



Hydraulic cylinder Mill type

CDL2 type

- ▶ Series L2
- ▶ Component series 1X

2 pressure ranges:

- ▶ Nominal pressure 160 bar [16 MPa]
- ▶ Nominal pressure 250 bar [25 MPa]

Features

- ▶ 4 types of mounting
- ▶ Piston Ø (**ØAL**) 25 ... 200 mm
- ▶ Piston rod Ø (**ØMM**) 14 ... 125 mm
- ▶ Stroke length up to 3 m
- ▶ Short length

Ordering code

01	02	03	04		05		06		07	08	09		10	11	12	13	14	15	16	17	18
CD	L2		/		/		/			1X	/	B	1	1	C		U		W		*

01	Differential cylinder	CD
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02	Series L2	L2
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Types of mounting

03	Self-aligning clevis at base	MP5
	Round flange at head	MF3 ¹⁾
	Trunnion	MT4 ^{1; 2)}
	No mounting	M00 ³⁾

04	Piston Ø (ØAL) from 25 ... 200 mm; possible version see page 14	...
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05	Piston rod Ø (ØMM) at a nominal pressure of 160 bar: 14, 18, 22, 28, 36, 45, 56 and 70 mm possible; see page 6 Piston rod Ø (ØMM) at a nominal pressure of 250 bar: 25, 32, 40, 50, 63, 80, 100 and 125 mm possible; see page 6	...
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06	Stroke length in mm; admissible stroke lengths must be observed, see page 24 and 25	...
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Design principle

07	Head and base screwed in	C ³⁾
	Head screwed in, base welded	D ⁴⁾

08	Component series 10 ... 19 (10 ... 19: Unchanged installation and connection dimensions)	1X
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Line connection/version

09	Pipe thread according to ISO 228-1	B
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Line connection/position at head

10	View to piston rod	1
		

Line connection/position at base

11	View to piston rod	1
		

Piston rod design

12	Hard chromium-plated	C
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Piston rod end

13	Thread	H ⁴⁾
	Piston rod end H with mounted swivel head CGKD	K ⁴⁾
	With swivel head, not removable	F ^{4; 5)}
	Internal thread	E ³⁾
	Piston rod end E with mounted swivel head CGKL	L ³⁾

End position cushioning

14	Without end position cushioning	U
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Seal design

15	Standard seal system (suitable for mineral oils HL, HLP)	M
	Standard seal system FKM (for phosphate ester HFDR)	V

Ordering code

01	02	03		04		05		06	07	08		09	10	11	12	13	14	15	16	17	18
CD	L2		/		/		/			1X	/	B	1	1	C		U		W		*

Option 1

16	Without option	W
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Option 2

17	Without option	W
	With piston rod extension "LY" in mm	Y ⁶⁾
18	Further details in the plain text	*

- 1) Only piston Ø (**ØAL**) 25 ... 125 mm
- 2) Trunnion position freely selectable. Always specify the dimension "XV/XU" in mm in the plain text when ordering (see order example)
- 3) Only piston Ø (**ØAL**) 25 ... 32 mm
- 4) Only piston Ø (**ØAL**) 40 ... 200 mm
- 5) Only MP5; MT4
- 6) Always specify the piston rod extension dimension "LY" in mm in the plain text when ordering (see order example)

Order example:

CDL2MT4/100/56/200D1X/B11CHUMWY LY = 20 XV = 245
 CDL2MF3/80/45/100D1X/B11CHUMWW

Project planning software ICS (Interactive Catalog System)

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

selection, the user quickly and reliably gets the exact technical data of the selected component as well as 2D and 3D CAD data in the correct file format for all common CAD systems.

Technical data

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

general		
Weight	kg	See page 28
Installation position		Any
Ambient temperature range	°C	–20 ... +80
Primer coat ¹⁾	µm	Min. 40

hydraulic		
Nominal pressure ²⁾	bar [MPa]	160 [16] (with ØMM: 14, 18, 22, 28, 36, 45, 56 and 70 mm)
	bar [MPa]	250 [25] (with ØMM: 25, 32, 40, 50, 63, 80, 100 and 125 mm)
Minimum operating pressure ³⁾ (without load)	bar [MPa]	10 [1]
Static test pressure	bar [MPa]	240/375 [24/37.5]
Hydraulic fluid		See table below
Hydraulic fluid temperature range	°C	–20 ... +80
Viscosity range	mm²/s	12 ... 380 (preferably 20 ... 100)
Maximum permitted degree of contamination of the hydraulic fluid - cleanliness class according to ISO 4406 (c)		Class 20/18/15 ⁴⁾
Stroke speed (depending on line connection)	m/s	0.5

Hydraulic fluid	Classification	Suitable sealing materials	Standards
Mineral oils	HL, HLP	NBR, FKM	DIN 51524
Flame-resistant – water-free	HFDR	FKM	ISO 12922

¹⁾ By default, hydraulic cylinders are primed with a coating (color gentian blue RAL 5010). Other colors upon request. With cylinders and attachment parts, the following surfaces are not primed or painted:

- All fit diameters to the customer side
- Sealing surfaces for line connection

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

²⁾ The cylinders of this series have been designed for 2 million load cycles at a nominal pressure of 160/250 bar. Higher operating pressures upon request. If there are extreme loads, such as high sequence cycles, the suitability of mounting elements and threaded piston rod connections for the application must be checked due to standardized geometries.

³⁾ A minimum operating pressure is required in order to guarantee good functioning of the cylinder. Without load, a minimum pressure is recommend, for lower pressures, please contact us.

⁴⁾ 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 life cycle of the components.

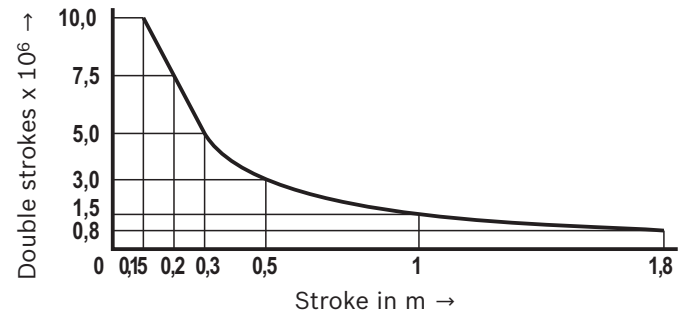
Technical data

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

Life cycle:

cylinders correspond to the reliability recommendations for industrial applications.

≥ 10000000 double strokes in idle continuous operation or 3000 km piston travel at 70 % of the nominal pressure, without load on the piston rod, with a maximum velocity of 0.5 m/s, with a failure rate of less than 5 %.



Notice!

Boundary and application conditions:

- ▶ The mechanical alignment of the movement axis and thus the mounting points of hydraulic cylinder and piston rod must be ensured. Lateral forces on the guides of piston rod and piston are to be avoided. It may be necessary to consider the own weight of the hydraulic cylinder (MP5 or MT4) or the piston rod.
- ▶ The buckling length/buckling load of the piston rod and/or the hydraulic cylinder must be observed (see page 24 and 25).
- ▶ The maximum admissible operating pressure must be complied with in any operating state of the hydraulic cylinder. Possible pressure intensification resulting from the area ratio of annulus to piston area and possible throttling points are to be observed.
- ▶ Detrimental environmental influences, like e.g. aggressive finest particles, vapors, high temperatures, etc. as well as contaminations and deterioration of the hydraulic fluid are to be avoided.

Standards:

standard; main dimensions like piston Ø (ØAL) and piston rod Ø (ØMM) correspond to ISO 3320.

Acceptance:

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

Safety instructions:

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

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

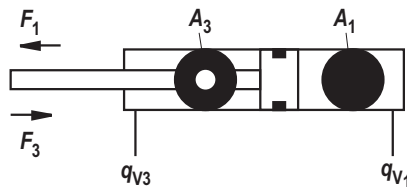
Check lists for hydraulic cylinders:

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

This list does not claim to be complete. In case of questions regarding the compatibility with media or exceedance of the boundary or application conditions, please contact us.

