



Hydraulic cylinder Tie rod design

Component series 2X
Nominal pressure 160 bar (16 MPa)

**Series CDT3...Z;
CGT3...Z; CST3...Z**

Features

- Installation dimensions according to ISO 6020-2, DIN 24554 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 2700 mm
- Integrated guide socket for fast and easy maintenance
- Self-adjusting or adjustable end position cushioning as option
- Patented safety bleeding device 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)

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 75 % of the maximum operating pressure with maximum amplitude and oscillatory load.

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.

Minimum pressure:

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 20 bar is recommended for differential cylinders; for lower pressures as well as double-acting cylinders, please contact us.

Installation position: Any

Hydraulic fluid:

Mineral oils DIN 51524 HL, HLP

Oil-in-water emulsion HFA

Water glycol HFCP

Phosphate ester HFD-R

Hydraulic fluid temperature range: See page 61

Ambient temperature range: See page 61

Optimum viscosity range: 20 to 100 mm²/s

Minimum admissible viscosity: 2.8 mm²/s

Maximum admissible viscosity: 380 mm²/s

Cleanliness class according 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 need to be met in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components.

Bleeding: By default

Primer coat: By default, hydraulic cylinders are primed with a coating (color gentian blue RAL 5010) of min. 40 µm. 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
- Connection surface for valve mounting position measurement system

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:

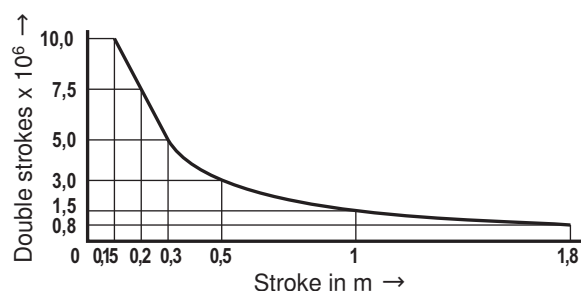
- The mechanical alignment of the movement axis and thus the mounting points of hydraulic cylinder and piston rod must be ensured. Lateral forces on the guides of piston rod and piston are to be avoided. It may be necessary to consider the own weight of the hydraulic cylinder (MP1, MP3, MP5, MT1, MT2 or MT4) or the piston rod.
- The 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 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.

Life cycle:

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 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 %.



Acceptance:

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

Safety instructions:

For the assembly, commissioning and maintenance of hydraulic cylinders, the operating instructions data sheet have to be observed!

Service and repair works have to be performed by 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.

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.

Double-acting cylinders 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 0/+2 mm is admissible for strokes up to 1250 mm; for larger strokes please contact us.

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 16 and 36.

When using end position cushioning, the minimum stroke must also be observed. With stroke lengths smaller than the cushioning length, we recommend selecting the cylinder without end position cushioning.

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.

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.

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 cushioning	–	–	–	–	–	–	–	–	–	–
	with cushioning	30	32	46	44	50	54	56	68	73	106
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)

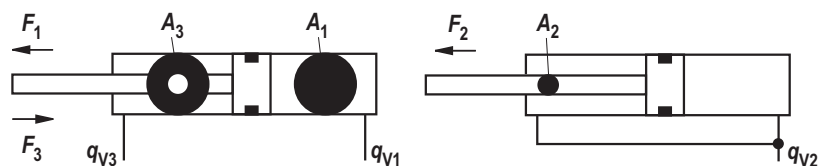
The ICS (Interactive Catalog System) is a selection and project planning aid for hydraulic cylinders. The ICS allows designers for machines and systems to quickly and reliably find the perfect hydraulic cylinder solution through logic-guided type key enquiries. This software helps to solve design and project planning tasks more quickly and efficiently. After having been guided through the product selection, the user quick-

ly 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 ØAL mm	Piston rod ØMM mm		Area ratio φ A_1/A_3	Areas			Force ¹⁾						Flow at 0.1 m/s ²⁾			Max. avail- able stroke length (mm)			
	160 bar	210 bar		Piston A_1 cm ²	Rod A_2 cm ²	Ring A_3 cm ²	Pressure F_1 kN		Diff. F_2 kN		Pulling F_3 kN		Off q_{V1} l/min	Diff. q_{V2} l/min	On q_{V3} l/min				
							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⁾	- 22 ³⁾	1.25 1.43	12.56	2.54 3.80	10.02 8.76	20.10	- 26.38	4.06 6.08	- 7.98	16.03 14.02	- 18.40	7.5	1.50 2.30	6.00 5.30	1000			
	28	28	1.96		6.16	6.4		9.86	12.94	10.24	13.44	3.70		3.80					
	22 28 ³⁾ 36	- 28 ³⁾ 36	1.25 1.46 2.08		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			
	36 45 ³⁾ 56	- 45 ³⁾ 56	1.25 1.46 1.96		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	
	45 56 ³⁾ 70	- 56 ³⁾ 70	1.25 1.46 1.96		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			
	70 110	- 110 ⁴⁾	1.25 1.90		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
	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

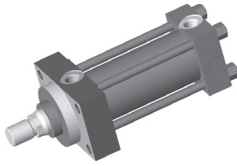


- ¹⁾ Theoretical static cylinder force
(without consideration of the efficiency and admissible load for attachment parts like e.g. tilt heads, plates or valves, etc.)
- ²⁾ Stroke velocity
- ³⁾ Piston rod Ø not standardized
- ⁴⁾ With operating pressures up to 210 bar only on request

Overview types of mounting: Series CDT3 (for operating pressure up to 210 bar)

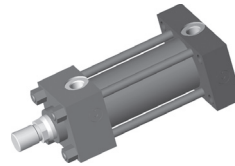
CDT3 ME5 (ISO/DIN/NF)

see page 10, 11



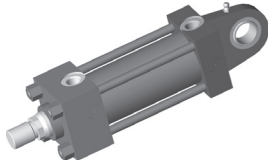
CDT3 ME6 (ISO/DIN/NF)

see page 10, 11



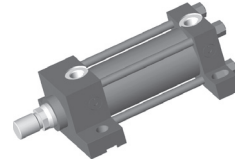
CDT3 MP5 (ISO/DIN/NF)

see page 12, 13



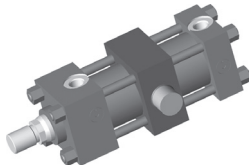
CDT3 MS2 (ISO/DIN/NF)

see page 14, 15



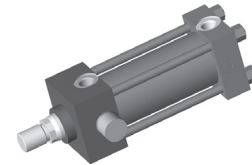
CDT3 MT4 (ISO/DIN/NF)

see page 16, 17



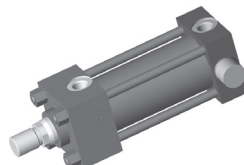
CDT3 MT1 (ISO/DIN/NF)

see page 18, 19



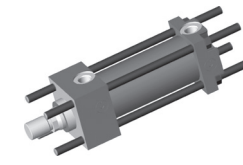
CDT3 MT2 (ISO/DIN/NF)

see page 18, 19



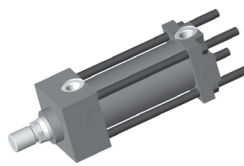
CDT3 MX1 (ISO/DIN/NF)

see page 20, 21



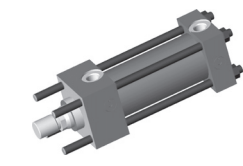
CDT3 MX2 (ISO/DIN/NF)

see page 22, 23



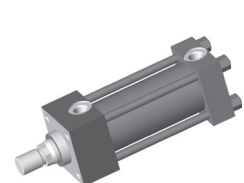
CDT3 MX3 (ISO/DIN/NF)

see page 22, 23



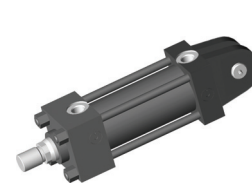
CDT3 MX5 (NF)

see page 24, 25



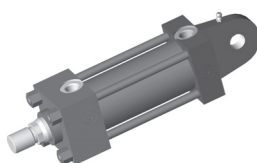
CDT3 MP1 (ISO/DIN/NF)

see page 26, 27



CDT3 MP3 (ISO/DIN/NF)

see page 26, 27



The preferred cylinder designs are marked in gray.

CD	T3	/	/	/	Z	2X										*
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 Fork 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 = 2X 20 to 29 unchanged installation and connection dimensions																
Line connection/design Pipe thread (ISO 1179-1) = B Metric ISO thread (ISO 6149-1) = R Enlarged pipe thread (ISO 1179-1) = S																
Line connection/position at head see page 41  1 = 1 2 = 2 3 = 3 4 = 4																
Comments: ¹⁾ Trunnion position freely selectable; when ordering, always specify the "XV" dimension in the clear 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																

Further details in the plain text

Option 2
W = Without option
Y = Specify the piston rod extension LY in the clear text in mm

Option 1
W = Without option
B = ^{3; 4; 16} Leakage oil connection
A = Threaded coupling, on both sides

Seal design
M = Standard seal system
T = Reduced friction
S = High temperature with reduced friction

End position cushioning
 See pages 56 to 60
U = Without
D = On both sides, self-adjusting
S = Head side, self-adjusting
K = Base side, self-adjusting
E = ⁴⁾ On both sides, adjustable

Piston rod end
 See pages 10 to 27
H = ¹⁴⁾ Thread (DIN/ISO) for tilt head CGKA
D = ¹⁵⁾ Thread (ISO) for tilt head CGKA
E = ¹²⁾ Internal thread
F = ^{5; 14)} With mounted tilt head CGKA (DIN/ISO)
K = ^{5; 15)} With mounted tilt head CGKA (ISO)
T = ⁶⁾ With trunnion

Piston rod design
H = Hardened and hard chromium-plated

Line connection/position at base
 see page 41



1
= 1
2
= 2
3
= 3
4
= 4

View to piston rod

- 1) Trunnion position freely selectable; when ordering, always specify the "XV" dimension in the clear 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
- 5) Not possible with type of mounting MX1 and MX3
- 6) See page 44 (Only with standardized piston rod Ø 22 to 140 mm possible), observe the max. operating pressure
- 11) Observe the max. stroke length available, page 5, and the admissible stroke length (according to kinking calculation) on pages 52 to 55
- 12) See page 44 (Only with standardized piston rod Ø 18 to 140 mm possible), observe the max. operating pressure
- 13) Observe the admissible piston rod Ø and assigned threads at the piston rod end for 210 bar (pages 5 and 10 to 27)

Order example:
CDT3MP5/50/36/300Z2X/B11HHDMMWW

When selecting, please observe the limitations on the corresponding catalog pages!

- ¹⁴⁾ For operating pressure up to 160 bar
¹⁵⁾ For operating pressure up to 210 bar
¹⁶⁾ Not possible with MT1

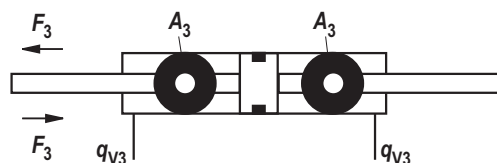
Areas, forces, flow: Series CGT3 (for operating pressure up to 160 bar)

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. avail- able stroke length (mm)
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	2700
	140	160.22	256.35	96.1	

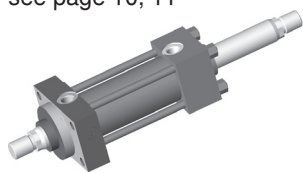
1) Theoretical static cylinder force
(without consideration of the efficiency and
admissible load for attachment parts like
e.g. tilt heads, plates or valves, etc.)

2) Stroke velocity

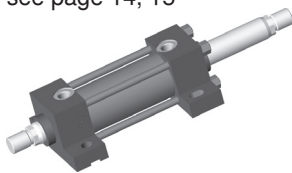
3) Piston rod Ø not standardized


Overview types of mounting: Series CGT3 (for operating pressure up to 160 bar)
CGT3 ME5

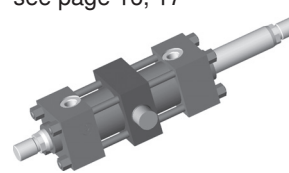
see page 10, 11


CGT3 MS2

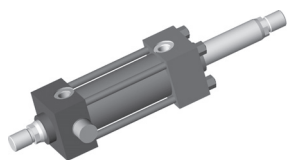
see page 14, 15


CGT3 MT4

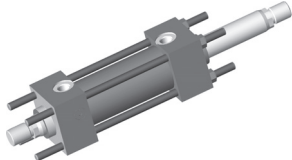
see page 16, 17


CGT3 MT1

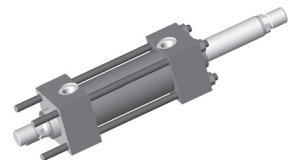
see page 18, 19


CGT3 MX1

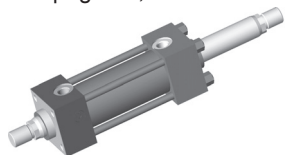
see page 20, 21


CGT3 MX3

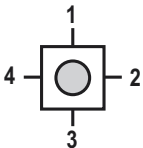
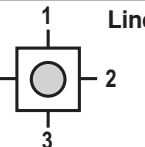
see page 22, 23


CGT3 MX5

see page 24, 25



Ordering code: Series CGT3 (for operating pressure up to 160 bar)

CG	T3	/	/	/	Z	2X									*
Double-acting cylinder ¹⁰⁾ = CG															Further details in the plain text
Series = T3															Option 2
Types of mounting															W = Without option
Rectangular flange at head = ME5															Y = Specify the piston rod extension LY in the clear text in mm
Foot mounting = MS2															Option 1
Trunnion in center ¹⁾ = MT4															W = Without option
Trunnion at head = MT1															B = 3; 4; 16) Leakage oil connection
Extended tie rods, on both sides = MX1															A = Threaded coupling, on both sides
Extended tie rods, at head = MX3															Seal design
Tapped hole at head = MX5															M = Standard seal system
Piston Ø (ØAL) 25 to 200 mm															T = Servo quality/reduced friction
Piston rod Ø (ØMM) 12 to 140 mm															S = High temperature with reduced friction
Stroke length in mm ¹⁴⁾															End position cushioning
Design principle															see pages 56 to 60
Head and base connected to tie rod = Z															U = Without
Component series = 2X															D = On both sides, self-adjusting
20 to 29 unchanged installation and connection dimensions															S = Head side, self-adjusting
Line connection/design															K = Base side, self-adjusting
Pipe thread (ISO 1179-1) = B															E = ⁴⁾ On both sides, adjustable
Metric ISO thread (ISO 6149-1) = R															Piston rod end
Enlarged pipe thread (ISO 1179-1) = S															see pages 10 to 27
Line connection/position at head															H = Thread (DIN/ISO) for tilt head CGKA
see page 41															D = Thread (ISO) for tilt head CGKA
View to piston rod															E = ¹²⁾ Internal thread
															F = ⁵⁾ With mounted tilt head CGKA (DIN/ISO)
															K = ⁵⁾ With mounted tilt head CGKA (ISO)
															Piston rod design
															H = Hardened and hard chromium-plated
															Line connection/position at base
															see page 41
															View to piston rod
															

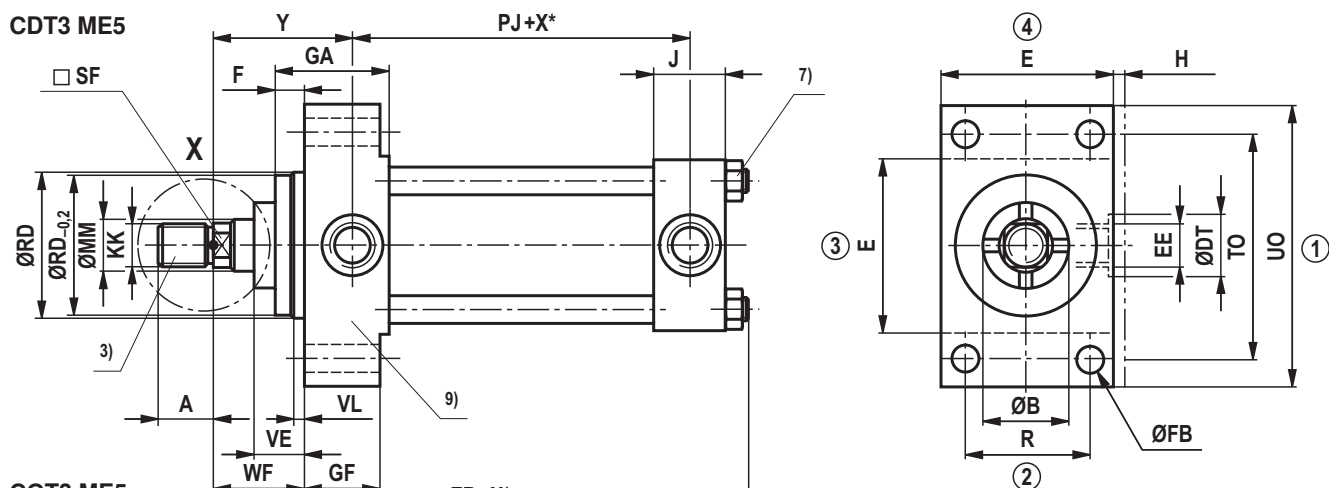
Comments:

- ¹⁾ Trunnion position freely selectable; when ordering, always specify the "XV" dimension in the clear 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
- ⁵⁾ Not possible with type of mounting MX1 and MX3
- ¹⁰⁾ Not standardized
- ¹²⁾ See page 44 (only with standardized piston rod Ø 18 to 140 mm possible), 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

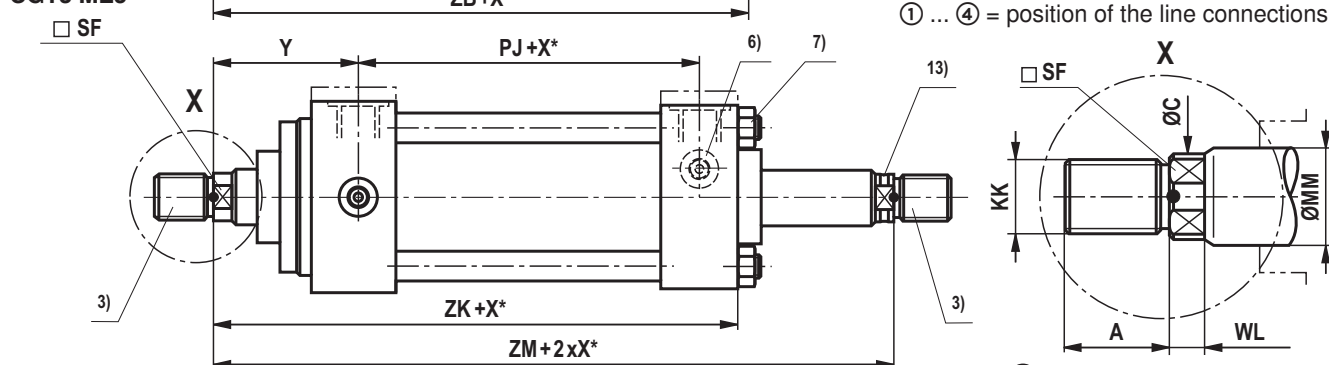
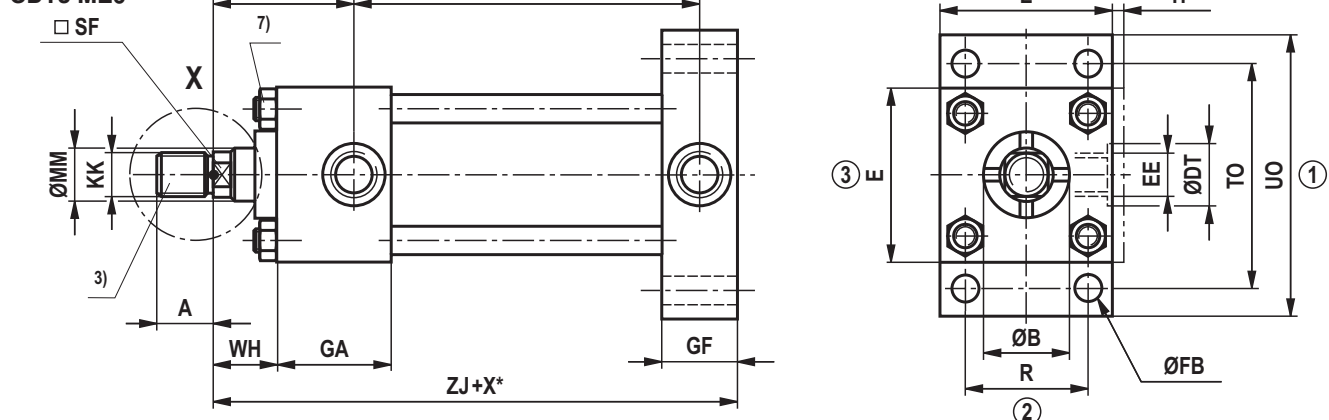
Order example:

CGT3ME5/80/56/400Z2X/B11HDMWW

When selecting, please observe the limitations on the corresponding catalog pages!

