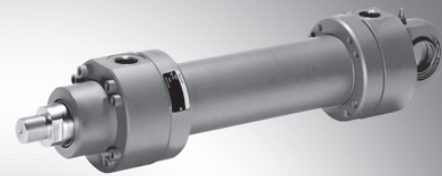


Hydraulic cylinder mill type

RE 17332/07.13
Replaces: 07.12

1/74

Series CDH1 / CGH1 / CSH1

Component series 3X
Nominal pressure 250 bar (25 MPa)

HA/4646/95

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Features

- 6 types of mounting
- Piston Ø (**ØAL**): 40 to 320 mm
- Piston rod Ø (**ØMM**): 22 to 220 mm
- Stroke lengths to 6 m

Project planning software **Interactive Catalog System****Online**www.boschrexroth.com/ics

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

Standards:

Bosch Rexroth standard; main dimensions like piston \varnothing and piston rod \varnothing correspond to ISO 3320

Nominal pressure: 250 bar

Static test pressure: 375 bar

Reduced test pressure: 315 bar

Higher operating pressures upon request

The specified operating pressures apply to applications with shock-free operation with regard to excess pressure and/or external loads. With extreme loads like e.g. high cycle sequence, mounting elements and threaded piston rod connections must be designed for durability.

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 differential cylinders; for lower pressures as well as double-acting cylinders, please contact us.

Installation position: Any

Hydraulic fluid:

Mineral oils DIN 51524 HL, HLP

Oil-in-water emulsion HFA

Water glycol HFC

Phosphate ester HFD-R

Polyol ester HFD-U

Hydraulic fluid temperature range: See page 62

Ambient temperature range: See page 62

Optimum viscosity range: 20 to 100 mm²/s

Minimum admissible viscosity: 12 mm²/s

Maximum admissible viscosity: 380 mm²/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 need to be met in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components.

For the selection of the filters see www.boschrexroth.com/filter

Bleeding by default: Secured against screwing out

Primer coat: By default, hydraulic cylinders are primed with a coating (color gentian blue RAL 5010) of min. 40 μ m. 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
- Sealing surfaces for flange connection
- Connection surfaces for valve mounting
- Inductive proximity switches
- Position measurement system

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

In the online order system, more painting systems can be selected. These systems are not displayed via the type key and not automatically considered when ordering replacement cylinders. Accessories that are ordered as separate order item are not primed or painted by default. Corresponding priming and/or painting on request.

Stroke velocity: Please observe the guideline on max. stroke velocities (with recommended flow velocity of 5 m/s in the line connection) in the table. Higher stroke velocities on request. If the extension velocity is considerably higher than the retraction velocity of the piston rod, drag-out losses of the medium may result. If necessary, please consult us.

Piston \varnothing (mm)	Line connection	Max. stroke velocity in m/s
40	G1/2	0,31
50	G1/2	0,20
63	G3/4	0,28
80	G3/4	0,18
100	G1	0,20
125	G1 1/4	0,20
140	G1 1/4	0,16
160	G1 1/2	0,18
180	G1 1/2	0,14
200	G1 1/2	0,11
220	G1 1/2	0,09
250	G1 1/2	0,07
280	G1 1/2	0,06
320	G1 1/2	0,04

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

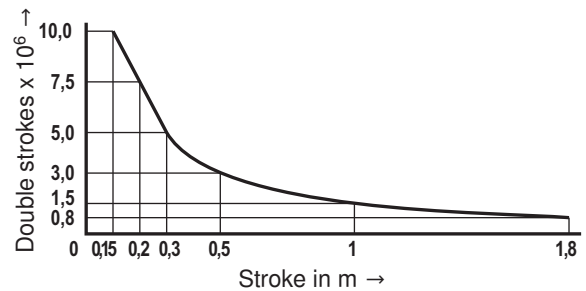
Boundary and application conditions:

- 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 (MP3/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 topic Buckling).
- The maximum admissible stroke velocities with regard to the suitability/load of seals must be observed as must their compatibility with the properties of the fluid type (see page topic Seals).
- The maximum admissible velocities/kinetic energies when moving into the end positions, also considering external loads, must be observed.
Danger: Excess pressure
- 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.

Notice: 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.

Life cycle:

Rexroth 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 maximum operating pressure, without load on the piston rod, with a maximum velocity of 0.5 m/s, with a failure rate of less than 5 %.



Acceptance:

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

Safety instructions:

For the assembly, commissioning and maintenance of hydraulic cylinders, the operating instructions 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 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 (07200).

Project planning software ICS (Interactive Catalog System)

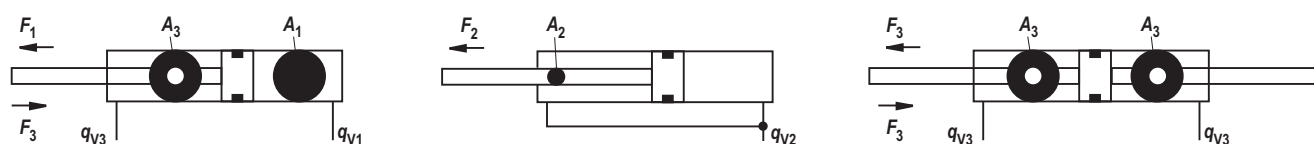
The ICS (Interactive Catalog System) is a selection and project planning aid for hydraulic cylinders. The ICS allows designers for machines and systems to quickly and reliably find the perfect hydraulic cylinder solution through logic-guided type key enquiries. This software helps to solve design and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

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

This allows users to reduce costs while increasing their competitiveness.

Diameters, areas, forces, flow

Piston \varnothing AL mm	Piston rod \varnothing MM mm	Area ratio φ A_1/A_3	Areas			Force at 250 bar ¹⁾			Flow at 0.1 m/s ²⁾			Max. avail- able stroke length mm
			Piston A_1 cm ²	Rod A_2 cm ²	Ring A_3 cm ²	Pressure F_1 kN	Diff. F_2 kN	Pulling F_3 kN	Off q_{V1} l/min	Diff. q_{V2} l/min	On q_{V3} l/min	
40	22	1,43	12,56	3,80	8,76	31,40	9,50	21,90	7,5	2,3	5,3	2000
	28	1,96		6,16	6,40		15,40	16,00		3,7	3,8	
50	28	1,46	19,63	6,16	13,47	49,10	15,40	33,70	11,8	3,7	8,1	2000
	36	2,08		10,18	9,45		25,45	23,65		6,1	5,7	
63	36	1,48	31,17	10,18	20,99	77,90	25,45	52,45	18,7	6,1	12,6	2000
	45	2,04		15,90	15,27		39,75	38,15		9,5	9,2	
80	45	1,46	50,26	15,90	34,36	125,65	39,75	85,90	30,2	9,5	20,7	2000
	56	1,96		24,63	25,63		61,55	64,10		14,8	15,4	
100	56	1,46	78,54	24,63	53,91	196,35	61,55	134,80	47,1	14,8	32,3	3000
	70	1,96		38,48	40,06		96,20	100,15		23,1	24,0	
125	70	1,46	122,72	38,48	84,24	306,75	96,20	210,55	73,6	23,1	50,5	3000
	90	2,08		63,62	59,10		159,05	147,70		38,2	35,4	
140	90	1,70	153,94	63,62	90,32	384,75	159,05	225,70	92,4	38,2	54,2	3000
	100	2,04		78,54	75,40		196,35	188,40		47,1	45,3	
160	100	1,64	201,06	78,54	122,50	502,50	196,35	306,15	120,6	47,1	73,5	3000
	110	1,90		95,06	106,00		237,65	264,85		57,0	63,6	
180	110	1,60	254,47	95,06	159,43	636,17	237,65	398,52	152,7	57,0	95,7	3000
	125	1,93		122,72	131,75		306,80	329,37		73,6	79,1	
200	125	1,64	314,16	122,72	191,44	785,25	306,80	478,45	188,5	73,6	114,9	3000
	140	1,96		153,96	160,20		384,90	400,35		92,4	96,1	
220	140	1,68	380,1	153,9	226,2	950,3	384,8	565,5	228,1	92,4	135,7	6000
	160	2,12		201,0	179,1		502,6	447,7		120,7	107,4	
250	160	1,69	490,8	201,0	289,8	1227,2	502,7	724,5	294,5	120,7	173,8	6000
	180	2,08		254,4	236,4		636,2	591,0		152,7	141,8	
280	180	1,70	615,7	254,4	361,3	1539,4	636,2	903,2	369,4	152,7	216,7	6000
	200	2,04		314,1	301,6		785,4	753,9		188,5	180,9	
320	200	1,64	804,2	314,1	490,1	2010,6	785,4	1225,2	482,5	188,5	294,0	6000
	220	1,90		380,1	424,2		950,3	1060,3		228,1	254,4	



