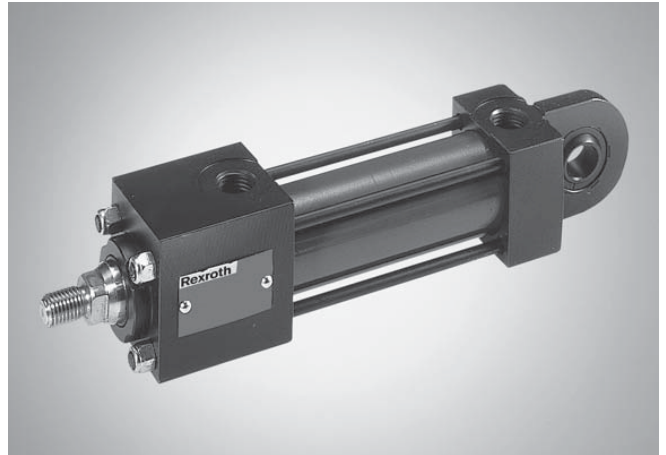


RE 17 039/03.03

Hydraulic cylinder Types CDT3...F / CGT3...F

Series 1X

Nominal pressure:
160 bar (16 MPa)

00001473

Type CDT3ME5/...F1X/...

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Features

- ISO 6020/2, DIN 24 554 and NF/ISO 6020/2
- 13 mounting styles
- Piston Ø: 25 to 200 mm
- Piston rod Ø: 12 to 140 mm
- Stroke length up to 2700 mm



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General guidelines

Maximum pressure:

This series is designed to a standard to work at a dynamic continuous pressure of 160 bar for all mounting styles. Under certain conditions a higher pressure is also permissible. For confirmation of the suitability for use at this higher pressure taking into account the requirements of the ISO 9001 quality standard, we require an exact application description, i.e. a specification document. When using a differential circuit or a meter-out throttle the pressure intensification must be taken into account. Dynamic pressures above 240 bar, within the cylinder, are not permitted.

Minimum pressure:

Dependent on the application a certain minimum pressure is required to ensure correct operation of the cylinder. Without load a minimum pressure of 10 bar is recommended for differential cylinders, for low pressures and double rod cylinders, please consult ourselves.

Piston rod:

The piston rod material, as standard, is a hard chrom plated hardened steel with high elasticity. This provides a high resistance against mechanical shocks and an optimum service life.

The threaded end is reduced in diameter and is therefore protected.

The standards, DIN 24554 and NF/ISO 6020/2 give a thread size per piston rod diameter. This guarantees that the full dynamic forces within the frame work of this standard can be transmitted. ISO 6020/2 additionally provides for the large (differential) piston rods, a second larger thread and deviating from DIN 24554 and NF/ISO 6020/2 different external threads as well as internal threads, lengthened piston rods or threaded ends are available. However when using smaller threads than those stated within the standards, it has to be taken into account that the maximum permissible pressure is limited and that with larger threads the assembly limits are taken into account. The end type „T“ to NF/ISO 6020/2 has pressure limitations, see page 39.

Double roded cylinder with a through piston rod:

The dimensions stated within this catalogue relate to the draft standard.

This design style has a much higher friction than the „CD version“ with a single piston rod.

Both rod diameters in the standard version are identical. If the cylinder is so mounted that the rods are statically fixed and the body of the cylinder moves, then particular attention should be given to the side loadings caused by the cylinder's own weight.

Seal versions:

As standard there are three seal versions available: „M“ (standard), „T“ (low friction) and „V“ (high temperature applications). For information regarding the application of these seals at various temperatures and speed ranges see page 3.

The seal installation areas conform to ISO 5597 for the „M“ piston seals, ISO 7425-1 for all piston seals and ISO 6195-C for all piston rod wipers.

The „M“ seal version has a hydrolysis proof wiper and can be used at high speeds when the pressure is less than 100 bar and the frequency is lower than 3 Hz.

Cylinders with longer strokes are preferably fitted with the type „M“ seals.

Piston rod guide bush:

Manufactured from GGG-50 DIN 1693 gray cast iron and from piston rod diameter 40 mm as a cartridge, for small diameters in a screwed open design so that simple assembly is possible. For spare parts purposes a guide bush with pre-assembled seals is available, see page 43.

Pistons:

Design with an integrated cushioning pin, screwed onto the piston rod, glued and mechanically locked by means of a grub screw.

The seal installation chambers are to ISO 7425-1, and are identical for the seal versions „M“, „T“ and „V“. They can therefore be exchanged without having to replace the piston.

Cover / tube seals:

The closed design of the seal chamber and the tube being centralised to both sides of the seal ensure that, especially for longer stroke cylinders, the optimum sealing conditions are achieved.

Stroke tolerances:

In accordance with ISO 8131 for stroke lengths up to 1250 mm, a stroke tolerance of 0/+2 mm is permissible; for longer strokes please consult ourselves.

A tolerance of $\pm 0,3$ mm is available as an option, smaller tolerances for tie rod cylinders is not sensible.

Recommended maximum strokes:

The strokes stated on page 3 ensure trouble-free operation under all application conditions with a maximum pressure of 160 bar. In all cases the buckling loads have to be checked.

Longer strokes are available on request, with lower pressures and when only pulling loads have to be considered.

Minimum strokes:

For the „MT4“ mounting style there has to be a minimum stroke due to the width of the trunnions, see page 3.

When using end position cushioning a minimum stroke has to be considered (see page 3). With stroke lengths that are less than the cushioning length, we recommend that cylinders without cushioning are used.

Pipe connections:

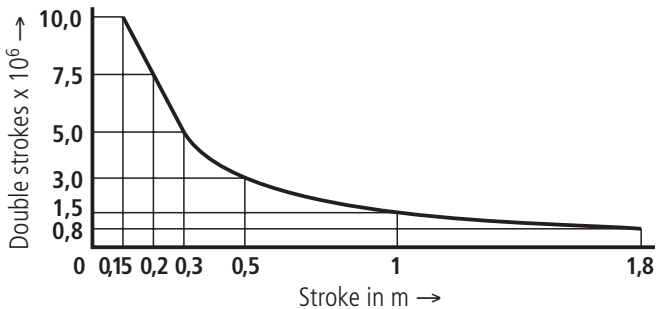
We supply BSP pipe threads to ISO 8138 and ISO 6020/2, the counter sinks are to ISO 1179/1. Enlarged connections are available as an option. Metric pipe connections or SAE flanges connections are available on request.

General guidelines

Service life:

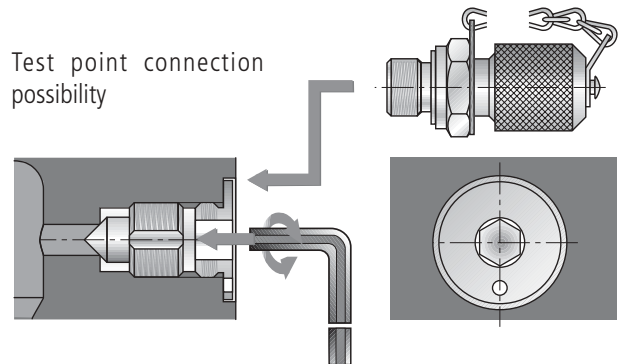
The Rexroth cylinders conform to the recommendations of an inter-professional standardisation committee and Hydraulics Association with regard to reliability:

≥ 10 000 000 double strokes under no load, continuous operation, or 3000 km stroke length at 70% of the operating pressure, without any load on the piston rod, with a maximum speed of 0.5 m/s and a failure rate of less than 5%.



Bleeding:

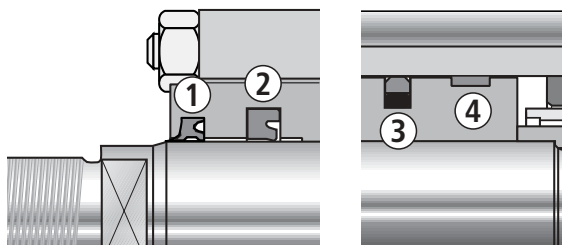
As standard a patented safety bleeding system, with regard to unintended removal from the head or base, (for piston diameters larger than 32 mm) is supplied. The dimensions to ISO 6020/2 are maintained. The connection makes it possible to fit a test point (with check valve) or for contamination free bleeding.



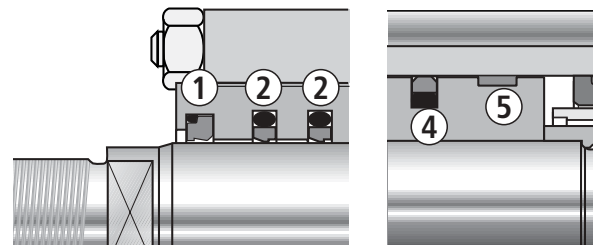
Ø Piston (mm)		25	32	40	50	63	80	100	125	160	200
Min. recommended stroke in mm	Without damping	–	–	–	–	–	–	–	–	–	–
	With damping	31	33	50	52	43	57	56	68	73	106
Max. recommended stroke in mm	ME5, MS2, MX1/5/7	300	380	480	600	750	800	1000	1250	1280	1400
	ME6, MP1/3/5, MT 1/2/4	200	250	320	400	500	530	660	830	850	930
Max. permissible radial force *	N	25	40	63	100	160	250	400	680	1000	1600
Maximum speed (m/s)	M 160 bar	0.50			0.40		0.30		0.25		
	M 100 bar	0.70			0.60		0.40		0.35		
	T, V 160 bar	1.00			0.80		0.60		0.50		
Recommended minimum speed (mm/s)	M	30									
	T, V	1									
Pressure medium temperature for the seals	M °C	-20...+80									
	T °C	-20...+90									
	V °C	-20...+150									
Viscosity	mm ² /s	2.8...380									
Filtration	M	Oil contamination class 18/15 ... 19/16 to ISO 4406									
	T, V	Oil contamination class 16/13 ... 17/14 to ISO 4406									

* On the piston rod guide bush

Version „M“



Versions „T or V“



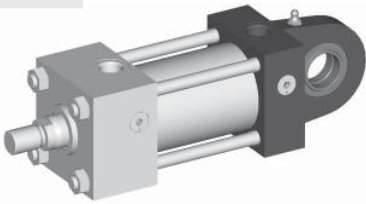
	Seal material					Pressure fluid compatibility			
	1	2	2	3,4 or 4,5	O-Ring	HM-HV	HFC**	HFDR	HFDU
M	Wiper Polyester	Secondary seals –	Primary seals PU	Piston seals AU/NBR/POM	NBR	+++	–	+	++
T	PTFE/NBR	PTFE/NBR	PTFE/NBR	PTFE/NBR	NBR	+++	+++	++	+++
V	FKM	PTFE/FKM	PTFE/FKM	PTFE/FKM	FKM	+++	++	++	+++

** Pressure medium at > 60 °C on request +++ = Very good ++ = Good + = Average – = Bad

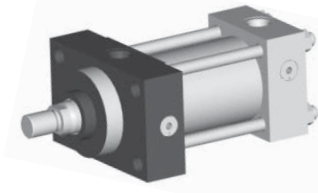
Mounting style overview

Mounting styles DIN / ISO

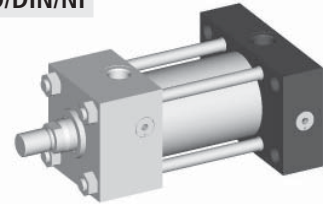
MP5 See page 10
ISO/DIN/NF



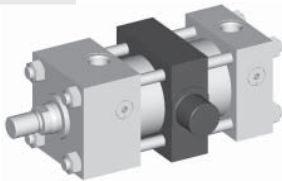
ME5 See page 8
ISO/DIN/NF



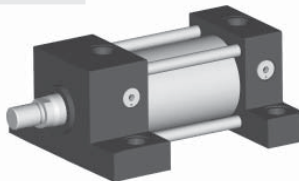
ME6 See page 8
ISO/DIN/NF



MT4 See page 14
ISO/DIN/NF

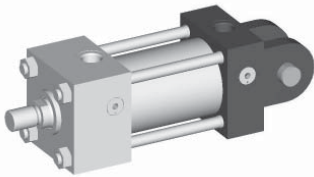


MS2 See page 12
ISO/DIN/NF

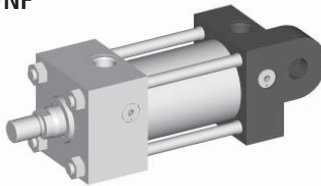


Mounting styles ISO

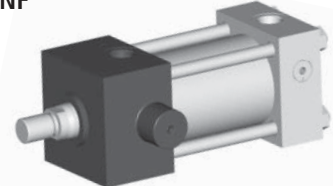
MP1 See page 24
ISO/NF



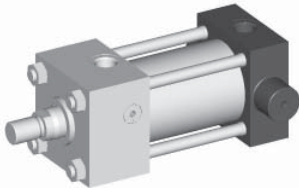
MP3 See page 24
ISO/NF



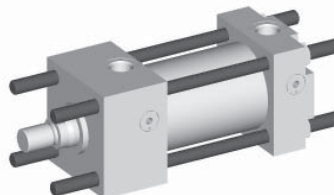
MT1 See page 16
ISO/NF



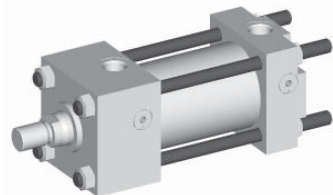
MT2 See page 16
ISO/NF



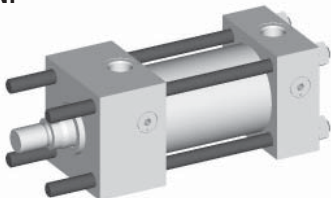
MX1 See page 18
ISO/NF



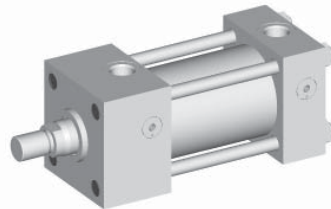
MX2 See page 20
ISO/NF



MX3 See page 20
ISO/NF



MX5 See page 22
NF



Comparison ISO / DIN / NF E

- ISO 6020/2 comprises of 12 mounting styles
- DIN 24 554 comprises of 5 mounting styles
- NF/ISO 6020-2 comprises of 12 mounting styles
- The mounting styles MP5, ME5, ME6, MT4 and MS2 to ISO, DIN and NF E are interchangeable.
- In addition to the type CD.. double acting cylinders the type CG.. double roded cylinders have been incorporated into this series.

Ordering details

*Further details
in clear text
Interventionen

T3 / / / / F 1X / / / / H / / / / *

Double acting cylinder = CD
Double rod cylinder¹⁾ = CG

Series: = T3

Mounting styles DIN / ISO

Rectangular flange at head = ME5
Rectangular flange at base = ME6
Self-aligning rear clevis mounting = MP5
Foot mounting = MS2
Trunnions at the centre ²⁾ = MT4

Mounting styles ISO

Fork at base = MP1
Plain rear clevis mounting = MP3
Trunnions at head = MT1
Trunnions at base = MT2
Lengthend tie rods, both ends = MX1
Lengthend tie rods, at base = MX2
Lengthend tie rods, at head = MX3
Threaded holes on head = MX5

Pistons Ø (AL) 25 to 200 mm

Piston rods Ø (MM) 12 to 140 mm

Stroke length in mm

Design principle

Head and base connected by tie rods with guide bush = F

Series = 1X

10 to 19 unchanged installation and connection dimensions

Pipe connections / versions

Pipe threads (ISO 8138) = B
Metric ISO threads (DIN / ISO 6149-1) = R
Enlarged pipe threads (ISO 8138) = S

Pipe connections / location at head

See page 27 = 1
= 2
View onto the piston rod = 3
= 4

Remarks:

- 1) = ME5; MT1; MT4; MS2; MX1; MX3; MX5, not standardised
- 2) = XV in mm to be stated in clear text
- 3) = Piston Ø 25 to 125 mm
- 4) = Piston Ø 40 to 200 mm
- 5) = For DIN mounting styles and pipe connections „B“

Option 2

W = Without option

Option 1

W = Without option

B = ⁵⁾ Drain connection

A = ⁴⁾ Test point, 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 end, self-adjusting

K = Base end, self-adjusting

L = ³⁾ Both sides, self-adjusting „Low energy“

E = ⁵⁾ Both sided, adjustable

Piston rod end

H = Thread (DIN / ISO) for self-aligning clevis CGKA

D = Thread (ISO) for self-aligning clevis CGKA

E = Internal thread

F = With mounted self-aligning clevis CGKA (DIN / ISO)

K = With mounted self-aligning clevis CGKA (ISO)

T = Mit Zapfen

Piston rod version

H = Surface hardened and hard chromium plated

Pipe connection / location at base

See page 27

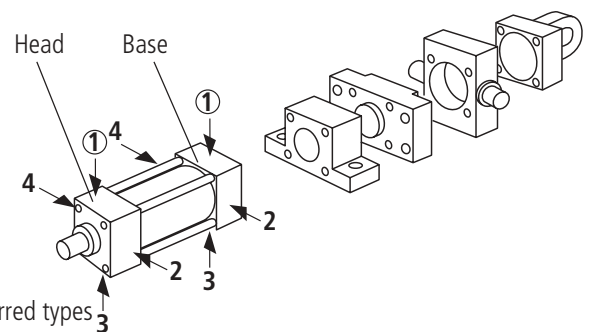
1 =

2 =

3 =

4 =

View onto the piston rod

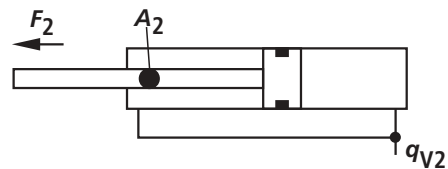
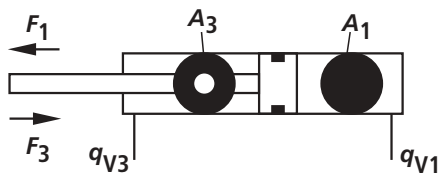


When selecting a cylinder take the limitations stated on the associated pages within this catalogue into account!

