

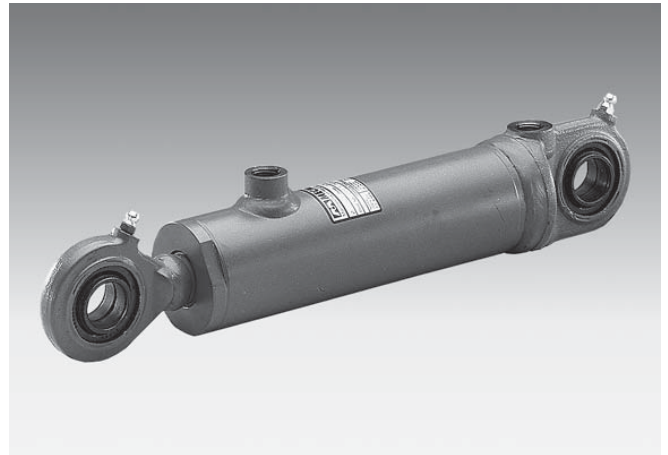
RE 17 325/01.03

Replaces: 07.02

**Hydraulic cylinder
Type CDL1**

Series 1X

Nominal pressure 160 bar (16 MPa)



5 001

Type CDL1MP5/...

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Features

- Maximum operating pressure 240 bar (24 MPa)
- 5 mounting styles
- Piston Ø: 25 to 200 mm
- Piston rod Ø: 14 to 110 mm
- Stroke lengths up to 3 m
- Compact design



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Technical data

Standards:

Bosch Rexroth standards;
Main dimensions such as piston \varnothing and piston rod \varnothing meet the requirements of DIN ISO 3320.

Nominal pressure: 160 bar (16 MPa)

Static test pressure: 240 bar (24 MPa)

With extreme shock loads the mounting elements and piston rod threads must be laid out for continuous operation.

Operating pressure: Up to a max. 240 bar (24 MPa)
Dependent on the cylinder version and application for operating pressures up to 240 bar (24 MPa) and suitable for a maximum of 200 000 load cycles.

Installation: Optional

Pressure fluid:

Mineral oils DIN 51 524 (HL, HLP)
Phosphate ester (HFD-R)
Water glycol (HFC) on request.

Pressure fluid temperature range: $-20\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$

Viscosity: 2.8 to 380 mm^2/s

Degree of contamination: Maximum permissible degree of contamination of the pressure fluid is to NAS 1638 class 10. We therefore recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$.

Stroke speed: Max. 0.5 m/s (depending on the connection port)

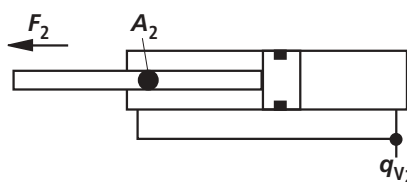
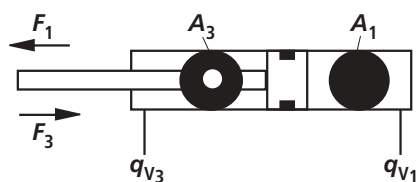
Acceptance: Each cylinder is tested to Bosch Rexroth standards.

Cylinders whose application data lies outside the stated values can be offered as a special version.

For assembly, commissioning and maintenance of hydraulic cylinders, please take the details stated within catalogue sheet RE 07 100 into account!

Area, force, flow


Piston AL \varnothing mm	Piston rod MM \varnothing mm	Area ratio φ A_1/A_3	Area			Force at 160 bar ¹⁾			Flow at 0,1 m/s ²⁾		
			Piston A_1 cm^2	Area Rod A_2 cm^2	Annulus A_3 cm^2	Pressure F_1 kN	Diff. F_2 kN	Pull F_3 kN	Out q_{V1} L/min	Diff. q_{V2} L/min	In q_{V3} L/min
25	14	1,46	4,91	1,54	3,37	7,85	2,46	5,39	2,9	0,9	2,0
32	18	1,46	8,04	2,54	5,50	12,86	4,07	8,79	4,8	1,5	3,3
40	22	1,43	12,56	3,80	8,76	20,10	6,08	14,02	7,5	2,3	5,3
50	28	1,46	19,63	6,15	13,47	31,40	9,85	21,55	11,8	3,7	8,1
63	36	1,48	31,16	10,17	20,98	49,85	16,28	33,57	18,7	6,1	12,6
80	45	1,46	50,24	15,90	34,34	80,38	25,43	54,95	30,1	9,5	20,6
100	56	1,46	78,50	24,62	53,88	125,60	39,39	86,21	47,1	14,8	32,3
125	70	1,46	122,66	38,47	84,19	196,25	61,54	134,71	73,6	23,1	50,5
160	90	1,46	200,96	63,59	137,38	321,54	101,74	219,80	120,6	38,2	82,4
200	110	1,43	314,00	94,99	219,02	502,40	151,98	350,42	188,4	57,0	131,4



Notes:

- 1) Theoretical force (efficiency not taken into account).
- 2) Stroke velocity

Ordering details

CD	L1	/	/	/	1X/B	1	C	U	W
<p>Differential cylinder = CD</p> <p>Series = L1</p> <p>Mounting styles</p> <p>Self-aligning clevis at base ²⁾ = MP5</p> <p>Round flange at head = MF3</p> <p>Round flange at base = MF4</p> <p>Trunnions ⁴⁾ = MT4</p> <p>Without mounting ¹⁾ = M00</p> <p>Piston (25 - 200 mm) (see page 2)</p> <p>Piston rod Ø (14 - 110 mm) (see page 2)</p> <p>Stroke length in mm</p> <p>Design principle</p> <p>Head and rear screwed ¹⁾ = C</p> <p>Head screwed, base welded ²⁾ = D</p> <p>Series = 1X (10 to 19: unchanged installation and connection dimensions)</p> <p>Connection port Pipe thread - ISO 228/1 = B</p> <p>Connection ports/position at head and base = 1</p> <div style="text-align: center;">  <p>Viewed on the piston rod</p> </div>									
<p>Option 2</p> <p>Y = Enter piston rod extension LY in clear text in mm</p> <p>W = Without option</p> <p>Option 1</p> <p>W = Without option</p> <p>Seal version</p> <p>Suitable for mineral oil to DIN 51 524 HL, HLP</p> <p>M = Standard seal system</p> <p>Suitable for Phosphate ester-HFD-R</p> <p>V = Standard seal system (up to 150°C)</p> <p>End position cushioning</p> <p>U = Without</p> <p>Piston rod end</p> <p>H = Thread</p> <p>F = ^{2, 3)} With self-aligning clevis</p> <p>Piston rod version</p> <p>C = Hard chromium plated</p>									

Notes:

- 1) Only piston Ø 25 - 32 mm
- 2) Only piston Ø 40 - 200 mm
- 3) Only MP5; MT4
- 4) The trunnion can be located as required. Dim. „XV/XU“ must always be stated in clear text in mm in the order.

Ordering example:

CDL1MT4/100/56/560D1X/B1CHUMWW, XV=245 mm.
CDL1MF3/200/110/600D1X/B1CHUMWW

Cylinder weight

Piston	Piston rod	Cylinder weight at 0 mm stroke length					Cylinder weight per 100 mm stroke length
AL Ø	MM Ø	M00 kg	MP5 kg	MF3 kg	MF4 kg	MT4 kg	kg
25	14	0.56	–	0.81	0.91	0.96	0.33
32	18	0.95	–	1.26	1.45	1.65	0.55
40	22	–	1.68	2.42	2.48	3.00	0.85
50	28	–	2.67	3.87	4.13	4.77	1.18
63	36	–	4.73	6.53	7.13	8.13	1.80
80	45	–	8.46	12.2	12.9	14.1	2.90
100	56	–	14.9	19.6	20.6	25.1	4.60
125	70	–	28.2	34.3	38.9	45.2	7.20
160	90	–	68.3	89.5	85.5	93.2	11.50
200	110	–	100	127	120	149	15.30

Tolerances to ISO 8135

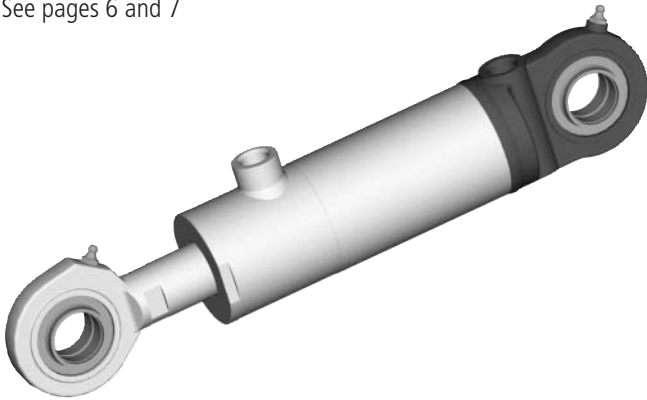
Installation dimensions	WC	XO/XF ¹⁾	XV/XU	ZJ ¹⁾	Stroke tolerances
Mounting style	MF3	MP5	MT4	MF4	
Stroke length	Tolerances				
0 - 499	± 2	± 1.5	± 2	± 1.5	+ 3
50 - 1249	± 2.8	± 2	± 2.8	± 2	+ 4
1250 - 3149	± 4	± 3	± 4	± 3	+ 6