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

²⁾ Stroke velocity

Tolerances according to ISO 6020-1

Installation dimensions	WC	XC ²⁾	XO ²⁾	XS ^{1), 2)}	XV ²⁾	ZP ²⁾	Stroke tolerances
Type of mounting	MF3	MP3	MP5	MS2	MT4	MF4	
Stroke length	Tolerances						
≤ 1250	±2	±1,5	±1,5	±2	±2	±1,5	+2
> 1250 – ≤ 3150	±4	±3	±3	±4	±4	±3	+5
> 3150 – ≤ 6000	±8	±5	±5	±8	±8	±5	+8

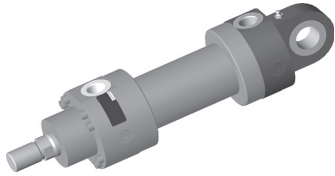
¹⁾ Not standardized

²⁾ Including stroke length

Overview of types of mounting: Series CDH1 and CGH1

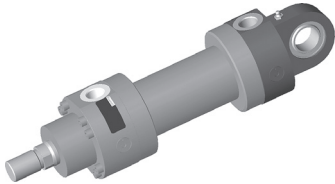
CDH1 MP3

see page 10, 11



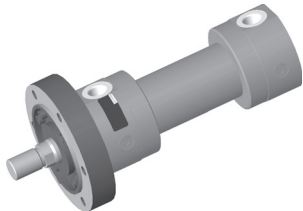
CDH1 MP5

see page 12, 13



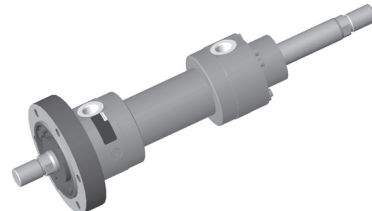
CDH1 MF3

see page 14, 15



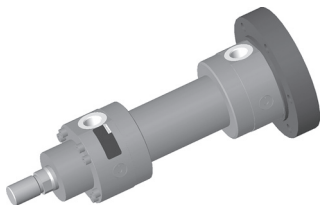
CGH1 MF3

see page 14, 15



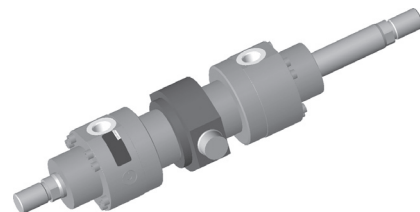
CDH1 MF4

see page 16, 17



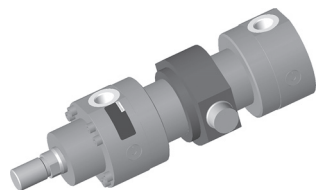
CGH1 MT4

see page 18, 19



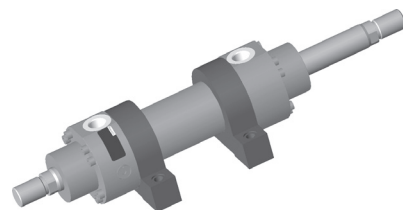
CDH1 MT4

see page 18, 19



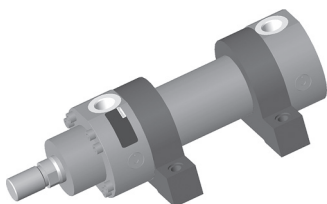
CGH1 MS2

see page 20, 21



CDH1 MS2

see page 20, 21



Ordering code series CDH1

Additional options

Fields for additional options	
Z	
Inductive proximity switches without mating connector Mating connector - separate order see page 44 without inductive proximity switches	³⁷⁾ = E = W
Additional guide rings Without additional guide rings	^{10), 28)} = F = W
Threaded coupling, on both sides Without threaded coupling	= A = W
	Y = Specify the piston rod extension LY in the clear text in mm W = Without piston rod extension A = ^{14), 35)} Spherical bearing, maintenance-free B = Flanged grease nipple W = Standard conical grease nipple

Order examples:

Without additional options: CDH1MP5/100/56/300A3X/B11CADMW

With additional options: CDH1MP5/100/56/300A3X/B11CADMZ EWABW

- 1) Only piston Ø 40 to 200 mm
- 2) Trunnion position freely selectable. When ordering, always specify the "XV" dimension in the clear text in mm
- 3) Observe the max. available stroke length page 4 and admissible stroke length (acc. to buckling calculation) pages 56 to 58
- 4) Not possible with MF4
- 5) Piston Ø 40 to 80 mm, only position 11, subplates only possible in combination with line connection "B" at the head
- 6) Piston Ø 63 to 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
- 7) Piston Ø 125 to 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
- 8) Piston Ø 160 to 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
- 9) Only piston Ø 80 to 320 mm
- 10) Seal design A, B not possible; piston Ø 220 to 320 mm standard
- 12) Only piston rod Ø 22 to 140 mm
- 13) Not with piston Ø 320 mm
- 14) Not possible with piston rod end "N"
- 15) Subplates for SL and SV valves (isolator valves)
Note: Seal designs T, G, L, R, S and V are not designed for the static holding function!
- 28) With seal design "L" standard
- 30) All graphical presentations in the data sheet show position 1
- 31) With MS2, only position 11 is possible
- 34) With MF4 and line connection B, M or C not possible
- 35) Not possible with MP3
- 37) Min. stroke length = 20 mm

Ordering code series CGH1

Additional options

Fields for additional options	
Z	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div>
Inductive proximity switches without mating connector Mating connector - separate order see page 44 without inductive proximity switches	³⁷⁾ = E = W
Additional guide rings Without additional guide rings	^{10), 28)} = F = W
Threaded coupling, on both sides Without threaded coupling	= A = W
	Y = ¹⁶⁾ Specify the piston rod extension LY in the clear text in mm W = Without piston rod extension A = ^{14), 35)} Spherical bearing, maintenance-free B = Flanged grease nipple W = Standard conical grease nipple

Order examples:

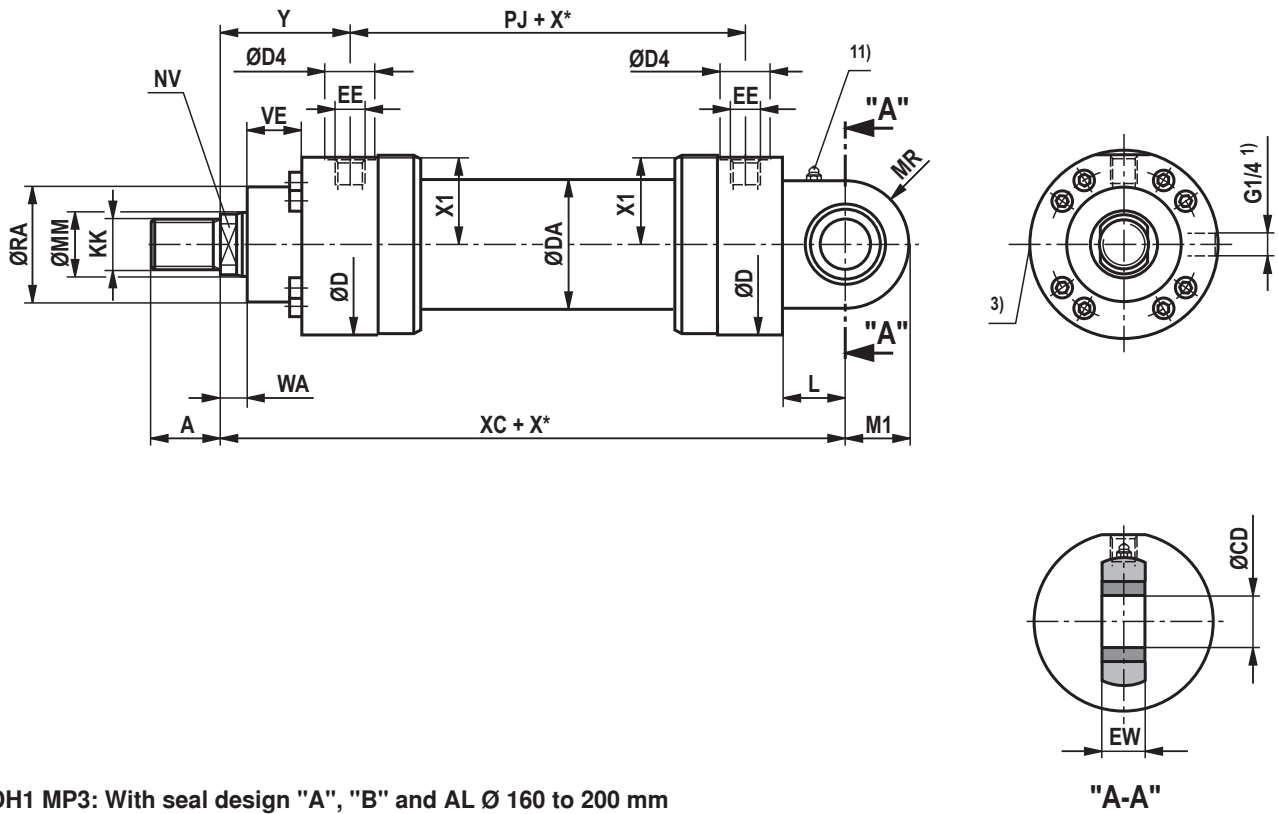
Without additional options: CGH1MF3/100/56/300A3X/B11CADMW

With additional options: CGH1MF3/100/56/300A3X/B11CADMZ EWABW

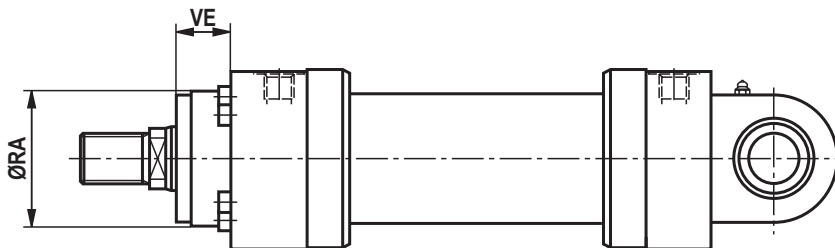
- | | |
|---|---|
| <p>1) Only piston Ø 40 to 200 mm</p> <p>2) Trunnion position freely selectable. When ordering, always specify the "XV" dimension in the clear text in mm</p> <p>3) Observe the max. available stroke length page 4 and admissible stroke length (acc. to buckling calculation) pages 56 to 58</p> <p>9) Only piston Ø 80 to 320 mm</p> <p>10) Seal design A, B not possible; piston Ø 220 to 320 mm standard</p> <p>11) Only piston rod Ø 22 to 36 mm</p> <p>12) Only piston rod Ø 22 to 140 mm</p> <p>13) Not with piston Ø 320 mm</p> <p>14) Not possible with piston rod end "N"</p> | <p>16) Only at left piston rod side (orientation: Catalog figures)</p> <p>17) Only one plain clevis / self-aligning clevis mounted, left piston rod side (orientation: Catalog figures)</p> <p>18) Not standardized</p> <p>28) With seal design "L" standard</p> <p>30) All graphical presentations in the data sheet show position 1</p> <p>35) Not possible with MP3</p> <p>36) Not possible with piston rod Ø 45 to 140 mm</p> <p>37) Min. stroke length = 20 mm</p> |
|---|---|

Swivel eye at base CDH1: MP3

CDH1 MP3; ØAL 40 to 200 mm



CDH1 MP3: With seal design "A", "B" and AL Ø 160 to 200 mm



Dimensions CDH1: MP3 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4)	EE 4)	Y	PJ
40	22/28	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120
50	28/36	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120
63	36/45	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133
80	45/56	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146
100	56/70	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171
125	70/90	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205
140	90/100	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219
160	100/110	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240
180	110/125	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264
200	125/140	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278

ØAL	ØMM	X1	WA	XC	L	MR	M1	ØCD H11	EW -0,4	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	22/28	41	14	252	32,5	31	28	25	23	52	40	52	20
50	28/36	48,5	18	265	37,5	36	32,5	30	28	65	40	65	16
63	36/45	56,5	22	302	45	42	40	35	30	75	45	75	17
80	45/56	67	20	330	50	52	50	40	35	95	45	95	13
100	56/70	82	30	385	60	65	62,5	50	40	115	55	115	20
125	70/90	99	32	447	70	70	70	60	50	135	60	135	17
140	90/100	109,5	35	490	75	82	82	70	55	155	70	155	22
160	100/110	129	40	550	85	95	95	80	60	200	80	200	80
180	110/125	142,5	40	610	90	113	113	90	65	220	90	220	90
200	125/140	152	40	645	115	125	125	100	70	235	95	235	95

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Throttle valve only with end position cushioning "E" (180° for bleeding)

4) Flange connections see separate table pages 36 and 37

5) Thread design „G”

6) Thread design „A”

7) Dimensions for cylinders with seal design M, T, G, L, R, S and V

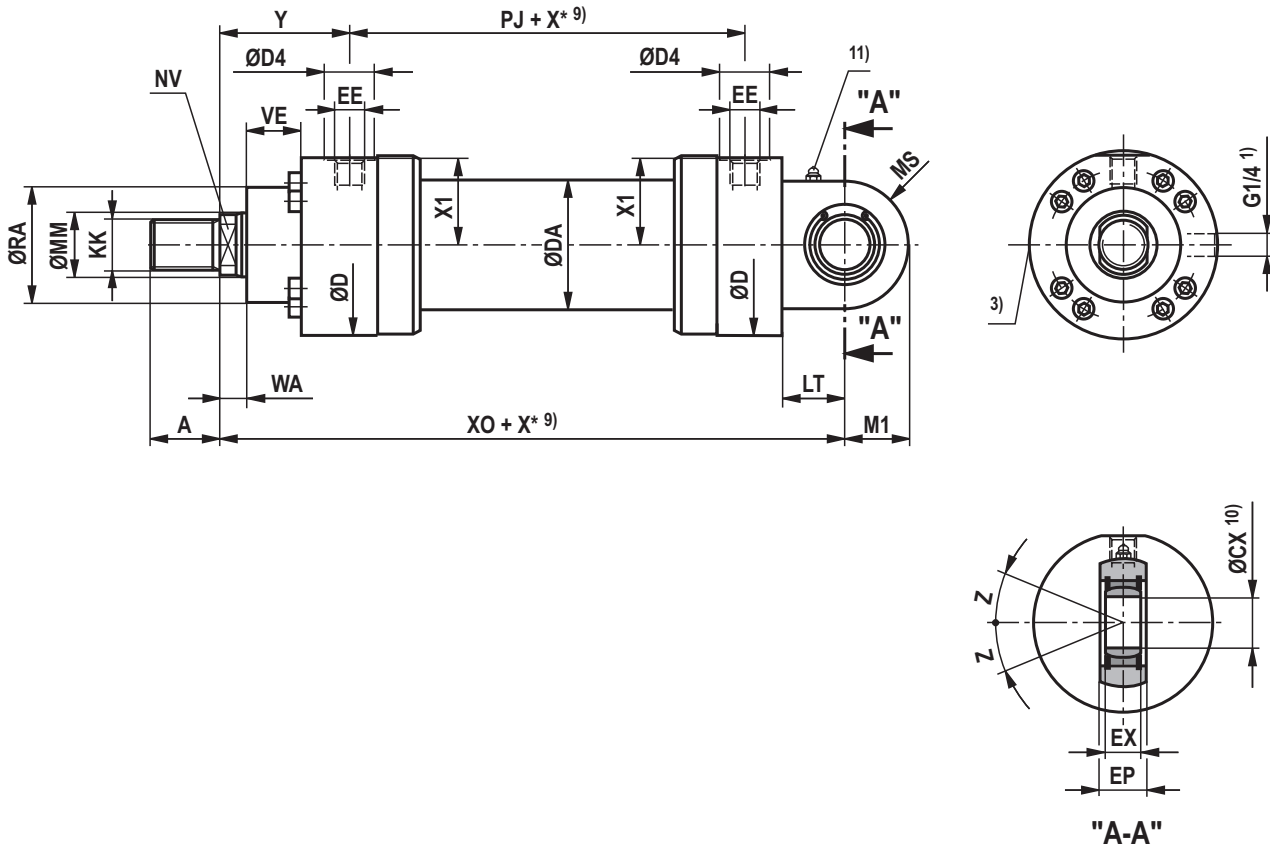
8) Dimensions for cylinders with seal design A and B