Ordering examples: CDT3/MP5/50/36/300F1X/B11HDMWW
CGT3/ME5/80/56/400F1X/B11HDMWW

Areas, forces, flows

Piston	Piston rod	Area ratio	Areas			Force at 160 bar ¹⁾			Flow at 0.1 m/s ²⁾		
			Piston	Rod	Annulus	Push	Diff.	Pull	Out	Diff.	On
AL Ø mm	MM Ø mm	φ A_1/A_3	A_1 cm ²	A_2 cm ²	A_3 cm ²	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
	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
	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
	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
	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
	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
	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 (efficiency not taken into account)
- 2) Stroke velocity

Cylinder weights in kg

CDT3

AL	MM	MX1 ME5 MS2	ME6 MP3 MP1	MP5	MT4	MX2 MX3 MX5	MT1 MT2	Hub 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
	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
	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
	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
	56	15	15	15	19	14	15	3.3
100	45	20	20	20	24	19	22	3.3
	70	21	21	21	25	19	23	5.1
125	56	38	39	38	46	35	43	6.3
	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

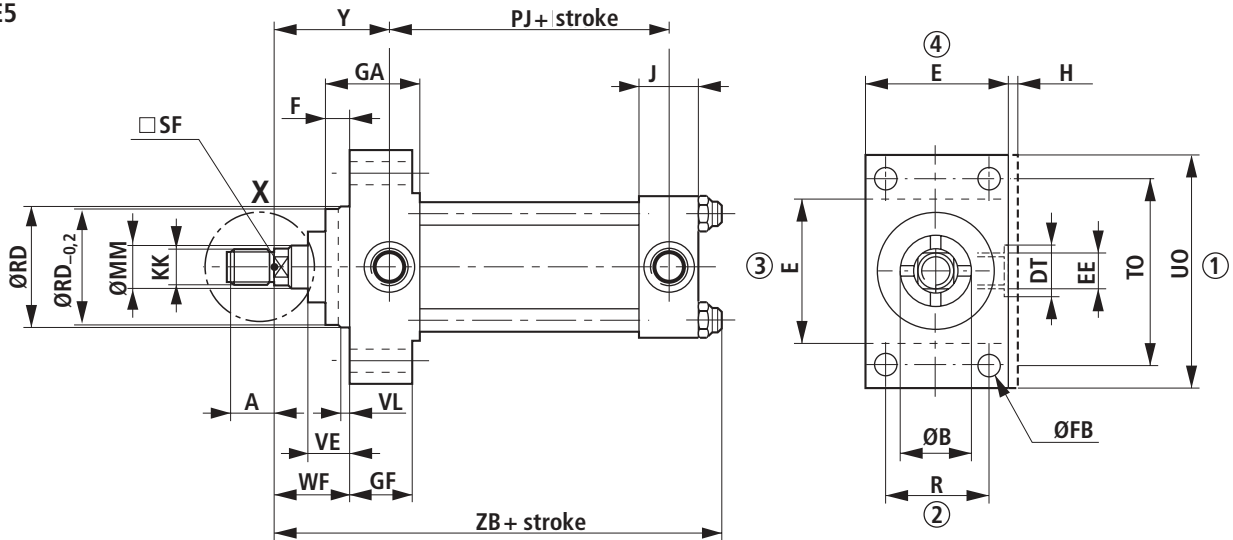
For self-aligning clevis, clevis/bracket and trunnion bracket see page 20

CGT3

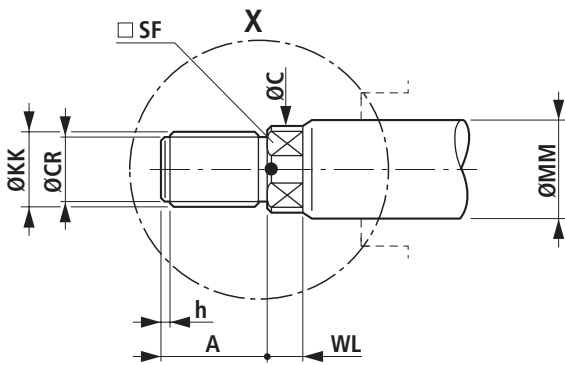
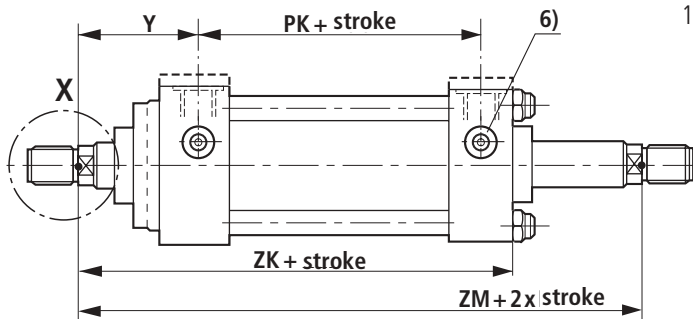
AL	MM	MX1 ME5 MS2	ME6 MP3 MP1	MP5	MT4	MX2 MX3 MX5	MT1 MT2	Hub 100 mm
25	12	1,2	1,2	1,1	1,4	1,1	1,2	0,5
	18	1.4	1.4	1.3	1.6	1.3	1.4	0.8
32	14	1.6	1.7	1.5	1.9	1.5	1.6	0.6
	22	1.9	2.0	1.8	2.2	1.8	1.9	0.9
40	18	3.6	3.6	3.4	4.3	3.3	3.4	1.0
	28	4.0	4.0	3.8	4.7	3.7	3.8	1.6
50	22	5.7	5.7	5.3	7.0	5.2	5.3	1.4
	36	6.4	6.4	6.0	7.7	5.9	6.0	2.4
63	28	8.3	8.3	7.9	9.8	7.6	7.9	1.9
	45	9.7	9.5	9.1	11	8.8	9.1	3.4
80	36	15	15	15	19	13	15	3.0
	56	17	17	17	21	16	17	5.2
100	45	22	22	21	26	20	24	4.5
	70	25	25	24	29	23	27	8.1
125	56	41	42	41	49	39	46	8.2
	90	46	47	46	55	44	51	14
160	70	68	73	69	83	65	69	12
	110	75	80	76	91	72	79	21
200	90	124	132	126	158	118	126	18
	140	137	144	139	171	131	138	33

Mounting styles ME5, ME6

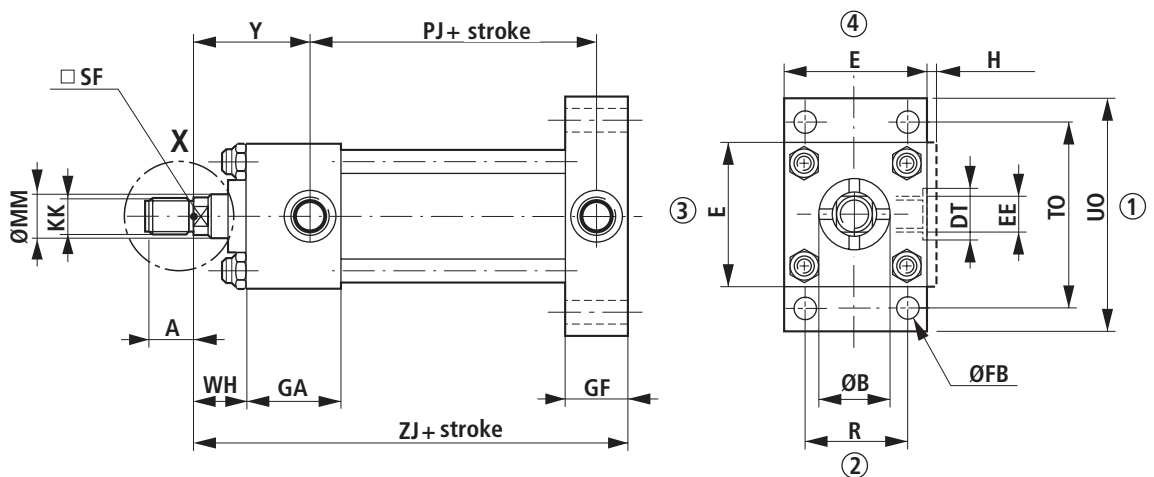
ME5



1...4 = Connection port locations



ME6



Dimensions ME5, ME6 (mm)

AL	MM	DIN / ISO							ISO							B f9	RD f8
		KK ¹⁾	A ¹⁾ max	C	SF	WL	h	CR	KK ²⁾	A ²⁾ max	C	SF	WL	h	CR		
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	
	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	
	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	
	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	
	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	
	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	
	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	GA	E	EE	DT	EE	DT	J	H	PJ ¹⁰⁾ ± 1.25	PJ ¹¹⁾ ± 1.25	WF ± 2	WH ± 2	Y ¹⁰⁾ ± 2	Y ¹¹⁾ ± 2
25	46.5	40 ±1.5	G1/4	25	M14x1.5	21	22.5	5	53	64.5	25	15	50	38.5
32	46.5	45 ±1.5	G1/4	25	M14x1.5	21	23.5	5	56	68.5	35	25	60	47.5
40	52	63 ±1.5	G3/8	28	M18x1.5	26	33	–	73	77	35	25	62	58
50	57.8	75 ±1.5	G1/2	34	M22x1.5	29	33.8	–	74	78	41	25	67	63
63	55.8	90 ±1.5	G1/2	34	M22x1.5	29	33.8	–	80	81.5	48	32	71	69.5
80	65	115 ±1.5	G3/4	42	M27x2	34	39	–	93	93	51	31	77	77
100	67	130 ±2	G3/4	42	M27x2	34	40	–	101	101	57	35	82	82
125	73.5	165 ±2	G1	47	M33x2	43	51.5	–	117	117	57	35	86	86
160	80.5	205 ±2	G1	47	M33x2	43	55.5	–	130	130	57	32	86	86
200	101	245 ±2	G1 1/4	58	M42x2	52	76	–	165	165	57	32	98	98

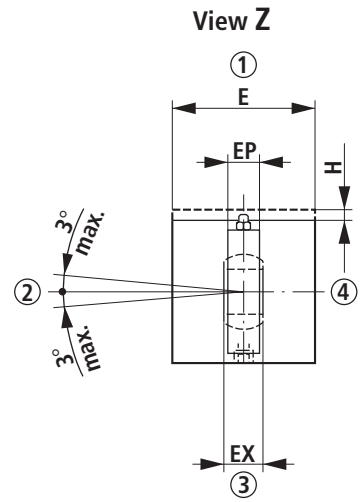
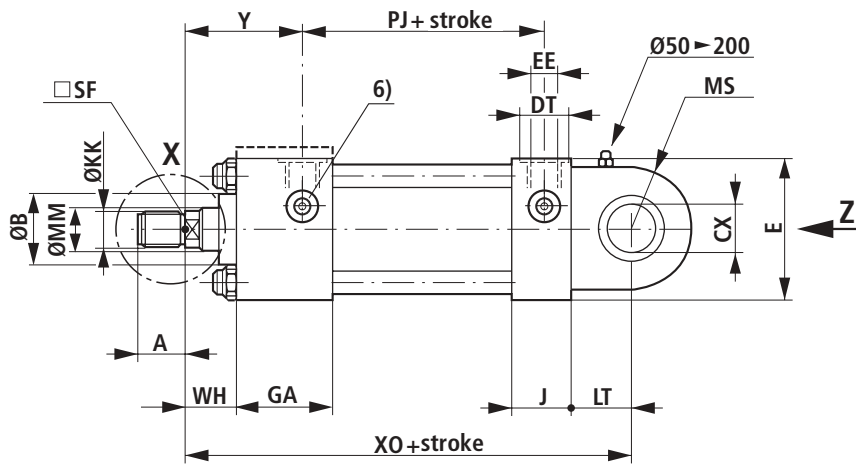
AL	F max	FB H13	GF	PK ¹⁰⁾	PK ¹¹⁾	R JS13	TO JS13	UO max	VE max	VL min	ZB max	ZJ ± 1	ZK ± 1	ZM ± 2
25	10	5.5	25	54	65.5	27	51	65	16	3	121	114	139	154
32	10	6.6	25	58	70.5	33	58	70	22	3	137	128	153	178
40	10	11	38	71	75	41	87	110	22	3	166	153	170	195
50	16	14	38	73	77	52	105	130	25	4	176	159	182	207
63	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

Notes

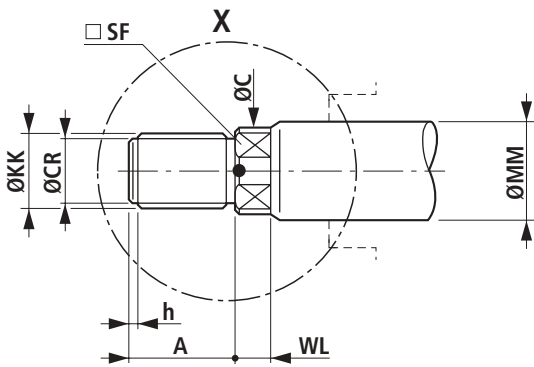
- 1) Thread for piston rod ends „F“ and „H“
- 2) Thread for piston rod ends „D“ and „K“
- 3) Piston rod ends „E“ and „T“, see page 39
- 5) Dim. „H“ always at the connection port location
- 6) For connection port locations and bleeding see page 27
- 7) For tightening torques see page 42
- 9) Flange thickness to DIN 24554
- 10) ME5: for connection port locations „1“ and „3“ at head
- 11) ME5: for connection port locations „2“ and „4“ at head

Mounting styles MP5

MP5



1...4 = Connection port locations



Dimensions MP5 (mm)

AL	MM	DIN / ISO							ISO							B f9
		KK ¹⁾	A ¹⁾ max	C	SF	WL	h	CR	KK ²⁾	A ²⁾ max	C	SF	WL	h	CR	
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	
	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	
	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	
	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	
	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	
	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	
	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	GA	E	EE	DT	EE	DT	J	H	PJ ± 1.25	WH ± 2	Y ± 2
25	46.5	40 ±1.5	G1/4	25	M14x1.5	21	22.5	5	53	15	50
32	46.5	45 ±1.5	G1/4	25	M14x1.5	21	23.5	5	56	25	60
40	52	63 ±1.5	G3/8	28	M18x1.5	26	33	–	73	25	62
50	57.8	75 ±1.5	G1/2	34	M22x1.5	29	33.8	–	74	25	67
63	55.8	90 ±1.5	G1/2	34	M22x1.5	29	33.8	–	80	32	71
80	65	115 ±1.5	G3/4	42	M27x2	34	39	–	93	31	77
100	67	130 ±2	G3/4	42	M27x2	34	40	–	101	35	82
125	73.5	165 ±2	G1	47	M33x2	43	51.5	–	117	35	86
160	80.5	205 ±2	G1	47	M33x2	43	55.5	–	130	32	86
200	101	245 ±2	G11/4	58	M42x2	52	76	–	165	32	98

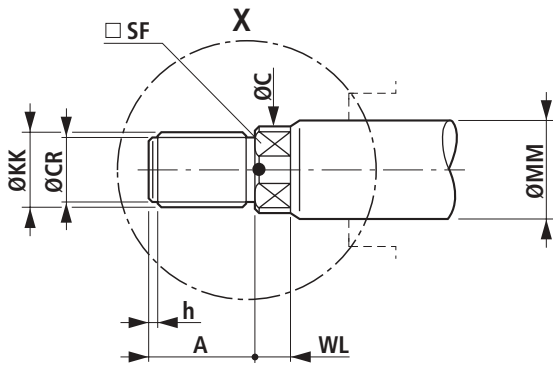
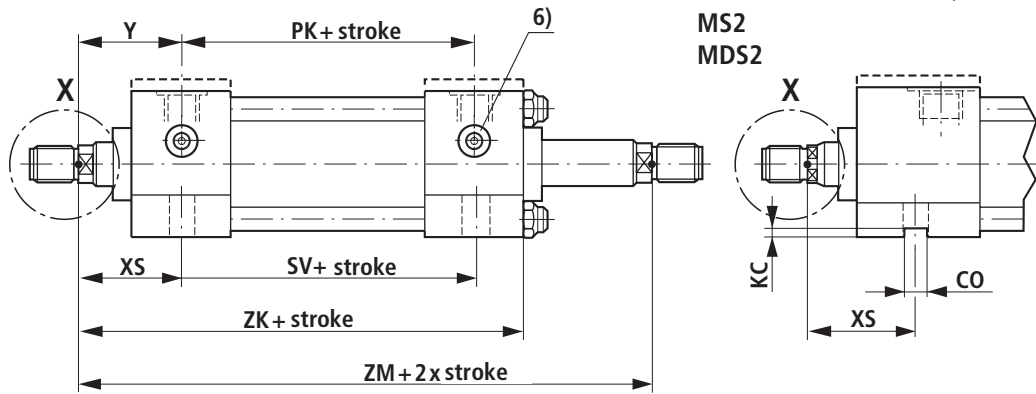
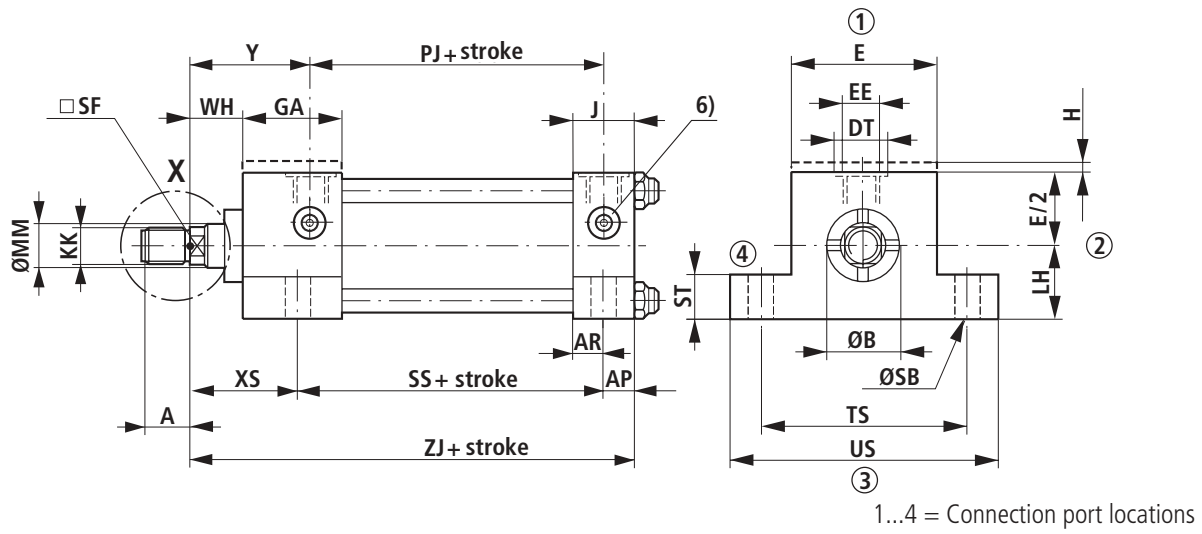
AL	CX	EP h15	EX	LT min	XO ± 1.25	MS max
25	12 –0.008	8	10 –0.12	16	130	20
32	16 –0.008	11	14 –0.12	20	148	22,5
40	20 –0.012	13	16 –0.12	25	178	29
50	25 –0.012	17	20 –0.12	31	190	33
63	30 –0.012	19	22 –0.12	38	206	40
80	40 –0.012	23	28 –0.12	48	238	50
100	50 –0.012	30	35 –0.12	58	261	62
125	60 –0.015	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

Notes

- 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 39
- 4) Dim. „H“ is always at the connection port location
- 5) For connection port locations and bleeding see page 27
- 6) For tightening torques, see page 42
- 7) Grease nipple M6 DIN 71 412 from piston Ø 40 mm

Mounting styles MS2

MS2



Dimensions MS2 (mm)

AL	MM	DIN / ISO							ISO							B f9
		KK ¹⁾	A ¹⁾ max	C	SF	WL	h	CR	KK ²⁾	A ²⁾ max	C	SF	WL	h	CR	
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	
	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	
	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	
	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	
	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	
	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	
	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	E	EE	DT	EE	DT	H	PJ ± 1,25	WH ± 2	Y ± 2	AP	AR
25	40 ±1.5	G1/4	25	M14x1.5	21	5	53	15	50	8	14.5
32	45 ±1.5	G1/4	25	M14x1.5	21	5	56	25	60	10	13.5
40	63 ±1.5	G3/8	28	M18x1.5	26	–	73	25	62	10	23
50	75 ±1.5	G1/2	34	M22x1.5	29	–	74	25	67	13	20.8
63	90 ±1.5	G1/2	34	M22x1.5	29	–	80	32	71	17	16.8
80	115 ±1.5	G3/4	42	M27x2	34	–	93	31	77	17	22
100	130 ±2	G3/4	42	M27x2	34	–	101	35	82	22	18
125	165 ±2	G1	47	M33x2	43	–	117	35	86	22	29.5
160	205 ±2	G1	47	M33x2	43	–	130	32	86	29	26.5
200	245 ±2	G11/4	58	M42x2	52	–	165	32	98	35	41