Dimensions: Type of mounting ME5, ME6 (dimensions in mm)
CDT3 ME5


① ... ④ = position of the line connections

CGT3 ME5

CDT3 ME6


ØAL	F max	ØFB H13	GF ⁹⁾	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	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	324	356

Dimensions: ME5, ME6 (dimensions in mm)

ØAL	ØMM	DIN / ISO ¹⁾ (for operating pressure up to 160 bar)					ISO ²⁾ (for operating pressure up to 210 bar)					ØB f9	ØRD f8
		KK ¹⁾	A ¹⁾ max	ØC	SF	WL	KK ²⁾	A ²⁾ max	ØC	SF	WL		
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	53	46	10	–	–	–	–	–	72	105
	70 ¹²⁾	–	–	–	–	–	M48x2 ¹⁴⁾	63	67	60	15	88	150
	90	M42x2	56	86	75	15	M64x3 ¹⁴⁾	85	86	75	15	108	150
160	70	M48x2	63	67	60	15	–	–	–	–	–	88	125
	110	M48x2	63	106	92	18	M80x3 ¹⁴⁾	95	106	92	18	133	170
200	90	M64x3	85	86	75	15	–	–	–	–	–	108	150
	140	M64x3	85	136	125	18	M100x3 ¹⁴⁾	112	136	125	18	163	210

ØAL	E	EE	ØDT	EE	ØDT	GA	H ⁵⁾	J	PJ ¹⁰⁾ ± 1,25	PJ ¹¹⁾ ± 1,25	WF ± 2	WH ± 2	Y ¹⁰⁾ ± 2	Y ¹¹⁾ ± 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	73,5	–	51,5	117	117	57	35	86	86
160	205 ± 2	G 1	47	M33x2	43	80,5	–	55,5	130	130	57	32	86	86
200	245 ± 2	G 1 1/4	58	M42x2	52	101	–	76	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 44

⁵⁾ "H" dimension always in line connection position
Exception ME5 head and ME6 base

⁶⁾ For the position of the line connections and the bleeding
see page 41

⁷⁾ Tightening torque see page 63

⁹⁾ Flange thickness according to DIN 24554

¹⁰⁾ ME5: For line connection position "1" and "3" at head

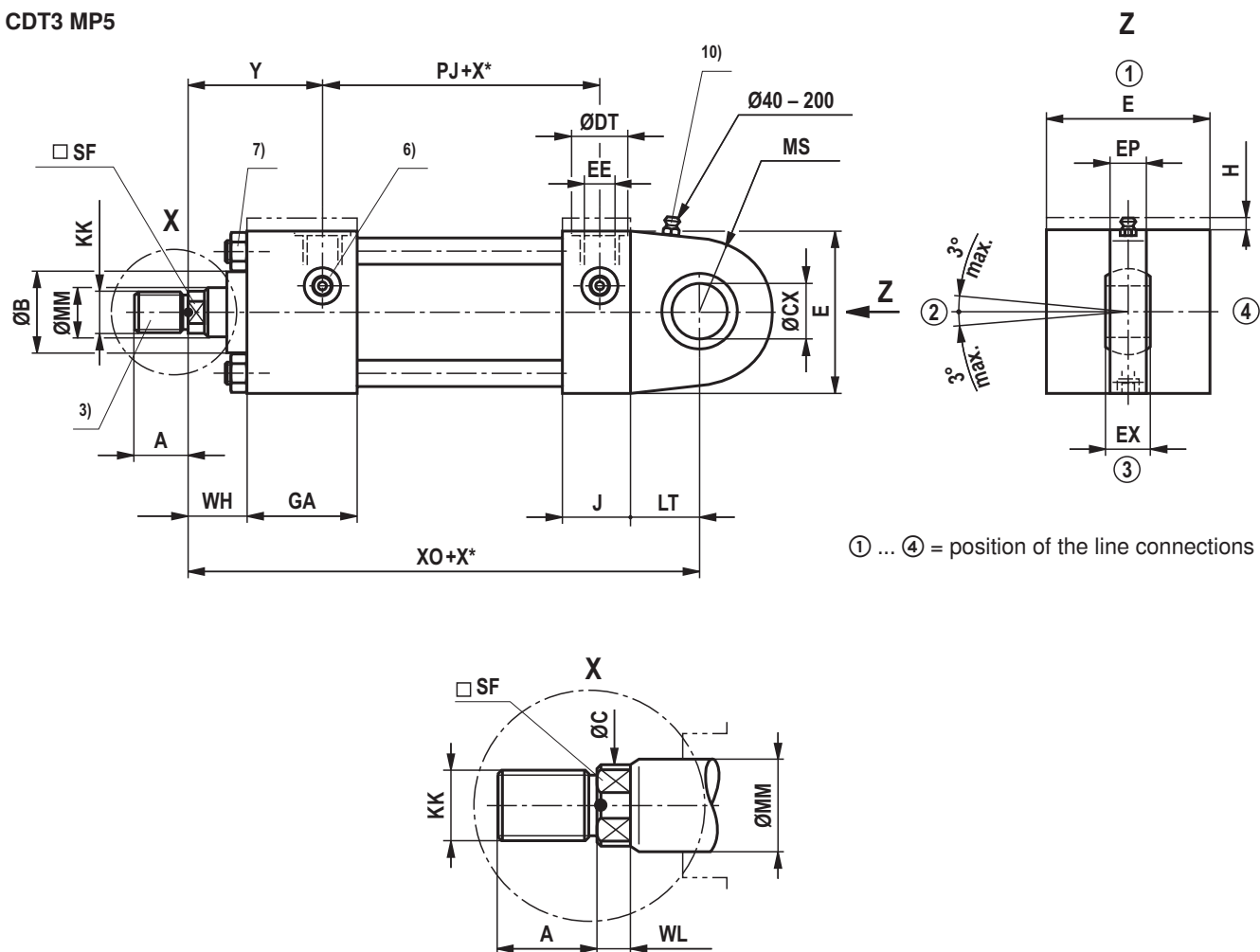
¹¹⁾ ME5: For line connection position "2" and "4" at head

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

Line connection/ position	Position H	
	ME5 head	ME6 base
1	1	1
2	1	1
3	3	3
4	3	3

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: MP5 (dimensions in mm)

ØAL	ØMM	DIN / ISO ¹⁾ (for operating pressure up to 160 bar)					ISO ²⁾ (for operating pressure up to 210 bar)					ØB f9
		KK ¹⁾	A ¹⁾ max	ØC	SF	WL	KK ²⁾	A ²⁾ max	ØC	SF	WL	
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	53	46	10	–	–	–	–	–	72
	70 ¹²⁾	–	–	–	–	–	M48x2 ¹⁴⁾	63	67	60	15	88
	90	M42x2	56	86	75	15	M64x3 ¹⁴⁾	85	86	75	15	108
160	70	M48x2	63	67	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	18	M80x3 ¹⁴⁾	95	106	92	18	133
200	90	M64x3	85	86	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	18	M100x3 ¹⁴⁾	112	136	125	18	163

ØAL	E	EE	ØDT	EE	ØDT	GA	H ⁵⁾	J	PJ ± 1,25	WH ± 2	Y ± 2
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	73.5	–	51.5	117	35	86
160	205 ± 2	G 1	47	M33x2	43	80.5	–	55.5	130	32	86
200	245 ± 2	G 1 1/4	58	M42x2	52	101	–	76	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 44

⁵⁾ "H" dimension always in line connection position

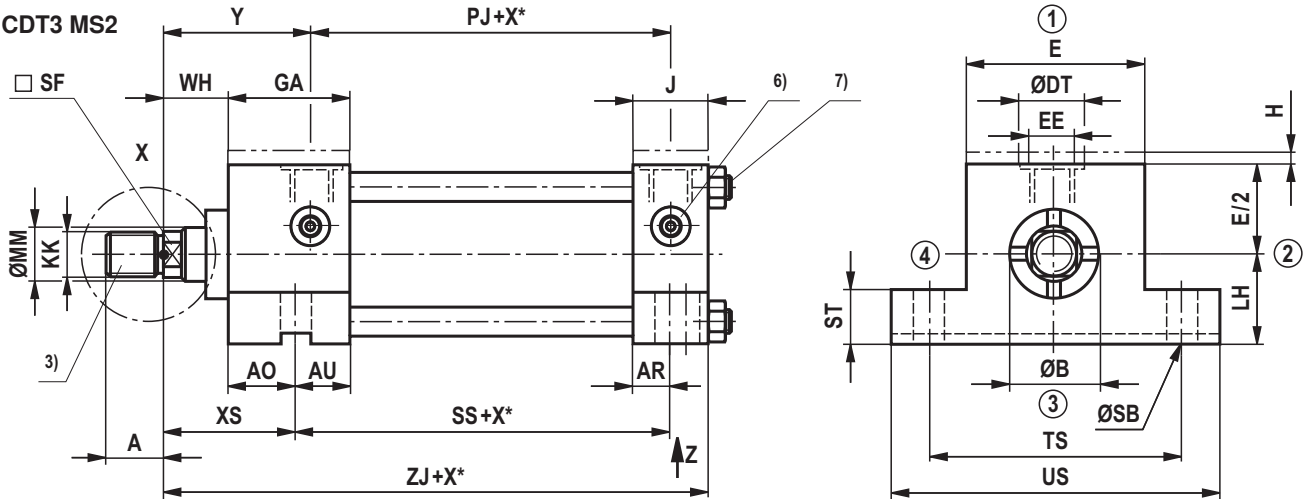
⁶⁾ For the position of the line connections and the bleeding see page 41

⁷⁾ Tightening torque see page 63

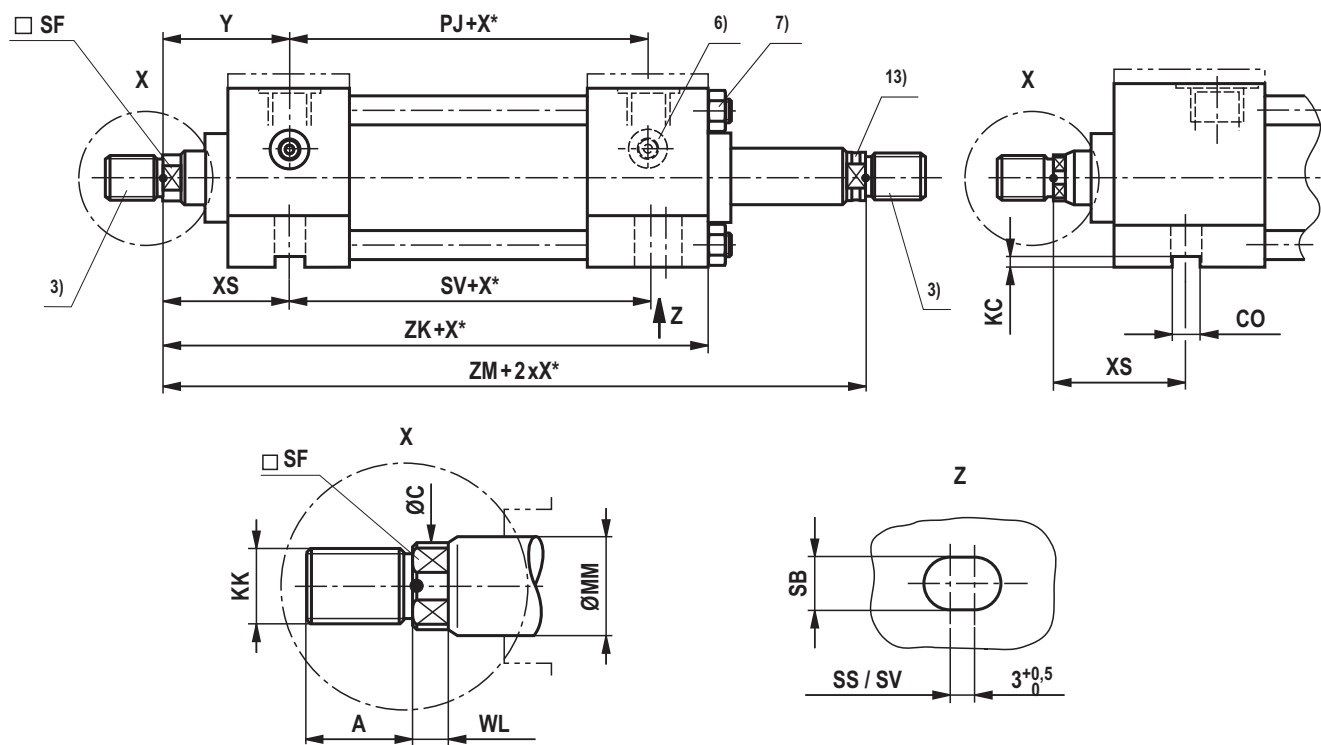
¹⁰⁾ Lubricating nipple M6 DIN 71412 from piston Ø 40 mm

¹²⁾ Piston rod Ø not standardized

¹⁴⁾ With operating pressures up to 210 bar only on request

Dimensions: Type of mounting MS2 (dimensions in mm)
CDT3 MS2


① ... ④ = position of the line connections

CGT3 MS2


ØAL	CO N9	KC $+0,2$ -0	LH h10	ØSB H13	SS $\pm 1,25$	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	29.5	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	131	32	131	210	254	79	232	254	289	44	29.5
160	–	–	101	33	130	38	130	260	318	86	245	270	302	54	26.5
200	–	–	122	39	172	44	172	311	381	92	299	324	356	60	41

Dimensions: MS2 (dimensions in mm)

ØAL	ØMM	DIN / ISO ¹⁾ (for operating pressure up to 160 bar)					ISO ²⁾ (for operating pressure up to 210 bar)					ØB f9
		KK ¹⁾	A ¹⁾ max	ØC	SF	WL	KK ²⁾	A ²⁾ max	ØC	SF	WL	
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	53	46	10	–	–	–	–	–	72
	70 ¹²⁾	–	–	–	–	–	M48x2 ¹⁴⁾	63	67	60	15	88
	90	M42x2	56	86	75	15	M64x3 ¹⁴⁾	85	86	75	15	108
160	70	M48x2	63	67	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	18	M80x3 ¹⁴⁾	95	106	92	18	133
200	90	M64x3	85	86	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	18	M100x3 ¹⁴⁾	112	136	125	18	163

ØAL	E	EE	ØDT	EE	ØDT	GA	H ⁵⁾	J	PJ ± 1,25	WH ± 2	Y ± 2	AR
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	73.5	–	51.5	117	35	86	29.5
160	205 ± 2	G 1	47	M33x2	43	80.5	–	55.5	130	32	86	26.5
200	245 ± 2	G 1 1/4	58	M42x2	52	101	–	76	165	32	98	41

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 44

⁵⁾ "H" dimension always in line connection position

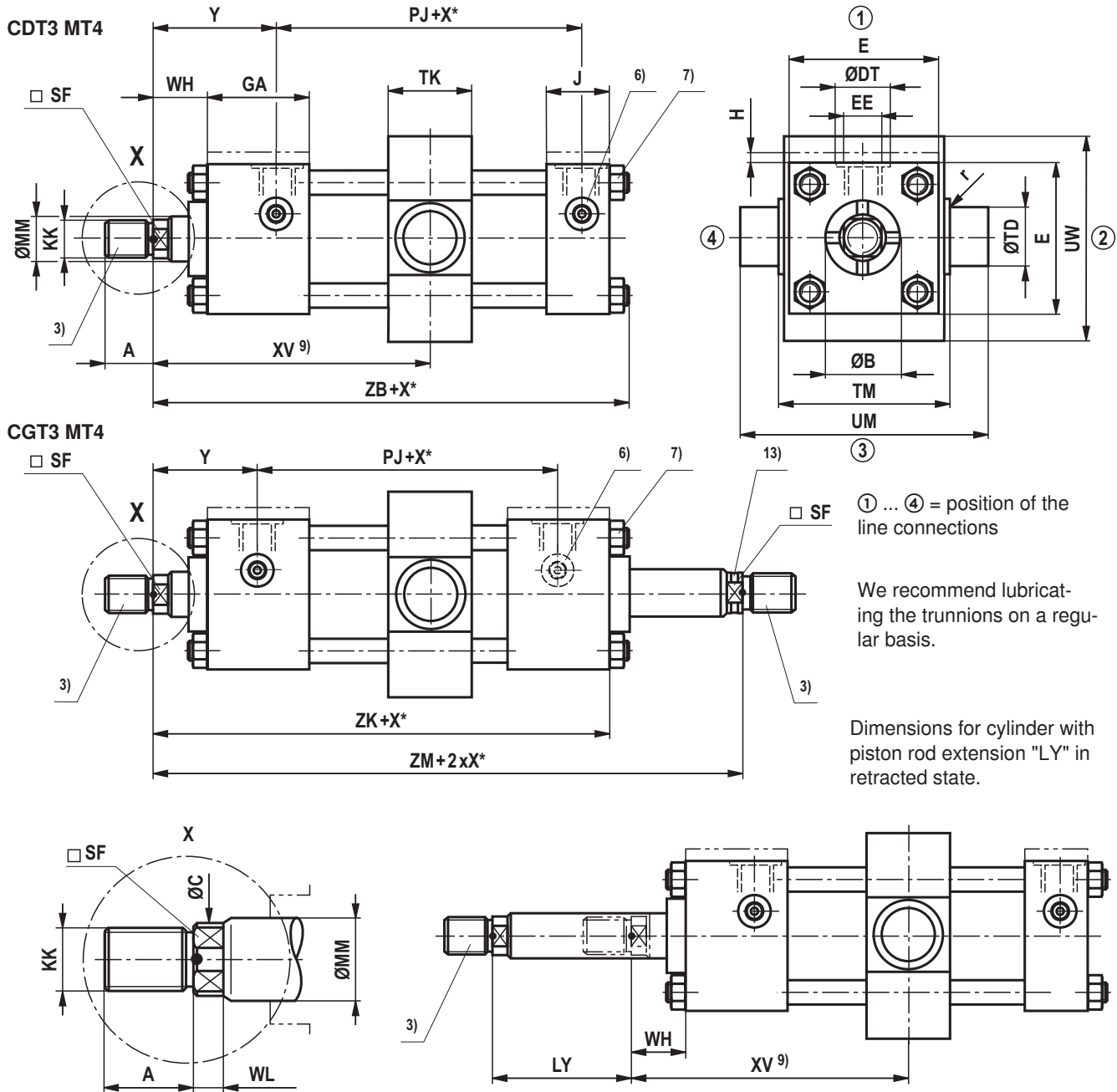
⁶⁾ For the position of the line connections and the bleeding see page 41

⁷⁾ Tightening torque see page 63

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 MT4 (dimensions in mm)


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 + Hub	121	138	154
32	1	16	25	55	79	53	0	88	89 + Hub	137	151	177
40	1.6	20	30	76	108	74	0	95	104 + Hub	166	172	196
50	1.6	25	40	89	129	81	0	105	105 + Hub	176	183	207
63	2	32	50	100	150	97	10	117	107 + Hub	185	190	223
80	2.5	40	60	127	191	124	12	130	118 + Hub	212	216	246
100	2.5	50	70	140	220	137	18	142	124 + Hub	225	230	265
125	3.2	63	90	178	278	175	25	157	132 + Hub	260	254	289
160	3.2	80	110	215	341	221	40	171	131 + Hub	279	270	302
200	3.2	100	130	279	439	281	48	202	154 + Hub	336	324	356

Dimensions: MT4 (dimensions in mm)

ØAL	ØMM	DIN / ISO ¹⁾ (for operating pressure up to 160 bar)					ISO ²⁾ (for operating pressure up to 210 bar)					ØB f9
		KK ¹⁾	A ¹⁾ max	ØC	SF	WL	KK ²⁾	A ²⁾ max	ØC	SF	WL	
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	53	46	10	–	–	–	–	–	72
	70 ¹²⁾	–	–	–	–	–	M48x2 ¹⁴⁾	63	67	60	15	88
	90	M42x2	56	86	75	15	M64x3 ¹⁴⁾	85	86	75	15	108
160	70	M48x2	63	67	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	18	M80x3 ¹⁴⁾	95	106	92	18	133
200	90	M64x3	85	86	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	18	M100x3 ¹⁴⁾	112	136	125	18	163

ØAL	E	EE	ØDT	EE	ØDT	GA	H ^{5; 11)}	J	PJ ± 1,25	WH ± 2	Y ± 2
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	73.5	–	51.5	117	35	86
160	205 ± 2	G 1	47	M33x2	43	80.5	–	55.5	130	32	86
200	245 ± 2	G 1 1/4	58	M42x2	52	101	–	76	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 44

⁵⁾ "H" dimension always in line connection position

⁶⁾ For the position of the line connections and the bleeding see page 41

⁷⁾ Tightening torque see page 63

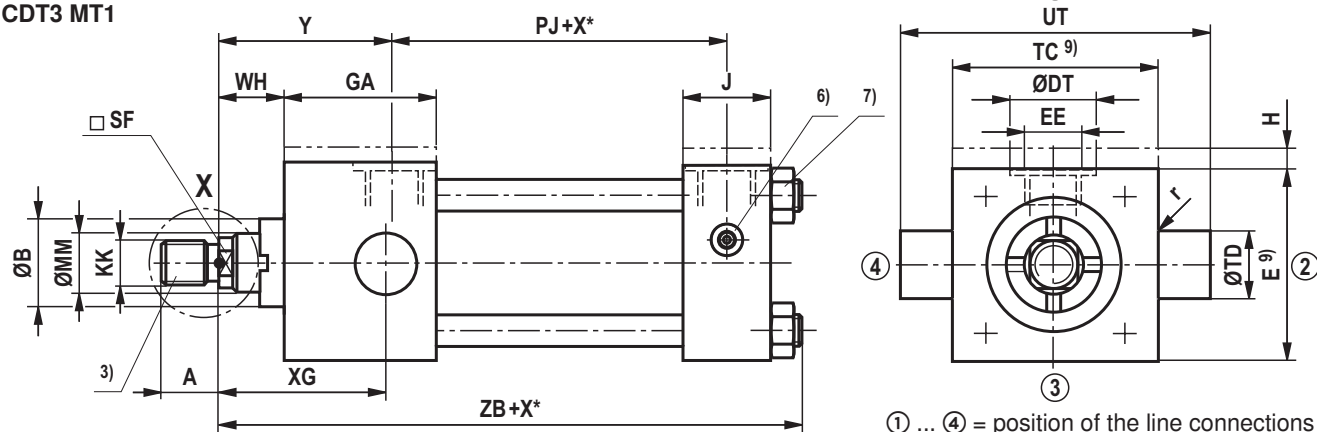
⁹⁾ "XV" dimension in mm, always specify in the plain text

¹¹⁾ Piston Ø 25 and 32 mm: "H" dimension with line connection

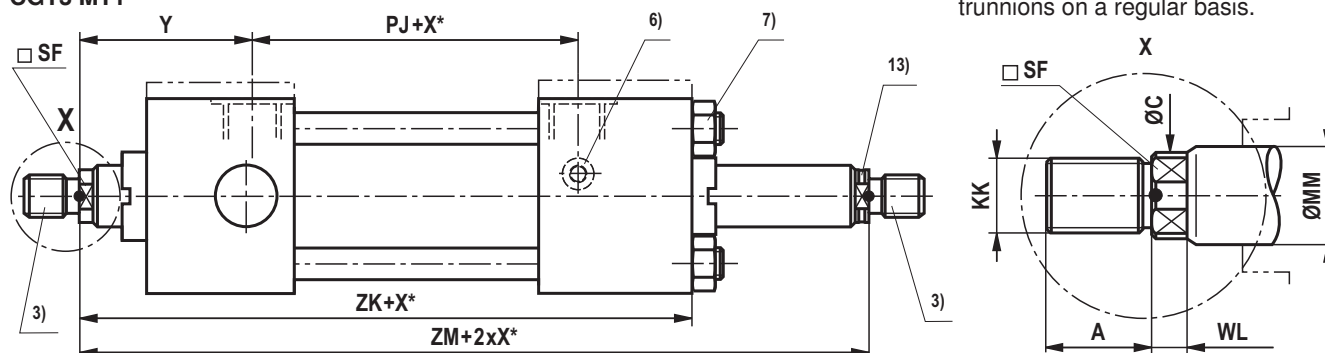
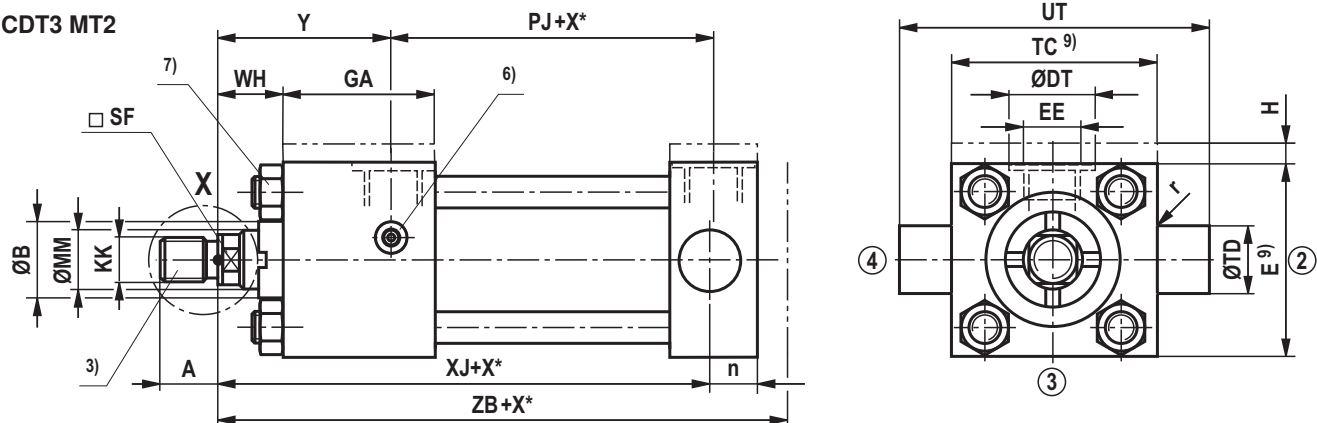
¹²⁾ Piston rod Ø not standardized

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 MT1, MT2 (dimensions in mm)
CDT3 MT1


We recommend lubricating the trunnions on a regular basis.