¹⁾ Stroke length included

Mounting style overview

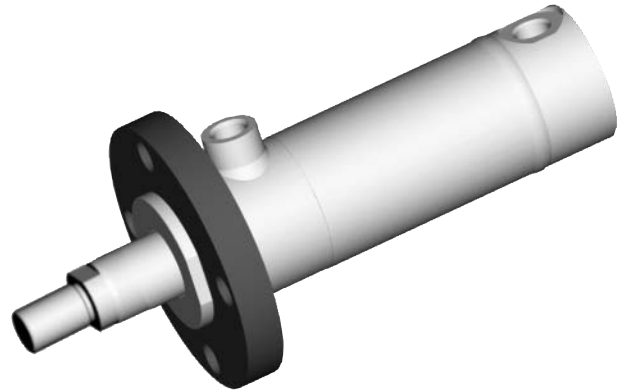
CDL1 MP5

See pages 6 and 7



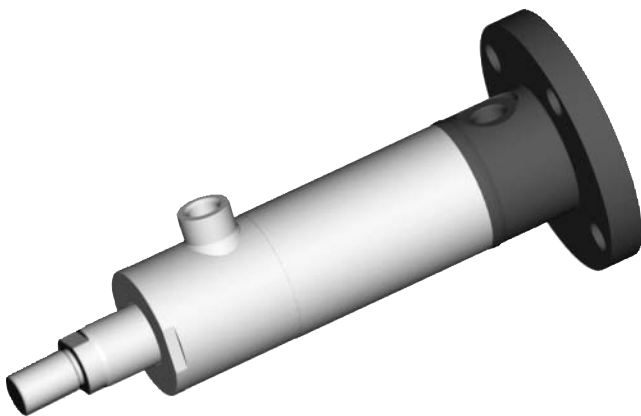
CDL1 MF3

See pages 8 and 9



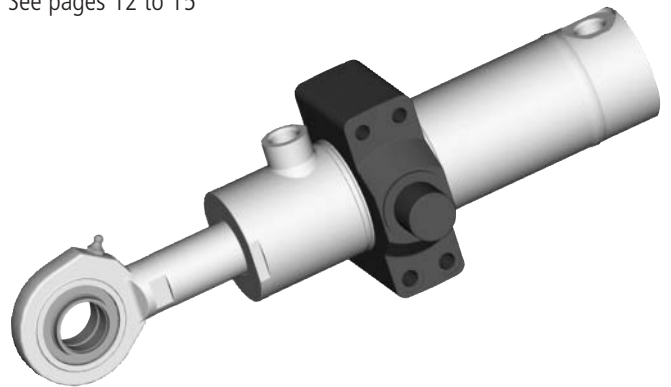
CDL1 MF4

See pages 10 and 11



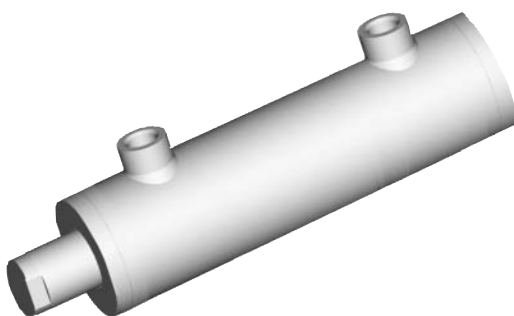
CDL1 MT4

See pages 12 to 15



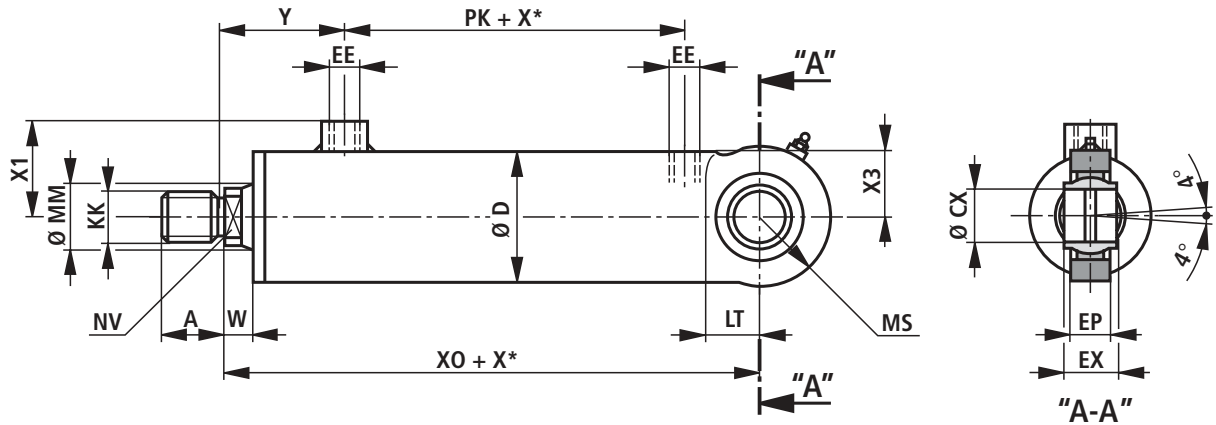
CDL1 M00

See page 16

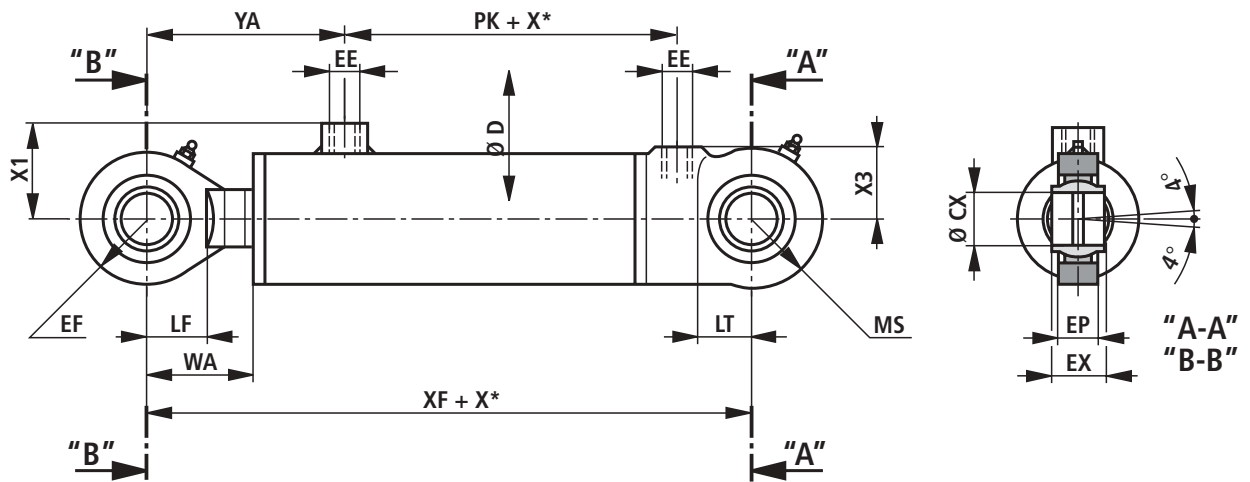


Mounting style MP5

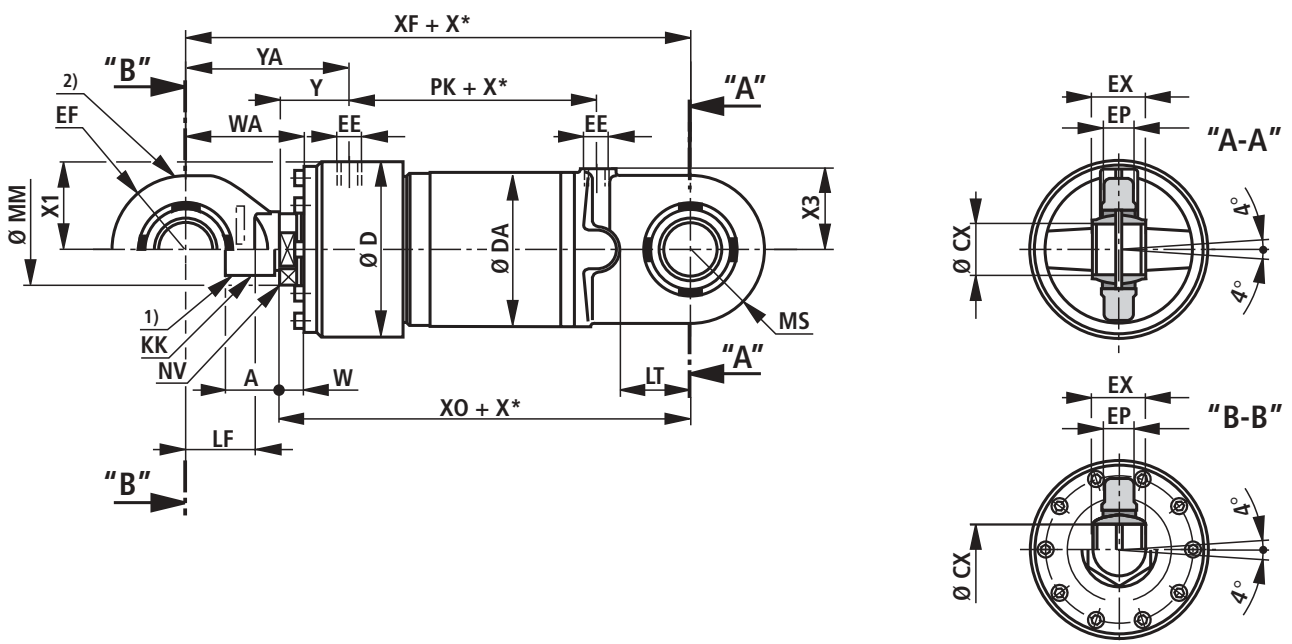
CDL1 MP5; AL-Ø 40-125 mm¹⁾



CDL1 MP5; AL-Ø 40-125 mm²⁾



CDL1 MP5; AL-Ø 160-200 mm^{1); 2)}



Dimensions MP5 (in mm)

AL Ø	MM Ø	KK	A	NV	W	WA	Y	YA	PK	EE	X1 ±1	X3 ±1	XO
25	14	–	–	–	–	–	–	–	–	–	–	–	–
32	18	–	–	–	–	–	–	–	–	–	–	–	–
40	22	M16 x 1.5	22	17	13	44	60	91	50	G 1/4	39	29	140
50	28	M20 x 1.5	28	22	13	50	62	99	57	G 3/8	45	33	157
63	36	M27 x 2	36	28	14	63	68	117	69	G 1/2	55	40	182
80	45	M33 x 2	45	36	16	76	84	144	76	G 1/2	65	53	208
100	56	M42 x 2	56	46	18	88	90	160	85	G 3/4	80	63	227
125	70	M48 x 2	63	60	20	106	99	185	93	G 3/4	95	78	259
160	90	M65 x 1.5	65	75	23	139	104	219	143	G 1	110	100	367
200	110	M80 x 2	80	95	23	162	105	245	154	G 1	134	120	396