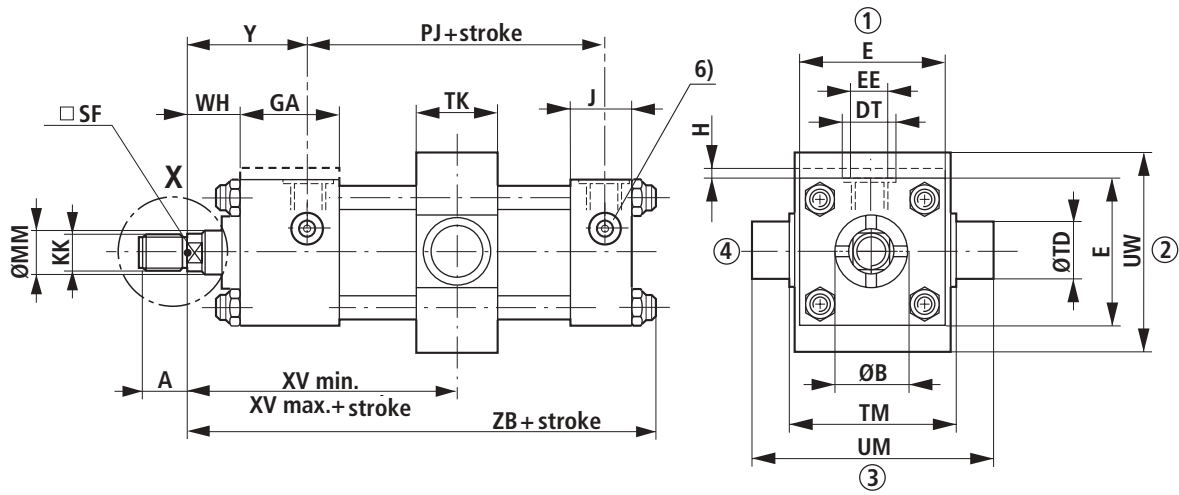
AL	CO H8	KC	LH h10	PK ± 1.25	SB H13	SS ± 1.25	ST	SV ± 1	TS JS13	US	XS ±2	ZJ ±1	ZK ±1	ZM ±2
25	12	4	19	54	6.6	73	8.5	88	54	72	33	114	139	154
32	12	4	22	58	9	73	12.5	88	63	84	45	128	153	178
40	12	4	31	71	11	98	12.5	105	83	103	45	153	170	195
50	12	4	37	73	14	92	19	99	102	127	54	159	182	207
63	16	4	44	81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

Notes

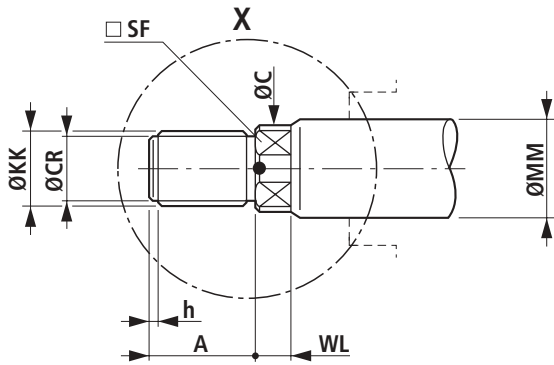
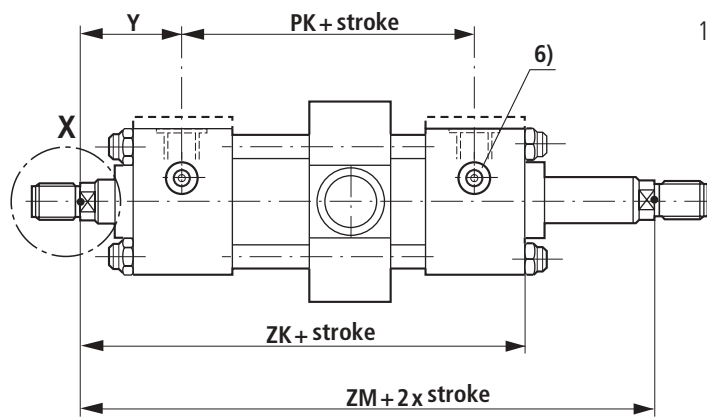
- 1) Thread for piston rod ends „F“ and „H“
- 2) Thread for piston rod ends „D“ and „K“
- 3) For piston rod ends „E“ and „T“, see page 39
- 5) Dim. „H“ is always at the connection port location
- 6) For connection port locations and bleeding, see page 27
- 7) For tightening torques, see page 42

Mounting styles MT4

MT4



1...4 = Connection port locations



Dimensions MT4 (mm)

AL	MM	DIN / ISO							ISO							B f9
		KK ¹⁾	A ¹⁾ max	C	SF	WL	h	CR	KK ²⁾	A ²⁾ max	C	SF	WL	h	CR	
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	
	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	
	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	
	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	
	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	
	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	
	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	GA	E	EE	DT	EE	DT	J	H	PJ ± 1.25	WH ± 2	Y ± 2
25	46.5	40 ±1.5	G1/4	25	M14x1.5	21	22.5	5	53	15	50
32	46.5	45 ±1.5	G1/4	25	M14x1.5	21	23.5	5	56	25	60
40	52	63 ±1.5	G3/8	28	M18x1.5	26	33	–	73	25	62
50	57.8	75 ±1.5	G1/2	34	M22x1.5	29	33.8	–	74	25	67
63	55.8	90 ±1.5	G1/2	34	M22x1.5	29	33.8	–	80	32	71
80	65	115 ±1.5	G3/4	42	M27x2	34	39	–	93	31	77
100	67	130 ±2	G3/4	42	M27x2	34	40	–	101	35	82
125	73.5	165 ±2	G1	47	M33x2	43	51.5	–	117	35	86
160	80.5	205 ±2	G1	47	M33x2	43	55.5	–	130	32	86
200	101	245 ±2	G11/4	58	M42x2	52	76	–	165	32	98

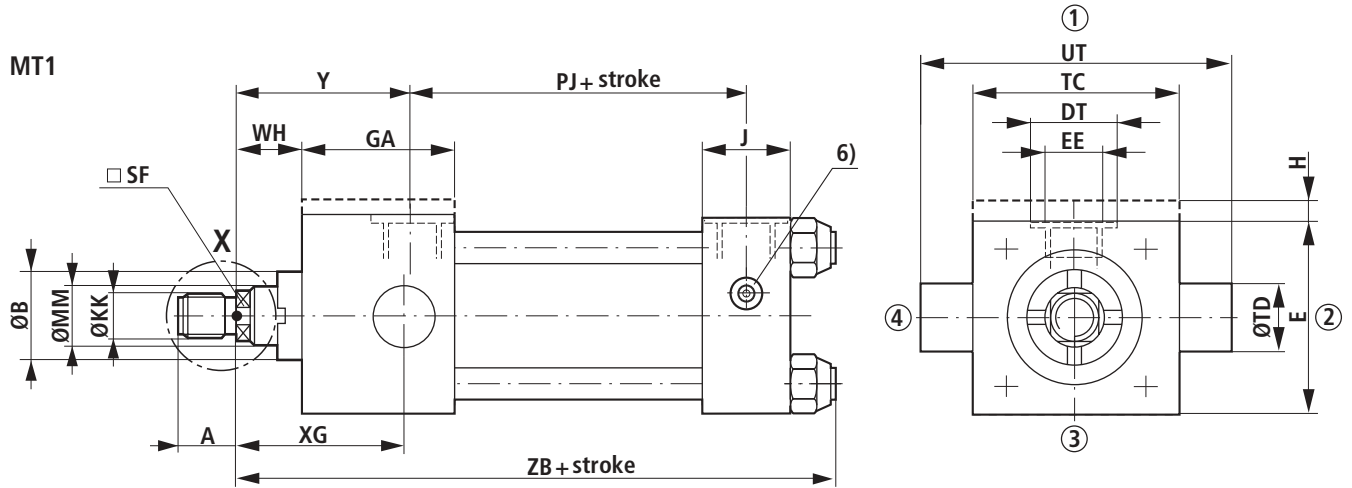
AL	PK ±1.25	r	TD f8	TK max	TM h14	UM h15	UW max	X min	XV min ±2	XV max ±2	ZB max	ZK ± 1	ZM ± 2
25	54	0.8	12	20	48	68	63	0	74	79 + X	121	139	154
32	58	0.8	16	25	55	79	75	10	93	83 + X	137	153	178
40	71	1.2	20	30	76	108	92	15	106	91 + X	166	170	195
50	73	1.6	25	40	89	129	112	4	106	102 + X	176	182	207
63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

Notes

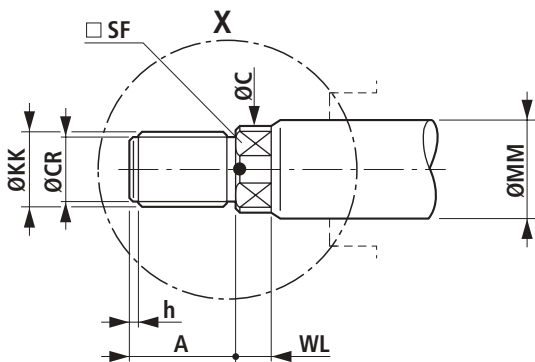
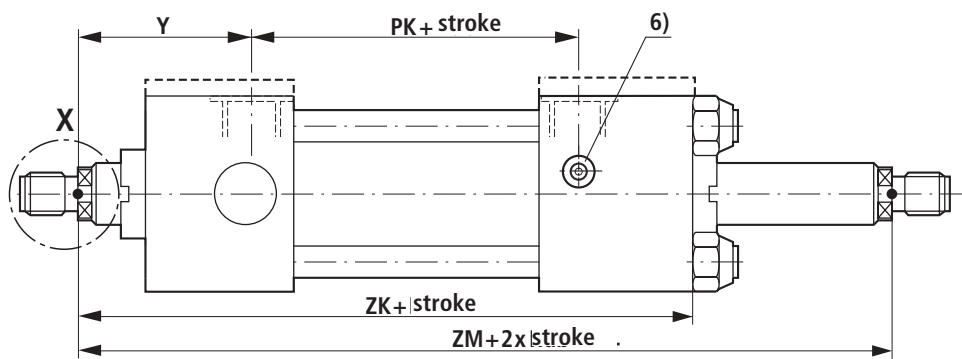
- 1) Thread for piston rod ends „F“ and „H“
- 2) Thread for piston rod ends „D“ and „K“
- 3) For piston rod ends „E“ and „T“ see page 39
- 4) Dim. „H“ is always at the connection port location
- 5) Dim. „H“ is always at the connection port location
- 6) For connection port locations and bleeding see page 27
- 7) For tightening torques see page 42
- 8) Dim. „XV“ in mm, always to be stated in clear text
- 9) Dim. „XV“ in mm, always to be stated in clear text
- 10) Piston Ø 25 and 32 mm: Dim. „H“ take the connection port locations „2“ and „4“ into account

Mounting styles MT1, MT2

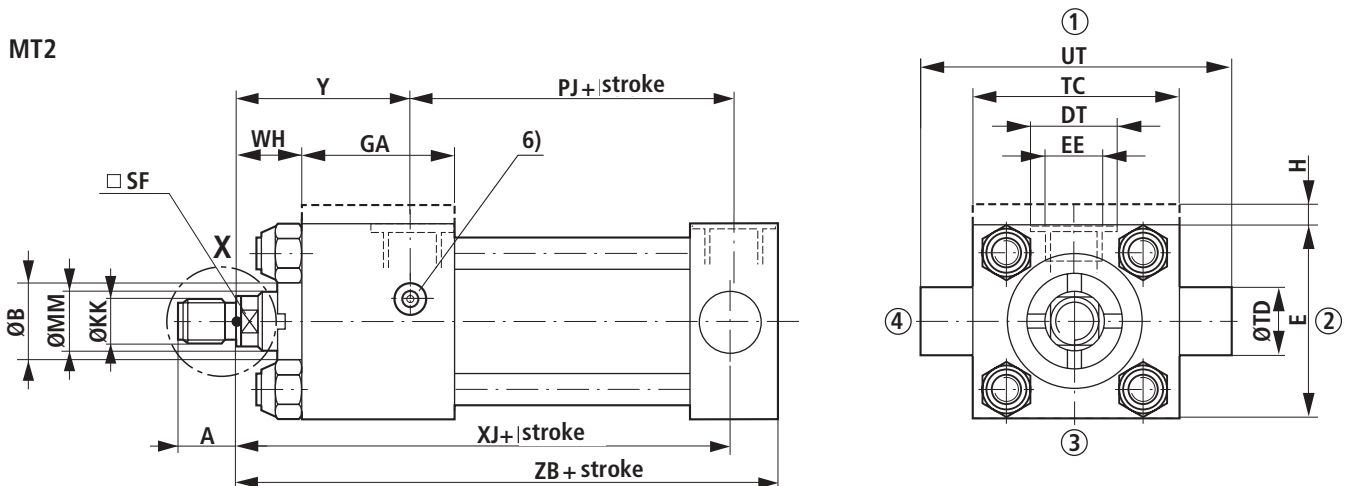
MT1



1...4 = Connection port locations



MT2



Dimensions MT1, MT2 (mm)

AL	MM	DIN / ISO							ISO							B f9
		KK ¹⁾	A ¹⁾ max	C	SF	WL	h	CR	KK ²⁾	A ²⁾ max	C	SF	WL	h	CR	
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	
	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	
	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	
	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	
	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	
	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	
	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	GA	E	EE	DT	EE	DT	J	H	PJ ± 1.25	WH ± 2	Y ± 2
25	46.5	40 ±1.5	G1/4	25	M14x1.5	21	22.5	5	53	15	50
32	46.5	45 ±1.5	G1/4	25	M14x1.5	21	23.5	5	56	25	60
40	52	63 ±1.5	G3/8	28	M18x1.5	26	33	–	73	25	62
50	57.8	75 ±1.5	G1/2	34	M22x1.5	29	33.8	–	74	25	67
63	55.8	90 ±1.5	G1/2	34	M22x1.5	29	33.8	–	80	32	71
80	65	115 ±1.5	G3/4	42	M27x2	34	39	–	93	31	77
100	67	130 ±2	G3/4	42	M27x2	34	40	–	101	35	82
125	73.5	165 ±2	G1	47	M33x2	43	51.5	–	117	35	86
160	80.5	205 ±2	G1	47	M33x2	43	55.5	–	130	32	86
200	101	245 ±2	G11/4	58	M42x2	52	76	–	165	32	98

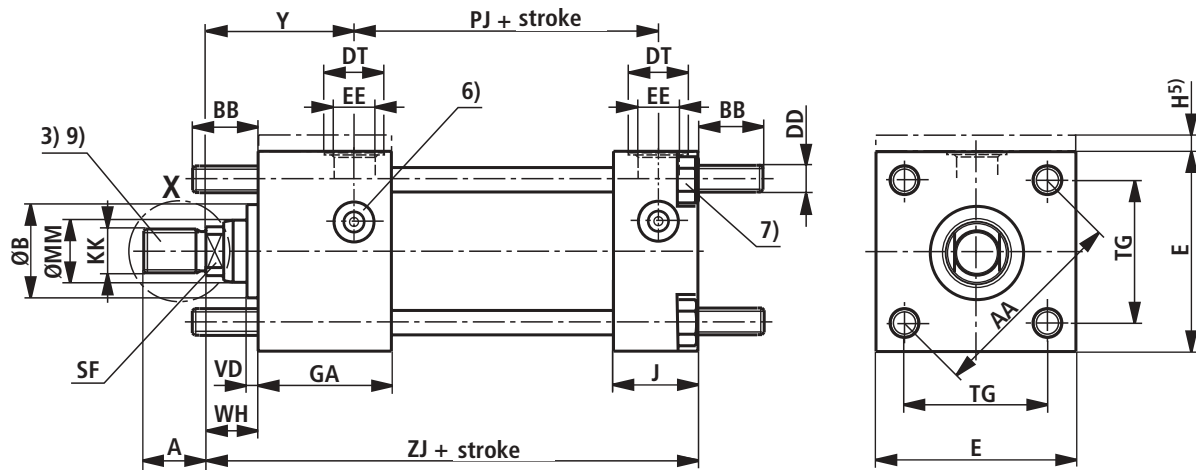
AL	n	PK ±1.25	r	TC h14	TD f8	UT h15	XG ±2	XJ ±1.25	ZB max	ZK ± 1	ZM ± 2
25	13	54	0.8	38	12	58	44	101	121	139	154
32	13	58	0.8	44	16	68	54	115	137	153	178
40	19	71	1.2	63	20	95	57	134	166	170	195
50	19	73	1.6	76	25	116	64	140	176	182	207
63	19	81	1.6	89	32	139	70	149	185	191	223
80	22	92	2.4	114	40	178	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	40	130	3.2	203	80	329	75	230	279	270	302
200	53	160	3.2	241	100	401	85	276	336	324	356

Notes

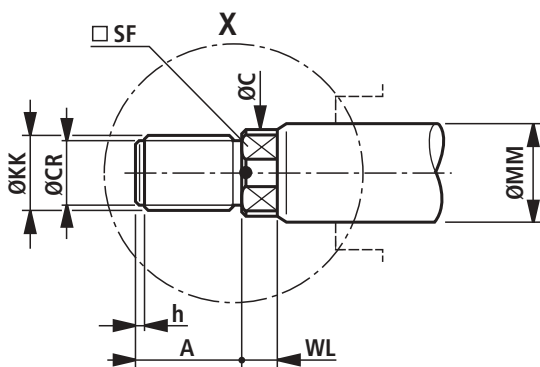
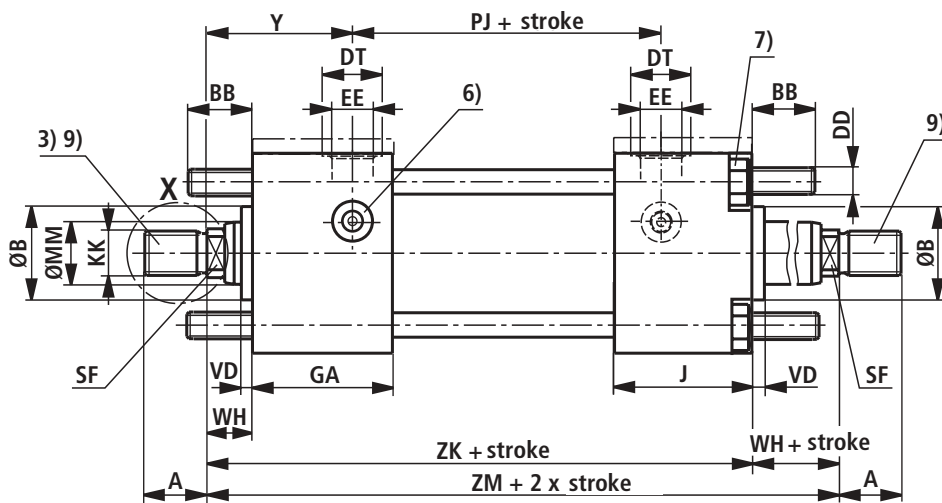
- 1) Thread for piston rod ends „F“ and „H“
- 2) Thread for piston rod ends „D“ and „K“
- 3) For piston rod ends „E“ and „T“ see page 39
- 4) Dim. „H“ is always at the connection port location
- 5) For connection port locations and bleeding see page 27
- 6) For tightening torques see page 42
- 7) For shorter strokes take „TC“ and „E“ into account
- 8) For shorter strokes take „TC“ and „E“ into account

