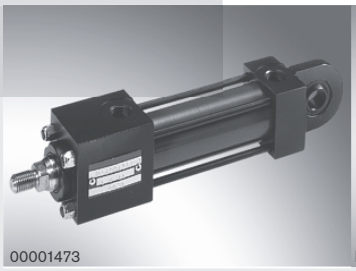
Rexroth
Bosch Group

Hydraulic cylinders
Tie rod design

RE 17039/09.05 1/62
Replaces: 03.05

Series **CDT3...F / CGT3...F**
CST3...F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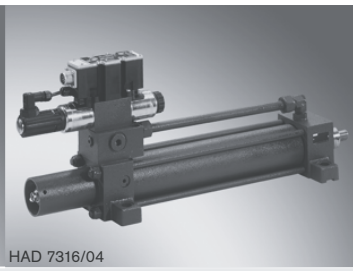
HAD 7316/04

Component series 1X
Nominal pressure 160 bar (16 MPa)

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Features

- Installation dimensions to ISO 6020/2, DIN 24554 and NF/ISO 6020/2
- 13 mounting types
- Piston Ø 25 to 200 mm
- Piston rod Ø 12 to 140 mm
- Stroke lengths up to 2700 mm
- Integrated guide bushing for simple and easy maintenance
- Self-adjusting or adjustable end position cushioning optional
- Patented safety bleeding system for simple and reliable bleeding
- Ease of installation due to freely selectable position of pipe connections on head and cap

Planning software IHC Designer by Rexroth

Online www.boschrexroth.com/Rexroth-IHD

Download www.boschrexroth.com/business_units/bri/de/downloads/ihc

General notes

Maximum pressure:
These series are designed in accordance with standards for a dynamic continuous pressure of 160 bar for all mounting types. Under certain conditions, a higher pressure may be permitted. To confirm this, we require a detailed application description on the basis of a technical data sheet in line with the ISO 9001 quality standard. In the case of a regenerative circuit or a meter-out throttle, pressure intensification must be taken into account. When used in conjunction with a meter-out throttle, the dynamic pressure in the cylinder must not exceed 240 bar.

Minimum pressure:
Depending on the application, a certain minimum pressure is required to ensure correct operation of the cylinder. Under no-load condition, a minimum pressure of 10 bar is recommended for single rod cylinders. In the case of lower pressures or double rod cylinders, please consult us.

Installation of cylinder:
The cylinder may only be installed or the piston rod end screwed into the machine part or into a self-aligning clevis while the cylinder is depressurised.

Piston rod:
The piston rod material used as a standard is hard chromium-plated, hardened steel with a high elasticity value. This ensures high resistance against mechanical impacts and an optimum service life.

The end of the thread is reduced in its diameter and hence protected.

Standards DIN 24554 and NF/ISO 6020/2 provide only one thread size per piston rod diameter. This ensures the full transmission of dynamic forces within the framework of the standard. ISO 6020/2 additionally provides a second, larger thread for the largest piston rod per piston diameter. Male threads differing from DIN 24554 and NF/ISO 6020/2 as well as female threads, extended piston rods or thread ends are available. However, it must be noted that when a thread smaller than that provided in the standard is used, the permissible maximum pressure is restricted and, with larger threads, the limits of mounting options must be taken into account. Spigot end “T” according to NF/ISO 6020/2 goes along with pressure restrictions, see page 41.

Double rod cylinder with through piston rod:
The dimensions specified in the catalogue comply with the proposal in the standard.

This type of design involves much higher friction than the “CD version” with single piston rod.

In the standard version, both piston rod diameters are of the same size. If the cylinder is used in applications, where the piston rods are statically mounted and the cylinder body is traversed, transverse forces that are caused by the cylinder’s own weight and act on the guide bushing must be taken into account.

Seal versions:
As a standard, 3 seal versions are available: “M” (standard), “T“ (low friction) and “V“ (high-temperature applications). For information about the use of seals for various temperature and velocity ranges, see page 3.

The seal installation spaces comply with ISO 5597 for “M“ piston rod seals, ISO 7425-1 for all piston seals and ISO 6195-C for all piston rod wipers.

Seal version “M“ is provided with a hydrolysis-resistant wiper and can be operated at higher velocities, if the pressure is lower than 100 bar and the frequency is less than 3 Hz.

Long-stroke cylinders are preferably fitted with seal version “M“.

Piston rod guide bushing:
From piston diameters of 40 mm on, the piston rod guide bush is made of grey cast iron grade GGG-50 to DIN 1693 and designed as screw-in cartridge. Smaller diameters are of screwed, open design to ensure ease of installation. Guide bushes with seals installed are available for spare parts purposes, see page 43.

Pistons:
Version with integrated damping nose, which is screwed onto the piston rod, glued on and secured mechanically by means of a grub screw.

The seal installation spaces are identical for seal versions “M”, “T” and “V” in accordance with ISO 7425-1, that is, the seals can be replaced without requiring a piston change.

Seals between barrel, head and cap:
The enclosed design of seal installation spaces with centring of the barrel to both sides of the seal ensures optimum sealing, especially for cylinders with long strokes.

Stroke tolerances:
According to ISO 8131, for strokes up to 1250 mm a stroke tolerance of 0/+2 mm is permitted; in the case of longer strokes, please consult us.

A tolerance of ±0.3 mm is optionally possible; smaller tolerances are not useful for tie rod cylinders.

Recommended maximum strokes:
The strokes recommended on page 3 ensure proper operation under all operating conditions at a maximum pressure of 160 bar. The buckling load must be verified in all cases.

At lower pressures or pulling loads only, longer strokes are possible on request.

Minimum strokes:
For mounting type “MT4“ observe the minimum stroke due to the trunnion width, see page 14.

When using end position cushioning, also observe the minimum stroke (see page 3). In the case of stroke lengths shorter than the cushioning length, we recommend the use of a cylinder without end position cushioning.

Stop tube extensions and tie rod supports are possible on request.

Pipe connections:
Cylinders of type CDT3/CGT3 are available with BSP thread and enlarged BSP thread to ISO 8138 and with metric ISO threads to DIN/ISO 6149-1.
Cylinders of series CST3 are available with BSP thread to ISO 8138 or with a subplate.

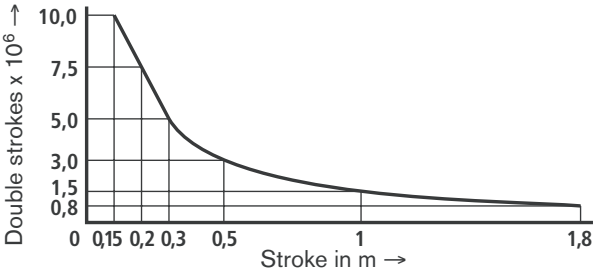
Counterbores to ISO 1179/1.

Primer coating:
As a standard, hydraulic cylinders are primered with one coat (colour: gentian blue, RAL 5010) of max. 80 µm. Other colours on enquiry.

General notes

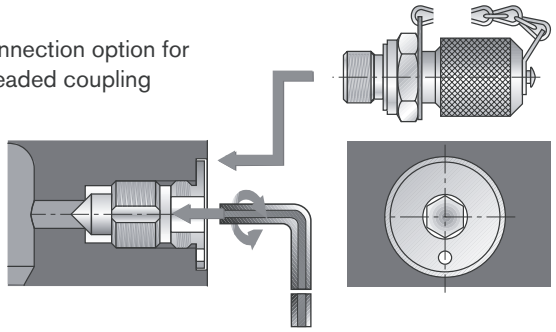
Service life:
Rexroth cylinders comply with reliability recommendations for industrial applications.

≥ 10 000 000 double strokes in no-load continuous operation or 3000 km travel at 70% of the maximum operating pressure, without loading of the piston rod and at a maximum velocity of 0.5 m/s, with a failure rate of less than 5%.



Bleeding:
As a standard, a patented safety bleeding feature is provided against unintentional turning out in the head and the cap (for piston diameters greater than 32 mm), while adhering to the dimensions in accordance with ISO 6020/2. The connection allows the installation of a threaded coupling with check valve for pressur measurements or dirt-free bleeding.

Connection option for threaded coupling

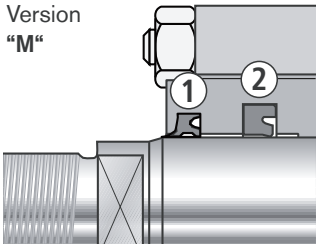


Piston Ø (mm)		25	32	40	50	63	80	100	125	160	200
Min. **recommended**	Without cushioning	–	–	–	–	–	–	–	–	–	–
stroke in mm	With cushioning	31	33	50	52	43	57	56	68	73	106
Max. **recommended**	ME5, MS2, MX1/2/3/5	300	380	480	600	750	800	1000	1250	1280	1400
stroke in mm	ME6, MP1/3/5, MT 1/2/4	200	250	320	400	500	530	660	830	850	930
Max permissible radial force[1] N		25	40	63	100	160	250	400	680	1000	1600
Maximum	Seal version M; 160 bar	0.50				0.40		0.30		0,25	
velocity	Seal version M; 100 bar	0.70				0.60		0.40		0,35	
(m/s)	Seal version T, V; 160 bar	1.00				0.80		0.60		0,50	
Recommended min.	Seal version M	30									
velocity (mm/s)	Seal version T, V	1									
Viscosity	mm^2/s	2.8...380									
Cleanliness class to ISO		Max. permissible degree of contamination of the hydraulic fluid to ISO 4406 (c) class 20/18/15.									

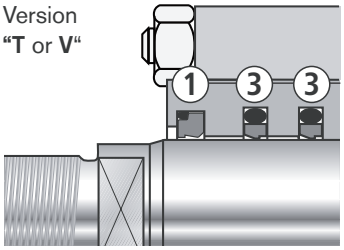
[1] on piston rod guide bushing

Piston rod seal

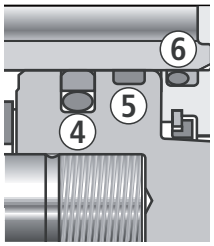
Version **"M"**



Version **"T** or **V"**



Piston seal "M", "T", "V"



Medium	Seal version	Compatibility with media / seal materials			
		① Double scraper	② ③ Piston rod seal	④ ⑤ Piston seal	⑥ O-ring
HL, HLP, HFA	M	AU	EU	EU / NBR / POM	NBR
HL, HLP, HFA, HFC	T	PTFE/NBR	PTFE / NBR	PTFE / NBR	
HFD-R, HFA	V	FKM	PTFE / FKM	PTFE / FKM	FKM

HL, HLP: –20 °C to +80 °C HFA: +5 °C to +55 °C HFC: –20 °C to +60 °C HFD-R: –20 °C to +150 °C

Planning software IHC Designer

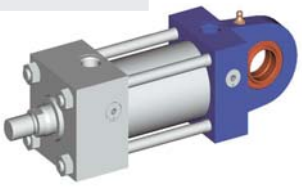
The IHC Designer (Interactive Hydraulics Cylinder Designer) offers a selection and planning aid for hydraulic cylinders. With the help of the IHC Designer, designers of plant and machinery can quickly and easily find the optimum cylinder solution thanks to logic-guided type code queries. The software helps to master designing and engineering tasks faster and more efficiently. After having navigated through the product selection, the user gets the exact technical details of the selected component as well as 2D and 3D-CAD files in the suitable file format for all common CAD systems in a swift and reliable manner.

The user can save costs and hence increase his competitiveness.

Overview of mounting types: Series CDT3...F; CGT3...F

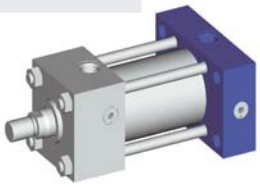
Mounting types DIN / ISO

MP5 see page 10
ISO/DIN/NF

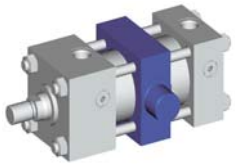


ME5 see page 8
ISO/DIN/NF

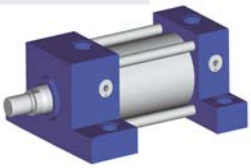
ME6 see page 8
ISO/DIN/NF



MT4 see page 14
ISO/DIN/NF



MS2 see page 12
ISO/DIN/NF

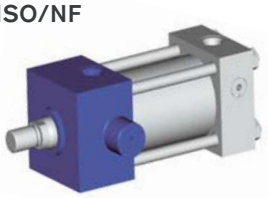


Mounting types ISO

MP1 see page 24
ISO/NF

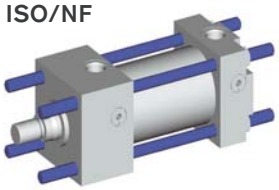
MP3 see page 24
ISO/NF

MT1 see page 16
ISO/NF

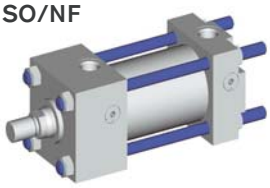


MT2 see page 16
ISO/NF

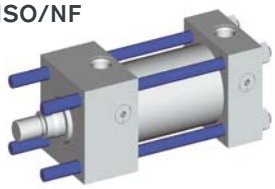
MX1 see page 18
ISO/NF



MX2 see page 20
ISO/NF



MX3 see page 20
ISO/NF



MX5 see page 22
NF

Comparisons ISO / DIN / NF

- ISO 6020/2 comprises 12 mounting types
- DIN 24 554 comprises 5 mounting types
- NF/ISO 6020-2 comprises 12 mounting types
- Mounting types MP5, ME5, ME6, MT4 and MS2 to ISO, DIN and NF E are interchangeable.
- In addition to single rod cylinders CD.., double rod cylinders CG.. were also included in this series.

Ordering code

Preferred cylinder versions are shown on a grey background.

	T3	/	/	/	F	1X	/			H							*

Single rod cylinder = CD
Double rod cylinder[1] = CG

Series: = T3

Mounting types DIN / ISO

Rectangular flange at head	= ME5
Rectangular flange at cap	= ME6
Self-aligning clevis at cap	= MP5
Foot mounting	= MS2
Central trunnion [2]	= MT4

Mounting types ISO

Fork clevis at cap	= MP1
Plain clevis at cap	= MP3
Trunnion at head	= MT1
Trunnion at cap	= MT2
Extended tie rods, both sides	= MX1
Extended tie rods, at cap	= MX2
Extended tie rods, at head	= MX3
Theaded bores at head [6]	= MX5

Piston Ø (AL) 25 to 200 mm

Piston rod Ø (MM) 12 to 140 mm

Stroke length in mm

Design principle
Head and cap connected by tie rod with guide bush = F

Component series = 1X
10 to 19: unchanged installation and connection dimensions

Pipe connection / version

BSP thread (ISO 8138)	= B
Metric ISO thread (DIN / ISO 6149-1)	= R
Enlarged BSP thread (ISO 8138)	= S

Pipe connection / position at head
see page 27

View to piston rod: = 1 / = 2 / = 3 / = 4

*Further details in clear text

Option 2

W =	No option
Y =	Indicate piston rod extension LY in mm in clear text

Option 1

W =	No option
B = [5]	Drain port
A = [4]	Threaded coupling, both sides

Seal version
see page 3

M =	Standard seal system
T =	Reduced friction
V =	High temperature with reduced friction

End position cushioning
see page 33

U =	Without
D =	Both sides, self-adjusting
S =	Head side, self-adjusting
K =	Cap side, self-adjusting
L = [3]	Both sides, self-adjusting “Low Energy“
E = [5]	Both sides, adjustable

Piston rod end
see page 9 to 25

H =	Thread (DIN / ISO) for self-aligning clevis CGKA
D =	Thread (ISO) for self-aligning clevis CGKA
E =	Female thread
F = [8]	With self-aligning clevis CGKA mounted (DIN / ISO)
K = [8]	With self-aligning clevis CGKA mounted (ISO)
T = [7; 9]	With spigot

Piston rod version

H =	Hardened and hard chromium-plated

Pipe connection / position at cap
see page 27

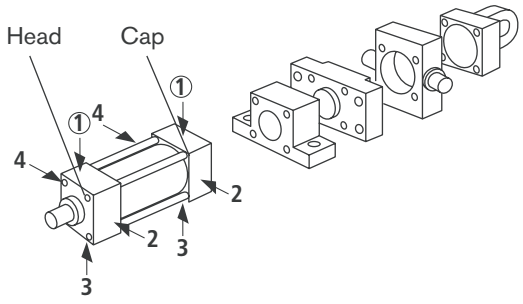
View to piston rod: 1 = / 2 = / 3 = / 4 =

Remarks:

[1] = ME5; MT1; MT4; MS2; MX1; MX3; MX5 only, not standardized
[2] = Indicate XV in mm in clear text
[3] = Piston Ø 25 to 125 mm
[4] = Piston Ø 40 to 200 mm
[5] = For DIN mounting types and pipe connection “B“
[6] = Not standardised to ISO
[7] = See page 41 (piston rod Ø 22 to 140 mm only)
[8] = Not possible with mounting types MX1 and MX3
[9] = Not possible for CG version

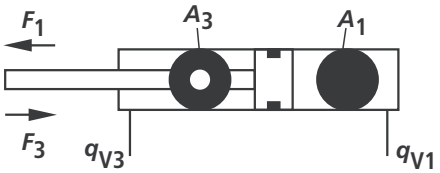
When making your selection, observe the restrictions given on the relevant pages in the catalogue!

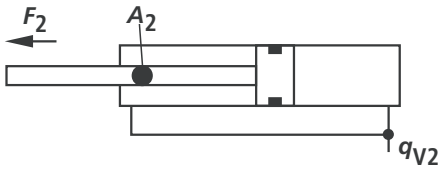
Order examples: CDT3MP5/50/36/300F1X/B11HHDMWW
CGT3ME5/80/56/400F1X/B11HHDMWW



Areas, forces, flow

Piston	Piston rod	Area ratio	Areas			Force at 160 bar [1]			Flow at 0.1 m/s [2]		
			Piston	Rod	Annulus	Pushing	Diff.	Pulling	Out	Diff.	In
AL Ø mm	**MM** Ø mm	φ A_1/A_3	A_1 cm²	A_2 cm²	A_3 cm²	F_1 kN	F_2 kN	F_3 kN	q_{V1} L/min	q_{V2} L/min	q_{V3} L/min
25	**12**	1.30	4.91	1.13	3.78	7.85	1.81	6.04	2.9	0.7	2.3
	18	2.08		2.54	2.37		4.07	3.78		1.5	1.4
32	**14**	1.25	8.04	1.54	6.50	12.87	2.46	10.40	4.8	0.9	3.9
	22	1.90		3.80	4.24		6.08	6.79		2.3	2.5
40	**18**	1.25	12.56	2.54	10.02	20.11	4.07	16.03	7.5	1.5	6.0
	22 [12]	1.43		3.80	8.77		6.08	14.02		2.3	5.3
	28	1.96		6.16	6.40		9.85	10.25		3.7	3.8
50	**22**	1.25	19.63	3.80	15.83	31.42	6.08	25.33	11.8	2.3	9.5
	28 [12]	1.46		6.16	13.48		9.85	21.56		3.7	8.1
	36	2.08		10.18	9.45		16.29	15.13		6.1	5.7
63	**28**	1.25	31.17	6.16	25.01	49.88	9.85	40.02	18.7	3.7	15.0
	36 [12]	1.48		10.18	20.99		16.29	33.59		6.1	12.6
	45	2.04		15.90	15.27		25.45	24.43		9.5	9.2
80	**36**	1.25	50.26	10.18	40.08	80.42	16.29	64.14	30.2	6.1	24.0
	45 [12]	1.46		15.90	34.36		25.45	54.98		9.5	20.6
	56	1.96		24.63	25.63		39.41	41.02		14.8	15.4
100	**45**	1.25	78.54	15.90	62.64	125.66	25.45	100.21	47.1	9.5	37.6
	56 [12]	1.46		24.63	53.91		39.41	86.26		14.8	32.3
	70	1.96		38.48	40.06		61.58	64.09		23.1	24.0
125	**56**	1.25	122.72	24.63	98.09	196.35	39.41	156.94	73.6	14.8	58.9
	70 [12]	1.46		38.48	84.23		61.58	134.77		23.1	50.5
	90	2.08		63.62	59.10		101.79	94.56		38.2	35.5
160	**70**	1.25	201.06	38.48	162.58	321.70	61.58	260.12	120.6	23.1	97.5
	110	1.90		95.03	106.03		152.05	169.64		57.0	63.6
200	**90**	1.25	314.16	63.62	250.54	502.65	101.79	400.86	188.5	38.2	150.3
	140	1.96		153.94	160.22		246.30	256.35		92.4	96.1





Remarks

[1] Theoretical force (without consideration of efficiency)

[2] Stroke velocity

[12] Piston rod Ø not standardised

Cylinder weights (in kg)

CDT3

Ø AL	Ø MM	MX1, ME5, MS2	ME6, MP3, MP1	MP5	MT4	MX2, MX3, MX5	MT1, MT2	Stroke 100 mm
25	12	1.1	1.1	1.0	1.3	1.0	1.1	0.4
	18	1.2	1.2	1.1	1.4	1.1	1.2	0.6
32	14	1.5	1.6	1.4	1.8	1.4	1.5	0.5
	22	1.6	1.7	1.5	1.9	1.5	1.6	0.6
40	18	3.4	3.4	3.2	4.1	3.1	3.2	0.8
	22 [12)]	3.4	3.4	3.2	4.1	3.1	3.2	0.9
	28	3.5	3.5	3.3	4.2	3.2	3.3	1.1
50	22	5.3	5.3	4.9	6.6	4.8	4.9	1.1
	28 [12)]	5.4	5.4	5	6.7	4.9	5	1.3
	36	5.5	5.5	5.1	6.8	5.0	5.1	1.6
63	28	7.7	7.7	7.3	9.2	7.0	7.3	1.4
	36 [12)]	7.9	7.8	7.4	9.3	7.1	7.4	1.7
	45	8.2	8.0	7.6	9.5	7.3	7.6	2.2
80	36	14	14	14	18	12	15	2.2
	45 [12)]	14	14	14	17	13	14	2.6
	56	15	15	15	19	14	15	3.3
100	45	20	20	20	24	19	22	3.3
	56 [12)]	20	20	19	24	18	22	4.1
	70	21	21	21	25	19	23	5.1
125	56	38	39	38	46	35	43	6.3
	70 [12)]	38	39	38	46	35	43	7.3
	90	39	40	39	48	37	44	9.3
160	70	62	67	63	78	59	64	8.7
	110	64	69	65	80	61	67	13.2
200	90	112	120	115	147	107	114	13.4
	140	115	123	117	149	109	117	20.5

For self-aligning clevis, fork-type mounting block and trunnion mounting block, see page 28 and 29

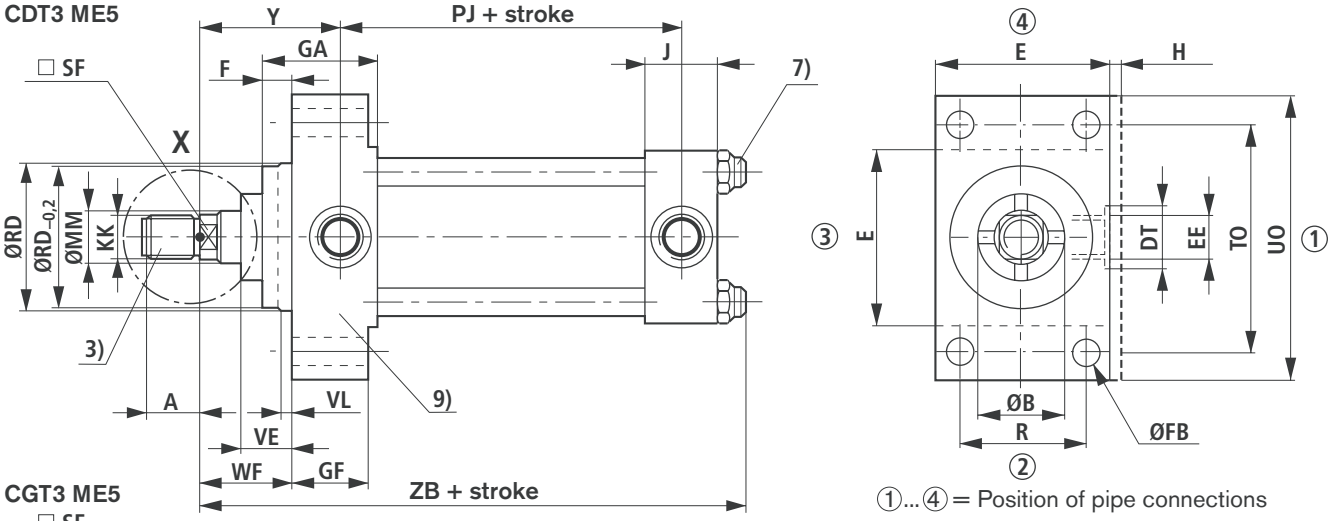
CGT3

Ø AL	Ø MM	MX1, ME5, MS2	MT4	MX3, MX5	MT1	Stroke 100 mm
25	12	1.2	1.4	1.1	1.2	0.5
	18	1.4	1.6	1.3	1.4	0.8
32	14	1.6	1.9	1.5	1.6	0.6
	22	1.9	2.2	1.8	1.9	0.9
40	18	3.6	4.3	3.3	3.4	1.0
	22 [12)]	3.8	4.5	3.5	3.6	1.2
	28	4.0	4.7	3.7	3.8	1.6
50	22	5.7	7.0	5.2	5.3	1.4
	28 [12)]	6.0	7.3	5.5	5.6	1.8
	36	6.4	7.7	5.9	6.0	2.4
63	28	8.3	9.8	7.6	7.9	1.9
	36 [12)]	8.8	10.3	8.1	8.4	2.5
	45	9.7	11	8.8	9.1	3.4
80	36	15	19	13	15	3.0
	45 [12)]	16	20	14	16	3.8
	56	17	21	16	17	5.2
100	45	22	26	20	24	4.5
	56 [12)]	23	27	21	25	6.1
	70	25	29	23	27	8.1
125	56	41	49	39	46	8.2
	70 [12)]	43	51	41	48	10.3
	90	46	55	44	51	14
160	70	68	83	65	69	12
	110	75	91	72	79	21
200	90	124	158	118	126	18
	140	137	171	131	138	33

[12)] Piston rod Ø not standardised

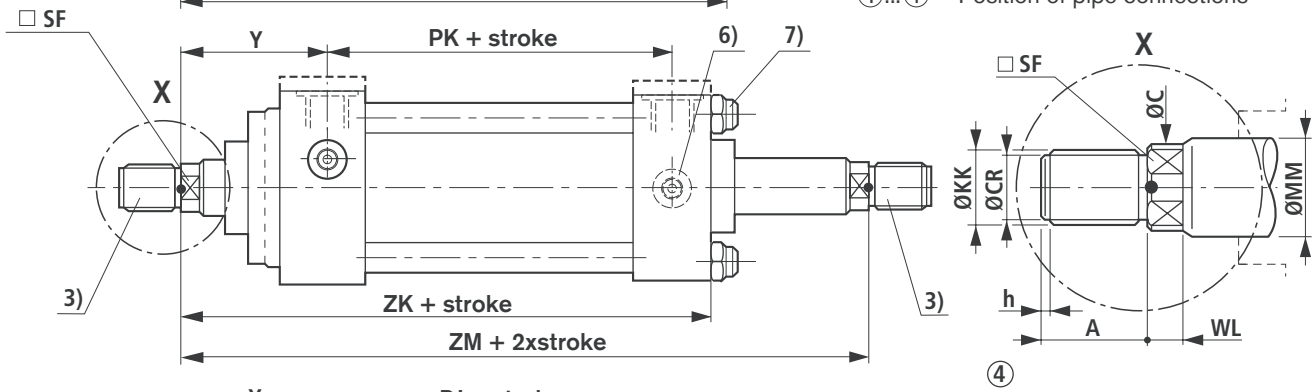
Mounting types ME5, ME6 (nominal dimensions in mm)

CDT3 ME5

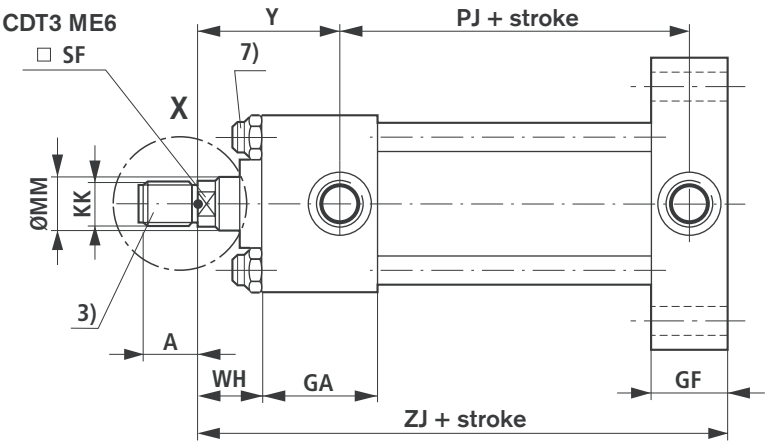


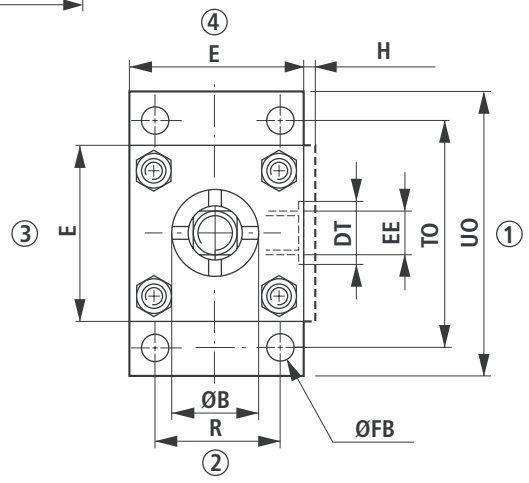
①...④ = Position of pipe connections

CGT3 ME5



CDT3 ME6





AL Ø	F max	FB H13	GF 9)	PK 10) ± 1.25	PK 11) ± 1.25	R JS13	TO JS13	UO max	VE max	VL min	ZB max	ZJ ± 1	ZK ± 1	ZM ± 2
25	10	5.5	25	54	65.5	27	51	65	16	3	121	114	139	154
32	10	6.6	25	58	70.5	33	58	70	22	3	137	128	153	178
40	10	11	38	71	75	41	87	110	22	3	166	153	170	195
50	16	14	38	73	77	52	105	130	25	4	176	159	182	207
63	16	14	38	81	82.5	65	117	145	29	4	185	168	191	223
80	20	18	45	92	92	83	149	180	29	4	212	190	215	246
100	22	18	45	101	101	97	162	200	32	5	225	203	230	265
125	22	22	58	117	117	126	208	250	32	5	260	232	254	289
160	25	26	58	130	130	155	253	300	32	5	279	245	270	302
200	25	33	76	160	160	190	300	360	32	5	336	299	324	356