Diameters, areas, forces, flow

Piston ØAL	Piston rod ØMM mm		Area ratio φ A ₁ /A ₃	Areas		Force generated by pressure ¹⁾ F ₁ kN		Traction force ¹⁾ F ₃ kN		Flow at 0.1 m/s ²⁾		Max. available stroke length mm
	at a nominal pressure of			Piston A ₁ cm ²	Ring A ₃ cm ²	at a nominal pressure of		at a nominal pressure of		Off q _{v1} l/min	On q _{v3} l/min	
	160 bar	250 bar				160 bar	250 bar	160 bar	250 bar			
25	14	–	1,46	4,91	3,37	7,85	–	5,39	–	2,94	2,02	600
32	18	–	1,46	8,04	5,50	12,86	–	8,79	–	4,82	3,30	800
40	22	–	1,43	12,56	8,76	20,10	–	14,02	–	7,54	5,26	1000
	–	25	1,64		7,65	–	31,40	–	19,13		4,59	
50	28	–	1,46	19,63	13,47	31,40	–	21,55	–	11,78	8,08	1200
	–	32	1,69		11,59	–	49,06	–	28,97		6,95	
63	36	–	1,49	31,16	20,98	49,85	–	33,57	–	18,69	12,59	1400
	–	40	1,68		18,60	–	77,89	–	46,49		11,16	
80	45	–	1,46	50,24	34,34	80,38	–	54,95	–	30,14	20,61	1700
	–	50	1,64		30,62	–	125,60	–	76,54		18,37	
100	56	–	1,46	78,50	53,88	125,60	–	86,21	–	47,10	32,33	2000
	–	63	1,66		47,34	–	196,25	–	118,36		28,41	
125	70	–	1,46	122,66	84,19	196,25	–	134,71	–	73,59	50,51	2300
	–	80	1,69		72,42	–	306,64	–	181,04		43,45	
160	–	100	1,64	200,96	122,46	–	502,40	–	306,15	120,58	73,48	2600
200	–	125	1,64	314,00	191,34	–	785,00	–	478,36	188,40	114,81	3000



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

²⁾ Stroke speed

Tolerances

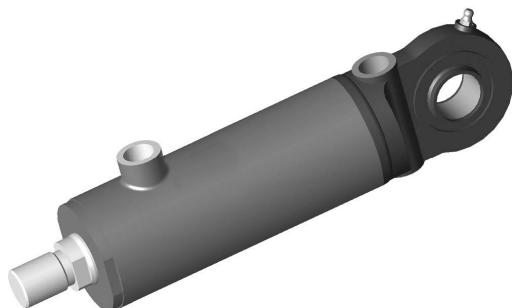
(dimensions in mm)

Installation dimensions	WC	XO/XF ¹⁾	XV/XU	Stroke tolerances
Type of mounting	MF3	MP5	MT4	
Stroke length	Tolerances			
≤ 1250	±3	±2	±2	+2,5
> 1250 ... ≤ 3000	±4	±3	±4	+4

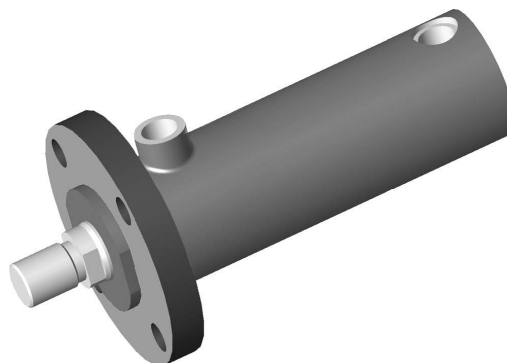
¹⁾ Including stroke length

Overview: Types of mounting**MP5**

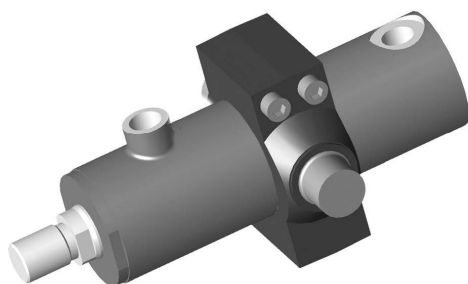
see page 8 and 9

**MF3**

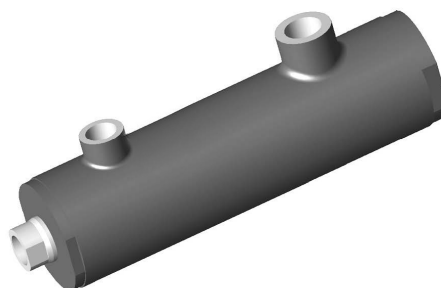
see page 10 and 11

**MT4**

see page 12 and 13

**M00**

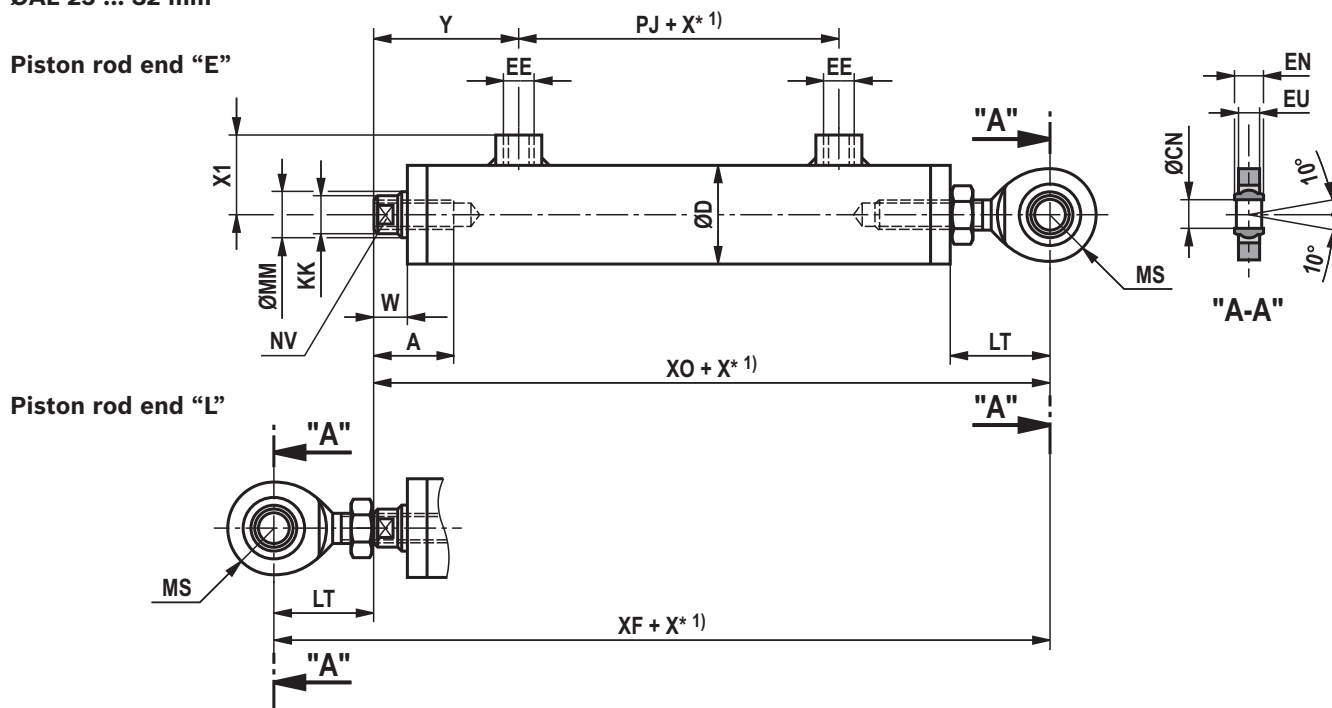
see page 14



Dimensions: Type of mounting MP5
 (dimensions in mm)

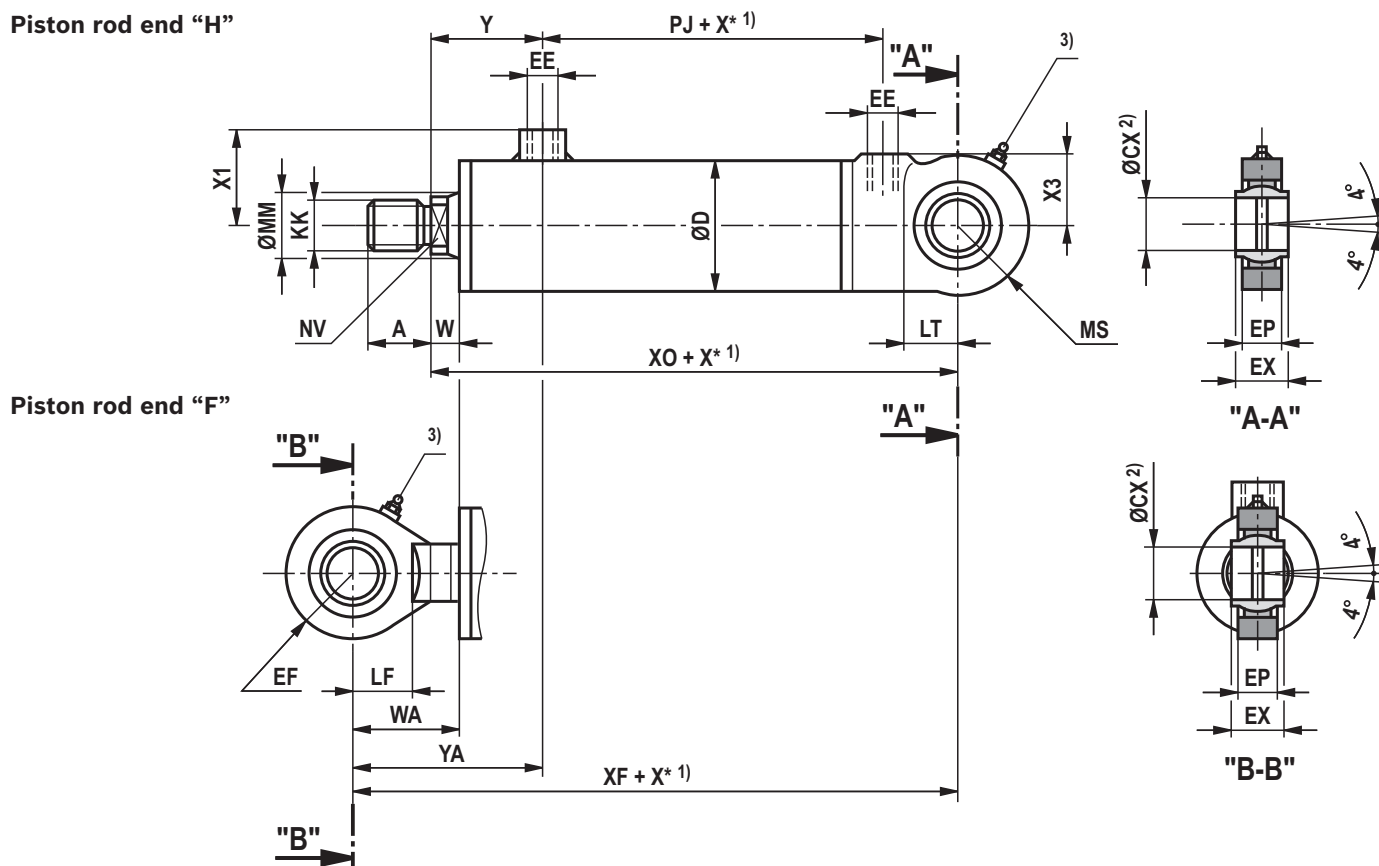
ØAL 25 ... 32 mm

Piston rod end "E"