Mounting style MX1

CDT3 MX1



CGT3 MX1



Dimensions MX1 (mm)

AL	MM	DIN / ISO							ISO							B f9
		KK ¹⁾	A ¹⁾ max	C	SF	WL	h	CR	KK ²⁾	A ²⁾ max	C	SF	WL	h	CR	
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	
	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	
	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	
	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	
	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	
	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	
	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	DD	GA	E	EE	DT	EE	DT	J	H	PJ ± 1.25	WH ± 2	Y ± 2
25	M5x0.8	46.5	40 ± 1.5	G1/4	25	M14x1.5	21	22.5	5	53	15	50
32	M6x1	46.5	45 ± 1.5	G1/4	25	M14x1.5	21	23.5	5	56	25	60
40	M8x1	52	63 ± 1.5	G3/8	28	M18x1.5	26	33	–	73	25	62
50	M12x1.25	57.8	75 ± 1.5	G1/2	34	M22x1.5	29	33.8	–	74	25	67
63	M12x1.25	55.8	90 ± 1.5	G1/2	34	M22x1.5	29	33.8	–	80	32	71
80	M16x1.5	65	115 ± 1.5	G3/4	42	M27x2	34	39	–	93	31	77
100	M16x1.5	67	130 ± 2	G3/4	42	M27x2	34	40	–	101	35	82
125	M22x1.5	73.5	165 ± 2	G1	47	M33x2	43	51.5	–	117	35	86
160	M22x1.5	80.5	205 ± 2	G1	47	M33x2	43	55.5	–	130	32	86
200	M30x2	101	245 ± 2	G1 1/4	58	M42x2	52	76	–	165	32	98

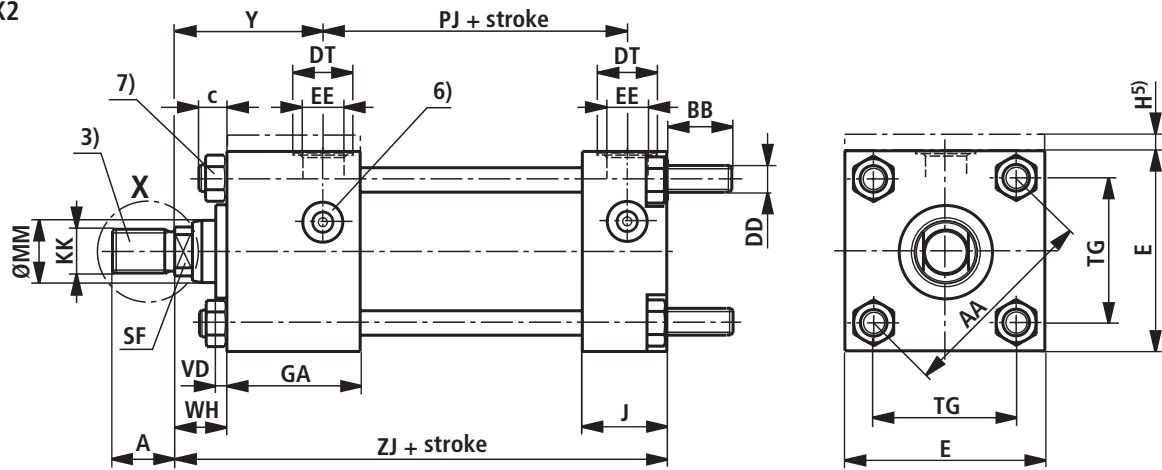
AL	AA	BB +3	PK ± 1.25	TG js13	VD	ZB max	ZJ ± 1.25	ZK ± 1	ZM ± 2
25	40	19	54	28.3	6	121	114	139	154
32	47	24	58	33.2	12	137	128	153	178
40	59	35	71	41.7	12	166	153	170	195
50	74	46	73	52.3	9	176	159	182	207
63	91	46	81	64.3	13	185	168	191	223
80	117	59	92	82.7	9	212	190	215	246
100	137	59	101	96.9	10	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

Notes

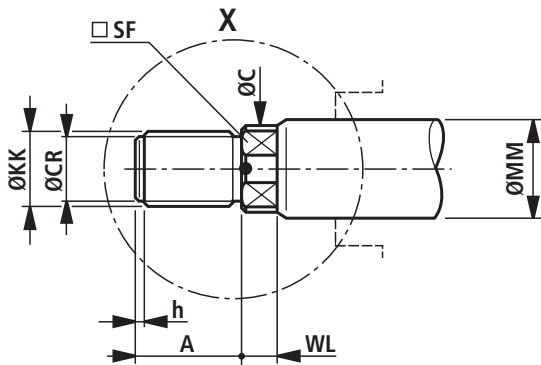
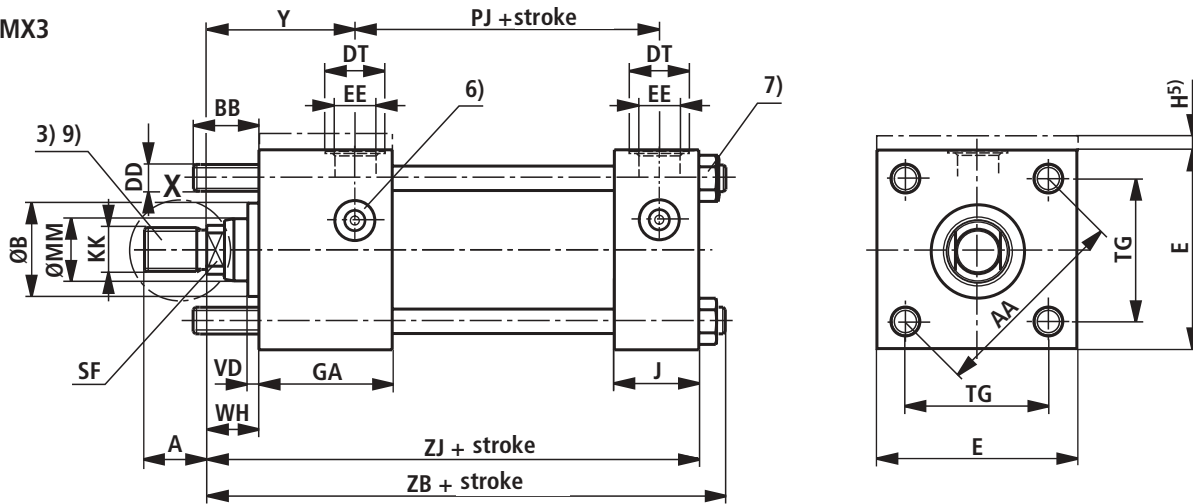
- 1) Thread for piston rod ends „F“ and „H“
- 2) Thread for piston rod ends „D“ und „K“
- 3) For piston rod ends „E“ and „T“ see page 39
- 4) Dim. „H“ is always at the connection port location
- 5) For connection port locations and bleeding see page 27
- 6) For tightening torques see page 42
- 7) Take dim. „BB“ into account when fitting the self-aligning clevis

Mounting styles MX2, MX3

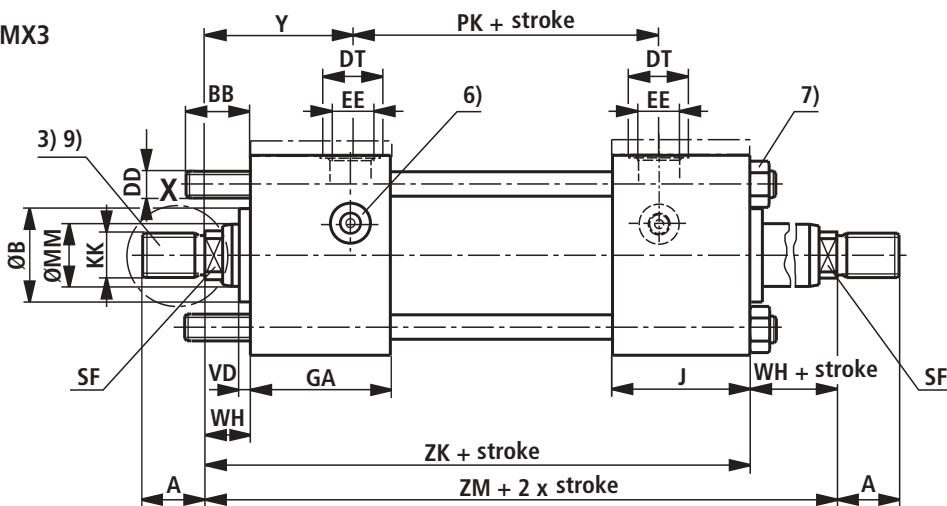
CDT3 MX2



CDT3 MX3



CGT3 MX3



Dimensions MX2, MX3 (mm)

AL	MM	DIN / ISO							ISO							B f9
		KK ¹⁾	A ¹⁾ max	C	SF	WL	h	CR	KK ²⁾	A ²⁾ max	C	SF	WL	h	CR	
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	
	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	
	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	
	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	
	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	
	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	
	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	GA	E	EE	DT	EE	DT	J	H	PJ ± 1.25	WH ± 2	Y ± 2
25	46.5	40 ±1.5	G1/4	25	M14x1.5	21	22.5	5	53	15	50
32	46.5	45 ±1.5	G1/4	25	M14x1.5	21	23.5	5	56	25	60
40	52	63 ±1.5	G3/8	28	M18x1.5	26	33	–	73	25	62
50	57.8	75 ±1.5	G1/2	34	M22x1.5	29	33.8	–	74	25	67
63	55.8	90 ±1.5	G1/2	34	M22x1.5	29	33.8	–	80	32	71
80	65	115 ±1.5	G3/4	42	M27x2	34	39	–	93	31	77
100	67	130 ±2	G3/4	42	M27x2	34	40	–	101	35	82
125	73.5	165 ±2	G1	47	M33x2	43	51.5	–	117	35	86
160	80.5	205 ±2	G1	47	M33x2	43	55.5	–	130	32	86
200	101	245 ±2	G11/4	58	M42x2	52	76	–	165	32	98

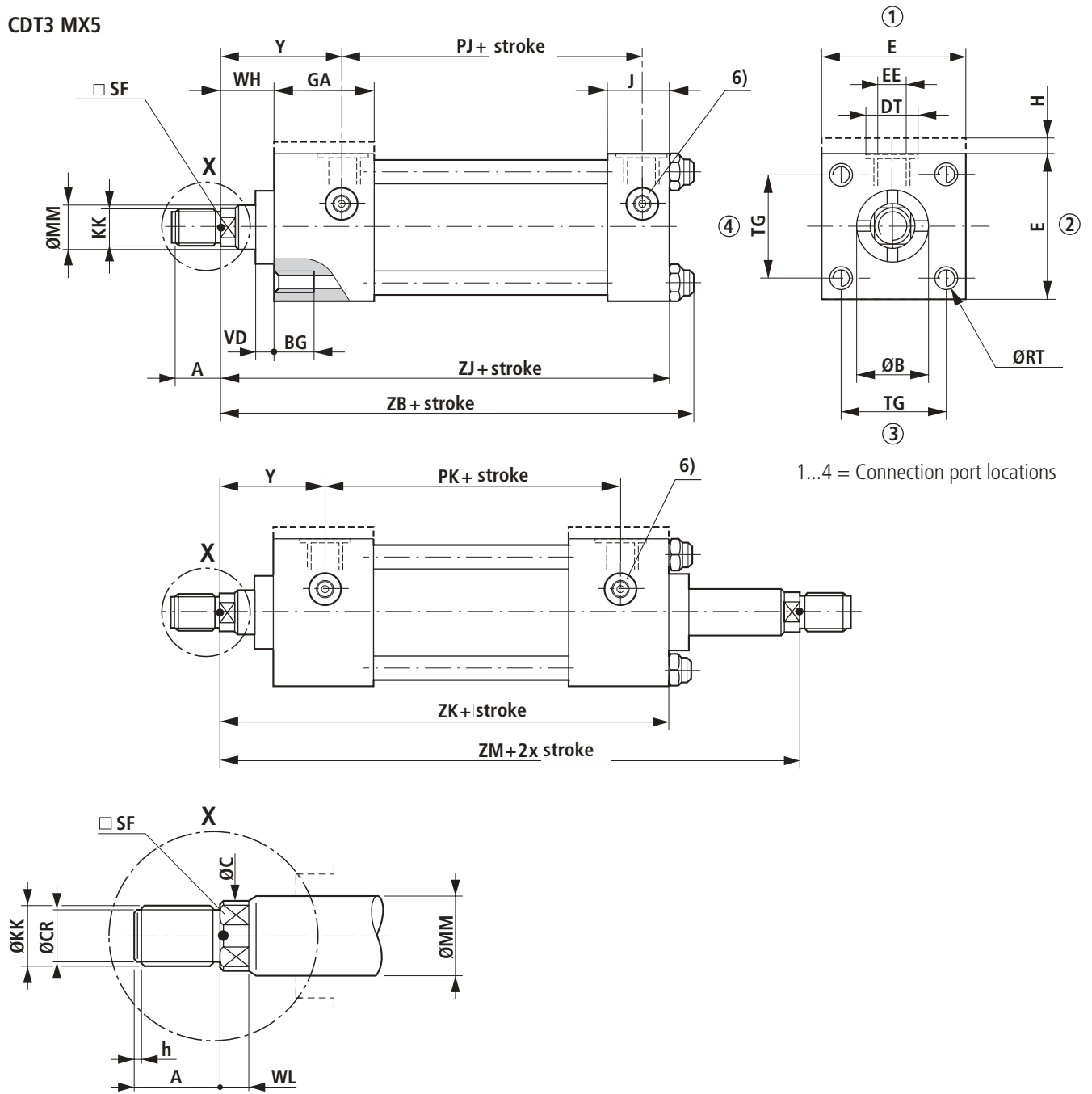
AL	AA	BB +3	PK ±1.25	TG js13	VD	ZB max	ZJ ± 1	ZK ± 1	ZM ± 2
25	40	19	54	28.3	6	121	114	139	154
32	47	24	58	33.2	12	137	128	153	178
40	59	35	71	41.7	12	166	153	170	195
50	74	46	73	52.3	9	176	159	182	207
63	91	46	81	64.3	13	185	168	191	223
80	117	59	92	82.7	9	212	190	215	246
100	137	59	101	96.9	10	225	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

Notes

- 1) Thread for piston rod ends „F“ and „H“
- 2) Thread for piston rod ends „D“ and „K“
- 3) For piston rod ends „E“ und „T“ siehe Seite 39
- 4) Dim. „H“ is always at the connection port location
- 5) For connection port locations and bleeding see page 27
- 6) For tightening torques see page 42
- 7) Take dim. „BB“ into account when fitting the self-aligning clevis

Mounting style MX5

CDT3 MX5



Dimensions MX5 (mm)

AL	MM	DIN / ISO							ISO							B f9
		KK ¹⁾	A ¹⁾ max	C	SF	WL	h	CR	KK ²⁾	A ²⁾ max	C	SF	WL	h	CR	
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	
	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	
	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	
	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	
	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	
	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	
	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

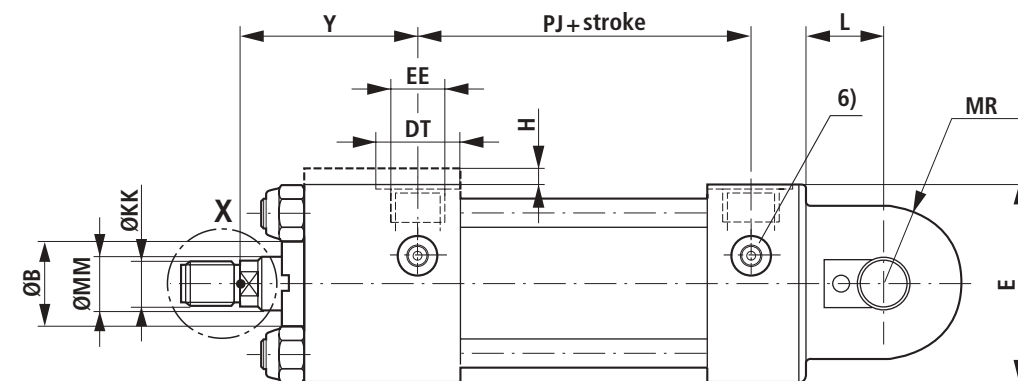
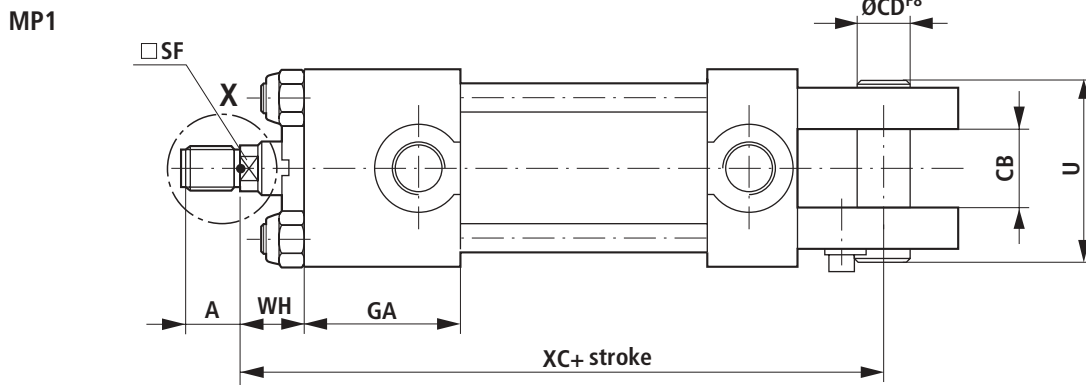
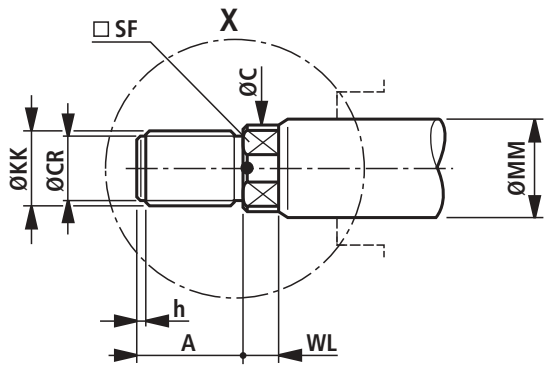
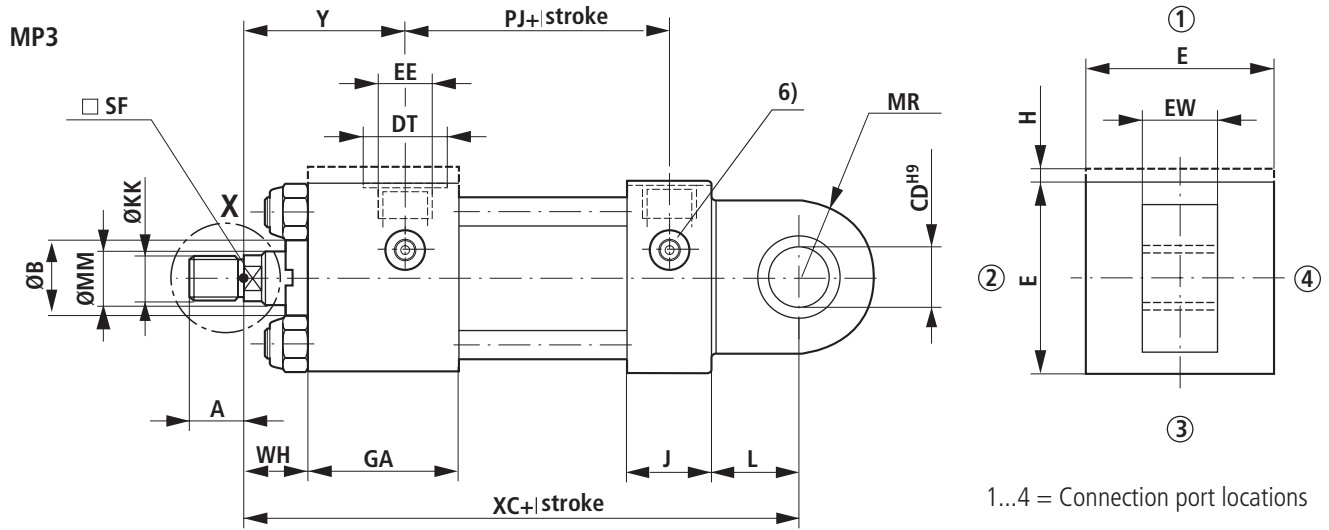
AL	GA	E	EE	DT	EE	DT	J	H	PJ ± 1.25	WH ± 2	Y ± 2
25	46.5	40 ±1.5	G1/4	25	M14x1.5	21	22.5	5	53	15	50
32	46.5	45 ±1.5	G1/4	25	M14x1.5	21	23.5	5	56	25	60
40	52	63 ±1.5	G3/8	28	M18x1.5	26	33	–	73	25	62
50	57.8	75 ±1.5	G1/2	34	M22x1.5	29	33.8	–	74	25	67
63	55.8	90 ±1.5	G1/2	34	M22x1.5	29	33.8	–	80	32	71
80	65	115 ±1.5	G3/4	42	M27x2	34	39	–	93	31	77
100	67	130 ±2	G3/4	42	M27x2	34	40	–	101	35	82
125	73.5	165 ±2	G1	47	M33x2	43	51.5	–	117	35	86
160	80.5	205 ±2	G1	47	M33x2	43	55.5	–	130	32	86
200	101	245 ±2	G11/4	58	M42x2	52	76	–	165	32	98