Dimensions ME5, ME6 (nominal dimensions in mm)

		DIN / ISO [1]							ISO [2]								
AL Ø	MM Ø	KK [1]	A [1] max	C Ø	SF	WL	h	CR	KK [2]	A [2] max	C Ø	SF	WL	h	CR	B f9	RE f8
25	12	M10x1.25	14	11	10	5	1	7.5	–	–						24	38
	18	M10x1.25	14	15	13	5	1	8	M14x1.5	18	15	13	5	2	11	30	38
32	14	M12x1.25	16	13	11	5	2.5	9.5	–	–						26	42
	22	M12x1.25	16	19	17	5	3	10	M16x1.5	22	19	17	5	3	13	34	42
40	18	M14x1.5	18	15	13	5	2	11	–	–						30	62
	22 [12]								M16x1.5	22	19	17	5	3	13	34	62
	28	M14x1.5	18	25	22	7	2	11	M20x1.5	28	25	22	7	3	17	42	62
50	22	M16x1.5	22	19	17	5	3	13	–	–						34	74
	28 [12]								M20x1.5	28	25	22	7	3	17	42	74
	36	M16x1.5	22	33	30	8	3	13	M27x2	36	33	30	8	3	23.5	50	74
63	28	M20x1.5	28	25	22	7	3	17	–	–						42	75
	36 [12]								M27x2	36	33	30	8	3	23.5	50	88
	45	M20x1.5	28	42	36	10	3	17	M33x2	45	42	36	10	4	29.5	60	88
80	36	M27x2	36	33	30	8	3	23.5	–	–						50	82
	45 [12]								M33x2	45	42	36	10	4	29.5	60	105
	56	M27x2	36	53	46	10	3	24	M42x2	56	53	46	10	5	38.5	72	105
100	45	M33x2	45	42	36	10	4	29.5	–	–						60	92
	56 [12]								M42x2	56	53	46	10	5	38.5	72	125
	70	M33x2	45	67	60	15	4	30	M48x2	63	67	60	15	3	44.5	88	125
125	56	M42x2	56	53	46	10	5	38.5	–	–						72	105
	70 [12]								M48x2	63	67	60	15	3	44.5	88	150
	90	M42x2	56	86	75	15	5	39	M64x3	85	86	75	15	4.5	59	108	150
160	70	M48x2	63	67	60	15	3	44.5	–	–						88	125
	110	M48x2	63	106	92	18	3	45	M80x3	95	106	92	18	4.5	75	133	170
200	90	M64x3	85	86	75	15	4.5	59	–	–						108	150
	140	M64x3	85	136	125	18	5	59	M100x3	112	136	125	18	4.5	95	163	210

AL Ø	E	EE	DT	EE	DT	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	46.5	5	23.5	56	68.5	35	25	60	47.5
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52	–	33	73	77	35	25	62	58
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.8	–	33.8	74	78	41	25	67	63
63	90 ± 1.5	G 1/2	34	M22x1.5	29	55.8	–	33.8	80	81.5	48	32	71	69.5
80	115 ± 1.5	G 3/4	42	M27x2	34	65	–	39	93	93	51	31	77	77
100	130 ± 2	G 3/4	42	M27x2	34	67	–	40	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

[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 41

[5] Dimension “H“ always at the position of the pipe connection

[6] For the position of pipe connections and bleed point, see page 27

[7] For tightening torque, see page 43

[9] Flange thickness to DIN 24554

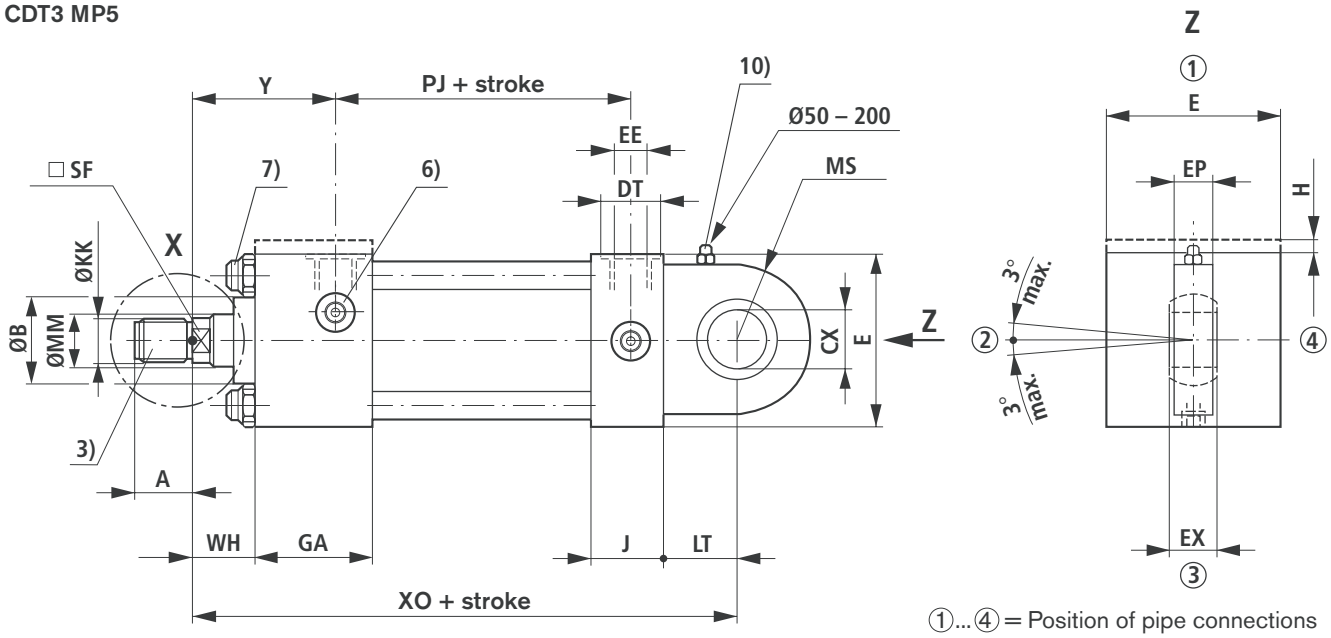
[10] ME5: for pipe connection position “1“ and “3“ at head

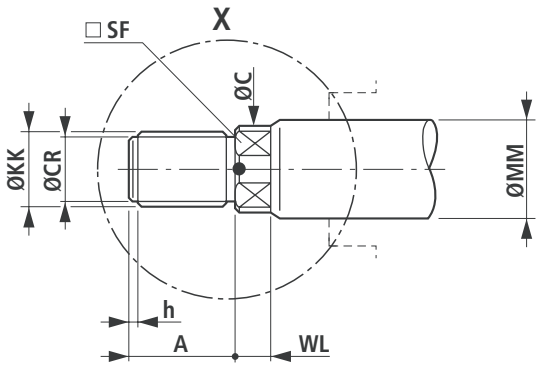
[11] ME5: for pipe connection position “2“ and “4“ at head

[12] Piston rod Ø not standardised

Mounting type MP5 (nominal dimensions in mm)

CDT3 MP5





AL Ø	CX	EP h15	EX	LT min	XO ± 1.25	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 (nominal dimensions in mm)

		DIN / ISO [1]							ISO [2]							
AL Ø	MM Ø	KK [1]	A [1] max	C Ø	SF	WL	h	CR	KK [2]	A [2] max	C Ø	SF	WL	h	CR	B f9
25	12	M10x1.25	14	11	10	5	1	7.5	–	–						24
	18	M10x1.25	14	15	13	5	1	8	M14x1.5	18	15	13	5	2	11	30
32	14	M12x1.25	16	13	11	5	2.5	9.5	–	–						26
	22	M12x1.25	16	19	17	5	3	10	M16x1.5	22	19	17	5	3	13	34
40	18	M14x1.5	18	15	13	5	2	11	–	–						30
	22 [12]								M16x1.5	22	19	17	5	3	13	34
	28	M14x1.5	18	25	22	7	2	11	M20x1.5	28	25	22	7	3	17	42
50	22	M16x1.5	22	19	17	5	3	13	–	–						34
	28 [12]								M20x1.5	28	25	22	7	3	17	42
	36	M16x1.5	22	33	30	8	3	13	M27x2	36	33	30	8	3	23.5	50
63	28	M20x1.5	28	25	22	7	3	17	–	–						42
	36 [12]								M27x2	36	33	30	8	3	23.5	50
	45	M20x1.5	28	42	36	10	3	17	M33x2	45	42	36	10	4	29.5	60
80	36	M27x2	36	33	30	8	3	23.5	–	–						50
	45 [12]								M33x2	45	42	36	10	4	29.5	60
	56	M27x2	36	53	46	10	3	24	M42x2	56	53	46	10	5	38.5	72
100	45	M33x2	45	42	36	10	4	29.5	–	–						60
	56 [12]								M42x2	56	53	46	10	5	38.5	72
	70	M33x2	45	67	60	15	4	30	M48x2	63	67	60	15	3	44.5	88
125	56	M42x2	56	53	46	10	5	38.5	–	–						72
	70 [12]								M48x2	63	67	60	15	3	44.5	88
	90	M42x2	56	86	75	15	5	39	M64x3	85	86	75	15	4.5	59	108
160	70	M48x2	63	67	60	15	3	44.5	–	–						88
	110	M48x2	63	106	92	18	3	45	M80x3	95	106	92	18	4.5	75	133
200	90	M64x3	85	86	75	15	4.5	59	–	–						108
	140	M64x3	85	136	125	18	5	59	M100x3	112	136	125	18	4.5	95	163

AL Ø	E	EE	DT	EE	DT	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	46.5	5	23.5	56	25	60
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52	–	33	73	25	62
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.8	–	33.8	74	25	67
63	90 ± 1.5	G 1/2	34	M22x1.5	29	55.8	–	33.8	80	32	71
80	115 ± 1.5	G 3/4	42	M27x2	34	65	–	39	93	31	77
100	130 ± 2	G 3/4	42	M27x2	34	67	–	40	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

[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 41

[5] Dimension “H“ always at the position of the pipe connection

[6] For the position of pipe connections and bleed point, see page 27

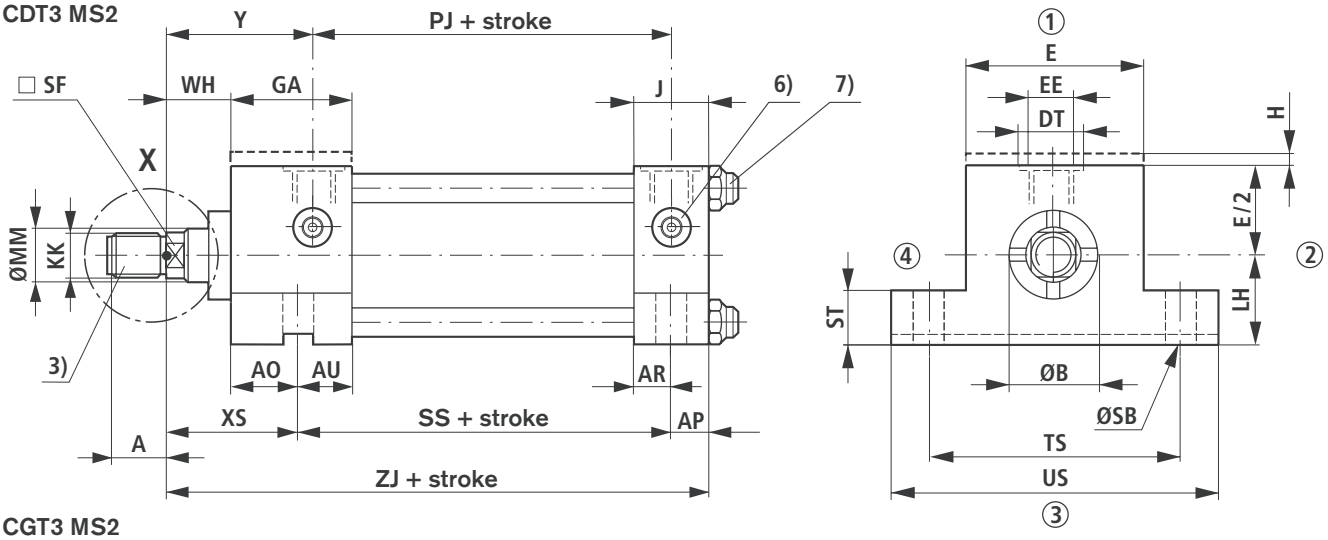
[7] For tightening torque, see page 43

[10] Grease nipple M6 DIN 71412 from piston Ø 40 mm

[12] Piston rod Ø not standardised

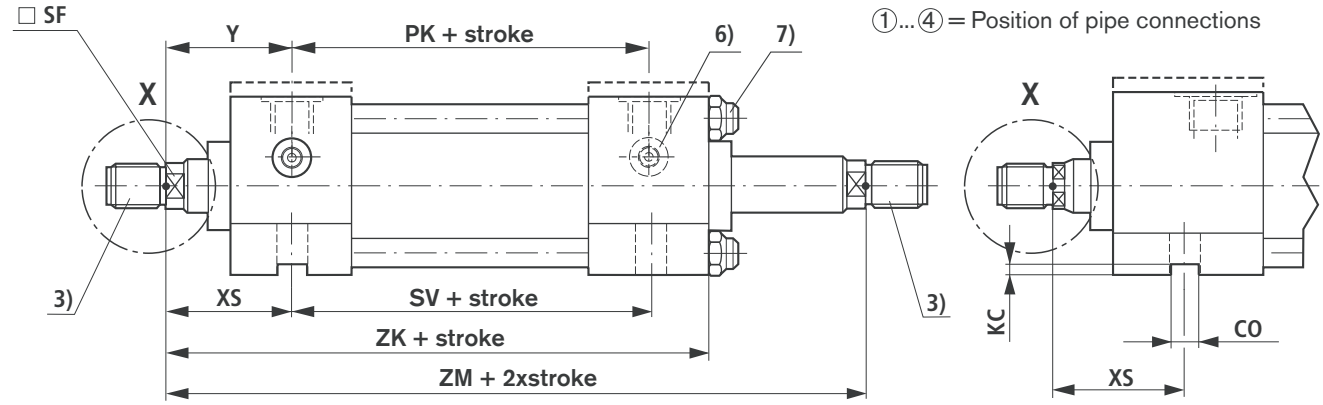
Mounting type MS2 (nominal dimensions in mm)

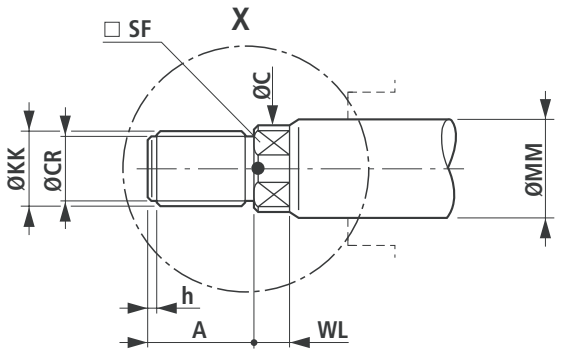
CDT3 MS2



①...④ = Position of pipe connections

CGT3 MS2





AL Ø	CO H8	KC	LH h10	PK ± 1.25	SB H13	SS ± 1.25	ST	SV ± 1	TS JS13	US + 2	XS ± 2	ZJ ± 1	ZK ± 1	ZM ± 2	AO	AU
25	12	4	19	54	6.6	73	8.5	88	54	72	33	114	139	154	18	28.5
32	12	4	22	58	9	73	12.5	88	63	84	45	128	153	178	20	26.5
40	12	4	31	71	11	98	12.5	105	83	103	45	153	170	195	20	32
50	12	4	37	73	14	92	19	99	102	127	54	159	182	207	29	28.8
63	16	4	44	81	18	86	26	93	124	161	65	168	191	223	33	22.8
80	16	5	57	92	18	105	26	110	149	186	68	190	215	246	37	28
100	16	5	63	101	26	102	32	107	172	216	79	203	230	265	44	23
125	20	5	82	117	26	131	32	131	210	254	79	232	254	289	44	29.5
160	–	–	101	130	33	130	38	130	260	318	86	245	270	302	54	26.5
200	–	–	122	160	39	172	44	172	311	381	92	299	324	356	60	41

Dimensions MS2 (nominal dimensions in mm)

		DIN / ISO [1]							ISO [2]							
AL Ø	MM Ø	KK [1]	A [1] max	C Ø	SF	WL	h	CR	KK [2]	A [2] max	C Ø	SF	WL	h	CR	B f9
25	12	M10x1.25	14	11	10	5	1	7.5	–	–						24
	18	M10x1.25	14	15	13	5	1	8	M14x1.5	18	15	13	5	2	11	30
32	14	M12x1.25	16	13	11	5	2.5	9.5	–	–						26
	22	M12x1.25	16	19	17	5	3	10	M16x1.5	22	19	17	5	3	13	34
40	18	M14x1.5	18	15	13	5	2	11	–	–						30
	22 [12]								M16x1.5	22	19	17	5	3	13	34
	28	M14x1.5	18	25	22	7	2	11	M20x1.5	28	25	22	7	3	17	42
50	22	M16x1.5	22	19	17	5	3	13	–	–						34
	28 [12]								M20x1.5	28	25	22	7	3	17	42
	36	M16x1.5	22	33	30	8	3	13	M27x2	36	33	30	8	3	23.5	50
63	28	M20x1.5	28	25	22	7	3	17	–	–						42
	36 [12]								M27x2	36	33	30	8	3	23.5	50
	45	M20x1.5	28	42	36	10	3	17	M33x2	45	42	36	10	4	29.5	60
80	36	M27x2	36	33	30	8	3	23.5	–	–						50
	45 [12]								M33x2	45	42	36	10	4	29.5	60
	56	M27x2	36	53	46	10	3	24	M42x2	56	53	46	10	5	38.5	72
100	45	M33x2	45	42	36	10	4	29.5	–	–						60
	56 [12]								M42x2	56	53	46	10	5	38.5	72
	70	M33x2	45	67	60	15	4	30	M48x2	63	67	60	15	3	44.5	88
125	56	M42x2	56	53	46	10	5	38.5	–	–						72
	70 [12]								M48x2	63	67	60	15	3	44.5	88
	90	M42x2	56	86	75	15	5	39	M64x3	85	86	75	15	4.5	59	108
160	70	M48x2	63	67	60	15	3	44.5	–	–						88
	110	M48x2	63	106	92	18	3	45	M80x3	95	106	92	18	4.5	75	133
200	90	M64x3	85	86	75	15	4.5	59	–	–						108
	140	M64x3	85	136	125	18	5	59	M100x3	112	136	125	18	4.5	95	163

AL Ø	E	EE	DT	EE	DT	GA	H [5]	J	PJ ± 1.25	WH ± 2	Y ± 2	AP	AR
25	40 ± 1.5	G 1/4	25	M14x1.5	21	46.5	5	22.5	53	15	50	8	14.5
32	45± 1.5	G 1/4	25	M14x1.5	21	46.5	5	23.5	56	25	60	10	13.5
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52	–	33	73	25	62	10	23
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.8	–	33.8	74	25	67	13	20.8
63	90 ± 1.5	G 1/2	34	M22x1.5	29	55.8	–	33.8	80	32	71	17	16.8
80	115 ± 1.5	G 3/4	42	M27x2	34	65	–	39	93	31	77	17	22
100	130 ± 2	G 3/4	42	M27x2	34	67	–	40	101	35	82	22	18
125	165 ± 2	G 1	47	M33x2	43	73.5	–	51.5	117	35	86	22	29.5
160	205 ± 2	G 1	47	M33x2	43	80.5	–	55.5	130	32	86	29	26.5
200	245 ± 2	G 1 1/4	58	M42x2	52	101	–	76	165	32	98	35	41

[1] Thread for pston rod ends “F“ and “H“

[2] Thread for pston rod ends “D“ and “K“

[3] For piston rod ends “E“ and “T“, see page 41

[5] Dimension “H“ always at the position of the pipe connection

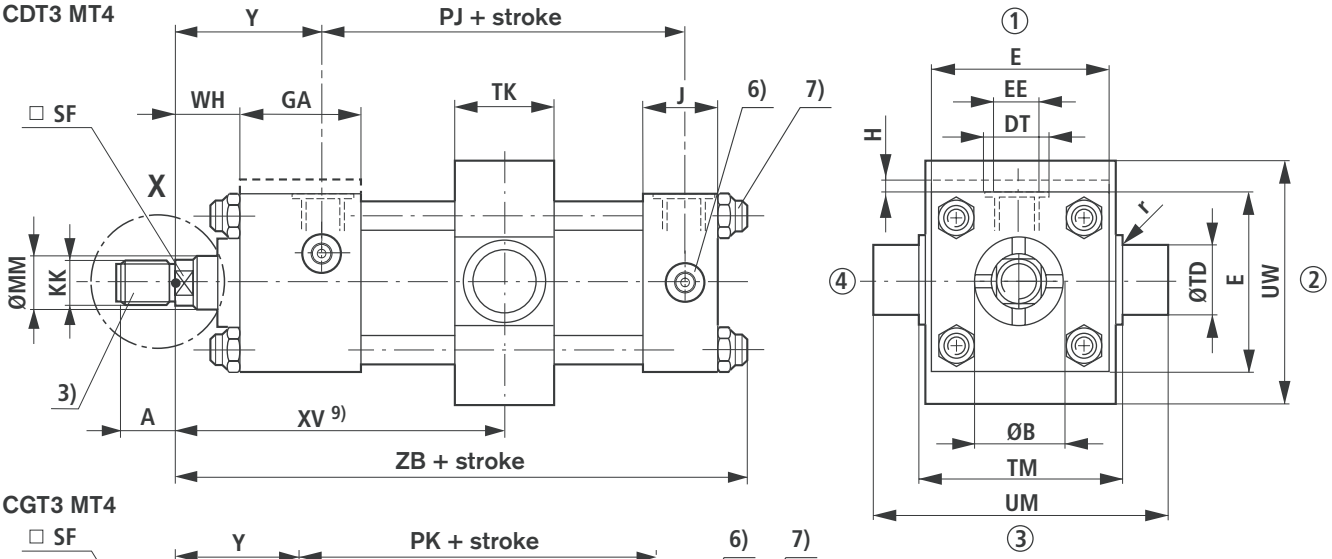
[6] For the position of pipe connections and bleed point, see page 27

[7] For tightening torque, see page 43

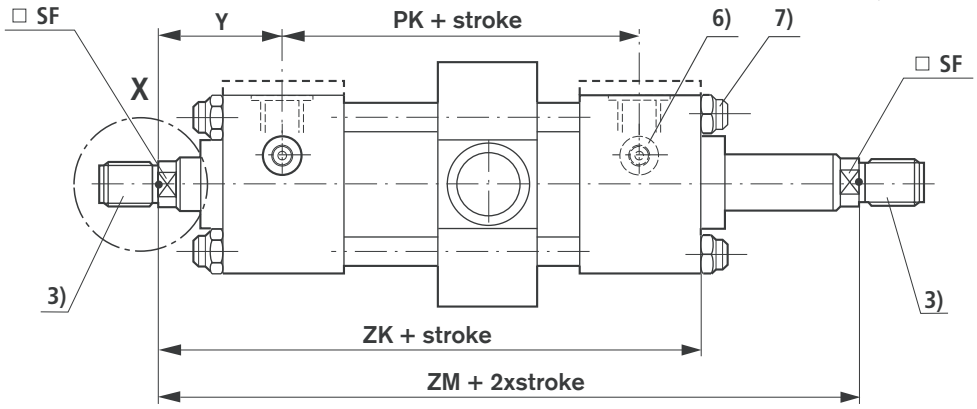
[12] Piston rod Ø not standardised

Mounting type MT4 (nominal dimensions in mm)

CDT3 MT4



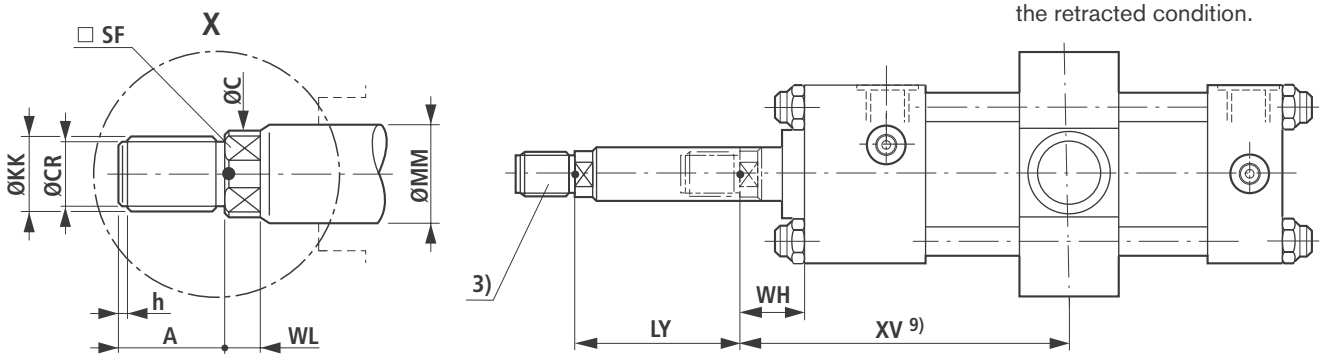
CGT3 MT4



①...④ = Position of pipe connection

The trunnions should be lubricated at regular intervals.

Dimensions for cylinder with piston rod extension “LY“ in the retracted condition.



