

# Hydraulic cylinder Mill type

**RE 17325/07.09**  
Replaces: 11.06

1/28

## Type CDL1

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

cdl\_d

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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

Project planning software **Interactive Catalog System****Online**[www.boschrexroth.com/ics](http://www.boschrexroth.com/ics)**Brochure  
download**[www.boschrexroth.com/  
business\\_units/bri/de/downloads/ihc](http://www.boschrexroth.com/business_units/bri/de/downloads/ihc)

## Technical data

### Standards:

Bosch Rexroth standard;  
Main dimensions like piston  $\varnothing$  and piston rod  $\varnothing$  according to DIN ISO 3320.

**Nominal pressure:** 160 bar (16 MPa)

Static test pressure: 240 bar (24 MPa).

Operating pressure: up to max. 240 bar (24 MPa)

Depending on cylinder design and case of application, suitable for operating pressures up to 240 bar (24 MPa) with maximally 200,000 load cycles.

With extreme shock loads, mounting elements and threaded piston rod connections must be designed for endurance strength.

### Minimum pressure:

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

**Installation position:** any

### Hydraulic fluid:

Mineral oils DIN 51524 (HL, HLP)

Phosphoric acid ester (HFD-R)

Water glycol HFC upon request

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

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

**Optimum viscosity range:** 20 to 100  $\text{mm}^2/\text{s}$

Minimum admissible viscosity: 12  $\text{mm}^2/\text{s}$

Maximum admissible viscosity: 380  $\text{mm}^2/\text{s}$

### Cleanliness class according to ISO

Maximum admissible degree of contamination of the hydraulic fluid according to ISO 4406 (c) class 20/18/15.

The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the service life of the components. For the selection of filters, see data sheets RE 50070, RE 50076, RD 50081, RE 50086, RE 50087, and RE 50088.

**Stroke velocity:** up to 0,5 m/s  
(depending on the line connection)

### Primer coat:

By default, hydraulic cylinders are primed with a coating (color gentian blue RAL 5010) of max. 80  $\mu\text{m}$ .

With cylinders and attachment parts, the following surfaces are not primed or painted:

- all fit diameters to the customer side

- Sealing faces for line connection

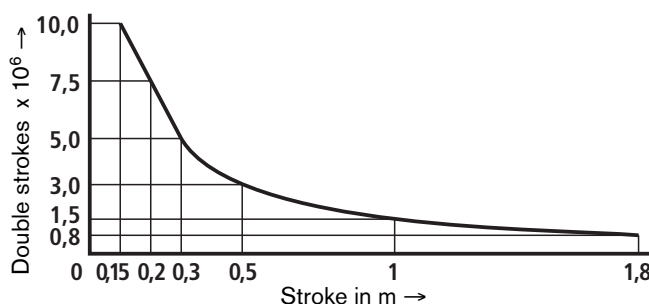
- Sealing faces for flange connection

The surfaces that are not painted are protected by means of a corrosion protection agent (MULTICOR LF 80).

### Life time:

Rexroth cylinders correspond to the reliability recommendations for industrial applications.

$\geq 10,000,000$  double strokes in idle continuous operation or 3000 km piston travel at 70% of the maximum operating pressure, without load on the piston rod, with a maximum speed of 0.5 m/s, with a failure rate of less than 5%.



### Acceptance:

Each cylinder is tested according to Bosch Rexroth standard

### Safety notes:

For the assembly, commissioning and maintenance of hydraulic cylinders, the operating instructions RE 07100-B have to be observed!

Service and repair works have to be performed by Bosch Rexroth AG or by personnel especially trained for this purpose. No warranty is accepted for damage as a consequence of assembly, maintenance or repair works not performed by Bosch Rexroth AG.

### Check lists for hydraulic cylinders:

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

## Engineering software ICS (Interactive Catalog System)

The ICS-Designer (Interactive Hydraulics Cylinder Designer) is an engineering and selection aid for hydraulic cylinders. With the aid of the IHC-Designer it is possible for designers of machines and systems, by the logically guided type code questionnaire, to quickly and reliably find the optimum hydraulic cylinder solution. The software enables the design and engineering tasks to be carried out quicker and efficiently. After being gui-

ded through the product selection, the user quickly obtains reliable and exact technical data of the selected components as well as the associated 2D and 3D-CAD data in the correct file format for all current CAD systems.

You, as a user thereby reduce your costs and therefore increase your competitiveness.

## Area, force, flow

Piston	Piston rod	Area ratio	Area			Force at 160 bar <sup>1)</sup>			Flow at 0.1 m/s <sup>2)</sup>		
			Piston	Rod	Annulus	Pressure	Diff.	Pull	Out	Diff.	In
AL Ø mm	MM Ø mm	$\varphi$ $A_1/A_3$	$A_1$ cm <sup>2</sup>	$A_2$ cm <sup>2</sup>	$A_3$ cm <sup>2</sup>	$F_1$ kN	$F_2$ kN	$F_3$ kN	$q_{V1}$ l/min	$q_{V2}$ l/min	$q_{V3}$ 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:

<sup>1)</sup> Theoretical force (efficiency not taken into account).

<sup>2)</sup> Stroke velocity

## Tolerances to ISO 8135

Installation dimensions	WC	XO/XF <sup>1)</sup>	XV/XU	ZJ <sup>1)</sup>	Stroke tolerances
Mounting style	MF3	MP5	MT4	MF4	
Stroke length	Tolerances				
0 – 1250	±2.8	±2	±2.8	±2	
1251–3000	±4	±3	±4	±3	+5

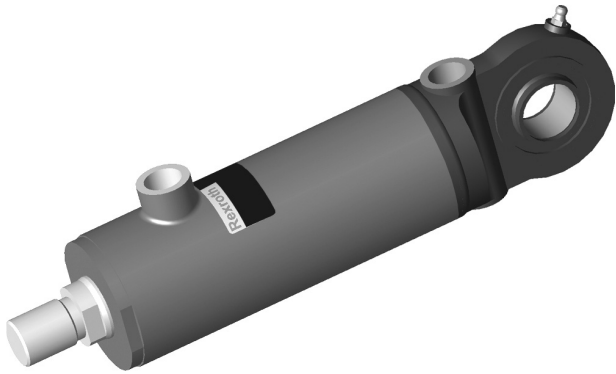
<sup>1)</sup> Stroke length included

## Mounting style overview

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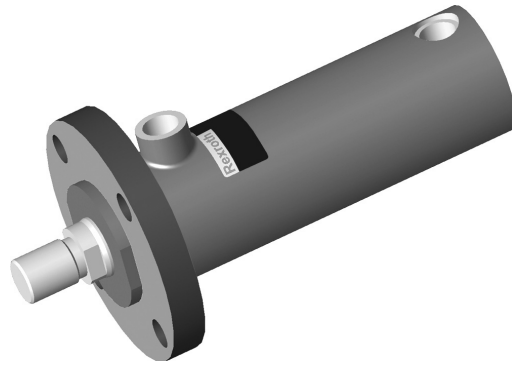
### CDL1 MP5

