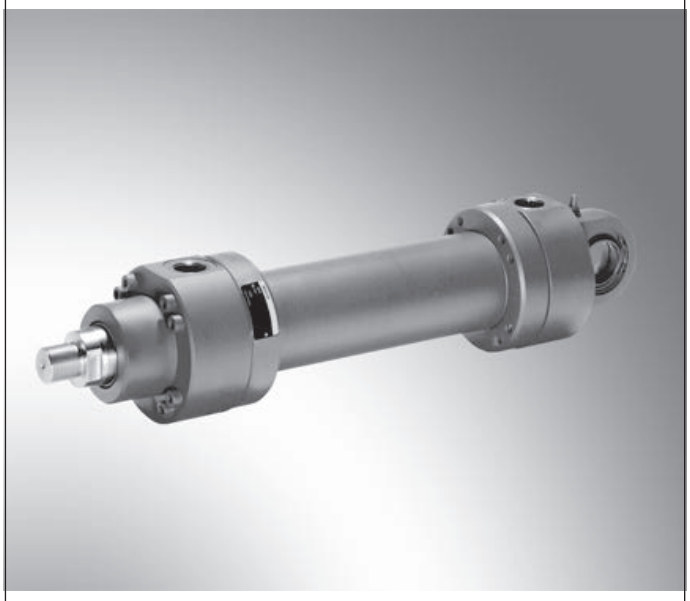
Цилиндры

Технические характеристики

rexroth
A Bosch Company

Hydraulic cylinder
Mill type

Series CDH1 / CGH1 / CSH1



H4646_d

- Component series 3X
- Nominal pressure 250 bar (25 MPa)

Features

- 6 types of mounting
- Piston Ø (**ØAL**): 40 to 320 mm
- Piston rod Ø (**ØMM**): 22 to 220 mm
- Stroke lengths up to 6 m
- Self-adjusting and adjustable end position cushioning
- IO-Link interface, optional

Contents

Ordering code series CDH1

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CD	**H1**		/		/		/		**A**	**3X**	/								

01	Differential cylinder	**CD**
02	Series	**H1**

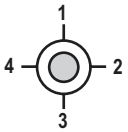
Types of mounting

03	Swivel eye at base	**MP3** [1)]
	Self-aligning clevis at base	**MP5**
	Round flange at head	**MF3**
	Round flange at base	**MF4**
	Trunnion mounting	**MT4** [2)]
	Foot mounting	**MS2**
04	Piston Ø (ØAL) **40 ... 320** mm	
05	Piston rod Ø (ØMM) **22 ... 220** mm	
06	Stroke length in mm [3)]	
07	Design principle: Head and base flanged	**A**
08	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

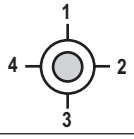
Line connection / version

09	According to ISO 1179-1 (pipe thread ISO 228-1)	**B**
	According to ISO 9974-1 (metric thread ISO 261)	**M**
	Flange hole pattern according to ISO 6162-2 tab. 2 type 1 (≙SAE 6000 PSI)	**D** [4; 9)]
	Flange hole pattern according to ISO 6164 tab. 2	**H** [4)]
	According to ISO 1179-1 (pipe thread ISO 228-1) with flat pipe flange	**C** [31)]
	With mounted control block	**Y** [38)]
	for directional and control valves	
	Subplate NG6	**P** [4; 5)]
	Subplate NG10	**T** [4; 6)]
	Subplate NG16	**U** [4; 7)]
	Subplate NG25	**V** [4; 8)]
	for SL and SV valves	
	Subplate NG6	**A** [4; 5; 15)]
	Subplate NG10	**E** [4; 6; 15)]
	Subplate NG20	**L** [4; 7; 15)]
	Subplate NG30	**N** [4; 8; 15)]

Line connection / position at head

10	View to piston rod [30)]		**1** **2** **3** **4**

Line connection/position at base

11	View to piston rod [30)]		**1** **2** [34)] **3** **4** [34)]

Ordering code series CDH1

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CD	**H1**		/		/		/		**A**	**3X**	/								

Piston rod design

12	Hard chromium-plated	**C**
	Hardened and hard chromium-plated [12)]	**H**
	Nickel-plated and hard chromium-plated [19)]	**N**

Piston rod end

13	Thread for swivel head CGAS	**A**
	Thread for swivel head CGA, CGAK, plain clevis CSA	**G** [13)]
	With mounted swivel head CGAS	**S**
	With mounted swivel head CGA	**L** [13)]
	With mounted swivel head CGAK	**M** [13)]
	With mounted plain clevis CSA	**N** [1)]

End position cushioning

14	Without	**U**
	Both sides, self-adjusting	**D** [1)]
	Both sides, adjustable	**E**
	Base sides, self-adjusting	**K** [1; 38)]
	Head sides, self-adjusting	**S** [1; 38)]

Seal design - observe selection criteria for seals, see page 71

15	**For mineral oil HL, HLP and HFA**	
	Standard seal system	**M**
	Standard seal system with guide rings	**L**
	Reduced friction, heavy industry	**R**
	For mineral oil HL, HLP, HFA and water glycol HFC	
	Standard seal system HFC	**G** [40)]
	Servo quality / reduced friction	**T**
	Chevron seal kits	**A**
	For HDFR phosphate ester and HFDU polyol ester	
	Servo quality / reduced friction	**S**
	Standard seal system FKM	**V** [40)]
	Chevron seal kits	**B** [39)]

Option

16	**Without** additional options, do **not** fill fields for additional options	**W**
	Additional options, fill fields for additional options	**Z**

Ordering code series CDH1 (fields for additional options)

	01	02	03	04	05	06	07	08
Z								

01	Without inductive proximity switches	**W**
	Inductive proximity switches **without** mating connector - separate order, see page 49	**E** 37)
02	Without additional guide rings	**W**
	Additional guide rings	**F** 10), 28)
03	Without measuring coupling	**W**
	Measuring coupling, on both sides	**A**
	Measuring coupling, on both sides, stainless steel version	**E** 38)
04	Standard grease nipples, DIN 71412 form A	**W**
	Spherical bearing, maintenance-free	**A** 14), 35)
	Flat type grease nipples, DIN 3404 form A	**B**
05	Without piston rod extension	**W**
	Specify the piston rod extension LY in the plain text in mm	**Y**
06	Priming class CP3	**W**
	Painting class CP4	**B** 21)
	Painting class CP5	**L** 21)
	Painting class CP6	**U** 21)
	Painting class CP7	**E** 21)
07	Without oil filling	**W**
	With corrosion protection oil VG 68	**F**
08	Without test certificate	**W**
	With certificate of compliance 2.1 based on EN 10204	**B**
	With acceptance test certificate 3.1 based on EN 10204	**C**

Order examples:

Without additional options: CDH1MP5/100/56/300A3X/B11CADMW

With additional options: CDH1MP5/100/56/300A3X/B11CADMZEWABWWWW

1) Only piston Ø 40 to 200 mm
2) Trunnion position freely selectable. When ordering, always specify the "XV" dimensions in the plain text in mm
3) Observe the max. available stroke length page 14 and admissible stroke length (acc. to buckling calculation) page 65 to 67
4) Not possible with MF4
5) Piston Ø 40 to 80 mm, only position 11, subplates only possible in combination with line connection "B" at the head
6) Piston Ø 63 to 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
7) Piston Ø 125 to 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
8) Piston Ø 160 to 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
9) Only piston Ø 80 to 320 mm
10) Seal designs A, B not possible;
Piston Ø 220 to 320 mm standard
12) Only piston rod Ø 22 to 140 mm
13) Not with piston Ø 320 mm
14) Not possible with plain clevis "N"
15) Subplates for SL and SV valves (check valves)
Please note: Seal designs T, G, L, R, S and V are not designed for static hold function!
19) From piston Ø 63 mm
21) Specify RAL color in the plain text
28) Standard with seal design "L"
30) All graphical pictures in the data sheet show position 1
31) With MS2, only position 11 is possible
34) With MF4 and line connection B, M or C not possible
35) Not possible with MP3
37) Min. stroke length = 20 mm
38) On request
39) Not with piston rod Ø 22 mm
40) Not with piston rod Ø 220 mm

Ordering code series CGH1

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CG	**H1**		/		/		/		**A**	**3X**	/								

01	Double-rod cylinder	**CG** [18]
02	Series	**H1**

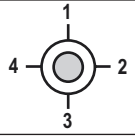
Types of mounting

03	Round flange at head	**MF3**
	Trunnion mounting	**MT4** [2]
	Foot mounting	**MS2**
04	Piston Ø (ØAL) **40 ... 320** mm	
05	Piston rod Ø (ØMM) **22 ... 220** mm	
06	Stroke length in mm [3]	
07	Design principle: Head and base flanged	**A**
08	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

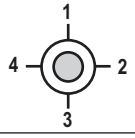
Line connection / version

09	According to ISO 1179-1 (pipe thread ISO 228-1)	**B**
	According to ISO 9974-1 (metric thread ISO 261)	**M**
	Flange hole pattern according to ISO 6162-2 tab. 2 type 1 (≙SAE 6000 PSI)	**D** [9]
	Flange hole pattern according to ISO 6164 tab. 2	**H**
	According to ISO 1179-1 (pipe thread ISO 228-1) with flat pipe flange	**C** [31]
	With mounted control block	**Y** [38]

Line connection / position at head

10	View to piston rod [30] 	**1**
		2
		3
		4

Line connection/position at base

11	View to piston rod [30] 	**1**
		2
		3
		4

☞ **Notice:** Preferred types and standard units are contained in the EPS (standard price list).

Ordering code series CGH1

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CG	**H1**		**/**		**/**		**/**		**A**	**3X**	**/**								

Piston rod design

12	Hard chromium-plated	**C**
	Hardened and hard chromium-plated	**H** [12)]

Piston rod end

13	Thread for swivel head CGAS	**A**
	Thread for swivel head CGA, CGAK, plain clevis CSA	**G** [13)]
	With mounted swivel head CGAS	**S** [17)]
	With mounted swivel head CGA	**L** [13), 17)]
	With mounted swivel head CGAK	**M** [13), 17)]
	With mounted plain clevis CSA	**N** [1), 17)]

End position cushioning

14	Without	**U**
	Both sides, self-adjusting	**D** [1)]
	Both sides, adjustable	**E**

Seal design - observe selection criteria for seals, see page 71

15	**For mineral oil HL, HLP and HFA**	
	Standard seal system	**M**
	Standard seal system with guide rings	**L**
	Reduced friction, heavy industry	**R**
	For mineral oil HL, HLP, HFA and water glycol HFC	
	Standard seal system HFC	**G** [40)]
	Servo quality / reduced friction	**T**
	Chevron seal kits	**A**
	For HDFR phosphate ester and HFDU polyol ester	
	Servo quality / reduced friction	**S**
	Standard seal system FKM	**V** [40)]
	Chevron seal kits	**B** [39)]

Option

16	**Without** additional options, do **not** fill fields for additional options	**W**
	Additional options, fill fields for additional options	**Z**

Ordering code series CGH1 (fields for additional options)

Z

01	02	03	04	05	06	07	08

01	Without inductive proximity switches	**W**
	Inductive proximity switches **without** mating connector - separate order, see page 49	**E** 37)
02	Without additional guide rings	**W**
	Additional guide rings	**F** 10), 28)
03	Without measuring coupling	**W**
	Measuring coupling, on both sides	**A**
	Measuring coupling, on both sides, stainless steel version	**E** 38)
04	Standard grease nipples, DIN 71412 form A	**W**
	Spherical bearing, maintenance-free	**A** 14)
	Flat type grease nipples, DIN 3404 form A	**B**
05	Without piston rod extension	**W**
	Specify the piston rod extension LY in the plain text in mm	**Y** 16)
06	Priming class CP3	**W**
	Painting class CP4	**B** 21)
	Painting class CP5	**L** 21)
	Painting class CP6	**U** 21)
	Painting class CP7	**E** 21)
07	Without oil filling	**W**
	With corrosion protection oil VG 68	**F**
08	Without test certificate	**W**
	With certificate of compliance 2.1 based on EN 10204	**B**
	With acceptance test certificate 3.1 based on EN 10204	**C**

Order examples:

Without additional options: CGH1MF3/100/56/300A3X/B11CADMW

With additional options: CGH1MF3/100/56/300A3X/B11CADMZEWABWWWW

1) Only piston Ø 40 to 200 mm
2) Trunnion position freely selectable. When ordering, always specify the "XV" dimensions in the plain text in mm
3) Observe the max. available stroke length page 14 and admissible stroke length (acc. to buckling calculation) page 65 to 67
9) Only piston Ø 80 to 320 mm
10) Seal designs A, B not possible; Piston Ø 220 to 320 mm standard
12) Only piston rod Ø 22 to 140 mm
13) Not with piston Ø 320 mm
14) Not possible with plain clevis "N"
16) Only at left piston rod side (orientation: catalog figures)
17) Only one swivel head / plain clevis mounted, left piston rod side (orientation: catalog figures)
18) Not standardized
21) Specify RAL color in the plain text
28) Standard with seal design "L"
30) All graphical pictures in the data sheet show position 1
31) With MS2, only position 11 is possible
37) Min. stroke length = 20 mm
38) On request
39) Not with piston rod Ø 22 mm
40) Not with piston rod Ø 220 mm

Ordering code series CSH1

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CS	**H1**		/		/		/		**A**	**3X**	/								

01	Differential cylinder with position measurement system	**CS** 18)
02	Series	**H1**

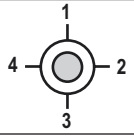
Types of mounting

03	Swivel eye at base	**MP3** 1)
	Self-aligning clevis at base	**MP5**
	Round flange at head	**MF3**
	Round flange at base	**MF4**
	Trunnion mounting	**MT4** 2)
	Foot mounting	**MS2**
04	Piston Ø (ØAL) **40 ... 320** mm	
05	Piston rod Ø (ØMM) **28 ... 220** mm	
06	Stroke length in mm 3)	
07	Design principle: Head and base flanged	**A**
08	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

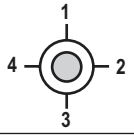
Line connection / version

09	According to ISO 1179-1 (pipe thread ISO 228-1)	**B**
	According to ISO 9974-1 (metric thread ISO 261)	**M**
	Flange hole pattern according to ISO 6162-2 tab. 2 type 1 (≙SAE 6000 PSI)	**D** 4); 9)
	Flange hole pattern according to ISO 6164 tab. 2	**H** 4)
	According to ISO 1179-1 (pipe thread ISO 228-1) with flat pipe flange	**C** 31)
	With mounted control block	**Y** 38)
	– For directional and control valves	
	Subplate NG6	**P** 4); 5)
	Subplate NG10	**T** 4); 6)
	Subplate NG16	**U** 4); 7)
	Subplate NG25	**V** 4); 8)
	– For SL and SV valves	
	Subplate NG6	**A** 4); 5); 15)
	Subplate NG10	**E** 4); 6); 15)
	Subplate NG20	**L** 4); 7); 15)
	Subplate NG30	**N** 4); 8); 15)

Line connection / position at head

10	View to piston rod 30)		**1** **2** **3** **4**

Line connection/position at base

11	View to piston rod 30)		**1** **2** 34) **3** **4** 34)

Ordering code series CSH1

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CS	**H1**		**/**		**/**		**/**		**A**	**3X**	**/**								**Z**

Piston rod design

12	Hard chromium-plated	**C**
	Hardened and hard chromium-plated	**H** [19)]

Piston rod end

13	Thread for swivel head CGAS	**A**
	Thread for swivel head CGA, CGAK, plain clevis CSA	**G** [13)]
	With mounted swivel head CGAS	**S**
	With mounted swivel head CGA	**L** [13)]
	With mounted swivel head CGAK	**M** [13)]
	With mounted plain clevis CSA	**N** [1)]

End position cushioning

14	Without	**U**
	Both sides, adjustable	**E** [20)]

Seal design - observe selection criteria for seals, see page 71

15	**For mineral oil HL, HLP and HFA**	
	Standard seal system	**M** [29)]
	Standard seal system with guide rings	**L**
	Reduced friction, heavy industry	**R** [29)]
	For mineral oil HL, HLP, HFA and water glycol HFC	
	Standard seal system HFC	**G** [29; 41)]
	Servo quality / reduced friction	**T** [29)]
	For HDFR phosphate ester and HFDU polyol ester	
	Servo quality / reduced friction	**S** [29)]
	Standard seal system FKM	**V** [29; 41)]

Option

16	**Additional** options, fill fields for additional options	**Z**

Ordering code series CSH1 (fields for additional options)

Z

01	02	03	04	05	06	07	08
T							

01	Position measurement system (magnetostrictive) **without** mating connector - separate order, see page 53, 55, 56 and 58	**T**
02	Analog output 4 ... 20 mA	**C**
	Analog output 0 ... 10 V	**F**
	Digital output SSI (resolution 5 µm, asynchronious forward)	**D**
	Digital output SSI (resolution 1 µm, synchronious forward)	**S**
	Profibus D63 (integrated supply)	**N**
	Profibus D53 (separate supply line)	**P**
	IO-Link	**L** [39); 40)]
	Profinet RT and IRT with encoder profile	**R**
03	Without measuring coupling	**W**
	Measuring coupling, on both sides	**A**
	Measuring coupling, on both sides, stainless steel version	**E** [38)]
04	Standard grease nipples, DIN 71412 form A	**W**
	Spherical bearing, maintenance-free	**A** [14); 35)]
	Flat type grease nipples, DIN 3404 form A	**B**
05	Without piston rod extension	**W**
	Specify the piston rod extension LY in the plain text in mm	**Y**
06	Priming class CP3	**W**
	Painting class CP4	**B** [21)]
	Painting class CP5	**L** [21)]
	Painting class CP6	**U** [21)]
	Painting class CP7	**E** [21)]
07	Without oil filling	**W**
	With corrosion protection oil VG 68	**F**
08	Without test certificate	**W**
	With certificate of compliance 2.1 based on EN 10204	**B**
	With acceptance test certificate 3.1 based on EN 10204	**C**

Order examples:

With additional options: CSH1MP5/100/56/300A3X/T11CAEMZTCAWWWWW

1) Only piston Ø 40 to 200 mm
2) Trunnion position freely selectable. When ordering, always specify the "XV" dimensions in the plain text in mm
3) Observe the max. available stroke length page 14 and admissible stroke length (acc. to buckling calculation) page 65 to 67
4) Not possible with MF4
5) Piston Ø 40 to 80 mm, only position 11, subplates only possible in combination with line connection "B" at the head
6) Piston Ø 63 to 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
7) Piston Ø 125 to 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
8) Piston Ø 160 to 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
9) Only piston Ø 80 to 320 mm
13) Not with piston Ø 320 mm
14) Not possible with plain clevis "N"
15) Subplates for SL and SV valves (check valves)
Please note: Seal designs T, G, L, R, S and V are not designed for static hold function!
18) Not standardized
19) Only piston rod Ø 28 to 140 mm
20) Possible from piston rod Ø 45 mm
21) Specify RAL color in the plain text
29) With CSH, by default with guide rings
30) All graphical pictures in the data sheet show position 1
31) With MS2, only position 11 is possible
34) With MF4 and line connection B, M or C not possible
35) Not possible with MP3
38) On request
39) Not possible with MP3 and MP5
40) Observe min. stroke length 50 mm / max. stroke length 2540 mm
41) Not with piston rod Ø 220 mm

Technical data

(For applications outside these values, please consult us!)

Standards:
Bosch Rexroth standard; main dimensions like piston Ø and piston rod Ø correspond to ISO 3320.

Nominal pressure: 250 bar
Static test pressure: 375 bar
Reduced test pressure 315 bar
The maximum operating pressures must be less than or equal to the applicable nominal pressures and apply to applications with shock-free operation with reference to excess pressure and/or external loads. With extreme loads like e.g. high cycle sequence, mounting elements and threaded piston rod connections must be designed for durability.

Minimum pressure:
Depending on the application, operating conditions and technical design, a certain minimum pressure (approx. 10 bar)
is required in order to guarantee a technically perfect function of the hydraulic cylinder.

Installation position: arbitrary

Hydraulic fluid (additional data sheet):
Mineral oils DIN 51524 HL, HLP (90220)
Oil-in-water emulsion HFA (90223)
Water glycol HFC (90223)
Phosphate ester HFDR (90222)
Polyol ester HFDU (90222)

Hydraulic fluid temperature range: see page 71
Ambient temperature range: see page 71
Optimum viscosity range: 20 to 100 mm^2/s
Minimum admissible viscosity: 12 mm^2/s
Maximum admissible viscosity: 380 mm^2/s

Cleanliness class acc. to ISO
Maximum admissible degree of contamination of the hydraulic fluid according to ISO 4406 (c) class 20/18/15. The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.

Bleeding by default secured against unscrewing

Color set-up:
Priming: By default, hydraulic cylinders are primed with a coating (color gentian blue RAL 5010) of min. 40 µm, see page 83.
Other colors on request.
Following surfaces of cylinders and attached parts are not primed:
- All fitting diameters to the customer side
- Sealing surfaces for line connection
- Sealing surfaces for flange connection
- Connection surface for valve mounting
- Inductive proximity switches
- Position measurement system
- Measuring coupling
- Spherical / plain bearing
- Grease nipples

Painting: By default, hydraulic cylinders can be ordered in four corrosivity categories in the RAL colors, see page 83.
Following surfaces of cylinders and attached parts are not painted:
- All fitting diameters and connection surfaces to customer side
- Sealing surfaces for line connection
- Sealing surfaces for flange connection
- Connection surface for valve mounting
- Inductive proximity switches
- Position measurement system
- Measuring coupling
- Spherical / plain bearing
- Grease nipples

Surfaces not primed or painted are protected with solvent-free corrosion protection compound.
Accessories ordered as a separate order item are not primed or painted by default. Corresponding priming and/or painting on request.

Technical data

(For applications outside these values, please consult us!)

Stroke velocity:

Please observe the guideline on max. stroke velocities (with recommended flow velocity of 5 m/s in the line connection) in the table. Higher stroke velocity on request. If the extension velocity is considerably higher than the retraction velocity of the piston rod, drag-out losses of the medium may result. If necessary, please consult us.

Piston Ø (mm)	Line connection	Max. stroke velocity in m/s
40	G1/2	0.31
50	G1/2	0.20
63	G3/4	0.28
80	G3/4	0.18
100	G1	0.20
125	G1 1/4	0.20
140	G1 1/4	0.16
160	G1 1/2	0.18
180	G1 1/2	0.14
200	G1 1/2	0.11
220	G1 1/2	0.09
250	G1 1/2	0.07
280	G1 1/2	0.06
320	G1 1/2	0.04

Boundary and application conditions:

- The mechanical alignment of the movement axis and thus the mounting points of hydraulic cylinder and piston rod must be ensured. Lateral forces on the guides of piston rod and piston are to be avoided. It may be necessary to consider the own weight of the hydraulic cylinder (MP3 / MP5 or MT4) or the piston rod.
- The bending length/bending load of the piston rod and/or the hydraulic cylinder must be observed (see page topic Bucklig).
- The maximum admissible stroke velocities with regard to the suitability/load of seals must be observed as must their compatibility with the properties of the hydraulic fluid (see page topic Seals).
- The maximum admissible velocities/kinetic energies when moving into the end positions, also considering external loads, must be observed.
  Danger: Excess pressure
- The maximum admissible operating pressure must be complied with in any operating state of the hydraulic cylinder. Possible pressure intensification resulting from the area ratio of annulus area to piston area and possible throttling points are to be observed.
- Detrimental environmental influences, like e.g. aggressive finest particles, vapors, high temperatures, etc. as well as contaminations and deterioration of the hydraulic fluid are to be avoided.

Notice:

- This list does not claim to be complete. In case of questions regarding the compatibility with the medium or exceedance of the boundary or application conditions, please contact us.
- All graphical pictures in the data sheet are examples. The product supplied may therefore differ from the figure shown.

Technical data

(For applications outside these values, please consult us!)

Acceptance:
Every hydraulic cylinders is tested according to Bosch Rexroth standards and following ISO 10100:2020 with module L.

Safety instructions:
For assembly, commissioning and maintenance of hydraulic cylinders, observe the operating instructions 07100-B! Service and repair work has to be performed by Bosch Rexroth AG or by personnel especially trained for this purpose. No warranty is accepted for damage as a consequence of assembly, maintenance or repair work not performed by Bosch Rexroth AG.

Check lists for hydraulic cylinders:
Cylinders the characteristics and/or application parameters of which deviate from the values specified in the data sheet can only be offered as a special version on request. For offers, the deviations of the characteristics and / or application parameters must be described in the check lists for hydraulic cylinders (07200).

Minimum strokes:
When using end position cushioning, the minimum stroke must also be observed, see page 68
"End position cushioning".

Project planning software ICS (Interactive Catalog System)

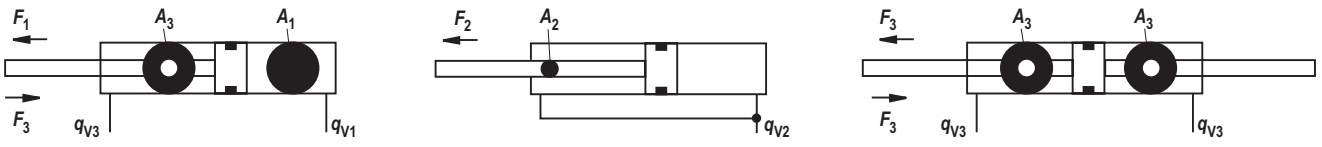
The ICS (Interactive Catalog System) is a selection and project planning aid for hydraulic cylinders. The ICS allows designers for machines and systems to quickly and reliably find the perfect hydraulic cylinder solution through logic-guided type key enquiries. This software helps to solve design and project planning tasks more quickly and efficiently. After having been guided through the product selection, the user quickly and reliably gets the exact technical data of the selected component as well as 3D CAD data in the correct file format for all common CAD systems. This allows users to reduce costs while increasing their competitiveness.

Technical data

(For applications outside these values, please consult us!)

Diameters, areas, forces, flow

Piston	Piston rod	Area ratio	Areas			Force at 250 bar [1]			Flow at 0.1 m/s [2]			Max. available stroke length
			Piston	Rod	Ring	Pressure	Diff.	Pulling	Off	Diff.	On	
ØAL mm	ØMM mm	ϕ A_1/A_3	A_1 cm²	A_2 cm²	A_3 cm²	F_1 kN	F_2 kN	F_3 kN	q_{V1} l/min	q_{V2} l/min	q_{V3} l/min	mm
40	**22**	1.43	12.56	3.80	8.76	31.40	9.50	21.90	7.5	2.3	5.3	2000
	28	1.96		6.16	6.40		15.40	16.00		3.7	3.8	
50	**28**	1.46	19.63	6.16	13.47	49.10	15.40	33.70	11.8	3.7	8.1	2000
	36	2.08		10.18	9.45		25.45	23.65		6.1	5.7	
63	**36**	1.48	31.17	10.18	20.99	77.90	25.45	52.45	18.7	6.1	12.6	2000
	45	2.04		15.90	15.27		39.75	38.15		9.5	9.2	
80	**45**	1.46	50.26	15.90	34.36	125.65	39.75	85.90	30.2	9.5	20.7	2000
	56	1.96		24.63	25.63		61.55	64.10		14.8	15.4	
100	**56**	1.46	78.54	24.63	53.91	196.35	61.55	134.80	47.1	14.8	32.3	3000
	70	1.96		38.48	40.06		96.20	100.15		23.1	24.0	
125	**70**	1.46	122.72	38.48	84.24	306.75	96.20	210.55	73.6	23.1	50.5	3000
	90	2.08		63.62	59.10		159.05	147.70		38.2	35.4	
140	**90**	1.70	153.94	63.62	90.32	384.75	159.05	225.70	92.4	38.2	54.2	3000
	100	2.04		78.54	75.40		196.35	188.40		47.1	45.3	
160	**100**	1.64	201.06	78.54	122.50	502.50	196.35	306.15	120.6	47.1	73.5	3000
	110	1.90		95.06	106.00		237.65	264.85		57.0	63.6	
180	**110**	1.60	254.47	95.06	159.43	636.17	237.65	398.52	152.7	57.0	95.7	3000
	125	1.93		122.72	131.75		306.80	329.37		73.6	79.1	
200	**125**	1.64	314.16	122.72	191.44	785.25	306.80	478.45	188.5	73.6	114.9	3000
	140	1.96		153.96	160.20		384.90	400.35		92.4	96.1	
220	**140**	1.68	380.1	153.9	226.2	950.3	384.8	565.5	228.1	92.4	135.7	6000
	160	2.12		201.0	179.1		502.6	447.7		120.7	107.4	
250	**160**	1.69	490.8	201.0	289.8	1227.2	502.7	724.5	294.5	120.7	173.8	6000
	180	2.08		254.4	236.4		636.2	591.0		152.7	141.8	
280	**180**	1.70	615.7	254.4	361.3	1539.4	636.2	903.2	369.4	152.7	216.7	6000
	200	2.04		314.1	301.6		785.4	753.9		188.5	180.9	
320	**200**	1.64	804.2	314.1	490.1	2010.6	785.4	1225.2	482.5	188.5	294.0	6000
	220	1.90		380.1	424.2		950.3	1060.3		228.1	254.4	



[1] Theoretical static cylinder force (without consideration of the efficiency and admissible load for attachment parts such as swivel heads, plates, or valves, etc.)

[2] Stroke velocity

Technical data

(For applications outside these values, please consult us!)

Tolerances according to DIN ISO 6022

Installation dimensions	WC	XC [2]	XO [2]	XS [1; 2]	XV [2]	ZP [2]	
Type of mounting	MF3	MP3	MP5	MS2	MT4	MF4	Stroke tolerances [3]
Stroke length	Tolerances						
≤ 1250	±2	±1.5	±1.5	±2	±2	±1.5	+2
> 1250 – ≤ 3150	±4	±3	±3	±4	±4	±3	+5
> 3150 – ≤ 6000	±8	±5	±5	±8	±8	±5	+8

1) Not standardized

2) Including stroke length

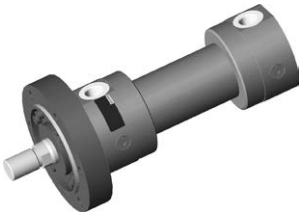
3) Stroke tolerances must not be added to the tolerances listed in this table.

Overview types of mounting: Series CDH1 / CGH1

CDH1 MP3; see page 18, 19

CDH1 MP5; see page 20, 21

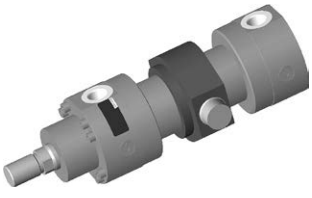
CDH1 MF3; see page 22, 23



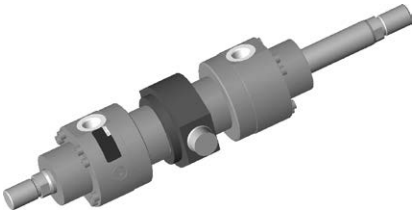
CGH1 MF3; see page 22, 23

CDH1 MF4; see page 24, 25

CDH1 MT4; see page 26, 27

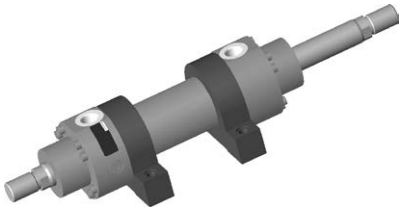


CGH1 MT4; see page 26, 27



CDH1 MS2; see page 28, 29

CGH1 MS2; see page 28, 29



Overview types of mounting: Series CSH1

CSH1 MP3
see page 30, 31

CSH1 MP5
see page 32, 33

CSH1 MF3
see page 34, 35

CSH1 MF4
see page 36, 37

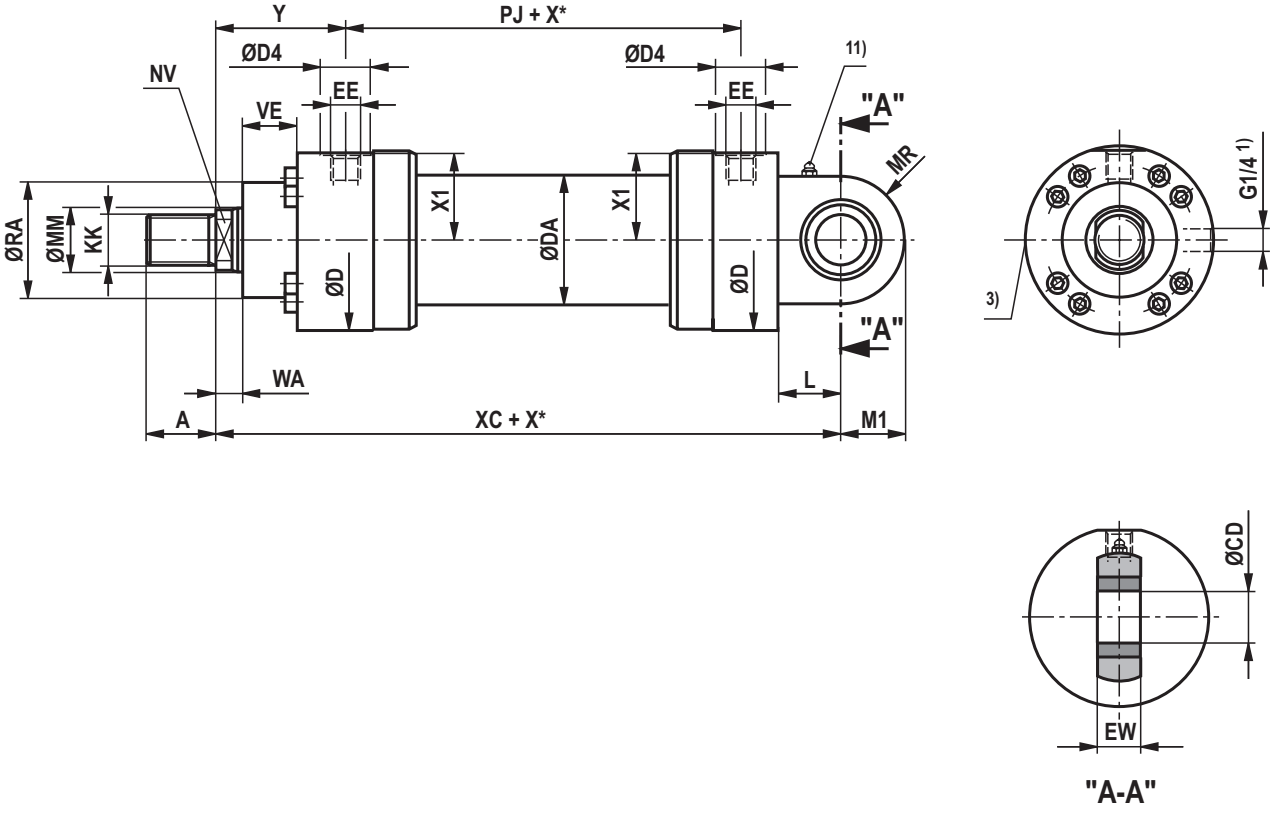
CSH1 MT4
see page 38, 39

CSH1 MS2
see page 40, 41

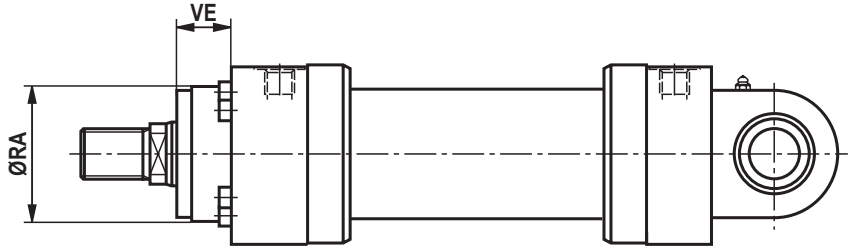
Dimensions

Swivel eye at base CDH1: MP3 (dimensions in mm)

CDH1 MP3; ØAL 40 - 200 mm



CDH1 MP3: with seal design "A", "B" and ØAL 160 - 200 mm



Dimensions

Swivel eye at base CDH1: MP3 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ
40	**22/28**	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120
50	**28/36**	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120
63	**36/45**	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133
80	**45/56**	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146
100	**56/70**	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171
125	**70/90**	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205
140	**90/100**	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219
160	**100/110**	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240
180	**110/125**	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264
200	**125/140**	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278

ØAL	ØMM	X1	WA	XC	L	MR	M1	ØCD H11	EW -0.4	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	**22/28**	41	14	252	32.5	31	28	25	23	52	40	52	20
50	**28/36**	48.5	18	265	37.5	36	32.5	30	28	65	40	65	16
63	**36/45**	56.5	22	302	45	42	40	35	30	75	45	75	17
80	**45/56**	67	20	330	50	52	50	40	35	95	45	95	13
100	**56/70**	82	30	385	60	65	62.5	50	40	115	55	115	20
125	**70/90**	99	32	447	70	70	70	60	50	135	60	135	17
140	**90/100**	109.5	35	490	75	82	82	70	55	155	70	155	22
160	**100/110**	129	40	550	85	95	95	80	60	200	80	200	80
180	**110/125**	142.5	40	610	90	113	113	90	65	220	90	220	90
200	**125/140**	152	40	645	115	125	125	100	70	235	95	235	95

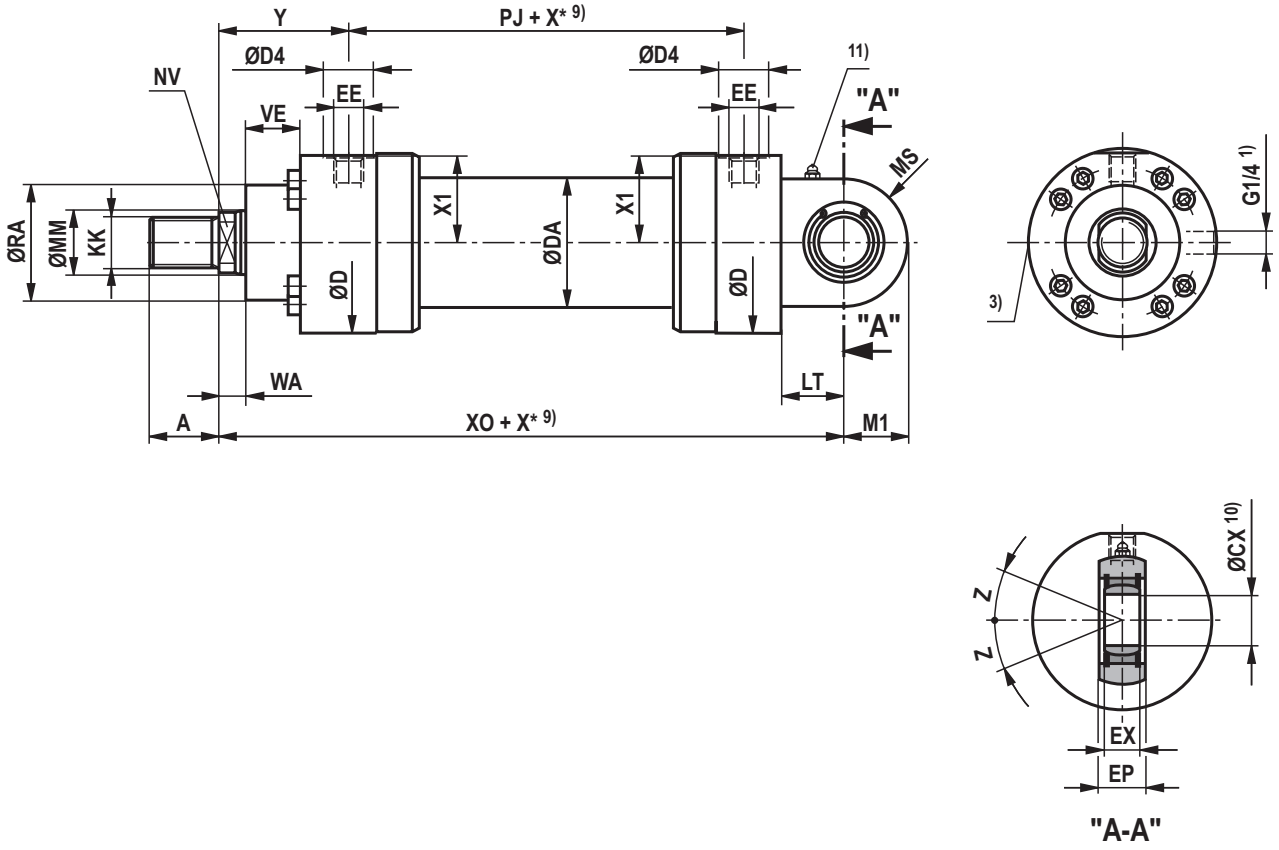
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
7) Dimensions for cylinders with seal design M, T, G, L, R, S and V
8) Dimensions for cylinders with seal design A and B
11) Standard version "W"
Grease nipple, cone head form A according to DIN 71412
16) Line connection "B" and "C"
17) Line connection "M"

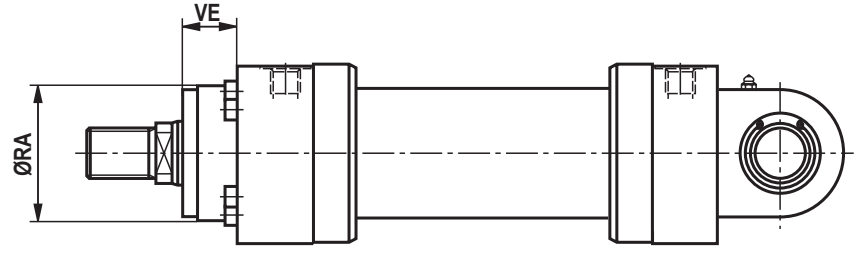
Dimensions

Self-aligning clevis at base CDH1: MP5 (dimensions in mm)

CDH1 MP5



CDH1 MP5: with seal design "A", "B" and ØAL 160 - 320 mm



Dimensions

Self-aligning clevis at base CDH1: MP5 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	C_0 18) kN
40	**22/28**	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	41	72
50	**28/36**	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48.5	106
63	**36/45**	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56.5	153
80	**45/56**	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67	250
100	**56/70**	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82	365
125	**70/90**	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99	400
140	**90/100**	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109.5	540
160	**100/110**	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129	670
180	**110/125**	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142.5	980
200	**125/140**	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152	1120
220	**140/160**	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174	1700
250	**160/180**	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194	1700
280	**180/200**	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210	2900
320	**200/220**	–	–	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	242	–

ØAL	ØMM	F_{adm} 19) kN	WA	XO	X* min	LT	M1	MS	ØCX	EP -0.4	EX	Z	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	**22/28**	25.9	14	252	–	32.5	28	31	$25_{-0.010}$	23	$20_{-0.12}$	7 °	52	40	52	20
50	**28/36**	38.2	18	265	–	37.5	32.5	36	$30_{-0.010}$	28	$22_{-0.12}$	6 °	65	40	65	16
63	**36/45**	55.1	22	302	–	45	40	42	$35_{-0.012}$	30	$25_{-0.12}$	6 °	75	45	75	17
80	**45/56**	90.0	20	330	–	50	50	52	$40_{-0.012}$	35	$28_{-0.12}$	7 °	95	45	95	13
100	**56/70**	131.4	30	385	–	60	62.5	65	$50_{-0.012}$	40	$35_{-0.12}$	6 °	115	55	115	20
125	**70/90**	144.0	32	447	–	70	70	70	$60_{-0.015}$	50	$44_{-0.15}$	6 °	135	60	135	17
140	**90/100**	194.4	35	490	–	75	82	82	$70_{-0.015}$	55	$49_{-0.15}$	6 °	155	70	155	22
160	**100/110**	241.2	40	550	–	85	95	95	$80_{-0.015}$	60	$55_{-0.15}$	6 °	200	80	200	80
180	**110/125**	352.8	40	610	–	90	113	113	$90_{-0.020}$	65	$60_{-0.20}$	5 °	220	90	220	90
200	**125/140**	403.2	40	645	–	115	125	125	$100_{-0.020}$	70	$70_{-0.20}$	7 °	235	95	235	95
220	**140/160**	612.0	40	750	–	125	150 12)	140 12)	$110_{-0.020}$	80	$70_{-0.20}$	6 °	270	115	270	115
250	**160/180**	612.0	40	789	–	140	168 12)	158 12)	$110_{-0.020}$	80	$70_{-0.20}$	6 °	300	125	300	125
280	**180/200**	1044.0	40	884	31	150	188 12)	178 12)	$120_{-0.020}$	90	$85_{-0.20}$	6 °	325	130	325	130
320	**200/220**	–	40	980	–	175	210 12)	200 12)	$140_{-0.020}$	110	$90_{-0.20}$	7 °	365	155	365	155

ØAL = piston Ø

ØMM = piston rod Ø

X* = stroke length

X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Throttle valve only with end position cushioning "E" (180° for bleeding)

4) Flange connections see separate table pages 42 and 43

5) Thread design "G"

6) Thread design "A"

7) Dimensions for cylinders with seal design M, T, G, L, R, S and V

8) Dimensions for cylinders with seal design A and B

9) Observe the min. stroke length "X*min"

10) Related bolt Ø m6;
Related bolt Ø j6 for maintenance-free spherical bearing

11) Standard version "W"
Grease nipple, cone head form A according to DIN 71412; not applicable to spherical bearing, maintenance-free "A"

12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting

16) Line connection "B" and "C"

17) Line connection "M"

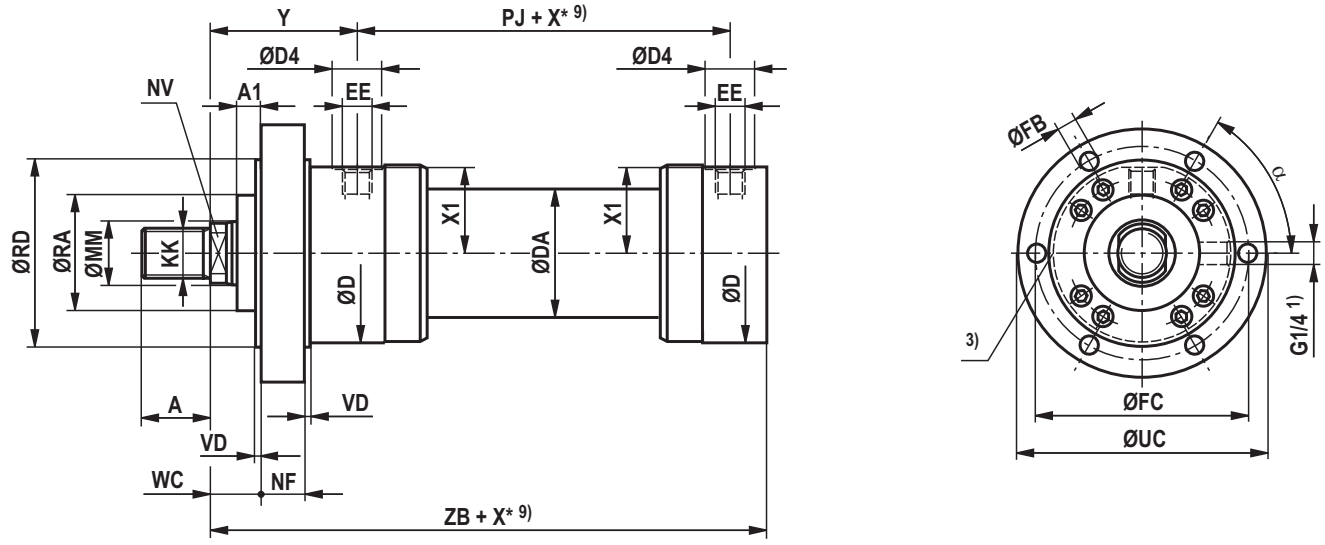
18) C_0 = static load rating of the swivel head

19) F_{adm} = max. admissible load of the swivel head with oscillatory or alternating loads

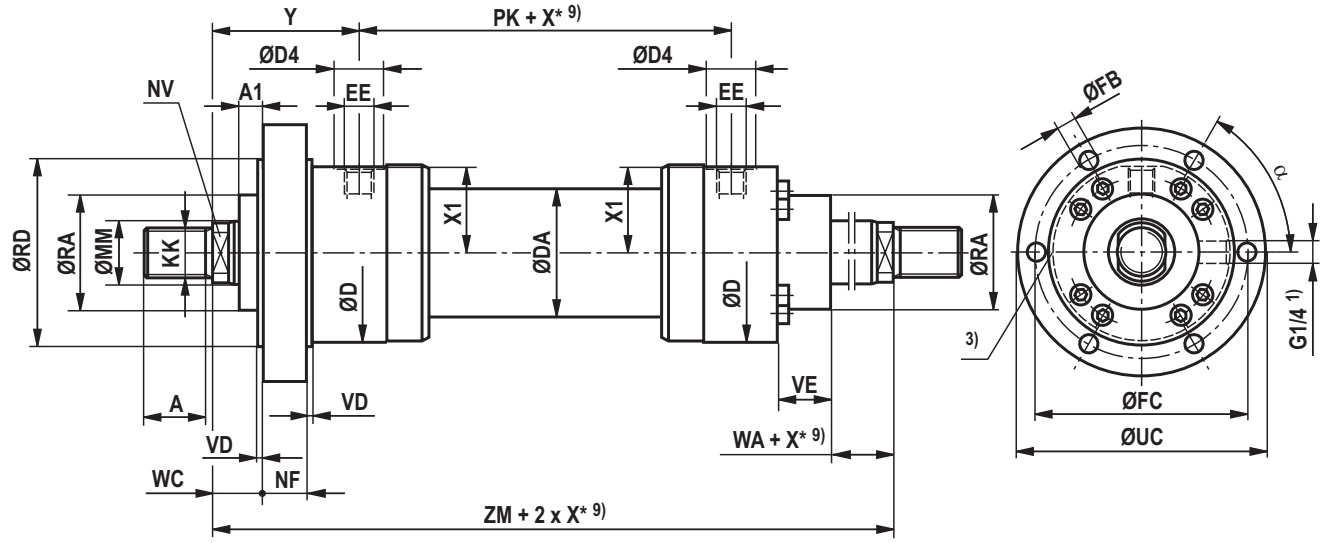
Dimensions

Round flange at head CDH1/CGH1: MF3 (dimensions in mm)

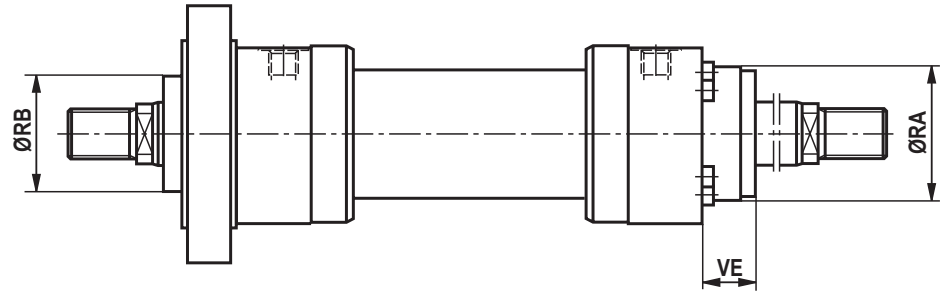
CDH1 MF3



CGH1 MF3



CGH1 MF3: with seal design "A", "B" and ØAL 160 - 320 mm



Dimensions

Round flange at head CDH1/CGH1: MF3 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1
40	**22/28**	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	41
50	**28/36**	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48.5
63	**36/45**	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56.5
80	**45/56**	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67
100	**56/70**	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82
125	**70/90**	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99
140	**90/100**	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109.5
160	**100/110**	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129
180	**110/125**	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142.5
200	**125/140**	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152
220	**140/160**	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174
250	**160/180**	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194
280	**180/200**	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210
320	**200/220**	–	–	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243

ØAL	ØMM	ØRD e8	WC	VD	NF	PK	A1	ZB	ZM	X* min	ØFB H13	ØFC js13	ØUC -1	α	WA	ØRA 7)	VE 7)	ØRA 8)	VE 8)	ØRB 8) max
40	**22/28**	90	19	5	30	120	0	226	278	–	9	108	130	60 °	14	52	40	52	20	–
50	**28/36**	110	23	5	30	120	0	233	294	–	11	130	160	60 °	18	65	40	65	16	–
63	**36/45**	130	27	5	35	133	0	262	333	–	13.5	155	185	60 °	22	75	45	75	17	–
80	**45/56**	145	25	5	35	146	0	280	354	–	13.5	170	200	60 °	20	95	45	95	13	–
100	**56/70**	175	35	5	45	171	0	330	419	–	17.5	205	245	60 °	30	115	55	115	20	–
125	**70/90**	210	37	5	50	205	0	382	475	–	22	245	295	60 °	32	135	60	135	17	–
140	**90/100**	230	45	10	50	219	0	420	531	–	22	265	315	60 °	35	155	70	155	22	–
160	**100/110**	275	50	10	60	240	0	475	610	–	30	325	385	60 °	40	200	80	200	80	–
180	**110/125**	300	50	10	70	264	0	515	662	–	30	360	420	60 °	40	220	90	220	90	–
200	**125/140**	320	50	10	75	278	0	535	688	–	33	375	445	60 °	40	235	95	235	95	–
220	**140/160**	370	60	10	85	326	20	635	810	–	33	430	490	60 °	40	270	115	270	115	270
250	**160/180**	415	70	10	85	326	30	659	858	–	39	485	555	60 °	40	300	125	300	125	300
280	**180/200**	450	65	10	95	375	25	744	939	31	39	520	590	60 °	40	325	130	325	130	325
320	**200/220**	510	65	10	120	431	25	815	1005	–	45	600	680	60 °	40	365	155	365	155	365

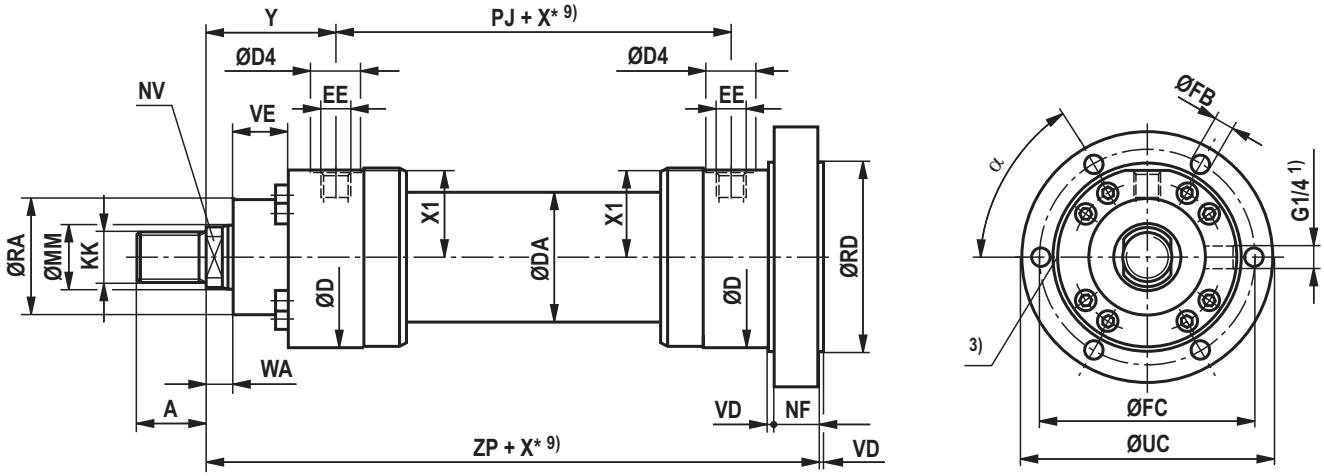
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
7) Dimensions for cylinders with seal design M, T, G, L, R, S and V
8) Dimensions for cylinders with seal design A and B
9) Observe the min. stroke length "X*min"
16) Line connection "B" and "C"
17) Line connection "M"

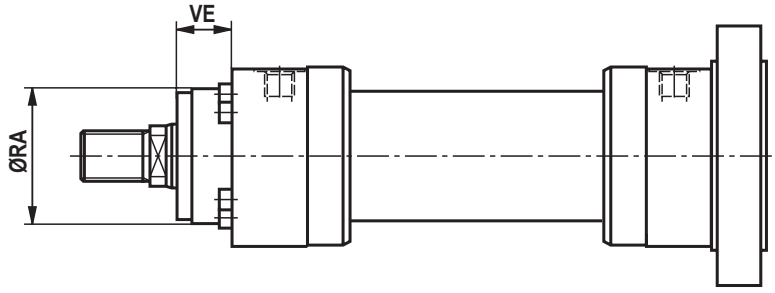
Dimensions

Round flange at base CDH1: MF4 (dimensions in mm)

CDH1 MF4



CDH1 MF4: with seal design "A", "B" and ØAL 160 - 320 mm



Dimensions

Round flange at base CDH1: MF4 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1
40	**22/28**	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	41
50	**28/36**	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48.5
63	**36/45**	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56.5
80	**45/56**	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67
100	**56/70**	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82
125	**70/90**	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99
140	**90/100**	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109.5
160	**100/110**	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129
180	**110/125**	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142.5
200	**125/140**	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152
220	**140/160**	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174
250	**160/180**	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194
280	**180/200**	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210
320	**200/220**	–	–	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243

ØAL	ØMM	WA	ZP	X* min	NF	VD	ØRD e8	ØFB H13	ØFC js13	ØUC -1	α	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	**22/28**	14	256	–	30	5	90	9	108	130	60 °	52	40	52	20
50	**28/36**	18	264	–	30	5	110	11	130	160	60 °	65	40	65	16
63	**36/45**	22	297	–	35	5	130	13.5	155	185	60 °	75	45	75	17
80	**45/56**	20	315	–	35	5	145	13.5	170	200	60 °	95	45	95	13
100	**56/70**	30	375	–	45	5	175	17.5	205	245	60 °	115	55	115	20
125	**70/90**	32	432	–	50	5	210	22	245	295	60 °	135	60	135	17
140	**90/100**	35	475	–	50	10	230	22	265	315	60 °	155	70	155	22
160	**100/110**	40	535	–	60	10	275	30	325	385	60 °	200	80	200	80
180	**110/125**	40	585	–	70	10	300	30	360	420	60 °	220	90	220	90
200	**125/140**	40	615	–	75	10	320	33	375	445	60 °	235	95	235	95
220	**140/160**	40	720	–	85	10	370	33	430	490	60 °	270	115	270	115
250	**160/180**	40	744	–	85	10	415	39	485	555	60 °	300	125	300	125
280	**180/200**	40	839	31	95	10	450	39	520	590	60 °	325	130	325	130
320	**200/220**	40	935	–	120	10	510	45	600	680	60 °	365	155	365	155

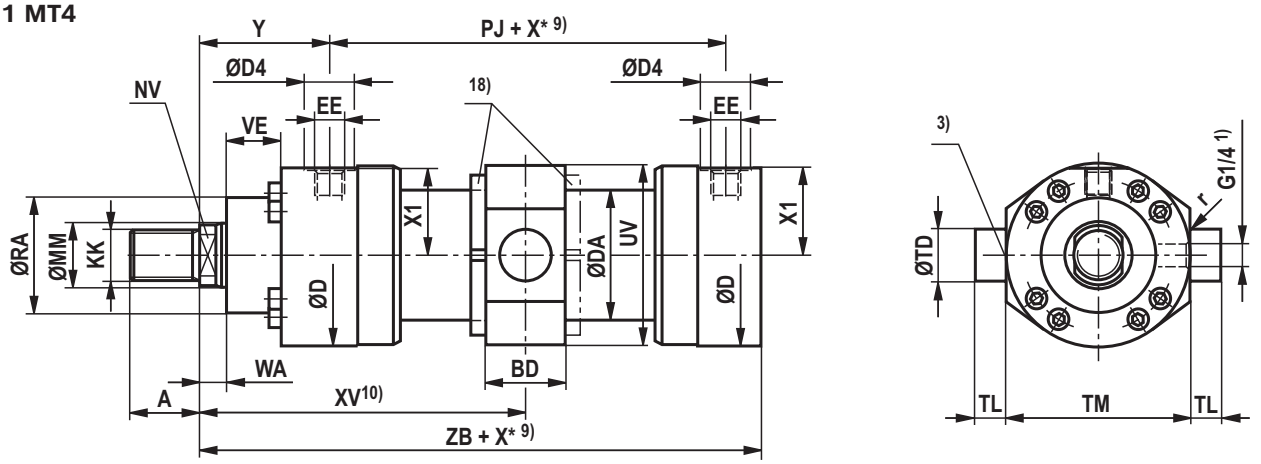
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning,observe the notice on page 68!

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
7) Dimensions for cylinders with seal design M, T, G, L, R, S and V
8) Dimensions for cylinders with seal design A and B
9) Observe the min. stroke length "X*min"
16) Line connection "B" and "C"
17) Line connection "M"

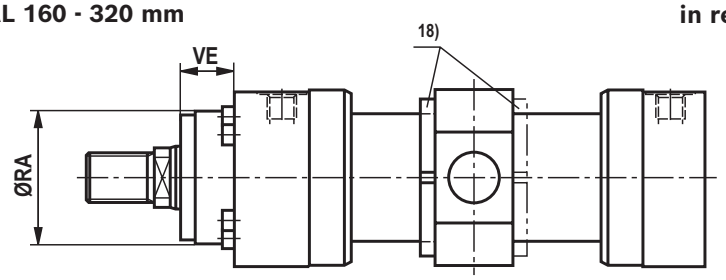
Dimensions

Trunnion mounting CDH1/CGH1: MT4 (dimensions in mm)

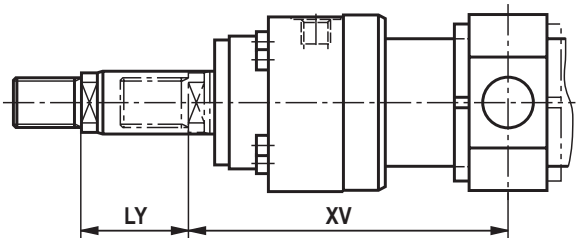
CDH1 MT4



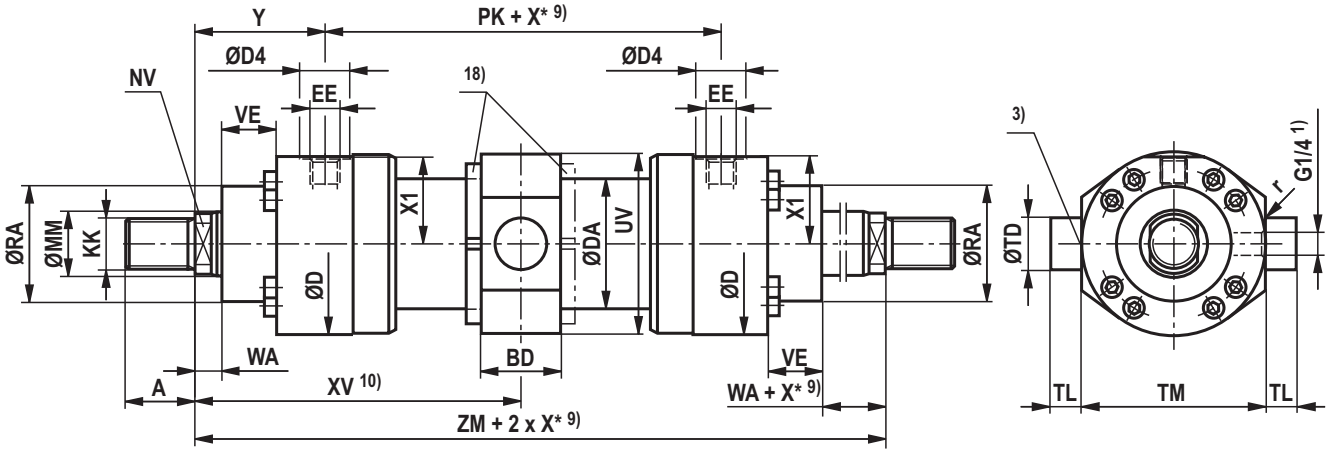
CDH1 MT4: with seal design "A", "B" and ØAL 160 - 320 mm



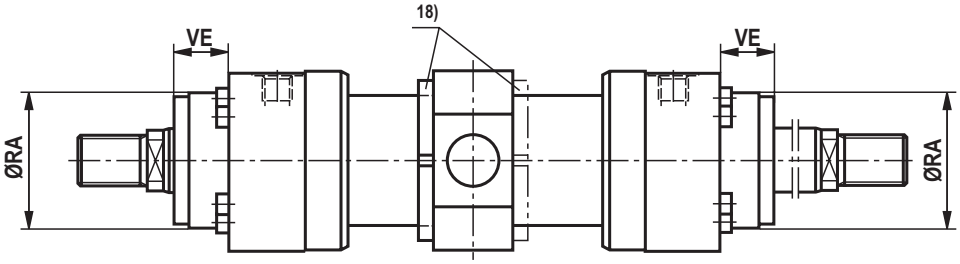
Dimensions for cylinder with piston rod extension "LY" in retracted condition



CGH1 MT4



CGH1 MT4: with seal design "A", "B" and ØAL 160 - 320 mm



☞ **Notice:** During installation, it must be ensured that the trunnion bearings are installed up to the trunnion shoulders. Any variation may reduce the product's service life.

Dimensions

Trunnion mountings CDH1/CGH1: MT4 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	WA
40	**22/28**	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	41	14
50	**28/36**	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48.5	18
63	**36/45**	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56.5	22
80	**45/56**	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67	20
100	**56/70**	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82	30
125	**70/90**	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99	32
140	**90/100**	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109.5	35
160	**100/110**	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129	40
180	**110/125**	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142.5	40
200	**125/140**	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152	40
220	**140/160**	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174	40
250	**160/180**	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194	40
280	**180/200**	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210	40
320	**200/220**	–	–	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243	40

ØAL	ØMM	PK	ZB	ZM	X* min	XV 11) cent	XV 10) min	XV 10) max	BD	UV 12)	ØTD e8	TL js16	TM h12	r	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	**22/28**	120	226	278	22	139+X*/2	150	136+X*	38	97	30	20	95	1.6	52	40	52	20
50	**28/36**	120	233	294	32	147+X*/2	163	140+X*	38	111	30	20	115	1.6	65	40	65	16
63	**36/45**	133	262	333	47	166.5+X*/2	190	155+X*	48	129	35	20	130	2	75	45	75	17
80	**45/56**	146	280	354	58	177+X*/2	206	160+X*	58	153	40	25	145	2	95	45	95	13
100	**56/70**	171	330	419	79	209.5+X*/2	249	185+X*	78	183	50	30	175	2	115	55	115	20
125	**70/90**	205	382	475	91	237.5+X*/2	283	192+X*	98	220	60	40	210	2.5	135	60	135	17
140	**90/100**	219	420	531	121	265.5+X*/2	326	205+X*	118	243	65	42.5	230	2.5	155	70	155	22
160	**100/110**	240	475	610	142	305+X*/2	376	234+X*	128	282	75	52.5	275	2.5	200	80	200	80
180	**110/125**	264	515	661	158	331+X*/2	410	252+X*	138	310	85	55	300	2.5	220	90	220	90
200	**125/140**	278	535	688	194	344+X*/2	441	247+X*	168	331	90	55	320	2.5	235	95	235	95
220	**140/160**	326	635	810	155	405+X*/2	482.5	327.5+X*	135	377	100	60	370	2.5	270	115	270	115
250	**160/180**	326	659	858	175	429+X*/2	516.5	341.5+X*	145	417	110	65	410	2.5	300	125	300	125
280	**180/200**	375	744	939	336	469.5+X*/2	637.5	301.5+X*	165	448	130	70	450	2.5	325	130	325	130
320	**200/220**	431	815	1005	180	502.5+X*/2	592.5	412.5+X*	195	513	160	90	510	2.5	365	155	365	155

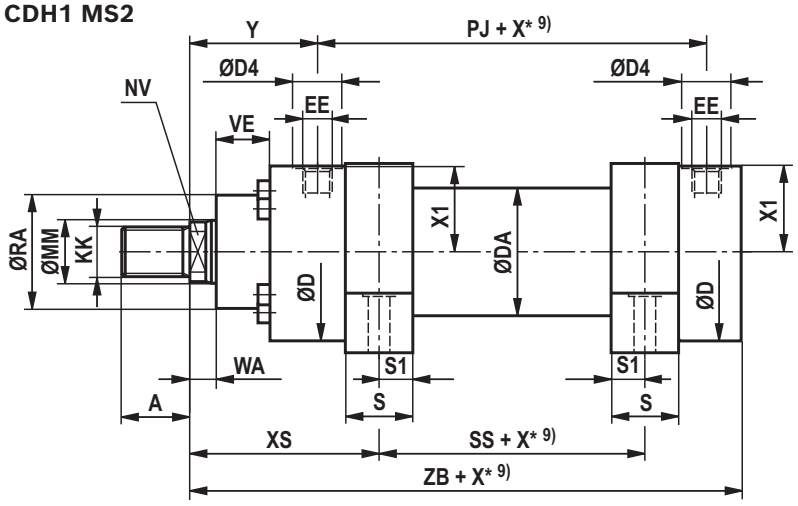
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

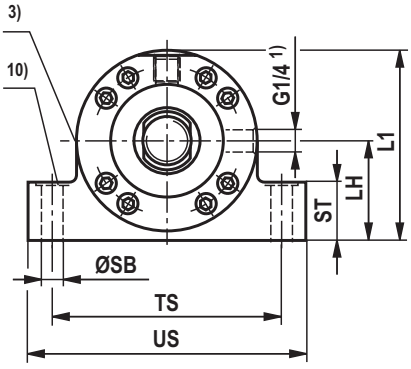
1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
7) Dimensions for cylinders with seal design M, T, G, L, R, S, V
8) Dimensions for cylinders with seal design A and B
9) Observe the min. stroke length "X*min"
10) When ordering, always specify the "XV" dimension in the clear text. Preferred XV dimension: Observe the trunnion position in the cylinder center XVmin and XVmax
11) XVcent recommendation: Trunnion position in cylinder center
12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting
16) Line connection "B" and "C"
17) Line connection "M"
18) Trunnion nut with ØAL ≥ 125 mm either at head or at base side depending on the position of the trunnion (XV)

Dimensions

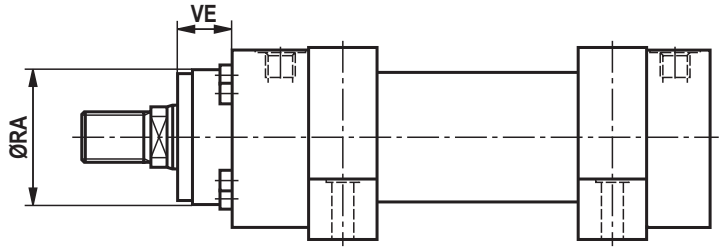
Foot mounting CDH1/CGH1: MS2 (dimensions in mm)

CDH1 MS2

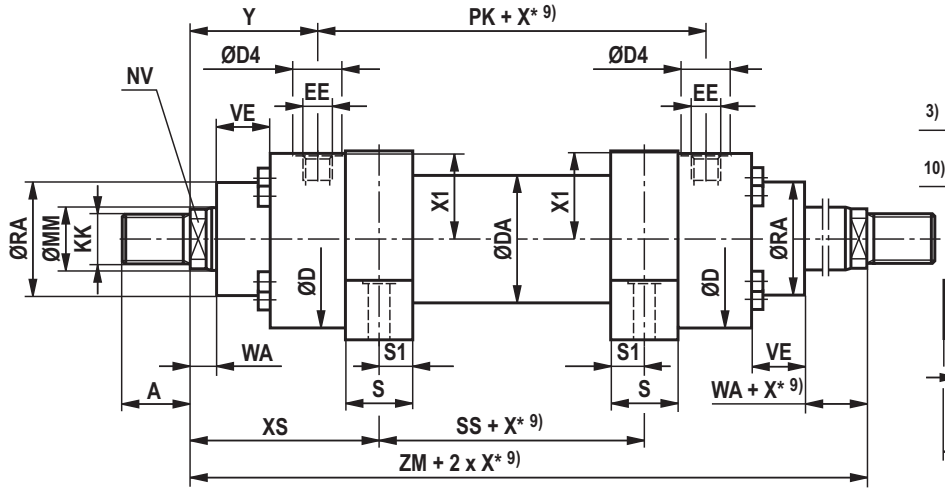


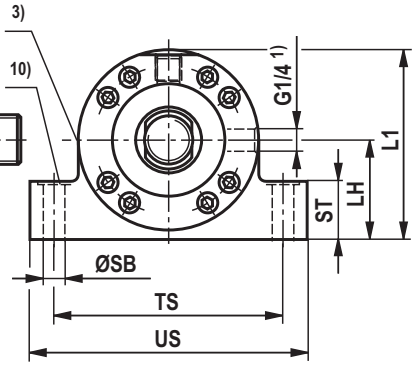


CDH1 MS2: with seal design "A", "B" and ØAL 160 - 320 mm

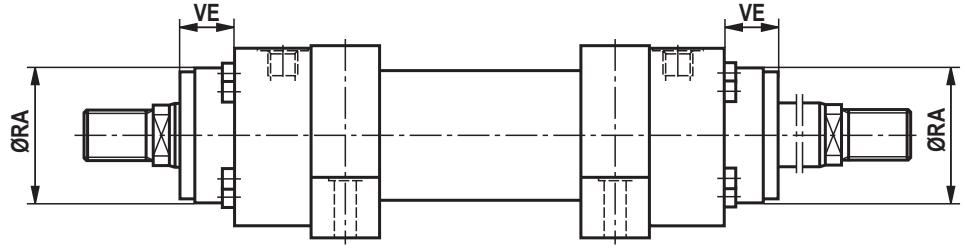


CGH1 MS2





CGH1 MS2: with seal design "A", "B" and ØAL 160 - 320 mm



Dimensions

Foot mounting CDH1/CGH1: MS2 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	WA
40	**22/28**	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	41	14
50	**28/36**	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48.5	18
63	**36/45**	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56.5	22
80	**45/56**	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67	20
100	**56/70**	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82	30
125	**70/90**	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99	32
140	**90/100**	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109.5	35
160	**100/110**	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129	40
180	**110/125**	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142.5	40
200	**125/140**	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152	40
220	**140/160**	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174	40
250	**160/180**	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194	40
280	**180/200**	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210	40
320	**200/220**	–	–	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243	40

ØAL	ØMM	PK	XS	ZB	ZM	SS	X* min	S	S1	ØSB H13	ST	TS js13	US max	LH	L1 12)	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	**22/28**	120	114	226	278	50	–	30	15	11	32	110	140	45	93	52	40	52	20
50	**28/36**	120	124.5	233	294	45	–	35	17.5	11	37	130	161	55	110	65	40	65	16
63	**36/45**	133	142	262	333	49	–	40	20	13.5	42	150	183	65	129	75	45	75	17
80	**45/56**	146	151	280	354	52	2	50	25	17.5	47	180	220	75	149	95	45	95	13
100	**56/70**	171	179	330	419	61	3	60	30	22	57	210	260	90	181	115	55	115	20
125	**70/90**	205	200	382	475	75	–	70	35	26	67	255	313	105	215	135	60	135	17
140	**90/100**	219	230.5	420	531	70	19	85	42.5	30	72	290	359	115	235	155	70	155	22
160	**100/110**	240	272.5	475	610	65	44	105	52.5	33	77	330	402	135	277	200	80	200	80
180	**110/125**	264	296.5	515	662	69	50	115	57.5	40	92	360	445	150	305	220	90	220	90
200	**125/140**	278	307.5	535	688	73	56	125	62.5	40	97	385	471	160	322	235	95	235	95
220	**140/160**	326	367.5	635	810	75	100	155	77.5	45	102	445	541	185	373	270	115	270	115
250	**160/180**	326	391.5	659	858	75	100	155	77.5	52	112	500	610	205	414	300	125	300	125
280	**180/200**	375	407.5	744	939	124	171	155	77.5	52	127	530	641	225	449	325	130	325	130
320	**200/220**	431	440	815	1005	125	85	190	95	62	142	610	732	255	512	365	155	365	155

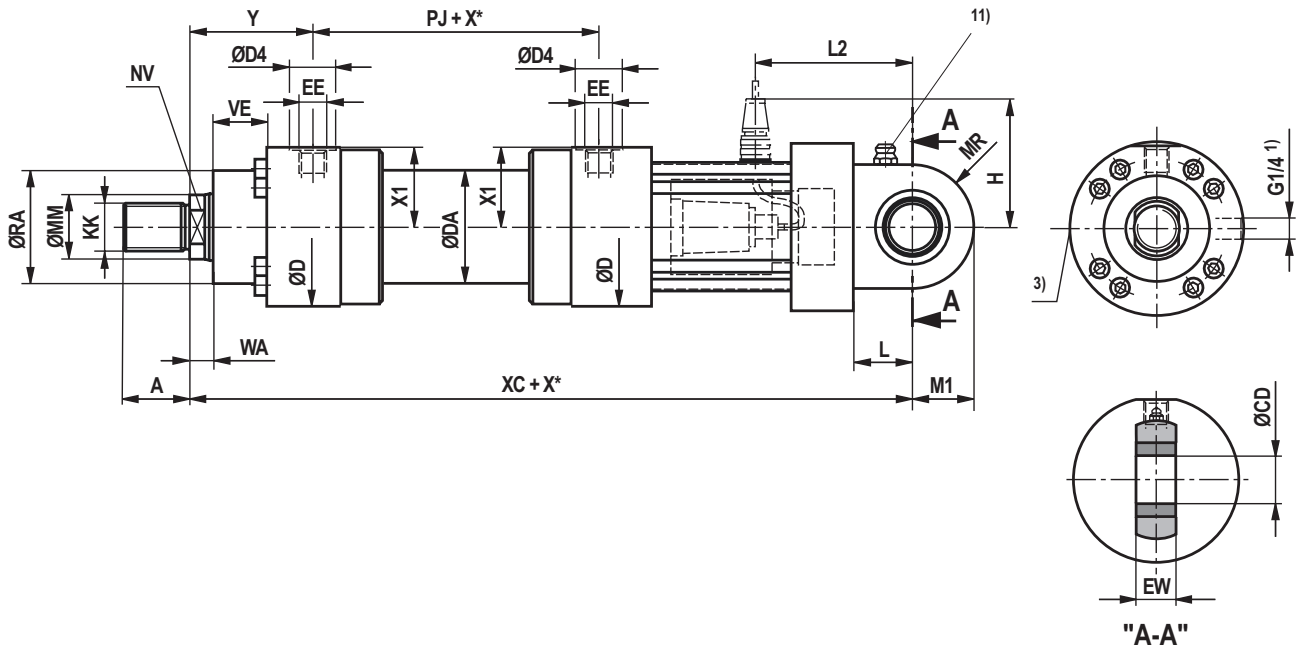
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
7) Dimensions for cylinders with seal design M, T, G, L, R, S and V
8) Dimensions for cylinders with seal design A and B
9) Observe the min. stroke length "X*min"
10) Recess 2 mm deep for hexagon socket head cap screws; ISO 4762 – The screws must not be subjected to shear force. Force distribution via additional external fitting strip
16) Line connection "B" and "C"
17) Line connection "M"

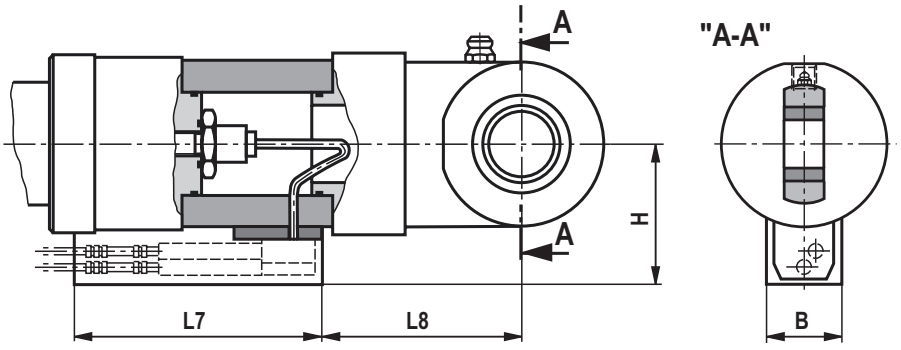
Dimensions

Swivel eye at base CSH1: MP3 (dimensions in mm)

CSH1 MP3; ØAL 40-200 mm
for position measurement system output "C", "F" and "D"



CSH1 MP3; ØAL 40-200 mm
for position measurement system output "N" and "P"



Dimensions

Swivel eye at base CSH1: MP3 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X* max
40	**28**	M16x1,5	16	M18x2	30	22	88	52	34	G1/2	M22x1,5	79	120	1000
50	**28/36**	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	1000
63	**36/45**	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	2000
80	**45/56**	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	2000
100	**56/70**	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	3000
125	**70/90**	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	3000
140	**90/100**	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	3000
160	**100/110**	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	3000
180	**110/125**	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	3000
200	**125/140**	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	3000

ØAL	ØMM	X1	WA	XC	L	MR	M1	ØCD H11	EW -0.4	ØRA	VE	L2	H 14)	H 13)	L7	L8	B
40	**28**	41	14	417	32.5	31	28	25	23	52	40	98	115	106	200	75	64
50	**28/36**	48.5	18	430	37.5	36	32.5	30	28	65	40	103	120	113	200	80	64
63	**36/45**	56.5	22	480	45	42	40	35	30	75	45	116	130	122	200	93	64
80	**45/56**	67	20	515	50	52	50	40	35	95	45	132	125	133	200	104	64
100	**56/70**	82	30	560	60	65	62.5	50	40	115	55	145	135	148	200	117	64
125	**70/90**	99	32	620	70	70	70	60	50	135	60	172	145	166	200	148	64
140	**90/100**	109.5	35	665	75	82	82	70	55	155	70	182	155	176	200	156	64
160	**100/110**	129	40	720	85	95	95	80	60	200	80	200	165	196	200	168	64
180	**110/125**	142.5	40	775	90	113	113	90	65	220	90	222	175	210	200	189	64
200	**125/140**	152	40	815	115	125	125	100	70	235	95	237	190	217	200	206	64

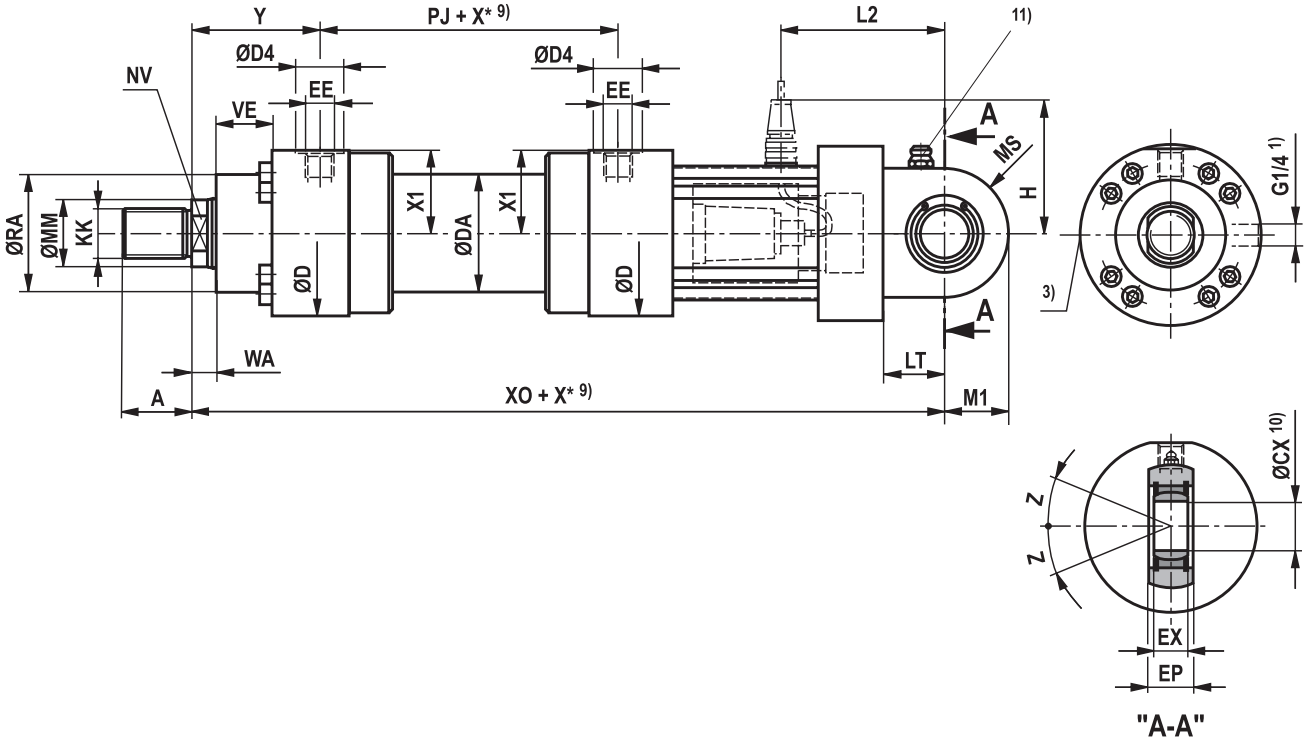
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
11) Standard version "W"
Grease nipple, cone head form A according to DIN 71412
13) Dimensions for position measurement system output "N" and "P"
14) Dimensions for position measurement system output "C", "F" and "D"
16) Line connection "B" and "C"
17) Line connection "M"

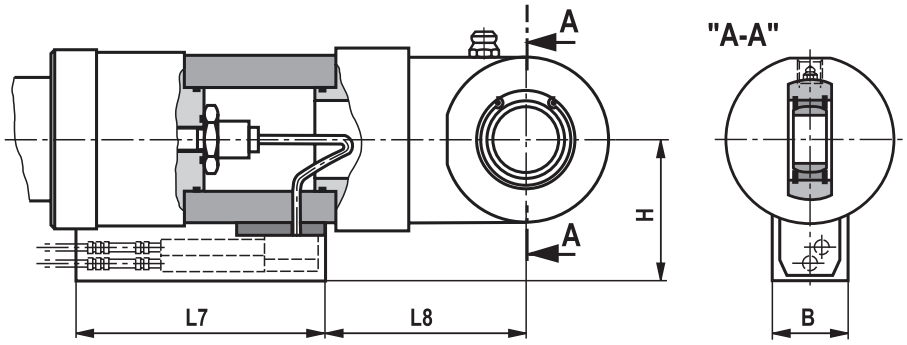
Dimensions

Self-aligning clevis at base CSH1: MP5 (dimensions in mm)

CSH1 MP5
for position measurement system output "C", "F" and "D"



CSH1 MP5
for position measurement system output "N" and "P"



Dimensions

Self-aligning clevis at base CSH1: MP5 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	X* max	C_0 18) kN
40	**28**	M16x1,5	16	M18x2	30	22	88	52	34	G1/2	M22x1,5	79	120	41	1000	72
50	**28/36**	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48.5	1000	106
63	**36/45**	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56.5	2000	153
80	**45/56**	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67	2000	250
100	**56/70**	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82	3000	365
125	**70/90**	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99	3000	400
140	**90/100**	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109.5	3000	540
160	**100/110**	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129	3000	670
180	**110/125**	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142.5	3000	980
200	**125/140**	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152	3000	1120
220	**140/160**	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174	3000	1700
250	**160/180**	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194	3000	1700
280	**180/200**	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210	3000	2900
320	**200/220**	–	–	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	242	3000	–

ØAL	ØMM	F_{adm} 19) kN	WA	XO	X* min	LT	M1	MS	ØCX	EP -0.4	EX	Z	ØRA	VE	L2	H 14)	H 13)	L7	L8	B
40	**28**	25.9	14	417	–	32.5	28	31	$25_{-0.010}$	23	$20_{-0.12}$	7 °	52	40	98	115	106	200	75	64
50	**28/36**	38.2	18	430	–	37.5	32.5	36	$30_{-0.010}$	28	$22_{-0.12}$	6 °	65	40	103	120	113	200	80	64
63	**36/45**	55.1	22	480	–	45	40	42	$35_{-0.012}$	30	$25_{-0.12}$	6 °	75	45	116	130	122	200	93	64
80	**45/56**	90.0	20	515	–	50	50	52	$40_{-0.012}$	35	$28_{-0.12}$	7 °	95	45	132	125	133	200	104	64
100	**56/70**	131.4	30	560	–	60	62.5	65	$50_{-0.012}$	40	$35_{-0.12}$	6 °	115	55	145	135	148	200	117	64
125	**70/90**	144.0	32	620	–	70	70	70	$60_{-0.015}$	50	$44_{-0.15}$	6 °	135	60	172	145	166	200	148	64
140	**90/100**	194.4	35	665	–	75	82	82	$70_{-0.015}$	55	$49_{-0.15}$	6 °	155	70	182	155	176	200	156	64
160	**100/110**	241.2	40	720	–	85	95	95	$80_{-0.015}$	60	$55_{-0.15}$	6 °	200	80	200	165	196	200	168	64
180	**110/125**	352.8	40	775	–	90	113	113	$90_{-0.020}$	65	$60_{-0.20}$	5 °	220	90	222	175	210	200	189	64
200	**125/140**	403.2	40	815	–	115	125	125	$100_{-0.020}$	70	$70_{-0.20}$	7 °	235	95	237	190	217	200	206	64
220	**140/160**	612.0	40	960	–	125	150 12)	140 12)	$110_{-0.020}$	80	$70_{-0.20}$	6 °	270	115	280	205	254	200	248	64
250	**160/180**	612.0	40	1000	–	140	168 12)	158 12)	$110_{-0.020}$	80	$70_{-0.20}$	6 °	300	125	300	220	269	200	263	64
280	**180/200**	1044.0	40	1105	31	150	188 12)	178 12)	$120_{-0.020}$	90	$85_{-0.20}$	6 °	325	130	330	270	276	200	295	64
320	**200/220**	–	40	1210	–	175	210 12)	200 12)	$140_{-0.020}$	110	$90_{-0.20}$	7 °	365	155	375	300	309	200	340	64

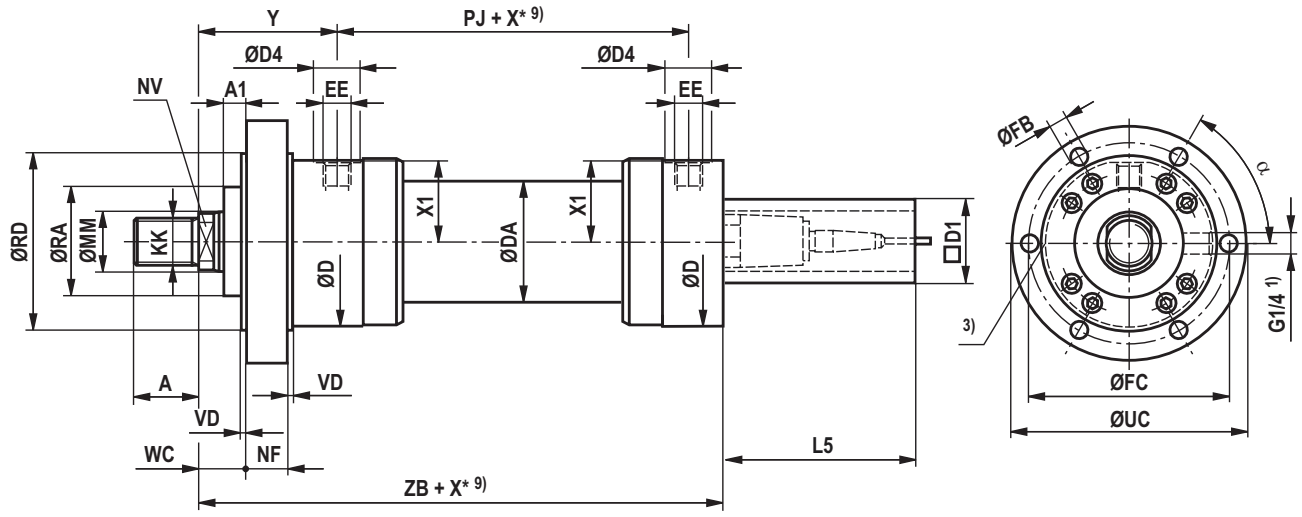
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
9) Observe the min. stroke length "X*min"
10) Related bolt Ø m6;
Related bolt Ø j6 for maintenance-free spherical bearing
11) Standard version "W"
Grease nipple, cone head form A according to DIN 71412; not applicable to spherical bearing, maintenance-free "A"
12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting
13) Dimensions for position measurement system output "N" and "P"
14) Dimensions for position measurement system output "C", "F" and "D"
16) Line connection "B" and "C"
17) Line connection "M"
18) C_0 = static load rating of the swivel head
19) F_{adm} = max. admissible load of the swivel head with oscillatory or alternating loads

Dimensions

Round flange at head CSH1: MF3 (dimensions in mm)

CSH1 MF3



Dimensions

Round flange at head CSH1: MF3 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	L5
40	**28**	M16x1,5	16	M18x2	30	22	88	52	34	G1/2	M22x1,5	79	120	41	166
50	**28/36**	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48.5	166
63	**36/45**	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56.5	166
80	**45/56**	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67	166
100	**56/70**	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82	166
125	**70/90**	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99	166
140	**90/100**	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109.5	166
160	**100/110**	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129	166
180	**110/125**	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142.5	166
200	**125/140**	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152	166
220	**140/160**	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174	166
250	**160/180**	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194	166
280	**180/200**	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210	166
320	**200/220**	–	–	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243	166

ØAL	ØMM	X* max	ØRD e8	WC	VD	NF	A1	ZB	X* min	ØFB H13	ØFC js13	ØUC -1	α	ØRA	D1 max
40	**28**	1000	90	19	5	30	0	235	–	9	108	130	60 °	52	80
50	**28/36**	1000	110	23	5	30	0	243	–	11	130	160	60 °	65	96
63	**36/45**	2000	130	27	5	35	0	287	–	13.5	155	185	60 °	75	96
80	**45/56**	2000	145	25	5	35	0	312	–	13.5	170	200	60 °	95	96
100	**56/70**	3000	175	35	5	45	0	352	–	17.5	205	245	60 °	115	96
125	**70/90**	3000	210	37	5	50	0	392	–	22	245	295	60 °	135	96
140	**90/100**	3000	230	45	10	50	0	430	–	22	265	315	60 °	155	96
160	**100/110**	3000	275	50	10	60	0	475	–	30	325	385	60 °	200	96
180	**110/125**	3000	300	50	10	70	0	515	–	30	360	420	60 °	220	96
200	**125/140**	3000	320	50	10	75	0	535	–	33	375	445	60 °	235	96
220	**140/160**	3000	370	60	10	85	20	635	–	33	430	490	60 °	270	96
250	**160/180**	3000	415	70	10	85	30	659	–	39	485	555	60 °	300	96
280	**180/200**	3000	450	65	10	95	25	744	31	39	520	590	60 °	325	96
320	**200/220**	3000	510	65	10	120	25	815	–	45	600	680	60 °	365	96

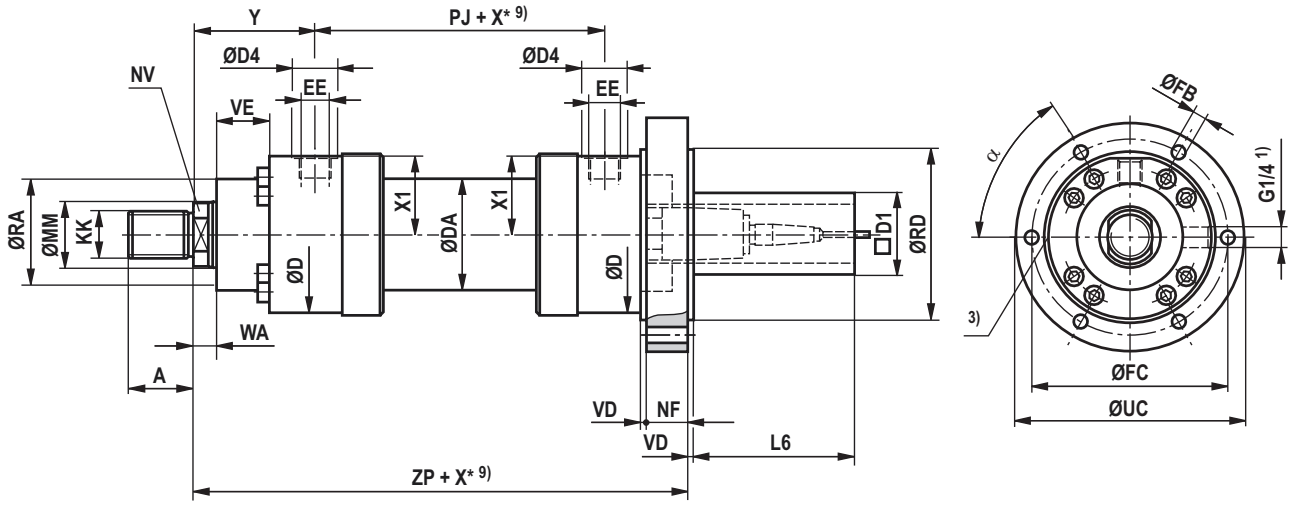
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
9) Observe the min. stroke length "X*min"
16) Line connection "B" and "C"
17) Line connection "M"

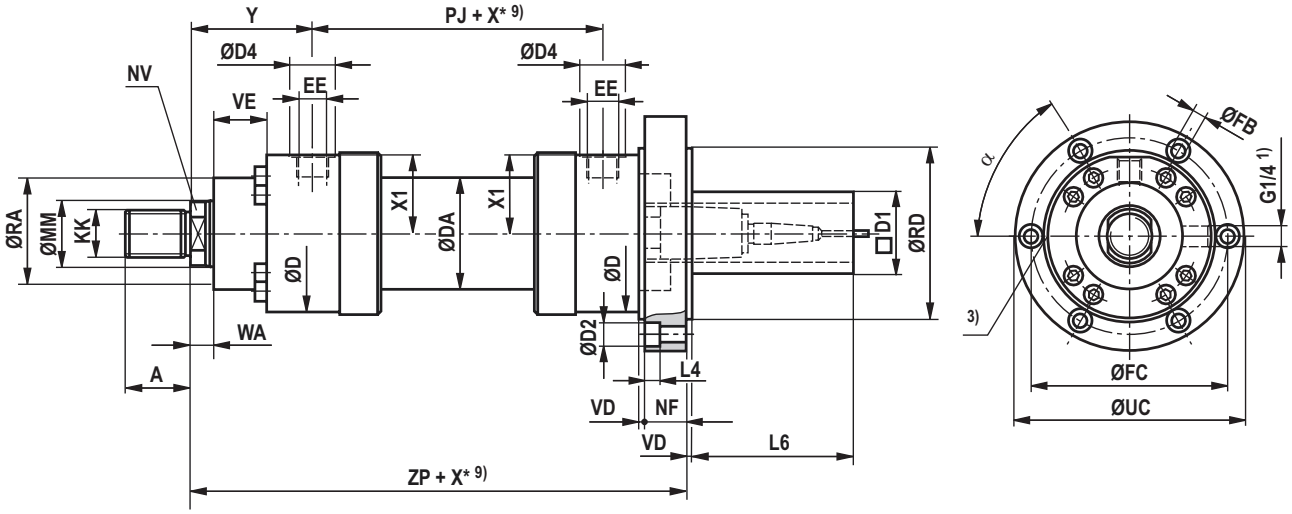
Dimensions

Round flange at base CSH1: MF4 (dimensions in mm)

CSH1 MF4; ØAL 40-100 mm



CSH1 MF4; ØAL 125-320 mm



Dimensions

Round flange at base CSH1: MF4 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	L4	ØD2	X* max
40	**28**	M16x1,5	16	M18x2	30	22	88	52	34	G1/2	M22x1,5	79	120	41	0	0	1000
50	**28/36**	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48.5	0	0	1000
63	**36/45**	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56.5	0	0	2000
80	**45/56**	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67	0	0	2000
100	**56/70**	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82	0	0	3000
125	**70/90**	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99	21.5	33	3000
140	**90/100**	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109.5	21.5	33	3000
160	**100/110**	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129	28.5	43	3000
180	**110/125**	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142.5	28.5	43	3000
200	**125/140**	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152	32	48	3000
220	**140/160**	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174	32	48	3000
250	**160/180**	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194	38	57	3000
280	**180/200**	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210	38	57	3000
320	**200/220**	–	–	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243	44	66	3000

ØAL	ØMM	WA	ZP	X* min	NF	VD	ØRD e8	ØFB H13	ØFC js13	ØUC -1	α	ØRA	VE	L6	D1 max
40	**28**	14	265	–	30	5	90	9	108	130	60 °	52	40	166	80
50	**28/36**	18	274	–	30	5	110	11	130	160	60 °	65	40	166	96
63	**36/45**	22	310	–	35	5	130	13.5	155	185	60 °	75	45	166	96
80	**45/56**	20	330	–	35	5	145	13.5	170	200	60 °	95	45	143	96
100	**56/70**	30	390	–	45	5	175	17.5	205	245	60 °	115	55	123	96
125	**70/90**	32	432	–	50	5	210	22	245	295	60 °	135	60	121	96
140	**90/100**	35	475	–	50	10	230	22	265	315	60 °	155	70	111	96
160	**100/110**	40	535	–	60	10	275	30	325	385	60 °	200	80	96	96
180	**110/125**	40	585	–	70	10	300	30	360	420	60 °	220	90	86	96
200	**125/140**	40	615	–	75	10	320	33	375	445	60 °	235	95	76	96
220	**140/160**	40	720	–	85	10	370	33	430	490	60 °	270	115	71	96
250	**160/180**	40	744	–	85	10	415	39	485	555	60 °	300	125	71	96
280	**180/200**	40	839	31	95	10	450	39	520	590	60 °	325	130	61	96
320	**200/220**	40	935	–	120	10	510	45	600	680	60 °	365	155	36	96

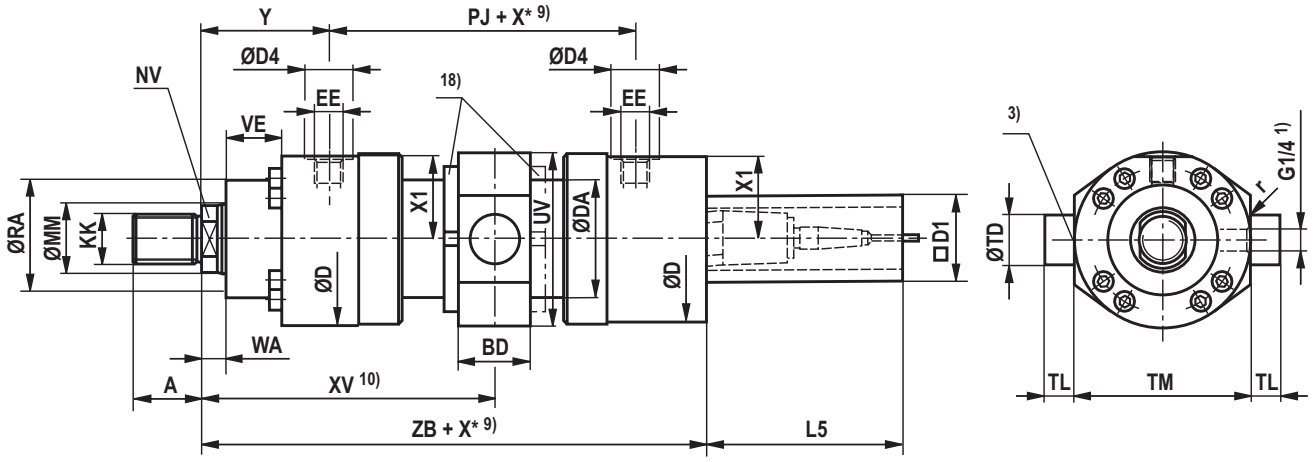
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
9) Observe the min. stroke length "X*min"
16) Line connection "B" and "C"
17) Line connection "M"

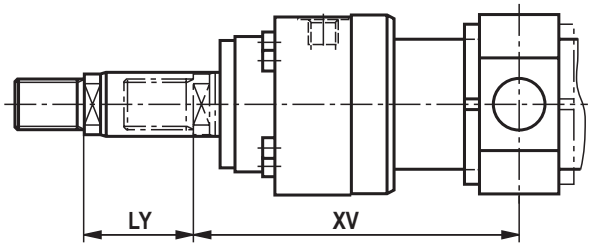
Dimensions

Trunnion mounting CSH1: MT4 (dimensions in mm)

CSH1 MT4



Dimensions for cylinder with piston rod extension "LY" in retracted condition



☞ **Notice:** During installation, it must be ensured that the trunnion bearings are installed up to the trunnion shoulders. Any variation may reduce the product's service life.

Dimensions

Trunnion mounting CSH1: MT4 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	WA	L5	X* max
40	**28**	M16x1,5	16	M18x2	30	22	88	52	34	G1/2	M22x1,5	79	120	41	14	166	1000
50	**28/36**	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48.5	18	166	1000
63	**36/45**	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56.5	22	166	2000
80	**45/56**	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67	20	166	2000
100	**56/70**	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82	30	166	3000
125	**70/90**	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99	32	166	3000
140	**90/100**	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109.5	35	166	3000
160	**100/110**	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129	40	166	3000
180	**110/125**	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142.5	40	166	3000
200	**125/140**	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152	40	166	3000
220	**140/160**	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174	40	166	3000
250	**160/180**	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194	40	166	3000
280	**180/200**	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210	40	166	3000
320	**200/220**	–	–	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243	40	166	3000

ØAL	ØMM	ZB	X* min	XV 11) cent	XV 10) min	XV 10) max	BD	UV 12)	ØTD e8	TL js16	TM h12	r	ØRA	VE	D1 max
40	**28**	235	22	139+X*/2	150	136+X*	38	97	30	20	95	1.6	52	40	80
50	**28/36**	243	32	147+X*/2	163	140+X*	38	111	30	20	115	1.6	65	40	96
63	**36/45**	287	47	166.5+X*/2	190	155+X*	48	129	35	20	130	2	75	45	96
80	**45/56**	312	58	177+X*/2	206	160+X*	58	153	40	25	145	2	95	45	96
100	**56/70**	352	79	209.5+X*/2	249	185+X*	78	183	50	30	175	2	115	55	96
125	**70/90**	392	91	237.5+X*/2	283	192+X*	98	220	60	40	210	2.5	135	60	96
140	**90/100**	430	121	265.5+X*/2	326	205+X*	118	243	65	42.5	230	2.5	155	70	96
160	**100/110**	475	142	305+X*/2	376	234+X*	128	282	75	52.5	275	2.5	200	80	96
180	**110/125**	515	158	331+X*/2	410	252+X*	138	310	85	55	300	2.5	220	90	96
200	**125/140**	535	194	344+X*/2	441	247+X*	168	331	90	55	320	2.5	235	95	96
220	**140/160**	635	155	405+X*/2	482.5	327.5+X*	135	377	100	60	370	2.5	270	115	96
250	**160/180**	659	175	429+X*/2	516.5	341.5+X*	145	417	110	65	410	2.5	300	125	96
280	**180/200**	744	336	469.5+X*/2	637.5	301.5+X*	165	448	130	70	450	2.5	325	130	96
320	**200/220**	815	180	502.5+X*/2	592.5	412.5+X*	195	513	160	90	510	2.5	365	155	96

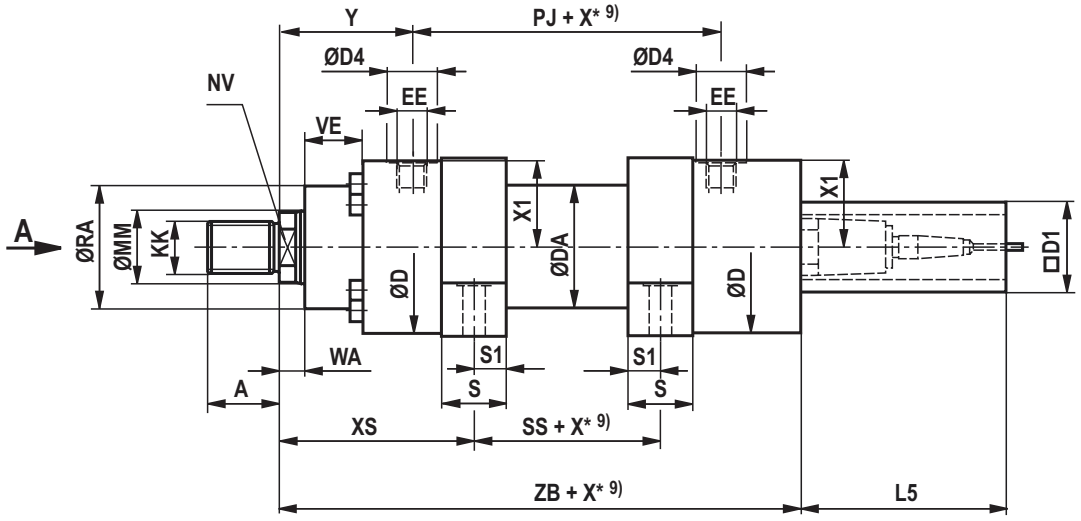
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
9) Observe the min. stroke length "X*min"
10) When ordering, always specify the "XV" dimension in the clear text. Preferred XV dimension: Observe the trunnion position in the cylinder center XVmin and XVmax
11) XVcent recommendation: Trunnion position in cylinder center
12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting
16) Line connection "B" and "C"
17) Line connection "M"
18) Trunnion nut with ØAL ≥ 125 mm either at head or at base side depending on the position of the trunnion (XV)

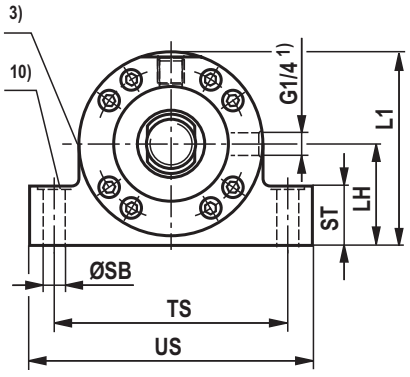
Dimensions

Foot mounting CSH1: MS2 (dimensions in mm)

CSH1 MS2



View A



Dimensions

Foot mounting CSH1: MS2 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	WA	L5	X* max
40	**28**	M16x1,5	16	M18x2	30	22	88	52	34	G1/2	M22x1,5	79	120	41	14	166	1000
50	**28/36**	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48.5	18	166	1000
63	**36/45**	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56.5	22	166	2000
80	**45/56**	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67	20	166	2000
100	**56/70**	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82	30	166	3000
125	**70/90**	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99	32	166	3000
140	**90/100**	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109.5	35	166	3000
160	**100/110**	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129	40	166	3000
180	**110/125**	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142.5	40	166	3000
200	**125/140**	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152	40	166	3000
220	**140/160**	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174	40	166	3000
250	**160/180**	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194	40	166	3000
280	**180/200**	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210	40	166	3000
320	**200/220**	–	–	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243	40	166	3000

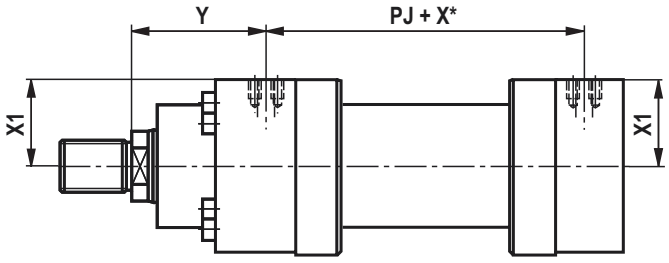
ØAL	ØMM	XS	ZB	SS	X* min	S	S1	ØSB H13	ST	TS js13	US max	LH	L1 12)	ØRA	VE	D1 max
40	**28**	114	235	50	–	30	15	11	32	110	140	45	93	52	40	80
50	**28/36**	124.5	243	45	–	35	17.5	11	37	130	161	55	110	65	40	96
63	**36/45**	142	287	49	–	40	20	13.5	42	150	183	65	129	75	45	96
80	**45/56**	151	312	52	2	50	25	17.5	47	180	220	75	149	95	45	96
100	**56/70**	179	352	61	3	60	30	22	57	210	260	90	181	115	55	96
125	**70/90**	200	392	75	–	70	35	26	67	255	313	105	215	135	60	96
140	**90/100**	230.5	430	70	19	85	42.5	30	72	290	359	115	235	155	70	96
160	**100/110**	272.5	475	65	44	105	52.5	33	77	330	402	135	277	200	80	96
180	**110/125**	296.5	515	69	50	115	57.5	40	92	360	445	150	305	220	90	96
200	**125/140**	307.5	535	73	56	125	62.5	40	97	385	471	160	322	235	95	96
220	**140/160**	367.5	635	75	100	155	77.5	45	102	445	541	185	373	270	115	96
250	**160/180**	391.5	659	75	100	155	77.5	52	112	500	610	205	414	300	125	96
280	**180/200**	407.5	744	124	171	155	77.5	52	127	530	641	225	449	325	130	96
320	**200/220**	440	815	125	85	190	95	62	142	610	732	255	512	365	155	96

ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

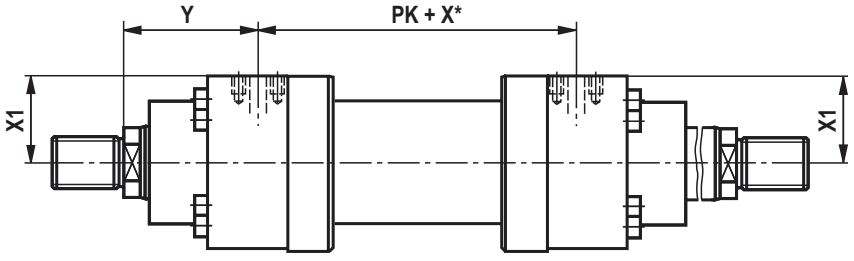
1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
9) Observe the min. stroke length "X*min"
10) Recess 2 mm deep, for hexagon socket head cap screws; ISO 4762 – The screws must not be subjected to shear force. Force distribution via additional external fitting strip
16) Line connection "B" and "C"
17) Line connection "M"

Dimensions: Flange ports (dimensions in mm)

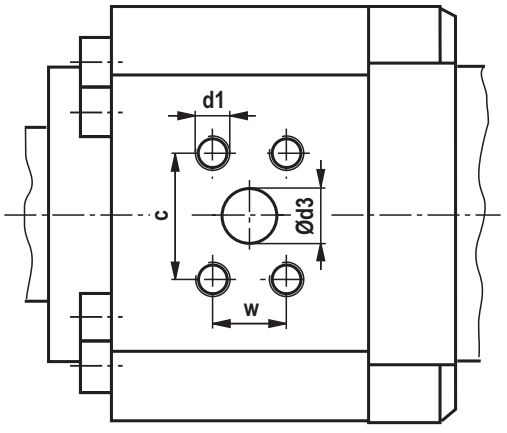
CDH1/CSH1



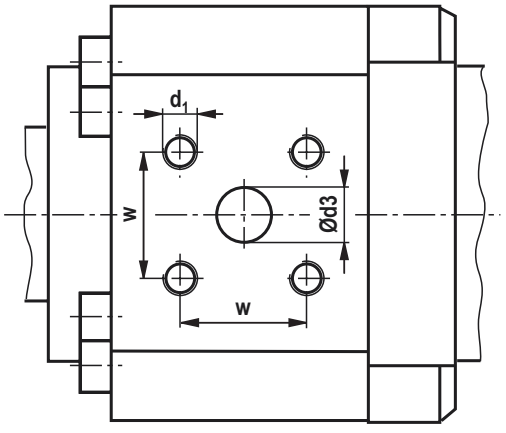
CGH1



Hole pattern for rectangular flange according to ISO 6162-2 table 2 type 1



Hole pattern for square flange according to ISO 6164 table 2



Dimensions: Flange ports (dimensions in mm)

ØAL	Version "D" ISO 6162-2 tab.2 type1 (400 bar) (≙ SAE 6000 PSI)											Version "H" ISO 6164 tab.2 (400 bar)								
	Y	PJ PK	X1	Ød$_3$	Ød$_3$ [4]	c ±0.25	w ±0.25	d$_1$	t$_1$ [1]	t$_1$ [2]	p [3]	Y	PJ PK	X1	Ød$_3$	w ±0.25	d1	t$_1$ [1]	t$_1$ [2]	p [3]
40	–	–	–	–	–	–	–	–	–	–	–	78	122	40.5	10	24.7	M6	12.5	10	400
50	–	–	–	–	–	–	–	–	–	–	–	86	122	48	10	24.7	M6	12.5	10	400
63	–	–	–	–	–	–	–	–	–	–	–	99	135	57	13	29.7	M8	16	13	400
80	102.5	149	65	13	1/2"	40.5	18.2	M8	16	14	400	103	148	67	13	29.7	M8	16	15	400
100	124	171	80.5	13	1/2"	40.5	18.2	M8	16	16	400	123	173	81.5	19	35.4	M8	16	16	400
125	135	205	97.5	19	3/4"	50.8	23.8	M10	20	20	400	131.5	212	99	25	43.8	M10	20	20	400
140	152	227	107	25	1"	57.2	27.8	M12	24	24	400	152	227	109	25	43.8	M10	20	20	400
160	184	242	127	25	1"	57.2	27.8	M12	24	24	400	182.5	245	128	32	51.6	M12	24	24	400
180	199	264	139.5	32	1 1/4"	66.6	31.8	M14	26	26	400	199	264	142	32	51.6	M12	24	24	400
200	205	278	149	32	1 1/4"	66.6	31.8	M14	26	26	400	201.5	285	149.5	38	60.1	M16	30	30	400
220	242	326	168	38	1 1/2"	79.3	36.5	M16	30	30	400	242	326	171	38	60.1	M16	30	30	400
250	266	326	189	38	1 1/2"	79.3	36.5	M16	30	30	400	266	326	192	38	60.1	M16	30	30	400
280	282	375	204	38	1 1/2"	79.3	36.5	M16	30	30	400	282	375	207	38	60.1	M16	30	30	400
320	287	431	236	51	2"	96.8	44.5	M20	36	36	400	287	431	240	51	69.3	M16	30	30	400

Main dimensions see pages 18 to 41

ØAL = piston Ø

X* = stroke length

[1] Thread depth for seal design M, T, G, L, R, S and V

[2] Thread depth for seal design A and B

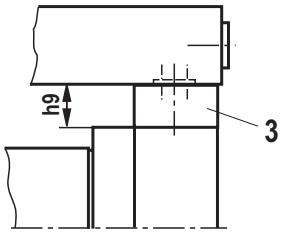
[3] Max. operating pressure for related flanges in bar

[4] Flange hole pattern according to ISO 6162-2 tab. 2 type 1 corresponds to flange hole pattern according to SAE 6000 PSI

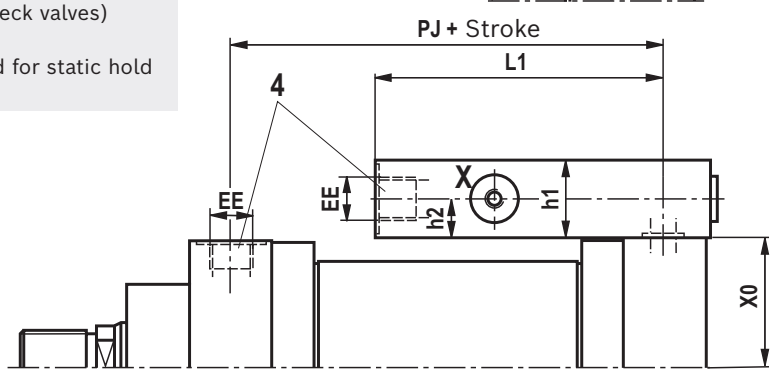
Dimensions: Subplates for valve mounting (SL and SV valve) (dimensions in mm)

Note:
Valves, fittings and piping are **not** included in the scope of delivery!

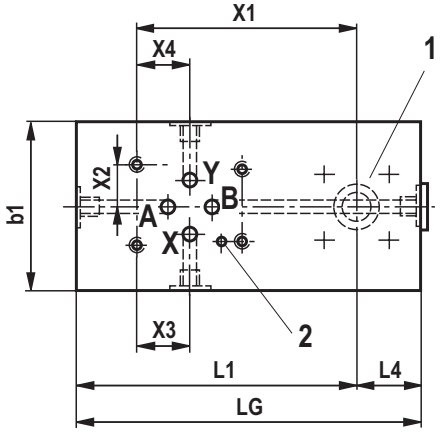
Installation situation with MT4



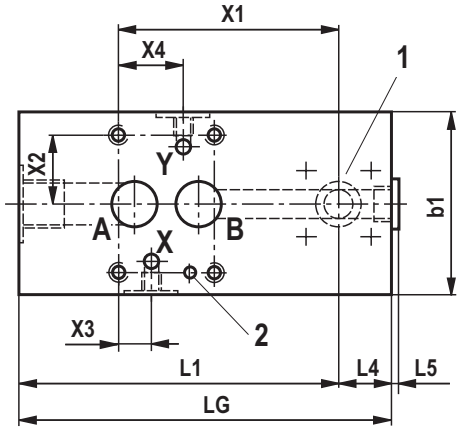
☞ **Notice:** Subplates for SL and SV valves (check valves)
Please note:
Seal designs T, G, L, R, S and V are not designed for static hold function!



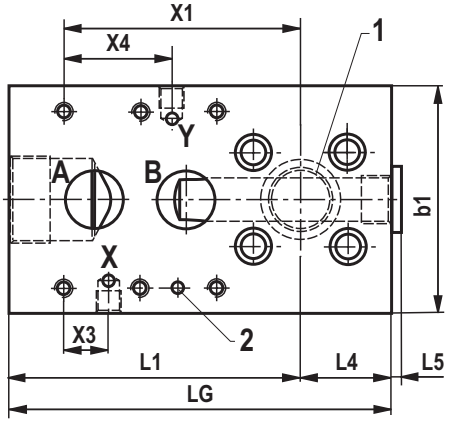
NG6
Hole pattern according to ISO 24340 form A and ISO 4401



NG10 and 20
Hole pattern according to ISO 5781



NG30
Hole pattern according to ISO 5781



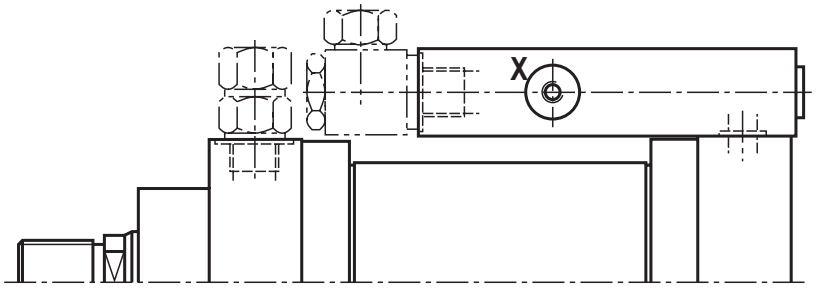
1 Port B to the piston side according to ISO 6164
2 Bore for locking pin
3 Adapter plate for type of mounting MT4 (included in the scope of delivery for MT4)
4 Line connection "B" dimensions "EE" see also pages 18 to 41

Dimensions: Subplates for valve mounting (SL and SV valve) (dimensions in mm)

ØAL	Valve size (NG)	PJ	EE	Stroke min [1]		Plate dimensions							Port size, hole pattern						Position point valve	
				[2]	[3]	X0	L1	L4	L5	LG	b1	h1	h9	h2	A	X	Y	X3	X4	X1	X2
40	6	121	G1/2	50	50	40.5	90	20	4	110	55	40	10	20	G1/2	G1/4	G1/4	21.5	21.5	65.5	15.5
50	6	121	G1/2	50	50	48.0	90	20	4	110	55	40	10	20	G1/2	G1/4	G1/4	21.5	21.5	65.5	15.5
63	6	134	G3/4	64	64	57.0	100	25	5	125	55	47	20	23.5	G3/4	G1/4	G1/4	21.5	21.5	70.5	15.5
	10	134	G3/4	64	64	57.0	105	25	5	130	85	47	20	23.5	G3/4	G1/4	G1/4	21.4	21.4	73	33.3
80	6	147	G3/4	58	58	67.0	100	25	5	125	55	47	20	23.5	G3/4	G1/4	G1/4	21.5	21.5	70.5	15.5
	10	147	G3/4	58	58	67.0	105	25	5	130	85	47	20	23.5	G3/4	G1/4	G1/4	21.4	21.4	73	33.3
100	10	172	G1	50	79	81.5	102	28	5	130	85	50	20	25	G1	G1/4	G1/4	21.4	21.4	70	33.3
125	10	208.5	G1 1/4	60	91	99.0	115	35	5	150	85	60	30	30	G1 1/4	G1/4	G1/4	21.4	21.4	80	33.3
	20	208.5	G1 1/4	60	91	99.0	140	35	5	175	100	60	30	30	G1 1/4	G1/4	G1/4	20.8	39.7	95	39.7
140	10	223	G1 1/4	50	121	109.0	115	35	5	150	85	60	30	30	G1 1/4	G1/4	G1/4	21.4	21.4	80	33.3
	20	223	G1 1/4	50	121	109.0	140	35	5	175	100	60	30	30	G1 1/4	G1/4	G1/4	20.8	39.7	95	39.7
160	10	242.5	G1 1/2	60	142	128.0	120	40	5	160	85	70	30	35	G1 1/2	G1/4	G1/4	21.4	21.4	90	33.3
	20	242.5	G1 1/2	60	142	128.0	135	50	5	185	100	70	30	35	G1 1/2	G1/4	G1/4	20.8	39.7	105	39.7
	30	242.5	G1 1/2	60	142	128.0	160	50	5	210	125	70	30	35	G1 1/2	G1/4	G1/4	24.6	59.6	130	48.4
180	10	264	G1 1/2	50	158	142.0	120	40	5	160	85	70	30	35	G1 1/2	G1/4	G1/4	21.4	21.4	90	33.3
	20	264	G1 1/2	50	158	142.0	135	50	5	185	100	70	30	35	G1 1/2	G1/4	G1/4	20.8	39.7	105	39.7
	30	264	G1 1/2	50	158	142.0	160	50	5	210	125	70	30	35	G1 1/2	G1/4	G1/4	24.6	59.6	130	48.4
200	10	281.5	G1 1/2	30 [4]	194	149.5	130	45	5	175	95	70	20	35	G1 1/2	G1/4	G1/4	21.4	21.4	100	33.3
	20	281.5	G1 1/2	30 [4]	194	149.5	140	45	5	185	100	70	20	35	G1 1/2	G1/4	G1/4	20.8	39.7	115	39.7
	30	281.5	G1 1/2	30 [4]	194	149.5	165	45	5	210	125	70	20	35	G1 1/2	G1/4	G1/4	24.6	59.6	140	48.4

ØAL = piston Ø

[1] The information only applies to the following connection situation!



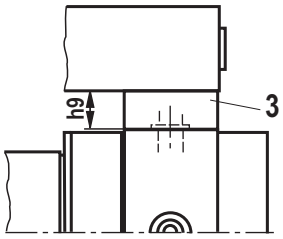
[2] Not for MT4

[3] Only for MT4

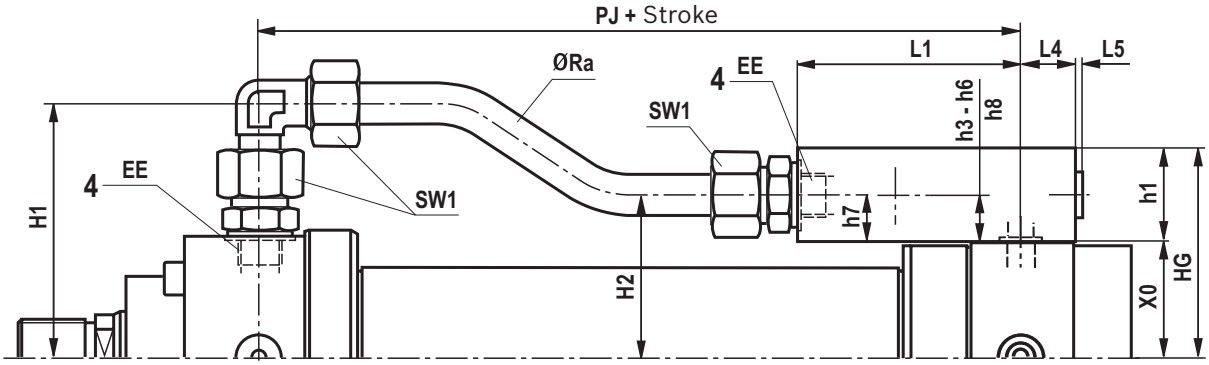
[4] With type of mounting "MS2". observe X*min on page 28 and/or 40

Dimensions: Subplates for valve mounting (directional and control valves) (dimensions in mm)

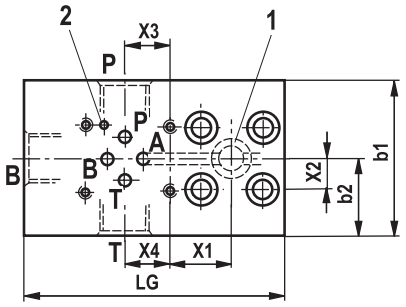
Installation situation with MT4



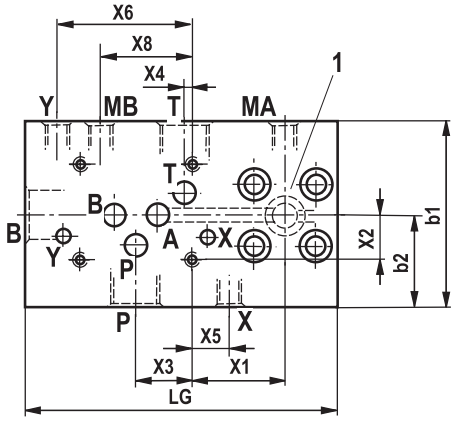
1 Port A to the piston side according to ISO 6164
2 Bore for locking pin
3 Adapter plate for type of mounting MT4 (included in the scope of delivery for MT4)
4 Connection "B" dimensions "EE" see also pages 18 to 41



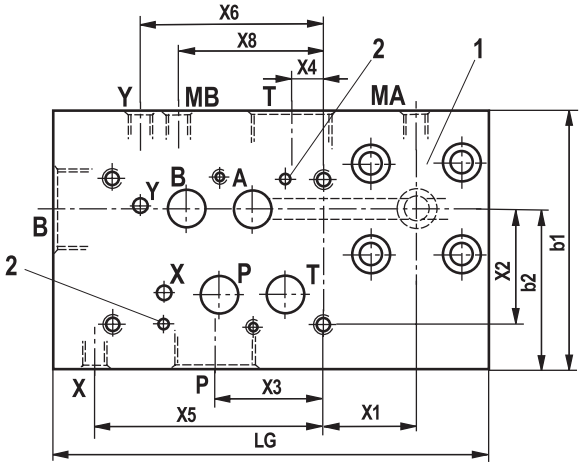
NG6
Hole pattern according to ISO 24340 form A and ISO 4401



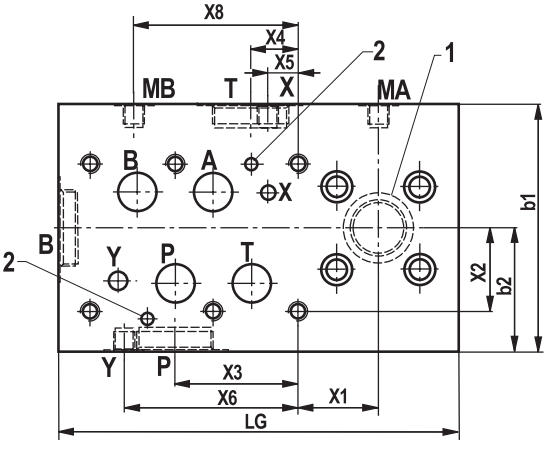
NG10
Hole pattern according to ISO 24340 form A and ISO 4401



NG16
Hole pattern according to ISO 24340 form A and ISO 4401



NG25
Hole pattern according to ISO 24340 form A and ISO 4401



With larger stroke lengths and depending on the piston diameter, the pipeline is mounted at the cylinder pipe using pipe supports. A maximum of two sandwich plates is admissible.

Dimensions: Subplates for valve mounting (directional and control valves) (dimensions in mm)

ØAL	Valve size (NG)	PJ	EE	Stroke min	Plate dimensions															
					L1	L4	L5 max	H1	H2 [1]	H2 [2]	SW1	ØRa	b1	h1	LG	HG [1]	HG [2]	b2	X0	h7	h9
40	6	121	G1/2	242	90	20	4	96.0	60.5	70.5	30	16.0x2.5	65	40	110	80.5	90.5	32.5	40.5	20	10
50	6	121	G1/2	242	90	20	4	103.5	68.0	78.0	30	16.0x2.5	65	40	110	88.0	98.0	32.5	48.0	20	10
63	6	134	G3/4	276	100	25	5	121.5	80.5	100.5	36	20.0x3.0	75	47	125	104.0	124.0	37.5	57.0	23.5	20
	10	134	G3/4	301	125	25	5	121.5	80.0	100.0	36	20.0x3.0	90	70	150	127.0	147.0	45	57.0	23	20
80	6	147	G3/4	263	100	25	5	132.0	90.5	110.5	36	20.0x3.0	75	47	125	114.0	134.0	37.5	67.0	23.5	20
	10	147	G3/4	288	125	25	5	132.0	90.0	110.0	36	20.0x3.0	90	70	150	137.0	157.0	45	67.0	23	20
100	10	172	G1	317	132	28	5	155.0	111.5	131.5	46	25.0x4.0	90	80	160	161.5	181.5	45	81.5	30	20
125	10	208.5	G1 1/4	330	135	35	5	177.5	134.0	164.0	50	30.0x5.0	105	95	170	194.0	224.0	52.5	99.0	35	30
	16	208.5	G1 1/4	370	175	35	5	177.5	144.0	174.0	50	30.0x5.0	120	100	210	199.0	229.0	60	99.0	45	30
140	10	223	G1 1/4	315	135	35	5	188.0	144.0	174.0	50	30.0x5.0	105	95	170	204.0	234.0	52.5	109.0	35	30
	16	223	G1 1/4	355	175	35	5	188.0	154.0	184.0	50	30.0x5.0	120	100	210	209.0	239.0	60	109.0	45	30
160	10	242.5	G1 1/2	399	150	40	5	218.0	163.0	193.0	60	38.0x6.0	105	95	190	223.0	253.0	52.5	128.0	35	30
	16	242.5	G1 1/2	429	180	40	5	218.0	178.0	208.0	60	38.0x6.0	125	105	220	233.0	263.0	62.5	128.0	50	30
	25	242.5	G1 1/2	449	200	50	0	218.0	183.0	213.0	60	38.0x6.0	155	110	250	238.0	268.0	77.5	128.0	55	30
180	10	264	G1 1/2	377	150	40	5	231.5	177.0	207.0	60	38.0x6.0	105	95	190	237.0	267.0	52.5	142.0	35	30
	16	264	G1 1/2	407	180	40	5	231.5	192.0	222.0	60	38.0x6.0	125	105	220	247.0	277.0	62.5	142.0	50	30
	25	264	G1 1/2	427	200	50	0	231.5	197.0	227.0	60	38.0x6.0	155	110	250	252.0	282.0	77.5	142.0	55	30
200	10	281.5	G1 1/2	365	155	50	5	241.0	184.5	204.5	60	38.0x6.0	110	95	205	244.5	264.5	55	149.5	35	20
	16	281.5	G1 1/2	400	190	50	5	241.0	199.5	219.5	60	38.0x6.0	125	105	240	254.5	274.5	62.5	149.5	50	20
	25	281.5	G1 1/2	420	210	50	0	241.0	204.5	224.5	60	38.0x6.0	155	110	260	259.5	279.5	77.5	149.5	55	20

ØAL	Valve size (NG)	Port size, hole pattern																Position point valve	
		P	X3	h3	T	X4	h4	X	X5	h5	Y	X6	h6	MA	MB	X8	h8	X1	X2
40	6	G1/2	21.5	20	G1/2	21.5	20	-	-	-	-	-	-	-	-	-	-	25	15.5
50	6	G1/2	21.5	20	G1/2	21.5	20	-	-	-	-	-	-	-	-	-	-	25	15.5
63	6	G3/4	21.5	23.5	G3/4	21.5	23.5	-	-	-	-	-	-	-	-	-	-	30	15.5
	10	G3/4	27	33	G3/4	3.5	33	G1/4	18	47	G1/4	65.0	47	G1/4	G1/4	60	17	45	21.4
80	6	G3/4	21.5	23.5	G3/4	21.5	23.5	-	-	-	-	-	-	-	-	-	-	30	15.5
	10	G3/4	27	33	G3/4	3.5	33	G1/4	18	47	G1/4	65.0	47	G1/4	G1/4	60	17	45	21.4
100	10	G1	27	30	G1	3.5	40	G1/4	18	57	G1/4	65.0	57	G1/4	G1/4	58	20	52	21.4
125	10	G1 1/4	27	35	G1 1/4	3.5	45	G1/4	20	72	G1/4	65.0	72	G1/4	G1/4	55	25	55	21.4
	16	G1 1/4	52	32	G1 1/4	15	32	G1/4	76.5	75	G1/4	88.0	80	G1/4	G1/4	88	40	45	40
140	10	G1 1/4	27	35	G1 1/4	3.5	45	G1/4	20	72	G1/4	65.0	72	G1/4	G1/4	55	25	55	21.4
	16	G1 1/4	52	32	G1 1/4	15	32	G1/4	76.5	75	G1/4	88.0	80	G1/4	G1/4	88	40	45	40
160	10	G1 1/2	27	35	G1 1/2	3.5	45	G1/4	20	72	G1/4	65.0	72	G1/4	G1/4	55	25	60	21.4
	16	G1 1/2	57	35	G1 1/2	15	34	G1/4	76.5	80	G1/4	86.0	85	G1/4	G1/4	86	45	50	40
	25	G1 1/2	77	42	G1 1/2	30	34	G1/4	19	90	G1/4	109.0	90	G1/4	G1/4	103	50	50	52.1
180	10	G1 1/2	27	35	G1 1/2	3.5	45	G1/4	20	72	G1/4	65.0	72	G1/4	G1/4	55	25	60	21.4
	16	G1 1/2	57	35	G1 1/2	15	34	G1/4	76.5	80	G1/4	86.0	85	G1/4	G1/4	86	45	50	40
	25	G1 1/2	77	42	G1 1/2	30	34	G1/4	19	90	G1/4	109.0	90	G1/4	G1/4	103	50	50	52.1
200	10	G1 1/2	27	35	G1 1/2	3.5	45	G1/4	19	72	G1/4	62.0	72	G1/4	G1/4	50	25	72	21.4
	16	G1 1/2	57	35	G1 1/2	15	34	G1/4	76.5	80	G1/4	86.0	85	G1/4	G1/4	86	45	60	40
	25	G1 1/2	77	42	G1 1/2	30	34	G1/4	19	90	G1/4	109.0	90	G1/4	G1/4	103	50	60	52.1

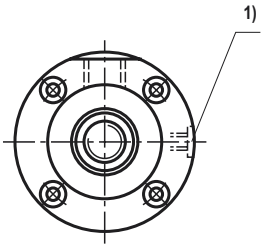
ØAL = piston Ø

[1] Not for MT4

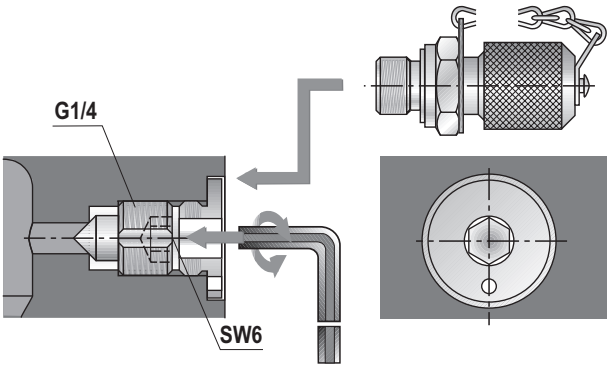
[2] Only for MT4

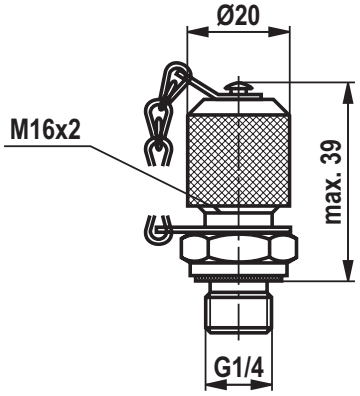
Bleeding / measuring coupling
(dimensions in mm)

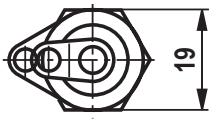
By default, a patented safety vent against unintended unscrewing in head and base is delivered for all cylinders. The port allows for the installation of a measuring coupling with check valve for pressure measurement or contamination-free bleeding. Measuring coupling with check valve function, i.e. the measuring or bleeding hose can also be connected when the system is pressurized.



1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)



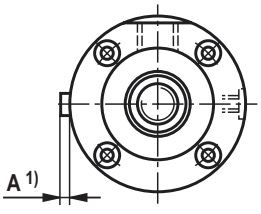




Scope of delivery: Measuring coupling **G1/4**
MEASURING COUPLING AB 20-11/K1 G1/4 with seal ring made of NBR
Material no. **R900009090**
MEASURING COUPLING AB 20-11/K1V G1/4 with seal ring made of FKM
Material no. **R900001264**

Dimensions: Throttle valve
(dimensions in mm)

ØAL	40	50	63	80	100	125	140	160	180	200	220	250	280	320
Protrusion A 1)	1	0	0	0	0	0	0	0	0	0	9.5	0	0	0
Nominal width	4	4	4	5	5	8	8	8	8	8	20	20	20	20



ØAL = piston Ø

1) Throttle valve only with end position cushioning "E" (180° for bleeding) Protrusion A in closed condition

Proximity switch
(dimensions in mm)

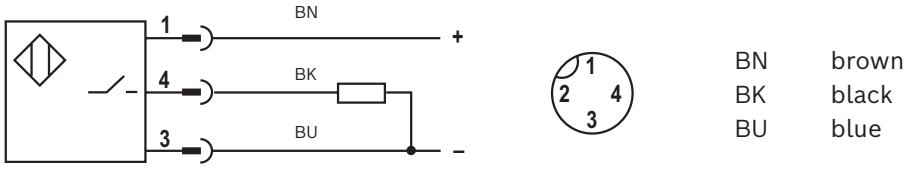
Inductive proximity switches are used as reliable end position control for hydraulic cylinders. They are an important element for the safe and exact monitoring of safety equipment, lockings and/or other machine functions in their end position by means of the output of signals. The proximity switch which is high-pressure-resistant up to 500 bar works in a contactless manner.

Consequently, it is wear-free. The proximity switch has been set at the factory. The switching distance must not be adjusted. The lock nut of the proximity switch is marked at the factory using sealing wax. On versions with proximity switch, the cylinders are provided with proximity switches on both sides.

Technical data
(For applications outside these values, please consult us!)

Electrical			
Function type			PNP normally open contact
Admissible pressure		bar	500
Operating voltage		V DC	10 ... 30
	including residual ripple	%	≤ 15
Voltage drop		V	≤ 15
Rated operating voltage		V DC	24
Rated operating current		mA	200
Idle current		mA	≤ 8
Residual current		µA	≤ 10
Repetition accuracy		%	≤ 5
Hysteresis		%	≤ 15
Ambient temperature range		°C	-25 ... +80
Temperature drift		%	≤ 10
Switching frequency		Hz	1000
Protection class according to DIN EN 60529	▶ Active area		IP68
	▶ Proximity switch		IP67
Housing material			Material no. 1.4104

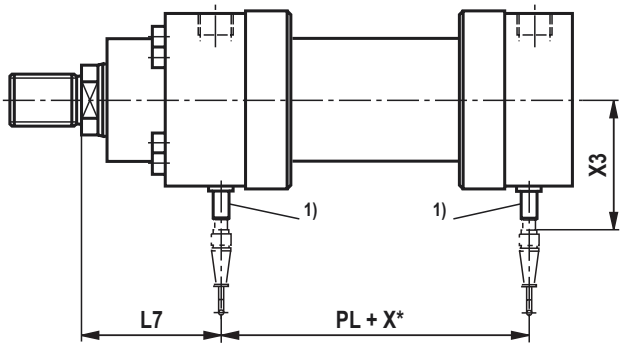
Pin assignment



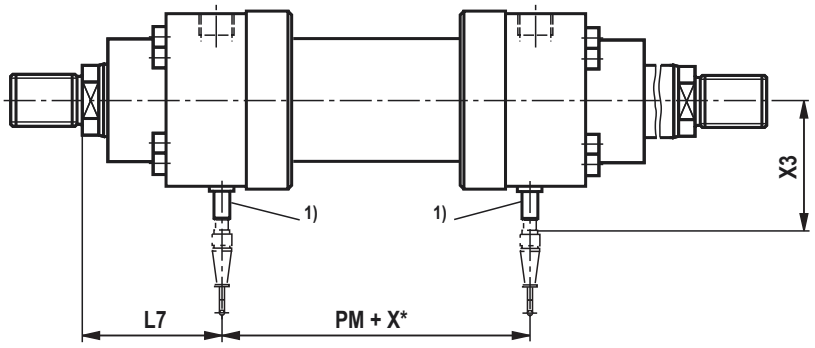
BN	brown
BK	black
BU	blue

Dimensions: Proximity switch (dimensions in mm)

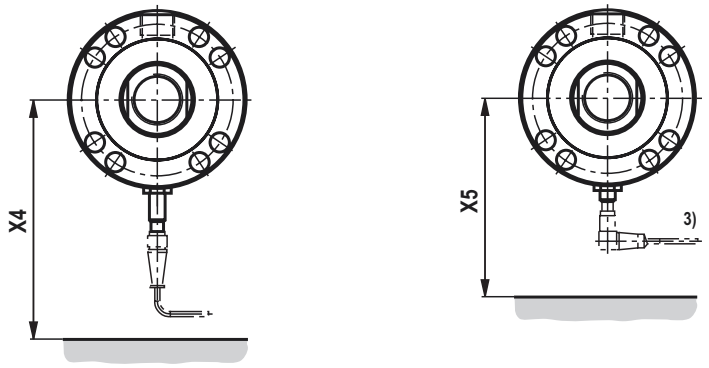
CDH1



CGH1

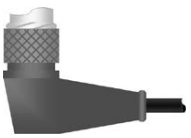


Installation space for mating connector



Mating connector with 5 m cable
Material no. **R913016852**
(mating connector is **not** included in the scope of delivery, must be ordered separately)

Mating connector, angled with 5 m cable (position of the cable outlet cannot be defined)
Material no. **R988064311**
(mating connector is **not** included in the scope of delivery, must be ordered separately)



Dimensions: Proximity switch (dimensions in mm)

ØAL	ØMM	PL	PM	L7	X3	X4	X5
40	**22** **28**	112	112	83	94	170	125
50	**28** **36**	110	110	92	98	175	130
63	**36** **45**	125	125	104	103	180	135
80	**45** **56**	138	138	108	108	185	140
100	**56** **70**	161	161	129	116	195	150
125	**70** **90**	189	189	143	126	205	160
140	**90** **100**	209	209	161	146	225	180
160	**100** **110**	228	228	191	151	230	185
180	**110** **125**	254	254	204	159	235	190
200	**125** **140**	264	264	212	166	245	200
220	**140** **160**	310	310	250	177 [2]	255	– [3]
250	**160** **180**	310	310	274	187 [2]	265	– [3]
280	**180** **200**	369	369	285	189 [2]	275	– [3]
320	**200** **220**	415	415	295	209 [2]	285	– [3]

Main dimensions see page 18 to 29

ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length

1) The proximity switch is always located opposite of the line connection
2) Piston Ø 220 - 320 mm
Proximity switch not protruding
3) Piston Ø 220 - 320 mm
Angled mating connector not possible

Position measurement system

The magnetostrictive position measurement system that is pressure-resistant and works contactless and absolute.

Operating conditions	
Protection class	IP67 (connector professionally mounted) IP68 at cable outlet
EMC test	Electro-magnetic interference emission according to EN 61000-6-3 Electro-magnetic interference resistance according to EN 61000-6-2 The sensor complies with EC directives and bears the CE marking

Technical data: Analog output
(For applications outside these values, please consult us!)

Analog "F" / "C"			
Electrical connection	Type of connection		1 x M16 connector (6-pole)
	Power consumption	W	<3.25
Operating conditions	Operating temperature	°C	-40 ... +85
Tightening torque M_A	≤ 1500 mm measurement length	Nm	50 ±4%
	> 1500 mm measurement length	Nm	65 ±4%
Wrench size SW		mm	46
Voltage "F"		V	0 ... 10
	Input resistance control system	kΩ	>5
	Resolution		16 bit (internal resolution 0.1 µm)
Current "C"		mA	4 ... 20
	Load	Ω	min/max: 0/500
	Resolution		16 bit (internal resolution 0.1 µm)

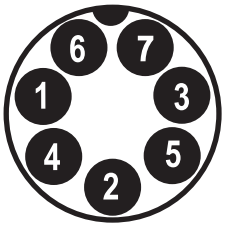
Connector
(View to pin side)

Pin	Cable	Function
1	gray	Position 1 (solenoid)
2	pink	DC ground
3	yellow	not used
4	green	DC ground
5	brown	+12 ... 30 VDC ±20% (9.6 ... 36 VDC)
6	white	DC ground (0 V)

Technical data: Digital output
(For applications outside these values, please consult us!)

Digital "D" / "S"			
Electrical connection	Type of connection		1 x M16 connector (7-pole)
	Power consumption	W	1.2 typical
Operating conditions	Operating temperature	°C	-40 ... +85
Tightening torque M_A	≤ 1500 mm measurement length	Nm	50 ±4%
	> 1500 mm measurement length	Nm	65 ±4%
Wrench size SW		mm	46
SSI "D"	Interface		SSI 24 bit (RS-485/RS-422)
	Resolution	µm	5
	Direction of measurement		asynchronious forward
	Data format		Gray
SSI "S"	Interface		SSI 24 bit (RS-485/RS-422)
	Resolution	µm	1
	Direction of measurement		synchronious forward
	Data format		Gray

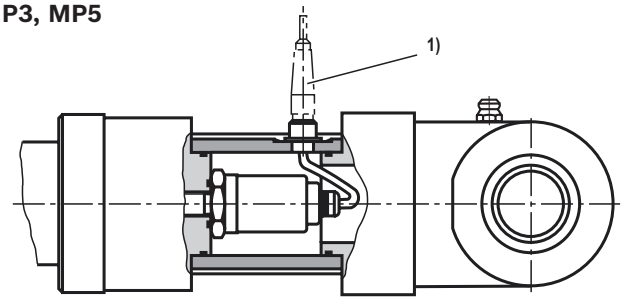
Connector
(View to pin side)



Pin	Cable	Function
1	gray	Data (-)
2	pink	Data (+)
3	yellow	Clock (+)
4	green	Clock (-)
5	brown	+12 ... 30 VDC ±20% (9.6 ... 36 VDC)
6	white	DC ground (0 V)
7	-	not used

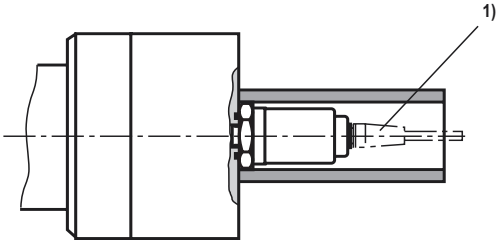
Types of mounting

MP3, MP5

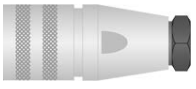


1) For analog output:
6-pole amphenol mating connector, material no. R900072231
(mating connector is **not** included in the scope of delivery, must be ordered separately)

MF3, MF4, MT4, MS2



1) For digital output:
7-pole amphenol mating connector, material no. R900079551
(mating connector is **not** included in the scope of delivery, must be ordered separately)

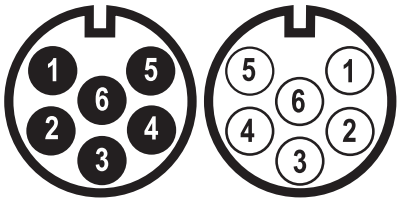


Technical data: Profibus
(For applications outside these values, please consult us!)

Profibus "N" / "P"			**Profibus 63 / Profibus 53**
Electrical connection	Type of connection		2 x M16 connector (6-pole), alternatively 2 x M12 connector (5-pole) and 1 x M8 connector (4-pole)
	Current consumption	mA	90, typical
Operating conditions	Operating temperature	°C	-40 ... +75
Tightening torque M_A		Nm	65 ±4%
Wrench size SW		mm	46
Output	Interface		IEC 61158 CPF3 PROFIBUS
	Data record		PROFIBUS-DP slave
	Transmission rate	MBit/s	max. 12
Measurement accuracy	Travel resolution	µm	1 ... 1000 selectable as parameter
	Velocity		With 5 µm travel resolution: 0.64 mm/s to 500 mm; 0.43 mm/s to 2000 mm; 0.21 mm/s to 4500 mm; 0.14 mm/s to 7600 mm measurement length With 2 µm travel resolution: 2.5 times smaller values
	Linearity		< ± 0.01% Full Scale (Minimum +/– 50 µm)
	Repeatability		< ± 0.001% Full Scale (Minimum +/– 2.5 µm)
	Temperature coefficient	ppm/°C	< 15
	Hysteresis	µm	< 4

Pin assignment for Profibus

Pin assignment for Profibus D63

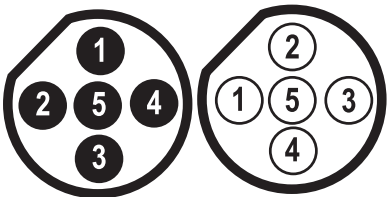


Pins Sockets

Pin	Cable	Function
1	green	RxD/TxD-N (bus)
2	red	RxD/TxD-P (bus)
3	––	DGND (terminating resistor) *
4	––	VP (terminating resistor) *
5	black	+24 V DC (–15 / +20%)
6	blue	DC ground (0 V)
––	yellow/green	Shield compensating line, is usually not to be connected

* only with sockets

Pin assignment for Profibus D53

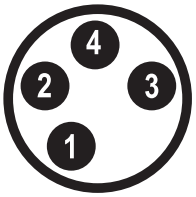


Pins Sockets

Pin	Cable	Function
1	––	VP+5 (terminating resistor) *
2	green	RxD/TxD-N (bus)
3	––	DGND (terminating resistor) *
4	red	RxD/TxD-P (bus)
5	Shield	Shield

* only with sockets

Supply

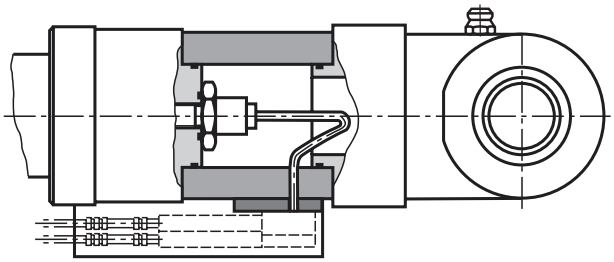


View connector side

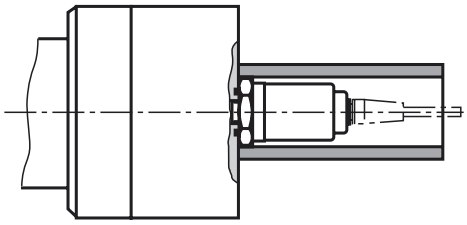
Pin	Cable	Function
1	brown	+24 V DC (–15 / +20%)
2	white	not used
3	blue	DC ground (0 V)
4	black	not used

Types of mounting

MP3, MP5



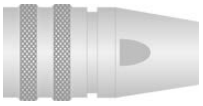
MF3, MF4, MT4, MS2



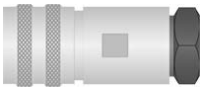
The output of the position measurement system is by default always rotated by 180° to the selected position of the hydraulic connection in the cylinder base.

Mating connectors for D63

Signal input
6-pole mating connector M16
Material no. R900705950 (socket)



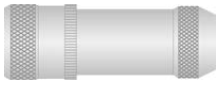
Signal output
6-pole end plug M16
Material no. R900722518 (pins)



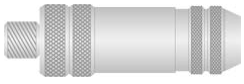
Signal output
6-pole mating connector M16
Material no. R900705951 (pins)

Mating connectors for D53

Signal input
5-pole mating connector M12-B
Material no. R900773386 (socket)



4-pole mating connector M8
Material no. R901132799



Signal output
5-pole mating connector M12-B
Material no. R901091655 (pins)

Connection cable 5 m with
4-pole mating connector M8
Material no. R901213191

Connection cable 10 m with
4-pole mating connector M8
Material no. R913008737

Connection cable 15 m with
4-pole mating connector M8
Material no. R913008738

Signal output
5-pole end plug M12-B
Material no. R901070126 (pins)

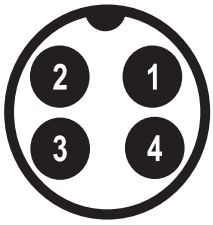
Mating connector is **not** included in the scope of delivery, must be ordered separately.

Technical data: IO-Link
(For applications outside these values, please consult us!)

IO-Link "L"			**IO-Link V1.1**
Electrical connection	Type of connection		1 x M12 connector (4-pole)
	Operating voltage	VDC	+24 (± 25%) / residual ripple ≤ 0.28 Vpp
	Current consumption	mA	< 50
Operating conditions	Operating temperature	°C	-40 ... +75
Tightening torque M_A		Nm	50 ±4%
Wrench size SW		mm	34
Output	Interface		Digital
	Transmission record		IO-Link V1.1
	Data format	Bit	32 signed (position in µm)
	Data transmission rate		COM3 (230.4 kBaud)
	Process data Device - Master	Bytes	4
	Process data Master - Device	Bytes	0
	Measured variable	MBit/s	Position
Measured values	Resolution [1]	µm	5; 10; 20; 50 or 100
	Cycle time:	ms	Minimum 1 (depending on master)
	Linearity [2]	%	≤ ±0.02 F.S. (Minimum ±60 µm)
	Measurement repetition accuracy	%	≤ ±0.005 F.S. (Minimum ±20 µm)

[1] Selectable via IO-Link Master.
[2] Tested with position magnet 251 416-2.

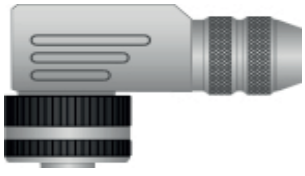
M12 connector (A-coded)
View to sensor



Pin	Function
1	+ 24 VDC (± 25%)
2	DI / DQ
3	DC ground (0 V)
4	C / Q

Mating connectors

M12 A-coded (5-pole), straight
Material number: R913045873



M12 A-coded (5-pole), angled
Material number: R901500328

Mating connector is **not** included in the scope of delivery, must be ordered separately.

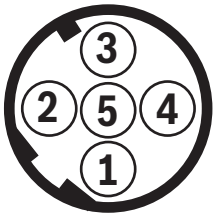
Technical data: Profinet
(For applications outside these values, please consult us!)

Profinet "R"			**Profinet RT / Profinet IRT version 2.3**				
Electrical connection	Type of connection		2 x M12 device socket (5-pole) 1 x M12 connector (4-pole)				
	Operating voltage	VDC	+12 ... 30 (± 20%) (9.6 ... 36)				
	Power consumption	W	< 4 typical				
Operating conditions	Operating temperature	°C	-40 ... +85				
Tightening torque M_A		Nm	65 ±4%				
Wrench size SW		mm	46				
Output	Interface		Profinet RT				
			Profinet IRT version 2.3				
	Data record		MTS profile and encoder profile 4.1				
	Data transmission rate	MBit/s	max. 100				
Measured values	Resolution	µm	0,5 ... 100 (selectable)				
	Cycle time [1] Measurement length	mm	≤ 50	≤ 715	≤ 2000	≤ 4675	≤ 7620
	Cycle time:	µs	250	500	1000	2000	4000
	Linearity deviation [2] Measurement length	mm	≤ 500		> 500		
	linearity deviation	µm	≤ ± 50		< 0.01% F.S		
	Measurement repetition accuracy	%	≤ ±0.001 F.S. (Minimum ±2.5 µm) typical				
	Hysteresis	µm	< 4 typical				
	Temperature coefficient	ppm/K	< 15 typical				

[1] Sensor with standard settings

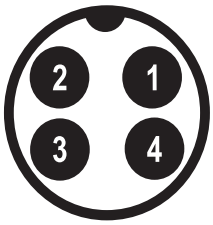
[2] Tested with position magnet 251 416-2.

M12 device socket (D-coded)
Port 1 and 2 - signal
(View to sensor)



Pin	Function
1	Tx (+)
2	Rx (+)
3	Tx (–)
4	Rx (–)
5	Not used

M12 connector (A-coded)

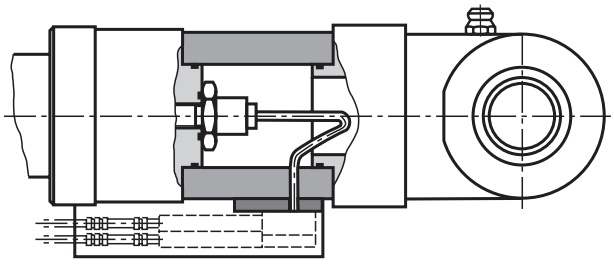


Pin	Function
1	+12...30 VDC (±20%)
2	Not used
3	DC ground (0 V)
4	Not used

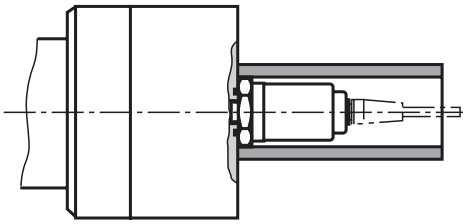
Technical data: Profinet

Types of mounting

MP3, MP5



MF3, MF4, MT4, MS2



The output of the position measurement system is by default always rotated by 180° to the selected position of the hydraulic connection in the cylinder base.

Mating connectors

M12 D-coded (4-pole), straight

Material number: R913045872
(required 2 x)

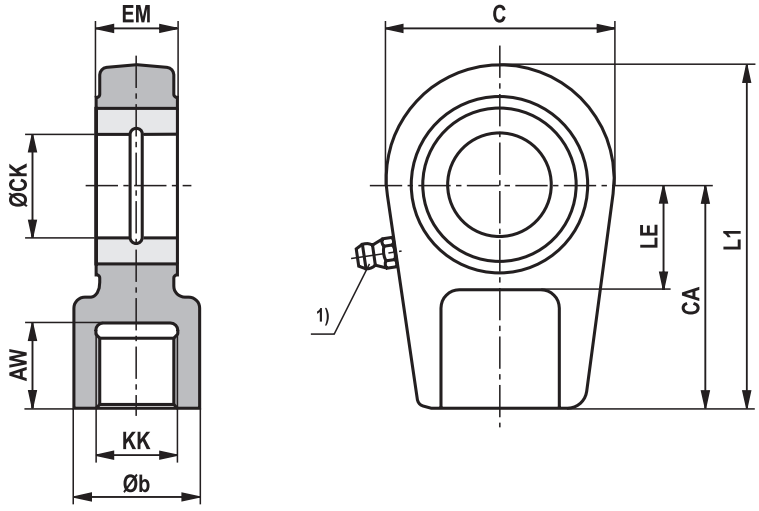
M12 A-coded (5-pole), straight

Material number: R913045873

Mating connector is **not** included in the scope of delivery, must be ordered separately.

Plain clevis CSA
(dimensions in mm)

ØAL 40-200 mm



ØAL	Type	Material no.	AW	Øb	C	CA	ØCK H11	EM -0.4	KK	LE	L1	*m* 2) kg	C_0 3) kN	F_{adm} 4) kN
40	**CSA 16**	R900303150	17	28	56	50	25	23	M16x1,5	25	80	0.43	72	25.9
50	**CSA 22**	R900303151	23	34	64	60	30	28	M22x1,5	30	94	0.7	106	38.2
63	**CSA 28**	R900303152	29	44	78	70	35	30	M28x1,5	40	112	1.1	153	55.1
80	**CSA 35**	R900303153	36	55	94	85	40	35	M35x1,5	45	135	2.0	250	90.0
100	**CSA 45**	R900303154	46	70	116	105	50	40	M45x1,5	55	168	3.3	365	131.4
125	**CSA 58**	R900303155	59	87	130	130	60	50	M58x1,5	65	200	5.5	400	144.0
140	**CSA 65**	R900303156	66	93	154	150	70	55	M65x1,5	75	232	8.6	540	194.4
160	**CSA 80**	R900303157	81	125	176	170	80	60	M80x2	80	265	12.2	670	241.2
180	**CSA100**	R900303158	101	143	206	210	90	65	M100x2	90	323	21.5	980	352.8
200	**CSA110**	R900303159	111	153	230	235	100	70	M110x2	105	360	27.5	1120	403.2

The specified dimensions are maximum values and may differ depending on the manufacturer.
The following values are excluded: CA, CK, EM, KK
The plain clevis must always be screwed against the shoulder of the piston rod and secured against loosening!

ØAL = piston Ø

1) Grease nipple, cone head form A according to DIN 71412

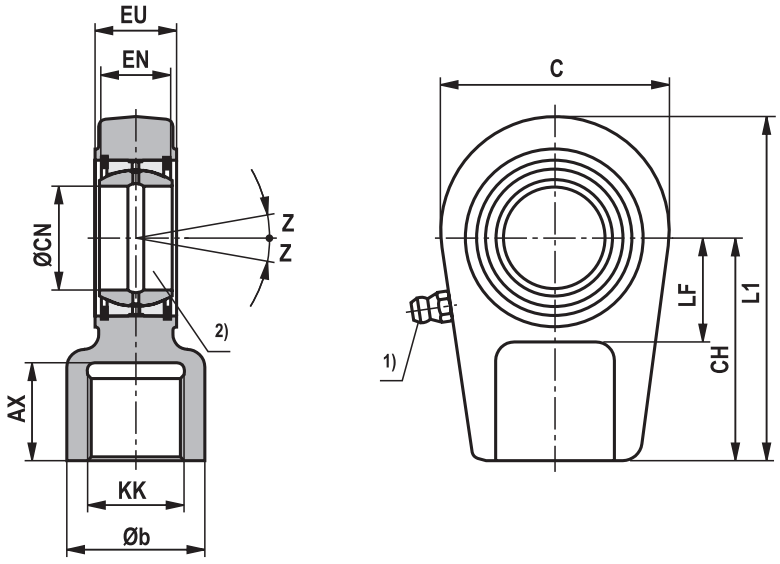
2) ***m*** = weight of plain clevis in kg

3) C_0 = static load rating of the plain clevis

4) F_{adm} = max. admissible load of the plain clevis for oscillatory or alternating loads

Swivel head CGA
(dimensions in mm)

ØAL 40-280 mm



ØAL	Type	AX min	Øb max	C	CH	ØCN 2)	EN	EU -0.4	KK	L1	LF min	Z	*m* 3) kg
40	**CGA 16**	17	26	56	50	$25_{-0.010}$	$20_{-0.12}$	23	M16x1,5	80	28	7 °	0.43
50	**CGA 22**	23	33	64	60	$30_{-0.010}$	$22_{-0.12}$	28	M22x1,5	94	30	6 °	0.7
63	**CGA 28**	29	41	78	70	$35_{-0.012}$	$25_{-0.12}$	30	M28x1,5	112	38	6 °	1.1
80	**CGA 35**	36	50	94	85	$40_{-0.012}$	$28_{-0.12}$	35	M35x1,5	135	45	7 °	2.0
100	**CGA 45**	46	62	116	105	$50_{-0.012}$	$35_{-0.12}$	40	M45x1,5	168	55	6 °	3.3
125	**CGA 58**	59	76	130	130	$60_{-0.015}$	$44_{-0.15}$	50	M58x1,5	200	65	6 °	5.5
140	**CGA 65**	66	87	154	150	$70_{-0.015}$	$49_{-0.15}$	55	M65x1,5	232	75	6 °	8.6
160	**CGA 80**	81	106	176	170	$80_{-0.015}$	$55_{-0.15}$	60	M80x2	265	80	6 °	12.2
180	**CGA100**	101	125	206	210	$90_{-0.020}$	$60_{-0.20}$	65	M100x2	323	90	5 °	21.5
200	**CGA110**	111	139	230	235	$100_{-0.020}$	$70_{-0.20}$	70	M110x2	360	105	7 °	27.5
220	**CGA120**	125	153	265	265	$110_{-0.020}$	$70_{-0.20}$	80	M120x3	407.5	115	6 °	40.7
250	**CGA120**	125	153	265	265	$110_{-0.020}$	$70_{-0.20}$	80	M120x3	407.5	115	6 °	40.7
280	**CGA130**	135	173	340	310	$120_{-0.020}$	$85_{-0.20}$	90	M130x3	490	140	6 °	76.4

ØAL	Type	Material no. requiring maintenance	Material no. maintenance-free	C_0 4) kN	F_{adm} 5) kN
40	**CGA 16**	R900303125	R900322702	72	35.9
50	**CGA 22**	R900303126	R900321695	106	38.2
63	**CGA 28**	R900303127	R900321653	153	55.1
80	**CGA 35**	R900303128	R900321694	250	90.0
100	**CGA 45**	R900303129	R900321667	365	131.4
125	**CGA 58**	R900303130	R900321693	400	144.0
140	**CGA 65**	R900303131	R900323345	540	194.4
160	**CGA 80**	R900303132	R900321669	670	241.2
180	**CGA100**	R900303133	R900323349	980	352.8
200	**CGA110**	R900303134	R900868406	1120	403.2
220	**CGA120**	R900303135	R900321668	1700	612.0
250	**CGA120**	R900303135	R900321668	1700	612.0
280	**CGA130**	R900303136	On request	2900	1044.0

The specified dimensions are maximum values and may differ depending on the manufacturer.
The following values are excluded: CH, CN, EN, EU, KK

The swivel head must always be screwed against the shoulder of the piston rod and secured against loosening!

ØAL = piston Ø

1) Grease nipple, cone head form A according to DIN 71412; not applicable to spherical bearing, maintenance-free "A"

2) Related bolt Ø m6;
Related bolt Ø j6 with maintenance-free spherical bearing

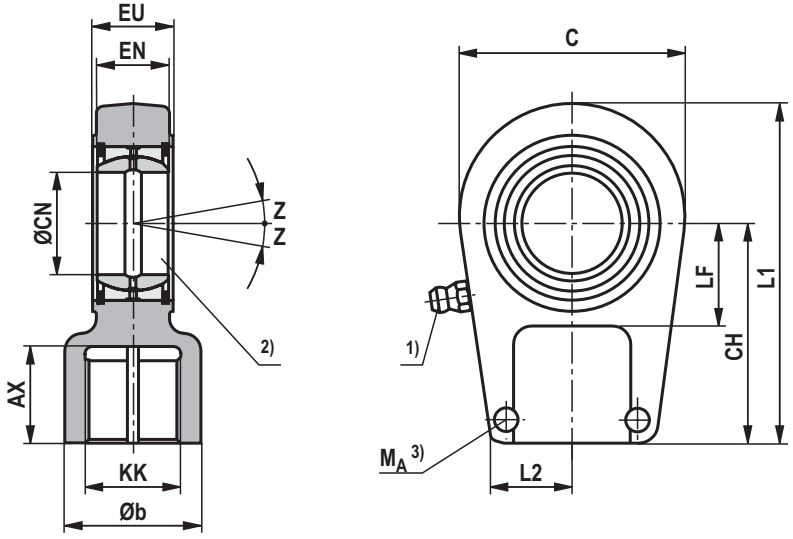
3) ***m*** = weight of swivel head in kg

4) C_0 = static load rating of the swivel head

5) F_{adm} = max. admissible load of the swivel head with oscillatory or alternating loads

Swivel head CGAK (clampable)
(dimensions in mm)

ØAL 40-280 mm



ØAL	Type	Material no. requiring maintenance	Material no. maintenance-free	C_0 4) kN	F_{adm} 5) kN	AX min	Øb max	C	CH	ØCN 2)	EN	EU -0.4	KK
40	**CGAK 16**	R900303162	R900321784	72	35.9	17	26	56	50	$25_{-0.010}$	$20_{-0.12}$	23	M16x1,5
50	**CGAK 22**	R900303163	R900321683	106	38.2	23	33	64	60	$30_{-0.010}$	$22_{-0.12}$	28	M22x1,5
63	**CGAK 28**	R900303164	R900300717	153	55.1	29	41	78	70	$35_{-0.012}$	$25_{-0.12}$	30	M28x1,5
80	**CGAK 35**	R900303165	R900322738	250	90.0	36	50	94	85	$40_{-0.012}$	$28_{-0.12}$	35	M35x1,5
100	**CGAK 45**	R900303166	R900322019	365	131.4	46	62	116	105	$50_{-0.012}$	$35_{-0.12}$	40	M45x1,5
125	**CGAK 58**	R900303167	R900322020	400	144.0	59	76	130	130	$60_{-0.015}$	$44_{-0.15}$	50	M58x1,5
140	**CGAK 65**	R900303168	R900324812	540	194.4	66	87	154	150	$70_{-0.015}$	$49_{-0.15}$	55	M65x1,5
160	**CGAK 80**	R900303169	R900541157	670	241.2	81	106	176	170	$80_{-0.015}$	$55_{-0.15}$	60	M80x2
180	**CGAK100**	R900321655	R900323305	980	352.8	101	125	206	210	$90_{-0.020}$	$60_{-0.20}$	65	M100x2
200	**CGAK110**	R900321691	R900329997	1120	403.2	111	139	231	235	$100_{-0.020}$	$70_{-0.20}$	70	M110x2
220	**CGAK120**	R900321621	R900323333	1700	612.0	125	155	266	265	$110_{-0.020}$	$70_{-0.20}$	80	M120x3
250	**CGAK120**	R900321621	R900323333	1700	612.0	125	153	265	265	$110_{-0.020}$	$70_{-0.20}$	80	M120x3
280	**CGAK130**	R900322015	R900540850	2900	1044.0	135	173	340	310	$120_{-0.020}$	$85_{-0.20}$	90	M130x3

Swivel head CGAK (clampable)
(dimensions in mm)

ØAL	Type	L1	L2 max	LF	Z	Clamping screws ISO 4762-10.9	M_A [3] Nm	m [4] kg
40	**CGAK 16**	80	24	28	7 °	M8	30	0.43
50	**CGAK 22**	94	26	30	6 °	M8	30	0.7
63	**CGAK 28**	112	34	38	6 °	M10	54	1.1
80	**CGAK 35**	135	39	45	7 °	M10	59	2.0
100	**CGAK 45**	168	46	55	6 °	M12	100	3.3
125	**CGAK 58**	200	61	65	6 °	M16	250	5.5
140	**CGAK 65**	232	66	75	6 °	M16	250	8.6
160	**CGAK 80**	265	81	80	6 °	M20	490	12.2
180	**CGAK100**	323	91	90	5 °	M20	490	21.5
200	**CGAK110**	360	101	105	7 °	M24	840	27.5
220	**CGAK120**	407.5	111	115	6 °	M24	840	40.7
250	**CGAK120**	407.5	111	115	6 °	M24	840	40.7
280	**CGAK130**	490	129	140	6 °	M24	840	76.4

The specified dimensions are maximum values and may differ depending on the manufacturer.
The following values are excluded: CH, CN, EN, EU, KK

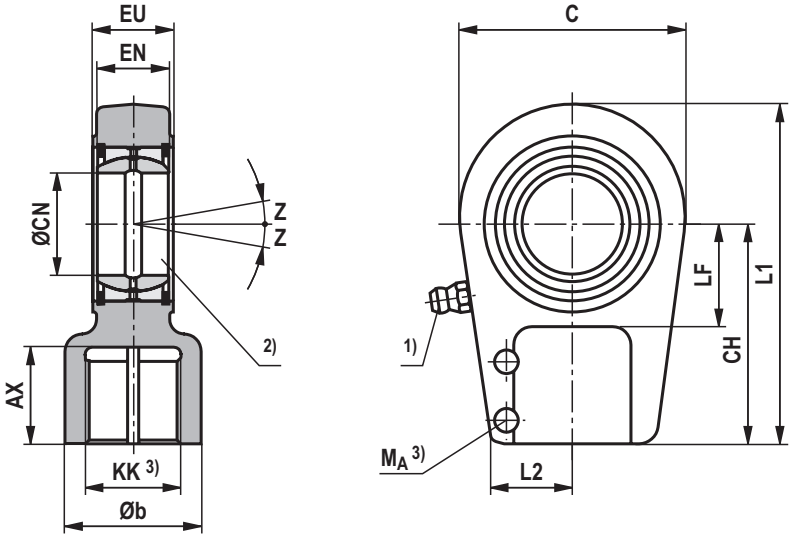
The swivel head must always be screwed against the shoulder of the piston rod and secured against loosening!

ØAL = piston Ø

1) Grease nipple, cone head form A according to DIN 71412; not applicable to spherical bearing, maintenance-free "A"
2) Related bolt Ø m6; Related bolt Ø j6 with maintenance-free spherical bearing
3) M_A = tightening torque
4) m = weight of swivel head in kg
5) C_0 = static load rating of the swivel head
6) F_{adm} = max. admissible load of the swivel head with oscillatory or alternating loads

Swivel head CGAS (clampable)
(dimensions in mm)

ØAL 40-320 mm



ØAL	Type	Material no. requiring maintenance	Material no. maintenance-free	C_0 6) kN	F_{adm} 7) kN	AX min	Øb max	C max	CH	ØCN 2)	EN	EU -0.4	KK
40	**CGAS 25**	R900303137	R900321681	82	27.1	30	28	56	65	$25_{-0.010}$	$20_{-0.12}$	23	M18x2
50	**CGAS 30**	R900303138	R900321696	122	40.3	35	34	64	75	$30_{-0.010}$	$22_{-0.12}$	28	M24x2
63	**CGAS 35**	R900303139	R900322716	177	58.4	46	46	78	90	$35_{-0.012}$	$25_{-0.12}$	30	M30x2
80	**CGAS 40**	R900303140	R900321665	287	94.7	56	57	94	105	$40_{-0.012}$	$28_{-0.12}$	35	M39x3
100	**CGAS 50**	R900303141	R900322017	422	139.3	76	70	116	135	$50_{-0.012}$	$35_{-0.12}$	40	M50x3
125	**CGAS 60**	R900303142	R900321685	522	172.3	96	87	130	170	$60_{-0.015}$	$44_{-0.15}$	50	M64x3
140	**CGAS 70**	R900303143	R900321690	707	233.3	112	111	154	195	$70_{-0.015}$	$49_{-0.15}$	55	M80x3
160	**CGAS 80**	R900303144	R900322022	870	287.1	122	129	176	210	$80_{-0.015}$	$55_{-0.15}$	60	M90x3
180	**CGAS 90**	R900303145	R900323344	1284	423.7	142	153	211	250	$90_{-0.020}$	$60_{-0.20}$	65	M100x3
200	**CGAS100**	R900303146	R900321689	1460	481.8	152	170	230	275	$100_{-0.020}$	$70_{-0.20}$	70	M110x4
220	**CGAS110**	R900303147	R900323326	2024	667.9	162	180	264	300	$110_{-0.020}$	$70_{-0.20}$	80	M120x4
250	**CGAS110**	R900303147	R900323326	2024	667.9	162	180	264	300	$110_{-0.020}$	$70_{-0.20}$	80	M120x4
280	**CGAS120**	R900303148	R900324830	2970	980.1	192	210	340	360	$120_{-0.020}$	$85_{-0.20}$	90	M150x4
320	**CGAS140**	R900317314	R900540515	3350	1105.5	210	230	380	420	$140_{-0.025}$	$90_{-0.25}$	110	M160x4

Swivel head CGAS (clampable)
(dimensions in mm)

ØAL	Type	L1 max	L2 max	LF min	Z [3]	Clamping screws ISO 4762-10.9	M_A [4] Nm	m [5] kg
40	**CGAS 25**	95	24	25	7-8 °	M8	30	0.65
50	**CGAS 30**	109	28	30	6-7 °	M8	30	1.0
63	**CGAS 35**	132	36	40	6-7 °	M10	59	1.5
80	**CGAS 40**	155	39	44	7 °	M12	100	2.4
100	**CGAS 50**	198	45	55	6-7 °	M12	100	4.8
125	**CGAS 60**	240	59	65	6-7 °	M16	250	8.6
140	**CGAS 70**	279	70	75	6 °	M16	250	12.2
160	**CGAS 80**	305	85	80	6 °	M20	490	18.4
180	**CGAS 90**	366	91	90	5 °	M20	490	31.6
200	**CGAS100**	400	95	105	7 °	M20	490	34
220	**CGAS110**	443	106	115	6 °	M24	840	44
250	**CGAS110**	443	106	115	6 °	M24	840	44
280	**CGAS120**	540	122	140	6 °	M24	840	75
320	**CGAS140**	620	129	185	7 °	M30	1700	160

The specified dimensions are maximum values and may differ depending on the manufacturer.
The following values are excluded: CH, CN, EN, EU, KK

The swivel head must always be screwed against the shoulder of the piston rod and secured against loosening!

ØAL = piston Ø

1) Grease nipple, cone head form A according to DIN 71412;
not applicable to spherical bearing, maintenance-free "A"

2) Related bolt Ø m6;
Related bolt Ø j6 for maintenance-free
Spherical bearing

3) Dimensions may differ depending on the manufacturer

4) M_A = tightening torque

5) m = weight of swivel head in kg

6) C_0 = static load rating of the swivel head

7) F_{adm} = max. admissible load of the swivel head with oscillatory or alternating loads

Buckling

For the admissible stroke length with flexibly guided load and a factor of 3.5 for safety against buckling, please refer to the relevant table. For other installation positions of the cylinder, the admissible stroke length must be interpolated. Admissible stroke length for non-guided load on request. Buckling calculations are carried out according to the following formulas:

1. Calculation according to Euler

$$F = \frac{\pi^2 \cdot E \cdot I}{v \cdot L_K^2} \qquad \text{if } \lambda > \lambda_g$$

2. Calculation according to Tetmajer

$$F = \frac{d^2 \cdot \pi \,(335\text{-}0.62 \cdot \lambda)}{4 \cdot v} \qquad \text{if } \lambda \le \lambda_g$$

Explanation:

E = module of elasticity in N/mm²
= 2.1 x 10^5 for steel

I = geometrical moment of inertia in mm⁴ for circular cross-section = $\frac{d^4 \cdot \pi}{64}$ = $0.0491 \cdot d^4$

v = 3.5 (safety factor)

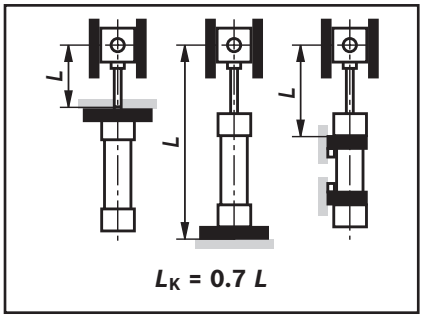
L_K = free bending length in mm (depending on the type of mounting see sketches A, B, C)

d = Piston rod Ø in mm

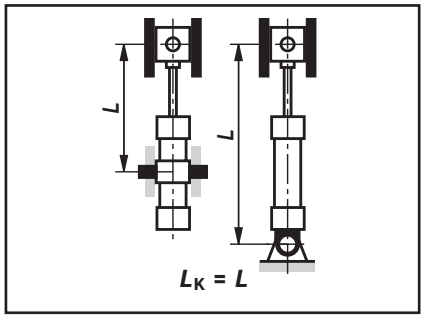
λ = Slenderness ratio
= $\frac{4 \cdot L_K}{d}$ $\qquad \lambda_g = \pi \sqrt{\frac{E}{0.8 \cdot R_e}}$

R_e = yield strength of the piston rod material

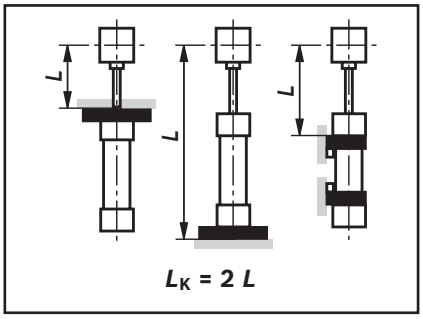
Influence of the type of mounting on the bending length:



$L_K = 0.7\ L$



$L_K = L$



$L_K = 2\ L$

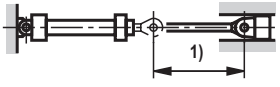
Admissible stroke length
(dimensions in mm)

Type of mounting CDH1/CSH1 [2]: MP3, MP5

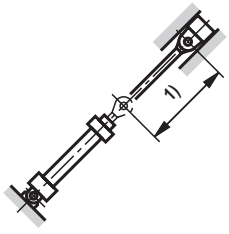
ØAL	ØMM	Admissible stroke length with 100 bar 0 °	100 bar 45 °	100 bar 90 °	160 bar 0 °	160 bar 45 °	160 bar 90 °	250 bar 0 °	250 bar 45 °	250 bar 90 °
40	**22**	195	200	215	130	135	140	40	45	55
	28	385	400	445	295	300	320	215	220	225
50	**28**	285	295	310	205	210	215	120	130	135
	36	535	555	625	425	430	460	320	325	335
63	**36**	390	400	440	290	295	305	200	205	210
	45	655	685	790	530	545	585	410	415	430
80	**45**	500	515	560	375	385	400	240	260	280
	56	815	850	980	665	680	735	520	525	545
100	**56**	610	630	705	470	480	505	280	295	355
	70	985	1030	1240	820	845	930	650	660	695
125	**70**	770	800	900	600	615	650	360	380	465
	90	1295	1360	1670	1095	1130	1265	885	900	955
140	**90**	1145	1200	1430	945	970	1070	740	755	790
	100	1400	1475	1840	1190	1230	1390	965	985	1050
160	**100**	1230	1285	1530	1010	1040	1140	790	800	840
	110	1480	1555	1930	1250	1290	1455	1005	1030	1090
180	**110**	1305	1365	1630	1065	1095	1200	825	840	880
	125	1675	1765	2210	1420	1470	1670	1150	1175	1260
200	**125**	1500	1580	1930	1240	1290	1430	985	1005	1060
	140	1865	1965	2520	1590	1660	1910	1305	1340	1440
220	**140**	1620	1710	2180	1360	1415	1630	1090	1120	1200
	160	2075	2200	3000	1810	1890	2280	1510	1560	1730
250	**160**	1885	1990	2570	1600	1670	1930	1300	1330	1440
	180	2330	2475	3370	2040	2135	2570	1710	1770	1960
280	**180**	2075	2200	2900	1775	1880	2170	1450	1490	1620
	200	2510	2670	3700	2200	2310	2820	1850	1920	2140
320	**200**	2170	2300	3070	1850	1940	2290	1500	1550	1700
	220	2590	2760	3850	2260	2380	2920	1890	1960	2200

Installation position

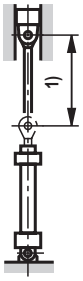
0 °



45 °



90 °

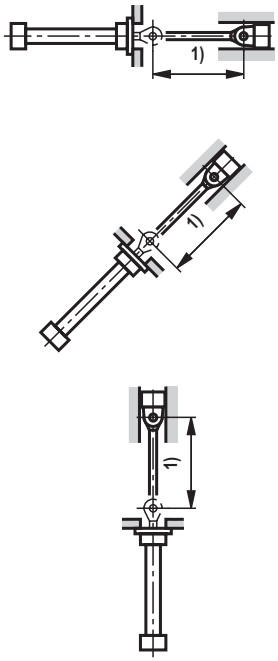


[1] Adm. Stroke length

Admissible stroke length
(dimensions in mm)

Type of mounting CDH1/CGH1/CSH1 [2]: MF3

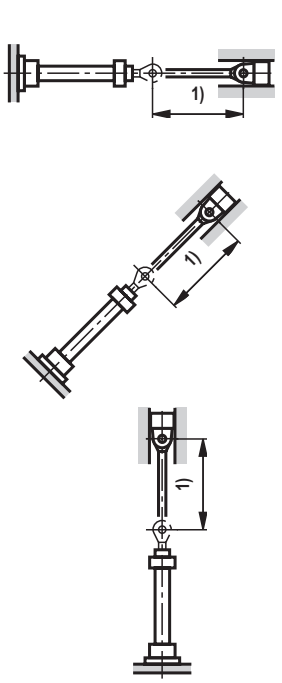
ØAL	ØMM	Admissible stroke length with 100 bar			160 bar			250 bar			Installation position
		0 °	45 °	90 °	0 °	45 °	90 °	0 °	45 °	90 °	
40	22	895	915	980	730	735	760	440	450	510	0 °
	28	1400	1415	1630	1180	1205	1275	970	980	1010	
50	28	1180	1200	1280	955	965	995	700	730	780	
	36	1785	1855	2160	1530	1570	1695	1275	1290	1340	
63	36	1520	1560	1690	1250	1270	1315	1010	1015	1035	
	45	2000	2000	2000	1875	1925	2000	1570	1595	1670	
80	45	1855	1905	2000	1540	1560	1630	1140	1180	1280	
	56	2000	2000	2000	2000	2000	2000	1910	1940	2000	
100	56	2250	2320	2500	1880	1910	2010	1300	1360	1580	
	70	3000	3000	3000	2770	2860	3000	2360	2400	2550	
125	70	2760	2860	3000	2330	2375	2520	1580	1680	1990	45 °
	90	3000	3000	3000	3000	3000	3000	3000	3000	3000	
140	90	3000	3000	3000	3000	3000	3000	2770	2820	2980	
	100	3000	3000	3000	3000	3000	3000	3000	3000	3000	
160	100	3000	3000	3000	3000	3000	3000	2980	3000	3000	
	110	3000	3000	3000	3000	3000	3000	3000	3000	3000	
180	110	3000	3000	3000	3000	3000	3000	3000	3000	3000	
	125	3000	3000	3000	3000	3000	3000	3000	3000	3000	
200	125	3000	3000	3000	3000	3000	3000	3000	3000	3000	
	140	3000	3000	3000	3000	3000	3000	3000	3000	3000	
220	140	5400	5680	6000	4800	4980	5780	4120	4220	4560	90 °
	160	6000	6000	6000	5820	6000	6000	5150	5330	6000	
250	160	6000	6000	6000	5450	5660	6000	4720	4840	5290	
	180	6000	6000	6000	6000	6000	6000	5730	5920	6000	
280	180	6000	6000	6000	6000	6000	6000	5270	5420	5970	
	200	6000	6000	6000	6000	6000	6000	6000	6000	6000	
320	200	6000	6000	6000	6000	6000	6000	6000	6000	6000	
	220	6000	6000	6000	6000	6000	6000	6000	6000	6000	



[1] Adm. Stroke length

Type of mounting CDH1/CSH1 [2]: MF4

ØAL	ØMM	Admissible stroke length with 100 bar			160 bar			250 bar			Installation position
		0 °	45 °	90 °	0 °	45 °	90 °	0 °	45 °	90 °	
40	22	325	340	370	245	250	260	105	110	140	0 °
	28	565	590	695	465	475	520	365	370	385	
50	28	455	470	515	350	360	375	220	230	265	
	36	770	805	960	640	660	725	515	525	550	
63	36	600	620	710	475	490	520	350	370	380	
	45	930	975	1210	790	820	920	645	660	700	
80	45	760	785	895	610	625	670	395	420	495	
	56	1150	1210	1495	985	1020	1145	810	825	875	
100	56	905	945	1120	745	765	835	420	460	620	
	70	1370	1445	1880	1190	1235	1440	995	1020	1100	
125	70	1175	1225	1460	980	1010	1105	580	620	835	45 °
	90	1815	1920	2560	1600	1670	1980	1365	1400	1540	
140	90	1600	1695	2190	1390	1440	1670	1150	1180	1275	
	100	1915	2030	2770	1695	1770	2130	1440	1490	1650	
160	100	1730	1825	2350	1490	1550	1790	1235	1265	1365	
	110	2030	2155	2910	1790	1870	2240	1520	1565	1720	
180	110	1850	1950	2510	1590	1655	1900	1310	1340	1450	
	125	2295	2440	3000	2030	2130	2570	1730	1785	1980	
200	125	2110	2230	2270	1835	1910	2250	1530	1575	1720	
	140	2540	2700	3000	2265	2380	2930	1945	2010	2260	
220	140	2250	2400	3350	1990	2090	2550	1685	1740	1950	90 °
	160	2800	2990	4500	2530	2680	3480	2220	2310	2700	
250	160	2615	2780	3900	2320	2435	3000	1980	2050	2300	
	180	3140	3360	5050	2850	3010	3910	2500	2610	3050	
280	180	2850	3050	4400	2550	2680	3370	2190	2270	2600	
	200	3370	3610	5550	3070	3250	4300	2700	2820	3330	
320	200	3000	3210	4700	2680	2830	3590	2100	2390	2750	
	220	3500	3750	5800	3180	3370	4480	2790	2920	3460	

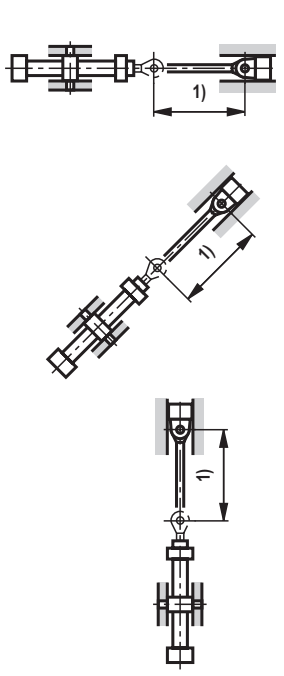


[1] Adm. Stroke length

Admissible stroke length
(dimensions in mm)

Type of mounting CDH1/CGH1/CSH1 [2]: MT4 trunnion in cylinder center

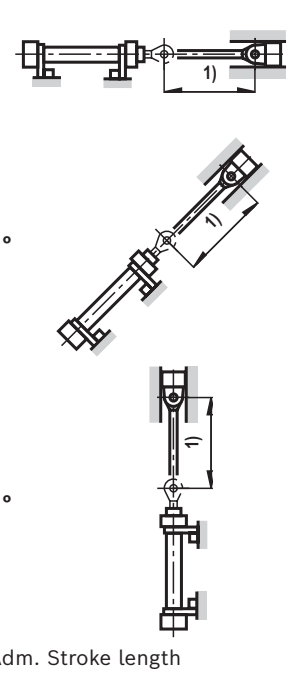
ØAL	ØMM	Admissible stroke length with 100 bar			160 bar			250 bar			Installation position
		0 °	45 °	90 °	0°	45 °	90 °	0 °	45 °	90 °	
40	22	340	345	365	250	255	260	130	135	145	0 °
	28	590	605	665	470	480	500	365	370	375	
50	28	460	470	495	350	355	365	245	250	260	
	36	790	815	910	645	655	690	510	515	525	
63	36	610	625	675	475	485	500	360	365	370	
	45	965	1000	1140	800	815	870	635	645	665	
80	45	770	790	850	605	615	635	440	455	475	
	56	1190	1235	1410	990	1010	1080	795	805	830	
100	56	930	955	1060	745	755	795	490	510	595	
	70	1430	1490	1770	1210	1240	1360	985	1000	1045	
125	70	1185	1225	1360	960	980	1030	640	670	780	45 °
	90	1885	1970	2390	1620	1665	1850	1340	1360	1430	
140	90	1675	1710	2060	1410	1415	1575	1140	1155	1205	
	100	2020	2115	2610	1735	1790	2010	1440	1465	1555	
160	100	1805	1880	2210	1510	1550	1680	1215	1230	1285	
	110	2140	2240	2740	1830	1885	2100	1505	1535	1620	
180	110	1925	2005	2360	1605	1650	1790	1290	1310	1360	
	125	2420	2540	3000	2080	2150	2420	1720	1755	1865	
200	125	2130	2230	2690	1790	1840	2040	1440	1465	1540	
	140	2610	2750	3000	2250	2330	2670	1865	1910	2050	
220	140	2490	2510	3150	2050	2120	2400	1685	1720	1835	90 °
	160	3000	3170	4230	2640	2750	3260	2240	2310	2530	
250	160	2750	2900	3660	2380	2460	2810	1970	2020	2160	
	180	3350	3540	4750	2960	3090	3670	2520	2600	2850	
280	180	3040	3210	4140	2640	2750	3170	2210	2260	2440	
	200	3620	3840	5210	3210	3360	4040	2750	2830	3140	
320	200	3210	3390	4410	2790	2900	3380	2320	2380	2580	
	220	3770	4000	5450	3340	3490	4200	2850	2930	3250	



[1] Adm. Stroke length

Type of mounting CDH1/CGH1/CSH1 [2]: MS2

ØAL	ØMM	Admissible stroke length with 100 bar			160 bar			250 bar			Installation position
		0 °	45 °	90 °	0°	45 °	90 °	0 °	45 °	90 °	
40	22	825	840	885	645	650	665	370	375	410	0 °
	28	1305	1350	1535	1085	1110	1180	875	885	910	
50	28	1075	1100	1175	855	865	890	610	625	675	
	36	1680	1750	2000	1430	1465	1590	1175	1190	1240	
63	36	1405	1440	1570	1135	1155	1200	895	900	920	
	45	2000	2000	2000	1760	1810	1990	1460	1480	1555	
80	45	1730	1780	1960	1410	1435	1500	1000	1050	1155	
	56	2000	2000	2000	2000	2000	2000	1785	1820	1920	
100	56	2110	2180	2440	1740	1770	1870	1140	1220	1440	
	70	3000	3000	3000	2620	2710	3000	2210	2260	2400	
125	70	2600	2695	3000	2170	2210	2360	1400	1480	1820	45 °
	90	3000	3000	3000	3000	3000	3000	2890	2970	3000	
140	90	3000	3000	3000	3000	3000	3000	2585	2635	2800	
	100	3000	3000	3000	3000	3000	3000	3000	3000	3000	
160	100	3000	3000	3000	3000	3000	3000	2760	2810	2990	
	110	3000	3000	3000	3000	3000	3000	3000	3000	3000	
180	110	3000	3000	3000	3000	3000	3000	2940	3000	3000	
	125	3000	3000	3000	3000	3000	3000	3000	3000	3000	
200	125	3000	3000	3000	3000	3000	3000	3000	3000	3000	
	140	3000	3000	3000	3000	3000	3000	3000	3000	3000	
220	140	5090	5370	6000	4490	4670	5470	3820	3910	4260	
	160	6000	6000	6000	5510	5800	6000	4850	5020	5750	90 °
250	160	5790	6000	6000	5150	5370	6000	4420	4540	4990	
	180	6000	6000	6000	6000	6000	6000	5420	5630	6000	
280	180	6000	6000	6000	5700	5960	6000	4930	5070	5630	
	200	6000	6000	6000	6000	6000	6000	6000	6000	6000	
320	200	6000	6000	6000	6000	6000	6000	5200	5400	6000	
	220	6000	6000	6000	6000	6000	6000	6000	6000	6000	



[1] Adm. Stroke length

With longer strokes, an extended guide and/or the use of guide rings may be reasonable for increasing the service life, depending on the respective case of application and installation position. Recommendation on request.

[2] With CSH1, observe the maximum stroke length "X*max", pages 30 to 41

End position cushioning

End position cushioning:

The objective is to reduce the velocity of a moved mass, the center of gravity of which lies on the cylinder axis, to a level at which neither the cylinder nor the machine into which the cylinder is installed is damaged. For velocities above 20 mm/s, we recommend the use of an end position cushioning feature, which absorbs energy without requiring the use of additional equipment. It must, however, always be checked whether end position cushioning is also required for lower velocities with large masses.

Damping capacity:

When decelerating masses via end position cushioning, the structural-inherent damping capacity must not be exceeded. Cylinders with end position cushioning can achieve their full damping capacity only over the entire stroke length.

With the adjustable end position cushioning version "E", a throttle valve is additionally provided when compared with version "D". End position cushioning version "E" allows cycle times to be optimized. The max. damping capacity can only be achieved when the throttle valve is closed.

The calculation depends on the factors mass, velocity, system pressure and installation position. For this reason, mass and velocity are used to determine the characteristic D_m and system pressure and installation position to determine the characteristic D_p.

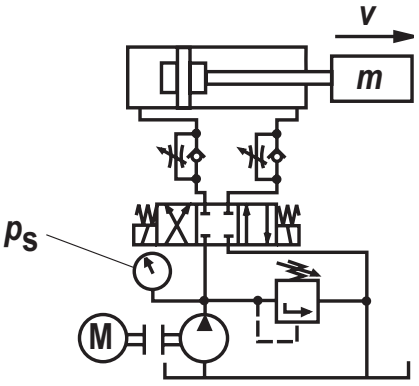
These two characteristics are used for verifying the admissible damping capacity in the "damping capacity" diagram. The intersection point of the characteristics D_m and D_p must always be below the damping capacity curve of the selected cylinder. The values in the diagrams refer to an average oil temperature of +45 to +65 °C with the throttle valve being closed.

For special applications with very short stroke times, high velocities or large masses, cylinders with special end position cushioning versions can be offered on request. When fixed or adjustable stops are used, special measures must be taken!

Formulas:

$$D_m = \frac{m}{10^K}\ ;\ K = kv\ (0.5 - v)$$

m = moved mass in kg
v = stroke velocity in m/s
kv = see table page 69



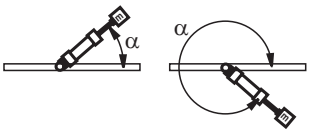
Extension for CDH1 and CSH1

$$D_p = p_S - \frac{m \cdot 9.81 \cdot \sin\alpha}{A_1 \cdot 10}$$

Retraction for CDH1, CGH1 and CSH1; extension for CGH1

$$D_p = p_S + \frac{m \cdot 9.81 \cdot \sin\alpha}{A_3 \cdot 10}$$

p_S = system pressure in bar
A_1 = piston area in cm² (see page 14)
A_3 = annulus area in cm² (see page 14)
α = angle to the horizontal in degree



Damping length

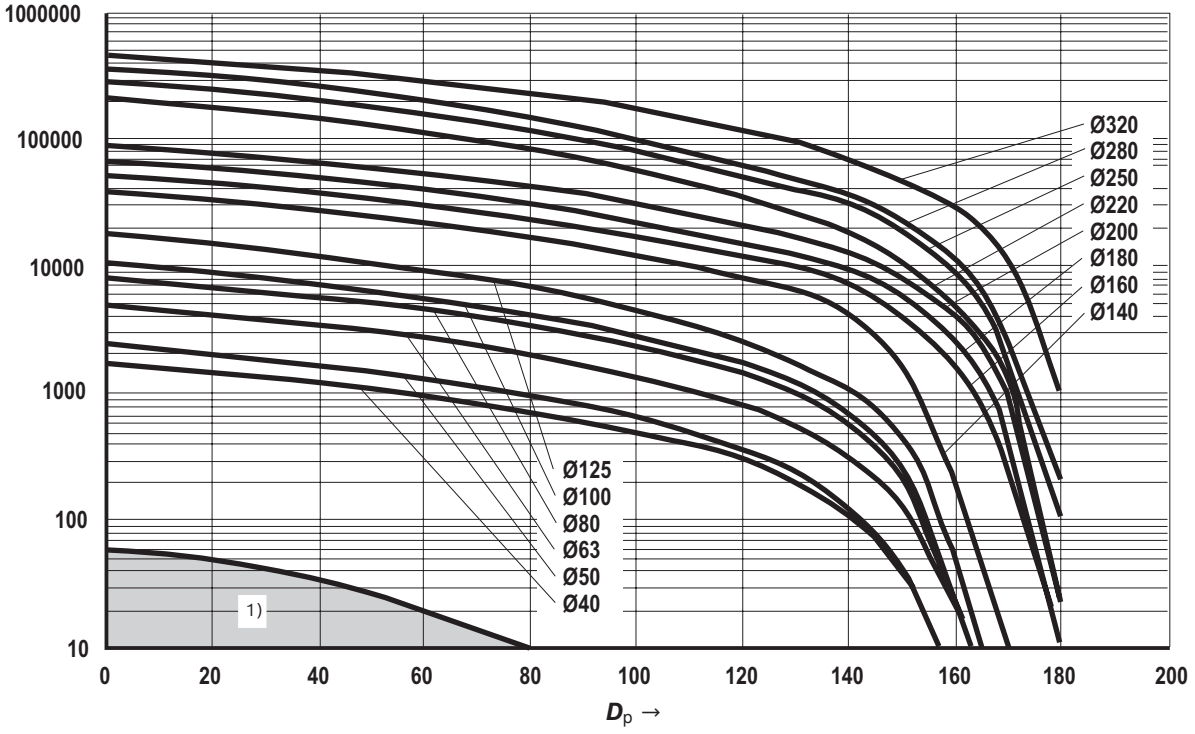
With cylinder strokes within the damping lengths, restrictions with regard to velocity / cycle time are possible.
We recommend minimum stroke greater than the damping length plus 10 mm!

ØAL mm	**40**	**50**	**63**	**80**	**100**	**125**	**140**	**160**	**180**	**200**	**220**	**250**	**280**	**320**
Head side	21	20	23	25	25	25	33	33	37	37	76	81	86	90
Base side	21	20	23	25	25	25	33	33	37	37	76	81	86	90

End position cushioning

ØAL mm	**40**	**50**	**63**	**80**	**100**	**125**	**140**	**160**	**180**	**200**	**220**	**250**	**280**	**320**
kv ①	2.85	2.97	2.56	2.82	3.51	3.02	2.53	2.65	2.91	2.76	2.85	2.95	3.11	3.13
kv ②	3.1	3.25	2.85	2.85	3.52	2.91	2.53	2.93	2.95	2.95	2.93	3.1	3.12	3.07
kv ③	2.95	3.1	2.73	3.1	3.51	2.95	2.51	2.91	2.95	2.91	2.93	2.93	3.15	3.25

Damping capacity: Extension for CDH1 and CSH1, with *kv* ①

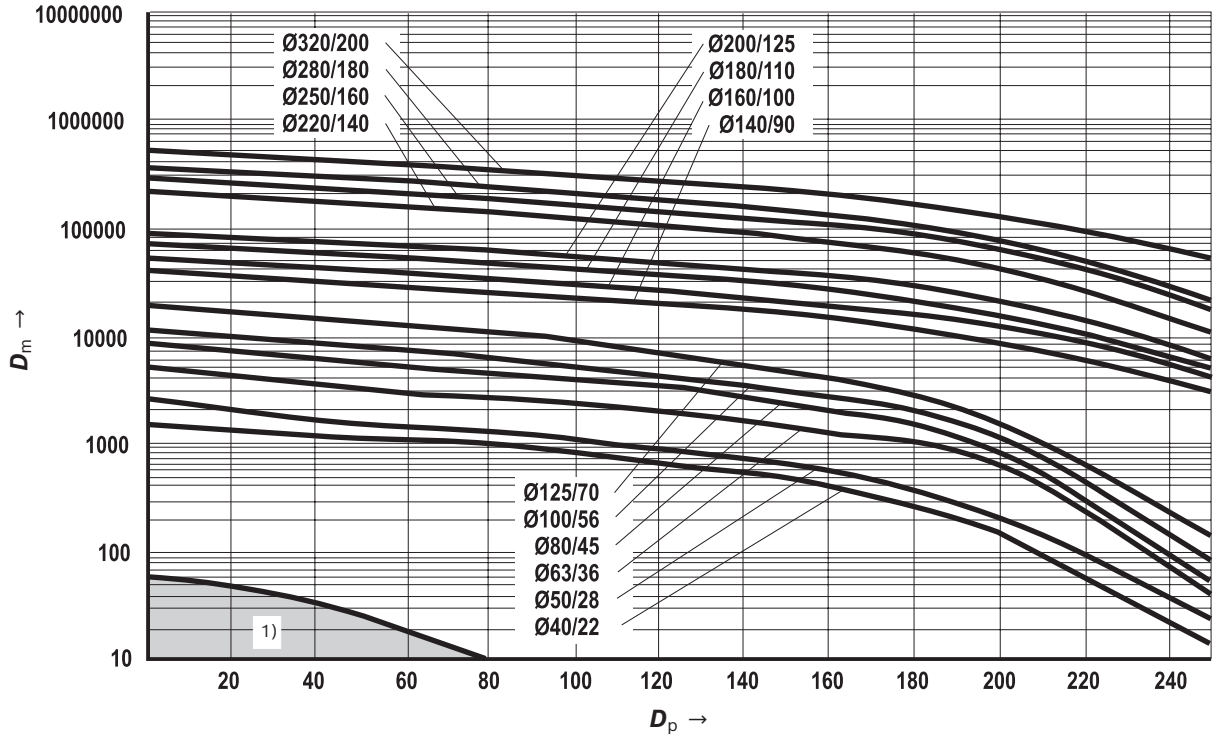


ØAL = piston Ø

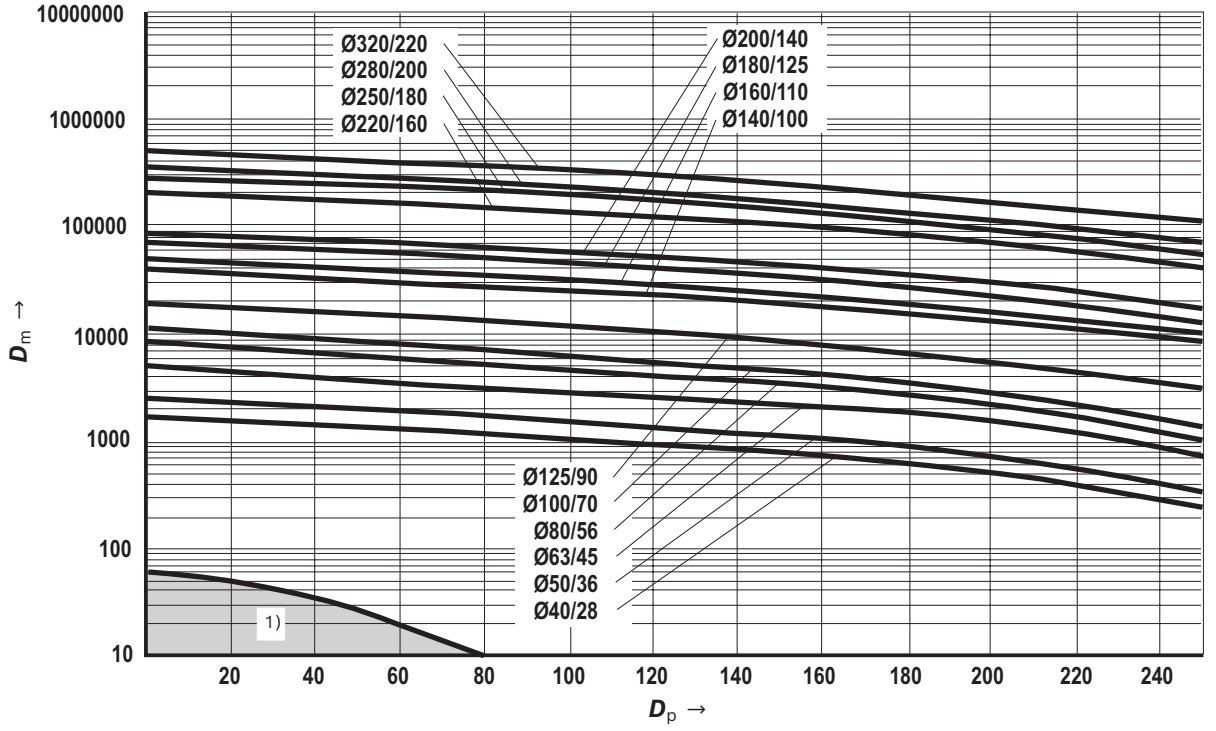
1) If with standard applications the calculated intersection point of D_m and D_p is within the marked area, we recommend designing the cylinder without end position cushioning.

End position cushioning

Damping capacity: Retraction for CDH1, CGH1 and CSH1; extension for CGH1 with *kv* ②



Damping capacity: Retraction for CDH1, CGH1 and CSH1; extension for CGH1 with *kv* ③



[1] If with standard applications the calculated intersection point of D_m and D_p is within the marked area, we recommend designing the cylinder without end position cushioning.

Selection criteria for seals

The specified values are to be regarded as guidelines; depending on the application, it may be necessary to check the suitability of the seal system. Generally, a medium temperature of approx. 40 °C is recommended.

	Work and environmental conditions	Seal versions								
		M	G	V	L	A	B	T	R	S
Medium / temperature	**Medium HL, HLP / operating temperature medium**	++	++	++	++	++	++	++	++	++
	Medium HFA / operating temperature medium +5 °C ... +55 °C	+/–	+/–	+/–	+/–	+	+/–	++	+/–	+/–
	Medium HFC / operating temperature medium –20 °C ... +60 °C	–	++	–	–	+/–	–	++	–	–
	Medium HFDR / operating temperature medium –15 °C ... +80 °C	–	–	++	–	–	++	–	–	++
	Medium HFDU / operating temperature medium –15 °C ... +80 °C	–	–	++	–	–	++	–	–	++
	Ambient and rod temperature in the area of the piston rod from –20 °C ... +80 °C [1]	++	+	+ [2]	++	++	+ [2]	+	++	++ [2]
	Extended ambient and rod temperature in the area of the piston rod from +80 °C ... +120 °C [1]	–	–	++	–	–	+	–	–	++
Function / velocity...	static hold function more than 10 minutes: Attention! Application- and temperature-dependent	++	+	+	+	++	++	+	+	+
	Static hold function short-time < 1 minute	++	++	++	++	++	++	++	++	++
	Robust application conditions: Steel works, mining, thin ice	++	++	++	++	++	++	–	++	–
	Zero point control, hardly any amplitude, frequency max. 5 Hz, not longer than 5 minutes	–	–	–	+/–	–	–	++	+	++
	Cylinder velocity min. 0.001 m/sec stick-slip behavior	++	+	+	++	–	–	++	++	++
	Cylinder velocity from 0.01 m/sec to 0.5 m/sec [3]	++	+	+	++	+	+	++	++	++
	Cylinder velocity > 0.5 m/sec to max. 0.8 m/sec [3]	–	+/–	+/–	++	–	–	++	+	++
	Stroke > 1.0 m	+/–	++	++	++	++	++	++	++	++
	Standstill period (wear)	++	+/–	+/–	++	+/–	–	++	++	++
	Undissolved air in the oil [4]	–	+	+	+	–	–	+	+	+

++ = very good + = good +/– = conditional, depending on the application parameters – = inappropriate

General technical data in corresponding data sheets will remain valid, see page 11!

1) Moreover, observe the corresponding medium temperature range
2) Lower temperature limit –15 °C
3) Standard line connections not designed for that velocity
4) – Seal is destroyed / + Seal is not directly destroyed, leakage may occur

Seal kits [1)]

CDH1 – Standard

ØAL	ØMM	Material no. for seal design								
		M	G	V	L	A	B	T	R	S
40	22	R900850072	R961006000	R961006035	R961006070	R900860270	–	R900849536	R961006105	R900861000
	28	R900851087	R961006002	R961006037	R961006072	R900859445	R900859770	R900858841	R961006107	R900861001
50	28	R900850181	R961006003	R961006038	R961006073	R900860928	R900860938	R900857535	R961006108	R900861002
	36	R900849392	R961006005	R961006040	R961006075	R900851515	R900860940	R900860277	R961006110	R900861004
63	36	R900850191	R961006006	R961006041	R961006076	R900860930	R900851206	R900860278	R961006111	R900861005
	45	R900847956	R961006008	R961006043	R961006078	R900851638	R900859678	R900847855	R961006113	R900861007
80	45	R900851086	R961006009	R961006044	R961006079	R900854708	R900860942	R900860280	R961006114	R900861008
	56	R900850905	R961006011	R961006046	R961006081	R900854718	R900851205	R900856180	R961006116	R900861010
100	56	R900853936	R961006012	R961006047	R961006082	R900860470	R900860944	R900860282	R961006117	R900861011
	70	R900853382	R961006014	R961006049	R961006084	R900856094	R900860946	R900860285	R961006119	R900861013
125	70	R900853966	R961006015	R961006050	R961006085	R900854709	R900860948	R900860286	R961006120	R900861014
	90	R900857949	R961006017	R961006052	R961006087	R900856095	R900855464	R900856102	R961006122	R900861016
140	90	R900858281	R961006018	R961006053	R961006088	R900860932	R900860951	R900860289	R961006123	R900861017
	100	R900853965	R961006019	R961006054	R961006089	R900856096	R900860952	R900860290	R961006124	R900849080
160	100	R900855683	R961006020	R961006055	R961006090	R900860468	R900860953	R900860291	R961006125	R900861018
	110	R900851146	R961006021	R961006056	R961006091	R900860933	R900860954	R900857536	R961006126	R900861019
180	110	R900856497	R961006023	R961006058	R961006093	R900860934	R900860955	R900852561	R961006128	R900861020
	125	R900848603	R961006024	R961006059	R961006094	R900860935	R900860956	R900860292	R961006129	R900861021
200	125	R900860294	R961006025	R961006060	R961006095	R900860936	R900860957	R900860295	R961006130	R900861022
	140	R900856431	R961006026	R961006061	R961006096	R900860937	R900860958	R900860293	R961006131	R900861023
220	140	R900888100	R961006027	R961006062	R961006097	R900888116	R900888140	R900888108	R961006132	R900888132
	160	R900888101	R961006028	R961006063	R961006098	R900888117	R900888141	R900888109	R961006133	R900888133
250	160	R900888102	R961006029	R961006064	R961006099	R900888118	R900888142	R900888110	R961006134	R900888134
	180	R900888103	R961006030	R961006065	R961006100	R900888119	R900888143	R900888111	R961006135	R900888135
280	180	R900888104	R961006031	R961006066	R961006101	R900888120	R900888144	R900888112	R961006136	R900888136
	200	R900888105	R961006032	R961006067	R961006102	R900888121	R900888145	R900888113	R961006137	R900888137
320	200	R900888106	R961006033	R961006068	R961006103	R900888122	R900888146	R900888114	R961006138	R900888138
	220	R900888107	–	–	R961006104	R900888123	R900888147	R900888115	R961006139	R900888139

ØAL = piston Ø

ØMM = piston rod Ø

[1)] Seal kits for proximity switches and subplate mounting separate material no.

Seal kits [1)]

CGH1 – Standard

ØAL	ØMM	Material no. for seal design								
		M	G	V	L	A	B	T	R	S
40	22	R900867251	R961006221	R961006256	R961006291	R900866746	–	R900868888	R961006326	R900868942
	28	R900867252	R961006223	R961006258	R961006293	R900866747	R900867133	R900868889	R961006328	R900868943
50	28	R900867253	R961006224	R961006259	R961006294	R900866748	R900867134	R900868890	R961006329	R900868944
	36	R900864930	R961006226	R961006261	R961006296	R900866750	R900867136	R900868892	R961006331	R900868946
63	36	R900867260	R961006227	R961006262	R961006297	R900866751	R900867137	R900868893	R961006332	R900868947
	45	R900867262	R961006229	R961006264	R961006299	R900866753	R900867139	R900868895	R961006334	R900868949
80	45	R900867263	R961006230	R961006265	R961006300	R900866754	R900867140	R900868896	R961006335	R900868950
	56	R900867265	R961006232	R961006267	R961006302	R900866756	R900867142	R900868898	R961006337	R900868952
100	56	R900867266	R961006233	R961006268	R961006303	R900866757	R900867143	R900868899	R961006338	R900868953
	70	R900867268	R961006235	R961006270	R961006305	R900866759	R900867146	R900868901	R961006340	R900868955
125	70	R900867269	R961006236	R961006271	R961006306	R900866760	R900867147	R900868902	R961006341	R900867906
	90	R900867270	R961006238	R961006273	R961006308	R900866762	R900867149	R900868904	R961006343	R900868957
140	90	R900867271	R961006239	R961006274	R961006309	R900866763	R900867150	R900868905	R961006344	R900868958
	100	R900867272	R961006240	R961006275	R961006310	R900866764	R900867151	R900868906	R961006345	R900868959
160	100	R900867273	R961006241	R961006276	R961006311	R900866765	R900867152	R900868907	R961006346	R900868960
	110	R900867274	R961006242	R961006277	R961006312	R900866766	R900867153	R900868908	R961006347	R900868961
180	110	R900867275	R961006244	R961006279	R961006314	R900866767	R900867154	R900868909	R961006349	R900868962
	125	R900867276	R961006245	R961006280	R961006315	R900866768	R900867155	R900868910	R961006350	R900868963
200	125	R900867277	R961006246	R961006281	R961006316	R900866769	R900867156	R900868911	R961006351	R900868964
	140	R900867278	R961006247	R961006282	R961006317	R900866770	R900867157	R900868912	R961006352	R900868965
220	140	R900888020	R961006248	R961006283	R961006318	R900888036	R900888060	R900888028	R961006353	R900888052
	160	R900888021	R961006249	R961006284	R961006319	R900888037	R900888061	R900888029	R961006354	R900888053
250	160	R900888022	R961006250	R961006285	R961006320	R900888038	R900888062	R900888030	R961006355	R900888054
	180	R900888023	R961006251	R961006286	R961006321	R900888039	R900888063	R900888031	R961006356	R900888055
280	180	R900888024	R961006252	R961006287	R961006322	R900888040	R900888064	R900888032	R961006357	R900888056
	200	R900888025	R961006253	R961006288	R961006323	R900888041	R900888065	R900888033	R961006358	R900888057
320	200	R900888026	R961006254	R961006289	R961006324	R900888042	R900888066	R900888034	R961006359	R900888058
	220	R900888027	–	–	R961006325	R900888043	R900888067	R900888035	R961006360	R900888059

ØAL = piston Ø

ØMM = piston rod Ø

1) Seal kits for proximity switches and subplate mounting separate material no.

Seal kits [1)]

CDH1 – Standard + additional option F

ØAL	ØMM	Material no. for seal design					
		M+F	G+F	V+F	T+F	R+F	S+F
40	22	R900861024	R961006140	R961006167	R900861049	R961006194	R900861099
	28	R900861025	R961006142	R961006169	R900861050	R961006196	R900861100
50	28	R900861026	R961006143	R961006170	R900861051	R961006197	R900861101
	36	R900861028	R961006145	R961006172	R900861053	R961006199	R900861103
63	36	R900861029	R961006146	R961006173	R900861054	R961006200	R900861104
	45	R900861031	R961006148	R961006175	R900861056	R961006202	R900861106
80	45	R900861032	R961006149	R961006176	R900861057	R961006203	R900861107
	56	R900861034	R961006151	R961006178	R900861059	R961006205	R900861109
100	56	R900861035	R961006152	R961006179	R900861060	R961006206	R900861112
	70	R900861037	R961006154	R961006181	R900861062	R961006208	R900861115
125	70	R900861038	R961006155	R961006182	R900861063	R961006209	R900861117
	90	R900861040	R961006157	R961006184	R900861065	R961006211	R900861122
140	90	R900861041	R961006158	R961006185	R900861066	R961006212	R900861124
	100	R900861042	R961006159	R961006186	R900861067	R961006213	R900861126
160	100	R900861043	R961006160	R961006187	R900861068	R961006214	R900861128
	110	R900861044	R961006161	R961006188	R900861069	R961006215	R900861130
180	110	R900861045	R961006163	R961006190	R900861070	R961006217	R900861133
	125	R900861046	R961006164	R961006191	R900861071	R961006218	R900861135
200	125	R900861047	R961006165	R961006192	R900861072	R961006219	R900861142
	140	R900861048	R961006166	R961006193	R900861073	R961006220	R900861143

CGH1 – Standard + additional option F

ØAL	ØMM	Material no. for seal design					
		M+F	G+F	V+F	T+F	R+F	S+F
40	22	R900868998	R961006361	R961006388	R900869025	R961006415	R900869092
	28	R900868999	R961006363	R961006390	R900869026	R961006417	R900869093
50	28	R900869000	R961006364	R961006391	R900869027	R961006418	R900869094
	36	R900869002	R961006366	R961006393	R900869029	R961006420	R900869096
63	36	R900869003	R961006367	R961006394	R900869030	R961006421	R900869097
	45	R900869005	R961006369	R961006396	R900869032	R961006423	R900869099
80	45	R900869006	R961006370	R961006397	R900869033	R961006424	R900869100
	56	R900869008	R961006372	R961006399	R900869035	R961006426	R900869102
100	56	R900869009	R961006373	R961006400	R900869036	R961006427	R900869103
	70	R900869013	R961006375	R961006402	R900869038	R961006429	R900869105
125	70	R900869014	R961006376	R961006403	R900869039	R961006430	R900869106
	90	R900869016	R961006378	R961006405	R900869041	R961006432	R900869108
140	90	R900869017	R961006379	R961006406	R900869042	R961006433	R900869109
	100	R900869018	R961006380	R961006407	R900869043	R961006434	R900869110
160	100	R900869019	R961006381	R961006408	R900869044	R961006435	R900869111
	110	R900869020	R961006382	R961006409	R900869045	R961006436	R900869112
180	110	R900869021	R961006384	R961006411	R900869046	R961006438	R900869113
	125	R900869022	R961006385	R961006412	R900869047	R961006439	R900869114
200	125	R900869023	R961006386	R961006413	R900869048	R961006440	R900869115
	140	R900869024	R961006387	R961006414	R900869049	R961006441	R900869116

ØAL = piston Ø
ØMM = piston rod Ø

[1)] Seal kits for proximity switches and subplate mounting separate material no.

Seal kits [2)]

CSH1

ØAL	ØMM	Material no. for seal design						
		M	G	V	L	T	R	S
40	28	R900861025	R961006142	R961006169	R961006072	R900861050	R961006196	R900861100
50	28	R900861026	R961006143	R961006170	R961006073	R900861051	R961006197	R900861101
	36	R900861028	R961006145	R961006172	R961006075	R900861053	R961006199	R900861103
63	36	R900861029	R961006146	R961006173	R961006076	R900861054	R961006200	R900861104
	45	R900861031	R961006148	R961006175	R961006078	R900861056	R961006202	R900861106
80	45	R900861032	R961006149	R961006176	R961006079	R900861057	R961006203	R900861107
	56	R900861034	R961006151	R961006178	R961006081	R900861059	R961006205	R900861109
100	56	R900861035	R961006152	R961006179	R961006082	R900861060	R961006206	R900861112
	70	R900861037	R961006154	R961006181	R961006084	R900861062	R961006208	R900861115
125	70	R900861038	R961006155	R961006182	R961006085	R900861063	R961006209	R900861117
	90	R900861040	R961006157	R961006184	R961006087	R900861065	R961006211	R900861122
140	90	R900861041	R961006158	R961006185	R961006088	R900861066	R961006212	R900861124
	100	R900861042	R961006159	R961006186	R961006089	R900861067	R961006213	R900861126
160	100	R900861043	R961006160	R961006187	R961006090	R900861068	R961006214	R900861128
	110	R900861044	R961006161	R961006188	R961006091	R900861069	R961006215	R900861130
180	110	R900861045	R961006163	R961006190	R961006093	R900861070	R961006217	R900861133
	125	R900861046	R961006164	R961006191	R961006094	R900861071	R961006218	R900861135
200	125	R900861047	R961006165	R961006192	R961006095	R900861072	R961006219	R900861142
	140	R900861048	R961006166	R961006193	R961006096	R900861073	R961006220	R900861143
220	140	R900888100	R961006027	R961006062	R961006097	R900888108	R961006132	R900888132
	160	R900888101	R961006028	R961006063	R961006098	R900888109	R961006133	R900888133
250	160	R900888102	R961006029	R961006064	R961006099	R900888110	R961006134	R900888134
	180	R900888103	R961006030	R961006065	R961006100	R900888111	R961006135	R900888135
280	180	R900888104	R961006031	R961006066	R961006101	R900888112	R961006136	R900888136
	200	R900888105	R961006032	R961006067	R961006102	R900888113	R961006137	R900888137
320	200	R900888106	R961006033	R961006068	R961006103	R900888114	R961006138	R900888138
	220	R900888107	–	–	R961006104	R900888115	R961006139	R900888139

ØAL = piston Ø

ØMM = piston rod Ø

2) Seal kits for position measurement system and subplate mounting separate material no.

Seal kits

Only for proximity switches

ØAL	Material no. for seal design								
	M / M+F	T / T+F	G / G+F	L	R / R+F	A	S / S+F	V / V+F	B
40 to 200	R900885938						R900885939		
220 to 320	R900894997						R900894998		

Only for subplate mounting

ØAL	Material no. for seal design	
	M, T, G, L, R, A	S, B, V
40	R961006022	R961006243
50	R961006022	R961006243
63	R961006057	R961006278
80	R961006057	R961006278
100	R961006092	R961006313
125	R961006127	R961006348
140	R961006127	R961006348
160	R961006162	R961006383
180	R961006162	R961006383
200	R961006189	R961006410

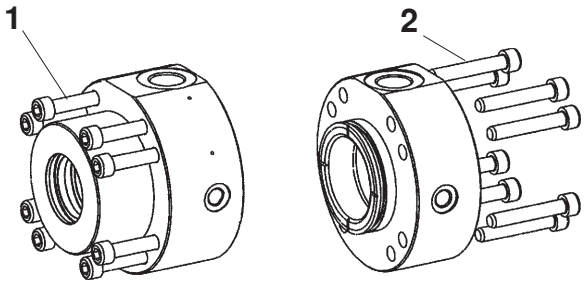
Only for position measurement system

ØAL	Material no. for seal design	
	M, T, G, L, R	S, V
40	R900885935	R900885937
50	R900894958	R900894979
63	R900894959	R900894980
80	R900894960	R900894981
100	R900894961	R900894982
125	R900894962	R900894983
140	R900894963	R900894985
160	R900894964	R900894986
180	R900894973	R900894987
200	R900894974	R900894988
220	R900894975	R900894989
250	R900894976	R900894991
280	R900894977	R900894993
320	R900894978	R900894994

ØAL = piston Ø

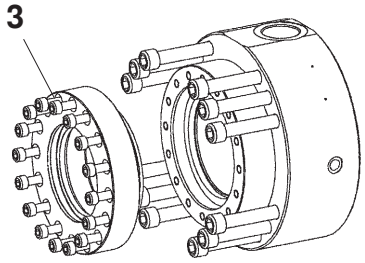
Tightening torques

Screws: Head and base (item 1 and 2)



Series	Piston Ø	Screw	Quantity	Quality class	Tightening torque
CDH1 / CGH1 / CSH1	**40**	M8	4	10.9	23 Nm
CDH1 / CGH1 / CSH1	**50**	M8	8	10.9	20 Nm
CDH1 / CGH1 / CSH1	**63**	M8	8	10.9	30 Nm
CDH1 / CGH1 / CSH1	**80**	M10	8	10.9	55 Nm
CDH1 / CGH1 / CSH1	**100**	M12	8	10.9	100 Nm
CDH1 / CGH1 / CSH1	**125**	M16	8	10.9	200 Nm
CDH1 / CGH1 / CSH1	**140**	M16	12	10.9	170 Nm
CDH1 / CGH1 / CSH1	**160**	M16	12	10.9	220 Nm
CDH1 / CGH1 / CSH1	**180**	M20	12	10.9	350 Nm
CDH1 / CGH1 / CSH1	**200**	M20	12	10.9	410 Nm
CDH1 / CGH1 / CSH1	**220**	M20	16	10.9	460 Nm
CDH1 / CGH1 / CSH1	**250**	M24	16	10.9	700 Nm
CDH1 / CGH1 / CSH1	**280**	M24	16	10.9	800 Nm
CDH1 / CGH1 / CSH1	**320**	M30	16	10.9	1500 Nm

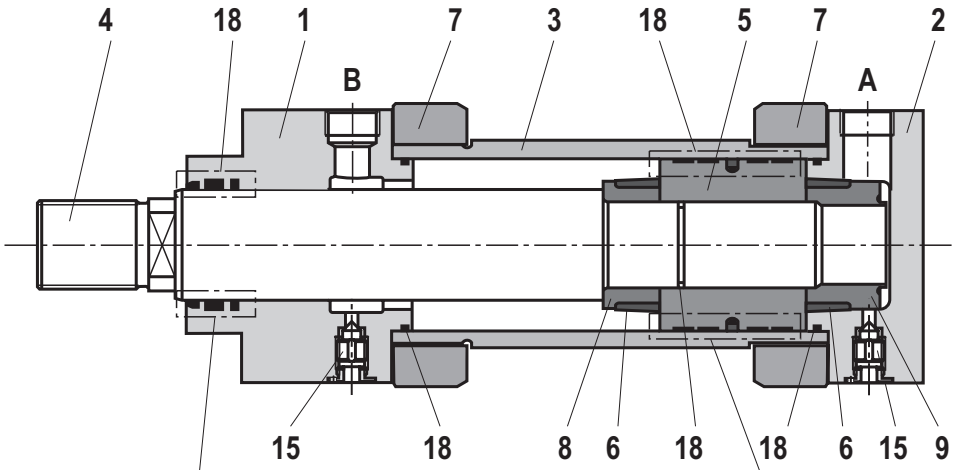
Screws: Seal cover (item 3)

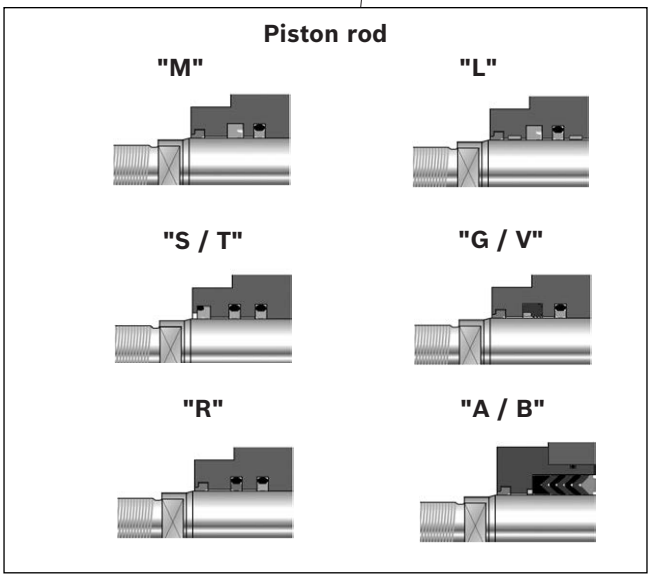


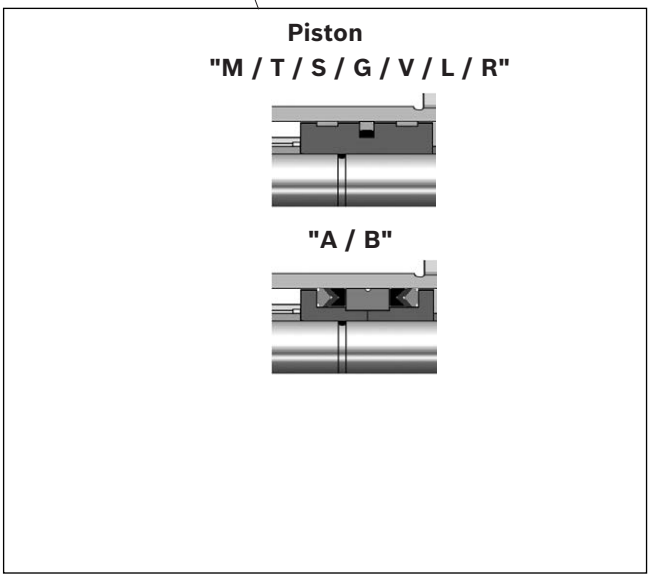
Only with seal design "A" and "B"

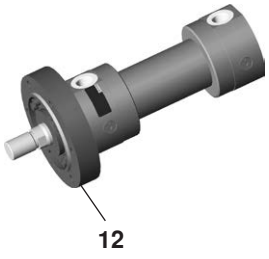
Series	Piston Ø	Piston rod Ø	Screw	Quantity	Quality class	Tightening torque
CDH1 / CGH1	**160**	**100**	M10	16	10.9	60 Nm
		110				
CDH1 / CGH1	**180**	**110**	M12	16	10.9	80 Nm
		125				
CDH1 / CGH1	**200**	**125**	M12	16	10.9	90 Nm
		140				
CDH1 / CGH1	**220**	**140**	M12	16	10.9	90 Nm
		160		24		
CDH1 / CGH1	**250**	**160**	M12	24	10.9	90 Nm
		180				
CDH1 / CGH1	**280**	**180**	M12	24	10.9	90 Nm
		200				
CDH1 / CGH1	**320**	**200**	M12	24	10.9	90 Nm
		220	M16	16		230 Nm

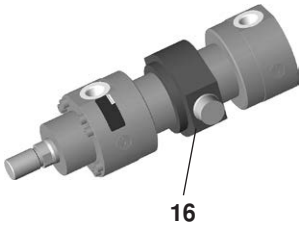
Components: Series CDH1

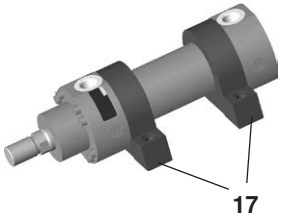






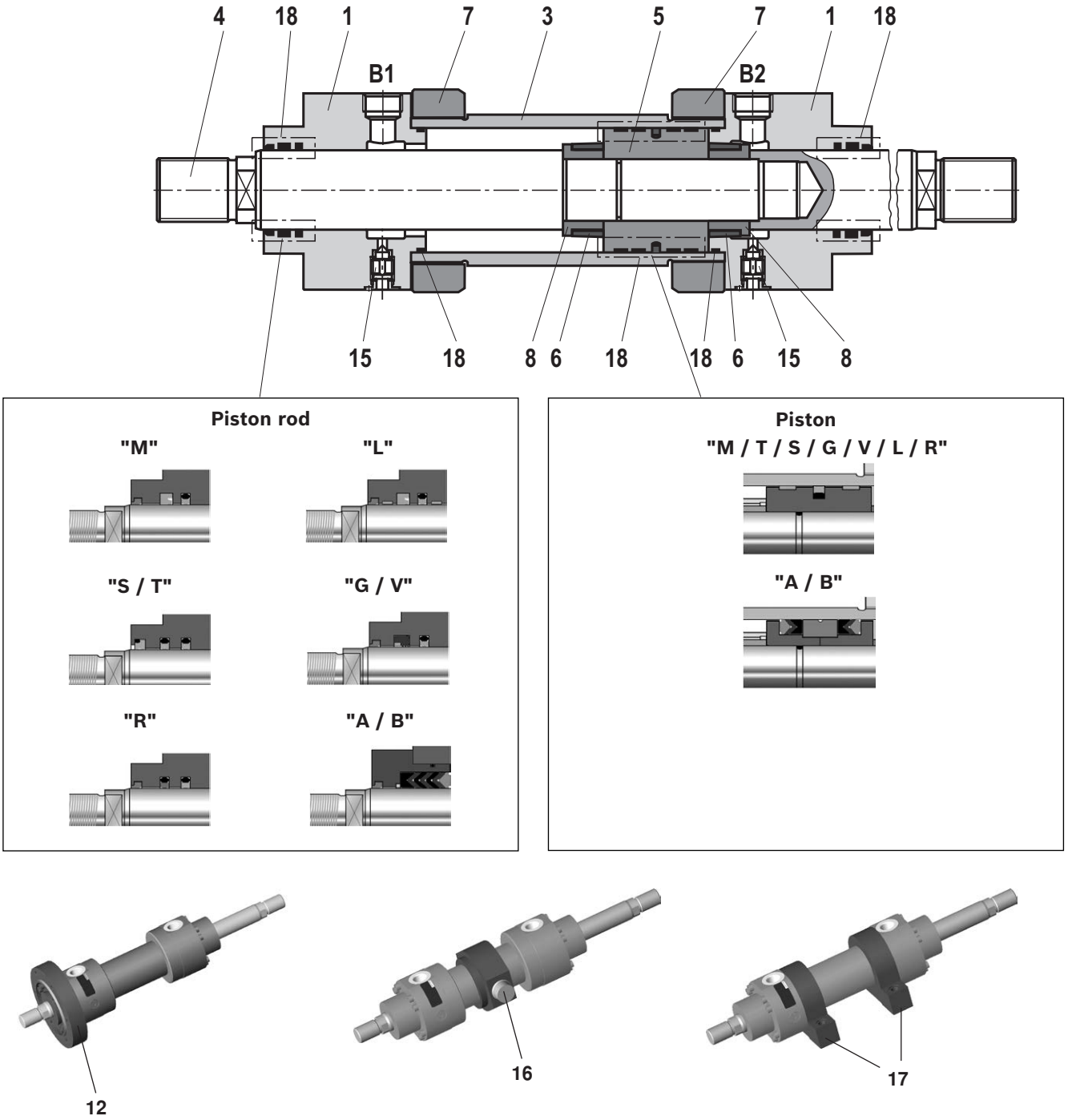






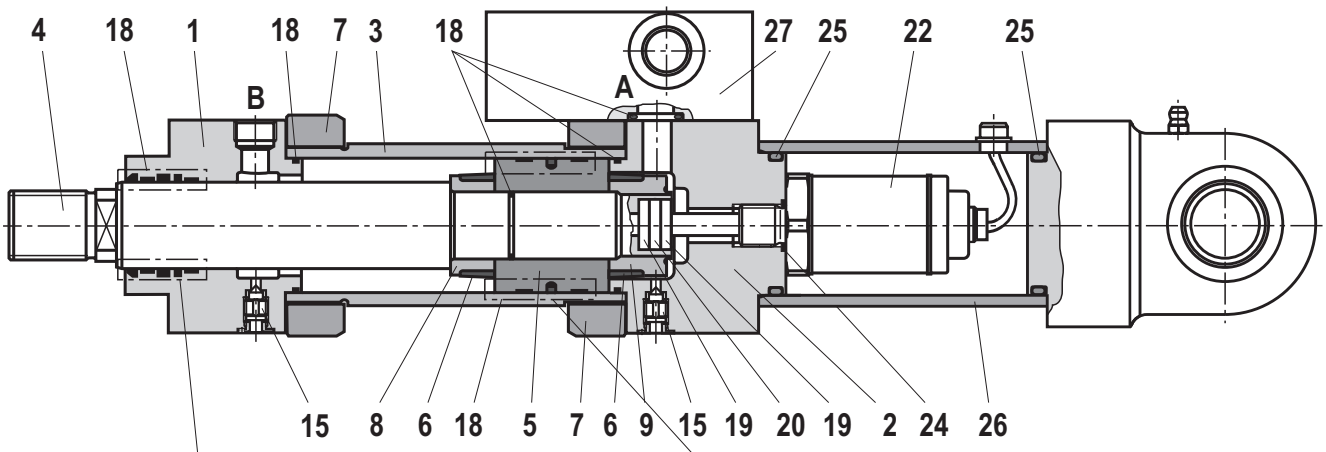
A Piston chamber
B Annulus area
1 Head
2 Base
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Socket
9 Socket
10 Base MP3
11 Base MP5
12 Round flange MF3
14 Round flange MF4
15 Bleeding
16 Trunnion MT4
17 Foot MS2
18 Seal kit:
Wiper
Rod seal
Piston seal
O-ring
Guide ring

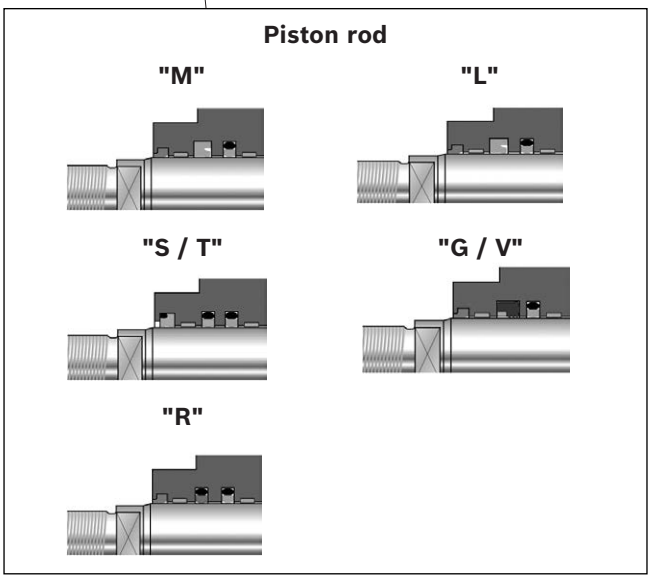
Components: Series CGH1

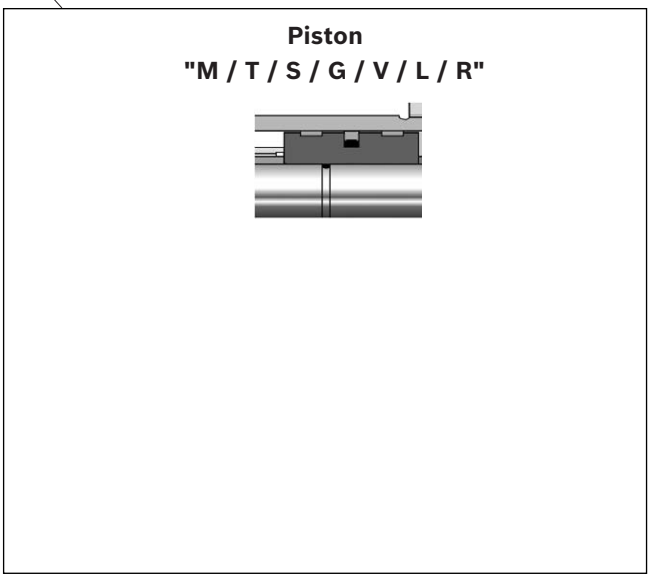


B1 Annulus area 1
B2 Annulus area 2
1 Head
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Socket
12 Round flange MF3
15 Bleeding
16 Trunnion MT4
17 Foot MS2
18 Seal kit:
Wiper
Rod seal
Piston seal
O-ring
Guide ring

Components: Series CSH1 MP3 and MP5

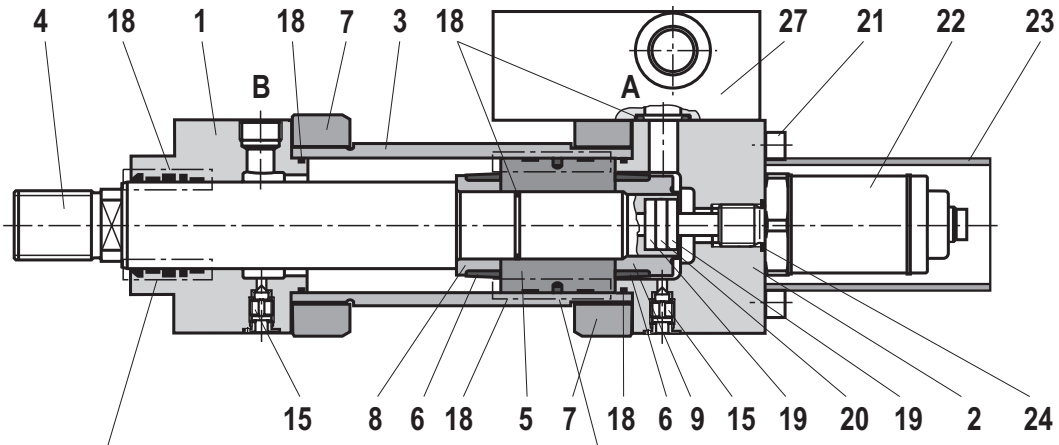


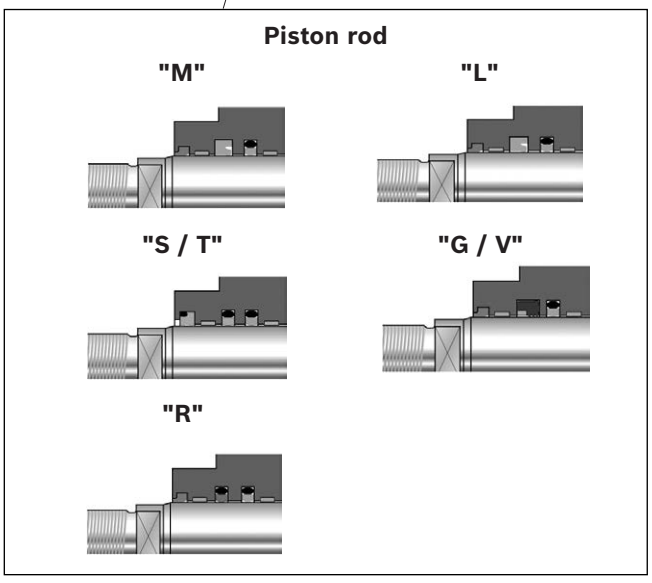


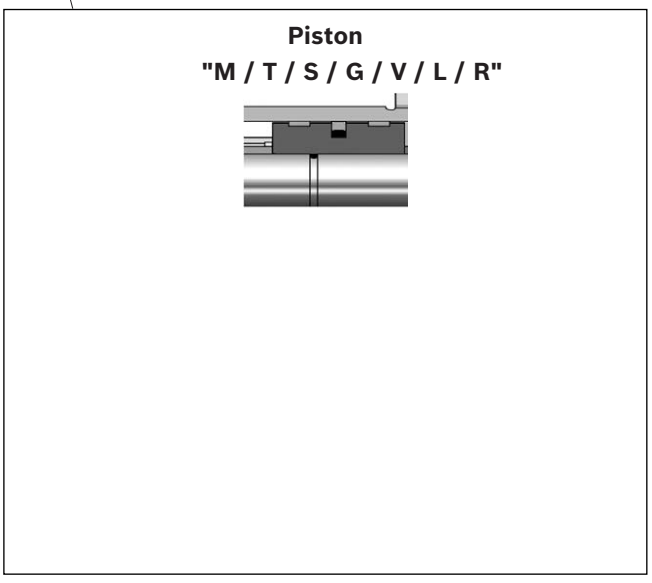


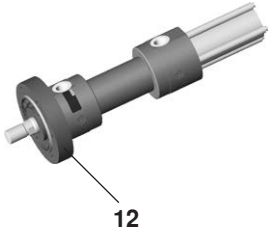
A Piston chamber
B Annulus area
1 Head
2 Base
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Socket
9 Socket
10 Base MP3
11 Base MP5
15 Bleeding
18 Seal kit:
Wiper
Rod seal
Piston seal
O-ring
Guide ring
19 Insulating socket
20 Solenoid
22 Position measurement system
24 Seal
25 Seal
26 Protective pipe
27 Subplate

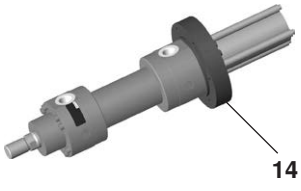
Components: Series CSH1 MF3, MF4, MT4 and MS2

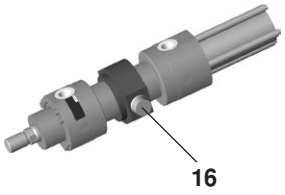


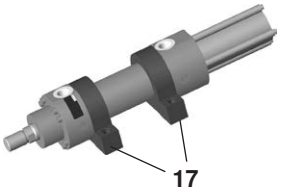












A Piston chamber
B Annulus area
1 Head
2 Base
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Socket
9 Socket
12 Round flange MF3
14 Round flange MF4
15 Bleeding
16 Trunnion MT4
17 Foot MS2
18 Seal kit:
Wiper
Rod seal
Piston seal
O-ring
Guide ring
19 Insulating socket
20 Solenoid
21 Hexagon socket head cap screws
22 Position measurement system
23 Protective pipe
24 Seal
27 Subplate

Cylinder weight

Piston	Piston rod	CD/CS cylinder with 0 mm stroke length					per 100 mm stroke length	CG cylinder with 0 mm stroke length			per 100 mm stroke length
ØAL	**ØMM**	**MP3** [1] **MP5** [1]	**MP3** [2] **MP5** [2]	**MF3 MF4**	**MT4**	**MS2**		**MF3**	**MT4**	**MS2**	
mm	mm	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg
40	**22** **28**	7 7	12 12	9 9	9 9	9 9	0.9 1.0	10 10	9 9	9 10	1.2 1.5
50	**28** **36**	10 10	16.5 16.5	14 14	12 12	12 13	1.2 1.5	15 15	14 14	14 14	1.6 2.3
63	**36** **45**	16 16	25.5 25.5	22 22	19 19	19 20	2.1 2.6	24 24	21 22	21 22	2.9 3.8
80	**45** **56**	25 26	35 36	30 31	29 30	31 32	2.9 3.6	34 35	33 34	35 36	4.1 5.5
100	**56** **70**	43 44	58.5 59.5	52 53	50 51	52 53	4.6 5.7	59 60	56 58	58 60	6.6 8.8
125	**70** **90**	79 80	99 100	93 95	91 93	90 92	7.3 9.2	103 106	101 105	100 104	10.3 14.2
140	**90** **100**	111 112	137 138	127 128	130 131	131 132	10.7 11.9	145 146	147 149	148 150	15.7 18.1
160	**100** **110**	168 169	205 206	198 200	200 202	209 210	12.6 13.9	230 234	233 236	241 244	18.8 21.4
180	**110** **125**	236 239	283 286	270 272	269 271	278 281	14.7 16.8	314 319	312 318	322 327	22.1 26.5
200	**125** **140**	306 309	361 364	348 351	346 349	358 361	19.0 21.5	369 376	367 373	380 386	28.6 33.5
220	**140** **160**	452	556	515	479	509	27.1 30.9	598	562	593	39.1 46.7
250	**160** **180**	582	710	664	618	649	32.7 36.9	784	739	770	48.5 56.9
280	**180** **200**	753	950	846	784	822	44.2 48.8	981	919	957	64.2 73.4
320	**200** **220**	1125	1404	1290	1180	1222	55.2 60.4	1452	1343	1385	79.8 90.2

ØAL = piston Ø

ØMM = piston rod Ø

[1] Weight without position measurement system

[2] Weight with position measurement system

Corrosivity categories

In this connection, observe the information on the color set-up on page 11 "Technical data".
The specified resistances of the individual Bosch Rexroth classes only refer to the primed / painted cylinder areas, not, for example, to piston rods, trunnions, etc.
In this connection, special measures may be necessary.

	Class	**Certification by**	**Applications**	
			Inside	**Outside**
Priming	CP3	240 h salt spray test SST (DIN EN ISO 9227) 240 h condensation water test KKT (DIN EN ISO 6270-2) Layer thickness: min. 40 µm	Field of application, e.g. Hall atmosphere, Air humidity ≤ 60%, no thermal load.	Not suitable for outdoor exposure.
Painting	CP4	480 h salt spray test SST. (DIN EN ISO 9227) 480 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: 120 µm	Unheated buildings in which there may be condensation (production rooms, storage and sport halls).	Urban and industrial atmosphere with little salt or sulfur dioxide load.
	CP5	720 h salt spray test SST (DIN EN ISO 9227) 480 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: 140 µm	Silo and debris facilities, chemical plants, boathouses above sea water, laundries, breweries with high humidity and medium contamination.	Industrial and coastal areas with medium salt load.
	CP6	1000 h salt spray test NSS (DIN EN ISO 9227) 480 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: 220 µm	Buildings or areas with almost permanent condensation and serious contamination.	Industrial areas with large humidity and aggressive atmosphere.
	CP7	1440 h salt spray test NSS (DIN EN ISO 9227) 720 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: 320 µm	Buildings or areas with almost permanent condensation and with serious contamination.	Coastal and offshore areas with high salt load.

RE 17335
Edition: 2021-07
Replaces: 2017-07

rexroth
A Bosch Company

Hydraulic cylinder
Mill type

Series CDH2 / CGH2 / CSH2

H4652_d

- Component series 3X
- Nominal pressure 250 bar (25 MPa)

Features

- Standards: DIN 24333, ISO 6022
- 6 types of mounting
- Piston Ø (**ØAL**): 40 ... 320 mm
- Piston rod Ø (**ØMM**): 25 ... 220 mm
- Stroke lengths up to 6 m
- Self-adjusting and adjustable end position cushioning
- IO-Link interface, optional

Contents

Ordering code series CDH2

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CD	**H2**		**/**		**/**		**/**		**A**	**3X**	**/**								

01	Differential cylinder	**CD**
02	Series	**H2**

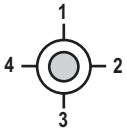
Types of mounting

03	Swivel eye at base	**MP3**
	Self-aligning clevis at base	**MP5**
	Round flange at head	**MF3**
	Round flange at base	**MF4**
	Trunnion mounting	**MT4** 2)
	Foot mounting	**MS2** 18)
04	Piston Ø (ØAL) **40 ... 320** mm	
05	Piston rod Ø (ØMM) **25 ... 220** mm	
06	Stroke length in mm 3)	
07	Design principle: Head and base flanged	**A**
08	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

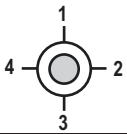
Line connection / version

09	According to ISO 1179-1 (pipe thread ISO 228-1)	**B**
	According to ISO 9974-1 (metric thread ISO 261)	**M** 33)
	Flange hole pattern according to ISO 6162-1 tab. 2 type 1 (≙SAE 3000 PSI)	**F** 4; 21)
	Flange hole pattern according to ISO 6162-2 tab. 2 type 1 (≙SAE 6000 PSI)	**D** 4; 9)
	Flange hole pattern according to ISO 6164 tab. 1	**K** 1; 4)
	Flange hole pattern according to ISO 6164 tab. 2	**H** 4)
	According to ISO 1179-1 (pipe thread ISO 228-1) with flat pipe flange	**C** 31)
	With mounted control block	**Y** 38)
	For directional and control valves	
	Subplate NG6	**P** 4; 5)
	Subplate NG10	**T** 4; 6)
	Subplate NG16	**U** 4; 7)
	Subplate NG25	**V** 4; 32)
	For SL and SV valves	
	Subplate NG6	**A** 4; 5; 15)
	Subplate NG10	**E** 4; 6; 15)
	Subplate NG20	**L** 4; 7; 15)
	Subplate NG30	**N** 4; 32; 15)

Line connection / position at head

10	View to piston rod 30)		**1** **2** **3** **4**

Line connection/position at base

11	View to piston rod 30)		**1** **2** **3** **4**

Ordering code series CDH2

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CD	**H2**		**/**		**/**		**/**		**A**	**3X**	**/**								

Piston rod design

12	Hard chromium-plated	**C**
	Hardened and hard chromium-plated	**H** [23)]
	Nickel-plated and hard chromium-plated	**N** [19)]

Piston rod end

13	Thread for swivel head CGKD	**H**
	With mounted swivel head CGKD	**F**

End position cushioning

14	Without	**U**
	Both sides, self-adjusting	**D** [1)]
	Both sides, adjustable	**E**
	Base sides, self-adjusting	**K** [1; 38)]
	Head sides, self-adjusting	**S** [1; 38)]

Seal design - observe selection criteria for seals, see page “Selection criteria for seals” on page 71

15	**For mineral oil HL, HLP and HFA**	
	Standard seal system	**M**
	Standard seal system with guide rings	**L**
	Reduced friction, heavy industry	**R**
	For mineral oil HL, HLP, HFA and water glycol HFC	
	Standard seal system HFC	**G** [40)]
	Servo quality / reduced friction	**T**
	Chevron seal kits	**A**
	For HDFR phosphate ester and HFDU polyol ester	
	Servo quality / reduced friction	**S**
	Standard seal system FKM	**V** [40)]
	Chevron seal kits	**B**

Option

16	**Without** additional options, do **not** fill fields for additional options	**W**
	Additional options, fill fields for additional options	**Z**

Ordering code series CDH2 (fields for additional options)

	01	02	03	04	05	06	07	08
Z								

01	Without inductive proximity switches	**W**
	Inductive proximity switches **without** mating connector - separate order, see page 49	**E** [37]
02	Without additional guide rings	**W**
	Additional guide rings	**F** [10], [28]
03	Without measuring coupling	**W**
	Measuring coupling, on both sides	**A**
	Measuring coupling, on both sides, stainless steel version	**E** [38]
04	Standard grease nipples, DIN 71412 form A	**W**
	Flat type grease nipples, DIN 3404 form A	**B**
05	Without piston rod extension	**W**
	Specify the piston rod extension LY in the plain text in mm	**Y**
06	Priming class CP3	**W**
	Painting class CP4	**B** [11]
	Painting class CP5	**L** [11]
	Painting class CP6	**U** [11]
	Painting class CP7	**E** [11]
07	Without oil filling	**W**
	With corrosion protection oil VG 68	**F**
08	Without test certificate	**W**
	With certificate of compliance 2.1 based on EN 10204	**B**
	With acceptance test certificate 3.1 based on EN 10204	**C**

Order examples:

Without additional options: CDH2MT4/63/45/350A3X/B11CHDMW, XV = 300 mm

With additional options: CDH2MF3/80/56/500A3X/B11CHDMZEWAWWWW

[1] Only piston Ø 40 ... 200 mm

[2] Trunnion position freely selectable. When ordering, always specify the "XV" dimensions in the plain text in mm

[3] Observe the max. available stroke length page 14 and admissible stroke length (acc. to buckling calculation) page 65 to 67

[4] Not possible with MF4

[5] Piston Ø 40 ... 80 mm, only position 11, subplates only possible in combination with line connection "B" at the head

[6] Piston Ø 63 ... 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head

[7] Piston Ø 125 ... 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head

[9] Only piston Ø 80 ... 320 mm

[10] Seal designs A, B not possible; Piston Ø 220 ... 320 mm standard

[11] Specify RAL color in the plain text

[15] Subplates for SL and SV valves (check valves) Please note: Seal designs T, G, L, R, S and V are not designed for static hold function!

[18] Not standardized

[19] From piston Ø 63 mm

[21] Only piston Ø 63 ... 200 mm

[23] Only piston rod Ø 25 ... 140 mm

[28] Standard with seal design "L"

[30] All graphical pictures in the data sheet show position 1

[31] With MS2, only position 11 is possible

[32] Piston Ø 180 ... 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head

[33] Version does not comply with ISO 6022

[35] Not possible with MP3

[37] Min. stroke length = 20 mm

[38] On request

[40] Not with piston rod Ø 220 mm

Ordering code series CGH2

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CG	**H2**		/		/		/		**A**	**3X**	/								

01	Double-rod cylinder	**CG** [18]
02	Series	**H2**

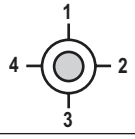
Types of mounting

03	Round flange at head	**MF3**
	Trunnion mounting	**MT4** [2]
	Foot mounting	**MS2**
04	Piston Ø (ØAL) **40 ... 320** mm	
05	Piston rod Ø (ØMM) **25 ... 220** mm	
06	Stroke length in mm [3]	
07	Design principle: Head and base flanged	**A**
08	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

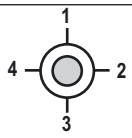
Line connection / version

09	According to ISO 1179-1 (pipe thread ISO 228-1)	**B**
	According to ISO 9974-1 (metric thread ISO 261)	**M** [33]
	Flange hole pattern according to ISO 6162-1 tab. 2 type 1 (≙SAE 3000 PSI)	**F** [21]
	Flange hole pattern according to ISO 6162-2 tab. 2 type 1 (≙SAE 6000 PSI)	**D** [9]
	Flange hole pattern according to ISO 6164 tab. 1	**K** [1]
	Flange hole pattern according to ISO 6164 tab. 2	**H**
	According to ISO 1179-1 (pipe thread ISO 228-1) with flat pipe flange	**C** [31]
	With mounted control block	**Y** [38]

Line connection / position at head

10	View to piston rod [30]		**1** **2** **3** **4**

Line connection / position at base

11	View to piston rod [30]		**1** **2** **3** **4**

☞ **Notice:** Preferred types and standard units are contained in the EPS (standard price list).

Ordering code series CGH2

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CG	**H2**		**/**		**/**		**/**		**A**	**3X**	**/**								

Piston rod design

12	Hard chromium-plated	**C**
	Hardened and hard chromium-plated	**H** [23)]

Piston rod end

13	Thread for swivel head CGKD	**H**
	With mounted swivel head CGKD	**F** [17)]

End position cushioning

14	Without	**U**
	Both sides, self-adjusting	**D** [1)]
	Both sides, adjustable	**E**

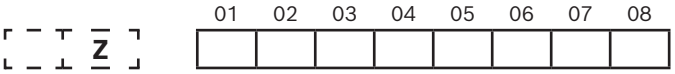
Seal design - observe selection criteria for seals, see page 71

15	**For mineral oil HL, HLP and HFA**	
	Standard seal system	**M**
	Standard seal system with guide rings	**L**
	Reduced friction, heavy industry	**R**
	For mineral oil HL, HLP, HFA and water glycol HFC	
	Standard seal system HFC	**G** [40)]
	Servo quality / reduced friction	**T**
	Chevron seal kits	**A**
	For HDFR phosphate ester and HFDU polyol ester	
	Servo quality / reduced friction	**S**
	Standard seal system FKM	**V** [40)]
	Chevron seal kits	**B**

Option

16	**Without** additional options, do **not** fill fields for additional options	**W**
	Additional options, fill fields for additional options	**Z**

Ordering code series CGH2 (fields for additional options)



01	Without inductive proximity switches	**W**
	Inductive proximity switches **without** mating connector - separate order, see page 49	**E** [37]
02	Without additional guide rings	**W**
	Additional guide rings	**F** [10], [28]
03	Without measuring coupling	**W**
	Measuring coupling, on both sides	**A**
	Measuring coupling, on both sides, stainless steel version	**E** [38]
04	Standard grease nipples, DIN 71412 form A	**W**
	Flat type grease nipples, DIN 3404 form A	**B**
05	Without piston rod extension	**W**
	Specify the piston rod extension LY in the plain text in mm	**Y** [16]
06	Priming class CP3	**W**
	Painting class CP4	**B** [11]
	Painting class CP5	**L** [11]
	Painting class CP6	**U** [11]
	Painting class CP7	**E** [11]
07	Without oil filling	**W**
	With corrosion protection oil VG 68	**F**
08	Without test certificate	**W**
	With certificate of compliance 2.1 based on EN 10204	**B**
	With acceptance test certificate 3.1 based on EN 10204	**C**

Order examples:

Without additional options: CGH2MF3/100/70/500A3X/B11CHUMW

With additional options: CGH2MF3/100/70/500A3X/B11CHUMZEWAWWWWW

[1] Only piston Ø 40 ... 200 mm

[2] Trunnion position freely selectable. When ordering, always specify the "XV" dimensions in the plain text in mm

[3] Observe the max. available stroke length page 14 and admissible stroke length (acc. to buckling calculation) page 65 to 67

[9] Only piston Ø 80 ... 320 mm

[10] Seal designs A, B not possible;
Piston Ø 220 ... 320 mm standard

[11] Specify RAL color in the plain text

[16] Only at left piston rod side
(orientation: catalog figures)

[17] Only one swivel head / plain clevis mounted, left piston rod side
(orientation: catalog figures)

[18] Not standardized

[21] Only piston Ø 63 ... 200 mm

[23] Only piston rod Ø 25 ... 140 mm

[28] Standard with seal design "L"

[30] All graphical pictures in the data sheet show position 1

[31] With MS2, only position 11 is possible

[33] Version does not comply with ISO 6022

[37] Min. stroke length = 20 mm

[38] On request

[40] Not with piston rod Ø 220 mm

Ordering code series CSH2

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CS	**H2**		**/**		**/**		**/**		**A**	**3X**	**/**								

01	Differential cylinder with position measurement system	**CS** 18)
02	Series	**H2**

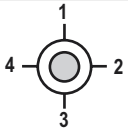
Types of mounting

03	Swivel eye at base	**MP3**
	Self-aligning clevis at base	**MP5**
	Round flange at head	**MF3**
	Round flange at base	**MF4**
	Trunnion mounting	**MT4** 2)
	Foot mounting	**MS2**
04	Piston Ø (ØAL) **40 ... 320** mm	
05	Piston rod Ø (ØMM) **28 ... 220** mm	
06	Stroke length in mm 3)	
07	Design principle: Head and base flanged	**A**
08	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

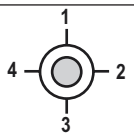
Line connection / version

09	According to ISO 1179-1 (pipe thread ISO 228-1)	**B**
	According to ISO 9974-1 (metric thread ISO 261)	**M** 33)
	Flange hole pattern according to ISO 6162-1 tab. 2 type 1 (≙SAE 3000 PSI)	**F** 4); 21)
	Flange hole pattern according to ISO 6162-2 tab. 2 type 1 (≙SAE 6000 PSI)	**D** 4); 9)
	Flange hole pattern according to ISO 6164 tab. 1	**K** 1; 4)
	Flange hole pattern according to ISO 6164 tab. 2	**H** 4)
	According to ISO 1179-1 (pipe thread ISO 228-1) with flat pipe flange	**C** 31)
	With mounted control block	**Y** 38)
	– For directional and control valves	
	Subplate NG6	**P** 4); 5)
	Subplate NG10	**T** 4); 6)
	Subplate NG16	**U** 4); 7)
	Subplate NG25	**V** 4); 32)
	– For SL and SV valves	
	Subplate NG6	**A** 4); 5); 15)
	Subplate NG10	**E** 4); 6); 15)
	Subplate NG20	**L** 4); 7); 15)
	Subplate NG30	**N** 4); 15); 32)

Line connection / position at head

10	View to piston rod 30)		**1** **2** **3** **4**

Line connection/position at base

11	View to piston rod 30)		**1** **2** **3** **4**

Ordering code series CSH2

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CS	**H2**		**/**		**/**		**/**		**A**	**3X**	**/**								**Z**

Piston rod design

12	Hard chromium-plated	**C**
	Hardened and hard chromium-plated	**H** [19)]

Piston rod end

13	Thread for swivel head CGKD	**H**
	With mounted swivel head CGKD	**F**

End position cushioning

14	Without	**U**
	Both sides, adjustable	**E** [20)]

Seal design - observe selection criteria for seals, see page 71

15	**For mineral oil HL, HLP and HFA**	
	Standard seal system	**M** [29)]
	Standard seal system with guide rings	**L**
	Reduced friction, heavy industry	**R** [29)]
	For mineral oil HL, HLP, HFA and water glycol HFC	
	Standard seal system HFC	**G** [29; 41)]
	Servo quality / reduced friction	**T** [29)]
	For HDFR phosphate ester and HFDU polyol ester	
	Servo quality / reduced friction	**S** [29)]
	Standard seal system FKM	**V** [29; 41)]

Option

16	**Additional** options, fill fields for additional options	**Z**

Ordering code series CSH2 (fields for additional options)

Z

01	02	03	04	05	06	07	08
T							

01	Position measurement system (magnetostrictive) **without** mating connector - separate order, see page 53, 55, 56 and 58	**T**
02	Analog output 4 ... 20 mA	**C**
	Analog output 0 ... 10 V	**F**
	Digital output SSI (resolution 5 µm, asynchronious forward)	**D**
	Digital output SSI (resolution 1 µm, synchronious forward)	**S**
	Profibus D63 (integrated supply)	**N**
	Profibus D53 (separate supply line)	**P**
	IO-Link	**L** [39); 40)]
	Profinet RT and IRT with encoder profile	**R**
03	Without measuring coupling	**W**
	Measuring coupling, on both sides	**A**
	Measuring coupling, on both sides, stainless steel version	**E** [38)]
04	Standard grease nipples, DIN 71412 form A	**W**
	Spherical bearing, maintenance-free	**A** [14); 35)]
	Flat type grease nipples, DIN 3404 form A	**B**
05	Without piston rod extension	**W**
	Specify the piston rod extension LY in the plain text in mm	**Y**
06	Priming class CP3	**W**
	Painting class CP4	**B** [11)]
	Painting class CP5	**L** [11)]
	Painting class CP6	**U** [11)]
	Painting class CP7	**E** [11)]
07	Without oil filling	**W**
	With corrosion protection oil VG 68	**F**
08	Without test certificate	**W**
	With certificate of compliance 2.1 based on EN 10204	**B**
	With acceptance test certificate 3.1 based on EN 10204	**C**

Order examples:

With additional options: CSH2MP5/100/56/300A3X/T11CAEMZTCAWWWWW

1) Only piston Ø 40 ... 200 mm
2) Trunnion position freely selectable. When ordering, always specify the "XV" dimensions in the plain text in mm
3) Observe the max. available stroke length page 14 and admissible stroke length (acc. to buckling calculation) page 65 to 67
4) Not possible with MF4
5) Piston Ø 40 ... 80 mm, only position 11, subplates only possible in combination with line connection "B" at the head
6) Piston Ø 63 ... 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
7) Piston Ø 125 ... 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
9) Only piston Ø 80 ... 320 mm
11) Specify RAL color in the plain text
14) Not possible with plain clevis "N"
15) Subplates for SL and SV valves (check valves)
Please note: Seal designs T, G, L, R, S and V are not designed for static hold function!
18) Not standardized
19) Only piston rod Ø 28 ... 140 mm
20) Possible from piston rod Ø 45 mm
21) Only piston Ø 63 ... 200 mm
29) With CSH, by default with guide rings
30) All graphical pictures in the data sheet show position 1
31) With MS2, only position 11 is possible
32) Piston Ø 180 ... 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
33) Version does not comply with ISO 6022
35) Not possible with MP3
38) On request
39) Not possible with MP3 and MP5
40) Observe min. stroke length 50 mm / max. stroke length 2540 mm
41) Not with piston rod Ø 220 mm

Technical data

(For applications outside these values, please consult us!)

Standards:
The installation dimensions and types of mounting of the cylinder comply with the standards DIN 24333 and ISO 6022.

Nominal pressure: 250 bar
Static test pressure: 375 bar
Reduced test pressure 315 bar
The maximum operating pressures must be less than or equal to the applicable nominal pressures and apply to applications with shock-free operation with reference to excess pressure and/or external loads. With extreme loads like e.g. high cycle sequence, mounting elements and threaded piston rod connections must be designed for durability.

Minimum pressure:
Depending on the application, operating conditions and technical design, a certain minimum pressure (approx. 10 bar) is required in order to guarantee a technically perfect function of the hydraulic cylinder.

Installation position: arbitrary

Hydraulic fluid (additional data sheet):
Mineral oils DIN 51524 HL, HLP (90220)
Oil-in-water emulsion HFA (90223)
Water glycol HFC (90223)
Phosphate ester HFDR (90222)
Polyol ester HFDU (90222)

Hydraulic fluid temperature range: see page 71
Ambient temperature range: see page 71
Optimum viscosity range: 20 to 100 mm^2/s
Minimum admissible viscosity: 12 mm^2/s
Maximum admissible viscosity: 380 mm^2/s

Cleanliness class acc. to ISO
Maximum admissible degree of contamination of the hydraulic fluid according to ISO 4406 (c) class 20/18/15. The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.

Bleeding by default secured against unscrewing

Color set-up:
Priming: By default, hydraulic cylinders are primed with a coating (color gentian blue RAL 5010) of min. 40 µm, see page 83.
Other colors on request.
Following surfaces of cylinders and attached parts are not primed:
- All fitting diameters to the customer side
- Sealing surfaces for line connection
- Sealing surfaces for flange connection
- Connection surface for valve mounting
- Inductive proximity switches
- Position measurement system
- Measuring coupling
- Spherical / plain bearing
- Grease nipples

Painting: By default, hydraulic cylinders can be ordered in four corrosivity categories in the RAL colors, see page 83.
Following surfaces of cylinders and attached parts are not painted:
- All fitting diameters and connection surfaces to customer side
- Sealing surfaces for line connection
- Sealing surfaces for flange connection
- Connection surface for valve mounting
- Inductive proximity switches
- Position measurement system
- Measuring coupling
- Spherical / plain bearing
- Grease nipples

Surfaces not primed or painted are protected with solvent-free corrosion protection compound.
Accessories ordered as a separate order item are not primed or painted by default. Corresponding priming and/or painting on request.

Technical data

(For applications outside these values, please consult us!)

Stroke velocity:

Please observe the guideline on max. stroke velocities (with recommended flow velocity of 5 m/s in the line connection) in the table. Higher stroke velocity on request.

If the extension velocity is considerably higher than the retraction velocity of the piston rod, drag-out losses of the medium may result. If necessary, please consult us.

Piston Ø (mm)	Line connection	Max. stroke velocity in m/s
40	G1/2	0.31
50	G1/2	0.20
63	G3/4	0.28
80	G3/4	0.18
100	G1	0.20
125	G1	0.13
140	G1 1/4	0.16
160	G1 1/4	0.12
180	G1 1/4	0.10
200	G1 1/4	0.08
220	G1 1/2	0.09
250	G1 1/2	0.07
280	G1 1/2	0.06
320	G1 1/2	0.04

Boundary and application conditions:

- The mechanical alignment of the movement axis and thus the mounting points of hydraulic cylinder and piston rod must be ensured. Lateral forces on the guides of piston rod and piston are to be avoided. It may be necessary to consider the own weight of the hydraulic cylinder (MP3 / MP5 or MT4) or the piston rod.
- The bending length/bending load of the piston rod and/or the hydraulic cylinder must be observed (see page topic Bucklig).
- The maximum admissible stroke velocities with regard to the suitability/load of seals must be observed as must their compatibility with the properties of the hydraulic fluid (see page topic Seals).
- The maximum admissible velocities/kinetic energies when moving into the end positions, also considering external loads, must be observed.
  Danger: Excess pressure
- The maximum admissible operating pressure must be complied with in any operating state of the hydraulic cylinder. Possible pressure intensification resulting from the area ratio of annulus area to piston area and possible throttling points are to be observed.
- Detrimental environmental influences, like e.g. aggressive finest particles, vapors, high temperatures, etc. as well as contaminations and deterioration of the hydraulic fluid are to be avoided.

Notice:

- This list does not claim to be complete. In case of questions regarding the compatibility with the medium or exceedance of the boundary or application conditions, please contact us.
- All graphical pictures in the data sheet are examples. The product supplied may therefore differ from the figure shown.

Technical data

(For applications outside these values, please consult us!)

Acceptance:
Every hydraulic cylinders is tested according to Bosch Rexroth standards and following ISO 10100:2020 with module L.

Safety instructions:
For assembly, commissioning and maintenance of hydraulic cylinders, observe the operating instructions 07100-B! Service and repair work has to be performed by Bosch Rexroth AG or by personnel especially trained for this purpose. No warranty is accepted for damage as a consequence of assembly, maintenance or repair work not performed by Bosch Rexroth AG.

Check lists for hydraulic cylinders:
Cylinders the characteristics and/or application parameters of which deviate from the values specified in the data sheet can only be offered as a special version on request. For offers, the deviations of the characteristics and / or application parameters must be described in the check lists for hydraulic cylinders (07200).

Minimum strokes:
When using end position cushioning, the minimum stroke must also be observed, see page 68 "End position cushioning".

Project planning software ICS (Interactive Catalog System)

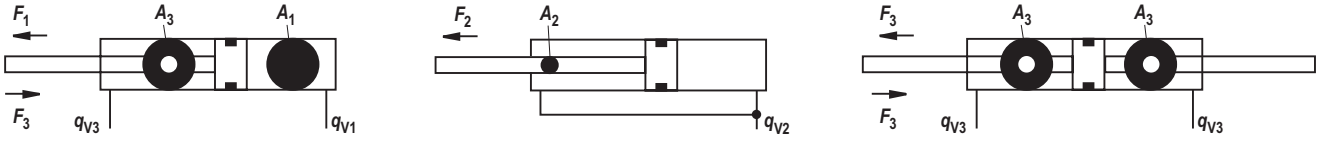
The ICS (Interactive Catalog System) is a selection and project planning aid for hydraulic cylinders. The ICS allows designers for machines and systems to quickly and reliably find the perfect hydraulic cylinder solution through logic-guided type key enquiries. This software helps to solve design and project planning tasks more quickly and efficiently. After having been guided through the product selection, the user quickly and reliably gets the exact technical data of the selected component as well as 3D CAD data in the correct file format for all common CAD systems. This allows users to reduce costs while increasing their competitiveness.

Technical data

(For applications outside these values, please consult us!)

Diameters, areas, forces, flow

Piston	Piston rod	Area ratio	Areas			Force at 250 bar [1]			Flow at 0.1 m/s [2]			Max. available stroke length
			Piston	Rod	Ring	Pressure	Diff.	Pulling	Off	Diff.	On	
ØAL mm	ØMM mm	ϕ A_1/A_3	A_1 cm²	A_2 cm²	A_3 cm²	F_1 kN	F_2 kN	F_3 kN	q_{V1} l/min	q_{V2} l/min	q_{V3} l/min	mm
40	**25**	1.64	12.56	4.90	7.65	31.40	12.25	19.12	7.5	2.9	4.6	2000
	28	1.96		6.16	6.40		15.40	16.00		3.7	3.8	
50	**32**	1.69	19.63	8.04	11.59	49.10	20.12	28.98	11.8	4.8	7.0	2000
	36	2.08		10.18	9.45		25.45	23.65		6.1	5.7	
63	**40**	1.67	31.17	12.56	18.61	77.90	31.38	46.52	18.7	7.5	11.2	2000
	45	2.04		15.90	15.27		39.75	38.15		9.5	9.2	
80	**50**	1.66	50.26	19.63	30.63	125.65	49.07	76.58	30.2	11.8	18.4	2000
	56	1.96		24.63	25.63		61.55	64.10		14.8	15.4	
100	**63**	1.66	78.54	31.16	47.38	196.35	77.93	118.42	47.1	18.7	28.4	3000
	70	1.96		38.48	40.06		96.20	100.15		23.1	24.0	
125	**80**	1.69	122.72	50.24	72.48	306.75	125.62	181.13	73.6	30.1	43.5	3000
	90	2.08		63.62	59.10		159.05	147.70		38.2	35.4	
140	**90**	1.70	153.94	63.62	90.32	384.75	159.05	225.70	92.4	38.2	54.2	3000
	100	2.04		78.54	75.40		196.35	188.40		47.1	45.3	
160	**100**	1.64	201.06	78.54	122.50	502.50	196.35	306.15	120.6	47.1	73.5	3000
	110	1.90		95.06	106.00		237.65	264.85		57.0	63.6	
180	**110**	1.60	254.47	95.06	159.43	636.17	237.65	398.52	152.7	57.0	95.7	3000
	125	1.93		122.72	131.75		306.80	329.37		73.6	79.1	
200	**125**	1.64	314.16	122.72	191.44	785.25	306.80	478.45	188.5	73.6	114.9	3000
	140	1.96		153.96	160.20		384.90	400.35		92.4	96.1	
220	**140**	1.68	380.1	153.96	226.2	950.3	384.9	565.5	228.1	92.4	135.7	6000
	160	2.12		201.0	179.1		502.6	447.7		120.7	107.4	
250	**160**	1.69	490.8	201.0	289.8	1227.2	502.6	724.5	294.5	120.7	173.8	6000
	180	2.08		254.4	236.4		636.2	590.0		152.7	141.8	
280	**180**	1.70	615.7	254.4	361.3	1539.4	636.2	903.2	369.4	152.7	216.7	6000
	200	2.04		314.1	301.6		785.4	753.9		188.5	180.9	
320	**200**	1.64	804.2	314.1	490.1	2010.6	785.4	1225.2	482.5	188.5	294.0	6000
	220	1.90		380.1	424.2		950.3	1060.3		228.1	254.4	



[1] Theoretical static cylinder force (without consideration of the efficiency and admissible load for attachment parts such as swivel heads, plates, or valves, etc.)

[2] Stroke velocity

Technical data

(For applications outside these values, please consult us!)

Tolerances according to DIN ISO 6022

Installation dimensions	WC	XC [2]	XO [2]	XS [1; 2]	XV [2]	ZP [2]	Stroke tolerances [3]
Type of mounting	MF3	MP3	MP5	MS2	MT4	MF4	
Stroke length	Tolerances						
≤ 1250	±2	±1.5	±1.5	±2	±2	±1.5	+2
> 1250 – ≤ 3150	±4	±3	±3	±4	±4	±3	+5
> 3150 – ≤ 6000	±8	±5	±5	±8	±8	±5	+8

[1] Not standardized

[2] Including stroke length

[3] Stroke tolerances must not be added to the tolerances listed in this table.

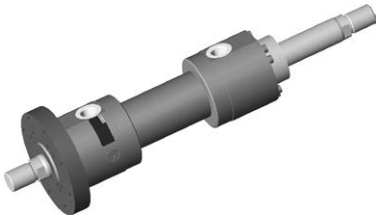
Overview types of mounting: Series CDH2 / CGH2

CDH2 MP3; see page 18, 19

CDH2 MP5; see page 20, 21

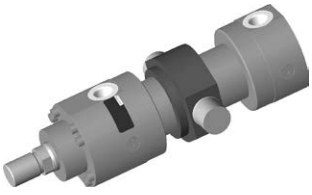
CDH2 MF3; see page 22, 23

CGH2 MF3; see page 22, 23



CDH2 MF4; see page 24, 25

CDH2 MT4; see page 26, 27



CGH2 MT4; see page 26, 27

CDH2 MS2; see page 28, 29

CGH2 MS2; see page 28, 29

Overview types of mounting: Series CSH2

CSH2 MP3

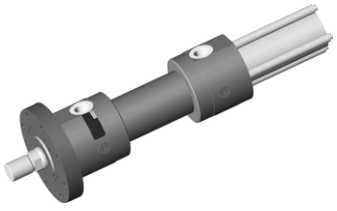
see page 30, 31

CSH2 MP5

see page 32, 33

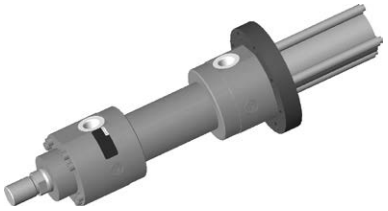
CSH2 MF3

see page 34, 35



CSH2 MF4

see page 36, 37



CSH2 MT4

see page 38, 39

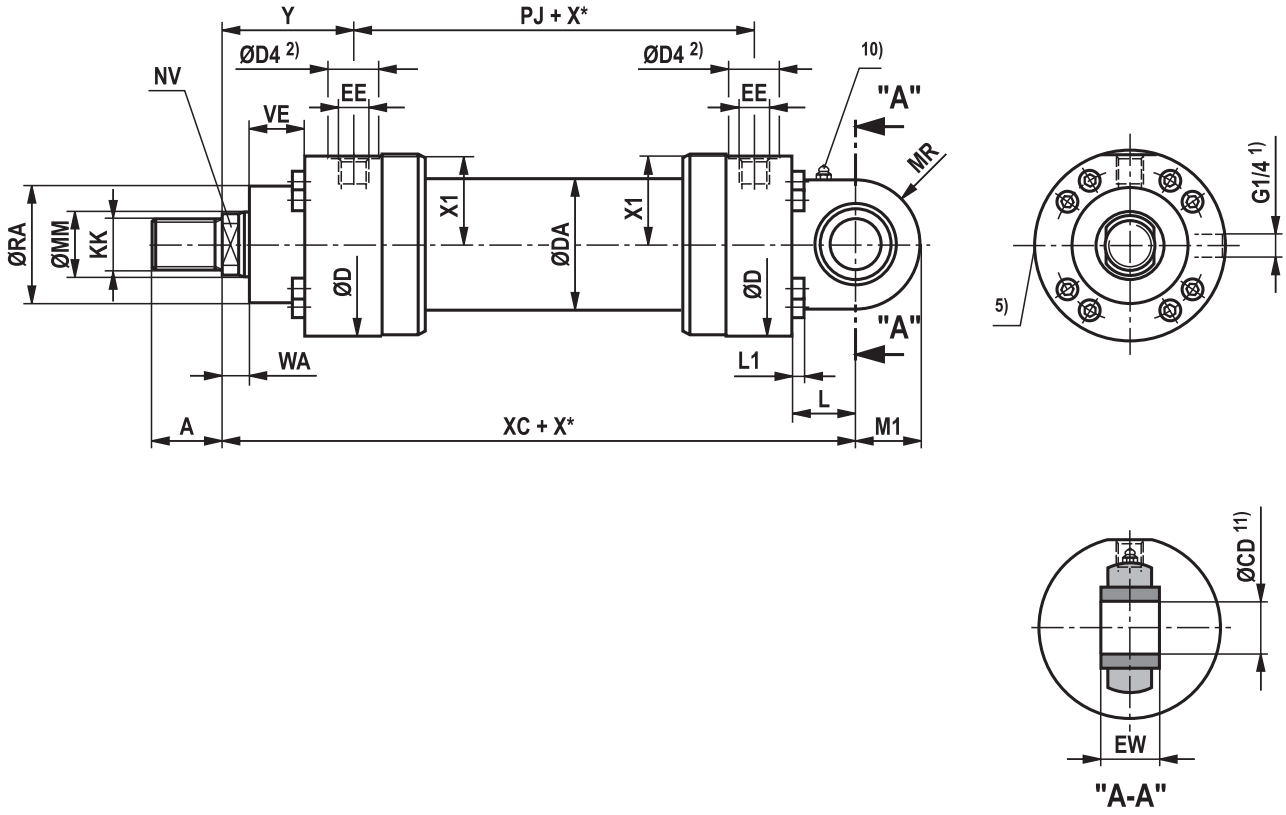
CSH2 MS2

see page 40, 41

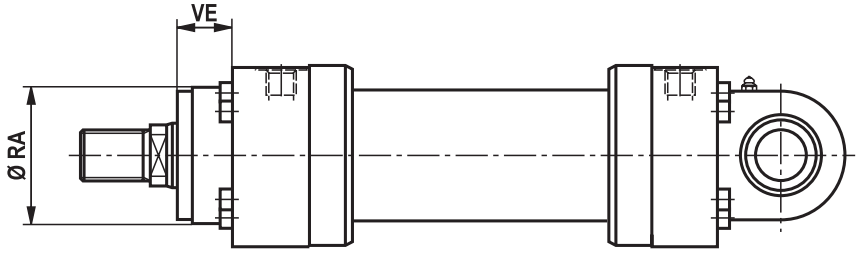
Dimensions

Swivel eye at base CDH2: MP3 (dimensions in mm)

CDH2 MP3; ØAL 40 - 200 mm



CDH2 MP3: with seal design "A", "B" and ØAL 160 - 320 mm



Dimensions

Swivel eye at base CDH2: MP3 (dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 [2]	EE [4; 16]	EE [4; 17]	Y	PJ	X1
40 [6]	**25/28**	M20x1,5	28	19/22	88	52	34	G1/2	M22x1,5	83	120	41
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1,5	98	120	48.5
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5
220 [6]	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 [3]	244	326	174
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 [3]	257	326	194
280 [6]	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 [3]	290	375	220.5
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 [3]	282	391	243

ØAL	ØMM	WA	XC	L	L1	MR	M1	ØCD H9	EW h12	ØRA [7]	VE [7]	ØRA [8]	VE [8]
40 [6]	**25/28**	18	282	53	8	32	32	25	25	52	29	88	–
50	**32/36**	18	305	61	8	40	40	32	32	63	29	102	–
63	**40/45**	21	348	74	8	50	50	40	40	75	32	120	–
80	**50/56**	24	395	90	10	63	63	50	50	90	36	145	–
100	**63/70**	27	442	102	12	71	71	63	63	110	41	170	–
125	**80/90**	31	520	124	16	90	90	80	80	132	45	206	–
140	**90/100**	31	580	149	16	100	100	90	90	145	45	226	–
160	**100/110**	35	617	150	16	112	112	100	100	160	50	200	50
180	**110/125**	40	690	180	20	129	129	110	110	185	55	220	55
200	**125/140**	40	756	206	20	145	145	125	125	200	61	235	61
220 [6]	**140/160**	42	890	253	20	179 [12]	187 [12]	160	160	235	71	270	71
250	**160/180**	42	903	253	24	179 [12]	187 [12]	160	160	250	71	300	71
280 [6]	**180/200**	48	1072	320	30	230 [12]	240 [12]	200	200	295	88	325	88
320	**200/220**	48	1080	320	30	231 [12]	241 [12]	200	200	320	88	365	88

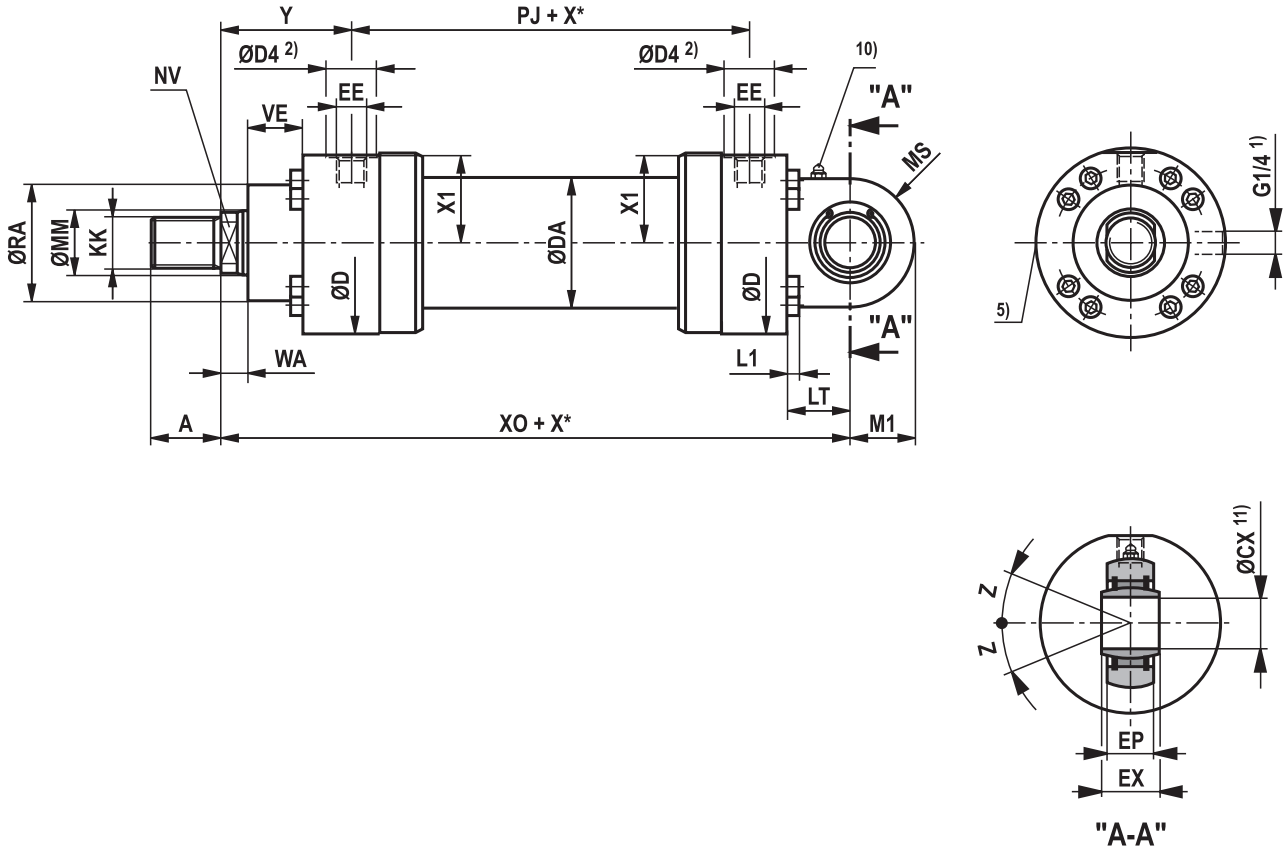
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Thread size does not comply with ISO 6022; M50 x 2 available on request
4) Flange connections see separate table pages 36 and 37
5) Throttle valve only with end position cushioning "E" (180° for bleeding)
6) Piston Ø not standardized
7) Dimensions for cylinders with seal design M, T, G, L, R, S and V
8) Dimensions for cylinders with seal design A and B
10) Standard version "W" Grease nipple, cone head form A according to DIN 71412
11) Related bolt Ø f8
12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting
16) Line connection "B" and "C"
17) Line connection "M"

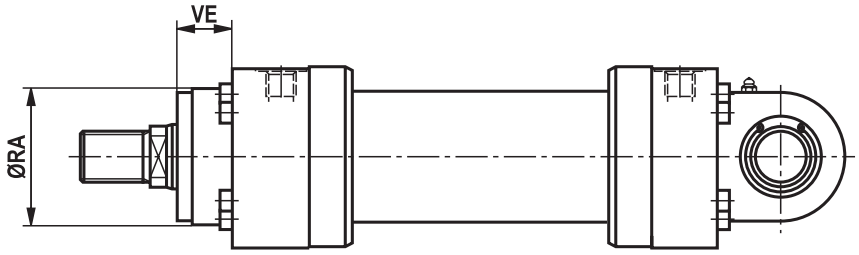
Dimensions

Self-aligning clevis at base CDH2: MP5 (dimensions in mm)

CDH2 MP5



CDH2 MP5: with seal design "A", "B" and ØAL 160 - 320 mm



Dimensions

Self-aligning clevis at base CDH2: MP5 (dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 [2]	EE [4; 16]	EE [4; 17]	Y	PJ	X1	WA	XO
40 [6]	**25/28**	M20x1,5	28	19/22	88	52	34	G1/2	M22x1,5	83	120	41	18	282
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1,5	98	120	48.5	18	305
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21	348
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24	395
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27	442
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31	520
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31	580
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35	617
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40	690
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40	756
220 [6]	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 [3]	244	326	174	42	890
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 [3]	257	326	194	42	903
280 [6]	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 [3]	290	375	220.5	48	1072
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 [3]	282	391	243	48	1080

ØAL	ØMM	LT	L1	MS	M1	ØCX [11] H7	EP	EX h12	ØRA [7]	VE [7]	ØRA [8]	VE [8]	Z
40 [6]	**25/28**	53	8	32	32	25	22	25	52	29	88	–	2 °
50	**32/36**	61	8	40	40	32	27	32	63	29	102	–	4 °
63	**40/45**	74	8	50	50	40	32	40	75	32	120	–	4 °
80	**50/56**	90	10	63	63	50	40	50	90	36	145	–	4 °
100	**63/70**	102	12	71	71	63	52	63	110	41	170	–	4 °
125	**80/90**	124	16	90	90	80	66	80	132	45	206	–	4 °
140	**90/100**	149	16	100	100	90	72	90	145	45	226	–	4 °
160	**100/110**	150	16	112	112	100	84	100	160	50	200	50	4 °
180	**110/125**	180	20	129	129	110	88	110	185	55	220	55	4 °
200	**125/140**	206	20	145	145	125	102	125	200	61	235	61	4 °
220 [6]	**140/160**	253	20	179 [12]	187 [12]	160	130	160	235	71	270	71	4 °
250	**160/180**	253	24	179 [12]	187 [12]	160	130	160	250	71	300	71	4 °
280 [6]	**180/200**	320	30	230 [12]	240 [12]	200	138	200	295	88	325	88	4 °
320	**200/220**	320	30	231 [12]	241 [12]	200	162	200	320	88	365	88	4 °

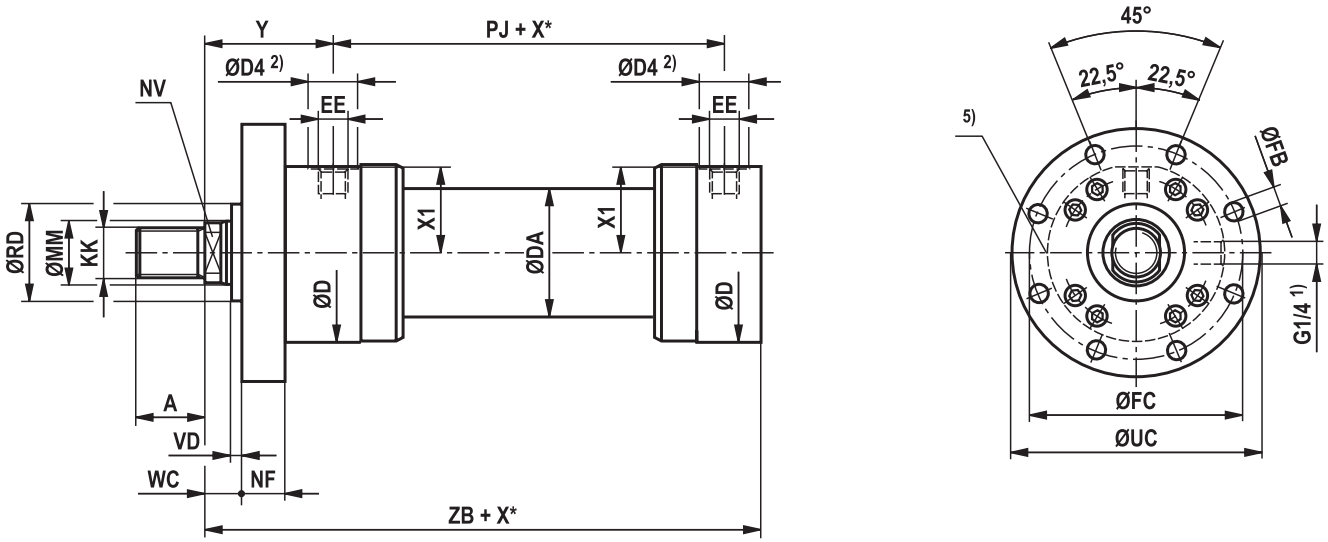
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Thread size does not comply with ISO 6022; M50 x 2 available on request
4) Flange connections see separate table pages 36 and 37
5) Throttle valve only with end position cushioning "E" (180° for bleeding)
6) Piston Ø not standardized
7) Dimensions for cylinders with seal design M, T, G, L, R, S and V
8) Dimensions for cylinders with seal design A and B
10) Standard version "W" Grease nipple, cone head form A according to DIN 71412
11) Related bolt Ø f8
12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting
16) Line connection "B" and "C"
17) Line connection "M"

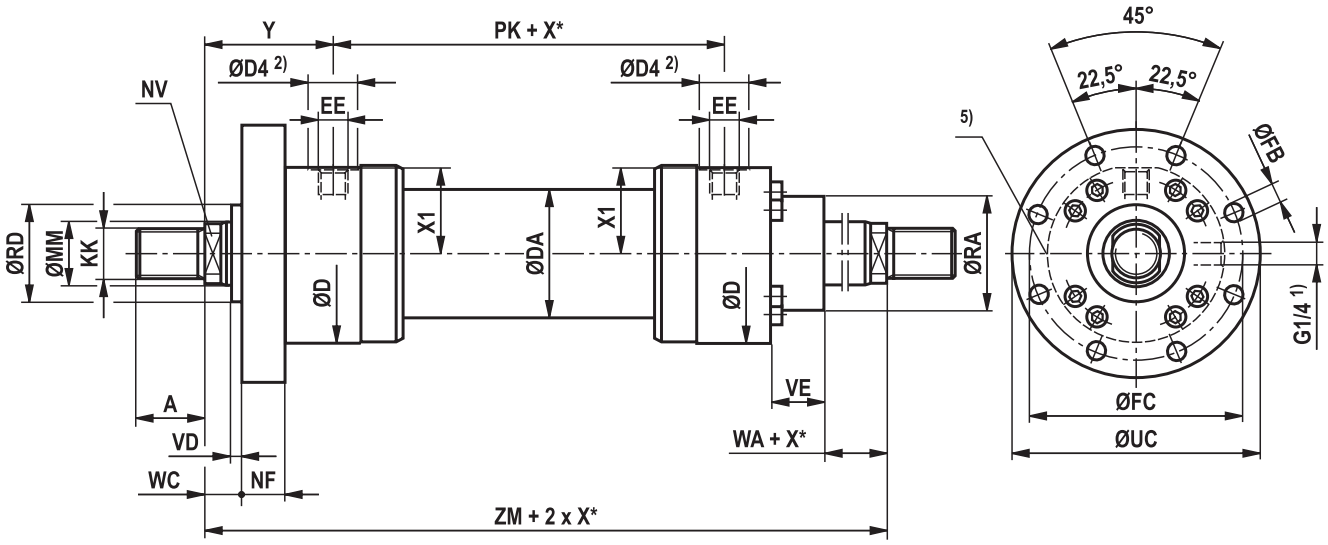
Dimensions

Round flange at head CDH2/CGH2: MF3 (dimensions in mm)

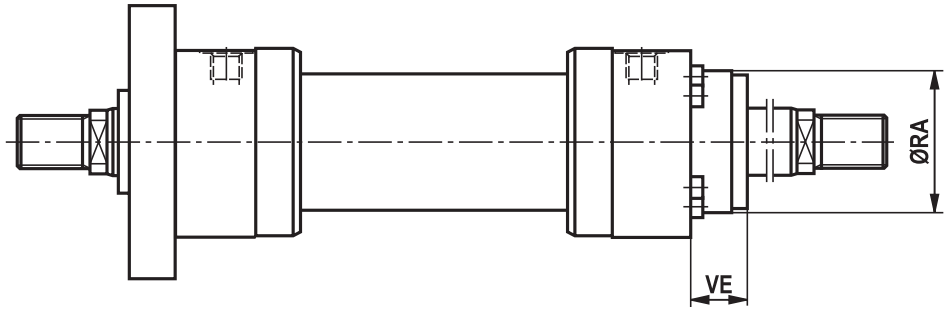
CDH2 MF3



CGH2 MF3 10)



CGH2 MF3 10): with seal design "A", "B" and ØAL 160 - 320 mm



Dimensions

Round flange at head CDH2/CGH2: MF3 (dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 [2]	EE [4; 16]	EE [4; 17]	Y	PJ	X1	WA
40 [6]	**25/28**	M20x1,5	28	19/22	88	52	34	G1/2	M22x1,5	83	120	41	18
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1,5	98	120	48.5	18
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40
220 [6]	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 [3]	244	326	174	42
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 [3]	257	326	194	42
280 [6]	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 [3]	290	375	220.5	48
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 [3]	282	391	243	48

ØAL	ØMM	ØRD f8	WC	VD	NF js13	PK	ZB max	ZM	ØFB H13	ØFC js13	ØUC -1	ØRA [7]	VE [7]	ØRA [8]	VE [8]
40 [6]	**25/28**	52	22	4	25	120	230	286	11	115	138	52	29	88	–
50	**32/36**	63	22	4	25	120	244	316	13.5	132	155	63	29	102	–
63	**40/45**	75	25	4	28	133	274	357	13.5	150	175	75	32	120	–
80	**50/56**	90	28	4	32	155	305	395	17.5	180	210	90	36	145	–
100	**63/70**	110	32	5	36	171	340	439	22	212	250	110	41	170	–
125	**80/90**	132	36	5	40	205	396	511	22	250	290	132	45	206	–
140	**90/100**	145	36	5	40	219	430	551	26	285	330	145	45	226	–
160	**100/110**	160	40	5	45	235	467	605	26	315	360	160	50	200	50
180	**110/125**	185	45	5	50	264	510	652	33	355	410	185	55	220	55
200	**125/140**	200	45	5	56	278	550	718	33	385	440	200	61	235	61
220 [6]	**140/160**	235	50	8	63	326	637	814	39	435	500	235	71	270	71
250	**160/180**	250	50	8	63	326	650	840	39	475	540	250	71	300	71
280 [6]	**180/200**	295	56	8	80	375	752	955	45	555	630	295	88	325	88
320	**200/220**	320	56	8	80	391	760	955	45	600	675	320	88	365	88

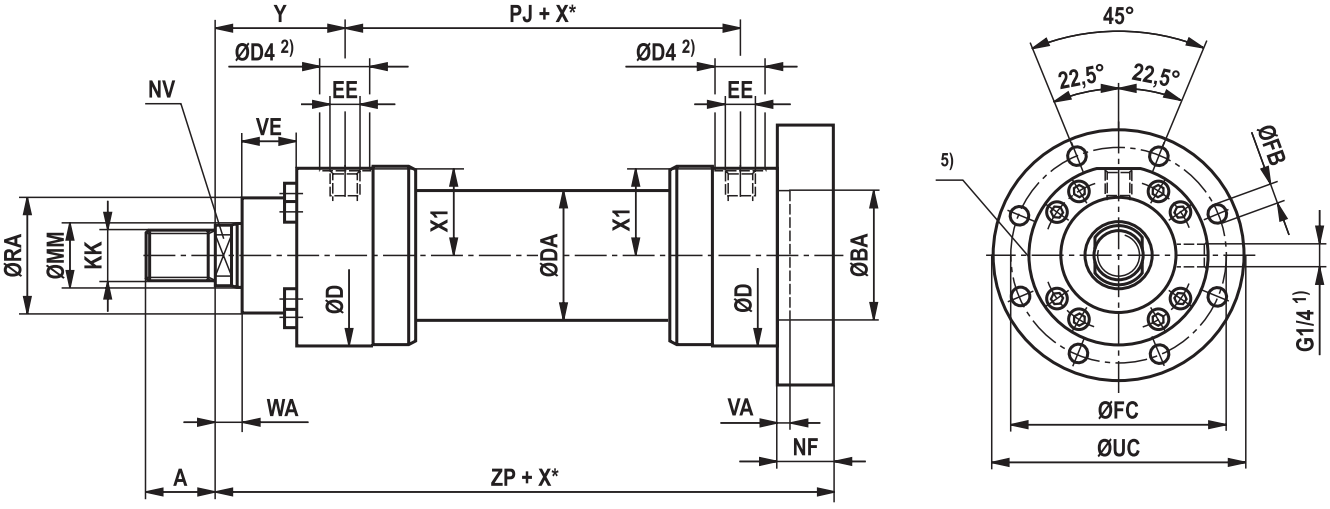
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Thread size does not comply with ISO 6022; M50 x 2 available on request
4) Flange connections see separate table pages 42 and 43
5) Throttle valve only with end position cushioning "E" (180° for bleeding)
6) Piston Ø not standardized
7) Dimensions for cylinders with seal design M, T, G, L, R, S and V
8) Dimensions for cylinders with seal design A and B
10) Double-acting cylinder not standardized
16) Line connection "B" and "C"
17) Line connection "M"

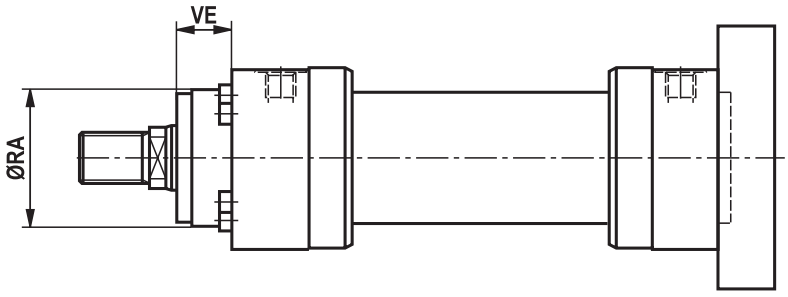
Dimensions

Round flange at base CDH2: MF4 (dimensions in mm)

CDH2 MF4



CDH2 MF4: with seal design "A", "B" and ØAL 160 - 320 mm



Dimensions

Round flange at base CDH2: MF4 (dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 [2]	EE [4; 16]	EE [4; 17]	Y	PJ	X1	WA
40 [6]	**25/28**	M20x1,5	28	19/22	88	52	34	G1/2	M22x1,5	83	120	41	18
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1,5	98	120	48.5	18
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40
220 [6]	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 [3]	244	326	174	42
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 [3]	257	326	194	42
280 [6]	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 [3]	290	375	220.5	48
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 [3]	282	391	243	48

ØAL	ØMM	ZP	NF js13	VA	ØBA H8	ØFB H13	ØFC js13	ØUC -1	ØRA [7]	VE [7]	ØRA [8]	VE [8]
40 [6]	**25/28**	250	25	5	52	11	115	138	52	29	88	–
50	**32/36**	265	25	4	63	13.5	132	155	63	29	102	–
63	**40/45**	298	28	4	75	13.5	150	175	75	32	120	–
80	**50/56**	332	32	5	90	17.5	180	210	90	36	145	–
100	**63/70**	371	36	5	110	22	212	250	110	41	170	–
125	**80/90**	430	40	6	132	22	250	290	132	45	206	–
140	**90/100**	465	40	5	145	26	285	330	145	45	226	–
160	**100/110**	505	45	7	160	26	315	360	160	50	200	50
180	**110/125**	550	50	10	185	33	355	410	185	55	220	55
200	**125/140**	596	56	10	200	33	385	440	200	61	235	61
220 [6]	**140/160**	690	63	10	235	39	435	500	235	71	270	71
250	**160/180**	703	63	10	250	39	475	540	250	71	300	71
280 [6]	**180/200**	822	80	10	295	45	555	630	295	88	325	88
320	**200/220**	830	80	10	320	45	600	675	320	88	365	88

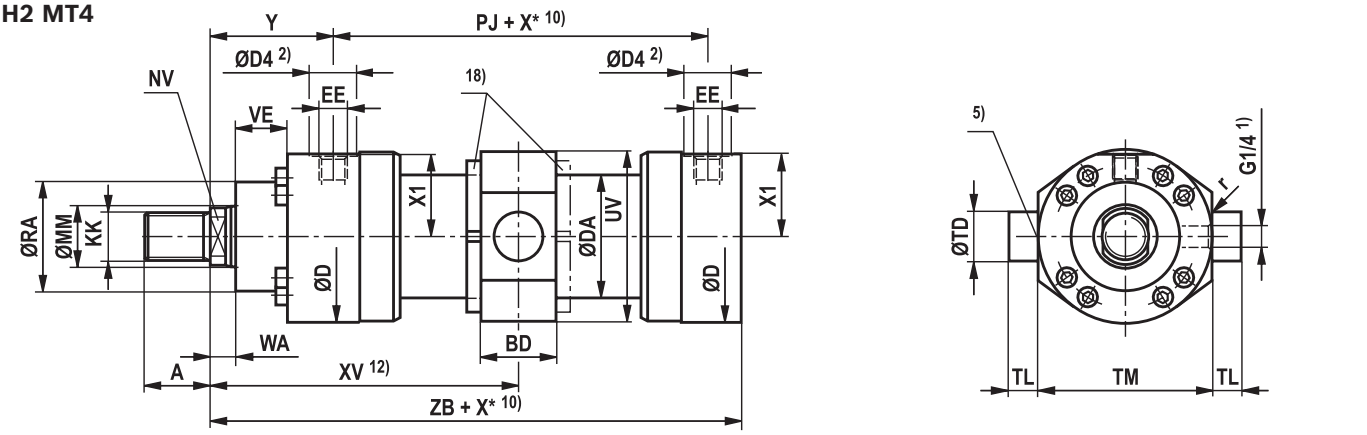
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length

[1] Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
[2] Ø D4 max. 0.5 mm deep
[3] Thread size does not comply with ISO 6022; M50 x 2 available on request
[4] Flange connections see separate table pages 42 and 43
[5] Throttle valve only with end position cushioning "E" (180° for bleeding)
[6] Piston Ø not standardized
[7] Dimensions for cylinders with seal design M, T, G, L, R, S and V
[8] Dimensions for cylinders with seal design A and B
[16] Line connection "B" and "C"
[17] Line connection "M"

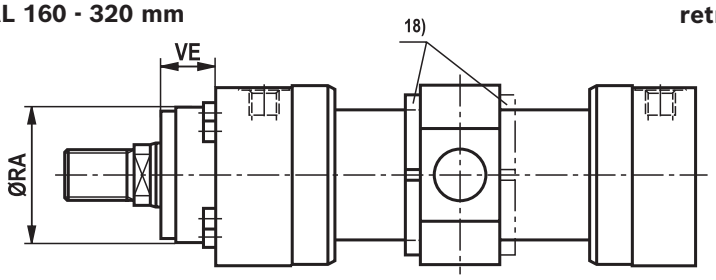
Dimensions

Trunnion mounting CDH2/CGH2: MT4 (dimensions in mm)

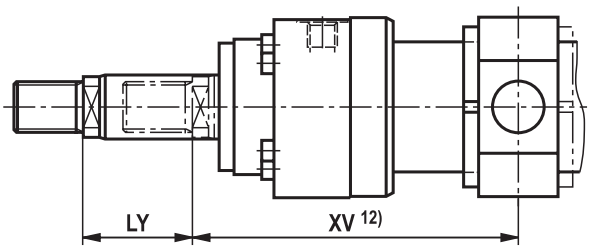
CDH2 MT4



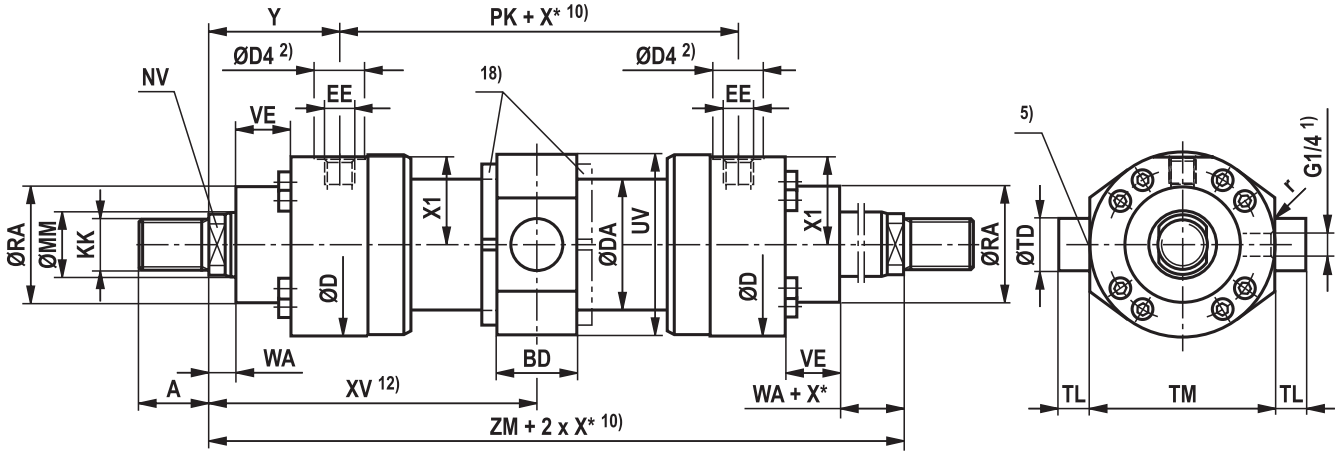
CDH2 MT4: with seal design "A", "B" and ØAL 160 - 320 mm



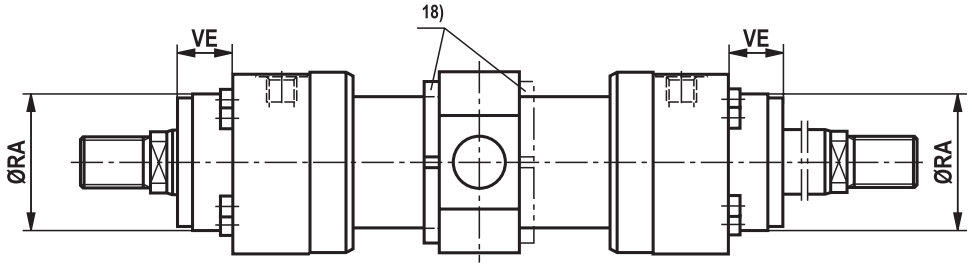
Dimensions for cylinder with piston rod extension "LY" in retracted condition



CGH2 MT4 11)



CGH2 MT4 11): with seal design "A", "B" and ØAL 160 - 320 mm



Dimensions

Trunnion mountings CDH2/CGH2: MT4 (dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 [2]	EE [4; 16]	EE [4; 17]	Y	PJ	X1	WA
40 [6]	**25/28**	M20x1,5	28	19/22	88	52	34	G1/2	M22x1,5	83	120	41	18
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1,5	98	120	48.5	18
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40
220 [6]	**140/160**	M125x4	125	120/140	355	273	65	G1 1/2	M48x2 [3]	244	326	174	42
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 [3]	257	326	194	42
280 [6]	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 [3]	290	375	220.5	48
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 [3]	282	391	243	48

ØAL	ØMM	PK	ZB max	ZM	X* min	XV [14] cent	XV [12] min	XV [12] max	BD	UV [15]	ØTD e8	TL js16	TM h12	r	ØRA [7]	VE [7]	ØRA [8]	VE [8]
40 [6]	**25/28**	120	230	286	22	143+X*/2	154	140+X*	38	97	25	20	95	0.8	52	29	88	–
50	**32/36**	120	244	316	32	158+X*/2	174	151+X*	38	111	32	25	112	0.8	63	29	102	–
63	**40/45**	133	274	357	47	178.5+X*/2	202	167+X*	48	129	40	32	125	1	75	32	120	–
80	**50/56**	155	305	395	58	197.5+X*/2	226.5	180.5+X*	58	163	50	40	150	1	90	36	145	–
100	**63/70**	171	340	439	79	219.5+X*/2	259	195+X*	78	188	63	50	180	1.2	110	41	170	–
125	**80/90**	205	396	511	91	255.5+X*/2	301	210+X*	98	234	80	63	224	1.2	132	45	206	–
140	**90/100**	219	430	551	121	275.5+X*/2	336	215+X*	118	257	90	70	265	1.5	145	45	226	–
160	**100/110**	235	467	605	142	302.5+X*/2	373.5	231.5+X*	128	287	100	80	280	1.5	160	50	200	50
180	**110/125**	264	510	652	158	326+X*/2	405	247+X*	138	328	110	90	320	1.5	185	55	220	55
200	**125/140**	278	550	718	204	359+X*/2	461	257+X*	178	343	125	100	335	1.5	200	61	235	61
220 [6]	**140/160**	326	637	814	200	407+X*/2	507	307+X*	180	393	160	125	385	1.5	235	71	270	71
250	**160/180**	326	650	840	210	420+X*/2	525	315+X*	180	433	160	125	425	1.5	250	71	300	71
280 [6]	**180/200**	375	752	955	241	477.5+X*/2	598	357+X*	220	486	200	160	480	2	295	88	325	88
320	**200/220**	391	760	955	245	477.5+X*/2	600	355+X*	220	536	200	160	530	2	320	88	365	88

ØAL = piston Ø

ØMM = piston rod Ø

X* = stroke length

X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

[1] Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

[2] Ø D4 max. 0.5 mm deep

[3] Thread size does not comply with ISO 6022; M50 x 2 available on request

[4] Flange connections see separate table pages 42 and 43

[5] Throttle valve only with end position cushioning "E" (180° for bleeding)

[6] Piston Ø not standardized

[7] Dimensions for cylinders with seal design M, T, G, L, R, S and V

[8] Dimensions for cylinders with seal design A and B

[10] Observe the min. stroke length "X*min"

[11] Double-acting cylinder not standardized

[12] When ordering, always specify the "XV" dimension in the clear text. Preferred XV dimension:
Observe the trunnion position in the cylinder center XVmin and XVmax

[14] XVcent recommendation:
Trunnion position in cylinder center

[15] The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting

[16] Line connection "B" and "C"

[17] Line connection "M"

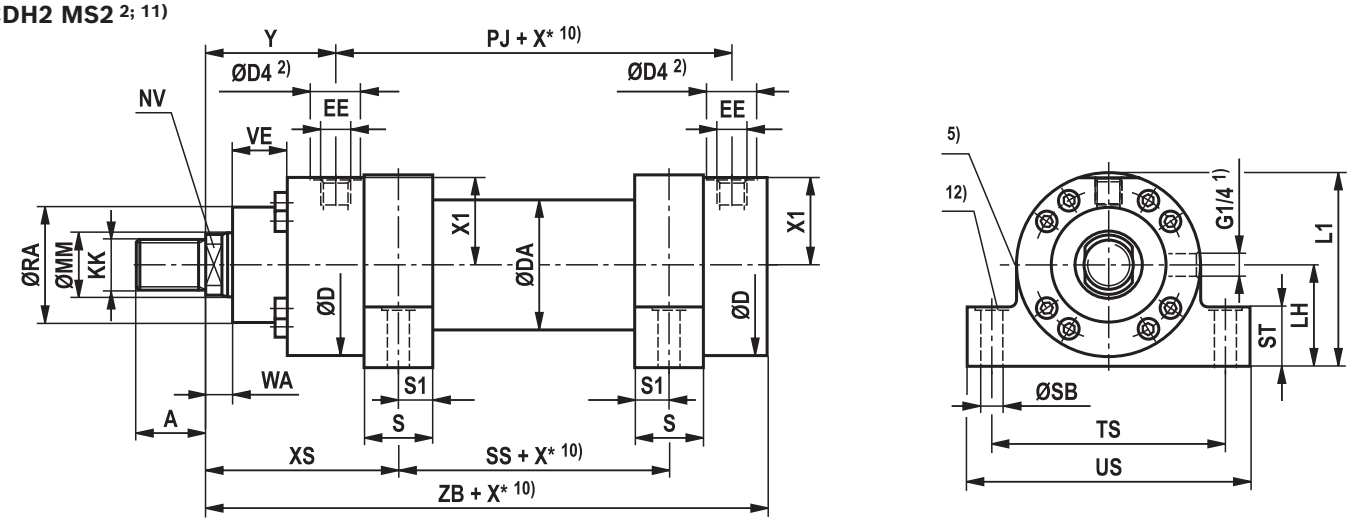
[18] Trunnion nut with ØAL ≥ 125 mm either at head or at base side depending on the position of the trunnion (XV)

☞ **Installation information:** During installation, it must be ensured that the trunnion bearings are installed up to the trunnion shoulders. Any variation may reduce the product's service life.