CGT3 MT1

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	51	3.2	165	63	265	75	209	260	254	289
160	40	3.2	203	80	329	75	230	279	270	302
200	53	4.5	241	100	401	85	276	336	324	356

Dimensions: MT1, MT2 (dimensions in mm)

ØAL	ØMM	DIN / ISO ¹⁾ (for operating pressure up to 160 bar)					ISO ²⁾ (for operating pressure up to 210 bar)					ØB f9
		KK ¹⁾	A ¹⁾ max	ØC	SF	WL	KK ²⁾	A ²⁾ max	ØC	SF	WL	
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	53	46	10	–	–	–	–	–	72
	70 ¹²⁾	–	–	–	–	–	M48x2 ¹⁴⁾	63	67	60	15	88
	90	M42x2	56	86	75	15	M64x3 ¹⁴⁾	85	86	75	15	108
160	70	M48x2	63	67	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	18	M80x3 ¹⁴⁾	95	106	92	18	133
200	90	M64x3	85	86	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	18	M100x3 ¹⁴⁾	112	136	125	18	163

ØAL	E	EE	ØDT	EE	ØDT	GA		H ⁵⁾	J	PJ ± 1,25	WH ± 2	Y ± 2
						MT1	MT2					
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	74.9	73.5	–	51.5	117	35	86
160	205 ± 2	G 1	47	M33x2	43	86.4	80.5	–	55.5	130	32	86
200	245 ± 2	G 1 1/4	58	M42x2	52	106.4	101	–	76	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 44

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 41

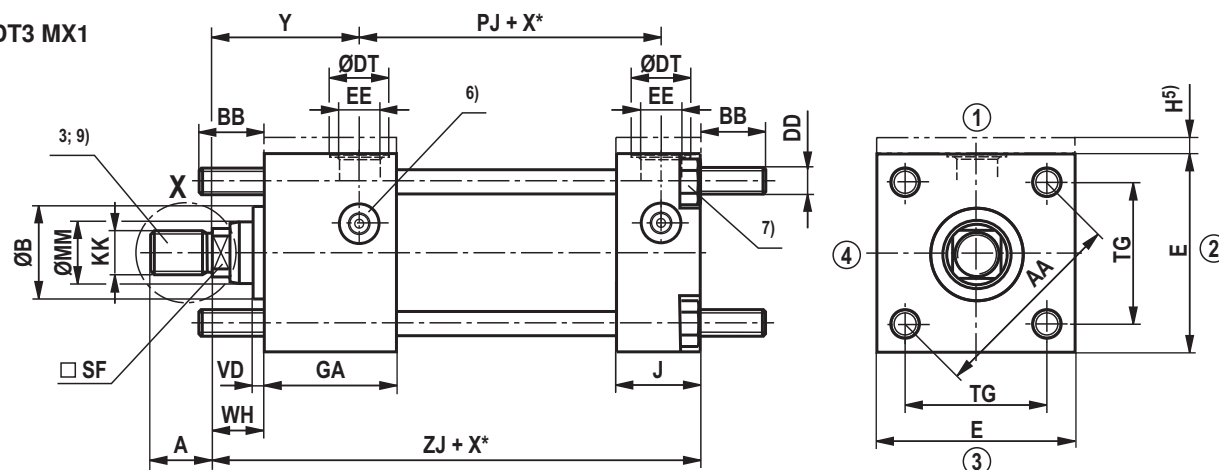
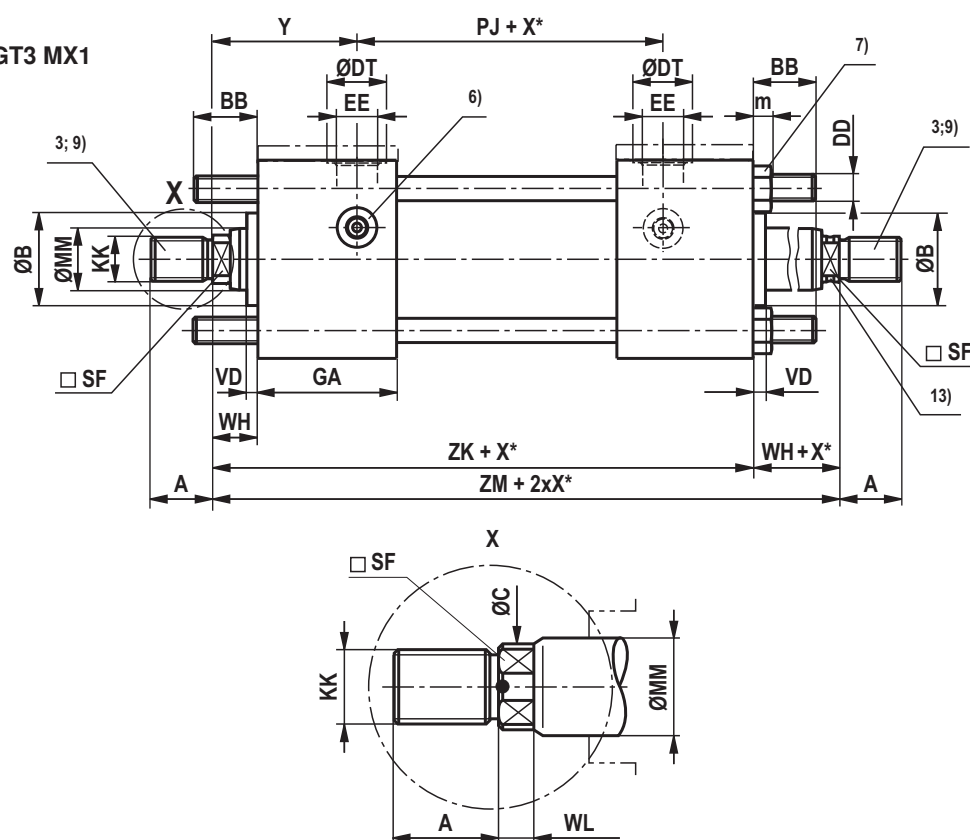
7) Tightening torque see page 63

9) With short strokes, observe "TC" and "E"

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 MX1 (dimensions in mm)
CDT3 MX1

CGT3 MX1


① ... ④ = position of the line connections

$\varnothing AL$	AA	$BB^{9)}$ + 3	TG js13	VD	ZJ $\pm 1,25$	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	9	232	254	289
160	219	92	154.9	7	245	270	302
200	269	115	190.2	7	299	324	356

Dimensions: MX1 (dimensions in mm)

ØAL	ØMM	DIN / ISO ¹⁾ (for operating pressure up to 160 bar)					ISO ²⁾ (for operating pressure up to 210 bar)					ØB f9
		KK ¹⁾	A ¹⁾ max	ØC	SF	WL	KK ²⁾	A ²⁾ max	ØC	SF	WL	
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	53	46	10	–	–	–	–	–	72
	70 ¹²⁾	–	–	–	–	–	M48x2 ¹⁴⁾	63	67	60	15	88
	90	M42x2	56	86	75	15	M64x3 ¹⁴⁾	85	86	75	15	108
160	70	M48x2	63	67	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	18	M80x3 ¹⁴⁾	95	106	92	18	133
200	90	M64x3	85	86	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	18	M100x3 ¹⁴⁾	112	136	125	18	163

ØAL	DD	E	EE	ØDT	EE	ØDT	GA	H ⁵⁾	J	m	PJ ± 1,25	WH ± 2	Y ± 2
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	73.5	–	51.5	18	117	35	86
160	M27x2	205 ± 2	G 1	47	M33x2	43	80.5	–	55.5	22	130	32	86
200	M30x2	245 ± 2	G 1 1/4	58	M42x2	52	101	–	76	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 44

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 41

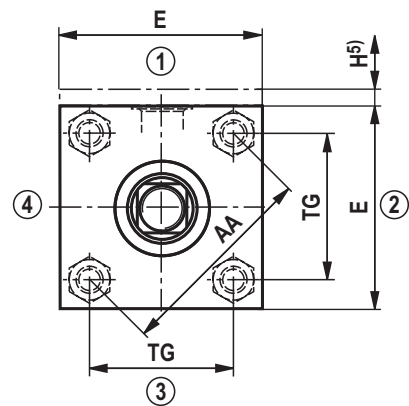
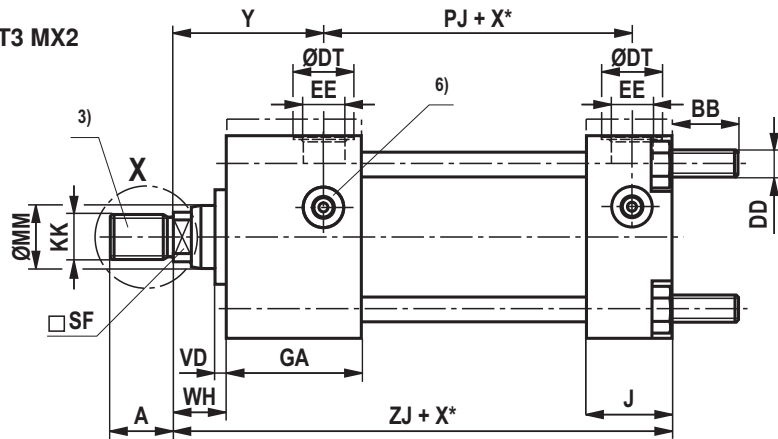
7) Tightening torque see page 63

9) Observe the "BB" dimension for the tilt head assembly

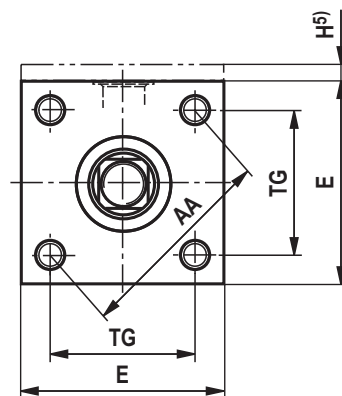
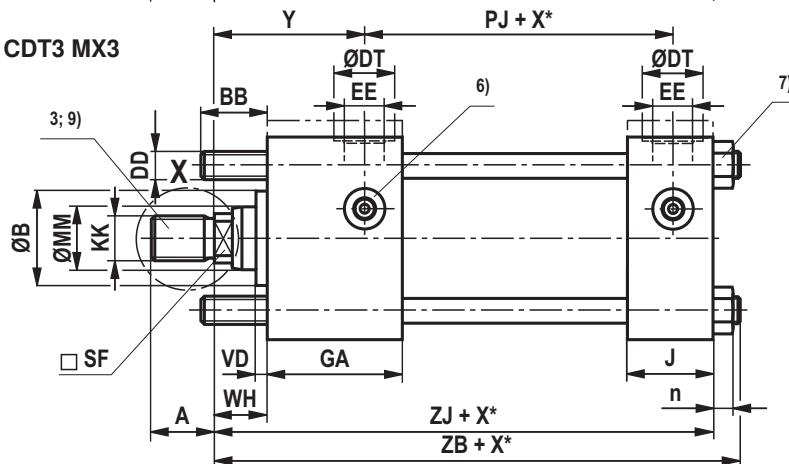
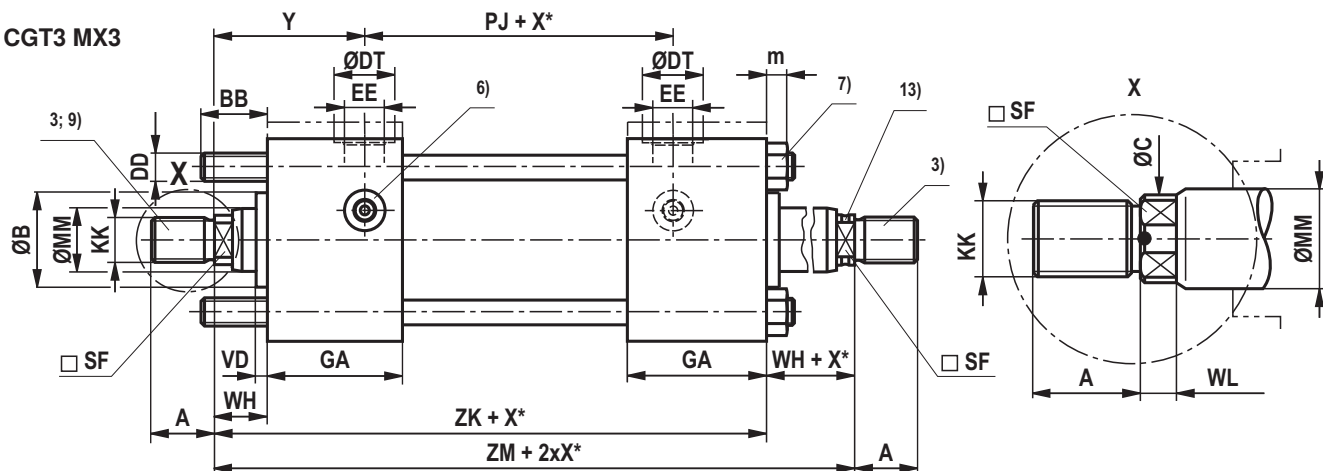
12) Piston rod Ø not standardized

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 MX2, MX3 (dimensions in mm)
CDT3 MX2


① ... ④ = position of the line connections

CDT3 MX3

CGT3 MX3


$\varnothing AL$	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	9	260	232	254	289
160	219	92	154.9	7	279	245	270	302
200	269	115	190.2	7	336	299	324	356

Dimensions: MX2, MX3 (dimensions in mm)

ØAL	ØMM	DIN / ISO ¹⁾ (for operating pressure up to 160 bar)					ISO ²⁾ (for operating pressure up to 210 bar)					ØB f9
		KK ¹⁾	A ¹⁾ max	ØC	SF	WL	KK ²⁾	A ²⁾ max	ØC	SF	WL	
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	53	46	10	–	–	–	–	–	72
	70 ¹²⁾	–	–	–	–	–	M48x2 ¹⁴⁾	63	67	60	15	88
	90	M42x2	56	86	75	15	M64x3 ¹⁴⁾	85	86	75	15	108
160	70	M48x2	63	67	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	18	M80x3 ¹⁴⁾	95	106	92	18	133
200	90	M64x3	85	86	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	18	M100x3 ¹⁴⁾	112	136	125	18	163

ØAL	DD	E	EE	ØDT	EE	ØDT	GA	H ⁵⁾	J	m	PJ ± 1,25	WH ± 2	Y ± 2
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	73.5	–	51.5	18	117	35	86
160	M27x2	205 ± 2	G 1	47	M33x2	43	80.5	–	55.5	22	130	32	86
200	M30x2	245 ± 2	G 1 1/4	58	M42x2	52	101	–	76	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 44

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 41

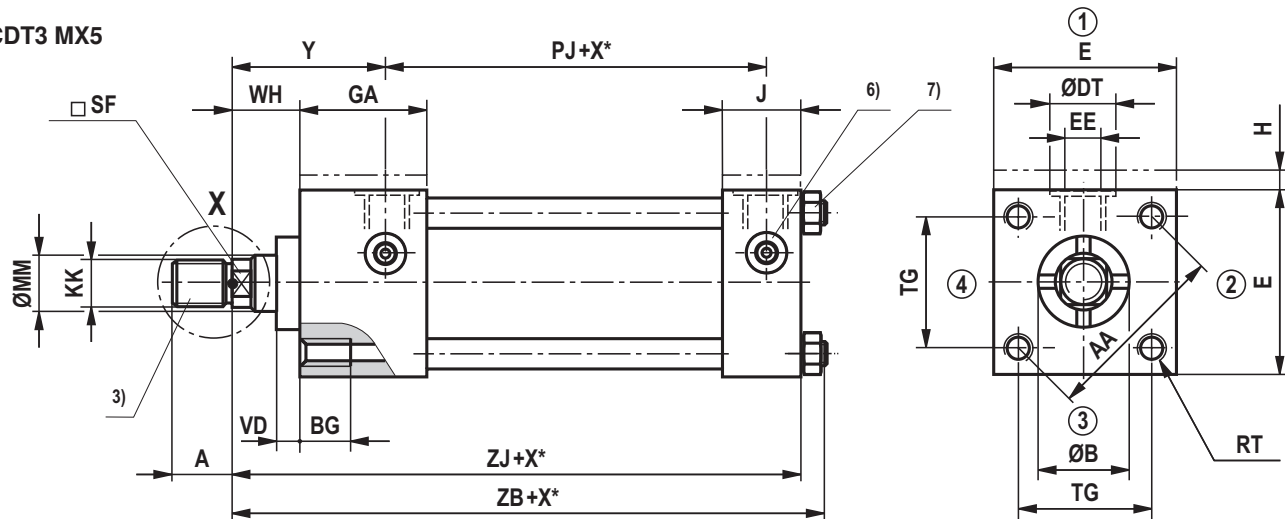
7) Tightening torque see page 63

9) Observe the "BB" dimension for the tilt head assembly

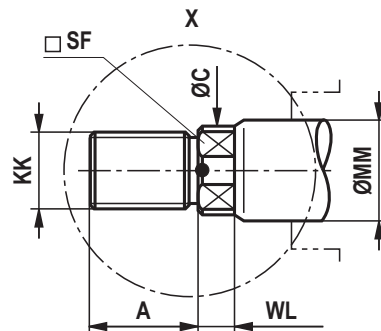
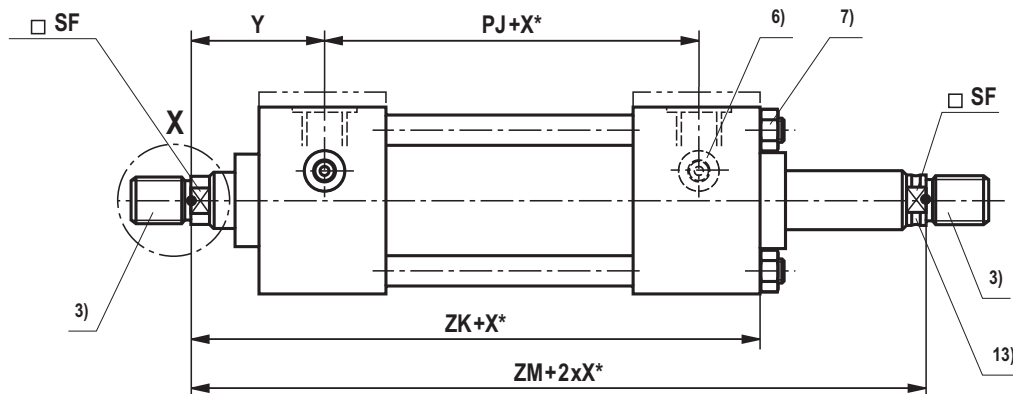
12) Piston rod Ø not standardized

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 MX5 (dimensions in mm)
CDT3 MX5


① ... ④ = position of the line connections

CGT3 MX5


$\varnothing AL$	AA	BG min	RT 6H	TG js13	VD	ZB max	ZJ $\pm 1,25$	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	9	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	324	356

Dimensions: MX5 (dimensions in mm)

ØAL	ØMM	DIN / ISO ¹⁾ (for operating pressure up to 160 bar)					ISO ²⁾ (for operating pressure up to 210 bar)					ØB f9
		KK ¹⁾	A ¹⁾ max	ØC	SF	WL	KK ²⁾	A ²⁾ max	ØC	SF	WL	
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	53	46	10	–	–	–	–	–	72
	70 ¹²⁾	–	–	–	–	–	M48x2 ¹⁴⁾	63	67	60	15	88
	90	M42x2	56	86	75	15	M64x3 ¹⁴⁾	85	86	75	15	108
160	70	M48x2	63	67	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	18	M80x3 ¹⁴⁾	95	106	92	18	133
200	90	M64x3	85	86	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	18	M100x3 ¹⁴⁾	112	136	125	18	163

ØAL	E	EE	ØDT	EE	ØDT	GA	H ⁵⁾	J	PJ ± 1,25	WH ± 2	Y ± 2
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	73.5	–	51.5	117	35	86
160	205 ± 2	G 1	47	M33x2	43	80.5	–	55.5	130	32	86
200	245 ± 2	G 1 1/4	58	M42x2	52	101	–	76	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 44