see Page 6 and 7



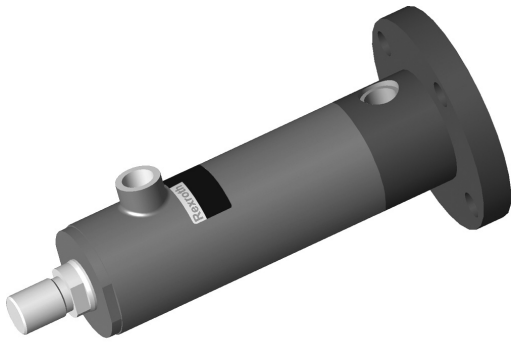
### CDL1 MF3

see Page 8 and 9



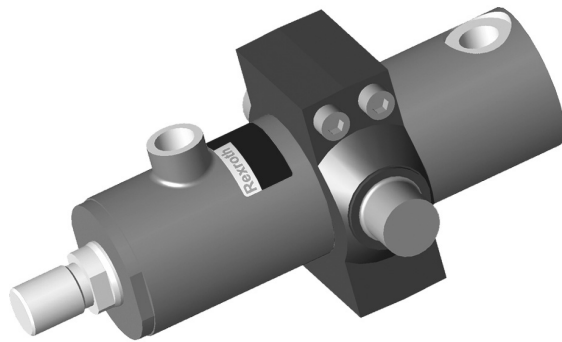
### CDL1 MF4

see Page 10 and 11



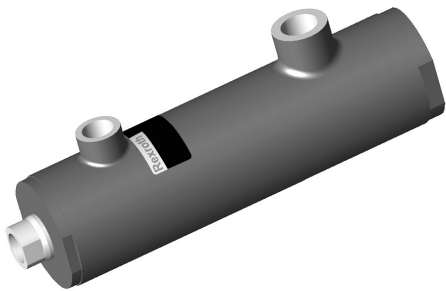
### CDL1 MT4

see Page 12 to 15

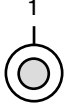


### CDL1 M00

see Page 16



## Ordering details

CD	L1	/	/	/		1X/B	1	C		U		W	
Differential-cylinder = CD	Frame size = L1												
<b>Mounting styles</b> Self-aligning clevis at base <sup>2)</sup> = MP5 Round flange at head = MF3 Round flange at base = MF4 Trunnions <sup>3)</sup> = MT4 Without mounting <sup>1)</sup> = M00													
<b>Piston Ø (25–200 mm)</b> (see page 3)													
<b>Piston rod Ø (14–110 mm)</b> (see page 3)													
<b>Stroke length in mm</b>													
<b>Design principle</b> Head and rear screwed <sup>1)</sup> = C Head screwed, base welded <sup>2)</sup> = D													
<b>Component series</b> = 1X (10 to 19: unchanged installation and connection dimensions)													
<b>Connection port</b> Pipe thread – ISO 228/1 = B													
<b>Connection ports/position at head and base</b> = 1 <div style="display: flex; align-items: center; margin-top: 10px;"> <div style="text-align: center; margin-right: 20px;">  </div> <div>Viewed on the piston rod</div> </div>													
<b>Option 2</b> Y = Enter piston rod extension LY in clear text in mm W = Without option													
<b>Option 1</b> W = Without option													
<b>Seal version</b> Suitable for mineral oil to DIN 51524 HL, HLP M = Standard seal system Suitable for Phosphate ester-HFD-R V = Standard seal system (up to 150 °C)													
<b>End position cushioning</b> U = Without													
<b>Piston rod end</b> H = Thread F = <sup>2), 3)</sup> with swivel head, not removable K = <sup>5)</sup> Piston rod end H with assembled swivel head CGKD													
<b>Piston rod version</b> C = Hard chromium plated													

### Notes:

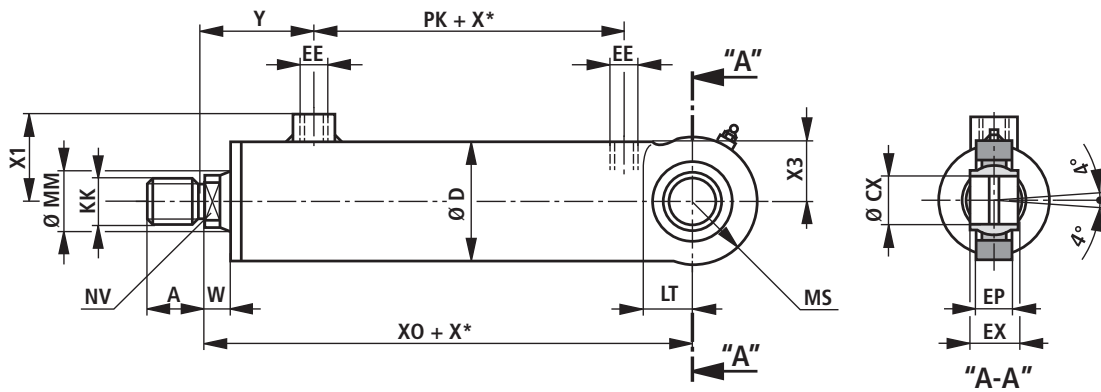
- <sup>1)</sup> Only piston Ø 25–32 mm
- <sup>2)</sup> Only piston Ø 40–200 mm
- <sup>3)</sup> Only MP5; MT4
- <sup>4)</sup> Swivel pin position freely selectable. Always specify the dimension "XV/XU" in the clear text when ordering.
- <sup>5)</sup> Only piston Ø 40 – 125 mm

### Ordering example:

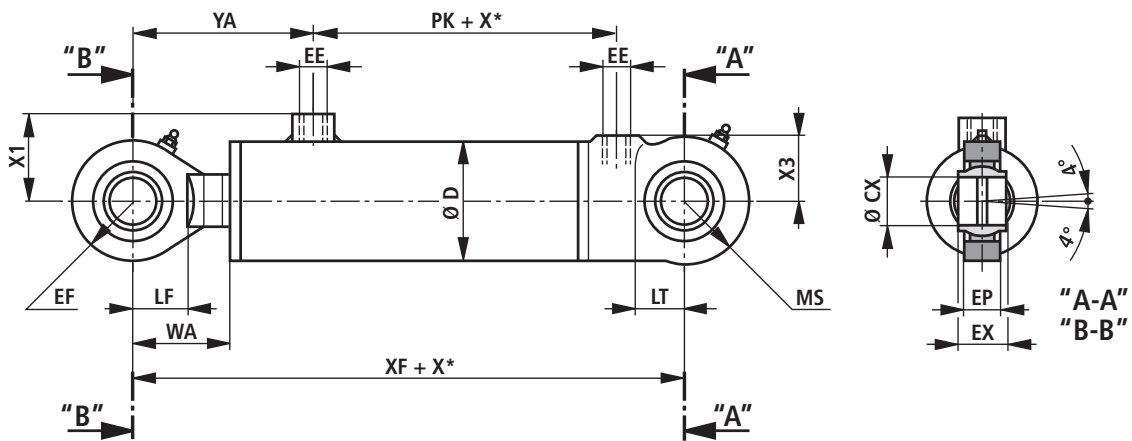
CDL1MT4/100/56/560D1X/B1CHUMWW, XV=245 mm.  
 CDL1MF3/200/110/600D1X/B1CHUMWW

## Mounting style MP5

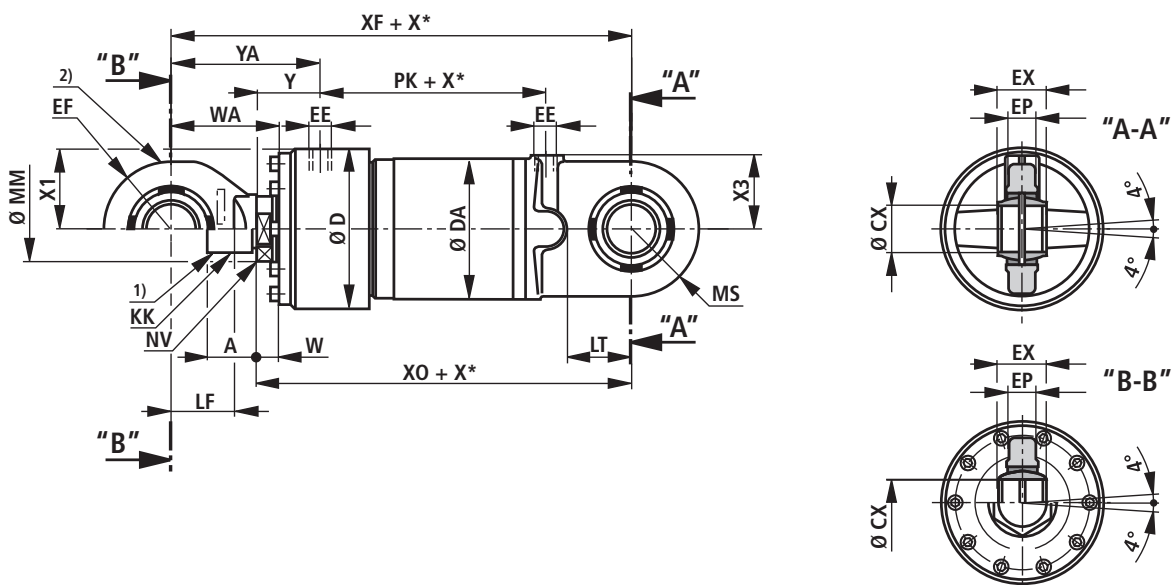
CDL1 MP5; AL-Ø 40–125 mm <sup>1)</sup>



CDL1 MP5; AL-Ø 40–125 mm <sup>2)</sup>



CDL1 MP5; AL-Ø 160–200 mm <sup>1), 2)</sup>



## 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	136	219	143	G 1	110	100	367
200	110	M80 x 2	80	95	23	162	141	245	154	G 1	134	120	396

AL Ø	MM Ø	XF	D max	DA	LT	LF	MS H7	CX <sup>3)</sup> ±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 <sup>4)</sup>	40	65	90
200	110	536	268	230	102	100	110	80 <sup>4)</sup>	45	74	110