AL Ø	PK ± 1.25	r	TD f8	TK max	TM h14	UM h15	UW max	Stroke min	XV min	XV max	ZB max	ZK ± 1	ZM ± 2
25	54	0.8	12	20	48	68	63	0	74	79 + stroke	121	139	154
32	58	0.8	16	25	55	79	75	10	93	83 + stroke	137	153	178
40	71	1.2	20	30	76	108	92	15	106	91 + stroke	166	170	195
50	73	1.6	25	40	89	129	112	4	106	102 + stroke	176	182	207
63	81	1.6	32	50	100	150	126	10	116	106 + stroke	185	191	223
80	92	2.4	40	60	127	191	160	11	129	118 + stroke	212	215	246
100	101	2.4	50	70	140	220	180	17	141	124 + stroke	225	230	265
125	117	3.2	63	90	178	278	215	25	157	132 + stroke	260	254	289
160	130	3.2	80	110	215	341	260	40	171	131 + stroke	279	270	302
200	160	3.2	100	130	279	439	365	48	202	154 + stroke	336	324	356

Dimensions MT4 (nominal dimensions in mm)

		DIN / ISO [1]							ISO [2]							
AL Ø	MM Ø	KK [1]	A [1] max	C Ø	SF	WL	h	CR	KK [2]	A [2] max	C Ø	SF	WL	h	CR	B f9
25	12	M10x1.25	14	11	10	5	1	7.5	–	–						24
	18	M10x1.25	14	15	13	5	1	8	M14x1.5	18	15	13	5	2	11	30
32	14	M12x1.25	16	13	11	5	2.5	9.5	–	–						26
	22	M12x1.25	16	19	17	5	3	10	M16x1.5	22	19	17	5	3	13	34
40	18	M14x1.5	18	15	13	5	2	11	–	–						30
	22 [12]								M16x1.5	22	19	17	5	3	13	34
	28	M14x1.5	18	25	22	7	2	11	M20x1.5	28	25	22	7	3	17	42
50	22	M16x1.5	22	19	17	5	3	13	–	–						34
	28 [12]								M20x1.5	28	25	22	7	3	17	42
	36	M16x1.5	22	33	30	8	3	13	M27x2	36	33	30	8	3	23.5	50
63	28	M20x1.5	28	25	22	7	3	17	–	–						42
	36 [12]								M27x2	36	33	30	8	3	23.5	50
	45	M20x1.5	28	42	36	10	3	17	M33x2	45	42	36	10	4	29.5	60
80	36	M27x2	36	33	30	8	3	23.5	–	–						50
	45 [12]								M33x2	45	42	36	10	4	29.5	60
	56	M27x2	36	53	46	10	3	24	M42x2	56	53	46	10	5	38.5	72
100	45	M33x2	45	42	36	10	4	29.5	–	–						60
	56 [12]								M42x2	56	53	46	10	5	38.5	72
	70	M33x2	45	67	60	15	4	30	M48x2	63	67	60	15	3	44.5	88
125	56	M42x2	56	53	46	10	5	38.5	–	–						72
	70 [12]								M48x2	63	67	60	15	3	44.5	88
	90	M42x2	56	86	75	15	5	39	M64x3	85	86	75	15	4.5	59	108
160	70	M48x2	63	67	60	15	3	44.5	–	–						88
	110	M48x2	63	106	92	18	3	45	M80x3	95	106	92	18	4.5	75	133
200	90	M64x3	85	86	75	15	4.5	59	–	–						108
	140	M64x3	85	136	125	18	5	59	M100x3	112	136	125	18	4.5	95	163

AL Ø	E	EE	DT	EE	DT	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	46.5	5	23.5	56	25	60
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52	–	33	73	25	62
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.8	–	33.8	74	25	67
63	90 ± 1.5	G 1/2	34	M22x1.5	29	55.8	–	33.8	80	32	71
80	115 ± 1.5	G 3/4	42	M27x2	34	65	–	39	93	31	77
100	130 ± 2	G 3/4	42	M27x2	34	67	–	40	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

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 41

5) Dimension “H“ always at the position of the pipe connection

6) For the position of pipe connections and bleed point, see page 27

7) For tightening torque, see page 43

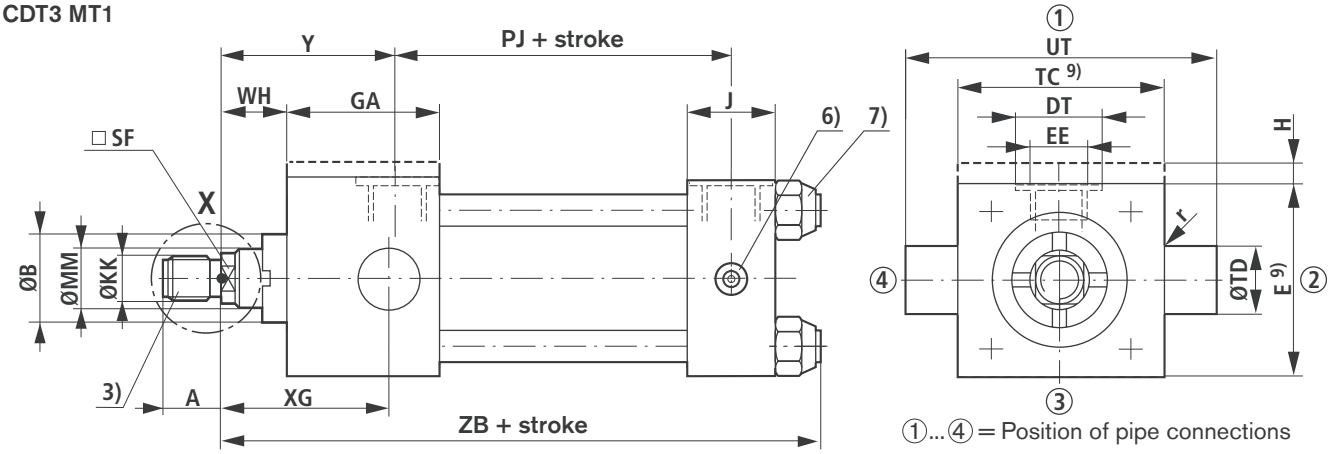
9) Always indicate dimension “XV“ in mm in clear text

11) Piston Ø 25 and 32 mm: Observe dimension “H“ with pipe connection positions “2” and “4“

12) Piston rod Ø not standardised

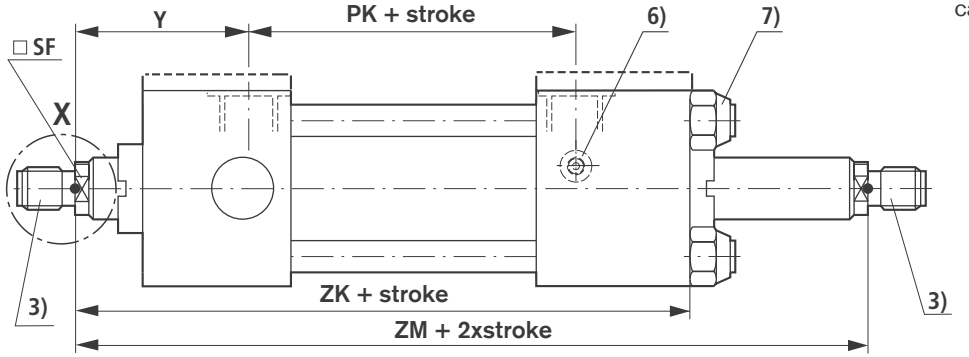
Mounting types MT1, MT2 (nominal dimensions in mm)

CDT3 MT1

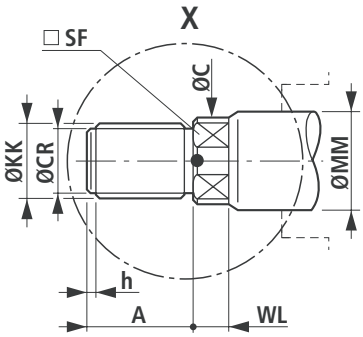


①...④ = Position of pipe connections

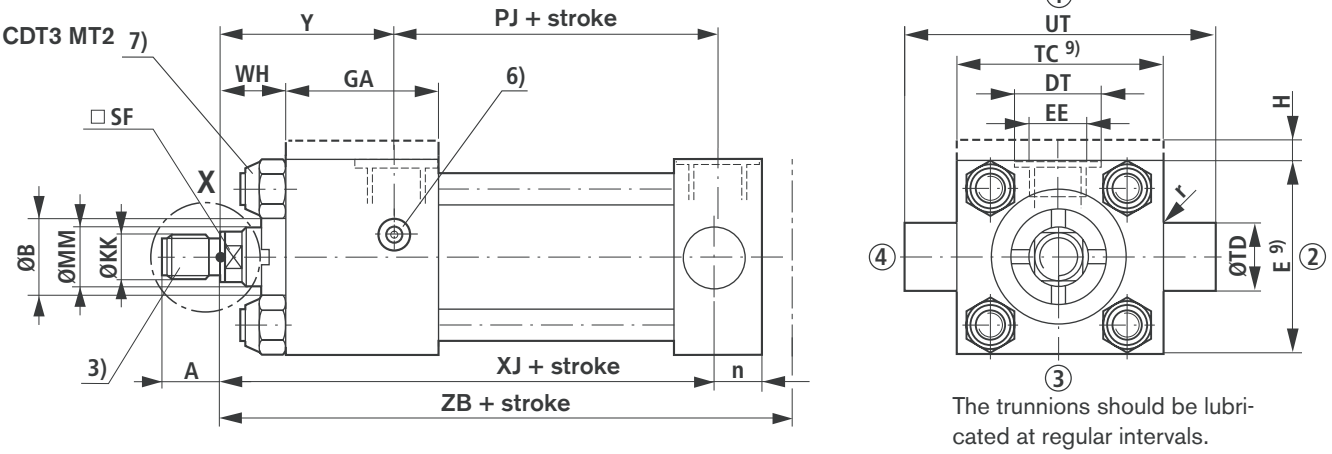
CGT3 MT1



The trunnions should be lubricated at regular intervals.



CDT3 MT2



The trunnions should be lubricated at regular intervals.

AL Ø	n	PK ± 1.25	r	TC h14	TD f8	UT h15	XG ± 2	XJ ± 1.25	ZB max	ZK ± 1	ZM ± 2
25	13	54	1	38	12	58	44	101	121	139	154
32	13	58	1	44	16	68	54	115	137	153	178
40	19	71	1.6	63	20	95	57	134	166	170	195
50	19	73	1.6	76	25	116	64	140	176	182	207
63	19	81	2	89	32	139	70	149	185	191	223
80	22	92	2.4	114	40	178	76	168	212	215	246
100	38	101	2.4	127	50	207	71	187	225	230	265
125	51	117	3.2	165	63	265	75	209	260	254	289
160	49	130	3.2	203	80	329	75	230	279	270	302
200	53	160	4.5	241	100	401	85	276	336	324	356

Dimensions MT1, MT2 (nominal dimensions in mm)

		DIN / ISO [1]							ISO [2]							
AL Ø	MM Ø	KK [1]	A [1] max	C Ø	SF	WL	h	CR	KK [2]	A [2] max	C Ø	SF	WL	h	CR	B f9
25	12	M10x1.25	14	11	10	5	1	7.5	–	–						24
	18	M10x1.25	14	15	13	5	1	8	M14x1.5	18	15	13	5	2	11	30
32	14	M12x1.25	16	13	11	5	2.5	9.5	–	–						26
	22	M12x1.25	16	19	17	5	3	10	M16x1.5	22	19	17	5	3	13	34
40	18	M14x1.5	18	15	13	5	2	11	–	–						30
	22 [12]								M16x1.5	22	19	17	5	3	13	34
	28	M14x1.5	18	25	22	7	2	11	M20x1.5	28	25	22	7	3	17	42
50	22	M16x1.5	22	19	17	5	3	13	–	–						34
	28 [12]								M20x1.5	28	25	22	7	3	17	42
	36	M16x1.5	22	33	30	8	3	13	M27x2	36	33	30	8	3	23.5	50
63	28	M20x1.5	28	25	22	7	3	17	–	–						42
	36 [12]								M27x2	36	33	30	8	3	23.5	50
	45	M20x1.5	28	42	36	10	3	17	M33x2	45	42	36	10	4	29.5	60
80	36	M27x2	36	33	30	8	3	23.5	–	–						50
	45 [12]								M33x2	45	42	36	10	4	29.5	60
	56	M27x2	36	53	46	10	3	24	M42x2	56	53	46	10	5	38.5	72
100	45	M33x2	45	42	36	10	4	29.5	–	–						60
	56 [12]								M42x2	56	53	46	10	5	38.5	72
	70	M33x2	45	67	60	15	4	30	M48x2	63	67	60	15	3	44.5	88
125	56	M42x2	56	53	46	10	5	38.5	–	–						72
	70 [12]								M48x2	63	67	60	15	3	44.5	88
	90	M42x2	56	86	75	15	5	39	M64x3	85	86	75	15	4.5	59	108
160	70	M48x2	63	67	60	15	3	44.5	–	–						88
	110	M48x2	63	106	92	18	3	45	M80x3	95	106	92	18	4.5	75	133
200	90	M64x3	85	86	75	15	4.5	59	–	–						108
	140	M64x3	85	136	125	18	5	59	M100x3	112	136	125	18	4.5	95	163

AL Ø	E	EE	DT	EE	DT	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	46.5	5	23.5	56	25	60
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52	–	33	73	25	62
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.8	–	33.8	74	25	67
63	90 ± 1.5	G 1/2	34	M22x1.5	29	55.8	–	33.8	80	32	71
80	115 ± 1.5	G 3/4	42	M27x2	34	65	–	39	93	31	77
100	130 ± 2	G 3/4	42	M27x2	34	67	–	40	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

[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 41

[5] Dimension “H“ always at the position of the pipe connection

[6] For the position of pipe connections and bleed point, see page 27

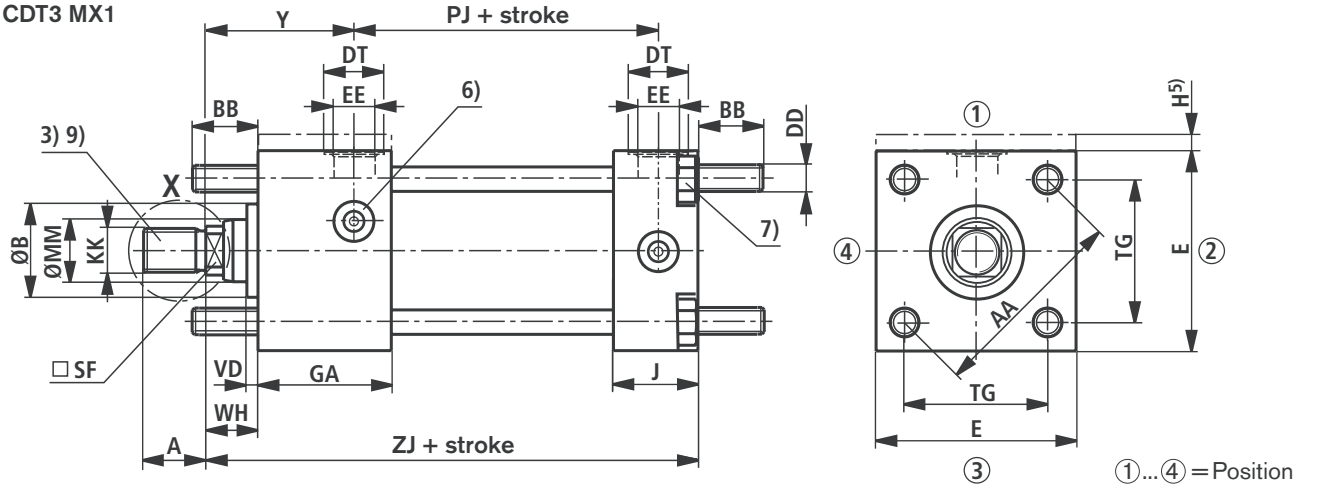
[7] For tightening torque, see page 43

[9] Observe “TC” and “E” for short strokes

[12] Piston rod Ø not standardised

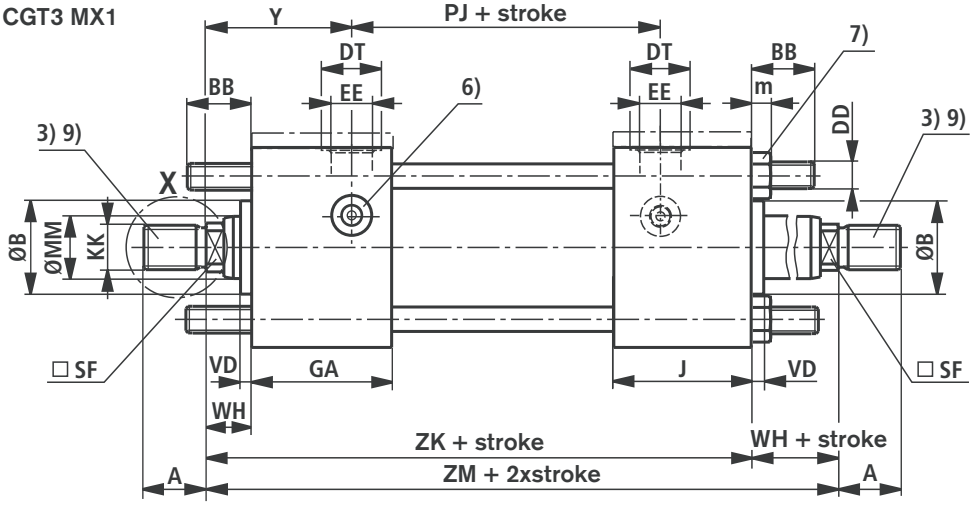
Mounting type MX1 (nominal dimensions in mm)

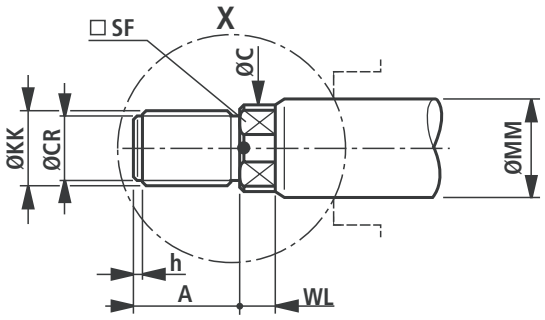
CDT3 MX1



①...④ = Position of pipe connections

CGT3 MX1





AL Ø	AA	BB 9) + 3	PK ± 1.25	TG js13	VD	ZB max	ZJ ± 1.25	ZK ± 1	ZM ± 2
25	40	19	54	28.3	6	121	114	139	154
32	47	24	58	33.2	12	137	128	153	178
40	59	35	71	41.7	12	166	153	170	195
50	74	46	73	52.3	9	176	159	182	207
63	91	46	81	64.3	13	185	168	191	223
80	117	59	92	82.7	9	212	190	215	246
100	137	59	101	96.9	10	225	203	230	265
125	178	81	117	125.9	9	260	232	254	289
160	219	92	130	154.9	7	279	245	270	302
200	269	115	160	190.2	7	336	299	324	356

Dimensions MX1 (nominal dimensions in mm)

		DIN / ISO [1]							ISO [2]							
AL Ø	MM Ø	KK [1]	A [1] max	C Ø	SF	WL	h	CR	KK [2]	A [2] max	C Ø	SF	WL	h	CR	B f9
25	12	M10x1.25	14	11	10	5	1	7.5	–	–						24
	18	M10x1.25	14	15	13	5	1	8	M14x1.5	18	15	13	5	2	11	30
32	14	M12x1.25	16	13	11	5	2.5	9.5	–	–						26
	22	M12x1.25	16	19	17	5	3	10	M16x1.5	22	19	17	5	3	13	34
40	18	M14x1.5	18	15	13	5	2	11	–	–						30
	22 [12]								M16x1.5	22	19	17	5	3	13	34
	28	M14x1.5	18	25	22	7	2	11	M20x1.5	28	25	22	7	3	17	42
50	22	M16x1.5	22	19	17	5	3	13	–	–						34
	28 [12]								M20x1.5	28	25	22	7	3	17	42
	36	M16x1.5	22	33	30	8	3	13	M27x2	36	33	30	8	3	23.5	50
63	28	M20x1.5	28	25	22	7	3	17	–	–						42
	36 [12]								M27x2	36	33	30	8	3	23.5	50
	45	M20x1.5	28	42	36	10	3	17	M33x2	45	42	36	10	4	29.5	60
80	36	M27x2	36	33	30	8	3	23.5	–	–						50
	45 [12]								M33x2	45	42	36	10	4	29.5	60
	56	M27x2	36	53	46	10	3	24	M42x2	56	53	46	10	5	38.5	72
100	45	M33x2	45	42	36	10	4	29.5	–	–						60
	56 [12]								M42x2	56	53	46	10	5	38.5	72
	70	M33x2	45	67	60	15	4	30	M48x2	63	67	60	15	3	44.5	88
125	56	M42x2	56	53	46	10	5	38.5	–	–						72
	70 [12]								M48x2	63	67	60	15	3	44.5	88
	90	M42x2	56	86	75	15	5	39	M64x3	85	86	75	15	4.5	59	108
160	70	M48x2	63	67	60	15	3	44.5	–	–						88
	110	M48x2	63	106	92	18	3	45	M80x3	95	106	92	18	4.5	75	133
200	90	M64x3	85	86	75	15	4.5	59	–	–						108
	140	M64x3	85	136	125	18	5	59	M100x3	112	136	125	18	4.5	95	163

AL Ø	DD	E	EE	DT	EE	DT	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	46.5	5	23.5	5	56	25	60
40	M8x1	63 ± 1.5	G 3/8	28	M18x1.5	26	52	–	33	6.5	73	25	62
50	M12x1.25	75 ± 1.5	G 1/2	34	M22x1.5	29	57.8	–	33.8	10	74	25	67
63	M12x1.25	90 ± 1.5	G 1/2	34	M22x1.5	29	55.8	–	33.8	10	80	32	71
80	M16x1.5	115 ± 1.5	G 3/4	42	M27x2	34	65	–	39	13	93	31	77
100	M16x1.5	130 ± 2	G 3/4	42	M27x2	34	67	–	40	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

[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 41

[5] Dimension “H“ always at the position of the pipe connection

[6] For positions of pipe connections and bleed point, see page 27

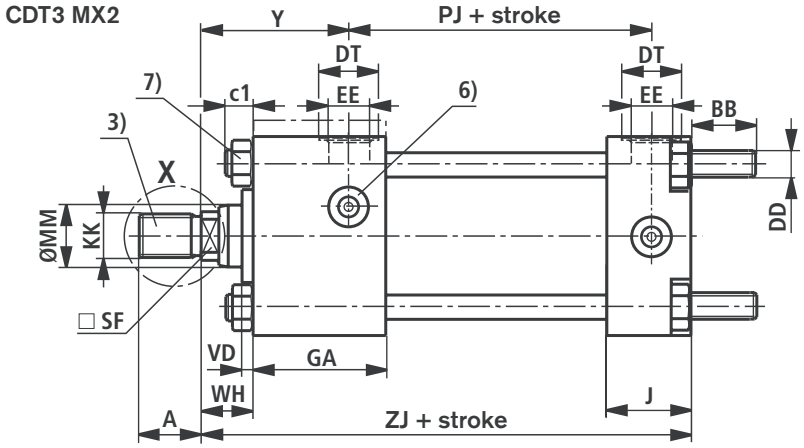
[7] For tightening torque, see page 43

[9] When mounting self-aligning clevis, observe dimension “BB”

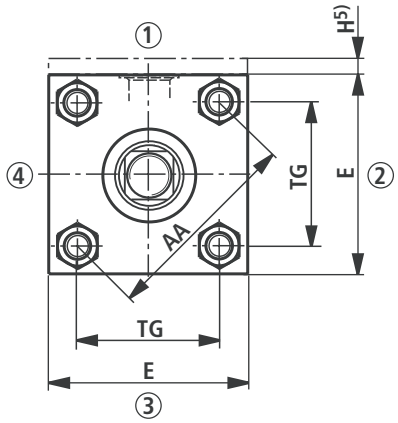
[12] Piston rod Ø not standardised

Mounting types MX2, MX3 (nominal dimensions in mm)

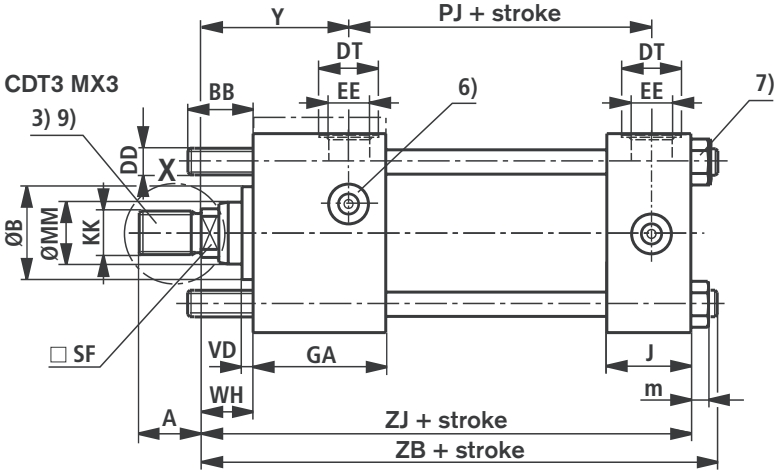
CDT3 MX2

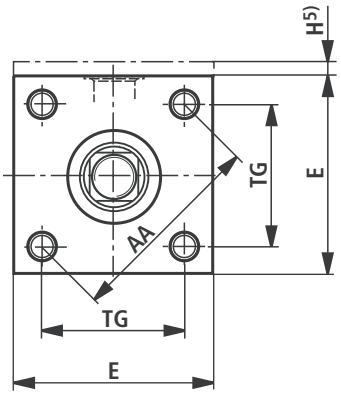


①...④ = Position of pipe connections

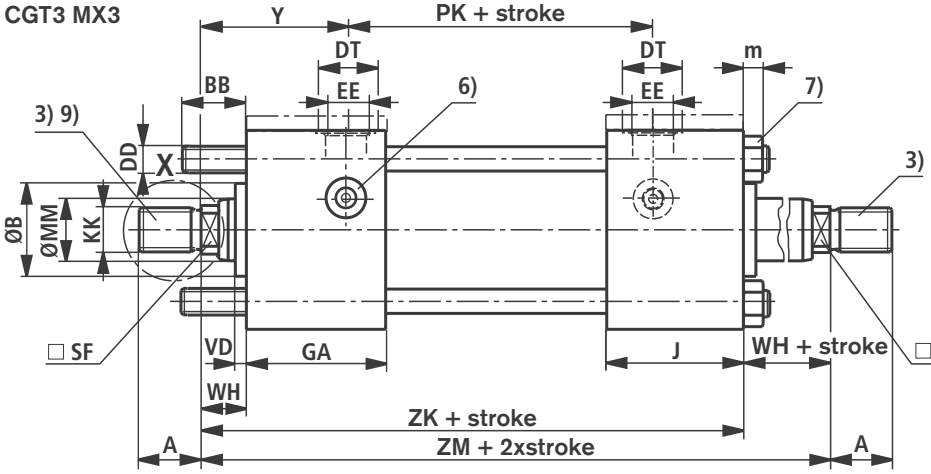


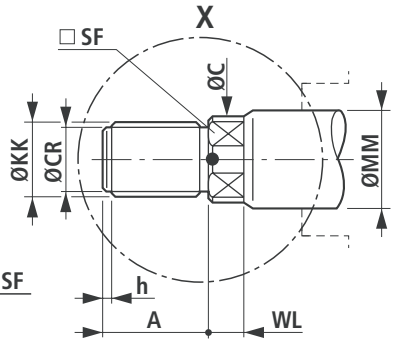
CDT3 MX3





CGT3 MX3





AL Ø	c1 max	AA	BB 9) + 3	PK ± 1.25	TG js13	VD	ZB max	ZJ ± 1	ZK ± 1	ZM ± 2
25	7	40	19	54	28.3	6	121	114	139	154
32	9	47	24	58	33.2	12	137	128	153	178
40	13	59	35	71	41.7	12	166	153	170	195
50	17	74	46	73	52.3	9	176	159	182	207
63	17	91	46	81	64.3	13	185	168	191	223
80	22	117	59	92	82.7	9	212	190	215	246
100	22	137	59	101	96.9	10	225	203	230	265
125	28	178	81	117	125.9	9	260	232	254	289
160	34	219	92	130	154.9	7	279	245	270	302
200	37	269	115	160	190.2	7	336	299	324	356

Dimensions MX2, MX3 (nominal dimensions in mm)

		DIN / ISO [1]							ISO [2]							
AL Ø	MM Ø	KK [1]	A [1] max	C Ø	SF	WL	h	CR	KK [2]	A [2] max	C Ø	SF	WL	h	CR	B f9
25	12	M10x1.25	14	11	10	5	1	7.5	–	–						24
	18	M10x1.25	14	15	13	5	1	8	M14x1.5	18	15	13	5	2	11	30
32	14	M12x1.25	16	13	11	5	2.5	9.5	–	–						26
	22	M12x1.25	16	19	17	5	3	10	M16x1.5	22	19	17	5	3	13	34
40	18	M14x1.5	18	15	13	5	2	11	–	–						30
	22 [12]								M16x1.5	22	19	17	5	3	13	34
	28	M14x1.5	18	25	22	7	2	11	M20x1.5	28	25	22	7	3	17	42
50	22	M16x1.5	22	19	17	5	3	13	–	–						34
	28 [12]								M20x1.5	28	25	22	7	3	17	42
	36	M16x1.5	22	33	30	8	3	13	M27x2	36	33	30	8	3	23.5	50
63	28	M20x1.5	28	25	22	7	3	17	–	–						42
	36 [12]								M27x2	36	33	30	8	3	23.5	50
	45	M20x1.5	28	42	36	10	3	17	M33x2	45	42	36	10	4	29.5	60
80	36	M27x2	36	33	30	8	3	23.5	–	–						50
	45 [12]								M33x2	45	42	36	10	4	29.5	60
	56	M27x2	36	53	46	10	3	24	M42x2	56	53	46	10	5	38.5	72
100	45	M33x2	45	42	36	10	4	29.5	–	–						60
	56 [12]								M42x2	56	53	46	10	5	38.5	72
	70	M33x2	45	67	60	15	4	30	M48x2	63	67	60	15	3	44.5	88
125	56	M42x2	56	53	46	10	5	38.5	–	–						72
	70 [12]								M48x2	63	67	60	15	3	44.5	88
	90	M42x2	56	86	75	15	5	39	M64x3	85	86	75	15	4.5	59	108
160	70	M48x2	63	67	60	15	3	44.5	–	–						88
	110	M48x2	63	106	92	18	3	45	M80x3	95	106	92	18	4.5	75	133
200	90	M64x3	85	86	75	15	4.5	59	–	–						108
	140	M64x3	85	136	125	18	5	59	M100x3	112	136	125	18	4.5	95	163

AL Ø	DD	E	EE	DT	EE	DT	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	46.5	5	23.5	5	56	25	60
40	M8x1	63 ± 1.5	G 3/8	28	M18x1.5	26	52	–	33	6.5	73	25	62
50	M12x1.25	75 ± 1.5	G 1/2	34	M22x1.5	29	57.8	–	33.8	10	74	25	67
63	M12x1.25	90 ± 1.5	G 1/2	34	M22x1.5	29	55.8	–	33.8	10	80	32	71
80	M16x1.5	115 ± 1.5	G 3/4	42	M27x2	34	65	–	39	13	93	31	77
100	M16x1.5	130 ± 2	G 3/4	42	M27x2	34	67	–	40	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

[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 41

[5] Dimension “H“ always at the position of the pipe connection

[6] For positions of pipe connections and bleed point, see page 27

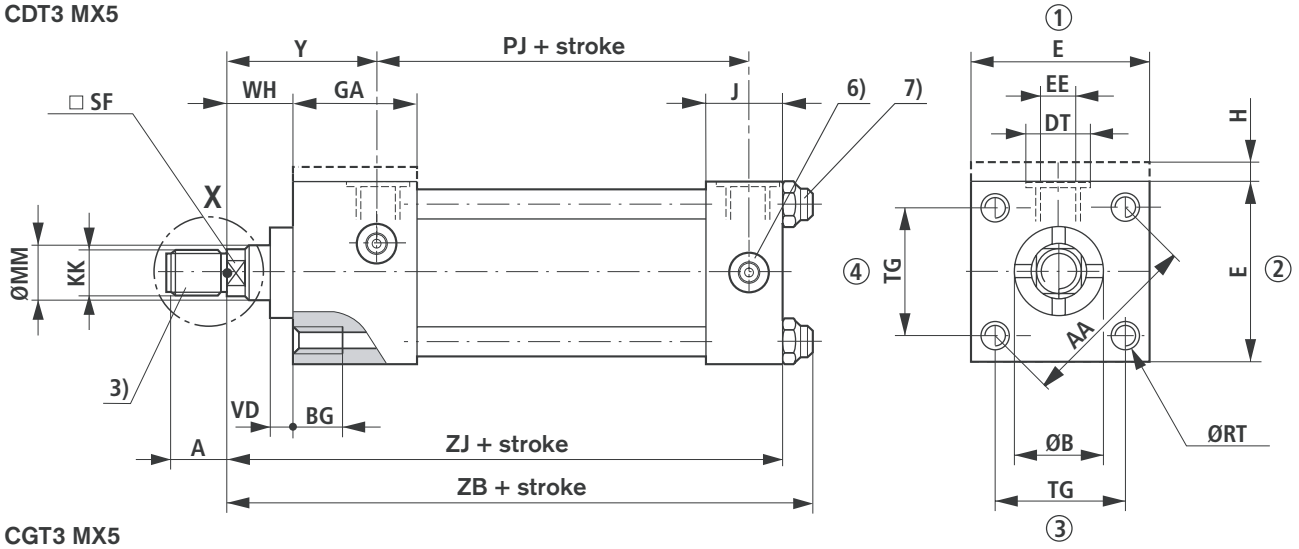
[7] For tightening torque, see page 43

[9] When mounting self-aligning clevis, observe dimension “BB“

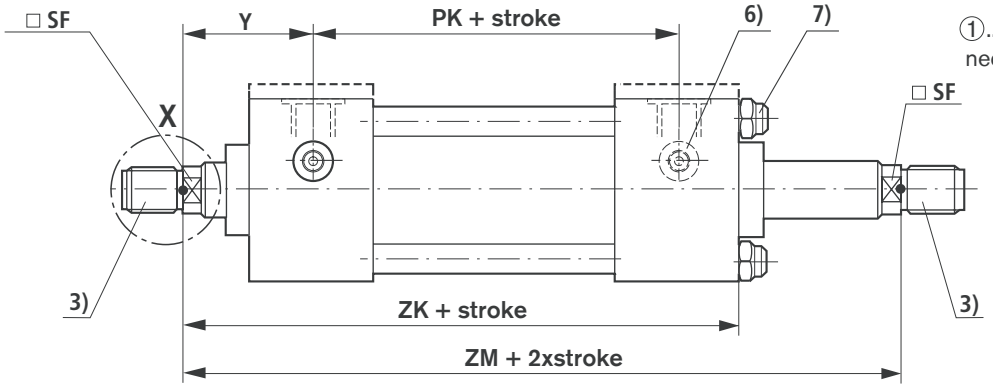
[12] Piston rod Ø not standardised

Mounting type MX5 (nominal dimensions in mm)