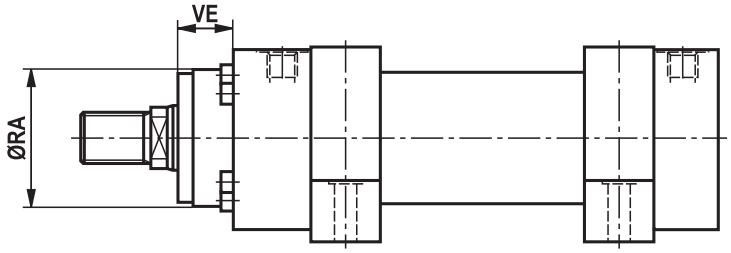
Dimensions

Foot mounting CDH2/CGH2: MS2 (dimensions in mm)

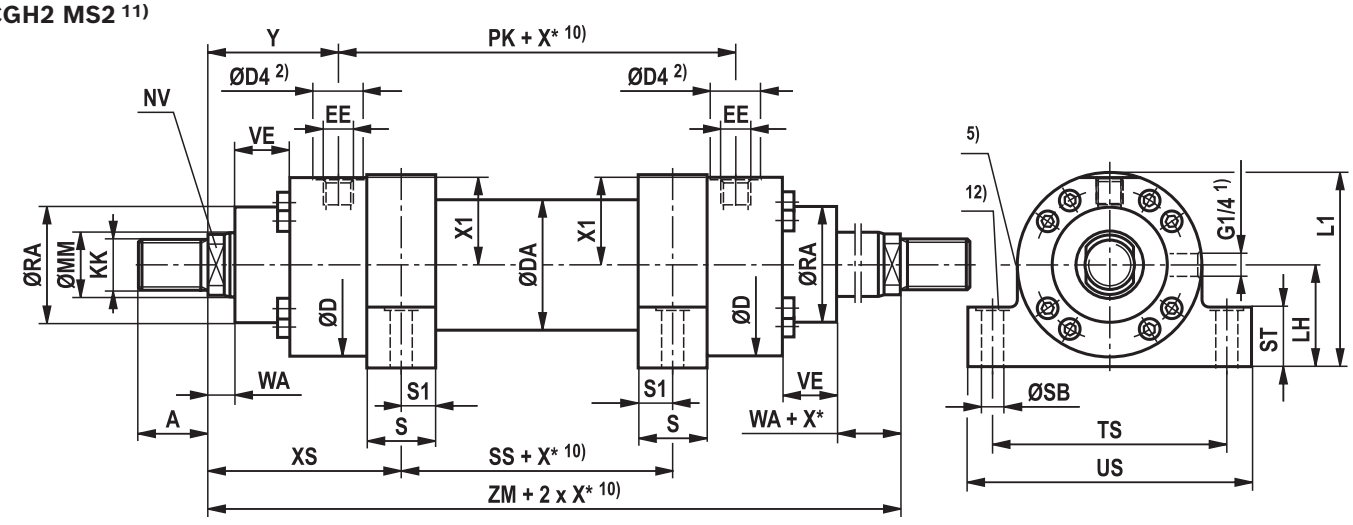
CDH2 MS2 [2; 11)]



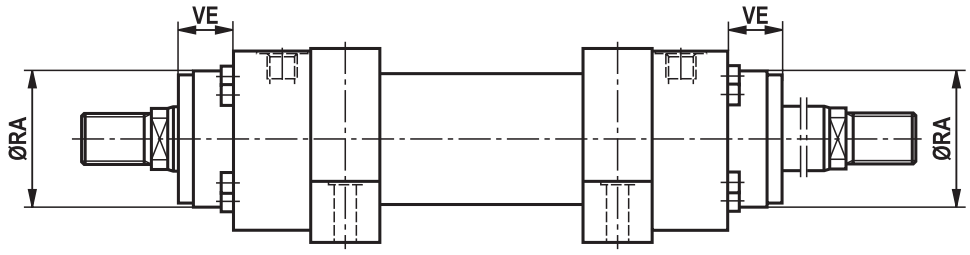
CDH2 MS2 [11)]: with seal design "A", "B" and ØAL 160 - 320 mm



CGH2 MS2 [11)]



CGH2 MS2 [11)]: with seal design "A", "B" and ØAL 160 - 320 mm



Dimensions

Foot mounting CDH2/CGH2: MS2 (dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 [2]	EE [4; 16]	EE [4; 17]	Y	PJ	X1	WA
40 [6]	**25/28**	M20x1,5	28	19/22	88	52	34	G1/2	M22x1,5	83	120	41	18
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1,5	98	120	48.5	18
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40
220 [6]	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 [3]	244	326	174	42
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 [3]	257	326	194	42
280 [6]	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 [3]	290	375	220.5	48
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 [3]	282	391	243	48

ØAL	ØMM	PK	XS	ZB max	ZM	SS	X* [10] min	S	S1	ØSB H13	ST	TS js13	US max	LH	L1	ØRA [7]	VE [7]	ØRA [8]	VE [8]
40 [6]	**25/28**	120	118	230	286	50	1	30	15	11	32	110	140	45	93	52	29	88	–
50	**32/36**	120	135.5	244	316	45	1	35	17.5	11	37	130	161	55	110	63	29	102	–
63	**40/45**	133	154	274	357	49	1	40	20	13.5	42	150	183	65	129	75	32	120	–
80	**50/56**	155	171.5	305	395	52	2	50	25	17.5	47	180	220	75	149	90	36	145	–
100	**63/70**	171	189	340	439	61	3	60	30	22	57	210	260	90	181	110	41	170	–
125	**80/90**	205	218	396	511	75	1	70	35	26	67	255	313	105	215	132	45	206	–
140	**90/100**	219	240.5	430	551	70	19	85	42.5	30	72	290	359	115	235	145	45	226	–
160	**100/110**	235	270	467	605	65	44	105	52.5	33	77	330	402	135	277	160	50	200	50
180	**110/125**	264	291.5	510	652	69	50	115	57.5	40	92	360	445	150	305	185	55	220	55
200	**125/140**	278	322.5	550	718	73	56	125	62.5	40	97	385	471	160	322	200	61	235	61
220 [6]	**140/160**	326	369.5	637	814	75	100	155	77.5	45	102	445	541	185	373	235	71	270	71
250	**160/180**	326	382.5	650	840	75	100	155	77.5	52	112	500	610	205	414	250	71	300	71
280 [6]	**180/200**	375	415.5	752	955	124	51	155	77.5	52	142	550	661	235	469	295	88	325	88
320	**200/220**	391	435	760	955	85	125	190	95	62	142	610	732	255	512	320	88	365	88

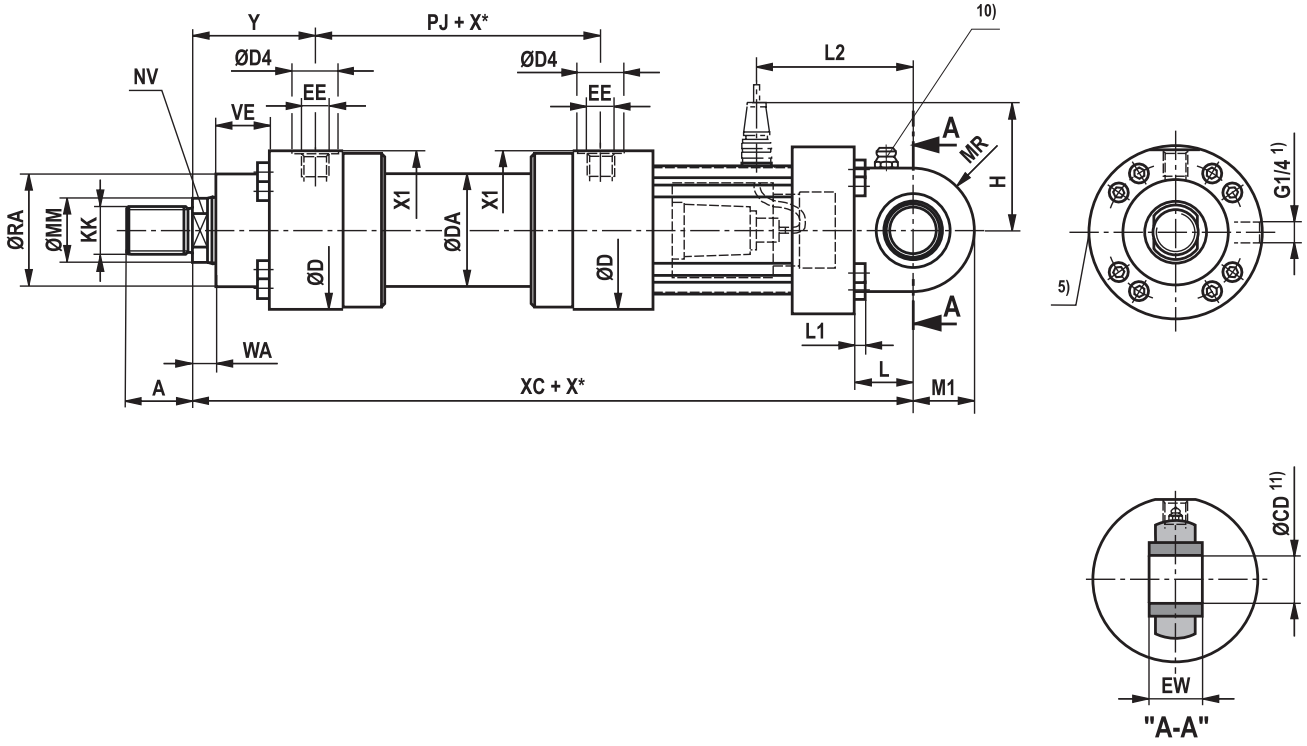
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

[1] Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
[2] Ø D4 max. 0.5 mm deep
[3] Thread size does not comply with ISO 6022; M50 x 2 available on request
[4] Flange connections see separate table pages 42 and 43
[5] Throttle valve only with end position cushioning "E" (180° for bleeding)
[6] Piston Ø not standardized
[7] Dimensions for cylinders with seal design M, T, G, L, R, S and V
[8] Dimensions for cylinders with seal design A and B
[10] Observe the min. stroke length "X*min"
[11] Not standardized
[12] Recess 2 mm deep, for hexagon socket head cap screws; ISO 4762 – The screws must not be subjected to shear force. Force introduction via additional external fitting strip
[16] Line connection "B" and "C"
[17] Line connection "M"

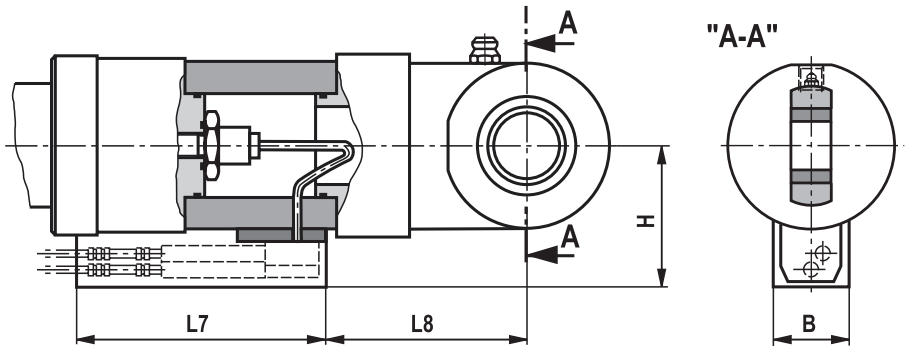
Dimensions

Swivel eye at base CSH2: MP3 (dimensions in mm)

CSH2 MP3
for position measurement system output "C", "F" and "D"



CSH2 MP3
for position measurement system output "N" and "P"



Dimensions

Swivel eye at base CSH2: MP3 (dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 [2]	EE [4; 16]	EE [4; 17]	Y	PJ	X1	WA	XC	X* max
40 [6]	**28**	M20x1,5	28	22	88	52	34	G1/2	M22x1,5	83	120	41	18	447	1000
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1,5	98	120	48.5	18	470	1000
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21	526	2000
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24	580	2000
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27	617	3000
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31	693	3000
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31	755	3000
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35	787	3000
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40	855	3000
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40	926	3000
220 [6]	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 [3]	244	326	174	42	1100	3000
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 [3]	257	326	194	42	1115	3000
280 [6]	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 [3]	290	375	220.5	48	1295	3000
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 [3]	282	391	243	48	1300	3000

ØAL	ØMM	L	L1	MR	M1	ØCD H9	EW h12	ØRA	VE	L2	H [13]	H [14]	L7	L8	B
40 [6]	**28**	53	8	32	32	25	25	52	29	124	106	115	200	101	64
50	**32/36**	61	8	40	40	32	32	63	29	132	113	120	200	109	64
63	**40/45**	74	8	50	50	40	40	75	32	150	122	130	200	127	64
80	**50/56**	90	10	63	63	50	50	90	36	176.5	133	125	200	149	64
100	**63/70**	102	12	71	71	63	63	110	41	192	148	135	200	164	64
125	**80/90**	124	16	90	90	80	80	132	45	227	166	145	200	203	64
140	**90/100**	149	16	100	100	90	90	145	45	262	176	155	200	236	64
160	**100/110**	150	16	112	112	100	100	160	50	269.5	196	165	200	237	64
180	**110/125**	180	20	129	129	110	110	185	55	307	210	175	200	274	64
200	**125/140**	206	20	145	145	125	125	200	61	333	217	190	200	302	64
220 [6]	**140/160**	253	20	179 [12]	187 [12]	160	160	235	71	418	254	205	200	386	64
250	**160/180**	253	24	179 [12]	187 [12]	160	160	250	71	420	269	220	200	387	64
280 [6]	**180/200**	320	30	230 [12]	240 [12]	200	200	295	88	510	286	280	200	475	64
320	**200/220**	320	30	231 [12]	241 [12]	200	200	320	88	520	309	300	200	485	64

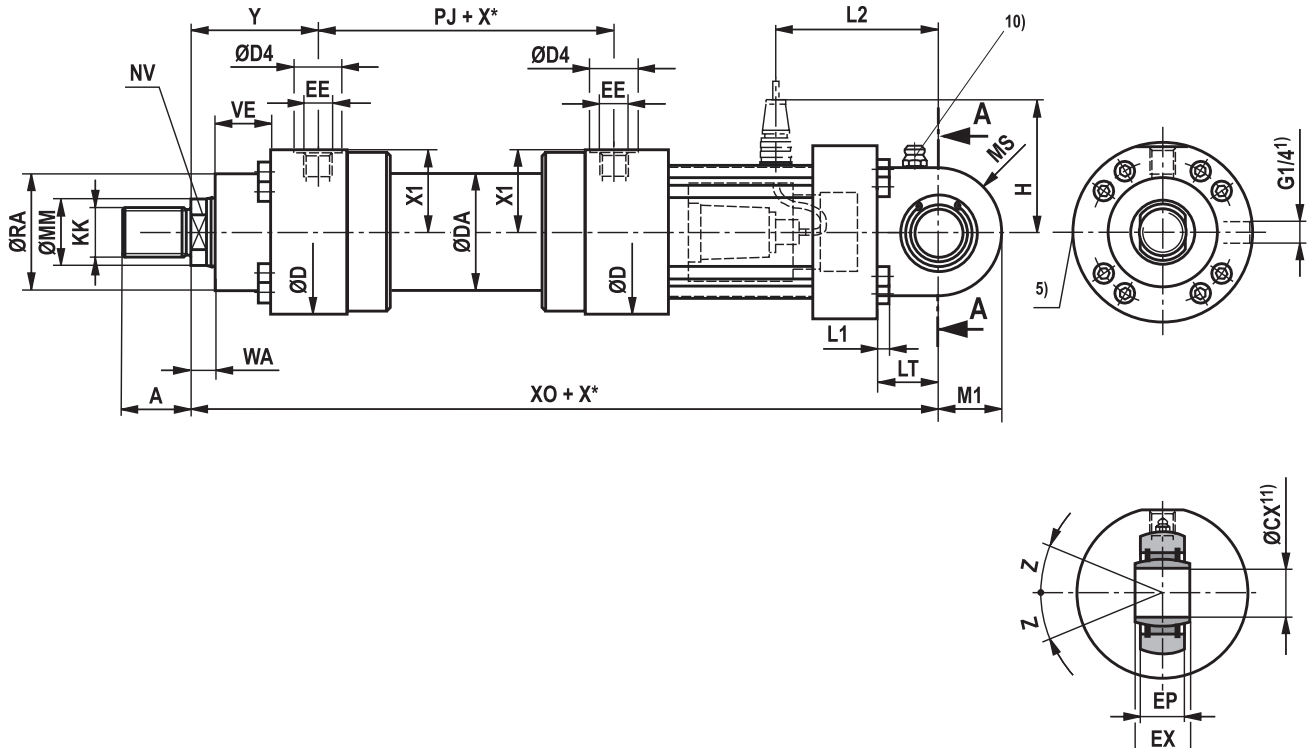
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Thread size does not comply with ISO 6022; M50 x 2 available on request
4) Flange connections see separate table pages 42 and 43
5) Throttle valve only with end position cushioning "E" (180° for bleeding)
6) Piston Ø not standardized
10) Standard version "W" Grease nipple, cone head form A according to DIN 71412
11) Related bolt Ø f8
12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting
13) Dimensions for position transducer output "N" and "P"
14) Dimensions for position transducer output "C", "F" and "D"
16) Line connection "B" and "C"
17) Line connection "M"

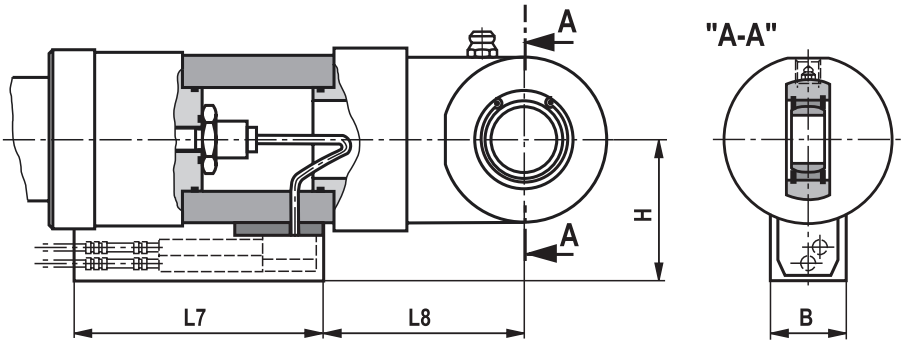
Dimensions

Self-aligning clevis at base CSH2: MP5 (dimensions in mm)

CSH2 MP5
for position measurement system output "C", "F" and "D"



CSH2 MP5
for position measurement system output "N" and "P"



Dimensions

Self-aligning clevis at base CSH2: MP5 (dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 [2]	EE [4; 16]	EE [4; 17]	Y	PJ	X1	WA	XO	X* max
40 [6]	**28**	M20x1,5	28	22	88	52	34	G1/2	M22x1,5	83	120	41	18	447	1000
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1,5	98	120	48.5	18	470	1000
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21	526	2000
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24	580	2000
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27	617	3000
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31	693	3000
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31	755	3000
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35	787	3000
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40	855	3000
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40	926	3000
220 [6]	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 [3]	244	326	174	42	1100	3000
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 [3]	257	326	194	42	1115	3000
280 [6]	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 [3]	290	375	220.5	48	1295	3000
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 [3]	282	391	243	48	1300	3000

ØAL	ØMM	LT	L1	MS	M1	ØCX [11] H7	EP	EX h12	ØRA	VE	Z	L2	H [13]	H [14]	L7	L8	B
40 [6]	**28**	53	8	32	32	25	22	25	52	29	2 °	124	106	115	200	101	64
50	**32/36**	61	8	40	40	32	27	32	63	29	4 °	132	113	120	200	109	64
63	**40/45**	74	8	50	50	40	32	40	75	32	4 °	150	122	130	200	127	64
80	**50/56**	90	10	63	63	50	40	50	90	36	4 °	176.5	133	125	200	149	64
100	**63/70**	102	12	71	71	63	52	63	110	41	4 °	192	148	135	200	164	64
125	**80/90**	124	16	90	90	80	66	80	132	45	4 °	227	166	145	200	203	64
140	**90/100**	149	16	100	100	90	72	90	145	45	4 °	262	176	155	200	236	64
160	**100/110**	150	16	112	112	100	84	100	160	50	4 °	269.5	196	165	200	237	64
180	**110/125**	180	20	129	129	110	88	110	185	55	4 °	307	210	175	200	274	64
200	**125/140**	206	20	145	145	125	102	125	200	61	4 °	333	217	190	200	302	64
220 [6]	**140/160**	253	20	179 [12]	187 [12]	160	130	160	235	71	4 °	418	254	205	200	386	64
250	**160/180**	253	24	179 [12]	187 [12]	160	130	160	250	71	4 °	420	269	220	200	387	64
280 [6]	**180/200**	320	30	230 [12]	240 [12]	200	138	200	295	88	4 °	510	286	280	200	475	64
320	**200/220**	320	30	231 [12]	241 [12]	200	162	200	320	88	4 °	520	309	300	200	485	64

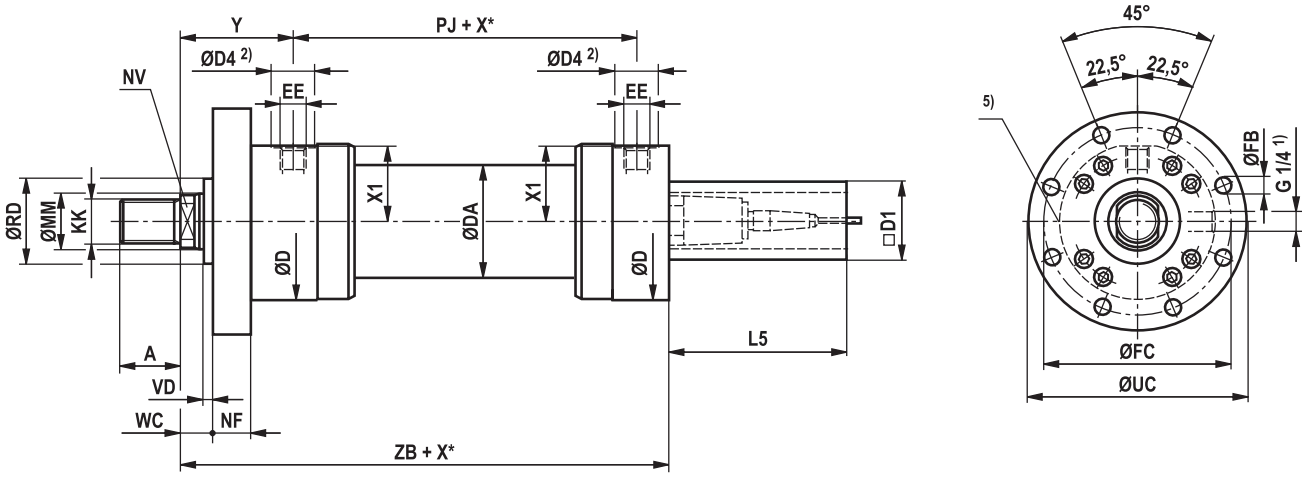
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length

[1] Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
[2] Ø D4 max. 0.5 mm deep
[3] Thread size does not comply with ISO 6022; M50 x 2 available on request
[4] Flange connections see separate table pages 42 and 43
[5] Throttle valve only with end position cushioning "E" (180° for bleeding)
[6] Piston Ø not standardized
[10] Standard version "W" Grease nipple, cone head form A according to DIN 71412
[11] Related bolt Ø m6
[12] The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting
[13] Dimensions for position transducer output "N" and "P"
[14] Dimensions for position transducer output "C", "F" and "D"
[16] Line connection "B" and "C"
[17] Line connection "M"

Dimensions

Round flange at head CSH2: MF3 (dimensions in mm)

CSH2 MF3



Dimensions

Round flange at head CSH2: MF3 (dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 [2]	EE [4; 16]	EE [4; 17]	Y	PJ	X1	X* max	L5	D1 max
40 [6]	**28**	M20x1,5	28	22	88	52	34	G1/2	M22x1,5	83	120	41	1000	166	80
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1,5	98	120	48.5	1000	166	96
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	2000	166	96
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	2000	166	96
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	3000	166	96
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	3000	166	96
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	3000	166	96
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	3000	166	96
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	3000	166	96
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	3000	166	96
220 [6]	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 [3]	244	326	174	3000	166	96
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 [3]	257	326	194	3000	166	96
280 [6]	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 [3]	290	375	220.5	3000	166	96
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 [3]	282	391	243	3000	166	96

ØAL	ØMM	ØRD f8	WC	VD	NF js13	ZB max	ØFB H13	ØFC js13	ØUC -1
40 [6]	**28**	52	22	4	25	239	11	115	138
50	**32/36**	63	22	4	25	254	13.5	132	155
63	**40/45**	75	25	4	28	299	13.5	150	175
80	**50/56**	90	28	4	32	332.5	17.5	180	210
100	**63/70**	110	32	5	36	362	22	212	250
125	**80/90**	132	36	5	40	410	22	250	290
140	**90/100**	145	36	5	40	440	26	285	330
160	**100/110**	160	40	5	45	472.5	26	315	360
180	**110/125**	185	45	5	50	510	33	355	410
200	**125/140**	200	45	5	56	550	33	385	440
220 [6]	**140/160**	235	50	8	63	637	39	435	500
250	**160/180**	250	50	8	63	650	39	475	540
280 [6]	**180/200**	295	56	8	80	752	45	555	630
320	**200/220**	320	56	8	80	760	45	600	675

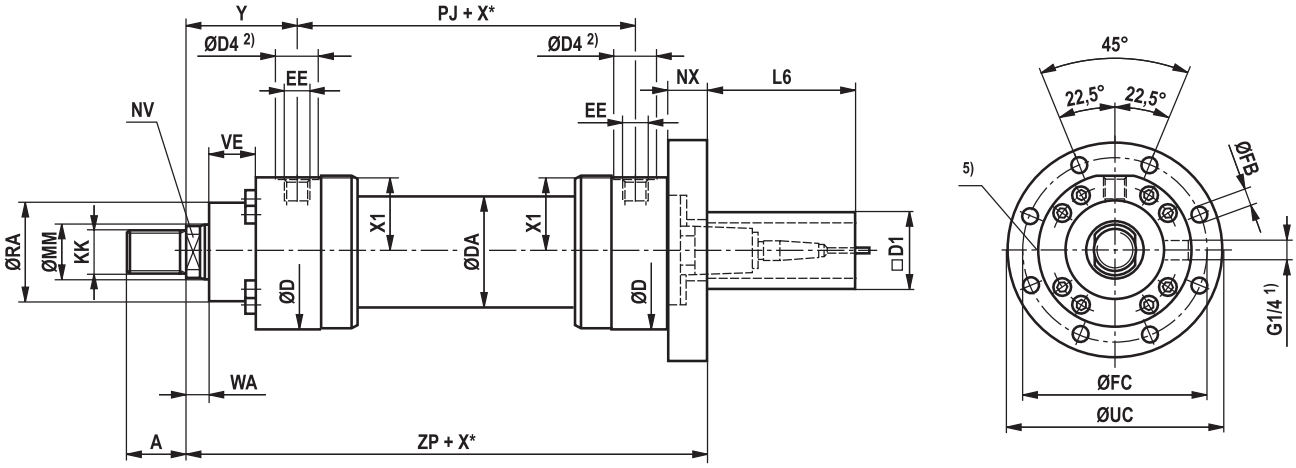
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length

[1] Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
[2] Ø D4 max. 0.5 mm deep
[3] Thread size does not comply with ISO 6022; M50 x 2 available on request
[4] Flange connections see separate table pages 42 and 43
[5] Throttle valve only with end position cushioning "E" (180° for bleeding)
[6] Piston Ø not standardized
[16] Line connection "B" and "C"
[17] Line connection "M"

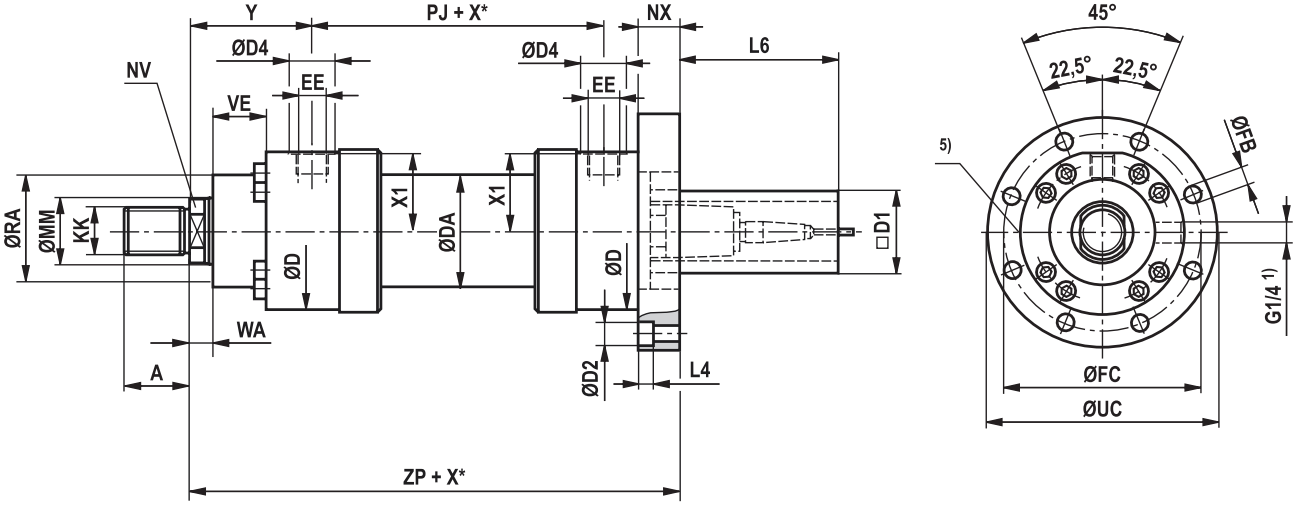
Dimensions

Round flange at base CSH2: MF4 (dimensions in mm)

CSH2 MF4; ØAL 40-100 mm



CSH2 MF4; ØAL 125-320 mm



Dimensions

Round flange at base CSH2: MF4 (dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 [2]	EE [4; 16]	EE [4; 17]	Y	PJ	X1	WA	X* max	L4
40 [6]	**28**	M20x1,5	28	22	88	52	34	G1/2	M22x1,5	83	120	41	18	1000	3
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1,5	98	120	48.5	18	1000	3
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21	2000	0
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24	2000	0
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27	3000	0
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31	3000	21.5
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31	3000	25.5
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35	3000	25.5
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40	3000	32
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40	3000	32
220 [6]	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 [3]	244	326	174	42	3000	38
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 [3]	257	326	194	42	3000	38
280 [6]	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 [3]	290	375	220.5	48	3000	44
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 [3]	282	391	243	48	3000	44

ØAL	ØMM	L6	ØD2	D1 max	ZP	NX js13	ØFB H13	ØFC js13	ØUC -1	ØRA	VE
40 [6]	**28**	166	18	80	262	28	11	115	138	52	29
50	**32/36**	166	20	96	278	28	13.5	132	155	63	29
63	**40/45**	166	0	96	313	28	13.5	150	175	75	32
80	**50/56**	166	0	96	350	32	17.5	180	210	90	36
100	**63/70**	138	0	96	390	36	22	212	250	110	41
125	**80/90**	131	33	96	445	55	22	250	290	132	45
140	**90/100**	121	40	96	485	60	26	285	330	145	45
160	**100/110**	113.5	40	96	525	65	26	315	360	160	50
180	**110/125**	106	48	96	570	70	33	355	410	185	55
200	**125/140**	100	48	96	616	76	33	385	440	200	61
220 [6]	**140/160**	88	57	96	715	88	39	435	500	235	71
250	**160/180**	86	57	96	730	90	39	475	540	250	71
280 [6]	**180/200**	61	66	96	857	115	45	555	630	295	88
320	**200/220**	61	66	96	865	115	45	600	675	320	88

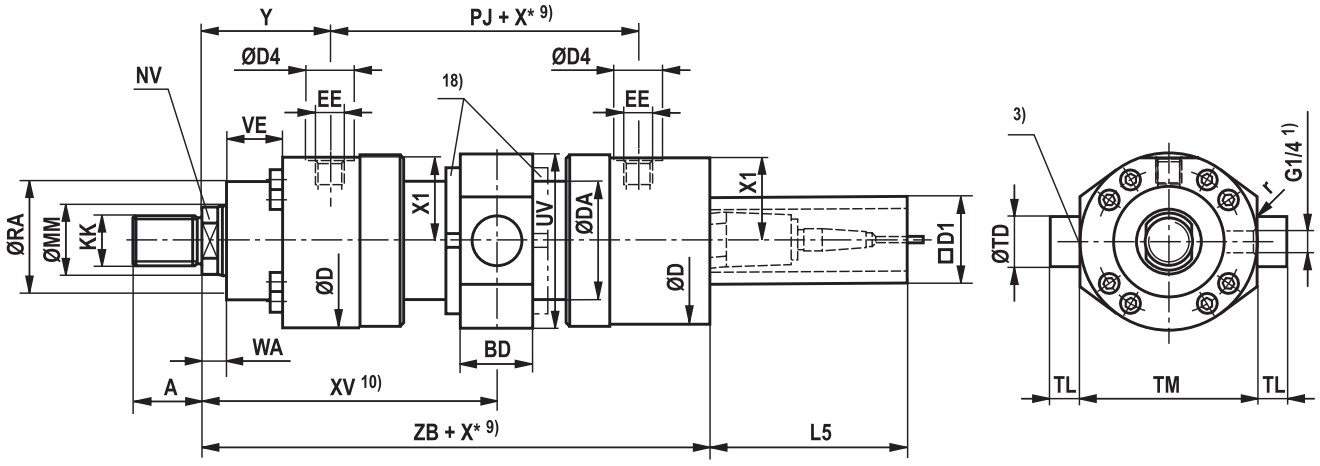
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length

[1] Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
[2] Ø D4 max. 0.5 mm deep
[3] Thread size does not comply with ISO 6022; M50 x 2 available on request
[4] Flange connections see separate table pages 42 and 43
[5] Throttle valve only with end position cushioning "E" (180° for bleeding)
[6] Piston Ø not standardized
[16] Line connection "B" and "C"
[17] Line connection "M"

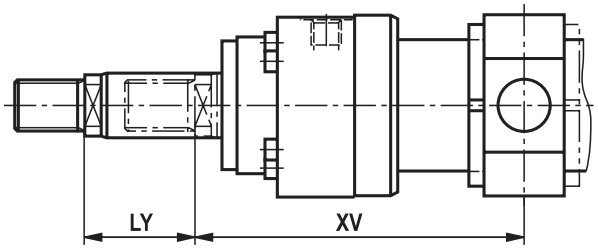
Dimensions

Trunnion mounting CSH2: MT4 (dimensions in mm)

CSH2 MT4



Dimensions for cylinder with piston rod extension "LY" in retracted condition



☞ **Installation information:** During installation, it must be ensured that the trunnion bearings are installed up to the trunnion shoulders. Any variation may reduce the product's service life.

Dimensions

Trunnion mounting CSH2: MT4 (dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 [2]	EE [4; 16]	EE [4; 17]	Y	PJ	X1	WA	X* max	L5	D1 max
40 [6]	**28**	M20x1,5	28	22	88	52	34	G1/2	M22x1,5	83	120	41	18	1000	166	80
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1,5	98	120	48.5	18	1000	166	96
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21	2000	166	96
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24	2000	166	96
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27	3000	166	96
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31	3000	166	96
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31	3000	166	96
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35	3000	166	96
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40	3000	166	96
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40	3000	166	96
220 [6]	**140/160**	M125x4	125	120/140	355	273	65	G1 1/2	M48x2 [3]	244	326	174	42	3000	166	96
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 [3]	257	326	194	42	3000	166	96
280 [6]	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 [3]	290	375	220.5	48	3000	166	96
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 [3]	282	391	243	48	3000	166	96

ØAL	ØMM	ZB max	X* min	XV [14] cent	XV [12] min	XV [12] max	BD	UV [15]	ØTD f8	TL js16	TM h12	r	ØRA	VE
40 [6]	**28**	239	22	143+X*/2	154	140+X*	38	97	25	20	95	0.8	52	29
50	**32/36**	254	32	158+X*/2	174	151+X*	38	111	32	25	112	0.8	63	29
63	**40/45**	299	47	178.5+X*/2	202	167+X*	48	129	40	32	125	1	75	32
80	**50/56**	332.5	58	197.5+X*/2	226.5	180.5+X*	58	163	50	40	150	1	90	36
100	**63/70**	362	79	219.5+X*/2	259	195+X*	78	188	63	50	180	1.2	110	41
125	**80/90**	410	91	255.5+X*/2	301	210+X*	98	234	80	63	224	1.2	132	45
140	**90/100**	440	121	275.5+X*/2	336	215+X*	118	257	90	70	265	1.5	145	45
160	**100/110**	472.5	142	302.5+X*/2	373.5	231.5+X*	128	287	100	80	280	1.5	160	50
180	**110/125**	510	158	326+X*/2	405	247+X*	138	328	110	90	320	1.5	185	55
200	**125/140**	550	204	359+X*/2	461	257+X*	178	343	125	100	335	1.5	200	61
220 [6]	**140/160**	637	200	407+X*/2	507	307+X*	180	393	160	125	385	1.5	235	71
250	**160/180**	650	210	420+X*/2	525	315+X*	180	433	160	125	425	1.5	250	71
280 [6]	**180/200**	752	241	477.5+X*/2	598	357+X*	220	486	200	160	480	2	295	88
320	**200/220**	760	245	477.5+X*/2	600	355+X*	220	536	200	160	530	2	320	88

ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

[1] Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

[2] Ø D4 max. 0.5 mm deep

[3] Thread size does not comply with ISO 6022; M50 x 2 available on request

[4] Flange connections see separate table pages 42 and 43

[5] Throttle valve only with end position cushioning "E" (180° for bleeding)

[6] Piston Ø not standardized

[10] Observe the min. stroke length "X*min"

[11] Double-acting cylinder not standardized

[12] When ordering, always specify the "XV" dimension in the clear text. Preferred XV dimension: Observe the trunnion position in the cylinder center XVmin and XVmax

[14] XVcent recommendation: Trunnion position in cylinder center

[15] The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting

[16] Line connection "B" and "C"

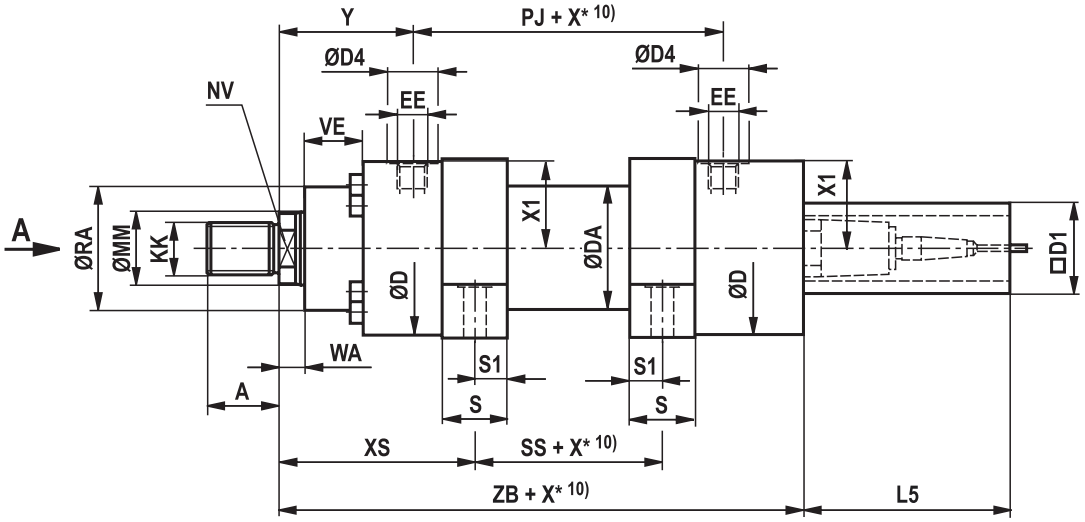
[17] Line connection "M"

[18] Trunnion nut with ØAL ≥ 125 mm either at head or at base side depending on the position of the trunnion (XV)

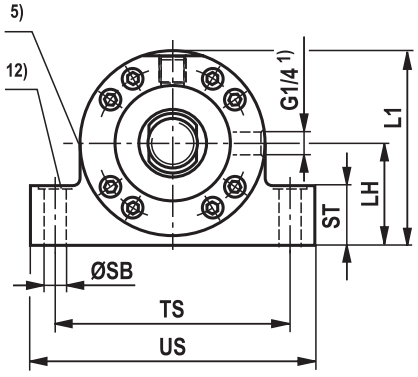
Dimensions

Foot mounting CSH2: MS2 (dimensions in mm)

CSH2 MS2



View A



Dimensions

Foot mounting CSH2: MS2 (dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 [2]	EE [4; 16]	EE [4; 17]	Y	PJ	X1	WA	X* max
40 [6]	**28**	M20x1,5	28	22	88	52	34	G1/2	M22x1,5	83	120	41	18	1000
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1,5	98	120	48.5	18	1000
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21	2000
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24	2000
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27	3000
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31	3000
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31	3000
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35	3000
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40	3000
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40	3000
220 [6]	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 [3]	244	326	174	42	3000
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 [3]	257	326	194	42	3000
280 [6]	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 [3]	290	375	220.5	48	3000
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 [3]	282	391	243	48	3000

ØAL	ØMM	L5	D1 max	XS	ZB max	SS	X* [10] min	S	S1	ØSB H13	ST	TS js13	US max	LH	L1	ØRA	VE
40 [6]	**28**	166	80	118	239	50	1	30	15	11	32	110	140	45	93	52	29
50	**32/36**	166	96	135.5	254	45	1	35	17.5	11	37	130	161	55	110	63	29
63	**40/45**	166	96	154	299	49	1	40	20	13.5	42	150	183	65	129	75	32
80	**50/56**	166	96	171.5	332.5	52	2	50	25	17.5	47	180	220	75	149	90	36
100	**63/70**	166	96	189	362	61	3	60	30	22	57	210	260	90	181	110	41
125	**80/90**	166	96	218	410	75	1	70	35	26	67	255	313	105	215	132	45
140	**90/100**	166	96	240.5	440	70	19	85	42.5	30	72	290	359	115	235	145	45
160	**100/110**	166	96	270	472.5	65	44	105	52.5	33	77	330	402	135	277	160	50
180	**110/125**	166	96	291.5	510	69	50	115	57.5	40	92	360	445	150	305	185	55
200	**125/140**	166	96	322.5	550	73	56	125	62.5	40	97	385	471	160	322	200	61
220 [6]	**140/160**	166	96	369.5	637	75	100	155	77.5	45	102	445	541	185	373	235	71
250	**160/180**	166	96	382.5	650	75	100	155	77.5	52	112	500	610	205	414	250	71
280 [6]	**180/200**	166	96	415.5	752	124	51	155	77.5	52	142	550	661	235	469	295	88
320	**200/220**	166	96	435	760	85	125	190	95	62	142	610	732	255	512	320	88

ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

[1] Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

[2] Ø D4 max. 0.5 mm deep

[3] Thread size does not comply with ISO 6022; M50 x 2 available on request

[4] Flange connections see separate table pages 42 and 43

[5] Throttle valve only with end position cushioning "E" (180° for bleeding)

[6] Piston Ø not standardized

[10] Observe the min. stroke length "X*min"

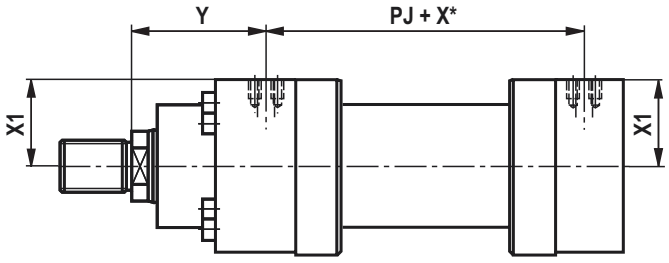
[12] Recess 2 mm deep, for hexagon socket head cap screws; ISO 4762 – The screws must not be subjected to shear force. Force introduction via additional external fitting strip

[16] Line connection "B" and "C"

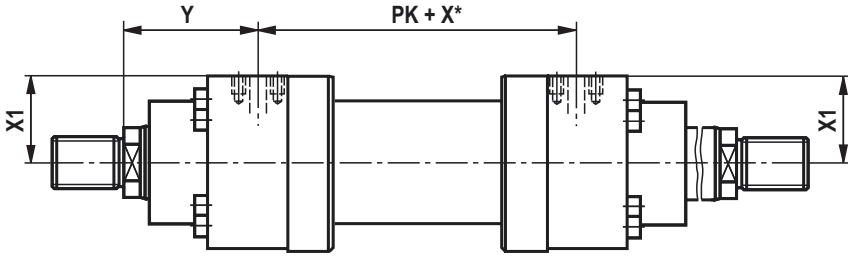
[17] Line connection "M"

Dimensions: Flange ports (dimensions in mm)

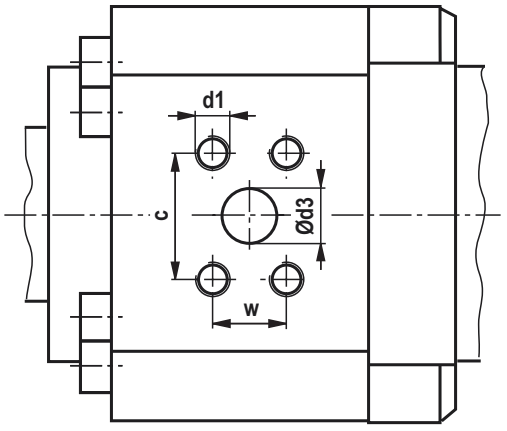
CDH2/CSH2



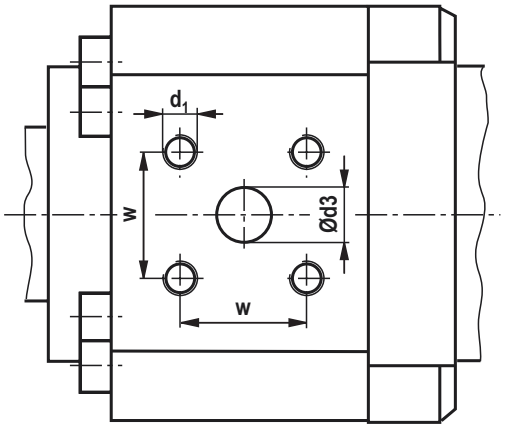
CGH2



Hole pattern for rectangular flange according to ISO 6162-2 table 2 type 1 and ISO 6162-2 table 2 type 1



Hole pattern for square flange according to ISO 6164 table 1 and ISO 6164 table 2



Dimensions: Flange ports (dimensions in mm)

ØAL	**Version "F"** [6] ISO 6162-1 tab.2 type1 (200 - 350 bar) (≙ SAE 3000 PSI)											**Version "K"** [7] ISO 6164 tab.1 (250 bar)								
	Y	**PJ PK**	**X1**	**Ød$_3$**	**Ød$_3$** [4]	**c** ±0.25	**w** ±0.25	**d$_1$**	**t$_1$** [1]	**t$_1$** [2]	**p** [3]	**Y**	**PJ PK**	**X1**	**Ød$_3$**	**w** ±0.25	**d$_1$**	**t$_1$** [1]	**t$_1$** [2]	**p** [3]
40	–	–	–	–	–	–	–	–	–	–	–	82	122	40.5	10	24.7	M6	12.5	10	250
50	–	–	–	–	–	–	–	–	–	–	–	97	122	48	10	24.7	M6	12.5	12.5	250
63	111	135	55	13	1/2"	38.1	17.5	M8	16	16	350	111	135	57	13	29.7	M8	16	16	250
80	123.5	148	68	13	1/2"	38.1	17.5	M8	16	16	350	123.5	148	69.5	13	29.7	M8	16	16	250
100	133	173	79	19	3/4"	47.6	22.3	M10	20	20	350	133	173	81.5	19	35.4	M8	16	16	250
125	153	205	97.5	25	1"	52.4	26.2	M10	20	20	350	157	197	100	19	35.4	M8	16	16	250
140	162	227	107	32	1 1/4"	58.7	30.2	M10	20	20	250	162	227	109	25	43.8	M10	20	20	250
160	181.5	242	127	32	1 1/4"	58.7	30.2	M10	20	20	250	181.5	242	128.5	25	43.8	M10	20	20	250
180	193	266	139	38	1 1/2"	69.9	35.7	M12	24	24	200	194	264	142	32	51.6	M12	24	24	250
200	219	280	146.5	38	1 1/2"	69.9	35.7	M12	24	24	200	220	278	148.5	32	51.6	M12	24	24	250

ØAL	**Version "D"** [8] ISO 6162-2 tab.2 type1 (400 bar) (≙ SAE 6000 PSI)											**Version "H"** [8] ISO 6164 tab.2 (400 bar)								
	Y	**PJ PK**	**X1**	**Ød$_3$**	**Ød$_3$** [5]	**c** ±0.25	**w** ±0.25	**d$_1$**	**t$_1$** [1]	**t$_1$** [2]	**p** [3]	**Y**	**PJ PK**	**X1**	**Ød$_3$**	**w** ±0.25	**d$_1$**	**t$_1$** [1]	**t$_1$** [2]	**p** [3]
40	–	–	–	–	–	–	–	–	–	–	–	82	122	40.5	10	24.7	M6	12.5	10	400
50	–	–	–	–	–	–	–	–	–	–	–	97	122	48	10	24.7	M6	12.5	12.5	400
63	–	–	–	–	–	–	–	–	–	–	–	111	135	57	13	29.7	M8	16	16	400
80	120	155	67	13	1/2"	40.5	18.2	M8	16	14	400	123.5	148	69.5	13	29.7	M8	16	16	400
100	134	171	80.5	13	1/2"	40.5	18.2	M8	16	16	400	133	173	81.5	19	35.4	M8	16	16	400
125	153	205	97	19	3/4"	50.8	23.8	M10	20	20	400	157	197	100	19	35.4	M8	16	16	400
140	162	227	107	25	1"	57.2	27.8	M12	24	24	400	162	227	109	25	43.8	M10	20	20	400
160	181.5	242	127	25	1"	57.2	27.8	M12	24	24	400	181.5	242	128.5	25	43.8	M10	20	20	400
180	194	264	139.5	32	1 1/4"	66.6	31.8	M14	26	26	400	194	264	142	32	51.6	M12	24	24	400
200	220	278	147	32	1 1/4"	66.6	31.8	M14	26	26	400	220	278	148.5	32	51.6	M12	24	24	400
220	244	326	168	38	1 1/2"	79.3	36.5	M16	30	30	400	244	326	171	38	60.1	M16	30	30	400
250	257	326	189	38	1 1/2"	79.3	36.5	M16	30	30	400	257	326	192	38	60.1	M16	30	30	400
280	290	375	215	38	1 1/2"	79.3	36.5	M16	30	30	400	290	375	218	38	60.1	M16	30	30	400
320	282	391	236	51	2"	96.8	44.5	M20	36	36	400	282	391	240	51	69.3	M16	30	30	400

Main dimensions see pages 18 to 41

ØAL = piston Ø

X* = stroke length

1) Thread depth for seal design M, T, G, L, R, S and V

2) Thread depth for seal design A and B

3) Max. operating pressure for related flanges in bar

4) Flange hole pattern according to ISO 6162-1 tab. 2 type 1 corresponds to flange hole pattern according to SAE 6000 PSI

5) Flange hole pattern according to ISO 6162-2 tab.2 type 1 corresponds to flange hole pattern according to SAE 6000 PSI

6) Version "F" with piston Ø 125 - 200 mm not standardized

7) Version "K" with piston Ø 40 - 50 mm and piston -Ø 180 - 200 mm not standardized

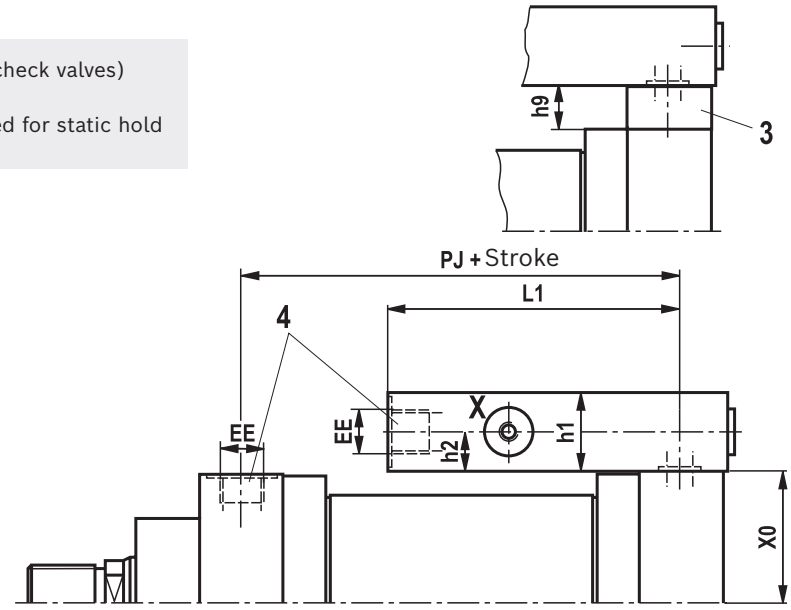
8) Versions "D" and "H" not standardized

Dimensions: Subplates for valve mounting (SL and SV valve) (dimensions in mm)

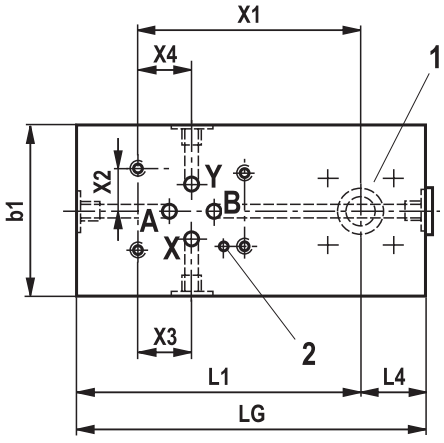
Note:
Valves, fittings and piping are **not** included in the scope of delivery!

☞ **Notice:** Subplates for SL and SV valves (check valves)
Please note:
Seal designs T, G, L, R, S and V are not designed for static hold function!

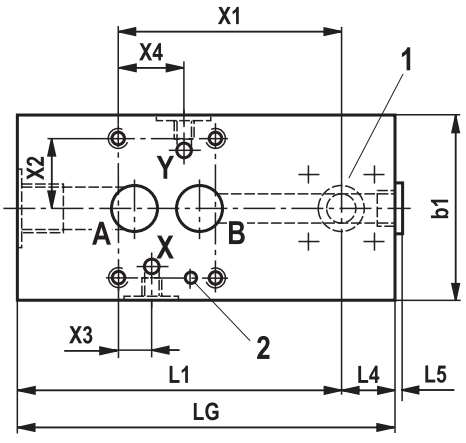
Installation situation with MT4



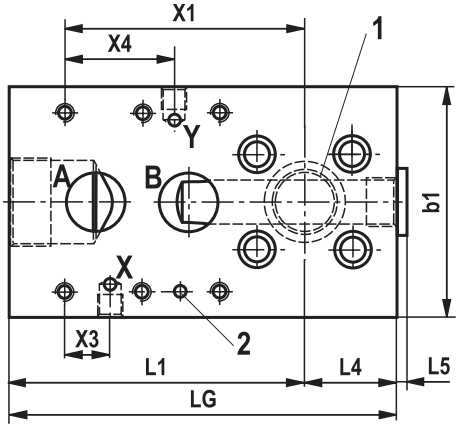
NG6
Hole pattern according to ISO 24340 form A and ISO 4401



NG10 and 20
Hole pattern according to ISO 5781



NG30
Hole pattern according to ISO 5781



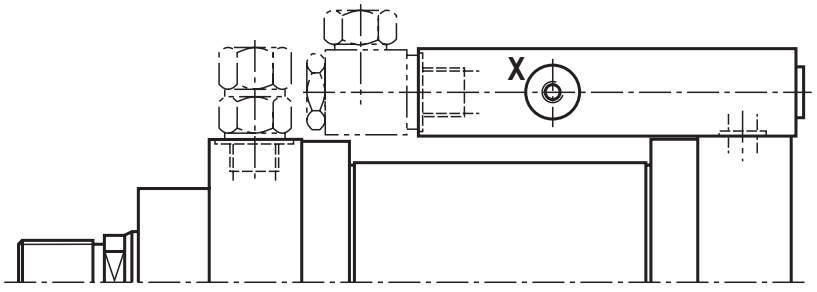
1 Port B to the piston side according to ISO 6164
2 Bore for locking pin
3 Adapter plate for type of mounting MT4 (included in the scope of delivery for MT4)
4 Line connection "B" dimensions "EE" see also pages 18 ... 41

Dimensions: Subplates for valve mounting (SL and SV valve) (dimensions in mm)

ØAL	Valve size (NG)	PJ	EE	Stroke min [1]		X0	Plate dimensions							Port size, hole pattern						Position point valve	
				[2]	[3]		L1	L4	L5	LG	b1	h1	h9	h2	A	X	Y	X3	X4	X1	X2
40	6	121	G1/2	50	50	40.5	90	20	4	110	55	40	10	20	G1/2	G1/4	G1/4	21.5	21.5	65.5	15.5
50	6	121	G1/2	50	50	48.0	90	20	4	110	55	40	10	20	G1/2	G1/4	G1/4	21.5	21.5	65.5	15.5
63	6	134	G3/4	64	64	57.0	100	25	5	125	55	47	20	23.5	G3/4	G1/4	G1/4	21.5	21.5	70.5	15.5
	10	134	G3/4	64	64	57.0	105	25	5	130	85	47	20	23.5	G3/4	G1/4	G1/4	21.4	21.4	73	33.3
80	6	151.5	G3/4	58	58	69.5	100	25	5	125	55	47	20	23.5	G3/4	G1/4	G1/4	21.5	21.5	70.5	15.5
	10	151.5	G3/4	58	58	69.5	105	25	5	130	85	47	20	23.5	G3/4	G1/4	G1/4	21.4	21.4	73	33.3
100	10	172	G1	50	79	81.5	102	28	5	130	85	50	20	25	G1	G1/4	G1/4	21.4	21.4	70	33.3
125	10	201	G1	50	91	100.0	102	28	5	130	85	50	20	25	G1	G1/4	G1/4	21.4	21.4	70	33.3
	20	201	G1	50	91	100.0	137	28	5	165	100	50	20	25	G1	G1/4	G1/4	20.8	39.7	92	39.7
140	10	223	G1 1/4	50	121	109.0	115	35	5	150	85	60	30	30	G1 1/4	G1/4	G1/4	21.4	21.4	80	33.3
	20	223	G1 1/4	50	121	109.0	140	35	5	175	100	60	30	30	G1 1/4	G1/4	G1/4	20.8	39.7	95	39.7
160	10	238.5	G1 1/4	30 [4]	142	128.5	115	35	5	150	85	60	30	30	G1 1/4	G1/4	G1/4	21.4	21.4	80	33.3
	20	238.5	G1 1/4	30 [4]	142	128.5	140	35	5	175	100	60	30	30	G1 1/4	G1/4	G1/4	20.8	39.7	95	39.7
180	10	264	G1 1/4	30 [4]	158	142.0	120	40	5	160	85	60	30	30	G1 1/4	G1/4	G1/4	21.4	21.4	90	33.3
	20	264	G1 1/4	30 [4]	158	142.0	135	50	5	185	100	60	30	30	G1 1/4	G1/4	G1/4	20.8	39.7	105	39.7
	30	264	G1 1/4	30 [4]	158	142.0	160	50	5	210	125	60	30	30	G1 1/4	G1/4	G1/4	24.6	59.6	130	48.4
200	10	278	G1 1/4	20 [4]	204	148.5	120	40	5	160	85	60	30	30	G1 1/4	G1/4	G1/4	21.4	21.4	90	33.3
	20	278	G1 1/4	20 [4]	204	148.5	135	50	5	185	100	60	30	30	G1 1/4	G1/4	G1/4	20.8	39.7	105	39.7
	30	278	G1 1/4	20 [4]	204	148.5	160	50	5	210	125	60	30	30	G1 1/4	G1/4	G1/4	24.6	59.6	130	48.4

ØAL = piston Ø

[1] The information only applies to the following connection situation!



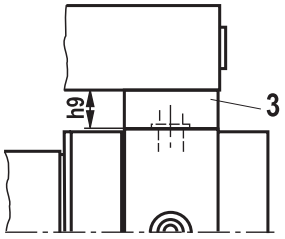
[2] Not for MT4

[3] Only for MT4

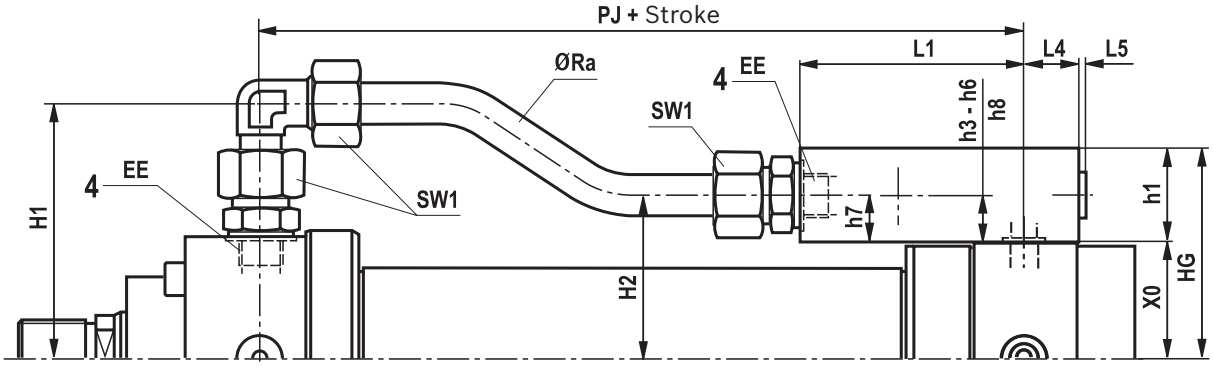
[4] With type of mounting "MS2". observe X*min on page 29 and/or 41

Dimensions: Subplates for valve mounting (directional and control valves) (dimensions in mm)

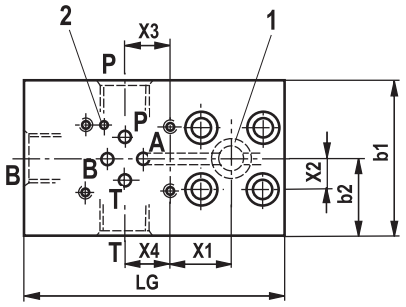
Installation situation with MT4



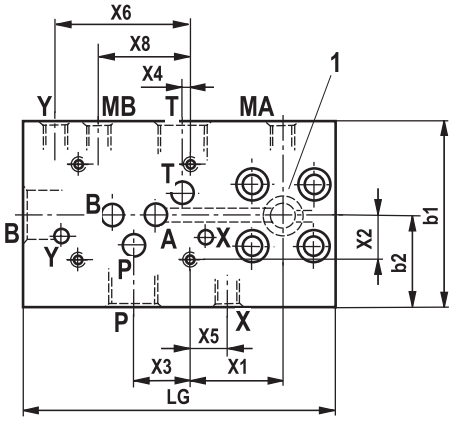
1 Port A to the piston side according to ISO 6164
2 Bore for locking pin
3 Adapter plate for type of mounting MT4 (included in the scope of delivery for MT4)
4 Connection "B" dimensions "EE" see also pages 18 to 41



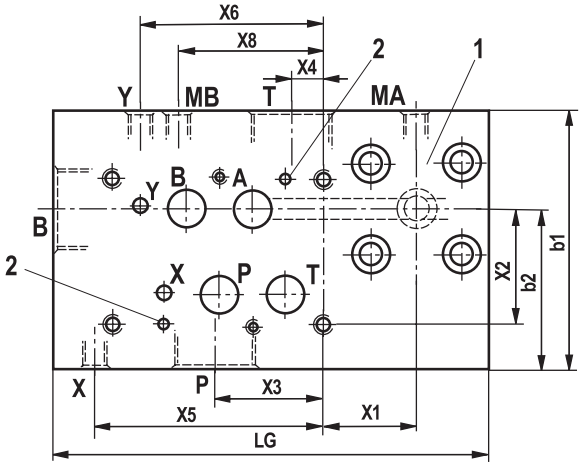
NG6
Hole pattern according to ISO 24340 form A and ISO 4401



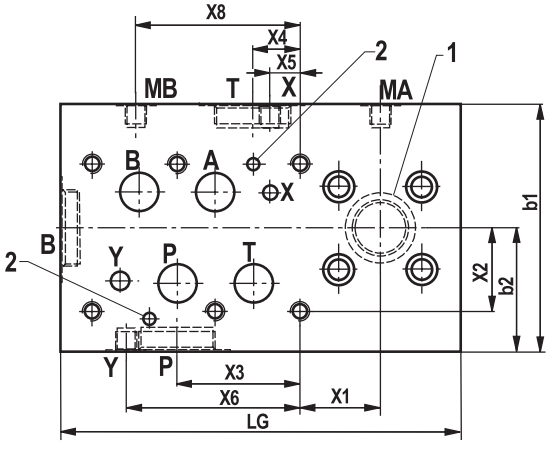
NG10
Hole pattern according to ISO 24340 form A and ISO 4401



NG16
Hole pattern according to ISO 24340 form A and ISO 4401



NG25
Hole pattern according to ISO 24340 form A and ISO 4401



With larger stroke lengths and depending on the piston diameter, the pipeline is mounted at the cylinder pipe using pipe supports. A maximum of two sandwich plates is admissible.

Dimensions: Subplates for valve mounting (directional and control valves) (dimensions in mm)

ØAL	Valve size (NG)	PJ	EE	Stroke min	Plate dimensions																
					L1	L4	L5 max	H1	H2 [1]	H2 [2]	SW1	ØRa	b1	h1	LG	HG [1]	HG [2]	b2	X0	h7	h9
40	6	121	G1/2	242	90	20	4	96.0	60.5	70.5	30	16.0x2.5	65	40	110	80.5	90.5	32.5	40.5	20	10
50	6	121	G1/2	242	90	20	4	103.5	68.0	78.0	30	16.0x2.5	65	40	110	88.0	98.0	32.5	48.0	20	10
63	6	134	G3/4	276	100	25	5	121.5	80.5	100.5	36	20.0x3.0	75	47	125	104.0	124.0	37.5	57.0	23.5	20
	10	134	G3/4	301	125	25	5	121.5	80.0	100.0	36	20.0x3.0	90	70	150	127.0	147.0	45	57.0	23	20
80	6	151.5	G3/4	259	100	25	5	134.5	93.0	113.0	36	20.0x3.0	75	47	125	116.5	136.5	37.5	69.5	23.5	20
	10	151.5	G3/4	284	125	25	5	134.5	92.5	112.5	36	20.0x3.0	90	70	150	139.5	159.5	45	69.5	23	20
100	10	172	G1	317	132	28	5	155.0	111.5	131.5	46	25.0x4.0	90	80	160	161.5	181.5	45	81.5	30	20
125	10	201	G1	288	132	28	5	173.5	130.0	150.0	46	25.0x4.0	90	80	160	180.0	200.0	45	100.0	30	20
	16	201	G1	318	162	28	5	173.5	140.0	160.0	46	25.0x4.0	115	90	190	190.0	210.0	57.5	100.0	40	20
140	10	223	G1 1/4	315	135	35	5	188	144.0	174.0	50	30.0x5.0	105	95	170	204.0	234.0	52.5	109.0	35	30
	16	223	G1 1/4	355	175	35	5	188	154.0	184.0	50	30.0x5.0	120	100	210	209.0	239.0	60	109.0	45	30
160	10	238.5	G1 1/4	300	135	35	5	208	163.5	193.5	50	30.0x5.0	105	95	170	223.5	253.5	52.5	128.5	35	30
	16	238.5	G1 1/4	340	175	35	5	208	173.5	203.5	50	30.0x5.0	120	100	210	228.5	258.5	60	128.5	45	30
180	10	264	G1 1/4	289	150	40	5	222	177.0	207.0	50	30.0x5.0	105	95	190	237.0	267.0	52.5	142.0	35	30
	16	264	G1 1/4	319	180	40	5	222	192.0	222.0	50	30.0x5.0	125	105	220	247.0	277.0	62.5	142.0	50	30
	25	264	G1 1/4	339	200	50	0	222	197.0	227.0	50	30.0x5.0	155	110	250	252.0	282.0	77.5	142.0	55	30
200	10	278	G1 1/4	275	150	40	5	229	183.5	213.5	50	30.0x5.0	105	95	190	243.5	273.5	52.5	148.5	35	30
	16	278	G1 1/4	305	180	40	5	229	198.5	228.5	50	30.0x5.0	125	105	220	253.5	283.5	62.5	148.5	50	30
	25	278	G1 1/4	325	200	50	0	229	203.5	233.5	50	30.0x5.0	155	110	250	258.5	288.5	77.5	148.5	55	30

ØAL	Valve size (NG)	Port size, hole pattern																Position point valve	
		P	X3	h3	T	X4	h4	X	X5	h5	Y	X6	h6	MA	MB	X8	h8	X1	X2
40	6	G1/2	21.5	20	G1/2	21.5	20	-	-	-	-	-	-	-	-	-	-	25	15.5
50	6	G1/2	21.5	20	G1/2	21.5	20	-	-	-	-	-	-	-	-	-	-	25	15.5
63	6	G3/4	21.5	23.5	G3/4	21.5	23.5	-	-	-	-	-	-	-	-	-	-	30	15.5
	10	G3/4	27	33	G3/4	3.5	33	G1/4	18	47	G1/4	65.0	47	G1/4	G1/4	60	17	45	21.4
80	6	G3/4	21.5	23.5	G3/4	21.5	23.5	-	-	-	-	-	-	-	-	-	-	30	15.5
	10	G3/4	27	33	G3/4	3.5	33	G1/4	18	47	G1/4	65.0	47	G1/4	G1/4	60	17	45	21.4
100	10	G1	27	30	G1	3.5	40	G1/4	18	57	G1/4	65.0	57	G1/4	G1/4	58	20	52	21.4
125	10	G1	27	30	G1	3.5	40	G1/4	18	57	G1/4	65.0	57	G1/4	G1/4	58	20	52	21.4
	16	G1	50	26	G1	17	25	G1/4	76.5	60	G1/4	88.0	70	G1/4	G1/4	88	35	37	37.5
140	10	G1 1/4	27	35	G1 1/4	3.5	45	G1/4	20	72	G1/4	65.0	72	G1/4	G1/4	55	25	55	21.4
	16	G1 1/4	52	32	G1 1/4	15	32	G1/4	76.5	75	G1/4	88.0	80	G1/4	G1/4	88	40	45	40
160	10	G1 1/4	27	35	G1 1/4	3.5	45	G1/4	20	72	G1/4	65.0	72	G1/4	G1/4	55	25	55	21.4
	16	G1 1/4	52	32	G1 1/4	15	32	G1/4	76.5	75	G1/4	88.0	80	G1/4	G1/4	88	40	45	40
180	10	G1 1/4	27	35	G1 1/4	3.5	45	G1/4	20	72	G1/4	62	72	G1/4	G1/4	55	25	60	21.4
	16	G1 1/4	57	35	G1 1/4	15	34	G1/4	76.5	80	G1/4	86	85	G1/4	G1/4	86	45	50	40
	25	G1 1/4	77	42	G1 1/4	29.4	32	G1/4	17.5	90	G1/4	112.7	90	G1/4	G1/4	110	50	50	52.1
200	10	G1 1/4	27	35	G1 1/4	3.5	45	G1/4	20	72	G1/4	62	72	G1/4	G1/4	55	25	60	21.4
	16	G1 1/4	57	35	G1 1/4	15	34	G1/4	76.5	80	G1/4	86	85	G1/4	G1/4	86	45	50	40
	25	G1 1/4	77	42	G1 1/4	29.4	32	G1/4	17.5	90	G1/4	112.7	90	G1/4	G1/4	110	50	50	52.1

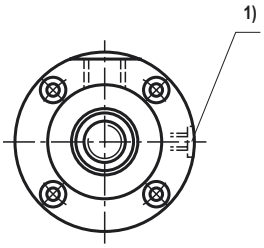
ØAL = piston Ø

[1] Not for MT4

[2] Only for MT4

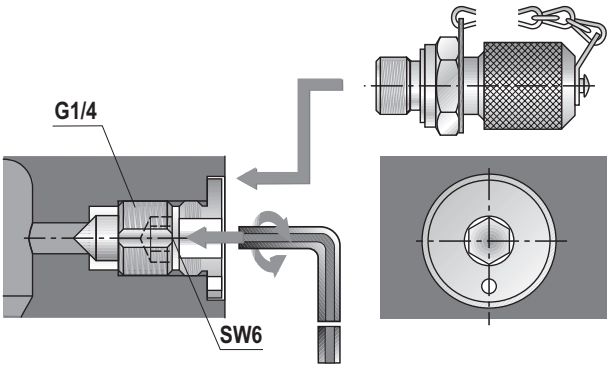
Bleeding / measuring coupling
(dimensions in mm)

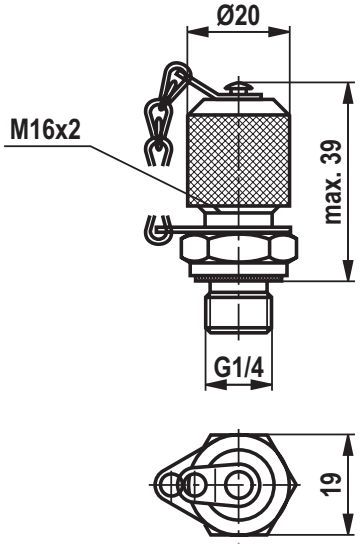
By default, a patented safety vent against unintended unscrewing in head and base is delivered for all cylinders.



1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

The port allows for the installation of a measuring coupling with check valve for pressure measurement or contamination-free bleeding. Measuring coupling with check valve function, i.e. the measuring or bleeding hose can also be connected when the system is pressurized.

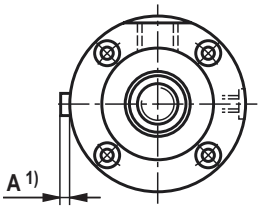




Scope of delivery: Measuring coupling **G1/4**
MEASURING COUPLING AB 20-11/K1 G1/4 with seal ring made of NBR
Material no. **R900009090**
MEASURING COUPLING AB 20-11/K1V G1/4 with seal ring made of FKM
Material no. **R900001264**

Dimensions: Throttle valve
(dimensions in mm)

ØAL	40	50	63	80	100	125	140	160	180	200	220	250	280	320
Protrusion A 1)	1	0	0	0	0	0	0	0	0	0	9.5	0	0	0
Nominal width	4	4	4	5	5	8	8	8	8	8	20	20	20	20



ØAL = piston Ø

1) Throttle valve only with end position cushioning "E" (180° for bleeding) Protrusion A in closed condition

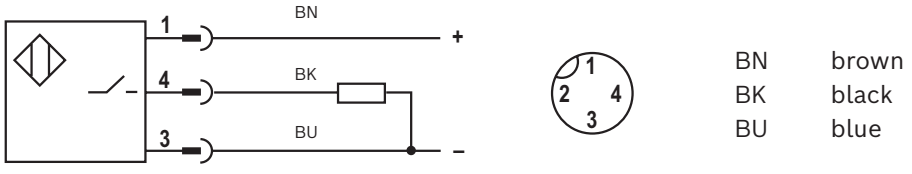
Proximity switch
(dimensions in mm)

Inductive proximity switches are used as reliable end position control for hydraulic cylinders. They are an important element for the safe and exact monitoring of safety equipment, lockings and/or other machine functions in their end position by means of the output of signals. The proximity switch which is high-pressure-resistant up to 500 bar works in a contactless manner. Consequently, it is wear-free. The proximity switch has been set at the factory. The switching distance must not be adjusted. The lock nut of the proximity switch is marked at the factory using sealing wax. On versions with proximity switch, the cylinders are provided with proximity switches on both sides.

Technical data
(For applications outside these values, please consult us!)

Electrical			
Function type			PNP normally open contact
Admissible pressure		bar	500
Operating voltage		V DC	10 ... 30
	including residual ripple	%	≤ 15
Voltage drop		V	≤ 15
Rated operating voltage		V DC	24
Rated operating current		mA	200
Idle current		mA	≤ 8
Residual current		µA	≤ 10
Repetition accuracy		%	≤ 5
Hysteresis		%	≤ 15
Ambient temperature range		°C	-25 ... +80
Temperature drift		%	≤ 10
Switching frequency		Hz	1000
Protection class according to DIN EN 60529	▶ Active area		IP68
	▶ Proximity switch		IP67
Housing material			Material no. 1.4104

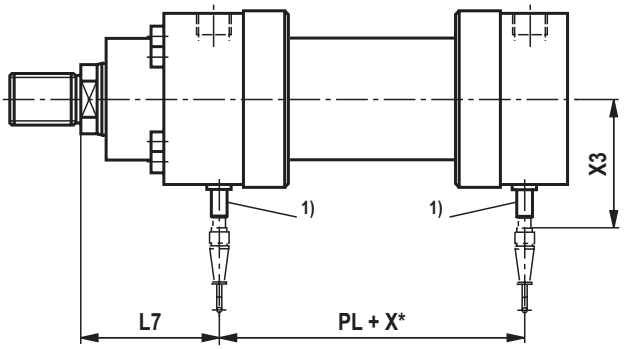
Pin assignment



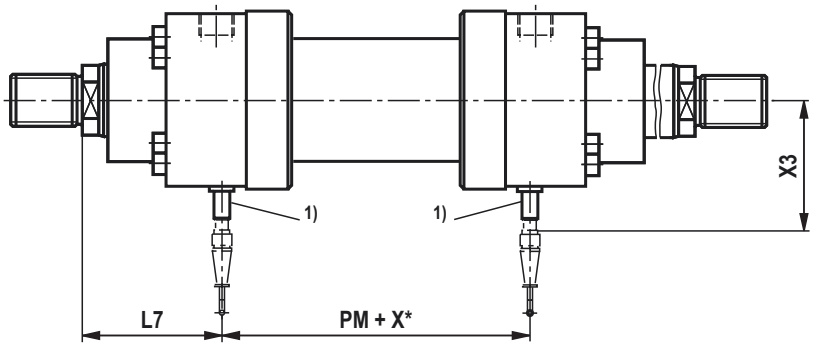
BN	brown
BK	black
BU	blue

Dimensions: Proximity switch (dimensions in mm)

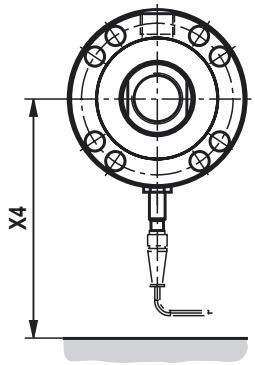
CDH2

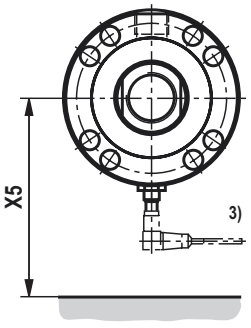


CGH2



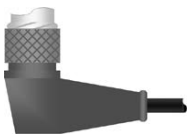
Installation space for mating connector





Mating connector with 5 m cable
Material no. **R913016852**
(mating connector is **not** included in the scope of delivery, must be ordered separately)

Mating connector, angled with 5 m cable (position of the cable outlet cannot be defined)
Material no. **R988064311**
(mating connector is **not** included in the scope of delivery, must be ordered separately)



Dimensions: Proximity switch (dimensions in mm)

ØAL	ØMM	PL	PM	L7	X3	X4	X5
40	**25** **28**	112	112	87	94	170	125
50	**32** **36**	110	110	103	98	175	130
63	**40** **45**	125	125	116	103	180	135
80	**50** **56**	138	138	128.5	108	185	140
100	**63** **70**	161	161	139	116	195	150
125	**80** **90**	189	189	161	126	205	160
140	**90** **100**	209	209	171	146	225	180
160	**100** **110**	228	228	188.5	151	230	185
180	**110** **125**	254	254	199	159	235	190
200	**125** **140**	264	264	227	166	245	200
220	**140** **160**	310	310	252	177 [2)]	255	– [3)]
250	**160** **180**	310	310	265	187 [2)]	265	– [3)]
280	**180** **200**	369	369	293	199 [2)]	275	– [3)]
320	**200** **220**	375	375	290	209 [2)]	285	– [3)]

Main dimensions see page 18 to 29

ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length

1) The proximity switch is always located opposite of the line connection
2) Piston Ø 220 - 320 mm
Proximity switch not protruding
3) Piston Ø 220 - 320 mm
Angled mating connector not possible

Position measurement system

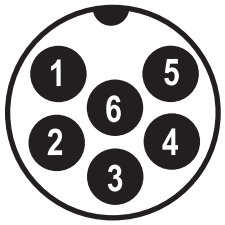
The magnetostrictive position measurement system that is pressure-resistant and works contactless and absolute.

Operating conditions	
Protection class	IP67 (connector professionally mounted) IP68 at cable outlet
EMC test	Electro-magnetic interference emission according to EN 61000-6-3 Electro-magnetic interference resistance according to EN 61000-6-2 The sensor complies with EC directives and bears the CE marking

Technical data: Analog output
(For applications outside these values, please consult us!)

Analog "F" / "C"			
Electrical connection	Type of connection		1 x M16 connector (6-pole)
	Power consumption	W	<3.25
Operating conditions	Operating temperature	°C	-40 ... +85
Tightening torque M_A	≤ 1500 mm measurement length	Nm	50 ±4%
	> 1500 mm measurement length	Nm	65 ±4%
Wrench size SW		mm	46
Voltage "F"		V	0 ... 10
	Input resistance control system	kΩ	>5
	Resolution		16 bit (internal resolution 0.1 µm)
Current "C"		mA	4 ... 20
	Load	Ω	min/max: 0/500
	Resolution		16 bit (internal resolution 0.1 µm)

Connector
(View to pin side)

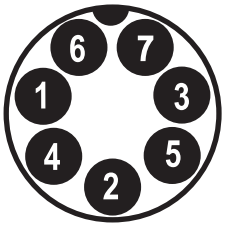


Pin	Cable	Function
1	gray	Position 1 (solenoid)
2	pink	DC ground
3	yellow	not used
4	green	DC ground
5	brown	+12 ... 30 VDC ±20% (9.6 ... 36 VDC)
6	white	DC ground (0 V)

Technical data: Digital output
(For applications outside these values, please consult us!)

Digital "D" / "S"			
Electrical connection	Type of connection		1 x M16 connector (7-pole)
	Power consumption	W	1.2 typical
Operating conditions	Operating temperature	°C	-40 ... +85
Tightening torque M_A	≤ 1500 mm measurement length	Nm	50 ±4%
	> 1500 mm measurement length	Nm	65 ±4%
Wrench size SW		mm	46
SSI "D"	Interface		SSI 24 bit (RS-485/RS-422)
	Resolution	µm	5
	Direction of measurement		asynchronious forward
	Data format		Gray
SSI "S"	Interface		SSI 24 bit (RS-485/RS-422)
	Resolution	µm	1
	Direction of measurement		synchronious forward
	Data format		Gray

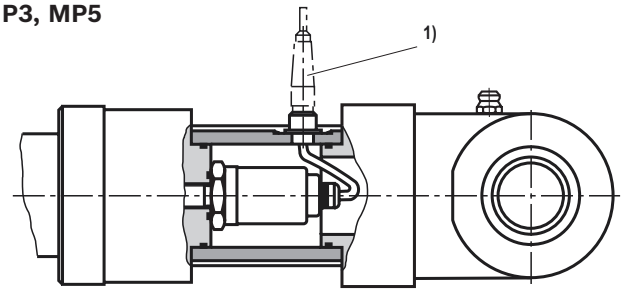
Connector
(View to pin side)



Pin	Cable	Function
1	gray	Data (-)
2	pink	Data (+)
3	yellow	Clock (+)
4	green	Clock (-)
5	brown	+12 ... 30 VDC ±20% (9.6 ... 36 VDC)
6	white	DC ground (0 V)
7	-	not used

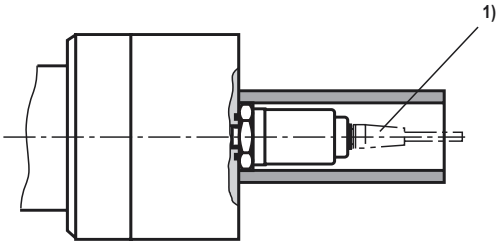
Types of mounting

MP3, MP5

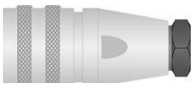


1) For analog output:
6-pole amphenol mating connector, material no. R900072231
(mating connector is **not** included in the scope of delivery, must be ordered separately)

MF3, MF4, MT4, MS2



1) For digital output:
7-pole amphenol mating connector, material no. R900079551
(mating connector is **not** included in the scope of delivery, must be ordered separately)

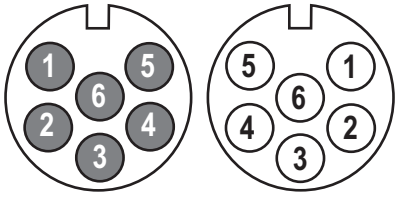


Technical data: Profibus
(For applications outside these values, please consult us!)

Profibus "N" / "P"			**Profibus 63 / Profibus 53**
Electrical connection	Type of connection		2 x M16 connector (6-pole), alternatively 2 x M12 connector (5-pole) and 1 x M8 connector (4-pole)
	Current consumption	mA	90, typical
Operating conditions	Operating temperature	°C	-40 ... +75
Tightening torque M_A		Nm	65 ±4%
Wrench size SW		mm	46
Output	Interface		IEC 61158 CPF3 PROFIBUS
	Data record		PROFIBUS-DP slave
	Transmission rate	MBit/s	max. 12
Measurement accuracy	Travel resolution	µm	1 ... 1000 selectable as parameter
	Velocity		With 5 µm travel resolution: 0.64 mm/s to 500 mm; 0.43 mm/s to 2000 mm; 0.21 mm/s to 4500 mm; 0.14 mm/s to 7600 mm measurement length With 2 µm travel resolution: 2.5 times smaller values
	Linearity		< ± 0.01% Full Scale (Minimum +/– 50 µm)
	Repeatability		< ± 0.001% Full Scale (Minimum +/– 2.5 µm)
	Temperature coefficient	ppm/°C	< 15
	Hysteresis	µm	< 4

Pin assignment for Profibus

Pin assignment for Profibus D63

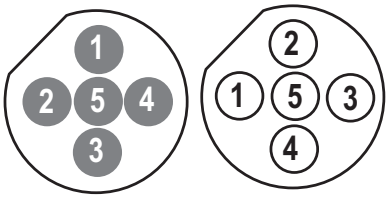


Pins Sockets

Pin	Cable	Function
1	green	RxD/TxD-N (bus)
2	red	RxD/TxD-P (bus)
3	––	DGND (terminating resistor) *
4	––	VP (terminating resistor) *
5	black	+24 V DC (–15 / +20%)
6	blue	DC ground (0 V)
––	yellow/ green	Shield compensating line, is usually not to be connected

* only with sockets

Pin assignment for Profibus D53

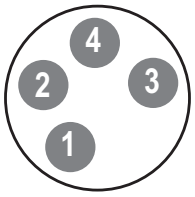


Pins Sockets

Pin	Cable	Function
1	––	VP+5 (terminating resistor) *
2	green	RxD/TxD-N (bus)
3	––	DGND (terminating resistor) *
4	red	RxD/TxD-P (bus)
5	Shield	Shield

* only with sockets

Supply

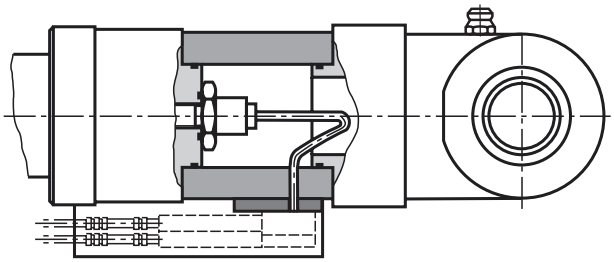


View connector side

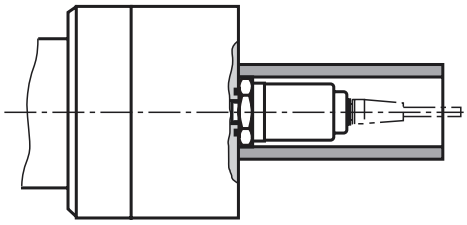
Pin	Cable	Function
1	brown	+24 V DC (–15 / +20%)
2	white	not used
3	blue	DC ground (0 V)
4	black	not used

Types of mounting

MP3, MP5



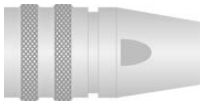
MF3, MF4, MT4, MS2



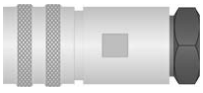
The output of the position measurement system is by default always rotated by 180° to the selected position of the hydraulic connection in the cylinder base.

Mating connectors for D63

Signal input
6-pole mating connector M16
Material no. R900705950 (socket)



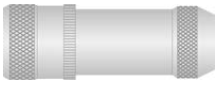
Signal output
6-pole end plug M16
Material no. R900722518 (pins)



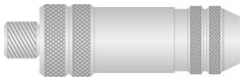
Signal output
6-pole mating connector M16
Material no. R900705951 (pins)

Mating connectors for D53

Signal input
5-pole mating connector M12-B
Material no. R900773386 (socket)



4-pole mating connector M8
Material no. R901132799



Signal output
5-pole mating connector M12-B
Material no. R901091655 (pins)

Connection cable 5 m
with 4-pole mating connector M8
Material no. R901213191

Connection cable 10 m
with 4-pole mating connector M8
Material no. R913008737

Connection cable 15 m
with 4-pole mating connector M8
Material no. R913008738

Signal output
5-pole end plug M12-B
Material no. R901070126 (pins)

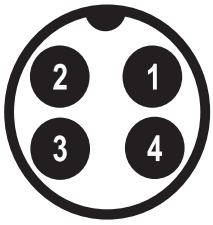
Mating connector is **not** included in the scope of delivery, must be ordered separately.

Technical data: IO-Link
(For applications outside these values, please consult us!)

IO-Link "L"			**IO-Link V1.1**
Electrical connection	Type of connection		1 x M12 connector (4-pole)
	Operating voltage	VDC	+24 (± 25%) / residual ripple ≤ 0.28 Vpp
	Current consumption	mA	< 50
Operating conditions	Operating temperature	°C	-40 ... +75
Tightening torque M_A		Nm	50 ±4%
Wrench size SW		mm	34
Output	Interface		Digital
	Transmission record		IO-Link V1.1
	Data format	Bit	32 signed (position in µm)
	Data transmission rate		COM3 (230.4 kBaud)
	Process data Device - Master	Bytes	4
	Process data Master - Device	Bytes	0
	Measured variable	MBit/s	Position
Measured values	Resolution [1]	µm	5; 10; 20; 50 or 100
	Cycle time:	ms	Minimum 1 (depending on master)
	Linearity [2]	%	≤ ±0.02 F.S. (Minimum ±60 µm)
	Measurement repetition accuracy	%	≤ ±0.005 F.S. (Minimum ±20 µm)

[1] Selectable via IO-Link Master.
[2] Tested with position magnet 251 416-2.

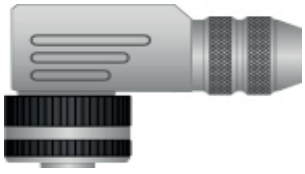
M12 connector (A-coded)
View to sensor



Pin	Function
1	+ 24 VDC (± 25%)
2	DI / DQ
3	DC ground (0 V)
4	C / Q

Mating connectors

M12 A-coded (5-pole), straight
Material number: R913045873



M12 A-coded (5-pole), angled
Material number: R901500328

Mating connector is **not** included in the scope of delivery, must be ordered separately.

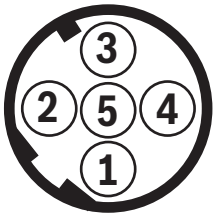
Technical data: Profinet
(For applications outside these values, please consult us!)

Profinet "R"				**Profinet RT / Profinet IRT version 2.3**				
Electrical connection	Type of connection			2 x M12 device socket (5-pole) 1 x M12 connector (4-pole)				
	Operating voltage		VDC	+12 ... 30 (± 20%) (9.6 ... 36)				
	Power consumption		W	< 4 typical				
Operating conditions	Operating temperature		°C	-40 ... +85				
Tightening torque M_A			Nm	65 ±4%				
Wrench size SW			mm	46				
Output	Interface			Profinet RT				
				Profinet IRT version 2.3				
	Data record			MTS profile and encoder profile 4.1				
	Data transmission rate		MBit/s	max. 100				
Measured values	Resolution		µm	0,5 ... 100 (selectable)				
	Cycle time [1]	Measurement length	mm	≤ 50	≤ 715	≤ 2000	≤ 4675	≤ 7620
		Cycle time:	µs	250	500	1000	2000	4000
	Linearity deviation [2] Measurement length		mm	≤ 500		> 500		
	linearity deviation		µm	≤ ± 50		< 0.01% F.S		
	Measurement repetition accuracy		%	≤ ±0.001 F.S. (Minimum ±2.5 µm) typical				
	Hysteresis		µm	< 4 typical				
	Temperature coefficient		ppm/K	< 15 typical				

[1] Sensor with standard settings

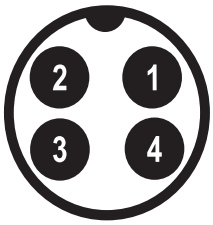
[2] Tested with position magnet 251 416-2.

M12 device socket (D-coded)
Port 1 and 2 - signal
(View to sensor)



Pin	Function
1	Tx (+)
2	Rx (+)
3	Tx (–)
4	Rx (–)
5	Not used

M12 connector (A-coded)

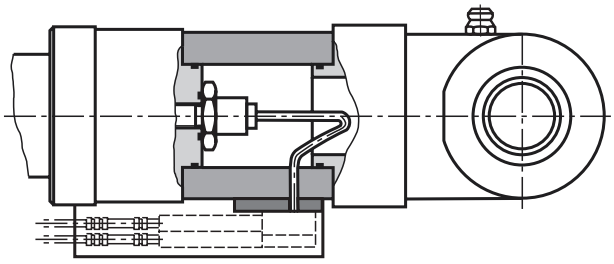


Pin	Function
1	+12...30 VDC (±20%)
2	Not used
3	DC ground (0 V)
4	Not used

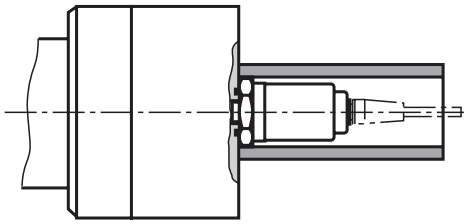
Technical data: Profinet

Types of mounting

MP3, MP5



MF3, MF4, MT4, MS2



The output of the position measurement system is by default always rotated by 180° to the selected position of the hydraulic connection in the cylinder base.

Mating connectors

M12 D-coded (4-pole), straight

Material number: R913045872
(required 2 x)

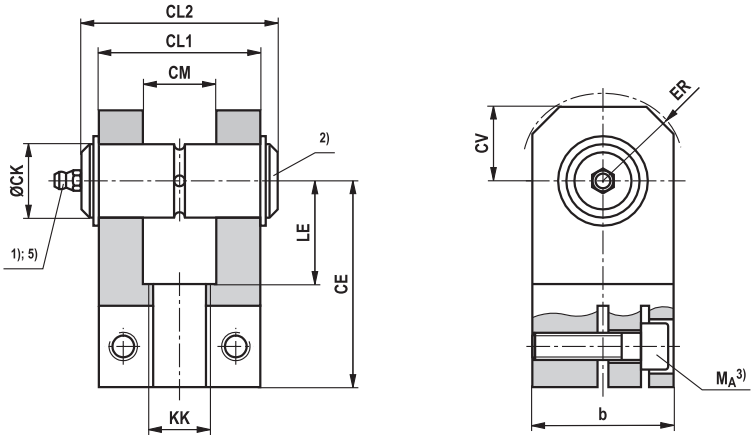
M12 A-coded (5-pole), straight

Material number: R913045873

Mating connector is **not** included in the scope of delivery, must be ordered separately.

Fork clevis CCKB (clampable)
(dimensions in mm)

ISO 8132



ØAL	ØMM	Type	Material no.	Nominal force kN	b max	CE js13	ØCK H9 2)	CL1 h16	CL2 max	CM A13	ER max
40	**25/28**	**CCKB 25**	R900542845	32	50	65	25	56	84	25	32
50	**32/36**	**CCKB 32**	R900542846	50	65	80	32	70	105	32	40
63	**40/45**	**CCKB 40**	R900542847	80	80	97	40	90	133	40	50
80	**50/56**	**CCKB 50**	R900542848	125	100	120	50	110	165	50	63
100	**63/70**	**CCKB 63**	R900542849	200	140	140	63	140	185	63	71
125	**80/90**	**CCKB 80**	R900542850	320	180	180	80	170	225	80	90
140	**90/100**	**CCKB 90**	6)	400	200	195	90	190	6)	90	100
160	**100/110**	**CCKB 100**	6)	500	220	210	100	210	6)	100	110

ØAL	ØMM	Type	KK 6H	LE min	CV max	Clamping screw ISO 4762-10.9	M_A 3) Nm	m 4) kg
40	**25/28**	**CCKB 25**	M20x1,5	34	32	M10x35	49	1.4
50	**32/36**	**CCKB 32**	M27x2	41	40	M12x40	85	2.8
63	**40/45**	**CCKB 40**	M33x2	51	50	M16x50	210	5.2
80	**50/56**	**CCKB 50**	M42x2	63	63	M20x60	425	9.5
100	**63/70**	**CCKB 63**	M48x2	75	71	M24x80	730	21.5
125	**80/90**	**CCKB 80**	M64x3	94	90	M30x100	1450	38.2
140	**90/100**	**CCKB 90**	M72x3	108	100	M36x120	2480	6)
160	**100/110**	**CCKB 100**	M80x3	114	110	M36x130	2480	6)

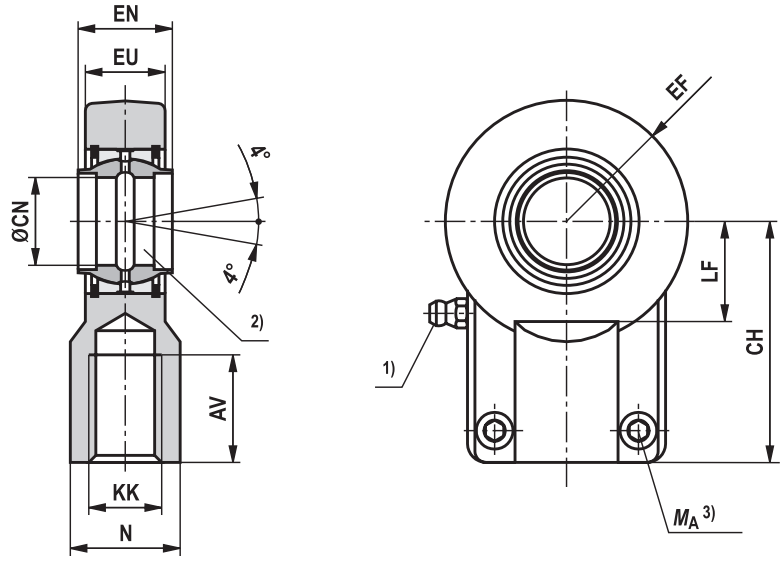
Geometry and dimensions may differ depending on the manufacturer.
In case of combination with other mounting elements, the usability must be checked.

The fork clevis must always be screwed against the shoulder of the piston rod and secured against loosening!

ØAL = piston Ø
ØMM = piston rod Ø
1) Grease nipple, cone head form A according to DIN 71412
2) Related bolt Ø m6
(bolt and bolt lock are included in the scope of delivery and not mounted upon delivery)
3) M_A = tightening torque4)
4) *m* = weight of the fork clevis in kg
5) Without lubrication bore
6) On request

Swivel head CGKD (clampable)
(dimensions in mm)

ISO 8132



ØAL	ØMM	Type	Material no.	Nominal force kN	AV min	N max	CH js13	EF max	ØCN H7 2)	EN h12	EU max
40	**25/28**	**CGKD 25**	R900323332	32	29	31	65	32	25	25	22
50	**32/36**	**CGKD 32**	R900322049	50	37	38	80	40	32	32	28
63	**40/45**	**CGKD 40**	R900322029	80	46	47	97	50	40	40	34
80	**50/56**	**CGKD 50**	R900322719	125	57	58	120	63	50	50	42
100	**63/70**	**CGKD 63**	R900322028	200	64	70	140	72.5	63	63	53.5
125	**80/90**	**CGKD 80**	R900322700	320	86	91	180	92	80	80	68
140	**90/100**	**CGKD 90** 7)	R900325702	400	91	100	195	101	90	90	72
160	**100/110**	**CGKD 100**	R900322030	500	96	110	210	114	100	100	85.5
180	**110/125**	**CGKD 110** 7)	R900308153	635	106	125	235	129	110	110	88
200	**125/140**	**CGKD 125**	R900322026	800	113	135	260	160	125	125	105
220	**140/160**	**CGKD 160**	R900300718	1,520	126	165	310	200	160	160	133
250	**160/180**	**CGKD 160**	R900300718	1,520	126	165	310	200	160	160	133
280	**180/200**	**CGKD 200**	R900324814	2,000	161	215	390	250	200	200	165
320	**200/220**	**CGKD 200**	R900324814	2,000	161	215	390	250	200	200	165

Swivel head CGKD (clampable)
(dimensions in mm)

ØAL	ØMM	Type	KK 6H	LF min	Clamping screw ISO 4762-10.9	M_A [3] Nm	m [4] kg	C_0 [5] kN	F_{adm} [6] kN
40	**25/28**	**CGKD 25**	M20x1,5	25.5	M8x20	30	0.65	78	28.8
50	**32/36**	**CGKD 32**	M27x2	30	M10x25	59	1.15	114	42.1
63	**40/45**	**CGKD 40**	M33x2	39	M10x30	59	2.1	204	75.3
80	**50/56**	**CGKD 50**	M42x2	47	M12x35	100	4	310	114.4
100	**63/70**	**CGKD 63**	M48x2	58	M16x40	250	7.2	430	158.7
125	**80/90**	**CGKD 80**	M64x3	74	M20x50	490	15	695	256.5
140	**90/100**	**CGKD 90** [7]	M72x3	85	M20x60	490	19	750	276.8
160	**100/110**	**CGKD 100**	M80x3	94	M24x60	840	25.5	1060	391.1
180	**110/125**	**CGKD 110** [7]	M90x3	105	M24x60	840	36.5	1200	442.8
200	**125/140**	**CGKD 125**	M100x3	116	M24x70	840	52.5	1430	527.7
220	**140/160**	**CGKD 160**	M125x4	145	M24x80	840	82.5	2200	811.8
250	**160/180**	**CGKD 160**	M125x4	145	M24x80	840	82.5	2200	811.8
280	**180/200**	**CGKD 200**	M160x4	190	M30x100	1700	168	3650	1346.9
320	**200/220**	**CGKD 200**	M160x4	190	M30x100	1700	168	3650	1346.9

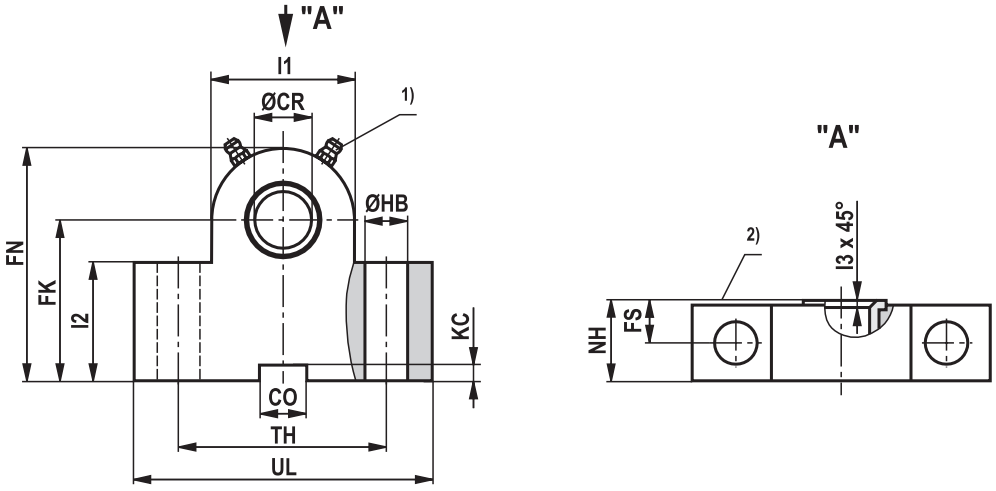
The specified dimensions are maximum values and may differ depending on the manufacturer.
In case of combination with other mounting elements, the usability must be checked.

The swivel head must always be screwed against the shoulder of the piston rod. Afterwards, the clamping screws must be tightened with the specified tightening torque.

ØAL = piston Ø
ØMM = piston rod Ø
1) Grease nipple, cone head form A according to DIN 71412
2) Related bolt Ø m6
3) M_A = tightening torque
4) m = weight of swivel head in kg
5) C_0 = static load rating of the swivel head
6) F_{adm} = max. admissible load of the swivel head with oscillatory or alternating loads
7) Not contained in the standard

Trunnion bearing block CLTB
(dimensions in mm)

ISO 8132



ØAL	Type [3]	Material no.	Nominal force kN [4]	ØCR H7	CO N9	FK JS12	FN max.	FS js13	ØHB H13	KC +0.3
40	**CLTB 25**	R900772610	32	25	25	55	80	12	13.5	5.4
50	**CLTB 32**	R900772611	50	32	25	65	100	15	17.5	5.4
63	**CLTB 40**	R900772612	80	40	36	76	120	16	22	8.4
80	**CLTB 50**	R900772613	125	50	36	95	140	20	26	8.4
100	**CLTB 63**	R900772614	200	63	50	112	180	25	33	11.4
125	**CLTB 80**	R900772615	320	80	50	140	220	31	39	11.4
140	**CLTB 90**	R901364220	385	90	63	160	250	40	45	12.4
160	**CLTB 100**	R901205929	500	100	63	180	280	45	52	12.4
180	**CLTB 110**	R901364223	630	110	80	200	310	50	52	15.4
200	**CLTB 125**	R901363022	785	125	80	220	345	56	45	15.4

ØAL	Type [3]	l1	l2	l3	NH max.	TH js13	UL max.	*m* [5] kg
40	**CLTB 25**	56	45	1.5	26	80	110	2.1
50	**CLTB 32**	70	52	2	33	110	150	4.55
63	**CLTB 40**	88	60	2.5	41	125	170	7.3
80	**CLTB 50**	100	75	2.5	51	160	210	14.5
100	**CLTB 63**	130	85	3	61	200	265	23.1
125	**CLTB 80**	160	112	3.5	81	250	325	52.3
140	**CLTB 90**	180	130	4	91	265	345	[6]
160	**CLTB 100**	200	145	4.5	102	295	385	100
180	**CLTB 110**	220	160	5	112	320	410	[6]
200	**CLTB 125**	[6]	[6]	[6]	132	385	570	[6]

Note:
Geometry and dimensions may differ depending on the manufacturer.
All graphical pictures are examples.
In case of combination with other mounting elements, the usability must be checked.
The trunnion bearing blocks are suitable for attachment in case of type of mounting MT4.

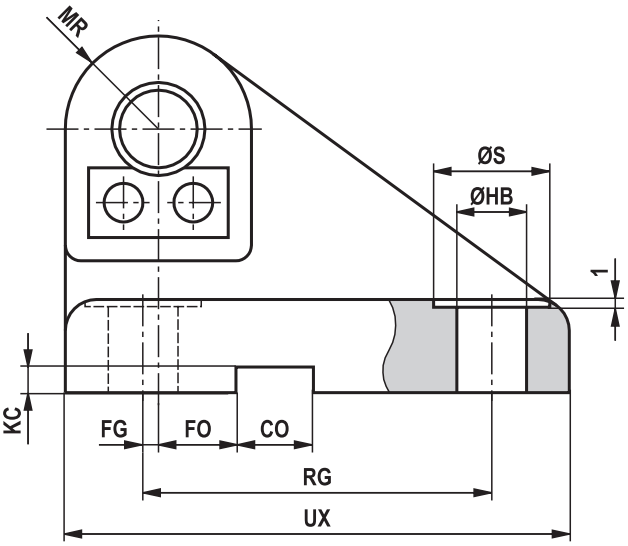
ØAL = piston Ø

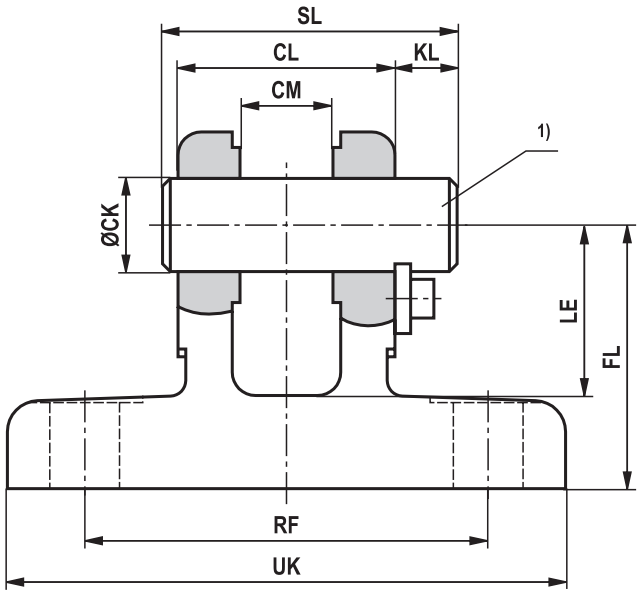
1) Grease nipple, cone head form A according to DIN 71412
2) Trunnion contact surface (inside)
3) Bearing blocks are always supplied in pairs
4) Nominal force applies to applications in pairs
5) ***m*** = weight of trunnion bearing block in kg (indication per pair)
6) On request

Clevis bracket CLCA (clampable)

(dimensions in mm)

ISO 8132, form B





ØAL	ØMM	Type	Material no.	Nominal force kN	ØCK H9 1)	CL h16	CM A13	CO N9	FG JS14	FL js13	FO JS14
40	**25/28**	**CLCA 25**	R900542864	32	25	56	25	25	10	55	10
50	**32/36**	**CLCA 32**	R900542865	50	32	70	32	25	14.5	65	6
63	**40/45**	**CLCA 40**	R900542866	80	40	90	40	36	17.5	76	6
80	**50/56**	**CLCA 50**	R900542867	125	50	110	50	36	25	95	0
100	**63/70**	**CLCA 63**	R900542868	200	63	140	63	50	33	112	0
125	**80/90**	**CLCA 80**	R900542869	320	80	170	80	50	45	140	0
140	**90/100**	**CLCA 90**	R901373007	400	90	190	90	63	47.5	160	0
160	**100/110**	**CLCA 100**	R901261098	500	100	210	100	63	52.5	180	0
180	**110/125**	**CLCA 110**	R901373008	635	110	240	110	80	62.5	200	0
200	**125/140**	**CLCA 125**	R901373011	800	125	270	125	80	75	230	0

ØAL	ØMM	Type	ØHB H13	KC +0.3	KL	LE min	MR max	RF js13	RG js13	ØS	SL	UK max	UX max	*m* 2) kg
40	**25/28**	**CLCA 25**	13.5	5.4	10	37	25	90	85	20	69	120	115	3
50	**32/36**	**CLCA 32**	17.5	5.4	13	43	32	110	110	26	87	145	145	5
63	**40/45**	**CLCA 40**	22	8.4	16	52	40	140	125	33	110	185	170	9.6
80	**50/56**	**CLCA 50**	26	8.4	19	65	50	165	150	40	133	215	200	15.5
100	**63/70**	**CLCA 63**	33	11.4	20	75	63	210	170	48	164	270	230	27.5
125	**80/90**	**CLCA 80**	39	11.4	26	95	80	250	210	57	202	320	280	47
140	**90/100**	**CLCA 90**	45	12.4	28	108	90	280	235	66	224	360	320	3)
160	**100/110**	**CLCA 100**	52	12.4	30	120	100	315	250	76	246	405	345	3)
180	**110/125**	**CLCA 110**	52	15.4	31	138	110	335	305	76	277	425	400	3)
200	**125/140**	**CLCA 125**	52	15.4	32	170	125	365	350	76	310	455	450	3)

Note:

Geometry and dimensions may differ depending on the manufacturer.

In case of combination with other mounting elements, the usability must be checked.

ØAL = piston Ø

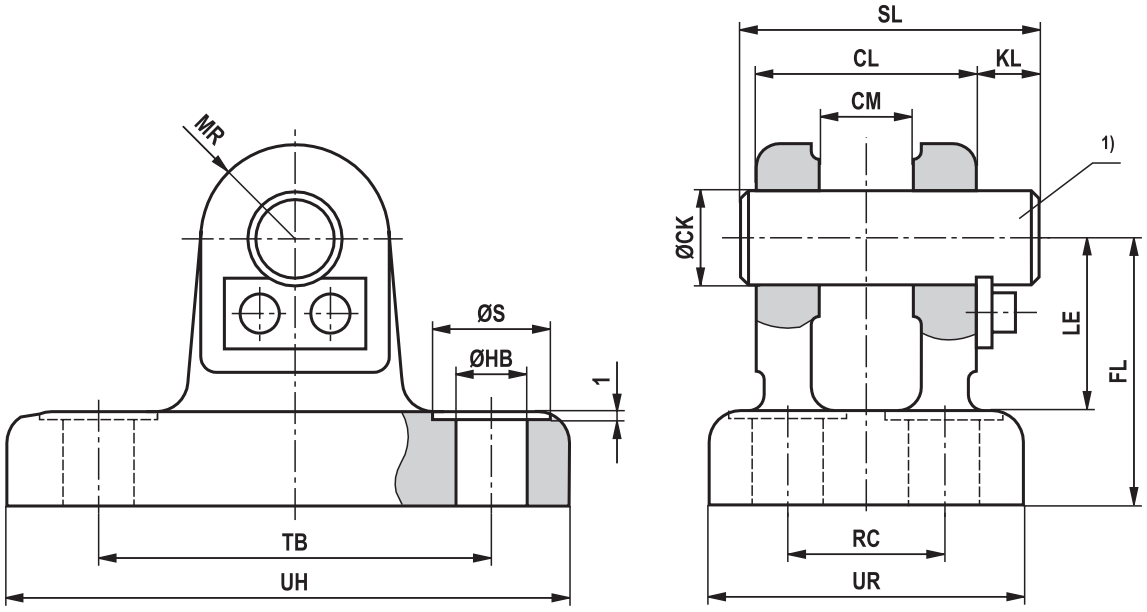
ØMM = piston rod Ø

1) Bolt Ø m6 required (bolt and bolt lock are included in the scope of delivery and are not mounted upon delivery)

2) ***m*** = weight of clevis bracket in kg

3) On request

Clevis bracket CLCD (clampable)
(dimensions in mm)



ØAL	ØMM	Type	Material no.	Nominal force kN	ØCK H9 1)	CL h16	CM A13	FL JS12	ØHB H13	KL
40	**25/28**	**CLCD 25**	R900542882	32	25	56	25	55	13.5	10
50	**32/36**	**CLCD 32**	R900542883	50	32	70	32	65	17.5	13
63	**40/45**	**CLCD 40**	R900542884	80	40	90	40	76	22	16
80	**50/56**	**CLCD 50**	R900542885	125	50	110	50	95	26	19
100	**63/70**	**CLCD 63**	R900542886	200	63	140	63	112	33	20
125	**80/90**	**CLCD 80**	R900542887	320	80	170	80	140	39	26
140	**90/100**	**CLCD 90**	3)	400	90	190	90	160	45	28
160	**100/110**	**CLCD 100**	3)	500	100	210	100	180	45	30
180	**110/125**	**CLCD 110**	3)	635	110	240	110	200	52	31
200	**125/140**	**CLCD 125**	3)	800	125	270	125	230	52	32

ØAL	ØMM	Type	LE min	MR max	RC JS14	ØS	SL	TB JS14	UR max	UH max	*m* 2) kg
40	**25/28**	**CLCD 25**	37	25	40	20	69	85	70	113	1.9
50	**32/36**	**CLCD 32**	43	32	50	26	87	110	85	143	3
63	**40/45**	**CLCD 40**	52	40	65	33	110	130	108	170	5.5
80	**50/56**	**CLCD 50**	65	50	80	40	133	170	130	220	10.6
100	**63/70**	**CLCD 63**	75	63	100	48	164	210	160	270	17
125	**80/90**	**CLCD 80**	95	80	125	57	202	250	210	320	32
140	**90/100**	**CLCD 90**	108	90	140	66	224	290	230	370	3)
160	**100/110**	**CLCD 100**	120	100	160	66	246	315	260	400	3)
180	**110/125**	**CLCD 110**	138	110	180	76	277	350	290	445	3)
200	**125/140**	**CLCD 125**	170	125	200	76	310	385	320	470	3)

Note:

Geometry and dimensions may differ depending on the manufacturer.

In case of combination with other mounting elements, the usability must be checked.

ØAL = Piston Ø

ØMM = Piston rod Ø

1) Related bolt Ø m6
(bolt and bolt lock are included in the scope of delivery and not mounted upon delivery)

2) ***m*** = weight of clevis bracket in kg

3) On request

Buckling

For the admissible stroke length with flexibly guided load and a factor of 3.5 for safety against buckling, please refer to the relevant table. For other installation positions of the cylinder, the admissible stroke length must be interpolated. Admissible stroke length for non-guided load on request. Buckling calculations are carried out according to the following formulas:

1. Calculation according to Euler

$$F = \frac{\pi^2 \cdot E \cdot I}{v \cdot L_K^2} \qquad \text{if } \lambda > \lambda_g$$

2. Calculation according to Tetmajer

$$F = \frac{d^2 \cdot \pi \,(335 - 0.62 \cdot \lambda)}{4 \cdot v} \qquad \text{if } \lambda \le \lambda_g$$

Influence of the type of mounting on the bending length:

Explanation:

E = module of elasticity in N/mm²
= 2.1 x 10^5 for steel

I = geometrical moment of inertia in mm⁴ for circular cross-section $= \frac{d^4 \cdot \pi}{64} = 0.0491 \cdot d^4$

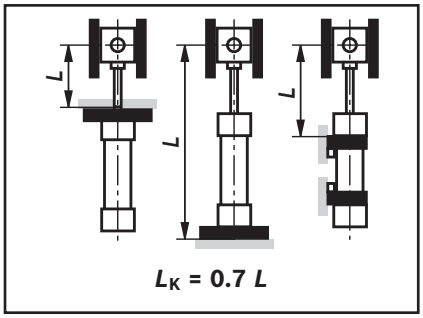
v = 3.5 (safety factor)

L_K = free bending length in mm (depending on the type of mounting see sketches A, B, C)

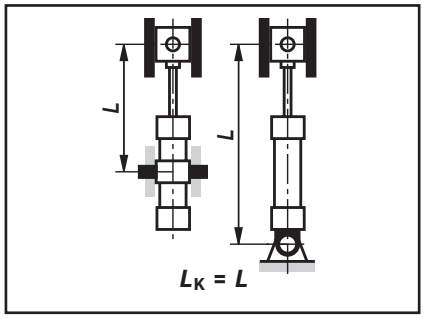
d = Piston rod Ø in mm

λ = Slenderness ratio
$= \frac{4 \cdot L_K}{d}$ $\qquad \lambda_g = \pi \sqrt{\frac{E}{0.8 \cdot R_e}}$

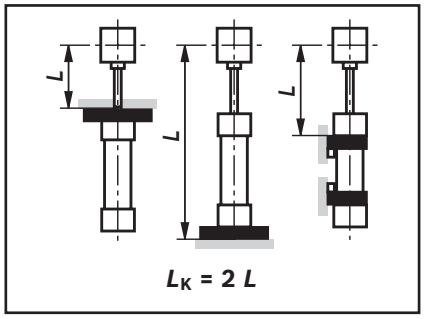
R_e = yield strength of the piston rod material



$L_K = 0.7\ L$



$L_K = L$



$L_K = 2\ L$

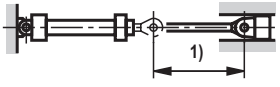
Admissible stroke length
(dimensions in mm)

Type of mounting CDH2/CSH2 [2]: MP3, MP5

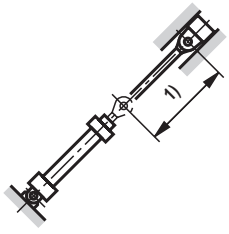
ØAL	ØMM	Admissible stroke length with 100 bar 0 °	100 bar 45 °	100 bar 90 °	160 bar 0 °	160 bar 45 °	160 bar 90 °	250 bar 0 °	250 bar 45 °	250 bar 90 °
40	**25**	195	200	215	130	135	140	40	45	55
	28	385	400	445	295	300	320	215	220	225
50	**32**	380	390	430	280	285	300	195	200	205
	36	505	525	595	395	405	430	290	295	305
63	**40**	480	500	550	365	370	385	255	260	265
	45	640	660	750	505	515	550	380	385	395
80	**50**	590	615	690	455	465	495	330	335	345
	56	765	800	930	615	630	685	470	475	495
100	**63**	750	780	910	595	610	660	445	455	470
	70	940	985	1195	775	800	885	605	615	650
125	**80**	970	1015	1200	780	805	880	595	605	635
	90	1235	1300	1610	1030	1070	1200	825	840	895
140	**90**	1075	1130	1360	875	905	1000	675	685	725
	100	1335	1405	1770	1120	1165	1325	900	920	985
160	**100**	1175	1230	1480	955	985	1085	735	750	785
	110	1430	1500	1875	1195	1240	1400	955	975	1040
180	**110**	1250	1310	1570	1010	1045	1150	775	790	830
	125	1620	1710	2160	1365	1420	1620	1100	1125	1205
200	**125**	1435	1510	1860	1180	1220	1365	915	935	990
	140	1795	1900	2450	1525	1590	1840	1240	1270	1370
220	**140**	1620	1710	2180	1360	1415	1630	1090	1120	1200
	160	2075	2200	3000	1810	1890	2280	1510	1560	1730
250	**160**	1805	1910	2490	1520	1590	1850	1220	1250	1360
	180	2250	2395	3300	1960	2060	2500	1630	1690	1880
280	**180**	2075	2200	2900	1775	1880	2170	1450	1490	1620
	200	2510	2670	3700	2200	2310	2820	1850	1920	2140
320	**200**	2135	2270	3030	1820	1900	2260	1470	1510	1660
	220	2550	2720	3820	2230	2340	2880	1860	1930	2170

Installation position

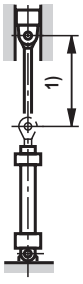
0 °



45 °



90 °



[1] Adm. Stroke length

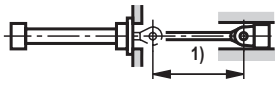
Admissible stroke length
(dimensions in mm)

Type of mounting CDH2/CGH2/CSH2 [2]: MF3

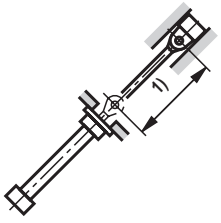
ØAL	ØMM	Admissible stroke length with 100 bar			160 bar			250 bar		
		0 °	45 °	90 °	0 °	45 °	90 °	0 °	45 °	90 °
40	25	895	915	980	730	735	760	440	450	510
	28	1400	1415	1630	1180	1205	1275	970	980	1010
50	32	1440	1490	1670	1210	1230	1300	985	995	1025
	36	1760	1830	2000	1510	1545	1675	1255	1270	1320
63	40	1735	1800	2000	1475	1510	1620	1215	1230	1270
	45	2000	2000	2000	1830	1880	2080	1540	1560	1640
80	50	2000	2000	2000	1810	1850	1995	1495	1515	1570
	56	2000	2000	2000	2000	2000	2000	1870	1900	2000
100	63	2580	2690	3000	2235	2300	2550	1875	1910	2010
	70	3000	3000	3000	2690	2780	3000	2300	2350	2520
125	80	3000	3000	3000	2840	2930	3000	2400	2450	2590
	90	3000	3000	3000	3000	3000	3000	3000	3000	3000
140	90	3000	3000	3000	3000	3000	3000	2700	2760	2950
	100	3000	3000	3000	3000	3000	3000	3000	3000	3000
160	100	3000	3000	3000	3000	3000	3000	2920	2980	3000
	110	3000	3000	3000	3000	3000	3000	3000	3000	3000
180	110	3000	3000	3000	3000	3000	3000	3000	3000	3000
	125	3000	3000	3000	3000	3000	3000	3000	3000	3000
200	125	3000	3000	3000	3000	3000	3000	3000	3000	3000
	140	3000	3000	3000	3000	3000	3000	3000	3000	3000
220	140	5400	5680	6000	4800	4980	5780	4120	4220	4560
	160	6000	6000	6000	5820	6000	6000	5150	5330	6000
250	160	5850	6000	6000	5270	5500	6000	4600	4740	5250
	180	6000	6000	6000	6000	6000	6000	5650	5850	6000
280	180	6000	6000	6000	6000	6000	6000	5270	5420	5970
	200	6000	6000	6000	6000	6000	6000	6000	6000	6000
320	200	6000	6000	6000	6000	6000	6000	5950	6000	6000
	220	6000	6000	6000	6000	6000	6000	6000	6000	6000

Installation position

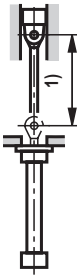
0 °



45 °



90 °



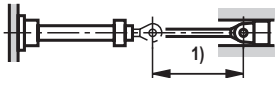
[1] Adm. Stroke length

Type of mounting CDH2/CSH2 [2]: MF4

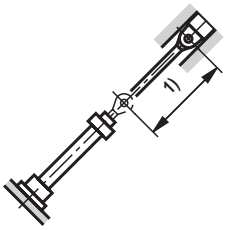
ØAL	ØMM	Admissible stroke length with 100 bar			160 bar			250 bar		
		0 °	45 °	90 °	0 °	45 °	90 °	0 °	45 °	90 °
40	25	325	340	370	245	250	260	105	110	140
	28	565	590	695	465	475	520	365	370	385
50	32	600	625	715	485	495	530	370	375	390
	36	755	790	950	630	650	715	505	515	540
63	40	730	765	905	600	615	675	470	480	500
	45	920	965	1190	780	805	905	630	645	685
80	50	910	950	1130	750	775	845	595	605	630
	56	1125	1185	1470	960	990	1120	785	800	850
100	63	1120	1175	1460	945	980	1105	770	785	835
	70	1350	1430	1860	1175	1220	1420	980	1000	1090
125	80	1430	1510	1910	1225	1270	1450	1000	1025	1100
	90	1750	1855	2490	1540	1610	1910	1300	1340	1470
140	90	1585	1675	2170	1370	1425	1650	1135	1165	1260
	100	1895	2010	2750	1675	1755	2110	1425	1470	1630
160	100	1725	1820	2340	1490	1545	1780	1230	1260	1360
	110	2030	2150	2900	1785	1870	2230	1510	1560	1720
180	110	1855	1960	2510	1595	1660	1910	1315	1350	1450
	125	2300	2440	3350	2040	2130	2580	1735	1790	1990
200	125	2105	2230	2950	1830	1910	2250	1530	1570	1715
	140	2535	2700	3000	2260	2370	2920	1940	2010	2255
220	140	2250	2400	3350	1990	2090	2550	1685	1740	1950
	160	2800	2990	4500	2530	2680	3480	2220	2310	2700
250	160	2600	2770	3900	2310	2430	3000	1975	2040	2300
	180	3130	3350	5050	2840	3000	3910	2500	2600	3040
280	180	2850	3050	4400	2550	2680	3370	2190	2270	2600
	200	3370	3610	5550	3070	3250	4300	2700	2820	3330
320	200	3070	3270	4750	2750	2890	3650	2150	2460	2810
	220	3560	3820	5850	3250	3430	4550	2860	2980	3530

Installation position

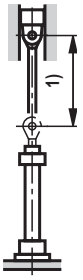
0 °



45 °



90 °



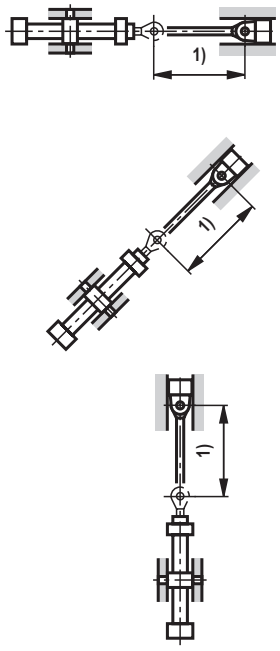
[1] Adm. Stroke length

Admissible stroke length

(dimensions in mm)

Type of mounting CDH2/CGH2/CSH2 [2]: MT4 trunnion in cylinder center

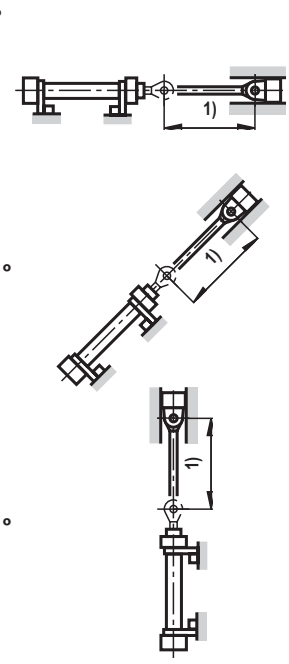
ØAL	ØMM	Admissible stroke length with									Installation position
		100 bar			160 bar			250 bar			
		0°	45 °	90 °	0°	45 °	90 °	0°	45 °	90 °	
40	25	340	345	365	250	255	260	130	135	145	0°
	28	590	605	665	470	480	500	365	370	375	
50	32	600	615	670	470	480	495	355	360	365	
	36	770	795	890	625	635	670	485	490	505	
63	40	740	765	845	590	600	630	450	455	465	
	45	940	975	1115	770	790	845	610	620	640	
80	50	920	950	1055	735	750	790	570	575	590	
	56	1155	1195	1375	950	975	1045	755	765	790	
100	63	1145	1190	1365	940	960	1030	740	750	775	
	70	1400	1460	1740	1180	1210	1330	955	970	1015	
125	80	1470	1530	1780	1220	1250	1350	970	985	1020	45 °
	90	1820	1910	2320	1550	1600	1780	1275	1300	1370	
140	90	1640	1710	2020	1370	1410	1540	1100	1120	1170	
	100	1980	2080	2570	1700	1755	1970	1400	1430	1515	
160	100	1780	1850	2180	1485	1520	1660	1190	1210	1260	
	110	2110	2210	2710	1800	1860	2080	1480	1510	1595	
180	110	1910	1990	2340	1590	1635	1780	1275	1295	1350	
	125	2405	2530	3000	2065	2130	2400	1710	1740	1850	
200	125	2180	2280	2740	1840	1890	2090	1490	1510	1590	
	140	2660	2800	3000	2300	2380	2720	1915	1960	2100	
220	140	2490	2510	3150	2050	2120	2400	1685	1720	1835	90 °
	160	3000	3170	4230	2640	2750	3260	2240	2310	2530	
250	160	2730	2870	3640	2350	2440	2790	1950	1990	2140	
	180	3320	3520	4720	2940	3060	3650	2500	2570	2830	
280	180	3040	3210	4140	2640	2750	3170	2210	2260	2440	
	200	3620	3840	5210	3210	3360	4040	2750	2830	3140	
320	200	3250	3430	4455	2820	2930	3410	2360	2420	2620	
	220	3800	4030	5500	3370	3530	4250	2880	2970	3290	



[1] Adm. Stroke length

Type of mounting CDH2/CGH2/CSH2 [2]: MS2

ØAL	ØMM	Admissible stroke length with									Installation position
		100 bar			160 bar			250 bar			
		0°	45 °	90 °	0°	45 °	90 °	0°	45 °	90 °	
40	22	825	840	885	645	650	665	370	375	410	0°
	28	1305	1350	1535	1085	1110	1180	875	885	910	
50	28	1330	1375	1560	1095	1120	1190	875	885	910	
	36	1645	1715	2030	1395	1430	1560	1140	1160	1210	
63	36	1610	1670	1950	1345	1380	1490	1085	1100	1145	
	45	1980	2000	2000	1700	1750	1950	1410	1435	1510	
80	45	1980	2000	2000	1665	1710	1850	1350	1370	1425	
	56	2000	2000	2000	2000	2000	2000	1730	1760	1860	
100	56	2420	2535	3000	2080	2140	2390	1720	1750	1850	
	70	2880	3000	3000	2530	2630	3000	2140	2190	2360	
125	70	3000	3000	3000	2660	2750	3000	2220	2270	2410	45 °
	90	3000	3000	3000	3000	3000	3000	2810	2890	3000	
140	90	3000	3000	3000	2970	3000	3000	2490	2550	2740	
	100	3000	3000	3000	3000	3000	3000	3000	3000	3000	
160	100	3000	3000	3000	3000	3000	3000	2690	2750	2950	
	110	3000	3000	3000	3000	3000	3000	3000	3000	3000	
180	110	3000	3000	3000	3000	3000	3000	2890	2960	3000	
	125	3000	3000	3000	3000	3000	3000	3000	3000	3000	
200	125	3000	3000	3000	3000	3000	3000	3000	3000	3000	
	140	3000	3000	3000	3000	3000	3000	3000	3000	3000	
220	140	5090	5370	6000	4490	4670	5470	3820	3910	4260	90 °
	160	6000	6000	6000	5510	5800	6000	4850	5020	5750	
250	160	5520	5860	6000	4940	5170	6000	4270	4410	4920	
	180	6000	6000	6000	6000	6000	6000	5320	5520	6000	
280	180	6000	6000	6000	5700	5960	6000	4930	5070	5630	
	200	6000	6000	6000	6000	6000	6000	6000	6000	6000	
320	200	6000	6000	6000	5890	6000	6000	4750	5310	6000	
	220	6000	6000	6000	6000	6000	6000	6000	6000	6000	



[1] Adm. Stroke length

With longer strokes, an extended guide and/or the use of guide rings may be reasonable for increasing the service life, depending on the respective case of application and installation position. Recommendation on request.

[2] With CSH2, observe the maximum stroke length "X*max", pages 30 to 41

End position cushioning

End position cushioning:

The objective is to reduce the velocity of a moved mass, the center of gravity of which lies on the cylinder axis, to a level at which neither the cylinder nor the machine into which the cylinder is installed is damaged.
For velocities above 20 mm/s, we recommend the use of an end position cushioning feature, which absorbs energy without requiring the use of additional equipment.
It must, however, always be checked whether end position cushioning is also required for lower velocities with large masses.

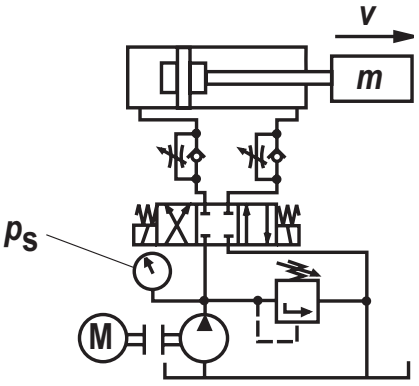
Damping capacity:

When decelerating masses via end position cushioning, the structural-inherent damping capacity must not be exceeded. Cylinders with end position cushioning can achieve their full damping capacity only over the entire stroke length.
With the adjustable end position cushioning version "E", a throttle valve is additionally provided when compared with version "D". End position cushioning version "E" allows cycle times to be optimized. The max. damping capacity can only be achieved when the throttle valve is closed.
The calculation depends on the factors mass, velocity, system pressure and installation position. For this reason, mass and velocity are used to determine the characteristic D_m and system pressure and installation position to determine the characteristic D_p.
These two characteristics are used for verifying the admissible damping capacity in the "damping capacity" diagram. The intersection point of the characteristics D_m and D_p must always be below the damping capacity curve of the selected cylinder. The values in the diagrams refer to an average oil temperature of +45 to +65 °C with the throttle valve being closed.
For special applications with very short stroke times, high velocities or large masses, cylinders with special end position cushioning versions can be offered on request. When fixed or adjustable stops are used, special measures must be taken!

Formulas:

$$D_m = \frac{m}{10^K}\ ;\ K = kv\ (0.5 - v)$$

m = moved mass in kg
v = stroke velocity in m/s
kv = see table page 69



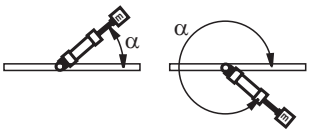
Extension for CDH2 and CSH2

$$D_p = p_S - \frac{m \cdot 9.81 \cdot \sin\alpha}{A_1 \cdot 10}$$

Retraction for CDH2, CGH2 and CSH2; extension for CGH2

$$D_p = p_S + \frac{m \cdot 9.81 \cdot \sin\alpha}{A_3 \cdot 10}$$

p_S = system pressure in bar
A_1 = piston area in cm² (see page 14)
A_3 = annulus area in cm² (see page 14)
α = angle to the horizontal in degree



Damping length

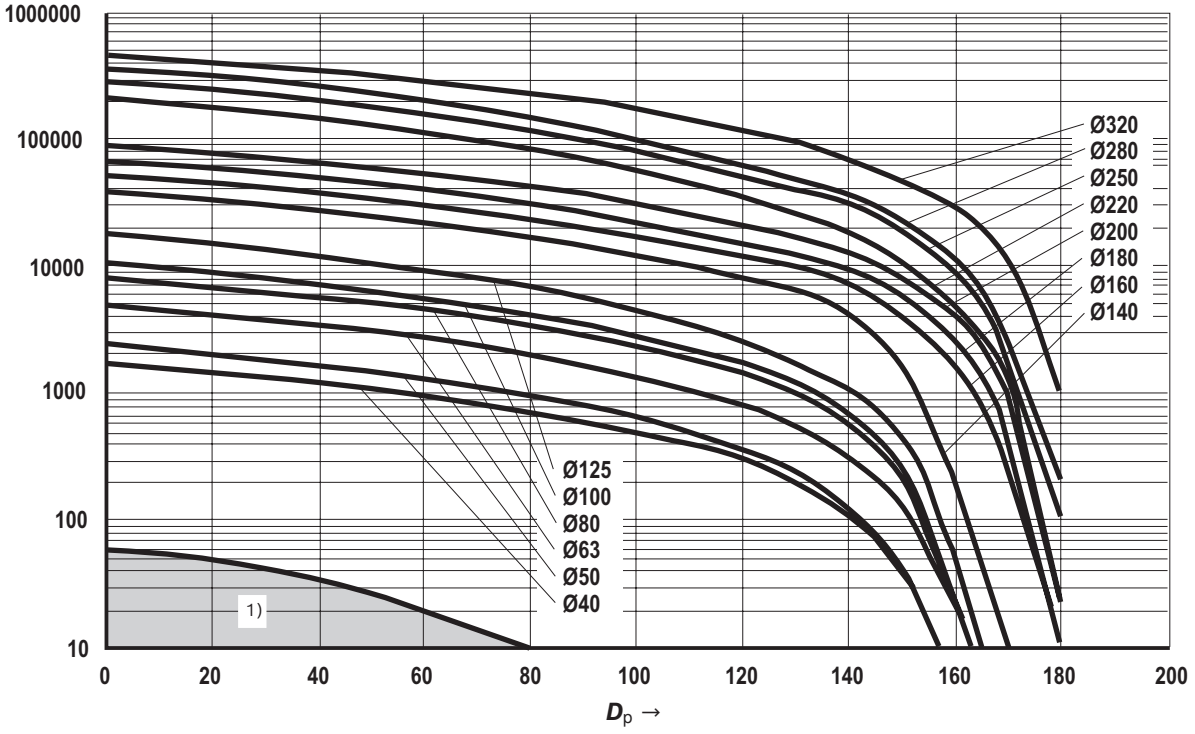
With cylinder strokes within the damping lengths, restrictions with regard to velocity / cycle time are possible.
We recommend minimum stroke greater than the damping length plus 10 mm!

ØAL mm	**40**	**50**	**63**	**80**	**100**	**125**	**140**	**160**	**180**	**200**	**220**	**250**	**280**	**320**
Head side	21	20	23	25	25	25	33	33	37	37	76	81	86	90
Base side	21	20	23	25	25	25	33	33	37	37	76	81	86	90

End position cushioning

ØAL mm	**40**	**50**	**63**	**80**	**100**	**125**	**140**	**160**	**180**	**200**	**220**	**250**	**280**	**320**
kv ①	2.85	2.97	2.56	2.82	3.51	3.02	2.53	2.65	2.91	2.76	2.85	2.95	3.11	3.13
kv ②	3.1	3.25	2.85	2.85	3.52	2.91	2.53	2.93	2.95	2.95	2.93	3.1	3.12	3.07
kv ③	2.95	3.1	2.73	3.1	3.51	2.95	2.51	2.91	2.95	2.91	2.93	2.93	3.15	3.25

Damping capacity: Extension for CDH2 and CSH2, with *kv* ①

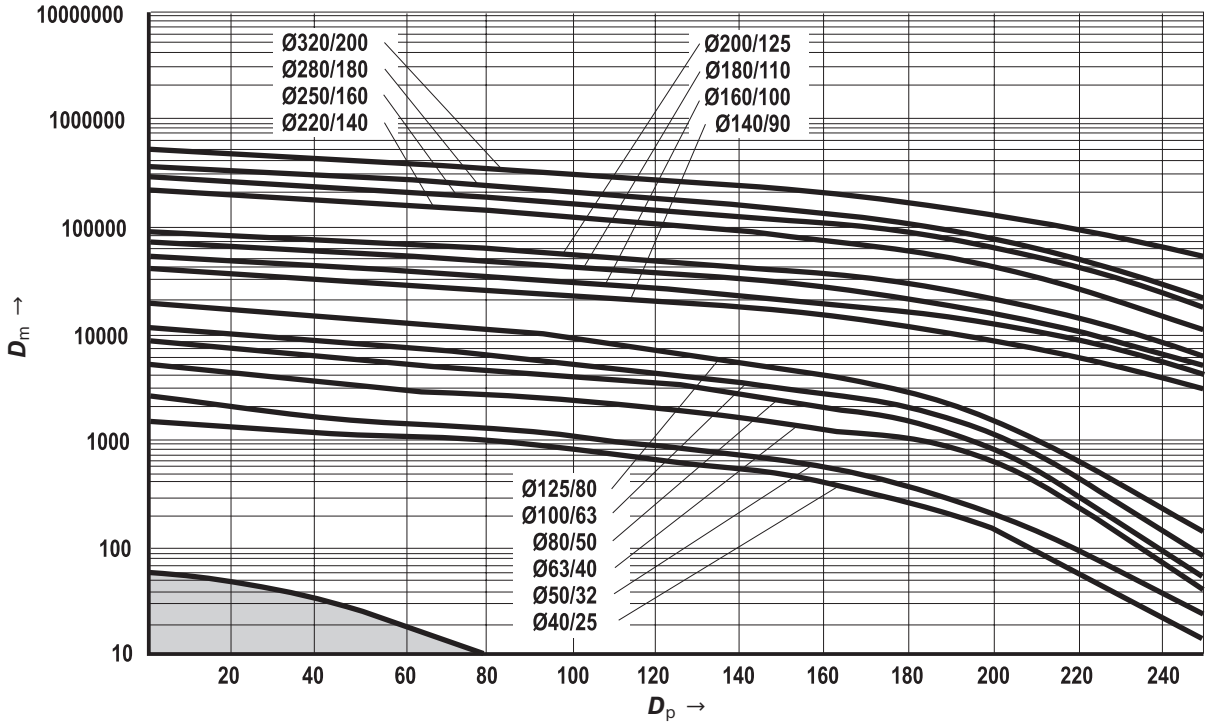


ØAL = piston Ø

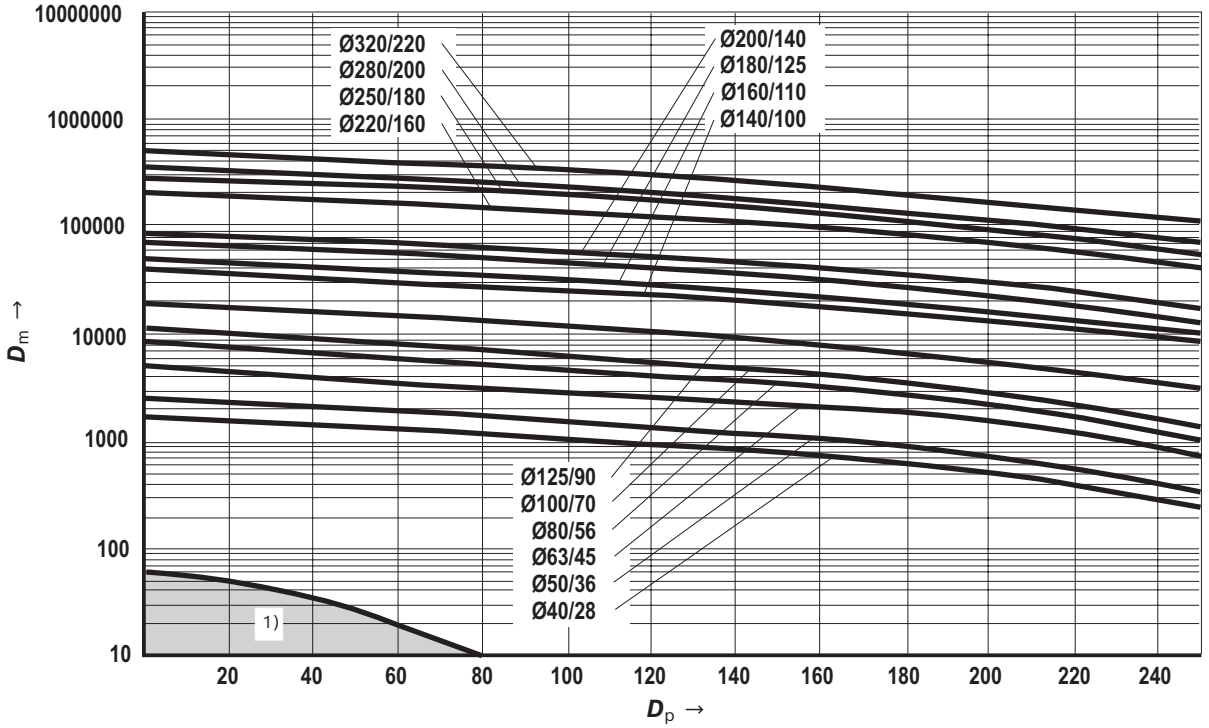
1) If with standard applications the calculated intersection point of D_m and D_p is within the marked area, we recommend designing the cylinder without end position cushioning.

End position cushioning

Damping capacity: Retraction for CDH2, CGH2 and CSH2; extension for CGH2 with *kv* ②



Damping capacity: Retraction for CDH2, CGH2 and CSH2; extension for CGH2 with *kv* ③



1) If with standard applications the calculated intersection point of D_m and D_p is within the marked area, we recommend designing the cylinder without end position cushioning.

Selection criteria for seals

The specified values are to be regarded as guidelines; depending on the application, it may be necessary to check the suitability of the seal system. Generally, a medium temperature of approx. 40 °C is recommended.

	Work and environmental conditions	Seal versions								
		M	G	V	L	A	B	T	R	S
Medium / temperature	**Medium HL, HLP** / operating temperature medium –20 °C ... +80 °C	++	++	++	++	++	++	++	++	++
	Medium HFA / operating temperature medium +5 °C ... +55 °C	+/–	+/–	+/–	+/–	+	+/–	++	+/–	+/–
	Medium HFC / operating temperature medium –20 °C ... +60 °C	–	++	–	–	+/–	–	++	–	–
	Medium HFDR / operating temperature medium –15 °C ... +80 °C	–	–	++	–	–	++	–	–	++
	Medium HFDU / operating temperature medium –15 °C ... +80 °C	–	–	++	–	–	++	–	–	++
	Ambient and rod temperature in the area of the piston rod from –20 °C ... +80 °C [1]	++	+	+ [2]	++	++	+ [2]	+	++	++ [2]
	Extended ambient and rod temperature in the area of the piston rod from +80 °C ... +120 °C [1]	–	–	++	–	–	+	–	–	++
Function / velocity...	static hold function more than 10 minutes: Attention! Application- and temperature-dependent	++	+	+	+	++	++	+	+	+
	Static hold function short-time < 1 minute	++	++	++	++	++	++	++	++	++
	Robust application conditions: Steel works, mining, thin ice	++	++	++	++	++	++	–	++	–
	Zero point control, hardly any amplitude, frequency max. 2 Hz, not longer than 5 minutes	–	–	–	+/–	–	–	++	+	++
	Cylinder velocity min. 0.001 m/sec stick-slip behavior	++	+	+	++	–	–	++	++	++
	Cylinder velocity from 0.01 m/sec to 0.5 m/sec [3]	++	+	+	++	+	+	++	++	++
	Cylinder velocity > 0.5 m/sec to max. 0.8 m/sec [3]	–	+/–	+/–	++	–	–	++	+	++
	Stroke > 1.0 m	+/–	++	++	++	++	++	++	++	++
	Standstill period (wear)	++	+/–	+/–	++	+/–	–	++	++	++
	Undissolved air in the oil [4]	–	+	+	+	–	–	+	+	+

++ = very good + = good +/– = conditional, depending on the application parameters – = inappropriate

General technical data in corresponding data sheets will remain valid, see page 11!

1) Moreover, observe the corresponding medium temperature range
2) Lower temperature limit –15 °C
3) Standard line connections not designed for that velocity
4) – Seal is destroyed / + Seal is not directly destroyed, leakage may occur

Seal kits [1)]

CDH2 – Standard

ØAL	ØMM	Material no. for seal design								
		M	G	V	L	A	B	T	R	S
40	25	R901010141	R961006001	R961006036	R961006071	R901010145	R901010147	R901010143	R961006106	R901010146
	28	R900851087	R961006002	R961006037	R961006072	R900859445	R900859770	R900858841	R961006107	R900861001
50	32	R900860274	R961006004	R961006039	R961006074	R900860929	R900860939	R900860275	R961006109	R900861003
	36	R900849392	R961006005	R961006040	R961006075	R900851515	R900860940	R900860277	R961006110	R900861004
63	40	R900859509	R961006007	R961006042	R961006077	R900851637	R900860941	R900860279	R961006112	R900861006
	45	R900847956	R961006008	R961006043	R961006078	R900851638	R900859678	R900847855	R961006113	R900861007
80	50	R900857129	R961006010	R961006045	R961006080	R900856092	R900860943	R900860281	R961006115	R900861009
	56	R900850905	R961006011	R961006046	R961006081	R900854718	R900851205	R900856180	R961006116	R900861010
100	63	R900860283	R961006013	R961006048	R961006083	R900856093	R900860945	R900860284	R961006118	R900861012
	70	R900853382	R961006014	R961006049	R961006084	R900856094	R900860946	R900860285	R961006119	R900861013
125	80	R900860287	R961006016	R961006051	R961006086	R900860931	R900860950	R900860288	R961006121	R900861015
	90	R900857949	R961006017	R961006052	R961006087	R900856095	R900855464	R900856102	R961006122	R900861016
140	90	R900858281	R961006018	R961006053	R961006088	R900860932	R900860951	R900860289	R961006123	R900861017
	100	R900853965	R961006019	R961006054	R961006089	R900856096	R900860952	R900860290	R961006124	R900849080
160	100	R900855683	R961006020	R961006055	R961006090	R900860468	R900860953	R900860291	R961006125	R900861018
	110	R900851146	R961006021	R961006056	R961006091	R900860933	R900860954	R900857536	R961006126	R900861019
180	110	R900856497	R961006023	R961006058	R961006093	R900860934	R900860955	R900852561	R961006128	R900861020
	125	R900848603	R961006024	R961006059	R961006094	R900860935	R900860956	R900860292	R961006129	R900861021
200	125	R900860294	R961006025	R961006060	R961006095	R900860936	R900860957	R900860295	R961006130	R900861022
	140	R900856431	R961006026	R961006061	R961006096	R900860937	R900860958	R900860293	R961006131	R900861023
220	140	R900888100	R961006027	R961006062	R961006097	R900888116	R900888140	R900888108	R961006132	R900888132
	160	R900888101	R961006028	R961006063	R961006098	R900888117	R900888141	R900888109	R961006133	R900888133
250	160	R900888102	R961006029	R961006064	R961006099	R900888118	R900888142	R900888110	R961006134	R900888134
	180	R900888103	R961006030	R961006065	R961006100	R900888119	R900888143	R900888111	R961006135	R900888135
280	180	R900888104	R961006031	R961006066	R961006101	R900888120	R900888144	R900888112	R961006136	R900888136
	200	R900888105	R961006032	R961006067	R961006102	R900888121	R900888145	R900888113	R961006137	R900888137
320	200	R900888106	R961006033	R961006068	R961006103	R900888122	R900888146	R900888114	R961006138	R900888138
	220	R900888107	–	–	R961006104	R900888123	R900888147	R900888115	R961006139	R900888139

ØAL = piston Ø

ØMM = piston rod Ø

[1)] Seal kits for proximity switches and subplate mounting separate material no.

Seal kits [1)]

CGH2 – Standard

ØAL	ØMM	Material no. for seal design								
		M	G	V	L	A	B	T	R	S
40	25	R901010159	R961006222	R961006257	R961006292	R901010162	R901010170	R901010161	R961006327	R901010169
	28	R900867252	R961006223	R961006258	R961006293	R900866747	R900867133	R900868889	R961006328	R900868943
50	32	R900867254	R961006225	R961006260	R961006295	R900866749	R900867135	R900868891	R961006330	R900868945
	36	R900864930	R961006226	R961006261	R961006296	R900866750	R900867136	R900868892	R961006331	R900868946
63	40	R900867261	R961006228	R961006263	R961006298	R900866752	R900867138	R900868894	R961006333	R900868948
	45	R900867262	R961006229	R961006264	R961006299	R900866753	R900867139	R900868895	R961006334	R900868949
80	50	R900867264	R961006231	R961006266	R961006301	R900866755	R900867141	R900868897	R961006336	R900868951
	56	R900867265	R961006232	R961006267	R961006302	R900866756	R900867142	R900868898	R961006337	R900868952
100	63	R900867267	R961006234	R961006269	R961006304	R900866758	R900867144	R900868900	R961006339	R900868954
	70	R900867268	R961006235	R961006270	R961006305	R900866759	R900867146	R900868901	R961006340	R900868955
125	80	R900860730	R961006237	R961006272	R961006307	R900866761	R900867148	R900868903	R961006342	R900868956
	90	R900867270	R961006238	R961006273	R961006308	R900866762	R900867149	R900868904	R961006343	R900868957
140	90	R900867271	R961006239	R961006274	R961006309	R900866763	R900867150	R900868905	R961006344	R900868958
	100	R900867272	R961006240	R961006275	R961006310	R900866764	R900867151	R900868906	R961006345	R900868959
160	100	R900867273	R961006241	R961006276	R961006311	R900866765	R900867152	R900868907	R961006346	R900868960
	110	R900867274	R961006242	R961006277	R961006312	R900866766	R900867153	R900868908	R961006347	R900868961
180	110	R900867275	R961006244	R961006279	R961006314	R900866767	R900867154	R900868909	R961006349	R900868962
	125	R900867276	R961006245	R961006280	R961006315	R900866768	R900867155	R900868910	R961006350	R900868963
200	125	R900867277	R961006246	R961006281	R961006316	R900866769	R900867156	R900868911	R961006351	R900868964
	140	R900867278	R961006247	R961006282	R961006317	R900866770	R900867157	R900868912	R961006352	R900868965
220	140	R900888020	R961006248	R961006283	R961006318	R900888036	R900888060	R900888028	R961006353	R900888052
	160	R900888021	R961006249	R961006284	R961006319	R900888037	R900888061	R900888029	R961006354	R900888053
250	160	R900888022	R961006250	R961006285	R961006320	R900888038	R900888062	R900888030	R961006355	R900888054
	180	R900888023	R961006251	R961006286	R961006321	R900888039	R900888063	R900888031	R961006356	R900888055
280	180	R900888024	R961006252	R961006287	R961006322	R900888040	R900888064	R900888032	R961006357	R900888056
	200	R900888025	R961006253	R961006288	R961006323	R900888041	R900888065	R900888033	R961006358	R900888057
320	200	R900888026	R961006254	R961006289	R961006324	R900888042	R900888066	R900888034	R961006359	R900888058
	220	R900888027	–	–	R961006325	R900888043	R900888067	R900888035	R961006360	R900888059

ØAL = piston Ø

ØMM = piston rod Ø

1) Seal kits for proximity switches and subplate mounting separate material no.

Seal kits [1)]

CDH2 – Standard + additional option F

ØAL	ØMM	Material no. for seal design					
		M+F	G+F	V+F	T+F	R+F	S+F
40	25	R901010148	R961006141	R961006168	R901010149	R961006195	R901010150
	28	R900861025	R961006142	R961006169	R900861050	R961006196	R900861100
50	32	R900861027	R961006144	R961006171	R900861052	R961006198	R900861102
	36	R900861028	R961006145	R961006172	R900861053	R961006199	R900861103
63	40	R900861030	R961006147	R961006174	R900861055	R961006201	R900861105
	45	R900861031	R961006148	R961006175	R900861056	R961006202	R900861106
80	50	R900861033	R961006150	R961006177	R900861058	R961006204	R900861108
	56	R900861034	R961006151	R961006178	R900861059	R961006205	R900861109
100	63	R900861036	R961006153	R961006180	R900861061	R961006207	R900861114
	70	R900861037	R961006154	R961006181	R900861062	R961006208	R900861115
125	80	R900861039	R961006156	R961006183	R900861064	R961006210	R900861120
	90	R900861040	R961006157	R961006184	R900861065	R961006211	R900861122
140	90	R900861041	R961006158	R961006185	R900861066	R961006212	R900861124
	100	R900861042	R961006159	R961006186	R900861067	R961006213	R900861126
160	100	R900861043	R961006160	R961006187	R900861068	R961006214	R900861128
	110	R900861044	R961006161	R961006188	R900861069	R961006215	R900861130
180	110	R900861045	R961006163	R961006190	R900861070	R961006217	R900861133
	125	R900861046	R961006164	R961006191	R900861071	R961006218	R900861135
200	125	R900861047	R961006165	R961006192	R900861072	R961006219	R900861142
	140	R900861048	R961006166	R961006193	R900861073	R961006220	R900861143

CGH2 – Standard + additional option F

ØAL	ØMM	Material no. for seal design					
		M+F	G+F	V+F	T+F	R+F	S+F
40	25	R901010151	R961006362	R961006389	R901010154	R961006416	R901010156
	28	R900868999	R961006363	R961006390	R900869026	R961006417	R900869093
50	32	R900869001	R961006365	R961006392	R900869028	R961006419	R900869095
	36	R900869002	R961006366	R961006393	R900869029	R961006420	R900869096
63	40	R900869004	R961006368	R961006395	R900869031	R961006422	R900869098
	45	R900869005	R961006369	R961006396	R900869032	R961006423	R900869099
80	50	R900869007	R961006371	R961006398	R900869034	R961006425	R900869101
	56	R900869008	R961006372	R961006399	R900869035	R961006426	R900869102
100	63	R900869012	R961006374	R961006401	R900869037	R961006428	R900869104
	70	R900869013	R961006375	R961006402	R900869038	R961006429	R900869105
125	80	R900869015	R961006377	R961006404	R900869040	R961006431	R900869107
	90	R900869016	R961006378	R961006405	R900869041	R961006432	R900869108
140	90	R900869017	R961006379	R961006406	R900869042	R961006433	R900869109
	100	R900869018	R961006380	R961006407	R900869043	R961006434	R900869110
160	100	R900869019	R961006381	R961006408	R900869044	R961006435	R900869111
	110	R900869020	R961006382	R961006409	R900869045	R961006436	R900869112
180	110	R900869021	R961006384	R961006411	R900869046	R961006438	R900869113
	125	R900869022	R961006385	R961006412	R900869047	R961006439	R900869114
200	125	R900869023	R961006386	R961006413	R900869048	R961006440	R900869115
	140	R900869024	R961006387	R961006414	R900869049	R961006441	R900869116

ØAL = piston Ø
ØMM = piston rod Ø

[1)] Seal kits for proximity switches and subplate mounting separate material no.

Seal kits [2)]

CSH2

ØAL	ØMM	Material no. for seal design						
		M	T	G	L	R	S	V
40	28	R900861025	R900861050	R961006142	R961006072	R961006196	R900861100	R961006169
50	32	R900861027	R900861052	R961006144	R961006074	R961006198	R900861102	R961006171
	36	R900861028	R900861053	R961006145	R961006075	R961006199	R900861103	R961006172
63	40	R900861030	R900861055	R961006147	R961006077	R961006201	R900861105	R961006174
	45	R900861031	R900861056	R961006148	R961006078	R961006202	R900861106	R961006175
80	50	R900861033	R900861058	R961006150	R961006080	R961006204	R900861108	R961006177
	56	R900861034	R900861059	R961006151	R961006081	R961006205	R900861109	R961006178
100	63	R900861036	R900861061	R961006153	R961006083	R961006207	R900861114	R961006180
	70	R900861037	R900861062	R961006154	R961006084	R961006208	R900861115	R961006181
125	80	R900861039	R900861064	R961006156	R961006086	R961006210	R900861120	R961006183
	90	R900861040	R900861065	R961006157	R961006087	R961006211	R900861122	R961006184
140	90	R900861041	R900861066	R961006158	R961006088	R961006212	R900861124	R961006185
	100	R900861042	R900861067	R961006159	R961006089	R961006213	R900861126	R961006186
160	100	R900861043	R900861068	R961006160	R961006090	R961006214	R900861128	R961006187
	110	R900861044	R900861069	R961006161	R961006091	R961006215	R900861130	R961006188
180	110	R900861045	R900861070	R961006163	R961006093	R961006217	R900861133	R961006190
	125	R900861046	R900861071	R961006164	R961006094	R961006218	R900861135	R961006191
200	125	R900861047	R900861072	R961006165	R961006095	R961006219	R900861142	R961006192
	140	R900861048	R900861073	R961006166	R961006096	R961006220	R900861143	R961006193
220	140	R900888100	R900888108	R961006027	R961006097	R961006132	R900888116	R961006062
	160	R900888101	R900888109	R961006028	R961006098	R961006133	R900888117	R961006063
250	160	R900888102	R900888110	R961006029	R961006099	R961006134	R900888118	R961006064
	180	R900888103	R900888111	R961006030	R961006100	R961006135	R900888119	R961006065
280	180	R900888104	R900888112	R961006031	R961006101	R961006136	R900888120	R961006066
	200	R900888105	R900888113	R961006032	R961006102	R961006137	R900888121	R961006067
320	200	R900888106	R900888114	R961006033	R961006103	R961006138	R900888122	R961006068
	220	R900888107	R900888115	–	R961006104	R961006139	R900888123	–

ØAL = piston Ø

ØMM = piston rod Ø

2) Seal kits for position measurement system and subplate mounting separate material no.

Seal kits

Only for proximity switches

ØAL	Material no. for seal design								
	M / M+F	T / T+F	G / G+F	L	R / R+F	A	S / S+F	V / V+F	B
40 ... 200	R900885938						R900885939		
220 ... 320	R900894997						R900894998		

Only for subplate mounting

ØAL	Material no. for seal design	
	M, T, G, L, R, A	S, B, V
40	R961006022	R961006243
50	R961006022	R961006243
63	R961006057	R961006278
80	R961006057	R961006278
100	R961006092	R961006313
125	R961006092	R961006313
140	R961006127	R961006348
160	R961006127	R961006348
180	R961006162	R961006383
200	R961006162	R961006383

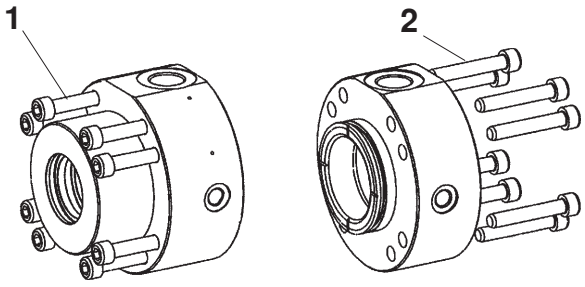
Only for position measurement system

ØAL	Material no. for seal design	
	M, T, G, L, R	S, V
40	R900885935	R900885937
50	R900894958	R900894979
63	R900894959	R900894980
80	R900894960	R900894981
100	R900894961	R900894982
125	R900894962	R900894983
140	R900894963	R900894985
160	R900894964	R900894986
180	R900894973	R900894987
200	R900894974	R900894988
220	R900894975	R900894989
250	R900894976	R900894991
280	R900894977	R900894993
320	R900894978	R900894994

ØAL = piston Ø

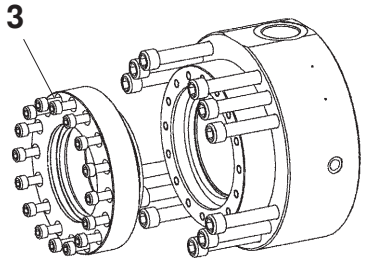
Tightening torques

Screws: Head and base (item 1 and 2)



Series	Piston Ø	Screw	Quantity	Quality class	Tightening torque
CDH2 / CGH2 / CSH2	**40**	M8	4	10.9	23 Nm
CDH2 / CGH2 / CSH2	**50**	M8	8	10.9	20 Nm
CDH2 / CGH2 / CSH2	**63**	M8	8	10.9	30 Nm
CDH2 / CGH2 / CSH2	**80**	M10	8	10.9	55 Nm
CDH2 / CGH2 / CSH2	**100**	M12	8	10.9	100 Nm
CDH2 / CGH2 / CSH2	**125**	M16	8	10.9	200 Nm
CDH2 / CGH2 / CSH2	**140**	M16	12	10.9	170 Nm
CDH2 / CGH2 / CSH2	**160**	M16	12	10.9	220 Nm
CDH2 / CGH2 / CSH2	**180**	M20	12	10.9	350 Nm
CDH2 / CGH2 / CSH2	**200**	M20	12	10.9	410 Nm
CDH2 / CGH2 / CSH2	**220**	M20	16	10.9	460 Nm
CDH2 / CGH2 / CSH2	**250**	M24	16	10.9	700 Nm
CDH2 / CGH2 / CSH2	**280**	M30	12	10.9	1700 Nm
CDH2 / CGH2 / CSH2	**320**	M30	16	10.9	1500 Nm

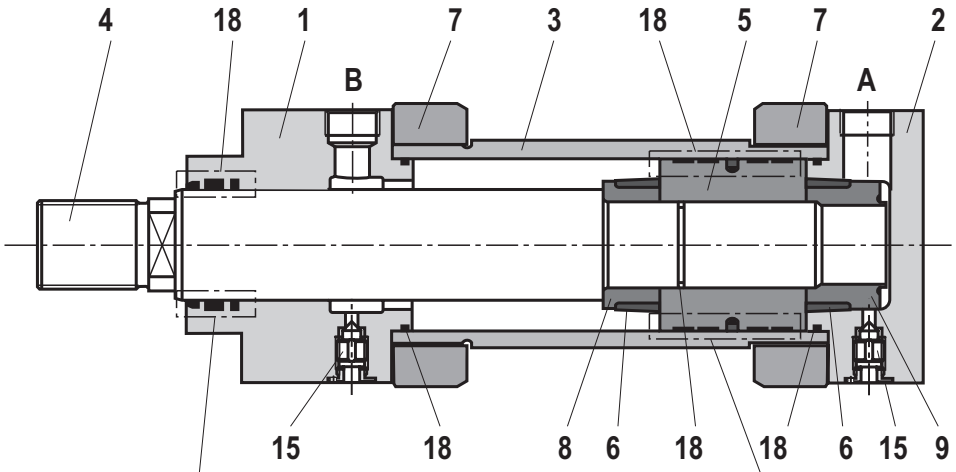
Screws: Seal cover (item 3)

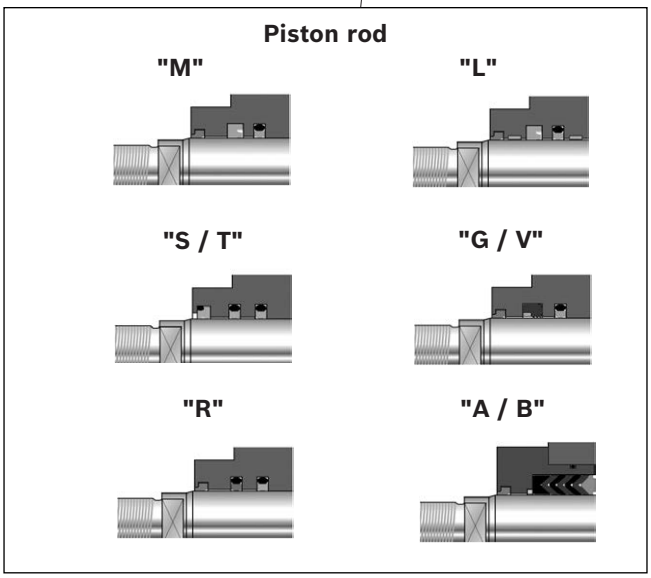


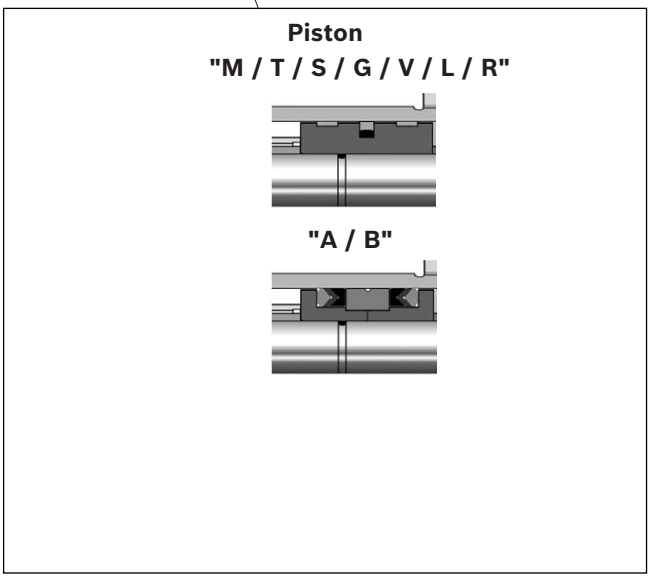
Only with seal design "A" and "B"

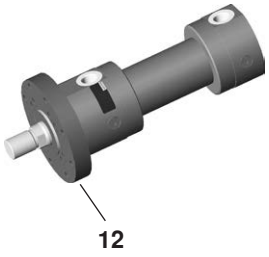
Series	Piston Ø	Piston rod Ø	Screw	Quantity	Quality class	Tightening torque
CDH2 / CGH2	**160**	**100**	M10	16	10.9	60 Nm
		110				
CDH2 / CGH2	**180**	**110**	M12	16	10.9	80 Nm
		125				
CDH2 / CGH2	**200**	**125**	M12	16	10.9	90 Nm
		140				
CDH2 / CGH2	**220**	**140**	M12	16	10.9	90 Nm
		160		24		
CDH2 / CGH2	**250**	**160**	M12	24	10.9	90 Nm
		180				
CDH2 / CGH2	**280**	**180**	M12	24	10.9	90 Nm
		200				
CDH2 / CGH2	**320**	**200**	M12	24	10.9	90 Nm
		220	M16	16		230 Nm

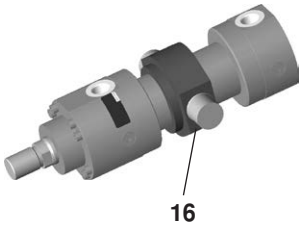
Components: Series CDH2

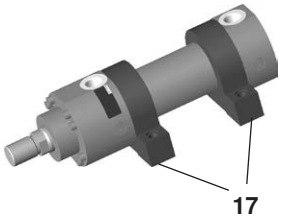






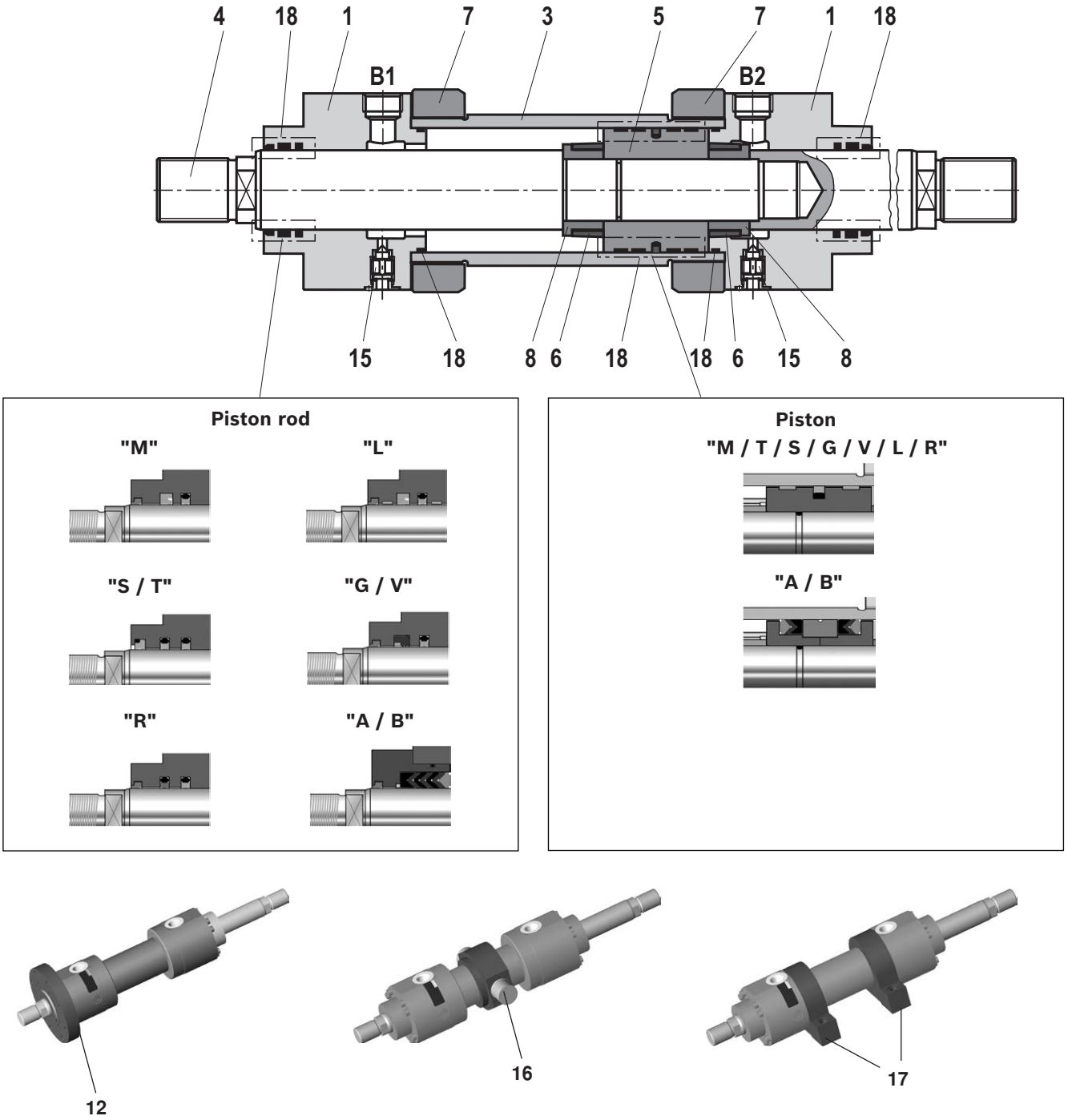






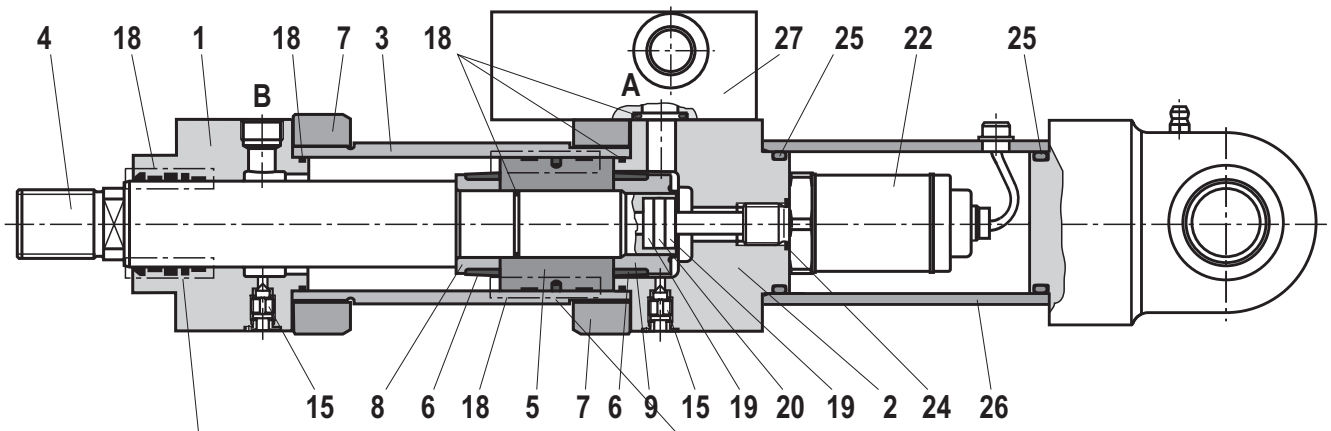
A Piston chamber
B Annulus area
1 Head
2 Base
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Socket
9 Socket
10 Base MP3
11 Base MP5
12 Round flange MF3
14 Round flange MF4
15 Bleeding
16 Trunnion MT4
17 Foot MS2
18 Seal kit:
Wiper
Rod seal
Piston seal
O-ring
Guide ring

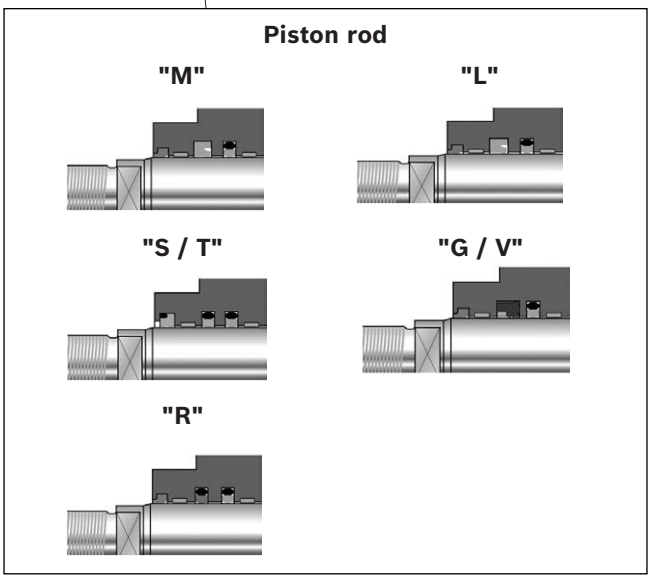
Components: Series CGH2

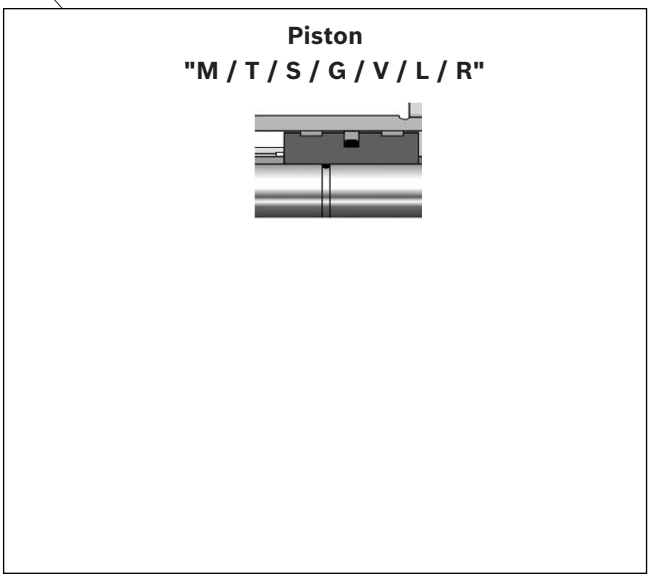


B1 Annulus area 1
B2 Annulus area 2
1 Head
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Socket
12 Round flange MF3
15 Bleeding
16 Trunnion MT4
17 Foot MS2
18 Seal kit:
Wiper
Rod seal
Piston seal
O-ring
Guide ring

Components: Series CSH2 MP3 and MP5

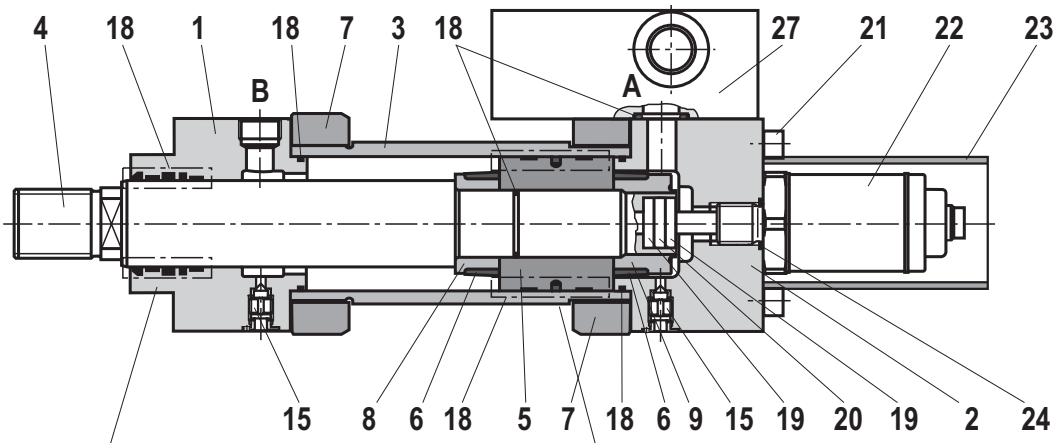


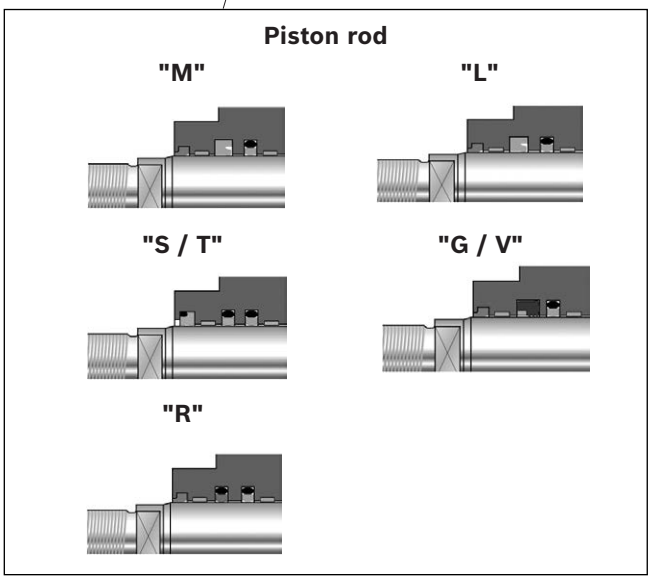


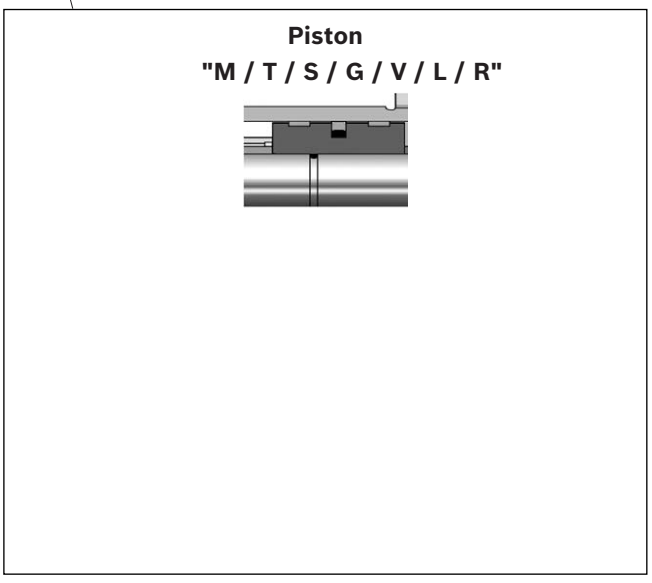


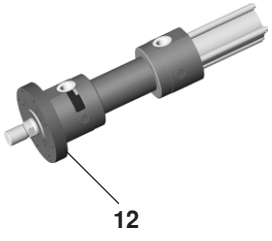
A Piston chamber
B Annulus area
1 Head
2 Base
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Socket
9 Socket
10 Base MP3
11 Base MP5
15 Bleeding
18 Seal kit:
Wiper
Rod seal
Piston seal
O-ring
Guide ring
19 Insulating socket
20 Solenoid
22 Position measurement system
24 Seal
25 Seal
26 Protective pipe
27 Subplate

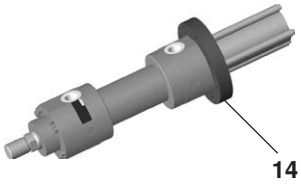
Components: Series CSH2 MF3, MF4, MT4 and MS2

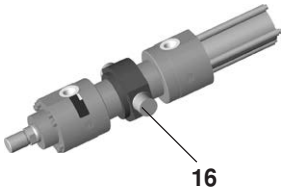


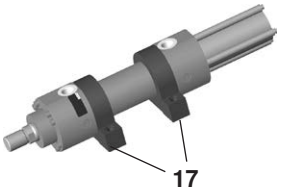












A Piston chamber
B Annulus area
1 Head
2 Base
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Socket
9 Socket
12 Round flange MF3
14 Round flange MF4
15 Bleeding
16 Trunnion MT4
17 Foot MS2
18 Seal kit:
Wiper
Rod seal
Piston seal
O-ring
Guide ring
19 Insulating socket
20 Solenoid
21 Hexagon socket head cap screws
22 Position measurement system
23 Protective pipe
24 Seal
27 Subplate

Cylinder weight

Piston	Piston rod	CD/CS cylinder with 0 mm stroke length					per 100 mm stroke length	CG cylinder with 0 mm stroke length			per 100 mm stroke length
ØAL	**ØMM**	**MP3** [1] **MP5** [1]	**MP3** [2] **MP5** [2]	**MF3 MF4**	**MT4**	**MS2**		**MF3**	**MT4**	**MS2**	
mm	mm	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg
40	**25**	7	12	9	9	9	0.9	10	10	10	1.3
	28	7	12	9	9	9	1.0	10	10	10	1.5
50	**32**	12	19.5	14	13	13	1.3	16	16	16	1.9
	36	12	19.5	14	13	14	1.5	16	16	16	2.3
63	**40**	20	29.5	21	21	21	2.3	25	25	25	3.3
	45	20	29.5	21	21	21	2.6	25	25	25	3.8
80	**50**	32	42.5	35	34	35	3.2	41	40	41	4.7
	56	32	42.5	35	34	36	3.6	41	40	42	5.5
100	**63**	51	64.5	54	54	55	5.2	63	63	64	7.6
	70	51	64.5	55	54	56	5.7	64	64	65	8.8
125	**80**	95	114	96	99	98	8.2	113	115	114	12.1
	90	96	115	97	100	99	9.2	115	117	116	14.2
140	**90**	131	157	132	136	137	10.7	155	158	159	15.7
	100	132	158	133	137	138	11.9	156	160	161	18.1
160	**100**	185	220	184	197	206	12.6	217	231	239	18.8
	110	186	221	186	199	207	13.9	220	233	242	21.4
180	**110**	255	303	253	264	274	14.7	294	305	314	22.1
	125	258	304	256	267	277	16.8	300	311	320	26.5
200	**125**	349	405	332	350	363	19.0	359	377	389	28.6
	140	352	406	335	353	366	21.5	365	383	396	33.5
220	**140**	527	625	512	546	518	27.1	604	638	610	39.1
	160						30.9				46.7
250	**160**	673	795	640	677	650	32.7	761	798	772	48.5
	180						36.9				56.9
280	**180**	976	1192	966	1020	918	44.2	1130	1183	1081	64.2
	200						48.8				73.4
320	**200**	1251	1512	1172	1223	1174	55.2	1354	1405	1356	79.8
	220						60.4				90.2

ØAL = piston Ø

ØMM = piston rod Ø

[1] Weight without position measurement system

[2] Weight with position measurement system

Corrosivity categories

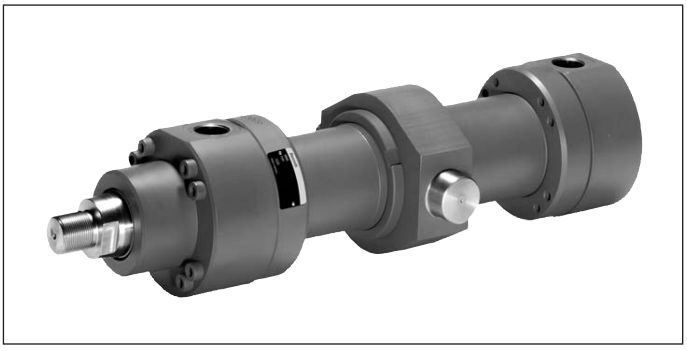
In this connection, observe the information on the color set-up on page 11 "Technical data".
The specified resistances of the individual Bosch Rexroth classes only refer to the primed / painted cylinder areas, not, for example, to piston rods, trunnions, etc.
In this connection, special measures may be necessary.

	Class	Certification by	Applications	
			Inside	Outside
Priming	CP3	240 h salt spray test SST (DIN EN ISO 9227) 240 h condensation water test KKT (DIN EN ISO 6270-2) Layer thickness: min. 40 µm	Field of application, e.g. Hall atmosphere, Air humidity ≤ 60%, no thermal load.	Not suitable for outdoor exposure.
Painting	CP4	480 h salt spray test SST. (DIN EN ISO 9227) 480 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: 120 µm	Unheated buildings in which there may be condensation (production rooms, storage and sport halls).	Urban and industrial atmosphere with little salt or sulfur dioxide load.
	CP5	720 h salt spray test SST (DIN EN ISO 9227) 480 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: 140 µm	Silo and debris facilities, chemical plants, boathouses above sea water, laundries, breweries with high humidity and medium contamination.	Industrial and coastal areas with medium salt load.
	CP6	1000 h salt spray test NSS (DIN EN ISO 9227) 480 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: 220 µm	Buildings or areas with almost permanent condensation and serious contamination.	Industrial areas with large humidity and aggressive atmosphere.
	CP7	1440 h salt spray test NSS (DIN EN ISO 9227) 720 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: 320 µm	Buildings or areas with almost permanent condensation and with serious contamination.	Coastal and offshore areas with high salt load.

Hydraulic cylinder for potentially explosive areas

RE 17335-X

Series CDH2...XC / CGH2...XC / CSH2...XE



- Series H2
- Component series 3X
- Nominal pressure 250 bar *[25 MPa]*

Features

- Standards: DIN 24333, ISO 6022
- 6 types of mounting
- Piston Ø (**ØAL**): 40 ... 320 mm
- Piston rod Ø (**ØMM**): 25 ... 220 mm
- Stroke lengths up to 6 m
- Self-adjusting and adjustable end position cushioning

Contents

Ordering code: Series CDH2...XC

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CD	**H2**		**/**		**/**		**/**		**XC**	**3X**	**/**								

01	Differential cylinder	**CD**
02	Series	**H2**

Types of mounting

03	Swivel eye at base	**MP3**
	Self-aligning clevis at base	**MP5**
	Round flange at head	**MF3**
	Round flange at base	**MF4**
	Trunnion	**MT4** [2)]
	Foot mounting	**MS2** [18)]
04	Piston Ø (**ØAL**) 40 ... 320 mm	**...**
05	Piston rod Ø (**ØMM**) 25 ... 220 mm	**...**
06	Stroke length in mm [3)]	**...**

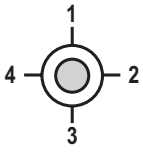
Protection class for ATEX version

07	Design safety	**XC**
08	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

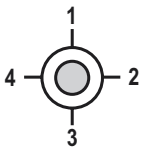
Line connection / version

09	According to ISO 1179-1 (pipe thread ISO 228-1)	**B**
	According to ISO 9974-1 (metric thread ISO 261)	**M** [33)]
	Flange connection according to ISO 6162-1 tab. 2 type 1 (≙ SAE 3000 PSI)	**F** [4; 21)]
	Flange connection according to ISO 6162-2 tab. 2 type 1 (≙ SAE 6000 PSI)	**D** [4; 9)]
	Flange connection according to ISO 6164 tab. 1	**K** [1; 4)]
	Flange connection according to ISO 6164 tab. 2	**H** [4)]

Line connection / position at head

10	View to piston rod [30)] 	**1**
		2
		3
		4

Line connection / position at base

11	View to piston rod [30)] 	**1**
		2
		3
		4

Piston rod design

12	Hard chromium-plated	**C**
	Hardened and hard chromium-plated	**H** [23)]
	Nickel-plated and hard chromium-plated	**N** [24)]

Piston rod end

13	Thread for swivel head CGKD	**H**
	With mounted swivel head CGKD	**F**

Ordering code: Series CDH2...XC

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CD	**H2**		**/**		**/**		**/**		**XC**	**3X**	**/**								

End position cushioning

14	**Without** end position cushioning	**U**
	Both sides, self-adjusting	**D** [1]
	Both sides, adjustable	**E**

Seal design

15	**For mineral oil HL, HLP and oil-in-water-emulsion HFA**	Standard seal system	**M**
	For mineral oil HL, HLP, oil-in-water emulsion HFA and water glycol HFC	Servo quality / reduced friction	**T**
		Chevron seal kits	**A**
	For phosphoric acid esters HFDR	Servo quality / reduced friction	**S**
		Chevron seal kits	**B**

Option

16	Additional options, fill fields for additional options	**Z**
	Without additional options, do **not** fill fields for additional options	**W**

Additional options

Fields for additional options

		17	18	19	20	21
	Z	**W**				

17	**Without** option	**W**

18	Additional guide rings	**F** [10]
	Without additional guide rings	**W**

19	Measuring coupling, on both sides	**A**
	Without measuring coupling	**W**

20	Flanged grease nipple	**B**
	Standard conical grease nipple	**W**

21	Specify the piston rod extension LY in the plain text in mm	**Y**
	Without piston rod extension	**W**

Order examples:

Without additional options:
CDH2MT4/63/45/350XC3X/B11CHDMWW, XV=300 mm

With additional options:
CDH2MF3/80/56/500XC3X/B11CHDMZ WWAWW

[1] Only piston Ø 40 to 200 mm
[2] Trunnion position freely selectable.
When ordering, always specify the "XV" dimensions in the plain text in mm
[3] Observe the max. available stroke length, page 11, and the admissible stroke length (acc. to kinking calculation) on pages 43 to 45
[4] Not possible with MF4
[9] Only piston Ø 80 to 320 mm
[10] Seal designs A, B not possible;
Piston Ø 220 to 320 mm standard
[18] Not standardized
[21] Only piston Ø 63 to 200 mm
[23] Only piston rod Ø 25 to 140 mm
[24] Only piston rod Ø 40 to 160 mm
[30] All graphical presentations in the data sheet show position 1
[33] Version does not comply with ISO 6022

Ordering code: Series CGH2...XC

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CG	**H2**		**/**		**/**		**/**		**XC**	**3X**	**/**								

01	Double-acting cylinders	**CG**
02	Series	**H2**

Types of mounting

03	Round flange at head	**MF3**
	Trunnion	**MT4** [2)]
	Foot mounting	**MS2**
04	Piston Ø (**ØAL**) 40 ... 320 mm	**...**
05	Piston rod Ø (**ØMM**) 25 ... 220 mm	**...**
06	Stroke length in mm [3)]	**...**

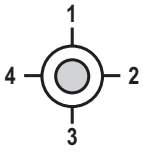
Protection class for ATEX version

07	Design safety	**XC**
08	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

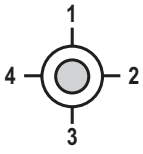
Line connection / version

09	According to ISO 1179-1 (pipe thread ISO 228-1)	**B**
	According to ISO 9974-1 (metric thread ISO 261)	**M** [33)]
	Flange connection according to ISO 6162-1 tab. 2 type 1 (≙ SAE 3000 PSI)	**F** [21)]
	Flange connection according to ISO 6162-2 tab. 2 type 1 (≙ SAE 6000 PSI)	**D** [9)]
	Flange connection according to ISO 6164 tab. 1	**K** [1)]
	Flange connection according to ISO 6164 tab. 2	**H**

Line connection / position at head

10	View to piston rod [30)] 	**1**
		2
		3
		4

Line connection / position at base

11	View to piston rod [30)] 	**1**
		2
		3
		4

Piston rod design

12	Hard chromium-plated	**C**
	Hardened and hard chromium-plated	**H** [23)]

Piston rod end

13	Thread for swivel head CGKD	**H**
	With mounted swivel head CGKD	**F** [17)]

End position cushioning

14	**Without** end position cushioning	**U**
	Both sides, self-adjusting	**D** [1)]
	Both sides, adjustable	**E**

Ordering code: Series CGH2...XC

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CG	**H2**		**/**		**/**		**/**		**XC**	**3X**	**/**								

Seal design

15	**For mineral oil HL, HLP and oil-in-water-emulsion HFA**	Standard seal system	**M**
	For mineral oil HL, HLP, oil-in-water emulsion HFA and water glycol HFC	Servo quality / reduced friction	**T**
		Chevron seal kits	**A**
	For phosphoric acid esters HFDR	Servo quality / reduced friction	**S**
		Chevron seal kits	**B**

Option

16	Additional options, fill fields for additional options	**Z**
	Without additional options, do **not** fill fields for additional options	**W**

Additional options

Fields for additional options

	17	18	19	20	21
Z	**W**				

17	**Without** option	**W**
18	Additional guide rings	**F** [10]
	Without additional guide rings	**W**
19	Measuring coupling, on both sides	**A**
	Without measuring coupling	**W**
20	Flanged grease nipple	**B**
	Standard conical grease nipple	**W**
21	Specify the piston rod extension LY in the plain text in mm	**Y** [16]
	Without piston rod extension	**W**

Order examples:

Without additional options:
CGH2MF3/100/70/500XC3X/B11CHUMWW

With additional options:
CGH2MF3/100/70/500XC3X/B11CHUMZ WWAWW

[1] Only piston Ø 40 to 200 mm
[2] Trunnion position freely selectable.
When ordering, always specify the "XV" dimensions in the plain text in mm
[3] Observe the max. available stroke length, page 11, and the admissible stroke length (acc. to kinking calculation) on pages 43 to 45
[9] Only piston Ø 80 to 320 mm
[10] Seal designs A, B not possible;
Piston Ø 220 to 320 mm standard
[16] Only at left piston rod side
(orientation: catalog figures)
[17] Only one swivel head / plain clevis mounted, left piston rod side
(orientation: catalog figures)
[18] Not standardized
[21] Only piston Ø 63 to 200 mm
[23] Only piston rod Ø 25 to 140 mm
[30] All graphical presentations in the data sheet show position 1
[33] Version does not comply with ISO 6022

Ordering code: Series CSH2...XE

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CS	**H2**		**/**		**/**		**/**		**XE**	**3X**	**/**								**Z**

01	Differential cylinder with position measurement system	**CS** [18]
02	Series	**H2**

Types of mounting

03	Swivel eye at base	**MP3** [34]
	Self-aligning clevis at base	**MP5** [34]
	Round flange at head	**MF3**
	Round flange at base	**MF4**
	Trunnion	**MT4** [2]
	Foot mounting	**MS2**
04	Piston Ø (**ØAL**) 40 ... 320 mm	**...**
05	Piston rod Ø (**ØMM**) 28 ... 220 mm	**...**
06	Stroke length in mm [3]	**...**

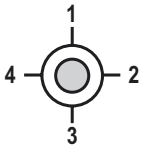
Protection class for ATEX version

07	Increased safety	**XE**
08	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

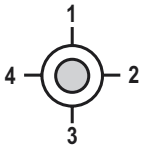
Line connection / version

09	According to ISO 1179-1 (pipe thread ISO 228-1)	**B**
	According to ISO 9974-1 (metric thread ISO 261)	**M** [33]
	Flange connection according to ISO 6162-1 tab. 2 type 1 (≙ SAE 3000 PSI)	**F** [4; 21]
	Flange connection according to ISO 6162-2 tab. 2 type 1 (≙ SAE 6000 PSI)	**D** [4; 9]
	Flange connection according to ISO 6164 tab. 1	**K** [1; 4]
	Flange connection according to ISO 6164 tab. 2	**H** [4]

Line connection / position at head

10	View to piston rod [30] 	**1**
		2
		3
		4

Line connection / position at base

11	View to piston rod [30] 	**1**
		2
		3
		4

Piston rod design

12	Hard chromium-plated	**C**
	Hardened and hard chromium-plated	**H** [19]

Piston rod end

13	Thread for swivel head CGKD	**H**
	With mounted swivel head CGKD	**F**

Ordering code: Series CSH2...XE

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CS	**H2**		**/**		**/**		**/**		**XE**	**3X**	**/**								**Z**

End position cushioning

14	**Without** end position cushioning	**U**
	Both sides, adjustable	**E** [20]

Seal design

15	**For mineral oil HL, HLP and oil-in-water-emulsion HFA**	Standard seal system	**M** [29]
	For mineral oil HL, HLP, oil-in-water emulsion HFA and water glycol HFC	Servo quality / reduced friction	**T** [29]
	For phosphoric acid esters HFDR	Servo quality / reduced friction	**S** [29]

Option

16	Additional options, fill fields for additional options	**Z**

Additional options

Fields for additional options

		17	18	19	20	21
	Z	**T**				

17	Position measurement system (magnetostrictive) **without** mating connector, mating connector – separate order, see page 37	**T**

18	Analog output 4 ... 20 mA	**C**
	Analog output 0 ... 10 V	**F**
	Digital output SSI	**D**

19	Measuring coupling, on both sides	**A**
	Without measuring coupling	**W**

20	Flanged grease nipple	**B**
	Standard conical grease nipple	**W**

21	Specify the piston rod extension LY in the plain text in mm	**Y**
	Without piston rod extension	**W**

Order example:

CSH2MF3/100/70/500XE3X/B11CHUTZ TFABW

[1] Only piston Ø 40 to 200 mm

[2] Trunnion position freely selectable.
When ordering, always specify the "XV" dimensions in the plain text in mm

[3] Observe the max. available stroke length, page 11, and the admissible stroke length (acc. to kinking calculation) on pages 43 to 45

[4] Not possible with MF4

[9] Only piston Ø 80 to 320 mm

[18] Not standardized

[19] Only piston rod Ø 28 mm to 140 mm

[20] Possible from piston rod Ø 45 mm

[21] Only piston Ø 63 to 200 mm

[29] With CSH2...XE, by default with guide belts

[30] All graphical presentations in the data sheet show position 1

[33] Version does not comply with ISO 6022

[34] Only upon request

Technical data

(For applications outside these values, please consult us!)

ATEX units for potentially explosive areas

What you need to know about the documentation for ATEX units.

The documentation for ATEX units applies to the explosion-proof version of Bosch Rexroth hydraulic cylinders and consists of the following parts:

- Operating instructions 07100-B for tie rod design / mill type hydraulic cylinders and mill type for potentially explosive areas
- Technical data sheet 17335-X
- Operating instructions of the position measurement system (only with version CSH2..XE)
- Declaration of conformity according to directive 2014/34/EU

You can find further information on the correct handling of hydraulic products in our publication "General product information on hydraulic products" 07008.

Information on explosion protection:

- Cylinders without position measurement system
  - Marking according to directive 2014/34/EU II 2G Ex h IIC T4 Gb
  - Marking according to directive 2014/34/EU II 2D Ex h IIIC T135 °C Db
  - Ambient temperature –20 °C ≤ Ta ≤ +80 °C
- Cylinders with position measurement system
  - Marking according to directive 2014/34/EU II 3G Ex ec IIC T4 Gc
  - Marking according to directive 2014/34/EU II 3D Ex tc IIIC T135 °C Dc
  - Ambient temperature –20 °C ≤ Ta ≤ +75 °C

General			
Weight		kg	see page 58
Installation position			any
Ambient temperature range		°C	see page 49
Primer coat [1]		µm	min. 40

Hydraulic			
Nominal pressure [2]		bar *[MPa]*	250 *[25]*
Minimum operating pressure [3]	(without load)	bar *[MPa]*	10 *[1]*
Static test pressure		bar *[MPa]*	375 *[37.5]*
Reduced test pressure		bar *[MPa]*	315 *[31.5]*
Hydraulic fluid			see table below
Hydraulic fluid temperature range		°C	see page 49
Viscosity range		mm^2/s	12 ... 380
Maximum admissible degree of contamination of the hydraulic fluid cleanliness class according to ISO 4406 (c)			Class 20/18/15 [4]
Stroke speed [5] (depending on line connection)		m/s	see table page 9
Bleeding			by default secured against screwing out

Hydraulic fluid [6]	**Classification**	**Suitable sealing materials**	**Standards**
Mineral oils	HL, HLP	NBR, FKM	DIN 51524
Oil-in-water emulsion	HFA	NBR, FKM	ISO 12922
Phosphoric acid esters	HFDR	FKM	ISO 12922
Water glycol	HFC	upon request	

☞ **Important information on hydraulic fluids:**

- The ignition temperature of the hydraulic fluid used must be 50 K higher than the maximum surface temperature of the set temperature class.
- In order to prevent electrostatic charging, the hydraulic fluid must have a conductivity > 10000 pS/m.

Technical data

(For applications outside these values, please consult us!)

Stroke velocity

Piston Ø in mm	Line connection	Max. stroke velocity in m/s
40	G1/2	0.31
50	G1/2	0.20
63	G3/4	0.28
80	G3/4	0.18
100	G1	0.20
125	G1	0.13
140	G1 1/4	0.16

Piston Ø in mm	Line connection	Max. stroke velocity in m/s
160	G1 1/4	0.12
180	G1 1/4	0.10
200	G1 1/4	0.08
220	G1 1/2	0.09
250	G1 1/2	0.07
280	G1 1/2	0.06
320	G1 1/2	0.04

1) By default, hydraulic cylinders are primed with a coating (color gentian blue RAL 5010). Other colors upon request. With cylinders and attachment parts, the following surfaces are not primed or painted:

- ▶ All fit diameters to the customer side
- ▶ Sealing surfaces for line connection
- ▶ Sealing surfaces for flange connection
- ▶ Position measurement system

The areas that are not painted are protected by means of a solvent-free corrosion protection agent.

2) Higher operating pressures upon request
The specified operating pressures apply to applications with shock-free operation with regard to excess pressure and / or external loads. With extreme loads like e.g. high cycle sequence, mounting elements and threaded piston rod connections must be designed for durability.

3) Depending on the application, a certain minimum pressure is required in order to guarantee good functioning of the cylinder. Without load, a minimum pressure of 10 bar is recommended for differential cylinders; for lower pressures as well as double-acting cylinders, please contact us.

4) The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.

5) Please observe the guideline on max. stroke velocities (with recommended flow velocity of 5 m/s in the line connection) in the table. Higher stroke velocity upon request.
If the extension velocity is considerably higher than the retraction velocity of the piston rod, drag-out losses of the medium may result. If necessary, please consult us.

6) For further information on hydraulic fluids refer to data sheet R.90223.

Technical data

(For applications outside these values, please consult us!)

☞ **Notice!**

Boundary and application conditions:

- The mechanical alignment of the movement axis and thus the mounting points of hydraulic cylinder and piston rod must be ensured. Lateral forces on the guides of piston rod and piston are to be avoided. It may be necessary to consider the own weight of the hydraulic cylinder (MP3 / MP5 or MT4) or the piston rod.
- The bending length / bending load of the piston rod and / or the hydraulic cylinder must be observed (see page 43).
- The maximum admissible stroke velocities with regard to the suitability / load of seals must be observed as must their compatibility with the properties of the hydraulic fluid (see page 49).
- The maximum admissible velocities / kinetic energies when moving into the end positions, also considering external loads, must be observed. Danger: Excess pressure
- The maximum admissible operating pressure must be complied with in any operating state of the hydraulic cylinder. Possible pressure intensification resulting from the area ratio of annulus area to piston area and possible throttling points are to be observed.
- Detrimental environmental influences, e.g. aggressive finest particles, vapors, high temperatures, etc. as well as contaminations and deterioration of the hydraulic fluid are to be avoided.
- Minimum stroke: When using end position cushioning, the minimum stroke must also be observed, see page 46 to 48 "End position cushioning".

Standards:

The installation dimensions and types of mounting of the cylinder comply with the standards DIN 24333 and ISO 6022.

Acceptance:

Each cylinder is tested according to Bosch Rexroth standard and in compliance with ISO 10100: 2001.

Safety instructions:

For assembly, commissioning and maintenance of hydraulic cylinders, observe the operating instructions 07100-B!
Service and repair work has to be performed by Bosch Rexroth AG or by personnel especially trained for this purpose. No warranty is accepted for damage as a consequence of assembly, maintenance or repair work not performed by Bosch Rexroth AG.

Check lists for hydraulic cylinders:

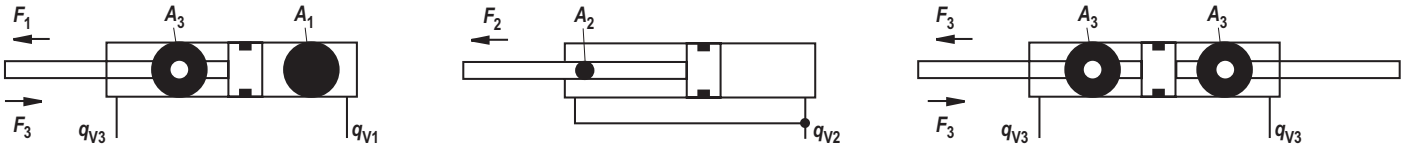
Cylinders the characteristics and/or application parameters of which deviate from the values specified in the data sheet can only be offered as a special version upon request. For offers, the deviations of the characteristics and / or application parameters must be described in the check lists for hydraulic cylinders (07200).

This list does not claim to be complete. In case of questions regarding the compatibility with media or exceedance of the boundary or application conditions, please contact us.

All graphical representations in the data sheet are examples. The product supplied may therefore differ from the figure.

Diameters, areas, forces, flow

Piston	Piston rod	Area ratio	Areas			Force at 250 bar [1]			Flow at 0.1 m/s [2]			Max. available stroke length
			Piston	Rod	Ring	Pressure	Diff.	Pulling	Off	Diff.	On	
ØAL mm	**ØMM** mm	ϕ A_1/A_3	A_1 cm²	A_2 cm²	A_3 cm²	F_1 kN	F_2 kN	F_3 kN	q_{V1} l/min	q_{V2} l/min	q_{V3} l/min	mm
40	**25** **28**	1.64 1.96	12.56	4.90 6.16	7.65 6.40	31.40	12.25 15.40	19.12 16.00	7.5	2.9 3.7	4.6 3.8	2000
50	**32** **36**	1.69 2.08	19.63	8.04 10.18	11.59 9.45	49.10	20.12 25.45	28.98 23.65	11.8	4.8 6.1	7.0 5.7	2000
63	**40** **45**	1.67 2.04	31.17	12.56 15.90	18.61 15.27	77.90	31.38 39.75	46.52 38.15	18.7	7.5 9.5	11.2 9.2	2000
80	**50** **56**	1.66 1.96	50.26	19.63 24.63	30.63 25.63	125.65	49.07 61.55	76.58 64.10	30.2	11.8 14.8	18,4 15.4	2000
100	**63** **70**	1.66 1.96	78.54	31.16 38.48	47.38 40.06	196.35	77.93 96.20	118.42 100.15	47.1	18.7 23.1	28.4 24.0	3000
125	**80** **90**	1.69 2.08	122.72	50.24 63.62	72.48 59.10	306.75	125.62 159.05	181.13 147.70	73.6	30.1 38.2	43.5 35.4	3000
140	**90** **100**	1.70 2.04	153.94	63.62 78.54	90.32 75.40	384.75	159.05 196.35	225.70 188.40	92.4	38.2 47.1	54.2 45.3	3000
160	**100** **110**	1.64 1.90	201.06	78.54 95.06	122.50 106.00	502.50	196.35 237.65	306.15 264.85	120.6	47.1 57.0	73.5 63.6	3000
180	**110** **125**	1.60 1.93	254.47	95.06 122.72	159.43 131.75	636.17	237.65 306.80	398.52 329.37	152.7	57.0 73.6	95.7 79.1	3000
200	**125** **140**	1.64 1.96	314.16	122.72 153.96	191.44 160.20	785.25	306.80 384.90	478.45 400.35	188.5	73.6 92.4	114.9 96.1	3000
220	**140** **160**	1.68 2.12	380.1	153.96 201.0	226.2 179.1	950.3	384.9 502.6	565.5 447.7	228.1	92.4 120.7	135.7 107.4	6000
250	**160** **180**	1.69 2.08	490.8	201.0 254.4	289.8 236.4	1227.2	502.6 636.2	724.5 590.0	294.5	120.7 152.7	173.8 141.8	6000
280	**180** **200**	1.70 2.04	615.7	254.4 314.1	361.3 301.6	1539.4	636.2 785.4	903.2 753.9	369.4	152.7 188.5	216.7 180.9	6000
320	**200** **220**	1.64 1.90	804.2	314.1 380.1	490.1 424.2	2010.6	785.4 950.3	1225.2 1060.3	482.5	188.5 228.1	294.0 254.4	6000



[1] Theoretical static cylinder force (without consideration of the efficiency and admissible load for attachment parts such as swivel heads, plates, or valves, etc.)

[2] Stroke velocity

Tolerances according to ISO 6020-1

Installation dimensions	WC	XC [2]	XO [2]	XS [1; 2]	XV [2]	ZP [2]	Stroke tolerances
Type of mounting	MF3	MP3	MP5	MS2	MT4	MF4	
Stroke length	Tolerances						
≤ 1250	±2	±1.5	±1.5	±2	±2	±1.5	+2
> 1250 – ≤ 3150	±4	±3	±3	±4	±4	±3	+5
> 3150 – ≤ 6000	±8	±5	±5	±8	±8	±5	+8

[1] Not standardized

[2] Including stroke length

Overview types of mounting: Series CDH2...XC

CDH2...XC: MP3

see page 14, 15

CDH2...XC: MF4

see page 20, 21

CDH2...XC: MP5

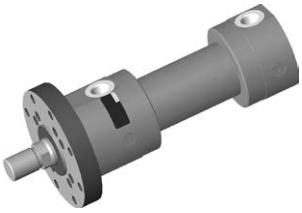
see page 16, 17

CDH2...XC: MT4

see page 22, 23

CDH2...XC: MF3

see page 18, 19



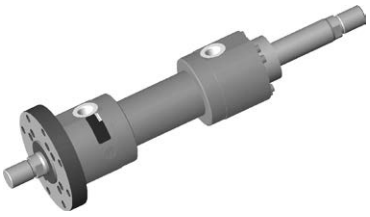
CDH2...XC: MS2

see page 24, 25

Overview types of mounting: Series CGH2...XC

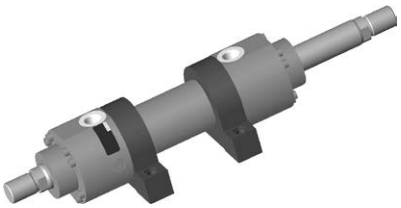
CGH2...XC: MF3

see page 18, 19



CGH2...XC: MS2

see page 24, 25



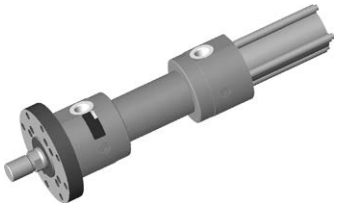
CGH2...XC: MT4

see page 22, 23

Overview types of mounting: Series CSH2...XE

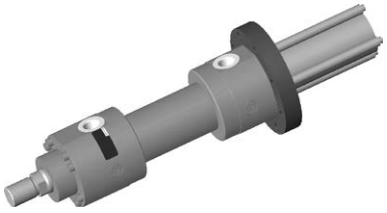
CSH2...XE: MF3

see page 26, 27



CSH2...XE: MF4

see page 28, 29



CSH2...XE: MT4

see page 30, 31

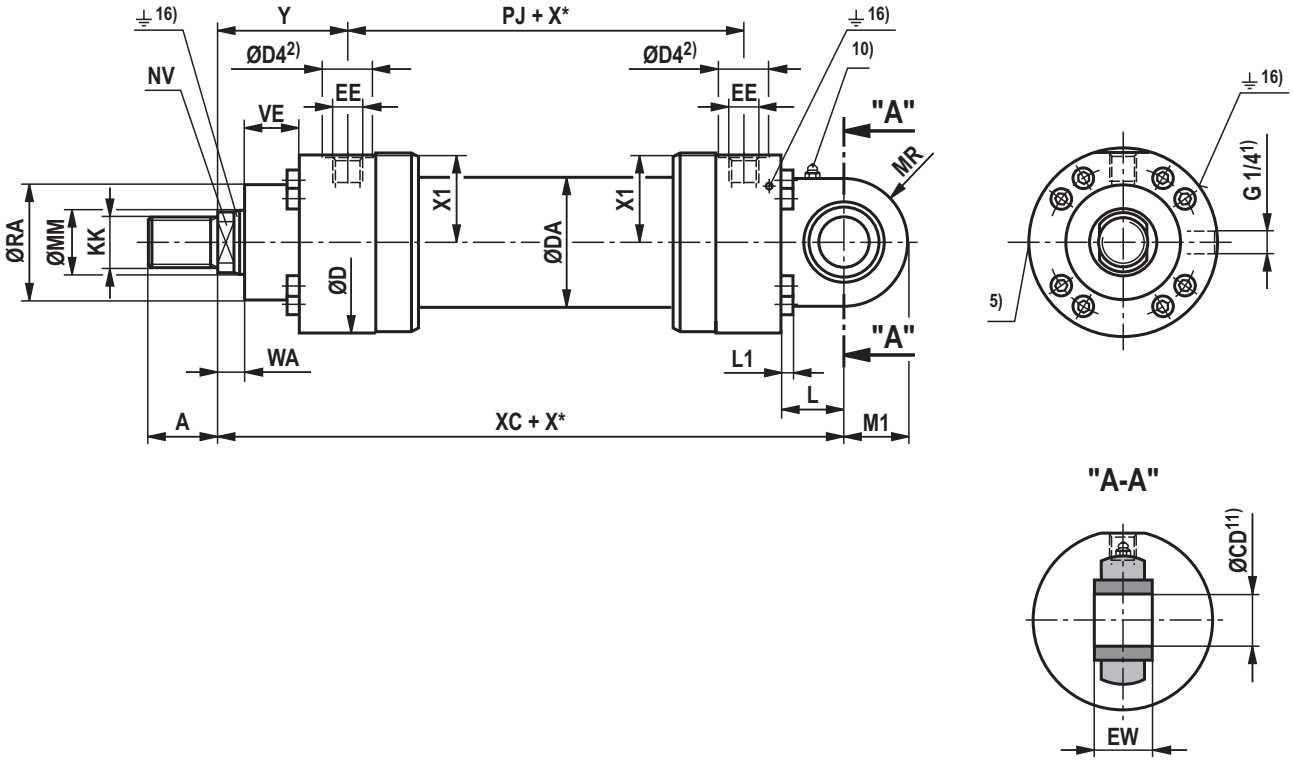
CSH2...XE: MS2

see page 32, 33

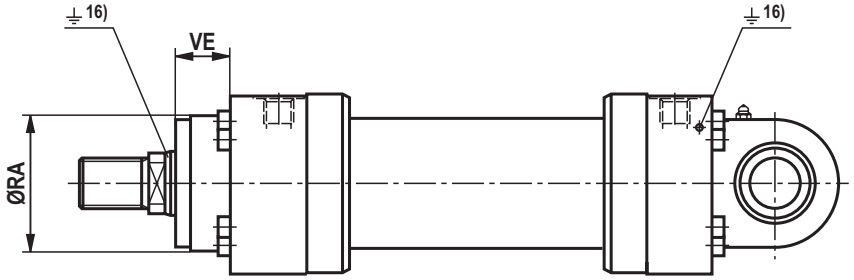
Dimensions: Swivel eye at base CDH2...XC: MP3

(dimensions in mm)

CDH2...XC: MP3



CDH2...XC: MP3: with seal design "A", "B" and AL Ø 160 ... 320 mm



Dimensions: Swivel eye at base CDH2...XC: MP3

(dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 2)	EE 4), 19)	EE 4), 20)	Y	PJ	X1	WA	XC
40 6)	**25/28**	M20x1.5	28	19/22	88	52	34	G1/2	M22x1.5	83	120	41	18	282
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1.5	98	120	48.5	18	305
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21	348
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24	395
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27	442
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31	520
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31	580
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35	617
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40	690
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40	756
220 6)	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 3)	244	326	174	42	890
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 3)	257	326	194	42	903
280 6)	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 3)	290	375	220.5	48	1072
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 3)	282	391	243	48	1080

ØAL	ØMM	L	L1	MR	M1	ØCD H9	EW h12	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40 6)	**25/28**	53	8	32	32	25	25	52	29	88	–
50	**32/36**	61	8	40	40	32	32	63	29	102	–
63	**40/45**	74	8	50	50	40	40	75	32	120	–
80	**50/56**	90	10	63	63	50	50	90	36	145	–
100	**63/70**	102	12	71	71	63	63	110	41	170	–
125	**80/90**	124	16	90	90	80	80	132	45	206	–
140	**90/100**	149	16	100	100	90	90	145	45	226	–
160	**100/110**	150	16	112	112	100	100	160	50	200	50
180	**110/125**	180	20	129	129	110	110	185	55	220	55
200	**125/140**	206	20	145	145	125	125	200	61	235	61
220 6)	**140/160**	253	20	179 12)	187 12)	160	160	235	71	270	71
250	**160/180**	253	24	179 12)	187 12)	160	160	250	71	300	71
280 6)	**180/200**	320	30	230 12)	240 12)	200	200	295	88	325	88
320	**200/220**	320	30	231 12)	241 12)	200	200	320	88	365	88

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Thread size does not comply with ISO 6022; M50 x 2 available upon request

4) Flange connections see separate tables on pages 34 and 35

5) Throttle valve only with end position cushioning "E" (180° for bleeding)

6) Piston Ø not standardized

7) Dimensions for cylinders with seal design M, T, and S

8) Dimensions for cylinders with seal design A and B

10) Standard version "W" Lubricating nipple, cone head form A according to DIN 71412

11) Related bolt Ø f8

12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting

16) Equipotential bonding see pages 40 and 41

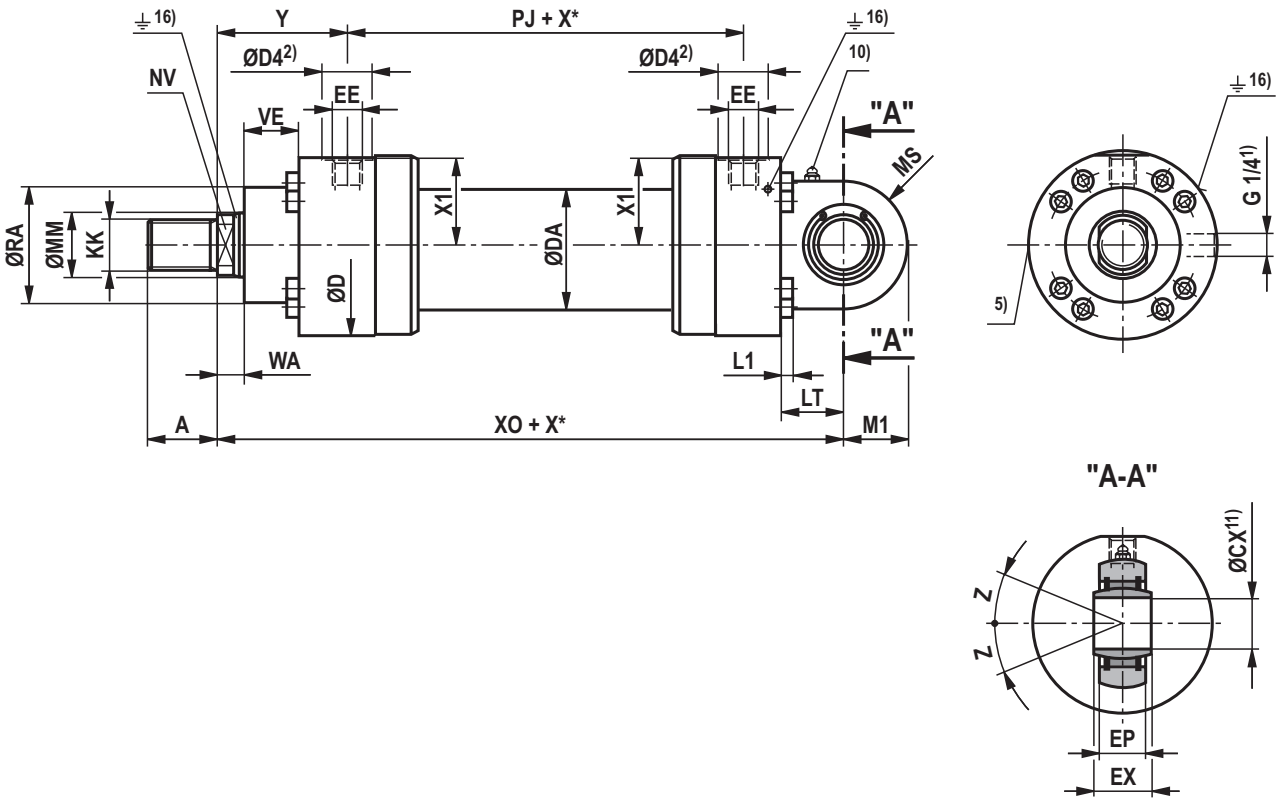
19) Line connection "B"

20) Line connection "M"

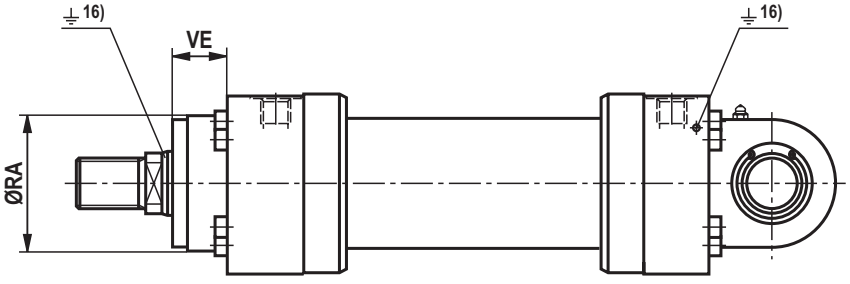
Dimensions: Self-aligning clevis at base CDH2...XC: MP5

(dimensions in mm)

CDH2...XC: MP5



CDH2...XC: MP5: with seal design "A", "B" and AL Ø 160 ... 320 mm



Dimensions: Self-aligning clevis at base CDH2...XC: MP5

(dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 2)	EE 4), 19)	EE 4), 20)	Y	PJ	X1	WA	XO
40 6)	**25/28**	M20x1.5	28	19/22	88	52	34	G1/2	M22x1.5	83	120	41	18	282
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1.5	98	120	48.5	18	305
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21	348
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24	395
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27	442
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31	520
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31	580
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35	617
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40	690
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40	756
220 6)	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 3)	244	326	174	42	890
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 3)	257	326	194	42	903
280 6)	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 3)	290	375	220.5	48	1072
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 3)	282	391	243	48	1080

ØAL	ØMM	LT	L1	MS	M1	ØCX 11) H7	EP	EX h12	ØRA 7)	VE 7)	ØRA 8)	VE 8)	Z
40 6)	**25/28**	53	8	32	32	25	22	25	52	29	88	–	2°
50	**32/36**	61	8	40	40	32	27	32	63	29	102	–	4°
63	**40/45**	74	8	50	50	40	32	40	75	32	120	–	4°
80	**50/56**	90	10	63	63	50	40	50	90	36	145	–	4°
100	**63/70**	102	12	71	71	63	52	63	110	41	170	–	4°
125	**80/90**	124	16	90	90	80	66	80	132	45	206	–	4°
140	**90/100**	149	16	100	100	90	72	90	145	45	226	–	4°
160	**100/110**	150	16	112	112	100	84	100	160	50	200	50	4°
180	**110/125**	180	20	129	129	110	88	110	185	55	220	55	4°
200	**125/140**	206	20	145	145	125	102	125	200	61	235	61	4°
220 6)	**140/160**	253	20	179 12)	187 12)	160	130	160	235	71	270	71	4°
250	**160/180**	253	24	179 12)	187 12)	160	130	160	250	71	300	71	4°
280 6)	**180/200**	320	30	230 12)	240 12)	200	138	200	295	88	325	88	4°
320	**200/220**	320	30	231 12)	241 12)	200	162	200	320	88	365	88	4°

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Thread size does not comply with ISO 6022; M50 x 2 available upon request

4) Flange connections see separate tables on pages 34 and 35

5) Throttle valve only with end position cushioning "E" (180° for bleeding)

6) Piston Ø not standardized

7) Dimensions for cylinders with seal design M, T, and S

8) Dimensions for cylinders with seal design A and B

10) Standard version "W"
Lubricating nipple, cone head form A according to DIN 71412

11) Related bolt Ø f8

12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting

16) Equipotential bonding see pages 40 and 41

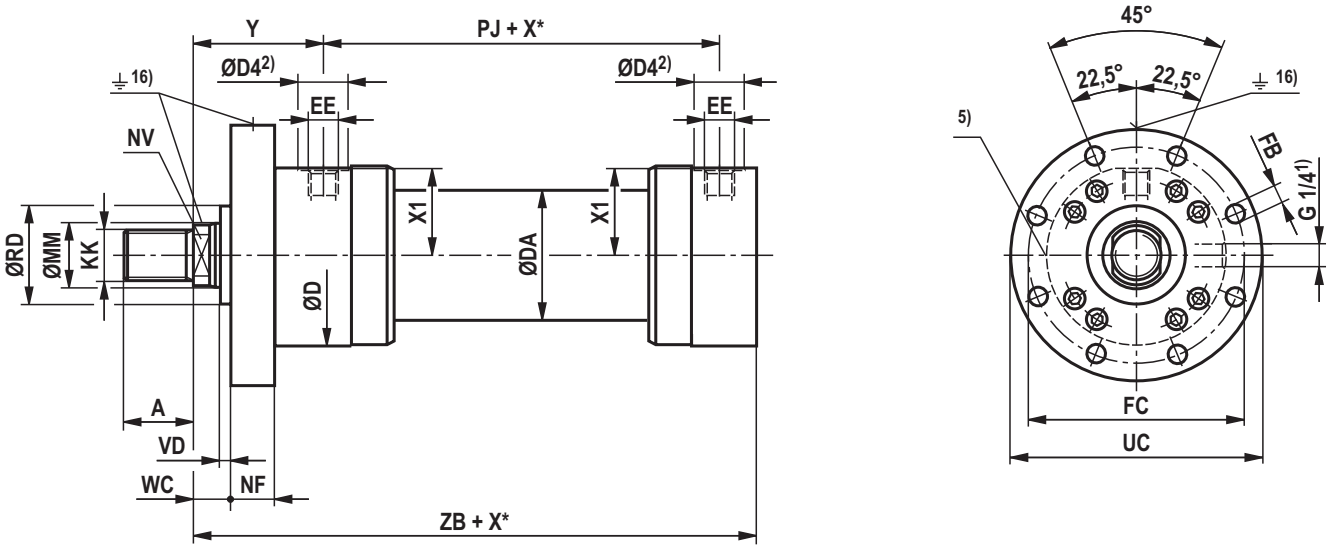
19) Line connection "B"

20) Line connection "M"

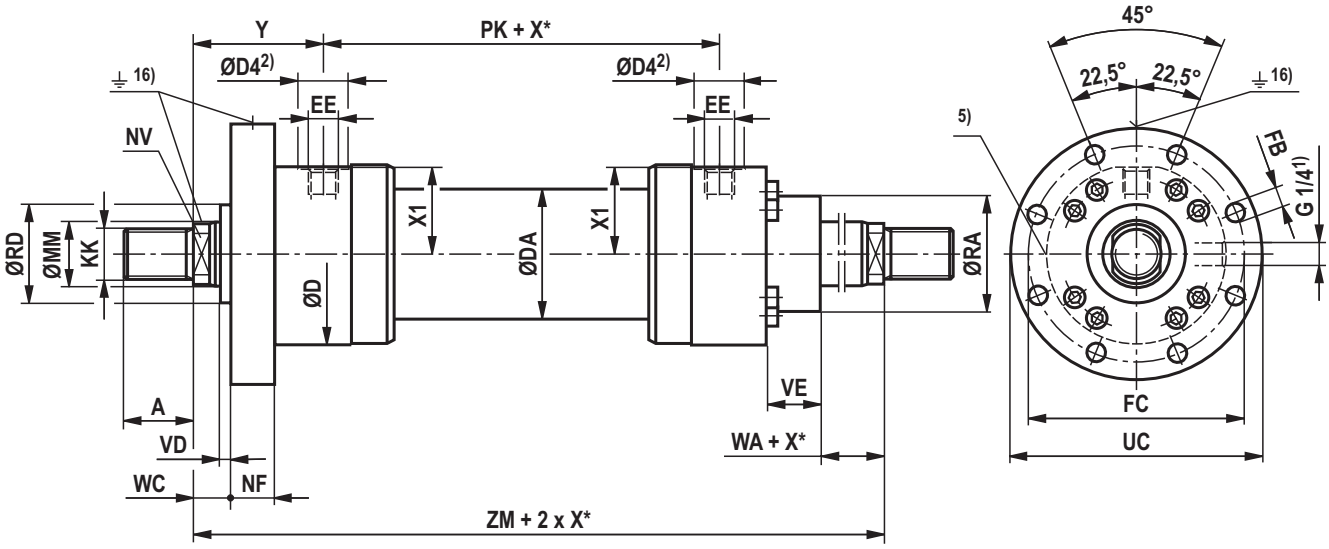
Dimensions: Round flange at head CDH2...XC / CGH2...XC: MF3

(dimensions in mm)

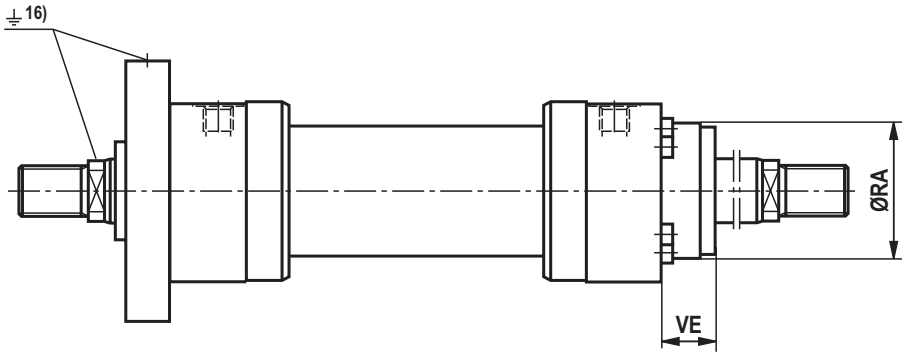
CDH2...XC: MF3



CGH2...XC: MF3 10)



CGH2...XC: MF3 10): with seal design "A", "B" and AL Ø 160 ... 320 mm



Dimensions: Round flange at head CDH2...XC / CGH2...XC: MF3

(dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 2)	EE 4), 19)	EE 4), 20)	Y	PJ	X1	WA
40 6)	**25/28**	M20x1.5	28	19/22	88	52	34	G1/2	M22x1.5	83	120	41	18
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1.5	98	120	48.5	18
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40
220 6)	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 3)	244	326	174	42
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 3)	257	326	194	42
280 6)	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 3)	290	375	220.5	48
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 3)	282	391	243	48

ØAL	ØMM	ØRD f8	WC	VD	NF js13	PK	ZB max.	ZM	ØFB H13	ØFC js13	ØUC –1	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40 6)	**25/28**	52	22	4	25	120	230	286	11	115	138	52	29	88	–
50	**32/36**	63	22	4	25	120	244	316	13.5	132	155	63	29	102	–
63	**40/45**	75	25	4	28	133	274	357	13.5	150	175	75	32	120	–
80	**50/56**	90	28	4	32	155	305	395	17.5	180	210	90	36	145	–
100	**63/70**	110	32	5	36	171	340	439	22	212	250	110	41	170	–
125	**80/90**	132	36	5	40	205	396	511	22	250	290	132	45	206	–
140	**90/100**	145	36	5	40	219	430	551	26	285	330	145	45	226	–
160	**100/110**	160	40	5	45	235	467	605	26	315	360	160	50	200	50
180	**110/125**	185	45	5	50	264	510	652	33	355	410	185	55	220	55
200	**125/140**	200	45	5	56	278	550	718	33	385	440	200	61	235	61
220 6)	**140/160**	235	50	8	63	326	637	814	39	435	500	235	71	270	71
250	**160/180**	250	50	8	63	326	650	840	39	475	540	250	71	300	71
280 6)	**180/200**	295	56	8	80	375	752	955	45	555	630	295	88	325	88
320	**200/220**	320	56	8	80	391	760	955	45	600	675	320	88	365	88

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Thread size does not comply with ISO 6022; M50 x 2 available upon request

4) Flange connections see separate tables on pages 34 and 35

5) Throttle valve only with end position cushioning "E" (180° for bleeding)

6) Piston Ø not standardized

7) Dimensions for cylinders with seal design M, T, and S

8) Dimensions for cylinders with seal design A and B

10) Double-acting cylinder not standardized

16) Equipotential bonding see pages 40 and 41

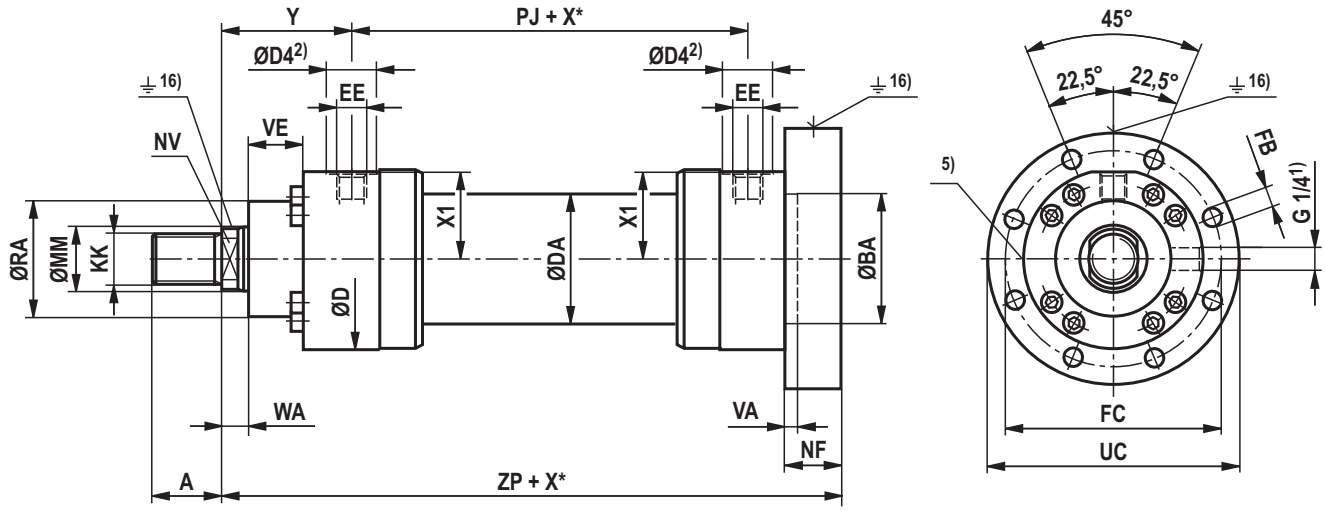
19) Line connection "B"

20) Line connection "M"

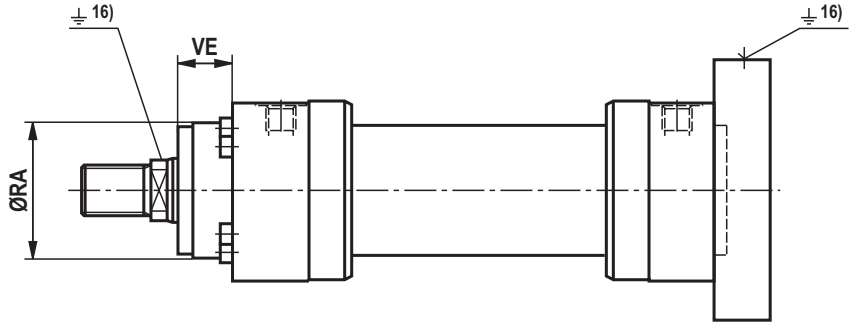
Dimensions: Round flange at base CDH2...XC: MF4

(dimensions in mm)

CDH2...XC: MF4



CDH2...XC: MF4 10): with seal design "A", "B" and AL Ø 160 ... 320 mm



Dimensions: Round flange at base CDH2...XC: MF4

(dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 2)	EE 4), 19)	EE 4), 20)	Y	PJ	X1	WA
40 6)	**25/28**	M20x1.5	28	19/22	88	52	34	G1/2	M22x1.5	83	120	41	18
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1.5	98	120	48.5	18
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40
220 6)	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 3)	244	326	174	42
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 3)	257	326	194	42
280 6)	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 3)	290	375	220.5	48
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 3)	282	391	243	48

ØAL	ØMM	ZP	NF js13	VA	ØBA H8	ØFB H13	ØFC js13	ØUC –1	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40 6)	**25/28**	250	25	5	52	11	115	138	52	29	88	–
50	**32/36**	265	25	4	63	13.5	132	155	63	29	102	–
63	**40/45**	298	28	4	75	13.5	150	175	75	32	120	–
80	**50/56**	332	32	5	90	17.5	180	210	90	36	145	–
100	**63/70**	371	36	5	110	22	212	250	110	41	170	–
125	**80/90**	430	40	6	132	22	250	290	132	45	206	–
140	**90/100**	465	40	5	145	26	285	330	145	45	226	–
160	**100/110**	505	45	7	160	26	315	360	160	50	200	50
180	**110/125**	550	50	10	185	33	355	410	185	55	220	55
200	**125/140**	596	56	10	200	33	385	440	200	61	235	61
220 6)	**140/160**	690	63	10	235	39	435	500	235	71	270	71
250	**160/180**	703	63	10	250	39	475	540	250	71	300	71
280 6)	**180/200**	822	80	10	295	45	555	630	295	88	325	88
320	**200/220**	830	80	10	320	45	600	675	320	88	365	88

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Thread size does not comply with ISO 6022; M50 x 2 available upon request

4) Flange connections see separate tables on pages 34 and 35

5) Throttle valve only with end position cushioning "E" (180° for bleeding)

6) Piston Ø not standardized

7) Dimensions for cylinders with seal design M, T, and S

8) Dimensions for cylinders with seal design A and B

16) Equipotential bonding see pages 40 and 41

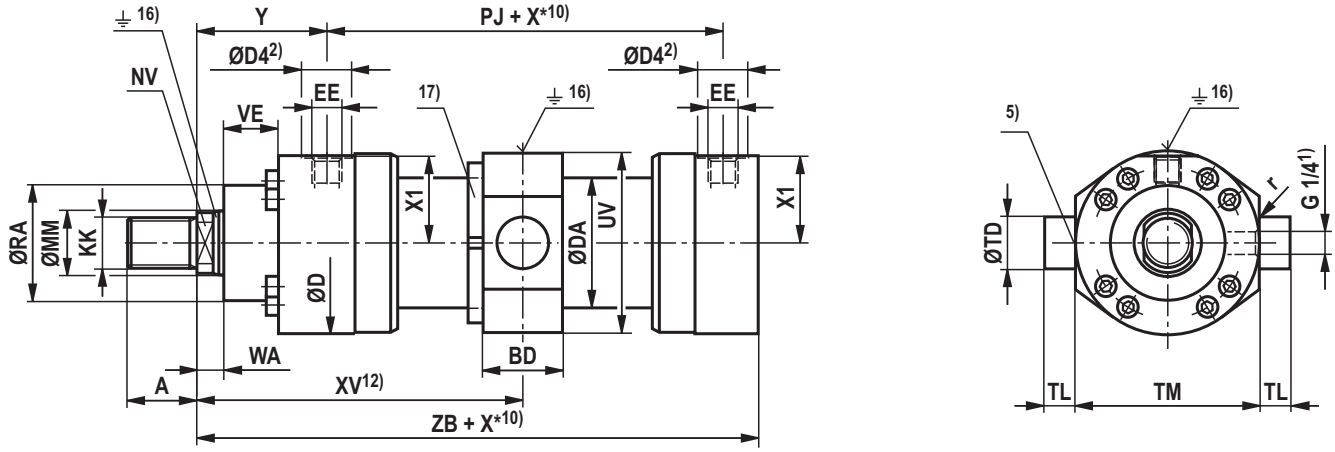
19) Line connection "B"

20) Line connection "M"

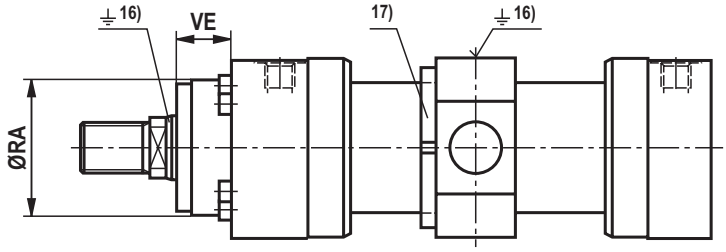
Dimensions: Trunnion CDH2...XC / CGH2...XC: MT4

(dimensions in mm)

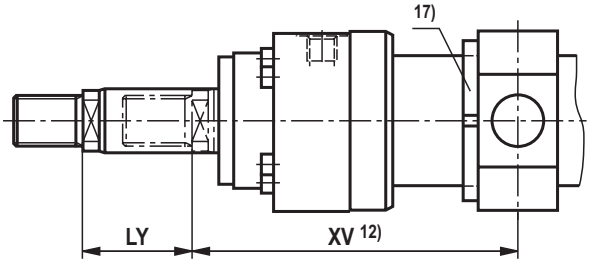
CDH2...XC: MT4



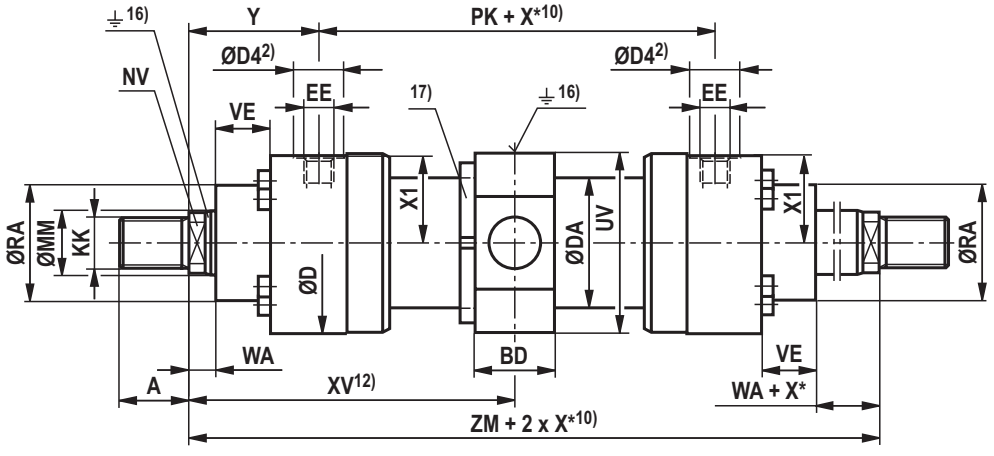
CDH2...XC: MT4: with seal design "A", "B" and AL Ø 160 ... 320 mm

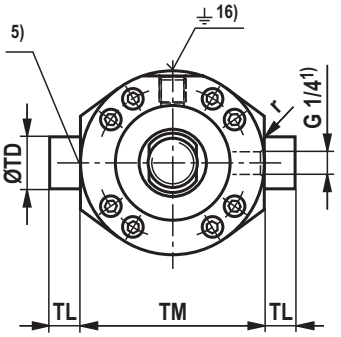


Dimensions for cylinder with piston rod extension "LY" in retracted condition

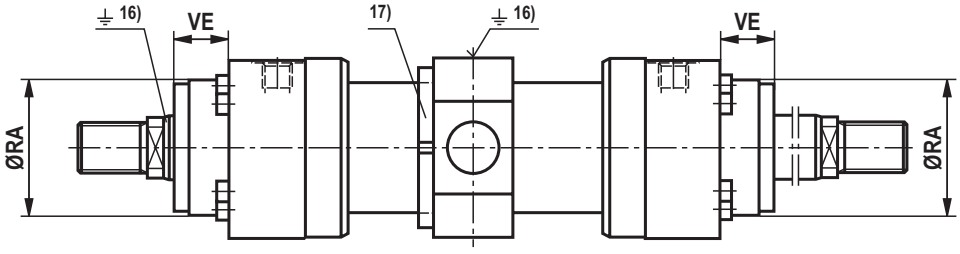


CGH2...XC: MT4 11)





CGH2...XC: MT4 11): with seal design "A", "B" and AL Ø 160 ... 320 mm



Dimensions: Trunnion CDH2...XC / CGH2...XC: MT4

(dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 2)	EE 4), 19)	EE 4), 20)	Y	PJ	X1	WA
40 6)	**25/28**	M20x1.5	28	19/22	88	52	34	G1/2	M22x1.5	83	120	41	18
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1.5	98	120	48.5	18
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40
220 6)	**140/160**	M125x4	125	120/140	355	273	65	G1 1/2	M48x2 3)	244	326	174	42
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 3)	257	326	194	42
280 6)	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 3)	290	375	220.5	48
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 3)	282	391	243	48

ØAL	ØMM	PK	ZB max.	ZM	X* min.	XV 14) average	XV 12) min.	XV 12) max.	BD	UV 15)	ØTD f8	TL js16	TM h12	r	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40 6)	**25/28**	120	230	286	22	143+X*/2	154	140+X*	38	97	25	20	95	0.8	52	29	88	–
50	**32/36**	120	244	316	32	158+X*/2	174	151+X*	38	111	32	25	112	0.8	63	29	102	–
63	**40/45**	133	274	357	47	178.5+X*/2	202	167+X*	48	129	40	32	125	1	75	32	120	–
80	**50/56**	155	305	395	58	197.5+X*/2	226.5	180.5+X*	58	163	50	40	150	1	90	36	145	–
100	**63/70**	171	340	439	79	219.5+X*/2	259	195+X*	78	188	63	50	180	1.2	110	41	170	–
125	**80/90**	205	396	511	91	255.5+X*/2	301	210+X*	98	234	80	63	224	1.2	132	45	206	–
140	**90/100**	219	430	551	121	275.5+X*/2	336	215+X*	118	257	90	70	265	1.5	145	45	226	–
160	**100/110**	235	467	605	142	302.5+X*/2	373.5	231.5+X*	128	287	100	80	280	1.5	160	50	200	50
180	**110/125**	264	510	652	158	326+X*/2	405	247+X*	138	328	110	90	320	1.5	185	55	220	55
200	**125/140**	278	550	718	204	359+X*/2	461	257+X*	178	343	125	100	335	1.5	200	61	235	61
220 6)	**140/160**	326	637	814	200	407+X*/2	507	307+X*	180	393	160	125	385	1.5	235	71	270	71
250	**160/180**	326	650	840	210	420+X*/2	525	315+X*	180	433	160	125	425	1.5	250	71	300	71
280 6)	**180/200**	375	752	955	241	477.5+X*/2	598	357+X*	220	486	200	160	480	2	295	88	325	88
320	**200/220**	391	760	955	245	477.5+X*/2	600	355+X*	220	536	200	160	530	2	320	88	365	88

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length
$X^*_{min.}$ = min. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Thread size does not comply with ISO 6022; M50 x 2 available upon request
4) Flange connections see separate tables on pages 34 and 35
5) Throttle valve only with end position cushioning "E" (180° for bleeding)
6) Piston Ø not standardized
7) Dimensions for cylinders with seal design M, T, and S
8) Dimensions for cylinders with seal design A and B
10) Observe the min. stroke length "$X^*_{min.}$"
11) Double-acting cylinder not standardized
12) When ordering, always specify the "XV" dimension in the clear text. Preferred XV dimension: Observe trunnion position in cylinder center $XV_{min.}$ and $XV_{max.}$
14) $XV_{cent.}$ recommendation: Trunnion position in cylinder center
15) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting
16) Equipotential bonding see pages 40 and 41
17) Trunnion nut with AL Ø ≥ 125 mm either at head or at base side depending on the position of the trunnion (XV).
19) Line connection "B"
20) Line connection "M"

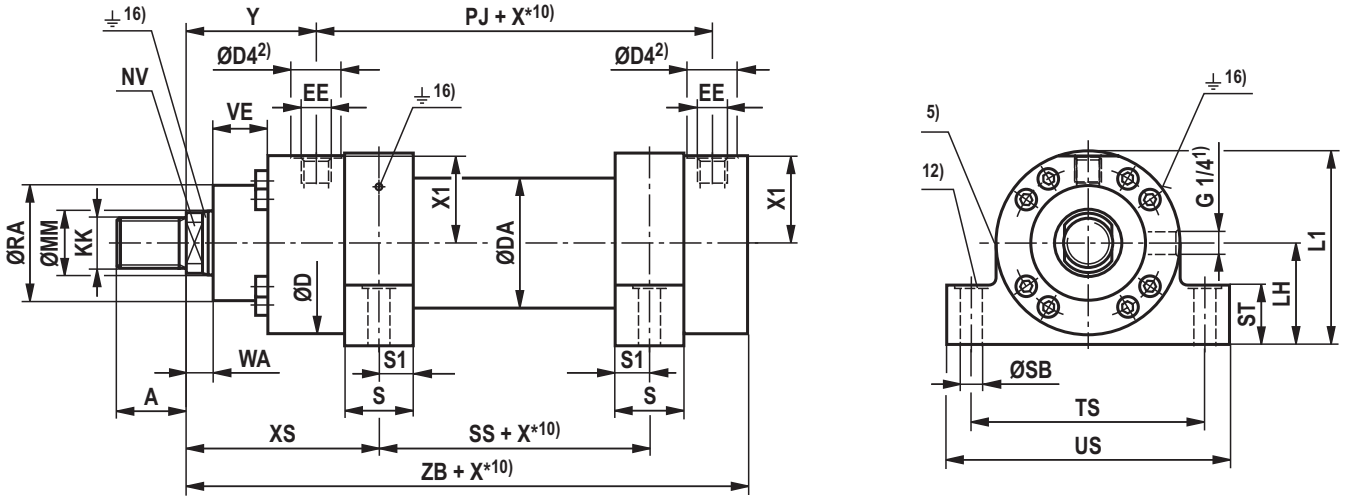
☞ **Important installation information!**

During installation, it must be ensured that the trunnion bearings are installed up to the trunnion shoulders. Any non-compliance may reduce the product's service life.

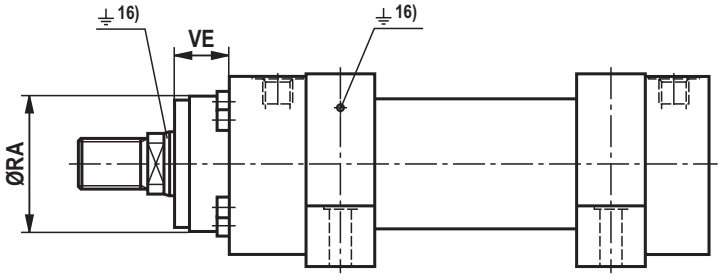
Dimensions: Foot mounting CDH2...XC / CGH2...XC: MS2

(dimensions in mm)

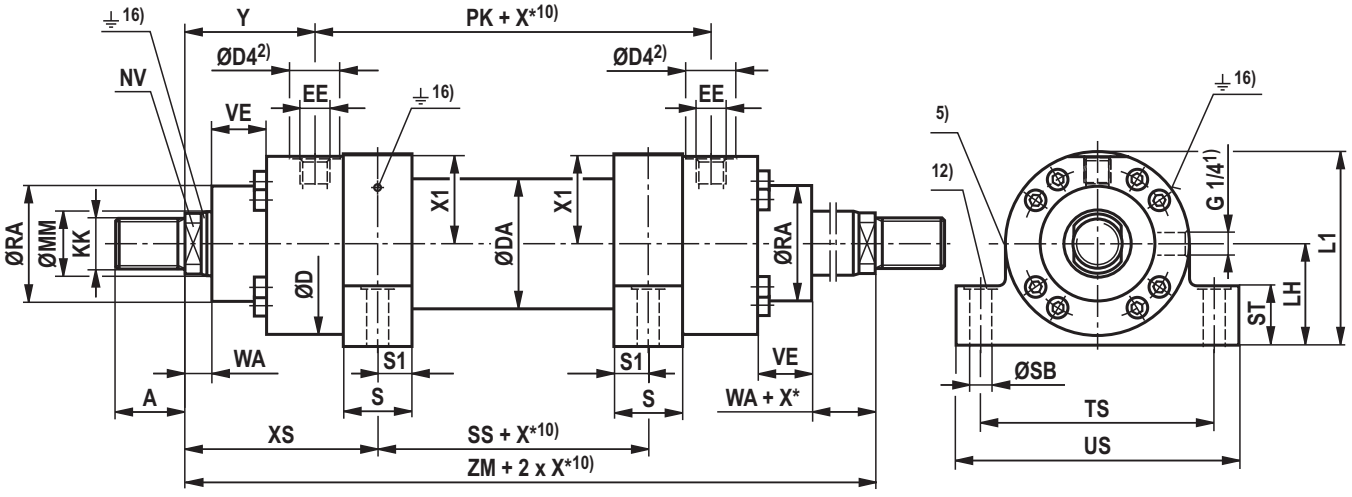
CDH2...XC: MS2 [2; 11)]



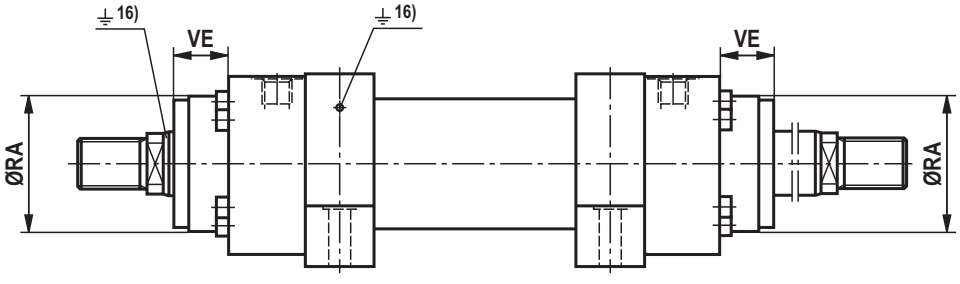
CDH2...XC: MS2 [11)]: with seal design "A", "B" and AL Ø 160 ... 320 mm



CGH2...XC: MS2 [11)]



CGH2...XC: MS2 [11)]: with seal design "A", "B" and AL Ø 160 ... 320 mm



Dimensions: Foot mounting CDH2...XC / CGH2...XC: MS2

(dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 2)	EE 4), 19)	EE 4), 20)	Y	PJ	X1	WA
40 6)	**25/28**	M20x1.5	28	19/22	88	52	34	G1/2	M22x1.5	83	120	41	18
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1.5	98	120	48.5	18
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40
220 6)	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 3)	244	326	174	42
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 3)	257	326	194	42
280 6)	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 3)	290	375	220.5	48
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 3)	282	391	243	48

ØAL	ØMM	PK	XS	ZB max.	ZM	SS	X* min.	S	S1	ØSB H13	ST	TS js13	US 15)	LH	L1	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40 6)	**25/28**	120	118	230	286	50	1	30	15	11	32	110	140	45	93	52	29	88	–
50	**32/36**	120	135.5	244	316	45	1	35	17.5	11	37	130	161	55	110	63	29	102	–
63	**40/45**	133	154	274	357	49	1	40	20	13.5	42	150	183	65	129	75	32	120	–
80	**50/56**	155	171.5	305	395	52	2	50	25	17.5	47	180	220	75	149	90	36	145	–
100	**63/70**	171	189	340	439	61	3	60	30	22	57	210	260	90	181	110	41	170	–
125	**80/90**	205	218	396	511	75	1	70	35	26	67	255	313	105	215	132	45	206	–
140	**90/100**	219	240.5	430	551	70	19	85	42.5	30	72	290	359	115	235	145	45	226	–
160	**100/110**	235	270	467	605	65	44	105	52.5	33	77	330	402	135	277	160	50	200	50
180	**110/125**	264	291.5	510	652	69	50	115	57.5	40	92	360	445	150	305	185	55	220	55
200	**125/140**	278	322.5	550	718	73	56	125	62.5	40	97	385	471	160	322	200	61	235	61
220 6)	**140/160**	326	369.5	637	814	75	100	155	77.5	45	102	445	541	185	373	235	71	270	71
250	**160/180**	326	382.5	650	840	75	100	155	77.5	52	112	500	610	205	414	250	71	300	71
280 6)	**180/200**	375	415.5	752	955	124	51	155	77.5	52	142	550	661	235	469	295	88	325	88
320	**200/220**	391	435	760	955	85	125	190	95	62	142	610	732	255	512	320	88	365	88

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

$X^*_{min.}$ = min. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Thread size does not comply with ISO 6022; M50 x 2 available upon request

4) Flange connections see separate tables on pages 34 and 35

5) Throttle valve only with end position cushioning "E" (180° for bleeding)

6) Piston Ø not standardized

7) Dimensions for cylinders with seal design M, T, and S

8) Dimensions for cylinders with seal design A and B

10) Observe the min. stroke length "$X^*_{min.}$"

11) Not standardized

12) Recess 2 mm deep, for hexagon socket head cap screws; ISO 4762 – The screws must not be subjected to shear force. Force introduction via additional external fitting strip

15) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting

16) Equipotential bonding see pages 40 and 41

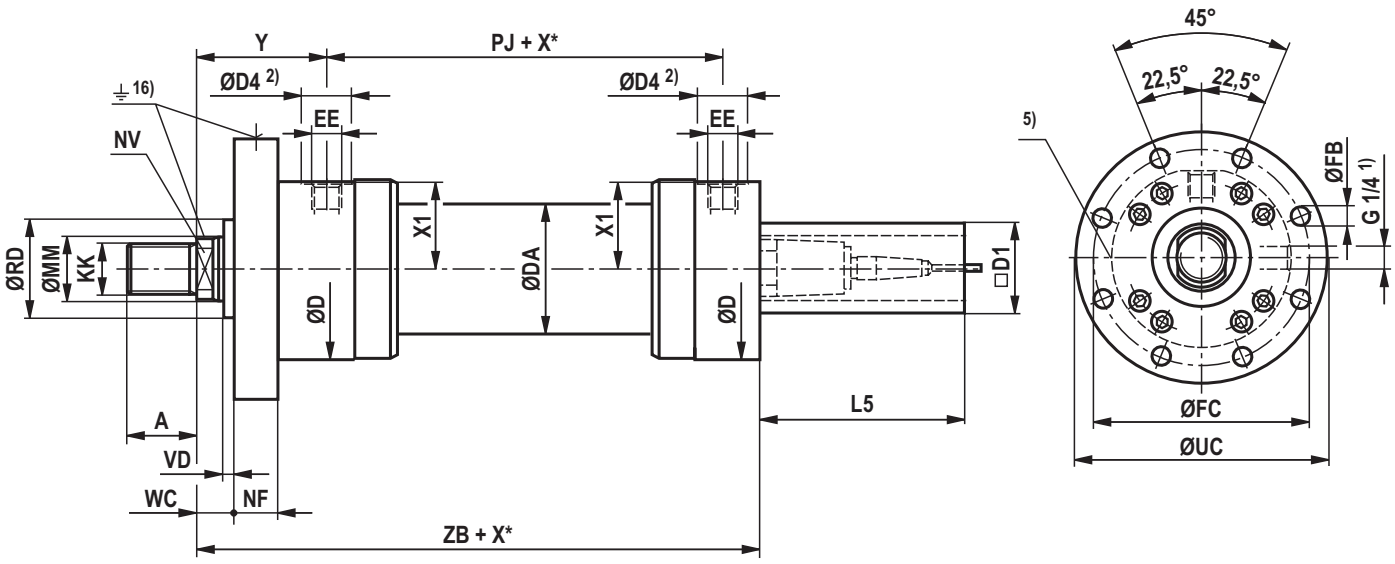
19) Line connection "B"

20) Line connection "M"

Dimensions: Round flange at head CSH2...XE: MF3

(dimensions in mm)

CSH2...XE: MF3



Dimensions: Round flange at head CSH2...XE: MF3

(dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 2)	EE 4), 19)	EE 4), 20)	Y	PJ	X1	X* max.	L5	D1 max.
40 6)	**25/28**	M20x1.5	28	19/22	88	52	34	G1/2	M22x1.5	83	120	41	1000	166	80
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1.5	98	120	48.5	1000	166	96
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	2000	166	96
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	2000	166	96
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	3000	166	96
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	3000	166	96
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	3000	166	96
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	3000	166	96
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	3000	166	96
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	3000	166	96
220 6)	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 3)	244	326	174	3000	166	96
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 3)	257	326	194	3000	166	96
280 6)	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 3)	290	375	220.5	3000	166	96
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 3)	282	391	243	3000	166	96

ØAL	ØMM	ØRD f8	WC	VD	NF js13	ZB max.	ØFB H13	ØFC js13	ØUC –1
40 6)	**25/28**	52	22	4	25	239	11	115	138
50	**32/36**	63	22	4	25	254	13.5	132	155
63	**40/45**	75	25	4	28	299	13.5	150	175
80	**50/56**	90	28	4	32	332.5	17.5	180	210
100	**63/70**	110	32	5	36	362	22	212	250
125	**80/90**	132	36	5	40	410	22	250	290
140	**90/100**	145	36	5	40	440	26	285	330
160	**100/110**	160	40	5	45	472.5	26	315	360
180	**110/125**	185	45	5	50	510	33	355	410
200	**125/140**	200	45	5	56	550	33	385	440
220 6)	**140/160**	235	50	8	63	637	39	435	500
250	**160/180**	250	50	8	63	650	39	475	540
280 6)	**180/200**	295	56	8	80	752	45	555	630
320	**200/220**	320	56	8	80	760	45	600	675

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

$X^*_{max.}$ = max. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Thread size does not comply with ISO 6022; M50 x 2 available upon request

4) Flange connections see separate tables on pages 34 and 35

5) Throttle valve only with end position cushioning "E" (180° for bleeding)

6) Piston Ø not standardized

16) Equipotential bonding see pages 40 and 41

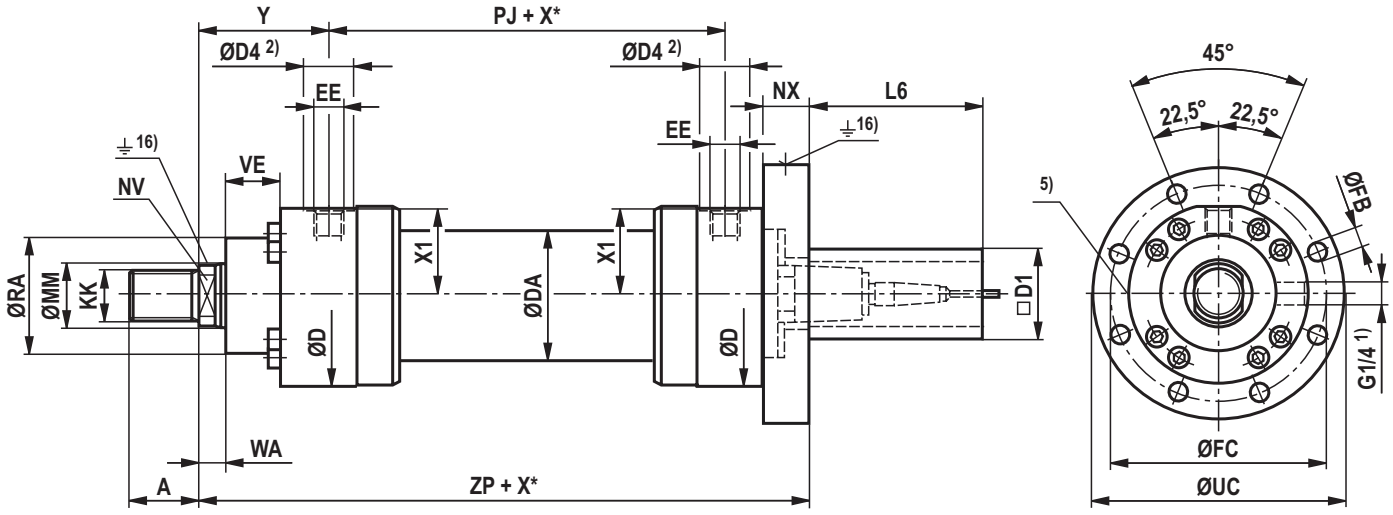
19) Line connection "B"

20) Line connection "M"

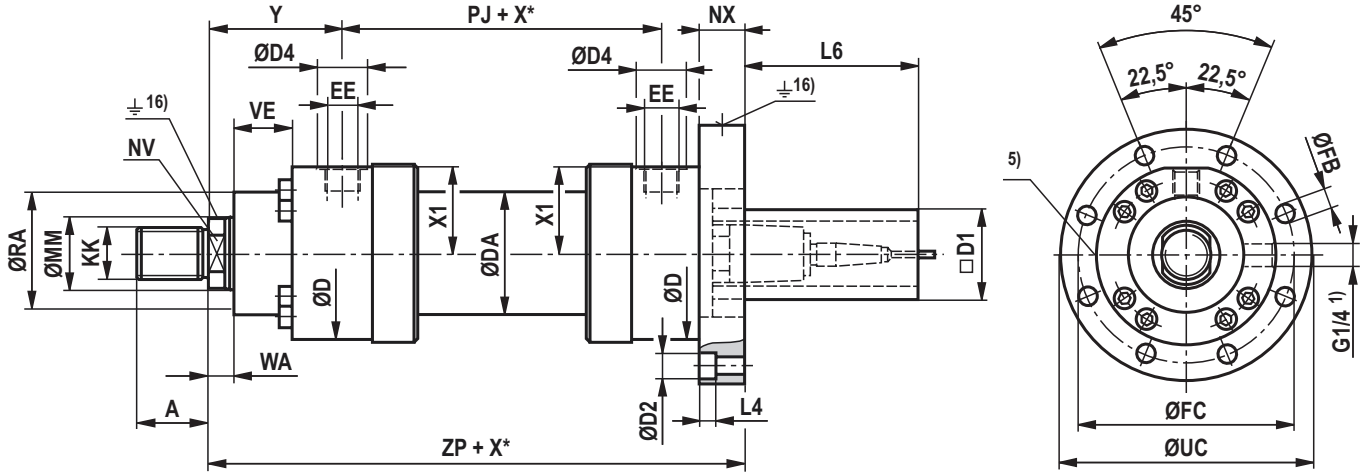
Dimensions: Round flange at base CSH2...XE: MF4

(dimensions in mm)

CSH2...XE: MF4: ØAL 40 ... 100 mm



CSH2...XE: MF4: ØAL 125 ... 320 mm



Dimensions: Round flange at base CSH2...XE: MF4

(dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 2)	EE 4), 19)	EE 4), 20)	Y	PJ	X1	WA	X* max.	L4
40 6)	**25/28**	M20x1.5	28	19/22	88	52	34	G1/2	M22x1.5	83	120	41	18	1000	3
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1.5	98	120	48.5	18	1000	3
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21	2000	0
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24	2000	0
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27	3000	0
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31	3000	21.5
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31	3000	25.5
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35	3000	25.5
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40	3000	32
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40	3000	32
220 6)	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 3)	244	326	174	42	3000	38
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 3)	257	326	194	42	3000	38
280 6)	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 3)	290	375	220.5	48	3000	44
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 3)	282	391	243	48	3000	44

ØAL	ØMM	L6	ØD2	D1 max.	ZP	NX js13	ØFB H13	ØFC js13	ØUC −1	ØRA	VE
40 6)	**25/28**	166	18	80	262	28	11	115	138	52	29
50	**32/36**	166	20	96	278	28	13.5	132	155	63	29
63	**40/45**	166	0	96	313	28	13.5	150	175	75	32
80	**50/56**	166	0	96	350	32	17.5	180	210	90	36
100	**63/70**	138	0	96	390	36	22	212	250	110	41
125	**80/90**	131	33	96	445	55	22	250	290	132	45
140	**90/100**	121	40	96	485	60	26	285	330	145	45
160	**100/110**	113.5	40	96	525	65	26	315	360	160	50
180	**110/125**	106	48	96	570	70	33	355	410	185	55
200	**125/140**	100	48	96	616	76	33	385	440	200	61
220 6)	**140/160**	88	57	96	715	88	39	435	500	235	71
250	**160/180**	86	57	96	730	90	39	475	540	250	71
280 6)	**180/200**	61	66	96	857	115	45	555	630	295	88
320	**200/220**	61	66	96	865	115	45	600	675	320	88

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

$X^*_{max.}$ = max. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Thread size does not comply with ISO 6022; M50 x 2 available upon request

4) Flange connections see separate tables on pages 34 and 35

5) Throttle valve only with end position cushioning "E" (180° for bleeding)

6) Piston Ø not standardized

16) Equipotential bonding see pages 40 and 41

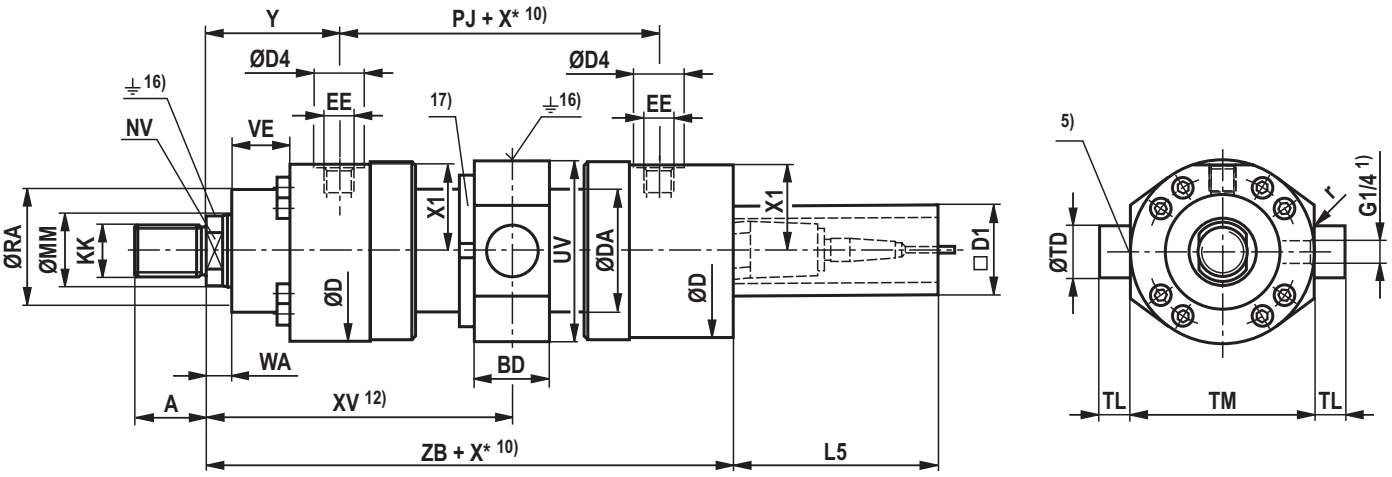
19) Line connection "B"

20) Line connection "M"

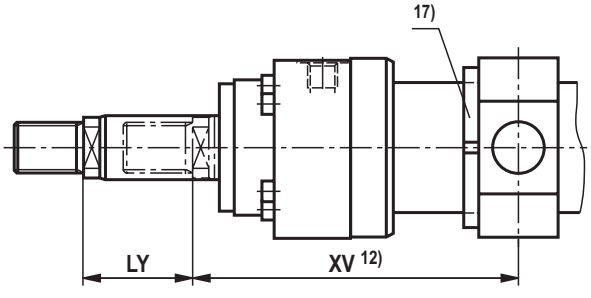
Dimensions: Trunnion CSH2...XE: MT4

(dimensions in mm)

CSH2...XE: MT4



Dimensions for cylinder with piston rod extension "LY" in retracted condition



Dimensions: Trunnion CSH2...XE: MT4

(dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 2)	EE 4), 19)	EE 4), 20)	Y	PJ	X1	WA	X* max.	L5	D1 max.
40 6)	**25/28**	M20x1.5	28	19/22	88	52	34	G1/2	M22x1.5	83	120	41	18	1000	166	80
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1.5	98	120	48.5	18	1000	166	96
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21	2000	166	96
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24	2000	166	96
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27	3000	166	96
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31	3000	166	96
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31	3000	166	96
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35	3000	166	96
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40	3000	166	96
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40	3000	166	96
220 6)	**140/160**	M125x4	125	120/140	355	273	65	G1 1/2	M48x2 3)	244	326	174	42	3000	166	96
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 3)	257	326	194	42	3000	166	96
280 6)	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 3)	290	375	220.5	48	3000	166	96
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 3)	282	391	243	48	3000	166	96

ØAL	ØMM	ZB max.	X* min.	XV 14) average	XV 12) min.	XV 12) max.	BD	UV 15)	ØTD f8	TL js16	TM h12	r	ØRA	VE
40 6)	**25/28**	239	22	143+X*/2	154	140+X*	38	97	25	20	95	0.8	52	29
50	**32/36**	254	32	158+X*/2	174	151+X*	38	111	32	25	112	0.8	63	29
63	**40/45**	299	47	178.5+X*/2	202	167+X*	48	129	40	32	125	1	75	32
80	**50/56**	332.5	58	197.5+X*/2	226.5	180.5+X*	58	163	50	40	150	1	90	36
100	**63/70**	362	79	219.5+X*/2	259	195+X*	78	188	63	50	180	1.2	110	41
125	**80/90**	410	91	255.5+X*/2	301	210+X*	98	234	80	63	224	1.2	132	45
140	**90/100**	440	121	275.5+X*/2	336	215+X*	118	257	90	70	265	1.5	145	45
160	**100/110**	472.5	142	302.5+X*/2	373.5	231.5+X*	128	287	100	80	280	1.5	160	50
180	**110/125**	510	158	326+X*/2	405	247+X*	138	328	110	90	320	1.5	185	55
200	**125/140**	550	204	359+X*/2	461	257+X*	178	343	125	100	335	1.5	200	61
220 6)	**140/160**	637	200	407+X*/2	507	307+X*	180	393	160	125	385	1.5	235	71
250	**160/180**	650	210	420+X*/2	525	315+X*	180	433	160	125	425	1.5	250	71
280 6)	**180/200**	752	241	477.5+X*/2	598	357+X*	220	486	200	160	480	2	295	88
320	**200/220**	760	245	477.5+X*/2	600	355+X*	220	536	200	160	530	2	320	88

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length
$X^*_{max.}$ = max. stroke length
$X^*_{min.}$ = min. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Thread size does not comply with ISO 6022; M50 x 2 available upon request
4) Flange connections see separate tables on pages 34 and 35
5) Throttle valve only with end position cushioning "E" (180° for bleeding)
6) Piston Ø not standardized
10) Observe the min. stroke length "$X^*_{min.}$"
11) Double-acting cylinder not standardized
12) When ordering, always specify the "XV" dimension in the clear text. Preferred XV dimension: Observe trunnion position in cylinder center $XV_{min.}$ and $XV_{max.}$
14) $XV_{cent.}$ recommendation: Trunnion position in cylinder center
15) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting
16) Equipotential bonding see pages 40 and 41
17) Trunnion nut with AL Ø ≥ 125 mm either at head or at base side depending on the position of the trunnion (XV).
19) Line connection "B"
20) Line connection "M"

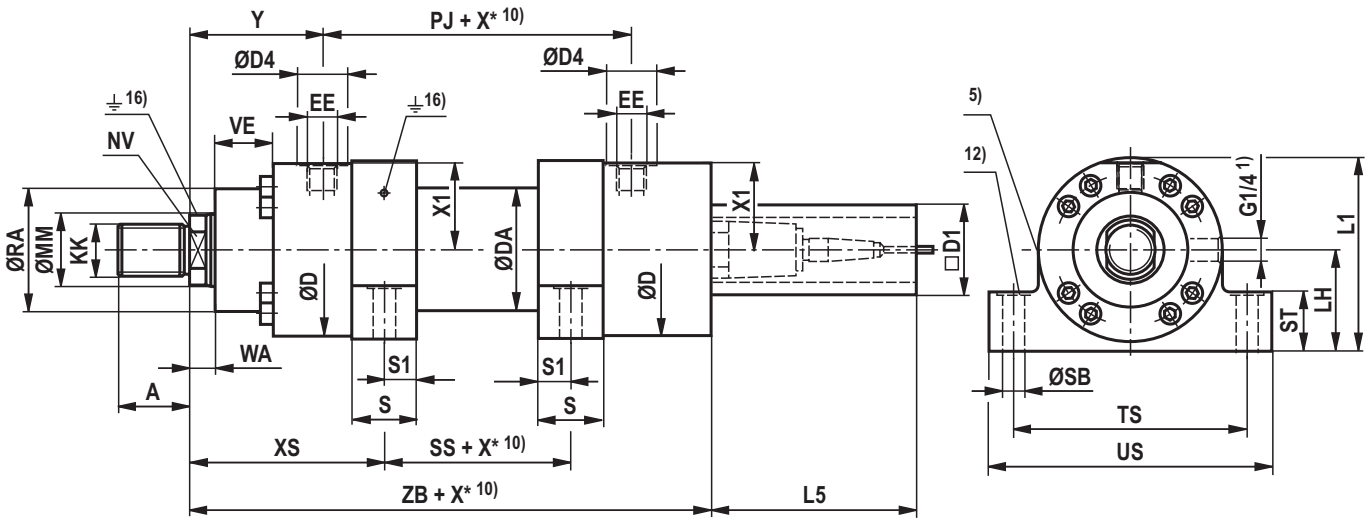
☞ **Important installation information!**

During installation, it must be ensured that the trunnion bearings are installed up to the trunnion shoulders. Any non-compliance may reduce the product's service life.