11) Standard design „W”

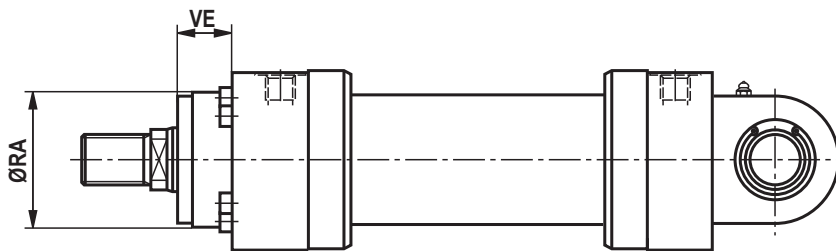
Grease nipple cone head form A according to DIN 71412

Self-aligning clevis at base CDH1: MP5

CDH1 MP5



CDH1 MP5: With seal design "A", "B" and AL Δ 160 to 320 mm



Dimensions CDH1: MP5 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4)	EE 4)	Y	PJ	X1
40	22/28	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	41
50	28/36	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48,5
63	36/45	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56,5
80	45/56	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67
100	56/70	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82
125	70/90	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99
140	90/100	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109,5
160	100/110	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129
180	110/125	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142,5
200	125/140	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152
220	140/160	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174
250	160/180	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194
280	180/200	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210
320	200/220	-	-	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	242

ØAL	ØMM	WA	XO	X* min	LT	M1	MS	ØCX	EP -0,4	EX	Z	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	22/28	14	252	-	32,5	28	31	25 _{-0,010}	23	20 _{-0,12}	7°	52	40	52	20
50	28/36	18	265	-	37,5	32,5	36	30 _{-0,010}	28	22 _{-0,12}	6°	65	40	65	16
63	36/45	22	302	-	45	40	42	35 _{-0,012}	30	25 _{-0,12}	6°	75	45	75	17
80	45/56	20	330	-	50	50	52	40 _{-0,012}	35	28 _{-0,12}	7°	95	45	95	13
100	56/70	30	385	-	60	62,5	65	50 _{-0,012}	40	35 _{-0,12}	6°	115	55	115	20
125	70/90	32	447	-	70	70	70	60 _{-0,015}	50	44 _{-0,15}	6°	135	60	135	17
140	90/100	35	490	-	75	82	82	70 _{-0,015}	55	49 _{-0,15}	6°	155	70	155	22
160	100/110	40	550	-	85	95	95	80 _{-0,015}	60	55 _{-0,15}	6°	200	80	200	80
180	110/125	40	610	-	90	113	113	90 _{-0,020}	65	60 _{-0,20}	5°	220	90	220	90
200	125/140	40	645	-	115	125	125	100 _{-0,020}	70	70 _{-0,20}	7°	235	95	235	95
220	140/160	40	750	-	125	150 ¹²⁾	140 ¹²⁾	110 _{-0,020}	80	70 _{-0,20}	6°	270	115	270	115
250	160/180	40	789	-	140	168 ¹²⁾	158 ¹²⁾	110 _{-0,020}	80	70 _{-0,20}	6°	300	125	300	125
280	180/200	40	884	31	150	188 ¹²⁾	178 ¹²⁾	120 _{-0,020}	90	85 _{-0,20}	6°	325	130	325	130
320	200/220	40	980	-	175	210 ¹²⁾	200 ¹²⁾	140 _{-0,020}	110	90 _{-0,20}	7°	365	155	365	155

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

X*min = Min. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Throttle valve only with end position cushioning "E" (180° for bleeding)

4) Flange connections see separate table pages 36 and 37

5) Thread design „G”

6) Thread design „A”

7) Dimensions for cylinders with seal design M, T, G, L, R, S and V

8) Dimensions for cylinders with seal design A and B

9) Observe the min. stroke length "X*min"

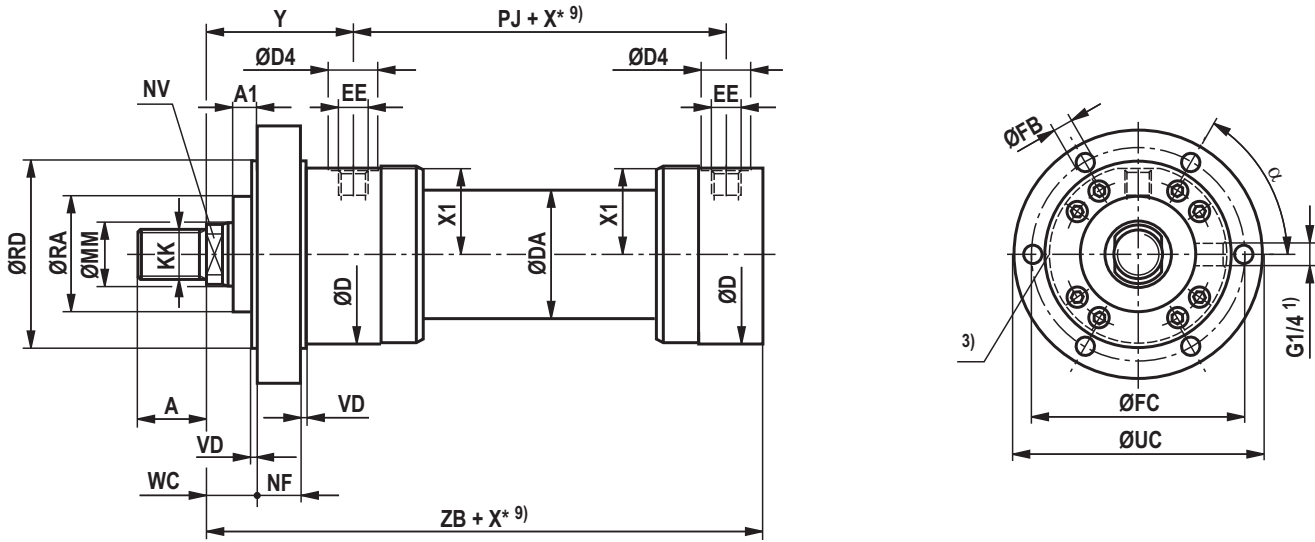
10) Related bolt Ø m6; related bolt Ø j6 with maintenance-free spherical bearing