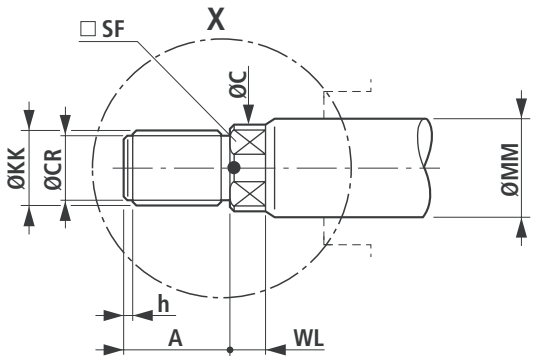
CDT3 MX5



CGT3 MX5



①...④ = Position of pipe connections



AL Ø	AA	BG min	PK ± 1.25	RT 6H	TG js13	VD	ZB max	ZJ ± 1.25	ZK ± 1	ZM ± 2
25	40	8	54	M5x0.8	28.3	6	121	114	139	154
32	47	9	58	M6x1	33.2	12	137	128	153	178
40	59	12	71	M8x1.25	41.7	12	166	153	170	195
50	74	18	73	M12x1.75	52.3	9	176	159	182	207
63	91	18	81	M12x1.75	64.3	13	185	168	191	223
80	117	24	92	M16x2	82.7	9	212	190	215	246
100	137	24	101	M16x2	96.9	10	225	203	230	265
125	178	27	117	M22x2.5	125.9	9	260	232	254	289
160	219	32	130	M27x3	154.9	7	279	245	270	302
200	269	40	160	M30x3.5	190.2	7	336	299	324	356

Dimensions MX5 (nominal dimensions in mm)

		DIN / ISO [1]							ISO [2]							
AL Ø	MM Ø	KK [1]	A [1] max	C Ø	SF	WL	h	CR	KK [2]	A [2] max	C Ø	SF	WL	h	CR	B f9
25	12	M10x1.25	14	11	10	5	1	7.5	–	–						24
	18	M10x1.25	14	15	13	5	1	8	M14x1.5	18	15	13	5	2	11	30
32	14	M12x1.25	16	13	11	5	2.5	9.5	–	–						26
	22	M12x1.25	16	19	17	5	3	10	M16x1.5	22	19	17	5	3	13	34
40	18	M14x1.5	18	15	13	5	2	11	–	–						30
	22 [12]								M16x1.5	22	19	17	5	3	13	34
	28	M14x1.5	18	25	22	7	2	11	M20x1.5	28	25	22	7	3	17	42
50	22	M16x1.5	22	19	17	5	3	13	–	–						34
	28 [12]								M20x1.5	28	25	22	7	3	17	42
	36	M16x1.5	22	33	30	8	3	13	M27x2	36	33	30	8	3	23.5	50
63	28	M20x1.5	28	25	22	7	3	17	–	–						42
	36 [12]								M27x2	36	33	30	8	3	23.5	50
	45	M20x1.5	28	42	36	10	3	17	M33x2	45	42	36	10	4	29.5	60
80	36	M27x2	36	33	30	8	3	23.5	–	–						50
	45 [12]								M33x2	45	42	36	10	4	29.5	60
	56	M27x2	36	53	46	10	3	24	M42x2	56	53	46	10	5	38.5	72
100	45	M33x2	45	42	36	10	4	29.5	–	–						60
	56 [12]								M42x2	56	53	46	10	5	38.5	72
	70	M33x2	45	67	60	15	4	30	M48x2	63	67	60	15	3	44.5	88
125	56	M42x2	56	53	46	10	5	38.5	–	–						72
	70 [12]								M48x2	63	67	60	15	3	44.5	88
	90	M42x2	56	86	75	15	5	39	M64x3	85	86	75	15	4.5	59	108
160	70	M48x2	63	67	60	15	3	44.5	–	–						88
	110	M48x2	63	106	92	18	3	45	M80x3	95	106	92	18	4.5	75	133
200	90	M64x3	85	86	75	15	4.5	59	–	–						108
	140	M64x3	85	136	125	18	5	59	M100x3	112	136	125	18	4.5	95	163

AL Ø	E	EE	DT	EE	DT	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	46.5	5	23.5	56	25	60
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52	–	33	73	25	62
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.8	–	33.8	74	25	67
63	90 ± 1.5	G 1/2	34	M22x1.5	29	55.8	–	33.8	80	32	71
80	115 ± 1.5	G 3/4	42	M27x2	34	65	–	39	93	31	77
100	130 ± 2	G 3/4	42	M27x2	34	67	–	40	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

[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 41

[5] Dimension “H“ always at the position of the pipe connection

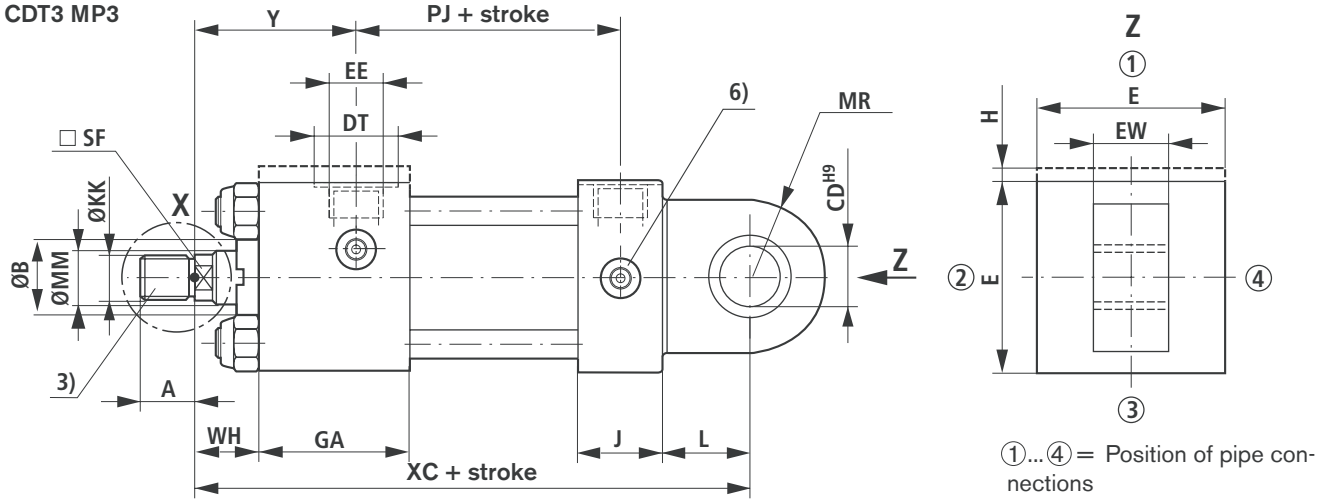
[6] For positions of pipe connections and bleed point, see page 27

[7] For tightening torque, see page 43

[12] Piston rod Ø not standardised

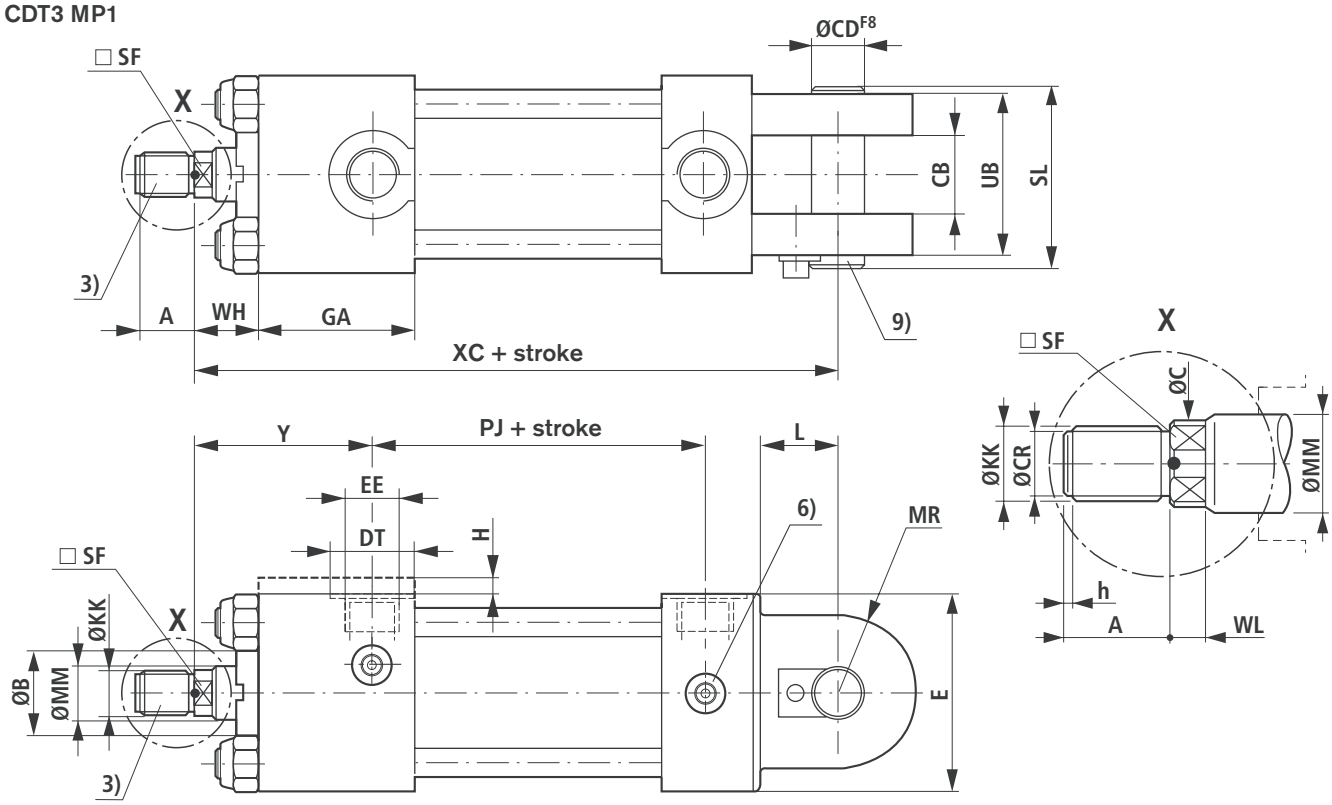
Mounting types MP1, MP3 (nominal dimensions in mm)

CDT3 MP3



①...④ = Position of pipe connections

CDT3 MP1



AL Ø	CB A16	CD H9	EW h14	L min	MR max	UB max	SL	XC ± 1.25
25	12	10	12	13	12	24	33	127
32	16	12	16	19	17	32	42	147
40	20	14	20	19	17	40	50	172
50	30	20	30	32	29	60	69	191
63	30	20	30	32	29	60	69	200
80	40	28	40	39	34	80	89	229
100	50	36	50	54	50	100	110	257
125	60	45	60	57	53	120	132	289
160	70	56	70	63	59	140	155	308
200	80	70	80	82	78	160	175	381

Dimensions MP1, MP3 (nominal dimensions in mm)

		DIN / ISO [1]							ISO [2]							
AL Ø	MM Ø	KK [1]	A [1] max	C Ø	SF	WL	h	CR	KK [2]	A [2] max	C Ø	SF	WL	h	CR	B f9
25	12	M10x1.25	14	11	10	5	1	7.5	–	–						24
	18	M10x1.25	14	15	13	5	1	8	M14x1.5	18	15	13	5	2	11	30
32	14	M12x1.25	16	13	11	5	2.5	9.5	–	–						26
	22	M12x1.25	16	19	17	5	3	10	M16x1.5	22	19	17	5	3	13	34
40	18	M14x1.5	18	15	13	5	2	11	–	–						30
	22 [12]								M16x1.5	22	19	17	5	3	13	34
	28	M14x1.5	18	25	22	7	2	11	M20x1.5	28	25	22	7	3	17	42
50	22	M16x1.5	22	19	17	5	3	13	–	–						34
	28 [12]								M20x1.5	28	25	22	7	3	17	42
	36	M16x1.5	22	33	30	8	3	13	M27x2	36	33	30	8	3	23.5	50
63	28	M20x1.5	28	25	22	7	3	17	–	–						42
	36 [12]								M27x2	36	33	30	8	3	23.5	50
	45	M20x1.5	28	42	36	10	3	17	M33x2	45	42	36	10	4	29.5	60
80	36	M27x2	36	33	30	8	3	23.5	–	–						50
	45 [12]								M33x2	45	42	36	10	4	29.5	60
	56	M27x2	36	53	46	10	3	24	M42x2	56	53	46	10	5	38.5	72
100	45	M33x2	45	42	36	10	4	29.5	–	–						60
	56 [12]								M42x2	56	53	46	10	5	38.5	72
	70	M33x2	45	67	60	15	4	30	M48x2	63	67	60	15	3	44.5	88
125	56	M42x2	56	53	46	10	5	38.5	–	–						72
	70 [12]								M48x2	63	67	60	15	3	44.5	88
	90	M42x2	56	86	75	15	5	39	M64x3	85	86	75	15	4.5	59	108
160	70	M48x2	63	67	60	15	3	44.5	–	–						88
	110	M48x2	63	106	92	18	3	45	M80x3	95	106	92	18	4.5	75	133
200	90	M64x3	85	86	75	15	4.5	59	–	–						108
	140	M64x3	85	136	125	18	5	59	M100x3	112	136	125	18	4.5	95	163

AL Ø	E	EE	DT	EE	DT	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	46.5	5	23.5	56	25	60
40	63 ± 1.5	G 3/8	28	M18x1.5	26	52	–	33	73	25	62
50	75 ± 1.5	G 1/2	34	M22x1.5	29	57.8	–	33.8	74	25	67
63	90 ± 1.5	G 1/2	34	M22x1.5	29	55.8	–	33.8	80	32	71
80	115 ± 1.5	G 3/4	42	M27x2	34	65	–	39	93	31	77
100	130 ± 2	G 3/4	42	M27x2	34	67	–	40	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

[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 41

[5] Dimension “H“ always at the position of the pipe connection

[6] For positions of pipe connections and bleed point, see page 27

[7] For tightening torque, see page 43

[9] Spigot included in the scope of supply

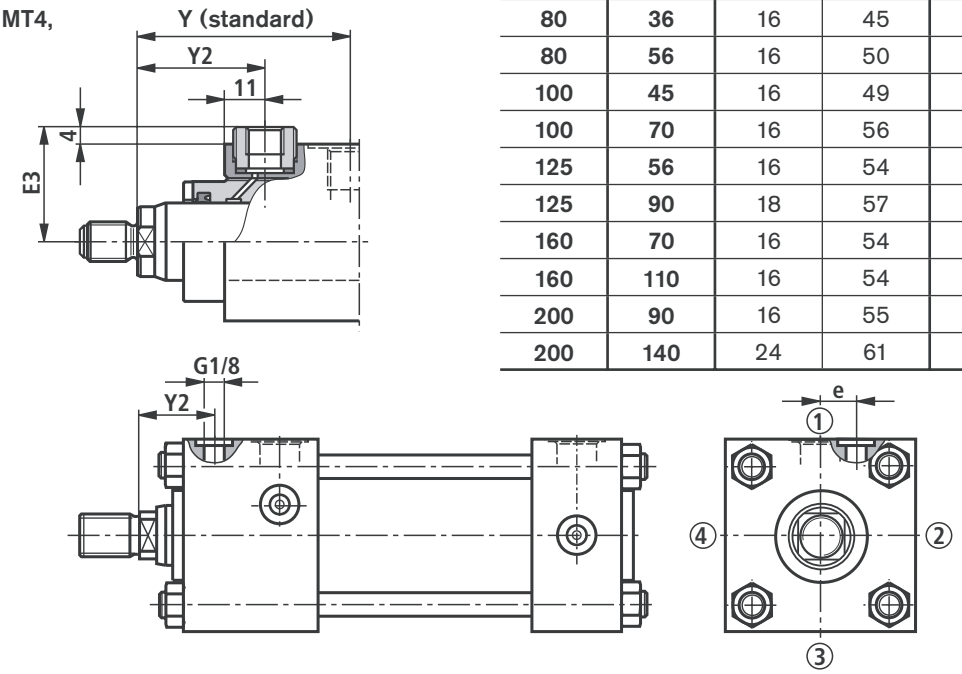
[12] Piston rod Ø not standardised

Drain port / enlarged pipe connection (nominal dimensions in mm)

Drain port

When high-quality seals are employed, the use of a drain port is usually not necessary. Only in special cases, e.g. when the extension velocity is more than 2 x the retraction velocity with larger strokes, continuous pressurisation or similar, a drag oil collection connection is recommended. For extension velocities greater than 5 x the retraction velocity, consult us!

ME6, MP5, MS2, MT4, Ø 25, 32, 40



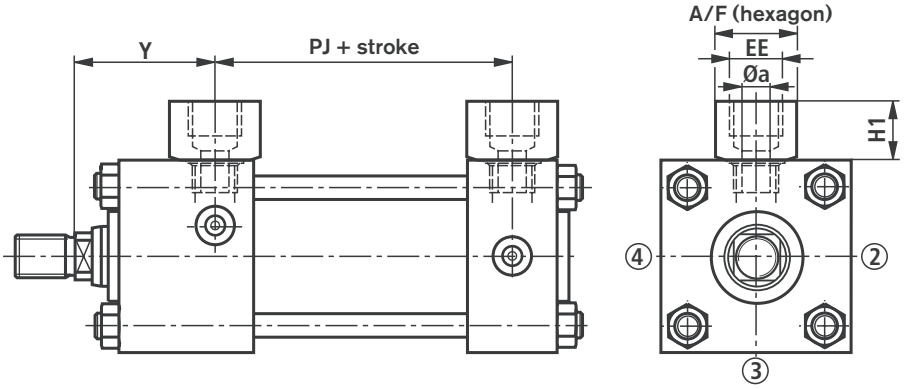
		MS2, MT4 ME6, MP5		ME5	
Ø AL	**Ø MM**	**e**	**Y2**	**e**	**Y2**
25		0	21	17	35
32		0	32	18	45
40		0	38	22	47
50		15	39	34	52
63		16	46	43	59
80	**36**	16	45	27	62
80	**56**	16	50	27	62
100	**45**	16	49	30	68
100	**70**	16	56	30	68
125	**56**	16	54	45	68
125	**90**	18	57	45	68
160	**70**	16	54	45	68
160	**110**	16	54	47	68
200	**90**	16	55	45	68
200	**140**	24	61	45	72

Enlarged pipe connection

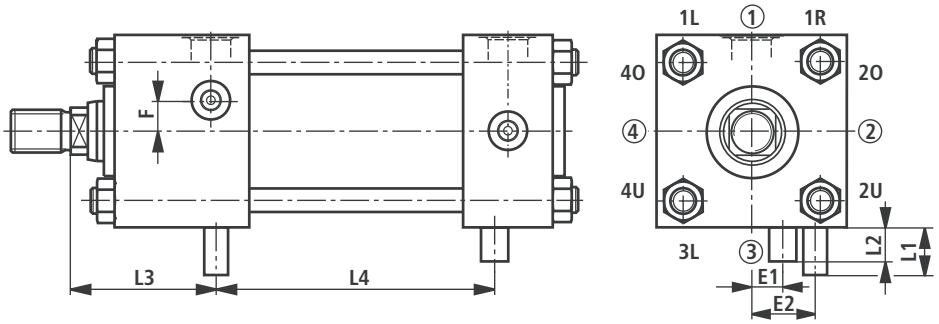
The oil ports of this series are generously dimensioned in accordance with standards; at high velocity, pressure drop Δp can be reduced by using larger oil connections, but in some cases, standard dimensions cannot be complied with, see table.

Not feasible for mounting types ME 5 / 6 with connection position 2 or 4 .

Ø AL	EE	H1	Y	PJ	SW	Ø a
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	G11/4	39	86	117	60	23
160	G11/4	–	86	130	–	–
200	G11/2	–	86	165	–	–



Position of pipe connections / bleed point / leakage oil / throttle valve



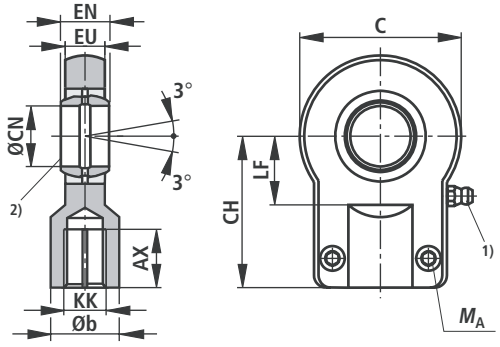
		CDT3 / CST3					CGT3						
Mounting type	Pipe connection	Bleeding Head 1	Bleeding Cap	Leakage Head 1	Throttle valve Head 1	Throttle valve Cap		Bleeding Head 1	Bleeding Head 2	Leakage Head 1	Leakage Head 2	Throttle valve Head 1	Throttle valve Head 2
MP5, MT4	1	2	2	1	3R	3R	MT4	2	4	1	1	3R	3L
	2	3	3	2	4U	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	1	3R	3R	ME5	2	4	1	1	3R	3L
	2	3R	3	1	1L	4U		3R	1	1	2	1L	4O
	3	4	4	3	1L	1L		4	2	3	3	1L	1R
	4	1L	1	3	3R	2O		1L	3	3	3	3R	2U
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		–	–	–	–	–	–
MS2	1	2	2	1	4O	4O	MS2	2	4	1	1	4O	2O
MP1, MP3, MX1, MX2, MX3, MX5	1	2	2	–	–	–	MX1, MX2, MX3	2	4	–	–	–	–
	2	3	3	–	–	–		3	1	–	–	–	–
	3	4	4	–	–	–		4	2	–	–	–	–
	4	1	1	–	–	–		1	3	–	–	–	–
MT1	1	3R	2	–	–	–	MT1	3R	4	–	–	–	–
	3	1L	4	–	–	–		1L	2	–	–	–	–
MT2	1	2	3R	–	–	–		–	–	–	–	–	–
	3	4	1L	–	–	–		–	–	–	–	–	–

	Bleeding			Throttle valve adjustable on both sides						
AL Ø	Head offset F	ME5, connection 1/3	A/F socket	Projection L1 (head)	Projection L2 (cap)	Offset from centre E1 (head)	Offset from centre E2 (cap)	Dimension L3	Dimension L4	
25	–	–	–	12	12	6	6	46.5	60 + stroke	
32	–	–	–	12	8.5	9	4	55	66 + stroke	
40	10	0	5	6.5	2	8	8	56.5	79 + stroke	84 + stroke [1]
50	10	0	5	4.5	–	10	10	60	82 + stroke	88 + stroke [1]
63	14	0	5	–	–	15	11	70	82 + stroke	
80	20	0	6	–	–	14	18	73.5	100 + stroke	
100	24	0	6	–	–	13	20	84.5	100 + stroke	
125	0	0	6	–	–	22	22	91.5	109 + stroke	
160	0	0	6	4	–	30	30	93.5	115 + stroke	
200	0	0	6	4	–	30	30	114	128 + stroke	

[1] Dimension L4 for mounting type MS2

Self-aligning clevis (with locking screws): **CGKA** (nominal dimensions in mm) **- AP 6**

ISO 8133
DIN 24555

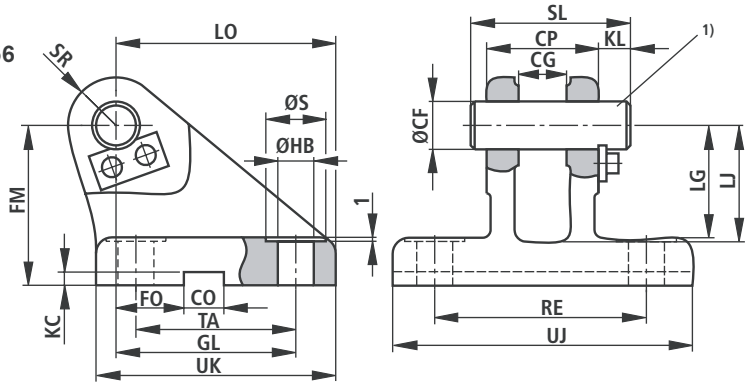


1) Grease nipple, tapered head, form A to DIN 71412
2) Associated pin Ø h6
3) Cannot be lubricated
4) Can be lubricated via lubricating hole
5) Self-aligning clevis to ISO 6982, DIN 24338, associated spigot Ø h6
7) Self-aligning clevis weight

KK	Type	Material no.	AX min.	b	C max.	CH js13	CN Ø	EN	EU h13	LF min.	M_A Nm	m 7) kg
M10 x1.25	**CGKA 12** 3)	R900327186	15	17	40	42	12 –0.008	10 –0.12	8	16	9.5	0.15
M12x1.25	**CGKA 16** 4)	R900327192	17	21	45	48	16 –0.008	14 –0.12	11	20	9.5	0.25
M14x1.5	**CGKA 20** 4)	R900306874	19	25	55	58	20 –0.012	16 –0.12	13	25	23	0.43
M16x1.5	**CGKA 25**	R900327191	23	30	65	68	25 –0.012	20 –0.12	17	30	23	0.73
M20x1.5	**CGKA 30**	R900327187	29	36	80	85	30 –0.012	22 –0.12	19	35	46	1.3
M27x2	**CGKA 40**	R900327188	37	45	100	105	40 –0.012	28 –0.12	23	45	46	2.3
M33x2	**CGKA 50**	R900327368	46	55	125	130	50 –0.012	35 –0.12	30	58	80	4.4
M42x2	**CGKA 60**	R900327369	57	68	160	150	60 –0.012	44 –0.12	38	68	195	8.4
M48x2	**CGKA 80**	R900327370	64	90	205	185	80 –0.015	55 –0.15	47	92	385	15.6
M64x3	**CGKA 100**	R900327371	86	110	240	240	100 –0.02	70 –0.2	57	116	660	28
M80x3	**CGKD 100** 5)	R900322030	96	110	210	210	100 H7	100 h12	84	98	385	28
M100x3	**CGKD 125** 5)	R900322026	113	135	262	260	125 H7	125 h12	102	120	385	43

Fork-type mounting block (with locking screws): **CLCB** (nominal dimensions in mm) **- AB 5**

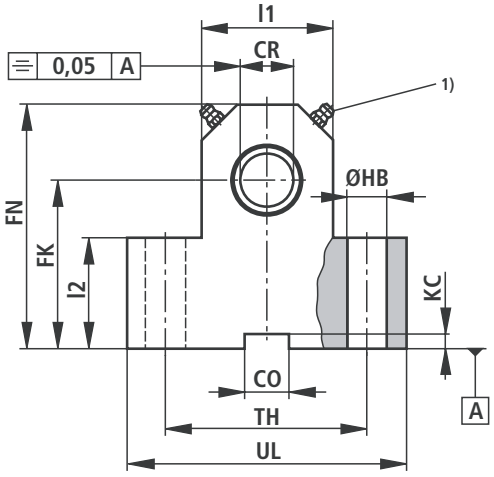
ISO 8133
DIN 24 556

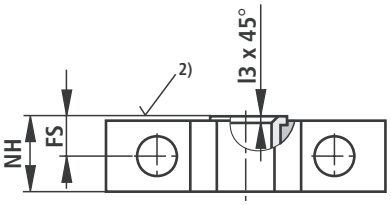


1) Associated spigot Ø h6, which suits self-aligning clevis CGKA... (pin and pin locking element included in the scope of supply)
2) Weight of fork-type mounting block

Piston Ø	Type	Material no.	m 2) kg	CF Ø K7	CP h14	CG +0.1 +0.3	CO N9	FO js14	FM js11	GL js13	HB Ø	KC +0.3 0	KL	LG	LJ	LO	RE js13	SL	SR max.	TA js13	UJ	UK	S Ø
25	**CLCB 12**	R900326960	0.6	12	30	10	10	16	40	46	9	3.3	8	28	29	56	55	40	12	40	75	60	15
32	**CLCB 16**	R900327372	1.3	16	40	14	16	18	50	61	11	4.3	8	37	38	74	70	50	16	55	95	80	18
40	**CLCB 20**	R900327373	2.1	20	50	16	16	20	55	64	14	4.3	10	39	40	80	85	62	20	58	120	90	20
50	**CLCB 25**	R900326961	3.2	25	60	20	25	22	65	78	16	5.4	10	48	49	98	100	72	25	70	140	110	24
63	**CLCB 30**	R900327374	6.5	30	70	22	25	24	85	97	18	5.4	13	62	63	120	115	85	30	90	160	135	26
80	**CLCB 40**	R900327375	12.0	40	80	28	36	24	100	123	22	8.4	16	72	73	148	135	100	40	120	190	170	33
100	**CLCB 50**	R900327376	23.0	50	100	35	36	35	125	155	30	8.4	19	90	92	190	170	122	50	145	240	215	48
125	**CLCB 60**	R900327377	37.0	60	120	44	50	35	150	187	39	11.4	20	108	110	225	200	145	60	185	270	260	60
160	**CLCB 80**	R900327378	79.0	80	160	55	50	35	190	255	45	11.4	26	140	142	295	240	190	80	260	320	340	80
200	**CLCB 100**	R900327379	140.0	100	200	70	63	35	210	285	48	12.4	30	150	152	335	300	235	100	300	400	400	80

Trunnion mounting block CLTA (nominal dimensions in mm) - AT 4





1) Grease nipple, cone form A to DIN 71412

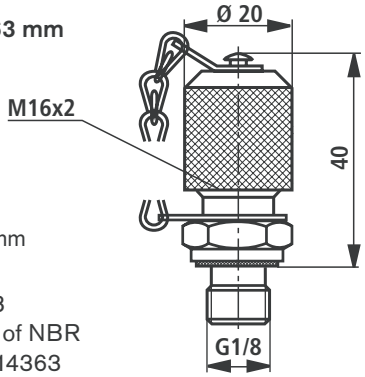
2) Inner side

3) Weight per pair, mounting blocks are always supplied in pairs

Piston Ø	Type	Material no	*m* 3)	CR	CO	FK	FN	FS	HB Ø	KC	NH	TH	UL	l1	l2	l3
			kg	H7	N9	js12	max.	js14	H13	+ 0.3	max.	js14	max.			
25	**CLTA 12**	R901071355	0.5	12	10	38	55	8	9	3.3	17	40	63	25	25	1
32	**CLTA 16**	R901071364	0.9	16	16	45	65	10	11	4.3	21	50	80	30	30	1
40	**CLTA 20**	R901071365	1.35	20	16	55	80	10	11	4.3	21	60	90	40	38	1.5
50	**CLTA 25**	R901071368	2.4	25	25	65	90	12	14	5.4	26	80	110	56	45	1.5
63	**CLTA 32**	R901071377	5.0	32	25	75	110	15	18	5.4	33	110	150	70	52	2
80	**CLTA 40**	R901071380	8.5	40	36	95	140	16	22	8.4	41	125	170	88	60	2.5
100	**CLTA 50**	R901071385	15	50	36	105	150	20	26	8.4	51	160	210	90	72	2.5
125	**CLTA 63**	R901071395	30	63	50	125	195	25	33	11.4	61	200	265	136	87	3
160	**CLTA 80**	R901071398	59	80	50	150	230	31	39	11.4	81	250	325	160	112	3.5
200	**CLTA 100**	R901071400	131	100	63	200	300	42	52	12.4	101	320	410	200	150	4.5

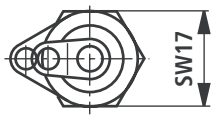
Threaded coupling

For piston Ø 40 - 63 mm



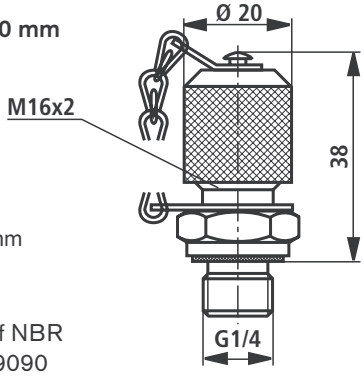
Scope of supply for piston Ø 40 to 63 mm

Threaded coupling
AB 20-11/K3, G 1/8
with seal ring made of NBR
Material no. R900014363



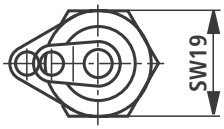
Threaded coupling
AB 20-11/K3V, G 1/8
with seal ring made of FKM
Material no. R900024710

For piston Ø 80 - 200 mm



Scope of supply for piston Ø 80 to 200 mm

Threaded coupling
AB 20-11/K1, G 1/4
with seal ring made of NBR
Material no. R900009090



Threaded coupling
AB 20-11/K1V, G 1/4
with seal ring made of FKM
Material no. R900001264

Remarks

For pressure measurement or bleeding.
For installation in the bleeding/measuring connection. Threaded coupling with check valve function, i.e. all measuring instruments can also be connected under pressure.