ØAL 40 ... 200 mm

Piston rod end "H"



Dimensions: Type of mounting MP5
(dimensions in mm)

ØAL	ØMM at a nominal pressure of		KK	A	NV	W	WA	ØD	Y	YA	PJ	XO	XF
	160 bar	250 bar											
25	14	–	M10	26	12	10	–	32	44	–	26	131	158
32	18	–	M12	28	15	11	–	40	48	–	31	148	180
40	22	–	M16x1,5	22	17	13	44	50	60	91	50	140	171
	–	25	M20x1,5	28	19	15	41	52	62	88	54	147	173
50	28	–	M20x1,5	28	22	13	50	60	62	99	57	157	194
	–	32	M27x2	36	27	15	52	62	64	101	65	167	204
63	36	–	M27x2	36	28	14	63	75	68	117	69	182	231
	–	40	M33x2	45	32	17	64	78	71	118	72	192	239
80	45	–	M33x2	45	36	16	76	95	84	144	76	208	268
	–	50	M42x2	56	41	19	74	100	84	139	81	222	277
100	56	–	M42x2	56	46	18	88	120	90	160	85	227	297
	–	63	M48x2	63	50	19	90	125	91	162	93	256	327
125	70	–	M48x2	63	60	20	106	150	99	185	93	259	345
	–	80	M64x3	85	65	22	112	160	105	195	113	307	397
160	–	100	M80x3	95	85	30	118	200	124	212	120	390	478
200	–	125	M100x3	112	110	35	143	245	139	247	124	434	542

ØAL	ØMM at a nominal pressure of		EE	X1 ±1	X3 ±1	LT	LF	MS ±2	ØCX H7	EX h12	EP max.	EF ±2	ØCN -0,008	EN h12	EU max.
	160 bar	250 bar													
25	14	–	G1/8	24,5	–	27	–	14,5	–	–	–	–	10	9	7,5
32	18	–	G1/4	33	–	32	–	17	–	–	–	–	12	10	8,5
40	22	–	G1/4	39	29	24	23	28	20	20	16	28	–	–	–
	–	25	G1/4	46	30	29	29	31	25	25	20	33	–	–	–
50	28	–	G3/8	45	33	31	29	33	25	25	20	33	–	–	–
	–	32	G3/8	52	37	37	34	39	32	32	22	42	–	–	–
63	36	–	G1/2	55	40	38	34	42	32	32	22	42	–	–	–
	–	40	G1/2	65	44	48	44	48	40	40	26	51	–	–	–
80	45	–	G1/2	65	53	46	44	51	40	40	26	51	–	–	–
	–	50	G1/2	76	57	57	50	60	50	50	34	61	–	–	–
100	56	–	G3/4	80	63	54	50	61	50	50	34	61	–	–	–
	–	63	G3/4	91	70	73	63	73	63	63	42	76	–	–	–
125	70	–	G3/4	95	78	65	63	76	63	63	42	76	–	–	–
	–	80	G3/4	109	88	90	80	92	80	80	52	92	–	–	–
160	–	100	G1	136	97	120	–	110	100	100	72	110	–	–	–
200	–	125	G1	158	120	145	–	130	125	125	92	130	–	–	–

1) X* = stroke length

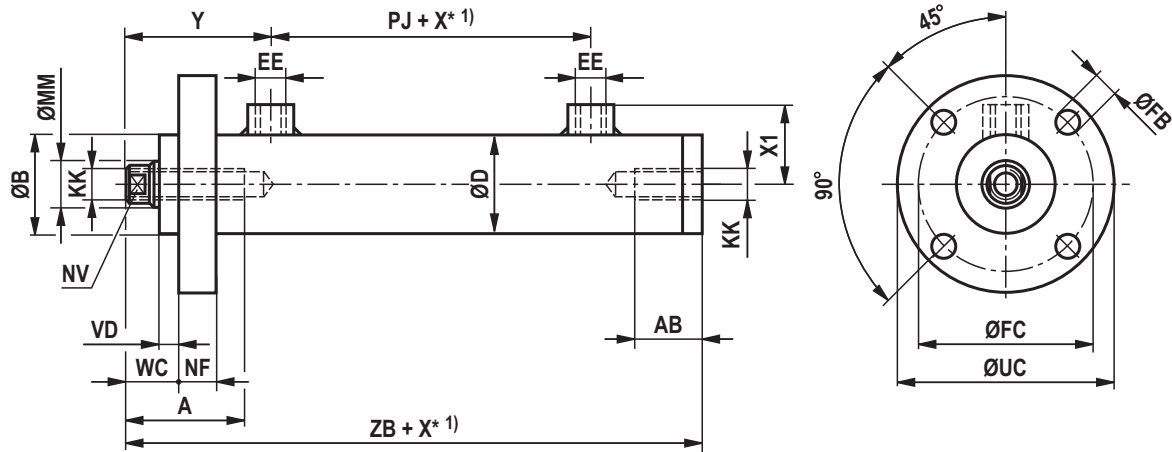
2) Related bolts Ø j6

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

Dimensions: Type of mounting MF3
 (dimensions in mm)

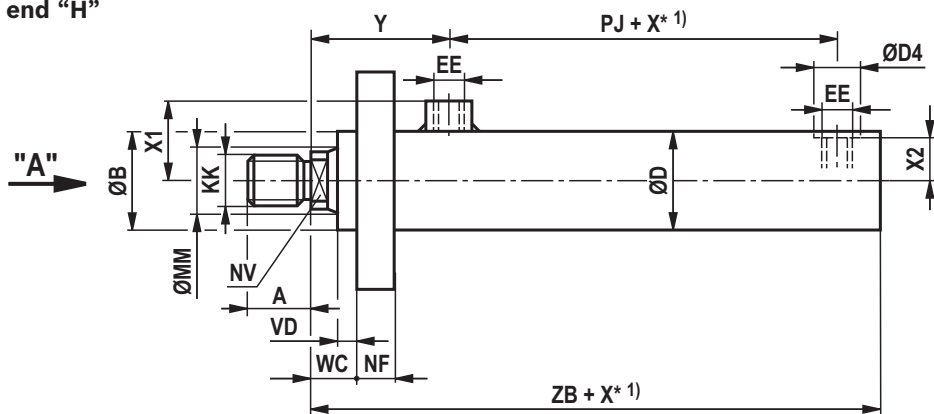
ØAL 25 ... 32 mm

Piston rod end "E"

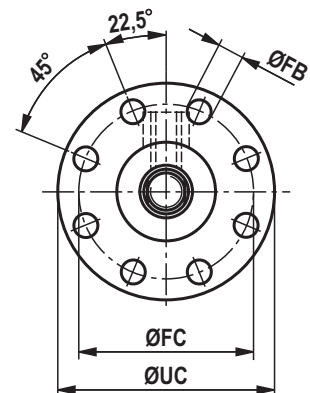
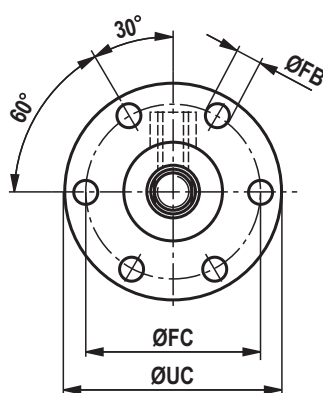
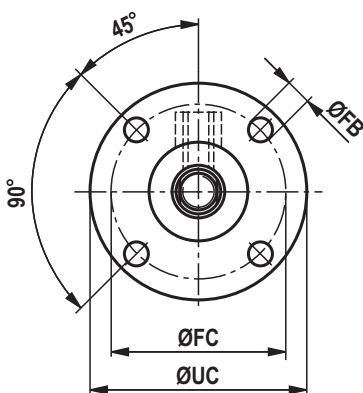


ØAL 40 ... 125 mm

Piston rod end "H"



"A"



Dimensions: Type of mounting MF3
(dimensions in mm)