AL Ø	MM Ø	XF	D max	DA	LT	LF	MS H7	CX ³⁾ ±2	EP h12	EX max	EF
25	14	–	–	–	–	–	–	–	–	–	–
32	18	–	–	–	–	–	–	–	–	–	–
40	22	171	52	–	24	23	28	20	16	20	28
50	28	194	62	–	31	29	33	25	20	25	33
63	36	231	77	–	38	34	42	32	22	32	42
80	45	268	98	–	46	44	51	40	26	40	51
100	56	297	122	–	54	50	61	50	34	50	61
125	70	345	152	–	65	63	76	63	42	63	76
160	90	482	220	190	86	83	90	70 ⁴⁾	40	65	90
200	110	536	268	230	102	100	110	80 ⁴⁾	45	74	110

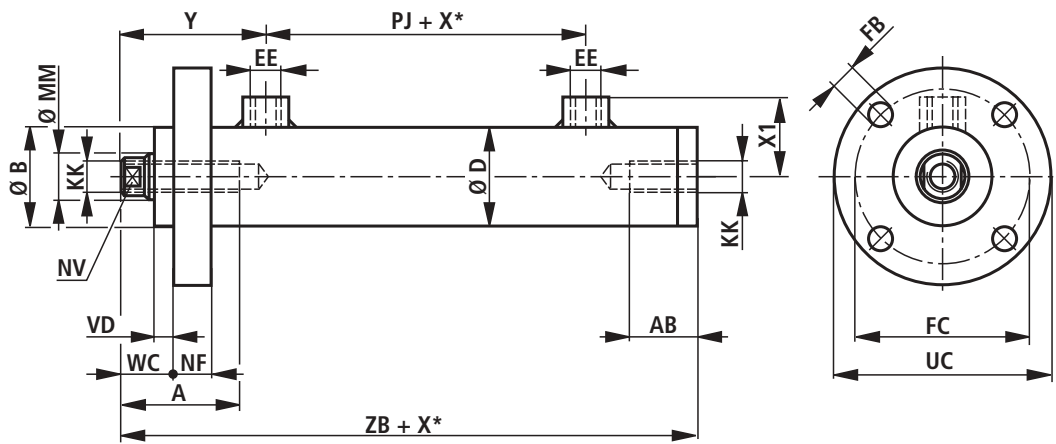
Notes:

AL = Piston Ø
MM = Piston rod Ø
X* = Stroke length

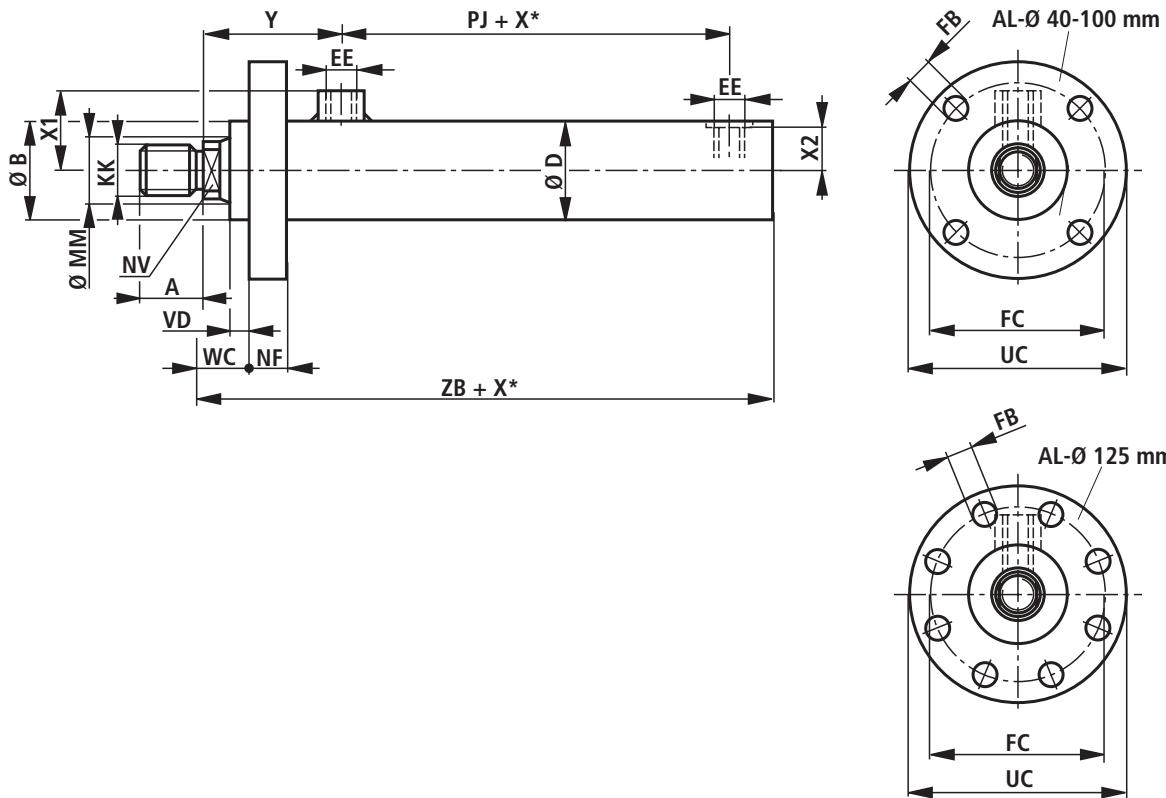
- 1) Piston rod end „H“
- 2) Piston rod end „F“
- 3) Associated pin Ø j6
- 4) Tolerance: 0/-0.015

Mounting style MF3

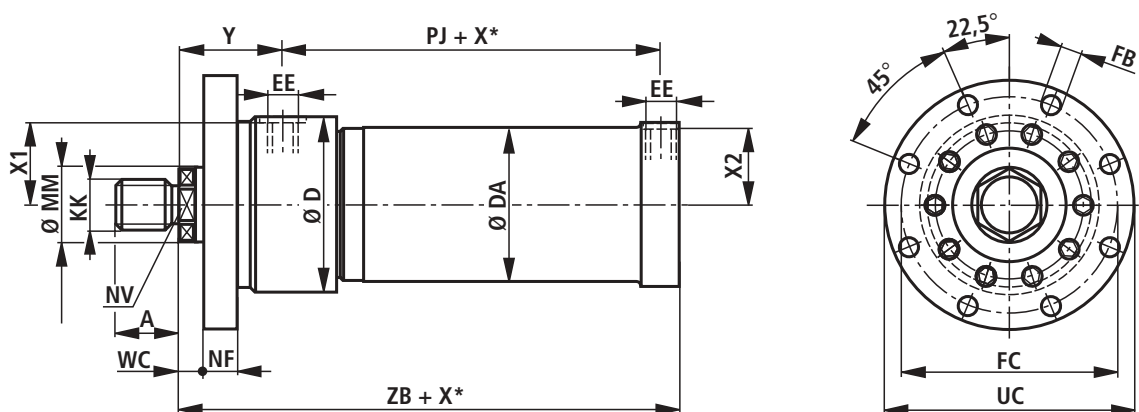
CDL1 MF3; AL-Ø 25-32 mm



CDL1 MF3; AL-Ø 40-125 mm



CDL1 MF3; AL-Ø 160-200 mm



Dimensions MF3 (in mm)

AL Ø	MM Ø	KK	A	AB	NV	B ±0,3	VD	WC	NF	D max	DA
25	14	M10	26	21	12	32	6	16	12	33	–
32	18	M12	28	25	15	40	6	17	12	41	–
40	22	M16 x 1.5	22	–	17	50	7	20	14	52	–
50	28	M20 x 1.5	28	–	22	60	7	20	16	62	–
63	36	M27 x 2	36	–	28	75	7	21	20	77	–
80	45	M33 x 2	45	–	36	93	7	23	25	98	–
100	56	M42 x 2	56	–	46	120	8	26	25	122	–
125	70	M48 x 2	63	–	60	150 ¹⁾	9	29	32	152	–
160	90	M65 x 1.5	65	–	75	–	–	35	36	220	190
200	110	M80 x 2	80	–	95	–	–	35	40	268	230

AL Ø	MM Ø	Y	PJ	EE	X1 ±1	X2 ±1	ZB	FB H13	FC	UC max
25	14	44	26	G 1/8	24.5	–	104	6.6	55	68
32	18	48	31	G 1/4	33	–	116	9	65	78
40	22	60	50	G 1/4	39	22	124	11	85	108
50	28	62	57	G 3/8	45	27	135	13.5	100	128
63	36	68	71	G 1/2	55	33.5	159	17.5	120	148
80	45	84	80	G 1/2	65	44.5	185	22	150	188
100	56	90	89	G 3/4	80	57	202	22	180	218
125	70	99	97	G 3/4	95	72	221	17.5	200	238
160	90	104	133	G 1	110	110	300	22	270	316
200	110	105	144	G 1	134	125	316	26	325	380

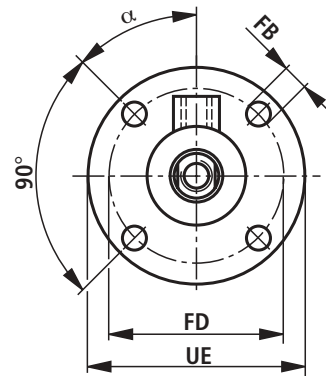
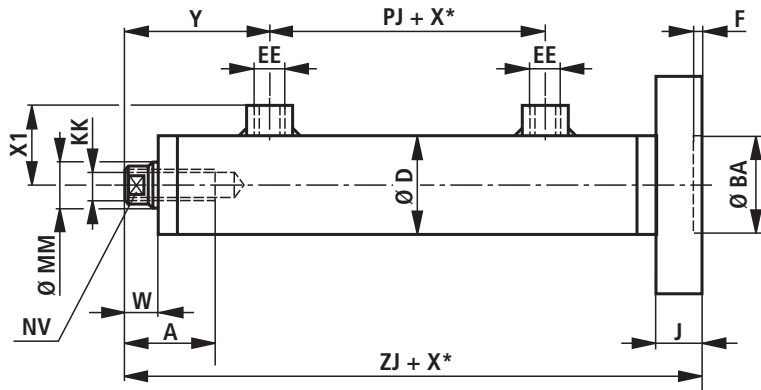
Notes:

AL = Piston Ø
MM = Piston rod Ø
X* = Stroke length

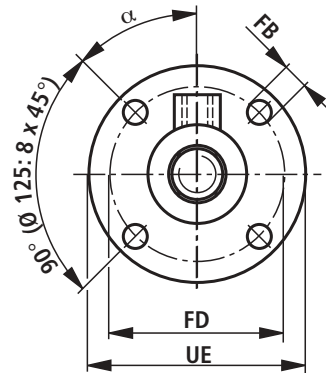
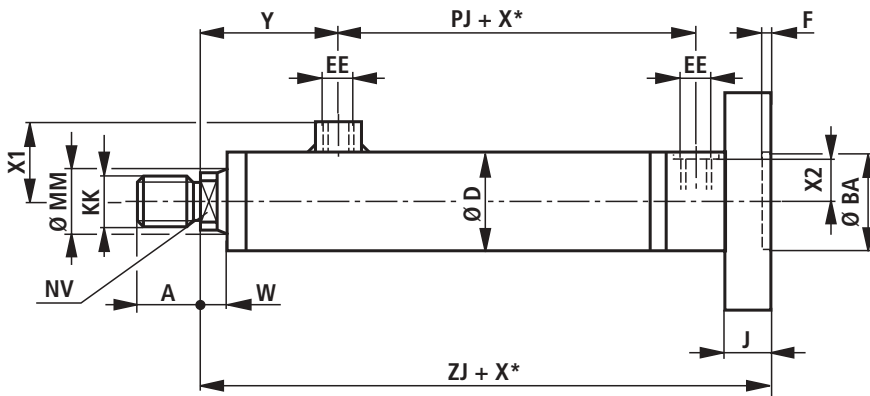
¹⁾ Tolerance: ±0.5

Mounting style MF4

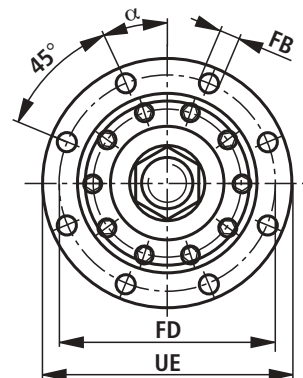
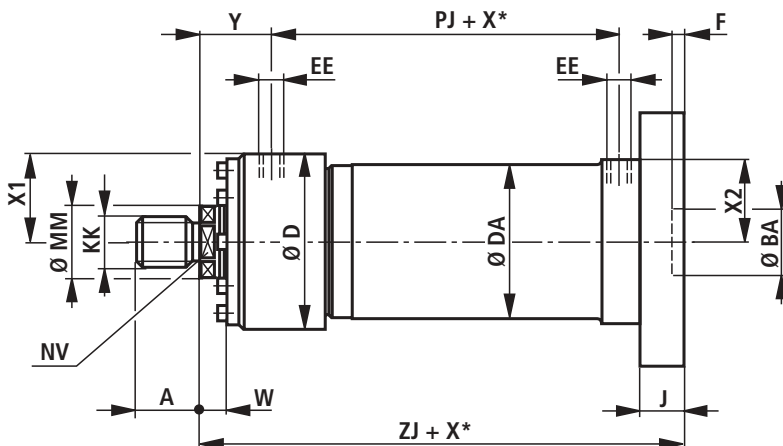
CDL1 MF4; AL-Ø 25-32 mm



CDL1 MF4; AL-Ø 40-125 mm



CDL1 MF4; AL-Ø 160-200 mm



Dimensions MF4 (in mm)

AL Ø	MM Ø	KK	A	NV	W	D max	DA	Y	PJ	EE	X1 ±1
25	14	M10	26	12	10	33	–	44	26	G 1/8	24.5
32	18	M12	28	15	11	41	–	48	31	G 1/4	33
40	22	M16 x 1.5	22	17	13	52	–	60	50	G 1/4	39
50	28	M20 x 1.5	28	22	13	62	–	62	57	G 3/8	45
63	36	M27 x 2	36	28	14	77	–	68	71	G 1/2	55
80	45	M33 x 2	45	36	16	98	–	84	80	G 1/2	65
100	56	M42 x 2	56	46	18	122	–	90	89	G 3/4	80
125	70	M48 x 2	63	60	20	152	–	99	97	G 3/4	95
160	90	M65 x 1.5	65	75	23	220	190	104	133	G 1	110
200	110	M80 x 2	80	95	23	268	230	105	144	G 1	134

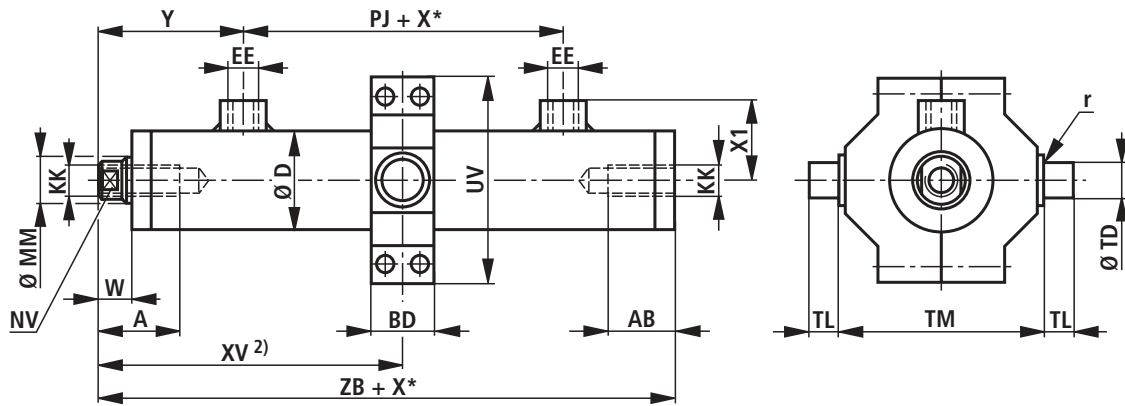
AL Ø	MM Ø	X2 ±1	ZJ	BA E8	F	J	FB	FD	UE	α
25	14	–	108	32	2	15	6,6	55	68	45°
32	18	–	121	40	2	16	9	65	78	45°
40	22	22	141	50	3	14	11	85	108	45°
50	28	27	158	60	3	16	13,5	100	128	45°
63	36	33.5	185	75	3	20	17,5	120	148	45°
80	45	44.5	211	93	3	25	22	150	188	45°
100	56	57	228	120	3	25	22	180	218	45°
125	70	72	254	150	3	32	17,5	200	238	22.5 °
160	90	110	300	93	5	36	22	270	316	22.5 °
200	110	125	316	114	5	40	26	325	380	22.5 °

Notes:

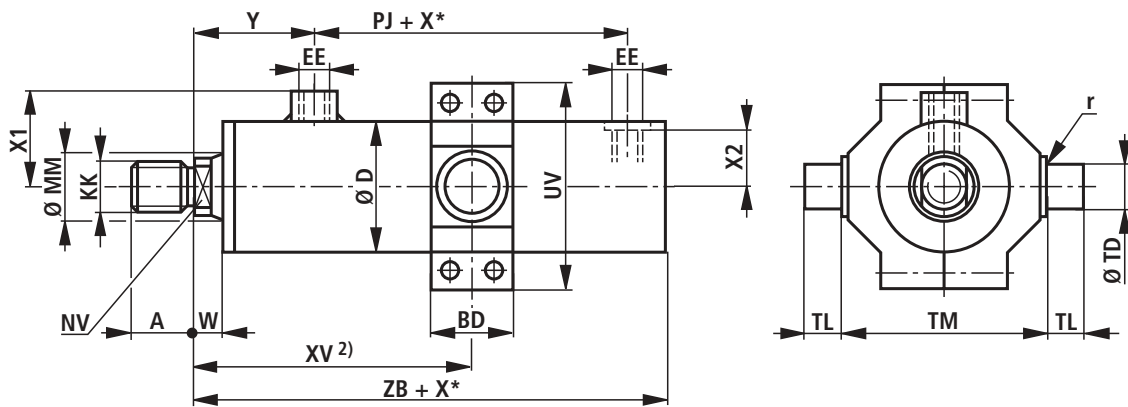
AL = Piston Ø
MM = Piston rod Ø
X* = Stroke length

Mounting style MT4

CDL1 MT4; AL-Ø 25-32 mm ¹⁾



CDL1 MT4; AL-Ø 40-125 mm ¹⁾



Dimensions MT4 (in mm)

AL Ø	MM Ø	KK	A	AB	NV	W	D max	Y	EE	PJ	XV ²⁾ min	XV ²⁾ max
25	14	M10	26	21	12	10	33	44	G 1/8	26	68	47 + X*
32	18	M12	28	25	15	11	41	48	G 1/4	31	78	50 + X*
40	22	M16 x 1.5	22	–	17	13	52	60	G 1/4	50	94	71 + X*
50	28	M20 x 1.5	28	–	22	13	62	62	G 3/8	57	104	72 + X*
63	36	M27 x 2	36	–	28	14	77	68	G 1/2	71	119	82 + X*
80	45	M33 x 2	45	–	36	16	98	84	G 1/2	80	144	93 + X*
100	56	M42 x 2	56	–	46	18	122	90	G 3/4	89	162	93 + X*
125	70	M48 x 2	63	–	60	20	152	99	G 3/4	97	183	98 + X*