Buckling

The permissible stroke lengths for a flexibly guided load and 3.5-fold safety against buckling can be found in the relevant table. In the case of a differing installation orientation of the cylinder, the permissible stroke length has to be interpolated. Permissible stroke lengths for non-guided loads on enquiry.

Buckling can be calculated according to the following formula:

1. Calculation according to Euler

$$F = \frac{\pi^2 \cdot E \cdot I}{\nu \cdot L_B{}^2} \quad \text{when } \lambda > \lambda g$$

2. Calculation according to Tetmajer

$$F = \frac{d^2 \cdot \pi \,(335\text{-}0.62 \cdot \lambda)}{4 \cdot \nu} \quad \text{when } \lambda \le \lambda g$$

Explanation:

E = Modulus of elasticity in N/mm^2
= 2.1 x 10^5 for steel

I = Moment of inertia in mm^4 for circular cross-sectional area: $= \frac{d^4 \cdot \pi}{64} = 0.0491 \cdot d^4$

ν = 3.5 (safety factor)

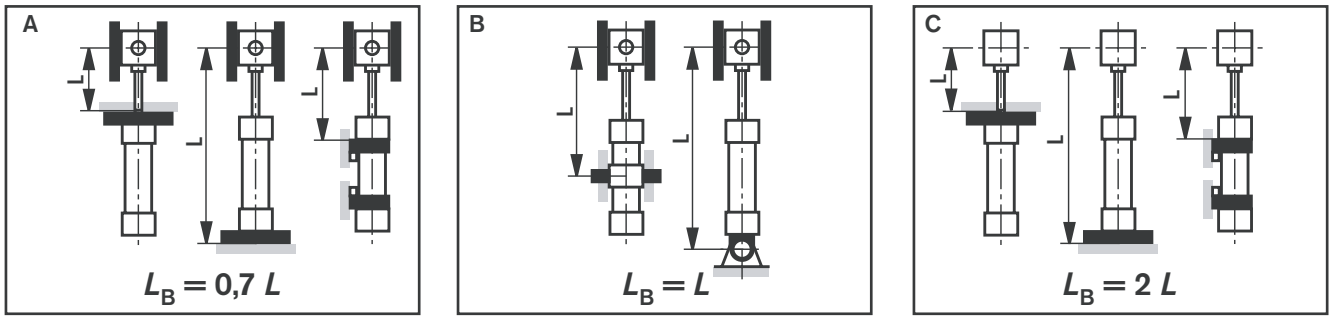
L_K = Free buckling length in mm (depending on mounting style, see sketches A, B, C)

d = Piston rod Ø in mm

λ = Slenderness ratio $= \frac{4 \cdot L_B}{d}$ $\quad \lambda g = \pi \sqrt{\frac{E}{0.8 \cdot R_e}}$

R_e = Yield strength of the piston rod material

Influence of the mounting style on the buckling length:



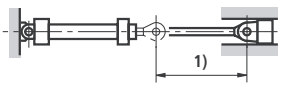
Permissible stroke length (nominal dimensions in mm)

Mounting type MP1, MP3, MP5

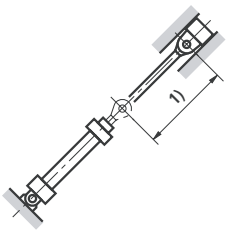
AL Ø	MM Ø	Permissible stroke length at 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	Max. available stroke length
25	12	115	120	125	85	85	90	50	50	55	600
	18	315	330	375	270	275	300	205	210	220	
32	14	115	120	125	85	85	90	50	50	55	800
	22	370	385	440	315	325	350	240	245	255	
40	18	160	165	175	120	125	130	75	75	80	1000
	22	310	320	350	260	265	290	195	200	205	
	28	465	485	580	400	415	465	315	320	340	
50	22	205	210	220	155	160	165	100	100	105	1200
	28	420	430	475	355	360	380	270	275	280	
	36	620	650	790	545	565	640	435	445	475	
63	28	280	285	305	220	225	230	150	150	155	1400
	36	560	580	645	480	490	520	375	380	390	
	45	770	810	995	680	710	805	555	565	605	
80	36	380	390	415	305	310	320	210	215	220	1700
	45	695	715	800	600	610	650	470	475	490	
	56	945	995	1225	840	870	995	685	670	745	
100	45	480	495	540	390	400	420	280	285	290	2000
	56	850	880	1000	740	760	820	590	600	625	
	70	1150	1210	1550	1030	1075	1260	855	875	955	
125	56	595	615	685	490	500	535	360	365	375	2300
	70	1065	1105	1290	940	965	1060	765	775	810	
	90	1445	1535	2110	1315	1380	1690	1115	1150	1285	
160	70	730	755	850	610	625	670	455	460	475	2600
	110	1715	1815	2450	1565	1640	2015	1335	1380	1540	
200	90	945	985	1140	800	825	900	610	620	645	2700
	140	2120	2255	2700	1955	2060	2625	1690	1755	2010	

Installation orientation

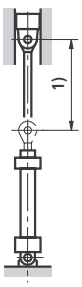
0°



45°



90°



[1] **Perm. stroke**

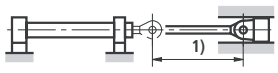
Permissible stroke length (nominal dimensions in mm)

Mounting type MS2

AL Ø	MM Ø	Permissible stroke length at 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	Max. available stroke length
25	12	500	510	530	420	425	435	325	325	330	600
	18	600	600	600	600	600	600	600	600	600	
32	14	525	535	555	435	440	450	335	335	340	800
	22	800	800	800	800	800	800	800	800	800	
40	18	700	715	750	590	595	610	455	460	465	1000
	22	975	1000	1000	855	875	940	690	700	720	
	28	1000	1000	1000	1000	1000	1000	1000	1000	1000	
50	22	835	850	895	705	710	730	545	550	555	1200
	28	855	1200	1200	1100	1130	1200	895	910	945	
	36	1200	1200	1200	1200	1200	1200	1200	1200	1200	
63	28	1060	1086	1160	900	915	950	705	710	720	1400
	36	1400	1400	1400	1400	1400	1400	1185	1200	1255	
	45	1400	1400	1400	1400	1400	1400	1400	1400	1400	
80	36	1370	1405	1525	1175	1195	1250	930	935	955	1700
	45	1700	1700	1700	1700	1700	1700	1460	1480	1555	
	56	1700	1700	1700	1700	1700	1700	1700	1700	1700	
100	45	1685	1735	1910	1460	1485	1570	1165	1175	1205	2000
	56	2000	2000	2000	2000	2000	2000	1800	1835	1950	
	70	2000	2000	2000	2000	2000	2000	2000	2000	2000	
125	56	2075	2140	2300	1810	1845	1970	1455	1470	1515	2300
	70	2300	2300	2300	2300	2300	2300	2240	2290	2300	
	90	2300	2300	2300	2300	2300	2300	2300	2300	2300	
160	70	2515	2595	2600	2200	2245	2415	1780	1800	1855	2600
	110	2600	2600	2600	2600	2600	2600	2600	2600	2600	
200	90	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700
	140	2700	2700	2700	2700	2700	2700	2700	2700	2700	

Installation orientation

0°



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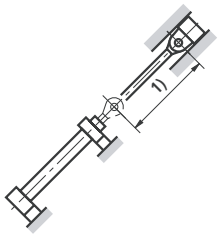
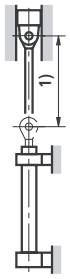


90°



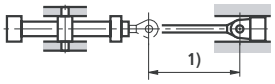
1) Perm. stroke

Mounting type MT4 (trunnion position at the centre of the cylinder)

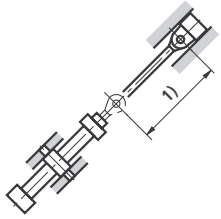
AL Ø	MM Ø	Permissible stroke length at 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	Max. available stroke length
25	12	190	190	200	150	150	155	105	105	105	600
	18	455	470	535	395	405	435	310	315	325	
32	14	195	200	205	150	155	155	105	105	105	800
	22	535	555	625	460	470	510	365	365	380	
40	18	265	270	290	215	215	225	150	155	155	1000
	22	430	445	480	360	370	385	275	280	285	
	28	670	700	825	590	605	670	475	480	505	
50	22	330	335	355	265	270	280	190	195	195	1200
	28	570	590	645	485	495	520	375	380	390	
	36	885	925	1115	785	810	910	640	655	690	
63	28	435	445	470	355	360	375	265	265	270	1400
	36	755	780	865	650	660	700	510	575	530	
	45	1095	1145	1390	975	1010	1140	800	815	870	
80	36	585	595	630	480	485	505	340	360	365	1700
	45	890	920	1025	760	775	830	590	595	615	
	56	1340	1400	1700	1195	1240	1405	1000	1010	1075	
100	45	725	745	805	605	615	645	415	440	475	2000
	56	1090	1130	1295	940	965	1045	740	750	782	
	70	1615	1700	2000	1460	1515	1770	1225	1255	1355	
125	56	900	925	1015	760	775	820	485	520	605	2300
	70	1340	1395	1640	1170	1205	1330	940	955	1000	
	90	2035	2150	2300	1860	1945	2300	1590	1635	1815	
160	70	1100	1300	1255	935	955	1015	730	735	760	2600
	110	2410	2550	2600	2210	2315	2600	1905	1960	2180	
200	90	1420	1470	1680	1225	1255	1360	770	830	1020	2700
	140	2700	2700	2700	2700	2700	2700	2415	2495	2700	

Installation orientation

0°



45°



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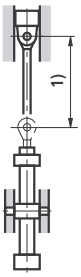


1) Perm. stroke

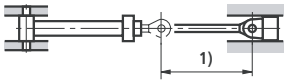
Permissible stroke length (nominal dimensions in mm)

Mounting type MT2

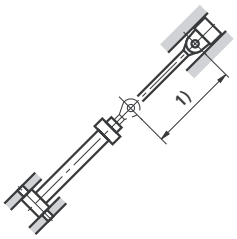
AL Ø	MM Ø	Permissible stroke length at 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	Max. available stroke length
25	12	130	130	135	100	100	105	65	65	65	600
	18	330	340	390	285	290	315	220	225	230	
32	14	135	135	140	100	100	105	65	65	65	800
	22	390	405	455	335	340	370	260	260	270	
40	18	180	185	200	145	145	150	95	95	100	1000
	22	305	315	340	250	260	270	185	190	195	
	28	485	505	600	425	435	485	335	345	360	
50	22	230	235	245	180	185	190	125	125	125	1200
	28	410	425	465	345	350	370	260	265	270	
	36	645	675	815	570	590	665	460	470	500	
63	28	310	315	335	250	250	260	180	180	180	1400
	36	550	565	630	465	475	505	360	365	375	
	45	800	840	1025	710	735	835	580	595	630	
80	36	415	425	450	340	345	355	250	250	255	1700
	45	675	700	780	580	590	630	450	455	470	
	56	980	1030	1260	875	905	1030	720	735	780	
100	45	515	530	575	430	435	455	320	320	330	2000
	56	825	855	980	710	730	795	565	570	595	
	70	1185	1245	1585	1065	1110	1300	890	915	990	
125	56	640	660	730	540	550	580	410	410	425	2300
	70	1015	1060	1240	890	915	1010	715	725	760	
	90	1495	1580	2110	1365	1425	1735	1160	1195	1330	
160	70	785	810	905	665	675	720	505	515	530	2600
	110	1770	1870	2505	1620	1695	2070	1390	1430	1595	
200	90	1015	1055	1210	870	895	970	680	685	715	2700
	140	2190	2325	2700	2025	2125	2695	1760	1825	2080	

Installation orientation

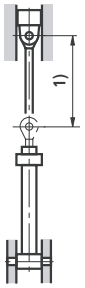
0°



45°



90°



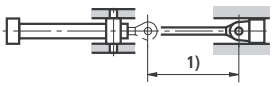
[1] Perm. stroke

Mounting type MT1

AL Ø	MM Ø	Permissible stroke length at 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	Max. available stroke length
25	12	325	325	330	260	260	265	190	190	190	600
	18	600	600	600	600	600	600	500	510	520	
32	14	335	335	345	265	270	270	190	190	190	800
	22	800	800	800	735	750	800	580	590	605	
40	18	460	465	475	370	375	375	270	270	275	1000
	22	690	705	760	585	595	620	455	460	465	
	28	1000	1000	1000	945	970	1000	760	770	800	
50	22	550	555	570	450	450	455	330	330	335	1200
	28	905	930	1015	775	790	830	615	620	630	
	36	1200	1200	1200	1200	1200	1200	1010	1025	1075	
63	28	715	725	750	590	590	600	440	440	445	1400
	36	1175	1210	1335	1015	1035	1100	805	810	835	
	45	1400	1400	1400	1400	1400	1400	1245	1270	1345	
80	36	940	955	995	780	785	805	590	590	600	1700
	45	1465	1510	1675	1270	1300	1375	1015	1025	1055	
	56	1700	1700	1700	1700	1700	1700	1525	1555	1655	
100	45	1190	1210	1270	995	1005	1030	740	760	770	2000
	56	1790	1850	2000	1570	1600	1730	1270	1285	1330	
	70	2000	2000	2000	2000	2000	2000	1900	1945	2000	
125	56	1480	1505	1595	1245	1260	1300	965	970	980	2300
	70	2190	2270	2300	1935	1990	2175	1585	1605	1675	
	90	2300	2300	2300	2300	2300	2300	2300	2300	2300	
160	70	1805	1840	1965	1525	1545	1600	1185	1195	1210	2600
	110	2600	2600	2600	2600	2600	2600	2600	2600	2600	
200	90	2340	2400	2610	2000	2035	2135	1575	1585	1620	2700
	140	2700	2700	2700	2700	2700	2700	2700	2700	2700	

Installation orientation

0°



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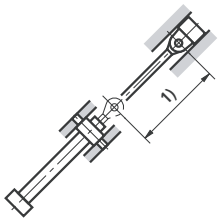

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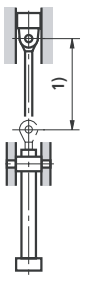


[1] Perm. stroke

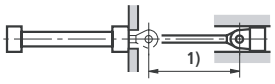
Permissible stroke length (nominal dimensions in mm)

Mounting types ME5, MX3, MX5

AL Ø	MM Ø	Permissible stroke length at 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	Max. available stroke length
25	12	510	520	540	430	435	445	335	335	340	600
	18	600	600	600	600	600	600	600	600	600	
32	14	535	545	565	445	450	460	345	345	350	800
	22	800	800	800	800	800	800	800	800	800	
40	18	710	725	755	600	605	620	465	470	475	1000
	22	990	1000	1000	870	890	955	705	715	735	
	28	1000	1000	1000	1000	1000	1000	1000	1000	1000	
50	22	850	865	910	720	725	750	560	565	570	1200
	28	1200	1200	1200	1125	1150	1200	920	930	965	
	36	1200	1200	1200	1200	1200	1200	1200	1200	1200	
63	28	1080	1100	1170	920	930	965	720	725	740	1400
	36	1400	1400	1400	1400	1400	1400	1205	1225	1280	
	45	1400	1400	1400	1400	1400	1400	1400	1400	1400	
80	36	1390	1425	1545	1195	1215	1270	950	955	975	1700
	45	1700	1700	1700	1700	1700	1700	1485	1510	1580	
	56	1700	1700	1700	1700	1700	1700	1700	1700	1700	
100	45	1710	1760	1935	1480	1510	1590	1185	1195	1225	2000
	56	2000	2000	2000	2000	2000	2000	1815	1850	1965	
	70	2000	2000	2000	2000	2000	2000	2000	2000	2000	
125	56	2100	2165	2300	1830	1865	1990	1200	1280	1540	2300
	70	2300	2300	2300	2300	2300	2300	2255	2300	2300	
	90	2300	2300	2300	2300	2300	2300	2300	2300	2300	
160	70	2540	2600	2600	2225	2275	2440	1805	1825	1885	2600
	110	2600	2600	2600	2600	2600	2600	2600	2600	2600	
200	90	2700	2700	2700	2700	2700	2700	2360	2395	2510	2700
	140	2700	2700	2700	2700	2700	2700	2700	2700	2700	

Installation orientation

0°



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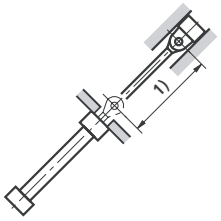
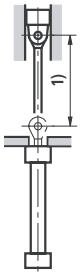


90°



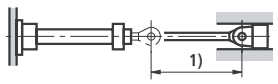
1) Perm. stroke

Mounting types ME6, MX1, MX2

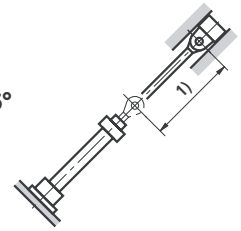
AL Ø	MM Ø	Permissible stroke length at 70 bar 0°	70 bar 45°	70 bar 90°	100 bar 0°	100 bar 45°	100 bar 90°	160 bar 0°	160 bar 45°	160 bar 90°	Max. available stroke length
25	12	195	200	220	160	160	170	115	115	120	600
	18	445	465	585	395	410	475	325	330	360	
32	14	205	210	230	165	170	180	120	120	120	800
	22	525	550	685	465	485	560	385	390	420	
40	18	270	280	315	225	230	245	165	165	170	1000
	22	435	455	520	375	385	420	295	300	310	
	28	645	680	895	580	605	730	485	500	555	
50	22	335	350	390	280	285	305	210	210	220	1200
	28	580	600	700	505	515	565	400	405	425	
	36	845	895	1200	770	805	990	655	675	755	
63	28	445	460	520	375	385	415	285	290	300	1400
	36	760	795	940	670	690	765	540	550	580	
	45	1045	1105	1400	955	1140	1240	815	845	955	
80	36	590	610	690	505	515	555	390	395	410	1700
	45	940	980	1160	830	855	950	675	685	720	
	56	1275	1350	1700	1170	1225	1520	1005	1035	1175	
100	45	725	755	885	630	645	710	495	505	530	2000
	56	1145	1200	1465	1025	1060	1205	850	865	920	
	70	1530	1625	2000	1415	1485	1925	1230	1280	1485	
125	56	885	925	1110	775	800	900	620	635	670	2300
	70	1380	1450	1835	1245	1290	1500	1040	1065	1155	
	90	1900	2025	2300	1770	1875	2300	1570	1640	1980	
160	70	1080	1130	1370	950	985	1110	770	785	835	2600
	110	2250	2395	2600	2105	2225	2600	1870	1950	2360	
200	90	1375	1445	1825	1225	1275	1485	1010	1035	1120	2700
	140	2700	2700	2700	2605	2700	2700	2340	2450	2700	

Installation orientation

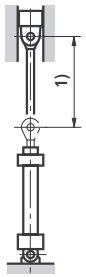
0°



45°



90°



1) Perm. stroke

End position cushioning

End position cushioning:

The objective is to reduce the speed of a moving mass, whose centre of gravity is on the cylinder axis, to a level, at which neither the cylinder nor the machine, into which the cylinder is installed, can be damaged.

For velocities above 20 mm/s we recommend the use of end position cushioning, so that the energy can be absorbed without the use of additional means.

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

The advantages of this cushioning system are:

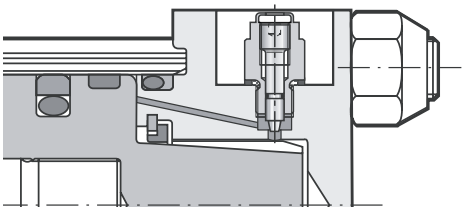
- Progressive deceleration.
- Short cushioning times.
- Cushioning length depends on velocity.
- Low cushioning pressures and no pressure peaks, hence increase safety and longer service life of the cylinder and the machine.
- Insusceptible to changes in pressure, temperature and moved mass.
- Controlled limitation of the piston's end stop velocity – increased safety and reliability.
- Faster acceleration from the end position due to special check valve and floating bush.

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

The adjustable end position cushioning type "E" is the same as type "D", but incorporates and additional throttle valve. End position cushioning type "E" allows optimising of the cycle times. The maximum cushioning capacity can only be achieved when the throttle valve is closed. However, care must be taken to ensure that the max. recommended end stop speed is not exceeded.

For special applications with very short stroke times, high speeds or great masses, the cylinders can also be provided with special end position cushioning types on request.

When using fixed or adjustable limit stops, special measures must be taken!

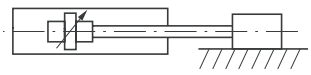


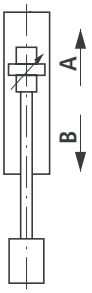
Cushioning capacity:

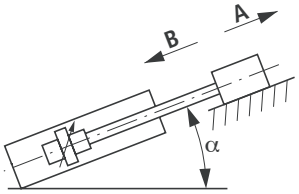
When decelerating masses via the end position cushioning, the maximum design cushioning capacity must not be exceeded.

In conjunction with this, the kinetic energy and potential energy of the moved mass must be calculated and compared with the permissible values specified in the diagrams on pages 36 to

Determination of energy







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

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

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

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

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

E	[Nm] [joule]	For maximum value, see pages 36-39
m	[kg]	Total moved mass, including piston and piston rod
v	[m/s]	Max. velocity
g	[m/s²]	9.81
l_a	[m]	Cushioning length, see page 35

End position cushioning

Cushioning lenghts and weights

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	20	20	20	20	31	31	31	33	33	33	33	33	33
	Cap	19	19	19	19	29	29	29	29	29	29	29	29	29
m in kg	Piston	0.15	0.2	0.25	0.4	0.6	0.6	0.7	0.8	1	1.2	1.4	1.7	2.0
(kg/100 mm)	Piston 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	33	33	33	33	33	33	33	33	33	38	38	57	57
	Cap	34	34	34	33	33	33	46	46	46	46	46	64	64
m in kg	Piston	2.6	3	3.6	4.7	5.3	6.3	8.0	9.2	11	16	20	30	38
(kg/100 mm)	Piston 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 the case of values higher than v_{max}, please consult us.

[12] Piston rod Ø not standardised

The diagrams on pages 36-39 are based on the above table, the specified maximum velocities related to seal “M” and a closed throttle screw.