AL	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

Notes

- 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 39
- 4) Dim. „H“ is always at the connection port location
- 5) For connection port locations and bleeding see page 27
- 6) For tightening torques see page 42
- 7) Take dim. „BB“ into account when fitting the self-aligning clevis

Mounting styles MP1, MP3



Dimensions MP1, MP3 (mm)

AL	MM	DIN / ISO							ISO							B f9
		KK ¹⁾	A ¹⁾ max	C	SF	WL	h	CR	KK ²⁾	A ²⁾ max	C	SF	WL	h	CR	
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	
	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	
	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	
	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	
	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	
	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	
	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	GA	E	EE	DT	EE	DT	J	H	PJ ± 1.25	WH ± 2	Y ± 2
25	46.5	40 ±1.5	G1/4	25	M14x1.5	21	22.5	5	53	15	50
32	46.5	45 ±1.5	G1/4	25	M14x1.5	21	23.5	5	56	25	60
40	52	63 ±1.5	G3/8	28	M18x1.5	26	33	–	73	25	62
50	57.8	75 ±1.5	G1/2	34	M22x1.5	29	33.8	–	74	25	67
63	55.8	90 ±1.5	G1/2	34	M22x1.5	29	33.8	–	80	32	71
80	65	115 ±1.5	G3/4	42	M27x2	34	39	–	93	31	77
100	67	130 ±2	G3/4	42	M27x2	34	40	–	101	35	82
125	73.5	165 ±2	G1	47	M33x2	43	51.5	–	117	35	86
160	80,5	205 ±2	G1	47	M33x2	43	55.5	–	130	32	86
200	101	245 ±2	G11/4	58	M42x2	52	76	–	165	32	98

AL	CB A16	CD	EW h14	L min	MR max	UB max	u	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

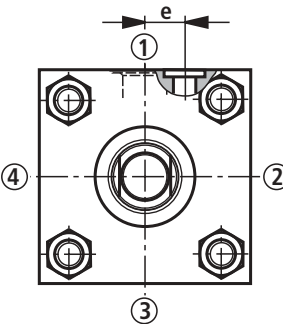
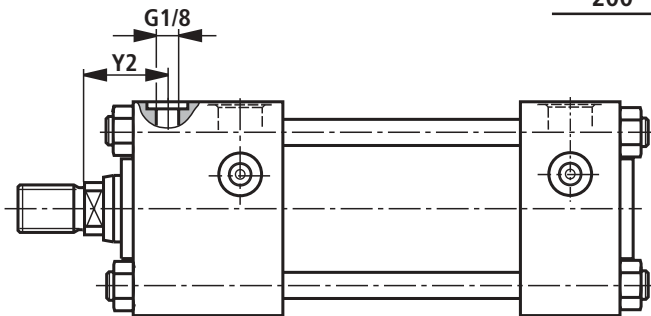
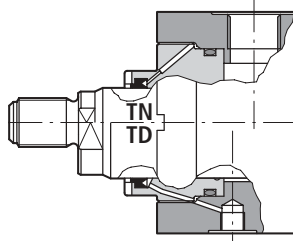
Notes

- 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 39
- 4) Dim. „H“ is always at the connection port location
- 5) For connection port locations and bleeding see page 27
- 6) For tightening torques see page 42
- 7) The bolts are included within the scope of supply
- 8) For connection port locations and bleeding see page 27
- 9) For tightening torques see page 42
- 10) The bolts are included within the scope of supply

Drain connection / enlarged pipe connections

Drain connection

By using high technology seals the need of having a drain connection is generally unnecessary. The drain connection is only required when, e.g. the extension speed is more than 2 x the retraction speed (with long strokes), when continuously pressurised, a drag oil collection connection is recommended. For extension speeds higher than 5 x the retraction speed, consultations are required.



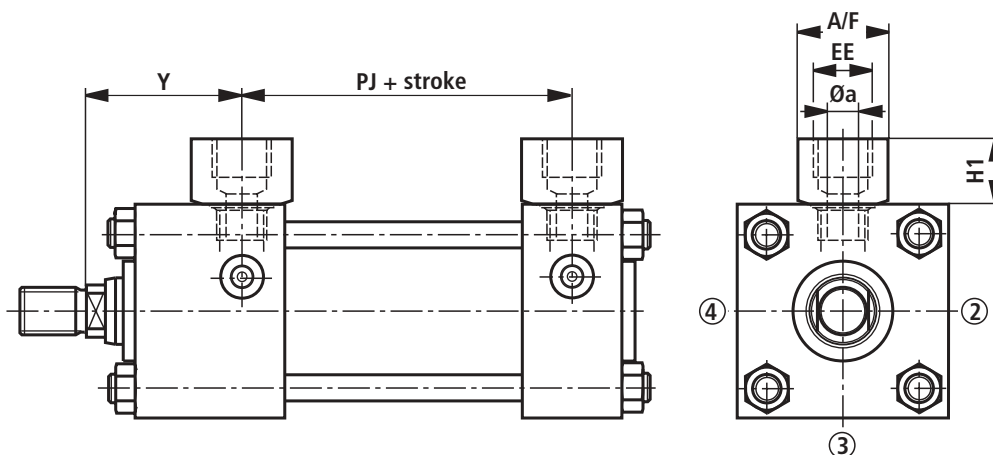
		MS2, MT4 ME6, MP5		ME5	
AL	MM	e	Y2	e	Y2
25		6	21	17	35
32		7	32	18	45
40		13	38	22	47
50		15	39	34	51
63		16	46	43	59
80	36	16	45	27	62
80	56	16	50	27	62
100	45	16	49	30	68
100	70	16	56	30	68
125	56	16	54	45	68
125	90	18	57	45	68
160	70	16	54	45	68
160	110	16	54	47	68
200	90	16	55	45	68
200	140	24	61	45	72

Enlarged pipe connections

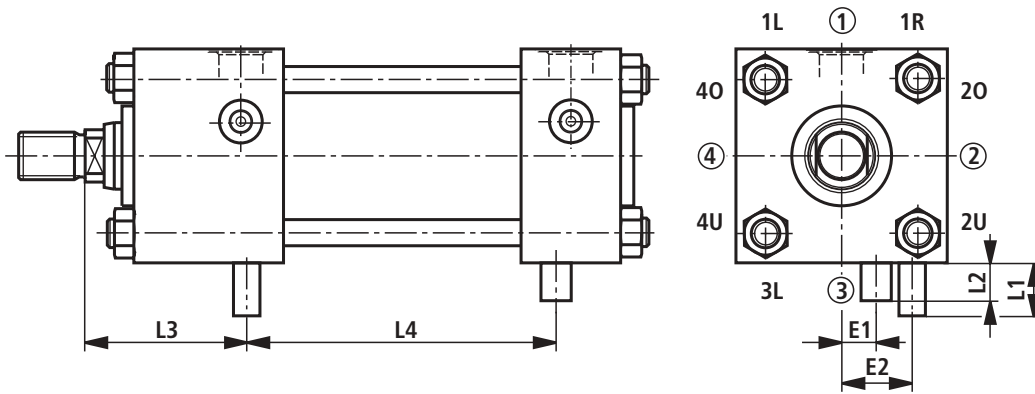
The oil connections for this series are to the standard generously sized; however, with higher speeds the ΔP can be reduced by using larger oil connections, but in some instances the standard dimensions cannot be maintained, see table.

Not possible for mounting styles ME 5 / 6 with port locations 2 or 4.

AL	EE	H1	Y	PJ	A/F	$\varnothing a$
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	G1 1/4	39	86	117	60	23
160	G1 1/4	–	86	130	–	–
200	G1 1/2	–	86	165	–	–



Connection port locations / bleeding / oil leakage / throttle valve



Mounting	Connection port	CDT3					CGT3						
		Bleeding		Oil leakage	Throttle valve		Bleeding		Oil leakage		Throttle valve		
		Head 1	Base	Head 1	Head 1	Base	Head 1	Head 2	Head 1	Head 2	Head 1	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	40
	3	4	4	3	1L	1L		4	2	3	3	1L	1R
	4	1	1	4	20	20		1	3	4	4	20	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	40
	3	4	4	3	1L	1L		4	2	3	3	1L	1R
	4	1L	1	3	3R	20		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	20	3R		-	-	-	-	-	-
MS2	1	2	2	1	40	40	MS2	2	4	1	1	40	20
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	-	-	-		-	-	-	-	-	-

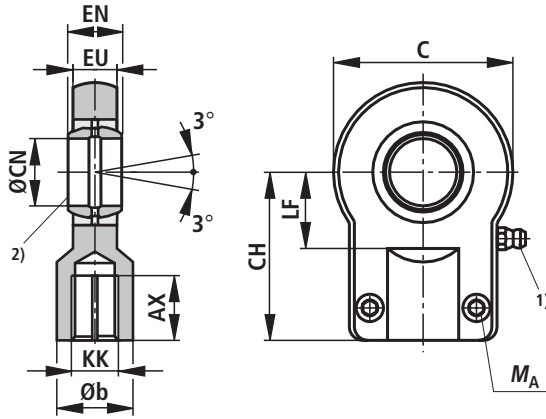
Throttle valve on both sides adjustable

AL Ø	Protrusion		Centre off-set		L3	Dimensions	
	L1 (head)	L2 (base)	E1 (head)	E2 (base)		L4	
25	12	12	6	6	46.5	60 + stroke	
32	12	8.5	9	4	55	66 + stroke	
40	6.5	2	8	8	56.5	79 + stroke	84 + stroke ¹⁾
50	4.5	-	10	10	60	82 + stroke	88 + stroke ¹⁾
63	-	-	15	11	70	82 + stroke	
80	-	-	14	18	73.5	100 + stroke	
100	-	-	13	20	84.5	100 + stroke	
125	-	-	22	22	91.5	109 + stroke	
160	4	-	30	30	93.5	115 + stroke	
200	4	-	30	30	114	128 + stroke	

¹⁾ Dim. L4 for mounting style MS2

Self-aligning clevis (with locking screws): CGKA (mm) - AP 6

ISO 8133
DIN 24 555

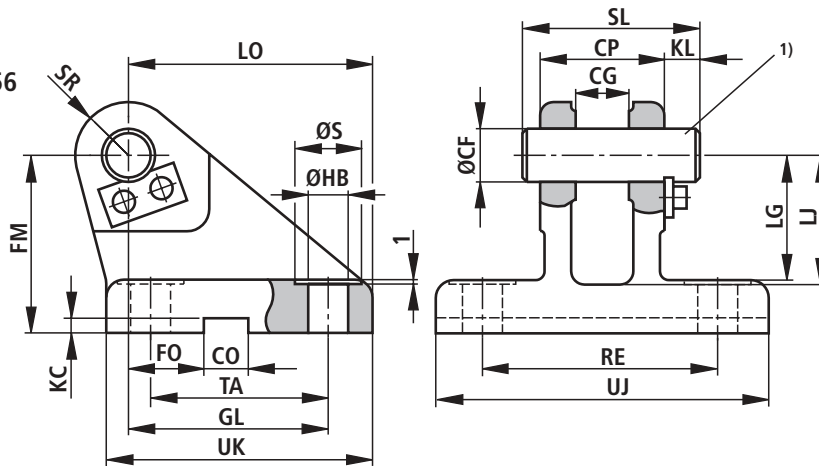


- 1) Grease nipple, cone head form A to DIN 71 412
- 2) Associated pin \varnothing h6
- 3) Lubricant cannot be applied
- 4) Lubricant can be applied via the lubrication hole
- 5) Self-aligning clevis to ISO 6982, DIN 24 338, associated bolts \varnothing h6
- 7) Self-aligning clevis weight

KK	Type	Material No.	AX min.	b	C max.	CH js13	CN \varnothing	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 _{-0.015}	44 _{-0.15}	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

Clevis bracket (with locking screws): CLCB (mm) - AB 5

ISO 8133
DIN 24 556

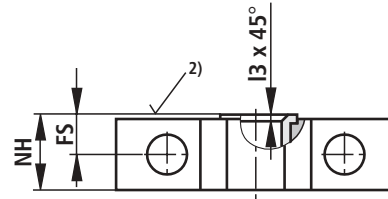
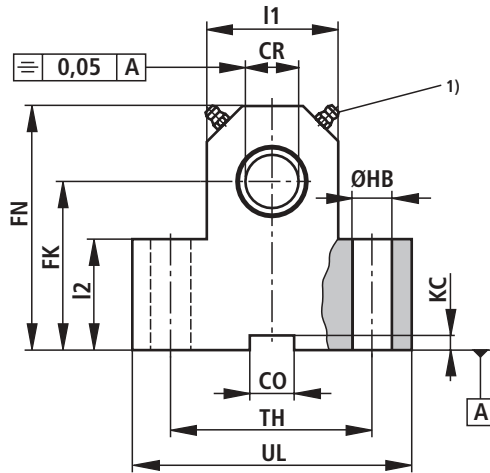


- 1) The associated \varnothing h6 pin which fits the CGKA... clevis bracket (pin and pin locking elements are included within the scope of supply)
- 2) Clevis bracket weight

Piston \varnothing	Type	Mat. No.	$m^2)$ kg	CF \varnothing K7	CP h14	CG $+0.1$ $+0.3$	CO N9	FO js14	FM js11	GL js13	HB \varnothing	KC $+0.3$ 0	KL	LG	LJ	LO js13	RE	SL	SR max	TA js13	UJ	UK	S \varnothing
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 bearing block CLTA (mm) - AT 4

DIN 24 556

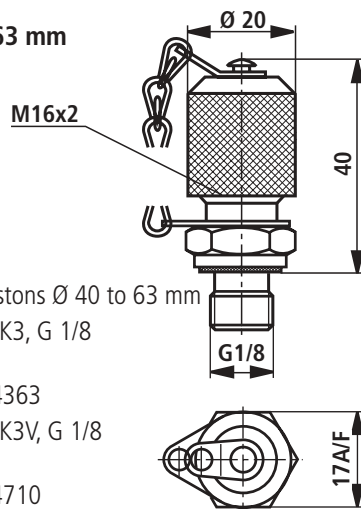


- 1) Grease nipple, head form A to DIN 71 412
- 2) Inner side
- 3) Weight per pair, bearing blocks are supplied in pairs

Piston Ø	Type	Mat. No.	$m^{3)}$ kg	CR H7	CO N9	FK js12	FN max	FS js14	HB Ø H13	KC +0.3	NH max	TH js14	UL max	I1	I2	I3
25	CLTA 12	R900771870	0.5	12	10	38	55	8	9	3.3	17	40	63	25	25	1
32	CLTA 16	R900771871	0.9	16	16	45	65	10	11	4.3	21	50	80	30	30	1
40	CLTA 20	R900771872	1.35	20	16	55	80	10	11	4.3	21	60	90	40	38	1.5
50	CLTA 25	R900771873	2.4	25	25	65	90	12	14	5.4	26	80	110	56	45	1.5
63	CLTA 32	R900771874	5.0	32	25	75	110	15	18	5.4	33	110	150	70	52	2
80	CLTA 40	R900771876	8.5	40	36	95	140	16	22	8.4	41	125	170	88	60	2.5
100	CLTA 50	R900771877	15	50	36	105	150	20	26	8.4	51	160	210	90	72	2.5
125	CLTA 63	R900771878	30	63	50	125	195	25	33	11.4	61	200	265	136	87	3
160	CLTA 80	R900771879	59	80	50	150	230	31	39	11.4	81	250	325	160	112	3.5
200	CLTA 100	R900771880	131	100	63	200	300	42	52	12.4	101	320	410	200	150	4.5

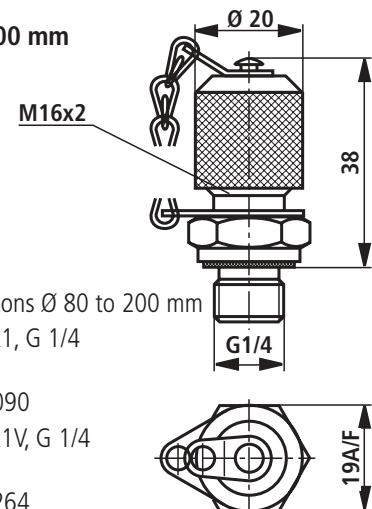
Coupling

For pistons Ø 40 - 63 mm



Scope of supply for pistons Ø 40 to 63 mm
 Coupling AB-E 20-11/K3, G 1/8
 with NBR seal
 Material No. R900014363
 Coupling AB-E 20-11/K3V, G 1/8
 with FKM seal
 Material No. R900024710

For pistons Ø 80 - 200 mm



Scope of supply for pistons Ø 80 to 200 mm
 Coupling AB-E 20-11/K1, G 1/4
 with NBR seal
 Material No. R900009090
 Coupling AB-E 20-11/K1V, G 1/4
 with FKM seal
 Material No. R900001264

Notes

For pressure measurement or bleeding.
 For installation in the bleed/measuring port. Coupling with check valve function, i.e. it can also be connected when pressure is present.