Dimensions: Foot mounting CSH2...XE: MS2

(dimensions in mm)

CSH2...XE MS2



Dimensions: Foot mounting CSH2...XE: MS2

(dimensions in mm)

ØAL	ØMM	KK	A	NV	ØD	ØDA	ØD4 2)	EE 4), 19)	EE 4), 20)	Y	PJ	X1	WA	X* max.
40 6)	**25/28**	M20x1.5	28	19/22	88	52	34	G1/2	M22x1.5	83	120	41	18	1000
50	**32/36**	M27x2	36	27/30	102	62	34	G1/2	M22x1.5	98	120	48.5	18	1000
63	**40/45**	M33x2	45	32/36	120	78	42	G3/4	M27x2	112	133	56.5	21	2000
80	**50/56**	M42x2	56	41/46	145	95	42	G3/4	M27x2	120	155	69.5	24	2000
100	**63/70**	M48x2	63	50/60	170	125	47	G1	M33x2	134	171	82	27	3000
125	**80/90**	M64x3	85	65/75	206	150	47	G1	M33x2	153	205	100.5	31	3000
140	**90/100**	M72x3	90	75/85	226	170	58	G1 1/4	M42x2	166	219	109.5	31	3000
160	**100/110**	M80x3	95	85/95	265	190	58	G1 1/4	M42x2	185	235	129.5	35	3000
180	**110/125**	M90x3	105	95/110	292	210	58	G1 1/4	M42x2	194	264	143.5	40	3000
200	**125/140**	M100x3	112	110/120	306	235	58	G1 1/4	M42x2	220	278	150.5	40	3000
220 6)	**140/160**	M125x4	125	120/140	355	270	65	G1 1/2	M48x2 3)	244	326	174	42	3000
250	**160/180**	M125x4	125	140/160	395	305	65	G1 1/2	M48x2 3)	257	326	194	42	3000
280 6)	**180/200**	M160x4	160	160/180	445	343	65	G1 1/2	M48x2 3)	290	375	220.5	48	3000
320	**200/220**	M160x4	160	180/200	490	394	65	G1 1/2	M48x2 3)	282	391	243	48	3000

ØAL	ØMM	L5	D1 max.	XS	ZB max.	SS	X* min.	S	S1	ØSB H13	ST	TS js13	US 15)	LH	L1 15)	ØRA	VE
40 6)	**25/28**	166	80	118	239	50	1	30	15	11	32	110	140	45	93	52	29
50	**32/36**	166	96	135.5	254	45	1	35	17.5	11	37	130	161	55	110	63	29
63	**40/45**	166	96	154	299	49	1	40	20	13.5	42	150	183	65	129	75	32
80	**50/56**	166	96	171.5	332.5	52	2	50	25	17.5	47	180	220	75	149	90	36
100	**63/70**	166	96	189	362	61	3	60	30	22	57	210	260	90	181	110	41
125	**80/90**	166	96	218	410	75	1	70	35	26	67	255	313	105	215	132	45
140	**90/100**	166	96	240.5	440	70	19	85	42.5	30	72	290	359	115	235	145	45
160	**100/110**	166	96	270	472.5	65	44	105	52.5	33	77	330	402	135	277	160	50
180	**110/125**	166	96	291.5	510	69	50	115	57.5	40	92	360	445	150	305	185	55
200	**125/140**	166	96	322.5	550	73	56	125	62.5	40	97	385	471	160	322	200	61
220 6)	**140/160**	166	96	369.5	637	75	100	155	77.5	45	102	445	541	185	373	235	71
250	**160/180**	166	96	382.5	650	75	100	155	77.5	52	112	500	610	205	414	250	71
280 6)	**180/200**	166	96	415.5	752	124	51	155	77.5	52	142	550	661	235	469	295	88
320	**200/220**	166	96	435	760	85	125	190	95	62	142	610	732	255	512	320	88

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

$X^*_{max.}$ = max. stroke length

$X^*_{min.}$ = min. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Thread size does not comply with ISO 6022; M50 x 2 available upon request

4) Flange connections see separate tables on pages 34 and 35

5) Throttle valve only with end position cushioning "E" (180° for bleeding)

6) Piston Ø not standardized

10) Observe the min. stroke length "$X^*_{min.}$"

12) Recess 2 mm deep, for hexagon socket head cap screws; ISO 4762 – The screws must not be subjected to shear force. Force introduction via additional external fitting strip

15) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting

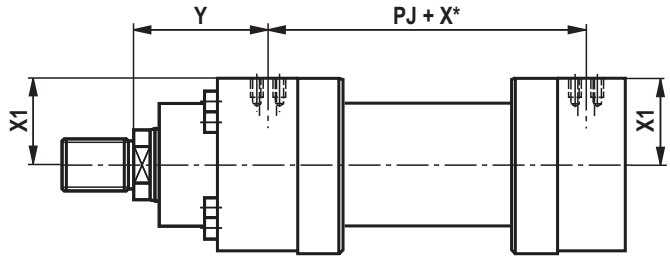
16) Equipotential bonding see pages 40 and 41

19) Line connection "B"

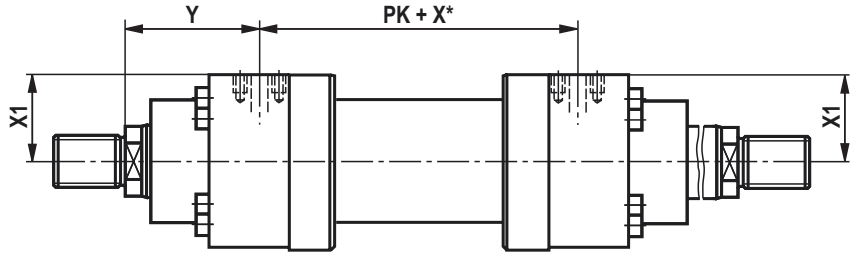
20) Line connection "M"

Dimensions: Flange ports
(dimensions in mm)

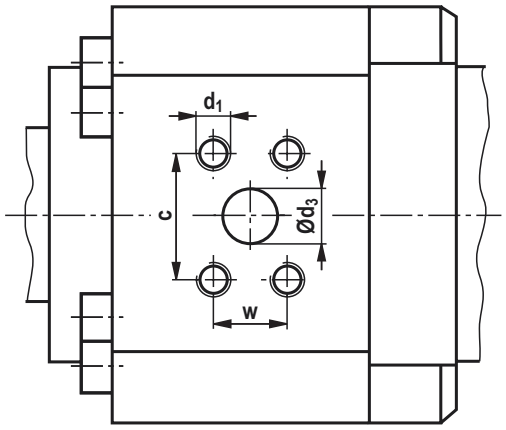
CDH2...XC / CSH2...XE



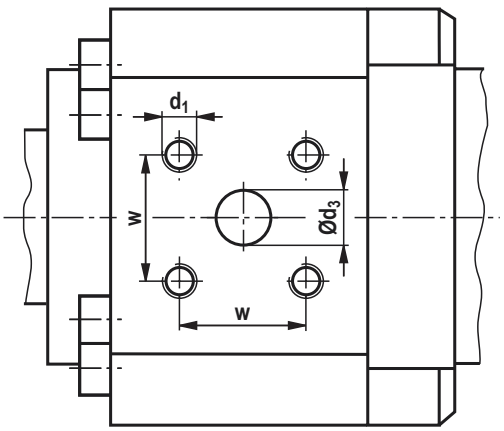
CGH2...XC



Dimensions for rectangular flange according to ISO 6162-1 tab. 2 type 1 and ISO 6162-2 tab. 2 type 1



Dimensions for square flange according to ISO 6164 table 1 and ISO 6164 table 2



Dimensions: Flange ports

(dimensions in mm)

	Version "F" [6] ISO 6162-1 tab. 2 type 1 (200 ... 350 bar) (≙ SAE 3000 PSI)											Version "K" [7] ISO 6164 tab. 1 (250 bar)								
ØAL	Y	PJ PK	X1	Ød$_3$	Ød$_3$ [4]	c ±0.25	w ±0.25	d$_1$	t$_1$ [1]	t$_1$ [2]	p [3]	Y	PJ PK	X1	Ød$_3$	w ±0.25	d$_1$	t$_1$ [1]	t$_1$ [2]	p [3]
40	–	–	–	–	–	–	–	–	–	–	–	82	122	40.5	10	24.7	M6	12.5	10	250
50	–	–	–	–	–	–	–	–	–	–	–	97	122	48	10	24.7	M6	12.5	12.5	250
63	111	135	55	13	1/2"	38.1	17.5	M8	16	16	350	111	135	57	13	29.7	M8	16	16	250
80	123.5	148	68	13	1/2"	38.1	17.5	M8	16	16	350	123.5	148	69.5	13	29.7	M8	16	16	250
100	133	173	79	19	3/4"	47.6	22.3	M10	20	20	350	133	173	81.5	19	35.4	M8	16	16	250
125	153	205	98	25	1"	52.4	26.2	M10	20	20	350	157	197	100	19	35.4	M8	16	16	250
140	162	227	107	32	1 1/4"	58.7	30.2	M10	20	20	250	162	227	109	25	43.8	M10	20	20	250
160	181.5	242	127	32	1 1/4"	58.7	30.2	M10	20	20	250	181.5	242	128.5	25	43.8	M10	20	20	250
180	193	266	139	38	1 1/2"	69.9	35.7	M12	24	24	200	194	264	142	32	51.6	M12	24	24	250
200	219	280	146.5	38	1 1/2"	69.9	35.7	M12	24	24	200	220	278	148.5	32	51.6	M12	24	24	250

	Version "D" [8] ISO 6162-2 tab. 2 type 1 (400 bar) (≙ SAE 6000 PSI)											Version "H" [8] ISO 6164 tab.2 (400 bar)								
ØAL	Y	PJ PK	X1	Ød$_3$	Ød$_3$ [5]	c ±0.25	w ±0.25	d$_1$	t$_1$ [1]	t$_1$ [2]	p [3]	Y	PJ PK	X1	Ød$_3$	w ±0.25	d$_1$	t$_1$ [1]	t$_1$ [2]	p [3]
40	–	–	–	–	–	–	–	–	–	–	–	82	122	40.5	10	24.7	M6	12.5	10	400
50	–	–	–	–	–	–	–	–	–	–	–	97	122	48	10	24.7	M6	12.5	12.5	400
63	–	–	–	–	–	–	–	–	–	–	–	111	135	57	13	29.7	M8	16	16	400
80	120	155	67	13	1/2"	40.5	18.2	M8	16	14	400	123.5	148	69.5	13	29.7	M8	16	16	400
100	134	171	80.5	13	1/2"	40.5	18.2	M8	16	16	400	133	173	81.5	19	35.4	M8	16	16	400
125	153	205	97	19	3/4"	50.8	23.8	M10	20	20	400	157	197	100	19	35.4	M8	16	16	400
140	162	227	107	25	1"	57.2	27.8	M12	24	24	400	162	227	109	25	43.8	M10	20	20	400
160	181.5	242	127	25	1"	57.2	27.8	M12	24	24	400	181.5	242	128.5	25	43.8	M10	20	20	400
180	194	264	139.5	32	1 1/4"	66.6	31.8	M14	26	26	400	194	264	142	32	51.6	M12	24	24	400
200	220	278	147	32	1 1/4"	66.6	31.8	M14	26	26	400	220	278	148.5	32	51.6	M12	24	24	400
220	244	326	168	38	1 1/2"	79.3	36.5	M16	30	30	400	244	326	171	38	60.1	M16	30	30	400
250	257	326	189	38	1 1/2"	79.3	36.5	M16	30	30	400	257	326	192	38	60.1	M16	30	30	400
280	290	375	215	38	1 1/2"	79.3	36.5	M16	30	30	400	290	375	218	38	60.1	M16	30	30	400
320	282	391	236	51	2"	96.8	44.5	M20	36	36	400	282	391	240	51	69.3	M16	30	30	400

Main dimensions see pages 14 to 33

ØAL = Piston Ø

X* = Stroke length

1) Thread depth for seal design M, T, and S

2) Thread depth for seal design A and B

3) Max. operating pressure for related flanges in bar

4) Flange connection according to ISO 6162-1 tab. 2 type 1 corresponds to flange connection according to SAE 3000 PSI

5) Flange connection according to ISO 6162-2 tab. 2 type 1 corresponds to flange connection according to SAE 6000 PSI

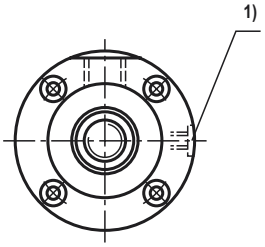
6) Version "F" with piston Ø 125 ... 200 mm not standardized

7) Version "K" with piston Ø 40 ... 50 mm and piston Ø 180 ... 200 mm not standardized

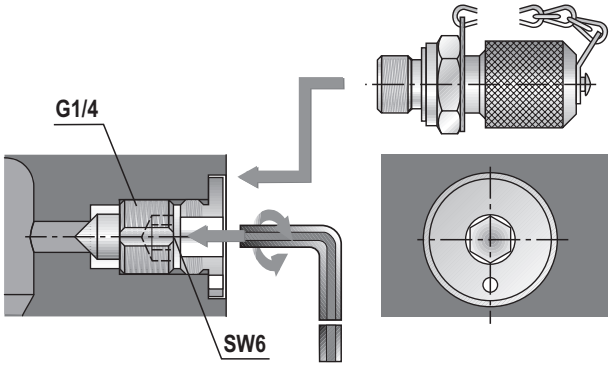
8) Versions "D" and "H" not standardized

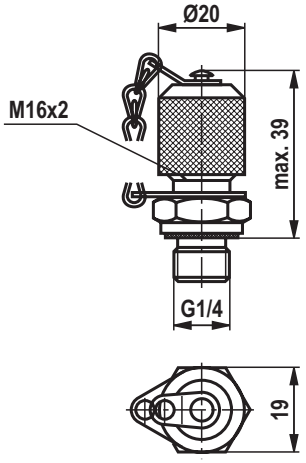
Dimensions: Bleeding / measuring coupling
(dimensions in mm)

By default, a patented safety vent against unintended screwing out in head and base is delivered for all cylinders. The port allows for the installation of a measuring coupling with check valve for pressure measurement or contamination-free bleeding. Measuring coupling with check valve function, i.e. it can also be connected when the system is pressurized.



1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

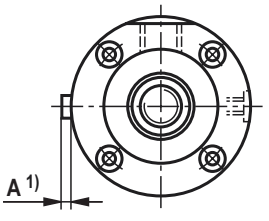




Scope of delivery: Measuring coupling **G1/4**
MEASURING COUPLING AB 20-11/K1 G1/4 with seal ring made of NBR
Material no. **R900009090**
MEASURING COUPLING AB 20-11/K1V G1/4 with seal ring made of FKM
Material no. **R900001264**

Dimensions: Throttle valve
(dimensions in mm)

ØAL	40	50	63	80	100	125	140	160	180	200	220	250	280	320
Protrusion A 1)	1	0	0	0	0	0	0	0	0	0	9.5	0	0	0
Nominal width	4	4	4	5	5	8	8	8	8	8	20	20	20	20

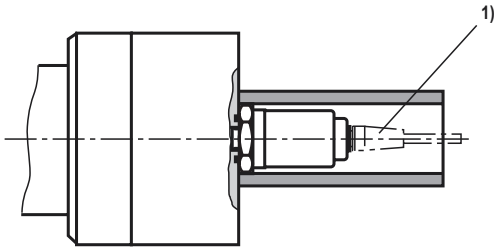


ØAL = Piston Ø

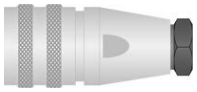
1) Throttle valve only with end position cushioning "E" (180° for bleeding)
Protrusion A in closed condition

Position measurement system

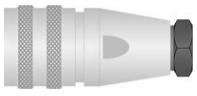
Types of mounting
MF3, MF4, MT4, MS2



1) For analog output:
6-pole Amphenol mating connector
Material no. **R900072231**
(mating connector is **not** included in the scope of delivery, must be ordered separately)

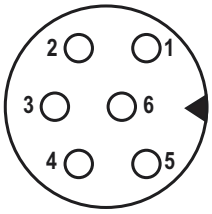


1) For digital output:
7-pole Amphenol mating connector
Material no. **R900079551**
(mating connector is **not** included in the scope of delivery, must be ordered separately)



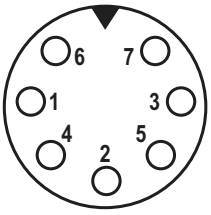
Pin assignment

Position measurement system (analog output)
Connector (view to pin side)



Pin	Cable	Signal / current	Signal / voltage
1	gray	4 ... 20 mA	0 ... 10 V
2	pink	DC ground	DC ground
3	yellow	not assigned	not assigned
4	green	DC ground	DC ground
5	brown	+24 V DC (+20% / –15%)	+24 V DC (+20% / –15%)
6	white	DC ground (0 V)	DC ground (0 V)

Position measurement system (digital output)
Connector (view to pin side)



Pin	Cable	Signal / SSi
1	gray	Data (–)
2	pink	Data (+)
3	yellow	Clock (+)
4	green	Clock (–)
5	brown	+24 V DC (+20 % / –15 %)
6	white	DC ground (0 V)
7	–	not assigned

Position measurement system

The position measurement system that is pressure-resistant up to 500 bar works in a contactless and absolute manner. The basis of this position measurement system is the magnetostrictive effect. Here, the coincidence of two magnetic fields triggers a torsion pulse.
This pulse runs on the waveguide inside the gauge from the measuring point to the sensor head. The running time is constant and almost temperature-independent.
It is proportional to the position of the solenoid and thus a measure for the actual position value and is converted in the sensor into a direct analog or digital output.

Technical data

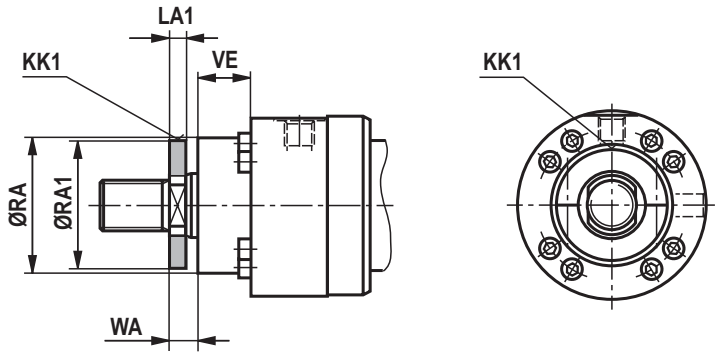
(For applications outside these values, please consult us!)

Operating pressure		bar	250
Analog output		V	0 ... 10
	Load resistance	kΩ	≥ 5
	Resolution		unlimited
Analog output		mA	4 ... 20
	Load resistance	Ω	0 ... 500
	Resolution		unlimited
Digital output			SSI 24 bit gray-coded
	Resolution	µm	5
	Direction of measurement		asynchronously forward
Linearity (absolute accuracy)	Analog	% mm	≤ ±0.02% (referred to measurement length) min. ±0.05
	Digital	% mm	≤ ±0.01% (referred to measurement length) min. ±0.04
Reproducibility		% mm	±0.001 (referred to measurement length) min. ±0.0025
Hysteresis		mm	≤ 0.004
Supply voltage		V DC	24 (±10 % with analog output)
	Current consumption	mA	100
	Residual ripple	% s-s	≤ 1
		V DC	24 (+20 %/–15 % with digital output)
	Current consumption	mA	70
	Residual ripple	% s-s	≤ 1
Protection class	Pipe and flange		IP 67
	Sensor electronics		IP 65
Ambient temperature	Sensor electronics	°C	–20 ... +75
Derating	Sensor electronics		6.5 K/W ≥ 49 °C

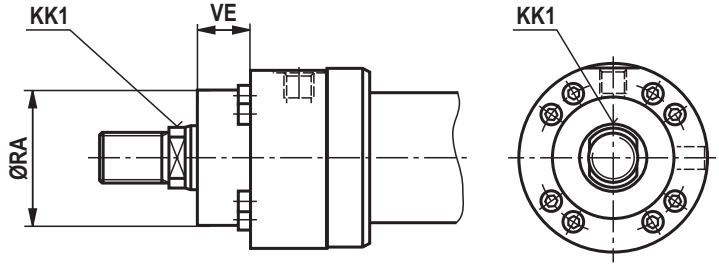
Position / dimensions: Equipotential bonding

(dimensions in mm)

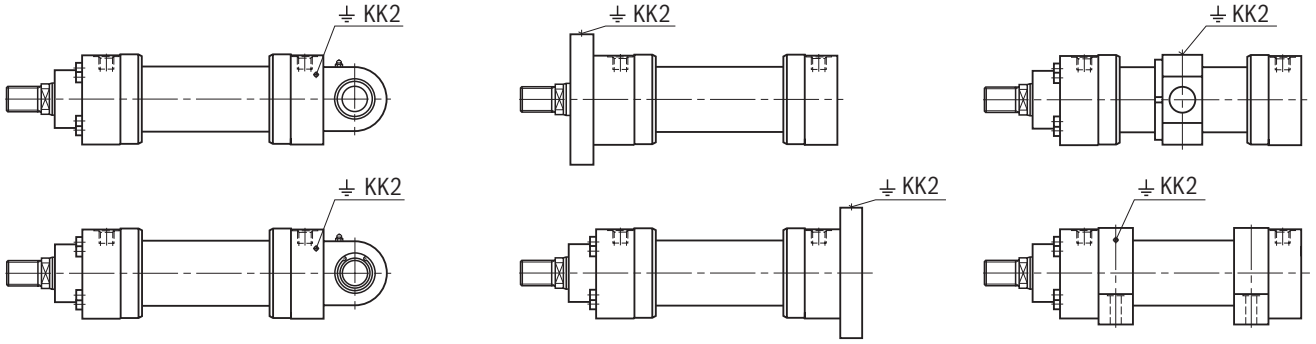
Mounting ring for equipotential bonding
at the piston rod (KK1)
Piston Ø 40 ... 125 mm



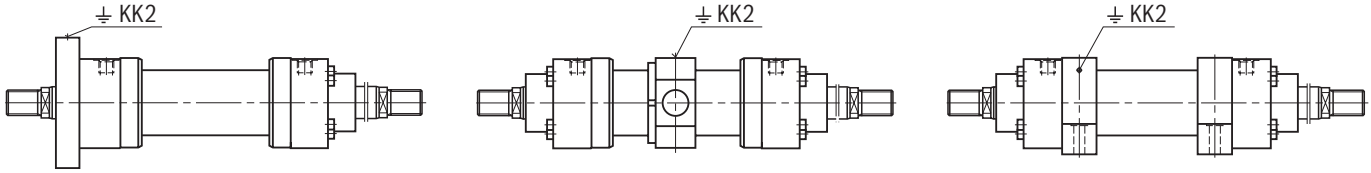
Equipotential bonding at the piston rod (KK1)
Piston Ø 140 ... 320 mm



Equipotential bonding at the cylinder (KK2)
Piston Ø 40 ... 320 mm
CDH2...XC

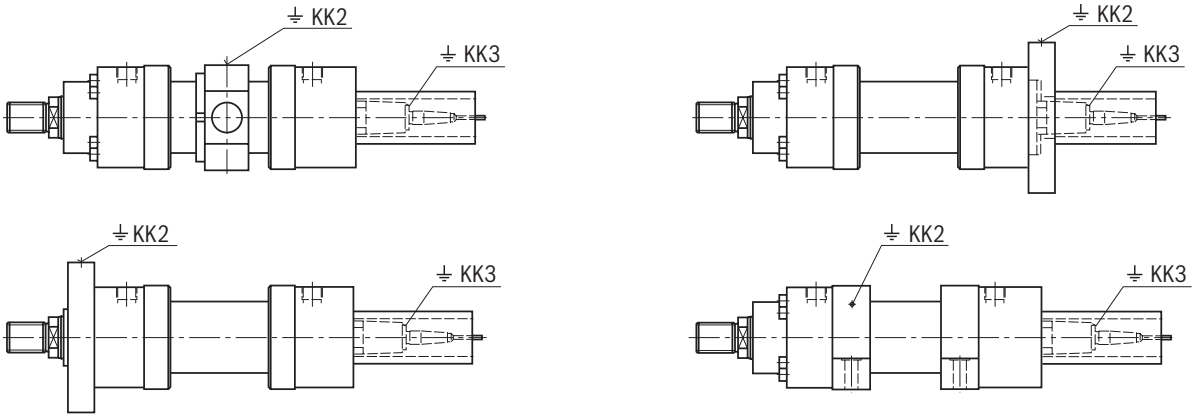


CGH2...XC



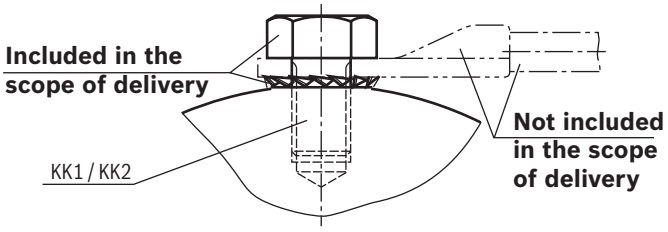
Position / dimensions: Equipotential bonding
(dimensions in mm)

CSH2...XE



KK1 and KK2

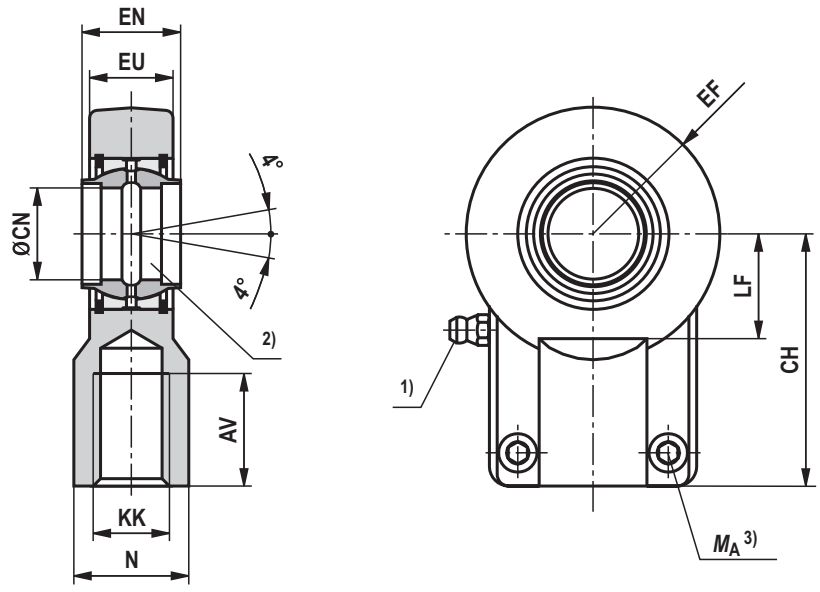
ØAL	ØMM	RA1	LA1	KK1 / KK2
40	**25**	48	12	M6
	28	50		
50	**32**	56	12	M6
	36	60		
63	**40**	68	12	M6
	45	72		
80	**50**	80	13	M6
	56	85		
100	**63**	95	18	M6
	70	100		
125	**80**	110	18	M6
	90	120		
140 ... 320	**–**	–	–	M8



ØAL = Piston Ø
ØMM = Piston rod Ø
KK3 = cable clamp at the position measurement system

Dimensions: Swivel head CGKD (clampable)
(dimensions in mm)

ISO 8132



ØAL	Type	Material no.	Nominal force kN	AV min.	N max.	CH js13	EF max.	ØCN 2) H7	EN h12	EU max.
40	**CGKD 25**	R900323332	32	29	31	65	32	25	25	22
50	**CGKD 32**	R900322049	50	37	38	80	40	32	32	28
63	**CGKD 40**	R900322029	80	46	47	97	50	40	40	34
80	**CGKD 50**	R900322719	125	57	58	120	63	50	50	42
100	**CGKD 63**	R900322028	200	64	70	140	72.5	63	63	53.5
125	**CGKD 80**	R900322700	320	86	91	180	92	80	80	68
140	**CGKD 90** 7)	R900325702	400	91	100	195	101	90	90	72
160	**CGKD 100**	R900322030	500	96	110	210	114	100	100	85.5
180	**CGKD 110** 7)	R900308153	635	106	125	235	129	110	110	88
200	**CGKD 125**	R900322026	800	113	135	260	160	125	125	105
220	**CGKD 160**	R900300718	1,520	126	165	310	200	160	160	133
250	**CGKD 160**	R900300718	1,520	126	165	310	200	160	160	133
280	**CGKD 200**	R900324814	2,000	161	215	390	250	200	200	165
320	**CGKD 200**	R900324814	2,000	161	215	390	250	200	200	165

Dimensions: Swivel head CGKD (clampable)
(dimensions in mm)

ØAL	Type	KK	LF min.	Clamping screw ISO 4762-10.9	M_A [3] Nm	m [4] kg	C_0 [5] kN	F_{adm} [6] kN
40	**CGKD 25**	M20x1.5	25.5	M8x20	30	0.65	78	28.8
50	**CGKD 32**	M27x2	30	M10x25	59	1.15	114	42.1
63	**CGKD 40**	M33x2	39	M10x30	59	2.1	204	75.3
80	**CGKD 50**	M42x2	47	M12x35	100	4	310	114.4
100	**CGKD 63**	M48x2	58	M16x40	250	7.2	430	158.7
125	**CGKD 80**	M64x3	74	M20x50	490	15	695	256.5
140	**CGKD 90** [7]	M72x3	85	M20x60	490	19	750	276.8
160	**CGKD 100**	M80x3	94	M24x60	840	25.5	1060	391.1
180	**CGKD 110** [7]	M90x3	105	M24x60	840	36.5	1200	442.8
200	**CGKD 125**	M100x3	116	M24x70	840	52.5	1430	527.7
220	**CGKD 160**	M125x4	145	M24x80	840	82.5	2200	811.8
250	**CGKD 160**	M125x4	145	M24x80	840	82.5	2200	811.8
280	**CGKD 200**	M160x4	190	M30x100	1700	168	3650	1346.9
320	**CGKD 200**	M160x4	190	M30x100	1700	168	3650	1346.9

Note:
Geometry and dimensions may differ depending on the manufacturer. All graphical representations are examples. In case of combination with other mounting elements, the usability must be checked.

ØAL = Piston Ø

[1] Lubricating nipple, cone head form A according to DIN 71412

[2] Related bolt Ø m6

[3] M_A = Tightening torque
The tilt head must always be screwed against the shoulder of the piston rod. Afterwards, the clamping screws must be tightened with the specified tightening torque.

[4] m = Weight of swivel head in kg

[5] C_O = static load rating of the tilt head

[6] F_{adm} = max. admissible load of the tilt head with oscillatory or alternating loads

[7] Not contained in the standard

Kinking

For the admissible stroke length with flexibly guided load and a factor of 3.5 for safety against kinking, please refer to the relevant table. For other installation positions of the cylinder, the admissible stroke length must be interpolated. Admissible stroke length for non-guided load on request. Kinking calculations are carried out according to the following formulas:

1. Calculation according to Euler

$$F = \frac{\pi^2 \cdot E \cdot I}{v \cdot L_K^2} \qquad \text{if } \lambda > \lambda_g$$

2. Calculation according to Tetmajer

$$F = \frac{d^2 \cdot \pi\,(335 - 0.62 \cdot \lambda)}{4 \cdot v} \qquad \text{if } \lambda \le \lambda_g$$

Explanation:

E = Module of elasticity in N/mm²
= 2.1 x 10⁵ for steel

I = Geometrical moment of inertia in mm⁴
for circular cross-section = $\frac{d^4 \cdot \pi}{64} = 0.0491 \cdot d^4$

v = 3.5 (safety factor)

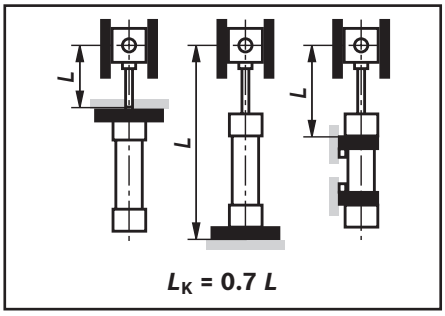
L_K = free bending length in mm (depending on the type of-mounting see sketches A, B, C)

d = Piston rod Ø in mm

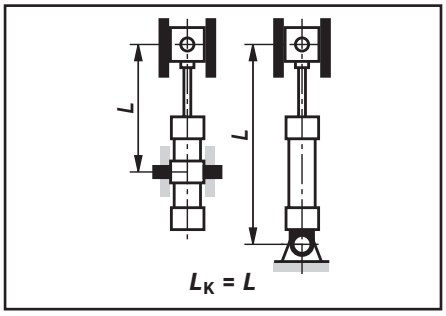
λ = Slenderness ratio
$= \frac{4 \cdot L_K}{d}$ $\qquad \lambda_g = \pi \sqrt{\frac{E}{0.8 \cdot R_e}}$

R_e = Yield strength of the piston rod material

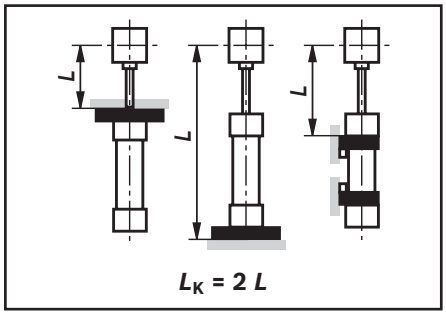
Influence of the type of mounting on the bending length:



$L_K = 0.7\ L$



$L_K = L$

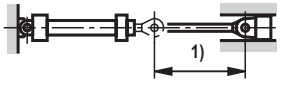


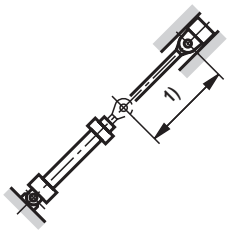
$L_K = 2\ L$

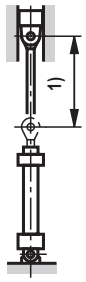
Admissible stroke length (dimensions in mm)

Type of mounting CDH2...XC: MP3, MP5

ØAL	ØMM	admissible stroke length with									Installation position
		100 bar			160 bar			250 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
40	25	195	200	215	130	135	140	40	45	55	0°
	28	385	400	445	295	300	320	215	220	225	
50	32	380	390	430	280	285	300	195	200	205	
	36	505	525	595	395	405	430	290	295	305	
63	40	480	500	550	365	370	385	255	260	265	
	45	640	660	750	505	515	550	380	385	395	
80	50	590	615	690	455	465	495	330	335	345	
	56	765	800	930	615	630	685	470	475	495	
100	63	750	780	910	595	610	660	445	455	470	
	70	940	985	1195	775	800	885	605	615	650	
125	80	970	1015	1200	780	805	880	595	605	635	45°
	90	1235	1300	1610	1030	1070	1200	825	840	895	
140	90	1075	1130	1360	875	905	1000	675	685	725	
	100	1335	1405	1770	1120	1165	1325	900	920	985	
160	100	1175	1230	1480	955	985	1085	735	750	785	
	110	1430	1500	1875	1195	1240	1400	955	975	1040	
180	110	1250	1310	1570	1010	1045	1150	775	790	830	
	125	1620	1710	2160	1365	1420	1620	1100	1125	1205	
200	125	1435	1510	1860	1180	1220	1365	915	935	990	
	140	1795	1900	2450	1525	1590	1840	1240	1270	1370	
220	140	1620	1710	2180	1360	1415	1630	1090	1120	1200	90°
	160	2075	2200	3000	1810	1890	2280	1510	1560	1730	
250	160	1805	1910	2490	1520	1590	1850	1220	1250	1360	
	180	2250	2395	3300	1960	2060	2500	1630	1690	1880	
280	180	2075	2200	2900	1775	1880	2170	1450	1490	1620	
	200	2510	2670	3700	2200	2310	2820	1850	1920	2140	
320	200	2135	2270	3030	1820	1900	2260	1470	1510	1660	
	220	2550	2720	3820	2230	2340	2880	1860	1930	2170	





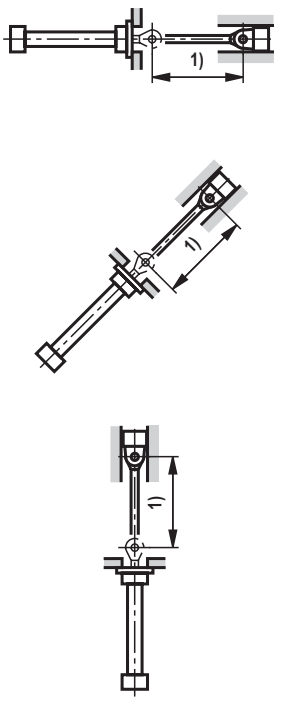


1) Adm. Stroke length

Admissible stroke length (dimensions in mm)

Type of mounting CDH2...XC / CGH2...XC / CSH2...XE [2]: MF3

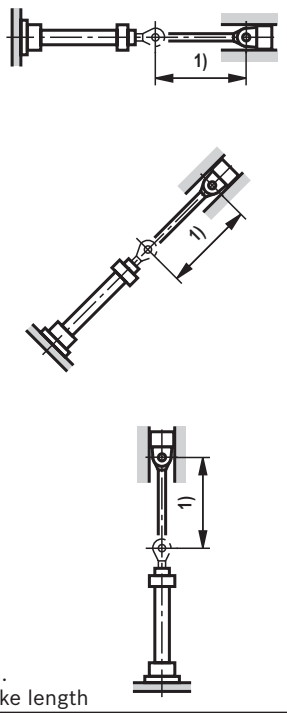
ØAL	ØMM	admissible stroke length with									Installation position
		100 bar			160 bar			250 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
40	25	895	915	980	730	735	760	440	450	510	0°
	28	1400	1415	1630	1180	1205	1275	970	980	1010	
50	32	1440	1490	1670	1210	1230	1300	985	995	1025	
	36	1760	1830	2000	1510	1545	1675	1255	1270	1320	
63	40	1735	1800	2000	1475	1510	1620	1215	1230	1270	
	45	2000	2000	2000	1830	1880	2080	1540	1560	1640	
80	50	2000	2000	2000	1810	1850	1995	1495	1515	1570	
	56	2000	2000	2000	2000	2000	2000	1870	1900	2000	
100	63	2580	2690	3000	2235	2300	2550	1875	1910	2010	
	70	3000	3000	3000	2690	2780	3000	2300	2350	2520	
125	80	3000	3000	3000	2840	2930	3000	2400	2450	2590	45°
	90	3000	3000	3000	3000	3000	3000	3000	3000	3000	
140	90	3000	3000	3000	3000	3000	3000	2700	2760	2950	
	100	3000	3000	3000	3000	3000	3000	3000	3000	3000	
160	100	3000	3000	3000	3000	3000	3000	2920	2980	3000	
	110	3000	3000	3000	3000	3000	3000	3000	3000	3000	
180	110	3000	3000	3000	3000	3000	3000	3000	3000	3000	
	125	3000	3000	3000	3000	3000	3000	3000	3000	3000	
200	125	3000	3000	3000	3000	3000	3000	3000	3000	3000	
	140	3000	3000	3000	3000	3000	3000	3000	3000	3000	
220	140	5400	5680	6000	4800	4980	5780	4120	4220	4560	90°
	160	6000	6000	6000	5820	6000	6000	5150	5330	6000	
250	160	5850	6000	6000	5270	5500	6000	4600	4740	5250	
	180	6000	6000	6000	6000	6000	6000	5650	5850	6000	
280	180	6000	6000	6000	6000	6000	6000	5270	5420	5970	
	200	6000	6000	6000	6000	6000	6000	6000	6000	6000	
320	200	6000	6000	6000	6000	6000	6000	5950	6000	6000	
	220	6000	6000	6000	6000	6000	6000	6000	6000	6000	



[1] Adm. Stroke length

Type of mounting CDH2...XC / CSH2...XE [2]: MF4

ØAL	ØMM	admissible stroke length with									Installation position
		100 bar			160 bar			250 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
40	25	325	340	370	245	250	260	105	110	140	0°
	28	565	590	695	465	475	520	365	370	385	
50	32	600	625	715	485	495	530	370	375	390	
	36	755	790	950	630	650	715	505	515	540	
63	40	730	765	905	600	615	675	470	480	500	
	45	920	965	1190	780	805	905	630	645	685	
80	50	910	950	1130	750	775	845	595	605	630	
	56	1125	1185	1470	960	990	1120	785	800	850	
100	63	1120	1175	1460	945	980	1105	770	785	835	
	70	1350	1430	1860	1175	1220	1420	980	1000	1090	
125	80	1430	1510	1910	1225	1270	1450	1000	1025	1100	45°
	90	1750	1855	2490	1540	1610	1910	1300	1340	1470	
140	90	1585	1675	2170	1370	1425	1650	1135	1165	1260	
	100	1895	2010	2750	1675	1755	2110	1425	1470	1630	
160	100	1725	1820	2340	1490	1545	1780	1230	1260	1360	
	110	2030	2150	2900	1785	1870	2230	1510	1560	1720	
180	110	1855	1960	2510	1595	1660	1910	1315	1350	1450	
	125	2300	2440	3350	2040	2130	2580	1735	1790	1990	
200	125	2105	2230	2950	1830	1910	2250	1530	1570	1715	
	140	2535	2700	3000	2260	2370	2920	1940	2010	2255	
220	140	2250	2400	3350	1990	2090	2550	1685	1740	1950	90°
	160	2800	2990	4500	2530	2680	3480	2220	2310	2700	
250	160	2600	2770	3900	2310	2430	3000	1975	2040	2300	
	180	3130	3350	5050	2840	3000	3910	2500	2600	3040	
280	180	2850	3050	4400	2550	2680	3370	2190	2270	2600	
	200	3370	3610	5550	3070	3250	4300	2700	2820	3330	
320	200	3070	3270	4750	2750	2890	3650	2150	2460	2810	
	220	3560	3820	5850	3250	3430	4550	2860	2980	3530	

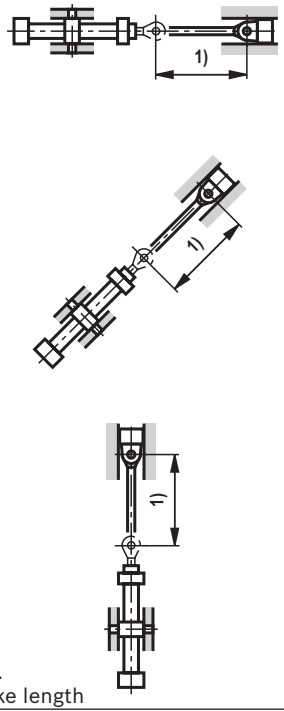


[1] Adm. Stroke length

Admissible stroke length (dimensions in mm)

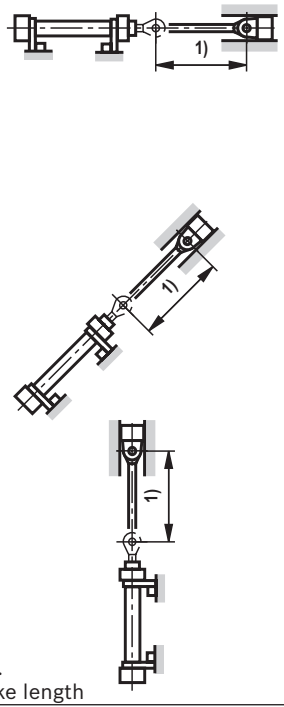
Type of mounting CDH2...XC / CGH2...XC / CSH2...XE [2]: MT4 trunnion in cylinder center

ØAL	ØMM	admissible stroke length with									Installation position
		100 bar			160 bar			250 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
40	25	340	345	365	250	255	260	130	135	145	0°
	28	590	605	665	470	480	500	365	370	375	
50	32	600	615	670	470	480	495	355	360	365	
	36	770	795	890	625	635	670	485	490	505	
63	40	740	765	845	590	600	630	450	455	465	
	45	940	975	1115	770	790	845	610	620	640	
80	50	920	950	1055	735	750	790	570	575	590	
	56	1155	1195	1375	950	975	1045	755	765	790	
100	63	1145	1190	1365	940	960	1030	740	750	775	
	70	1400	1460	1740	1180	1210	1330	955	970	1015	
125	80	1470	1530	1780	1220	1250	1350	970	985	1020	45°
	90	1820	1910	2320	1550	1600	1780	1275	1300	1370	
140	90	1640	1710	2020	1370	1410	1540	1100	1120	1170	
	100	1980	2080	2570	1700	1755	1970	1400	1430	1515	
160	100	1780	1850	2180	1485	1520	1660	1190	1210	1260	
	110	2110	2210	2710	1800	1860	2080	1480	1510	1595	
180	110	1910	1990	2340	1590	1635	1780	1275	1295	1350	
	125	2405	2530	3000	2065	2130	2400	1710	1740	1850	
200	125	2180	2280	2740	1840	1890	2090	1490	1510	1590	
	140	2660	2800	3000	2300	2380	2720	1915	1960	2100	
220	140	2490	2510	3150	2050	2120	2400	1685	1720	1835	90°
	160	3000	3170	4230	2640	2750	3260	2240	2310	2530	
250	160	2730	2870	3640	2350	2440	2790	1950	1990	2140	
	180	3320	3520	4720	2940	3060	3650	2500	2570	2830	
280	180	3040	3210	4140	2640	2750	3170	2210	2260	2440	
	200	3620	3840	5210	3210	3360	4040	2750	2830	3140	
320	200	3250	3430	4455	2820	2930	3410	2360	2420	2620	[1] Adm. Stroke length
	220	3800	4030	5500	3370	3530	4250	2880	2970	3290	



Type of mounting CDH2...XC / CGH2...XC / CSH2...XE [2]: MS2

ØAL	ØMM	admissible stroke length with									Installation position
		100 bar			160 bar			250 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
40	25	825	840	885	645	650	665	370	375	410	0°
	28	1305	1350	1535	1085	1110	1180	875	885	910	
50	32	1330	1375	1560	1095	1120	1190	875	885	910	
	36	1645	1715	2030	1395	1430	1560	1140	1160	1210	
63	40	1610	1670	1950	1345	1380	1490	1085	1100	1145	
	45	1980	2000	2000	1700	1750	1950	1410	1435	1510	
80	50	1980	2000	2000	1665	1710	1850	1350	1370	1425	
	56	2000	2000	2000	2000	2000	2000	1730	1760	1860	
100	63	2420	2535	3000	2080	2140	2390	1720	1750	1850	
	70	2880	3000	3000	2530	2630	3000	2140	2190	2360	
125	80	3000	3000	3000	2660	2750	3000	2220	2270	2410	45°
	90	3000	3000	3000	3000	3000	3000	2810	2890	3000	
140	90	3000	3000	3000	2970	3000	3000	2490	2550	2740	
	100	3000	3000	3000	3000	3000	3000	3000	3000	3000	
160	100	3000	3000	3000	3000	3000	3000	2690	2750	2950	
	110	3000	3000	3000	3000	3000	3000	3000	3000	3000	
180	110	3000	3000	3000	3000	3000	3000	2890	2960	3000	
	125	3000	3000	3000	3000	3000	3000	3000	3000	3000	
200	125	3000	3000	3000	3000	3000	3000	3000	3000	3000	
	140	3000	3000	3000	3000	3000	3000	3000	3000	3000	
220	140	5090	5370	6000	4490	4670	5470	3820	3910	4260	90°
	160	6000	6000	6000	5510	5800	6000	4850	5020	5750	
250	160	5520	5860	6000	4940	5170	6000	4270	4410	4920	
	180	6000	6000	6000	6000	6000	6000	5320	5520	6000	
280	180	6000	6000	6000	5700	5960	6000	4930	5070	5630	
	200	6000	6000	6000	6000	6000	6000	6000	6000	6000	
320	200	6000	6000	6000	5890	6000	6000	4750	5310	6000	[1] Adm. Stroke length
	220	6000	6000	6000	6000	6000	6000	6000	6000	6000	



With longer strokes, an extended guide and/or the use of guide rings may be reasonable for increasing the service life, depending on the respective case of application and installation position. Recommendation on request.

[2] With CSH2...XE, observe the maximum stroke length "X* $_{max.}$", pages 26 to 33

End position cushioning

End position cushioning:

The objective is to reduce the velocity of a moved mass, the center of gravity of which lies on the cylinder axis, to a level at which neither the cylinder nor the machine into which the cylinder is installed is damaged. For velocities above 20 mm/s, we recommend the use of an end position cushioning feature, which absorbs energy without requiring the use of an additional device. It must, however, always be checked whether end position cushioning is also required for lower velocities with large masses.
With stroke lengths smaller than the damping lengths, we recommend selecting the cylinder without end position cushioning. With cylinder strokes within the damping lengths, restrictions with regard to speed / cycle time are possible.

Damping capacity:

When decelerating masses via end position cushioning, the structural-inherent damping capacity must not be exceeded. Cylinders with end position cushioning can achieve their full damping capacity only over the entire stroke length.
With the adjustable end position cushioning version "E", a throttle valve is additionally provided when compared with version "D". End position cushioning version "E" allows cycle times to be optimized. The max. damping capacity can only be achieved when the throttle valve is closed.
The calculation depends on the factors weight, velocity, system pressure and installation position. For this reason, mass and velocity are used to determine the characteristic D_m and system pressure and installation position to determine the characteristic D_p.
These two characteristics are used for verifying the admissible damping capacity in the "damping capacity" diagram. The intersection point of the characteristics D_m and D_p must always be below the damping capacity curve of the selected cylinder. The values in the diagrams refer to an average oil temperature of + 45 to +65 °C with the throttle valve being closed.
For special applications with very short stroke times, high velocities or large masses, cylinders with special end position cushioning versions can be offered on request. When fixed or adjustable stops are used, special measures must be taken!

Formulas:

$$D_m = \frac{m}{10^K}; \quad K = kv\,(0.5 - v)$$

m = moved weight in kg
v = stroke velocity in m/s
kv = see table page 47

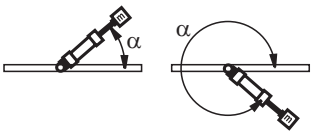
Extension for CDH2...XC and CSH2...XE

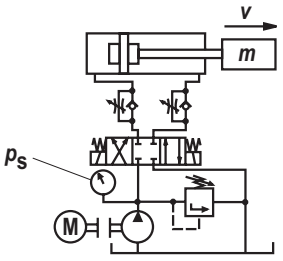
$$D_p = p_S - \frac{m \cdot 9.81 \cdot \sin\alpha}{A_1 \cdot 10}$$

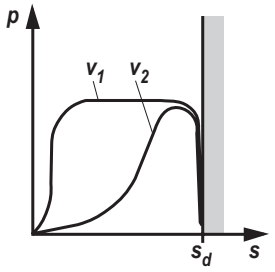
Retraction for CDH2...XC, CGH2...XC and CSH2...XE; Extension for CGH2...XC

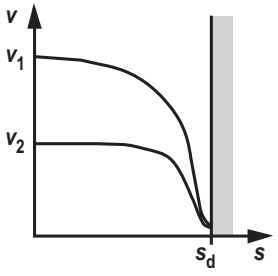
$$D_p = p_S + \frac{m \cdot 9.81 \cdot \sin\alpha}{A_3 \cdot 10}$$

p_S = system pressure in bar
A_1 = piston area in cm² (see page 11)
A_3 = annulus area in cm² (see page 11)
α = angle to the horizontal in degree









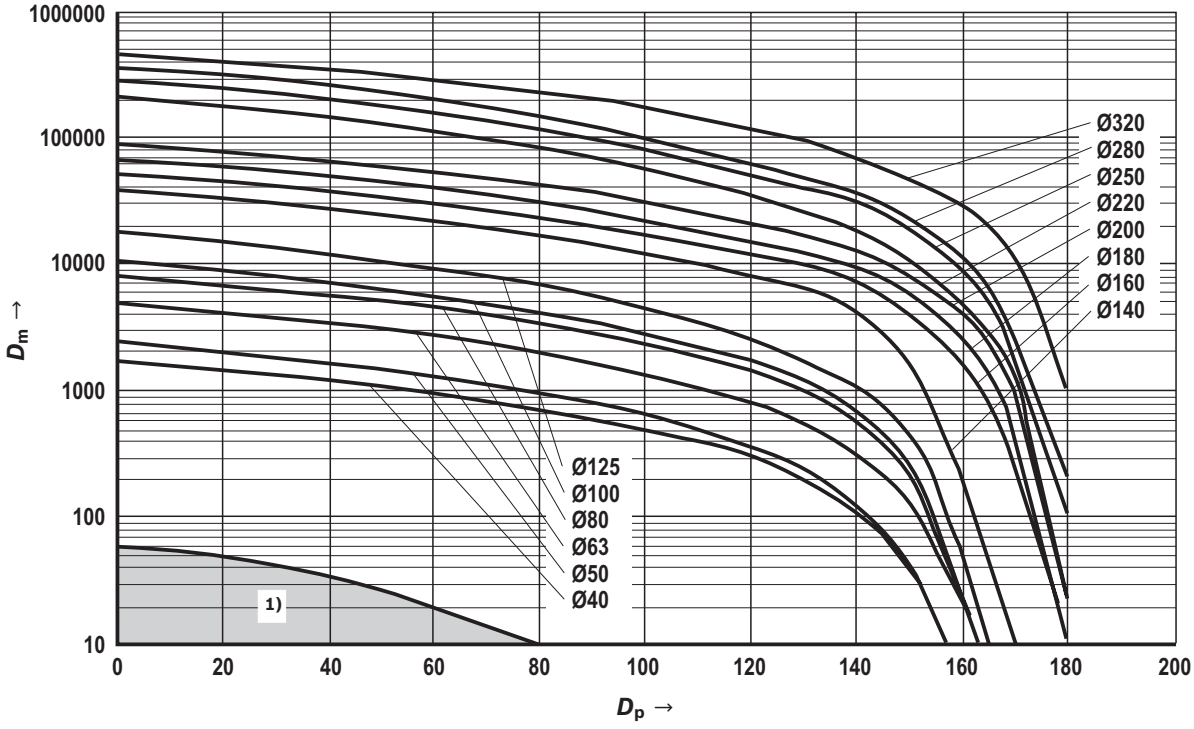
Damping length

ØAL mm	40	50	63	80	100	125	140	160	180	200	220	250	280	320
Head side	21	20	23	25	25	25	33	33	37	37	76	81	86	90
Base side	21	20	23	25	25	25	33	33	37	37	76	81	86	90

End position cushioning

ØAL mm	**40**	**50**	**63**	**80**	**100**	**125**	**140**	**160**	**180**	**200**	**220**	**250**	**280**	**320**
kv ①	2.85	2.97	2.56	2.82	3.51	3.02	2.53	2.65	2.91	2.76	2.85	2.95	3.11	3.13
kv ②	3.1	3.25	2.85	2.85	3.52	2.91	2.53	2.93	2.95	2.95	2.93	3.1	3.12	3.07
kv ③	2.95	3.1	2.73	3.1	3.51	2.95	2.51	2.91	2.95	2.91	2.93	2.93	3.15	3.25

Damping capacity: Extension for CDH2...XC and CSH2...XE, with *kv* ①

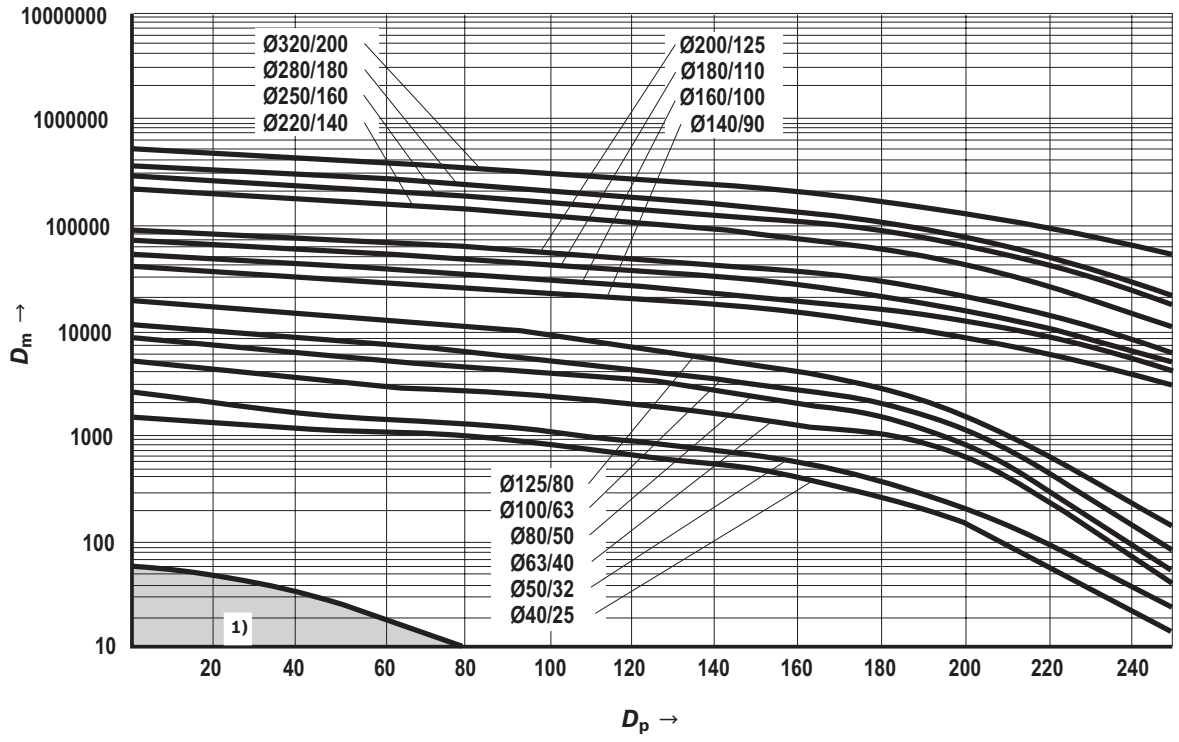


ØAL = Piston Ø

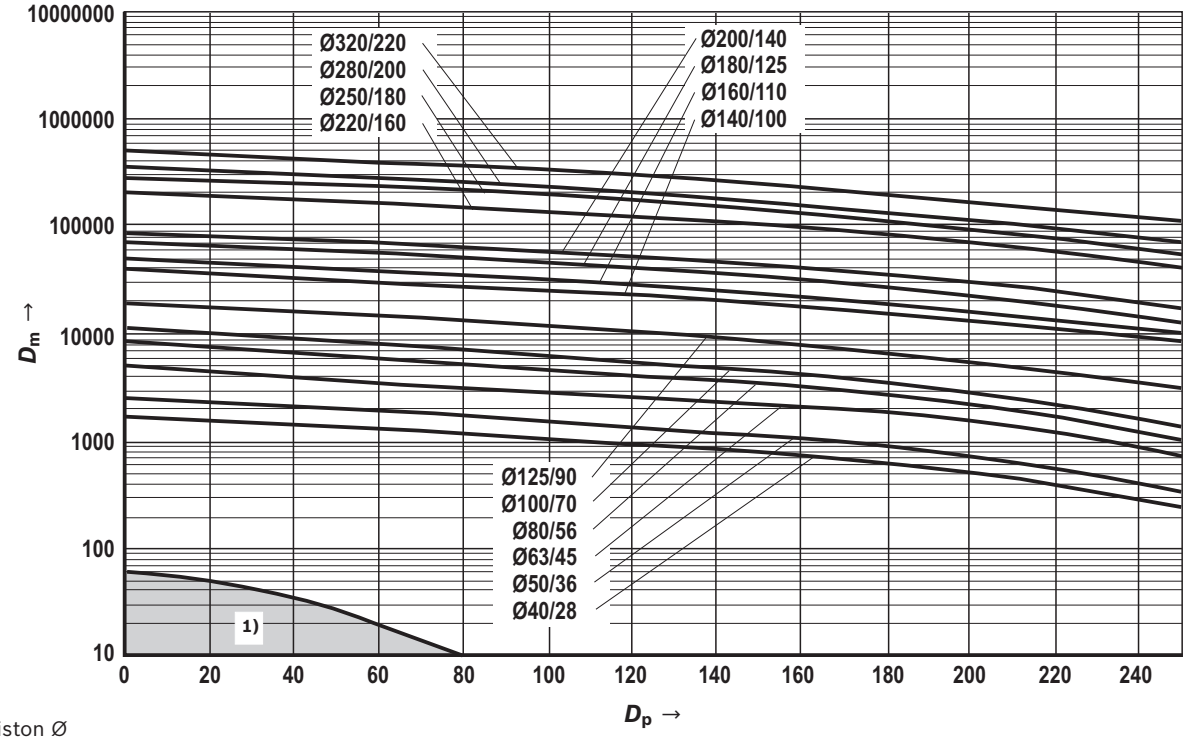
1) If with standard applications the calculated intersection point of D_m and D_p is within the marked area, we recommend designing the cylinder without end position cushioning.

End position cushioning

Damping capacity: Retraction for CDH2...XC, CGH2...XC and CSH2...XE; extension for CGH2...XC with *kv* ②



Damping capacity: Retraction for CDH2...XC, CGH2...XC and CSH2...XE; extension for CGH2...XC with *kv* ③



ØAL = Piston Ø

1) If with standard applications the calculated intersection point of D_m and D_p is within the marked area, we recommend designing the cylinder without end position cushioning.

Selection criteria for seals

	Work and environmental conditions	Seal versions				
		M	**A**	**B**	**T**	**S**
Medium / temperature	**Medium HL, HLP** / operating temperature medium –20 °C to +80 °C	++	++	++	++	++
	Medium HFA / operating temperature medium +5 °C to +55 °C	+/–	+	+/–	++	+/–
	Medium HFC / operating temperature medium –20 °C to +60 °C	–	+/–	–	++	–
	Medium HFDR / operating temperature medium –15 °C to +80 °C	–	–	++	–	++
	Ambient and rod temperature in the area of the piston rod with version CDH2..XC and CGH2..XC from –20 °C to +80 °C [1] / with version CSH2..XE from –20 °C to +75 °C [1]	++	++	+ [2]	+	++ [2]
Function / velocity...	static holding function more than 10 minutes: Attention! Application- and temperature-dependent	++	++	++	+	+
	Static holding function short-time < 1 minute	++	++	++	++	++
	Robust application conditions: Steel works, mining, thin ice	++	++	++	–	–
	Zero point control, hardly any amplitude, frequency max. 5 Hz, not longer than 5 minutes	–	–	–	++	++
	Cylinder velocity min. 0.001 m/sec stick-slip behavior	++	–	–	++	++
	Cylinder velocity from 0.01 m/sec to 0.5 m/sec [3]	++	+	+	++	++
	Cylinder velocity > 0.5 m/sec to max. 0.8 m/sec [3]	–	–	–	++	++
	Stroke > 1.0 m	+/–	++	++	++	++
	Standstill period (wear)	++	+/–	–	++	++
	Undissolved air in the oil [4]	–	–	–	+	+

++ = very good + = good +/– = conditional, depending on the application parameters – = inappropriate

General technical data in corresponding data sheets will remain valid!

Generally, a medium temperature of approx. 40 °C is recommended. The specified values are to be regarded as guidelines; depending on the application, it may be necessary to check the suitability of the seal system.

[1] Moreover, observe the corresponding medium temperature range
[2] Lower temperature limit –15 °C
[3] Standard line connections not designed for that velocity
[4] – Seal is destroyed / + Seal is not directly destroyed, leakage may occur

Seal kits

CDH2...XC – standard

ØAL	ØMM	Material no. for seal design				
		M	A	B	T	S
40	25	R901010141	R901010145	R901010147	R901010143	R901010146
	28	R900851087	R900859445	R900859770	R900858841	R900861001
50	32	R900860274	R900860929	R900860939	R900860275	R900861003
	36	R900849392	R900851515	R900860940	R900860277	R900861004
63	40	R900859509	R900851637	R900860941	R900860279	R900861006
	45	R900847956	R900851638	R900859678	R900847855	R900861007
80	50	R900857129	R900856092	R900860943	R900860281	R900861009
	56	R900850905	R900854718	R900851205	R900856180	R900861010
100	63	R900860283	R900856093	R900860945	R900860284	R900861012
	70	R900853382	R900856094	R900860946	R900860285	R900861013
125	80	R900860287	R900860931	R900860950	R900860288	R900861015
	90	R900857949	R900856095	R900855464	R900856102	R900861016
140	90	R900858281	R900860932	R900860951	R900860289	R900861017
	100	R900853965	R900856096	R900860952	R900860290	R900849080
160	100	R900855683	R900860468	R900860953	R900860291	R900861018
	110	R900851146	R900860933	R900860954	R900857536	R900861019
180	110	R900856497	R900860934	R900860955	R900852561	R900861020
	125	R900848603	R900860935	R900860956	R900860292	R900861021
200	125	R900860294	R900860936	R900860957	R900860295	R900861022
	140	R900856431	R900860937	R900860958	R900860293	R900861023
220	140	R900888100	R900888116	R900888140	R900888108	R900888132
	160	R900888101	R900888117	R900888141	R900888109	R900888133
250	160	R900888102	R900888118	R900888142	R900888110	R900888134
	180	R900888103	R900888119	R900888143	R900888111	R900888135
280	180	R900888104	R900888120	R900888144	R900888112	R900888136
	200	R900888105	R900888121	R900888145	R900888113	R900888137
320	200	R900888106	R900888122	R900888146	R900888114	R900888138
	220	R900888107	R900888123	R900888147	R900888115	R900888139

ØAL = Piston Ø
ØMM = Piston rod Ø

Seal kits

CGH2...XC – standard

ØAL	ØMM	Material no. for seal design				
		M	A	B	T	S
40	25	R901010159	R901010162	R901010170	R901010161	R901010169
	28	R900867252	R900866747	R900867133	R900868889	R900868943
50	32	R900867254	R900866749	R900867135	R900868891	R900868945
	36	R900864930	R900866750	R900867136	R900868892	R900868946
63	40	R900867261	R900866752	R900867138	R900868894	R900868948
	45	R900867262	R900866753	R900867139	R900868895	R900868949
80	50	R900867264	R900866755	R900867141	R900868897	R900868951
	56	R900867265	R900866756	R900867142	R900868898	R900868952
100	63	R900867267	R900866758	R900867144	R900868900	R900868954
	70	R900867268	R900866759	R900867146	R900868901	R900868955
125	80	R900860730	R900866761	R900867148	R900868903	R900868956
	90	R900867270	R900866762	R900867149	R900868904	R900868957
140	90	R900867271	R900866763	R900867150	R900868905	R900868958
	100	R900867272	R900866764	R900867151	R900868906	R900868959
160	100	R900867273	R900866765	R900867152	R900868907	R900868960
	110	R900867274	R900866766	R900867153	R900868908	R900868961
180	110	R900867275	R900866767	R900867154	R900868909	R900868962
	125	R900867276	R900866768	R900867155	R900868910	R900868963
200	125	R900867277	R900866769	R900867156	R900868911	R900868964
	140	R900867278	R900866770	R900867157	R900868912	R900868965
220	140	R900888020	R900888036	R900888060	R900888028	R900888052
	160	R900888021	R900888037	R900888061	R900888029	R900888053
250	160	R900888022	R900888038	R900888062	R900888030	R900888054
	180	R900888023	R900888039	R900888063	R900888031	R900888055
280	180	R900888024	R900888040	R900888064	R900888032	R900888056
	200	R900888025	R900888041	R900888065	R900888033	R900888057
320	200	R900888026	R900888042	R900888066	R900888034	R900888058
	220	R900888027	R900888043	R900888067	R900888035	R900888059

ØAL = Piston Ø
ØMM = Piston rod Ø

Seal kits

CDH2...XC – standard + additional option F

ØAL	ØMM	Material no. for seal design		
		M+F	T+F	S+F
40	25	R901010148	R901010149	R901010150
	28	R900861025	R900861050	R900861100
50	32	R900861027	R900861052	R900861102
	36	R900861028	R900861053	R900861103
63	40	R900861030	R900861055	R900861105
	45	R900861031	R900861056	R900861106
80	50	R900861033	R900861058	R900861108
	56	R900861034	R900861059	R900861109
100	63	R900861036	R900861061	R900861114
	70	R900861037	R900861062	R900861115
125	80	R900861039	R900861064	R900861120
	90	R900861040	R900861065	R900861122
140	90	R900861041	R900861066	R900861124
	100	R900861042	R900861067	R900861126
160	100	R900861043	R900861068	R900861128
	110	R900861044	R900861069	R900861130
180	110	R900861045	R900861070	R900861133
	125	R900861046	R900861071	R900861135
200	125	R900861047	R900861072	R900861142
	140	R900861048	R900861073	R900861143

CGH2...XC – standard + additional option F

ØAL	ØMM	Material no. for seal design		
		M+F	T+F	S+F
40	25	R901010151	R901010154	R901010156
	28	R900868999	R900869026	R900869093
50	32	R900869001	R900869028	R900869095
	36	R900869002	R900869029	R900869096
63	40	R900869004	R900869031	R900869098
	45	R900869005	R900869032	R900869099
80	50	R900869007	R900869034	R900869101
	56	R900869008	R900869035	R900869102
100	63	R900869012	R900869037	R900869104
	70	R900869013	R900869038	R900869105
125	80	R900869015	R900869040	R900869107
	90	R900869016	R900869041	R900869108
140	90	R900869017	R900869042	R900869109
	100	R900869018	R900869043	R900869110
160	100	R900869019	R900869044	R900869111
	110	R900869020	R900869045	R900869112
180	110	R900869021	R900869046	R900869113
	125	R900869022	R900869047	R900869114
200	125	R900869023	R900869048	R900869115
	140	R900869024	R900869049	R900869116

ØAL = Piston Ø ØMM = Piston rod Ø

Seal kits [2)]

CSH2...XE

ØAL	ØMM	Material no. for seal design		
		M	T	S
40	28	R900861025	R900861050	R900861100
50	32	R900861027	R900861052	R900861102
	36	R900861028	R900861053	R900861103
63	40	R900861030	R900861055	R900861105
	45	R900861031	R900861056	R900861106
80	50	R900861033	R900861058	R900861108
	56	R900861034	R900861059	R900861109
100	63	R900861036	R900861061	R900861114
	70	R900861037	R900861062	R900861115
125	80	R900861039	R900861064	R900861120
	90	R900861040	R900861065	R900861122
140	90	R900861041	R900861066	R900861124
	100	R900861042	R900861067	R900861126
160	100	R900861043	R900861068	R900861128
	110	R900861044	R900861069	R900861130
180	110	R900861045	R900861070	R900861133
	125	R900861046	R900861071	R900861135
200	125	R900861047	R900861072	R900861142
	140	R900861048	R900861073	R900861143
220	140	R900888100	R900888108	R900888116
	160	R900888101	R900888109	R900888117
250	160	R900888102	R900888110	R900888118
	180	R900888103	R900888111	R900888119
280	180	R900888104	R900888112	R900888120
	200	R900888105	R900888113	R900888121
320	200	R900888106	R900888114	R900888122
	220	R900888107	R900888115	R900888123

Only for position measurement system

ØAL	Material no. for seal design	
	M, T	S
40	R900885935	R900885937
50	R900894958	R900894979
63	R900894959	R900894980
80	R900894960	R900894981
100	R900894961	R900894982
125	R900894962	R900894983
140	R900894963	R900894985
160	R900894964	R900894986
180	R900894973	R900894987
200	R900894974	R900894988
220	R900894975	R900894989
250	R900894976	R900894991
280	R900894977	R900894993
320	R900894978	R900894994

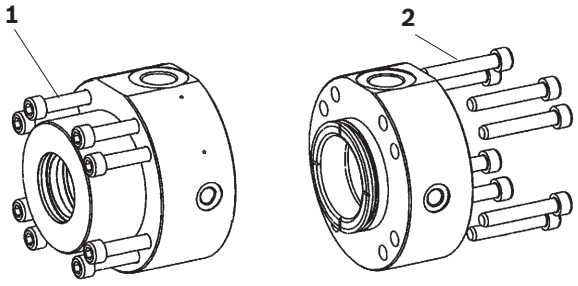
ØAL = Piston Ø

ØMM = Piston rod Ø

[2)] Seal kits for position measurement system separate material no.

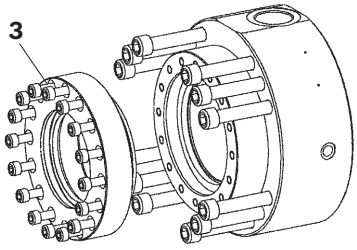
Tightening torques

Screws: Head and base (item 1 and 2)



Series	Piston Ø	Screw	Quantity	Quality class	Tightening torque
CDH2...XC / CGH2...XC / CSH2...XE	**40**	M8	4	10.9	23 Nm
CDH2...XC / CGH2...XC / CSH2...XE	**50**	M8	8	10.9	20 Nm
CDH2...XC / CGH2...XC / CSH2...XE	**63**	M8	8	10.9	30 Nm
CDH2...XC / CGH2...XC / CSH2...XE	**80**	M10	8	10.9	55 Nm
CDH2...XC / CGH2...XC / CSH2...XE	**100**	M12	8	10.9	100 Nm
CDH2...XC / CGH2...XC / CSH2...XE	**125**	M16	8	10.9	200 Nm
CDH2...XC / CGH2...XC / CSH2...XE	**140**	M16	12	10.9	170 Nm
CDH2...XC / CGH2...XC / CSH2...XE	**160**	M16	12	10.9	220 Nm
CDH2...XC / CGH2...XC / CSH2...XE	**180**	M20	12	10.9	350 Nm
CDH2...XC / CGH2...XC / CSH2...XE	**200**	M20	12	10.9	410 Nm
CDH2...XC / CGH2...XC / CSH2...XE	**220**	M20	16	10.9	460 Nm
CDH2...XC / CGH2...XC / CSH2...XE	**250**	M24	16	10.9	700 Nm
CDH2...XC / CGH2...XC / CSH2...XE	**280**	M30	12	10.9	1700 Nm
CDH2...XC / CGH2...XC / CSH2...XE	**320**	M30	16	10.9	1500 Nm

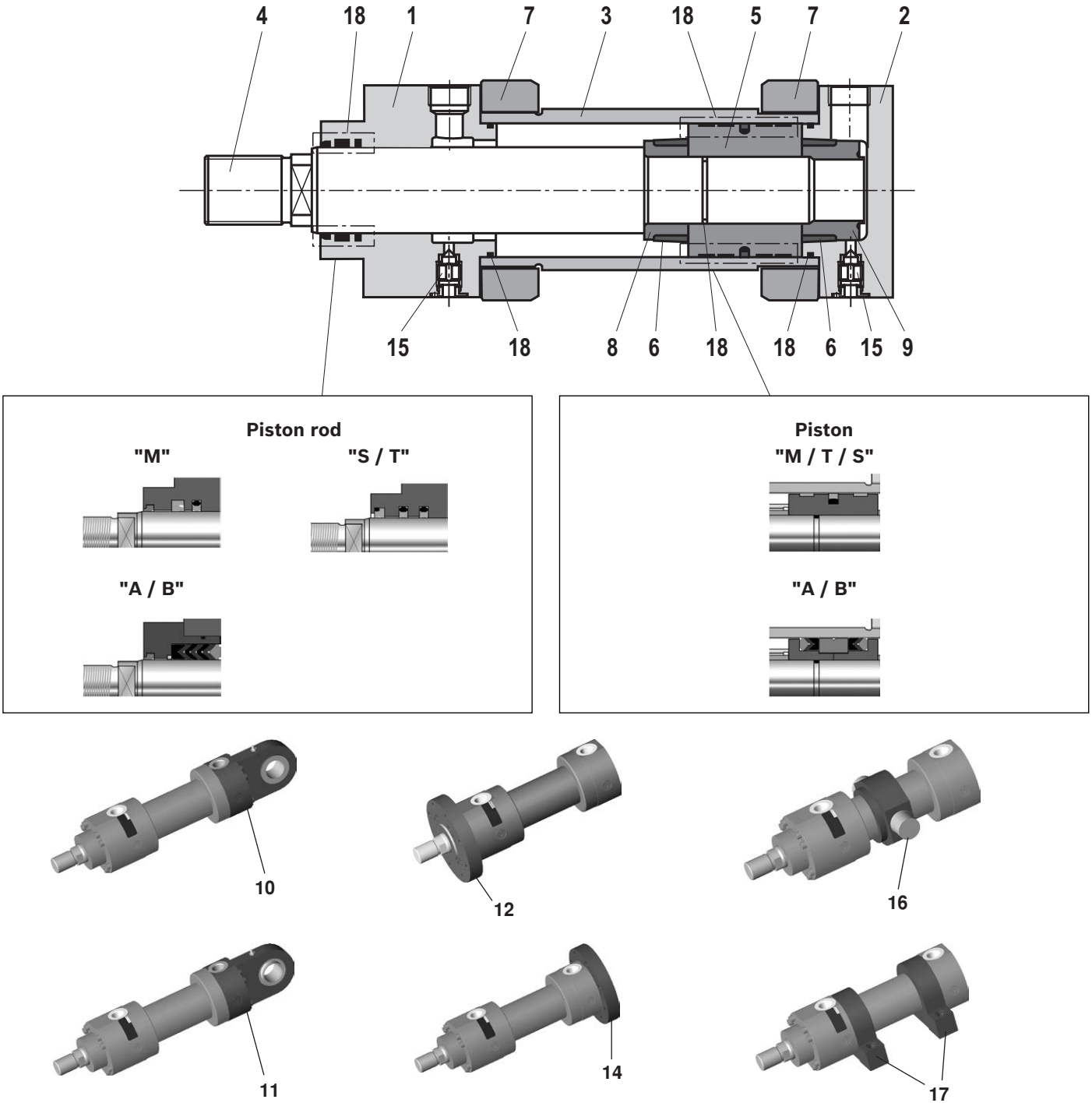
Screws: Seal cover (item 3)



Only with seal design "A" and "B"

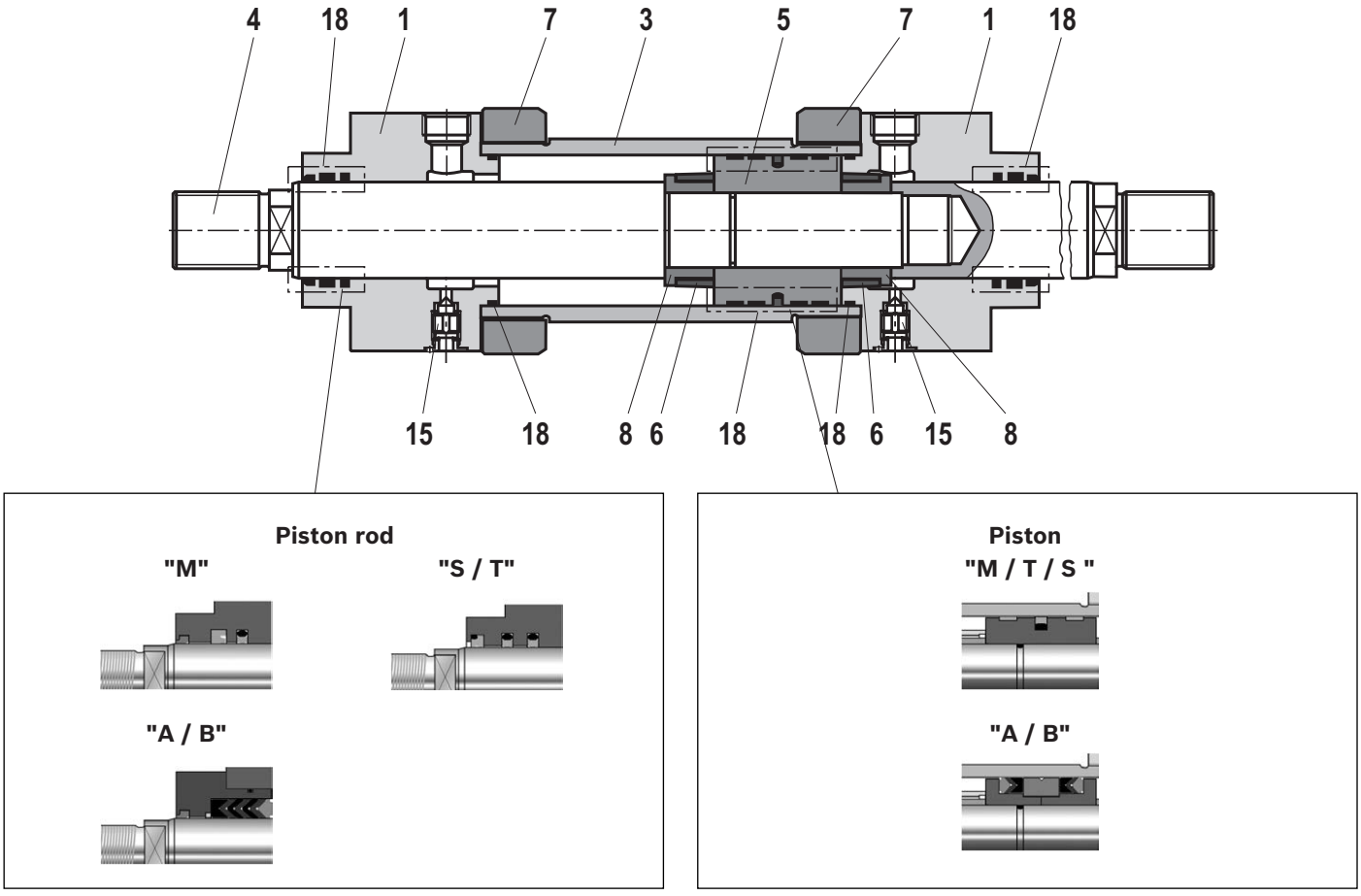
Series	Piston Ø	Piston rod Ø	Screw	Quantity	Quality class	Tightening torque
CDH2...XC / CGH2...XC	**160**	**100**	M10	16	10.9	60 Nm
		110				
CDH2...XC / CGH2...XC	**180**	**110**	M12	16	10.9	80 Nm
		125				
CDH2...XC / CGH2...XC	**200**	**125**	M12	16	10.9	90 Nm
		140				
CDH2...XC / CGH2...XC	**220**	**140**	M12	16	10.9	90 Nm
		160		24		
CDH2...XC / CGH2...XC	**250**	**160**	M12	24	10.9	90 Nm
		180				
CDH2...XC / CGH2...XC	**280**	**180**	M12	24	10.9	90 Nm
		200				
CDH2...XC / CGH2...XC	**320**	**200**	M12	24	10.9	90 Nm
		220	M16	16		230 Nm

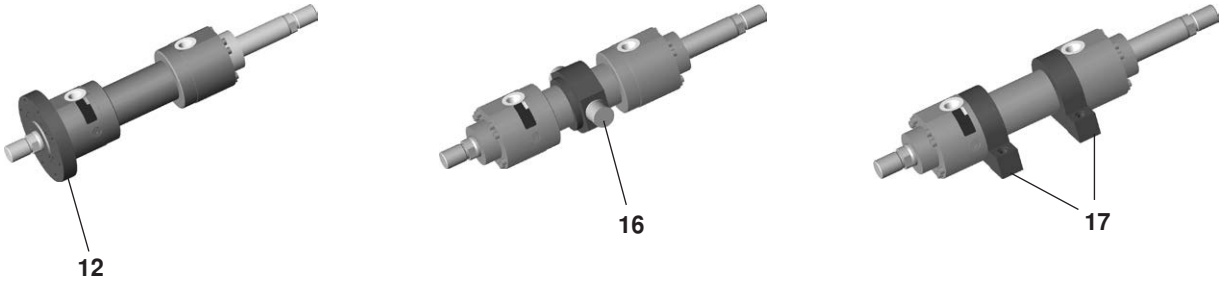
Spare parts: Series CDH2...XC:



1 Head
2 Base
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Socket
9 Socket
10 Base MP3
11 Base MP5
12 Round flange MF3
14 Round flange MF4
15 Bleeding
16 Trunnion MT4
17 Foot MS2
18 Seal kit:
- Wiper
- Rod seal
- Piston seal
- Seal ring
- Guide ring

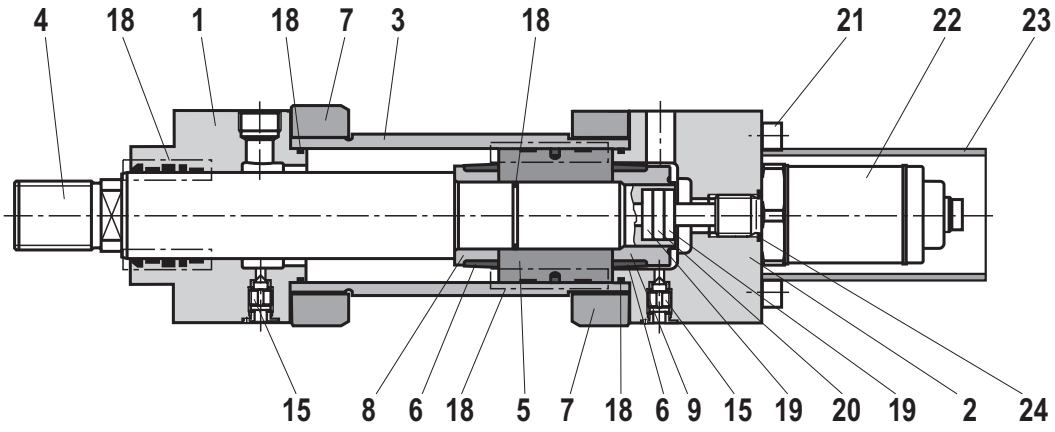
Spare parts: Series CGH2...XC:





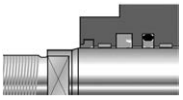
1 Head
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Socket
12 Round flange MF3
15 Bleeding
16 Trunnion MT4
17 Foot MS2
18 Seal kit:
- Wiper
- Rod seal
- Piston seal
- Seal ring
- Guide ring

Spare parts: Series CSH2...XE: MF3, MF4, MT4 and MS2

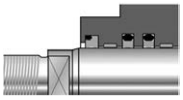


Piston rod

"M"

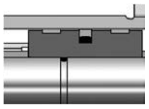


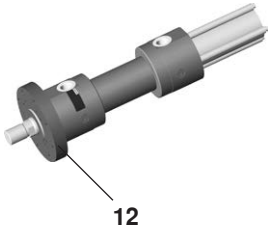
"S / T"

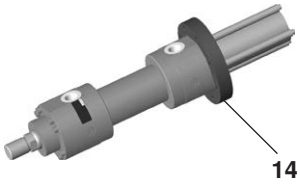


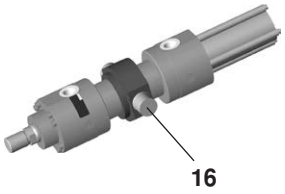
Piston

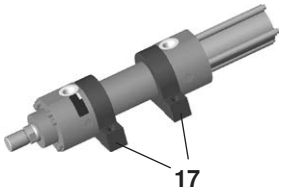
"M / T / S"











1 Head
2 Base
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Socket
9 Socket
12 Round flange MF3
14 Round flange MF4
15 Bleeding
16 Trunnion MT4
17 Foot MS2
18 Seal kit:
- Wiper
- Rod seal
- Piston seal
- Seal ring
- Guide ring

19 Insulating socket
20 Solenoid
21 Hexagon socket head cap screws
22 Position transducer
23 Protective pipe
24 Seal

Cylinder weight

Piston	Piston rod	CD/CS cylinder with 0 mm stroke length				per 100 mm stroke length	CG cylinder with 0 mm stroke length			per 100 mm stroke length
ØAL	**ØMM**	**MP3** [1] **MP5** [1]	**MF3 MF4**	**MT4**	**MS2**		**MF3**	**MT4**	**MS2**	
mm	mm	kg	kg	kg	kg	kg	kg	kg	kg	kg
40	**25**	7	9	9	9	0.9	10	10	10	1.3
	28	7	9	9	9	1.0	10	10	10	1.5
50	**32**	12	14	13	13	1.3	16	16	16	1.9
	36	12	14	13	14	1.5	16	16	16	2.3
63	**40**	20	21	21	21	2.3	25	25	25	3.3
	45	20	21	21	21	2.6	25	25	25	3.8
80	**50**	32	35	34	35	3.2	41	40	41	4.7
	56	32	35	34	36	3.6	41	40	42	5.5
100	**63**	51	54	54	55	5.2	63	63	64	7.6
	70	51	55	54	56	5.7	64	64	65	8.8
125	**80**	95	96	99	98	8.2	113	115	114	12.1
	90	96	97	100	99	9.2	115	117	116	14.2
140	**90**	131	132	136	137	10.7	155	158	159	15.7
	100	132	133	137	138	11.9	156	160	161	18.1
160	**100**	185	184	197	206	12.6	217	231	239	18.8
	110	186	186	199	207	13.9	220	233	242	21.4
180	**110**	255	253	264	274	14.7	294	305	314	22.1
	125	258	256	267	277	16.8	300	311	320	26.5
200	**125**	349	332	350	363	19.0	359	377	389	28.6
	140	352	335	353	366	21.5	365	383	396	33.5
220	**140**	527	512	546	518	27.1	604	638	610	39.1
	160					30.9				46.7
250	**160**	673	640	677	650	32.7	761	798	772	48.5
	180					36.9				56.9
280	**180**	976	966	1020	918	44.2	1130	1183	1081	64.2
	200					48.8				73.4
320	**200**	1251	1172	1223	1174	55.2	1354	1405	1356	79.8
	220					60.4				90.2

ØAL = Piston Ø

ØMM = Piston rod Ø

[1] Weight without position measurement system

RE 17338
Edition: 2021-07
Replaces: 2017-07

rexroth
A Bosch Company

Hydraulic cylinder
Mill type

Series CDH3 / CGH3 / CSH3

H4646_d

- Component series 3X
- Nominal pressure 350 bar (35 MPa)

Features

- 6 types of mounting
- Piston Ø (**ØAL**): 40 ... 320 mm
- Piston rod Ø (**ØMM**): 28 ... 220 mm
- Stroke lengths up to 6 m
- Self-adjusting and adjustable end position cushioning
- IO-Link interface, optional

Contents

Ordering code series CDH3

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CD	**H3**		/		/		/		**A**	**3X**	/								

01	Differential cylinder	**CD**
02	Series	**H3**

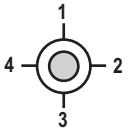
Types of mounting

03	Swivel eye at base	**MP3** [1)]
	Self-aligning clevis at base	**MP5**
	Round flange at head	**MF3**
	Round flange at base	**MF4**
	Trunnion mounting	**MT4** [2)]
	Foot mounting	**MS2**
04	Piston Ø (ØAL) **40 ... 320** mm	
05	Piston rod Ø (ØMM) **28 ... 220** mm	
06	Stroke length in mm [3)]	
07	Design principle: Head and base flanged	**A**
08	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

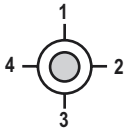
Line connection / version

09	According to ISO 1179-1 (pipe thread ISO 228-1)	**B**
	According to ISO 9974-1 (metric thread ISO 261)	**M**
	Flange hole pattern according to ISO 6162-2 tab. 2 type 1 (≙SAE 6000 PSI)	**D** [4; 9)]
	Flange hole pattern according to ISO 6164 tab. 2	**H** [4)]
	According to ISO 1179-1 (pipe thread ISO 228-1) with flat pipe flange	**C** [31)]
	With mounted control block	**Y** [38)]
	for directional and control valves	
	Subplate NG6	**P** [4; 5; 27)]
	Subplate NG10	**T** [4; 6; 27)]
	Subplate NG16	**U** [4; 7; 27)]
	Subplate NG25	**V** [4; 7; 27)]
	for SL and SV valves	
	Subplate NG6	**A** [4; 5; 15; 27)]
	Subplate NG10	**E** [4; 6; 15; 27)]
	Subplate NG20	**L** [4; 7; 15; 27)]
	Subplate NG30	**N** [4; 7; 15; 27)]

Line connection / position at head

10	View to piston rod [30)]		**1** **2** **3** **4**

Line connection/position at base

11	View to piston rod [30)]		**1** **2** [34)] **3** **4** [34)]

Ordering code series CDH3

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CD	**H3**		/		/		/		**A**	**3X**	/								

Piston rod design

12	Hard chromium-plated	**C**
	Hardened and hard chromium-plated	**H** [12)]
	Nickel-plated and hard chromium-plated	**N** [9)]

Piston rod end

13	Thread for swivel head CGAS	**A**
	Thread for swivel head CGA, CGAK, plain clevis CSA	**G** [13)]
	With mounted swivel head CGAS	**S**
	With mounted swivel head CGA	**L** [13)]
	With mounted swivel head CGAK	**M** [13)]
	With mounted plain clevis CSA	**N** [1)]

End position cushioning

14	Without	**U**
	Both sides, self-adjusting	**D** [1)]
	Both sides, adjustable	**E**
	Base sides, self-adjusting	**K** [1; 38)]
	Head sides, self-adjusting	**S** [1; 38)]

Seal design - observe selection criteria for seals, see page 71

15	**For mineral oil HL, HLP and HFA**	
	Standard seal system	**M**
	Standard seal system with guide rings	**L**
	Reduced friction, heavy industry	**R**
	For mineral oil HL, HLP, HFA and water glycol HFC	
	Standard seal system HFC	**G** [27; 40)]
	Servo quality / reduced friction	**T**
	Chevron seal kits	**A**
	For HDFR phosphate ester and HFDU polyol ester	
	Servo quality / reduced friction	**S**
	Standard seal system FKM	**V** [27; 40)]
	Chevron seal kits	**B**

Option

16	**Without** additional options, do **not** fill fields for additional options	**W**
	Additional options, fill fields for additional options	**Z**

Ordering code series CDH3 (fields for additional options)

	01	02	03	04	05	06	07	08
Z								

01	Without inductive proximity switches	**W**
	Inductive proximity switches **without** mating connector - separate order, see page 49	**E** [37]
02	Without additional guide rings	**W**
	Additional guide rings	**F** [10], [28]
03	Without measuring coupling	**W**
	Measuring coupling, on both sides	**A**
	Measuring coupling, on both sides, stainless steel version	**E** [38]
04	Standard grease nipples, DIN 71412 form A	**W**
	Spherical bearing, maintenance-free	**A** [14], [35]
	Flat type grease nipples, DIN 3404 form A	**B**
05	Without piston rod extension	**W**
	Specify the piston rod extension LY in the plain text in mm	**Y**
06	Priming class CP3	**W**
	Painting class CP4	**B** [21]
	Painting class CP5	**L** [21]
	Painting class CP6	**U** [21]
	Painting class CP7	**E** [21]
07	Without oil filling	**W**
	With corrosion protection oil VG 68	**F**
08	Without test certificate	**W**
	With certificate of compliance 2.1 based on EN 10204	**B**
	With acceptance test certificate 3.1 based on EN 10204	**C**

Order examples:

Without additional options: CDH3MP5/100/56/300A3X/B11CADMW

With additional options: CDH3MP5/100/56/300A3X/B11CADMZEWABWWWW

[1] Only piston Ø 40 ... 200 mm

[2] Trunnion position freely selectable. When ordering, always specify the "XV" dimensions in the plain text in mm

[3] Observe the max. available stroke length page 14 and admissible stroke length (acc. to buckling calculation) page 65 to 67

[4] Not possible with MF4

[5] Piston Ø 40 ... 80 mm, only position 11, subplates only possible in combination with line connection "B" at the head

[6] Piston Ø 63 ... 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head

[7] Piston Ø 125 ... 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head

[9] From piston Ø 63 mm

[10] Seal designs A, B not possible;
Piston Ø 220 ... 320 mm standard

[12] Only piston rod Ø 28 ... 140 mm

[13] Only piston Ø 40 ... 250 mm

[14] Not possible with plain clevis "N"

[15] Subplates for SL and SV valves (check valves)
Please note: Seal designs T, G, L, R, S and V are not designed for static hold function!

[21] Specify RAL color in the plain text

[27] Maximum operating pressure 315 bar

[28] Standard with seal design "L"

[30] All graphical pictures in the data sheet show position 1

[31] With MS2, only position 11 is possible

[34] With MF4 and line connection B, M or C not possible

[35] Not possible with MP3

[37] Min. stroke length = 20 mm

[38] On request

[40] Not with piston Ø 320 mm

Ordering code series CGH3

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CG	**H3**		/		/		/		**A**	**3X**	/								

01	Double-rod cylinder	**CG** [18]
02	Series	**H3**

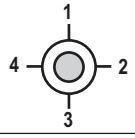
Types of mounting

03	Round flange at head	**MF3**
	Trunnion mounting	**MT4** [2]
	Foot mounting	**MS2**
04	Piston Ø (ØAL) **40 ... 320** mm	
05	Piston rod Ø (ØMM) **28 ... 220** mm	
06	Stroke length in mm [3]	
07	Design principle: Head and base flanged	**A**
08	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

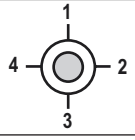
Line connection / version

09	According to ISO 1179-1 (pipe thread ISO 228-1)	**B**
	According to ISO 9974-1 (metric thread ISO 261)	**M**
	Flange hole pattern according to ISO 6162-2 tab. 2 type 1 (≙SAE 6000 PSI)	**D** [9]
	Flange hole pattern according to ISO 6164 tab. 2	**H**
	According to ISO 1179-1 (pipe thread ISO 228-1) with flat pipe flange	**C** [31]
	With mounted control block	**Y** [38]

Line connection / position at head

10	View to piston rod [30] 	**1**
		2
		3
		4

Line connection/position at base

11	View to piston rod [30] 	**1**
		2
		3
		4

☞ **Notice:** Preferred types and standard units are contained in the EPS (standard price list).

Ordering code series CGH3

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CG	**H3**		**/**		**/**		**/**		**A**	**3X**	**/**								

Piston rod design

12	Hard chromium-plated	**C**
	Hardened and hard chromium-plated	**H** [12)]

Piston rod end

13	Thread for swivel head CGAS	**A**
	Thread for swivel head CGA, CGAK, plain clevis CSA	**G** [13)]
	With mounted swivel head CGAS	**S** [13; 17)]
	With mounted swivel head CGA	**L** [13), 17)]
	With mounted swivel head CGAK	**M** [13), 17)]
	With mounted plain clevis CSA	**N** [1), 17)]

End position cushioning

14	Without	**U**
	Both sides, self-adjusting	**D** [1)]
	Both sides, adjustable	**E**

Seal design - observe selection criteria for seals, see page 71

15	**For mineral oil HL, HLP and HFA**	
	Standard seal system	**M**
	Standard seal system with guide rings	**L**
	Reduced friction, heavy industry	**R**
	For mineral oil HL, HLP, HFA and water glycol HFC	
	Standard seal system HFC	**G** [27; 40)]
	Servo quality / reduced friction	**T**
	Chevron seal kits	**A**
	For HDFR phosphate ester and HFDU polyol ester	
	Servo quality / reduced friction	**S**
	Standard seal system FKM	**V** [27; 40)]
	Chevron seal kits	**B**

Option

16	**Without** additional options, do **not** fill fields for additional options	**W**
	Additional options, fill fields for additional options	**Z**

Ordering code series CGH3 (fields for additional options)

Z

01	02	03	04	05	06	07	08

01	Without inductive proximity switches	**W**
	Inductive proximity switches **without** mating connector - separate order, see page 49	**E** 37)
02	Without additional guide rings	**W**
	Additional guide rings	**F** 10), 28)
03	Without measuring coupling	**W**
	Measuring coupling, on both sides	**A**
	Measuring coupling, on both sides, stainless steel version	**E** 38)
04	Standard grease nipples, DIN 71412 form A	**W**
	Spherical bearing, maintenance-free	**A** 14)
	Flat type grease nipples, DIN 3404 form A	**B**
05	Without piston rod extension	**W**
	Specify the piston rod extension LY in the plain text in mm	**Y** 16)
06	Priming class CP3	**W**
	Painting class CP4	**B** 21)
	Painting class CP5	**L** 21)
	Painting class CP6	**U** 21)
	Painting class CP7	**E** 21)
07	Without oil filling	**W**
	With corrosion protection oil VG 68	**F**
08	Without test certificate	**W**
	With certificate of compliance 2.1 based on EN 10204	**B**
	With acceptance test certificate 3.1 based on EN 10204	**C**

Order examples:

Without additional options: CGH3MF3/100/56/300A3X/B11CADMW

With additional options: CGH3MF3/100/56/300A3X/B11CADMZEWABWWWW

1) Only piston Ø 40 ... 200 mm
2) Trunnion position freely selectable. When ordering, always specify the "XV" dimensions in the plain text in mm
3) Observe the max. available stroke length page 14 and admissible stroke length (acc. to buckling calculation) page 65 to 67
9) From piston Ø 63 mm
10) Seal designs A, B not possible; Piston Ø 220 ... 320 mm standard
12) Only piston rod Ø 28 ... 140 mm
13) Only piston Ø 40 ... 250 mm
14) Not possible with plain clevis "N"
16) Only at left piston rod side (orientation: catalog figures)
17) Only one swivel head / plain clevis mounted, left piston rod side (orientation: catalog figures)
18) Not standardized
21) Specify RAL color in the plain text
27) Maximum operating pressure 315 bar
28) Standard with seal design "L"
30) All graphical pictures in the data sheet show position 1
31) With MS2, only position 11 is possible
37) Min. stroke length = 20 mm
38) On request
40) Not with piston Ø 320 mm

Ordering code series CSH3

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CS	**H3**		/		/		/		**A**	**3X**	/								

01	Differential cylinder with position measurement system	**CS** 18)
02	Series	**H3**

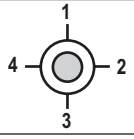
Types of mounting

03	Swivel eye at base	**MP3** 1)
	Self-aligning clevis at base	**MP5**
	Round flange at head	**MF3**
	Round flange at base	**MF4**
	Trunnion mounting	**MT4** 2)
	Foot mounting	**MS2**
04	Piston Ø (ØAL) **40 ... 320** mm	
05	Piston rod Ø (ØMM) **28 ... 220** mm	
06	Stroke length in mm 3)	
07	Design principle: Head and base flanged	**A**
08	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

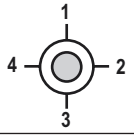
Line connection / version

09	According to ISO 1179-1 (pipe thread ISO 228-1)	**B**
	According to ISO 9974-1 (metric thread ISO 261)	**M**
	Flange hole pattern according to ISO 6162-2 tab. 2 type 1 (≙SAE 6000 PSI)	**D** 4; 9)
	Flange hole pattern according to ISO 6164 tab. 2	**H** 4)
	According to ISO 1179-1 (pipe thread ISO 228-1) with flat pipe flange	**C** 31)
	With mounted control block	**Y** 38)
	– For directional and control valves	
	Subplate NG6	**P** 4; 5; 27)
	Subplate NG10	**T** 4; 6; 27)
	Subplate NG16	**U** 4; 7; 27)
	Subplate NG25	**V** 4; 7; 27)
	– For SL and SV valves	
	Subplate NG6	**A** 4; 5; 15; 27)
	Subplate NG10	**E** 4; 6; 15; 27)
	Subplate NG20	**L** 4; 7; 15; 27)
	Subplate NG30	**N** 4; 7; 15; 27)

Line connection / position at head

10	View to piston rod 30)		**1** **2** **3** **4**

Line connection / position at base

11	View to piston rod 30)		**1** **2** 34) **3** **4** 34)

Ordering code series CSH3

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16
CS	**H3**		**/**		**/**		**/**		**A**	**3X**	**/**								**Z**

Piston rod design

12	Hard chromium-plated	**C**
	Hardened and hard chromium-plated	**H** [19)]

Piston rod end

13	Thread for swivel head CGAS	**A**
	Thread for swivel head CGA, CGAK, plain clevis CSA	**G** [26)]
	With mounted swivel head CGAS	**S**
	With mounted swivel head CGA	**L** [26)]
	With mounted swivel head CGAK	**M** [26)]
	With mounted plain clevis CSA	**N** [1)]

End position cushioning

14	Without	**U**
	Both sides, adjustable	**E** [20)]

Seal design - observe selection criteria for seals, see page 71

15	**For mineral oil HL, HLP and HFA**	
	Standard seal system	**M** [29)]
	Standard seal system with guide rings	**L**
	Reduced friction, heavy industry	**R** [29)]
	For mineral oil HL, HLP, HFA and water glycol HFC	
	Standard seal system HFC	**G** [13; 27; 29)]
	Servo quality / reduced friction	**T** [29)]
	For HDFR phosphate ester and HFDU polyol ester	
	Servo quality / reduced friction	**S** [29)]
	Standard seal system FKM	**V** [13; 27; 29)]

Option

16	**Additional** options, fill fields for additional options	**Z**

Ordering code series CSH3 (fields for additional options)

Z

01	02	03	04	05	06	07	08
T							

01	Position measurement system (magnetostrictive) **without** mating connector - separate order, see page 53, 55, 56 and 58	**T**
02	Analog output 4 ... 20 mA	**C**
	Analog output 0 ... 10 V	**F**
	Digital output SSI (resolution 5 µm, asynchronious forward)	**D**
	Digital output SSI (resolution 1 µm, synchronious forward)	**S**
	Profibus D63 (integrated supply)	**N**
	Profibus D53 (separate supply line)	**P**
	IO-Link	**L** 39; 40)
	Profinet RT and IRT with encoder profile	**R**
03	Without measuring coupling	**W**
	Measuring coupling, on both sides	**A**
	Measuring coupling, on both sides, stainless steel version	**E** 38)
04	Standard grease nipples, DIN 71412 form A	**W**
	Spherical bearing, maintenance-free	**A** 14; 35)
	Flat type grease nipples, DIN 3404 form A	**B**
05	Without piston rod extension	**W**
	Specify the piston rod extension LY in the plain text in mm	**Y**
06	Priming class CP3	**W**
	Painting class CP4	**B** 21)
	Painting class CP5	**L** 21)
	Painting class CP6	**U** 21)
	Painting class CP7	**E** 21)
07	Without oil filling	**W**
	With corrosion protection oil VG 68	**F**
08	Without test certificate	**W**
	With certificate of compliance 2.1 based on EN 10204	**B**
	With acceptance test certificate 3.1 based on EN 10204	**C**

Order examples: With additional options: CSH3MP5/100/70/300A3X/B11CAUMZTFAWWWWW

1) Only piston Ø 40 ... 200 mm
2) Trunnion position freely selectable. When ordering, always specify the "XV" dimensions in the plain text in mm
3) Observe the max. available stroke length page 14 and admissible stroke length (acc. to buckling calculation) page 65 to 67
4) Not possible with MF4
5) Piston Ø 40 ... 80 mm, only position 11, subplates only possible in combination with line connection "B" at the head
6) Piston Ø 63 ... 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
7) Piston Ø 125 ... 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
9) From piston Ø 63 mm
13) Not with piston Ø 320 mm
14) Not possible with plain clevis "N"
15) Subplates for SL and SV valves (check valves)
Please note: Seal designs T, G, L, R, S and V are not designed for static hold function!
18) Not standardized
19) Only piston rod Ø 28 ... 140 mm
20) Possible from piston rod Ø 45 mm
21) Specify RAL color in the plain text
26) Only piston Ø 40 ... 250 mm
27) Maximum operating pressure 315 bar
29) With CSH, by default with guide rings
30) All graphical pictures in the data sheet show position 1
31) With MS2, only position 11 is possible
34) With MF4 and line connection B, M or C not possible
35) Not possible with MP3
38) On request
39) Not possible with MP3 and MP5
40) Observe min. stroke length 50 mm / max. stroke length 2540 mm

Technical data

(For applications outside these values, please consult us!)

Standards:
Bosch Rexroth standard; main dimensions like piston Ø and piston rod Ø correspond to ISO 3320.

Nominal pressure: 350 bar
Static test pressure: 525 bar
Reduced test pressure 315 bar
The maximum operating pressures must be less than or equal to the applicable nominal pressures and apply to applications with shock-free operation with reference to excess pressure and/or external loads. With extreme loads like e.g. high cycle sequence, mounting elements and threaded piston rod connections must be designed for durability.

Minimum pressure:
Depending on the application, operating conditions and technical design, a certain minimum pressure (approx. 10 bar) is required in order to guarantee a technically perfect function of the hydraulic cylinder.

Installation position: arbitrary

Hydraulic fluid (additional data sheet):
Mineral oils DIN 51524 HL, HLP (90220)
Oil-in-water emulsion HFA (90223)
Water glycol HFC (90223)
Phosphate ester HFDR (90222)
Polyol ester HFDU (90222)

Hydraulic fluid temperature range: see page 71
Ambient temperature range: see page 71
Optimum viscosity range: 20 ... 100 mm^2/s
Minimum admissible viscosity: 12 mm^2/s
Maximum admissible viscosity: 380 mm^2/s

Cleanliness class acc. to ISO
Maximum admissible degree of contamination of the hydraulic fluid according to ISO 4406 (c) class 20/18/15. The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.

Bleeding by default secured against unscrewing

Color set-up:
Priming: By default, hydraulic cylinders are primed with a coating (color gentian blue RAL 5010) of min. 40 µm, see page 82.
Other colors on request.
Following surfaces of cylinders and attached parts are not primed:
- All fitting diameters to the customer side
- Sealing surfaces for line connection
- Sealing surfaces for flange connection
- Connection surface for valve mounting
- Inductive proximity switches
- Position measurement system
- Measuring coupling
- Spherical / plain bearing
- Grease nipples

Painting: By default, hydraulic cylinders can be ordered in four corrosivity categories in the RAL colors, see page 82.
Following surfaces of cylinders and attached parts are not painted:
- All fitting diameters and connection surfaces to customer side
- Sealing surfaces for line connection
- Sealing surfaces for flange connection
- Connection surface for valve mounting
- Inductive proximity switches
- Position measurement system
- Measuring coupling
- Spherical / plain bearing
- Grease nipples

Surfaces not primed or painted are protected with solvent-free corrosion protection compound.
Accessories ordered as a separate order item are not primed or painted by default. Corresponding priming and/or painting on request.

Technical data

(For applications outside these values, please consult us!)

Stroke velocity:

Please observe the guideline on max. stroke velocities (with recommended flow velocity of 5 m/s in the line connection) in the table. Higher stroke velocity on request. If the extension velocity is considerably higher than the retraction velocity of the piston rod, drag-out losses of the medium may result. If necessary, please consult us.

Piston Ø (mm)	Line connection	Max. stroke velocity in m/s
40	G1/2	0.31
50	G1/2	0.20
63	G3/4	0.28
80	G3/4	0.18
100	G1	0.20
125	G1 1/4	0.20
140	G1 1/4	0.16
160	G1 1/2	0.18
180	G1 1/2	0.14
200	G1 1/2	0.11
220	G1 1/2	0.09
250	G1 1/2	0.07
280	G1 1/2	0.06
320	G1 1/2	0.04

Boundary and application conditions:

- The mechanical alignment of the movement axis and thus the mounting points of hydraulic cylinder and piston rod must be ensured. Lateral forces on the guides of piston rod and piston are to be avoided. It may be necessary to consider the own weight of the hydraulic cylinder (MP3 / MP5 or MT4) or the piston rod.
- The bending length/bending load of the piston rod and/or the hydraulic cylinder must be observed (see page topic Bucklig).
- The maximum admissible stroke velocities with regard to the suitability/load of seals must be observed as must their compatibility with the properties of the hydraulic fluid (see page topic Seals).
- The maximum admissible velocities/kinetic energies when moving into the end positions, also considering external loads, must be observed.
  Danger: Excess pressure
- The maximum admissible operating pressure must be complied with in any operating state of the hydraulic cylinder. Possible pressure intensification resulting from the area ratio of annulus area to piston area and possible throttling points are to be observed.
- Detrimental environmental influences, like e.g. aggressive finest particles, vapors, high temperatures, etc. as well as contaminations and deterioration of the hydraulic fluid are to be avoided.

Notice:

- This list does not claim to be complete. In case of questions regarding the compatibility with the medium or exceedance of the boundary or application conditions, please contact us.
- All graphical pictures in the data sheet are examples. The product supplied may therefore differ from the figure shown.

Technical data

(For applications outside these values, please consult us!)

Acceptance:
Every hydraulic cylinders is tested according to Bosch Rexroth standards and following ISO 10100:2020 with module L.

Safety instructions:
For assembly, commissioning and maintenance of hydraulic cylinders, observe the operating instructions 07100-B! Service and repair work has to be performed by Bosch Rexroth AG or by personnel especially trained for this purpose. No warranty is accepted for damage as a consequence of assembly, maintenance or repair work not performed by Bosch Rexroth AG.

Check lists for hydraulic cylinders:
Cylinders the characteristics and/or application parameters of which deviate from the values specified in the data sheet can only be offered as a special version on request. For offers, the deviations of the characteristics and / or application parameters must be described in the check lists for hydraulic cylinders (07200).

Minimum strokes:
When using end position cushioning, the minimum stroke must also be observed, see page 68 "End position cushioning".

Project planning software ICS (Interactive Catalog System)

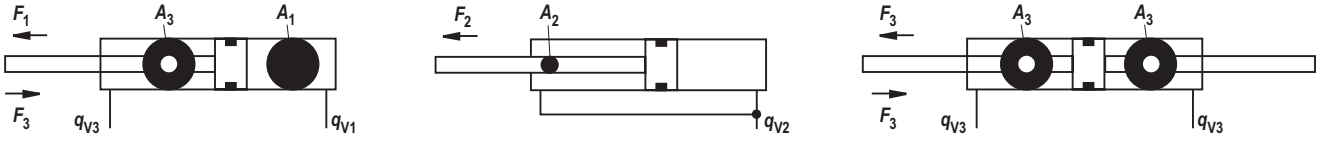
The ICS (Interactive Catalog System) is a selection and project planning aid for hydraulic cylinders. The ICS allows designers for machines and systems to quickly and reliably find the perfect hydraulic cylinder solution through logic-guided type key enquiries. This software helps to solve design and project planning tasks more quickly and efficiently. After having been guided through the product selection, the user quickly and reliably gets the exact technical data of the selected component as well as 3D CAD data in the correct file format for all common CAD systems. This allows users to reduce costs while increasing their competitiveness.

Technical data

(For applications outside these values, please consult us!)

Diameters, areas, forces, flow

Piston	Piston rod	Area ratio	Areas			Force at 350 bar [1]			Flow at 0.1 m/s [2]			Max. available stroke length
			Piston	Rod	Ring	Pressure	Diff.	Pulling	Off	Diff.	On	
ØAL mm	**ØMM** mm	ϕ A_1/A_3	A_1 cm²	A_2 cm²	A_3 cm²	F_1 kN	F_2 kN	F_3 kN	q_{V1} l/min	q_{V2} l/min	q_{V3} l/min	mm
40	28	1.96	12.56	6.16	6.40	43.96	21.56	22.40	7.5	3.7	3.8	2000
50	36	2.08	19.63	10.18	9.45	68.71	35.63	33.08	11.8	6.1	5.7	2000
63	45	2.04	31.17	15.90	15.27	109.10	55.65	53.45	18.7	9.5	9.2	2000
80	56	1.96	50.26	24.63	25.63	175.91	86.21	89.71	30.2	14.8	15.4	2000
100	70	1.96	78.54	38.48	40.06	274.89	134.68	140.21	47.1	23.1	24.0	3000
125	90	2.08	122.72	63.62	59.10	429.52	222.67	206.85	73.6	38.2	35.4	3000
140	100	2.04	153.94	78.54	75.40	538.79	274.89	263.90	92.4	47.1	45.3	3000
160	110	1.90	201.06	95.06	106.00	703.71	332.71	371.00	120.6	57.0	63.6	3000
180	125	1.93	254.47	122.72	131.75	890.65	429.52	461.13	152.7	73.6	79.1	3000
200	140	1.96	314.16	153.96	160.20	1099.56	538.86	560.70	188.5	92.4	96.1	3000
220	160	2.12	380.1	201.0	179.1	1330.5	703.7	626.8	228.1	120.7	107.4	6000
250	180	2.08	490.8	254.4	236.4	1718.1	890.6	827.4	294.5	152.7	141.8	6000
280	200	2.04	615.7	314.1	301.6	2155.1	1099.6	1055.6	369.4	188.5	180.9	6000
320	220	1.90	804.2	380.1	424.2	2814.9	1330.5	1484.4	482.5	228.1	254.4	6000



[1] Theoretical static cylinder force (without consideration of the efficiency and admissible load for attachment parts such as swivel heads, plates, or valves, etc.)

[2] Stroke velocity

Tolerances according to DIN ISO 6022

Installation dimensions	WC	XC [2]	XO [2]	XS [1; 2]	XV [2]	ZP [2]	Stroke tolerances [3]
Type of mounting	MF3	MP3	MP5	MS2	MT4	MF4	
Stroke length	Tolerances						
≤ 1250	±2	±1.5	±1.5	±2	±2	±1.5	+2
> 1250 – ≤ 3150	±4	±3	±3	±4	±4	±3	+5
> 3150 – ≤ 6000	±8	±5	±5	±8	±8	±5	+8

[1] Not standardized

[2] Including stroke length

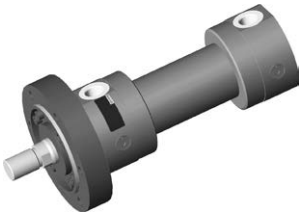
[3] Stroke tolerances must not be added to the tolerances listed in this table.

Overview types of mounting: Series CDH3 / CGH3

CDH3 MP3; see page 18, 19

CDH3 MP5; see page 20, 21

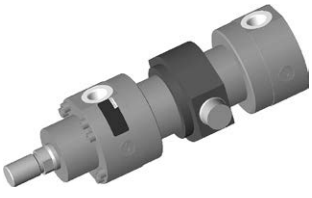
CDH3 MF3; see page 22, 23



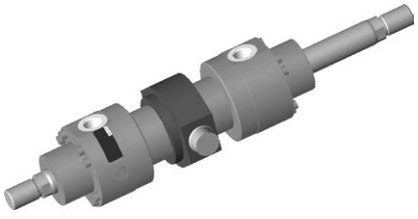
CGH3 MF3; see page 22, 23

CDH3 MF4; see page 24, 25

CDH3 MT4; see page 26, 27

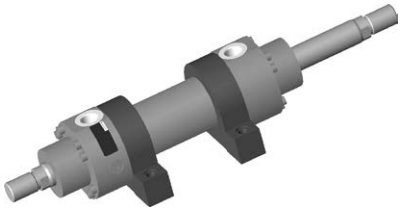


CGH3 MT4; see page 26, 27



CDH3 MS2; see page 28, 29

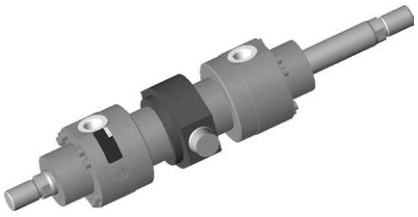
CGH3 MS2; see page 28, 29



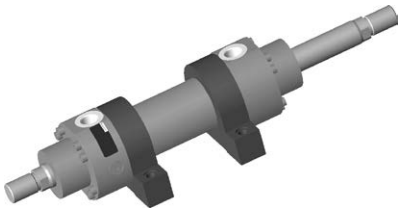
Overview types of mounting: Series CGH3

CGH3 MF3; see page 22, 23

CGH3 MT4; see page 26, 27



CGH3 MS2; see page 28, 29



Overview types of mounting: Series CSH3

CSH3 MP3

see page 30, 31

CSH3 MP5

see page 32, 33

CSH3 MF3

see page 34, 35

CSH3 MF4

see page 36, 37

CSH3 MT4

see page 38, 39

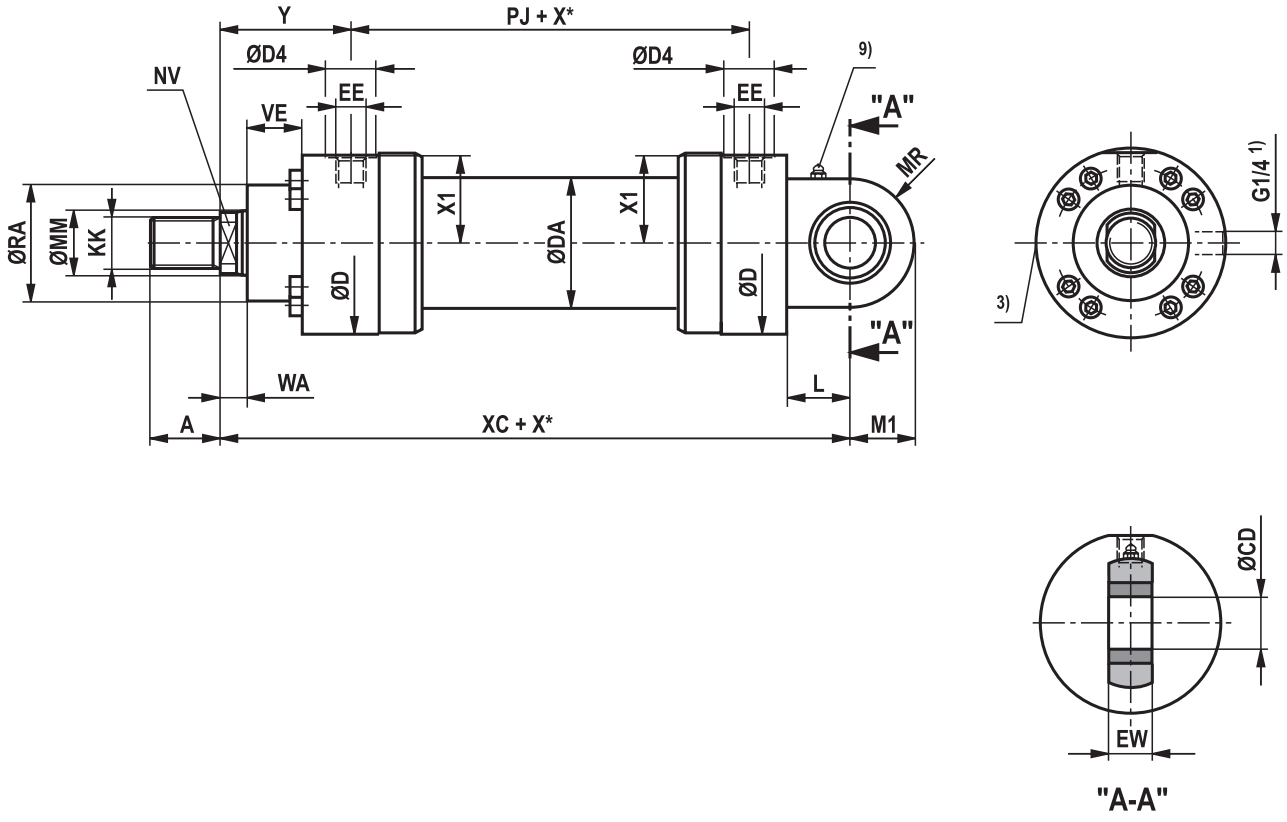
CSH3 MS2

see page 40, 41

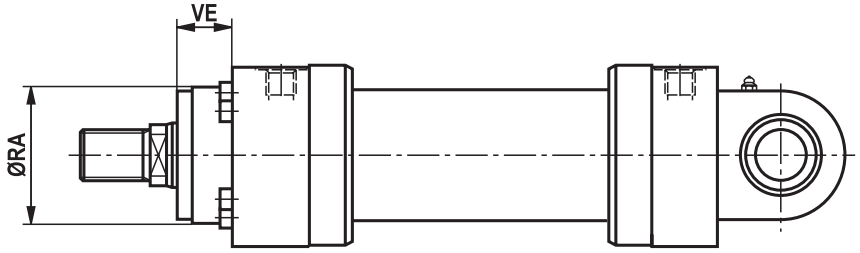
Dimensions

Swivel eye at base CDH3: MP3 (dimensions in mm)

CDH3 MP3; ØAL 40 - 200 mm



CDH3 MP3: with seal design "A", "B" and ØAL 160 - 200 mm



Dimensions

Swivel eye at base CDH3: MP3 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ
40	**28**	M22x1,5	22	M24x2	35	22	92	52	34	G1/2	M22x1,5	91	120
50	**36**	M28x1,5	28	M30x2	45	30	108	62	34	G1/2	M22x1,5	90	120
63	**45**	M35x1,5	35	M39x3	55	36	140	78	42	G3/4	M27x2	117	133
80	**56**	M45x1,5	45	M50x3	75	46	148	100	42	G3/4	M27x2	124	146
100	**70**	M58x1,5	58	M64x3	95	60	186	125	47	G1	M33x2	119	171
125	**90**	M65x1,5	65	M80x3	110	75	235	160	58	G1 1/4	M42x2	170	205
140	**100**	M80x2	80	M90x3	120	85	258	175	58	G1 1/4	M42x2	186	219
160	**110**	M100x2	100	M100x3	140	95	292	200	65	G1 1/2	M48x2	210	240
180	**125**	M110x2	110	M110x4	150	110	325	220	65	G1 1/2	M48x2	241	264
200	**140**	M120x3	120	M120x4	160	120	350	245	65	G1 1/2	M48x2	262	278

ØAL	ØMM	X1	WA	XC	L	MR	M1	ØCD H11	EW h12	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	**28**	43	18	268	35	36	34	30	28	52	45	52	20
50	**36**	51.5	18	280	45	42	40	35	30	70	47	70	19
63	**45**	67	22	330	50	52	50	40	35	88	43	88	13
80	**56**	71.5	22	355	55	65	62.5	50	40	98	53	98	15
100	**70**	90.5	25	390	65	70	70	60	50	120	55	120	17
125	**90**	114	32	495	75	82	82	70	55	150	68	150	20
140	**100**	126	35	530	80	95	95	80	60	170	75	170	23
160	**110**	142.5	40	600	90	113	113	90	65	200	90	200	90
180	**125**	159.5	45	665	105	125	125	100	70	230	100	230	100
200	**140**	172.5	45	710	115	142.5	142.5	110	80	250	110	250	110

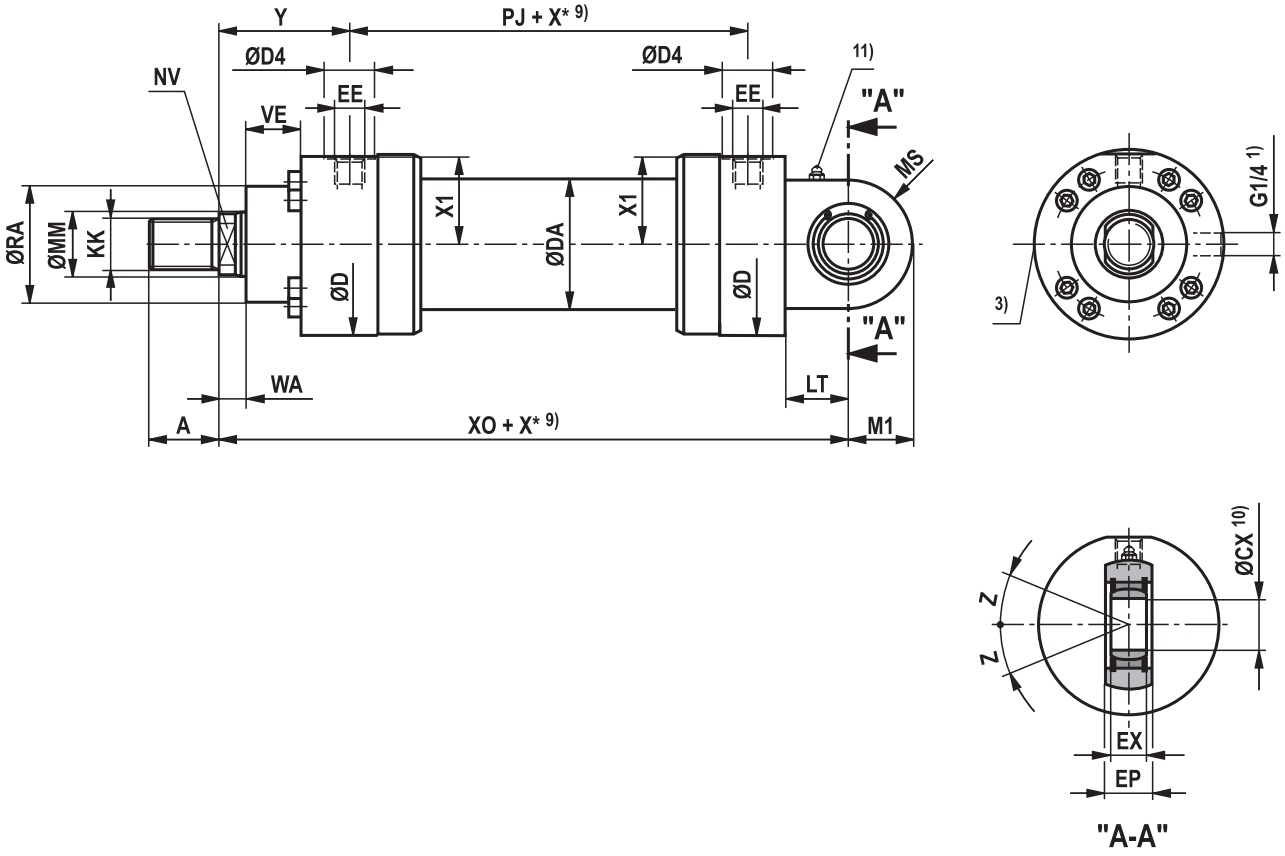
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
7) Dimensions for cylinders with seal design M, T, G, L, R, S and V
8) Dimensions for cylinders with seal design A and B
11) Standard version "W"
Grease nipple, cone head form A according to DIN 71412
16) Line connection "B" and "C"
17) Line connection "M"

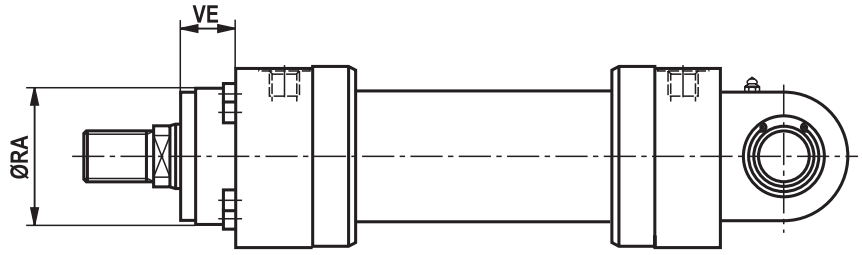
Dimensions

Self-aligning clevis at base CDH3: MP5 (dimensions in mm)

CDH3 MP5



CDH3 MP5: with seal design "A", "B" and ØAL 160 - 320 mm



Dimensions

Self-aligning clevis at base CDH3: MP5 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	C_0 18) kN
40	**28**	M22x1,5	22	M24x2	35	22	92	52	34	G1/2	M22x1,5	91	120	43	106
50	**36**	M28x1,5	28	M30x2	45	30	108	62	34	G1/2	M22x1,5	90	120	51.5	153
63	**45**	M35x1,5	35	M39x3	55	36	140	78	42	G3/4	M27x2	117	133	67	250
80	**56**	M45x1,5	45	M50x3	75	46	148	100	42	G3/4	M27x2	124	146	71.5	365
100	**70**	M58x1,5	58	M64x3	95	60	186	125	47	G1	M33x2	119	171	90.5	400
125	**90**	M65x1,5	65	M80x3	110	75	235	160	58	G1 1/4	M42x2	170	205	114	540
140	**100**	M80x2	80	M90x3	120	85	258	175	58	G1 1/4	M42x2	186	219	126	670
160	**110**	M100x2	100	M100x3	140	95	292	200	65	G1 1/2	M48x2	210	240	142.5	980
180	**125**	M110x2	110	M110x4	150	110	325	220	65	G1 1/2	M48x2	241	264	159.5	1120
200	**140**	M120x3	120	M120x4	160	120	350	245	65	G1 1/2	M48x2	262	278	172.5	1700
220	**160**	M120x3	120	M120x4	160	140	375	292	65	G1 1/2	M48x2	262	326	185	1700
250	**180**	M130x3	130	M150x4	190	160	440	324	65	G1 1/2	M48x2	272	336	218	2900
280	**200**	–	–	M160x4	200	180	460	368	65	G1 1/2	M48x2	282	366	228	–
320	**220**	–	–	M180x4	220	200	490	406	65	G1 1/2	M48x2	287	391	243	–

ØAL	ØMM	F_{adm} 19) kN	WA	XO	X* min	LT	M1	MS	ØCX	EP -0.4	EX	Z	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	**28**	38.2	18	268	–	35	34	36	$30_{-0.010}$	28	$22_{-0.12}$	6 °	52	45	52	20
50	**36**	55.1	18	280	–	45	40	42	$35_{-0.012}$	30	$25_{-0.12}$	6 °	70	47	70	19
63	**45**	90.0	22	330	–	50	50	52	$40_{-0.012}$	35	$28_{-0.12}$	7 °	88	43	88	13
80	**56**	131.4	22	355	–	55	62.5	65	$50_{-0.012}$	40	$35_{-0.12}$	6 °	98	53	98	15
100	**70**	144.0	25	390	–	65	70	70	$60_{-0.015}$	50	$44_{-0.15}$	6 °	120	55	120	17
125	**90**	194.4	32	495	–	75	82	82	$70_{-0.015}$	55	$49_{-0.15}$	6 °	150	68	150	20
140	**100**	241.2	35	530	–	80	95	95	$80_{-0.015}$	60	$55_{-0.15}$	6 °	170	75	170	23
160	**110**	352.8	40	600	–	90	113	113	$90_{-0.020}$	65	$60_{-0.20}$	5 °	200	90	200	90
180	**125**	403.2	45	665	–	105	125	125	$100_{-0.020}$	70	$70_{-0.20}$	7 °	230	100	230	100
200	**140**	612.0	45	710	–	115	142.5	142.5	$110_{-0.020}$	80	$70_{-0.20}$	6 °	250	110	250	110
220	**160**	612.0	40	760	–	115	150 12)	140 12)	$110_{-0.020}$	80	$70_{-0.20}$	6 °	275	125	275	125
250	**180**	1044.0	40	825	20	140	188 12)	178 12)	$120_{-0.020}$	90	$85_{-0.20}$	6 °	320	135	320	135
280	**200**	–	40	895	–	170	210 12)	200 12)	$140_{-0.025}$	100	$90_{-0.25}$	7 °	335	150	335	150
320	**220**	–	40	965	340	200	260 12)	250 12)	$160_{-0.025}$	110	$105_{-0.25}$	8 °	350	165	350	165

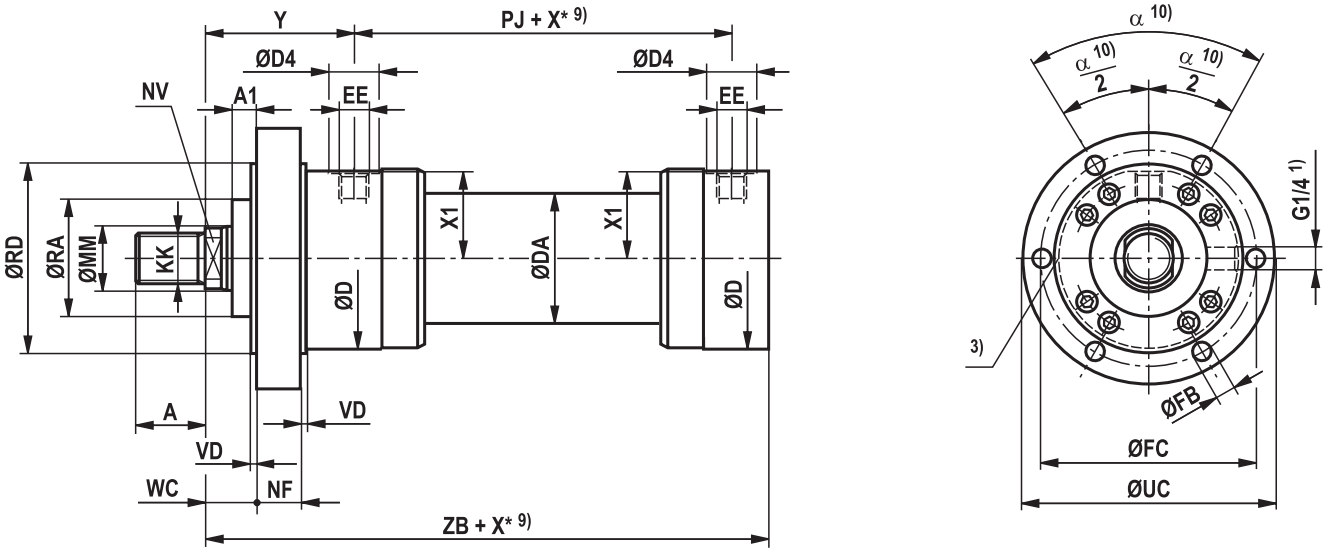
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
7) Dimensions for cylinders with seal design M, T, G, L, R, S and V
8) Dimensions for cylinders with seal design A and B
9) Observe the min. stroke length "X*min"
10) Related bolt Ø m6;
Related bolt Ø j6 for maintenance-free spherical bearing
11) Standard version "W"
Grease nipple, cone head form A according to DIN 71412; not applicable to spherical bearing, maintenance-free "A"
12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting
16) Line connection "B" and "C"
17) Line connection "M"
18) C_0 = static load rating of the swivel head
19) F_{adm} = max. admissible load of the swivel head with oscillatory or alternating loads

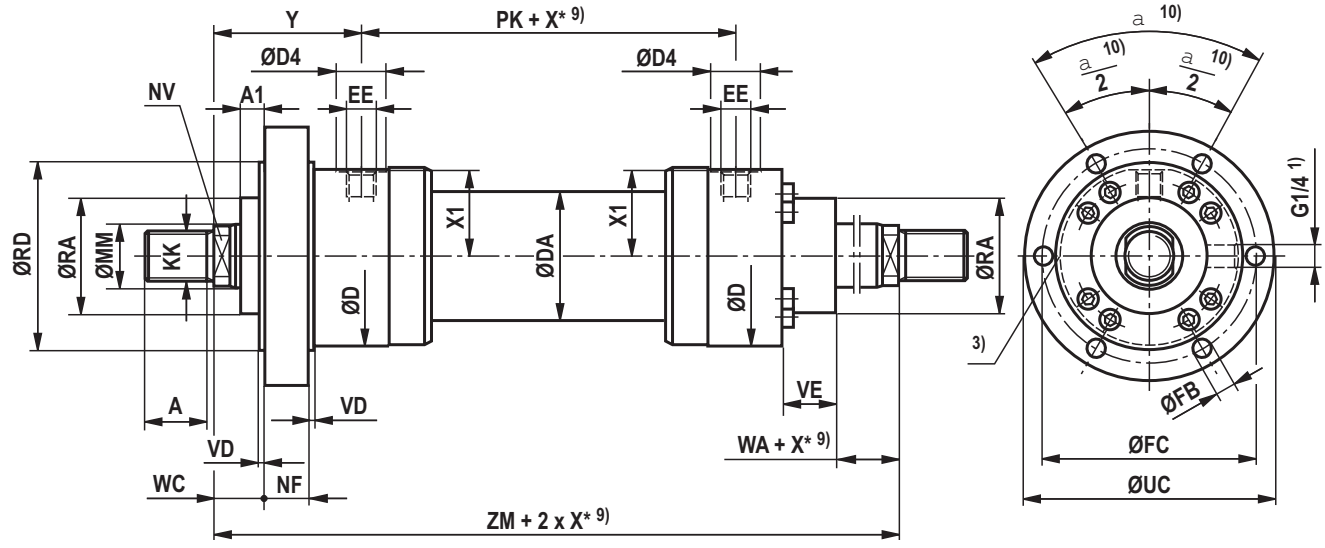
Dimensions

Round flange at head CDH3/CGH3: MF3 (dimensions in mm)

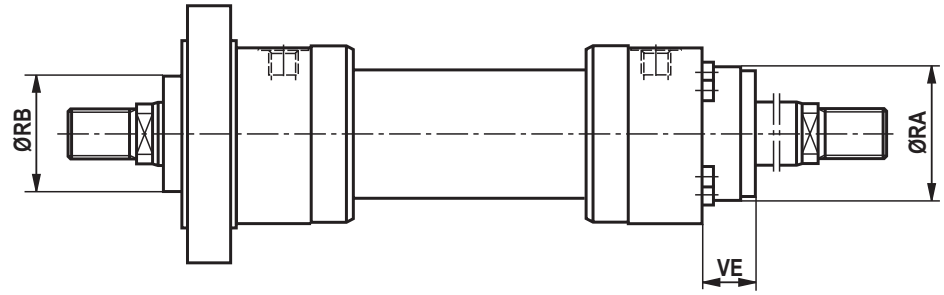
CDH3 MF3



CGH3 MF3



CGH3 MF3: with seal design "A", "B" and ØAL 160 - 320 mm



Dimensions

Round flange at head CDH3/CGH3: MF3 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1
40	**28**	M22x1,5	22	M24x2	35	22	92	52	34	G1/2	M22x1,5	91	120	43
50	**36**	M28x1,5	28	M30x2	45	30	108	62	34	G1/2	M22x1,5	90	120	51.5
63	**45**	M35x1,5	35	M39x3	55	36	140	78	42	G3/4	M27x2	117	133	67
80	**56**	M45x1,5	45	M50x3	75	46	148	100	42	G3/4	M27x2	124	146	71.5
100	**70**	M58x1,5	58	M64x3	95	60	186	125	47	G1	M33x2	119	171	90.5
125	**90**	M65x1,5	65	M80x3	110	75	235	160	58	G1 1/4	M42x2	170	205	114
140	**100**	M80x2	80	M90x3	120	85	258	175	58	G1 1/4	M42x2	186	219	126
160	**110**	M100x2	100	M100x3	140	95	292	200	65	G1 1/2	M48x2	210	240	142.5
180	**125**	M110x2	110	M110x4	150	110	325	220	65	G1 1/2	M48x2	241	264	159.5
200	**140**	M120x3	120	M120x4	160	120	350	245	65	G1 1/2	M48x2	262	278	172.5
220	**160**	M120x3	120	M120x4	160	140	375	292	65	G1 1/2	M48x2	262	326	185
250	**180**	M130x3	130	M150x4	190	160	440	324	65	G1 1/2	M48x2	272	336	218
280	**200**	–	–	M160x4	200	180	460	368	65	G1 1/2	M48x2	282	366	228
320	**220**	–	–	M180x4	220	200	490	406	65	G1 1/2	M48x2	287	391	243

ØAL	ØMM	ØRD e8	WC	VD	NF	PK	A1	ZB	ZM	X* min	ØFB H13	ØFC js13	ØUC -1	α	WA	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	**28**	95	23	5	35	120	0	238	302	–	13.5	120	145	60 °	18	52	45	52	20
50	**36**	115	20	5	40	120	0	237	300	–	13.5	140	165	60 °	18	70	47	70	19
63	**45**	150	20	5	40	133	0	285	367	–	17.5	180	210	60 °	22	88	43	88	13
80	**56**	160	20	5	50	146	0	305	394	–	17.5	195	230	60 °	22	98	53	98	15
100	**70**	200	20	5	55	171	0	330	409	–	22	230	270	60 °	25	120	55	120	17
125	**90**	245	25	5	70	205	0	425	545	–	26	290	335	60 °	32	150	68	150	20
140	**100**	280	30	10	70	219	0	457	591	–	30	330	380	60 °	35	170	75	170	23
160	**110**	300	40	10	80	240	0	515	660	–	30	360	420	45 °	40	200	90	200	90
180	**125**	335	40	10	95	264	0	565	746	–	36	400	470	45 °	45	230	100	230	100
200	**140**	360	40	10	105	278	0	600	802	–	36	430	500	45 °	45	250	110	250	110
220	**160**	400	40	10	115	326	0	655	850	–	39	475	550	45 °	40	275	125	275	125
250	**180**	450	40	10	125	336	0	695	880	20	45	530	610	45 °	40	320	135	320	135
280	**200**	470	50	10	130	366	0	735	930	–	45	550	630	45 °	40	335	150	335	150
320	**220**	510	55	10	140	391	5	775	965	340	45	590	670	30 °	40	350	165	350	165

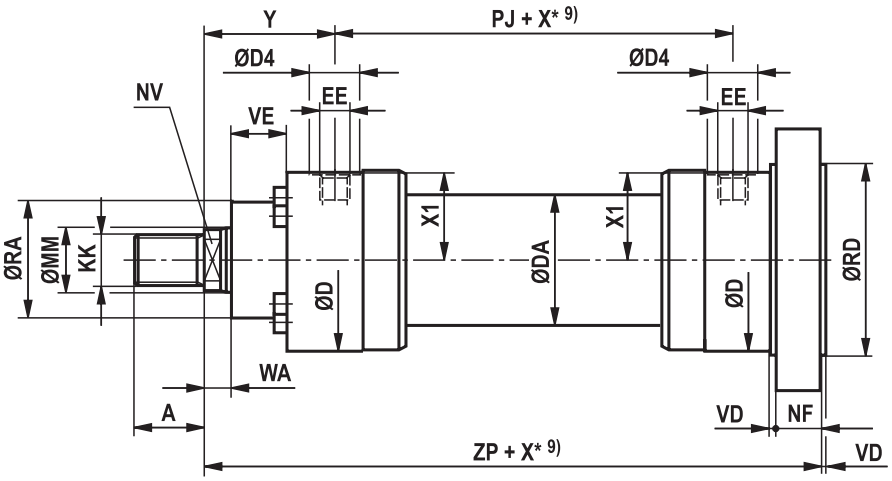
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

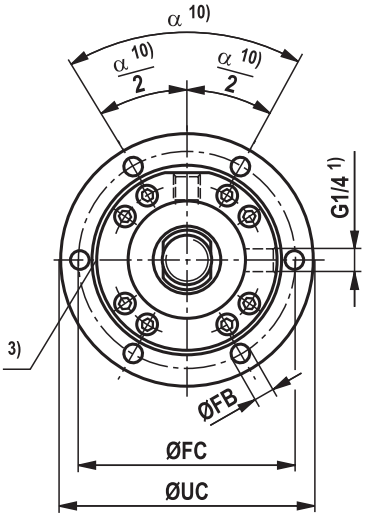
1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
7) Dimensions for cylinders with seal design M, T, G, L, R, S and V
8) Dimensions for cylinders with seal design A and B
9) Observe the min. stroke length "X*min"
10) With piston Ø 160 to 280 mm 8 mounting bores
With piston Ø 320 mm 12 mounting bores
16) Line connection "B" and "C"
17) Line connection "M"

Dimensions

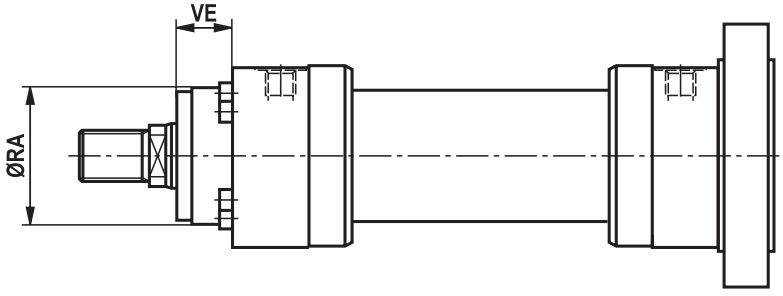
Round flange at base CDH3: MF4 (dimensions in mm)

CDH3 MF4





CDH3 MF4: with seal design "A", "B" and ØAL 160 - 320 mm



Dimensions

Round flange at base CDH3: MF4 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1
40	**28**	M22x1,5	22	M24x2	35	22	92	52	34	G1/2	M22x1,5	91	120	43
50	**36**	M28x1,5	28	M30x2	45	30	108	62	34	G1/2	M22x1,5	90	120	51.5
63	**45**	M35x1,5	35	M39x3	55	36	140	78	42	G3/4	M27x2	117	133	67
80	**56**	M45x1,5	45	M50x3	75	46	148	100	42	G3/4	M27x2	124	146	71.5
100	**70**	M58x1,5	58	M64x3	95	60	186	125	47	G1	M33x2	119	171	90.5
125	**90**	M65x1,5	65	M80x3	110	75	235	160	58	G1 1/4	M42x2	170	205	114
140	**100**	M80x2	80	M90x3	120	85	258	175	58	G1 1/4	M42x2	186	219	126
160	**110**	M100x2	100	M100x3	140	95	292	200	65	G1 1/2	M48x2	210	240	142.5
180	**125**	M110x2	110	M110x4	150	110	325	220	65	G1 1/2	M48x2	241	264	159.5
200	**140**	M120x3	120	M120x4	160	120	350	245	65	G1 1/2	M48x2	262	278	172.5
220	**160**	M120x3	120	M120x4	160	140	375	292	65	G1 1/2	M48x2	262	326	185
250	**180**	M130x3	130	M150x4	190	160	440	324	65	G1 1/2	M48x2	272	336	218
280	**200**	–	–	M160x4	200	180	460	368	65	G1 1/2	M48x2	282	366	228
320	**220**	–	–	M180x4	220	200	490	406	65	G1 1/2	M48x2	287	391	243

ØAL	ØMM	WA	ZP	X* min	NF	VD	ØRD e8	ØFB H13	ØFC js13	ØUC -1	α	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	**28**	18	273	–	35	5	95	13.5	120	145	60 °	52	45	52	20
50	**36**	18	277	–	40	5	115	13.5	140	165	60 °	70	47	70	19
63	**45**	22	325	–	40	5	150	17.5	180	210	60 °	88	43	88	13
80	**56**	22	355	–	50	5	160	17.5	195	230	60 °	98	53	98	15
100	**70**	25	385	–	55	5	200	22	230	270	60 °	120	55	120	17
125	**90**	32	495	–	70	5	245	26	290	335	60 °	150	68	150	20
140	**100**	35	532	–	70	10	280	30	330	380	60 °	170	75	170	23
160	**110**	40	600	–	80	10	300	30	360	420	45 °	200	90	200	90
180	**125**	45	665	–	95	10	335	36	400	470	45 °	230	100	230	100
200	**140**	45	710	–	105	10	360	36	430	500	45 °	250	110	250	110
220	**160**	40	770	–	115	10	400	39	475	550	45 °	275	125	275	125
250	**180**	40	820	20	125	10	450	45	530	610	45 °	320	135	320	135
280	**200**	40	865	–	130	10	470	45	550	630	45 °	335	150	335	150
320	**220**	40	915	340	140	10	510	45	590	670	30 °	350	165	350	165

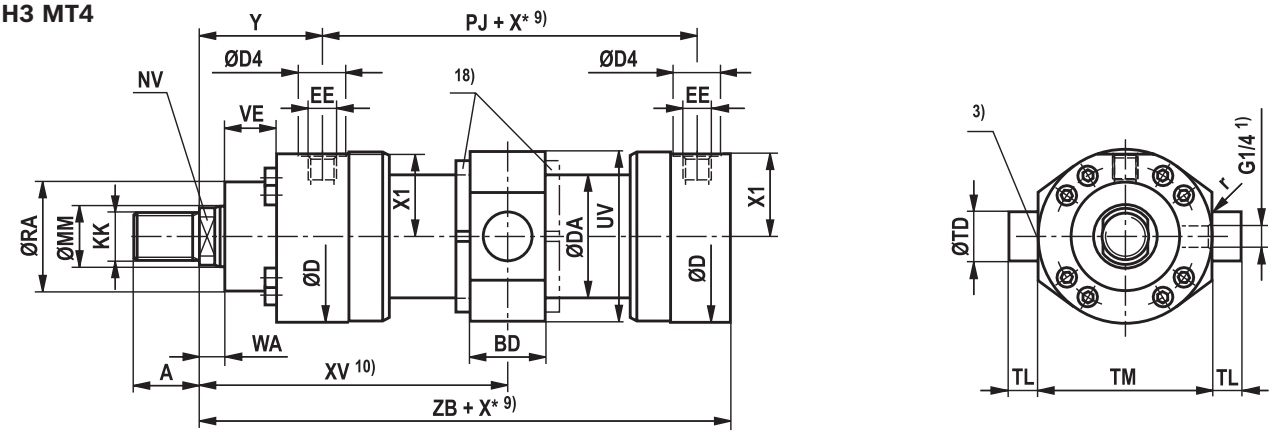
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
7) Dimensions for cylinders with seal design M, T, G, L, R, S and V
8) Dimensions for cylinders with seal design A and B
9) Observe the min. stroke length "X*min"
10) With piston Ø 160 to 280 mm 8 mounting bores
With piston Ø 320 mm 12 mounting bores
16) Line connection "B" and "C"
17) Line connection "M"

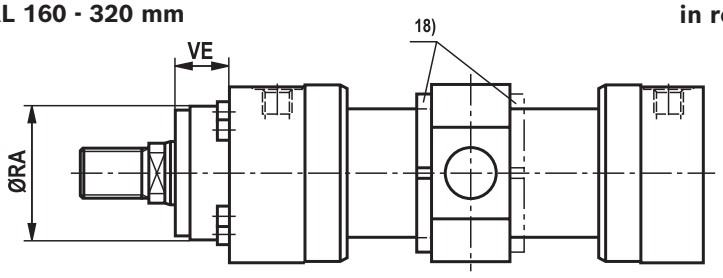
Dimensions

Trunnion mounting CDH3/CGH3: MT4 (dimensions in mm)

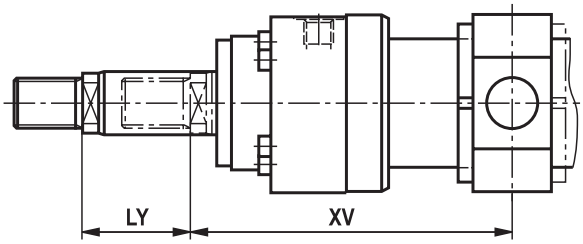
CDH3 MT4



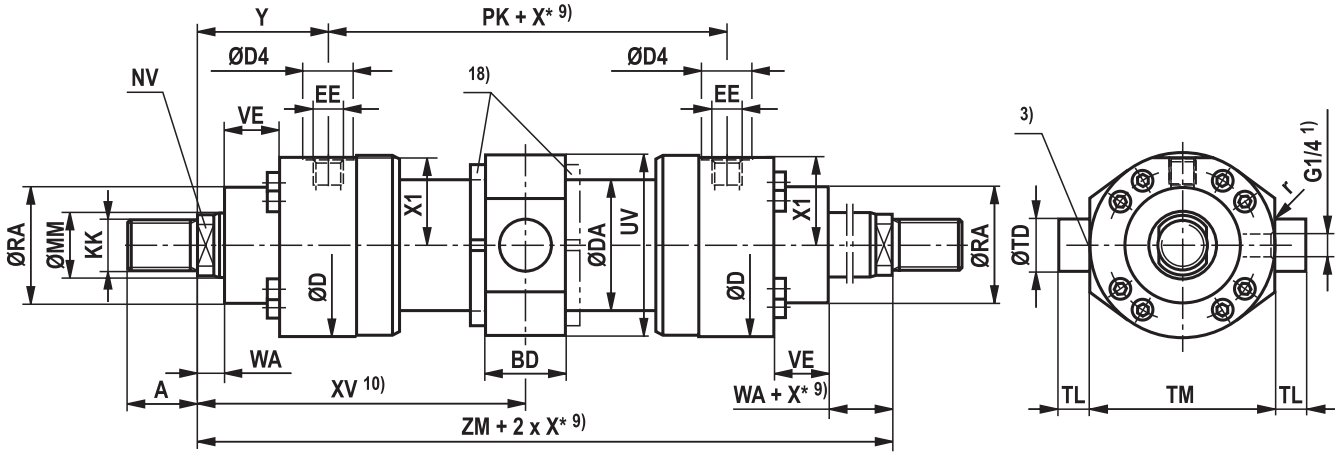
CDH3 MT4: with seal design "A", "B" and ØAL 160 - 320 mm



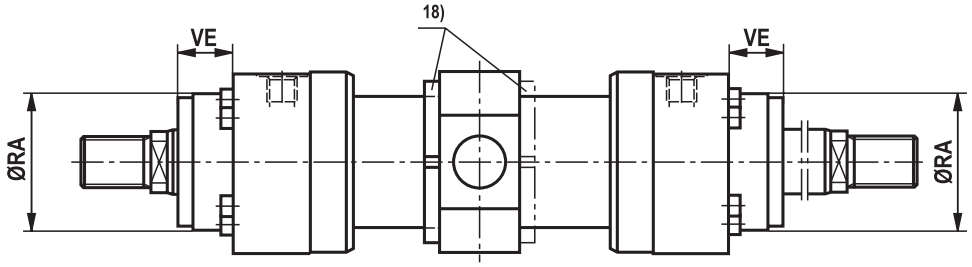
Dimensions for cylinder with piston rod extension "LY" in retracted condition



CGH3 MT4



CGH3 MT4: with seal design "A", "B" and ØAL 160 - 320 mm



☞ **Notice:** During installation, it must be ensured that the trunnion bearings are installed up to the trunnion shoulders. Any variation may reduce the product's service life.

Dimensions

Trunnion mountings CDH3/CGH3: MT4 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	WA
40	**28**	M22x1,5	22	M24x2	35	22	92	52	34	G1/2	M22x1,5	91	120	43	18
50	**36**	M28x1,5	28	M30x2	45	30	108	62	34	G1/2	M22x1,5	90	120	51.5	18
63	**45**	M35x1,5	35	M39x3	55	36	140	78	42	G3/4	M27x2	117	133	67	22
80	**56**	M45x1,5	45	M50x3	75	46	148	100	42	G3/4	M27x2	124	146	71.5	22
100	**70**	M58x1,5	58	M64x3	95	60	186	125	47	G1	M33x2	119	171	90.5	25
125	**90**	M65x1,5	65	M80x3	110	75	235	160	58	G1 1/4	M42x2	170	205	114	32
140	**100**	M80x2	80	M90x3	120	85	258	175	58	G1 1/4	M42x2	186	219	126	35
160	**110**	M100x2	100	M100x3	140	95	292	200	65	G1 1/2	M48x2	210	240	142.5	40
180	**125**	M110x2	110	M110x4	150	110	325	220	65	G1 1/2	M48x2	241	264	159.5	45
200	**140**	M120x3	120	M120x4	160	120	350	245	65	G1 1/2	M48x2	262	278	172.5	45
220	**160**	M120x3	120	M120x4	160	140	375	292	65	G1 1/2	M48x2	262	326	185	40
250	**180**	M130x3	130	M150x4	190	160	440	324	65	G1 1/2	M48x2	272	336	218	40
280	**200**	–	–	M160x4	200	180	460	368	65	G1 1/2	M48x2	282	366	228	40
320	**220**	–	–	M180x4	220	200	490	406	65	G1 1/2	M48x2	287	391	243	40

ØAL	ØMM	PK	ZB	ZM	X* min	XV 11) cent	XV 10) min	XV 10) max	BD	UV 12)	ØTD e8	TL js16	TM h12	r	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	**28**	120	238	302	42	151+X*/2	172	138+X*	48	101	40	30	95	2	52	45	52	20
50	**36**	120	237	300	50	150+X*/2	175	134+X*	48	117	40	30	120	2	70	47	70	19
63	**45**	133	285	367	64	183.5+X*/2	215.5	163.5+X*	53	153	45	35	150	2	88	43	88	13
80	**56**	146	305	384	82	197+X*/2	238	168+X*	68	169	55	50	160	2	98	53	98	15
100	**70**	171	330	409	109	204.5+X*/2	259	165+X*	88	203	60	55	200	2	120	55	120	17
125	**90**	205	425	545	131	272.5+X*/2	338	207+X*	118	252	75	60	245	2.5	150	68	150	20
140	**100**	219	457	591	147	295.5+X*/2	369	222+X*	128	282	85	70	280	2.5	170	75	170	23
160	**110**	240	515	660	186	330+X*/2	423	237+X*	148	310	95	80	300	2.5	200	90	200	90
180	**125**	264	565	746	212	373+X*/2	479	267+X*	168	348	110	90	335	2.5	230	100	230	100
200	**140**	278	600	802	228	401+X*/2	515	287+X*	188	373	120	100	360	2.5	250	110	250	110
220	**160**	326	655	850	205	425+X*/2	527.5	322.5+X*	165	398	130	100	400	2.5	275	125	275	125
250	**180**	336	695	880	245	440+X*/2	562.5	317.5+X*	175	463	140	100	450	5	320	135	320	135
280	**200**	366	735	930	245	465+X*/2	587.5	342.5+X*	205	486	170	125	480	5	335	150	335	150
320	**220**	391	775	965	600	482.5+X*/2	782.5	182.5+X*	245	537	200	150	500	5	350	165	350	165

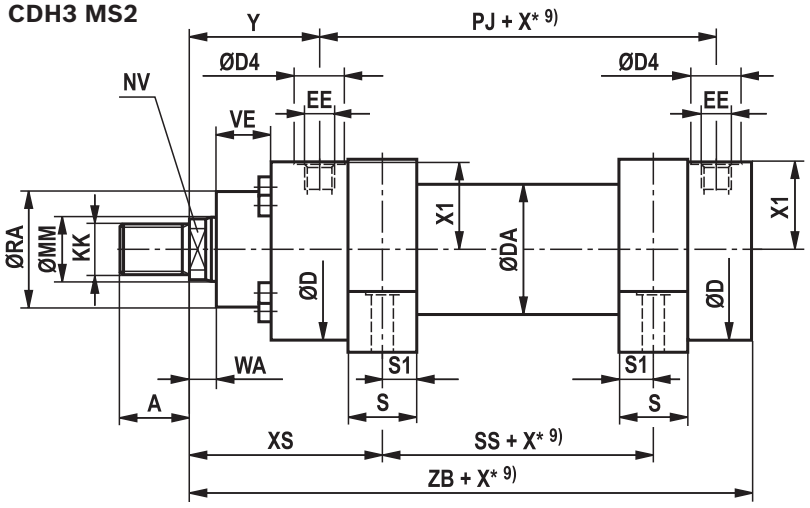
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

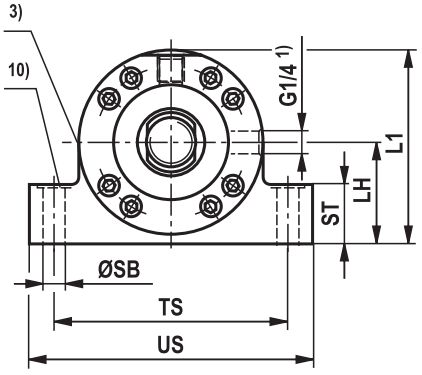
1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
7) Dimensions for cylinders with seal design M, T, G, L, R, S, V
8) Dimensions for cylinders with seal design A and B
9) Observe the min. stroke length "X*min"
10) When ordering, always specify the "XV" dimension in the clear text. Preferred XV dimension: Observe the trunnion position in the cylinder center XVmin and XVmax
11) XVcent recommendation: Trunnion position in cylinder center
12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting
16) Line connection "B" and "C"
17) Line connection "M"
18) Trunnion nut with ØAL ≥ 125 mm either at head or at base side depending on the position of the trunnion (XV)

Dimensions

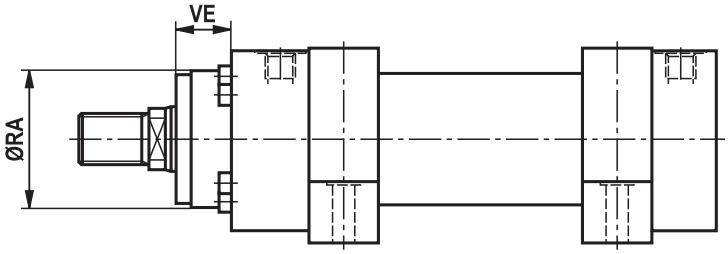
Foot mounting CDH3/CGH3: MS2 (dimensions in mm)

CDH3 MS2

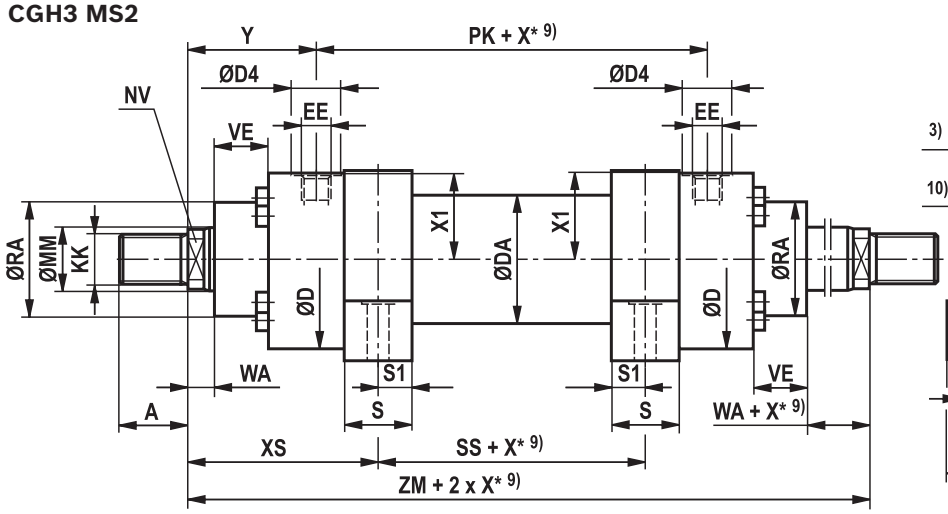


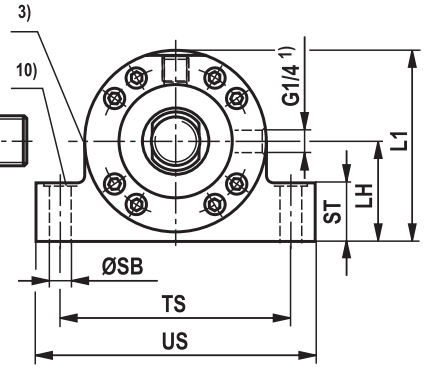


CDH3 MS2: with seal design "A", "B" and ØAL 160 - 320 mm

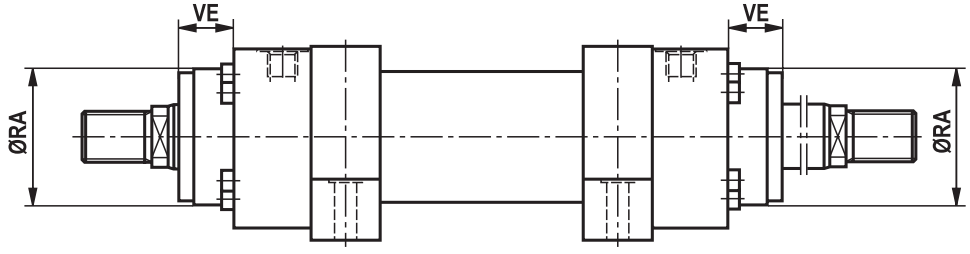


CGH3 MS2





CGH3 MS2: with seal design "A", "B" and ØAL 160 - 320 mm



Dimensions

Foot mounting CDH3/CGH3: MS2 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	WA
40	**28**	M22x1,5	22	M24x2	35	22	92	52	34	G1/2	M22x1,5	91	120	43	18
50	**36**	M28x1,5	28	M30x2	45	30	108	62	34	G1/2	M22x1,5	90	120	51.5	18
63	**45**	M35x1,5	35	M39x3	55	36	140	78	42	G3/4	M27x2	117	133	67	22
80	**56**	M45x1,5	45	M50x3	75	46	148	100	42	G3/4	M27x2	124	146	71.5	22
100	**70**	M58x1,5	58	M64x3	95	60	186	125	47	G1	M33x2	119	171	90.5	25
125	**90**	M65x1,5	65	M80x3	110	75	235	160	58	G1 1/4	M42x2	170	205	114	32
140	**100**	M80x2	80	M90x3	120	85	258	175	58	G1 1/4	M42x2	186	219	126	35
160	**110**	M100x2	100	M100x3	140	95	292	200	65	G1 1/2	M48x2	210	240	142.5	40
180	**125**	M110x2	110	M110x4	150	110	325	220	65	G1 1/2	M48x2	241	264	159.5	45
200	**140**	M120x3	120	M120x4	160	120	350	245	65	G1 1/2	M48x2	262	278	172.5	45
220	**160**	M120x3	120	M120x4	160	140	375	292	65	G1 1/2	M48x2	262	326	185	40
250	**180**	M130x3	130	M150x4	190	160	440	324	65	G1 1/2	M48x2	272	336	218	40
280	**200**	–	–	M160x4	200	180	460	368	65	G1 1/2	M48x2	282	366	228	40
320	**220**	–	–	M180x4	220	200	490	406	65	G1 1/2	M48x2	287	391	243	40

ØAL	ØMM	PK	XS	ZB	ZM	SS	X* min	S	S1	ØSB H13	ST	TS js13	US max	LH	L1	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	**28**	120	126	238	302	50	–	30	15	17.5	32	125	164	50	100	52	45	52	20
50	**36**	120	130	237	300	40	4	40	20	22	37	150	197	60	118	70	47	70	19
63	**45**	133	164	285	367	39	15	50	25	24	47	185	235	75	149	88	43	88	13
80	**56**	146	176	305	394	42	22	60	30	26	52	210	270	80	160	98	53	98	15
100	**70**	171	179	330	409	51	23	70	35	33	62	250	320	100	200	120	55	120	17
125	**90**	205	245	425	545	55	39	90	45	40	72	310	392	120	245	150	68	150	20
140	**100**	219	265.5	457	591	60	39	95	47.5	40	77	340	422	135	271	170	75	170	23
160	**110**	240	302.5	515	660	55	64	115	57.5	45	87	370	462	150	305	200	90	200	90
180	**125**	264	353.5	565	746	39	110	145	72.5	45	79	415	515	165	337	230	100	230	100
200	**140**	278	379.5	600	802	43	116	155	77.5	52	112	460	570	180	366	250	110	250	110
220	**160**	326	387.5	655	850	75	100	155	77.5	52	112	500	610	200	398	275	125	275	125
250	**180**	336	397.5	695	880	85	90	155	77.5	52	122	550	660	225	456	320	135	320	135
280	**200**	366	410	735	930	110	70	160	80	62	142	600	722	235	476	335	150	335	150
320	**220**	391	440	775	965	85	400	190	95	74	162	650	785	255	512	350	165	350	165

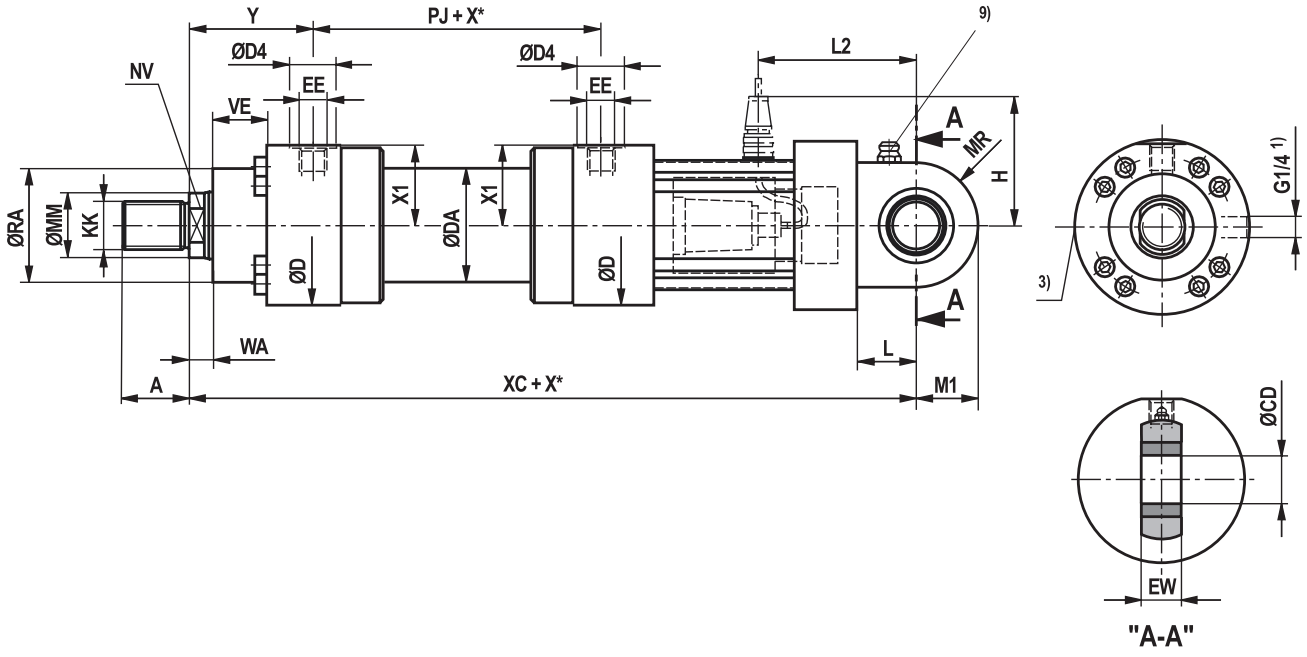
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
7) Dimensions for cylinders with seal design M, T, G, L, R, S and V
8) Dimensions for cylinders with seal design A and B
9) Observe the min. stroke length "X*min"
10) Recess 2 mm deep for hexagon socket head cap screws; ISO 4762 (for piston Ø 320 mm DIN 931) – The screws must not be subjected to shear force. Force distribution via additional external fitting strip
16) Line connection "B" and "C"
17) Line connection "M"

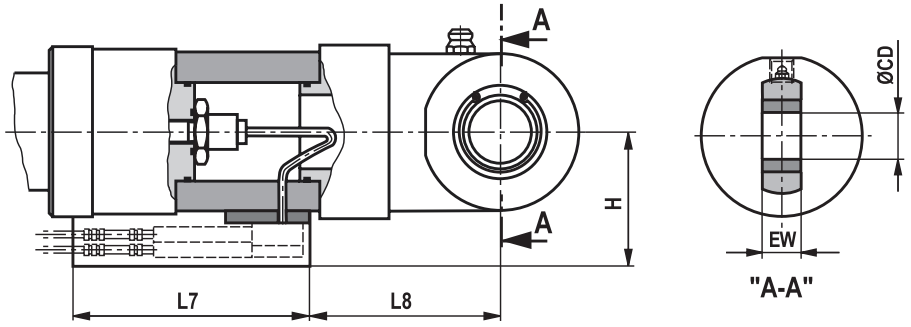
Dimensions

Swivel eye at base CSH3: MP3 (dimensions in mm)

CSH3 MP3; ØAL 40-200 mm
for position measurement system output "C", "F" and "D"



CSH3 MP3; ØAL 40-200 mm
for position measurement system output "N" and "P"



Dimensions

Swivel eye at base CSH3: MP3 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X* max
40	**28**	M22x1,5	22	M24x2	35	22	92	52	34	G1/2	M22x1,5	91	120	1000
50	**36**	M28x1,5	28	M30x2	45	30	108	62	34	G1/2	M22x1,5	90	120	1000
63	**45**	M35x1,5	35	M39x3	55	36	140	78	42	G3/4	M27x2	117	133	2000
80	**56**	M45x1,5	45	M50x3	75	46	148	100	42	G3/4	M27x2	124	146	2000
100	**70**	M58x1,5	58	M64x3	95	60	186	125	47	G1	M33x2	119	171	3000
125	**90**	M65x1,5	65	M80x3	110	75	235	160	58	G1 1/4	M42x2	170	205	3000
140	**100**	M80x2	80	M90x3	120	85	258	175	58	G1 1/4	M42x2	186	219	3000
160	**110**	M100x2	100	M100x3	140	95	292	200	65	G1 1/2	M48x2	210	240	3000
180	**125**	M110x2	110	M110x4	150	110	325	220	65	G1 1/2	M48x2	241	264	3000
200	**140**	M120x3	120	M120x4	160	120	350	245	65	G1 1/2	M48x2	262	278	3000

ØAL	ØMM	X1	WA	XC	L	MR	M1	ØCD H11	EW h12	ØRA	VE	L2	H 14)	H 13)	L7	L8	B
40	**28**	43	18	433	35	36	34	30	28	52	45	102	200	83	108	115	64
50	**36**	51.5	18	445	45	42	40	35	30	70	47	115	200	102	116	125	64
63	**45**	67	22	508	50	52	50	40	35	88	43	127	200	104	133	140	64
80	**56**	71.5	22	540	55	65	62.5	50	40	98	53	137	200	109	137	125	64
100	**70**	90.5	25	565	65	70	70	60	50	120	55	155	200	127	156	135	64
125	**90**	114	32	668	75	82	82	70	55	150	68	185	200	161	181	150	64
140	**100**	126	35	705	80	95	95	80	60	170	75	192	200	166	192	160	64
160	**110**	142.5	40	785	90	113	113	90	65	200	90	225	200	193	210	170	64
180	**125**	159.5	45	838	105	125	125	100	70	230	100	235	200	202	226	180	64
200	**140**	172.5	45	888	115	142.5	142.5	110	80	250	110	245	200	214	239	195	64

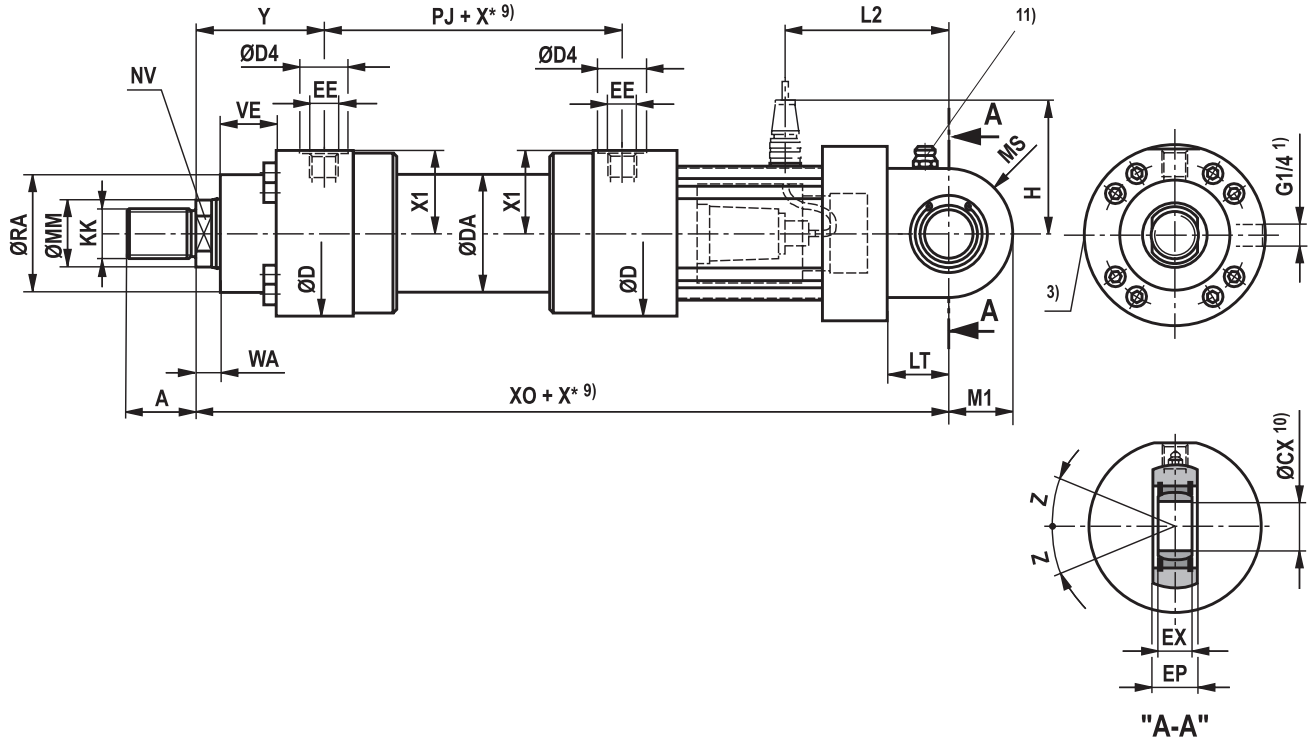
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
11) Standard version "W"
Grease nipple, cone head form A according to DIN 71412
13) Dimensions for position measurement system output "N" and "P"
14) Dimensions for position measurement system output "C", "F" and "D"
16) Line connection "B" and "C"
17) Line connection "M"

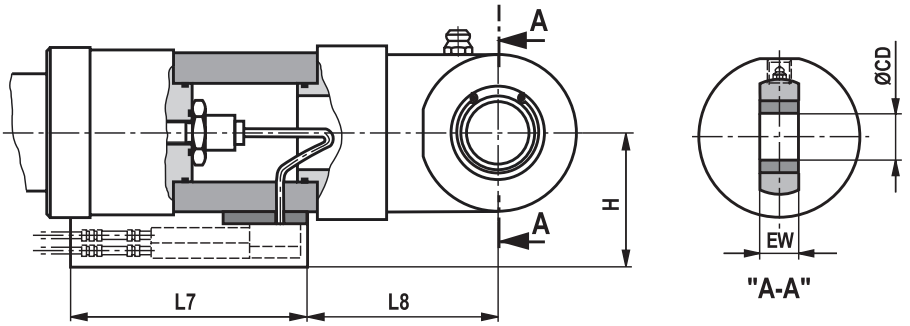
Dimensions

Self-aligning clevis at base CSH3: MP5 (dimensions in mm)

CSH3 MP5
for position measurement system output "C", "F" and "D"



CSH3 MP5
for position measurement system output "N" and "P"



Dimensions

Self-aligning clevis at base CSH3: MP5 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	X* max	C_0 18) kN
40	**28**	M22x1,5	22	M24x2	35	22	92	52	34	G1/2	M22x1,5	91	120	43	1000	106
50	**36**	M28x1,5	28	M30x2	45	30	108	62	34	G1/2	M22x1,5	90	120	51.5	1000	153
63	**45**	M35x1,5	35	M39x3	55	36	140	78	42	G3/4	M27x2	117	133	67	2000	250
80	**56**	M45x1,5	45	M50x3	75	46	148	100	42	G3/4	M27x2	124	146	71.5	2000	365
100	**70**	M58x1,5	58	M64x3	95	60	186	125	47	G1	M33x2	119	171	90.5	3000	400
125	**90**	M65x1,5	65	M80x3	110	75	235	160	58	G1 1/4	M42x2	170	205	114	3000	540
140	**100**	M80x2	80	M90x3	120	85	258	175	58	G1 1/4	M42x2	186	219	126	3000	670
160	**110**	M100x2	100	M100x3	140	95	292	200	65	G1 1/2	M48x2	210	240	142.5	3000	980
180	**125**	M110x2	110	M110x4	150	110	325	220	65	G1 1/2	M48x2	241	264	159.5	3000	1120
200	**140**	M120x3	120	M120x4	160	120	350	245	65	G1 1/2	M48x2	262	278	172.5	3000	1700
220	**160**	M120x3	120	M120x4	160	140	375	292	65	G1 1/2	M48x2	262	326	185	3000	1700
250	**180**	M130x3	130	M150x4	190	160	440	324	65	G1 1/2	M48x2	272	336	218	3000	2900
280	**200**	–	–	M160x4	200	180	460	368	65	G1 1/2	M48x2	282	366	228	3000	–
320	**220**	–	–	M180x4	220	200	490	406	65	G1 1/2	M48x2	287	391	243	3000	–

ØAL	ØMM	F_{adm} 19) kN	WA	XO	X* min	LT	M1	MS	ØCX	EP -0.4	EX	Z	ØRA	VE	L2	L7	L8	H 13)	H 14)	B
40	**28**	38.2	18	433	–	35	34	36	$30_{-0.010}$	28	$22_{-0.12}$	6 °	52	45	102	200	83	108	115	64
50	**36**	55.1	18	445	–	45	40	42	$35_{-0.012}$	30	$25_{-0.12}$	6 °	70	47	115	200	102	116	125	64
63	**45**	90.0	22	508	–	50	50	52	$40_{-0.012}$	35	$28_{-0.12}$	7 °	88	43	127	200	104	133	140	64
80	**56**	131.4	22	540	–	55	62.5	65	$50_{-0.012}$	40	$35_{-0.12}$	6 °	98	53	137	200	109	137	125	64
100	**70**	144.0	25	565	–	65	70	70	$60_{-0.015}$	50	$44_{-0.15}$	6 °	120	55	155	200	127	156	135	64
125	**90**	194.4	32	668	–	75	82	82	$70_{-0.015}$	55	$49_{-0.15}$	6 °	150	68	185	200	161	181	150	64
140	**100**	241.2	35	705	–	80	95	95	$80_{-0.015}$	60	$55_{-0.15}$	6 °	170	75	192	200	166	192	160	64
160	**110**	352.8	40	785	–	90	113	113	$90_{-0.020}$	65	$60_{-0.20}$	5 °	200	90	225	200	193	210	170	64
180	**125**	403.2	45	838	–	105	125	125	$100_{-0.020}$	70	$70_{-0.20}$	7 °	230	100	235	200	202	226	180	64
200	**140**	612.0	45	888	–	115	142.5	142.5	$110_{-0.020}$	80	$70_{-0.20}$	6 °	250	110	245	200	214	239	195	64
220	**160**	612.0	40	970	–	115	150 12)	140 12)	$110_{-0.020}$	80	$70_{-0.20}$	6 °	275	125	270	200	238	254	215	64
250	**180**	1044.0	40	1055	20	140	188 12)	178 12)	$120_{-0.020}$	90	$85_{-0.20}$	6 °	320	135	320	200	283	284	235	64
280	**200**	–	40	1115	–	170	210 12)	200 12)	$140_{-0.025}$	100	$90_{-0.25}$	7 °	335	150	350	200	315	294	285	64
320	**220**	–	40	1195	340	200	260 12)	250 12)	$160_{-0.025}$	110	$105_{-0.25}$	8 °	350	165	400	200	400	309	300	64

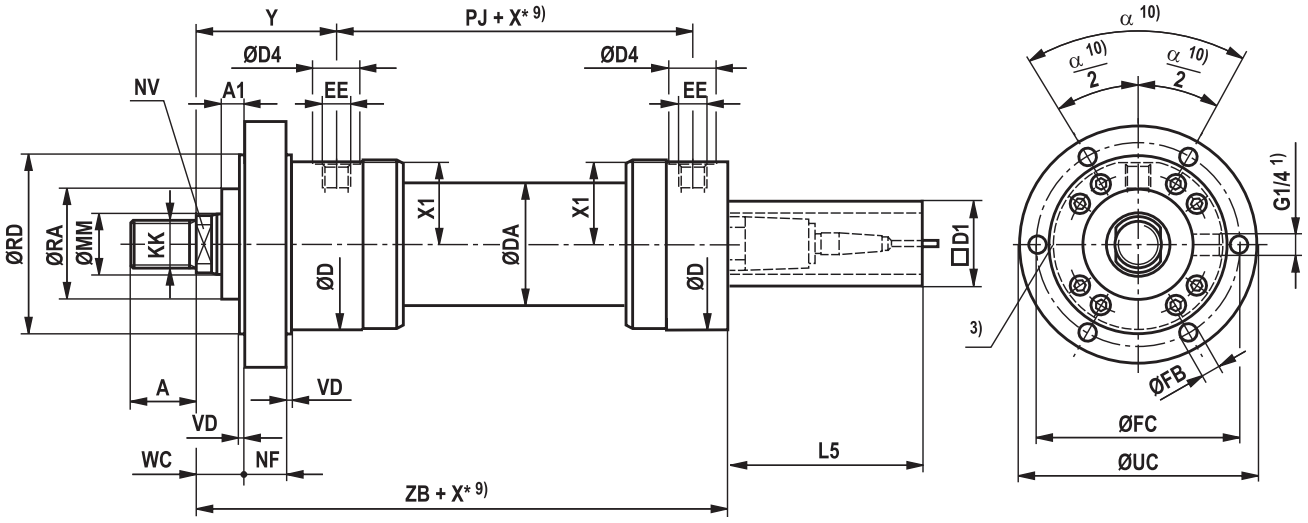
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
9) Observe the min. stroke length "X*min"
10) Related bolt Ø m6;
Related bolt Ø j6 for maintenance-free spherical bearing
11) Standard version "W"
Grease nipple, cone head form A according to DIN 71412;
not applicable to spherical bearing, maintenance-free "A"
12) The specified dimensions are maximum values,
tolerance classes 342 according to ISO 9013: Thermal cutting
13) Dimensions for position measurement system output "N" and "P"
14) Dimensions for position measurement system output "C", "F" and "D"
16) Line connection "B" and "C"
17) Line connection "M"
18) C_0 = static load rating of the swivel head
19) F_{adm} = max. admissible load of the swivel head with oscillatory or alternating loads

Dimensions

Round flange at head CSH3: MF3 (dimensions in mm)

CSH3 MF3



Dimensions

Round flange at head CSH3: MF3 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	L5
40	**28**	M22x1,5	22	M24x2	35	22	92	52	34	G1/2	M22x1,5	91	120	43	166
50	**36**	M28x1,5	28	M30x2	45	30	108	62	34	G1/2	M22x1,5	90	120	51.5	166
63	**45**	M35x1,5	35	M39x3	55	36	140	78	42	G3/4	M27x2	117	133	67	166
80	**56**	M45x1,5	45	M50x3	75	46	148	100	42	G3/4	M27x2	124	146	71.5	166
100	**70**	M58x1,5	58	M64x3	95	60	186	125	47	G1	M33x2	119	171	90.5	166
125	**90**	M65x1,5	65	M80x3	110	75	235	160	58	G1 1/4	M42x2	170	205	114	166
140	**100**	M80x2	80	M90x3	120	85	258	175	58	G1 1/4	M42x2	186	219	126	166
160	**110**	M100x2	100	M100x3	140	95	292	200	65	G1 1/2	M48x2	210	240	142.5	166
180	**125**	M110x2	110	M110x4	150	110	325	220	65	G1 1/2	M48x2	241	264	159.5	166
200	**140**	M120x3	120	M120x4	160	120	350	245	65	G1 1/2	M48x2	262	278	172.5	166
220	**160**	M120x3	120	M120x4	160	140	375	292	65	G1 1/2	M48x2	262	326	185	166
250	**180**	M130x3	130	M150x4	190	160	440	324	65	G1 1/2	M48x2	272	336	218	166
280	**200**	–	–	M160x4	200	180	460	368	65	G1 1/2	M48x2	282	366	228	166
320	**220**	–	–	M180x4	220	200	490	406	65	G1 1/2	M48x2	287	391	243	166

ØAL	ØMM	X* max	ØRD e8	WC	VD	NF	A1	ZB	X* min	ØFB H13	ØFC js13	ØUC -1	α	ØRA	D1 max
40	**28**	1000	95	23	5	35	0	247	–	13.5	120	145	60 °	52	80
50	**36**	1000	115	20	5	40	0	246	–	13.5	140	165	60 °	70	96
63	**45**	2000	150	20	5	40	0	304	–	17.5	180	210	60 °	88	96
80	**56**	2000	160	20	5	50	0	332	–	17.5	195	230	60 °	98	96
100	**70**	3000	200	20	5	55	0	347	–	22	230	270	60 °	120	96
125	**90**	3000	245	25	5	70	0	427	–	26	290	335	60 °	150	96
140	**100**	3000	280	30	10	70	0	460	–	30	330	380	60 °	170	96
160	**110**	3000	300	40	10	80	0	515	–	30	360	420	45 °	200	96
180	**125**	3000	335	40	10	95	0	565	–	36	400	470	45 °	230	96
200	**140**	3000	360	40	10	105	0	600	–	36	430	500	45 °	250	96
220	**160**	3000	400	40	10	115	0	655	–	39	475	550	45 °	275	96
250	**180**	3000	450	40	10	125	0	695	20	45	530	610	45 °	320	96
280	**200**	3000	470	50	10	130	0	735	–	45	550	630	45 °	335	96
320	**220**	3000	510	55	10	140	5	775	340	45	590	670	30 °	350	96

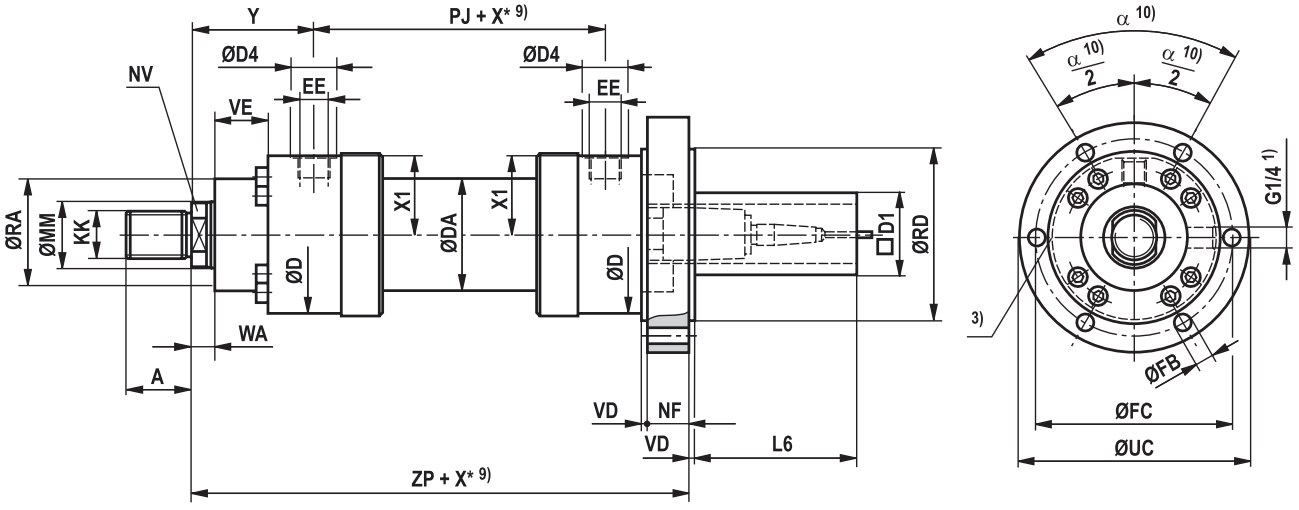
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
9) Observe the min. stroke length "X*min"
10) With piston Ø 160 to 280 mm 8 mounting bores
With piston Ø 320 mm 12 mounting bores
16) Line connection "B" and "C"
17) Line connection "M"

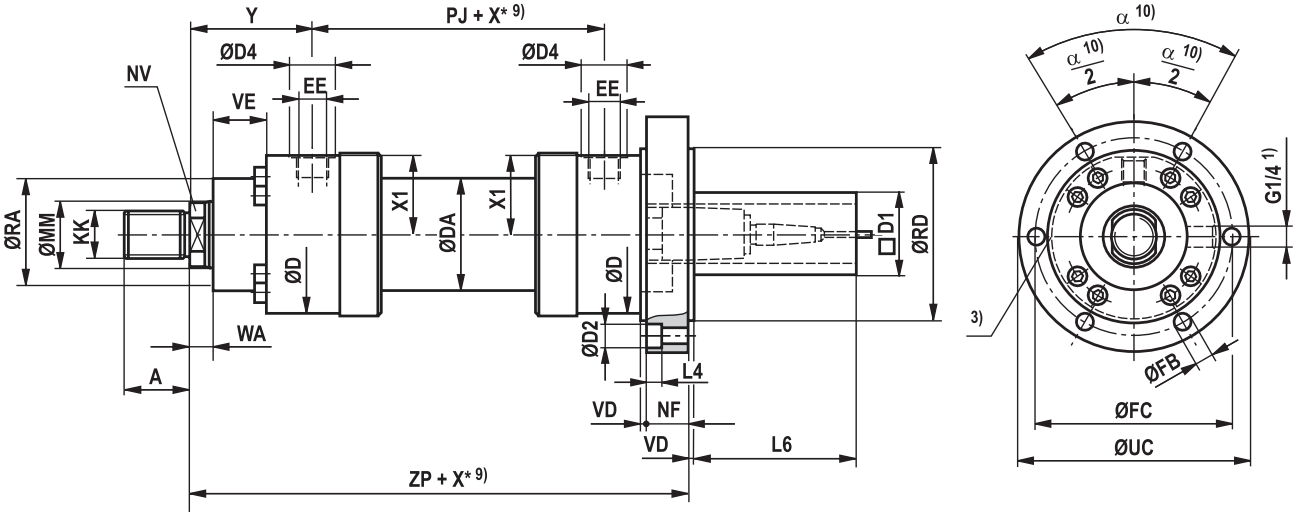
Dimensions

Round flange at base CSH3: MF4 (dimensions in mm)

CSH3 MF4; ØAL 40-100 mm



CSH3 MF4; ØAL 125-320 mm



Dimensions

Round flange at base CSH3: MF4 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	L4	ØD2	X* max
40	**28**	M22x1,5	22	M24x2	35	22	92	52	34	G1/2	M22x1,5	91	120	43	0	0	1000
50	**36**	M28x1,5	28	M30x2	45	30	108	62	34	G1/2	M22x1,5	90	120	51.5	0	0	1000
63	**45**	M35x1,5	35	M39x3	55	36	140	78	42	G3/4	M27x2	117	133	67	0	0	2000
80	**56**	M45x1,5	45	M50x3	75	46	148	100	42	G3/4	M27x2	124	146	71.5	0	0	2000
100	**70**	M58x1,5	58	M64x3	95	60	186	125	47	G1	M33x2	119	171	90.5	0	0	3000
125	**90**	M65x1,5	65	M80x3	110	75	235	160	58	G1 1/4	M42x2	170	205	114	25.5	40	3000
140	**100**	M80x2	80	M90x3	120	85	258	175	58	G1 1/4	M42x2	186	219	126	28.5	43	3000
160	**110**	M100x2	100	M100x3	140	95	292	200	65	G1 1/2	M48x2	210	240	142.5	28.5	43	3000
180	**125**	M110x2	110	M110x4	150	110	325	220	65	G1 1/2	M48x2	241	264	159.5	35	53	3000
200	**140**	M120x3	120	M120x4	160	120	350	245	65	G1 1/2	M48x2	262	278	172.5	35	53	3000
220	**160**	M120x3	120	M120x4	160	140	375	292	65	G1 1/2	M48x2	262	326	185	38	57	3000
250	**180**	M130x3	130	M150x4	190	160	440	324	65	G1 1/2	M48x2	272	336	218	44	66	3000
280	**200**	–	–	M160x4	200	180	460	368	65	G1 1/2	M48x2	282	366	228	44	66	3000
320	**220**	–	–	M180x4	220	200	490	406	65	G1 1/2	M48x2	287	391	243	44	66	3000

ØAL	ØMM	WA	ZP	X* min	NF	VD	ØRD e8	ØFB H13	ØFC js13	ØUC -1	α	ØRA	VE	L6	D1 max
40	**28**	18	282	–	35	5	95	13.5	120	145	60 °	52	45	166	80
50	**36**	18	285	–	40	5	115	13.5	140	165	60 °	70	47	166	96
63	**45**	22	340	–	40	5	150	17.5	180	210	60 °	88	43	153	96
80	**56**	22	370	–	50	5	160	17.5	195	230	60 °	98	53	123	96
100	**70**	25	402	–	55	5	200	22	230	270	60 °	120	55	106	96
125	**90**	32	495	–	70	5	245	26	290	335	60 °	150	68	93	96
140	**100**	35	532	–	70	10	280	30	330	380	60 °	170	75	84	96
160	**110**	40	600	–	80	10	300	30	360	420	45 °	200	90	71	96
180	**125**	45	665	–	95	10	335	36	400	470	45 °	230	100	56	96
200	**140**	45	710	–	105	10	360	36	430	500	45 °	250	110	46	96
220	**160**	40	770	–	115	10	400	39	475	550	45 °	275	125	41	96
250	**180**	40	820	20	125	10	450	45	530	610	45 °	320	135	31	96
280	**200**	40	865	–	130	10	470	45	550	630	45 °	335	150	26	96
320	**220**	40	915	340	140	10	510	45	590	670	30 °	350	165	16	96

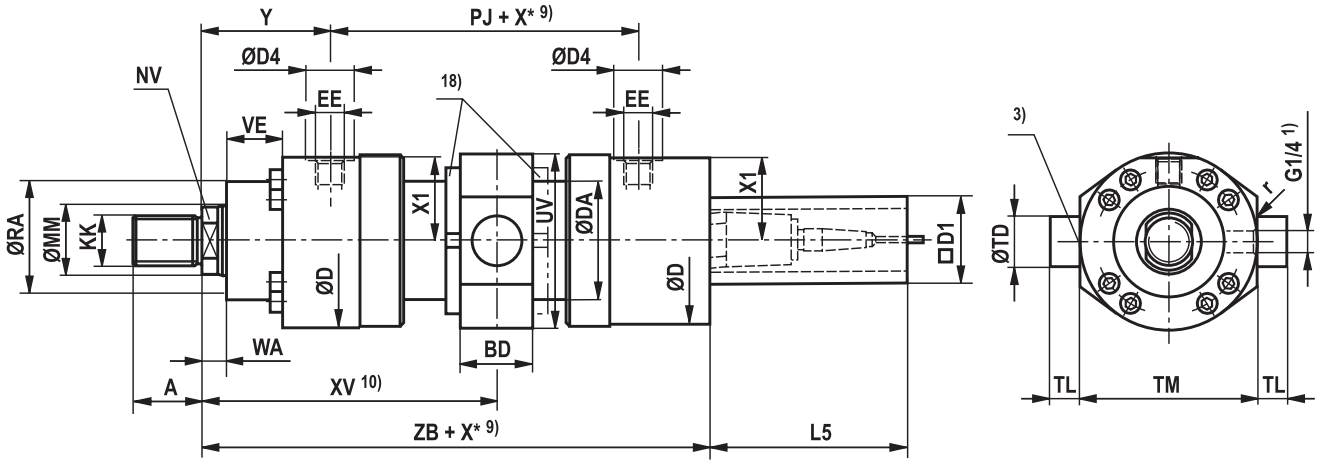
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
9) Observe the min. stroke length "X*min"
10) With piston Ø 160 to 280 mm 8 mounting bores
With piston Ø 320 mm 12 mounting bores
16) Line connection "B" and "C"
17) Line connection "M"

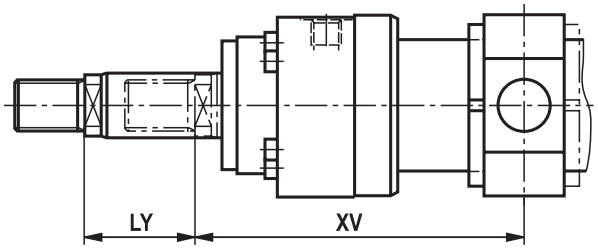
Dimensions

Trunnion mounting CSH3: MT4 (dimensions in mm)

CSH3 MT4



Dimensions for cylinder with piston rod extension "LY" in retracted condition



☞ **Notice:** During installation, it must be ensured that the trunnion bearings are installed up to the trunnion shoulders. Any variation may reduce the product's service life.

Dimensions

Trunnion mounting CSH3: MT4 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	WA	L5	X* max
40	**28**	M22x1,5	22	M24x2	35	22	92	52	34	G1/2	M22x1,5	91	120	43	18	166	1000
50	**36**	M28x1,5	28	M30x2	45	30	108	62	34	G1/2	M22x1,5	90	120	51.5	18	166	1000
63	**45**	M35x1,5	35	M39x3	55	36	140	78	42	G3/4	M27x2	117	133	67	22	166	2000
80	**56**	M45x1,5	45	M50x3	75	46	148	100	42	G3/4	M27x2	124	146	71.5	22	166	2000
100	**70**	M58x1,5	58	M64x3	95	60	186	125	47	G1	M33x2	119	171	90.5	25	166	3000
125	**90**	M65x1,5	65	M80x3	110	75	235	160	58	G1 1/4	M42x2	170	205	114	32	166	3000
140	**100**	M80x2	80	M90x3	120	85	258	175	58	G1 1/4	M42x2	186	219	126	35	166	3000
160	**110**	M100x2	100	M100x3	140	95	292	200	65	G1 1/2	M48x2	210	240	142.5	40	166	3000
180	**125**	M110x2	110	M110x4	150	110	325	220	65	G1 1/2	M48x2	241	264	159.5	45	166	3000
200	**140**	M120x3	120	M120x4	160	120	350	245	65	G1 1/2	M48x2	262	278	172.5	45	166	3000
220	**160**	M120x3	120	M120x4	160	140	375	292	65	G1 1/2	M48x2	262	326	185	40	166	3000
250	**180**	M130x3	130	M150x4	190	160	440	324	65	G1 1/2	M48x2	272	336	218	40	166	3000
280	**200**	–	–	M160x4	200	180	460	368	65	G1 1/2	M48x2	282	366	228	40	166	3000
320	**220**	–	–	M180x4	220	200	490	406	65	G1 1/2	M48x2	287	391	243	40	166	3000

ØAL	ØMM	ZB	X* min	XV 11) cent	XV 10) min	XV 10) max	BD	UV 12)	ØTD e8	TL js16	TM h12	r	ØRA	VE	D1 max
40	**28**	247	42	151+X*/2	172	138+X*	48	101	40	30	95	2	52	45	80
50	**36**	246	50	150+X*/2	175	134+X*	48	117	40	30	120	2	70	47	96
63	**45**	304	64	183.5+X*/2	215.5	163.5+X*	53	153	45	35	150	2	88	43	96
80	**56**	332	82	197+X*/2	238	168+X*	68	169	55	50	160	2	98	53	96
100	**70**	347	109	204.5+X*/2	259	165+X*	88	203	60	55	200	2	120	55	96
125	**90**	427	131	272.5+X*/2	338	207+X*	118	252	75	60	245	2.5	150	68	96
140	**100**	460	147	295.5+X*/2	369	222+X*	128	282	85	70	280	2.5	170	75	96
160	**110**	515	186	330+X*/2	423	237+X*	148	310	95	80	300	2.5	200	90	96
180	**125**	565	212	373+X*/2	479	267+X*	168	348	110	90	335	2.5	230	100	96
200	**140**	600	228	401+X*/2	515	287+X*	188	373	120	100	360	2.5	250	110	96
220	**160**	655	205	425+X*/2	527.5	322.5+X*	165	398	130	100	400	2.5	275	125	96
250	**180**	695	245	440+X*/2	562.5	317.5+X*	175	463	140	100	450	5	320	135	96
280	**200**	735	245	465+X*/2	587.5	342.5+X*	205	486	170	125	480	5	335	150	96
320	**220**	775	600	482.5+X*/2	782.5	182.5+X*	245	537	200	150	500	5	350	165	96

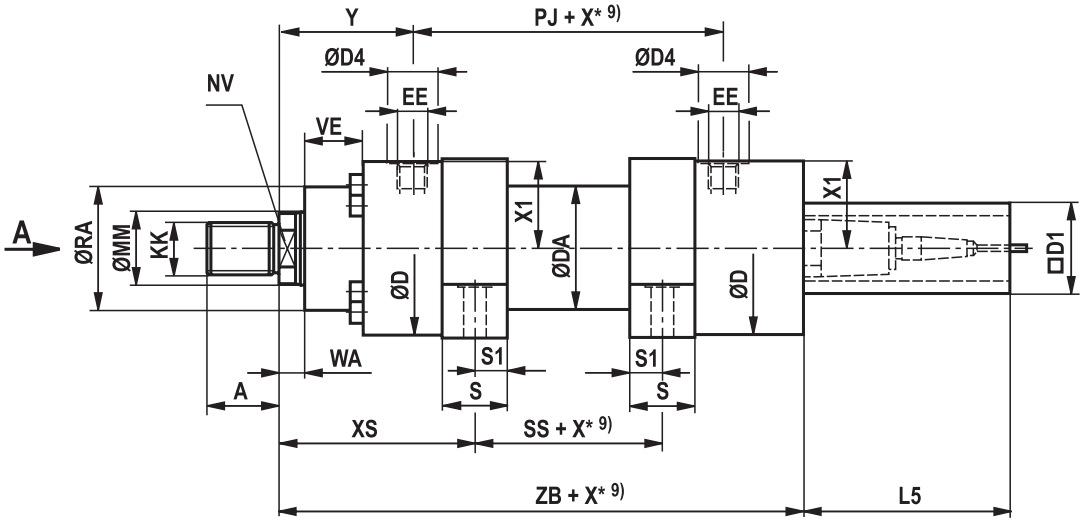
ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
9) Observe the min. stroke length "X*min"
10) When ordering, always specify the "XV" dimension in the clear text. Preferred XV dimension: Observe the trunnion position in the cylinder center XVmin and XVmax
11) XVcent recommendation: Trunnion position in cylinder center
12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting
16) Line connection "B" and "C"
17) Line connection "M"
18) Trunnion nut with ØAL ≥ 125 mm either at head or at base side depending on the position of the trunnion (XV)

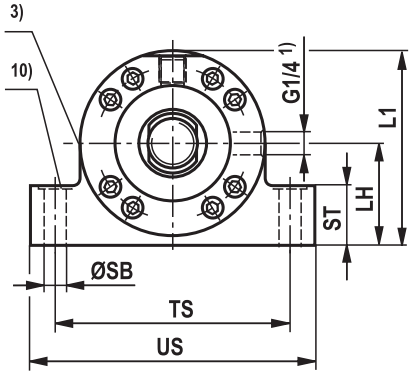
Dimensions

Foot mounting CSH3: MS2 (dimensions in mm)

CSH3 MS2



View A



Dimensions

Foot mounting CSH3: MS2 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4; 16)	EE 4; 17)	Y	PJ	X1	WA	L5	X* max
40	**28**	M22x1,5	22	M24x2	35	22	92	52	34	G1/2	M22x1,5	91	120	43	18	166	1000
50	**36**	M28x1,5	28	M30x2	45	30	108	62	34	G1/2	M22x1,5	90	120	51.5	18	166	1000
63	**45**	M35x1,5	35	M39x3	55	36	140	78	42	G3/4	M27x2	117	133	67	22	166	2000
80	**56**	M45x1,5	45	M50x3	75	46	148	100	42	G3/4	M27x2	124	146	71.5	22	166	2000
100	**70**	M58x1,5	58	M64x3	95	60	186	125	47	G1	M33x2	119	171	90.5	25	166	3000
125	**90**	M65x1,5	65	M80x3	110	75	235	160	58	G1 1/4	M42x2	170	205	114	32	166	3000
140	**100**	M80x2	80	M90x3	120	85	258	175	58	G1 1/4	M42x2	186	219	126	35	166	3000
160	**110**	M100x2	100	M100x3	140	95	292	200	65	G1 1/2	M48x2	210	240	142.5	40	166	3000
180	**125**	M110x2	110	M110x4	150	110	325	220	65	G1 1/2	M48x2	241	264	159.5	45	166	3000
200	**140**	M120x3	120	M120x4	160	120	350	245	65	G1 1/2	M48x2	262	278	172.5	45	166	3000
220	**160**	M120x3	120	M120x4	160	140	375	292	65	G1 1/2	M48x2	262	326	185	40	166	3000
250	**180**	M130x3	130	M150x4	190	160	440	324	65	G1 1/2	M48x2	272	336	218	40	166	3000
280	**200**	–	–	M160x4	200	180	460	368	65	G1 1/2	M48x2	282	366	228	40	166	3000
320	**220**	–	–	M180x4	220	200	490	406	65	G1 1/2	M48x2	287	391	243	40	166	3000

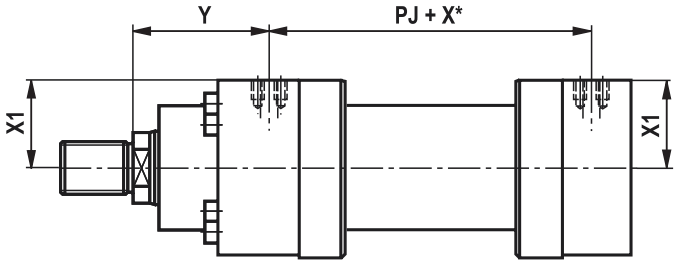
ØAL	ØMM	XS	ZB	SS	X* min	S	S1	ØSB H13	ST	TS js13	US max	LH	L1	ØRA	VE	D1 max
40	**28**	126	247	50	–	30	15	17.5	32	125	164	50	100	52	45	80
50	**36**	130	246	40	4	40	20	22	37	150	197	60	118	70	47	96
63	**45**	164	304	39	15	50	25	24	47	185	235	75	149	88	43	96
80	**56**	176	332	42	22	60	30	26	52	210	270	80	160	98	53	96
100	**70**	179	347	51	23	70	35	33	62	250	320	100	200	120	55	96
125	**90**	245	427	55	39	90	45	40	72	310	392	120	245	150	68	96
140	**100**	265.5	460	60	39	95	47.5	40	77	340	422	135	271	170	75	96
160	**110**	302.5	515	55	64	115	57.5	45	87	370	462	150	305	200	90	96
180	**125**	353.5	565	39	110	145	72.5	45	79	415	515	165	337	230	100	96
200	**140**	379.5	600	43	116	155	77.5	52	112	460	570	180	366	250	110	96
220	**160**	387.5	655	75	100	155	77.5	52	112	500	610	200	398	275	125	96
250	**180**	397.5	695	85	90	155	77.5	52	122	550	660	225	456	320	135	96
280	**200**	410	735	110	70	160	80	62	142	600	722	235	476	335	150	96
320	**220**	440	815	125	85	190	95	62	142	610	732	255	512	365	155	96

ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length
X*max = max. stroke length
X*min = min. stroke length
With hydraulic cylinders with end position cushioning, observe the notice on page 68!

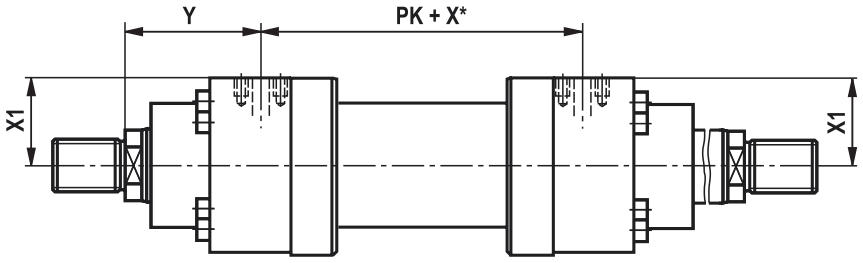
1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)
2) Ø D4 max. 0.5 mm deep
3) Throttle valve only with end position cushioning "E" (180° for bleeding)
4) Flange connections see separate table pages 42 and 43
5) Thread design "G"
6) Thread design "A"
9) Observe the min. stroke length "X*min"
10) Recess 2 mm deep, for hexagon socket head cap screws; ISO 4762 (for piston Ø 320 mm DIN 931) – The screws must not be subjected to shear force. Force distribution via additional external fitting strip
16) Line connection "B" and "C"
17) Line connection "M"

Dimensions: Flange ports (dimensions in mm)

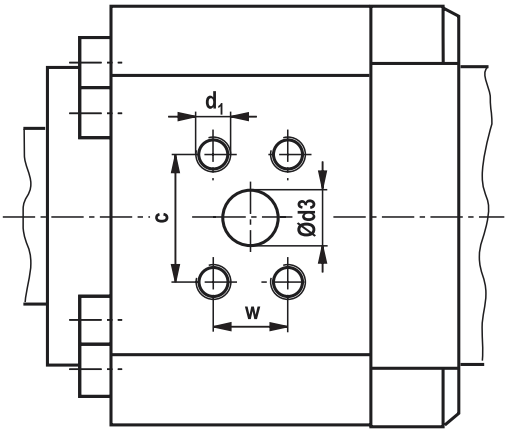
CDH3/CSH3



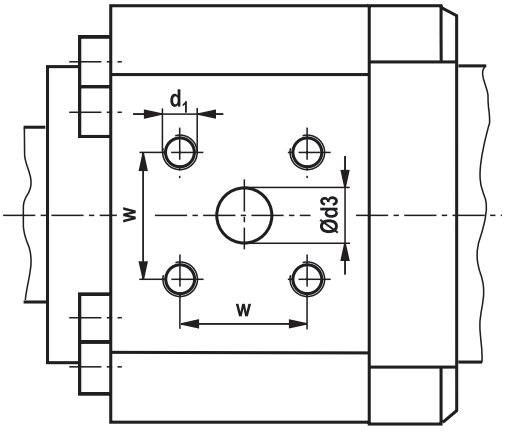
CGH3



Hole pattern for rectangular flange according to ISO 6162-2 table 2 type 1



Hole pattern for square flange according to ISO 6164 table 2



Dimensions: Flange ports (dimensions in mm)

ØAL	Version "D" ISO 6162-2 tab.2 type1 (400 bar) (≙ SAE 6000 PSI)										Version "H" ISO 6164 tab.2 (400 bar)							
	Y	PJ PK	X1	Ød$_3$	Ød$_3$ [3]	c ±0.25	w ±0.25	d$_1$	t$_1$ [1]	p [2]	Y	PJ PK	X1	Ød$_3$	w ±0.25	d1	t$_1$ [1]	p [2]
40	–	–	–	–	–	–	–	–	–	–	90	122	42.5	10	24.7	M6	12.5	400
50	–	–	–	–	–	–	–	–	–	–	89	122	51	10	24.7	M6	12.5	400
63	113	141	65	13	1/2“	40.5	18.2	M8	16	400	113	141	66	19	35.4	M8	16	400
80	120	154	69	13	1/2“	40.5	18.2	M8	16	400	120	154	70	19	35.4	M8	16	400
100	114	181	87	19	3/4“	50.8	23.8	M10	20	400	118	173	89.5	19	35.4	M8	16	400
125	162.5	220	111.5	25	1“	57.2	27.8	M12	24	400	162.5	220	112.5	32	51.6	M12	24	400
140	179.5	232	121.5	32	1 1/4“	66.6	31.8	M14	26	400	179.5	232	124.5	32	51.6	M12	24	400
160	197.5	265	139.5	32	1 1/4“	66.6	31.8	M14	26	400	197.5	265	140.5	38	60.1	M16	30	400
180	233.5	279	156.5	32	1 1/4“	66.6	31.8	M14	26	400	233.5	279	156.5	38	60.1	M16	30	400
200	254.5	293	167.5	38	1 1/2“	79.3	36.5	M16	30	400	254.5	293	170.5	38	60.1	M16	30	400
220	262	326	178	38	1 1/2“	79.3	36.5	M16	30	400	262	326	182	38	60.1	M16	30	400
250	272	336	212	38	1 1/2“	79.3	36.5	M16	30	400	272	336	216	38	60.1	M16	30	400
280	282	366	222	38	1 1/2“	79.3	36.5	M16	30	400	282	366	226	38	60.1	M16	30	400
320	287	391	236	51	2“	96.8	44.5	M20	36	400	287	391	240	51	69.3	M16	30	400

For main dimensions, see page 18 ... 41

ØAL = piston Ø
X* = stroke length

[1] Thread depth

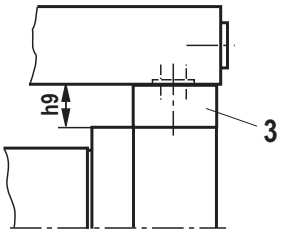
[2] Max. operating pressure for related flanges in bar

[3] Flange hole pattern according to ISO 6162-2 tab. 2 type 1 corresponds to flange hole pattern according to SAE 6000 PSI

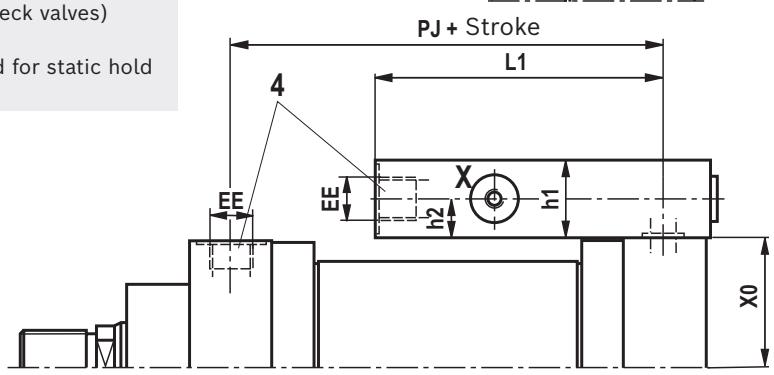
Dimensions: Subplates for valve mounting (SL and SV valve) (dimensions in mm)

Note:
Valves, fittings and piping are **not** included in the scope of delivery!

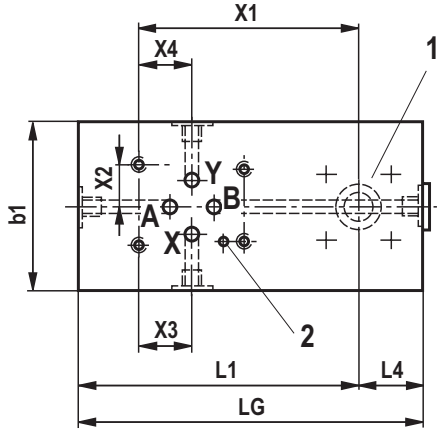
Installation situation with MT4



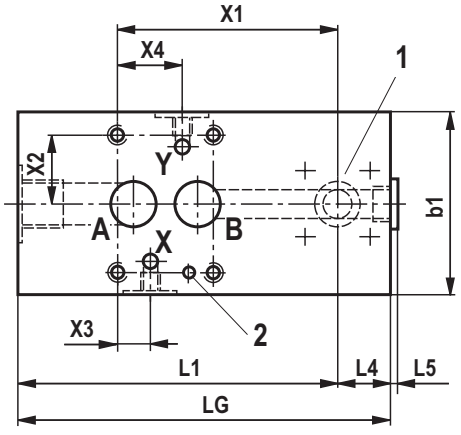
☞ **Notice:** Subplates for SL and SV valves (check valves)
Please note:
Seal designs T, G, L, R, S and V are not designed for static hold function!



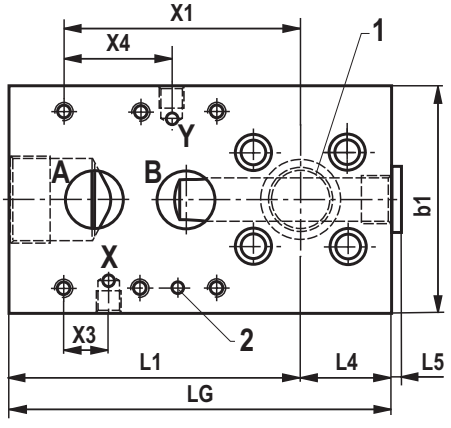
NG6
Hole pattern according to ISO 24340 form A and ISO 4401



NG10 and 20
Hole pattern according to ISO 5781



NG30
Hole pattern according to ISO 5781



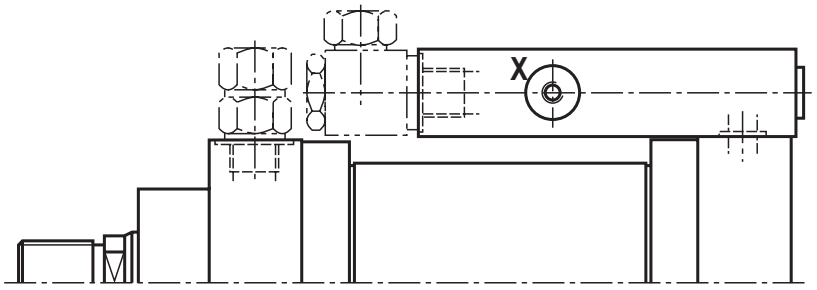
1 Port B to the piston side according to ISO 6164
2 Bore for locking pin
3 Adapter plate for type of mounting MT4 (included in the scope of delivery for MT4)
4 Line connection "B" dimensions "EE" see also pages 18 ... 41

Dimensions: Subplates for valve mounting (SL and SV valve) (dimensions in mm)

ØAL	Valve size (NG)	PJ	EE	Stroke min [1]		X0	Plate dimensions							Port size, hole pattern						Position point valve	
				[2]	[3]		L1	L4	L5	LG	b1	h1	h9	h2	A	X	Y	X3	X4	X1	X2
40	6	121	G1/2	50	50	42.5	90	20	4	110	55	40	10	20	G1/2	G1/4	G1/4	21.5	21.5	65.5	15.5
50	6	121	G1/2	50	50	51.0	90	20	4	110	55	40	10	20	G1/2	G1/4	G1/4	21.5	21.5	65.5	15.5
63	6	137	G3/4	64	64	66.0	105	30	5	135	60	45	20	22.5	G3/4	G1/4	G1/4	21.5	21.5	75.5	15.5
	10	137	G3/4	64	64	66.0	110	30	5	140	85	45	20	22.5	G3/4	G1/4	G1/4	21.4	21.4	78	33.3
80	6	150	G3/4	58	82	70.0	105	30	5	135	60	45	20	22.5	G3/4	G1/4	G1/4	21.5	21.5	75.5	15.5
	10	150	G3/4	58	82	70.0	110	30	5	140	85	45	20	22.5	G3/4	G1/4	G1/4	21.4	21.4	78	33.3
100	10	172	G1	50	109	89.5	102	28	5	130	85	50	20	25	G1	G1/4	G1/4	21.4	21.4	70	33.3
125	10	212.5	G1 1/4	80	131	112.5	120	40	5	160	85	60	30	30	G1 1/4	G1/4	G1/4	21.4	21.4	90	33.3
	20	212.5	G1 1/4	80	131	112.5	135	50	5	185	100	60	30	30	G1 1/4	G1/4	G1/4	20.8	39.7	105	39.7
	30	212.5	G1 1/4	80	131	112.5	160	50	5	210	125	60	30	30	G1 1/4	G1/4	G1/4	24.6	59.6	130	48.4
140	10	225.5	G1 1/4	60	147	124.5	120	40	5	160	85	60	30	30	G1 1/4	G1/4	G1/4	21.4	21.4	90	33.3
	20	225.5	G1 1/4	60	147	124.5	135	50	5	185	100	60	30	30	G1 1/4	G1/4	G1/4	20.8	39.7	105	39.7
	30	225.5	G1 1/4	60	147	124.5	160	50	5	210	125	60	30	30	G1 1/4	G1/4	G1/4	24.6	59.6	130	48.4
160	10	252.5	G1 1/2	60 [4]	186	140.5	130	45	5	175	95	70	20	35	G1 1/2	G1/4	G1/4	21.4	21.4	100	33.3
	20	252.5	G1 1/2	60 [4]	186	140.5	140	45	5	185	100	70	20	35	G1 1/2	G1/4	G1/4	20.8	39.7	115	39.7
	30	252.5	G1 1/2	60 [4]	186	140.5	165	45	5	210	125	70	20	35	G1 1/2	G1/4	G1/4	24.6	59.6	140	48.4
180	10	271.5	G1 1/2	50 [4]	212	156.5	130	45	5	175	95	70	20	35	G1 1/2	G1/4	G1/4	21.4	21.4	100	33.3
	20	271.5	G1 1/2	50 [4]	212	156.5	140	45	5	185	100	70	20	35	G1 1/2	G1/4	G1/4	20.8	39.7	115	39.7
	30	271.5	G1 1/2	50 [4]	212	156.5	165	45	5	210	125	70	20	35	G1 1/2	G1/4	G1/4	24.6	59.6	140	48.4
200	10	285.5	G1 1/2	30 [4]	228	170.5	130	45	5	175	95	70	20	35	G1 1/2	G1/4	G1/4	21.4	21.4	100	33.3
	20	285.5	G1 1/2	30 [4]	228	170.5	140	45	5	185	100	70	20	35	G1 1/2	G1/4	G1/4	20.8	39.7	115	39.7
	30	285.5	G1 1/2	30 [4]	228	170.5	165	45	5	210	125	70	20	35	G1 1/2	G1/4	G1/4	24.6	59.6	140	48.4

ØAL = piston Ø

[1] The information only applies to the following connection situation!



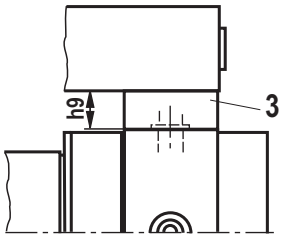
[2] Not for MT4

[3] Only for MT4

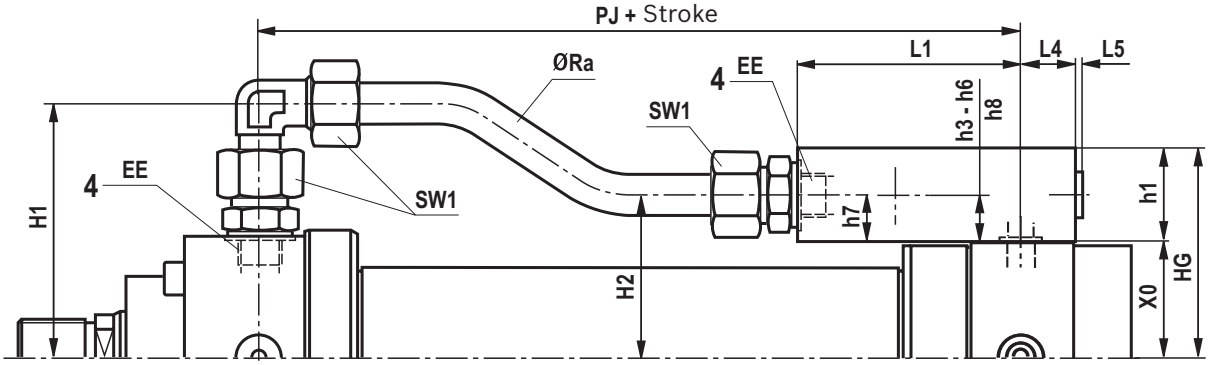
[4] With type of mounting "MS2". observe X*min on page 28 and/or 40

Dimensions: Subplates for valve mounting (directional and control valves) (dimensions in mm)

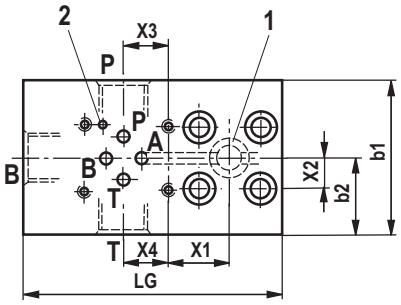
Installation situation with MT4



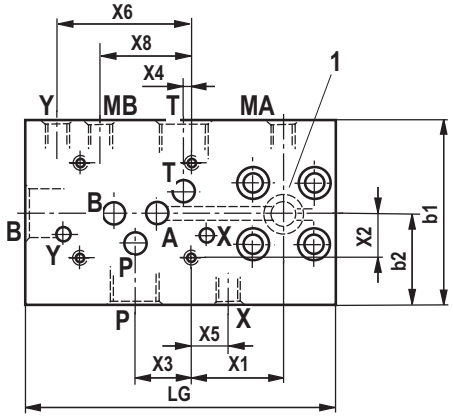
1 Port A to the piston side according to ISO 6164
2 Bore for locking pin
3 Adapter plate for type of mounting MT4 (included in the scope of delivery for MT4)
4 Connection "B" dimensions "EE" see also pages 18 ... 41



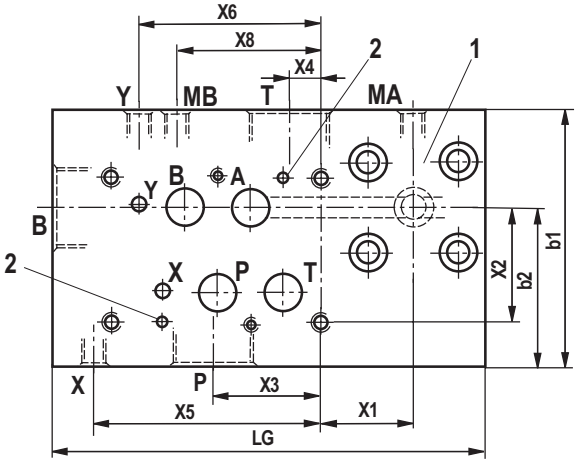
NG6
Hole pattern according to ISO 24340 form A and ISO 4401



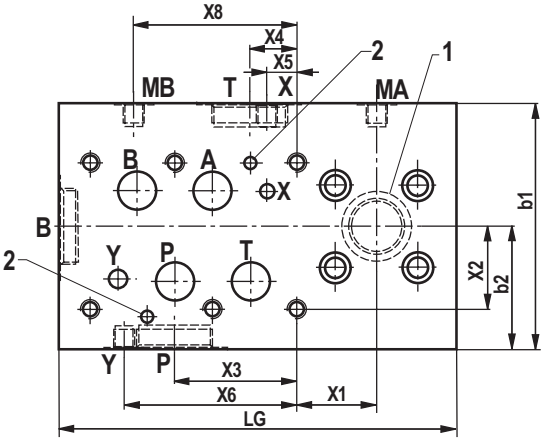
NG10
Hole pattern according to ISO 24340 form A and ISO 4401



NG16
Hole pattern according to ISO 24340 form A and ISO 4401



NG25
Hole pattern according to ISO 24340 form A and ISO 4401



With larger stroke lengths and depending on the piston diameter, the pipeline is mounted at the cylinder pipe using pipe supports. A maximum of two sandwich plates is admissible.

Dimensions: Subplates for valve mounting (directional and control valves – dimensions in mm)

ØAL	Valve size (NG)	PJ	EE	Stroke min	Plate dimensions																
					L1	L4	L5 max	H1	H2 [1]	H2 [2]	SW1	ØRa	b1	h1	LG	HG [1]	HG [2]	b2	X0	h7	h9
40	6	121	G1/2	242	90	20	4	98.0	62.5	72.5	30	16.0x2.5	65	40	110	82.5	92.5	32.5	42.5	20	10
50	6	121	G1/2	242	90	20	4	106.5	71.0	81.0	30	16.0x2.5	65	40	110	91.0	101.0	32.5	51.0	20	10
63	6	137	G3/4	278	105	30	5	132.0	88.5	108.5	36	20.0x3.0	75	45	135	111.0	131.0	37.5	66.0	22.5	20
	10	137	G3/4	303	130	30	5	132.0	89.0	109.0	36	20.0x3.0	90	70	160	136.0	156.0	45	66.0	23	20
80	6	150	G3/4	265	105	30	5	136.5	92.5	112.5	36	20.0x3.0	75	45	135	115.0	135.0	37.5	70.0	22.5	20
	10	150	G3/4	290	130	30	5	136.5	93.0	113.0	36	20.0x3.0	90	70	160	140.0	160.0	45	70.0	23	20
100	10	172	G1	317	132	28	5	163.5	119.5	139.5	46	25.0x4.0	90	80	160	169.5	189.5	45	89.5	30	20
125	10	212.5	G1 1/4	341	150	40	5	192.5	147.5	177.5	50	30.0x5.0	105	95	190	207.5	237.5	52.5	112.5	35	30
	16	212.5	G1 1/4	371	180	40	5	192.5	162.5	192.5	50	30.0x5.0	125	105	220	217.5	247.5	62.5	112.5	50	30
	25	212.5	G1 1/4	391	200	50	0	192.5	167.5	197.5	50	30.0x5.0	155	110	250	222.5	252.5	77.5	112.5	55	30
140	10	225.5	G1 1/4	328	150	40	5	204.5	159.5	189.5	50	30.0x5.0	105	95	190	219.5	249.5	52.5	124.5	35	30
	16	225.5	G1 1/4	358	180	40	5	204.5	174.5	204.5	50	30.0x5.0	125	105	220	229.5	259.5	62.5	124.5	50	30
	25	225.5	G1 1/4	378	200	50	0	204.5	179.5	209.5	50	30.0x5.0	155	110	250	234.5	264.5	77.5	124.5	55	30
160	10	252.5	G1 1/2	394	155	50	5	231.5	175.5	195.5	60	38.0x6.0	110	95	205	235.5	255.5	55	140.5	35	20
	16	252.5	G1 1/2	429	190	50	5	231.5	190.5	210.5	60	38.0x6.0	125	105	240	245.5	265.5	62.5	140.5	50	20
	25	252.5	G1 1/2	449	210	50	0	231.5	195.5	215.5	60	38.0x6.0	155	110	260	250.5	270.5	77.5	140.5	55	20
180	10	271.5	G1 1/2	375	155	50	5	248.5	191.5	211.5	60	38.0x6.0	110	95	205	251.5	271.5	55	156.5	35	20
	16	271.5	G1 1/2	248	190	50	5	248.5	206.5	226.5	60	38.0x6.0	125	105	240	261.5	281.5	62.5	156.5	50	20
	25	271.5	G1 1/2	307	210	50	0	248.5	211.5	231.5	60	38.0x6.0	155	110	260	266.5	286.5	77.5	156.5	55	20
200	10	285.5	G1 1/2	253	155	50	5	261.5	205.5	225.5	60	38.0x6.0	110	95	205	265.5	285.5	55	170.5	35	20
	16	285.5	G1 1/2	234	190	50	5	261.5	220.5	240.5	60	38.0x6.0	125	105	240	275.5	295.5	62.5	170.5	50	20
	25	285.5	G1 1/2	293	210	50	0	261.5	225.5	245.5	60	38.0x6.0	155	110	260	280.5	300.5	77.5	170.5	55	20

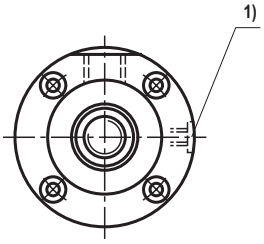
ØAL	Valve size (NG)	Port size, hole pattern																Position point valve	
		P	X3	h3	T	X4	h4	X	X5	h5	Y	X6	h6	MA	MB	X8	h8	X1	X2
40	6	G1/2	21.5	20	G1/2	21.5	20	-	-	-	-	-	-	-	-	-	-	25	15.5
50	6	G1/2	21.5	20	G1/2	21.5	20	-	-	-	-	-	-	-	-	-	-	25	15.5
63	6	G3/4	21.5	22.5	G3/4	21.5	22.5	-	-	-	-	-	-	-	-	-	-	35	15.5
	10	G3/4	27	33	G3/4	3.5	33	G1/4	18	57	G1/4	64.0	57	G1/4	G1/4	50	17	50	21.4
80	6	G3/4	21.5	22.5	G3/4	21.5	22.5	-	-	-	-	-	-	-	-	-	-	35	15.5
	10	G3/4	27	33	G3/4	3.5	33	G1/4	18	57	G1/4	64.0	57	G1/4	G1/4	50	17	50	21.4
100	10	G1	27	30	G1	3.5	40	G1/4	18	57	G1/4	65.0	57	G1/4	G1/4	58	20	52	21.4
125	10	G1 1/4	27	35	G1 1/4	3.5	45	G1/4	20	72	G1/4	62.0	72	G1/4	G1/4	55	25	60	21.4
	16	G1 1/4	57	35	G1 1/4	15	34	G1/4	76.5	80	G1/4	86.0	85	G1/4	G1/4	86	45	50	40
	25	G1 1/4	77	42	G1 1/4	30	34	G1/4	19	90	G1/4	109.0	90	G1/4	G1/4	103	50	50	52.1
140	10	G1 1/4	27	35	G1 1/4	3.5	45	G1/4	20	72	G1/4	62.0	72	G1/4	G1/4	55	25	60	21.4
	16	G1 1/4	57	35	G1 1/4	15	34	G1/4	76.5	80	G1/4	86.0	85	G1/4	G1/4	86	45	50	40
	25	G1 1/4	77	42	G1 1/4	30	34	G1/4	19	90	G1/4	109.0	90	G1/4	G1/4	103	50	50	52.1
160	10	G1 1/2	27	35	G1 1/2	3.5	45	G1/4	19	72	G1/4	62.0	72	G1/4	G1/4	50	25	72	21.4
	16	G1 1/2	57	35	G1 1/2	15	34	G1/4	76.5	80	G1/4	86.0	85	G1/4	G1/4	86	45	60	40
	25	G1 1/2	77	42	G1 1/2	30	34	G1/4	19	90	G1/4	109.0	90	G1/4	G1/4	103	50	60	52.1
180	10	G1 1/2	27	35	G1 1/2	3.5	45	G1/4	19	72	G1/4	62.0	72	G1/4	G1/4	50	25	72	21.4
	16	G1 1/2	57	35	G1 1/2	15	34	G1/4	76.5	80	G1/4	86.0	85	G1/4	G1/4	86	45	60	40
	25	G1 1/2	77	42	G1 1/2	30	34	G1/4	19	90	G1/4	109.0	90	G1/4	G1/4	103	50	60	52.1
200	10	G1 1/2	27	35	G1 1/2	3.5	45	G1/4	19	72	G1/4	62.0	72	G1/4	G1/4	50	25	72	21.4
	16	G1 1/2	57	35	G1 1/2	15	34	G1/4	76.5	80	G1/4	86.0	85	G1/4	G1/4	86	45	60	40
	25	G1 1/2	77	42	G1 1/2	30	34	G1/4	19	90	G1/4	109.0	90	G1/4	G1/4	103	50	60	52.1

ØAL = piston Ø [1] Not for MT4 [2] Only for MT4

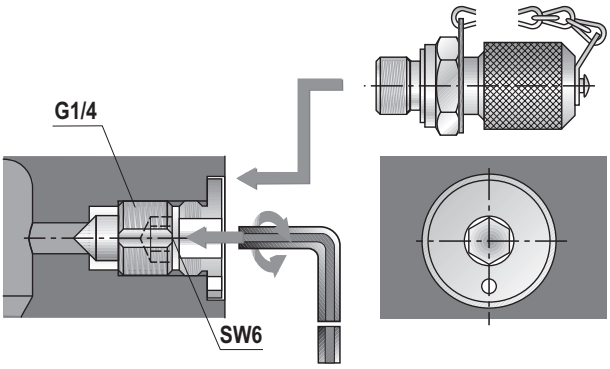
Bleeding / measuring coupling
(dimensions in mm)

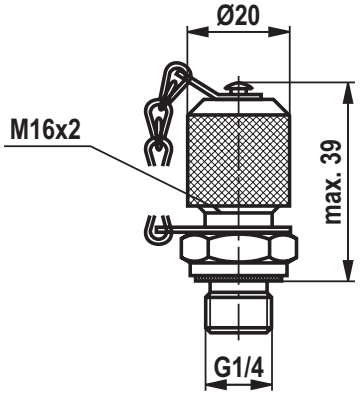
By default, a patented safety vent against unintended unscrewing in head and base is delivered for all cylinders.

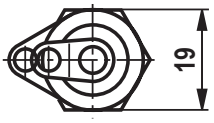
The port allows for the installation of a measuring coupling with check valve for pressure measurement or contamination-free bleeding. Measuring coupling with check valve function, i.e. the measuring or bleeding hose can also be connected when the system is pressurized.



1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)



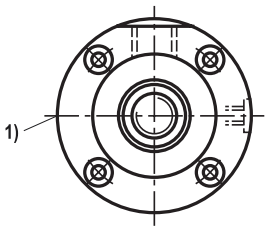




Scope of delivery: Measuring coupling **G1/4**
MEASURING COUPLING AB 20-11/K1 G1/4 with seal ring made of NBR
Material no. **R900009090**
MEASURING COUPLING AB 20-11/K1V G1/4 with seal ring made of FKM
Material no. **R900001264**

Dimensions: Throttle valve
(dimensions in mm)

ØAL	40	50	63	80	100	125	140	160	180	200	220	250	280	320
Nominal width	4	4	4	5	5	8	8	8	8	8	20	20	20	20



ØAL = piston Ø

1) Throttle valve only with end position cushioning "E" (180° for bleeding)

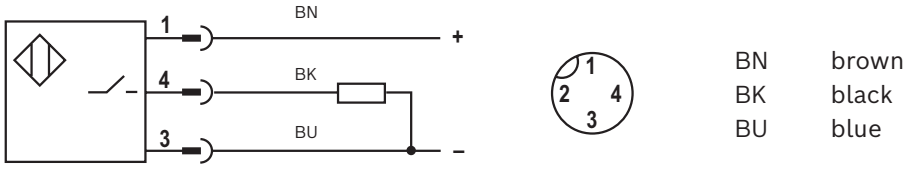
Proximity switch
(dimensions in mm)

Inductive proximity switches are used as reliable end position control for hydraulic cylinders. They are an important element for the safe and exact monitoring of safety equipment, lockings and/or other machine functions in their end position by means of the output of signals. The proximity switch which is high-pressure-resistant up to 500 bar works in a contactless manner. Consequently, it is wear-free. The proximity switch has been set at the factory. The switching distance must not be adjusted. The lock nut of the proximity switch is marked at the factory using sealing wax. On versions with proximity switch, the cylinders are provided with proximity switches on both sides.

Technical data
(For applications outside these values, please consult us!)

Electrical			
Function type			PNP normally open contact
Admissible pressure		bar	500
Operating voltage		V DC	10 ... 30
	including residual ripple	%	≤ 15
Voltage drop		V	≤ 1.5
Rated operating voltage		V DC	24
Rated operating current		mA	200
Idle current		mA	≤ 8
Residual current		µA	≤ 10
Repetition accuracy		%	≤ 5
Hysteresis		%	≤ 15
Ambient temperature range		°C	-25 ... +80
Temperature drift		%	≤ 10
Switching frequency		Hz	1000
Protection class according to DIN EN 60529	▶ Active area		IP68
	▶ Proximity switch		IP67
Housing material			Material no. 1.4104

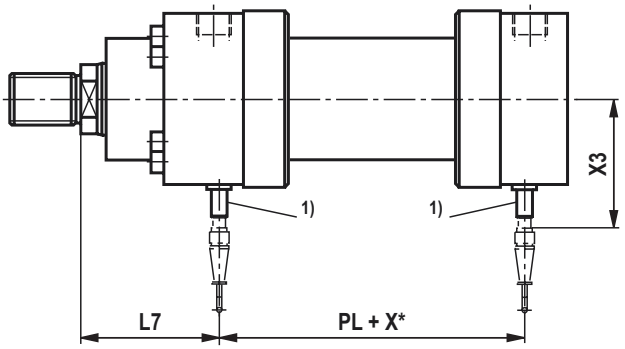
Pin assignment



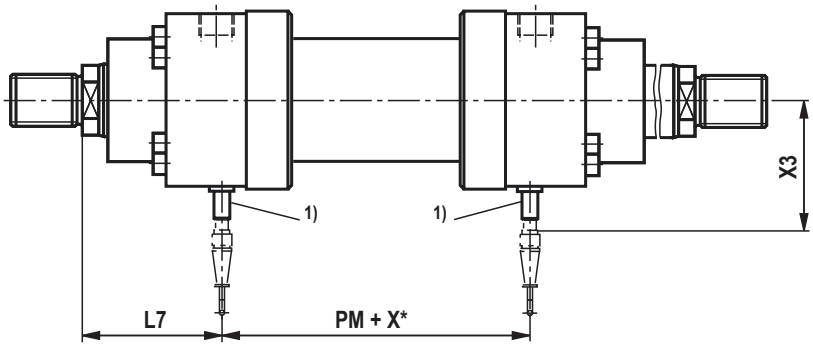
BN	brown
BK	black
BU	blue

Dimensions: Proximity switch (dimensions in mm)

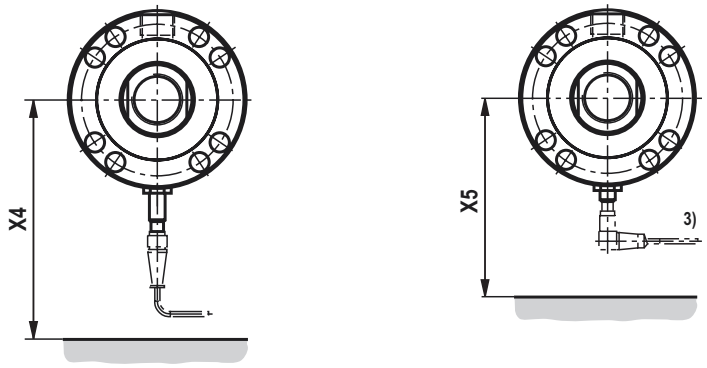
CDH3



CGH3

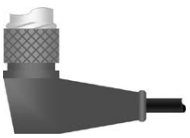


Installation space for mating connector



Mating connector with 5 m cable
Material no. **R913016852**
(mating connector is **not** included in the scope of delivery, must be ordered separately)

Mating connector, angled with 5 m cable (position of the cable outlet cannot be defined)
Material no. **R988064311**
(mating connector is **not** included in the scope of delivery, must be ordered separately)



Dimensions: Proximity switch (dimensions in mm)

ØAL	ØMM	PL	PM	L7	X3	X4	X5
40	**28**	112	112	95	94	170	125
50	**36**	110	110	95	98	175	130
63	**45**	125	125	121	103	180	135
80	**56**	138	138	128	108	185	140
100	**70**	161	161	124	116	195	150
125	**90**	189	189	178	126	205	160
140	**100**	209	209	191	146	225	180
160	**110**	228	228	216	151	230	185
180	**125**	254	254	246	159 [2)]	235	190
200	**140**	264	264	269	166 [2)]	245	200
220	**160**	310	310	270	177 [2)]	255	– [3)]
250	**180**	320	320	280	187 [2)]	265	– [3)]
280	**200**	360	360	285	199 [2)]	275	– [3)]
320	**220**	375	375	295	209 [2)]	285	– [3)]

For main dimensions, see page 18 ... 29

ØAL = piston Ø
ØMM = piston rod Ø
X* = stroke length

1) The proximity switch is always located opposite of the line connection
2) Piston Ø 220 - 320 mm
Proximity switch not protruding
3) Piston Ø 220 - 320 mm
Angled mating connector not possible

Position measurement system

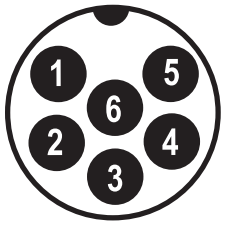
The magnetostrictive position measurement system that is pressure-resistant and works contactless and absolute.

Operating conditions	
Protection class	IP67 (connector professionally mounted) IP68 at cable outlet
EMC test	Electro-magnetic interference emission according to EN 61000-6-3 Electro-magnetic interference resistance according to EN 61000-6-2 The sensor complies with EC directives and bears the CE marking

Technical data: Analog output
(For applications outside these values, please consult us!)

Analog "F" / "C"			
Electrical connection	Type of connection		1 x M16 connector (6-pole)
	Power consumption	W	<3.25
Operating conditions	Operating temperature	°C	-40 ... +85
Tightening torque M_A	≤ 1500 mm measurement length	Nm	50 ±4%
	> 1500 mm measurement length	Nm	65 ±4%
Wrench size SW		mm	46
Voltage "F"		V	0 ... 10
	Input resistance control system	kΩ	>5
	Resolution		16 bit (internal resolution 0.1 µm)
Current "C"		mA	4 ... 20
	Load	Ω	min/max: 0/500
	Resolution		16 bit (internal resolution 0.1 µm)

Connector
(View to pin side)

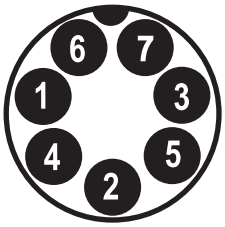


Pin	Cable	Function
1	gray	Position 1 (solenoid)
2	pink	DC ground
3	yellow	not used
4	green	DC ground
5	brown	+12 ... 30 VDC ±20% (9.6 ... 36 VDC)
6	white	DC ground (0 V)

Technical data: Digital output
(For applications outside these values, please consult us!)

Digital "D" / "S"			
Electrical connection	Type of connection		1 x M16 connector (7-pole)
	Power consumption	W	1.2 typical
Operating conditions	Operating temperature	°C	-40 ... +85
Tightening torque M_A	≤ 1500 mm measurement length	Nm	50 ±4%
	> 1500 mm measurement length	Nm	65 ±4%
Wrench size SW		mm	46
SSI "D"	Interface		SSI 24 bit (RS-485/RS-422)
	Resolution	µm	5
	Direction of measurement		asynchronious forward
	Data format		Gray
SSI "S"	Interface		SSI 24 bit (RS-485/RS-422)
	Resolution	µm	1
	Direction of measurement		synchronious forward
	Data format		Gray

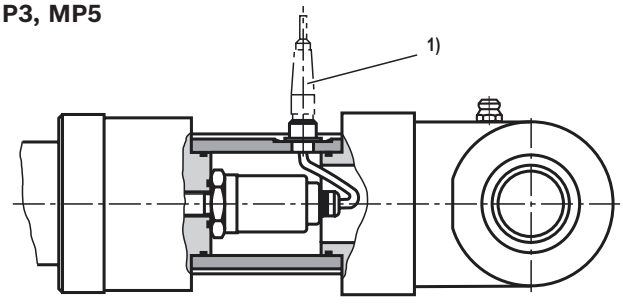
Connector
(View to pin side)



Pin	Cable	Function
1	gray	Data (-)
2	pink	Data (+)
3	yellow	Clock (+)
4	green	Clock (-)
5	brown	+12 ... 30 VDC ±20% (9.6 ... 36 VDC)
6	white	DC ground (0 V)
7	-	not used

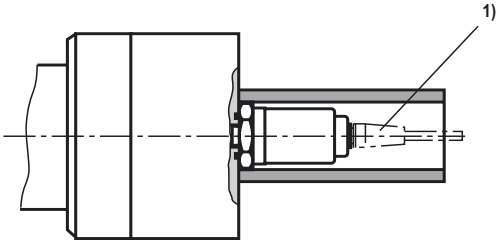
Types of mounting

MP3, MP5



1) For analog output:
6-pole amphenol mating connector, material no. R900072231
(mating connector is **not** included in the scope of delivery, must be ordered separately)

MF3, MF4, MT4, MS2



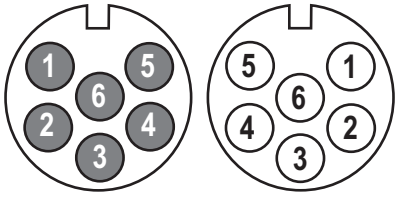
1) For digital output:
7-pole amphenol mating connector, material no. R900079551
(mating connector is **not** included in the scope of delivery, must be ordered separately)

Technical data: Profibus
(For applications outside these values, please consult us!)

Profibus "N" / "P"			**Profibus 63 / Profibus 53**
Electrical connection	Type of connection		2 x M16 connector (6-pole), alternatively 2 x M12 connector (5-pole) and 1 x M8 connector (4-pole)
	Current consumption	mA	90, typical
Operating conditions	Operating temperature	°C	-40 ... +75
Tightening torque M_A		Nm	65 ±4%
Wrench size SW		mm	46
Output	Interface		IEC 61158 CPF3 PROFIBUS
	Data record		PROFIBUS-DP slave
	Transmission rate	MBit/s	max. 12
Measurement accuracy	Travel resolution	µm	1 ... 1000 selectable as parameter
	Velocity		With 5 µm travel resolution: 0.64 mm/s to 500 mm; 0.43 mm/s to 2000 mm; 0.21 mm/s to 4500 mm; 0.14 mm/s + 7600 mm measurement length With 2 µm travel resolution: 2.5 times smaller values
	Linearity		< ± 0.01% Full Scale (Minimum +/– 50 µm)
	Repeatability		< ± 0.001% Full Scale (Minimum +/– 2.5 µm)
	Temperature coefficient	ppm/°C	< 15
	Hysteresis	µm	< 4

Pin assignment for Profibus

Pin assignment for Profibus D63

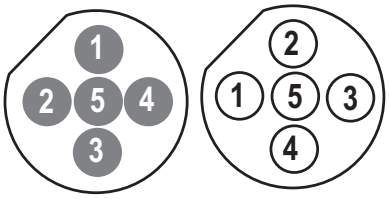


Pins Sockets

Pin	Cable	Function
1	green	RxD/TxD-N (bus)
2	red	RxD/TxD-P (bus)
3	––	DGND (terminating resistor) *
4	––	VP (terminating resistor) *
5	black	+24 V DC (–15 / +20%)
6	blue	DC ground (0 V)
––	yellow/ green	Shield compensating line, is usually not to be connected

* only with sockets

Pin assignment for Profibus D53

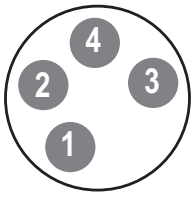


Pins Sockets

Pin	Cable	Function
1	––	VP+5 (terminating resistor) *
2	green	RxD/TxD-N (bus)
3	––	DGND (terminating resistor) *
4	red	RxD/TxD-P (bus)
5	Shield	Shield

* only with sockets

Supply

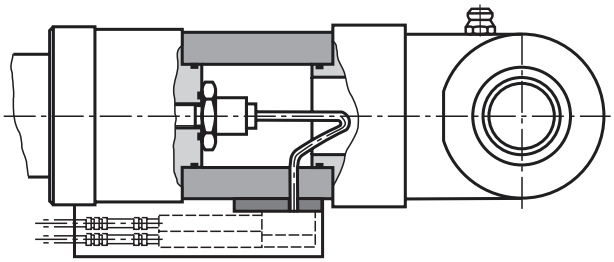


View connector side

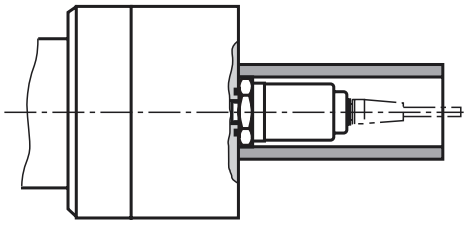
Pin	Cable	Function
1	brown	+24 V DC (–15 / +20%)
2	white	not used
3	blue	DC ground (0 V)
4	black	not used

Types of mounting

MP3, MP5



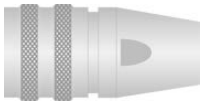
MF3, MF4, MT4, MS2



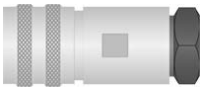
The output of the position measurement system is by default always rotated by 180° to the selected position of the hydraulic connection in the cylinder base.

Mating connectors for D63

Signal input
6-pole mating connector M16
Material no. R900705950 (socket)



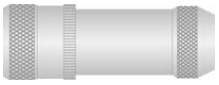
Signal output
6-pole end plug M16
Material no. R900722518 (pins)



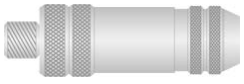
Signal output
6-pole mating connector M16
Material no. R900705951 (pins)

Mating connectors for D53

Signal input
5-pole mating connector M12-B
Material no. R900773386 (socket)



4-pole mating connector M8
Material no. R901132799



Signal output
5-pole mating connector M12-B
Material no. R901091655 (pins)

Connection cable 5 m
with 4-pole mating connector M8
Material no. R901213191

Connection cable 10 m
with 4-pole mating connector M8
Material no. R913008737

Connection cable 15 m
with 4-pole mating connector M8
Material no. R913008738

Signal output
5-pole end plug M12-B
Material no. R901070126 (pins)

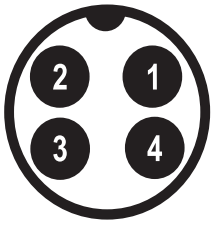
Mating connector is **not** included in the scope of delivery, must be ordered separately.

Technical data: IO-Link
(For applications outside these values, please consult us!)

IO-Link "L"			**IO-Link V1.1**
Electrical connection	Type of connection		1 x M12 connector (4-pole)
	Operating voltage	VDC	+24 (± 25%) / residual ripple ≤ 0.28 Vpp
	Current consumption	mA	< 50
Operating conditions	Operating temperature	°C	-40 ... +75
Tightening torque M_A		Nm	50 ±4%
Wrench size SW		mm	34
Output	Interface		Digital
	Transmission record		IO-Link V1.1
	Data format	Bit	32 signed (position in µm)
	Data transmission rate		COM3 (230.4 kBaud)
	Process data Device - Master	Bytes	4
	Process data Master - Device	Bytes	0
	Measured variable	MBit/s	Position
Measured values	Resolution [1]	µm	5; 10; 20; 50 or 100
	Cycle time:	ms	Minimum 1 (depending on master)
	Linearity [2]	%	≤ ±0.02 F.S. (Minimum ±60 µm)
	Measurement repetition accuracy	%	≤ ±0.005 F.S. (Minimum ±20 µm)

[1] Selectable via IO-Link Master.
[2] Tested with position magnet 251 416-2.

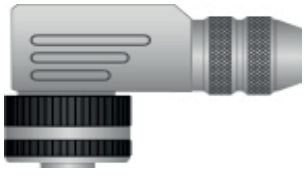
M12 connector (A-coded)
View to sensor



Pin	Function
1	+ 24 VDC (± 25%)
2	DI / DQ
3	DC ground (0 V)
4	C / Q

Mating connectors

M12 A-coded (5-pole), straight
Material number: R913045873



M12 A-coded (5-pole), angled
Material number: R901500328

Mating connector is **not** included in the scope of delivery, must be ordered separately.

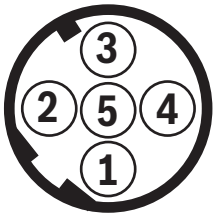
Technical data: Profinet
(For applications outside these values, please consult us!)

Profinet "R"				**Profinet RT / Profinet IRT version 2.3**				
Electrical connection	Type of connection			2 x M12 device socket (5-pole) 1 x M12 connector (4-pole)				
	Operating voltage		VDC	+12 ... 30 (± 20%) (9.6 ... 36)				
	Power consumption		W	< 4 typical				
Operating conditions	Operating temperature		°C	-40 ... +85				
Tightening torque M_A			Nm	65 ±4%				
Wrench size SW			mm	46				
Output	Interface			Profinet RT				
				Profinet IRT version 2.3				
	Data record			MTS profile and encoder profile 4.1				
	Data transmission rate		MBit/s	max. 100				
Measured values	Resolution		µm	0,5 ... 100 (selectable)				
	Cycle time [1]	Measurement length	mm	≤ 50	≤ 715	≤ 2000	≤ 4675	≤ 7620
		Cycle time:	µs	250	500	1000	2000	4000
	Linearity deviation [2] Measurement length		mm	≤ 500		> 500		
	linearity deviation		µm	≤ ± 50		< 0.01% F.S		
	Measurement repetition accuracy		%	≤ ±0.001 F.S. (Minimum ±2.5 µm) typical				
	Hysteresis		µm	< 4 typical				
	Temperature coefficient		ppm/K	< 15 typical				

[1] Sensor with standard settings

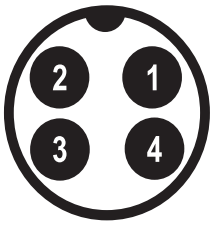
[2] Tested with position magnet 251 416-2.

M12 device socket (D-coded)
Port 1 and 2 - signal
(View to sensor)



Pin	Function
1	Tx (+)
2	Rx (+)
3	Tx (−)
4	Rx (−)
5	Not used

M12 connector (A-coded)

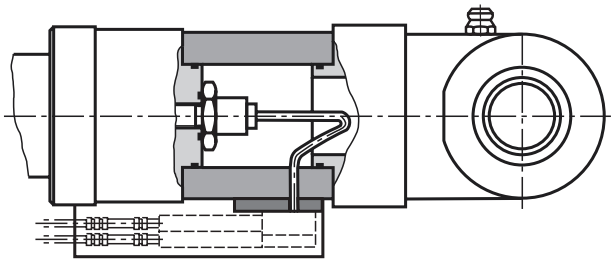


Pin	Function
1	+12...30 VDC (±20%)
2	Not used
3	DC ground (0 V)
4	Not used

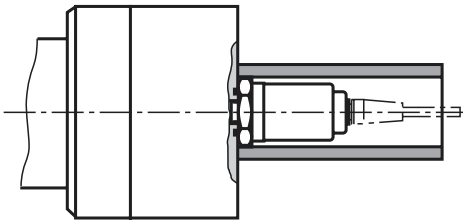
Technical data: Profinet

Types of mounting

MP3, MP5



MF3, MF4, MT4, MS2



The output of the position measurement system is by default always rotated by 180° to the selected position of the hydraulic connection in the cylinder base.

Mating connectors

M12 D-coded (4-pole), straight

Material number: R913045872
(required 2 x)

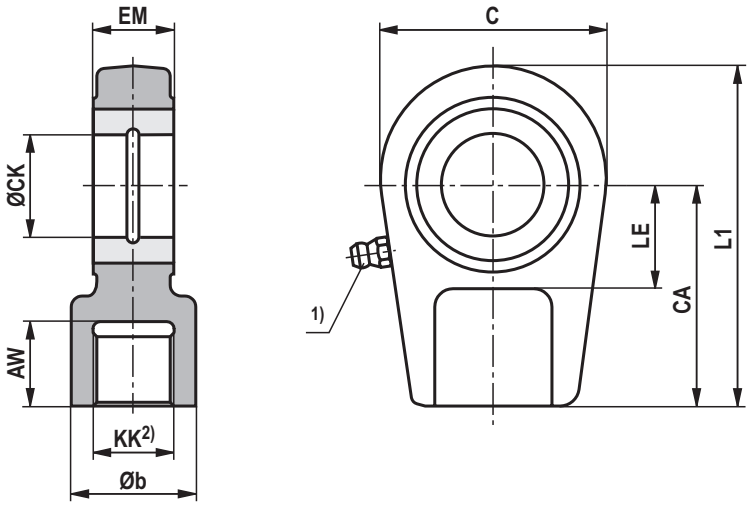
M12 A-coded (5-pole), straight

Material number: R913045873

Mating connector is **not** included in the scope of delivery, must be ordered separately.

Plain clevis CSA
(dimensions in mm)

ØAL 40-200 mm



ØAL	Type	Material no.	AW	Øb	C	CA	ØCK H11	EM -0.4	KK	LE	L1	*m* 2) kg	C_0 3) kN	F_{adm} 4) kN
40	**CSA 22**	R900303151	23	34	64	60	30	28	M22x1,5	30	94	0.7	106	38.2
50	**CSA 28**	R900303152	29	44	78	70	35	30	M28x1,5	40	112	1.1	153	55.1
63	**CSA 35**	R900303153	36	55	94	85	40	35	M35x1,5	45	135	2.0	250	90.0
80	**CSA 45**	R900303154	46	70	116	105	50	40	M45x1,5	55	168	3.3	365	131.4
100	**CSA 58**	R900303155	59	87	130	130	60	50	M58x1,5	65	200	5.5	400	144.0
125	**CSA 65**	R900303156	66	93	154	150	70	55	M65x1,5	75	232	8.6	540	194.4
140	**CSA 80**	R900303157	81	125	176	170	80	60	M80x2	80	265	12.2	670	241.2
160	**CSA100**	R900303158	101	143	206	210	90	65	M100x2	90	323	21.5	980	352.8
180	**CSA110**	R900303159	111	153	230	235	100	70	M110x2	105	360	27.5	1120	403.2
200	**CSA120**	R900303160	125	176	265	265	110	80	M120x3	115	407.5	40.7	1700	612.0

The specified dimensions are maximum values and may differ depending on the manufacturer.
The following values are excluded: CA, CK, EM, KK
The plain clevis must always be screwed against the shoulder of the piston rod and secured against loosening!

ØAL = piston Ø

1) Grease nipple, cone head form A according to DIN 71412

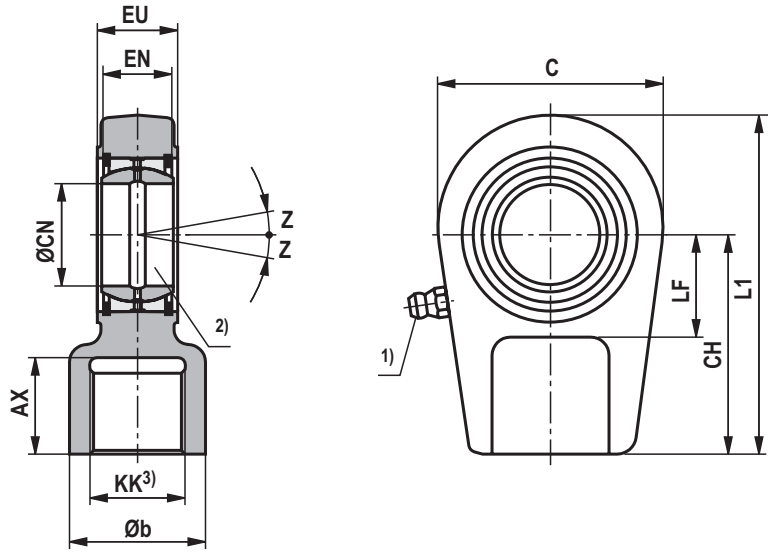
2) ***m*** = weight of plain clevis in kg

3) C_0 = static load rating of the plain clevis

4) F_{adm} = max. admissible load of the plain clevis for oscillatory or alternating loads

Swivel head CGA
(dimensions in mm)

ØAL 40-250 mm



ØAL	Type	AX min	Øb max	C	CH	ØCN 2)	EN	EU -0.4	KK	L1	LF min	Z	*m* 3) kg
40	**CGA22**	23	33	64	60	$30_{-0.010}$	$22_{-0.12}$	28	M22x1,5	94	30	6 °	0.7
50	**CGA28**	29	41	78	70	$35_{-0.012}$	$25_{-0.12}$	30	M28x1,5	112	38	6 °	1.1
63	**CGA35**	36	50	94	85	$40_{-0.012}$	$28_{-0.12}$	35	M35x1,5	135	45	7 °	2.0
80	**CGA45**	46	62	116	105	$50_{-0.012}$	$35_{-0.12}$	40	M45x1,5	168	55	6 °	3.3
100	**CGA58**	59	76	130	130	$60_{-0.015}$	$44_{-0.15}$	50	M58x1,5	200	65	6 °	5.5
125	**CGA65**	66	87	154	150	$70_{-0.015}$	$49_{-0.15}$	55	M65x1,5	232	75	6 °	8.6
140	**CGA80**	81	106	176	170	$80_{-0.015}$	$55_{-0.15}$	60	M80x2	265	80	6 °	12.2
160	**CGA100**	101	125	206	210	$90_{-0.020}$	$60_{-0.20}$	65	M100x2	323	90	5 °	21.5
180	**CGA110**	111	139	230	235	$100_{-0.020}$	$70_{-0.20}$	70	M110x2	360	105	7 °	27.5
200	**CGA120**	125	153	265	265	$110_{-0.020}$	$70_{-0.20}$	80	M120x3	407.5	115	6 °	40.7
220	**CGA120**	125	153	265	265	$110_{-0.020}$	$70_{-0.20}$	80	M120x3	407.5	115	6 °	40.7
250	**CGA130**	135	173	340	310	$120_{-0.020}$	$85_{-0.20}$	90	M130x3	490	140	6 °	76.4

ØAL	Type	Material no. requiring maintenance	Material no. maintenance-free	C_0 4) kN	F_{adm} 5) kN
40	**CGA22**	R900303126	R900321695	106	38.2
50	**CGA28**	R900303127	R900321653	153	55.1
63	**CGA35**	R900303128	R900321694	250	90.0
80	**CGA45**	R900303129	R900321667	365	131.4
100	**CGA58**	R900303130	R900321693	400	144.0
125	**CGA65**	R900303131	R900323345	540	194.4
140	**CGA80**	R900303132	R900321669	670	241.2
160	**CGA100**	R900303133	R900323349	980	352.8
180	**CGA110**	R900303134	R900868406	1120	403.2
200	**CGA120**	R900303135	R900321668	1700	612.0
220	**CGA120**	R900303135	R900321668	1700	612.0
250	**CGA130**	R900303136	On request	2900	1044.0

The specified dimensions are maximum values and may differ depending on the manufacturer. The following values are excluded: CH, CN, EN, EU, KK

The swivel head must always be screwed against the shoulder of the piston rod and secured against loosening!

ØAL = piston Ø

1) Grease nipple, cone head form A according to DIN 71412; not applicable to spherical bearing, maintenance-free "A"

2) Related bolt Ø m6;
Related bolt Ø j6 with maintenance-free spherical bearing

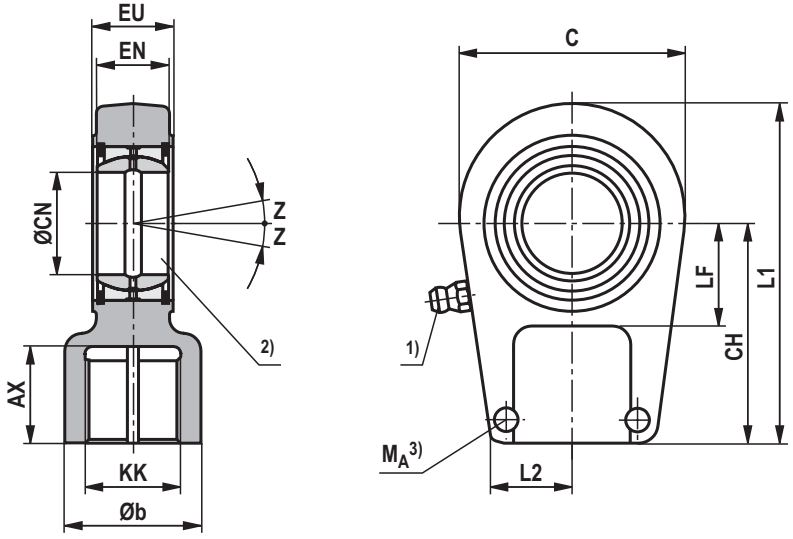
3) ***m*** = weight of swivel head in kg

4) C_0 = static load rating of the swivel head

5) F_{adm} = max. admissible load of the swivel head with oscillatory or alternating loads

Swivel head CGAK (clampable)
(dimensions in mm)

ØAL 40-250 mm



ØAL	Type	Material no. requiring maintenance	Material no. maintenance-free	C_0 4) kN	F_{adm} 5) kN	AX min	Øb max	C	CH	ØCN 2)	EN	EU -0.4	KK
40	**CGA22**	R900303163	R900321683	106	38.2	23	33	64	60	$30_{-0.010}$	$22_{-0.12}$	28	M22x1,5
50	**CGA28**	R900303164	R900300717	153	55.1	29	41	78	70	$35_{-0.012}$	$25_{-0.12}$	30	M28x1,5
63	**CGA35**	R900303165	R900322738	250	90.0	36	50	94	85	$40_{-0.012}$	$28_{-0.12}$	35	M35x1,5
80	**CGA45**	R900303166	R900322019	365	131.4	46	62	116	105	$50_{-0.012}$	$35_{-0.12}$	40	M45x1,5
100	**CGA58**	R900303167	R900322020	400	144.0	59	76	130	130	$60_{-0.015}$	$44_{-0.15}$	50	M58x1,5
125	**CGA65**	R900303168	R900324812	540	194.4	66	87	154	150	$70_{-0.015}$	$49_{-0.15}$	55	M65x1,5
140	**CGA80**	R900303169	R900541157	670	241.2	81	106	176	170	$80_{-0.015}$	$55_{-0.15}$	60	M80x2
160	**CGA100**	R900321655	R900323305	980	352.8	101	125	206	210	$90_{-0.020}$	$60_{-0.20}$	65	M100x2
180	**CGA110**	R900321691	R900329997	1120	403.2	111	139	231	235	$100_{-0.020}$	$70_{-0.20}$	70	M110x2
200	**CGA120**	R900321621	R900323333	1700	612.0	125	155	266	265	$110_{-0.020}$	$70_{-0.20}$	80	M120x3
220	**CGA120**	R900321621	R900323333	1700	612.0	125	153	265	265	$110_{-0.020}$	$70_{-0.20}$	80	M120x3
250	**CGA130**	R900322015	R900540850	2900	1044.0	135	173	340	310	$120_{-0.020}$	$85_{-0.20}$	90	M130x3

Swivel head CGAK (clampable)
(dimensions in mm)

ØAL	Type	L1	L2 max	LF	Z	Clamping screws ISO 4762-10.9	M_A [3] Nm	m [4] kg
40	CGAK 22	94	26	30	6 °	M8	30	0.7
50	CGAK 28	112	34	38	6 °	M10	54	1.1
63	CGAK 35	135	39	45	7 °	M10	59	2.0
80	CGAK 45	168	46	55	6 °	M12	100	3.3
100	CGAK 58	200	61	65	6 °	M16	250	5.5
125	CGAK 65	232	66	75	6 °	M16	250	8.6
140	CGAK 80	265	81	80	6 °	M20	490	12.2
160	CGAK100	323	91	90	5 °	M20	490	21.5
180	CGAK110	360	101	105	7 °	M24	840	27.5
200	CGAK120	407.5	111	115	6 °	M24	840	40.7
220	CGAK120	407.5	111	115	6 °	M24	840	40.7
250	CGAK130	490	129	140	6 °	M24	840	76.4

The specified dimensions are maximum values and may differ depending on the manufacturer.
The following values are excluded: CH, CN, EN, EU, KK

The swivel head must always be screwed against the shoulder of the piston rod and secured against loosening!

ØAL = piston Ø

1) Grease nipple, cone head form A according to DIN 71412;
not applicable to spherical bearing, maintenance-free "A"

2) Related bolt Ø m6;
Related bolt Ø j6 with maintenance-free spherical bearing

3) M_A = tightening torque

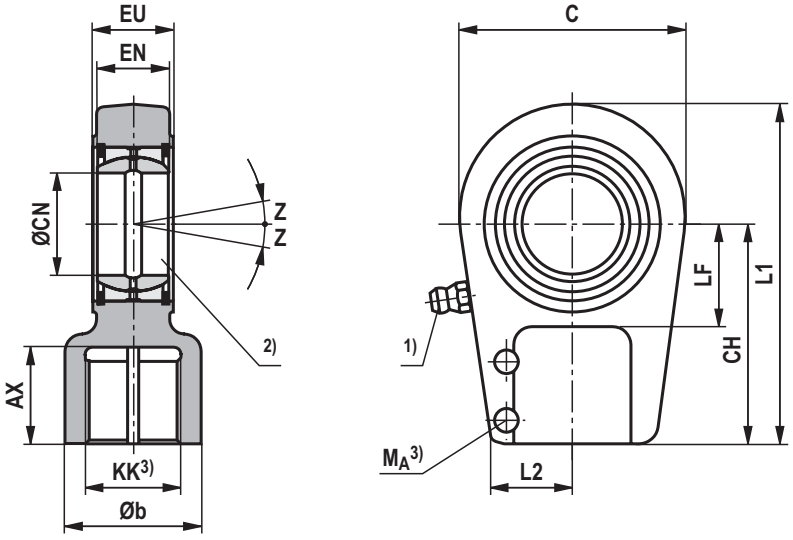
4) m = weight of swivel head in kg

5) C_0 = static load rating of the swivel head

6) F_{adm} = max. admissible load of the swivel head with oscillatory or alternating loads

Swivel head CGAS (clampable)
(dimensions in mm)

ØAL 40-320 mm



ØAL	Type	Material no. requiring maintenance	Material no. maintenance-free	C_0 6) kN	F_{adm} 7) kN	AX min	Øb max	C max	CH	ØCN 2)	EN	EU -0.4	KK
40	**CGAS30**	R900303138	R900321696	122	40.3	35	34	64	75	$30_{-0.010}$	$22_{-0.12}$	28	M24x2
50	**CGAS35**	R900303139	R900322716	177	58.4	46	46	78	90	$35_{-0.012}$	$25_{-0.12}$	30	M30x2
63	**CGAS40**	R900303140	R900321665	287	94.7	56	57	94	105	$40_{-0.012}$	$28_{-0.12}$	35	M39x3
80	**CGAS50**	R900303141	R900322017	422	139.3	76	70	116	135	$50_{-0.012}$	$35_{-0.12}$	40	M50x3
100	**CGAS60**	R900303142	R900321685	522	172.3	96	87	130	170	$60_{-0.015}$	$44_{-0.15}$	50	M64x3
125	**CGAS70**	R900303143	R900321690	707	233.3	112	111	154	195	$70_{-0.015}$	$49_{-0.15}$	55	M80x3
140	**CGAS80**	R900303144	R900322022	870	287.1	122	129	176	210	$80_{-0.015}$	$55_{-0.15}$	60	M90x3
160	**CGAS90**	R900303145	R900323344	1284	423.7	142	153	211	250	$90_{-0.020}$	$60_{-0.20}$	65	M100x3
180	**CGAS100**	R900303146	R900321689	1460	481.8	152	170	230	275	$100_{-0.020}$	$70_{-0.20}$	70	M110x4
200	**CGAS110**	R900303147	R900323326	2024	667.9	162	180	264	300	$110_{-0.020}$	$70_{-0.20}$	80	M120x4
220	**CGAS110**	R900303147	R900323326	2024	667.9	162	180	264	300	$110_{-0.020}$	$70_{-0.20}$	80	M120x4
250	**CGAS120**	R900303148	R900324830	2970	980.1	192	210	340	360	$120_{-0.020}$	$85_{-0.20}$	90	M150x4
280	**CGAS140**	R900317314	R900540515	3350	1105.5	210	230	380	420	$140_{-0.025}$	$90_{-0.25}$	110	M160x4
320	**CGAS160**	R900303149	R900322725	4302	1419.7	221	260	480	460	$160_{-0.025}$	$105_{-0.25}$	110	M180x4

Swivel head CGAS (clampable)
(dimensions in mm)

ØAL	Type	L1 max	L2 max	LF min	Z [3]	Clamping screws ISO 4762-10.9	M_A [4] Nm	m [5] kg
40	**CGAS 30**	109	28	30	6-7 °	M8	30	1.0
50	**CGAS 35**	132	36	40	6-7 °	M10	59	1.5
63	**CGAS 40**	155	39	44	7 °	M12	100	2.4
80	**CGAS 50**	198	45	55	6-7 °	M12	100	4.8
100	**CGAS 60**	240	59	65	6-7 °	M16	250	8.6
125	**CGAS 70**	279	70	75	6 °	M16	250	12.2
140	**CGAS 80**	305	85	80	6 °	M20	490	18.4
160	**CGAS 90**	366	91	90	5 °	M20	490	31.6
180	**CGAS100**	400	95	105	7 °	M20	490	34
200	**CGAS110**	443	106	115	6 °	M24	840	44
220	**CGAS110**	443	106	115	6 °	M24	840	44
250	**CGAS120**	540	122	140	6 °	M24	840	75
280	**CGAS140**	620	129	185	7 °	M30	1700	160
320	**CGAS160**	710	146	200	8 °	M30	1700	235

The specified dimensions are maximum values and may differ depending on the manufacturer.
The following values are excluded: CH, CN, EN, EU, KK

The swivel head must always be screwed against the shoulder of the piston rod and secured against loosening!

ØAL = piston Ø

1) Grease nipple, cone head form A according to DIN 71412; not applicable to spherical bearing, maintenance-free "A"
2) Related bolt Ø m6; Related bolt Ø j6 for maintenance-free Spherical bearing
3) Dimensions may differ depending on the manufacturer
4) M_A = tightening torque The clamping screws must be tightened with the specified tightening torque.
5) m = weight of swivel head in kg
6) C_0 = static load rating of the swivel head
7) F_{adm} = max. admissible load of the swivel head with oscillatory or alternating loads

Buckling

For the admissible stroke length with flexibly guided load and a factor of 3.5 for safety against buckling, please refer to the relevant table. For other installation positions of the cylinder, the admissible stroke length must be interpolated. Admissible stroke length for non-guided load on request. Buckling calculations are carried out according to the following formulas:

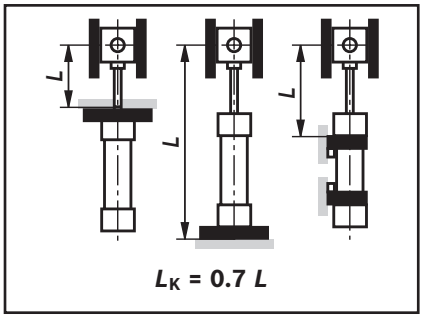
1. Calculation according to Euler

$$F = \frac{\pi^2 \cdot E \cdot I}{v \cdot L_K^2} \qquad \text{if } \lambda > \lambda_g$$

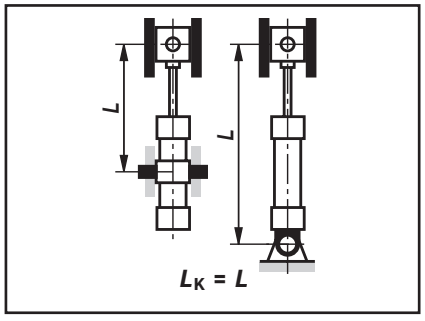
2. Calculation according to Tetmajer

$$F = \frac{d^2 \cdot \pi \,(335\text{-}0.62 \cdot \lambda)}{4 \cdot v} \qquad \text{if } \lambda \le \lambda_g$$

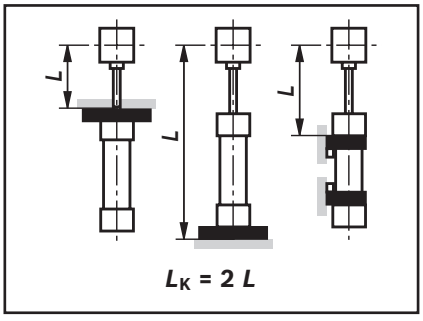
Influence of the type of mounting on the bending length:



$L_K = 0.7\ L$



$L_K = L$



$L_K = 2\ L$

Explanation:

E = module of elasticity in N/mm²
= 2.1 x 10^5 for steel

I = geometrical moment of inertia in mm⁴ for circular cross-section $= \frac{d^4 \cdot \pi}{64} = 0.0491 \cdot d^4$

v = 3.5 (safety factor)

L_K = free bending length in mm (depending on the type of mounting see sketches A, B, C)

d = piston rod Ø in mm

λ = slenderness ratio

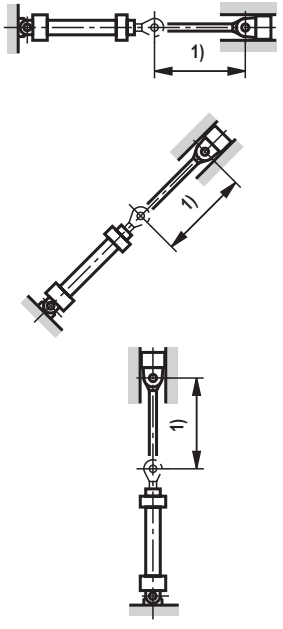
$= \frac{4 \cdot L_K}{d} \qquad \lambda_g = \pi \sqrt{\frac{E}{0.8 \cdot R_e}}$

R_e = yield strength of the piston rod material

Admissible stroke length
(dimensions in mm)

Type of mounting CDH3/CSH3 [2]: MP3, MP5

ØAL	ØMM	Admissible stroke length with 100 bar			210 bar			350 bar			Installation position
		0 °	45 °	90 °	0 °	45 °	90 °	0 °	45 °	90 °	
40	**28**	360	375	420	225	230	240	140	145	150	**0 °**
50	**36**	505	525	351	335	340	355	230	235	240	
63	**45**	625	650	755	425	430	455	295	300	305	
80	**56**	765	800	945	530	545	575	375	380	390	
100	**70**	950	995	1200	680	695	745	495	500	515	
125	**90**	1200	1270	1610	895	925	1010	665	680	705	**45 °**
140	**100**	1335	1405	1785	995	1025	1125	745	755	790	
160	**110**	1380	1406	1865	1025	1055	1160	755	770	805	
180	**125**	1580	1670	2150	1180	1220	1350	880	895	940	
200	**140**	1780	1890	2470	1355	1400	1565	1035	1055	1110	
220	**160**	1985	2110	2970	1575	1640	1900	1230	1260	1360	**90 °**
250	**180**	2190	2340	3310	1740	1820	2120	1370	1400	1510	
280	**200**	2360	2520	3640	1890	1970	2330	1490	1530	1660	
320	**220**	2530	2700	3830	2010	2100	2450	1320	1460	1740	

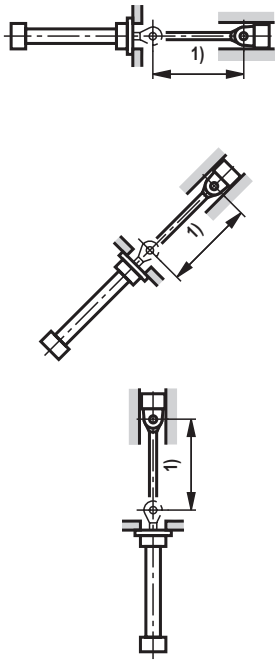


[1] Adm. Stroke length

Admissible stroke length
(dimensions in mm)

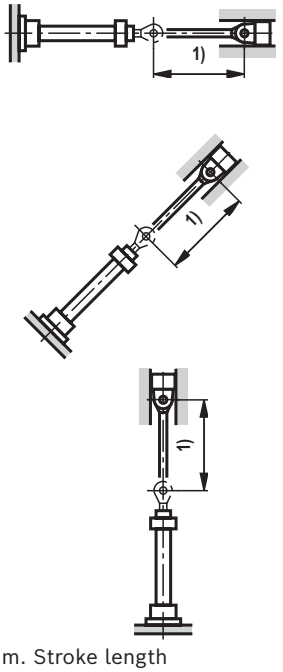
Type of mounting CDH3/CGH3/CSH3 [2]: MF3

ØAL	ØMM	Admissible stroke length with 100 bar			210 bar			350 bar			Installation position
		0 °	45 °	90 °	0 °	45 °	90 °	0 °	45 °	90 °	
40	28	1370	1415	1600	1020	1035	1075	795	800	810	**0 °**
50	36	1755	1825	2135	1345	1370	1440	1060	1070	1090	
63	45	2000	2000	2000	1660	1695	1800	1320	1330	1365	
80	56	2000	2000	2000	2000	2000	2000	1600	1620	1665	
100	70	3000	3000	3000	2470	2530	2740	1900	2010	2085	
125	90	3000	3000	3000	3000	3000	3000	2615	2660	2785	**45 °**
140	100	3000	3000	3000	3000	3000	3000	2875	2920	3000	
160	110	3000	3000	3000	3000	3000	3000	2775	3000	3000	
180	125	3000	3000	3000	3000	3000	3000	3000	3000	3000	
200	140	3000	3000	3000	3000	3000	3000	3000	3000	3000	
220	160	6000	6000	6000	5410	5630	6000	4575	4675	5055	**90 °**
250	180	6000	6000	6000	5950	6000	6000	4815	5160	5605	
280	200	6000	6000	6000	6000	6000	6000	5005	5565	6000	
320	220	6000	6000	6000	6000	6000	6000	4560	5060	6000	[1] Adm. Stroke length



Type of mounting CDH3/CSH3 [2]: MF4

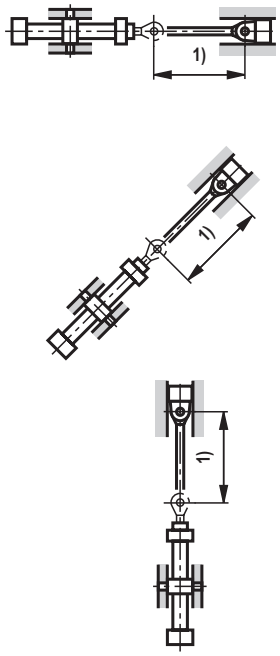
ØAL	ØMM	Admissible stroke length with 100 bar			210 bar			350 bar			Installation position
		0 °	45 °	90 °	0 °	45 °	90 °	0 °	45 °	90 °	
40	28	540	565	675	380	385	410	270	275	280	**0 °**
50	36	735	770	940	540	550	590	400	405	415	
63	45	900	945	1175	670	690	745	505	510	530	
80	56	1080	1140	1450	825	845	930	630	635	665	
100	70	1330	1400	1840	1030	1070	1190	805	820	860	
125	90	1655	1760	2450	1330	1380	1590	1060	1080	1160	**45 °**
140	100	1830	1940	2700	1470	1530	1760	1175	1200	1285	
160	110	1905	2030	2830	1530	1590	1835	1035	1160	1300	
180	125	2210	2355	3310	1795	1870	2170	1285	1435	1585	
200	140	2400	2565	3000	1965	2050	2420	1410	1590	1765	
220	160	2655	2850	4445	2245	2360	2935	1735	1930	2160	**90 °**
250	180	2945	3160	4950	2490	2620	3275	1840	2095	2410	
280	200	3170	3410	5455	2705	2850	3615	1870	2140	2665	
320	220	3425	3680	5775	2905	3055	3820	1675	1925	2815	[1] Adm. Stroke length



Admissible stroke length
(dimensions in mm)

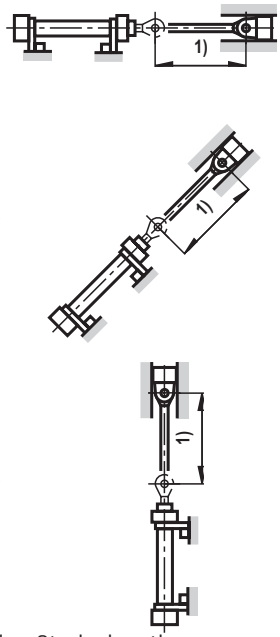
Type of mounting CDH3/CGH3/CSH3 [2]: MT4 trunnion in cylinder center

ØAL	ØMM	Admissible stroke length with									Installation position
		100 bar			210 bar			350 bar			
		0 °	45 °	90 °	0 °	45 °	90 °	0 °	45 °	90 °	
40	**28**	560	580	640	380	385	395	265	270	275	**0 °**
50	**36**	760	790	890	353	545	565	390	395	400	
63	**45**	930	965	1105	665	675	705	490	495	505	
80	**56**	1125	1170	1365	815	830	875	610	615	625	
100	**70**	1390	1450	1730	1030	1050	1120	785	790	810	
125	**90**	1755	1845	2300	1345	1380	1500	1040	1050	1090	**45 °**
140	**100**	1935	2030	2545	1485	1525	1660	1150	1165	1210	
160	**110**	2020	2125	2660	1545	1585	1725	1190	1205	1250	
180	**125**	2300	2420	3000	1770	1820	1990	1370	1390	1445	
200	**140**	2555	2695	3000	1990	2050	2270	1555	1580	1655	
220	**160**	2870	3045	4185	2320	2410	2760	1865	1905	2035	**90 °**
250	**180**	3180	3380	4665	2580	2680	3080	2080	2125	2270	
280	**200**	3430	3645	5130	2800	2915	3390	2270	2325	2500	
320	**220**	3700	3925	5435	3000	3115	3585	2065	2295	2640	[1] Adm. Stroke length



Type of mounting CDH3/CGH3/CSH3 [2]: MS2

ØAL	ØMM	Admissible stroke length with									Installation position
		100 bar			210 bar			350 bar			
		0 °	45 °	90 °	0 °	45 °	90 °	0 °	45 °	90 °	
40	**28**	1265	1310	1500	920	935	970	690	695	710	**0 °**
50	**36**	1650	1715	2000	1235	1260	1330	950	960	980	
63	**45**	1995	2000	2000	1520	1550	1655	1180	1190	1220	
80	**56**	2000	2000	2000	1850	1895	2000	1445	1460	1510	
100	**70**	2940	3000	3000	2310	2370	2585	1830	1855	1925	
125	**90**	3000	3000	3000	3000	3000	3000	2640	2685	2810	**45 °**
140	**100**	3000	3000	3000	3000	3000	3000	2640	2690	2840	
160	**110**	3000	3000	3000	3000	3000	3000	2510	2760	2955	
180	**125**	3000	3000	3000	3000	3000	3000	2900	3000	3000	
200	**140**	3000	3000	3000	3000	3000	3000	3000	3000	3000	
220	**160**	6000	6000	6000	5065	5280	6000	4225	4330	4705	**90 °**
250	**180**	6000	6000	6000	5590	5835	6000	4455	4805	5250	
280	**200**	6000	6000	6000	6000	6000	6000	4645	5205	5790	
320	**220**	6000	6000	6000	6000	6000	6000	4175	4680	6000	[1] Adm. Stroke length



With longer strokes, an extended guide and/or the use of guide rings may be reasonable for increasing the service life, depending on the respective case of application and installation position. Recommendation on request.

[2] With CSH3, observe the maximum stroke length "X*max", pages 30 ... 41

End position cushioning

End position cushioning:

The objective is to reduce the velocity of a moved mass, the center of gravity of which lies on the cylinder axis, to a level at which neither the cylinder nor the machine into which the cylinder is installed is damaged. For velocities above 20 mm/s, we recommend the use of an end position cushioning feature, which absorbs energy without requiring the use of additional equipment. It must, however, always be checked whether end position cushioning is also required for lower velocities with large masses.

Damping capacity:

When decelerating masses via end position cushioning, the structural-inherent damping capacity must not be exceeded. Cylinders with end position cushioning can achieve their full damping capacity only over the entire stroke length.

With the adjustable end position cushioning version "E", a throttle valve is additionally provided when compared with version "D". End position cushioning version "E" allows cycle times to be optimized. The max. damping capacity can only be achieved when the throttle valve is closed. The calculation depends on the factors mass, velocity, system pressure and installation position. For this reason, mass and velocity are used to determine the characteristic D_m and system pressure and installation position to determine the characteristic D_p.

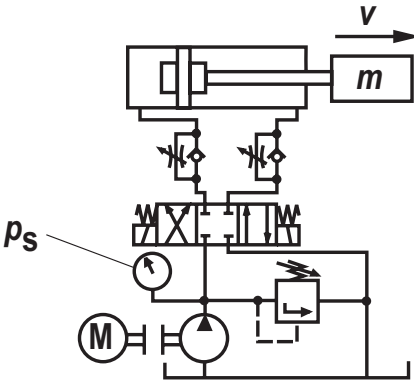
These two characteristics are used for verifying the admissible damping capacity in the "damping capacity" diagram. The intersection point of the characteristics D_m and D_p must always be below the damping capacity curve of the selected cylinder. The values in the diagrams refer to an average oil temperature of +45 ... +65 °C with the throttle valve being closed.

For special applications with very short stroke times, high velocities or large masses, cylinders with special end position cushioning versions can be offered on request. When fixed or adjustable stops are used, special measures must be taken!

Formulas:

$$D_m = \frac{m}{10^K} \; ; \; K = kv\,(0.5 - v)$$

m = moved mass in kg
v = stroke velocity in m/s
kv = see table page 69



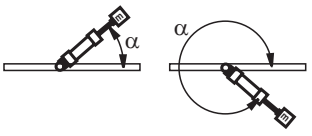
Extension for CDH3 and CSH3

$$D_p = p_S - \frac{m \cdot 9.81 \cdot \sin\alpha}{A_1 \cdot 10}$$

Retraction for CDH3, CGH3 and CSH3; extension for CGH3

$$D_p = p_S + \frac{m \cdot 9.81 \cdot \sin\alpha}{A_3 \cdot 10}$$

p_S = system pressure in bar
A_1 = piston area in cm² (see page 14)
A_3 = annulus area in cm² (see page 14)
α = angle to the horizontal in degree



Damping length

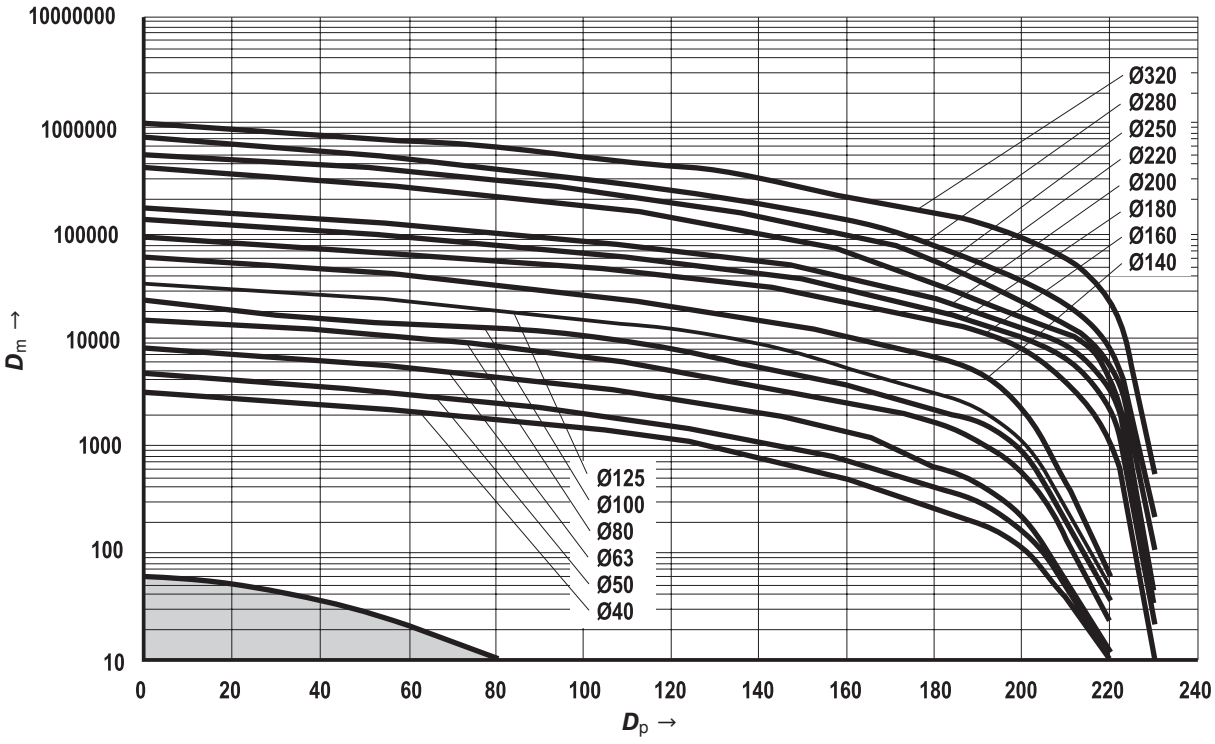
With cylinder strokes within the damping lengths, restrictions with regard to velocity / cycle time are possible. We recommend minimum stroke greater than the damping length plus 10 mm!

ØAL mm	**40**	**50**	**63**	**80**	**100**	**125**	**140**	**160**	**180**	**200**	**220**	**250**	**280**	**320**
Head side	21	20	23	25	25	25	33	33	37	37	76	81	86	90
Base side	21	20	23	25	25	25	33	33	37	37	76	81	86	90

End position cushioning

ØAL mm	**40**	**50**	**63**	**80**	**100**	**125**	**140**	**160**	**180**	**200**	**220**	**250**	**280**	**320**
kv ①	1.72	1.85	1.51	1.85	2.34	2.02	1.85	1.93	1.84	1.65	1.41	1.45	1.58	1.68
kv ②	2.31	1.85	1.95	1.86	2.25	1.97	1.94	1.92	2.05	1.97	1.64	1.61	1.82	1.94

Damping capacity: Extension for CDH3 and CSH3, with *kv* ①

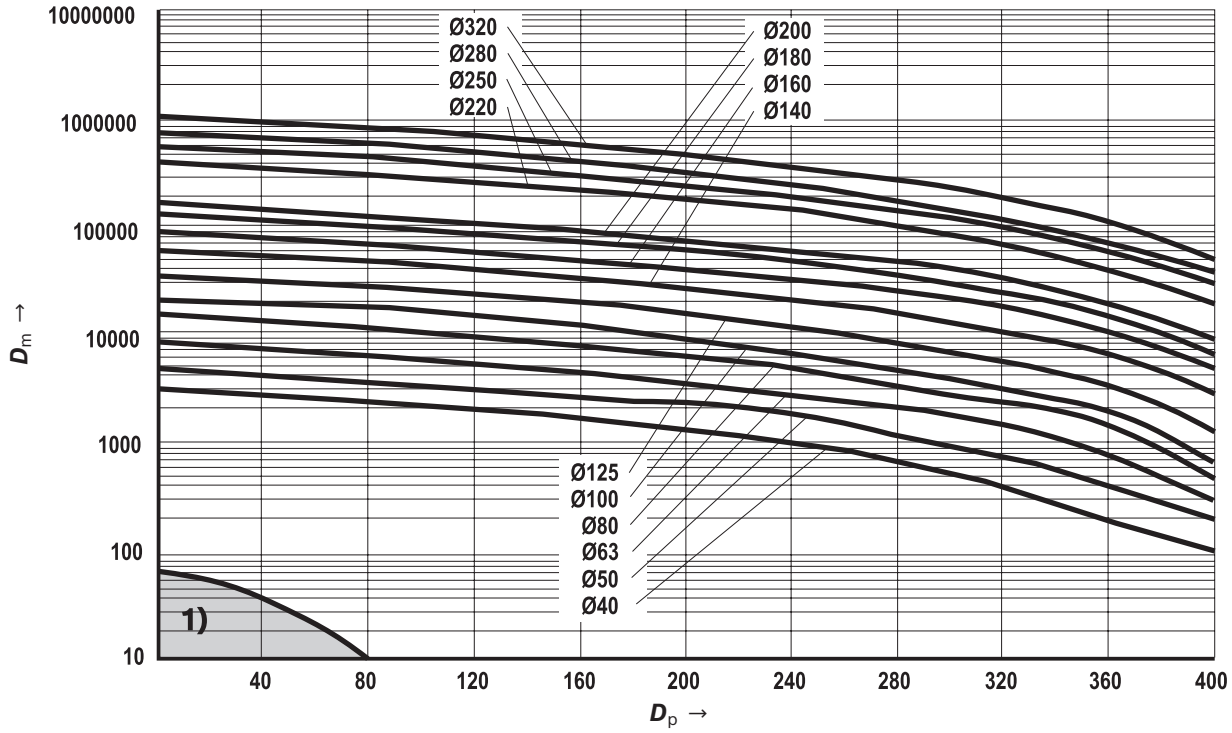


ØAL = piston Ø

1) If with standard applications the calculated intersection point of D_m and D_p is within the marked area, we recommend designing the cylinder without end position cushioning.

End position cushioning

Damping capacity: Retraction for CDH3, CGH3 and CSH3; extension for CGH3 with *kv* ②



1) If with standard applications the calculated intersection point of D_m and D_p is within the marked area, we recommend designing the cylinder without end position cushioning.

Selection criteria for seals

The specified values are to be regarded as guidelines; depending on the application, it may be necessary to check the suitability of the seal system. Generally, a medium temperature of approx. 40 °C is recommended.

	Work and environmental conditions	Seal versions								
		M	G	V	L	A	B	T	R	S
Medium / temperature	**Medium HL, HLP** / operating temperature medium –20 °C ... +80 °C	++	++	++	++	++	++	++	++	++
	Medium HFA / operating temperature medium +5 °C ... +55 °C	+/–	+/–	+/–	+/–	+	+/–	++	+/–	+/–
	Medium HFC / operating temperature medium –20 °C ... +60 °C	–	++	–	–	+/–	–	++	–	–
	Medium HFDR / operating temperature medium –15 °C to +80 °C	–	–	++	–	–	++	–	–	++
	Medium HFDU / operating temperature medium –15 °C ... +80 °C	–	–	++	–	–	++	–	–	++
	Ambient and rod temperature in the area of the piston rod from –20 °C ... +80 °C [1]	++	+	+ [2]	++	++	+ [2]	+	++	++ [2]
	Extended ambient and rod temperature in the area of the piston rod from +80 °C ... +120 °C [1]	–	–	++	–	–	+	–	–	++
Function / velocity...	static hold function more than 10 minutes: Attention! Application- and temperature-dependent	++	+	+	+	++	++	+	+	+
	Static hold function short-time < 1 minute	++	++	++	++	++	++	++	++	++
	Robust application conditions: Steel works, mining, thin ice	++	++	++	++	++	++	–	++	–
	Zero point control, hardly any amplitude, frequency max. 2 Hz, not longer than 5 minutes	–	–	–	+/–	–	–	++	+	++
	Cylinder velocity min. 0.001 m/sec stick-slip behavior	++	+	+	++	–	–	++	++	++
	Cylinder velocity from 0.01 m/sec to 0.5 m/sec [3]	++	+	+	++	+	+	++	++	++
	Cylinder velocity > 0.5 m/sec to max. 0.8 m/sec [3]	–	+/–	+/–	++	–	–	++	+	++
	Stroke > 1.0 m	+/–	++	++	++	++	++	++	++	++
	Standstill period (wear)	++	+/–	+/–	++	+/–	–	++	++	++
	Undissolved air in the oil [4]	–	+	+	+	–	–	+	+	+

++ = very good + = good +/– = conditional, depending on the application parameters – = inappropriate

General technical data in corresponding data sheets will remain valid, see page 11!

1) Moreover, observe the corresponding medium temperature range
2) Lower temperature limit –15 °C
3) Standard line connections not designed for that velocity
4) – Seal is destroyed / + Seal is not directly destroyed, leakage may occur

Seal kits [1)]

CDH3 – Standard

ØAL	ØMM	Material no. for seal design								
		M	G	V	L	A	B	T	R	S
40	28	R900851087	R961006002	R961006037	R961006072	R900859445	R900859770	R900858841	R961006107	R900861001
50	36	R900849392	R961006005	R961006040	R961006075	R900851515	R900860940	R900860277	R961006110	R900861004
63	45	R900847956	R961006008	R961006043	R961006078	R900851638	R900859678	R900847855	R961006113	R900861007
80	56	R900850905	R961006011	R961006046	R961006081	R900854718	R900851205	R900856180	R961006116	R900861010
100	70	R900853382	R961006014	R961006049	R961006084	R900856094	R900860946	R900860285	R961006119	R900861013
125	90	R900857949	R961006017	R961006052	R961006087	R900856095	R900855464	R900856102	R961006122	R900861016
140	100	R900853965	R961006019	R961006054	R961006089	R900856096	R900860952	R900860290	R961006124	R900849080
160	110	R900851146	R961006021	R961006056	R961006091	R900860933	R900860954	R900857536	R961006126	R900861019
180	125	R900848603	R961006024	R961006059	R961006094	R900860935	R900860956	R900860292	R961006129	R900861021
200	140	R900856431	R961006026	R961006061	R961006096	R900860937	R900860958	R900860293	R961006131	R900861023
220	160	R900888101	R961006028	R961006063	R961006098	R900888117	R900888141	R900888109	R961006133	R900888133
250	180	R900888103	R961006030	R961006065	R961006100	R900888119	R900888143	R900888111	R961006135	R900888135
280	200	R900888105	R961006032	R961006067	R961006102	R900888121	R900888145	R900888113	R961006137	R900888137
320	220	R900888107	–	–	R961006104	R900888123	R900888147	R900888115	R961006139	R900888139

CGH3 – Standard

ØAL	ØMM	Material no. for seal design								
		M	G	V	L	A	B	T	R	S
40	28	R900867252	R961006223	R961006258	R961006293	R900866747	R900867133	R900868889	R961006328	R900868943
50	36	R900864930	R961006226	R961006261	R961006296	R900866750	R900867136	R900868892	R961006331	R900868946
63	45	R900867262	R961006229	R961006264	R961006299	R900866753	R900867139	R900868895	R961006334	R900868949
80	56	R900867265	R961006232	R961006267	R961006302	R900866756	R900867142	R900868898	R961006337	R900868952
100	70	R900867268	R961006235	R961006270	R961006305	R900866759	R900867146	R900868901	R961006340	R900868955
125	90	R900867270	R961006238	R961006273	R961006308	R900866762	R900867149	R900868904	R961006343	R900868957
140	100	R900867272	R961006240	R961006275	R961006310	R900866764	R900867151	R900868906	R961006345	R900868959
160	110	R900867274	R961006242	R961006277	R961006312	R900866766	R900867153	R900868908	R961006347	R900868961
180	125	R900867276	R961006245	R961006280	R961006315	R900866768	R900867155	R900868910	R961006350	R900868963
200	140	R900867278	R961006247	R961006282	R961006317	R900866770	R900867157	R900868912	R961006352	R900868965
220	160	R900888021	R961006249	R961006284	R961006319	R900888037	R900888061	R900888029	R961006354	R900888053
250	180	R900888023	R961006251	R961006286	R961006321	R900888039	R900888063	R900888031	R961006356	R900888055
280	200	R900888025	R961006253	R961006288	R961006323	R900888041	R900888065	R900888033	R961006358	R900888057
320	220	R900888027	–	–	R961006325	R900888043	R900888067	R900888035	R961006360	R900888059

ØAL = piston Ø

ØMM = piston rod Ø

[1)] Seal kits for proximity switches and subplate mounting separate material no.