ØAL	ØMM at a nominal pressure of		KK	A	AB	NV	ØB ±0,3	VD	WC	NF	ØD	Y	PJ
	160 bar	250 bar											
25	14	–	M10	26	21	12	32	6	16	12	32	44	26
32	18	–	M12	28	25	15	40	6	17	12	40	48	31
40	22	–	M16x1,5	22	–	17	50	7	20	14	50	60	50
	–	25	M20x1,5	28	–	19	52	7	22	17	52	72	53
50	28	–	M20x1,5	28	–	22	60	7	20	16	60	62	57
	–	32	M27x2	36	–	27	62	7	22	19	62	77	59
63	36	–	M27x2	36	–	28	75	7	21	20	75	68	71
	–	40	M33x2	45	–	32	78	7	24	22	78	86	71
80	45	–	M33x2	45	–	36	93	7	23	25	95	84	80
	–	50	M42x2	56	–	41	100	10	29	28	100	97	75
100	56	–	M42x2	56	–	46	120	8	26	25	120	90	89
	–	63	M48x2	63	–	50	125 ²⁾	11	30	32	125	106	89
125	70	–	M48x2	63	–	60	150 ²⁾	9	29	32	150	99	97
	–	80	M64x3	85	–	65	160 ²⁾	17	39	35	160	119	102

ØAL	ØMM at a nominal pressure of		EE	ØD4	X1 ±1	X2 ±1	ZB	ØFB H13	ØFC	ØUC max.	Number of mounting bores
	160 bar	250 bar									
25	14	–	G1/8	–	24,5	–	104	6,6	55	68	4
32	18	–	G1/4	–	33	–	116	9	65	78	4
40	22	–	G1/4	23	39	22	124	11	85	108	4
	–	25	G1/4	23	46	23	139	11	92	114	6
50	28	–	G3/8	27	45	27	135	13,5	100	128	4
	–	32	G3/8	27	52	28	151	13,5	106	132	6
63	36	–	G1/2	36	55	33,5	159	17,5	120	148	4
	–	40	G1/2	36	65	35	177	17,5	132	164	6
80	45	–	G1/2	36	65	44,5	185	22	150	188	4
	–	50	G1/2	36	76	47	192	17,5	160	193	8
100	56	–	G3/4	43	80	57	202	22	180	218	4
	–	63	G3/4	43	91	60	218	22	190	230	6
125	70	–	G3/4	43	95	72	221	17,5	200	238	8
	–	80	G3/4	43	109	77	244	22	230	270	8

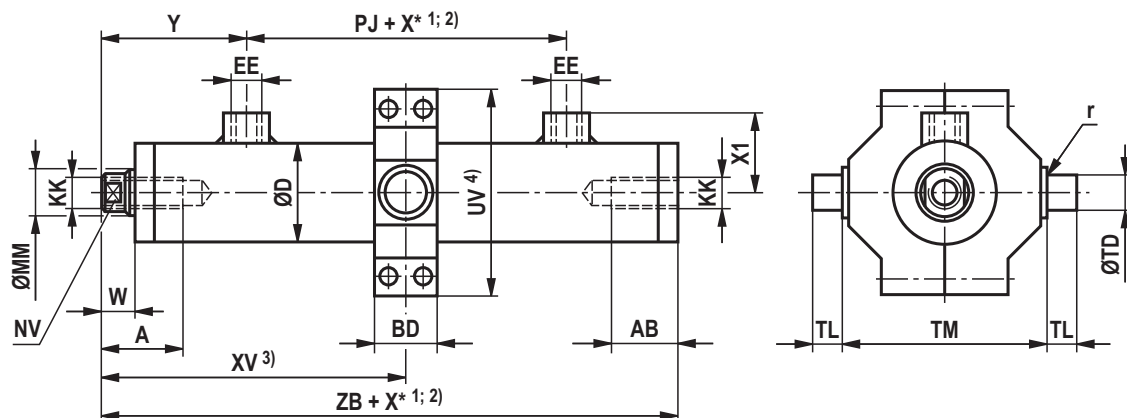
¹⁾ X* = stroke length

²⁾ Tolerance: ±0.5

Dimensions: Type of mounting MT4
 (dimensions in mm)

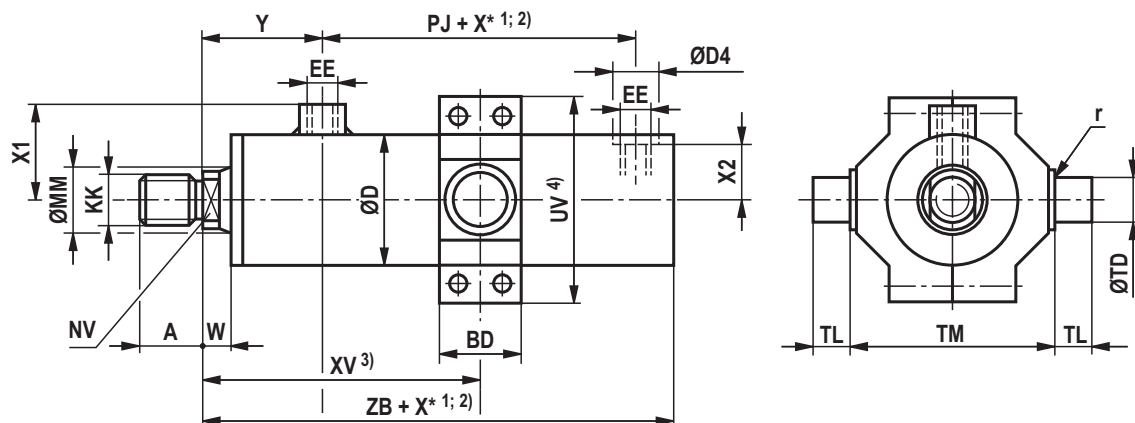
ØAL 25 ... 32 mm

Piston rod end "E"

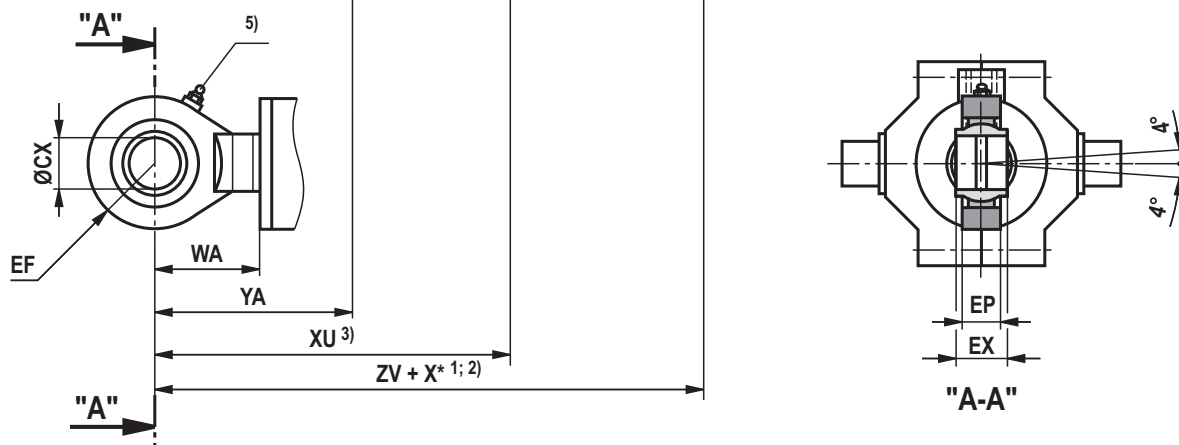


ØAL 40 ... 125 mm

Piston rod end "H"



Piston rod end "F"



Dimensions: Type of mounting MT4 (dimensions in mm)

ØAL	ØMM at a nominal pressure of		KK	A	AB	NV	W	WA	ØD	Y	YA	PJ	X* 2)	XV		XU	
	160 bar	250 bar												min.	max.	min.	max.
25	14	–	M10	26	21	12	10	–	32	44	–	26	21	68	47+X*	–	–
32	18	–	M12	28	25	15	11	–	40	48	–	31	28	78	50+X*	–	–
40	22	–	M16x1,5	22	–	17	13	44	50	60	91	50	23	94	71+X*	125	102+X*
	–	25	M20x1,5	28	–	19	15	41	52	62	88	53	60	112	52+X*	138	78+X*
50	28	–	M20x1,5	28	–	22	13	50	60	62	99	57	32	104	72+X*	141	109+X*
	–	32	M27x2	36	–	27	15	52	62	64	101	62	66	121	55+X*	158	92+X*
63	36	–	M27x2	36	–	28	14	63	75	68	117	71	37	119	82+X*	168	131+X*
	–	40	M33x2	45	–	32	17	64	78	71	118	71	78	135	57+X*	182	104+X*
80	45	–	M33x2	45	–	36	16	76	95	84	144	80	51	144	93+X*	204	153+X*
	–	50	M42x2	56	–	41	19	74	100	84	139	78	91	157	66+X*	212	121+X*
100	56	–	M42x2	56	–	46	18	88	120	90	160	89	69	162	93+X*	232	163+X*
	–	63	M48x2	63	–	50	19	90	125	91	162	90	115	180	65+X*	251	136+X*
125	70	–	M48x2	63	–	60	20	106	150	99	185	97	85	183	98+X*	269	184+X*
	–	80	M64x3	85	–	65	22	112	160	105	195	102	135	208	73+X*	298	163+X*