Buckling

Buckling:

A cylinder that is subject to pressure forces is susceptible to buckling. Due to this the stroke length, dependent on the pressure, mounting style, the guidance quality of the moved mass, is limited. Stated within the table are theoretical stroke lengths = L in relation to the pressure and diameter. These values divided by the mounting and load guidance factors = K gives the maximum permissible stroke = H. If this length is exceeded then the cylinder will buckle and be damaged. If the required stroke is, however, longer than this value then this factor can be overcome by selecting a different mounting style, load guidance or by using a longer piston diameter.

1. Calculation according to Euler

$$F = \frac{\pi^2 \cdot E \cdot I}{\nu \cdot L_K^2} \text{ when } \lambda > \lambda_g$$

2. Calculation according to Tetmajer

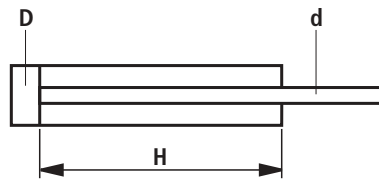
$$F = \frac{d^2 \cdot \pi (335 - 0.62 \cdot \lambda)}{4 \cdot \nu} \text{ when } \lambda \leq \lambda_g$$

Explanation:

E = Modulus of elasticity in N/mm²
= 2.1 x 10⁵ for steel

I = Moment of inertia in mm⁴ for a circular cross-sectional area

$$I = \frac{d^4 \cdot \pi}{64} = 0.0491 \cdot d^4$$



ν = 3.5 (safety factor)

L_K = Free buckling length in mm (depending on the mounting styles, see page 31)

d = Piston rod Ø in mm

λ = Slenderness ration
 $\lambda_g = \pi \sqrt{\frac{E}{0.8 \cdot R_e}}$

R_e = Yield strength of the piston rod material

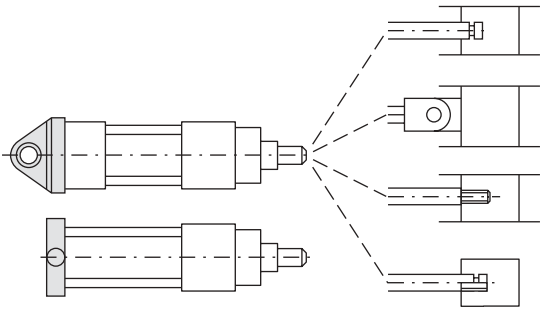
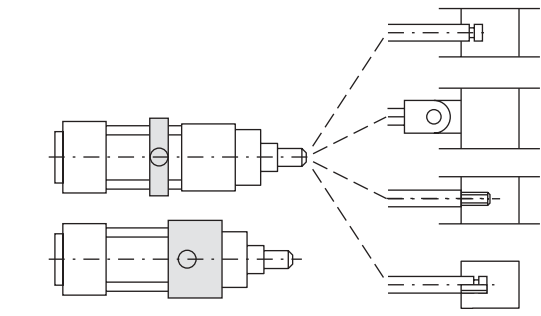
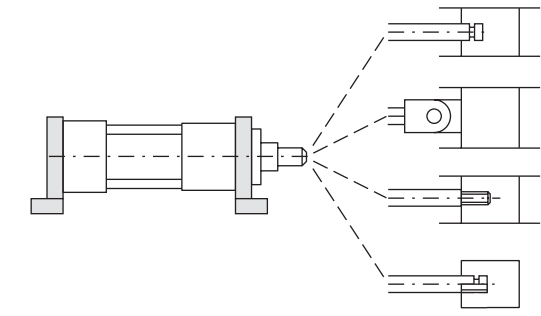
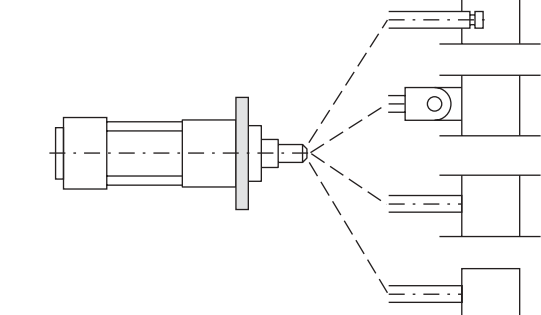
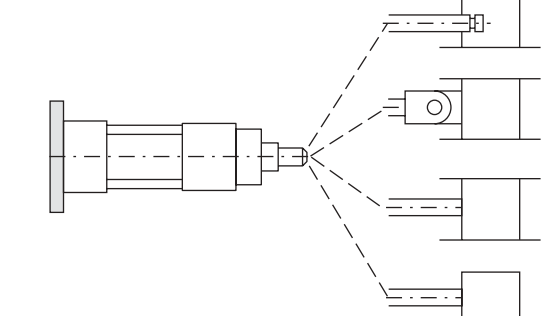
L = H • K H = Stroke

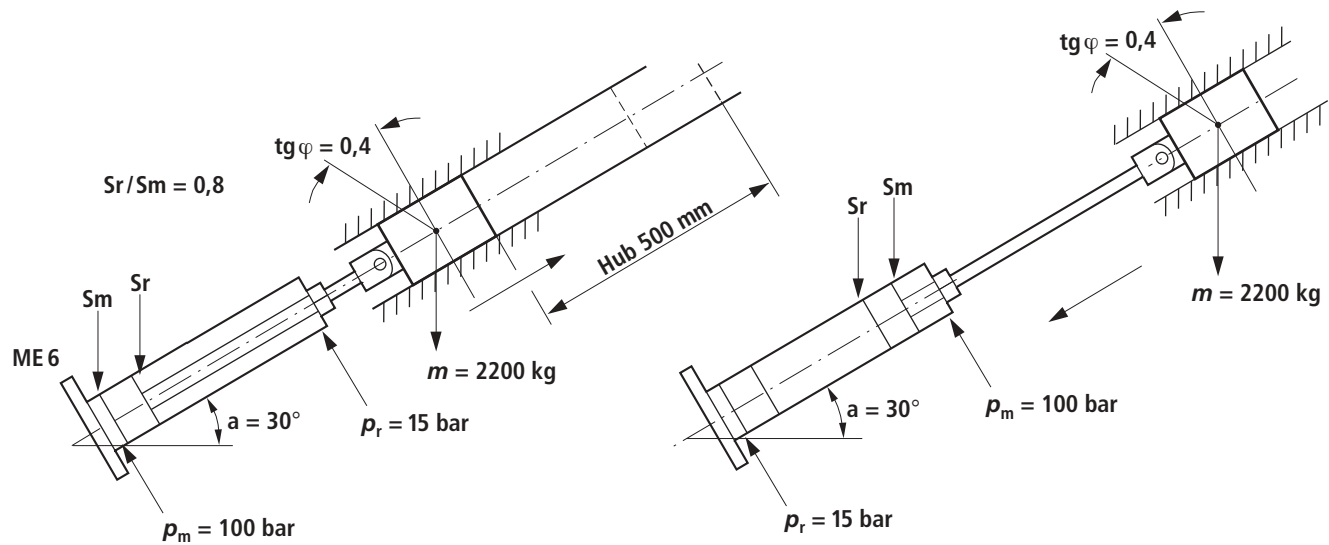
or
L = Theoretical stroke value from table

$H = \frac{L}{K}$ K = Load guidance factor on page 31

Piston Ø AL	Piston rods Ø MM	Pressure in bar															
		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160
25	12	1118	787	640	552	491	446	411	382	358	337	319	303	289	275	263	252
	18	2521	1779	1450	1254	1119	1020	942	880	828	784	746	712	683	656	633	611
32	14	1188	836	679	585	520	471	433	402	376	353	333	315	298	283	269	255
	22	2941	2076	1692	1462	1305	1189	1098	1025	964	913	868	829	794	763	735	710
40	18	1571	1106	899	774	688	625	574	533	499	469	443	420	399	379	361	343
	28	3812	2691	2193	1895	1692	1541	1424	1329	1251	1184	1126	1075	1031	991	955	922
50	22	1877	1321	1073	924	822	745	685	636	594	558	527	498	473	449	426	405
	36	5042	3559	2901	2508	2239	2040	1885	1760	1656	1567	1491	1425	1365	1313	1265	1222
63	28	2414	1699	1380	1189	1057	959	881	818	765	719	679	643	610	579	551	524
	45	6252	4413	3597	3109	2776	2529	2337	2182	2052	1943	1848	1766	1692	1627	1568	1514
80	36	3143	2212	1797	1548	1377	1249	1149	1067	998	938	886	839	797	758	721	687
	56	7624	5381	4386	3791	3384	3083	2848	2659	2501	2367	2252	2151	2061	1981	1909	1843
100	45	3928	2765	2246	1935	1721	1561	1436	1333	1247	1173	1108	1049	996	947	902	859
	70	9530	6727	5482	4739	4230	3854	3560	3323	3126	2959	2815	2689	2577	2477	2386	2304
125	56	4867	3425	2783	2397	2132	1934	1778	1651	1544	1452	1371	1298	1233	1172	1115	1061
	90	12604	8897	7552	6269	5597	5100	4712	4399	4139	3918	3728	3561	3414	3282	3163	3055
160	70	5939	4179	3394	2923	2598	2356	2165	2009	1878	1764	1664	1574	1492	1416	1344	1275
	110	14707	10380	8459	7311	6526	5945	5492	5126	4822	4563	4340	4145	3972	3817	3677	3550
200	90	7857	5530	4493	3870	3442	3123	2872	2667	2494	2346	2215	2099	1993	1895	1804	1717
	140	19060	13453	10964	9477	8460	7707	7121	6647	6253	5919	5360	5377	5153	4953	4773	4608

Buckling

Mounting styles	Load transmission	K	Stop tebe extension
MP 1 MP 3 MP 5 MT 2		2	c
		2	
		1.5	
		4	d
MT 4 MT 1		1.5	b
		1.5	
		1	
		3	c
MS 2		0.7	a
		0.7	
		0.5	
		2	b
ME 5 MX 5 MX 1 MX 7		0.7	a
		0.7	
		0.5	
		2	b
ME 6		1.5	b
		1.5	
		1	
		4	d



Example:

Stroke time 2 s

Load friction co-efficient = 0.4

Available pressure $p_m = 100$ bar

Return pressure $p_r = 15$ bar

S_m = Surface area on which the working pressure is applied

S_r = Surface area on which the return pressure is applied

m = Total moved mass

v = Maximum velocity

$g = 9.81$ m/s²

l_a = Cushioning length, see page 34

To be determined:

Piston and piston rod diameter

Piston rod; extending:

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

η_1 = Cylinder efficiency = 0.9 (estimated)

η_2 = System efficiency

$$\begin{aligned} \eta_2 &= \frac{p_m \cdot S_m - p_r \cdot S_r}{p_m \cdot S_m} \\ &= \frac{p_m \cdot S_m - 0.8 \cdot p_r \cdot S_m}{p_m \cdot S_m} \\ &= \frac{p_m - 0.8 \cdot p_r}{p_m} \\ &= \frac{100 - 0.8 \cdot 15}{100} \\ &= 0.88 \end{aligned}$$

The force required to move a mass:

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

(F = Frictional force plus the potential energy)

Craft 18.27 kN at $\eta = 0.79$ and $p_m = 100$ bar this results in a cylinder piston diameter = 63 mm

Piston rod; retracting:

$$\begin{aligned} F &= 0.4 \cdot m \cdot g \cdot \cos \alpha - m \cdot g \cdot \sin \alpha \\ &= 0.4 \cdot 2200 \cdot 9.81 \cdot 0.866 - 2200 \cdot 9.81 \cdot 0.5 \\ &= -3315 \text{ N} \\ &= -3.3 \text{ kN} \end{aligned}$$

(F = Frictional force plus the potential energy)

No force problems when retracting

Checking the buckling length:

The table on page 30 results for a $p_m = 100$ bar and a cylinder size of 63 / 28 a $L = 719$ mm

For ME 6, $K = 1.5$ (page 31) the buckling length $H = L / K$

$= 719 / 1.5 = 479$ mm

The cylinder buckles

There are 2 possibilities:

- A 45 mm piston rod diameter, L = safe from buckling
- Change the mounting style, e.g. MS2 with a co-efficiency of 0.7

End position cushioning

Checking the end position cushioning:

Average speed $0.5 / 2 = 0.25$ m/s

Max. speed 0.267 m/s

Cushioning capacity when the piston rod is being extended =

$$\frac{m \cdot v^2}{2} - m \cdot g \cdot L_a \cdot \sin \alpha = \frac{2200 \cdot 0.267^2}{2} - 2200 \cdot 9.81 \cdot 0.028 \cdot 0.5 = -224 \text{ joules}$$

No cushioning problems when extending

Cushioning capacity when the piston rod is being retracted =

$$\frac{m \cdot v^2}{2} + m \cdot g \cdot L_a \cdot \sin \alpha = \frac{2200 \cdot 0.267^2}{2} + 2200 \cdot 9.81 \cdot 0.025 \cdot 0.5 = 348 \text{ joules}$$

The diagram on page 36 gives a result of 445 joules for $P_m = 100$ bar, $v_{\max} = 0.4$ m/s, so 0.267 m/s has to be cushioned

$$E_U = E_{\max} \cdot \frac{v_U}{v_{\max}} = 445 \cdot \frac{0.267}{0.4} = 297 \text{ joules}$$

The cylinder cannot absorb this energy;

The next larger diameter of 80 / 56 has to be selected.

End position cushioning:

For speeds above 20 mm/s we recommend the use of cushioning, so that the energy can be dissipated without the use of additional means. Thereby damage to the cylinder and the surrounding area is prevented. The CDT3 series is fitted with a self-adjusting progressive cushioning system.

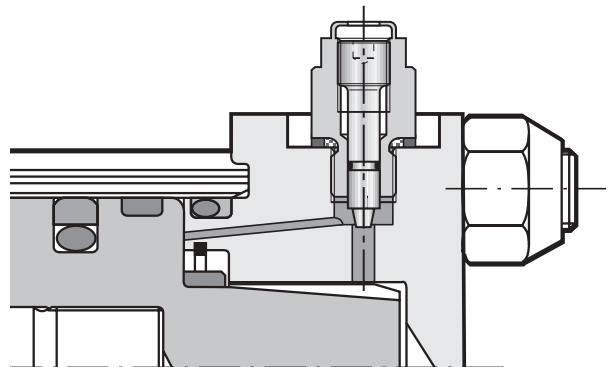
The advantages of this cushioning system are:

- Progressive delay.
- Short cushioning times.
- The cushioning length is dependent on the speed.
- Low cushioning pressures and no pressure peaks, therefore the safety and the service life of the cylinder and its surroundings are increased.
- Non-sensitive characteristics with changes in the pressure, the temperature and the moved mass.
- Automatic limitation of the piston's end stop velocity: increased safety and reliability.
- A special check valve and a floating sleeve makes possible immediately high flows giving fast end stop positioning.
- The negative effects of adjustable cushioning by means of a screw are prevented (shocks, adjustment changes due to oscillations or untrained personnel, leaks at the screw, etc.)
- Application range:
30 to 160 bar operating pressure = Cushioning D,
20 to 70 bar for cushioning low energies and for short cushioning times = Cushioning L (piston diameters less than 125 mm).

Cushioning type E ist the same as type D but includes a throttle screw to adjust the cushioning times; care however has to be taken to ensure that the maximum recommended end stop speed is not exceeded. The maximum energies shown within the curves are only valid when the throttle valve is fully closed.

For special applications, e.g. very short stroke times, high speeds, masses or energies, we can provide perforated ring cushioning „BT“; additional information is available on request.

Each cylinder that is fitted with progressive cushioning must use its entire stroke length. When using an external fixed or adjustable end stop special measures have to be taken, please consult ourselves.

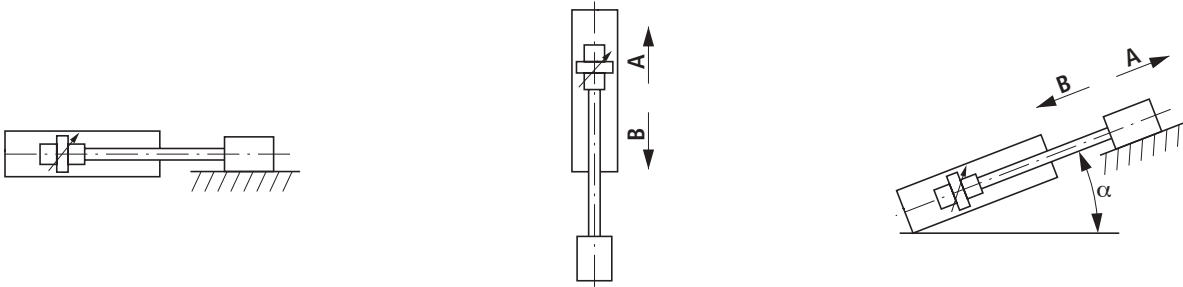


End position cushioning

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 of the moved mass has to be calculated and then compared with the permissible values stated within the diagrams shown on pages 37 to 39.

Determining the energy



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

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

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

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

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

E	[Nm] [joules]	For maximum value see page 37
m	[kg]	Total moved mass, including the piston and rod
v	[m/s]	Maximum velocity
g	[m/s ²]	9.81
l _a	[m]	Cushioning lengths, see below

Cushioning lengths and masses

Cylinder Ø		25		32		40		50		63		80		100		125		160		200	
		12	18	14	22	18	28	22	36	28	45	36	56	45	70	56	90	70	110	90	140
l _a (mm)	Head	15	17	25	27	28	28	28	28	33	50										
	Cap	16	16	25	25	25	29	28	40	40	56										
m [kg]	Piston	0.15	0.2	0.25	0.4	0.6	0.7	0.8	1.2	1.4	2.0	2.6	3.6	4.7	6.3	8.0	11	16	20	30	38
(kg/100 mm)	Rod	0.09	0.2	0.12	0.3	0.2	0.5	0.3	0.8	0.5	1.2	0.8	2.0	1.2	3.0	2.0	5.0	3.0	7.5	5.0	12
v max *	(m/s)	0.5		0.5		0.5		0.5		0.4		0.4		0.3		0.3		0.25		0.25	

* If the v_{max} is exceeded then please contact ourselves.