AL Ø	MM Ø	X1 ±1	X2 ±1	ZB	X* ³⁾ min	BD	UV	TD f8	TL	TM h12	r
25	14	24.5	–	104	21	20	64	12	10	63	1
32	18	33	–	116	28	25	75	16	12	75	1
40	22	39	22	124	23	35	86	20	16	90	1.5
50	28	45	27	135	32	40	100	25	20	105	1.5
63	36	55	33.5	159	37	50	126	32	25	120	2
80	45	65	44.5	185	51	65	145	40	32	135	2.5
100	56	80	57	202	69	80	175	50	40	160	2.5
125	70	95	72	221	85	100	215	63	50	195	3

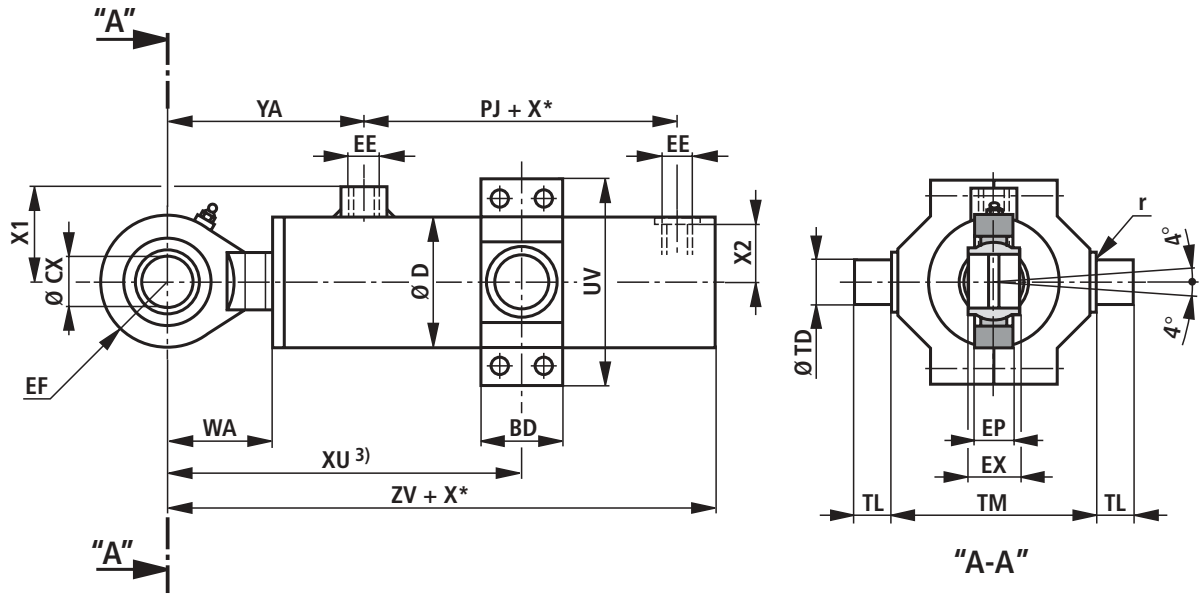
Notes:

AL = Piston Ø
MM = Piston rod Ø
X* = Stroke length

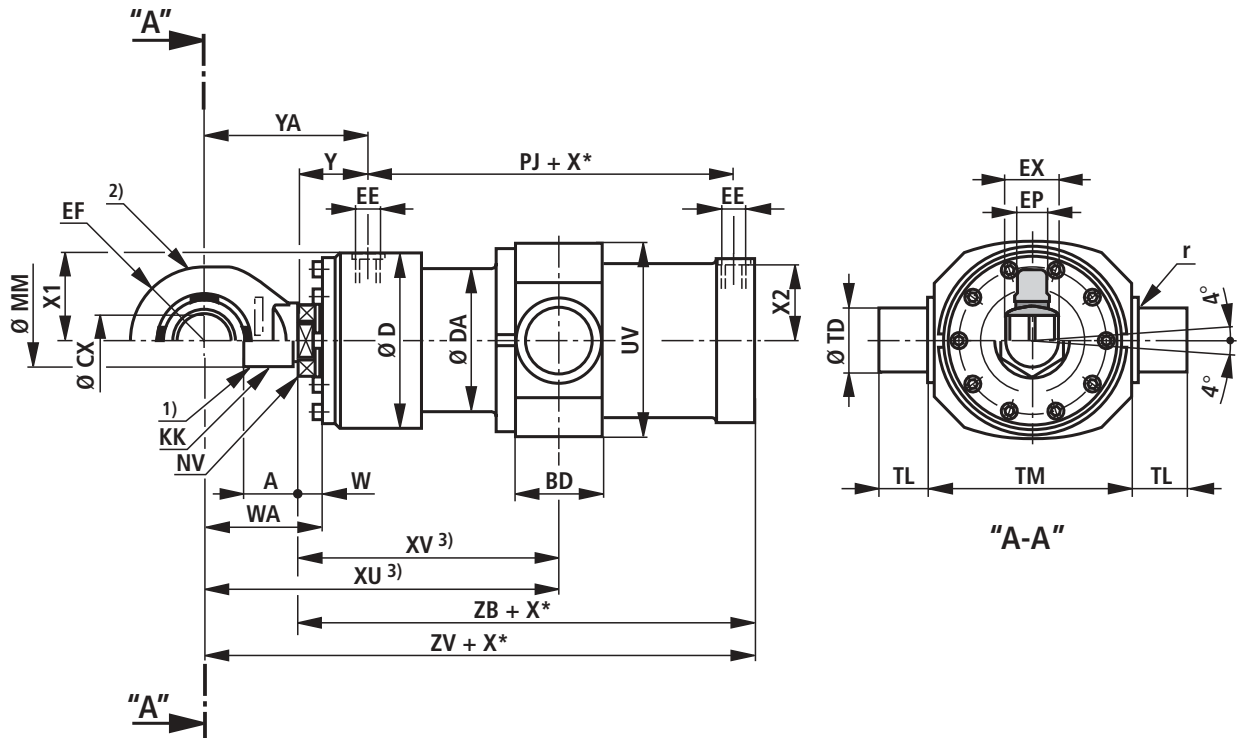
- 1) Piston rod end „H“
- 2) The trunnion can be located as required.
Dim. „XV“ must always be stated in clear text in mm in the order
- 3) Take the minimum stroke length „X* min“ into account.

Mounting style MT4

CDL1 MT4; AL-Ø 40-125 mm ²⁾



CDL1 MT4; AL-Ø 160-200 mm ^{1); 2)}



Dimensions MT4 (in mm)

AL Ø	MM Ø	KK	A	NV	W	WA	D max	DA	Y	YA	EE	PJ	XV ³⁾ min	XV ³⁾ max
40	22	M16 x 1.5	22	17	13	44	52	–	60	91	G 1/4	50	94	71 + X*
50	28	M20 x 1.5	28	22	13	50	62	–	62	99	G 3/8	57	104	72 + X*
63	36	M27 x 2	36	28	14	63	77	–	68	117	G 1/2	71	119	82 + X*
80	45	M33 x 2	45	36	16	76	98	–	84	144	G 1/2	80	144	93 + X*
100	56	M42 x 2	56	46	18	88	122	–	90	160	G 3/4	89	162	93 + X*
125	70	M48 x 2	63	60	20	106	152	–	99	185	G 3/4	97	183	98 + X*
160	90	M65 x 1.5	65	75	23	139	220	190	104	219	G 1	133	265	120 + X*
200	110	M80 x 2	80	95	23	162	268	230	105	245	G 1	144	285	120 + X*

AL Ø	MM Ø	X1 ±1	X2 ±1	XU ³⁾ min	XU ³⁾ max	ZB	ZV	X* ⁴⁾ min	BD	UV	TD f8	TL	TM h12	r	CX H7	EX h12	EP	EF max
40	22	39	22	125	102 + X*	124	155	23	35	86	20	16	90	1.5	20	20	16	28
50	28	45	27	141	109 + X*	135	172	32	40	100	25	20	105	1.5	25	25	20	33
63	36	55	33.5	168	131 + X*	159	208	37	50	126	32	25	120	2	32	32	22	42
80	45	65	44.5	204	153 + X*	185	245	51	65	145	40	32	135	2.5	40	40	26	51
100	56	80	57	232	163 + X*	202	272	69	80	175	50	40	160	2.5	50	50	34	61
125	70	95	72	269	184 + X*	221	307	85	100	215	63	50	195	3	63	63	42	76
160	90	110	110	380	235 + X*	268	383	147	100	250	80	63	240	2.5	70 ⁵⁾	65	40	90
200	110	134	125	425	260 + X*	280	420	168	125	300	100	80	295	3	80 ⁵⁾	74	45	110

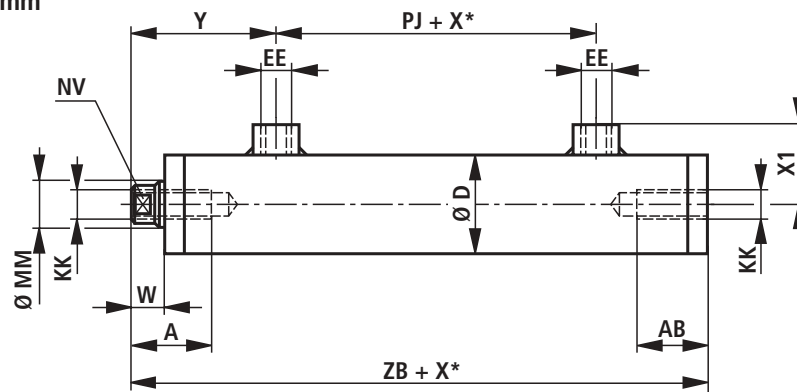
Notes:

AL = Piston Ø
MM = Piston rod Ø
X* = Stroke length

- 1) Piston rod end „H“
- 2) Piston rod end „F“
- 3) The trunnion can be location as required. Dim. „XV/XU“ must always be stated in clear text in mm in the order.
- 4) Take the minimum stroke length „X* min“ into account.
- 5) Tolerance: 0/-0.015

Mounting style M00

CDL1 M00; AL-Ø 25-32 mm



Dimensions M00 (in mm)