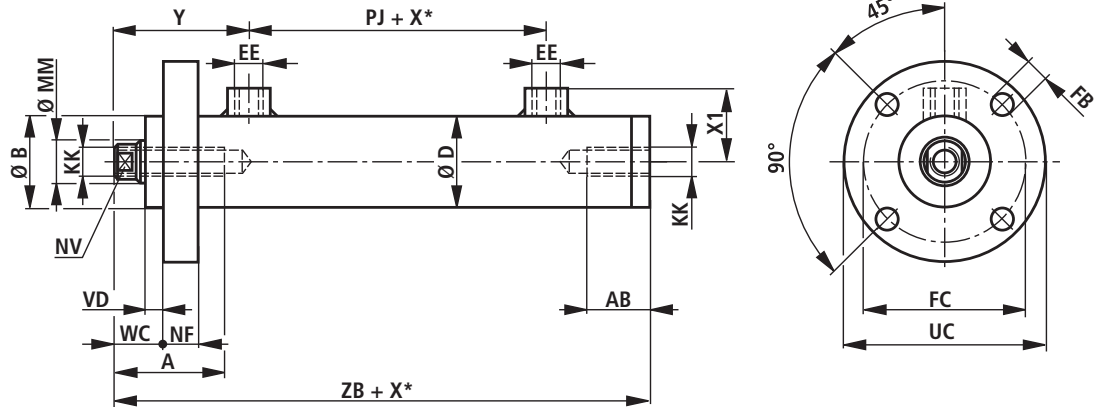
### Notes:

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

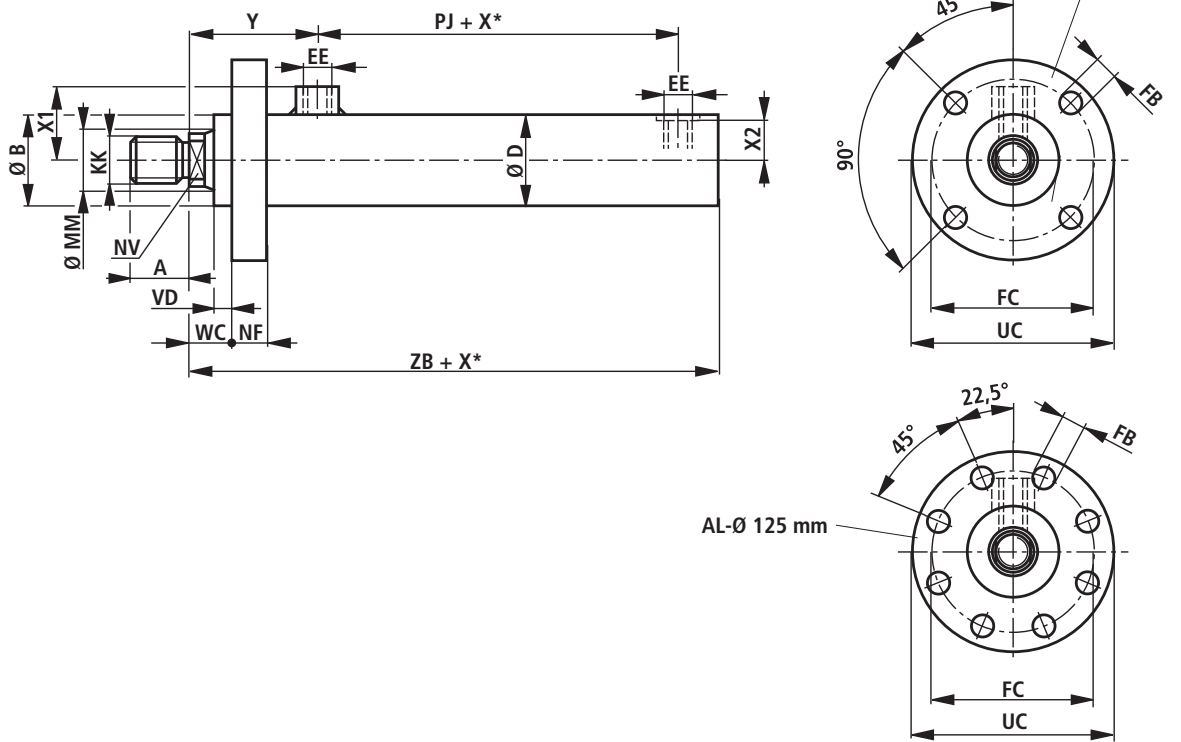
- 1) Piston rod end „H“  
2) Piston rod end „F“  
3) Associated pin Ø j6  
4) Tolerance: 0/-0.015

## Mounting style MF3

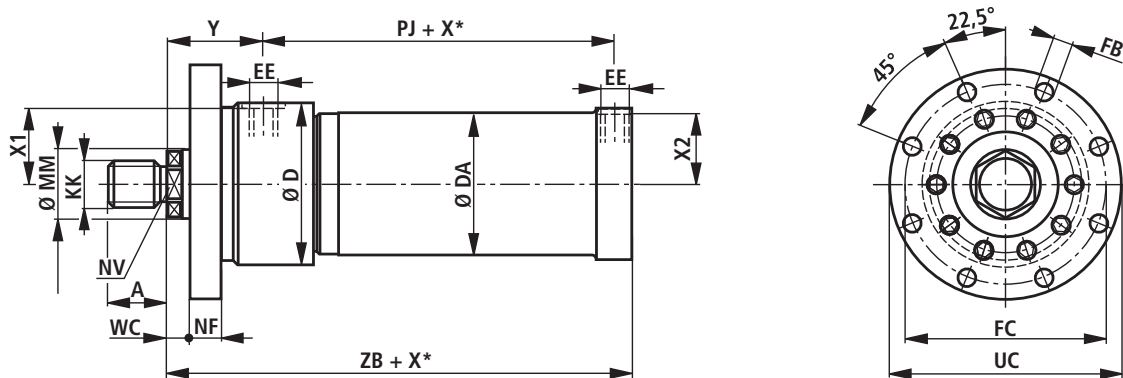
CDL1 MF3; AL-Ø 25–32 mm



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 <sup>1)</sup>	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	136	133	G 1	110	110	300	22	270	316
200	110	141	144	G 1	134	125	316	26	325	380

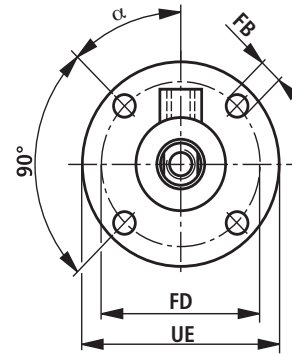
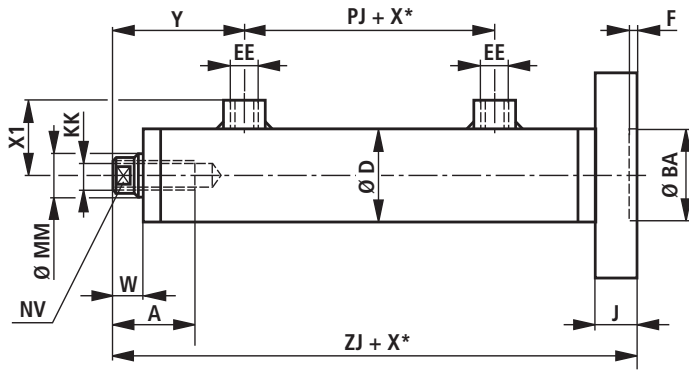
### Notes:

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

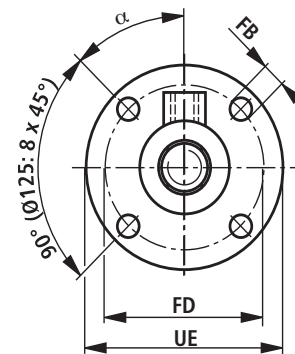
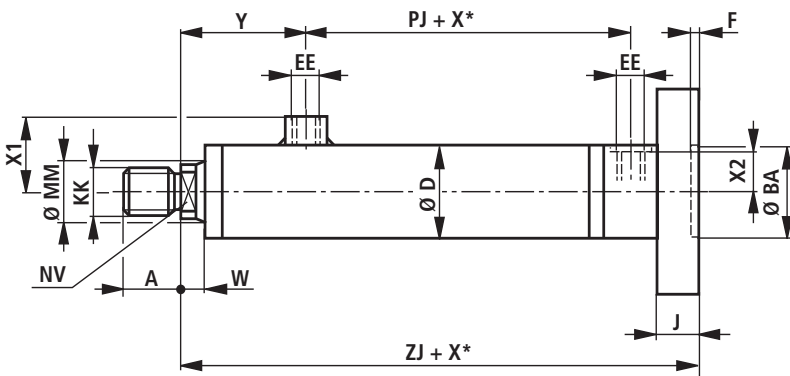
<sup>1)</sup> Tolerance: ±0.5