5) "H" dimension always in line connection position

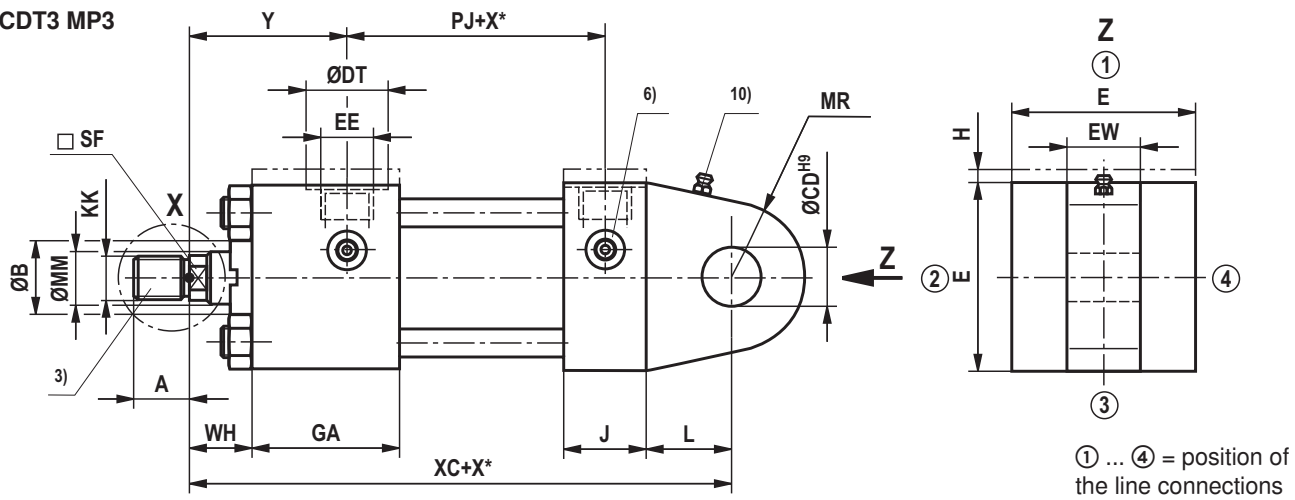
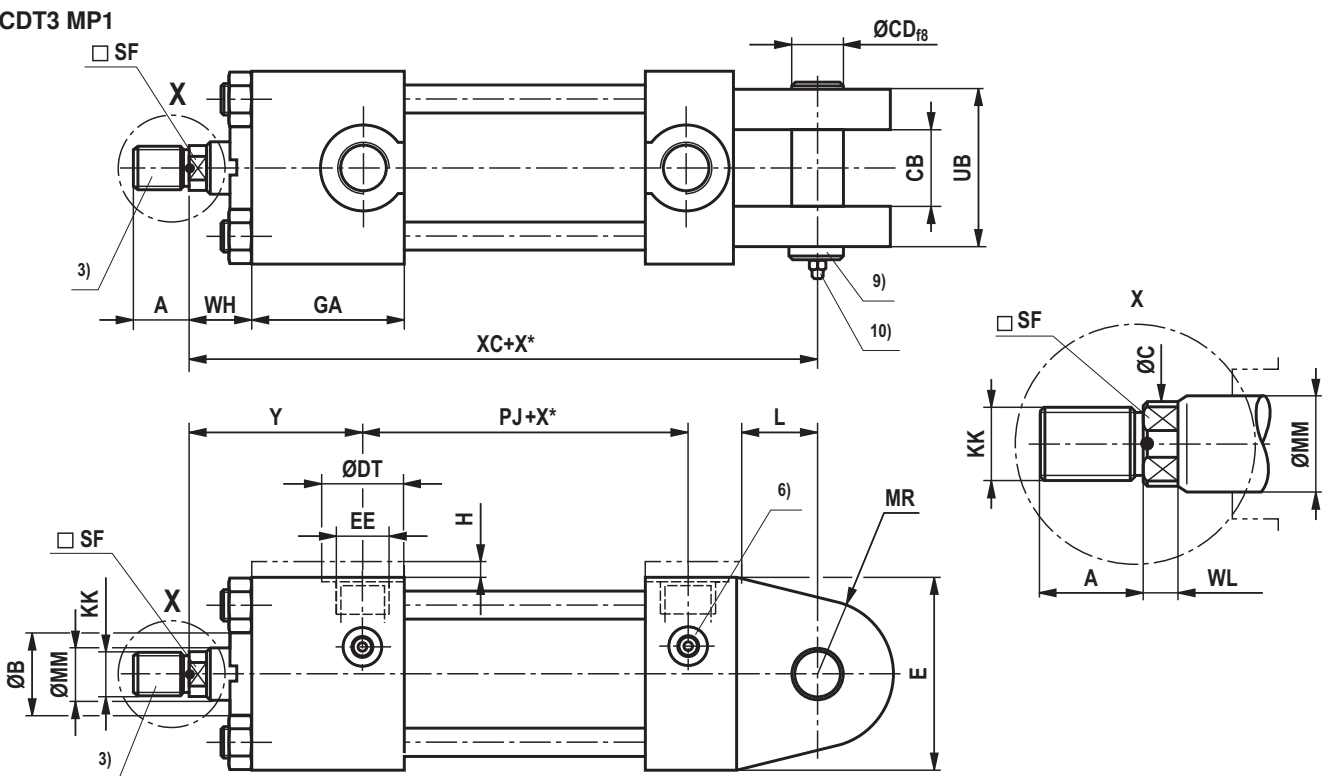
6) For the position of the line connections and the bleeding see page 41

7) Tightening torque see page 63

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 MP1, MP3 (dimensions in mm)
CDT3 MP3

CDT3 MP1


$\varnothing AL$	CB A16	$\varnothing CD$ H9; f8	EW h14	L min	MR max	UB max	XC $\pm 1,25$
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: MP1, MP3 (dimensions in mm)

ØAL	ØMM	DIN / ISO ¹⁾ (for operating pressure up to 160 bar)					ISO ²⁾ (for operating pressure up to 210 bar)					ØB f9
		KK ¹⁾	A ¹⁾ max	ØC	SF	WL	KK ²⁾	A ²⁾ max	ØC	SF	WL	
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	53	46	10	–	–	–	–	–	72
	70 ¹²⁾	–	–	–	–	–	M48x2 ¹⁴⁾	63	67	60	15	88
	90	M42x2	56	86	75	15	M64x3 ¹⁴⁾	85	86	75	15	108
160	70	M48x2	63	67	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	18	M80x3 ¹⁴⁾	95	106	92	18	133
200	90	M64x3	85	86	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	18	M100x3 ¹⁴⁾	112	136	125	18	163

ØAL	E	EE	ØDT	EE	ØDT	GA	H ⁵⁾	J	PJ ± 1,25	WH ± 2	Y ± 2
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	73.5	–	51.5	117	35	86
160	205 ± 2	G 1	47	M33x2	43	80.5	–	55.5	130	32	86
200	245 ± 2	G 1 1/4	58	M42x2	52	101	–	76	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 44

5) "H" dimension always in line connection position

6) For the position of the line connections and the bleeding see page 41

7) Tightening torque see page 63

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

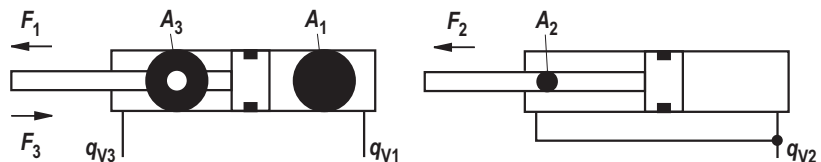
Areas, forces, flow: Series CST3 (for operating pressure up to 160 bar)

Piston ØAL mm	Piston rod ØMM mm	Area ratio φ A_1/A_3	Areas			Force at 160 bar ¹⁾			Flow at 0.1 m/s ²⁾		
			Piston A_1 cm ²	Rod A_2 cm ²	Ring A_3 cm ²	Pressure F_1 kN	Diff. F_2 kN	Pulling F_3 kN	Off q_{V1} l/min	Diff. q_{V2} l/min	On 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
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
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
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
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
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
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
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

¹⁾ Theoretical static cylinder force
(without consideration of the efficiency
and admissible load for attachment
parts like e.g. tilt heads, plates or
valves, etc.)

²⁾ Stroke velocity

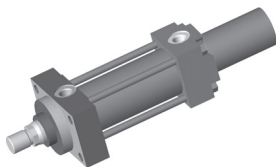
³⁾ Piston rod Ø not standardized



Overview types of mounting: Series CST3 (only for operating pressure up to 160 bar)

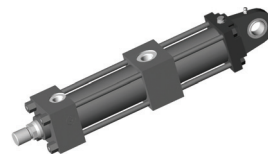
CST3 ME5

see page 30, 31



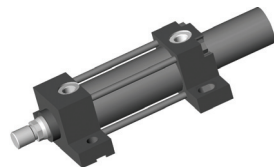
CST3 MP5

see page 32, 33



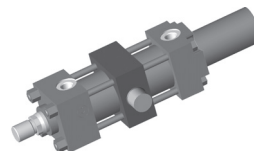
CST3 MS2

see page 34, 35



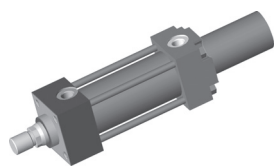
CST3 MT4

see page 36, 37



CST3 MX5

see page 38, 39



CS	T3	/	/	/	Z	2X								*
-----------	-----------	---	---	---	----------	-----------	--	--	--	--	--	--	--	---

1
4 2
3

= 1
= 2
= 3
= 4

H = Thread (DIN/ISO) for tilt head
CGKA/CGKD

D = Thread (ISO) for tilt head
CGKA/CGKD

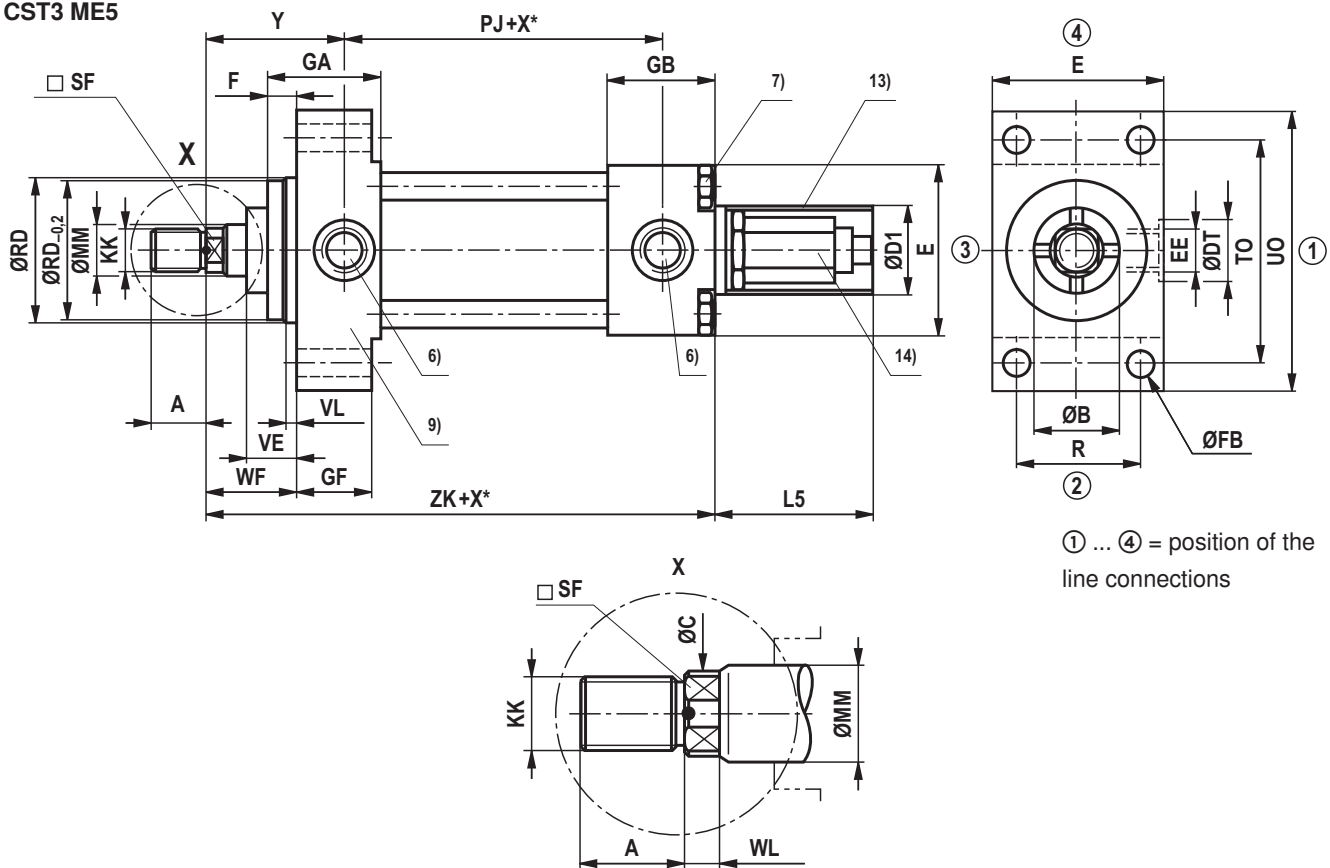
F = With mounted tilt head
CGKA/CGKD (DIN/ISO)

K = With mounted tilt head
CGKA/CGKD (DIN/ISO)

H = Hardened and hard chromium-plated

View to piston rod

¹⁵⁾ Only piston Ø 100 – 200 mm

Dimensions: Type of mounting ME5 (dimensions in mm)
CST3 ME5


① ... ④ = position of the line connections

$\varnothing AL$	$\varnothing MM$	PJ ¹⁰⁾ $\pm 1,25$	PJ ¹¹⁾ $\pm 1,25$	R JS13	TO JS13	UO max	VE max	VL min	ZK ± 1	L5	$\varnothing D1$ max	X* max	X* min without subplate	X* min with subplate
40	28	73	77	41	87	110	22	3	195	–	–	600	–	50
50	28 36	74	78	52	105	130	25	4	194	–	–	500 800	–	50
63	36 45	80	81	65	117	145	29	4	205	82	96	650 1000	–	45
80	45 56	93	93	83	149	180	29	4	234	82	96	800 1200	–	32
100	56 70	101	101	97	162	200	32	5	248	82	96	1000 1370	–	57
125	70 90	117	117	126	208	250	32	5	260.5	82	96	1200 1420	–	35
160	70 110	130	130	155	253	300	32	5	272.5	82	96	1000 1410	20	20
200	90 140	160	160	190	300	360	32	5	329	82	96	1300 1350	20	20

Dimensions: ME5 (dimensions in mm)

ØAL	ØMM	DIN / ISO ¹⁾					ISO ²⁾					ØB f9	ØRD f8
		KK ¹⁾	A ¹⁾ max	ØC	SF	WL	KK ²⁾	A ²⁾ max	ØC	SF	WL		
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	67	60	15	88	150
	90	M42x2	56	86	75	15	M64x3	85	86	75	15	108	150
160	70	M48x2	63	67	60	15	–	–	–	–	–	88	125
	110	M48x2	63	106	92	18	M80x3	95	106	92	18	133	170
200	90	M64x3	85	86	75	15	–	–	–	–	–	108	150
	140	M64x3	85	136	125	18	M100x3	112	136	125	18	163	210

ØAL	F max	ØFB H13	GF ⁹⁾	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	73.5	57	86	86
160	25	26	58	205 ± 2	G 1	47	83	80.5	57	86	86
200	25	33	76	245 ± 2	G 1 1/4	58	101	101	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 41

⁷⁾ Tightening torque see page 63

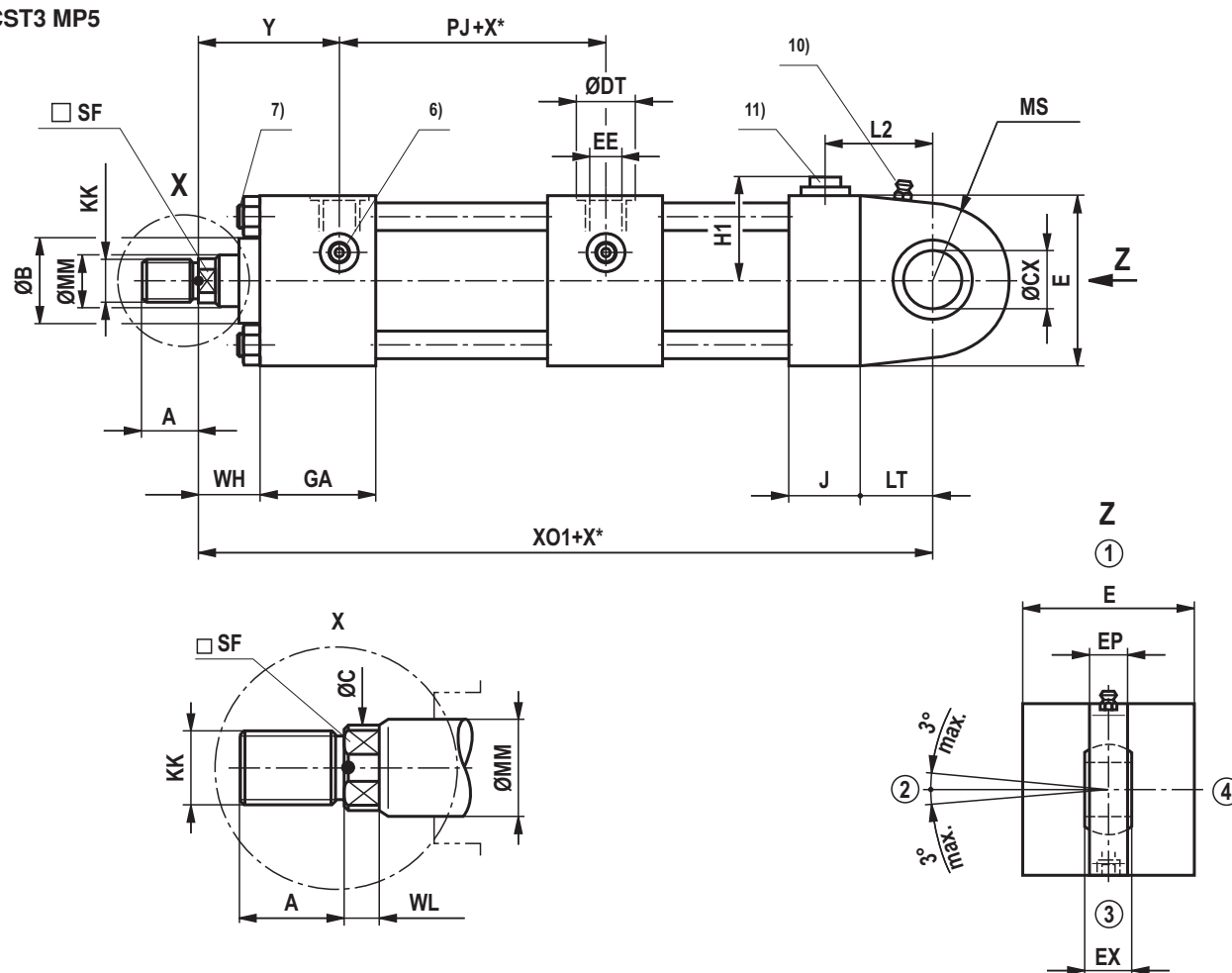
⁹⁾ Flange thickness according to DIN 24554

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: Type of mounting 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* max	X* min without subplate	X* min with subplate
40	28	20 - 0.012	13	16 - 0.12	25	348	29	390	—	50
50	28 36	25 - 0.012	17	20 - 0.12	31	365	33	325 520	—	50
63	36 45	30 - 0.012	19	22 - 0.12	38	383	40	420 650	—	45
80	45 56	40 - 0.012	23	28 - 0.12	48	410	50	520 780	—	32
100	56 70	50 - 0.012	30	35 - 0.12	58	436	62	650 940	—	57
125	70 90	60 - 0.015	38	44 - 0.15	72	487	80	780 1240	—	35
160	70 110	80 - 0.015	47	55 - 0.15	92	528	100	650 1410	20	20
200	90 140	100 - 0.020	57	70 - 0.20	116	632	120	850 1350	20	20

Dimensions: MP5 (dimensions in mm)

ØAL	ØMM	DIN / ISO ¹⁾					ISO ²⁾					ØB f9
		KK ¹⁾	A ¹⁾ max	ØC	SF	WL	KK ²⁾	A ²⁾ max	ØC	SF	WL	
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	67	60	15	88
	90	M42x2	56	86	75	15	M64x3	85	86	75	15	108
160	70	M48x2	63	67	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	18	M80x3	95	106	92	18	133
200	90	M64x3	85	86	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	18	M100x3	112	136	125	18	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	73.5	51.5	117	35	86
160	110.5	120.5	205 ± 2	G 1	47	80.5	55.5	130	32	86
200	130.5	157	245 ± 2	G 1 1/4	58	101	76	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 41