ØAL	ØMM at a nominal pressure of		EE	ØD4	X1 ±1	X2 ±1	ZB	ZV	BD	UV max.	TD f8	TL	TM h12	r	ØCX H7	EX h12	EP max.	EF ±2
	160 bar	250 bar																
25	14	–	G1/8	–	24,5	–	104	–	20	66	12	10	63	1	–	–	–	–
32	18	–	G1/4	–	33	–	116	–	25	77	16	12	75	1	–	–	–	–
40	22	–	G1/4	23	39	22	124	155	35	88	20	16	90	1,5	20	20	16	28
	–	25	G1/4	23	46	23	129	155	40	98	25	20	95	1,5	25	25	20	33
50	28	–	G3/8	27	45	27	135	172	40	102	25	20	105	1,5	25	25	20	33
	–	32	G3/8	27	52	28	141	178	50	114	32	25	112	1,5	32	32	22	42
63	36	–	G1/2	36	55	33,5	159	208	50	129	32	25	120	2	32	32	22	42
	–	40	G1/2	36	65	35	162	209	60	137	40	32	125	1,5	40	40	26	51
80	45	–	G1/2	36	65	44,5	185	245	65	148	40	32	135	2,5	40	40	26	51
	–	50	G1/2	36	76	47	182	237	75	167	50	40	150	2	50	50	34	61
100	56	–	G3/4	43	80	57	202	272	80	178	50	40	160	2,5	50	50	34	61
	–	63	G3/4	43	91	60	204	275	100	201	63	50	180	2,5	63	63	42	76
125	70	–	G3/4	43	95	72	221	307	100	218	63	50	195	3	63	63	42	76
	–	80	G3/4	43	109	77	230	320	120	257	80	63	224	2,5	80	80	52	92

1) X* = stroke length

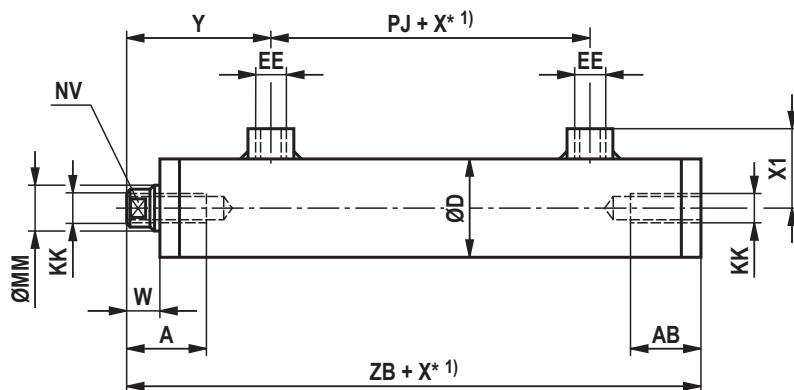
2) Please observe min. stroke length "X* min".

3) Trunnion position freely selectable. Always specify the dimensions "XV/XU" in mm in the plain text when ordering.

4) The specified dimensions are maximum values.

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

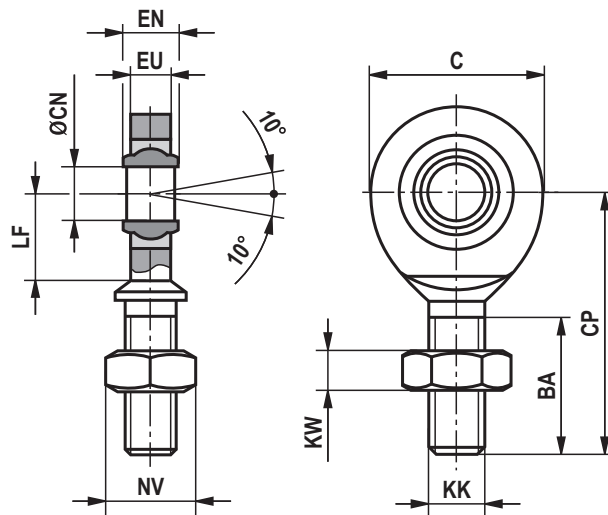
Piston rod end “E”



ØAL	ØMM at a nominal pressure of		KK	A	AB	NV	W	ØD	Y	PJ	EE	X1 ±1	ZB
	160 bar	250 bar											
25	14	–	M10	26	21	12	10	32	44	26	G1/8	24,5	104
32	18	–	M12	28	25	15	11	40	48	31	G1/4	33	116

1) $\mathbf{X}^*$ = stroke length

Dimensions: Swivel head CGKL
 (dimensions in mm)

ISO 12240-4


ØAL	ØMM	Type	KK	BA min.	C	ØCN -0,008	CP max.	EN h12	EU max.	KW	LF min.	NV	$m^{1)}$ kg	$C_0^{2)}$ kN	$F_{adm}^{3)}$ kN
25	14	CGKL 10	M10	26	29	10	48	9	7,5	5	15	16	0,1	22	8,1
32	18	CGKL 12	M12	28	34	12	54	10	8,5	6	18	18	0,1	30,4	11,2

ØAL = piston Ø

ØMM = piston rod Ø

¹⁾ m = weight of swivel head in kg

²⁾ C_0 = static load rating of the swivel head in kN

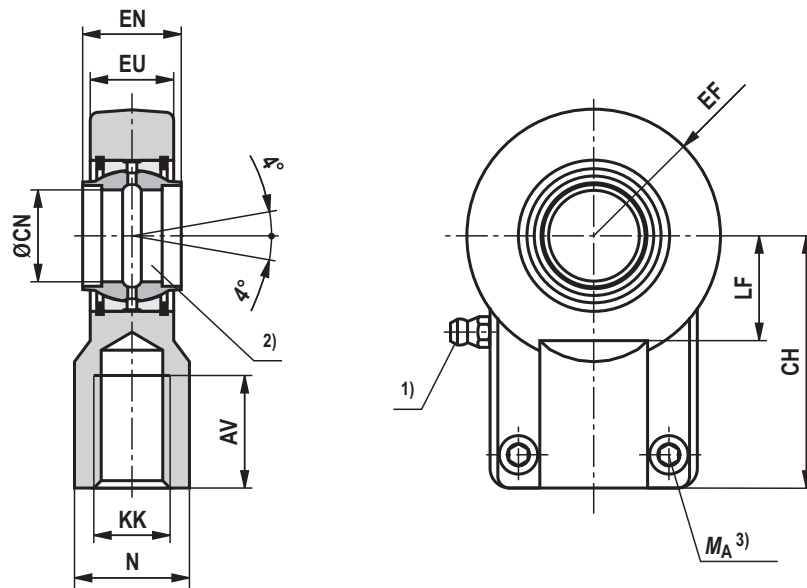
³⁾ F_{adm} = maximum admissible load on the swivel head during oscillatory or alternating loads

Notice!

Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

Dimensions: Swivel head CGKD (clampable)
 (dimensions in mm)

ISO 8132



ØAL	ØMM	Type	Nominal force kN	AV min.	N max.	CH js13	EF max.	ØCN H7 ²⁾	EN h12	EU max.
40	22	CGKD 20	20	23	28	52	25	20	20	17,5
40	25	CGKD 25	32	29	31	65	32	25	25	22
50	28									
50	32	CGKD 32	50	37	38	80	40	32	32	28
63	36									
63	40	CGKD 40	80	46	47	97	50	40	40	34
80	45									
80	50	CGKD 50	125	57	58	120	63	50	50	42
100	56									
100	63	CGKD 63	200	64	70	140	72,5	63	63	53,5
125	70									
125	80	CGKD 80	320	86	91	180	92	80	80	68
160	100	CGKD 100	500	96	110	210	114	100	100	85,5
200	125	CGKD 125	800	113	135	260	160	125	125	105

Dimensions: Swivel head CGKD (clampable)
(dimensions in mm)

ØAL	ØMM	Type	KK	LF min.	Clamping screws ISO 4762-10.9	$M_A^{3)}$ Nm	$m^{4)}$ kg	$C_0^{5)}$ kN	$F_{adm}^{6)}$ kN
40	22	CGKD 20	M16x1,5	20,5	M8x20	25	0,35	48	17,7
40	25	CGKD 25	M20x1,5	25,5	M8x20	30	0,65	78	28,8
50	28								
50	32	CGKD 32	M27x2	30	M10x25	59	1,15	114	42,1
63	36								
63	40	CGKD 40	M33x2	39	M10x30	59	2,1	204	75,3
80	45								
80	50	CGKD 50	M42x2	47	M12x35	100	4	310	114,4
100	56								
100	63	CGKD 63	M48x2	58	M16x40	250	7,2	430	158,7
125	70								
125	80	CGKD 80	M64x3	74	M20x50	490	15	695	265,5
160	100	CGKD 100	M80x3	94	M24x60	840	25,5	1060	391,1
200	125	CGKD 125	M100x3	116	M24x70	840	52,5	1430	527,7

ØAL = piston Ø

ØMM = piston rod Ø

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

2) Bolt Ø m6 required

3) M_A = tightening torque in Nm

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 of swivel head in kg

5) C_0 = static load rating of the swivel head in kN

6) F_{adm} = maximum admissible load on the swivel head in kN during oscillatory or alternating loads



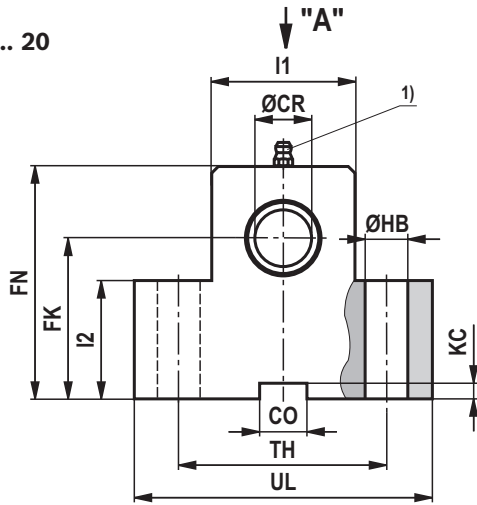
Notice!

Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

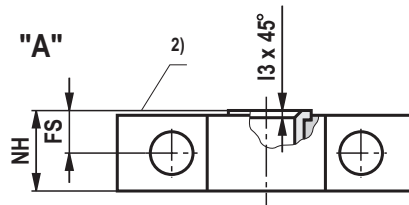
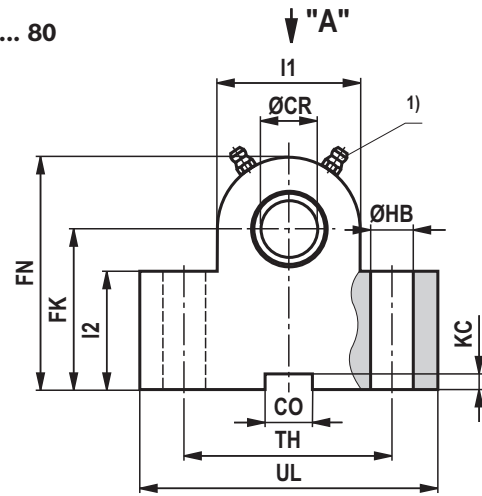
Dimensions: Trunnion bracket CLTB
(dimensions in mm)

ISO 8132

CLTB 12 ... 20



CLTB 25 ... 80



ØAL	ØMM	Type ³⁾	Nominal force kN ⁴⁾	ØCR H7	CO N9	FK js12	FN max.	FS js14	ØHB H13
25	14	CLTB 12	8	12	10	34	50	8	9
32	18	CLTB 16	12,5	16	16	40	60	10	11
40	22	CLTB 20	20	20	16	45	70	10	11
40	25	CLTB 25	32	25	25	55	80	12	13,5
50	28								
50	32	CLTB 32	50	32	25	65	100	15	17,5
63	36								
63	40	CLTB 40	80	40	36	76	120	16	22
80	45								
80	50	CLTB 50	125	50	36	95	140	20	26
100	56								
100	63	CLTB 63	200	63	50	112	180	25	33
125	70								
125	80	CLTB 80	320	80	50	140	220	31	39

Dimensions: Trunnion bracket CLTB (dimensions in mm)

ØAL	ØMM	Type ³⁾	KC +0,3	I1	I2	I3	NH max.	TH js14	UL max.	m ⁵⁾ kg
25	14	CLTB 12	3,3	25	25	1	17	40	63	0,4
32	18	CLTB 16	4,3	30	30	1	21	50	80	0,85
40	22	CLTB 20	4,3	40	38	1,5	21	60	90	1,2
40	25	CLTB 25	5,4	56	45	1,5	26	80	110	2,1
50	28									
50	32	CLTB 32	5,4	70	52	2	33	110	150	4,55
63	36									
63	40	CLTB 40	8,4	88	60	2,5	41	125	170	7,3
80	45									
80	50	CLTB 50	8,4	100	75	2,5	51	160	210	14,5
100	56									
100	63	CLTB 63	11,4	130	85	3	61	200	265	23,1
125	70									
125	80	CLTB 80	11,4	160	112	3,5	81	250	325	52,3

ØAL = piston Ø

ØMM = piston rod Ø

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

²⁾ Contact surface trunnion (inside)

³⁾ Bearing blocks are always supplied in pairs

⁴⁾ Nominal force applies to applications in pairs

⁵⁾ **m** = weight of trunnion bracket in kg (specified per pair)

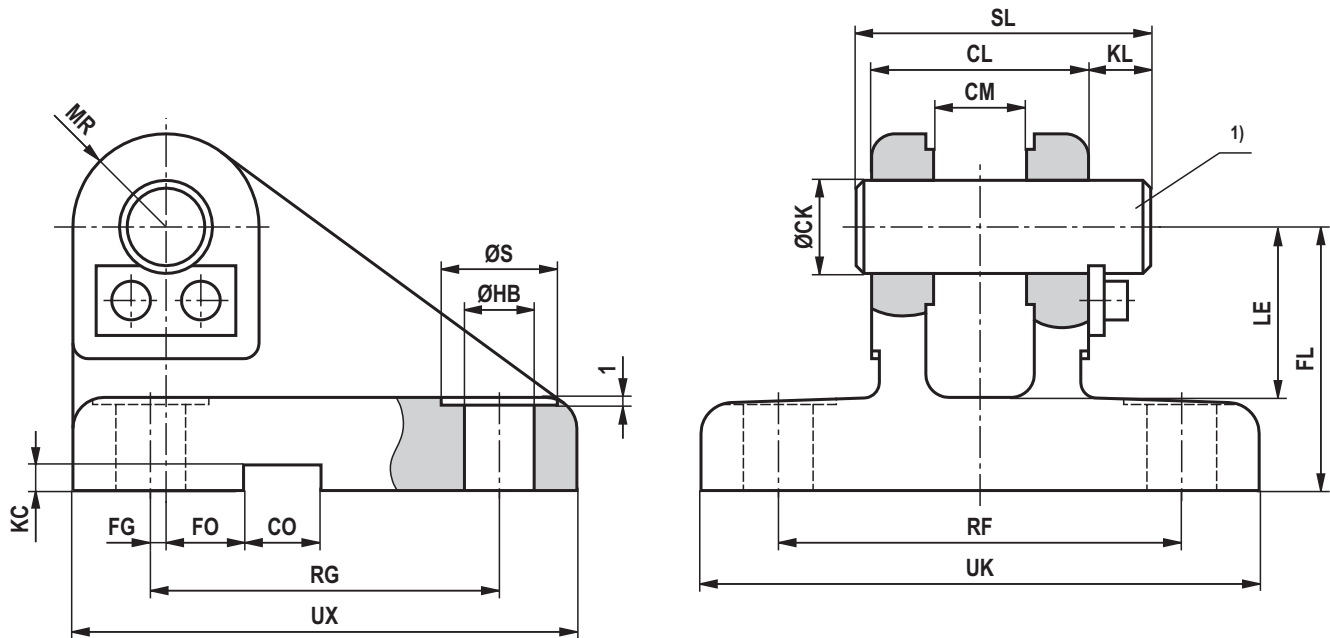
Notice!

Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

The trunnion brackets are suitable for mounting type MT4.

Dimensions: Clevis bracket CLCA (clampable)
 (dimensions in mm)

ISO 8132, form B



ØAL	ØMM	Type	Nominal force kN	ØCK ¹⁾ H9	CL h16	CM A12	CO N9	FG js14	FL js12	FO js14	ØHB H13
25	14	CLCA 10 ²⁾	5	10	24	10	8	2	32	10	6,6
32	18	CLCA 12 ²⁾	8	12	28	12	10	2	34	10	9
40	22	CLCA 20	20	20	45	20	16	7,5	45	10	11
40	25	CLCA 25	32	25	56	25	25	10	55	10	13,5
50	28										
50	32	CLCA 32	50	32	70	32	25	14,5	65	6	17,5
63	36										
63	40	CLCA 40	80	40	90	40	36	17,5	76	6	22
80	45										
80	50	CLCA 50	125	50	110	50	36	25	95	0	26
100	56										
100	63	CLCA 63	200	63	140	63	50	33	112	0	33
125	70										
125	80	CLCA 80	320	80	170	80	50	45	140	0	39
160	100	CLCA 100	500	100	210	100	63	52,5	180	0	52
200	125	CLCA 125	800	125	270	125	80	75	230	0	52

Dimensions: Clevis bracket CLCA (clampable)
(dimensions in mm)

ØAL	ØMM	Type	KC +0,3	KL	LE min.	MR max.	RF js14	RG js14	ØS	SL	UK max.	UX max.	m ⁴⁾ kg
25	14	CLCA 10 ²⁾	3,3	8	22	10	39	44	11	34	56	60	0,33
32	18	CLCA 12 ²⁾	3,3	8	22	12	52	45	15	38	72	65	0,45
40	22	CLCA 20	4,3	10	30	20	75	70	18	58	100	95	1,5
40	25	CLCA 25	5,4	10	37	25	90	85	20	69	120	115	3
50	28												
50	32	CLCA 32	5,4	13	43	32	110	110	26	87	145	145	4,5
63	36												
63	40	CLCA 40	8,4	16	52	40	140	125	33	110	185	170	8,5
80	45												
80	50	CLCA 50	8,4	19	65	50	165	150	40	133	215	200	13,5
100	56												
100	63	CLCA 63	11,4	20	75	63	210	170	48	164	270	230	23,4
125	70												
125	80	CLCA 80	11,4	26	95	80	250	210	57	202	320	280	38,5
160	100	CLCA 100	12,4	30	120	100	315	250	76	246	405	345	99,2
200	125	CLCA 125	15,4	32	170	125	365	350	76	310	455	450	174,1

ØAL = piston Ø

ØMM = piston rod Ø

- 1) Bolt Ø m6 required
(bolt and bolt lock are included in the scope of delivery and are not mounted upon delivery)
- 2) 2 washers for mounting required
 - for CLCA 10: Washer DIN 988 10x16x0.5
 - for CLCA 12: Washer DIN 988 12x18x1
- 3) Upon request
- 4) **m** = weight of clevis bracket in kg