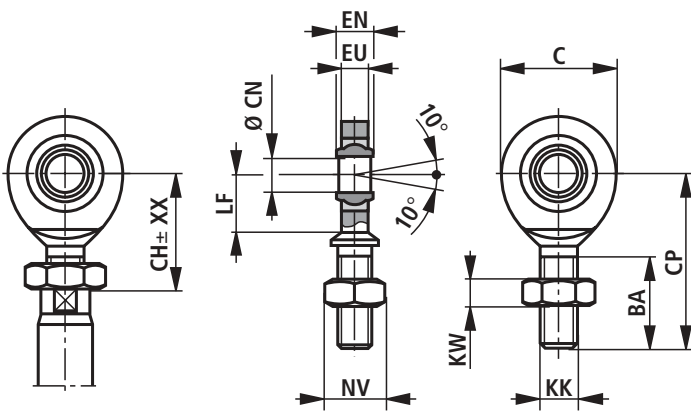
AL Ø	MM Ø	KK	A	AB	NV	W	Y	PJ	EE	X1 ± 1	D max	ZB
25	14	M10	26	21	12	10	44	26	G 1/8	24.5	33	104
32	18	M12	28	25	15	11	48	31	G 1/4	33	41	116

Notes:

- AL = Piston Ø
- MM = Piston rod Ø
- X* = Stroke length

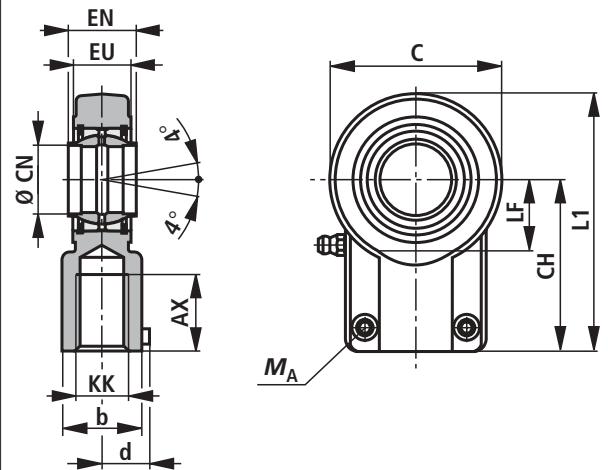
Self-aligning clevis (in mm)

AL-Ø 25-32 mm

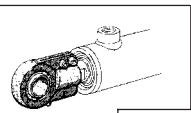


ISO 6126
DIN 648 E

AL-Ø 40-125 mm



ISO 6982
DIN 24338

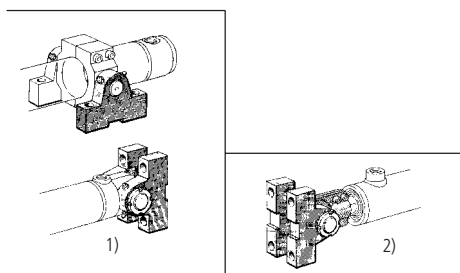
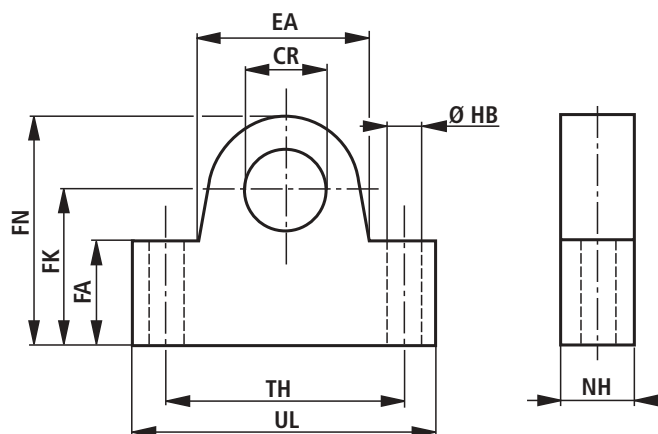


AL Ø	MM Ø	Material No.	KK	AX	b	BA	C	CH	CN ²⁾	CP max	d max	EN h12	EU	KW	L1	LF	NV	M _A ¹⁾ Nm	m ³⁾ kg
25	14	371-25-0003-1	M10	–	–	26	29	29	10	48	–	9	7	5	–	15	16	–	0,1
32	18	371-32-0003-1	M12	–	–	28	34	35	12	54	–	10	8	6	–	18	18	–	0,1
40	22	371-40-0002-1	M16 x 1.5	23	25	–	50	52	20	–	18,5	20	17	–	77	22	–	13	0,4
50	28	371-50-0002-1	M20x1.5	29	30	–	62	65	25	–	18,5	25	21	–	97	27	–	13	0,7
63	36	371-63-0002-1	M27 x 2	37	38	–	76	80	32	–	22	32	27	–	120	32	–	32	1,1
80	45	371-80-0002-1	M33 x 2	46	47	–	97	97	40	–	26	40	32	–	147	41	–	32	2,1
100	56	371-98-0002-1	M42 x 2	57	58	–	118	120	50	–	29	50	40	–	183	50	–	64	4,5
125	70	371-12-0002-1	M48 x 2	64	70	–	142	140	63	–	37	63	52	–	211	62	–	80	7,6

Notes:

- The self-aligning clevis must always be screwed on up to the piston rod thread stop. Subsequently, the clamping screws have to be tightened to the specified torque.
- Tolerances:
AL-Ø 25- 32 mm -0.008
AL-Ø 40-125 mm H7
- Weight of the self-aligning clevis

Mounting block (in mm)



AL Ø	MM Ø	AL Ø	MM Ø	Material No.	CR	EA max	FA	FK js12	FN	HB	NH	TH	UL	m ⁴⁾ kg
–	–	25	14	2370-1-2412-1	10	20	20	34	45	9	16	40	60	0.36
25 ³⁾	14 ³⁾	32	18	2370-1-2512-1	12	20	20	34	45	9	16	40	60	0.35
32 ³⁾	18 ³⁾	–	–	2370-1-3212-1	16	24	25	40	53	11	20	50	76	0.65
40	22	40	22	2370-1-4012-1	20	35	27	45	63	11	20	60	86	1.0
50	28	50	28	2370-1-5012-1	25	54	35	55	77	14	24	80	110	1.9
63	36	63	36	2370-1-6312-1	32	65	40	65	92	18	30	110	150	3.5
80	45	80	45	2370-1-8012-1	40	82	45	76	112	22	32	125	170	5.1
100	56	100	56	2370-1-9812-1	50	106	60	95	138	27	40	160	210	9.7
125	70	125	70	2370-1-1212-1	63	140	70	112	168	33	50	200	260	18.7
160 ³⁾	90 ³⁾	–	–	371-16-0012-1	80	175	85	140	215	39	62	250	322	31.0
–	–	160	90	3420-01-012-1	70	120	65	140	200	31	65	280	345	33.6
200 ³⁾	110 ³⁾	–	–	371-20-0012-1	100	180	80	160	250	39	80	324	394	65.0
–	–	200	110	371-16-0012-1	80	175	85	140	215	39	62	250	322	31.0

Notes:

The mounting blocks are suitable for use with mounting styles MP5, MT4 and self-aligning clevis.

Mounting blocks are always supplied as pairs.

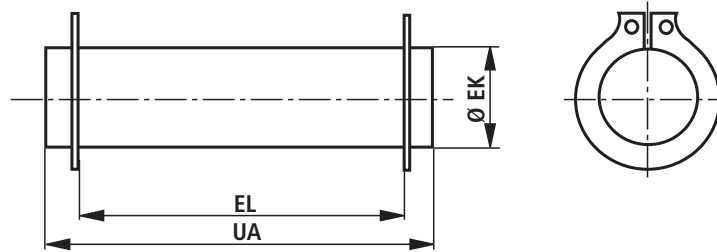
1) For mounting styles MP5 and MT4

2) For self-aligning clevis

3) Only for mounting style MT4

4) Weight per pair

Pin (in mm)



AL Ø	MM Ø	Material No.	EK j6	EL	UA	m ¹⁾ kg
25	14	2370-1-2513-1	10	41	46	0.03
32	18	2370-1-3213-1	12	42	47	0.04
40	22	2370-1-4013-1	20	60	66	0.16
50	28	2370-1-5013-1	25	74	81	0.3
63	36	2370-1-6313-1	32	92	100	0.6
80	45	2370-1-8013-1	40	104	114	1.1
100	56	2370-1-9813-1	50	130	142	2.2
125	70	2370-1-1213-1	63	163	175	4.3
160	90	3420-01-013-1	70	195	222	7.2
200	110	371-16-0013-1	80	198	240	10.2

Note:

¹⁾ Pin weight

Buckling

The permissible stroke with a flexibly guided load and 3.5 safety factor against buckling can be obtained from the appropriate table. With a deviating cylinder installation orientation the permissible stroke has to be interpolated. Permissible stroke lengths for non-guided loads are available on request.