Seal kits [1)]

CDH3 – Standard + additional option F

ØAL	ØMM	Material no. for seal design					
		M+F	G+F	V+F	T+F	R+F	S+F
40	**28**	R900861025	R961006142	R961006169	R900861050	R961006196	R900861100
50	**36**	R900861028	R961006145	R961006172	R900861053	R961006199	R900861103
63	**45**	R900861031	R961006148	R961006175	R900861056	R961006202	R900861106
80	**56**	R900861034	R961006151	R961006178	R900861059	R961006205	R900861109
100	**70**	R900861037	R961006154	R961006181	R900861062	R961006208	R900861115
125	**90**	R900861040	R961006157	R961006184	R900861065	R961006211	R900861122
140	**100**	R900861042	R961006159	R961006186	R900861067	R961006213	R900861126
160	**110**	R900861044	R961006161	R961006188	R900861069	R961006215	R900861130
180	**125**	R900861046	R961006164	R961006191	R900861071	R961006218	R900861135
200	**140**	R900861048	R961006166	R961006193	R900861073	R961006220	R900861143

CGH3 – Standard + additional option F

ØAL	ØMM	Material no. for seal design					
		M+F	G+F	V+F	T+F	R+F	S+F
40	**28**	R900868999	R961006363	R961006390	R900869026	R961006417	R900869093
50	**36**	R900869002	R961006366	R961006393	R900869029	R961006420	R900869096
63	**45**	R900869005	R961006369	R961006396	R900869032	R961006423	R900869099
80	**56**	R900869008	R961006372	R961006399	R900869035	R961006426	R900869102
100	**70**	R900869013	R961006375	R961006402	R900869038	R961006429	R900869105
125	**90**	R900869016	R961006378	R961006405	R900869041	R961006432	R900869108
140	**100**	R900869018	R961006380	R961006407	R900869043	R961006434	R900869110
160	**110**	R900869020	R961006382	R961006409	R900869045	R961006436	R900869112
180	**125**	R900869022	R961006385	R961006412	R900869047	R961006439	R900869114
200	**140**	R900869024	R961006387	R961006414	R900869049	R961006441	R900869116

ØAL = piston Ø

ØMM = piston rod Ø

[1)] Seal kits for proximity switches and subplate mounting separate material no.

Seal kits [1)]

CSH3

ØAL	ØMM	Material no. for seal design						
		M	G	V	L	T	R	S
40	**28**	R900861025	R961006142	R961006169	R961006072	R900861050	R961006196	R900861100
50	**36**	R900861028	R961006145	R961006172	R961006075	R900861053	R961006199	R900861103
63	**45**	R900861031	R961006148	R961006175	R961006078	R900861056	R961006202	R900861106
80	**56**	R900861034	R961006151	R961006178	R961006081	R900861059	R961006205	R900861109
100	**70**	R900861037	R961006154	R961006181	R961006084	R900861062	R961006208	R900861115
125	**90**	R900861040	R961006157	R961006184	R961006087	R900861065	R961006211	R900861122
140	**100**	R900861042	R961006159	R961006186	R961006089	R900861067	R961006213	R900861126
160	**110**	R900861044	R961006161	R961006188	R961006091	R900861069	R961006215	R900861130
180	**125**	R900861046	R961006164	R961006191	R961006094	R900861071	R961006218	R900861135
200	**140**	R900861048	R961006166	R961006193	R961006096	R900861073	R961006220	R900861143
220	**160**	R900888101	R961006028	R961006063	R961006098	R900888109	R961006133	R900888133
250	**180**	R900888103	R961006030	R961006065	R961006100	R900888111	R961006135	R900888135
280	**200**	R900888105	R961006032	R961006067	R961006102	R900888113	R961006137	R900888137
320	**220**	R900888107	–	–	R961006104	R900888115	R961006139	R900888139

ØAL = piston Ø

ØMM = piston rod Ø

[2)] Seal kits for position measurement system and subplate mounting separate material no.

Seal kits

Only for proximity switches

ØAL	Material no. for seal design								
	M / M+F	T / T+F	G / G+F	L	R / R+F	A	S / S+F	V / V+F	B
40 ... 200	R900885938						R900885939		
220 ... 320	R900894997						R900894998		

Only for subplate mounting

ØAL	Material no. for seal design	
	M, T, G, L, R, A	S, B, V
40	R961006022	R961006243
50	R961006022	R961006243
63	R961006092	R961006313
80	R961006092	R961006313
100	R961006092	R961006313
125	R961006162	R961006383
140	R961006162	R961006383
160	R961006189	R961006410
180	R961006189	R961006410
200	R961006189	R961006410

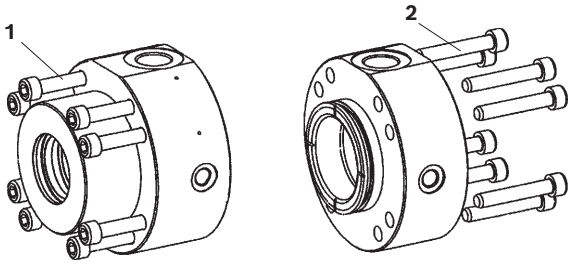
Only for position measurement system

ØAL	Material no. for seal design	
	M, T, G, L, R	S, V
40	R900885935	R900885937
50	R900894958	R900894979
63	R900894959	R900894980
80	R900894960	R900894981
100	R900894961	R900894982
125	R900894962	R900894983
140	R900894963	R900894985
160	R900894964	R900894986
180	R900894973	R900894987
200	R900894974	R900894988
220	R900894975	R900894989
250	R900894976	R900894991
280	R900894977	R900894993
320	R900894978	R900894994

ØAL = piston Ø

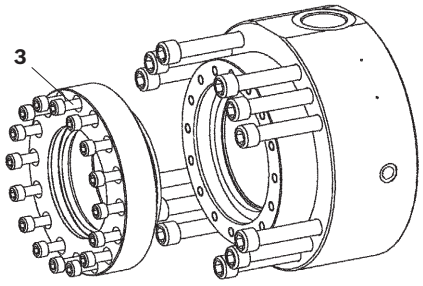
Tightening torques

Screws: Head and base (item 1 and 2)



Series	Piston Ø	Screw	Quantity	Quality class	Tightening torque
CDH3 / CGH3 / CSH3	**40**	M10	4	10.9	40 Nm
CDH3 / CGH3 / CSH3	**50**	M8	8	10.9	25 Nm
CDH3 / CGH3 / CSH3	**63**	M10	8	10.9	50 Nm
CDH3 / CGH3 / CSH3	**80**	M12	8	10.9	90 Nm
CDH3 / CGH3 / CSH3	**100**	M16	8	10.9	175 Nm
CDH3 / CGH3 / CSH3	**125**	M20	8	10.9	350 Nm
CDH3 / CGH3 / CSH3	**140**	M20	8	10.9	450 Nm
CDH3 / CGH3 / CSH3	**160**	M24	8	10.9	670 Nm
CDH3 / CGH3 / CSH3	**180**	M24	12	10.9	580 Nm
CDH3 / CGH3 / CSH3	**200**	M24	12	10.9	720 Nm
CDH3 / CGH3 / CSH3	**220**	M24	16	10.9	750 Nm
CDH3 / CGH3 / CSH3	**250**	M30	16	10.9	1400 Nm
CDH3 / CGH3 / CSH3	**280**	M30	16	10.9	1600 Nm
CDH3 / CGH3 / CSH3	**320**	M42	12	10.9	4200 Nm

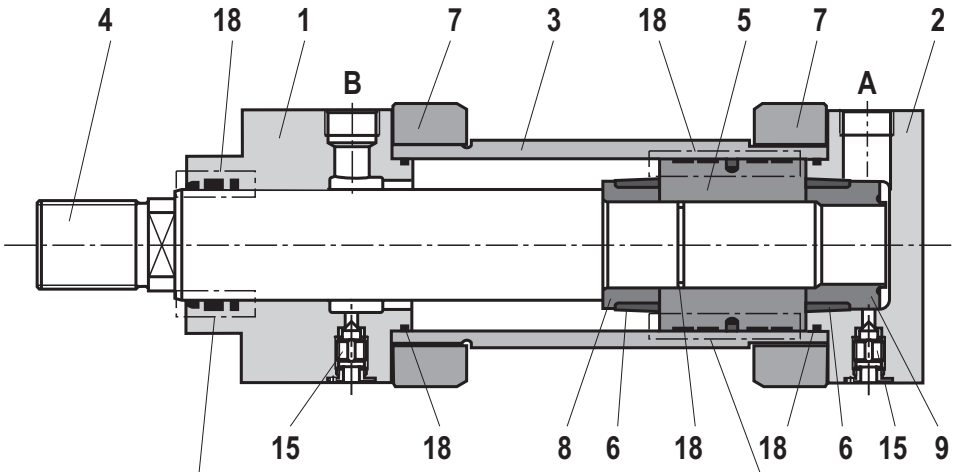
Screws: Seal cover (item 3)

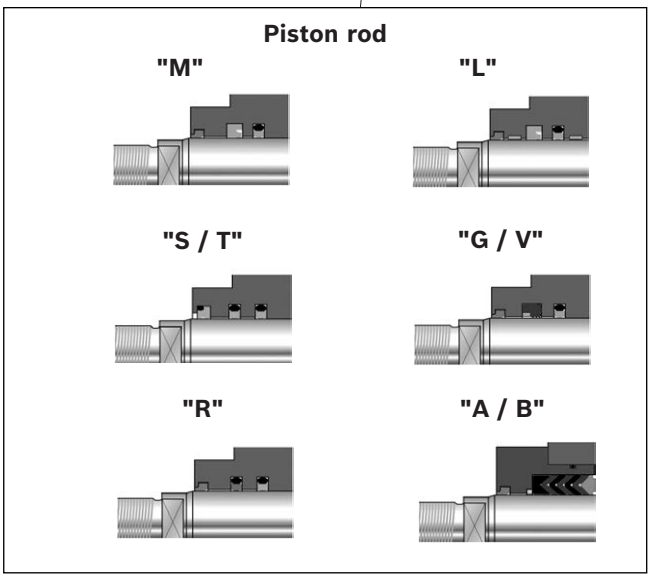


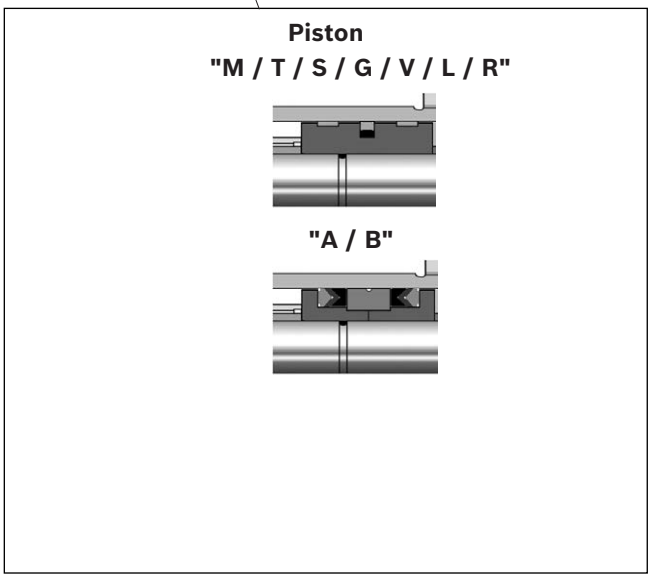
Only with seal design "A" and "B"

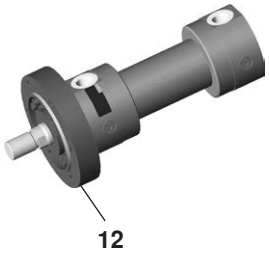
Series	Piston Ø	Piston rod Ø	Screw	Quantity	Quality class	Tightening torque
CDH3 / CGH3	**160**	**110**	M10	16	10.9	60 Nm
CDH3 / CGH3	**180**	**125**	M12	16	10.9	80 Nm
CDH3 / CGH3	**200**	**140**	M12	16	10.9	90 Nm
CDH3 / CGH3	**220**	**160**	M12	24	10.9	90 Nm
CDH3 / CGH3	**250**	**180**	M16	16	10.9	90 Nm
CDH3 / CGH3	**280**	**200**	M16	16	10.9	230 Nm
CDH3 / CGH3	**320**	**220**	M16	24	10.9	230 Nm

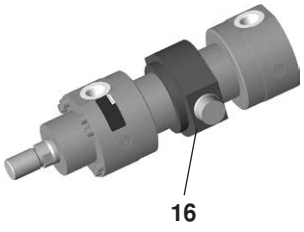
Components: Series CDH3

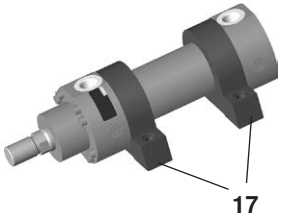






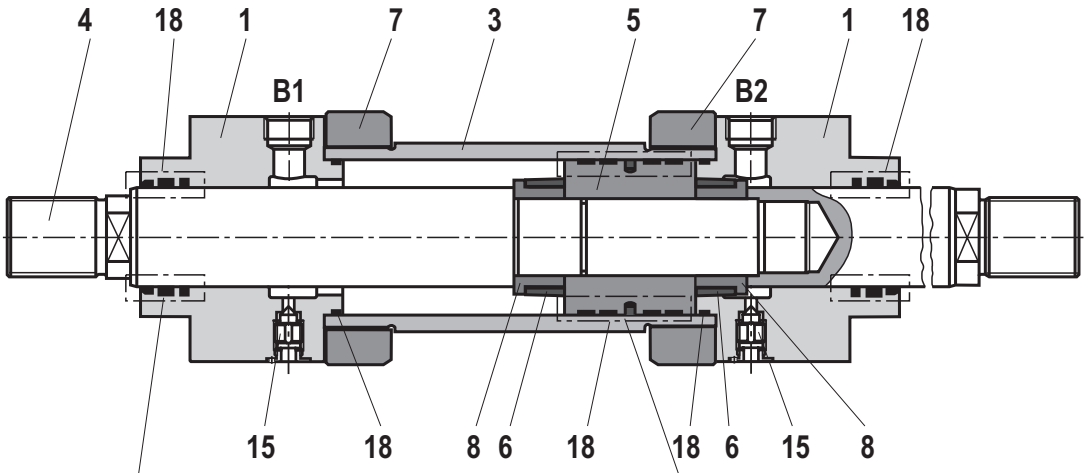


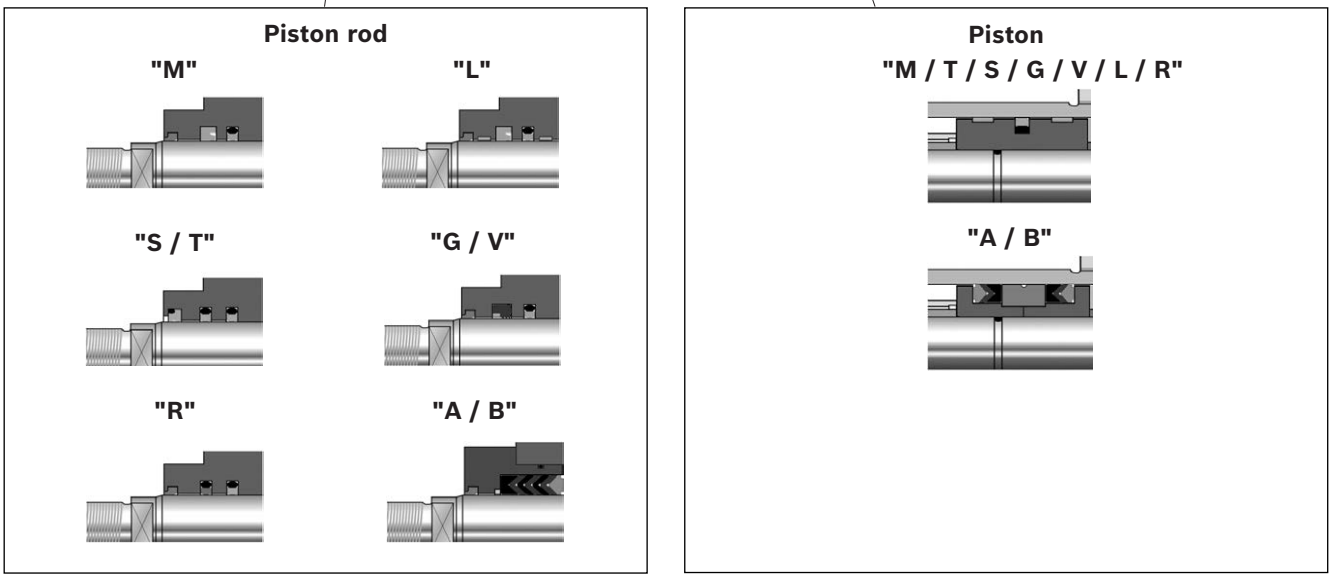


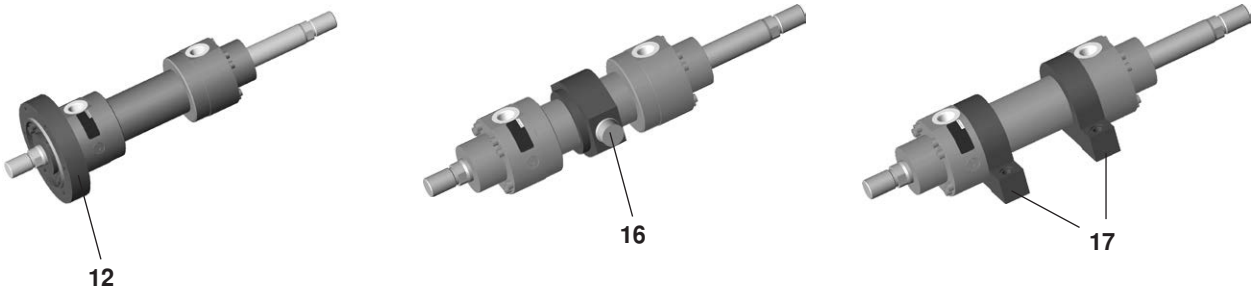


A Piston chamber
B Annulus area
1 Head
2 Base
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Socket
9 Socket
10 Base MP3
11 Base MP5
12 Round flange MF3
14 Round flange MF4
15 Bleeding
16 Trunnion MT4
17 Foot MS2
18 Seal kit:
Wiper
Rod seal
Piston seal
O-ring
Guide ring

Components: Series CGH3

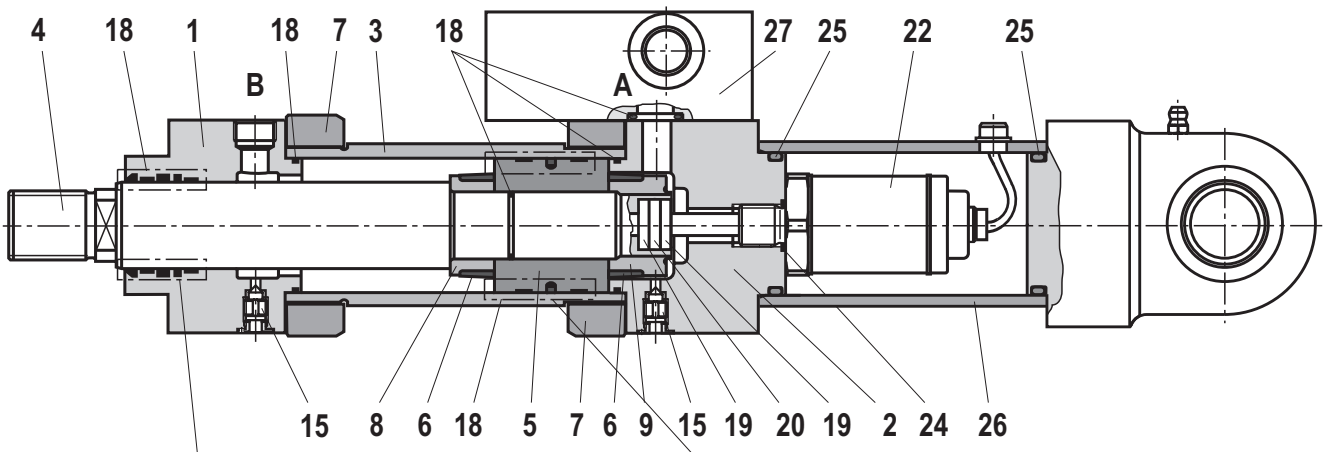


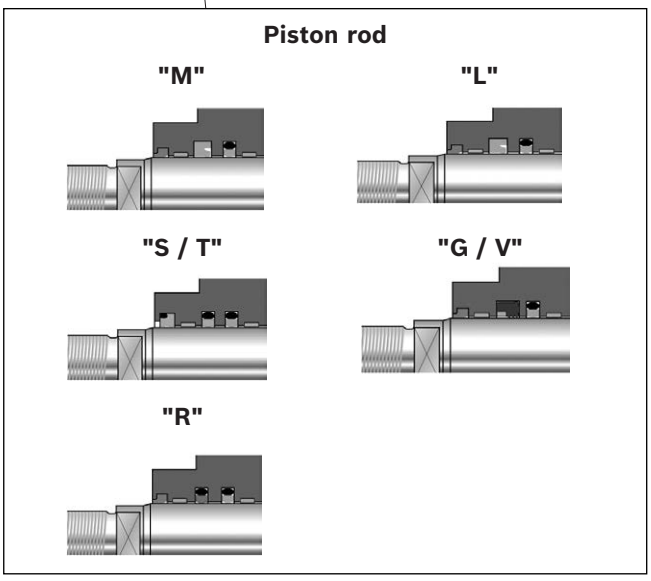


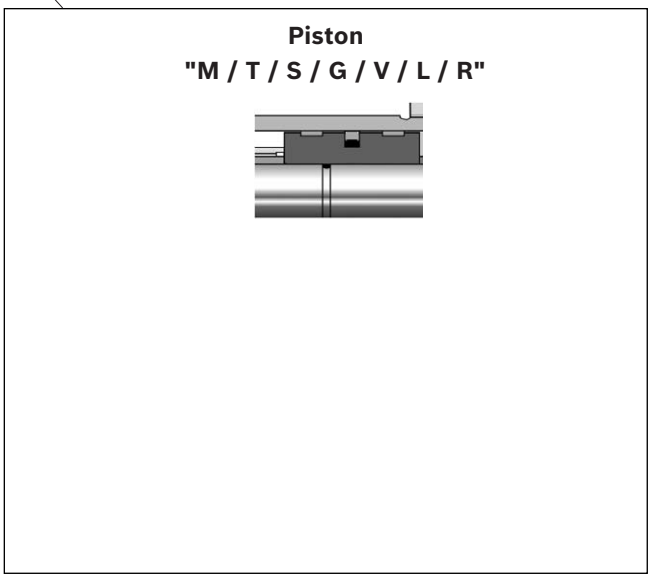


B1 Annulus area 1
B2 Annulus area 2
1 Head
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Socket
12 Round flange MF3
15 Bleeding
16 Trunnion MT4
17 Foot MS2
18 Seal kit:
Wiper
Rod seal
Piston seal
O-ring
Guide ring

Components: Series CSH3 MP3 and MP5

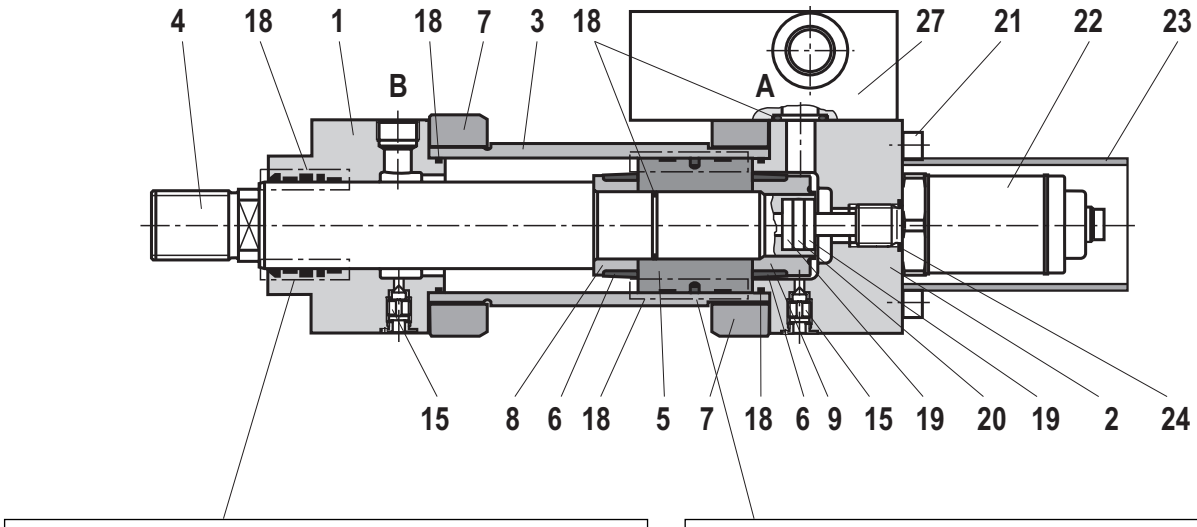


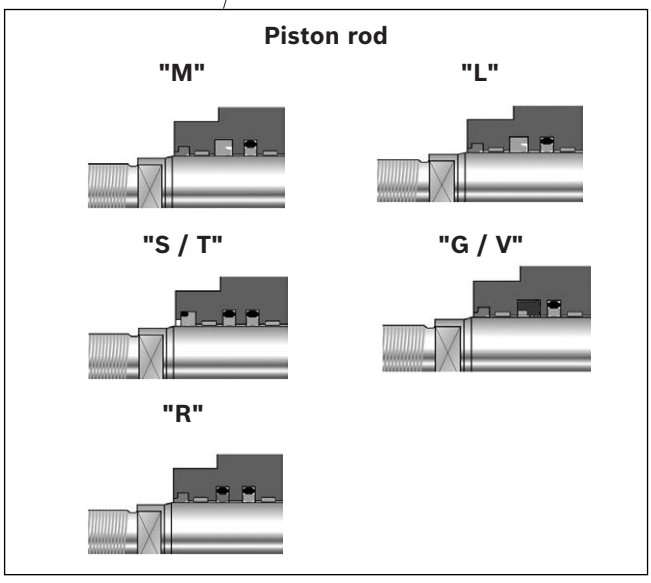


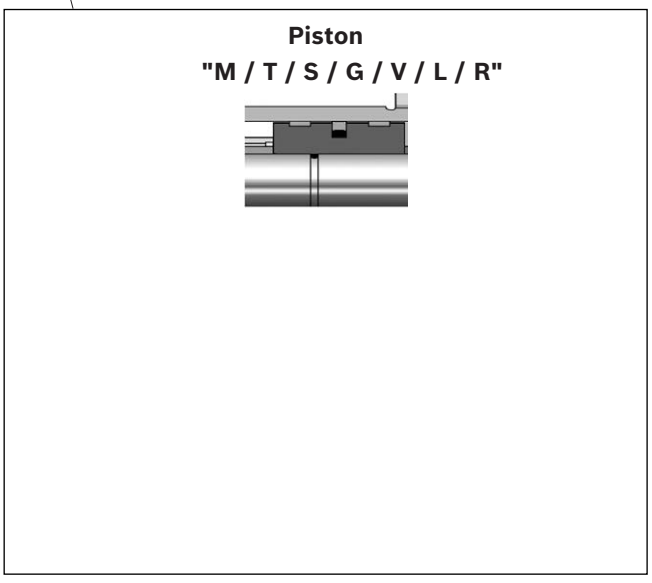


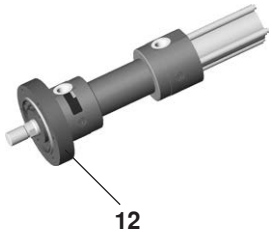
A Piston chamber
B Annulus area
1 Head
2 Base
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Socket
9 Socket
10 Base MP3
11 Base MP5
15 Bleeding
18 Seal kit:
Wiper
Rod seal
Piston seal
O-ring
Guide ring
19 Insulating socket
20 Solenoid
22 Position measurement system
24 Seal
25 Seal
26 Protective pipe
27 Subplate

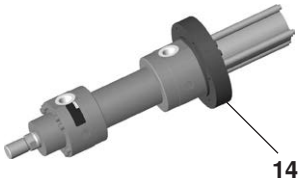
Components: Series CSH3 MF3, MF4, MT4 and MS2

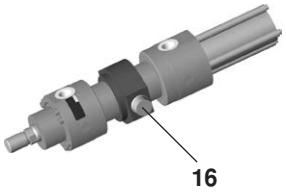


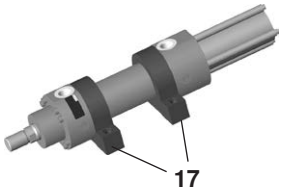












A Piston chamber
B Annulus area
1 Head
2 Base
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Socket
9 Socket
12 Round flange MF3
14 Round flange MF4
15 Bleeding
16 Trunnion MT4
17 Foot MS2
18 Seal kit:
Wiper
Rod seal
Piston seal
O-ring
Guide ring
19 Insulating socket
20 Solenoid
21 Hexagon socket head cap screws
22 Position measurement system
23 Protective pipe
24 Seal
27 Subplate

Cylinder weight

Piston	Piston rod	CD/CS cylinder with 0 mm stroke length					per 100 mm stroke length	CG cylinder with 0 mm stroke length			per 100 mm stroke length
ØAL	**ØMM**	**MP3** [1] **MP5** [1]	**MP3** [2] **MP5** [2]	**MF3 MF4**	**MT4**	**MS2**		**MF3**	**MT4**	**MS2**	
mm	mm	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg
40	**28**	8	14	11	11	9	1.2	12	12	10	1.6
50	**36**	12	20	17	15	15	1.6	19	17	17	2.4
63	**45**	26	41	32	30	32	2.6	37	35	36	3.8
80	**56**	33	44.5	43	40	42	4.2	49	46	48	6.1
100	**70**	58	74.5	72	71	73	5.7	80	79	81	8.8
125	**90**	120	150	148	145	149	11.1	170	166	171	16.1
140	**100**	167	203	205	202	206	13.0	236	233	236	19.1
160	**110**	229	284	276	276	275	16.3	316	316	315	23.8
180	**125**	317	383	387	386	404	19.5	456	455	473	29.1
200	**140**	425	500	506	504	531	24.4	562	560	587	36.5
220	**160**	514	623	653	570	590	37.8	753	671	690	53.6
250	**180**	777	959	939	854	829	46.2	1057	972	948	66.2
280	**200**	915	1147	1073	1028	984	59.7	1224	1179	1135	84.3
320	**220**	1200	1479	1274	1211	1211	68.3	1431	1369	1369	98.1

ØAL = piston Ø

ØMM = piston rod Ø

[1] Weight without position measurement system

[2] Weight with position measurement system

Corrosivity categories

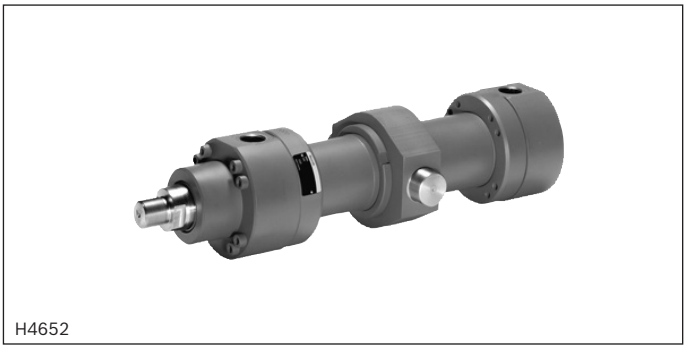
In this connection, observe the information on the color set-up on page 11 "Technical data".
The specified resistances of the individual Bosch Rexroth classes only refer to the primed / painted cylinder areas, not, for example, to piston rods, trunnions, etc.
In this connection, special measures may be necessary.

	Class	Certification by	Applications	
			Inside	Outside
Priming	CP3	240 h salt spray test SST (DIN EN ISO 9227) 240 h condensation water test KKT (DIN EN ISO 6270-2) Layer thickness: min. 40 µm	Field of application, e.g. Hall atmosphere, Air humidity ≤ 60%, no thermal load.	Not suitable for outdoor exposure.
Painting	CP4	480 h salt spray test SST. (DIN EN ISO 9227) 480 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: 120 µm	Unheated buildings in which there may be condensation (production rooms, storage and sport halls).	Urban and industrial atmosphere with little salt or sulfur dioxide load.
	CP5	720 h salt spray test SST (DIN EN ISO 9227) 480 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: 140 µm	Silo and debris facilities, chemical plants, boathouses above sea water, laundries, breweries with high humidity and medium contamination.	Industrial and coastal areas with medium salt load.
	CP6	1000 h salt spray test NSS (DIN EN ISO 9227) 480 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: 220 µm	Buildings or areas with almost permanent condensation and serious contamination.	Industrial areas with large humidity and aggressive atmosphere.
	CP7	1440 h salt spray test NSS (DIN EN ISO 9227) 720 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: 320 µm	Buildings or areas with almost permanent condensation and with serious contamination.	Coastal and offshore areas with high salt load.

Hydraulic cylinder, mill type

Series CDM1 / CGM1 / CSM1

RE 17329
Edition: 2014-07
Replaces: 10.07
09.07
17328



H4652

- Component series 2X
- Nominal pressure 160 bar *[16 MPa]*

Features

- Installation dimensions according to ISO 6020/1 and VW 39 D 920
- 9 types of mounting
- Piston Ø (**ØAL**) 25 to 200 mm
- Piston rod Ø (**ØMM**) 14 to 140 mm
- Stroke lengths up to 3,000 mm
- Self-adjusting or adjustable end position cushioning

Contents

Ordering code: Series CDM1

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16	17
CD	**M1**		/		/		/		**A**	**2X**	/									

01	Differential cylinders	**CD**
02	Series	**M1**

Types of mounting

03	**No** mounting	**M00** 2)
	Rectangular flange at head	**MF1** 3)
	Rectangular flange at base	**MF2** 3)
	Round flange at head	**MF3**
	Round flange at base	**MF4**
	Swivel eye at base	**MP3**
	Self-aligning clevis at base	**MP5**
	Trunnion	**MT4** 4)
	Foot mounting	**MS2**
04	Piston Ø (**ØAL**) 25 ... 200 mm, see page 10	**...**
05	Piston rod Ø (**ØMM**) 14 ... 140 mm, see page 10	**...**
06	Stroke length in mm	**...**

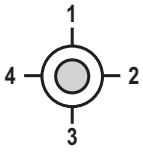
Design principle

07	Head and base flanged	**A**
08	Component series 20 ... 29 (20 ... 29: unchanged installation and connection dimensions)	**2X**

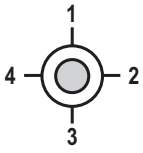
Line connection / version

09	Pipe thread ISO 1179-1		**B**
	Metric ISO thread (DIN/ISO 6149-1)		**R**
	Enlarged pipe thread ISO 1179-1, page 40		**S** 5; 6)
	Rectangular flange connection ISO 6162, page 41		**F** 6; 7)
	Square flange connection ISO 6164, page 41		**H** 6; 8)
	For directional and control valves, page 44, 45	Subplate size 6	**P** 6; 9; 14)
		Subplate size 10	**T** 6; 10; 14)
		Subplate size 16	**U** 6; 11; 14)
	For SL and SV valves 16), page 42, 43	Subplate size 6	**A** 6; 9; 14)
		Subplate size 10	**E** 6; 10; 14)
		Subplate size 20	**L** 6; 11; 14)

Line connection/position at head

10	View to piston rod 18)		**1** **2** **3** **4**

Line connection/position at base

11	View to piston rod 18)		**1** **2** **3** **4**

Ordering code: Series CDM1

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16	17
CD	**M1**		**/**		**/**		**/**		**A**	**2X**	**/**									

Piston rod design

12	Hard chromium-plated	**C**
	Hardened and hard chromium-plated	**H** [12]
	Stainless steel, hard chromium-plated	**L**

Piston rod end

13	Thread (ISO 6020-1) for swivel head CGKD	**G**
	Thread (VW standard) for swivel head CGKD	**H** [17]
	Internal thread, page 40	**E** [13]
	Piston rod end **H with** mounted swivel head CGKD	**F** [17]
	Piston rod end **G with** mounted swivel head CGKD	**K**

End position cushioning

14	**Without** end position cushioning	**U**
	Both sides, self-adjusting	**D**
	Head side, self-adjusting	**S**
	Base side, self-adjusting	**K**
	Both sides, adjustable	**E**

Seal design

15	**Suitable for mineral oil according to 51524 HL, HLP**	Standard seal system	**M**
		Servo quality / reduced friction	**T** [8]
		Chevron seal kits	**A** [7]
	Suitable for phosphoric acid esters HFDR	Standard seal system	**V**
		Servo quality / reduced friction	**S** [8]

Option 1

16	**Without** option	**W**
	Measuring coupling, on both sides	**A**
	Inductive proximity switch **without** mating connector, mating connector – separate order see page 48	**E** [8]

Option 2

17	**Without** option	**W**
	Specify the piston rod extension LY in the plain text in mm	**Y**

Order examples:

CDM1MT4/50/28/550A2X/B11CGDMWW, XV = 175 mm

CDM1MF3/200/140/950A2X/B11CHKAWW

Note:

Replacement cylinder for series 1X

In the event of an exchange to series 2X, the bearing blocks (trunnions) must also be replaced!

[2] Only available on request

[3] Piston Ø 25 up to 125 mm

[4] When ordering, always specify the “XV” dimension in the clear text in mm

[5] Piston Ø 63 up to 200 mm

[6] Not for MF2; MF4

[7] Piston Ø 50 up to 200 mm

[8] Piston Ø 40 up to 200 mm

[9] Piston Ø 40 to 80 mm, only position 11

[10] Piston Ø 63 to 200 mm, only position 11

[11] Piston Ø 125 to 200 mm, only position 11

[12] Piston rod Ø 14 up to 110 mm

[13] Piston rod Ø 22 up to 140 mm

[14] Subplates only possible with pipe thread (ISO 1179-1)

[16] Subplates for SL and SV valves (isolator valves)
Note: Seal design T and S are not designed for the static holding function!

[17] Per piston Ø, only possible with large piston rod Ø

[18] All graphical presentations in the data sheet show position 1

Ordering code: Series CGM1

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16	17
CG	**M1**		/		/		/		**A**	**2X**	/									

01	Double-acting cylinders	**CG** [1]
02	Series	**M1**

Types of mounting

03	Rectangular flange at head	**MF1** [3]
	Round flange at head	**MF3**
	Trunnion	**MT4** [4]
	Foot mounting	**MS2**
04	Piston Ø (**ØAL**) 25 ... 200 mm, see page 10	**...**
05	Piston rod Ø (**ØMM**) 14 ... 140 mm, see page 10	**...**
06	Stroke length in mm	**...**

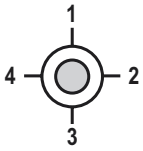
Design principle

07	Head and base flanged	**A**
08	Component series 20 ... 29 (20 ... 29: unchanged installation and connection dimensions)	**2X**

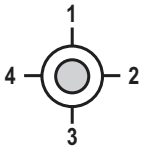
Line connection / version

09	Pipe thread ISO 1179-1		**B**
	Metric ISO thread (DIN/ISO 6149-1)		**R**
	Enlarged pipe thread ISO 1179-1, page 40		**S** [5]
	Rectangular flange connection ISO 6162, page 41		**F** [7]
	Square flange connection ISO 6164, page 41		**H** [8]
	For directional and control valves, page 44, 45	Subplate size 6	**P** [6; 9; 14]
		Subplate size 10	**T** [6; 10; 14]
		Subplate size 16	**U** [6; 11; 14]
	For SL and SV valves [16], page 42, 43	Subplate size 6	**A** [6; 9; 14]
		Subplate size 10	**E** [6; 10; 14]
		Subplate size 20	**L** [6; 11; 14]

Line connection/position at head

10	View to piston rod [18]		**1**
			2
			3
			4

Line connection/position at base

11	View to piston rod [18]		**1**
			2
			3
			4

Piston rod design

12	Hard chromium-plated	**C**
	Hardened and hard chromium-plated	**H** [12]
	Stainless steel, hard chromium-plated	**L**

Ordering code: Series CGM1

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16	17
CG	**M1**		**/**		**/**		**/**		**A**	**2X**	**/**									

Piston rod end

13	Thread (ISO 6020-1) for swivel head CGKD	**G**
	Thread (VW standard) for swivel head CGKD	**H** [17]
	Piston rod end **H with** mounted swivel head CGKD	**F** [17]
	Piston rod end **G with** mounted swivel head CGKD	**K**

End position cushioning

14	**Without** end position cushioning	**U**
	Both sides, self-adjusting	**D**
	Both sides, adjustable	**E**

Seal design

15	**Suitable for mineral oil according to 51524 HL, HLP**	Standard seal system	**M**
		Servo quality / reduced friction	**T** [8]
		Chevron seal kits	**A** [7]
	Suitable for phosphoric acid esters HFDR	Standard seal system	**V**
		Servo quality / reduced friction	**S** [8]

Option 1

16	**Without** option	**W**
	Measuring coupling, on both sides	**A**
	Inductive proximity switch **without** mating connector, mating connector – separate order see page 48	**E** [8]

Option 2

17	**Without** option	**W**
	Specify the piston rod extension LY in the plain text in mm	**Y**

Order examples:
CGM1MT4/50/28/550A2X/B11CGDMWW, XV = 175 mm
CGM1MF3/200/140/950A2X/B11CHDAWW

Note:
Replacement cylinder for series 1X
In the event of an exchange to series 2X, the bearing blocks (trunnions) must also be replaced!

[1] Not standardized
[3] Piston Ø 25 up to 125 mm
[4] When ordering, always specify the “XV” dimension in the clear text in mm
[5] Piston Ø 63 up to 200 mm
[7] Piston Ø 50 up to 200 mm
[8] Piston Ø 40 up to 200 mm
[9] Piston Ø 40 to 80 mm, only position 11
[10] Piston Ø 63 to 200 mm, only position 11
[11] Piston Ø 125 to 200 mm, only position 11
[12] Piston rod Ø 14 up to 110 mm
[14] Subplates only possible with pipe thread ISO 1179-1
[16] Subplates for SL and SV valves (isolator valves)
Note: Seal design T and S are not designed for the static holding function!
[17] Per piston Ø, only possible with large piston rod Ø
[18] All graphical presentations in the data sheet show position 1

Ordering code: Series CSM1

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16	17
CS	**M1**		/		/		/		**A**	**2X**	/								**T**	

01	Differential cylinder **with** position measurement system	**CS** [1]
02	Series	**M1**

Types of mounting

03	Rectangular flange at head	**MF1** [3]
	Round flange at head	**MF3**
	Swivel eye at base	**MP3**
	Self-aligning clevis at base	**MP5**
	Trunnion	**MT4** [4]
	Foot mounting	**MS2**
04	Piston Ø (**ØAL**) 40 ... 200 mm, see page 10	**...**
05	Piston rod Ø (**ØMM**) 28 ... 140 mm, see page 10	**...**
06	Stroke length in mm	**...**

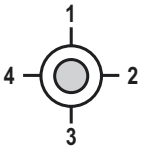
Design principle

07	Head and base flanged	**A**
08	Component series 20 ... 29 (20 ... 29: unchanged installation and connection dimensions)	**2X**

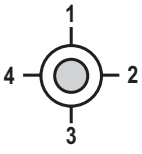
Line connection / version

09	Pipe thread ISO 1179-1		**B**
	Metric ISO thread (DIN/ISO 6149-1)		**R**
	Enlarged pipe thread ISO 1179-1, page 40		**S** [5]
	Rectangular flange connection ISO 6162, page 41		**F** [7]
	Square flange connection ISO 6164, page 41		**H**
	For directional and control valves, page 44, 45	Subplate size 6	**P** [6; 9; 14]
		Subplate size 10	**T** [6; 10; 14]
		Subplate size 16	**U** [6; 11; 14]
	For SL and SV valves [16], page 42, 43	Subplate size 6	**A** [6; 9; 14]
		Subplate size 10	**E** [6; 10; 14]
		Subplate size 20	**L** [6; 11; 14]

Line connection/position at head

10	View to piston rod [18]		**1** **2** **3** **4**

Line connection/position at base

11	View to piston rod [18]		**1** **2** **3** **4**

Piston rod design

12	Hard chromium-plated	**C**
	Stainless steel, hard chromium-plated	**L**

Ordering code: Series CSM1

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16	17
CS	**M1**		**/**		**/**		**/**		**A**	**2X**	**/**								**T**	

Piston rod end

13	Thread (ISO 6020-1) for swivel head CGKD	**G**
	Thread (VW standard) for swivel head CGKD	**H** [17]
	Internal thread, page 40	**E**
	Piston rod end **H with** mounted swivel head CGKD	**F** [17]
	Piston rod end **G with** mounted swivel head CGKD	**K**

End position cushioning

14	**Without** end position cushioning	**U**
	Both sides, adjustable	**E** [15]

Seal design

15	**Suitable for mineral oil according to 51524 HL, HLP**	Standard seal system	**M**
		Servo quality / reduced friction	**T**
	Suitable for phosphoric acid esters HFDR	Servo quality / reduced friction	**S**

Option 1

16	Position measurement system (magnetostrictive) **without** mating connector, mating connector – separate order, see page 51	**T**

Option 2

17	Analog output 4 ... 20 mA	**C**
	Analog output 0 ... 10 V	**F**
	Digital output SSI	**D**

Order example:
CSM1MT4/50/36/300A2X/B11CHUMTC, XV = 175 mm

[1] Not standardized
[3] Piston Ø 40 up to 125 mm
[4] When ordering, always specify the “XV” dimension in the clear text in mm
[5] Piston Ø 63 up to 200 mm
[6] Not for MF2; MF4
[7] Piston Ø 50 up to 200 mm
[9] Piston Ø 40 to 80 mm, only position 11
[10] Piston Ø 63 to 200 mm, only position 11
[11] Piston Ø 125 to 200 mm, only position 11
[14] Subplates only possible with pipe thread (ISO 1179-1)
[15] Piston Ø 80 up to 200 mm
[16] Subplates for SL and SV valves (isolator valves)
Note: Seal design T and S are not designed for the static holding function!
[17] Per piston Ø, only possible with large piston rod Ø
[18] All graphical presentations in the data sheet show position 1

General information on series CSM1

The series CSM1...2X is based on the series CDM1...2X (according to ISO 6020/1).
The same general instructions apply for series CSM1...2X as for series CDM1...2X.

Dimensional differences or deviations in the type code caused by the integrated position measurement system are shown on the pages for the dimensions.

Technical data

(For applications outside these parameters, please consult us!)

General		
Weight	kg	see page 75
Installation position		any
Ambient temperature range	°C *[°F]*	–20 ... +80 *[–4 ... +176]*
Primer coat [1]	µm	min. 40

Hydraulic		
Nominal pressure [2]	bar *[MPa]*	160 *[16]*
Minimum operating pressure [3] (without load)	bar *[MPa]*	10 *[1]*
Static test pressure	bar *[MPa]*	240 *[24]*
Hydraulic fluid		see table below
Hydraulic fluid temperature range	°C *[°F]*	–20 ... +80 *[–4 ... +176]*
Viscosity range	mm^2/s	2.8 ... 380
Maximum permissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)		Class 20/18/15 [4]
Stroke speed [5] (depending on line connection)	m/s	up to 0.5
Bleeding		standard, from piston Ø 40 mm secured against unscrewing

Hydraulic fluid [6]	**Classification**	**Suitable sealing materials**	**Standards**
Mineral oils	HL, HLP	NBR, FKM	DIN 51524
Phosphoric acid esters	HFDR	FKM	ISO 12922
Water glycol	HFC	upon request	

1) By default, hydraulic cylinders are primed with a coating (color gentian blue RAL 5010). Other colors upon request. With cylinders and attachment parts, the following surfaces are not primed or painted:
   - ▶ All fit diameters to the customer side
   - ▶ Sealing surfaces for line connection
   - ▶ Sealing surfaces for flange connection
   - ▶ Position measurement system

   The areas that are not painted are protected by means of a solvent-free corrosion protection agent.

2) Higher operating pressures up to 200 bar available on request. With extreme loads, mounting elements and threaded piston rod connections must be designed for durability.

3) Depending on the application, a certain minimum pressure is required in order to guarantee good functioning of the cylinder. Without load, a minimum pressure of 10 bar is recommended for differential cylinders; for lower pressures as well as double-acting cylinders, please contact us.

4) The cleanliness classes stated for the components has to be maintained in hydraulic systems. Effective filtration prevents faults and at the same time increases the service life of the components.

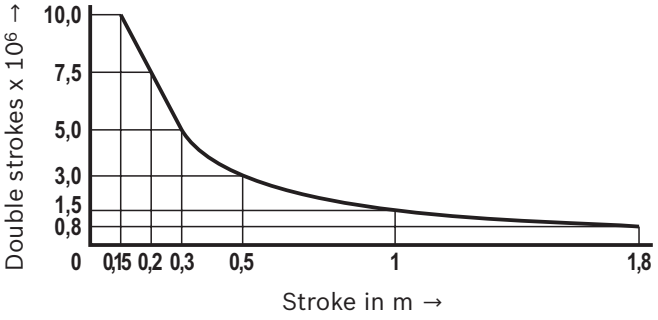
5) If the extension velocity is considerably higher than the retraction velocity of the piston rod, drag-out losses of the medium may result. If necessary, please consult us.

6) For further information on hydraulic fluids, see data sheet R.90223.

Life cycle:

Rexroth cylinders correspond to the reliability recommendations for industrial applications.

≥ 10,000,000 double strokes in idle continuous operation or 3000 km piston travel at 70% of the maximum operating pressure, without load on the piston rod, with a maximum velocity of 0.5 m/s, with a failure rate of less than 5%.



Technical data

(For applications outside these parameters, please consult us!)

☞ **Notices:**

Boundary and application conditions:

- The mechanical alignment of the movement axis and thus the mounting points of hydraulic cylinder and piston rod must be ensured. Lateral forces on the guides of piston rod and piston are to be avoided.
  It may be necessary to consider the own weight of the hydraulic cylinder (MP3/MP5 or MT4) or the piston rod.
- The kinking length/kinking load of the piston rod and/or the hydraulic cylinder must be observed (see page topic Kinking).
- The maximum admissible stroke velocities with regard to the suitability/load of seals must be observed as must their compatibility with the properties of the fluid type (see page topic Seals).
- The maximum admissible velocities/kinetic energies when moving into the end positions, also considering external loads, must be observed.
  Danger: Excess pressure
- The maximum admissible operating pressure must be complied with in any operating state of the hydraulic cylinder.
  Possible pressure intensification resulting from the area ratio of annulus area to piston area and possible throttling points are to be observed.
- Detrimental environmental influences, like e.g. aggressive finest particles, vapors, high temperatures, etc. as well as contaminations and deterioration of the hydraulic fluid are to be avoided.

Standards:

The installation dimensions and types of mounting of the cylinder comply with the standards ISO 6020/1 and VW 39 D 920.

Acceptance:

Each cylinder is tested according to Bosch Rexroth standard and in compliance with ISO 10100: 2001.

Safety instructions:

For assembly, commissioning and maintenance of hydraulic cylinders, observe the operating instructions 07100-B!

Service and repair works have to be performed by Bosch Rexroth AG or by personnel especially trained for this purpose. No warranty is accepted for damage as a consequence of assembly, maintenance or repair work not performed by Bosch Rexroth AG.

Check lists for hydraulic cylinders:

Cylinders the characteristics and/or application parameters of which deviate from the values specified in the data sheet can only be offered as special version upon request. For offers, the deviations of the characteristics and/or application parameters must be described in the check lists for hydraulic cylinders (07200).

This list does not claim to be complete. In case of questions regarding the compatibility with media or exceedance of the boundary or application conditions, please contact us.

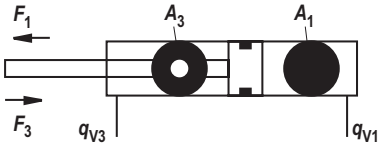
All graphical presentations in the data sheet are an example. The product supplied may therefore differ from the photo shown.

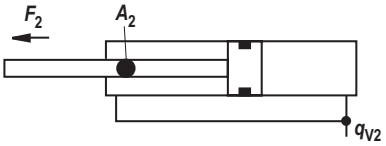
Project planning software ICS (**I**nteractive **C**atalog **S**ystem)

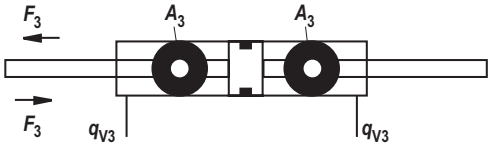
The ICS (Interactive Catalog System) is a selection and project planning help for hydraulic cylinders. The ICS allows designers for machines and systems to quickly and reliably find the perfect hydraulic cylinder solution through logic-guided type key enquiries. This software helps to solve design and project planning tasks more quickly and efficiently. After having been guided through the product selection, the user quickly and reliably gets the exact technical data of the selected component as well as 2D and 3D CAD data in the correct file format for all common CAD systems.
This allows users to reduce costs while increasing their competitiveness.

Diameters, areas, forces, flow

Piston	Piston rod	Area ratio	Areas			Force at 160 bar [1]			Flow at 0.1 m/s [2]			max. available stroke length
			Piston	Rod	Ring	pres-sure	Diff.	Pulling	From	Diff.	On	
ØAL mm	**ØMM** mm	ϕ A_1/A_3	A_1 cm²	A_2 cm²	A_3 cm²	F_1 kN	F_2 kN	F_3 kN	q_{V1} l/min	q_{V2} l/min	q_{V3} l/min	mm
25	**14** **18**	1.46 2.08	4.91	1.54 2.54	3.37 2.36	7.85	2.44 4.07	5.37 3.76	2.9	0.9 1.5	2.0 1.4	600
32	**18** **22**	1.46 1.90	8.04	2.54 3.80	5.50 4.24	12.80	4.07 6.08	8.78 6.76	4.8	1.5 2.3	3.3 2.5	800
40	**22** **28**	1.43 1.96	12.56	3.80 6.16	8.76 6.41	20.00	6.08 9.82	14.03 10.24	7.5	2.3 3.7	5.2 3.8	1000
50	**28** **36**	1.46 2.08	19.63	6.16 10.18	13.47 9.46	31.30	9.82 16.29	21.55 15.10	11.8	3.7 6.1	8.1 5.6	1200
63	**36** **45**	1.48 2.04	31.17	10.18 15.90	20.99 15.27	49.80	16.29 25.40	33.56 24.41	18.7	6.1 9.5	12.6 9.2	1400
80	**45** **56**	1.46 1.96	50.26	15.90 24.63	34.36 25.63	80.30	25.40 39.30	54.96 40.99	30.2	9.5 14.8	20.7 15.4	1700
100	**56** **70**	1.46 1.96	78.54	24.63 38.48	53.91 40.06	125.00	39.30 61.50	86.22 64.04	47.1	14.8 23.1	32.3 24.0	2000
125	**70** **90**	1.46 2.08	122.72	38.48 63.62	84.24 59.10	196.00	61.50 101.00	134.7 94.49	73.6	23.1 38.2	50.5 35.4	2300
160	**90** **110**	1.46 1.90	201.06	63.62 95.06	137.44 106.00	321.00	101.00 151.00	219.8 169.5	120.6	38.2 57.0	82.4 63.6	2600
200	**110** **140**	1.43 1.96	314.16	95.06 153.96	219.09 160.20	502.60	152.00 246.30	350.6 256.3	188.5	57.0 92.4	131.5 96.1	3000







[1] Theoretical static cylinder force (without consideration of the efficiency and admissible load for attachment parts like e.g. swivel heads, plates or valves, etc.)

[2] Stroke velocity

Tolerances according to ISO 6020-1

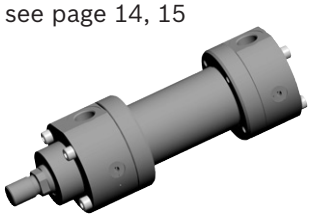
Installation dimensions	WF	W	WC	XC [1]	XO [1]	XS	SS	XV	ZF [1]	ZP [1]	Stroke tolerances in mm
Type of mounting	M00	MF1	MF3	MP3	MP5	MS2	MS2	MT4	MF2	MF4	
Stroke length in mm	Tolerances in mm										
≤ 1250	± 2	± 2	± 2	± 1.5	± 1.5	± 2	± 1.5	± 2	± 1.5	± 1.5	+ 2
> 1250 to ≤ 3000	± 4	± 4	± 4	± 3	± 3	± 4	± 3	± 4	± 3	± 3	+ 5

[1] Not standardized

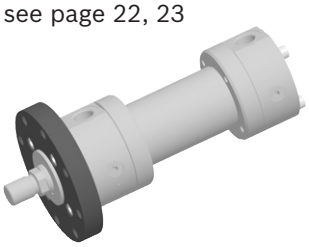
[2] Including stroke length

Overview types of mounting: Series CDM1

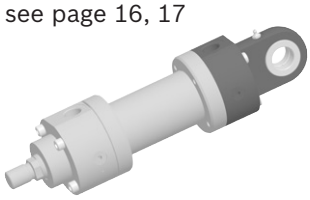
CDM1: M00
see page 14, 15



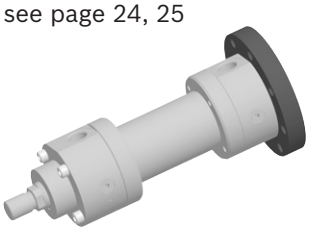
CDM1: MF3
see page 22, 23



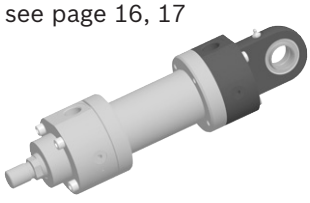
CDM1: MP3
see page 16, 17



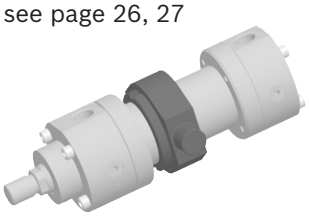
CDM1: MF4
see page 24, 25



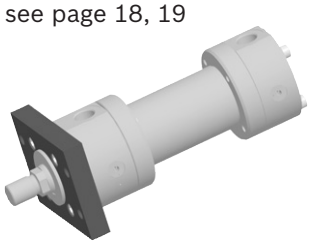
CDM1: MP5
see page 16, 17



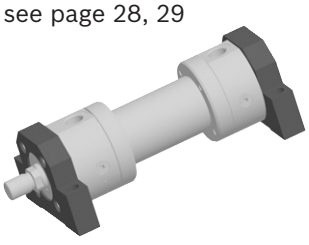
CDM1: MT4
see page 26, 27



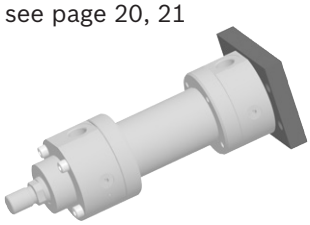
CDM1: MF1
see page 18, 19



CDM1: MS2
see page 28, 29

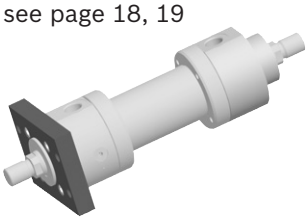


CDM1: MF2
see page 20, 21

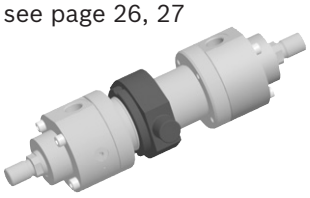


Overview types of mounting: Series CGM1

CGM1: MF1
see page 18, 19

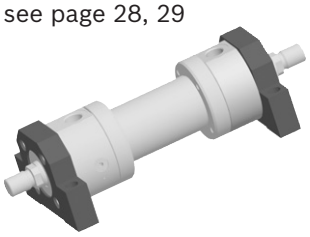


CGM1: MT4
see page 26, 27



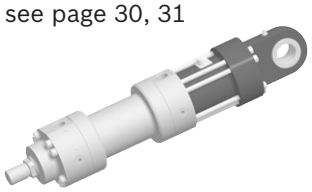
CGM1: MF3
see page 22, 23

CGM1: MS2
see page 28, 29



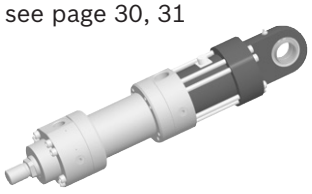
Overview types of mounting: Series CSM1

CSM1: MP3
see page 30, 31



CSM1: MF3
see page 34, 35

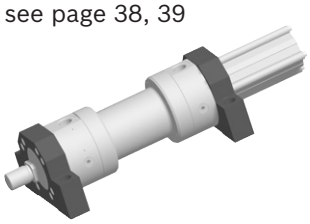
CSM1: MP5
see page 30, 31



CSM1: MT4
see page 36, 37

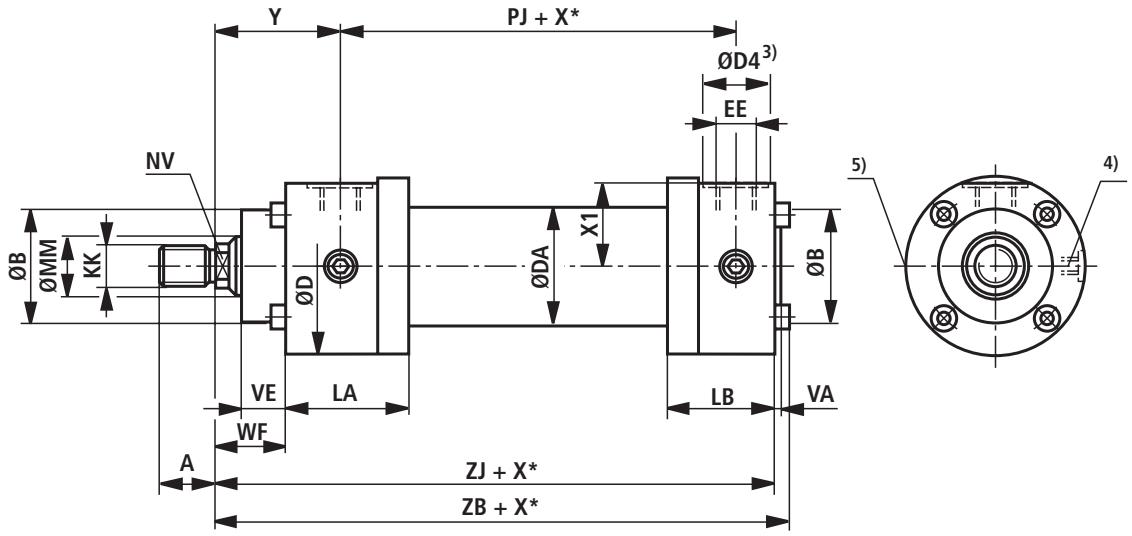
CSM1: MF1
see page 32, 33

CSM1: MS2
see page 38, 39

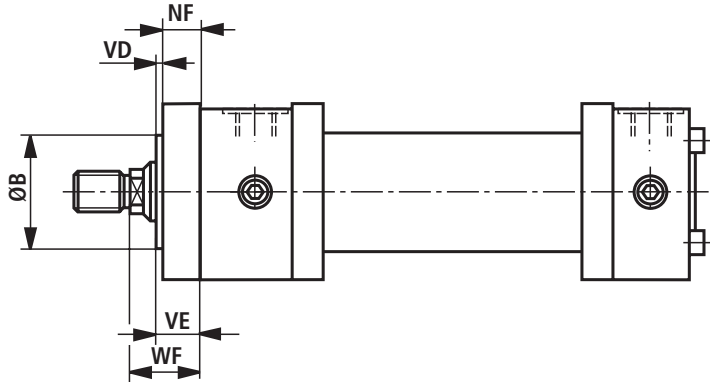


Dimensions CDM1: M00
(dimensions in mm)

CDM1: M00



CDM1: M00...2X/...A: as sleeve design and AL-Ø 50 ... 200 mm



Dimensions CDM1: M00

(dimensions in mm)

ØAL	ØMM	KK[1)] ISO 6020/1	A [1)] ISO 6020/1	KK[2)] VW 39 D 920	A [2)] VW 39 D 920	NV	ØB f8	ØD	ØDA	ØD4 [3; 8)]	EE [8)]	ØD4 [3; 9)]	EE [9)]
25	**14** **18**	M12 x 1.25 M14 x 1.5	16 18	– M12 x 1.25	– 16	12 14	32	56	35	25	G1/4	21	M14x1.5
32	**18** **22**	M14 x 1.5 M16 x 1.5	18 22	– M14 x 1.5	– 18	14 18	40	67	42	28	G3/8	26	M18x1.5
40	**22** **28**	M16 x 1.5 M20 x 1.5	22 28	– M16 x 1.5	– 22	18 22	50	78	50	34	G1/2	29	M22x1.5
50	**28** **36**	M20 x 1.5 M27 x 2	28 36	– M20 x 1.5	– 28	22 30	60	95	60	34	G1/2	29	M22x1.5
63	**36** **45**	M27 x 2 M33 x 2	36 45	– M27 x 2	– 36	30 36	70	116	78	42	G3/4	34	M27x2
80	**45** **56**	M33 x 2 M42 x 2	45 56	– M33 x 2	– 45	36 46	85	130	95	42	G3/4	34	M27x2
100	**56** **70**	M42 x 2 M48 x 2	56 63	– M42 x 2	– 56	46 60	106	158	120	47	G1	43	M33x2
125	**70** **90**	M48 x 2 M64 x 3	63 85	– M48 x 2	– 63	60 75	132	192	150	47	G1	43	M33x2
160	**90** **110**	M64 x 3 M80 x 3	85 95	– M64 x 3	– 85	75 95	160	237	190	58	G1 1/4	52	M42x2
200	**110** **140**	M80 x 3 M100 x 3	95 112	– M80 x 3	– 95	95 120	200	285	230	58	G1 1/4	52	M42x2

ØAL	ØMM	Y	PJ	X1	PI	VE	VD	NF	WF	ZB	ZJ	LA	LB
25	**14** **18**	58	77	26	3	15	–	–	28	156	150	58	43
32	**18** **22**	64	89	30.5	3	19	–	–	32	176	170	62	47
40	**22** **28**	71	97	35.5	3	19	–	–	32	196	190	73	56
50	**28** **36**	72	111	44.5	4	24	4	20	38	213	205	74	62
63	**36** **45**	82	117	54.5	4	29	4	25	45	234	224	84	72
80	**45** **56**	91	134	62.5	4	36	4	32	54	260	250	93	81
100	**56** **70**	108	162	75.5	5	37	5	32	57	310	300	117	96
125	**70** **90**	121	174	92.5	5	37	5	32	60	335	325	143	112
160	**90** **110**	143	191	115.5	8	41	5	36	66	380	370	171	130
200	**110** **140**	190	224	138.5	15	45	5	40	75	466	450	230	151

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends “G” and “K”

2) Thread for piston rod ends “H” and “F”

3) ØD4 recess max. 0.5 mm deep

4) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

5) Throttle valve only with end position cushioning “E” (180° for bleeding)

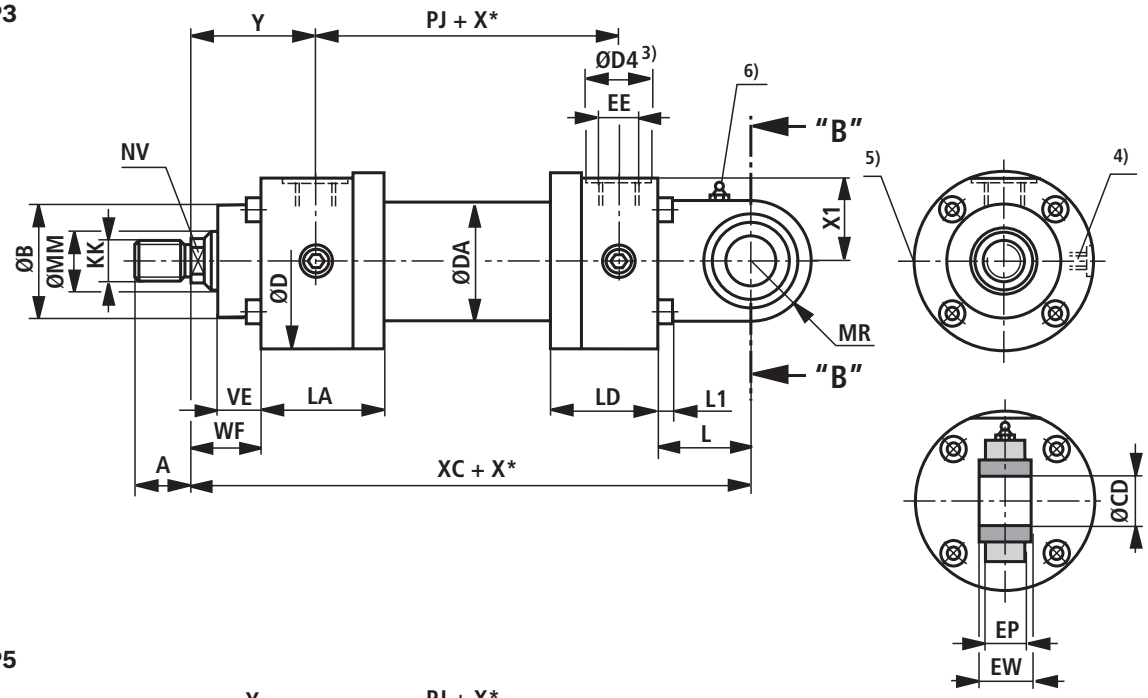
8) Line connection “B”

9) Line connection “R”

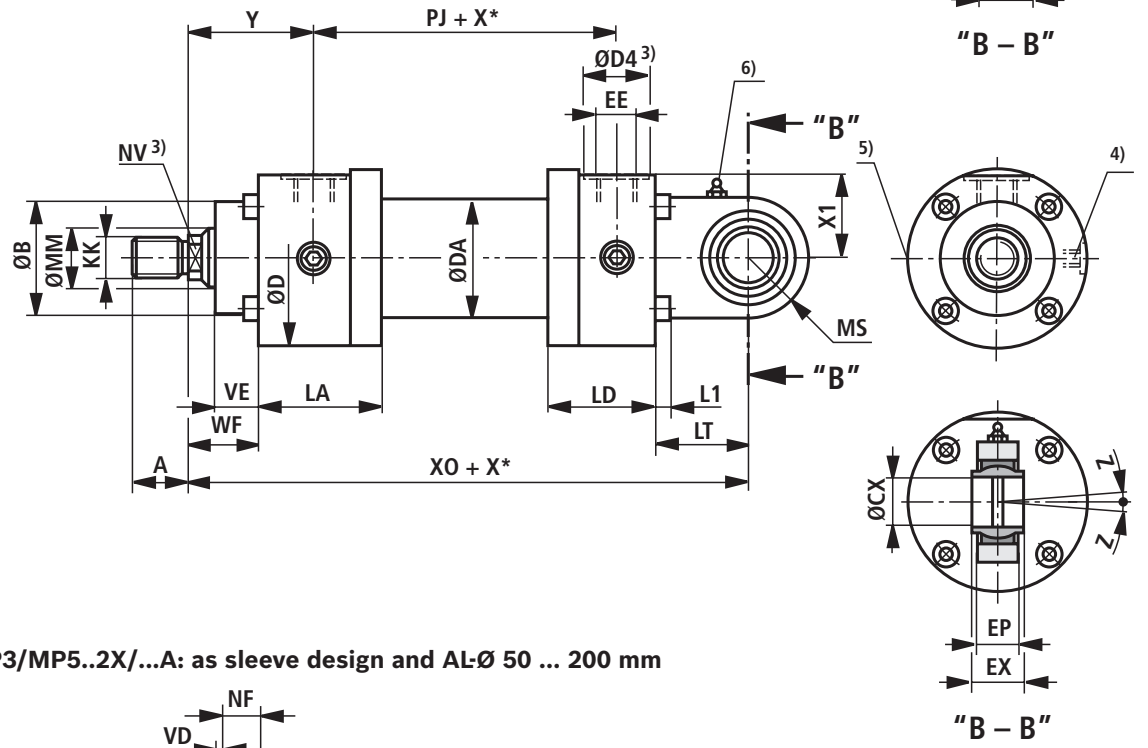
Dimensions CDM1: MP3 / MP5

(dimensions in mm)

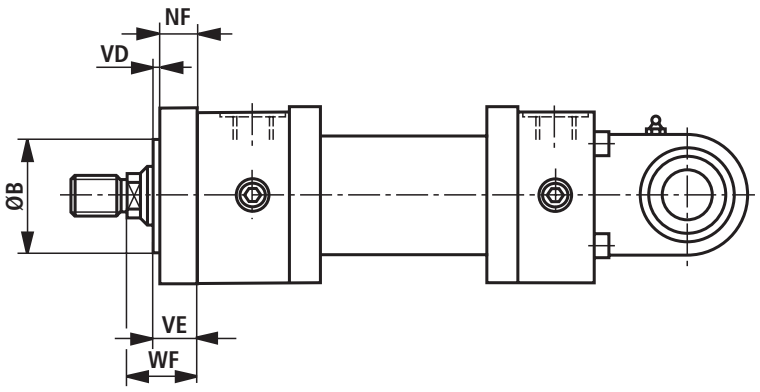
CDM1: MP3



CDM1: MP5



CDM1: MP3/MP5..2X/...A: as sleeve design and AL-Ø 50 ... 200 mm



Dimensions CDM1: MP3 / MP5

(dimensions in mm)

Ø AL	Ø MM	KK[1)] ISO 6020/1	A [1)]	KK[2)] VW 39 D 920	A [2)]	NV	ØB f8	ØD	ØDA	ØD4 3; 8)	EE 8)	ØD4 3; 9)	EE 9)	Y	PJ
25	**14** **18**	M12 x 1.25 M14 x 1.5	16 18	– M12 x 1.25	– 16	12 14	32	56	35	25	G1/4	21	M14x1.5	58	77
32	**18** **22**	M14 x 1.5 M16 x 1.5	18 22	– M14 x 1.5	– 18	14 18	40	67	42	28	G3/8	26	M18x1.5	64	89
40	**22** **28**	M16 x 1.5 M20 x 1.5	22 28	– M16 x 1.5	– 22	18 22	50	78	50	34	G1/2	29	M22x1.5	71	97
50	**28** **36**	M20 x 1.5 M27 x 2	28 36	– M20 x 1.5	– 28	22 30	60	95	60	34	G1/2	29	M22x1.5	72	111
63	**36** **45**	M27 x 2 M33 x 2	36 45	– M27 x 2	– 36	30 36	70	116	78	42	G3/4	34	M27x2	82	117
80	**45** **56**	M33 x 2 M42 x 2	45 56	– M33 x 2	– 45	36 46	85	130	95	42	G3/4	34	M27x2	91	134
100	**56** **70**	M42 x 2 M48 x 2	56 63	– M42 x 2	– 56	46 60	106	158	120	47	G1	43	M33x2	108	162
125	**70** **90**	M48 x 2 M64 x 3	63 85	– M48 x 2	– 63	60 75	132	192	150	47	G1	43	M33x2	121	174
160	**90** **110**	M64 x 3 M80 x 3	85 95	– M64 x 3	– 85	75 95	160	237	190	58	G1 1/4	52	M42x2	143	191
200	**110** **140**	M80 x 3 M100 x 3	95 112	– M80 x 3	– 95	95 120	200	285	230	58	G1 1/4	52	M42x2	190	224

ØAL	MM	X1	VE	WF	NF	VD	XC/XO	CD/CX H9/H7	EP	EW/EX h12	L/LT	MR/MS	LA	LD	L1	Z
25	**14** **18**	26	15	28	–	–	178	12	11	12	25	16	58	46	6	2°
32	**18** **22**	30.5	19	32	–	–	206	16	13	16	33	20	62	50	6	2°
40	**22** **28**	35.5	19	32	–	–	231	20	17	20	38	25	73	59	6	2°
50	**28** **36**	44.5	24	38	20	4	257	25	22	25	48	32	74	66	8	2°
63	**36** **45**	54.5	29	45	25	4	289	32	27	32	61	40	84	76	10	4°
80	**45** **56**	62.5	36	54	32	4	332	40	32	40	78	50	93	85	10	4°
100	**56** **70**	75.5	37	57	32	5	395	50	40	50	90	63	117	101	10	4°
125	**70** **90**	92.5	37	60	32	5	428	63	52	63	98	71	143	117	12	4°
160	**90** **110**	115.5	41	66	36	5	505	80	66	80	127	90	171	138	12	4°
200	**110** **140**	138.5	45	75	40	5	615	100	84	100	150	112	230	166	16	4°

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends “G” and “K”

2) Thread for piston rod ends “H” and “F”

3) ØD4 recess max. 0.5 mm deep

4) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

5) Throttle valve only with end position cushioning “E” (180° for bleeding)

6) Lubricating nipple, cone head form A according to DIN 71412 (with pistons Ø 25 mm bearings cannot be lubricated)

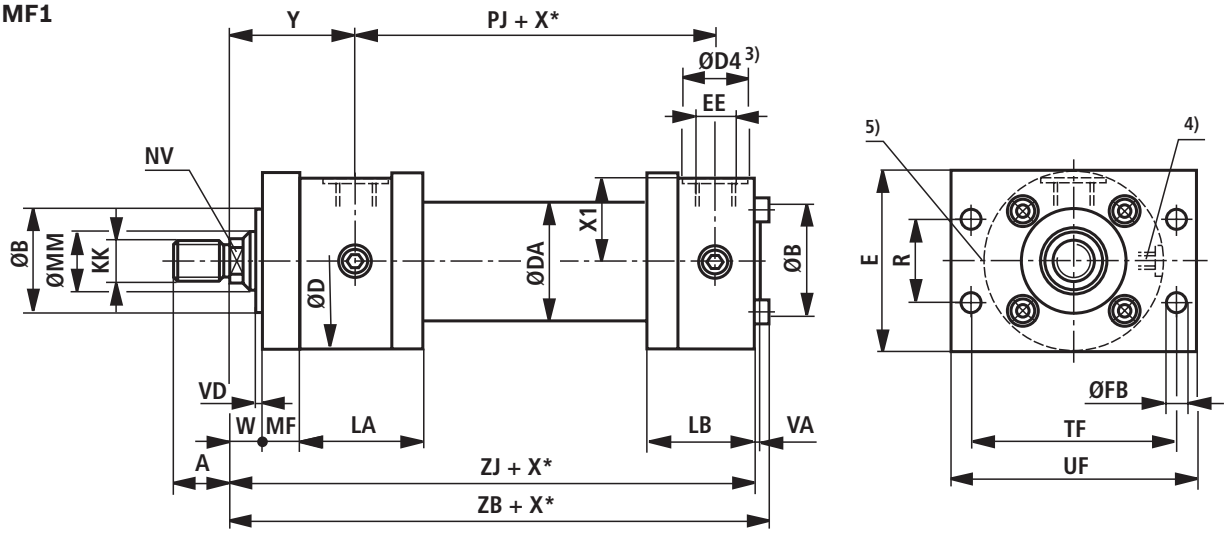
8) Line connection “B”

9) Line connection “R”

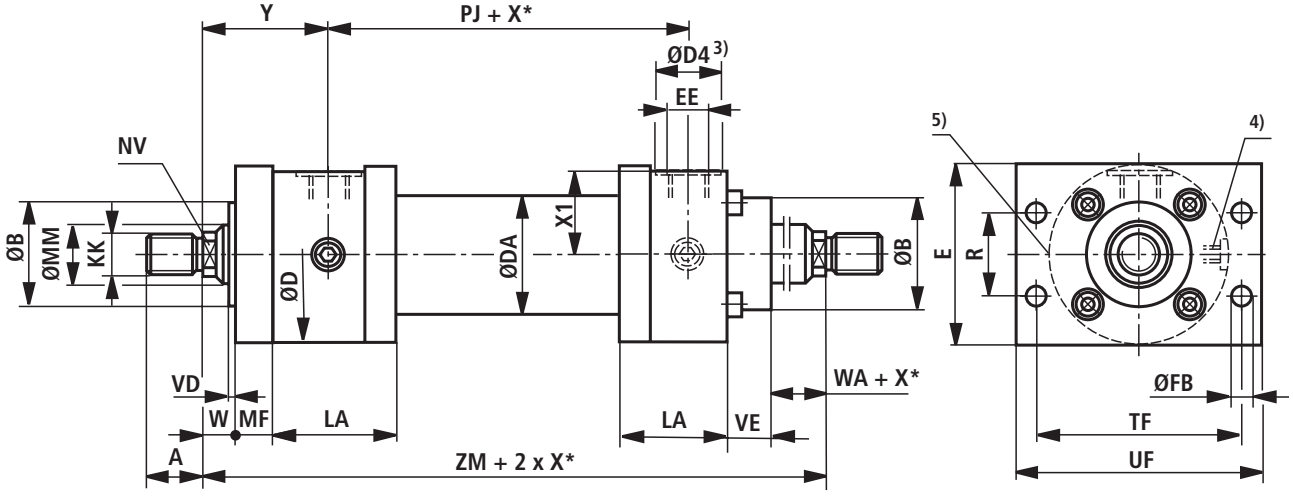
Dimensions CDM1 / CGM1: MF1

(dimensions in mm)

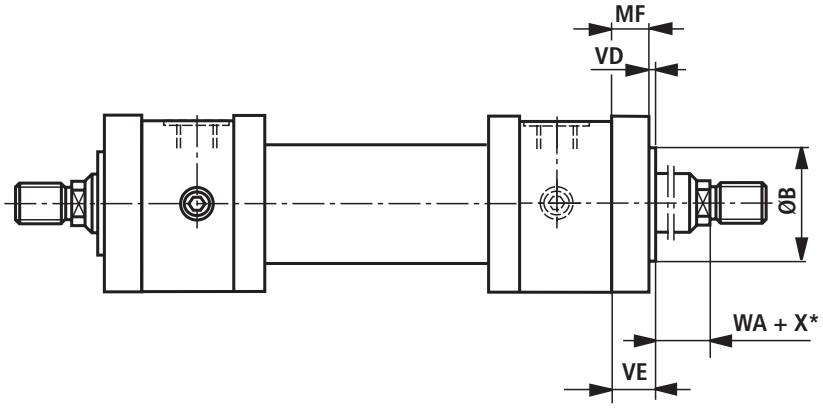
CDM1: MF1



CGM1: MF1



CGM1: MF1..2X/...A: as sleeve design and AL-Ø 50 ... 200 mm



Dimensions CDM1 / CGM1: MF1

(dimensions in mm)

ØAL	ØMM	KK[1)] ISO 6020/1	A [1)] ISO 6020/1	KK[2)] VW 39 D 920	A [2)] VW 39 D 920	NV	ØB f8	ØD	ØDA	ØD4 [3; 8)]	EE [8)]	ØD4 [3; 9)]	EE [9)]	Y	PJ	X1
25	**14** **18**	M12x1.25 M14x1.5	16 18	– M12x1.25	– 16	12 14	32	56	35	25	G1/4	21	M14x1.5	58	77	26
32	**18** **22**	M14x1.5 M16x1.5	18 22	– M14x1.5	– 18	14 18	40	67	42	28	G3/8	26	M18x1.5	64	89	30.5
40	**22** **28**	M16x1.5 M20x1.5	22 28	– M16x1.5	– 22	18 22	50	78	50	34	G1/2	29	M22x1.5	71	97	35.5
50	**28** **36**	M20x1.5 M27x2	28 36	– M20x1.5	– 28	22 30	60	95	60	34	G1/2	29	M22x1.5	72	111	44.5
63	**36** **45**	M27x2 M33x2	36 45	– M27x2	– 36	30 36	70	116	78	42	G3/4	34	M27x2	82	117	54.5
80	**45** **56**	M33x2 M42x2	45 56	– M33x2	– 45	36 46	85	130	95	42	G3/4	34	M27x2	91	134	62.5
100	**56** **70**	M42x2 M48x2	56 63	– M42x2	– 56	46 60	106	158	120	47	G1	43	M33x2	108	162	75.5
125	**70** **90**	M48x2 M64x3	63 85	– M48x2	– 63	60 75	132	192	150	47	G1	43	M33x2	121	174	92.5

ØAL	ØMM	VE	WA	MF	PI	VD	W	ZJ	ZB	ZM	E	R js13	TF js13	UF	ØFB H13	LA	LB
25	**14** **18**	15	13	12	3	3	16	150	156	193	60	28.7	69.2	85	6.6	58	43
32	**18** **22**	19	13	16	3	3	16	170	176	217	70	35.2	85	105	9	62	47
40	**22** **28**	19	13	16	3	3	16	190	196	239	80	40.6	98	115	9	73	56
50	**28** **36**	24	14	20	4	4	18	205	213	255	100	48.2	116.4	140	11	74	62
63	**36** **45**	29	16	25	4	4	20	224	234	281	120	55.5	134	160	13.5	84	72
80	**45** **56**	36	18	32	4	4	22	250	260	316	135	63.1	152.5	185	17.5	93	81
100	**56** **70**	37	20	32	5	5	25	300	310	378	160	76.5	184.8	225	22	117	96
125	**70** **90**	37	23	32	5	5	28	325	335	416	195	90.2	217.1	255	22	143	112

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends “G” and “K”

2) Thread for piston rod ends “H” and “F”

3) ØD4 recess max. 0.5 mm deep

4) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

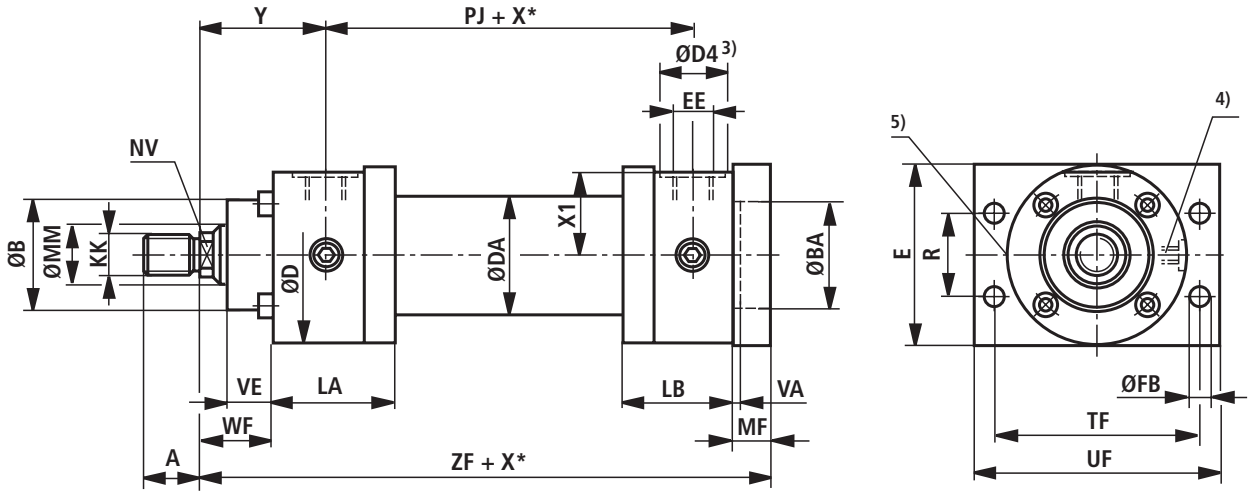
5) Throttle valve only with end position cushioning “E” (180° for bleeding)

8) Line connection “B”

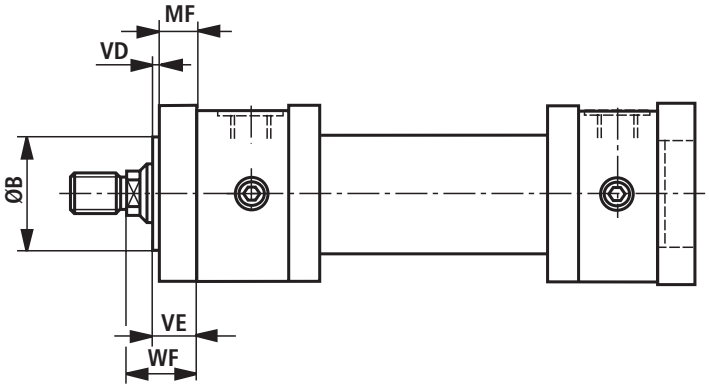
9) Line connection “R”

Dimensions CDM1: MF2
(dimensions in mm)

CDM1: MF2



CDM1: MF2..2X/...A: as sleeve design and AL-Ø 50 ... 200 mm



Dimensions CDM1: MF2

(dimensions in mm)

ØAL	ØMM	KK[1)] ISO 6020/1	A [1)]	KK[2)] VW 39 D 920	A [2)]	NV	ØB f8	ØD	ØDA	ØD4 [3; 8)]	EE [8)]	ØD4 [3; 9)]	EE [9)]	Y	PJ
25	**14** **18**	M12 x 1.25 M14 x 1.5	16 18	– M12 x 1.25	– 16	12 14	32	56	35	25	G1/4	21	M14x1.5	58	77
32	**18** **22**	M14 x 1.5 M16 x 1.5	18 22	– M14 x 1.5	– 18	14 18	40	67	42	28	G3/8	26	M18x1.5	64	89
40	**22** **28**	M16 x 1.5 M20 x 1.5	22 28	– M16 x 1.5	– 22	18 22	50	78	50	34	G1/2	29	M22x1.5	71	97
50	**28** **36**	M20 x 1.5 M27 x 2	28 36	– M20 x 1.5	– 28	22 30	60	95	60	34	G1/2	29	M22x1.5	72	111
63	**36** **45**	M27 x 2 M33 x 2	36 45	– M27 x 2	– 36	30 36	70	116	78	42	G3/4	34	M27x2	82	117
80	**45** **56**	M33 x 2 M42 x 2	45 56	– M33 x 2	– 45	36 46	85	130	95	42	G3/4	34	M27x2	91	134
100	**56** **70**	M42 x 2 M48 x 2	56 63	– M42 x 2	– 56	46 60	106	158	120	47	G1	43	M33x2	108	162
125	**70** **90**	M48 x 2 M64 x 3	63 85	– M48 x 2	– 63	60 75	132	192	150	47	G1	43	M33x2	121	174

ØAL	ØMM	X1	WF	MF	PI	VE	VD	ØBA H8	ZF	E	R js13	TF js13	UF	ØFB H13	LA	LB
25	**14** **18**	26	28	12	3	15	–	32	162	60	28.7	69.2	85	6.6	58	43
32	**18** **22**	30.5	32	16	3	19	–	40	186	70	35.2	85	105	9	62	47
40	**22** **28**	35.5	32	16	3	19	–	50	206	80	40.6	98	115	9	73	56
50	**28** **36**	44.5	38	20	4	24	4	60	225	100	48.2	116.4	140	11	74	62
63	**36** **45**	54.5	45	25	4	29	4	70	249	120	55.5	134	160	13.5	84	72
80	**45** **56**	62.5	54	32	4	36	4	85	282	135	63.1	152.5	185	17.5	93	81
100	**56** **70**	75.5	57	32	5	37	5	106	332	160	76.5	184.8	225	22	117	96
125	**70** **90**	92.5	60	32	5	37	5	132	357	195	90.2	217.1	255	22	143	112

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends “G” and “K”

2) Thread for piston rod ends “H” and “F”

3) ØD4 recess max. 0.5 mm deep

4) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

5) Throttle valve only with end position cushioning “E” (180° for bleeding)

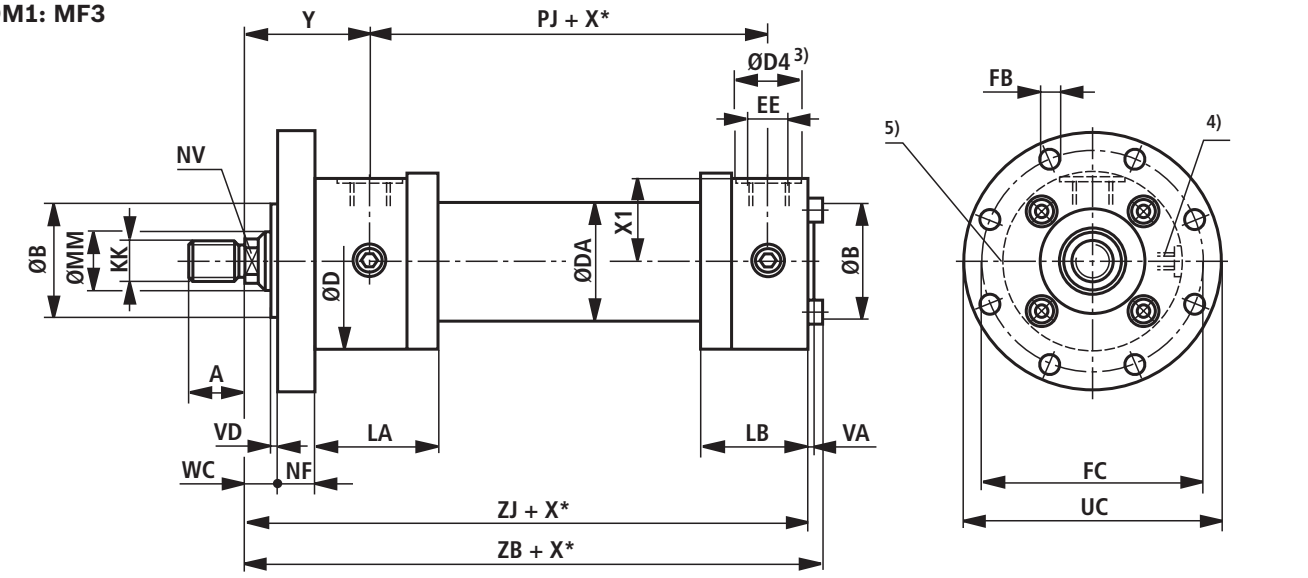
8) Line connection “B”

9) Line connection “R”

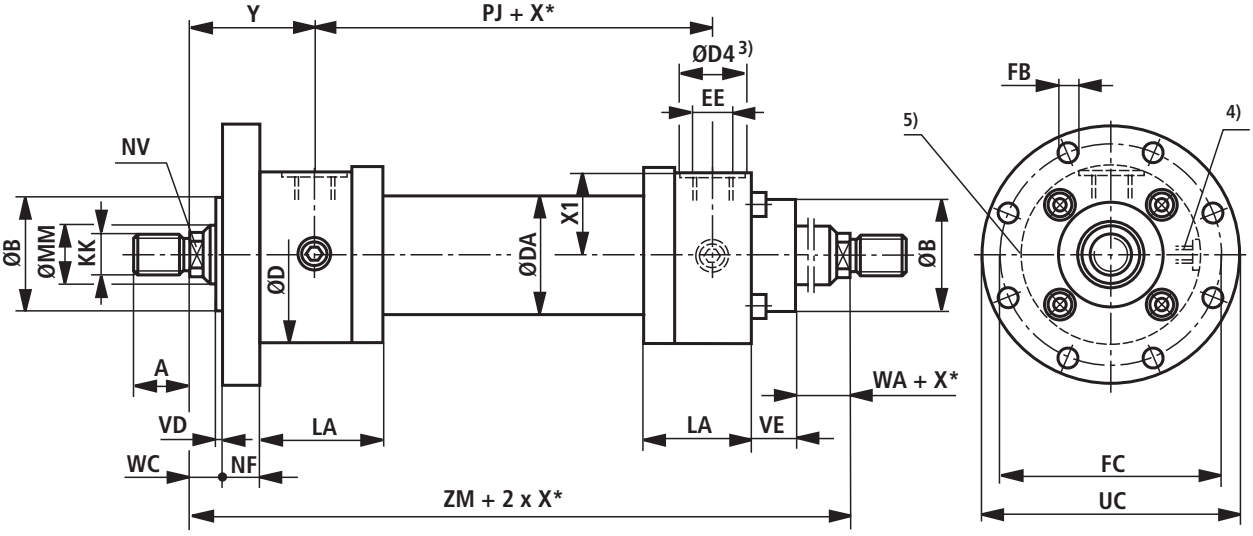
Dimensions CDM1 / CGM1: MF3

(dimensions in mm)

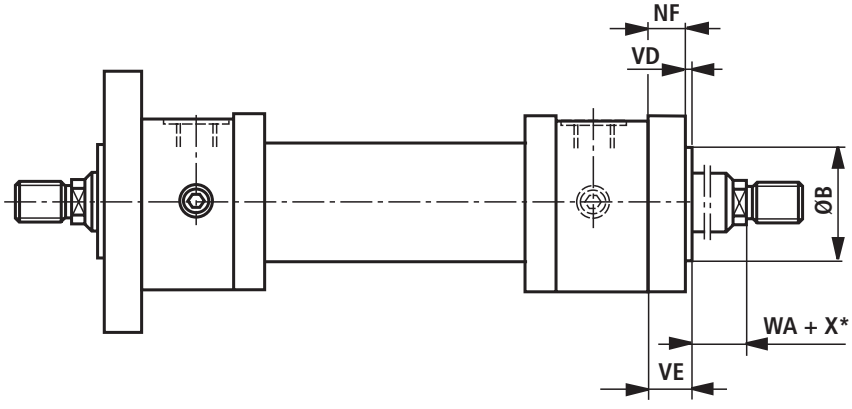
CDM1: MF3



CGM1: MF3



CGM1: MF3..2X/...A: as sleeve design and AL-Ø 50 ... 200 mm



Dimensions CDM1 / CGM1: MF3

(dimensions in mm)

ØAL	ØMM	KK[1)] ISO 6020/1	A[1)]	KK[2)] VW 39 D 920	A[2)]	NV	ØB f8	ØD	ØDA	ØD4 [3; 8)]	EE [8)]	ØD4 [3; 9)]	EE [9)]	Y	PJ
25	**14** **18**	M12x1.25 M14x1.5	16 18	– M12x1.25	– 16	12 14	32	56	35	25	G1/4	21	M14x1.5	58	77
32	**18** **22**	M14x1.5 M16x1.5	18 22	– M14x1.5	– 18	14 18	40	67	42	28	G3/8	26	M18x1.5	64	89
40	**22** **28**	M16x1.5 M20x1.5	22 28	– M16x1.5	– 22	18 22	50	78	50	34	G1/2	29	M22x1.5	71	97
50	**28** **36**	M20x1.5 M27x2	28 36	– M20x1.5	– 28	22 30	60	95	60	34	G1/2	29	M22x1.5	72	111
63	**36** **45**	M27x2 M33x2	36 45	– M27x2	– 36	30 36	70	116	78	42	G3/4	34	M27x2	82	117
80	**45** **56**	M33x2 M42x2	45 56	– M33x2	– 45	36 46	85	130	95	42	G3/4	34	M27x2	91	134
100	**56** **70**	M42x2 M48x2	56 63	– M42x2	– 56	46 60	106	158	120	47	G1	43	M33x2	108	162
125	**70** **90**	M48x2 M64x3	63 85	– M48x2	– 63	60 75	132	192	150	47	G1	43	M33x2	121	174
160	**90** **110**	M64x3 M80x3	85 95	– M64x3	– 85	75 95	160	237	190	58	G1 1/4	52	M42x2	143	191
200	**110** **140**	M80x3 M100x3	95 112	– M80x3	– 95	95 120	200	285	230	58	G1 1/4	52	M42x2	190	224

ØAL	ØMM	X1	VE	WA	NF	PI	VD	WC	ZJ	ZB	ZM	ØFC js13	ØUC –1	ØFB H13	LA	LB
25	**14** **18**	26	15	13	12	3	3	16	150	156	193	75	90	6.6	58	43
32	**18** **22**	30.5	19	13	16	3	3	16	170	176	217	92	110	9	62	47
40	**22** **28**	35.5	19	13	16	3	3	16	190	196	239	106	125	9	73	56
50	**28** **36**	44.5	24	14	20	4	4	18	205	213	255	126	150	11	74	62
63	**36** **45**	54.5	29	16	25	4	4	20	224	234	281	145	170	13.5	84	72
80	**45** **56**	62.5	36	18	32	4	4	22	250	260	316	165	195	17.5	93	81
100	**56** **70**	75.5	37	20	32	5	5	25	300	310	378	200	240	22	117	96
125	**70** **90**	92.5	37	23	32	5	5	28	325	335	416	235	275	22	143	112
160	**90** **110**	115.5	41	25	36	8	5	30	370	380	477	280	320	22	171	130
200	**110** **140**	138.5	45	30	40	15	5	35	450	466	604	340	385	26	230	151

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends “G” and “K”

2) Thread for piston rod ends “H” and “F”

3) ØD4 recess max. 0.5 mm deep

4) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

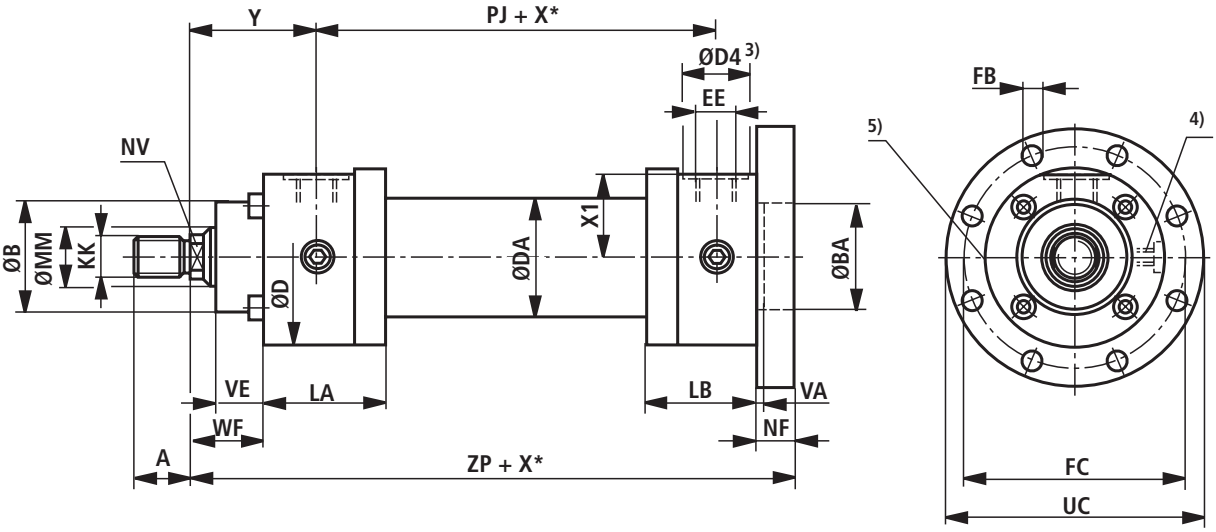
5) Throttle valve only with end position cushioning “E” (180° for bleeding)

8) Line connection “B”

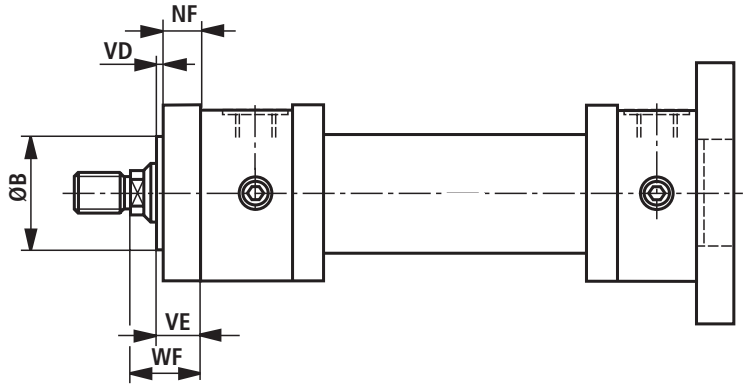
9) Line connection “R”

Dimensions CDM1: MF4
(dimensions in mm)

CDM1: MF4



CDM1: MF4..2X/...A: as sleeve design and AL-Ø 50 ... 200 mm



Dimensions CDM1: MF4

(dimensions in mm)

AL Ø	MM Ø	KK[1] ISO 6020/1	A[1]	KK[2] VW 39 D 920	A[2]	NV	ØD	ØDA	ØD4 3; 8)	EE 8)	ØD4 3; 9)	EE 9)	Y	PJ
25	**14** **18**	M12x1.25 M14x1.5	16 18	– M12x1.25	– 16	12 14	56	35	25	G1/4	21	M14x1.5	58	77
32	**18** **22**	M14x1.5 M16x1.5	18 22	– M14x1.5	– 18	14 18	67	42	28	G3/8	26	M18x1.5	64	89
40	**22** **28**	M16x1.5 M20x1.5	22 28	– M16x1.5	– 22	18 22	78	50	34	G1/2	29	M22x1.5	71	97
50	**28** **36**	M20x1.5 M27x2	28 36	– M20x1.5	– 28	22 30	95	60	34	G1/2	29	M22x1.5	72	111
63	**36** **45**	M27x2 M33x2	36 45	– M27x2	– 36	30 36	116	78	42	G3/4	34	M27x2	82	117
80	**45** **56**	M33x2 M42x2	45 56	– M33x2	– 45	36 46	130	95	42	G3/4	34	M27x2	91	134
100	**56** **70**	M42x2 M48x2	56 63	– M42x2	– 56	46 60	158	120	47	G1	43	M33x2	108	162
125	**70** **90**	M48x2 M64x3	63 85	– M48x2	– 63	60 75	192	150	47	G1	43	M33x2	121	174
160	**90** **110**	M64x3 M80x3	85 95	– M64x3	– 85	75 95	237	190	58	G1 1/4	52	M42x2	143	191
200	**110** **140**	M80x3 M100x3	95 112	– M80x3	– 95	95 120	285	230	58	G1 1/4	52	M42x2	190	224

ØAL	ØMM	X1	WF	NF	PI	VE	VD	ØB/BA f8/H8	ZP	ØFC js13	ØUC –1	ØFB H13	LA	LB
25	**14** **18**	26	28	12	3	15	–	32	162	75	90	6.6	58	43
32	**18** **22**	30.5	32	16	3	19	–	40	186	92	110	9	62	47
40	**22** **28**	35.5	32	16	3	19	–	50	206	106	125	9	73	56
50	**28** **36**	44.5	38	20	4	24	4	60	225	126	150	11	74	62
63	**36** **45**	54.5	45	25	4	29	4	70	249	145	170	13.5	84	72
80	**45** **56**	62.5	54	32	4	36	4	85	282	165	195	17.5	93	81
100	**56** **70**	75.5	57	32	5	37	5	106	332	200	240	22	117	96
125	**70** **90**	92.5	60	32	5	37	5	132	357	235	275	22	143	112
160	**90** **110**	115.5	66	36	8	41	5	160	406	280	320	22	171	130
200	**110** **140**	138.5	75	40	15	45	5	200	490	340	385	26	230	151

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends “G” and “K”

2) Thread for piston rod ends “H” and “F”

3) ØD4 recess max. 0.5 mm deep

4) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

5) Throttle valve only with end position cushioning “E” (180° for bleeding)

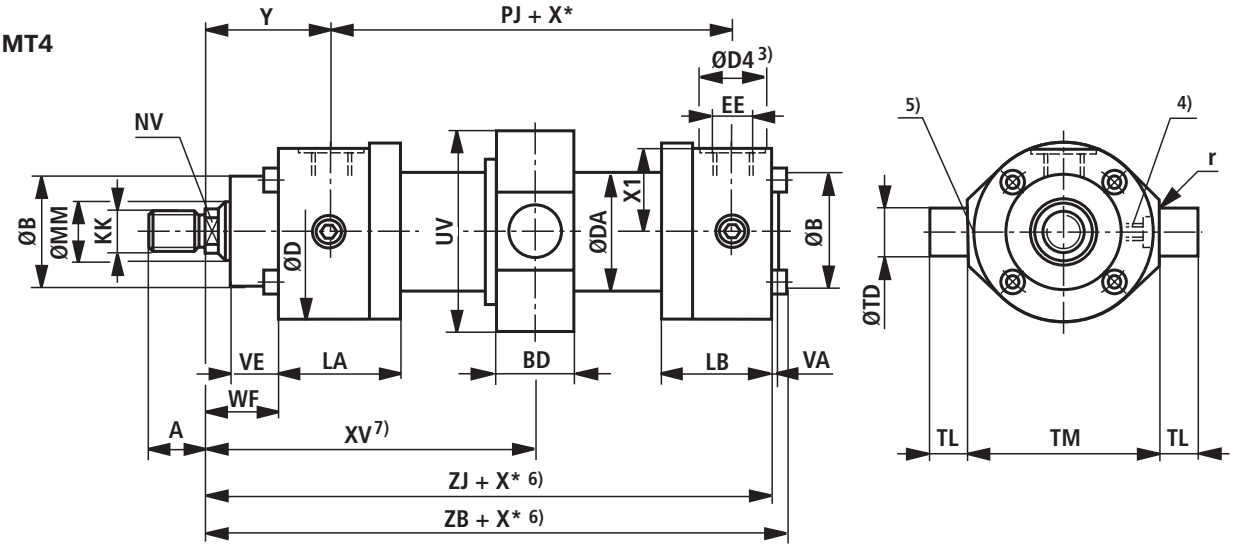
8) Line connection “B”

9) Line connection “R”

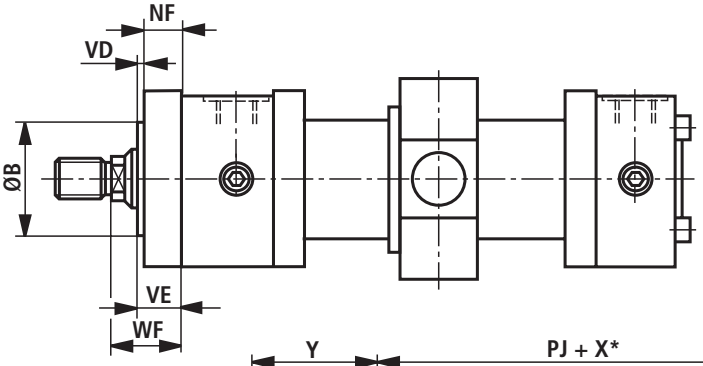
Dimensions CDM1 / CGM1: MT4

(dimensions in mm)

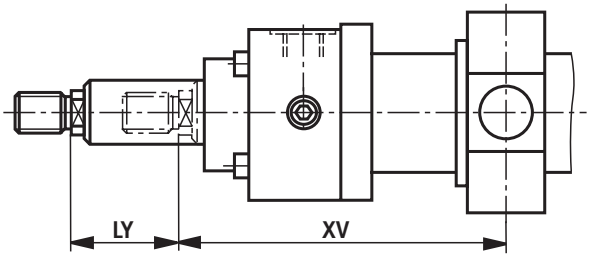
CDM1: MT4



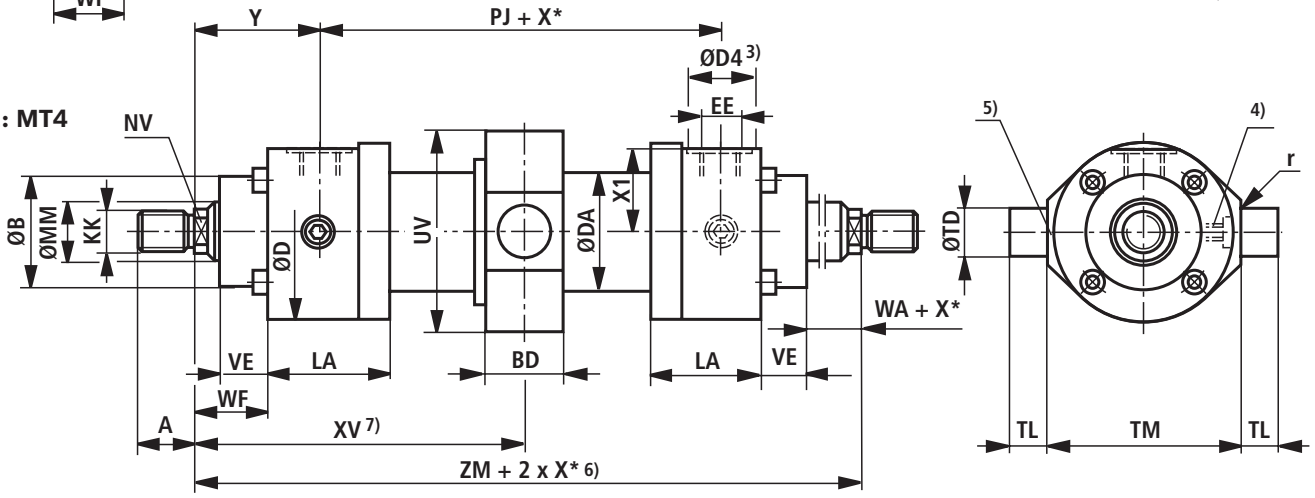
CDM1: MT4..2X/...A: as sleeve design and AL-Ø 50 ... 200 mm



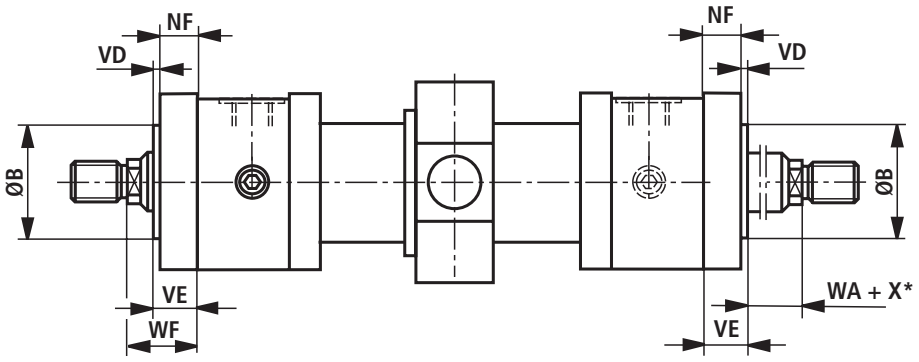
Dimensions for cylinder with piston rod extension "LY" in retracted condition



CGM1: MT4



CGM1: MT4..2X/...A: as sleeve design and AL-Ø 50 ... 200 mm



Dimensions CDM1 / CGM1: MT4

(dimensions in mm)

AL Ø	MM Ø	KK[1)] ISO 6020/1	A [1)] ISO 6020/1	KK[2)] VW 39 D 920	A [2)] VW 39 D 920	NV	ØB f8	ØD	ØDA	ØD4 3); 8)	EE 8)	ØD4 3); 9)	EE 9)	Y	PJ	X1	VE
25	**14** **18**	M12x1.25 M14x1.5	16 18	– M12x1.25	– 16	12 14	32	56	35	25	G1/4	21	M14x1.5	58	77	26	15
32	**18** **22**	M14x1.5 M16x1.5	18 22	– M14x1.5	– 18	14 18	40	67	42	28	G3/8	26	M18x1.5	64	89	30.5	19
40	**22** **28**	M16x1.5 M20x1.5	22 28	– M16x1.5	– 22	18 22	50	78	50	34	G1/2	29	M22x1.5	71	97	35.5	19
50	**28** **36**	M20x1.5 M27x2	28 36	– M20x1.5	– 28	22 30	60	95	60	34	G1/2	29	M22x1.5	72	111	44.5	24
63	**36** **45**	M27x2 M33x2	36 45	– M27x2	– 36	30 36	70	116	78	42	G3/4	34	M27x2	82	117	54.5	29
80	**45** **56**	M33x2 M42x2	45 56	– M33x2	– 45	36 46	85	130	95	42	G3/4	34	M27x2	91	134	62.5	36
100	**56** **70**	M42x2 M48x2	56 63	– M42x2	– 56	46 60	106	158	120	47	G1	43	M33x2	108	162	75.5	37
125	**70** **90**	M48x2 M64x3	63 85	– M48x2	– 63	60 75	132	192	150	47	G1	43	M33x2	121	174	92.5	37
160	**90** **110**	M64x3 M80x3	85 95	– M64x3	– 85	75 95	160	237	190	58	G1 1/4	52	M42x2	143	191	115.5	41
200	**110** **140**	M80x3 M100x3	95 112	– M80x3	– 95	95 120	200	285	230	58	G1 1/4	52	M42x2	190	224	138.5	45

AL Ø	MM Ø	WF	WA	NF	PI	VD	ZJ	ZB	ZM	BD	UV 10)	r	ØTD f8	TL js13	TM h12	XV [7)] min.	XV [7)] max.	X* [6)] min.	LA	LB
25	**14** **18**	28	13	–	3	–	150	156	193	19	58	0.8	12	10	63	107.5	93.5+X*	22	58	43
32	**18** **22**	32	13	–	3	–	170	176	217	24	67	0.8	16	12	75	118	107+X*	19	62	47
40	**22** **28**	32	13	–	3	–	190	196	239	28	78	1	20	16	90	131	116+X*	23	73	56
50	**28** **36**	38	14	20	4	4	205	213	255	33	95	1	25	20	105	141.5	122.5+X*	28	74	62
63	**36** **45**	45	16	25	4	4	224	234	281	38	116	1.5	32	25	120	164	129+X*	47	84	72
80	**45** **56**	54	18	32	4	4	250	260	316	53	130	2	40	32	135	189.5	138.5+X*	63	93	81
100	**56** **70**	57	20	32	5	5	300	310	378	68	158	2	50	40	160	224	166+X*	70	117	96
125	**70** **90**	60	23	32	5	5	325	335	416	78	210	2.5	63	50	195	261	170+X*	106	143	112
160	**90** **110**	66	25	36	8	5	370	380	477	118	250	3	80	63	240	320	177+X*	163	171	130
200	**110** **140**	75	30	40	15	5	450	466	604	148	300	3	100	80	295	403	221+X*	202	230	151

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends “G” and “K”

2) Thread for piston rod ends “H” and “F”

3) ØD4 recess max. 0.5 mm deep

4) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

5) Throttle valve only with end position cushioning “E” (180° for bleeding)

6) Observe the min. stroke length “$X^*_{min.}$”

7) When ordering, always specify the “XV” dimension in the plain text ($XV_{min.}$ and $XV_{max.}$)

8) Line connection “B”

9) Line connection “R”

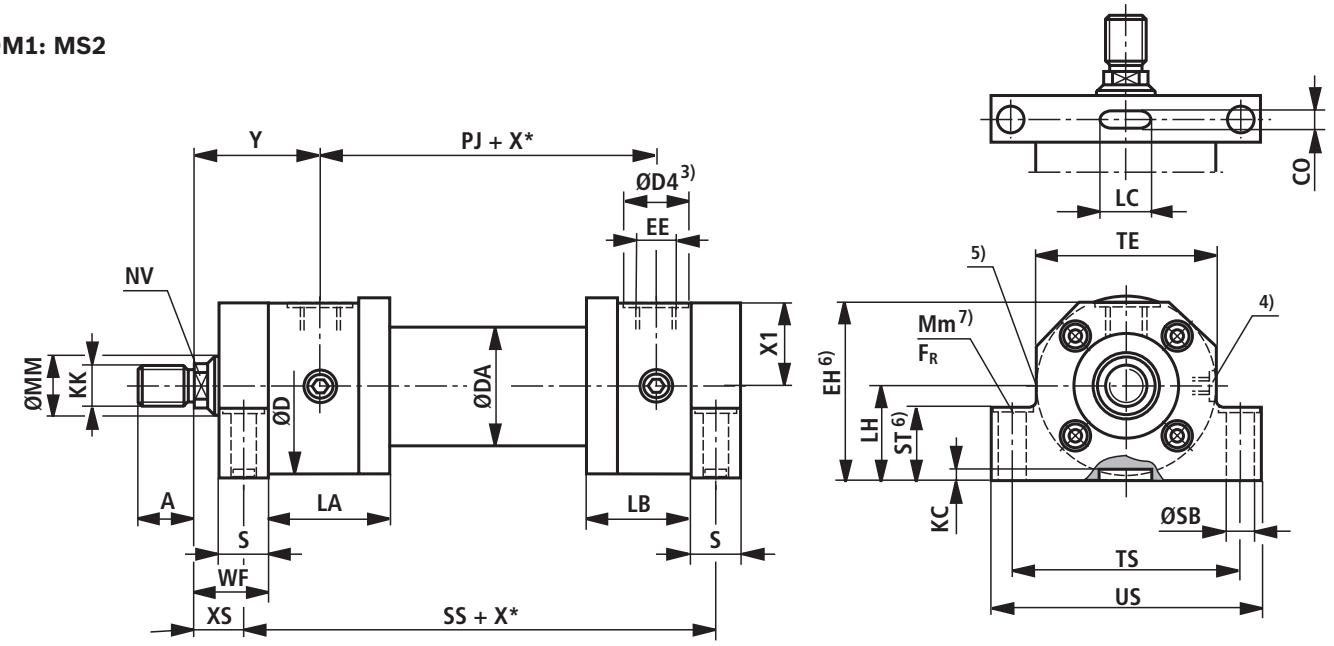
10) Tolerance according to EN ISO 9013: Thermal cutting

Note: Replacement cylinder for series 1X
In the event of an exchange to series 2X, the bearing blocks (trunnions) must also be replaced!
Comply with $XV_{min.}$, $XV_{max.}$ and $X^*_{min.}$!

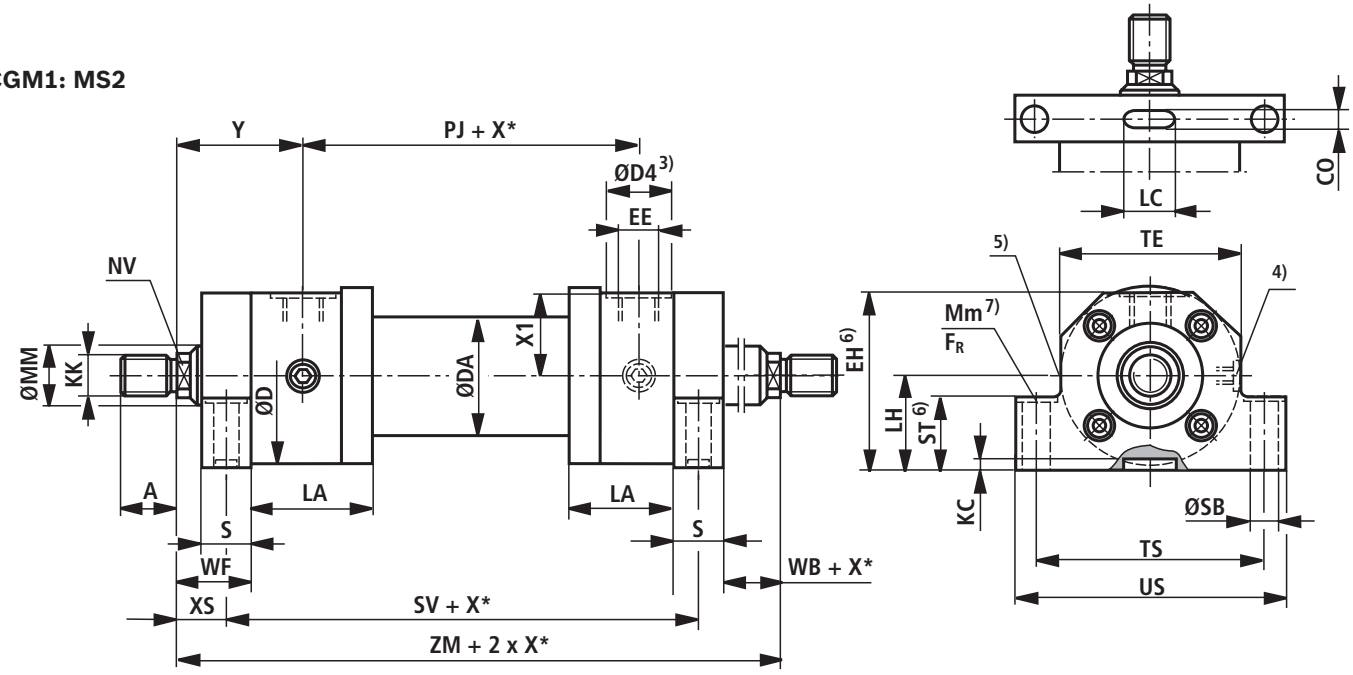
Dimensions CDM1 / CGM1: MS2

(dimensions in mm)

CDM1: MS2



CGM1: MS2



ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends “G” and “K”

2) Thread for piston rod ends “H” and “F”

3) ØD4 recess max. 0.5 mm deep

4) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

5) Throttle valve only with end position cushioning “E” (180° for bleeding)

6) Specified dimensions are smaller than the max. dimensions in ISO 6020/1

7) Recess max. 2 mm deep, for hexagon socket head cap screws according to ISO 4762

The mounting screws must not be subjected to shear force. The mounting screws according to ISO 4762 (property class 10.9) must be tightened with the specified torque M_m.

If the calculated frictional force F_R is lower than the maximum cylinder force, a key must be used on the head.

Calculation basis:

- The specified frictional force F_R refers to a friction factor of 0.2 (steel / steel)
- Foot on the head side as fixed bearing
- Foot on the base side as floating bearing

8) Line connection “B”

9) Line connection “R”

Dimensions CDM1 / CGM1: MS2

(dimensions in mm)

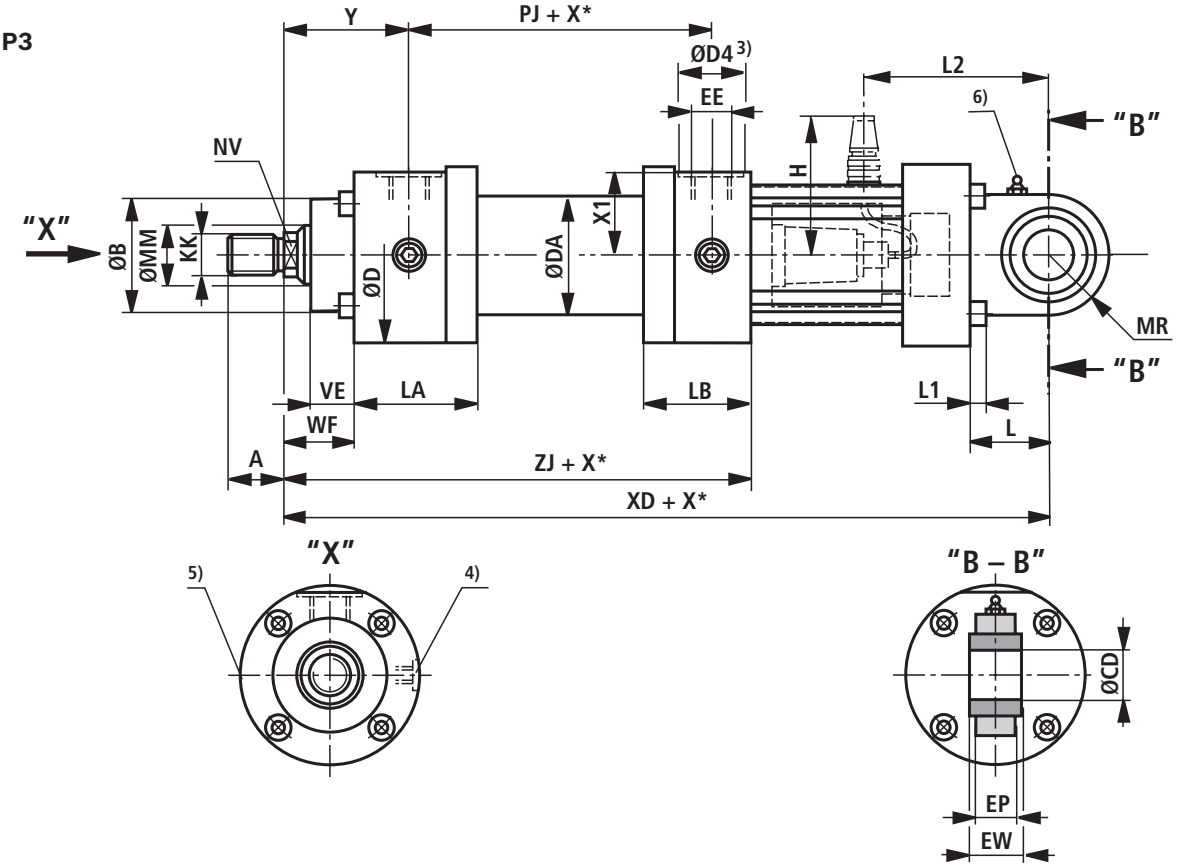
AL Ø	MM Ø	KK[1)] ISO 6020/1	A [1)] ISO 6020/1	KK[2)] VW 39 D 920	A [2)] VW 39 D 920	NV	ØD	ØDA	ØD4 3; 8)	EE 8)	ØD4 3; 9)	EE 9)	Y	PJ	X1	WF	WB
25	**14** **18**	M12x1.25 M14x1.5	16 18	– M12x1.25	– 16	12 14	56	35	25	G1/4	21	M14x1.5	58	77	26	28	8
32	**18** **22**	M14x1.5 M16x1.5	18 22	– M14x1.5	– 18	14 18	67	42	28	G3/8	26	M18x1.5	64	89	30.5	32	7
40	**22** **28**	M16x1.5 M20x1.5	22 28	– M16x1.5	– 22	18 22	78	50	34	G1/2	29	M22x1.5	71	97	35.5	32	7
50	**28** **36**	M20x1.5 M27x2	28 36	– M20x1.5	– 28	22 30	95	60	34	G1/2	29	M22x1.5	72	111	44.5	38	6
63	**36** **45**	M27x2 M33x2	36 45	– M27x2	– 36	30 36	116	78	42	G3/4	34	M27x2	82	117	54.5	45	13
80	**45** **56**	M33x2 M42x2	45 56	– M33x2	– 45	36 46	130	95	42	G3/4	34	M27x2	91	134	62.5	54	14
100	**56** **70**	M42x2 M48x2	56 63	– M42x2	– 56	46 60	158	120	47	G1	43	M33x2	108	162	75.5	57	7
125	**70** **90**	M48x2 M64x3	63 85	– M48x2	– 63	60 75	192	150	47	G1	43	M33x2	121	174	92.5	60	4
160	**90** **110**	M64x3 M80x3	85 95	– M64x3	– 85	75 95	237	190	58	G1 1/4	52	M42x2	143	191	115.5	66	6
200	**110** **140**	M80x3 M100x3	95 112	– M80x3	– 95	95 120	285	230	58	G1 1/4	52	M42x2	190	224	138.5	75	3

AL Ø	MM Ø	XS	SS	SV	CO N9	LC +0.5	ZM	KC +0.5	EH [6)] –1	LH h10	S js13	ØSB H13	ST [6)]	TE	TS js13	US –1	LA	LB	FR [7)] kN	Mm [7)] Nm
25	**14** **18**	18	142	157	6	25	193	3.5	57	32	20	9	24	56	75	92	58	43	4.90	30
32	**18** **22**	19.5	163	178	8	36	217	4	67	38	25	11	32	67	90	110	62	47	7.90	60
40	**22** **28**	19.5	183	200	8	36	239	4	77.5	43	25	11	32	78	100	120	73	56	7.90	60
50	**28** **36**	22	199	211	10	40	255	4.5	95	52	32	14	42	95	120	145	74	62	11.10	100
63	**36** **45**	29	211	223	10	40	281	4.5	113	62	32	18	50	116	150	180	84	72	21.15	250
80	**45** **56**	34	236	248	14	63	316	5	129	70	40	22	60	130	170	210	93	81	33.35	490
100	**56** **70**	32	293	314	16	70	378	6	153	82	50	26	70	158	205	250	117	96	48.30	850
125	**70** **90**	32	321	352	18	80	416	6	190	100	56	33	80	192	245	300	143	112	77.80	1710
160	**90** **110**	36	364	405	22	125	477	8	232	119	60	33	90	238	295	350	171	130	77.80	1710
200	**110** **140**	39	447	526	28	160	604	9	282	145	72	39	110	285	350	415	230	151	113.25	2970

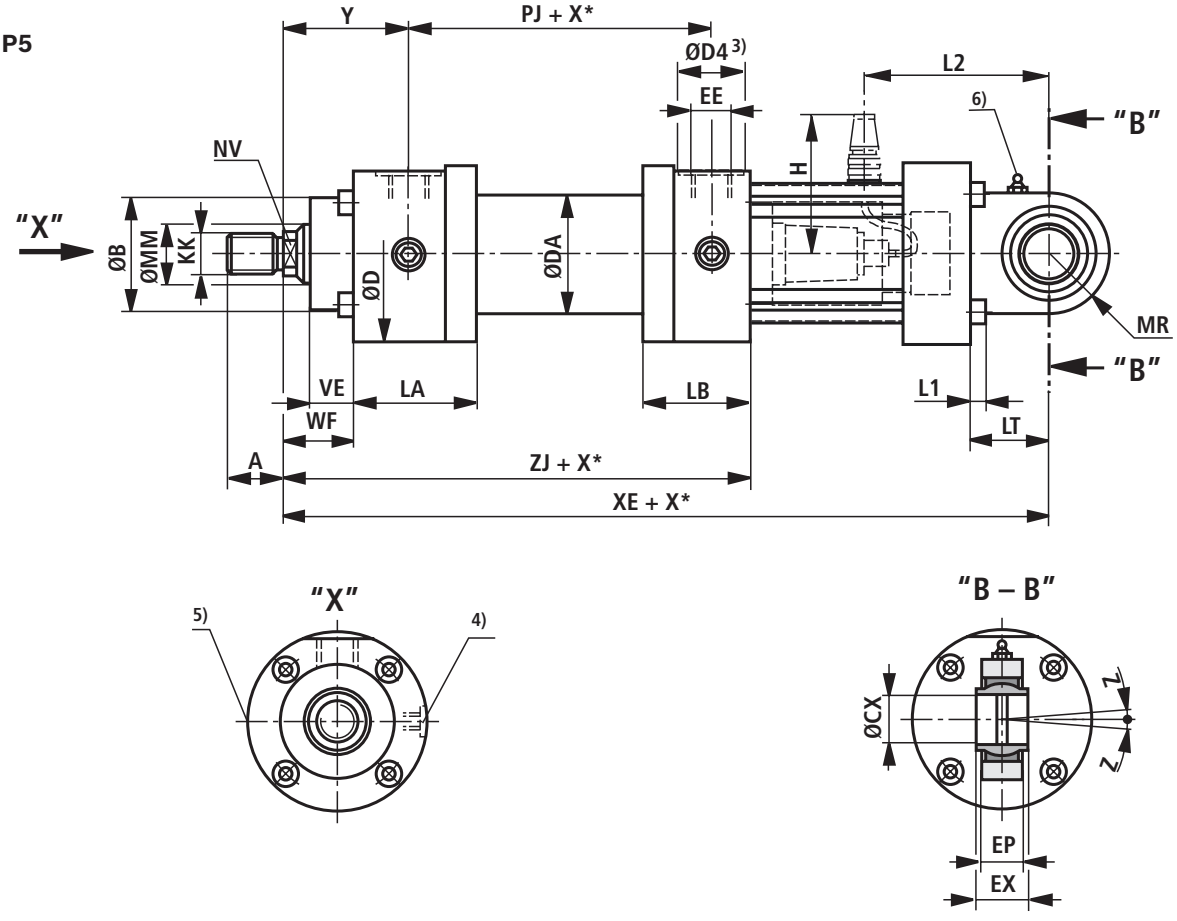
Dimensions CSM1: MP3 / MP5

(dimensions in mm)

CSM1: MP3



CSM1: MP5



Dimensions CSM1: MP3 / MP5

(dimensions in mm)

ØAL	ØMM	KK[1)] ISO 6020/1	A [1)] ISO 6020/1	KK[2)] VW 39 D 920	A [2)] VW 39 D 920	NV	ØB f8	ØD	ØDA	ØD4 [3; 8)]	EE [8)]	ØD4 [3; 9)]	EE [9)]	Y	PJ
40	**28**	M20x1.5	28	M16x1.5	22	22	50	78	50	34	G1/2	29	M22x1.5	71	97
50	**28** **36**	M20x1.5 M27x2	28 36	– M20x1.5	– 28	22 30	60	95	60	34	G1/2	29	M22x1.5	72	111
63	**36** **45**	M27x2 M33x2	36 45	– M27x2	– 36	30 36	70	116	78	42	G3/4	34	M27x2	82	117
80	**45** **56**	M33x2 M42x2	45 56	– M33x2	– 45	36 46	85	130	95	42	G3/4	34	M27x2	91	134
100	**56** **70**	M42x2 M48x2	56 63	– M42x2	– 56	46 60	106	158	120	47	G1	43	M33x2	108	162
125	**70** **90**	M48x2 M64x3	63 85	– M48x2	– 63	60 75	132	192	150	47	G1	43	M33x2	121	174
160	**90** **110**	M64x3 M80x3	85 95	– M64x3	– 85	75 95	160	237	190	58	G1 1/4	52	M42x2	143	191
200	**110** **140**	M80x3 M100x3	95 112	– M80x3	– 95	95 120	200	285	230	58	G1 1/4	52	M42x2	190	224

ØAL	ØMM	X1	VE	WF	ZJ	XD/XE	CD/CX H9/H7	EP	EW/EX h12	L/LT	L1	MR/MS	H	L2	LA	LB	Z
40	**28**	35.5	19	32	190	381	20	17	20	38	6	25	110	102	73	56	2°
50	**28** **36**	44.5	24	38	205	407	25	22	25	48	8	32	120	120	74	62	2°
63	**36** **45**	54.5	29	45	224	439	32	27	32	61	10	40	130	138	84	72	4°
80	**45** **56**	62.5	36	54	250	482	40	32	40	78	10	50	120	165	93	81	4°
100	**56** **70**	75.5	37	57	300	545	50	40	50	90	10	63	135	200	117	96	4°
125	**70** **90**	92.5	37	60	325	578	63	52	63	98	12	71	145	208	143	112	4°
160	**90** **110**	115.5	41	66	370	655	80	66	80	127	12	90	165	245	171	130	4°
200	**110** **140**	138.5	45	75	450	765	100	84	100	150	16	112	185	278	230	151	4°

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends “G” and “K”

2) Thread for piston rod ends “H” and “F”

3) ØD4 recess max. 0.5 mm deep

4) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

5) Throttle valve only with end position cushioning “E” (180° for bleeding)

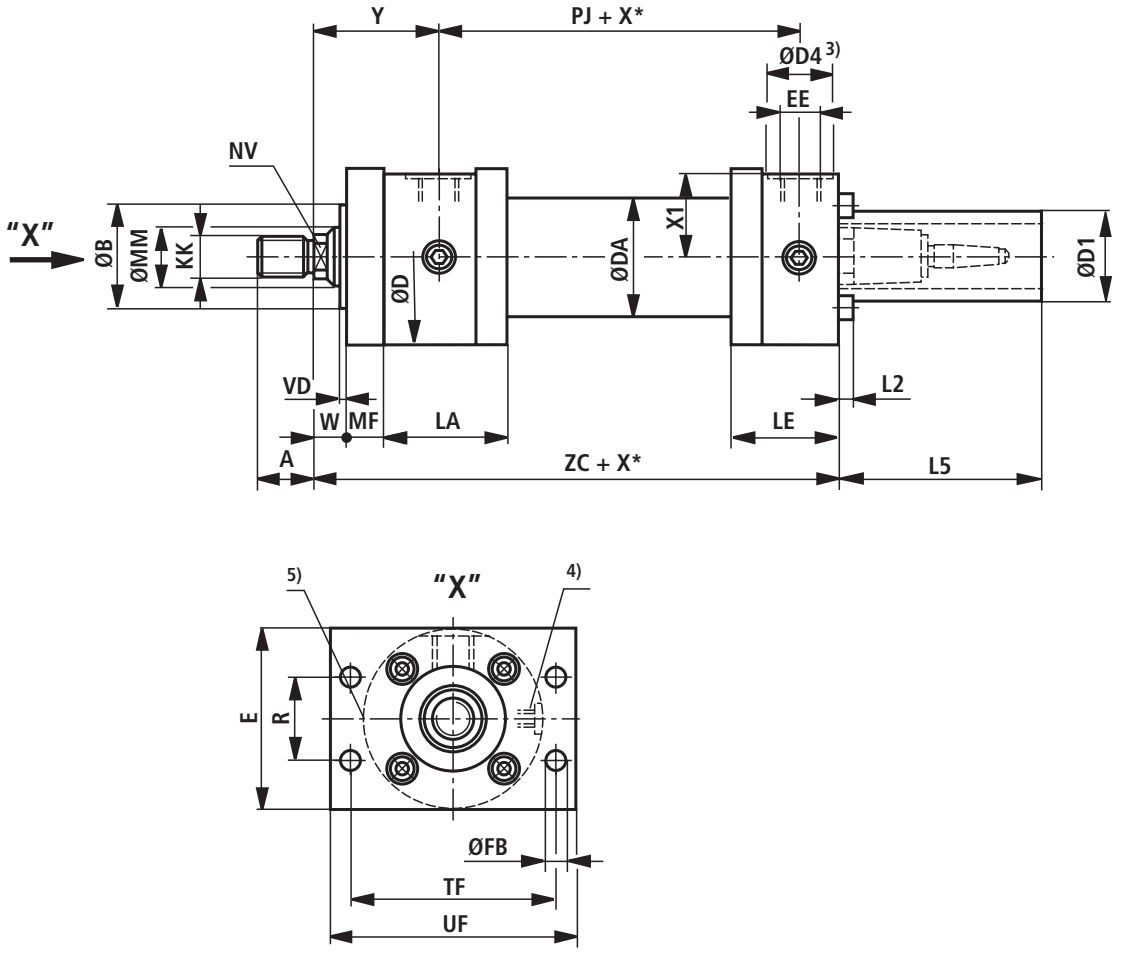
6) Lubricating nipple, cone head form A according to DIN 71412

8) Line connection “B”

9) Line connection “R”

Dimensions CSM1: MF1
(dimensions in mm)

CSM1: MF1



Dimensions CSM1: MF1

(dimensions in mm)

ØAL	Ø MM	KK[1)] ISO 6020/1	A [1)]	KK[2)] VW 39 D 920	A [2)]	NV	ØB f8	ØD	ØDA	ØD4 [3; 8)]	EE [8)]	ØD4 [3; 9)]	EE [9)]	Y	PJ
40	**28**	M20x1.5	28	M16x1.5	22	22	50	78	50	34	G1/2	29	M22x1.5	71	97
50	**28** **36**	M20x1.5 M27x2	28 36	– M20x1.5	– 28	22 30	60	95	60	34	G1/2	29	M22x1.5	72	111
63	**36** **45**	M27x2 M33x2	36 45	– M27x2	– 36	30 36	70	116	78	42	G3/4	34	M27x2	82	117
80	**45** **56**	M33x2 M42x2	45 56	– M33x2	– 45	36 46	85	130	95	42	G3/4	34	M27x2	91	134
100	**56** **70**	M42x2 M48x2	56 63	– M42x2	– 56	46 60	106	158	120	47	G1	43	M33x2	108	162
125	**70** **90**	M48x2 M64x3	63 85	– M48x2	– 63	60 75	132	192	150	47	G1	43	M33x2	121	174

ØAL	ØMM	X1	MF	VD	W	ZC	E	R js13	TF js13	UF	ØFB H13	ØD1	L5	LA	LE	L2
40	**28**	35.5	16	3	16	211	80	40.6	98	115	9	80	166	73	77	0
50	**28** **36**	44.5	20	4	18	224	100	48.2	116.4	140	11	96	166	74	81	0
63	**36** **45**	54.5	25	4	20	237	120	55.5	134	160	13.5	96	166	84	85	0
80	**45** **56**	62.5	32	4	22	281	135	63.1	152.5	185	17.5	96	166	93	112	10
100	**56** **70**	75.5	32	5	25	322	160	76.5	184.8	225	22	96	166	117	118	0
125	**70** **90**	92.5	32	5	28	347	195	90.2	217.1	255	22	96	166	143	134	0

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends “G” and “K”

2) Thread for piston rod ends “H” and “F”

3) ØD4 recess max. 0.5 mm deep

4) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

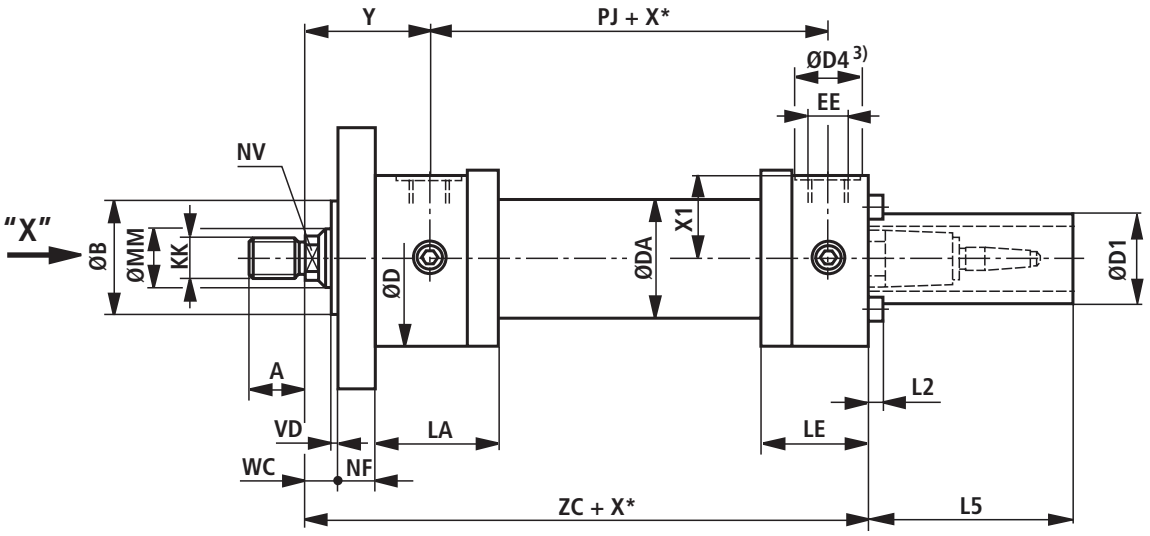
5) Throttle valve only with end position cushioning “E” (180° for bleeding)

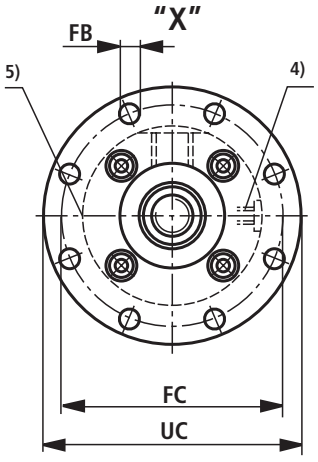
8) Line connection “B”

9) Line connection “R”

Dimensions CSM1: MF3
(dimensions in mm)

CSM1: MF3





Dimensions CSM1: MF3

(dimensions in mm)

ØAL	ØMM	KK[1)] ISO 6020/1	A [1)] ISO 6020/1	KK[2)] VW 39 D 920	A [2)] VW 39 D 920	NV	ØB f8	ØD	ØDA	ØD4 [3; 8)]	EE [8)]	ØD4 [3; 9)]	EE [9)]	Y	PJ
40	**28**	M20x1.5	28	M16x1.5	22	22	50	78	50	34	G1/2	29	M22x1.5	71	97
50	**28** **36**	M20x1.5 M27x2	28 36	– M20x1.5	– 28	22 30	60	95	60	34	G1/2	29	M22x1.5	72	111
63	**36** **45**	M27x2 M33x2	36 45	– M27x2	– 36	30 36	70	116	78	42	G3/4	34	M27x2	82	117
80	**45** **56**	M33x2 M42x2	45 56	– M33x2	– 45	36 46	85	130	95	42	G3/4	34	M27x2	91	134
100	**56** **70**	M42x2 M48x2	56 63	– M42x2	– 56	46 60	106	158	120	47	G1	43	M33x2	108	162
125	**70** **90**	M48x2 M64x3	63 85	– M48x2	– 63	60 75	132	192	150	47	G1	43	M33x2	121	174
160	**90** **110**	M64x3 M80x3	85 95	– M64x3	– 85	75 95	160	237	190	58	G1 1/4	52	M42x2	143	191
200	**110** **140**	M80x3 M100x3	95 112	– M80x3	– 95	95 120	200	285	230	58	G1 1/4	52	M42x2	190	224

ØAL	ØMM	X1	NF	VD	WC	ZC	ØFC js13	ØUC –1	ØFB H13	ØD1	L5	LA	LE	L2
40	**28**	35.5	16	3	16	211	106	125	9	80	166	73	77	0
50	**28** **36**	44.5	20	4	18	224	126	150	11	96	166	74	81	0
63	**36** **45**	54.5	25	4	20	237	145	170	13.5	96	166	84	85	0
80	**45** **56**	62.5	32	4	22	281	165	195	17.5	96	166	93	112	10
100	**56** **70**	75.5	32	5	25	322	200	240	22	96	166	117	118	0
125	**70** **90**	92.5	32	5	28	347	235	275	22	96	166	143	134	0
160	**90** **110**	115.5	36	5	30	390	280	320	22	96	166	171	150	0
200	**110** **140**	138.5	40	5	35	472	340	385	26	96	166	230	173	0

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends “G” and “K”

2) Thread for piston rod ends “H” and “F”

3) ØD4 recess max. 0.5 mm deep

4) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

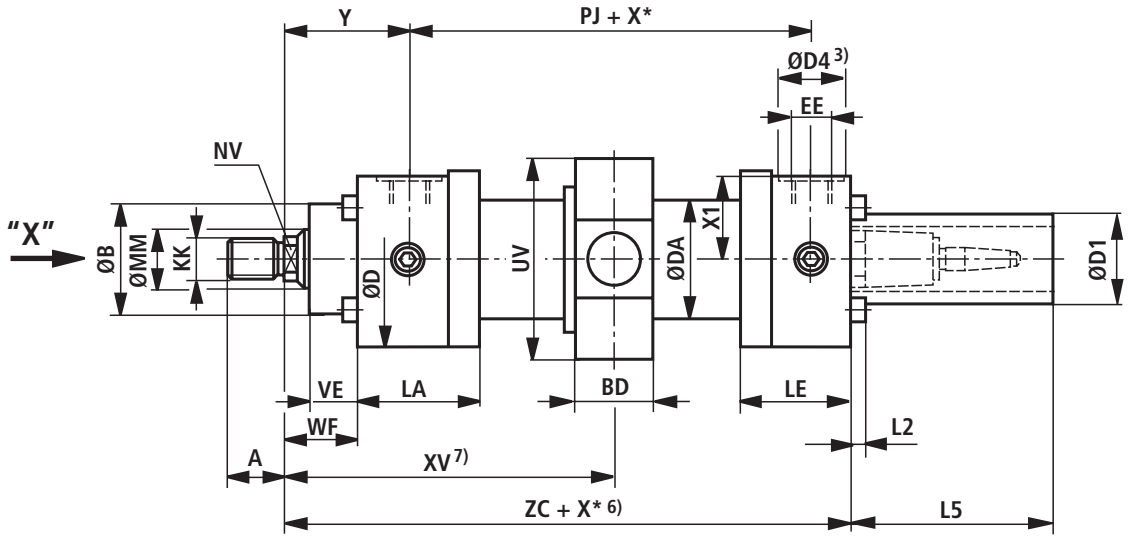
5) Throttle valve only with end position cushioning “E” (180° for bleeding)

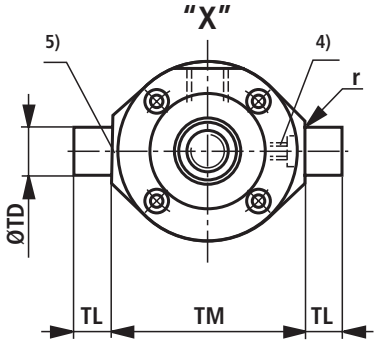
8) Line connection “B”

9) Line connection “R”

Dimensions CSM1: MT4
(dimensions in mm)

CSM1: MT4





Dimensions CSM1: MT4

(dimensions in mm)

ØAL	ØMM	KK[1)] ISO 6020/1	A [1)] ISO 6020/1	KK[2)] VW 39 D 920	A [2)] VW 39 D 920	NV	ØB f8	ØD	ØDA	ØD4 [3; 8)]	EE [8)]	ØD4 [3; 9)]	EE [9)]	Y	PJ	X1
40	**28**	M20x1.5	28	M16x1.5	22	22	50	78	50	34	G1/2	29	M22x1.5	71	97	35.5
50	**28** **36**	M20x1.5 M27x2	28 36	– M20x1.5	– 28	22 28	60	95	60	34	G1/2	29	M22x1.5	72	111	44.5
63	**36** **45**	M27x2 M33x2	36 45	– M27x2	– 36	28 36	70	116	78	42	G3/4	34	M27x2	82	117	54.5
80	**45** **56**	M33x2 M42x2	45 56	– M33x2	– 45	36 46	85	130	95	42	G3/4	34	M27x2	91	134	62.5
100	**56** **70**	M42x2 M48x2	56 63	– M42x2	– 56	46 60	106	158	120	47	G1	43	M33x2	108	162	75.5
125	**70** **90**	M48x2 M64x3	63 85	– M48x2	– 63	60 75	132	192	150	47	G1	43	M33x2	121	174	92.5
160	**90** **110**	M64x3 M80x3	85 95	– M64x3	– 85	75 95	160	238	190	58	G1 1/4	52	M42x2	143	191	115.5
200	**110** **140**	M80x3 M100x3	95 112	– M80x3	– 95	95 120	200	285	230	58	G1 1/4	52	M42x2	190	224	138.5

ØAL	ØMM	VE	WF	ZC	BD	UV [10)]	r	ØTD f8	TL js13	TM h12	XV [7)] min.	XV [7)] max.	X* [6)] min.	ØD1	L5	LA	LE	L2
40	**28**	19	32	211	28	78	1	20	16	90	131	116+X*	23	80	166	73	77	0
50	**28** **36**	24	38	224	33	95	1	25	20	105	141.5	122.5+X*	28	96	166	74	81	0
63	**36** **45**	29	45	237	38	116	1.5	32	25	120	164	129+X*	47	96	166	84	85	0
80	**45** **56**	36	54	281	53	130	2	40	32	135	189.5	138.5+X*	63	96	166	93	112	10
100	**56** **70**	37	57	322	68	158	2	50	40	160	224	166+X*	70	96	166	117	118	0
125	**70** **90**	37	60	347	78	210	2.5	63	50	195	261	170+X*	106	96	166	143	134	0
160	**90** **110**	41	66	390	118	250	3	80	63	240	320	177+X*	163	96	166	171	150	0
200	**110** **140**	45	75	472	148	300	3	100	80	295	403	221+X*	202	96	166	230	173	0

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends “G” and “K”

2) Thread for piston rod ends “H” and “F”

3) ØD4 recess max. 0.5 mm deep

4) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

5) Throttle valve only with end position cushioning “E” (180° for bleeding)

6) Observe the min. stroke length “$X^*_{min.}$”

7) When ordering, always specify the “XV” dimension in the plain text ($XV_{min.}$ and $XV_{max.}$)

8) Line connection “B”

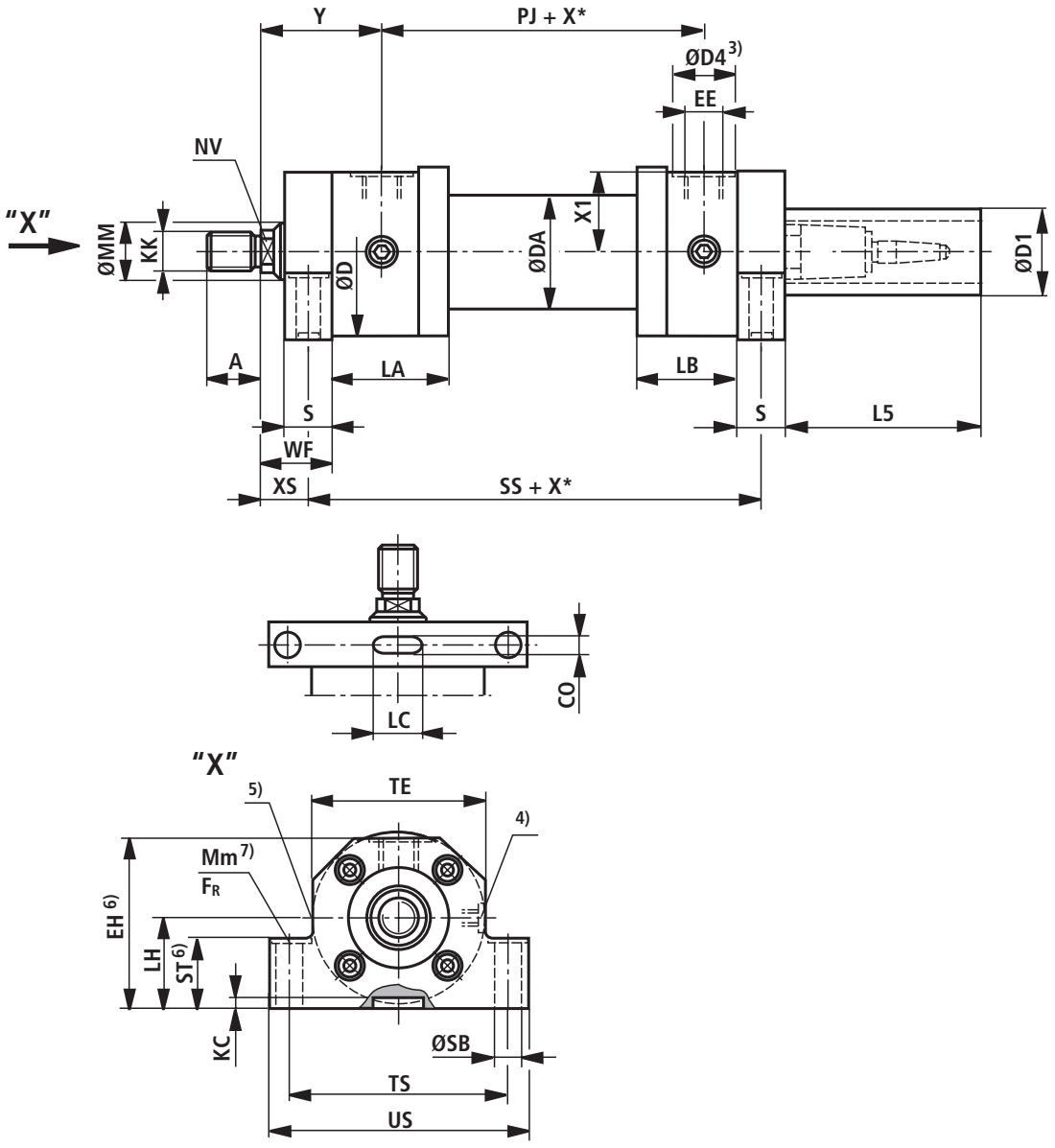
9) Line connection “R”

10) Tolerance according to EN ISO 9013: Thermal cutting

Dimensions CSM1: MS2

(dimensions in mm)

CSM1: MS2



Dimensions CSM1: MS2

(dimensions in mm)

AL Ø	MM Ø	KK[1)] ISO 6020/1	A [1)]	KK[2)] VW 39 D 920	A [2)]	NV	ØD	ØDA	ØD4 3; 8)	EE 8)	ØD4 3; 9)	EE 9)	Y	PJ	X1	WF	XS
40	**28**	M20x1.5	28	M16x1.5	22	22	78	50	34	G1/2	29	M22x1.5	71	97	35.5	32	19.5
50	**28** **36**	M20x1.5 M27x2	28 36	– M20x1.5	– 28	22 30	95	60	34	G1/2	29	M22x1.5	72	111	44.5	38	22
63	**36** **45**	M27x2 M33x2	36 45	– M27x2	– 36	30 36	116	78	42	G3/4	34	M27x2	82	117	54.5	45	29
80	**45** **56**	M33x2 M42x2	45 56	– M33x2	– 45	36 46	130	95	42	G3/4	34	M27x2	91	134	62.5	54	34
100	**56** **70**	M42x2 M48x2	56 63	– M42x2	– 56	46 60	158	120	47	G1	43	M33x2	108	162	75.5	57	32
125	**70** **90**	M48x2 M64x3	63 85	– M48x2	– 63	60 75	192	150	47	G1	43	M33x2	121	174	92.5	60	32
160	**90** **110**	M64x3 M80x3	85 95	– M64x3	– 85	75 95	237	190	58	G1 1/4	52	M42x2	143	191	115.5	66	36
200	**110** **140**	M80x3 M100x3	95 112	– M80x3	– 95	95 120	285	230	58	G1 1/4	52	M42x2	190	224	138.5	75	39

ØAL	ØMM	SS	CO N9	LC +0.5	KC +0.5	EH [6)] –1	LH h10	S js13	ØSB H13	ST 6)	TE	TS js13	US –1	ØD1	L5	LA	LB	FR [7)] kN	Mm [7)] Nm
40	**28**	183	8	36	4	77.5	43	25	11	32	78	100	120	80	166	73	56	7.90	60
50	**28** **36**	199	10	40	4.5	95	52	32	14	42	95	120	145	96	166	74	62	11.10	100
63	**36** **45**	211	10	40	4.5	113	62	32	18	50	116	150	180	96	166	84	72	21.15	250
80	**45** **56**	236	14	63	5	129	70	40	22	60	130	170	210	96	166	93	81	33.35	490
100	**56** **70**	293	16	70	6	153	82	50	26	70	158	205	250	96	138	117	96	48.30	850
125	**70** **90**	321	18	80	6	190	100	56	33	80	192	245	300	96	132	143	112	77.80	1710
160	**90** **110**	364	22	125	8	232	119	60	33	90	238	295	350	96	126	171	130	77.80	1710
200	**110** **140**	447	28	160	9	282	145	72	39	110	285	350	415	96	116	230	151	113.25	2970

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends “G” and “K”

2) Thread for piston rod ends “H” and “F”

3) ØD4 recess max. 0.5 mm deep

4) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

5) Throttle valve only with end position cushioning “E” (180° for bleeding)

6) Specified dimensions are smaller than the max. dimensions in ISO 6020/1

7) Recess max. 2 mm deep, for hexagon socket head cap screws according to ISO 4762

The mounting screws must not be subjected to shear force. The mounting screws according to ISO 4762 (property class 10.9) must be tightened with the specified torque M_m.

If the calculated frictional force F_R is lower than the maximum cylinder force, a key must be used on the head.

Calculation basis:

- The specified frictional force F_R refers to a friction factor of 0.2 (steel / steel)
- Foot on the head side as fixed bearing
- Foot on the base side as floating bearing

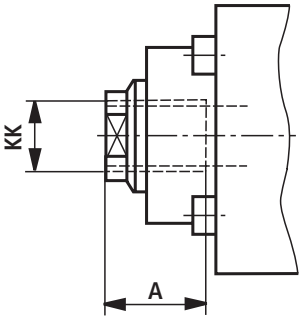
8) Line connection “B”

9) Line connection “R”

Piston rod end E
(dimensions in mm)

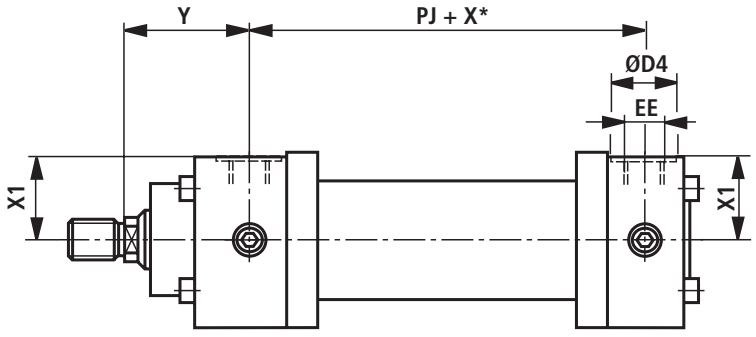
ØAL	ØMM	KK	A
		ISO 6020/1	
32	**22**	M16x1.5	22
40	**22**	M16x1.5	22
	28	M20x1.5	28
50	**28**	M20x1.5	28
	36	M27x2	36
63	**36**	M27x2	36
	45	M33x2	45
80	**45**	M33x2	45
	56	M42x2	56

ØAL	ØMM	KK	A
		ISO 6020/1	
100	**56**	M42x2	56
	70	M48x2	63
125	**70**	M48x2	63
	90	M64x3	85
160	**90**	M64x3	85
	110	M80x3	95
200	**110**	M80x3	95
	140	M100x3	112

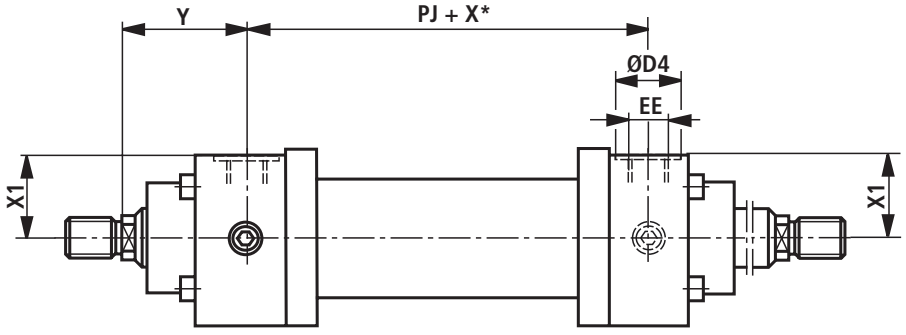


Enlarged line connections
(dimensions in mm)

CDM1



CGM1



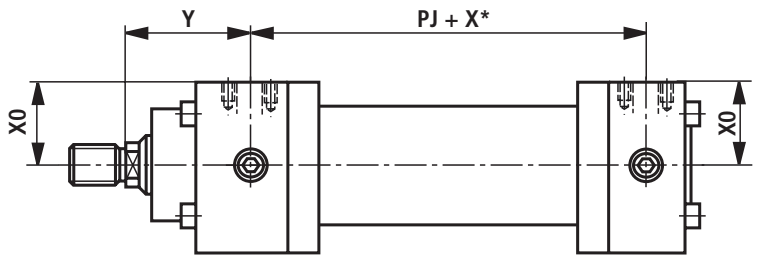
Ø AL	Version "S" ISO 1179-1				
	EE	ØD4[1)]	Y	PJ	X1
25	–	–	–	–	–
32	–	–	–	–	–
40	–	–	–	–	–
50	–	–	–	–	–
63	G1	47	80	121	53.5
80	G1	47	91	134	60.5
100	G1 1/4	58	108	162	74
125	G1 1/4	58	121	174	92
160	G1 1/2	65	143	191	114.5
200	G1 1/2	65	190	224	138.5

Main dimensions see pages 14 ... 39

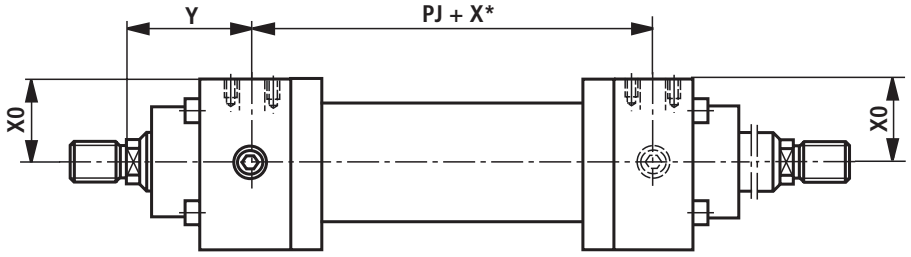
ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length
1) ØD4 recess max. 0.5 mm deep

Flange ports
(dimensions in mm)

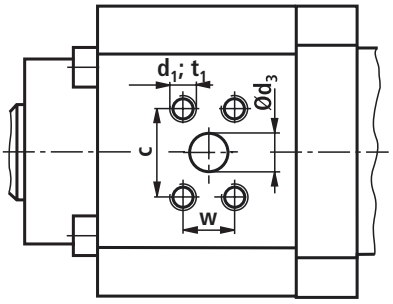
CDM1



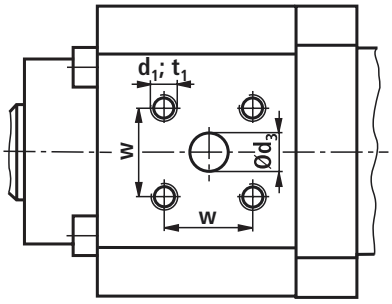
CGM1



Dimensions for rectangular flange according to ISO 6162-1 (≙ SAE 3000 PSI)



Dimensions for square flange according to ISO 6164



ØAL	Version "F" ISO 6162-1 (≙ SAE 3000 PSI) [1]									Version "H" ISO 6164						
	Y	PJ	X0	Ød3	Ød3 [1]	c ±0.25	w ±0.25	d1	t1 [2]	Y	PJ	X0	Ød3	w ±0.25	d1	t1 [2]
25	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
32	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
40	–	–	–	–	–	–	–	–	–	69	101	34.5	10	24.7	M6	13
50	72	111	41	13	1/2“	38.1	17.5	M8	14	72	111	44	10	24.7	M6	13
63	82	117	52	13	1/2“	38.1	17.5	M8	16	82	117	52	13	29.7	M8	16
80	91	134	60	13	1/2“	38.1	17.5	M8	16	91	134	60	13	29.7	M8	16
100	108	162	72	19	3/4“	47.6	22.3	M10	20	108	162	72	19	35.4	M8	16
125	121	174	91	19	3/4“	47.6	22.3	M10	20	121	174	91	19	35.4	M8	16
160	143	191	114	25	1“	52.4	26.2	M10	20	143	191	114	25	43.8	M10	20
200	190	224	138	25	1“	52.4	26.2	M10	20	190	224	138	25	43.8	M10	20

Main dimensions see pages 14 ... 39

ØAL = Piston Ø
X* = Stroke length

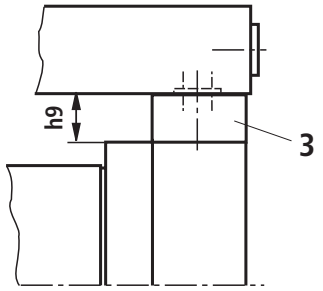
[1] Flange connection according to ISO 6162-1 corresponds to flange connection according to SAE 3000 PSI
[2] Thread depth

Subplates for valve mounting
(SL and SV valve)

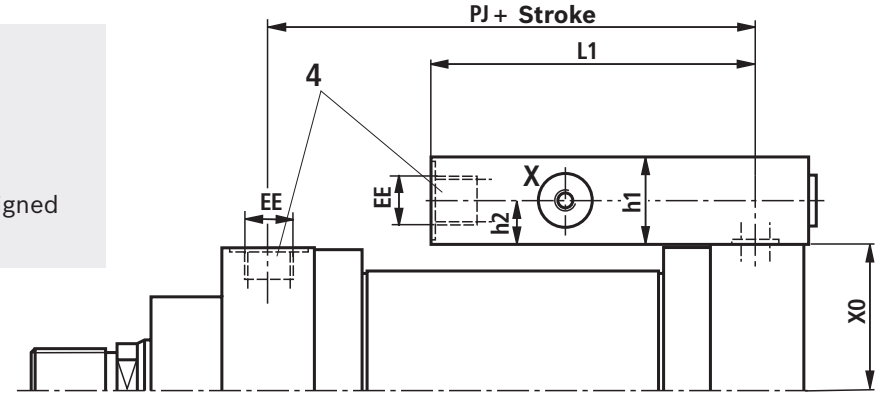
Note:
Valves, fittings and piping are **not** included in the scope of delivery!

1 Port B to the piston side according to ISO 6164
2 Bore for locking pin
3 Adapter plate for MT4 type of mounting (part of the scope of delivery for MT4)
4 Line connection “B” dimensions, see also page 14 ... 39

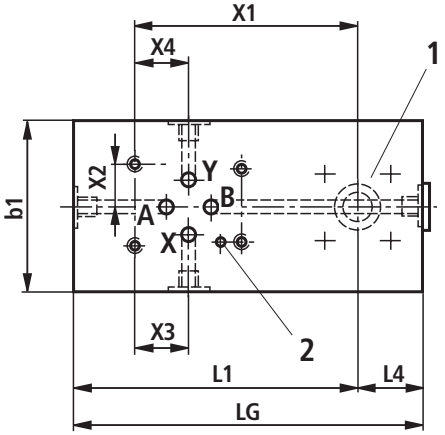
Installation situation with MT4



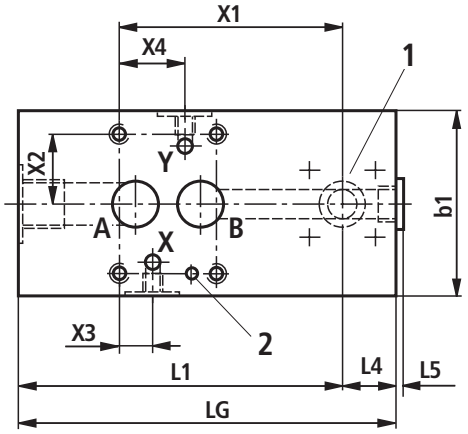
☞ **Important note:**
Subplates for SL and SV valves (isolator valves)
Note:
Seal design T and S are not designed for the static holding function!



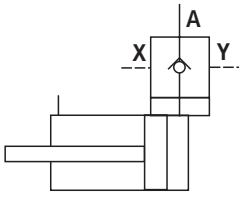
Size 6
Dimensions according to DIN 24340 form A and ISO 4401



Size 10 and 20
Dimensions according to DIN 24340 form D and ISO 5781



Piping symbol



Subplates for valve mounting

(SL and SV valve – dimensions in mm)

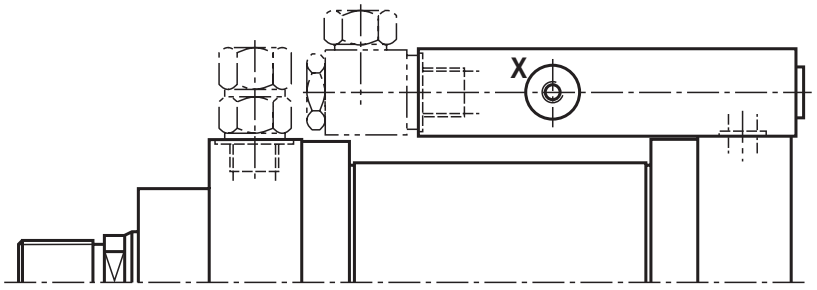
ØAL	Valve size	PJ	EE	Minimum stroke [1] 2)	Minimum stroke [1] 3)	X0	Plate dimensions L1	L4	L5	LG	b1	h1	h9	Port size, Porting pattern h2	A	X	Y	X3	X4	Position point Valve X1	X2
40	6	97	G1/2	100	100	34.5	90	20	4	110	55	40	10	20	G1/2	G1/4	G1/4	21.5	21.5	65.5	15.5
50	6	111	G1/2	100	100	44	90	20	4	110	55	40	10	20	G1/2	G1/4	G1/4	21.5	21.5	65.5	15.5
63	6	117	G3/4	100	100	52	100	25	5	125	55	45	10	22.5	G3/4	G1/4	G1/4	21.5	21.5	70.5	15.5
	10	117	G3/4	100	100	52	105	25	5	130	85	45	10	22.5	G3/4	G1/4	G1/4	21.5	21.5	73	33.35
80	6	134	G3/4	100	100	60	100	25	5	125	55	45	10	22.5	G3/4	G1/4	G1/4	21.5	21.5	70.5	15.5
	10	134	G3/4	100	100	60	105	25	5	130	85	45	10	22.5	G3/4	G1/4	G1/4	21.5	21.5	73	33.35
100	10	162	G1	100	100	72	102	28	5	130	85	50	10	25	G1	G1/4	G1/4	21.5	21.5	70	33.35
125	10	174	G1	100	106	91	102	28	5	130	85	50	20	25	G1	G1/4	G1/4	21.5	21.5	70	33.35
	20	174	G1	100	106	91	137	28	5	165	100	50	20	25	G1	G1/4	G1/4	20.6	39.5	92	39.7
160	10	191	G1 1/4	100	163	114	115	35	5	150	85	60	20	30	G1 1/4	G1/4	G1/4	21.5	21.5	80	33.35
	20	191	G1 1/4	100	163	114	140	35	5	175	100	60	20	30	G1 1/4	G1/4	G1/4	20.6	39.5	95	39.7
200	10	224	G1 1/4	100	202	138	115	35	5	150	85	60	20	30	G1 1/4	G1/4	G1/4	21.5	21.5	80	33.35
	20	224	G1 1/4	100	202	138	140	35	5	175	100	60	20	30	G1 1/4	G1/4	G1/4	20.6	39.5	95	39.7

ØAL = Piston Ø

2) Not for MT4

3) Not for MT4

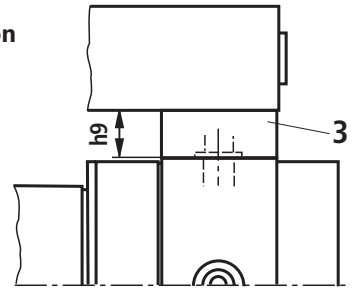
1) The information only applies to the following connection situation!

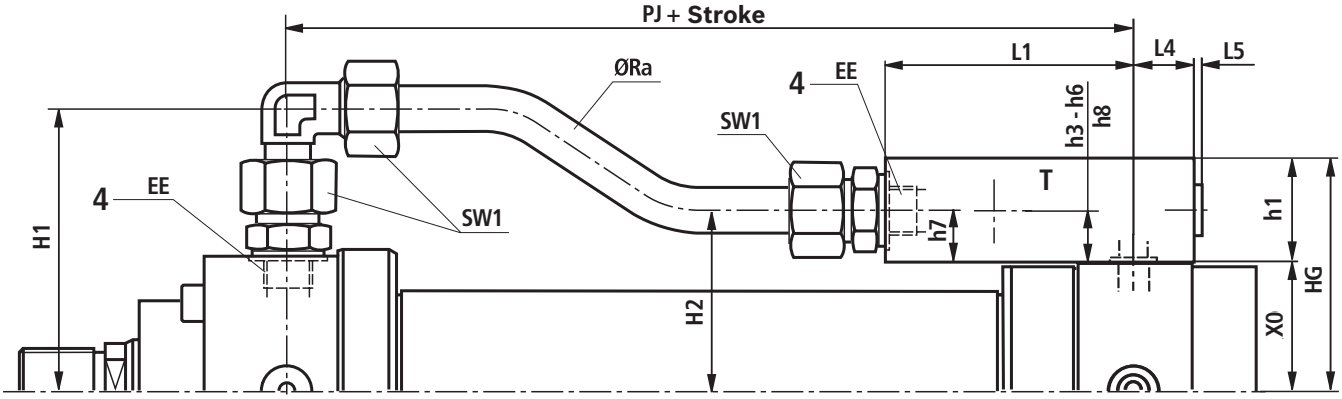


Subplates for valve mounting
(directional and high-response valves)

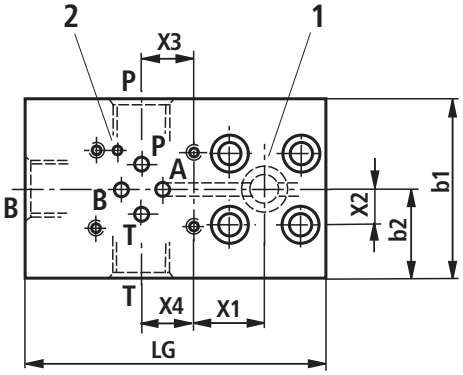
1 Port B to the piston side according to ISO 6164
2 Bore for locking pin
3 Adapter plate for MT4 type of mounting (part of the scope of delivery for MT4)
4 Line connection “B” dimensions, see also page 14 ... 39

Installation situation with MT4

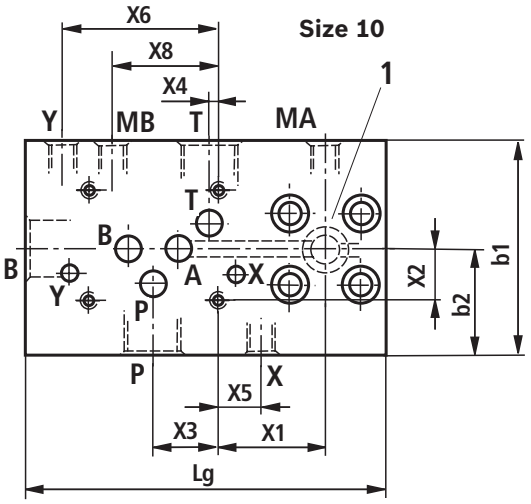




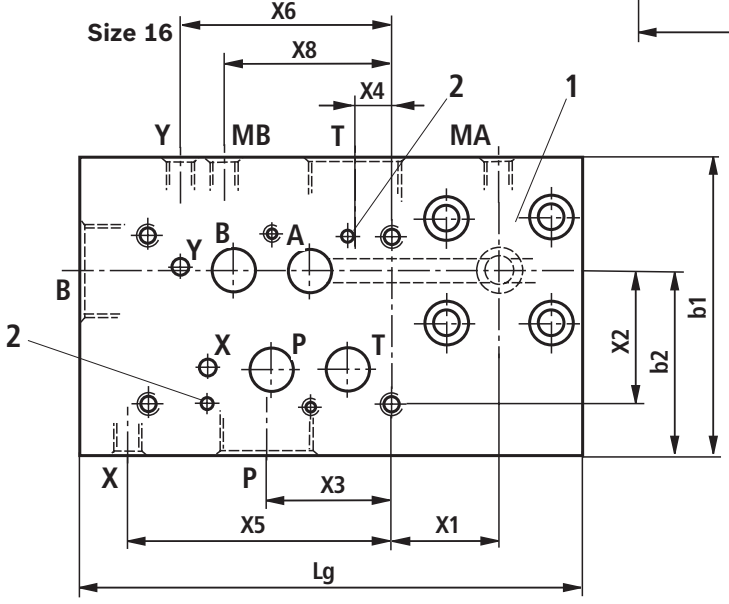
Size 6



Size 10



Size 16



Notice:
Dimensions according to DIN 24340 form A and ISO 4401

Subplates for valve mounting

(directional and high-response valves – dimensions in mm)

					Plate and piping dimensions																
ØAL	Valve size	PJ	EE	Minimum stroke	L1	L4	$L5_{max.}$	H1	H2 [1]	H2 [2]	Wrench size 1 mm	ØRa	b1	h1	lg	HG [1]	HG [2]	b2	X0	h7	h9
40	6	101	G1/2	225	90	20	4	90	54.5	64.5	30	16.0 x 2.5	65	40	110	74.5	84.5	32.5	34.5	20	10
50	6	111	G1/2	215	90	20	4	99	64	74	30	16.0 x 2.5	65	40	110	84	94	32.5	44	20	10
63	6	117	G3/4	250	100	25	5	119	74.5	84.5	36	20.0 x 3.0	75	45	125	97	107	37.5	52	22.5	10
	10	117	G3/4	275	125	25	5	119	75	85	36	20.0 x 3.0	90	70	150	122	132	45	52	23	10
80	6	134	G3/4	235	100	25	5	127	82.5	92.5	36	20.0 x 3.0	75	45	125	105	115	37.5	60	22.5	10
	10	134	G3/4	260	125	25	5	127	83	93	36	20.0 x 3.0	90	70	150	130	140	45	60	23	10
100	10	162	G1	280	132	28	5	148	102	112	46	25.0 x 4.0	90	80	160	152	162	45	72	30	10
125	10	174	G1	270	132	28	5	165	121	141	46	25.0 x 4.0	90	80	160	171	191	45	91	30	20
	16	174	G1	300	162	28	5	165	131	151	46	25.0 x 4.0	120	90	190	181	201	77.5	91	40	20
160	10	191	G1 1/4	295	135	35	5	193.5	149	169	50	30.0 x 5.0	105	95	170	209	229	55	114	35	20
	16	191	G1 1/4	335	175	35	5	193.5	159	179	50	30.0 x 5.0	125	100	210	214	234	77.5	114	45	20
200	10	224	G1 1/4	260	135	35	5	216.5	173	193	50	30.0 x 5.0	105	95	170	233	253	55	138	35	20
	16	224	G1 1/4	300	175	35	5	216.5	183	203	50	30.0 x 5.0	125	100	210	238	258	77.5	138	45	20

		Connection size, position of connections															
ØAL	Valve size	P	X3	h3	T	X4	h4	X	X5	h5	Y	X6	h6	MA	MB	X8	h8
40	6	G1/2	21.5	20	G1/2	21.5	20	–	–	–	–	–	–	–	–	–	–
50	6	G1/2	21.5	20	G1/2	21.5	20	–	–	–	–	–	–	–	–	–	–
63	6	G3/4	21.5	22.5	G3/4	21.5	22.5	–	–	–	–	–	–	–	–	–	–
	10	G3/4	27	33	G3/4	3.5	33	G1/4	18	47	G1/4	65	47	G1/4	G1/4	60	17
80	6	G3/4	21.5	22.5	G3/4	21.5	22.5	-	-	-	-	-	-	-	-	-	-
	10	G3/4	27	33	G3/4	3.5	33	G1/4	18	47	G1/4	65	47	G1/4	G1/4	60	17
100	10	G1	27	30	G1	3.5	40	G1/4	18	57	G1/4	65	57	G1/4	G1/4	58	20
125	10	G1	27	30	G1	3.5	40	G1/4	18	57	G1/4	65	57	G1/4	G1/4	58	20
	16	G1	50	26	G1	17.0	25	G1/4	105	45	G1/4	88	70	G1/4	G1/4	88	35
160	10	G1 1/4	27	35	G1 1/4	3.5	45	G1/4	20	72	G1/4	65	72	G1/4	G1/4	55	25
	16	G1 1/4	52	32	G1 1/4	15.0	32	G1/4	110	55	G1/4	88	80	G1/4	G1/4	88	40
200	10	G1 1/4	27	35	G1 1/4	3.5	45	G1/4	20	72	G1/4	65	72	G1/4	G1/4	55	25
	16	G1 1/4	52	32	G1 1/4	15.0	32	G1/4	110	55	G1/4	88	80	G1/4	G1/4	88	40

		Position point Valve	
ØAL	Valve size	X1	X2
40	6	25	15.5
50	6	25	15.5
63	6	30	15.5
	10	45	21.4
80	6	30	15.5
	10	45	21.4
100	10	52	21.4
125	10	52	21.4
	16	37	55.6
160	10	55	21.4
	16	45	55.6
200	10	55	21.4
	16	45	55.6

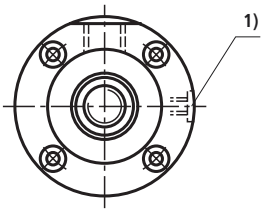
[1] Not for MT4

[2] Not for MT4

The dimensions h3, h4, h5, h6, h8 and X3, X4, X5, X6, define the position of connections P, T, B, X, Y.

Bleeding / measuring coupling
(dimensions in mm)

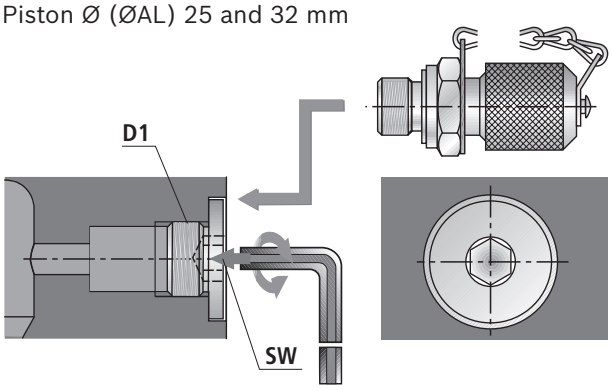
By default, a patented safety bleeding device against unintended screwing out in head and base is delivered for piston Ø ≥ 40 mm.
For piston Ø 25 and 32 mm, a bleed screw G1/8 is installed in head and base which is **not** secured against screwing out.
The port allows for the installation of a measuring coupling with check valve for pressure measurement or contamination-free bleeding. Measuring coupling with check valve function, i.e. it can also be connected when the system is pressurized.



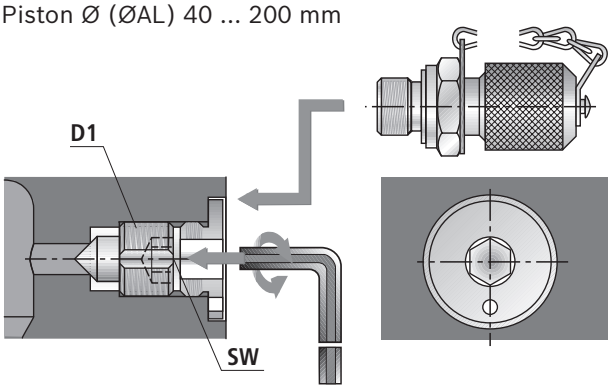
1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

Connection possibility for measuring coupling

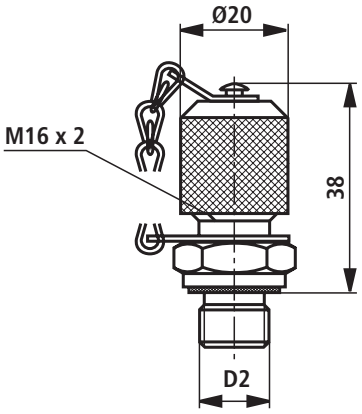
Piston Ø (ØAL) 25 and 32 mm



Piston Ø (ØAL) 40 ... 200 mm

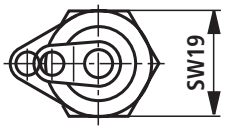


	Bleed screw			Measuring coupling
ØAL	D1	Fuse	SW	D2
25 and 32	G1/8	not secured	5	G1/8
40 and 50	G1/8	secured	5	G1/8
63 ... 200	G1/4	secured	6	G1/4



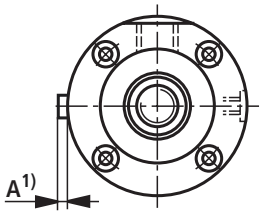
Scope of delivery: Measuring coupling **G1/8**
MEASURING COUPLING AB 20-11/K3 G1/8 with seal ring made from NBR
Material no. **R900014363**
MEASURING COUPLING AB 20-11/K3V G1/8 with seal ring made from FKM
Material no. **R900024710**

Scope of delivery: Measuring coupling **G1/4**
MEASURING COUPLING AB 20-11/K1 G1/4 with seal ring made from NBR
Material no. **R900009090**
MEASURING COUPLING AB 20-11/K1V G1/4 with seal ring made from FKM
Material no. **R900001264**



Throttle valve
(dimensions in mm)

ØAL	25	32	40	50	63	80	100	125	160	200
Protrusion A 1)	6.5	4	5.5	1.5	0	0	0	0	0	0



ØAL = Piston Ø

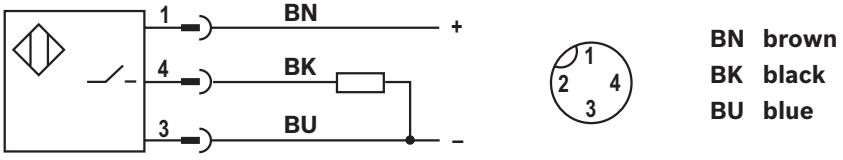
1) Throttle valve only with end position cushioning “E” (180° for bleeding) Protrusion A in closed condition

Proximity switch

Inductive proximity switches are used as reliable end position control for hydraulic cylinders. They are an important element for the safe and exact monitoring of safety equipment, locks and/or other machine functions in their end position by means of the output of signals.
The proximity switch which is high-pressure resistant up to 500 bar works in a contactless manner. Consequently, it is wear-free. The proximity switch has been set at the factory. The switching distance must not be adjusted. The lock nut of the proximity switch is marked at the factory using sealing wax. On versions with proximity switch, the cylinders are equipped with proximity switches.

Technical data (For applications outside these parameters, please consult us!)			
Function type			PNP normally open contact
Admissible pressure		bar	500
Operating voltage		V DC	10 ... 30
	– including residual ripple	%	≤ 15
Voltage drop		V	≤ 1.5
Rated operating voltage		V DC	24
Rated operating current		mA	200
Idle current		mA	≤ 8
Residual current		µA	≤ 10
Repetition accuracy		%	≤ 5
Hysteresis		%	≤ 15
Ambient temperature range		°C	–25 ... +80
Temperature drift		%	≤ 10
Switching frequency		Hz	1000
Protection class	– active area	IP	68 according to DIN 40050
	– Proximity switch	IP	67 according to DIN 40050
Housing material			Material no. 1.4104

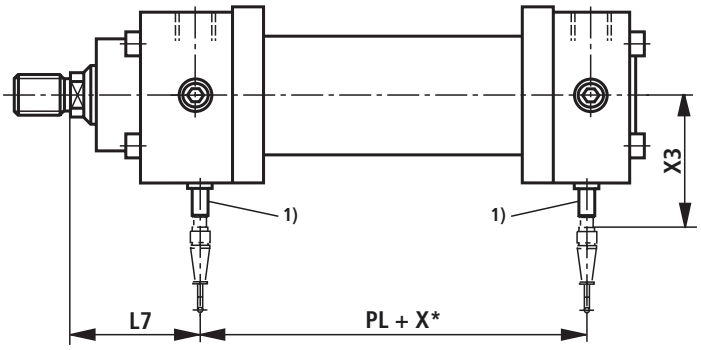
Pin assignment



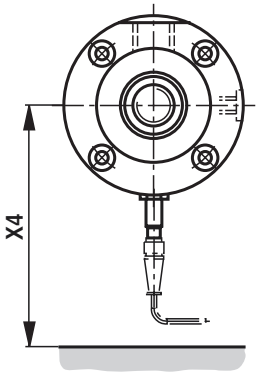
BN brown
BK black
BU blue

Proximity switch
(dimensions in mm)

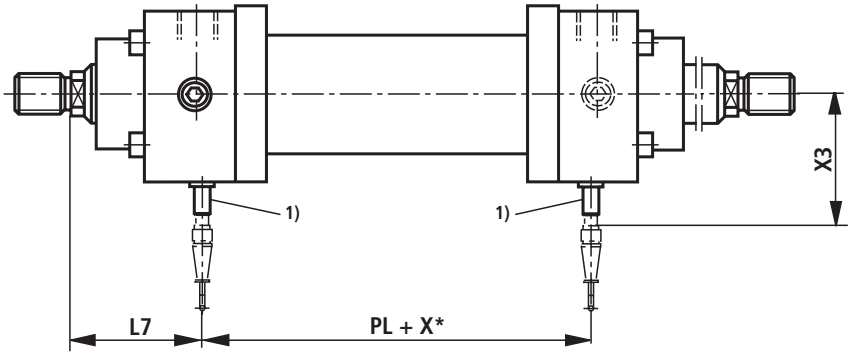
CDM1

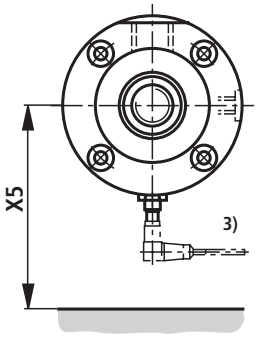


Installation space for mating connector

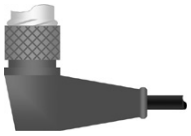


CGM1





Mating connector with 5 m cable
Material no. **R913016852**
(mating connector is **not** included in the scope of delivery, must be ordered separately)



Mating connector, angled with 5 m cable
(position of the cable outlet cannot be defined)
Material no. **R988064311**
(mating connector is **not** included in the scope of delivery, must be ordered separately)

Proximity switch
(dimensions in mm)

ØAL	ØMM	PL	L7	X3	X4	X5
25 [2]	**14** **18**	–	–	–	–	–
32 [2]	**18** **22**	–	–	–	–	–
40	**22** **28**	97	71	94	170	125
50	**28** **36**	103	76	98	175	130
63	**36** **45**	113	84	103	180	135
80	**45** **56**	124	96	109	185	140
100	**56** **70**	150	114	116	195	150
125	**70** **90**	158	129	126	205	160
160	**90** **110**	181	148	136	215	170
200	**110** **140**	214	195	151	230	185

Main dimensions see pages 14 ... 39

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

[1] The proximity switch is always located opposite of the line connection
[2] Piston Ø 25 to 32 mm proximity switch not possible

Position measurement system

The position measurement system that is pressure-resistant up to 500 bar works in a contactless and absolute manner. The basis of this position measurement system is the magnetostrictive effect. Here, the coincidence of two magnetic fields triggers a torsional impulse.

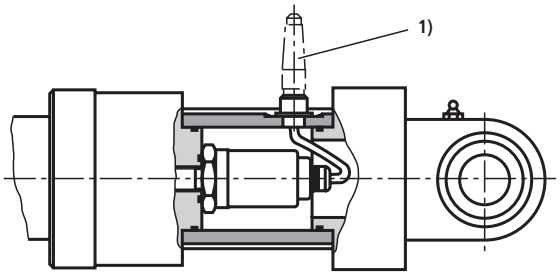
This impulse runs on the wave guide inside the scale from the measuring point to the sensor head. The running time is constant and almost independent of temperature. It is proportional to the solenoid position and thus a measure for the actual position value and is converted within the sensor into a direct analog or digital output.

Technical data (For applications outside these parameters, please consult us!)			
Admissible pressure		bar	500
Analog output		V	0 ... 10
	– Load resistance	kΩ	≥ 5
	– Resolution		unlimited
Analog output		mA	4 ... 20
	– Load resistance	Ω	0 ... 500
	– Resolution		unlimited
Digital output			SSI 24 bit gray-coded
	– Resolution	µm	5
	– Direction of measurement		forwards
Linearity (absolute accuracy)	– Analog	% mm	≤ ±0.02 (referred to measurement length) min. ±0.05
	– Digital	% mm	≤ ±0.01 (referred to measurement length) min. ±0.04
Reproducibility		% mm	±0.001 (referred to measurement length) min. ±0.0025
Hysteresis		mm	≤ 0.004
Supply voltage		V DC	24 (±10% with analog output)
	– Current consumption	mA	100
	– Residual ripple	% s-s	≤ 1
		V DC	24 (+ 20 %/– 15 % with digital output)
	– Current consumption	mA	70
	– Residual ripple	% s-s	≤ 1
Protection class	– Pipe and flange	IP	67
	– Sensor electronics	IP	65
Operating temperature	– Sensor electronics	°C	–40 ... +75
Temperature coefficient	– Voltage	ppm/°C	70
	– Current	ppm/°C	90

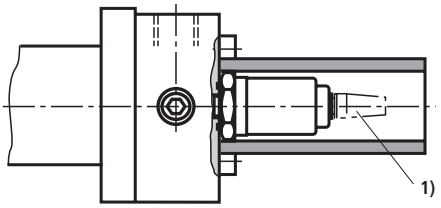
Position measurement system

Types of mounting

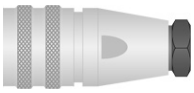
MP3, MP5



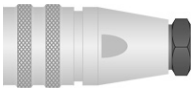
MF3, MF4, MT4, MS2



[1] For analog output:
6-pin mating connector
Material no. **R900072231**
(mating connector is **not** included in the scope of delivery, must be ordered separately)
Protection class: IP 67

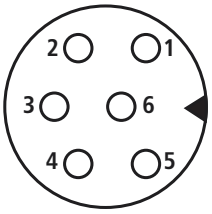


[1] For digital output:
7-pin mating connector
Material no. **R900079551**
(mating connector is **not** included in the scope of delivery, must be ordered separately)
Protection class: IP 67



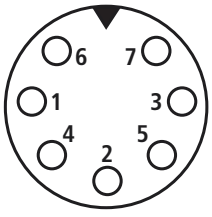
Pin assignment

Position measurement system (analog output)
Connector (view to pin side)



Pin	Cable	Signal / current	Signal / voltage
1	gray	4 ... 20 mA	0 ... 10 V
2	pink	DC ground	DC ground
3	Yellow	not used	not used
4	Green	DC ground	DC ground
5	brown	+24 V DC (+20 % / –15 %)	+24 V DC (+20 % / –15 %)
6	white	DC ground (0 V)	DC ground (0 V)

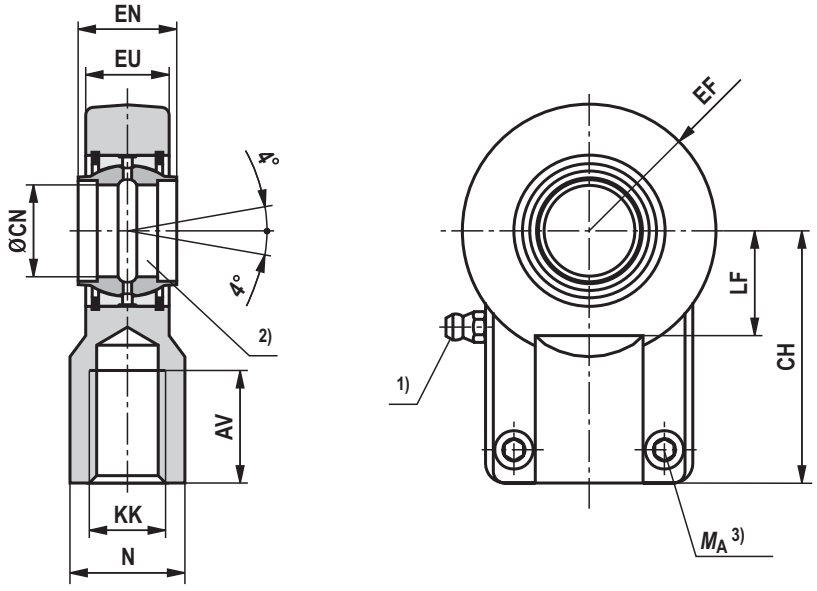
Position measurement system (digital output)
Connector (view to pin side)



Pin	Cable	Signal / SSi
1	gray	Data (–)
2	pink	Data (+)
3	Yellow	Clock (+)
4	Green	Clock (–)
5	brown	+24 V DC (+20 % / –15 %)
6	white	DC ground (0 V)
7	–	not used

Dimensions: Swivel head CGKD(clampable)
(dimensions in mm)

ISO 8132



ØAL	ØMM	Type	Material no.	Nominal force kN	AV min.	N max.	CH js13	EF max.	ØCN H7 2)	EN h12	EU max.
25	**14 / 18**	**CGKD 12** 7)	R900540998	8	17	19	38	16.5	12	12	11
25	**18**	**CGKD 16**	R900308559	12.5	19	22	44	20.5	16	16	14
32	**18 / 22**										
32	**22**	**CGKD 20**	R900308576	20	23	28	52	25	20	20	17.5
40	**22 / 28**										
40	**28**	**CGKD 25**	R900323332	32	29	31	65	32	25	25	22
50	**28 / 36**										
50	**36**	**CGKD 32**	R900322049	50	37	38	80	40	32	32	28
63	**36 / 45**										
63	**45**	**CGKD 40**	R900322029	80	46	47	97	50	40	40	34
80	**45 / 56**										
80	**56**	**CGKD 50**	R900322719	125	57	58	120	63	50	50	42
100	**56 / 70**										
100	**70**	**CGKD 63**	R900322028	200	64	70	140	72.5	63	63	53.5
125	**70 / 90**										
125	**90**	**CGKD 80**	R900322700	320	86	91	180	92	80	80	68
160	**90 / 110**										
160	**110**	**CGKD 100**	R900322030	500	96	110	210	114	100	100	85.5
200	**110 / 140**										
200	**140**	**CGKD 125**	R900322026	800	113	135	260	160	125	125	105

Dimensions: Swivel head CGKD(clampable)
(dimensions in mm)

ØAL	ØMM	Type	KK	LF min.	Clamping screw ISO 4762-10.9	M_A [3] Nm	m [4] kg	C_0 [5] kN	F_{adm} [6] kN
25	**14 / 18**	**CGKD 12** [7]	M12x1.25	13	M5x16	6	0.1	24.5	9.0
25	**18**	**CGKD 16**	M14x1.5	16.5	M6x14	10	0.2	36.5	13.5
32	**18 / 22**								
32	**22**	**CGKD 20**	M16x1.5	20.5	M8x20	25	0.35	48	17.7
40	**22 / 28**								
40	**28**	**CGKD 25**	M20x1.5	25.5	M8x20	30	0.65	78	28.8
50	**28 / 36**								
50	**36**	**CGKD 32**	M27x2	30	M10x25	59	1.15	114	42.1
63	**36 / 45**								
63	**45**	**CGKD 40**	M33x2	39	M10x30	59	2.1	204	75.3
80	**45 / 56**								
80	**56**	**CGKD 50**	M42x2	47	M12x35	100	4	310	114.4
100	**56 / 70**								
100	**70**	**CGKD 63**	M48x2	58	M16x40	250	7.2	430	158.7
125	**70 / 90**								
125	**90**	**CGKD 80**	M64x3	74	M20x50	490	15	695	265.5
160	**90 / 110**								
160	**110**	**CGKD 100**	M80x3	94	M24x60	840	25.5	1060	391.1
200	**110 / 140**								
200	**140**	**CGKD 125**	M100x3	116	M24x70	840	52.5	1430	527.7

ØAL = Piston Ø

ØMM = Piston rod Ø

1) Lubricating nipple, cone head form A according to DIN 71412

2) Related bolt Ø m6

3) M_A = tightening torque
The swivel head must always be screwed against the shoulder of the piston rod. Afterwards, the clamping screws must be tightened with the specified tightening torque.

4) m = Weight swivel head in kg

5) C_0 = static load rating of the swivel head

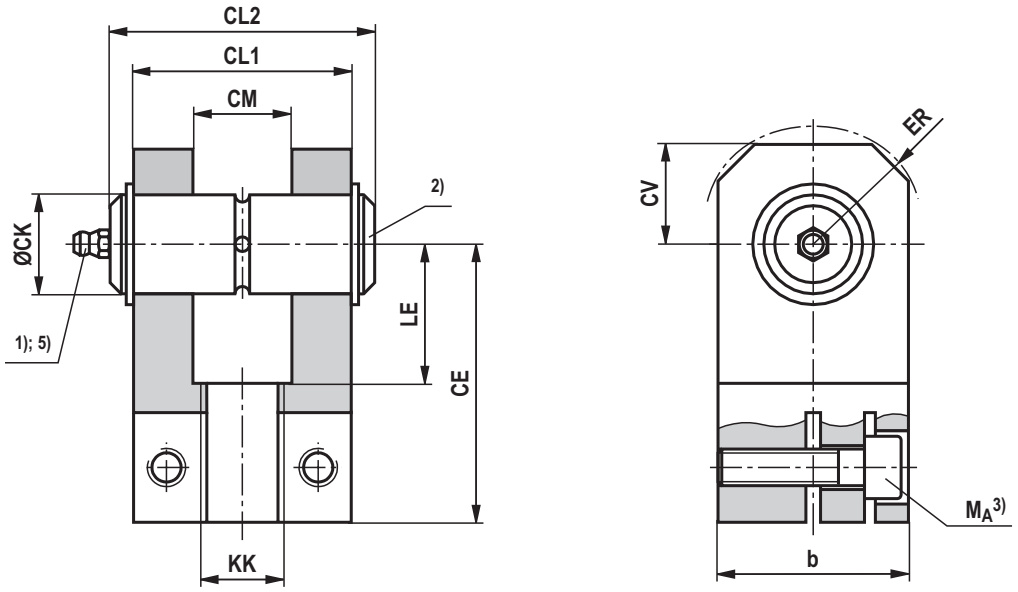
6) F_{adm} = max. admissible load of the swivel head with oscillatory or alternating loads

7) Bearings cannot be re-lubricated

☞ **Notice:**
Geometry and dimensions may differ depending on the manufacturer. All graphical presentations are examples. In case of combination with other mounting elements, the usability must be checked.

Dimensions: Fork clevis CCKB (clampable)
(dimensions in mm)

ISO 8132



ØAL	ØMM	Type	Material no.	Nominal force kN	b max.	CE js13	ØCK H9 2)	CL1 h16	CL2 max.	CM A13	ER max.
25	**14 / 18**	**CCKB 12** 5)	R900542842	8	25	38	12	28	49	12	16
25	**18**	**CCKB 16**	R900542843	12.5	30	44	16	36	57	16	20
32	**18 / 22**										
32	**22**	**CCKB 20**	R900542844	20	40	52	20	45	72	20	25
40	**22 / 28**										
40	**28**	**CCKB 25**	R900542845	32	50	65	25	56	84	25	32
50	**28 / 36**										
50	**36**	**CCKB 32**	R900542846	50	65	80	32	70	105	32	40
63	**36 / 45**										
63	**45**	**CCKB 40**	R900542847	80	80	97	40	90	133	40	50
80	**45 / 56**										
80	**56**	**CCKB 50**	R900542848	125	100	120	50	110	165	50	63
100	**56 / 70**										
100	**70**	**CCKB 63**	R900542849	200	140	140	63	140	185	63	71
125	**70 / 90**										
125	**90**	**CCKB 80**	R900542850	320	180	180	80	170	225	80	90
160	**90 / 110**										
160	**110**	**CCKB 100**	6)	500	220	210	100	210	6)	100	110
200	**110 / 140**										

Dimensions: Fork clevis CCKB (clampable)
(dimensions in mm)

ØAL	ØMM	Type	KK	LE min.	CV max.	Clamping screw ISO 4762-10.9	M_A [3] Nm	*m* [4] kg
25	**14 / 18**	**CCKB 12** [5]	M12x1.25	18	16	M4x16	2.9	0.2
25	**18**	**CCKB 16**	M14x1.5	22	20	M6x20	10	0.35
32	**18 / 22**							
32	**22**	**CCKB 20**	M16x1.5	27	25	M8x30	25	0.7
40	**22 / 28**							
40	**28**	**CCKB 25**	M20x1.5	34	32	M10x35	49	1.4
50	**28 / 36**							
50	**36**	**CCKB 32**	M27x2	41	40	M12x40	85	2.8
63	**36 / 45**							
63	**45**	**CCKB 40**	M33x2	51	50	M16x50	210	5.2
80	**45 / 56**							
80	**56**	**CCKB 50**	M42x2	63	63	M20x60	425	9.5
100	**56 / 70**							
100	**70**	**CCKB 63**	M48x2	75	71	M24x80	730	21.5
125	**70 / 90**							
125	**90**	**CCKB 80**	M64x3	94	90	M30x100	1450	38.2
160	**90 / 110**							
160	**110**	**CCKB 100**	M80x3	114	110	M36x130	2480	[6]
200	**110 / 140**							

ØAL = Piston Ø

ØMM = Piston rod Ø

1) Lubricating nipple, cone head form A according to DIN 71412

2) Bolt Ø m6 required
(bolt and bolt lock are included in the scope of delivery and are not mounted upon delivery)

3) M_A = tightening torque
The fork clevis must always be screwed against the shoulder of the piston rod. Afterwards, the clamping screws must be tightened with the specified tightening torque.

4) ***m*** = Weight fork clevis in kg

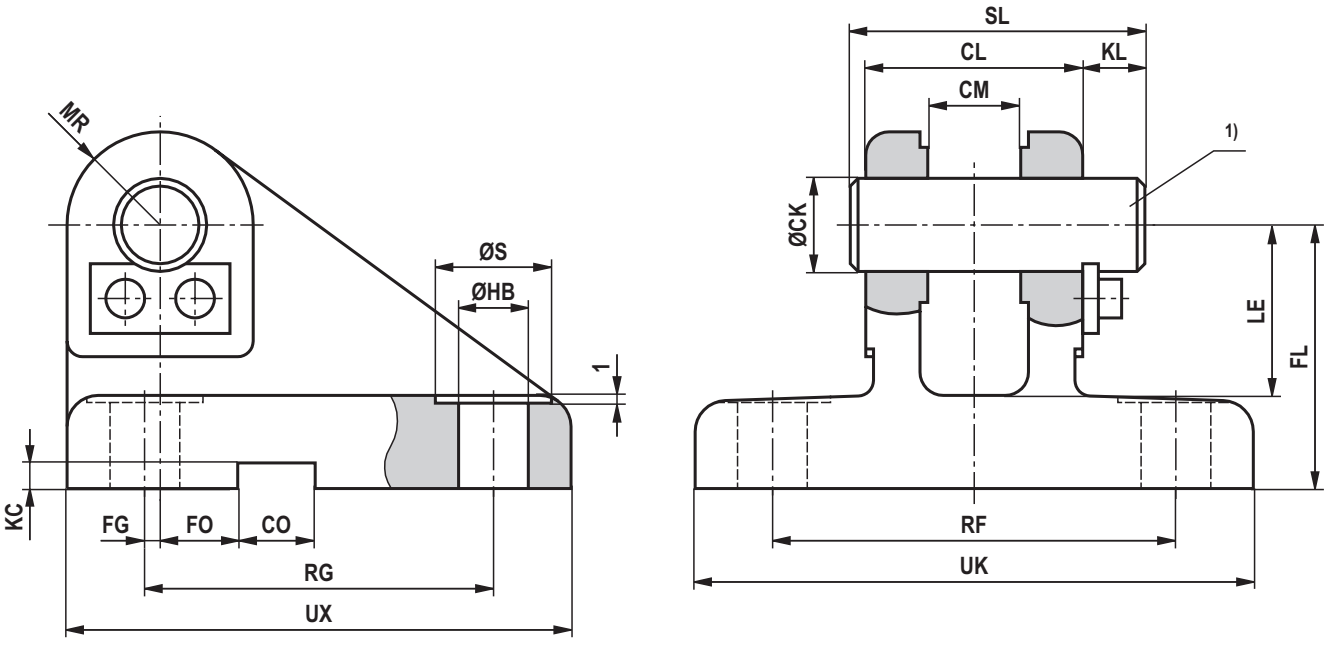
5) Without lubrication bore

6) On request

☞ **Notice:**
Geometry and dimensions may differ depending on the manufacturer. All graphical presentations are examples. In case of combination with other mounting elements, the usability must be checked.

Dimensions: Clevis bracket CLCA
(dimensions in mm)

ISO 8132, form B



ØAL	ØAL	ØMM	Type	Material no.	Nominal force kN	ØCK H9 [1]	CL h16	CM A12	CO N9	FG js14	FL js12	FO js14
25	**25**	**14 / 18**	**CLCA 12**	R900542861	8	12	28	12	10	2	34	10
32	**25**	**18**	**CLCA 16**	R900542862	12.5	16	36	16	16	3.5	40	10
	32	**18 / 22**										
40	**32**	**22**	**CLCA 20**	R900542863	20	20	45	20	16	7.5	45	10
	40	**22 / 28**										
50	**40**	**28**	**CLCA 25**	R900542864	32	25	56	25	25	10	55	10
	50	**28 / 36**										
63	**50**	**36**	**CLCA 32**	R900542865	50	32	70	32	25	14.5	65	6
	63	**36 / 45**										
80	**63**	**45**	**CLCA 40**	R900542866	80	40	90	40	36	17.5	76	6
	80	**45 / 56**										
100	**80**	**56**	**CLCA 50**	R900542867	125	50	110	50	36	25	95	0
	100	**56 / 70**										
125	**100**	**70**	**CLCA 63**	R900542868	200	63	140	63	50	33	112	0
	125	**70 / 90**										
160	**125**	**90**	**CLCA 80**	R900542869	320	80	170	80	50	45	140	0
	160	**90 / 110**										
200	**160**	**110**	**CLCA 100**	[3]	500	100	210	100	63	52.5	180	0
	200	**110 / 140**										
–	**200**	**140**	**CLCA 125**	[3]	800	125	270	125	80	75	230	0

Dimensions: Clevis bracket CLCA

(dimensions in mm)

ØAL	ØAL	ØMM	Type	ØHB H13	KC +0.3	KL	LE min.	MR max.	RF js14	RG js14	ØS	SL	UK max.	UX max.	*m* [2] kg
25	**25**	**14 / 18**	**CLCA 12**	9	3.3	8	22	12	52	45	15	38	72	65	0.45
32	**25**	**18**	**CLCA 16**	11	4.3	8	27	16	65	55	18	46	90	80	1
	32	**18 / 22**													
40	**32**	**22**	**CLCA 20**	11	4.3	10	30	20	75	70	18	58	100	95	1.5
	40	**22 / 28**													
50	**40**	**28**	**CLCA 25**	13.5	5.4	10	37	25	90	85	20	69	120	115	3
	50	**28 / 36**													
63	**50**	**36**	**CLCA 32**	17.5	5.4	13	43	32	110	110	26	87	145	145	5
	63	**36 / 45**													
80	**63**	**45**	**CLCA 40**	22	8.4	16	52	40	140	125	33	110	185	170	9.6
	80	**45 / 56**													
100	**80**	**56**	**CLCA 50**	26	8.4	19	65	50	165	150	40	133	215	200	15.5
	100	**56 / 70**													
125	**100**	**70**	**CLCA 63**	33	11.4	20	75	63	210	170	48	164	270	230	27.5
	125	**70 / 90**													
160	**125**	**90**	**CLCA 80**	39	11.4	26	95	80	250	210	57	202	320	280	47
	160	**90 / 110**													
200	**160**	**110**	**CLCA 100**	52	12.4	30	120	100	315	250	76	246	405	345	[3]
	200	**110 / 140**													
–	**200**	**140**	**CLCA 125**	52	15.4	32	170	125	365	350	76	310	455	450	[3]

ØAL = Piston Ø

ØMM = Piston rod Ø

[1] Bolt Ø m6 required
(bolt and bolt lock are included in the scope of delivery and are not mounted upon delivery)

[2] ***m*** = weight clevis bracket in kg

[3] On request

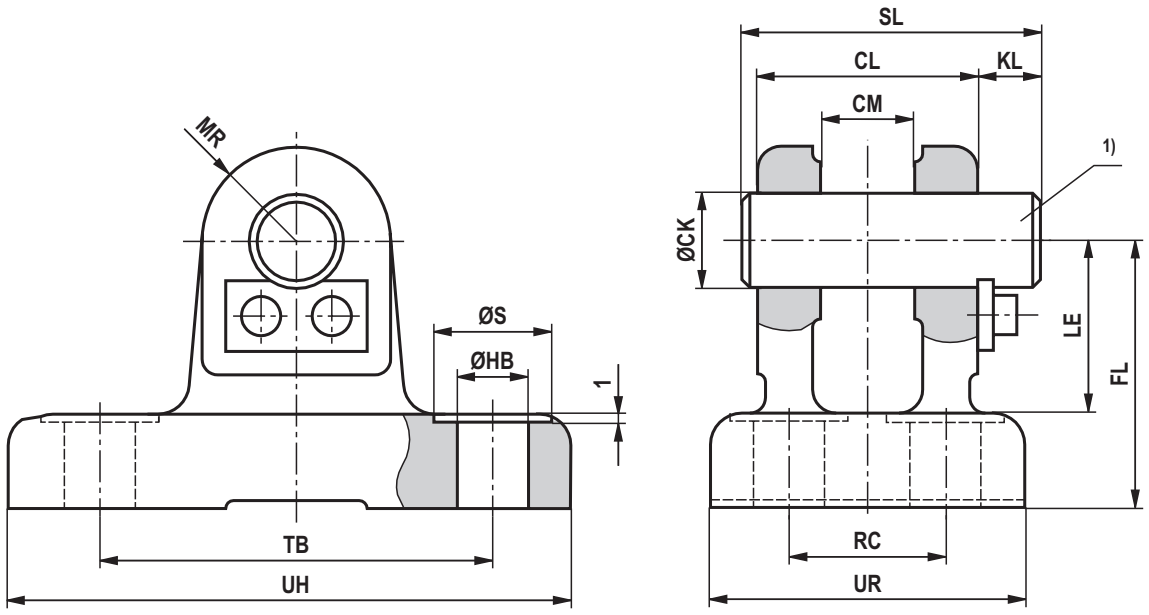
☞ **Notice:**

Geometry and dimensions may differ depending on the manufacturer. All graphical presentations are examples. In case of combination with other mounting elements, the usability must be checked.

Dimensions: Clevis bracket CLCD

(dimensions in mm)

ISO 8132, form A



ØAL	ØAL	ØMM	Type	Material no.	Nominal force kN	ØCK H9 [1]	CL h16	CM A13	FL js12	ØHB H13	KL
25	**25**	**14 / 18**	**CLCD 12**	R900542879	8	12	28	12	34	9	8
32	**25**	**18**	**CLCD 16**	R900542880	12.5	16	36	16	40	11	8
	32	**18 / 22**									
40	**32**	**22**	**CLCD 20**	R900542881	20	20	45	20	45	11	10
	40	**22 / 28**									
50	**40**	**28**	**CLCD 25**	R900542882	32	25	56	25	55	13.5	10
	50	**28 / 36**									
63	**50**	**36**	**CLCD 32**	R900542883	50	32	70	32	65	17.5	13
	63	**36 / 45**									
80	**63**	**45**	**CLCD 40**	R900542884	80	40	90	40	76	22	16
	80	**45 / 56**									
100	**80**	**56**	**CLCD 50**	R900542885	125	50	110	50	95	26	19
	100	**56 / 70**									
125	**100**	**70**	**CLCD 63**	R900542886	200	63	140	63	112	33	20
	125	**70 / 90**									
160	**125**	**90**	**CLCD 80**	R900542887	320	80	170	80	140	39	26
	160	**90 / 110**									
200	**160**	**110**	**CLCD 100**	[3]	500	100	210	100	180	45	30
	200	**110 / 140**									
–	**200**	**140**	**CLCD 125**	[3]	800	125	270	125	230	52	32

Dimensions: Clevis bracket CLCD

(dimensions in mm)

ØAL	ØAL	ØMM	Type	LE min.	MR max.	RC js14	ØS	SL	TB js14	UR max.	UH max.	*m* [2] kg
25	**25**	**14 / 18**	**CLCD 12**	22	12	20	15	38	50	40	70	0.35
32	**25**	**18**	**CLCD 16**	27	16	26	18	46	65	50	90	0.7
	32	**18 / 22**										
40	**32**	**22**	**CLCD 20**	30	20	32	18	58	75	58	98	0.95
	40	**22 / 28**										
50	**40**	**28**	**CLCD 25**	37	25	40	20	69	85	70	113	1.9
	50	**28 / 36**										
63	**50**	**36**	**CLCD 32**	43	32	50	26	87	110	85	143	3
	63	**36 / 45**										
80	**63**	**45**	**CLCD 40**	52	40	65	33	110	130	108	170	5.5
	80	**45 / 56**										
100	**80**	**56**	**CLCD 50**	65	50	80	40	133	170	130	220	10.6
	100	**56 / 70**										
125	**100**	**70**	**CLCD 63**	75	63	100	48	164	210	160	270	17
	125	**70 / 90**										
160	**125**	**90**	**CLCD 80**	95	80	125	57	202	250	210	320	32
	160	**90 / 110**										
200	**160**	**110**	**CLCD 100**	120	100	160	66	246	315	260	400	[3]
	200	**110 / 140**										
–	**200**	**140**	**CLCD 125**	170	125	200	76	310	385	320	470	[3]

ØAL = Piston Ø

ØMM = Piston rod Ø

[1] Bolt Ø m6 required
(bolt and bolt lock are included in the scope of delivery and are not mounted upon delivery)

[2] ***m*** = weight clevis bracket in kg

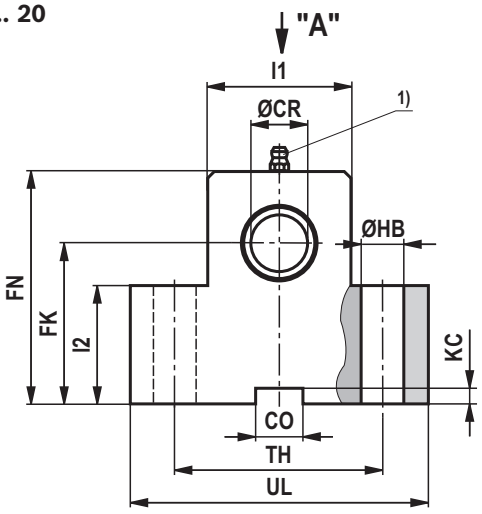
[3] On request

☞ **Notice:**
Geometry and dimensions may differ depending on the manufacturer. All graphical presentations are examples. In case of combination with other mounting elements, the usability must be checked.

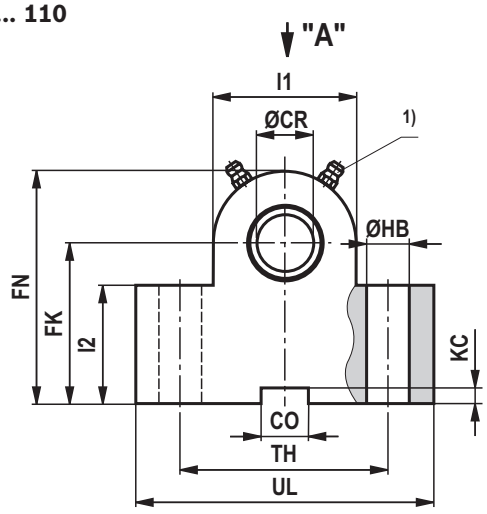
Dimensions: Trunnion bearing block CLTB
(dimensions in mm)

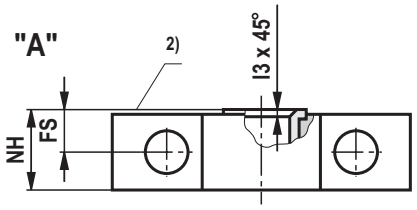
ISO 8132

CLTB 12 ... 20



CLTB 25 ... 110





ØAL	Type [3]	Material no.	Nominal force kN [4]	ØCR H7	CO N9	FK js12	FN max.	FS js14	ØHB H13	KC +0.3
25	**CLTB 12**	R900772607	8	12	10	34	50	8	9	3.3
32	**CLTB 16**	R900772608	12.5	16	16	40	60	10	11	4.3
40	**CLTB 20**	R900772609	20	20	16	45	70	10	11	4.3
50	**CLTB 25**	R900772610	32	25	25	55	80	12	13.5	5.4
63	**CLTB 32**	R900772611	50	32	25	65	100	15	17.5	5.4
80	**CLTB 40**	R900772612	80	40	36	76	120	16	22	8.4
100	**CLTB 50**	R900772613	125	50	36	95	140	20	26	8.4
125	**CLTB 63**	R900772614	200	63	50	112	180	25	33	11.4
160 [6]	**CLTB 80**	R900772615	320	80	50	140	220	31	39	11.4
200 [6]	**CLTB 100**	R901205929	500	100	63	180	280	45	52	12.4

Dimensions: Trunnion bearing block CLTB

(dimensions in mm)

ØAL	Type [3]	l1	l2	l3	NH max.	TH js14	UL max.	*m* [5] kg
25	**CLTB 12**	25	25	1	17	40	63	0.4
32	**CLTB 16**	30	30	1	21	50	80	0.85
40	**CLTB 20**	40	38	1.5	21	60	90	1.2
50	**CLTB 25**	56	45	1.5	26	80	110	2.1
63	**CLTB 32**	70	52	2	33	110	150	4.55
80	**CLTB 40**	88	60	2.5	41	125	170	7.3
100	**CLTB 50**	100	75	2.5	51	160	210	14.5
125	**CLTB 63**	130	85	3	61	200	265	23.1
160 [6]	**CLTB 80**	160	112	3.5	81	250	325	52.3
200 [6]	**CLTB 100**	200	145	4.5	102	295	385	[7]

ØAL = Piston Ø

1) Lubricating nipple, cone head form A according to DIN 71412

2) Contact surface trunnion (inside)

3) Bearing blocks are always supplied in pairs

4) Nominal force applies to applications in pairs

5) ***m*** = weight of trunnion bracket in kg (specified per pair)

6) Bearing blocks for piston Ø 160 and 200 mm, dimensions differ for replacement transactions (CDM1 / CGM1 / CSM1 series 1X). Please consult us!

7) On request

☞ **Notice:**

Geometry and dimensions may differ depending on the manufacturer. All graphical presentations are examples. In case of combination with other mounting elements, the usability must be checked.

The trunnion brackets are suitable for mounting type MT4.

Kinking

For the admissible stroke length with flexibly guided load and a factor of 3.5 for safety against kinking, please refer to the relevant table. For other installation positions of the cylinder, the admissible stroke length must be interpolated. Admissible stroke length for non-guided load on request. Kinking calculations are carried out according to the following formulas:

1. Calculation according to Euler

$$F = \frac{\pi^2 \cdot E \cdot I}{v \cdot L_K^2} \qquad \text{if } \lambda > \lambda_g$$

2. Calculation according to Tetmajer

$$F = \frac{d^2 \cdot \pi\,(335 - 0.62 \cdot \lambda)}{4 \cdot v} \quad \text{if } \lambda \le \lambda_g$$

Explanation:

E = Module of elasticity in N/mm²
= 2.1 x 10^5 for steel

I = Geometrical moment of inertia in mm⁴
for circular cross-section = $\frac{d^4 \cdot \pi}{64} = 0.0491 \cdot d^4$

v = 3.5 (safety factor)

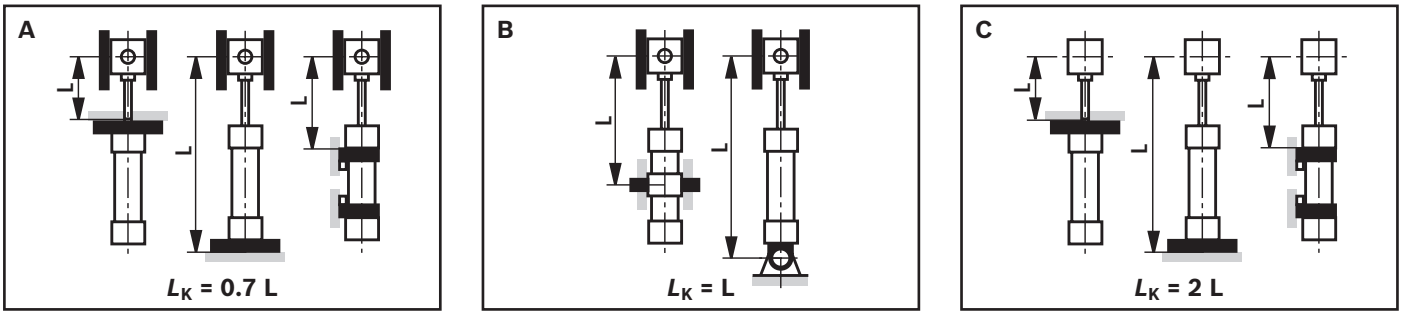
L_K = free kinking length in mm (depending on the type of mounting see sketches A, B, C)

d = Piston rod Ø in mm

λ = Slenderness ratio
$= \frac{4 \cdot L_K}{d}$ $\qquad \lambda_g = \pi \sqrt{\frac{E}{0.8 \cdot R_e}}$

R_e = yield strength of the piston rod material

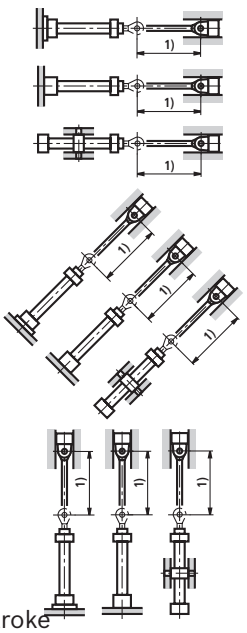
Influence of the type of mounting on the kinking length:



Admissible stroke length
(dimensions in mm)

Type of mounting MF2, MF4, MT4 trunnion (with $XV_{max.}$)

ØAL	ØMM	admissible stroke length with									Installation position
		70 bar			100 bar			160 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	14	260	270	305	215	220	240	160	165	170	0°
	18	435	455	485	385	400	460	310	315	340	
32	18	340	355	410	290	295	325	215	220	230	
	22	510	535	665	450	465	535	365	370	400	
40	22	405	425	495	345	355	395	265	270	285	
	28	640	680	875	575	600	710	475	490	535	
50	28	540	560	665	465	480	535	365	370	390	45°
	36	845	895	1180	765	805	970	645	665	735	
63	36	705	740	900	620	640	725	500	510	540	
	45	1030	1100	1480	945	990	1220	805	830	930	
80	45	855	900	1120	760	790	905	615	630	680	
	56	1230	1310	1700	1130	1190	1490	975	1010	1140	
100	56	1030	1090	1390	925	965	1130	760	780	850	
	70	1500	1590	2000	1380	1460	1880	1200	1250	1440	
125	70	1280	1360	1770	1160	1210	1450	970	995	1090	90°
	90	1900	2030	2300	1770	1880	2300	1570	1640	1950	
160	90	1620	1710	2320	1470	1540	1900	1250	1290	1440	
	110	2200	2350	2600	2060	2180	2600	1820	1900	2280	
200	110	1890	2010	2760	1730	1820	2260	1470	1520	1720	
	140	2720	2910	3000	2560	2720	3000	2290	2400	2980	

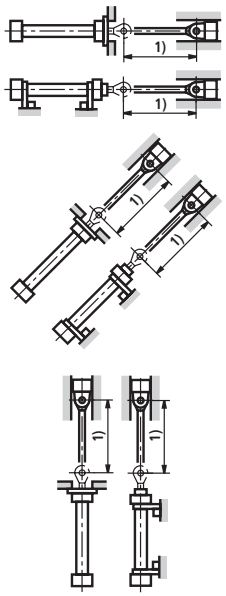


1) adm. stroke

Admissible stroke length
(dimensions in mm)

Type of mounting MF1, MF3, MS2

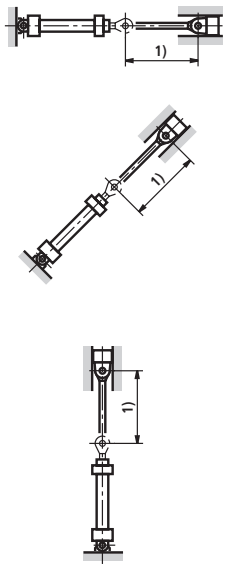
ØAL	ØMM	admissible stroke length with									Installation position
		70 bar			100 bar			160 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	14	350	355	380	300	305	315	235	240	240	0°
	18	530	550	645	470	485	535	390	400	415	
32	18	445	455	495	385	390	410	310	315	320	
	22	615	640	660	550	570	625	460	465	490	
40	22	530	545	590	460	470	490	370	375	380	
	28	775	810	980	700	725	815	590	600	635	
50	28	670	690	770	590	600	640	475	485	495	45°
	36	975	1020	1300	890	925	1080	765	785	845	
63	36	845	880	1000	750	770	830	615	625	645	
	45	1170	1230	1400	1070	1120	1330	920	950	1040	
80	45	1020	1060	1240	910	935	1020	750	765	795	
	56	1390	1470	1700	1280	1340	1620	1110	1150	1270	
100	56	1240	1290	1540	1110	1150	1280	930	940	990	
	70	1680	1780	2000	1560	1640	2000	1370	1410	1590	
125	70	1510	1570	1920	1360	1400	1590	1140	1160	1240	90°
	90	2090	2220	2300	1960	2060	2300	1740	1810	2110	
160	90	1880	1980	2500	1720	1780	2070	1460	1500	1610	
	110	2430	2580	2600	2280	2400	2600	2600	2110	2460	
200	110	2210	2320	2980	2020	2100	2470	1730	1770	1920	
	140	2980	3000	3000	2810	2980	3000	2540	2650	3000	



1) adm. stroke

Type of mounting: MP3, MP5

ØAL	ØMM	admissible stroke length with									Installation position
		70 bar			100 bar			160 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	14	155	160	175	120	125	130	75	80	85	0°
	18	300	310	360	250	260	285	190	195	220	
32	18	210	220	240	165	170	180	110	115	120	
	22	345	360	420	290	300	330	220	225	235	
40	22	255	265	295	205	210	225	140	145	150	
	28	445	465	560	385	395	445	295	305	320	
50	28	350	360	405	285	290	315	205	210	215	45°
	36	600	630	770	525	540	615	415	425	455	
63	36	470	490	560	395	405	440	290	292	310	
	45	740	780	970	650	680	780	525	535	580	
80	45	575	600	700	490	505	555	370	375	390	
	56	890	935	1190	790	820	960	640	660	715	
100	56	705	735	880	600	620	695	460	470	495	
	70	1085	1150	1500	970	1015	1215	800	825	910	
125	70	890	935	1135	770	800	905	605	615	655	90°
	90	1400	1490	2030	1270	1340	1660	1070	1110	1250	
160	90	1130	1190	1490	990	1030	1190	790	810	870	
	110	1620	1720	2370	1470	1550	1930	1240	1290	1450	
200	110	1320	1390	1770	1160	1210	1420	930	955	1040	
	140	2010	2140	3000	1850	1950	2520	1580	1650	1910	



1) adm. stroke

End position cushioning

End position cushioning:
The objective is to reduce the velocity of a moved mass, whose center of gravity lies on the cylinder axis to a level, at which neither the cylinder nor the machine into which the cylinder is installed is damaged. For velocities above 20 mm/s, we recommend the use of an end position cushioning feature, which absorbs energy without requiring the use of additional equipment. It must, however, always be verified whether end position cushioning is also required for lower velocities with large masses.

Damping capacity:
When decelerating masses via the end position cushioning, the structural-inherent cushioning capacity must not be exceeded. Cylinders with end position cushioning can achieve their full damping capacity only over the entire stroke length.
With the adjustable end position cushioning version “E”, a throttle valve is additionally provided when compared with version “D”. End position cushioning version “E” allows cycle times to be optimized. The max. damping capacity can only be achieved when the throttle valve is closed.
The calculation depends on the factors weight, velocity, system pressure and installation position. For this reason, mass and velocity are used to determine the characteristic D_m and system pressure and installation position to determine the characteristic D_p. These two characteristics are used for verifying the admissible damping capacity in the “damping capacity” diagram. The intersection point of the characteristics D_m and D_p must always be below the damping capacity curve of the selected cylinder. The values in the diagrams refer to an average oil temperature of +45 to +65 °C with the throttle valve being closed.
For special applications with very short stroke times, high velocities or large masses, cylinders with special end position cushioning versions can be offered on request. When fixed or adjustable stops are used, special measures must be taken!

Formulas:

$$D_m = \frac{m}{10^K};\ K = kv\ (0.5 - v)$$

m= moved weight in kg
v= stroke velocity in m/s
kv= see table page 65

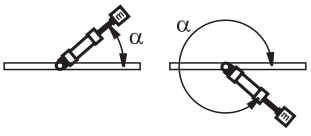
Extension:

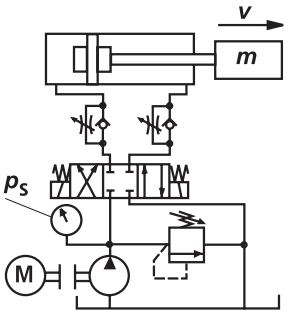
$$D_p = p_S - \frac{m \cdot 9.81 \cdot \sin\alpha}{A_1 \cdot 10}$$

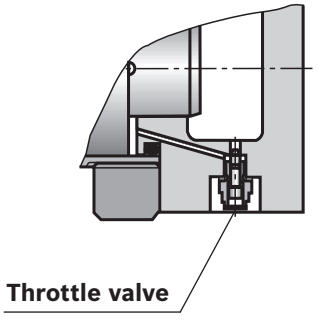
Retraction:

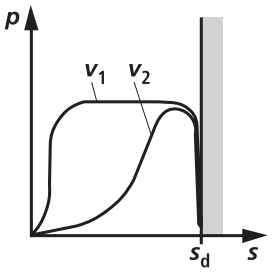
$$D_p = p_S + \frac{m \cdot 9.81 \cdot \sin\alpha}{A_3 \cdot 10}$$

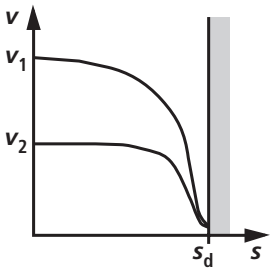
p_S = system pressure in bar
A_1= piston area in cm² (see page 10)
A_3= annulus area in cm² (see page 10)
α = angle to the horizontal in degree











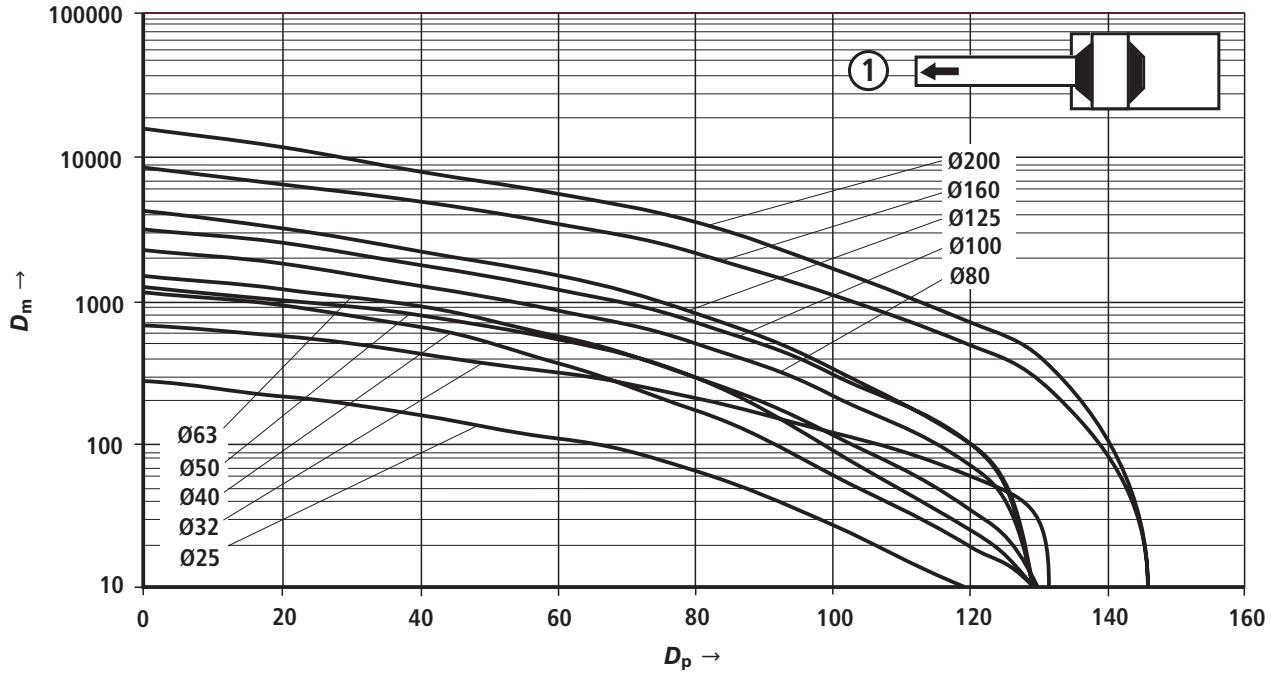
Damping length

ØAL mm	25	32	40	50	63	80	100	125	160	200
Head side	15	19	23	22	27	27	32	33	40	46
Base side	15	19	23	22	27	27	32	33	40	46

End position cushioning / damping capacity

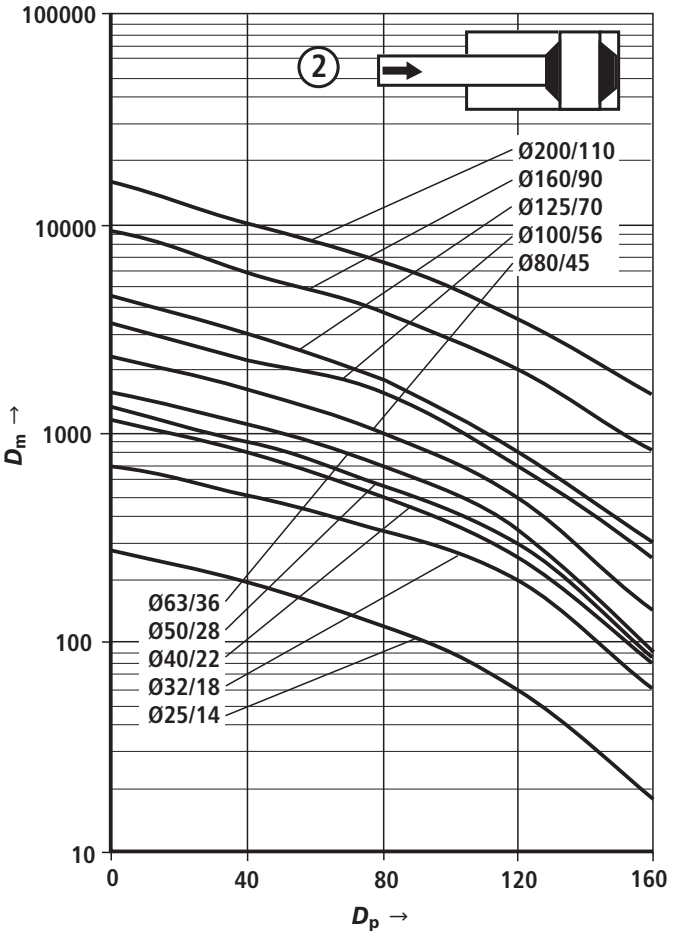
AL Ø mm	**25**	**32**	**40**	**50**	**63**	**80**	**100**	**125**	**160**	**200**
kv ①	2.97	2.56	2.82	3.51	3.02	2.53	2.65	2.91	2.76	2.95
kv ②	3.15	2.93	2.95	3.45	2.95	2.53	2.93	2.95	2.95	3.1
kv ③	3.1	2.73	3.1	3.51	2.95	2.51	2.91	2.95	2.91	2.93

Damping capacity:
Extension for CDM1 and CSM1 with *kv* ①

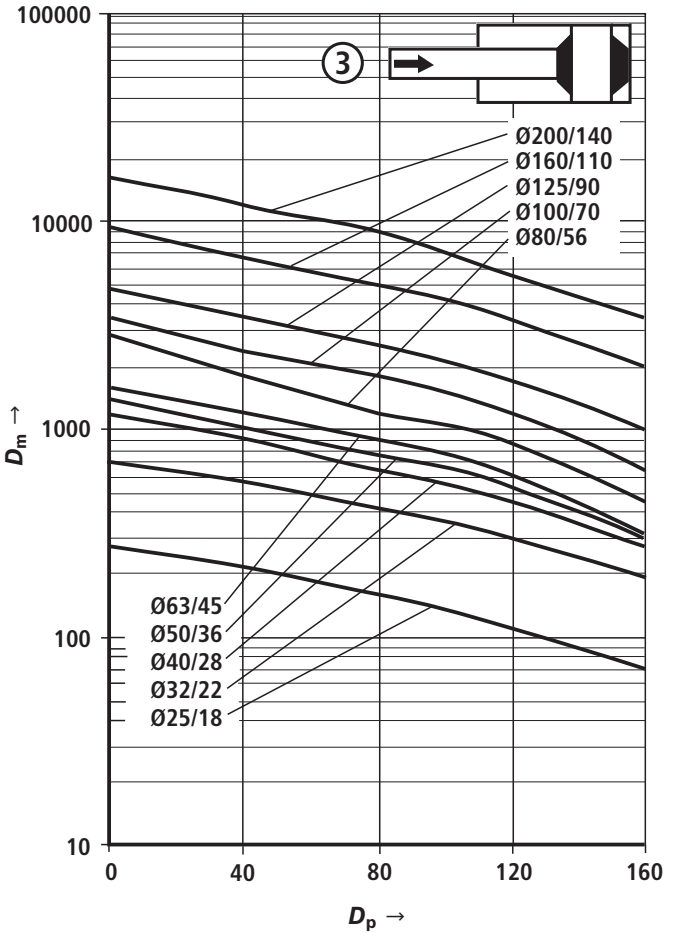


End position cushioning / damping capacity

Damping capacity:
Retraction for CDM1, CGM1 and CSM1 with *kv* ②;
Extension for CGM1 with *kv* ②



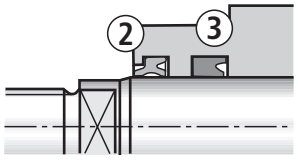
Damping capacity:
Retraction for CDM1, CGM1 and CSM1 with *kv* ③;
Extension for CGM1 with *kv* ③



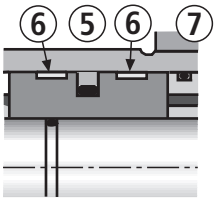
Seal (piston rod / piston)

Version "**M** and **V**"
Piston Ø (ØAL) 25 and 32 mm

Seal piston rod

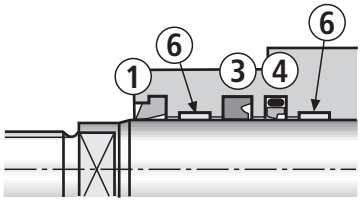


Seal piston

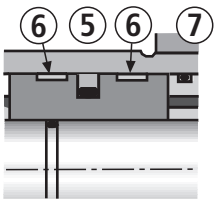


Piston Ø (ØAL) 40 ... 200 mm

Seal piston rod

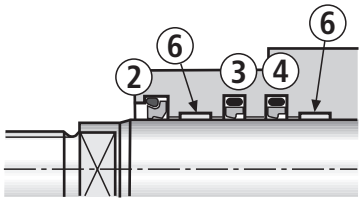


Seal piston

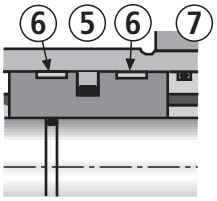


Version "**T** and **S**"
Piston Ø (ØAL) 40 ... 200 mm

Seal piston rod

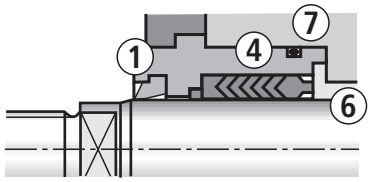


Seal piston

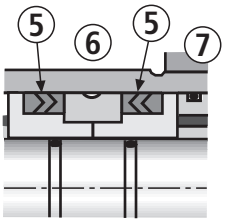


Version "**A**"
Piston Ø (ØAL) 50 ... 200 mm

Seal piston rod



Seal piston



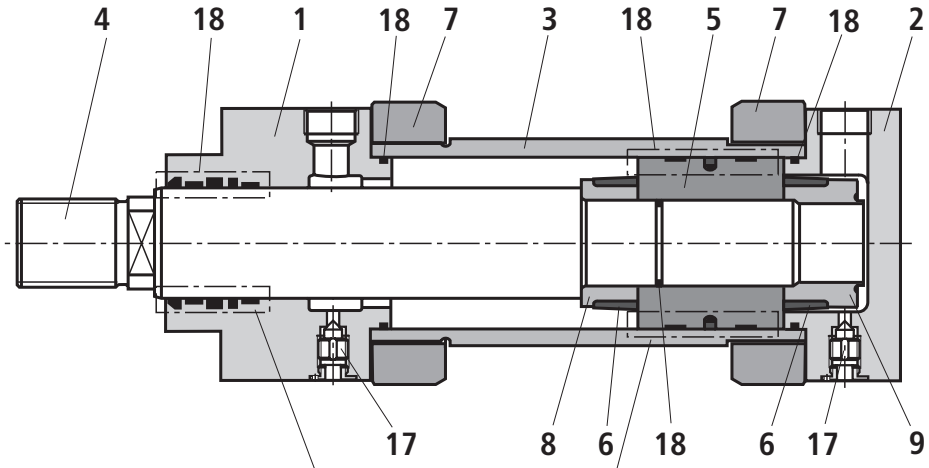
Medium	Seal version	Compatibility of the medium used / seal materials						
		① Wiper	② Double wiper		③ Rod seal		④ Rod seal (primary)	⑤ Piston seal
			Piston Ø 25 and 32	Piston Ø 40 ... 200	Piston Ø 25 and 32	(secondary) piston Ø 40 ... 200		
HL, HLP	M	TPE	AU	–	AU	AU	PTFE / NBR	TPE / NBR
HL, HLP, HFC	T	–	–	PTFE / NBR	–	PTFE / NBR	PTFE / NBR	PTFE / NBR
HFDR	V	TPE	FKM	–	FKM	PTFE / FKM	PTFE / FKM	PTFE / FKM
HFDR	S	–	–	PTFE / FKM	–	PTFE / FKM	PTFE / FKM	PTFE / FKM
HL, HLP, HFC	A	TPE	–	–	–	–	POM / NBR	POM / NBR

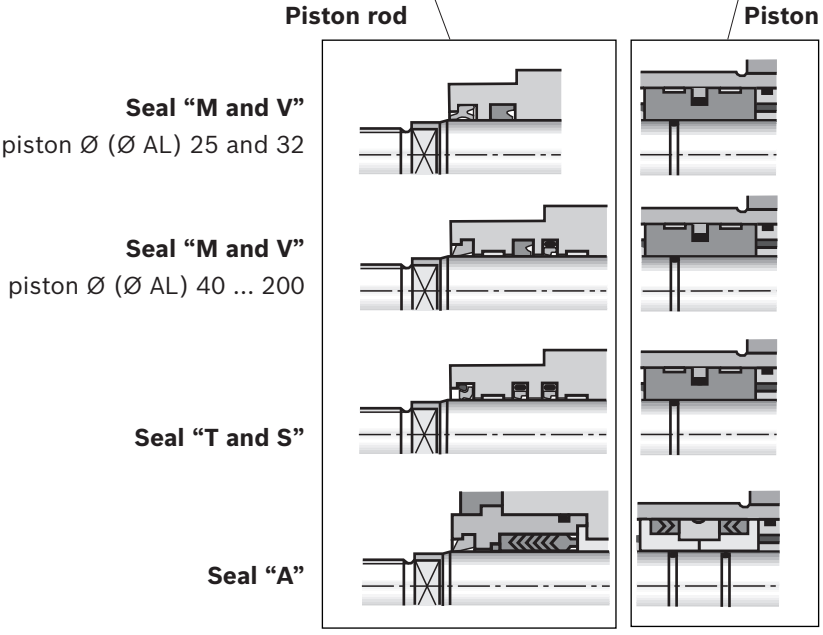
Medium	Seal version	⑥ Guide	⑦ Seal ring	Features
HL, HLP	M	Fabric composite	NBR	Holding function on the piston
HL, HLP, HFC	T	Fabric composite	NBR	low friction
HFDR	V	Fabric composite	FKM	high temperature
HFDR	S	Fabric composite	FKM	low friction and high temperature
HL, HLP, HFC	A	Red brass	NBR	Holding function

HL, HLP, HFDR: -20 ℃ ... +80 ℃

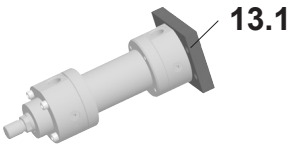
HFC: -20 ℃ ... +60 ℃

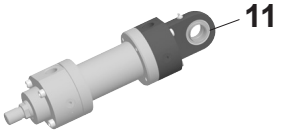
Spare parts drawing: Series: CDM1

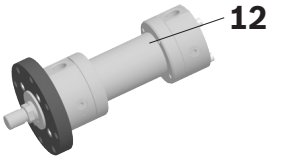


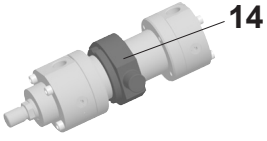


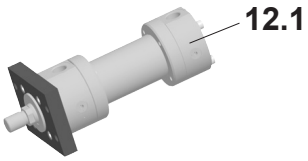
1 Head
2 Base
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Bushing
9 Bushing
10 Base MP3
11 Base MP5
12 Round flange MF3
12.1 Rectangular flange MF1
13 Round flange MF4
13.1 Rectangular flange MF2
14 Trunnion MT4
15 Foot MS2
17 Bleeding
18 Seal kit:
Wiper
Rod seal
Piston seal
Seal ring
Support ring
Guide ring

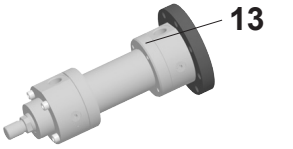


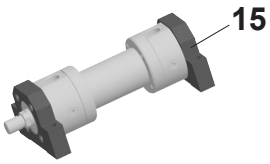




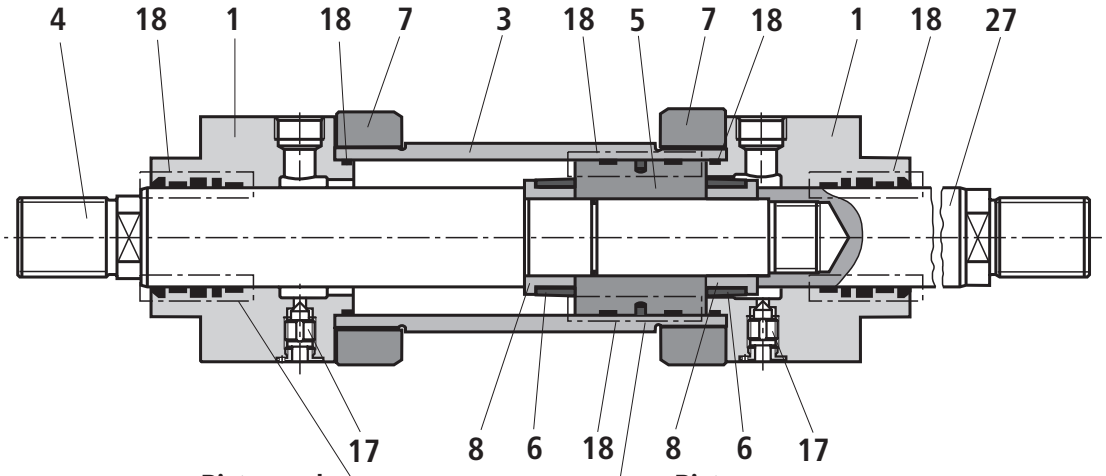




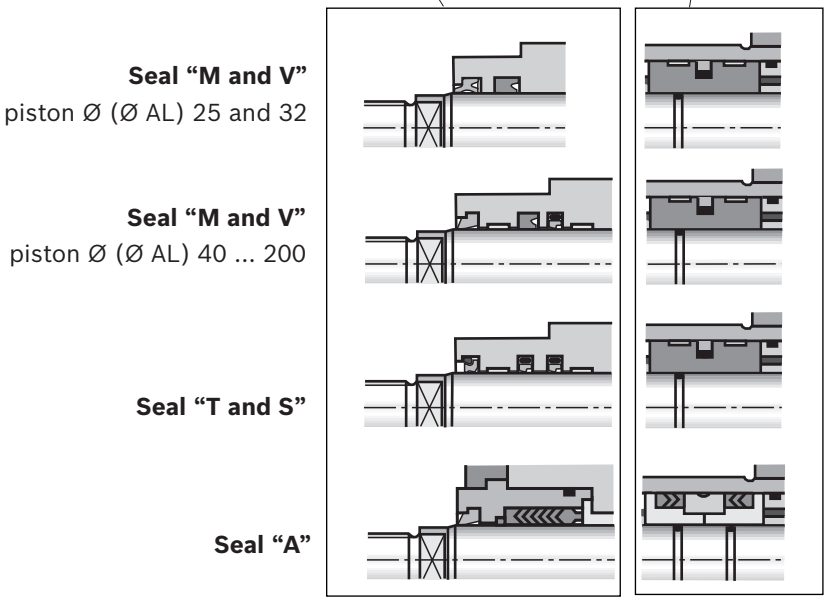




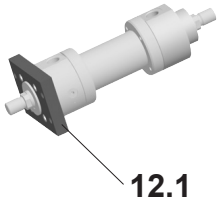
Spare parts drawing: Series: CGM1

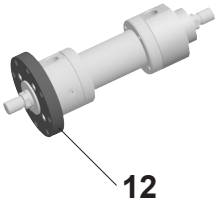


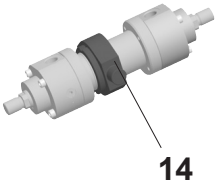
Piston rod **Piston**

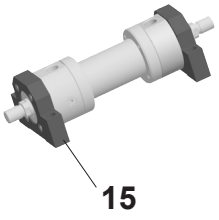


1 Head
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Bushing
12 Round flange MF3
12.1 Rectangular flange MF1
14 Trunnion MT4
15 Foot MS2
17 Bleeding
18 Seal kit:
Wiper
Rod seal
Piston seal
Seal ring
Guide ring
27 Piston rod

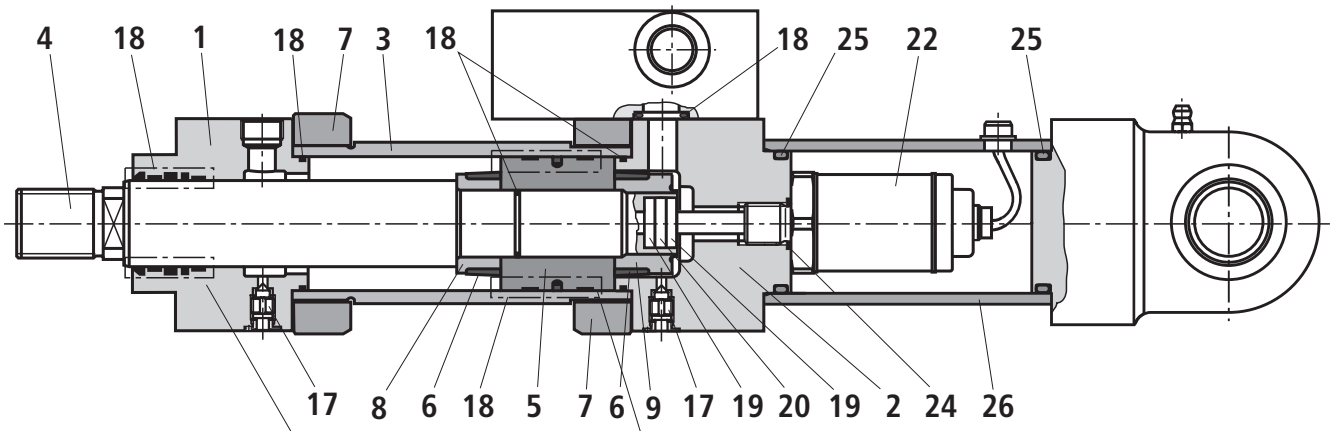


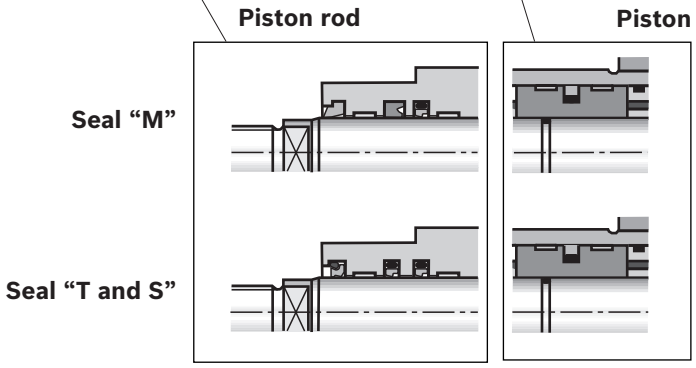






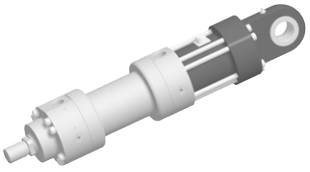
Spare parts drawing: Series CSM1: MP3 and MP5



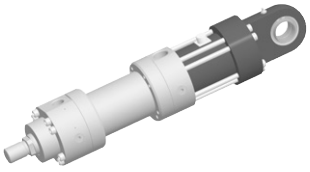


1 Head
2 Base
3 Pipe
4 Piston rod
5 Piston
6 Damping bush
7 Flange
8 Bushing
9 Bushing
17 Bleeding
18 Seal kit:
Wiper
Rod seal
Piston seal
Seal ring
Support ring
Guide ring
19 Insulating socket
20 Solenoid
22 Position transducer
24 Seal
25 Seal
26 Protective pipe

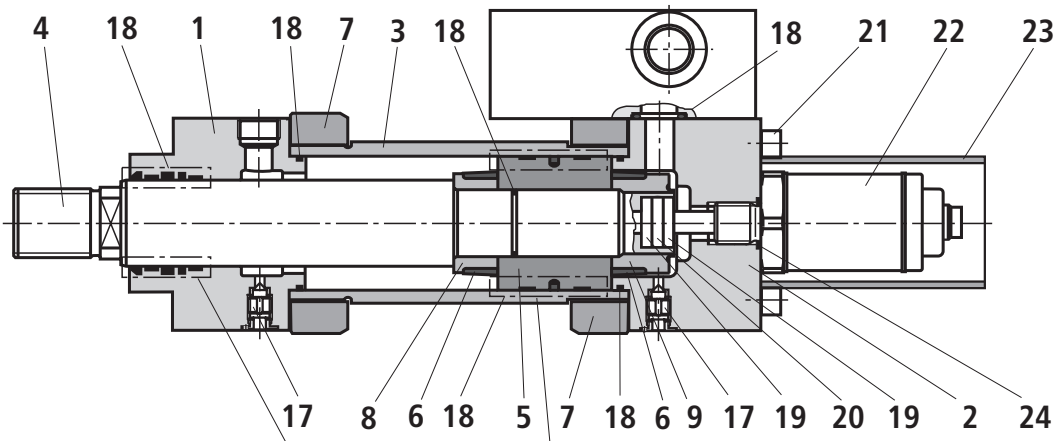
CSM1: MP3
Swivel eye at base

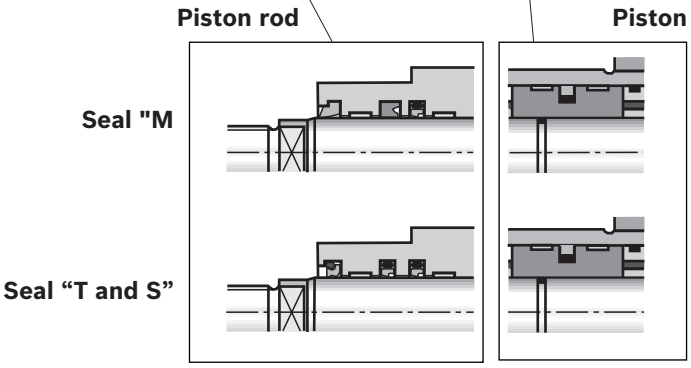


CSM1: MP5
Self-aligning clevis at base



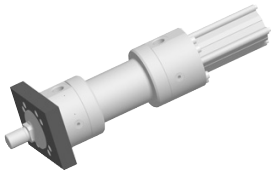
Spare parts drawing: Series CSM1: MF, MT4 and MS2





1	Head
2	Base
3	Pipe
4	Piston rod
5	Piston
6	Damping bush
7	Flange
8	Bushing
9	Bushing
17	Bleeding
18	Seal kit: Wiper Rod seal Piston seal Seal ring Support ring Guide ring
19	Insulating socket
20	Solenoid
21	Hex socket head cap screws
22	Position transducer
23	Protective pipe
24	Seal

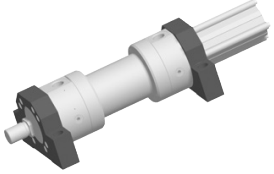
CSM1: MF1
Rectangular flange at head



CSM1: MF3
Round flange at head

CSM1: MT4
Trunnion

CSM1: MS2
Foot mounting



Seal kits: Series CDM1 [1] / CSM1 [2]

ØAL	ØMM	Material no. for seal design				
		M	T	V	S	A
25	14	R407026468	–	R407026567	–	–
	18	R407026529	–	R407026568	–	–
32	18	R407026530	–	R407026569	–	–
	22	R407026531	R407026548	R407026570	R407026587	–
40	22	R407026532	R407026549	R407026571	R407026588	–
	28	R407026533	R407026550	R407026572	R407026589	–
50	28	R407026534	R407026551	R407026573	R407026590	R407026604
	36	R407026535	R407026552	R407026574	R407026591	R407026605
63	36	R407026536	R407026553	R407026575	R407026592	R407026606
	45	R407026537	R407026554	R407026576	R407026593	R407026607
80	45	R407026538	R407026555	R407026577	R407026594	R407026608
	56	R407026539	R407026556	R407026578	R407026595	R407026609
100	56	R407026540	R407026557	R407026579	R407026596	R407026610
	70	R407026541	R407026558	R407026580	R407026597	R407026611
125	70	R407026542	R407026559	R407026581	R407026598	R407026612
	90	R407026543	R407026560	R407026582	R407026599	R407026613
160	90	R407026544	R407026561	R407026583	R407026600	R407026614
	110	R407026545	R407026562	R407026584	R407026601	R407026615
200	110	R407026546	R407026563	R407026585	R407026602	R407026616
	140	R407026547	R407026564	R407026586	R407026603	R407026617

ØAL = Piston Ø

ØMM = Piston rod Ø

1) Seal kits for proximity switches separate material no. see page 73

2) Seal kits for position transducers separate material no. see page 73

Seal kits: Series CGM1 [3)]

ØAL	ØMM	Material no. for seal design				
		M	T	V	S	A
25	14	R407026792	–	R407026829	–	–
	18	R407026793	–	R407026830	–	–
32	18	R407026794	–	R407026831	–	–
	22	R407026795	R407026812	R407026832	R407026849	–
40	22	R407026796	R407026813	R407026833	R407026850	–
	28	R407026797	R407026814	R407026834	R407026851	–
50	28	R407026798	R407026815	R407026835	R407026852	R407026866
	36	R407026799	R407026816	R407026836	R407026853	R407026867
63	36	R407026800	R407026817	R407026837	R407026854	R407026868
	45	R407026801	R407026818	R407026838	R407026855	R407026869
80	45	R407026802	R407026819	R407026839	R407026856	R407026870
	56	R407026803	R407026820	R407026840	R407026857	R407026871
100	56	R407026804	R407026821	R407026841	R407026858	R407026872
	70	R407026805	R407026822	R407026842	R407026859	R407026873
125	70	R407026806	R407026823	R407026843	R407026860	R407026874
	90	R407026807	R407026824	R407026844	R407026861	R407026875
160	90	R407026808	R407026825	R407026845	R407026862	R407026876
	110	R407026809	R407026826	R407026846	R407026863	R407026877
200	110	R407026810	R407026827	R407026847	R407026864	R407026878
	140	R407026811	R407026828	R407026848	R407026865	R407026879

[3)] Seal kits for proximity switches separate material no. see below

Only for proximity switches

ØAL	Material no. for seal design	
	M, T, A	V, S
25 and 32	–	–
40 ... 200	R900885938	R900885939

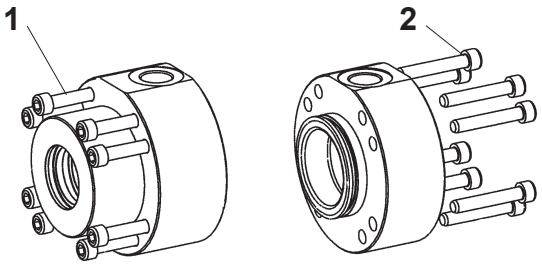
Only for position transducers

ØAL	Material no. for seal design	
	M, T	S
40	R407026769	R407026777
50	R407026770	R407026778
63	R407026771	R407026779
80	R407026772	R407026780
100	R407026773	R407026781
125	R407026774	R407026782
160	R407026775	R407026783
200	R407026776	R407026784

ØAL = Piston Ø
ØMM = Piston rod Ø

Tightening torques

Screws: Head and base
(Pos. 1 and 2)



Series	ØAL	Screw	Quantity	Quality class	Tightening torque Nm
CDM1 / CGM1 / CSM1	**25**	M6	4	10.9	13
CDM1 / CGM1 / CSM1	**32**	M6	4	10.9	13
CDM1 / CGM1 / CSM1	**40**	M6	4	10.9	13
CDM1 / CGM1 / CSM1	**50**	M8	4	10.9	30
CDM1 / CGM1 / CSM1	**63**	M10	4	10.9	60
CDM1 / CGM1 / CSM1	**80**	M10	8	10.9	50
CDM1 / CGM1 / CSM1	**100**	M10	8	10.9	60
CDM1 / CGM1 / CSM1	**125**	M12	12	10.9	100
CDM1 / CGM1 / CSM1	**160**	M12	16	10.9	100
CDM1 / CGM1 / CSM1	**200**	M16	16	10.9	200

Cylinder weight

Piston	Piston rod	CD/CS cylinder with 0 mm stroke length							per 100 mm stroke length	CG cylinder with 0 mm stroke length				per 100 mm stroke length
ØAL	**ØMM**	**M00**	**MP3** [1] **MP5** [1]	**MP3** [2] **MP5** [2]	**MF1 MF2**	**MF3 MF4**	**MT4**	**MS2**		**MF1**	**MF3**	**MT4**	**MS2**	
mm	mm	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg
25	**14**	2.2	2.3	–	2.6	2.7	2.6	3.2	0.5	3.0	3.1	3.0	3.6	0.6
	18	2.2	2.3	–	2.6	2.7	2.6	3.2	0.6	3.0	3.1	3.0	3.6	0.8
32	**18**	3.1	3.3	–	3.8	4.0	3.7	4.7	0.7	4.3	4.5	4.2	5.2	0.9
	22	3.1	3.3	–	3.8	4.0	3.7	4.7	0.8	4.3	4.5	4.2	5.2	1.1
40	**22**	5.5	5.9	–	6.4	6.7	6.5	7.6	0.9	7.1	7.5	7.3	8.4	1.2
	28	5.6	6.0	10.2	6.5	6.8	6.6	7.7	1.1	7.1	7.5	7.3	8.4	1.5
50	**28**	8.1	8.9	14.4	9.7	10.2	9.8	12.0	1.2	11.0	11.5	11.1	13.3	1.7
	36	8.3	9.1	14.6	9.9	10.4	10.0	12.2	1.5	11.0	11.5	11.1	13.3	2.3
63	**36**	14.0	15.5	25.0	17.0	17.5	17.0	20.0	2.1	18.5	19.0	18.5	22.0	2.9
	45	14.0	15.5	25.0	17.0	17.5	17.0	20.0	2.6	18.5	19.0	18.5	22.0	3.8
80	**45**	20.0	22.5	30.5	24.0	25.0	24.0	29.0	2.9	27.0	28.0	27.0	32.0	4.1
	56	20.0	22.5	30.5	24.0	25.0	24.0	29.0	3.6	27.0	28.0	27.0	32.0	5.5
100	**56**	36.0	41.0	53.0	42.5	44.5	43.5	52.0	5.4	48.0	50.0	49.0	57.5	7.4
	70	37.0	42.0	54.0	43.5	45.5	44.5	53.0	6.5	50.0	52.0	51.0	59.5	9.5
125	**70**	60.0	66.0	84.0	68.0	70.0	73.5	86.0	7.3	78.0	80.0	83.0	96.0	10.3
	90	61.0	67.0	85.0	69.0	71.0	74.5	87.0	9.3	81.0	83.0	86.0	99.0	14.2
160	**90**	107.0	122.0	150.0	–	121.0	136.0	148.0	11.5	–	143.0	158.0	170.0	16.5
	110	108.0	123.0	151.0	–	122.0	137.0	149.0	14.0	–	145.0	160.0	172.0	21.4
200	**110**	193.0	222.0	262.0	–	217.0	245.0	259.0	15.4	–	267.0	295.0	309.0	22.9
	140	196.0	225.0	265.0	–	220.0	248.0	262.0	20.1	–	273.0	301.0	315.0	32.1

[1] Mass for CD cylinder

[2] Mass for CS cylinder

Hydraulic cylinder
Mill type

RE 17326

CDL2 type

- Series L2
- Component series 1X

2 pressure ranges:

- Nominal pressure 160 bar *[16 MPa]*
- Nominal pressure 250 bar *[25 MPa]*

Features

- 4 types of mounting
- Piston Ø (**ØAL**) 25 ... 200 mm
- Piston rod Ø (**ØMM**) 14 ... 125 mm
- Stroke length up to 3 m
- Short length

Contents

Ordering code

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16	17	18
CD	**L2**		**/**		**/**		**/**			**1X**	**/**	**B**	**1**	**1**	**C**		**U**		**W**		*****

01	Differential cylinder	**CD**
02	Series L2	**L2**

Types of mounting

03	Self-aligning clevis at base	**MP5**
	Round flange at head	**MF3** 1)
	Trunnion	**MT4** 1; 2)
	No mounting	**M00** 3)
04	Piston Ø (**ØAL**) from 25 ... 200 mm; possible version see page 14	**...**
05	Piston rod Ø (**ØMM**) at a nominal pressure of 160 bar: 14, 18, 22, 28, 36, 45, 56 and 70 mm possible; see page 6 Piston rod Ø (**ØMM**) at a nominal pressure of 250 bar: 25, 32, 40, 50, 63, 80, 100 and 125 mm possible; see page 6	**...**
06	Stroke length in mm; admissbile stroke lengths must be observed, see page 24 and 25	**...**

Design principle

07	Head and base screwed in	**C** 3)
	Head screwed in, base welded	**D** 4)
08	Component series 10 ... 19 (10 ... 19: Unchanged installation and connection dimensions)	**1X**

Line connection/version

09	Pipe thread according to ISO 228-1	**B**

Line connection/position at head

10	View to piston rod 	**1**

Line connection/position at base

11	View to piston rod 	**1**

Piston rod design

12	Hard chromium-plated	**C**

Piston rod end

13	Thread	**H** 4)
	Piston rod end H with mounted swivel head CGKD	**K** 4)
	With swivel head, not removable	**F** 4; 5)
	Internal thread	**E** 3)
	Piston rod end E with mounted swivel head CGKL	**L** 3)

End position cushioning

14	**Without** end position cushioning	**U**

Seal design

15	Standard seal system (suitable for mineral oils HL, HLP)	**M**
	Standard seal system FKM (for phosphate ester HFDR)	**V**

Ordering code

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16	17	18
CD	**L2**		**/**		**/**		**/**			**1X**	**/**	**B**	**1**	**1**	**C**		**U**		**W**		*****

Option 1

16	**Without** option	**W**

Option 2

17	**Without** option	**W**
	With piston rod extension "LY" in mm	**Y** [6]
18	Further details in the plain text	*****

[1] Only piston Ø (**ØAL**) 25 ... 125 mm

[2] Trunnion position freely selectable. Always specify the dimension “XV/XU” in mm in the plain text when ordering (see order example)

[3] Only piston Ø (**ØAL**) 25 ... 32 mm

[4] Only piston Ø (**ØAL**) 40 ... 200 mm

[5] Only MP5; MT4

[6] Always specify the piston rod extension dimension “LY” in mm in the plain text when ordering (see order example)

Order example:

CDL2MT4/100/56/200D1X/B11CHUMWY LY = 20 XV = 245

CDL2MF3/80/45/100D1X/B11CHUMWW

Project planning software ICS (Interactive Catalog System)

The ICS (Interactive Catalog System) is a selection and project planning aid for hydraulic cylinders. The ICS allows designers for machines and systems to quickly and reliably find the perfect hydraulic cylinder solution through logic-guided type code enquiries. This software helps to solve design and project planning tasks more quickly and efficiently. After having been guided through the product selection, the user quickly and reliably gets the exact technical data of the selected component as well as 2D and 3D CAD data in the correct file format for all common CAD systems.

Technical data

(For applications outside these parameters, please consult us!)

general			
Weight		kg	See page 28
Installation position			Any
Ambient temperature range		°C	–20 ... +80
Primer coat [1]		µm	Min. 40

hydraulic			
Nominal pressure [2]		bar *[MPa]*	160 *[16]* (with **ØMM**: 14, 18, 22, 28, 36, 45, 56 and 70 mm)
		bar *[MPa]*	250 *[25]* (with **ØMM**: 25, 32, 40, 50, 63, 80, 100 and 125 mm)
Minimum operating pressure [3]	(without load)	bar *[MPa]*	10 *[1]*
Static test pressure		bar *[MPa]*	240/375 *[24/37.5]*
Hydraulic fluid			See table below
Hydraulic fluid temperature range		°C	–20 ... +80
Viscosity range		mm^2/s	12 ... 380 (preferably 20 ... 100)
Maximum permitted degree of contamination of the hydraulic fluid - cleanliness class according to ISO 4406 (c)			Class 20/18/15 [4]
Stroke speed (depending on line connection)		m/s	0.5

Hydraulic fluid		**Classification**	**Suitable sealing materials**	**Standards**
Mineral oils		HL, HLP	NBR, FKM	DIN 51524
Flame-resistant	– water-free	HFDR	FKM	ISO 12922

1) By default, hydraulic cylinders are primed with a coating (color gentian blue RAL 5010). Other colors upon request. With cylinders and attachment parts, the following surfaces are not primed or painted:
   - ▶ All fit diameters to the customer side
   - ▶ Sealing surfaces for line connection

   The surfaces that are not painted are protected by means of a corrosion protection agent (MULTICOR LF 80).

2) The cylinders of this series have been designed for 2 million load cycles at a nominal pressure of 160/250 bar. Higher operating pressures upon request. If there are extreme loads, such as high sequence cycles, the suitability of mounting elements and threaded piston rod connections for the application must be checked due to standardized geometries.

3) A minimum operating pressure is required in order to guarantee good functioning of the cylinder. Without load, a minimum pressure is recommend, for lower pressures, please contact us.

4) The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components.

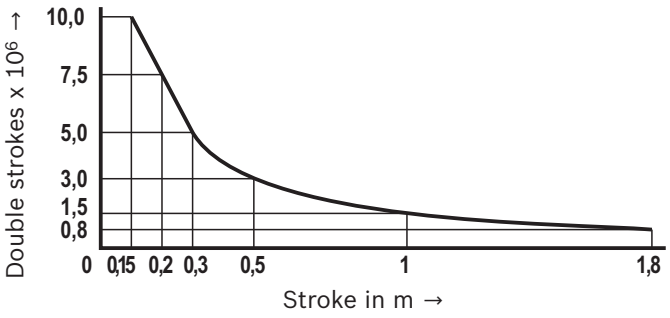
Technical data

(For applications outside these parameters, please consult us!)

Life cycle:

Rexroth cylinders correspond to the reliability recommendations for industrial applications.

≥ 10000000 double strokes in idle continuous operation or 3000 km piston travel at 70 % of the nominal pressure, without load on the piston rod, with a maximum velocity of 0.5 m/s, with a failure rate of less than 5 %.



☞ **Notice!**

Boundary and application conditions:

- The mechanical alignment of the movement axis and thus the mounting points of hydraulic cylinder and piston rod must be ensured. Lateral forces on the guides of piston rod and piston are to be avoided. It may be necessary to consider the own weight of the hydraulic cylinder (MP5 or MT4) or the piston rod.
- The buckling length/buckling load of the piston rod and/or the hydraulic cylinder must be observed (see page 24 and 25).
- The maximum admissible operating pressure must be complied with in any operating state of the hydraulic cylinder. Possible pressure intensification resulting from the area ratio of annulus to piston area and possible throttling points are to be observed.
- Detrimental environmental influences, like e.g. aggressive finest particles, vapors, high temperatures, etc. as well as contaminations and deterioration of the hydraulic fluid are to be avoided.

Standards:

Rexroth standard; main dimensions like piston Ø (**ØAL**) and piston rod Ø (**ØMM**) correspond to ISO 3320.

Acceptance:

Each cylinder is tested according to Rexroth standard and in compliance with ISO 10100: 2001.

Safety instructions:

For the assembly, commissioning and maintenance of hydraulic cylinders, the operating instructions 07100-B have to be observed!

Service and repair work has to be performed by Bosch Rexroth AG or by personnel especially trained for this purpose. No warranty is accepted for damage as a consequence of assembly, maintenance or repair work not performed by Bosch Rexroth AG.

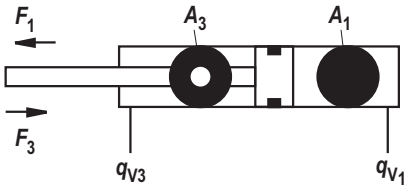
Check lists for hydraulic cylinders:

Cylinders the characteristics and/or application parameters of which deviate from the values specified in the data sheet can only be offered as special version upon request. For offers, the deviations of the characteristics and/or application parameters must be described in the check lists for hydraulic cylinders (07200).

This list does not claim to be complete. In case of questions regarding the compatibility with media or exceedance of the boundary or application conditions, please contact us.

Diameters, areas, forces, flow

Piston ØAL	**Piston rod ØMM** mm **at a nominal pressure of**		**Area ratio φ**	**Areas**		**Force generated by pressure** [1] F_1 kN **at a nominal pressure of**		**Traction force** [1] F_3 kN **at a nominal pressure of**		**Flow at 0.1** m/s [2]		**Max. available stroke length**
				Piston A_1	**Ring** A_3					**Off** q_{V1}	**On** q_{V3}	
mm	160 bar	250 bar	A_1/A_3	cm²	cm²	160 bar	250 bar	160 bar	250 bar	l/min	l/min	mm
25	**14**	**–**	1,46	4,91	3,37	7,85	–	5,39	–	2,94	2,02	600
32	**18**	**–**	1,46	8,04	5,50	12,86	–	8,79	–	4,82	3,30	800
40	**22**	**–**	1,43	12,56	8,76	20,10	–	14,02	–	7,54	5,26	1000
	–	**25**	1,64		7,65	–	31,40	–	19,13		4,59	
50	**28**	**–**	1,46	19,63	13,47	31,40	–	21,55	–	11,78	8,08	1200
	–	**32**	1,69		11,59	–	49,06	–	28,97		6,95	
63	**36**	**–**	1,49	31,16	20,98	49,85	–	33,57	–	18,69	12,59	1400
	–	**40**	1,68		18,60	–	77,89	–	46,49		11,16	
80	**45**	**–**	1,46	50,24	34,34	80,38	–	54,95	–	30,14	20,61	1700
	–	**50**	1,64		30,62	–	125,60	–	76,54		18,37	
100	**56**	**–**	1,46	78,50	53,88	125,60	–	86,21	–	47,10	32,33	2000
	–	**63**	1,66		47,34	–	196,25	–	118,36		28,41	
125	**70**	**–**	1,46	122,66	84,19	196,25	–	134,71	–	73,59	50,51	2300
	–	**80**	1,69		72,42	–	306,64	–	181,04		43,45	
160	**–**	**100**	1,64	200,96	122,46	–	502,40	–	306,15	120,58	73,48	2600
200	**–**	**125**	1,64	314,00	191,34	–	785,00	–	478,36	188,40	114,81	3000



[1] Theoretical static cylinder force (without consideration of the efficiency and admissible load for attachment parts like e.g. swivel heads, plates or valves, etc.)

[2] Stroke speed

Tolerances
(dimensions in mm)

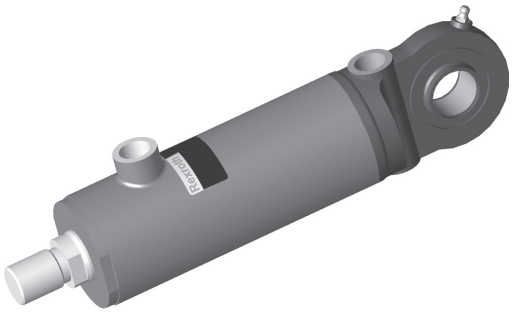
Installation dimensions	WC	XO/XF [1]	XV/XU	
Type of mounting	MF3	MP5	MT4	
Stroke length	**Tolerances**			**Stroke tolerances**
≤ 1250	±3	±2	±2	+2,5
> 1250 ... ≤ 3000	±4	±3	±4	+4

[1] Including stroke length

Overview: Types of mounting

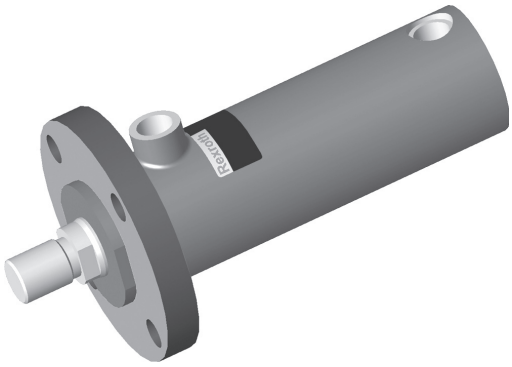
MP5

see page 8 and 9



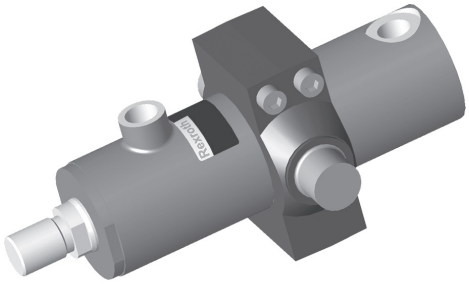
MF3

see page 10 and 11



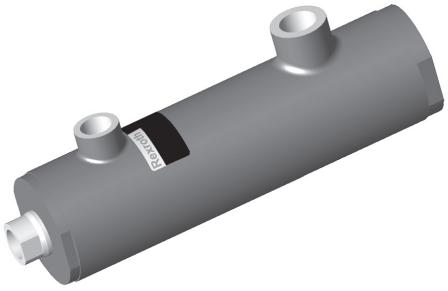
MT4

see page 12 and 13



M00

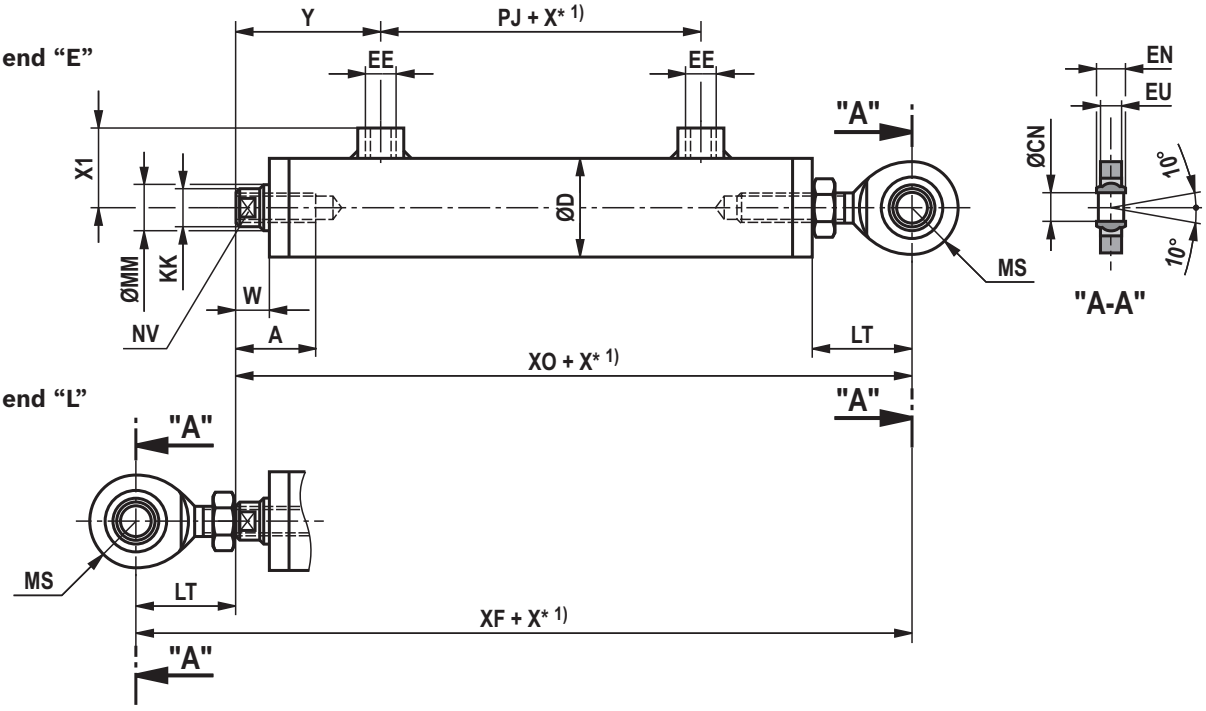
see page 14



Dimensions: Type of mounting MP5 (dimensions in mm)

ØAL 25 ... 32 mm

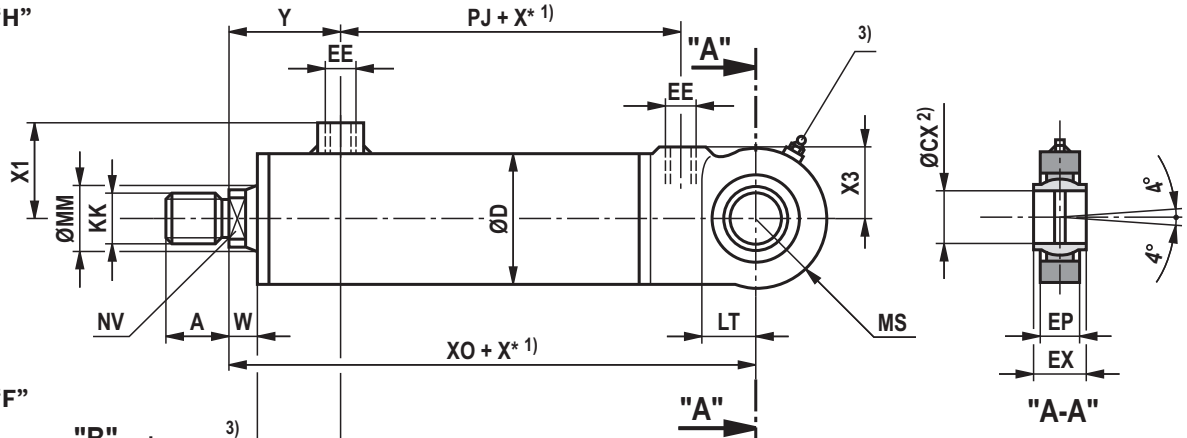
Piston rod end “E”



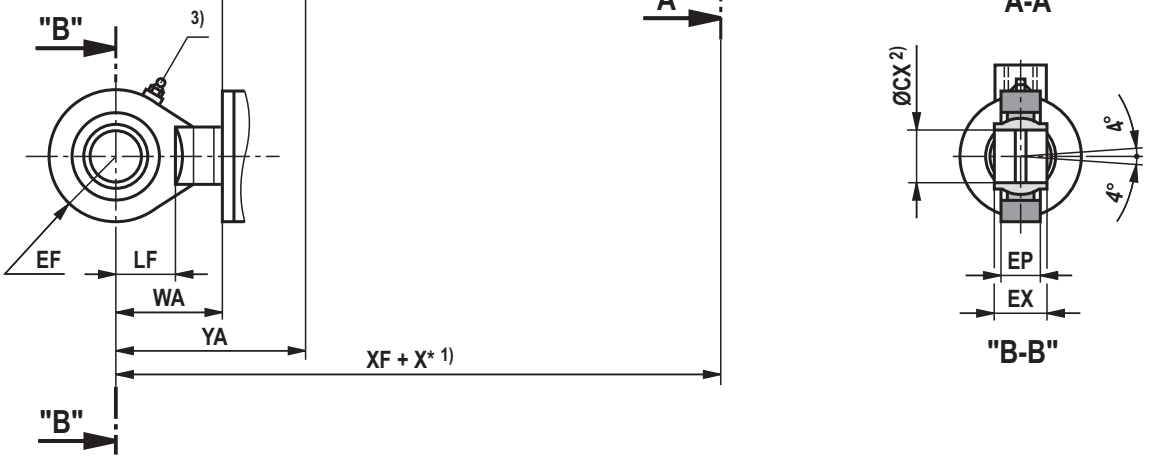
Piston rod end “L”

ØAL 40 ... 200 mm

Piston rod end “H”



Piston rod end “F”



Dimensions: Type of mounting MP5 (dimensions in mm)

ØAL	ØMM at a nominal pressure of		KK	A	NV	W	WA	ØD	Y	YA	PJ	XO	XF
	160 bar	250 bar											
25	**14**	**–**	M10	26	12	10	–	32	44	–	26	131	158
32	**18**	**–**	M12	28	15	11	–	40	48	–	31	148	180
40	**22**	**–**	M16x1,5	22	17	13	44	50	60	91	50	140	171
	–	**25**	M20x1,5	28	19	15	41	52	62	88	54	147	173
50	**28**	**–**	M20x1,5	28	22	13	50	60	62	99	57	157	194
	–	**32**	M27x2	36	27	15	52	62	64	101	65	167	204
63	**36**	**–**	M27x2	36	28	14	63	75	68	117	69	182	231
	–	**40**	M33x2	45	32	17	64	78	71	118	72	192	239
80	**45**	**–**	M33x2	45	36	16	76	95	84	144	76	208	268
	–	**50**	M42x2	56	41	19	74	100	84	139	81	222	277
100	**56**	**–**	M42x2	56	46	18	88	120	90	160	85	227	297
	–	**63**	M48x2	63	50	19	90	125	91	162	93	256	327
125	**70**	**–**	M48x2	63	60	20	106	150	99	185	93	259	345
	–	**80**	M64x3	85	65	22	112	160	105	195	113	307	397
160	**–**	**100**	M80x3	95	85	30	118	200	124	212	120	390	478
200	**–**	**125**	M100x3	112	110	35	143	245	139	247	124	434	542

ØAL	ØMM at a nominal pressure of		EE	X1 ±1	X3 ±1	LT	LF	MS ±2	ØCX H7	EX h12	EP max.	EF ±2	ØCN -0,008	EN h12	EU max.
	160 bar	250 bar													
25	**14**	**–**	G1/8	24,5	–	27	–	14,5	–	–	–	–	10	9	7,5
32	**18**	**–**	G1/4	33	–	32	–	17	–	–	–	–	12	10	8,5
40	**22**	**–**	G1/4	39	29	24	23	28	20	20	16	28	–	–	–
	–	**25**	G1/4	46	30	29	29	31	25	25	20	33	–	–	–
50	**28**	**–**	G3/8	45	33	31	29	33	25	25	20	33	–	–	–
	–	**32**	G3/8	52	37	37	34	39	32	32	22	42	–	–	–
63	**36**	**–**	G1/2	55	40	38	34	42	32	32	22	42	–	–	–
	–	**40**	G1/2	65	44	48	44	48	40	40	26	51	–	–	–
80	**45**	**–**	G1/2	65	53	46	44	51	40	40	26	51	–	–	–
	–	**50**	G1/2	76	57	57	50	60	50	50	34	61	–	–	–
100	**56**	**–**	G3/4	80	63	54	50	61	50	50	34	61	–	–	–
	–	**63**	G3/4	91	70	73	63	73	63	63	42	76	–	–	–
125	**70**	**–**	G3/4	95	78	65	63	76	63	63	42	76	–	–	–
	–	**80**	G3/4	109	88	90	80	92	80	80	52	92	–	–	–
160	**–**	**100**	G1	136	97	120	–	110	100	100	72	110	–	–	–
200	**–**	**125**	G1	158	120	145	–	130	125	125	92	130	–	–	–

1) **X*** = stroke length

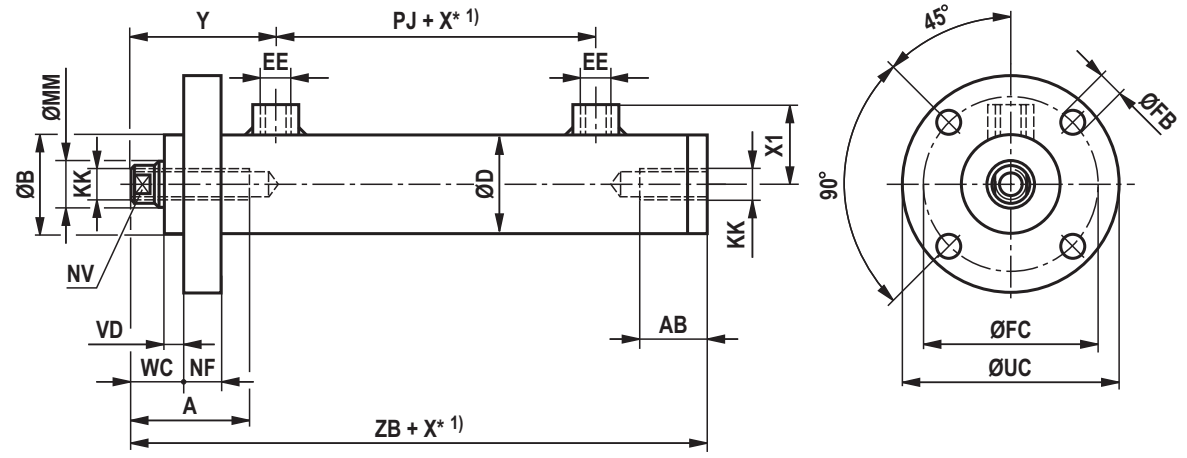
2) Related bolts Ø j6

3) Lubricating nipple, cone head form A according to DIN 71412

Dimensions: Type of mounting MF3 (dimensions in mm)

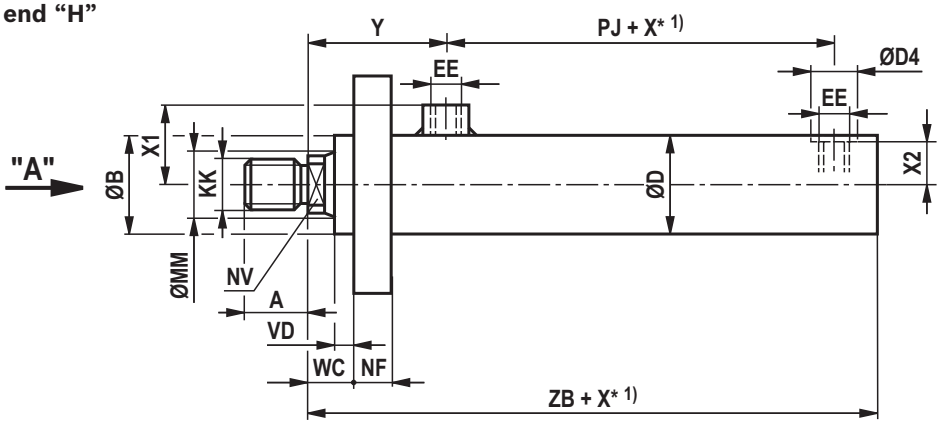
ØAL 25 ... 32 mm

Piston rod end “E”

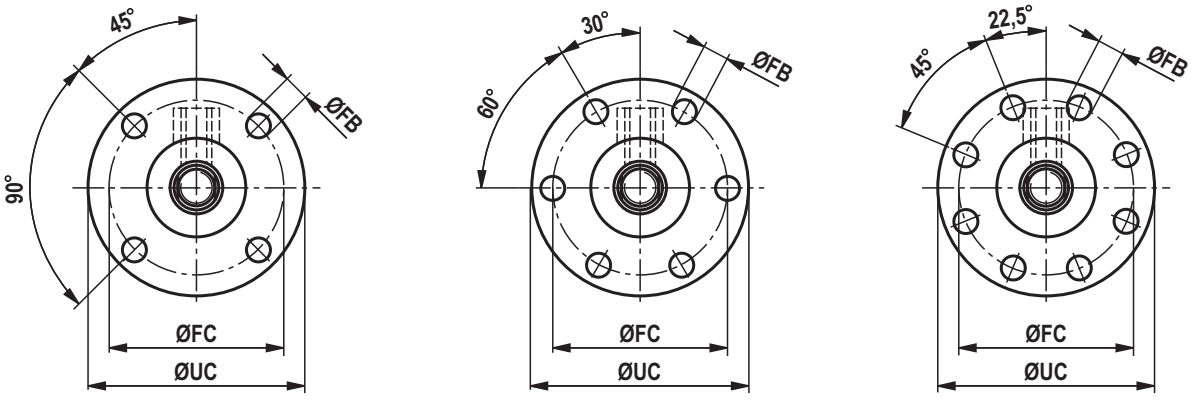


ØAL 40 ... 125 mm

Piston rod end “H”



"A"



Dimensions: Type of mounting MF3 (dimensions in mm)

ØAL	ØMM at a nominal pressure of		KK	A	AB	NV	ØB ±0,3	VD	WC	NF	ØD	Y	PJ
	160 bar	250 bar											
25	**14**	**–**	M10	26	21	12	32	6	16	12	32	44	26
32	**18**	**–**	M12	28	25	15	40	6	17	12	40	48	31
40	**22**	**–**	M16x1,5	22	–	17	50	7	20	14	50	60	50
	–	**25**	M20x1,5	28	–	19	52	7	22	17	52	72	53
50	**28**	**–**	M20x1,5	28	–	22	60	7	20	16	60	62	57
	–	**32**	M27x2	36	–	27	62	7	22	19	62	77	59
63	**36**	**–**	M27x2	36	–	28	75	7	21	20	75	68	71
	–	**40**	M33x2	45	–	32	78	7	24	22	78	86	71
80	**45**	**–**	M33x2	45	–	36	93	7	23	25	95	84	80
	–	**50**	M42x2	56	–	41	100	10	29	28	100	97	75
100	**56**	**–**	M42x2	56	–	46	120	8	26	25	120	90	89
	–	**63**	M48x2	63	–	50	125 [2]	11	30	32	125	106	89
125	**70**	**–**	M48x2	63	–	60	150 [2]	9	29	32	150	99	97
	–	**80**	M64x3	85	–	65	160 [2]	17	39	35	160	119	102

ØAL	ØMM at a nominal pressure of		EE	ØD4	X1 ±1	X2 ±1	ZB	ØFB H13	ØFC	ØUC max.	Number of mounting bores
	160 bar	250 bar									
25	**14**	**–**	G1/8	–	24,5	–	104	6,6	55	68	4
32	**18**	**–**	G1/4	–	33	–	116	9	65	78	4
40	**22**	**–**	G1/4	23	39	22	124	11	85	108	4
	–	**25**	G1/4	23	46	23	139	11	92	114	6
50	**28**	**–**	G3/8	27	45	27	135	13,5	100	128	4
	–	**32**	G3/8	27	52	28	151	13,5	106	132	6
63	**36**	**–**	G1/2	36	55	33,5	159	17,5	120	148	4
	–	**40**	G1/2	36	65	35	177	17,5	132	164	6
80	**45**	**–**	G1/2	36	65	44,5	185	22	150	188	4
	–	**50**	G1/2	36	76	47	192	17,5	160	193	8
100	**56**	**–**	G3/4	43	80	57	202	22	180	218	4
	–	**63**	G3/4	43	91	60	218	22	190	230	6
125	**70**	**–**	G3/4	43	95	72	221	17,5	200	238	8
	–	**80**	G3/4	43	109	77	244	22	230	270	8

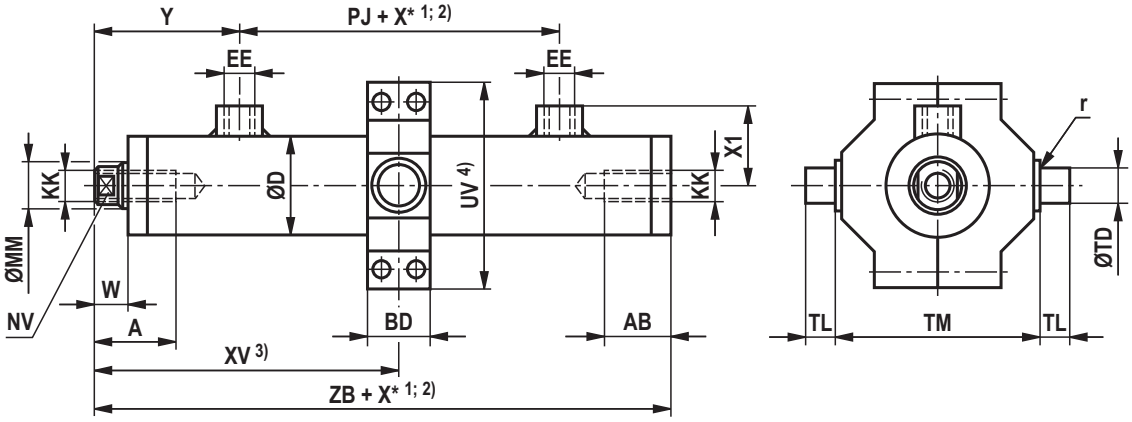
[1] **X*** = stroke length

[2] Tolerance: ±0.5

Dimensions: Type of mounting MT4 (dimensions in mm)

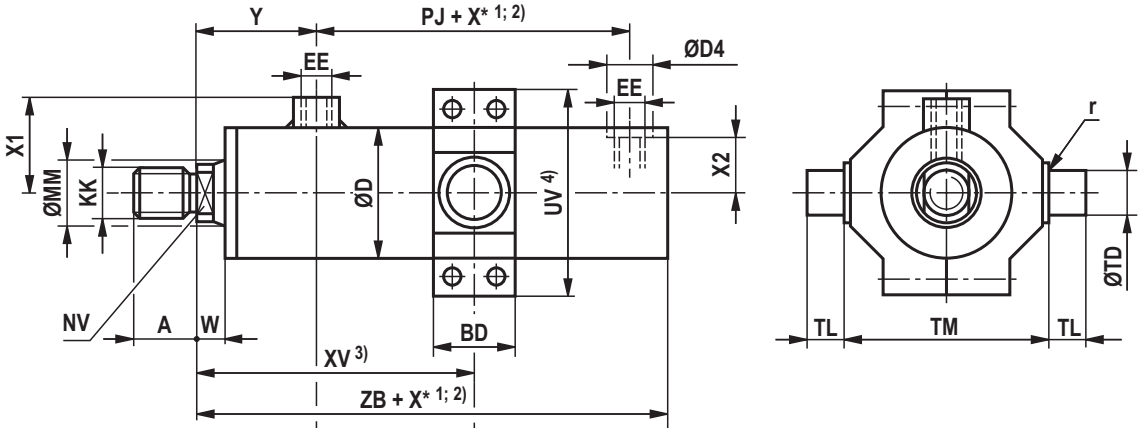
ØAL 25 ... 32 mm

Piston rod end “E”

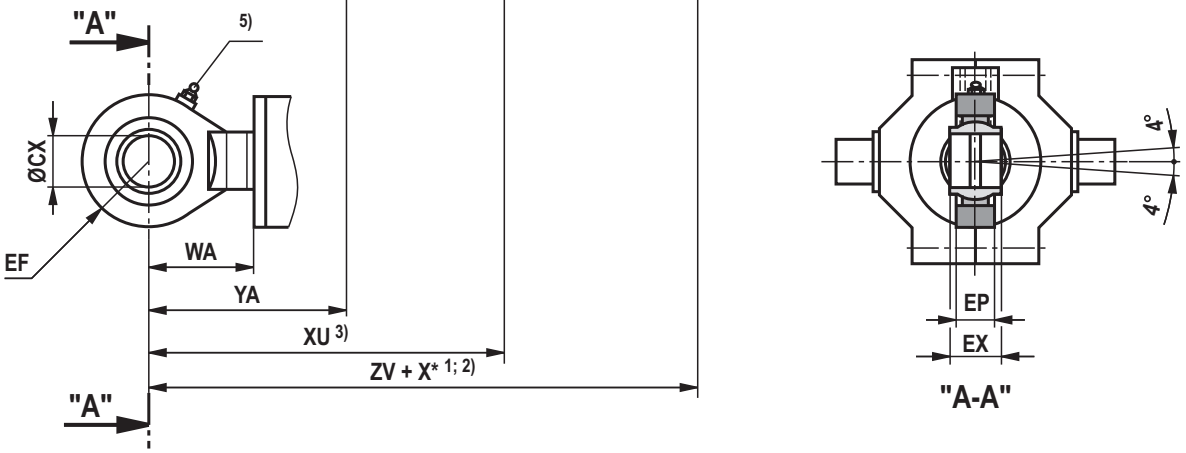


ØAL 40 ... 125 mm

Piston rod end “H”



Piston rod end “F”



Dimensions: Type of mounting MT4 (dimensions in mm)

ØAL	ØMM at a nominal pressure of		KK	A	AB	NV	W	WA	ØD	Y	YA	PJ	X* [2]	XV		XU	
	160 bar	250 bar											min.	min.	max.	min.	max.
25	**14**	**–**	M10	26	21	12	10	–	32	44	–	26	21	68	47+X*	–	–
32	**18**	**–**	M12	28	25	15	11	–	40	48	–	31	28	78	50+X*	–	–
40	**22**	**–**	M16x1,5	22	–	17	13	44	50	60	91	50	23	94	71+X*	125	102+X*
	–	**25**	M20x1,5	28	–	19	15	41	52	62	88	53	60	112	52+X*	138	78+X*
50	**28**	**–**	M20x1,5	28	–	22	13	50	60	62	99	57	32	104	72+X*	141	109+X*
	–	**32**	M27x2	36	–	27	15	52	62	64	101	62	66	121	55+X*	158	92+X*
63	**36**	**–**	M27x2	36	–	28	14	63	75	68	117	71	37	119	82+X*	168	131+X*
	–	**40**	M33x2	45	–	32	17	64	78	71	118	71	78	135	57+X*	182	104+X*
80	**45**	**–**	M33x2	45	–	36	16	76	95	84	144	80	51	144	93+X*	204	153+X*
	–	**50**	M42x2	56	–	41	19	74	100	84	139	78	91	157	66+X*	212	121+X*
100	**56**	**–**	M42x2	56	–	46	18	88	120	90	160	89	69	162	93+X*	232	163+X*
	–	**63**	M48x2	63	–	50	19	90	125	91	162	90	115	180	65+X*	251	136+X*
125	**70**	**–**	M48x2	63	–	60	20	106	150	99	185	97	85	183	98+X*	269	184+X*
	–	**80**	M64x3	85	–	65	22	112	160	105	195	102	135	208	73+X*	298	163+X*

ØAL	ØMM at a nominal pressure of		EE	ØD4	X1 ±1	X2 ±1	ZB	ZV	BD	UV max.	TD f8	TL	TM h12	r	ØCX H7	EX h12	EP max.	EF ±2
	160 bar	250 bar																
25	**14**	**–**	G1/8	–	24,5	–	104	–	20	66	12	10	63	1	–	–	–	–
32	**18**	**–**	G1/4	–	33	–	116	–	25	77	16	12	75	1	–	–	–	–
40	**22**	**–**	G1/4	23	39	22	124	155	35	88	20	16	90	1,5	20	20	16	28
	–	**25**	G1/4	23	46	23	129	155	40	98	25	20	95	1,5	25	25	20	33
50	**28**	**–**	G3/8	27	45	27	135	172	40	102	25	20	105	1,5	25	25	20	33
	–	**32**	G3/8	27	52	28	141	178	50	114	32	25	112	1,5	32	32	22	42
63	**36**	**–**	G1/2	36	55	33,5	159	208	50	129	32	25	120	2	32	32	22	42
	–	**40**	G1/2	36	65	35	162	209	60	137	40	32	125	1,5	40	40	26	51
80	**45**	**–**	G1/2	36	65	44,5	185	245	65	148	40	32	135	2,5	40	40	26	51
	–	**50**	G1/2	36	76	47	182	237	75	167	50	40	150	2	50	50	34	61
100	**56**	**–**	G3/4	43	80	57	202	272	80	178	50	40	160	2,5	50	50	34	61
	–	**63**	G3/4	43	91	60	204	275	100	201	63	50	180	2,5	63	63	42	76
125	**70**	**–**	G3/4	43	95	72	221	307	100	218	63	50	195	3	63	63	42	76
	–	**80**	G3/4	43	109	77	230	320	120	257	80	63	224	2,5	80	80	52	92

1) **X*** = stroke length

2) Please observe min. stroke length "**X*** min".