## Mounting style MF4

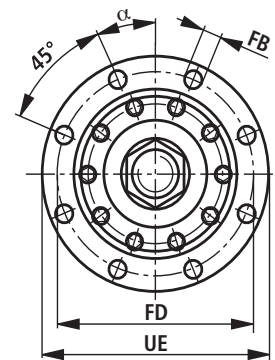
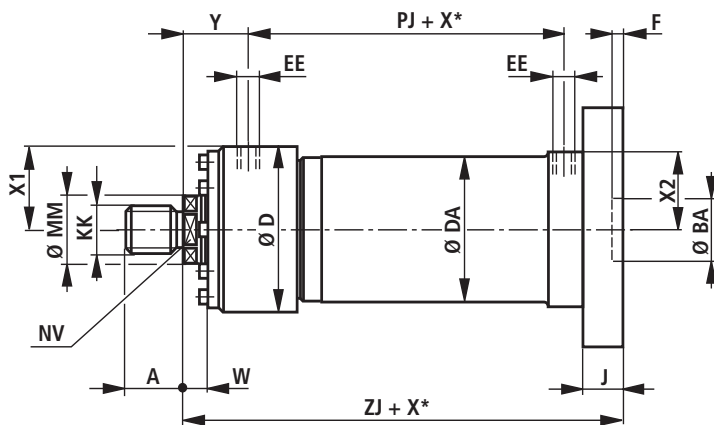
CDL1 MF4; AL-Ø 25–32 mm



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	136	133	G 1	110
200	110	M80 x 2	80	95	23	268	230	141	144	G 1	134

AL Ø	MM Ø	X2 ±1	ZJ	BA E8	F	J	FB	FD	UE	α
25	14	–	118	32	2	14	6.6	55	68	45 °
32	18	–	132	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:**

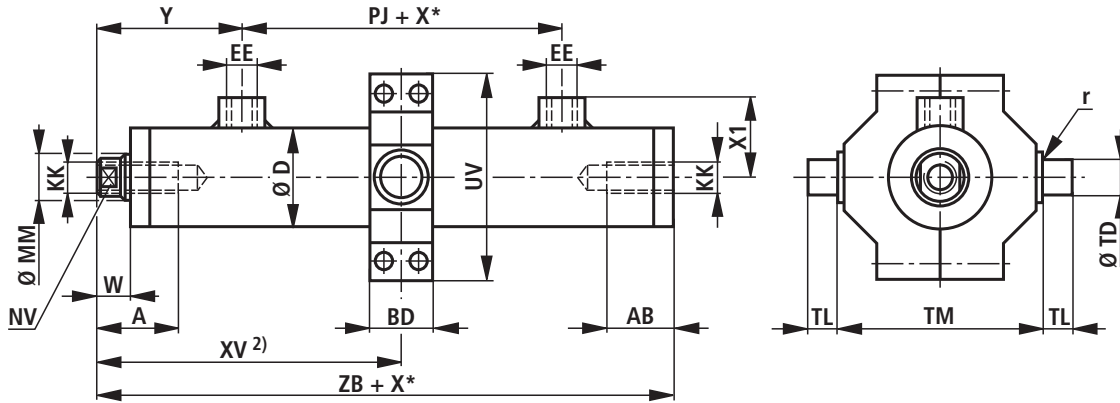
AL = Piston Ø

MM = Piston rod Ø

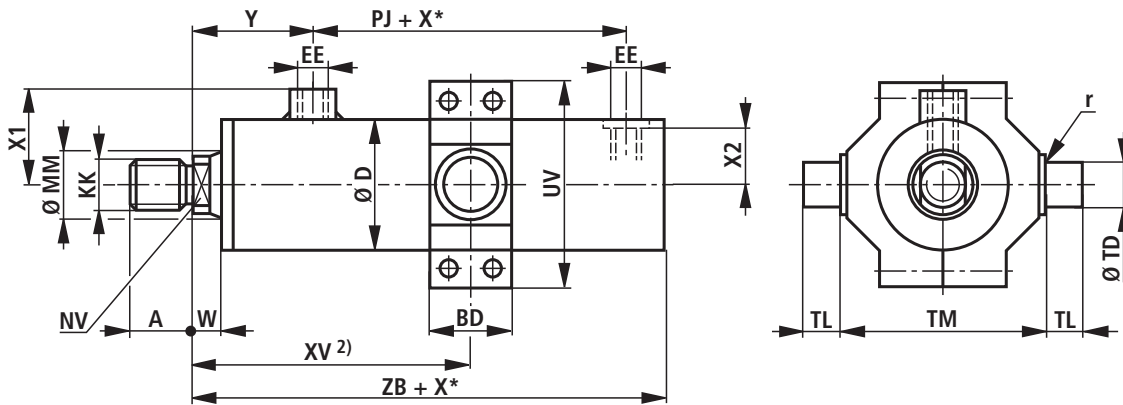
X\* = Stroke length

## Mounting style MT4

CDL1 MT4; AL-Ø 25–32 mm <sup>1)</sup>



CDL1 MT4; AL-Ø 40–125 mm <sup>1)</sup>



## Dimensions MT4 (in mm)

AL Ø	MM Ø	KK	A	AB	NV	W	D max	Y	EE	PJ	XV <sup>2)</sup> min	XV <sup>2)</sup> 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* <sup>3)</sup> min	BD	UV <sup>6)</sup>	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

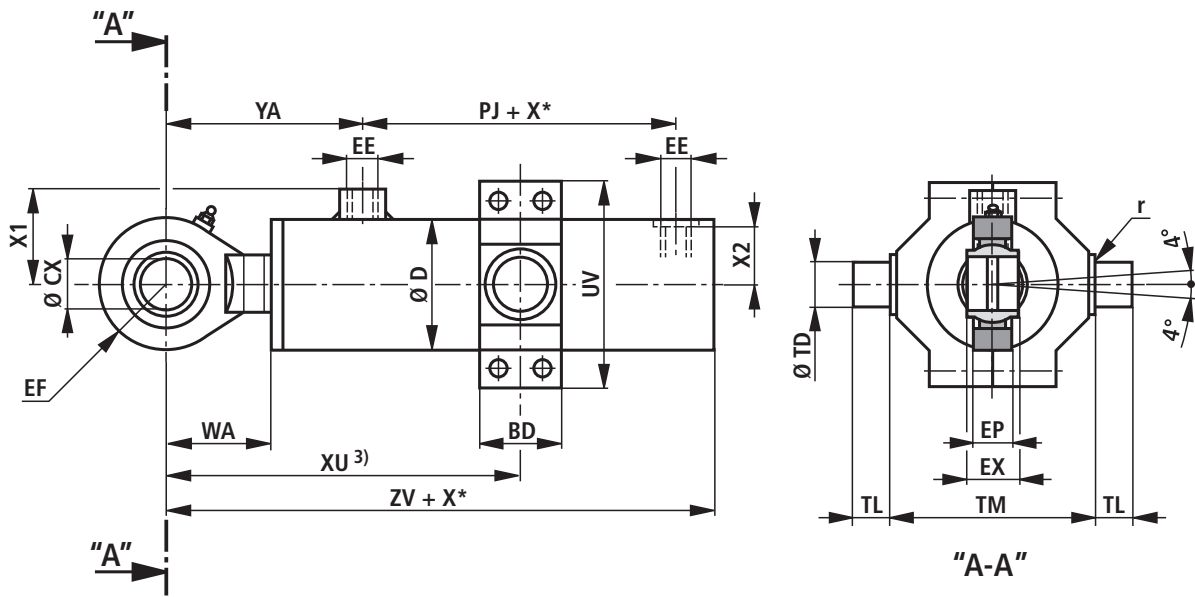
### Notes:

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

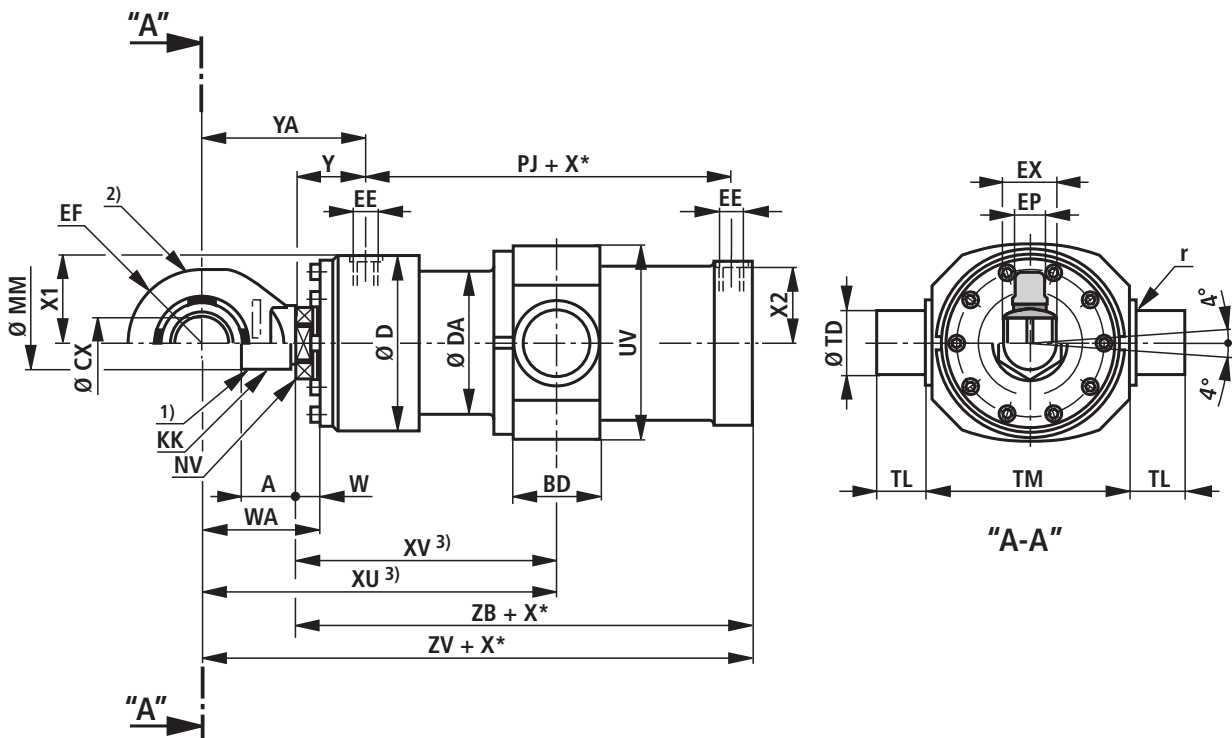
- 1) Piston rod end „H“  
2) The trunnion can be located as required.  
Dim. „XV“ must always be stated in clear text in mm in the order.  
3) Take the minimum stroke length „X\* min“ into account.  
6) Tolerance according to EN ISO 9013: Thermal cutting

## Mounting style MT4

CDL1 MT4; AL-Ø 40–125 mm <sup>2)</sup>



CDL1 MT4; AL-Ø 160–200 mm <sup>1) 2)</sup>



## Dimensions MT4 (in mm)

AL Ø	MM Ø	KK	A	NV	W	WA	D max	DA	Y	YA	EE	PJ	XV <sup>3)</sup> min	XV <sup>3)</sup> 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	136	219	G 1	133	265	120 + X*
200	110	M80 x 2	80	95	23	162	268	230	141	245	G 1	144	285	120 + X*

AL Ø	MM Ø	X1 ±1	X2 ±1	XU <sup>3)</sup> min	XU <sup>3)</sup> max	ZB	ZV	X* <sup>4)</sup> min	BD	UV <sup>6)</sup>	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 <sup>5)</sup>	65	40	90
200	110	134	125	425	260 + X*	280	420	168	125	300	100	80	295	3	80 <sup>5)</sup>	74	45	110

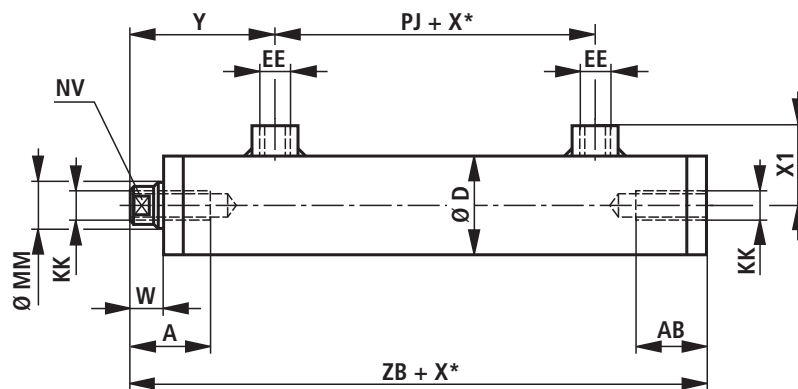
### Notes:

- 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 located 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
- 6) Tolerance according to EN ISO 9013: Thermal cutting

## 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:

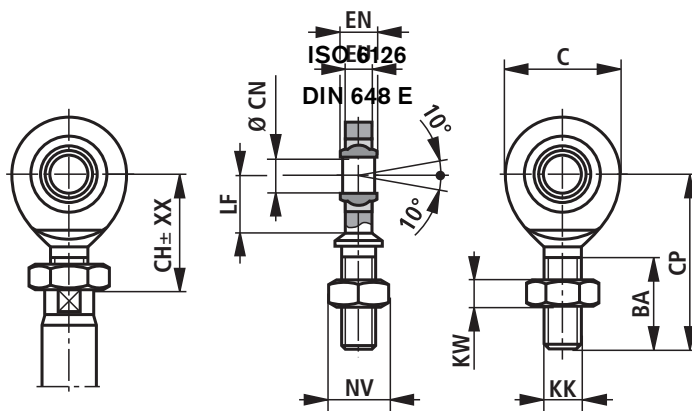
- AL = Piston Ø
- MM = Piston rod Ø
- X\* = Stroke length



## Self aligning clevis (in mm)

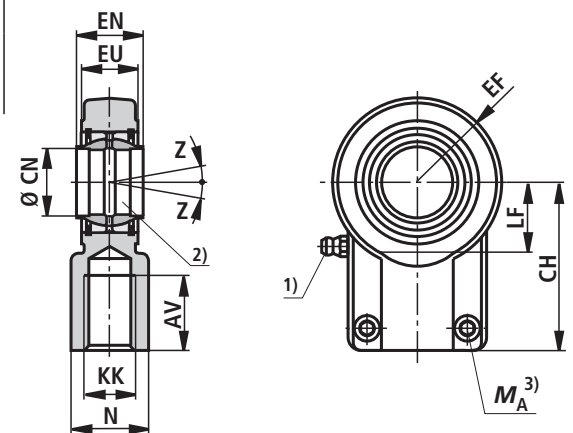
## CGKL

AL-Ø 25–32 mm

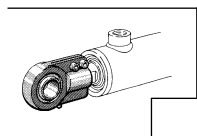
ISO 6126  
DIN 648 E

## CGKD

AL-Ø 40–125 mm



DIN ISO 8132



Series CDL1		Typ	Material-Nr.	KK	AV min.	N max.	BA	C	CH js13	EF max.	CN Ø 5)	CP max.	EN h12	EU max.	KW	LF min.	NV	Z	Clamping screw ISO 4762-10.9	M <sub>A</sub> <sup>3)</sup> Nm	m <sup>4)</sup> g	Nominal force N
AL Ø	MM Ø																					
25	14	CGKL 10	3712500031	M10	-	-	26	29	29	-	10	48	9	7	5	15	16	-	-	-	0,1	-
32	18	CGKL 12	3713200031	M12	-	-	28	34	35	-	12	54	10	8	6	18	18	-	-	-	0,1	-
40	22	CGKD 20	R900308576	M16x1,5	23	28	-	-	52	25	20	-	20	17,5	-	20,5	-	2°	M8x20	25	0,35	20.000
50	28	CGKD 25	R900323332	M20x1,5	29	31	-	-	65	32	25	-	25	22	-	25,5	-	2°	M8x20	25	0,65	32.000
63	36	CGKD 32	R900322049	M27x2	37	38	-	-	80	40	32	-	32	28	-	30	-	4°	M10x25	49	1,15	50.000
80	45	CGKD 40	R900322029	M33x2	46	47	-	-	97	50	40	-	40	34	-	39	-	4°	M10x30	49	2,1	80.000
100	56	CGKD 50	R900322719	M42x2	57	58	-	-	120	63	50	-	50	42	-	47	-	4°	M12x35	86	4	125.000
125	70	CGKD 63	R900322028	M48x2	64	70	-	-	140	72,5	63	-	63	53,5	-	58	-	4°	M16x40	210	7,2	200.000

## Notes

AL = Piston Ø

MM = Piston rod Ø

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

2) = related bolt Ø r6

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

4) m = Weight swivel head

5) = Tolerances:

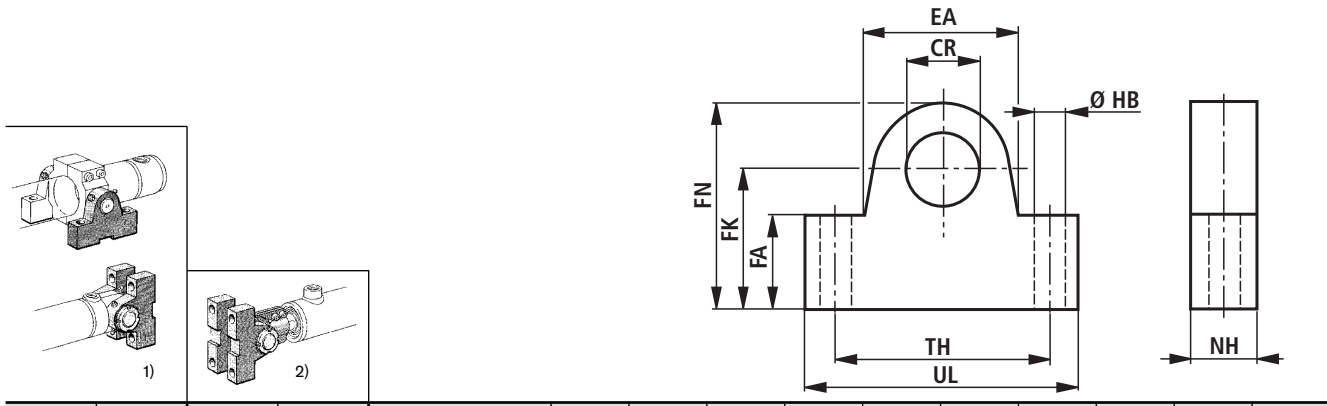
AL-Ø 25- 32 mm -0,008

AL-Ø 40-125 mm H7

Geometry and dimensions may differ depending on the manufacturer.

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

**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 <sup>4)</sup> kg
-	-	25	14	2370-1-2412-1	10	20	20	34	45	9	16	40	60	0.36
25 <sup>3)</sup>	14 <sup>3)</sup>	32	18	2370-1-2512-1	12	20	20	34	45	9	16	40	60	0.35
32 <sup>3)</sup>	18 <sup>3)</sup>	-	-	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 <sup>3)</sup>	90 <sup>3)</sup>	-	-	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 <sup>3)</sup>	110 <sup>3)</sup>	-	-	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

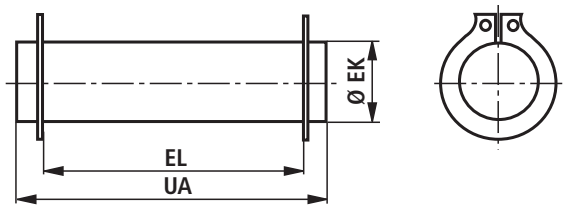
**Comments**

The bearing blocks are suitable for attachment in case of mounting type MP5, MT4 and at the swivel head. Bearing blocks are always supplied in pairs.

- AL = Piston Ø
- MM = Piston rod Ø
- 1) = For mounting type MP5 and MT4
- 2) = For swivel head
- 3) = Only for mounting type MT4
- 4) m = Weight per pair

**Bolt CAL (dimensions in mm)**

Series CDL1 AL Ø	MM Ø	Type	Material no.	ØEK j6	EL	UA	m <sup>1)</sup> kg
25	14	CAL 10	2370125131	10	41	46	0,03
32	18	CAL 12	2370132131	12	42	47	0,04
40	22	CAL 20	2370140131	20	60	66	0,16
50	28	CAL 25	2370150131	25	74	81	0,3
63	36	CAL 32	2370163131	32	92	100	0,6
80	45	CAL 40	2370180131	40	104	114	1,1
100	56	CAL 50	2370198131	50	130	142	2,2
125	70	CAL 63	2370112131	63	163	175	4,3
160	90	CAL 70	3420010131	70	195	222	7,2
200	110	CAL 80	3711600131	80	198	240	10,2



**Comments**

- AL = Piston Ø
- MM = Piston rod Ø
- 1) m = Weight bolt

## 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

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

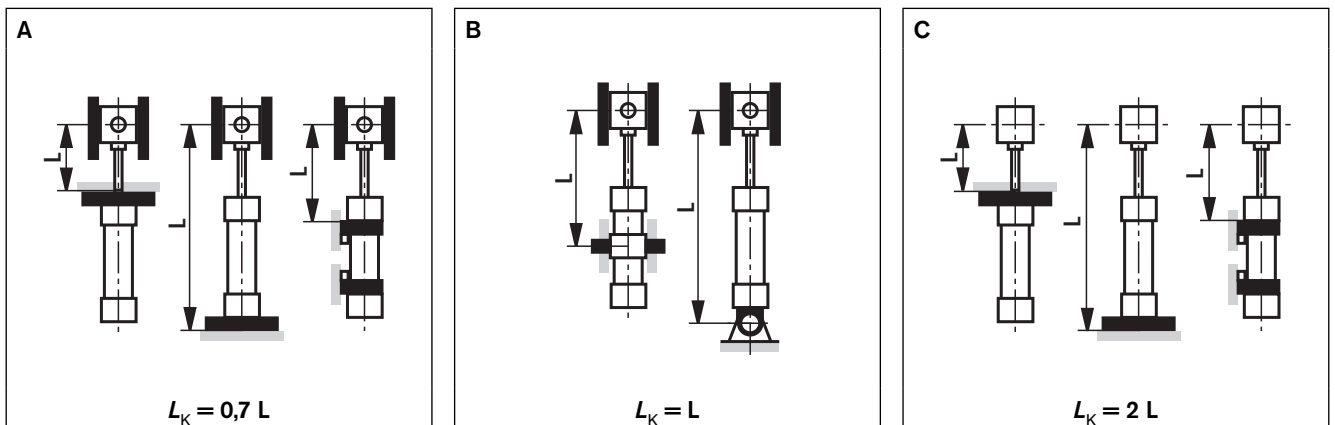
### 2. Calculation according to Tetmajer

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

### Explanation:

$E$	=	Modulus of elasticity in N/mm <sup>2</sup>
	=	2.1 x 10 <sup>5</sup> for steel
$I$	=	Moment of inertia in mm <sup>4</sup> for circular cross-sectional area
	=	$\frac{d^4 \cdot \pi}{64} = 0.0491 \cdot d^4$
$\nu$	=	3.5 (safety factor)
$L_K$	=	Free buckling length in mm (depending on mounting style, see sketches A, B, C)
$d$	=	Piston rod Ø in mm
$\lambda$	=	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:



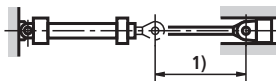
## Permissible stroke lengths MP5 (in mm)

### Mounting style MP5

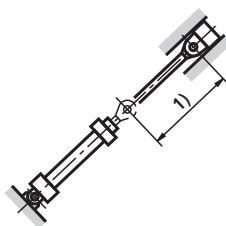
AL Ø	MM Ø	Permissible stroke at									Max. available stroke
		80 bar			160 bar			240 bar			
		0 °	45 °	90 °	0 °	45 °	90 °	0 °	45 °	90 °	
25	14	–	–	–	–	–	–	–	–	–	600
32	18	–	–	–	–	–	–	–	–	–	800
40	22	295	305	325	200	205	210	145	150	155	1000
50	28	390	400	435	270	275	280	205	205	215	1200
63	36	510	525	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

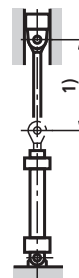
0 °



45 °



90 °



<sup>1)</sup> Permissible stroke

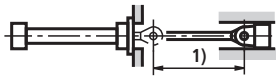
## Permissible stroke lengths MF3 (in mm)

### Mounting style MF3

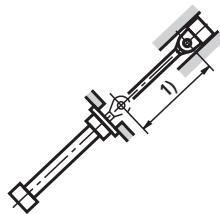
AL Ø	MM Ø	Permissible stroke at									Max. available stroke
		80 bar			160 bar			240 bar			
		0 °	45 °	90 °	0 °	45 °	90 °	0 °	45 °	90 °	
25	14	640	655	715	475	480	490	385	390	395	600
32	18	820	845	930	615	625	645	505	510	515	800
40	22	955	985	1000	720	730	760	530	555	605	1000
50	28	1200	1200	1200	940	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

0 °



45 °



90 °



<sup>1)</sup> Permissible stroke

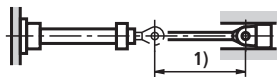
## Permissible stroke lengths MF4 (in mm)