The calculations for buckling are carried out as follows:

1. Calculation according to Euler

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

2. Calculation according to Tetmajer

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

Explanation:

E = Modulus of elasticity in N/mm²
= $2,1 \times 10^5$ for steel

I = Moment of inertia in mm⁴ for circular cross-sectional area
$$= \frac{d^4 \cdot \pi}{64} = 0.0491 \cdot d^4$$

ν = 3.5 (safety factor)

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

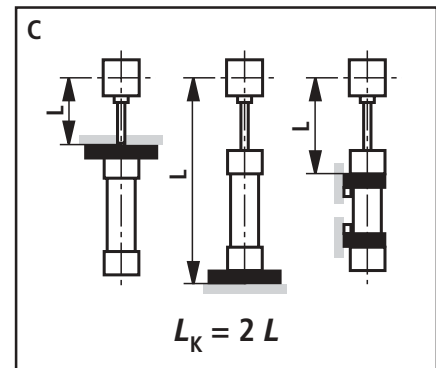
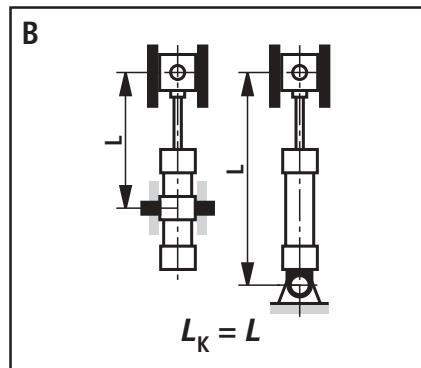
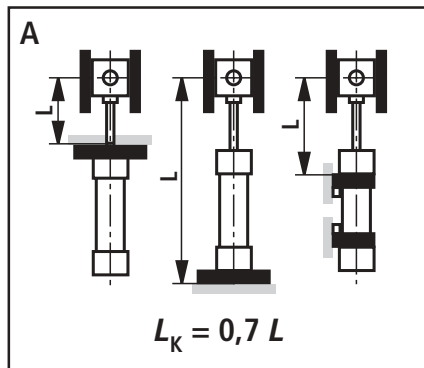
d = Piston rod in mm

λ = Slenderness ratio

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

R_e = Yield strength of piston rod material

The influence of the mounting style on the buckling length:

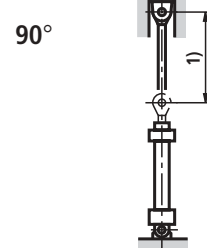
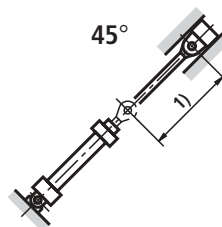
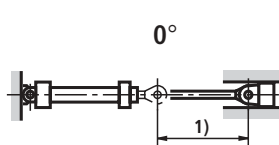


Permissible stroke lengths (in mm)

Mounting style MP5

AL Ø	MM Ø	Permissible stroke at									Max. available stroke
		80 bar			160 bar			240 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	14	–	–	–	–	–	–	–	–	–	600
32	18	–	–	–	–	–	–	–	–	–	800
40	22	295	305	325	200	205	210	145	150	155	1000
50	28	390	400	435	270	275	280	205	205	215	1200
63	36	510	525	580	360	365	375	280	285	290	1400
80	45	625	645	725	450	455	475	350	355	360	1700
100	56	775	805	915	570	580	605	450	455	465	2000
125	70	960	995	1150	715	730	770	560	580	595	2300
160	90	1110	1170	1470	865	885	975	620	680	750	2600
200	110	1330	1400	1770	1040	1070	1180	630	700	920	3000

Installation

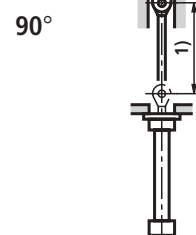
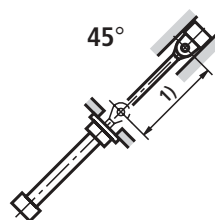
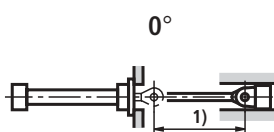


1) Permissible stroke

Mounting style MF3

AL Ø	MM Ø	Permissible stroke at									Max. available stroke
		80 bar			160 bar			240 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	14	640	655	715	475	480	490	385	390	395	600
32	18	820	845	930	615	625	645	505	510	515	800
40	22	955	985	1000	720	730	760	530	555	605	1000
50	28	1200	1200	1200	940	950	990	770	780	795	1200
63	36	1400	1400	1400	1220	1240	1310	1010	1025	1050	1400
80	45	1700	1700	1700	1495	1525	1620	1200	1260	1300	1700
100	56	2000	2000	2000	1830	1870	2000	1370	1480	1610	2000
125	70	2300	2300	2300	2270	2300	2300	1650	1780	2030	2300
160	90	2600	2600	2600	2600	2600	2600	1850	2050	2600	2600
200	110	3000	3000	3000	3000	3000	3000	1900	2100	3000	3000

Installation



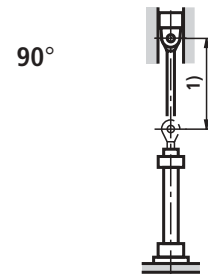
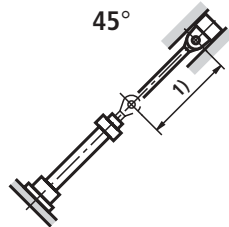
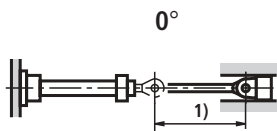
1) Permissible stroke

Permissible stroke lengths (in mm)

Mounting styles MF4

AL Ø	MM Ø	Permissible stroke at									Max. available stroke
		80 bar			160 bar			240 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	14	275	280	310	190	195	200	140	145	150	600
32	18	360	370	410	255	260	270	200	205	210	800
40	22	415	430	490	300	305	320	205	220	240	1000
50	28	545	565	650	400	405	425	315	320	325	1200
63	36	705	735	865	530	540	570	425	430	445	1400
80	45	855	895	1070	655	670	715	500	535	555	1700
100	56	1050	1100	1340	815	835	900	600	650	705	2000
125	70	1290	1355	1700	1020	1050	1145	715	785	900	2300
160	90	1650	1735	2220	1325	1365	1510	930	1030	1190	2600
200	110	1990	2095	2680	1605	1655	1830	960	1050	1450	3000

Installation



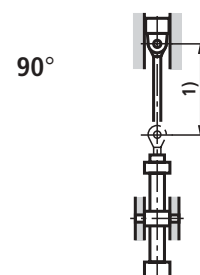
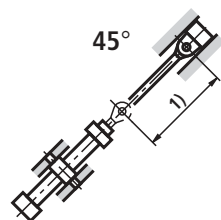
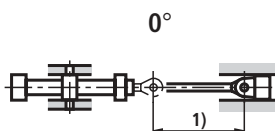
1) Permissible stroke

Mounting style MT4

Trunnions in the centre

AL Ø	MM Ø	Permissible stroke at									Max. available stroke
		80 bar			160 bar			240 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	14	285	290	305	190	195	200	140	145	150	600
32	18	370	375	400	255	260	265	200	205	210	800
40	22	440	450	480	310	315	320	235	240	250	1000
50	28	575	590	635	415	420	430	330	335	340	1200
63	36	745	765	840	545	550	565	440	445	450	1400
80	45	905	935	1040	670	680	705	540	545	555	1700
100	56	1115	1150	1300	835	850	885	680	685	700	2000
125	70	1370	1420	1630	1045	1065	1115	840	865	885	2300
160	90	1735	1805	2110	1340	1365	1445	1080	1120	1150	2600
200	110	2080	2160	2530	1610	1645	1740	1120	1170	1390	3000

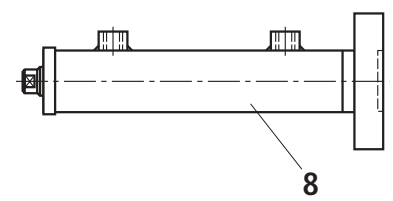
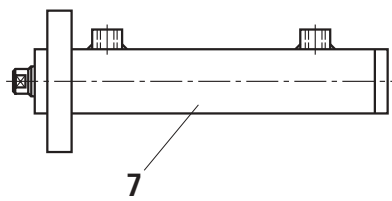
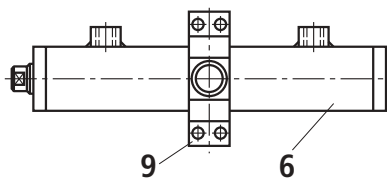
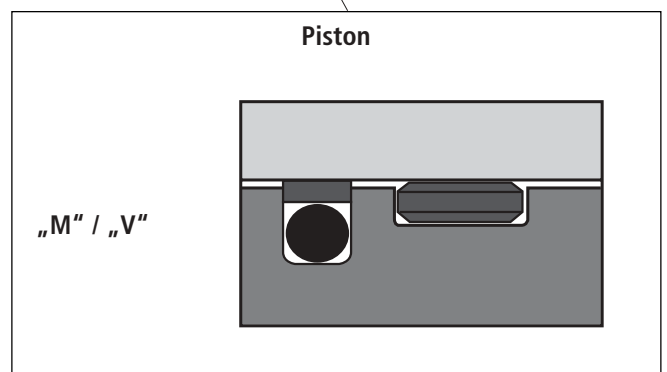
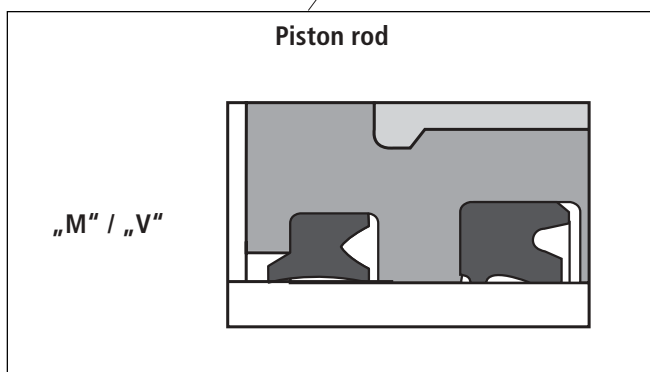
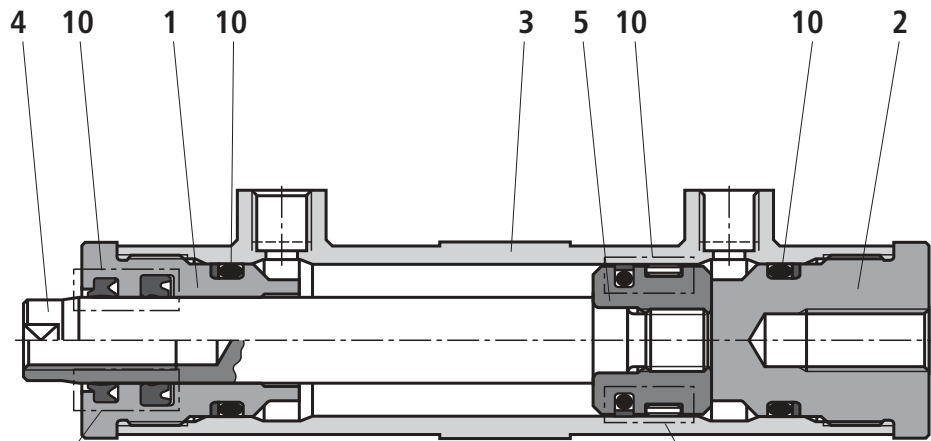
Installation