At lower velocities, the absorbed energy reduces according to the following formula:

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

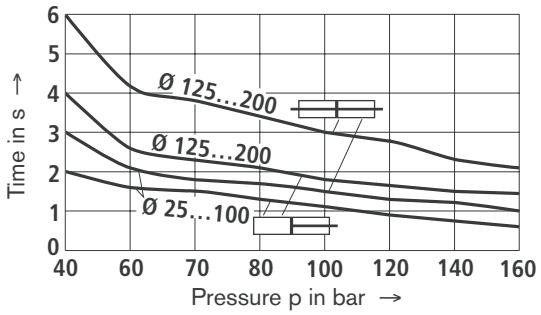
E_U = Energy absorbed

E_{max} = For max. energy, see characteristic curve

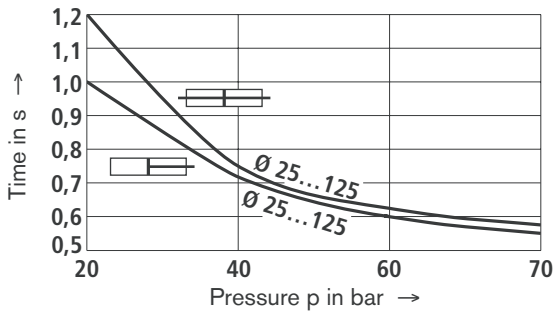
v_U = Stroke velocity

v_{max} = Max. velocity for seal version “M“

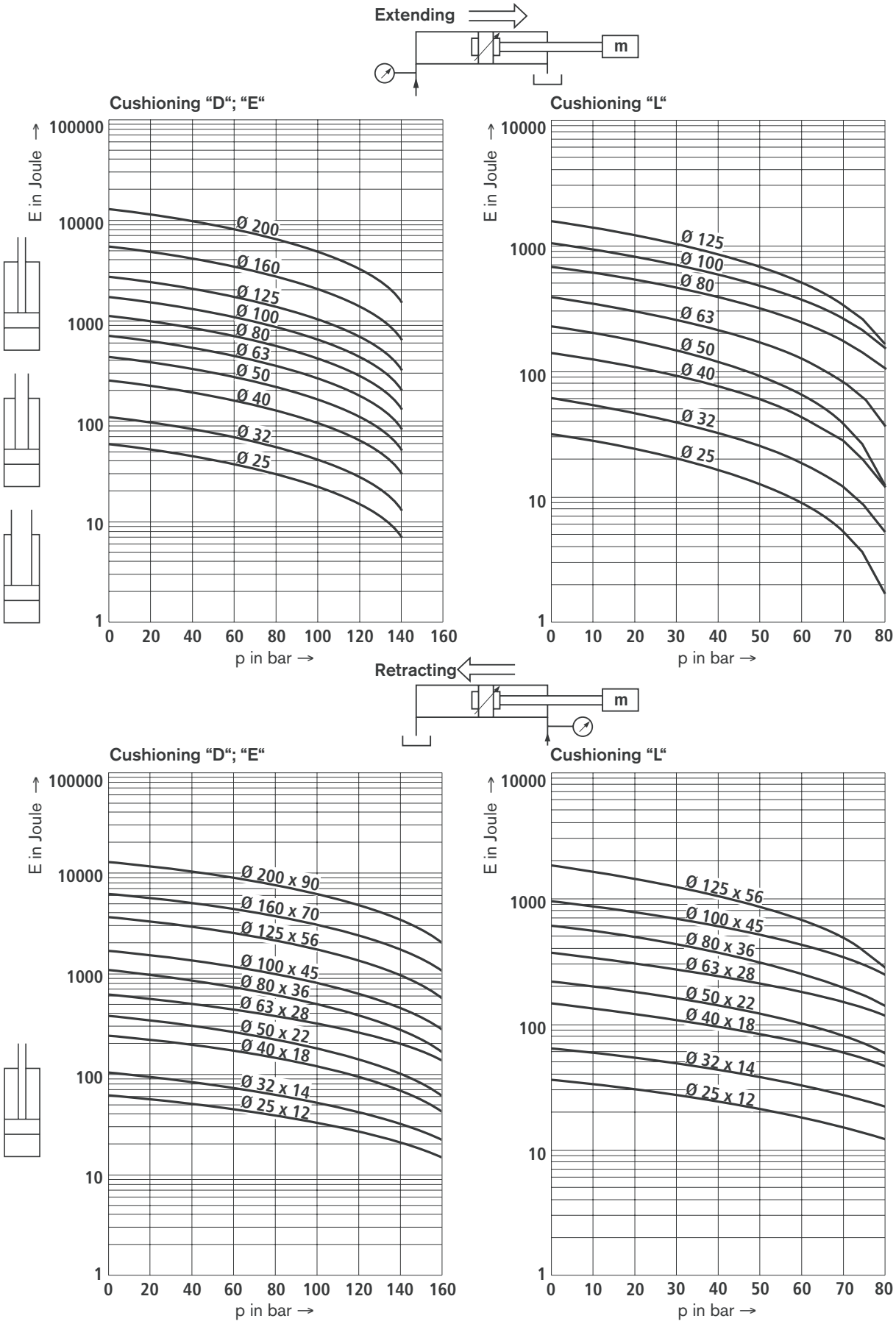
Max. cushioning time “D“; “E“



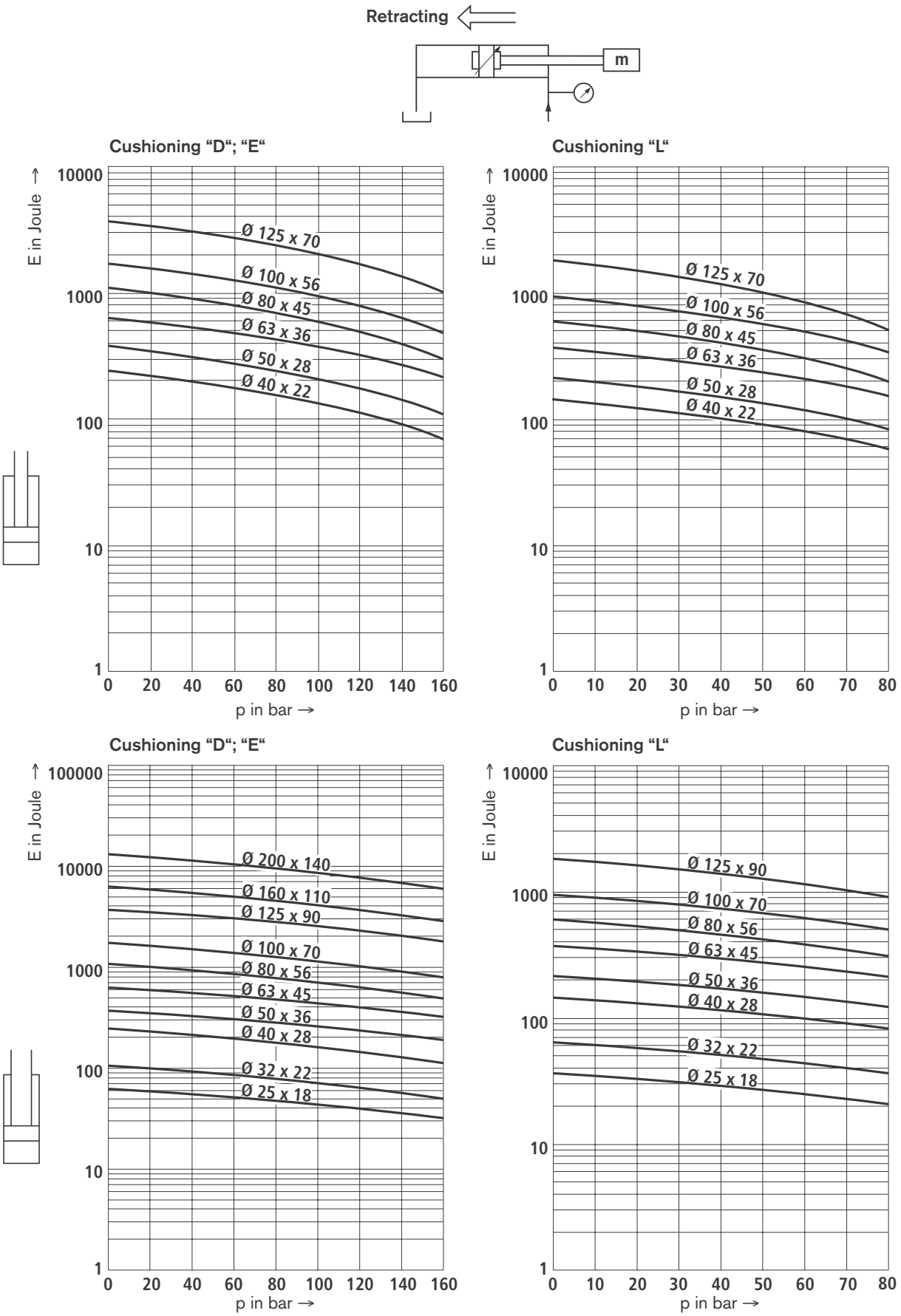
Max. cushioning time “L“



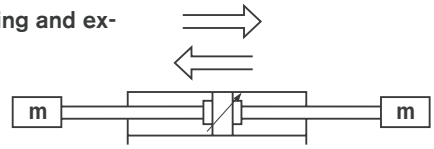
End position cushioning



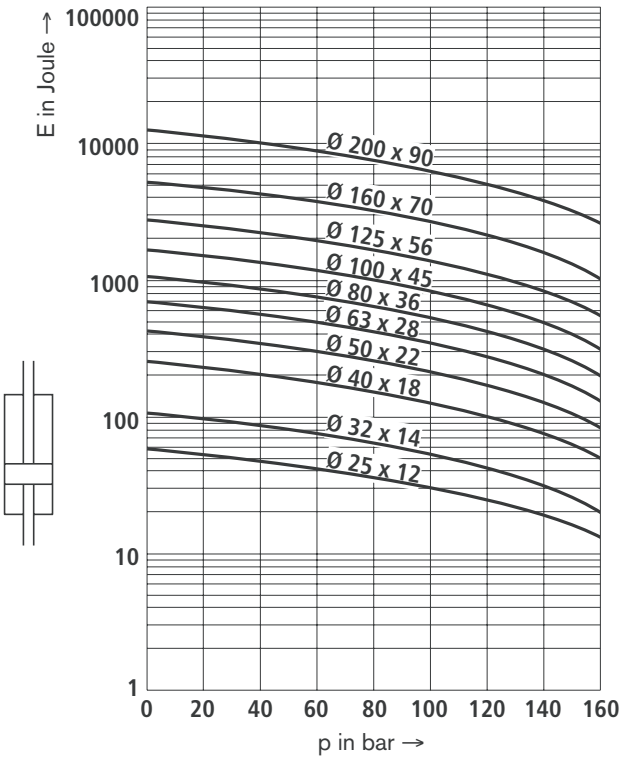
End position cushioning



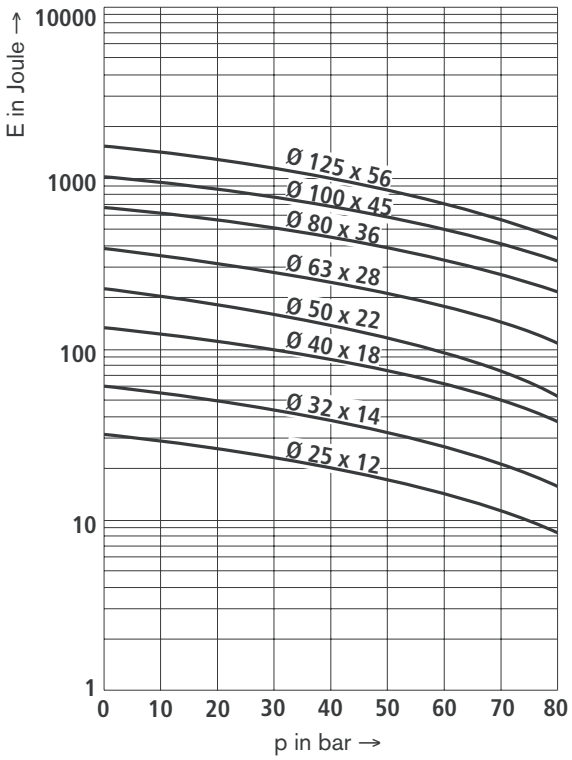
End position cushioning



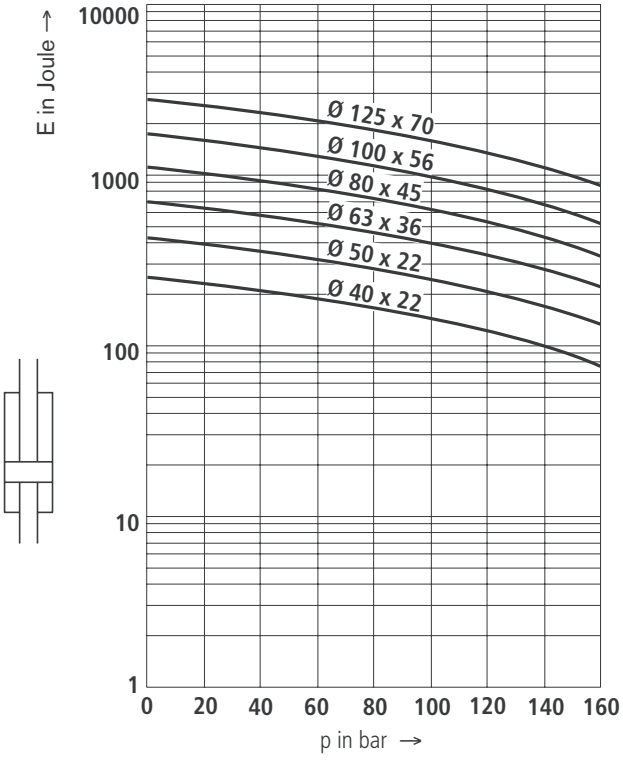
Cushioning "D"; "E"



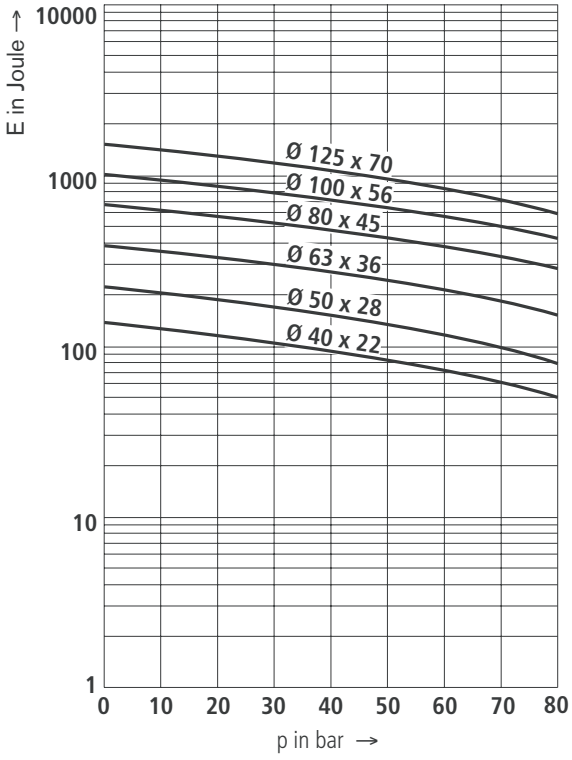
Cushioning "L"



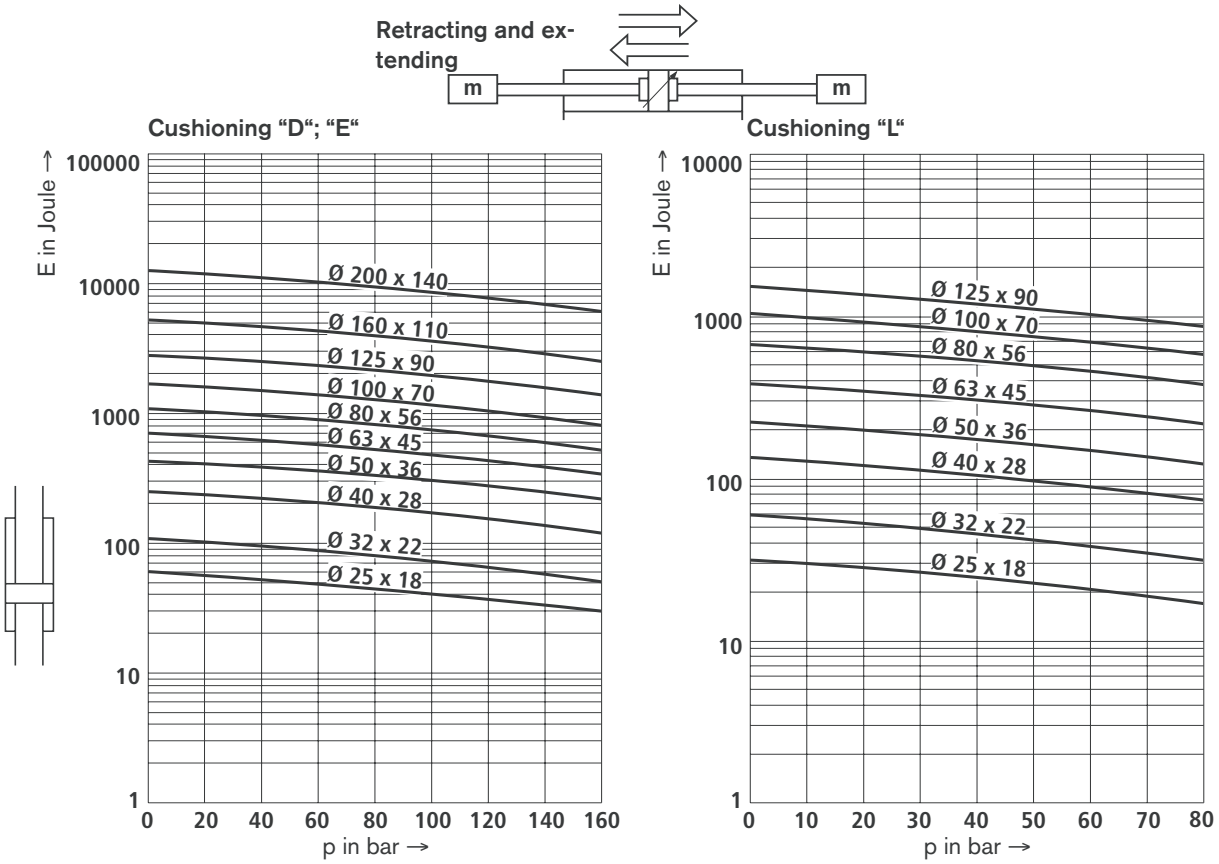
Cushioning "D"; "E"



Cushioning "L"

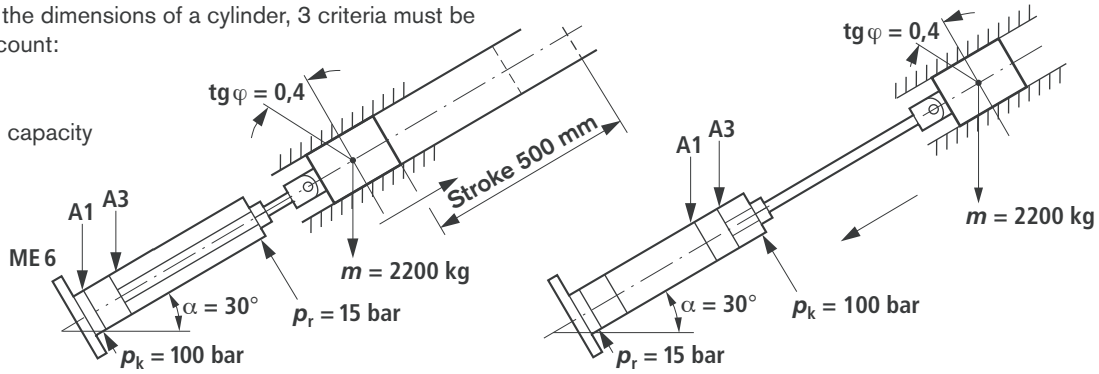


End position cushioning



Calculation example

To determine the dimensions of a cylinder, 3 criteria must be taken into account:
– Force
– Buckling
– Cushioning capacity



Example:
Stroke time = 2 seconds
Load friction coefficient = tg φ = 0.4 (estimated)
Available pressure p_k = 100 bar
Return pressure p_r = 15 bar
A1 = piston area, A3 = piston annulus area
φ = area ratio A1 / A3, see page 6
m = total moved mass, v = velocity
La = cushioning length, see page 35

To be determined:
Piston and piston rod diameter

Piston rod, extending:
Total efficiency η = η1 • η2
η1 = cylinder efficiency = 0.9 (estimated)
η2 = system efficiency

$$\eta 2 = \frac{p_k \bullet A1 - p_r \bullet A3}{p_k \bullet A1} = 1 - \frac{p_r}{p_k \bullet \varphi\ ^{1)}} = \frac{15}{100 \bullet 1.25} = 0.88$$

$$\eta = 0.9 \bullet 0.88 = 0.79$$

1) Assuming the smallest "φ"

Force required to move a mass:
F = frictional force plus potential energy
= tg φ • m • g • cos α + m • g • sin α
= 0.4 • 2200 • 9.81 • 0.866 + 2200 • 9.81 • 0.5 = 18270 N
= 18.27 kN
This theoretical force of 18.27 kN at η = 0.79 results in a required force = 23.13 kN, and consequently, for p_k = 100 bar a cylinder piston diameter = 63 mm is required, see page 6

Piston rod, retracting:
F = frictional force minus potential energy
= tg φ • m • g • cos α – m • g • sin α
= 0.4 • 2200 • 9.81 • 0.866 – 2200 • 9.81 • 0.5
= – 3315 N = – 3.3 kN No force problem when retracting

Verification of buckling length:
The table on page 33 shows for p_k = 100 bar and for cylinder 63 / 28 a permissible maximum stroke = 385 mm: The cylinder therefore buckles.

There are 2 possibilities:
– Select piston rod diameter 45, max. permissible stroke = 1140 mm, hence buckling-proof
– Change mounting type, e.g. MS2 with a permissible maximum stroke = 915 mm

Verification of 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 extending the piston rod =

$$\frac{m \bullet v_u^2}{2} - m \bullet g \bullet La \bullet \sin\alpha = \frac{2200 \bullet 0.275^2}{2} - 2200 \bullet 9.81 \bullet 0.033 \bullet 0.5 = -272 \text{ joules}$$

No cushioning problems when the piston rod is extending

Cushioning capacity required for retracting the piston rod =

$$\frac{m \bullet v_u^2}{2} + m \bullet g \bullet La \bullet \sin\alpha = \frac{2200 \bullet 0.275^2}{2} + 2200 \bullet 9.81 \bullet 0.029 \bullet 0.5 = 396 \text{ joules}$$

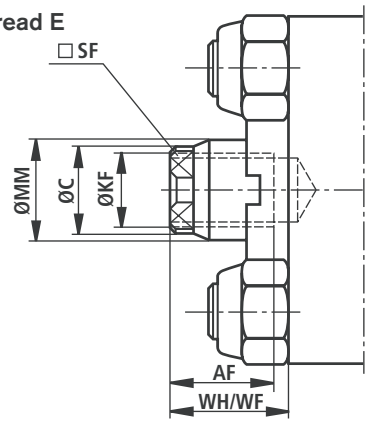
The diagram on page 37 shows 445 joules for pk = 100 bar and v_{max} = 0.4 m/s, i.e. for 0.275 m/s the cylinder can absorb energy (see page 35):

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

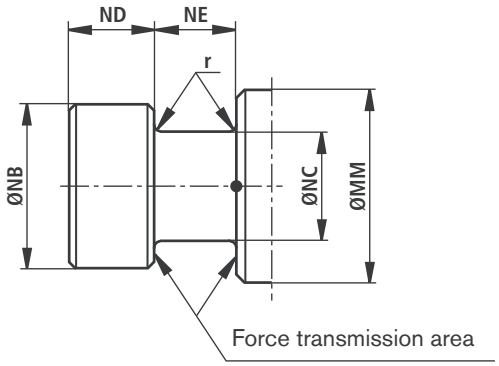
The cylinder cannot absorb the required cushioning capacity:
Select the next larger diameter 80 / 56.

Piston rod ends E and T (nominal dimensions in mm)

Female thread E



Spigot T



AL Ø	MM Ø	Stroke [2] min	KF	AF	C	SF	NB h13	NC h13	ND / NE h13 / H11	r	p max.[1] bar
25	12	0	M8x1	14	11	10	–	–	–	–	–
	18	0	M12x1.25	18	17	15	–	–	–	–	–
32	14	0	M10x1.25	16	13	11	–	–	–	–	–
	22	0	M16x1.5	22	21	18	18	11.2	8	0.5	160
40	18	0	M12x1.25	18	17	15	–	–	–	–	–
	28	0	M20x1.5	28	25	22	22.4	14	10	0.5	160
50	22	0	M16x1.5	22	21	18	18	11.2	8	0.5	105
	36	0	M27x2	36	33	30	28	18	12.5	0.8	190
63	28	0	M20x1.5	28	25	22	22.4	14	10	0.5	95
	45	0	M33x2	45	42	36	35.5	22.4	16	0.8	160
80	36	0	M27x2	36	33	30	28	18	12.5	0.8	105
	56	6	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	8	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] for pulling load

[2] = minimum stroke length for piston rod end “E“

Supplementary information

Mounting types:

MX5:
This mounting type, see ISO 6099, to NFE 48.016, allows mounting by means of 4 threaded holes in the head.

MS2:
- With key: a key according to DIN 6885 T1, form A, which has to be provided by the buyer, is to be inserted in a groove below the mounting foot in order to relieve the 4 fixing screws, see page 12; standard in preparation.
- Plate mounting: an oil connection via the supporting plate with O-ring and counterbore at connection position 3 is available on request.
- Positions of connections: positions 2 and 4 can cause mounting problems (connection fitting / fixing screws) and are therefore not offered in the standard product range.

Fixing screws:
To fix cylinders with mounting types MX..-/ME..-/MS.. use screws of class 12.9 and nuts of at least class 10. The tightening torques are stated on the relevant pages relating to dimensions.

Commissioning:
Observe the cylinder-specific operating instructions for mounting, commissioning and maintenance of hydraulic cylinders.
A cylinder can only perform its function in an optimum way, if the following basic rules are observed during mounting and prior to commissioning:
- A correct alignment of the cylinder prevents alignment errors, jamming of the piston rod, premature wear.
- Avoid side loads on the piston rod.
- Thoroughly clean the pipes and connection threads before assembly.
- Bleed the system and use a clean, well filtered oil. It is recommended that you install the cylinder when the piston rod is completely retracted , adjust the zero stroke of the load mechanically, extend the piston rod completely and to adjust the stroke position by means of the fixing points between the mass to be moved and the piston rod end.

Repair:
Spare parts kits are to be fitted in accordance with Rexroth guidelines.

Cylinder surface protection:
The cylinders are primered before being shipped, which ensures protection against corrosion. Other paints can be subsequently applied without any problems. On request, a white epoxy paint coat can be provided, which is recommended, e.g. for use in humid and aggressive environments.

Accessories:
The cylinder can be supplied with the CGKA self-aligning clevis fitted. Any other accessory parts can only be ordered as loose supply.

Mounting play:
Due to tolerances, movable mounts have a mechanical play and are therefore not suitable for use in closed control loops that require high positioning accuracy.

Metal wiper:
A metal wiper is recommended, where, due to adhesive dirt, standard wipers could be destroyed.

End position switch:
Inductive end position switches on enquiry.

Piston rod clamping unit:
To hold the piston rod mechanically over a longer period of time in a fixed position in the depressurised condition or for safety reasons, a piston rod clamping unit can be mounted to the cylinder head. However, it must in no case be used as braking unit.

Special applications:
Special applications such as three-position cylinders (cap to cap), single acting cylinders, air-pressurised on one end, on enquiry.

CD-ROM:
CD-ROM with cylinder calculation and 2 D and 3 D (files) on enquiry.

Internet:
Further information can be obtained at the Internet:
www.boschrexroth.de

Standard description:

ISO 6020/2:
Installation dimensions for 160 bar cylinders with a single piston rod – Part 2: Compact series for piston diameters 25 to 200 mm.

DIN 24554:
As ISO 6020/2, but restricted selection of mounting types and piston rod threads. Contained in many OEM and automotive specifications.

NFE 48.016:
As DIN 24 554, but additionally with mounting type MX 5, spigot at the piston rod end and cylinders with through piston rod.

ISO 6020/3:
Installation dimensions for 160 bar cylinders with a single piston rod – Part 2: Compact series for piston diameters 250 to 500 mm.

ISO 6099:
Description and coding of mounting types and their dimensions.

ISO 6195:
Installation spaces for piston rod wipers with linear movement – dimensions and tolerances.

ISO 5597:
Installation spaces for piston seals and piston rod seals – dimensions and tolerances.

ISO 7425/1:
Installation spaces for seals made of plastic-reinforced elastomers – Part 1: Installation dimensions for piston seals.

ISO 8131:
160 bar cylinders with a single piston rod, compact series, tolerances.

ISO 8133:
160 bar cylinders with a single piston rod, compact series – accessories interchangeability dimensions.

ISO/FDIS 8138:
160 bar cylinders with a single piston rod, compact series – oil connection dimensions.

ISO 6547:
Installation dimensions for piston seals and guide strips – dimensions and tolerances.

ISO 3320:
Piston and piston rod diameters – metric version.

ISO 3322:
Nominal pressures.

ISO 4393:
Piston strokes, basic series / preferred series

ISO 4395:
Types of threads and dimensions for piston rod ends.

DIN:
Standardisation organisation in Germany.

Afnor:
Standardisation organisation in France.

NF:
Standard issued by Afnor.

Spare parts – material no.

Complete seal kit

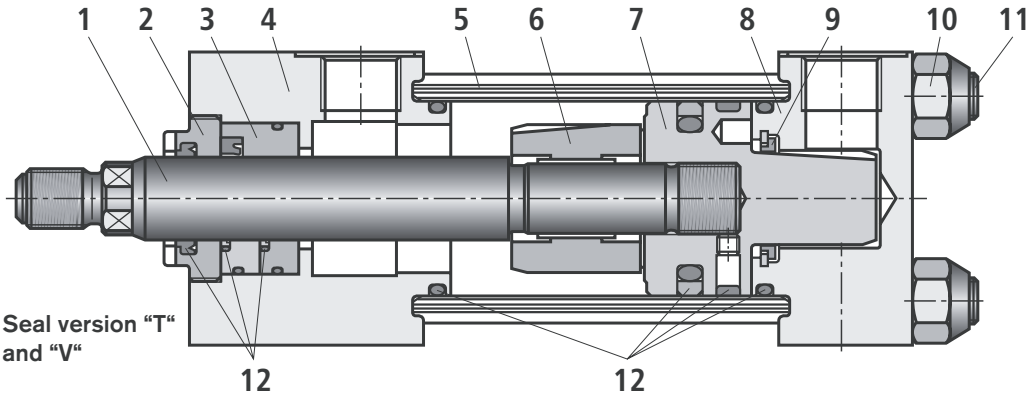
Ø AL	Ø MM	CDT3 M	CDT3 T	CDT3 V	CGT3 M	CGT3 T	CGT3 V
25	12	7 472 D02 046	7 472 D02 066	7 472 D02 086	7 472 D02 106	7 472 D02 126	7 472 D02 146
	18	7 472 D02 047	7 472 D02 067	7 472 D02 087	7 472 D02 107	7 472 D02 127	7 472 D02 147
32	14	7 472 D02 048	7 472 D02 068	7 472 D02 088	7 472 D02 108	7 472 D02 128	7 472 D02 148
	22	7 472 D02 049	7 472 D02 069	7 472 D02 089	7 472 D02 109	7 472 D02 129	7 472 D02 149
40	18	7 472 D02 050	7 472 D02 070	7 472 D02 090	7 472 D02 110	7 472 D02 130	7 472 D02 150
	22	7 472 D03 187	7 472 D03 193	7 472 D03 199	7 472 D03 205	7 472 D03 211	7 472 D03 217
	28	7 472 D02 051	7 472 D02 071	7 472 D02 091	7 472 D02 111	7 472 D02 131	7 472 D02 151
50	22	7 472 D02 052	7 472 D02 072	7 472 D02 092	7 472 D02 112	7 472 D02 132	7 472 D02 152
	28	7 472 D03 188	7 472 D03 194	7 472 D03 200	7 472 D03 206	7 472 D03 212	7 472 D03 218
	36	7 472 D02 053	7 472 D02 073	7 472 D02 093	7 472 D02 113	7 472 D02 133	7 472 D02 153
63	28	7 472 D02 054	7 472 D02 074	7 472 D02 094	7 472 D02 114	7 472 D02 134	7 472 D02 154
	36	7 472 D03 189	7 472 D03 195	7 472 D03 201	7 472 D03 207	7 472 D03 213	7 472 D03 219
	45	7 472 D02 055	7 472 D02 075	7 472 D02 095	7 472 D02 115	7 472 D02 135	7 472 D02 155
80	36	7 472 D02 056	7 472 D02 076	7 472 D02 096	7 472 D02 116	7 472 D02 136	7 472 D02 156
	45	7 472 D03 190	7 472 D03 196	7 472 D03 202	7 472 D03 208	7 472 D03 214	7 472 D03 220
	56	7 472 D02 057	7 472 D02 077	7 472 D02 097	7 472 D02 117	7 472 D02 137	7 472 D02 157
100	45	7 472 D02 058	7 472 D02 078	7 472 D02 098	7 472 D02 118	7 472 D02 138	7 472 D02 158
	56	7 472 D03 191	7 472 D03 197	7 472 D03 203	7 472 D03 209	7 472 D03 215	7 472 D03 221
	70	7 472 D02 059	7 472 D02 079	7 472 D02 099	7 472 D02 119	7 472 D02 139	7 472 D02 159
125	56	7 472 D02 060	7 472 D02 080	7 472 D02 100	7 472 D02 120	7 472 D02 140	7 472 D02 160
	70	7 472 D03 192	7 472 D03 198	7 472 D03 204	7 472 D03 210	7 472 D03 216	7 472 D03 222
	90	7 472 D02 061	7 472 D02 081	7 472 D02 101	7 472 D02 121	7 472 D02 141	7 472 D02 161
160	70	7 472 D02 062	7 472 D02 082	7 472 D02 102	7 472 D02 122	7 472 D02 142	7 472 D02 162
	110	7 472 D02 063	7 472 D02 083	7 472 D02 103	7 472 D02 123	7 472 D02 143	7 472 D02 163
200	90	7 472 D02 064	7 472 D02 084	7 472 D02 104	7 472 D02 124	7 472 D02 144	7 472 D02 164
	140	7 472 D02 065	7 472 D02 085	7 472 D02 105	7 472 D02 125	7 472 D02 145	7 472 D02 165

Ø AL	Ø MM	Guide bush kit assembled with seals M	Guide bush kit assembled with seals T	Guide bush kit assembled with seals V	Tie rod nut for mounting types ME5/6, MP1/3/5, MS2, MT1/2/4, MX5	Tie rod nut for mounting types MX1, MX2, MX3	Tightening torque in Nm for mounting types ME5/6, MP1/3/5, MS2, MT1/2/4, MX3/5	Tightening torque in Nm for mounting types MX1/2
25	12	7 472 D02 166	7 472 D02 183	7 472 D02 200	7 472 D02 379	7 472 D02 379	5,5	3
	18	7 472 D02 167	7 472 D02 184	7 472 D02 201				
32	14	7 472 D02 168	7 472 D02 185	7 472 D02 202	7 472 D02 380	7 472 D02 380	8	6,5
	22	7 472 D02 169	7 472 D02 186	7 472 D02 203				
40	18	7 472 D02 170	7 472 D02 187	7 472 D02 204	2 915 062 005	7 472 D02 381	20	12
	22	7 472 D03 223	7 472 D03 229	7 472 D03 235				
	28	7 472 D02 171	7 472 D02 188	7 472 D02 205				
50	22	7 472 D02 172	7 472 D02 189	7 472 D02 206	1 813 300 820	7 472 D02 382	50	37
	28	7 472 D03 224	7 472 D03 230	7 472 D03 236				
	36	7 472 D02 173	7 472 D02 190	7 472 D02 207				
63	28	7 472 D02 174	7 472 D02 191	7 472 D02 208	1 813 300 820	7 472 D02 382	60	40
	36	7 472 D03 225	7 472 D03 231	7 472 D03 237				
	45	7 472 D02 175	7 472 D02 192	7 472 D02 209				
80	36	7 472 D02 173	7 472 D02 190	7 472 D02 207	1 813 300 821	7 472 D02 383	125	90
	45	7 472 D03 226	7 472 D03 232	7 472 D03 238				
	56	7 472 D02 176	7 472 D02 193	7 472 D02 210				
100	45	7 472 D02 177	7 472 D02 194	7 472 D02 211	1 813 300 821	7 472 D02 383	190	100
	56	7 472 D03 227	7 472 D03 233	7 472 D03 239				
	70	7 472 D02 178	7 472 D02 195	7 472 D02 212				
125	56	7 472 D02 176	7 472 D02 193	7 472 D02 210	7 472 Z76 723	7 472 D02 384	400	240
	70	7 472 D03 228	7 472 D03 234	7 472 D03 240				
	90	7 472 D02 179	7 472 D02 196	7 472 D02 213				
160	70	7 472 D02 180	7 472 D02 197	7 472 D02 214	1 813 300 824	7 472 D02 385	800	450
	110	7 472 D02 181	7 472 D02 198	7 472 D02 215				
200	90	7 472 D02 179	7 472 D02 196	7 472 D02 213	7 472 Z76 719	7 472 D02 386	1250	600
	140	7 472 D02 182	7 472 D02 199	7 472 D02 216				

If spares for head, cap, barrel, piston rod, etc. are required, state the material number of the cylinder.