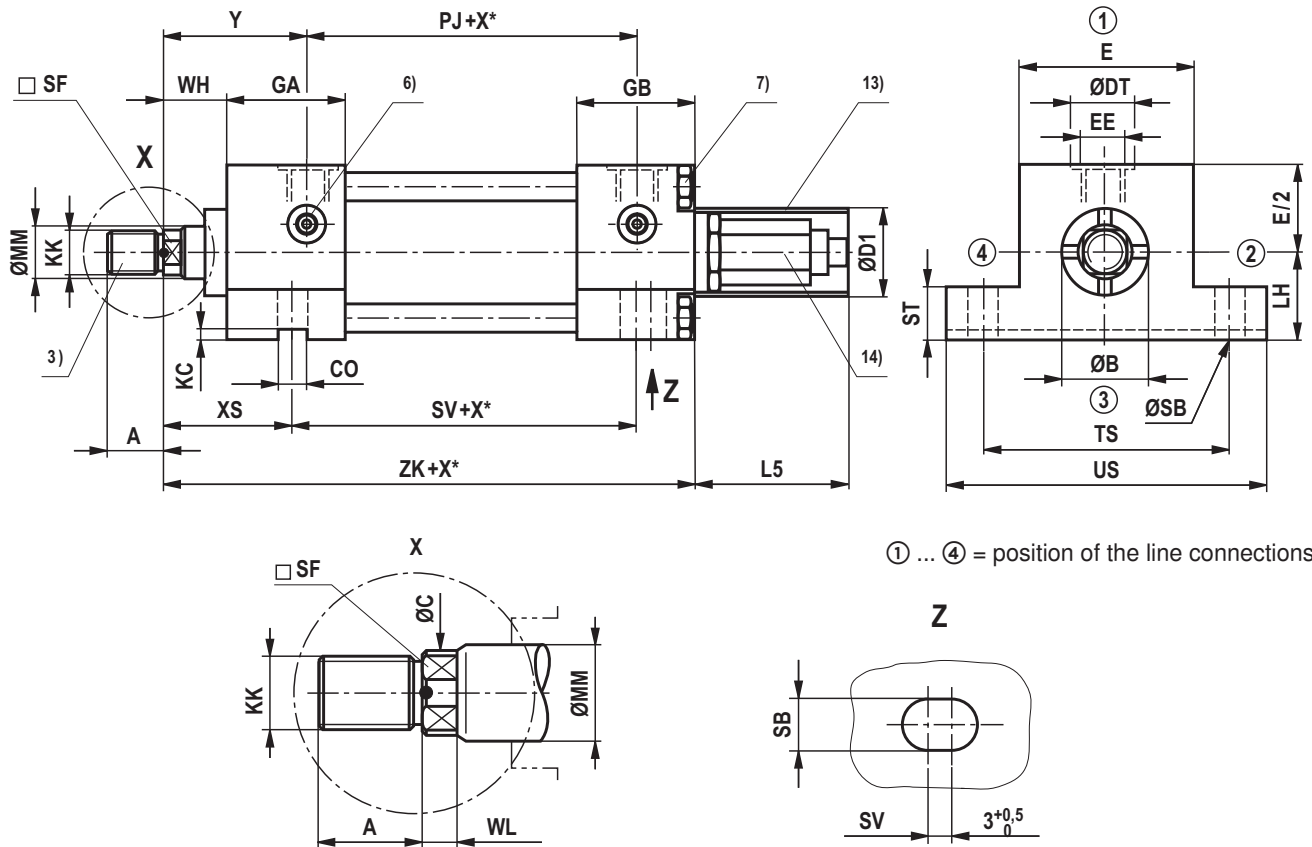
⁷⁾ Tightening torque see page 63

¹⁰⁾ Lubricating nipple M6 DIN 71412

¹¹⁾ Only in line connection position 1 at base

Dimensions: Type of mounting MS2 (dimensions in mm)

CST3 MS2



ØAL	CO N9	KC +0,2 0	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	131	210	254
160	30	8	101	130	33	38	130	260	318
200	40	8	122	160	39	44	172	311	381

Dimensions: MS2 (dimensions in mm)

ØAL	ØMM	DIN / ISO ¹⁾					ISO ²⁾					ØB f9
		KK ¹⁾	A ¹⁾ max	ØC	SF	WL	KK ²⁾	A ²⁾ max	ØC	SF	WL	
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	67	60	15	88
	90	M42x2	56	86	75	15	M64x3	85	86	75	15	108
160	70	M48x2	63	67	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	18	M80x3	95	106	92	18	133
200	90	M64x3	85	86	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	18	M100x3	112	136	125	18	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	73.5	73.5	35	86
160	205 ± 2	G 1	47	80.5	80.5	32	86
200	245 ± 2	G 1 1/4	58	101	101	32	98

ØAL	ØMM	XS ± 2	ZK ± 1	L5	ØD1 max	X* max	X* min without subplate	X* min with subplate
40	28	45	195	–	–	600	–	50
50	28	54	194	–	–	500	–	50
	36					800		
63	36	65	205	82	96	650	–	45
	45					1000		
80	45	68	234	82	96	800	–	32
	56					1200		
100	56	79	248	82	96	1000	–	57
	70					1370		
125	70	79	254	82	96	1200	–	35
	90					1420		
160	70	86	270	82	96	1000	20	20
	110					1410		
200	90	92	324	82	96	1300	20	20
	140					1350		

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"

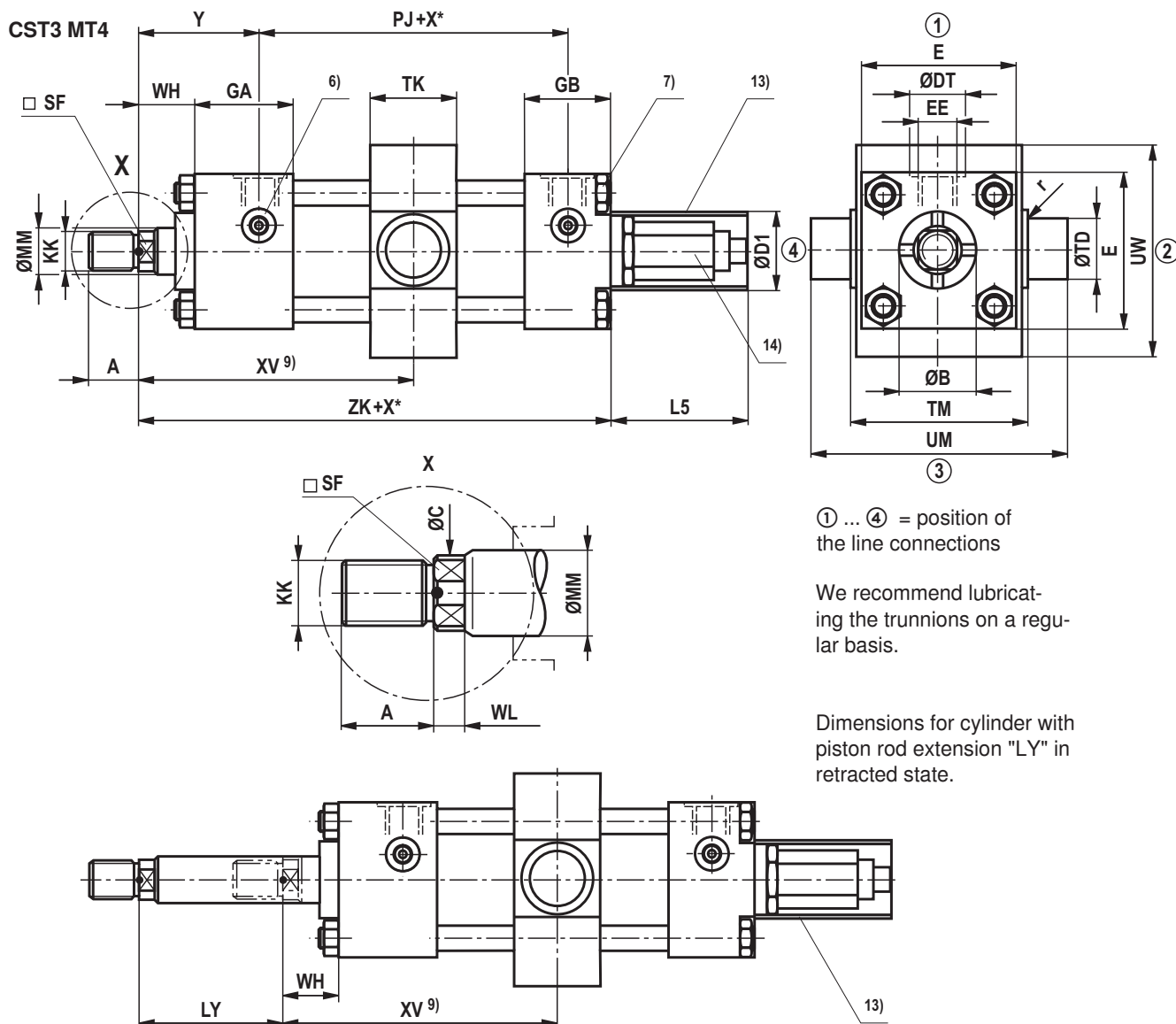
²⁾ Thread for piston rod ends "D" and "K"

⁶⁾ For the position of the line connections and the bleeding see page 41

⁷⁾ Tightening torque see page 63

¹³⁾ With piston Ø 40 – 50 mm without protective pipe

¹⁴⁾ Installation space for position measurement system at least 200 mm

Dimensions: Type of mounting MT4 (dimensions in mm)


ØAL	ØMM	Line connection "B"			Line connection "P", "T", "U"			X* max	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 + Hub	50	95	76 + Hub	390	195	–	–
50	28 36	–	105	105 + Hub	50	105	77 + Hub	325 520	194	–	–
63	36 45	10	117	107 + Hub	45	117	82 + Hub	420 650	205	82	96
80	45 56	12	130	118 + Hub	35	130	96 + Hub	520 780	234	82	96
100	56 70	18	142	124 + Hub	57	142	101 + Hub	650 940	248	82	96
125	70 90	25	157	132 + Hub	63	157	94 + Hub	780 1240	254	82	96
160	70 110	40	171	131 + Hub	74	171	97 + Hub	650 1410	270	82	96
200	90 140	48	202	154 + Hub	73	202	129 + Hub	850 1350	324	82	96

Dimensions: MT4 (dimensions in mm)

ØAL	ØMM	DIN / ISO ¹⁾					ISO ²⁾					ØB f9
		KK ¹⁾	A ¹⁾ max	ØC	SF	WL	KK ²⁾	A ²⁾ max	ØC	SF	WL	
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	67	60	15	88
	90	M42x2	56	86	75	15	M64x3	85	86	75	15	108
160	70	M48x2	63	67	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	18	M80x3	95	106	92	18	133
200	90	M64x3	85	86	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	18	M100x3	112	136	125	18	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	1.2	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	1.6	32	90 ± 1.5	G 1/2	34	57.5	72.5	32	71
80	93	60	127	191	124	2.4	40	115 ± 1.5	G 3/4	42	67	85	31	77
100	101	70	140	220	137	2.4	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	73.5	73.5	35	86
160	130	110	215	341	221	3.2	80	205 ± 2	G 1	47	80.5	80.5	32	86
200	160	130	279	439	281	3.2	100	245 ± 2	G 1 1/4	58	101	101	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"

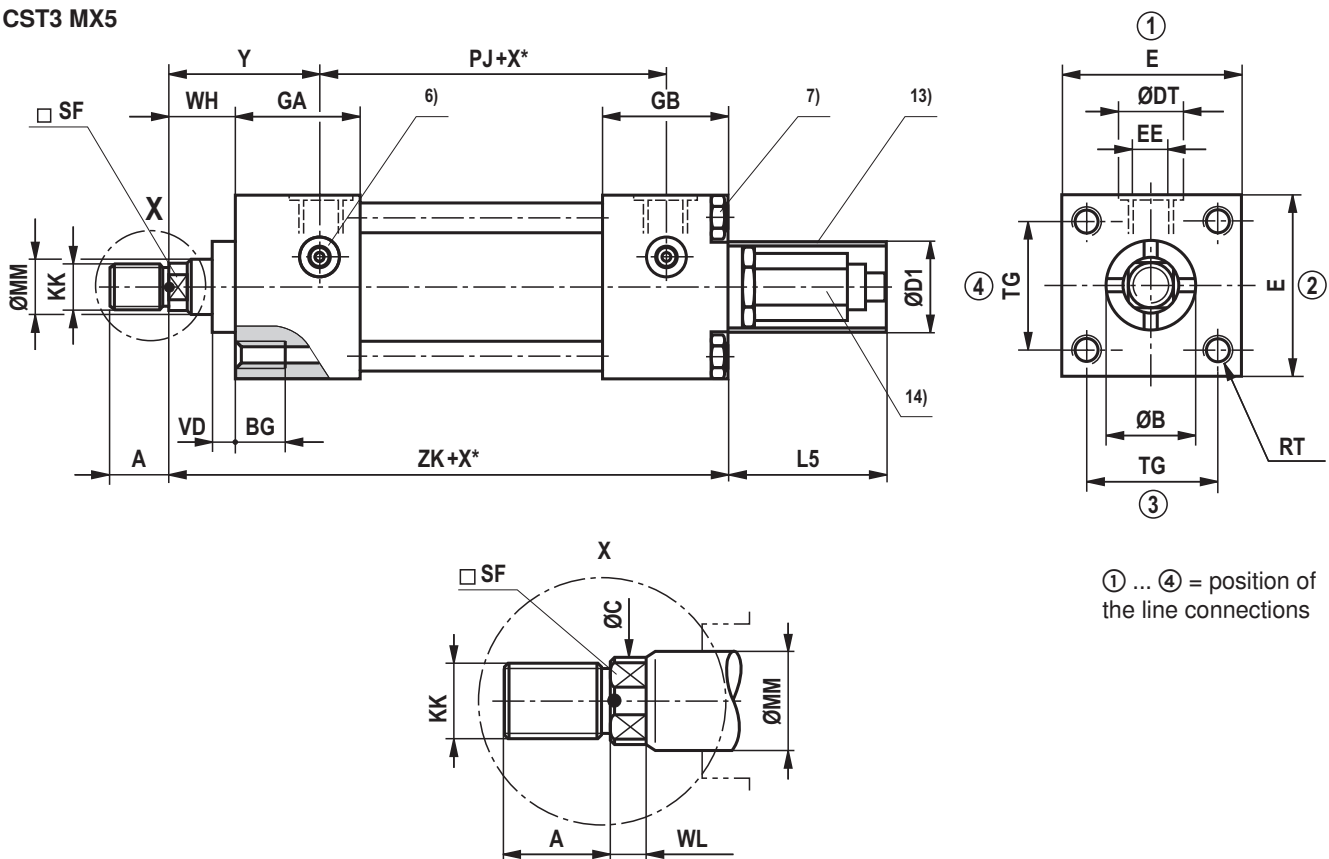
⁶⁾ For the position of the line connections and the bleeding see page 41

⁷⁾ Tightening torque see page 63

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: Type of mounting MX5 (dimensions in mm)
CST3 MX5


ØAL	ØMM	BG min	PJ ± 1,25	RT 6H	TG js13	VD	ZK ± 1	X* max	X* min without subplate	X* min with subplate
40	28	12	73	M8x1.25	41.7	12	195	600	–	50
50	28 36	18	74	M12x1.75	52.3	9	194	500 800	–	50
63	36 45	18	80	M12x1.75	64.3	13	205	650 1000	–	45
80	45 56	24	93	M16x2	82.7	9	234	800 1200	–	32
100	56 70	24	101	M16x2	96.9	10	248	1000 1370	–	57
125	70 90	27	117	M22x2.5	125.9	9	254	1200 1420	–	35
160	70 110	32	130	M27x3	154.9	7	270	1000 1410	20	20
200	90 140	40	160	M30x3.5	190.2	7	324	1300 1350	20	20

Dimensions: MX5 (dimensions in mm)

ØAL	ØMM	DIN / ISO ¹⁾					ISO ²⁾					ØB f9
		KK ¹⁾	A ¹⁾ max	ØC	SF	WL	KK ²⁾	A ²⁾ max	ØC	SF	WL	
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	67	60	15	88
	90	M42x2	56	86	75	15	M64x3	85	86	75	15	108
160	70	M48x2	63	67	60	15	–	–	–	–	–	88
	110	M48x2	63	106	92	18	M80x3	95	106	92	18	133
200	90	M64x3	85	86	75	15	–	–	–	–	–	108
	140	M64x3	85	136	125	18	M100x3	112	136	125	18	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	73.5	73.5	35	86
160	82	96	205 ± 2	G 1	47	80.5	80.5	32	86
200	82	96	245 ± 2	G 1 1/4	58	101	101	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 41

⁷⁾ Tightening torque see page 63

¹³⁾ With piston Ø 40 – 50 mm without protective pipe

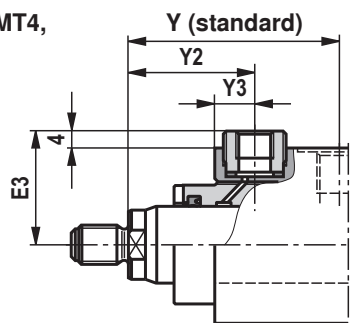
¹⁴⁾ Installation space for position measurement system at least 200 mm

Leakage oil connection/enlarged line connection (dimensions in mm)

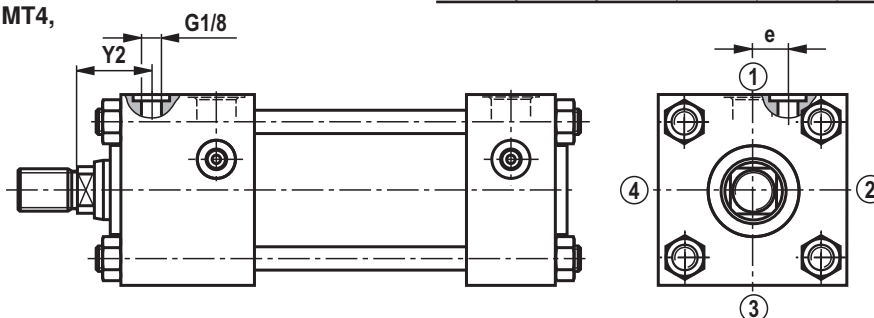
Leakage oil connection

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 extension velocity more than 2 times 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



ME5, ME6, MP5, MS2, MT4,
Ø 50 to Ø 200



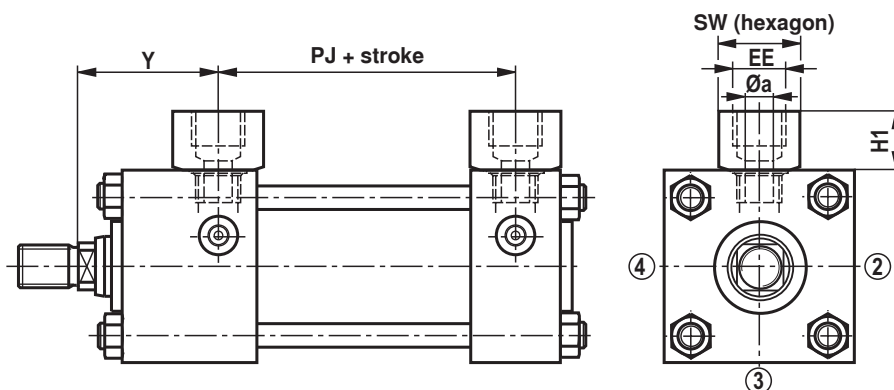
ØAL	ØMM	MS2, MT4 ME6, MP5				ME5	
		e	Y2	Y3	E3	e	Y2
25		0	25.5	10.5	29.5	17	35
32		0	35.5	10.5	32	18	45
40		0	36	11	36	22	47
50		14.5	39	–	–	34	52
63		16	45.5	–	–	43	59
80		16	48	–	–	27	62
100	45	16	52	–	–	30	68
100	70	16	55	–	–	30	68
125	56	16	54	–	–	45	68
125	90	18	57	–	–	45	68
160	70	16	54	–	–	45	68
160	110	16	54	–	–	47	68
200	90	16	55	–	–	45	68
200	140	24	61	–	–	45	72

Enlarged line connection

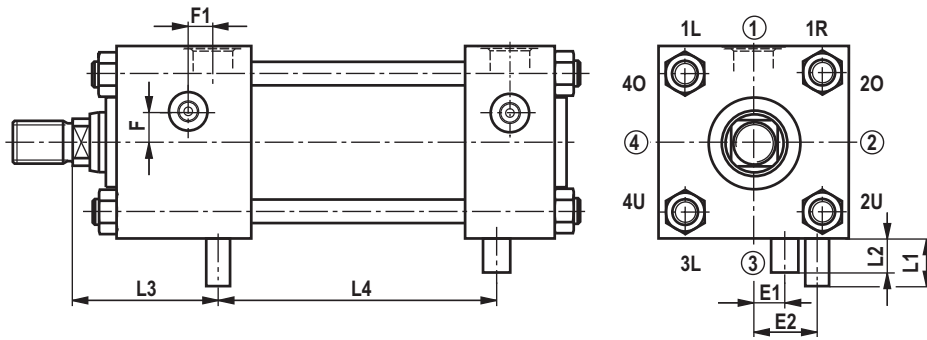
The oil ports of this series are generously dimensioned according to the standard; with high velocities, the pressure drop Δp can be reduced by using larger oil ports; sometimes, it is, however, no longer possible to comply with the standard dimensions, see table.

Cannot be realized for the types of mounting ME 5 / 6 with connection position 2 or 4.

ØAL	EE	H1	Y ±2	PJ ±1.25	SW	Øa
25	G3/8	20	50	53	27	9
32	G3/8	20	60	56	27	9
40	G1/2	23	62	73	32	11
50	G3/4	29	67	74	41	14
63	G3/4	29	71	80	41	14
80	G1	33	77	93	46	18
100	G1	33	82	101	46	18
125	G1 1/4	39	86	117	60	23
160	G1 1/4	–	86	130	–	–
200	G1 1/2	–	98	165	–	–



Position of line connections/bleeding/leakage oil/throttle valve



Mounting	Line connection	CDT3 / CST3						CGT3					
		Bleeding		Leakage oil		Throttle valve		Bleeding		Leakage oil		Throttle valve	
		Head	Base	Head	Head ¹⁾	Base ¹⁾		Head 1	Head 2	Head 1	Head 2	Head 1	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	ME6	¹⁾ Not possible with CST3 ²⁾ Protrusion 3 mm ³⁾ Types of mounting ME5, ME6, MP5, MT4, MP1, MP3, MT2, MX1, MX2, MX3 and MX5					
	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							

ØAL	Bleeding						Throttle valve adjustable on both sides					
	F			F1	F1	SW	Protrusion		Center offset		Dimension	
	Head/base offset			Connection 1/3	Connection 2/4	Allen wrench	L1	L2	E1	E2	L3	L4
	3)	MT1	MS2	ME5			(Head)	(Base)	(Head)	(Base)		
25	0	6	5	11.5	0	5 2)	12	12	6	6	48	57 + Hub
32	0	5	5	12.5	0	5 2)	12	12	9	9	57.5	61 + Hub
40	10	10	10	0	10	5	5.5	5.5	8	8	61.5	74 + Hub
50	10	10	10	0	10	5	3	3	10	10	67	74 + Hub
63	14	14	14	0	14	5	0	0	15	15	72	78 + Hub
80	10	10	10	0	10	6	0	0	14	14	81	85 + Hub
100	12	12	12	0	12	6	0	0	13	13	86	93 + Hub
125	0	0	0	0	–	6	–	–	22	22	91.5	109 + Hub
160	0	0	0	0	–	6	4	–	30	30	93.5	115 + Hub
200	0	0	0	0	–	6	4	–	30	30	114	128 + Hub

Bleeding/threaded coupling (dimensions in mm)

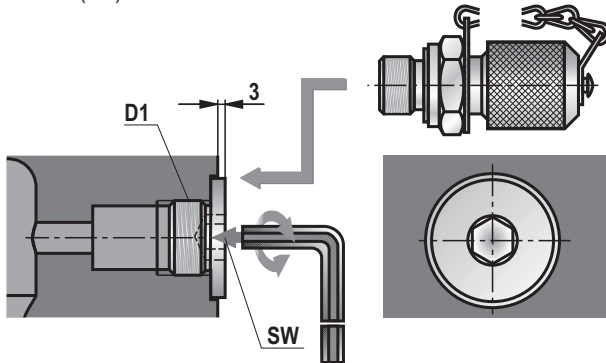
By default, a patented safety bleeding device against unintended screwing out in head and base is delivered for piston $\varnothing \geq 40$ mm.