3) Trunnion position freely selectable. Always specify the dimensions "XV/XU" in mm in the plain text when ordering.

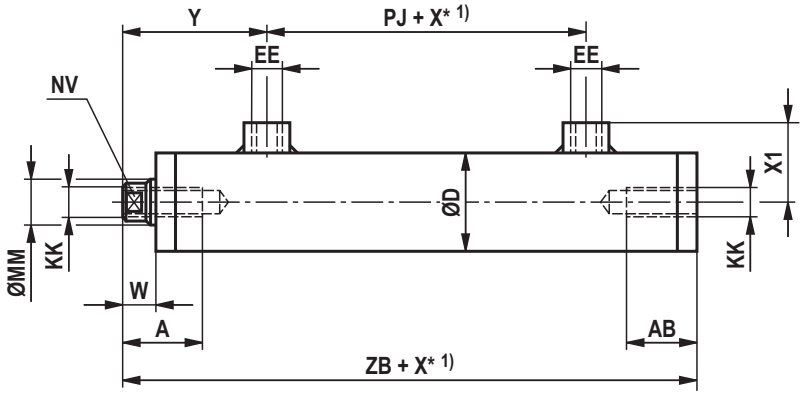
4) The specified dimensions are maximum values.

5) Lubricating nipple, cone head form A according to DIN 71412

Dimensions: Type of mounting M00 (dimensions in mm)

ØAL 25 ... 32 mm

Piston rod end “E”

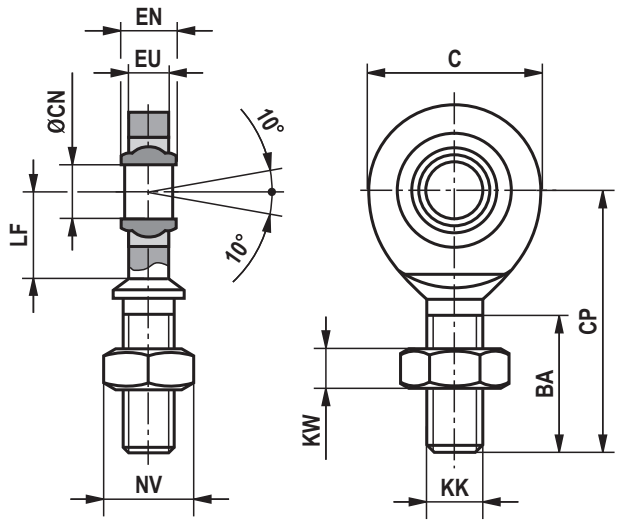


ØAL	ØMM at a nominal pressure of		KK	A	AB	NV	W	ØD	Y	PJ	EE	X1 ±1	ZB
	160 bar	250 bar											
25	**14**	**–**	M10	26	21	12	10	32	44	26	G1/8	24,5	104
32	**18**	**–**	M12	28	25	15	11	40	48	31	G1/4	33	116

1) **X*** = stroke length

Dimensions: Swivel head CGKL (dimensions in mm)

ISO 12240-4



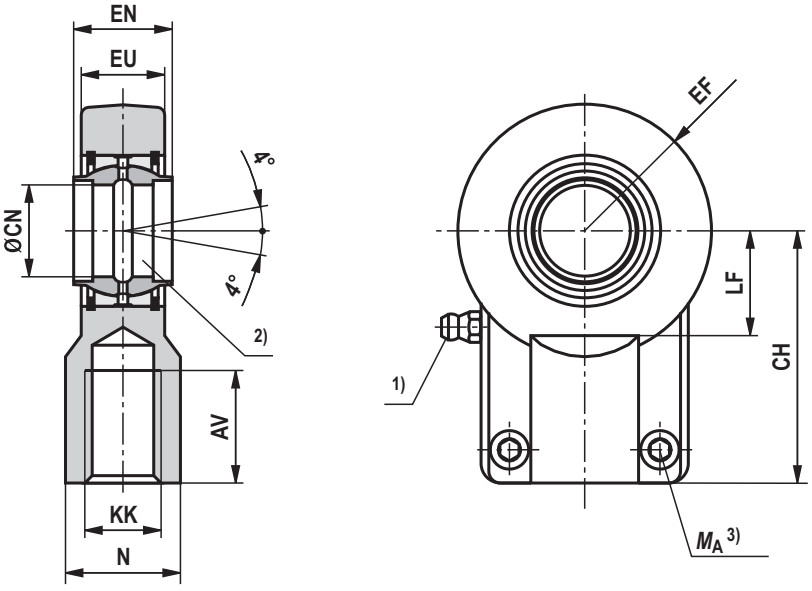
ØAL	ØMM	Type	Material no.	KK	BA min.	C	ØCN -0,008	CP max.	EN h12	EU max.	KW	LF min.	NV	m [1] kg	C_0 [2] kN	F_{adm} [3] kN
25	**14**	**CGKL 10**	3712500031	M10	26	29	10	48	9	7,5	5	15	16	0,1	22	8,1
32	**18**	**CGKL 12**	3713200031	M12	28	34	12	54	10	8,5	6	18	18	0,1	30,4	11,2

ØAL = piston Ø
ØMM = piston rod Ø
1) m = weight of swivel head in kg
2) C_0 = static load rating of the swivel head in kN
3) F_{adm} = maximum admissible load on the swivel head during oscillatory or alternating loads

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

Dimensions: Swivel head CGKD (clampable) (dimensions in mm)

ISO 8132



ØAL	ØMM	Type	Material no.	Nominal force kN	AV min.	N max.	CH js13	EF max.	ØCN H7 2)	EN h12	EU max.
40	**22**	**CGKD 20**	R900308576	20	23	28	52	25	20	20	17,5
40	**25**	**CGKD 25**	R900323332	32	29	31	65	32	25	25	22
50	**28**										
50	**32**	**CGKD 32**	R900322049	50	37	38	80	40	32	32	28
63	**36**										
63	**40**	**CGKD 40**	R900322029	80	46	47	97	50	40	40	34
80	**45**										
80	**50**	**CGKD 50**	R900322719	125	57	58	120	63	50	50	42
100	**56**										
100	**63**	**CGKD 63**	R900322028	200	64	70	140	72,5	63	63	53,5
125	**70**										
125	**80**	**CGKD 80**	R900322700	320	86	91	180	92	80	80	68
160	**100**	**CGKD 100**	R900322030	500	96	110	210	114	100	100	85,5
200	**125**	**CGKD 125**	R900322026	800	113	135	260	160	125	125	105

Dimensions: Swivel head CGKD (clampable) (dimensions in mm)

ØAL	ØMM	Type	KK	LF min.	Clamping screws ISO 4762-10.9	M_A [3] Nm	m [4] kg	C_0 [5] kN	F_{adm} [6] kN
40	**22**	**CGKD 20**	M16x1,5	20,5	M8x20	25	0,35	48	17,7
40	**25**	**CGKD 25**	M20x1,5	25,5	M8x20	30	0,65	78	28,8
50	**28**								
50	**32**	**CGKD 32**	M27x2	30	M10x25	59	1,15	114	42,1
63	**36**								
63	**40**	**CGKD 40**	M33x2	39	M10x30	59	2,1	204	75,3
80	**45**								
80	**50**	**CGKD 50**	M42x2	47	M12x35	100	4	310	114,4
100	**56**								
100	**63**	**CGKD 63**	M48x2	58	M16x40	250	7,2	430	158,7
125	**70**								
125	**80**	**CGKD 80**	M64x3	74	M20x50	490	15	695	265,5
160	**100**	**CGKD 100**	M80x3	94	M24x60	840	25,5	1060	391,1
200	**125**	**CGKD 125**	M100x3	116	M24x70	840	52,5	1430	527,7

ØAL = piston Ø

ØMM = piston rod Ø

1) Lubricating nipple, cone head form A according to DIN 71412

2) Bolt Ø m6 required

3) M_A = tightening torque in Nm
The swivel head must always be screwed against the shoulder of the piston rod. Afterwards, the clamping screws must be tightened with the specified tightening torque

4) m = weight of swivel head in kg

5) C_0 = static load rating of the swivel head in kN

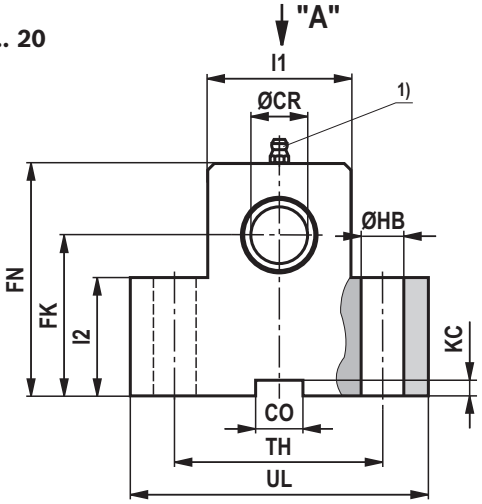
6) F_{adm} = maximum admissible load on the swivel head in kN during oscillatory or alternating loads

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

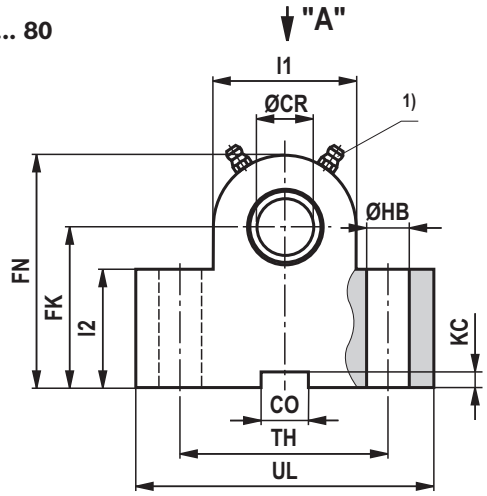
Dimensions: Trunnion bracket CLTB
(dimensions in mm)

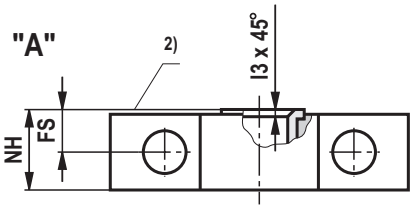
ISO 8132

CLTB 12 ... 20



CLTB 25 ... 80





ØAL	ØMM	Type [3]	Material no.	Nominal force kN [4]	ØCR H7	CO N9	FK js12	FN max.	FS js14	ØHB H13
25	**14**	**CLTB 12**	R900772607	8	12	10	34	50	8	9
32	**18**	**CLTB 16**	R900772608	12,5	16	16	40	60	10	11
40	**22**	**CLTB 20**	R900772609	20	20	16	45	70	10	11
40	**25**	**CLTB 25**	R900772610	32	25	25	55	80	12	13,5
50	**28**									
50	**32**	**CLTB 32**	R900772611	50	32	25	65	100	15	17,5
63	**36**									
63	**40**	**CLTB 40**	R900772612	80	40	36	76	120	16	22
80	**45**									
80	**50**	**CLTB 50**	R900772613	125	50	36	95	140	20	26
100	**56**									
100	**63**	**CLTB 63**	R900772614	200	63	50	112	180	25	33
125	**70**									
125	**80**	**CLTB 80**	R900772615	320	80	50	140	220	31	39

Dimensions: Trunnion bracket CLTB (dimensions in mm)

ØAL	ØMM	Type [3]	KC +0,3	l1	l2	l3	NH max.	TH js14	UL max.	*m* [5] kg
25	**14**	**CLTB 12**	3,3	25	25	1	17	40	63	0,4
32	**18**	**CLTB 16**	4,3	30	30	1	21	50	80	0,85
40	**22**	**CLTB 20**	4,3	40	38	1,5	21	60	90	1,2
40	**25**	**CLTB 25**	5,4	56	45	1,5	26	80	110	2,1
50	**28**									
50	**32**	**CLTB 32**	5,4	70	52	2	33	110	150	4,55
63	**36**									
63	**40**	**CLTB 40**	8,4	88	60	2,5	41	125	170	7,3
80	**45**									
80	**50**	**CLTB 50**	8,4	100	75	2,5	51	160	210	14,5
100	**56**									
100	**63**	**CLTB 63**	11,4	130	85	3	61	200	265	23,1
125	**70**									
125	**80**	**CLTB 80**	11,4	160	112	3,5	81	250	325	52,3

ØAL = piston Ø

ØMM = piston rod Ø

1) Lubricating nipple, cone head form A according to DIN 71412

2) Contact surface trunnion (inside)

3) Bearing blocks are always supplied in pairs

4) Nominal force applies to applications in pairs

5) ***m*** = weight of trunnion bracket in kg (specified per pair)

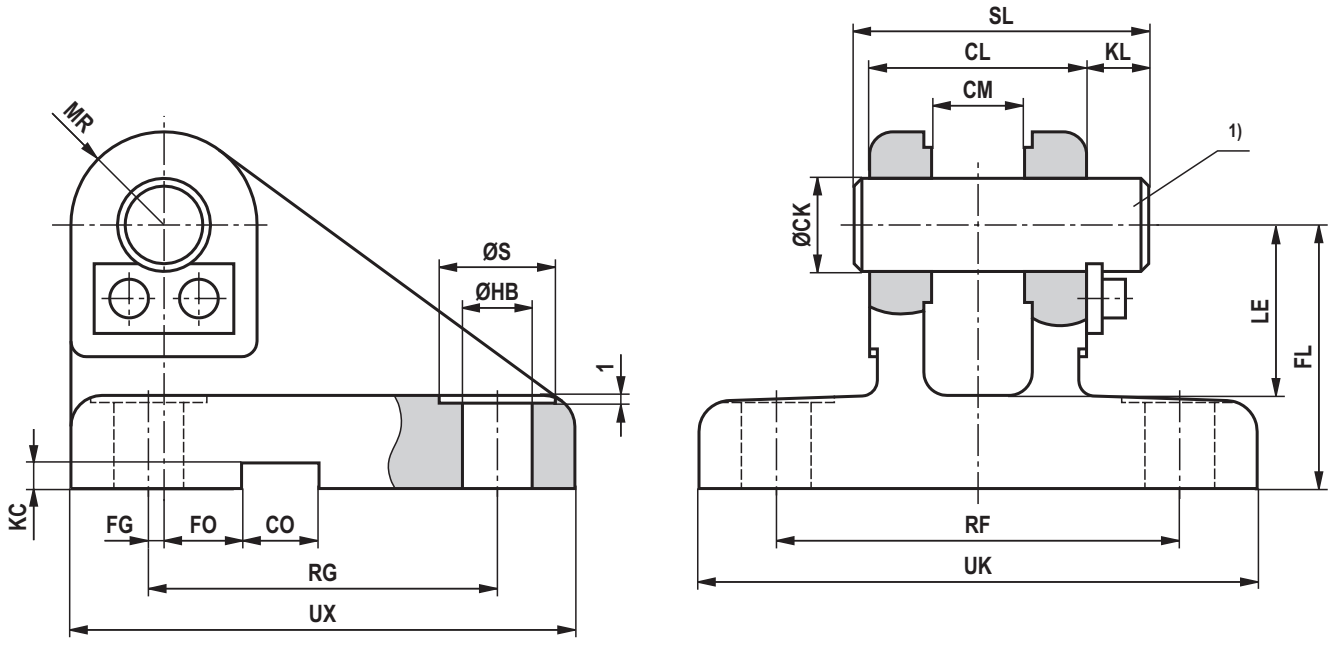
☞ **Notice!**

Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

The trunnion brackets are suitable for mounting type MT4.

Dimensions: Clevis bracket CLCA (clampable) (dimensions in mm)

ISO 8132, form B



ØAL	ØMM	Type	Material no.	Nominal force kN	ØCK [1] H9	CL h16	CM A12	CO N9	FG js14	FL js12	FO js14	ØHB H13
25	**14**	**CLCA 10** [2]	[3]	5	10	24	10	8	2	32	10	6,6
32	**18**	**CLCA 12** [2]	R900542861	8	12	28	12	10	2	34	10	9
40	**22**	**CLCA 20**	R900542863	20	20	45	20	16	7,5	45	10	11
40	**25**	**CLCA 25**	R900542864	32	25	56	25	25	10	55	10	13,5
50	**28**											
50	**32**	**CLCA 32**	R900542865	50	32	70	32	25	14,5	65	6	17,5
63	**36**											
63	**40**	**CLCA 40**	R900542866	80	40	90	40	36	17,5	76	6	22
80	**45**											
80	**50**	**CLCA 50**	R900542867	125	50	110	50	36	25	95	0	26
100	**56**											
100	**63**	**CLCA 63**	R900542868	200	63	140	63	50	33	112	0	33
125	**70**											
125	**80**	**CLCA 80**	R900542869	320	80	170	80	50	45	140	0	39
160	**100**	**CLCA 100**	[3]	500	100	210	100	63	52,5	180	0	52
200	**125**	**CLCA 125**	[3]	800	125	270	125	80	75	230	0	52

Dimensions: Clevis bracket CLCA (clampable) (dimensions in mm)

ØAL	ØMM	Type	KC +0,3	KL	LE min.	MR max.	RF js14	RG js14	ØS	SL	UK max.	UX max.	*m* [4] kg
25	**14**	**CLCA 10** [2]	3,3	8	22	10	39	44	11	34	56	60	0,33
32	**18**	**CLCA 12** [2]	3,3	8	22	12	52	45	15	38	72	65	0,45
40	**22**	**CLCA 20**	4,3	10	30	20	75	70	18	58	100	95	1,5
40	**25**	**CLCA 25**	5,4	10	37	25	90	85	20	69	120	115	3
50	**28**												
50	**32**	**CLCA 32**	5,4	13	43	32	110	110	26	87	145	145	4,5
63	**36**												
63	**40**	**CLCA 40**	8,4	16	52	40	140	125	33	110	185	170	8,5
80	**45**												
80	**50**	**CLCA 50**	8,4	19	65	50	165	150	40	133	215	200	13,5
100	**56**												
100	**63**	**CLCA 63**	11,4	20	75	63	210	170	48	164	270	230	23,4
125	**70**												
125	**80**	**CLCA 80**	11,4	26	95	80	250	210	57	202	320	280	38,5
160	**100**	**CLCA 100**	12,4	30	120	100	315	250	76	246	405	345	99,2
200	**125**	**CLCA 125**	15,4	32	170	125	365	350	76	310	455	450	174,1

ØAL = piston Ø

ØMM = piston rod Ø

1) Bolt Ø m6 required
(bolt and bolt lock are included in the scope of delivery and are not mounted upon delivery)

2) 2 washers for mounting required
- ▶ for CLCA 10: Washer DIN 988 10x16x0.5
  Material no. R900061310
- ▶ for CLCA 12: Washer DIN 988 12x18x1
  Material no. R900006948

3) Upon request

4) ***m*** = weight of clevis bracket in kg

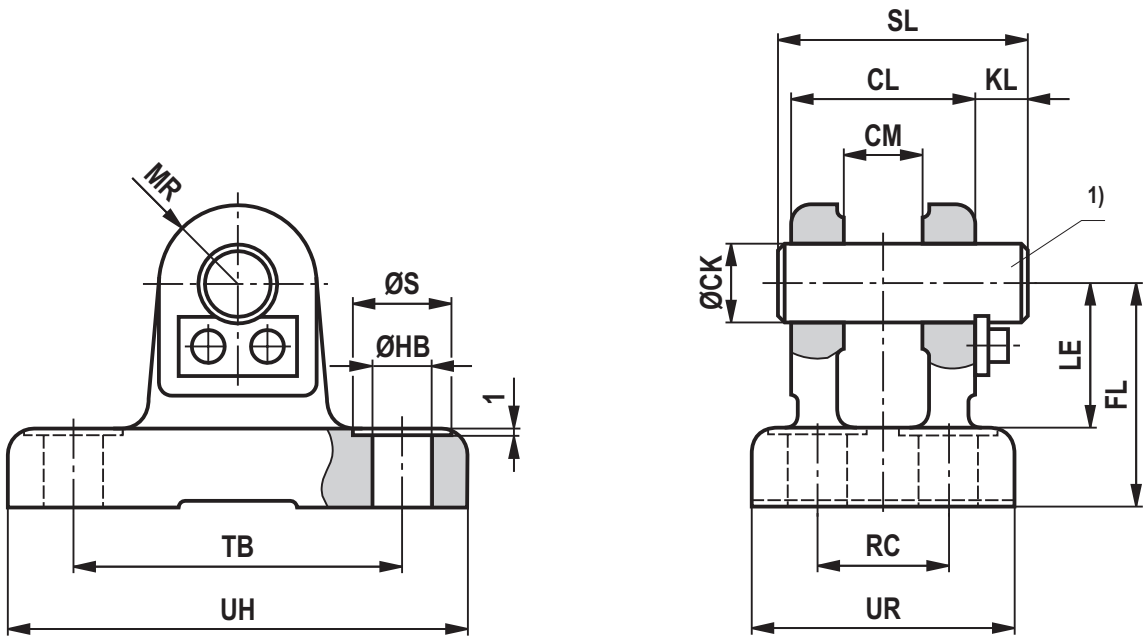
☞ **Notice!**

Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

The clevis brackets are suitable for mounting type MP5 and for mounting on the swivel head.

Dimensions: Clevis bracket CLCD (clampable) (dimensions in mm)

ISO 8132, form A



ØAL	ØMM	Type	Material no.	Nominal force kN	ØCK H9 [1]	CL h16	CM A12	FL js12	ØHB H13	KL	LE min.
25	**14**	**CLCD 10** [2]	[3]	5	10	24	10	32	6,6	8	22
32	**18**	**CLCD 12** [2]	R900542879	8	12	28	12	34	9	8	22
40	**22**	**CLCD 20**	R900542881	20	20	45	20	45	11	10	30
40	**25**	**CLCD 25**	R900542882	32	25	56	25	55	13,5	10	37
50	**28**										
50	**32**	**CLCD 32**	R900542883	50	32	70	32	65	17,5	13	43
63	**36**										
63	**40**	**CLCD 40**	R900542884	80	40	90	40	76	22	16	52
80	**45**										
80	**50**	**CLCD 50**	R900542885	125	50	110	50	95	26	19	65
100	**56**										
100	**63**	**CLCD 63**	R900542886	200	63	140	63	112	33	20	75
125	**70**										
125	**80**	**CLCD 80**	R900542887	320	80	170	80	140	39	26	95
160	**100**	**CLCD 100**	[3]	500	100	210	100	180	45	30	120
200	**125**	**CLCD 125**	[3]	800	125	270	125	230	52	32	170

Dimensions: Clevis bracket CLCD (clampable) (dimensions in mm)

ØAL	ØMM	Type	MR max.	RC js14	ØS	SL	TB js14	UR max.	UH max.	*m* [3] kg
25	**14**	**CLCD 10** [2]	10	17	11	34	42	33	60	0,27
32	**18**	**CLCD 12** [2]	12	20	15	38	50	40	70	0,35
40	**22**	**CLCD 20**	20	32	18	58	75	58	98	0,95
40	**25**	**CLCD 25**	25	40	20	69	85	70	113	1,9
50	**28**									
50	**32**	**CLCD 32**	32	50	26	87	110	85	143	3
63	**36**									
63	**40**	**CLCD 40**	40	65	33	110	130	108	170	5,5
80	**45**									
80	**50**	**CLCD 50**	50	80	40	133	170	130	220	10,6
100	**56**									
100	**63**	**CLCD 63**	63	100	48	164	210	160	270	17
125	**70**									
125	**80**	**CLCD 80**	80	125	57	202	250	210	320	32
160	**100**	**CLCD 100**	100	160	66	246	315	260	400	74
200	**125**	**CLCD 125**	125	200	76	310	385	320	470	129

ØAL = piston Ø

ØMM = piston rod Ø

1) Bolt Ø m6 required
(bolt and bolt lock are included in the scope of delivery and are not mounted upon delivery)

2) 2 Washers for mounting required
- ▶ for CLCD 10: Washer DIN 988 10x16x0.5
  Material no. R900061310
- ▶ for CLCD 12: Washer DIN 988 12x18x1
  Material no. R900006948

3) Upon request

4) ***m*** = weight of clevis bracket in kg

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.
The clevis brackets are suitable for mounting type MP5 and for mounting on the swivel head.

Buckling

For the admissible stroke length with flexibly guided load and a factor of 3.5 for safety against buckling, please refer to the relevant table. For other installation positions of the cylinder, the admissible stroke length must be interpolated. Admissible stroke length for non-guided load on request.
Buckling calculations are carried out according to the following formulas:

1. Calculation according to Euler

$$F = \frac{\pi^2 \cdot E \cdot I}{v \cdot L_K^2} \quad \text{if } \lambda > \lambda_g$$

2. Calculation according to Tetmajer

$$F = \frac{d^2 \cdot \pi \,(335\text{-}0{,}62 \cdot \lambda)}{4 \cdot v} \quad \text{if } \lambda \le \lambda_g$$

Explanation:

E = module of elasticity in N/mm²
= 2,1 x 10^5 for steel

I = geometrical moment of inertia in mm⁴ for circular cross-section
$= \frac{d^4 \cdot \pi}{64} = 0{,}0491 \cdot d^4$

v = 3,5 (safety factor)

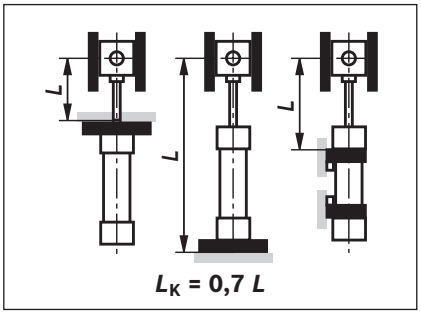
L_K = free buckling length in mm (depending on the type of mounting see sketches A, B, C)

d = piston rod Ø in mm

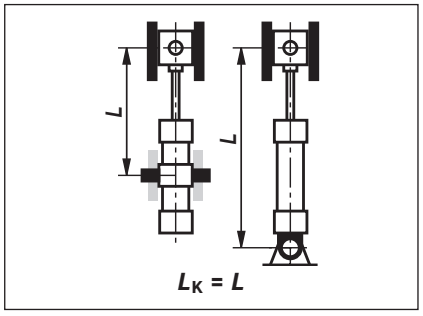
λ = slenderness ratio
$= \frac{4 \cdot L_K}{d}$ $\qquad \lambda_g = \pi \cdot \sqrt{\frac{E}{0{,}8 \cdot R_e}}$

R_e = yield strength of the piston rod material

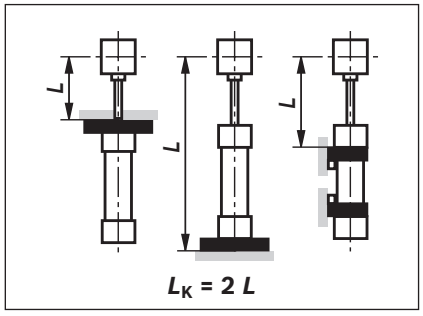
Influence of the mounting type on the buckling length:



$L_K = 0{,}7\ L$



$L_K = L$



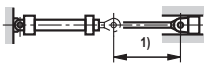
$L_K = 2\ L$

Admissible stroke length: Type of mounting MP5 (dimensions in mm)

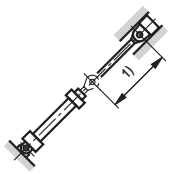
ØAL	ØMM	Admissible stroke at 80 bar 0°	80 bar 45°	80 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	250 bar 0°	250 bar 45°	250 bar 90°
25	**14**	170	175	185	105	105	110	–	–	–
32	**18**	230	230	250	145	145	150	–	–	–
40	**22**	285	290	315	185	190	195	–	–	–
	25	370	380	425	255	260	270	190	190	195
50	**28**	380	390	420	255	260	265	–	–	–
	32	490	505	570	345	350	365	260	265	270
63	**36**	500	515	565	345	350	360	–	–	–
	40	600	625	715	435	440	465	330	335	340
80	**45**	610	630	705	430	440	455	–	–	–
	50	725	755	890	535	545	580	410	415	430
100	**56**	755	780	890	545	555	580	–	–	–
	63	910	950	1145	685	700	755	540	545	565
125	**70**	935	975	1125	690	705	740	–	–	–
	80	1125	1180	1485	870	895	985	695	705	740
160	**100**	1350	1420	1810	1050	1085	1200	840	855	900
200	**125**	1645	1735	2250	1300	1340	1500	1045	1065	1130

Installation position

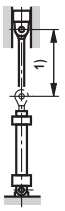
0°



45°

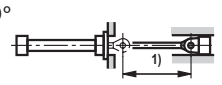
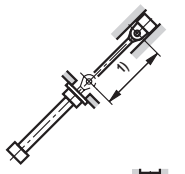
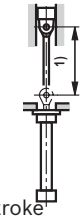


90°

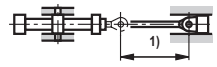
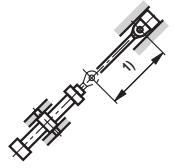
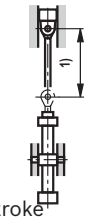


[1] Admissible stroke

Admissible stroke length: Type of mounting MF3
(dimensions in mm)

ØAL	ØMM	Admissible stroke at									Installation position
		80 bar			160 bar			250 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	**14**	600	600	600	485	485	495	–	–	–	0° 
32	**18**	800	800	800	630	635	645	–	–	–	
40	**22**	1000	1000	1000	735	740	755	–	–	–	
	25	1000	1000	1000	935	950	985	755	760	770	45° 
50	**28**	1200	1200	1200	955	965	990	–	–	–	
	32	1200	1200	1200	1200	1200	1200	990	1000	1025	
63	**36**	1400	1400	1400	1250	1260	1310	–	–	–	
	40	1400	1400	1400	1400	1400	1400	1230	1240	1275	
80	**45**	1700	1700	1700	1530	1550	1620	–	–	–	90° 
	50	1700	1700	1700	1700	1700	1700	1505	1520	1570	
100	**56**	2000	2000	2000	1875	1910	2000	–	–	–	
	63	2000	2000	2000	2000	2000	2000	1910	1935	2000	
125	**70**	2300	2300	2300	2300	2300	2300	–	–	–	
	80	2300	2300	2300	2300	2300	2300	2300	2300	2300	1) Admissible stroke

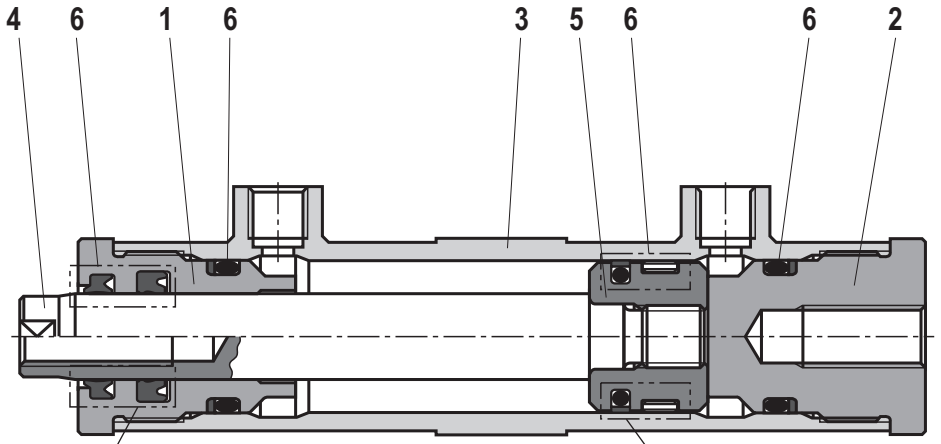
Admissible stroke length: Type of mounting MT4 [2)]
(dimensions in mm)

ØAL	ØMM	Admissible stroke at									Installation position
		80 bar			160 bar			250 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	**14**	270	275	290	180	180	185	–	–	–	0° 
32	**18**	355	360	385	245	245	250	–	–	–	
40	**22**	410	420	450	280	285	290	–	–	–	
	25	515	530	590	365	370	380	275	275	280	45° 
50	**28**	540	555	595	375	380	390	–	–	–	
	32	680	705	790	495	500	520	380	380	390	
63	**36**	710	730	800	505	510	525	–	–	–	
	40	840	870	995	620	630	660	480	485	495	
80	**45**	860	885	985	620	625	650	–	–	–	90° 
	50	1010	1055	1225	755	770	815	595	600	615	
100	**56**	1050	1090	1230	770	780	815	–	–	–	
	63	1265	1320	1580	965	990	1055	770	780	800	
125	**70**	1300	1350	1555	970	990	1040	–	–	–	
	80	1565	1645	2050	1230	1260	1380	995	1010	1050	1) Admissible stroke

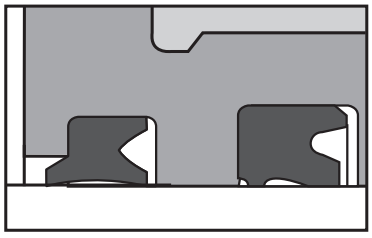
2) Trunnion in cylinder center

Overview: Individual components

ØAL 25 ... 32 mm

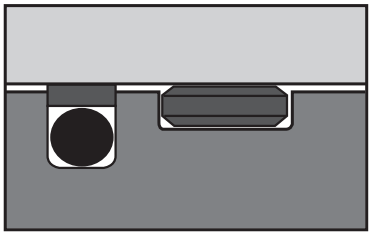


Piston rod



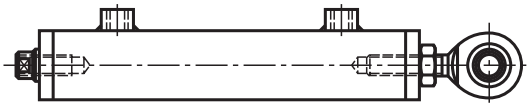
„M“ / „V“

Piston

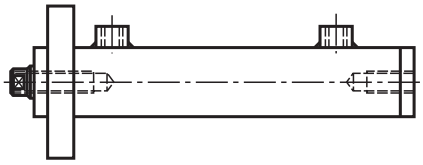


„M“ / „V“

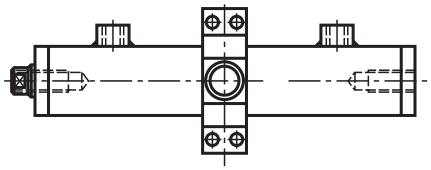
Type of mounting MP5



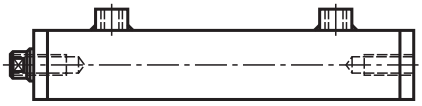
Type of mounting MF3



Type of mounting MT4



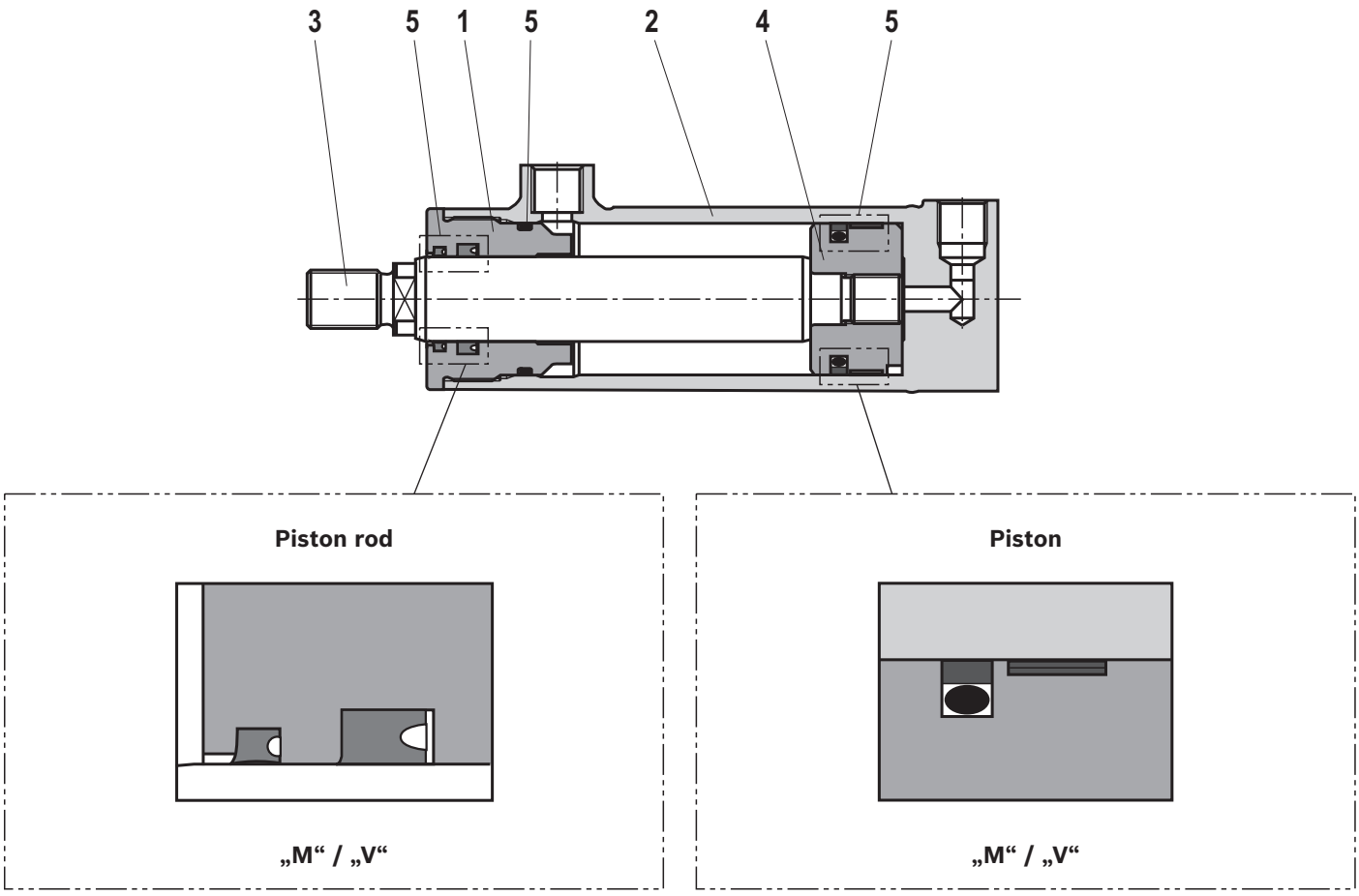
Type of mounting M00



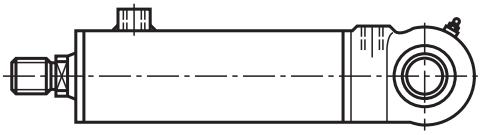
1 Head
2 Base
3 Pipe
4 Piston rod
5 Piston
6 Seal kit: Scraper, rod seal, piston seal, O ring, guide ring

Overview: Individual components

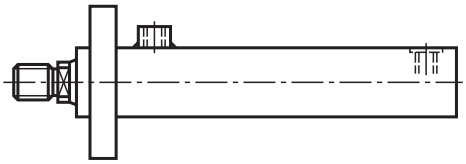
ØAL 40 ... 200 mm



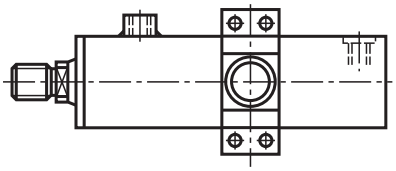
Type of mounting MP5



Type of mounting MF3



Type of mounting MT4



1 Head
2 Pipe
3 Piston rod
4 Piston
5 Seal kit: Scraper, rod seal, piston seal, O ring, guide ring

Seal kit

ØAL mm	ØMM mm	Material no. for seal kit for version	
		M	V
25	**14**	R961008600	R961008616
32	**18**	R961008601	R961008617
40	**22**	R961008602	R961008618
	25	R961008603	R961008619
50	**28**	R961008604	R961008620
	32	R961008605	R961008621
63	**36**	R961008606	R961008622
	40	R961008607	R961008623
80	**45**	R961008608	R961008624
	50	R961008609	R961008625
100	**56**	R961008610	R961008626
	63	R961008611	R961008627
125	**70**	R961008612	R961008628
	80	R961008613	R961008629
160	**100**	R961008614	R961008630
200	**125**	R961008615	R961008631

Cylinder weight

Piston	Piston rod	Weight of cylinder with stroke length 0 mm				Weight of cylinder per 100 mm stroke length
ØAL mm	ØMM mm	MP5 kg	MF3 kg	MT4 kg	M00 kg	kg
25	**14**	1	1	1	1	0,4
32	**18**	2	2	2	2	0,6
40	**22**	2	3	3	–	0,9
	25	2	4	4	–	1,1
50	**28**	3	4	5	–	1,2
	32	4	5	7	–	1,5
63	**36**	5	7	9	–	1,8
	40	6	9	12	–	2,3
80	**45**	9	13	15	–	2,9
	50	11	15	20	–	3,8
100	**56**	15	20	26	–	4,6
	63	19	26	36	–	6
125	**70**	29	35	46	–	7,2
	80	38	43	67	–	10,1
160	**100**	67	–	–	–	15,1
200	**125**	110	–	–	–	22

Rexroth
Bosch Group

Hydraulic cylinders
Tie rod design

RE 17049/07.17 1/70
Replaces: 11.16

Series CDT3…Z; CGT3…Z; CST3…Z

Component series 3X
Nominal pressure 160 bar (16 MPa)

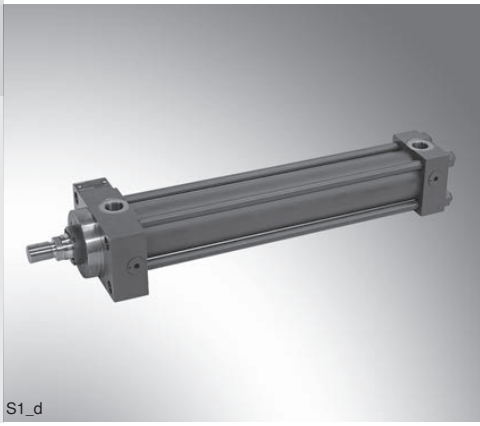

S1_d

Table of contents

Features

- Installation dimensions according to ISO 6020-2 and NF/ISO 6020-2
- 13 types of mounting
- Piston Ø **(ØAL)**: 25 to 200 mm
- Piston rod Ø **(ØMM)**: 12 to 140 mm
- Stroke lengths up to 3000 mm
- Integrated guide socket for fast and easy maintenance
- Self-adjusting or adjustable end position cushioning as option
- Patented safety vent for easy and safe bleeding
- Easy assembly thanks to freely selectable position of the line connections at head and base

Technical data (For applications outside these parameters, please consult us!)

Nominal pressure: 160 bar (16 MPa)
Maximum operating pressure (only static load)**:** 210 bar (21 MPa)
Static test pressure: 240 bar (24 MPa)
For admissible pressures, please refer to the table on page 6.

Cylinders of this series are designed for a nominal pressure of 160 bar and in version CD for a maximum operating pressure of 210 bar with static load.

(Static load: less than 10,000 load cycles over the entire life cycle)

The admissible dynamic operating pressure amounts to 160 bar.

The maximum operating pressures must be less than or equal to the applicable nominal pressures and apply to applications with shock-free operation with reference to excess pressure and/or external loads. With extreme loads like e.g. high sequence cycle, mounting elements and threaded piston rod connections must be designed for durability.

Minimum pressure:
Depending on the application, application conditions and technical design, a certain minimum pressure (approx. 10 bar) is required in order to guarantee technically unobjectionable functioning of the hydraulic cylinder.

Installation position: any

Hydraulic fluid (amending data sheet):
Mineral oils DIN 51524 HL, HLP (R. 90220)
Oil-in-water emulsion HFA (R. 90223)
Water glycol HFC (R. 90223)
Phosphate ester HFD-R (R. 90222)

Hydraulic fluid temperature range: see page 63

Ambient temperature range: see page 63

Perfect viscosity range: 20 to 100 mm^2/s

Minimum admissible viscosity: 2.8 mm^2/s

Maximum admissible viscosity: 380 mm^2/s

Cleanliness class acc. to ISO
Maximum admissible degree of contamination of the hydraulic fluid according to ISO 4406 (c) class 20/18/15.
The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.

Bleeding: By default

Color set-up:
Priming: By default, hydraulic cylinders are primed with a coating (color gentian blue RAL 5010) of min. 40 µm, see page 70.

Other colors upon request.

With cylinders and attachment parts, the following surfaces are not primed:

- All fit diameters to the customer side
- Sealing surfaces for line connection
- Sealing surfaces for flange connection
- Connection surface for valve mounting
- Inductive proximity switches
- Position measurement system
- Measuring coupling
- Spherical / plain bearings
- Lubricating nipples

Painting: By default, hydraulic cylinders can be ordered in the CP4 corrosivity category in the RAL colors, see page 70.

With cylinders and attachment parts, the following surfaces are not primed:

- All fit diameters and connection surfaces to the customer side
- Sealing surfaces for line connection
- Sealing surfaces for flange connection
- Connection surface for valve mounting
- Inductive proximity switches
- Position measurement system
- Measuring coupling
- Spherical / plain bearings
- Lubricating nipples

The areas that are not primed or painted are protected by means of a solvent-free corrosion protection agent.

Accessories that are ordered as separate order item are not primed or painted by default.

Corresponding priming and/or painting on request.

Technical data (For applications outside these parameters, please consult us!)

Boundary and application conditions:

- The mechanical alignment of the movement axis and thus the mounting points of hydraulic cylinder and piston rod must be ensured. Lateral forces on the guides of piston rod and piston are to be avoided. It may be necessary to consider the own weight of the hydraulic cylinder (MP1, MP3, MP5, MT1, MT2 or MT4) or the piston rod.
- The bending length/bending load of the piston rod and/or the hydraulic cylinder must be observed (see page topic Kinking).
- The maximum admissible stroke velocities with regard to the suitability/load of seals must be observed as must their compatibility with the properties of the hydraulic fluid (see page topic Seals).
- The maximum admissible velocities/kinetic energies when moving into the end positions, also considering external loads, must be observed.
  Danger: Excess pressure
- The maximum admissible operating pressure must be complied with in any operating state of the hydraulic cylinder. Possible pressure intensification resulting from the area ratio of annulus area to piston area and possible throttling points are to be observed.
- Detrimental environmental influences, like e. g. aggressive finest particles, vapors, high temperatures, etc. as well as contamination and deterioration of the hydraulic fluid are to be avoided.

Notice: This list does not claim to be complete. In case of questions regarding the compatibility with the medium or exceedance of the boundary or application conditions, please contact us.

Acceptance:
Each cylinder is tested according to Bosch Rexroth standard and in compliance with ISO 10100: 2001.

Safety instructions:
For assembly, commissioning and maintenance of hydraulic cylinders, observe the operating instructions data sheet 07100-B!
Service and repair work has to be performed by Bosch Rexroth or by personnel especially trained for this purpose. No warranty is accepted for damage as a consequence of assembly, maintenance or repair works not performed by Bosch Rexroth.

Check lists for hydraulic cylinders:
Cylinders the characteristics and/or application parameters of which deviate from the values specified in the data sheet can only be offered as a special version upon request. For offers, the variations of the characteristics and/or application parameters must be described in the check lists for hydraulic cylinders (data sheet 07200).

Double-acting cylinder with continuous piston rod:
With this design type, the friction is considerably higher than with the "CD version" with simple piston rod.

Stroke tolerances:
According to ISO 6020-2, a stroke tolerance of +2 mm is admissible for strokes up to 1250 mm; the stroke tolerance for cylinder strokes over 1250 mm to 3000 mm is +5 mm.

A tolerance of ±0.3 mm is possible as option, smaller tolerances are not reasonable for tie rod cylinders.

Minimum strokes:
For the "MT4" mounting, the minimum stroke is to be observed due to the trunnion width, see pages 18 and 38.

When using end position cushioning, the minimum stroke must also be observed, see page 58 "End position cushioning".

With CST3 with and without subplate, please observe the minimum stroke, see page 32 to 40.

Support width extension and tie rod support are possible upon request.

Line connections:
The cylinders of series CDT3/CGT3 are supplied with pipe thread or enlarged pipe thread according to ISO 1179-1 or metric ISO thread according to ISO 6149-1.

The cylinders of series CST3 are supplied with pipe thread according to ISO 1179-1 or with subplate.

Technical data (For applications outside these parameters, please consult us!)

Stroke velocity:
See information on stroke length and stroke velocity, higher stroke velocity on request.
If the extension velocity is considerably higher than the retraction velocity of the piston rod, drag-out losses of the medium may result. If necessary, please consult us.

Piston Ø **ØAL** mm	Piston rod Ø **ØMM** mm	Line connection **"B / R"** **EE**	Max. stroke velocity in m/s	Line connection **"S"** **EE**	Max. stroke velocity in m/s
25	**12**	G 1/4	0.60	G 3/8	0.90
	14		0.60		1.00
	18		0.90		1.40
32	**14**	G 1/4	0.40	G 3/8	0.50
	18		0.40		0.60
	22		0.50		0.80
40	**18**	G 3/8	0.40	G 1/2	0.80
	22		0.40		0.90
	28		0.50		1.20
50	**22**	G 1/2	0.50	G 3/4	0.70
	28		0.60		0.80
	36		0.80		1.10
63	**28**	G 1/2	0.30	G 3/4	0.50
	36		0.40		0.50
	45		0.50		0.70
80	**36**	G 3/4	0.30	G 1	0.50
	45		0.30		0.50
	56		0.40		0.70
100	**45**	G 3/4	0.20	G 1	0.30
	56		0.20		0.40
	70		0.30		0.50
125	**56**	G 1	0.20	G 1 1/4	0.30
	70		0.20		0.40
	90		0.30		0.50
160	**70**	G 1	0.20	G 1 1/4	0.20
	90		0.20		0.20
	110		0.20		0.30
200	**90**	G 1 1/4	0.20	G 1 1/2	0.20
	110		0.20		0.20
	140		0.20		0.20

Information on stroke length and stroke velocity

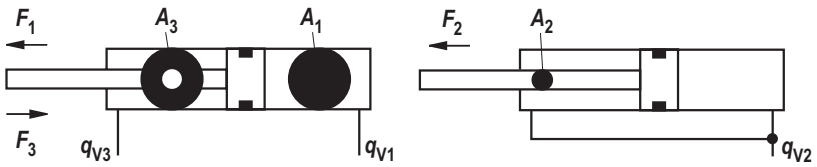
ØAL (mm)		25	32	40	50	63	80	100	125	160	200
min **recommended** stroke in mm	without damping	–	–	–	–	–	–	–	–	–	–
	with damping	30	32	46	44	50	54	56	66	72	80
maximum velocity (m/s)	Seal design M; 160 bar	0.50				0.40		0.30		0.25	
	Seal design M; 100 bar	0.70				0.60		0.40		0.35	
	Seal design T, S; 160 bar	1.00				0.80		0.60		0.50	
recommended minimum velocity (mm/s)	Seal design M	30									
	Seal design T, S	1									

Project planning software ICS (Interactive Catalog System)

The ICS (Interactive Catalog System) is a selection and project planning aid for hydraulic cylinders. The ICS allows designers for machines and systems to quickly and reliably find the perfect hydraulic cylinder solution through logic-guided type key enquiries. This software helps to solve design and project planning tasks more quickly and efficiently. After having been guided through the product selection, the user quickly and reliably gets the exact technical data of the selected component as well as 2D and 3D CAD data in the correct file format for all common CAD systems.
This allows users to reduce costs while increasing their competitiveness.

Areas, forces, flow: Series CDT3 (for operating pressure up to 210 bar)

Piston	Piston rod		Area ratio	Areas			Force [1]						Flow at 0.1 m/s [2]			Max. available stroke length (mm)[5]
				Piston	Rod	Ring	Pressure		Diff.		Pulling		Off	Diff.	On	
ØAL mm	**ØMM** mm		φ A_1/A_3	A_1 cm²	A_2 cm²	A_3 cm²	F_1 kN		F_2 kN		F_3 kN		q_{V1} l/min	q_{V2} l/min	q_{V3} l/min	
	160 bar	210 bar					160 bar	210 bar	160 bar	210 bar	160 bar	210 bar				
25	**12** **18**	**-** **18**	1.3 2.07	4.91	1.13 2.54	3.78 2.37	7.86	- 10.31	1.81 4.06	- 5.33	6.05 3.79	- 4.98	2.9	0.70 1.50	2.30 1.40	600
32	**14** **22**	**-** **22**	1.25 1.90	8.04	1.54 3.80	6.5 4.24	12.86	- 16.88	2.46 6.08	- 7.98	10.40 6.78	- 8.90	4.8	0.90 2.30	3.90 2.50	800
40	**18** **22** [3] **28**	**-** **22** [3] **28**	1.25 1.43 1.96	12.56	2.54 3.80 6.16	10.02 8.76 6.4	20.10	- 26.38	4.06 6.08 9.86	- 7.98 12.94	16.03 14.02 10.24	- 18.40 13.44	7.5	1.50 2.30 3.70	6.00 5.30 3.80	1000
50	**22** **28** [3] **36**	**-** **28** [3] **36**	1.25 1.46 2.08	19.63	3.8 6.16 10.18	15.83 13.47 9.45	31.41	- 41.22	6.08 9.86 16.29	- 12.94 21.38	25.33 21.55 15.12	- 28.29 19.85	11.8	2.30 3.70 6.10	9.50 8.10 5.70	1200
63	**28** **36** [3] **45**	**-** **36** [3] **45**	1.25 1.48 2.04	31.17	6.16 10.18 15.90	25.01 20.99 15.27	49.87	- 65.46	9.86 16.29 25.44	12.94 21.38 33.39	40.02 33.58 24.43	- 44.08 32.07	18.7	3.70 6.10 9.50	15.00 12.60 9.20	1400
80	**36** **45** [3] **56**	**-** **45** [3] **56**	1.25 1.46 1.96	50.26	10.18 15.90 24.63	40.08 34.36 25.63	80.42	- 105.55	16.29 25.44 39.41	21.38 33.39 51.72	64.13 54.98 41.01	- 72.16 53.82	30.2	6.10 9.50 14.80	24.00 20.60 15.40	1700
100	**45** **56** [3] **70**	**-** **56** [3] **70**	1.25 1.46 1.96	78.54	15.90 24.63 38.48	62.64 53.91 40.06	125.66	- 164.93	25.44 39.41 61.57	33.39 51.72 80.81	100.22 86.26 64.10	- 113.21 84.13	47.1	9.50 14.80 23.10	37.60 32.30 24.00	2000
125	**56** **70** [3] **90**	**-** **70** [3; 4] **90** [4]	1.25 1.46 2.08	122.72	24.63 38.48 63.62	98.09 84.24 59.1	196.35	- [4]	39.41 61.57 101.79	51.72 80.81 133.60	156.94 134.78 94.56	- [4] [4]	73.6	14.80 23.10 38.20	58.90 50.50 35.50	2300
160	**70** **110**	- **110** [4]	1.25 1.90	201.06	38.48 95.03	162.58 106.03	321.70	- [4]	61.57 152.05	80.81 199.56	260.13 169.65	- [4]	120.6	23.10 57.00	97.50 63.60	2600
200	**90** **140**	- **140** [4]	1.25 1.96	314.16	63.62 153.94	250.54 160.22	502.66	- [4]	101.79 246.30	133.60 323.27	400.86 256.35	- [4]	188.5	38.20 92.40	150.30 96.10	3000



[1] Theoretical static cylinder force (without consideration of the efficiency and admissible load for attachment parts like e.g. swivel heads, plates or valves, etc.)

[2] Stroke velocity

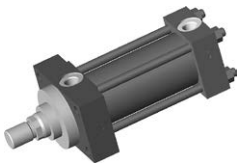
[3] Piston rod Ø not standardized

[4] With operating pressures up to 210 bar only on request

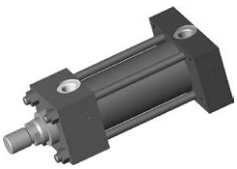
[5] Larger stroke lengths upon request

Overview types of mounting: Series CDT3 (for operating pressure up to 210 bar)

CDT3 ME5 (ISO/DIN/NF)
see page 12, 13



CDT3 ME6 (ISO/DIN/NF)
see page 12, 13

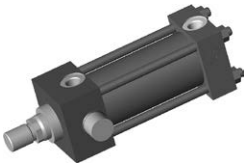


CDT3 MP5 (ISO/DIN/NF)
see page 14, 15

CDT3 MS2 (ISO/DIN/NF)
see page 16, 17

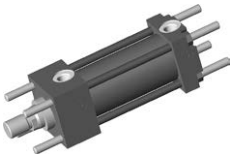
CDT3 MT4 (ISO/DIN/NF)
see page 18, 19

CDT3 MT1 (ISO/DIN/NF)
see page 20, 21



CDT3 MT2 (ISO/DIN/NF)
see page 20, 21

CDT3 MX1 (ISO/DIN/NF)
see page 22, 23



CDT3 MX2 (ISO/DIN/NF)
see page 24, 25

CDT3 MX3 (ISO/DIN/NF)
see page 24, 25

CDT3 MX5 (NF)
see page 26, 27

CDT3 MP1 (ISO/DIN/NF)
see page 28, 29

CDT3 MP3 (ISO/DIN/NF)
see page 28, 29

Ordering code: Series CDT3 (for operating pressure up to 210 bar)

The preferred cylinder designs are marked in gray.

CD	T3	/ / /	Z	3X																*

Differential cylinder = **CD**

Series = **T3**

Types of mounting DIN/ISO
- Rectangular flange at head = **ME5**
- Rectangular flange at base = **ME6**
- Self-aligning clevis at base = **MP5**
- Foot mounting = **MS2**
- Trunnion in center [1)] = **MT4**

Types of mounting ISO
- Clevis at base = **MP1**
- Swivel eye at base = **MP3**
- Trunnion at head = **MT1**
- Trunnion at base = **MT2**
- Extended tie rod, on both sides = **MX1**
- Extended tie rod, at base = **MX2**
- Extended tie rod, at head = **MX3**
- Tapped hole at head [2)] = **MX5**

Piston Ø (ØAL) 25 to 200 mm

Piston rod Ø (ØMM) 12 to 140 mm [13)]

Stroke length in mm [11)]

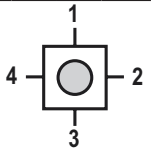
Design principle
Head and base connected to tie rod = **Z**

Component series = **3X**
30 to 39 unchanged installation and connection dimensions

Line connection/version
- Pipe thread (ISO 1179-1) = **B**
- Metric ISO thread (ISO 6149-1) [17)] = **R**
- Enlarged pipe thread (ISO 1179-1) [17)] = **S**

Line connection/position at head
see page 43

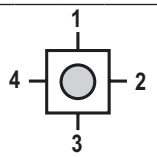
View to piston rod



= **1** = **2** = **3** = **4**

Line connection/position at base
see page 43

View to piston rod



= **1** = **2** = **3** = **4**

Piston rod design
- **H =** Hardened and hard chromium-plated

Piston rod end
see pages 12 to 29
- **H =** [14)] Thread (DIN/ISO) for swivel head CGKA
- **D =** [15)] Thread (ISO) for swivel head CGKA
- **E =** [12)] Internal thread
- **F =** [5; 14)] With mounted swivel head CGKA (DIN/ISO)
- **K =** [5; 15)] With mounted swivel head CGKA (ISO)
- **T =** [6)] With trunnion

End position cushioning
see pages 58 to 62
- **U =** Without
- **D =** Both sides, self-adjusting
- **S =** Head sides, self-adjusting
- **K =** Base sides, self-adjusting
- **E =** [4)] On both sides, adjustable

Seal design
- **M =** Standard seal system
- **T =** Reduced friction
- **S =** High temperature with reduced friction

Option 1
- **W =** Without option
- **B =** [3; 4; 16)] Leakage oil connection
- **A =** Measuring coupling, on both sides

Option 2
- **W =** Without option
- **Y =** Specify the piston rod extension LY in the plain text in mm

Color set-up
- **W =** Priming class CP3
- **B =** [18)] Painting class CP4

Oil filling
- **W =** without oil filling
- **F =** with oil filling

Test certificate
- **W =** without test certificate
- **C =** with acceptance test certificate 3.1 based on EN 10204

Further details in the plain text

Ordering code: Series CDT3 (for operating pressure up to 210 bar)

Order example:
CDT3MP5/50/36/300Z3X/B11HHDMWW

When selecting, please observe the limitations on the corresponding catalog pages!

Comments:

1) Trunnion position freely selectable; when ordering, always specify the "XV" dimension in the plain text in mm.
2) Not ISO standardized
3) With type of mounting MS2 and piston Ø 25 and end position cushioning, "E" is not possible
4) With piston Ø 25 to 100 mm: only line connection "B" possible.
With piston Ø 125 to 200 mm: only DIN types of mounting and line connection "B" possible
With type of mounting MX1 and MX2, only possible for piston Ø 40 to 200.
5) Not possible with type of mounting MX1 and MX3.
6) See page 46 (Only possible with standardized piston rod Ø 22 to 140 mm), observe the max. operating pressure.
11) Observe the max. stroke length available, page 6, and the admissible stroke length (according to kinking calculation) on pages 54 to 57
12) See page 46 (Only possible with standardized piston rod Ø 18 to 140 mm), observe the max. operating pressure.
13) Observe the admissible piston rod Ø and assigned threads at the piston rod end for 210 bar (pages 6 and 12 to 29)
14) For operating pressure up to 160 bar
15) For operating pressure up to 210 bar
16) Not possible with MT1.
17) For type of mounting ME5 and ME6, only position 1 and 3 possible
18) Specify RAL color in the plain text

Areas, forces, flow: Series CGT3 (for operating pressure up to 160 bar)

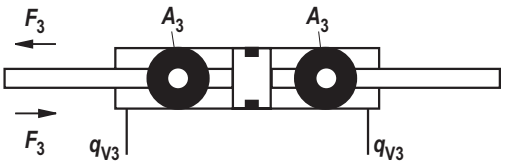
Piston **ØAL** mm	Piston rod **ØMM** mm	Areas A_3 cm^2	Force at 160 bar [1] F_3 kN	Flow at 0.1 m/s [2] q_{V3} l/min	Max. available stroke length (mm)[4]
25	**12**	3.78	6.04	2.3	600
	18	2.37	3.78	1.4	
32	**14**	6.50	10.40	3.9	800
	22	4.24	6.79	2.5	
40	**18**	10.02	16.03	6.0	1000
	22 [3]	8.77	14.02	5.3	
	28	6.40	10.25	3.8	
50	**22**	15.83	25.33	9.5	1200
	28 [3]	13.48	21.56	8.1	
	36	9.45	15.13	5.7	
63	**28**	25.01	40.02	15.0	1400
	36 [3]	20.99	33.59	12.6	
	45	15.27	24.43	9.2	
80	**36**	40.08	64.14	24.0	1700
	45 [3]	34.36	54.98	20.6	
	56	25.63	41.02	15.4	
100	**45**	62.64	100.21	37.6	2000
	56 [3]	53.91	86.26	32.3	
	70	40.06	64.09	24.0	
125	**56**	98.09	156.94	58.9	2300
	70 [3]	84.23	134.77	50.5	
	90	59.10	94.56	35.5	
160	**70**	162.58	260.12	97.5	2600
	110	106.03	169.64	63.6	
200	**90**	250.54	400.86	150.3	3000
	140	160.22	256.35	96.1	

1) Theoretical static cylinder force (without consideration of the efficiency and admissible load for attachment parts like e.g. swivel heads, plates or valves, etc.)

2) Stroke velocity

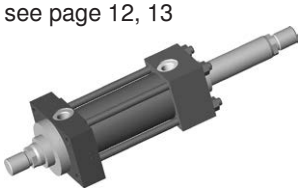
3) Piston rod Ø not standardized

4) Larger stroke lengths upon request

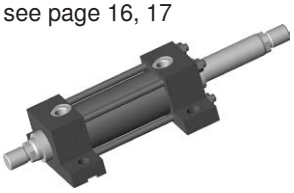


Overview types of mounting: Series CGT3 (for operating pressure up to 160 bar)

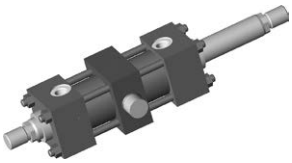
CGT3 ME5
see page 12, 13



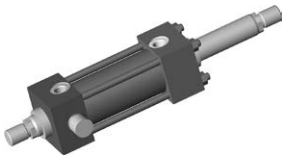
CGT3 MS2
see page 16, 17



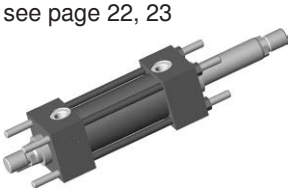
CGT3 MT4
see page 18, 19



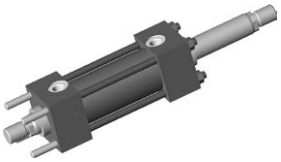
CGT3 MT1
see page 20, 21



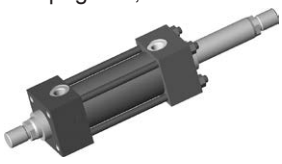
CGT3 MX1
see page 22, 23



CGT3 MX3
see page 24, 25



CGT3 MX5
see page 26, 27



Ordering code: Series CGT3 (for operating pressure up to 160 bar)

CG	T3	/	/	/	Z	3X													*

Double-acting cylinder [10] = CG

Series = T3

Types of mounting
Rectangular flange at head = ME5
Foot mounting = MS2
Trunnion in center [1] = MT4
Trunnion at head = MT1
Extended tie rod, on both sides = MX1
Extended tie rod, at head = MX3
Tapped hole at head = MX5

Piston Ø (ØAL) 25 to 200 mm

Piston rod Ø (ØMM) 12 to 140 mm

Stroke length in mm [14]

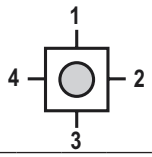
Design principle
Head and base connected to tie rod = Z

Component series = 3X
30 to 39 unchanged installation and connection dimensions

Line connection/version
Pipe thread (ISO 1179-1) = B
Metric ISO thread (ISO 6149-1) [17] = R
Enlarged pipe thread (ISO 1179-1) [17] = S

Line connection / position at head
see page 43

View to piston rod



= 1
= 2
= 3
= 4

Comments:

[1] Trunnion position freely selectable; when ordering, always specify the "XV" dimension in the plain text in mm.

[3] With type of mounting MS2 and piston Ø 25 and end position cushioning, "E" is not possible

[4] With piston Ø 25 to 100 mm: only line connection "B" possible
With piston Ø 125 to 200 mm: only DIN types of mounting and line connection "B" possible
With type of mounting MX1 and MX2, only possible for piston Ø 40 to 200

[5] Not possible with type of mounting MX1 and MX3.

[10] Not standardized

[12] See page 44 (Only possible with standardized piston rod Ø 18 to 140 mm), observe the max. operating pressure.

[14] Observe the max. stroke length available, page 8, and the admissible stroke length (according to kinking calculation) on pages 52 to 55

[16] Not possible with MT1.

[17] For type of mounting ME5 and ME6, only position 1 and 3 possible

[18] Specify RAL color in the plain text

Further details in the plain text

Test certificate
W = without test certificate
C = with acceptance test certificate 3.1 based on EN 10204

Oil filling
W = without oil filling
F = with oil filling

Color set-up
W = Priming class CP3
B = [18] Painting class CP4

Option 2
W = Without option
Y = Specify the piston rod extension LY in the plain text in mm

Option 1
W = Without option
B = [3; 4; 16] Leakage oil connection
A = Measuring coupling, on both sides

Seal design
M = Standard seal system
T = Servo quality/reduced friction
S = High temperature with reduced friction

End position cushioning
see pages 58 to 62
U = Without
D = Both sides, self-adjusting
E = [4] On both sides, adjustable

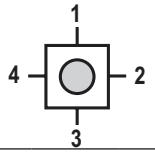
Piston rod end
see pages 12 to 29
H = Thread (DIN/ISO) for swivel head CGKA
D = Thread (ISO) for swivel head CGKA
E = [12] Internal thread
F = [5] With mounted swivel head CGKA (DIN/ISO)
K = [5] With mounted swivel head CGKA (ISO)

Piston rod design
H = Hardened and hard chromium-plated

Line connection / position at base
see page 43

View to piston rod

1 =
2 =
3 =
4 =

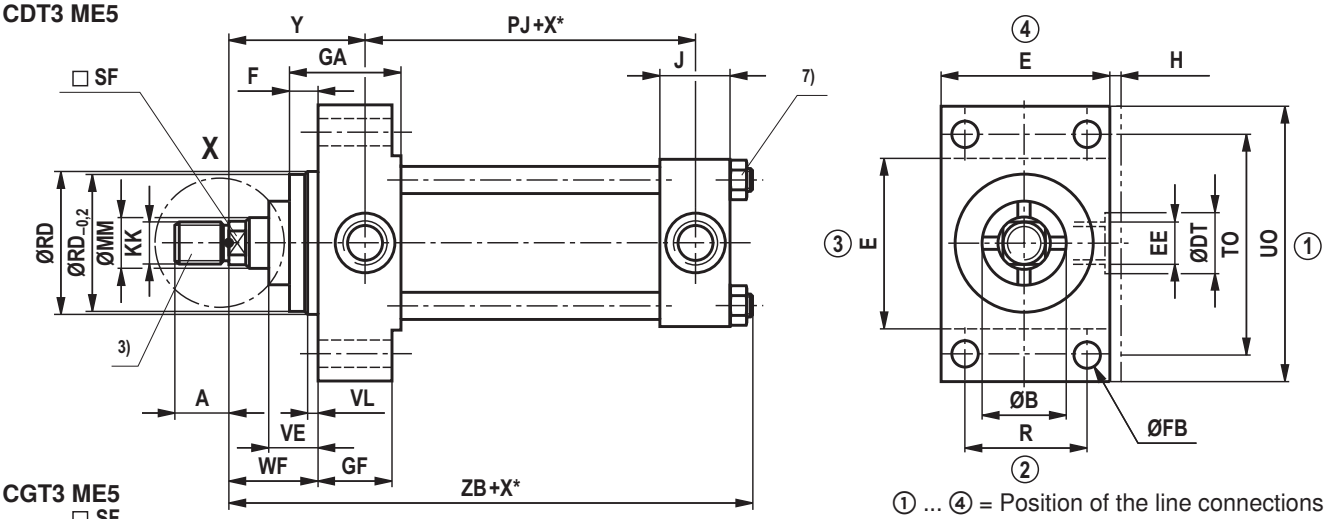


Order example:
CGT3ME5/80/56/400Z3X/B11HHDMWW

When selecting, please observe the limitations on the corresponding catalog pages!

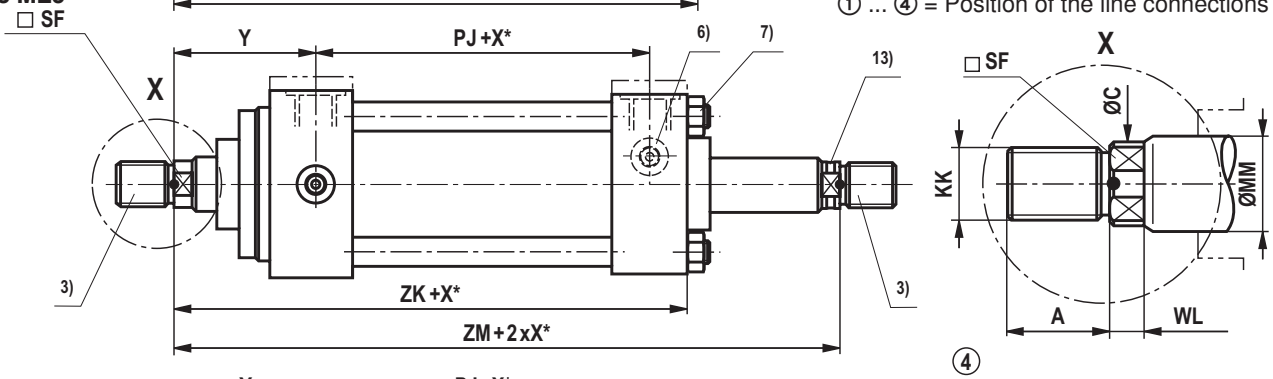
Dimensions: **Rectangular flange at head CDT3/CGT3; ME5** (dimensions in mm)
Rectangular flange at base CDT3; ME6 (dimensions in mm)

CDT3 ME5

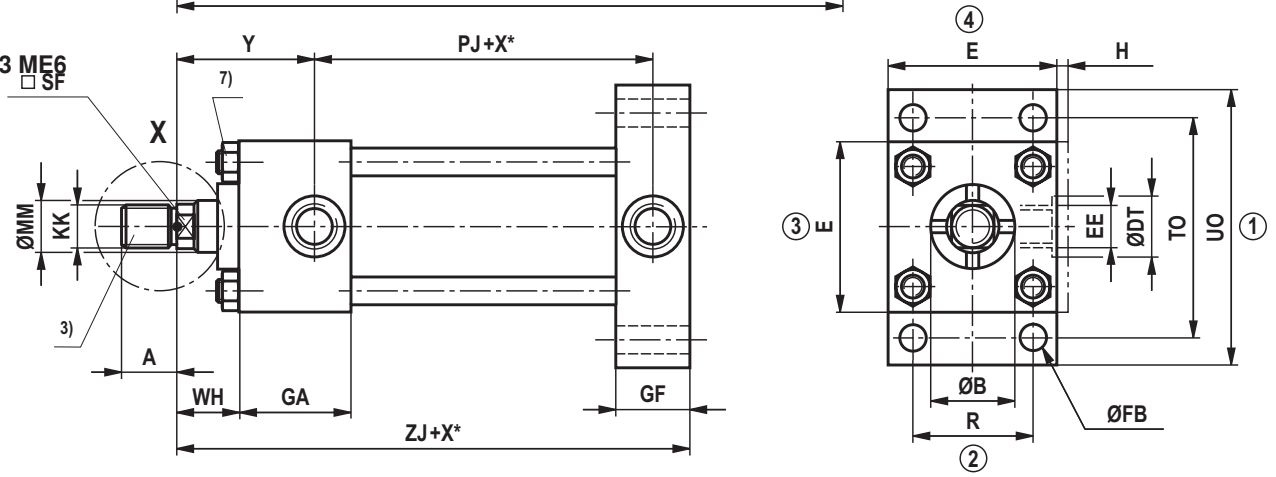


① ... ④ = Position of the line connections

CGT3 ME5



CDT3 ME6



ØAL	F max	ØFB H13	GF ME5/ME6	R JS13	TO JS13	UO max	VE max	VL min	ZB max	ZJ ± 1	ZK ± 1	ZM ± 2
25	10	5.5	25	27	51	65	16	3	121	114	138	154
32	10	6.6	25/26.5	33	58	70	22	3	137	128	151	177
40	10	11	38	41	87	110	22	3	166	153	172	196
50	16	14	38	52	105	130	25	4	176	159	183	207
63	16	14	38	65	117	145	29	4	185	168	190	223
80	20	18	45	83	149	180	29	4	212	190	216	246
100	22	18	45	97	162	200	32	5	225	203	230	265
125	22	22	58	126	208	250	32	5	260	232	254	289
160	25	26	58	155	253	300	32	5	279	245	270	302
200	25	33	76	190	300	360	32	5	336	299	329	361

Dimensions: Rectangular flange at head CDT3/CGT3; ME5 (dimensions in mm)
Rectangular flange at base CDT3; ME6 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)						
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9	ØRD f8
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24	38
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30	38
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26	42
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34	42
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30	62
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34	62
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42	62
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34	74
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42	74
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50	74
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42	75
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50	88
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60	88
80	36	M27x2	36	34	30	8	–	–	–	–	–	50	82
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60	105
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72	105
100	45	M33x2	45	43	36	10	–	–	–	–	–	60	92
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72	125
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88	125
125	56	M42x2	56	54	46	15	–	–	–	–	–	72	105
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88	150
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108	150
160	70	M48x2	63	68	60	15	–	–	–	–	–	88	125
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133	170
200	90	M64x3	85	88	75	15	–	–	–	–	–	108	150
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163	210

ØAL	E	Line connection "B"		Line connection "R"		GA	H [5]	J	PJ [10]	PJ [11]	WF	WH	Y [10]	Y [11]
		EE	ØDT	EE	ØDT	ME5/ME6			± 1.25	± 1.25	± 2	± 2	± 2	± 2
25	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	53	64.5	25	15	50	38.5
32	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	56	68.5	35	25	60	47.5
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	73	77	35	25	62	58
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	74	78	41	25	67	63
63	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	80	81	48	32	71	70
80	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	93	93	51	31	77	77
100	130 ± 2	G 3/4	42	M27x2	34	70	–	43	101	101	57	35	82	82
125	165 ± 2	G 1	47	M33x2	43	80/76	–	54	117	117	57	35	86	86
160	205 ± 2	G 1	47	M33x2	43	83	–	58	130	130	57	32	86	86
200	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	165	165	57	32	98	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

Line connection/ position	Position H	
	ME5 head	ME6 base
1	1	1
2	1	1
3	3	3
4	3	3

5) "H" dimension always in line connection position except for ME5 head and ME6 base

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

10) ME5: for line connection position "1" and "3" at head

11) ME5: for line connection position "2" and "4" at head

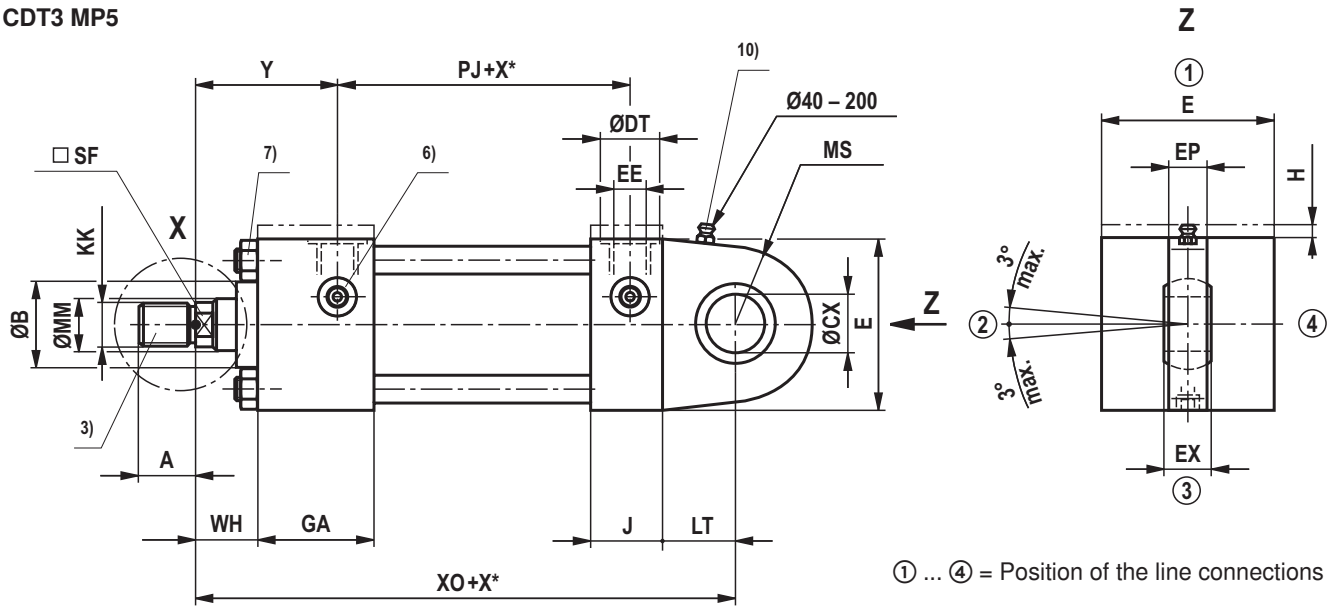
12) Piston rod Ø not standardized

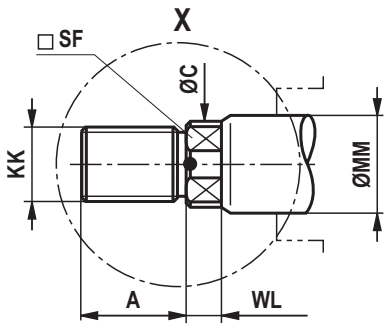
13) CG design: Piston rod marked with groove, only admissible for 50 bar tensile load

14) With operating pressures up to 210 bar only on request

Dimensions: Self-aligning clevis at base CDT3; MP5 (dimensions in mm)

CDT3 MP5





ØAL	ØCX	EP h13	EX	LT min	XO ± 1.5	MS max
25	12 – 0.008	8	10 – 0.12	16	130	20
32	16 – 0.008	11	14 – 0.12	20	148	22.5
40	20 – 0.012	13	16 – 0.12	25	178	29
50	25 – 0.012	17	20 – 0.12	31	190	33
63	30 – 0.012	19	22 – 0.12	38	206	40
80	40 – 0.012	23	28 – 0.12	48	238	50
100	50 – 0.012	30	35 – 0.12	58	261	62
125	60 – 0.015	38	44 – 0.15	72	304	80
160	80 – 0.015	47	55 – 0.15	92	337	100
200	100 – 0.020	57	70 – 0.20	116	415	120

Dimensions: Self-aligning clevis at base CDT3; MP5 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	56	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	E	Line connection "B"		Line connection "R"		GA	H [5]	J	PJ ± 1.25	WH ± 2	Y ± 2
		EE	ØDT	EE	ØDT						
25	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	53	15	50
32	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	56	25	60
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	73	25	62
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	74	25	67
63	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	80	32	71
80	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	93	31	77
100	130 ± 2	G 3/4	42	M27x2	34	70	–	43	101	35	82
125	165 ± 2	G 1	47	M33x2	43	76	–	54	117	35	86
160	205 ± 2	G 1	47	M33x2	43	83	–	58	130	32	86
200	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	165	32	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 45

7) Tightening torque see page 65

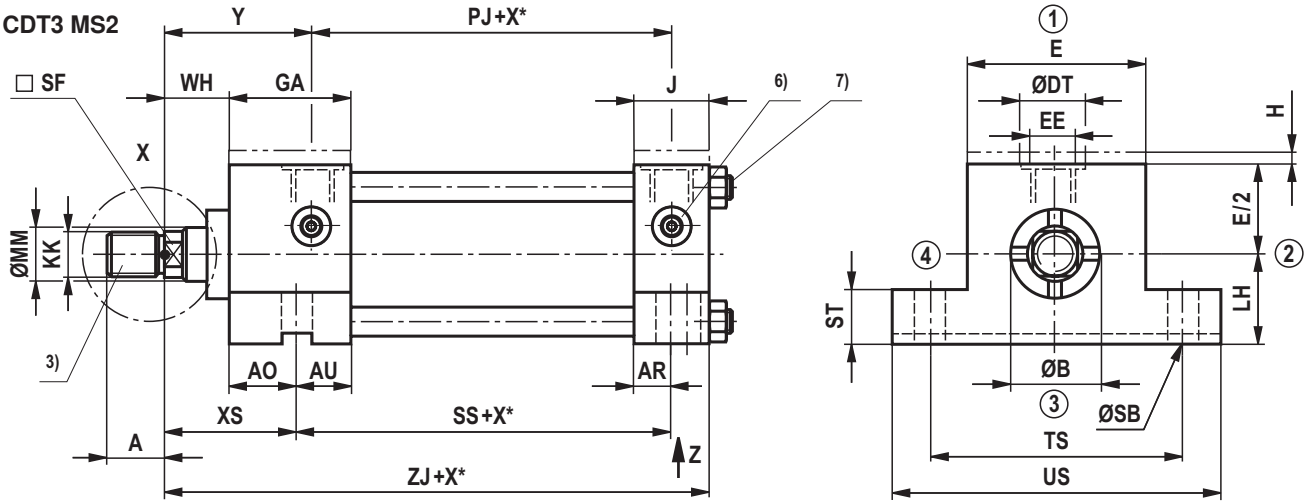
10) Lubricating nipple M6 DIN 71412 from piston Ø 40 mm

12) Piston rod Ø not standardized

14) With operating pressures up to 210 bar only on request

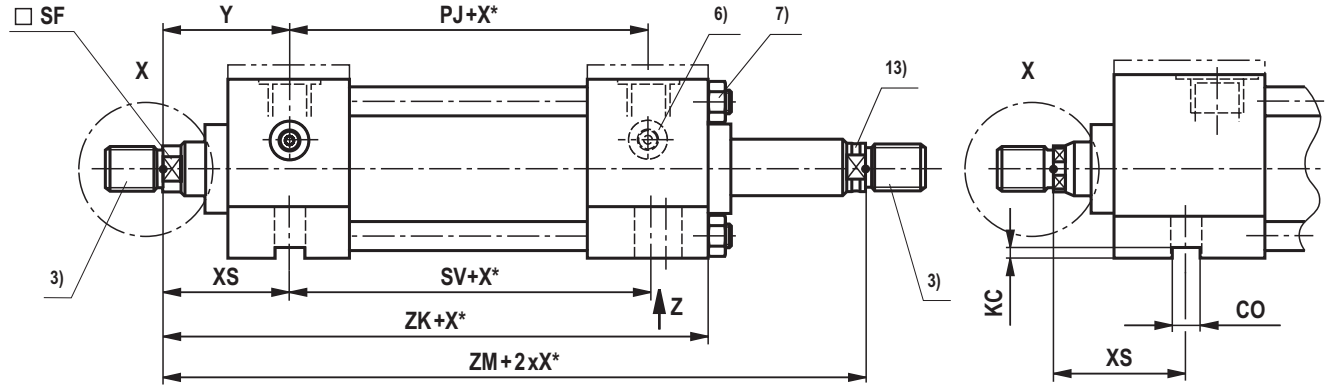
Dimensions: Foot mounting CDT3/CGT3; MS2 (dimensions in mm)

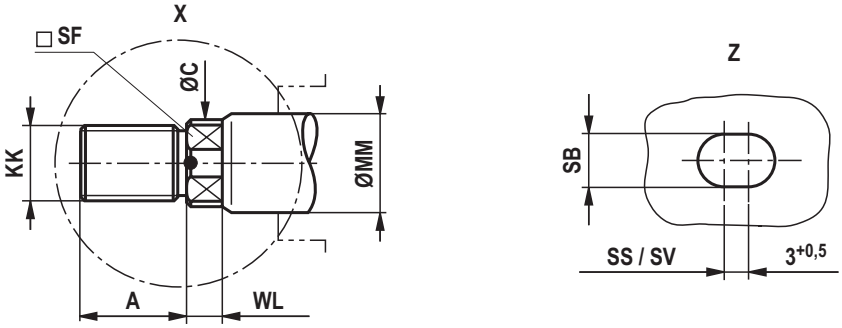
CDT3 MS2



① ... ④ = Position of the line connections

CGT3 MS2





ØAL	CO N9	KC + 0.2	LH h10	ØSB H13	SS ± 1.25	ST	SV ± 1	TS JS13	US max	XS ± 2	ZJ ± 1	ZK ± 1	ZM ± 2	AO	AU
25	12	3	19	6.6	72	8.5	87	54	72	33	114	138	154	18	28.5
32	12	4	22	9	72	12.5	87	63	84	45	128	151	177	20	28
40	12	4	31	11	97	12.5	105	83	103	45	153	172	196	20	32.5
50	12	4.5	37	14	91	19	99	102	127	54	159	183	207	29	28
63	16	4.5	44	18	85	26	92	124	161	65	168	190	223	33	24.5
80	16	5	57	18	104	26	110	149	186	68	190	216	246	39	28
100	16	6	63	26	101	32	107	172	216	79	203	230	265	44	26
125	20	5	82	26	130	32	131	210	254	79	232	254	289	44	32
160	30	8	101	33	129	38	130	260	318	86	245	270	302	54	29
200	40	8	122	39	171	44	177	311	381	92	299	329	361	60	47.5

Dimensions: Foot mounting CDT3/CGT3; MS2 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	56	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	E	Line connection "B"		Line connection "R"		GA	H [5]	J	PJ ± 1.25	WH ± 2	Y ± 2	AR
		EE	ØDT	EE	ØDT							
25	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	53	15	50	13.5
32	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	56	25	60	14
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	73	25	62	22.5
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	74	25	67	19.5
63	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	80	32	71	17.5
80	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	93	31	77	23
100	130 ± 2	G 3/4	42	M27x2	34	70	–	43	101	35	82	20
125	165 ± 2	G 1	47	M33x2	43	76	–	54	117	35	86	31
160	205 ± 2	G 1	47	M33x2	43	83	–	58	130	32	86	28
200	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	165	32	98	41.5

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

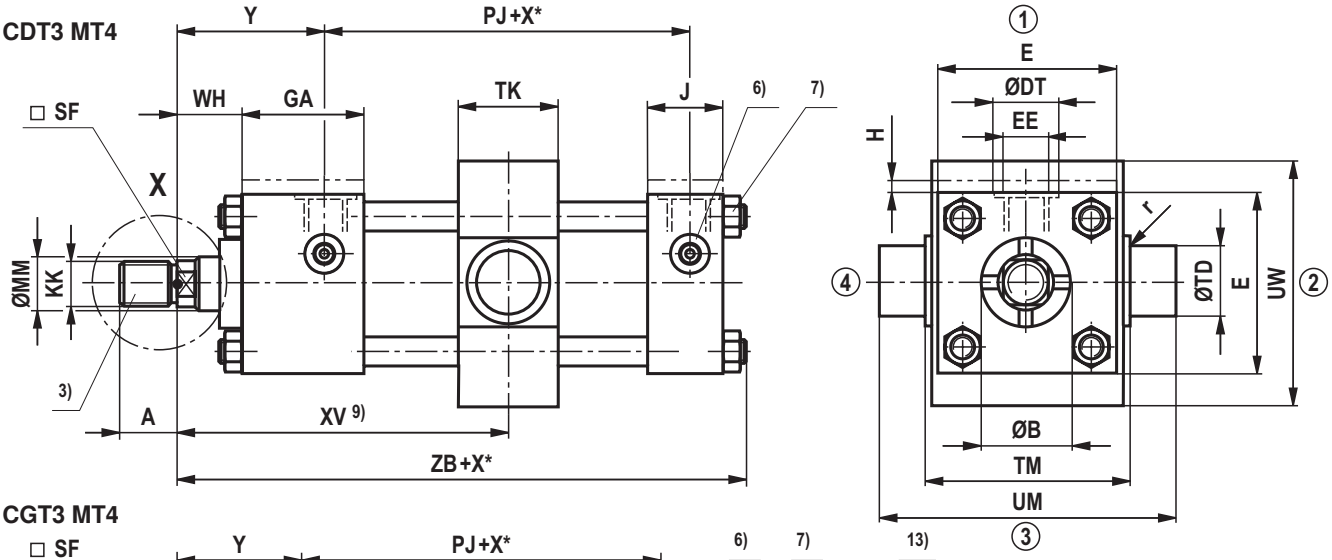
12) Piston rod Ø not standardized

13) CG design: Piston rod marked with groove, only admissible for 50 bar tensile load

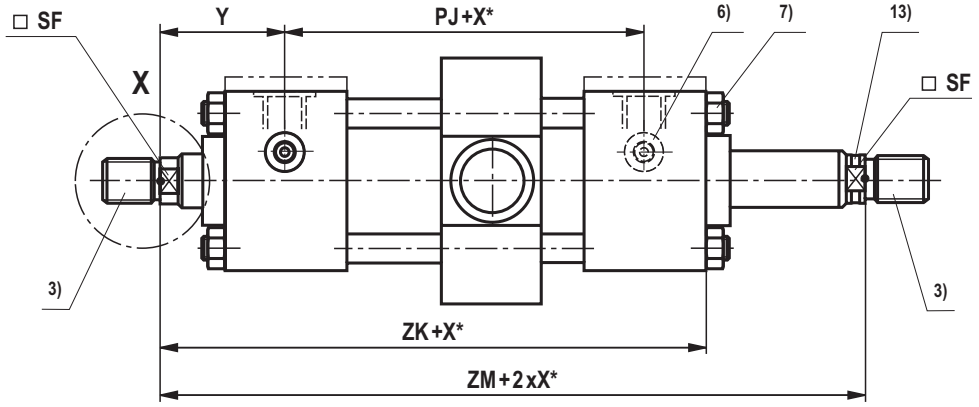
14) With operating pressures up to 210 bar only on request

Dimensions: Trunnion in center CDT3/CGT3: MT4 (dimensions in mm)

CDT3 MT4



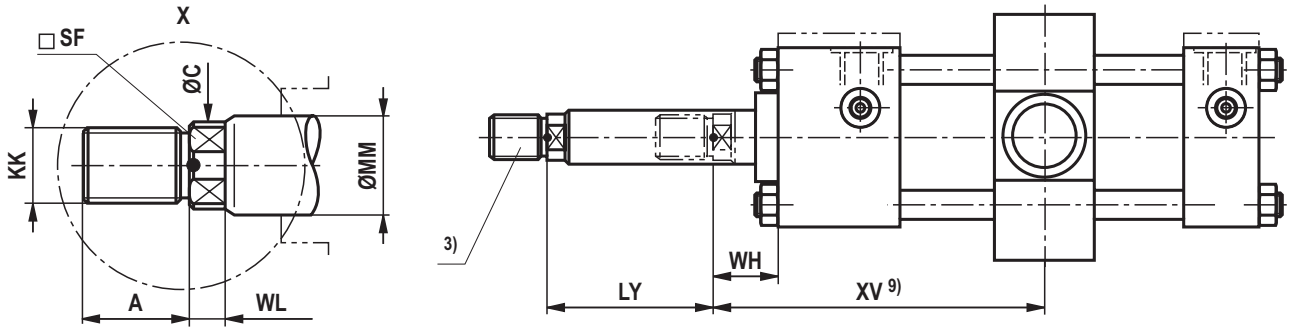
CGT3 MT4



① ... ④ = Position of the line connections

We recommend lubricating the trunnions on a regular basis.

Dimensions for cylinder with piston rod extension "LY" in retracted condition.



ØAL	r	ØTD f8	TK max	TM h14	UM h15	UW max	X* min	XV min	XV max	ZB max	ZK ± 1	ZM ± 2
25	1	12	20	48	68	43	0	74	80 + stroke	121	138	154
32	1	16	25	55	79	53	0	88	89 + stroke	137	151	177
40	1.6	20	30	76	108	74	0	95	104 + stroke	166	172	196
50	1.6	25	40	89	129	81	0	105	105 + stroke	176	183	207
63	2	32	50	100	150	97	10	117	107 + stroke	185	190	223
80	2.5	40	60	127	191	124	12	130	118 + stroke	212	216	246
100	2.5	50	70	140	220	137	18	142	124 + stroke	225	230	265
125	3.2	63	90	178	278	175	25	157	132 + stroke	260	254	289
160	3.5	80	110	215	341	212	40	171	131 + stroke	279	270	302
200	4.5	100	130	279	439	276	48	202	154 + stroke	336	329	361

Dimensions: Trunnion in center CDT3/CGT3: MT4 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	56	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	E	Line connection "B"		Line connection "R"		GA	H [5; 11]	J	PJ ± 1.25	WH ± 2	Y ± 2
		EE	ØDT	EE	ØDT						
25	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	53	15	50
32	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	56	25	60
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	73	25	62
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	74	25	67
63	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	80	32	71
80	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	93	31	77
100	130 ± 2	G 3/4	42	M27x2	34	70	–	43	101	35	82
125	165 ± 2	G 1	47	M33x2	43	76	–	54	117	35	86
160	205 ± 2	G 1	47	M33x2	43	83	–	58	130	32	86
200	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	165	32	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

9) "XV" dimension in mm, always specify in the plain text

11) Piston Ø 25 and 32 mm: dimension "H" with line connection

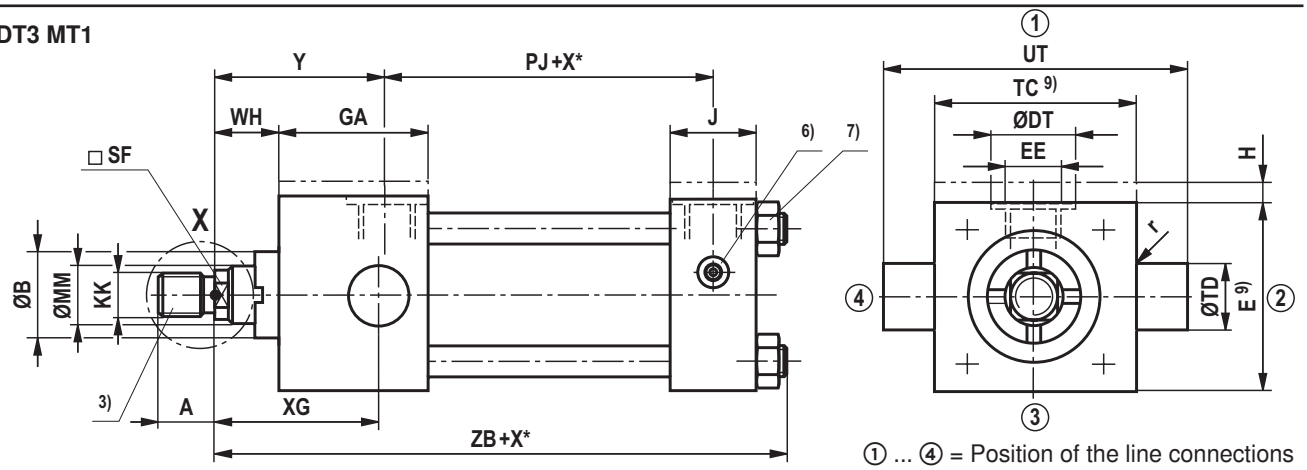
12) Piston rod Ø not standardized

13) CG version: Piston rod marked with groove, only admissible for 50 bar tensile load

14) With operating pressures up to 210 bar only on request

Dimensions: **Trunnion at head CDT3/CGT3; MT1** (dimensions in mm)
Trunnion at base CDT3; MT2 (dimensions in mm)

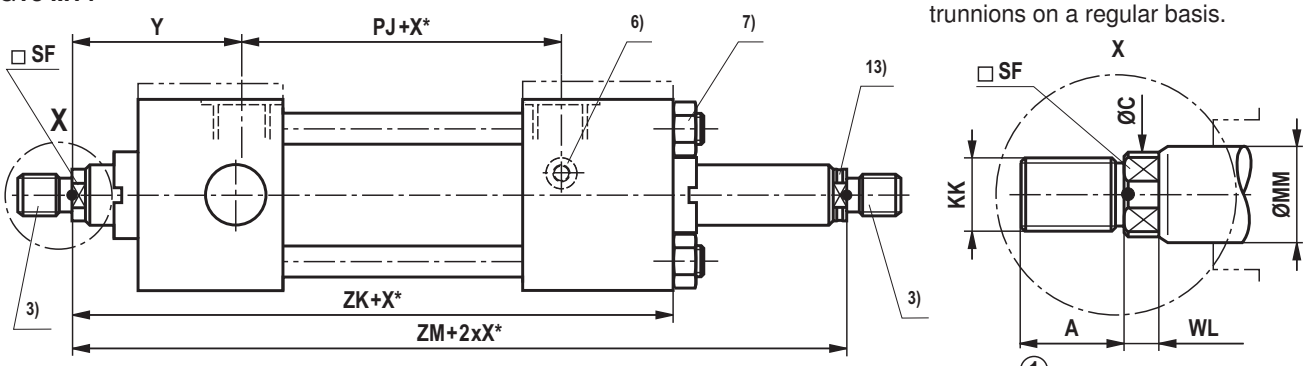
CDT3 MT1



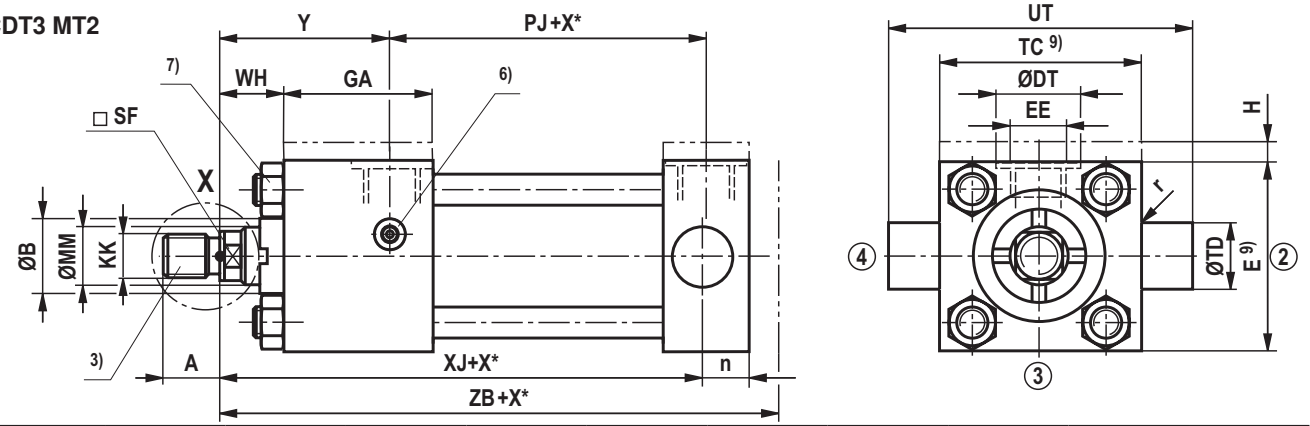
① ... ④ = Position of the line connections

CGT3 MT1

We recommend lubricating the trunnions on a regular basis.



CDT3 MT2



ØAL	n	r	TC h14	ØTD f8	UT h15	XG ± 2	XJ ± 1.25	ZB max	ZK ± 1	ZM ± 2
25	13	1	38	12	58	44	101	121	138	154
32	13	1	44	16	68	54	115	137	151	177
40	19	1.6	63	20	95	57	134	166	172	196
50	19	1.6	76	25	116	64	140	176	183	207
63	19	2	89	32	139	70	149	185	190	223
80	23	2.5	114	40	178	76	168	212	216	246
100	28	2.5	127	50	207	71	187	225	230	265
125	35	3.2	165	63	265	75	209	260	254	289
160	43	3.2	203	80	329	75	230	279	270	302
200	54.5	4.5	241	100	401	85	276	336	329	361

Dimensions: Trunnion at head CDT3/CGT3; MT1 (dimensions in mm)
Trunnion at base CDT3; MT2 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	56	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	E	Line connection "B"		Line connection "R"		GA	H [5]	J	PJ ± 1.25	WH ± 2	Y ± 2
		EE	ØDT	EE	ØDT						
25	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	53	15	50
32	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	56	25	60
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	73	25	62
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	74	25	67
63	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	80	32	71
80	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	93	31	77
100	130 ± 2	G 3/4	42	M27x2	34	70	–	43	101	35	82
125	165 ± 2	G 1	47	M33x2	43	76	–	54	117	35	86
160	205 ± 2	G 1	47	M33x2	43	83	–	58	130	32	86
200	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	165	32	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

9) With short strokes, observe "TC" and "E"

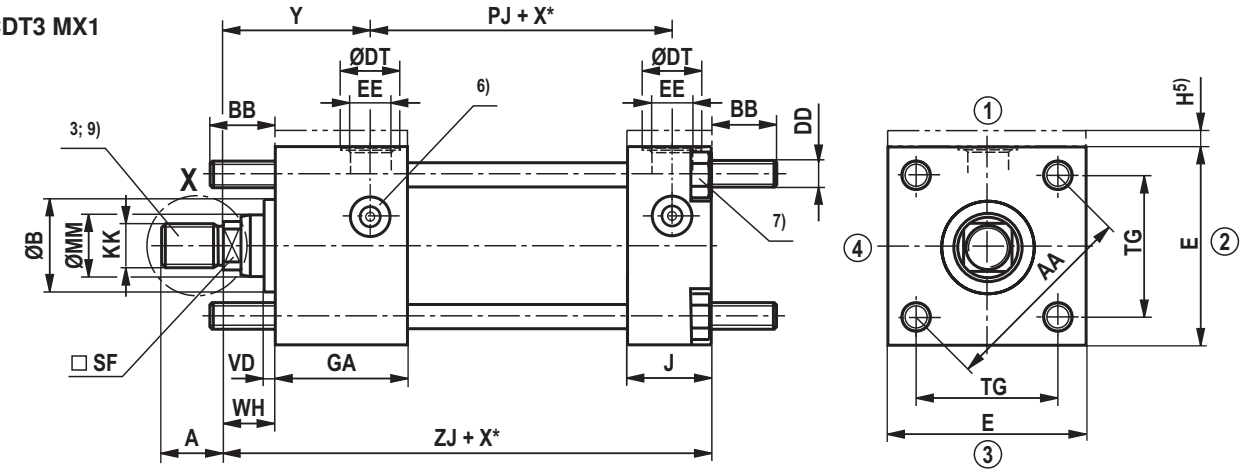
12) Piston rod Ø not standardized

13) CG version: Piston rod marked with groove, only admissible for 50 bar tensile load

14) With operating pressures up to 210 bar only on request

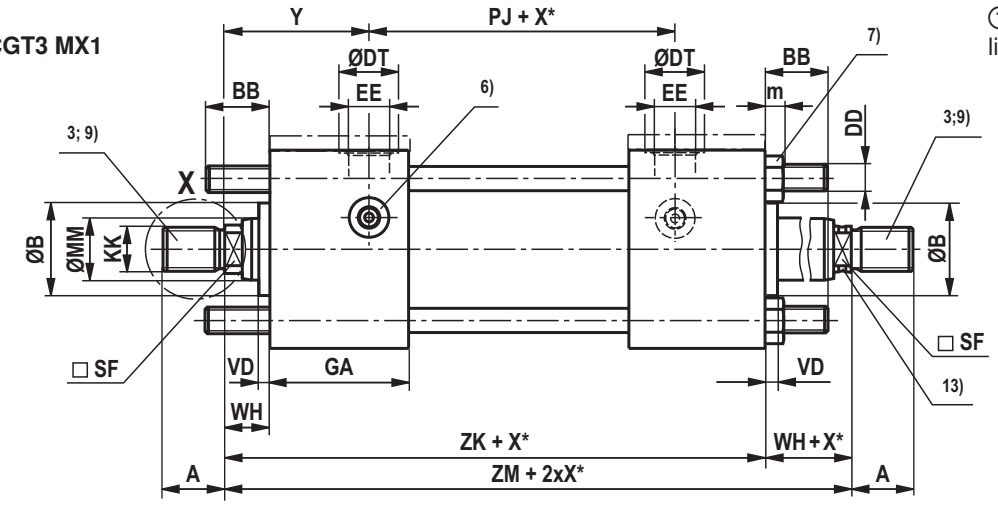
Dimensions: Extended tie rod, on both sides CDT3/CGT3; MX1 (dimensions in mm)

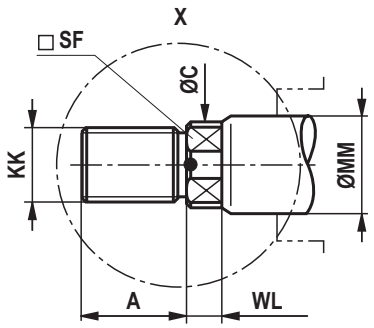
CDT3 MX1



① ... ④ = Position of the line connections

CGT3 MX1





ØAL	AA	BB [9] + 3	TG js13	VD	ZJ ± 1.25	ZK ± 1	ZM ± 2
25	40	19	28.3	6	114	138	154
32	47	24	33.2	12	128	151	177
40	59	35	41.7	12	153	172	196
50	74	46	52.3	9	159	183	207
63	91	46	64.3	13	168	190	223
80	117	59	82.7	9	190	216	246
100	137	59	96.9	10	203	230	265
125	178	81	125.9	10	232	254	289
160	219	92	154.9	7	245	270	302
200	269	115	190.2	7	299	329	361

Dimensions: Extended tie rod, on both sides CDT3/CGT3; MX1 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	54	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	DD	E	Line connection "B"		Line connection "R"		GA	H [5]	J	m	PJ ± 1.25	WH ± 2	Y ± 2
			EE	ØDT	EE	ØDT							
25	M5x0.8	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	4	53	15	50
32	M6x1	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	5	56	25	60
40	M8x1	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	6.5	73	25	62
50	M12x1.25	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	10	74	25	67
63	M12x1.25	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	10	80	32	71
80	M16x1.5	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	13	93	31	77
100	M16x1.5	130 ± 2	G 3/4	42	M27x2	34	70	–	43	13	101	35	82
125	M22x1.5	165 ± 2	G 1	47	M33x2	43	76	–	54	18	117	35	86
160	M27x2	205 ± 2	G 1	47	M33x2	43	83	–	58	22	130	32	86
200	M30x2	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	24	165	32	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

9) Observe the "BB" dimension for the swivel head assembly

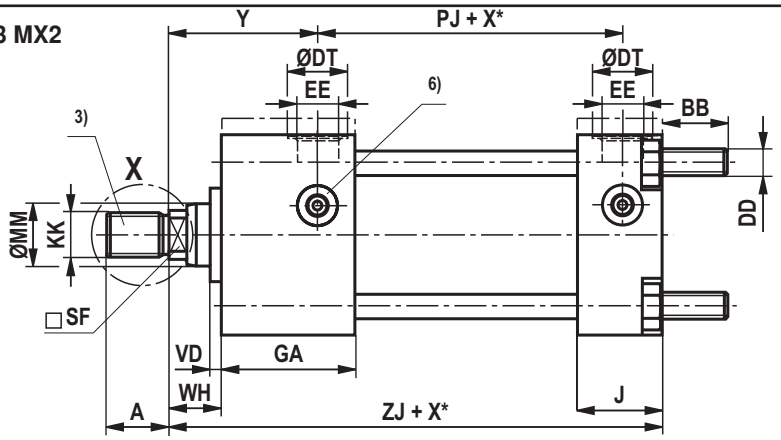
12) Piston rod Ø not standardized

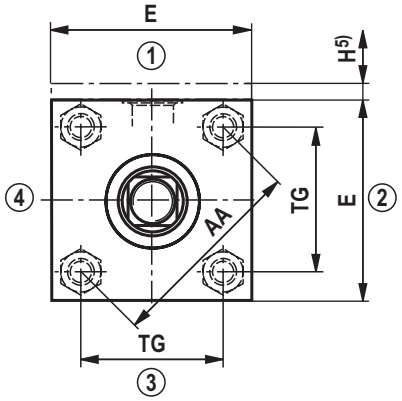
13) CG version: Piston rod marked with groove, only admissible for 50 bar tensile load

14) With operating pressures up to 210 bar only on request

Dimensions: **Extended tie rod at base CDT3; MX2** (dimensions in mm)
Extended tie rod at head CDT3/CGT3; MX3 (dimensions in mm)

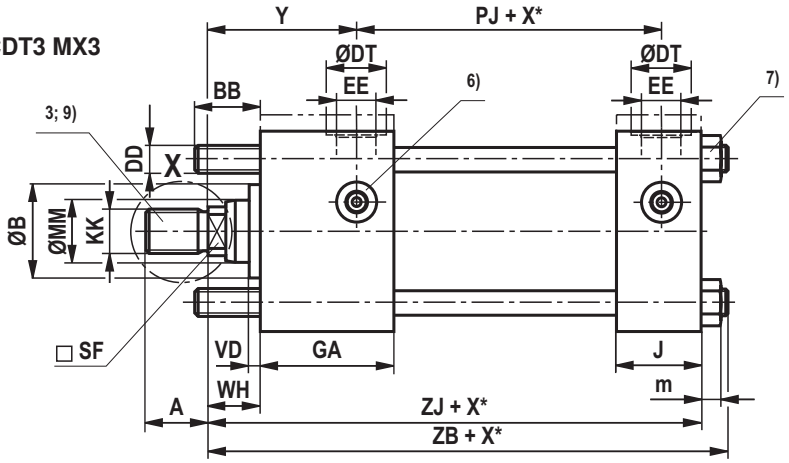
CDT3 MX2

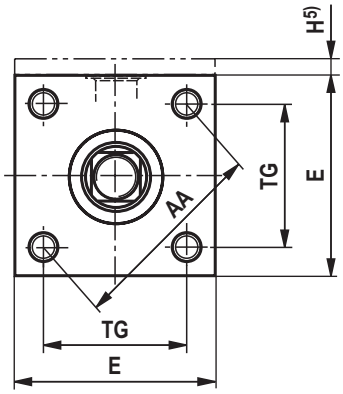




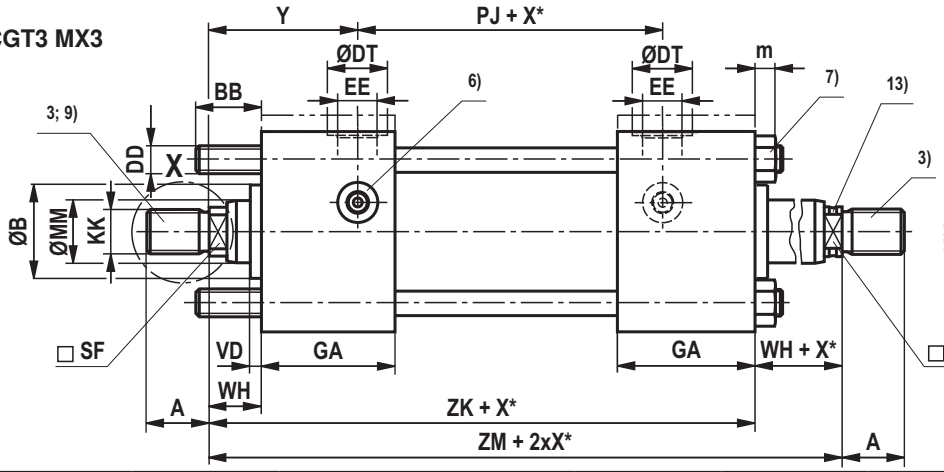
① ... ④ = Position of the line connections

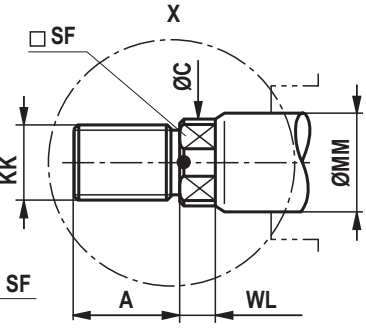
CDT3 MX3





CGT3 MX3





ØAL	AA	BB 9) + 3	TG js13	VD	ZB max	ZJ ± 1	ZK ± 1	ZM ± 2
25	40	19	28.3	6	121	114	138	154
32	47	24	33.2	12	137	128	151	177
40	59	35	41.7	12	166	153	172	196
50	74	46	52.3	9	176	159	183	207
63	91	46	64.3	13	185	168	190	223
80	117	59	82.7	9	212	190	216	246
100	137	59	96.9	10	225	203	230	265
125	178	81	125.9	10	260	232	254	289
160	219	92	154.9	7	279	245	270	302
200	269	115	190.2	7	336	299	329	361

Dimensions: Extended tie rod at base CDT3; MX2 (dimensions in mm)
Extended tie rod at head CDT3/CGT3; MX3 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	56	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	DD	E	Line connection "B"		Line connection "R"		GA	H [5]	J	m	PJ ± 1.25	WH ± 2	Y ± 2
			EE	ØDT	EE	ØDT							
25	M5x0.8	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	4	53	15	50
32	M6x1	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	5	56	25	60
40	M8x1	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	6.5	73	25	62
50	M12x1.25	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	10	74	25	67
63	M12x1.25	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	10	80	32	71
80	M16x1.5	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	13	93	31	77
100	M16x1.5	130 ± 2	G 3/4	42	M27x2	34	70	–	43	13	101	35	82
125	M22x1.5	165 ± 2	G 1	47	M33x2	43	76	–	54	18	117	35	86
160	M27x2	205 ± 2	G 1	47	M33x2	43	83	–	58	22	130	32	86
200	M30x2	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	24	165	32	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

9) Observe the "BB" dimension for the swivel head assembly

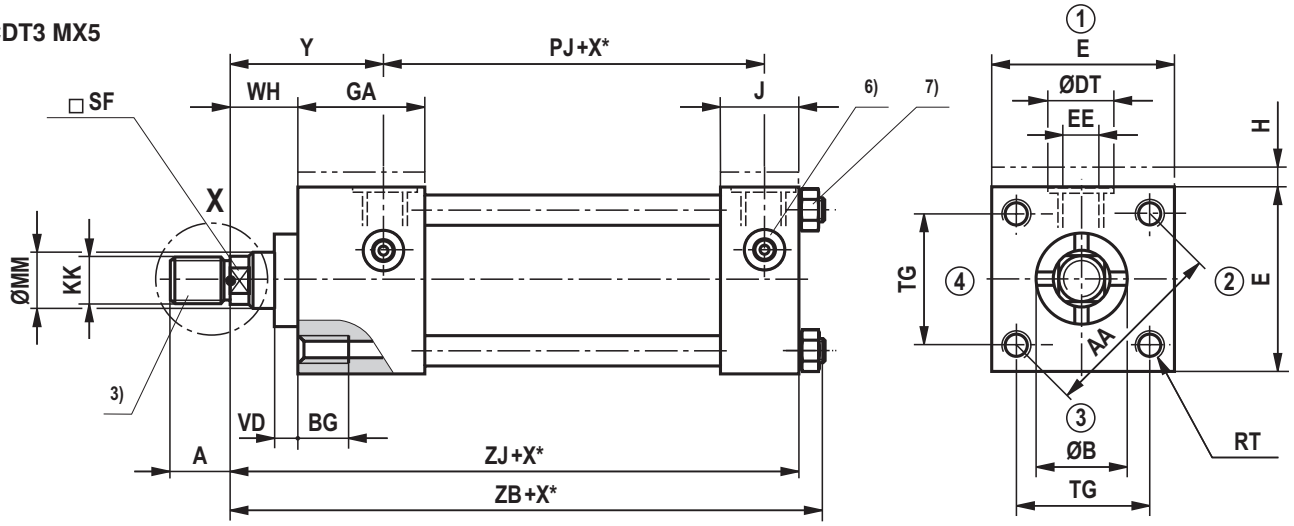
12) Piston rod Ø not standardized

13) CG version: Piston rod marked with groove, only admissible for 50 bar tensile load

14) With operating pressures up to 210 bar only on request

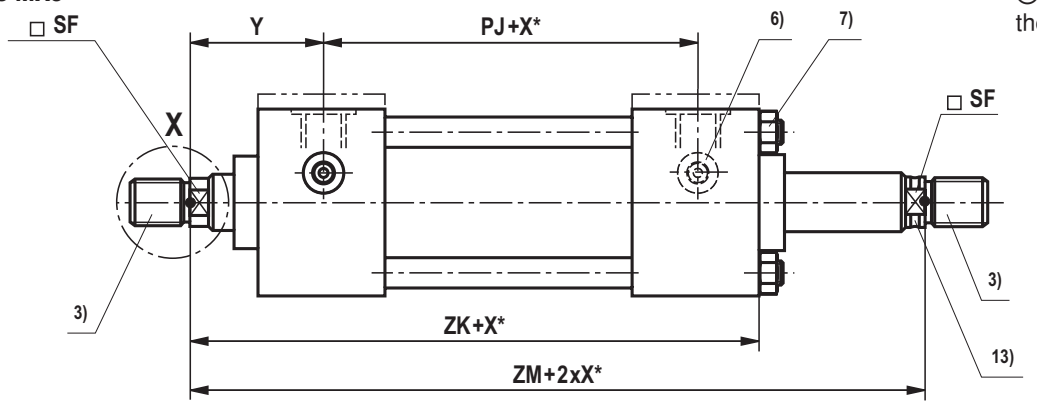
Dimensions: Tapped hole at head CDT3/CGT3; MX5 (dimensions in mm)

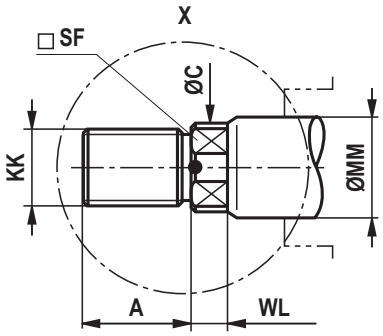
CDT3 MX5



① ... ④ = Position of the line connections

CGT3 MX5





ØAL	AA	BG min	RT 6H	TG js13	VD	ZB max	ZJ ± 1.25	ZK ± 1	ZM ± 2
25	40	8	M5x0.8	28.3	6	121	114	138	154
32	47	9	M6x1	33.2	12	137	128	151	177
40	59	12	M8x1.25	41.7	12	166	153	172	196
50	74	18	M12x1.75	52.3	9	176	159	183	207
63	91	18	M12x1.75	64.3	13	185	168	190	223
80	117	24	M16x2	82.7	9	212	190	216	246
100	137	24	M16x2	96.9	10	225	203	230	265
125	178	27	M22x2.5	125.9	10	260	232	254	289
160	219	32	M27x3	154.9	7	279	245	270	302
200	269	40	M30x3.5	190.2	7	336	299	329	361

Dimensions: Tapped hole at head CDT3/CGT3; MX5 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	56	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	E	Line connection "B"		Line connection "R"		GA	H [5]	J	PJ ± 1.25	WH ± 2	Y ± 2
		EE	ØDT	EE	ØDT						
25	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	53	15	50
32	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	56	25	60
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	73	25	62
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	74	25	67
63	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	80	32	71
80	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	93	31	77
100	130 ± 2	G 3/4	42	M27x2	34	70	–	43	101	35	82
125	165 ± 2	G 1	47	M33x2	43	76	–	54	117	35	86
160	205 ± 2	G 1	47	M33x2	43	83	–	58	130	32	86
200	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	165	32	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

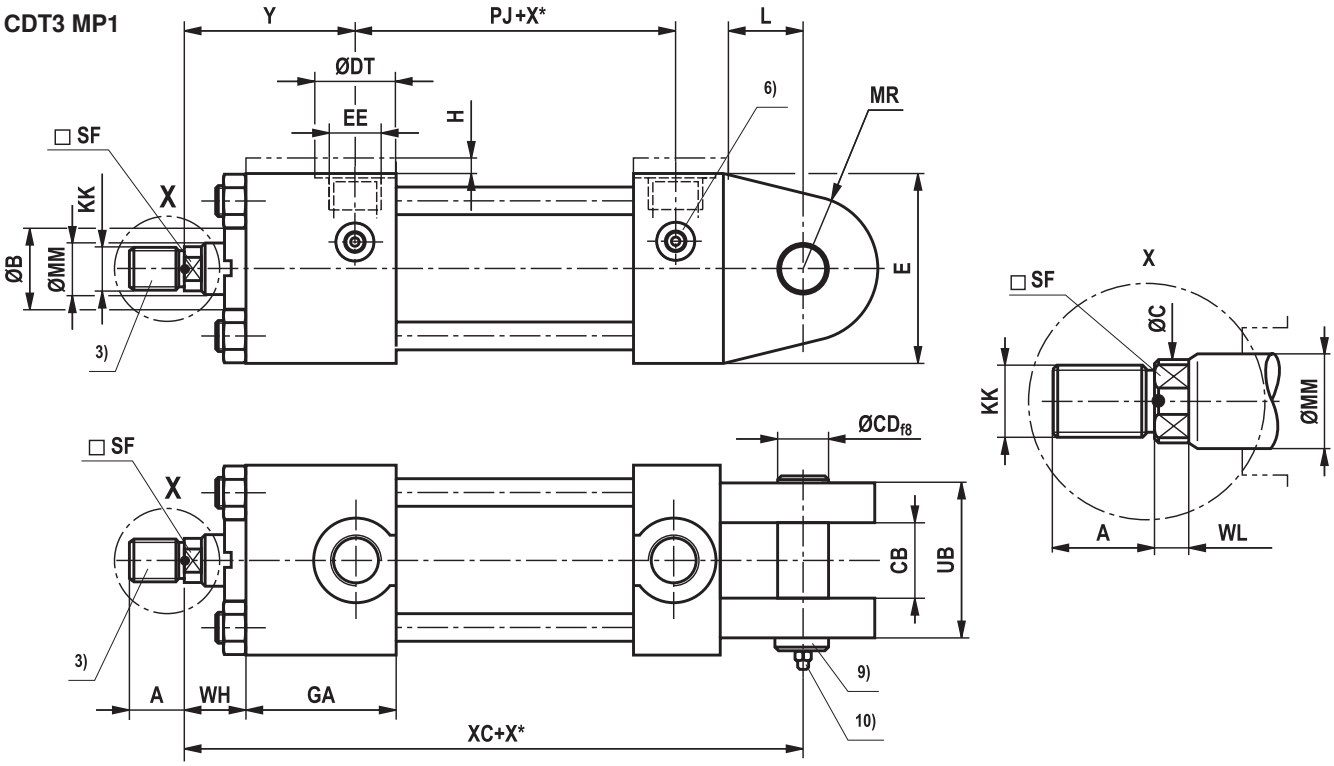
12) Piston rod Ø not standardized

13) CG design: Piston rod marked with groove, only admissible for 50 bar tensile load

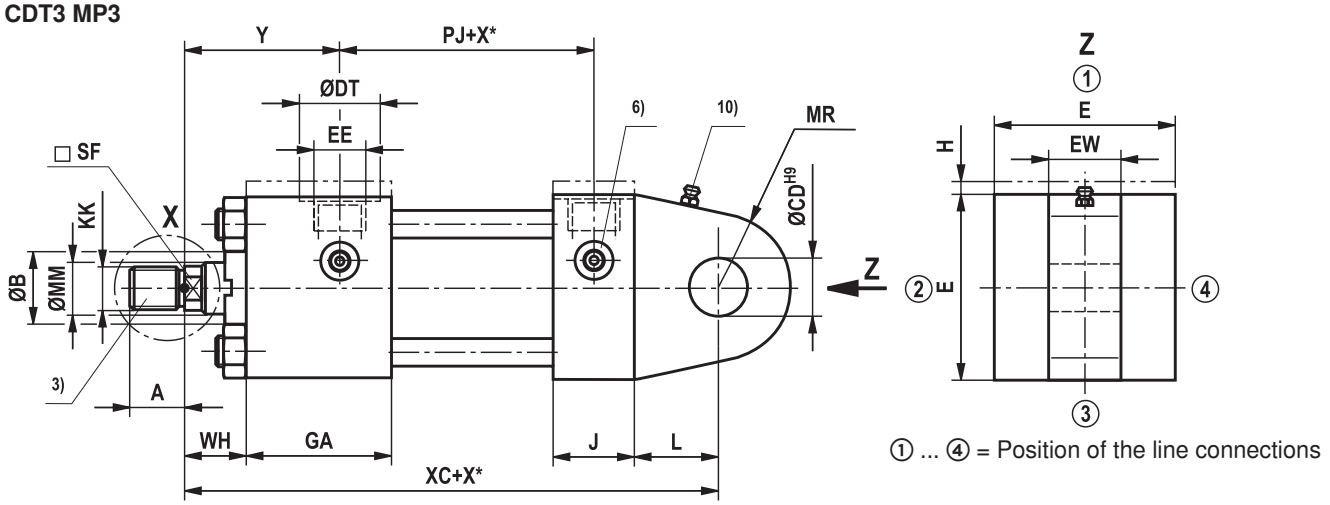
14) With operating pressures up to 210 bar only on request

Dimensions: Type of mounting CDT3; MP1, MP3 (dimensions in mm)

CDT3 MP1



CDT3 MP3



ØAL	CB A16	ØCD H9; f8	EW h14	L min	MR max	UB max	XC ± 1.25
25	12	10	12	13	12	25	127
32	16	12	16	19	17	34	147
40	20	14	20	19	17	42	172
50	30	20	30	32	29	62	191
63	30	20	30	32	29	62	200
80	40	28	40	39	34	83	229
100	50	36	50	54	50	103	257
125	60	45	60	57	53	120	289
160	70	56	70	63	59	140	308
200	80	70	80	82	78	160	381

Dimensions: Type of mounting CDT3; MP1, MP3 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	56	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	E	Line connection "B"		Line connection "R"		GA	H [5]	J	PJ ± 1.25	WH ± 2	Y ± 2
		EE	ØDT	EE	ØDT						
25	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	53	15	50
32	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	56	25	60
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	73	25	62
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	74	25	67
63	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	80	32	71
80	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	93	31	77
100	130 ± 2	G 3/4	42	M27x2	34	70	–	43	101	35	82
125	165 ± 2	G 1	47	M33x2	43	76	–	54	117	35	86
160	205 ± 2	G 1	47	M33x2	43	83	–	58	130	32	86
200	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	165	32	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

9) Bolt included in the scope of delivery

10) Lubricating nipple M6 DIN 71412

12) Piston rod Ø not standardized

14) With operating pressures up to 210 bar only on request

Areas, forces, flow: Series CST3 (for operating pressure up to 160 bar)

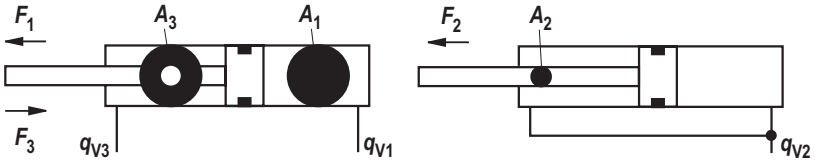
Piston	Piston rod	Area ratio	Areas			Force at 160 bar [1]			Flow at 0.1 m/s [2]			Max. available stroke length (mm)[4]
			Piston	Rod	Ring	Pressure	Diff.	Pulling	Off	Diff.	On	
ØAL mm	**ØMM** mm	φ A_1/A_3	A_1 cm²	A_2 cm²	A_3 cm²	F_1 kN	F_2 kN	F_3 kN	q_{V1} l/min	q_{V2} l/min	q_{V3} l/min	
40	**28**	1.96	12.56	6.16	6.40	20.11	9.85	10.25	7.5	3.7	3.8	1000
50	**28** [3] **36**	1.46 2.08	19.63	6.16 10.18	13.48 9.45	31.42	9.85 16.29	21.56 15.13	11.8	3.7 6.1	8.1 5.7	1200
63	**36** [3] **45**	1.48 2.04	31.17	10.18 15.90	20.99 15.27	49.88	16.29 25.45	33.59 24.43	18.7	6.1 9.5	12.6 9.2	1400
80	**45** [3] **56**	1.46 1.96	50.26	15.90 24.63	34.36 25.63	80.42	25.45 39.41	54.98 41.02	30.2	9.5 14.8	20.6 15.4	1700
100	**56** [3] **70**	1.46 1.96	78.54	24.63 38.48	53.91 40.06	125.66	39.41 61.58	86.26 64.09	47.1	14.8 23.1	32.3 24.0	2000
125	**70** [3] **90**	1.46 2.08	122.72	38.48 63.62	84.23 59.10	196.35	61.58 101.79	134.77 94.56	73.6	23.1 38.2	50.5 35.5	2300
160	**70** **110**	1.25 1.90	201.06	38.48 95.03	162.58 106.03	321.70	61.58 152.05	260.12 169.64	120.6	23.1 57.0	97.5 63.6	2600
200	**90** **140**	1.25 1.96	314.16	63.62 153.94	250.54 160.22	502.65	101.79 246.30	400.86 256.35	188.5	38.2 92.4	150.3 96.1	3000

[1] Theoretical static cylinder force (without consideration of the efficiency and admissible load for attachment parts like e.g. swivel heads, plates or valves, etc.)

[2] Stroke velocity

[3] Piston rod Ø not standardized

[4] Larger stroke lengths upon request



Overview types of mounting: Series CST3 (Only for operating pressure up to 160 bar)

CST3 ME5

see page 32, 33

CST3 MP5

see page 34, 35

CST3 MS2

see page 36, 37

CST3 MT4

see page 38, 39

CST3 MX5

see page 40, 41

Ordering code: Series CST3 (for operating pressure up to 160 bar)

CS	T3	/ / /	Z	3X														*

Differential cylinder with position measurement system [10] = **CS**

Series = **T3**

Types of mounting DIN/ISO
Rectangular flange at head = **ME5**
Self-aligning clevis at base = **MP5**
Foot mounting [8] = **MS2**
Trunnion in center [1] = **MT4**
Tapped hole at head = **MX5**

Piston Ø (ØAL) 40 to 200 mm

Piston rod Ø (ØMM) 28 to 140 mm

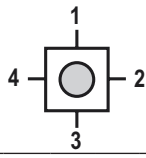
Stroke length in mm [11]

Design principle
Head and base connected to tie rod = **Z**

Component series = **3X**
30 to 39 unchanged installation and connection dimensions

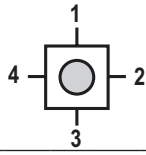
Line connection/version
Pipe thread (ISO 1179-1) = **B**
Subplate NG6 [8; 9] = **P**
Subplate NG10 [8] = **T**
Subplate NG16 [8; 15] = **U**

Line connection / position at head
see page 43



View to piston rod
= **1**
= **2**
= **3**
= **4**

Line connection / position at base
see page 43



View to piston rod
= **1**
= **2**
= **3**
= **4**

Further details in the plain text

Test certificate
W = without test certificate
C = with acceptance test certificate 3.1 based on EN 10204

Oil filling
W = without oil filling
F = with oil filling

Color set-up
W = Priming class CP3
B = [18] Painting class CP4

Option 2
C = Analog output 4-20 mA
F = Analog output 0-10 V
D = Digital output SSI

Option 1
T = Position measurement system (magnetostrictive) without mating connector
Mating connector - separate order see page 48

Seal design
M = Standard seal system
T = Servo quality/reduced friction
S = High temperature with reduced friction

End position cushioning
U = Without

Piston rod end
see pages 32 to 41
H = Thread (DIN/ISO) for swivel head CGKA
D = Thread (ISO) for swivel head CGKA
F = With mounted swivel head CGKA (DIN/ISO)
K = With mounted swivel head CGKA (ISO)

Piston rod design
H = Hardened and hard chromium-plated

Comments:

[1] Trunnion position freely selectable; when ordering, always specify the "XV" dimension in the plain text in mm.

[8] Only position 11 possible

[9] Only up to piston Ø 80 mm

[10] not standardized

[11] Observe the max. and min. stroke length on pages 32 to 41 and the admissible stroke length (according to kinking calculation) on pages 54 to 55

[15] Only piston Ø 100 – 200 mm

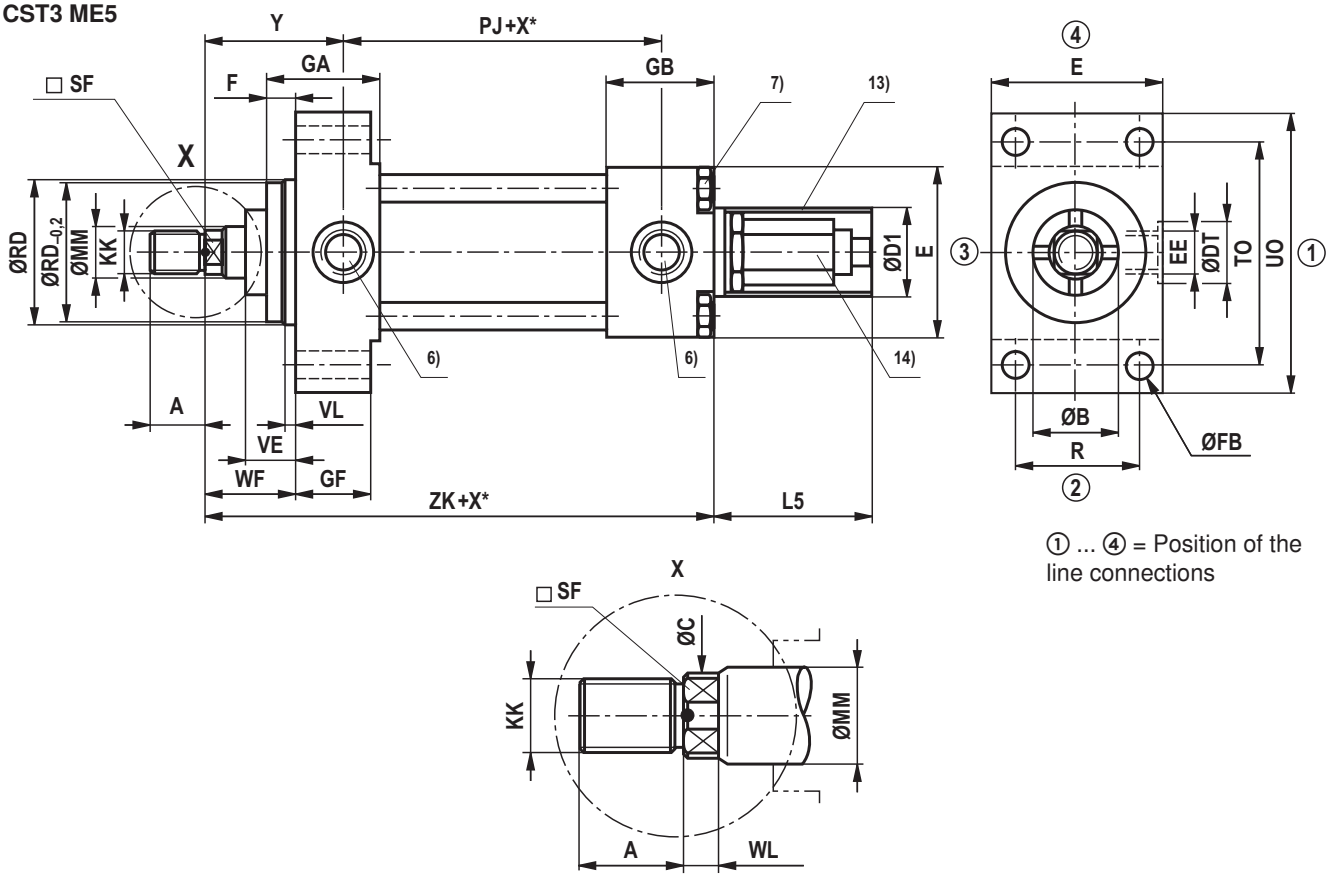
[18] Specify RAL color in the plain text

Order example:
CST3ME5/50/36/300Z3X/P11HDUTTD

When selecting, please observe the limitations on the corresponding catalog pages!

Dimensions: Rectangular flange at head CST3; ME5 (dimensions in mm)

CST3 ME5



ØAL	ØMM	PJ [10] ± 1.25	PJ [11] ± 1.25	R JS13	TO JS13	UO max	VE max	VL min	ZK ± 1	L5	ØD1 max	X* min **without** subplate	X* min **with** subplate
40	**28**	73	77	41	87	110	22	3	195	–	–	–	50
50	**28** **36**	74	78	52	105	130	25	4	194	–	–	–	50
63	**36** **45**	80	81	65	117	145	29	4	205	82	96	–	45
80	**45** **56**	93	93	83	149	180	29	4	234	82	96	–	32
100	**56** **70**	101	101	97	162	200	32	5	248	82	96	–	57
125	**70** **90**	117	117	126	208	250	32	5	265.5	82	96	–	35
160	**70** **110**	130	130	155	253	300	32	5	277	82	96	20	20
200	**90** **140**	165	160	190	300	360	32	5	326.5	82	96	20	20

Dimensions: Rectangular flange at head CST3; ME5 (dimensions in mm)

		DIN / ISO [1]					ISO [2]						
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9	ØRD f8
40	**28**	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42	62
50	**28**	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42	74
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50	74
63	**36**	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50	88
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60	88
80	**45**	M27x2	36	43	36	10	M33x2	45	43	36	10	60	105
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72	105
100	**56**	M33x2	45	54	46	10	M42x2	56	54	46	10	72	125
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88	125
125	**70**	–	–	–	–	–	M48x2	63	68	60	15	88	150
	90	M42x2	56	88	75	15	M64x3	85	86	75	15	108	150
160	**70**	M48x2	63	68	60	15	–	–	–	–	–	88	125
	110	M48x2	63	106	92	15	M80x3	95	106	92	15	133	170
200	**90**	M64x3	85	88	75	15	–	–	–	–	–	108	150
	140	M64x3	85	136	125	15	M100x3	112	136	125	15	163	210

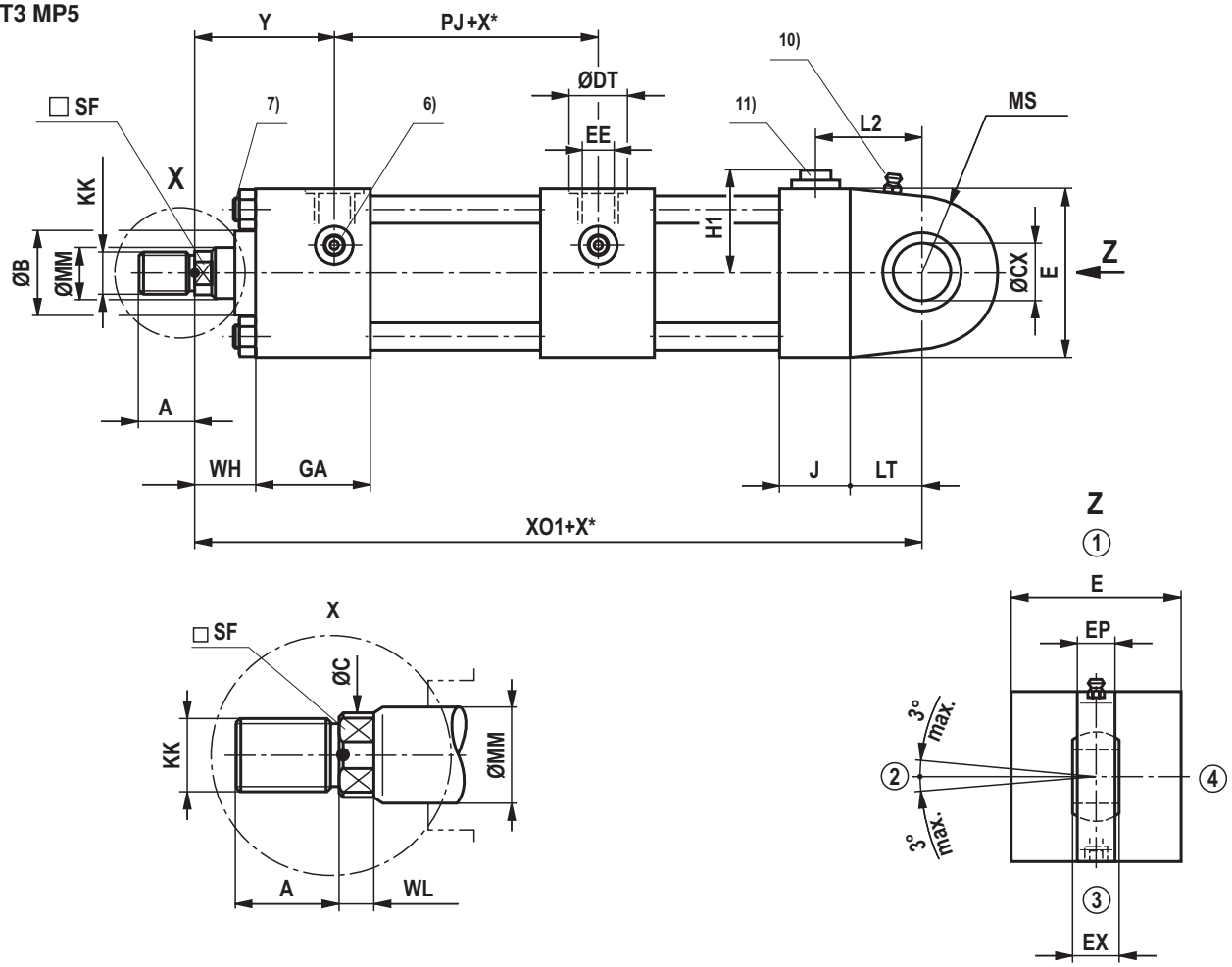
ØAL	F max	ØFB H13	GF	E	EE	ØDT	GA	GB	WF ± 2	Y [10] ± 2	Y [11] ± 2
40	10	11	38	63 ± 1.5	G 3/8	28	52.5	75.5	35	62	58
50	16	14	38	75 ± 1.5	G 1/2	34	57.5	68.5	41	67	63
63	16	14	38	90 ± 1.5	G 1/2	34	57.5	72.5	48	71	70
80	20	18	45	115 ± 1.5	G 3/4	42	67	85	51	77	77
100	22	18	45	130 ± 2	G 3/4	42	70	88	57	82	82
125	22	22	58	165 ± 2	G 1	47	80	87.5	57	86	86
160	25	26	58	205 ± 2	G 1	47	83	90	57	86	86
200	25	33	76	245 ± 2	G 1 1/4	58	107.5	105	57	98	98

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length
X*min = Min. stroke length
X*max = Max. stroke length

1) Thread for piston rod ends "F" and "H"
2) Thread for piston rod ends "D" and "K"
6) For the position of the line connections and the bleeding see page 43
7) Tightening torque see page 65
10) ME5: for line connection position "1" and "3" at head
11) ME5: for line connection position "2" and "4" at head
13) With piston Ø 40 – 50 mm without protective pipe
14) Installation space for position measurement system at least 200 mm

Dimensions: Self-aligning clevis at base CST3; MP5 (dimensions in mm)

CST3 MP5



① ... ④ = Position of the line connections

ØAL	ØMM	ØCX	EP h13	EX	LT min	XO1 ± 1.5	MS max	X* min **without** subplate	X* min **with** subplate
40	**28**	20 – 0.012	13	16 – 0.12	25	348	29	–	50
50	**28** **36**	25 – 0.012	17	20 – 0.12	31	365	33	–	50
63	**36** **45**	30 – 0.012	19	22 – 0.12	38	383	40	–	45
80	**45** **56**	40 – 0.012	23	28 – 0.12	48	410	50	–	32
100	**56** **70**	50 – 0.012	30	35 – 0.12	58	436	62	–	57
125	**70** **90**	60 – 0.015	38	44 – 0.15	72	487	80	–	35
160	**70** **110**	80 – 0.015	47	55 – 0.15	92	528	100	20	20
200	**90** **140**	100 – 0.020	57	70 – 0.20	116	632	120	20	20

Dimensions: Self-aligning clevis at base CST3; MP5 (dimensions in mm)

		DIN / ISO [1]					ISO [2]					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
40	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	28	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	36	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	45	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	56	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	70	–	–	–	–	–	M48x2	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3	112	136	125	15	163

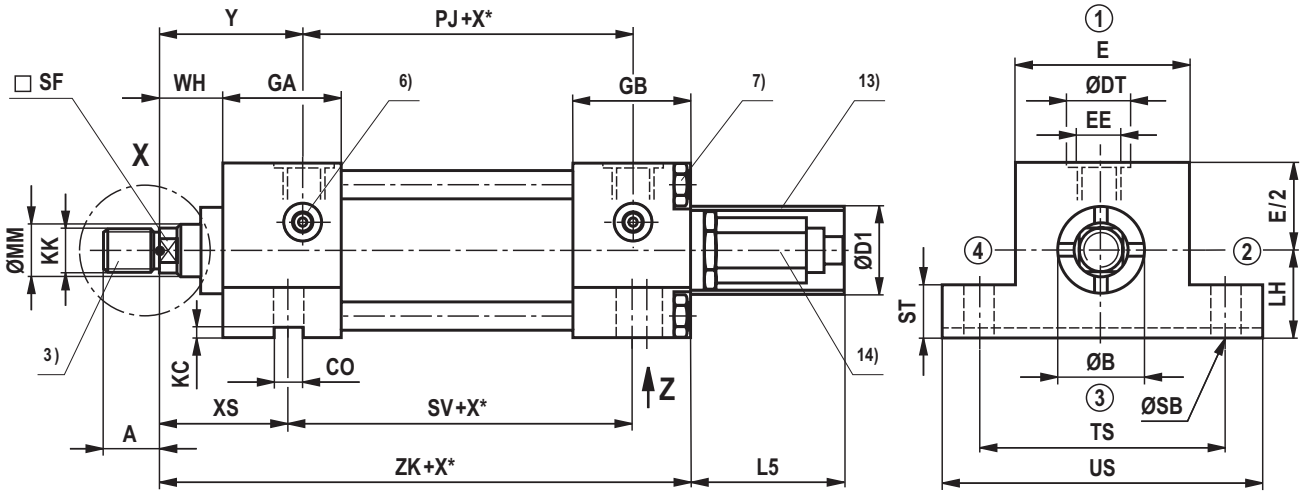
ØAL	H1	L2	E	EE	ØDT	GA	J	PJ ± 1.25	WH ± 2	Y ± 2
40	40	43.5	63 ± 1.5	G 3/8	28	52.5	33.5	73	25	62
50	45.5	49	75 ± 1.5	G 1/2	34	57.5	33.5	74	25	67
63	53	55	90 ± 1.5	G 1/2	34	57.5	35.5	80	32	71
80	65.5	68	115 ± 1.5	G 3/4	42	67	41	93	31	77
100	73	78	130 ± 2	G 3/4	42	70	43	101	35	82
125	90.5	101	165 ± 2	G 1	47	76	54	117	35	86
160	110.5	121	205 ± 2	G 1	47	83	58	130	32	86
200	130.5	157	245 ± 2	G 1 1/4	58	107.5	77.5	165	32	98

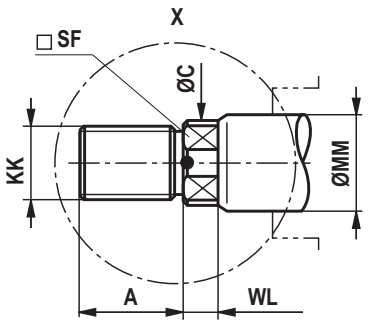
ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length
X*min = Min. stroke length
X*max = Max. stroke length

1) Thread for piston rod ends "F" and "H"
2) Thread for piston rod ends "D" and "K"
6) For the position of the line connections and the bleeding see page 43
7) Tightening torque see page 65
10) Lubricating nipple M6 DIN 71412
11) Only in line connection position 1 at base

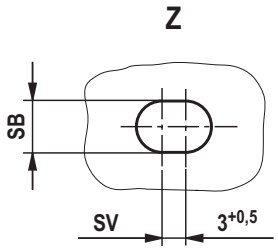
Dimensions: Foot mounting CST3; MS2 (dimensions in mm)

CST3 MS2





① ... ④ = Position of the line connections



ØAL	CO N9	KC +0.2	LH h10	PJ ± 1.25	ØSB H13	ST	SV ± 1	TS JS13	US max
40	12	4	31	73	11	12.5	106.5	83	103
50	12	4.5	37	74	14	19	99.5	102	127
63	16	4.5	44	80	18	26	91.5	124	161
80	16	5	57	93	18	26	110.5	149	186
100	16	6	63	101	26	32	106.5	172	216
125	20	6	82	117	26	32	128.5	210	254
160	30	8	101	130	33	38	129	260	318
200	40	8	122	165	39	44	171	311	381

Dimensions: Foot mounting CST3; MS2 (dimensions in mm)

		DIN / ISO [1]					ISO [2]					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
40	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	28	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	36	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	45	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	56	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	70	–	–	–	–	–	M48x2	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3	112	136	125	15	163

ØAL	E	EE	ØDT	GA	GB	WH ± 2	Y ± 2
40	63 ± 1.5	G 3/8	28	52.5	75.5	25	62
50	75 ± 1.5	G 1/2	34	57.5	68.5	25	67
63	90 ± 1.5	G 1/2	34	57.5	72.5	32	71
80	115 ± 1.5	G 3/4	42	67	85	31	77
100	130 ± 2	G 3/4	42	70	88	35	82
125	165 ± 2	G 1	47	76	87.5	35	86
160	205 ± 2	G 1	47	83	90	32	86
200	245 ± 2	G 1 1/4	58	107.5	105	32	98

ØAL	ØMM	XS ± 2	ZK ± 1	L5	ØD1 max	X* min **without** subplate	X* min **with** subplate
40	28	45	195	–	–	–	50
50	28	54	194	–	–	–	50
	36						
63	36	65	205	–	–	–	45
	45						
80	45	68	234	82	96	–	32
	56						
100	56	79	248	82	96	–	57
	70						
125	70	79	265.5	82	96	–	35
	90						
160	70	86	277	82	96	20	20
	110						
200	90	92	326.5	82	96	20	20
	140						

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length
X*min = Min. stroke length
X*max = Max. stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

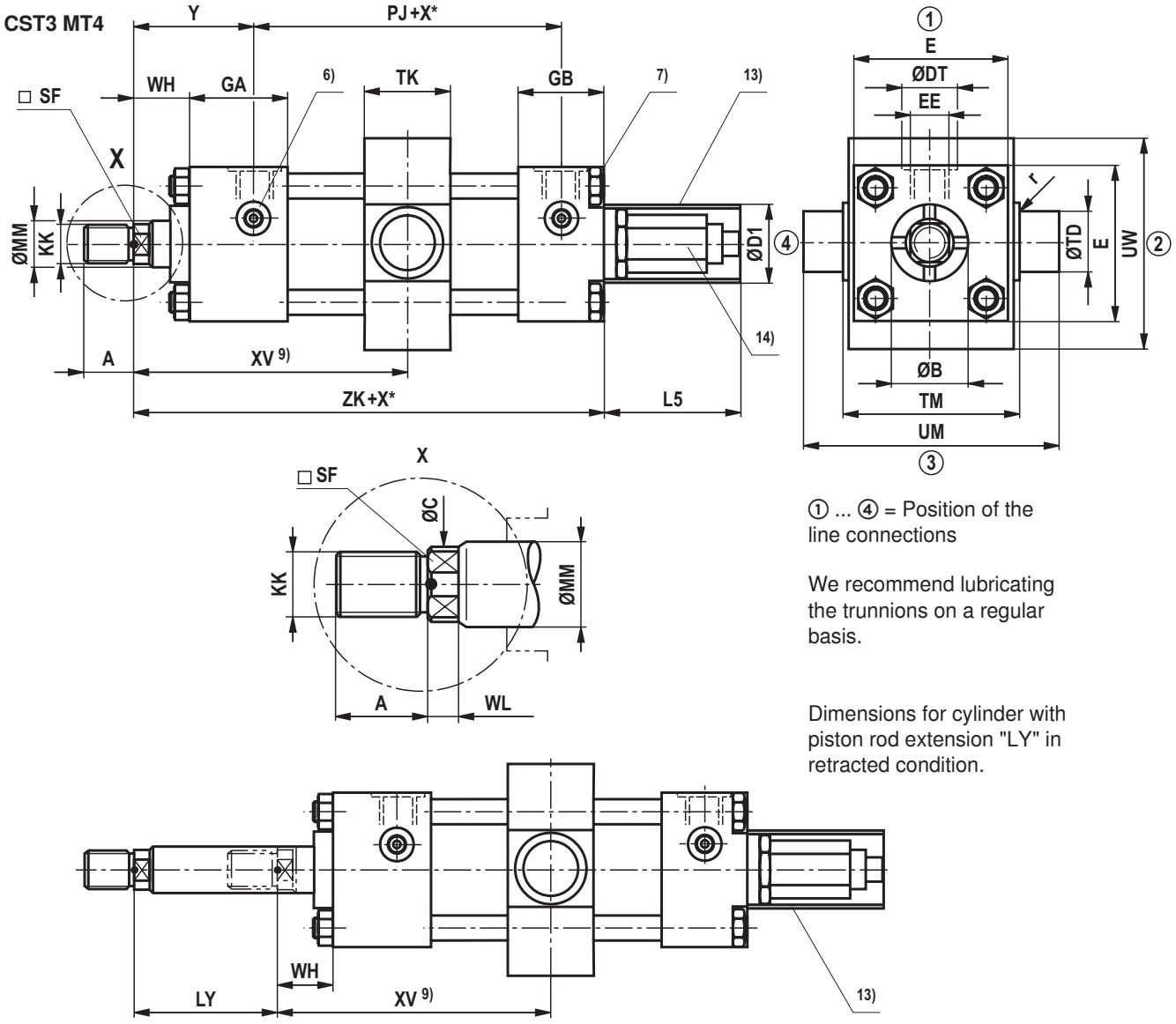
6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

13) With piston Ø 40 – 50 mm without protective pipe

14) Installation space for position measurement system at least 200 mm

Dimensions: Trunnion in the center CST3; MT4 (dimensions in mm)



① ... ④ = Position of the line connections

We recommend lubricating the trunnions on a regular basis.

Dimensions for cylinder with piston rod extension "LY" in retracted condition.

ØAL	ØMM	Line connection "B"			Line connection "P", "T", "U"			ZK ± 1	L5	ØD1 max
		X* min	XV min ± 2	XV max ± 2	X* min	XV min ± 2	XV max ± 2			
40	**28**	–	95	104 + stroke	50	95	76 + stroke	195	–	–
50	**28** **36**	–	105	105 + stroke	50	105	77 + stroke	194	–	–
63	**36** **45**	10	117	107 + stroke	45	117	82 + stroke	205	82	96
80	**45** **56**	12	130	118 + stroke	35	130	96 + stroke	234	82	96
100	**56** **70**	18	142	124 + stroke	57	142	101 + stroke	248	82	96
125	**70** **90**	25	157	132 + stroke	63	157	94 + stroke	265.5	82	96
160	**70** **110**	40	171	131 + stroke	74	171	97 + stroke	277	82	96
200	**90** **140**	48	202	154 + stroke	73	202	129 + stroke	326.5	82	96

Dimensions: Trunnion in the center CST3; MT4 (dimensions in mm)

		DIN / ISO [1]					ISO [2]					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
40	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	28	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	36	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	45	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	56	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	70	–	–	–	–	–	M48x2	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3	112	136	125	15	163

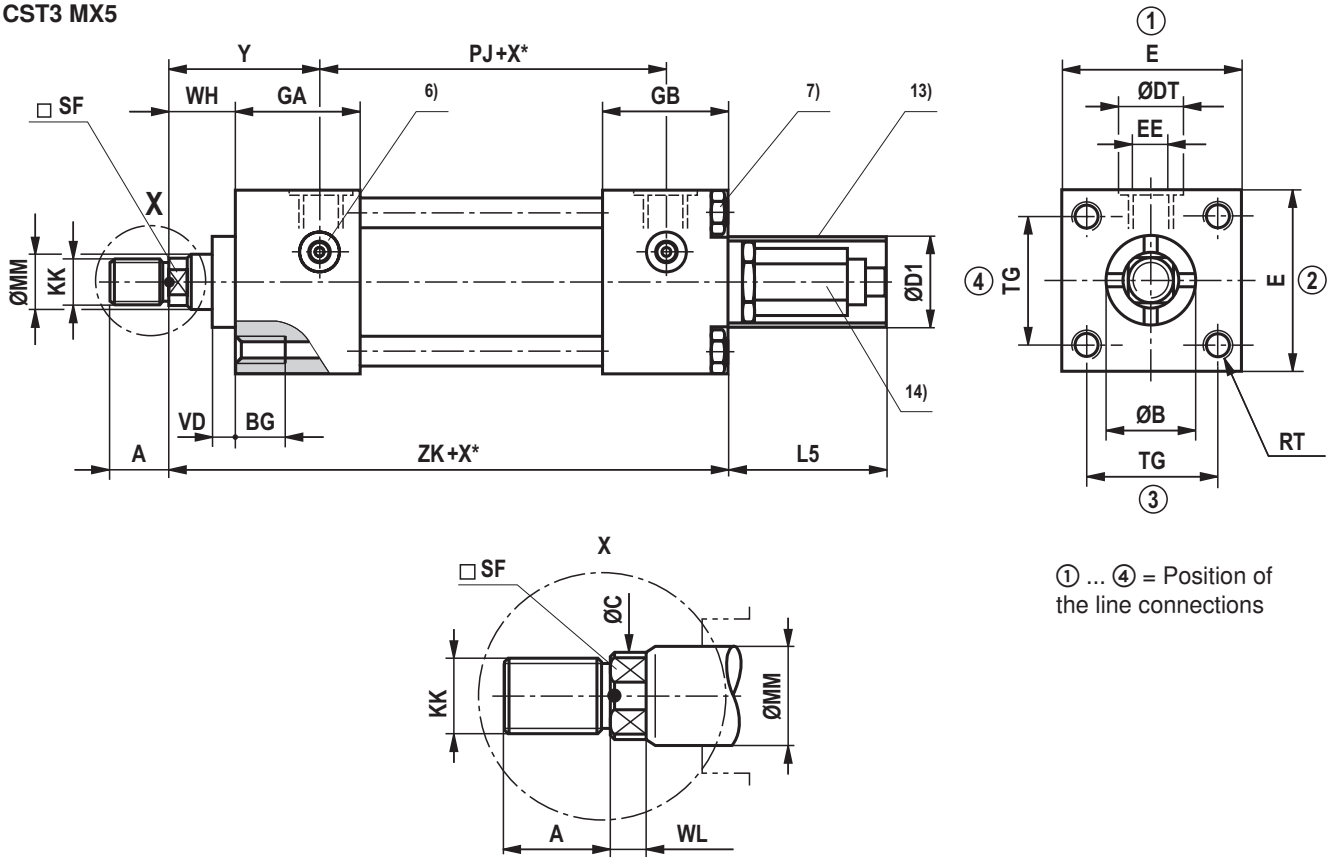
ØAL	PJ ±1.25	TK max	TM h14	UM h15	UW max	r	ØTD f8	E	EE	ØDT	GA	GB	WH ±2	Y ±2
40	73	30	76	108	74	1.6	20	63 ± 1.5	G 3/8	28	52.5	75.5	25	62
50	74	40	89	129	81	1.6	25	75 ± 1.5	G 1/2	34	57.5	68.5	25	67
63	80	50	100	150	97	2.0	32	90 ± 1.5	G 1/2	34	57.5	72.5	32	71
80	93	60	127	191	124	2.5	40	115 ± 1.5	G 3/4	42	67	85	31	77
100	101	70	140	220	137	2.5	50	130 ± 2	G 3/4	42	70	88	35	82
125	117	90	178	278	175	3.2	63	165 ± 2	G 1	47	76	87.5	35	86
160	130	110	215	341	212	3.5	80	205 ± 2	G 1	47	83	90	32	86
200	160	130	279	439	276	4.5	100	245 ± 2	G 1 1/4	58	107.5	105	32	98

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length
X*min = Min. stroke length
X*max = Max. stroke length

1) Thread for piston rod ends "F" and "H"
2) Thread for piston rod ends "D" and "K"
6) For the position of the line connections and the bleeding see page 43
7) Tightening torque see page 65
9) "XV" dimension in mm, always specify in the plain text
13) With piston Ø 40 – 50 mm without protective pipe
14) Installation space for position measurement system at least 200 mm

Dimensions: Tapped hole at head CST3; MX5 (dimensions in mm)

CST3 MX5



① ... ④ = Position of the line connections

ØAL	ØMM	BG min	PJ ± 1.25	RT 6H	TG js13	VD	ZK ± 1	X* min **without** subplate	X* min **with** subplate
40	**28**	12	73	M8x1.25	41.7	12	195	–	50
50	**28** **36**	18	74	M12x1.75	52.3	9	194	–	50
63	**36** **45**	18	80	M12x1.75	64.3	13	205	–	45
80	**45** **56**	24	93	M16x2	82.7	9	234	–	32
100	**56** **70**	24	101	M16x2	96.9	10	248	–	57
125	**70** **90**	27	117	M22x2.5	125.9	10	265.5	–	35
160	**70** **110**	32	130	M27x3	154.9	7	277	20	20
200	**90** **140**	40	165	M30x3.5	190.2	7	326.5	20	20

Dimensions: Tapped hole at head CST3; MX5 (dimensions in mm)

		DIN / ISO [1]					ISO [2]					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
40	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	28	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	36	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	45	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	56	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	70	–	–	–	–	–	M48x2	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3	112	136	125	15	163

ØAL	L5	ØD1 max	E	EE	DT	GA	GB	WH ± 2	Y ± 2
40	–	–	63 ± 1.5	G 3/8	28	52.5	75.5	25	62
50	–	–	75 ± 1.5	G 1/2	34	57.5	68.5	25	67
63	82	96	90 ± 1.5	G 1/2	34	57.5	72.5	32	71
80	82	96	115 ± 1.5	G 3/4	42	67	85	31	77
100	82	96	130 ± 2	G 3/4	42	70	88	35	82
125	82	96	165 ± 2	G 1	47	76	87.5	35	86
160	82	96	205 ± 2	G 1	47	83	90	32	86
200	82	96	245 ± 2	G 1 1/4	58	107.5	105	32	98

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length
X*min = Min. stroke length
X*max = Max. stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

13) With piston Ø 40 – 50 mm without protective pipe

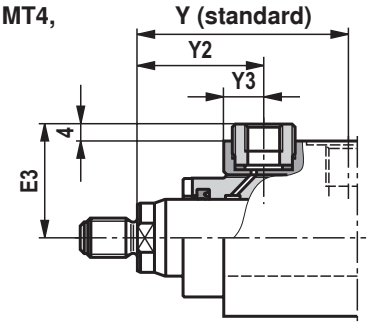
14) Installation space for position measurement system at least 200 mm

Leakage oil connection / **Enlarged line connection** (dimensions in mm)

Leakage oil connection

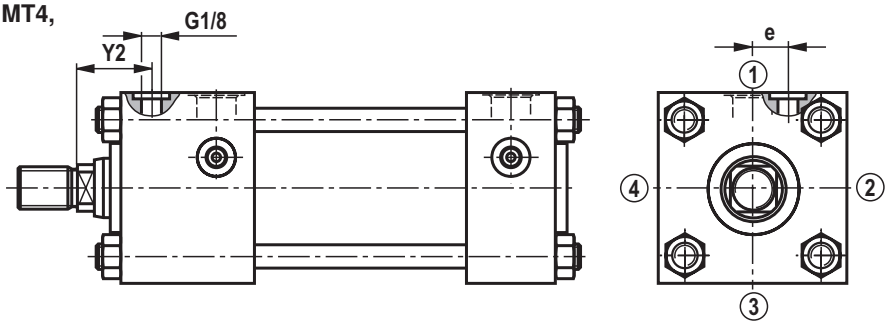
If technical high-quality seals are used, use of a leakage oil connection is generally not necessary. A drag oil collection connection is only recommended in special cases such as an extension velocity of more than 2 times the retraction velocity with larger strokes, permanent pressurization and the like. In case the extension velocities are more than 5 times the retraction velocity, please contact us.

ME6, MP5, MS2, MT4, Ø 25, 32, 40



		MS2, MT4 ME6, MP5				ME5	
ØAL	**ØMM**	**e**	**Y2**	**Y3**	**E3**	**e**	**Y2**
25		0	25.5	10.5	29.5	17	35
32		0	35.5	10.5	32	18	45
40		0	36	11	36	22	47
50		14.5	39	–	–	34	52
63		16	45.5	–	–	43	59
80		16	48	–	–	27	62
100	**45**	16	52	–	–	30	68
100	**70**	16	55	–	–	30	68
125	**56**	18	55.5	–	–	45	68
125	**90**	18	55.5	–	–	45	68
160	**70**	24	54.5	–	–	45	68
160	**110**	24	54.5	–	–	47	68
200	**90**	24	59.5	–	–	45	72
200	**140**	24	59.5	–	–	60	72

ME5, ME6, MP5, MS2, MT4, Ø 50 to Ø 200



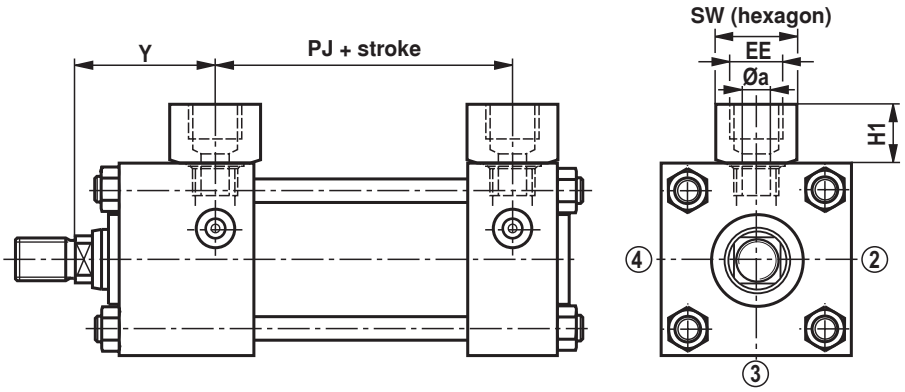
Enlarged line connection

The oil ports of this series are generously dimensioned according to the standard; with high velocity, the pressure drop Δp can be reduced by using larger oil ports; sometimes, it is, however, no longer possible to comply with the standard dimensions, see table.

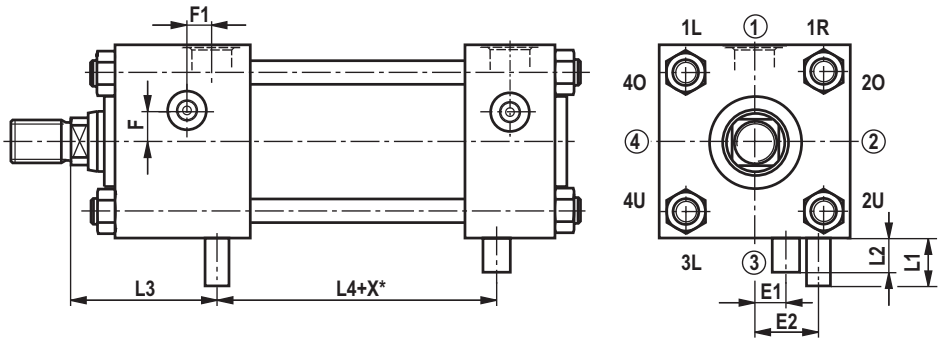
Cannot be realized for the types of mounting ME 5 / 6 with connection position 2 or 4.

M_A = tightening torque

ØAL	**EE**	**H1**	**Y** ±2	**PJ** ±1.25	**SW**	**Øa**	M_A Nm (±5 %)
25	G3/8	20	50	53	27	9	20
32	G3/8	20	60	56	27	9	20
40	G1/2	23	62	73	32	11	26
50	G3/4	29	67	74	41	14	48
63	G3/4	29	71	80	41	14	48
80	G1	33	77	93	46	18	74
100	G1	33	82	101	46	18	74
125	G11/4	39	86	117	60	23	127
160	G11/4	–	86	130	–	–	–
200	G11/2	–	98	165	–	–	–



Position of line connections, bleeding, leakage oil, throttle valve



Mounting	Line connection	CDT3 / CST3 Bleeding Head	Bleeding Base	Leakage oil Head 1)	Throttle valve Head 1)	Throttle valve Base 1)	CGT3	Bleeding Head 1	Bleeding Head 2	Leakage oil Head 1	Leakage oil Head 2	Throttle valve Head 1	Throttle valve Head 2
MP5, MT4, MP1, MP3, MX1, MX2, MX3, MX5	1	2	2	1	3R	3R	MT4, MX1, MX3	2	4	1	1	3R	3L
	2	3	3	2	4U	4U		3	1	2	2	4U	4O
	3	4	4	3	1L	1L		4	2	3	3	1L	1R
	4	1	1	4	2O	2O		1	3	4	4	2O	2U
ME5	1	2	2	1R	3R	3R	ME5	2	4	1R	1	3R	3L
	2	3R	3	1R	1L	4U		3R	1	1R	2	1L	4O
	3	4	4	3L	1L	1L		4	2	3L	3	1L	1R
	4	1L	1	3L	3R	2O		1L	3	3L	4	3R	2U
MS2	1	2O	2O	1	4O	4O	MS2	2O	4O	1	1	4O	2O
MT1	1	3L	2	–	3R	3R	MT1	3L	4	–	–	3R	3L
	3	1R	4	–	1L	1L		1R	2	–	–	1L	1R
MT2	1	2	3L	1	3R	3R							
	3	4	1R	3	1L	1L							
ME6	1	2	2	1	3R	3R							
	2	3	3	2	4U	1L							
	3	4	4	3	1L	1L							
	4	1	1	4	2O	3R							

1) Not possible with CST3
2) Protrusion 3 mm.
3) Types of mounting ME5 (only base), ME6, MP5, MT4, MP1, MP3, MT2, MX1, MX2, MX3 and MX5.
4) Position of line connection
X* = Stroke length
M_A = Tightening torque

ØAL	F Head/base 4) 3)	F (head) 2/4 ME5	F MT1	F MS2	F1 Position of line connection 4) 1/3 ME5	F1 2/4 ME5	F2 Position of bleeding 4) 1/3 ME5	F2 2/4 ME5	SW Allen wrench	Throttle valve adjustable on both sides: Protrusion L1 (head)	Protrusion L2 (base)	Center offset E1 (head)	Center offset E2 (base)	Dimension L3	Dimension L4	M_A Nm
25	0	0	6	5	11.5	23	23	11.5	5 2)	12	12	6	6	48	57	5
32	0	0	5	5	13	25.5	25.5	13	5 2)	12	12	9	9	57.5	61	5
40	10	10	10	10	15.5	19.5	15.5	15.5	5	5.5	5.5	8	8	61.5	74	5
50	10	10	10	10	15.5	29.5	15.5	15.5	5	3	3	10	10	67	74	5
63	14	14	14	14	18.5	20	18.5	18.5	5	0	0	15	15	72	78	5
80	10	10	10	10	21	21	21	21	6	0	0	14	14	81	85	15
100	24/12	24	12	12	23	23	23	23	6	0	0	13	13	86	93	15
125	0	0	12	0	25	25	25	25	6	–	–	22	22	91.5	109	24
160	0	0	0	0	29	29	29	29	6	–	–	30	30	93.5	115	24
200	0	0	0	0	41.5	41.5	31.5	31.5	6	–	–	30	30	114	128	24

Bleeding / **measuring coupling** (dimensions in mm)

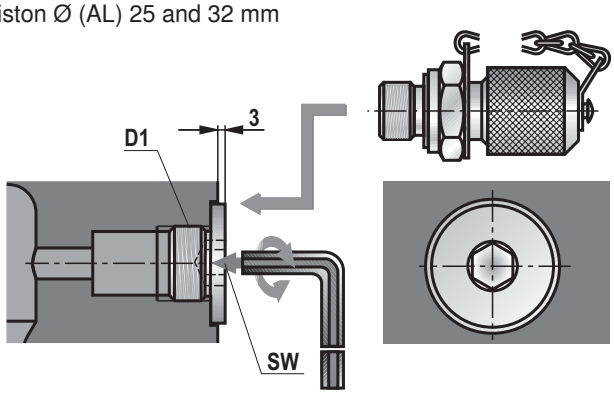
By default, a patented safety vent against unintended screwing out in head and base is delivered for piston Ø ≥ 40 mm.

For piston Ø 25 and 32 mm, a bleed screw G1/8 is installed in head and base which is **not** secured against screwing out.

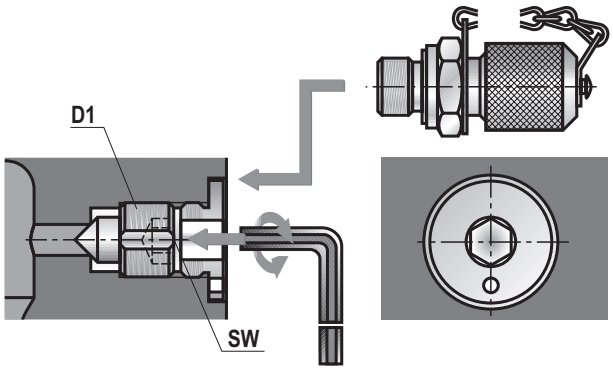
The port allows for the installation of a measuring coupling with check valve for pressure measurement or contamination-free bleeding. Measuring coupling with check valve function, i.e. it can also be connected when the system is pressurized.

Connection possibility for measuring coupling

Piston Ø (AL) 25 and 32 mm

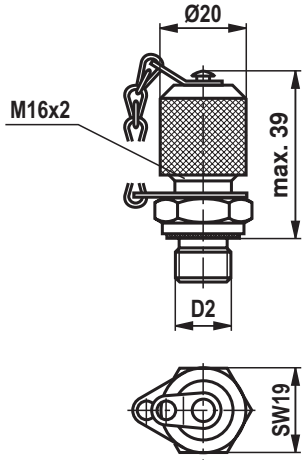


Piston Ø (AL) 40 to 200 mm



ØAL	Bleed screw D1	Bleed screw Fuse	Bleed screw SW	Measuring coupling D2	M_A Nm
25 and 32	G1/8	not secured	5	G1/8	18
40 and 63	G1/8	secured	5	G1/8	18
80 to 200	G1/4	secured	6	G1/4	40

M_A = Tightening torque



Scope of delivery: measuring coupling **G1/8**

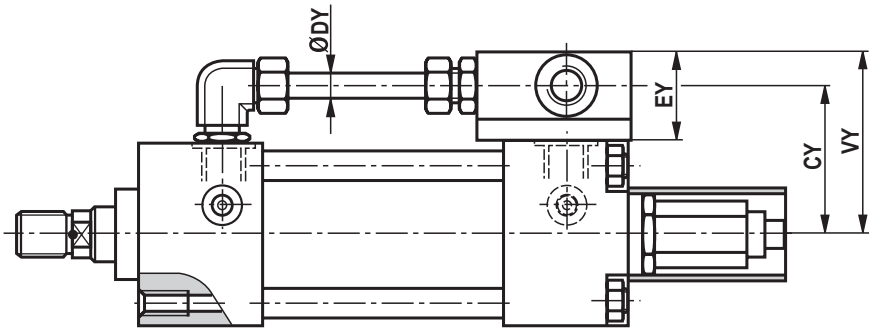
MESSKUPPLUNG AB 20-11/K3 G1/8 with seal ring made of NBR
Material no. **R900014363**
MESSKUPPLUNG AB 20-11/K3V G1/8 with seal ring made of FKM
Material no. **R900024710**

Scope of delivery: measuring coupling **G1/4**

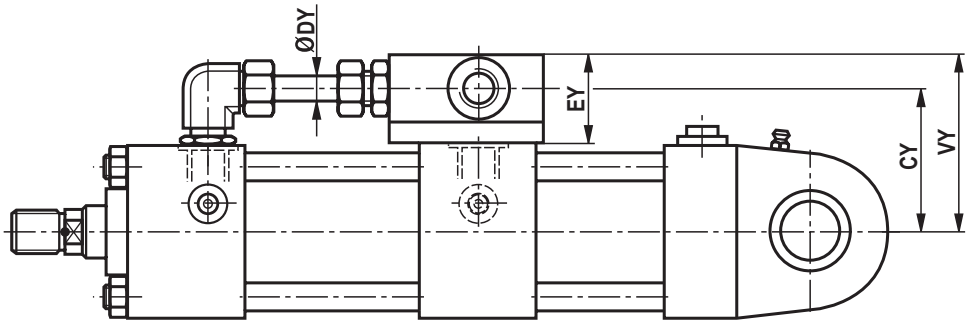
MESSKUPPLUNG AB 20-11/K1 G1/4 with seal ring made of NBR
Material no. **R900009090**
MESSKUPPLUNG AB 20-11/K1V G1/4 with seal ring made of FKM
Material no. **R900001264**

Subplates for valve mounting – Dimensions and porting pattern (dimensions in mm)

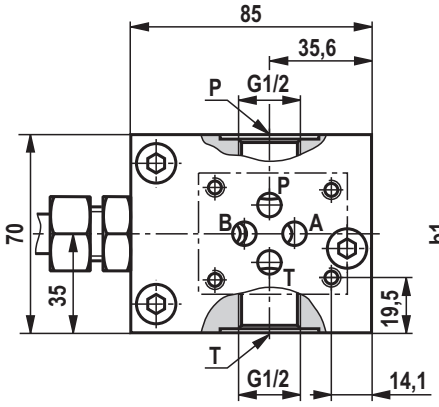
MX5
ME5, MS2, MT4



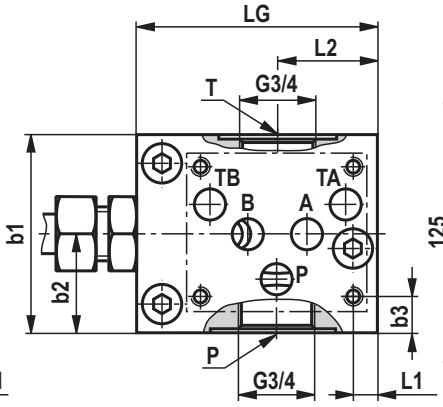
MP5



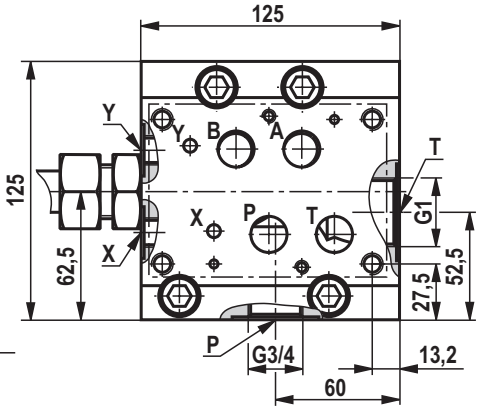
NG6
Porting pattern according to ISO 4401



NG10
Porting pattern according to ISO 4401



NG16
Porting pattern according to ISO 4401



ØAL	NG6				NG10										NG16			
	CY	EY	VY	ØDY	CY	EY	VY	ØDY	LG	L1	L2	b1	b2	b3	CY	EY	VY	ØDY
40	62.2	49.7	80.2	15	62.2	49.7	80.2	15	85	8.5	35.5	70	35	13	–	–	–	–
50	68.2	49.7	86.2	15	68.2	49.7	86.2	15	85	8.5	35.5	70	35	13	–	–	–	–
63	75.7	49.7	93.7	15	75.7	49.7	93.7	15	85	8.5	35.5	70	35	13	–	–	–	–
80	88.2	49.7	106.2	15	88.2	49.7	106.2	15	85	8.5	35.5	70	35	13	–	–	–	–
100	–	–	–	–	103	64.7	128.7	20	110	27	54	125	62.5	39.5	104	79.7	144.7	20
125	–	–	–	–	120	64.7	145.7	20	110	27	54	125	62.5	39.5	121.5	79.7	162.2	20
160	–	–	–	–	140	64.7	165.7	20	110	27	54	125	62.5	39.5	141.5	79.7	182.2	20
200	–	–	–	–	160	64.7	185.7	20	110	27	54	125	62.5	39.5	161.5	79.7	202.2	20

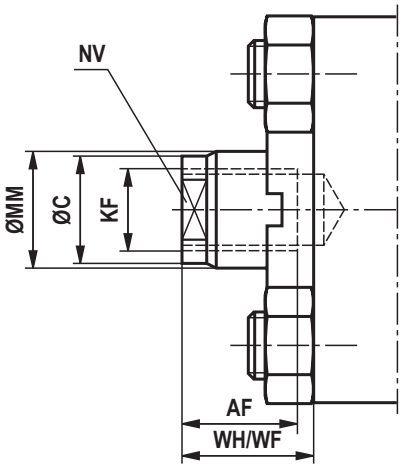
For the weight of the subplates refer to page 46.

Weight: Subplates

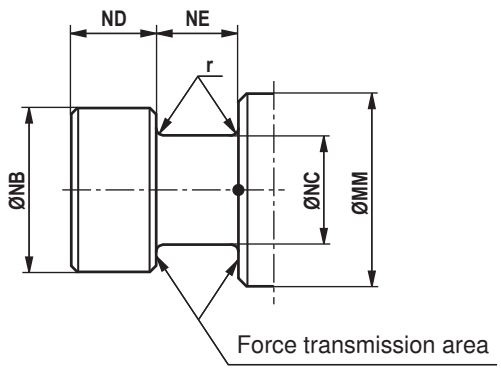
ØAL	NG6 in kg	NG10 in kg	NG16 in kg
40	2.3	2.3	–
50	2.3	2.3	–
63	2.3	2.3	–
80	2.3	2.3	–
100	–	7.0	9.8
125	–	7.0	9.8
160	–	7.0	9.8
200	–	7.0	9.8

Piston rod ends E and T (dimensions in mm)

Internal thread E



Trunnion T



ØAL	ØMM	Stroke [2] min	KF	AF	ØC	NV	ØNB h13	ØNC h13	ND / NE h13 / H11	r	p max. [1] bar
25	**18**	14	M12x1.25	18	17	15	–	–	–	–	–
32	**22**	17	M16x1.5	22	21	18	18	11.2	8	0.5	160
40	**18**	20	M12x1.25	18	17	15	–	–	–	–	–
	28	36	M20x1.5	28	25	22	22.4	14	10	0.5	160
50	**22**	27	M16x1.5	22	21	18	18	11.2	8	0.5	105
	36	56	M27x2	36	34	30	28	18	12.5	0.8	190
63	**28**	33	M20x1.5	28	25	22	22.4	14	10	0.5	95
	45	61	M33x2	45	42	36	35.5	22.4	16	0.8	160
80	**36**	47	M27x2	36	34	30	28	18	12.5	0.8	105
	56	64	M42x2	56	53	46	45	28	20	1.2	160
100	**45**	0	M33x2	45	42	36	35.5	22.4	16	0.8	90
	70	0	M48x2	63	67	60	56	35.5	25	1.2	160
125	**56**	0	M42x2	56	53	46	45	28	20	1.2	100
	90	30	M64x3	85	86	75	78	45	30	1.5	160
160	**70**	5	M48x2	63	67	60	56	35.5	25	1.5	90
	110	45	M80x3	95	106	95	106	65	35	1.5	160
200	**90**	35	M64x3	85	88	75	78	45	30	1.5	90
	140	67	M100x3	112	136	125	136	70	45	1.5	160

[1] With pulling load

[2] = Minimum stroke length with piston rod end "E" and only with CGT3

Position measurement system

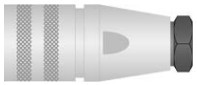
The position measurement system that is pressure-resistant up to 500 bar works in a contactless and absolute manner. The basis of this position measurement system is the magnetostrictive effect. Here, the coincidence of two magnetic fields triggers a torsional impulse.
This impulse runs on the wave guide inside the scale from the measuring point to the sensor head. The running time is constant and almost independent of temperature. It is proportional to the solenoid position and thus a measure for the actual position value and is converted within the sensor into a direct analog or digital output.

Technical data
(For applications outside these parameters, please consult us!)

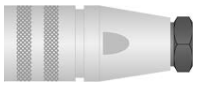
Operating pressure		bar	160
Analog output		V	0 to 10
	Load resistance	kΩ	≥ 5
	Resolution		unlimited
Analog output		mA	4 to 20
	Load resistance	Ω	0 to 500
	Resolution		unlimited
Digital output			SSI 24 bit gray-coded
	Resolution	µm	5
	Direction of measurement		asynchronously forward
Linearity (absolute accuracy)	Analog	% mm	≤ ±0.02 % (referred to measurement length) min. ±0.05
	Digital	% mm	≤ ±0.01 % (referred to measurement length) min. ±0.04
Reproducibility		% mm	±0.001 (referred to measurement length) min. ±0.0025
Hysteresis		mm	≤ 0.004
Supply voltage		V DC	24 (±10 % with analog output)
	Current consumption	mA	100
	Residual ripple	% s-s	≤ 1
	 Current consumption	V DC mA	24 (+20 %/–15 % with digital output) 70
	Residual ripple	% s-s	≤ 1
Protection class	Pipe and flange		IP 67
	Sensor electronics		IP 65
Operating temperature	Sensor electronics	°C	–40 to +75
Temperature coefficient	Voltage	ppm/°C	70
	Current	ppm/°C	90

Position measurement system

[1] For analog output:
6-pole amphenol mating connector
Material no. **R900072231**
(mating connector is **not** included in the scope of delivery, must be ordered separately)

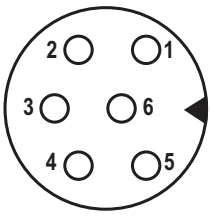


[1] For digital output:
7-pole amphenol mating connector
Material no. **R900079551**
(mating connector is **not** included in the scope of delivery, must be ordered separately)



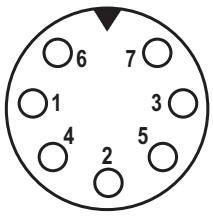
Pin assignment

Position measurement system (analog output)
Connector (view to pin side)



Pin	Cable	Signal / current	Signal / voltage
1	gray	4 … 20 mA	0 … 10 V
2	pink	DC ground	DC ground
3	yellow	not used	not used
4	green	DC ground	DC ground
5	brown	+24 V DC (+20 % / –15 %)	+24 V DC (+20 % / –15 %)
6	white	DC ground (0 V)	DC ground (0 V)

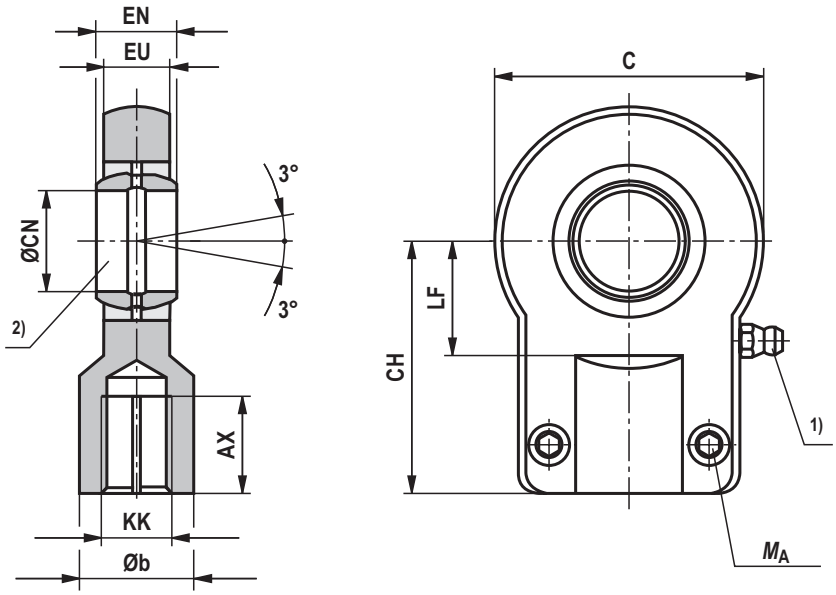
Position measurement system (digital output)
Connector (view to pin side)



Pin	Cable	Signal / SSi
1	gray	Data (–)
2	pink	Data (+)
3	yellow	Clock (+)
4	green	Clock (–)
5	brown	+24 V DC (+20%/–15%)
6	white	DC ground (0 V)
7	–	not used

Swivel head CGKA - AP 6 (clampable) (dimensions in mm)

ISO 8133 / ISO 8132



Type	Material no.	KK	AX min	Øb	C max	CH js13	ØCN	EN	EU max	LF min	M_A [7] Nm	m [8] kg	C_0 [9] (head) kN	F_{adm} [10] kN
CGKA 12 [3]	R900327186	M10x1.25	15	17	40	42	12 -0.008	10 -0.12	8	16	9.5	0.15	17	6.3
CGKA 16 [4]	R900327192	M12x1.25	17	21	45	48	16 -0.008	14 -0.12	11	20	9.5	0.25	28.5	10.5
CGKA 20 [4]	R900306874	M14x1.5	19	25	55	58	20 -0.012	16 -0.12	13	25	23	0.43	42.5	15.7
CGKA 25	R900327191	M16x1.5	23	30	65	68	25 -0.012	20 -0.12	17	30	23	0.73	67	24.7
CGKA 30	R900327187	M20x1.5	29	36	80	85	30 -0.012	22 -0.12	19	35	46	1.3	108	39.9
CGKA 40	R900327188	M27x2	37	45	100	105	40 -0.012	28 -0.12	23	45	46	2.3	156	57.6
CGKA 50	R900327368	M33x2	46	55	125	130	50 -0.012	35 -0.12	30	58	80	4.4	245	90.4
CGKA 60	R900327369	M42x2	57	68	160	150	60 -0.012	44 -0.12	38	68	195	8.4	380	140.2
CGKA 80	R900327370	M48x2	64	90	205	185	80 -0.015	55 -0.15	47	82 [6]	385	15.6	585	215.9
CGKA 100	R900327371	M64x3	86	110	240	240	100 -0.02	70 -0.2	57	116	660	28	865	319.2
CGKD 100 [5]	R900322030	M80x3	96	110	210	210	100 H7	100 h12	84	98	385	28	1060	391.1
CGKD 125 [5]	R900322026	M100x3	113	135	262	260	125 H7	125 h12	102	120	385	43	1430	527.7

Note:

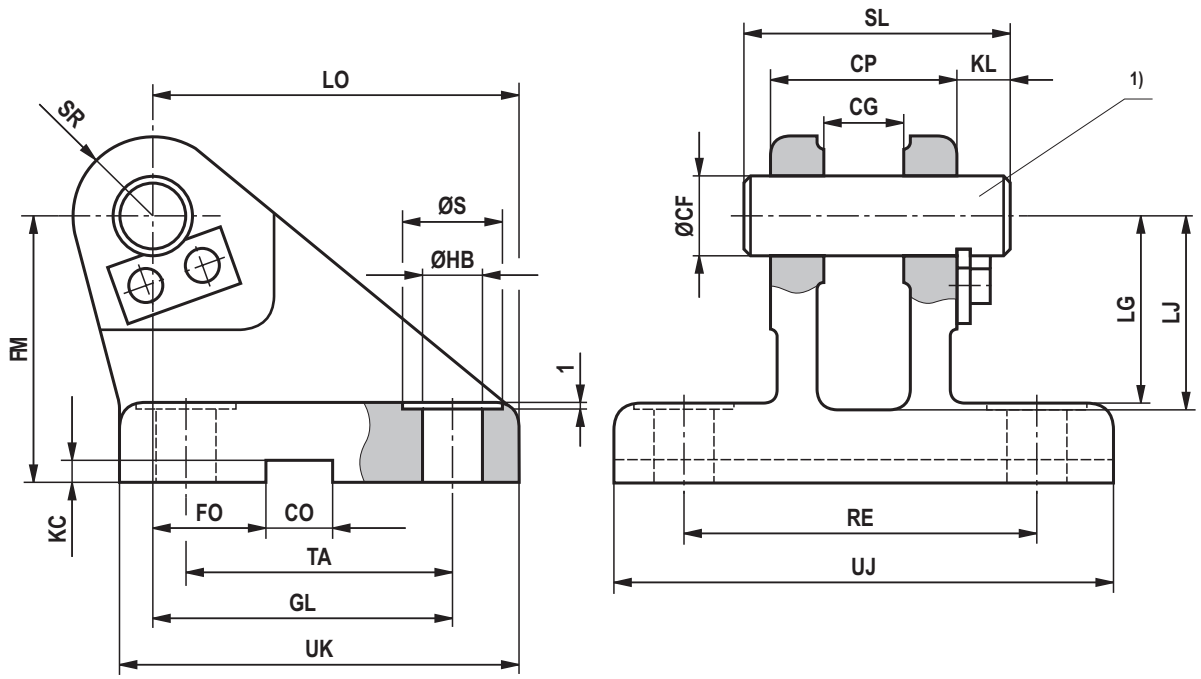
Geometry and dimensions may differ depending on the manufacturer.

In case of combination with other mounting elements, the usability must be checked.

1) Lubricating nipple, cone head form A according to DIN 71412
2) Bolt Ø h6 required
3) Cannot be re-lubricated
4) Can be re-lubricated via lubricating hole
5) Swivel head according to ISO 8132, bolt Ø m6 required
6) Dimensions may differ from the standard depending on the manufacturer
7) M_A = Tightening torque
The swivel head must always be screwed against the piston rod shoulder. Afterwards, the clamping screws must be tightened with the specified tightening torque.
8) m = Weight of swivel head in kg
9) C_0 = Static load rating of the swivel head
10) F_{adm} = Maximum admissible load on the swivel head during oscillatory or alternating loads

Clevis bracket CLCB - AB 5 (clampable) (dimensions in mm)

ISO 8133



Type	Material no.	Nominal force kN	ØCF K7 [1]	CP h14	CG + 0.1 + 0.3	CO N9	FO js14	FM js11	GL js13	ØHB	ØS
CLCB 12	R900326960	8	12	30	10	10	16	40	46	9	15
CLCB 16	R900327372	12.5	16	40	14	16	18	50	61	11	18
CLCB 20	R900327373	20	20	50	16	16	20	55	64	14 [3]	20
CLCB 25	R900326961	32	25	60	20	25	22	65	78	16 [3]	24
CLCB 30	R900327374	50	30	70	22	25	24	85	97	18 [3]	26
CLCB 40	R900327375	80	40	80	28	36	24	100	123	22	33
CLCB 50	R900327376	125	50	100	35	36	35	125	155	30	48
CLCB 60	R900327377	200	60	120	44	50	35	150	187	39	60
CLCB 80	R900327378	320	80	160	55	50	35	190	255	45	80
CLCB 100	R900327379	500	100	200	70	63	35	210	285	48	80

Clevis bracket CLCB - AB 5 (clampable) (dimensions in mm)

Type	KC + 0.3	KL	LG	LJ	LO	RE js13	SL	SR max.	TA js13	UJ	UK	*m* [2] kg
CLCB 12	3.3	8	28	29	56	55	40	12	40	75	60	0.6
CLCB 16	4.3	8	37	38	74	70	50	16	55	95	80	1.3
CLCB 20	4.3	10	39	40	80	85	62	20	58	120	90	2.1
CLCB 25	5.4	10	48	49	98	100	72	25	70	140	110	3.2
CLCB 30	5.4	13	62	63	120	115	85	30	90	160	135	6.5
CLCB 40	8.4	16	72	73	148	135	100	40	120	190	170	12.0
CLCB 50	8.4	19	90	92	190	170	122	50	145	240	215	23.0
CLCB 60	11.4	20	108	110	225	200	145	60	185	270	260	37.0
CLCB 80	11.4	26	140	142	295	240	190	80	260	320	340	79.0
CLCB 100	12.4	30	150	152	335	300	235	100	300	400	400	140.0

Note:

Geometry and dimensions may differ depending on the manufacturer.

In case of combination with other mounting elements, the usability must be checked.

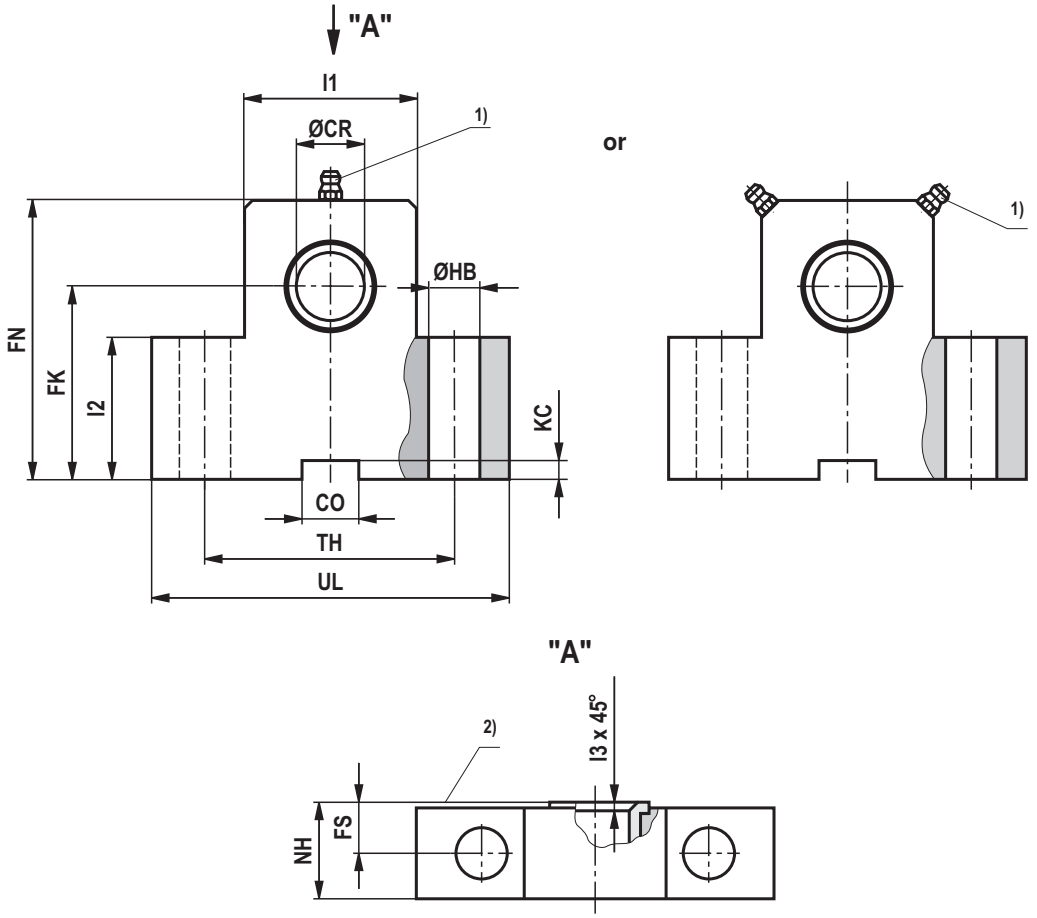
[1] Bolt Ø h6 required, suitable for swivel head CGKA...
(bolt and bolt lock are included in the scope of delivery)

[2] ***m*** = Weight of clevis bracket in kg

[3] Dimensions may differ from the standard depending on the manufacturer

Trunnion bearing block CLTA - **AT 4** (dimensions in mm)

CLTA 12-20



ØAL	Type	Material no.	Nominal force kN [4]	ØCR H7	CO N9	FK js12	FN max	FS js14	ØHB H13	KC +0.3	NH max	TH js14	UL max	l1	l2	l3	*m* [5] kg
25	**CLTA 12**	R901071355	8	12	10	38	55	8	9	3.3	17 [3]	40	63	25	25	1	0.5
32	**CLTA 16**	R901071364	12.5	16	16	45	65	10	11	4.3	21	50	80	30	30	1	0.9
40	**CLTA 20**	R901071365	20	20	16	55	80	10	11	4.3	21	60	90	40	38	1.5	1.35

Note:

Geometry and dimensions may differ depending on the manufacturer.

In case of combination with other mounting elements, the usability must be checked.

ØAL = Piston Ø

1) Lubricating nipple, cone form A according to DIN 71412

2) Inside

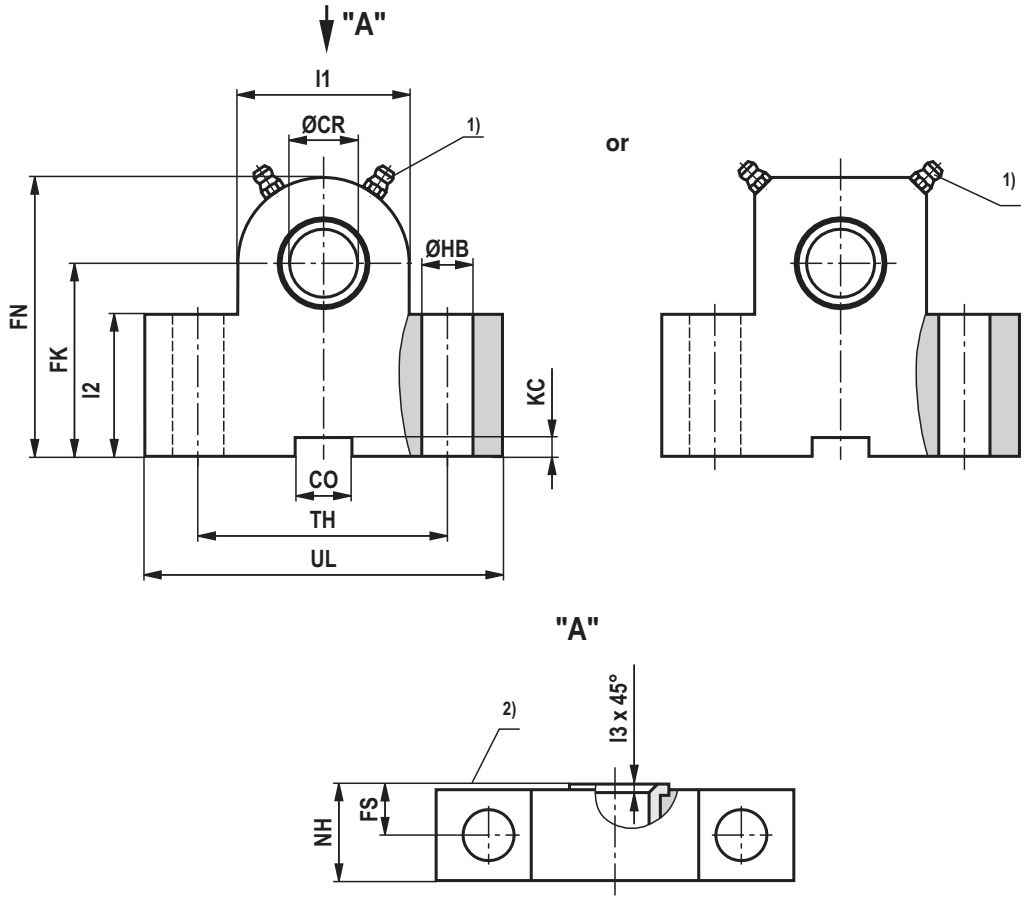
3) Dimensions may differ depending on the manufacturer

4) Nominal force applies to applications in pairs

5) ***m*** = Weight per pair in kg, brackets are delivered in pairs

Trunnion bearing block CLTA - AT 4 (dimensions in mm)

CLTA 25-100



ØAL	Type	Material no.	Nominal force kN [4]	ØCR H7	CO N9	FK js12	FN max	FS js14	ØHB H13	KC +0.3	NH max	TH js14	UL max	l1	l2	l3	*m* [5] kg
50	**CLTA 25**	R901071368	32	25	25	65	90	12	14 [3]	5.4	26	80	110	56	45	1.5	2.4
63	**CLTA 32**	R901071377	50	32	25	75	110	15	18 [3]	5.4	33	110	150	70	52	2	5.0
80	**CLTA 40**	R901071380	80	40	36	95	140	16	22	8.4	41	125	170	88	60	2.5	8.5
100	**CLTA 50**	R901071385	125	50	36	105	150	20	26	8.4	51	160	210	90	72	2.5	15
125	**CLTA 63**	R901071395	200	63	50	125	195	25	33	11.4	61	200	265	136	87	3	30
160	**CLTA 80**	R901071398	320	80	50	150	230	31	39	11.4	81	250	325	160	112	3.5	59
200	**CLTA 100**	R901071400	500	100	63	200	300	42	52	12.4	101	320	410	200	150	4.5	131

Note:

Geometry and dimensions may differ depending on the manufacturer.

In case of combination with other mounting elements, the usability must be checked.

ØAL = Piston Ø

1) Lubricating nipple, cone form A according to DIN 71412

2) Inside

3) Dimensions may differ depending on the manufacturer

4) Nominal force applies to applications in pairs

5) ***m*** = Weight per pair in kg, brackets are delivered in pairs

Kinking

For the admissible stroke length with flexibly guided load and a factor of 3.5 for safety against kinking, please refer to the relevant table. For other installation positions of the cylinder, the admissible stroke length must be interpolated. Admissible stroke length for non-guided load on request.

Kinking calculations are carried out according to the following formulas:

1. Calculation according to Euler

$$F = \frac{\pi^2 \cdot E \cdot I}{v \cdot L_K^2} \text{ if } \lambda > \lambda_g$$

2. Calculation according to Tetmajer

$$F = \frac{d^2 \cdot \pi\,(335\text{-}0.62 \cdot \lambda)}{4 \cdot v} \text{ if } \lambda \le \lambda_g$$

Influence of the type of mounting on the bending length:

Explanation:

E = Module of elasticity in N/mm²
= 2.1 x 10^5 for steel

I = Geometrical moment of inertia in mm⁴

for circular cross-section $= \frac{d^4 \cdot \pi}{64} = 0.0491 \cdot d^4$

v = 3.5 (safety factor)

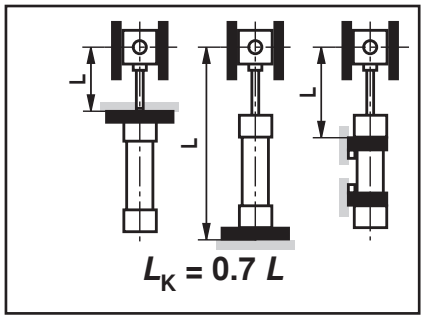
L_K = Free bending length in mm (depending on the type of mounting see sketches A, B, C)

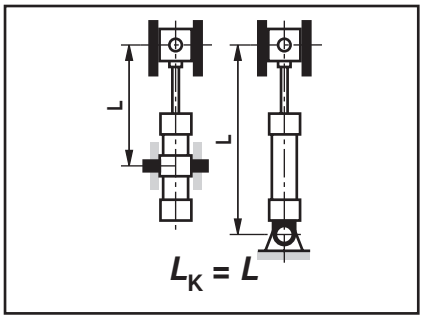
d = Piston rod Ø in mm

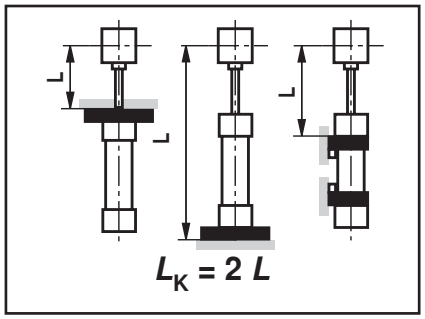
λ = Slenderness ratio

$= \frac{4 \cdot L_K}{d}$ $\quad \lambda_g = \pi \sqrt{\frac{E}{0.8 \cdot R_e}}$

R_e = Yield strength of the piston rod material







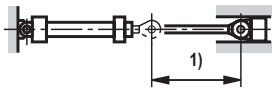
Admissible stroke length (dimensions in mm)

Type of mounting MP1, MP3, MP5

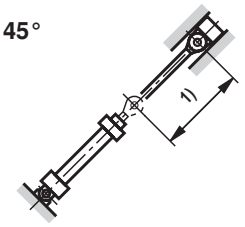
ØAL	ØMM	Admissible stroke length with 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	210 bar 0°	210 bar 45°	210 bar 90°
25	12	115	120	125	85	85	90	50	50	55			
	18	315	330	375	270	275	300	205	210	220	180	180	185
32	14	115	120	125	85	85	90	50	50	55			
	22	370	385	440	315	325	350	240	245	255	210	210	215
40	18	160	165	175	120	125	130	75	75	80			
	22	310	320	350	260	265	290	195	200	205	130	130	135
	28	465	485	580	400	415	465	315	320	340	280	285	290
50	22	205	210	220	155	160	165	100	100	105			
	28	420	430	475	355	360	380	270	275	280	190	195	195
	36	620	650	790	545	565	640	435	445	475	395	400	410
63	28	280	285	305	220	225	230	150	150	155			
	36	560	580	645	480	490	520	375	380	390	280	280	285
	45	770	810	995	680	710	805	555	565	605	500	510	530
80	36	380	390	415	305	310	320	210	215	220			
	45	695	715	800	600	610	650	470	475	490	350	355	360
	56	945	995	1225	840	870	995	685	670	745	615	625	655
100	45	480	495	540	390	400	420	280	285	290			
	56	850	880	1000	740	760	820	590	600	625	445	450	460
	70	1150	1210	1550	1030	1075	1260	855	875	955	780	790	830
125	56	595	615	685	490	500	535	360	365	375			
	70	1065	1105	1290	940	965	1060	765	775	810	570	575	595
	90	1445	1535	2110	1315	1380	1690	1115	1150	1285	1035	1055	1130
160	70	730	755	850	610	625	670	455	460	475			
	110	1715	1815	2450	1565	1640	2015	1335	1380	1540	1205	1235	1320
200	90	945	985	1140	800	825	900	610	620	645			
	140	2120	2255	2700	1955	2060	2625	1690	1755	2010	1540	1580	1725

Installation position

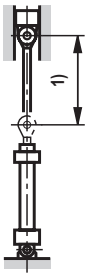
0°



45°



90°



1) Adm. stroke length

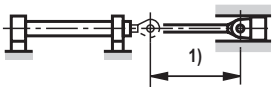
Admissible stroke length (dimensions in mm)

Type of mounting MS2

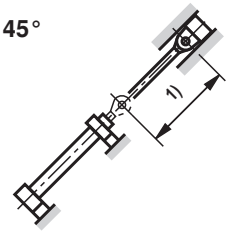
ØAL	ØMM	Admissible stroke length with 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	210 bar 0°	210 bar 45°	210 bar 90°
25	12	500	510	530	420	425	435	325	325	330			
	18	600	600	600	600	600	600	600	600	600	600	600	600
32	14	525	535	555	435	440	450	335	335	340			
	22	800	800	800	800	800	800	800	800	800	780	790	800
40	18	700	715	750	590	595	610	455	460	465			
	22	975	1000	1000	855	875	940	690	700	720	610	610	620
	28	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
50	22	835	850	895	705	710	730	545	550	555			
	28	855	1200	1200	1100	1130	1200	895	910	945	795	800	815
	36	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
63	28	1060	1086	1160	900	915	950	705	710	720			
	36	1400	1400	1400	1400	1400	1400	1185	1200	1255	1045	1055	1080
	45	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
80	36	1370	1405	1525	1175	1195	1250	930	935	955			
	45	1700	1700	1700	1700	1700	1700	1460	1480	1555	1295	1305	1340
	56	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
100	45	1685	1735	1910	1460	1485	1570	1165	1175	1205			
	56	2000	2000	2000	2000	2000	2000	1800	1835	1950	1595	1615	1670
	70	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
125	56	2075	2140	2300	1810	1845	1970	1455	1470	1515			
	70	2300	2300	2300	2300	2300	2300	2240	2290	2300	2010	2035	2120
	90	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300
160	70	2515	2595	2600	2200	2245	2415	1780	1800	1855			
	110	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600
200	90	2700	2700	2700	2700	2700	2700	2700	2700	2700			
	140	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700

Installation position

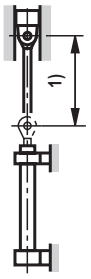
0°



45°



90°



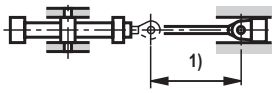
1) Adm. stroke length

Type of mounting MT4 (trunnion position in cylinder center)

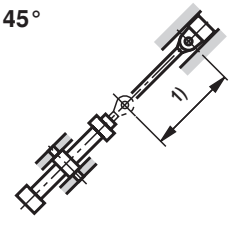
ØAL	ØMM	Admissible stroke length with 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	210 bar 0°	210 bar 45°	210 bar 90°
25	12	190	190	200	150	150	155	105	105	105			
	18	455	470	535	395	405	435	310	315	325	275	280	285
32	14	195	200	205	150	155	155	105	105	105			
	22	535	555	625	460	470	510	365	365	380	320	325	330
40	18	265	270	290	215	215	225	150	155	155			
	22	430	445	480	360	370	385	275	280	285	230	230	235
	28	670	700	825	590	605	670	475	480	505	430	435	445
50	22	330	335	355	265	270	280	190	195	195			
	28	570	590	645	485	495	520	375	380	390	315	315	320
	36	885	925	1115	785	810	910	640	655	690	580	590	610
63	28	435	445	470	355	360	375	265	265	270			
	36	755	780	865	650	660	700	510	575	530	430	430	440
	45	1095	1145	1390	975	1010	1140	800	815	870	725	735	765
80	36	585	595	630	480	485	505	340	360	365			
	45	890	920	1025	760	775	830	590	595	615	535	540	550
	56	1340	1400	1700	1195	1240	1405	1000	1010	1075	885	900	940
100	45	725	745	805	605	615	645	415	440	475			
	56	1090	1130	1295	940	965	1045	740	750	782	675	680	695
	70	1615	1700	2000	1460	1515	1770	1225	1255	1355	1115	1130	1185
125	56	900	925	1015	760	775	820	485	520	605			
	70	1340	1395	1640	1170	1205	1330	940	955	1000	855	865	890
	90	2035	2150	2300	1860	1945	2300	1590	1635	1815	1480	1510	1605
160	70	1100	1300	1255	935	955	1015	730	735	760			
	110	2410	2550	2600	2210	2315	2600	1905	1960	2180	1720	1755	1875
200	90	1420	1470	1680	1225	1255	1360	770	830	1020			
	140	2700	2700	2700	2700	2700	2700	2415	2495	2700	2195	2250	2240

Installation position

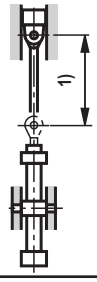
0°



45°



90°



1) Adm. stroke length

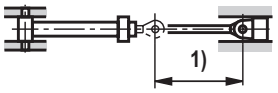
Admissible stroke length (dimensions in mm)

Type of mounting MT2

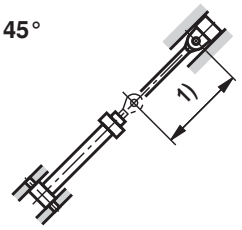
ØAL	ØMM	Admissible stroke length with 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	210 bar 0°	210 bar 45°	210 bar 90°
25	12	130	130	135	100	100	105	65	65	65			
	18	330	340	390	285	290	315	220	225	230	195	195	200
32	14	135	135	140	100	100	105	65	65	65			
	22	390	405	455	335	340	370	260	260	270	230	230	235
40	18	180	185	200	145	145	150	95	95	100			
	22	305	315	340	250	260	270	185	190	195	155	155	155
	28	485	505	600	425	435	485	335	345	360	305	305	315
50	22	230	235	245	180	185	190	125	125	125			
	28	410	425	465	345	350	370	260	265	270	220	220	225
	36	645	675	815	570	590	665	460	470	500	420	425	440
63	28	310	315	335	250	250	260	180	180	180			
	36	550	565	630	465	475	505	360	365	375	305	305	315
	45	800	840	1025	710	735	835	580	595	630	530	535	555
80	36	415	425	450	340	345	355	250	250	255			
	45	675	700	780	580	590	630	450	455	470	380	385	395
	56	980	1030	1260	875	905	1030	720	735	780	645	655	685
100	45	515	530	575	430	435	455	320	320	330			
	56	825	855	980	710	730	795	565	570	595	480	485	500
	70	1185	1245	1585	1065	1110	1300	890	915	990	815	830	870
125	56	640	660	730	540	550	580	410	410	425			
	70	1015	1060	1240	890	915	1010	715	725	760	615	625	640
	90	1495	1580	2110	1365	1425	1735	1160	1195	1330	1080	1105	1175
160	70	785	810	905	665	675	720	505	515	530			
	110	1770	1870	2505	1620	1695	2070	1390	1430	1595	1260	1290	1375
200	90	1015	1055	1210	870	895	970	680	685	715			
	140	2190	2325	2700	2025	2125	2695	1760	1825	2080	1610	1650	1790

Installation position

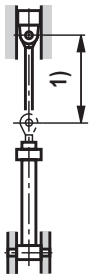
0°



45°



90°



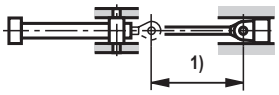
[1] **Adm. stroke length**

Type of mounting MT1

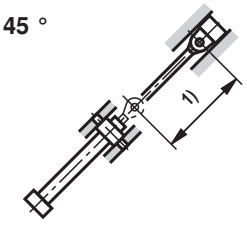
ØAL	ØMM	Admissible stroke length with 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	210 bar 0°	210 bar 45°	210 bar 90°
25	12	325	325	330	260	260	265	190	190	190			
	18	600	600	600	600	600	600	500	510	520	445	450	455
32	14	335	335	345	265	270	270	190	190	190			
	22	800	800	800	735	750	800	580	590	605	520	520	530
40	18	460	465	475	370	375	375	270	270	275			
	22	690	705	760	585	595	620	455	460	465	385	390	390
	28	1000	1000	1000	945	970	1000	760	770	800	685	690	705
50	22	550	555	570	450	450	455	330	330	335			
	28	905	930	1015	775	790	830	615	620	630	515	520	525
	36	1200	1200	1200	1200	1200	1200	1010	1025	1075	915	925	955
63	28	715	725	750	590	590	600	440	440	445			
	36	1175	1210	1335	1015	1035	1100	805	810	835	695	695	705
	45	1400	1400	1400	1400	1400	1400	1245	1270	1345	1135	1150	1190
80	36	940	955	995	780	785	805	590	590	600			
	45	1465	1510	1675	1270	1300	1375	1015	1025	1055	860	865	880
	56	1700	1700	1700	1700	1700	1700	1525	1555	1655	1385	1405	1460
100	45	1190	1210	1270	995	1005	1030	740	760	770			
	56	1790	1850	2000	1570	1600	1730	1270	1285	1330	1085	1095	1115
	70	2000	2000	2000	2000	2000	2000	1900	1945	2000	1740	1765	1850
125	56	1480	1505	1595	1245	1260	1300	965	970	980			
	70	2190	2270	2300	1935	1990	2175	1585	1605	1675	1375	1385	1420
	90	2300	2300	2300	2300	2300	2300	2300	2300	2300	2290	2300	2300
160	70	1805	1840	1965	1525	1545	1600	1185	1195	1210			
	110	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600
200	90	2340	2400	2610	2000	2035	2135	1575	1585	1620			
	140	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700

Installation position

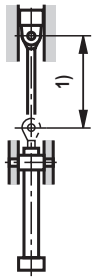
0 °



45 °



90 °



[1] **Adm. stroke length**

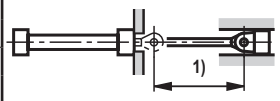
Admissible stroke length (dimensions in mm)

Type of mounting ME5, MX3, MX5

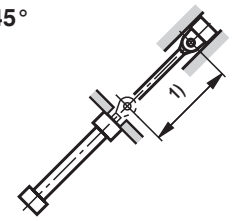
ØAL	ØMM	Admissible stroke length with 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	210 bar 0°	210 bar 45°	210 bar 90°
25	12	510	520	540	430	435	445	335	335	340			
	18	600	600	600	600	600	600	600	600	600	600	600	600
32	14	535	545	565	445	450	460	345	345	350			
	22	800	800	800	800	800	800	800	800	800	790	800	800
40	18	710	725	755	600	605	620	465	470	475			
	22	990	1000	1000	870	890	955	705	715	735	620	625	635
	28	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
50	22	850	865	910	720	725	750	560	565	570			
	28	1200	1200	1200	1125	1150	1200	920	930	965	810	815	830
	36	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
63	28	1080	1100	1170	920	930	965	720	725	740			
	36	1400	1400	1400	1400	1400	1400	1205	1225	1280	1065	1075	1100
	45	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
80	36	1390	1425	1545	1195	1215	1270	950	955	975			
	45	1700	1700	1700	1700	1700	1700	1485	1510	1580	1310	1325	1360
	56	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
100	45	1710	1760	1935	1480	1510	1590	1185	1195	1225			
	56	2000	2000	2000	2000	2000	2000	1815	1850	1965	1620	1635	1690
	70	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
125	56	2100	2165	2300	1830	1865	1990	1200	1280	1540			
	70	2300	2300	2300	2300	2300	2300	2255	2300	2300	2030	2060	2140
	90	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300
160	70	2540	2600	2600	2225	2275	2440	1805	1825	1885			
	110	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600
200	90	2700	2700	2700	2700	2700	2700	2360	2395	2510			
	140	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700

Installation position

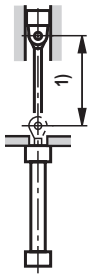
0°



45°



90°



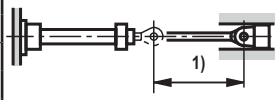
1) Adm. stroke length

Type of mounting ME6, MX1, MX2

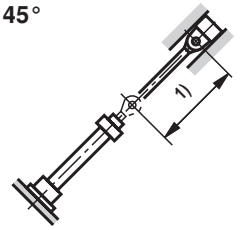
ØAL	ØMM	Admissible stroke length with 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	210 bar 0°	210 bar 45°	210 bar 90°
25	12	195	200	220	160	160	170	115	115	120			
	18	445	465	585	395	410	475	325	330	360	295	295	310
32	14	205	210	230	165	170	180	120	120	120			
	22	525	550	685	465	485	560	385	390	420	345	350	365
40	18	270	280	315	225	230	245	165	165	170			
	22	435	455	520	375	385	420	295	300	310	245	250	255
	28	645	680	895	580	605	730	485	500	555	450	460	480
50	22	335	350	390	280	285	305	210	210	220			
	28	580	600	700	505	515	565	400	405	425	335	340	350
	36	845	895	1200	770	805	990	655	675	755	605	620	655
63	28	445	460	520	375	385	415	285	290	300			
	36	760	795	940	670	690	765	540	550	580	465	470	490
	45	1045	1105	1400	955	1140	1240	815	845	955	765	780	835
80	36	590	610	690	505	515	555	390	395	410			
	45	940	980	1160	830	855	950	675	685	720	580	585	610
	56	1275	1350	1700	1170	1225	1520	1005	1035	1175	930	950	1025
100	45	725	755	885	630	645	710	495	505	530			
	56	1145	1200	1465	1025	1060	1205	850	865	920	730	740	770
	70	1530	1625	2000	1415	1485	1925	1230	1280	1485	1170	1195	1300
125	56	885	925	1110	775	800	900	620	635	670			
	70	1380	1450	1835	1245	1290	1500	1040	1065	1155	915	935	980
	90	1900	2025	2300	1770	1875	2300	1570	1640	1980	1525	1570	1745
160	70	1080	1130	1370	950	985	1110	770	785	835			
	110	2250	2395	2600	2105	2225	2600	1870	1950	2360	1780	1835	2045
200	90	1375	1445	1825	1225	1275	1485	1010	1035	1120			
	140	2700	2700	2700	2605	2700	2700	2340	2450	2700	2245	2325	2660

Installation position

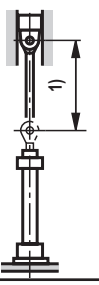
0°



45°



90°



1) Adm. stroke length

End position cushioning

End position cushioning:

The objective is to reduce the velocity of a moved mass, the center of gravity of which lies on the cylinder axis, to a level at which neither the cylinder nor the machine into which the cylinder is installed is damaged.

For velocities above 20 mm/s, we recommend the use of an end position cushioning feature, which absorbs energy without requiring the use of an additional device.

It must, however, always be checked whether end position cushioning is also required for lower velocities with large masses.

The series CDT3 / CGT3 is equipped with a progressive damping system.

Advantages of this damping system:

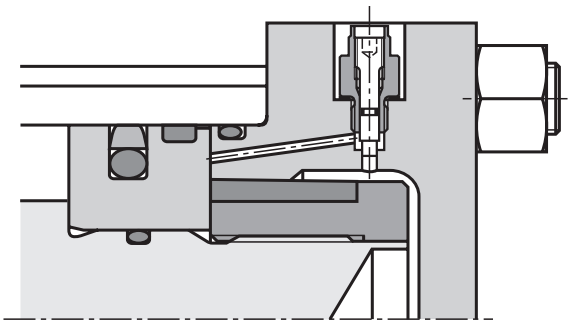
- Progressive delay.
- Short damping time.
- Effective damping length depending on the velocity.
- Due to low damping pressures and no pressure peaks, safety and the life cycle of the cylinder and the machine are increased.
- Insensitive to changes in pressure, temperature and the moved masses.
- Controlled end stop velocity of the piston – more safety and reliability.
- Quick start-up due to special check valve and floating bushing.

Cylinders with end position cushioning can achieve their full damping capacity only over the entire damping length.

With the adjustable end position cushioning version "E", a throttle valve is additionally provided when compared with version "D". End position cushioning version "E" allows cycle times to be optimized.
The max. damping capacity can only be achieved when the throttle valve is closed.

For special applications with very short stroke times, high velocities or large masses, cylinders with special end position cushioning versions can be offered on request.

When fixed or adjustable stops are used, special measures must be taken!

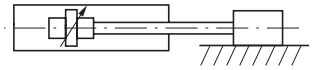


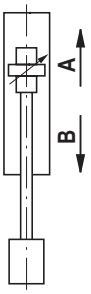
Damping capacity:

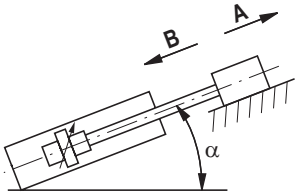
When decelerating masses via end position cushioning, the structural-inherent damping capacity must not be exceeded.

To this end, the kinetic energy and potential energy of the moved mass are to be calculated and compared to the admissible values from the diagrams on pages 58 and 59.

Energy determination







$$E = \frac{1}{2}\, m \cdot v^2$$

Retraction (A): $$E = \frac{1}{2}\, mv^2 - mg \cdot l_a$$

Extension (A): $$E = \frac{1}{2}\, mv^2 - mg \cdot l_a \cdot \sin \alpha$$

Extension (B): $$E = \frac{1}{2}\, mv^2 + mg \cdot l_a$$

Retraction (B): $$E = \frac{1}{2}\, mv^2 + mg \cdot l_a \cdot \sin \alpha$$

E	[Nm] [Joule]	Maximum value see pages 58 to 61
m	[kg]	Total moved mass incl. piston and rod

v	[m/s]	Max. velocity
g	[m/s^2]	9.81
l_a	[m]	Damping length, see page 59

End position cushioning

Damping lengths and weights
With cylinder strokes within the damping lengths, restrictions with regard to speed / cycle time are possible.
We recommend minimum stroke greater than the damping length plus 10 mm!

Cylinder Ø		25		32		40			50			63		
		12	18	14	22	18	22 [12]	28	22	28 [12]	36	28	36 [12]	45
l_a in mm	Head	15	15	16	16	23	23	23	22	22	22	25	25	25
	Base	15	15	16	16	23	23	23	22	22	22	25	25	25
m in kg	Piston	0.15	0.2	0.25	0.4	0.6	0.6	0.7	0.8	1	1.2	1.4	1.7	2.0
(kg/100 mm)	Rod	0.1	0.2	0.12	0.3	0.2	0.3	0.5	0.3	0.5	0.8	0.5	0.8	1.2
v_{max} [1]	(m/s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4

Cylinder Ø		80			100			125			160		200	
		36	45 [12]	56	45	56 [12]	70	56	70 [12]	90	70	110	90	140
l_a in mm	Head	27	27	27	28	28	28	33	33	33	36	36	40	40
	Base	27	27	27	28	28	28	33	33	33	36	36	40	40
m in kg	Piston	2.6	3	3.6	4.7	5.3	6.3	8.0	9.2	11	16	20	30	38
(kg/100 mm)	Rod	0.8	1.2	2.0	1.2	2	3.0	2.0	3	5.0	3.0	7.5	5.0	12
v_{max} [1]	(m/s)	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.25	0.25	0.25	0.25

[1] In case v_{max} is exceeded, please contact us.

[12] Piston rod Ø not standardized

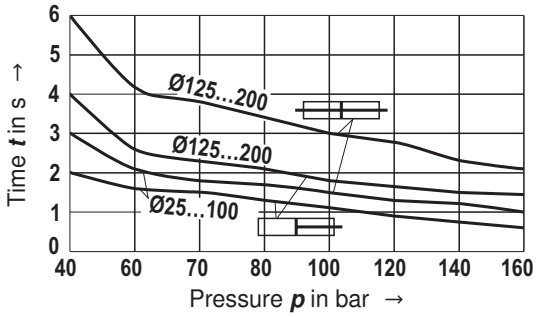
The diagrams on pages 60 and 61 are based on the preceding table, the maximum velocities specified with closed throttle screw.

With slower velocities, the absorbing energy decreases according to the formula.

$$E_U = E_{max} \cdot \frac{v_U}{v_{max}}$$

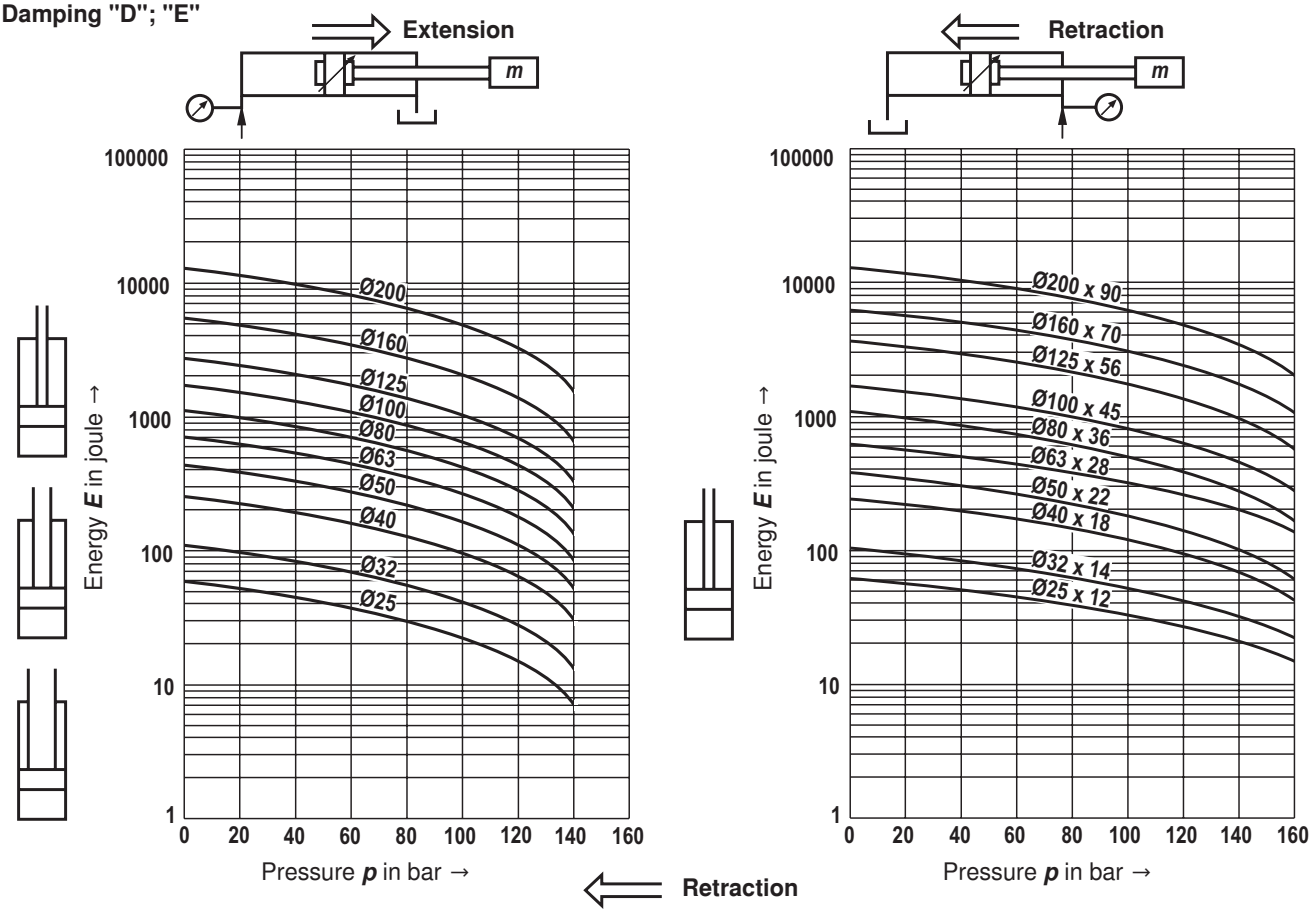
E_U = Energy absorbing
E_{max} = Energy max. see characteristic curve
v_U = Stroke velocity
v_{max} = Velocity max. for seal design "M"

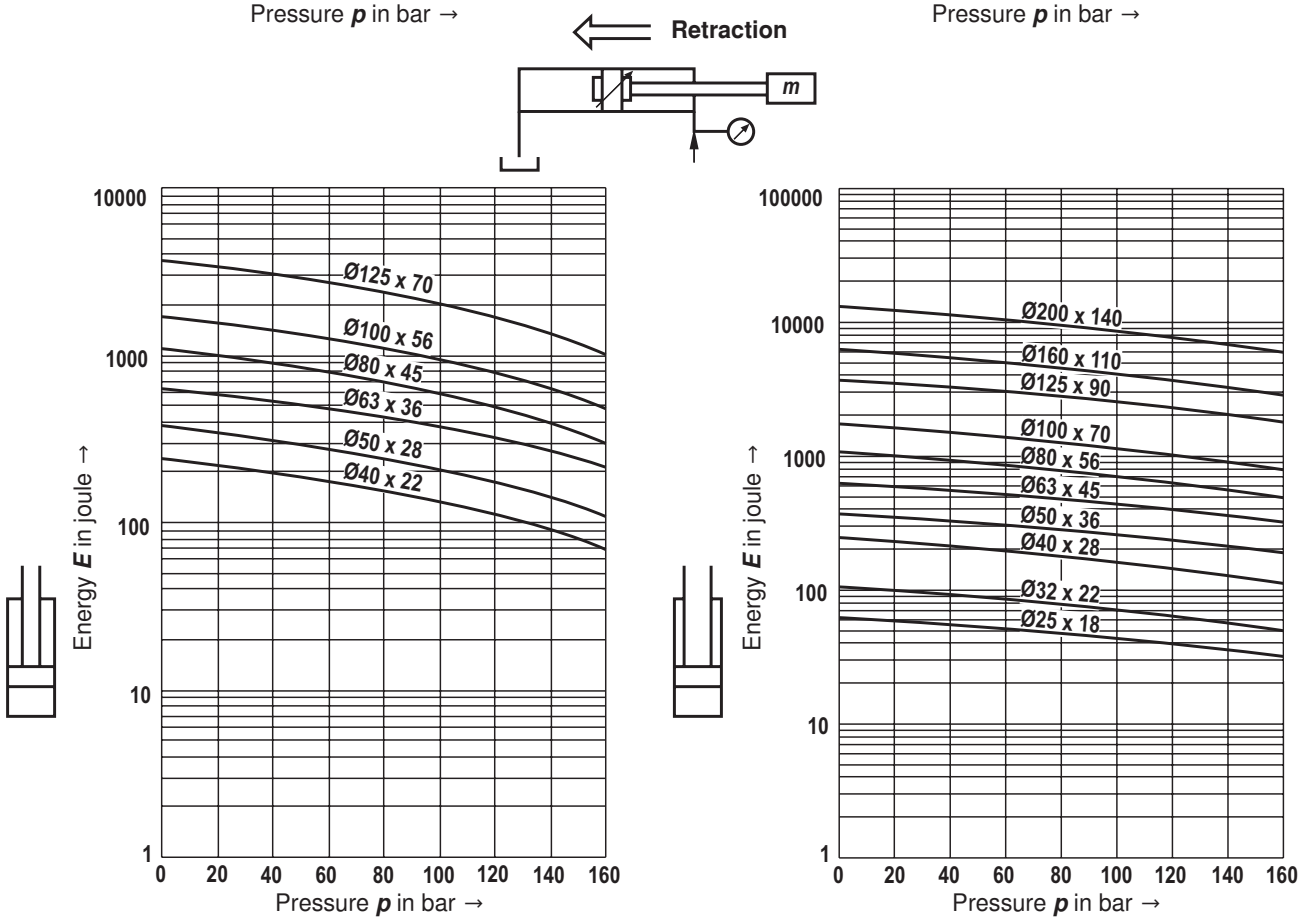
Max. damping time "D"; "E"



End position cushioning

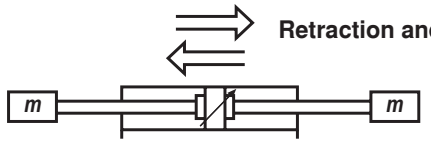
Damping "D"; "E"

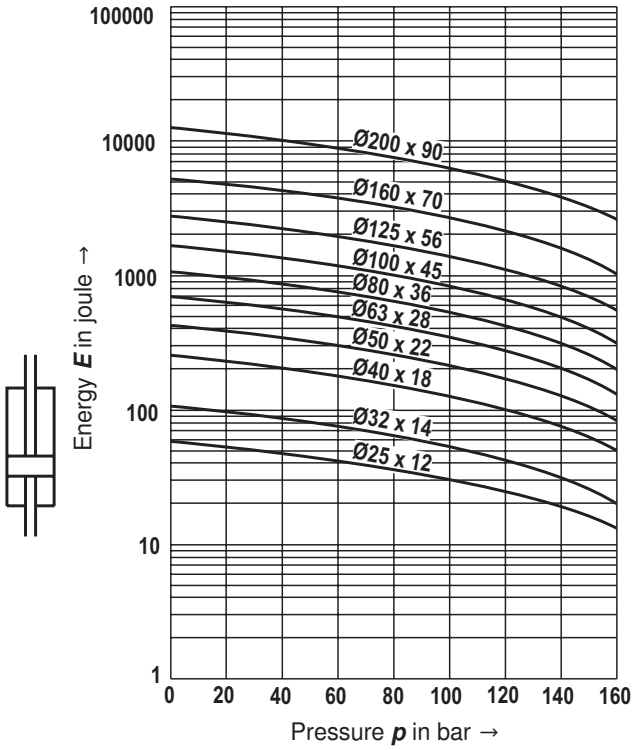


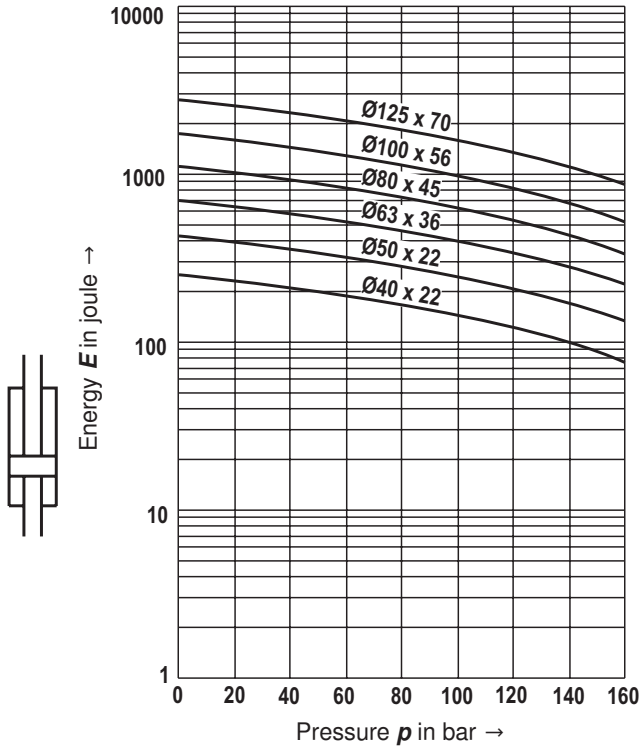


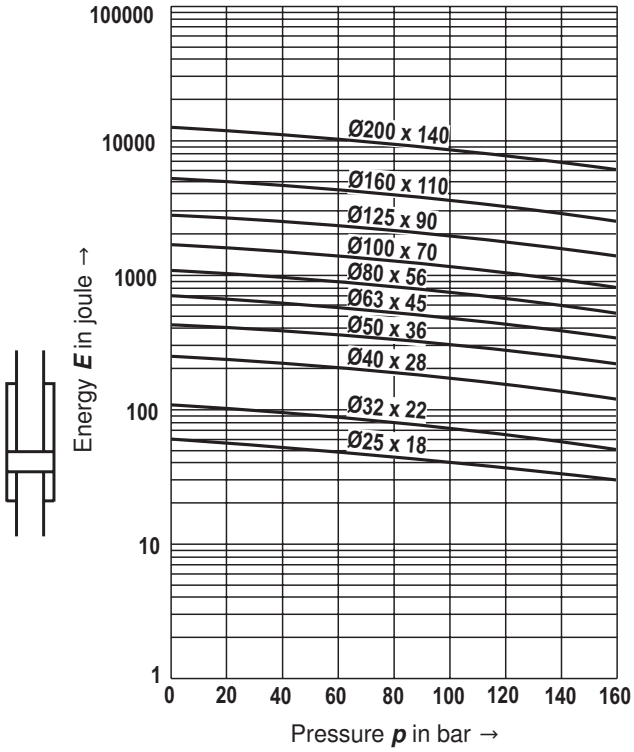
End position cushioning

Damping "D"; "E"



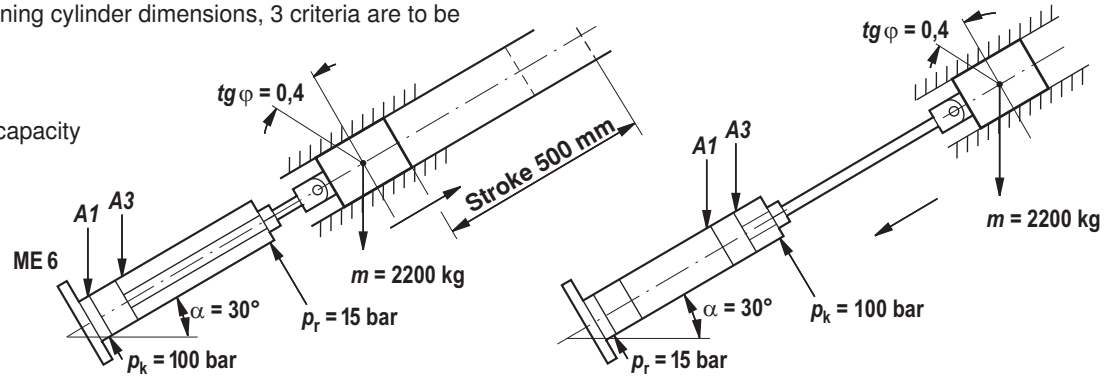






Calculation example

When designing cylinder dimensions, 3 criteria are to be considered:
– Force
– Kinking
– Damping capacity



Example:
Stroke time = 2 seconds
Load friction coefficient = $tg\ \varphi$ = 0.4 (estimated)
Available pressure p_k = 100 bar
Return flow pressure p_r = 15 bar
A1 = Piston surface, ***A3*** = Piston annulus surface
φ = Surface ratio ***A1*** / ***A3***, see page 6
m = Total moved mass, v = Velocity
l_a = Damping length, see page 59

To be determined:
Piston and piston rod diameter

Extend piston rod:
Overall efficiency $\eta = \eta 1 \cdot \eta 2$
$\eta 1$ = Cylinder efficiency = 0.9 (estimated)
$\eta 2$ = System efficiency

$$\eta 2 = \frac{p_k \cdot A1 - p_r \cdot A3}{p_k \cdot A1} = 1 - \frac{p_r}{p_k \cdot \varphi\ ^{1)}} = \frac{15}{100 \cdot 1.25} = 0.88$$

$$\eta = 0.9 \cdot 0.88 = 0.79$$

[1)] Assuming the smallest "φ"

Force required to move the mass:
F = Frictional force plus potential energy
$= tg\ \varphi \cdot m \cdot g \cdot \cos \alpha + m \cdot g \cdot \sin \alpha$
= 0.4 • 2200 • 9.81 • 0.866 + 2200 • 9.81 • 0.5 = 18270 N
= 18.27 kN
This theoretical force 18.27 kN with η = 0.79 results in a required force = 23.13 kN and thus, a cylinder piston diameter = 63 mm is necessary for p_k = 100 bar, see page 6

Retract piston rod:
F = Frictional force minus potential energy
$= tg\ \varphi \cdot m \cdot g \cdot \cos \alpha - m \cdot g \cdot \sin \alpha$
= 0.4 • 2200 • 9.81 • 0.866 – 2200 • 9.81 • 0.5
= – 3315 N = – 3.3 kN no force problem during retraction

Test of bending length:
For p_k = 100 bar and cylinder 63 / 28, the table on page 57 results in a maximum admissible stroke = 385 mm:
So the cylinder kinks

There are 2 possibilities:
– Select piston rod diameter 45,
max. admissible stroke = 1140 mm, i.e. kinking-proof
– Change the type of mounting, e.g. MS2 with a
maximum admissible stroke = 915 mm

Test of the end position cushioning

Average velocity 0.5 / 2 = 0.25 m/s
Max. Velocity v_u = 0.275 m/s
(estimated correction coefficient = 1.1 due to start-up and braking)

Damping capacity required for piston rod extension =

$$\frac{m \cdot v_u^2}{2} - m \cdot g \cdot l_a \cdot \sin \alpha = \frac{2200 \cdot 0.275^2}{2} - 2200 \cdot 9.81 \cdot 0.025 \cdot 0.5 = -186 \text{ joules}$$

No damping problem for piston rod extension

Damping capacity required for piston rod retraction =

$$\frac{m \cdot v_u^2}{2} + m \cdot g \cdot l_a \cdot \sin \alpha = \frac{2200 \cdot 0.275^2}{2} + 2200 \cdot 9.81 \cdot 0.025 \cdot 0.5 = 353 \text{ joules}$$

Diagram on page 60 results in 445 joules for p_k = 100 bar and v_{max} = 0.4 m/s, i.e. the cylinder can absorb energy for 0.275 m/s (see page 59):

$$E_u = E_{max} \cdot \frac{v_u}{v_{max}} = 445 \cdot \frac{0.275}{0.4} = 306 \text{ joules}$$

So the cylinder cannot absorb the necessary damping capacity:
you have to select the next larger diameter 80 / 56.

Selection criteria for seals

	Work and environmental conditions	Seal versions M	T	S
Medium / temperature	**Medium HL, HLP** / operating temperature medium –20 °C to +80 °C	++	++	++
	Medium HFA / operating temperature medium +5 °C to +55 °C	+/–	++	+/–
	Medium HFC / operating temperature medium –20 °C to +60 °C	–	++	–
	Medium HFD-R / operating temperature medium –15 °C to +80 °C	–	–	++
	Medium HFD-U / operating temperature medium –15 °C to +80 °C	–	–	++
	Ambient and rod temperature in the area of the piston rod from –20 °C to +80 °C [1]	++	+	++ [2]
	Extended ambient and rod temperature in the area of the piston rod from +80 °C to +120 °C	–	–	++
Function / velocity...	Static holding function more than 10 minutes: Attention! Application- and temperature-dependent	++	+	+
	Static holding function short-time < 1 minute	++	++	++
	Robust application conditions: Steel works, mining, thin ice	++	–	–
	Zero point control, hardly any amplitude, frequency max. 5 Hz, not longer than 5 minutes	–	++	++
	Cylinder velocity min. 0.001 m/sec stick-slip behavior	++	++	++
	Cylinder velocity from 0.01 m/sec to 0.5 m/sec	++	++	++
	Cylinder velocity > 0.5 m/sec to max. 0.8 m/sec	–	++	++
	Stroke > 1.0 m	+/–	++	++
	Standstill period (wear)	++	++	++
	undissolved air in the oil [3]	–	+	+

++ = very good + = good +/– = conditional, depending on the application parameters – = inappropriate

General technical data in corresponding data sheets will remain valid, see page 2!

1) Moreover, observe the corresponding medium temperature range

2) Lower temperature limit –15 °C

3) – Seal is destroyed / + Seal is not directly destroyed, leaks may occur

Generally, a medium temperature of approx. 40 °C is recommended. The specified values are to be regarded as guidelines; depending on the application, it may be necessary to check the suitability of the seal system.

Seal kits

Seal kit complete

ØAL	ØMM	Material no. for seal design CDT3			Material no. for seal design CGT3		
		M	T	S	M	T	S
25	12	R961008000	R961008026	R961008052	R961008078	R961008104	R961008130
	18	R961008001	R961008027	R961008053	R961008079	R961008105	R961008131
32	14	R961008002	R961008028	R961008054	R961008080	R961008106	R961008132
	22	R961008003	R961008029	R961008055	R961008081	R961008107	R961008133
40	18	R961008004	R961008030	R961008056	R961008082	R961008108	R961008134
	22	R961008005	R961008031	R961008057	R961008083	R961008109	R961008135
	28	R961008006	R961008032	R961008058	R961008084	R961008110	R961008136
50	22	R961008007	R961008033	R961008059	R961008085	R961008111	R961008137
	28	R961008008	R961008034	R961008060	R961008086	R961008112	R961008138
	36	R961008009	R961008035	R961008061	R961008087	R961008113	R961008139
63	28	R961008010	R961008036	R961008062	R961008088	R961008114	R961008140
	36	R961008011	R961008037	R961008063	R961008089	R961008115	R961008141
	45	R961008012	R961008038	R961008064	R961008090	R961008116	R961008142
80	36	R961008013	R961008039	R961008065	R961008091	R961008117	R961008143
	45	R961008014	R961008040	R961008066	R961008092	R961008118	R961008144
	56	R961008015	R961008041	R961008067	R961008093	R961008119	R961008145
100	45	R961008016	R961008042	R961008068	R961008094	R961008120	R961008146
	56	R961008017	R961008043	R961008069	R961008095	R961008121	R961008147
	70	R961008018	R961008044	R961008070	R961008096	R961008122	R961008148
125	56	R961011580	R961011587	R961011595	R961011603	R961011610	R961011617
	70	R961011581	R961011588	R961011596	R961011604	R961011611	R961011618
	90	R961011582	R961011589	R961011597	R961011605	R961011612	R961011619
160	70	R961011583	R961011590	R961011598	R961011606	R961011613	R961011620
	110	R961011584	R961011591	R961011599	R961011607	R961011614	R961011621
200	90	R961011585	R961011592	R961011601	R961011608	R961011615	R961011622
	140	R961011586	R961011593	R961011602	R961011609	R961011616	R961011623

Seal kit CST3 only for cylinder [1)]

ØAL	ØMM	Material no. for seal design CST3		
		M	T	S
40	28	R961008006	R961008032	R961008058
50	28	R961008008	R961008034	R961008060
	36	R961008009	R961008035	R961008061
63	36	R961008011	R961008037	R961008063
	45	R961008012	R961008038	R961008064
80	45	R961008014	R961008040	R961008066
	56	R961008015	R961008041	R961008067
100	56	R961008017	R961008043	R961008069
	70	R961008018	R961008044	R961008070
125	70	R961011581	R961011588	R961011596
	90	R961011582	R961011589	R961011597
160	70	R961011583	R961011590	R961011598
	110	R961011584	R961011591	R961011599
200	90	R961011585	R961011592	R961011601
	140	R961011586	R961011593	R961011602

ØAL = Piston Ø

ØMM = Piston rod Ø

[1)] Seal kits for position measurement system and subplate mounting separate material no.

Seal kits

Only for subplate mounting

Subplates NG	Material number for seal design	
	M, T	S
6	R961008236	R961008239
10, 16	R961011631	R961011632

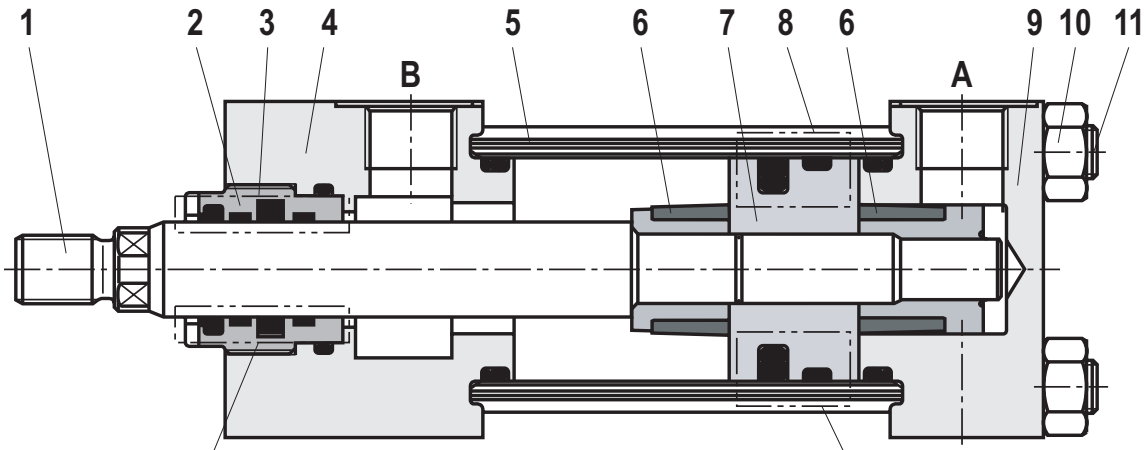
Only for position measurement system

ØAL	Material number for seal design	
	M, T	S
40	R961008156	R961008161
50	R961008157	R961008162
63	R961008158	R961008163
80	R961008159	R961008164
100	R961008160	R961008165
125	R961011625	R961011626
160	R961011627	R961011628
200	R961011629	R961011630

Tightening torques

ØAL	ØMM	Tightening torques for tie rod nut in Nm for types of mounting	
		ME5/6, MP1/3/5, MS2, MT1/2/4, MX3/5	MX1/2
25	12	5.5	4
	18		
32	14	8	6
	22		
40	18	20	15
	22		
	28		
50	22	50	37
	28		
	36		
63	28	60	45
	36		
	45		
80	36	125	90
	45		
	56		
100	45	190	140
	56		
	70		
125	56	400	300
	70		
	90		
160	70	800	600
	110		
200	90	1250	900
	140		

Spare parts: Series CDT3



Piston rod seals

Ø25 – 32 and Ø40/18

M

T, S

Ø40/22, Ø40/28 and Ø50 – 200

M

T, S

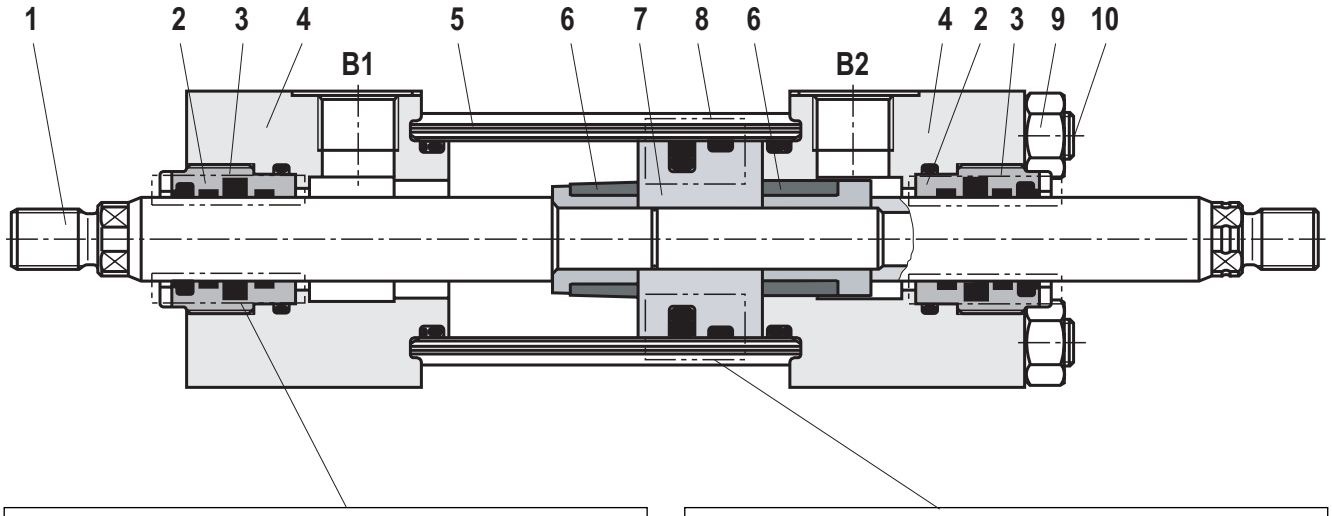
Piston seals

M, T, S for piston Ø25 – 63

M, T, S for piston Ø80 – 200

A Piston chamber
B Annulus area
1 Piston rod
2 Guide socket
3 Piston rod seal
4 Cylinder head
5 Cylinder pipe
6 Damping bush
7 Piston
8 Piston seal
9 Cylinder base
10 Nut
11 Tie rod

Spare parts: Series CGT3



Piston rod seals

Ø25 – 32 and Ø40/18

M

T, S

Ø40/22, Ø40/28 and Ø50 – 200

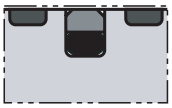
M

T, S

Piston seals

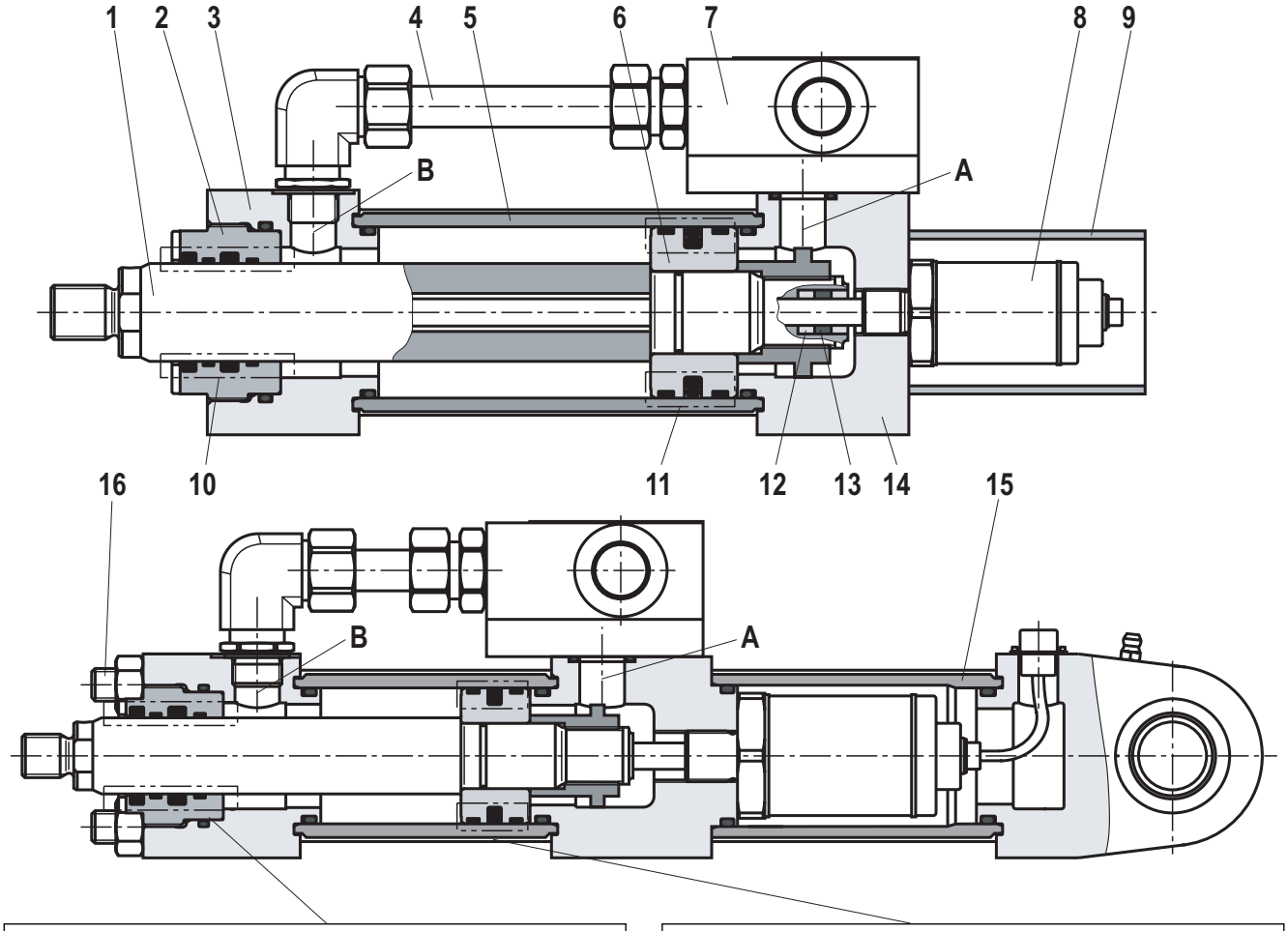
M, T, S for piston Ø25 – 63

M, T, S for piston Ø80 – 200



B1 Annulus area 1
B2 Annulus area 2
1 Piston rod
2 Guide socket
3 Piston rod seal
4 Cylinder head
5 Cylinder pipe
6 Damping bush
7 Piston
8 Piston seal
9 Nut
10 Tie rod

Spare parts: Series CST3



Piston rod seals

Ø40 – 200

M

T, S

Piston seals

M, T, S for piston Ø40 – 63

M, T, S for piston Ø80 – 200

A Piston chamber
B Annulus area
1 Piston rod
2 Guide socket
3 Cylinder head
4 Piping
5 Cylinder pipe
6 Piston
7 Subplate
8 Position measurement system
9 Protective pipe
10 Piston rod seal
11 Piston seal
12 Insulating socket
13 Solenoid
14 Cylinder base
15 Connection pipe
16 Tie rod

Weight for cylinder (in kg)

CDT3 / CGT3

ØAL	ØMM	MX1, ME5, MS2		ME6, MP3, MP1		MP5		MT4		MX2, MX3, MX5 (in case of CGT3 **without** MX2)		MT1, MT2 (in case of CGT3 **without** MT2)		Stroke 100 mm	
		CDT3	CGT3	CDT3	CGT3	CDT3	CGT3	CDT3	CGT3	CDT3	CGT3	CDT3	CGT3	CDT3	CGT3
25	12	1.1	1.2	1.1	–	1.0	–	1.3	1.4	1.0	1.1	1.1	1.2	0.4	0.5
	18	1.2	1.4	1.2	–	1.1	–	1.4	1.6	1.1	1.3	1.2	1.4	0.6	0.8
32	14	1.5	1.6	1.6	–	1.4	–	1.8	1.9	1.4	1.5	1.5	1.6	0.5	0.6
	22	1.6	1.9	1.7	–	1.5	–	1.9	2.2	1.5	1.8	1.6	1.9	0.6	0.9
40	18	3.4	3.6	3.4	–	3.2	–	4.1	4.3	3.1	3.3	3.2	3.4	0.8	1.0
	22 [12]	3.4	3.8	3.4	–	3.2	–	4.1	4.5	3.1	3.5	3.2	3.6	0.9	1.2
	28	3.5	4.0	3.5	–	3.3	–	4.2	4.7	3.2	3.7	3.3	3.8	1.1	1.6
50	22	5.3	5.7	5.3	–	4.9	–	6.6	7.0	4.8	5.2	4.9	5.3	1.1	1.4
	28 [12]	5.4	6.0	5.4	–	5	–	6.7	7.3	4.9	5.5	5	5.6	1.3	1.8
	36	5.5	6.4	5.5	–	5.1	–	6.8	7.7	5.0	5.9	5.1	6.0	1.6	2.4
63	28	7.7	8.3	7.7	–	7.3	–	9.2	9.8	7.0	7.6	7.3	7.9	1.4	1.9
	36 [12]	7.9	8.8	7.8	–	7.4	–	9.3	10.3	7.1	8.1	7.4	8.4	1.7	2.5
	45	8.2	9.7	8.0	–	7.6	–	9.5	11	7.3	8.8	7.6	9.1	2.2	3.4
80	36	14	15	14	–	14	–	18	19	12	13	15	15	2.2	3.0
	45 [12]	14	16	14	–	14	–	17	20	13	14	14	16	2.6	3.8
	56	15	17	15	–	15	–	19	21	14	16	15	17	3.3	5.2
100	45	20	22	20	–	20	–	24	26	19	20	22	24	3.3	4.5
	56 [12]	20	23	20	–	19	–	24	27	18	21	22	25	4.1	6.1
	70	21	25	21	–	21	–	25	29	19	23	23	27	5.1	8.1
125	56	38	41	39	–	38	–	46	49	35	39	43	46	6.3	8.2
	70 [12]	38	43	39	–	38	–	46	51	35	41	43	48	7.3	10.3
	90	39	46	40	–	39	–	48	55	37	44	44	51	9.3	14
160	70	62	68	67	–	63	–	78	83	59	65	64	69	8.7	12
	110	64	75	69	–	65	–	80	91	61	72	67	79	13.2	21
200	90	112	124	120	–	115	–	147	158	107	118	114	126	13.4	18
	140	115	137	123	–	117	–	149	171	109	131	117	138	20.5	33

Swivel head, clevis bracket and trunnion bearing block see pages 49 to 53

Subplates see page 46

[12] Piston rod Ø not standardized

Weight for cylinder (in kg)

CST3

ØAL	ØMM	ME5, MS2	MP5	MT4	MX5	Stroke 100 mm
40	**28**	3.5	3.8	4.2	3.2	1.1
50	**28** [12)]	5.4	5.8	6.7	4.9	1.3
	36	5.5	5.9	6.8	5.0	1.6
63	**36** [12)]	7.9	8.5	9.3	7.1	1.7
	45	8.2	8.7	9.5	7.3	2.2
80	**45** [12)]	14	16.1	17	13	2.6
	56	15	17.3	19	14	3.3
100	**56** [12)]	20	21.8	24	18	4.1
	70	21	24.1	25	19	5.1
125	**70** [12)]	38	43.7	46	35	7.3
	90	39	44.8	48	37	9.3
160	**70**	62	72.5	78	59	8.7
	110	64	74.8	80	61	13.2
200	**90**	112	132	147	107	13.4
	140	115	134.5	149	109	20.5

Swivel head, clevis bracket and trunnion bearing block see pages 49 to 53

Subplates see page 46

[12)] Piston rod Ø not standardized

Corrosivity categories

In this connection, observe the information on the color set-up on page 2 "Technical data".
The specified resistances of the individual Bosch Rexroth classes only refer to the primed / painted cylinder areas, not, for example, to piston rods, trunnions, etc.
In this connection, special measures may be necessary.

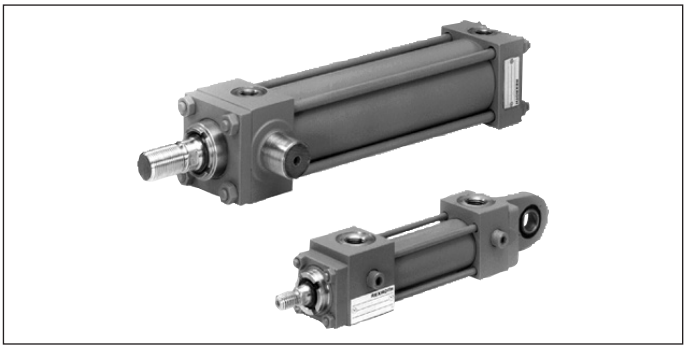
	Class	Properties	Applications	
			Inside	Outside
Priming	CP3 (C3, short [1)])	240 h salt spray test SST (DIN EN ISO 9227) 240 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: at least 40 µm	Field of application e. g. hall atmosphere, air humidity ≤ 60%, no thermal load.	Not suitable for outdoor exposure.
Painting	CP4 (C3, medium [1)])	480 h salt spray test SST (DIN EN ISO 9227) 480 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: 120 µm	Unheated buildings in which there may be condensation (production rooms, storage and sport halls).	Urban and industrial atmosphere with little salt or sulfur dioxide load.

[1)] according to DIN EN ISO 12944-2

Hydraulic cylinders
Tie rod design

Type CD70 / CG70

RE 17016
Edition: 2014-03
Replaces: 08.08



- Series 70
- Component series 1X
- Nominal pressure 70 bar *[7 MPa]*

Features

- 16 types of mounting
- Piston Ø (**ØAL**) 25 ... 200 mm
- Piston rod Ø (**ØMM**) 12 ... 140 mm
- Stroke length up to 3 m

Contents

Ordering code: Series CD70

01	02	03	04		05		06	07	08		09	10	11	12	13	14		15	16	17	18
CD	**70**			**/**		**–**		**Z**	**1X**	**/**							**–**				*****

01	Differential cylinder	**CD**
02	Series	**70**

Types of mounting

03	Spherical bearing at the cylinder base, page 12 ... 15	**B**
	Fork at the cylinder base, page 16 ... 19	**G** [1)]
	Rectangular flange at the cylinder head, page 20 ... 23	**C** [2)]
	Square flange at the cylinder head, page 24 ... 27	**H**
	Rectangular flange at the cylinder base, page 28 ... 31	**D** [2)]
	Square flange at the cylinder base, page 32 ... 35	**K**
	Trunnion at the cylinder head, page 36 ... 39	**R** [1)]
	Trunnion in cylinder center, page 40 ... 43	**E** [3)]
	Trunnion at the cylinder base, page 44 ... 47	**S**
	Foot mounting, page 48 ... 51	**F**
	Foot mounting with fitting key, page 52 ... 55	**L** [2)]
	Foot mounting with seal ring sealing for subplate mounting, page 56 ... 59	**M**
	Tapped holes in cylinder head and base, page 60 ... 63	**N**
	Foot mounting on front side with fitting key, page 64 ... 67	**T** [1; 2)]
	Extended tie rod at the cylinder head, page 68 ... 71	**P**
	Extended tie rod at the cylinder base, page 72 ... 75	**Q**

04	Piston Ø (**ØAL**) from 25 ... 200 mm; see page 9	**...**
05	Piston rod Ø (**ØMM**) from 12 ... 140 mm; see page 9	**...**
06	Stroke length in mm [4)]	**...**

Design principle

07	Head and base connected to tie rod	**Z**
08	Component series 11 ... 19 (unchanged installation and connection dimensions)	**1X**

Line connection/version

09	Flange connection with seal ring sealing; only possible with "M" type of mounting	**00**
	Pipe thread according to ISO 228/1	**01** [10)]
	Metric ISO thread	**02** [10)]
	Enlarged line connection; pipe thread according to ISO 228/1	**13** [5; 10)]
	Enlarged line connection; metric ISO thread	**14** [5; 10)]

Piston rod design

10	Hardened and hard chromium-plated	**H**
	Hard chromium-plated, from piston Ø ≥ 80 mm	**C** [6)]

Piston rod end

11	Male thread	**B**
	Male thread	**C**
	Internal thread	**E** [7)]
	Thread for swivel head	**F**
	With mounted swivel head CGK	**T**

Ordering code: Series CD70

01	02	03	04		05		06	07	08		09	10	11	12	13	14		15	16	17	18
CD	**70**			**/**		**–**		**Z**	**1X**	**/**							**–**				*****

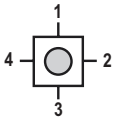
End position cushioning

12	**Without**	**U**
	Base side	**K**
	Head side	**S**
	On both sides	**D**

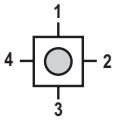
Hydraulic fluid

13	Seals, suitable for mineral oil according to DIN 51524 (HL, HLP)	**M**
	FKM seals suitable for phosphate ester (HFDR)	**V**

Line connection/position at head

14	Enter position; observe table on page 6!		**1** [8]
			2 [8]
	View to piston rod		**3** [8]
			4 [8]

Line connection/position at base

15	Enter position; observe table on page 6!		**1** [8]
			2 [8]
	View to piston rod		**3** [8]
			4 [8]

Seals

16	Standard version	**A**
	Design for low-friction operation	**T**
17	Enter support width extension; see page 85	**...**
18	Further details in the plain text [9]	*****

[1] Not possible with piston Ø 25 mm

[2] Not possible with piston Ø 200 mm

[3] Trunnion position freely selectable.
When ordering, always specify the "XV" dimension in the plain text in mm.
With piston Ø 25 mm, the trunnions are at the cylinder head.

[4] Observe the admissible stroke length, page 82 to 84

[5] Dimensions see page 76. Not possible with "K" type of mounting.

[6] Not possible with "E" piston rod end

[7] Not possible with piston rod Ø 12 mm

[8] All graphical representations in the data sheet show position 1

[9] Always specify the attachment of inductive proximity switches or piston rod extension "LY" in the order in the plain text

[10] Not possible with "M" type of mounting

Order example:

CD70B50/22-200Z1X/01HBDM1-1A

With special versions, an "X" will be inserted in the type key at the corresponding position and an SO number will be amended at the end.

Ordering code: Series CG70

01	02	03	04		05		06	07	08		09	10	11	12	13	14		15	16	17	18
CG	**70**			**/**		**–**		**Z**	**1X**	**/**							**–**				*****

01	Double-acting cylinders	**CG**
02	Series	**70**

Types of mounting

03	Rectangular flange at the cylinder head, page 20 ... 23	**C** [2)]
	Square flange at the cylinder head, page 24 ... 27	**H**
	Trunnion at the cylinder head, page 36 ... 39	**R** [1)]
	Trunnion in cylinder center, page 40 ... 43	**E** [3)]
	Foot mounting, page 48 ... 51	**F**
	Foot mounting with fitting key, page 52 ... 55	**L** [2)]
	Foot mounting with seal ring sealing for subplate mounting, page 56 ... 59	**M**
	Tapped holes in cylinder head and base, page 60 ... 63	**N**
	Extended tie rod at the cylinder head, page 68 ... 71	**P**
04	Piston Ø (**ØAL**) from 25 ... 200 mm; see page 9	**...**
05	Piston rod Ø (**ØMM**) from 12 ... 140 mm; see page 9	**...**
06	Stroke length in mm [4)]	**...**

Design principle

07	Head and base connected to tie rod	**Z**
08	Component series 11 ... 19 (unchanged installation and connection dimensions)	**1X**

Line connection/version

09	Flange connection with seal ring sealing; only possible with "M" type of mounting	**00**
	Pipe thread according to ISO 228/1	**01** [10)]
	Metric ISO thread	**02** [10)]
	Enlarged line connection; pipe thread according to ISO 228/1	**13** [5; 10)]
	Enlarged line connection; metric ISO thread	**14** [5; 10)]

Piston rod design

10	Hardened and hard chromium-plated	**H**
	Hard chromium-plated, from piston Ø ≥ 80 mm	**C** [6)]

Piston rod end

11	Male thread	**B**
	Male thread	**C**
	Internal thread	**E** [7)]
	Thread for swivel head	**F**
	With mounted swivel head CGK	**T**

End position cushioning

12	**Without**	**U**
	Base side	**K**
	Head side	**S**
	On both sides	**D**

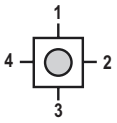
Hydraulic fluid

13	Seals, suitable for mineral oil according to DIN 51524 (HL, HLP)	**M**
	FKM seals suitable for phosphate ester (HFDR)	**V**

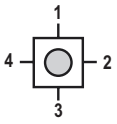
Ordering code: Series CG70

01	02	03	04	05		06	07	08		09	10	11	12	13	14		15	16	17	18
CG	**70**			**/**		**–**		**Z**	**1X**	**/**						**–**				*****

Line connection/position at head

14	Enter position; observe table on page 6! View to piston rod		**1** [8] **2** [8] **3** [8] **4** [8]

Line connection/position at base

15	Enter position; observe table on page 6! View to piston rod		**1** [8] **2** [8] **3** [8] **4** [8]

Seals

16	Standard version	**A**
	Design for low-friction operation	**T**
17	Enter support width extension; see page 85	**...**
18	Further details in the plain text [8]	*****

[1] Not possible with piston Ø 25 mm

[2] Not possible with piston Ø 200 mm

[3] Trunnion position freely selectable.
When ordering, always specify the "XV" dimension in the plain text in mm.
With piston Ø 25 mm, the trunnions are at the cylinder head.

[4] Observe the admissible stroke length, page 82 to 84

[5] Dimensions see page 76

[6] Not possible with "E" piston rod end

[7] Not possible with piston rod Ø 12 mm

[8] All graphical representations in the data sheet show position 1

[9] Always specify the attachment of inductive proximity switches or piston rod extension "LY" in the order in the plain text

[10] Not possible with "M" type of mounting

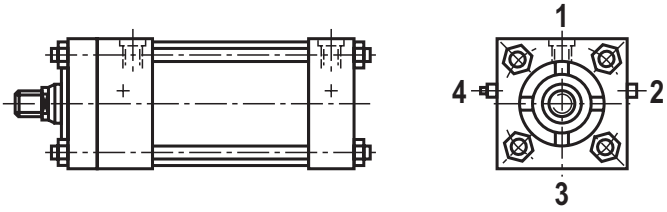
Order example:

CG70C50/22-200Z1X/01HBDM1-1A

With special versions, an "X" will be inserted in the type key at the corresponding position and an SO number will be amended at the end.

Position of the line connections

By rotating the cylinder head and/or cylinder base, the position of the line connections can be varied during the assembly for most cylinder mounting types. The possibilities can be seen in the following table.
Throttle and check valve will also change their position accordingly.
With F, L, N and T types of mounting as well as at the cylinder base with G type of mounting, throttle and check valve are in position 1 when the line connection is rotated.



	Selectable position of the line connections															
Types of mounting	B	C	D	E	F	G	H	K	L	M	N	P	Q	R	S	T
at the cylinder head	1	1	1	1	1	1	1	1	1	–	1	1	1	1	1	1
	2	2	2	2	2	2	2	2	2	–	2	2	2	–	2	2
	3	3	3	3	–	3	3	3	–	3	–	3	3	3	3	–
	4	4	4	4	4	4	4	4	4	–	4	4	4	–	4	4
at the cylinder base	1	1	1	1	1	1	1	1	1	–	1	1	1	1	1	1
	2	2	2	2	2	2	2	2	2	–	2	2	2	2	–	2
	3	3	3	3	–	3	3	3	–	3	–	3	3	3	3	–
	4	4	4	4	4	4	4	4	4	–	4	4	4	4	–	4

= Position 2 and 4 not possible with:

- Piston Ø 25 to 100 mm with enlarged line connection, version 13 and 14
- Piston Ø 25, 32/22 and 32/25 with line connection, version 01 and 02
- Piston Ø 32/18, 40/25, 50/36 and 63/45 in each case with damping

= Position 2 and 4 not possible with:

- Piston Ø 25
- Piston Ø 32 to 100 mm with enlarged line connection, version 13 and 14

= Position 2 and 4 not possible with piston Ø 25

= Position 2 and 4 not possible with piston Ø 25 with enlarged line connection, version 13 and 14

= Position 2 and 4 not possible with:

- Piston Ø 25 to 200 mm with enlarged line connection, version 13 and 14
- Piston Ø 25, 32 and 40 with line connection, version 01 and 02
- Piston Ø 50/36 and 63/45 with damping

= Position 2 and 4 not possible with:

- Piston Ø 25 to 63 mm with enlarged line connection, version 13 and 14

Technical data

(For applications outside these parameters, please consult us!)

general		
Weight	kg	See page 92
Installation position		Any
Ambient temperature range	°C	–20 ... +80
Primer coat [1]	µm	Min. 40

hydraulic		
Nominal pressure	bar *[MPa]*	70 *[7]*
Maximum operating pressure [2] (depending on piston Ø and type of mounting)	bar *[MPa]*	105 *[10.5]*
Minimum operating pressure [3] (without load)	bar *[MPa]*	10 *[1]*
Static test pressure (depending on piston Ø and type of mounting)	bar *[MPa]*	Admissible operating pressure x 1.3
Hydraulic fluid		See table below
Hydraulic fluid temperature range	°C	–20 ... +80
Viscosity range	mm^2/s	12 ... 380 (preferably 20 ... 100)
Maximum admissible degree of contamination of the hydraulic fluid - cleanliness class according to ISO 4406 (c)		Class 20/18/15 [4]
Stroke speed (depending on line connection)	m/s	0.5
Bleeding		By default
Tolerances see page 86		

Hydraulic fluid	**Classification**	**Suitable sealing materials**	**Standards**
Mineral oils	HL, HLP	NBR, FKM	DIN 51524
Phosphate ester	HFDR	FKM	ISO 12922

1) By default, hydraulic cylinders are primed with a coating (color gentian blue RAL 5010) of min. 40 µm. Other colors upon request. With hydraulic cylinders and attachment parts, the following areas are not primed or coated:
   - ▶ All fit diameters to the customer side
   - ▶ Sealing surfaces for line connection
   - ▶ Sealing surfaces for flange connection
   - ▶ Inductive proximity switches

   The areas that are not painted are protected by means of a solvent-free corrosion protection agent.

2) If there are extreme loads, such as high sequence cycles, the mounting elements and threaded piston rod connections must be checked for the application.

3) A minimum operating pressure is required in order to guarantee good functioning of the hydraulic cylinder. Without load, a minimum pressure of 10 bar is recommended for differential cylinders; for lower pressures as well as double-acting cylinders, please contact us.

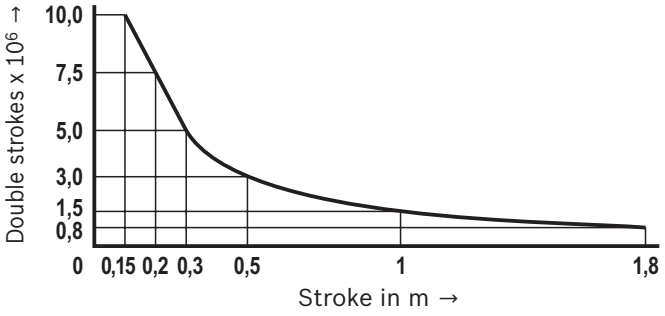
4) The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components.

Technical data

(For applications outside these parameters, please consult us!)

Life cycle:

Rexroth hydraulic cylinders correspond to the reliability recommendations for industrial applications.
≥ 10000000 double strokes in idle continuous operation or 3000 km piston travel at 70 % of the nominal pressure, without load on the piston rod, with a maximum velocity of 0.5 m/s, with a failure rate of less than 5 %.



☞ **Notice!**

Boundary and application conditions:

- The mechanical alignment of the movement axis and thus the mounting points of hydraulic cylinder and piston rod must be ensured. Lateral forces on the guides of piston rod and piston are to be avoided. It may be necessary to consider the own weight of the hydraulic cylinder (types of mounting: B, G, R, E or S) or the piston rod.
- The admissible stroke length/kinking load of the piston rod and/or the hydraulic cylinder must be observed (see page 82 to 85).
- The maximum admissible operating pressure must be complied with in any operating state of the hydraulic cylinder. Possible pressure intensification resulting from the ratio of annulus area to piston area and possible throttling points are to be observed.
- Detrimental environmental influences, like e.g. aggressive finest particles, vapors, high temperatures, etc. as well as contaminations and deterioration of the hydraulic fluid are to be avoided.

Standards:

Rexroth standard; the line connection threads are optionally designed as pipe thread according to ISO 228/1 or as metric ISO thread.

Acceptance:

Every hydraulic cylinder is tested according to Rexroth standard and complying with ISO 10100: 2001.

Safety instructions:

For assembly, commissioning and maintenance of hydraulic cylinders, observe the operating instructions 07100-B! Service and repair works have to be performed by Bosch Rexroth AG or by personnel especially trained for this purpose. In case of damage as a consequence of assembly, maintenance or repair work not performed by Bosch Rexroth AG, the warranty claim will be forfeited.

Check lists for hydraulic cylinders:

Hydraulic cylinders the characteristics and/or application parameters of which deviate from the values specified in the data sheet can only be offered as special version upon request. For offers, the deviations of the characteristics and/or application parameters must be described in the check lists for hydraulic cylinders (07200).

This list does not claim to be complete. In case of questions regarding the compatibility with media or exceedance of the boundary or application conditions, please contact us.

Project planning software ICS (Interactive Catalog System)

The ICS (Interactive Catalog System) is a selection and project planning aid for hydraulic cylinders. The ICS allows designers for machines and systems to quickly and reliably find the perfect hydraulic cylinder solution through logic-guided type code enquiries. This software helps to solve design and project planning tasks more quickly and efficiently. After having been guided through the product selection, the user quickly and reliably gets the exact technical data of the selected component as well as 2D and 3D CAD data in the correct file format for all common CAD systems.