11) Standard design „W” Grease nipple cone head form A according to DIN 71412

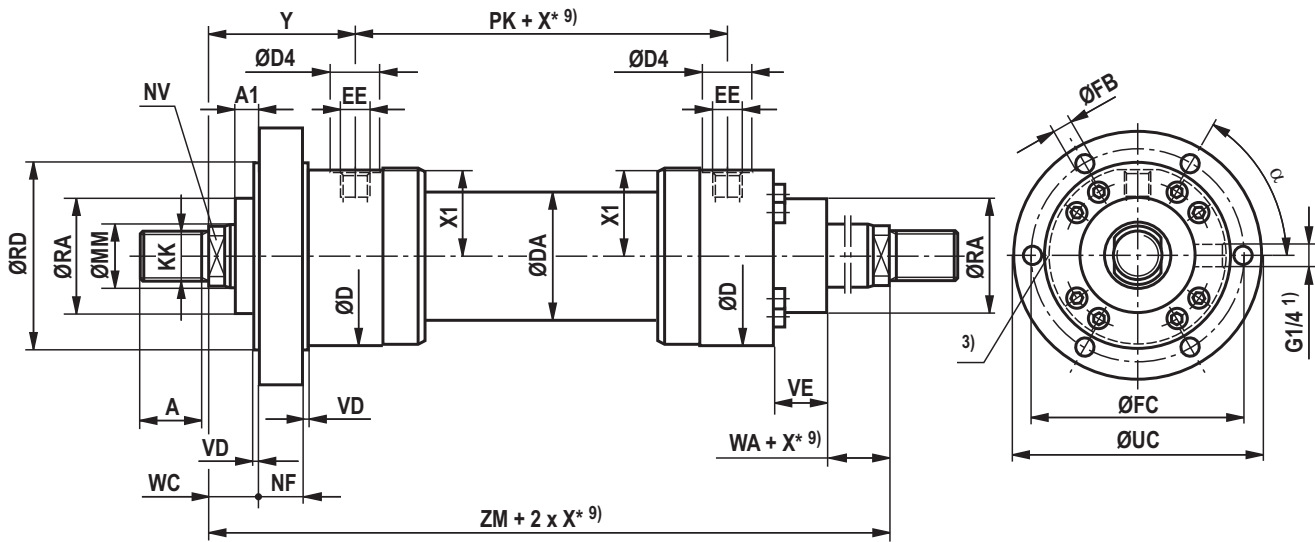
12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting

Round flange at head CDH1/CGH1: MF3

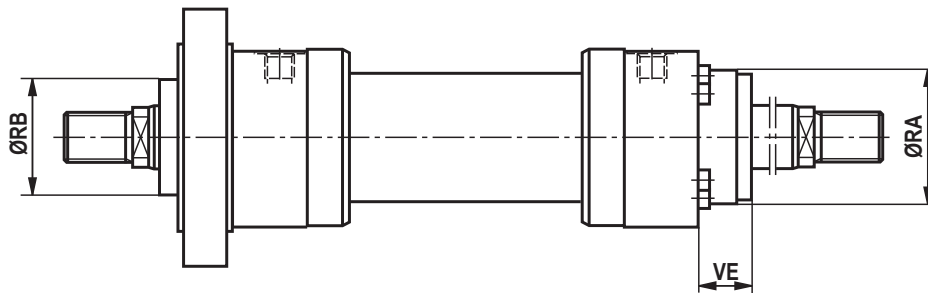
CDH1 MF3



CGH1 MF3



CGH1 MF3: With seal design "A", "B" and AL Ø 160 to 320 mm



Dimensions CDH1/CGH1: MF3 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4)	EE 4)	Y	PJ	X1
40	22/28	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	41
50	28/36	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48,5
63	36/45	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56,5
80	45/56	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67
100	56/70	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82
125	70/90	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99
140	90/100	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109,5
160	100/110	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129
180	110/125	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142,5
200	125/140	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152
220	140/160	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174
250	160/180	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194
280	180/200	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210
320	200/220	-	-	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243

ØAL	ØMM	ØRD e8	WC	VD	NF	PK	A1	ZB	ZM	X* min	ØFB H13	ØFC js13	ØUC -1	α	WA	ØRA 7)	VE 7)	ØRA 8)	VE 8)	ØRB 8) max
40	22/28	90	19	5	30	120	0	226	278	-	9	108	130	60°	14	52	40	52	20	-
50	28/36	110	23	5	30	120	0	233	294	-	11	130	160	60°	18	65	40	65	16	-
63	36/45	130	27	5	35	133	0	262	333	-	13,5	155	185	60°	22	75	45	75	17	-
80	45/56	145	25	5	35	146	0	280	354	-	13,5	170	200	60°	20	95	45	95	13	-
100	56/70	175	35	5	45	171	0	330	419	-	17,5	205	245	60°	30	115	55	115	20	-
125	70/90	210	37	5	50	205	0	382	475	-	22	245	295	60°	32	135	60	135	17	-
140	90/100	230	45	10	50	219	0	420	531	-	22	265	315	60°	35	155	70	155	22	-
160	100/110	275	50	10	60	240	0	475	610	-	30	325	385	60°	40	200	80	200	80	-
180	110/125	300	50	10	70	264	0	515	662	-	30	360	420	60°	40	220	90	220	90	-
200	125/140	320	50	10	75	278	0	535	688	-	33	375	445	60°	40	235	95	235	95	-
220	140/160	370	60	10	85	326	20	635	810	-	33	430	490	60°	40	270	115	270	115	270
250	160/180	415	70	10	85	326	30	659	858	-	39	485	555	60°	40	300	125	300	125	300
280	180/200	450	65	10	95	375	25	744	939	31	39	520	590	60°	40	325	130	325	130	325
320	200/220	510	65	10	120	431	25	815	1005	-	45	600	680	60°	40	365	155	365	155	365

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

X*min = Min. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Throttle valve only with end position cushioning "E" (180° for bleeding)

4) Flange connections see separate table pages 36 and 37

5) Thread design „G”

6) Thread design „A”

7) Dimensions for cylinders with seal design M, T, G, L, R, S and V

8) Dimensions for cylinders with seal design A and B

9) Observe the min. stroke length "X*min"

Dimensions CDH1: MF4 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4)	EE 4)	Y	PJ	X1
40	22/28	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	41
50	28/36	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48,5
63	36/45	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56,5
80	45/56	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67
100	56/70	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82
125	70/90	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99
140	90/100	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109,5
160	100/110	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129
180	110/125	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142,5
200	125/140	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152
220	140/160	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174
250	160/180	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194
280	180/200	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210
320	200/220	-	-	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243

ØAL	ØMM	WA	ZP	X* min	NF	VD	ØRD e8	ØFB H13	ØFC js13	ØUC -1	α	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	22/28	14	256	-	30	5	90	9	108	130	60°	52	40	52	20
50	28/36	18	264	-	30	5	110	11	130	160	60°	65	40	65	16
63	36/45	22	297	-	35	5	130	13,5	155	185	60°	75	45	75	17
80	45/56	20	315	-	35	5	145	13,5	170	200	60°	95	45	95	13
100	56/70	30	375	-	45	5	175	17,5	205	245	60°	115	55	115	20
125	70/90	32	432	-	50	5	210	22	245	295	60°	135	60	135	17
140	90/100	35	475	-	50	10	230	22	265	315	60°	155	70	155	22
160	100/110	40	535	-	60	10	275	30	325	385	60°	200	80	200	80
180	110/125	40	585	-	70	10	300	30	360	420	60°	220	90	220	90
200	125/140	40	615	-	75	10	320	33	375	445	60°	235	95	235	95
220	140/160	40	720	-	85	10	370	33	430	490	60°	270	115	270	115
250	160/180	40	744	-	85	10	415	39	485	555	60°	300	125	300	125
280	180/200	40	839	31	95	10	450	39	520	590	60°	325	130	325	130
320	200/220	40	935	-	120	10	510	45	600	680	60°	365	155	365	155

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

X*min = Min. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Throttle valve only with end position cushioning "E" (180° for bleeding)

4) Flange connections see separate table pages 36 and 37

5) Thread design „G”

6) Thread design „A”