For piston $\varnothing 25$ and 32 mm, a bleed screw G1/8 is installed in head and base which is **not** secured against screwing out.

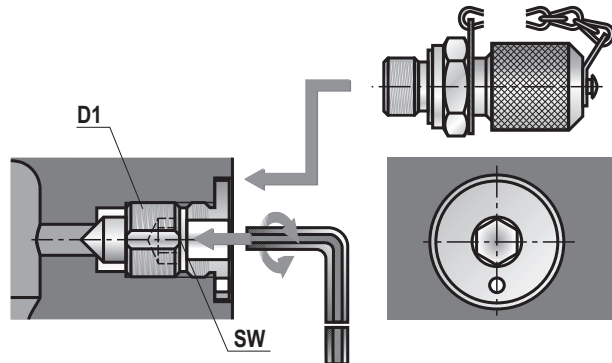
The port allows for the installation of a threaded coupling with check valve for pressure measurement or contamination-free bleeding. Threaded coupling with check valve function, i.e. it can also be connected when the system is pressurized.

Connection possibility for threaded coupling

Piston $\varnothing$ (AL) 25 and 32 mm



Piston $\varnothing$ (AL) 40 to 200 mm



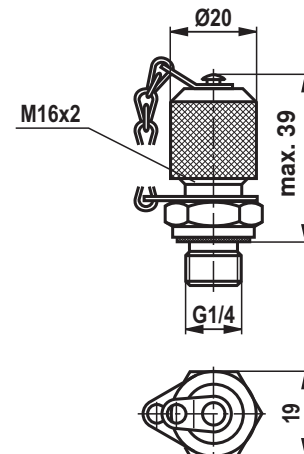
$\varnothing$ AL	Bleed screw			Threaded coupling
	D1	Fuse	SW	D2
25 and 32	G1/8	not secured	5	G1/8
40 and 63	G1/8	secured	5	G1/8
80 to 200	G1/4	secured	6	G1/4

Scope of delivery: Threaded coupling **G1/8**

SCREW JOINT AB 20-11/K3 G1/8 with seal ring of NBR
 SCREW JOINT AB 20-11/K3V G1/8 with seal ring of FKM

Scope of delivery: Threaded coupling **G1/4**

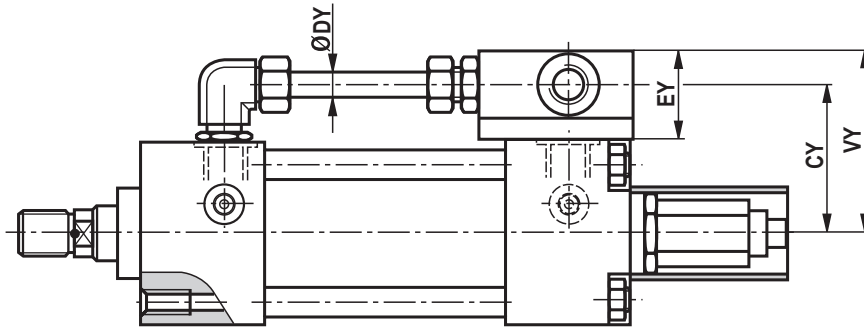
SCREW JOINT AB 20-11/K1 G1/4 with seal ring of NBR
 SCREW JOINT AB 20-11/K1V G1/4 with seal ring of FKM



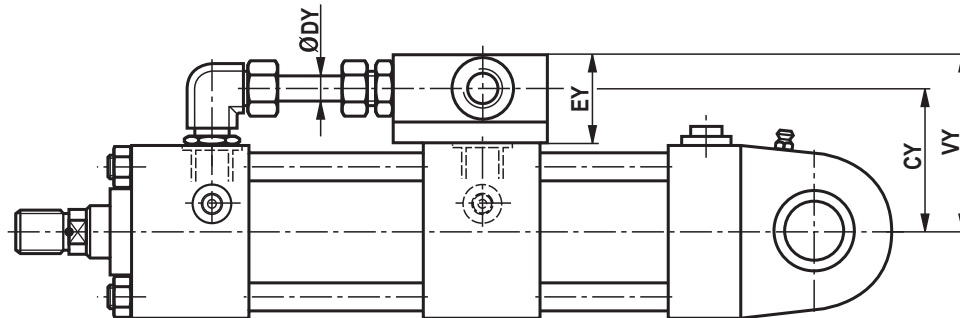
Subplates for valve mounting – dimensions and porting pattern (dimensions in mm)

MX5

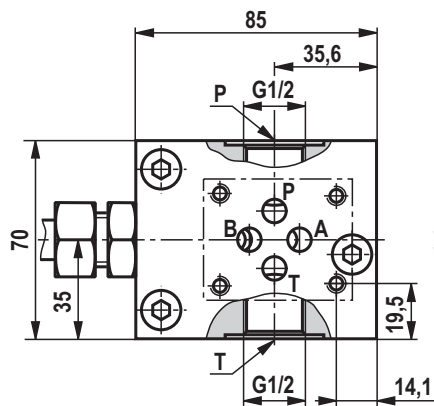
ME5, MS2, MT4



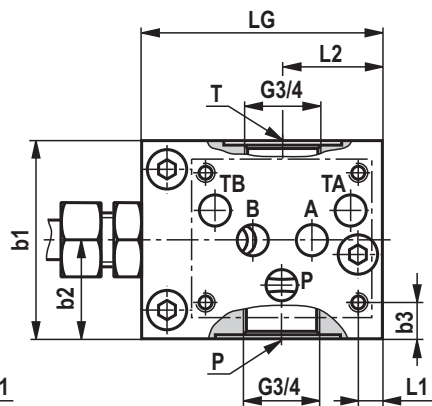
MP5



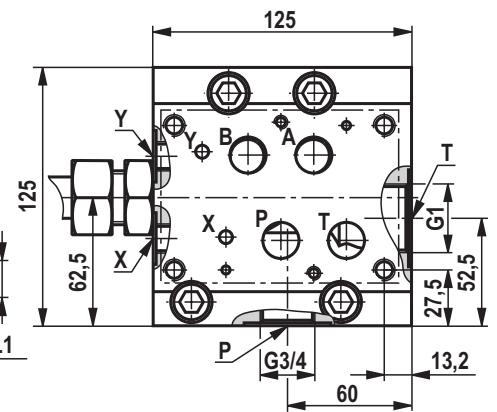
Size 6

 Porting pattern according
to ISO 4401


Size 10

 Porting pattern according
to ISO 4401


Size 16

 Porting pattern according
to ISO 4401


ØAL	Size 6				Size 10										Size 16			
	CY	EY	VY	ØDY	CY	EY	VY	ØDY	LG	L1	L2	b1	b2	b3	CY	EY	VY	ØDY
40	63.2	49.7	81.2	15	63.2	49.7	81.2	15	85	8.5	35.5	70	35	13	–	–	–	–
50	69.2	49.7	87.2	15	69.2	49.7	87.2	15	85	8.5	35.5	70	35	13	–	–	–	–
63	76.7	49.7	94.7	15	76.7	49.7	94.7	15	85	8.5	35.5	70	35	13	–	–	–	–
80	89.2	49.7	107.2	15	89.2	49.7	107.2	15	85	8.5	35.5	70	35	13	–	–	–	–
100	–	–	–	–	106.4	64.7	129.7	20	110	27	52	125	62.5	39.5	104	79.7	144.7	20
125	–	–	–	–	123.9	64.7	147.2	20	110	27	52	125	62.5	39.5	121.5	79.7	162.2	20
160	–	–	–	–	143.9	64.7	167.2	20	110	27	52	125	62.5	39.5	141.5	79.7	182.2	20
200	–	–	–	–	163.9	64.7	187.2	20	110	27	52	125	62.5	39.5	161.5	79.7	202.2	20

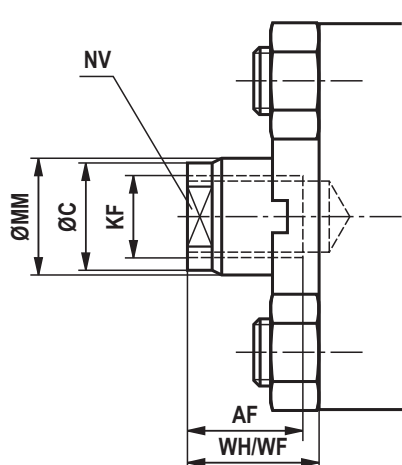
For the weight of the subplates refer to page 44.

Weight: Subplates

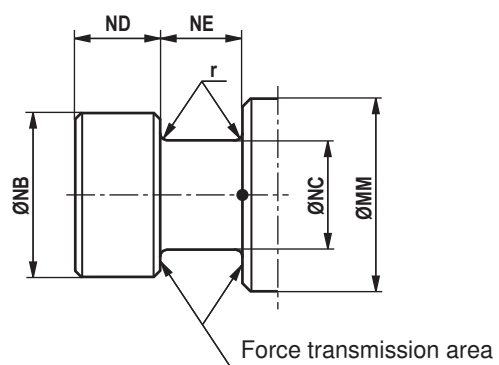
ØAL	Size 6 in kg	Size 10 in kg	Size 16 in kg
40	2.3	2.3	–
50	2.3	2.3	–
63	2.3	2.3	–
80	2.3	2.3	–
100	–	7.0	9.8
125	–	7.0	9.8
160	–	7.0	9.8
200	–	7.0	9.8

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	33	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	33	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	92	106	65	35	1.5	160
200	90	35	M64x3	85	86	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 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.

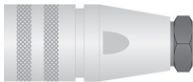
Technical data: Position measurement system

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

Operating pressure	bar	160
Analog output	V	0 to 10
	Load resistance	k Ω
	Resolution	unlimited
Analog output	mA	4 to 20
	Load resistance	Ω
	Resolution	unlimited
Digital output		SSI 24 bit gray-coded
	Resolution	μm
	Direction of measurement	asynchronously forward
Linearity (absolute accuracy)	Analog	%
		mm
	Digital	%
		mm
Reproducibility	%	± 0.02 % (referred to measurement length)
	mm	min. ± 0.05
Hysteresis	%	$\leq \pm 0.01$ % (referred to measurement length)
	mm	min. ± 0.04
Supply voltage	V DC	± 0.001 (referred to measurement length)
	mA	min. ± 0.0025
	Current consumption	≤ 0.004
	Residual ripple	≤ 1
	V DC	24 (± 10 % with analog output)
	mA	100
	Residual ripple	≤ 1
Protection class	Pipe and flange	24 (+20 %/-15 % with digital output)
	Sensor electronics	70
Operating temperature	°C	≤ 1
Temperature coefficient	Voltage	IP 67
	Current	IP 65
Temperature coefficient	ppm/°C	-40 to +75
	ppm/°C	70
		90

Position measurement system

- 1) For analog output:
6–pole amphenol mating connector
(Mating connector is **not** included in the scope of delivery, must be ordered separately)

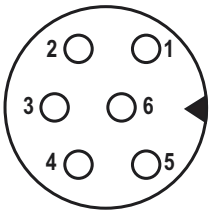


- 1) For digital output:
7–pole amphenol mating connector
(Mating connector is **not** included in the scope of delivery, must be ordered separately)



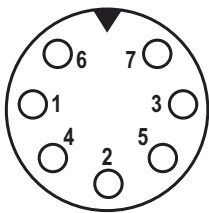
Pin assignment

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)

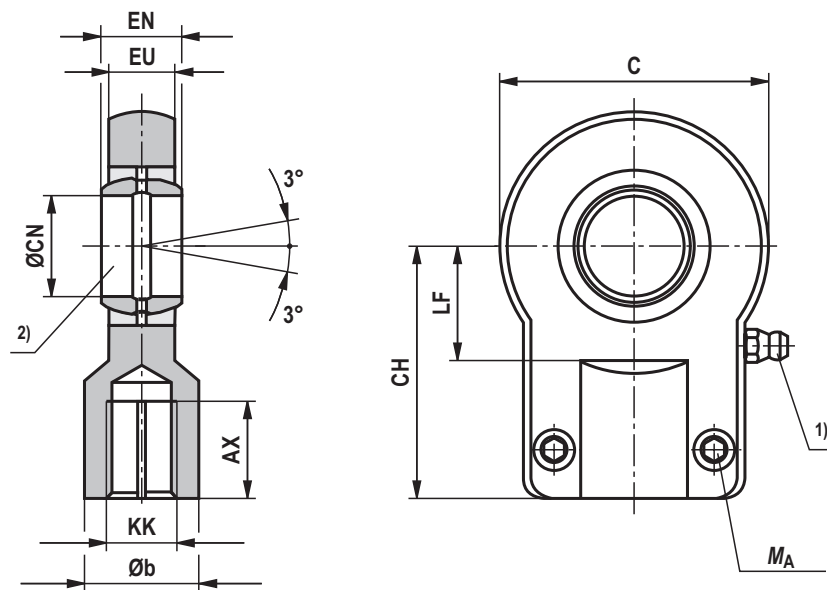


Pin	Cable	Signal / SSI
1	gray	Data (–)
2	pink	Data (+)
3	yellow	Clock (+)
4	green	Clock (–)
5	brown	+24 V DC(+20 % / –15 %)
6	white	DC ground (0 V)
7	–	not used

Tilt head CGKA - AP 6 (clampable) (dimensions in mm)

ISO 8133

DIN 24555



Type	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⁾	M10 x1,25	15	17	40	42	12 -0,008	10 -0,12	8	16	9,5	0,15	17	6,3
CGKA 16 ⁴⁾	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⁾	M14x1,5	19	25	55	58	20 -0,012	16 -0,12	13	25	23	0,43	42,5	15,7
CGKA 25	M16x1,5	23	30	65	68	25 -0,012	20 -0,12	17	30	23	0,73	67	24,7
CGKA 30	M20x1,5	29	36	80	85	30 -0,012	22 -0,12	19	35	46	1,3	108	39,9
CGKA 40	M27x2	37	45	100	105	40 -0,012	28 -0,12	23	45	46	2,3	156	57,6
CGKA 50	M33x2	46	55	125	130	50 -0,012	35 -0,12	30	58	80	4,4	245	90,4
CGKA 60	M42x2	57	68	160	150	60 -0,012	44 -0,12	38	68	195	8,4	380	140,2
CGKA 80	M48x2	64	90	205	185	80 -0,015	55 -0,15	47	82 ⁶⁾	385	15,6	585	215,9
CGKA 100	M64x3	86	110	240	240	100 -0,02	70 -0,2	57	116	660	28	865	319,2
CGKD 100 ⁵⁾	M80x3	96	110	210	210	100 H7	100 h12	84	98	385	28	1060	391,1
CGKD 125 ⁵⁾	M100x3	113	135	262	260	125 H7	125 h12	102	120	385	43	1200	442,8

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) Related bolt Ø h6

3) Cannot be re-lubricated

4) Can be re-lubricated via lubricating hole

5) Tilt head according to ISO 8132, related bolt Ø m6

6) Dimensions may differ from the standard depending on the manufacturer

7) M_A = tightening torque

The tilt head must always be screwed against the shoulder of the piston rod. Afterwards, the clamping screws have to be tightened applying the specified tightening torque.

8) m = Weight tilt head in kg

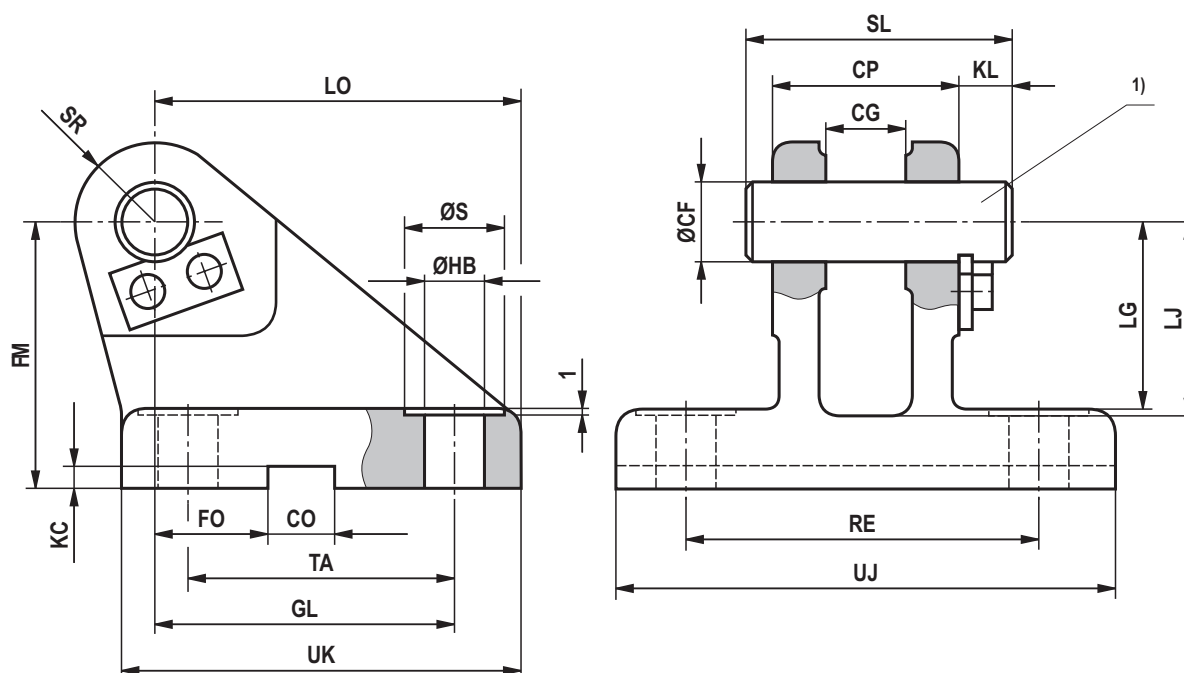
9) C_0 = static load rating of the tilt head

10) F_{adm} = maximum admissible load of the tilt head with oscillatory or alternating loads

Clevis bracket CLCB - AB 5 (clampable) (dimensions in mm)

ISO 8133

DIN 24556



Type	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	8	12	30	10	10	16	40	46	9	15
CLCB 16	12,5	16	40	14	16	18	50	61	11	18
CLCB 20	20	20	50	16	16	20	55	64	14 ³⁾	20
CLCB 25	32	25	60	20	25	22	65	78	16 ³⁾	24
CLCB 30	50	30	70	22	25	24	85	97	18 ³⁾	26
CLCB 40	80	40	80	28	36	24	100	123	22	33
CLCB 50	125	50	100	35	36	35	125	155	30	48
CLCB 60	200	60	120	44	50	35	150	187	39	60
CLCB 80	320	80	160	55	50	35	190	255	45	80
CLCB 100	500	100	200	70	63	35	210	285	48	80

Clevis bracket CLCB - AB 5 (clampable) (dimensions in mm)

Type	KC + 0,3 0	KL	LG	LJ	LO	RE js13	SL	SR max.	TA js13	UJ	UK	<i>m</i> 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:

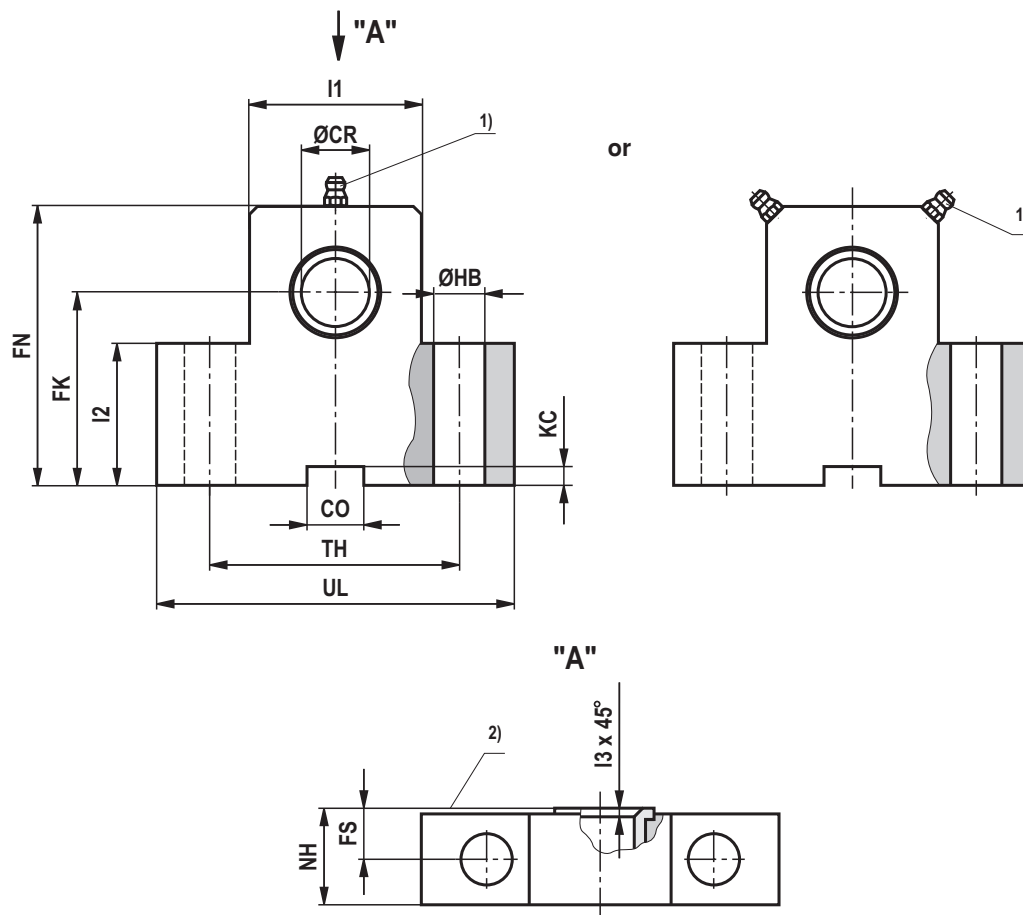
Geometry and dimensions may differ depending on the manufacturer.