### Mounting style MF4

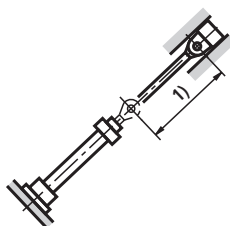
AL Ø	MM Ø	Permissible stroke at									Max. available stroke
		80 bar			160 bar			240 bar			
		0 °	45 °	90 °	0 °	45 °	90 °	0 °	45 °	90 °	
25	14	275	280	310	190	195	200	140	145	150	600
32	18	360	370	410	255	260	270	200	205	210	800
40	22	415	430	490	300	305	320	205	220	240	1000
50	28	545	565	650	400	405	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

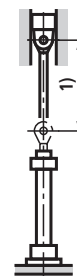
0 °



45 °



90 °



<sup>1)</sup> Permissible stroke

## Permissible stroke lengths MT4 (in mm)

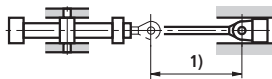
### Mounting style MT4

Trunnions in the centre

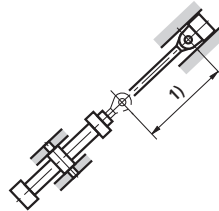
AL Ø	MM Ø	Permissible stroke at									Max. available stroke
		80 bar			160 bar			240 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	14	285	290	305	190	195	200	140	145	150	600
32	18	370	375	400	255	260	265	200	205	210	800
40	22	440	450	480	310	315	320	235	240	250	1000
50	28	575	590	635	415	420	430	330	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

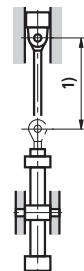
0°



45°



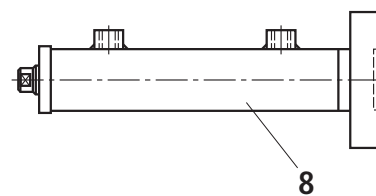
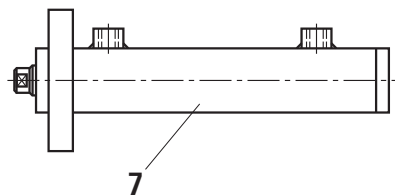
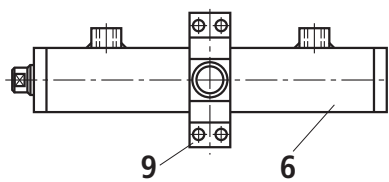
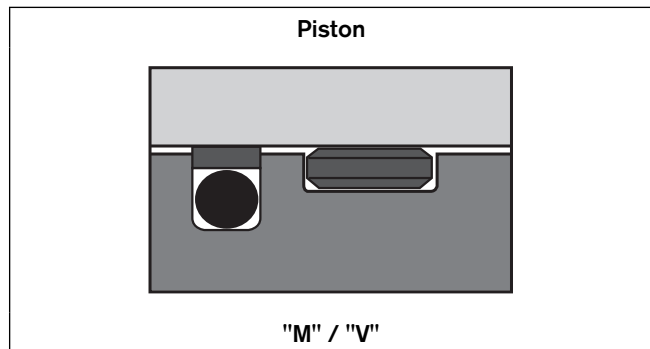
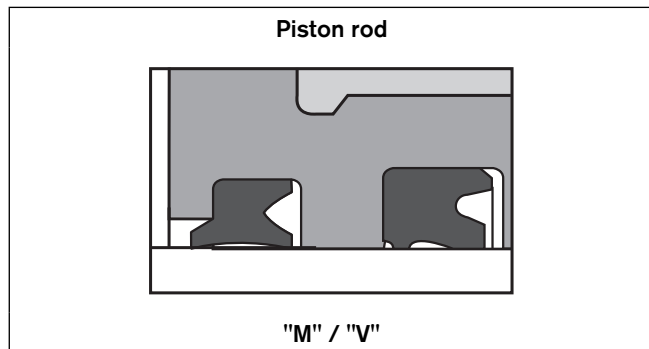
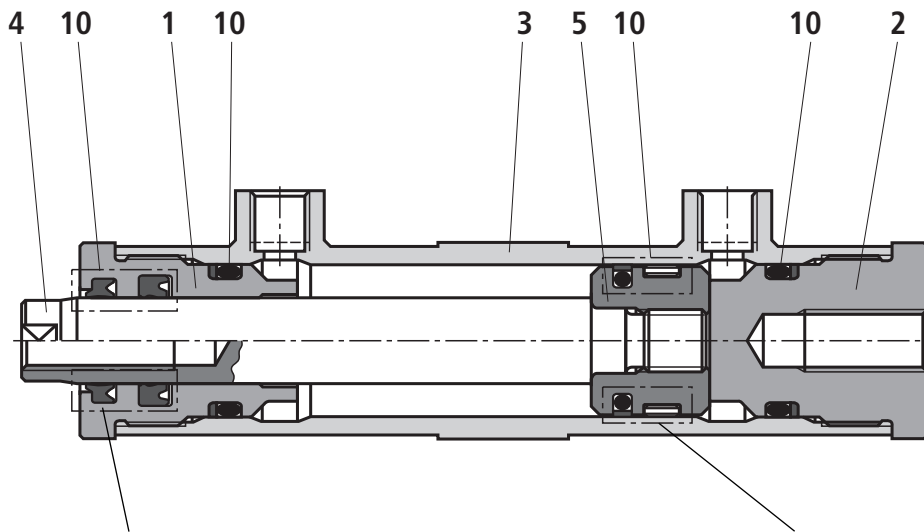
90°



<sup>1)</sup> Permissible stroke

## Spare parts

CDL1; AL-Ø 25-32 mm

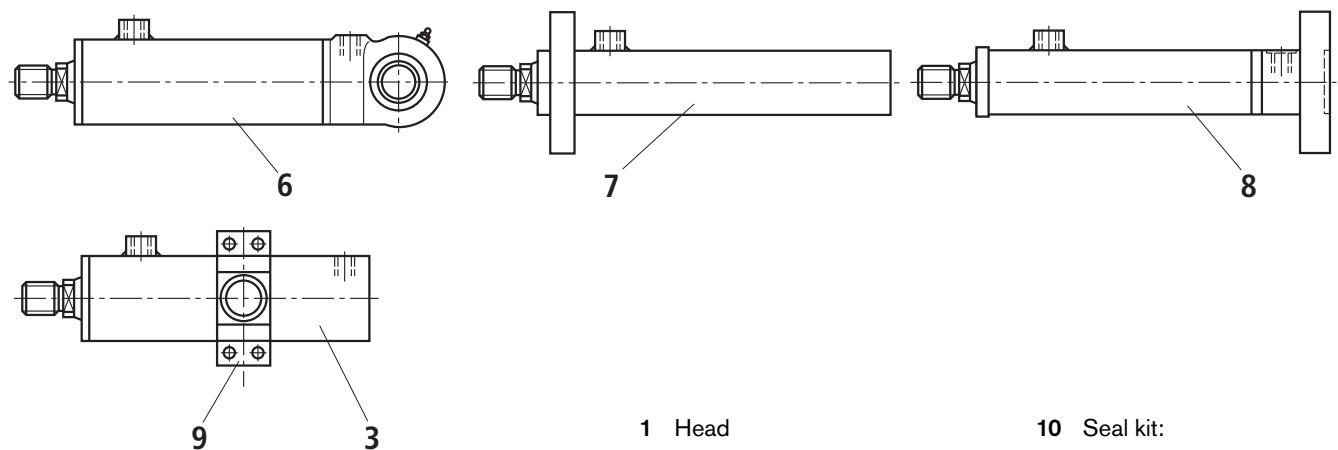
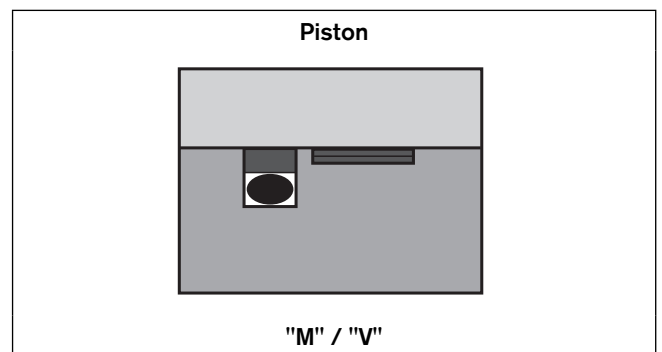
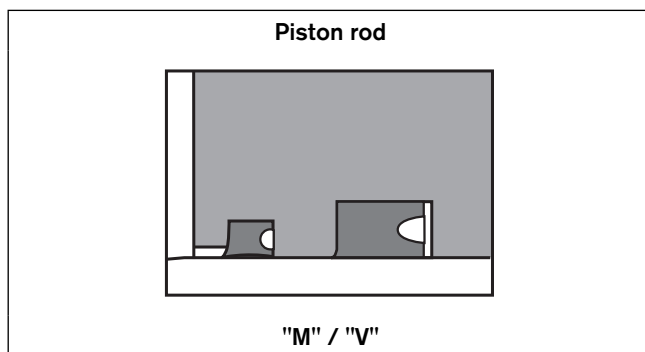
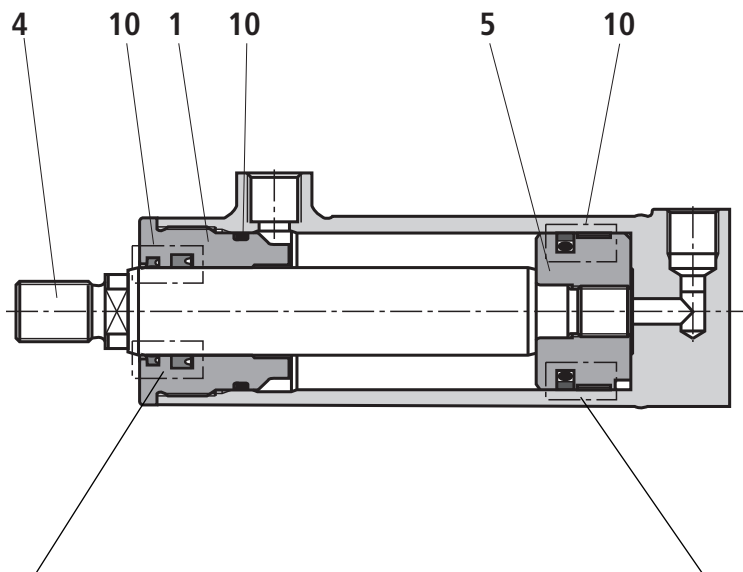


- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1 Head</li> <li>2 Base</li> <li>3 Barrel for M00; MF4</li> <li>4 Piston rod</li> <li>5 Piston</li> <li>6 Barrel for MT4</li> <li>7 Round flange MF3</li> <li>8 Barrel with round flange MF4</li> </ul> | <ul style="list-style-type: none"> <li>9 Trunnion MT4</li> <li>10 Seal kit:                     <ul style="list-style-type: none"> <li>Wiper</li> <li>Rod seal</li> <li>Piston seal</li> <li>O-ring</li> <li>Guide bush</li> </ul> </li> </ul> |
|---|--|



### Spare parts

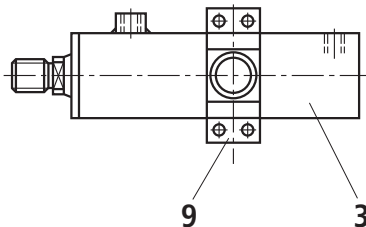
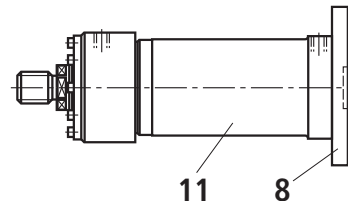
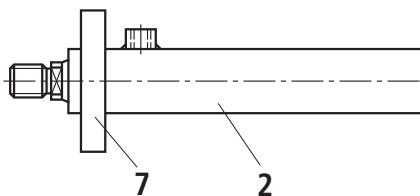
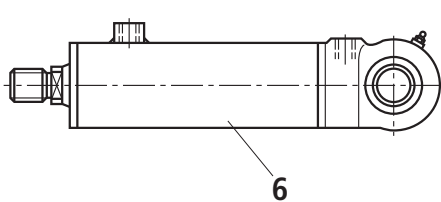
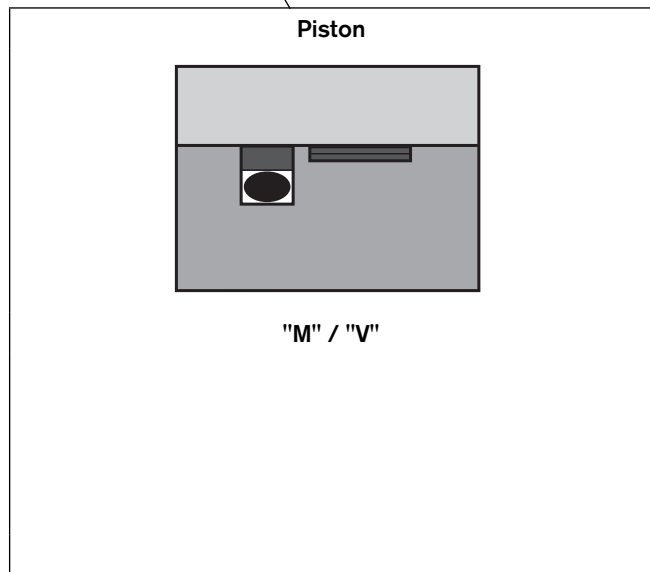
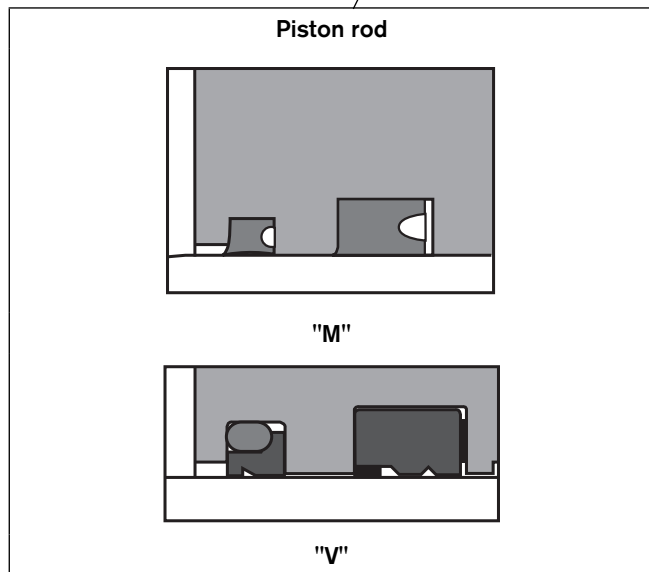
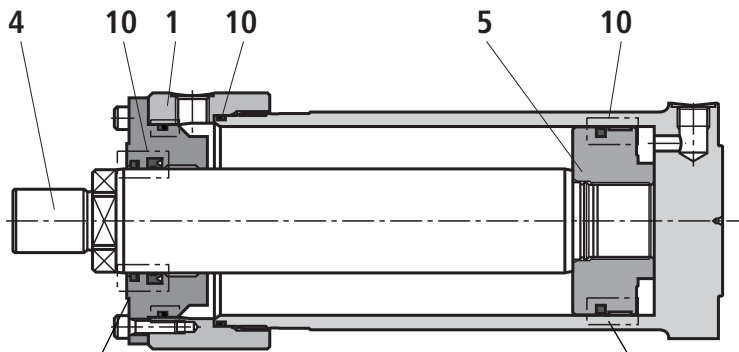
CDL1; AL-Ø 40-125 mm



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

### Spare parts

CDL1; AL-Ø 160-200 mm



- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1 Head</li> <li>2 Barrel for MF3</li> <li>3 Barrel for MT4</li> <li>4 Piston rod</li> <li>5 Piston</li> <li>6 Barrel with base MP5</li> <li>7 Round flange MF3</li> <li>8 Round flange MF4</li> <li>9 Trunnion MT4</li> </ul> | <ul style="list-style-type: none"> <li>10 Seal kit:                             <ul style="list-style-type: none"> <li>Wiper</li> <li>Rod seat</li> <li>Piston seal</li> <li>O-ring</li> <li>Guide bush</li> </ul> </li> <li>11 Barrel for MF4</li> </ul> |
|--|---|

## Seal kits

### CDL1 – Standard

AL Ø	MM Ø	Material-No. Seal version	
		M	V
25	14	0490612807	0490613609
32	18	0490612904	0490613706
40	22	0490613005	0490613803
50	28	0490613102	0490613900
63	36	0490613218	0490614001
80	45	0490613307	0490614109
100	56	0490613404	0490614206
125	70	0490613501	0490614303
160	90	0490628401	0490628509
200	110	0490628606	0490628703

## Cylinder weight

Piston	Piston rod	Weight cylinder with stroke length 0 mm					Weight cylinder with 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

## Notes

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