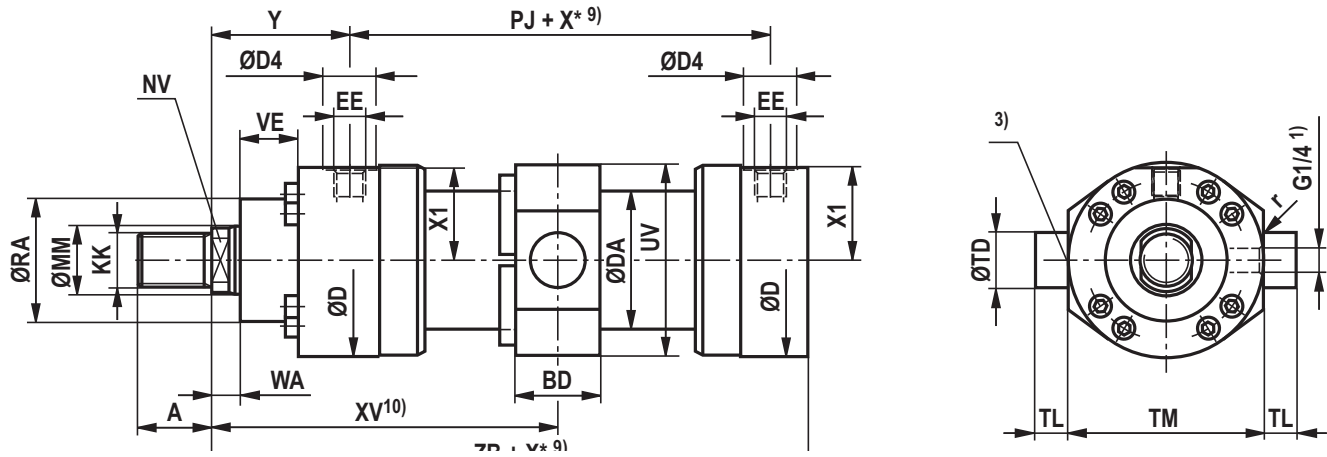
7) Dimensions for cylinders with seal design M, T, G, L, R, S and V

8) Dimensions for cylinders with seal design A and B

9) Observe the min. stroke length "X*min"

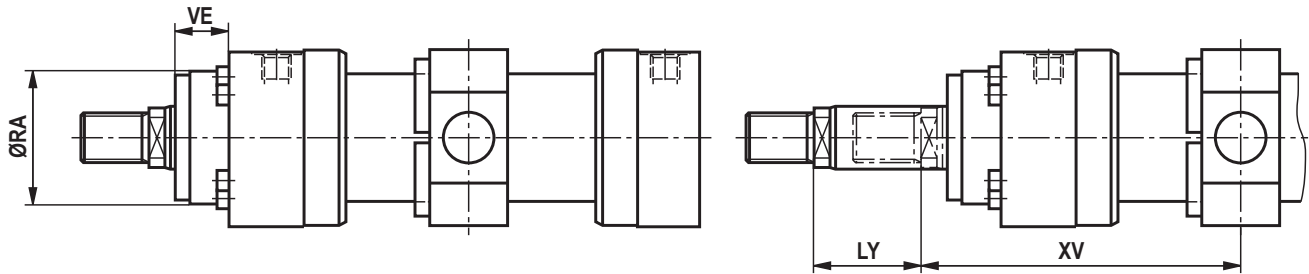
Trunnion CDH1/CGH1: MT4

CDH1 MT4

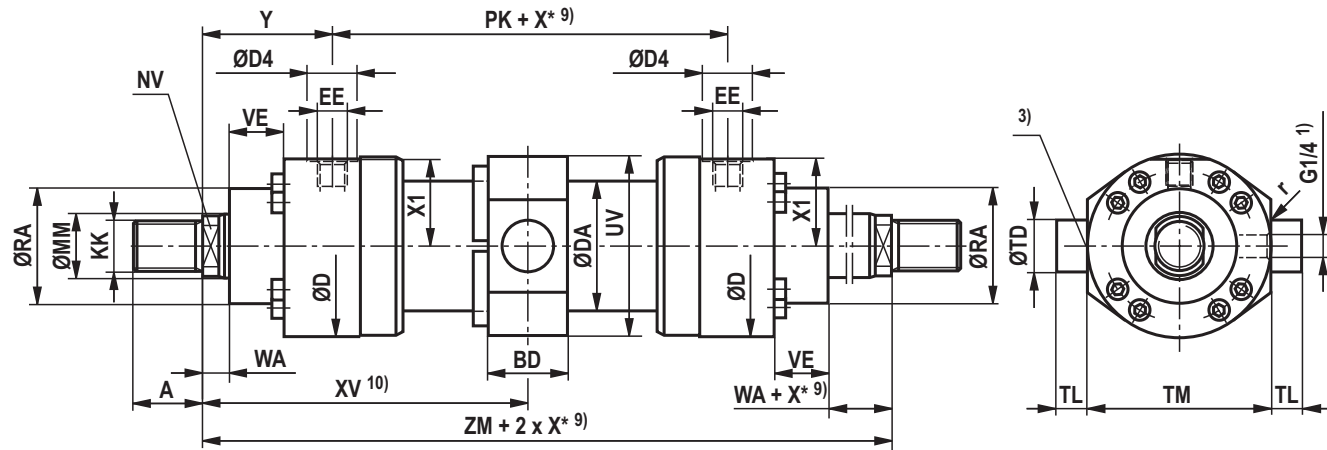


CDH1 MT4: With seal design "A", "B" and AL Ø 160 to 320 mm

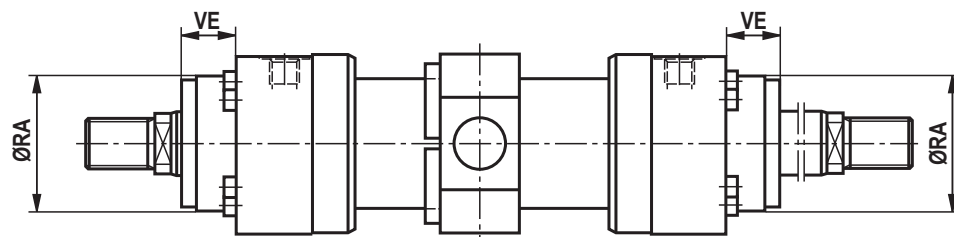
Dimensions for cylinder with piston rod extension "LY" in retracted condition



CGH1 MT4



CGH1 MT4: With seal design "A", "B" and AL Ø 160 to 320 mm



Dimensions CDH1/CGH1: MT4 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4)	EE 4)	Y	PJ	X1	WA
40	22/28	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	41	14
50	28/36	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48,5	18
63	36/45	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56,5	22
80	45/56	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67	20
100	56/70	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82	30
125	70/90	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99	32
140	90/100	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109,5	35
160	100/110	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129	40
180	110/125	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142,5	40
200	125/140	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152	40
220	140/160	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174	40
250	160/180	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194	40
280	180/200	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210	40
320	200/220	–	–	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243	40

ØAL	ØMM	PK	ZB	ZM	X* min	XV 11) cent	XV 10) min	XV 10) max	BD	UV 12)	ØTD e8	TL js16	TM h13	r	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	22/28	120	226	278	22	139+X*/2	150	136+X*	38	97	30	20	95	1,6	52	40	52	20
50	28/36	120	233	294	32	147+X*/2	163	140+X*	38	111	30	20	115	1,6	65	40	65	16
63	36/45	133	262	333	47	166,5+X*/2	190	155+X*	48	129	35	20	130	2	75	45	75	17
80	45/56	146	280	354	58	177+X*/2	206	160+X*	58	153	40	25	145	2	95	45	95	13
100	56/70	171	330	419	79	209,5+X*/2	249	185+X*	78	183	50	30	175	2	115	55	115	20
125	70/90	205	382	475	91	237,5+X*/2	283	207+X*	98	220	60	40	210	2,5	135	60	135	17
140	90/100	219	420	531	121	265,5+X*/2	326	220+X*	118	243	65	42,5	230	2,5	155	70	155	22
160	100/110	240	475	610	142	305+X*/2	376	254+X*	128	282	75	52,5	275	2,5	200	80	200	80
180	110/125	264	515	661	158	331+X*/2	410	272+X*	138	310	85	55	300	2,5	220	90	220	90
200	125/140	278	535	688	194	344+X*/2	441	267+X*	168	331	90	55	320	2,5	235	95	235	95
220	140/160	326	635	810	155	405+X*/2	482,5	327,5+X*	135	377	100	60	370	2,5	270	115	270	115
250	160/180	326	659	858	175	429+X*/2	516,5	341,5+X*	145	417	110	65	410	2,5	300	125	300	125
280	180/200	375	744	939	336	469,5+X*/2	637,5	301,5+X*	165	448	130	70	450	2,5	325	130	325	130
320	200/220	431	815	1005	180	502,5+X*/2	592,5	412,5+X*	195	513	160	90	510	2,5	365	155	365	155

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

X*min = Min. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Throttle valve only with end position cushioning "E" (180° for bleeding)