Diameters, forces and areas

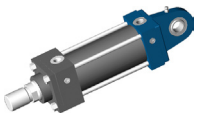
Operating pressure in bar	Piston Ø	mm	25		32			40			50		
	Piston rod Ø	mm	**12**	**16**	**18**	**22**	**25**	**16**	**18**	**25**	**22**	**25**	**36**
40	Force on piston side	kN	1.96		3.22			5.03			7.85		
	Force on rod side	kN	1.55	1.19	2.19	1.69	1.25	4.21	3.99	3.06	6.32	5.87	3.78
50	Force on piston side	kN	2.46		4.02			6.29			9.82		
	Force on rod side	kN	1.94	1.49	2.74	2.11	1.56	5.27	5.00	3.83	7.91	7.35	4.73
70	Force on piston side	kN	3.44		5.63			8.80			13.75		
	Force on rod side	kN	2.71	2.08	3.84	2.96	2.19	7.38	7.01	5.40	11.08	10.31	6.62
105	Force on piston side	kN	5.16		8.45			13.20			20.62		
	Force on rod side	kN	3.96	3.04	5.77	4.44	3.28	11.07	10.52	8.03	16.62	15.44	9.93
Piston area		cm^2	4.91		8.04			12.56			19.63		
Annulus area		cm^2	3.78	2.90	5.50	4.24	3.13	10.55	10.02	7.65	15.83	14.71	9.46
Area ratio		φ	1.25:1	1.6:1	1.4:1	2:1	2.5:1	1.2:1	1.25:1	1.6:1	1.25:1	1.35:1	2:1
Damping area	Force on piston side	cm^2	2.63		5.77			10.30			15.11		
	Force on rod side	cm^2	2.63	2.63	4.90	3.52	2.50	8.70	8.76	7.05	14.33	13.47	8.29
Max. available stroke length		mm	600		800			1000			1200		

Operating pressure in bar	Piston Ø	mm	63				80			100		
	Piston rod Ø	mm	**25**	**28**	**36**	**45**	**36**	**45**	**56**	**45**	**50**	**70**
40	Force on piston side	kN	12.47				20.10			31.42		
	Force on rod side	kN	10.49	9.99	8.38	6.00	16.02	13.73	10.25	25.04	23.55	16.01
50	Force on piston side	kN	15.59				25.10			39.27		
	Force on rod side	kN	13.12	12.50	10.49	7.62	20.03	17.16	12.80	31.29	29.43	20.02
70	Force on piston side	kN	21.82				35.18			54.98		
	Force on rod side	kN	18.36	17.50	14.68	10.68	28.04	24.03	17.93	43.80	41.20	28.01
105	Force on piston side	kN	–				–			–		
	Force on rod side	kN	–	–	–	–	–	–	–	–	–	–
Piston area		cm^2	31.16				50.24			78.50		
Annulus area		cm^2	26.25	25.01	20.98	15.26	40.07	34.34	25.62	62.60	58.88	40.04
Area ratio		φ	1.2:1	1.25:1	1.4:1	2:1	1.25:1	1.4:1	2:1	1.25:1	1.35:1	2:1
Damping area	Force on piston side	cm^2	26.65				40.64			58.90		
	Force on rod side	cm^2	23.13	23.13	19.80	13.08	37.70	30.60	20.07	58.90	54.70	31.97
Max. available stroke length		mm	1400				1700			2000		

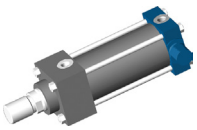
Operating pressure in bar	Piston Ø	mm	125				150				200		
	Piston rod Ø	mm	**50**	**56**	**63**	**90**	**63**	**70**	**80**	**100**	**90**	**100**	**140**
40	Force on piston side	kN	49.09				70.68				125.66		
	Force on rod side	kN	41.20	39.20	36.59	23.63	58.17	55.25	50.54	39.23	100.13	94.16	64.03
50	Force on piston side	kN	61.35				88.35				–		
	Force on rod side	kN	51.49	49.01	45.83	29.53	72.71	69.06	63.16	49.05	–	–	–
70	Force on piston side	kN	85.90				–				–		
	Force on rod side	kN	72.10	68.60	64.03	41.35	–	–	–	–	–	–	–
105	Force on piston side	kN	–				–				–		
	Force on rod side	kN	–	–	–	–	–	–	–	–	–	–	–
Piston area		cm^2	122.66				176.63				314.00		
Annulus area		cm^2	103.03	98.04	91.50	59.08	145.47	138.17	126.38	98.13	250.42	235.50	160.14
Area ratio		φ	1.2:1	1.25:1	1.35:1	2:1	1.2:1	1.25:1	1.4:1	1.8:1	1.25:1	1.35:1	2:1
Damping area	Force on piston side	cm^2	103.08				138.23				275.68		
	Force on rod side	cm^2	92.50	92.50	47.20	47.20	130.10	130.10	81.70	81.70	238.70	219.00	137.50
Max. available stroke length		mm	2300				2600				3000		

Overview types of mounting: Series CD70

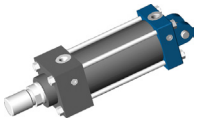
CD70 B
Page 12 ... 15



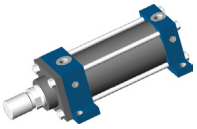
CD70 S
Page 44 ... 47



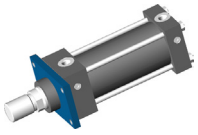
CD70 G
Page 16 ... 19



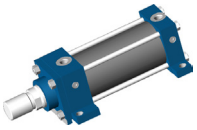
CD70 F
Page 48 ... 51



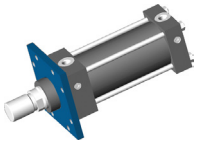
CD70 C
Page 20 ... 23



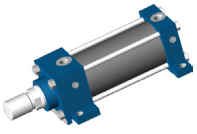
CD70 L
Page 52 ... 55



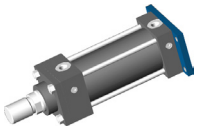
CD70 H
Page 24 ... 27



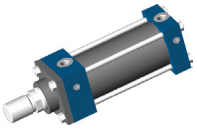
CD70 M
Page 56 ... 59



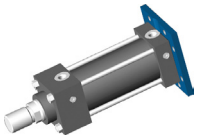
CD70 D
Page 28 ... 31



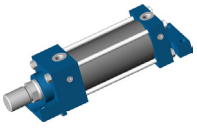
CD70 N
Page 60 ... 63



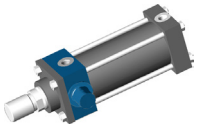
CD70 K
Page 32 ... 35



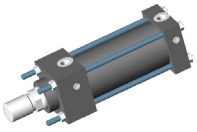
CD70 T
Page 64 ... 67



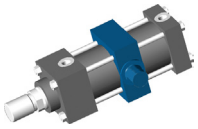
CD70 R
Page 36 ... 39



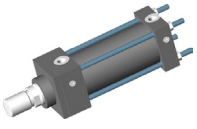
CD70 P
Page 68 ... 71



CD70 E
Page 40 ... 43

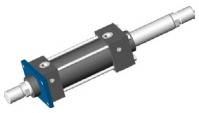


CD70 Q
Page 72 ... 75

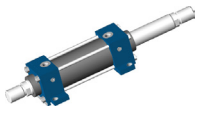


Overview types of mounting: Series CG70

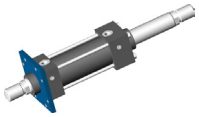
CG70 C
Page 20 ... 23



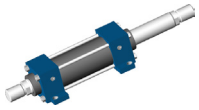
CG70 L
Page 52 ... 55



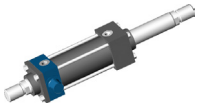
CG70 H
Page 24 ... 27



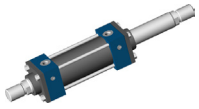
CG70 M
Page 56 ... 59



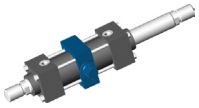
CG70 R
Page 36 ... 39



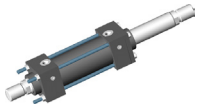
CG70 N
Page 60 ... 63



CG70 E
Page 40 ... 43



CG70 P
Page 68 ... 71



CG70 F
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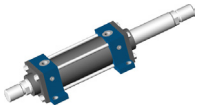
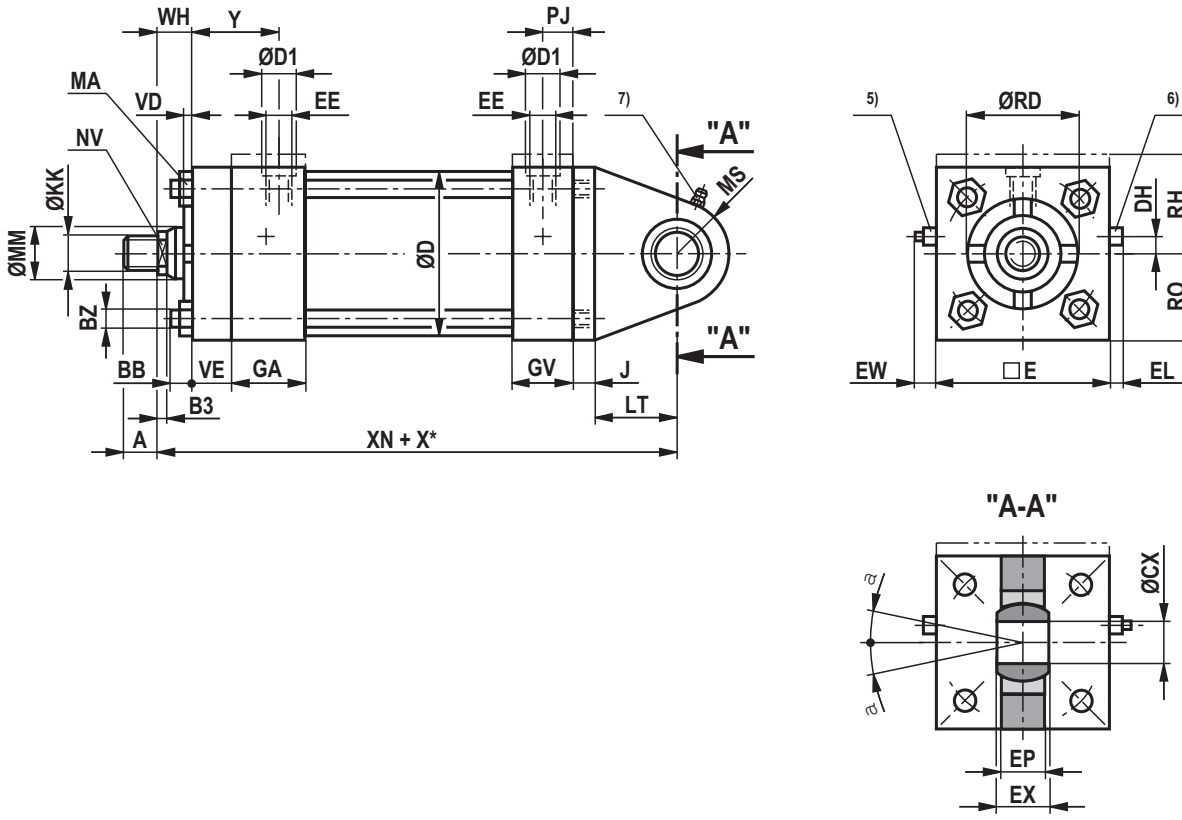


Dimensions: Type of mounting B (dimensions in mm)

Piston Ø 25 ... 63 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
25	12	105	M8x1.25	M10x1.5	M10	15	15
	16		M10x1.5	M12x1.5		19	
32	18	105	M10x1.5	M12x1.5	M12	19	18
	22		M16x1.5	M20x1.5		28	
	25		M20x1.5	M22x1.5			
40	16	105	M10x1.5	M12x1.5	M14	19	21
	18						
	25		M20x1.5	M22x1.5		28	
50	22	105	M16x1.5	M20x1.5	M20x1.5	28	30
	25		M20x1.5	M22x1.5			
	36		M26x1.5	M30x2		41	
63	25	70	M20x1.5	M22x1.5	M24x2	28	36
	28						
	36		M26x1.5	M30x2		41	
	45		M33x2	M39x2		51	

Dimensions: Type of mounting B (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	XN	J	LT	MS r	ØCX	RO	RH	DH
25	**12**	25.5	10	5.5	10	38	26	16	6.5	31	149	10	25	17	12	19	24 [1]	5
	16	28.5	13															
32	**18**	32	14	5.5	10	38	26	16	6	38	150	10	25	19	12	22.5	35.5 [2]	7
	22	34	19	8				25	13		159							
	25	38	22															
40	**16**	28.5	13	5.5	10	38	26	16	6	46	158	10	30	20	15	25.5	38.5 [3]	8
	18	32	14															
	25	38	22	8				25	13		167							
50	**22**	38	19	8	10	38	26	25	13	56	172	10	35	25	20	31.5	44.5 [3]	10
	25		22															
	36	50	30	10				32	16		179							
63	**25**	38	22	8	10	38	26	25	13	69	180	10	40	30	20	38	51 [3]	15
	28	42	24															
	36	50.7	30	10				32	16		187							
	45	60	41	12				38	19		193							

ØAL	ØMM	EE		ØD1 [4]		EW max.	□E	EL max.	Y	PJ	EP	EX	α	BB	BZ	M_A Nm
		Line connection														
		01	02	01	02											
25	**12**	G 1/4	M14x1.5	25	25	12	38	7	33	11	9	$10_{-0.12}$	10°	6	M5	5.5
	16															
32	**18**	G 1/4	M14x1.5	25	25	12	45	7	33	11	9	$10_{-0.12}$	10°	6	M5	5.5
	22															
	25															
40	**16**	G 1/4	M14x1.5	25	25	9	51	4	33	11	10	12_{-012}	8°	6	M5	5.5
	18															
	25															
50	**22**	G 1/4	M14x1.5	25	25	9	63	4	33	11	14	$16_{-0.12}$	9°	8	M8	23
	25															
	36															
63	**25**	G 1/4	M14x1.5	25	25	6	76	1	33	11	14	$16_{-0.12}$	9°	8	M8	23
	28															
	36															
	45															

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Raised cylinder head and base

2) Raised cylinder head except for Ø 32/18 with end position cushioning "U" or "K"

3) Raised cylinder head for: Ø 40/25; Ø 50/36 and Ø 63/45 with end position cushioning "D" or "S"

4) ØD1 max. 0.5 mm deep

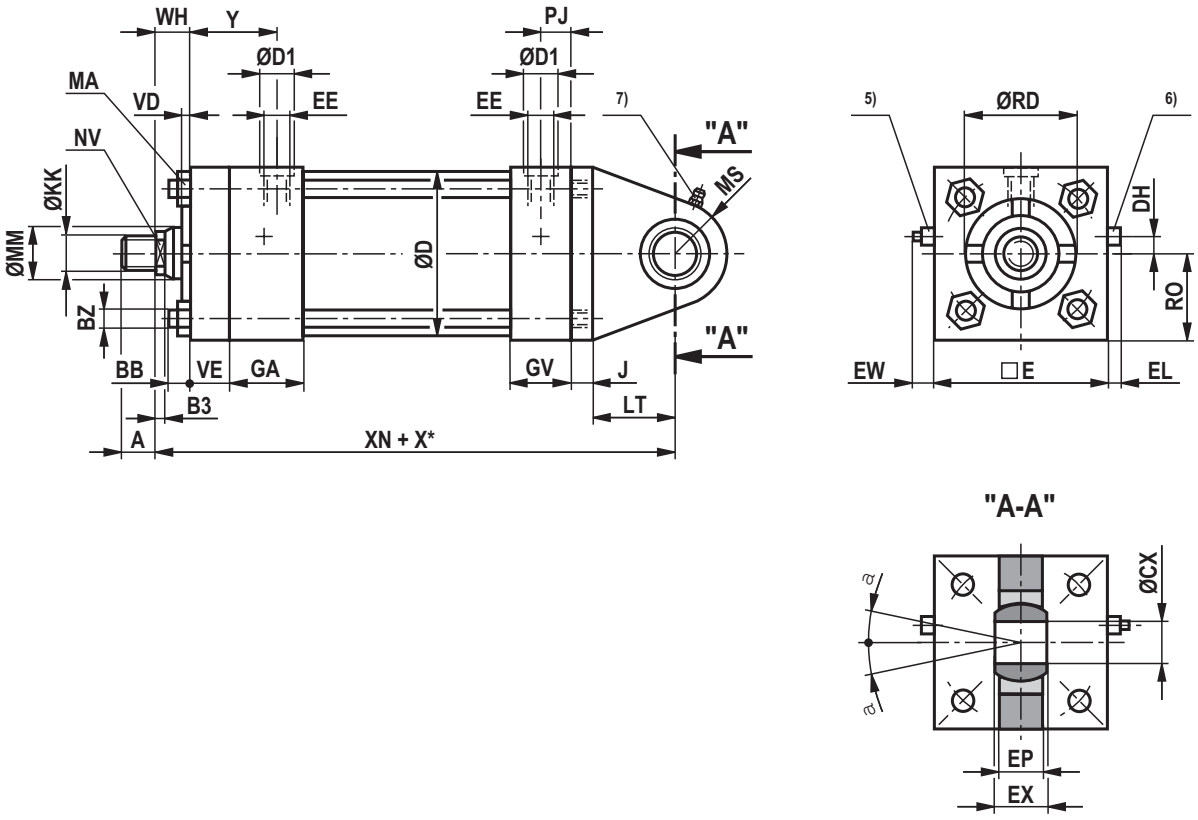
5) Adjustable throttle valve for the end position cushioning

6) Check valve and bleeding

7) Lubricating nipple, cone head form A according to DIN 71412

Dimensions: Type of mounting B (dimensions in mm)

Piston Ø 80 ... 200 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
80	36	70	M26x1.5	M30x2	M30x2	41	45
	45		M33x2	M39x2		51	
	56		M39x2	M45x2		57	
100	45	70	M33x2	M39x2	M39x3	51	65
	50		M39x2	M45x2		57	
	70		M48x2	M56x2		76	
125	50	70	M39x2	M45x2	M42x3	57	65
	56						
	63		M48x2	M56x2		76	
	90		M64x2	M76x2		89	
150	63	50	M48x2	M56x2	M45x3	76	68
	70						
	80		M58x2	M68x2		89	
	100		M76x2	M95x2		101	
200	90	40	M64x2	M76x2	M52x3	89	70
	100		M76x2	M95x2		101	
	140		M100x2	M130x2		140	

Dimensions: Type of mounting B (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	XN	J	LT	MS r	ØCX	RO	DH
80	**36**	50	30	10	16	45	33	25	10	86	209	15	45	35	25	47.5	15
	45	60	41	12				32	13		216						
	56	70	46	15				35			219						
100	**45**	60	41	12	16	45	33	32	13	106	226	15	55	42	25	57	20
	50	66.6	46	15				35			229						
	70	90	60					41	16		235						
125	**50**	66.6	46	15	16	45	33	35	13	135	245	15	65	55	30	70	30
	56	70															
	63	79.3	55					41	16		251						
	90	108	75														
150	**63**	79.3	55	15	19	51	40	38	13	160	284	20	80	70	35	82.5	35
	70	90	60														
	80	95.2	75														
	100	120	85														
200	**90**	108	75	15	19	51	40	38	13	215	307	25	95	80	45	108	55
	100	120	85														
	140	158	120														

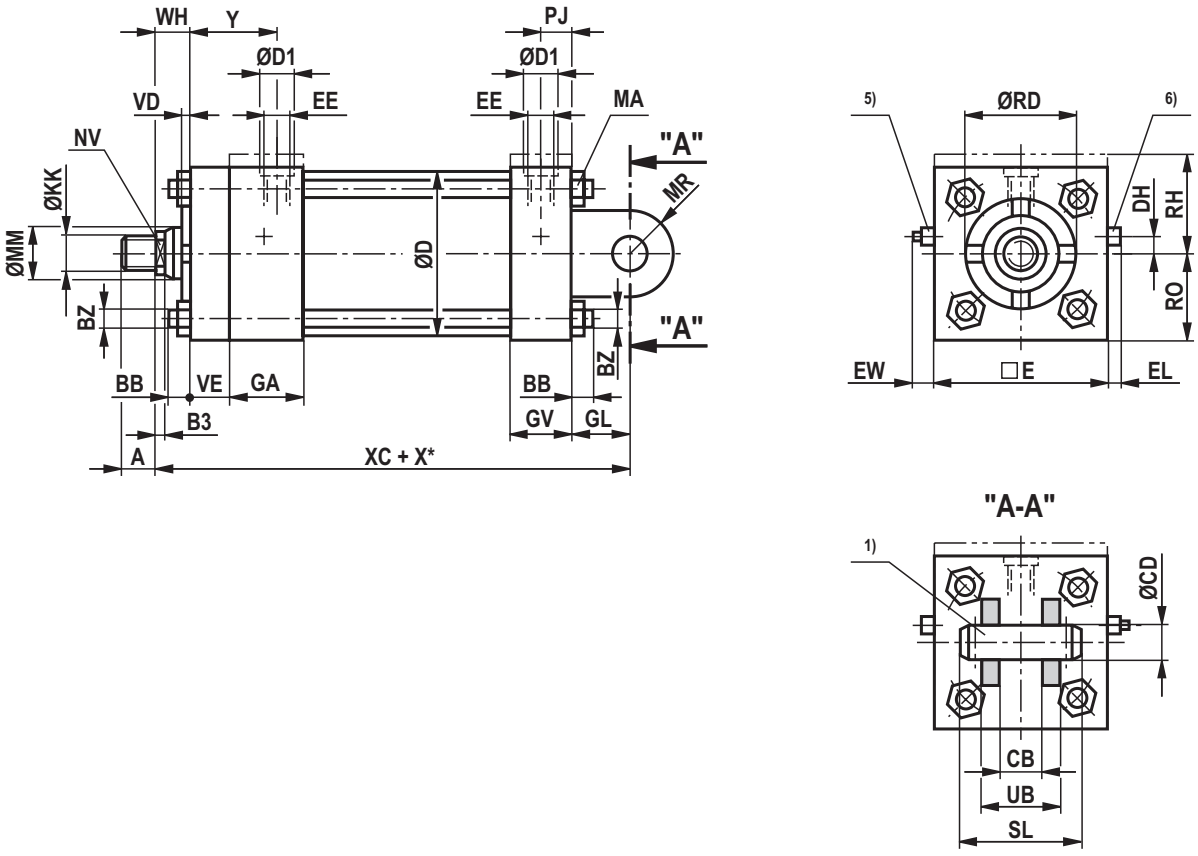
ØAL	ØMM	EE		ØD1 [4]		EW max.	□E	EL max.	Y	PJ	EP	EX	α	BB	BZ	M_A Nm
		Line connection														
		01	**02**	**01**	**02**											
80	**36**	G 1/2	M22x1.5	34	34	12	95	11	42	14.5	18	20 $^{-0.18}$	7°	10	M10	46
	45															
	56															
100	**45**	G 1/2	M22x1.5	34	34	9	114	8	42	14.5	18	20 $^{-0.18}$	7°	12	M12	80
	50															
	70															
125	**50**	G 1/2	M22x1.5	34	34	9	140	8	42	14.5	20	22 $^{-0.18}$	6°	13	M14	125
	56															
	63															
	90															
150	**63**	G 3/4	M26x1.5	42	42	16	165	12	48	18	23	25 $^{-0.12}$	6°	15	M16	23
	70															
	80															
	100															
200	**90**	G 3/4	M26x1.5	42	42	14	216	10	48	18	30	32 $^{-0.12}$	6°	15	M16	195
	100															
	140															

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

[4] ØD1 max. 0.5 mm deep
[5] Adjustable throttle valve for the end position cushioning
[6] Check valve and bleeding
[7] Lubricating nipple, cone head form A according to DIN 71412

Dimensions: Type of mounting G (dimensions in mm)

Piston Ø 25 ... 63 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
25	12	–	–	–	–	–	–
	16						
32	18	105	M10x1.5	M12x1.5	M12	19	18
	22		M16x1.5	M20x1.5		28	
	25		M20x1.5	M22x1.5			
40	16	105	M10x1.5	M12x1.5	M14	19	21
	18						
	25		M20x1.5	M22x1.5		28	
50	22	105	M16x1.5	M20x1.5	M20x1.5	28	30
	25		M20x1.5	M22x1.5			
	36		M26x1.5	M30x2		41	
63	25	70	M20x1.5	M22x1.5	M24x2	28	36
	28						
	36		M26x1.5	M30x2		41	
	45		M33x2	M39x2		51	

Dimensions: Type of mounting G (dimensions in mm)

ØAL	ØMM	ØRD	NV	B3	VE	GA	GV	WH	VD	ØD	GL	XC	MR r	ØCD H7 f7	RO	RH	DH
25	**12**	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	16																
32	**18**	32	14	5.5	10	38	26	16	6	38	19	134	11	12.7	22.5	35.5 [2]	7
	22	34	19	8				25	13			143					
	25	38	22														
40	**16**	28.5	13	5.5	10	38	26	16	6	46	19	137	12	12.7	25.5	38.5 [3]	8
	18	32	14														
	25	38	22	8				25	13			146					
50	**22**	38	19	8	10	38	26	25	13	56	19	146	16	12.7	31.5	44.5 [3]	10
	25		22														
	36	50	30	10				32	16			153					
63	**25**	38	22	8	10	38	26	25	13	69	19	149	16	12.7	38	51 [3] +1.4	15
	28	42	24														
	36	50.7	30	10				32	16			156					
	45	60	41	12				38	19			162					

ØAL	ØMM	EE		ØD1 [4]		EW max.	□E	EL max.	Y	PJ	CB +0.5	UB	SL	BB	BZ	M_A Nm
		Line connection														
		01	02	01	02											
25	**12**	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	16															
32	**18**	G 1/4	M14x1.5	25	25	12	45	7	33	11	20	40	52	6	M5	5.5
	22															
	25															
40	**16**	G 1/4	M14x1.5	25	25	9	51	4	33	11	20	44	56	6	M5	5.5
	18															
	25															
50	**22**	G 1/4	M14x1.5	25	25	9	63	4	33	11	20	44	56	8	M8	23
	25															
	36															
63	**25**	G 1/4	M14x1.5	25	25	6	76	1	33	11	20	44	56	8	M8	23
	28															
	36															
	45															

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Bolts and pins are included in the scope of delivery

2) Raised cylinder head except for Ø 32/18 with end position cushioning "U" or "K"

3) Raised cylinder head for: Ø 40/25; Ø 50/36 and Ø 63/45 with end position cushioning "D" or "S"

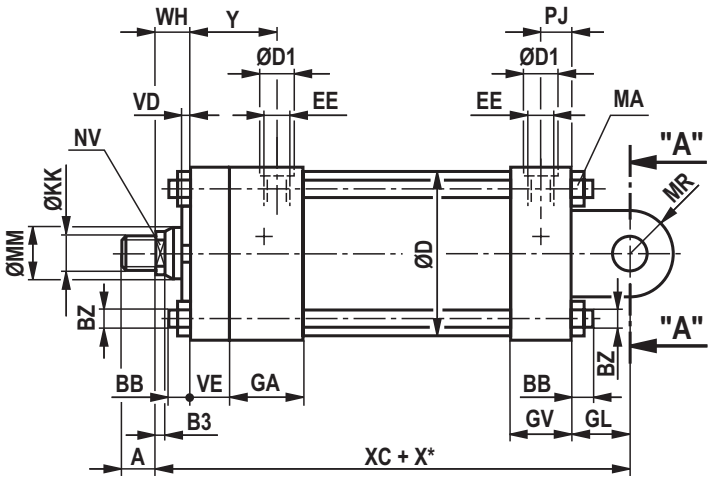
4) ØD1 max. 0.5 mm deep

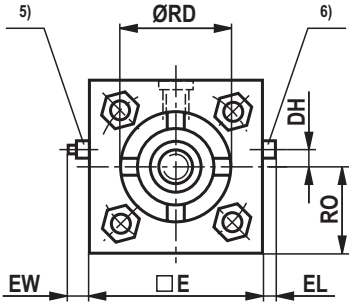
5) Adjustable throttle valve for the end position cushioning

6) Check valve and bleeding

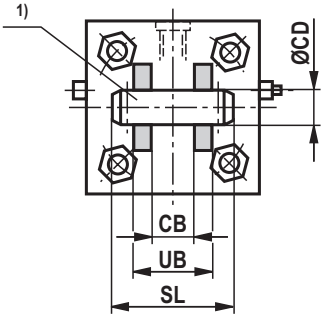
Dimensions: Type of mounting G (dimensions in mm)

Piston Ø 80 ... 200 mm





"A-A"



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
80	36	70	M26x1.5	M30x2	M30x2	41	45
	45		M33x2	M39x2		51	
	56		M39x2	M45x2		57	
100	45	70	M33x2	M39x2	M39x3	51	65
	50		M39x2	M45x2		57	
	70		M48x2	M56x2		76	
125	50	70	M39x2	M45x2	M42x3	57	65
	56						
	63		M48x2	M56x2		76	
	90		M64x2	M76x2		89	
150	63	50	M48x2	M56x2	M45x3	76	68
	70						
	80		M58x2	M68x2		89	
	100		M76x2	M95x2		101	
200	90	40	M64x2	M76x2	M52x3	89	70
	100		M76x2	M95x2		101	
	140		M100x2	M130x2		140	

Dimensions: Type of mounting G (dimensions in mm)

ØAL	ØMM	ØRD	NV	B3	VE	GA	GV	WH	VD	ØD	GL	XC	MR r	ØCD H7 f7	RO	DH
80	**36**	50	30	10	16	45	33	25	10	86	32	181	24	19.1	47.5	15
	45	60	41	12				32	13			188				
	56	70	46	15				35				191				
100	**45**	60	41	12	16	45	33	32	13	106	32	188	24	19.1	57	20
	50	66.6	46	15				35				191				
	70	90	60					41	16			197				
125	**50**	66.6	46	15	16	45	33	35	13	135	32	197	24	19.1	70	30
	56	70														
	63	79.3	55					41	16			203				
	90	108	75													
150	**63**	79.3	55	15	19	51	40	38	13	160	38	222	30	25.4	82.5	35
	70	90	60													
	80	95.2	75													
	100	120	85													
200	**90**	108	75	15	19	51	40	38	13	215	38	225	30	25.4	108	55
	100	120	85													
	140	158	120													

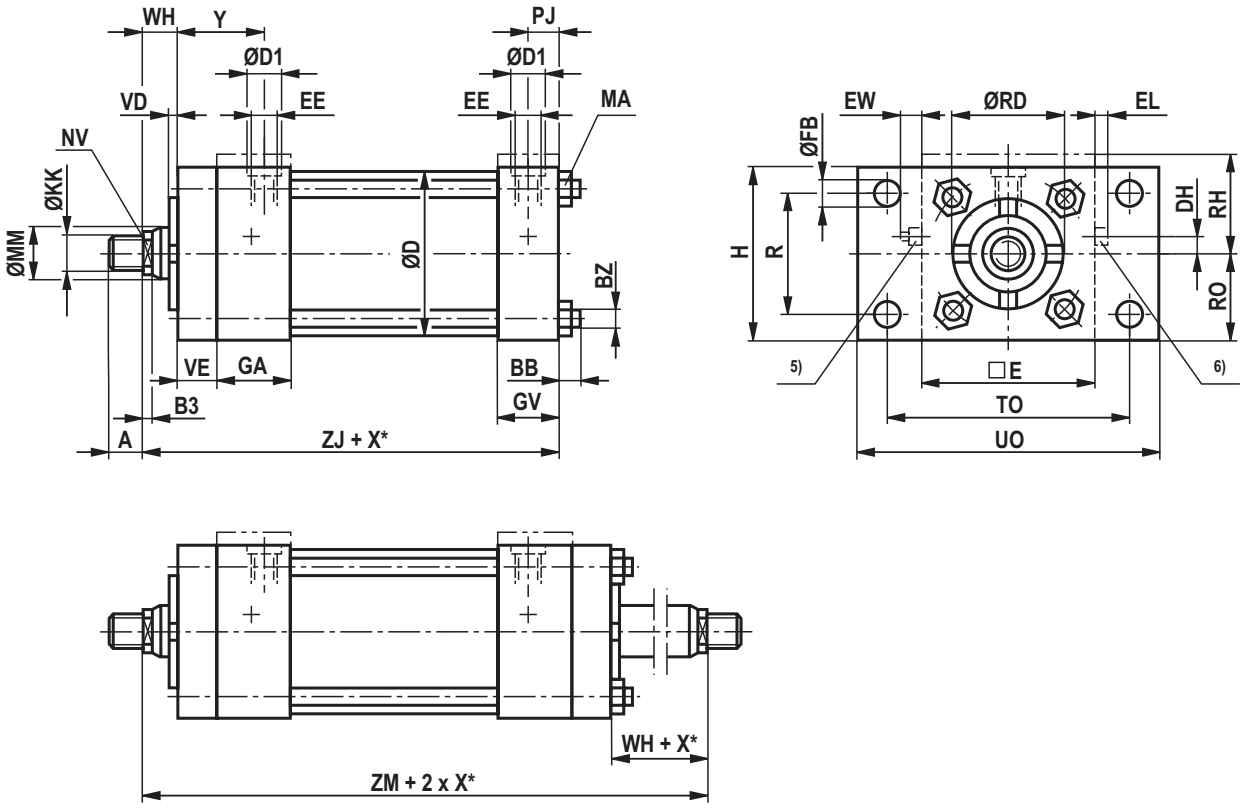
ØAL	ØMM	EE		ØD1 [4]		EW max.	⊡E	EL max.	Y	PJ	CB +0.5	UB	SL	BB	BZ	M_A Nm
		Line connection														
		01	02	01	02											
80	**36**	G 1/2	M22x1.5	34	34	12	95	11	42	14.5	33	65	77	10	M10	46
	45															
	56															
100	**45**	G 1/2	M22x1.5	34	34	9	114	8	42	14.5	33	65	77	12	M12	80
	50															
	70															
125	**50**	G 1/2	M22x1.5	34	34	9	140	8	42	14.5	33	65	77	13	M14	125
	56															
	63															
	90															
150	**63**	G 3/4	M26x1.5	42	42	16	140	12	48	18	40	80	92	15	M16	195
	70															
	80															
	100															
200	**90**	G 3/4	M26x1.5	42	42	14	216	10	48	18	40	80	92	15	M16	195
	100															
	140															

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

[1] Bolts and pins are included in the scope of delivery
[4] ØD1 max. 0.5 mm deep
[5] Adjustable throttle valve for the end position cushioning
[6] Check valve and bleeding

Dimensions: Type of mounting C (dimensions in mm)

Piston Ø 25 ... 63 mm



ØAL	ØMM	Operating pressure in bar		KK			A	
		Head side	Base side	Piston rod end				
				C, E	B	F	C, E, B	F
25	12	105	40	M8x1.25	M10x1.5	M10	15	15
	16			M10x1.5	M12x1.5		19	
32	18	105	45	M10x1.5	M12x1.5	M12	19	18
	22		25	M16x1.5	M20x1.5		28	
	25			M20x1.5	M22x1.5			
40	16	105	45	M10x1.5	M12x1.5	M14	19	21
	18							
	25		25	M20x1.5	M22x1.5		28	
50	22	105	25	M16x1.5	M20x1.5	M20x1.5	28	30
	25			M20x1.5	M22x1.5			
	36		15	M26x1.5	M30x2		41	
63	25	70	20	M20x1.5	M22x1.5	M24x2	28	36
	28							
	36		10	M26x1.5	M30x2		41	
	45			M33x2	M39x2		51	

Dimensions: Type of mounting C (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	ZM	RO	RH	DH	H	R
25	**12**	25.5	10	5.5	10	38	26	16	6.5	31	114	152	19	24 [1]	5	38	27.5
	16	28.5	13														
32	**18**	32	14	5.5	10	38	26	16	6	38	115	153	22.5	35.5 [2]	7	45	32
	22	34	19	8				25	13		124	171					
	25	38	22														
40	**16**	28.5	13	5.5	10	38	26	16	6	46	118	156	25.5	38.5 [3]	8	51	36.5
	18	32	14														
	25	38	22	8				25	13		127	174					
50	**22**	38	19	8	10	38	26	25	13	56	127	174	31.5	44.5 [3]	10	63	46.5
	25		22														
	36	50	30	10				32	16		134	188					
63	**25**	38	22	8	10	38	26	25	13	69	130	177	38	51 [3]	15	76	55.5
	28	42	24														
	36	50.7	30	10				32	16		137	191					
	45	60	41	12				38	19		143	203					

ØAL	ØMM	EE		ØD1 [4]		EW max.	□E	EL max.	Y	PJ	TO	UO	ØFB	BB	BZ	M_A Nm	X* [7] min.
		Line connection															
		01	02	01	02												
25	**12**	G 1/4	M14x1.5	25	25	12	38	7	33	11	51	63	6.5	6	M5	5.5	25
	16																
32	**18**	G 1/4	M14x1.5	25	25	12	45	7	33	11	63	80	8.5	6	M5	5.5	25
	22																
	25																
40	**16**	G 1/4	M14x1.5	25	25	9	51	4	33	11	70	85	8.5	6	M5	5.5	25
	18																
	25																
50	**22**	G 1/4	M14x1.5	25	25	9	63	4	33	11	85.5	105	9.5	8	M8	23	30
	25																
	36																
63	**25**	G 1/4	M14x1.5	25	25	6	76	1	33	11	98.5	115	9.5	8	M8	23	30
	28																
	36																
	45																

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Raised cylinder head and base

2) Raised cylinder head except for Ø 32/18 with end position cushioning "U" or "K"

3) Raised cylinder head for: Ø 40/25; Ø 50/36 and Ø 63/45 with end position cushioning "D" or "S"

4) ØD1 max. 0.5 mm deep

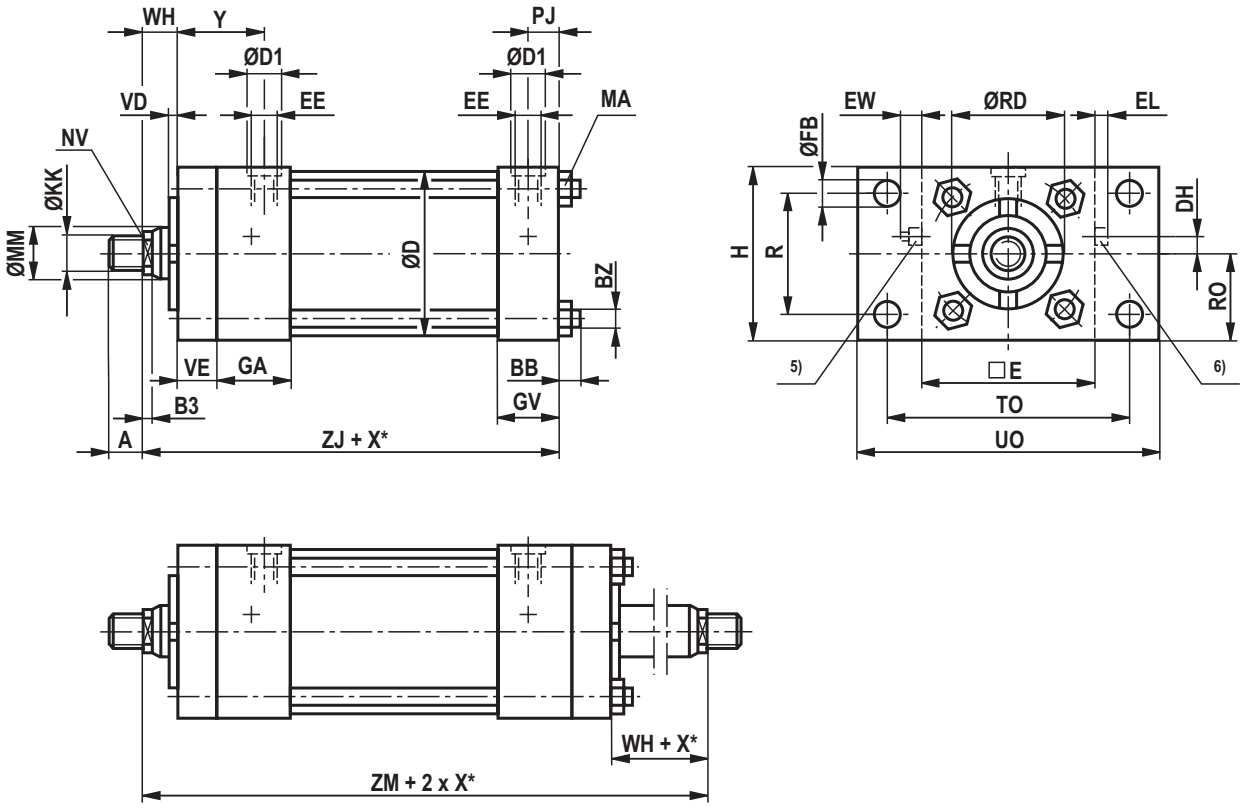
5) Adjustable throttle valve for the end position cushioning

6) Check valve and bleeding

7) Only with piston rod end "E" with double-acting cylinders

Dimensions: Type of mounting C (dimensions in mm)

Piston Ø 80 ... 200 mm



ØAL	ØMM	Operating pressure in bar		KK			A	
		Head side	Base side	Piston rod end				
				C, E	B	F	C, E, B	F
80	36	70	30	M26x1.5	M30x2	M30x2	41	45
	45			M33x2	M39x2		51	
	56		25	M39x2	M45x2		57	
100	45	70	25	M33x2	M39x2	M39x3	51	65
	50			M39x2	M45x2		57	
	70		15	M48x2	M56x2		76	
125	50	70	15	M39x2	M45x2	M42x3	57	65
	56							
	63		10	M48x2	M56x2		76	
	90			M64x2	M76x2		89	
150	63	50	20	M48x2	M56x2	M45x3	76	68
	70							
	80		15	M58x2	M68x2		89	
	100			M76x2	M95x2		101	
200	90	–	–	–	–	–	–	–
	100							
	140							

Dimensions: Type of mounting C (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	ZM	RO	DH	H	R
80	**36**	50	30	10	16	45	33	25	10	86	149	202	47.5	15	95	70
	45	60	41	12				32	13		156	216				
	56	70	46	15				35			159	222				
100	**45**	60	41	12	16	45	33	32	13	106	156	216	57	20	114	84.5
	50	66.6	46	15				35			159	222				
	70	90	60					41	16		165	234				
125	**50**	66.6	46	15	16	45	33	35	13	135	165	228	70	30	140	104
	56	70														
	63	79.3	55					41	16		171	240				
	90	108	75													
150	**63**	79.3	55	15	19	51	40	38	13	160	184	252	82.5	35	165	124
	70	90	60													
	80	95.2	75													
	100	120	85													
200	**90**	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	100															
	140															

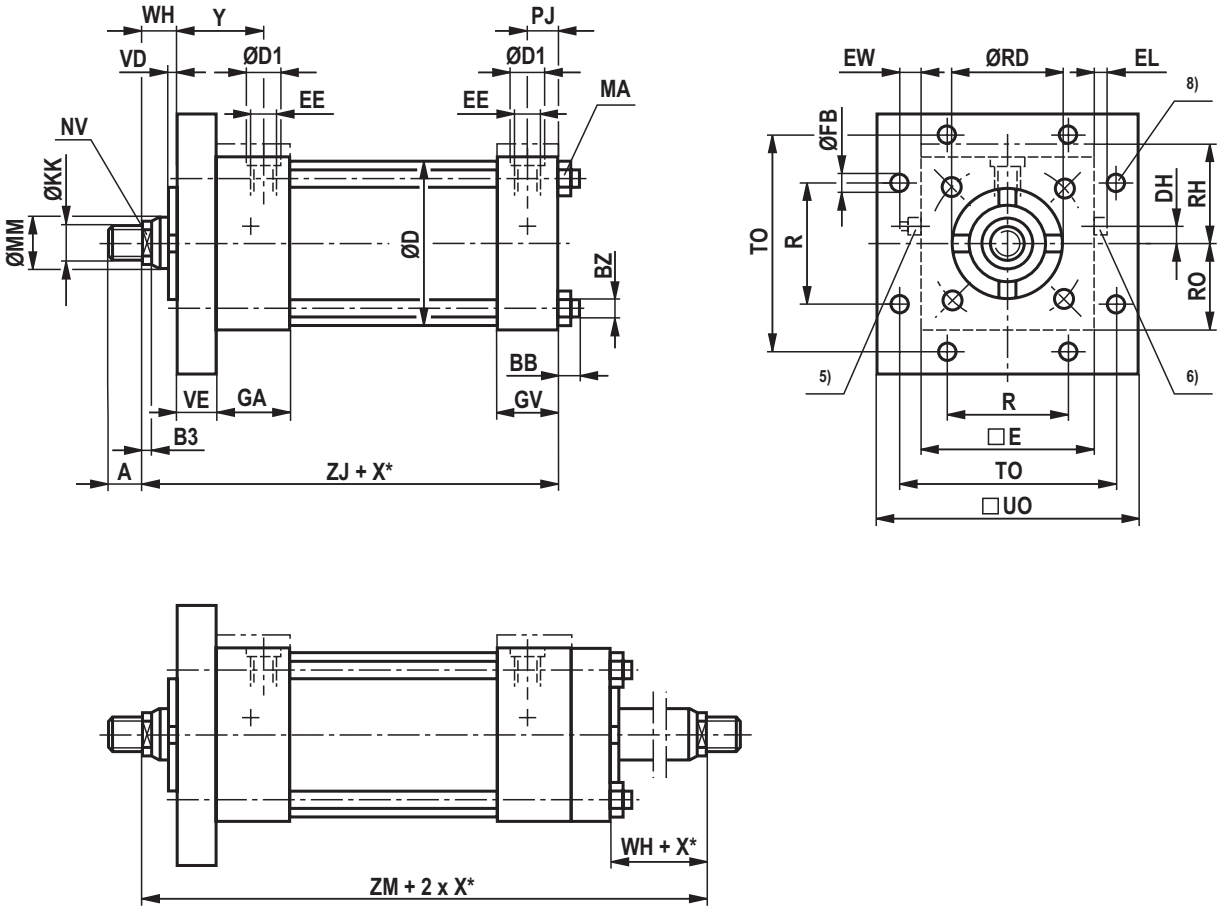
ØAL	ØMM	EE		ØD1 [4]		EW max.	□E	EL max.	Y	PJ	TO	UO	ØFB	BB	BZ	M_A Nm	X* [7] min.
		Line connection															
		01	02	01	02												
80	**36**	G 1/2	M22x1.5	34	34	12	95	11	42	14.5	119	140	11	10	M10	46	30
	45																
	56																
100	**45**	G 1/2	M22x1.5	34	34	9	114	8	42	14.5	138	160	11	12	M12	80	45
	50																
	70																
125	**50**	G 1/2	M22x1.5	34	34	9	140	8	42	14.5	168	195	14	13	M14	125	55
	56																
	63																
	90																
150	**63**	G 3/4	M26x1.5	42	42	16	165	12	48	18	193.5	220	14	15	M16	195	75
	70																
	80																
	100																
200	**90**	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	100																
	140																

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

[4] ØD1 max. 0.5 mm deep
[5] Adjustable throttle valve for the end position cushioning
[6] Check valve and bleeding
[7] Only with piston rod end "E" with double-acting cylinders

Dimensions: Type of mounting H (dimensions in mm)

Piston Ø 25 ... 63 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
25	12	105	M8x1.25	M10x1.5	M10	15	15
	16		M10x1.5	M12x1.5		19	
32	18	105	M10x1.5	M12x1.5	M12	19	18
	22		M16x1.5	M20x1.5		28	
	25		M20x1.5	M22x1.5			
40	16	105	M10x1.5	M12x1.5	M14	19	21
	18						
	25		M20x1.5	M22x1.5		28	
50	22	105	M16x1.5	M20x1.5	M20x1.5	28	30
	25		M20x1.5	M22x1.5			
	36		M26x1.5	M30x2		41	
63	25	70	M20x1.5	M22x1.5	M24x2	28	36
	28						
	36		M26x1.5	M30x2		41	
	45		M33x2	M39x2		51	

Dimensions: Type of mounting H (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	ZM	RO	RH	DH	R
25	**12**	25.5	10	5.5	10	38	26	16	6.5	31	114	152	19	24 [1]	5	27.5
	16	28.5	13													
32	**18**	32	14	5.5	10	38	26	16	6	38	115	153	22.5	35.5 [2]	7	32
	22	34	19	8				25	13		124	171				
	25	38	22													
40	**16**	28.5	13	5.5	10	38	26	16	6	46	118	156	25.5	38.5 [3]	8	36.5
	18	32	14	8												
	25	38	22					25	13		127	174				
50	**22**	38	19	8	10	38	26	25	13	56	127	174	31.5	44.5 [3]	10	46.5
	25		22													
	36	50	30	10				32	16		134	188				
63	**25**	38	22	8	10	38	26	25	13	69	130	177	38	51 [3]	15	55.5
	28	42	24													
	36	50.7	30	10				32	16		137	191				
	45	60	41	12				38	19		143	203				

ØAL	ØMM	EE		ØD1 [4]		EW max.	□E	EL max.	Y	PJ	TO	□UO	ØFB	BB	BZ	M_A Nm	X* [7] min.
		Line connection															
		01	02	01	02												
25	**12**	G 1/4	M14x1.5	25	25	12	38	7	33	11	51	63	6.5	6	M5	5.5	25
	16																
32	**18**	G 1/4	M14x1.5	25	25	12	45	7	33	11	63	80	8.5	6	M5	5.5	25
	22																
	25																
40	**16**	G 1/4	M14x1.5	25	25	9	51	4	33	11	70	85	8.5	6	M5	5.5	25
	18																
	25																
50	**22**	G 1/4	M14x1.5	25	25	9	63	4	33	11	85.5	105	9.5	8	M8	23	30
	25																
	36																
63	**25**	G 1/4	M14x1.5	25	25	6	76	1	33	11	98.5	115	9.5	8	M8	23	30
	28																
	36																
	45																

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Raised cylinder head and base

2) Raised cylinder head except for Ø 32/18 with end position cushioning "U" or "K"

3) Raised cylinder head for: Ø 40/25; Ø 50/36 and Ø 63/45 with end position cushioning "D" or "S"

4) ØD1 max. 0.5 mm deep

5) Adjustable throttle valve for the end position cushioning

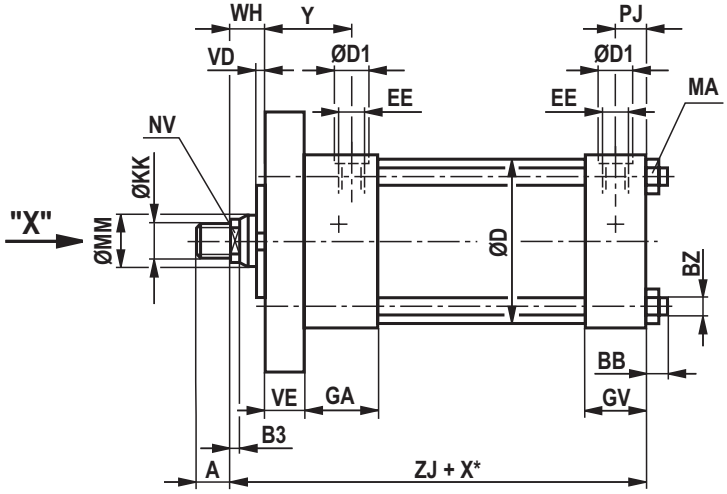
6) Check valve and bleeding

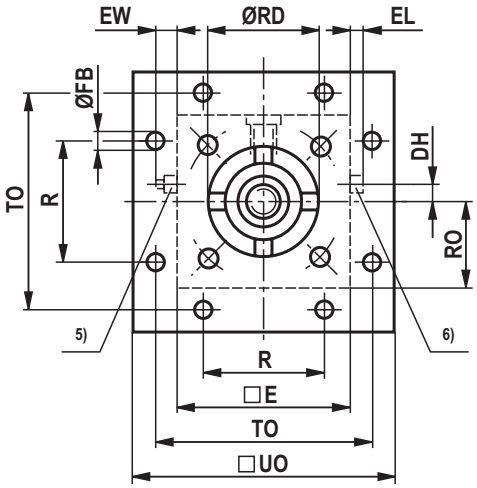
7) Only with piston rod end "E" with double-acting cylinders

8) 6 usable mounting bores: With raised cylinder head. With piston Ø 32 and 40 mm with line connection 13 or 14.

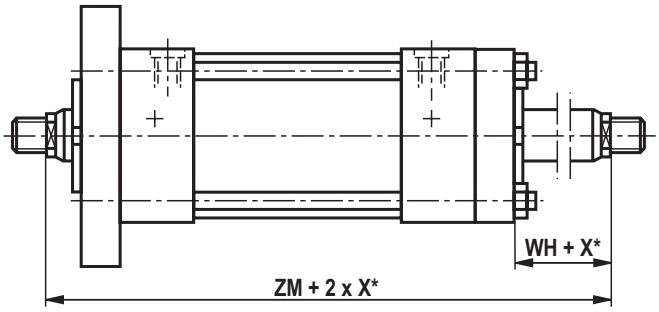
Dimensions: Type of mounting H (dimensions in mm)

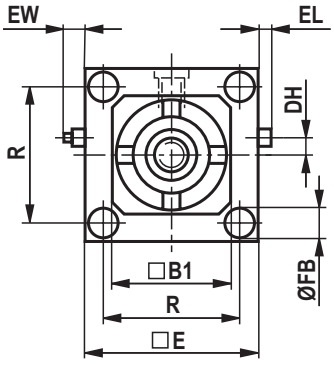
Piston Ø 80 ... 200 mm





View "X" Only for piston Ø 200 mm





ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
80	36	70	M26x1.5	M30x2	M30x2	41	45
	45		M33x2	M39x2		51	
	56		M39x2	M45x2		57	
100	45	70	M33x2	M39x2	M39x3	51	65
	50		M39x2	M45x2		57	
	70		M48x2	M56x2		76	
125	50	70	M39x2	M45x2	M42x3	57	65
	56						
	63		M48x2	M56x2		76	
	90		M64x2	M76x2		89	
150	63	50	M48x2	M56x2	M45x3	76	68
	70						
	80		M58x2	M68x2		89	
	100		M76x2	M95x2		101	
200	90	40	M64x2	M76x2	M52x3	89	70
	100		M76x2	M95x2		101	
	140		M100x2	M130x2		140	

Dimensions: Type of mounting H
(dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	ZM	RO	RH	DH	R
80	**36**	50	30	10	16	45	33	25	10	86	149	202	47.5	–	15	70
	45	60	41	12				32	13		156	216				
	56	70	46	15				35			159	222				
100	**45**	60	41	12	16	45	33	32	13	106	156	216	57	–	20	84.5
	50	66.6	46	15				35			159	222				
	70	90	60					41	16		165	134				
125	**50**	66.6	46	15	16	45	33	35	16	135	165	228	70	–	30	104
	56	70														
	63	79.3	55					41			171	240				
	90	108	75													
150	**63**	79.3	55	15	19	51	40	38	13	160	184	252	82.5	–	35	124
	70	90	60													
	80	95.2	75													
	100	120	85													
200	**90**	108	75	15	19	51	40	38	13	215	187	255	108	–	55	192.5
	100	120	85													
	140	158	120													

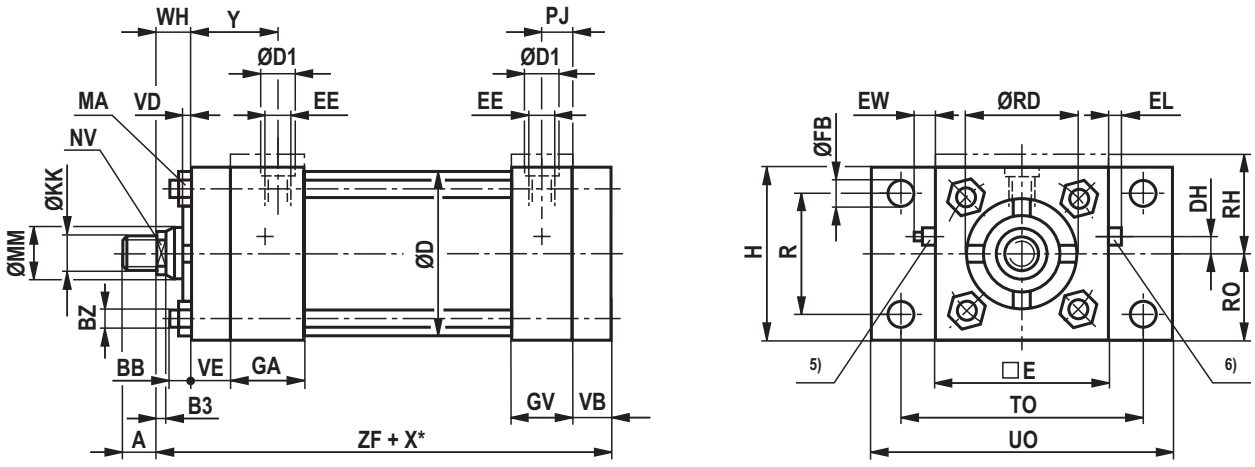
ØAL	ØMM	EE		ØD1 [4]		EW max.	□E	EL max.	Y	PJ	TO	□UO	ØFB	BB	BZ	□B1	M_A Nm	X* [7] min.
		Line connection																
		01	02	01	02													
80	**36**	G 1/2	M22x1.5	34	34	12	95	11	42	14.5	119	140	11	10	M10	–	46	30
	45																	
	56																	
100	**45**	G 1/2	M22x1.5	34	34	9	114	8	42	14.5	138	160	11	12	M12	–	80	45
	50																	
	70																	
125	**50**	G 1/2	M22x1.5	34	34	9	140	8	42	14.5	168	195	14	13	M14	–	125	55
	56																	
	63																	
	90																	
150	**63**	G 3/4	M26x1.5	42	42	16	165	12	48	18	193.5	220	14	15	M16	–	195	75
	70																	
	80																	
	100																	
200	**90**	G 3/4	M26x1.5	42	42	14	216	10	48	18	192.5	–	17.5	15	M16	140	195	115
	100																	
	140															178		

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

[4] ØD1 max. 0.5 mm deep
[5] Adjustable throttle valve for the end position cushioning
[6] Check valve and bleeding
[7] Only with piston rod end "E" with double-acting cylinders

Dimensions: Type of mounting D (dimensions in mm)

Piston Ø 25 ... 63 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
25	12	105	M8x1.25	M10x1.5	M10	15	15
	16		M10x1.5	M12x1.5		19	
32	18	105	M10x1.5	M12x1.5	M12	19	18
	22		M16x1.5	M20x1.5		28	
	25		M20x1.5	M22x1.5			
40	16	105	M10x1.5	M12x1.5	M14	19	21
	18						
	25		M20x1.5	M22x1.5		28	
50	22	105	M16x1.5	M20x1.5	M20x1.5	28	30
	25		M20x1.5	M22x1.5			
	36		M26x1.5	M30x2		41	
63	25	70	M20x1.5	M22x1.5	M24x2	28	36
	28						
	36		M26x1.5	M30x2		41	
	45		M33x2	M39x2		51	

Dimensions: Type of mounting D
(dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	VB	ZF	RO	RH	DH	H	R
25	**12**	25.5	10	5.5	10	38	26	16	6.5	31	10	124	19	24 [1]	5	38	27.5
	16	28.5	13														
32	**18**	32	14	5.5	10	38	26	16	6	38	10	125	22.5	35.5 [2]	7	45	32
	22	34	19	8				25	13			134					
	25	38	22														
40	**16**	28.5	13	5.5	10	38	26	16	6	46	9	127	25.5	38.5 [3]	8	51	36.5
	18	32	14														
	25	38	22	8				25	13			136					
50	**22**	38	19	8	10	38	26	25	13	56	9	136	31.5	44.5 [3]	10	63	46.5
	25		22														
	36	50	30	10				32	16			143					
63	**25**	28	22	8	10	38	26	25	13	69	10	140	38	51 [3]	15	76	55.5
	28	42	24														
	36	50.7	30	10				32	16			147					
	45	60	41	12				38	19			153					

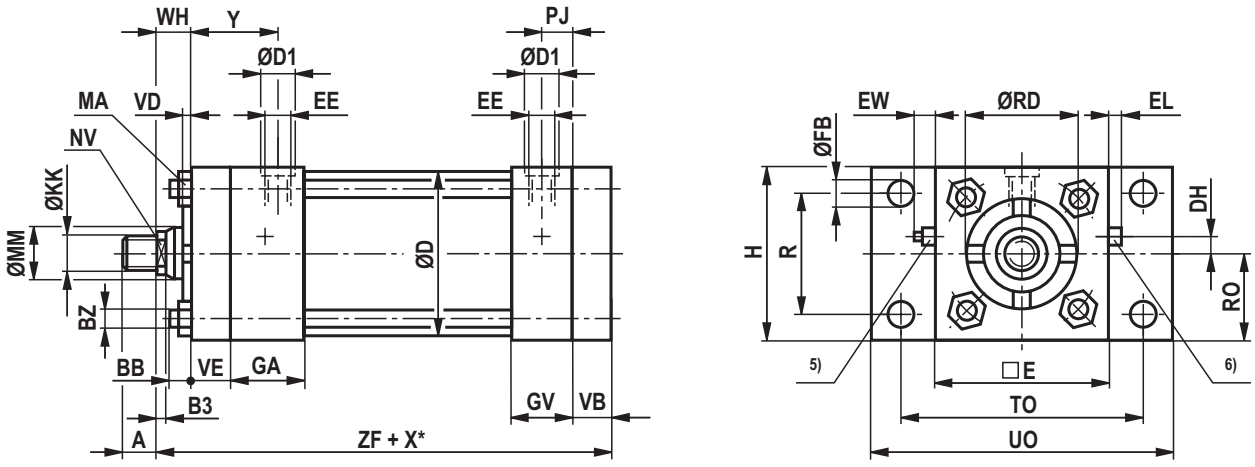
ØAL	ØMM	EE		ØD1 [4]		EW max.	□E	EL max.	Y	PJ	TO	UO	ØFB	BB	BZ	M_A Nm
		Line connection														
		01	**02**	**01**	**02**											
25	**12**	G 1/4	M14x1.5	25	25	12	38	7	33	11	51	63	6.5	6	M5	5.5
	16															
32	**18**	G 1/4	M14x1.5	25	25	12	45	7	33	11	63	80	8.5	6	M5	5.5
	22															
	25															
40	**16**	G 1/4	M14x1.5	25	25	9	51	4	33	11	70	85	8.5	6	M5	5.5
	18															
	25															
50	**22**	G 1/4	M14x1.5	25	25	9	63	4	33	11	85.5	105	9.5	8	M8	23
	25															
	36															
63	**25**	G 1/4	M14x1.5	25	25	6	76	1	33	11	98.5	115	9.5	8	M8	23
	28															
	36															
	45															

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

1) Raised cylinder head and base
2) Raised cylinder head except for Ø 32/18 with end position cushioning "U" or "K"
3) Raised cylinder head for: Ø 40/25; Ø 50/36 and Ø 63/45 with end position cushioning "D" or "S"
4) ØD1 max. 0.5 mm deep
5) Adjustable throttle valve for the end position cushioning
6) Check valve and bleeding

Dimensions: Type of mounting D (dimensions in mm)

Piston Ø 80 ... 200 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
80	36	70	M26x1.5	M30x2	M30x2	41	45
	45		M33x2	M39x2		51	
	56		M39x2	M45x2		57	
100	45	70	M33x2	M39x2	M39x3	51	65
	50		M39x2	M45x2		57	
	70		M48x2	M56x2		76	
125	50	70	M39x2	M45x2	M42x3	57	65
	56						
	63		M48x2	M56x2		76	
	90		M64x2	M76x2		89	
150	63	50	M48x2	M56x2	M45x3	76	68
	70						
	80		M58x2	M68x2		89	
	100		M76x2	M95x2		101	
200	90	40	M64x2	M76x2	M52x3	89	70
	100		M76x2	M95x2		101	
	140		M100x2	M130x2		140	

Dimensions: Type of mounting D (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	VB	ZF	RO	DH	H	R
80	**36**	50	30	10	16	45	33	25	10	86	16	165	47.5	15	95	70
	45	60	41	12				32	13			172				
	56	70	46	15				35				175				
100	**45**	60	41	12	16	45	33	32	13	106	16	172	57	20	114	84.5
	50	66.6	46	15				35	16			175				
	70	90	60					41				181				
125	**50**	66.6	46	15	16	45	33	35	13	135	16	181	70	30	140	104
	56	70														
	63	79.3	55					41	16			187				
	90	108	75													
150	**63**	79.3	55	15	19	51	40	38	13	160	19	203	82.5	35	165	124
	70	90	60													
	80	95.2	75													
	100	120	85													
200	**90**	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	100															
	140															

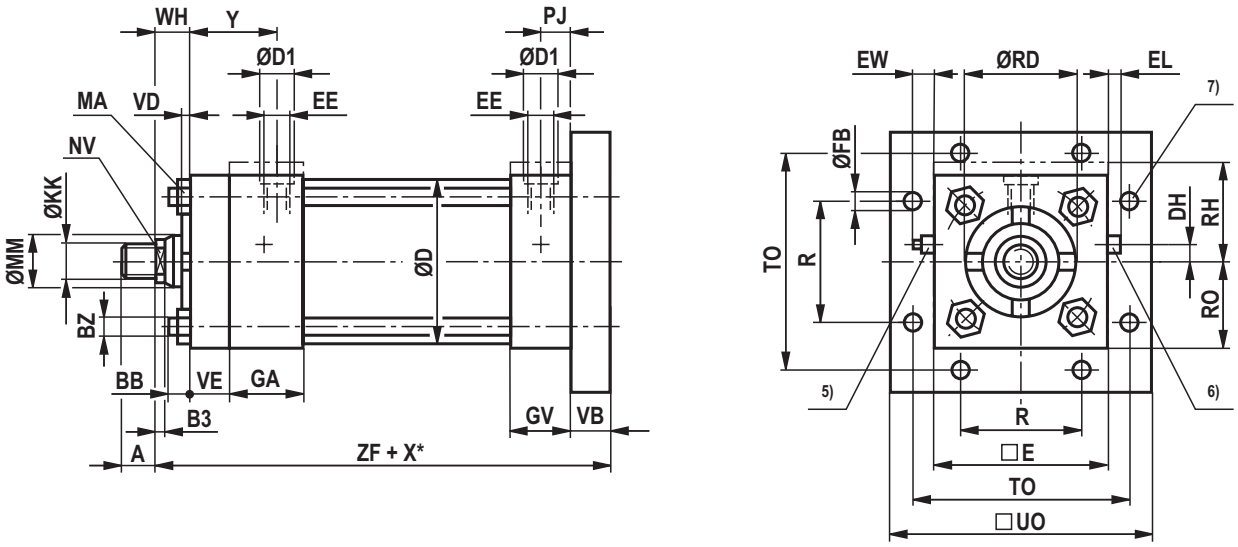
ØAL	ØMM	EE		ØD1 [4]		EW max.	□E	EL max.	Y	PJ	TO	UO	ØFB	BB	BZ	M_A Nm
		Line connection														
		01	02	01	02											
80	**36**	G 1/2	M22x1.5	34	34	12	95	11	42	14.5	119	140	11	10	M10	46
	45															
	56															
100	**45**	G 1/2	M22x1.5	34	34	9	114	8	42	14.5	138	160	11	12	M12	80
	50															
	70															
125	**50**	G 1/2	M22x1.5	34	34	9	140	8	42	14.5	168	195	14	13	M14	125
	56															
	63															
	90															
150	**63**	G 3/4	M26x1.5	42	42	16	165	12	48	18	193.5	220	14	15	M16	195
	70															
	80															
	100															
200	**90**	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	100															
	140															

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

[4] ØD1 max. 0.5 mm deep
[5] Adjustable throttle valve for the end position cushioning
[6] Check valve and bleeding

Dimensions: Type of mounting K (dimensions in mm)

Piston Ø 25 ... 63 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
25	12	105	M8x1.25	M10x1.5	M10	15	15
	16		M10x1.5	M12x1.5		19	
32	18	105	M10x1.5	M12x1.5	M12	19	18
	22		M16x1.5	M20x1.5		28	
	25		M20x1.5	M22x1.5			
40	16	105	M10x1.5	M12x1.5	M14	19	21
	18						
	25		M20x1.5	M22x1.5		28	
50	22	105	M16x1.5	M20x1.5	M20x1.5	28	30
	25		M20x1.5	M22x1.5			
	36		M26x1.5	M30x2		41	
63	25	70	M20x1.5	M22x1.5	M24x2	28	36
	28						
	36		M26x1.5	M30x2		41	
	45		M33x2	M39x2		51	

Dimensions: Type of mounting K
(dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	VB	ZF	RO	RH	DH	R
25	**12**	25.5	10	5.5	10	38	26	16	6.5	31	10	124	19	24 [1]	5	27.5
	16	28.5	13													
32	**18**	32	14	5.5	10	38	26	16	6	38	10	125	22.5	35.5 [2]	7	32
	22	34	19	8				25	13			134				
	25	38	22													
40	**16**	28.5	13	5.5	10	38	26	16	6	46	9	127	25.5	38.5 [3]	8	36.5
	18	32	14													
	25	38	22	8				25	13			136				
50	**22**	38	19	8	10	38	26	25	13	56	9	136	31.5	44.5 [3]	10	46.5
	25		22													
	36	50	30	10				32	16			143				
63	**25**	38	22	8	10	38	26	25	13	69	10	140	38	51 [3]	15	55.5
	28	42	24													
	36	50.7	30	10				32	16			147				
	45	60	41	12				38	19			153				

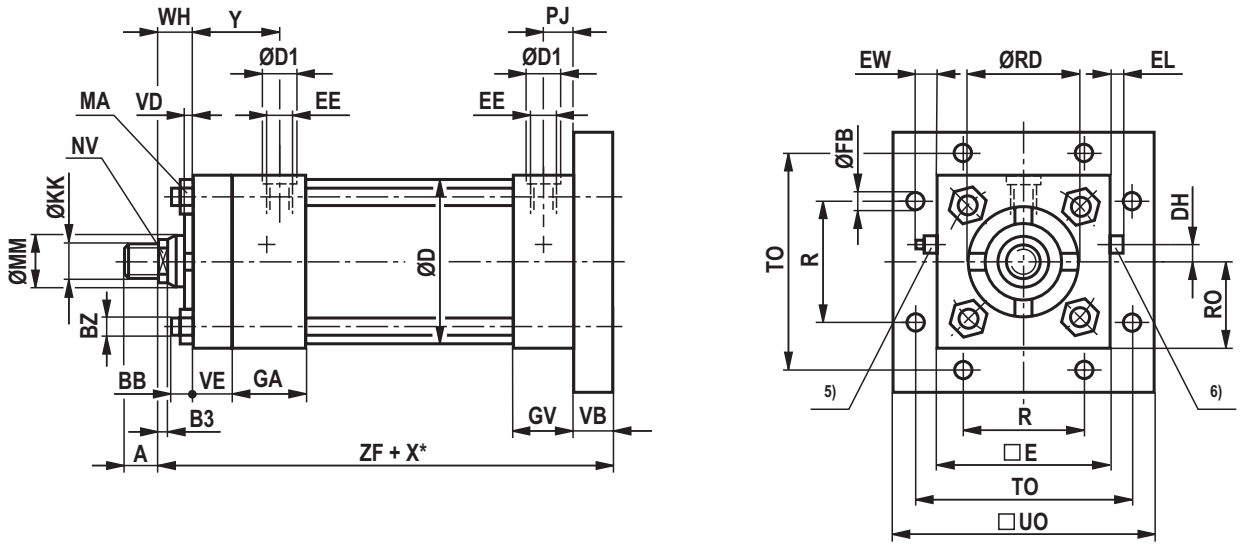
ØAL	ØMM	EE		ØD1 [4]		EW max.	□E	EL max.	Y	PJ	TO	□UO	ØFB	BB	BZ	M_A Nm
		Line connection														
		01	02	01	02											
25	**12**	G 1/4	M14x1.5	25	25	12	38	7	33	11	51	63	6.5	6	M5	5.5
	16															
32	**18**	G 1/4	M14x1.5	25	25	12	45	7	33	11	63	80	8.5	6	M5	5.5
	22															
	25															
40	**16**	G 1/4	M14x1.5	25	25	9	51	4	33	11	70	85	8.5	6	M5	5.5
	18															
	25															
50	**22**	G 1/4	M14x1.5	25	25	9	63	4	33	11	85.5	105	9.5	8	M8	23
	25															
	36															
63	**25**	G 1/4	M14x1.5	25	25	6	76	1	33	11	98.5	115	9.5	8	M8	23
	28															
	36															
	45															

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

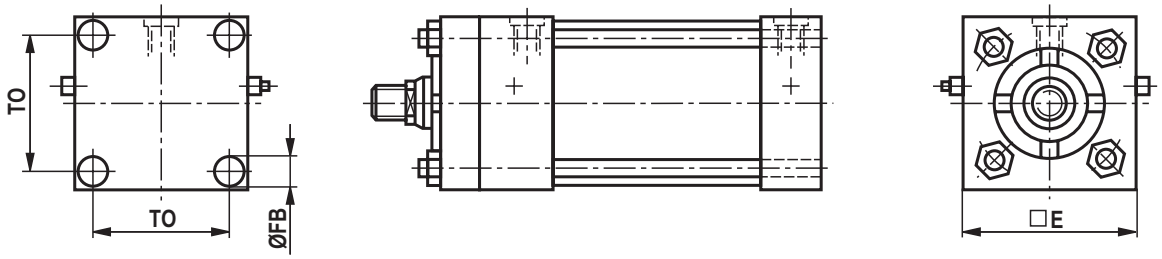
1) Raised cylinder head and base
2) Raised cylinder head except for Ø 32/18 with end position cushioning "U" or "K"
3) Raised cylinder head for: Ø 40/25; Ø 50/36 and Ø 63/45 with end position cushioning "D" or "S"
4) ØD1 max. 0.5 mm deep
5) Adjustable throttle valve for the end position cushioning
6) Check valve and bleeding
7) 6 usable mounting bores with raised cylinder base

Dimensions: Type of mounting K (dimensions in mm)

Piston Ø 80 ... 200 mm



Only for piston Ø 200 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
80	36	70	M26x1.5	M30x2	M30x2	41	45
	45		M33x2	M39x2		51	
	56		M39x2	M45x2		57	
100	45	70	M33x2	M39x2	M39x3	51	65
	50		M39x2	M45x2		57	
	70		M48x2	M56x2		76	
125	50	70	M39x2	M45x2	M42x3	57	65
	56						
	63		M48x2	M56x2		76	
	90		M64x2	M76x2		89	
150	63	50	M48x2	M56x2	M45x3	76	68
	70						
	80		M58x2	M68x2		89	
	100		M76x2	M95x2		101	
200	90	40	M64x2	M76x2	M52x3	89	70
	100		M76x2	M95x2		101	
	140		M100x2	M130x2		140	

Dimensions: Type of mounting K (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	VB	ZF	RO	DH	R
80	**36**	50	30	10	16	45	33	25	10	86	16	165	47.5	15	70
	45	60	41	12				32	13			172			
	56	70	46	15				35				175			
100	**45**	60	41	12	16	45	33	32	13	106	16	172	57	20	84.5
	50	66.6	46	15				35				175			
	70	90	60					41	16			181			
125	**50**	66.6	46	15	16	45	33	35	13	135	16	181	70	30	104
	56	70													
	63	79.3	55					41	16			187			
	90	108	75												
150	**63**	79.3	55	15	19	51	40	38	13	160	19	203	82.5	35	124
	70	90	60												
	80	95.2	75												
	100	120	85												
200	**90**	108	75	15	19	51	40	38	13	215	–	187	108	55	–
	100	120	85												
	140	158	120												

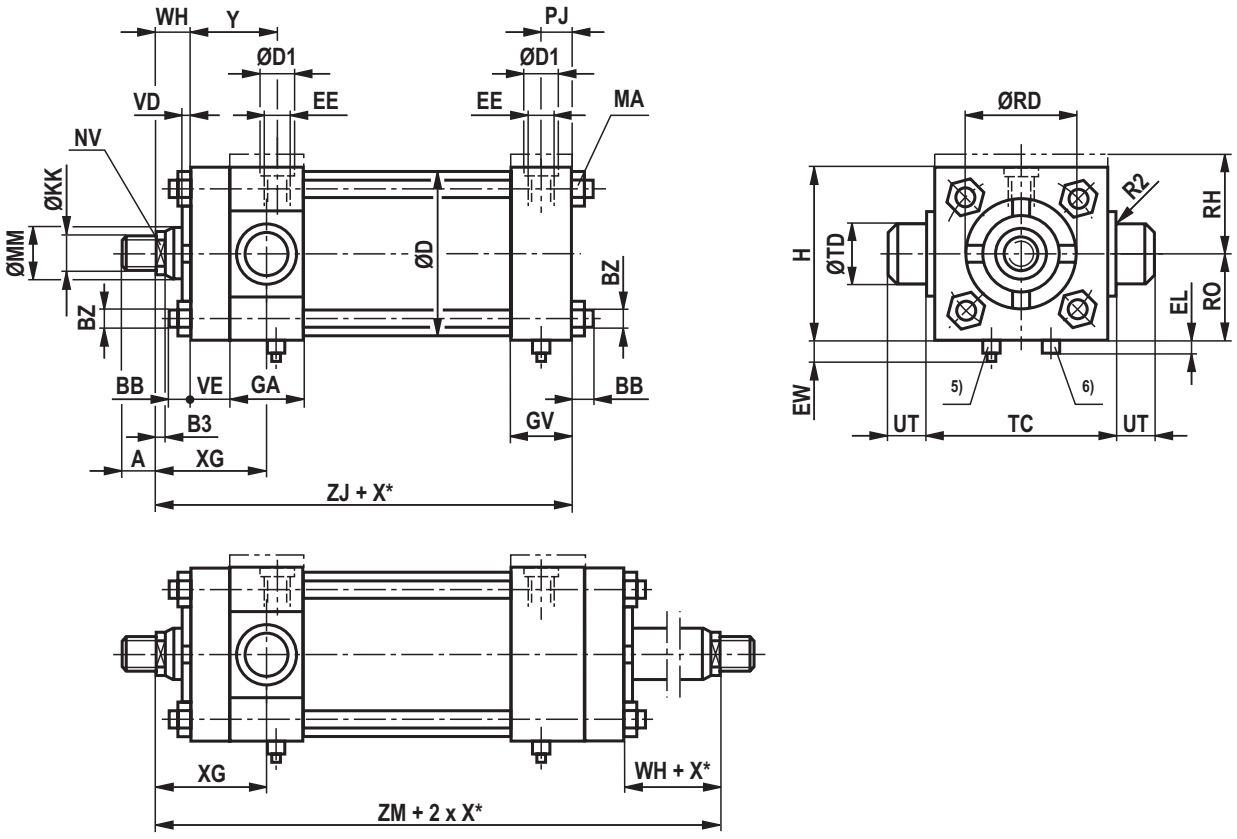
ØAL	ØMM	EE		ØD1 [4]		EW max.	□E	EL max.	Y	PJ	TO	□UO	ØFB	BB	BZ	M_A Nm
		Line connection														
		01	02	01	02											
80	**36**	G 1/2	M22x1.5	34	34	12	95	11	42	14.5	119	140	11	10	M10	46
	45															
	56															
100	**45**	G 1/2	M22x1.5	34	34	9	114	8	42	14.5	138	160	11	12	M12	80
	50															
	70															
125	**50**	G 1/2	M22x1.5	34	34	9	140	8	42	14.5	168	195	14	13	M14	125
	56															
	63															
	90															
150	**63**	G 3/4	M26x1.5	42	42	16	165	12	48	18	193.5	220	14	15	M16	195
	70															
	80															
	100															
200	**90**	G 3/4	M26x1.5	42	42	14	216	10	48	18	192.5	–	17.5	15	M16	195
	100															
	140															

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

[4] ØD1 max. 0.5 mm deep
[5] Adjustable throttle valve for the end position cushioning
[6] Check valve and bleeding

Dimensions: Type of mounting R (dimensions in mm)

Piston Ø 25 ... 63 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
25	12	–	–	–	–	–	–
	16						
32	18	105	M10x1.5	M12x1.5	M12	19	18
	22		M16x1.5	M20x1.5		28	
	25		M20x1.5	M22x1.5			
40	16	105	M10x1.5	M12x1.5	M14	19	21
	18						
	25		M20x1.5	M22x1.5		28	
50	22	105	M16x1.5	M20x1.5	M20x1.5	28	30
	25		M20x1.5	M22x1.5			
	36		M26x1.5	M30x2		41	
63	25	70	M20x1.5	M22x1.5	M24x2	28	36
	28						
	36		M26x1.5	M30x2		41	
	45		M33x2	M39x2		51	

Dimensions: Type of mounting R (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	XG	ZJ	ZM	RO	RH	H	ØTD −0.03
25	**12**	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	16																
32	**18**	32	14	5.5	10	38	26	16	6	38	44.5	115	153	23	35.5 [1]	46 +1.3	25.4
	22	34	19	8				25	13		53.5	124	171				
	25	38	22														
40	**16**	28.5	13	5.5	10	38	26	16	6	46	44.5	118	156	26.5	38.5 [2]	53 +1.4	25.4
	18	32	14														
	25	38	22	8				25	13		53.5	127	174				
50	**22**	38	19	8	10	38	26	25	13	56	53.5	127	174	32	44.5 [2]	64 +1.4	25.4
	25		22														
	36	50	30	10				32	16		60.5	134	188				
63	**25**	38	22	8	10	38	26	25	13	69	53.5	130	177	38	51 [2]	76 +1.4	25.4
	28	42	24														
	36	50.7	30	10				32	16		60.5	137	191				
	45	60	41	12				38	19		66.5	143	203				

ØAL	ØMM	EE		ØD1 [3]		EW max.	EL max.	Y	PJ	UT	TC −0.3	BB	BZ	M_A Nm	X* [4] min.
		Line connection													
		01	02	01	02										
25	**12**	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	16														
32	**18**	G 1/4	M14x1.5	25	25	12	7	33	11	25	45	6	M5	5.5	25
	22														
	25														
40	**16**	G 1/4	M14x1.5	25	25	9	4	33	11	25	51	6	M5	5.5	25
	18														
	25														
50	**22**	G 1/4	M14x1.5	25	25	9	4	33	11	25	63.5	8	M8	23	30
	25														
	36														
63	**25**	G 1/4	M14x1.5	25	25	6	1	33	11	25	76	8	M8	23	30
	28														
	36														
	45														

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Raised cylinder head except for Ø 32/18 with end position cushioning "U" or "K"

2) Raised cylinder head for: Ø 40/25; Ø 50/36 and Ø 63/45 with end position cushioning "D" or "S"

3) ØD1 max. 0.5 mm deep

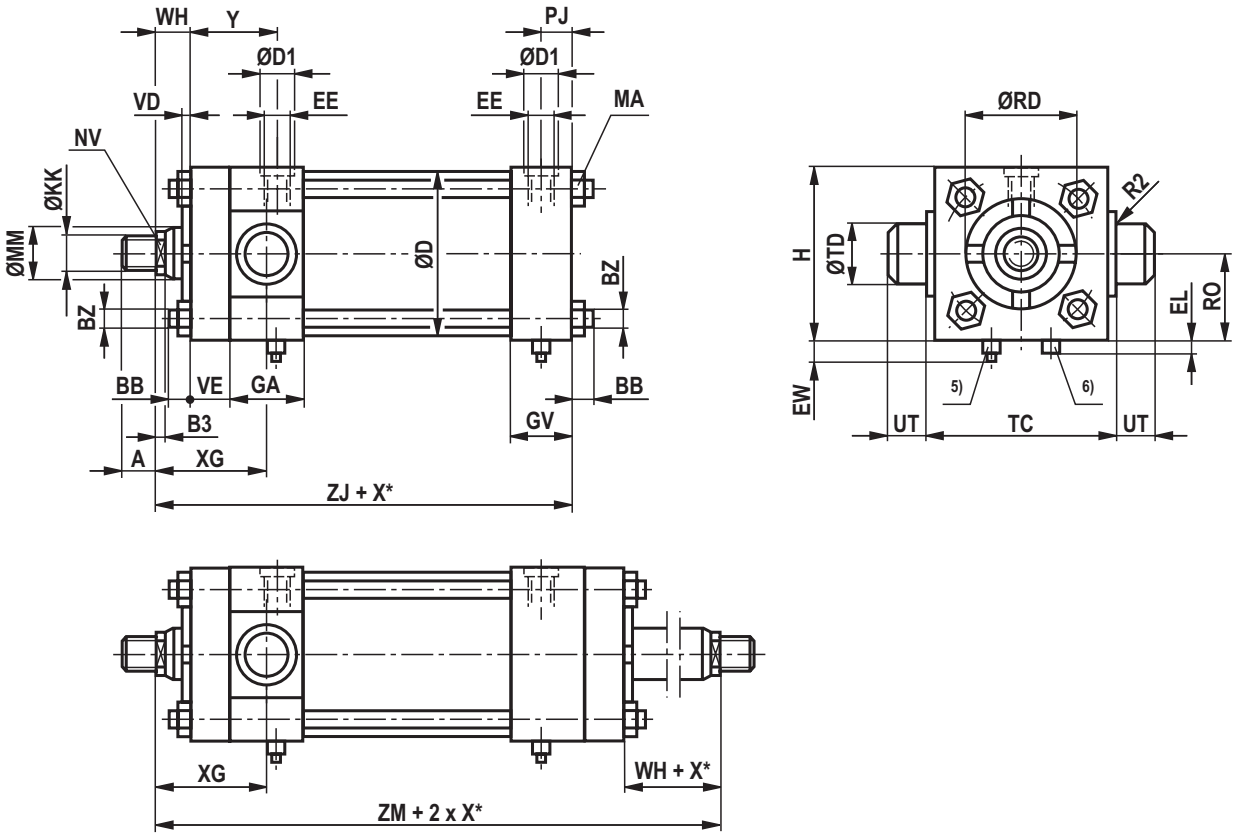
4) Only with piston rod end "E" with double-acting cylinders

5) Adjustable throttle valve for the end position cushioning

6) Check valve and bleeding

Dimensions: Type of mounting R (dimensions in mm)

Piston Ø 80 ... 200 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
80	36	70	M26x1.5	M30x2	M30x2	41	45
	45		M33x2	M39x2		51	
	56		M39x2	M45x2		57	
100	45	70	M33x2	M39x2	M39x3	51	65
	50		M39x2	M45x2		57	
	70		M48x2	M56x2		76	
125	50	70	M39x2	M45x2	M42x3	57	65
	56						
	63		M48x2	M56x2		76	
	90		M64x2	M76x2		89	
150	63	50	M48x2	M56x2	M45x3	76	68
	70						
	80		M58x2	M68x2		89	
	100		M76x2	M95x2		101	70
200	90	40	M64x2	M76x2	M52x3	89	
	100		M76x2	M95x2		101	
	140		M100x2	M130x2		140	

Dimensions: Type of mounting R (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	XG	ZJ	ZM	RO	H	ØTD −0.03
80	**36**	50	30	10	16	45	33	25	10	86	63.5	149	202	47.5	95 +1.5	25.4
	45	60	41	12				32	13		70.5	156	216			
	56	70	46	15				35			73.5	159	222			
100	**45**	60	41	12	16	45	33	32	13	106	70	156	216	57	114 +1.5	25.4
	50	66.6	46	15				35			73	159	222			
	70	90	60					41	16		79	165	234			
125	**50**	66.6	46	15	16	45	33	35	13	135	73	165	228	70	140 +1.6	25.4
	56	70														
	63	79.3	55					41	16		79	171	240			
	90	108	75													
150	**63**	79.3	55	15	19	51	40	38	13	160	82.5	184	252	82.5	165 +1.6	34.92
	70	90	60													
	80	95.2	75													
	100	120	85													
200	**90**	108	75	15	19	51	40	38	13	215	82.5	187	255	108	216 +1.8	34.92
	100	120	85													
	140	158	120													

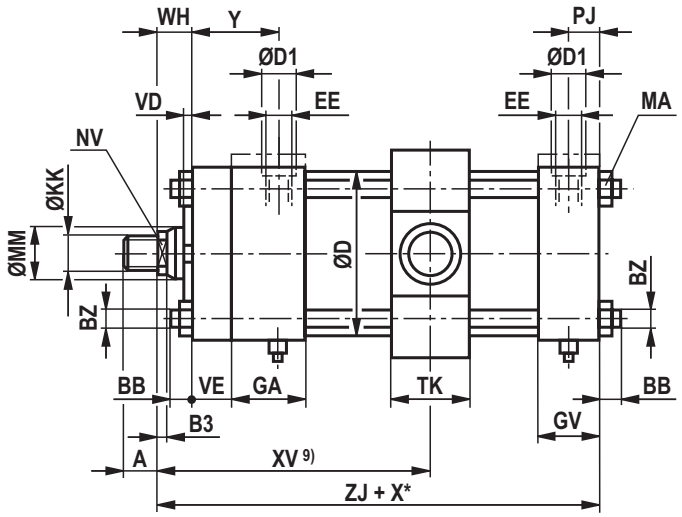
ØAL	ØMM	EE		ØD1 [3]		EW max.	EL max.	Y	PJ	UT	TC −0.3	BB	BZ	M_A Nm	X* [4] min.
		Line connection													
		01	02	01	02										
80	**36**	G 1/2	M22x1.5	34	34	12	11	42	14.5	25	95	10	M10	46	30
	45														
	56														
100	**45**	G 1/2	M22x1.5	34	34	9	8	42	14.5	25	114	12	M12	80	45
	50														
	70														
125	**50**	G 1/2	M22x1.5	34	34	9	8	42	14.5	25	140	13	M14	125	55
	56														
	63														
	90														
150	**63**	G 3/4	M26x1.5	42	42	16	12	48	18	35	165	15	M16	195	75
	70														
	80														
	100														
200	**90**	G 3/4	M26x1.5	42	42	14	10	48	18	35	216	15	M16	195	115
	100														
	140														

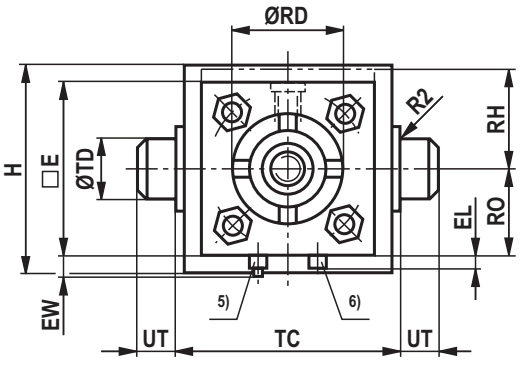
ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

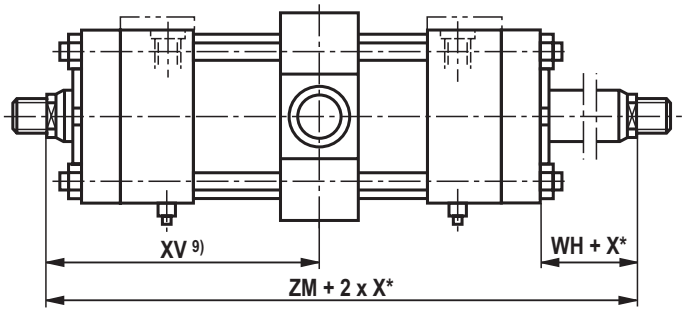
[3] ØD1 max. 0.5 mm deep
[4] Only with piston rod end "E" with double-acting cylinders
[5] Adjustable throttle valve for the end position cushioning
[6] Check valve and bleeding

Dimensions: Type of mounting E (dimensions in mm)

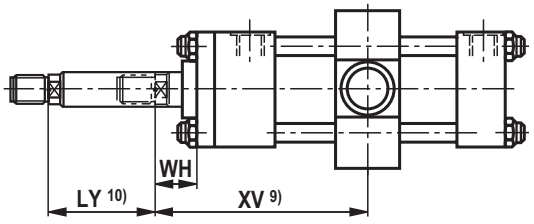
Piston Ø 25 ... 63 mm







☞ **Notice!**
Dimensions for hydraulic cylinders with piston rod extension "LY" in retracted condition:



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
25	12	105	M8x1.25	M10x1.5	M10	15	15
	16		M10x1.5	M12x1.5		19	
32	18	105	M10x1.5	M12x1.5	M12	19	18
	22		M16x1.5	M20x1.5		28	
	25		M20x1.5	M22x1.5			
40	16	105	M10x1.5	M12x1.5	M14	19	21
	18						
	25		M20x1.5	M22x1.5		28	
50	22	105	M16x1.5	M20x1.5	M20x1.5	28	30
	25		M20x1.5	M22x1.5			
	36		M26x1.5	M30x2		41	
63	25	70	M20x1.5	M22x1.5	M24x2	28	36
	28						
	36		M26x1.5	M30x2		41	
	45		M33x2	M39x2		51	

Dimensions: Type of mounting E (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	XV [9] min.	XV [9] max.	ZJ	ZM	TK	RO	RH	H
25 [5]	**12**	25.5	10	5.5	10	38	26	16	6.5	31	44.5	–	114	152	–	19	24 [1]	–
	16	28.5	13															
32	**18**	32	14	5.5	10	38	26	16	6	38	80	73+X*	115	153	32	22.5	35.5 [2]	–
	22	34	19	8				25	13		89	82+X*	124	171				
	25	38	22															
40	**16**	28.5	13	5.5	10	38	26	16	6	46	80	76+X*	118	156	32	25.5	38.5 [3]	65 +1.4
	18	32	14															
	25	38	22	8				25	13		89	85+X*	127	174				
50	**22**	38	19	8	10	38	26	25	13	56	92	82+X*	127	174	38	31.5	44.5 [3]	75 +1.4
	25		22															
	36	50	30	10				32	16		99	89+X*	134	188				
63	**25**	38	22	8	10	38	26	25	13	69	92	85+X*	130	177	38	38	51 [3]	90 +1.5
	28	42	24															
	36	50.7	30	10				32	16		99	92+X*	137	191				
	45	60	41	12				38	19		105	98+X*	143	203				

ØAL	ØMM	EE		ØD1 [4]		EW max.	□E	EL max.	Y	PJ	ØTD –0.03	UT	TC –0.3	BB	BZ	M_A Nm	X* min. [7]	X* min. [8]
		Line connection																
		01	02	01	02													
25	**12**	G 1/4	M14x1.5	25	25	12	38	7	33	11	19.05	19	38	6	M5	5.5	–	25
	16																	
32	**18**	G 1/4	M14x1.5	25	25	12	45	7	33	11	25.4	25	50	6	M5	5.5	10	25
	22																	
	25																	
40	**16**	G 1/4	M14x1.5	25	25	9	51	4	33	11	25.4	25	63.5	6	M5	5.5	10	25
	18																	
	25																	
50	**22**	G 1/4	M14x1.5	25	25	9	63	4	33	11	25.4	25	76	8	M8	23	10	30
	25																	
	36																	
63	**25**	G 1/4	M14x1.5	25	25	6	76	1	33	11	25.4	25	89	8	M8	23	10	30
	28																	
	36																	
	45																	

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Raised cylinder head and base

2) Raised cylinder head except for Ø 32/18 with end position cushioning "U" or "K"

3) Raised cylinder head for: Ø 40/25; Ø 50/36 and Ø 63/45 with end position cushioning "D" or "S"

4) ØD1 max. 0.5 mm deep

5) Adjustable throttle valve for the end position cushioning

6) Check valve and bleeding

7) Except for piston rod end "E" with double-acting cylinders

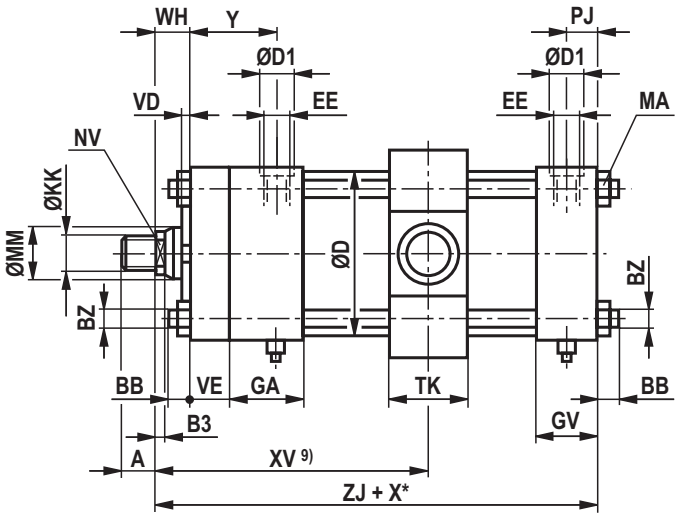
8) Only with piston rod end "E" with double-acting cylinders

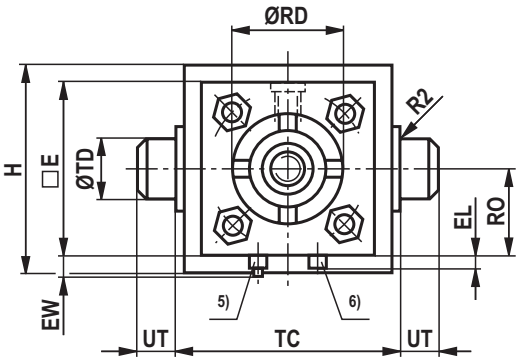
9) Trunnion position freely selectable.
When ordering, always specify the "XV" dimension in the plain text in mm. With piston Ø 25, the trunnions are at the cylinder head

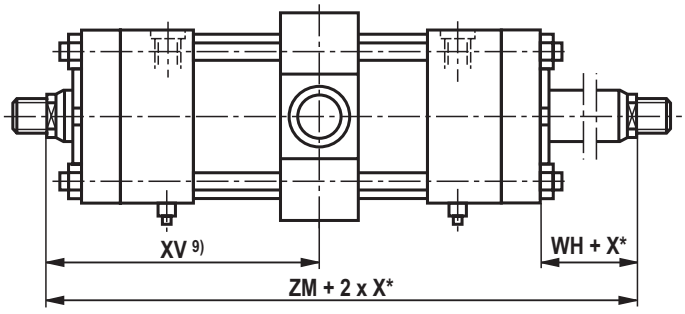
10) Always specify the piston rod extension "LY" in the order in the plain text

Dimensions: Type of mounting E (dimensions in mm)

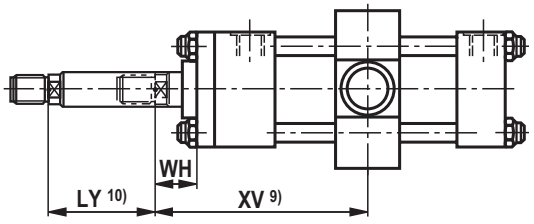
Piston Ø 80 ... 200 mm







☞ **Notice!**
Dimensions for hydraulic cylinders with piston rod extension "LY" in retracted condition:



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
80	36	70	M26x1.5	M30x2	M30x2	41	45
	45		M33x2	M39x2		51	
	56		M39x2	M45x2		57	
100	45	70	M33x2	M39x2	M39x3	51	65
	50		M39x2	M45x2		57	
	70		M48x2	M56x2		76	
125	50	70	M39x2	M45x2	M42x3	57	65
	56						
	63		M48x2	M56x2		76	
	90		M64x2	M76x2		89	
150	63	50	M48x2	M56x2	M45x3	76	68
	70						
	80		M58x2	M68x2		89	
	100		M76x2	M95x2		101	
200	90	40	M64x2	M76x2	M52x3	89	70
	100		M76x2	M95x2		101	
	140		M100x2	M130x2		140	

Dimensions: Type of mounting E (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	XV [9] min.	XV [9] max.	ZJ	ZM	TK	RO	H
80	**36**	50	30	10	16	45	33	25	10	86	111	91+X*	149	202	50	47.5	115 +1.5
	45	60	41	12				32	13		118	98+X*	156	216			
	56	70	46	15				35			121	101+X*	159	222			
100	**45**	60	41	12	16	45	33	32	13	106	118	98+X*	156	216	50	57	135 +1.6
	50	66.6	46	15				35			121	101+X*	159	222			
	70	90	60					41	16		127	107+X*	165	234			
125	**50**	66.6	46	15	16	45	33	35	13	135	121	107+X*	165	228	50	70	160 +1.6
	56	70															
	63	79.3	55					41	16		127	113+X*	171	240			
	90	108	75														
150	**63**	79.3	55	15	19	51	40	38	13	160	140	112+X*	184	252	64	82.5	195 +1.8
	70	90	60														
	80	95.2	75														
	100	120	85														
200	**90**	108	75	15	19	51	40	38	13	215	140	115+X*	187	255	64	108	250 +1.8
	100	120	85														
	140	158	120														

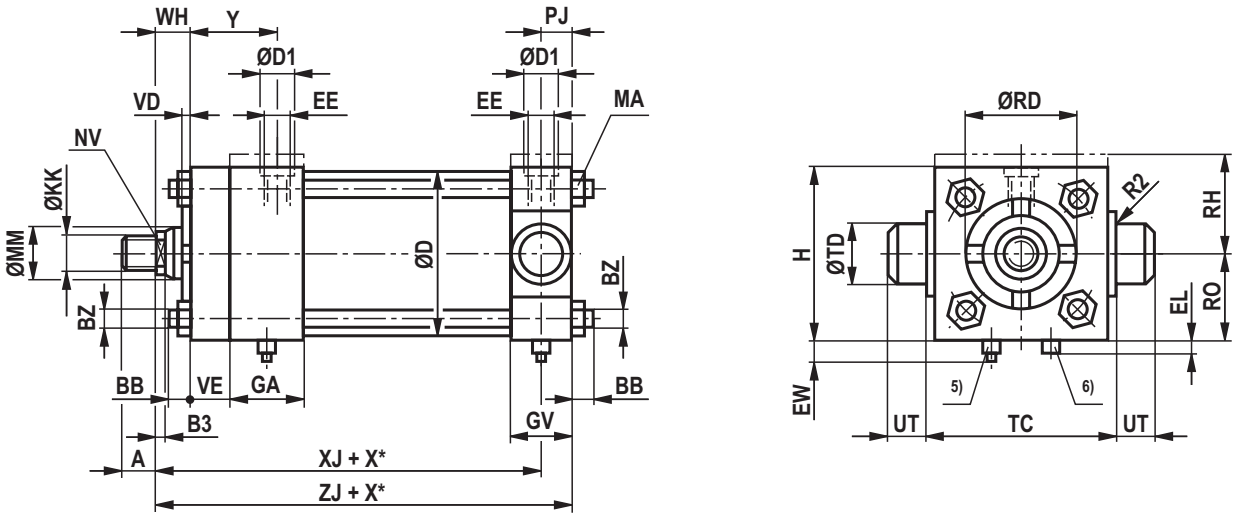
ØAL	ØMM	EE		ØD1 [4]		EW max.	□E	EL max.	Y	PJ	ØTD −0.03	UT	TC −0.3	BB	BZ	M_A Nm	X* min. [7]	X* min. [8]
		Line connection																
		01	02	01	02													
80	**36**	G 1/2	M22x1.5	34	34	12	95	11	42	15	25.4	25	114	10	M10	46	20	30
	45																	
	56																	
100	**45**	G 1/2	M22x1.5	34	34	9	114	8	42	15	25.4	25	133	12	M12	80	20	45
	50																	
	70																	
125	**50**	G 1/2	M22x1.5	34	34	9	140	8	42	15	25.4	25	159	13	M14	125	20	55
	56																	
	63																	
	90																	
150	**63**	G 3/4	M26x1.5	42	42	16	165	12	48	18	34.92	35	194	15	M16	195	30	75
	70																	
	80																	
	100																	
200	**90**	G 3/4	M26x1.5	42	42	14	216	10	48	18	34.92	35	248	15	M16	195	30	115
	100																	
	140																	

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

4) ØD1 max. 0.5 mm deep
5) Adjustable throttle valve for the end position cushioning
6) Check valve and bleeding
7) Except for piston rod end "E" with double-acting cylinders
8) Only with piston rod end "E" with double-acting cylinders
9) Trunnion position freely selectable.
When ordering, always specify the "XV" dimension in the plain text in mm. With piston Ø 25, the trunnions are at the cylinder head.
10) Always specify the piston rod extension "LY" in the order in the plain text

Dimensions: Type of mounting S (dimensions in mm)

Piston Ø 25 ... 63 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
25	12	105	M8x1.25	M10x1.5	M10	15	15
	16		M10x1.5	M12x1.5		19	
32	18	105	M10x1.5	M12x1.5	M12	19	18
	22		M16x1.5	M20x1.5		28	
	25		M20x1.5	M22x1.5			
40	16	105	M10x1.5	M12x1.5	M14	19	21
	18						
	25		M20x1.5	M22x1.5		28	
50	22	105	M16x1.5	M20x1.5	M20x1.5	28	30
	25		M20x1.5	M22x1.5			
	36		M26x1.5	M30x2		41	
63	25	70	M20x1.5	M22x1.5	M24x2	28	36
	28						
	36		M26x1.5	M30x2		41	
	45		M33x2	M39x2		51	

Dimensions: Type of mounting S
(dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	XJ	ZJ	RO	RH	H
25	**12**	25.5	10	5.5	10	38	26	16	6.5	31	101.5	114	19	24 [1]	43 +1.3
	16	28.5	13												
32	**18**	32	14	5.5	10	38	26	16	6	38	102	115	23	35.5 [2]	46
	22	34	19	8				25	13		111	124			
	25	38	22												
40	**16**	28.5	13	5.5	10	38	26	16	6	46	105	118	26.5	38.5 [3]	53 +1.4
	18	32	14												
	25	38	22	8				25	13		114	127			
50	**22**	38	19	8	10	38	26	25	13	56	114	127	32	44.5 [3]	64 +1.4
	25		22												
	36	50	30	10				32	16		121	134			
63	**25**	38	22	8	10	38	26	25	13	69	117	130	38	51 [3]	76 +1.4
	28	42	24												
	36	50.7	30	10				32	16		124	137			
	45	60	41	12				38	19		130	143			

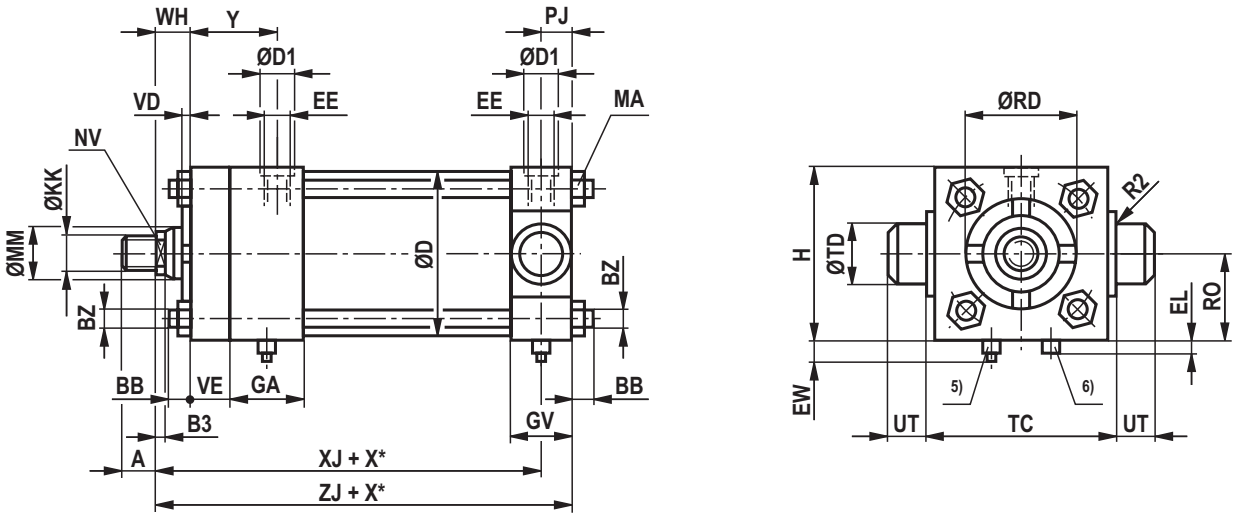
ØAL	ØMM	EE		ØD1 [4]		EW max.	EL max.	Y	PJ	ØTD −0.03	UT	TC −0.3	BB	BZ	M_A Nm
		Line connection													
		01	02	01	02										
25	**12**	G 1/4	M14x1.5	25	25	12	7	33	11	19.05	19	38	6	M5	5.5
	16														
32	**18**	G 1/4	M14x1.5	25	25	12	7	33	11	25.4	25	45	6	M5	5.5
	22														
	25														
40	**16**	G 1/4	M14x1.5	25	25	9	4	33	11	25.4	25	51	6	M5	5.5
	18														
	25														
50	**22**	G 1/4	M14x1.5	25	25	9	4	33	11	25.4	25	63.5	8	M8	23
	25														
	36														
63	**25**	G 1/4	M14x1.5	25	25	6	1	33	11	25.4	25	76	8	M8	23
	28														
	36														
	45														

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

1) Raised cylinder head and base
2) Raised cylinder head except for Ø 32/18 with end position cushioning "U" or "K"
3) Raised cylinder head for: Ø 40/25; Ø 50/36 and Ø 63/45 with end position cushioning "D" or "S"
4) ØD1 max. 0.5 mm deep
5) Adjustable throttle valve for the end position cushioning
6) Check valve and bleeding

Dimensions: Type of mounting S (dimensions in mm)

Piston Ø 80 ... 200 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
80	36	70	M26x1.5	M30x2	M30x2	41	45
	45		M33x2	M39x2		51	
	56		M39x2	M45x2		57	
100	45	70	M33x2	M39x2	M39x3	51	65
	50		M39x2	M45x2		57	
	70		M48x2	M56x2		76	
125	50	70	M39x2	M45x2	M42x3	57	65
	56						
	63		M48x2	M56x2		76	
	90		M64x2	M76x2		89	
150	63	50	M48x2	M56x2	M45x3	76	68
	70						
	80		M58x2	M68x2		89	
	100		M76x2	M95x2		101	
200	90	40	M64x2	M76x2	M52x3	89	70
	100		M76x2	M95x2		101	
	140		M100x2	M130x2		140	

Dimensions: Type of mounting S (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	XJ	ZJ	RO	H
80	**36**	50	30	10	16	45	33	25	10	86	133	149	47.5	95 +1.5
	45	60	41	12				32	13		140	156		
	56	70	46	15				35			143	159		
100	**45**	60	41	12	16	45	33	32	13	106	140	156	57	114 +1.5
	50	66.6	46	15				35			143	159		
	70	90	60					41	16		149	165		
125	**50**	66.6	46	15	16	45	33	35	13	135	149.5	165	70	140 +1.6
	56	70												
	63	79.3	55					41	16		155.5	171		
	90	108	75											
150	**63**	79.3	55	15	19	51	40	38	13	160	165	184	82.5	165 +1.6
	70	90	60											
	80	95.2	75											
	100	120	85											
200	**90**	108	75	15	19	51	40	38	13	215	168	187	108	216 +1.8
	100	120	85											
	140	158	120											

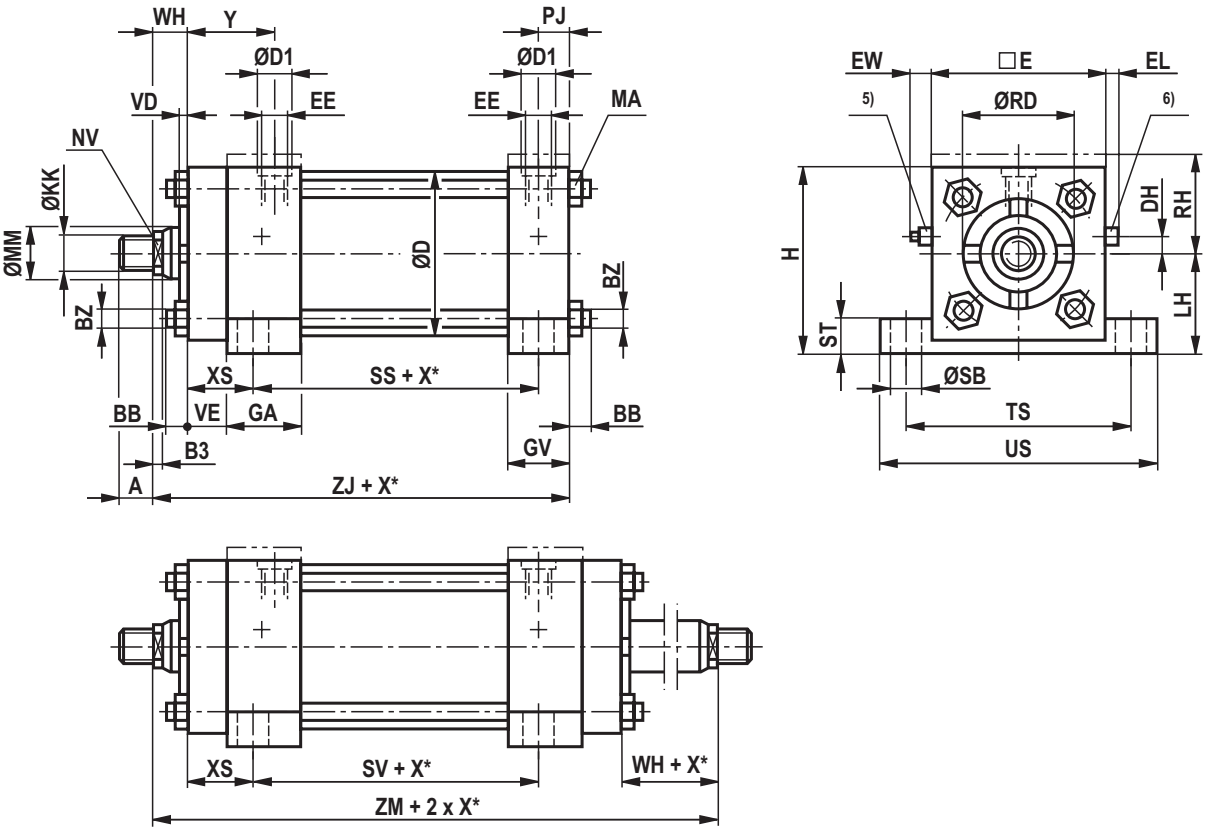
ØAL	ØMM	EE		ØD1 [4]		EW max.	EL max.	Y	PJ	ØTD –0.03	UT	TC –0.3	BB	BZ	M_A Nm
		Line connection													
		01	02	01	02										
80	**36**	G 1/2	M22x1.5	34	34	12	11	42	14.5	25.4	25	95	10	M10	46
	45														
	56														
100	**45**	G 1/2	M22x1.5	34	34	9	8	42	14.5	25.4	25	114	12	M12	80
	50														
	70														
125	**50**	G 1/2	M22x1.5	34	34	9	8	42	14.5	25.4	25	140	13	M14	125
	56														
	63														
	90														
150	**63**	G 3/4	M26x1.5	42	42	16	12	48	18	34.92	35	165	15	M16	195
	70														
	80														
	100														
200	**90**	G 3/4	M26x1.5	42	42	14	10	48	18	34.92	35	216	15	M16	195
	100														
	140														

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

[4] ØD1 max. 0.5 mm deep
[5] Adjustable throttle valve for the end position cushioning
[6] Check valve and bleeding

Dimensions: Type of mounting F (dimensions in mm)

Piston Ø 25 ... 63 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
25	12	105	M8x1.25	M10x1.5	M10	15	15
	16		M10x1.5	M12x1.5		19	
32	18	105	M10x1.5	M12x1.5	M12	19	18
	22		M16x1.5	M20x1.5		28	
	25		M20x1.5	M22x1.5			
40	16	105	M10x1.5	M12x1.5	M14	19	21
	18						
	25		M20x1.5	M22x1.5		28	
50	22	105	M16x1.5	M20x1.5	M20x1.5	28	30
	25		M20x1.5	M22x1.5			
	36		M26x1.5	M30x2		41	
63	25	70	M20x1.5	M22x1.5	M24x2	28	36
	28						
	36		M26x1.5	M30x2		41	
	45		M33x2	M39x2		51	

Dimensions: Type of mounting F (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	ZM	XS	SS	SV	LH h10	RH	H	DH
25	**12**	25.5	10	5.5	10	38	26	16	6.5	31	114	152	17.5	73	85	19	24 [1]	43 +1.3	5
	16	28.5	13																
32	**18**	32	14	5.5	10	38	26	16	6	38	115	153	19	70	83	22.5	35.5 [2]	46 +1.3	7
	22	34	19	8				25	13		124	171							
	25	38	22																
40	**16**	28.5	13	5.5	10	38	26	16	6	46	118	156	19	73	86	25.5	38.5 [3]	51 +1.4	8
	18	32	14																
	25	38	22	8				25	13		127	174							
50	**22**	38	19	8	10	38	26	25	13	56	127	174	19	73	86	31.7	44.5 [3]	64 +1.4	10
	25		22																
	36	50	30	10				32	16		134	188							
63	**25**	38	22	8	10	38	26	25	13	69	130	177	19	76	89	38	51 [3]	76 +1.4	15
	28	42	24																
	36	50.7	30	10				32	16		137	191							
	45	60	41	12				38	19		143	203							

ØAL	ØMM	EE		ØD1 [4]		Y	PJ	ST	ØSB	TS	US	EW max.	⬜E	EL max.	BB	BZ	M_A Nm	X* [7] min.
		Line connection																
		01	02	01	02													
25	**12**	G 1/4	M14x1.5	25	25	33	11	7.5	7	54	70 +1.4	12	38	7	6	M5	5.5	25
	16																	
32	**18**	G 1/4	M14x1.5	25	25	33	11	12	11	64	85 +1.5	12	45	7	6	M5	5.5	25
	22																	
	25																	
40	**16**	G 1/4	M14x1.5	25	25	33	11	12	11	70	91 +1.5	9	51	4	6	M5	5.5	25
	18																	
	25																	
50	**22**	G 1/4	M14x1.5	25	25	33	11	11	11	82.5	104 +1.5	9	63	4	8	M8	23	30
	25																	
	36																	
63	**25**	G 1/4	M14x1.5	25	25	33	11	11	11	95.5	116 +1.5	6	76	1	8	M8	23	30
	28																	
	36																	
	45																	

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Raised cylinder head and base

2) Raised cylinder head except for Ø 32/18 with end position cushioning "U" or "K"

3) Raised cylinder head for: Ø 40/25; Ø 50/36 and Ø 63/45 with end position cushioning "D" or "S"

4) ØD1 max. 0.5 mm deep

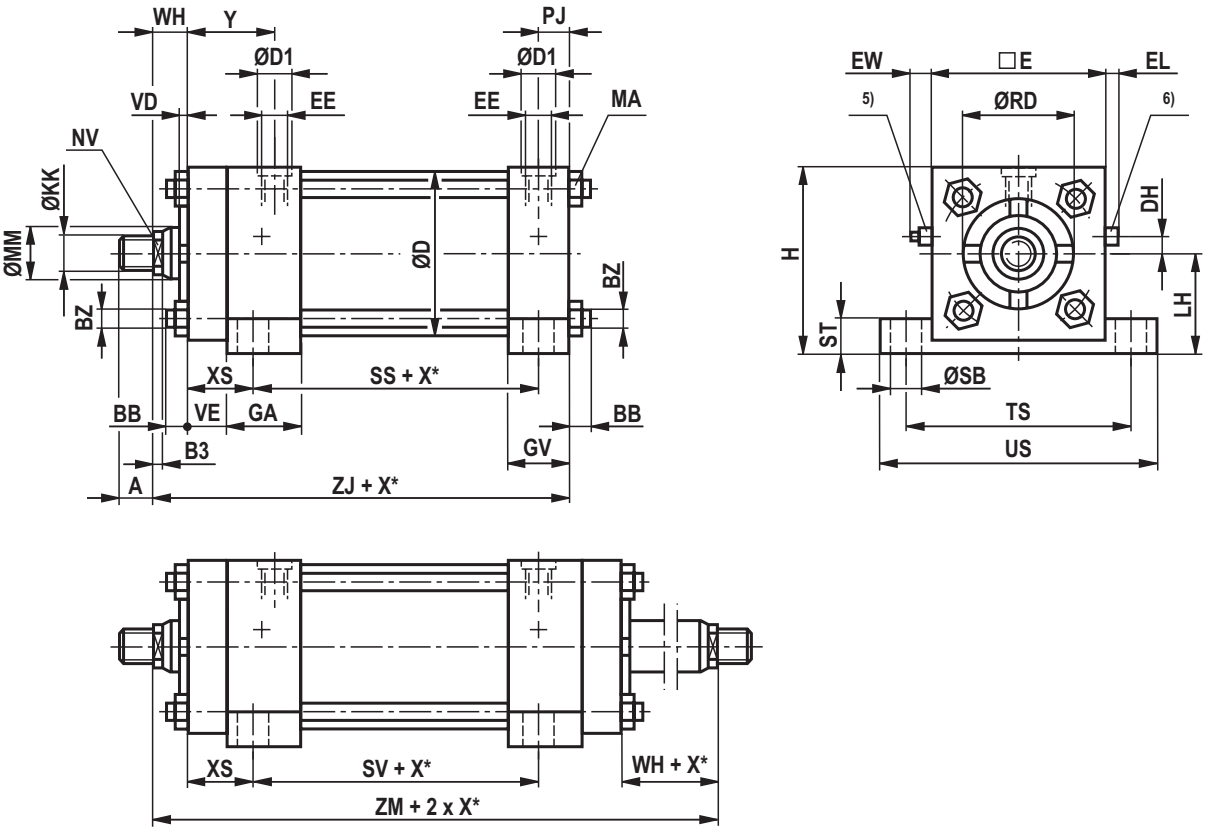
5) Adjustable throttle valve for the end position cushioning

6) Check valve and bleeding

7) Only with piston rod end "E" with double-acting cylinders

Dimensions: Type of mounting F (dimensions in mm)

Piston Ø 80 ... 200 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
80	36	70	M26x1.5	M30x2	M30x2	41	45
	45		M33x2	M39x2		51	
	56		M39x2	M45x2		57	
100	45	70	M33x2	M39x2	M39x3	51	65
	50		M39x2	M45x2		57	
	70		M48x2	M56x2		76	
125	50	70	M39x2	M45x2	M42x3	57	65
	56						
	63		M48x2	M56x2		76	
	90		M64x2	M76x2		89	
150	63	50	M48x2	M56x2	M45x3	76	68
	70						
	80		M58x2	M68x2		89	
	100		M76x2	M95x2		101	
200	90	40	M64x2	M76x2	M52x3	89	70
	100		M76x2	M95x2		101	
	140		M100x2	M130x2		140	

Dimensions: Type of mounting F (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	ZM	XS	SS	SV	LH h10	H	DH
80	**36**	50	30	10	16	45	33	25	10	86	149	202	28.5	82.5	95	47.5	95 +1.5	15
	45	60	41	12				32	13		156	216						
	56	70	46	15				35			159	222						
100	**45**	60	41	12	16	45	33	32	13	106	156	216	28.5	82.5	95	57.1	114 +1.5	15
	50	66.6	46	15				35			159	222						
	70	90	60					41	16		165	234						
125	**50**	66.6	46	15	16	45	33	35	13	135	165	228	33.5	79.5	91	69.8	140 +1.6	30
	56	70																
	63	79.3	55					41	16		171	240						
	90	108	75															
150	**63**	79.3	55	15	19	51	40	38	13	160	184	252	36.5	92	103	82.5	165 +1.6	35
	70	90	60															
	80	95.2	75															
	100	120	85															
200	**90**	108	75	15	19	51	40	38	13	215	187	255	36.5	95	106	108	216 +1.8	55
	100	120	85															
	140	158	120															

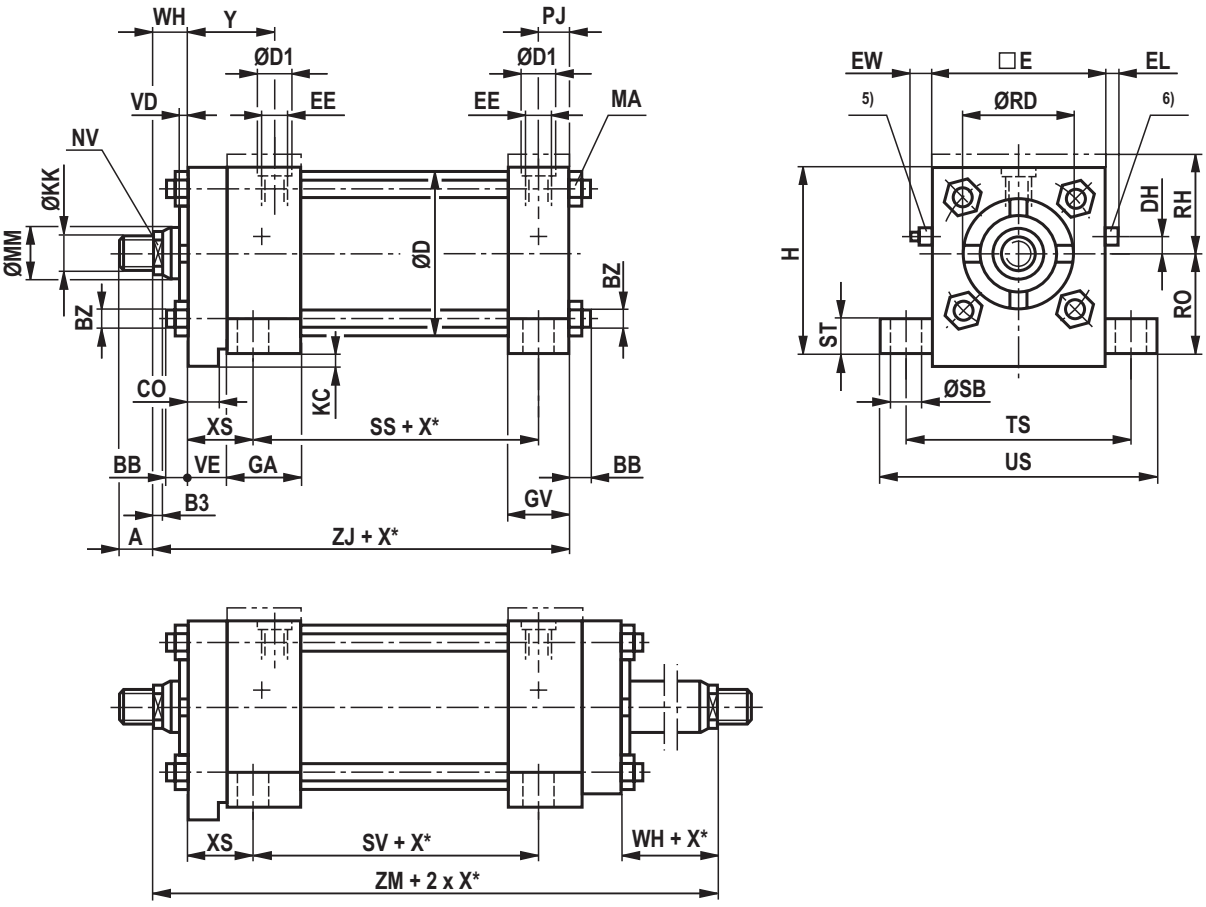
ØAL	ØMM	EE		ØD1 [4]		Y	PJ	ST	ØSB	TS	US	EW max.	□E	EL max.	BB	BZ	M_A Nm	X* [7] min.
		Line connection																
		01	02	01	02													
80	**36**	G 1/2	M22x1.5	34	34	42	14.5	19	14	120.5	145 +1.6	12	95	11	10	M10	46	30
	45																	
	56																	
100	**45**	G 1/2	M22x1.5	34	34	42	14.5	19	14	139.5	164 +1.6	9	114	8	12	M12	80	45
	50																	
	70																	
125	**50**	G 1/2	M22x1.5	34	34	42	14.5	24	23	174.5	210 +1.8	9	140	8	13	M14	125	55
	56																	
	63																	
	90																	
150	**63**	G 3/4	M26x1.5	42	42	48	18	24	23	200	235 +1.8	16	165	12	15	M16	195	75
	70																	
	80																	
	100																	
200	**90**	G 3/4	M26x1.5	42	42	48	18	24	23	251	286 +1.9	14	216	10	15	M16	195	115
	100																	
	140																	

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

[4] ØD1 max. 0.5 mm deep
[5] Adjustable throttle valve for the end position cushioning
[6] Check valve and bleeding
[7] Only with piston rod end "E" with double-acting cylinders

Dimensions: Type of mounting L
(dimensions in mm)

Piston Ø 25 ... 63 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
25	12	105	M8x1.25	M10x1.5	M10	15	15
	16		M10x1.5	M12x1.5		19	
32	18	105	M10x1.5	M12x1.5	M12	19	18
	22		M16x1.5	M20x1.5		28	
	25		M20x1.5	M22x1.5			
40	16	105	M10x1.5	M12x1.5	M14	19	21
	18						
	25		M20x1.5	M22x1.5		28	
50	22	105	M16x1.5	M20x1.5	M20x1.5	28	30
	25		M20x1.5	M22x1.5			
	36		M26x1.5	M30x2		41	
63	25	70	M20x1.5	M22x1.5	M24x2	28	36
	28						
	36		M26x1.5	M30x2		41	
	45		M33x2	M39x2		51	

Dimensions: Type of mounting L (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	ZM	XS	SS	SV	CO −0.07	KC −0.2	RO h10	RH	H	DH
25	**12**	25.5	10	5.5	10	38	26	16	6.5	31	114	152	17.5	73	85	8	5	19	24 [1]	43 +1.3	5
	16	28.5	13																		
32	**18**	32	14	5.5	10	38	26	16	6	38	115	153	19	70	83	8	5	22.5	35.5 [2]	46 +1.3	7
	22	34	19	8				25	13		124	171									
	25	38	22																		
40	**16**	28.5	13	5.5	10	38	26	16	6	46	118	156	19	73	86	8	5	25.5	38.5 [3]	51 +1.4	8
	18	32	14																		
	25	38	22	8				25	13		127	174									
50	**22**	38	19	8	10	38	26	25	13	56	127	174	19	73	86	8	5	31.7	44.5 [3]	64 +1.4	10
	25		22																		
	36	50	30	10				32	16		134	188									
63	**25**	38	22	8	10	38	26	25	13	69	130	177	19	76	89	8	5	38	51 [3]	76 +1.4	15
	28	42	24																		
	36	50.7	30	10				32	16		137	191									
	45	60	41	12				38	19		143	203									

ØAL	ØMM	EE		ØD1 [4]		Y	PJ	EW max.	□E	EL max.	ST	ØSB	TS	US	BB	BZ	M_A Nm	X* [7] min.
		Line connection																
		01	02	01	02													
25	**12**	G 1/4	M14x1.5	25	25	33	11	12	38	7	7.5	7	54	70 +1.4	6	M5	5.5	25
	16																	
32	**18**	G 1/4	M14x1.5	25	25	33	11	12	45	7	12	11	64	85 +1.5	6	M5	5.5	25
	22																	
	25																	
40	**16**	G 1/4	M14x1.5	25	25	33	11	9	51	4	12	11	70	91 +1.5	6	M5	5.5	25
	18																	
	25																	
50	**22**	G 1/4	M14x1.5	25	25	33	11	9	63	4	11	11	82.5	104 +1.5	8	M8	23	30
	25																	
	36																	
63	**25**	G 1/4	M14x1.5	25	25	33	11	6	76	1	11	11	95.5	116 +1.5	8	M8	23	30
	28																	
	36																	
	45																	

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Raised cylinder head and base

2) Raised cylinder head except for Ø 32/18 with end position cushioning "U" or "K"

3) Raised cylinder head for: Ø 40/25; Ø 50/36 and Ø 63/45 with end position cushioning "D" or "S"

4) ØD1 max. 0.5 mm deep

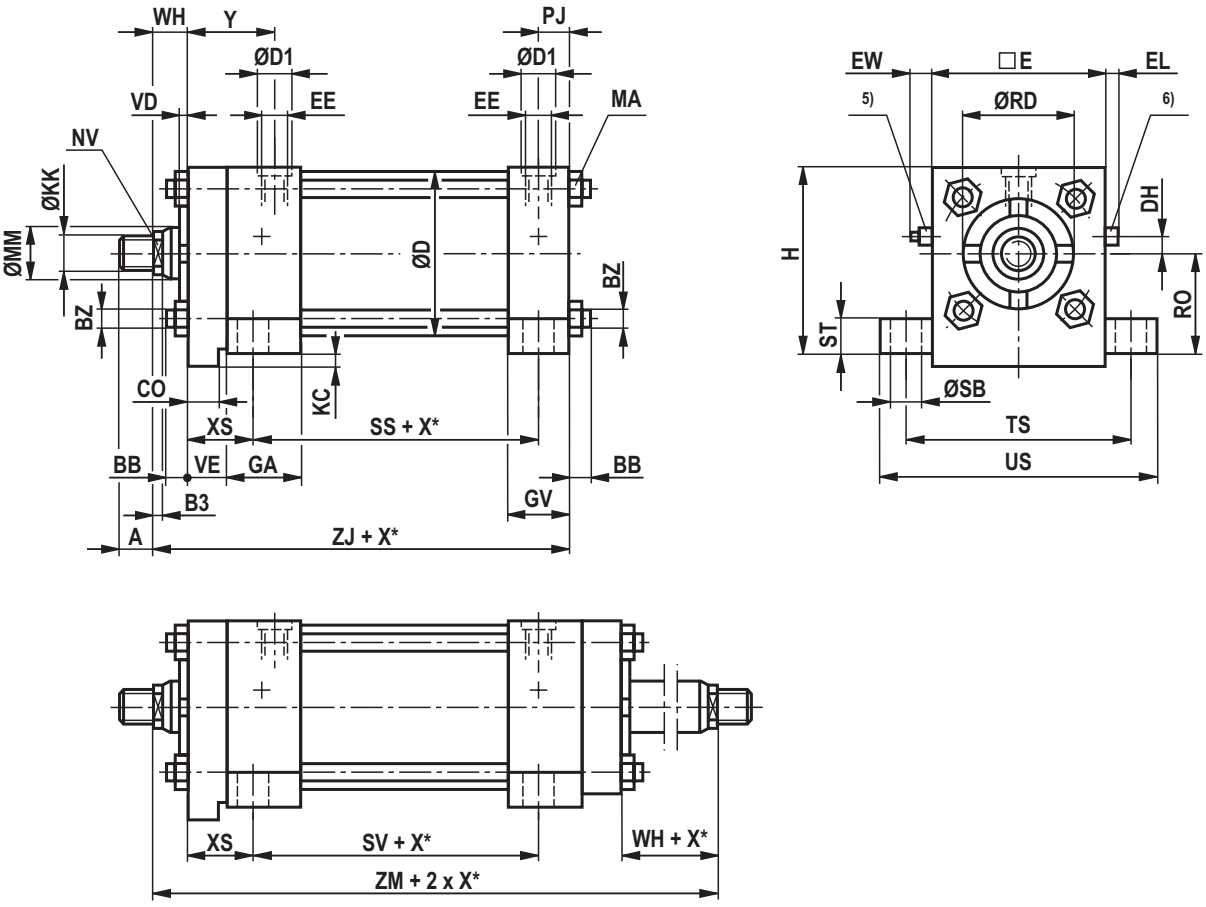
5) Adjustable throttle valve for the end position cushioning

6) Check valve and bleeding

7) Only with piston rod end "E" with double-acting cylinders

Dimensions: Type of mounting L (dimensions in mm)

Piston Ø 80 ... 200 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
80	36	70	M26x1.5	M30x2	M30x2	41	45
	45		M33x2	M39x2		51	
	56		M39x2	M45x2		57	
100	45	70	M33x2	M39x2	M39x3	51	65
	50		M39x2	M45x2		57	
	70		M48x2	M56x2		76	
125	50	70	M39x2	M45x2	M42x3	57	65
	56						
	63		M48x2	M56x2		76	
	90		M64x2	M76x2		89	
150	63	50	M48x2	M56x2	M45x3	76	68
	70						
	80		M58x2	M68x2		89	
	100		M76x2	M95x2		101	
200	90	–	–	–	–	–	–
	100						
	140						

Dimensions: Type of mounting L
(dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	ZM	XS	SS	SV	CO −0.07	KC −0.2	RO h10	H	DH
80	**36**	50	30	10	16	45	33	25	10	86	149	202	28.5	82.5	95	14	8	47.5	95 +1.5	15
	45	60	41	12				32	13		156	216								
	56	70	46	15				35			159	222								
100	**45**	60	41	12	16	45	33	32	13	106	156	216	28.5	82.5	95	14	8	57.1	114 +1.5	15
	50	66.6	46	15				35			159	222								
	70	90	60					41	16		165	234								
125	**50**	66.6	46	15	16	45	33	35	13	135	165	228	33.5	79.5	91	14	8	69.8	140 +1.6	30
	56	70																		
	63	79.3	55					41	16		171	240								
	90	108	75																	
150	**63**	79.3	55	15	19	51	40	38	13	160	184	252	36.5	92	103	18	9.5	82.5	165 +1.6	35
	70	90	60																	
	80	95.2	75																	
	100	120	85																	
200	**90**	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	100																			
	140																			

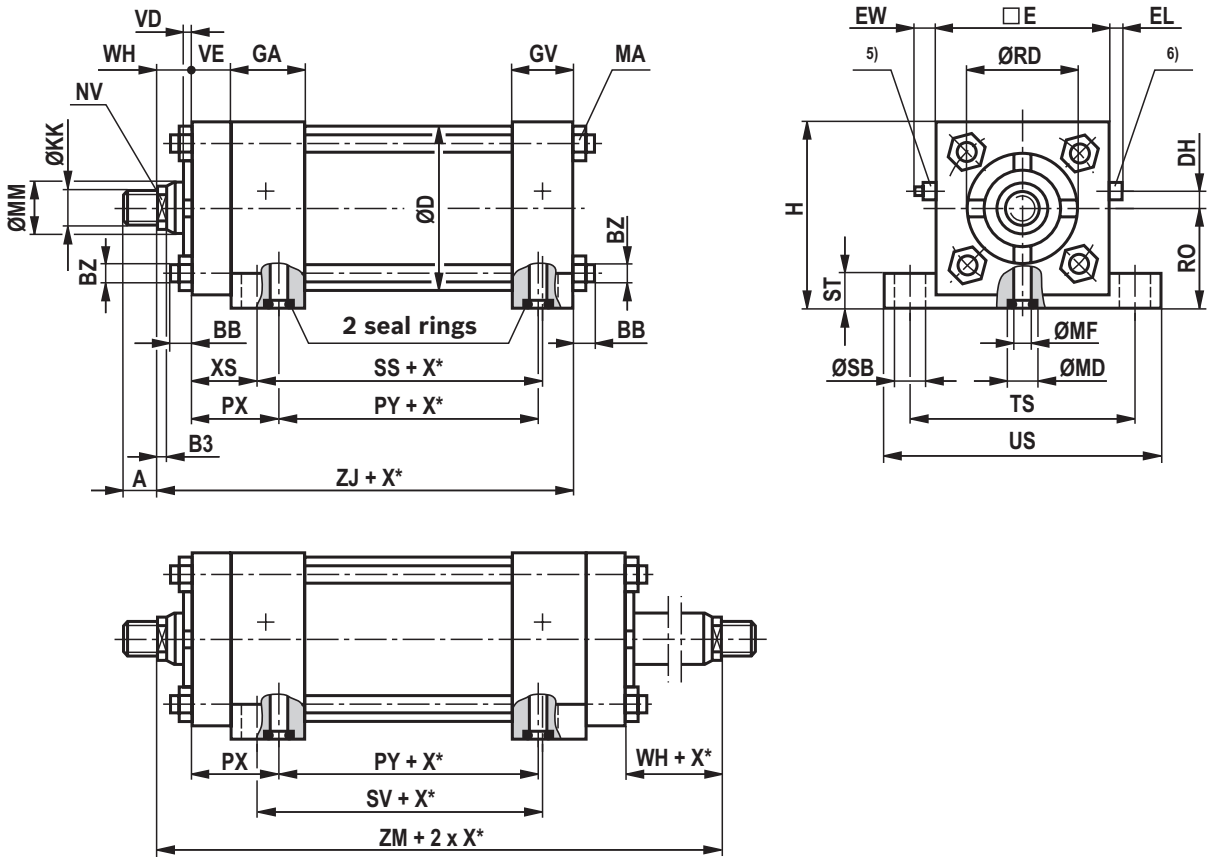
ØAL	ØMM	EE		ØD1 [4]		Y	PJ	EW max.	□E	EL max.	ST	ØSB	TS	US	BB	BZ	M_A Nm	X* [7] min.
		Line connection																
		01	02	01	02													
80	**36**	G 1/2	M22x1.5	34	34	42	14.5	12	95	11	19	14	120.5	145 +1.6	10	M10	46	30
	45																	
	56																	
100	**45**	G 1/2	M22x1.5	34	34	42	14.5	9	114	8	19	14	139.5	164 +1.6	12	M12	80	45
	50																	
	70																	
125	**50**	G 1/2	M22x1.5	34	34	42	14.5	9	140	8	24	23	174.5	210 +1.8	13	M14	125	55
	56																	
	63																	
	90																	
150	**63**	G 3/4	M26x1.5	42	42	48	18	16	165	12	24	23	200	235 +1.8	15	M16	195	75
	70																	
	80																	
	100																	
200	**90**	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	100																	
	140																	

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

4) ØD1 max. 0.5 mm deep
5) Adjustable throttle valve for the end position cushioning
6) Check valve and bleeding
7) Only with piston rod end "E" with double-acting cylinders

Dimensions: Type of mounting M
(dimensions in mm)

Piston Ø 25 ... 63 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
25	12	105	M8x1.25	M10x1.5	M10	15	15
	16		M10x1.5	M12x1.5		19	
32	18	105	M10x1.5	M12x1.5	M12	19	18
	22		M16x1.5	M20x1.5		28	
	25		M20x1.5	M22x1.5			
40	16	105	M10x1.5	M12x1.5	M14	19	21
	18						
	25		M20x1.5	M22x1.5		28	
50	22	105	M16x1.5	M20x1.5	M20x1.5	28	30
	25		M20x1.5	M22x1.5			
	36		M26x1.5	M30x2		41	
63	25	70	M20x1.5	M22x1.5	M24x2	28	36
	28						
	36		M26x1.5	M30x2		41	
	45		M33x2	M39x2		51	

Dimensions: Type of mounting M (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	ZM	XS	SS	SV	PX	PY	RO h10
25	**12**	25.5	10	5.5	10	38	26	16	6.5	31	114	152	17.5	73	85	33	54	19
	16	28.5	13															
32	**18**	32	14	5.5	10	38	26	16	6	38	115	153	19	70	83	33.5	54	22.5
	22	34	19	8				25	13		124	171						
	25	38	22															
40	**16**	28.5	13	5.5	10	38	26	16	6	46	118	156	19	73	86	35	54	25.5
	18	32	14															
	25	38	22	8				25	13		127	174						
50	**22**	38	19	8	10	38	26	25	13	56	127	174	19	73	86	35	54	31.7
	25		22															
	36	50	30	10				32	16		134	188						
63	**25**	38	22	8	10	38	26	25	13	69	130	177	19	76	89	35	57	38
	28	42	24															
	36	50.7	30	10				32	16		137	191						
	45	60	41	12				38	19		143	203						

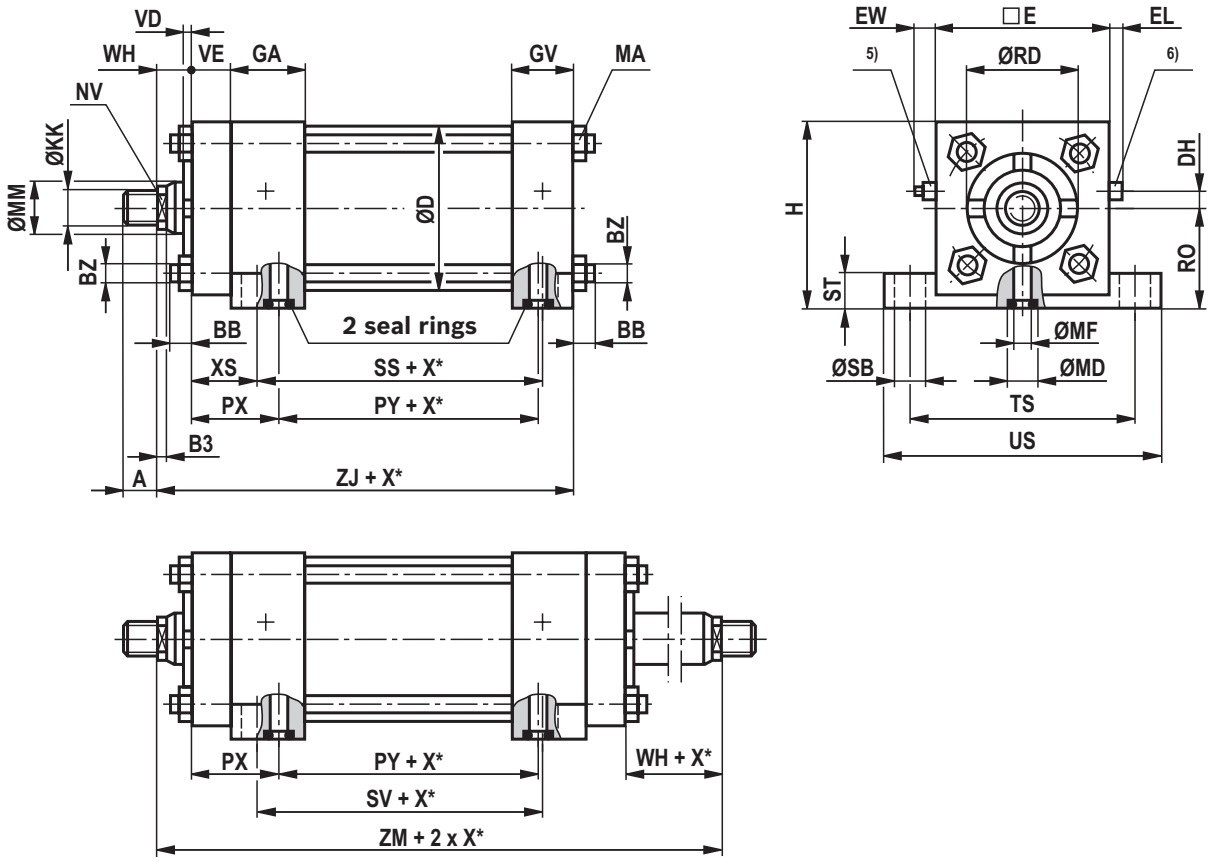
ØAL	ØMM	ST	ØSB	TS	US	EW max.	□E	EL max.	ØMF	ØMD	Seal rings 2x	DH	H	BB	BZ	MA Nm	X* [1] min.
25	**12**	7.5	7	54	70 +1.4	12	38	7	10	17	13 x 2	5	43 +1.3	6	M5	5.5	25
	16																
32	**18**	12	11	64	85 +1.5	12	45	7	10	17	13 x 2	7	46 +1.3	6	M5	5.5	25
	22																
	25																
40	**16**	12	11	70	91 +1.5	9	51	4	12	20	16 x 2	8	51 +1.4	6	M5	5.5	25
	18																
	25																
50	**22**	11	11	82.5	104 +1.5	9	63	4	12	20	16 x 2	10	64 +1.4	8	M8	23	30
	25																
	36																
63	**25**	11	11	95.5	116 +1.5	6	76	1	12	20	16 x 2	15	76 +1.4	8	M8	23	30
	28																
	36																
	45																

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

[1] Only with piston rod end "E" with double-acting cylinders
[5] Adjustable throttle valve for the end position cushioning
[6] Check valve and bleeding

Dimensions: Type of mounting M (dimensions in mm)

Piston Ø 80 ... 200 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
80	36	70	M26x1.5	M30x2	M30x2	41	45
	45		M33x2	M39x2		51	
	56		M39x2	M45x2		57	
100	45	70	M33x2	M39x2	M39x3	51	65
	50		M39x2	M45x2		57	
	70		M48x2	M56x2		76	
125	50	70	M39x2	M45x2	M42x3	57	65
	56						
	63		M48x2	M56x2		76	
	90		M64x2	M76x2		89	
150	63	50	M48x2	M56x2	M45x3	76	68
	70						
	80		M58x2	M68x2		89	
	100		M76x2	M95x2		101	
200	90	40	M64x2	M76x2	M52x3	89	70
	100		M76x2	M95x2		101	
	140		M100x2	M130x2		140	

Dimensions: Type of mounting M (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	ZM	XS	SS	SV	PX	PY	RO h10
80	**36**	50	30	10	16	45	33	25	10	86	149	202	28.5	82.5	95	42.5	67	47.5
	45	60	41	12				32	13		156	216						
	56	70	46	15				35			159	222						
100	**45**	60	41	12	16	45	33	32	13	106	156	216	28.5	82.5	95	42.5	67	57.1
	50	66.6	46	15				35			159	222						
	70	90	60					41	16		165	234						
125	**50**	66.6	46	15	16	45	33	35	13	135	165	228	33.5	79.5	91	42.5	73	69.8
	56	70																
	63	79.3	55					41	16		171	240						
	90	108	75															
150	**63**	79.3	55	15	19	51	40	38	13	160	184	252	36.5	92	103	48.5	79	82.5
	70	90	60															
	80	95.2	75															
	100	120	85															
200	**90**	108	75	15	19	51	40	38	13	215	187	255	36.5	95	106	48.5	82	108
	100	120	85															
	140	158	120															

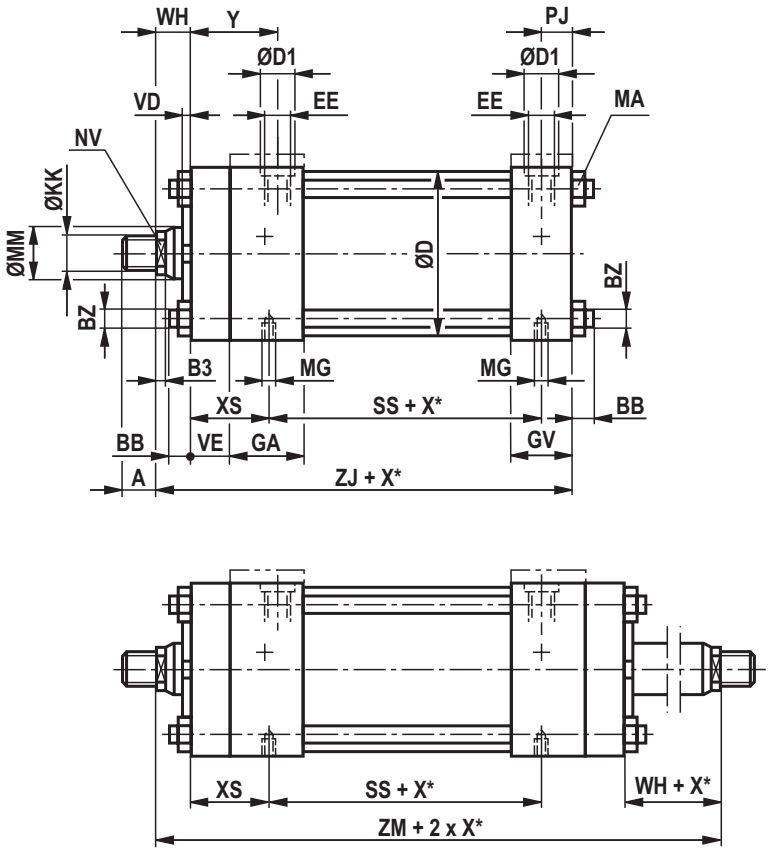
ØAL	ØMM	ST	ØSB	TS	US	EW max.	□E	EL max.	ØMF	ØMD	Seal rings 2x	DH	H	BB	BZ	MA Nm	X* [1] min.
80	**36**	19	14	120.5	145 +1.6	12	95	11	16	24	19 x 2.5	15	95 +1.5	10	M10	46	30
	45																
	56																
100	**45**	19	14	139.5	164 +1.6	9	114	8	16	24	19 x 2.5	15	114 +1.5	12	M12	80	45
	50																
	70																
125	**50**	24	23	174.5	210 +1.8	9	140	8	16	24	19 x 2.5	30	140 +1.6	13	M14	125	55
	56																
	63																
	90																
150	**63**	24	23	200	235 +1.8	16	165	12	22	30	25 x 2.5	35	165 +1.6	15	M16	195	75
	70																
	80																
	100																
200	**90**	24	23	251	286 +1.9	14	216	10	22	30	25 x 2.5	55	216 +1.8	15	M16	195	115
	100																
	140																

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

[1] Only with piston rod end "E" with double-acting cylinders
[5] Adjustable throttle valve for the end position cushioning
[6] Check valve and bleeding

Dimensions: Type of mounting N (dimensions in mm)

Piston Ø 25 ... 63 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
25	12	105	M8x1.25	M10x1.5	M10	15	15
	16		M10x1.5	M12x1.5		19	
32	18	105	M10x1.5	M12x1.5	M12	19	18
	22		M16x1.5	M20x1.5		28	
	25		M20x1.5	M22x1.5			
40	16	105	M10x1.5	M12x1.5	M14	19	21
	18						
	25		M20x1.5	M22x1.5		28	
50	22	105	M16x1.5	M20x1.5	M20x1.5	28	30
	25		M20x1.5	M22x1.5			
	36		M26x1.5	M30x2		41	
63	25	70	M20x1.5	M22x1.5	M24x2	28	36
	28						
	36		M26x1.5	M30x2		41	
	45		M33x2	M39x2		51	

Dimensions: Type of mounting N (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	ZM	XS	SS	RO h10	RH	DH
25	**12**	25.5	10	5.5	10	38	26	16	6.5	31	114	152	33	54	19	24 [1]	5
	16	28.5	13														
32	**18**	32	14	5.5	10	38	26	16	6	38	115	153	33.5	54	22.5	35.5 [2]	7
	22	34	19	8				25	13		124	171					
	25	38	22														
40	**16**	28.5	13	5.5	10	38	26	16	6	46	118	156	33.5	57	25.5	38.5 [3]	8
	18	32	14														
	25	38	22	8				25	13		127	174					
50	**22**	38	19	8	10	38	26	25	13	56	127	174	33.5	57	31.5	44.5 [3]	10
	25		22														
	36	50	30	10				32	16		134	188					
63	**25**	38	22	8	10	38	26	25	13	69	130	177	33.5	60.5	38	51 [3]	15
	28	42	24														
	36	50.7	30	10				32	16		137	191					
	45	60	41	12				38	19		143	203					

ØAL	ØMM	EE		ØD1 [4]		EW max.	□E	EL max.	Y	PJ	MG	B2	BG	BB	BZ	M_A Nm	X* [7] min.
		Line connection															
		01	02	01	02												
25	**12**	G 1/4	M14x1.5	25	25	12	38	7	33	11	M5	6	13.5	6	M5	5.5	25
	16																
32	**18**	G 1/4	M14x1.5	25	25	12	45	7	33	11	M6	9	14.5	6	M5	5.5	25
	22											7					
	25																
40	**16**	G 1/4	M14x1.5	25	25	9	51	4	33	11	M6	9	15.5	6	M5	5.5	25
	18											6					
	25																
50	**22**	G 1/4	M14x1.5	25	25	9	63	4	33	11	M8	12	22	8	M8	23	30
	25																
	36											8					
63	**25**	G 1/4	M14x1.5	25	25	6	76	1	33	11	M10	15	31	8	M8	23	30
	28											16					
	36											9					
	45																

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Raised cylinder head and base

2) Raised cylinder head except for Ø 32/18 with end position cushioning "U" or "K"

3) Raised cylinder head for: Ø 40/25; Ø 50/36 and Ø 63/45 with end position cushioning "D" or "S"

4) ØD1 max. 0.5 mm deep

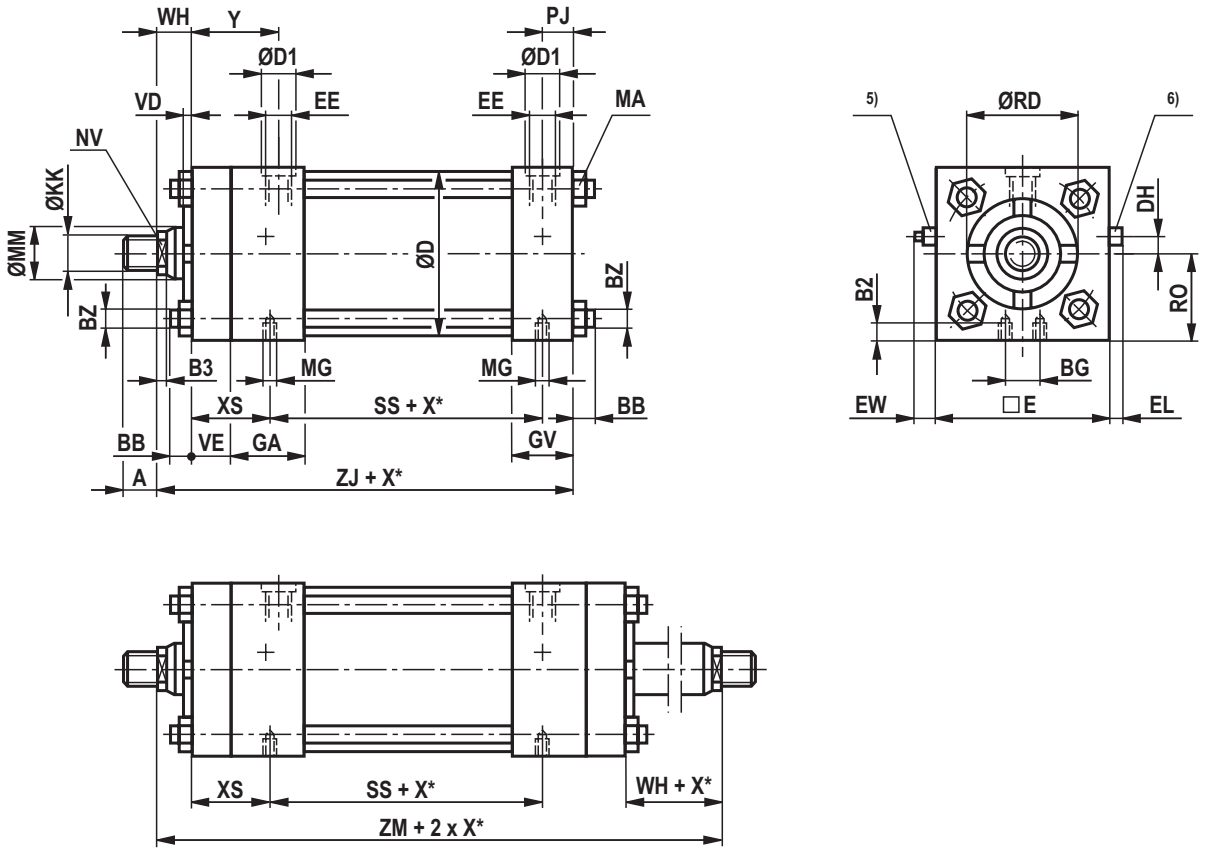
5) Adjustable throttle valve for the end position cushioning

6) Check valve and bleeding

7) Only with piston rod end "E" with double-acting cylinders

Dimensions: Type of mounting N (dimensions in mm)

Piston Ø 80 ... 200 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
80	36	70	M26x1.5	M30x2	M30x2	41	45
	45		M33x2	M39x2		51	
	56		M39x2	M45x2		57	
100	45	70	M33x2	M39x2	M39x3	51	65
	50		M39x2	M45x2		57	
	70		M48x2	M56x2		76	
125	50	70	M39x2	M45x2	M42x3	57	65
	56						
	63		M48x2	M56x2		76	
	90		M64x2	M76x2		89	
150	63	50	M48x2	M56x2	M45x3	76	68
	70						
	80		M58x2	M68x2		89	
	100		M76x2	M95x2		101	
200	90	40	M64x2	M76x2	M52x3	89	70
	100		M76x2	M95x2		101	
	140		M100x2	M130x2		140	

Dimensions: Type of mounting N
(dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	ZM	XS	SS	RO h10	DH
80	**36**	50	30	10	16	45	33	25	10	86	149	202	42.5	67	47.5	15
	45	60	41	12				32	13		156	216				
	56	70	46	15				35			159	222				
100	**45**	60	41	12	16	45	33	32	13	106	156	216	42.5	67	57	20
	50	66.6	46	15				35			159	222				
	70	90	60					41	16		165	234				
125	**50**	66.6	46	15	16	45	33	35	13	135	165	228	42.5	73	70	30
	56	70														
	63	79.3	55					41	16		171	240				
	90	108	75													
150	**63**	79.3	55	15	19	51	40	38	13	160	184	252	48.5	79	82.5	35
	70	90	60													
	80	95.2	75													
	100	120	85													
200	**90**	108	75	15	19	51	40	38	13	215	187	255	48.5	82	108	55
	100	120	85													
	140	158	120													

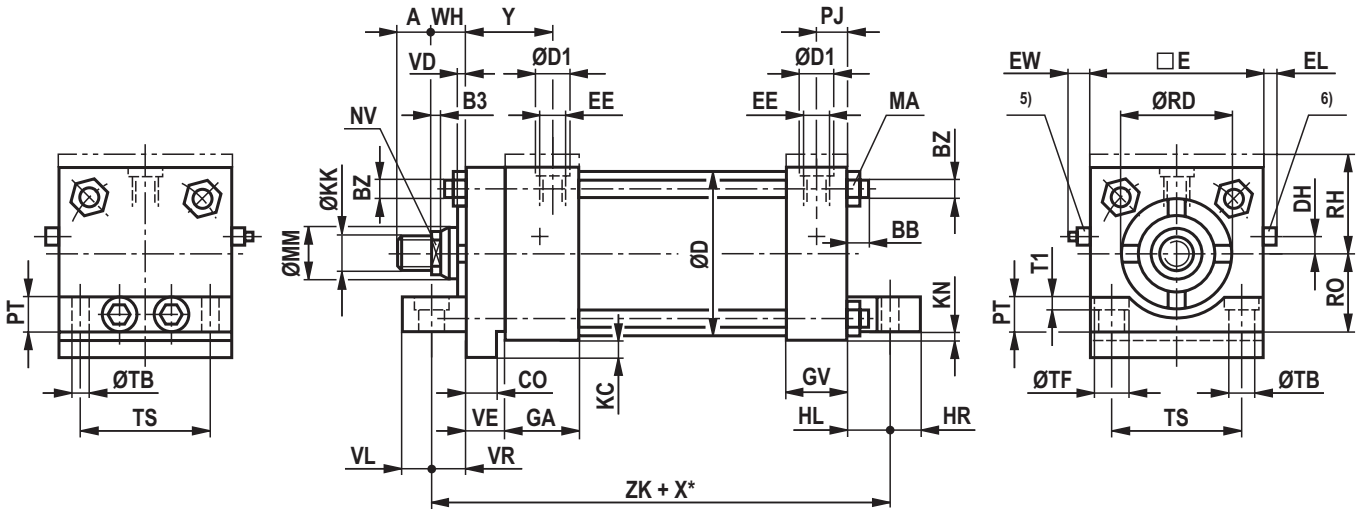
ØAL	ØMM	EE		ØD1 [4]		EW max.	□E	EL max.	Y	PJ	MG	B2	BG	BB	BZ	M_A Nm	X* [7] min.
		Line connection															
		01	02	01	02												
80	**36**	G 1/2	M22x1.5	34	34	12	95	11	42	14.5	M12	20	38	10	M10	46	30
	45											13					
	56																
100	**45**	G 1/2	M22x1.5	34	34	9	114	8	42	14.5	M12	25	52	12	M12	80	45
	50											20					
	70											15					
125	**50**	G 1/2	M22x1.5	34	34	9	140	8	42	14.5	M16	25	66	13	M14	125	55
	56																
	63											19					
	90																
150	**63**	G 3/4	M26x1.5	42	42	16	165	12	48	18	M20	35	80	15	M16	195	75
	70																
	80											30					
	100											25					
200	**90**	G 3/4	M26x1.5	42	42	14	216	10	48	18	M20	40	114.5	15	M16	195	115
	100																
	140											28					

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

[4] ØD1 max. 0.5 mm deep
[5] Adjustable throttle valve for the end position cushioning
[6] Check valve and bleeding
[7] Only with piston rod end "E" with double-acting cylinders

Dimensions: Type of mounting T (dimensions in mm)

Piston Ø 25 ... 63 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
25	12	–	–	–	–	–	–
	16						
32	18	105	M10x1.5	M12x1.5	M12	19	18
	22		M16x1.5	M20x1.5		28	
	25		M20x1.5	M22x1.5			
40	16	105	M10x1.5	M12x1.5	M14	19	21
	18						
	25		M20x1.5	M22x1.5		28	
50	22	105	M16x1.5	M20x1.5	M20x1.5	28	30
	25		M20x1.5	M22x1.5			
	36		M26x1.5	M30x2		41	
63	25	70	M20x1.5	M22x1.5	M24x2	28	36
	28						
	36		M26x1.5	M30x2		41	
	45		M33x2	M39x2		51	

Dimensions: Type of mounting T (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZK	RO −0.2	RH	DH	EW max.	□E	EL max.	VL	VR	CO −0.07	KC −0.2
25	**12**	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	16																				
32	**18**	32	14	5.5	10	38	26	16	6	38	137	22.5	35.5 [1]	7	12	45	7	7	19	8	5
	22	34	19	8				25	13												
	25	38	22																		
40	**16**	28.5	13	5.5	10	38	26	16	6	46	140	25.5	38.5 [2]	8	9	51	4	6.5	19.5	8	5
	18	32	14																		
	25	38	22	8				25	13												
50	**22**	38	19	8	10	38	26	25	13	56	149	31.7	44.5 [2]	10	9	63	4	7.5	23.5	8	5
	25		22																		
	36	50	30	10				32	16												
63	**25**	38	22	8	10	38	26	25	13	69	159	38	51 [2]	15	6	76	1	8	27	8	5
	28	42	24																		
	36	50.7	30	10				32	16												
	45	60	41	12				38	19												

ØAL	ØMM	EE		ØD1 [3]		Y	PJ	HL	HR	KN −0.4	PT	TS	T1	ØTF	ØTB	BB	BZ	M_A Nm
		Line connection																
		01	02	01	02													
25	**12**	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	16																	
32	**18**	G 1/4	M14x1.5	25	25	33	11	19	7	0.2	11	33	2	11	6.6	6	M5	5.5
	22																	
	25																	
40	**16**	G 1/4	M14x1.5	25	25	33	11	18.5	7.5	0.2	14	36.5	5	14	9	6	M5	5.5
	18																	
	25																	
50	**22**	G 1/4	M14x1.5	25	25	33	11	23.5	7.5	0.2	19	46.5	5	14	9.5	8	M8	23
	25																	
	36																	
63	**25**	G 1/4	M14x1.5	25	25	33	11	27	8	0.2	22	55.5	4.5	14	9.5	8	M8	23
	28																	
	36																	
	45																	

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Raised cylinder head except for Ø 32/18 with end position cushioning "U" or "K"

2) Raised cylinder head for: Ø 40/25; Ø 50/36 and Ø 63/45 with end position cushioning "D" or "S"

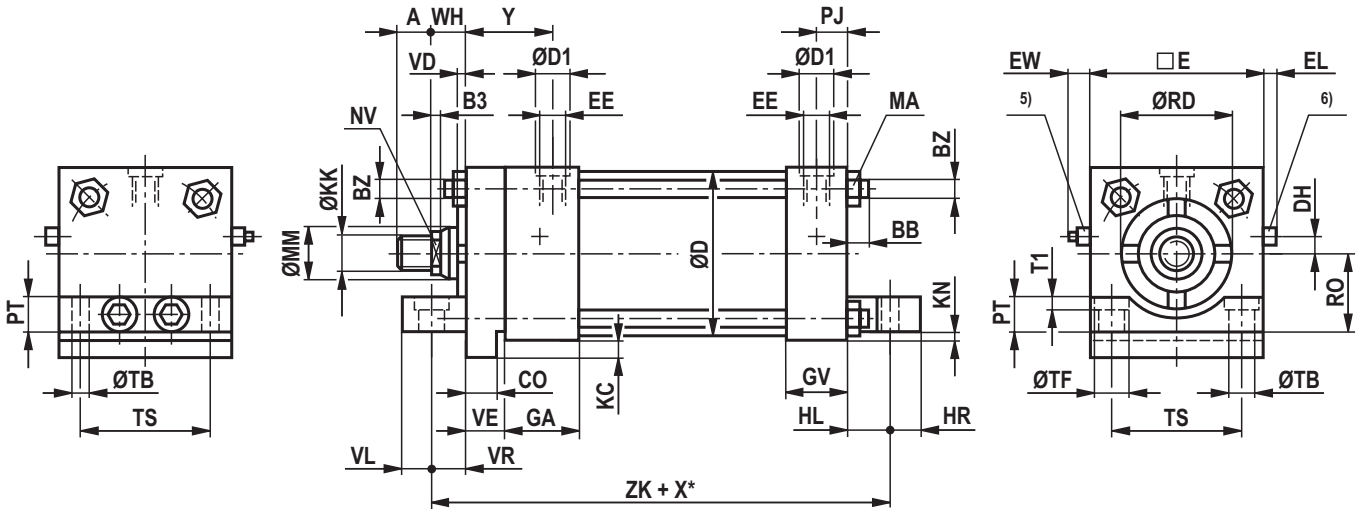
3) ØD1 max. 0.5 mm deep

5) Adjustable throttle valve for the end position cushioning

6) Check valve and bleeding

Dimensions: Type of mounting T (dimensions in mm)

Piston Ø 80 ... 200 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
80	36	70	M26x1.5	M30x2	M30x2	41	45
	45		M33x2	M39x2		51	
	56		M39x2	M45x2		57	
100	45	70	M33x2	M39x2	M39x3	51	65
	50		M39x2	M45x2		57	
	70		M48x2	M56x2		76	
125	50	70	M39x2	M45x2	M42x3	57	65
	56						
	63		M48x2	M56x2		76	
	90		M64x2	M76x2		89	
150	63	50	M48x2	M56x2	M45x3	76	68
	70						
	80		M58x2	M68x2		89	
	100		M76x2	M95x2		101	
200	90	–	–	–	–	–	–
	100						
	140						

Dimensions: Type of mounting T
(dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZK	RO −0.2	DH	EW max.	□E	EL max.	VL	VR	CO −0.07	KC −0.2
80	**36**	50	30	10	16	45	33	25	10	86	168	47.5	15	12	95	11	10	22	14	8
	45	60	41	12				32	13											
	56	70	46	15				35												
100	**45**	60	41	12	16	45	33	32	13	106	174.5	57.1	20	9	114	8	11	26	14	8
	50	66.6	46	15				35												
	70	90	60					41	16											
125	**50**	66.6	46	15	16	45	33	35	13	135	184	69.8	30	9	140	8	13	27	14	8
	56	70																		
	63	79.3	55					41	16											
	90	108	75																	
150	**63**	79.3	55	15	19	51	40	38	13	160	197	82.5	35	16	165	12	14.5	25.5	18	9.5
	70	90	60																	
	80	95.2	75																	
	100	120	85																	
200	**90**	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	100																			
	140																			

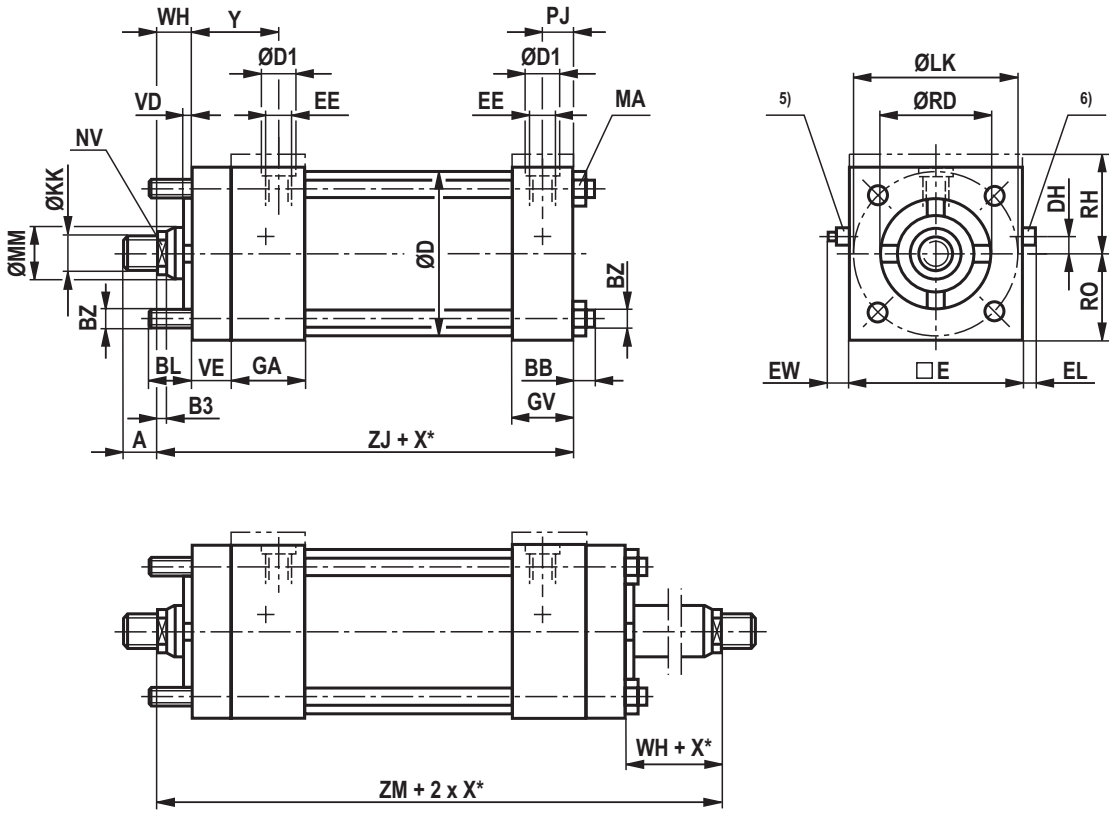
ØAL	ØMM	EE		ØD1 3)		Y	PJ	HL	HR	KN −0.4	PT	TS	T1	ØTF	ØTB	BB	BZ	M_A Nm
		Line connection																
		01	02	01	02													
80	**36**	G 1/2	M22x1.5	34	34	42	14.5	22	10	0.2	25	70	5	18	11	10	M10	46
	45																	
	56																	
100	**45**	G 1/2	M22x1.5	34	34	42	14.5	24.5	12.5	0.2	32	84.5	5	18	11	12	M12	80
	50																	
	70																	
125	**50**	G 1/2	M22x1.5	34	34	42	14.5	27	13	0.2	38	104	6	20	14	13	M14	125
	56																	
	63																	
	90																	
150	**63**	G 3/4	M26x1.5	42	42	48	18	25.5	14.5	0.2	40	124	–	–	14	15	M16	195
	70																	
	80																	
	100																	
200	**90**	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	100																	
	140																	

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

3) ØD1 max. 0.5 mm deep
5) Adjustable throttle valve for the end position cushioning
6) Check valve and bleeding

Dimensions: Type of mounting P
(dimensions in mm)

Piston Ø 25 ... 63 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
25	12	105	M8x1.25	M10x1.5	M10	15	15
	16		M10x1.5	M12x1.5		19	
32	18	105	M10x1.5	M12x1.5	M12	19	18
	22		M16x1.5	M20x1.5		28	
	25		M20x1.5	M22x1.5			
40	16	105	M10x1.5	M12x1.5	M14	19	21
	18						
	25		M20x1.5	M22x1.5		28	
50	22	105	M16x1.5	M20x1.5	M20x1.5	28	30
	25		M20x1.5	M22x1.5			
	36		M26x1.5	M30x2		41	
63	25	70	M20x1.5	M22x1.5	M24x2	28	36
	28						
	36		M26x1.5	M30x2		41	
	45		M33x2	M39x2		51	

Dimensions: Type of mounting P
(dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	ZM	RO	RH	DH	EW max.	□E	EL max.
25	**12**	25.5	10	5.5	10	38	26	16	6.5	31	114	152	19	24 [1]	5	12	38	7
	16	28.5	13															
32	**18**	32	14	5.5	10	38	26	16	6	38	115	153	22.5	35.5 [2]	7	12	45	7
	22	34	19	8				25	13		124	171						
	25	38	22															
40	**16**	28.5	13	5.5	10	38	26	16	6	46	118	156	25.5	38.5 [3]	8	9	51	4
	18	32	14															
	25	38	22	8				25	13		127	174						
50	**22**	38	19	8	10	38	26	25	13	56	127	174	31.5	44.5 [3]	10	9	63	4
	25		22															
	36	50	30	10				32	16		134	188						
63	**25**	38	22	8	10	38	26	25	13	69	130	177	38	51 [3]	15	6	76	1
	28	42	24															
	36	50.7	30	10				32	16		137	191						
	45	60	41	12				38	19		143	203						

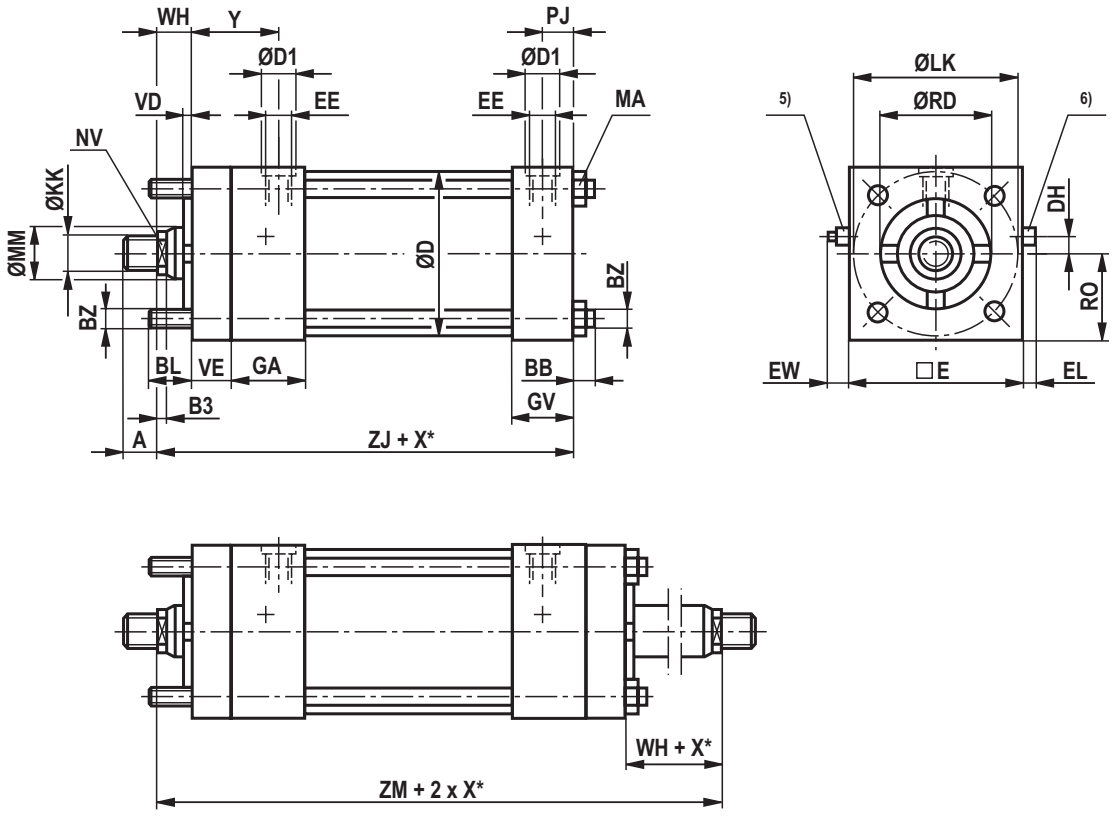
ØAL	ØMM	EE		ØD1 [4]		Y	PJ	ØLK	BL	BB	BZ	M_A Nm	X* [7] min.
		Line connection											
		01	**02**	**01**	**02**								
25	**12**	G 1/4	M14x1.5	25	25	33	11	39	20	6	M5	5.5	25
	16												
32	**18**	G 1/4	M14x1.5	25	25	33	11	46.5	20	6	M5	5.5	25
	22												
	25												
40	**16**	G 1/4	M14x1.5	25	25	33	11	51.5	25	6	M5	5.5	25
	18												
	25												
50	**22**	G 1/4	M14x1.5	25	25	33	11	66	28	8	M8	23	30
	25												
	36												
63	**25**	G 1/4	M14x1.5	25	25	33	11	78.5	28	8	M8	23	30
	28												
	36												
	45												

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

1) Raised cylinder head and base
2) Raised cylinder head except for Ø 32/18 with end position cushioning "U" or "K"
3) Raised cylinder head for: Ø 40/25; Ø 50/36 and Ø 63/45 with end position cushioning "D" or "S"
4) ØD1 max. 0.5 mm deep
5) Adjustable throttle valve for the end position cushioning
6) Check valve and bleeding
7) Only with piston rod end "E" with double-acting cylinders

Dimensions: Type of mounting P (dimensions in mm)

Piston Ø 80 ... 200 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
80	36	70	M26x1.5	M30x2	M30x2	41	45
	45		M33x2	M39x2		51	
	56		M39x2	M45x2		57	
100	45	70	M33x2	M39x2	M39x3	51	65
	50		M39x2	M45x2		57	
	70		M48x2	M56x2		76	
125	50	70	M39x2	M45x2	M42x3	57	65
	56						
	63		M48x2	M56x2		76	
	90		M64x2	M76x2		89	
150	63	50	M48x2	M56x2	M45x3	76	68
	70						
	80		M58x2	M68x2		89	
	100		M76x2	M95x2		101	
200	90	40	M64x2	M76x2	M52x3	89	70
	100		M76x2	M95x2		101	
	140		M100x2	M130x2		140	

Dimensions: Type of mounting P
(dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	ZM	RO	DH	EW max.	□E	EL max.
80	**36**	50	30	10	16	45	33	25	10	86	149	202	47.5	15	12	95	11
	45	60	41	12				32	13		156	216					
	56	70	46	15				35			159	222					
100	**45**	60	41	12	16	45	33	32	13	106	156	216	57	20	9	114	8
	50	66.6	46	15				35			159	222					
	70	90	60					41	16		165	234					
125	**50**	66.6	46	15	16	45	33	35	13	135	165	228	70	30	9	140	8
	56	70															
	63	79.3	55					41	16		171	240					
	90	108	75														
150	**63**	79.3	55	15	19	51	40	38	13	160	184	252	82.5	35	16	165	12
	70	90	60														
	80	95.2	75														
	100	120	85														
200	**90**	108	75	15	19	51	40	38	13	215	187	255	108	55	14	216	10
	100	120	85														
	140	158	120														

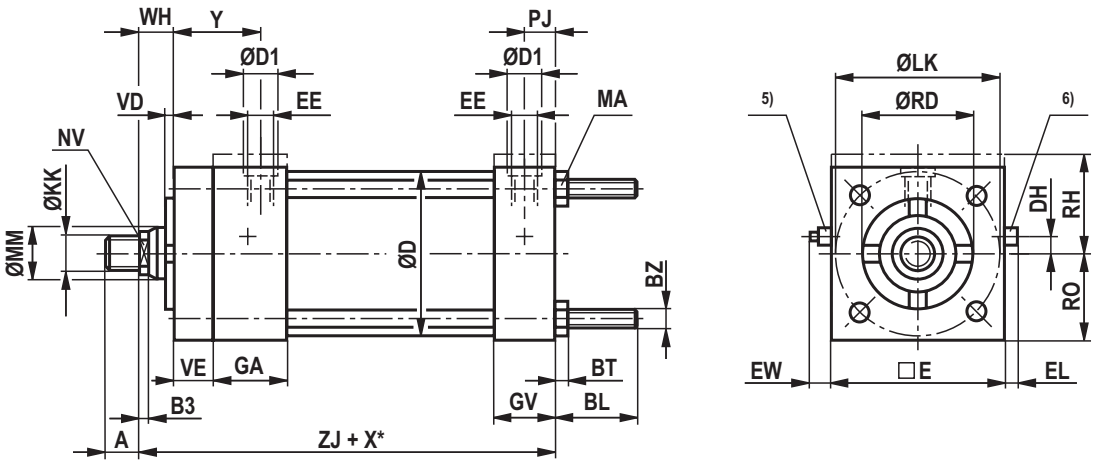
ØAL	ØMM	EE		ØD1 [4]		Y	PJ	ØLK	BL	BB	BZ	M_A Nm	X* [7] min.
		Line connection											
		01	**02**	**01**	**02**								
80	**36**	G 1/2	M22x1.5	34	34	42	14.5	99	35	10	M10	46	30
	45												
	56												
100	**45**	G 1/2	M22x1.5	34	34	42	14.5	119.5	35	12	M12	80	45
	50												
	70												
125	**50**	G 1/2	M22x1.5	34	34	42	14.5	150	45	13	M14	125	55
	56												
	63												
	90												
150	**63**	G 3/4	M26x1.5	42	42	48	18	177	45	15	M16	195	75
	70												
	80												
	100												
200	**90**	G 3/4	M26x1.5	42	42	48	18	232	58	15	M16	195	115
	100												
	140												

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

[4] ØD1 max. 0.5 mm deep
[5] Adjustable throttle valve for the end position cushioning
[6] Check valve and bleeding
[7] Only with piston rod end "E" with double-acting cylinders

Dimensions: Type of mounting Q (dimensions in mm)

Piston Ø 25 ... 63 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
25	12	105	M8x1.25	M10x1.5	M10	15	15
	16		M10x1.5	M12x1.5		19	
32	18	105	M10x1.5	M12x1.5	M12	19	18
	22		M16x1.5	M20x1.5		28	
	25		M20x1.5	M22x1.5			
40	16	105	M10x1.5	M12x1.5	M14	19	21
	18						
	25		M20x1.5	M22x1.5		28	
50	22	105	M16x1.5	M20x1.5	M20x1.5	28	30
	25		M20x1.5	M22x1.5			
	36		M26x1.5	M30x2		41	
63	25	70	M20x1.5	M22x1.5	M24x2	28	36
	28						
	36		M26x1.5	M30x2		41	
	45		M33x2	M39x2		51	

Dimensions: Type of mounting Q (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	RO	RH	DH	EW max.	□E	EL max.
25	**12**	25.5	10	5.5	10	38	26	16	6.5	31	114	19	24 [1]	5	12	38	7
	16	28.5	13														
32	**18**	32	14	5.5	10	38	26	16	6	38	115	22.5	35.5 [2]	7	12	45	7
	22	34	19	8				25	13		124						
	25	38	22														
40	**16**	28.5	13	5.5	10	38	26	16	6	46	118	25.5	38.5 [3]	8	9	51	4
	18	32	14														
	25	38	22	8				25	13		127						
50	**22**	38	19	8	10	38	26	25	13	56	127	31.5	44.5 [3]	10	9	63	4
	25		22														
	36	50	30	10				32	16		134						
63	**25**	38	22	8	10	38	26	25	13	69	130	38	51 [3]	15	6	76	1
	28	42	24														
	36	50.7	30	10				32	16		137						
	45	60	41	12				38	19		143						

ØAL	ØMM	EE		ØD1 [4]		Y	PJ	ØLK	BL	BT	BZ	M_A Nm
		Line connection										
		01	02	01	02							
25	**12**	G 1/4	M14x1.5	25	25	33	11	39	20	4	M5	5.5
	16											
32	**18**	G 1/4	M14x1.5	25	25	33	11	46.5	20	4	M5	5.5
	22											
	25											
40	**16**	G 1/4	M14x1.5	25	25	33	11	51.5	25	4	M5	5.5
	18											
	25											
50	**22**	G 1/4	M14x1.5	25	25	33	11	66	28	6.5	M8	23
	25											
	36											
63	**25**	G 1/4	M14x1.5	25	25	33	11	78.5	28	6.5	M8	23
	28											
	36											
	45											

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Raised cylinder head and base

2) Raised cylinder head except for Ø 32/18 with end position cushioning "U" or "K"

3) Raised cylinder head for: Ø 40/25; Ø 50/36 and Ø 63/45 with end position cushioning "D" or "S"

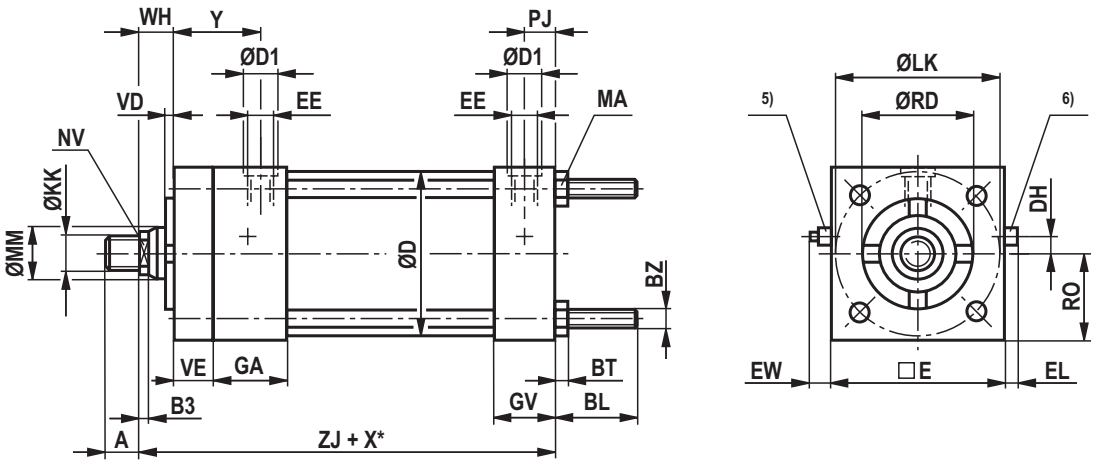
4) ØD1 max. 0.5 mm deep

5) Adjustable throttle valve for the end position cushioning

6) Check valve and bleeding

Dimensions: Type of mounting Q (dimensions in mm)

Piston Ø 80 ... 200 mm



ØAL	ØMM	Operating pressure in bar	KK			A	
			Piston rod end				
			C, E	B	F	C, E, B	F
80	36	70	M26x1.5	M30x2	M30x2	41	45
	45		M33x2	M39x2		51	
	56		M39x2	M45x2		57	
100	45	70	M33x2	M39x2	M39x3	51	65
	50		M39x2	M45x2		57	
	70		M48x2	M56x2		76	
125	50	70	M39x2	M45x2	M42x3	57	65
	56						
	63		M48x2	M56x2		76	
	90		M64x2	M76x2		89	
150	63	50	M48x2	M56x2	M45x3	76	68
	70						
	80		M58x2	M68x2		89	
	100		M76x2	M95x2		101	
200	90	40	M64x2	M76x2	M52x3	89	70
	100		M76x2	M95x2		101	
	140		M100x2	M130x2		140	

Dimensions: Type of mounting Q (dimensions in mm)

ØAL	ØMM	ØRD f7	NV	B3	VE	GA	GV	WH	VD	ØD	ZJ	RO	DH	EW max.	□E	EL max.
80	**36**	50	30	10	16	45	33	25	10	86	149	47.5	15	12	95	11
	45	60	41	12				32	13		156					
	56	70	46	15				35			159					
100	**45**	60	41	12	16	45	33	32	13	106	156	57	20	9	114	8
	50	66.6	46	15				35			159					
	70	90	60					41	16		165					
125	**50**	66.6	46	15	16	45	33	35	13	135	165	70	30	9	140	8
	56	70														
	63	79.3	55					41	16		171					
	90	108	75													
150	**63**	79.3	55	15	19	51	40	38	13	160	184	82.5	35	16	165	12
	70	90	60													
	80	95.2	75													
	100	120	85													
200	**90**	108	75	15	19	51	40	38	13	215	187	108	55	14	216	10
	100	120	85													
	140	158	120													

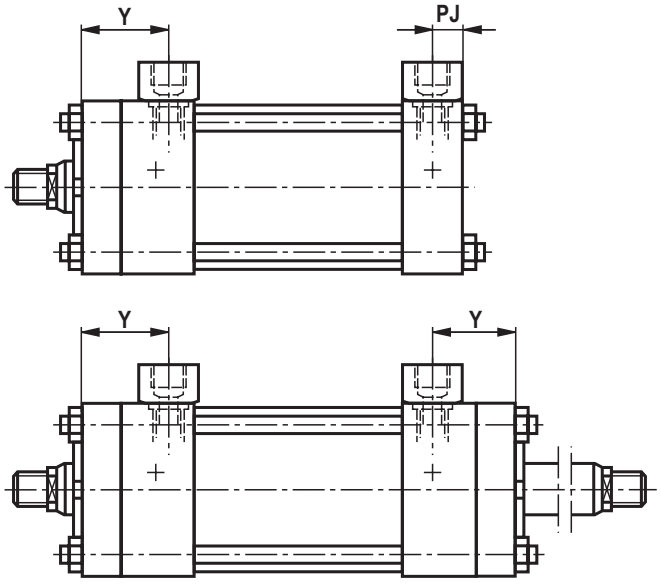
ØAL	ØMM	EE		ØD1 [4]		Y	PJ	ØLK	BL	BT	BZ	M_A Nm
		Line connection										
		01	**02**	**01**	**02**							
80	**36**	G 1/2	M22x1.5	34	34	42	14.5	99	35	8	M10	46
	45											
	56											
100	**45**	G 1/2	M22x1.5	34	34	42	14.5	119.5	35	10	M12	80
	50											
	70											
125	**50**	G 1/2	M22x1.5	34	34	42	14.5	150	45	11	M14	125
	56											
	63											
	90											
150	**63**	G 3/4	M26x1.5	42	42	48	18	177	45	13	M16	195
	70											
	80											
	100											
200	**90**	G 3/4	M26x1.5	42	42	48	18	232	58	13	M16	195
	100											
	140											

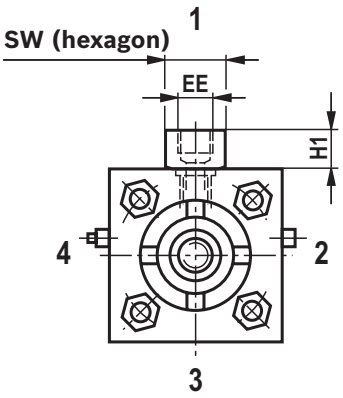
ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length

[4] ØD1 max. 0.5 mm deep
[5] Adjustable throttle valve for the end position cushioning
[6] Check valve and bleeding

Enlarged line connection 13 and 14

(dimensions in mm)



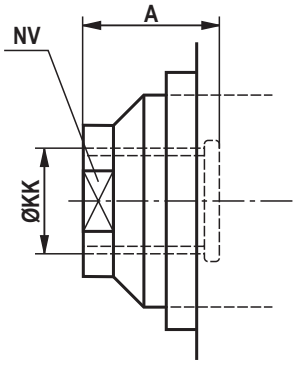


ØAL	EE Line connection		Y	PJ	SW	H1
	13	14				
25	G 3/8	M16 x 1.5	33	11	27	20
32	G 3/8	M16 x 1.5	33	11	27	20
40	G 3/8	M16 x 1.5	33	11	27	20
50	G 3/8	M16 x 1.5	33	11	27	20
63	G 3/8	M16 x 1.5	33	11	27	20
80	G 3/4	M26 x 1.5	42	14.5	41	29
100	G 3/4	M26 x 1.5	42	14.5	41	29
125	G 3/4	M26 x 1.5	42	14.5	41	29
150	G 1	M33 x 2	48	18	46	33
200	G 1	M33 x 2	48	18	46	33

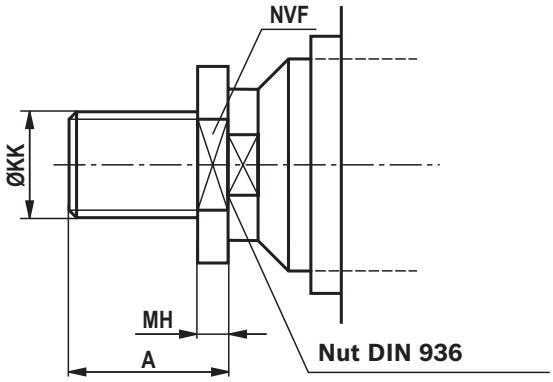
ØAL = Piston Ø

Piston rod ends "E" and "F"
(dimensions in mm)

Piston rod end "E"



Piston rod end "F"

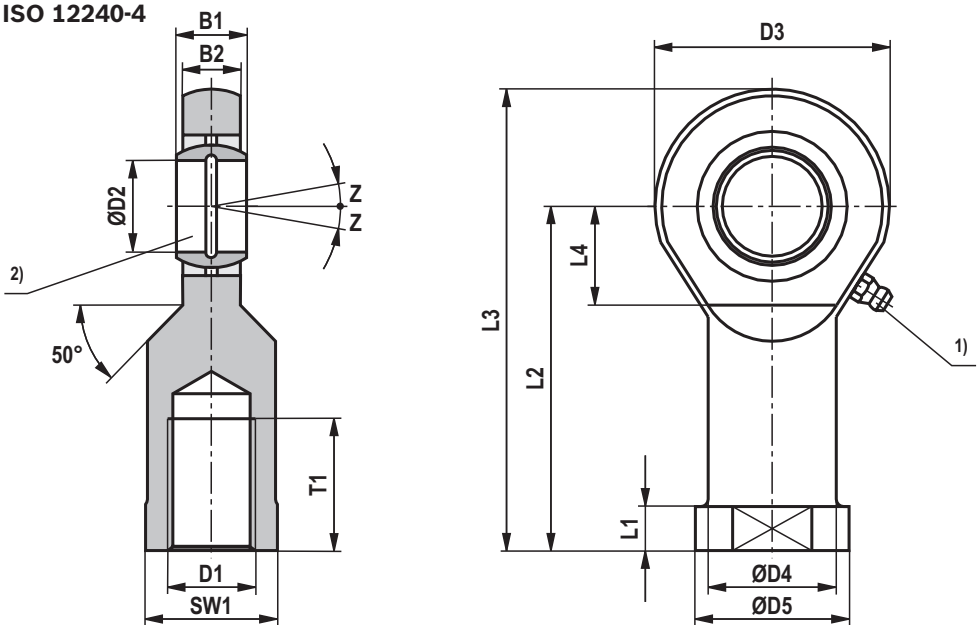


ØAL	ØMM	KK		A		NV	NVF	MH
		Piston rod end						
		E	F	E	F			
25	**12**	M8x1.25	M10	15	15	10	17	6
	16	M10x1.5		19		13		
32	**18**	M10x1.5	M12	19	18	14	19	7
	22	M16x1.5		28		19		
	25	M20x1.5				22		
40	**16**	M10x1.5	M14	19	21	13	22	8
	18					14		
	25	M20x1.5		28		22		
50	**22**	M16x1.5	M20x1.5	28	30	19	30	9
	25	M20x1.5				22		
	36	M26x1.5		41		30		
63	**25**	M20x1.5	M24x2	28	36	22	36	10
	28							
	36	M26x1.5		41		30		
	45	M33x2		51		41		
80	**36**	M26x1.5	M30x2	41	45	30	46	12
	45	M33x2		51		41		
	56	M39x2		57		46		
100	**45**	M33x2	M39x3	51	65	41	60	16
	50	M39x2		57		46		
	70	M48x2		76		60		
125	**50**	M39x2	M42x3	57	65	46	65	16
	56							
	63	M48x2		76		55		
	90	M64x2		89		75		
150	**63**	M48x2	M45x3	76	68	55	70	18
	70					60		
	80	M58x2		89		75		
	100	M76x2		101		85		
200	**90**	M64x2	M52x3	89	70	75	80	20
	100	M76x2		101		85		
	140	M100x2		140		120		

ØAL = Piston Ø ØMM = Piston rod Ø

Dimensions: Swivel head CGK
(dimensions in mm)

ISO 12240-4



Notice!
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, the usability must be checked.

ØAL	Type	Material no.	B1 -0.12	B2	D1	ØD2 h5	D3 max.	ØD4 max.	ØD5 max.
25	**CGK 10** [3]	R900001653	9	7	M10	10	30	16	20
32	**CGK 12** [3]	R900001327	10	8	M12	12	35	19	23
40	**CGK 15** [4]	R900001328	12	10	M14	15	41	22	27
50	**CGK 20** [4]	R900001329	16	13	M20x1.5	20	54	28	36
63	**CGK 25**	R900001330	20	17	M24x2	25	65	35	44
80	**CGK 30**	R900001331	22	19	M30x2	30	75	42	52
100	**CGK 40**	R900001332	28	23	M39x3	40	94	52	67
125	**CGK 45**	R900001333	32	27	M42x3	45	104	58	72
150	**CGK 50**	R900001334	35	30	M45x3	50	114	62	77
200	**CGK 60**	R900001335	44	38	M52x3	60	137	70	90

ØAL	Type	L1	L2	L3 max.	L4 min.	T1 min.	SW1 [5]	Z [5]	*m* kg	C_0 [6] kN	F_{adm} [7] kN
25	**CGK 10** [3]	6.5	43	60	13	15	15 / 16	12° – 15°	0.07	17.6	5.8
32	**CGK 12** [3]	7	50	69	17	18	19	10° – 11°	0.1	24.5	8.1
40	**CGK 15** [4]	8	61	83	19	21	22	8° – 12°	0.16	36	11.9
50	**CGK 20** [4]	10	77	106	24	30	30 / 32	9°	0.34	60	19.8
63	**CGK 25**	12	94	128	30	36	36	7°	0.6	83	27.4
80	**CGK 30**	15	110	149	34	45	41 / 46	6°	0.9	110	36.3
100	**CGK 40**	18	142	191	46	65	55	7°	2.0	180	59.4
125	**CGK 45**	20	145	199	50	65	60 / 65	7°	2.7	240	79.2
150	**CGK 50**	20	160	219	58	68	65 / 70	6°	3.5	290	95.7
200	**CGK 60**	20	175	246	73	70	75	6°	5.6	450	148.5

ØAL = Piston Ø

1) Lubricating nipple, cone head form A according to DIN 71412

2) Bolt Ø m6 required

3) Cannot be re-lubricated

4) Can be re-lubricated via lubricating hole in housing

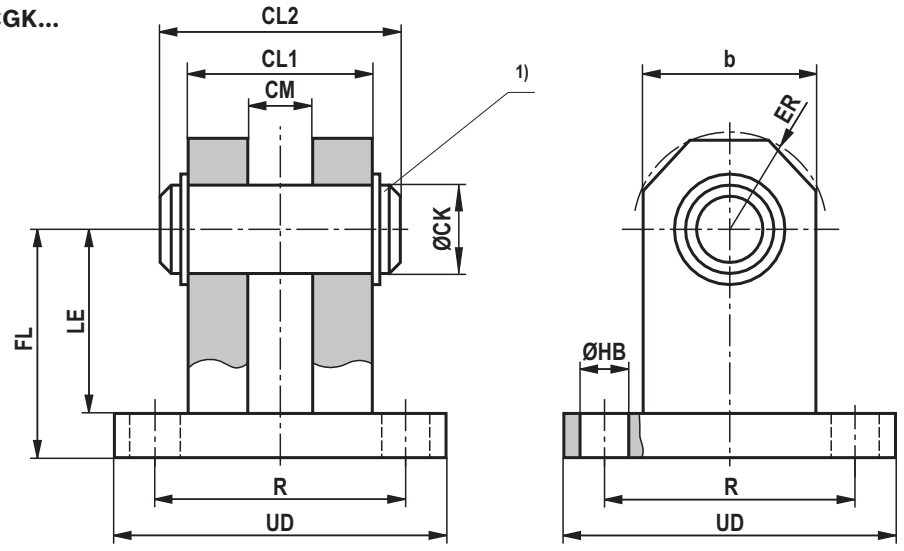
5) Dimensions may differ depending on the manufacturer

6) C_0 = Static load rating of the swivel head

7) F_{adm} = Maximum admissible load on the swivel head during oscillatory or alternating loads

Dimensions: Clevis bracket CLCC
(dimensions in mm)

Suitable for swivel head type CGK...



☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, the usability must be checked.

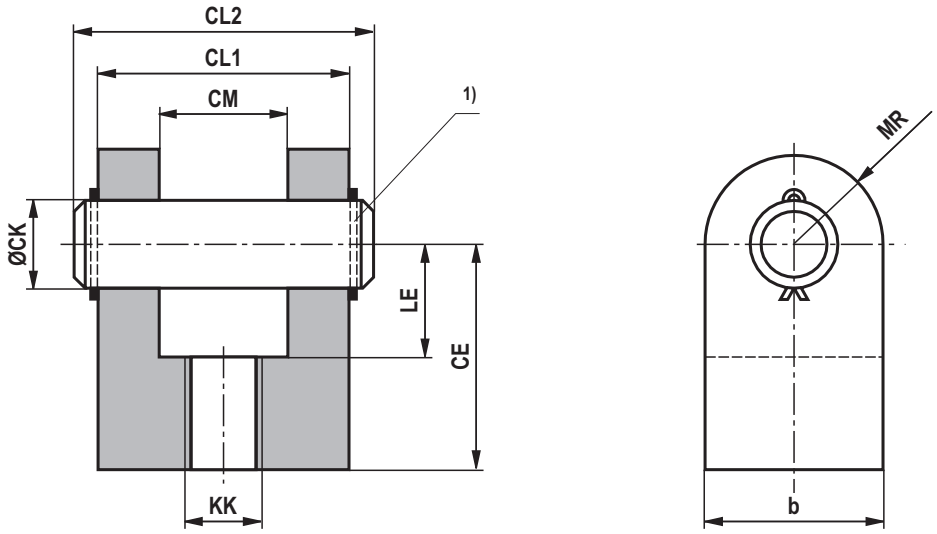
ØAL = Piston Ø

1) Bolt Ø m6 required (bolt and bolt lock are included in the scope of delivery)
2) When mounted on the piston rod with CGK...
3) When mounted on the cylinder base (mounting type "**B**")

ØAL [2]	ØAL [3]	Type	Material no.	ØCK H9 [1]	CL1 h16	CL2 max.	CM A12	FL js12
25	**–**	**CLCC 10**	R900318440	10	25	37	9	35
32	**25**	**CLCC 12**	R900318423	12	25	37	10	35
	32							
40	**40**	**CLCC 15**	R900318468	15	35	48	12	45
50	**50**	**CLCC 20**	R900318469	20	50	64	16	58
	63							
63	**80**	**CLCC 25**	R900318470	25	60	74	20	75
	100							
80	**125**	**CLCC 30**	R900318471	30	60	74	22	75
–	**150**	**CLCC 35**	R900318472	35	70	93	25	90
100	**–**	**CLCC 40**	R900318473	40	70	93	28	90
125	**200**	**CLCC 45**	R900318481	45	110	133	32	125
150	**–**	**CLCC 50**	R900318482	50	110	133	35	125
200	**–**	**CLCC 60**	R900318483	60	125	148	44	155

ØAL [2]	ØAL [3]	Type	ØHB H13	ER max.	LE min.	UD max.	R js14	b max.	*m* kg
25	**–**	**CLCC 10**	5.5	13	25	45	33	24	0.3
32	**25**	**CLCC 12**	5.5	13	25	45	33	24	0.3
	32								
40	**40**	**CLCC 15**	11	17	35	75	50	32	0.8
50	**50**	**CLCC 20**	13.5	22	42	90	65	40	1.8
	63								
63	**80**	**CLCC 25**	13.5	25	59	95	70	45	2.5
	100								
80	**125**	**CLCC 30**	13.5	25	59	95	70	45	2.5
–	**150**	**CLCC 35**	17.5	35	68	130	95	65	6.0
100	**–**	**CLCC 40**	17.5	35	68	130	95	65	6.0
125	**200**	**CLCC 45**	26	46	100	180	135	85	15.0
150	**–**	**CLCC 50**	26	46	100	180	135	85	15.0
200	**–**	**CLCC 60**	33	66	125	225	170	125	28.0

Dimensions: Fork clevis CCKA
(dimensions in mm)



ØMM	Type [2]	Material no.	ØCK H7 [1]	CL1 h16	CL2 max.	CM A12	CE js12	KK	LE min.	MR max.	b max.	*m* kg
16	**CCKA 10**	R900318486	12.7	44	56	20	38	M10x1.5	19	13	26	0.2
18												
22	**CCKA 16**	R900318488	19.1	65	77	32.5	54	M16x1.5	26	19	38	1.0
25	**CCKA 20**	R900318487	19.1	65	77	32.5	54	M20x1.5	26	19	38	1.0
28												
36	**CCKA 26**	R900318489	25.43	77	92	39	75	M26x1.5	34	26	52	2.4
45	**CCKA 33**	R900318491	34.95	100	118	51.5	95	M33x2	45	35	70	4.5
50	**CCKA 39**	R900318494	44.48	127	147	65	114	M39x2	57	45	90	8.5
56												
63	**CCKA 48**	R900318496	50.83	127	147	65	140	M48x2	64	50	100	13.0
70												
80	**CCKA 58**	R900541067	63.5	154	176	78	165	M58x2	76	65	130	23.0
90	**CCKA 64**	R900318498	76.23	154	176	78	172	M64x2	83	70	140	25.0

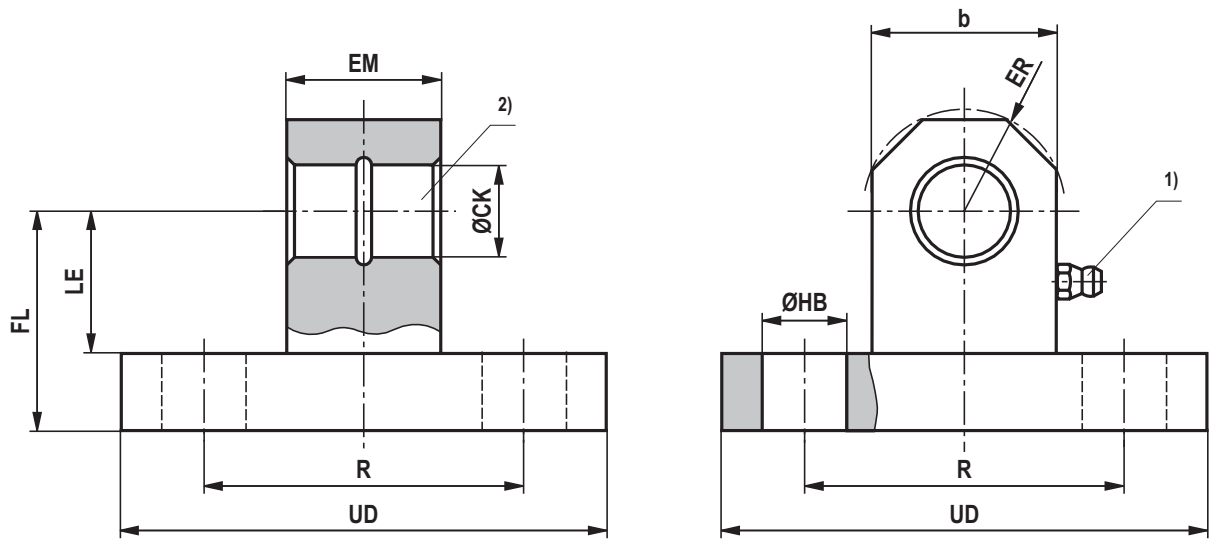
ØMM = Piston rod Ø

[1] Bolt Øf7 required
(bolt and bolt lock are included in the scope of delivery)

[2] Only possible with piston rod end "C".

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, the usability must be checked.

Dimensions: Eye bearing block CLEA
(dimensions in mm)



ØAL [3]	ØMM [4]	Type	Material no.	ØCK H7 [2]	EM h13	FL js12	ØHB H13	ER max.	LE min.	UD max.	R js14	b	*m* kg
32	**16**	**CLEA 10**	R900318516	12.7	20	28.5	11	13	18.5	63	41.5	24	0.4
40													
50	**18**												
63													
80	**22**	**CLEA 20**	R900318518	19.1	32.5	47.5	13.5	22	31.5	89	65	40	1.6
100	**25**												
125	**28**												
150	**36**	**CLEA 26**	R900318519	25.43	39	57	17.5	30	38	114	82.5	55	2.3
200													
–	**45**	**CLEA 33**	R900318520	34.95	51.5	76	17.5	41	54	127	97	75	5.8
–	**50**	**CLEA 39**	R900318521	44.48	65	79.5	22	49	57	165	126	90	10.0
	56												
–	**63**	**CLEA 48**	R900318522	50.83	65	89	26	56	64	190	145.5	105	14.0
	70												
–	**80**	**CLEA 58**	R900318524	63.53	78	101.5	30	69	77	216	167	130	21.0
–	**90**	**CLEA 64**	R900318523	76.23	78	108	33	77	83	242	190.5	145	26.0

ØAL = Piston Ø
ØMM = Piston rod Ø

1) Lubricating nipple, cone head form A according to DIN 71412
2) Suitable for fork clevis type CCKA...
3) When mounted on the cylinder base (type of mounting "**G**")
4) When mounted on the piston rod with CCKA...

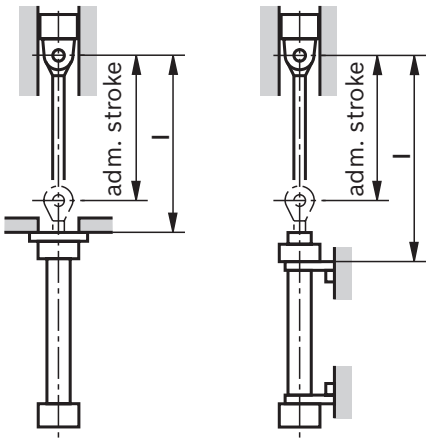
☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, the usability must be checked.

Admissible stroke lengths

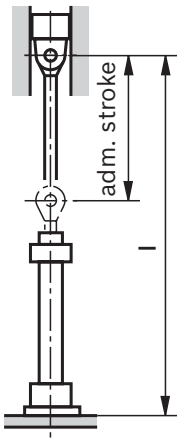
ØAL in mm	ØMM in mm	Types of mounting: C, F, H, L, M, N, P, T				Types of mounting: D, K, Q			
		Operating pressure in bar				Operating pressure in bar			
		40	50	70	105	40	50	70	105
		Maximum admissible stroke in mm				Maximum admissible stroke in mm			
25	**12**	600	600	530	425	460	410	330	250
	16	600	600	600	600	600	600	600	520
32	**18**	800	800	800	800	580	500	420	325
	22	800	800	800	800	800	760	630	500
	25	800	800	800	800	800	800	800	745
40	**16**	805	715	585	465	350	300	240	175
	18	1000	920	770	610	450	390	320	250
	25	1000	1000	1000	1000	900	780	635	500
50	**22**	1200	1090	900	720	540	460	360	280
	25	1200	1200	1200	965	765	670	550	430
	36	1200	1200	1200	1200	1200	1200	1110	890
63	**25**	1255	1115	920	–	570	500	405	–
	28	1400	1400	1130	–	700	610	490	–
	36	1400	1400	1400	–	1310	1160	960	–
	45	1400	1400	1400	–	1400	1400	1390	–
80	**36**	1700	1700	1545	–	910	800	630	–
	45	1700	1700	1700	–	1620	1435	1190	–
	56	1700	1700	1700	–	1700	1700	1670	–
100	**45**	2000	2000	1930	–	1170	1020	820	–
	50	2000	2000	2000	–	1580	1395	1155	–
	70	2000	2000	2000	–	2000	2000	2000	–
125	**50**	2300	2300	2300	–	1220	1075	885	–
	56	2300	2300	2300	–	1470	1290	1140	–
	63	2300	2300	2300	–	2035	1805	1500	–
	90	2300	2300	2300	–	2300	2300	2300	–
150	**63**	2600	2600	–	–	1670	1465	–	–
	70	2600	2600	–	-	1890	1680	–	–
	80	2600	2600	–	–	2600	2470	–	–
	100	2600	2600	–	–	2600	2600	–	–
200	**90**	3000	–	–	–	2380	–	–	–
	100	3000	–	–	–	3000	–	–	–
	140	3000	–	–	–	3000	–	–	–

ØAL = Piston Ø
ØMM = Piston rod Ø

$s_K = l \cdot \sqrt{\frac{1}{2}}$



$s_K = l \cdot \sqrt{\frac{1}{2}}$

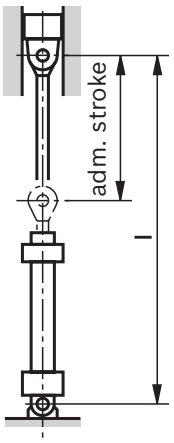


Admissible stroke lengths

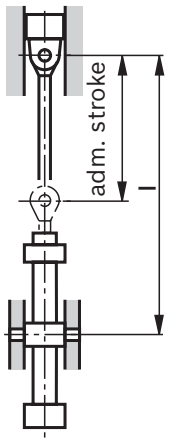
ØAL in mm	ØMM in mm	Types of mounting: B, G, S				Type of mounting: E (Position: Trunnion in cylinder center)			
		Operating pressure in bar				Operating pressure in bar			
		40	50	70	105	40	50	70	105
		Maximum admissible stroke in mm				Maximum admissible stroke in mm			
25	**12**	175	145	110	70	460	410	330	250
	16	390	340	275	200	600	600	600	520
32	**18**	390	340	300	200	580	500	420	325
	22	600	550	450	335	800	760	630	500
	25	800	745	615	480	800	800	800	690
40	**16**	200	165	120	80	320	275	215	160
	18	240	220	190	100	450	390	320	250
	25	600	550	450	335	900	780	635	500
50	**22**	375	300	245	170	540	460	360	280
	25	480	420	335	250	700	615	500	390
	36	1200	1000	820	700	1200	1200	1110	890
63	**25**	345	295	225	–	520	450	360	–
	28	500	410	340	–	700	610	490	–
	36	860	755	615	–	1205	1065	880	–
	45	1400	1250	1000	–	1400	1400	1390	–
80	**36**	680	580	420	–	680	580	420	–
	45	1070	940	765	–	1495	1325	1095	–
	56	1700	1500	1250	–	1700	1500	1250	–
100	**45**	800	740	600	–	800	740	600	–
	50	1030	900	730	–	1450	1275	1055	–
	70	2000	1900	1600	–	2000	1900	1600	–
125	**50**	775	670	535	–	1120	985	805	–
	56	1050	880	750	–	1050	880	750	–
	63	1345	1185	965	–	1880	1665	1375	–
	90	2300	2300	2200	–	2300	2300	2200	–
150	**63**	1065	925	–	–	1525	1340	–	–
	70	1350	1220	–	–	1350	1220	–	–
	80	1855	1635	–	–	2580	2285	–	–
	100	2600	2600	–	–	2600	2600	–	–
200	**90**	1750	–	–	–	1750	–	–	–
	100	2175	–	–	–	3000	–	–	–
	140	3000	–	–	–	3000	–	–	–

ØAL = Piston Ø
ØMM = Piston rod Ø

$s_K = l$



$s_K = l$

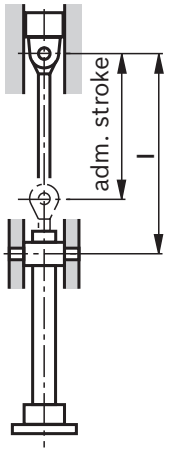


Admissible stroke lengths

ØAL in mm	ØMM in mm	Type of mounting: R			
		Operating pressure in bar			
		40	50	70	105
		Maximum admissible stroke in mm			
25	12	–	–	–	–
	16	–	–	–	–
32	18	800	800	670	520
	22	800	800	800	800
	25	800	800	800	800
40	16	510	445	355	270
	18	720	625	510	400
	25	1000	1000	1000	800
50	22	865	735	575	450
	25	1085	955	785	615
	36	1200	1200	1200	1200
63	25	810	710	575	–
	28	1120	975	785	–
	36	1400	1400	1355	–
	45	1400	1400	1400	–
80	36	1455	1280	1010	–
	45	1700	1700	1675	–
	56	1700	1700	1700	–
100	45	1870	1630	1310	–
	50	2000	1955	1620	–
	70	2000	2000	2000	–
125	50	1720	1515	1245	–
	56	2300	2065	1680	–
	63	2300	2300	2105	–
	90	2300	2300	2300	–
150	63	2330	2055	–	–
	70	2600	2600	–	–
	80	2600	2600	–	–
	100	2600	2600	–	–
200	90	3000	–	–	–
	100	3000	–	–	–
	140	3000	–	–	–

ØAL = Piston Ø
ØMM = Piston rod Ø

$s_K = l$



Kinking calculation

The kinking calculation is usually performed according to Euler as the piston rods are in most cases to be regarded as slim rods.

Kinking load $\boldsymbol{K} = \dfrac{\pi^2 \cdot \boldsymbol{E} \cdot \boldsymbol{J}}{\boldsymbol{s}_K{}^2}$ in N

i.e. with this load, the rod kinks!

Maximum operating load $\boldsymbol{F} = \dfrac{\boldsymbol{K}}{\boldsymbol{S}}$ in N

$\boldsymbol{s}_K$ = Free kinking length in mm

$\boldsymbol{E}$ = Module of elasticity in N/mm² = 2.1 • 10⁵ for steel

$\boldsymbol{J}$ = Moment of inertia in mm⁴ for circular cross-section

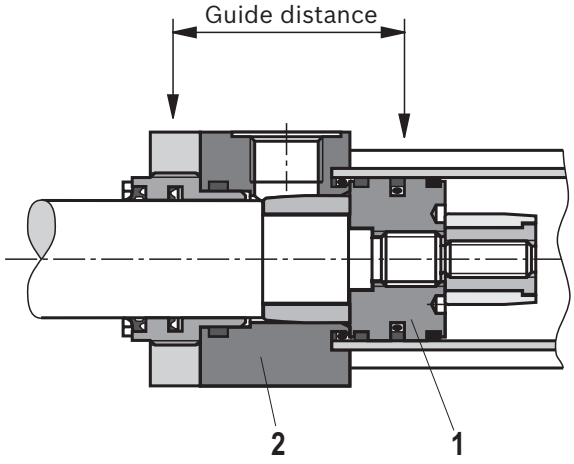
$= \dfrac{\boldsymbol{d}^4 \cdot \pi}{64} = 0.0491 \cdot \boldsymbol{d}^4$

$\boldsymbol{S}$ = Safety (3.5)

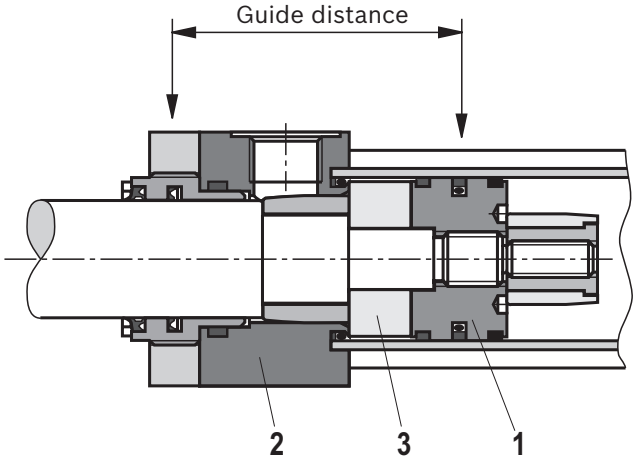
Support width extension

With long strokes and pressure load, a support width extension is recommended in order to reduce the bearing load with extended piston rod. With this extension, a spacer sleeve (3) is inserted between piston (1) and cylinder head (2). This spacer sleeve extends the lever arm and thus reduces the bearing load.

Without support width extension



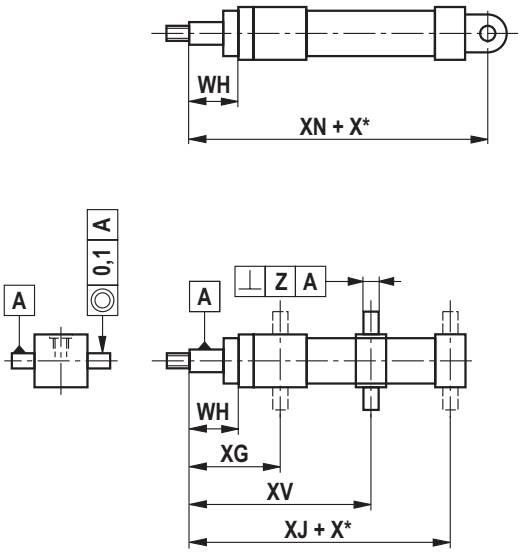
With support width extension

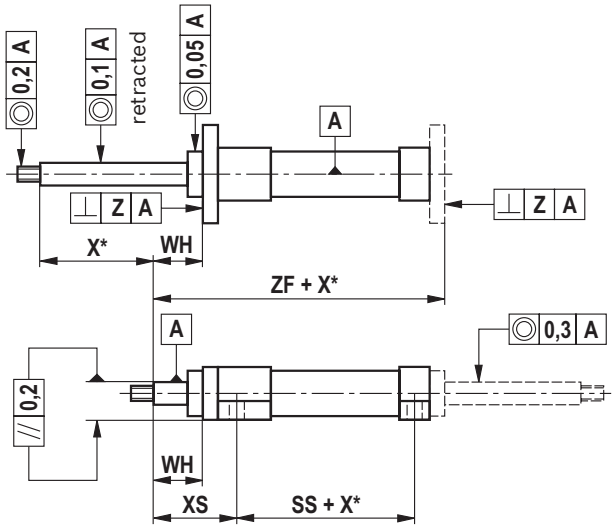


Type of mounting	Ordering code for support width extension in mm for all piston Ø							
	–	25	50	75	100	125	150	175
	Stroke length in mm							
B, G, S	up to 500	501 to 625	626 to 750	751 to 875	876 to 1000	1001 to 1125	1126 to 1250	1251 to 3000
C, F, H, L	up to 1425	1426 to 1785	1786 to 2150	2151 to 2500	2501 to 2860	2861 to 3000	–	–
D, E, K, Q	up to 665	666 to 835	836 to 1000	1001 to 1165	1166 to 1335	1336 to 1500	1501 to 1665	1666 to 3000
R	up to 1000	1001 to 1250	1251 to 1500	1501 to 1750	1751 to 2000	2001 to 2250	2251 to 2500	2501 to 3000
M, N, P, T	up to 1425	1426 to 1785	1786 to 2150	2151 to 2500	2501 to 2860	2861 to 3000	–	–

Installation length of the hydraulic cylinder with support width extension:
Installation length according to the unit dimensions + support width extension
(The trunnion position with type of mounting E and R will not be changed.)

Installation lengths and position tolerances





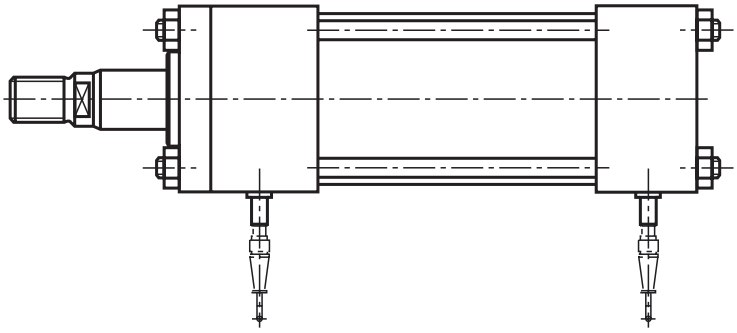
Stroke length in mm	up to 1250	1251 to 2000	2001 to 3000
Stroke tolerance in mm	+1	+1	+1
	–1.5	–2	–3
WH	±2	±2	+3
			–2
ZF	±1	±1.5	±2
XS	±2	±2	+3
			–2
SS	±1.25	+1.5	+1.5
		–2	–3
XG	±2	±2	+3
			–2
XV	±2	±2	±2
XJ	±2	±2	±2
XN	±1.25	±2	±2
Z	0.1 / 100		

When ordering, always specify the "XV" dimension in the plain text (observe XV_{min} and XV_{max})

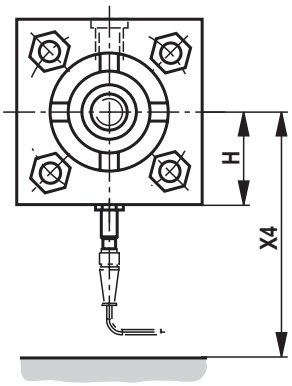
X* = Stroke length

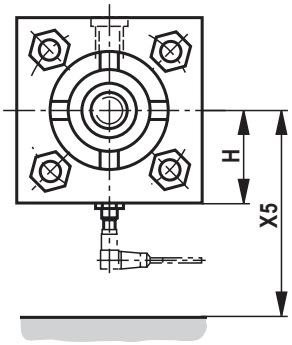
Inductive proximity switch

(When ordering, please specify in the plain text)



Assembly types





Mating connector with 5 m cable

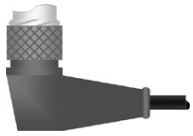
Material no. **R900026512**

(Mating connector is **not** included in the scope of delivery, must be ordered separately)

Mating connector, angled with 5 m cable (position of the cable outlet cannot be defined)

Material no. **R988064311**

(Mating connector is **not** included in the scope of delivery, must be ordered separately)



ØAL in mm	ØMM in mm	H	X4	X5
40	**16**	42.5	172	127
	18			
	25			
50	**22**	44.5	175	130
	25			
	36	48		
63	**25**	51	180	135
	28			
	36			
	45	53		
80	**36**	73.5	185	140
	45			
	56			

ØAL in mm	ØMM in mm	H	X4	X5
100	**45**	57	195	150
	50			
	70	83		
125	**50**	70	205	160
	56			
	63	–		
	90	96		
150	**63**	82.5	230	185
	70			
	80			
	100			
200	**90**	108	245	200
	100			
	140			

ØAL = Piston Ø

ØMM = Piston rod Ø

☞ **Notice!**

- Installation position: 180° opposite to the line connections
- Line connection: Enlarged line connections are only possible after consultation
- Type of mounting: With F, L, M, N and T types of mounting, the installation 180° opposite to the line connection is not possible
- Types of mounting and unit dimensions, see page 12 to 75

Proximity switch

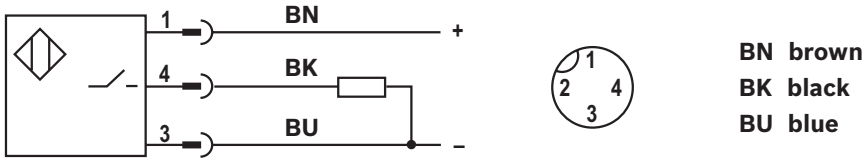
Inductive proximity switches are used as reliable end position control for hydraulic cylinders. They are an important element for the safe and exact monitoring of safety equipment, locks and/or other machine functions in their end position by means of the output of signals. The proximity switch which is high-pressure resistant up to 500 bar works in a contactless manner. Thus, it is wear-free. The proximity switch has been set at the factory. The switching distance must not be adjusted. The lock nut of the proximity switch is marked at the factory using sealing wax. On versions with proximity switch, the hydraulic cylinders are equipped with proximity switches.

Technical data

(For applications outside these parameters, please consult us!)

Function type			PNP normally open contact
Admissible pressure		bar	500
Operating voltage		V DC	10 ... 30
	Including residual ripple	%	≤ 15
Voltage drop		V	≤ 1.5
Rated operating voltage		V DC	24
Rated operating current		mA	200
Idle current		mA	≤ 8
Residual current		µA	≤ 10
Repetition accuracy		%	≤ 5
Hysteresis		%	≤ 15
Ambient temperature range		°C	–25 ... +80
Temperature drift		%	≤ 10
Switching frequency		Hz	1000
Protection class	Active area		IP 68
	Proximity switch		IP 67
Housing material			Material no. 1.4104

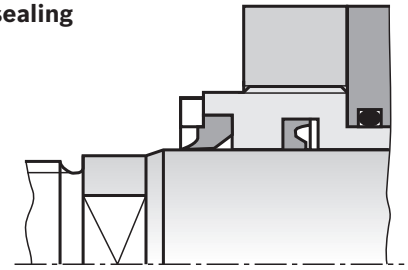
Pin assignment

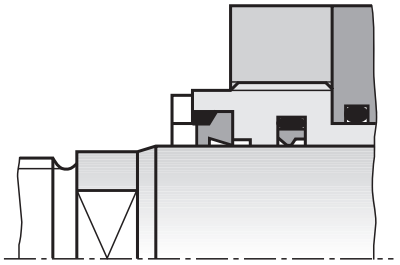


BN brown
BK black
BU blue

Seals (standard versions)

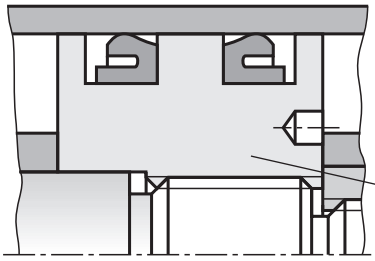
Piston rod sealing





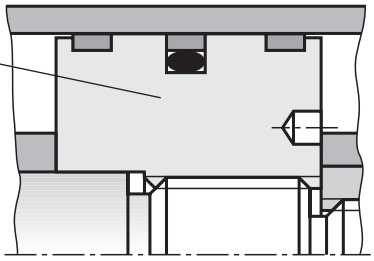
Design with piston Ø 32/25
Design with piston rod Ø 50, 63 and 80 mm

Piston sealing



Version "A"
Lip rings for leakage oil-free operation under static conditions

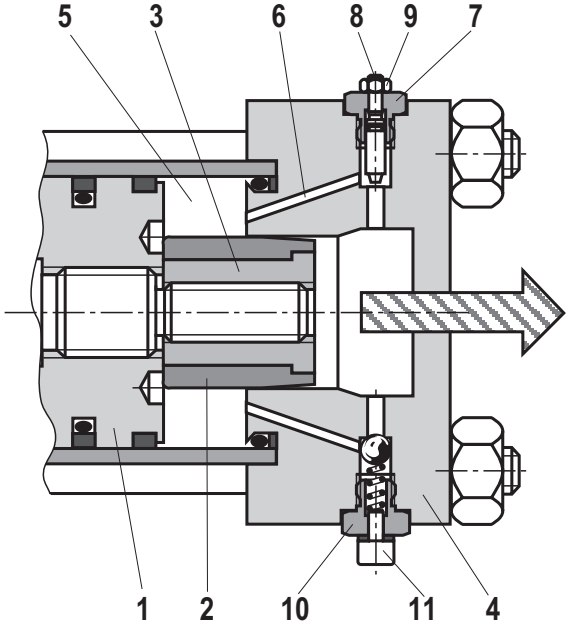
Version "T"
Sliding ring for low-friction operation



End position cushioning

End position cushioning at the cylinder base.
The piston (1) is screwed directly to the piston rod, the damping bush (2) by means of a threaded bushing (3). By retracting the conical damping bush into the bore of the cylinder base (4), the cross-section for the liquid discharged from the piston chamber (5) is reduced until it equals zero. The liquid from the piston chamber (5) can only be discharged via the bore (6) and the adjustable throttle valve (7). At the throttle valve (7), the damping effect is regulated. The smaller the flow cross-section, the larger the effect of the end position cushioning.

Adjustable throttle valve for the end position cushioning
The throttle valve version prevents the throttle bolt (8) from being screwed out when the end position cushioning is adjusted.
The set end position cushioning is secured by the lock nut (9).



Check valve with bleed screw
The check valve (10) serves as extension aid from the end position. In this way, the throttling point is evaded during the extension. The hydraulic cylinder is bled via the bleed screw (11).

In hydraulic cylinders without end position cushioning, this bleed screw is fitted by default.
Throttle valve and check valve are designed as installation kits and can be interchanged.

Braking force calculation

The end position cushioning must ensure controlled deceleration (braking) of the stroke velocity in both end positions.
In this connection, all effective energies must not exceed the maximum damping capacity.
In the damping which works according to the fluid flow throttling principle the energy to be braked is converted into heat.

Braking force calculation

The braking force of a hydraulic cylinder in case of horizontal installation is calculated as follows:

Extension movement:

$$F_B = m \cdot a + A_K \cdot p$$

Retraction movement:

$$F_B = m \cdot a + A_R \cdot p$$

- v = Stroke velocity in m/s
- s = Damping length in m
- A_K = Piston area in cm²
- A_R = Annulus area in cm²
- p = System pressure in N/cm²
- F_B = Braking force in N
- m = Moved weight in kg
- a = Deceleration in m/s²

$$a = \frac{v^2}{2 \cdot s}$$

1 bar ~ 10 N/cm²

With vertical stroke movements of the hydraulic cylinder, you must add or subtract the weight (consisting of load, piston and piston rod) to or from the braking force F_B according to the movement direction.
In this calculation, the cylinder's own friction has been neglected.

Calculation of the average damping pressure

Normally, the nominal pressure of the hydraulic cylinder must not be exceeded by the average damping pressure.

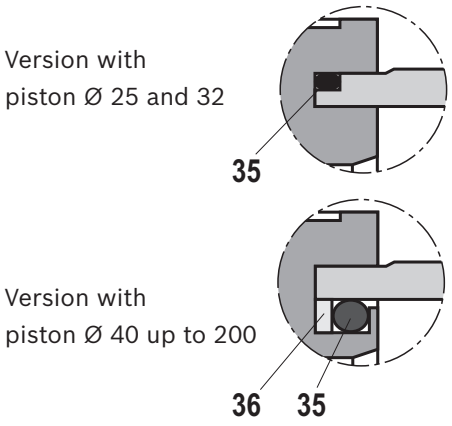
$$p_D = \frac{F_B}{A_D}$$

- p_D = Average damping pressure in N/cm²
- F_B = Braking force in N
- A_D = Effective damping area in cm²

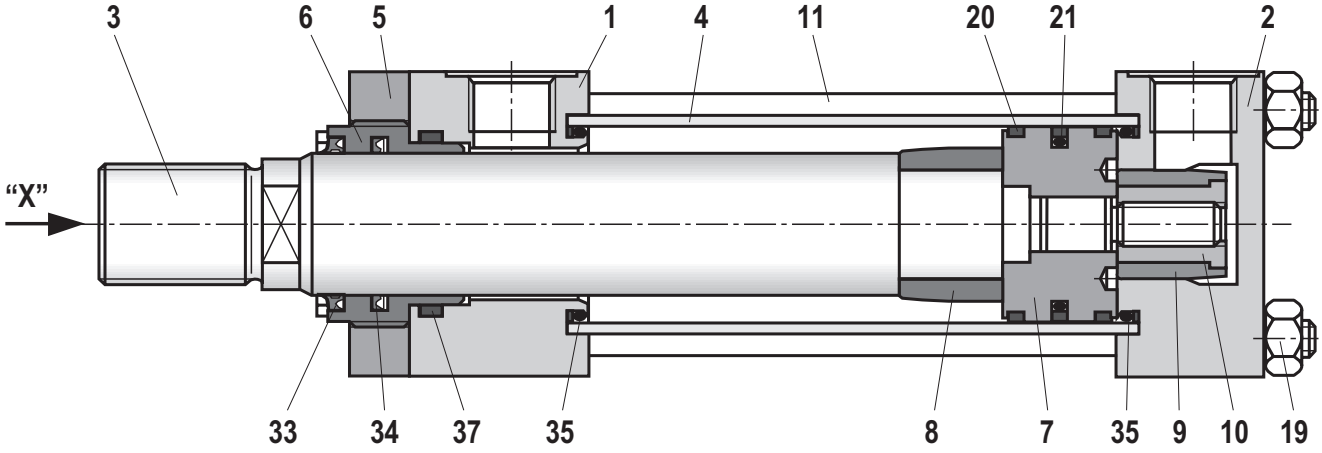
1 bar ~ 10 N/cm²

If the calculation results in an excessive value, the damping length has to be enlarged or the system pressure reduced.

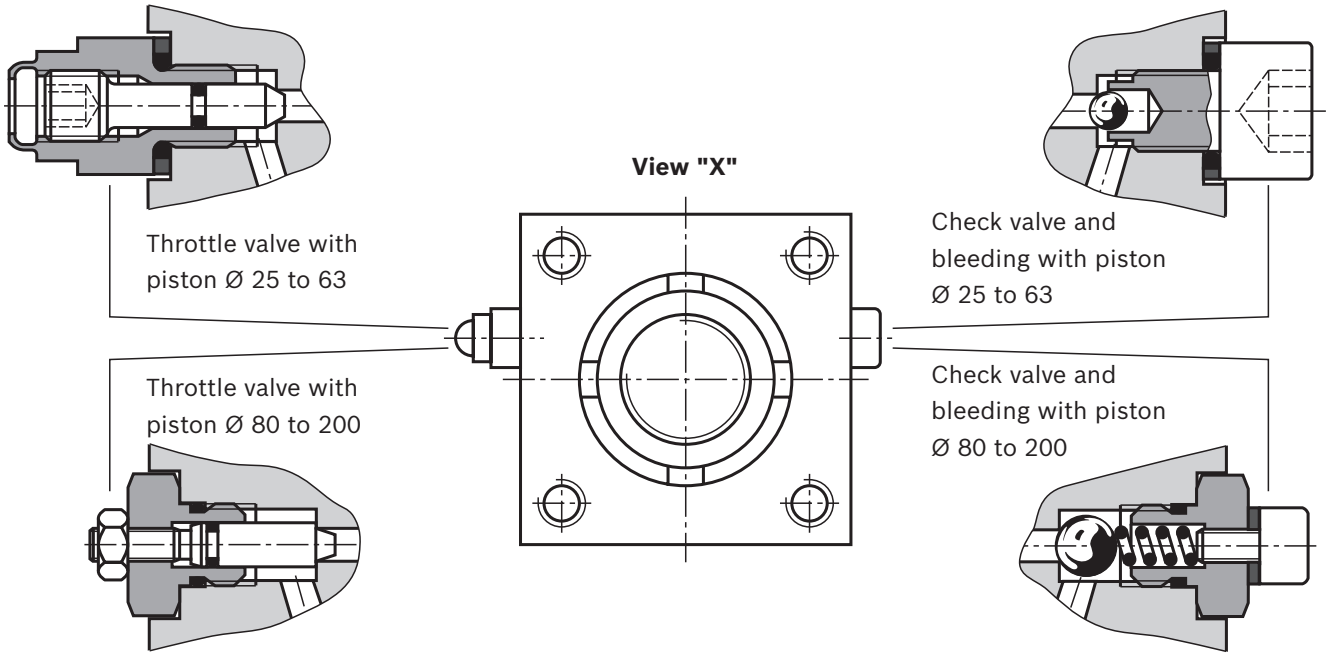
Spare parts drawing



1	Head	**10**	Thread ring
2	Base	**11**	Tie rod
3	Piston rod	**19**	Nut
4	Cylinder pipe	**20**	Guide ring
5	Flange	**21**	Piston seal
6	Guide socket	**33**	Wiper
7	Piston	**34**	Piston rod seal
8	Damping bush	**35**	Seal ring
9	Damping bush	**36**	Support ring
		37	Seal ring



Throttle and check valve in cylinder head and cylinder base



Ordering spare parts:

- For individual components, specify the denomination and item no. from the spare parts drawing with complete type designation of the hydraulic cylinder.
- For seal kits, specify the complete type designation of the hydraulic cylinder.

Weight

ØAL	mm	**25**		**32**			**40**			**50**		
ØMM	mm	**12**	**16**	**18**	**22**	**25**	**16**	**18**	**25**	**22**	**25**	**36**
Weight per 100 mm stroke in kg	Differential cylinders	0.3	0.37	0.5	0.6	0.7	0.55	0.6	0.8	0.9	1.0	1.3
	Double-acting cylinders	0.4	0.52	0.7	0.9	1.0	0.75	0.8	1.2	1.2	1.3	2.1
	Type of mounting	CD	CG	CD	CG		CD	CG		CD	CG	
Weight with 0 stroke in kg	B	1.2	–	1.9	–		2.4	–		4.0	–	
	G	–	–	1.7	–		2.2	–		3.7	–	
	E	1.2	1.5	2.2	2.5		2.9	3.5		4.5	6.0	
	H	1.2	1.5	1.9	2.4		2.5	3.0		4.0	5.3	
	K, D	1.4	–	2.2	–		2.7	–		4.5	–	
	C, F, L, M, R, S, T	1.1	1.4	1.8	2.3		2.3	2.8		3.7	5.0	
	N, P, Q	1.1	1.4	1.5	2.0		2.0	2.6		3.4	4.7	

ØAL	mm	**63**				**80**			**100**		
ØMM	mm	**25**	**28**	**36**	**45**	**36**	**45**	**56**	**45**	**50**	**70**
Weight per 100 mm stroke in kg	Differential cylinders	1.1	1.2	1.5	1.9	1.7	2.2	2.8	2.4	2.7	4.1
	Double-acting cylinders	1.5	1.6	2.1	3.0	2.5	3.4	4.7	3.6	4.3	7.1
	Type of mounting	CD		CG		CD	CG		CD	CG	
Weight with 0 stroke in kg	B	5.9		–		10.8	–		16.2	–	
	G	5.5		–		10.0	–		15.2	–	
	E	6.7		8.5		12.4	16.2		25.3	31.4	
	H	5.9		8.0		10.7	14.4		15.3	21.7	
	K, D	6.5		–		11.8	–		17.6	–	
	C, F, L, M, R, S, T	5.5		7.6		9.9	13.7		14.9	21.4	
	N, P, Q	5.2		7.3		9.2	12.9		13.5	20.0	

ØAL	mm	**125**				**150**				**200**		
ØMM	mm	**50**	**56**	**63**	**90**	**63**	**70**	**80**	**100**	**90**	**100**	**140**
Weight per 100 mm stroke in kg	Differential cylinders	3.5	3.9	4.4	7.9	5.1	5.6	6.6	8.7	9.5	10.7	17.7
	Double-acting cylinders	5.4	5.8	6.9	12.0	7.6	8.6	10.6	14.8	14.5	16.9	29.8
	Type of mounting	CD		CG		CD		CG		CD	CG	
Weight with 0 stroke in kg	B	26.7		–		40.7		–		75.4	–	
	G	25.5		–		39.0		–		72.0	–	
	E	29.3		40.1		47.1		62.1		84.8	111.1	
	H	26.9		37.7		40.7		55.7		68.2	94.5	
	K, D	29.3		–		44.8		–		70.4	–	
	C, F, L, M, R, S, T	25.2		36.0		38.5		53.5		71.6	98.0	
	N, P, Q	24.1		34.9		37.2		52.2		70.7	97.0	

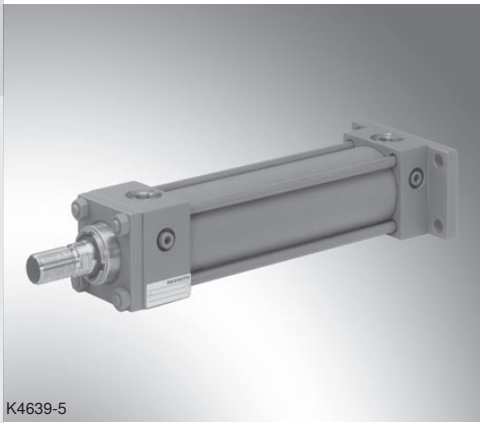
ØAL = Piston Ø
ØMM = Piston rod Ø
CD = Differential cylinder
CG = Double-acting cylinder

Rexroth
Bosch Group

Hydraulic cylinders

RE 17017/08.08 1/72
Replaces: 05.03

Series CD210 / CG210


K4639-5

Component series 1X
Nominal pressure 210 bar (21 MPa)

Table of contents

Features

- Service-friendly modular construction kit system, mounting of head and cap according to the tie rod principle
- Operating pressure up to max. 210 bar
- 16 mounting types
- Piston Ø: 40 to 200 mm
- Piston rod Ø: 16 to 140 mm

☞ **Note!**

For the selection of the cylinder variant, please observe the Explanations on page 6!

Technical data (for applications outside these parameters, please consult us!)

Nominal pressure: 210 bar [21 MPa]

Static test pressure: Permissible operating pressure x 1.3 (depending on piston Ø and type of mounting)

Maximum operating pressure: 210 bar [21 MPa] (depending on piston Ø and type of mounting)
The given operating pressures are valid for applications with jerk-free operation.
In the case of extreme loads, e.g. rapid cycle sequence, mounting elements and threaded piston rod connections must be rated for durability.

Installation position: Optional

Hydraulic fluid:
Mineral oils DIN 51524 (HL, HLP)
Phosphate ester (HFD-R)

Hydraulic fluid temperature range: –20 °C to +80 °C

Ambient temperature range: –20 °C to +80 °C

Optimum viscosity range: 20 to 100 mm^2/s
Min. viscosity: 12 mm^2/s
Max. viscosity: 380 mm^2/s

Cleanliness class to ISO
Permissible maximum degree of contamination of the hydraulic fluid to ISO 4406 (c) Class 20/18/15.
The cleanliness classes specified for components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, prolongs the service life of components.

For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086, RE 50087, RE 50088.

Stroke velocity: Up to 0.5 m/s
(depending on line connection)

Bleed points standard

Tolerances:
For stroke tolerances, permissible installation lengths and position tolerances, see page 67.

Primer coating:
As a standard, hydraulic cylinders are primered with one coating (color: gentian blue, RAL 5010) in a thickness of max. 80 µm.

The following surfaces on cylinders and attached parts are not primered or paint-coated:

- All diameters of fit to the customer side
- Sealing faces for the line connection
- Sealing faces for flanged connections
- Inductive proximity switches

Surfaces that are not paint-coated are protected by an anti-corrosion agent (MULTICOR LF 80).

Acceptance:
Each cylinder is tested according to Bosch Rexroth standard.

General notes

Safety notes:
For the installation, commissioning and maintenance of hydraulic cylinders, observe operating instructions RE 07100-B!

Servicing and repair work must be carried out by Bosch Rexroth AG or personnel having undergone special training in this field. No warranty is granted for damage resulting from installation, maintenance or repair work not carried out by Bosch Rexroth AG.

Checklists for hydraulic cylinders:
Cylinders, the operating data of which differ from the specified values, can only be offered as special variants on request. For the preparation of offers, the deviations of technical data and/or operating data must be described in the checklists for hydraulic cylinders (RE 07200).

Engineering software ICS (**I**nteractive **C**atalog **S**ystem)

The ICS (Interactive Catalog System) is a selection and engineering aid for hydraulic cylinders. With the help of the ICS, designers of plant and machinery can quickly and reliably find the optimum hydraulic cylinder solution through logic-guided type code queries. This software helps to solve design and engineering tasks more quickly and efficiently. After having been guided through the product selection, the user quickly and reliably gets the exact technical data of the selected components as well as 2D and 3D CAD data in the correct file format for all common CAD systems.

This allows users to reduce costs while increasing their competitiveness.

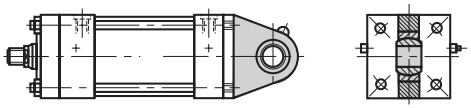
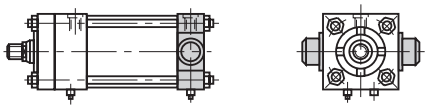
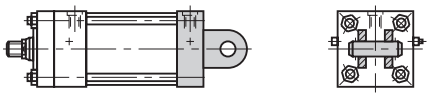
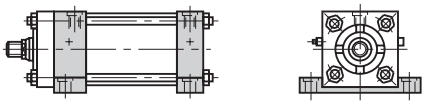
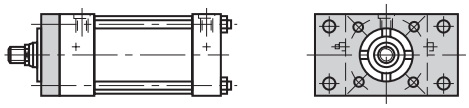
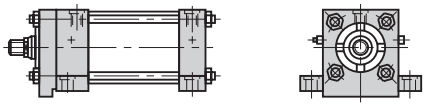
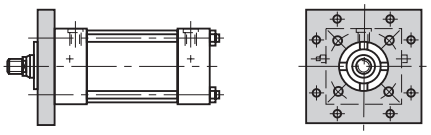
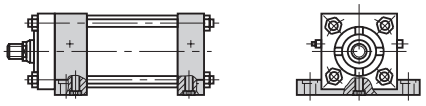
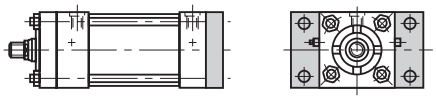
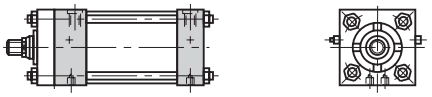
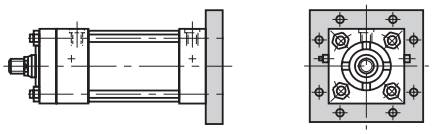
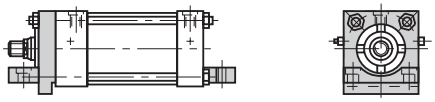
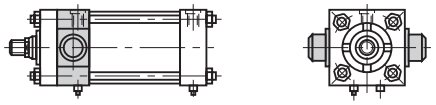
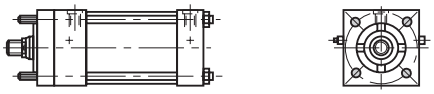
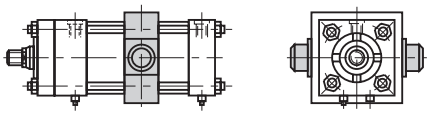
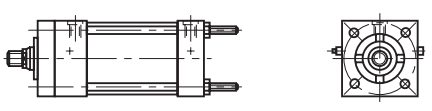
Forces and areas

Operating pressure in bar	Piston Ø	mm	40			50			63			
	Piston rod Ø	mm	16	18	25	22	25	36	25	28	36	45
75	Force; piston side	kN	9.43			14.73			23.38			
	Force; piston rod side	kN	7.91	7.51	5.37	11.88	11.04	7.10	19.69	18.76	15.74	11.44
100	Force; piston side	kN	12.56			19.64			31.18			
	Force; piston rod side	kN	10.56	10.03	7.66	15.84	14.71	9.47	26.26	25.03	20.99	15.26
150	Force; piston side	kN	18.85			29.45			46.76			
	Force; piston rod side	kN	15.84	15.04	11.48	23.76	22.08	14.20	39.40	37.53	31.49	22.90
210	Force; piston side	kN	26.39			41.24			65.46			
	Force; piston rod side	kN	22.17	21.05	16.05	33.27	30.91	19.88	55.15	52.55	44.08	32.06
Piston area		cm^2	12.56			19.63			31.16			
Annulus area		cm^2	10.55	10.02	7.65	15.83	14.71	9.46	26.25	25.01	20.98	15.26
Area ratio		φ	1.2:1	1.25:1	1.6:1	1.25:1	1.35:1	2:1	1.2:1	1.25:1	1.4:1	2:1
Cushioning area	Piston side	cm^2	6.84			13.91			22.10			
	Piston rod side	cm^2	8.76	8.76	6.41	14.33	13.47	8.29	23.10	23.10	19.80	13.10

Operating pressure in bar	Piston Ø	mm	80			100			125			
	Piston rod Ø	mm	36	45	56	45	50	70	50	56	63	90
75	Force; piston side	kN	37.70			58.91			92.04			
	Force; piston rod side	kN	30.07	25.77	19.22	46.97	44.18	30.05	77.31	73.57	68.66	44.33
100	Force; piston side	kN	50.27			78.54			122.72			
	Force; piston rod side	kN	40.10	34.36	25.63	62.63	58.91	40.06	103.08	98.10	91.55	59.11
150	Force; piston side	kN	75.40			117.81			184.08			
	Force; piston rod side	kN	60.14	51.54	38.45	93.95	88.37	60.10	154.63	147.13	137.32	88.66
210	Force; piston side	kN	210.56			164.94			257.71			
	Force; piston rod side	kN	84.20	72.15	53.83	131.53	123.71	84.13	216.48	206.00	192.25	124.13
Piston area		cm^2	50.24			78.50			122.66			
Annulus area		cm^2	40.07	34.34	25.62	62.60	58.88	40.04	103.03	98.04	91.50	59.08
Area ratio		φ	1.25:1	1.4:1	2:1	1.25:1	1.35:1	2:1	1.2:1	1.25:1	1.35:1	2:1
Cushioning area	Piston side	cm^2	30.63			58.90			92.50			
	Piston rod side	cm^2	36.40	30.60	20.10	57.30	54.70	31.97	92.50	92.50	47.20	47.20

Operating pressure in bar	Piston Ø	mm	150				180			200		
	Piston rod Ø	mm	63	70	80	100	80	90	125	90	100	140
75	Force; piston side	kN	132.54				190.85			235.62		
	Force; piston rod side	kN	109.16	103.68	94.84	73.63	153.16	143.14	98.81	187.92	176.72	120.17
100	Force; piston side	kN	176.72				254.47				314.16	
	Force; piston rod side	kN	145.55	138.24	126.45	98.18	204.21	190.85	131.75	250.56	235.63	160.23
150	Force; piston side	kN	265.08				381.70			471.24		
	Force; piston rod side	kN	218.33	207.38	189.68	147.28	306.32	286.28	197.63	375.85	353.45	240.34
210	Force; piston side	kN	371.10				534.39			659.74		
	Force; piston rod side	kN	305.65	290.32	265.55	206.20	428.85	400.80	276.70	526.18	494.83	336.50
Piston area		cm^2	176.63				254.34			314.00		
Annulus area		cm^2	145.47	138.17	126.38	98.13	204.10	190.75	131.68	250.42	235.50	160.14
Area ratio		φ	1.2:1	1.25:1	1.4:1	1.8:1	1.25:1	1.35:1	2:1	1.25:1	1.35:1	2:1
Cushioning area	Piston side	cm^2	126.50				193.6			235.60		
	Piston rod side	cm^2	130.10	130.10	81.70	81.70	179.00	179.00	109.20	238.70	219.00	137.50

Mounting types

Self-aligning clevis at cylinder cap **B**		Trunnion at cylinder cap **S**	
Fork clevis at cylinder cap **G**		Foot mounting **F**	
Rectangular flange at cylinder head **C**		Foot mounting with splined key **L**	
Square flange at cylinder head **H**		Foot mounting with seal ring for subplate mounting **M**	
Rectangular flange at cylinder cap **D**		Threaded bores in cylinder head and cap **N**	
Square flange at cylinder cap **K**		Foot mounting at front face with splined key **T**	
Trunnion at cylinder head **R**		Extended tie rods at cylinder cap **P**	
Trunnion at the center of the cylinder **E**		Trunnion at the center of the cylinder **Q**	

Ordering code

	210		/	–	Z	1X	/					–			*			

Cylinder
Single-rod cylinder = **CD**
Double-rod cylinder = **CG**

Series = 210

Mounting types
Self-aligning clevis at cylinder cap = **B**
Fork clevis at cylinder cap = **G**
Rectangular flange at cylinder head = **C**
Square flange at cylinder head = **H**
Rectangular flange at cylinder cap = **D**
Square flange at cylinder cap = **K**
Trunnion at cylinder head = **R**
Trunnion at the center of the cylinder [1); 2)] = **E**
Trunnion at cylinder cap = **S**
Foot mounting = **F**
Foot mounting with splined key = **L**
Foot mounting with seal ring for subplate mounting = **M**
Threaded bores in cylinder head and cap = **N**
Foot mounting at front face with splined key = **T**
Extended tie rod at cylinder head = **P**
Extended tie rod at cylinder cap = **Q**

Piston Ø (40 to 200 mm)
see page 3

Piston rod Ø (16 to 140 mm)
see page 3

Stroke length in mm [3)]

Component series 11 to 19 = **1X**
(11 to 19 unchanged installation and connection dimensions)

Pipe connection [4)]
00 = Flanged connection with seal ring; only possible with type of mounting "M"
01 = Pipe thread to ISO 228/1
02 = Metric ISO thread
13 = [5)] Enlarged pipe connection Pipe thread to ISO 228/1
14 = [5)] Enlarged pipe connection Metric ISO thread

Piston rod variant
H = Hardened and chromium hard-plated up to piston rod Ø ≤ 100 mm
C = Chromium hard-plated, from piston Ø ≥ 80 mm

Piston rod end
B = Male thread, see pages 8 to 61
C = Male thread, see pages 8 to 61
E = Female thread
F = Thread for self-aligning clevis
T = [6)] With self-aligning clevis CGK mounted
L = [7)] With self-aligning clevis CGA mounted
M = [7)] With self-aligning clevis CGAK mounted

End position cushioning
U = Without
K = (View "Y") on cap side
S = (View "X") on head side
D = On both sides

Hydraulic fluid
M = Seals, suitable for mineral oil to DIN 51524 (HL, HLP)
V = (FKM) seals suitable for Phosphate ester (HFD-R)

Pipe connection-cylinder head
Enter position
Observe table on page 6!

Pipe connection-cylinder cap
Enter position
Observe table on page 6

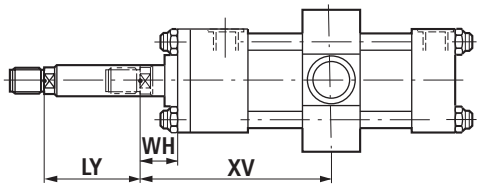
Seals
A = Standard version
T = Version for low-friction operation

Enter **stop tube extension**

Further details in clear text [8)]

[1)] The position of the trunnion can be freely selected. Always indicate dimension “XV“ in clear text in mm on the order.

[2)] Dimension for cylinder with trunnion and piston rod extension “LY“ in the retracted condition:



[3)] Observe permissible stroke length, pages 63 to 65

[4)] The pipe connection sizes are assigned to the piston Ø.

[5)] Not possible with piston Ø 200 mm

[6)] Only possible with Ø 40/16 to 180/80

[7)] Only possible with Ø 180/90 to 200/140

[8)] Always state mounting of inductive proximity switches or piston rod extension “LY“ in clear text on the order.

Order example: CD 210 B50/22-200Z1X/01HBDM1-1A

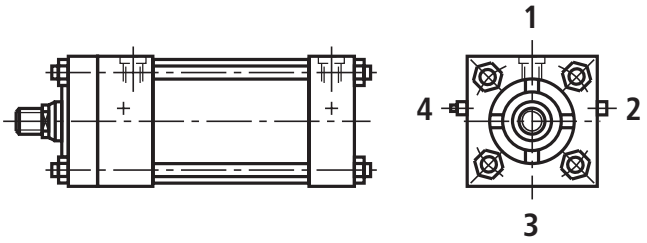
In the case of special variants, an “X” must be entered at the relevant place in the type code, and an SO number must be added at the end.

Position of line ports

By turning the cylinder head and/or cylinder cap the position of pipe ports can be varied for most of the cylinder mounting types during installation. The options can be seen in the table below.

The throttle and check valves change their position accordingly.

In the case of mounting types F, L, N and T, as well as on the cylinder cap for type of mounting G, the throttle and check valves are located at position 1 when the pipe connection is rotated.



	Selectable position of line ports															
Mounting types	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**K**	**L**	**M**	**N**	**P**	**Q**	**R**	**S**	**T**
At cylinder head	1	1	1	1	1	1	1	1	1	–	1	1	1	1	1	1
	2	2	2	2	□ 2	2	2	2	□ 2	–	■ 2	2	2	–	2	2
	3	3	3	3	–	3	3	3	–	3	–	3	3	3	3	–
	4	4	4	4	□ 4	4	4	4	□ 4	–	■ 4	4	4	–	4	4
At cylinder cap	1	1	1	1	1	1	1	1	1	–	1	1	1	1	1	1
	2	2	■ 2	2	□ 2	2	2	2	□ 2	–	■ 2	2	2	2	–	2
	3	3	3	3	–	3	3	3	–	3	–	3	3	3	3	–
	4	4	■ 4	4	□ 4	4	4	4	□ 4	–	■ 4	4	4	4	–	4

■ = Position 2 and 4 not possible for:
Piston Ø **40** with enlarged pipe connection 13 and 14

□ = Position 2 and 4 not possible for piston Ø **40; 50** and **63**

Explanations (explanation of items on pages 8 to 61)

1 Selectable position of line ports (see page 6).

12 Check valve and bleed point.
The bleed point is provided as standard.

13 Adjustable throttle valve for end position cushioning.

14 Thread versions B and C. Thread versions E and F as well as the associated self-aligning clevis are given on the last page of each piston Ø.

15 Observe the permissible loading for the screwed-on self-aligning clevis.

16 Associated pin Ø with fit m6.
Minimum strength of pin material $\sigma_{0.2}$= 600 N/mm^2
(is not included in the scope of supply).

17 Pins and split pins are included in the scope of supply.

20 Grease nipple, cone head form A to DIN 71412. As lubrication greases, commercial, anti-corrosion greases on lithium soap base can be used.

21 Lubrication possible via lubrication bore in the housing.

22 In conjunction with line connection 13 and 14, countersink Ø D1 on cap side is not suitable for seal ring fittings.

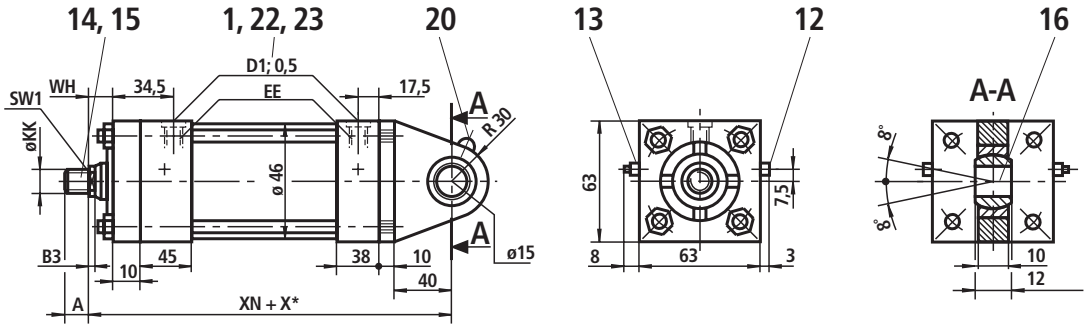
23 On the version with enlarged line connection 13 and 14 the distance between the two ports changes.

24 Double-rod cylinder CG,
max. tensile loading 13 kN on side “Y”

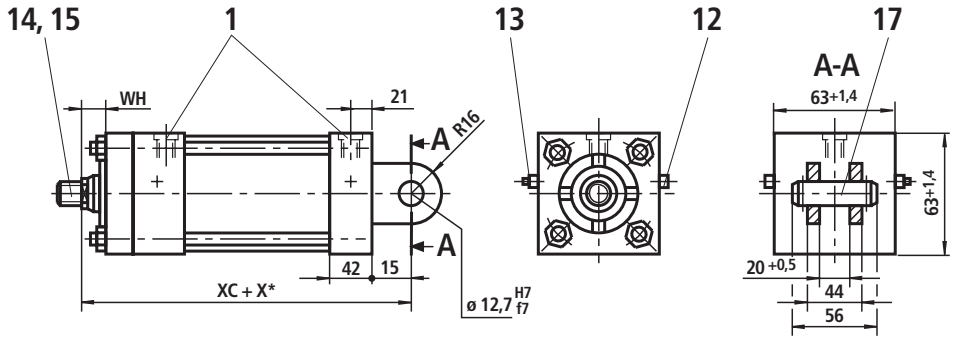
Piston Ø 40 (dimensions in mm)

For explanations of items, see page 7

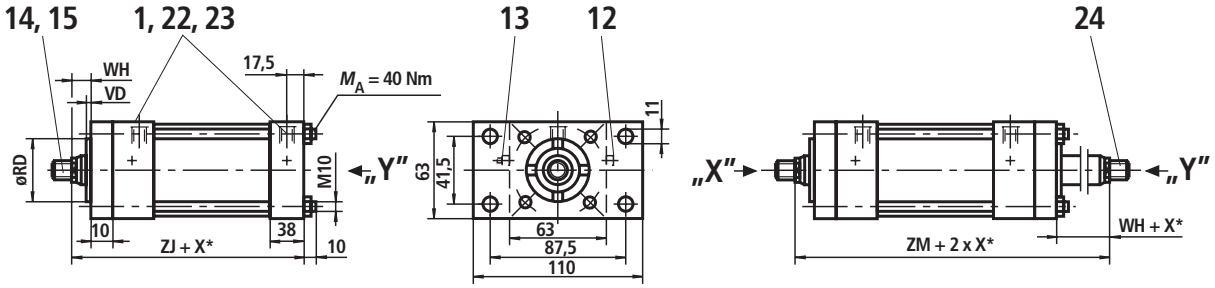
Type of mounting B Operating pressure 210 bar



Type of mounting G Operating pressure 210 bar



Type of mounting C Operating pressure with piston rod Ø 16 and 18: 180 bar on cap side; 210 bar on piston rod side
Operating pressure with piston rod Ø 25: 110 bar on cap side; 210 bar on piston rod side



Stroke$_{min}$ = 25 mm with thread version "E"
(only for double-rod cylinder)

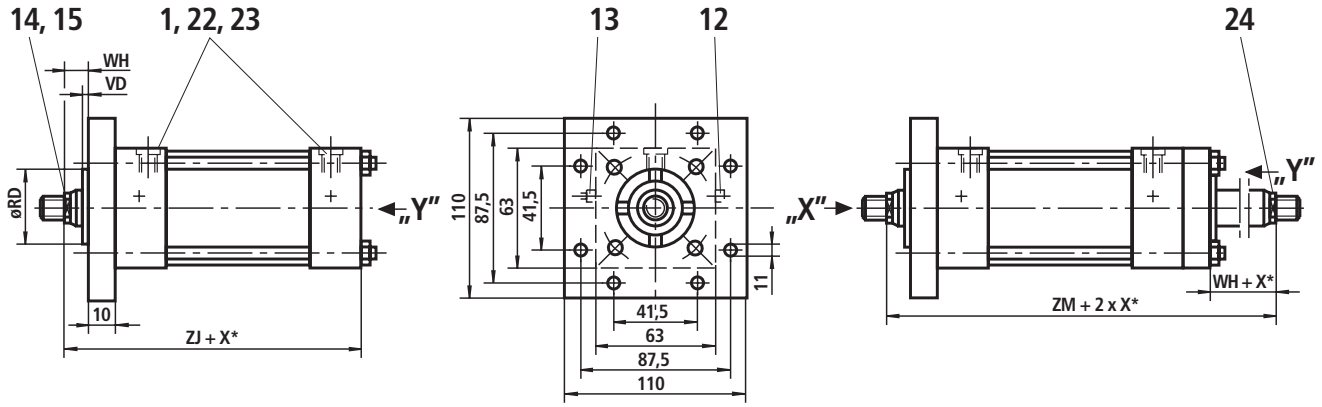
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
16	M10 x 1.5 ◥	M12 x 1.5	M14	19	35	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
18	M10 x 1.5 ◥	M12 x 1.5	M14	19	35								
25	M20 x 1.5	M22 x 1.5	M20 x 1.5	28	45								

X* = stroke length ◥ max. tensile load 13 kN

Piston Ø 40 (dimensions in mm)

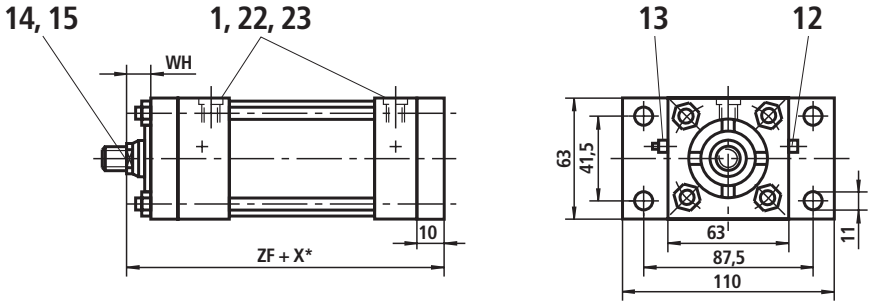
For explanations of items, see page 7

Type of mounting H Operating pressure 210 bar

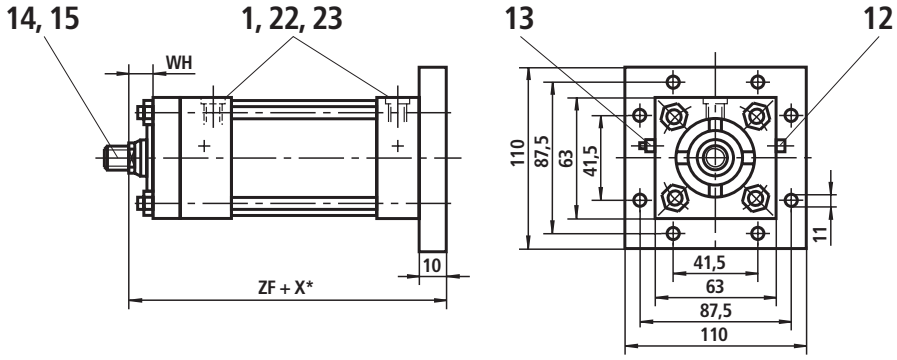


Stroke$_{min}$ = 25 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting D Operating pressure 210 bar



Type of mounting K Operating pressure 210 bar



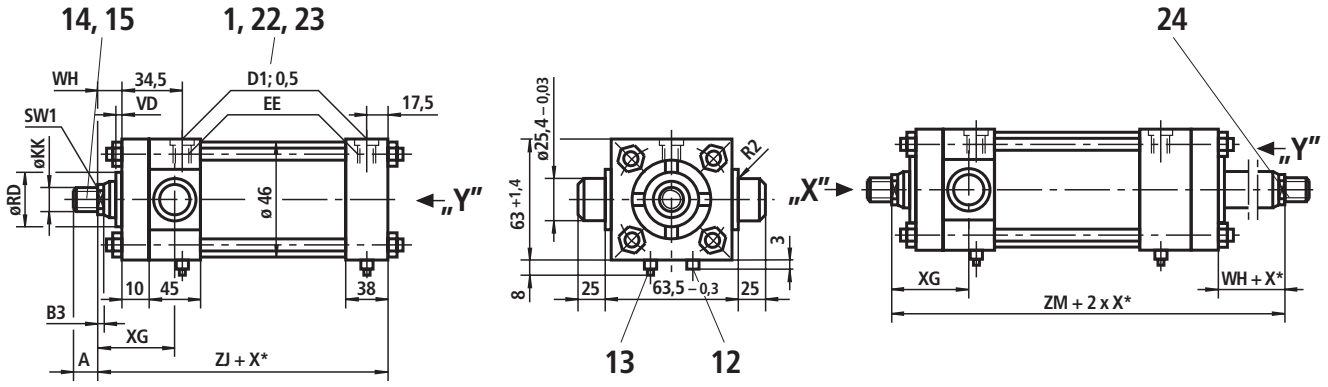
Piston rod Ø	ØRD f7	VD	WH	XC	XN	ZF	ZJ	ZM	B3	SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
16	28.5	6	16	162	193	153	143	176	5	13	30	30
18	32	6	16	162	193	153	143	176	5	14		
25	38	13	25	171	202	162	152	194	7	22		

X* = stroke length

Piston Ø 40 (dimensions in mm)

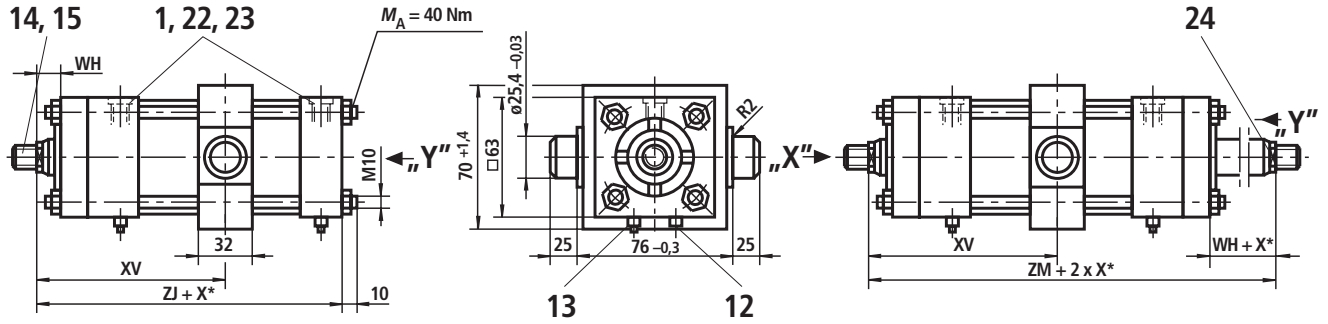
For explanations of items, see page 7

Type of mounting R Operating pressure 210 bar



Stroke$_{min}$ = 25 mm with thread version “E“ (only for double-rod cylinder)

Type of mounting E Operating pressure 210 bar

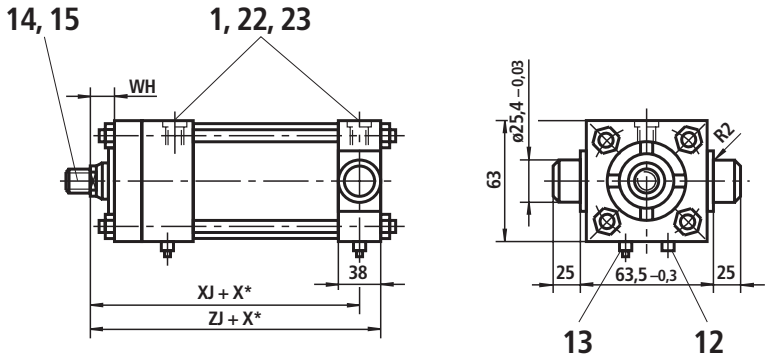


Stroke$_{min}$ = 10 mm
Always specify dimension “XV” in clear text on the order (obseve XV$_{min}$ and XV$_{max}$)

Note:
Dimensions for cylinder with piston rod extension “LY“ in the retracted condition, see index 2 on page 5.

Stroke$_{min}$ = 25 mm with thread version “E“ (only for double-rod cylinder)

Type of mounting S Operating pressure 210 bar



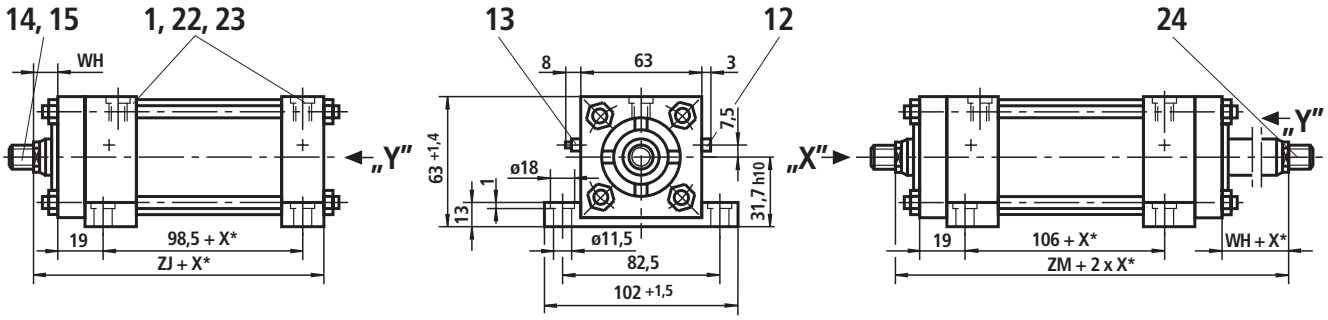
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
16	M10 x 1.5 ◥	M12 x 1.5	M14	19	35	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
18	M10 x 1.5 ◥	M12 x 1.5	M14	19	35								
25	M20 x 1.5	M22 x 1.5	M20 x 1.5	28	45								

X* = stroke length ◥ max. tensile load 13 kN

Piston Ø 40 (dimensions in mm)

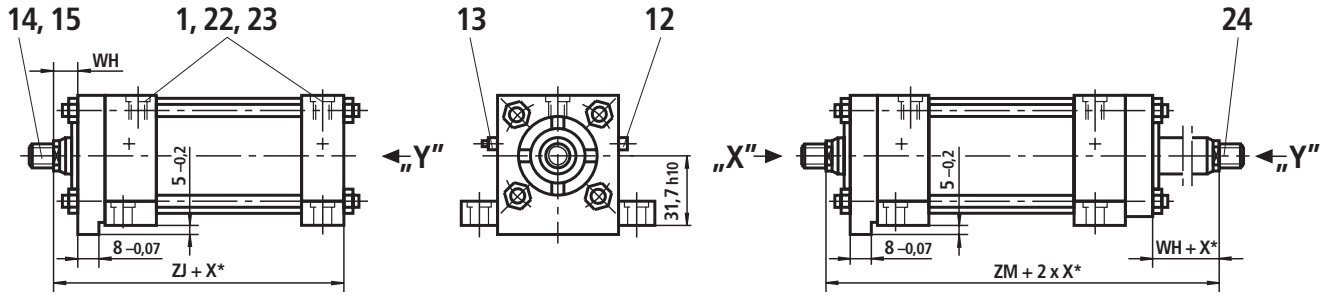
For explanations of items, see page 7

Type of mounting F Operating pressure 210 bar



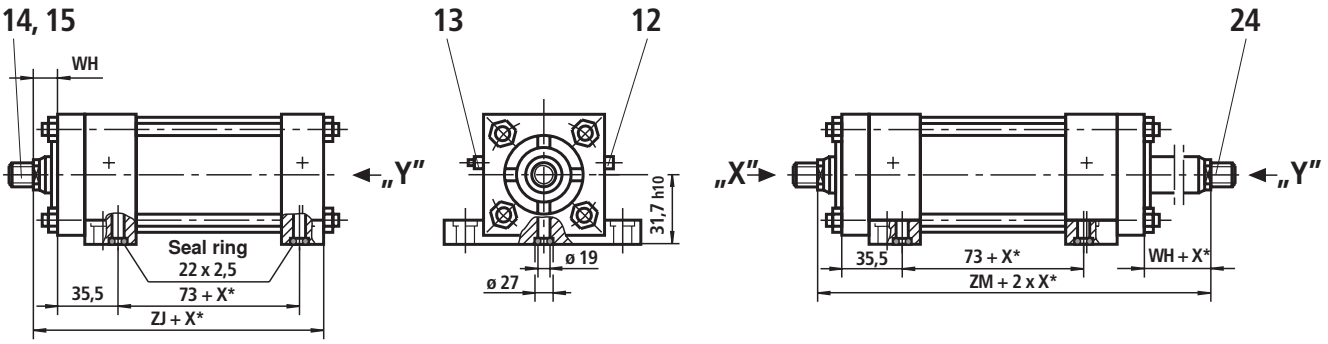
Stroke$_{min}$ = 25 mm with thread version “E“
(only for double-rod cylinder)

Type of mounting L Operating pressure 210 bar



Stroke$_{min}$ = 25 mm with thread version “E“
(only for double-rod cylinder)

Type of mounting M Operating pressure 210 bar



Stroke$_{min}$ = 25 mm with thread version “E“
(only for double-rod cylinder)

Piston rod Ø	ØRD f7	VD	WH	XG	XJ	XV [1] min.	XV [1] max.	ZJ	ZM	B3	SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
16	28.5	6	16	48	124	87	89 + X*	143	176	5	13	30	30
18	32	6	16	48	124	87	89 + X*	143	176	5	14		
25	38	13	25	57	133	96	98 + X*	152	194	7	22		

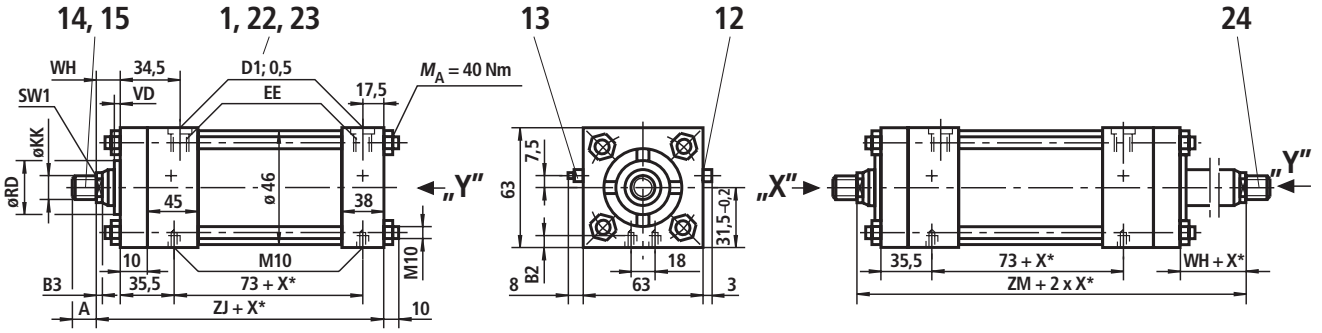
X* = stroke length

[1] Always specify dimension “XV” in clear text on the order (observe XV$_{min}$ and XV$_{max}$)

Piston Ø 40 (dimensions in mm)

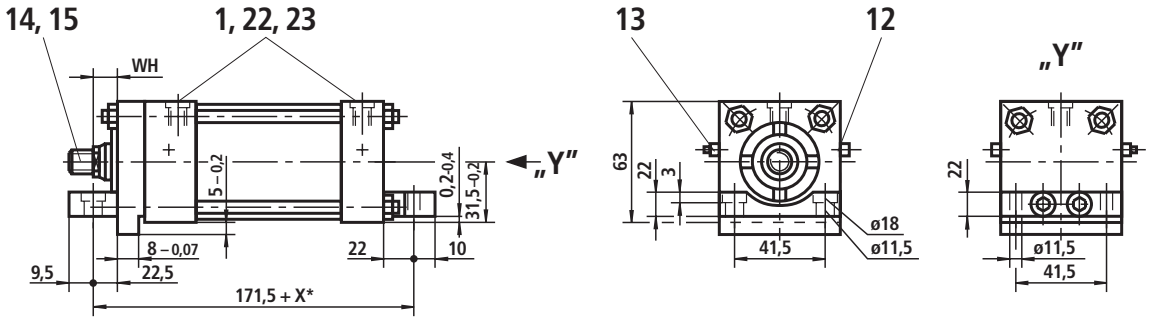
For explanations of items, see page 7

Type of mounting N Operating pressure 210 bar

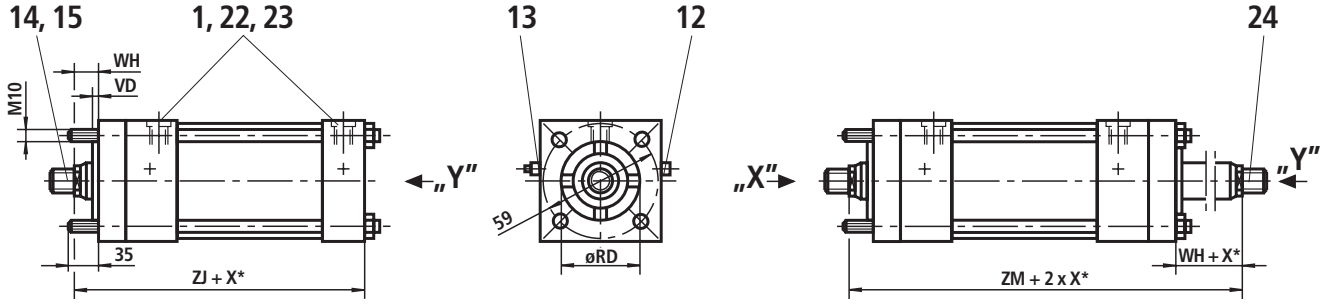


Stroke$_{min}$ = 25 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting T Operating pressure 210 bar



Type of mounting P Operating pressure 210 bar



Stroke$_{min}$ = 25 mm with thread version "E"
(only for double-rod cylinder)

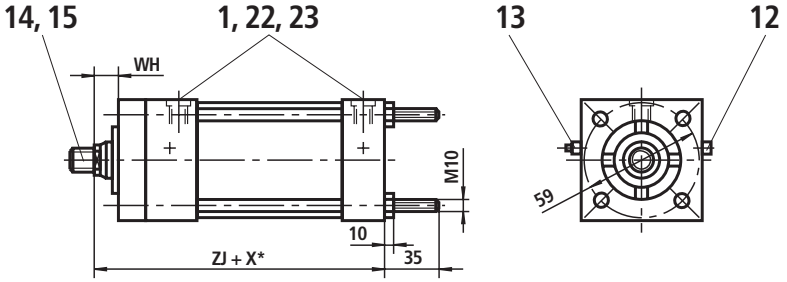
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
16	M10 x 1.5 ◥	M12 x 1.5	M14	19	35	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
18	M10 x 1.5 ◥	M12 x 1.5	M14	19	35								
25	M20 x 1.5	M22 x 1.5	M20 x 1.5	28	45								

X* = stroke length ◥ max. tensile load 13 kN

Piston Ø 40 (dimensions in mm)

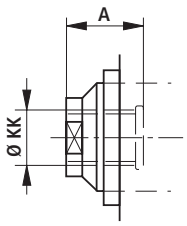
For explanations of items, see page 7

Type of mounting Q Operating pressure 210 bar

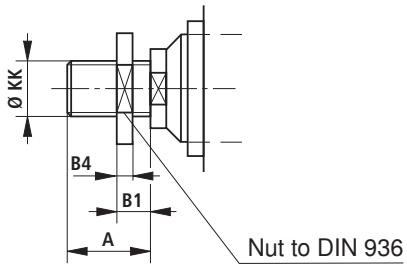


Additional thread versions

Thread version "E"

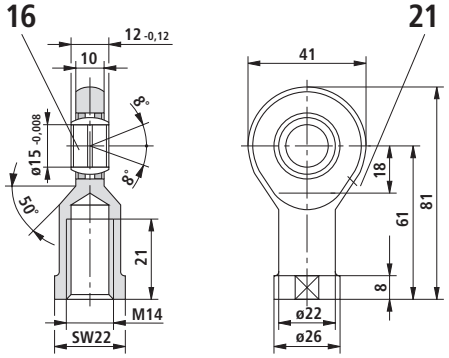


Thread version "F"



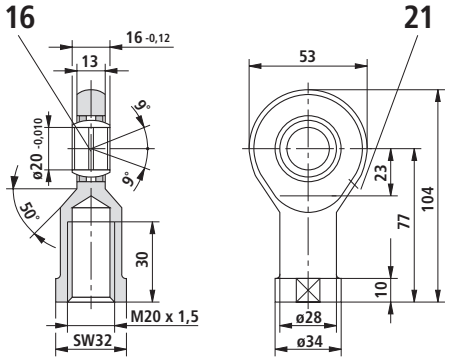
Self-aligning clevis CGK 15

suitable for thread version "F"
Material no.: **R900001328**
Weight: 0.16 kg
Permissible load: 18 kN



Self-aligning clevis CGK 20

suitable for thread version "F"
Material no.: **R900001329**
Weight: 0.34 kg
Permissible load: 30 kN



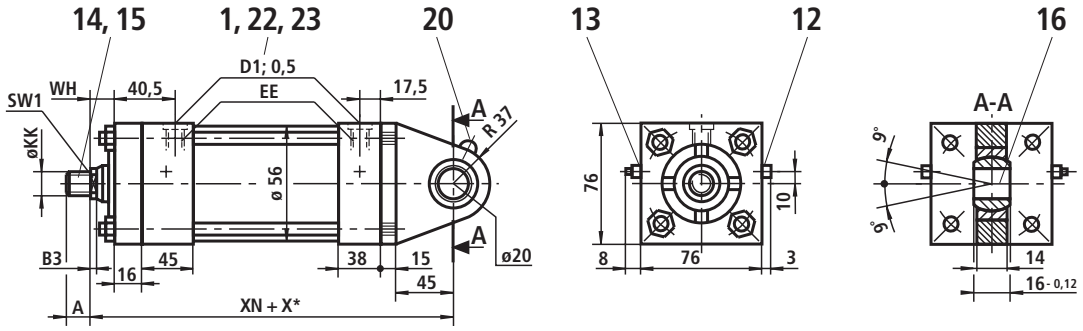
Piston rod Ø	ØRD f7	B4	VD	WH	ZJ	ZM	B1	B2	B3	SW1	Cushioning lengths	
											piston side	piston rod side
16	28.5	8	6	16	143	176	14	12	5	13	30	30
18	32	8	6	16	143	176	14	12	5	14		
25	38	9	13	25	152	194	15	12	7	22		

X* = stroke length

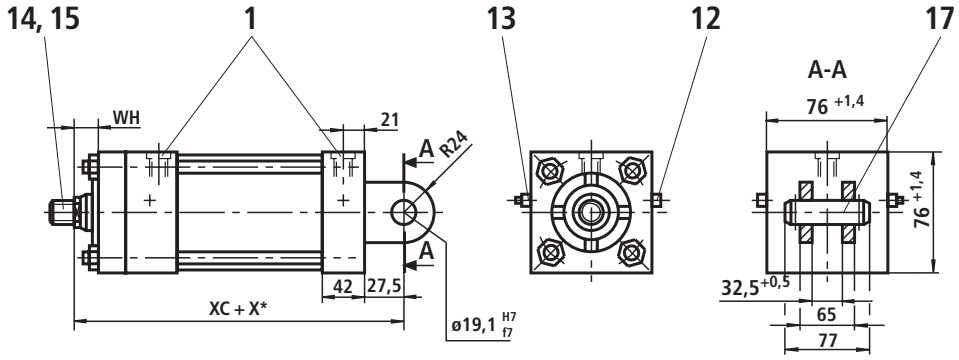
Piston Ø 50 (dimensions in mm)

For explanations of items, see page 7

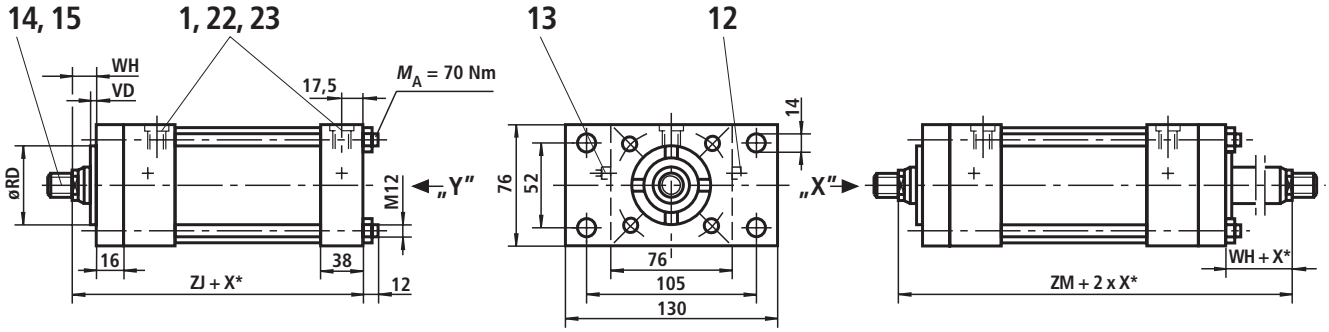
Type of mounting B Operating pressure 210 bar



Type of mounting G Operating pressure 210 bar



Type of mounting C Operating pressure with piston rod Ø 22 and Ø 25: 180 bar on cap side, 210 bar on piston rod side
Operating pressure with piston rod Ø 36: 110 bar on cap side, 210 bar on piston rod side



Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

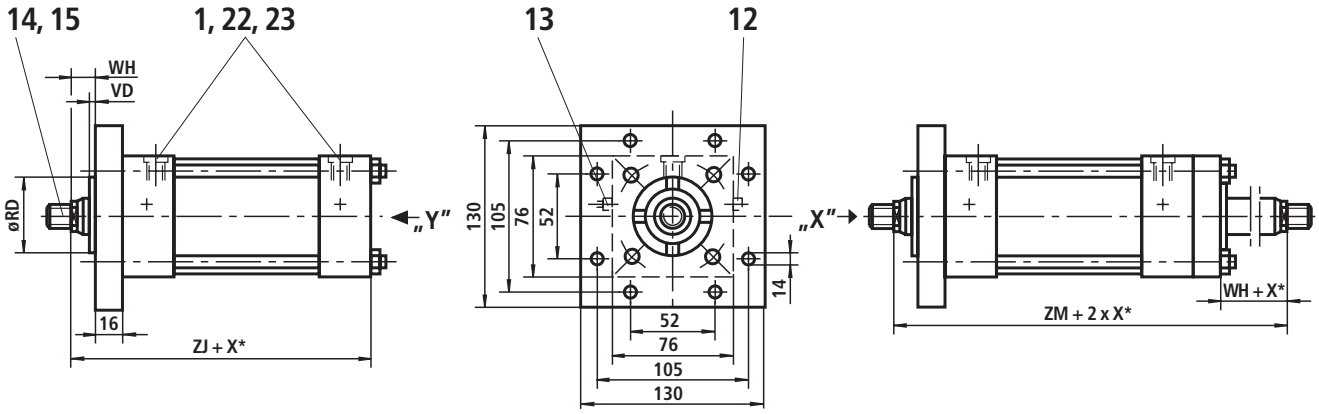
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
22	M16 x 1.5	M20 x 1.5	M20 x 1.5	28	45	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
25	M20 x 1.5	M22 x 1.5	M20 x 1.5	28	45								
36	M26 x 1.5	M30 x 2	M24 x 2	41	55								

X* = stroke length

Piston Ø 50 (dimensions in mm)

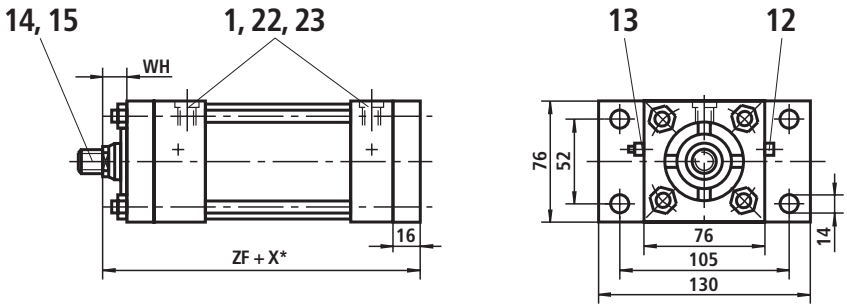
For explanations of items, see page 7

Type of mounting H Operating pressure 210 bar

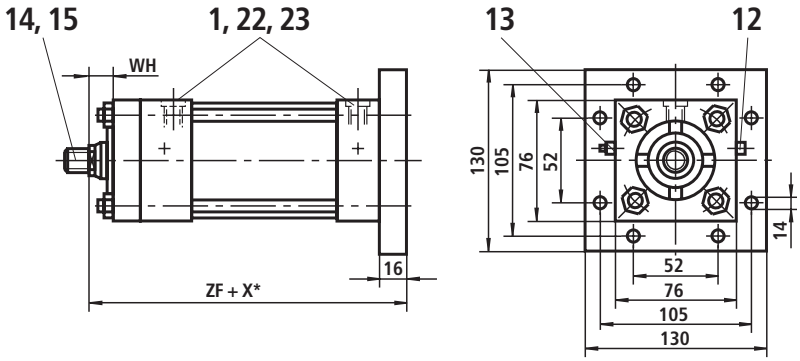


$Stroke_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting D Operating pressure 210 bar



Type of mounting K Operating pressure 210 bar



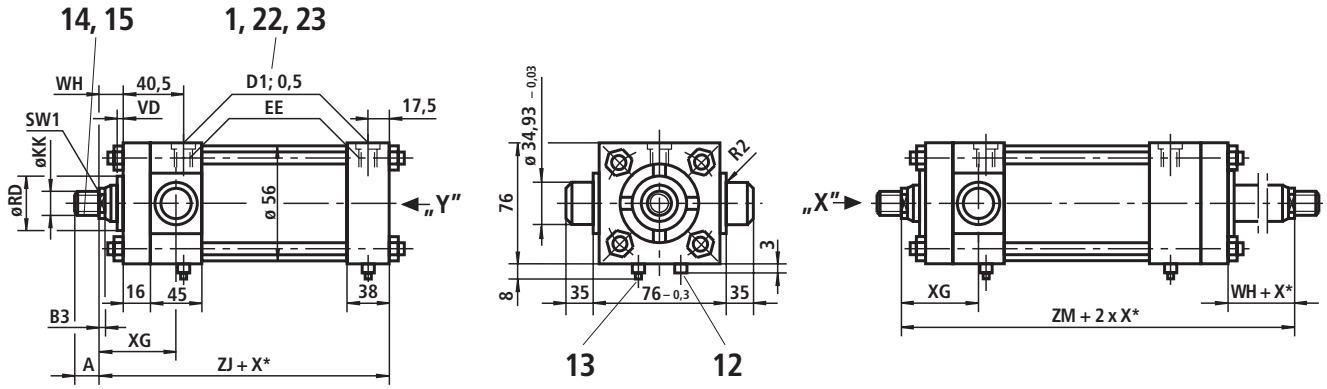
Piston rod Ø	ØRD f7	VD	WH	XC	XN	ZF	ZJ	ZM	B3	SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
22	38	6	19	184	212.5	168.5	152.5	194.5	8	19	30	30
25	38	7	19	184	212.5	168.5	152.5	194.5	8	22		
36	50	10	25.5	190.5	219	175	159	207.5	8	30		

X* = stroke length

Piston Ø 50 (dimensions in mm)

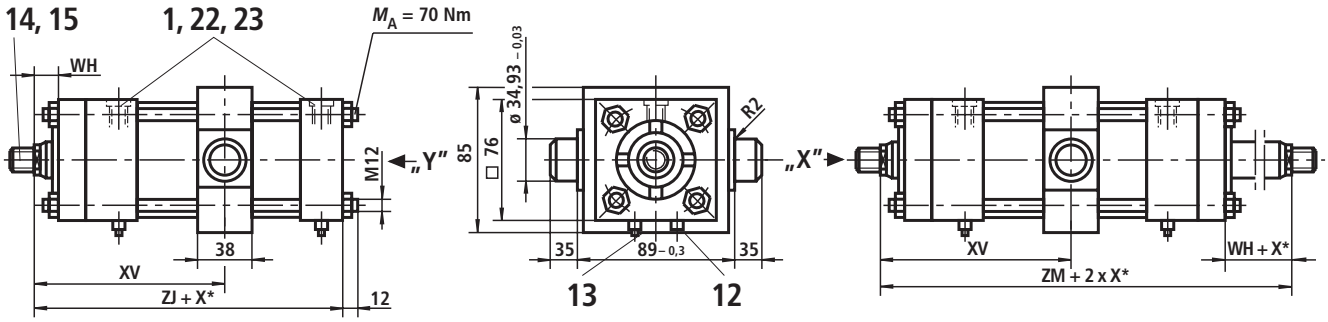
For explanations of items, see page 7

Type of mounting R Operating pressure 210 bar



$Stroke_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting E Operating pressure 210 bar

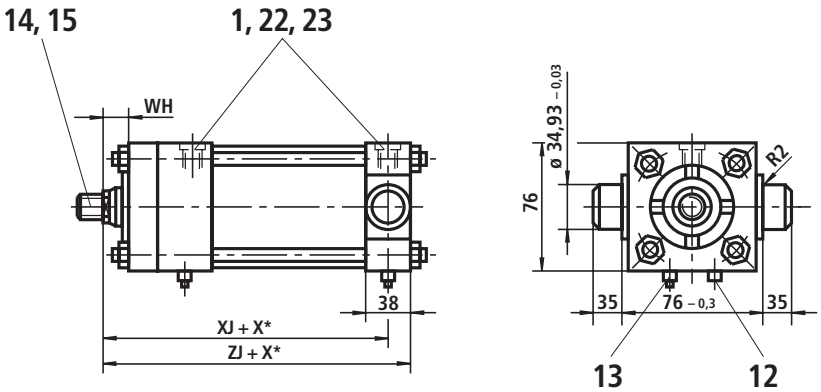


$Stroke_{min}$ = 10 mm
Always specify dimension "XV" in clear text on the order (observe XV_{min} and XV_{max})

Note:
Dimensions for cylinder with piston rod extension "LY" in the retracted condition, see index 2 on page 5.