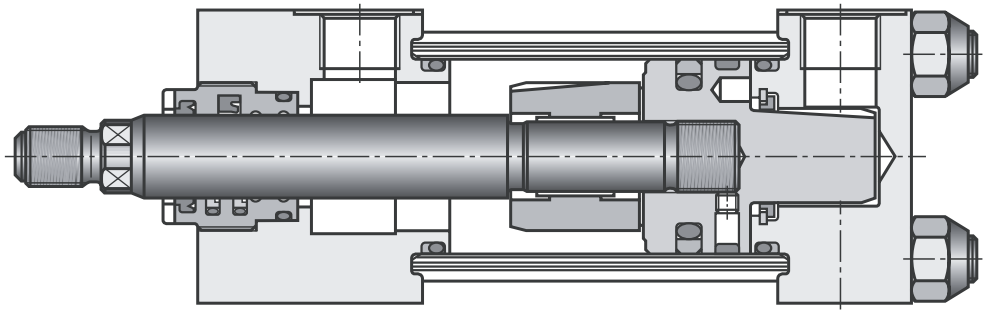
Spare parts

CDT3 Ø25, Ø32
Seal version “M“



Seal version “T“ and “V“

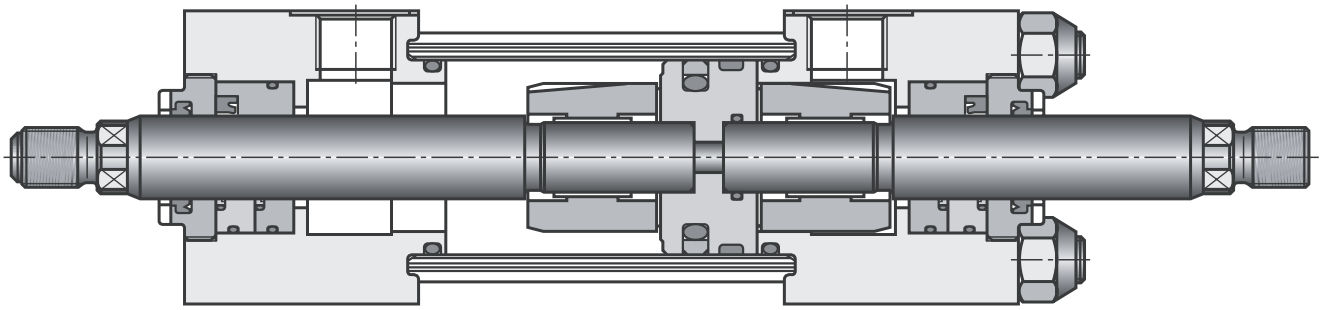
CDT3 Ø40 ... 200
Seal version “M“



Seal version “T“ and “V“

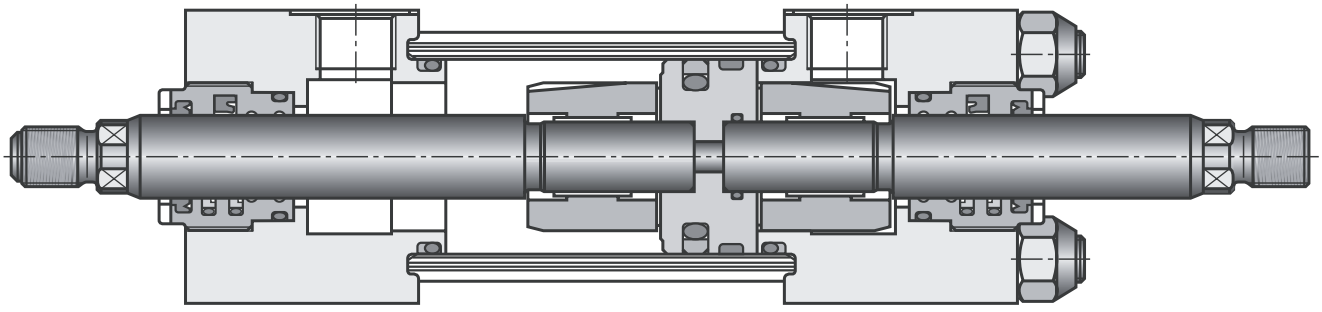
1 Piston rod
2 Cover
3 Guide bush
4 Cylinder head
5 Cylinder barrel
6 Cushioning bush
7 Piston
8 Cylinder cap
9 Damping ring
10 Nut
11 Tie rod
12 Seal kit
- Wiper
- Piston rod seal
- Piston seal
- O-ring
- Guide ring

CGT3 Ø25, Ø32
Seal version “M“



Seal version “T“ and “V“

CGT3 Ø40 ... 200
Seal version “M“



Seal version “T“ and “V“

General notes

Series CST3... is based on series CDT3.
(According to ISO 6020 /2)
For series CST3... the same general notes are valid as for series CDT3.

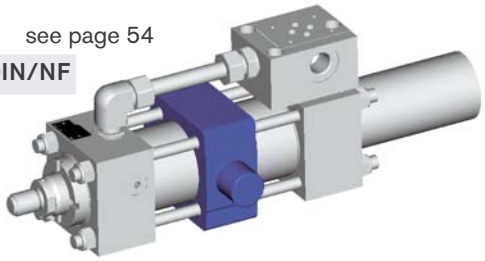
Deviations in tolerances or in the type code that result from the integrated position measuring system are given on the following pages.

Overview of mounting types: Series CST3...F

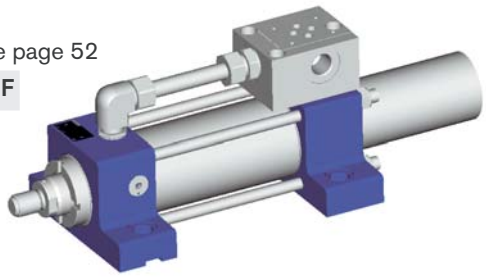
MP5 see page 50
ISO/DIN/NF

ME5 see page 48
ISO/DIN/NF

MT4 see page 54
ISO/DIN/NF



MS2 see page 52
ISO/DIN/NF



MX5 see page 56
NF

Stroke lengths

Maximum stroke length

AL-Ø	40	50	63	80	100	125	160	200
Mounting type	max. stroke length in mm							
ME5, MS2, MX5	480	600	750	800	1000	1250	1280	1400
MT4, MP5	320	400	500	530	660	830	850	930

Minimum stroke length without subplate

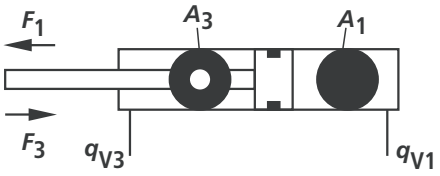
AL-Ø	40	50	63	80	100	125	160	200
Mounting type	min. stroke length in mm							
ME5, MS2, MX5, MP5	0						20	
MT4	15	4	10	11	17	25	40	48

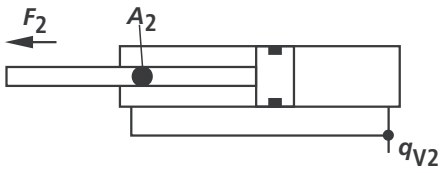
Minimum stroke length with subplate

AL-Ø	40	50	63	80	100	125	160	200
Mounting type	min. stroke length in mm							
ME5, MS2, MX5, MP5	50	50	45	30	50	35	20	20
MT4	70	50	45	35	57	63	74	73

Aras, forces, flow

Piston	Piston rod	Area ratio	Areas			Force at 160 bar [1]			Flow at 0.1 m/s [2]		
			Piston	Rod	Annulus	Pushing	Diff.	Pulling	Out	Diff.	In
AL Ø mm	**MM** Ø mm	φ A_1/A_3	A_1 cm²	A_2 cm²	A_3 cm²	F_1 kN	F_2 kN	F_3 kN	q_{V1} L/min	q_{V2} L/min	q_{V3} L/min
40	**28**	1.96	12.56	6.16	6.40	20.11	9.85	10.25	7.5	3.7	3.8
50	**28** [12)] **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** [12)] **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** [12)] **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** [12)] **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** [12)] **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





Remarks

[1)] Theoretical force (without consideration of efficiency)

[2)] Stroke velocity

[12)] Piston rod Ø not standardised

Weights of cylinders without subplate (in kg)

CST3

Ø AL	Ø MM	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

For self-aligning clevis, fork-type mounting block and trunnion mounting block, see pages 28 and 29

For subplates, see page 58

[12)] Piston rod Ø not standardised

Ordering code

CS	T3	/ / /	F	1X	/			H		U		T		*

Single rod cylinder with position measuring system = CS

Series: = T3

Mounting types DIN / ISO
- Rectangular flange at head = ME5
- Self-aligning clevis at cap [5] = MP5
- Foot mounting [3] = MS2
- Trunnion [1] = MT4
- Threaded bore at head [2] = MX5

Piston Ø (AL) 40 to 200 mm

Piston rod Ø (MM) 28 to 140 mm

Stroke length in mm

Design principle
- Head and cap connected by tie rod with guide bush = F

Component series = 1X
10 to 19: unchanged installation and connection dimensions

Pipe connection / version
- BSP thread (ISO 8138) = B
- Connection plaate size 6 [3; 4] = P
- Connection plaate size 10 [3] = T

Pipe connection / position at head
see page 27
View to piston rod
= 1
= 2
= 3
= 4

Pipe connection / position at cap
see page 27
View to piston rod
1 =
2 =
3 =
4 =

Piston rod version
- H = Hardened and hard chromium-plated

Piston rod end
see pages 48 to 57
- H = Thread (DIN/ISO) for self-aligning clevis CGKA/CGKD
- D = Thread (ISO) for self-aligning clevis CGKA/CGKD
- F = With self-aligning clevis CGKA/CGKD mounted (DIN/ISO)
- K = With self-aligning clevis CGKA/CGKD mounted (ISO)

End position cushioning
- U = None

Seal version
see page 3
- M = Standard seal system
- T = Reduced friction
- V = High temperature with reduced friction

Option 1
- T = Position measuring system (magnetostrictive) without cable socket
  Cable socket – separate order, see page 60

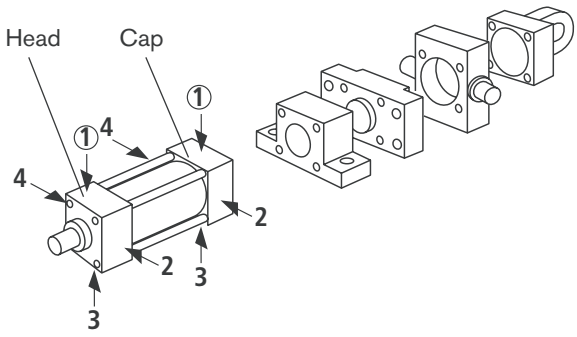
Option 2
- V = Prepeared for position measuring system
- C = Analogue output 4-20 mA
- F = Analogue output 0-10 V
- D = Digital output SSI

*Further details in clear text

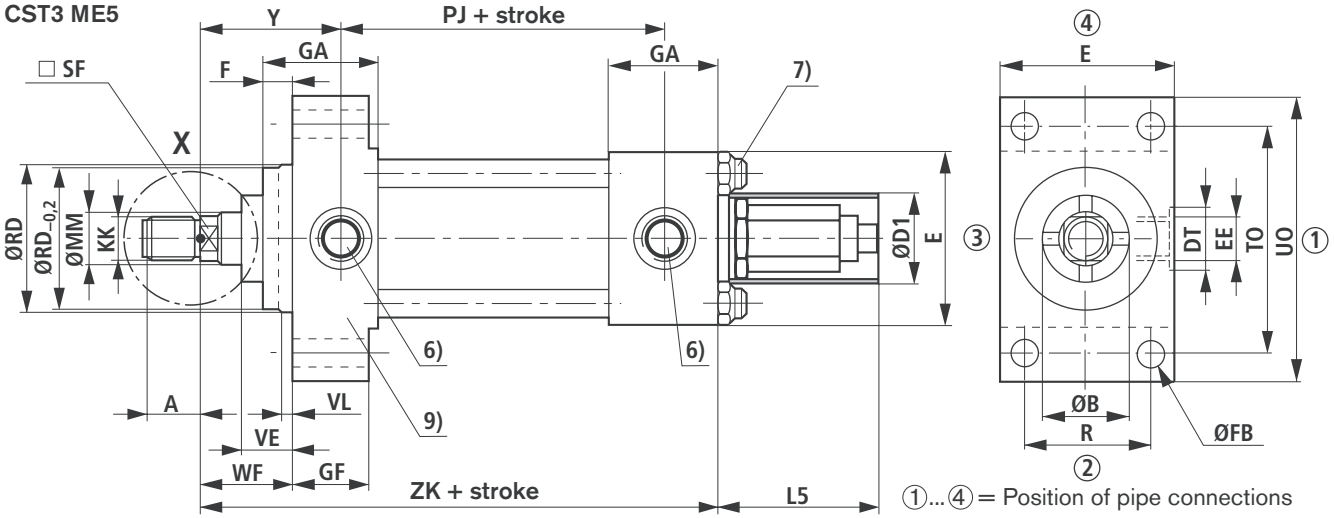
Remarks:
[1] = Optional position of trunnion, always indicate dimensionn “XV“ in mm in clear text on the order
[2] = Not standardised to DIN / ISO
[3] = Only position 11 possible
[4] = Only up to piston Ø 80 mm
[5] = Piston Ø 40 mm not possible

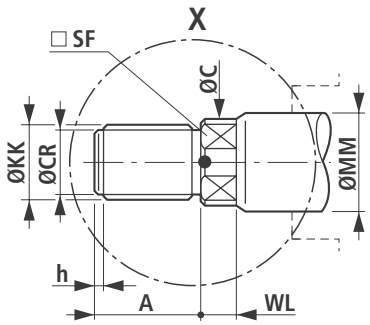
When making your selection, observe the restrictions on the relevant pages in the catalogue!

Order example: CST3ME5/50/36/300F1X/P11HDUTTD



Mounting type ME5 (nominal dimensions in mm)





AL Ø	F max	FB H13	GF [9]	PJ [10] ± 1,25	PJ [11] ± 1,25	R JS13	TO JS13	UO max	VE max	VL min	ZK ± 1	L5	Ø D1 max
40	10	11	38	73	77	41	87	110	22	3	172	95	51
50	16	14	38	74	78	52	105	130	25	4	183	102	51
63	16	14	38	80	81,5	65	117	145	29	4	190	105	60
80	20	18	45	93	93	83	149	180	29	4	216	82	100
100	22	18	45	101	101	97	162	200	32	5	230	82	100
125	22	22	58	117	117	126	208	250	32	5	254	82	120
160	25	26	58	130	130	155	253	300	32	5	270	82	120
200	25	33	76	160	160	190	300	360	32	5	329	82	120

Dimensions ME5 (nominal dimensions in mm)

		DIN / ISO [1]							ISO [2]								
AL Ø	MM Ø	KK [1]	A [1] max	C Ø	SF	WL	h	CR	KK [2]	A [2] max	C Ø	SF	WL	h	CR	B f9	RE f8
40	28	M14x1.5	18	25	22	7	2	11	M20x1.5	28	25	22	7	3	17	42	62
50	28								M20x1.5	28	25	22	7	3	17	42	74
	36	M16x1.5	22	33	30	8	3	13	M27x2	36	33	30	8	3	23.5	50	74
63	36								M27x2	36	33	30	8	3	23.5	50	88
	45	M20x1.5	28	42	36	10	3	17	M33x2	45	42	36	10	4	29.5	60	88
80	45								M33x2	45	42	36	10	4	29.5	60	105
	56	M27x2	36	53	46	10	3	24	M42x2	56	53	46	10	5	38.5	72	105
100	56								M42x2	56	53	46	10	5	38.5	72	125
	70	M33x2	45	67	60	15	4	30	M48x2	63	67	60	15	3	44.5	88	125
125	70								M48x2	63	67	60	15	3	44.5	88	150
	90	M42x2	56	86	75	15	5	39	M64x3	85	86	75	15	4.5	59	108	150
160	70	M48x2	63	67	60	15	3	44.5								88	125
	110	M48x2	63	106	92	18	3	45	M80x3	95	106	92	18	4.5	75	133	170
200	90	M64x3	85	86	75	15	4.5	59								108	150
	140	M64x3	85	136	125	18	5	59	M100x3	112	136	125	18	4.5	95	163	210

AL Ø	E	EE	DT	GA	WF ± 2	WH ± 2	Y [10] ± 2	Y [11] ± 2
40	63 ± 1.5	G 3/8	28	52	35	25	63	58
50	75 ± 1.5	G 1/2	34	57.8	41	25	67	63
63	90 ± 1.5	G 1/2	34	55.8	48	32	71	69.5
80	115 ± 1.5	G 3/4	42	65	51	31	77	77
100	130 ± 2	G 3/4	42	67	57	35	82	82
125	165 ± 2	G 1	47	73.5	57	35	86	86
160	205 ± 2	G 1	47	80.5	57	32	86	86
200	245 ± 2	G 1 1/4	58	101	57	32	98	98

[1] Thread for piston rod ends “F“ and “H“

[2] Thread for piston rod ends “D“ and “K“

[6] Positions of pipe connections and bleed point, see page 27

[7] For tightening torque, see page 43

[9] Flange thickness to DIN 24554

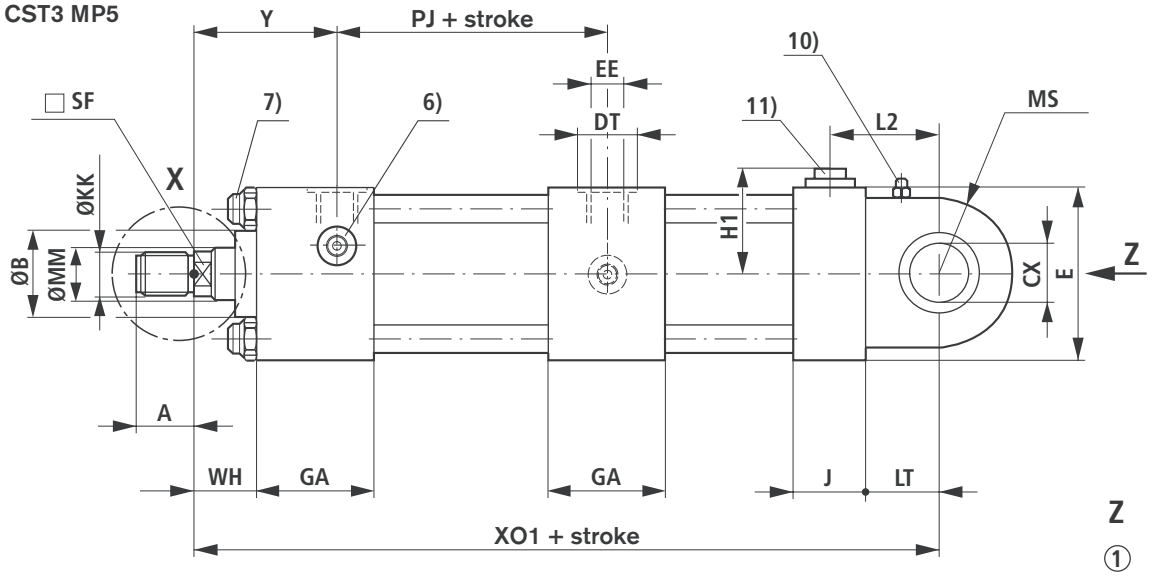
[10] ME5: for pipe connection positions “1” and “3” at head

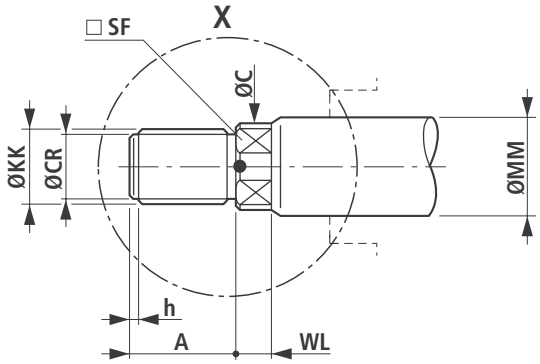
[11] ME5: for pipe connection positions “2“ and “4“ at head

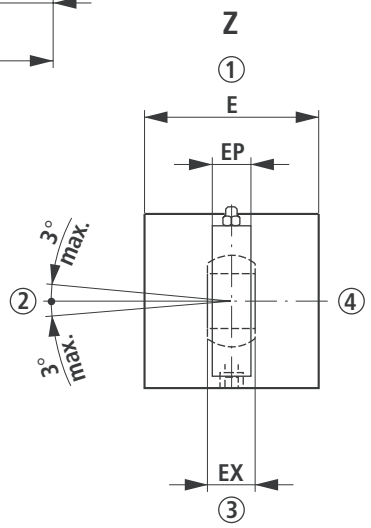
[12] Piston rod Ø not standardised

Mounting type MP5 (nominal dimensions in mm)

CST3 MP5







①...④ = Position of pipe connections

AL Ø	CX	EP h15	EX	LT min	XO1 ± 1.25	MS max	H1	L2
50	25 – 0.012	17	20 – 0.12	31	365	33	45.5	49
63	30 – 0.012	19	22 – 0.12	38	383	40	53	55
80	40 – 0.012	23	28 – 0.12	48	410	50	65.5	68
100	50 – 0.012	30	35 – 0.12	58	436	62	73	78
125	60 – 0.015	38	44 – 0.15	72	487	80	90.5	101
160	80 – 0.015	47	55 – 0.15	92	528	100	110.5	120.5
200	100 – 0.020	57	70 – 0.20	116	632	120	130.5	157

Dimensions MP5 (nominal dimensions in mm)

		DIN / ISO [1]							ISO [2]							
AL Ø	**MM Ø**	**KK** [1]	**A** [1] max	**C Ø**	**SF**	**WL**	**h**	**CR**	**KK** [2]	**A** [2] max	**C Ø**	**SF**	**WL**	**h**	**CR**	**B** f9
40	**28**	M14x1.5	18	25	22	7	2	11	M20x1.5	28	25	22	7	3	17	42
50	**28**								M20x1.5	28	25	22	7	3	17	42
	36	M16x1.5	22	33	30	8	3	13	M27x2	36	33	30	8	3	23.5	50
63	**36**								M27x2	36	33	30	8	3	23.5	50
	45	M20x1.5	28	42	36	10	3	17	M33x2	45	42	36	10	4	29.5	60
80	**45**								M33x2	45	42	36	10	4	29.5	60
	56	M27x2	36	53	46	10	3	24	M42x2	56	53	46	10	5	38.5	72
100	**56**								M42x2	56	53	46	10	5	38.5	72
	70	M33x2	45	67	60	15	4	30	M48x2	63	67	60	15	3	44.5	88
125	**70**								M48x2	63	67	60	15	3	44.5	88
	90	M42x2	56	86	75	15	5	39	M64x3	85	86	75	15	4.5	59	108
160	**70**	M48x2	63	67	60	15	3	44.5								88
	110	M48x2	63	106	92	18	3	45	M80x3	95	106	92	18	4.5	75	133
200	**90**	M64x3	85	86	75	15	4.5	59								108
	140	M64x3	85	136	125	18	5	59	M100x3	112	136	125	18	4.5	95	163

AL Ø	**E**	**EE**	**DT**	**GA**	**J**	**PJ** ± 1.25	**WH** ± 2	**Y** ± 2
50	75 ± 1.5	G 1/2	34	57.8	33.8	74	25	67
63	90 ± 1.5	G 1/2	34	55.8	33.8	80	32	71
80	115 ± 1.5	G 3/4	42	65	39	93	31	77
100	130 ± 2	G 3/4	42	67	40	101	35	82
125	165 ± 2	G 1	47	73.5	51.5	117	35	86
160	205 ± 2	G 1	47	80.5	55.5	130	32	86
200	245 ± 2	G 1 1/4	58	101	76	160	32	98

[1] Thread for piston rod ends “F“ and “H“

[2] Thread for piston rod ends “D“ and “K“

[6] For positions of pipe connections and bleed point, see page 27

[7] For tightening torque, see page 43

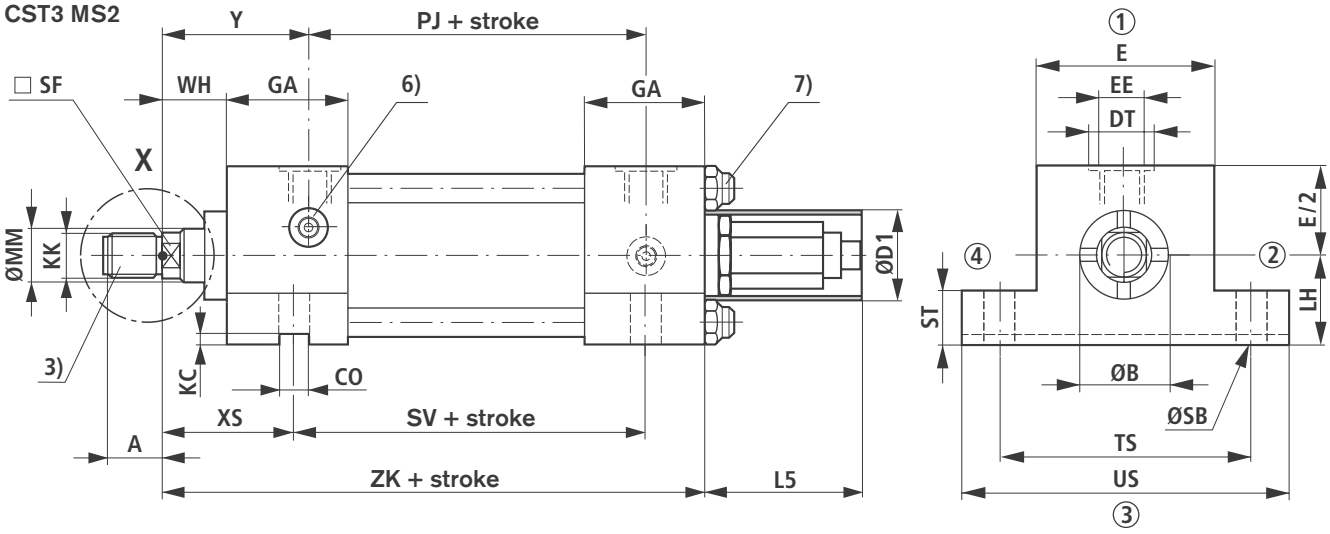
[10] Grease nipple M6 DIN 71412

[11] At position 1 only

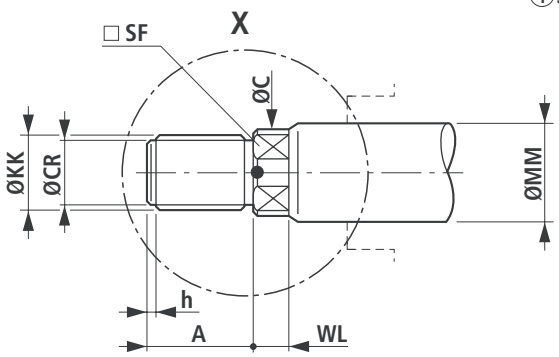
[12] Piston rod Ø not standardised

Mounting type MS2 (nominal dimensions in mm)