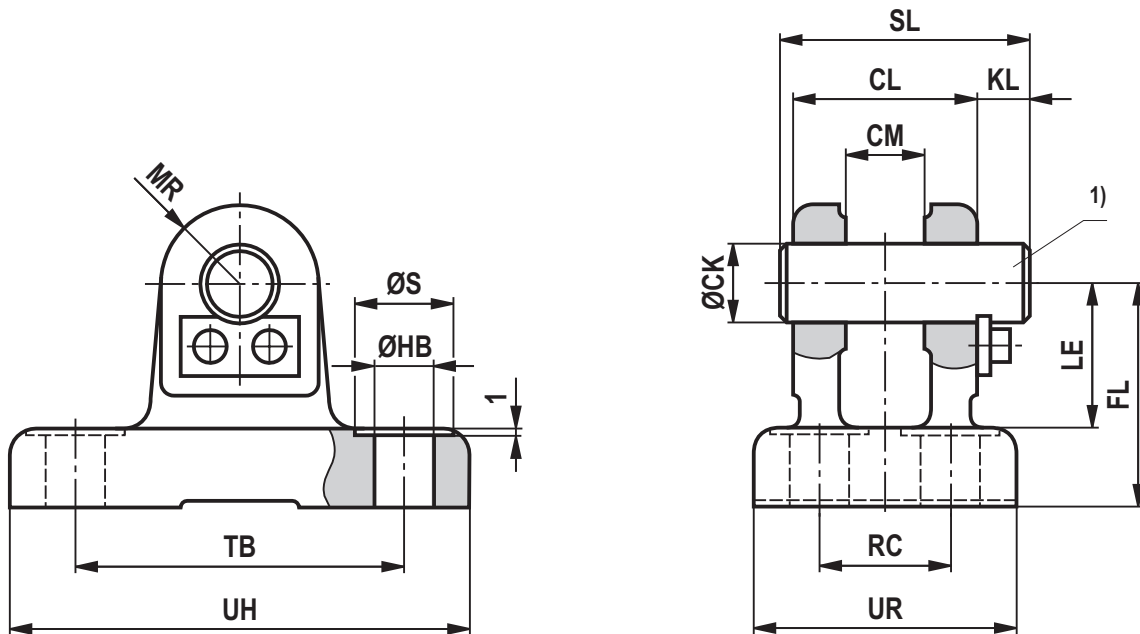
Notice!

Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

The clevis brackets are suitable for mounting type MP5 and for mounting on the swivel head.

Dimensions: Clevis bracket CLCD (clampable)
 (dimensions in mm)

ISO 8132, form A



ØAL	ØMM	Type	Nominal force kN	ØCK H9 1)	CL h16	CM A12	FL js12	ØHB H13	KL	LE min.
25	14	CLCD 10 ²⁾	5	10	24	10	32	6,6	8	22
32	18	CLCD 12 ²⁾	8	12	28	12	34	9	8	22
40	22	CLCD 20	20	20	45	20	45	11	10	30
40	25	CLCD 25	32	25	56	25	55	13,5	10	37
50	28									
50	32	CLCD 32	50	32	70	32	65	17,5	13	43
63	36									
63	40	CLCD 40	80	40	90	40	76	22	16	52
80	45									
80	50	CLCD 50	125	50	110	50	95	26	19	65
100	56									
100	63	CLCD 63	200	63	140	63	112	33	20	75
125	70									
125	80	CLCD 80	320	80	170	80	140	39	26	95
160	100	CLCD 100	500	100	210	100	180	45	30	120
200	125	CLCD 125	800	125	270	125	230	52	32	170

Dimensions: Clevis bracket CLCD (clampable)
(dimensions in mm)

ØAL	ØMM	Type	MR max.	RC js14	ØS	SL	TB js14	UR max.	UH max.	m ³⁾ kg
25	14	CLCD 10 ²⁾	10	17	11	34	42	33	60	0,27
32	18	CLCD 12 ²⁾	12	20	15	38	50	40	70	0,35
40	22	CLCD 20	20	32	18	58	75	58	98	0,95
40	25	CLCD 25	25	40	20	69	85	70	113	1,9
50	28									
50	32	CLCD 32	32	50	26	87	110	85	143	3
63	36									
63	40	CLCD 40	40	65	33	110	130	108	170	5,5
80	45									
80	50	CLCD 50	50	80	40	133	170	130	220	10,6
100	56									
100	63	CLCD 63	63	100	48	164	210	160	270	17
125	70									
125	80	CLCD 80	80	125	57	202	250	210	320	32
160	100	CLCD 100	100	160	66	246	315	260	400	74
200	125	CLCD 125	125	200	76	310	385	320	470	129

ØAL = piston Ø

ØMM = piston rod Ø

- 1) Bolt Ø m6 required
(bolt and bolt lock are included in the scope of delivery and are not mounted upon delivery)
- 2) 2 Washers for mounting required
 - for CLCD 10: Washer DIN 988 10x16x0.5
 - for CLCD 12: Washer DIN 988 12x18x1
- 3) Upon request
- 4) **m** = weight of clevis bracket in kg



Notice!

Geometry and dimensions may differ depending on the manufacturer. In case of combination with other mounting elements, check the suitability.

The clevis brackets are suitable for mounting type MP5 and for mounting on the swivel head.

Buckling

For the admissible stroke length with flexibly guided load and a factor of 3.5 for safety against buckling, please refer to the relevant table. For other installation positions of the cylinder, the admissible stroke length must be interpolated. Admissible stroke length for non-guided load on request.

Buckling calculations are carried out according to the following formulas:

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 = module of elasticity in N/mm²

= 2,1 x 10⁵ for steel

I = geometrical moment of inertia in mm⁴ for circular cross-section

$$= \frac{d^4 \cdot \pi}{64} = 0,0491 \cdot d^4$$

ν = 3,5 (safety factor)

L_K = free buckling length in mm (depending on the type of mounting see sketches A, B, C)

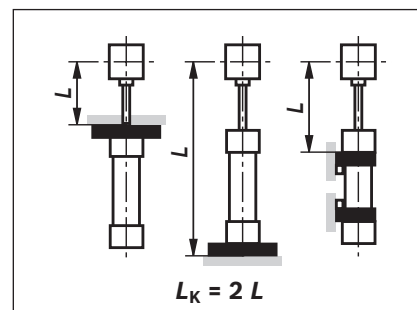
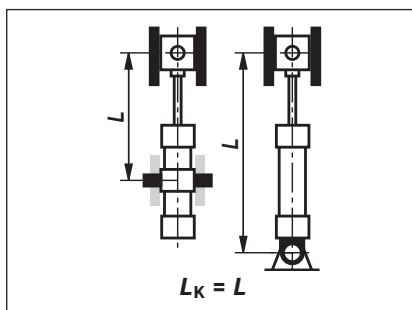
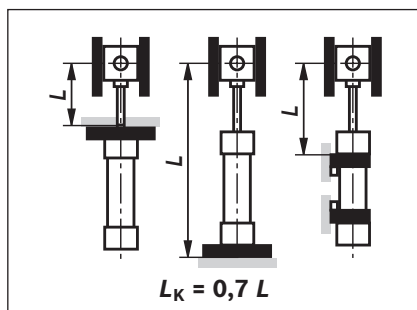
d = piston rod Ø in mm

λ = slenderness ratio

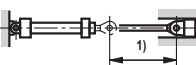
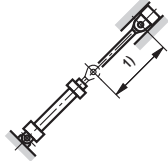
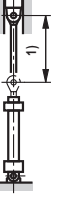
$$= \frac{4 \cdot L_K}{d} \quad \lambda_g = \pi \cdot \sqrt{\frac{E}{0,8 \cdot R_e}}$$

R_e = yield strength of the piston rod material

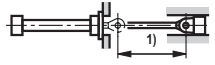
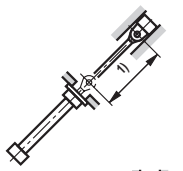
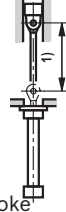
Influence of the mounting type on the buckling length:



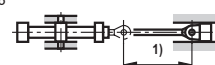
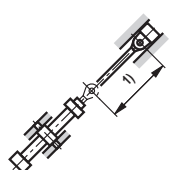
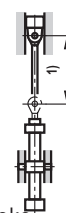
Admissible stroke length: Type of mounting MP5
(dimensions in mm)

ØAL	ØMM	Admissible stroke at									Installation position
		80 bar			160 bar			250 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	14	170	175	185	105	105	110	–	–	–	
32	18	230	230	250	145	145	150	–	–	–	
40	22	285	290	315	185	190	195	–	–	–	
	25	370	380	425	255	260	270	190	190	195	
50	28	380	390	420	255	260	265	–	–	–	
	32	490	505	570	345	350	365	260	265	270	
63	36	500	515	565	345	350	360	–	–	–	
	40	600	625	715	435	440	465	330	335	340	
80	45	610	630	705	430	440	455	–	–	–	
	50	725	755	890	535	545	580	410	415	430	
100	56	755	780	890	545	555	580	–	–	–	1) Admissible stroke
	63	910	950	1145	685	700	755	540	545	565	
125	70	935	975	1125	690	705	740	–	–	–	
	80	1125	1180	1485	870	895	985	695	705	740	
160	100	1350	1420	1810	1050	1085	1200	840	855	900	
200	125	1645	1735	2250	1300	1340	1500	1045	1065	1130	

Admissible stroke length: Type of mounting MF3
(dimensions in mm)