$Stroke_{min}$ = 30 mm
with thread version "E"
(only for double-rod cylinder)

Type of mounting S Operating pressure 210 bar



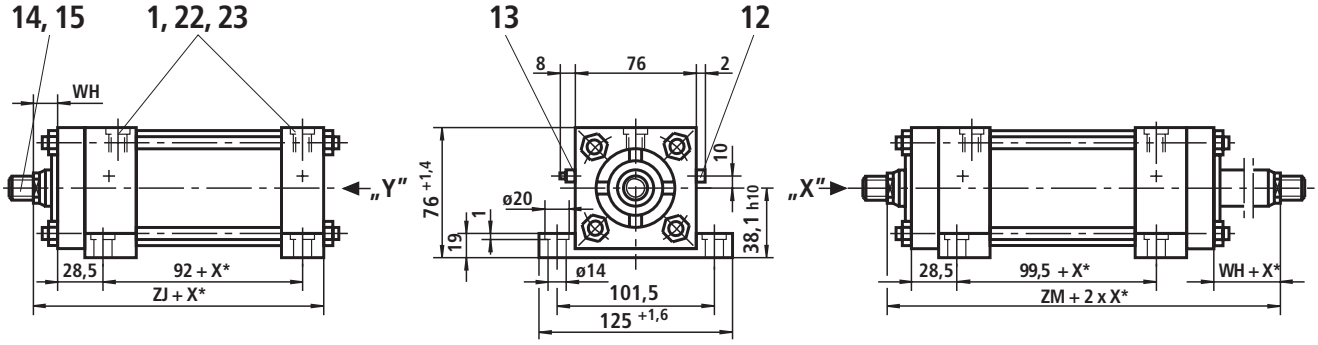
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
22	M16 x 1.5	M20 x 1.5	M20 x 1.5	28	45	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
25	M20 x 1.5	M22 x 1.5	M20 x 1.5	28	45								
36	M26 x 1.5	M30 x 2	M24 x 2	41	55								

X* = stroke length

Piston Ø 50 (dimensions in mm)

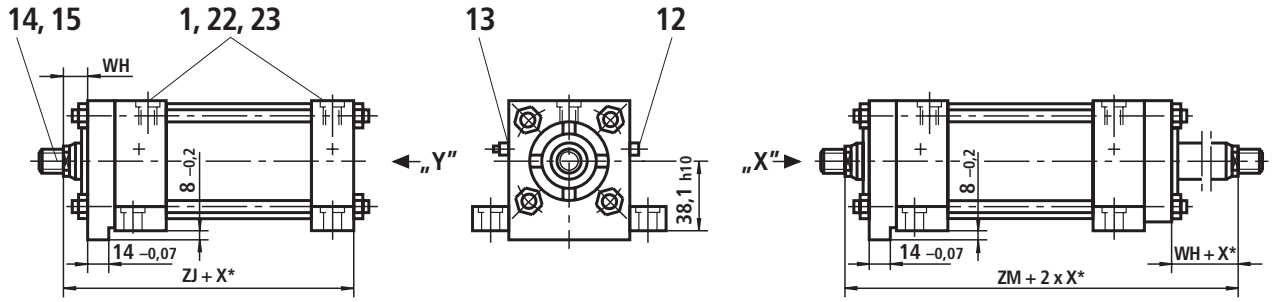
For explanations of items, see page 7

Type of mounting F Operating pressure 210 bar



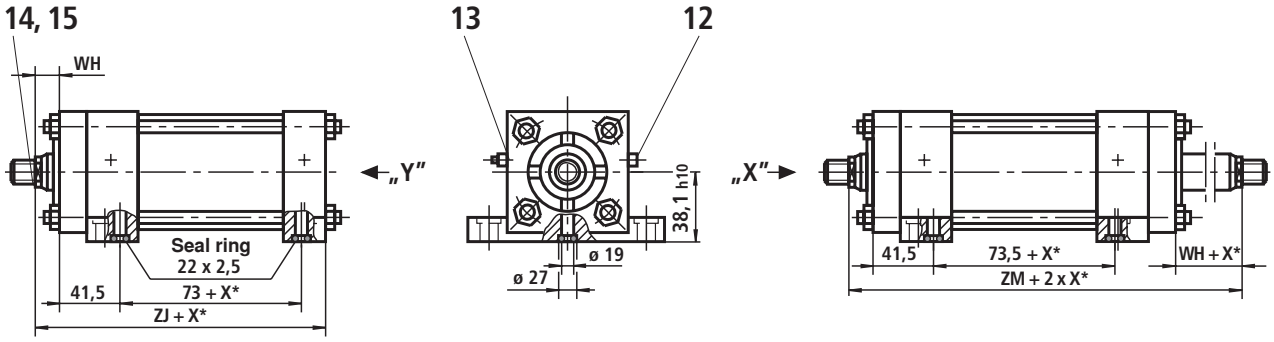
Stroke$_{min}$ = 30 mm with thread version “E“ (only for double-rod cylinder)

Type of mounting L Operating pressure 210 bar



Stroke$_{min}$ = 30 mm with thread version “E“ (only for double-rod cylinder)

Type of mounting M Operating pressure 210 bar



Stroke$_{min}$ = 30 mm with thread version “E“ (only for double-rod cylinder)

Piston rod Ø	ØRD f7	VD	WH	XG	XJ	XV [1] min.	XV [1] max.	ZJ	ZM	B3	SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
22	38	6	19	57	133.5	99	95 + X*	152.5	194.5	8	19	30	30
25	38	7	19	57	133.5	99	95 + X*	152.5	194.5	8	22		
36	50	10	25.5	63.5	140	105.5	102 + X*	159	207.5	8	30		

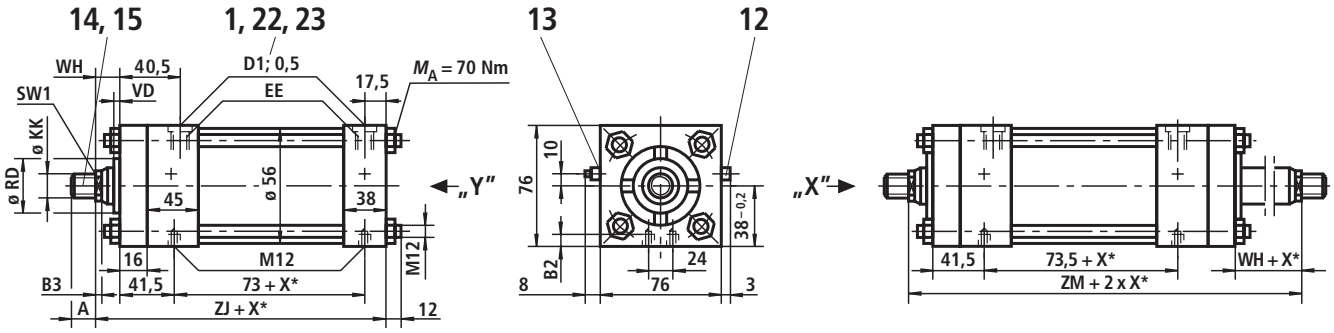
X* = stroke length

[1] Always specify dimension “XV” in clear text on the order (observe XV$_{min}$ and XV$_{max}$)

Piston Ø 50 (dimensions in mm)

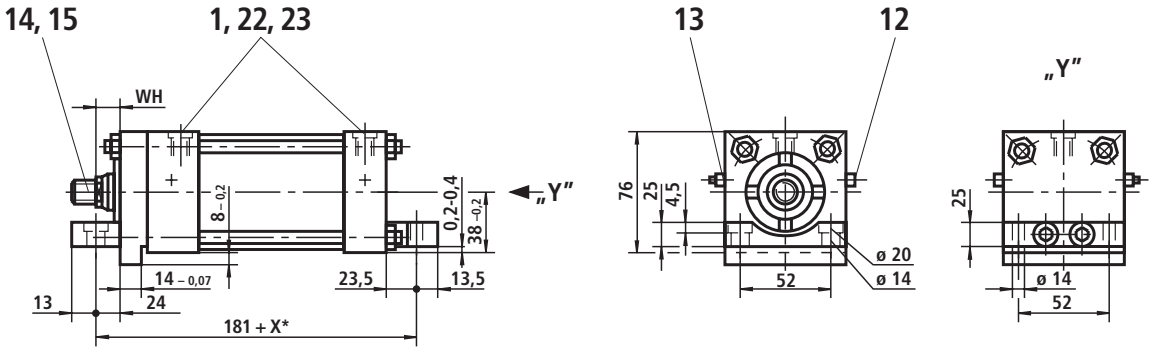
For explanations of items, see page 7

Type of mounting N Operating pressure 210 bar

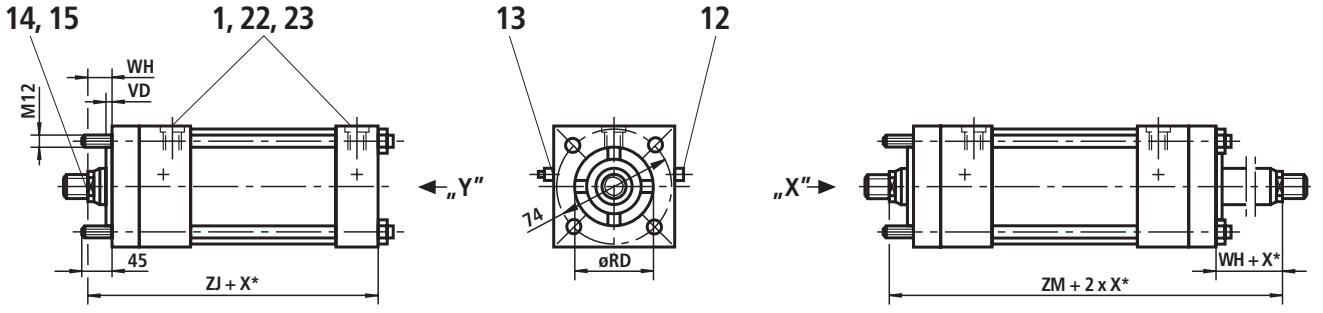


Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting T Operating pressure 210 bar



Type of mounting P Operating pressure 210 bar



Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

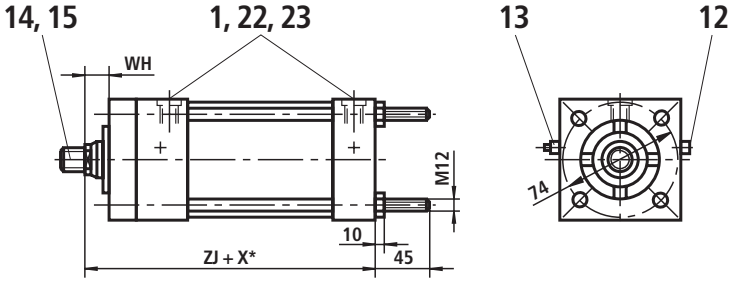
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
22	M16 x 1.5	M20 x 1.5	M20 x 1.5	28	45	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
25	M20 x 1.5	M22 x 1.5	M20 x 1.5	28	45								
36	M26 x 1.5	M30 x 2	M24 x 2	41	55								

X* = stroke length

Piston Ø 50 (dimensions in mm)

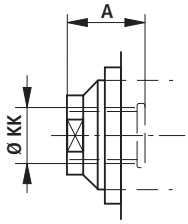
For explanations of items, see page 7

Type of mounting Q Operating pressure 210 bar

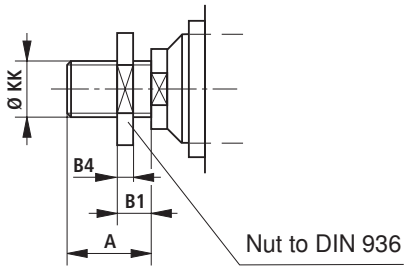


Additional thread versions

Thread version "E"

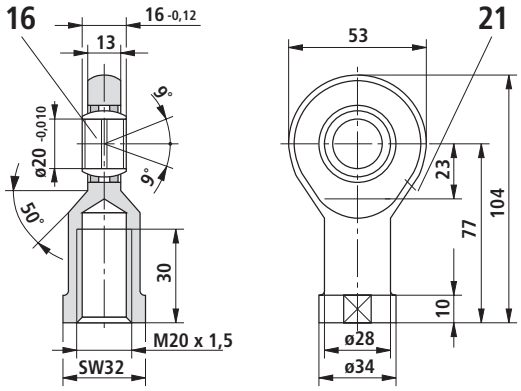


Thread version "F"



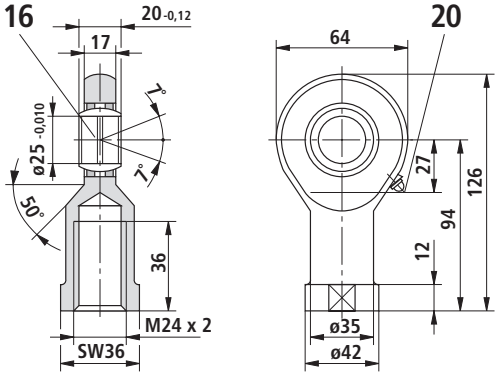
Self-aligning clevis CGK 20

suitable for thread version "F"
Material no.: **R900001329**
Weight: 0.34 kg
Permissible load: 30 kN



Self-aligning clevis CGK 25

suitable for thread version "F"
Material no.: **R900001330**
Weight: 0.6 kg
Permissible load: 42 kN



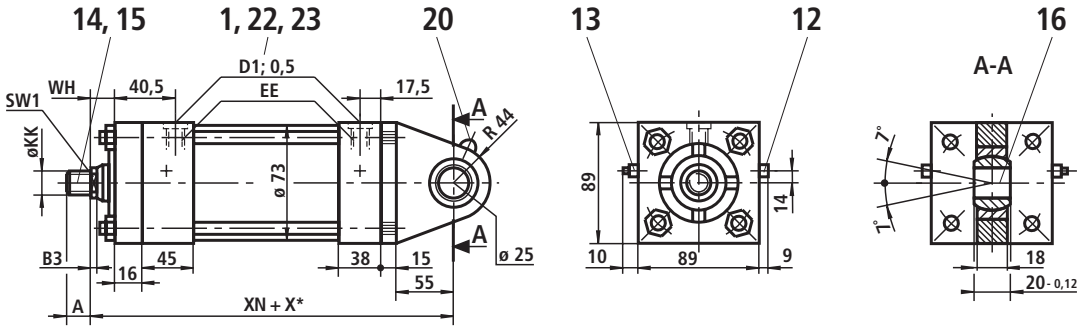
Piston rod Ø	ØRD f7	B4	VD	WH	ZJ	ZM	B1	B2	B3	SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
22	38	9	6	19	152.5	194.5	15	16	8	19	30	30
25	38	9	7	19	152.5	194.5	15	16	8	22		
36	50	10	10	25.5	159	207.5	19	12	8	30		

X* = stroke length

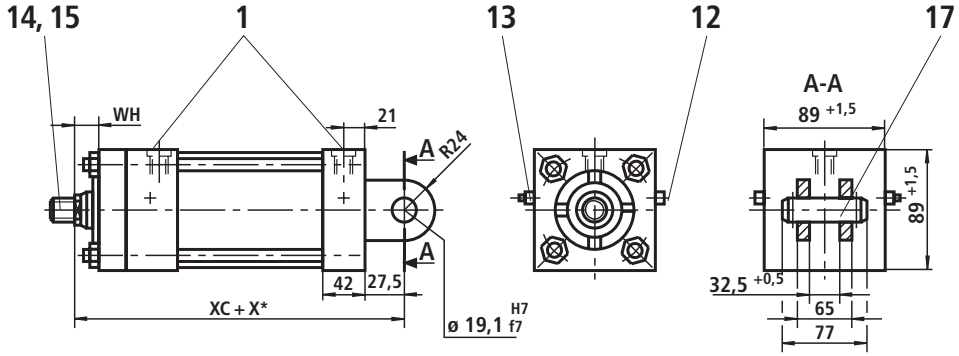
Piston Ø 63 (dimensions in mm)

For explanations of items, see page 7

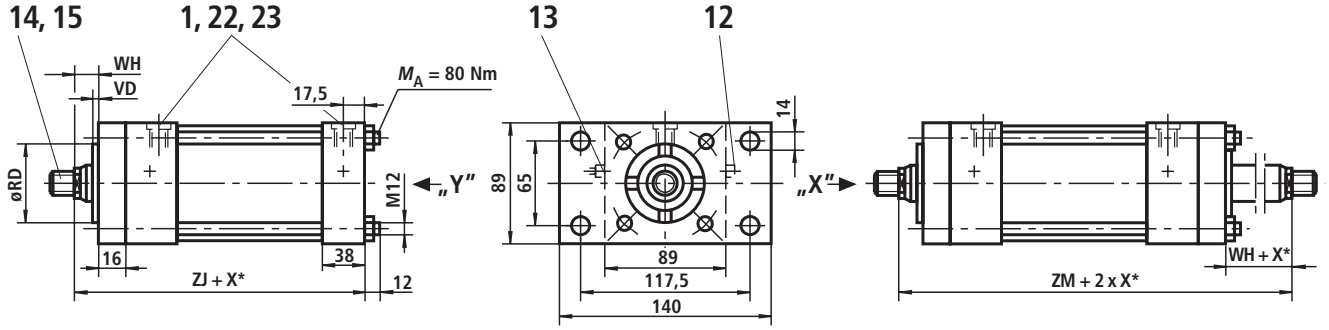
Type of mounting B Operating pressure 210 bar



Type of mounting G Operating pressure 210 bar



Type of mounting C Operating pressure with piston rod Ø 25 and Ø 28: 180 bar on cap side, 210 bar on piston rod side
Operating pressure with piston rod Ø 36 and Ø 45:110 bar on cap side, 210 bar on piston rod side



Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

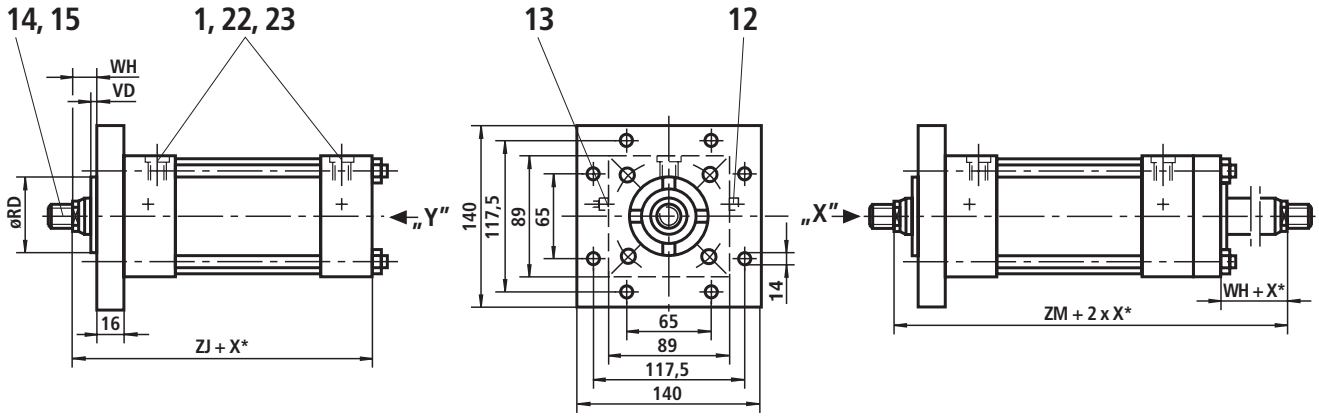
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
25	M20 x 1.5	M22 x 1.5	M24 x 2	28	55	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
28	M20 x 1.5	M22 x 1.5	M24 x 2	28	55								
36	M26 x 1.5	M30 x 2	M30 x 2	41	65								
45	M33 x 2	M39 x 2	M30 x 2	50	65								

X* = stroke length

Piston Ø 63 (dimensions in mm)

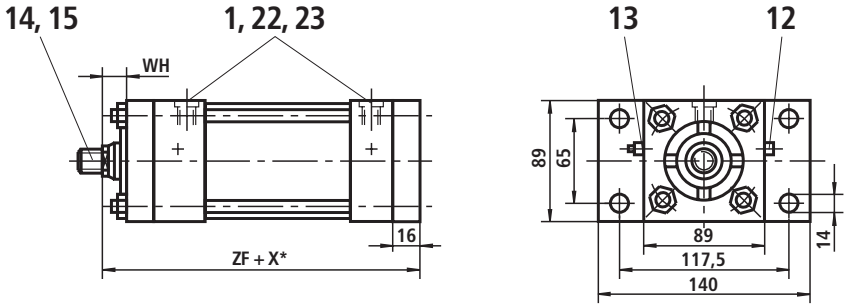
For explanations of items, see page 7

Type of mounting H Operating pressure 210 bar

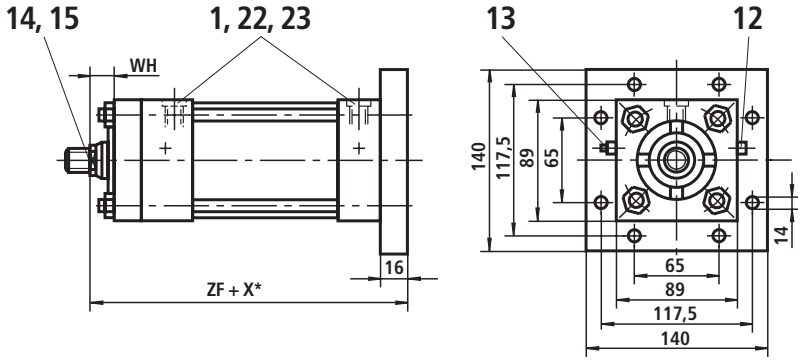


Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting D Operating pressure 210 bar



Type of mounting K Operating pressure 210 bar



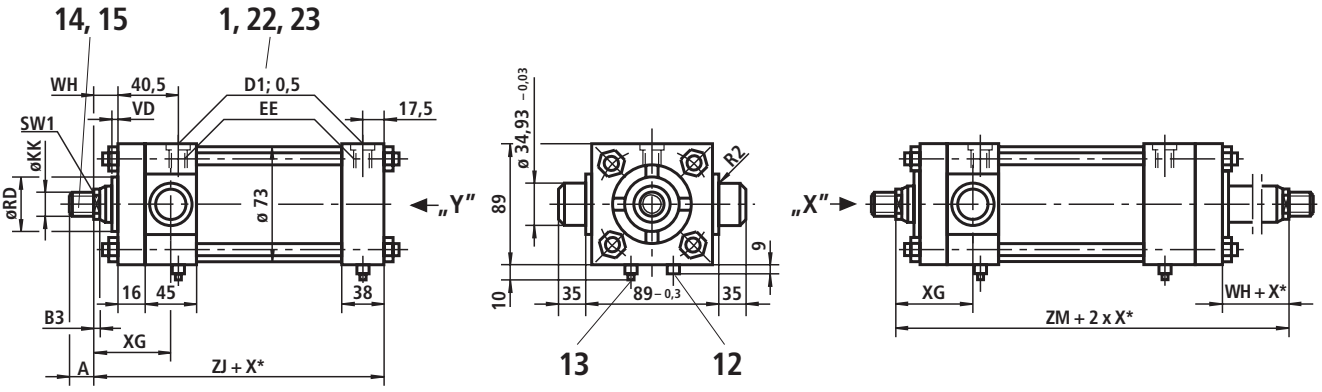
Piston rod Ø	ØRD f7	VD	WH	XC	XN	ZF	ZJ	ZM	B3	SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
25	38	6	19	187	225.5	171.5	155.5	197.5	8	22	30	30
28	42	6	19	187	225.5	171.5	155.5	197.5	8	22		
36	50.7	10	25.5	193.5	232	178	162	210.5	10	30		
45	60	13	32	200	238.5	184.5	168.5	223.5	12	41		

X* = stroke length

Piston Ø 63 (dimensions in mm)

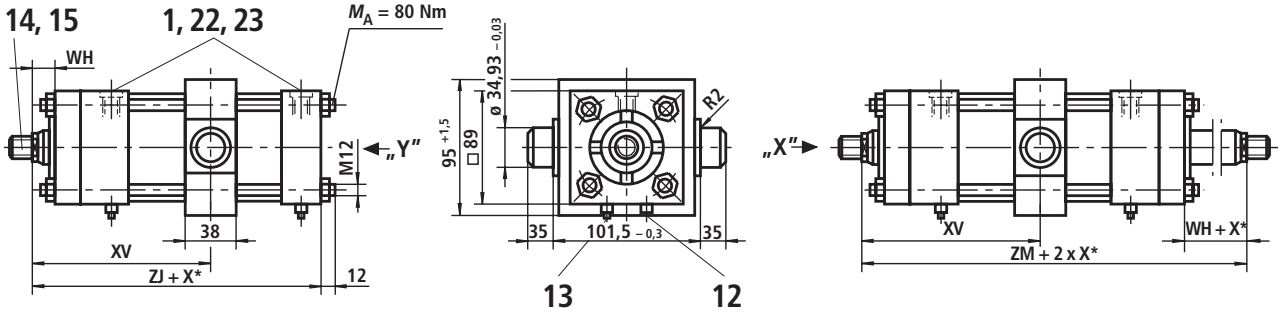
For explanations of items, see page 7

Type of mounting R Operating pressure 210 bar



Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting E Operating pressure 210 bar

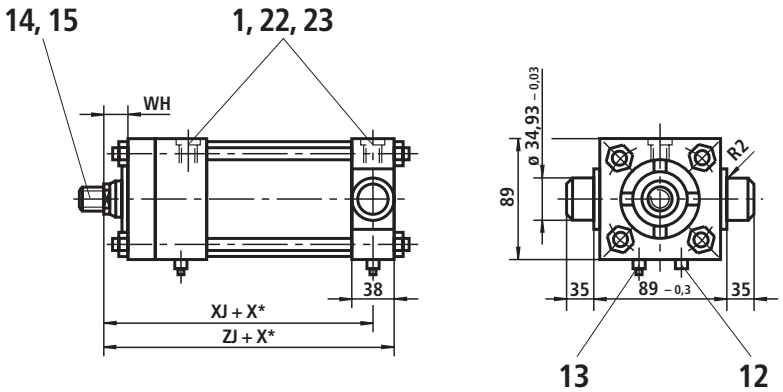


Stroke$_{min}$ = 10 mm
Always specify dimension "XV"
in clear text on the order
(observe XV$_{min}$ and XV$_{max}$)

Note:
Dimensions for cylinder with piston rod extension "LY" in the retracted condition, see index 2 on page 5.

Stroke$_{min}$ = 30 mm
with thread version "E"
(only for double-rod cylinder)

Type of mounting S Operating pressure 210 bar



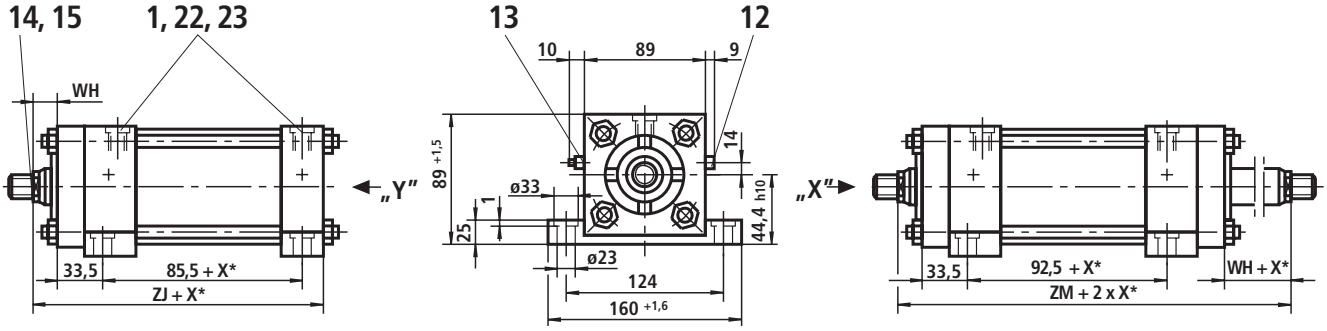
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
25	M20 x 1.5	M22 x 1.5	M24 x 2	28	55	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
28	M20 x 1.5	M22 x 1.5	M24 x 2	28	55								
36	M26 x 1.5	M30 x 2	M30 x 2	41	65								
45	M33 x 2	M39 x 2	M30 x 2	50	65								

X* = stroke length

Piston Ø 63 (dimensions in mm)

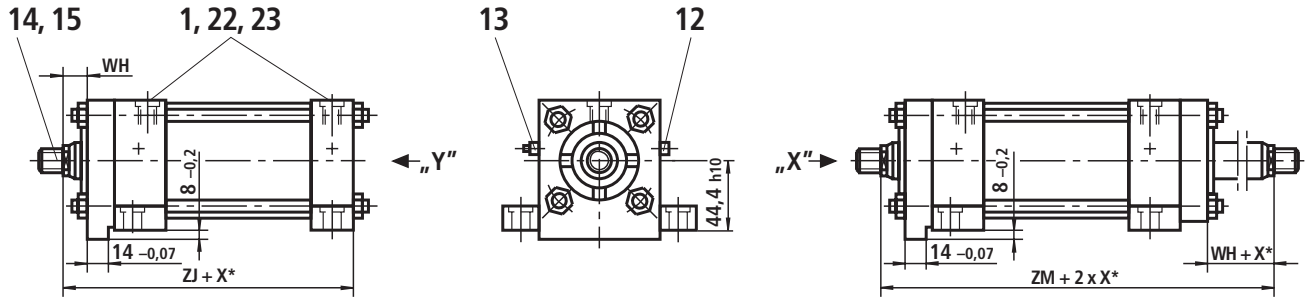
For explanations of items, see page 7

Type of mounting F Operating pressure 210 bar



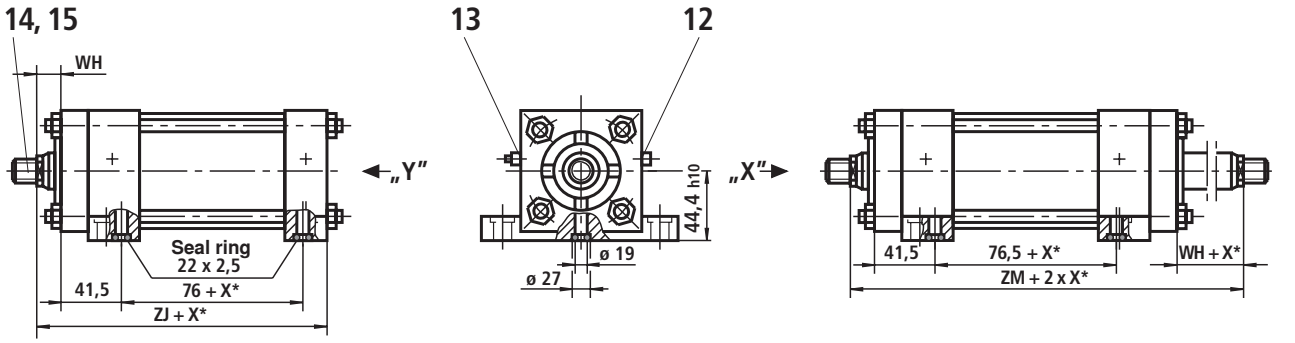
Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting L Operating pressure 210 bar



Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting M Operating pressure 210 bar



Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

Piston rod Ø	ØRD f7	VD	WH	XG	XJ	XV [1] min.	XV [1] max.	ZJ	ZM	B3	SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
25	38	6	19	57	136.5	99	98.5 + X*	155.5	197.5	8	22	30	30
28	42	6	19	57	136.5	99	98.5 + X*	155.5	197.5	8	22		
36	50.7	10	25.5	3.5	143	105.5	105 + X*	162	210.5	10	30		
45	60	13	32	70	149.5	112	111.5 + X*	168.5	223.5	12	41		

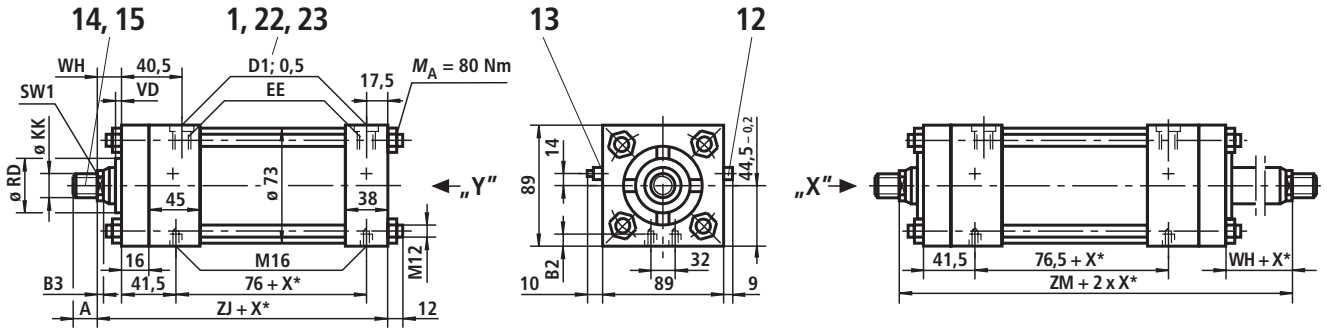
X* = stroke length

[1] Always specify dimension "XV" in clear text on the order (observe XV$_{min}$ and XV$_{max}$)

Piston Ø 63 (dimensions in mm)

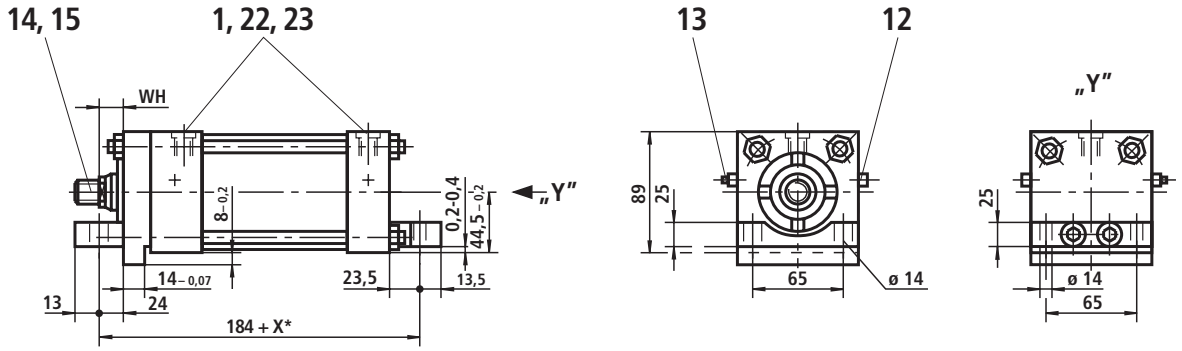
For explanations of items, see page 7

Type of mounting N Operating pressure 210 bar

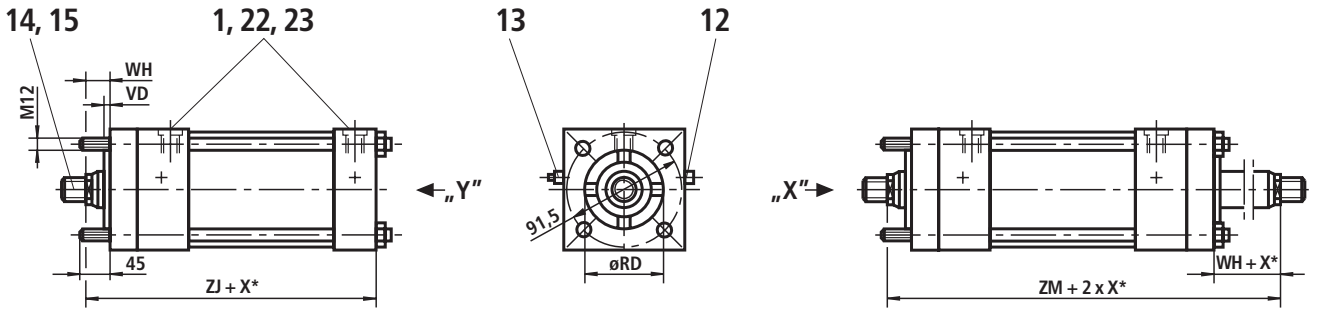


Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting T Operating pressure 210 bar



Type of mounting P Operating pressure 210 bar



Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

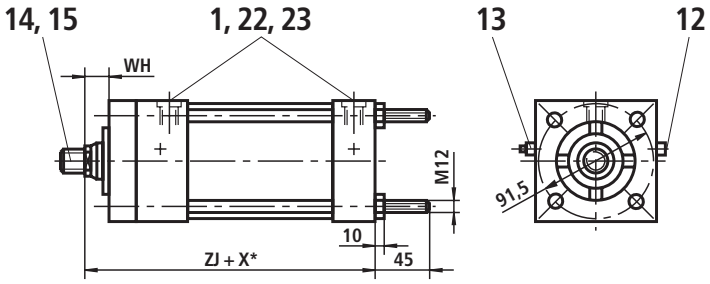
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C. E	B	F	C. E. B	F	01	13	02	14	01	13	02	14
25	M20 x 1.5	M22 x 1.5	M24 x 2	28	55	G1/2	G3/4	M22 x 1.5	M27 x 2	34	42	34	42
28	M20 x 1.5	M22 x 1.5	M24 x 2	28	55								
36	M26 x 1.5	M30 x 2	M30 x 2	41	65								
45	M33 x 2	M39 x 2	M30 x 2	50	65								

X* = stroke length

Piston Ø 63 (dimensions in mm)

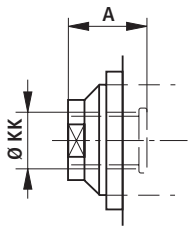
For explanations of items, see page 7

Type of mounting Q Operating pressure 210 bar

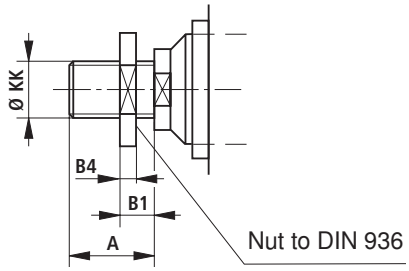


Additional thread versions

Thread version "E"

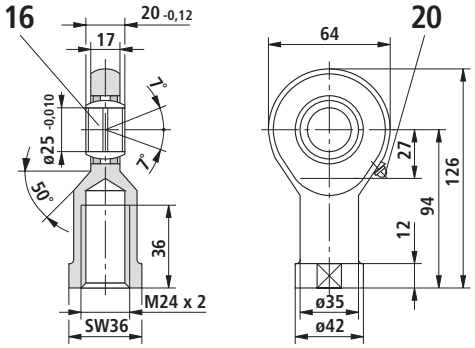


Thread version "F"



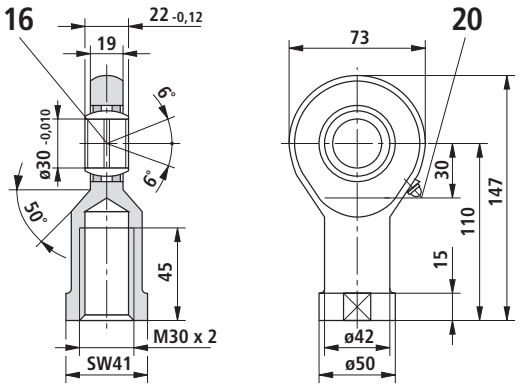
Self-aligning clevis CGK 25

suitable for thread version "F"
Material no.: **R900001330**
Weight: 0.6 kg
Permissible load: 42 kN



Self-aligning clevis CGK 30

suitable for thread version "F"
Material no.: **R900001331**
Weight: 0.9 kg
Permissible load: 55 kN



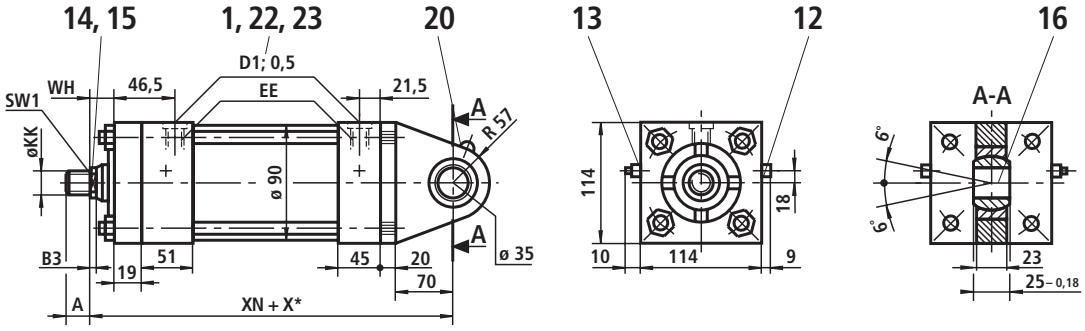
Piston rod Ø	ØRD f7	B4	VD	WH	ZJ	ZM	B1	B2	B3	SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
25	38	10	6	19	155.5	197.5	19	20	8	22	30	30
28	42	10	6	19	155.5	197.5	19	20	8	22		
36	50.7	12	10	25.5	162	210.5	20	14	10	30		
45	60	12	13	32	168.5	223.5	20	14	12	41		

X* = stroke length

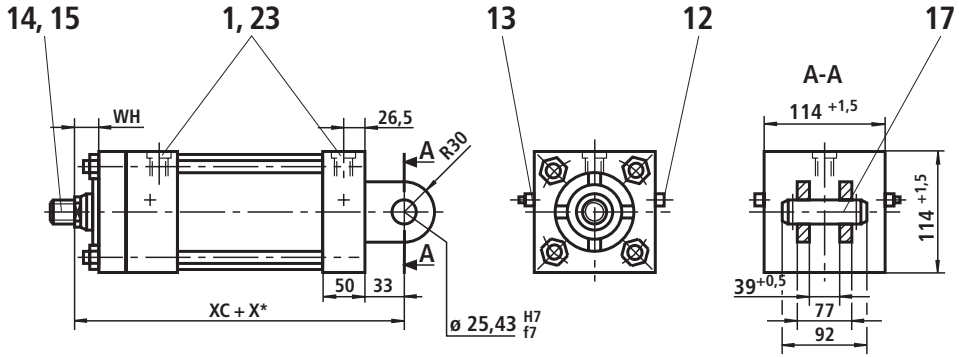
Piston Ø 80 (dimensions in mm)

For explanations of items, see page 7

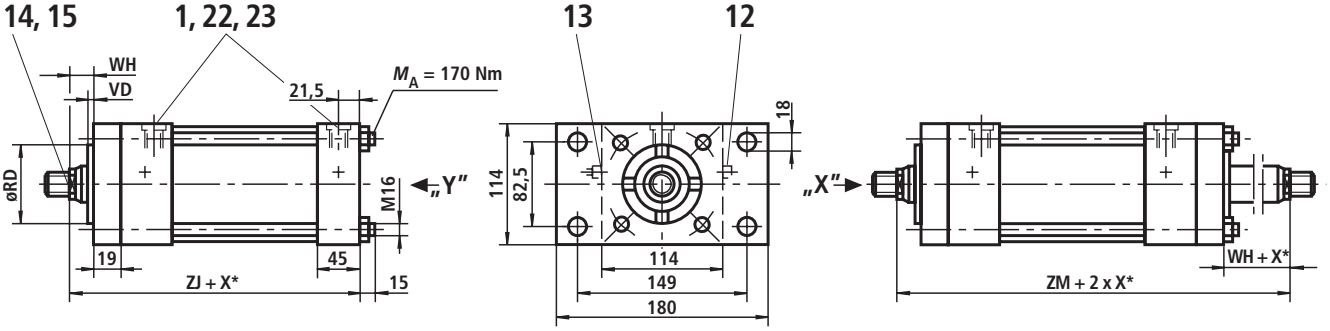
Type of mounting B Operating pressure 210 bar



Type of mounting G Operating pressure 210 bar



Type of mounting C Operating pressure with piston rod Ø 36: 180 bar on cap side, 210 bar on piston rod side
Operating pressure with piston rod Ø 45 and Ø 56: 110 bar on cap side, 210 bar on piston rod side



Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

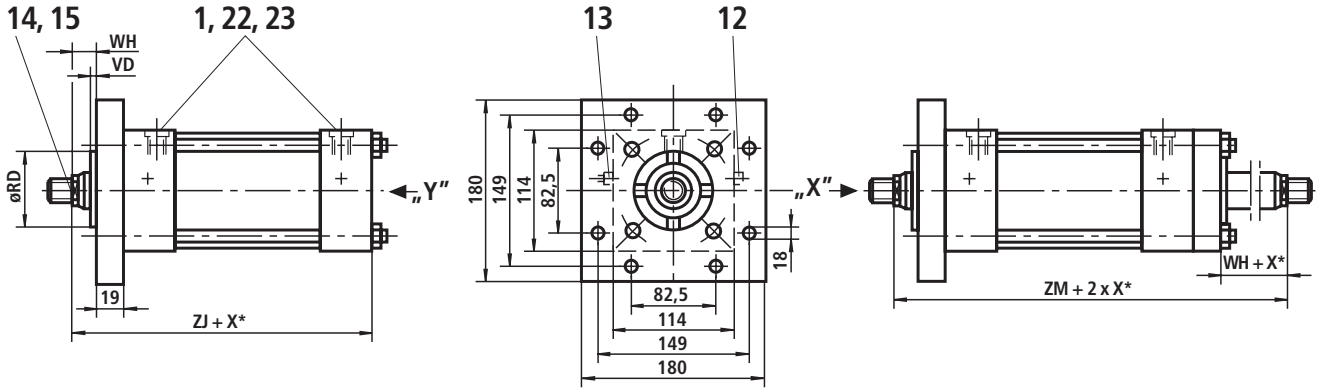
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
36	M26 x 1.5	M30 x 2	M30 x 2	41	65	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
45	M33 x 2	M39 x 2	M36 x 3	51	80								
56	M39 x 2	M45 x 2	M39 x 3	57	90								

X* = stroke length

Piston Ø 80 (dimensions in mm)

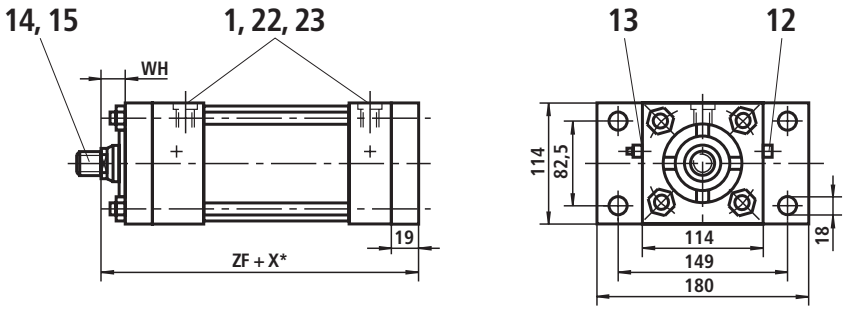
For explanations of items, see page 7

Type of mounting H Operating pressure 210 bar

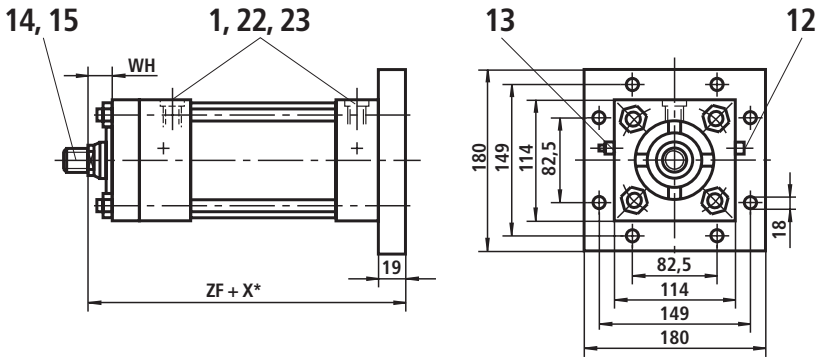


Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting D Operating pressure 210 bar



Type of mounting K Operating pressure 210 bar



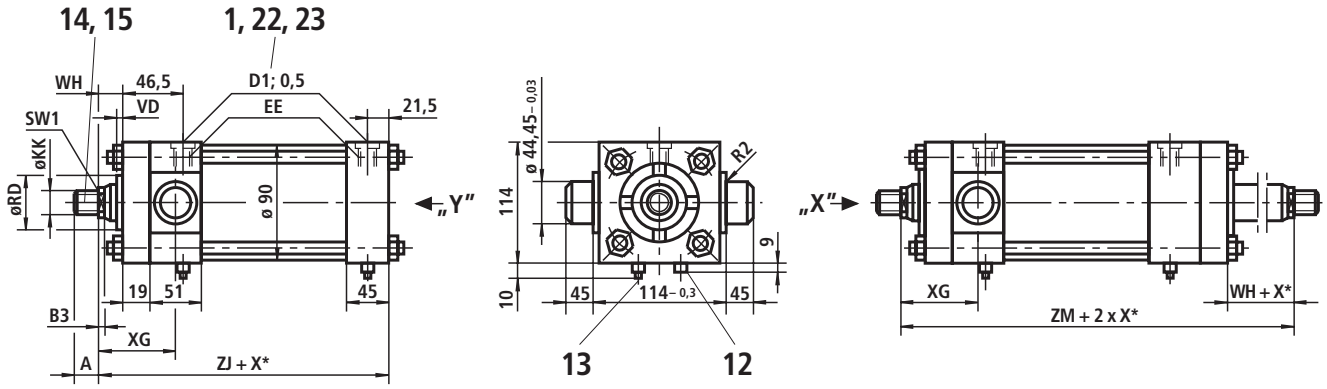
Piston rod Ø	ØRD f7	VD	WH	XC	XN	ZF	ZJ	ZM	B3	SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
36	50	6	22	219	271	200	181	228	9	30	35	35
45	60	10	28.5	225.5	277.5	206.5	187.5	241	12	41		
56	70	10	32	229	281	210	191	248	15	46		

X* = stroke length

Piston Ø 80 (dimensions in mm)

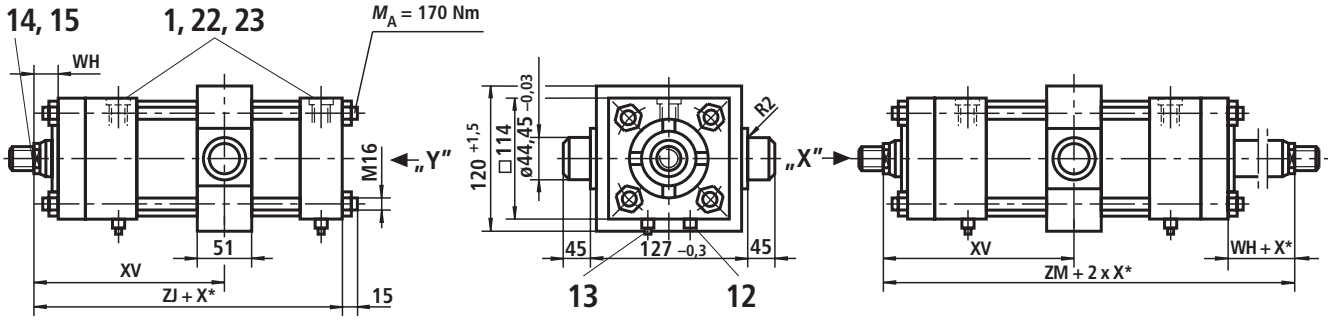
For explanations of items, see page 7

Type of mounting R Operating pressure 210 bar



Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting E Operating pressure 210 bar

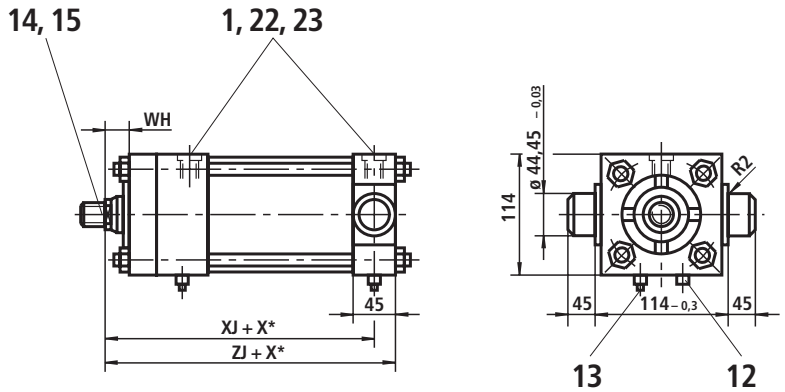


Stroke$_{min}$ = 20 mm
Always specify dimension "XV" in clear text on the order (observe XV$_{min}$ and XV$_{max}$)

Note:
Dimensions for cylinder with piston rod extension "LY" in the retracted condition, see index 2 on page 5.

Stroke$_{min}$ = 30 mm
with thread version "E"
(only for double-rod cylinder)

Type of mounting S Operating pressure 210 bar



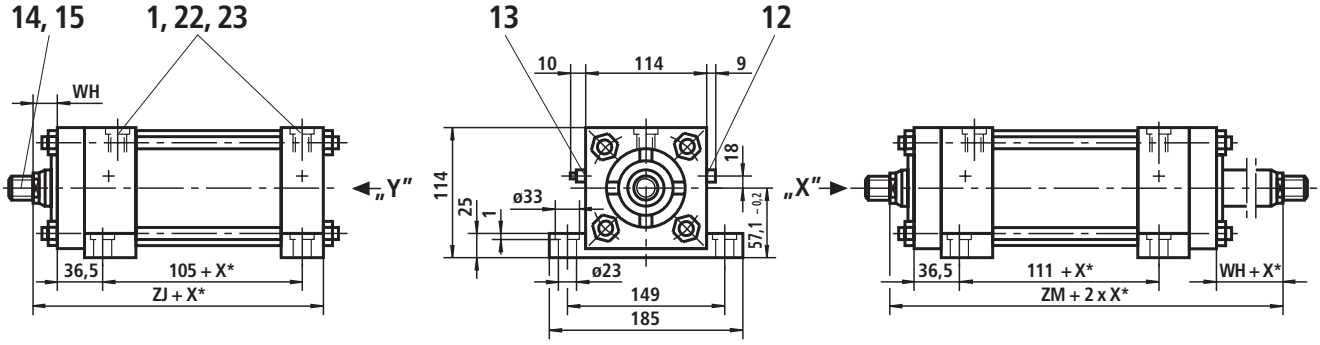
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
36	M26 x 1.5	M30 x 2	M30 x 2	41	65	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
45	M33 x 2	M39 x 2	M36 x 3	51	80								
56	M39 x 2	M45 x 2	M39 x 3	57	90								

X* = stroke length

Piston Ø 80 (dimensions in mm)

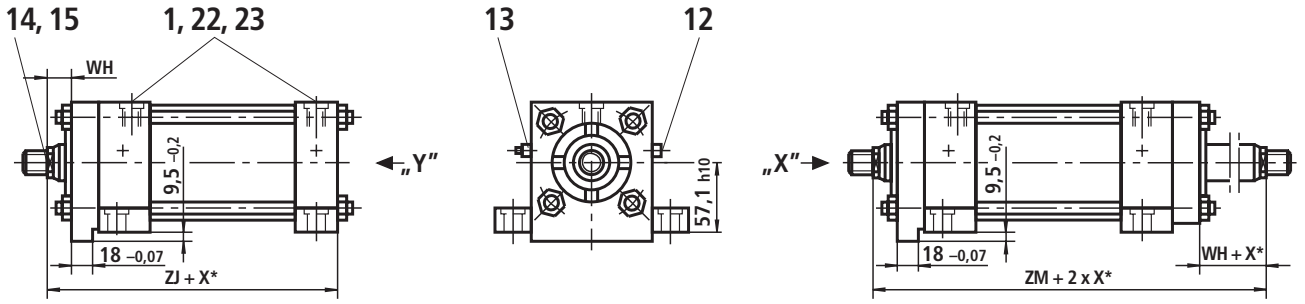
For explanations of items, see page 7

Type of mounting F Operating pressure 210 bar



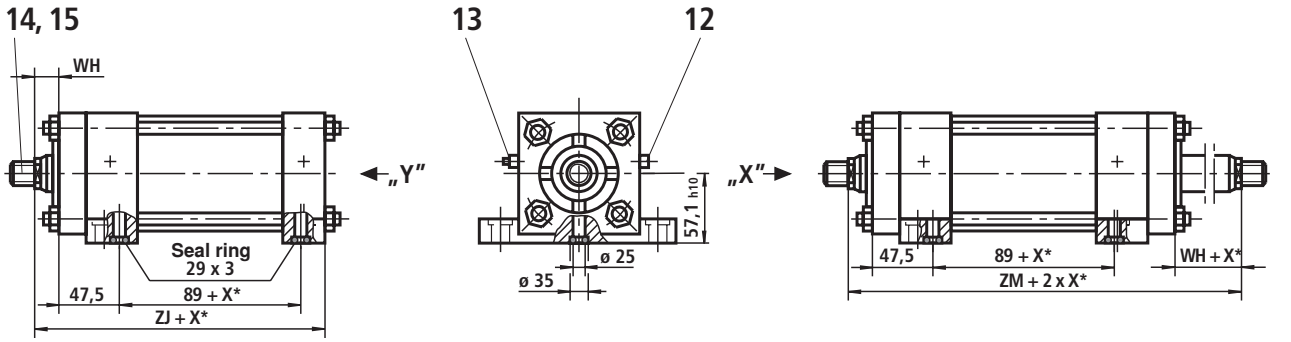
Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting L Operating pressure 210 bar



Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting M Operating pressure 210 bar



Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

Piston rod Ø	ØRD f7	VD	WH	XG	XJ	XV [1] min.	XV [1] max.	ZJ	ZM	B3	SW1	Cushioning lengths piston side	Cushioning lengths on piston rod side
36	50	6	22	66.5	158.5	117.5	110.5 + X*	181	228	9	30	35	35
45	60	10	28.5	73	165	124	117 + X*	187.5	241	12	41		
56	70	10	32	76.5	168.5	127.5	120.5 + X*	191	248	15	46		

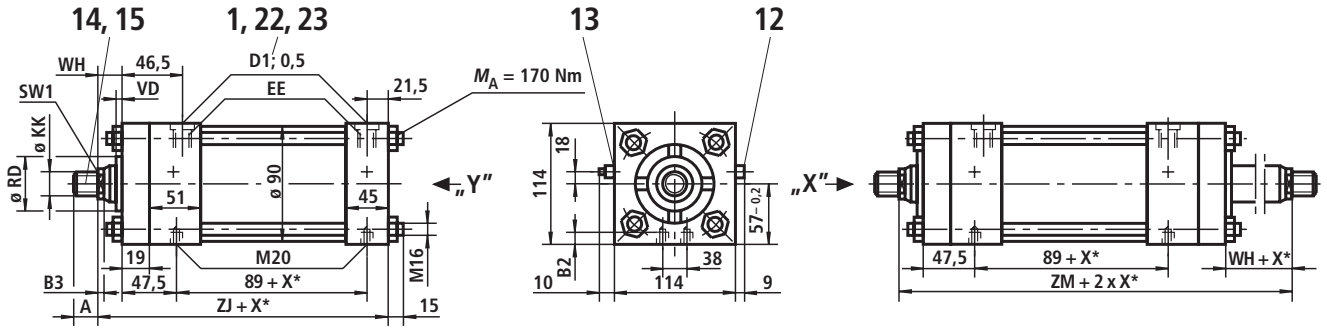
X* = stroke length

[1] Always specify dimension "XV" in clear text on the order (observe XV$_{min}$ and XV$_{max}$)

Piston Ø 80 (dimensions in mm)

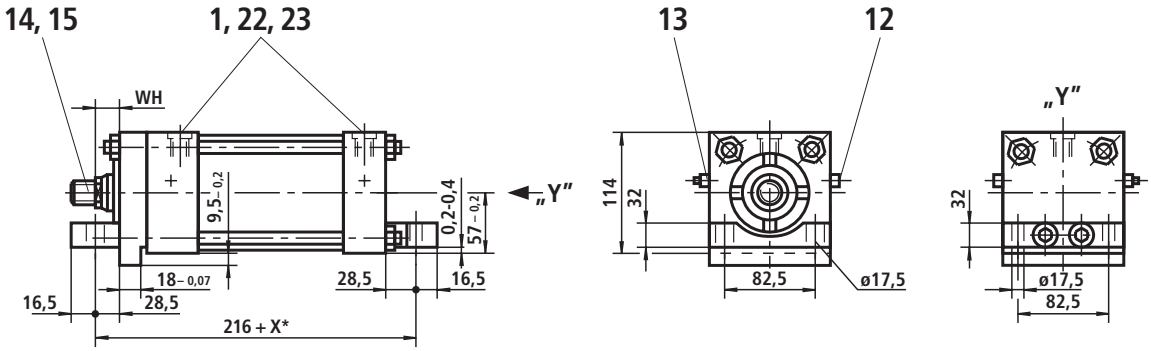
For explanations of items, see page 7

Type of mounting N Operating pressure 210 bar

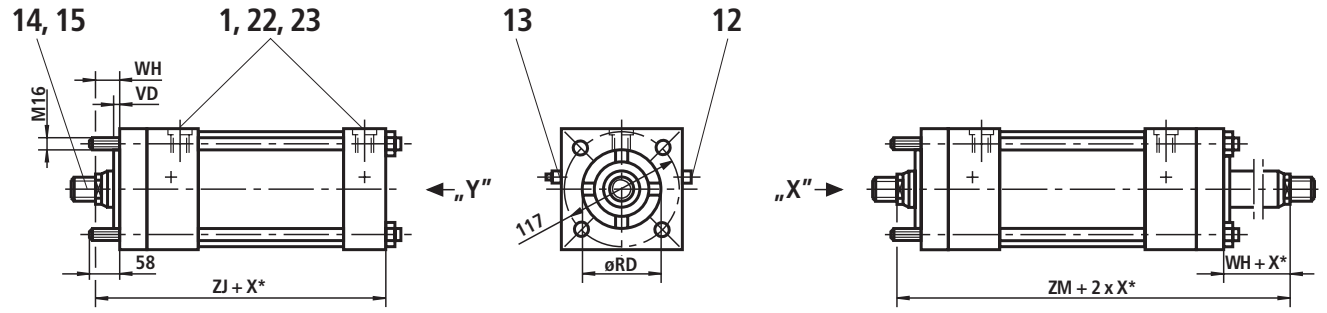


Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting T Operating pressure 210 bar



Type of mounting P Operating pressure 210 bar



Stroke$_{min}$ = 30 mm with thread version "E"
(only for double-rod cylinder)

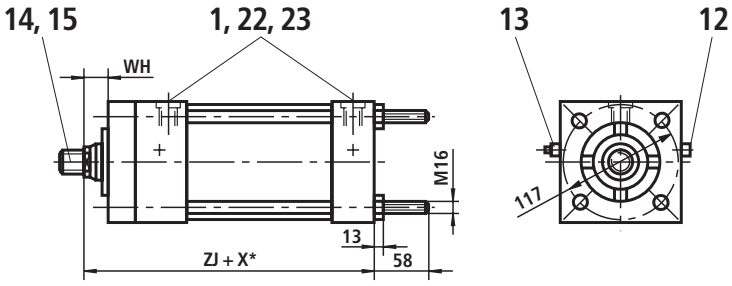
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
36	M26 x 1.5	M30 x 2	M30 x 2	41	65	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
45	M33 x 2	M39 x 2	M36 x 3	51	80								
56	M39 x 2	M45 x 2	M39 x 3	57	90								

X* = stroke length

Piston Ø 80 (dimensions in mm)

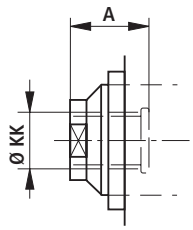
For explanations of items, see page 7

Type of mounting Q Operating pressure 210 bar

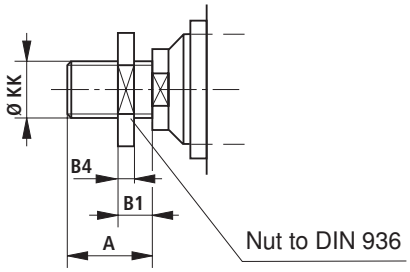


Additional thread versions

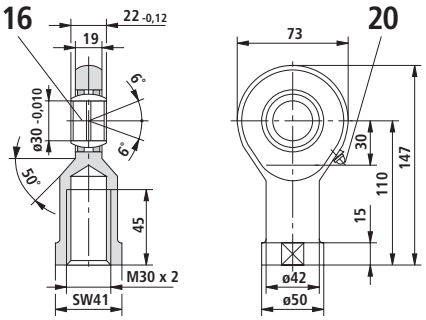
Thread version "E"



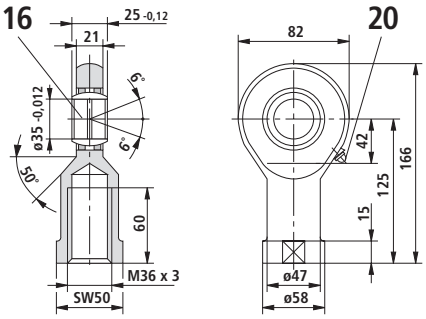
Thread version "F"



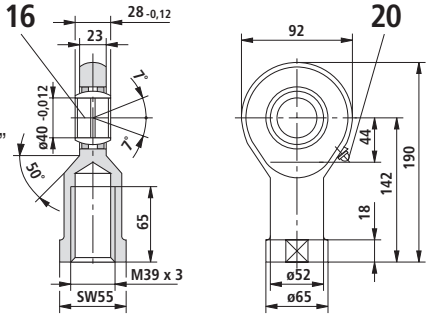
Self-aligning clevis CGK 30
suitable for thread version "F"
Material no.: **R900001331**
Weight: 0.9 kg
Permissible load: 55 kN



Self-aligning clevis CGK 35
suitable for thread version "F"
Material no.: **R900012486**
Weight: 1.4 kg
Permissible load: 73 kN



Self-aligning clevis CGK 40
suitable for thread version "F"
Material no.: **R900001332**
Weight: 2 kg
Permissible load: 90 kN



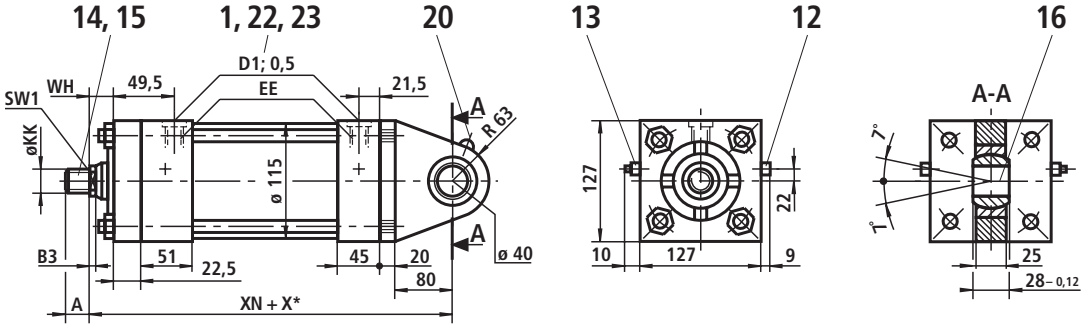
Piston rod Ø	ØRD f7	B4	VD	WH	ZJ	ZM	B1	B2	B3	SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
36	50	12	6	22	181	228	20	20	9	30	35	35
45	60	14	10	28.5	187.5	241	20	15	12	41		
56	70	16	10	32	191	248	25	15	15	46		

X* = stroke length

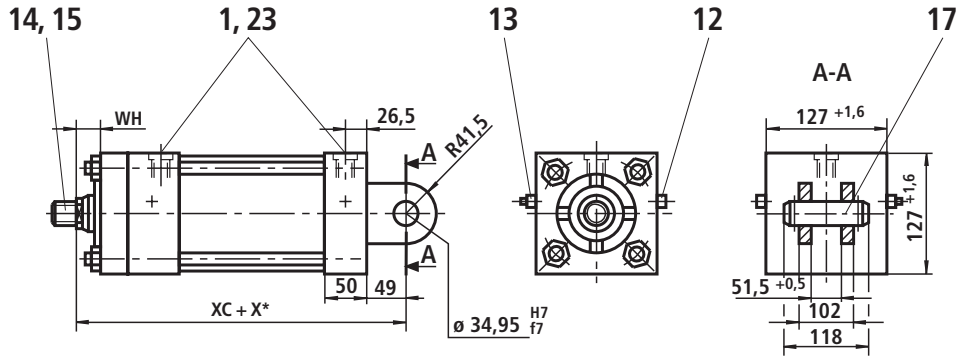
Piston Ø 100 (dimensions in mm)

For explanations of items, see page 7

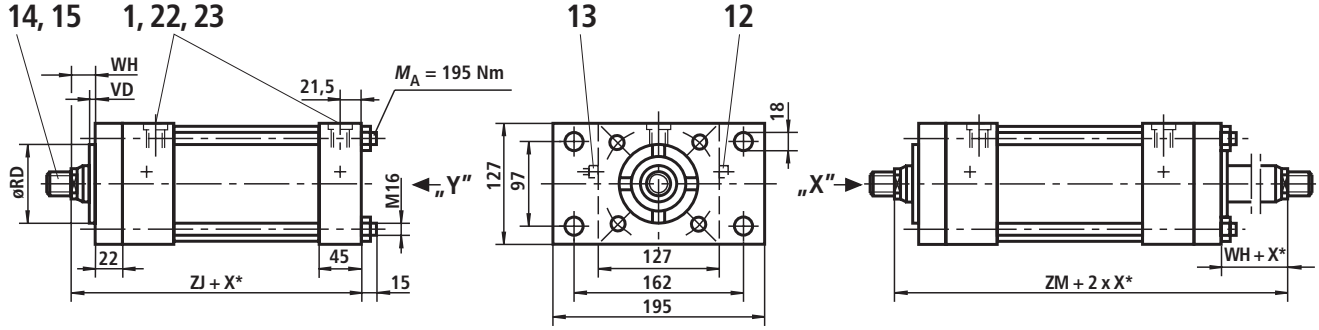
Type of mounting B Operating pressure 210 bar



Type of mounting G Operating pressure 210 bar



Type of mounting C Operating pressure with piston rod Ø 45 and Ø 50: 180 bar on cap side, 210 bar on piston rod side
Operating pressure with piston rod Ø 70: 110 bar on cap side, 210 bar on piston rod side



Stroke$_{min}$ = 55 mm with thread version "E"
(only for double-rod cylinder)

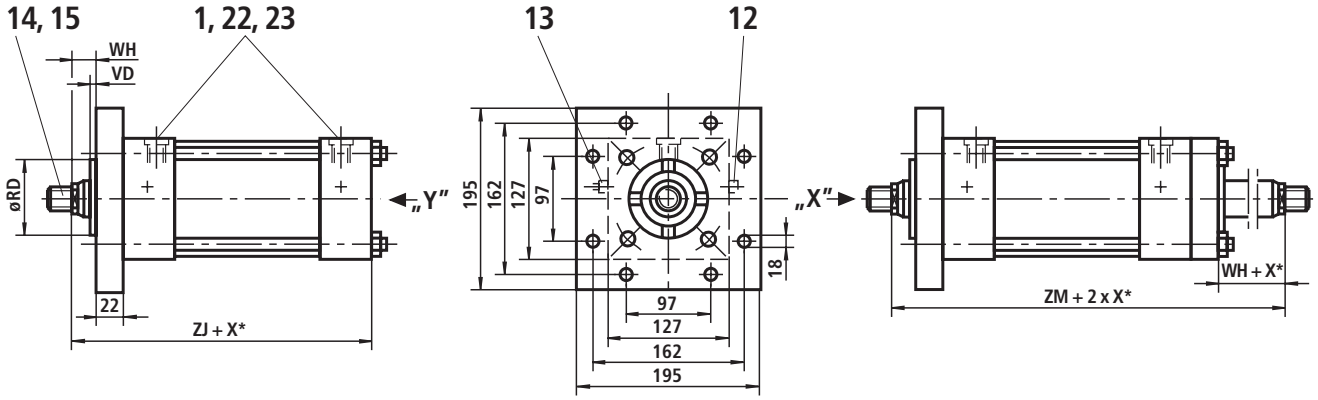
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
45	M33 x 2	M39 x 2	M42 x 3	51	90	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
50	M39 x 2	M45 x 2	M45 x 3	57	100								
70	M48 x 2	M56 x 2	M45 x 3	76	100								

X* = stroke length

Piston Ø 100 (dimensions in mm)

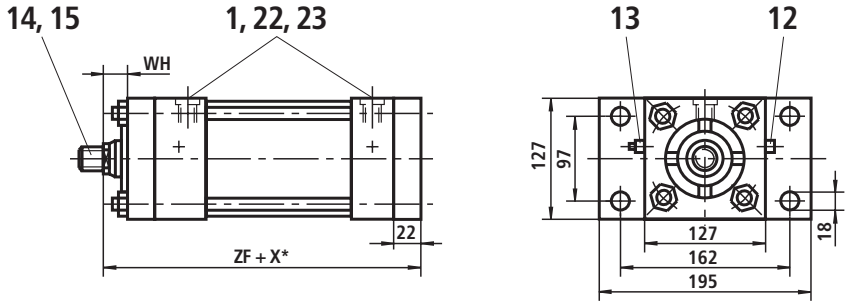
For explanations of items, see page 7

Type of mounting H Operating pressure 210 bar

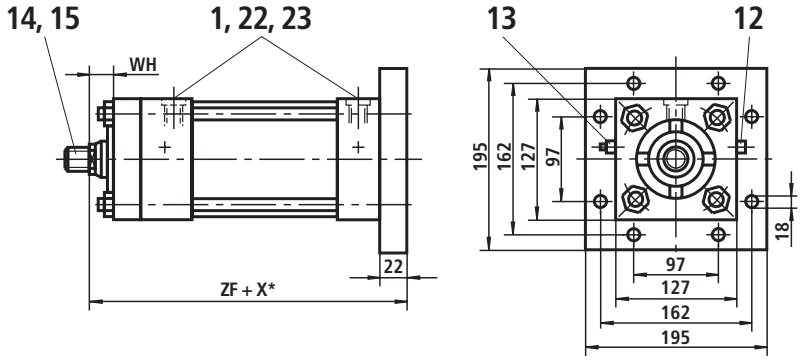


Stroke$_{min}$ = 55 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting D Operating pressure 210 bar



Type of mounting K Operating pressure 210 bar



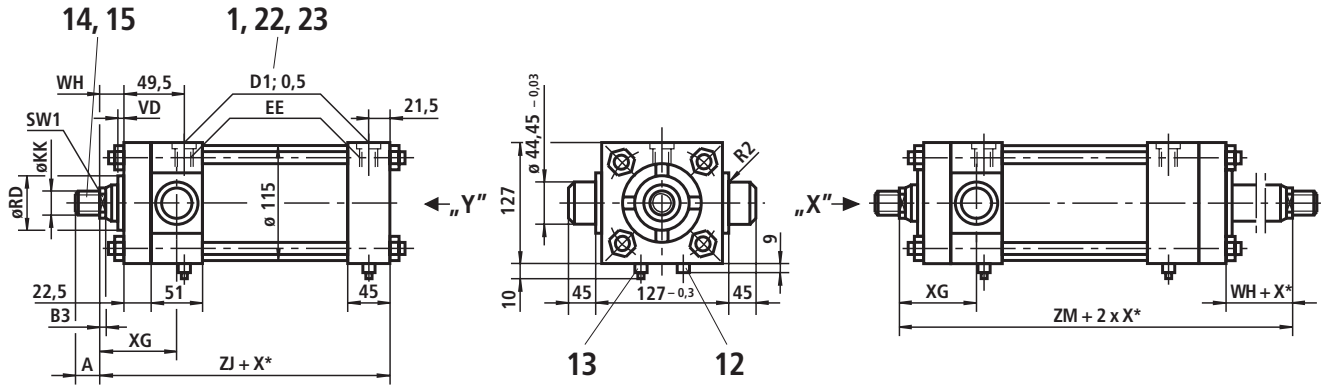
Piston rod Ø	ØRD f7	VD	WH	XC	XN	ZF	ZJ	ZM	B3	SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
45	60	6	25.5	248	294	216	194	247.5	12	41	35	35
50	66.6	6	28.5	251	297	219	197	253.5	15	46		
70	90	10	35	257.5	303.5	225.5	203.5	266.5	15	60		

X* = stroke length

Piston Ø 100 (dimensions in mm)

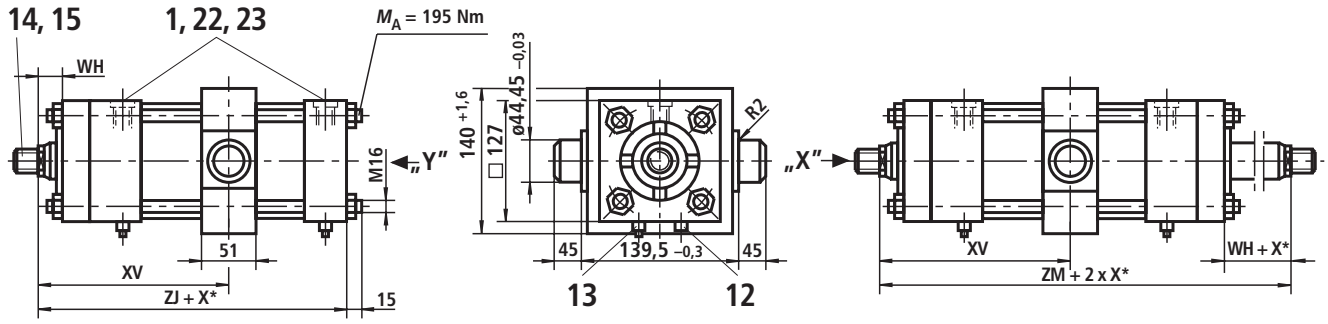
For explanations of items, see page 7

Type of mounting R Operating pressure 210 bar



Stroke$_{min}$ = 55 mm with thread version “E“
(only for double-rod cylinder)

Type of mounting E Operating pressure 210 bar

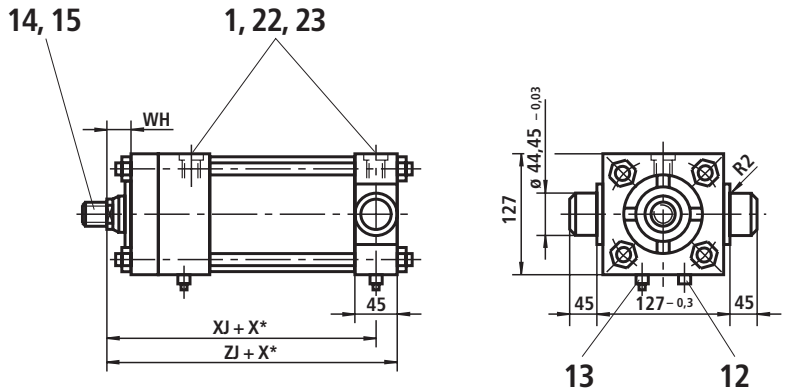


Stroke$_{min}$ = 20 mm
Always specify dimension “XV”
in clear text on the order
(observe XV$_{min}$ and XV$_{max}$)

Note:
Dimensions for cylinder with piston rod extension “LY“ in the retracted condition, see index 2 on page 5.

Stroke$_{min}$ = 55 mm
with thread version “E“
(only for double-rod cylinder)

Type of mounting S Operating pressure 210 bar



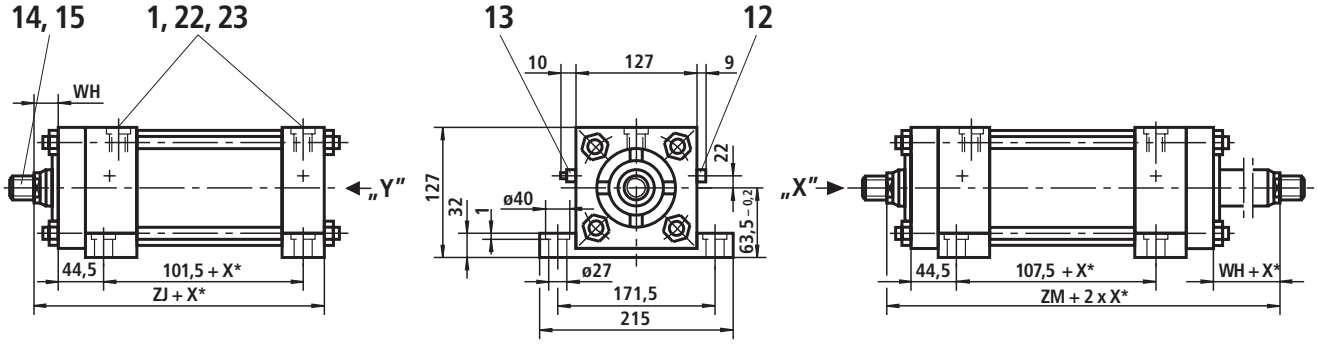
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
45	M33 x 2	M39 x 2	M42 x 3	51	90	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
50	M39 x 2	M45 x 2	M45 x 3	57	100								
70	M48x 2	M56 x 2	M45 x 3	76	100								

X* = stroke length

Piston Ø 100 (dimensions in mm)

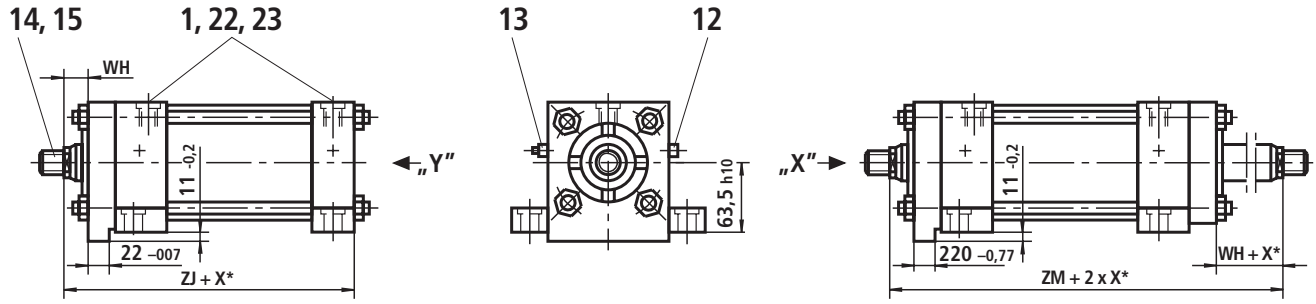
For explanations of items, see page 7

Type of mounting F Operating pressure 210 bar



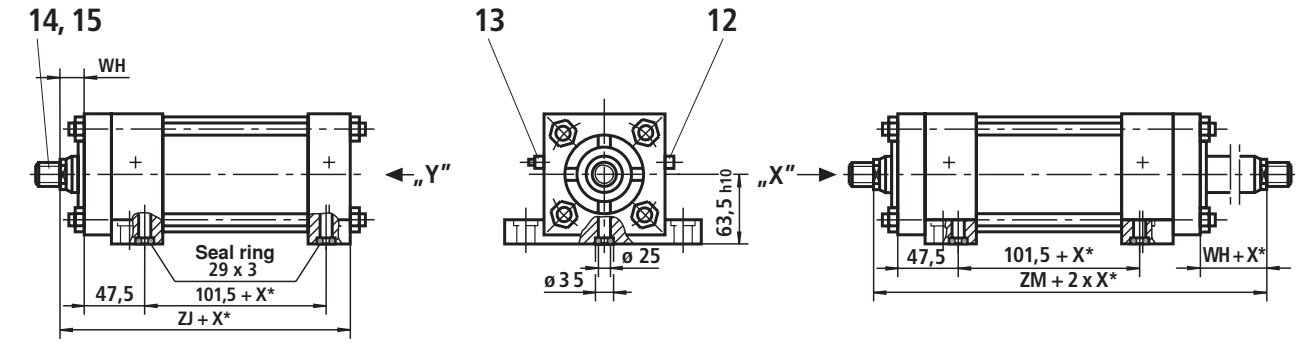
Stroke$_{min}$ = 55 mm with thread version “E“ (only for double-rod cylinder)

Type of mounting L Operating pressure 210 bar



Stroke$_{min}$ = 55 mm with thread version “E“ (only for double-rod cylinder)

Type of mounting M Operating pressure 210 bar



Stroke$_{min}$ = 55 mm with thread version “E“ (only for double-rod cylinder)

Piston rod Ø	ØRD f7	VD	WH	XG	XJ	XV [1] min.	XV [1] max.	ZJ	ZM	B3	SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
45	60	6	25.5	73	171.5	124.5	123.5 + X*	194	247.5	12	41	35	35
50	66.6	6	28.5	76	174.5	127.5	126.5 + X*	197	253.5	15	46		
70	90	10	35	82.5	181	134	133 + X*	203.5	266.5	15	60		

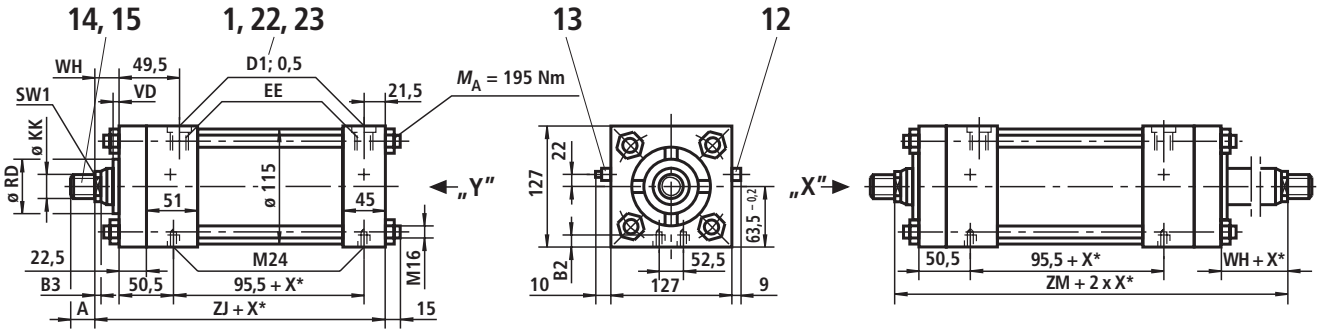
X* = stroke length

[1] Always specify dimension “XV” in clear text on the order (observe XV$_{min}$ and XV$_{max}$)

Piston Ø 100 (dimensions in mm)

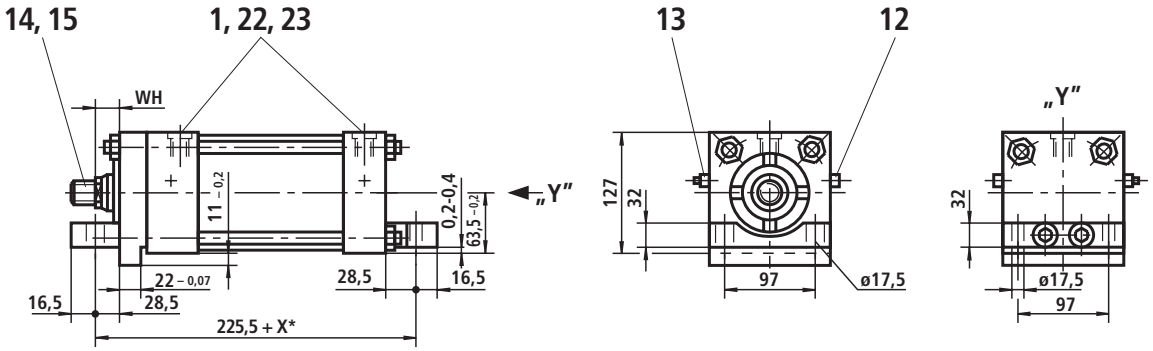
For explanations of items, see page 7

Type of mounting N Operating pressure 210 bar

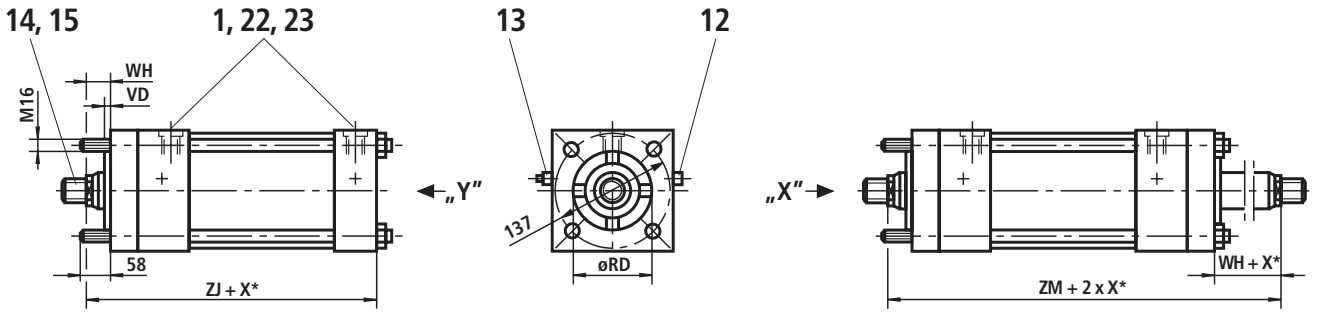


Stroke$_{min}$ = 55 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting T Operating pressure 210 bar



Type of mounting P Operating pressure 210 bar



Stroke$_{min}$ = 55 mm with thread version "E"
(only for double-rod cylinder)

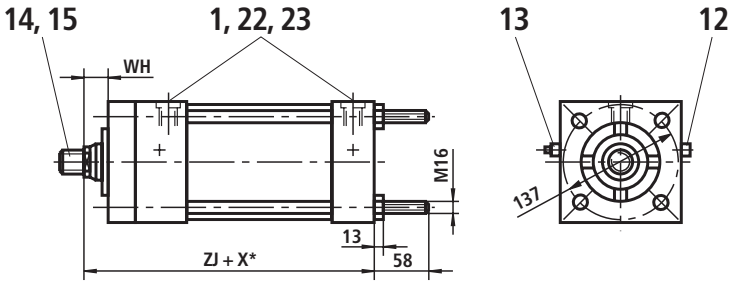
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
45	M33 x 2	M39 x 2	M42 x 3	51	90	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
50	M39 x 2	M45 x 2	M45 x 3	57	100								
70	M48 x 2	M56 x 2	M45 x 3	76	100								

X* = stroke length

Piston Ø 100 (dimensions in mm)

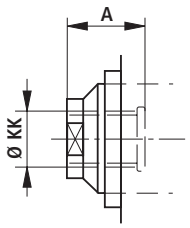
For explanations of items, see page 7

Type of mounting Q Operating pressure 210 bar

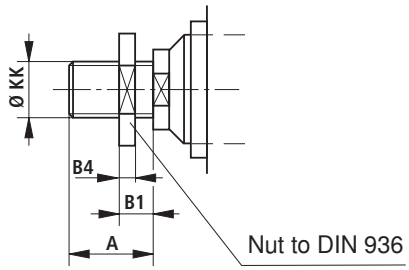


Additional thread versions

Thread version "E"

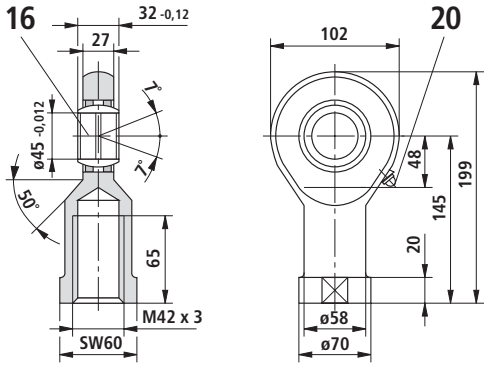


Thread version "F"



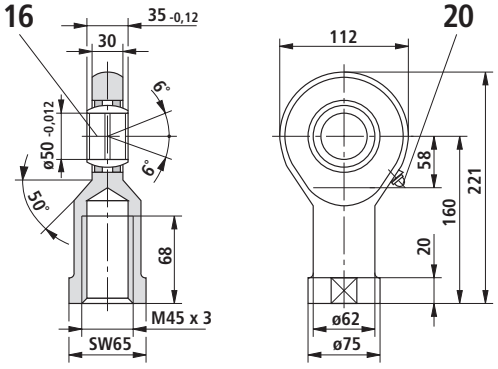
Self-aligning clevis CGK 45

suitable for thread version "F"
Material no.: **R900001333**
Weight: 2.7 kg
Permissible load: 120 kN



Self-aligning clevis CGK 50

suitable for thread version "F"
Material no.: **R900001334**
Weight: 3.5 kg
Permissible load: 145 kN



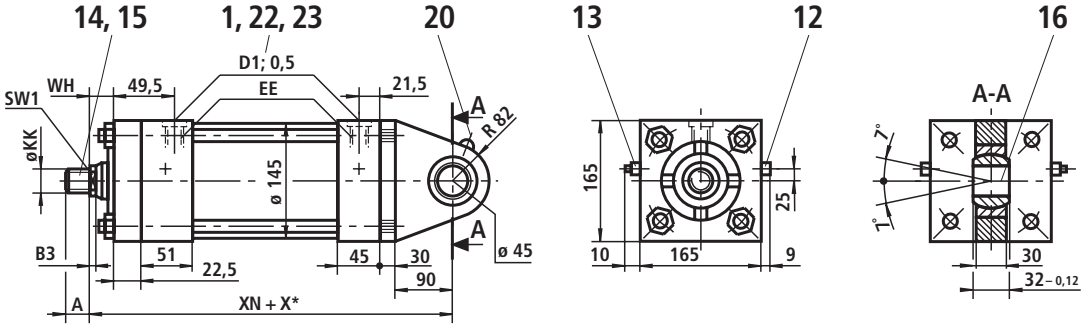
Piston rod Ø	ØRD f7	B4	VD	WH	ZJ	ZM	B1	B2	B3	SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
45	60	16	6	25.5	194	247.5	25	25	12	41	35	35
50	66.6	18	6	28.5	197	253.5	32	25	15	46		
70	90	18	10	35	203.5	266.5	32	15	15	60		

X* = stroke length

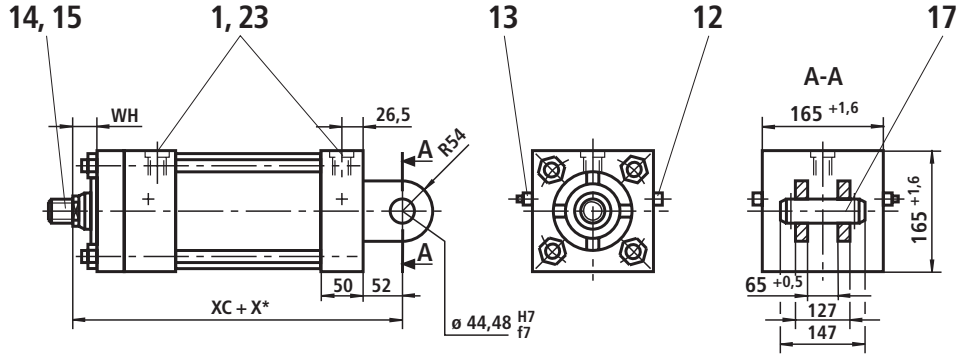
Piston Ø 125 (dimensions in mm)

For explanations of items, see page 7

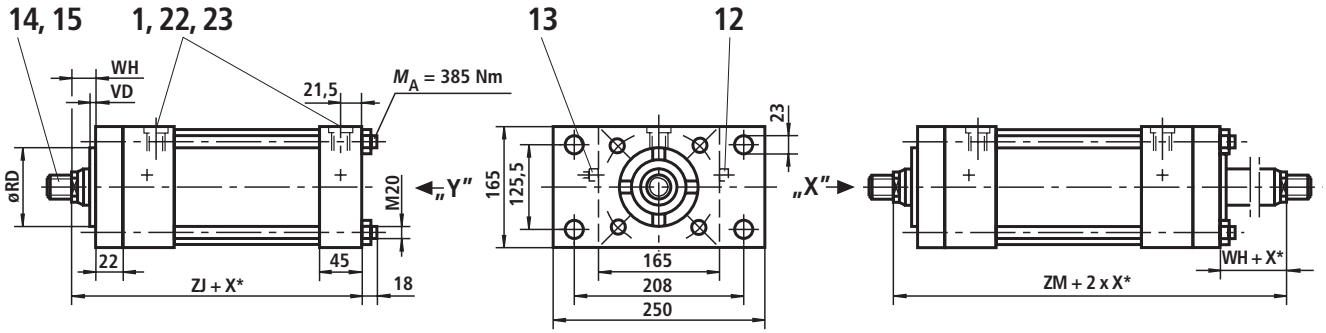
Type of mounting B Operating pressure 210 bar



Type of mounting G Operating pressure 210 bar



Type of mounting C Operating pressure with piston rod Ø 50 and Ø 56: 160 bar on cap side, 210 bar on piston rod side
Operating pressure with piston rod Ø 63 and Ø 90: 60 bar on cap side, 210 bar on piston rod side



Str_{okemin} = 70 mm with thread version "E"
(only for double-rod cylinder)

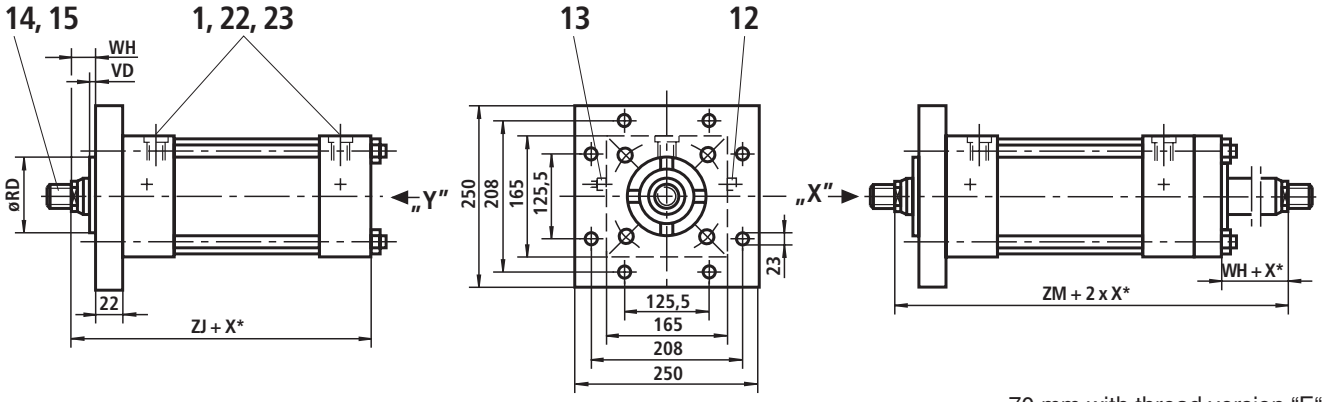
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
50	M39 x 2	M45 x 2	M45 x 3	57	100	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
56	M39 x 2	M45 x 2	M45 x 3	57	100								
63	M48 x 2	M56 x 2	M52 x 3	76	115								
90	M64 x 2	M76 x 2	M52 x 3	89	115								

X* = stroke length

Piston Ø 125 (dimensions in mm)

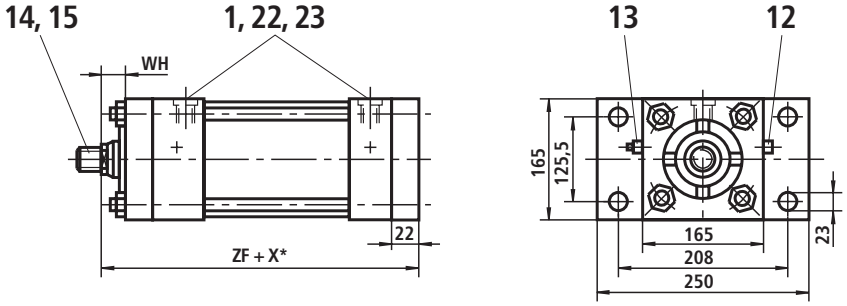
For explanations of items, see page 7

Type of mounting H Operating pressure 210 bar

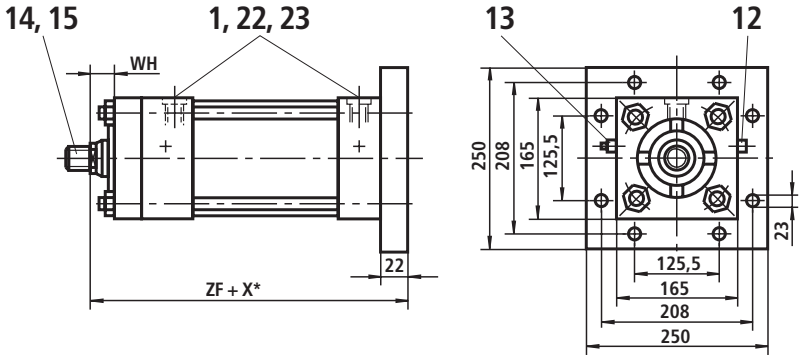


$Stroke_{min}$ = 70 mm with thread version "E" (only for double-rod cylinder)

Type of mounting D Operating pressure with piston rod Ø 50, 56 and Ø 63: 210 bar on cap side, 150 bar on piston rod side
Operating pressure with piston rod Ø 90: 210 bar on cap side, 210 bar on piston rod side



Type of mounting K Operating pressure 210 bar



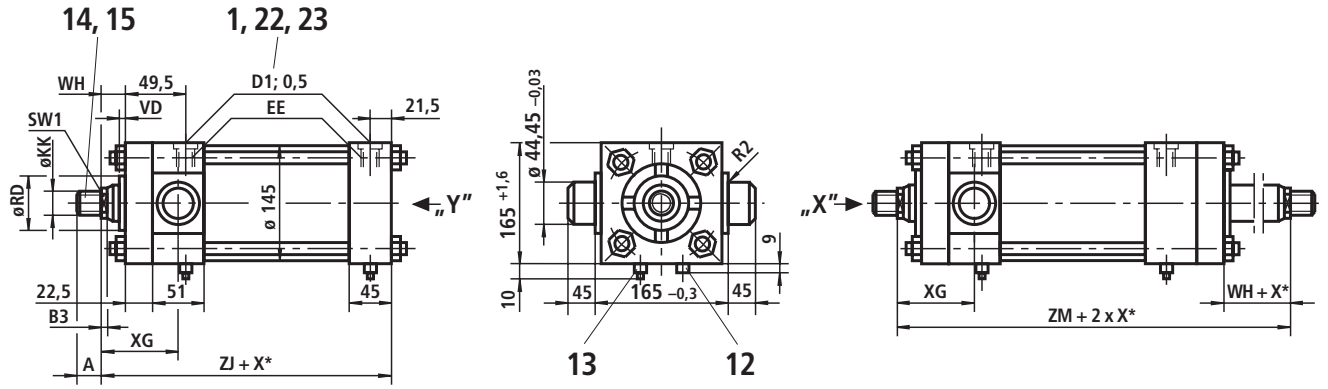
Piston rod Ø	ØRD f7	VD	WH	XC	XN	ZF	ZJ	ZM	B3	SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
50	66.6	6	28.5	266.5	329.5	231.5	209.5	266	14	46	33	35
56	70	7	28.5	266.5	329.5	231.5	209.5	266	14	46		
63	79.3	10	35	273	336	238	216	279	15	55		
90	108	10	35	273	336	238	216	279	15	75		

X* = stroke length

Piston Ø 125 (dimensions in mm)

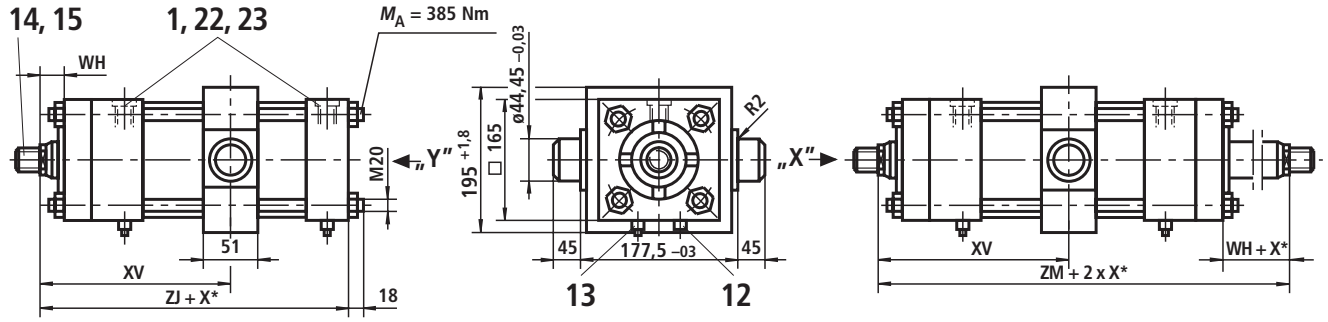
For explanations of items, see page 7

Type of mounting R Operating pressure 210 bar



$Stroke_{min}$ = 70 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting E Operating pressure 210 bar

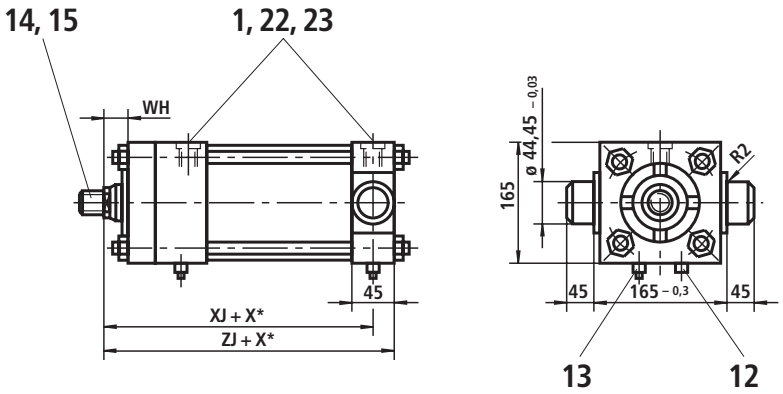


$Stroke_{min}$ = 20 mm
Always specify dimension "XV" in clear text on the order (observe XV_{min} and XV_{max})

Note:
Dimensions for cylinder with piston rod extension "LY" in the retracted condition, see index 2 on page 5.

$Stroke_{min}$ = 70 mm
with thread version "E"
(only for double-rod cylinder)

Type of mounting S Operating pressure 210 bar



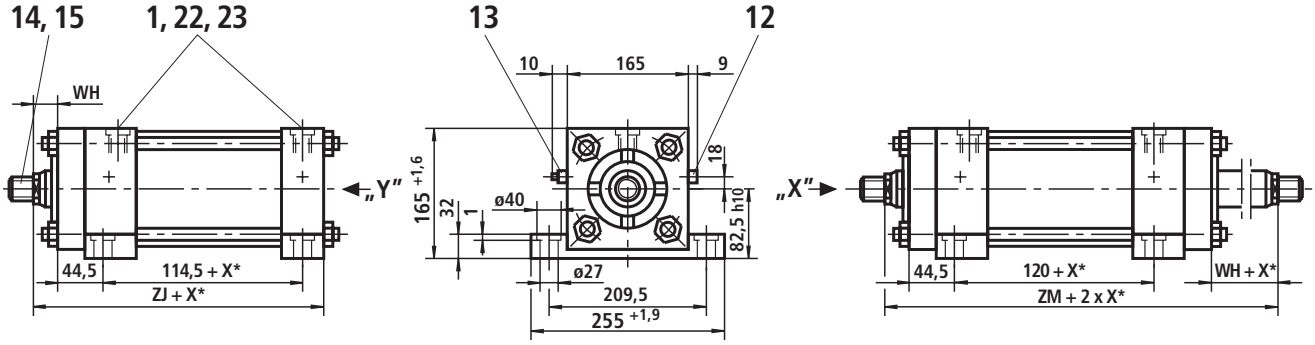
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
50	M39 x 2	M45 x 2	M45 x 3	57	100	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
56	M39 x 2	M45 x 2	M45 x 3	57	100								
63	M48 x 2	M56 x 2	M52 x 3	76	115								
90	M64 x 2	M76 x 2	M52 x 3	89	115								

X* = stroke length

Piston Ø 125 (dimensions in mm)

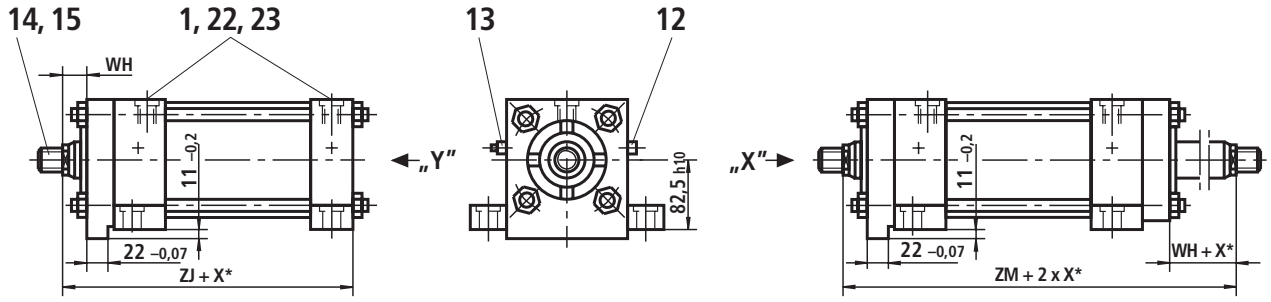
For explanations of items, see page 7

Type of mounting F Operating pressure 210 bar



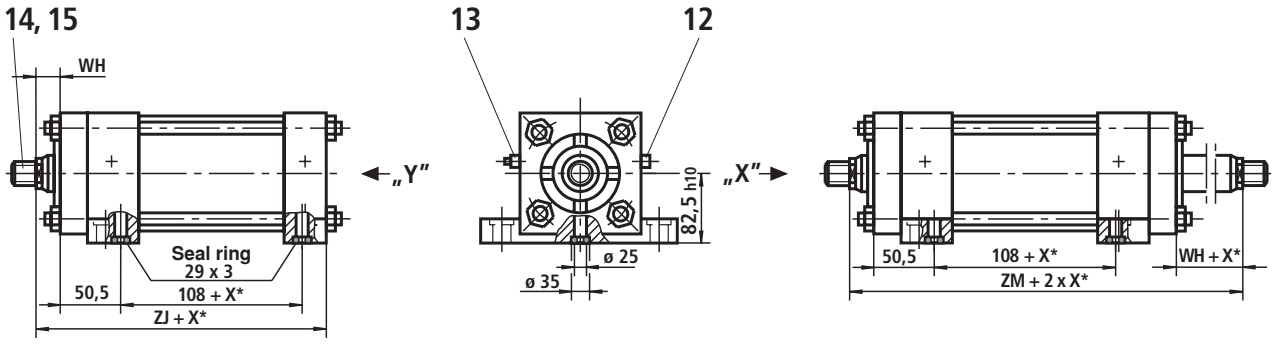
$Stroke_{min}$ = 70 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting L Operating pressure 210 bar



$Stroke_{min}$ = 70 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting M Operating pressure 210 bar



$Stroke_{min}$ = 70 mm with thread version "E"
(only for double-rod cylinder)

Piston rod Ø	ØRD f7	VD	WH	XG	XJ	XV [1] min.	XV [1] max.	ZJ	ZM	B3	SW1	Cushioning lengths kolben seitig	Cushioning lengths on piston rod side
50	66.6	6	28.5	76	187	127.5	139 + X*	209.5	266	14	46	33	35
56	70	7	28.5	76	187	127.5	139 + X*	209.5	266	14	46		
63	79.3	10	35	82.5	193.5	134	145.5 + X*	216	279	15	55		
90	108	10	35	82.5	193.5	134	145.5 + X*	216	279	15	75		

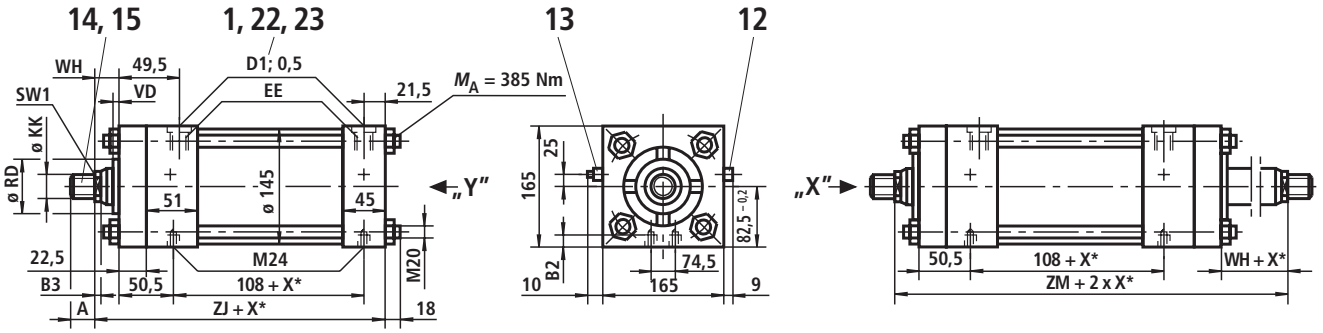
X* = stroke length

[1] Always specify dimension "XV" in clear text on the order (observe XV_{min} and XV_{max})

Piston Ø 125 (dimensions in mm)

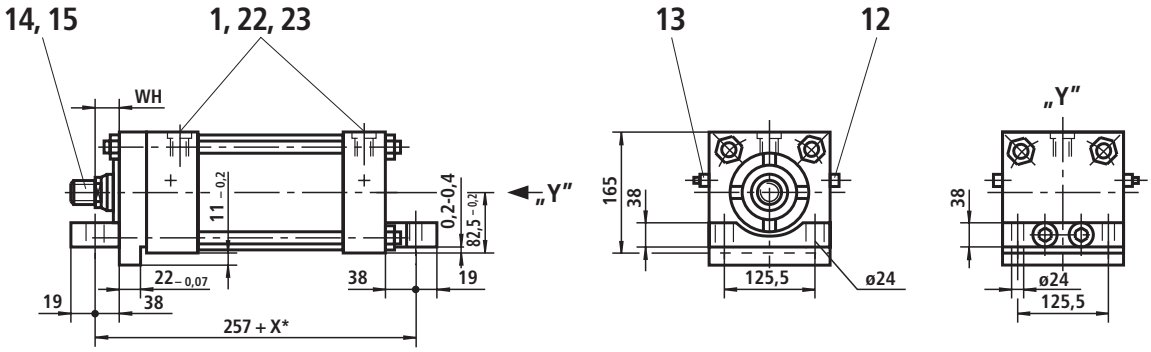
For explanations of items, see page 7

Type of mounting N Operating pressure 210 bar

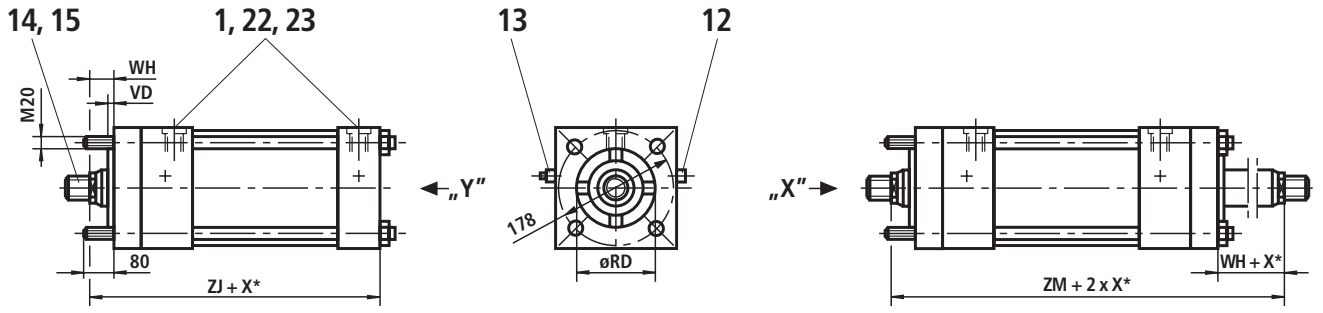


Stroke$_{min}$ = 70 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting T Operating pressure 210 bar



Type of mounting P Operating pressure 210 bar



Stroke$_{min}$ = 70 mm with thread version "E"
(only for double-rod cylinder)

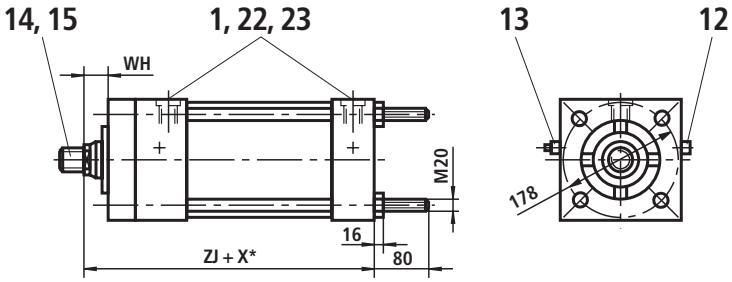
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
50	M39 x 2	M45 x 2	M45 x 3	57	100	G3/4	G1	M27 x 2	M33 x 2	42	47	42	47
56	M39 x 2	M45 x 2	M45 x 3	57	100								
63	M48 x 2	M56 x 2	M52 x 3	76	115								
90	M64 x 2	M76 x 2	M52 x 3	89	115								

X* = stroke length

Piston Ø 125 (dimensions in mm)

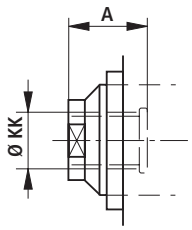
For explanations of items, see page 7

Type of mounting Q Operating pressure 210 bar

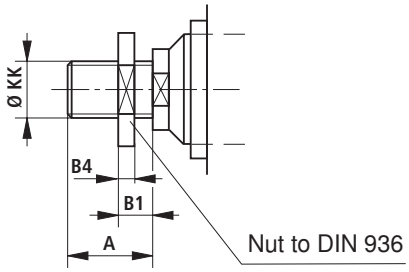


Additional thread versions

Thread version “E”

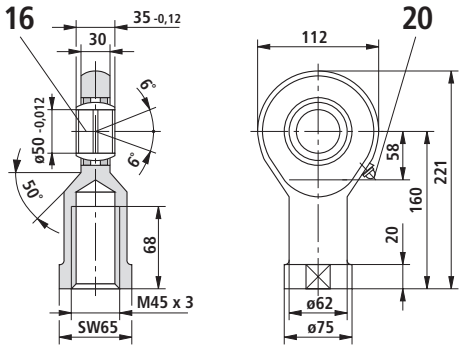


Thread version “F”



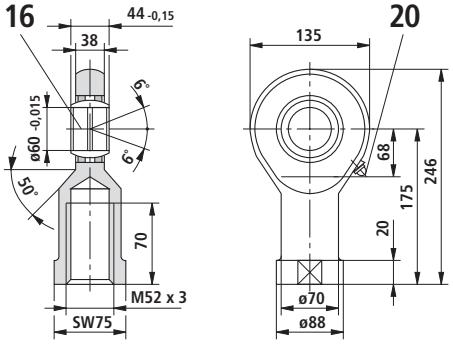
Self-aligning clevis CGK 50

suitable for thread version “F”
Material no.: **R900001334**
Weight: 3.5 kg
Permissible load: 145 kN



Self-aligning clevis CGK 60

suitable for thread version “F”
Material no.: **R900001335**
Weight: 5.6 kg
Permissible load: 225 kN



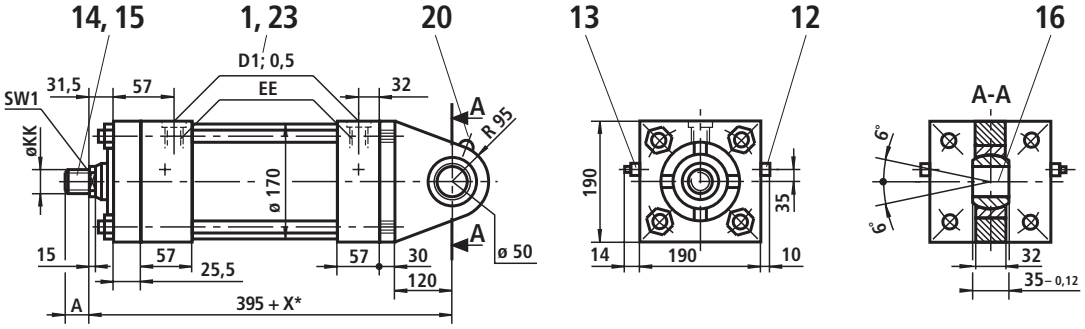
Piston rod Ø	ØRD f7	B4	VD	WH	ZJ	ZM	B1	B2	B3	SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
50	66.6	18	6	28.5	209.5	266	32	40	14	46	33	35
56	70	18	7	28.5	209.5	266	32	40	14	46		
63	79.3	20	10	35	216	279	45	25	15	55		
90	108	20	10	35	216	279	45	25	15	75		

X* = stroke length

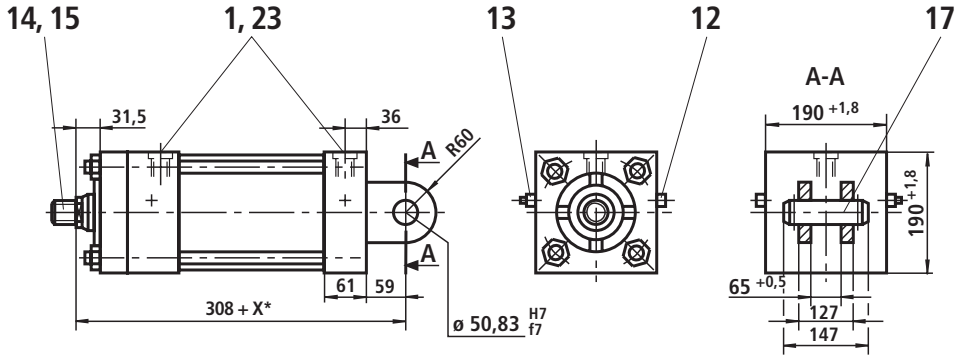
Piston Ø 150 (dimensions in mm)

For explanations of items, see page 7

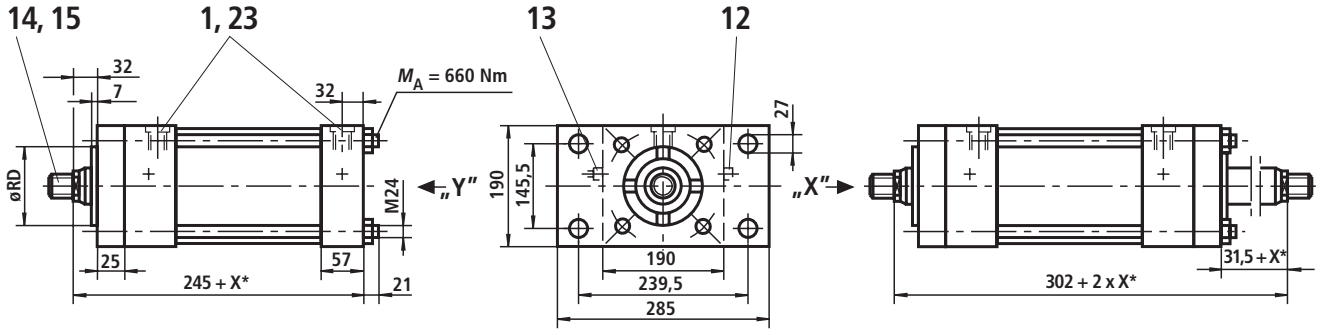
Type of mounting B Operating pressure 210 bar



Type of mounting G Operating pressure 210 bar



Type of mounting C Operating pressure with piston rod Ø 63 and Ø 70: 130 bar on cap side, 210 bar on piston rod side
Operating pressure with piston rod Ø 80 and Ø 100: 60 bar on cap side, 210 bar on piston rod side



Stroke$_{min}$ = 85 mm with thread version “E“
(only for double-rod cylinder)

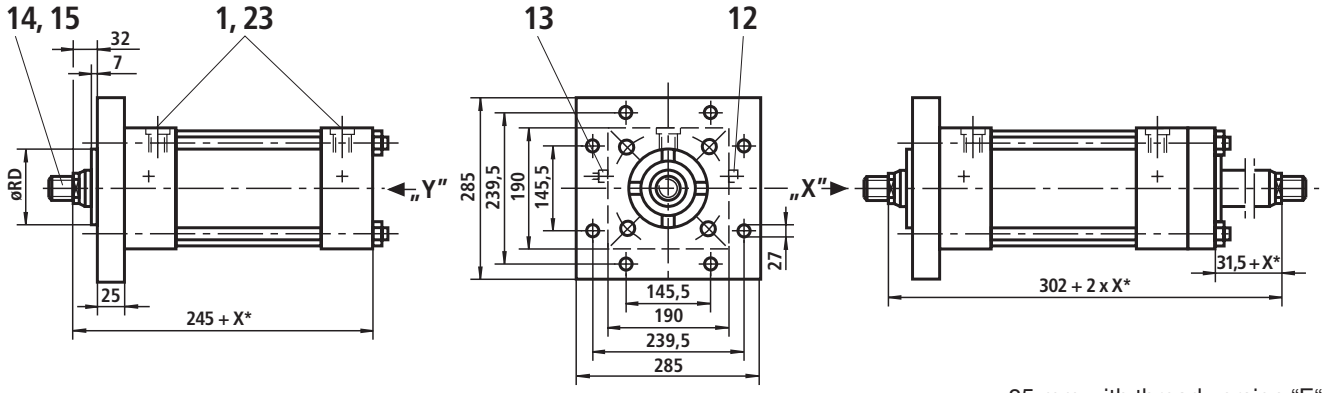
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
63	M48 x 2	M56 x 2	M52 x 3	76	115	G1	G1 1/4	M33 x 2	M42 x 2	47	58	47	58
70	M48 x 2	M56 x 2	M52 x 3	76	115								
80	M58 x 2	M68 x 2	M64 x 4	89	145								
100	M76 x 2	M95 x 2	M64 x 4	101	145								

X* = stroke length

Piston Ø 150 (dimensions in mm)

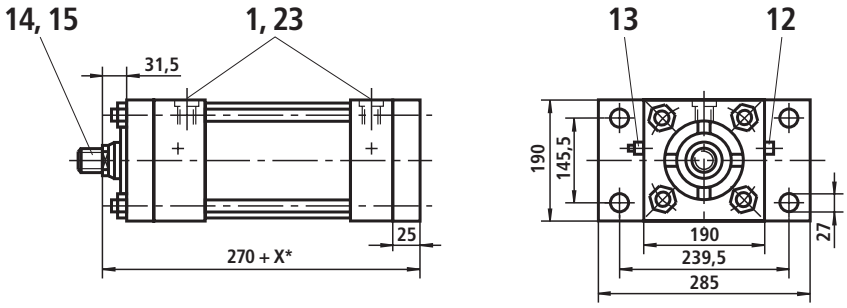
For explanations of items, see page 7

Type of mounting H Operating pressure 210 bar

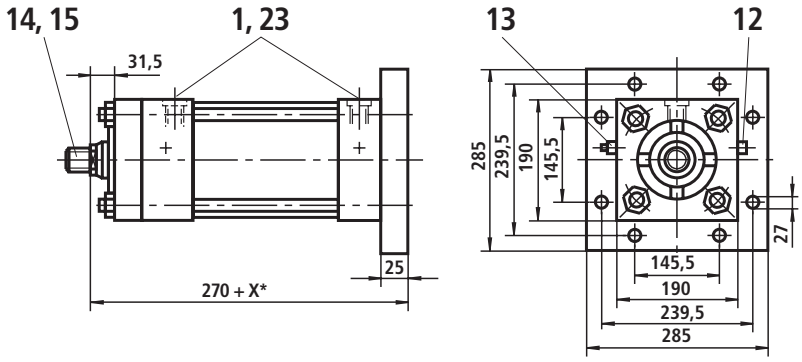


$Stroke_{min}$ = 85 mm with thread version "E" (only for double-rod cylinder)

Type of mounting D Operating pressure with piston rod Ø 63 and Ø 70: 210 bar on cap side, 150 bar on piston rod side
Operating pressure with piston rod Ø 80 and Ø 100: 210 bar on cap side, 210 bar on piston rod side



Type of mounting K Operating pressure 210 bar



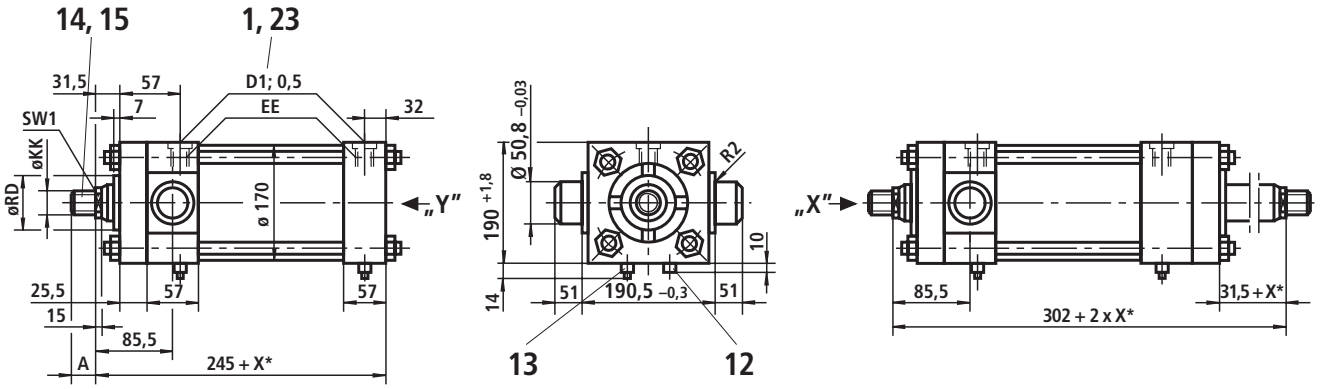
Piston rod Ø	ØRD f7									SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
63	79.3									55	38	35
70	90									60		
80	95.2									75		
100	120									85		

X* = stroke length

Piston Ø 150 (dimensions in mm)

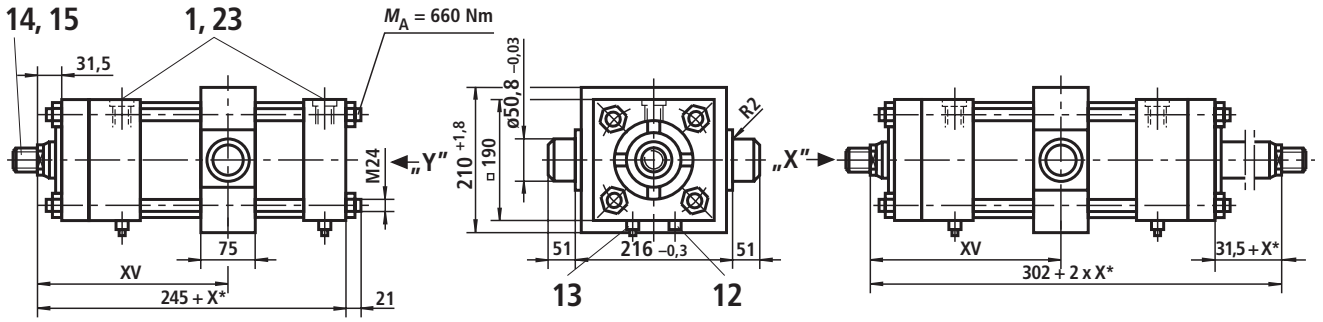
For explanations of items, see page 7

Type of mounting R Operating pressure 210 bar



Stroke$_{min}$ = 85 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting E Operating pressure 210 bar

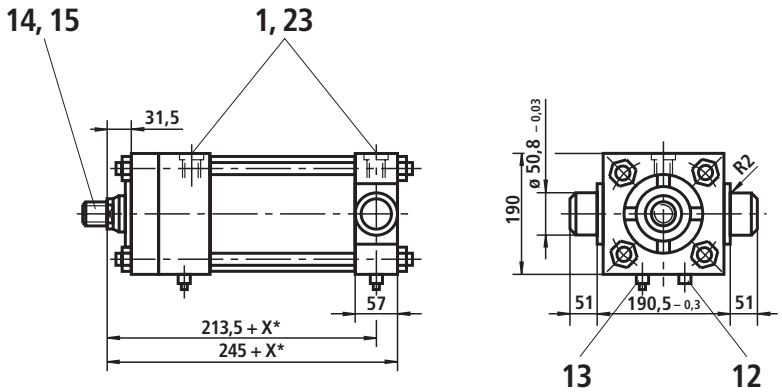


Stroke$_{min}$ = 20 mm
Always specify dimension "XV"
in clear text on the order
(observe XV$_{min}$ and XV$_{max}$)

Note:
Dimensions for cylinder with piston rod extension "LY" in the retracted condition, see index 2 on page 5.

Stroke$_{min}$ = 85 mm
with thread version "E"
(only for double-rod cylinder)

Type of mounting S Operating pressure 210 bar



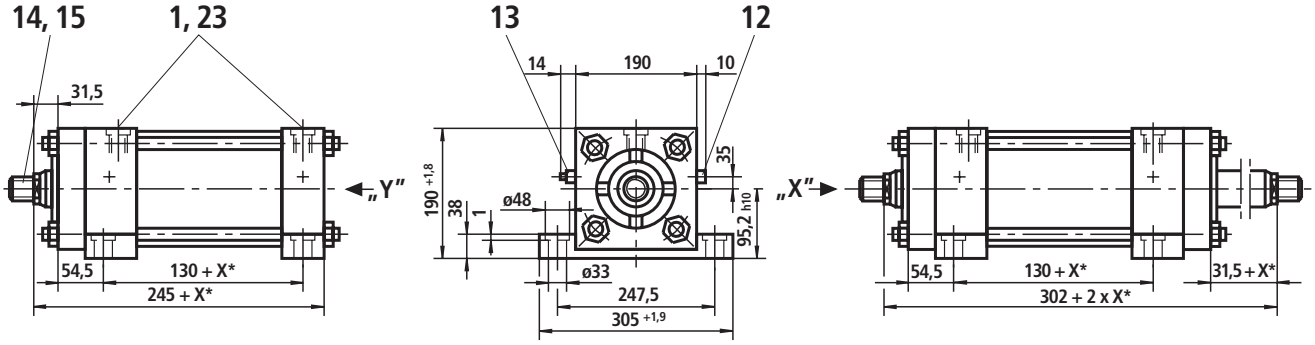
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
63	M48 x 2	M56 x 2	M52 x 3	76	115	G1	G1 1/4	M33 x 2	M42 x 2	47	58	47	58
70	M48 x 2	M56 x 2	M52 x 3	76	115								
80	M58 x 2	M68 x 2	M64 x 4	89	145								
100	M76 x 2	M95 x 2	M64 x 4	101	145								

X* = stroke length

Piston Ø 150 (dimensions in mm)

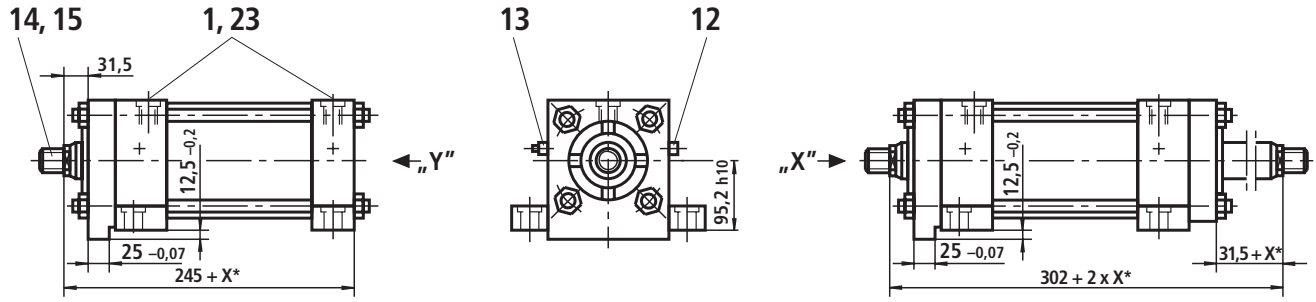
For explanations of items, see page 7

Type of mounting F Operating pressure 210 bar



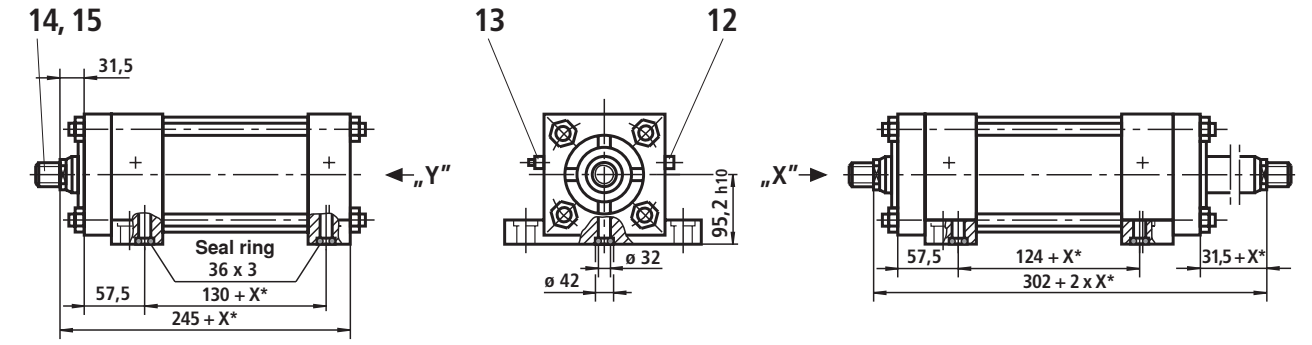
Stroke$_{min}$ = 85 mm with thread version "E" (only for double-rod cylinder)

Type of mounting L Operating pressure 210 bar



Stroke$_{min}$ = 85 mm with thread version "E" (only for double-rod cylinder)

Type of mounting M Operating pressure 210 bar



Stroke$_{min}$ = 85 mm with thread version "E" (only for double-rod cylinder)

Piston rod Ø	ØRD f7	XV [1] min.	XV [1] max.							SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
63	79.3	151.5	150.5 + X*							55	38	35
70	90	151.5	150.5 + X*							60		
80	95.2	151.5	150.5 + X*							75		
100	120	151.5	150.5 + X*							85		

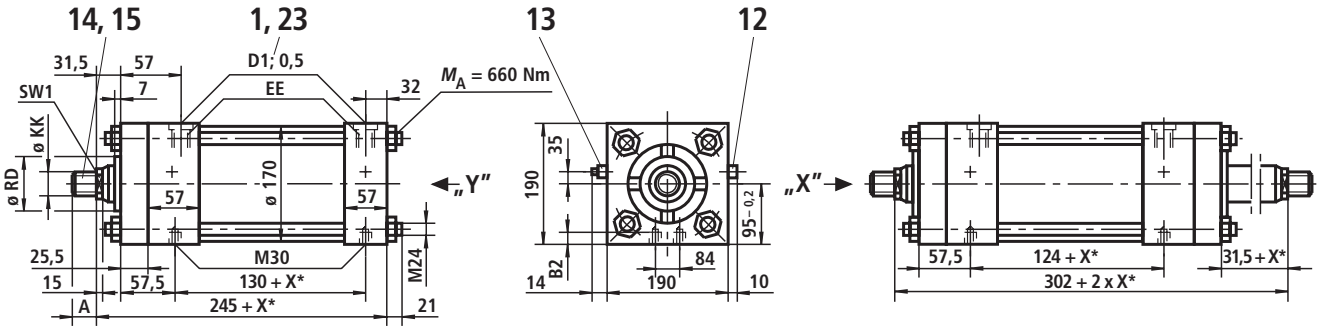
X* = stroke length

[1] Always specify dimension "XV" in clear text on the order (observe XV$_{min}$ and XV$_{max}$)

Piston Ø 150 (dimensions in mm)

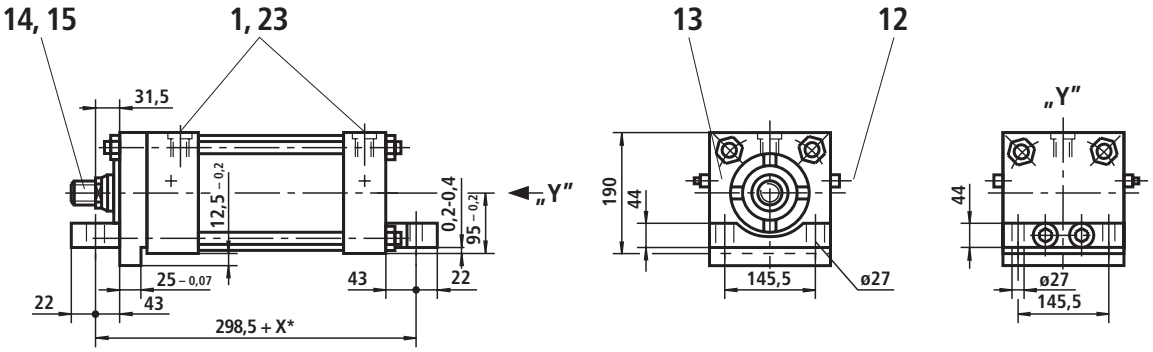
For explanations of items, see page 7

Type of mounting N Operating pressure 210 bar

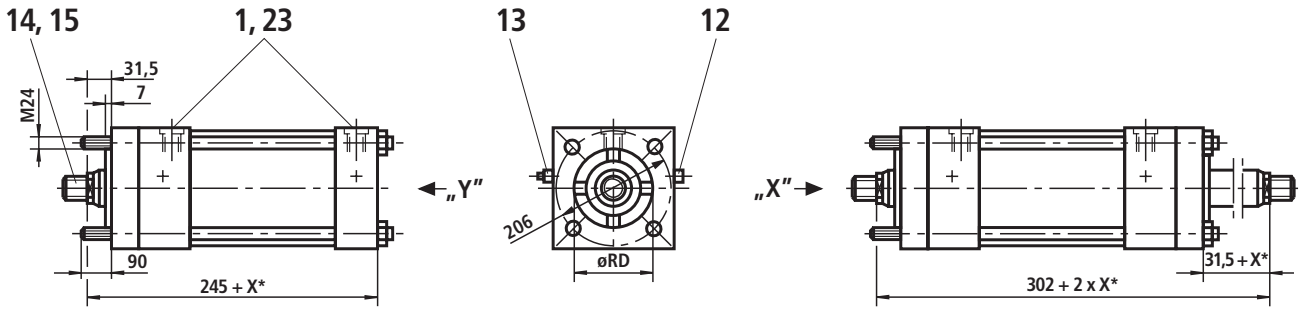


Stroke$_{min}$ = 85 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting T Operating pressure 210 bar



Type of mounting P Operating pressure 210 bar



Stroke$_{min}$ = 85 mm with thread version "E"
(only for double-rod cylinder)

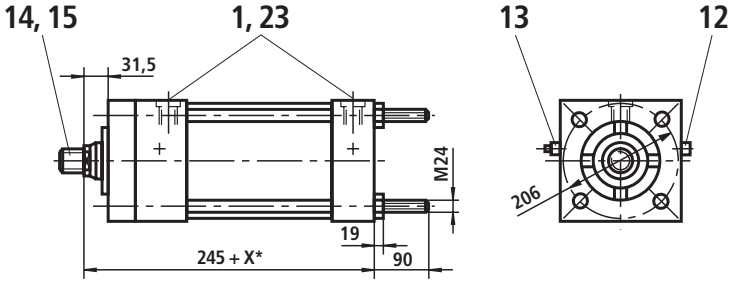
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
63	M48 x 2	M56 x 2	M52 x 3	76	115	G1	G1 1/4	M33 x 2	M42 x 2	47	58	47	58
70	M48 x 2	M56 x 2	M52 x 3	76	115								
80	M58 x 2	M68 x 2	M64 x 4	89	145								
100	M76 x 2	M95 x 2	M64 x 4	101	145								

X* = stroke length

Piston Ø 150 (dimensions in mm)

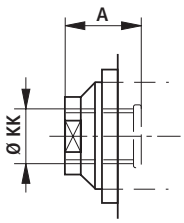
For explanations of items, see page 7

Type of mounting Q Operating pressure 210 bar

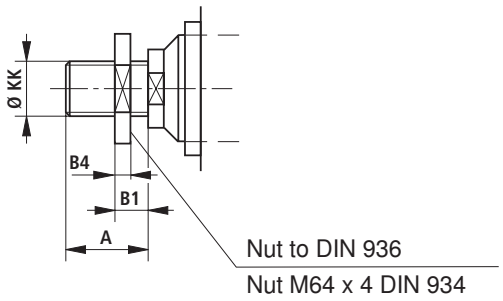


Additional thread versions

Thread version "E"

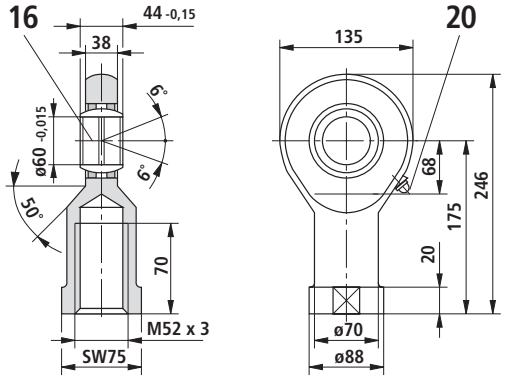


Thread version "F"



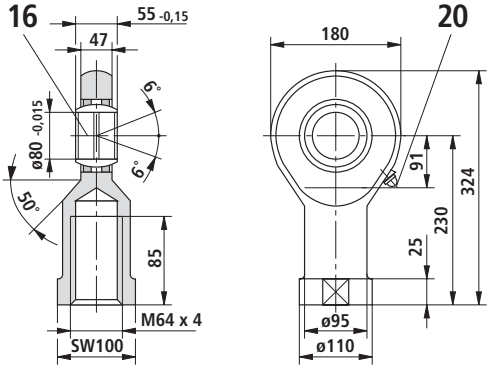
Self-aligning clevis CGK 60

suitable for thread version "F"
Material no.: **R900001335**
Weight: 5.6 kg
Permissible load: 225 kN



Self-aligning clevis CGK 80

suitable for thread version "F"
Material no.: **R900001928**
Weight: 13.1 kg
Permissible load: 371 kN



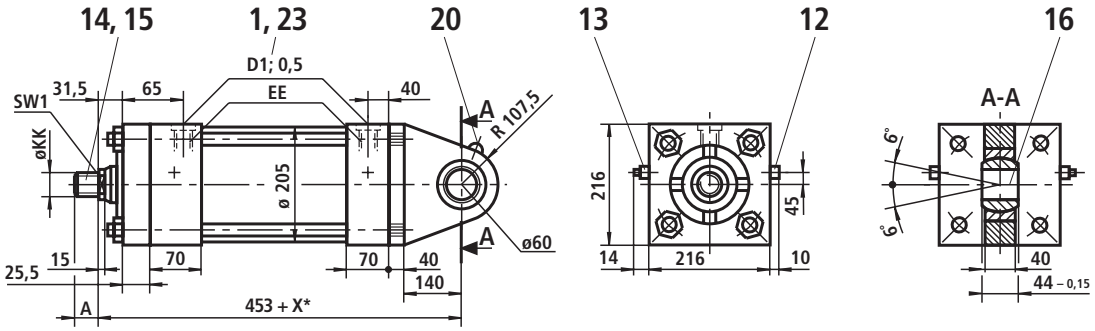
Piston rod Ø	ØRD f7	B4					B1	B2		SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
63	79.3	20					45	45		55	38	35
70	90	20					45	45		60		
80	95.2	51					60	30		75		
100	120	51					60	30		85		

X* = stroke length

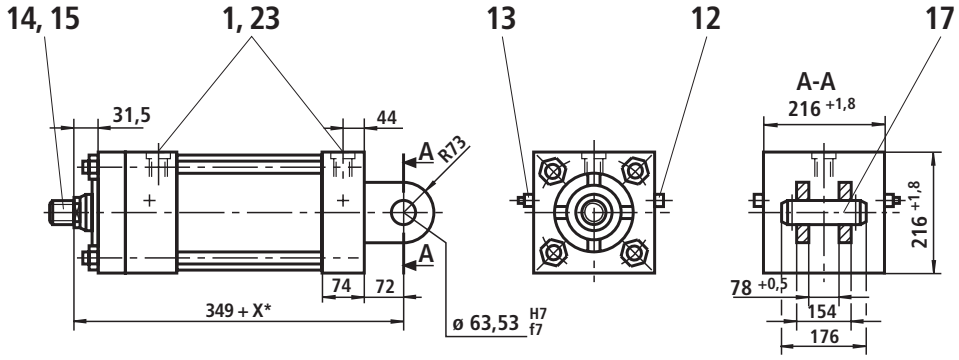
Piston Ø 180 (dimensions in mm)

For explanations of items, see page 7

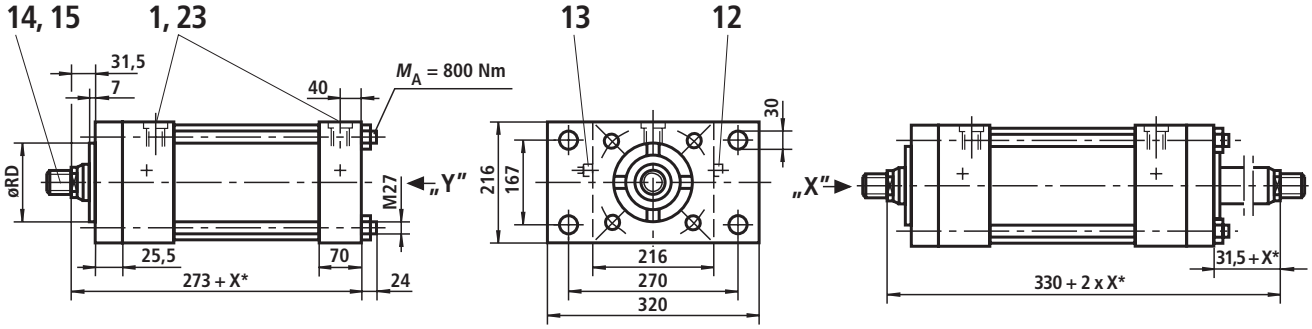
Type of mounting B Operating pressure 210 bar



Type of mounting G Operating pressure 210 bar



Type of mounting C Operating pressure with piston rod Ø 80 and Ø 90: 110 bar on cap side, 210 bar on piston rod side
Operating pressure with piston rod Ø 125: 60 bar on cap side, 210 bar on piston rod side



Stroke$_{min}$ = 105 mm with thread version "E"
(only for double-rod cylinder)

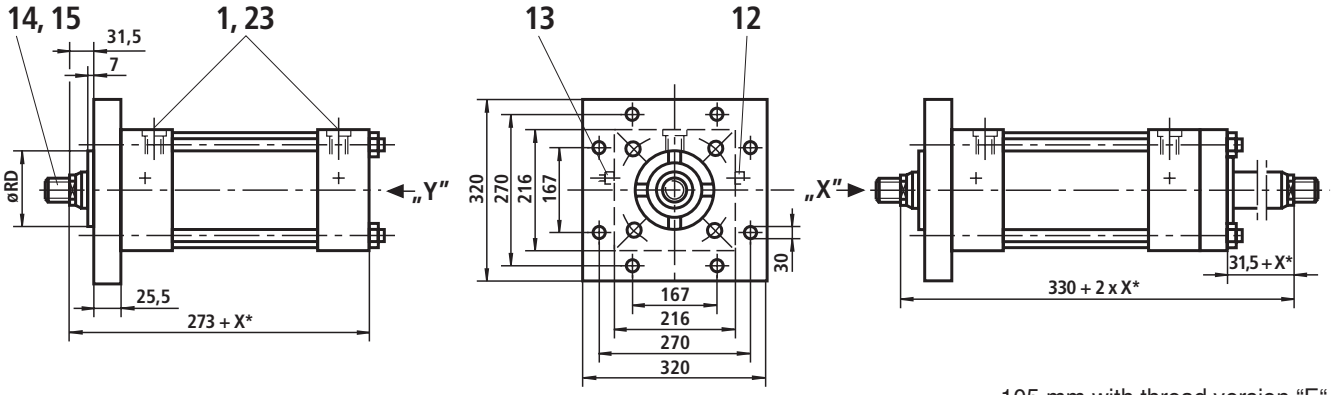
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
80	M58 x 2	M68 x 2	M64 x 4	89	145	G1 1/4	G1 1/2	M242 x 2	M48 x 2	58	65	58	65
90	M64 x 2	M76 x 2	M80 x 2	89	80								
125	M90 x 2	M110 x 2	M100 x 2	127	100								

X* = stroke length

Piston Ø 180 (dimensions in mm)

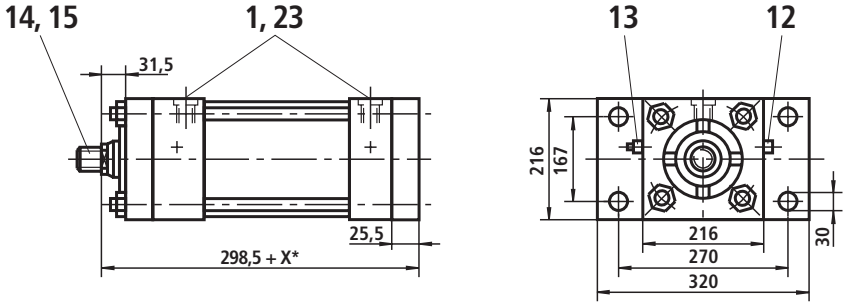
For explanations of items, see page 7

Type of mounting H Operating pressure 210 bar

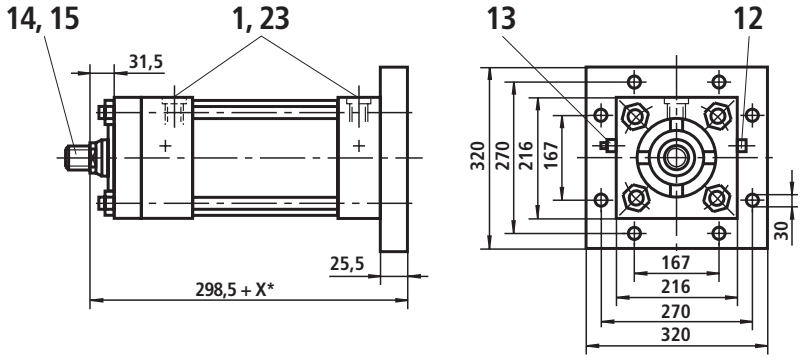


$Stroke_{min}$ = 105 mm with thread version "E" (only for double-rod cylinder)

Type of mounting D Operating pressure with piston rod Ø 80 and Ø 90: 210 bar on cap side, 110 bar on piston rod side
Operating pressure with piston rod Ø 125: 210 bar on cap side, 150 bar on piston rod side



Type of mounting K Operating pressure 210 bar



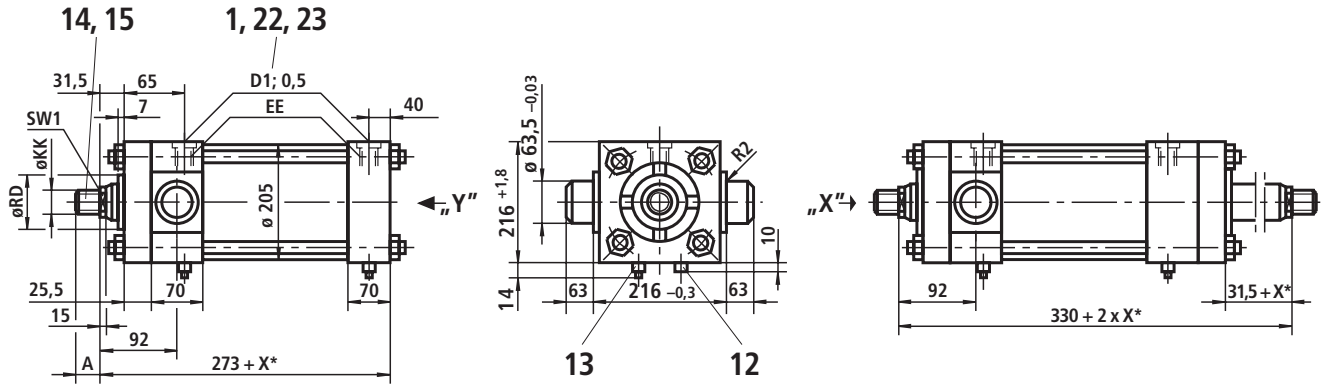
Piston rod Ø	ØRD f7									SW1	Cushioning lengths piston side	piston rod side
80	95.2									75	50	50
90	108									75		
125	146									115		

X* = stroke length

Piston Ø 180 (dimensions in mm)

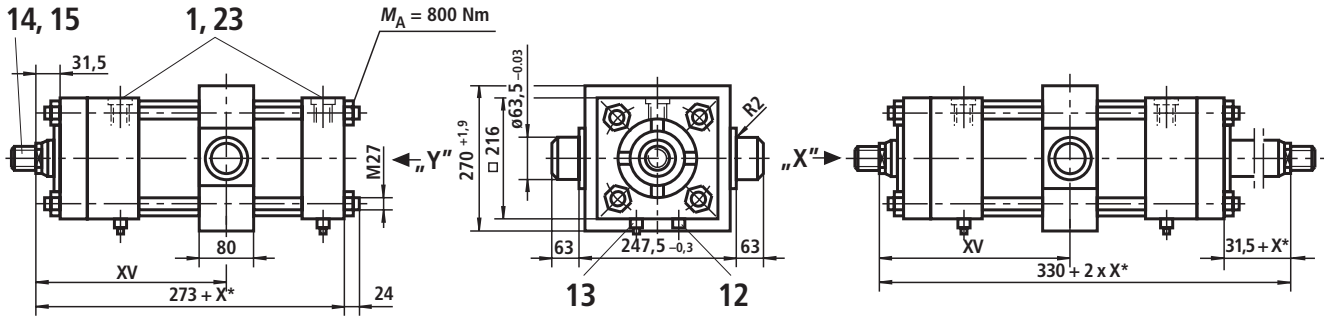
For explanations of items, see page 7

Type of mounting R Operating pressure 210 bar



Stroke$_{min}$ = 105 mm with thread version “E“
(only for double-rod cylinder)

Type of mounting E Operating pressure 210 bar

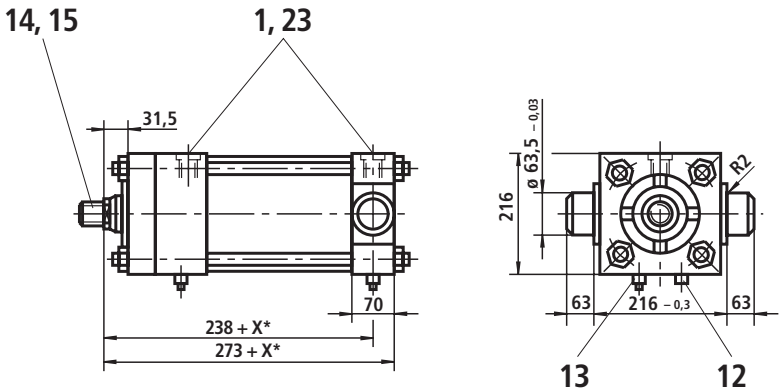


Stroke$_{min}$ = 25 mm
Always specify dimension “XV”
in clear text on the order
(observe XV$_{min}$ and XV$_{max}$)

Note:
Dimensions for cylinder with piston rod extension “LY“ in the retracted condition, see index 2 on page 5.

Stroke$_{min}$ = 105 mm
with thread version “E“
(only for double-rod cylinder)

Type of mounting S Operating pressure 210 bar



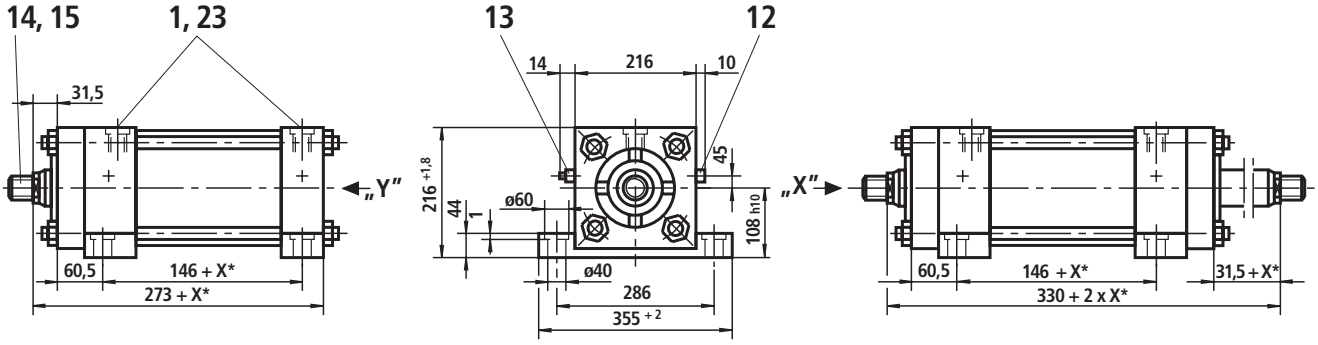
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
80	M58 x 2	M68 x 2	M64 x 4	89	145	G1 1/4	G1 1/2	M242 x 2	M48 x 2	58	65	58	65
90	M64 x 2	M76 x 2	M80 x 2	89	80								
125	M90 x 2	M110 x 2	M100 x 2	127	100								

X* = stroke length

Piston Ø 180 (dimensions in mm)

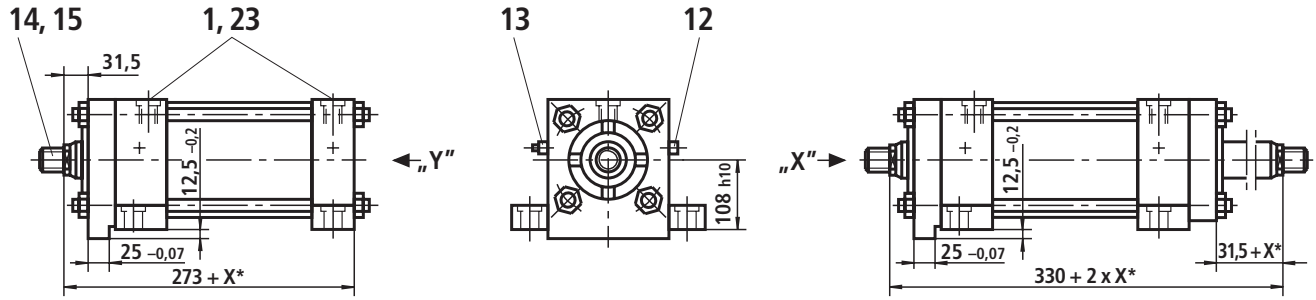
For explanations of items, see page 7

Type of mounting F Operating pressure 210 bar



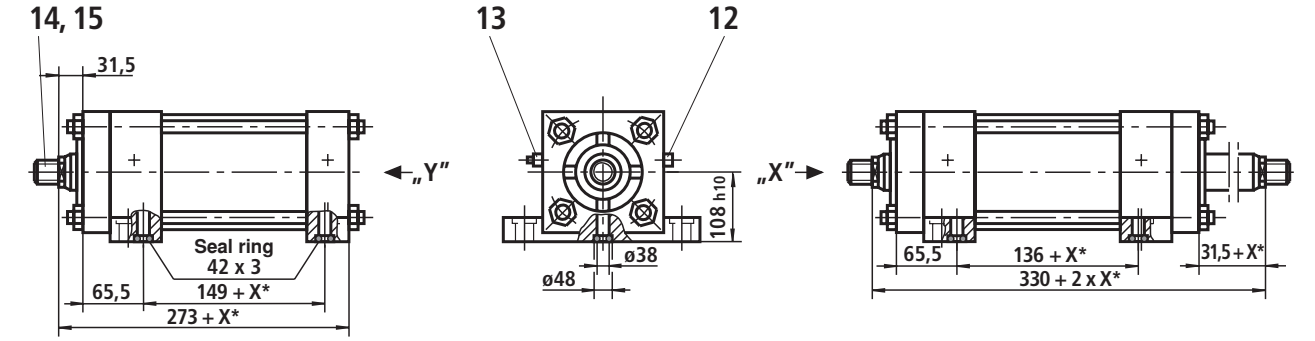
Stroke$_{min}$ = 105 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting L Operating pressure 210 bar



Stroke$_{min}$ = 105 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting M Operating pressure 210 bar



Stroke$_{min}$ = 105 mm with thread version "E"
(only for double-rod cylinder)

Piston rod Ø	ØRD f7	XV [1] min.	XV [1] max.							SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
80	95.2	167	163 + X*							75	50	50
90	108	167	163 + X*							75		
125	146	167	163 + X*							115		

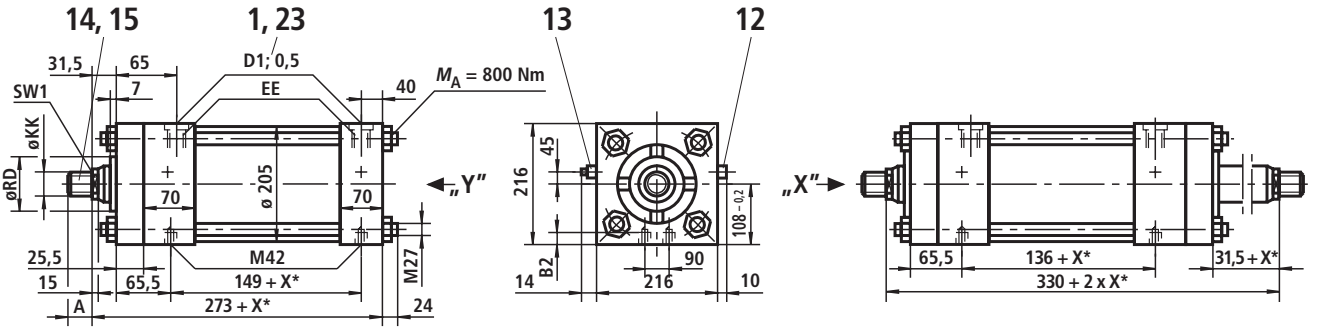
X* = stroke length

[1] Always specify dimension "XV" in clear text on the order (observe XV$_{min}$ and XV$_{max}$)

Piston Ø 180 (dimensions in mm)

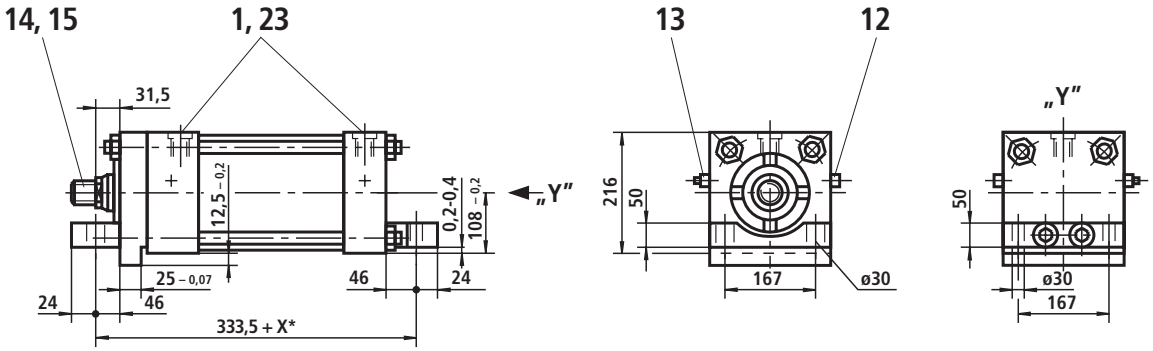
For explanations of items, see page 7

Type of mounting N Operating pressure 210 bar

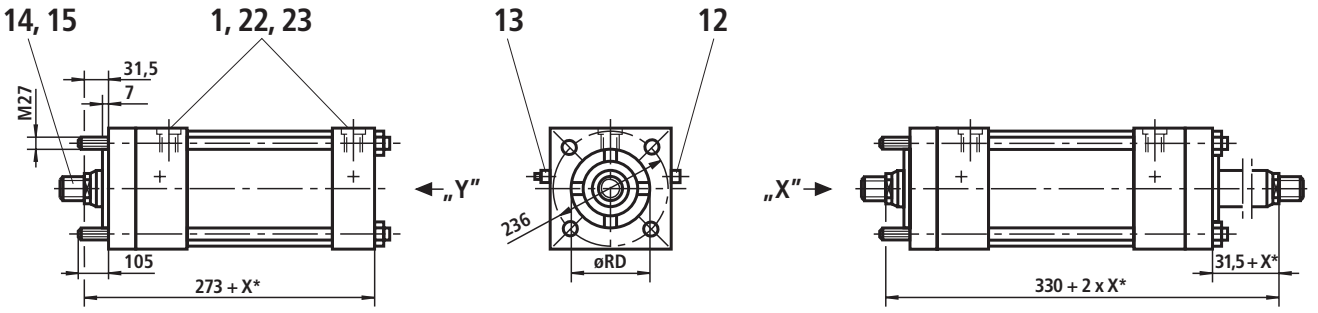


Stroke$_{min}$ = 105 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting T Operating pressure 210 bar



Type of mounting P Operating pressure 210 bar



Stroke$_{min}$ = 105 mm with thread version "E"
(only for double-rod cylinder)

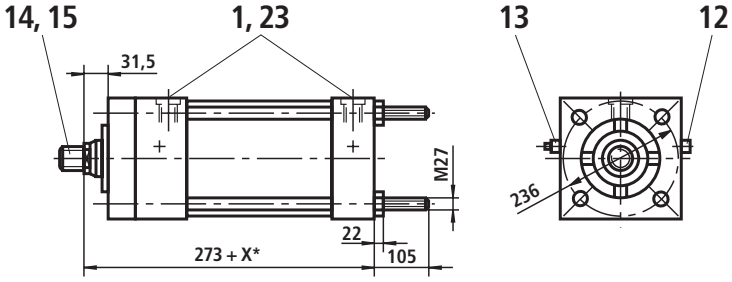
Piston	KK			A		EE				D1			
rod	Thread version			Thread version		Pipe connection				Pipe connection			
Ø	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
80	M58 x 2	M68 x 2	M64 x 4	89	145	G1 1/4	G1 1/2	M242 x 2	M48 x 2	58	65	58	65
90	M64 x 2	M76 x 2	M80 x 2	89	80								
125	M90 x 2	M110 x 2	M100 x 2	127	100								

X* = stroke length

Piston Ø 180 (dimensions in mm)

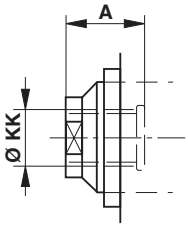
For explanations of items, see page 7

Type of mounting Q Operating pressure 210 bar

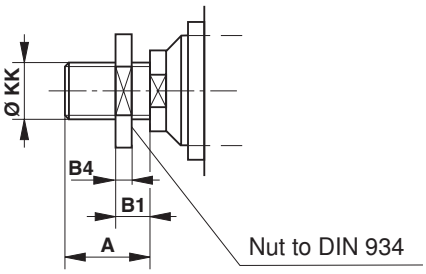


Additional thread versions

Thread version "E"

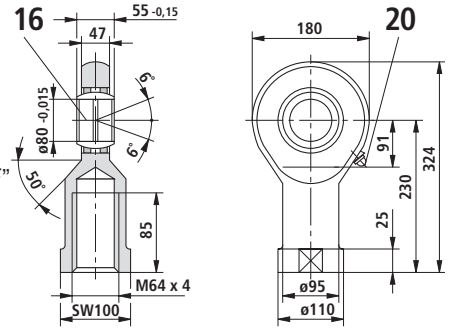


Thread version "F"



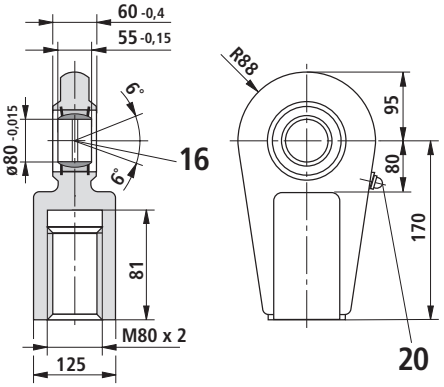
Self-aligning clevis CGK 80

suitable for thread version "F"
Material no.: **R900001928**
Weight: 13.1 kg
Permissible load: 375 kN



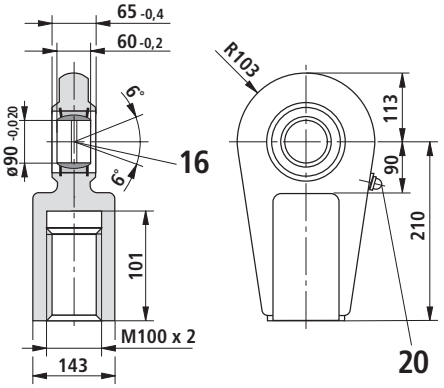
Self-aligning clevis CGA 80

suitable for thread version "F"
Material no.: **R900303132**
Weight: 12.2 kg
Permissible load: 385 kN



Self-aligning clevis CGA 100

suitable for thread version "F"
Material no.: **R900303133**
Weight: 21.5 kg
Permissible load: 535 kN



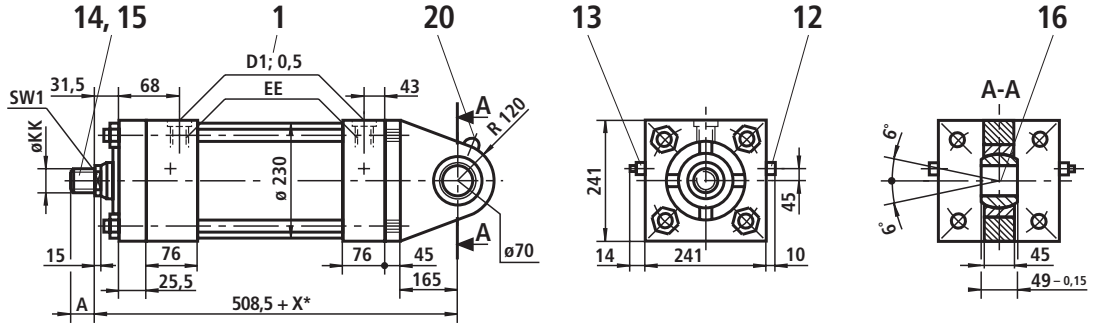
Piston rod Ø	ØRD f7	B4						B1	B2	SW1	Cushioning lengths	
											piston side	piston rod side
80	95.2	51						60	40	75	50	50
90	108	–						–	40	75		
125	146	–						–	28	115		

X* = stroke length

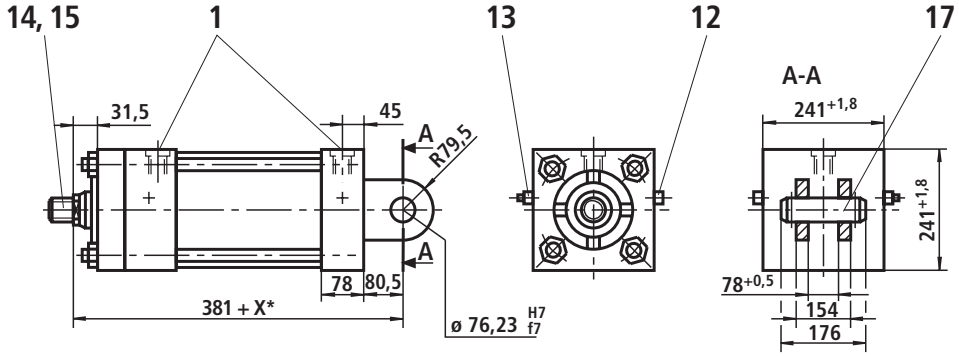
Piston Ø 200 (dimensions in mm)

For explanations of items, see page 7

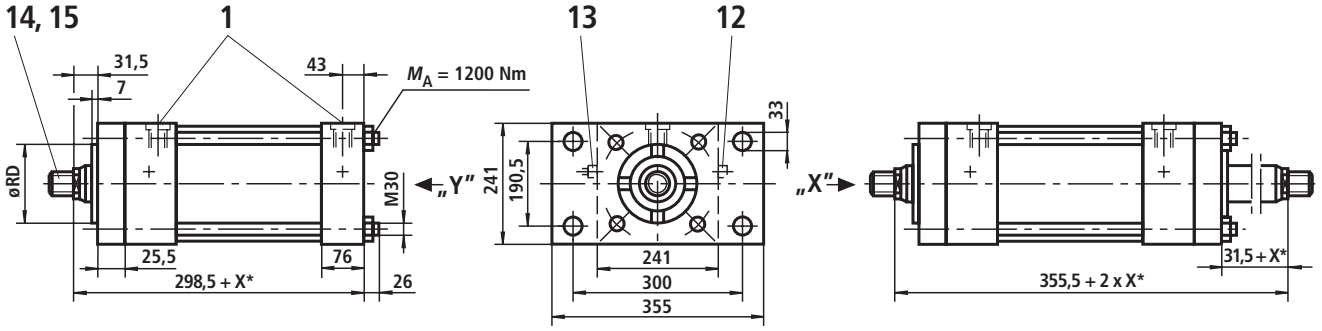
Type of mounting B Operating pressure 210 bar



Type of mounting G Operating pressure 210 bar



Type of mounting C Operating pressure with piston rod Ø 90 and Ø 100: 70 bar on cap side, 210 bar on piston rod side
Operating pressure with piston rod Ø 140: 40 bar on cap side, 210 bar on piston rod side



Stroke$_{min}$ = 120 mm with thread version "E"
(only for double-rod cylinder)

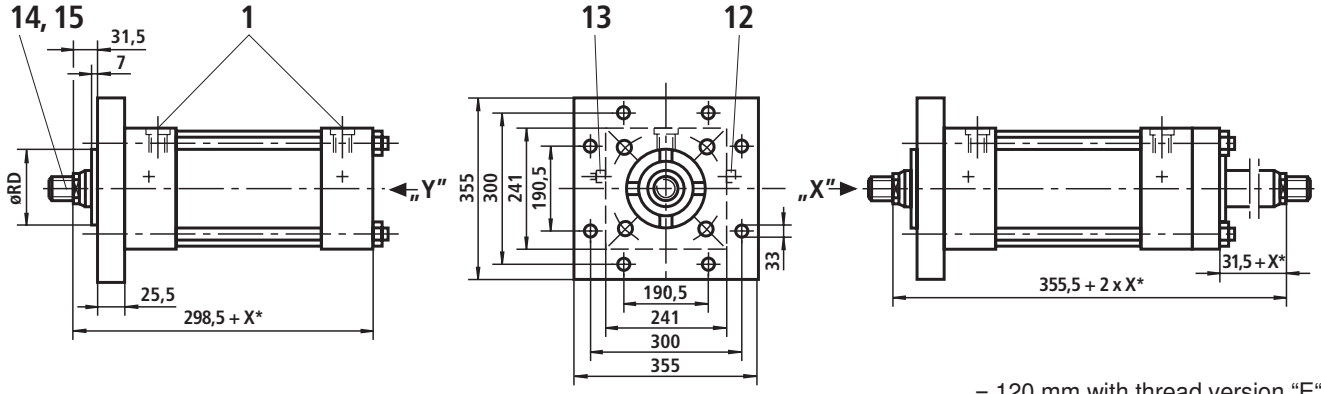
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
90	M64 x 2	M76 x 2	M80 x 2	89	80	G1 1/2	–	M48 x 2	–	65	–	65	–
100	M76 x 2	M95 x 2	M80 x 2	101	80								
140	M100 x 2	M130 x 2	M110 x 2	140	110								

X* = stroke length

Piston Ø 200 (dimensions in mm)

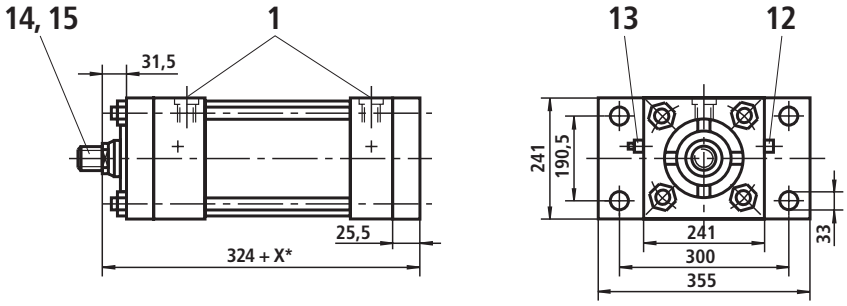
For explanations of items, see page 7

Type of mounting H Operating pressure 210 bar

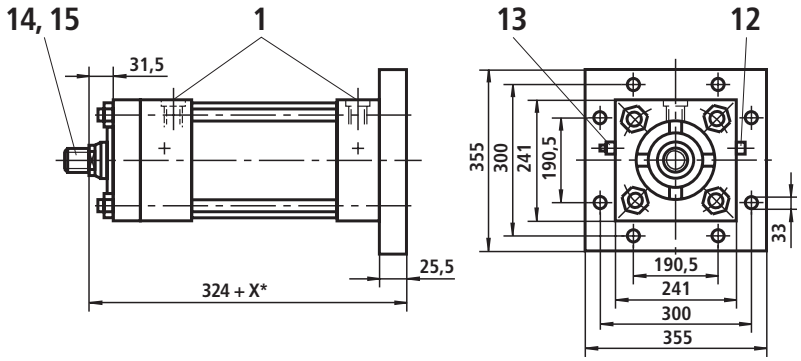


Stroke$_{min}$ = 120 mm with thread version "E" (only for double-rod cylinder)

Type of mounting D Operating pressure with piston rod Ø 90 and Ø 100: 210 bar on cap side, 110 bar on piston rod side
Operating pressure with piston rod Ø 140: 210 bar on cap side, 150 bar on piston rod side



Type of mounting K Operating pressure 210 bar



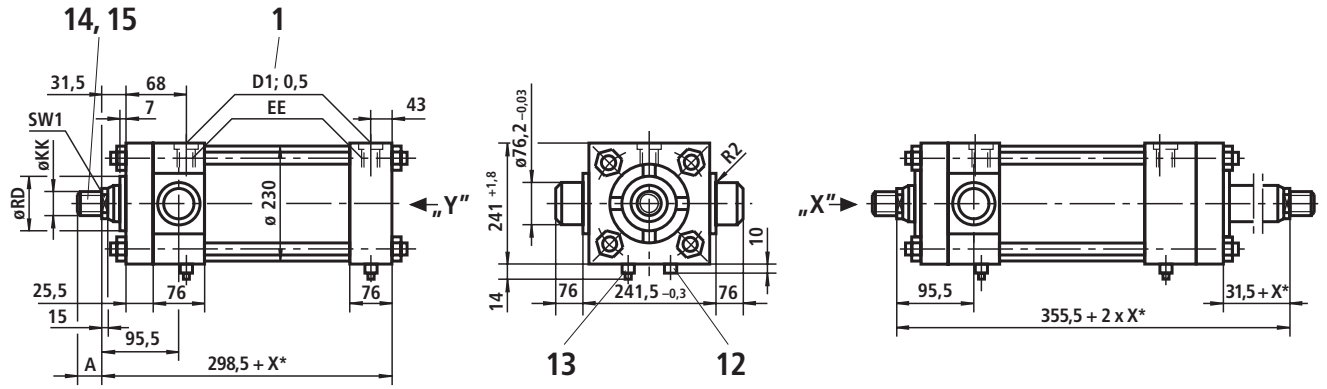
Piston rod Ø	ØRD f7									SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
90	108									75	50	50
100	120									85		
140	158									120		

X* = stroke length

Piston Ø 200 (dimensions in mm)

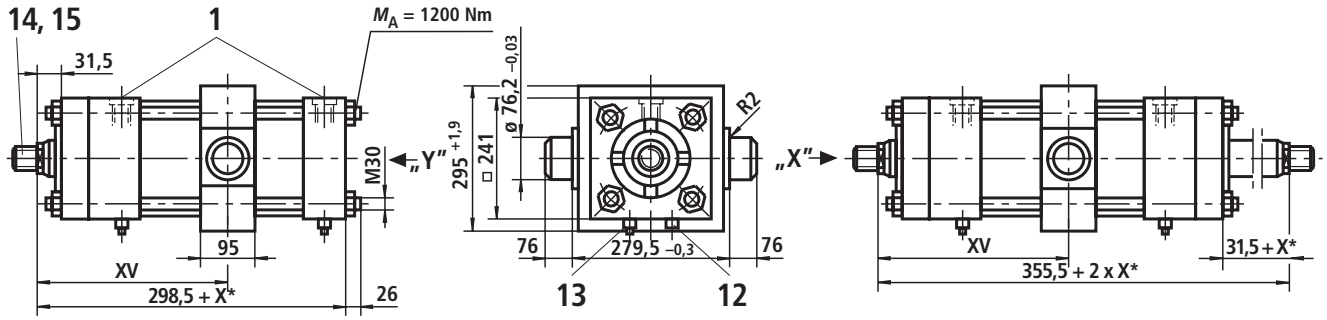
For explanations of items, see page 7

Type of mounting R Operating pressure 210 bar



Stroke$_{min}$ = 120 mm with thread version “E“
(only for double-rod cylinder)

Type of mounting E Operating pressure 210 bar

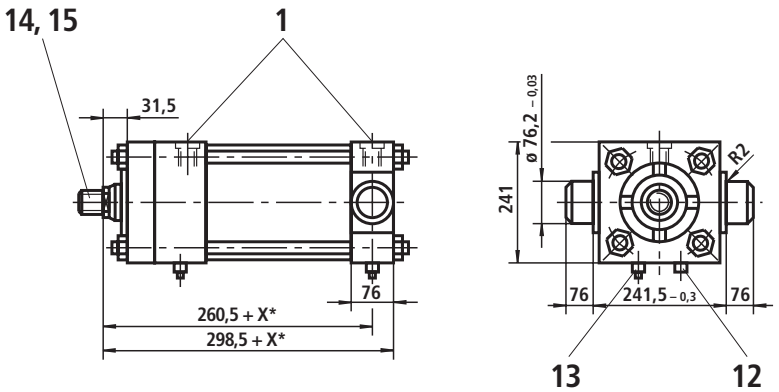


Stroke$_{min}$ = 25 mm
Always specify dimension “XV”
in clear text on the order
(observe XV$_{min}$ and XV$_{max}$)

Note:
Dimensions for cylinder with piston rod extension “LY“ in the retracted condition, see index 2 on page 5.

Stroke$_{min}$ = 120 mm
with thread version “E“
(only for double-rod cylinder)

Type of mounting S Operating pressure 210 bar



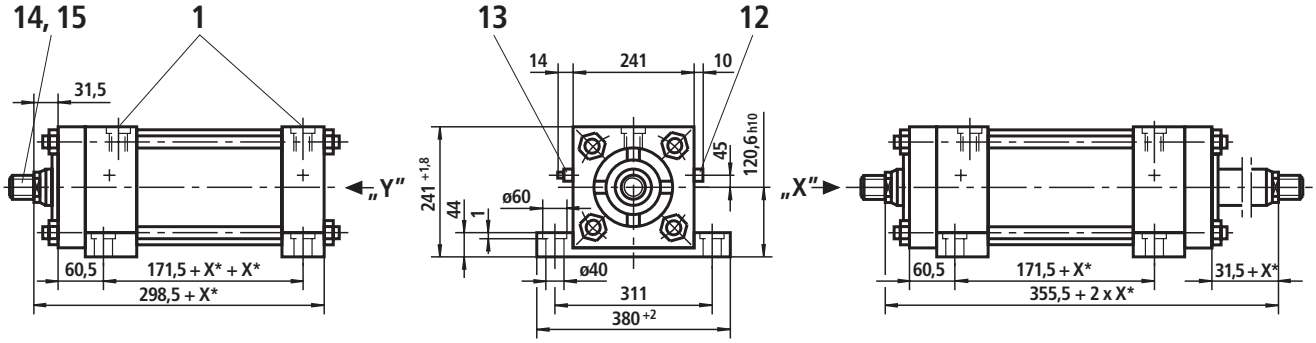
Piston rod Ø	KK			A		EE				D1			
	Thread version			Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
90	M64 x 2	M76 x 2	M80 x 2	89	80	G1 1/2	–	M48 x 2	–	65	–	65	–
100	M76 x 2	M95 x 2	M80 x 2	101	80								
140	M100 x 2	M130 x 2	M110 x 2	140	110								

X* = stroke length

Piston Ø 200 (dimensions in mm)

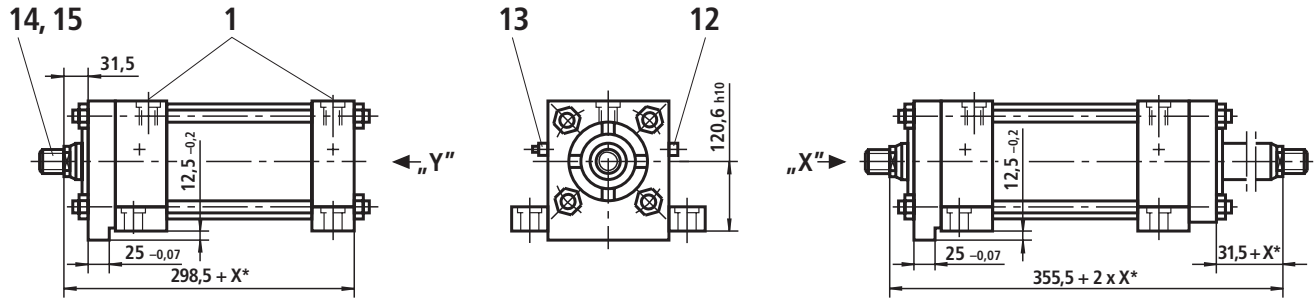
For explanations of items, see page 7

Type of mounting F Operating pressure 210 bar



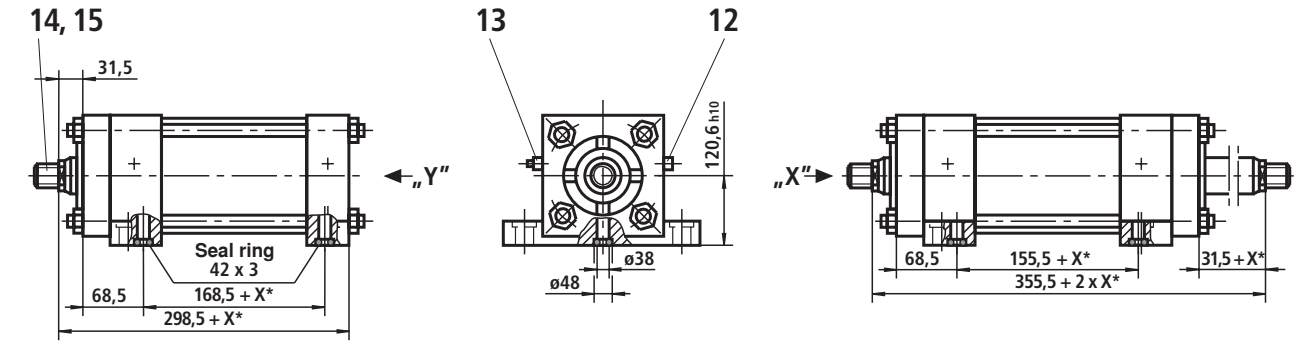
Stroke$_{min}$ = 120 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting L Operating pressure 210 bar



Stroke$_{min}$ = 120 mm with thread version "E"
(only for double-rod cylinder)

Type of mounting M Operating pressure 210 bar



Stroke$_{min}$ = 120 mm with thread version "E"
(only for double-rod cylinder)

Piston rod Ø	ØRD f7	XV [1] min.	XV [1] max.							SW1	Cushioning lengths	
											piston side	piston rod side
90	108	180.5	175 + X*							75	50	50
100	120	180.5	175 + X*							85		
140	158	180.5	175 + X*							120		

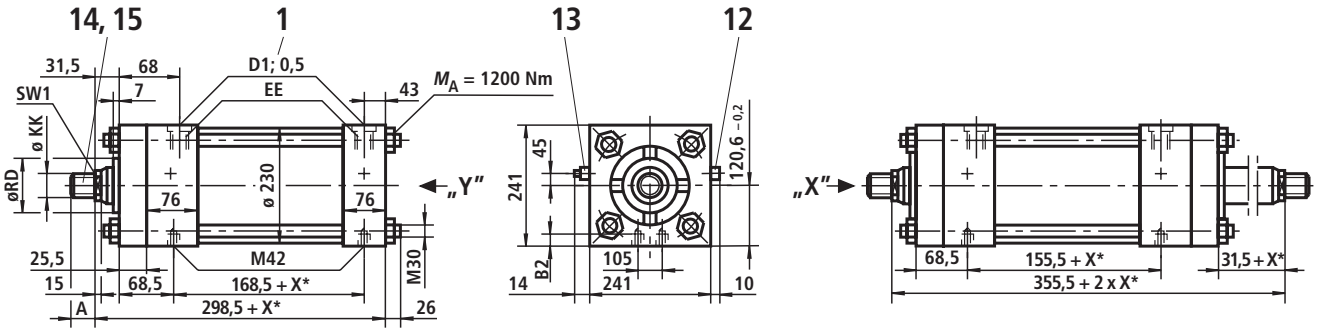
X* = stroke length

[1] Always specify dimension "XV" in clear text on the order (observe XV$_{min}$ and XV$_{max}$)

Piston Ø 200 (dimensions in mm)

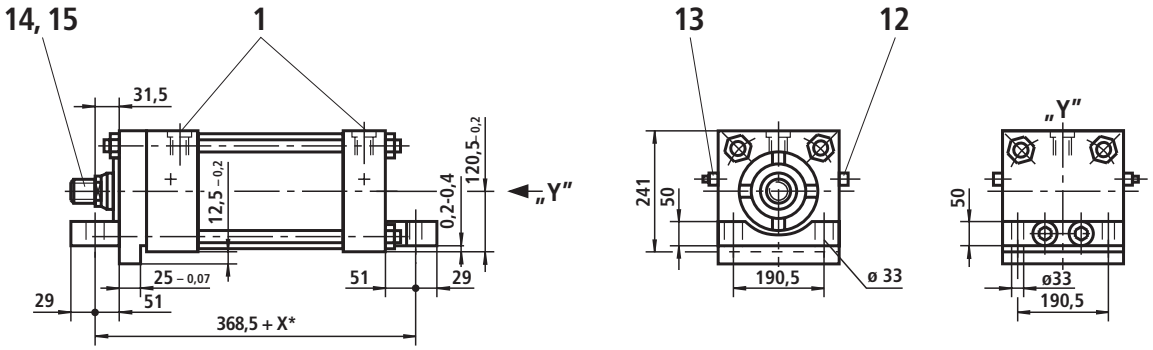
For explanations of items, see page 7

Type of mounting N Operating pressure 210 bar

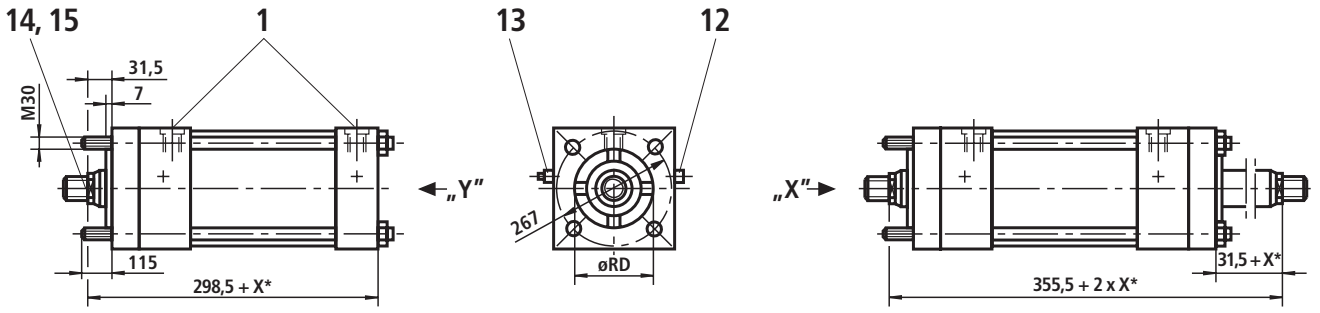


Stroke$_{min}$ = 120 mm with thread version “E“
(only for double-rod cylinder)

Type of mounting T Operating pressure 210 bar



Type of mounting P Operating pressure 210 bar



Stroke$_{min}$ = 120 mm with thread version “E“
(only for double-rod cylinder)

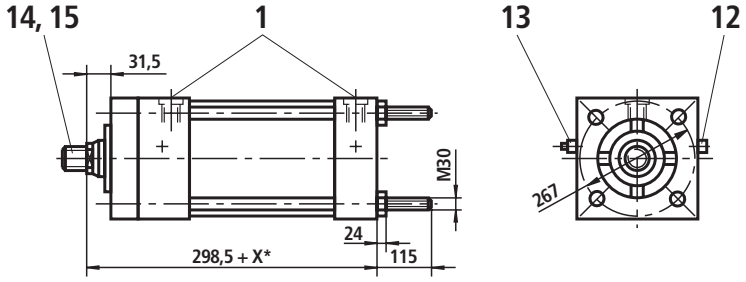
Piston rod Ø		KK		A		EE				D1			
		Thread version		Thread version		Pipe connection				Pipe connection			
	C, E	B	F	C, E, B	F	01	13	02	14	01	13	02	14
90	M64 x 2	M76 x 2	M80 x 2	89	80	G1 1/2	–	M48 x 2	–	65	–	65	–
100	M76 x 2	M95 x 2	M80 x 2	101	80								
140	M100 x 2	M130 x 2	M110 x 2	140	110								

X* = stroke length

Piston Ø 200 (dimensions in mm)

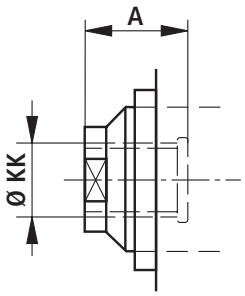
For explanations of items, see page 7

Type of mounting Q Operating pressure 210 bar

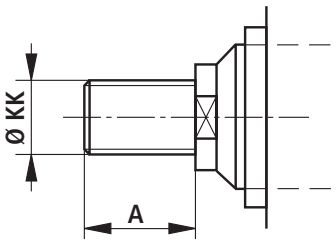


Additional thread versions

Thread version “E”

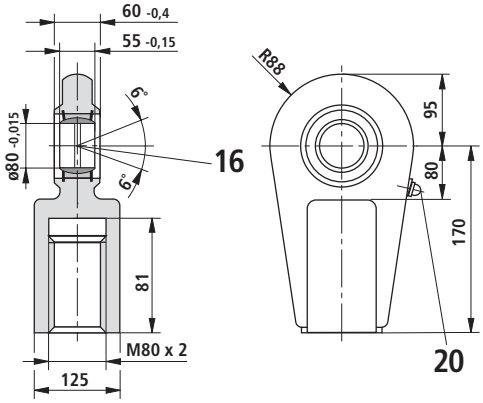


Thread version “F”



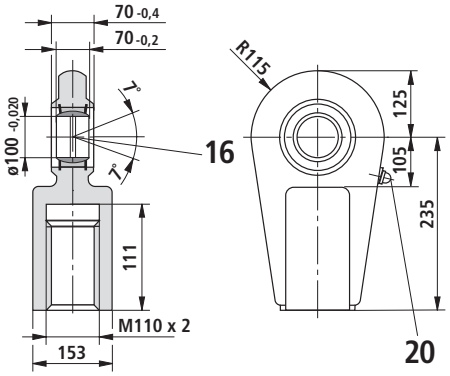
Self-aligning clevis CGA 80

suitable for thread version “F”
Material no.: **R900303132**
Weight: 12.2 kg
Permissible load: 385 KN



Self-aligning clevis CGA 110

suitable for thread version “F”
Material no.: **R900303134**
Weight: 27.5 kg
Permissible load: 660 KN



Piston rod Ø	ØRD f7							B2		SW1	Cushioning lengths piston side	Cushioning lengths piston rod side
90	108							55		75	50	50
100	120							55		85		
140	158							32		120		

X* = stroke length

Weight

Piston Ø	mm	**40**			**50**			**63**			
Piston rod Ø	mm	**16**	**18**	**25**	**22**	**25**	**36**	**25**	**28**	**36**	**45**
Weight in kg per 100 mm stroke	Single-rod cylinder	0.55	0.6	0.8	0.9	1.0	1.3	1.6	1.7	2.0	2.4
	Double-rod cylinder	0.75	0.8	1.2	1.2	1.3	2.1	2.0	2.2	2.6	3.6
	Type of mounting	CD		CG	CD		CG	CD		CG	
Weight in kg with 0 stroke	B	4.7		–	7.5		–	11.3		–	
	G	4.3		–	7.2		–	10.5		–	
	E	5.0		5.7	8.2		9.8	11.1		13.6	
	H	4.6		5.3	7.7		9.3	10.6		13.0	
	K, D	4.9		–	8.4		–	11.6		–	
	C, F, L, M, R, S, T	4.2		4.9	6.9		8.4	10.3		12.7	
	N, P, Q,	4.0		4.7	6.4		8.0	9.3		11.7	

Piston Ø	mm	**80**			**100**			**125**			
Piston rod Ø	mm	**36**	**45**	**56**	**45**	**50**	**70**	**50**	**56**	**63**	**90**
Weight in kg per 100 mm stroke	Single-rod cylinder	2.5	3.0	3.6	3.9	4.2	5.6	5.9	6.3	6.8	9.3
	Double-rod cylinder	3.3	4.2	5.5	4.1	5.8	8.6	7.8	8.2	9.3	14.3
	Type of mounting	CD		CG	CD		CG	CD		CG	
Weight in kg with 0 stroke	B	21.0		–	29.5		–	54.7		–	
	G	19.5		–	28.6		–	48.2		–	
	E	21.3		25.5	28.3		35.1	49.5		60.5	
	H	20.0		24.0	27.3		34.0	48.8		61.0	
	K, D	21.8		–	27.7		–	52.5		–	
	C, F, L, M, R, S, T	18.7		23.0	25.6		33.0	45.0		57.3	
	N, P, Q,	17.3		21.3	23.8		30.5	42.5		54.7	

Piston Ø	mm	**150**				**180**			**200**		
Piston rod Ø	mm	**63**	**70**	**80**	**100**	**80**	**90**	**125**	**90**	**100**	**140**
Weight in kg per 100 mm stroke	Single-rod cylinder	7.9	8.4	9.4	11.5	11.6	12.7	17.3	15.2	16.4	22.2
	Double-rod cylinder	10.4	14.0	13.4	17.7	15.6	17.7	26.9	20.2	22.6	34.3
	Type of mounting	CD		CG		CD		CG	CD		CG
Weight in kg with 0 stroke	B	81.3		–		132.2		–	181.5		–
	G	72.0		–		119.0		–	160.0		–
	E	76.5		91.5		117.5		142.0	165.0		197.0
	H	73.5		88.5		110.5		135.0	151.0		183.0
	K, D	80.6		–		120.0		–	162.5		–
	C, F, L, M, R, S, T	68.6		83.6		106.3		131.0	145.0		177.0
	N, P, Q,	66.0		81.0		101.3		126.0	140.0		172.0

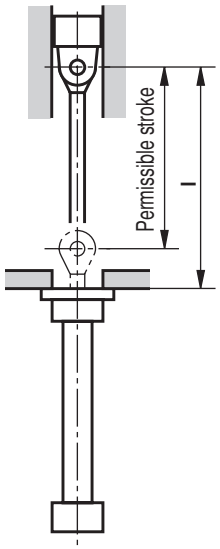
CD = Single-rod cylinder

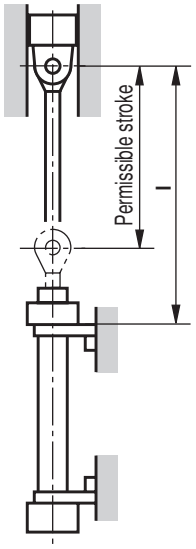
CG = Double-rod cylinder

Permissible stroke lengths

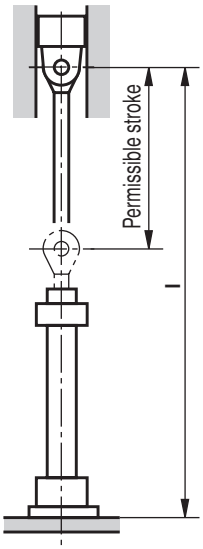
Piston Ø in mm	Piston rod Ø in mm	Mounting types: C, F, H, L, M, N, P, T				Mounting types: D, K, Q				Available maximum stroke length in mm (standard version)
		Operating pressure in bar				Operating pressure in bar				
		75	100	150	210	75	100	150	210	
		Permissible max. stroke in mm				Permissible max. stroke in mm				
40	16	560	470	370	295	195	155	105	70	1000
	18	745	635	505	415	285	230	170	130	
	25	1000	1000	1000	845	620	520	405	325	
50	22	880	750	595	490	340	280	205	155	1200
	25	1160	990	785	645	465	385	290	225	
	36	1200	1200	1200	1200	1090	925	730	600	
63	25	880	745	655	470	330	265	225	140	1400
	28	1145	975	775	640	460	380	285	220	
	36	1400	1400	1325	1100	820	690	535	430	
	45	1400	1400	1400	1400	1365	1165	920	755	
80	36	1505	1285	1025	845	615	510	390	305	1700
	45	1700	1700	1645	1365	1025	860	670	540	
	56	1700	1700	1700	1700	1670	1425	1130	925	
100	45	1875	1600	1275	1050	775	645	495	390	2000
	50	2000	1990	1585	1300	975	820	630	500	
	70	2000	2000	2000	2000	2000	1800	1430	1180	
125	50	1820	1545	1220	1000	735	610	455	350	2300
	56	2300	2005	1605	1325	990	830	640	510	
	63	2300	2300	2035	1680	1270	1070	830	665	
	90	2300	2300	2300	2300	2300	2300	1960	1625	
150	63	2450	2085	1655	1360	1010	845	645	505	2600
	70	2600	2600	2115	1755	1315	1110	865	700	
	80	2600	2600	2600	2280	1740	1465	1140	920	
	100	2600	2600	2600	2600	2600	2465	1965	1620	
180	80	2800	2800	2245	1845	1390	1165	895	710	2800
	90	2800	2800	2800	2515	1900	1615	1275	1044	
	125	2800	2800	2800	2800	2800	2800	2645	2195	
200	90	3000	3000	2690	2240	1675	1420	1120	910	3000
	100	3000	3000	3000	2845	2150	1830	1450	1190	
	140	3000	3000	3000	3000	3000	3000	2990	2485	

$S_K = l \cdot \sqrt{\frac{1}{2}}$



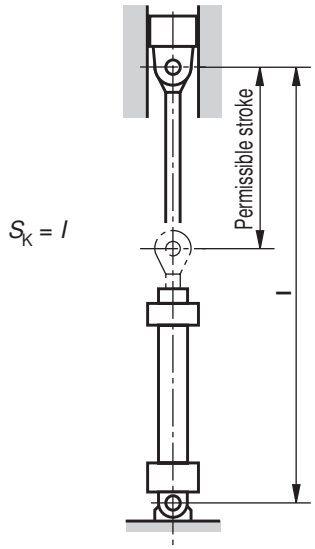


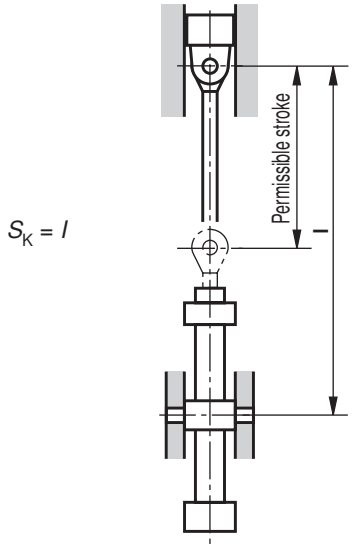
$S_K = l \cdot \sqrt{\frac{1}{2}}$



Permissible stroke lengths

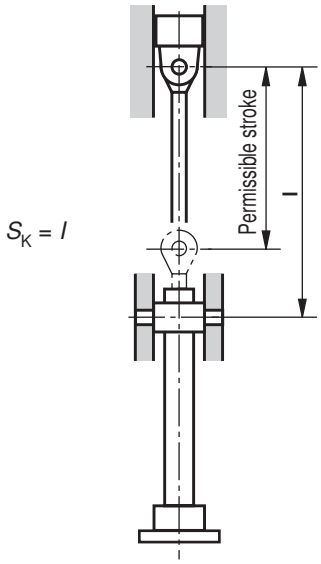
Piston Ø in mm	Piston rod Ø in mm	Mounting types: B, G, S Operating pressure in bar 75	100	150	210	Mounting types: E (Position: Trunnion at the center of the cylinder) Operating pressure in bar 75	100	150	210	Available maximum stroke length in mm (standard version)
		Permissible max. stroke in mm				Permissible max. stroke in mm				
40	**16**	95	65	30	10	195	155	105	70	1000
	18	160	120	75	45	285	230	170	130	
	25	415	340	250	190	620	520	405	325	
50	**22**	195	150	95	60	340	280	205	155	1200
	25	295	235	160	115	465	385	290	225	
	36	760	635	490	390	1090	925	730	600	
63	**25**	185	140	105	45	330	265	225	140	1400
	28	280	220	150	105	460	380	285	220	
	36	555	455	340	260	820	690	535	430	
	45	960	810	630	505	1365	1165	920	755	
80	**36**	380	305	215	150	615	510	390	305	1700
	45	690	570	425	325	1025	860	670	540	
	56	1175	990	770	615	1670	1425	1130	925	
100	**45**	495	400	285	205	775	645	495	390	2000
	50	650	530	385	290	975	820	630	500	
	70	1495	1265	990	800	2000	1800	1430	1180	
125	**50**	455	360	245	165	735	610	455	350	2300
	56	640	525	380	285	990	830	640	510	
	63	855	700	525	400	1270	1070	830	665	
	90	2035	1730	1365	1115	2300	2300	1960	1625	
150	**63**	640	510	360	255	1010	845	645	505	2600
	70	865	710	530	405	1315	1110	865	700	
	80	1180	975	735	570	1740	1465	1140	920	
	100	2045	1725	1355	1095	2600	2465	1965	1620	
180	**80**	900	725	525	390	1390	1165	895	710	2800
	90	1280	1065	815	640	1900	1615	1275	1044	
	125	2740	2325	1840	1500	2800	2800	2645	2195	
200	**90**	1095	905	675	520	1675	1420	1120	910	3000
	100	1445	1205	920	725	2150	1830	1450	1190	
	140	3000	2630	2080	1700	3000	3000	2990	2485	





Permissible stroke lengths

Piston Ø in mm	Piston rod Ø in mm	Type of mounting: R				Available maximum stroke length in mm (standard version)
		Operating pressure in bar				
		75	100	150	210	
		Permissible max. stroke in mm				
40	16	330	270	200	150	1000
	18	455	365	270	210	
	25	990	830	650	520	
50	22	545	450	325	250	1200
	25	770	620	480	380	
	36	1200	1200	1170	960	
63	25	540	445	380	255	1400
	28	735	610	455	350	
	36	1275	1080	845	685	
	45	1400	1400	1400	1210	
80	36	985	815	625	490	1700
	45	1585	1340	1055	855	
	56	1700	1700	1700	1480	
100	45	1240	1030	790	625	2000
	50	1515	1280	995	800	
	70	2000	2000	2000	1890	
125	50	1160	970	740	585	2300
	56	1585	1330	1025	815	
	63	1965	1660	1300	1050	
	90	2300	2300	2300	2300	
150	63	1585	1330	1030	825	2600
	70	2100	1775	1385	1120	
	80	2600	2265	1780	1445	
	100	2600	2600	2600	2590	
180	80	2160	1820	1415	1135	2800
	90	2680	2270	1790	1455	
	125	2800	2800	2800	2800	
200	90	2680	2270	1790	1455	3000
	100	3000	2825	2260	1865	
	140	3000	3000	3000	3000	



Calculation of buckling

Buckling calculations are usually carried out according to Euler, because piston rods are in most of the cases to be considered as slender rods

$$\text{Buckling load } K = \frac{\pi^2 \cdot E \cdot J}{s_K{}^2} \text{ in N}$$

i.e. under this load, the rod buckles!

$$\text{Max. operating load } F = \frac{K}{S} \text{ in N}$$

s_K = free buckling length in mm

E = modulus of elasticity in N/mm^2 = 2.1 • 10^5 for steel

J = Mass moment of inertia in mm^4 for circular cross-section

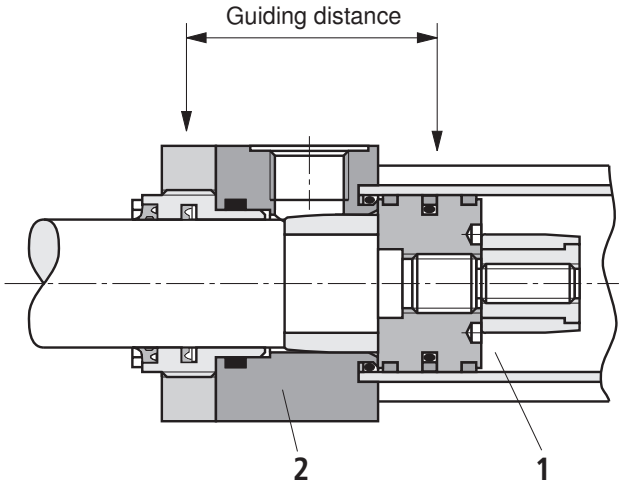
$$= \frac{d^4 \cdot \pi}{64} = 0.0491 \cdot d^4$$

S = safety (3.5)

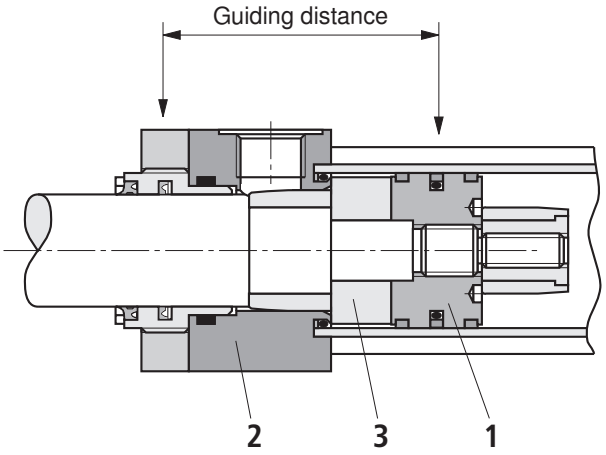
Stop tube extension

For long stroke and compressive loads, the use of a stop tube extension is recommended to avoid bearing stress when the piston rod is extended. With this solution, a spacer bushing (3) is installed between piston (1) and cylinder head (2). This spacer bushing extends the lever arm, thus reducing the load on the bearings.

Without stop tube extension



With stop tube extension



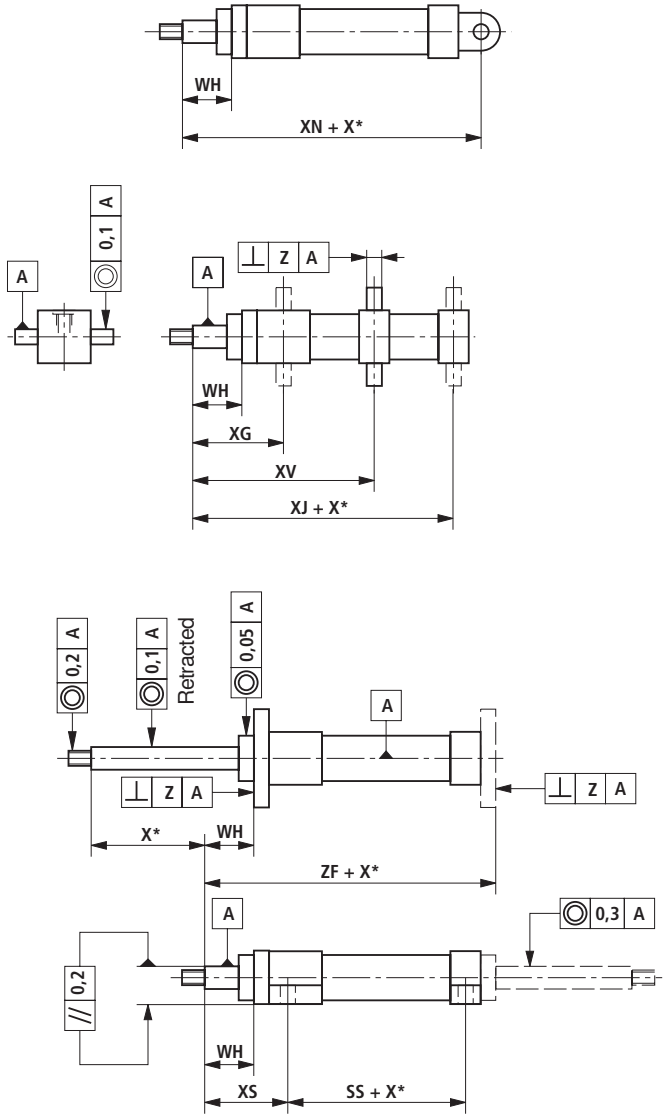
Ordering code	Stop tube extension in mm for all piston Ø							
	–	25	50	75	100	125	150	175
Type of mounting	**Stroke length in mm**							
B, G, S	Up to 500	501 to 625	626 to 750	751 to 875	876 to 1000	1001 to 1125	1126 to 1250	1251to 3000
C, F, H, L	Up to 1425	1426 to 1785	1786 to 2150	2151 to 2500	2501 to 2860	2861 to 3000	–	–
D, E, K, Q	Up to 665	666 to 835	836 to 1000	1001 to 1165	1166 to 1335	1336 to 1500	1501 to 1665	1666 to 3000
R	Up to 1000	1001 to 1250	1251 to 1500	1501 to 1750	1751 to 2000	2001 to 2250	2251 to 2500	2501 to 3000
M, N, P, T	Up to 1425	1426 to 1785	1786 to 2150	2151 to 2500	2501 to 2860	2861 to 3000	–	–

Installation length of cylinder with stop tube extension:

Installation length according to unit dimensions + stop tube extension

(The trunnion position of type of mounting E and R remains unchanged.)

Installation lengths and position tolerances

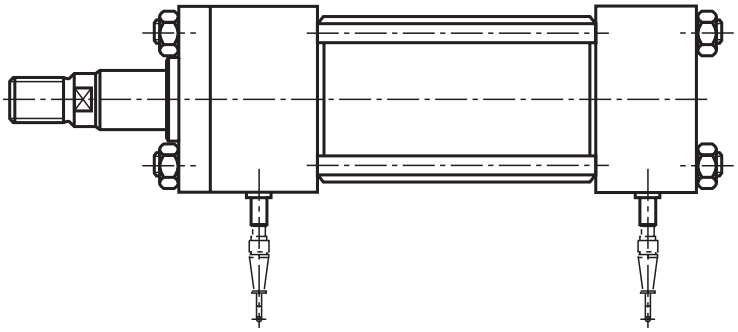


Stroke length in mm	Up to 1250	1251 to 2000	2001 to 3000
Stroke tolerance in mm	**+1**	**+1**	**+1**
	–1.5	**–2**	**–3**
WH	±2	±2	+3
			–2
ZF	±1	±1.5	±2
XS	±2	±2	+3
			–2
SS	±1.25	+1.5	+1.5
		–2	–3
XG	±2	±2	+3
			–2
XV	±2	±2	±2
XJ	±2	±2	±2
XN	±1.25	±2	±2
Z	0.1 / 100		

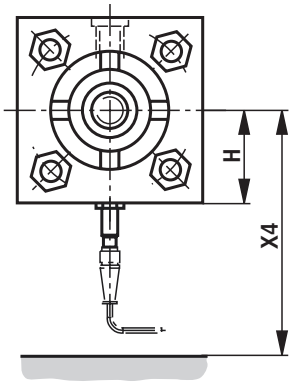
Always specify dimension “XV” in clear text on the order (observe XV_{min} and XV_{max})

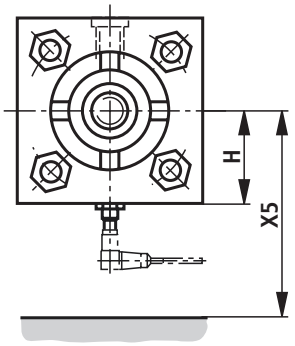
X* = stroke length

Inductive proximity switch (please state in clear text on the order, dimensions in mm)

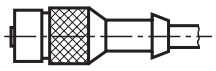


Types of mounting

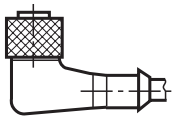




Mating connector with 5 m cable
Material no. **R900026512**
(Mating connector is **not** included in the scope of supply, but must be ordered separately)



Mating connector, angled with 5 m cable (Position of cable outlet cannot be defined)
Material no. **R900021404**
(Mating connector is **not** included in the scope of supply, but must be ordered separately)



Piston Ø	Piston rod Ø	H	X4	X5
40	**16**	42.5	172	127
	18			
	25			
50	**22**	42.5	175	130
	25			
	36	48		
63	**25**	44.5	180	135
	28			
	36	53		
	45			
80	**36**	57	185	140
	45	60		
	56			

Piston Ø	Piston rod Ø	H	X4	X5
100	**45**	63.5	195	150
	50			
	70	67.5		
125	**50**	82.5	205	160
	56			
	63			
	90			
150	**63**	85	230	185
	70			
	80			
	100			
180	**80**	108	235	190
	90			
	125			
200	**90**	120.5	245	200
	100			
	140			

Notes:

- Installation position: 180° opposite to the line connections
- Pipe connection: For enlarged line connections, please consult us
- Type of mounting: With mounting types F, L, M, N and T, the installation 180° opposite to the line connection is impossible
- For mounting types and unit dimensions, see pages 8 to 61

Proximity switch

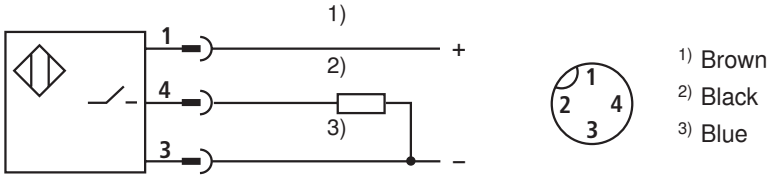
Inductive proximity switches are used for reliably checking the end positions of hydraulic cylinders. They are an important component for reliably and precisely monitoring safety equipment, locking mechanisms and/or other machine functions in their end position by issuing corresponding signals.

The proximity switch, which is high pressure-tight up to 500 bar, operates contact-free and floating. For this reason, it is wear-free. For safety reasons, the proximity switch is protected against being screwed in too deeply. The switching distance can therefore not be adjusted. Cylinder variants with proximity switch (option 1 “E“) are fitted with proximity switches on both sides.

Technical data (for applications outside these parameters, please consult us!)

Operating principle			PNP normally open
Permissible pressure		bar	500
Operating voltage		V DC	10 to 30
Including residual ripple content		%	≤ 15
Voltage drop		V	≤ 1.5
Rated operating voltage		V DC	24
Rated operating current		mA	200
No-load current		mA	≤ 8
Residual current		µA	≤ 10
Repeatability		%	≤ 5
Hysteresis		%	≤ 15
Ambient temperature range		°C	–25 to +80
Thermal drift		%	≤ 10
Switching frequency		Hz	1000
Type of protection to	Active area		IP 68
DIN EN 60529	Proximity switch		IP 67
Housing material			Material no. 1.4104

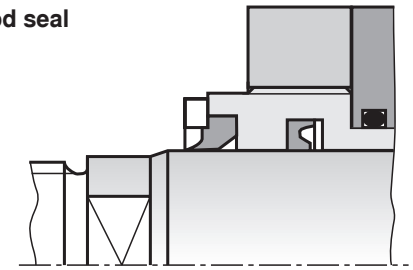
Pinout

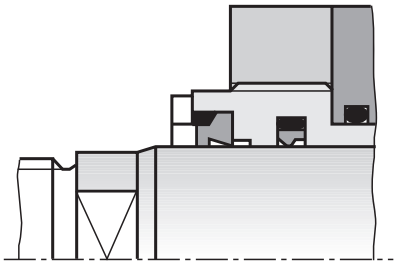


1) Brown
2) Black
3) Blue

Seals (standard versions)

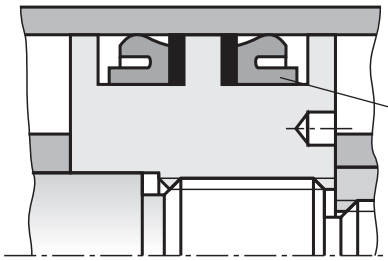
Piston rod seal





Variant for piston rod Ø 50,
63 and 80 mm

Piston seal

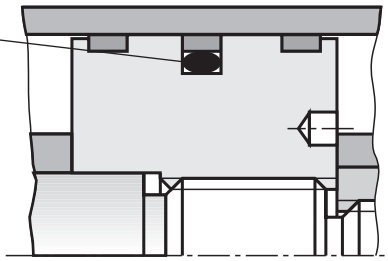


Version "T"

Slide ring for low-friction operation

Version "A"

Lip seal rings for leak-free operation under steady-state conditions



End position cushioning

End position cushioning at cylinder cap

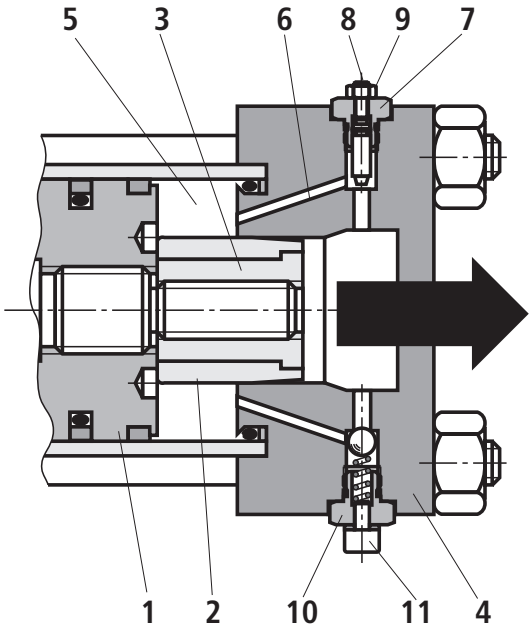
Piston (1) is screwed directly to the piston rod, cushioning bush (2) by means of threaded bushing (3).

As the tapered cushioning bush retracts into the bore of cylinder cap (4) the cross-section for the fluid flowing out of piston chamber (5) reduces until it becomes zero. The fluid can then only flow out of piston chamber (5) through bore (6) and adjustable throttle valve (7). The cushioning effect can be regulated on throttle valve (7). The smaller the flow cross-section, the greater the effect of end position cushioning.

Adjustable throttle valve for end position cushioning

The design of the throttle valve prevents throttling pin (8) from being turned out completely when end position cushioning is adjusted.

The setting made for end position cushioning is secured by locknut (9).



Check valve with bleed screw

Check valve (10) serves as extension aid from the end position. It by-passes the throttling point while the cylinder is extending.

The cylinder is bled via bleed screw (11).

This bleed screw is provided as standard on cylinders without end position cushioning.

Throttle valve and check valve are designed as installation kits and can be interchanged.

Calculation of braking force

End position cushioning must ensure a controlled deceleration (braking) of the stroke velocity in both end positions.

The total of the effective energies must not exceed the maximum work capacity of cushioning.

The energy to be decelerated is converted into heat in the cushioning zone, which operates according to the principle of fluid flow throttling.

Calculation of braking force

The braking force of a horizontally installed hydraulic cylinder can be calculated as follows:

Extension movement:

$$F_B = m \cdot a + A_K \cdot p$$

Retraction movement

$$F_B = m \cdot a + A_R \cdot p$$

F_B = braking force in N
m = moved mass in kg
a = deceleration in m/s²

$$a = \frac{v^2}{2 \cdot s}$$

v = stroke velocity in m/s
s = cushioning length in m
A_K = piston area in cm²
A_R = annulus area in cm²
p = system pressure in N/cm²

1 bar ~ 10 N/cm²

For vertical strokes of the cylinders, the weight force (consisting of external load, piston and piston rod) must be added to or subtracted from braking force F_B depending on the direction of movement.

The cylinder's internal friction is neglected in this calculation.

Calculation of the average cushioning pressure

Under normal operating conditions, the cushioning pressure must not exceed the nominal pressure of the cylinder.

$$p_D = \frac{F_B}{A_D}$$

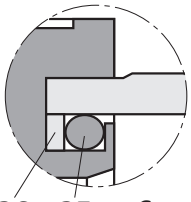
p_D = average cushioning pressure in N/cm²
F_B = braking force in N
A_D = effective cushioning area in cm²

1 bar ~ 10 N/cm²

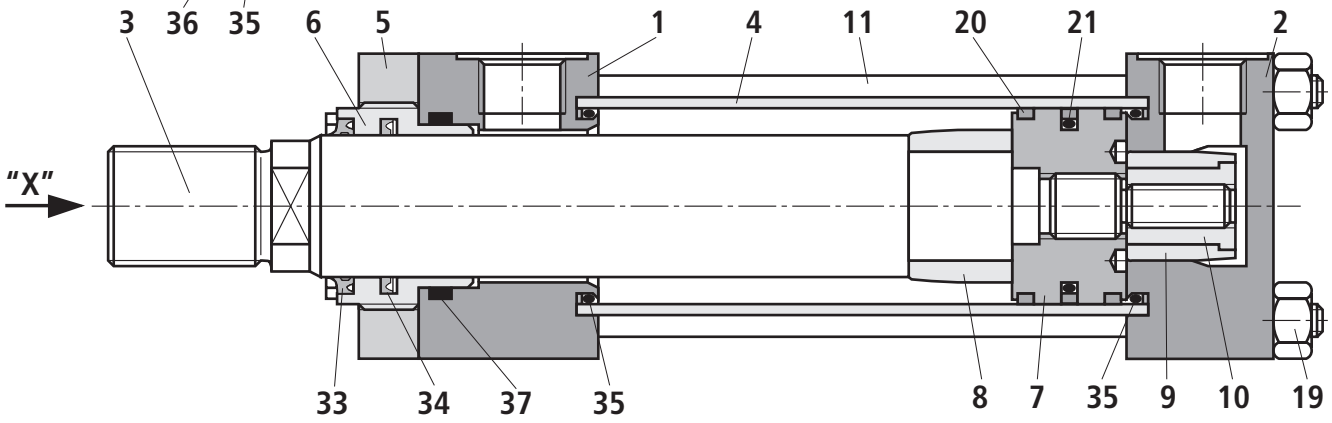
If this calculation results in too high a value, the cushioning length must be extended or the system pressure reduced.

Spare parts drawing

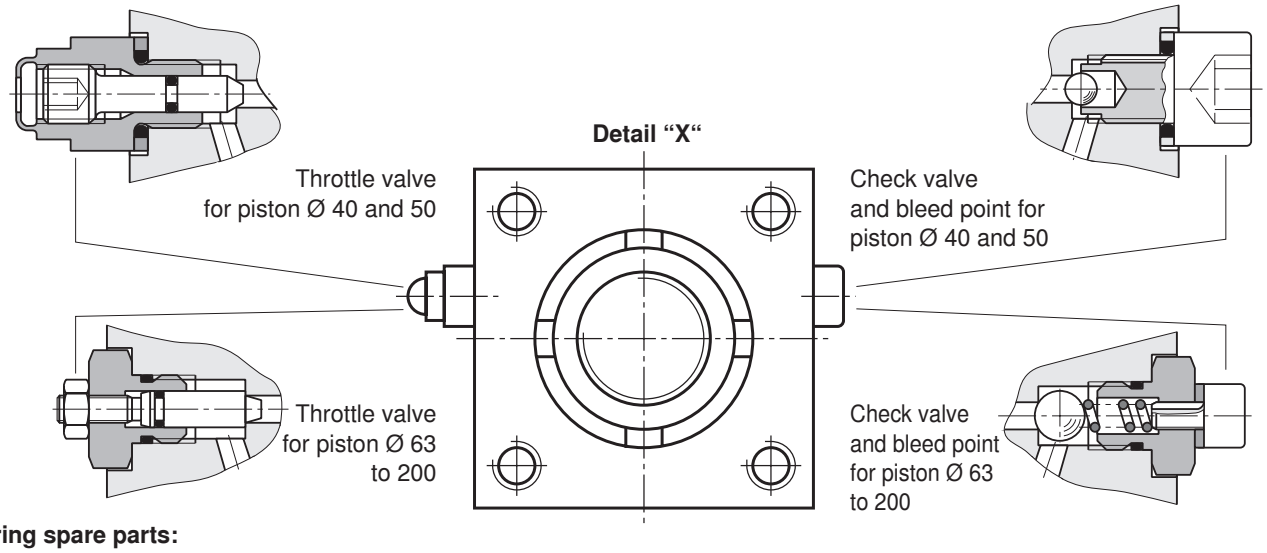
Variant for piston Ø 40 to 200



1 Head
2 Cap
3 Piston rod
4 Cylinder barrel
5 Flange
6 Guide bush
7 Piston
8 Cushioning bush
9 Cushioning bush
10 Threaded bushing
11 Tie rod
19 Nut
20 Guide band
21 Piston seal (variant "T")
33 Wiper
34 Piston rod seal
35 Seal ring
36 Back-up ring
37 Seal ring



Throttle and check valve in cylinder head and cylinder cap



Ordering spare parts:

- When ordering individual parts, please indicate the designation and item no. from the spare parts drawing with complete type code of the hydraulic cylinder
- For seal kits, please indicate the complete type code of the hydraulic cylinder.

Rexroth
Bosch Group

Hydraulic cylinders
Tie rod design

RE 17049/07.17 1/70
Replaces: 11.16

Series CDT3…Z; CGT3…Z; CST3…Z

Component series 3X
Nominal pressure 160 bar (16 MPa)

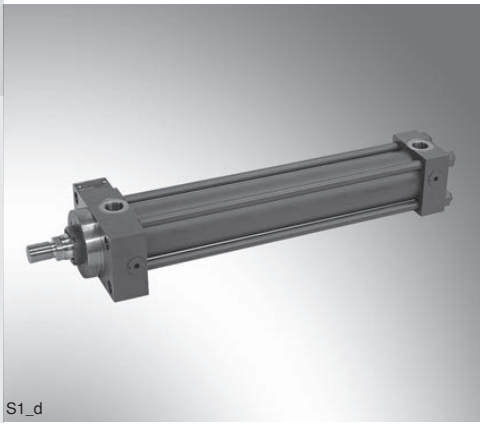

S1_d

Table of contents

Features

- Installation dimensions according to ISO 6020-2 and NF/ISO 6020-2
- 13 types of mounting
- Piston Ø **(ØAL)**: 25 to 200 mm
- Piston rod Ø **(ØMM)**: 12 to 140 mm
- Stroke lengths up to 3000 mm
- Integrated guide socket for fast and easy maintenance
- Self-adjusting or adjustable end position cushioning as option
- Patented safety vent for easy and safe bleeding
- Easy assembly thanks to freely selectable position of the line connections at head and base

Technical data (For applications outside these parameters, please consult us!)

Nominal pressure: 160 bar (16 MPa)
Maximum operating pressure (only static load)**:** 210 bar (21 MPa)
Static test pressure: 240 bar (24 MPa)
For admissible pressures, please refer to the table on page 6.

Cylinders of this series are designed for a nominal pressure of 160 bar and in version CD for a maximum operating pressure of 210 bar with static load.

(Static load: less than 10,000 load cycles over the entire life cycle)

The admissible dynamic operating pressure amounts to 160 bar.

The maximum operating pressures must be less than or equal to the applicable nominal pressures and apply to applications with shock-free operation with reference to excess pressure and/or external loads. With extreme loads like e.g. high sequence cycle, mounting elements and threaded piston rod connections must be designed for durability.

Minimum pressure:
Depending on the application, application conditions and technical design, a certain minimum pressure (approx. 10 bar) is required in order to guarantee technically unobjectionable functioning of the hydraulic cylinder.

Installation position: any

Hydraulic fluid (amending data sheet):
Mineral oils DIN 51524 HL, HLP (R. 90220)
Oil-in-water emulsion HFA (R. 90223)
Water glycol HFC (R. 90223)
Phosphate ester HFD-R (R. 90222)

Hydraulic fluid temperature range: see page 63

Ambient temperature range: see page 63

Perfect viscosity range: 20 to 100 mm^2/s

Minimum admissible viscosity: 2.8 mm^2/s

Maximum admissible viscosity: 380 mm^2/s

Cleanliness class acc. to ISO
Maximum admissible degree of contamination of the hydraulic fluid according to ISO 4406 (c) class 20/18/15.
The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.

Bleeding: By default

Color set-up:
Priming: By default, hydraulic cylinders are primed with a coating (color gentian blue RAL 5010) of min. 40 µm, see page 70.

Other colors upon request.

With cylinders and attachment parts, the following surfaces are not primed:

- All fit diameters to the customer side
- Sealing surfaces for line connection
- Sealing surfaces for flange connection
- Connection surface for valve mounting
- Inductive proximity switches
- Position measurement system
- Measuring coupling
- Spherical / plain bearings
- Lubricating nipples

Painting: By default, hydraulic cylinders can be ordered in the CP4 corrosivity category in the RAL colors, see page 70.

With cylinders and attachment parts, the following surfaces are not primed:

- All fit diameters and connection surfaces to the customer side
- Sealing surfaces for line connection
- Sealing surfaces for flange connection
- Connection surface for valve mounting
- Inductive proximity switches
- Position measurement system
- Measuring coupling
- Spherical / plain bearings
- Lubricating nipples

The areas that are not primed or painted are protected by means of a solvent-free corrosion protection agent.

Accessories that are ordered as separate order item are not primed or painted by default.

Corresponding priming and/or painting on request.

Technical data (For applications outside these parameters, please consult us!)

Boundary and application conditions:

- The mechanical alignment of the movement axis and thus the mounting points of hydraulic cylinder and piston rod must be ensured. Lateral forces on the guides of piston rod and piston are to be avoided. It may be necessary to consider the own weight of the hydraulic cylinder (MP1, MP3, MP5, MT1, MT2 or MT4) or the piston rod.
- The bending length/bending load of the piston rod and/or the hydraulic cylinder must be observed (see page topic Kinking).
- The maximum admissible stroke velocities with regard to the suitability/load of seals must be observed as must their compatibility with the properties of the hydraulic fluid (see page topic Seals).
- The maximum admissible velocities/kinetic energies when moving into the end positions, also considering external loads, must be observed.
  Danger: Excess pressure
- The maximum admissible operating pressure must be complied with in any operating state of the hydraulic cylinder. Possible pressure intensification resulting from the area ratio of annulus area to piston area and possible throttling points are to be observed.
- Detrimental environmental influences, like e. g. aggressive finest particles, vapors, high temperatures, etc. as well as contamination and deterioration of the hydraulic fluid are to be avoided.

Notice: This list does not claim to be complete. In case of questions regarding the compatibility with the medium or exceedance of the boundary or application conditions, please contact us.

Acceptance:
Each cylinder is tested according to Bosch Rexroth standard and in compliance with ISO 10100: 2001.

Safety instructions:
For assembly, commissioning and maintenance of hydraulic cylinders, observe the operating instructions data sheet 07100-B!
Service and repair work has to be performed by Bosch Rexroth or by personnel especially trained for this purpose. No warranty is accepted for damage as a consequence of assembly, maintenance or repair works not performed by Bosch Rexroth.

Check lists for hydraulic cylinders:
Cylinders the characteristics and/or application parameters of which deviate from the values specified in the data sheet can only be offered as a special version upon request. For offers, the variations of the characteristics and/or application parameters must be described in the check lists for hydraulic cylinders (data sheet 07200).

Double-acting cylinder with continuous piston rod:
With this design type, the friction is considerably higher than with the "CD version" with simple piston rod.

Stroke tolerances:
According to ISO 6020-2, a stroke tolerance of +2 mm is admissible for strokes up to 1250 mm; the stroke tolerance for cylinder strokes over 1250 mm to 3000 mm is +5 mm.

A tolerance of ±0.3 mm is possible as option, smaller tolerances are not reasonable for tie rod cylinders.

Minimum strokes:
For the "MT4" mounting, the minimum stroke is to be observed due to the trunnion width, see pages 18 and 38.

When using end position cushioning, the minimum stroke must also be observed, see page 58 "End position cushioning".

With CST3 with and without subplate, please observe the minimum stroke, see page 32 to 40.

Support width extension and tie rod support are possible upon request.

Line connections:
The cylinders of series CDT3/CGT3 are supplied with pipe thread or enlarged pipe thread according to ISO 1179-1 or metric ISO thread according to ISO 6149-1.

The cylinders of series CST3 are supplied with pipe thread according to ISO 1179-1 or with subplate.

Technical data (For applications outside these parameters, please consult us!)

Stroke velocity:
See information on stroke length and stroke velocity, higher stroke velocity on request.
If the extension velocity is considerably higher than the retraction velocity of the piston rod, drag-out losses of the medium may result. If necessary, please consult us.

Piston Ø **ØAL** mm	Piston rod Ø **ØMM** mm	Line connection **"B / R"** **EE**	Max. stroke velocity in m/s	Line connection **"S"** **EE**	Max. stroke velocity in m/s
25	**12**	G 1/4	0.60	G 3/8	0.90
	14		0.60		1.00
	18		0.90		1.40
32	**14**	G 1/4	0.40	G 3/8	0.50
	18		0.40		0.60
	22		0.50		0.80
40	**18**	G 3/8	0.40	G 1/2	0.80
	22		0.40		0.90
	28		0.50		1.20
50	**22**	G 1/2	0.50	G 3/4	0.70
	28		0.60		0.80
	36		0.80		1.10
63	**28**	G 1/2	0.30	G 3/4	0.50
	36		0.40		0.50
	45		0.50		0.70
80	**36**	G 3/4	0.30	G 1	0.50
	45		0.30		0.50
	56		0.40		0.70
100	**45**	G 3/4	0.20	G 1	0.30
	56		0.20		0.40
	70		0.30		0.50
125	**56**	G 1	0.20	G 1 1/4	0.30
	70		0.20		0.40
	90		0.30		0.50
160	**70**	G 1	0.20	G 1 1/4	0.20
	90		0.20		0.20
	110		0.20		0.30
200	**90**	G 1 1/4	0.20	G 1 1/2	0.20
	110		0.20		0.20
	140		0.20		0.20

Information on stroke length and stroke velocity

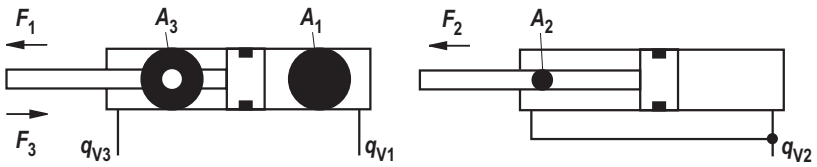
ØAL (mm)		25	32	40	50	63	80	100	125	160	200
min **recommended** stroke in mm	without damping	–	–	–	–	–	–	–	–	–	–
	with damping	30	32	46	44	50	54	56	66	72	80
maximum velocity (m/s)	Seal design M; 160 bar	0.50				0.40		0.30		0.25	
	Seal design M; 100 bar	0.70				0.60		0.40		0.35	
	Seal design T, S; 160 bar	1.00				0.80		0.60		0.50	
recommended minimum velocity (mm/s)	Seal design M	30									
	Seal design T, S	1									

Project planning software ICS (Interactive Catalog System)

The ICS (Interactive Catalog System) is a selection and project planning aid for hydraulic cylinders. The ICS allows designers for machines and systems to quickly and reliably find the perfect hydraulic cylinder solution through logic-guided type key enquiries. This software helps to solve design and project planning tasks more quickly and efficiently. After having been guided through the product selection, the user quickly and reliably gets the exact technical data of the selected component as well as 2D and 3D CAD data in the correct file format for all common CAD systems.
This allows users to reduce costs while increasing their competitiveness.

Areas, forces, flow: Series CDT3 (for operating pressure up to 210 bar)

Piston	Piston rod		Area ratio	Areas			Force [1]						Flow at 0.1 m/s [2]			Max. available stroke length (mm)[5]
				Piston	Rod	Ring	Pressure		Diff.		Pulling		Off	Diff.	On	
ØAL mm	**ØMM** mm		φ A_1/A_3	A_1 cm²	A_2 cm²	A_3 cm²	F_1 kN		F_2 kN		F_3 kN		q_{V1} l/min	q_{V2} l/min	q_{V3} l/min	
	160 bar	210 bar					160 bar	210 bar	160 bar	210 bar	160 bar	210 bar				
25	**12** **18**	**-** **18**	1.3 2.07	4.91	1.13 2.54	3.78 2.37	7.86	- 10.31	1.81 4.06	- 5.33	6.05 3.79	- 4.98	2.9	0.70 1.50	2.30 1.40	600
32	**14** **22**	**-** **22**	1.25 1.90	8.04	1.54 3.80	6.5 4.24	12.86	- 16.88	2.46 6.08	- 7.98	10.40 6.78	- 8.90	4.8	0.90 2.30	3.90 2.50	800
40	**18** **22** [3] **28**	**-** **22** [3] **28**	1.25 1.43 1.96	12.56	2.54 3.80 6.16	10.02 8.76 6.4	20.10	- 26.38	4.06 6.08 9.86	- 7.98 12.94	16.03 14.02 10.24	- 18.40 13.44	7.5	1.50 2.30 3.70	6.00 5.30 3.80	1000
50	**22** **28** [3] **36**	**-** **28** [3] **36**	1.25 1.46 2.08	19.63	3.8 6.16 10.18	15.83 13.47 9.45	31.41	- 41.22	6.08 9.86 16.29	- 12.94 21.38	25.33 21.55 15.12	- 28.29 19.85	11.8	2.30 3.70 6.10	9.50 8.10 5.70	1200
63	**28** **36** [3] **45**	**-** **36** [3] **45**	1.25 1.48 2.04	31.17	6.16 10.18 15.90	25.01 20.99 15.27	49.87	- 65.46	9.86 16.29 25.44	12.94 21.38 33.39	40.02 33.58 24.43	- 44.08 32.07	18.7	3.70 6.10 9.50	15.00 12.60 9.20	1400
80	**36** **45** [3] **56**	**-** **45** [3] **56**	1.25 1.46 1.96	50.26	10.18 15.90 24.63	40.08 34.36 25.63	80.42	- 105.55	16.29 25.44 39.41	21.38 33.39 51.72	64.13 54.98 41.01	- 72.16 53.82	30.2	6.10 9.50 14.80	24.00 20.60 15.40	1700
100	**45** **56** [3] **70**	**-** **56** [3] **70**	1.25 1.46 1.96	78.54	15.90 24.63 38.48	62.64 53.91 40.06	125.66	- 164.93	25.44 39.41 61.57	33.39 51.72 80.81	100.22 86.26 64.10	- 113.21 84.13	47.1	9.50 14.80 23.10	37.60 32.30 24.00	2000
125	**56** **70** [3] **90**	**-** **70** [3; 4] **90** [4]	1.25 1.46 2.08	122.72	24.63 38.48 63.62	98.09 84.24 59.1	196.35	- [4]	39.41 61.57 101.79	51.72 80.81 133.60	156.94 134.78 94.56	- [4] [4]	73.6	14.80 23.10 38.20	58.90 50.50 35.50	2300
160	**70** **110**	- **110** [4]	1.25 1.90	201.06	38.48 95.03	162.58 106.03	321.70	- [4]	61.57 152.05	80.81 199.56	260.13 169.65	- [4]	120.6	23.10 57.00	97.50 63.60	2600
200	**90** **140**	- **140** [4]	1.25 1.96	314.16	63.62 153.94	250.54 160.22	502.66	- [4]	101.79 246.30	133.60 323.27	400.86 256.35	- [4]	188.5	38.20 92.40	150.30 96.10	3000



[1] Theoretical static cylinder force (without consideration of the efficiency and admissible load for attachment parts like e.g. swivel heads, plates or valves, etc.)

[2] Stroke velocity

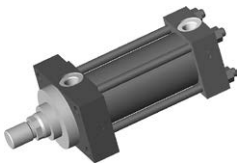
[3] Piston rod Ø not standardized

[4] With operating pressures up to 210 bar only on request

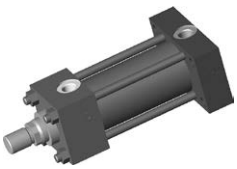
[5] Larger stroke lengths upon request

Overview types of mounting: Series CDT3 (for operating pressure up to 210 bar)

CDT3 ME5 (ISO/DIN/NF)
see page 12, 13



CDT3 ME6 (ISO/DIN/NF)
see page 12, 13

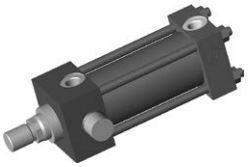


CDT3 MP5 (ISO/DIN/NF)
see page 14, 15

CDT3 MS2 (ISO/DIN/NF)
see page 16, 17

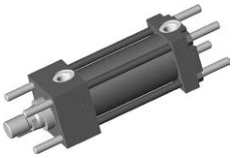
CDT3 MT4 (ISO/DIN/NF)
see page 18, 19

CDT3 MT1 (ISO/DIN/NF)
see page 20, 21



CDT3 MT2 (ISO/DIN/NF)
see page 20, 21

CDT3 MX1 (ISO/DIN/NF)
see page 22, 23



CDT3 MX2 (ISO/DIN/NF)
see page 24, 25

CDT3 MX3 (ISO/DIN/NF)
see page 24, 25

CDT3 MX5 (NF)
see page 26, 27

CDT3 MP1 (ISO/DIN/NF)
see page 28, 29

CDT3 MP3 (ISO/DIN/NF)
see page 28, 29

Ordering code: Series CDT3 (for operating pressure up to 210 bar)

The preferred cylinder designs are marked in gray.

CD	T3	/ / /	Z	3X																*

Differential cylinder = **CD**

Series = **T3**

Types of mounting DIN/ISO
- Rectangular flange at head = **ME5**
- Rectangular flange at base = **ME6**
- Self-aligning clevis at base = **MP5**
- Foot mounting = **MS2**
- Trunnion in center [1)] = **MT4**

Types of mounting ISO
- Clevis at base = **MP1**
- Swivel eye at base = **MP3**
- Trunnion at head = **MT1**
- Trunnion at base = **MT2**
- Extended tie rod, on both sides = **MX1**
- Extended tie rod, at base = **MX2**
- Extended tie rod, at head = **MX3**
- Tapped hole at head [2)] = **MX5**

Piston Ø (ØAL) 25 to 200 mm

Piston rod Ø (ØMM) 12 to 140 mm [13)]

Stroke length in mm [11)]

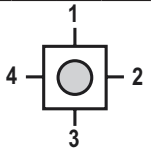
Design principle
Head and base connected to tie rod = **Z**

Component series = **3X**
30 to 39 unchanged installation and connection dimensions

Line connection/version
- Pipe thread (ISO 1179-1) = **B**
- Metric ISO thread (ISO 6149-1) [17)] = **R**
- Enlarged pipe thread (ISO 1179-1) [17)] = **S**

Line connection/position at head
see page 43

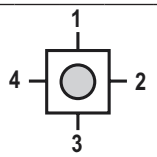
View to piston rod



= **1** = **2** = **3** = **4**

Line connection/position at base
see page 43

View to piston rod



= **1** = **2** = **3** = **4**

Piston rod design
- **H =** Hardened and hard chromium-plated

Piston rod end
see pages 12 to 29
- **H =** [14)] Thread (DIN/ISO) for swivel head CGKA
- **D =** [15)] Thread (ISO) for swivel head CGKA
- **E =** [12)] Internal thread
- **F =** [5; 14)] With mounted swivel head CGKA (DIN/ISO)
- **K =** [5; 15)] With mounted swivel head CGKA (ISO)
- **T =** [6)] With trunnion

End position cushioning
see pages 58 to 62
- **U =** Without
- **D =** Both sides, self-adjusting
- **S =** Head sides, self-adjusting
- **K =** Base sides, self-adjusting
- **E =** [4)] On both sides, adjustable

Seal design
- **M =** Standard seal system
- **T =** Reduced friction
- **S =** High temperature with reduced friction

Option 1
- **W =** Without option
- **B =** [3; 4; 16)] Leakage oil connection
- **A =** Measuring coupling, on both sides

Option 2
- **W =** Without option
- **Y =** Specify the piston rod extension LY in the plain text in mm

Color set-up
- **W =** Priming class CP3
- **B =** [18)] Painting class CP4

Oil filling
- **W =** without oil filling
- **F =** with oil filling

Test certificate
- **W =** without test certificate
- **C =** with acceptance test certificate 3.1 based on EN 10204

Further details in the plain text

Ordering code: Series CDT3 (for operating pressure up to 210 bar)

Order example:
CDT3MP5/50/36/300Z3X/B11HHDMWW

When selecting, please observe the limitations on the corresponding catalog pages!

Comments:

1) Trunnion position freely selectable; when ordering, always specify the "XV" dimension in the plain text in mm.
2) Not ISO standardized
3) With type of mounting MS2 and piston Ø 25 and end position cushioning, "E" is not possible
4) With piston Ø 25 to 100 mm: only line connection "B" possible.
With piston Ø 125 to 200 mm: only DIN types of mounting and line connection "B" possible
With type of mounting MX1 and MX2, only possible for piston Ø 40 to 200.
5) Not possible with type of mounting MX1 and MX3.
6) See page 46 (Only possible with standardized piston rod Ø 22 to 140 mm), observe the max. operating pressure.
11) Observe the max. stroke length available, page 6, and the admissible stroke length (according to kinking calculation) on pages 54 to 57
12) See page 46 (Only possible with standardized piston rod Ø 18 to 140 mm), observe the max. operating pressure.
13) Observe the admissible piston rod Ø and assigned threads at the piston rod end for 210 bar (pages 6 and 12 to 29)
14) For operating pressure up to 160 bar
15) For operating pressure up to 210 bar
16) Not possible with MT1.
17) For type of mounting ME5 and ME6, only position 1 and 3 possible
18) Specify RAL color in the plain text

Areas, forces, flow: Series CGT3 (for operating pressure up to 160 bar)

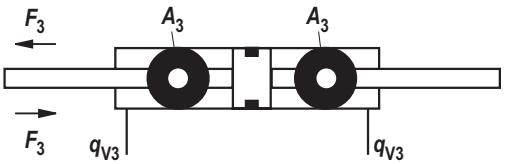
Piston **ØAL** mm	Piston rod **ØMM** mm	Areas A_3 cm^2	Force at 160 bar [1] F_3 kN	Flow at 0.1 m/s [2] q_{V3} l/min	Max. available stroke length (mm)[4]
25	**12**	3.78	6.04	2.3	600
	18	2.37	3.78	1.4	
32	**14**	6.50	10.40	3.9	800
	22	4.24	6.79	2.5	
40	**18**	10.02	16.03	6.0	1000
	22 [3]	8.77	14.02	5.3	
	28	6.40	10.25	3.8	
50	**22**	15.83	25.33	9.5	1200
	28 [3]	13.48	21.56	8.1	
	36	9.45	15.13	5.7	
63	**28**	25.01	40.02	15.0	1400
	36 [3]	20.99	33.59	12.6	
	45	15.27	24.43	9.2	
80	**36**	40.08	64.14	24.0	1700
	45 [3]	34.36	54.98	20.6	
	56	25.63	41.02	15.4	
100	**45**	62.64	100.21	37.6	2000
	56 [3]	53.91	86.26	32.3	
	70	40.06	64.09	24.0	
125	**56**	98.09	156.94	58.9	2300
	70 [3]	84.23	134.77	50.5	
	90	59.10	94.56	35.5	
160	**70**	162.58	260.12	97.5	2600
	110	106.03	169.64	63.6	
200	**90**	250.54	400.86	150.3	3000
	140	160.22	256.35	96.1	

1) Theoretical static cylinder force (without consideration of the efficiency and admissible load for attachment parts like e.g. swivel heads, plates or valves, etc.)

2) Stroke velocity

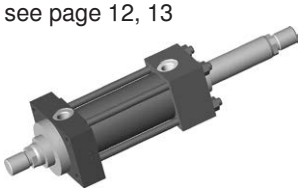
3) Piston rod Ø not standardized

4) Larger stroke lengths upon request

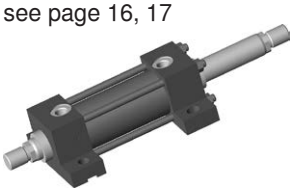


Overview types of mounting: Series CGT3 (for operating pressure up to 160 bar)

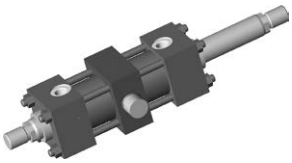
CGT3 ME5
see page 12, 13



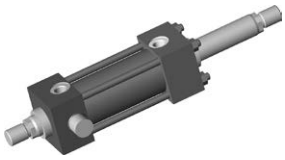
CGT3 MS2
see page 16, 17



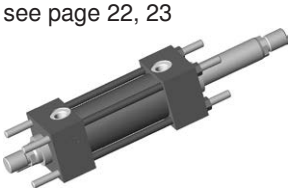
CGT3 MT4
see page 18, 19



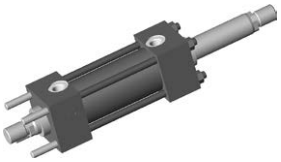
CGT3 MT1
see page 20, 21



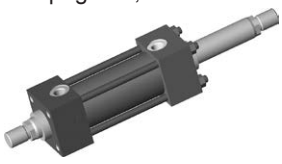
CGT3 MX1
see page 22, 23



CGT3 MX3
see page 24, 25



CGT3 MX5
see page 26, 27



Ordering code: Series CGT3 (for operating pressure up to 160 bar)

CG	T3	/	/	/	Z	3X													*

Double-acting cylinder [10] = CG

Series = T3

Types of mounting
Rectangular flange at head = ME5
Foot mounting = MS2
Trunnion in center [1] = MT4
Trunnion at head = MT1
Extended tie rod, on both sides = MX1
Extended tie rod, at head = MX3
Tapped hole at head = MX5

Piston Ø (ØAL) 25 to 200 mm

Piston rod Ø (ØMM) 12 to 140 mm

Stroke length in mm [14]

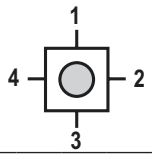
Design principle
Head and base connected to tie rod = Z

Component series = 3X
30 to 39 unchanged installation and connection dimensions

Line connection/version
Pipe thread (ISO 1179-1) = B
Metric ISO thread (ISO 6149-1) [17] = R
Enlarged pipe thread (ISO 1179-1) [17] = S

Line connection / position at head
see page 43

View to piston rod



= 1
= 2
= 3
= 4

Comments:

[1] Trunnion position freely selectable; when ordering, always specify the "XV" dimension in the plain text in mm.

[3] With type of mounting MS2 and piston Ø 25 and end position cushioning, "E" is not possible

[4] With piston Ø 25 to 100 mm: only line connection "B" possible
With piston Ø 125 to 200 mm: only DIN types of mounting and line connection "B" possible
With type of mounting MX1 and MX2, only possible for piston Ø 40 to 200

[5] Not possible with type of mounting MX1 and MX3.

[10] Not standardized

[12] See page 44 (Only possible with standardized piston rod Ø 18 to 140 mm), observe the max. operating pressure.

[14] Observe the max. stroke length available, page 8, and the admissible stroke length (according to kinking calculation) on pages 52 to 55

[16] Not possible with MT1.

[17] For type of mounting ME5 and ME6, only position 1 and 3 possible

[18] Specify RAL color in the plain text

Further details in the plain text

Test certificate
W = without test certificate
C = with acceptance test certificate 3.1 based on EN 10204

Oil filling
W = without oil filling
F = with oil filling

Color set-up
W = Priming class CP3
B = [18] Painting class CP4

Option 2
W = Without option
Y = Specify the piston rod extension LY in the plain text in mm

Option 1
W = Without option
B = [3; 4; 16] Leakage oil connection
A = Measuring coupling, on both sides

Seal design
M = Standard seal system
T = Servo quality/reduced friction
S = High temperature with reduced friction

End position cushioning
see pages 58 to 62
U = Without
D = Both sides, self-adjusting
E = [4] On both sides, adjustable

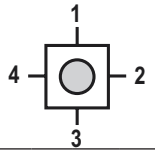
Piston rod end
see pages 12 to 29
H = Thread (DIN/ISO) for swivel head CGKA
D = Thread (ISO) for swivel head CGKA
E = [12] Internal thread
F = [5] With mounted swivel head CGKA (DIN/ISO)
K = [5] With mounted swivel head CGKA (ISO)

Piston rod design
H = Hardened and hard chromium-plated

Line connection / position at base
see page 43

View to piston rod

1 =
2 =
3 =
4 =

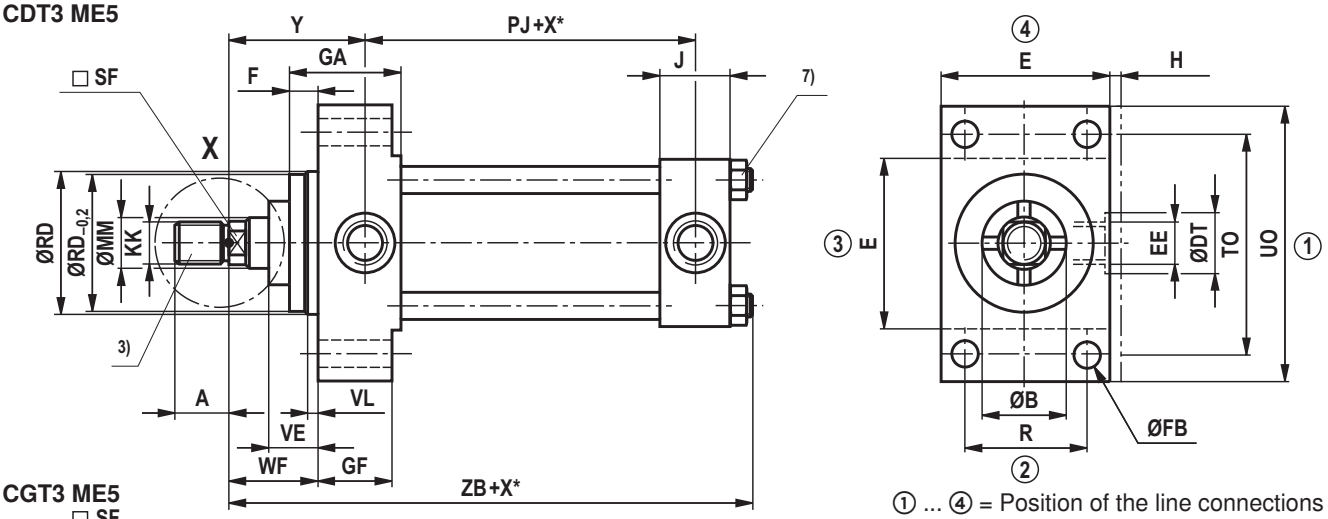


Order example:
CGT3ME5/80/56/400Z3X/B11HHDMWW

When selecting, please observe the limitations on the corresponding catalog pages!

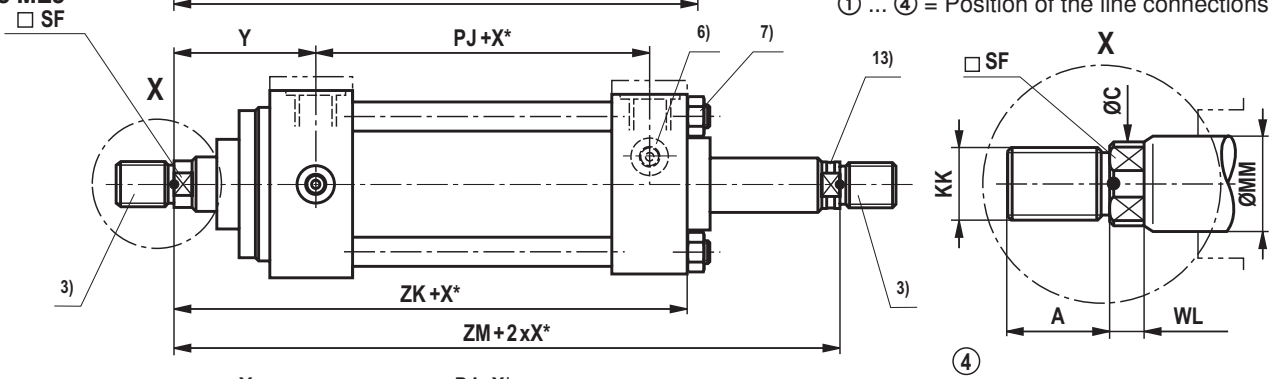
Dimensions: **Rectangular flange at head CDT3/CGT3; ME5** (dimensions in mm)
Rectangular flange at base CDT3; ME6 (dimensions in mm)

CDT3 ME5

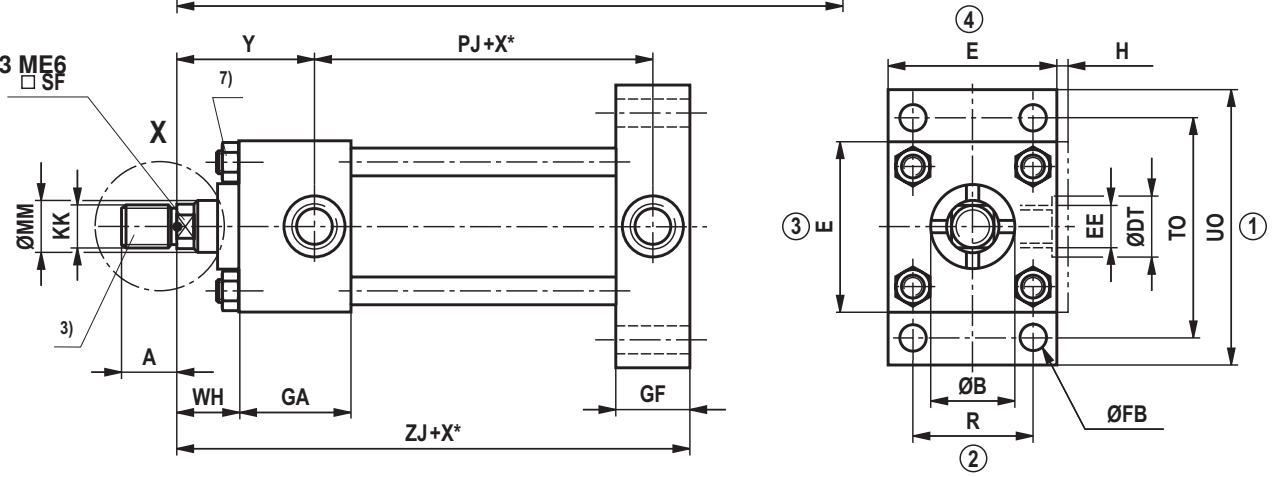


① ... ④ = Position of the line connections

CGT3 ME5



CDT3 ME6



ØAL	F max	ØFB H13	GF ME5/ME6	R JS13	TO JS13	UO max	VE max	VL min	ZB max	ZJ ± 1	ZK ± 1	ZM ± 2
25	10	5.5	25	27	51	65	16	3	121	114	138	154
32	10	6.6	25/26.5	33	58	70	22	3	137	128	151	177
40	10	11	38	41	87	110	22	3	166	153	172	196
50	16	14	38	52	105	130	25	4	176	159	183	207
63	16	14	38	65	117	145	29	4	185	168	190	223
80	20	18	45	83	149	180	29	4	212	190	216	246
100	22	18	45	97	162	200	32	5	225	203	230	265
125	22	22	58	126	208	250	32	5	260	232	254	289
160	25	26	58	155	253	300	32	5	279	245	270	302
200	25	33	76	190	300	360	32	5	336	299	329	361

Dimensions: Rectangular flange at head CDT3/CGT3; ME5 (dimensions in mm)
Rectangular flange at base CDT3; ME6 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)						
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9	ØRD f8
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24	38
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30	38
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26	42
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34	42
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30	62
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34	62
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42	62
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34	74
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42	74
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50	74
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42	75
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50	88
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60	88
80	36	M27x2	36	34	30	8	–	–	–	–	–	50	82
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60	105
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72	105
100	45	M33x2	45	43	36	10	–	–	–	–	–	60	92
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72	125
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88	125
125	56	M42x2	56	54	46	15	–	–	–	–	–	72	105
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88	150
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108	150
160	70	M48x2	63	68	60	15	–	–	–	–	–	88	125
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133	170
200	90	M64x3	85	88	75	15	–	–	–	–	–	108	150
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163	210

ØAL	E	Line connection "B"		Line connection "R"		GA	H [5]	J	PJ [10]	PJ [11]	WF	WH	Y [10]	Y [11]
		EE	ØDT	EE	ØDT	ME5/ME6			± 1.25	± 1.25	± 2	± 2	± 2	± 2
25	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	53	64.5	25	15	50	38.5
32	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	56	68.5	35	25	60	47.5
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	73	77	35	25	62	58
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	74	78	41	25	67	63
63	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	80	81	48	32	71	70
80	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	93	93	51	31	77	77
100	130 ± 2	G 3/4	42	M27x2	34	70	–	43	101	101	57	35	82	82
125	165 ± 2	G 1	47	M33x2	43	80/76	–	54	117	117	57	35	86	86
160	205 ± 2	G 1	47	M33x2	43	83	–	58	130	130	57	32	86	86
200	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	165	165	57	32	98	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

Line connection/ position	Position H	
	ME5 head	ME6 base
1	1	1
2	1	1
3	3	3
4	3	3

5) "H" dimension always in line connection position except for ME5 head and ME6 base

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

10) ME5: for line connection position "1" and "3" at head

11) ME5: for line connection position "2" and "4" at head

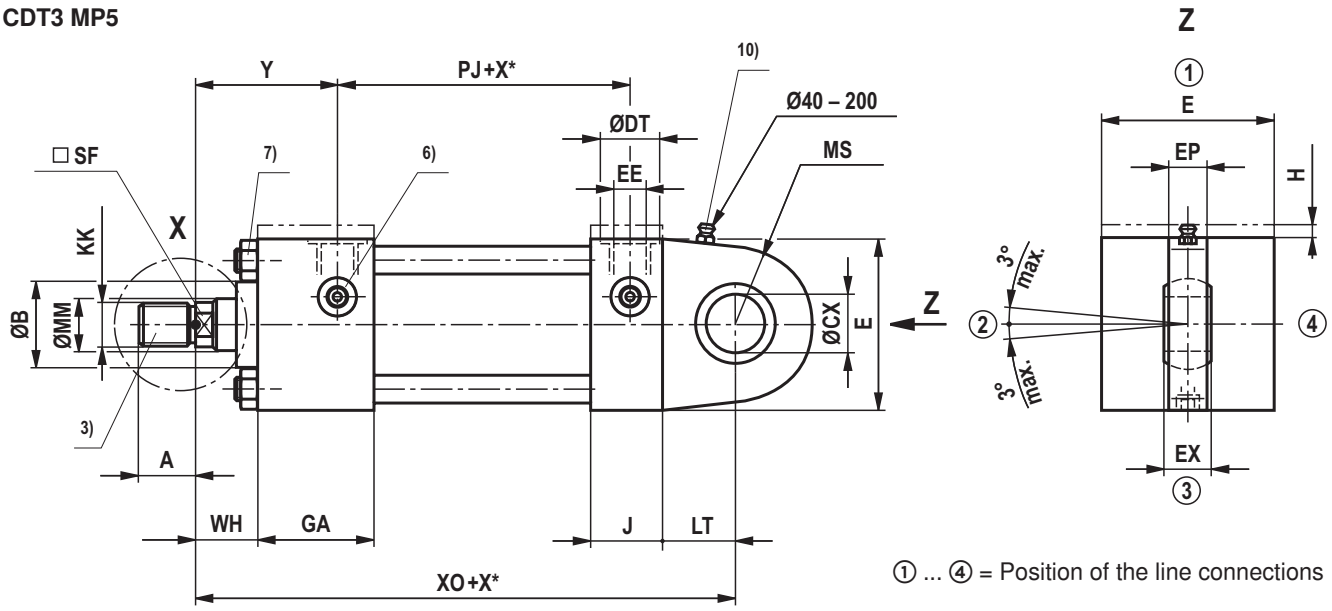
12) Piston rod Ø not standardized

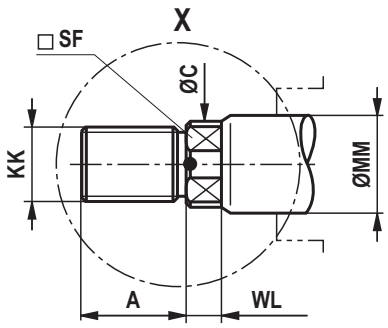
13) CG design: Piston rod marked with groove, only admissible for 50 bar tensile load

14) With operating pressures up to 210 bar only on request

Dimensions: Self-aligning clevis at base CDT3; MP5 (dimensions in mm)

CDT3 MP5





ØAL	ØCX	EP h13	EX	LT min	XO ± 1.5	MS max
25	12 – 0.008	8	10 – 0.12	16	130	20
32	16 – 0.008	11	14 – 0.12	20	148	22.5
40	20 – 0.012	13	16 – 0.12	25	178	29
50	25 – 0.012	17	20 – 0.12	31	190	33
63	30 – 0.012	19	22 – 0.12	38	206	40
80	40 – 0.012	23	28 – 0.12	48	238	50
100	50 – 0.012	30	35 – 0.12	58	261	62
125	60 – 0.015	38	44 – 0.15	72	304	80
160	80 – 0.015	47	55 – 0.15	92	337	100
200	100 – 0.020	57	70 – 0.20	116	415	120

Dimensions: Self-aligning clevis at base CDT3; MP5 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	56	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	E	Line connection "B"		Line connection "R"		GA	H [5]	J	PJ ± 1.25	WH ± 2	Y ± 2
		EE	ØDT	EE	ØDT						
25	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	53	15	50
32	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	56	25	60
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	73	25	62
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	74	25	67
63	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	80	32	71
80	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	93	31	77
100	130 ± 2	G 3/4	42	M27x2	34	70	–	43	101	35	82
125	165 ± 2	G 1	47	M33x2	43	76	–	54	117	35	86
160	205 ± 2	G 1	47	M33x2	43	83	–	58	130	32	86
200	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	165	32	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 45

7) Tightening torque see page 65

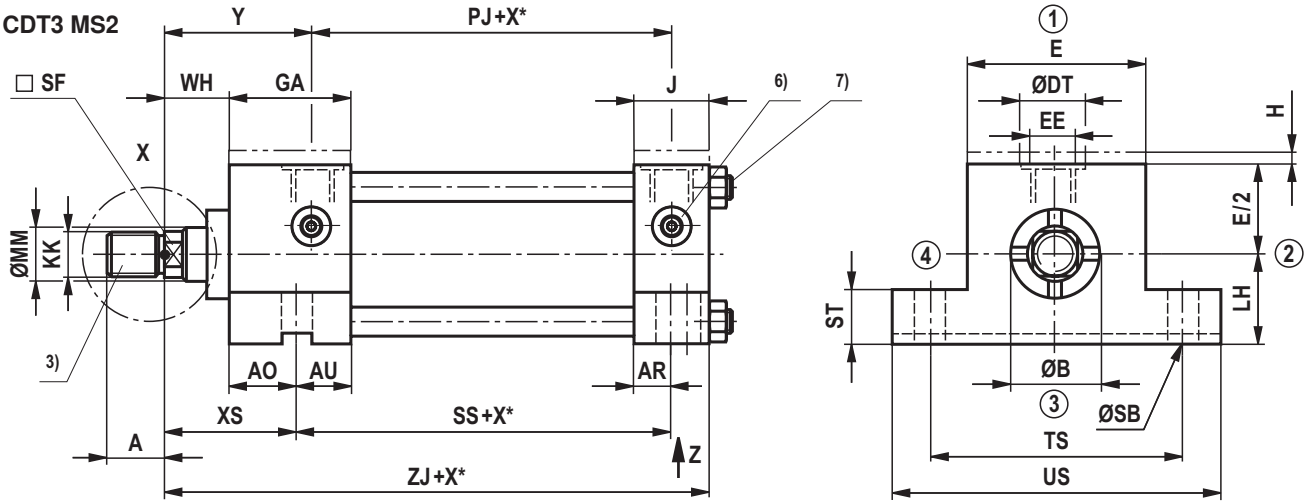
10) Lubricating nipple M6 DIN 71412 from piston Ø 40 mm

12) Piston rod Ø not standardized

14) With operating pressures up to 210 bar only on request

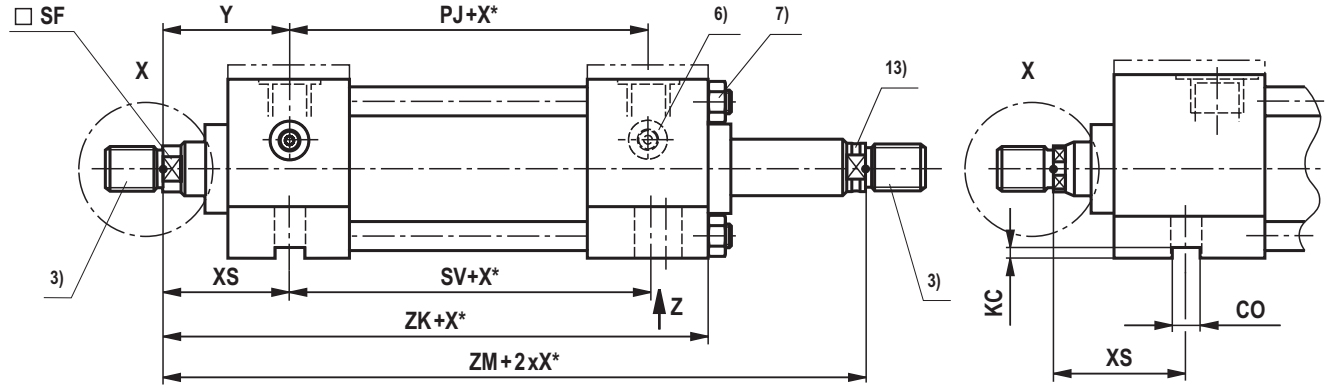
Dimensions: Foot mounting CDT3/CGT3; MS2 (dimensions in mm)

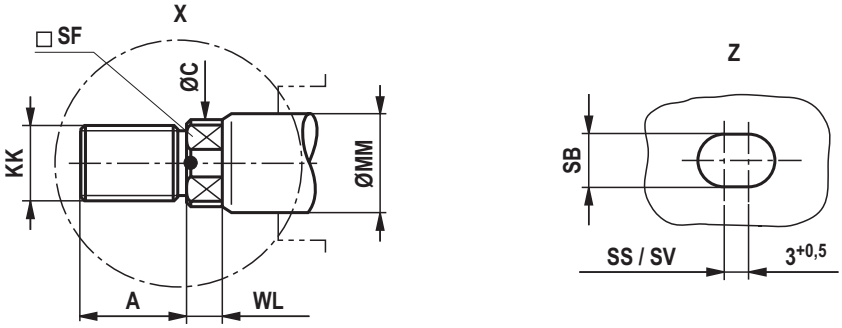
CDT3 MS2



① ... ④ = Position of the line connections

CGT3 MS2





ØAL	CO N9	KC + 0.2	LH h10	ØSB H13	SS ± 1.25	ST	SV ± 1	TS JS13	US max	XS ± 2	ZJ ± 1	ZK ± 1	ZM ± 2	AO	AU
25	12	3	19	6.6	72	8.5	87	54	72	33	114	138	154	18	28.5
32	12	4	22	9	72	12.5	87	63	84	45	128	151	177	20	28
40	12	4	31	11	97	12.5	105	83	103	45	153	172	196	20	32.5
50	12	4.5	37	14	91	19	99	102	127	54	159	183	207	29	28
63	16	4.5	44	18	85	26	92	124	161	65	168	190	223	33	24.5
80	16	5	57	18	104	26	110	149	186	68	190	216	246	39	28
100	16	6	63	26	101	32	107	172	216	79	203	230	265	44	26
125	20	5	82	26	130	32	131	210	254	79	232	254	289	44	32
160	30	8	101	33	129	38	130	260	318	86	245	270	302	54	29
200	40	8	122	39	171	44	177	311	381	92	299	329	361	60	47.5

Dimensions: Foot mounting CDT3/CGT3; MS2 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	56	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	E	Line connection "B"		Line connection "R"		GA	H [5]	J	PJ ± 1.25	WH ± 2	Y ± 2	AR
		EE	ØDT	EE	ØDT							
25	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	53	15	50	13.5
32	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	56	25	60	14
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	73	25	62	22.5
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	74	25	67	19.5
63	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	80	32	71	17.5
80	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	93	31	77	23
100	130 ± 2	G 3/4	42	M27x2	34	70	–	43	101	35	82	20
125	165 ± 2	G 1	47	M33x2	43	76	–	54	117	35	86	31
160	205 ± 2	G 1	47	M33x2	43	83	–	58	130	32	86	28
200	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	165	32	98	41.5

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

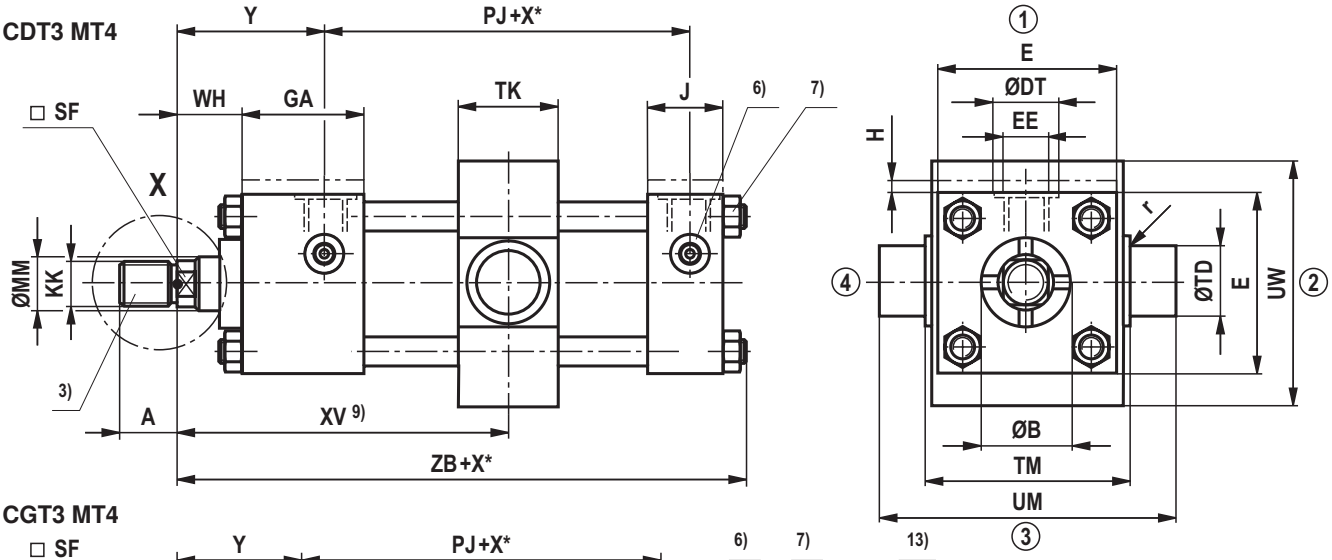
12) Piston rod Ø not standardized

13) CG design: Piston rod marked with groove, only admissible for 50 bar tensile load

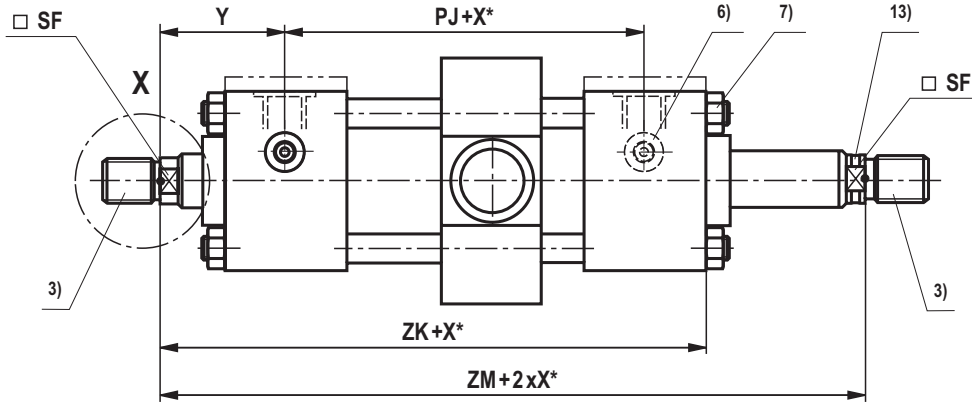
14) With operating pressures up to 210 bar only on request

Dimensions: Trunnion in center CDT3/CGT3: MT4 (dimensions in mm)

CDT3 MT4



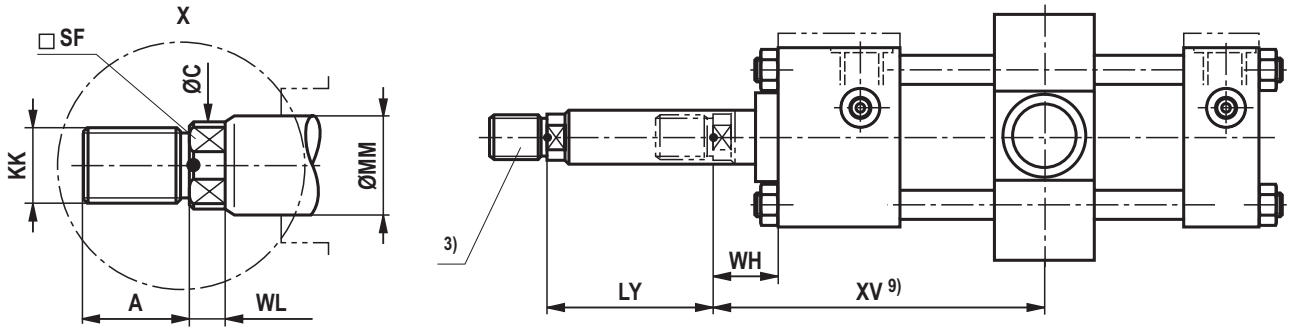
CGT3 MT4



① ... ④ = Position of the line connections

We recommend lubricating the trunnions on a regular basis.

Dimensions for cylinder with piston rod extension "LY" in retracted condition.



ØAL	r	ØTD f8	TK max	TM h14	UM h15	UW max	X* min	XV min	XV max	ZB max	ZK ± 1	ZM ± 2
25	1	12	20	48	68	43	0	74	80 + stroke	121	138	154
32	1	16	25	55	79	53	0	88	89 + stroke	137	151	177
40	1.6	20	30	76	108	74	0	95	104 + stroke	166	172	196
50	1.6	25	40	89	129	81	0	105	105 + stroke	176	183	207
63	2	32	50	100	150	97	10	117	107 + stroke	185	190	223
80	2.5	40	60	127	191	124	12	130	118 + stroke	212	216	246
100	2.5	50	70	140	220	137	18	142	124 + stroke	225	230	265
125	3.2	63	90	178	278	175	25	157	132 + stroke	260	254	289
160	3.5	80	110	215	341	212	40	171	131 + stroke	279	270	302
200	4.5	100	130	279	439	276	48	202	154 + stroke	336	329	361

Dimensions: Trunnion in center CDT3/CGT3: MT4 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	56	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	E	Line connection "B"		Line connection "R"		GA	H [5; 11]	J	PJ ± 1.25	WH ± 2	Y ± 2
		EE	ØDT	EE	ØDT						
25	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	53	15	50
32	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	56	25	60
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	73	25	62
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	74	25	67
63	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	80	32	71
80	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	93	31	77
100	130 ± 2	G 3/4	42	M27x2	34	70	–	43	101	35	82
125	165 ± 2	G 1	47	M33x2	43	76	–	54	117	35	86
160	205 ± 2	G 1	47	M33x2	43	83	–	58	130	32	86
200	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	165	32	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

9) "XV" dimension in mm, always specify in the plain text

11) Piston Ø 25 and 32 mm: dimension "H" with line connection

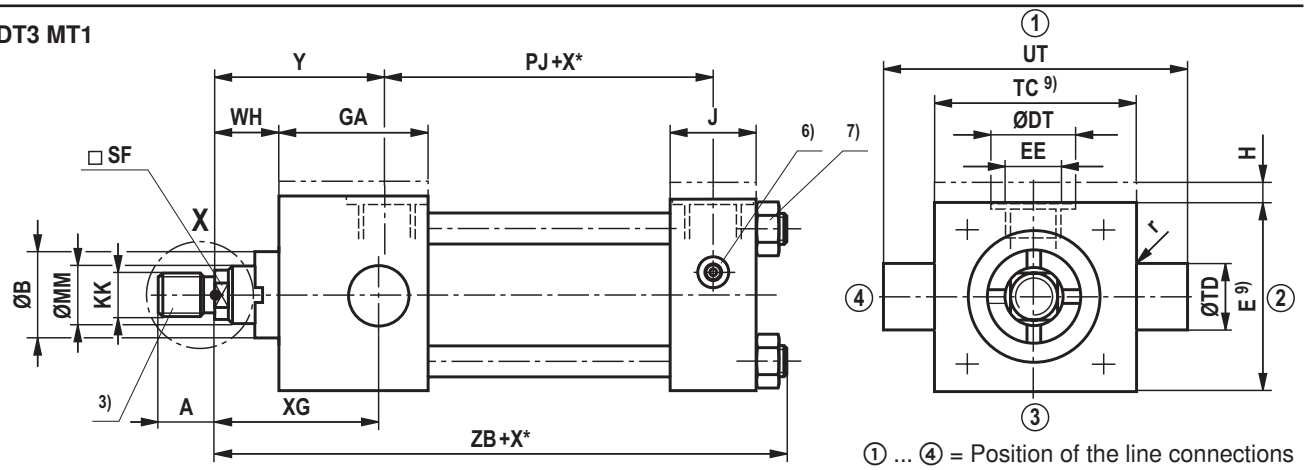
12) Piston rod Ø not standardized

13) CG version: Piston rod marked with groove, only admissible for 50 bar tensile load

14) With operating pressures up to 210 bar only on request

Dimensions: **Trunnion at head CDT3/CGT3; MT1** (dimensions in mm)
Trunnion at base CDT3; MT2 (dimensions in mm)

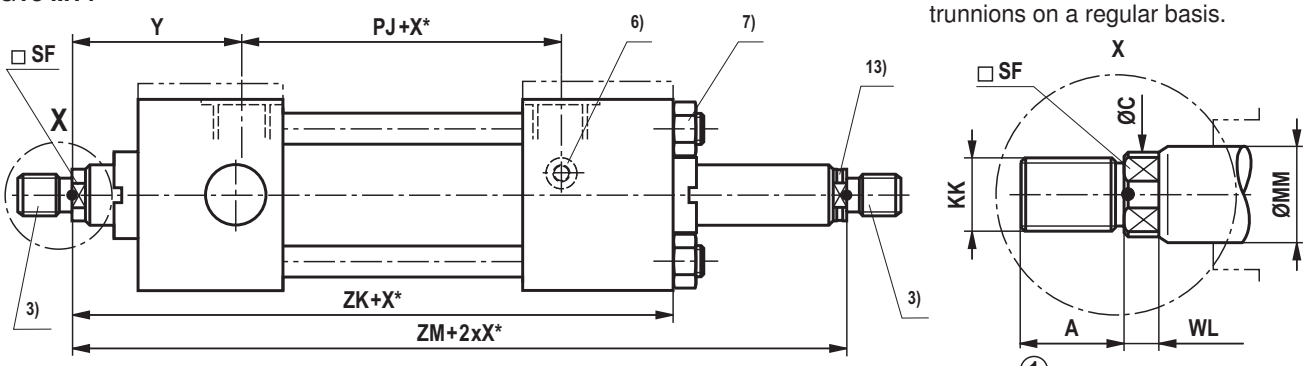
CDT3 MT1



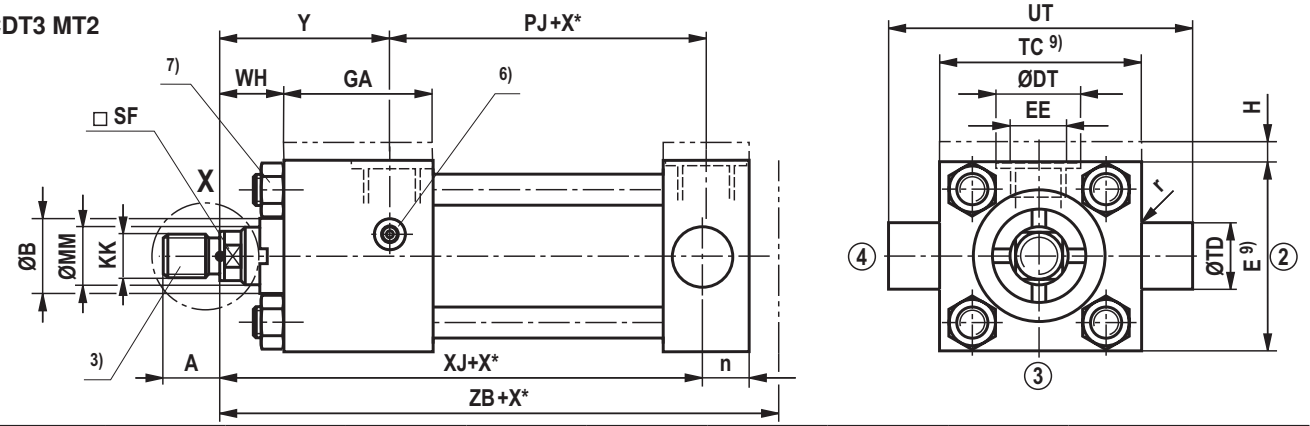
① ... ④ = Position of the line connections

CGT3 MT1

We recommend lubricating the trunnions on a regular basis.



CDT3 MT2



ØAL	n	r	TC h14	ØTD f8	UT h15	XG ± 2	XJ ± 1.25	ZB max	ZK ± 1	ZM ± 2
25	13	1	38	12	58	44	101	121	138	154
32	13	1	44	16	68	54	115	137	151	177
40	19	1.6	63	20	95	57	134	166	172	196
50	19	1.6	76	25	116	64	140	176	183	207
63	19	2	89	32	139	70	149	185	190	223
80	23	2.5	114	40	178	76	168	212	216	246
100	28	2.5	127	50	207	71	187	225	230	265
125	35	3.2	165	63	265	75	209	260	254	289
160	43	3.2	203	80	329	75	230	279	270	302
200	54.5	4.5	241	100	401	85	276	336	329	361

Dimensions: Trunnion at head CDT3/CGT3; MT1 (dimensions in mm)
Trunnion at base CDT3; MT2 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	56	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	E	Line connection "B"		Line connection "R"		GA	H [5]	J	PJ ± 1.25	WH ± 2	Y ± 2
		EE	ØDT	EE	ØDT						
25	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	53	15	50
32	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	56	25	60
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	73	25	62
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	74	25	67
63	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	80	32	71
80	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	93	31	77
100	130 ± 2	G 3/4	42	M27x2	34	70	–	43	101	35	82
125	165 ± 2	G 1	47	M33x2	43	76	–	54	117	35	86
160	205 ± 2	G 1	47	M33x2	43	83	–	58	130	32	86
200	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	165	32	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

9) With short strokes, observe "TC" and "E"

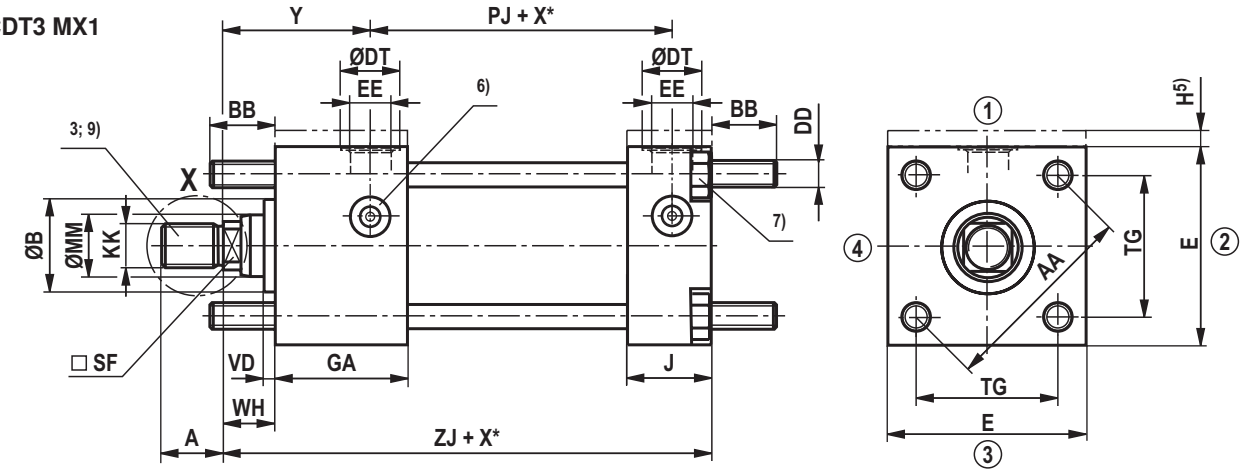
12) Piston rod Ø not standardized

13) CG version: Piston rod marked with groove, only admissible for 50 bar tensile load

14) With operating pressures up to 210 bar only on request

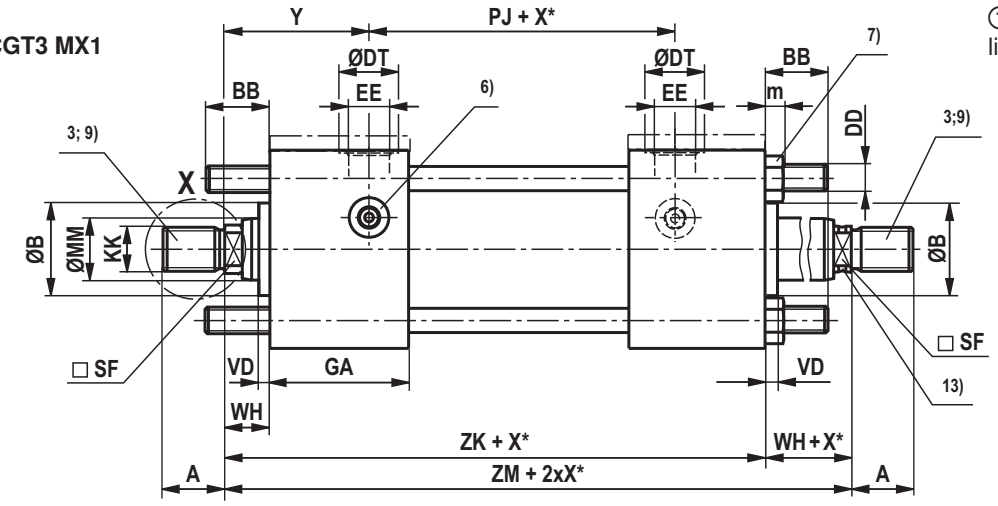
Dimensions: Extended tie rod, on both sides CDT3/CGT3; MX1 (dimensions in mm)

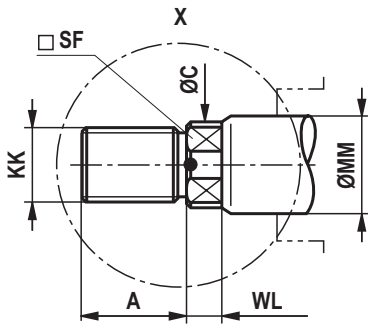
CDT3 MX1



① ... ④ = Position of the line connections

CGT3 MX1





ØAL	AA	BB [9] + 3	TG js13	VD	ZJ ± 1.25	ZK ± 1	ZM ± 2
25	40	19	28.3	6	114	138	154
32	47	24	33.2	12	128	151	177
40	59	35	41.7	12	153	172	196
50	74	46	52.3	9	159	183	207
63	91	46	64.3	13	168	190	223
80	117	59	82.7	9	190	216	246
100	137	59	96.9	10	203	230	265
125	178	81	125.9	10	232	254	289
160	219	92	154.9	7	245	270	302
200	269	115	190.2	7	299	329	361

Dimensions: Extended tie rod, on both sides CDT3/CGT3; MX1 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	54	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	DD	E	Line connection "B"		Line connection "R"		GA	H [5]	J	m	PJ ± 1.25	WH ± 2	Y ± 2
			EE	ØDT	EE	ØDT							
25	M5x0.8	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	4	53	15	50
32	M6x1	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	5	56	25	60
40	M8x1	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	6.5	73	25	62
50	M12x1.25	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	10	74	25	67
63	M12x1.25	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	10	80	32	71
80	M16x1.5	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	13	93	31	77
100	M16x1.5	130 ± 2	G 3/4	42	M27x2	34	70	–	43	13	101	35	82
125	M22x1.5	165 ± 2	G 1	47	M33x2	43	76	–	54	18	117	35	86
160	M27x2	205 ± 2	G 1	47	M33x2	43	83	–	58	22	130	32	86
200	M30x2	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	24	165	32	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

9) Observe the "BB" dimension for the swivel head assembly

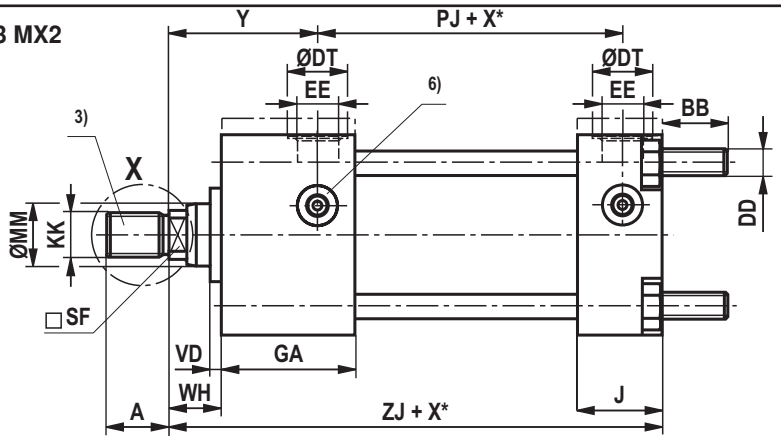
12) Piston rod Ø not standardized

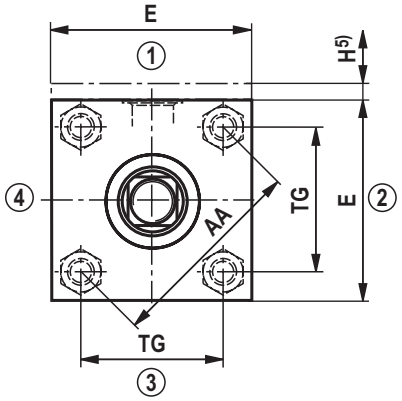
13) CG version: Piston rod marked with groove, only admissible for 50 bar tensile load

14) With operating pressures up to 210 bar only on request

Dimensions: **Extended tie rod at base CDT3; MX2** (dimensions in mm)
Extended tie rod at head CDT3/CGT3; MX3 (dimensions in mm)

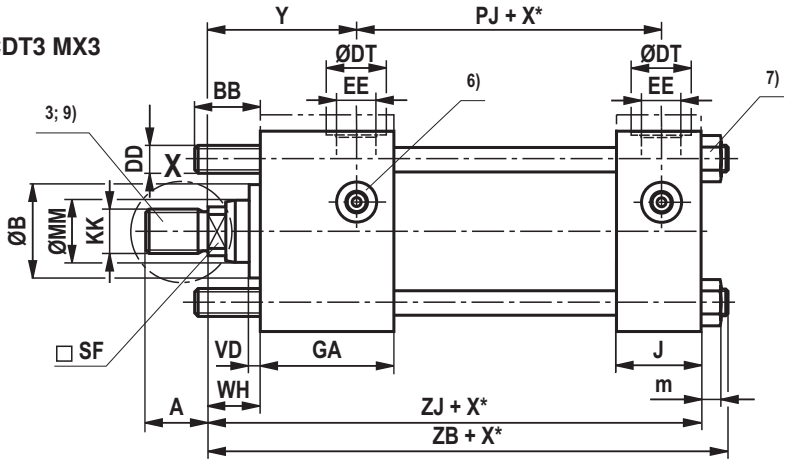
CDT3 MX2

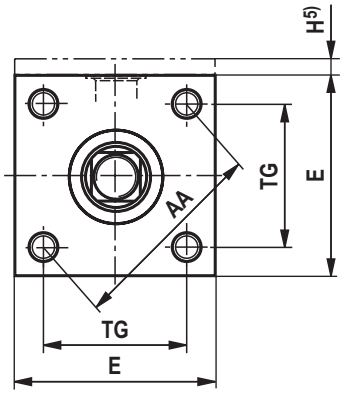




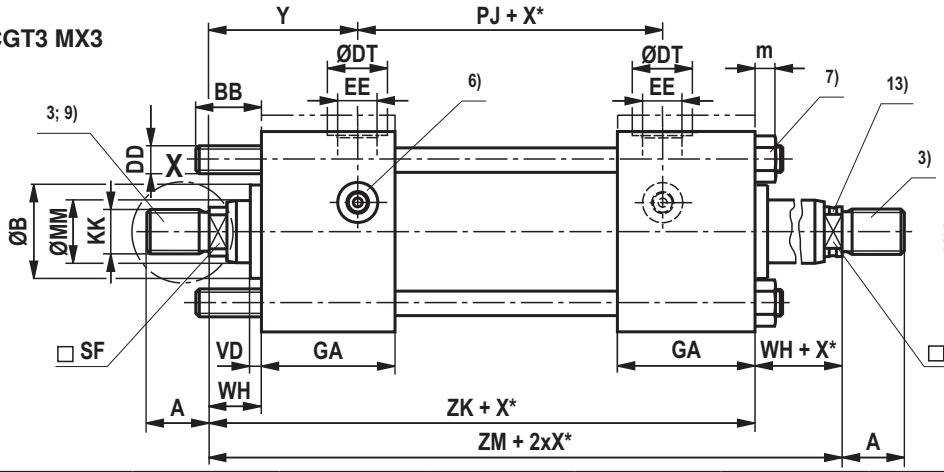
① ... ④ = Position of the line connections

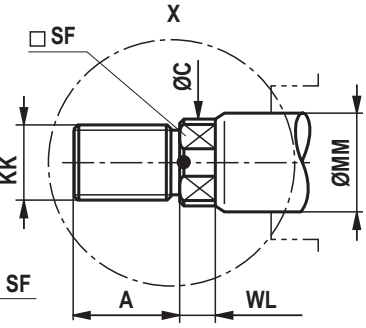
CDT3 MX3





CGT3 MX3





ØAL	AA	BB 9) + 3	TG js13	VD	ZB max	ZJ ± 1	ZK ± 1	ZM ± 2
25	40	19	28.3	6	121	114	138	154
32	47	24	33.2	12	137	128	151	177
40	59	35	41.7	12	166	153	172	196
50	74	46	52.3	9	176	159	183	207
63	91	46	64.3	13	185	168	190	223
80	117	59	82.7	9	212	190	216	246
100	137	59	96.9	10	225	203	230	265
125	178	81	125.9	10	260	232	254	289
160	219	92	154.9	7	279	245	270	302
200	269	115	190.2	7	336	299	329	361

Dimensions: Extended tie rod at base CDT3; MX2 (dimensions in mm)
Extended tie rod at head CDT3/CGT3; MX3 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	56	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	DD	E	Line connection "B"		Line connection "R"		GA	H [5]	J	m	PJ ± 1.25	WH ± 2	Y ± 2
			EE	ØDT	EE	ØDT							
25	M5x0.8	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	4	53	15	50
32	M6x1	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	5	56	25	60
40	M8x1	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	6.5	73	25	62
50	M12x1.25	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	10	74	25	67
63	M12x1.25	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	10	80	32	71
80	M16x1.5	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	13	93	31	77
100	M16x1.5	130 ± 2	G 3/4	42	M27x2	34	70	–	43	13	101	35	82
125	M22x1.5	165 ± 2	G 1	47	M33x2	43	76	–	54	18	117	35	86
160	M27x2	205 ± 2	G 1	47	M33x2	43	83	–	58	22	130	32	86
200	M30x2	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	24	165	32	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

9) Observe the "BB" dimension for the swivel head assembly

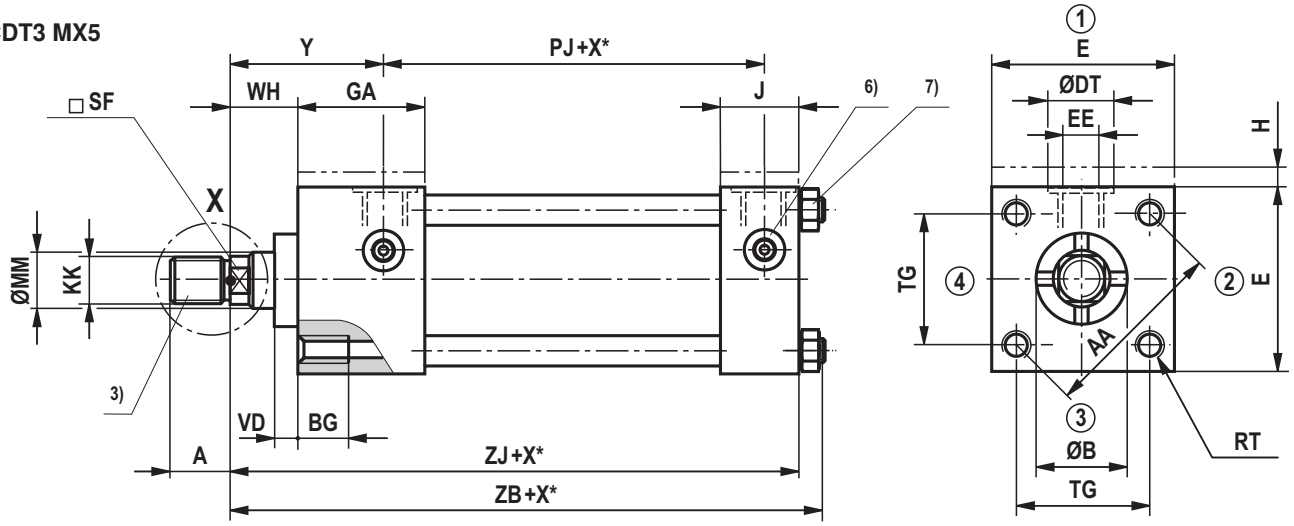
12) Piston rod Ø not standardized

13) CG version: Piston rod marked with groove, only admissible for 50 bar tensile load

14) With operating pressures up to 210 bar only on request

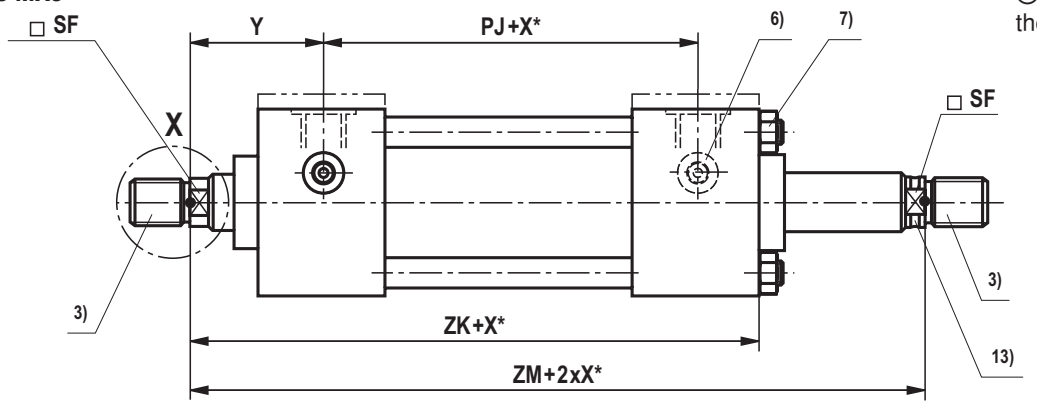
Dimensions: Tapped hole at head CDT3/CGT3; MX5 (dimensions in mm)

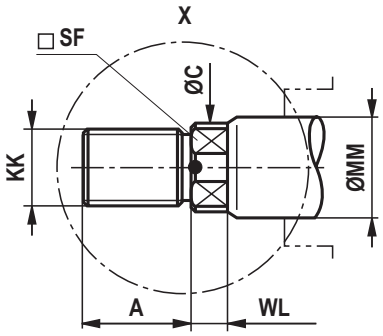
CDT3 MX5



① ... ④ = Position of the line connections

CGT3 MX5





ØAL	AA	BG min	RT 6H	TG js13	VD	ZB max	ZJ ± 1.25	ZK ± 1	ZM ± 2
25	40	8	M5x0.8	28.3	6	121	114	138	154
32	47	9	M6x1	33.2	12	137	128	151	177
40	59	12	M8x1.25	41.7	12	166	153	172	196
50	74	18	M12x1.75	52.3	9	176	159	183	207
63	91	18	M12x1.75	64.3	13	185	168	190	223
80	117	24	M16x2	82.7	9	212	190	216	246
100	137	24	M16x2	96.9	10	225	203	230	265
125	178	27	M22x2.5	125.9	10	260	232	254	289
160	219	32	M27x3	154.9	7	279	245	270	302
200	269	40	M30x3.5	190.2	7	336	299	329	361

Dimensions: Tapped hole at head CDT3/CGT3; MX5 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	56	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	E	Line connection "B"		Line connection "R"		GA	H [5]	J	PJ ± 1.25	WH ± 2	Y ± 2
		EE	ØDT	EE	ØDT						
25	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	53	15	50
32	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	56	25	60
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	73	25	62
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	74	25	67
63	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	80	32	71
80	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	93	31	77
100	130 ± 2	G 3/4	42	M27x2	34	70	–	43	101	35	82
125	165 ± 2	G 1	47	M33x2	43	76	–	54	117	35	86
160	205 ± 2	G 1	47	M33x2	43	83	–	58	130	32	86
200	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	165	32	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

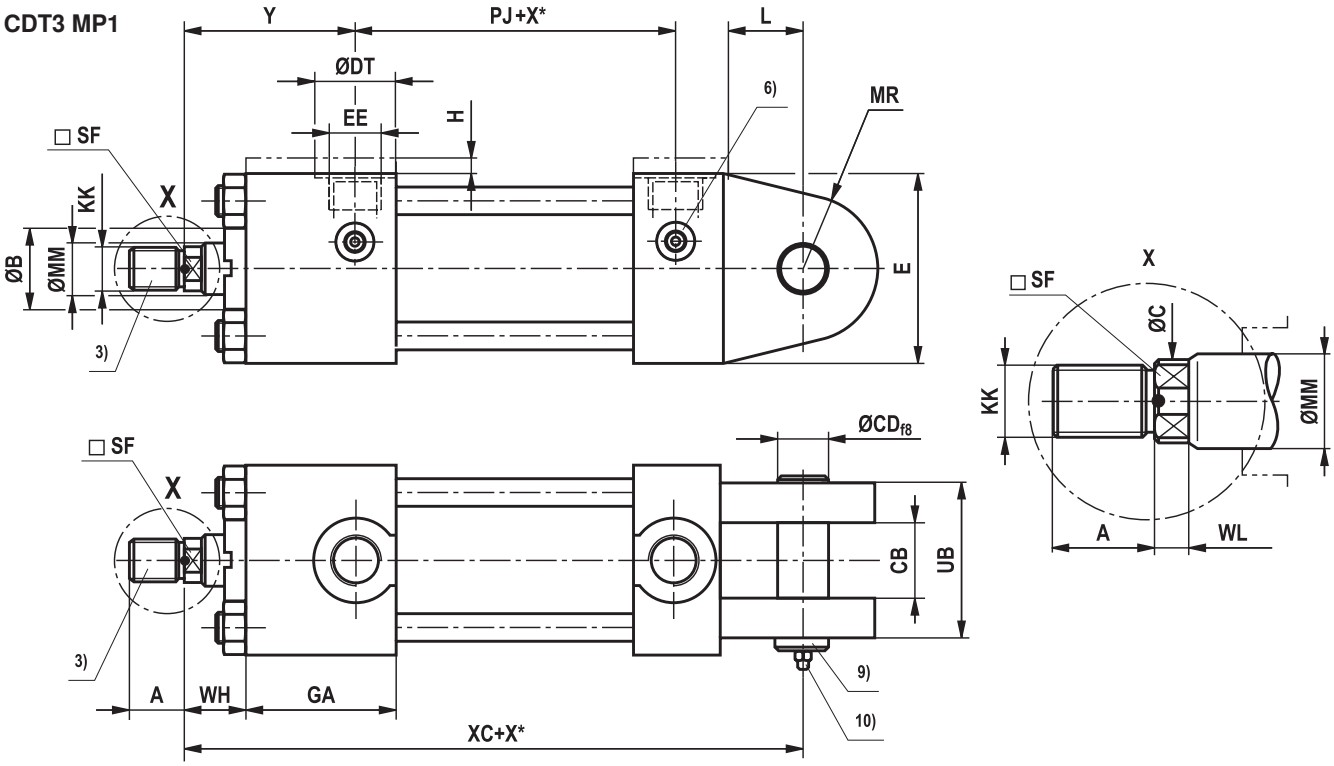
12) Piston rod Ø not standardized

13) CG design: Piston rod marked with groove, only admissible for 50 bar tensile load

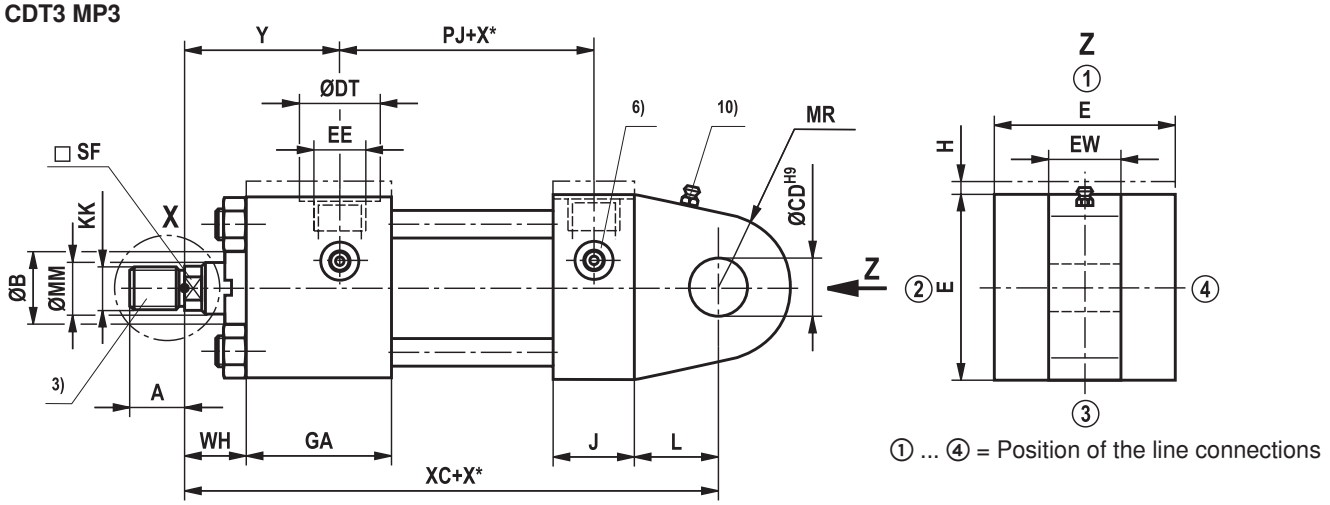
14) With operating pressures up to 210 bar only on request

Dimensions: Type of mounting CDT3; MP1, MP3 (dimensions in mm)

CDT3 MP1



CDT3 MP3



ØAL	CB A16	ØCD H9; f8	EW h14	L min	MR max	UB max	XC ± 1.25
25	12	10	12	13	12	25	127
32	16	12	16	19	17	34	147
40	20	14	20	19	17	42	172
50	30	20	30	32	29	62	191
63	30	20	30	32	29	62	200
80	40	28	40	39	34	83	229
100	50	36	50	54	50	103	257
125	60	45	60	57	53	120	289
160	70	56	70	63	59	140	308
200	80	70	80	82	78	160	381

Dimensions: Type of mounting CDT3; MP1, MP3 (dimensions in mm)

		DIN / ISO [1] (for operating pressure up to 160 bar)					ISO [2] (for operating pressure up to 210 bar)					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
25	12	M10x1.25	14	11	10	5	–	–	–	–	–	24
	18	M10x1.25	14	16.5	14	5	M14x1.5	18	16.5	14	5	30
32	14	M12x1.25	16	13	12	5	–	–	–	–	–	26
	22	M12x1.25	16	20.5	18	5	M16x1.5	22	20.5	18	5	34
40	18	M14x1.5	18	16.5	14	5	–	–	–	–	–	30
	22 [12]	M14x1.5	18	20.5	18	5	M16x1.5	22	20.5	18	5	34
	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	22	M16x1.5	22	20.5	18	5	–	–	–	–	–	34
	28 [12]	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	28	M20x1.5	28	26	22	7	–	–	–	–	–	42
	36 [12]	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	36	M27x2	36	34	30	8	–	–	–	–	–	50
	45 [12]	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	45	M33x2	45	43	36	10	–	–	–	–	–	60
	56 [12]	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	56	M42x2	56	54	46	15	–	–	–	–	–	72
	70 [12]	–	–	–	–	–	M48x2 [14]	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3 [14]	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3 [14]	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3 [14]	112	136	125	15	163

ØAL	E	Line connection "B"		Line connection "R"		GA	H [5]	J	PJ ± 1.25	WH ± 2	Y ± 2
		EE	ØDT	EE	ØDT						
25	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	53	15	50
32	45 ± 1.5	G 1/4	25	M14x1.5	21	48	5	25	56	25	60
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52.5	–	33.5	73	25	62
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	33.5	74	25	67
63	90 ± 1.5	G 1/2	34	M22x1.5	29	57.5	–	35.5	80	32	71
80	115 ± 1.5	G 3/4	42	M27x2	34	67	–	41	93	31	77
100	130 ± 2	G 3/4	42	M27x2	34	70	–	43	101	35	82
125	165 ± 2	G 1	47	M33x2	43	76	–	54	117	35	86
160	205 ± 2	G 1	47	M33x2	43	83	–	58	130	32	86
200	245 ± 2	G 1 1/4	58	M42x2	52	107.5	–	77.5	165	32	98

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

3) For piston rod ends "E" and "T" see page 46

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

9) Bolt included in the scope of delivery

10) Lubricating nipple M6 DIN 71412

12) Piston rod Ø not standardized

14) With operating pressures up to 210 bar only on request

Areas, forces, flow: Series CST3 (for operating pressure up to 160 bar)

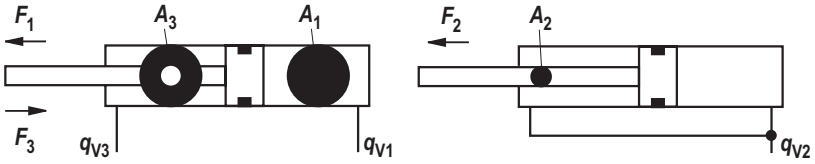
Piston	Piston rod	Area ratio	Areas			Force at 160 bar [1]			Flow at 0.1 m/s [2]			Max. available stroke length (mm)[4]
			Piston	Rod	Ring	Pressure	Diff.	Pulling	Off	Diff.	On	
ØAL mm	**ØMM** mm	φ A_1/A_3	A_1 cm²	A_2 cm²	A_3 cm²	F_1 kN	F_2 kN	F_3 kN	q_{V1} l/min	q_{V2} l/min	q_{V3} l/min	
40	**28**	1.96	12.56	6.16	6.40	20.11	9.85	10.25	7.5	3.7	3.8	1000
50	**28** [3] **36**	1.46 2.08	19.63	6.16 10.18	13.48 9.45	31.42	9.85 16.29	21.56 15.13	11.8	3.7 6.1	8.1 5.7	1200
63	**36** [3] **45**	1.48 2.04	31.17	10.18 15.90	20.99 15.27	49.88	16.29 25.45	33.59 24.43	18.7	6.1 9.5	12.6 9.2	1400
80	**45** [3] **56**	1.46 1.96	50.26	15.90 24.63	34.36 25.63	80.42	25.45 39.41	54.98 41.02	30.2	9.5 14.8	20.6 15.4	1700
100	**56** [3] **70**	1.46 1.96	78.54	24.63 38.48	53.91 40.06	125.66	39.41 61.58	86.26 64.09	47.1	14.8 23.1	32.3 24.0	2000
125	**70** [3] **90**	1.46 2.08	122.72	38.48 63.62	84.23 59.10	196.35	61.58 101.79	134.77 94.56	73.6	23.1 38.2	50.5 35.5	2300
160	**70** **110**	1.25 1.90	201.06	38.48 95.03	162.58 106.03	321.70	61.58 152.05	260.12 169.64	120.6	23.1 57.0	97.5 63.6	2600
200	**90** **140**	1.25 1.96	314.16	63.62 153.94	250.54 160.22	502.65	101.79 246.30	400.86 256.35	188.5	38.2 92.4	150.3 96.1	3000

[1] Theoretical static cylinder force (without consideration of the efficiency and admissible load for attachment parts like e.g. swivel heads, plates or valves, etc.)