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

- ¹⁾ Related bolt Ø h6, suitable for tilt head CGKA...
(bolt and bolt lock are included in the scope of delivery)
- ²⁾ *m* = Weight 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 to 20



ØAL	Type	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	I1	I2	I3	m ⁵⁾ kg
25	CLTA 12	8	12	10	38	55	8	9	3,3	17 ³⁾	40	63	25	25	1	0,5
32	CLTA 16	12,5	16	16	45	65	10	11	4,3	21	50	80	30	30	1	0,9
40	CLTA 20	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 = Kolben-Ø

¹⁾ Lubricating nipple, cone form A according to DIN 71412

²⁾ Inside

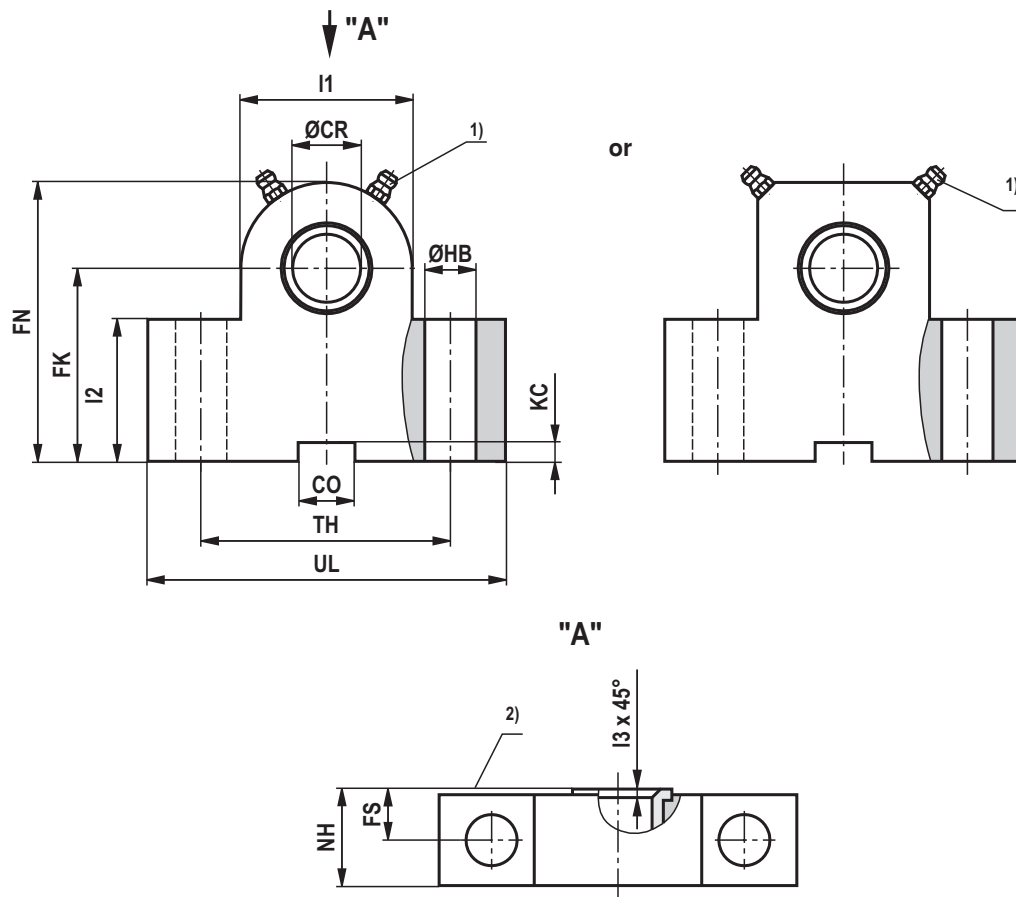
³⁾ Dimensions may differ depending on the manufacturer

⁴⁾ Nominal force applies to applications in pairs

⁵⁾ m = weight per pair, bearing blocks are delivered in pairs

Trunnion bearing block CLTA - AT 4 (dimensions in mm)

CLTA 25 to 100



ØAL	Type	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	I1	I2	I3	m ⁵⁾ kg
50	CLTA 25	32	25	25	65	90	12	14 ³⁾	5,4	26	80	110	56	45	1,5	2,4
63	CLTA 32	50	32	25	75	110	15	18 ³⁾	5,4	33	110	150	70	52	2	5,0
80	CLTA 40	80	40	36	95	140	16	22	8,4	41	125	170	88	60	2,5	8,5
100	CLTA 50	125	50	36	105	150	20	26	8,4	51	160	210	90	72	2,5	15
125	CLTA 63	200	63	50	125	195	25	33	11,4	61	200	265	136	87	3	30
160	CLTA 80	320	80	50	150	230	31	39	11,4	81	250	325	160	112	3,5	59
200	CLTA 100	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 = Kolben-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, bearing blocks are delivered in pairs

Kinking

The admissible stroke length with flexibly guided load and a factor of 3.5 for safety against kinking can be seen from 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

$$F = \frac{d^2 \cdot \pi (335 - 0,62 \cdot \lambda)}{4 \cdot v} \text{ if } \lambda \leq \lambda_g$$

Explanation:

E = modulus of elasticity in N/mm²

= 2.1×10^5 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)

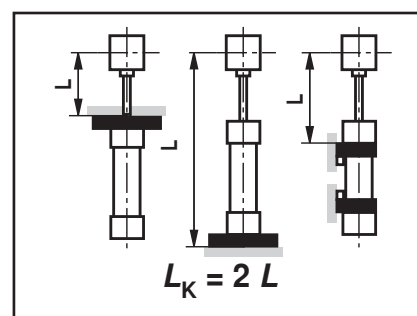
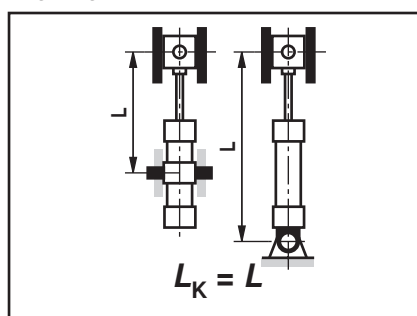
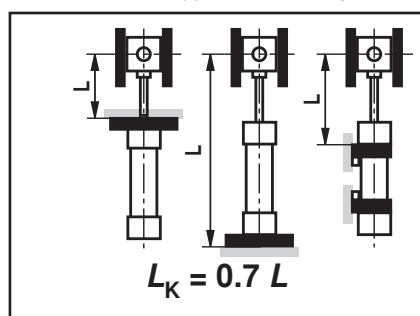
d = piston rod Ø in mm

λ = slenderness ratio

$$= \frac{4 \cdot L_K}{d} \quad \lambda_g = \pi \sqrt{\frac{E}{0.8 \cdot R_e}}$$

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)

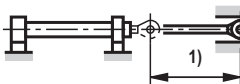
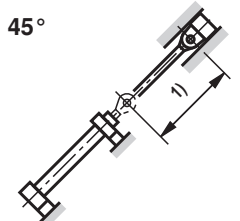
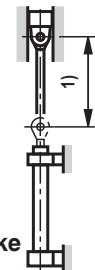
Type of mounting MP1, MP3, MP5

ØAL	ØMM	Admissible stroke length with									Installation position		
		70 bar			100 bar			160 bar			210 bar		
		0°	45°	90°	0°	45°	90°	0°	45°	90°	0°	45°	90°
25	12	115	120	125	85	85	90	50	50	55	180	180	185
	18	315	330	375	270	275	300	205	210	220			
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

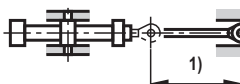
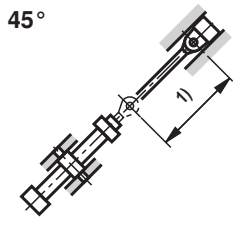
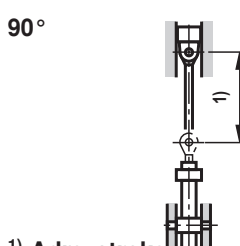
1) Adm. stroke length

Admissible stroke length (dimensions in mm)

Type of mounting MS2

ØAL	ØMM	Admissible stroke length with												Installation position
		70 bar			100 bar			160 bar			210 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	12	500	510	530	420	425	435	325	325	330				0° 
	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				45°
	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				90° 
	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				1) Adm. stroke length
	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	

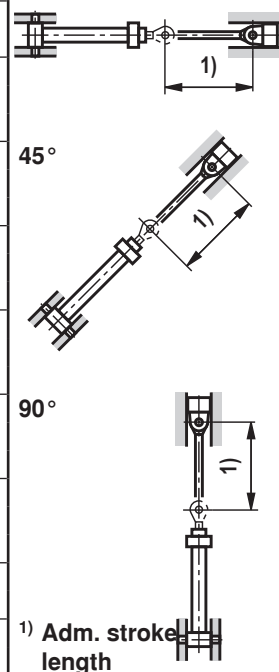
Type of mounting MT4 (trunnion position in cylinder center)

ØAL	ØMM	Admissible stroke length with												Installation position
		70 bar			100 bar			160 bar			210 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	12	190	190	200	150	150	155	105	105	105				0°
	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				45°
	22	430	445	480	360	370	385	275	280	285	230	230	235	
50	28	670	700	825	590	605	670	475	480	505	430	435	445	
	36	885	925	1115	785	810	910	640	655	690	580	590	610	
63	28	435	445	470	355	360	375	265	265	270				90°
	36	755	780	865	650	660	700	510	575	530	430	430	440	
80	45	1095	1145	1390	975	1010	1140	800	815	870	725	735	765	
	56	585	595	630	480	485	505	340	360	365				
100	45	890	920	1025	760	775	830	590	595	615	535	540	550	1) Adm. stroke length
	56	1340	1400	1700	1195	1240	1405	1000	1010	1075	885	900	940	
125	70	725	745	805	605	615	645	415	440	475				
	90	1090	1130	1295	940	965	1045	740	750	782	675	680	695	
160	70	1615	1700	2000	1460	1515	1770	1225	1255	1355	1115	1130	1185	
	110	900	925	1015	760	775	820	485	520	605				
200	90	1340	1395	1640	1170	1205	1330	940	955	1000	855	865	890	
	140	2035	2150	2300	1860	1945	2300	1590	1635	1815	1480	1510	1605	
200	90	1100	1300	1255	935	955	1015	730	735	760				
	140	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	

Admissible stroke length (dimensions in mm)

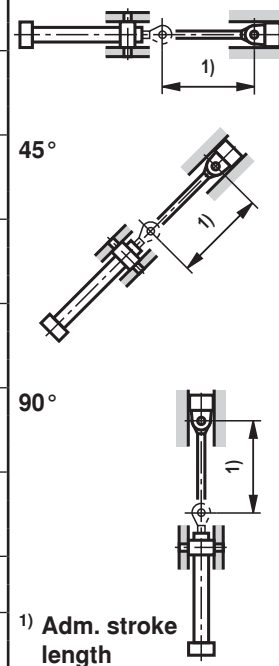
Type of mounting MT2

ØAL	ØMM	Admissible stroke length with									Installation position		
		70 bar			100 bar			160 bar			210 bar		
		0°	45°	90°	0°	45°	90°	0°	45°	90°	0°	45°	90°
25	12	130	130	135	100	100	105	65	65	65	195	195	200
	18	330	340	390	285	290	315	220	225	230			
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
50	28	485	505	600	425	435	485	335	345	360	305	305	315
	22	230	235	245	180	185	190	125	125	125			
63	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
80	28	310	315	335	250	250	260	180	180	180			
	36	550	565	630	465	475	505	360	365	375	305	305	315
100	45	800	840	1025	710	735	835	580	595	630	530	535	555
	36	415	425	450	340	345	355	250	250	255			
125	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
160	45	515	530	575	430	435	455	320	320	330			
	56	825	855	980	710	730	795	565	570	595	480	485	500
200	70	1185	1245	1585	1065	1110	1300	890	915	990	815	830	870
	56	640	660	730	540	550	580	410	410	425			
250	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
320	70	785	810	905	665	675	720	505	515	530			
	110	1770	1870	2505	1620	1695	2070	1390	1430	1595	1260	1290	1375
400	90	1015	1055	1210	870	895	970	680	685	715			
	140	2190	2325	2700	2025	2125	2695	1760	1825	2080	1610	1650	1790



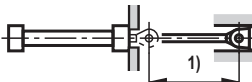
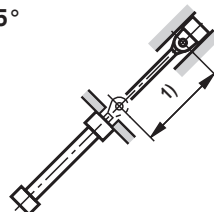
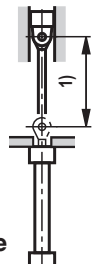
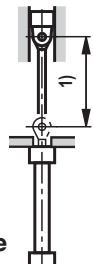
Type of mounting MT1

ØAL	ØMM	Admissible stroke length with									Installation position		
		70 bar			100 bar			160 bar			210 bar		
		0°	45°	90°	0°	45°	90°	0°	45°	90°	0°	45°	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
50	28	1000	1000	1000	945	970	1000	760	770	800	685	690	705
	22	550	555	570	450	450	455	330	330	335			
63	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
80	28	715	725	750	590	590	600	440	440	445			
	36	1175	1210	1335	1015	1035	1100	805	810	835	695	695	705
100	45	1400	1400	1400	1400	1400	1400	1245	1270	1345	1135	1150	1190
	36	940	955	995	780	785	805	590	590	600			
125	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
160	45	1190	1210	1270	995	1005	1030	740	760	770			
	56	1790	1850	2000	1570	1600	1730	1270	1285	1330	1085	1095	1115
200	70	2000	2000	2000	2000	2000	2000	1900	1945	2000	1740	1765	1850
	56	1480	1505	1595	1245	1260	1300	965	970	980			
250	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
320	70	1805	1840	1965	1525	1545	1600	1185	1195	1210			
	110	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600
400	90	2340	2400	2610	2000	2035	2135	1575	1585	1620			
	140	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700

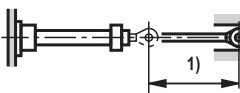


Admissible stroke length (dimensions in mm)

Type of mounting ME5, MX3, MX5

ØAL	ØMM	Admissible stroke length with												Installation position
		70 bar			100 bar			160 bar			210 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	12	510	520	540	430	435	445	335	335	340				0°
	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				45°
	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	90°
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	1) Adm. stroke length
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	1) Adm. stroke length
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	

Type of mounting ME6, MX1, MX2

ØAL	ØMM	Admissible stroke length with												Installation position
		70 bar			100 bar			160 bar			210 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	12	195	200	220	160	160	170	115	115	120				0°
	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				45°
	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	90°
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	1) Adm. stroke length
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	1) Adm. stroke length
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	

End position cushioning

End position cushioning:

The objective is to reduce the velocity of a moved reduced 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.

Series CDT3/CGT3 is equipped with a progressive cushioning system.

Advantages of this cushioning system:

- Progressive delay.
- Short cushioning time.
- Cushioning length depending on the velocity.
- Due to low cushioning 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.

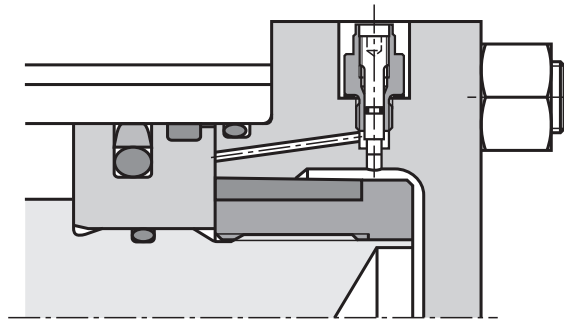
Cylinders with end position cushioning can achieve their full cushioning capacity only over the entire stroke length.

With the adjustable end position cushioning version "E", a throttle valve is additionally provided when compared with version "D". End position cushioning "E" allows for optimization of the cycle times.

The max. cushioning 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!

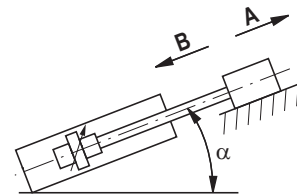
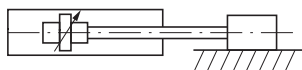


Cushioning capacity:

When decelerating masses via the end position cushioning, the structural-inherent cushioning 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 diagram on pages 58, 59.

Energy determination



$$E = \frac{1}{2} m \cdot v^2$$

$$1 \text{ Retract (A): } E = \frac{1}{2} mv^2 - mg \cdot l_a$$

$$1 \text{ Extend (B): } E = \frac{1}{2} mv^2 + mg \cdot l_a$$

$$1 \text{ Extend (A): } E = \frac{1}{2} mv^2 - mg \cdot l_a \cdot \sin \alpha$$

$$1 \text{ Retract (B): } E = \frac{1}{2} mv^2 + mg \cdot l_a \cdot \sin \alpha$$

E	[Nm] [joule]	Maximum value see pages 56 to 59
m	[kg]	Total moved mass incl. piston and rod
v	[m/s]	Max. velocity
g	[m/s ²]	9.81
l_a	[m]	Cushioning length, see page 57

End position cushioning

Cushioning lengths and masses

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 (kg/100 mm)	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
	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	38	38	57	57
	Base	27	27	27	28	28	28	46	46	46	46	46	64	64
m in kg (kg/100 mm)	Piston	2.6	3	3.6	4.7	5.3	6.3	8.0	9.2	11	16	20	30	38
	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 58, 59 are based on the preceding table, the maximum velocities specified referring to "M" seals with closed throttle screw.

With slower velocities, the absorbing energy decreases according to the formula.

$$E_U = E_{max} \cdot \frac{v_U}{v_{max}}$$

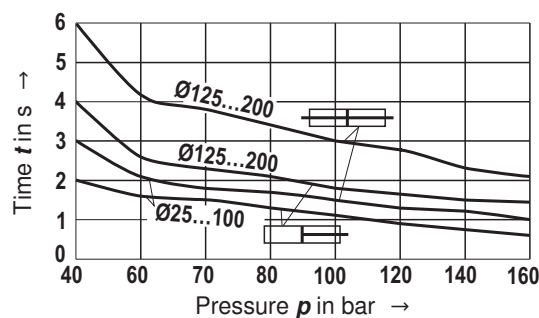
E_U = energy absorbing

E_{max} = energy max. see characteristic curve

v_U = stroke velocity

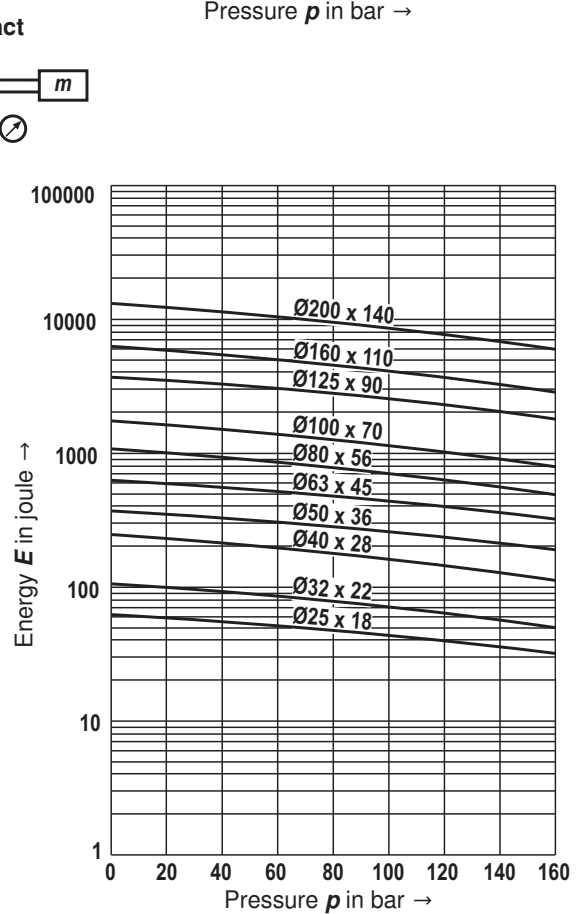
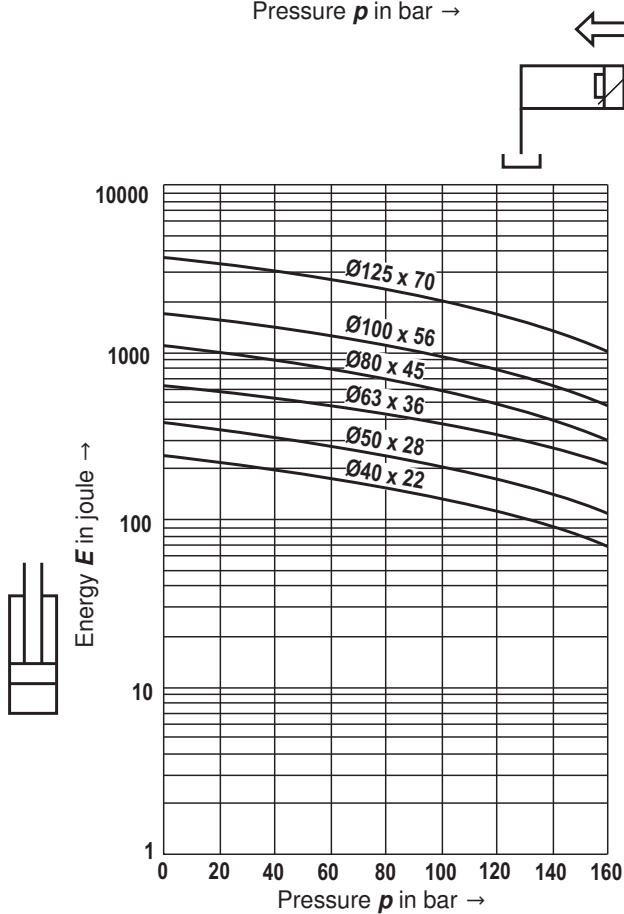
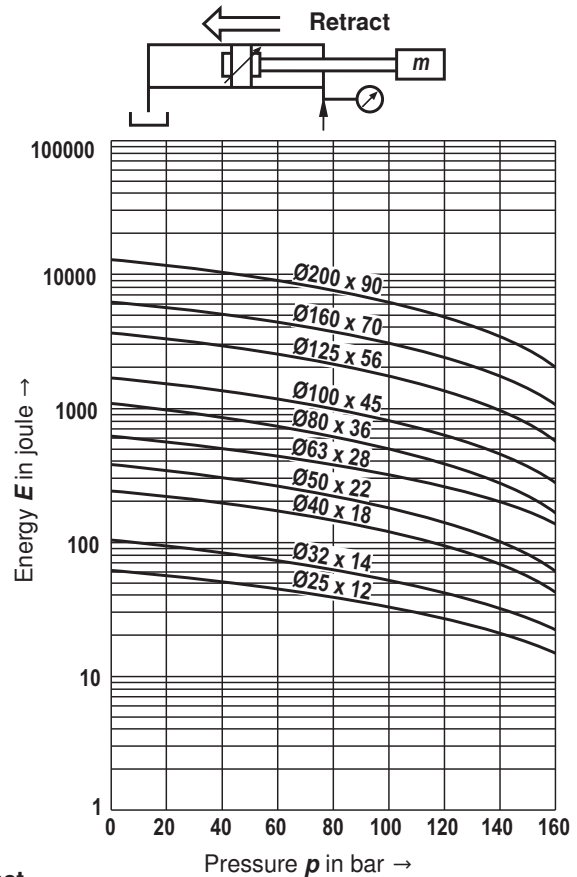
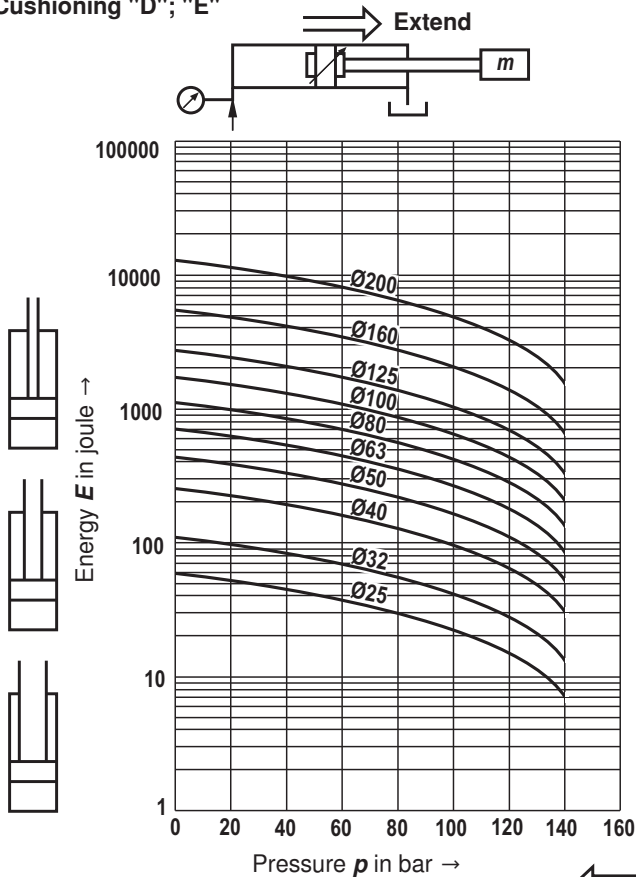
v_{max} = velocity max. for seal version "M"