End position cushioning

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

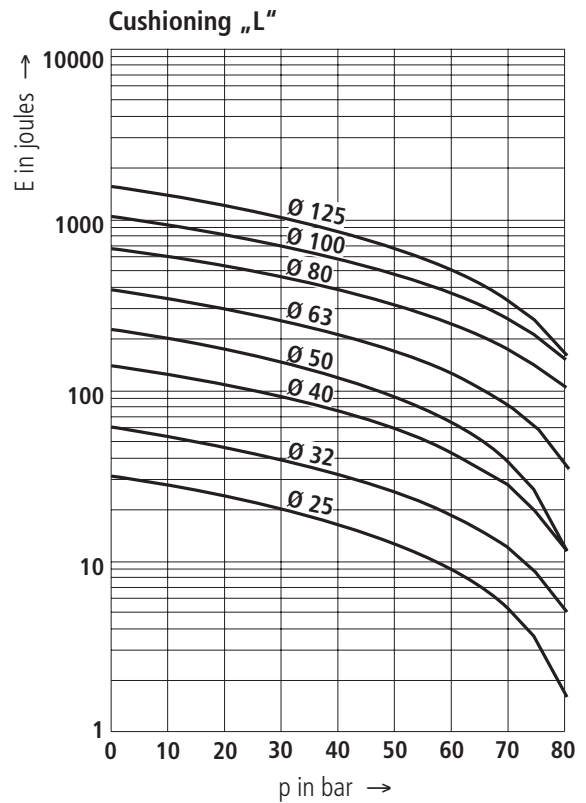
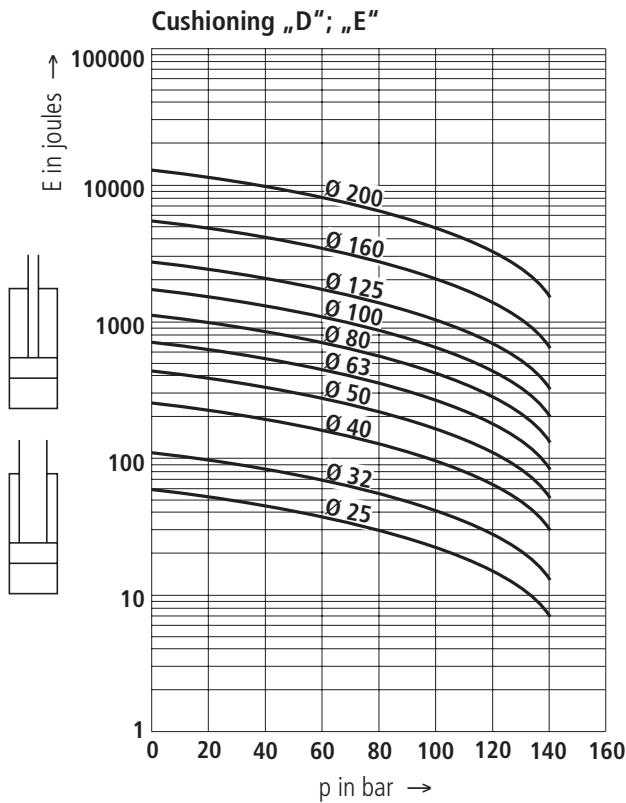
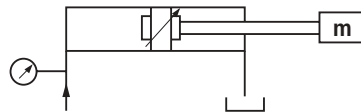
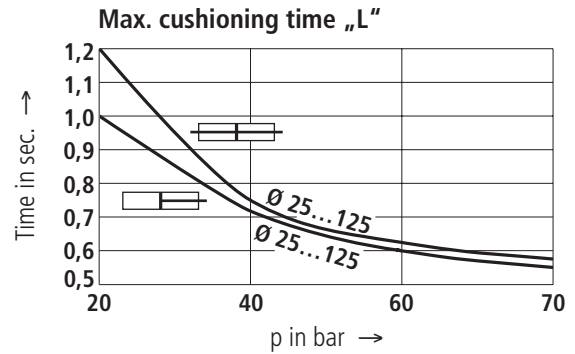
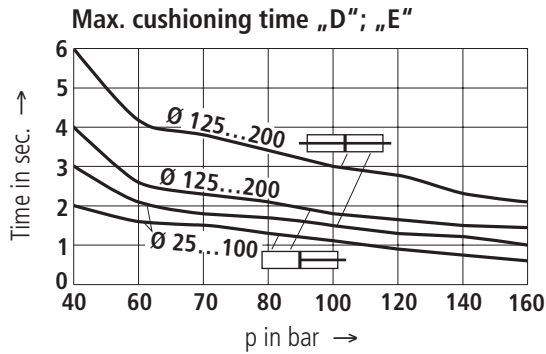
EU = Absorbed energy

E_{\max} = Max. energy, see characteristic curves

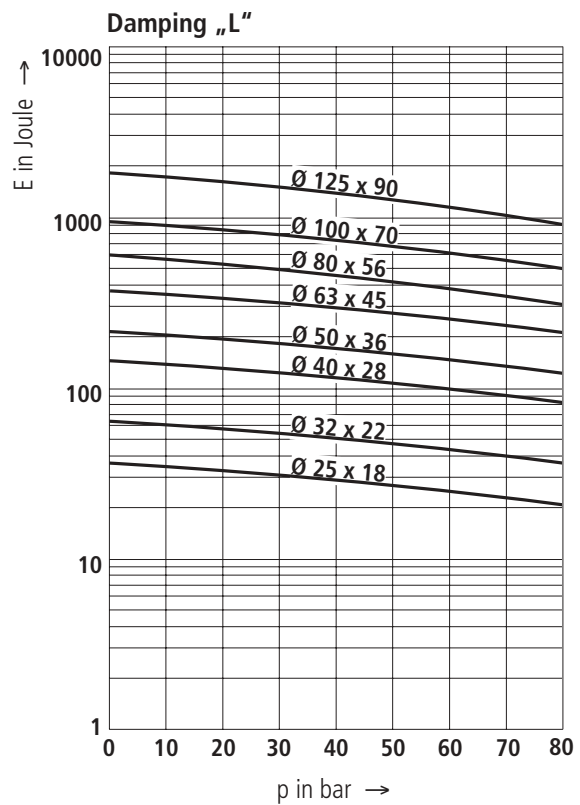
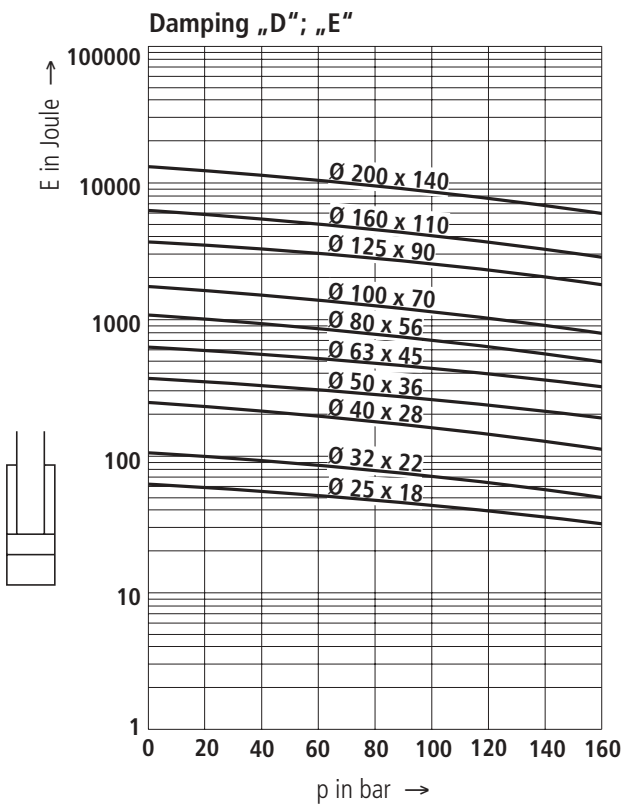
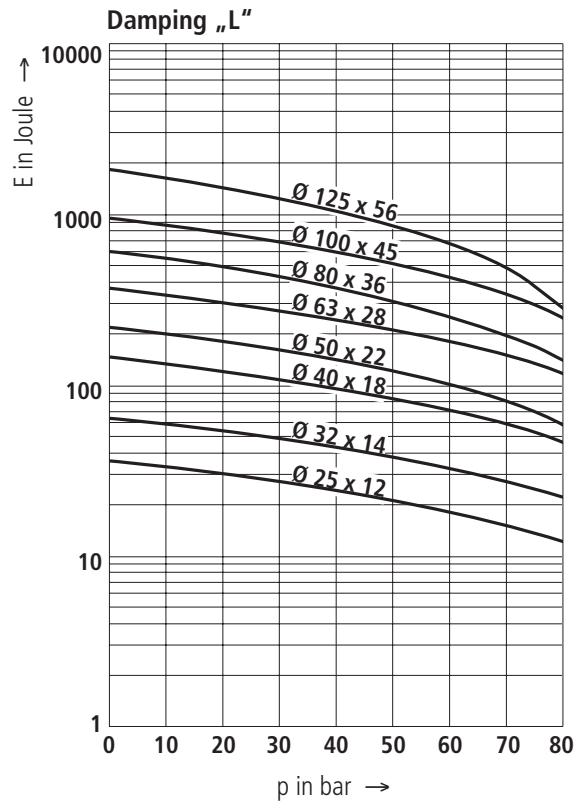
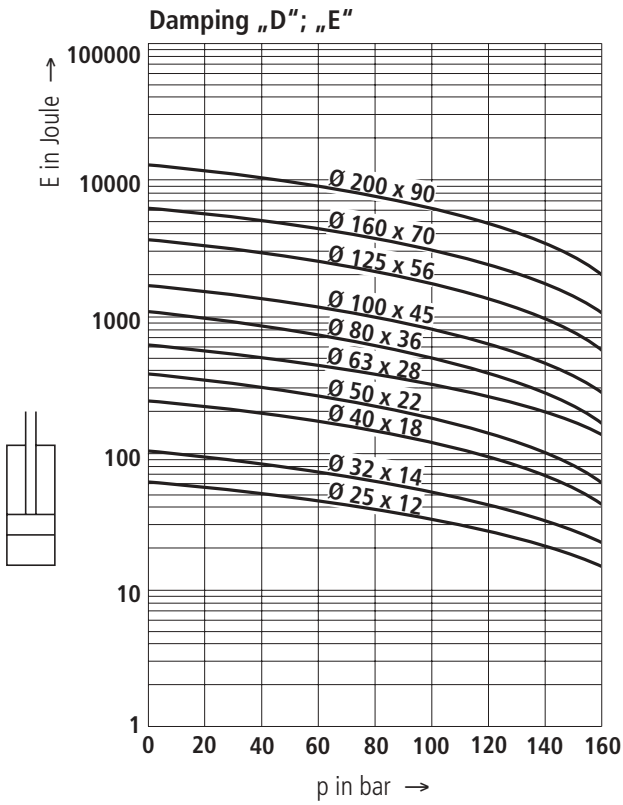
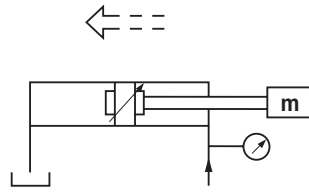
v_U = Stroke velocity

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

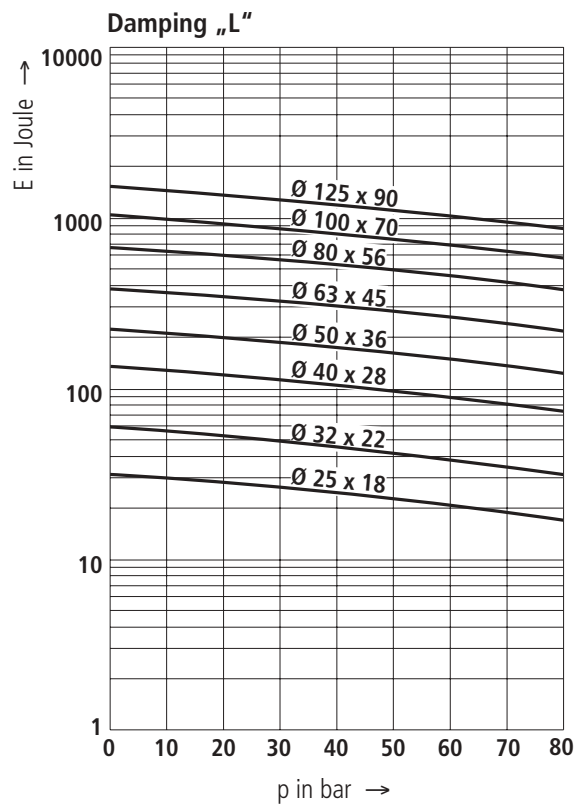
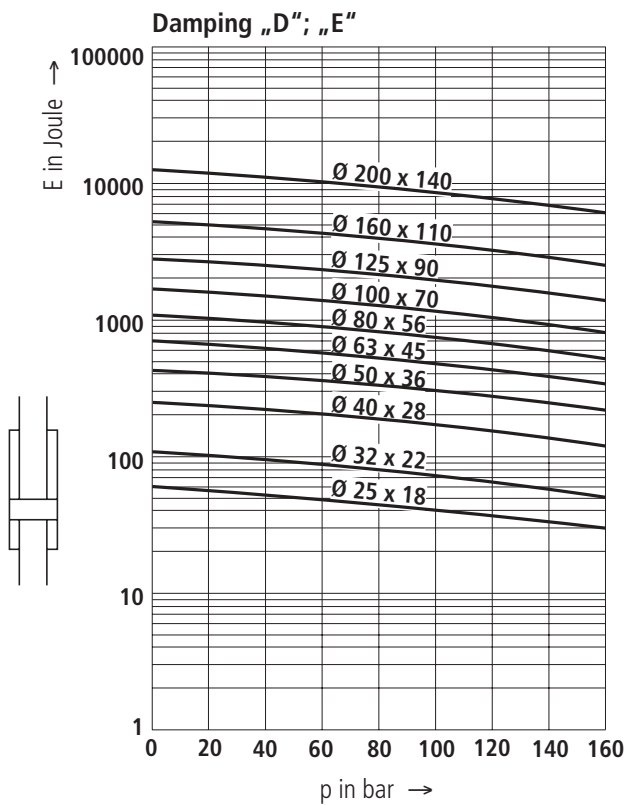
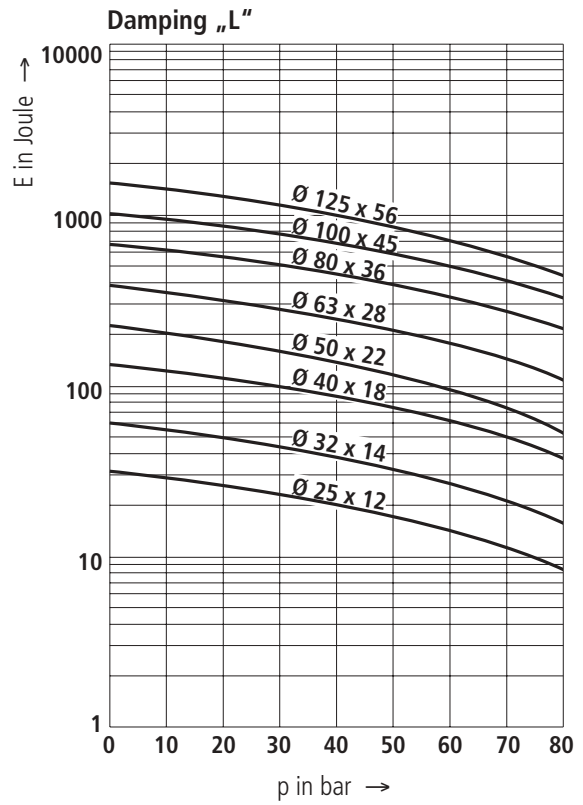
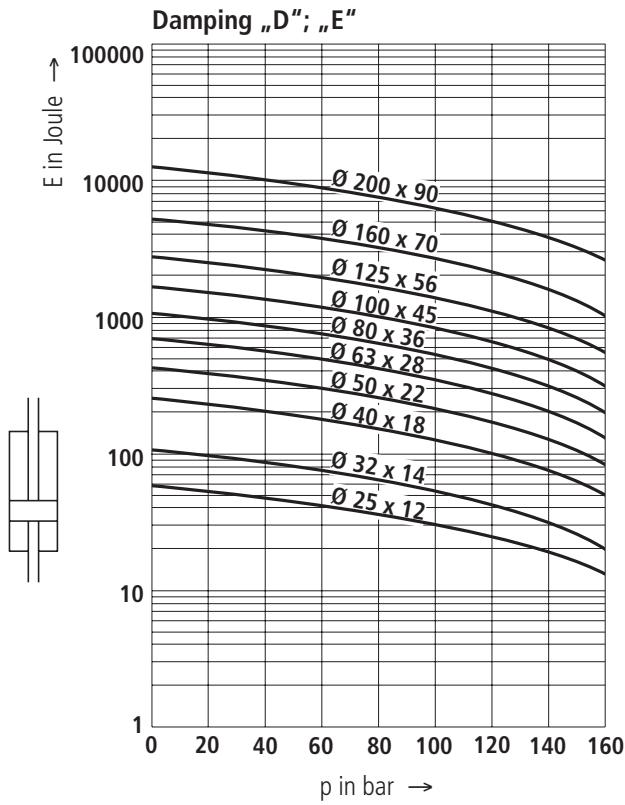
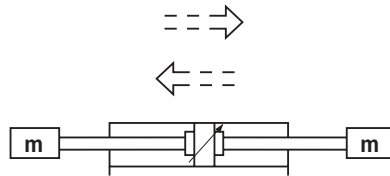
The values stated on page 34 are valid for the maximum velocities for the M type seals and a closed throttle.



End position cushioning



End position cushioning



Supports / stop tubes

Tie rod clamping block:

The clamping blocks are required for longer stroke lengths to stabilise the tie rods. However, in some cases the use cylinders of screwed design (without tie rods) is recommended. Please consult ourselves.

External supports:

Long stroke cylinders tend to bend which results in increased friction and increased wear. To prevent this from occurring a free support should be designed into the machine.

Piston Ø AL	Stroke > mm	Stroke > mm	Stroke > mm
25	900	800	1000
32	1200	900	1200
40	1500	1000	1500
50	1800	1100	1600
63	2100	1300	1800
80	2400	1500	2000
100	2700	1700	2500
125	–	2000	–
160	–	2200	–
200	–	2500	–

Internal stop tubes:

With long stroke cylinders it makes sense to fit stop tubes to lower bearing loads. This increases the distance between the piston and guide bush which in turn increases the stability of the cylinder, this in turn increases the cylinder's service life and functionality. This measure is not required for vertically hanging cylinders, that are suitably guided and are not subject to side loads.