4) Flange connections see separate table pages 36 and 37

5) Thread design „G”

6) Thread design „A”

7) Dimensions for cylinders with seal design M, T, G, L, R, S and V

8) Dimensions for cylinders with seal design A and B

9) Observe the min. stroke length "X*min"

10) When ordering, always specify the "XV" dimension in the clear text. Preferred XV dimension: Observe the trunnion position in the cylinder center XVmin and XVmax

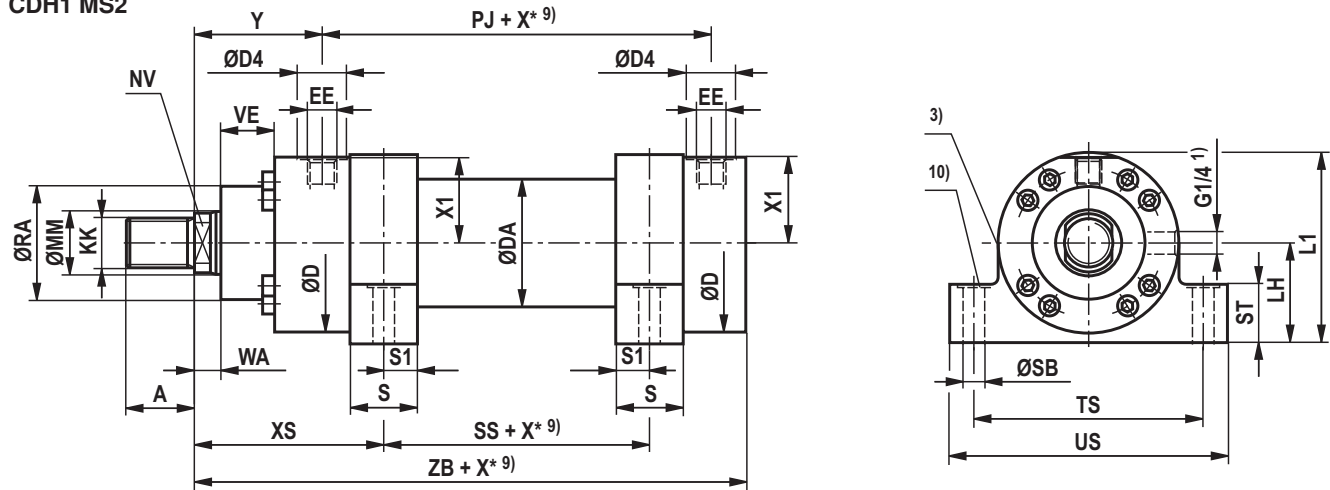
11) XVcent recommendation: Trunnion position in cylinder center

12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting

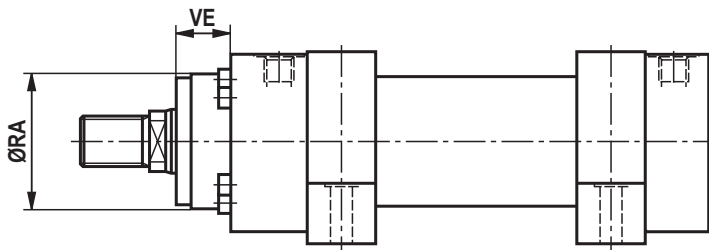
Important installation information: During installation, it must be ensured that the trunnion bearings are installed up to the trunnion shoulders. Any non-compliance may reduce the product's service life.

Foot mounting CDH1/CGH1: MS2

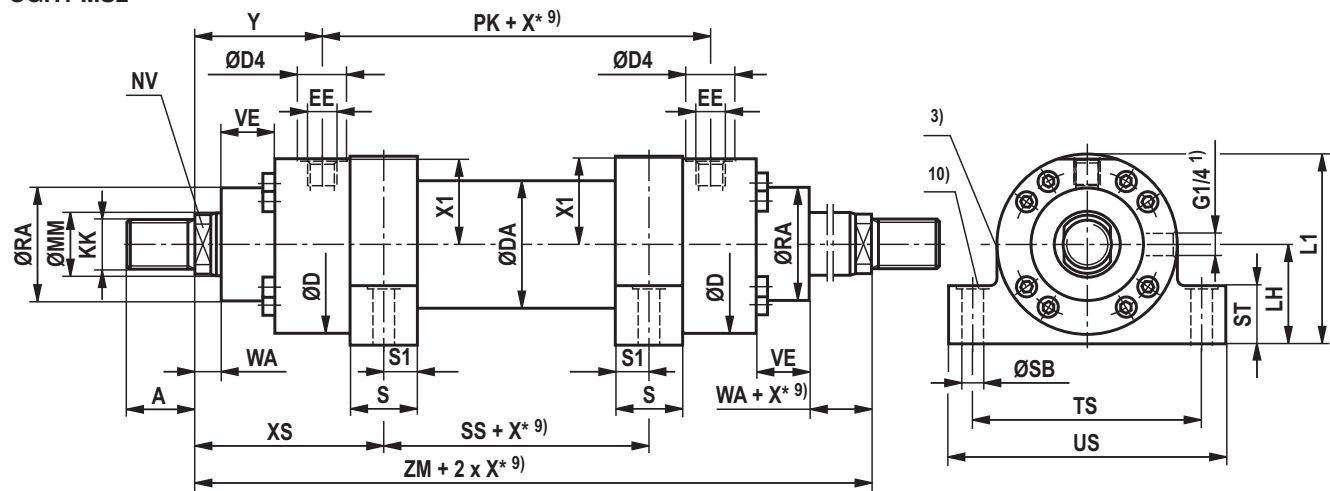
CDH1 MS2



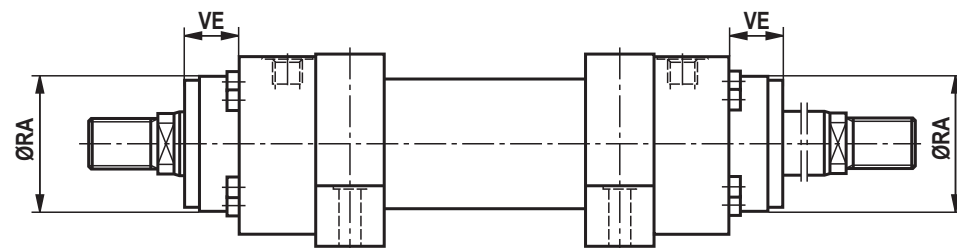
CDH1 MS2: With seal design "A", "B" and AL Ø 160 to 320 mm



CGH1 MS2



CGH1 MS2: With seal design "A", "B" and AL Ø 160 to 320 mm



Dimensions CDH1/CGH1: MS2 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4)	EE 4)	Y	PJ	X1	WA
40	22/28	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	41	14
50	28/36	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48,5	18
63	36/45	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56,5	22
80	45/56	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67	20
100	56/70	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82	30
125	70/90	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99	32
140	90/100	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109,5	35
160	100/110	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129	40
180	110/125	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142,5	40
200	125/140	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152	40
220	140/160	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174	40
250	160/180	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194	40
280	180/200	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210	40
320	200/220	–	–	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243	40

ØAL	ØMM	PK	XS	ZB	ZM	SS	X* min	S	S1	ØSB H13	ST	TS js13	US 12) -1	LH	L1 12)	ØRA 7)	VE 7)	ØRA 8)	VE 8)
40	22/28	120	114	226	278	50	–	30	15	11	32	110	140	45	93	52	40	52	20
50	28/36	120	124,5	233	294	45	–	35	17,5	11	37	130	161	55	110	65	40	65	16
63	36/45	133	142	262	333	49	–	40	20	13,5	42	150	183	65	129	75	45	75	17
80	45/56	146	151	280	354	52	2	50	25	17,5	47	180	220	75	149	95	45	95	13
100	56/70	171	179	330	419	61	3	60	30	22	57	210	260	90	181	115	55	115	20
125	70/90	205	200	382	475	75	–	70	35	26	67	255	313	105	215	135	60	135	17
140	90/100	219	230,5	420	531	70	19	85	42,5	30	72	290	359	115	235	155	70	155	22
160	100/110	240	272,5	475	610	65	44	105	52,5	33	77	330	402	135	277	200	80	200	80
180	110/125	264	296,5	515	662	69	50	115	57,5	40	92	360	445	150	305	220	90	220	90
200	125/140	278	307,5	535	688	73	56	125	62,5	40	97	385	471	160	322	235	95	235	95
220	140/160	326	367,5	635	810	75	100	155	77,5	45	102	445	541	185	373	270	115	270	115
250	160/180	326	391,5	659	858	75	100	155	77,5	52	112	500	610	205	414	300	125	300	125
280	180/200	375	407,5	744	939	124	171	155	77,5	52	127	530	641	225	449	325	130	325	130
320	200/220	431	440	815	1005	125	85	190	95	62	142	610	732	255	512	365	155	365	155

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

X*min = Min. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Throttle valve only with end position cushioning "E" (180° for bleeding)

4) Flange connections see separate table pages 36 and 37

5) Thread design „G”

6) Thread design „A”

7) Dimensions for cylinders with seal design M, T, G, L, R, S and V

8) Dimensions for cylinders with seal design A and B

9) Observe the min. stroke length "X*min"

10) Recess 2 mm deep, for hexagon socket head cap screws; ISO 4762 – The screws must not be subjected to shear force. Force distribution via additional external fitting strips.