ØAL	ØMM	Admissible stroke at									Installation position
		80 bar			160 bar			250 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	14	600	600	600	485	485	495	–	–	–	0° 
32	18	800	800	800	630	635	645	–	–	–	
40	22	1000	1000	1000	735	740	755	–	–	–	45° 
	25	1000	1000	1000	935	950	985	755	760	770	
50	28	1200	1200	1200	955	965	990	–	–	–	90° 
	32	1200	1200	1200	1200	1200	1200	990	1000	1025	
63	36	1400	1400	1400	1250	1260	1310	–	–	–	1) Admissible stroke
	40	1400	1400	1400	1400	1400	1400	1230	1240	1275	
80	45	1700	1700	1700	1530	1550	1620	–	–	–	
	50	1700	1700	1700	1700	1700	1700	1505	1520	1570	
100	56	2000	2000	2000	1875	1910	2000	–	–	–	
	63	2000	2000	2000	2000	2000	2000	1910	1935	2000	
125	70	2300	2300	2300	2300	2300	2300	–	–	–	
	80	2300	2300	2300	2300	2300	2300	2300	2300	2300	

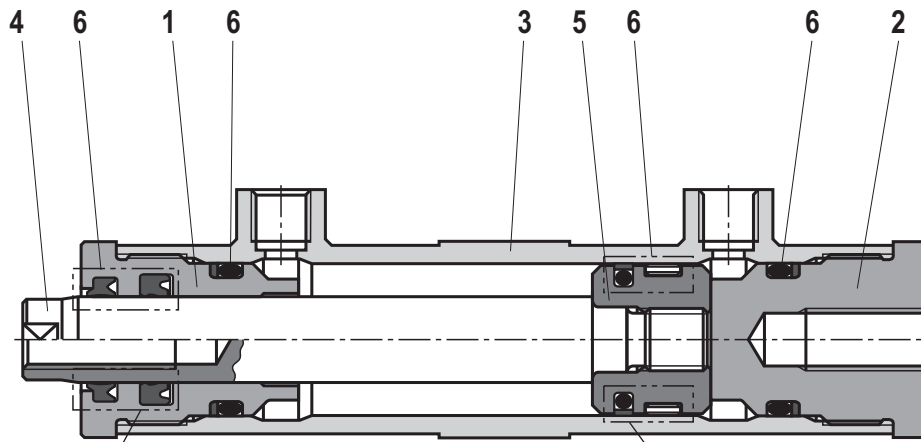
Admissible stroke length: Type of mounting MT4 ²⁾
(dimensions in mm)

ØAL	ØMM	Admissible stroke at									Installation position
		80 bar			160 bar			250 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
25	14	270	275	290	180	180	185	–	–	–	0° 
32	18	355	360	385	245	245	250	–	–	–	
40	22	410	420	450	280	285	290	–	–	–	45° 
	25	515	530	590	365	370	380	275	275	280	
50	28	540	555	595	375	380	390	–	–	–	90° 
	32	680	705	790	495	500	520	380	380	390	
63	36	710	730	800	505	510	525	–	–	–	1) Admissible stroke
	40	840	870	995	620	630	660	480	485	495	
80	45	860	885	985	620	625	650	–	–	–	
	50	1010	1055	1225	755	770	815	595	600	615	
100	56	1050	1090	1230	770	780	815	–	–	–	
	63	1265	1320	1580	965	990	1055	770	780	800	
125	70	1300	1350	1555	970	990	1040	–	–	–	
	80	1565	1645	2050	1230	1260	1380	995	1010	1050	

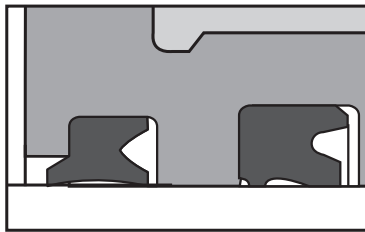
²⁾ Trunnion in cylinder center

Overview: Individual components

ØAL 25 ... 32 mm

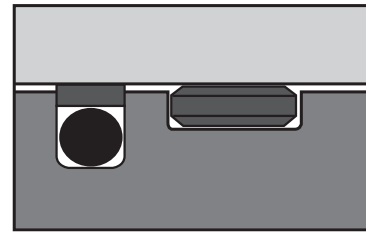


Piston rod



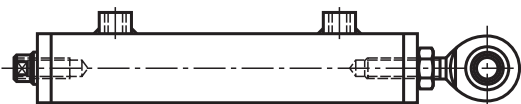
„M“ / „V“

Piston

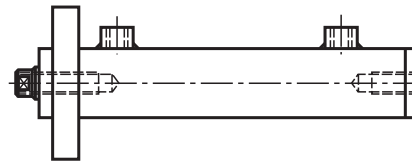


„M“ / „V“

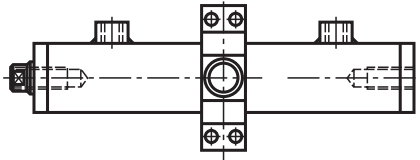
Type of mounting MP5



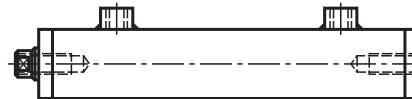
Type of mounting MF3



Type of mounting MT4



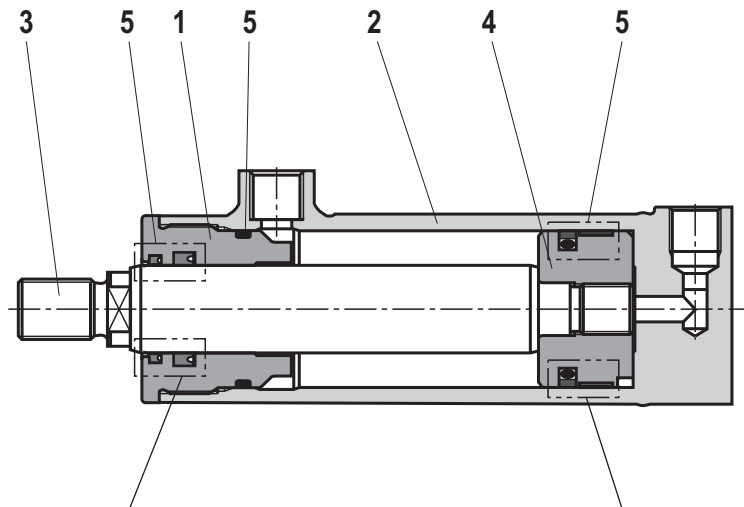
Type of mounting M00



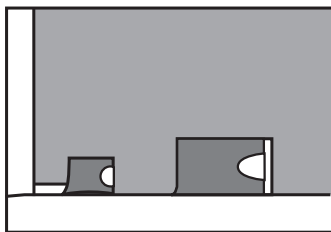
- 1 Head
- 2 Base
- 3 Pipe
- 4 Piston rod
- 5 Piston
- 6 Seal kit: Scraper, rod seal, piston seal, O ring, guide ring

Overview: Individual components

ØAL 40 ... 200 mm

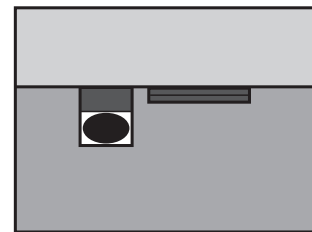


Piston rod



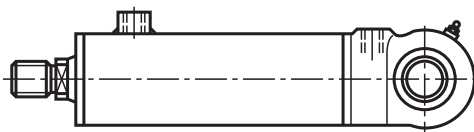
„M“ / „V“

Piston

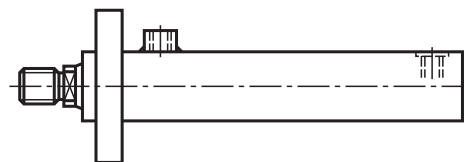


„M“ / „V“

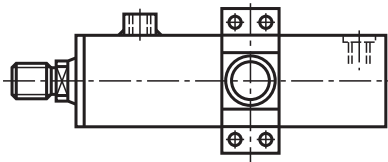
Type of mounting MP5



Type of mounting MF3



Type of mounting MT4



- 1 Head
- 2 Pipe
- 3 Piston rod
- 4 Piston
- 5 Seal kit: Scraper, rod seal, piston seal, O ring, guide ring

Seal kit

ØAL mm	ØMM mm	Material no. for seal kit for version	
		M	V
25	14		
32	18		
40	22		
	25		
50	28		
	32		
63	36		
	40		
80	45		
	50		
100	56		
	63		
125	70		
	80		
160	100		
200	125		

Cylinder weight

Piston ØAL mm	Piston rod ØMM mm	Weight of cylinder with stroke length 0 mm				Weight of cylinder per 100 mm stroke length kg
		MP5 kg	MF3 kg	MT4 kg	M00 kg	
25	14	1	1	1	1	0,4
32	18	2	2	2	2	0,6
40	22	2	3	3	–	0,9
	25	2	4	4	–	1,1
50	28	3	4	5	–	1,2
	32	4	5	7	–	1,5
63	36	5	7	9	–	1,8
	40	6	9	12	–	2,3
80	45	9	13	15	–	2,9
	50	11	15	20	–	3,8
100	56	15	20	26	–	4,6
	63	19	26	36	–	6
125	70	29	35	46	–	7,2
	80	38	43	67	–	10,1
160	100	67	–	–	–	15,1
200	125	110	–	–	–	22