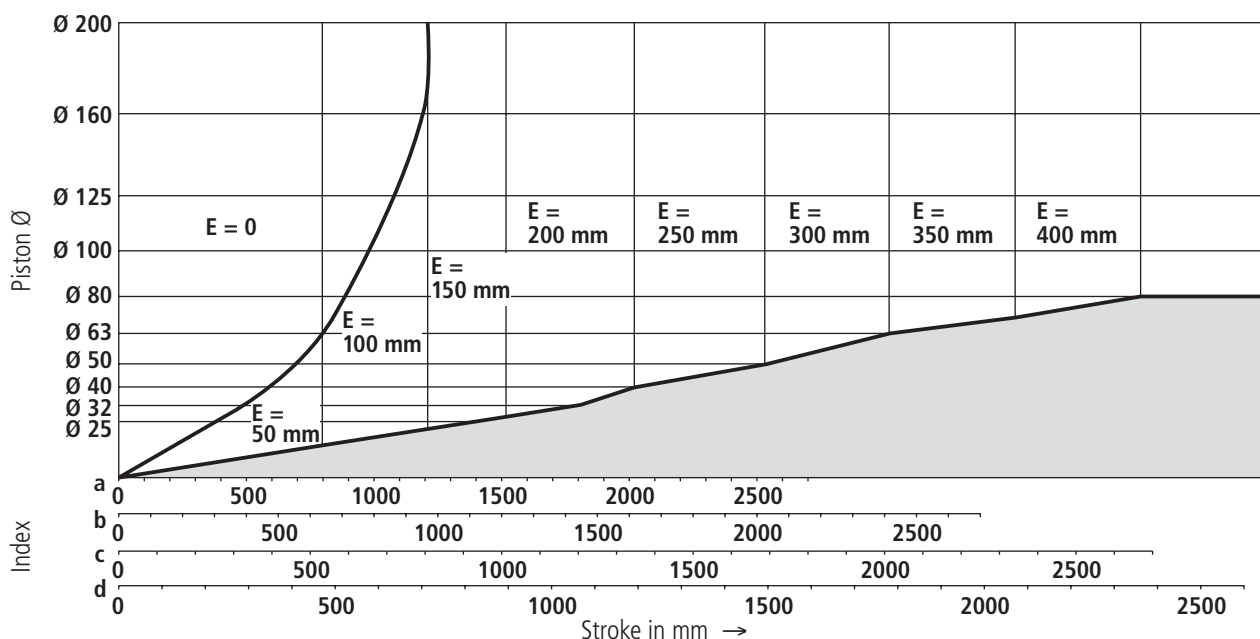
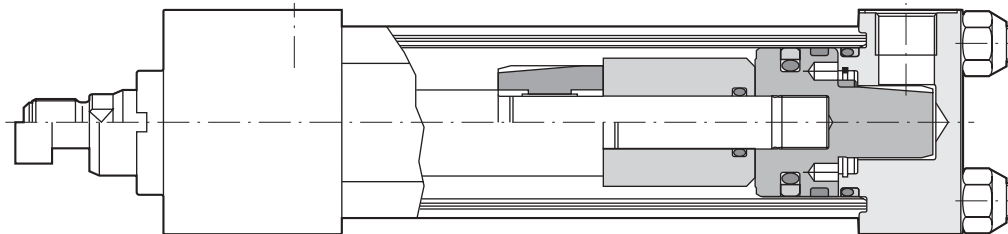
Stop tube lengths are dependent on the mounting style and the load

guidance. The stop tubes are available in 50 mm steps for all diameters other than the sizes 25 x 12 und 32 x 14, where the stroke lengths are limited.

M seals are preferred due to the side loads.

When ordering, the installation length has to be stated, i.e. the sum of the working stroke + the stop tube length.

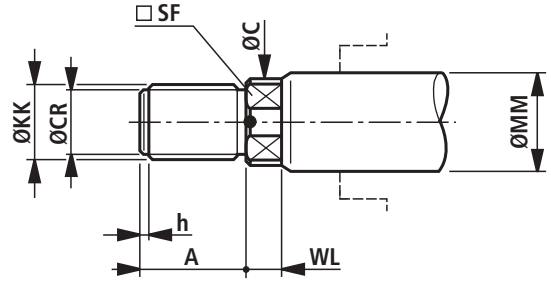
For the index see page 31.



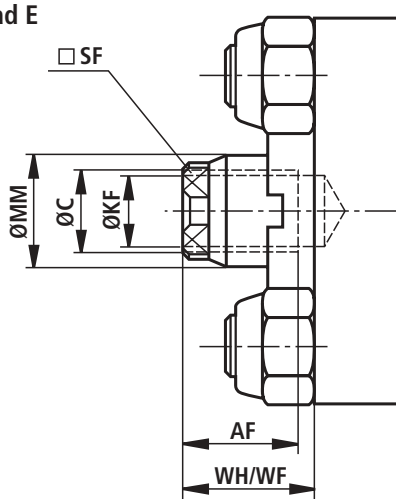
Piston rod ends E and T / miscellaneous versions / piston rods

Third piston rod dimensions

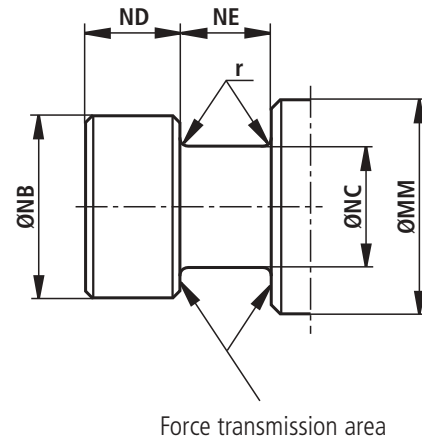
AL	MM	KK	A	C	SF	WL	h	CR	B
			h15						
40	22	M16x1.5	22	19	17	5	3	13	34
50	28	M20x1.5	28	25	22	7	3	17	42
63	36	M27x2	36	33	30	8	3	23.5	50
80	45	M33x2	45	42	36	10	4	29.5	60
100	56	M42x2	56	53	46	10	5	38.5	72
125	70	M48x2	63	67	60	15	3	44.5	88



Inner thread E



Spigot T



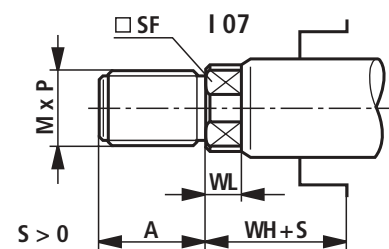
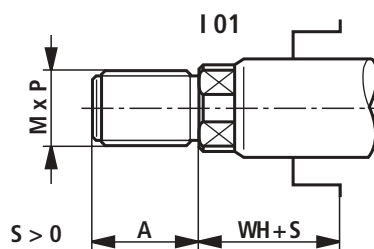
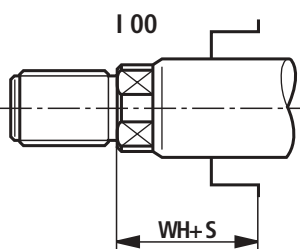
AL	MM	KK	AF	C	SF
Ø	Ø		h15	± 2	
25	12	M8x1	14	11	10
	18	M12x1.25	18	17	15
32	14	M10x1.25	16	13	11
	22	M16x1.5	22	21	18
40	18	M12x1.25	18	17	15
	28	M20x1.5	28	25	22
50	22	M16x1.5	22	21	18
	36	M27x2	36	33	30
63	28	M20x1.5	28	25	22
	45	M33x2	45	42	36
80	36	M27x2	36	33	30
	56	M42x2	56	53	46
100	45	M33x2	45	42	36
	70	M48x2	63	67	60
125	56	M42x2	56	53	46
	90	M64x3	85	86	75
160	70	M48x2	63	67	60
	110	M80x3	95	106	92
200	90	M64x3	85	86	75
	140	M100x3	112	136	125

NB	NC	ND / NE	r	P max. *
h13	h13	h13 / H11		bar
—	—	—	—	—
—	—	—	—	—
—	—	—	—	—
18	11.2	8	0.5	160
—	—	—	—	—
22.4	14	10	0.5	160
18	11.2	8	0.5	105
28	18	12.5	0.8	190
22.4	14	10	0.5	95
35.5	22.4	16	0.8	160
28	18	12.5	0.8	105
45	28	20	1.2	160
35.5	22.4	16	0.8	90
56	35.5	25	1.2	160
45	28	20	1.2	100
78	45	30	1.5	160
56	35.5	25	1.5	90
106	65	35	1.5	160
78	45	30	1.5	90
136	70	45	1.5	160

Other piston rods ends on request

Standard versions can be **modified** as an option e.g.:

* With a pulling load



S > 0
S = Piston rod extension

Additional information

Mounting styles:

MX5:

This mounting style, see ISO 6099, to NFE 48.016, makes assembly possible via 4 threaded holes in the head.

MS2:

- With a key; which is located in a keyway under the feet which has to be provided by the purchaser, to DIN 6885 T1, form A, which is used to unload the 4 fixing bolts, see page 12; the standard is in preparation.
- Subplate mounting: An oil connection, via the mounting plate, with an O-ring and counter bore in connection orientation 3 is possible on request.
- Connection orientation: The locations 2 and 4 can lead to assembly problems (connection fitting / fixing screws) and are therefore not included within the standard programme.

Fixing screws:

Screws to class 12.9 and nuts to a minimum of class 80 are required to fix cylinders with mounting styles MX..-/ME..-/MS... The tightening torques are stated on the relevant dimension page.

Commissioning:

Catalogue sheet RE 07100 is to be taken into account for assembly commissioning and the maintenance of hydraulic cylinders.

A cylinder can only optimally fulfill its function when the following basic rules have been complied with during assembly and commissioning:

- Correct cylinder alignment prevents alignment errors, the piston rod from jamming and early wear.
- Avoid side loads on the piston rod
- Carefully clean the pipework and connection threads before assembly
- Bleed the system and use good, clean filtered oil. It is recommended that the cylinder is fitted with the piston rod fully retracted, and to mechanically adjust the zero stroke of the load, then fully extend the piston rod and then adjust the stroke using the fixing between the moved mass and the piston rod ends.

Repairs:

The spare parts kits are to be fitted in accordance with the Rexroth instructions.

Cylinder surface protection:

The cylinders are given an undercoat before they are delivered to give protection against the formation of rust. Other paints can be subsequently applied without any problems. On request (as an option) they can be supplied painted with a white epoxy paint finish, this is recommended for applications in damp and aggressive environments.

Storage:

Rexroth cylinders are tested in the factory with mineral oil to ISO VG 046. After they have been drained the ports are plugged. The residual oil in the inner chamber protects the cylinder against the formation of rust for at least one year when stored in a dry and temperaturised

location. For cylinders with long strokes and in special cases e.g. damp, warm or cold surroundings, long term storage, large temperature fluctuations, consultations are necessary. When stored for more than two years we recommend that the seals are replaced before commissioning is carried out.

Accessories:

The CGKA swivel eye can be supplied pre-assembled on the cylinder. All other accessories are to be separately ordered. These are suitably protected for storage purposes.

Mounting play:

Movable mounts have, due to their tolerances, mechanical play and are therefore not suitable for use in closed loop circuits where high positional accuracy is required. We would be pleased to give recommendations on request.

Metal wipers:

The use of a metal wiper is recommended where, due to heavy contamination, a standard wiper would be destroyed.

Integrated position measuring systems:

This series can be fitted with an ultra-sonic based position measuring system, there are also a multitude of signal outputs available. Further information is available on request. Certain standardised dimensions can however not be maintained.

Limit switches:

Inductive limit switches can be catered for, however in certain cases special heads and bases are required. Consultations are required.

Piston rod clamping unit:

To lock the piston rod mechanically in a fixed position for longer periods of time in the depressurised condition or due to safety reasons, a piston rod clamping mechanism can be mounted onto the cylinder head. It must however not be used as a brake unit.

Special applications:

Special applications, e.g. a three position cylinder (base on base), single acting cylinders that have air on one side are available.

CD-ROM:

In addition to this catalogue, we have our CD-ROM with cylinder calculations and DXF (files);

Internet:

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

Additional information

Standards:

ISO 6020/2:

Interchangability dimensions for 160 bar cylinders with a single rod – part 2: Compact series for piston rod diameters of 25 to 200 mm.

DIN 24 554:

As ISO 6020/2 but with a limited selection of mounting styles and piston rod threads, requested by a large number of designers and large consumers for rationalisation reasons.

NFE 48.016:

As DIN 24 554, however additionally with the MX 5 mounting style, spigot on the piston rod end and cylinders with a through piston rod.

ISO 6020/3:

Interchangability dimensions for 160 bar cylinders with a single rod – part 2: Compact series for piston rod diameters of 250 to 500 mm.

ISO 6099:

Description and mounting style codification and their dimensions.

ISO 6195:

Installation chambers for piston rod wipers with linear movement – dimensions and tolerances.

ISO 5597:

Installation chambers for piston and piston rod seals.

ISO 7425/1:

Installation chambers for seals manufactured from plastic strengthened 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, tolerances, accessories, interchangability dimensions.

ISO/FDIS 8138:

160 bar cylinders with a single piston rod, compact series, oil connection dimensions.

ISO 6547:

Installation chambers for piston seals and guide strips – dimensions and tolerances.

ISO 3320:

Dimensions for pistons and piston rods – metric version.

ISO 3322:

Nominal pressures.

ISO 4393:

Piston stroke, basic series/preferred series

ISO 4395:

Piston rod end thread types and dimensions.

DIN:

Standardisation for Germany.

Afnor:

Standardisation for France.

NFE:

Standard taken from Afnor.

Spare parts

Complete seal kits		CDT3			CGT3		
AL	MM	M	T	V	M	T	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
	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
	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
	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
	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
	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
	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

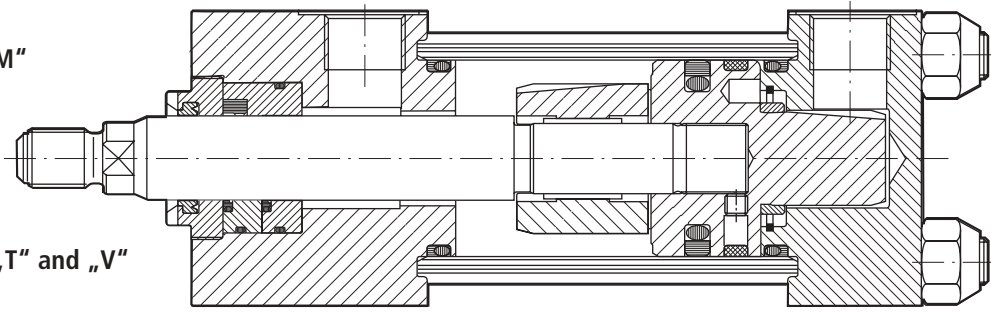
		Guide bush kit assembled with seals			Tie rod fixing nut		
AL	MM	M	T	V	ME5/6, MP1/3/5 MS2, MT1/2, MX5	MX1, MX2, MX3	Tightening torque Nm
25	12	7 472 D02 166	7 472 D02 183	7 472 D02 200	7 472 Z76 941	7 472 Z76 941	3
	18	7 472 D02 167	7 472 D02 184	7 472 D02 201			
32	14	7 472 D02 168	7 472 D02 185	7 472 D02 202	7 472 Z77 427	7 472 Z77 427	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	R900059808	12
	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	R900059974	37
	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	R900059974	40
	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	R900059975	90
	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	R900059975	100
	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	R900059804	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	R900059805	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	R900059806	600
	140	7 472 D02 182	7 472 D02 199	7 472 D02 216			

If spare covers, piston rod, cylinder barrel, etc. then the cylinder part no. must be stated.

Spare parts

CDT3 Ø25, Ø32

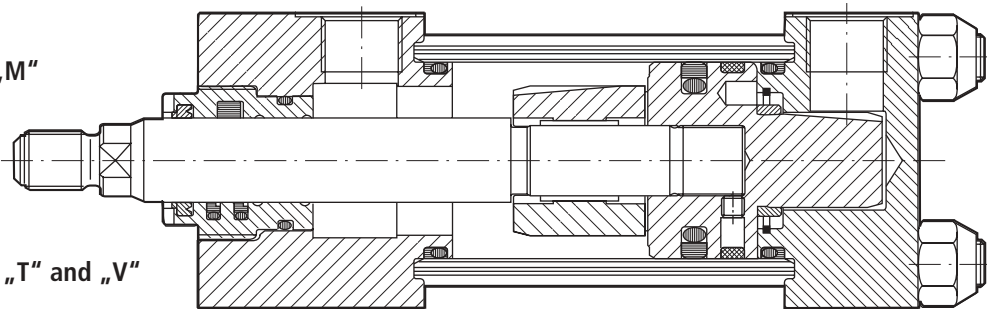
Version „M“



Versions „T“ and „V“

CDT3 Ø40 ... 200

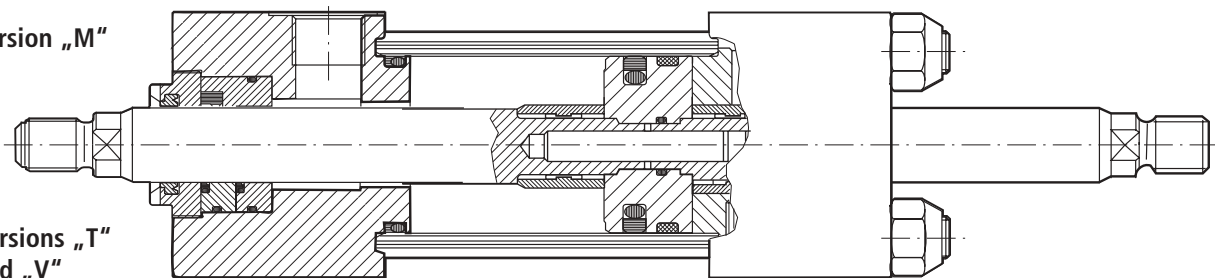
Version „M“



Versions „T“ and „V“

CGT3 Ø25, Ø32

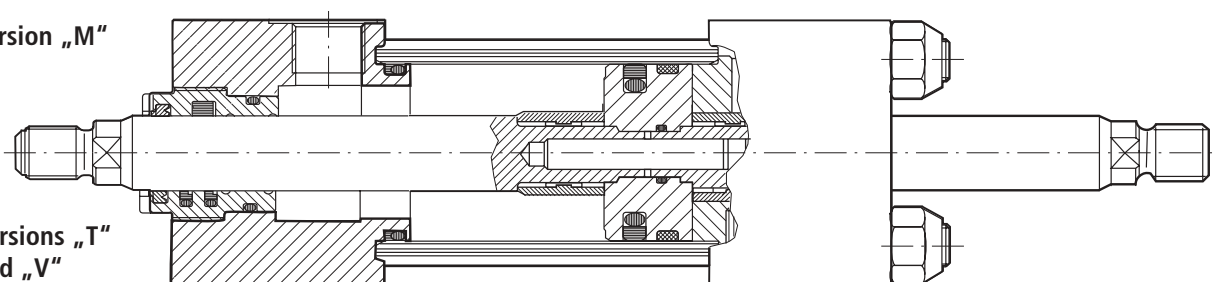
Version „M“



Versions „T“
and „V“

CGT3 Ø40 ... 200

Version „M“



Versions „T“
and „V“

The data specified above only serves to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The details stated do not release you from the responsibility for carrying out your own assessment and verification. It must be remembered that our products are subject to a natural process of wear and ageing.

Bosch Rexroth AG
Industrial Hydraulics

D-97813 Lohr am Main
Zum Eisengießer 1 • D-97816 Lohr am Main
Telefon 0 93 52 / 18-0
Telefax 0 93 52 / 18-23 58 • Telex 6 89 418-0
eMail documentation@boschrexroth.de
Internet www.boschrexroth.de

Bosch Rexroth SA

BP 37 – Z.I. Les Fourmis
F-74131 Bonneville Cedex
Tel. +33(0)4 50 25 35 45
Fax +33(0)4 50 25 35 19
Internet www.boschrexroth.fr

Bosch Rexroth Teknik AB

Varuvägen 7, Älvsjö
S-125 81 Stockholm
Tel. +46(08) 72 79 20 0
Fax +46(08) 86 87 21
eMail cyl.hyd@boschrexroth.se
Internet www.boschrexroth.se