CST3 MS2



①...④ = Position of pipe connections



AL Ø	CO H8	KC	LH h10	PJ ± 1,25	SB H13	ST	SV ± 1	TS JS13	US + 2	XS ± 2	ZK ± 1	L5	ØD1 max
40	12	4	31	73	11	12.5	107.5	83	103	45	172	95	51
50	12	4	37	74	14	19	100.5	102	127	54	183	102	51
63	16	4	44	80	18	26	92.5	124	161	65	190	105	60
80	16	5	57	93	18	26	111.5	149	186	68	216	82	100
100	16	5	63	101	26	32	107.5	172	216	79	230	82	100
125	20	5	82	117	26	32	131.5	210	254	79	254	82	120
160	–	–	101	130	33	38	130.5	260	318	86	270	82	120
200	–	–	122	160	39	44	172.5	311	381	92	329	82	120

Dimensions MS2 (nominal dimensions in mm)

		DIN / ISO [1]							ISO [2]							
AL Ø	MM Ø	KK [1]	A [1] max	C Ø	SF	WL	h	CR	KK [2]	A [2] max	C Ø	SF	WL	h	CR	B f9
40	28	M14x1.5	18	25	22	7	2	11	M20x1.5	28	25	22	7	3	17	42
50	28								M20x1.5	28	25	22	7	3	17	42
	36	M16x1.5	22	33	30	8	3	13	M27x2	36	33	30	8	3	23.5	50
63	36								M27x2	36	33	30	8	3	23.5	50
	45	M20x1.5	28	42	36	10	3	17	M33x2	45	42	36	10	4	29.5	60
80	45								M33x2	45	42	36	10	4	29.5	60
	56	M27x2	36	53	46	10	3	24	M42x2	56	53	46	10	5	38.5	72
100	56								M42x2	56	53	46	10	5	38.5	72
	70	M33x2	45	67	60	15	4	30	M48x2	63	67	60	15	3	44.5	88
125	70								M48x2	63	67	60	15	3	44.5	88
	90	M42x2	56	86	75	15	5	39	M64x3	85	86	75	15	4.5	59	108
160	70	M48x2	63	67	60	15	3	44.5								88
	110	M48x2	63	106	92	18	3	45	M80x3	95	106	92	18	4.5	75	133
200	90	M64x3	85	86	75	15	4.5	59								108
	140	M64x3	85	136	125	18	5	59	M100x3	112	136	125	18	4.5	95	163

AL Ø	E	EE	DT	GA	WH ± 2	Y ± 2
40	63 ± 1.5	G 3/8	28	52	25	62
50	75 ± 1.5	G 1/2	34	57.8	25	67
63	90 ± 1.5	G 1/2	34	55.8	32	71
80	115 ± 1.5	G 3/4	42	65	31	77
100	130 ± 2	G 3/4	42	67	35	82
125	165 ± 2	G 1	47	73.5	35	86
160	205 ± 2	G 1	47	80.5	32	86
200	245 ± 2	G 1 1/4	58	101	32	98

1) Thread for piston rod ends “F“ and “H“

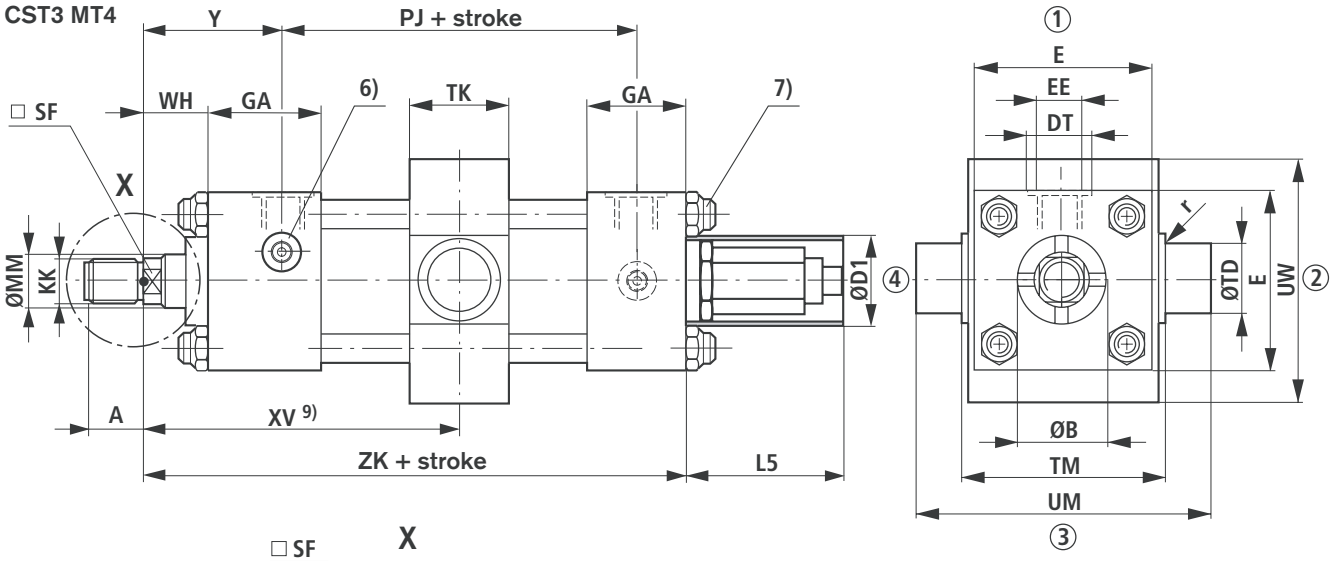
2) Thread for piston rod ends “D“ and “K“

6) For positions of pipe connections and bleed point, see page 27

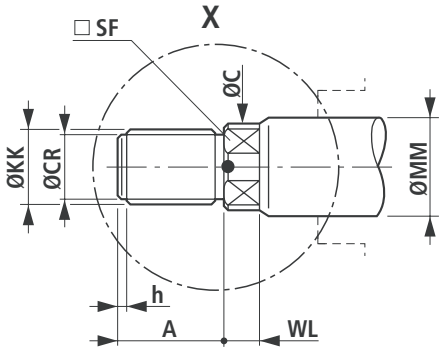
7) For tightening torque, see page 43

12) Piston rod Ø not standardised

Mounting type MT4 (nominal dimensions in mm)

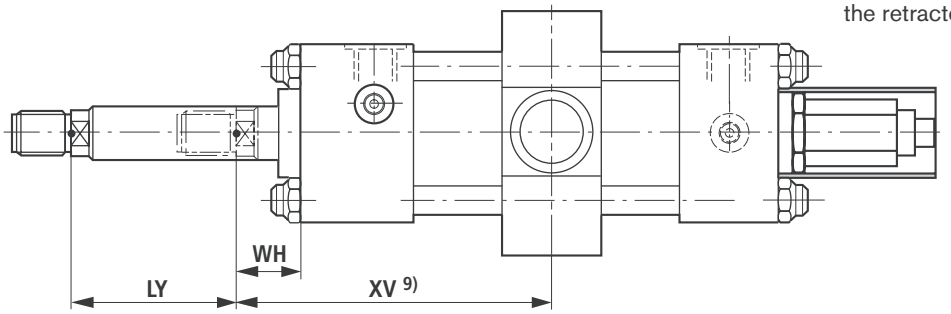


①...④ = Position of pipe connections



Trunnions should be lubricated at regular intervals.

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



AL Ø	PJ ±1.25	TK max	TM h14	UM h15	UW max	BSP thread Stroke min	BSP thread XV min 3) ± 2	BSP thread XV max 3) ± 2	Subplate Stroke min	Subplate XV min 4) ± 2	Subplate XV max 4) ± 2	ZK ± 1	L5	ØD1 max
40	73	30	76	108	92	15	106	91 + stroke	70	116	46 + stroke	172	95	51
50	74	40	89	129	112	4	106	102 + stroke	50	106	75 + stroke	183	102	51
63	80	50	100	150	126	10	116	106 + stroke	45	116	80 + stroke	190	105	60
80	93	60	127	191	160	11	129	118 + stroke	35	129	94 + stroke	216	82	100
100	101	70	140	220	180	17	141	124 + stroke	57	141	84 + stroke	230	82	100
125	117	90	178	278	215	25	157	132 + stroke	63	157	94 + stroke	254	82	120
160	130	110	215	341	260	40	171	131 + stroke	74	171	97 + stroke	270	82	120
200	160	130	279	439	365	48	202	154 + stroke	73	202	129 + stroke	329	82	120

Dimensions MT4 (nominal dimensions in mm)

		DIN / ISO [1]							ISO [2]							
AL Ø	MM Ø	KK [1]	A [1] max	C Ø	SF	WL	h	CR	KK [2]	A [2] max	C Ø	SF	WL	h	CR	B f9
40	28	M14x1.5	18	25	22	7	2	11	M20x1.5	28	25	22	7	3	17	42
50	28								M20x1.5	28	25	22	7	3	17	42
	36	M16x1.5	22	33	30	8	3	13	M27x2	36	33	30	8	3	23.5	50
63	36								M27x2	36	33	30	8	3	23.5	50
	45	M20x1.5	28	42	36	10	3	17	M33x2	45	42	36	10	4	29.5	60
80	45								M33x2	45	42	36	10	4	29.5	60
	56	M27x2	36	53	46	10	3	24	M42x2	56	53	46	10	5	38.5	72
100	56								M42x2	56	53	46	10	5	38.5	72
	70	M33x2	45	67	60	15	4	30	M48x2	63	67	60	15	3	44.5	88
125	70								M48x2	63	67	60	15	3	44.5	88
	90	M42x2	56	86	75	15	5	39	M64x3	85	86	75	15	4.5	59	108
160	70	M48x2	63	67	60	15	3	44.5								88
	110	M48x2	63	106	92	18	3	45	M80x3	95	106	92	18	4.5	75	133
200	90	M64x3	85	86	75	15	4.5	59								108
	140	M64x3	85	136	125	18	5	59	M100x3	112	136	125	18	4.5	95	163

AL Ø	r	TD f8	E	EE	DT	GA	WH ± 2	Y ± 2
40	1.2	20	63 ± 1.5	G 3/8	28	52	25	62
50	1.6	25	75 ± 1.5	G 1/2	34	57.8	25	67
63	1.6	32	90 ± 1.5	G 1/2	34	55.8	32	71
80	2.4	40	115 ± 1.5	G 3/4	42	65	31	77
100	2.4	50	130 ± 2	G 3/4	42	67	35	82
125	3.2	63	165 ± 2	G 1	47	73.5	35	86
160	3.2	80	205 ± 2	G 1	47	80.5	32	86
200	3.2	100	245 ± 2	G 1 1/4	58	101	32	98

1) Thread for piston rod ends “F“ and “H“

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

3) For pipe connection/version ”B“

4) For pipe connection/versions ”P“ and “T“

6) For positions of pipe connections and bleed point, see page 27

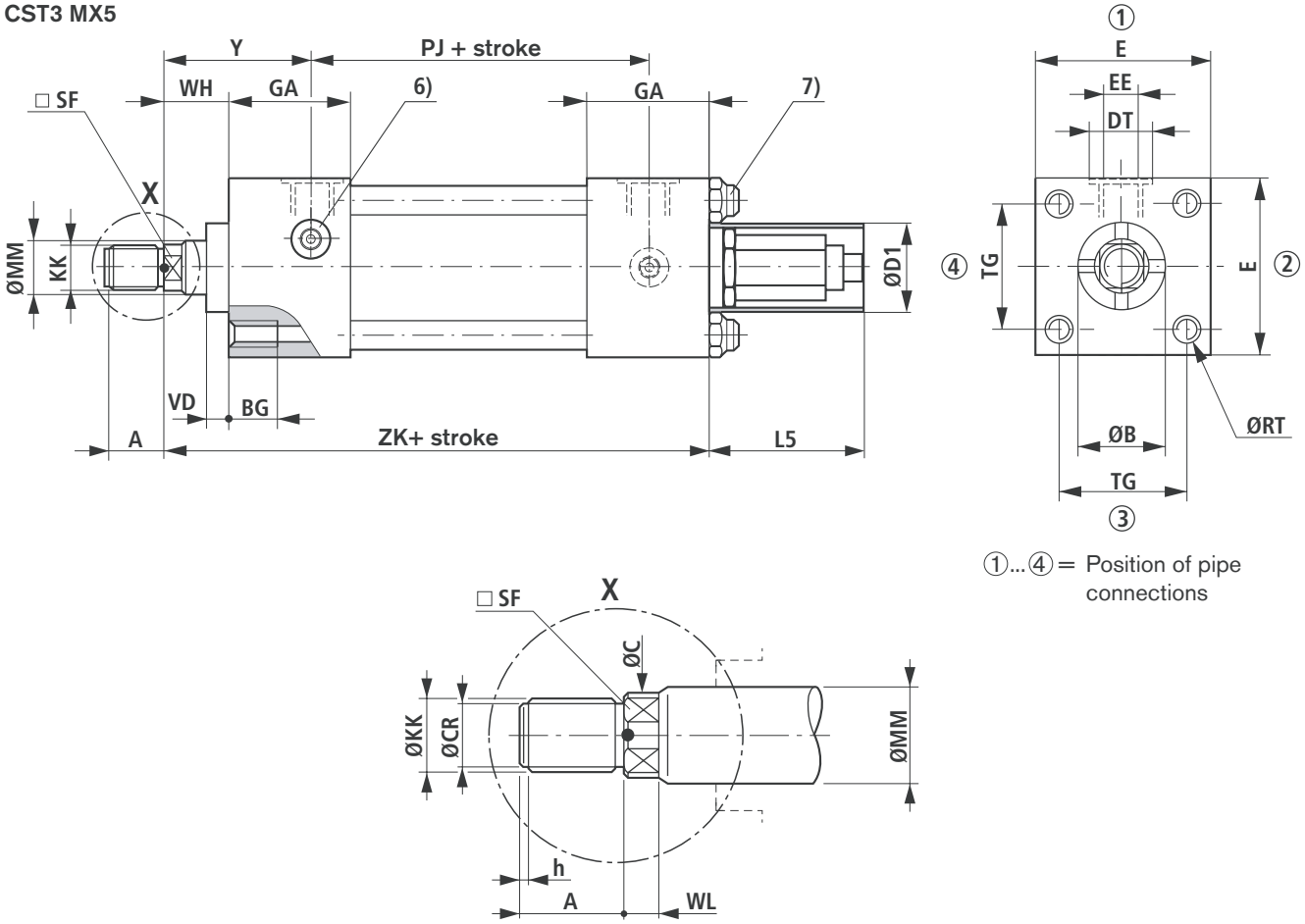
7) For tightening torque, see page 43

9) Always indicate dimension “XV“ in mm in clear text

12) Piston rod Ø not standardised

Mounting type MX5 (nominal dimensions in mm)

CST3 MX5



AL Ø	BG min	PJ ± 1.25	RT 6H	TG js13	VD	ZK ± 1	L5	ØD1 max
40	12	73	M8x1.25	41.7	12	172	95	51
50	18	74	M12x1.75	52.3	9	183	102	51
63	18	80	M12x1.75	64.3	13	190	105	60
80	24	93	M16x2	82.7	9	216	82	100
100	24	101	M16x2	96.9	10	230	82	100
125	27	117	M22x2.5	125.9	9	254	82	120
160	32	130	M27x3	154.9	7	270	82	120
200	40	160	M30x3.5	190.2	7	329	82	120

Dimensions MX5 (nominal dimensions in mm)

		DIN / ISO [1]							ISO [2]							
AL Ø	MM Ø	KK [1]	A [1] max	C Ø	SF	WL	h	CR	KK [2]	A [2] max	C Ø	SF	WL	h	CR	B f9
40	28	M14x1.5	18	25	22	7	2	11	M20x1.5	28	25	22	7	3	17	42
50	28								M20x1.5	28	25	22	7	3	17	42
	36	M16x1.5	22	33	30	8	3	13	M27x2	36	33	30	8	3	23.5	50
63	36								M27x2	36	33	30	8	3	23.5	50
	45	M20x1.5	28	42	36	10	3	17	M33x2	45	42	36	10	4	29.5	60
80	45								M33x2	45	42	36	10	4	29.5	60
	56	M27x2	36	53	46	10	3	24	M42x2	56	53	46	10	5	38.5	72
100	56								M42x2	56	53	46	10	5	38.5	72
	70	M33x2	45	67	60	15	4	30	M48x2	63	67	60	15	3	44.5	88
125	70								M48x2	63	67	60	15	3	44.5	88
	90	M42x2	56	86	75	15	5	39	M64x3	85	86	75	15	4.5	59	108
160	70	M48x2	63	67	60	15	3	44.5								88
	110	M48x2	63	106	92	18	3	45	M80x3	95	106	92	18	4.5	75	133
200	90	M64x3	85	86	75	15	4.5	59								108
	140	M64x3	85	136	125	18	5	59	M100x3	112	136	125	18	4.5	95	163

AL Ø	E	EE	DT	GA	WH ± 2	Y ± 2
40	63 ± 1.5	G 3/8	28	52	25	62
50	75 ± 1.5	G 1/2	34	57.8	25	67
63	90 ± 1.5	G 1/2	34	55.8	32	71
80	115 ± 1.5	G 3/4	42	65	31	77
100	130 ± 2	G 3/4	42	67	35	82
125	165 ± 2	G 1	47	73.5	35	86
160	205 ± 2	G 1	47	80.5	32	86
200	245 ± 2	G 1 1/4	58	101	32	98

1) Thread for piston rod ends “F“ and “H“

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

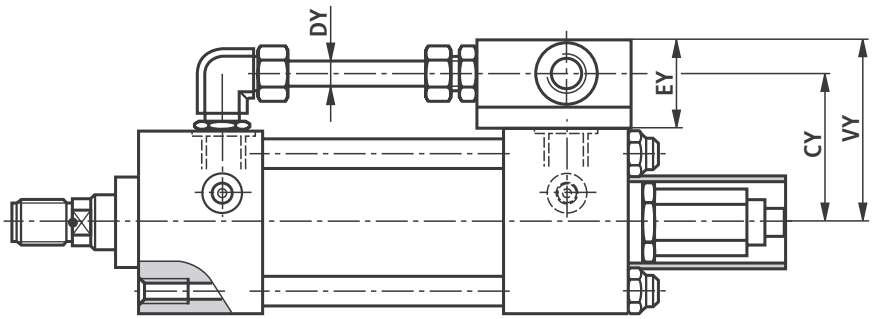
6) For positions of pipe connections and bleed point, see page 27

7) For tightening torque, see page 43

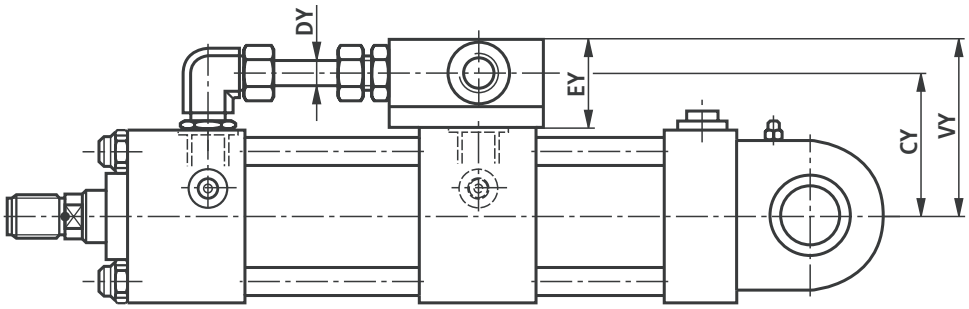
12) Piston rod Ø not standardised

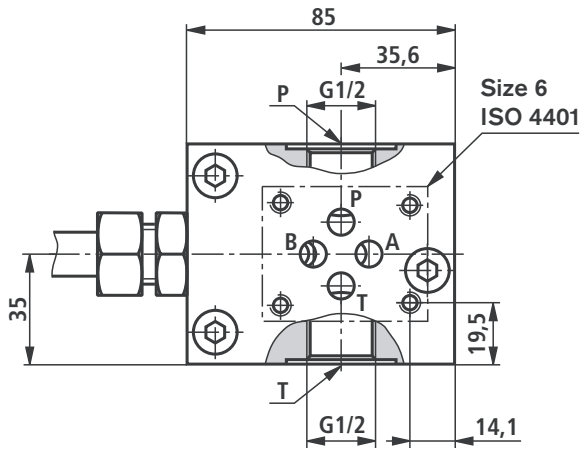
Subplates for valve mounting – dimensions and porting patterns (nominal dimensions in mm)

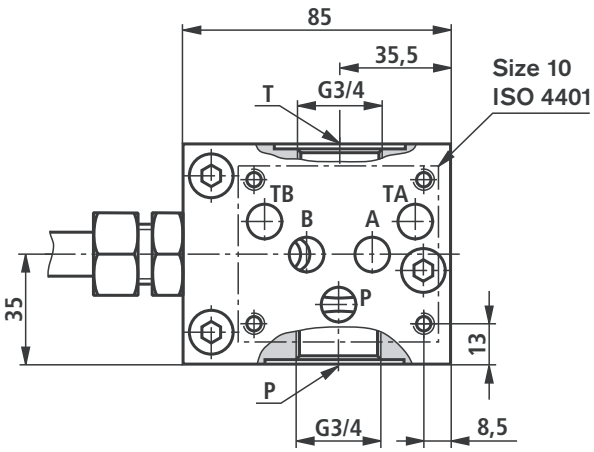
MX5
ME5, MS2, MT4



MP5







AL Ø	CY	EY	VY	DY Ø
40	62	50	80	15
50	68	50	86	15
63	76	50	94	15
80	89	50	107	15
100	103	65	128	20
125	120.5	65	146	20
160	140.5	65	166	20
200	160.5	65	186	20

Position measuring system

The position measuring system that is pressure-proof up to 500 bar operates contact-free and is an absolute measuring system. This position measuring system is based on the magetostrictive effect. A torsion impulse is triggered when two magnetic fields coincide.
This impulse is directed through the waveguide inside the scale from the place of measurement to the sensor head. The running time is constant and almost independent of temperature. It is proportional to the position of the magnet and hence a dimension for the actual position value and is converted into an analogue or digital output in the sensor.

Technical data (for applications outside these parameters, please consult us!)

Operating pressure		bar	160
Analogue output		V	0 to 10
	Load resistance	kΩ	≥ 5
	Resolution		Infinite
Analogue output		mA	4 to 20
	Load resistance	Ω	0 to 500
	Resolution		Infinite
Digital output			SSI 24 bit Gray-coded
	Resolution	µm	5
	Direction of measurement		Forward
Linearity (absolute accuracy)	Analogue	% mm	≤ ±0.02 % (referred to measuring length) min. ±0.05
	Digital	% mm	≤ ±0.01 % (referred to measuring length) min. ±0.04
Reproducibility		% mm	±0.001 (referred to measuring length) min. ±0.0025
Hysteresis		mm	≤ 0.004
Supply voltage		V DC	24 (± 10 % for analogue output)
	Current consumption	mA	100
	Residual ripple content	% s-s	≤ 1
	Current consumption	V DC mA	24 (+ 20 %/– 15 % for digital output) 70
	Residual ripple content	% s-s	≤ 1
Type of protection	Tube and flange		IP 67
	Sensor electronics		IP 65
Operating temperature	Sensor electronics	°C	– 40 to + 75
Temperature coefficient	Voltage	ppm/°C	70
	Current	ppm/°C	90

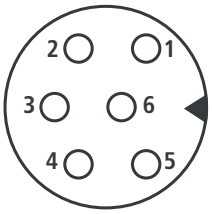
Position measuring system

For analogue output:
6-pin Amphenol cable socket
Material no **R900072231**
(cable socket **not** included in the scope of supply, must be ordered separately)

For digital output:
7-pin Amphenol cable socket
Material no. **R900079551**
(cable socket **not** included in the scope of supply, must be ordered separately)

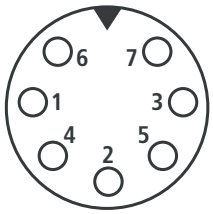
Pin assignment

Position measuring system (analogue output)
Component plug (viewed to pin side)



Pin	Cable	Signal / current	Signal / voltage
1	Grey	4 to 20 mA	0 - 10 V
2	Pink	Gnd	Gnd
3	Yellow	n. c.	10 - 0 V
4	Green	n. c.	Gnd
5	Brown	+24 V DC (±10%)	+24 V DC (±10%)
6	White	Gnd	Gnd

Position measuring system (digital output)
Component plug (viewed to pin side)



Pin	Cable	Signal / SSi
1	Grey	Data (–)
2	Pink	Data (+)
3	Yellow	Clock-pulse (+)
4	Green	Clock-pulse (–)
5	Brown	+24 V DC (+20%/–15%)
6	White	0 V
7	–	n. c.

Seal kits

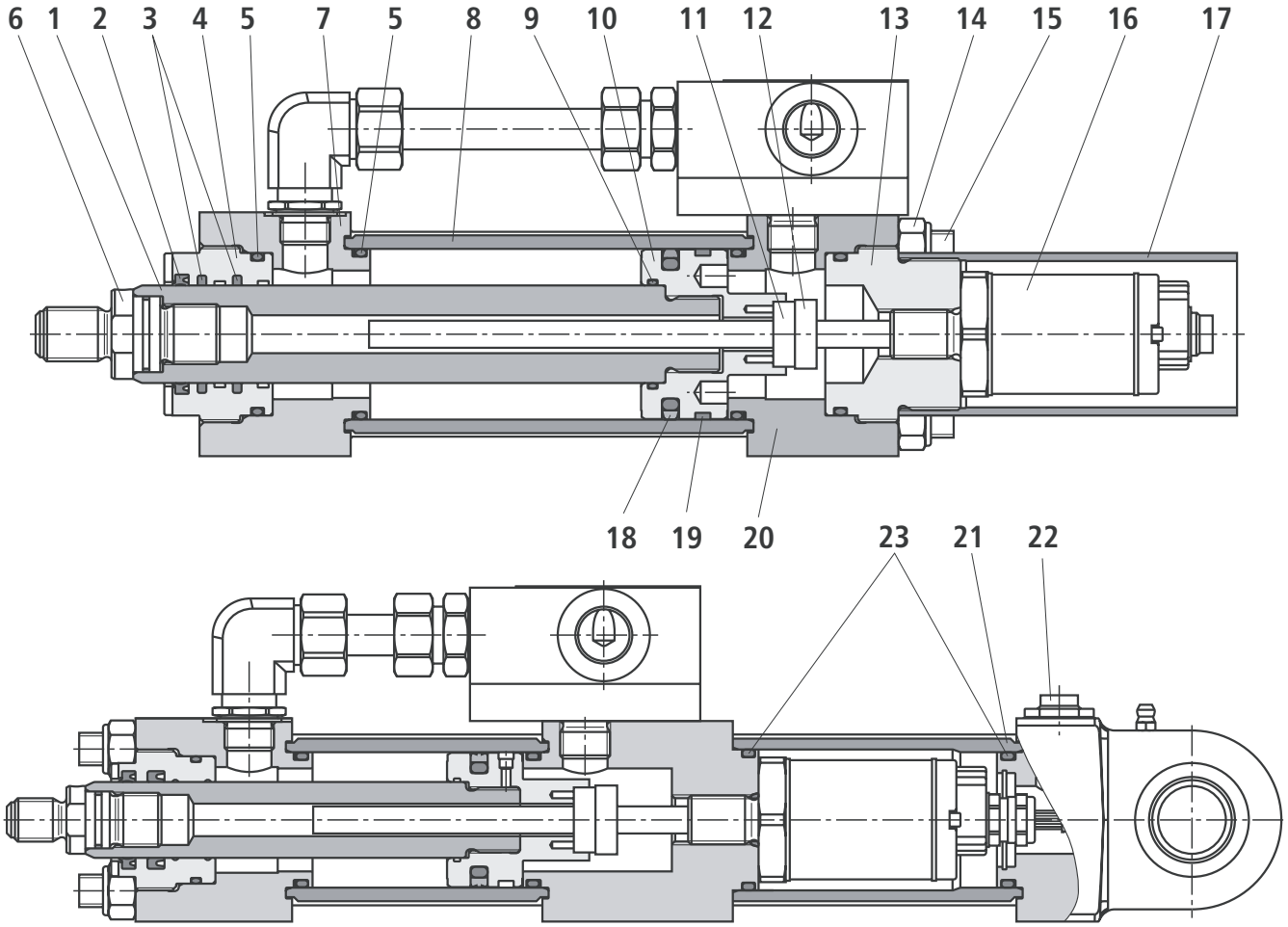
CST3...F

AL	MM	Material No. Seal version		
Ø	Ø	M	T	V
40	**28**	7472D03823	7472D03838	7472D03853
50	**28**	7472D03824	7472D03839	7472D03854
	36	7472D03825	7472D03840	7472D03855
63	**36**	7472D03826	7472D03841	7472D03856
	45	7472D03827	7472D03842	7472D03857
80	**45**	7472D03828	7472D03843	7472D03858
	56	7472D03829	7472D03844	7472D03859
100	**56**	7472D03830	7472D03845	7472D03860
	70	7472D03831	7472D03846	7472D03861
125	**70**	7472D03832	7472D03847	7472D03862
	90	7472D03833	7472D03848	7472D03863
160	**70**	7472D03834	7472D03849	7472D03864
	110	7472D03835	7472D03850	7472D03865
200	**90**	7472D03836	7472D03851	7472D03866
	140	7472D03837	7472D03852	7472D03867

AL = Piston Ø in mm

MM = Piston rod Ø in mm

Spare parts



1	Piston rod	**7**	Cylinder head	**13**	Cover	**19**	Guide ring
2	Wiper	**8**	Cylinder barrel	**14**	Nut	**20**	Cylinder cap
3	Piston seal	**9**	O-ring	**15**	Tie rod	**21**	Connecting tube
4	Guide bush	**10**	Piston	**16**	Position transducer	**22**	Socket
5	O-ring	**11**	Isolation bush	**17**	Protective tube	**23**	O-ring
6	Piston rod end	**12**	Magnet	**18**	Piston seal		

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