1) Permissible stroke

Spare parts

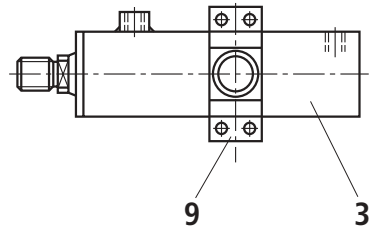
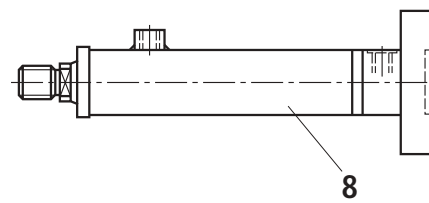
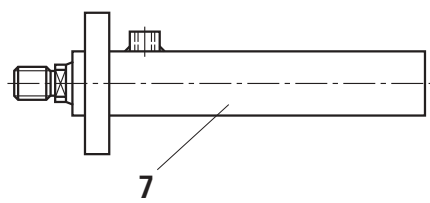
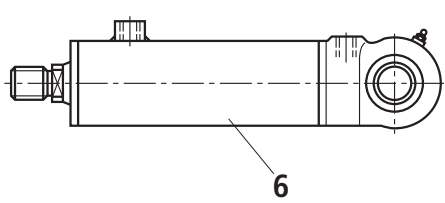
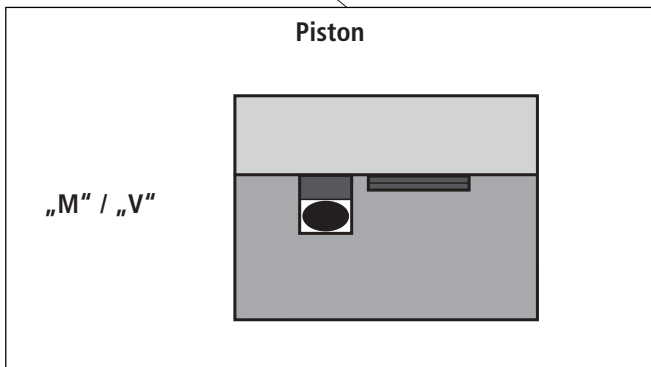
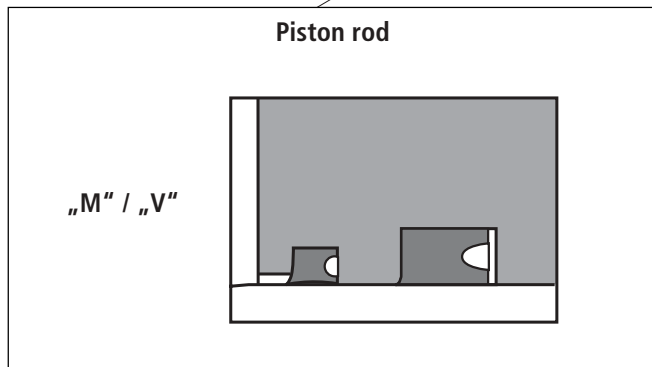
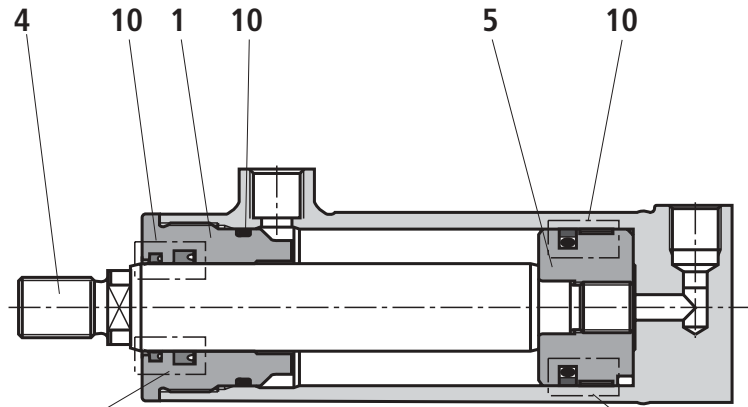
CDL1; AL-Ø 25-32 mm



- 1 Head
- 2 Base
- 3 Barrel for M00; MF4
- 4 Piston rod
- 5 Piston
- 6 Barrel for MT4
- 7 Round flange MF3
- 8 Barrel with round flange MF4
- 9 Trunnion MT4
- 10 Seal kit:
 - Wiper
 - Rod seal
 - Piston seal
 - O-ring
 - Guide bush

Spare parts

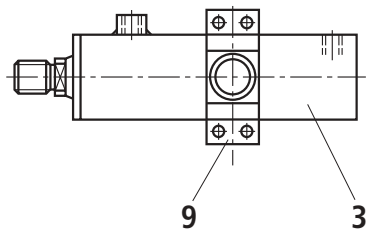
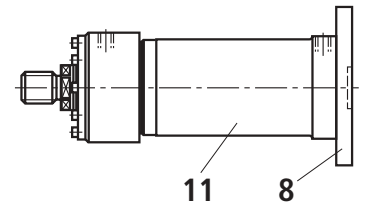
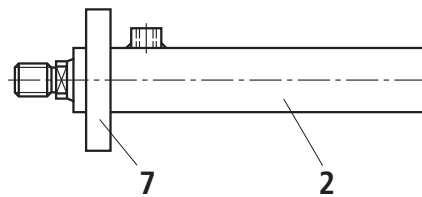
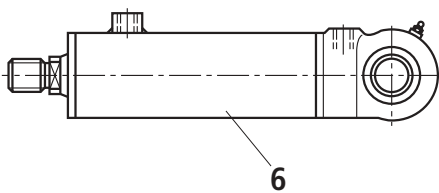
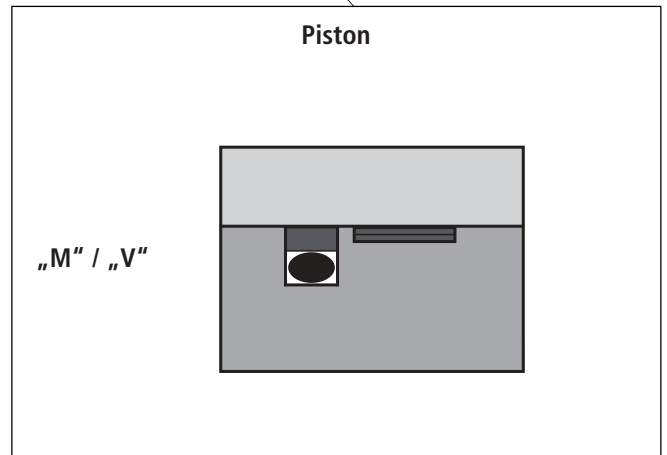
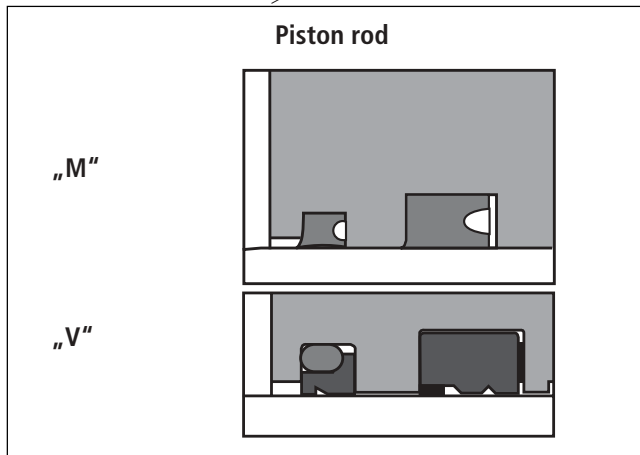
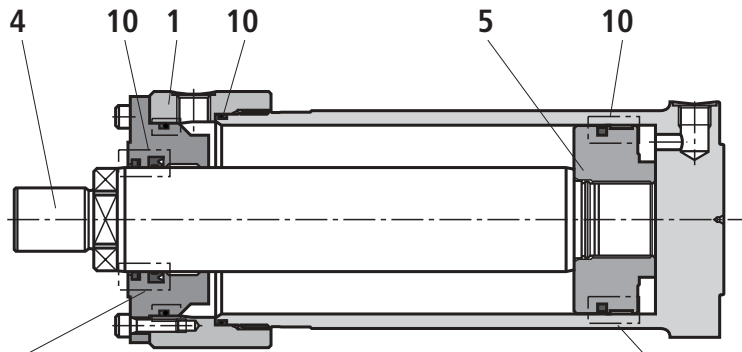
CDL1; AL-Ø 40-125 mm



- 1 Head
- 3 Barrel for MT4
- 4 Piston rod
- 5 Piston
- 6 Barrel with base MP5
- 7 Barrel with round flange MF3
- 8 Barrel with round flange MF4
- 9 Trunnion MT4
- 10 Seal kit:
 - Wiper
 - Rod seal
 - Piston seal
 - O-ring
 - Guide bush

Spare parts

CDL1; AL-Ø 160-200 mm



- 1 Head
- 2 Barrel for MF3
- 3 Barrel for MT4
- 4 Piston rod
- 5 Piston
- 6 Barrel with base MP5
- 7 Round flange MF3
- 8 Round flange MF4
- 9 Trunnion MT4

- 10 Seal kit:
Wiper
Rod seat
Piston seal
O-ring
Guide bush
- 11 Barrel for MF4

Seal kits

CDL1 – Standard

AL Ø	MM Ø	Material No. Seal version	
		M	V
25	14	049-063-420-7	049-063-521-8
32	18	049-063-430-4	049-063-530-7
40	22	049-063-440-1	049-063-540-4
50	28	049-063-450-9	049-063-550-1
63	36	049-063-460-6	049-063-560-9
80	45	049-063-470-3	049-063-570-6
100	56	049-063-480-0	049-063-580-3
125	70	049-063-490-8	049-063-590-0
160	90	049-063-500-5	049-063-600-8
200	110	049-063-510-2	049-063-610-5

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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.

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