Max. cushioning time "D"; "E"



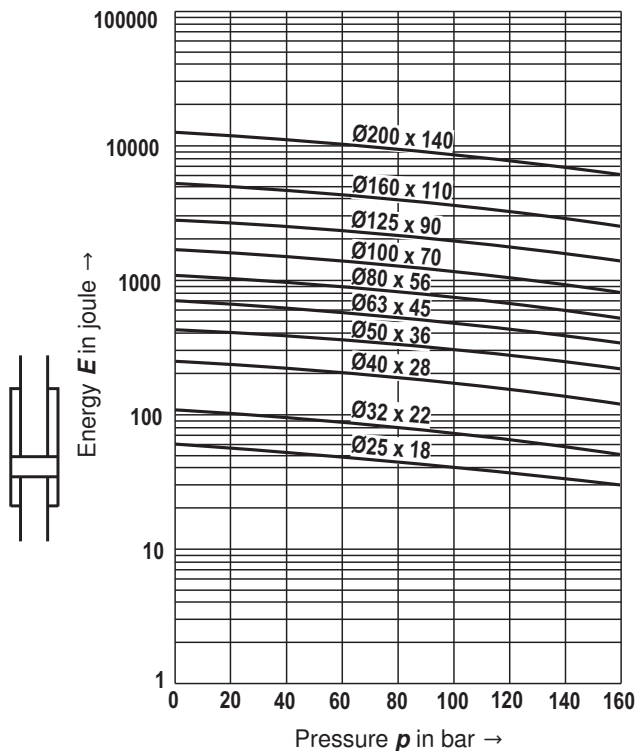
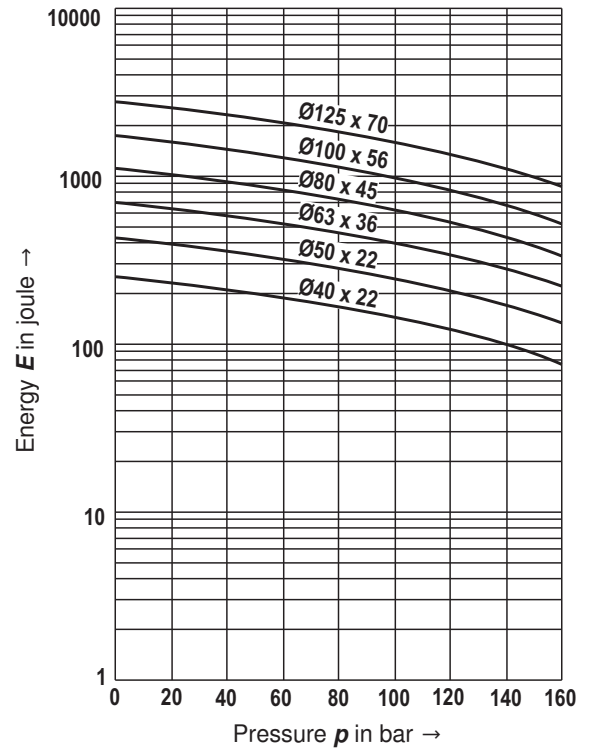
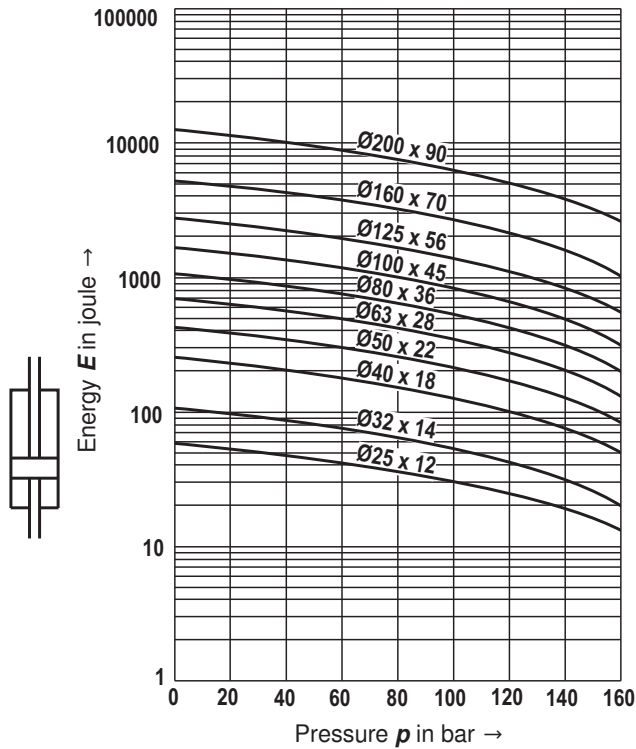
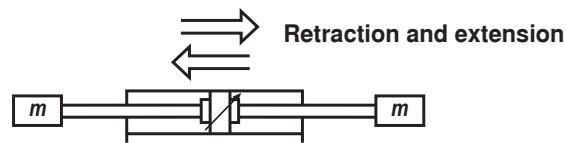
End position cushioning

Cushioning "D"; "E"



End position cushioning

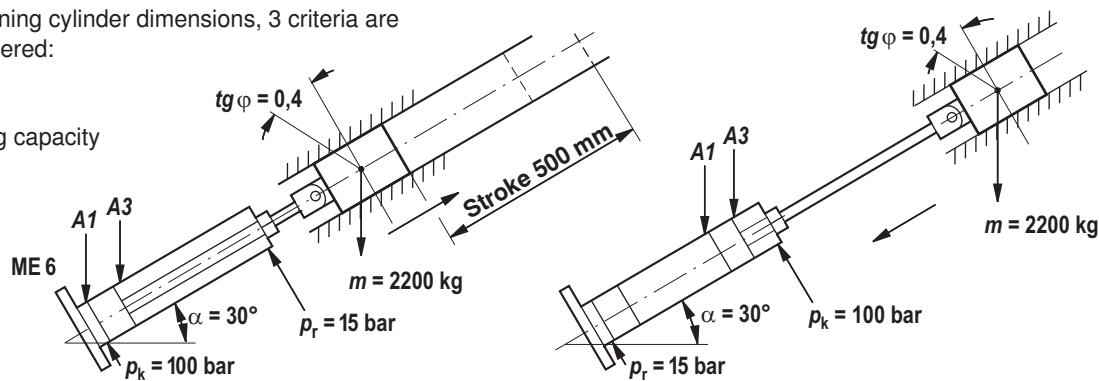
Cushioning "D"; "E"



Calculation example

When designing cylinder dimensions, 3 criteria are to be considered:

- Force
- Kinking
- Cushioning 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 ring surface

φ = surface ratio $A1 / A3$, see page 5

m = total moved mass, v = velocity

l_a = cushioning length, see page 57

To be determined:

Piston and piston rod diameter

Extend piston rod:

Total efficiency $\eta = \eta_1 \cdot \eta_2$

η_1 = cylinder efficiency = 0.9 (estimated)

η_2 = system efficiency

$$\eta_2 = \frac{p_k \cdot A1 - p_r \cdot A3}{p_k \cdot A1} = 1 - \frac{p_r}{p_k \cdot \varphi} = \frac{15}{100 \cdot 1.25} = 0.88$$

$$\eta = 0.9 \cdot 0.88 = 0.79$$

¹⁾ Assuming the smallest " φ "

Force required to move the mass:

F = frictional force plus potential energy

$$\begin{aligned} &= tg \varphi \cdot m \cdot g \cdot \cos \alpha + m \cdot g \cdot \sin \alpha \\ &= 0.4 \cdot 2200 \cdot 9.81 \cdot 0.866 + 2200 \cdot 9.81 \cdot 0.5 = 18270 \text{ N} \\ &= 18.27 \text{ kN} \end{aligned}$$

This theoretical force 18.27 kN with $\eta = 0.79$ 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 5

Retract piston rod:

F = frictional force minus potential energy

$$\begin{aligned} &= tg \varphi \cdot m \cdot g \cdot \cos \alpha - m \cdot g \cdot \sin \alpha \\ &= 0.4 \cdot 2200 \cdot 9.81 \cdot 0.866 - 2200 \cdot 9.81 \cdot 0.5 \\ &= -3315 \text{ N} = -3.3 \text{ kN} \quad \text{no force problem during retraction} \end{aligned}$$

Test of kinking length:

For $p_k = 100$ bar and cylinder 63 / 28, the table on page 55 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)

Cushioning 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 cushioning problem for piston rod extension

Cushioning 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 55 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 57):

$$E_u = E_{\max} \cdot \frac{v_u}{v_{\max}} = 445 \cdot \frac{0.275}{0.4} = 306 \text{ joules}$$

So the cylinder cannot absorb the necessary cushioning 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-term < 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

– = unsuitable

General technical data in corresponding data sheets will remain valid!

- 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, 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						
	18						
32	14						
	22						
40	18						
	22						
	28						
50	22						
	28						
	36						
63	28						
	36						
	45						
80	36						
	45						
	56						
100	45						
	56						
	70						
125	56						
	70						
	90						
160	70						
	110						
200	90						
	140						

Seal kit CST3 only for cylinder ¹⁾

ØAL	ØMM	Material no. for seal design CST3		
		M	T	S
40	28			
50	28			
	36			
63	36			
	45			
80	45			
	56			
100	56			
	70			
125	70			
	90			
160	70			
	110			
200	90			
	140			

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 Size	Material number for seal design	
	M, T	S
6		
10, 16		

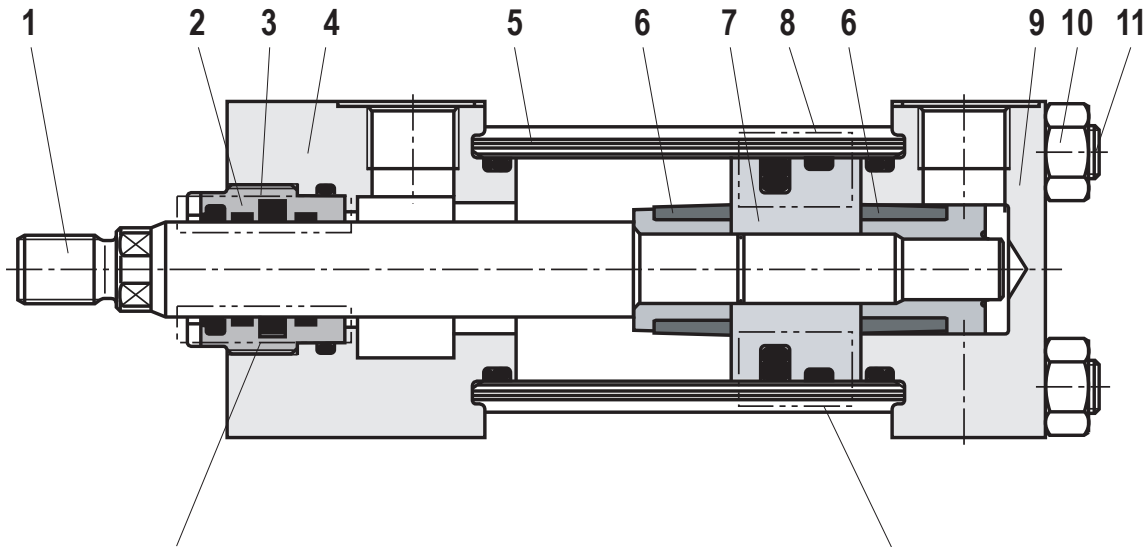
Only for position measurement system

ØAL	Material number for seal design	
	M, T	S
40		
50		
63		
80		
100		
125		
160		
200		

Tightening torques

ØAL	ØMM	Tightening torque 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	3
	18		
32	14	8	6,5
	22		
40	18	20	12
	22		
	28		
50	22	50	37
	28		
	36		
63	28	60	40
	36		
	45		
80	36	125	90
	45		
	56		
100	45	190	100
	56		
	70		
125	56	400	240
	70		
	90		
160	70	800	450
	110		
200	90	1250	600
	140		

Spare parts: Series CDT3



Piston rod seals

Ø25 – 32 and Ø40/18

M



T, S



Ø40/22, Ø40/28 and Ø50 – 100

M



T, S



Ø125 – 200

M



T, S



Piston seals

M, T, S for piston Ø25 – 63

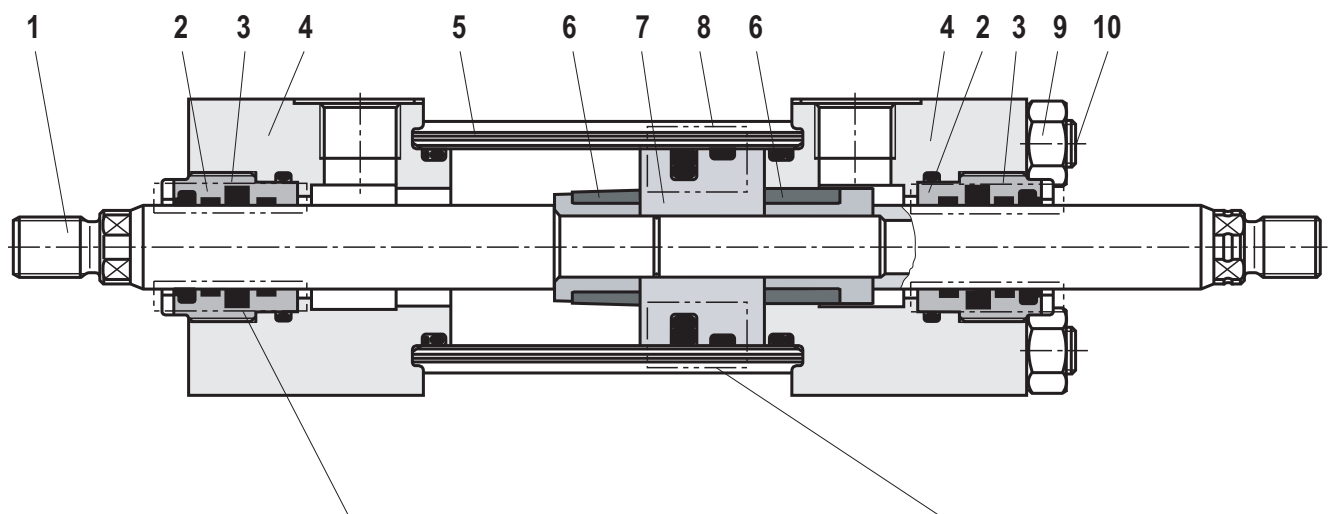


M, T, S for piston Ø80 – 200



- 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



Ø40/22, Ø40/28 and Ø50 – 100



Ø125 – 200

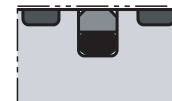


Piston seals

M, T, S for piston Ø25 – 63

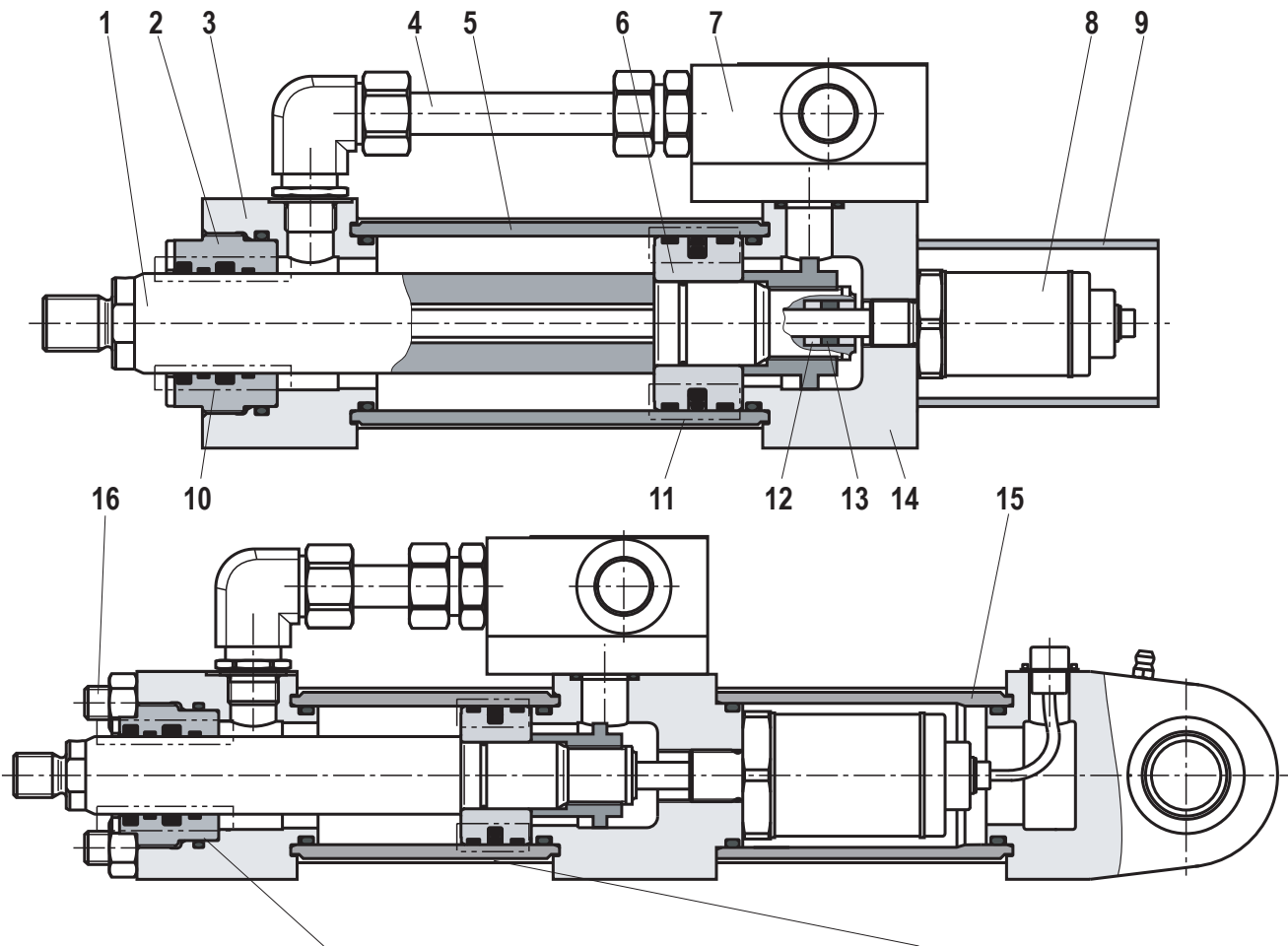


M, T, S for piston Ø80 – 200



- 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 – 100

M



T, S



Ø125 – 200

M



T, S



Piston seals

M, T, S for piston Ø40 – 63



M, T, S for piston Ø80 – 200



- | | | |
|-----------------|-------------------------------|----------------------|
| 1 Piston rod | 7 Subplate | 12 Insulating socket |
| 2 Guide socket | 8 Position measurement system | 13 Solenoid |
| 3 Cylinder head | 9 Protective pipe | 14 Cylinder base |
| 4 Piping | 10 Piston rod seal | 15 Connection pipe |
| 5 Cylinder pipe | 11 Piston seal | 16 Tie rod |
| 6 Piston | | |

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

Tilt head, clevis bracket and trunnion bearing block
see pages 47 to 51

Subplates see page 44

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

Tilt head, clevis bracket and trunnion bearing block
see pages 47 to 51
Subplates see page 44

¹²⁾ Piston rod Ø not standardized