[2] Stroke velocity

[3] Piston rod Ø not standardized

[4] Larger stroke lengths upon request



Overview types of mounting: Series CST3 (Only for operating pressure up to 160 bar)

CST3 ME5

see page 32, 33

CST3 MP5

see page 34, 35

CST3 MS2

see page 36, 37

CST3 MT4

see page 38, 39

CST3 MX5

see page 40, 41

Ordering code: Series CST3 (for operating pressure up to 160 bar)

CS	T3	/ / /	Z	3X														*

Differential cylinder with position measurement system [10] = **CS**

Series = **T3**

Types of mounting DIN/ISO
Rectangular flange at head = **ME5**
Self-aligning clevis at base = **MP5**
Foot mounting [8] = **MS2**
Trunnion in center [1] = **MT4**
Tapped hole at head = **MX5**

Piston Ø (ØAL) 40 to 200 mm

Piston rod Ø (ØMM) 28 to 140 mm

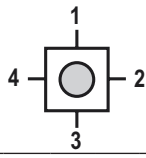
Stroke length in mm [11]

Design principle
Head and base connected to tie rod = **Z**

Component series = **3X**
30 to 39 unchanged installation and connection dimensions

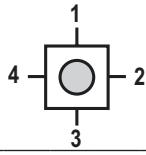
Line connection/version
Pipe thread (ISO 1179-1) = **B**
Subplate NG6 [8; 9] = **P**
Subplate NG10 [8] = **T**
Subplate NG16 [8; 15] = **U**

Line connection / position at head
see page 43



View to piston rod
= **1**
= **2**
= **3**
= **4**

Line connection / position at base
see page 43



View to piston rod
= **1**
= **2**
= **3**
= **4**

Further details in the plain text

Test certificate
W = without test certificate
C = with acceptance test certificate 3.1 based on EN 10204

Oil filling
W = without oil filling
F = with oil filling

Color set-up
W = Priming class CP3
B = [18] Painting class CP4

Option 2
C = Analog output 4-20 mA
F = Analog output 0-10 V
D = Digital output SSI

Option 1
T = Position measurement system (magnetostrictive) without mating connector
Mating connector - separate order see page 48

Seal design
M = Standard seal system
T = Servo quality/reduced friction
S = High temperature with reduced friction

End position cushioning
U = Without

Piston rod end
see pages 32 to 41
H = Thread (DIN/ISO) for swivel head CGKA
D = Thread (ISO) for swivel head CGKA
F = With mounted swivel head CGKA (DIN/ISO)
K = With mounted swivel head CGKA (ISO)

Piston rod design
H = Hardened and hard chromium-plated

Comments:

[1] Trunnion position freely selectable; when ordering, always specify the "XV" dimension in the plain text in mm.

[8] Only position 11 possible

[9] Only up to piston Ø 80 mm

[10] not standardized

[11] Observe the max. and min. stroke length on pages 32 to 41 and the admissible stroke length (according to kinking calculation) on pages 54 to 55

[15] Only piston Ø 100 – 200 mm

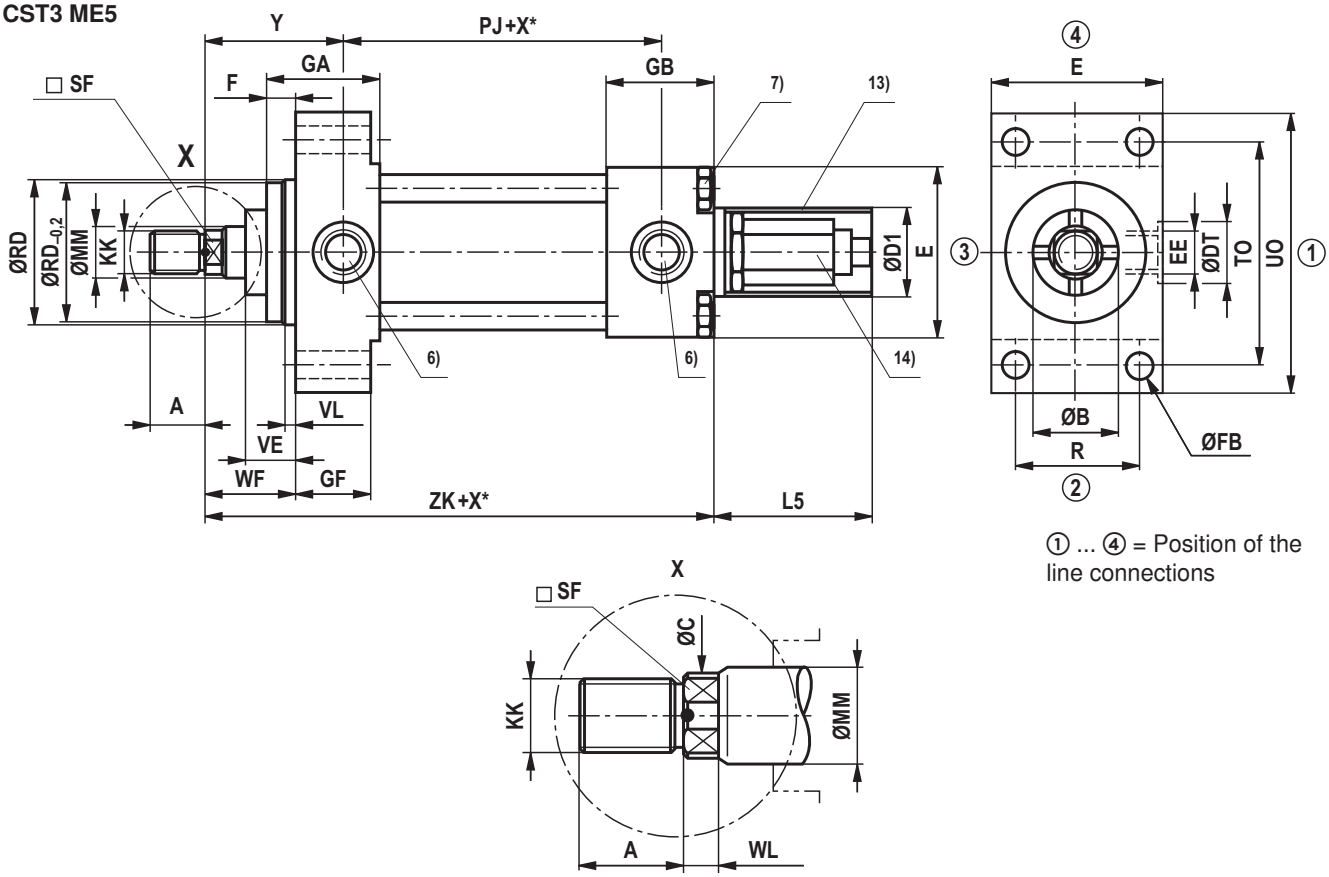
[18] Specify RAL color in the plain text

Order example:
CST3ME5/50/36/300Z3X/P11HDUTTD

When selecting, please observe the limitations on the corresponding catalog pages!

Dimensions: Rectangular flange at head CST3; ME5 (dimensions in mm)

CST3 ME5



ØAL	ØMM	PJ [10] ± 1.25	PJ [11] ± 1.25	R JS13	TO JS13	UO max	VE max	VL min	ZK ± 1	L5	ØD1 max	X* min **without** subplate	X* min **with** subplate
40	**28**	73	77	41	87	110	22	3	195	–	–	–	50
50	**28** **36**	74	78	52	105	130	25	4	194	–	–	–	50
63	**36** **45**	80	81	65	117	145	29	4	205	82	96	–	45
80	**45** **56**	93	93	83	149	180	29	4	234	82	96	–	32
100	**56** **70**	101	101	97	162	200	32	5	248	82	96	–	57
125	**70** **90**	117	117	126	208	250	32	5	265.5	82	96	–	35
160	**70** **110**	130	130	155	253	300	32	5	277	82	96	20	20
200	**90** **140**	165	160	190	300	360	32	5	326.5	82	96	20	20

Dimensions: Rectangular flange at head CST3; ME5 (dimensions in mm)

		DIN / ISO [1]					ISO [2]						
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9	ØRD f8
40	**28**	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42	62
50	**28**	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42	74
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50	74
63	**36**	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50	88
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60	88
80	**45**	M27x2	36	43	36	10	M33x2	45	43	36	10	60	105
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72	105
100	**56**	M33x2	45	54	46	10	M42x2	56	54	46	10	72	125
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88	125
125	**70**	–	–	–	–	–	M48x2	63	68	60	15	88	150
	90	M42x2	56	88	75	15	M64x3	85	86	75	15	108	150
160	**70**	M48x2	63	68	60	15	–	–	–	–	–	88	125
	110	M48x2	63	106	92	15	M80x3	95	106	92	15	133	170
200	**90**	M64x3	85	88	75	15	–	–	–	–	–	108	150
	140	M64x3	85	136	125	15	M100x3	112	136	125	15	163	210

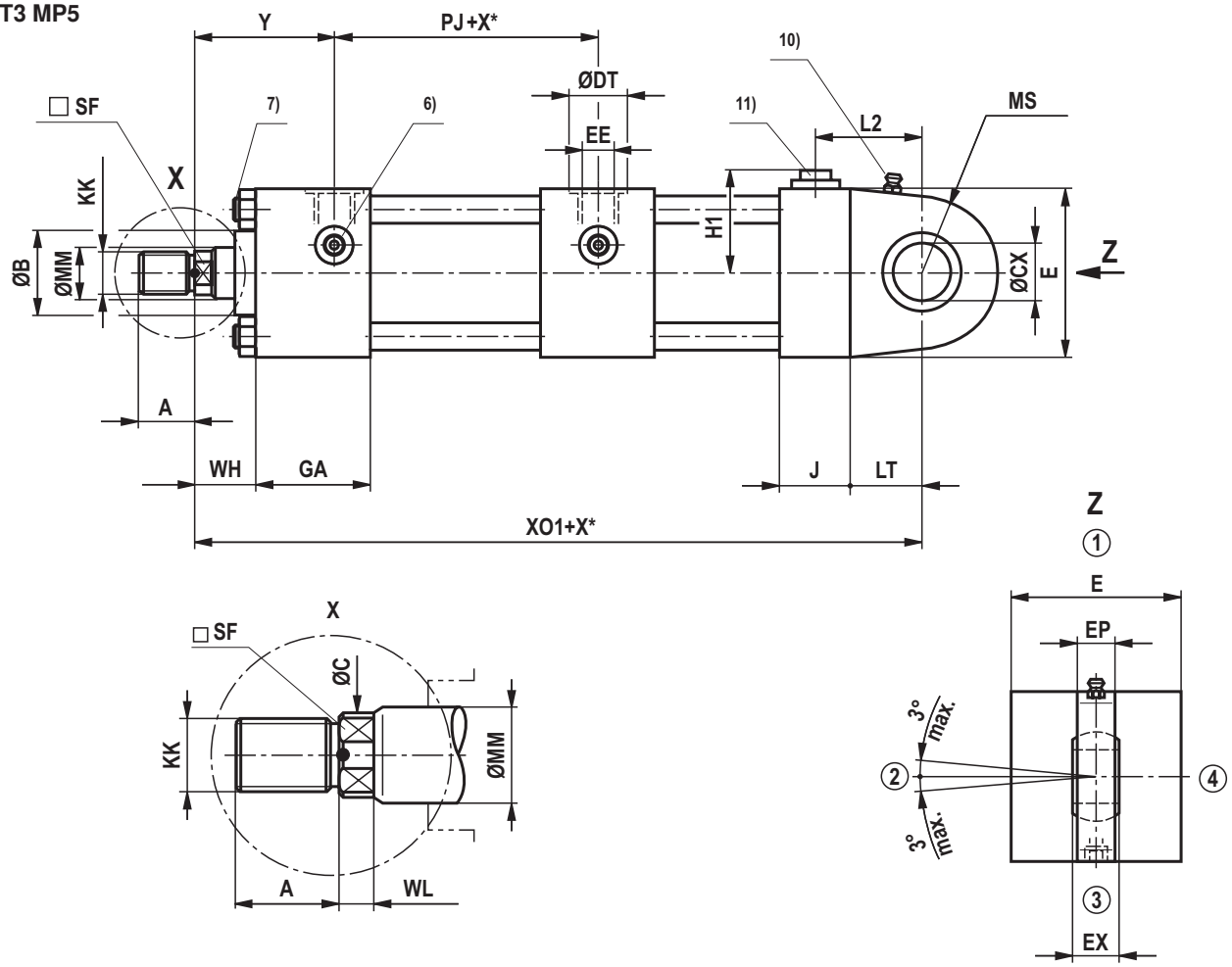
ØAL	F max	ØFB H13	GF	E	EE	ØDT	GA	GB	WF ± 2	Y [10] ± 2	Y [11] ± 2
40	10	11	38	63 ± 1.5	G 3/8	28	52.5	75.5	35	62	58
50	16	14	38	75 ± 1.5	G 1/2	34	57.5	68.5	41	67	63
63	16	14	38	90 ± 1.5	G 1/2	34	57.5	72.5	48	71	70
80	20	18	45	115 ± 1.5	G 3/4	42	67	85	51	77	77
100	22	18	45	130 ± 2	G 3/4	42	70	88	57	82	82
125	22	22	58	165 ± 2	G 1	47	80	87.5	57	86	86
160	25	26	58	205 ± 2	G 1	47	83	90	57	86	86
200	25	33	76	245 ± 2	G 1 1/4	58	107.5	105	57	98	98

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length
X*min = Min. stroke length
X*max = Max. stroke length

1) Thread for piston rod ends "F" and "H"
2) Thread for piston rod ends "D" and "K"
6) For the position of the line connections and the bleeding see page 43
7) Tightening torque see page 65
10) ME5: for line connection position "1" and "3" at head
11) ME5: for line connection position "2" and "4" at head
13) With piston Ø 40 – 50 mm without protective pipe
14) Installation space for position measurement system at least 200 mm

Dimensions: Self-aligning clevis at base CST3; MP5 (dimensions in mm)

CST3 MP5



① ... ④ = Position of the line connections

ØAL	ØMM	ØCX	EP h13	EX	LT min	XO1 ± 1.5	MS max	X* min **without** subplate	X* min **with** subplate
40	**28**	20 – 0.012	13	16 – 0.12	25	348	29	–	50
50	**28** **36**	25 – 0.012	17	20 – 0.12	31	365	33	–	50
63	**36** **45**	30 – 0.012	19	22 – 0.12	38	383	40	–	45
80	**45** **56**	40 – 0.012	23	28 – 0.12	48	410	50	–	32
100	**56** **70**	50 – 0.012	30	35 – 0.12	58	436	62	–	57
125	**70** **90**	60 – 0.015	38	44 – 0.15	72	487	80	–	35
160	**70** **110**	80 – 0.015	47	55 – 0.15	92	528	100	20	20
200	**90** **140**	100 – 0.020	57	70 – 0.20	116	632	120	20	20

Dimensions: Self-aligning clevis at base CST3; MP5 (dimensions in mm)

		DIN / ISO [1]					ISO [2]					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
40	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	28	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	36	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	45	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	56	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	70	–	–	–	–	–	M48x2	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3	112	136	125	15	163

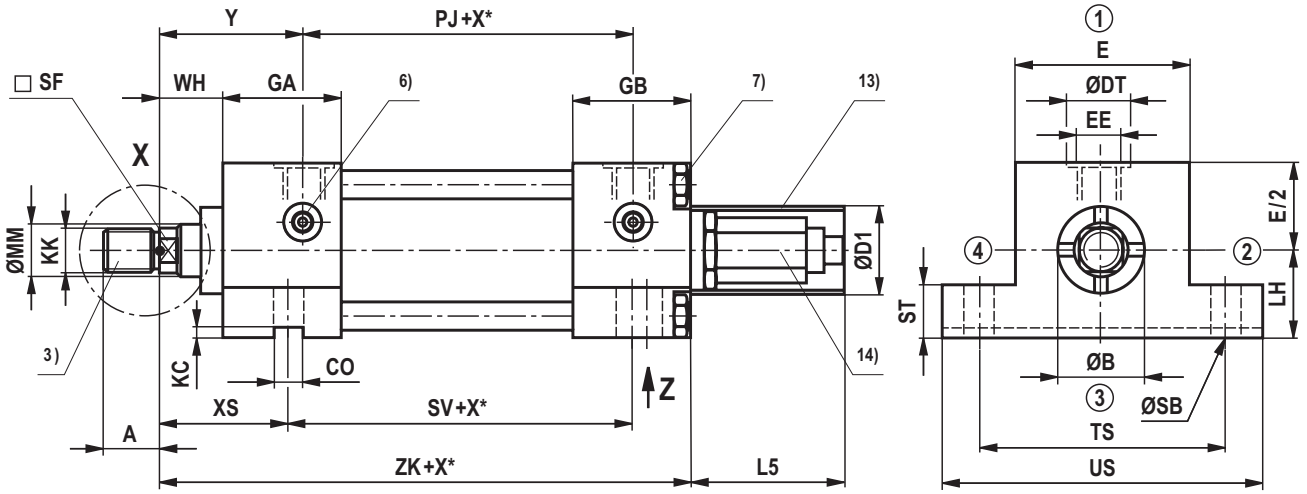
ØAL	H1	L2	E	EE	ØDT	GA	J	PJ ± 1.25	WH ± 2	Y ± 2
40	40	43.5	63 ± 1.5	G 3/8	28	52.5	33.5	73	25	62
50	45.5	49	75 ± 1.5	G 1/2	34	57.5	33.5	74	25	67
63	53	55	90 ± 1.5	G 1/2	34	57.5	35.5	80	32	71
80	65.5	68	115 ± 1.5	G 3/4	42	67	41	93	31	77
100	73	78	130 ± 2	G 3/4	42	70	43	101	35	82
125	90.5	101	165 ± 2	G 1	47	76	54	117	35	86
160	110.5	121	205 ± 2	G 1	47	83	58	130	32	86
200	130.5	157	245 ± 2	G 1 1/4	58	107.5	77.5	165	32	98

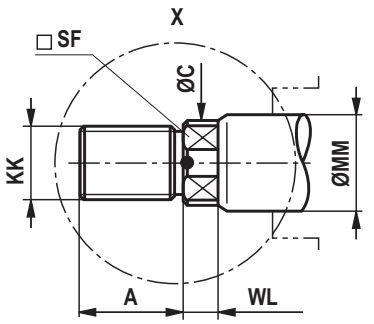
ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length
X*min = Min. stroke length
X*max = Max. stroke length

1) Thread for piston rod ends "F" and "H"
2) Thread for piston rod ends "D" and "K"
6) For the position of the line connections and the bleeding see page 43
7) Tightening torque see page 65
10) Lubricating nipple M6 DIN 71412
11) Only in line connection position 1 at base

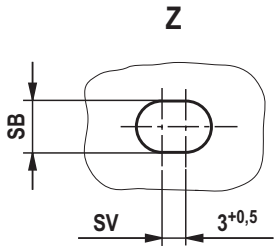
Dimensions: Foot mounting CST3; MS2 (dimensions in mm)

CST3 MS2





① ... ④ = Position of the line connections



ØAL	CO N9	KC +0.2	LH h10	PJ ± 1.25	ØSB H13	ST	SV ± 1	TS JS13	US max
40	12	4	31	73	11	12.5	106.5	83	103
50	12	4.5	37	74	14	19	99.5	102	127
63	16	4.5	44	80	18	26	91.5	124	161
80	16	5	57	93	18	26	110.5	149	186
100	16	6	63	101	26	32	106.5	172	216
125	20	6	82	117	26	32	128.5	210	254
160	30	8	101	130	33	38	129	260	318
200	40	8	122	165	39	44	171	311	381

Dimensions: Foot mounting CST3; MS2 (dimensions in mm)

		DIN / ISO [1]					ISO [2]					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
40	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	28	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	36	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	45	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	56	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	70	–	–	–	–	–	M48x2	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3	112	136	125	15	163

ØAL	E	EE	ØDT	GA	GB	WH ± 2	Y ± 2
40	63 ± 1.5	G 3/8	28	52.5	75.5	25	62
50	75 ± 1.5	G 1/2	34	57.5	68.5	25	67
63	90 ± 1.5	G 1/2	34	57.5	72.5	32	71
80	115 ± 1.5	G 3/4	42	67	85	31	77
100	130 ± 2	G 3/4	42	70	88	35	82
125	165 ± 2	G 1	47	76	87.5	35	86
160	205 ± 2	G 1	47	83	90	32	86
200	245 ± 2	G 1 1/4	58	107.5	105	32	98

ØAL	ØMM	XS ± 2	ZK ± 1	L5	ØD1 max	X* min **without** subplate	X* min **with** subplate
40	28	45	195	–	–	–	50
50	28	54	194	–	–	–	50
	36						
63	36	65	205	–	–	–	45
	45						
80	45	68	234	82	96	–	32
	56						
100	56	79	248	82	96	–	57
	70						
125	70	79	265.5	82	96	–	35
	90						
160	70	86	277	82	96	20	20
	110						
200	90	92	326.5	82	96	20	20
	140						

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length
X*min = Min. stroke length
X*max = Max. stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

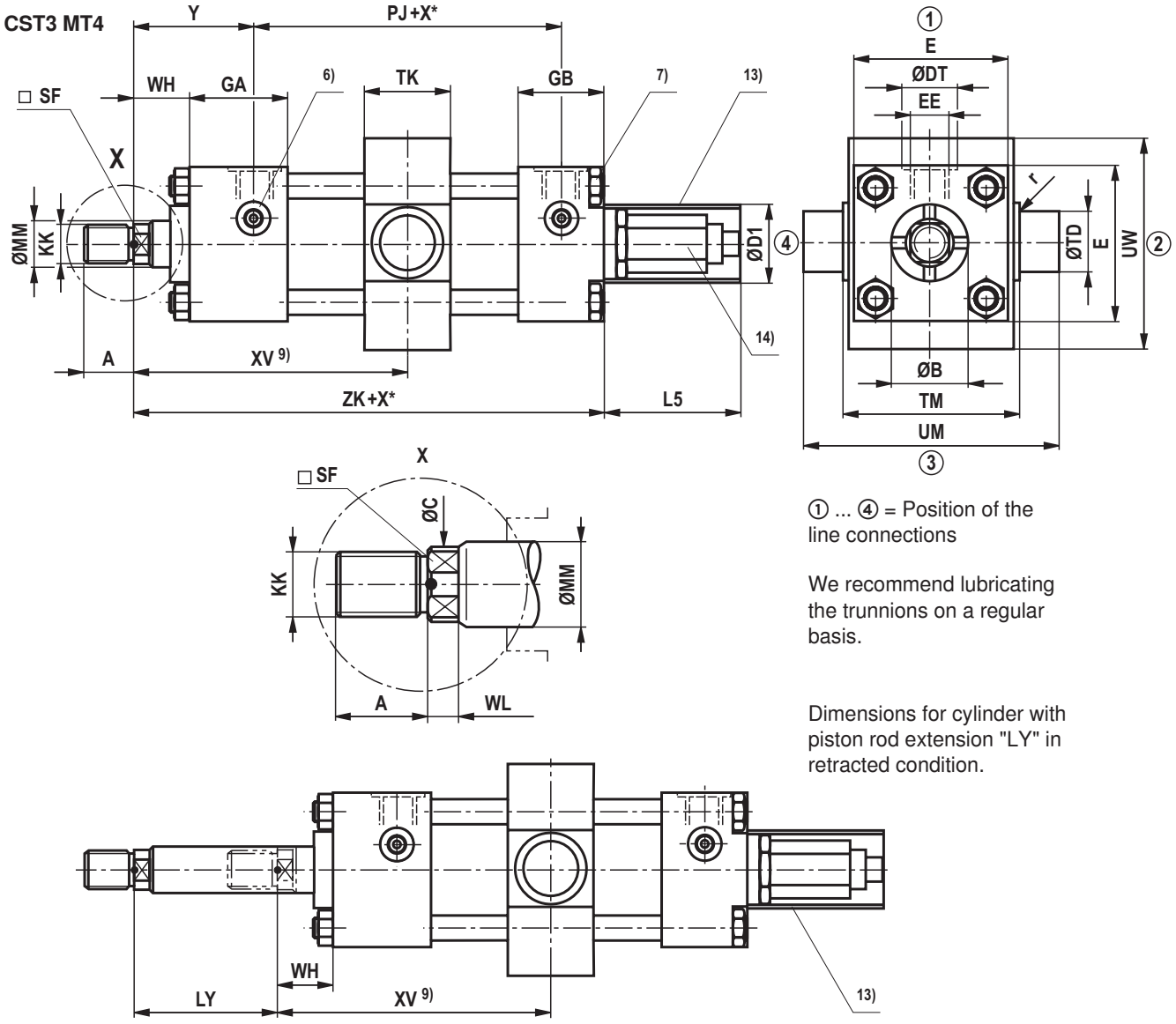
6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

13) With piston Ø 40 – 50 mm without protective pipe

14) Installation space for position measurement system at least 200 mm

Dimensions: Trunnion in the center CST3; MT4 (dimensions in mm)



① ... ④ = Position of the line connections

We recommend lubricating the trunnions on a regular basis.

Dimensions for cylinder with piston rod extension "LY" in retracted condition.

ØAL	ØMM	Line connection "B"			Line connection "P", "T", "U"			ZK ± 1	L5	ØD1 max
		X* min	XV min ± 2	XV max ± 2	X* min	XV min ± 2	XV max ± 2			
40	**28**	–	95	104 + stroke	50	95	76 + stroke	195	–	–
50	**28** **36**	–	105	105 + stroke	50	105	77 + stroke	194	–	–
63	**36** **45**	10	117	107 + stroke	45	117	82 + stroke	205	82	96
80	**45** **56**	12	130	118 + stroke	35	130	96 + stroke	234	82	96
100	**56** **70**	18	142	124 + stroke	57	142	101 + stroke	248	82	96
125	**70** **90**	25	157	132 + stroke	63	157	94 + stroke	265.5	82	96
160	**70** **110**	40	171	131 + stroke	74	171	97 + stroke	277	82	96
200	**90** **140**	48	202	154 + stroke	73	202	129 + stroke	326.5	82	96

Dimensions: Trunnion in the center CST3; MT4 (dimensions in mm)

		DIN / ISO [1]					ISO [2]					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
40	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	28	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	36	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	45	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	56	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	70	–	–	–	–	–	M48x2	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3	112	136	125	15	163

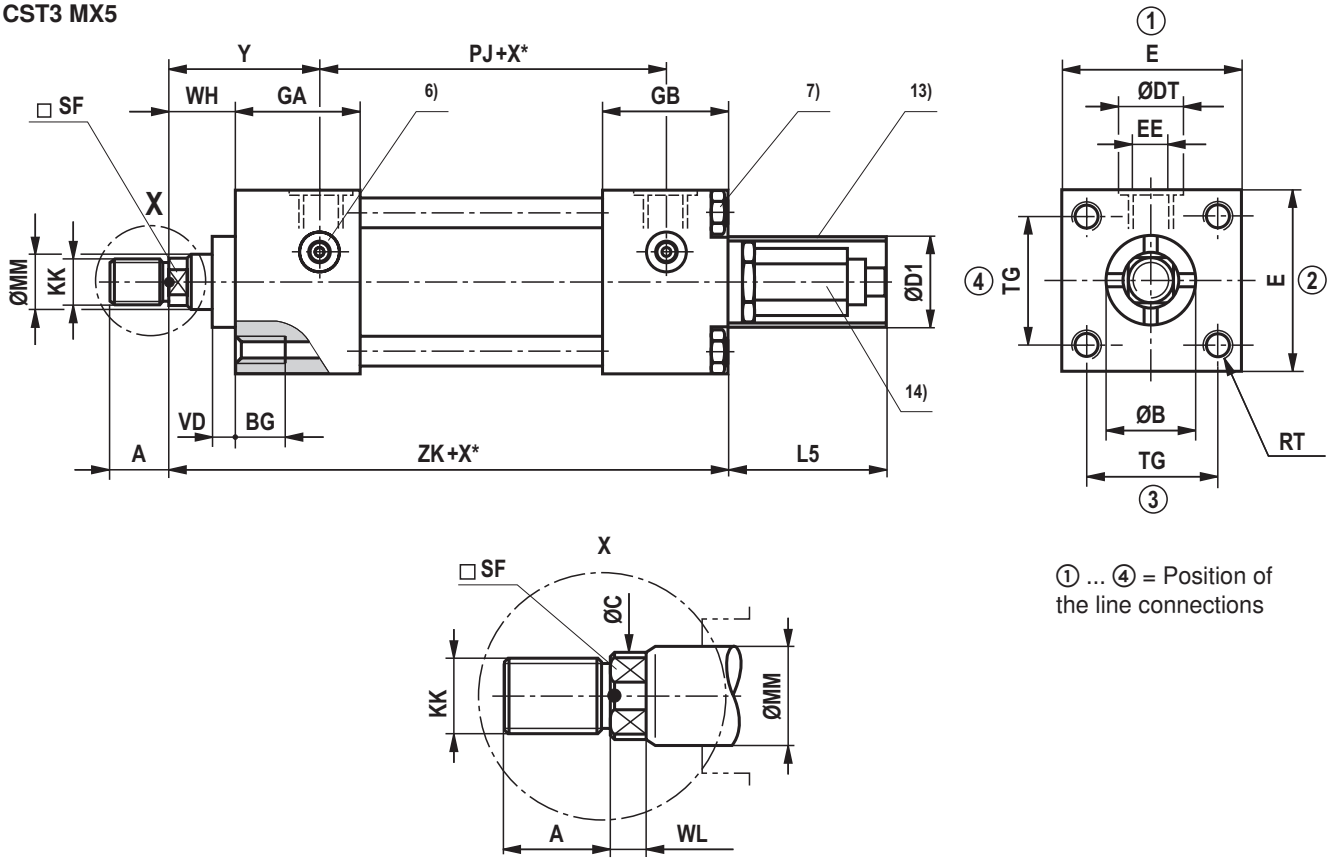
ØAL	PJ ±1.25	TK max	TM h14	UM h15	UW max	r	ØTD f8	E	EE	ØDT	GA	GB	WH ±2	Y ±2
40	73	30	76	108	74	1.6	20	63 ± 1.5	G 3/8	28	52.5	75.5	25	62
50	74	40	89	129	81	1.6	25	75 ± 1.5	G 1/2	34	57.5	68.5	25	67
63	80	50	100	150	97	2.0	32	90 ± 1.5	G 1/2	34	57.5	72.5	32	71
80	93	60	127	191	124	2.5	40	115 ± 1.5	G 3/4	42	67	85	31	77
100	101	70	140	220	137	2.5	50	130 ± 2	G 3/4	42	70	88	35	82
125	117	90	178	278	175	3.2	63	165 ± 2	G 1	47	76	87.5	35	86
160	130	110	215	341	212	3.5	80	205 ± 2	G 1	47	83	90	32	86
200	160	130	279	439	276	4.5	100	245 ± 2	G 1 1/4	58	107.5	105	32	98

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length
X*min = Min. stroke length
X*max = Max. stroke length

1) Thread for piston rod ends "F" and "H"
2) Thread for piston rod ends "D" and "K"
6) For the position of the line connections and the bleeding see page 43
7) Tightening torque see page 65
9) "XV" dimension in mm, always specify in the plain text
13) With piston Ø 40 – 50 mm without protective pipe
14) Installation space for position measurement system at least 200 mm

Dimensions: Tapped hole at head CST3; MX5 (dimensions in mm)

CST3 MX5



① ... ④ = Position of the line connections

ØAL	ØMM	BG min	PJ ± 1.25	RT 6H	TG js13	VD	ZK ± 1	X* min **without** subplate	X* min **with** subplate
40	**28**	12	73	M8x1.25	41.7	12	195	–	50
50	**28** **36**	18	74	M12x1.75	52.3	9	194	–	50
63	**36** **45**	18	80	M12x1.75	64.3	13	205	–	45
80	**45** **56**	24	93	M16x2	82.7	9	234	–	32
100	**56** **70**	24	101	M16x2	96.9	10	248	–	57
125	**70** **90**	27	117	M22x2.5	125.9	10	265.5	–	35
160	**70** **110**	32	130	M27x3	154.9	7	277	20	20
200	**90** **140**	40	165	M30x3.5	190.2	7	326.5	20	20

Dimensions: Tapped hole at head CST3; MX5 (dimensions in mm)

		DIN / ISO [1]					ISO [2]					
ØAL	ØMM	KK [1]	A [1] max	ØC	SF	WL	KK [2]	A [2] max	ØC	SF	WL	ØB f9
40	28	M14x1.5	18	26	22	7	M20x1.5	28	26	22	7	42
50	28	M16x1.5	22	26	22	7	M20x1.5	28	26	22	7	42
	36	M16x1.5	22	34	30	8	M27x2	36	34	30	8	50
63	36	M20x1.5	28	34	30	8	M27x2	36	34	30	8	50
	45	M20x1.5	28	43	36	10	M33x2	45	43	36	10	60
80	45	M27x2	36	43	36	10	M33x2	45	43	36	10	60
	56	M27x2	36	54	46	10	M42x2	56	54	46	10	72
100	56	M33x2	45	54	46	10	M42x2	56	54	46	10	72
	70	M33x2	45	68	60	15	M48x2	63	68	60	15	88
125	70	–	–	–	–	–	M48x2	63	68	60	15	88
	90	M42x2	56	88	75	15	M64x3	85	86	75	15	108
160	70	M48x2	63	68	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	15	M80x3	95	106	92	15	133
200	90	M64x3	85	88	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	15	M100x3	112	136	125	15	163

ØAL	L5	ØD1 max	E	EE	DT	GA	GB	WH ± 2	Y ± 2
40	–	–	63 ± 1.5	G 3/8	28	52.5	75.5	25	62
50	–	–	75 ± 1.5	G 1/2	34	57.5	68.5	25	67
63	82	96	90 ± 1.5	G 1/2	34	57.5	72.5	32	71
80	82	96	115 ± 1.5	G 3/4	42	67	85	31	77
100	82	96	130 ± 2	G 3/4	42	70	88	35	82
125	82	96	165 ± 2	G 1	47	76	87.5	35	86
160	82	96	205 ± 2	G 1	47	83	90	32	86
200	82	96	245 ± 2	G 1 1/4	58	107.5	105	32	98

ØAL = Piston Ø
ØMM = Piston rod Ø
X* = Stroke length
X*min = Min. stroke length
X*max = Max. stroke length

1) Thread for piston rod ends "F" and "H"

2) Thread for piston rod ends "D" and "K"

6) For the position of the line connections and the bleeding see page 43

7) Tightening torque see page 65

13) With piston Ø 40 – 50 mm without protective pipe

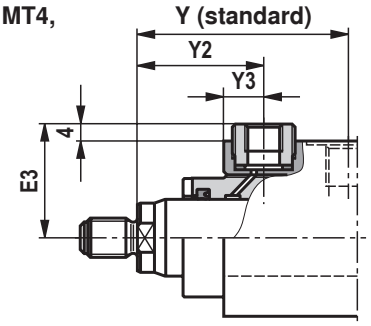
14) Installation space for position measurement system at least 200 mm

Leakage oil connection / **Enlarged line connection** (dimensions in mm)

Leakage oil connection

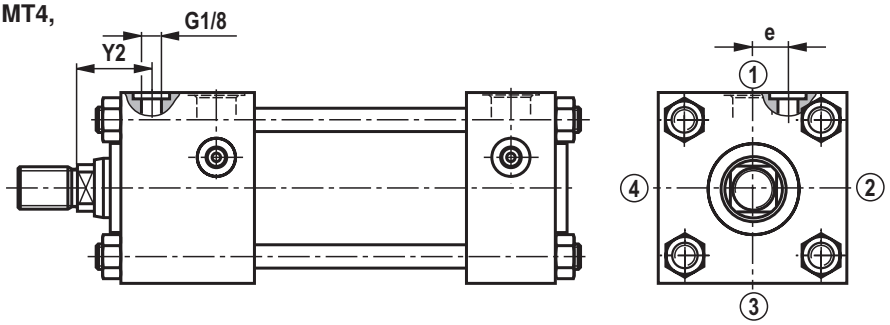
If technical high-quality seals are used, use of a leakage oil connection is generally not necessary. A drag oil collection connection is only recommended in special cases such as an extension velocity of more than 2 times the retraction velocity with larger strokes, permanent pressurization and the like. In case the extension velocities are more than 5 times the retraction velocity, please contact us.

ME6, MP5, MS2, MT4, Ø 25, 32, 40



		MS2, MT4 ME6, MP5				ME5	
ØAL	**ØMM**	**e**	**Y2**	**Y3**	**E3**	**e**	**Y2**
25		0	25.5	10.5	29.5	17	35
32		0	35.5	10.5	32	18	45
40		0	36	11	36	22	47
50		14.5	39	–	–	34	52
63		16	45.5	–	–	43	59
80		16	48	–	–	27	62
100	**45**	16	52	–	–	30	68
100	**70**	16	55	–	–	30	68
125	**56**	18	55.5	–	–	45	68
125	**90**	18	55.5	–	–	45	68
160	**70**	24	54.5	–	–	45	68
160	**110**	24	54.5	–	–	47	68
200	**90**	24	59.5	–	–	45	72
200	**140**	24	59.5	–	–	60	72

ME5, ME6, MP5, MS2, MT4, Ø 50 to Ø 200



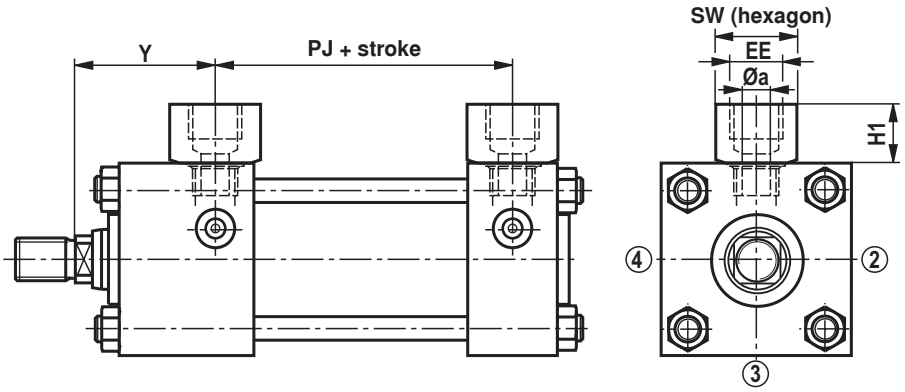
Enlarged line connection

The oil ports of this series are generously dimensioned according to the standard; with high velocity, the pressure drop Δp can be reduced by using larger oil ports; sometimes, it is, however, no longer possible to comply with the standard dimensions, see table.

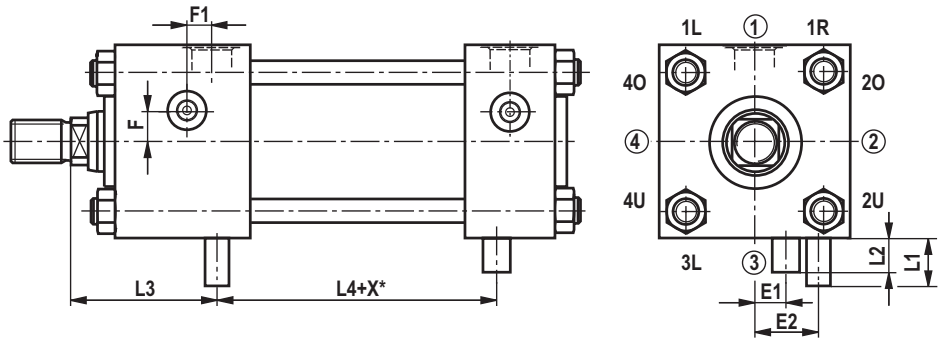
Cannot be realized for the types of mounting ME 5 / 6 with connection position 2 or 4.

M_A = tightening torque

ØAL	**EE**	**H1**	**Y** ±2	**PJ** ±1.25	**SW**	**Øa**	M_A Nm (±5 %)
25	G3/8	20	50	53	27	9	20
32	G3/8	20	60	56	27	9	20
40	G1/2	23	62	73	32	11	26
50	G3/4	29	67	74	41	14	48
63	G3/4	29	71	80	41	14	48
80	G1	33	77	93	46	18	74
100	G1	33	82	101	46	18	74
125	G11/4	39	86	117	60	23	127
160	G11/4	–	86	130	–	–	–
200	G11/2	–	98	165	–	–	–



Position of line connections, bleeding, leakage oil, throttle valve



Mounting	Line connection	CDT3 / CST3 Bleeding Head	Bleeding Base	Leakage oil Head 1)	Throttle valve Head 1)	Throttle valve Base 1)	CGT3	Bleeding Head 1	Bleeding Head 2	Leakage oil Head 1	Leakage oil Head 2	Throttle valve Head 1	Throttle valve Head 2
MP5, MT4, MP1, MP3, MX1, MX2, MX3, MX5	1	2	2	1	3R	3R	MT4, MX1, MX3	2	4	1	1	3R	3L
	2	3	3	2	4U	4U		3	1	2	2	4U	4O
	3	4	4	3	1L	1L		4	2	3	3	1L	1R
	4	1	1	4	2O	2O		1	3	4	4	2O	2U
ME5	1	2	2	1R	3R	3R	ME5	2	4	1R	1	3R	3L
	2	3R	3	1R	1L	4U		3R	1	1R	2	1L	4O
	3	4	4	3L	1L	1L		4	2	3L	3	1L	1R
	4	1L	1	3L	3R	2O		1L	3	3L	4	3R	2U
MS2	1	2O	2O	1	4O	4O	MS2	2O	4O	1	1	4O	2O
MT1	1	3L	2	–	3R	3R	MT1	3L	4	–	–	3R	3L
	3	1R	4	–	1L	1L		1R	2	–	–	1L	1R
MT2	1	2	3L	1	3R	3R							
	3	4	1R	3	1L	1L							
ME6	1	2	2	1	3R	3R							
	2	3	3	2	4U	1L							
	3	4	4	3	1L	1L							
	4	1	1	4	2O	3R							

1) Not possible with CST3
2) Protrusion 3 mm.
3) Types of mounting ME5 (only base), ME6, MP5, MT4, MP1, MP3, MT2, MX1, MX2, MX3 and MX5.
4) Position of line connection
X* = Stroke length
M_A = Tightening torque

ØAL	F Head/base 4) 3)	F (head) 2/4 ME5	F MT1	F MS2	F1 Position of line connection 4) 1/3 ME5	F1 2/4 ME5	F2 Position of bleeding 4) 1/3 ME5	F2 2/4 ME5	SW Allen wrench	Throttle valve adjustable on both sides: Protrusion L1 (head)	Protrusion L2 (base)	Center offset E1 (head)	Center offset E2 (base)	Dimension L3	Dimension L4	M_A Nm
25	0	0	6	5	11.5	23	23	11.5	5 2)	12	12	6	6	48	57	5
32	0	0	5	5	13	25.5	25.5	13	5 2)	12	12	9	9	57.5	61	5
40	10	10	10	10	15.5	19.5	15.5	15.5	5	5.5	5.5	8	8	61.5	74	5
50	10	10	10	10	15.5	29.5	15.5	15.5	5	3	3	10	10	67	74	5
63	14	14	14	14	18.5	20	18.5	18.5	5	0	0	15	15	72	78	5
80	10	10	10	10	21	21	21	21	6	0	0	14	14	81	85	15
100	24/12	24	12	12	23	23	23	23	6	0	0	13	13	86	93	15
125	0	0	12	0	25	25	25	25	6	–	–	22	22	91.5	109	24
160	0	0	0	0	29	29	29	29	6	–	–	30	30	93.5	115	24
200	0	0	0	0	41.5	41.5	31.5	31.5	6	–	–	30	30	114	128	24

Bleeding / **measuring coupling** (dimensions in mm)

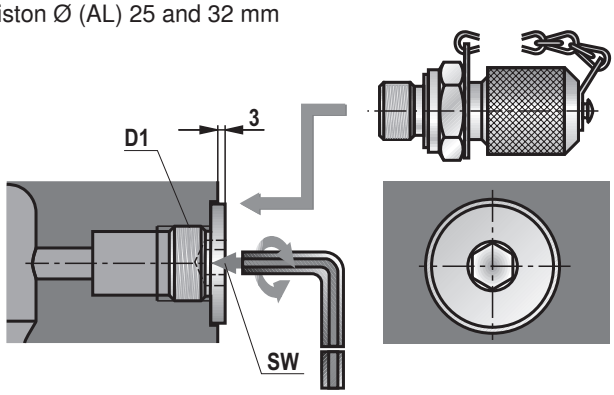
By default, a patented safety vent against unintended screwing out in head and base is delivered for piston Ø ≥ 40 mm.

For piston Ø 25 and 32 mm, a bleed screw G1/8 is installed in head and base which is **not** secured against screwing out.

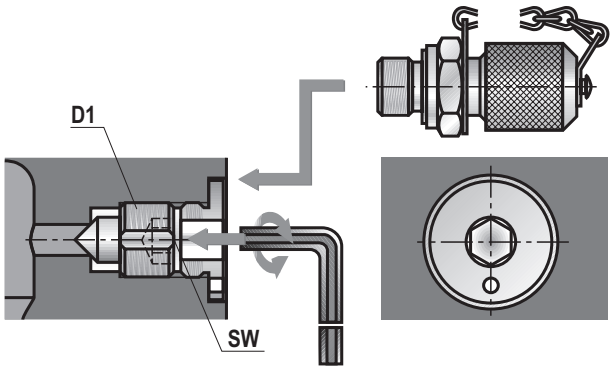
The port allows for the installation of a measuring coupling with check valve for pressure measurement or contamination-free bleeding. Measuring coupling with check valve function, i.e. it can also be connected when the system is pressurized.

Connection possibility for measuring coupling

Piston Ø (AL) 25 and 32 mm

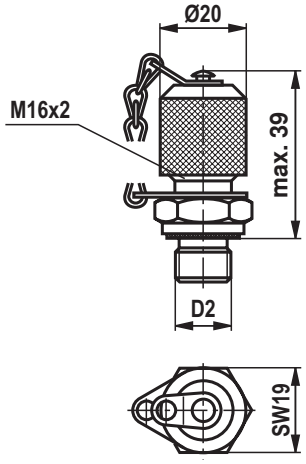


Piston Ø (AL) 40 to 200 mm



ØAL	Bleed screw D1	Bleed screw Fuse	Bleed screw SW	Measuring coupling D2	M_A Nm
25 and 32	G1/8	not secured	5	G1/8	18
40 and 63	G1/8	secured	5	G1/8	18
80 to 200	G1/4	secured	6	G1/4	40

M_A = Tightening torque



Scope of delivery: measuring coupling **G1/8**

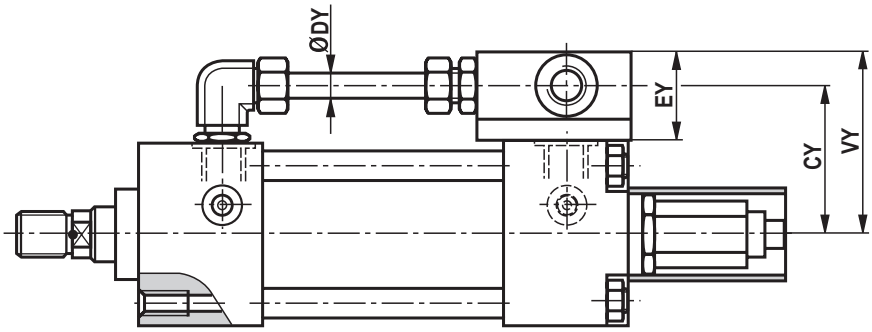
MESSKUPPLUNG AB 20-11/K3 G1/8 with seal ring made of NBR
Material no. **R900014363**
MESSKUPPLUNG AB 20-11/K3V G1/8 with seal ring made of FKM
Material no. **R900024710**

Scope of delivery: measuring coupling **G1/4**

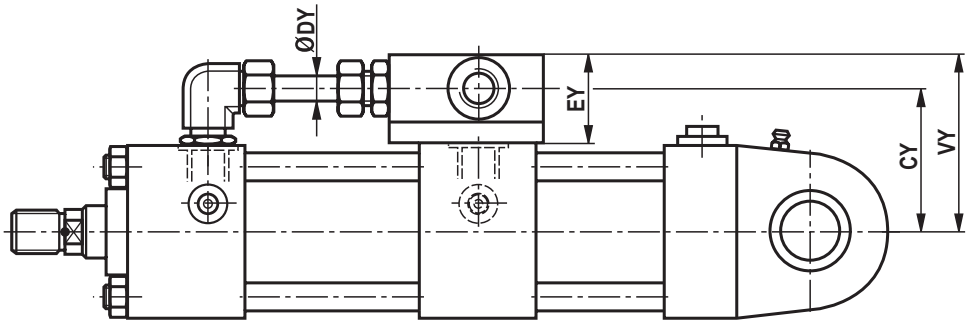
MESSKUPPLUNG AB 20-11/K1 G1/4 with seal ring made of NBR
Material no. **R900009090**
MESSKUPPLUNG AB 20-11/K1V G1/4 with seal ring made of FKM
Material no. **R900001264**

Subplates for valve mounting – Dimensions and porting pattern (dimensions in mm)

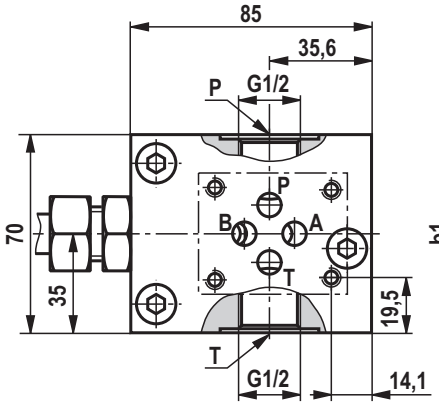
MX5
ME5, MS2, MT4



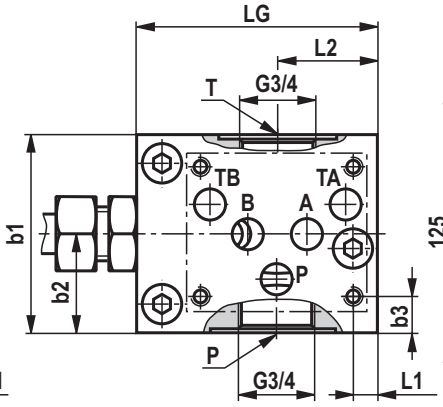
MP5



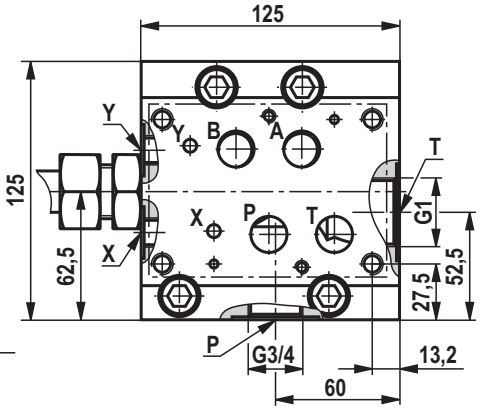
NG6
Porting pattern according to ISO 4401



NG10
Porting pattern according to ISO 4401



NG16
Porting pattern according to ISO 4401



ØAL	NG6				NG10										NG16			
	CY	EY	VY	ØDY	CY	EY	VY	ØDY	LG	L1	L2	b1	b2	b3	CY	EY	VY	ØDY
40	62.2	49.7	80.2	15	62.2	49.7	80.2	15	85	8.5	35.5	70	35	13	–	–	–	–
50	68.2	49.7	86.2	15	68.2	49.7	86.2	15	85	8.5	35.5	70	35	13	–	–	–	–
63	75.7	49.7	93.7	15	75.7	49.7	93.7	15	85	8.5	35.5	70	35	13	–	–	–	–
80	88.2	49.7	106.2	15	88.2	49.7	106.2	15	85	8.5	35.5	70	35	13	–	–	–	–
100	–	–	–	–	103	64.7	128.7	20	110	27	54	125	62.5	39.5	104	79.7	144.7	20
125	–	–	–	–	120	64.7	145.7	20	110	27	54	125	62.5	39.5	121.5	79.7	162.2	20
160	–	–	–	–	140	64.7	165.7	20	110	27	54	125	62.5	39.5	141.5	79.7	182.2	20
200	–	–	–	–	160	64.7	185.7	20	110	27	54	125	62.5	39.5	161.5	79.7	202.2	20

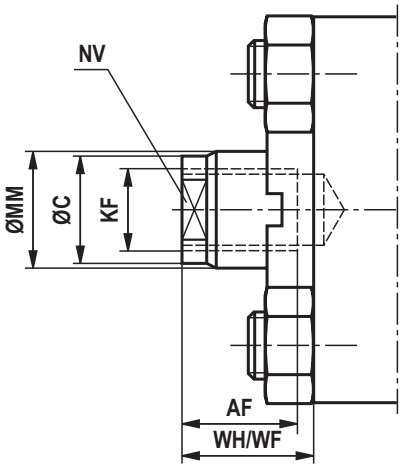
For the weight of the subplates refer to page 46.

Weight: Subplates

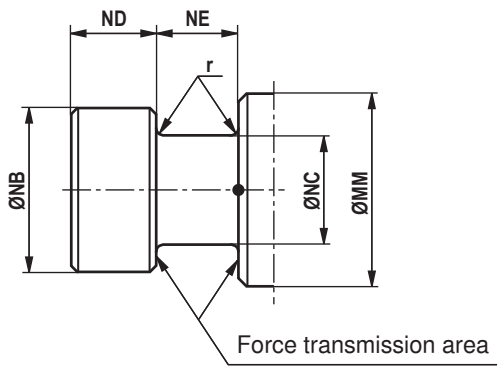
ØAL	NG6 in kg	NG10 in kg	NG16 in kg
40	2.3	2.3	–
50	2.3	2.3	–
63	2.3	2.3	–
80	2.3	2.3	–
100	–	7.0	9.8
125	–	7.0	9.8
160	–	7.0	9.8
200	–	7.0	9.8

Piston rod ends E and T (dimensions in mm)

Internal thread E



Trunnion T



ØAL	ØMM	Stroke [2] min	KF	AF	ØC	NV	ØNB h13	ØNC h13	ND / NE h13 / H11	r	p max. [1] bar
25	**18**	14	M12x1.25	18	17	15	–	–	–	–	–
32	**22**	17	M16x1.5	22	21	18	18	11.2	8	0.5	160
40	**18**	20	M12x1.25	18	17	15	–	–	–	–	–
	28	36	M20x1.5	28	25	22	22.4	14	10	0.5	160
50	**22**	27	M16x1.5	22	21	18	18	11.2	8	0.5	105
	36	56	M27x2	36	34	30	28	18	12.5	0.8	190
63	**28**	33	M20x1.5	28	25	22	22.4	14	10	0.5	95
	45	61	M33x2	45	42	36	35.5	22.4	16	0.8	160
80	**36**	47	M27x2	36	34	30	28	18	12.5	0.8	105
	56	64	M42x2	56	53	46	45	28	20	1.2	160
100	**45**	0	M33x2	45	42	36	35.5	22.4	16	0.8	90
	70	0	M48x2	63	67	60	56	35.5	25	1.2	160
125	**56**	0	M42x2	56	53	46	45	28	20	1.2	100
	90	30	M64x3	85	86	75	78	45	30	1.5	160
160	**70**	5	M48x2	63	67	60	56	35.5	25	1.5	90
	110	45	M80x3	95	106	95	106	65	35	1.5	160
200	**90**	35	M64x3	85	88	75	78	45	30	1.5	90
	140	67	M100x3	112	136	125	136	70	45	1.5	160

[1] With pulling load

[2] = Minimum stroke length with piston rod end "E" and only with CGT3

Position measurement system

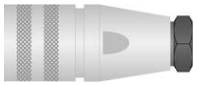
The position measurement system that is pressure-resistant up to 500 bar works in a contactless and absolute manner. The basis of this position measurement system is the magnetostrictive effect. Here, the coincidence of two magnetic fields triggers a torsional impulse.
This impulse runs on the wave guide inside the scale from the measuring point to the sensor head. The running time is constant and almost independent of temperature. It is proportional to the solenoid position and thus a measure for the actual position value and is converted within the sensor into a direct analog or digital output.

Technical data
(For applications outside these parameters, please consult us!)

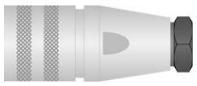
Operating pressure		bar	160
Analog output		V	0 to 10
	Load resistance	kΩ	≥ 5
	Resolution		unlimited
Analog output		mA	4 to 20
	Load resistance	Ω	0 to 500
	Resolution		unlimited
Digital output			SSI 24 bit gray-coded
	Resolution	µm	5
	Direction of measurement		asynchronously forward
Linearity (absolute accuracy)	Analog	% mm	≤ ±0.02 % (referred to measurement length) min. ±0.05
	Digital	% mm	≤ ±0.01 % (referred to measurement length) min. ±0.04
Reproducibility		% mm	±0.001 (referred to measurement length) min. ±0.0025
Hysteresis		mm	≤ 0.004
Supply voltage		V DC	24 (±10 % with analog output)
	Current consumption	mA	100
	Residual ripple	% s-s	≤ 1
	 Current consumption	V DC mA	24 (+20 %/–15 % with digital output) 70
	Residual ripple	% s-s	≤ 1
Protection class	Pipe and flange		IP 67
	Sensor electronics		IP 65
Operating temperature	Sensor electronics	°C	–40 to +75
Temperature coefficient	Voltage	ppm/°C	70
	Current	ppm/°C	90

Position measurement system

[1] For analog output:
6-pole amphenol mating connector
Material no. **R900072231**
(mating connector is **not** included in the scope of delivery, must be ordered separately)

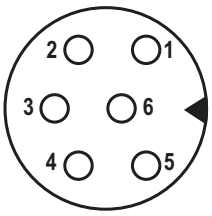


[1] For digital output:
7-pole amphenol mating connector
Material no. **R900079551**
(mating connector is **not** included in the scope of delivery, must be ordered separately)



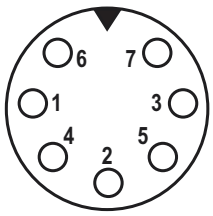
Pin assignment

Position measurement system (analog output)
Connector (view to pin side)



Pin	Cable	Signal / current	Signal / voltage
1	gray	4 … 20 mA	0 … 10 V
2	pink	DC ground	DC ground
3	yellow	not used	not used
4	green	DC ground	DC ground
5	brown	+24 V DC (+20 % / –15 %)	+24 V DC (+20 % / –15 %)
6	white	DC ground (0 V)	DC ground (0 V)

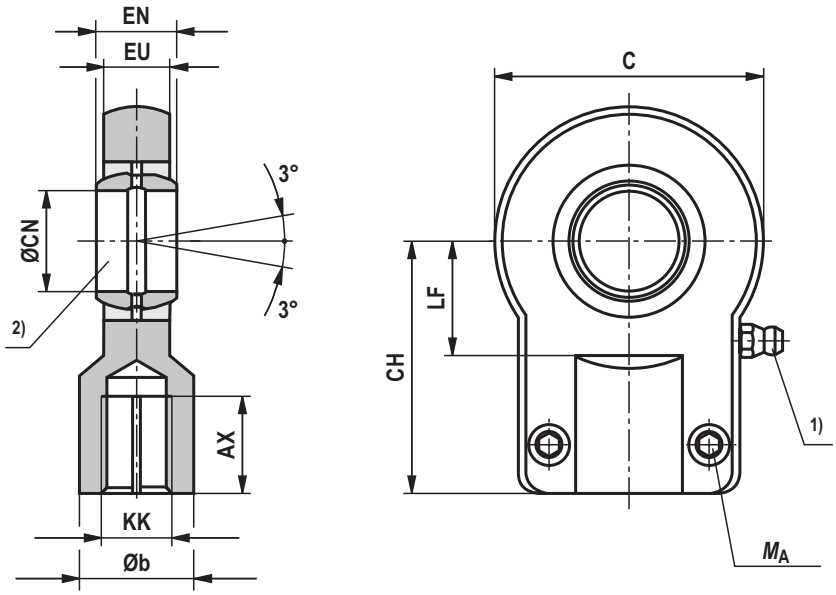
Position measurement system (digital output)
Connector (view to pin side)



Pin	Cable	Signal / SSi
1	gray	Data (–)
2	pink	Data (+)
3	yellow	Clock (+)
4	green	Clock (–)
5	brown	+24 V DC (+20%/–15%)
6	white	DC ground (0 V)
7	–	not used

Swivel head CGKA - AP 6 (clampable) (dimensions in mm)

ISO 8133 / ISO 8132



Type	Material no.	KK	AX min	Øb	C max	CH js13	ØCN	EN	EU max	LF min	M_A [7] Nm	m [8] kg	C_0 [9] (head) kN	F_{adm} [10] kN
CGKA 12 [3]	R900327186	M10x1.25	15	17	40	42	12 -0.008	10 -0.12	8	16	9.5	0.15	17	6.3
CGKA 16 [4]	R900327192	M12x1.25	17	21	45	48	16 -0.008	14 -0.12	11	20	9.5	0.25	28.5	10.5
CGKA 20 [4]	R900306874	M14x1.5	19	25	55	58	20 -0.012	16 -0.12	13	25	23	0.43	42.5	15.7
CGKA 25	R900327191	M16x1.5	23	30	65	68	25 -0.012	20 -0.12	17	30	23	0.73	67	24.7
CGKA 30	R900327187	M20x1.5	29	36	80	85	30 -0.012	22 -0.12	19	35	46	1.3	108	39.9
CGKA 40	R900327188	M27x2	37	45	100	105	40 -0.012	28 -0.12	23	45	46	2.3	156	57.6
CGKA 50	R900327368	M33x2	46	55	125	130	50 -0.012	35 -0.12	30	58	80	4.4	245	90.4
CGKA 60	R900327369	M42x2	57	68	160	150	60 -0.012	44 -0.12	38	68	195	8.4	380	140.2
CGKA 80	R900327370	M48x2	64	90	205	185	80 -0.015	55 -0.15	47	82 [6]	385	15.6	585	215.9
CGKA 100	R900327371	M64x3	86	110	240	240	100 -0.02	70 -0.2	57	116	660	28	865	319.2
CGKD 100 [5]	R900322030	M80x3	96	110	210	210	100 H7	100 h12	84	98	385	28	1060	391.1
CGKD 125 [5]	R900322026	M100x3	113	135	262	260	125 H7	125 h12	102	120	385	43	1430	527.7

Note:

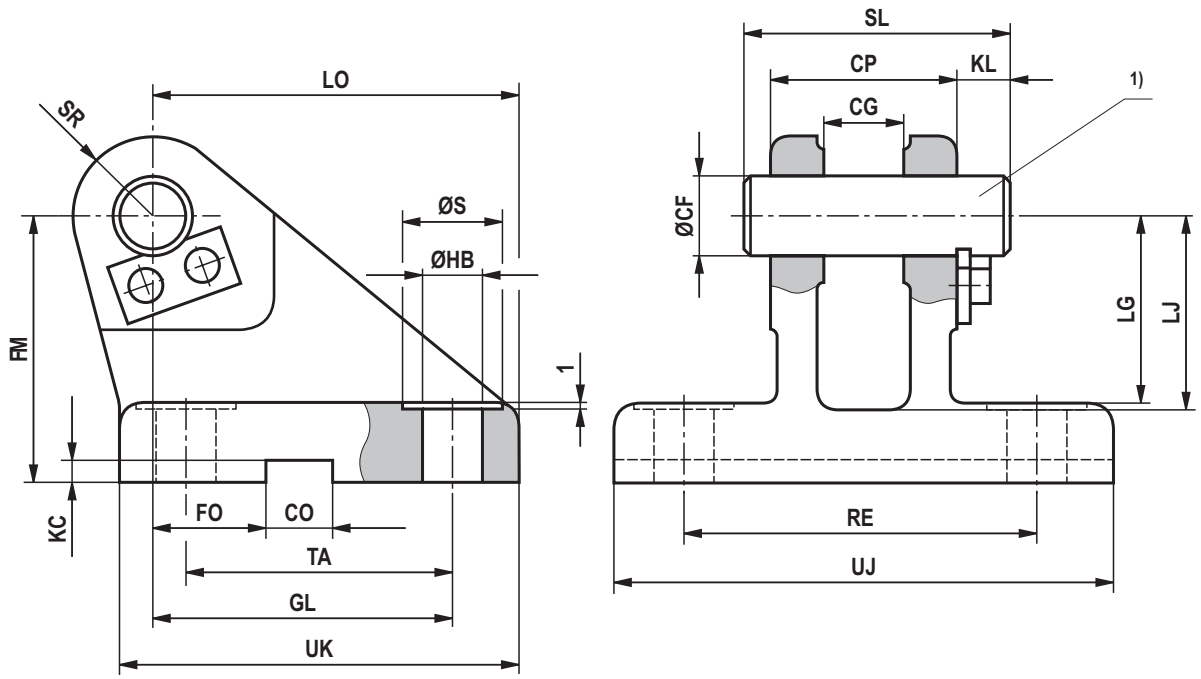
Geometry and dimensions may differ depending on the manufacturer.

In case of combination with other mounting elements, the usability must be checked.

1) Lubricating nipple, cone head form A according to DIN 71412
2) Bolt Ø h6 required
3) Cannot be re-lubricated
4) Can be re-lubricated via lubricating hole
5) Swivel head according to ISO 8132, bolt Ø m6 required
6) Dimensions may differ from the standard depending on the manufacturer
7) M_A = Tightening torque
The swivel head must always be screwed against the piston rod shoulder. Afterwards, the clamping screws must be tightened with the specified tightening torque.
8) m = Weight of swivel head in kg
9) C_0 = Static load rating of the swivel head
10) F_{adm} = Maximum admissible load on the swivel head during oscillatory or alternating loads

Clevis bracket CLCB - AB 5 (clampable) (dimensions in mm)

ISO 8133



Type	Material no.	Nominal force kN	ØCF K7 [1]	CP h14	CG + 0.1 + 0.3	CO N9	FO js14	FM js11	GL js13	ØHB	ØS
CLCB 12	R900326960	8	12	30	10	10	16	40	46	9	15
CLCB 16	R900327372	12.5	16	40	14	16	18	50	61	11	18
CLCB 20	R900327373	20	20	50	16	16	20	55	64	14 [3]	20
CLCB 25	R900326961	32	25	60	20	25	22	65	78	16 [3]	24
CLCB 30	R900327374	50	30	70	22	25	24	85	97	18 [3]	26
CLCB 40	R900327375	80	40	80	28	36	24	100	123	22	33
CLCB 50	R900327376	125	50	100	35	36	35	125	155	30	48
CLCB 60	R900327377	200	60	120	44	50	35	150	187	39	60
CLCB 80	R900327378	320	80	160	55	50	35	190	255	45	80
CLCB 100	R900327379	500	100	200	70	63	35	210	285	48	80

Clevis bracket CLCB - AB 5 (clampable) (dimensions in mm)

Type	KC + 0.3	KL	LG	LJ	LO	RE js13	SL	SR max.	TA js13	UJ	UK	*m* [2] kg
CLCB 12	3.3	8	28	29	56	55	40	12	40	75	60	0.6
CLCB 16	4.3	8	37	38	74	70	50	16	55	95	80	1.3
CLCB 20	4.3	10	39	40	80	85	62	20	58	120	90	2.1
CLCB 25	5.4	10	48	49	98	100	72	25	70	140	110	3.2
CLCB 30	5.4	13	62	63	120	115	85	30	90	160	135	6.5
CLCB 40	8.4	16	72	73	148	135	100	40	120	190	170	12.0
CLCB 50	8.4	19	90	92	190	170	122	50	145	240	215	23.0
CLCB 60	11.4	20	108	110	225	200	145	60	185	270	260	37.0
CLCB 80	11.4	26	140	142	295	240	190	80	260	320	340	79.0
CLCB 100	12.4	30	150	152	335	300	235	100	300	400	400	140.0

Note:

Geometry and dimensions may differ depending on the manufacturer.

In case of combination with other mounting elements, the usability must be checked.

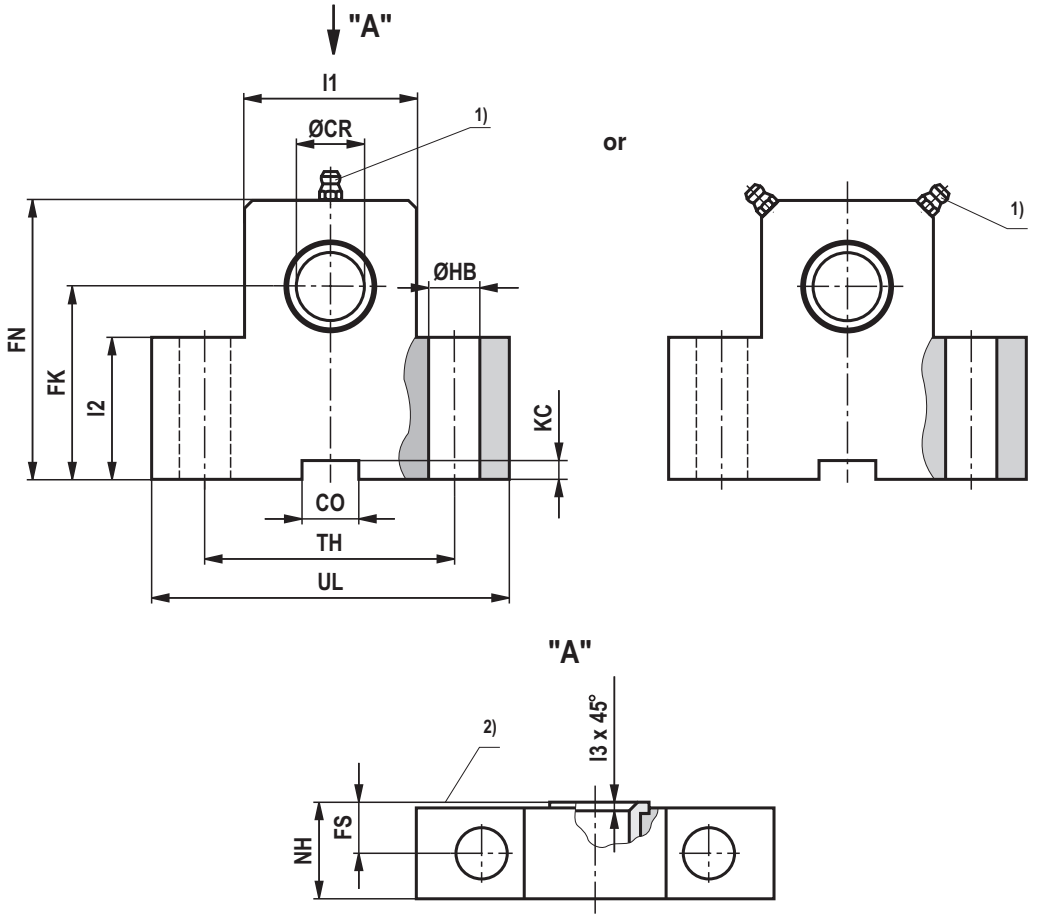
[1] Bolt Ø h6 required, suitable for swivel head CGKA...
(bolt and bolt lock are included in the scope of delivery)

[2] ***m*** = Weight of clevis bracket in kg

[3] Dimensions may differ from the standard depending on the manufacturer

Trunnion bearing block CLTA - **AT 4** (dimensions in mm)

CLTA 12-20



ØAL	Type	Material no.	Nominal force kN [4]	ØCR H7	CO N9	FK js12	FN max	FS js14	ØHB H13	KC +0.3	NH max	TH js14	UL max	l1	l2	l3	*m* [5] kg
25	**CLTA 12**	R901071355	8	12	10	38	55	8	9	3.3	17 [3]	40	63	25	25	1	0.5
32	**CLTA 16**	R901071364	12.5	16	16	45	65	10	11	4.3	21	50	80	30	30	1	0.9
40	**CLTA 20**	R901071365	20	20	16	55	80	10	11	4.3	21	60	90	40	38	1.5	1.35

Note:

Geometry and dimensions may differ depending on the manufacturer.

In case of combination with other mounting elements, the usability must be checked.

ØAL = Piston Ø

1) Lubricating nipple, cone form A according to DIN 71412

2) Inside

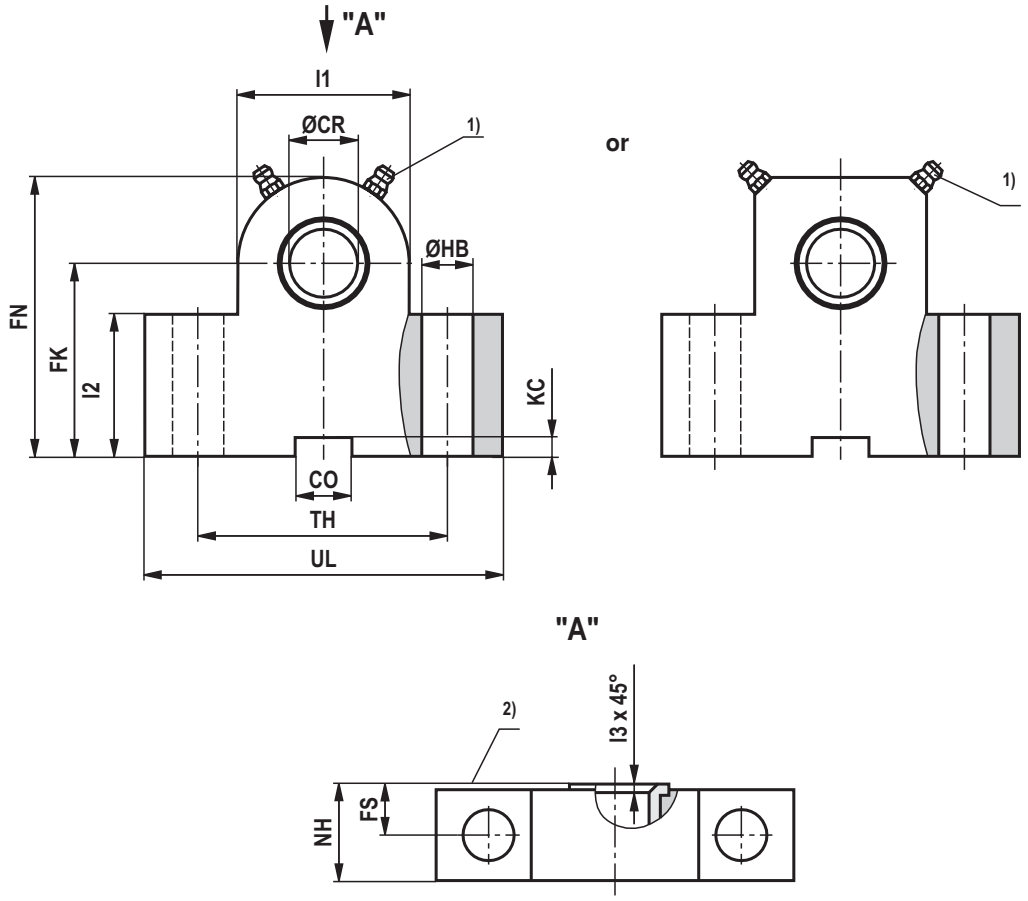
3) Dimensions may differ depending on the manufacturer

4) Nominal force applies to applications in pairs

5) ***m*** = Weight per pair in kg, brackets are delivered in pairs

Trunnion bearing block CLTA - AT 4 (dimensions in mm)

CLTA 25-100



ØAL	Type	Material no.	Nominal force kN [4]	ØCR H7	CO N9	FK js12	FN max	FS js14	ØHB H13	KC +0.3	NH max	TH js14	UL max	l1	l2	l3	*m* [5] kg
50	**CLTA 25**	R901071368	32	25	25	65	90	12	14 [3]	5.4	26	80	110	56	45	1.5	2.4
63	**CLTA 32**	R901071377	50	32	25	75	110	15	18 [3]	5.4	33	110	150	70	52	2	5.0
80	**CLTA 40**	R901071380	80	40	36	95	140	16	22	8.4	41	125	170	88	60	2.5	8.5
100	**CLTA 50**	R901071385	125	50	36	105	150	20	26	8.4	51	160	210	90	72	2.5	15
125	**CLTA 63**	R901071395	200	63	50	125	195	25	33	11.4	61	200	265	136	87	3	30
160	**CLTA 80**	R901071398	320	80	50	150	230	31	39	11.4	81	250	325	160	112	3.5	59
200	**CLTA 100**	R901071400	500	100	63	200	300	42	52	12.4	101	320	410	200	150	4.5	131

Note:

Geometry and dimensions may differ depending on the manufacturer.

In case of combination with other mounting elements, the usability must be checked.

ØAL = Piston Ø

1) Lubricating nipple, cone form A according to DIN 71412

2) Inside

3) Dimensions may differ depending on the manufacturer

4) Nominal force applies to applications in pairs

5) ***m*** = Weight per pair in kg, brackets are delivered in pairs

Kinking

For the admissible stroke length with flexibly guided load and a factor of 3.5 for safety against kinking, please refer to the relevant table. For other installation positions of the cylinder, the admissible stroke length must be interpolated. Admissible stroke length for non-guided load on request.

Kinking calculations are carried out according to the following formulas:

1. Calculation according to Euler

$$F = \frac{\pi^2 \cdot E \cdot I}{v \cdot L_K^2} \text{ if } \lambda > \lambda_g$$

2. Calculation according to Tetmajer

$$F = \frac{d^2 \cdot \pi\,(335\text{-}0.62 \cdot \lambda)}{4 \cdot v} \text{ if } \lambda \le \lambda_g$$

Influence of the type of mounting on the bending length:

Explanation:

E = Module of elasticity in N/mm²
= 2.1 x 10^5 for steel

I = Geometrical moment of inertia in mm⁴

for circular cross-section $= \frac{d^4 \cdot \pi}{64} = 0.0491 \cdot d^4$

v = 3.5 (safety factor)

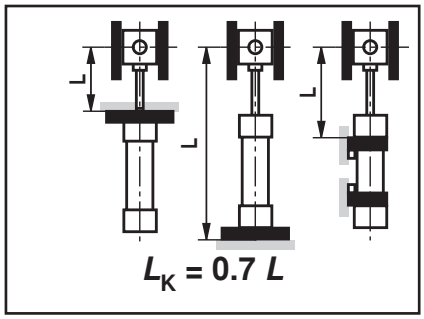
L_K = Free bending length in mm (depending on the type of mounting see sketches A, B, C)

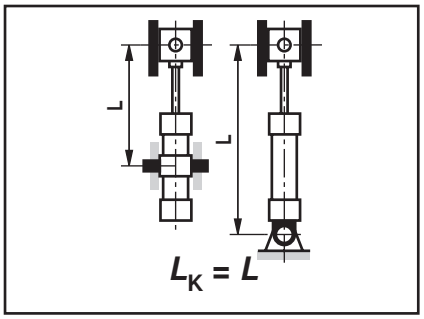
d = Piston rod Ø in mm

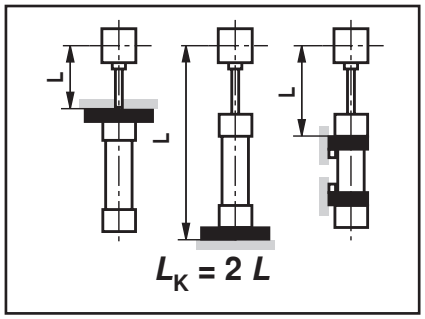
λ = Slenderness ratio

$= \frac{4 \cdot L_K}{d}$ $\quad \lambda_g = \pi \sqrt{\frac{E}{0.8 \cdot R_e}}$

R_e = Yield strength of the piston rod material







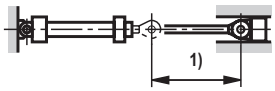
Admissible stroke length (dimensions in mm)

Type of mounting MP1, MP3, MP5

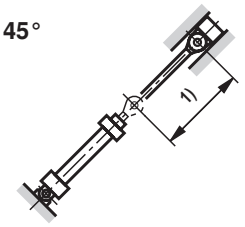
ØAL	ØMM	Admissible stroke length with 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	210 bar 0°	210 bar 45°	210 bar 90°
25	12	115	120	125	85	85	90	50	50	55			
	18	315	330	375	270	275	300	205	210	220	180	180	185
32	14	115	120	125	85	85	90	50	50	55			
	22	370	385	440	315	325	350	240	245	255	210	210	215
40	18	160	165	175	120	125	130	75	75	80			
	22	310	320	350	260	265	290	195	200	205	130	130	135
	28	465	485	580	400	415	465	315	320	340	280	285	290
50	22	205	210	220	155	160	165	100	100	105			
	28	420	430	475	355	360	380	270	275	280	190	195	195
	36	620	650	790	545	565	640	435	445	475	395	400	410
63	28	280	285	305	220	225	230	150	150	155			
	36	560	580	645	480	490	520	375	380	390	280	280	285
	45	770	810	995	680	710	805	555	565	605	500	510	530
80	36	380	390	415	305	310	320	210	215	220			
	45	695	715	800	600	610	650	470	475	490	350	355	360
	56	945	995	1225	840	870	995	685	670	745	615	625	655
100	45	480	495	540	390	400	420	280	285	290			
	56	850	880	1000	740	760	820	590	600	625	445	450	460
	70	1150	1210	1550	1030	1075	1260	855	875	955	780	790	830
125	56	595	615	685	490	500	535	360	365	375			
	70	1065	1105	1290	940	965	1060	765	775	810	570	575	595
	90	1445	1535	2110	1315	1380	1690	1115	1150	1285	1035	1055	1130
160	70	730	755	850	610	625	670	455	460	475			
	110	1715	1815	2450	1565	1640	2015	1335	1380	1540	1205	1235	1320
200	90	945	985	1140	800	825	900	610	620	645			
	140	2120	2255	2700	1955	2060	2625	1690	1755	2010	1540	1580	1725

Installation position

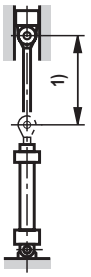
0°



45°



90°



1) Adm. stroke length

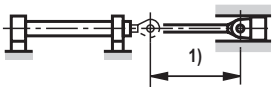
Admissible stroke length (dimensions in mm)

Type of mounting MS2

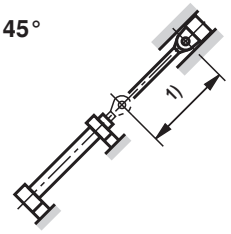
ØAL	ØMM	Admissible stroke length with 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	210 bar 0°	210 bar 45°	210 bar 90°
25	12	500	510	530	420	425	435	325	325	330			
	18	600	600	600	600	600	600	600	600	600	600	600	600
32	14	525	535	555	435	440	450	335	335	340			
	22	800	800	800	800	800	800	800	800	800	780	790	800
40	18	700	715	750	590	595	610	455	460	465			
	22	975	1000	1000	855	875	940	690	700	720	610	610	620
	28	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
50	22	835	850	895	705	710	730	545	550	555			
	28	855	1200	1200	1100	1130	1200	895	910	945	795	800	815
	36	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
63	28	1060	1086	1160	900	915	950	705	710	720			
	36	1400	1400	1400	1400	1400	1400	1185	1200	1255	1045	1055	1080
	45	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
80	36	1370	1405	1525	1175	1195	1250	930	935	955			
	45	1700	1700	1700	1700	1700	1700	1460	1480	1555	1295	1305	1340
	56	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
100	45	1685	1735	1910	1460	1485	1570	1165	1175	1205			
	56	2000	2000	2000	2000	2000	2000	1800	1835	1950	1595	1615	1670
	70	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
125	56	2075	2140	2300	1810	1845	1970	1455	1470	1515			
	70	2300	2300	2300	2300	2300	2300	2240	2290	2300	2010	2035	2120
	90	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300
160	70	2515	2595	2600	2200	2245	2415	1780	1800	1855			
	110	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600
200	90	2700	2700	2700	2700	2700	2700	2700	2700	2700			
	140	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700

Installation position

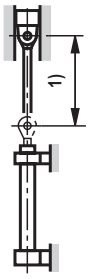
0°



45°



90°



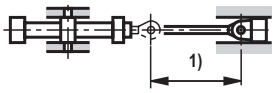
1) Adm. stroke length

Type of mounting MT4 (trunnion position in cylinder center)

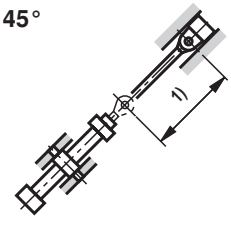
ØAL	ØMM	Admissible stroke length with 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	210 bar 0°	210 bar 45°	210 bar 90°
25	12	190	190	200	150	150	155	105	105	105			
	18	455	470	535	395	405	435	310	315	325	275	280	285
32	14	195	200	205	150	155	155	105	105	105			
	22	535	555	625	460	470	510	365	365	380	320	325	330
40	18	265	270	290	215	215	225	150	155	155			
	22	430	445	480	360	370	385	275	280	285	230	230	235
	28	670	700	825	590	605	670	475	480	505	430	435	445
50	22	330	335	355	265	270	280	190	195	195			
	28	570	590	645	485	495	520	375	380	390	315	315	320
	36	885	925	1115	785	810	910	640	655	690	580	590	610
63	28	435	445	470	355	360	375	265	265	270			
	36	755	780	865	650	660	700	510	575	530	430	430	440
	45	1095	1145	1390	975	1010	1140	800	815	870	725	735	765
80	36	585	595	630	480	485	505	340	360	365			
	45	890	920	1025	760	775	830	590	595	615	535	540	550
	56	1340	1400	1700	1195	1240	1405	1000	1010	1075	885	900	940
100	45	725	745	805	605	615	645	415	440	475			
	56	1090	1130	1295	940	965	1045	740	750	782	675	680	695
	70	1615	1700	2000	1460	1515	1770	1225	1255	1355	1115	1130	1185
125	56	900	925	1015	760	775	820	485	520	605			
	70	1340	1395	1640	1170	1205	1330	940	955	1000	855	865	890
	90	2035	2150	2300	1860	1945	2300	1590	1635	1815	1480	1510	1605
160	70	1100	1300	1255	935	955	1015	730	735	760			
	110	2410	2550	2600	2210	2315	2600	1905	1960	2180	1720	1755	1875
200	90	1420	1470	1680	1225	1255	1360	770	830	1020			
	140	2700	2700	2700	2700	2700	2700	2415	2495	2700	2195	2250	2240

Installation position

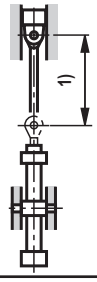
0°



45°



90°



1) Adm. stroke length

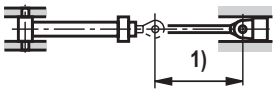
Admissible stroke length (dimensions in mm)

Type of mounting MT2

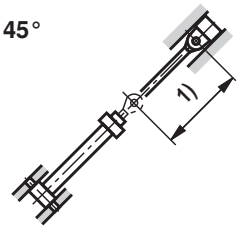
ØAL	ØMM	Admissible stroke length with 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	210 bar 0°	210 bar 45°	210 bar 90°
25	12	130	130	135	100	100	105	65	65	65			
	18	330	340	390	285	290	315	220	225	230	195	195	200
32	14	135	135	140	100	100	105	65	65	65			
	22	390	405	455	335	340	370	260	260	270	230	230	235
40	18	180	185	200	145	145	150	95	95	100			
	22	305	315	340	250	260	270	185	190	195	155	155	155
	28	485	505	600	425	435	485	335	345	360	305	305	315
50	22	230	235	245	180	185	190	125	125	125			
	28	410	425	465	345	350	370	260	265	270	220	220	225
	36	645	675	815	570	590	665	460	470	500	420	425	440
63	28	310	315	335	250	250	260	180	180	180			
	36	550	565	630	465	475	505	360	365	375	305	305	315
	45	800	840	1025	710	735	835	580	595	630	530	535	555
80	36	415	425	450	340	345	355	250	250	255			
	45	675	700	780	580	590	630	450	455	470	380	385	395
	56	980	1030	1260	875	905	1030	720	735	780	645	655	685
100	45	515	530	575	430	435	455	320	320	330			
	56	825	855	980	710	730	795	565	570	595	480	485	500
	70	1185	1245	1585	1065	1110	1300	890	915	990	815	830	870
125	56	640	660	730	540	550	580	410	410	425			
	70	1015	1060	1240	890	915	1010	715	725	760	615	625	640
	90	1495	1580	2110	1365	1425	1735	1160	1195	1330	1080	1105	1175
160	70	785	810	905	665	675	720	505	515	530			
	110	1770	1870	2505	1620	1695	2070	1390	1430	1595	1260	1290	1375
200	90	1015	1055	1210	870	895	970	680	685	715			
	140	2190	2325	2700	2025	2125	2695	1760	1825	2080	1610	1650	1790

Installation position

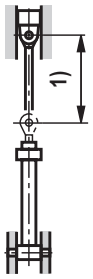
0°



45°



90°



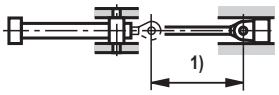
[1] **Adm. stroke length**

Type of mounting MT1

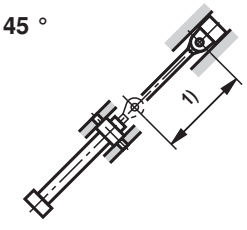
ØAL	ØMM	Admissible stroke length with 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	210 bar 0°	210 bar 45°	210 bar 90°
25	12	325	325	330	260	260	265	190	190	190			
	18	600	600	600	600	600	600	500	510	520	445	450	455
32	14	335	335	345	265	270	270	190	190	190			
	22	800	800	800	735	750	800	580	590	605	520	520	530
40	18	460	465	475	370	375	375	270	270	275			
	22	690	705	760	585	595	620	455	460	465	385	390	390
	28	1000	1000	1000	945	970	1000	760	770	800	685	690	705
50	22	550	555	570	450	450	455	330	330	335			
	28	905	930	1015	775	790	830	615	620	630	515	520	525
	36	1200	1200	1200	1200	1200	1200	1010	1025	1075	915	925	955
63	28	715	725	750	590	590	600	440	440	445			
	36	1175	1210	1335	1015	1035	1100	805	810	835	695	695	705
	45	1400	1400	1400	1400	1400	1400	1245	1270	1345	1135	1150	1190
80	36	940	955	995	780	785	805	590	590	600			
	45	1465	1510	1675	1270	1300	1375	1015	1025	1055	860	865	880
	56	1700	1700	1700	1700	1700	1700	1525	1555	1655	1385	1405	1460
100	45	1190	1210	1270	995	1005	1030	740	760	770			
	56	1790	1850	2000	1570	1600	1730	1270	1285	1330	1085	1095	1115
	70	2000	2000	2000	2000	2000	2000	1900	1945	2000	1740	1765	1850
125	56	1480	1505	1595	1245	1260	1300	965	970	980			
	70	2190	2270	2300	1935	1990	2175	1585	1605	1675	1375	1385	1420
	90	2300	2300	2300	2300	2300	2300	2300	2300	2300	2290	2300	2300
160	70	1805	1840	1965	1525	1545	1600	1185	1195	1210			
	110	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600
200	90	2340	2400	2610	2000	2035	2135	1575	1585	1620			
	140	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700

Installation position

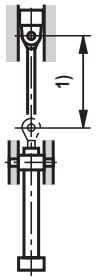
0 °



45 °



90 °



[1] **Adm. stroke length**

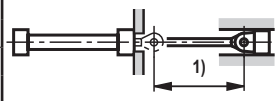
Admissible stroke length (dimensions in mm)

Type of mounting ME5, MX3, MX5

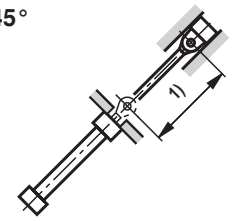
ØAL	ØMM	Admissible stroke length with 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	210 bar 0°	210 bar 45°	210 bar 90°
25	12	510	520	540	430	435	445	335	335	340			
	18	600	600	600	600	600	600	600	600	600	600	600	600
32	14	535	545	565	445	450	460	345	345	350			
	22	800	800	800	800	800	800	800	800	800	790	800	800
40	18	710	725	755	600	605	620	465	470	475			
	22	990	1000	1000	870	890	955	705	715	735	620	625	635
	28	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
50	22	850	865	910	720	725	750	560	565	570			
	28	1200	1200	1200	1125	1150	1200	920	930	965	810	815	830
	36	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
63	28	1080	1100	1170	920	930	965	720	725	740			
	36	1400	1400	1400	1400	1400	1400	1205	1225	1280	1065	1075	1100
	45	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
80	36	1390	1425	1545	1195	1215	1270	950	955	975			
	45	1700	1700	1700	1700	1700	1700	1485	1510	1580	1310	1325	1360
	56	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
100	45	1710	1760	1935	1480	1510	1590	1185	1195	1225			
	56	2000	2000	2000	2000	2000	2000	1815	1850	1965	1620	1635	1690
	70	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
125	56	2100	2165	2300	1830	1865	1990	1200	1280	1540			
	70	2300	2300	2300	2300	2300	2300	2255	2300	2300	2030	2060	2140
	90	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300
160	70	2540	2600	2600	2225	2275	2440	1805	1825	1885			
	110	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600
200	90	2700	2700	2700	2700	2700	2700	2360	2395	2510			
	140	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700

Installation position

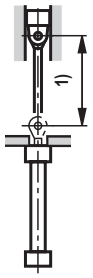
0°



45°



90°



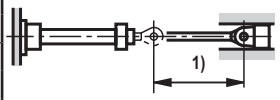
1) Adm. stroke length

Type of mounting ME6, MX1, MX2

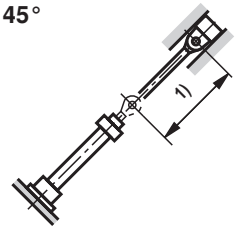
ØAL	ØMM	Admissible stroke length with 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	210 bar 0°	210 bar 45°	210 bar 90°
25	12	195	200	220	160	160	170	115	115	120			
	18	445	465	585	395	410	475	325	330	360	295	295	310
32	14	205	210	230	165	170	180	120	120	120			
	22	525	550	685	465	485	560	385	390	420	345	350	365
40	18	270	280	315	225	230	245	165	165	170			
	22	435	455	520	375	385	420	295	300	310	245	250	255
	28	645	680	895	580	605	730	485	500	555	450	460	480
50	22	335	350	390	280	285	305	210	210	220			
	28	580	600	700	505	515	565	400	405	425	335	340	350
	36	845	895	1200	770	805	990	655	675	755	605	620	655
63	28	445	460	520	375	385	415	285	290	300			
	36	760	795	940	670	690	765	540	550	580	465	470	490
	45	1045	1105	1400	955	1140	1240	815	845	955	765	780	835
80	36	590	610	690	505	515	555	390	395	410			
	45	940	980	1160	830	855	950	675	685	720	580	585	610
	56	1275	1350	1700	1170	1225	1520	1005	1035	1175	930	950	1025
100	45	725	755	885	630	645	710	495	505	530			
	56	1145	1200	1465	1025	1060	1205	850	865	920	730	740	770
	70	1530	1625	2000	1415	1485	1925	1230	1280	1485	1170	1195	1300
125	56	885	925	1110	775	800	900	620	635	670			
	70	1380	1450	1835	1245	1290	1500	1040	1065	1155	915	935	980
	90	1900	2025	2300	1770	1875	2300	1570	1640	1980	1525	1570	1745
160	70	1080	1130	1370	950	985	1110	770	785	835			
	110	2250	2395	2600	2105	2225	2600	1870	1950	2360	1780	1835	2045
200	90	1375	1445	1825	1225	1275	1485	1010	1035	1120			
	140	2700	2700	2700	2605	2700	2700	2340	2450	2700	2245	2325	2660

Installation position

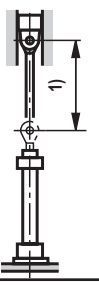
0°



45°



90°



1) Adm. stroke length

End position cushioning

End position cushioning:

The objective is to reduce the velocity of a moved mass, the center of gravity of which lies on the cylinder axis, to a level at which neither the cylinder nor the machine into which the cylinder is installed is damaged.

For velocities above 20 mm/s, we recommend the use of an end position cushioning feature, which absorbs energy without requiring the use of an additional device.

It must, however, always be checked whether end position cushioning is also required for lower velocities with large masses.

The series CDT3 / CGT3 is equipped with a progressive damping system.

Advantages of this damping system:

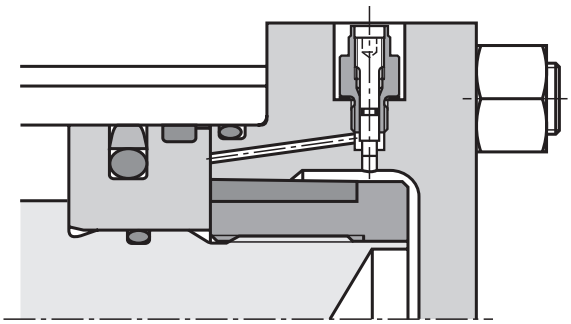
- Progressive delay.
- Short damping time.
- Effective damping length depending on the velocity.
- Due to low damping pressures and no pressure peaks, safety and the life cycle of the cylinder and the machine are increased.
- Insensitive to changes in pressure, temperature and the moved masses.
- Controlled end stop velocity of the piston – more safety and reliability.
- Quick start-up due to special check valve and floating bushing.

Cylinders with end position cushioning can achieve their full damping capacity only over the entire damping length.

With the adjustable end position cushioning version "E", a throttle valve is additionally provided when compared with version "D". End position cushioning version "E" allows cycle times to be optimized.
The max. damping capacity can only be achieved when the throttle valve is closed.

For special applications with very short stroke times, high velocities or large masses, cylinders with special end position cushioning versions can be offered on request.

When fixed or adjustable stops are used, special measures must be taken!

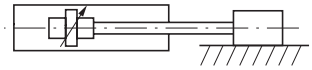


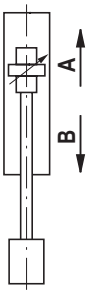
Damping capacity:

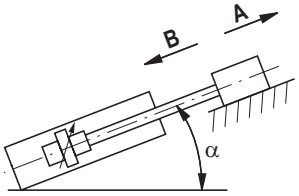
When decelerating masses via end position cushioning, the structural-inherent damping capacity must not be exceeded.

To this end, the kinetic energy and potential energy of the moved mass are to be calculated and compared to the admissible values from the diagrams on pages 58 and 59.

Energy determination







$$E = \frac{1}{2}\, m \cdot v^2$$

Retraction (A): $$E = \frac{1}{2}\, mv^2 - mg \cdot l_a$$

Extension (A): $$E = \frac{1}{2}\, mv^2 - mg \cdot l_a \cdot \sin \alpha$$

Extension (B): $$E = \frac{1}{2}\, mv^2 + mg \cdot l_a$$

Retraction (B): $$E = \frac{1}{2}\, mv^2 + mg \cdot l_a \cdot \sin \alpha$$

E	[Nm] [Joule]	Maximum value see pages 58 to 61
m	[kg]	Total moved mass incl. piston and rod

v	[m/s]	Max. velocity
g	[m/s^2]	9.81
l_a	[m]	Damping length, see page 59

End position cushioning

Damping lengths and weights
With cylinder strokes within the damping lengths, restrictions with regard to speed / cycle time are possible.
We recommend minimum stroke greater than the damping length plus 10 mm!

Cylinder Ø		25		32		40			50			63		
		12	18	14	22	18	22 [12]	28	22	28 [12]	36	28	36 [12]	45
l_a in mm	Head	15	15	16	16	23	23	23	22	22	22	25	25	25
	Base	15	15	16	16	23	23	23	22	22	22	25	25	25
m in kg	Piston	0.15	0.2	0.25	0.4	0.6	0.6	0.7	0.8	1	1.2	1.4	1.7	2.0
(kg/100 mm)	Rod	0.1	0.2	0.12	0.3	0.2	0.3	0.5	0.3	0.5	0.8	0.5	0.8	1.2
v_{max} [1]	(m/s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4

Cylinder Ø		80			100			125			160		200	
		36	45 [12]	56	45	56 [12]	70	56	70 [12]	90	70	110	90	140
l_a in mm	Head	27	27	27	28	28	28	33	33	33	36	36	40	40
	Base	27	27	27	28	28	28	33	33	33	36	36	40	40
m in kg	Piston	2.6	3	3.6	4.7	5.3	6.3	8.0	9.2	11	16	20	30	38
(kg/100 mm)	Rod	0.8	1.2	2.0	1.2	2	3.0	2.0	3	5.0	3.0	7.5	5.0	12
v_{max} [1]	(m/s)	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.25	0.25	0.25	0.25

[1] In case v_{max} is exceeded, please contact us.

[12] Piston rod Ø not standardized

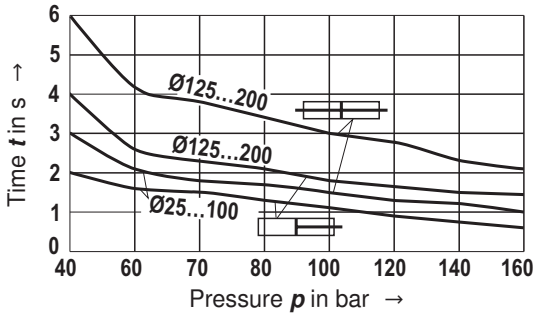
The diagrams on pages 60 and 61 are based on the preceding table, the maximum velocities specified with closed throttle screw.

With slower velocities, the absorbing energy decreases according to the formula.

$$E_U = E_{max} \cdot \frac{v_U}{v_{max}}$$

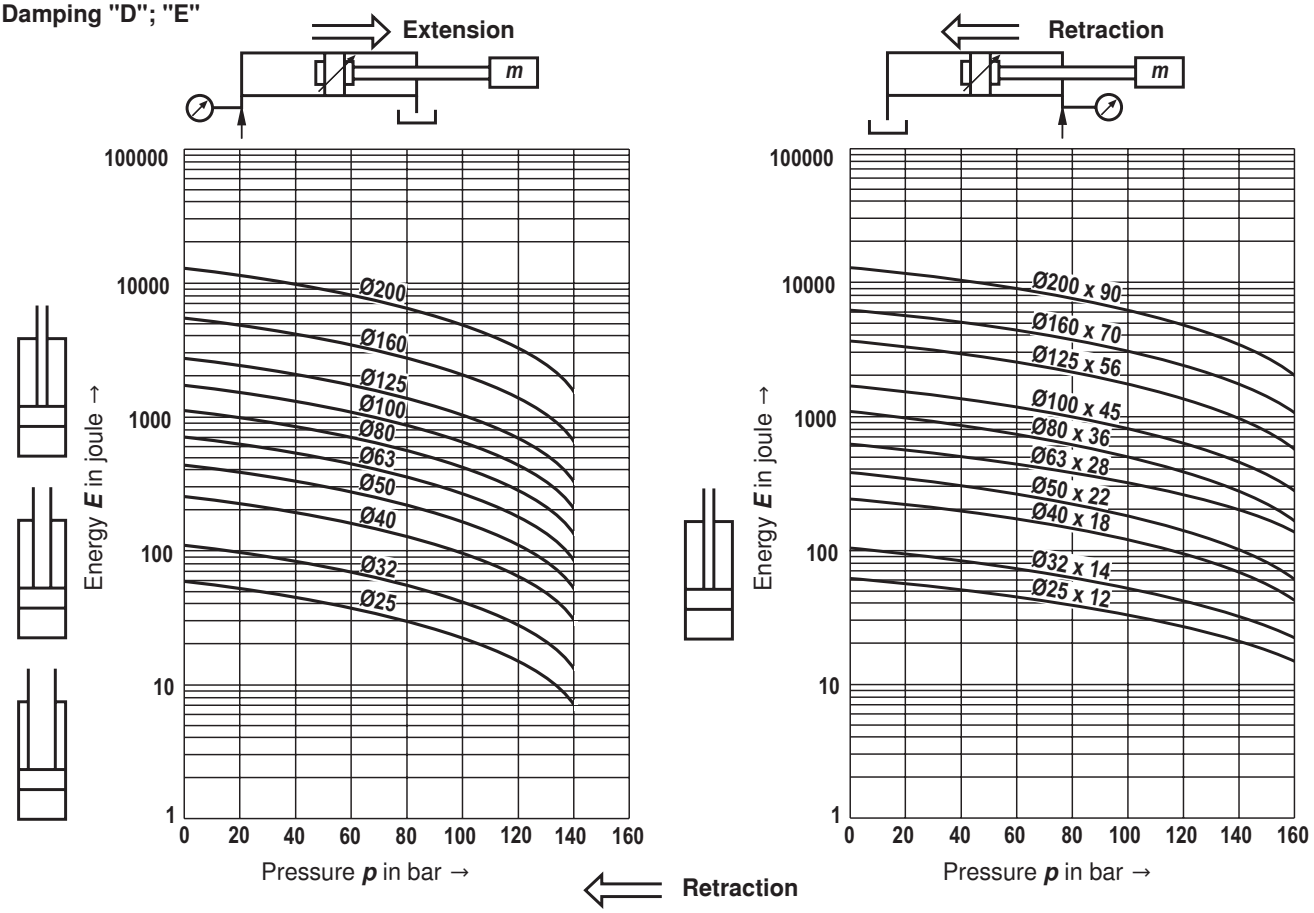
E_U = Energy absorbing
E_{max} = Energy max. see characteristic curve
v_U = Stroke velocity
v_{max} = Velocity max. for seal design "M"

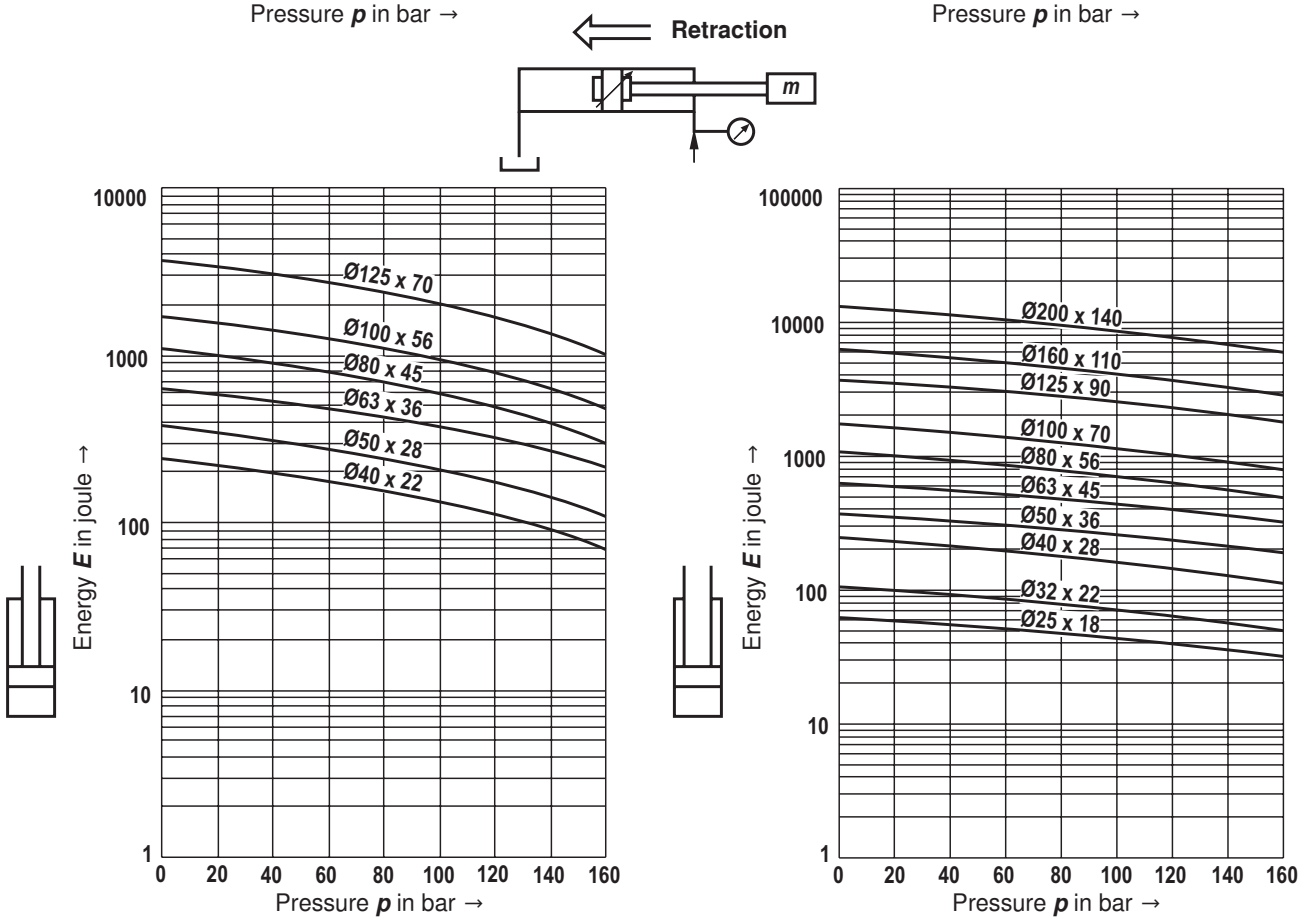
Max. damping time "D"; "E"



End position cushioning

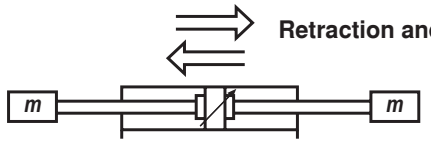
Damping "D"; "E"

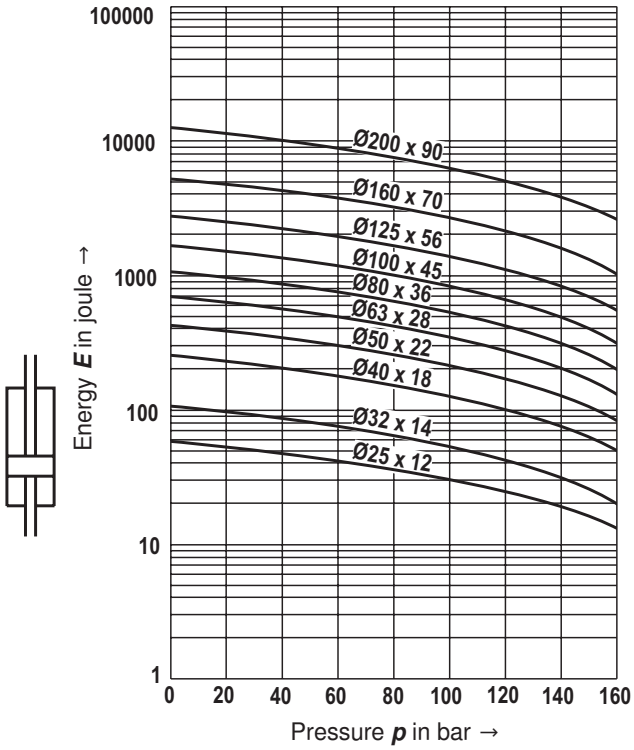


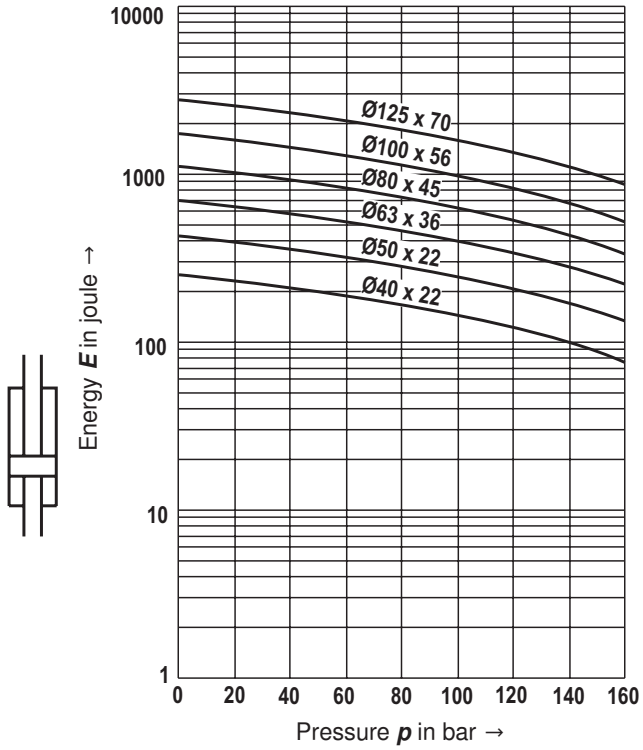


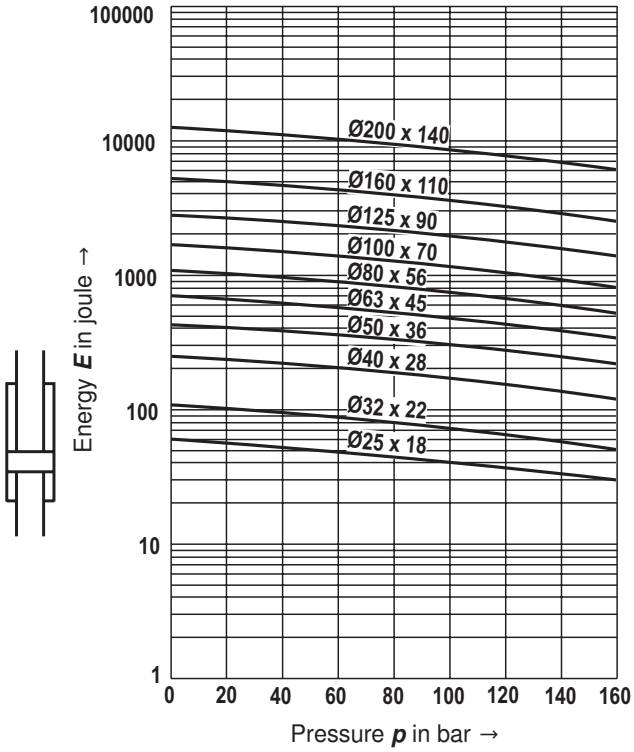
End position cushioning

Damping "D"; "E"



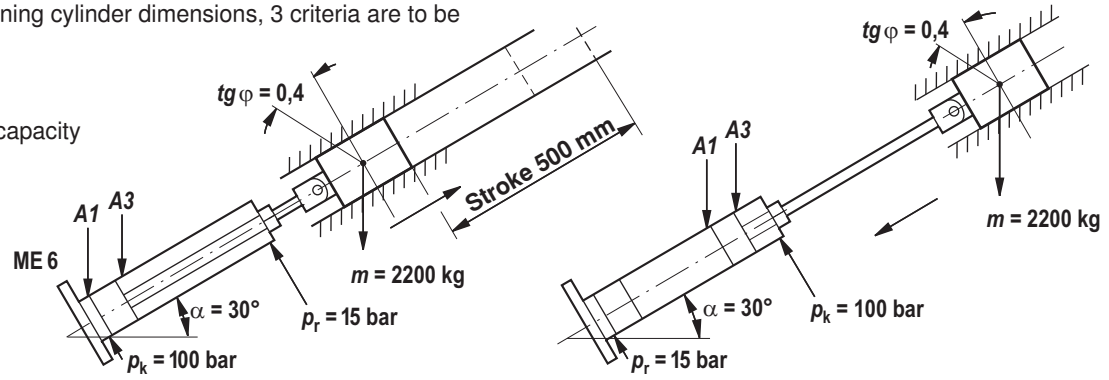






Calculation example

When designing cylinder dimensions, 3 criteria are to be considered:
– Force
– Kinking
– Damping capacity



Example:
Stroke time = 2 seconds
Load friction coefficient = $tg\ \varphi$ = 0.4 (estimated)
Available pressure p_k = 100 bar
Return flow pressure p_r = 15 bar
A1 = Piston surface, ***A3*** = Piston annulus surface
φ = Surface ratio ***A1*** / ***A3***, see page 6
m = Total moved mass, v = Velocity
l_a = Damping length, see page 59

To be determined:
Piston and piston rod diameter

Extend piston rod:
Overall efficiency $\eta = \eta 1 \cdot \eta 2$
$\eta 1$ = Cylinder efficiency = 0.9 (estimated)
$\eta 2$ = System efficiency

$$\eta 2 = \frac{p_k \cdot A1 - p_r \cdot A3}{p_k \cdot A1} = 1 - \frac{p_r}{p_k \cdot \varphi\ ^{1)}} = \frac{15}{100 \cdot 1.25} = 0.88$$

$$\eta = 0.9 \cdot 0.88 = 0.79$$

[1)] Assuming the smallest "φ"

Force required to move the mass:
F = Frictional force plus potential energy
$= tg\ \varphi \cdot m \cdot g \cdot \cos \alpha + m \cdot g \cdot \sin \alpha$
= 0.4 • 2200 • 9.81 • 0.866 + 2200 • 9.81 • 0.5 = 18270 N
= 18.27 kN
This theoretical force 18.27 kN with η = 0.79 results in a required force = 23.13 kN and thus, a cylinder piston diameter = 63 mm is necessary for p_k = 100 bar, see page 6

Retract piston rod:
F = Frictional force minus potential energy
$= tg\ \varphi \cdot m \cdot g \cdot \cos \alpha - m \cdot g \cdot \sin \alpha$
= 0.4 • 2200 • 9.81 • 0.866 – 2200 • 9.81 • 0.5
= – 3315 N = – 3.3 kN no force problem during retraction

Test of bending length:
For p_k = 100 bar and cylinder 63 / 28, the table on page 57 results in a maximum admissible stroke = 385 mm:
So the cylinder kinks

There are 2 possibilities:
– Select piston rod diameter 45,
max. admissible stroke = 1140 mm, i.e. kinking-proof
– Change the type of mounting, e.g. MS2 with a
maximum admissible stroke = 915 mm

Test of the end position cushioning

Average velocity 0.5 / 2 = 0.25 m/s
Max. Velocity v_u = 0.275 m/s
(estimated correction coefficient = 1.1 due to start-up and braking)

Damping capacity required for piston rod extension =

$$\frac{m \cdot v_u^2}{2} - m \cdot g \cdot l_a \cdot \sin \alpha = \frac{2200 \cdot 0.275^2}{2} - 2200 \cdot 9.81 \cdot 0.025 \cdot 0.5 = -186 \text{ joules}$$

No damping problem for piston rod extension

Damping capacity required for piston rod retraction =

$$\frac{m \cdot v_u^2}{2} + m \cdot g \cdot l_a \cdot \sin \alpha = \frac{2200 \cdot 0.275^2}{2} + 2200 \cdot 9.81 \cdot 0.025 \cdot 0.5 = 353 \text{ joules}$$

Diagram on page 60 results in 445 joules for p_k = 100 bar and v_{max} = 0.4 m/s, i.e. the cylinder can absorb energy for 0.275 m/s (see page 59):

$$E_u = E_{max} \cdot \frac{v_u}{v_{max}} = 445 \cdot \frac{0.275}{0.4} = 306 \text{ joules}$$

So the cylinder cannot absorb the necessary damping capacity:
you have to select the next larger diameter 80 / 56.

Selection criteria for seals

	Work and environmental conditions	Seal versions M	T	S
Medium / temperature	**Medium HL, HLP** / operating temperature medium –20 °C to +80 °C	++	++	++
	Medium HFA / operating temperature medium +5 °C to +55 °C	+/–	++	+/–
	Medium HFC / operating temperature medium –20 °C to +60 °C	–	++	–
	Medium HFD-R / operating temperature medium –15 °C to +80 °C	–	–	++
	Medium HFD-U / operating temperature medium –15 °C to +80 °C	–	–	++
	Ambient and rod temperature in the area of the piston rod from –20 °C to +80 °C [1]	++	+	++ [2]
	Extended ambient and rod temperature in the area of the piston rod from +80 °C to +120 °C	–	–	++
Function / velocity...	Static holding function more than 10 minutes: Attention! Application- and temperature-dependent	++	+	+
	Static holding function short-time < 1 minute	++	++	++
	Robust application conditions: Steel works, mining, thin ice	++	–	–
	Zero point control, hardly any amplitude, frequency max. 5 Hz, not longer than 5 minutes	–	++	++
	Cylinder velocity min. 0.001 m/sec stick-slip behavior	++	++	++
	Cylinder velocity from 0.01 m/sec to 0.5 m/sec	++	++	++
	Cylinder velocity > 0.5 m/sec to max. 0.8 m/sec	–	++	++
	Stroke > 1.0 m	+/–	++	++
	Standstill period (wear)	++	++	++
	undissolved air in the oil [3]	–	+	+

++ = very good + = good +/– = conditional, depending on the application parameters – = inappropriate

General technical data in corresponding data sheets will remain valid, see page 2!

1) Moreover, observe the corresponding medium temperature range

2) Lower temperature limit –15 °C

3) – Seal is destroyed / + Seal is not directly destroyed, leaks may occur

Generally, a medium temperature of approx. 40 °C is recommended. The specified values are to be regarded as guidelines; depending on the application, it may be necessary to check the suitability of the seal system.

Seal kits

Seal kit complete

ØAL	ØMM	Material no. for seal design CDT3			Material no. for seal design CGT3		
		M	T	S	M	T	S
25	12	R961008000	R961008026	R961008052	R961008078	R961008104	R961008130
	18	R961008001	R961008027	R961008053	R961008079	R961008105	R961008131
32	14	R961008002	R961008028	R961008054	R961008080	R961008106	R961008132
	22	R961008003	R961008029	R961008055	R961008081	R961008107	R961008133
40	18	R961008004	R961008030	R961008056	R961008082	R961008108	R961008134
	22	R961008005	R961008031	R961008057	R961008083	R961008109	R961008135
	28	R961008006	R961008032	R961008058	R961008084	R961008110	R961008136
50	22	R961008007	R961008033	R961008059	R961008085	R961008111	R961008137
	28	R961008008	R961008034	R961008060	R961008086	R961008112	R961008138
	36	R961008009	R961008035	R961008061	R961008087	R961008113	R961008139
63	28	R961008010	R961008036	R961008062	R961008088	R961008114	R961008140
	36	R961008011	R961008037	R961008063	R961008089	R961008115	R961008141
	45	R961008012	R961008038	R961008064	R961008090	R961008116	R961008142
80	36	R961008013	R961008039	R961008065	R961008091	R961008117	R961008143
	45	R961008014	R961008040	R961008066	R961008092	R961008118	R961008144
	56	R961008015	R961008041	R961008067	R961008093	R961008119	R961008145
100	45	R961008016	R961008042	R961008068	R961008094	R961008120	R961008146
	56	R961008017	R961008043	R961008069	R961008095	R961008121	R961008147
	70	R961008018	R961008044	R961008070	R961008096	R961008122	R961008148
125	56	R961011580	R961011587	R961011595	R961011603	R961011610	R961011617
	70	R961011581	R961011588	R961011596	R961011604	R961011611	R961011618
	90	R961011582	R961011589	R961011597	R961011605	R961011612	R961011619
160	70	R961011583	R961011590	R961011598	R961011606	R961011613	R961011620
	110	R961011584	R961011591	R961011599	R961011607	R961011614	R961011621
200	90	R961011585	R961011592	R961011601	R961011608	R961011615	R961011622
	140	R961011586	R961011593	R961011602	R961011609	R961011616	R961011623

Seal kit CST3 only for cylinder [1)]

ØAL	ØMM	Material no. for seal design CST3		
		M	T	S
40	28	R961008006	R961008032	R961008058
50	28	R961008008	R961008034	R961008060
	36	R961008009	R961008035	R961008061
63	36	R961008011	R961008037	R961008063
	45	R961008012	R961008038	R961008064
80	45	R961008014	R961008040	R961008066
	56	R961008015	R961008041	R961008067
100	56	R961008017	R961008043	R961008069
	70	R961008018	R961008044	R961008070
125	70	R961011581	R961011588	R961011596
	90	R961011582	R961011589	R961011597
160	70	R961011583	R961011590	R961011598
	110	R961011584	R961011591	R961011599
200	90	R961011585	R961011592	R961011601
	140	R961011586	R961011593	R961011602

ØAL = Piston Ø

ØMM = Piston rod Ø

[1)] Seal kits for position measurement system and subplate mounting separate material no.

Seal kits

Only for subplate mounting

Subplates NG	Material number for seal design	
	M, T	S
6	R961008236	R961008239
10, 16	R961011631	R961011632

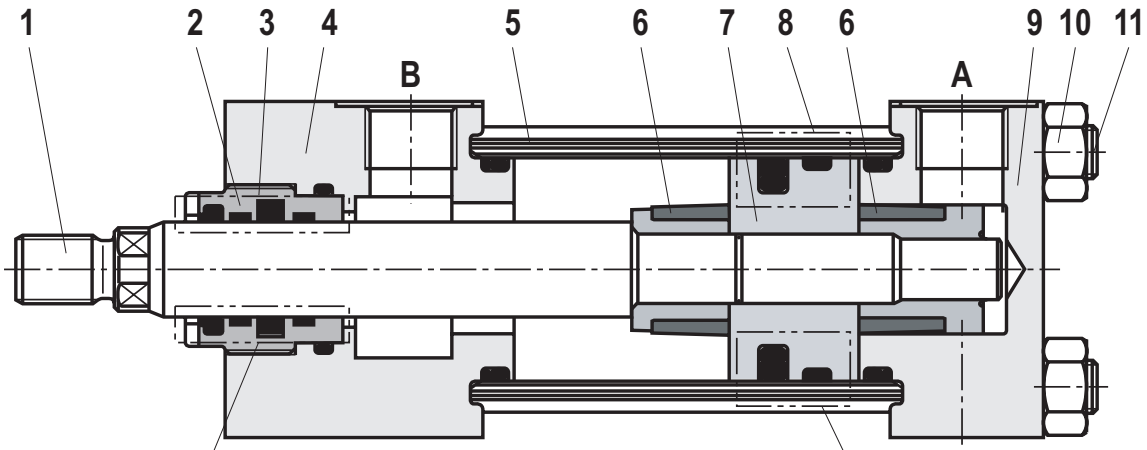
Only for position measurement system

ØAL	Material number for seal design	
	M, T	S
40	R961008156	R961008161
50	R961008157	R961008162
63	R961008158	R961008163
80	R961008159	R961008164
100	R961008160	R961008165
125	R961011625	R961011626
160	R961011627	R961011628
200	R961011629	R961011630

Tightening torques

ØAL	ØMM	Tightening torques for tie rod nut in Nm for types of mounting	
		ME5/6, MP1/3/5, MS2, MT1/2/4, MX3/5	MX1/2
25	12	5.5	4
	18		
32	14	8	6
	22		
40	18	20	15
	22		
	28		
50	22	50	37
	28		
	36		
63	28	60	45
	36		
	45		
80	36	125	90
	45		
	56		
100	45	190	140
	56		
	70		
125	56	400	300
	70		
	90		
160	70	800	600
	110		
200	90	1250	900
	140		

Spare parts: Series CDT3



Piston rod seals

Ø25 – 32 and Ø40/18

M

T, S

Ø40/22, Ø40/28 and Ø50 – 200

M

T, S

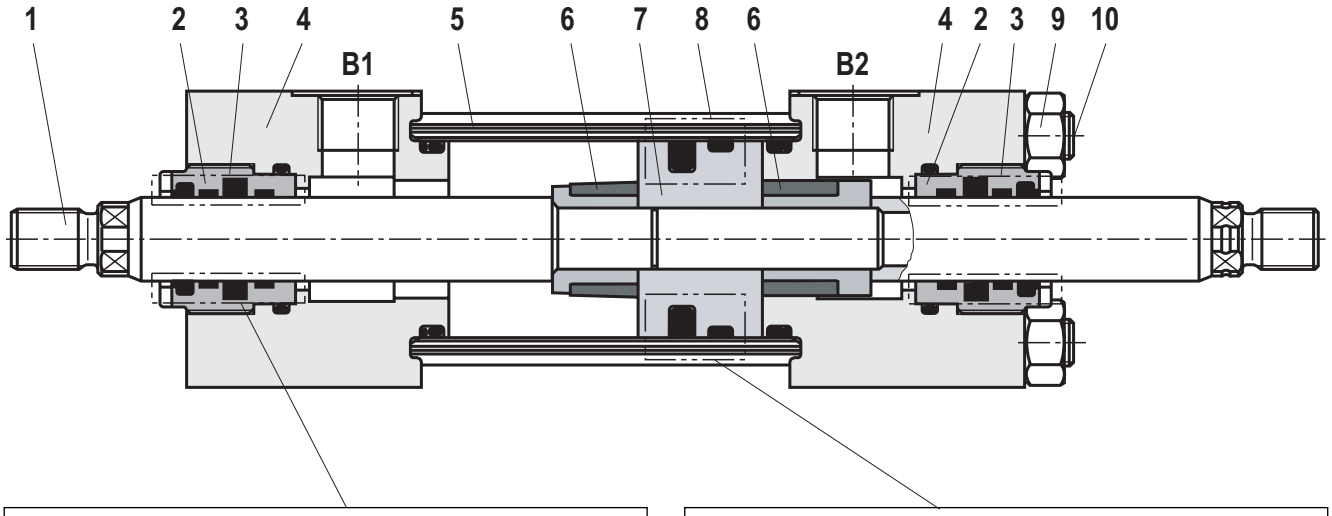
Piston seals

M, T, S for piston Ø25 – 63

M, T, S for piston Ø80 – 200

A Piston chamber
B Annulus area
1 Piston rod
2 Guide socket
3 Piston rod seal
4 Cylinder head
5 Cylinder pipe
6 Damping bush
7 Piston
8 Piston seal
9 Cylinder base
10 Nut
11 Tie rod

Spare parts: Series CGT3



Piston rod seals

Ø25 – 32 and Ø40/18

M

T, S

Ø40/22, Ø40/28 and Ø50 – 200

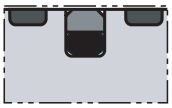
M

T, S

Piston seals

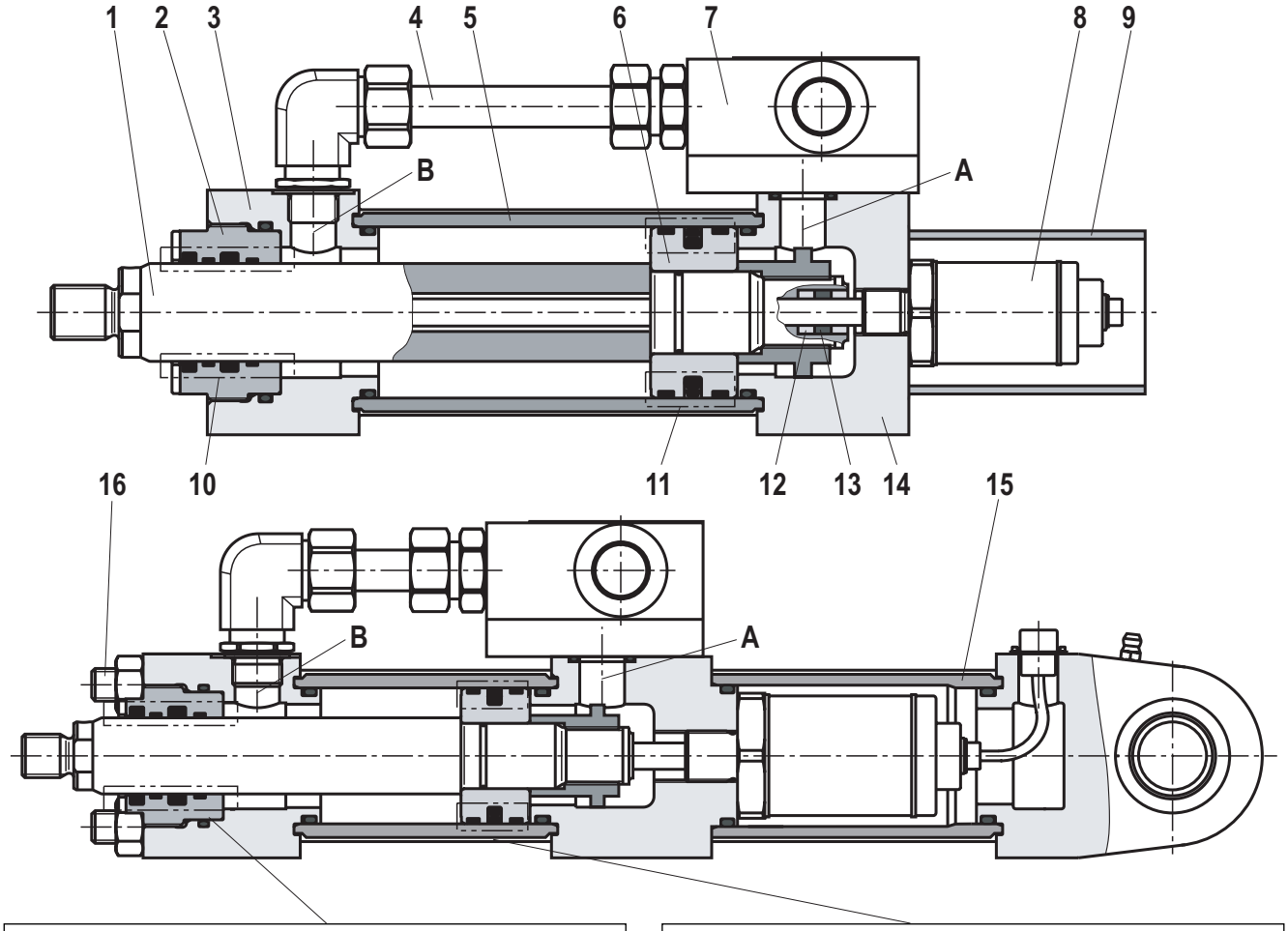
M, T, S for piston Ø25 – 63

M, T, S for piston Ø80 – 200



B1 Annulus area 1
B2 Annulus area 2
1 Piston rod
2 Guide socket
3 Piston rod seal
4 Cylinder head
5 Cylinder pipe
6 Damping bush
7 Piston
8 Piston seal
9 Nut
10 Tie rod

Spare parts: Series CST3



Piston rod seals

Ø40 – 200

M

T, S

Piston seals

M, T, S for piston Ø40 – 63

M, T, S for piston Ø80 – 200

A Piston chamber
B Annulus area
1 Piston rod
2 Guide socket
3 Cylinder head
4 Piping
5 Cylinder pipe
6 Piston
7 Subplate
8 Position measurement system
9 Protective pipe
10 Piston rod seal
11 Piston seal
12 Insulating socket
13 Solenoid
14 Cylinder base
15 Connection pipe
16 Tie rod

Weight for cylinder (in kg)

CDT3 / CGT3

ØAL	ØMM	MX1, ME5, MS2		ME6, MP3, MP1		MP5		MT4		MX2, MX3, MX5 (in case of CGT3 **without** MX2)		MT1, MT2 (in case of CGT3 **without** MT2)		Stroke 100 mm	
		CDT3	CGT3	CDT3	CGT3	CDT3	CGT3	CDT3	CGT3	CDT3	CGT3	CDT3	CGT3	CDT3	CGT3
25	12	1.1	1.2	1.1	–	1.0	–	1.3	1.4	1.0	1.1	1.1	1.2	0.4	0.5
	18	1.2	1.4	1.2	–	1.1	–	1.4	1.6	1.1	1.3	1.2	1.4	0.6	0.8
32	14	1.5	1.6	1.6	–	1.4	–	1.8	1.9	1.4	1.5	1.5	1.6	0.5	0.6
	22	1.6	1.9	1.7	–	1.5	–	1.9	2.2	1.5	1.8	1.6	1.9	0.6	0.9
40	18	3.4	3.6	3.4	–	3.2	–	4.1	4.3	3.1	3.3	3.2	3.4	0.8	1.0
	22 [12]	3.4	3.8	3.4	–	3.2	–	4.1	4.5	3.1	3.5	3.2	3.6	0.9	1.2
	28	3.5	4.0	3.5	–	3.3	–	4.2	4.7	3.2	3.7	3.3	3.8	1.1	1.6
50	22	5.3	5.7	5.3	–	4.9	–	6.6	7.0	4.8	5.2	4.9	5.3	1.1	1.4
	28 [12]	5.4	6.0	5.4	–	5	–	6.7	7.3	4.9	5.5	5	5.6	1.3	1.8
	36	5.5	6.4	5.5	–	5.1	–	6.8	7.7	5.0	5.9	5.1	6.0	1.6	2.4
63	28	7.7	8.3	7.7	–	7.3	–	9.2	9.8	7.0	7.6	7.3	7.9	1.4	1.9
	36 [12]	7.9	8.8	7.8	–	7.4	–	9.3	10.3	7.1	8.1	7.4	8.4	1.7	2.5
	45	8.2	9.7	8.0	–	7.6	–	9.5	11	7.3	8.8	7.6	9.1	2.2	3.4
80	36	14	15	14	–	14	–	18	19	12	13	15	15	2.2	3.0
	45 [12]	14	16	14	–	14	–	17	20	13	14	14	16	2.6	3.8
	56	15	17	15	–	15	–	19	21	14	16	15	17	3.3	5.2
100	45	20	22	20	–	20	–	24	26	19	20	22	24	3.3	4.5
	56 [12]	20	23	20	–	19	–	24	27	18	21	22	25	4.1	6.1
	70	21	25	21	–	21	–	25	29	19	23	23	27	5.1	8.1
125	56	38	41	39	–	38	–	46	49	35	39	43	46	6.3	8.2
	70 [12]	38	43	39	–	38	–	46	51	35	41	43	48	7.3	10.3
	90	39	46	40	–	39	–	48	55	37	44	44	51	9.3	14
160	70	62	68	67	–	63	–	78	83	59	65	64	69	8.7	12
	110	64	75	69	–	65	–	80	91	61	72	67	79	13.2	21
200	90	112	124	120	–	115	–	147	158	107	118	114	126	13.4	18
	140	115	137	123	–	117	–	149	171	109	131	117	138	20.5	33

Swivel head, clevis bracket and trunnion bearing block see pages 49 to 53

Subplates see page 46

[12] Piston rod Ø not standardized

Weight for cylinder (in kg)

CST3

ØAL	ØMM	ME5, MS2	MP5	MT4	MX5	Stroke 100 mm
40	**28**	3.5	3.8	4.2	3.2	1.1
50	**28** [12)]	5.4	5.8	6.7	4.9	1.3
	36	5.5	5.9	6.8	5.0	1.6
63	**36** [12)]	7.9	8.5	9.3	7.1	1.7
	45	8.2	8.7	9.5	7.3	2.2
80	**45** [12)]	14	16.1	17	13	2.6
	56	15	17.3	19	14	3.3
100	**56** [12)]	20	21.8	24	18	4.1
	70	21	24.1	25	19	5.1
125	**70** [12)]	38	43.7	46	35	7.3
	90	39	44.8	48	37	9.3
160	**70**	62	72.5	78	59	8.7
	110	64	74.8	80	61	13.2
200	**90**	112	132	147	107	13.4
	140	115	134.5	149	109	20.5

Swivel head, clevis bracket and trunnion bearing block see pages 49 to 53

Subplates see page 46

[12)] Piston rod Ø not standardized

Corrosivity categories

In this connection, observe the information on the color set-up on page 2 "Technical data".
The specified resistances of the individual Bosch Rexroth classes only refer to the primed / painted cylinder areas, not, for example, to piston rods, trunnions, etc.
In this connection, special measures may be necessary.

	Class	Properties	Applications	
			Inside	Outside
Priming	CP3 (C3, short [1)])	240 h salt spray test SST (DIN EN ISO 9227) 240 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: at least 40 µm	Field of application e. g. hall atmosphere, air humidity ≤ 60%, no thermal load.	Not suitable for outdoor exposure.
Painting	CP4 (C3, medium [1)])	480 h salt spray test SST (DIN EN ISO 9227) 480 h condensation water test KKT (DIN EN ISO 6270-2) Nominal layer thickness: 120 µm	Unheated buildings in which there may be condensation (production rooms, storage and sport halls).	Urban and industrial atmosphere with little salt or sulfur dioxide load.

[1)] according to DIN EN ISO 12944-2

The Drive & Control Company

Rexroth
Bosch Group

Large hydraulic cylinders: Customized solutions

The perfect fit

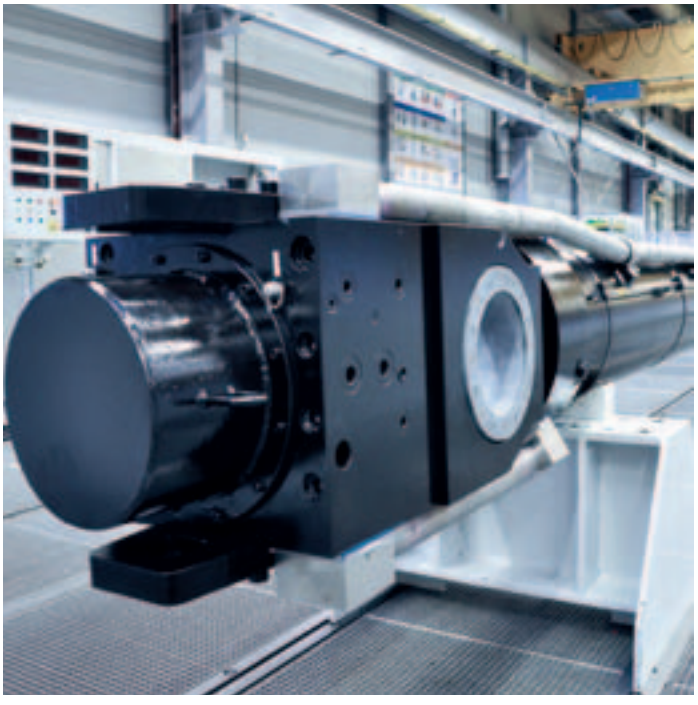
At Rexroth, your project is our challenge. We design and manufacture custom built cylinders, high pressure piston accumulators and pressure vessels for your individual applications. Our large hydraulic cylinders range from bore 200 mm up to 1.500 mm and strokes up to 24.000 mm. Our highly skilled specialists have a unique expertise for a large variety of industry sectors and know the special requirements of your application.

Rexroth has an outstanding track record of building large hydraulic cylinders for more than five decades. Our proven application-based engineering and production processes give you the assurance that every cylinder is perfectly crafted and suited to its task. Safe and reliable operations are important to all industries where these heavy cylinders are used. We work consistently to maintain industry-specific standards from classification societies such as LLOYD's Register, DNV, the American Bureau of Shipping, Rexroth and customer standards.

One of the most essential parts of large hydraulic cylinders is the piston rod surface. Rexroth has been a pioneer and trend setter in developing new technologies that improve uptime and reduce Total Cost of Ownership. All in-house surface technologies are bundled under the brand name Rexroth Enduroq.

Rexroth offers more than unusual dimensions and dedicated surface technologies. We deliver extra functionalities like integrated measuring systems, as well as complete drive and control solutions with perfectly matched power units, hydraulic piping and control systems. And we supply additional services like project management, engineering, commissioning, supervising and training. One-stop-shopping at Rexroth reduces the complexity of your project by instating clearly structured responsibilities.

As a global player with an international network in production, sales and service, Rexroth is always as big as you need it: as a cylinder supplier; as a main contractor for drive and control projects; and/or as a partner for lifecycle management support. Large hydraulic cylinders from Rexroth give your machinery the perfect fit – every time!



Engineering and production: Using the real performance potential

Large hydraulic cylinders are used to transmit heavy forces in often extreme environments. Additionally, they must operate reliably and safely over a long period of time. Only systemized engineering and production processes can make sure that the cylinder always meets the individual requirements. Rexroth has developed sophisticated design tools and unique inhouse research facilities for a reliable and cost-efficient cylinder design.

Avoiding deflection and buckling

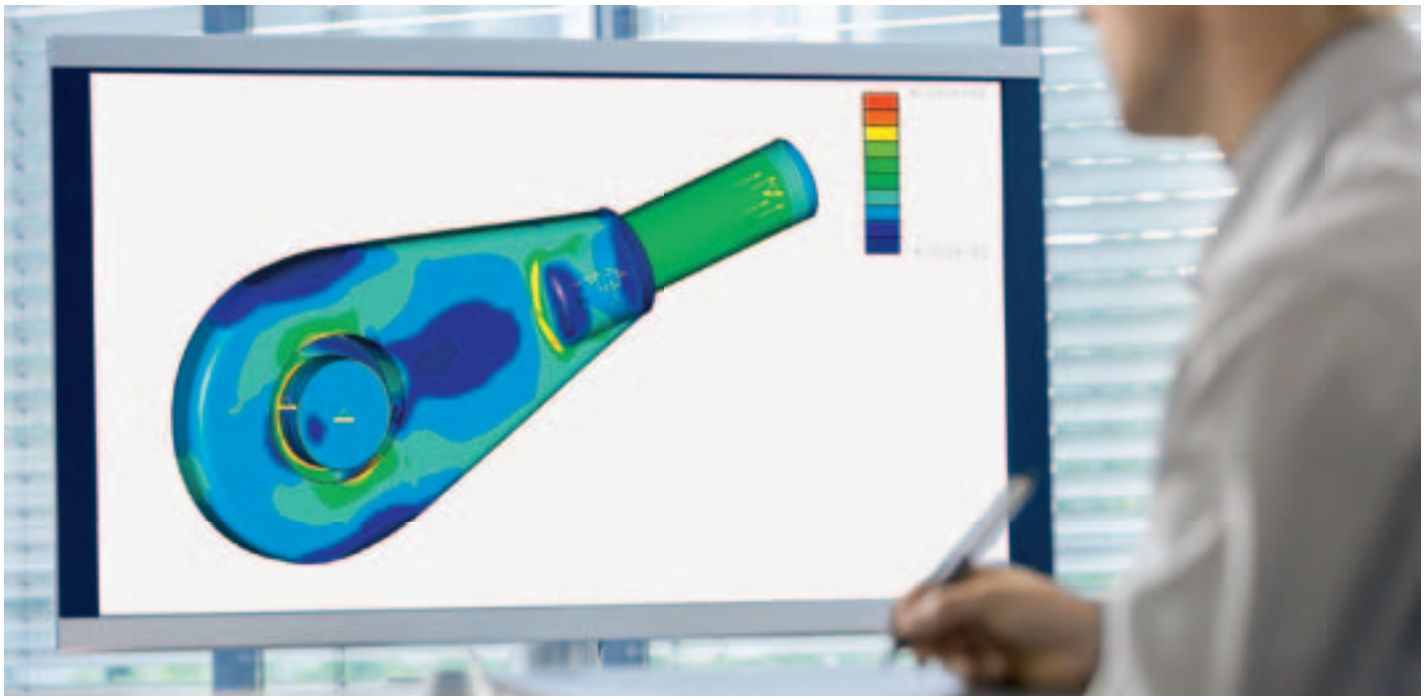
Our experts calculate the deflection and buckling of hydraulic cylinders. All typical mounting styles, friction moments in spherical bearings, transverse loads, accelerations and eccentric loads are taken into account. The calculations also encompass typical phenomena as ballooning of the shell, fabrication clearances in the cylinder guiding and identification of the bearing material. The result is a precise prediction of the cylinder under pushing as well as pulling loads.

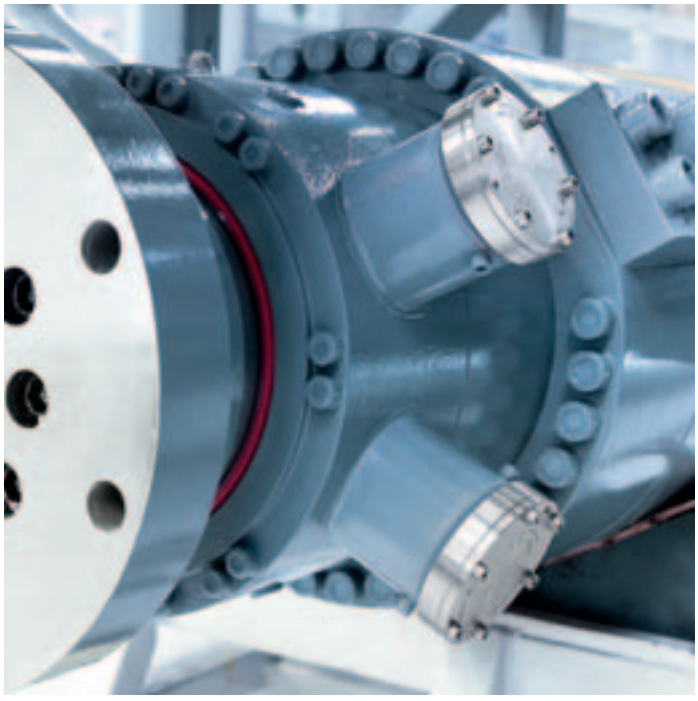
The eccentric position of the rod in the head, as well as the piston in the shell, is thoroughly analyzed. Local stresses in the rod, shell and bearings are precisely calculated. In several cases a force stroke diagram is required. These advanced and detailed calculations are the basis for a reliable and cost-efficient cylinder design.

◄ **Unique inhouse research facilities**

► **Calculating every detail to develop the perfect cylinder that stands any individual demand**

► **Integrated electronics for measuring systems**





Preventing fatigue

Rexroth has developed several unique construction details, as well as a set of demands for the materials, in addition to the applicable standards. These details are calculated with FEM (Finite Element Method) and combined with calculation methods according to recognized standards in order to realise a reliable design without critical fatigue.

The calculations cover parameters such as material type and thickness, local stresses, amplitudes, stress gradients and the number of load cycles. A load spectrum is required for cylinders in dynamic applications.

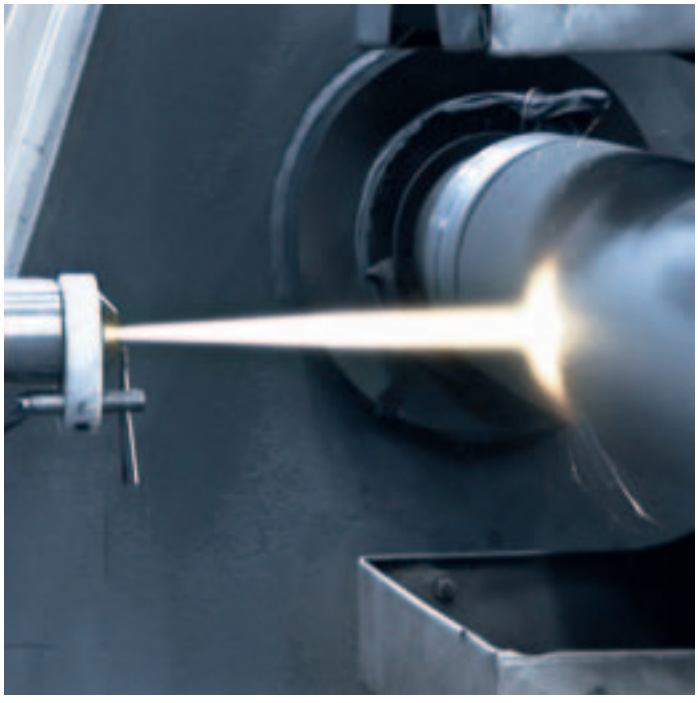
The art of surface technologies: Improving uptime whilst reducing Total Cost of Ownership

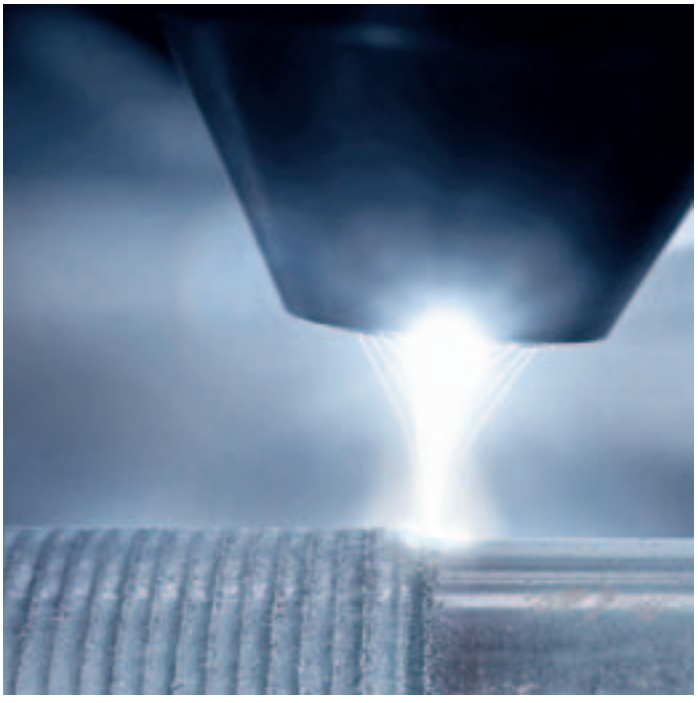
The piston rod surface of large hydraulic cylinders is one of the most essential parts of the hydraulic installation. The right combination of surface technology, seal concept and hydraulic medium defines the eventual uptime and Total Cost of Ownership. Rexroth has been one of the pioneers and trend setters in developing various in-house technologies for every industry and application.

Best surface technology

Rexroth Enduroq uses an integrated concept for selecting, engineering and producing the best surface technology in any industry or application. It bundles all in-house surface technologies for piston rods. To develop this concept, Rexroth analyzed service data from its installed cylinder base, which is the largest one in the world.

Enduroq 3200 is a dual layer, Ultimet-based, surface technology. It was specially developed for offshore splash zones (e.g. direct riser tensioners) and meets the highest qualification standard in the industry*. This standard has been developed by DNV in the Joint Industry Project, and Rexroth has played a prominent role in this development.





Other solutions
Other solutions for the cylinder rod surface include Enduroq 3000, a single layer Ultimet-based technology, as well as Enduroq 2000 and Enduroq 2200 which are both based on the proven HVOF technologies. Rexroth can also supply chromium-plated piston rods in applications where this has proven to offer the best combination of functionality, durability and Total Cost of Ownership.

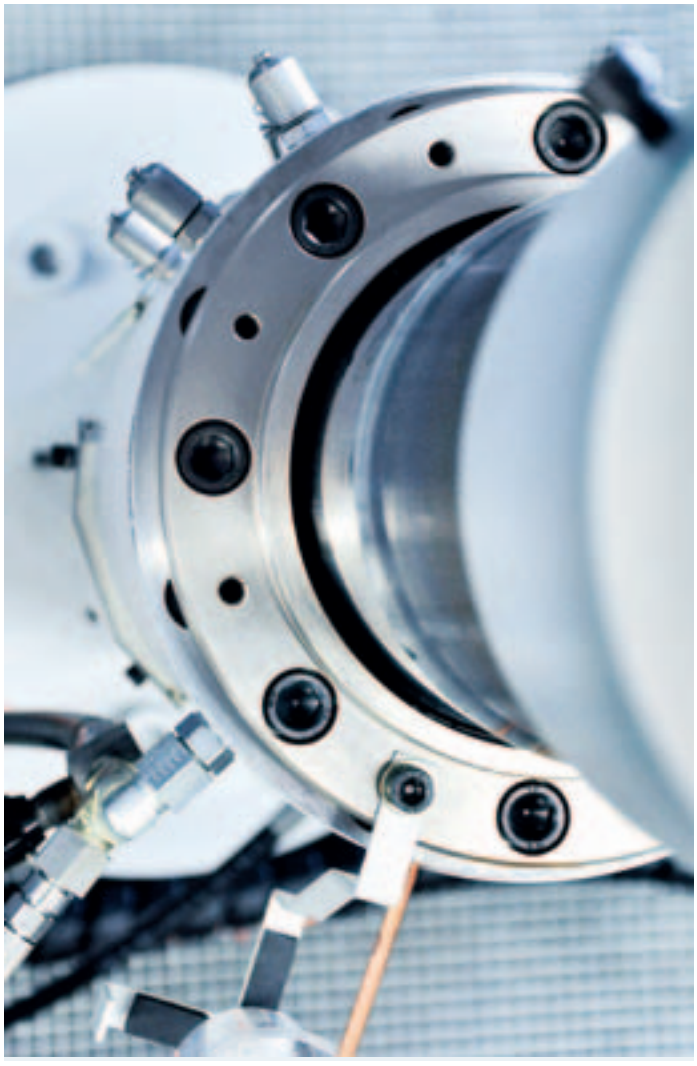
Seal configuration
Rexroth has developed a Seal Matrix for all kind of applications and piston rod surfaces. This matrix is the result of an extensive 'tribology' development program in co-operation with world leading seal manufacturers. Tribology analyzes friction, lubrication and wear of interacting surfaces in motion.

Some seal configurations are able to withstand the complete extrusion gap, fit for speeds up to 15 m/s, useable for low-friction applications and have excellent wear properties. Other seal configurations are adjustable, maintenance friendly and non-sensitive to dirt.

**Guideline for qualification of wear and corrosion protection surface materials for piston rods (Report No. 2009-3295; revised 2010).*

▶ **Exposed environment** ▼ **Surface technology**	Non-corrosive environment	Mild marine atmospheric open zone	Marine atmospheric sheltered zone	Seawater submerged, marine splash zone
Chromium	●			
Ni/Chromium	●	●		
Enduroq 2000	●	●	●	
Enduroq 2200	●	●	●	●
Enduroq 3000	●	●	●	●
Enduroq 3200	●	●	●	●

◀ **Rexroth Enduroq surface technologies for piston rods**
▶ **Seal testing**

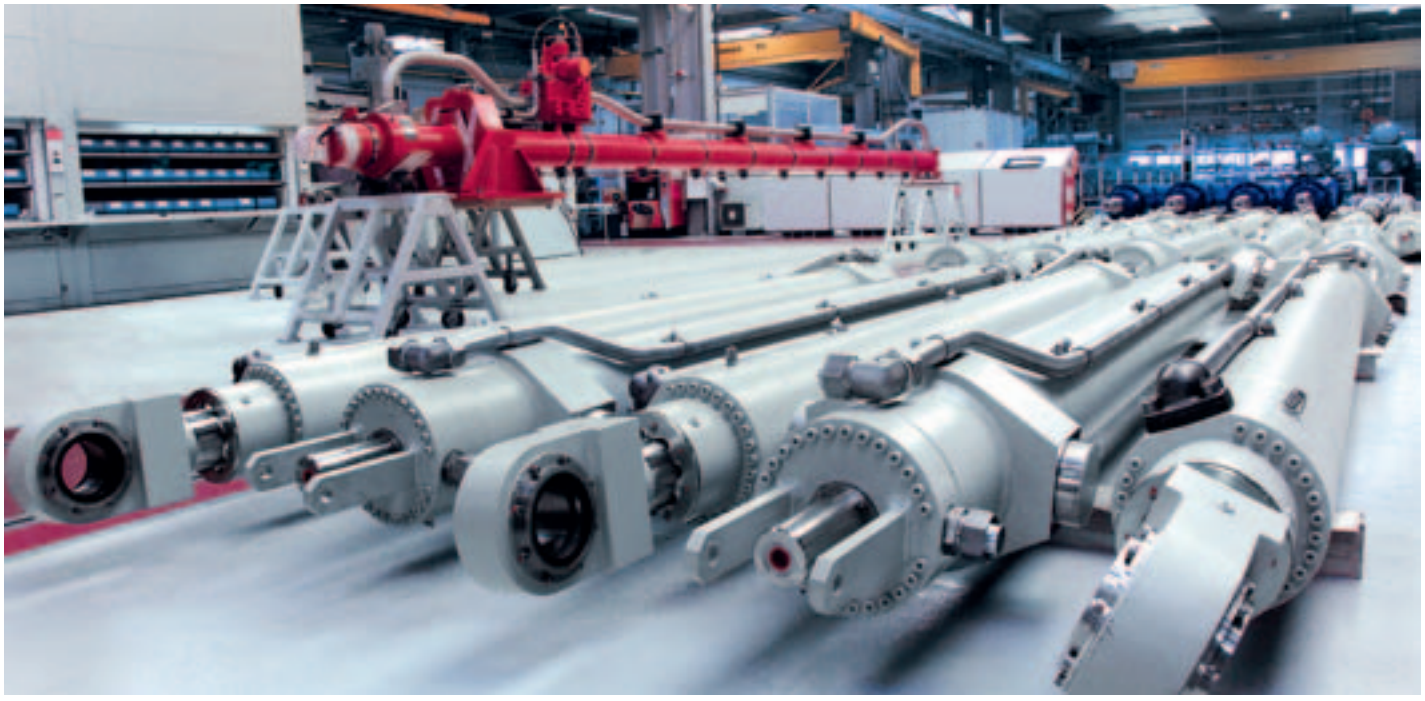


Life cycle management: Improving overall equipment effectiveness

More than 90 % of the life cycle costs are determined during the design phase. As a partner already in the engineering phase of the installation, Rexroth can save you maintenance time and costs, not to mention improving availability over the complete life cycle.

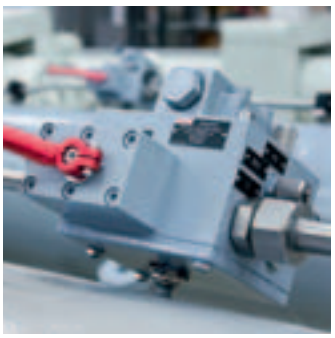
Unique developments
Rexroth has developed unique construction details and piston rod technologies which offer a twofold advantage: in addition to a longer life span, Rexroth cylinders also save maintenance time and improve the uptime and profitability of installations.

Repair and maintenance
Rexroth offers a wide range of repair and maintenance services. Our maintenance concept is made up of spare part management and delivery, field service, regular health checks and inspections, repair and overhaul services and technology upgrades. With various specialised service centres around the globe to support your maintenance operations.



All manufacturing processes are organized according to BPS, the Bosch Production System, which is based on the principles of lean-manufacturing.

Rexroth lifecycle management comprises services for your application all over the world.



Marine:
Ready for continuous challenges

Dredging
- trailing suction hopper dredger
- cutter-suction dredger
- spud hoist dredger
- split hopper dredger
- split barge
- piling barge
- stone dump barge
- pipe laying vessels

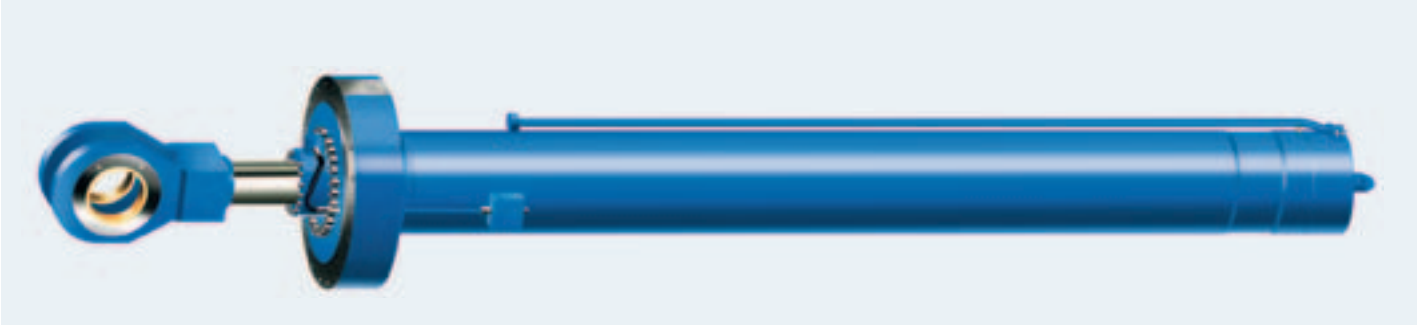
Naval
- AOR replenishment
- special equipment

Dredging, pipe laying or barges, in marine applications project cylinders have to perform under high forces and extreme environmental conditions. Rexroth offers customized, individual solutions perfectly matching to the requirements. Due to our extensive experience with classification bureaus, such as Bureau Veritas, DNV, ABS, LROS, Lloyds, GL, and others, Rexroth cylinders meet the specification right from the start.

Special Features
- optimum design because of application experience and highly specialized calculation and simulation tools
- piston rod coating with an extremely high wear and corrosion resistance
- first class seal and bearing configuration
- special shell mounted bearing against unpredictable axial forces
- cylinder integrated measuring system

Bottom door cylinder
to open the bottom doors of suction dredgers

Piston diameter:	480 mm
Piston rod diameter:	200 mm
Stroke length:	3,350 mm
Application:	submerged in sea water



The deepening and maintaining of ports, rivers or canals is a continuous challenge. Dredging strongly depends on reliable, specialized large hydraulic cylinder technology.

Cylinder for piling barge

Piston diameter:	1,000 mm
Piston rod diameter:	650 mm
Stroke length:	12,870 mm
Application:	installation of piles in the sediment

Cylinder for split barge

Piston diameter:	900 mm
Piston rod diameter:	400 mm
Stroke length:	3,500 mm
Application:	split barge, transportation of soil that hopper and cutter dredgers obtain during work

Offshore:
Cylinders made for toughest demands

Heave compensation	▶ wire line tensioning ▶ direct riser tensioning ▶ passive/active heave compensation ▶ linear concepts
Skidding	▶ rig skidding ▶ load out skidding
Deck mating	▶ deck mating systems ▶ fender systems ▶ integrated skidding systems ▶ decommissioning systems
Jacking	▶ positive engagement systems ▶ rack and pinion systems ▶ hydraulic concepts

Designed for the aggressive offshore environment Rexroth cylinders meet the highest demands regarding safety, corrosion resistance and heavy duty operation. As the leading supplier Rexroth is continuously adopting new technologies. Intensive interaction with OEMs, end-users and consultants ensures that we understand market demands, whether it is deep-sea, arctic or any other demanding offshore application.

Special features

- ▶ cylinder designs based on decades of knowledge and field experience
- ▶ extremely high wear and corrosion resistance
- ▶ high quality seal and bearing configuration
- ▶ integrated high quality piping
- ▶ unique solution for Position Measuring system
- ▶ measuring systems for potentially explosive atmospheres
- ▶ welding for low temperature applications.

Riser tensioner cylinder for oil-drilling vessels

Piston diameter:	560 mm
Piston rod diameter:	230 mm
Stroke length:	16,300 mm
Application:	dynamic application in aggressive environments

Whether high in the derrick, in the moon pool or deep down under water: Large hydraulic cylinders from Rexroth are accurate, reliable and cost effective.

Cylinder for jack up system

Piston diameter:	600 mm
Piston rod diameter:	280 mm
Stroke length:	3,150 mm
Application:	transforming a ship into a platform

Cylinder for heave compensation

Piston diameter:	300 mm
Piston rod diameter:	220 mm
Stroke length:	3,750 mm
Application:	compensating tidal influences on the system

Civil Engineering: Reliable solutions for highest uptime

Power generation	▶ radial gates ▶ flap gates ▶ intake gates ▶ bottom outlet ▶ turbine regulation ▶ valves
Ship locks	▶ miter gates ▶ culvert gates ▶ double hook gates ▶ sector gates
Moveable bridges	▶ bascule bridges ▶ lifting bridges ▶ swing bridges ▶ roll-on/roll-off bridges
Barriers	▶ roller/sliding gates

Due to the critical functions, operation has to be secured under all circumstances. Rexroth is constantly in close contact with governments, consultants and contractors. All solutions are designed to specific standards and regulations like DIN, ASME, JADEE, NEN. Our experience with design standards and sector related requirements lead to lowest possible Total Cost of Ownership.

Special features

- ▶ extreme resistance against corrosion, scratch and wear
- ▶ first class seal and bearing configuration
- ▶ integr. measuring system, with or without redundancy
- ▶ submerged solutions possible
- ▶ mechanical locking system
- ▶ integrated oil reservoir possible
- ▶ special options for low temperature operations
- ▶ oil supply through piston rod possible

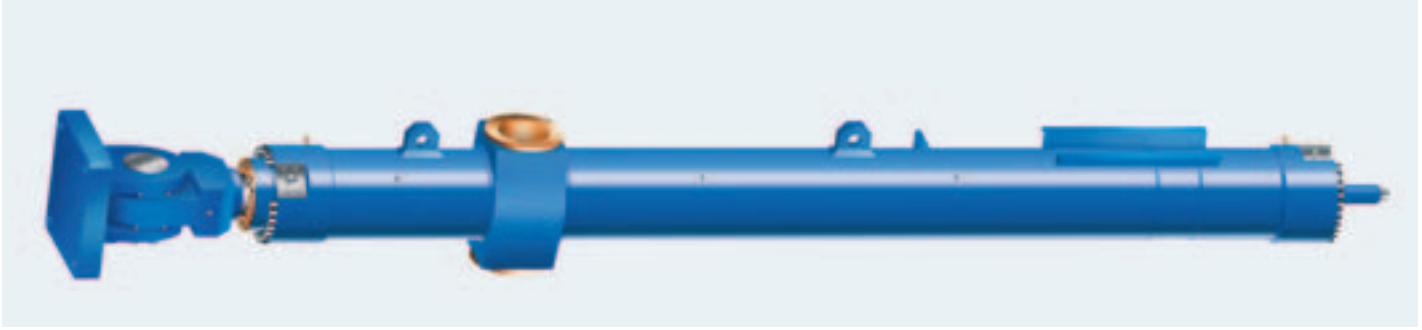
Bottom outlet cylinder for hydro power dam

Piston diameter:	450 mm
Piston rod diameter:	150 mm
Stroke length:	15,415 mm
Application:	partly submerged and low dynamic

Whether you are constructing power generation plants, dams, ship locks, bridges or barriers, Rexroth is your worldwide partner for civil engineering.

Miter gate cylinder for ship locks

Piston diameter:	300 mm
Piston rod diameter:	160 mm
Stroke length:	3,700 mm
Application:	medium dynamic, operating in splash zone



Cylinder for bascule bridge

Piston diameter:	540 mm
Piston rod diameter:	280 mm
Stroke length:	5,500 mm
Application:	low friction, heavy mass movement

General industrial applications and presses: Life time and durability

General industry
- pressure intensifiers
- cement rolling mills

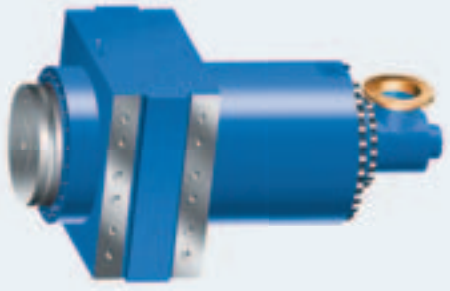
Presses
- metal forming
- extrusion
- injection moulding
- compactors
- jack rams

The environment and working conditions are usually hard and intensive due to the frequency of movement and 24/7 operations. Life time and durability are key words to our engineers for custom tailored cylinders.

Special features
- optimal design because of application experience and highly specialized calculation and simulation tools
- piston rod surface technology, where required, with an extremely high wear and corrosion resistance
- first class seal and bearing configuration for demanding environments and long life time
- special rod sealing for submerged solutions
- manifold block, pre-fill valve or measuring system integrated in the cylinder design
- integrated high quality piping
- special design based on fatigue calculations

Main pressing cylinder for baling presses

Piston diameter:	720 mm
Piston rod diameter:	700 mm
Stroke length:	600 mm
Application:	multi shift high cycle movement under harsh conditions



Highly dynamic applications, such as presses for scrap, paper, baling, laundry and pipe bending require special features.

Press cylinder with jack ram for slab press

Piston diameter:	480 mm
Piston rod diameter:	440 mm
Stroke length:	2,350 mm
Application:	high efficiency with low force high speed, approach and pull back

Double acting press cylinder for forging press

Piston diameter:	800 mm
Piston rod diameter:	750 mm
Stroke length:	1,950 mm
Application:	high impact load case under severe working conditions

Steel mill and rolling mill applications: Cylinders that will stand the heat

Continuous casting machines	▶ ladle turrets ▶ rotary joints ▶ segment
Rolling mills	▶ automatic gauge control ▶ roll change ▶ coiler
Secondary metallurgy	▶ ladle lift
Furnaces	▶ melting furnaces ▶ re-heat furnaces
Non ferrous casters	▶ vertical casting table control

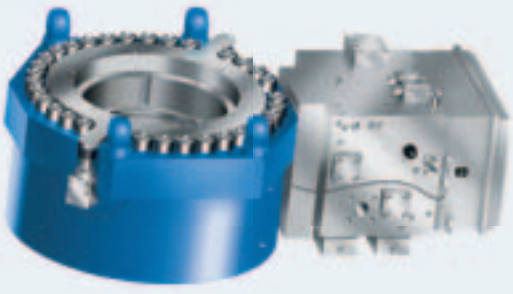
The sheer force is impressive: In a plate mill a Rexroth custom built cylinder delivers a rolling force of 90,000 kN with a bore up to 1,500 mm. The environment in this industry is harsh and demanding with strong vibrations, high temperatures, dust and pollution. Most of the cylinders are expected to operate for several years in 24/7 operation.

Special features

- optimal design because of application experience and highly specialized calculation and simulation tools
- piston rod surface technology with an extremely high wear and corrosion resistance
- first class seal and bearing configuration for harsh and aggressive environment
- special rod sealing and coating for submerged solutions
- manifold block and measuring system integrated in the cylinder design
- integrated piping

Automatic gauge cylinder for roll gap control

Piston diameter:	1,100 mm
Piston rod diameter:	950 mm
Stroke length:	40 mm
Application:	accurate, dynamic strip thickness control by high res. and integrated measurement- and servo-system



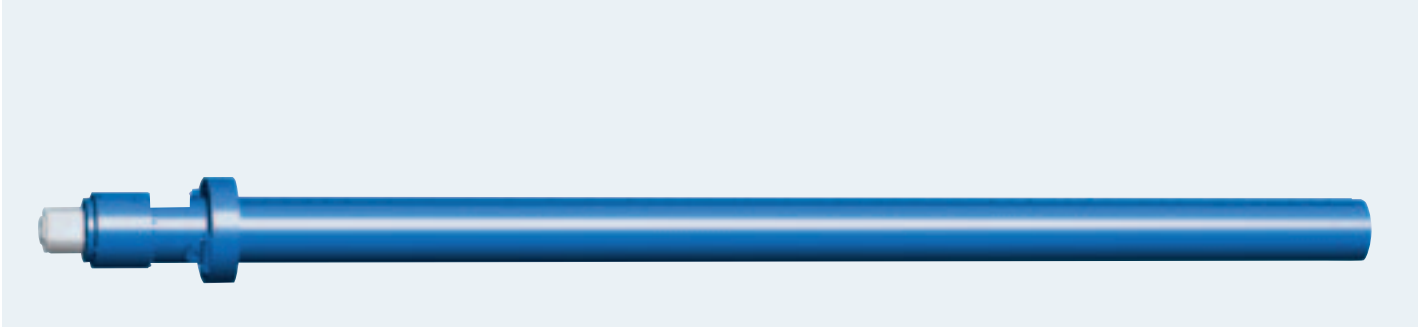
Strong vibrations, high temperatures, dust and pollution. The environment and working condition in heavy industry applications is harsh and demanding.

Ladle turret cylinder
for continuous casting

Piston diameter:	650 mm
Piston rod diameter:	450 mm
Stroke length:	645 mm
Application:	steel casting machinery continuously operating in high temperatures

Non ferrous casting cylinder
for billet or slab casting

Piston diameter:	380 mm
Piston rod diameter:	320 mm
Stroke length:	8,000 mm
Application:	underwater billet casting with a long stick-slip poor movement



Bulk materials handling and mining: Right dimension for heavy work

Surface mining	▶ stacker/reclaimers ▶ bucket wheel excavators ▶ belt wagons ▶ transport crawlers ▶ spreaders ▶ excavators
Bulk materials handling	▶ level luffing cranes ▶ ship loaders ▶ ship unloaders ▶ stack/reclaimers ▶ belt wagons ▶ spreaders
Tunnel boring machines	▶ hard rock tunneling ▶ shield tunneling

In the mining industry large hydraulic cylinders operate non-stop with all kinds of materials under extreme conditions, whereas in bulk materials handling they have to withstand abrasive and seaport conditions or high vibration levels. Cylinders in tunnel boring machines are exposed to wear-intensive circumstances, whilst dealing with extreme side loads and torque acting on the cutting head.

Special features

- ▶ optimal design because of application experience and highly specialized calculation and simulation tools
- ▶ extremely high wear and corrosion resistance
- ▶ first class seal and bearing configuration
- ▶ unique pre-stressed piston/piston rod connection for dynamic operation
- ▶ spherical bearing protection system
- ▶ spare sealing flange premounted on the piston rod
- ▶ welding for low temperature applications
- ▶ integrated piping, manifold block and measuring system

Boom cylinder for track loader

Piston diameter:	320 mm
Piston rod diameter:	180 mm
Stroke length:	1,735 mm
Application:	open-cast mining under abrasive and dirt conditions

Low weight and compact design, but at the same time a demand for high durability in extreme conditions: Rexroth cylinders perfectly meet the special demands and challenges, avoiding over dimensioning.

Cylinder for hydraulic mining shovel

Piston diameter:	360 mm
Piston rod diameter:	250 mm
Stroke length:	6,198 mm
Application:	oil extraction from Canadian tar fields

Thrust cylinder for shield tunneling

Piston diameter:	400 mm
Piston rod diameter:	280 mm
Stroke length:	1,700 mm
Application:	tunnel boring in wear-intensive circumstances

Special projects: Unusual design for unusual demands

Stadiums	▶ movable roofs ▶ movable floors ▶ platform supports
Theatres	▶ movable stages ▶ movable sceneries ▶ transport equipment
Elevators	▶ lifting equipment ▶ accumulator systems
Geothermics	▶ deep drilling

Our expertise in special projects supports you to realize the most challenging architectural designs. Movable roofs, for example in sport stadiums, typically are static large structures. Unstable movement should be avoided by all means because of high safety standards. For theatres and elevators, it is necessary to develop a compact design because of the limited built in space. Reducing stick-slip and noise levels are key in these applications.

Special features

- optimized tribology system in order to avoid stick-slip
- in-house simulation of dynamic system
- integrated measuring system to control movement
- optimal design to reduce built in dimensions
- high safety factors due to exceptional rules and regulations

Special cylinders for movable roofs

Piston diameter:	840 mm
Piston rod diameter:	400 mm
Stroke length:	15,213 mm
Application:	tennis arena with three movable roofs

Large cylinders in special projects have to meet various requirements related to design standards, position measuring and mounting styles.

Theatre cylinder
for hydraulic movable floor

Piston diameter:	350 mm
Piston rod diameter:	300 mm
Stroke length:	13,778 mm
Application:	national theatre with movable floors

Special cylinders for deep drilling

Piston diameter:	280 mm
Piston rod diameter:	250 mm
Stroke length:	11,000 mm
Application:	onshore and offshore oil and geothermic deep drilling

Application cylinder

Hydraulic Actuator
CGE

- Hydraulic Actuator for steam and gas turbines
- Actuator for process valve with internal or external triggering of fast switching
- Actuator for process valve for positioning (control) and with superimposed internal or external triggering of fast switching

Die cushion cylinder with control block
CYHZK

- Applications in mechanical/servo presses in the automobile industry and/or at suppliers
- Customized high-pressure/low-pressure supply.
- Intelligent high-response valve and pump technology
- Increased machine availability/durability

IGV- and VGV-Cylinders

- Guide vane adjustment at gas turbines

High Performance Cylinders

- Cylinder series for applications in testing and simulation technology and in metallurgy
- Modular design kit

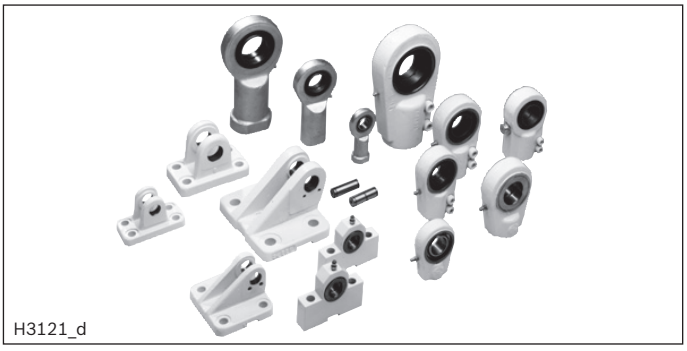
Standard Load Limiter

- Reliable limitation of the accident load in lifting units of the stage machinery
- Independent of the lifting unit's direction of movement
- Protection of the support frame during synchronized and single action
- Compact, installable unit
- Patented system

Mounting elements for hydraulic cylinders

Mounting elements

RE 17042
Edition: 2013-07
Replaces: 13.06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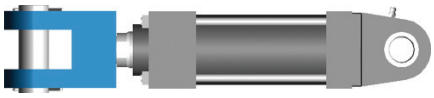
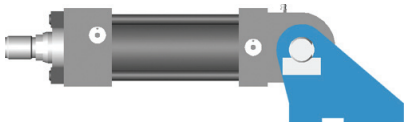
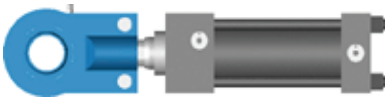
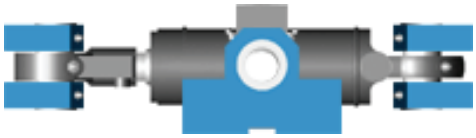
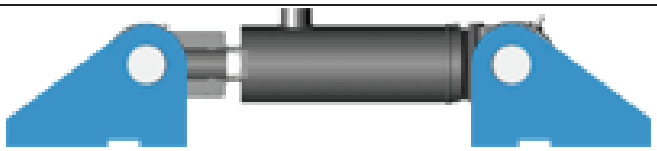
Features

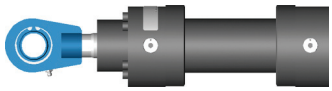
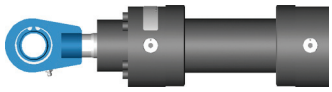
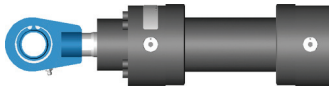
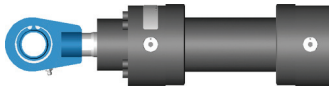
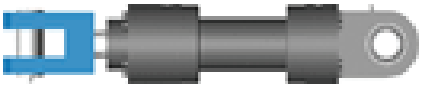
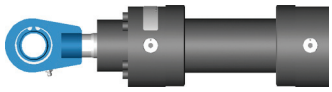
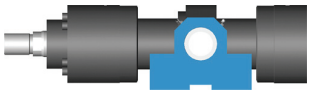
Mounting elements:
- Plain clevis
- Swivel head
- Fork clevis
- Bearing bracket
- Clevis bracket and eye bracket
- Trunnion bracket
- Bolts

Contents

Mounting element overview

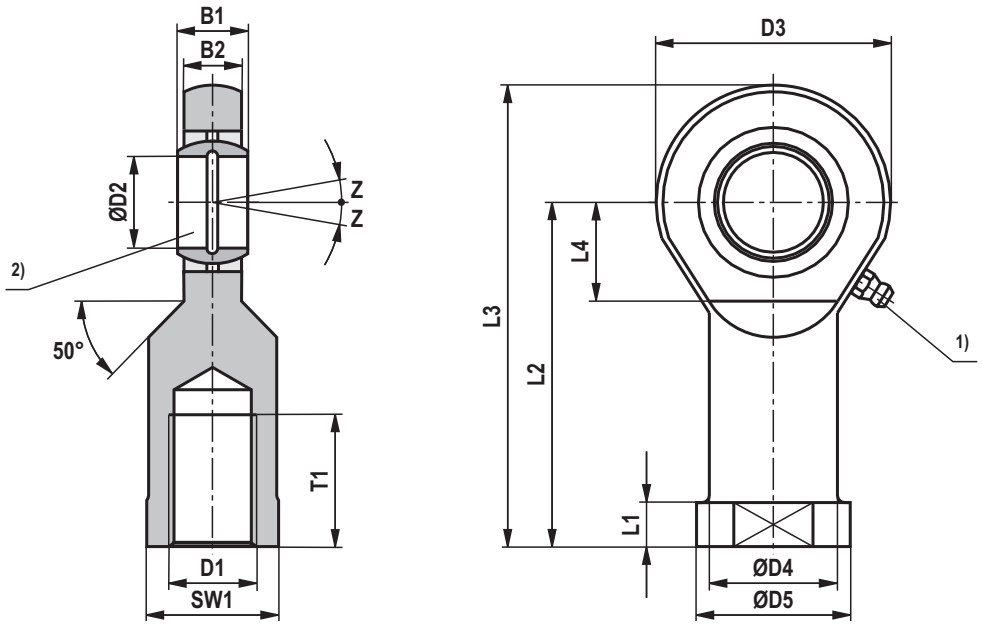
Assembly (symbolic representation)	Denomination / type	To be attached to series	Page
	Swivel head CGK ISO 12240-4	CD70/CG70 CD210/CG210	4, 5
	Clevis bracket CLCC		6, 7
	Fork clevis CCKA		8
	Eye bracket CLEA		9
	Clevis bracket (clampable) CLCB ISO 8133 DIN 24556	CDT3/CGT3/CST3	10, 11
	Trunnion bracket CLTA		12, 13
	Swivel head (clampable) CGKA ISO 8133 DIN 24555		14
	Swivel head CGKL ISO 12240-4	CDL2	15
	Swivel head (clampable) CGKD ISO 8132		16, 17
	Trunnion bracket CLTB ISO 8132		18, 19
	Clevis bracket (clampable) CLCA ISO 8132 form B		20, 21
	Clevis bracket (clampable) CLCD ISO 8132 form A		22, 23

Mounting element overview

Assembly (symbolic representation)	Denomination / type	To be attached to series	Page
	Plain clevis CSA	CDH1/CGH1/CSH1 CDH3/CGH3/CSH3	24, 25
	Swivel head CGA		26, 27
	Swivel head (clampable) CGAK		28, 29
	Swivel head (clampable) CGAS		30, 31
	Fork clevis (clampable) CCKB ISO 8132	CDH2/CGH2/CSH2 CDM1/CGM1/CSM1	32, 33
	Swivel head (clampable) CGKD ISO 8132		34, 35
	Trunnion bracket CLTB ISO 8132		36, 37
	Clevis bracket (clampable) CLCA ISO 8132 form B		38, 39
	Clevis bracket (clampable) CLCD ISO 8132 form A		40, 41

Dimensions: Swivel head CGK for series CD70/CG70 and CD210/CG210 (dimensions in mm)

ISO 12240-4



Series CD70 / CG70 ØAL	Series CD210 / CG210 ØAL	Series CD210 / CG210 ØMM	Type	Material no.	B1 -0,12	B2	D1	ØD2 h5	D3 max.	ØD4 max.	ØD5 max.
25	**–**	**–**	**CGK 10** 3)	R900001653	9	7	M10	10	30	16	20
32	**–**	**–**	**CGK 12** 3)	R900001327	10	8	M12	12	35	19	23
40	**40**	**16**	**CGK 15** 4)	R900001328	12	10	M14	15	41	22	27
		18									
50	**40**	**25**	**CGK 20** 4)	R900001329	16	13	M20x1,5	20	54	28	36
	50	**22**									
		25									
63	**50**	**36**	**CGK 25**	R900001330	20	17	M24x2	25	65	35	44
	63	**25**									
		28									
80	**63**	**36**	**CGK 30**	R900001331	22	19	M30x2	30	75	42	52
		45									
	80	**36**									
–	**80**	**45**	**CGK 35**	R900012486	25	21	M36x3	35	84	47	60
100	**80**	**56**	**CGK 40**	R900001332	28	23	M39x3	40	94	52	67
125	**100**	**45**	**CGK 45**	R900001333	32	27	M42x3	45	104	58	72
150	**100**	**50**	**CGK 50**	R900001334	35	30	M45x3	50	114	62	77
		70									
	125	**50**									
		56									
200	**125**	**63**	**CGK 60**	R900001335	44	38	M52x3	60	137	70	90
		63									
	150	**90**									
		70									
–	**150**	**80**	**CGK 80**	R900001928	55	47	M64x4	80	182	95	112
		100									
	180	**80**									

Dimensions: Swivel head CGK for series CD70/CG70 and CD210/CG210 (dimensions in mm)

Series			Type	L1	L2	L3 max.	L4 min.	T1 min.	SW1 [5]	Z [5]	*m* kg	C_0 [6] kN	F_{adm} [7] kN
CD70 / CG70	CD210 / CG210												
ØAL	ØAL	ØMM											
25	**–**	**–**	**CGK 10** [3]	6,5	43	60	13	15	15 / 16	12° – 15°	0,07	17,6	5,8
32	**–**	**–**	**CGK 12** [3]	7	50	69	17	18	19	10° – 11°	0,1	24,5	8,1
40	**40**	**16**	**CGK 15** [4]	8	61	83	19	21	22	8° – 12°	0,16	36	11,9
		18											
50	**40**	**25**	**CGK 20** [4]	10	77	106	24	30	30 / 32	9°	0,34	60	19,8
	50	**22**											
		25											
63	**50**	**36**	**CGK 25**	12	94	128	30	36	36	7°	0,6	83	27,4
	63	**25**											
		28											
80	**63**	**36**	**CGK 30**	15	110	149	34	45	41 / 46	6°	0,9	110	36,3
		45											
	80	**36**											
–	**80**	**45**	**CGK 35**	15	125	169	40	60	50	6°	1,4	146	48,2
100	**80**	**56**	**CGK 40**	18	142	191	46	65	55	7°	2,0	180	59,4
125	**100**	**45**	**CGK 45**	20	145	199	50	65	60 / 65	7°	2,7	240	79,2
150	**100**	**50**	**CGK 50**	20	160	219	58	68	65 / 70	6°	3,5	290	95,7
		70											
	125	**50**											
		56											
200	**125**	**63**	**CGK 60**	20	175	246	73	70	75	6°	5,6	450	148,5
		63											
	150	**90**											
		70											
–	**150**	**80**	**CGK 80**	25	230	324	98	85	100	6°	13,1	750	247,5
		100											
	180	**80**											

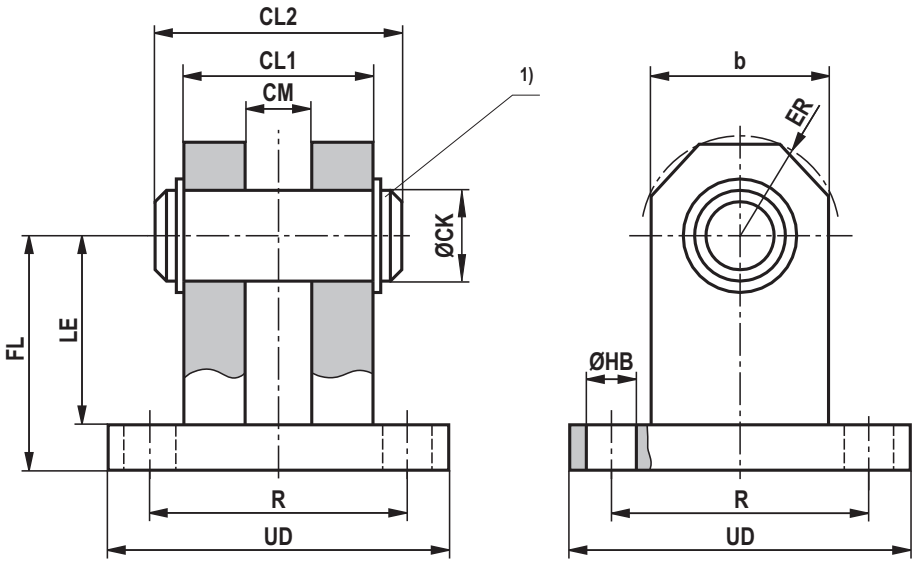
ØAL = piston Ø
ØMM = piston rod Ø

1) Lubricating nipple, cone head form A according to DIN 71412
2) Bolt Ø m6 required
3) Cannot be re-lubricated
4) Can be re-lubricated via lubricating hole in housing
5) Dimensions may differ depending on the manufacturer
6) C_0 = static load rating of the swivel head
7) F_{adm} = maximum admissible load on the swivel head during oscillatory or alternating loads

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

Dimensions: Clevis bracket CLCC for series CD70/CG70 and CD210/CG210 (dimensions in mm)

Suitable for swivel head type CGK... or CGA...



Series CD70 / CG70 ØAL [2]	Series CD70 / CG70 ØAL [3]	Series CD210 / CG210 ØAL	Series CD210 / CG210 ØMM	Series CD210 / CG210 ØAL [3]	Type	Material no.	ØCK H9 [1]	CL1 h16	CL2 max.	CM A12	FL js12
25	**–**	**–**	**–**	**–**	**CLCC 10**	R900318440	10	25	37	9	35
32	**25**	**–**	**–**	**–**	**CLCC 12**	R900318423	12	25	37	10	35
	32	**–**	**–**								
40	**40**	**40**	**16**	**40**	**CLCC 15**	R900318468	15	35	48	12	45
			18								
50	**50**	**40**	**25**	**50**	**CLCC 20**	R900318469	20	50	64	16	58
	63	**50**	**22**								
			25								
63	**80**	**50**	**36**	**63**	**CLCC 25**	R900318470	25	60	74	20	75
	100	**63**	**25**								
			28								
80	**125**	**63**	**36**	**–**	**CLCC 30**	R900318471	30	60	74	22	75
			45								
		80	**36**								
–	**150**	**80**	**45**	**80**	**CLCC 35**	R900318472	35	70	93	25	90
100	**–**	**80**	**56**	**100**	**CLCC 40**	R900318473	40	70	93	28	90
125	**200**	**100**	**45**	**125**	**CLCC 45**	R900318481	45	110	133	32	125
150	**–**	**100**	**50**	**150**	**CLCC 50**	R900318482	50	110	133	35	125
			70								
		125	**50**								
			56								
200	**–**	**125**	**63**	**180**	**CLCC 60**	R900318483	60	125	148	44	155
			90								
		150	**63**								
			70								
–	**–**	**150**	**80**	**–**	**CLCC 80**	R900318477	80	140	163	55	130
			100								
		180	**80**								
–	**–**	**180**	**90**	**–**	**CLCC 81**	R900318478	80	140	163	60	150
		200	**90**								
			100								
–	**–**	**180**	**125**	**–**	**CLCC 90**	R900318479	90	140	163	65	150
–	**–**	**200**	**140**	**–**	**CLCC 100**	R900318480	100	150	175	70	165
–	**–**	**–**		**200**	**CLCC 70**	R900318484	70	125	148	49	155

Dimensions: Clevis bracket CLCC for series CD70/CG70 and CD210/CG210 (dimensions in mm)

Series					Type	ØHB H13	ER max.	LE min.	UD max.	R js14	b max.	*m* kg
CD70 / CG70		CD210 / CG210										
ØAL [2]	ØAL [3]	ØAL	ØMM	ØAL [3]								
25	**–**	**–**	**–**	**–**	**CLCC 10**	5,5	13	25	45	33	24	0,3
32	**25**	**–**	**–**	**–**	**CLCC 12**	5,5	13	25	45	33	24	0,3
	32	**–**	**–**									
40	**40**	**40**	**16**	**40**	**CLCC 15**	11	17	35	75	50	32	0,8
			18									
50	**50**	**40**	**25**	**50**	**CLCC 20**	13,5	22	42	90	65	40	1,8
	63	**50**	**22**									
			25									
63	**80**	**50**	**36**	**63**	**CLCC 25**	13,5	25	59	95	70	45	2,5
	100	**63**	**25**									
			28									
80	**125**	**63**	**36**	**–**	**CLCC 30**	13,5	25	59	95	70	45	2,5
			45									
		80	**36**									
–	**150**	**80**	**45**	**80**	**CLCC 35**	17,5	35	68	130	95	65	6,0
100	**–**	**80**	**56**	**100**	**CLCC 40**	17,5	35	68	130	95	65	6,0
125	**200**	**100**	**45**	**125**	**CLCC 45**	26	46	100	180	135	85	15,0
150	**–**	**100**	**50**	**150**	**CLCC 50**	26	46	100	180	135	85	15,0
			70									
		125	**50**									
			56									
200	**–**	**125**	**63**	**180**	**CLCC 60**	33	66	125	225	170	125	28,0
			90									
		150	**63**									
			70									
–	**–**	**150**	**80**	**–**	**CLCC 80**	33	75	100	245	190	140	33,0
			100									
		180	**80**									
–	**–**	**180**	**90**	**–**	**CLCC 81**	33	75	120	245	190	140	34,0
		200	**90**									
			100									
–	**–**	**180**	**125**	**–**	**CLCC 90**	33	75	120	245	190	140	35,0
–	**–**	**200**	**140**	**–**	**CLCC 100**	33	95	135	255	200	170	41,0
–	**–**	**–**		**200**	**CLCC 70**	33	80	125	225	170	145	28,0

ØAL = piston Ø

ØMM = piston rod Ø

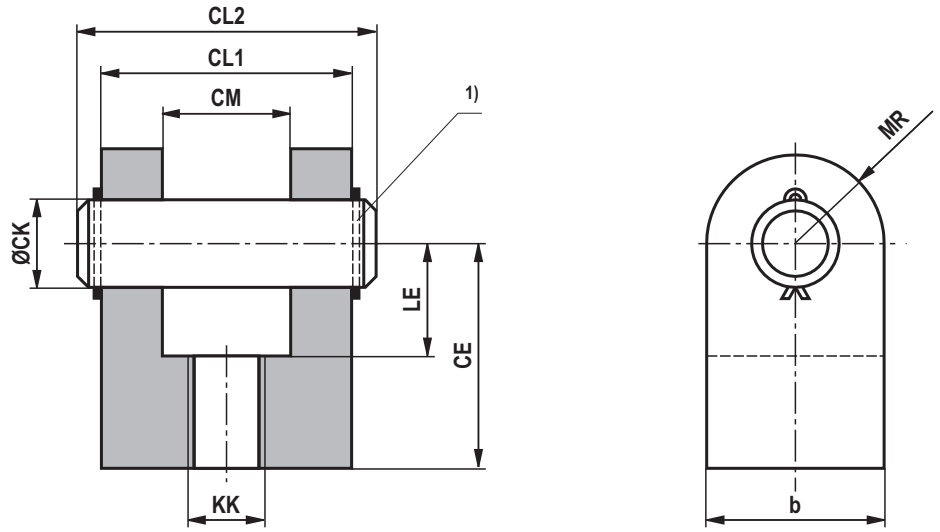
[1] Bolt Ø m6 required
(bolt and bolt lock are included in the scope of delivery)

[2] When mounted on the piston rod with CGK... or CGA

[3] When mounted on the cylinder base (mounting type "**B**")

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

Dimensions: Fork clevis CCKA for series CD70/CG70 and CD210/CG210 (dimensions in mm)



Series CD70 / CG70 ØMM	Series CD210 / CG210 ØMM	Type 2)	Material no.	ØCK H7 1)	CL1 h16	CL2 max.	CM A12	CE js12	KK	LE min.	MR max.	b max.	*m* kg
16	**16**	**CCKA 10**	R900318486	12,7	44	56	20	38	M10x1,5	19	13	26	0,2
18	**18**												
22	**22**	**CCKA 16**	R900318488	19,1	65	77	32,5	54	M16x1,5	26	19	38	1,0
25	**25**	**CCKA 20**	R900318487	19,1	65	77	32,5	54	M20x1,5	26	19	38	1,0
28	**28**												
36	**36**	**CCKA 26**	R900318489	25,43	77	92	39	75	M26x1,5	34	26	52	2,4
45	**45**	**CCKA 33**	R900318491	34,95	100	118	51,5	95	M33x2	45	35	70	4,5
50	**50**	**CCKA 39**	R900318494	44,48	127	147	65	114	M39x2	57	45	90	8,5
56	**56**												
63	**63**	**CCKA 48**	R900318496	50,83	127	147	65	140	M48x2	64	50	100	13,0
70	**70**												
80	**80**	**CCKA 58**	R900541067	63,5	154	176	78	165	M58x2	76	65	130	23,0
90	**90**	**CCKA 64**	R900318498	76,23	154	176	78	172	M64x2	83	70	140	25,0

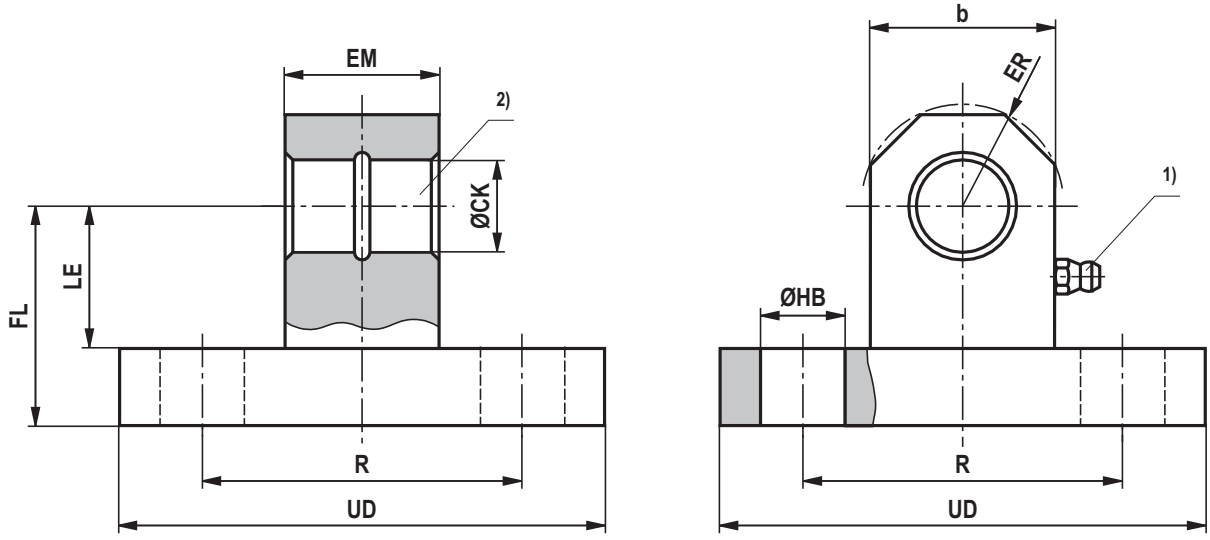
ØMM = piston rod Ø

1) Bolt Ø f7 required
(bolt and bolt lock are included in the scope of delivery)

2) Only possible with thread design "C".

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

Dimensions: Eye bracket CLEA for series CD70/CG70 and CD210/CG210 (dimensions in mm)



Series CD70 / CG70 ØAL 3)	Series CD70 / CG70 ØMM 4)	Series CD210 / CG210 ØAL 3)	Series CD210 / CG210 ØMM 4)	Type	Material no.	ØCK H7 2)	EM h13	FL js12	ØHB H13	ER max.	LE min.	UD max.	R js14	b	*m* kg
32	**16**	**40**	**16**	**CLEA 10**	R900318516	12,7	20	28,5	11	13	18,5	63	41,5	24	0,4
40															
50	**18**		**18**												
63															
80	**22**	**50**	**22**	**CLEA 20**	R900318518	19,1	32,5	47,5	13,5	22	31,5	89	65	40	1,6
100	**25**	**63**	**25**												
125	**28**		**28**												
150	**36**	**80**	**36**	**CLEA 26**	R900318519	25,43	39	57	17,5	30	38	114	82,5	55	2,3
200															
–	**45**	**100**	**45**	**CLEA 33**	R900318520	34,95	51,5	76	17,5	41	54	127	97	75	5,8
–	**50**	**125**	**50**	**CLEA 39**	R900318521	44,48	65	79,5	22	49	57	165	126	90	10,0
	56		**56**												
–	**63**	**150**	**63**	**CLEA 48**	R900318522	50,83	65	89	26	56	64	190	145,5	105	14,0
	70		**70**												
–	**80**	**180**	**80**	**CLEA 58**	R900318524	63,53	78	101,5	30	69	77	216	167	130	21,0
–	**90**	**200**	**90**	**CLEA 64**	R900318523	76,23	78	108	33	77	83	242	190,5	145	26,0

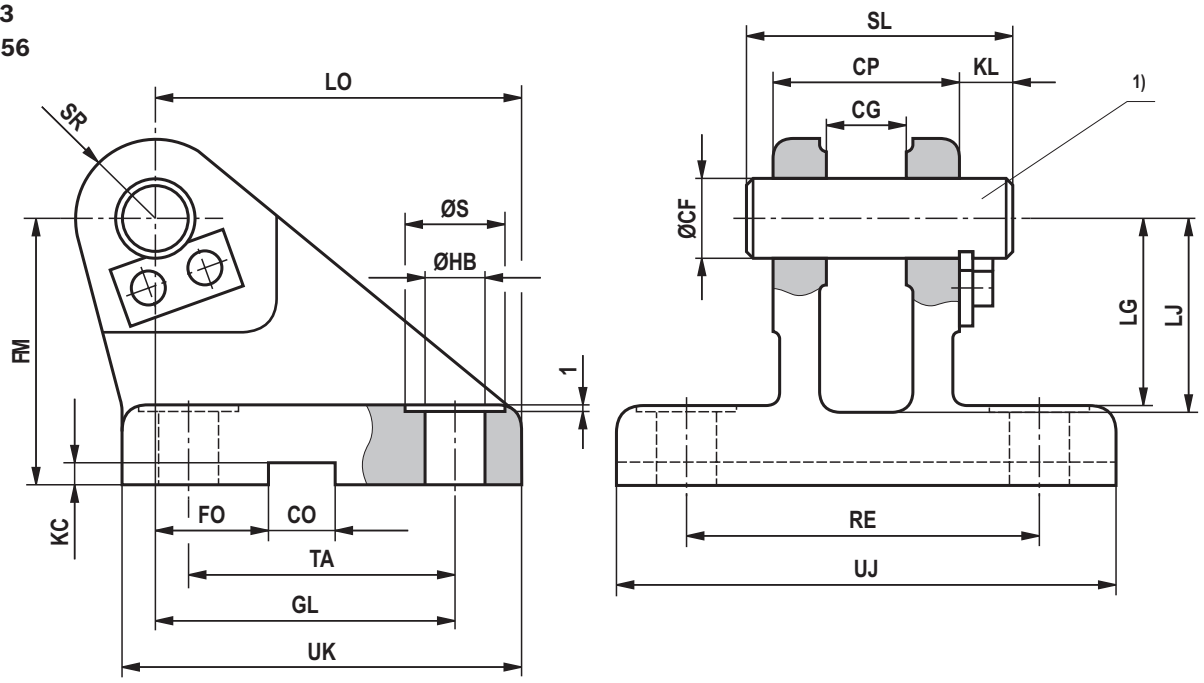
ØAL = piston Ø
ØMM = piston rod Ø

1) Lubricating nipple, cone head form A according to DIN 71412
2) Suitable for fork clevis type CCKA...
3) When mounted on the cylinder base (mounting type "**G**")
4) When mounted on the piston rod with CCKA...

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

Dimensions: Clevis bracket CLCB - AB 5 (clampable) for series CDT3/CGT3/CST3 (dimensions in mm)

ISO 8133
DIN 24556



Type	Material no.	Nominal force kN	ØCF K7 [1]	CP h14	CG +0,1 +0,3	CO N9	FO js14	FM js11	GL js13	ØHB	ØS
CLCB 12	R900326960	8	12	30	10	10	16	40	46	9	15
CLCB 16	R900327372	12,5	16	40	14	16	18	50	61	11	18
CLCB 20	R900327373	20	20	50	16	16	20	55	64	14 [3]	20
CLCB 25	R900326961	32	25	60	20	25	22	65	78	16 [3]	24
CLCB 30	R900327374	50	30	70	22	25	24	85	97	18 [3]	26
CLCB 40	R900327375	80	40	80	28	36	24	100	123	22	33
CLCB 50	R900327376	125	50	100	35	36	35	125	155	30	48
CLCB 60	R900327377	200	60	120	44	50	35	150	187	39	60
CLCB 80	R900327378	320	80	160	55	50	35	190	255	45	80
CLCB 100	R900327379	500	100	200	70	63	35	210	285	48	80

Dimensions: Clevis bracket CLCB - AB 5 (clampable) for series CDT3/CGT3/CST3 (dimensions in mm)

Type	KC +0,3 0	KL	LG	LJ	LO	RE js13	SL	SR max.	TA js13	UJ	UK	*m* [2] kg
CLCB 12	3,3	8	28	29	56	55	40	12	40	75	60	0,6
CLCB 16	4,3	8	37	38	74	70	50	16	55	95	80	1,3
CLCB 20	4,3	10	39	40	80	85	62	20	58	120	90	2,1
CLCB 25	5,4	10	48	49	98	100	72	25	70	140	110	3,2
CLCB 30	5,4	13	62	63	120	115	85	30	90	160	135	6,5
CLCB 40	8,4	16	72	73	148	135	100	40	120	190	170	12,0
CLCB 50	8,4	19	90	92	190	170	122	50	145	240	215	23,0
CLCB 60	11,4	20	108	110	225	200	145	60	185	270	260	37,0
CLCB 80	11,4	26	140	142	295	240	190	80	260	320	340	79,0
CLCB 100	12,4	30	150	152	335	300	235	100	300	400	400	140,0

1) Bolt Ø h6 required, suitable for swivel head CGKA... (bolt and bolt lock are included in the scope of delivery)

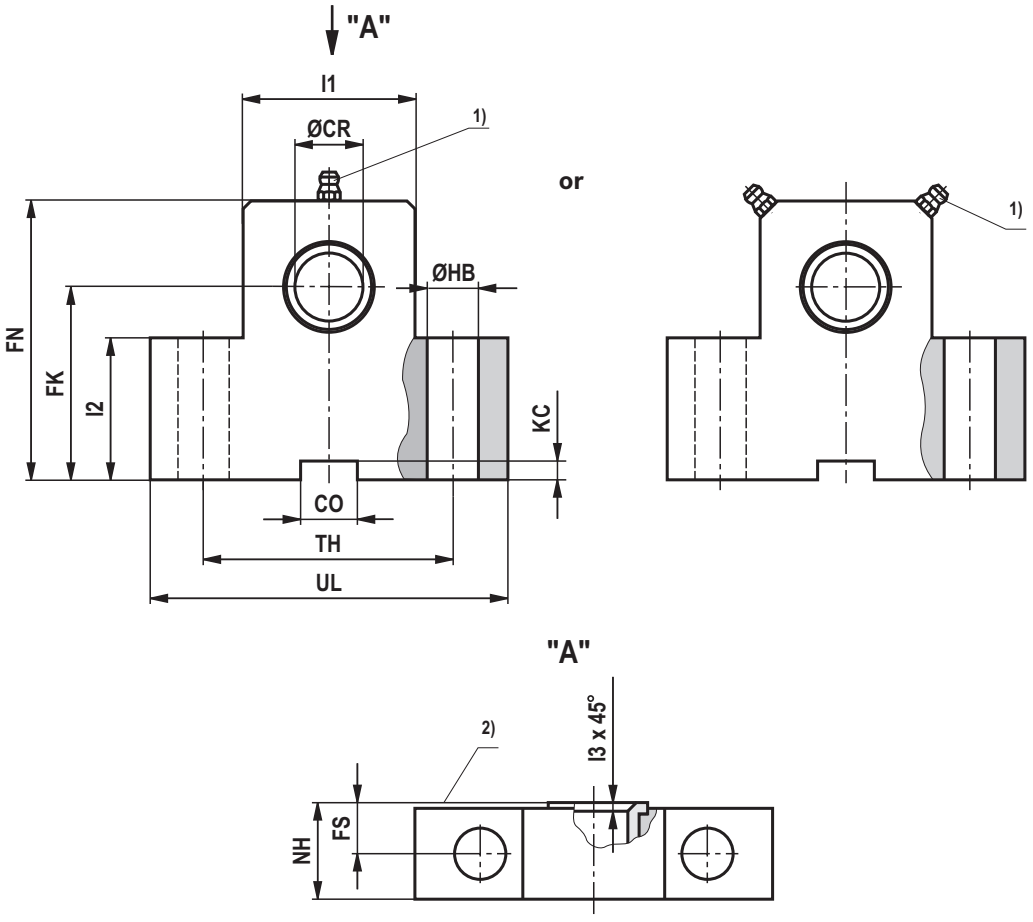
2) ***m*** = weight of clevis bracket in kg

3) Dimensions may differ from the standard depending on the manufacturer

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

Dimensions: Trunnion bracket CLTA - AT 4 for series CDT3/CGT3/CST3
(dimensions in mm)

CLTA 12-20



Series CDT3 / CGT3 / CST3 ØAL	Type	Material no.	Nominal force kN 4)	ØCR H7	CO N9	FK js12	FN max.	FS js14	ØHB H13	KC +0,3 0	NH max.	TH js14	UL max.	l1	l2	l3	*m* 5) kg
25	**CLTA 12**	R901071355	8	12	10	38	55	8	9	3,3	17 3)	40	63	25	25	1	0,5
32	**CLTA 16**	R901071364	12,5	16	16	45	65	10	11	4,3	21	50	80	30	30	1	0,9
40	**CLTA 20**	R901071365	20	20	16	55	80	10	11	4,3	21	60	90	40	38	1,5	1,35

ØAL = piston Ø

1) Lubricating nipple, cone form A according to DIN 71412

2) Inside

3) Dimensions may differ depending on the manufacturer

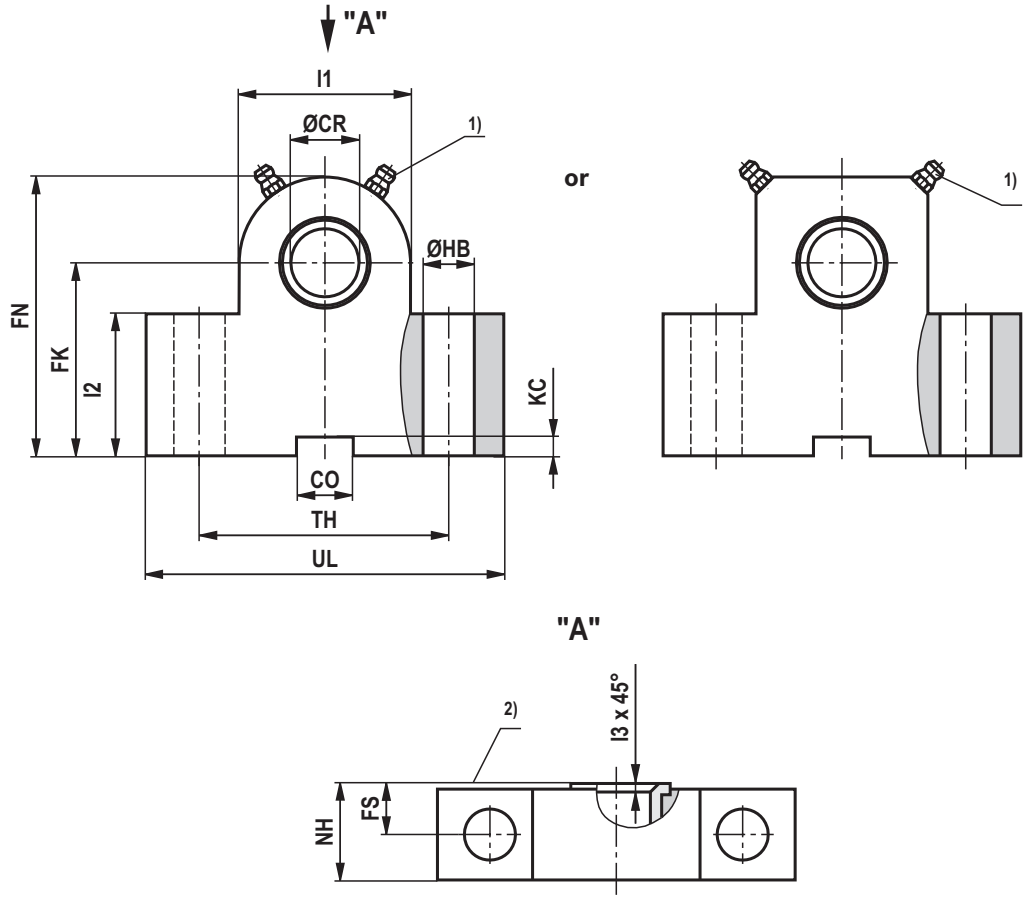
4) Nominal force applies to applications in pairs

5) ***m*** = weight per pair in kg, brackets are delivered in pairs

Notice!
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

Dimensions: Trunnion bracket CLTA - AT 4 for series CDT3/CGT3/CST3 (dimensions in mm)

CLTA 25-100



Series CDT3 / CGT3 / CST3 ØAL	Type	Material no.	Nominal force kN [4]	ØCR H7	CO N9	FK js12	FN max.	FS js14	ØHB H13	KC +0,3 0	NH max.	TH js14	UL max.	l1	l2	l3	*m* [5] kg
50	**CLTA 25**	R901071368	32	25	25	65	90	12	14 [3]	5,4	26	80	110	56	45	1,5	2,4
63	**CLTA 32**	R901071377	50	32	25	75	110	15	18 [3]	5,4	33	110	150	70	52	2	5,0
80	**CLTA 40**	R901071380	80	40	36	95	140	16	22	8,4	41	125	170	88	60	2,5	8,5
100	**CLTA 50**	R901071385	125	50	36	105	150	20	26	8,4	51	160	210	90	72	2,5	15
125	**CLTA 63**	R901071395	200	63	50	125	195	25	33	11,4	61	200	265	136	87	3	30
160	**CLTA 80**	R901071398	320	80	50	150	230	31	39	11,4	81	250	325	160	112	3,5	59
200	**CLTA 100**	R901071400	500	100	63	200	300	42	52	12,4	101	320	410	200	150	4,5	131

ØAL = piston Ø

1) Lubricating nipple, cone form A according to DIN 71412

2) Inside

3) Dimensions may differ depending on the manufacturer

4) Nominal force applies to applications in pairs

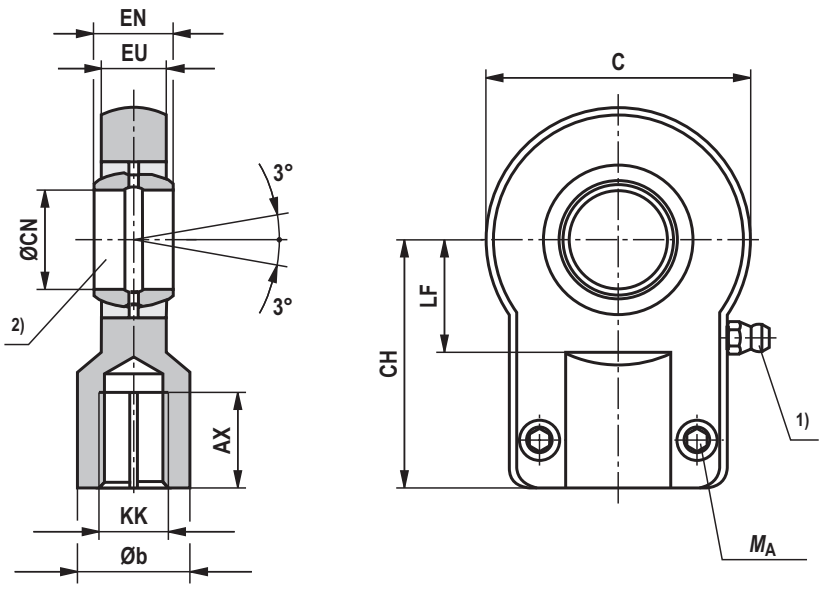
5) ***m*** = weight per pair in kg, brackets are delivered in pairs

☞ **Notice!**

Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

Dimensions: Swivel head CGKA - **AP 6** (clampable) for series CDT3/CGT3/CST3 (dimensions in mm)

ISO 8133
DIN 24555



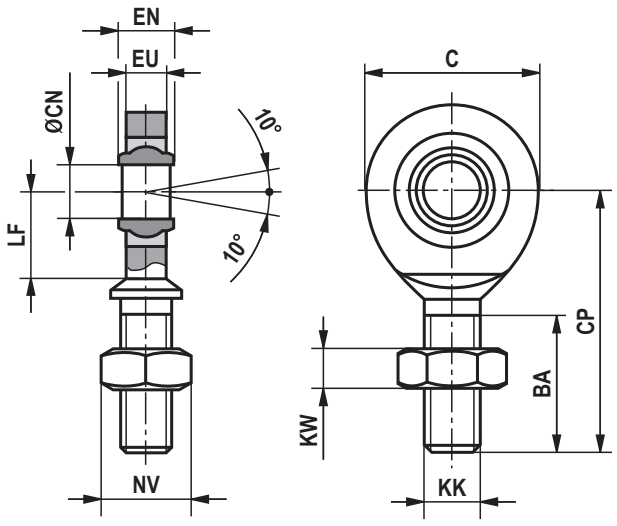
Type	Material no.	KK	AX min.	Øb	C max.	CH js13	ØCN 2)	EN	EU max.	LF min.	M_A 7) Nm	m 8) kg	C_0 9) (head) kN	F_{adm} 10) kN
CGKA 12 3)	R900327186	M10x1,25	15	17	40	42	12 –0,008	10 –0,12	8	16	9,5	0,15	17	6,3
CGKA 16 4)	R900327192	M12x1,25	17	21	45	48	16 –0,008	14 –0,12	11	20	9,5	0,25	28,5	10,5
CGKA 20 4)	R900306874	M14x1,5	19	25	55	58	20 –0,012	16 –0,12	13	25	23	0,43	42,5	15,7
CGKA 25	R900327191	M16x1,5	23	30	65	68	25 –0,012	20 –0,12	17	30	23	0,73	67	24,7
CGKA 30	R900327187	M20x1,5	29	36	80	85	30 –0,012	22 –0,12	19	35	46	1,3	108	39,9
CGKA 40	R900327188	M27x2	37	45	100	105	40 –0,012	28 –0,12	23	45	46	2,3	156	57,6
CGKA 50	R900327368	M33x2	46	55	125	130	50 –0,012	35 –0,12	30	58	80	4,4	245	90,4
CGKA 60	R900327369	M42x2	57	68	160	150	60 –0,012	44 –0,12	38	68	195	8,4	380	140,2
CGKA 80	R900327370	M48x2	64	90	205	185	80 –0,015	55 –0,15	47	82 6)	385	15,6	585	215,9
CGKA 100	R900327371	M64x3	86	110	240	240	100 –0,02	70 –0,2	57	116	660	28	865	319,2
CGKD 100 5)	R900322030	M80x3	96	110	210	210	100 H7	100 h12	84	98	385	28	1060	391,1
CGKD 125 5)	R900322026	M100x3	113	135	262	260	125 H7	125 h12	102	120	385	43	1200	442,8

1) Lubricating nipple, cone head form A according to DIN 71412
2) Bolt Ø h6 required
3) Cannot be re-lubricated
4) Can be re-lubricated via lubricating hole
5) Swivel head according to ISO 8132, bolt Ø m6 required
6) Dimensions may differ from the standard depending on the manufacturer
7) M_A = tightening torque
The swivel head must always be screwed against the shoulder of the piston rod. Afterwards, the clamping screws must be tightened with the specified tightening torque.
8) m = weight of swivel head in kg
9) C_0 = static load rating of the swivel head
10) F_{adm} = maximum admissible load on the swivel head during oscillatory or alternating loads

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

Dimensions: Swivel head CGKL for series CDL2
(dimensions in mm)

ISO 12240-4



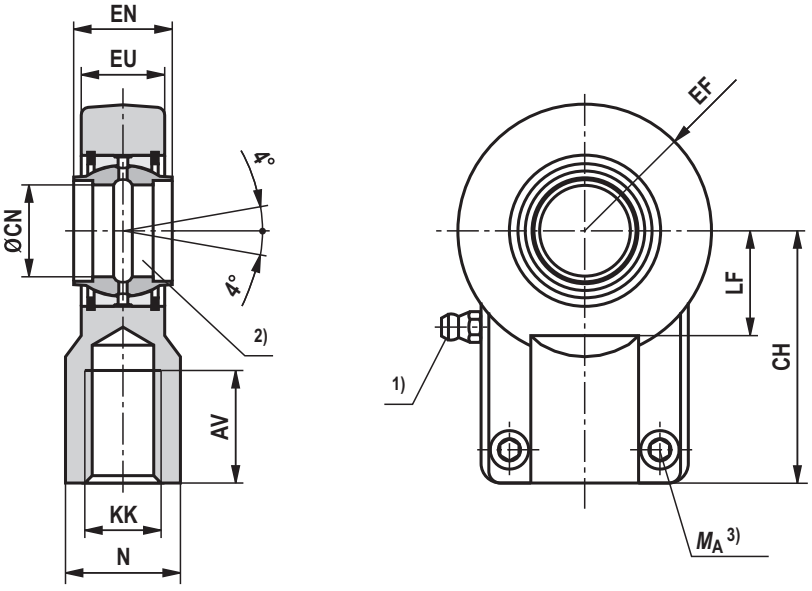
Series CDL2 ØAL	Series CDL2 ØMM	Type	Material no.	KK	BA min.	C	ØCN -0,008	CP max.	EN h12	EU max.	KW	LF min.	NV	*m* [1] kg	C_0 [2] kN	F_{adm} [3] kN
25	**14**	**CGKL 10**	3712500031	M10	26	29	10	48	9	7,5	5	15	16	0,1	22	8,1
32	**18**	**CGKL 12**	3713200031	M12	28	34	12	54	10	8,5	6	18	18	0,1	30,4	11,2

ØAL = piston Ø
ØMM = piston rod Ø
1) ***m*** = weight of swivel head in kg
2) C_0 = static load rating of the swivel head in kN
3) F_{adm} = maximum admissible load on the swivel head during oscillatory or alternating loads

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

Dimensions: Swivel head CGKD (clampable) for series CDL2
(dimensions in mm)

ISO 8132



Series CDL2 ØAL	Series CDL2 ØMM	Type	Material no.	Nominal force kN	AV min.	N max.	CH js13	EF max.	ØCN H7 2)	EN h12	EU max.
40	**22**	**CGKD 20**	R900308576	20	23	28	52	25	20	20	17,5
40	**25**	**CGKD 25**	R900323332	32	29	31	65	32	25	25	22
50	**28**										
50	**32**	**CGKD 32**	R900322049	50	37	38	80	40	32	32	28
63	**36**										
63	**40**	**CGKD 40**	R900322029	80	46	47	97	50	40	40	34
80	**45**										
80	**50**	**CGKD 50**	R900322719	125	57	58	120	63	50	50	42
100	**56**										
100	**63**	**CGKD 63**	R900322028	200	64	70	140	72,5	63	63	53,5
125	**70**										
125	**80**	**CGKD 80**	R900322700	320	86	91	180	92	80	80	68
160	**100**	**CGKD 100**	R900322030	500	96	110	210	114	100	100	85,5
200	**125**	**CGKD 125**	R900322026	800	113	135	260	160	125	125	105

Dimensions: Swivel head CGKD (clampable) for series CDL2 (dimensions in mm)

Series CDL2 ØAL	Series CDL2 ØMM	Type	KK	LF min.	Clamping screws ISO 4762-10.9	M_A [3] Nm	m [4] kg	C_0 [5] kN	F_{adm} [6] kN
40	**22**	**CGKD 20**	M16x1,5	20,5	M8x20	25	0,35	48	17,7
40	**25**	**CGKD 25**	M20x1,5	25,5	M8x20	30	0,65	78	28,8
50	**28**								
50	**32**	**CGKD 32**	M27x2	30	M10x25	59	1,15	114	42,1
63	**36**								
63	**40**	**CGKD 40**	M33x2	39	M10x30	59	2,1	204	75,3
80	**45**								
80	**50**	**CGKD 50**	M42x2	47	M12x35	100	4	310	114,4
100	**56**								
100	**63**	**CGKD 63**	M48x2	58	M16x40	250	7,2	430	158,7
125	**70**								
125	**80**	**CGKD 80**	M64x3	74	M20x50	490	15	695	265,5
160	**100**	**CGKD 100**	M80x3	94	M24x60	840	25,5	1060	391,1
200	**125**	**CGKD 125**	M100x3	116	M24x70	840	52,5	1430	527,7

ØAL = piston Ø

ØMM = piston rod Ø

1) Lubricating nipple, cone head form A according to DIN 71412

2) Bolt Ø m6 required

3) M_A = tightening torque in Nm
The swivel head must always be screwed against the shoulder of the piston rod. Afterwards, the clamping screws must be tightened with the specified tightening torque

4) m = weight of swivel head in kg

5) C_0 = static load rating of the swivel head in kN

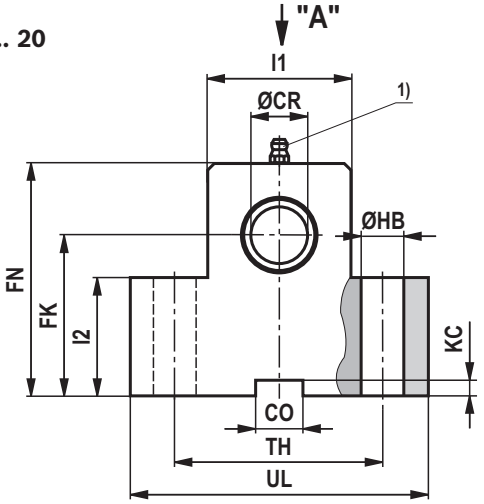
6) F_{adm} = maximum admissible load on the swivel head in kN during oscillatory or alternating loads

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

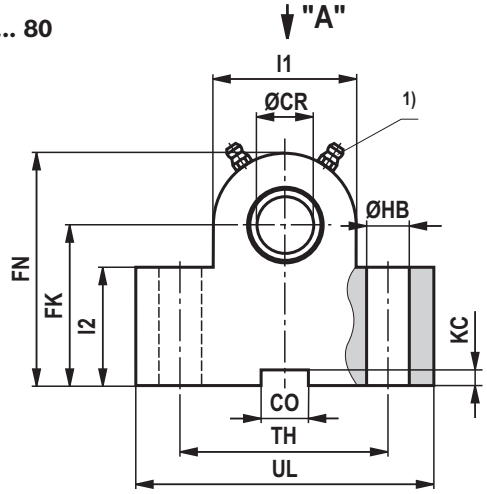
Dimensions: Trunnion bracket CLTB for series CDL2
(dimensions in mm)

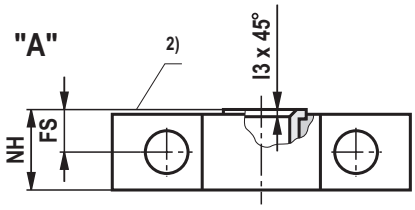
ISO 8132

CLTB 12 ... 20



CLTB 25 ... 80





Series CDL2 ØAL	Series CDL2 ØMM	Type [3]	Material no.	Nominal force kN [4]	ØCR H7	CO N9	FK js12	FN max.	FS js14	ØHB H13
25	**14**	**CLTB 12**	R900772607	8	12	10	34	50	8	9
32	**18**	**CLTB 16**	R900772608	12,5	16	16	40	60	10	11
40	**22**	**CLTB 20**	R900772609	20	20	16	45	70	10	11
40	**25**	**CLTB 25**	R900772610	32	25	25	55	80	12	13,5
50	**28**									
50	**32**	**CLTB 32**	R900772611	50	32	25	65	100	15	17,5
63	**36**									
63	**40**	**CLTB 40**	R900772612	80	40	36	76	120	16	22
80	**45**									
80	**50**	**CLTB 50**	R900772613	125	50	36	95	140	20	26
100	**56**									
100	**63**	**CLTB 63**	R900772614	200	63	50	112	180	25	33
125	**70**									
125	**80**	**CLTB 80**	R900772615	320	80	50	140	220	31	39

Dimensions: Trunnion bracket CLTB for series CDL2
(dimensions in mm)

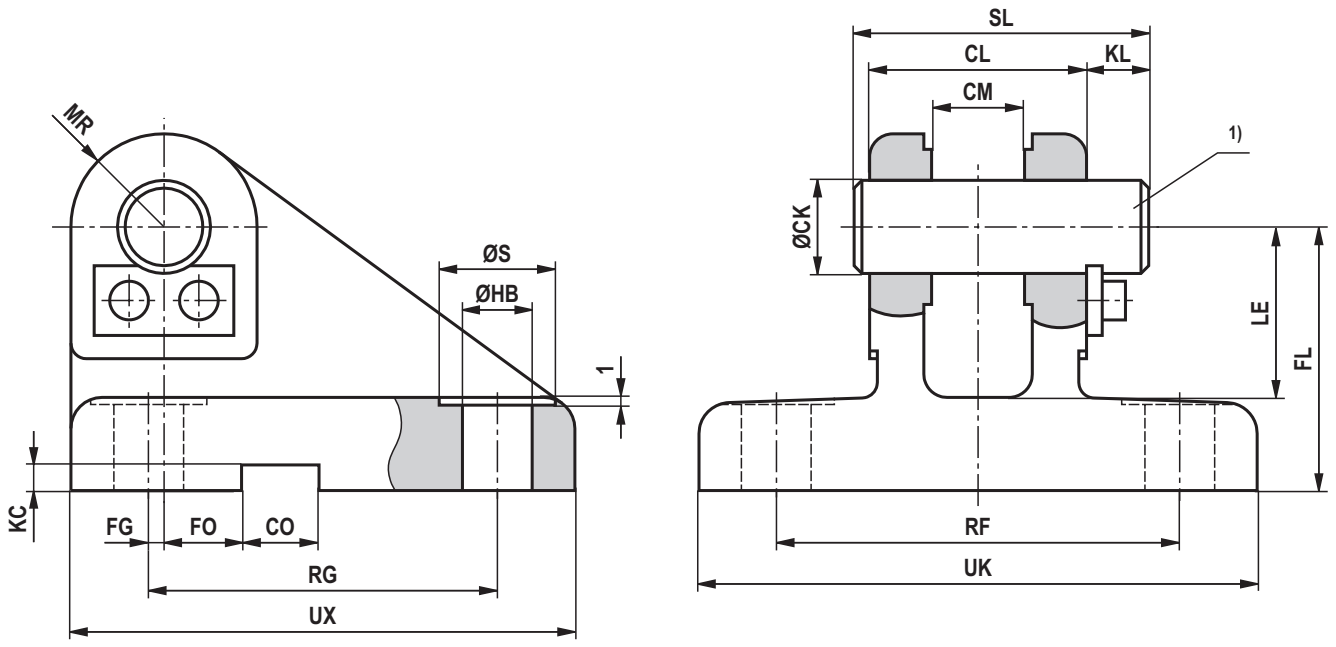
Series CDL2		Type [3]	KC +0,3	l1	l2	l3	NH max.	TH js14	UL max.	*m* [5] kg
ØAL	ØMM									
25	**14**	**CLTB 12**	3,3	25	25	1	17	40	63	0,4
32	**18**	**CLTB 16**	4,3	30	30	1	21	50	80	0,85
40	**22**	**CLTB 20**	4,3	40	38	1,5	21	60	90	1,2
40	**25**	**CLTB 25**	5,4	56	45	1,5	26	80	110	2,1
50	**28**									
50	**32**	**CLTB 32**	5,4	70	52	2	33	110	150	4,55
63	**36**									
63	**40**	**CLTB 40**	8,4	88	60	2,5	41	125	170	7,3
80	**45**									
80	**50**	**CLTB 50**	8,4	100	75	2,5	51	160	210	14,5
100	**56**									
100	**63**	**CLTB 63**	11,4	130	85	3	61	200	265	23,1
125	**70**									
125	**80**	**CLTB 80**	11,4	160	112	3,5	81	250	325	52,3

ØAL = piston Ø
ØMM = piston rod Ø
[1] Lubricating nipple, cone head form A according to DIN 71412
[2] Contact surface trunnion (inside)
[3] Bearing blocks are always supplied in pairs
[4] Nominal force applies to applications in pairs
[5] ***m*** = weight of trunnion bracket in kg (specified per pair)

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.
The trunnion brackets are suitable for mounting type MT4.

Dimensions: Clevis bracket CLCA (clampable) for series CDL2
(dimensions in mm)

ISO 8132, form B



Series CDL2 ØAL	Series CDL2 ØMM	Type	Material no.	Nominal force kN	ØCK H9 [1]	CL h16	CM A12	CO N9	FG js14	FL js12	FO js14	ØHB H13
25	**14**	**CLCA 10** [2]	[3]	5	10	24	10	8	2	32	10	6,6
32	**18**	**CLCA 12** [2]	R900542861	8	12	28	12	10	2	34	10	9
40	**22**	**CLCA 20**	R900542863	20	20	45	20	16	7,5	45	10	11
40	**25**	**CLCA 25**	R900542864	32	25	56	25	25	10	55	10	13,5
50	**28**											
50	**32**	**CLCA 32**	R900542865	50	32	70	32	25	14,5	65	6	17,5
63	**36**											
63	**40**	**CLCA 40**	R900542866	80	40	90	40	36	17,5	76	6	22
80	**45**											
80	**50**	**CLCA 50**	R900542867	125	50	110	50	36	25	95	0	26
100	**56**											
100	**63**	**CLCA 63**	R900542868	200	63	140	63	50	33	112	0	33
125	**70**											
125	**80**	**CLCA 80**	R900542869	320	80	170	80	50	45	140	0	39
160	**100**	**CLCA 100**	[3]	500	100	210	100	63	52,5	180	0	52
200	**125**	**CLCA 125**	[3]	800	125	270	125	80	75	230	0	52

Dimensions: Clevis bracket CLCA (clampable) for series CDL2
(dimensions in mm)

Series CDL2 ØAL	Series CDL2 ØMM	Type	KC +0,3	KL	LE min.	MR max.	RF js14	RG js14	ØS	SL	UK max.	UX max.	*m* [4] kg
25	**14**	**CLCA 10** [2]	3,3	8	22	10	39	44	11	34	56	60	0,33
32	**18**	**CLCA 12** [2]	3,3	8	22	12	52	45	15	38	72	65	0,45
40	**22**	**CLCA 20**	4,3	10	30	20	75	70	18	58	100	95	1,5
40	**25**	**CLCA 25**	5,4	10	37	25	90	85	20	69	120	115	3
50	**28**												
50	**32**	**CLCA 32**	5,4	13	43	32	110	110	26	87	145	145	4,5
63	**36**												
63	**40**	**CLCA 40**	8,4	16	52	40	140	125	33	110	185	170	8,5
80	**45**												
80	**50**	**CLCA 50**	8,4	19	65	50	165	150	40	133	215	200	13,5
100	**56**												
100	**63**	**CLCA 63**	11,4	20	75	63	210	170	48	164	270	230	23,4
125	**70**												
125	**80**	**CLCA 80**	11,4	26	95	80	250	210	57	202	320	280	38,5
160	**100**	**CLCA 100**	12,4	30	120	100	315	250	76	246	405	345	99,2
200	**125**	**CLCA 125**	15,4	32	170	125	365	350	76	310	455	450	174,1

ØAL = piston Ø
ØMM = piston rod Ø

[1] Bolt Ø m6 required
(bolt and bolt lock are included in the scope of delivery and are not mounted upon delivery)

[2] 2 washers for mounting required
- for CLCA 10: Washer DIN 988 10x16x0.5
  Material no. R900061310
- for CLCA 12: Washer DIN 988 12x18x1
  Material no. R900006948

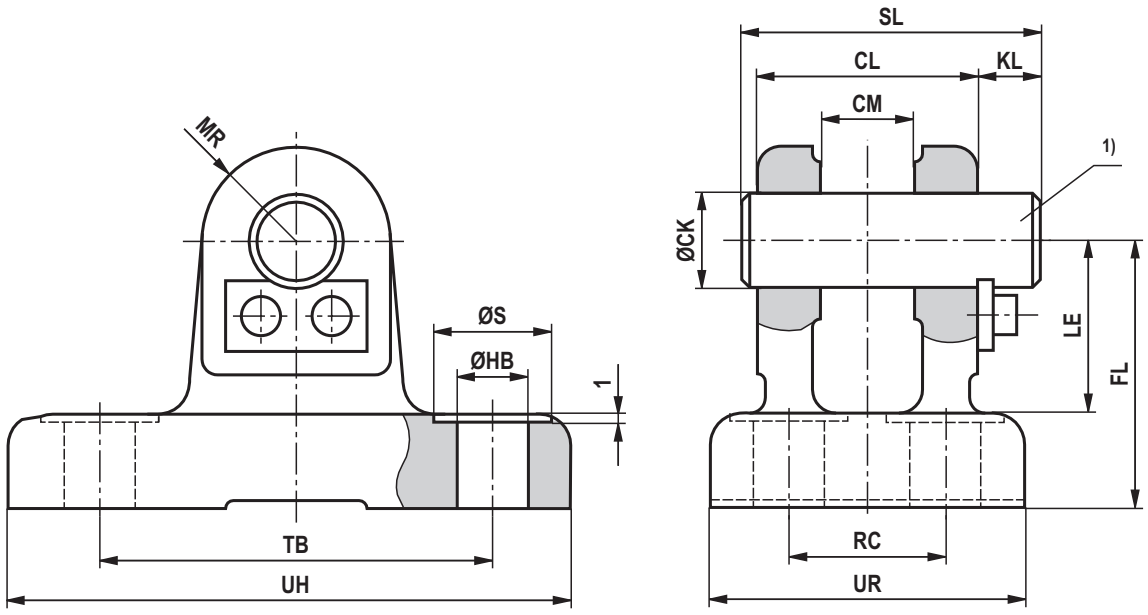
[3] Upon request

[4] ***m*** = weight of clevis bracket in kg

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.
The clevis brackets are suitable for mounting type MP5 and for mounting on the swivel head.

Dimensions: Clevis bracket CLCD (clampable) for series CDL2
(dimensions in mm)

ISO 8132, form A



Series CDL2		Type	Material no.	Nominal force	ØCK	CL	CM	FL	ØHB	KL	LE
ØAL	ØMM			kN	H9 [1]	h16	A12	js12	H13		min.
25	**14**	**CLCD 10** [2]	[3]	5	10	24	10	32	6,6	8	22
32	**18**	**CLCD 12** [2]	R900542879	8	12	28	12	34	9	8	22
40	**22**	**CLCD 20**	R900542881	20	20	45	20	45	11	10	30
40	**25**	**CLCD 25**	R900542882	32	25	56	25	55	13,5	10	37
50	**28**										
50	**32**	**CLCD 32**	R900542883	50	32	70	32	65	17,5	13	43
63	**36**										
63	**40**	**CLCD 40**	R900542884	80	40	90	40	76	22	16	52
80	**45**										
80	**50**	**CLCD 50**	R900542885	125	50	110	50	95	26	19	65
100	**56**										
100	**63**	**CLCD 63**	R900542886	200	63	140	63	112	33	20	75
125	**70**										
125	**80**	**CLCD 80**	R900542887	320	80	170	80	140	39	26	95
160	**100**	**CLCD 100**	[3]	500	100	210	100	180	45	30	120
200	**125**	**CLCD 125**	[3]	800	125	270	125	230	52	32	170

Dimensions: Clevis bracket CLCD (clampable) for series CDL2 (dimensions in mm)

Series CDL2 ØAL	Series CDL2 ØMM	Type	MR max.	RC js14	ØS	SL	TB js14	UR max.	UH max.	*m* [3] kg
25	**14**	**CLCD 10** [2]	10	17	11	34	42	33	60	0,27
32	**18**	**CLCD 12** [2]	12	20	15	38	50	40	70	0,35
40	**22**	**CLCD 20**	20	32	18	58	75	58	98	0,95
40	**25**	**CLCD 25**	25	40	20	69	85	70	113	1,9
50	**28**									
50	**32**	**CLCD 32**	32	50	26	87	110	85	143	3
63	**36**									
63	**40**	**CLCD 40**	40	65	33	110	130	108	170	5,5
80	**45**									
80	**50**	**CLCD 50**	50	80	40	133	170	130	220	10,6
100	**56**									
100	**63**	**CLCD 63**	63	100	48	164	210	160	270	17
125	**70**									
125	**80**	**CLCD 80**	80	125	57	202	250	210	320	32
160	**100**	**CLCD 100**	100	160	66	246	315	260	400	74
200	**125**	**CLCD 125**	125	200	76	310	385	320	470	129

ØAL = piston Ø

ØMM = piston rod Ø

[1] Bolt Ø m6 required
(bolt and bolt lock are included in the scope of delivery and are not mounted upon delivery)

[2] 2 washers for mounting required

- for CLCA 10: Washer DIN 988 10x16x0.5
  Material no. R900061310
- for CLCA 12: Washer DIN 988 12x18x1
  Material no. R900006948

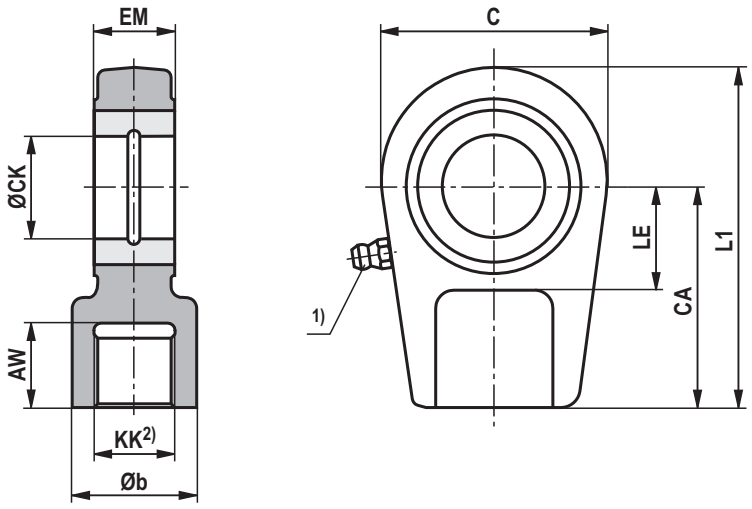
[3] Upon request

[4] ***m*** = weight of clevis bracket in kg

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.
The clevis brackets are suitable for mounting type MP5 and for mounting on the swivel head.

Dimensions: Plain clevis CSA for series CDH1/CGH1/CSH1 and CDH3/CGH3/CSH3 (dimension in mm)

AL-Ø 40 ... 200 mm



Series		Type	Material no.	AW	Øb	C	CA	ØCK	EM
CDH1 / CGH1 / CSH1 ØAL	CDH3 / CGH3 / CSH3 ØAL							H11	-0,4
40	**–**	**CSA 16**	R900303150	17	28	56	50	25	23
50	**40**	**CSA 22**	R900303151	23	34	64	60	30	28
63	**50**	**CSA 28**	R900303152	29	44	78	70	35	30
80	**63**	**CSA 35**	R900303153	36	55	94	85	40	35
100	**80**	**CSA 45**	R900303154	46	70	116	105	50	40
125	**100**	**CSA 58**	R900303155	59	87	130	130	60	50
140	**125**	**CSA 65**	R900303156	66	93	154	150	70	55
160	**140**	**CSA 80**	R900303157	81	125	176	170	80	60
180	**160**	**CSA100**	R900303158	101	143	206	210	90	65
200	**180**	**CSA110**	R900303159	111	153	230	235	100	70
–	**200**	**CSA120**	R900303160	125	176	265	265	110	80

Dimensions: Plain clevis CSA for series CDH1/CGH1/CSH1 and CDH3/CGH3/CSH3 (dimension in mm)

Series		Type	KK	LE	L1	m [3] kg	C_0 [4] kN	F_{adm} [5] kN
CDH1 / CGH1 / CSH1 ØAL	CDH3 / CGH3 / CSH3 ØAL							
40	**–**	**CSA 16**	M16x1,5	25	80	0,43	72	25,9
50	**40**	**CSA 22**	M22x1,5	30	94	0,7	106	38,2
63	**50**	**CSA 28**	M28x1,5	40	112	1,1	153	55,1
80	**63**	**CSA 35**	M35x1,5	45	135	2,0	250	90,0
100	**80**	**CSA 45**	M45x1,5	55	168	3,3	365	131,4
125	**100**	**CSA 58**	M58x1,5	65	200	5,5	400	144,0
140	**125**	**CSA 65**	M65x1,5	75	232	8,6	540	194,4
160	**140**	**CSA 80**	M80x2	80	265	12,2	670	241,2
180	**160**	**CSA100**	M100x2	90	323	21,5	980	352,8
200	**180**	**CSA110**	M110x2	105	360	27,5	1120	403,2
–	**200**	**CSA120**	M120x2	115	407,5	40,7	1700	612,0

ØAL = piston Ø

1) Lubricating nipple, cone head form A according to DIN 71412

2) The plain clevis must always be screwed against the shoulder of the piston rod

3) m = weight of plain clevis in kg

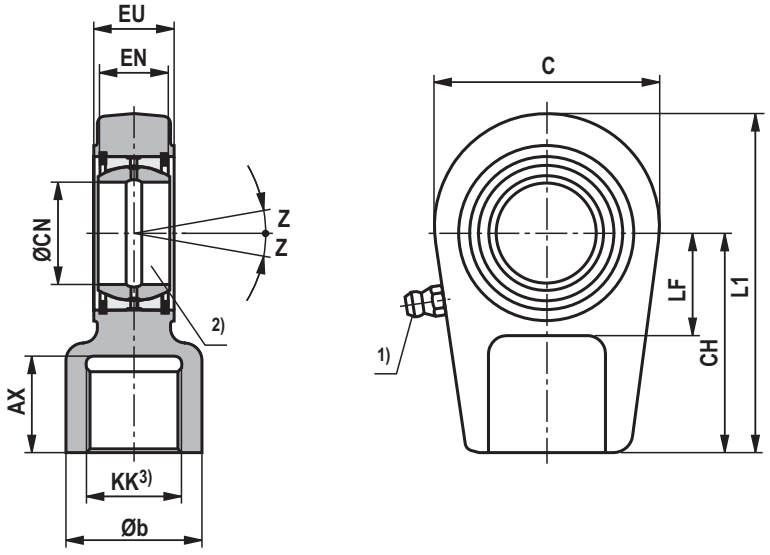
4) C_0 = static load rating of the plain clevis

5) F_{adm} = maximum admissible load on the plain clevis during oscillatory or alternating loads

☞ **Notice!**
The specified dimensions are maximum values and may differ depending on the manufacturer.
The following values are excluded: CA, CK, EM, KK

Dimensions: Swivel head CGA for series CDH1/CGH1/CSH1 and CDH3/CGH3/CSH3 (dimensions in mm)

AL-Ø 40 ... 280 mm



Series		Type	Material no.	AX min.	Øb max.	C	CH	ØCN 2)	EN	EU -0,4
CDH1 / CGH1 / CSH1 ØAL	CDH3 / CGH3 / CSH3 ØAL									
40	**–**	**CGA 16**	R900303125	17	26	56	50	$25_{-0,010}$	$20_{-0,12}$	23
50	**40**	**CGA 22**	R900303126	23	33	64	60	$30_{-0,010}$	$22_{-0,12}$	28
63	**50**	**CGA 28**	R900303127	29	41	78	70	$35_{-0,012}$	$25_{-0,12}$	30
80	**63**	**CGA 35**	R900303128	36	50	94	85	$40_{-0,012}$	$28_{-0,12}$	35
100	**80**	**CGA 45**	R900303129	46	62	116	105	$50_{-0,012}$	$35_{-0,12}$	40
125	**100**	**CGA 58**	R900303130	59	76	130	130	$60_{-0,015}$	$44_{-0,15}$	50
140	**125**	**CGA 65**	R900303131	66	87	154	150	$70_{-0,015}$	$49_{-0,15}$	55
160	**140**	**CGA 80**	R900303132	81	106	176	170	$80_{-0,015}$	$55_{-0,15}$	60
180	**160**	**CGA100**	R900303133	101	125	206	210	$90_{-0,020}$	$60_{-0,20}$	65
200	**180**	**CGA110**	R900303134	111	139	230	235	$100_{-0,020}$	$70_{-0,20}$	70
220	**200**	**CGA120**	R900303135	125	153	265	265	$110_{-0,020}$	$70_{-0,20}$	80
250	**220**	**CGA120**	R900303135	125	153	265	265	$110_{-0,020}$	$70_{-0,20}$	80
280	**250**	**CGA130**	R900303136	135	173	340	310	$120_{-0,020}$	$85_{-0,20}$	90

Dimensions: Swivel head CGA for series CDH1/CGH1/CSH1 and CDH3/CGH3/CSH3 (dimensions in mm)

AL-Ø 40 ... 280 mm

Series		Type	KK	L1	LF	Z	m [4]	C_0 [5]	F_{adm} [6]
CDH1 / CGH1 / CSH1 ØAL	CDH3 / CGH3 / CSH3 ØAL				min.		kg	kN	kN
40	**–**	**CGA 16**	M16x1,5	80	28	7°	0,43	72	25,9
50	**40**	**CGA 22**	M22x1,5	94	30	6°	0,7	106	38,2
63	**50**	**CGA 28**	M28x1,5	112	38	6°	1,1	153	55,1
80	**63**	**CGA 35**	M35x1,5	135	45	7°	2,0	250	90,0
100	**80**	**CGA 45**	M45x1,5	168	55	6°	3,3	365	131,4
125	**100**	**CGA 58**	M58x1,5	200	65	6°	5,5	400	144,0
140	**125**	**CGA 65**	M65x1,5	232	75	6°	8,6	540	194,4
160	**140**	**CGA 80**	M80x2	265	80	6°	12,2	670	241,2
180	**160**	**CGA100**	M100x2	323	90	5°	21,5	980	352,8
200	**180**	**CGA110**	M110x2	360	105	7°	27,5	1120	403,2
220	**200**	**CGA120**	M120x3	407,5	115	6°	40,7	1700	612,0
250	**220**	**CGA120**	M120x3	407,5	115	6°	40,7	1700	612,0
280	**250**	**CGA130**	M130x3	490	140	6°	76,4	2900	1044,0

ØAL = piston Ø

1) Lubricating nipple, cone head form A according to DIN 71412

2) Bolt Ø m6 required;
Bolt Ø j6 required with maintenance-free spherical bearing

3) The swivel head must always be screwed against the shoulder of the piston rod

4) m = weight of swivel head in kg

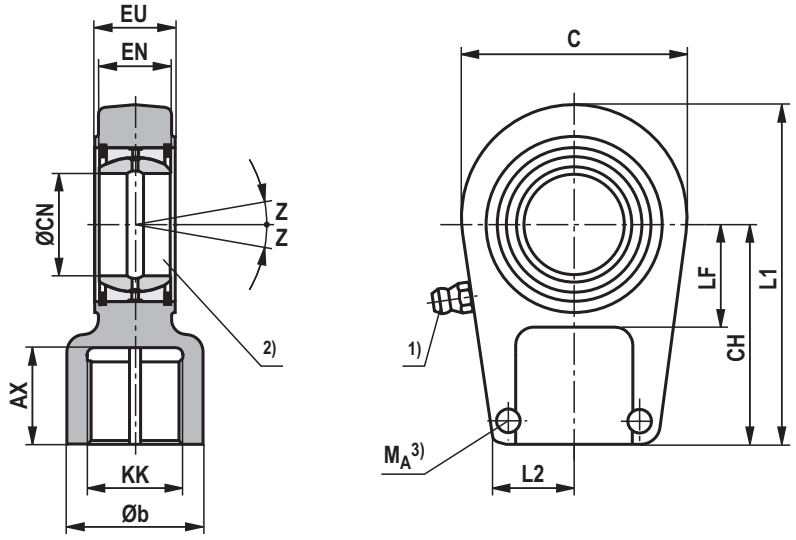
5) C_0 = static load rating of the swivel head

6) F_{adm} = maximum admissible load on the swivel head during oscillatory or alternating loads

☞ **Notice!**
The specified dimensions are maximum values and may differ depending on the manufacturer.
The following values are excluded: CH, CN, EN, EU, KK

Dimensions: Swivel head CGAK (clampable) for series CDH1/CGH1/CSH1 and CDH3/CGH3/CSH3 (dimensions in mm)

AL-Ø 40 ... 280 mm



Series		Type	Material no.	AX	Øb	C	CH	ØCN 2)	EN	EU	KK
CDH1 / CGH1 / CSH1 ØAL	CDH3 / CGH3 / CSH3 ØAL			min.	max.					-0,4	
40	**–**	**CGAK 16**	R900303162	17	26	56	50	$25_{-0,010}$	$20_{-0,12}$	23	M16x1,5
50	**40**	**CGAK 22**	R900303163	23	33	64	60	$30_{-0,010}$	$22_{-0,12}$	28	M22x1,5
63	**50**	**CGAK 28**	R900303164	29	41	78	70	$35_{-0,012}$	$25_{-0,12}$	30	M28x1,5
80	**63**	**CGAK 35**	R900303165	36	50	94	85	$40_{-0,012}$	$28_{-0,12}$	35	M35x1,5
100	**80**	**CGAK 45**	R900303166	46	62	116	105	$50_{-0,012}$	$35_{-0,12}$	40	M45x1,5
125	**100**	**CGAK 58**	R900303167	59	76	130	130	$60_{-0,015}$	$44_{-0,15}$	50	M58x1,5
140	**125**	**CGAK 65**	R900303168	66	87	154	150	$70_{-0,015}$	$49_{-0,15}$	55	M65x1,5
160	**140**	**CGAK 80**	R900303169	81	106	176	170	$80_{-0,015}$	$55_{-0,15}$	60	M80x2
180	**160**	**CGAK100**	R900321655	101	125	206	210	$90_{-0,020}$	$60_{-0,20}$	65	M100x2
200	**180**	**CGAK110**	R900321691	111	139	231	235	$100_{-0,020}$	$70_{-0,20}$	70	M110x2
220	**200**	**CGAK120**	R900321621	125	155	266	265	$110_{-0,020}$	$70_{-0,20}$	80	M120x3
250	**220**	**CGAK120**	R900321621	125	153	265	265	$110_{-0,020}$	$70_{-0,20}$	80	M120x3
280	**250**	**CGAK130**	R900322015	135	173	340	310	$120_{-0,020}$	$85_{-0,20}$	90	M130x3

Dimensions: Swivel head CGAK (clampable) for series CDH1/CGH1/CSH1 and CDH3/CGH3/CSH3 (dimensions in mm)

Series		Type	L1	L2 max.	LF	Z	Clamping screws ISO 4762-10.9	M_A [3] Nm	m [4] kg	C_0 [5] kN	F_{adm} [6] kN
CDH1 / CGH1 / CSH1 ØAL	CDH3 / CGH3 / CSH3 ØAL										
40	**–**	**CGAK 16**	80	24	28	7°	M8	30	0,43	72	25,9
50	**40**	**CGAK 22**	94	26	30	6°	M8	30	0,7	106	38,2
63	**50**	**CGAK 28**	112	34	38	6°	M10	54	1,1	153	55,1
80	**63**	**CGAK 35**	135	39	45	7°	M10	59	2,0	250	90,0
100	**80**	**CGAK 45**	168	46	55	6°	M12	100	3,3	365	131,4
125	**100**	**CGAK 58**	200	61	65	6°	M16	250	5,5	400	144,0
140	**125**	**CGAK 65**	232	66	75	6°	M16	250	8,6	540	194,4
160	**140**	**CGAK 80**	265	81	80	6°	M20	490	12,2	670	241,2
180	**160**	**CGAK100**	323	91	90	5°	M20	490	21,5	980	352,8
200	**180**	**CGAK110**	360	101	105	7°	M24	840	27,5	1120	403,2
220	**200**	**CGAK120**	407,5	111	115	6°	M24	840	40,7	1700	612,0
250	**220**	**CGAK120**	407,5	111	115	6°	M24	840	40,7	1700	612,0
280	**250**	**CGAK130**	490	129	140	6°	M24	840	76,4	2900	1044,0

ØAL = piston Ø

1) Lubricating nipple, cone head form A according to DIN 71412

2) Bolt Ø m6 required;
Bolt Ø j6 required with maintenance-free spherical bearing

3) M_A = tightening torque
The swivel head must always be screwed against the shoulder of the piston rod. Afterwards, the clamping screws must be tightened with the specified tightening torque.

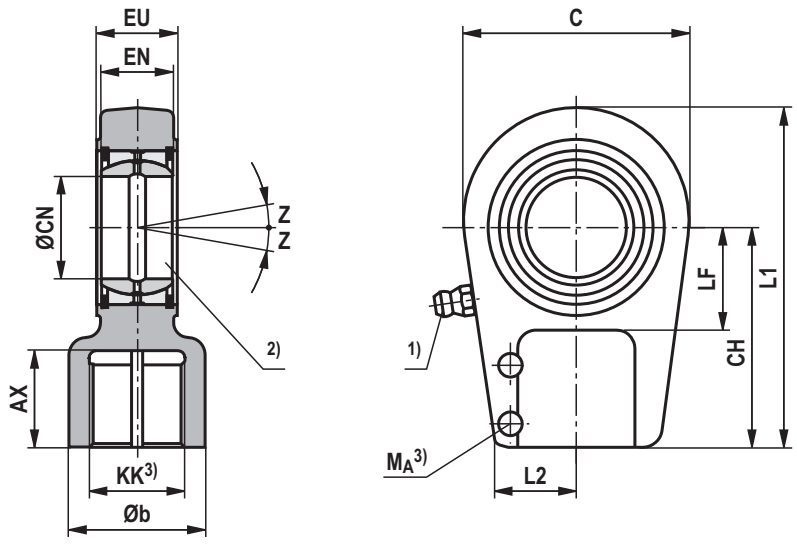
4) m = weight of swivel head in kg

5) C_0 = static load rating of the swivel head

6) F_{adm} = maximum admissible load on the swivel head during oscillatory or alternating loads

☞ **Notice!**
The specified dimensions are maximum values and may differ depending on the manufacturer.
The following values are excluded: CH, CN, EN, EU, KK

Dimensions: Swivel head CGAS (clampable) for series CDH1/CGH1/CSH1 and CDH3/CGH3/CSH3 (dimensions in mm)



Series		Type	Material no.	AX	Øb	C	CH	ØCN 2)	EN	EU	KK
CDH1 / CGH1 / CSH1 ØAL	CDH3 / CGH3 / CSH3 ØAL			min.	max.	max.				-0,4	
40	**–**	**CGAS 25**	R900303137	30	28	56	65	$25_{-0,010}$	$20_{-0,12}$	23	M18x2
50	**40**	**CGAS 30**	R900303138	35	34	64	75	$30_{-0,010}$	$22_{-0,12}$	28	M24x2
63	**50**	**CGAS 35**	R900303139	46	46	78	90	$35_{-0,012}$	$25_{-0,12}$	30	M30x2
80	**63**	**CGAS 40**	R900303140	56	57	94	105	$40_{-0,012}$	$28_{-0,12}$	35	M39x3
100	**80**	**CGAS 50**	R900303141	76	70	116	135	$50_{-0,012}$	$35_{-0,12}$	40	M50x3
125	**100**	**CGAS 60**	R900303142	96	87	130	170	$60_{-0,015}$	$44_{-0,15}$	50	M64x3
140	**125**	**CGAS 70**	R900303143	112	111	154	195	$70_{-0,015}$	$49_{-0,15}$	55	M80x3
160	**140**	**CGAS 80**	R900303144	122	129	176	210	$80_{-0,015}$	$55_{-0,15}$	60	M90x3
180	**160**	**CGAS 90**	R900303145	142	153	211	250	$90_{-0,020}$	$60_{-0,20}$	65	M100x3
200	**180**	**CGAS100**	R900303146	152	170	230	275	$100_{-0,020}$	$70_{-0,20}$	70	M110x4
220	**200**	**CGAS110**	R900303147	162	180	264	300	$110_{-0,020}$	$70_{-0,20}$	80	M120x4
250	**220**	**CGAS110**	R900303147	162	180	264	300	$110_{-0,020}$	$70_{-0,20}$	80	M120x4
280	**250**	**CGAS120**	R900303148	192	210	340	360	$120_{-0,020}$	$85_{-0,20}$	90	M150x4
320	**280**	**CGAS140**	R900317314	210	230	380	420	$140_{-0,025}$	$90_{-0,25}$	110	M160x4
–	**320**	**CGAS160**	R900303149	221	260	480	460	$160_{-0,025}$	$105_{-0,25}$	110	M180x4

Dimensions: Swivel head CGAS (clampable) for series CDH1/CGH1/CSH1 and CDH3/CGH3/CSH3 (dimensions in mm)

Series		Type	L1	L2	LF	Z [3]	Clamping screws	M_A [4]	m [5]	C_0 [6]	F_{adm} [7]
CDH1 / CGH1 / CSH1 ØAL	CDH3 / CGH3 / CSH3 ØAL		max.	max.	min.		ISO 4762-10.9	Nm	kg	kN	kN
40	**–**	**CGAS 25**	95	24	25	7-8°	M8	30	0,65	82	27,1
50	**40**	**CGAS 30**	109	28	30	6-7°	M8	30	1,0	122	40,3
63	**50**	**CGAS 35**	132	36	40	6-7°	M10	59	1,5	177	58,4
80	**63**	**CGAS 40**	155	39	44	7°	M12	100	2,4	287	94,7
100	**80**	**CGAS 50**	198	45	55	6-7°	M12	100	4,8	422	139,3
125	**100**	**CGAS 60**	240	59	65	6-7°	M16	250	8,6	522	172,3
140	**125**	**CGAS 70**	279	70	75	6°	M16	250	12,2	707	233,3
160	**140**	**CGAS 80**	305	85	80	6°	M20	490	18,4	870	287,1
180	**160**	**CGAS 90**	366	91	90	5°	M20	490	31,6	1284	423,7
200	**180**	**CGAS100**	400	95	105	7°	M20	490	34	1460	481,8
220	**200**	**CGAS110**	443	106	115	6°	M24	840	44	2024	667,9
250	**220**	**CGAS110**	443	106	115	6°	M24	840	44	2024	667,9
280	**250**	**CGAS120**	540	122	140	6°	M24	840	75	2970	980,1
320	**280**	**CGAS140**	620	129	185	7°	M30	1700	160	3350	1105,5
–	**320**	**CGAS160**	710	146	200	8°	M30	1700	235	4302	1419,7

ØAL = piston Ø

1) Lubricating nipple, cone head form A according to DIN 71412

2) Bolt Ø m6 required;
Bolt Ø j6 required with maintenance-free spherical bearing

3) Dimensions may differ depending on the manufacturer

4) M_A = tightening torque
The swivel head must always be screwed against the shoulder of the piston rod. Afterwards, the clamping screws must be tightened with the specified tightening torque.

5) m = weight of swivel head in kg

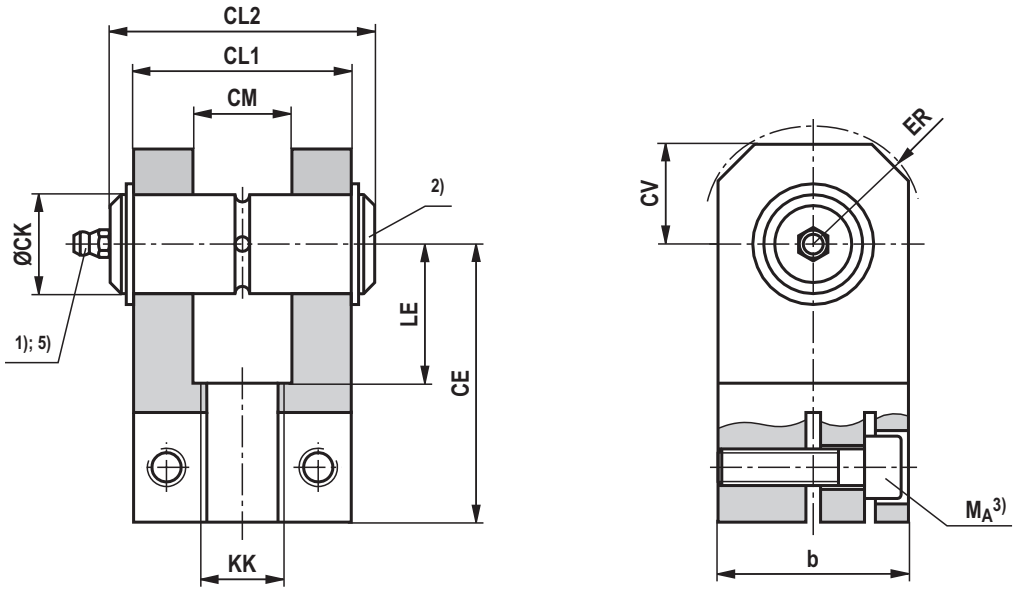
6) C_0 = static load rating of the swivel head

7) F_{adm} = maximum admissible load on the swivel head during oscillatory or alternating loads

☞ **Notice!**
The specified dimensions are maximum values and may differ depending on the manufacturer.
The following values are excluded: CH, CN, EN, EU, KK

Dimensions: Fork clevis CCKB (clampable) for series CDH2/CGH2/CSH2 and CDM1/CGM1/CSM1 (dimensions in mm)

ISO 8132



Series CDH2 / CGH2 / CSH2 ØAL	Series CDH2 / CGH2 / CSH2 ØMM	Series CDM1 / CGM1 / CSM1 ØAL	Series CDM1 / CGM1 / CSM1 ØMM	Type	Material no.	Nominal force kN	b max.	CE js13	ØCK H9 2)	CL1 h16	CL2 max.	CM A13	ER max.
–	–	25	14 / 18	CCKB 12 5)	R900542842	8	25	38	12	28	49	12	16
–	–	25	18	CCKB 16	R900542843	12,5	30	44	16	36	57	16	20
		32	18 / 22										
–	–	32	22	CCKB 20	R900542844	20	40	52	20	45	72	20	25
		40	22 / 28										
40	25 / 28	40	28	CCKB 25	R900542845	32	50	65	25	56	84	25	32
		50	28 / 36										
50	32 / 36	50	36	CCKB 32	R900542846	50	65	80	32	70	105	32	40
		63	36 / 45										
63	40 / 45	63	45	CCKB 40	R900542847	80	80	97	40	90	133	40	50
		80	45 / 56										
80	50 / 56	80	56	CCKB 50	R900542848	125	100	120	50	110	165	50	63
		100	56 / 70										
100	63 / 70	100	70	CCKB 63	R900542849	200	140	140	63	140	185	63	71
		125	70 / 90										
125	80 / 90	125	90	CCKB 80	R900542850	320	180	180	80	170	225	80	90
		160	90 / 110										
140	90 / 100	–	–	CCKB 90	6)	400	200	195	90	190	6)	90	100
160	100 / 110	160	110	CCKB 100	6)	500	220	210	100	210	6)	100	110
		200	110 / 140										

Dimensions: Fork clevis CCKB (clampable) for series CDH2/CGH2/CSH2 and CDM1/CGM1/CSM1 (dimensions in mm)

Series				Type	KK	LE min.	CV max.	Clamping screws ISO 4762-10.9	M_A [3] Nm	m [4] kg
CDH2 / CGH2 / CSH2		CDM1 / CGM1 / CSM1								
ØAL	ØMM	ØAL	ØMM							
–	–	25	14 / 18	CCKB 12 [5]	M12x1,25	18	16	M4x16	2,9	0,2
–	–	25	18	CCKB 16	M14x1,5	22	20	M6x20	10	0,35
		32	18 / 22							
–	–	32	22	CCKB 20	M16x1,5	27	25	M8x30	25	0,7
		40	22 / 28							
40	25 / 28	40	28	CCKB 25	M20x1,5	34	32	M10x35	49	1,4
		50	28 / 36							
50	32 / 36	50	36	CCKB 32	M27x2	41	40	M12x40	85	2,8
		63	36 / 45							
63	40 / 45	63	45	CCKB 40	M33x2	51	50	M16x50	210	5,2
		80	45 / 56							
80	50 / 56	80	56	CCKB 50	M42x2	63	63	M20x60	425	9,5
		100	56 / 70							
100	63 / 70	100	70	CCKB 63	M48x2	75	71	M24x80	730	21,5
		125	70 / 90							
125	80 / 90	125	90	CCKB 80	M64x3	94	90	M30x100	1450	38,2
		160	90 / 110							
140	90 / 100	–	–	CCKB 90	M72x3	108	100	M36x120	2480	[6]
160	100 / 110	160	110	CCKB 100	M80x3	114	110	M36x130	2480	[6]
		200	110 / 140							

ØAL = piston Ø

ØMM = piston rod Ø

1) Lubricating nipple, cone head form A according to DIN 71412

2) Bolt Ø m6 required
(bolt and bolt lock are included in the scope of delivery and are not mounted upon delivery)

3) M_A = tightening torque
The fork clevis must always be screwed against the shoulder of the piston rod. Afterwards, the clamping screws must be tightened with the specified tightening torque.

4) m = weight of the fork clevis in kg

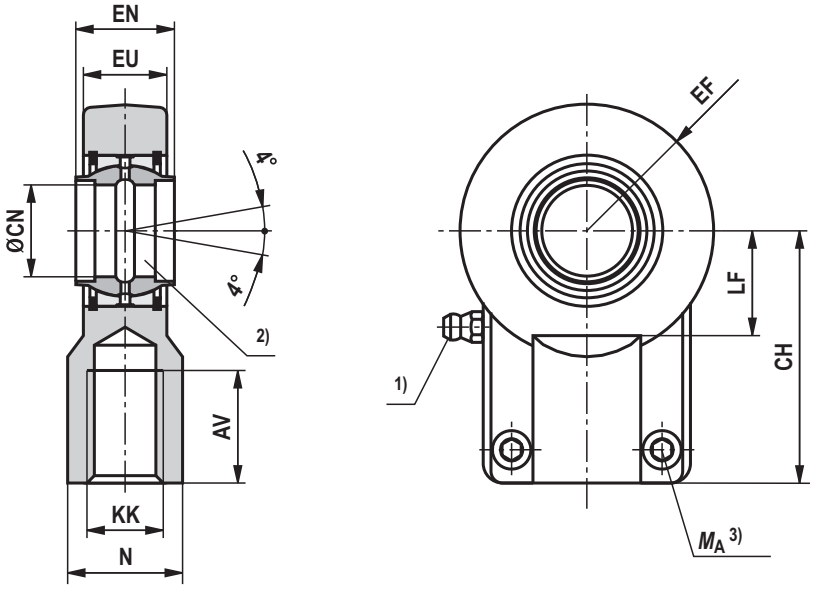
5) Without lubrication bore

6) Upon request

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

Dimensions: Swivel head CGKD (clampable) for series CDH2/CGH2/CSH2 and CDM1/CGM1/CSM1 (dimensions in mm)

ISO 8132



Series				Type	Material no.	Nominal force kN	AV min.	N max.	CH js13	EF max.	ØCN H7 2)	EN h12	EU max.
CDH2 / CGH2 / CSH2		CDM1 / CGM1 / CSM1											
ØAL	ØMM	ØAL	ØMM										
–	–	25	14 / 18	**CGKD 12** 7)	R900540998	8	17	19	38	16,5	12	12	11
–	–	25	18	**CGKD 16**	R900308559	12,5	19	22	44	20,5	16	16	14
		32	18 / 22										
–	–	32	22	**CGKD 20**	R900308576	20	23	28	52	25	20	20	17,5
		40	22 / 28										
40	25 / 28	40	28	**CGKD 25**	R900323332	32	29	31	65	32	25	25	22
		50	28 / 36										
50	32 / 36	50	36	**CGKD 32**	R900322049	50	37	38	80	40	32	32	28
		63	36 / 45										
63	40 / 45	63	45	**CGKD 40**	R900322029	80	46	47	97	50	40	40	34
		80	45 / 56										
80	50 / 56	80	56	**CGKD 50**	R900322719	125	57	58	120	63	50	50	42
		100	56 / 70										
100	63 / 70	100	70	**CGKD 63**	R900322028	200	64	70	140	72,5	63	63	53,5
		125	70 / 90										
125	80 / 90	125	90	**CGKD 80**	R900322700	320	86	91	180	92	80	80	68
		160	90 / 110										
140	90 / 100	–	–	**CGKD 90** 8)	R900325702	400	91	100	195	101	90	90	72
160	100 / 110	160	110	**CGKD 100**	R900322030	500	96	110	210	114	100	100	85,5
		200	110 / 140										
180	110 / 125	–	–	**CGKD 110** 8)	R900308153	635	106	125	235	129	110	110	88
200	125 / 140	200	140	**CGKD 125**	R900322026	800	113	135	260	160	125	125	105
220	140 / 160	–	–	**CGKD 160**	R900300718	1.520	126	165	310	200	160	160	133
250	160 / 180	–	–										
280	180 / 200	–	–	**CGKD 200**	R900324814	2.000	161	215	390	250	200	200	165
320	200 / 220	–	–										

Dimensions: Swivel head CGKD (clampable) for series CDH2/CGH2/CSH2 and CDM1/CGM1/CSM1 (dimensions in mm))

Series				Type	KK	LF min.	Clamping screws ISO 4762-10.9	M_A [3] Nm	m [4] kg	C_0 [5] kN	F_{adm} [6] kN
CDH2 / CGH2 / CSH2		CDM1 / CGM1 / CSM1									
ØAL	ØMM	ØAL	ØMM								
–	–	25	14 / 18	**CGKD 12** [7]	M12x1,25	13	M5x16	6	0,1	24,5	9,0
–	–	25	18	**CGKD 16**	M14x1,5	16,5	M6x14	10	0,2	36,5	13,5
		32	18 / 22								
–	–	32	22	**CGKD 20**	M16x1,5	20,5	M8x20	25	0,35	48	17,7
		40	22 / 28								
40	25 / 28	40	28	**CGKD 25**	M20x1,5	25,5	M8x20	30	0,65	78	28,8
		50	28 / 36								
50	32 / 36	50	36	**CGKD 32**	M27x2	30	M10x25	59	1,15	114	42,1
		63	36 / 45								
63	40 / 45	63	45	**CGKD 40**	M33x2	39	M10x30	59	2,1	204	75,3
		80	45 / 56								
80	50 / 56	80	56	**CGKD 50**	M42x2	47	M12x35	100	4	310	114,4
		100	56 / 70								
100	63 / 70	100	70	**CGKD 63**	M48x2	58	M16x40	250	7,2	430	158,7
		125	70 / 90								
125	80 / 90	125	90	**CGKD 80**	M64x3	74	M20x50	490	15	695	265,5
		160	90 / 110								
140	90 / 100	–	–	**CGKD 90** [8]	M72x3	85	M20x60	490	19	750	276,8
160	100 / 110	160	110	**CGKD 100**	M80x3	94	M24x60	840	25,5	1060	391,1
		200	110 / 140								
180	110 / 125	–	–	**CGKD 110** [8]	M90x3	105	M24x60	840	36,5	1200	442,8
200	125 / 140	200	140	**CGKD 125**	M100x3	116	M24x70	840	52,5	1430	527,7
220	140 / 160	–	–	**CGKD 160**	M125x4	145	M24x80	840	82,5	2200	811,8
250	160 / 180	–	–								
280	180 / 200	–	–	**CGKD 200**	M160x4	190	M30x100	1700	168	3650	1346,9
320	200 / 220	–	–								

ØAL = piston Ø

ØMM = piston rod Ø

1) Lubricating nipple, cone head form A according to DIN 71412

2) Bolt Ø m6 required

3) M_A = tightening torque
The swivel head must always be screwed against the shoulder of the piston rod. Afterwards, the clamping screws must be tightened with the specified tightening torque.

4) m = weight of swivel head in kg

5) C_0 = static load rating of the swivel head

6) F_{adm} = maximum admissible load on the swivel head during oscillatory or alternating loads

7) Bearing cannot be re-lubricated

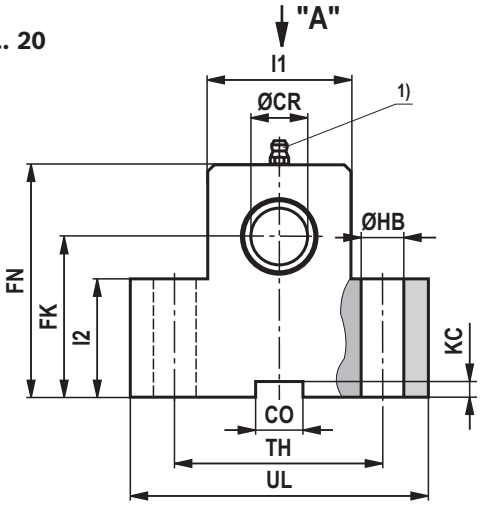
8) Not contained in the standard

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

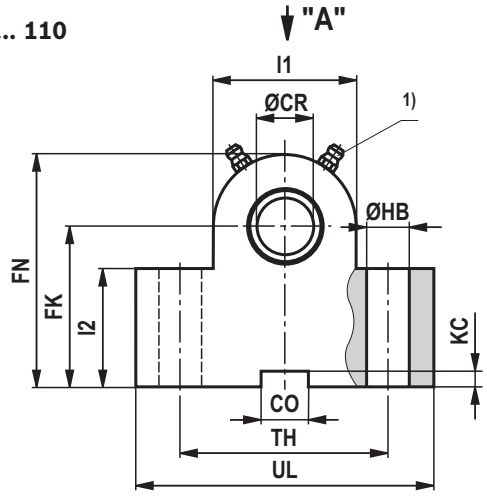
Dimensions: Trunnion bracket CLTB for series CDH2/CGH2/CSH2 and CDM1/CGM1/CSM1 (dimensions in mm)

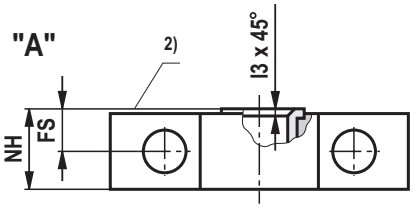
ISO 8132

CLTB 12 ... 20



CLTB 25 ... 110





Series CDH2 / CGH2 / CSH2 ØAL	Series CDM1 / CGM1 / CSM1 ØAL	Type [3]	Material no.	Nominal force kN [4]	ØCR H7	CO N9	FK js12	FN max.	FS js14	ØHB H13	KC +0,3
–	**25**	**CLTB 12**	R900772607	8	12	10	34	50	8	9	3,3
–	**32**	**CLTB 16**	R900772608	12,5	16	16	40	60	10	11	4,3
–	**40**	**CLTB 20**	R900772609	20	20	16	45	70	10	11	4,3
40	**50**	**CLTB 25**	R900772610	32	25	25	55	80	12	13,5	5,4
50	**63**	**CLTB 32**	R900772611	50	32	25	65	100	15	17,5	5,4
63	**80**	**CLTB 40**	R900772612	80	40	36	76	120	16	22	8,4
80	**100**	**CLTB 50**	R900772613	125	50	36	95	140	20	26	8,4
100	**125**	**CLTB 63**	R900772614	200	63	50	112	180	25	33	11,4
125	**160** [6]	**CLTB 80**	R900772615	320	80	50	140	220	31	39	11,4
140	**–**	**CLTB 90**	R901364220	385	90	63	160	250	40	45	12,4
160	**200** [6]	**CLTB 100**	R901205929	500	100	63	180	280	45	52	12,4
180	**–**	**CLTB 110**	R901364223	630	110	80	200	310	50	52	15,4

Dimensions: Trunnion bracket CLTB for series CDH2/CGH2/CSH2 and CDM1/CGM1/CSM1 (dimensions in mm)

Series		Type [3]	l1	l2	l3	NH max.	TH js14	UL max.	*m* [5] kg
CDH2 / CGH2 / CSH2 ØAL	CDM1 / CGM1 / CSM1 ØAL								
–	**25**	**CLTB 12**	25	25	1	17	40	63	0,4
–	**32**	**CLTB 16**	30	30	1	21	50	80	0,85
–	**40**	**CLTB 20**	40	38	1,5	21	60	90	1,2
40	**50**	**CLTB 25**	56	45	1,5	26	80	110	2,1
50	**63**	**CLTB 32**	70	52	2	33	110	150	4,55
63	**80**	**CLTB 40**	88	60	2,5	41	125	170	7,3
80	**100**	**CLTB 50**	100	75	2,5	51	160	210	14,5
100	**125**	**CLTB 63**	130	85	3	61	200	265	23,1
125	**160** [6]	**CLTB 80**	160	112	3,5	81	250	325	52,3
140	–	**CLTB 90**	180	130	4	91	265	345	[7]
160	**200** [6]	**CLTB 100**	200	145	4,5	102	295	385	[7]
180	–	**CLTB 110**	220	160	5	112	320	410	[7]

ØAL = piston Ø

1) Lubricating nipple, cone head form A according to DIN 71412

2) Contact surface trunnion (inside)

3) Bearing blocks are always supplied in pairs

4) Nominal force applies to applications in pairs

5) ***m*** = weight of trunnion bracket in kg (specified per pair)

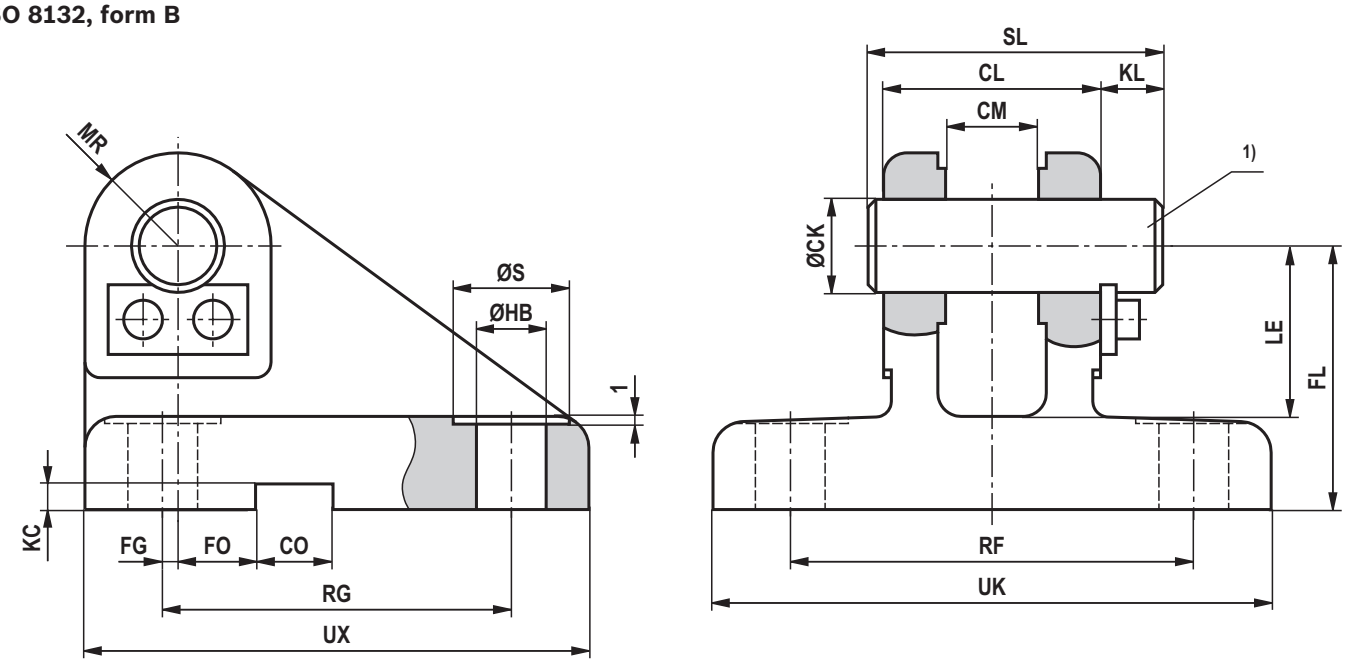
6) Bearing blocks for piston Ø 160 and 200 mm, dimensions differ for replacement transactions (CDM1 / CGM1 / CSM1 series 1X). Please consult us.

7) Upon request

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.
The trunnion brackets are suitable for mounting type MT4.

Dimensions: Clevis bracket CLCA (clampable) for series CDH2/CGH2/CSH2 and CDM1/CGM1/CSM1 (dimensions in mm)

ISO 8132, form B



Series					Type	Material no	Nominal force kN	ØCK H9 1)	CL h16	CM A12	CO N9	FG js14	FL js12	FO js14
CDH2 / CGH2 / CSH2		CDM1 / CGM1 / CSM1												
ØAL	ØMM	ØAL	ØAL	ØMM										
–	–	25	25	14 / 18	CLCA 12	R900542861	8	12	28	12	10	2	34	10
–	–	32	25	18	CLCA 16	R900542862	12,5	16	36	16	16	3,5	40	10
			32	18 / 22										
–	–	40	32	22	CLCA 20	R900542863	20	20	45	20	16	7,5	45	10
			40	22 / 28										
40	25 / 28	50	40	28	CLCA 25	R900542864	32	25	56	25	25	10	55	10
			50	28 / 36										
50	32 / 36	63	50	36	CLCA 32	R900542865	50	32	70	32	25	14,5	65	6
			63	36 / 45										
63	40 / 45	80	63	45	CLCA 40	R900542866	80	40	90	40	36	17,5	76	6
			80	45 / 56										
80	50 / 56	100	80	56	CLCA 50	R900542867	125	50	110	50	36	25	95	0
			100	56 / 70										
100	63 / 70	125	100	70	CLCA 63	R900542868	200	63	140	63	50	33	112	0
			125	70 / 90										
125	80 / 90	160	125	90	CLCA 80	R900542869	320	80	170	80	50	45	140	0
			160	90 / 110										
140	90 / 100	–	–	–	CLCA 90	3)	400	90	190	90	63	47,5	160	0
160	100 / 110	200	160	110	CLCA 100	3)	500	100	210	100	63	52,5	180	0
			200	110 / 140										
180	110 / 125	–	–	–	CLCA 110	3)	635	110	240	110	80	62,5	200	0
200	125 / 140	–	200	140	CLCA 125	3)	800	125	270	125	80	75	230	0

Dimensions: Clevis bracket CLCA (clampable) for series CDH2/CGH2/CSH2 and CDM1/CGM1/CSM1 (dimensions in mm)

Series					Type	ØHB H13	KC +0,3	KL	LE min.	MR max.	RF js14	RG js14	ØS	SL	UK max.	UX max.	*m* [2] kg
CDH2 / CGH2 / CSH2		CDM1 / CGM1 / CSM1															
ØAL	ØMM	ØAL	ØAL	ØMM													
–	–	25	25	14 / 18	CLCA 12	9	3,3	8	22	12	52	45	15	38	72	65	0,45
–	–	32	25	18	CLCA 16	11	4,3	8	27	16	65	55	18	46	90	80	1
			32	18 / 22													
–	–	40	32	22	CLCA 20	11	4,3	10	30	20	75	70	18	58	100	95	1,5
			40	22 / 28													
40	25 / 28	50	40	28	CLCA 25	13,5	5,4	10	37	25	90	85	20	69	120	115	3
			50	28 / 36													
50	32 / 36	63	50	36	CLCA 32	17,5	5,4	13	43	32	110	110	26	87	145	145	5
			63	36 / 45													
63	40 / 45	80	63	45	CLCA 40	22	8,4	16	52	40	140	125	33	110	185	170	9,6
			80	45 / 56													
80	50 / 56	100	80	56	CLCA 50	26	8,4	19	65	50	165	150	40	133	215	200	15,5
			100	56 / 70													
100	63 / 70	125	100	70	CLCA 63	33	11,4	20	75	63	210	170	48	164	270	230	27,5
			125	70 / 90													
125	80 / 90	160	125	90	CLCA 80	39	11,4	26	95	80	250	210	57	202	320	280	47
			160	90 / 110													
140	90 / 100	–	–	–	CLCA 90	45	12,4	28	108	90	280	235	66	224	360	320	[3]
160	100 / 110	200	160	110	CLCA 100	52	12,4	30	120	100	315	250	76	246	405	345	[3]
			200	110 / 140													
180	110 / 125	–	–	–	CLCA 110	52	15,4	31	138	110	335	305	76	277	425	400	[3]
200	125 / 140	–	200	140	CLCA 125	52	15,4	32	170	125	365	350	76	310	455	450	[3]

ØAL = piston Ø

ØMM = piston rod Ø

[1] Bolt Ø m6 required
(bolt and bolt lock are included in the scope of delivery and are not mounted upon delivery)

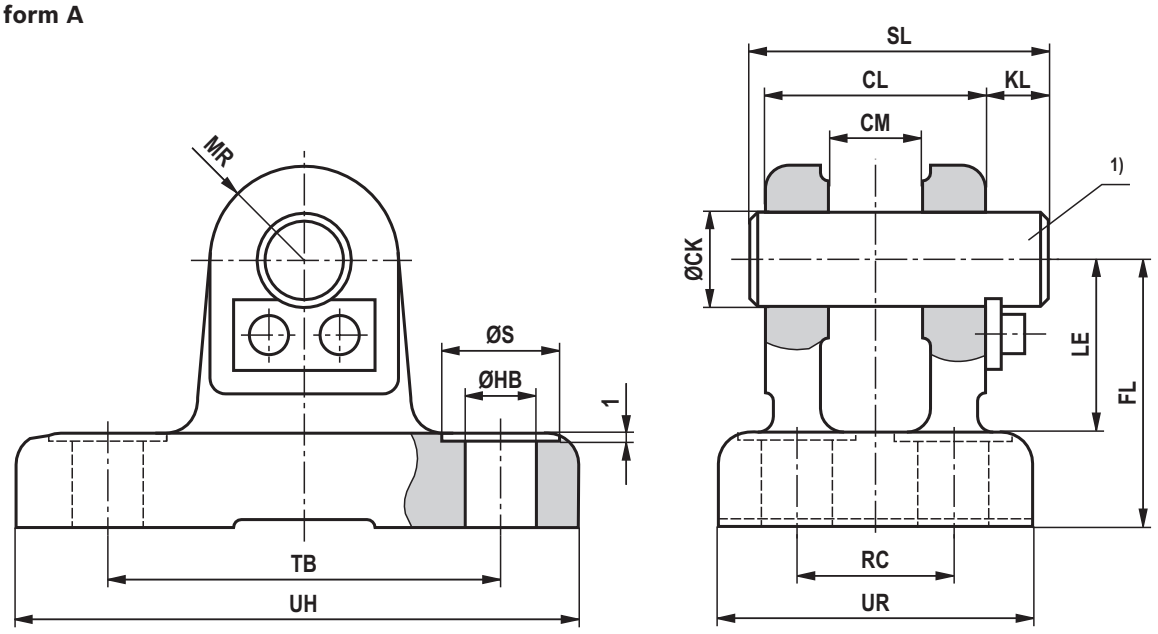
[2] ***m*** = weight of clevis bracket in kg

[3] Upon request

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

Dimensions: Clevis bracket CLCD (clampable) for series CDH2/CGH2/CSH2 and CDM1/CGM1/CSM1 (dimensions in mm)

ISO 8132, form A



Series					Type	Material no.	Nominal force kN	ØCK H9 1)	CL h16	CM A13	FL js12	ØHB H13	KL
CDH2 / CGH2 / CSH2		CDM1 / CGM1 / CSM1											
ØAL	ØMM	ØAL	ØAL	ØMM									
–	–	25	25	14 / 18	CLCD 12	R900542879	8	12	28	12	34	9	8
–	–	32	25	18	CLCD 16	R900542880	12,5	16	36	16	40	11	8
			32	18 / 22									
–	–	40	32	22	CLCD 20	R900542881	20	20	45	20	45	11	10
			40	22 / 28									
40	25 / 28	50	40	28	CLCD 25	R900542882	32	25	56	25	55	13,5	10
			50	28 / 36									
50	32 / 36	63	50	36	CLCD 32	R900542883	50	32	70	32	65	17,5	13
			63	36 / 45									
63	40 / 45	80	63	45	CLCD 40	R900542884	80	40	90	40	76	22	16
			80	45 / 56									
80	50 / 56	100	80	56	CLCD 50	R900542885	125	50	110	50	95	26	19
			100	56 / 70									
100	63 / 70	125	100	70	CLCD 63	R900542886	200	63	140	63	112	33	20
			125	70 / 90									
125	80 / 90	160	125	90	CLCD 80	R900542887	320	80	170	80	140	39	26
			160	90 / 110									
140	90 / 100	–	–	–	CLCD 90	3)	400	90	190	90	160	45	28
160	100 / 110	200	160	110	CLCD 100	3)	500	100	210	100	180	45	30
			200	110 / 140									
180	110 / 125	–	–	–	CLCD 110	3)	635	110	240	110	200	52	31
200	125 / 140	–	200	140	CLCD 125	3)	800	125	270	125	230	52	32

Dimensions: Clevis bracket CLCD (clampable) for series CDH2/CGH2/CSH2 and CDM1/CGM1/CSM1 (dimensions in mm)

Series					Type	LE	MR	RC	ØS	SL	TB	UR	UH	*m* [2]
CDH2 / CGH2 / CSH2		CDM1 / CGM1 / CSM1				min.	max.	js14			js14	max.	max.	kg
ØAL	ØMM	ØAL	ØAL	ØMM										
–	–	25	25	14 / 18	CLCD 12	22	12	20	15	38	50	40	70	0,35
–	–	32	25	18	CLCD 16	27	16	26	18	46	65	50	90	0,7
			32	18 / 22										
–	–	40	32	22	CLCD 20	30	20	32	18	58	75	58	98	0,95
			40	22 / 28										
40	25 / 28	50	40	28	CLCD 25	37	25	40	20	69	85	70	113	1,9
			50	28 / 36										
50	32 / 36	63	50	36	CLCD 32	43	32	50	26	87	110	85	143	3
			63	36 / 45										
63	40 / 45	80	63	45	CLCD 40	52	40	65	33	110	130	108	170	5,5
			80	45 / 56										
80	50 / 56	100	80	56	CLCD 50	65	50	80	40	133	170	130	220	10,6
			100	56 / 70										
100	63 / 70	125	100	70	CLCD 63	75	63	100	48	164	210	160	270	17
			125	70 / 90										
125	80 / 90	160	125	90	CLCD 80	95	80	125	57	202	250	210	320	32
			160	90 / 110										
140	90 / 100	–	–	–	CLCD 90	108	90	140	66	224	290	230	370	[3]
160	100 / 110	200	160	110	CLCD 100	120	100	160	66	246	315	260	400	[3]
			200	110 / 140										
180	110 / 125	–	–	–	CLCD 110	138	110	180	76	277	350	290	445	[3]
200	125 / 140	–	200	140	CLCD 125	170	125	200	76	310	385	320	470	[3]

ØAL = piston Ø

ØMM = piston rod Ø

[1] Bolt Ø m6 required
(bolt and bolt lock are included in the scope of delivery and are not mounted upon delivery)

[2] ***m*** = weight of clevis bracket in kg

[3] Upon request

☞ **Notice!**
Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

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