12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting

Ordering code series CSH1

CS	H1	/	/	/	A	3X	/							Z
----	----	---	---	---	---	----	---	--	--	--	--	--	--	---

Differential cylinder with position measurement system ¹⁸⁾ = CS

Series = H1

Types of mounting

- Swivel eye at base ¹⁾ = MP3
- Self-aligning clevis at base = MP5
- Round flange at head = MF3
- Round flange at base = MF4
- Trunnion ²⁾ = MT4
- Foot mounting = MS2

Piston Ø (ØAL) 40 to 320 mm

Piston rod Ø (ØMM) 28 to 220 mm

Stroke length in mm ³⁾

Design principle

Head and base flanged = A

Component series

30 to 39 Unchanged installation and connection dimensions = 3X

Line connection / version

According to ISO 1179-1 (pipe thread ISO 228-1) = B

According to ISO 9974-1 (metric thread ISO 261) = M

Flange porting pattern according to ISO 6162-2 tab. 2 type 1 ^{4), 9)} = D (≙ SAE 6000 PSI)

Flange porting pattern according to ISO 6164 tab. 2 ⁴⁾ = H

According to ISO 1179-1 (pipe thread ISO 228-1) with flat pipe flange ³¹⁾ = C

For directional and control valves

Subplate size 6 ^{4) 5)} = P

Subplate size 10 ^{4) 6)} = T

Subplate size 16 ^{4) 7)} = U

Subplate size 25 ^{4) 8)} = V

For SL and SV valves

Subplate size 6 ^{4) 5) 15)} = A

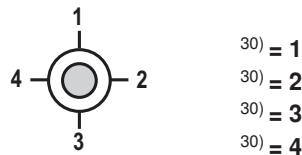
Subplate size 10 ^{4) 6) 15)} = E

Subplate size 20 ^{4) 7) 15)} = L

Subplate size 30 ^{4) 8) 15)} = N

Line connection/position at head

View to piston rod



Additional options

Fields for additional options

Z	T				
---	---	--	--	--	--

Position measurement system (magnetostrictive) without mating connector = T

Mating connector - separate order see page 47, 49

Analog output 4-20 mA = C

Analog output 0-10 V = F

Digital output SSI = D

Profibus D63 = N

Profibus D53 = P

Threaded coupling, on both sides = A

Without threaded coupling = W

Y = Piston rod extension LY specify in the clear text in mm

W = Without piston rod extension

A = ^{14), 35)} Spherical bearing, maintenance-free

B = Flanged grease nipple

W = Standard conical grease nipple

Order example:

CSH1MP5/100/56/300A3X/T11CAEMZ TCAWW

Option
Z = Additional options, fill the fields for additional options

Seal design
For mineral oil HL, HLP and HFA

M = ²⁹⁾ Standard seal system

L = Standard seal system with guide rings

R = ²⁹⁾ Reduced friction heavy industry

For mineral oil HL, HLP, HFA and water glycol HFC

G = ²⁹⁾ Standard seal system HFC

T = ²⁹⁾ Servo quality/reduced friction

For phosphate ester HFD-R and polyol ester HFD-U

S = ²⁹⁾ Servo quality/reduced friction

V = ²⁹⁾ Standard seal system FKM

End position cushioning

U = Without

E = ²⁰⁾ On both sides, adjustable

Piston rod end

A = Thread for plain clevis CGAS

G = ¹³⁾ Thread for plain clevis CGA, CGAK, plain clevis CSA

S = With mounted self-aligning clevis CGAS

L = ¹³⁾ With mounted self-aligning clevis CGA

M = ¹³⁾ With mounted self-aligning clevis CGAK

N = ¹⁾ With mounted plain clevis CSA

Piston rod design

C = Hard chromium-plated

N = ¹⁹⁾ Nickel-plated and hard chromium-plated

Line connection / position at base ³⁰⁾

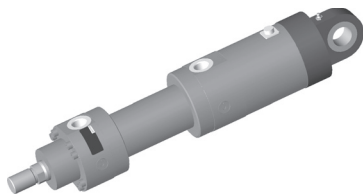
Ordering code Series CSH1

- 1) Only piston \varnothing 40 to 200 mm
- 2) Trunnion position freely selectable. When ordering, always specify the "XV" dimension in the clear text in mm.
- 3) Observe the max. available stroke length page 4 and admissible stroke length (acc. to buckling calculation) pages 56 to 58
- 4) Not possible with MF4
- 5) Piston \varnothing 40 to 80 mm, only position 11, subplates only possible in combination with line connection "B" at the head
- 6) Piston \varnothing 63 to 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
- 7) Piston \varnothing 125 to 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
- 8) Piston \varnothing 160 to 200 mm, only position 11, subplates only possible in combination with line connection "B" at the head
- 9) Only piston \varnothing 80 to 320 mm
- 13) Not with piston \varnothing 320 mm
- 14) Not possible with piston rod end "N"
- 15) Subplates for SL and SV valves (isolator valves)
Note: Seal designs T, G, L, R, S and V are not designed for the static holding function!
- 18) Not standardized
- 19) Only piston rod \varnothing 28 to 140 mm
- 20) Possible from piston rod \varnothing 45 mm
- 29) With CSH, by default with guide belts
- 30) All graphical presentations in the data sheet show position 1
- 31) With MS2, only position 11 is possible
- 34) With MF4 and line connection B, M or C not possible
- 35) Not possible with MP3

Overview of types of mounting: Series CSH1

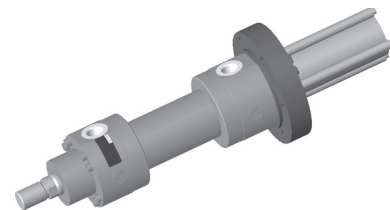
CSH1 MP3

see page 24, 25



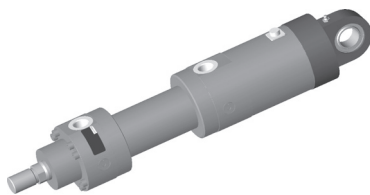
CSH1 MF4

see page 30, 31



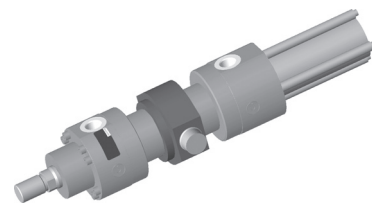
CSH1 MP5

see page 26, 27



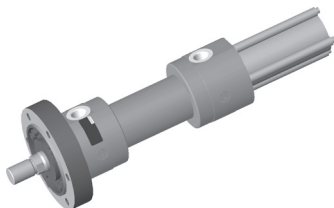
CSH1 MT4

see page 32, 33



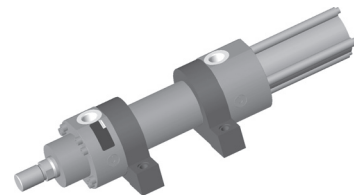
CSH1 MF3

see page 28, 29



CSH1 MS2

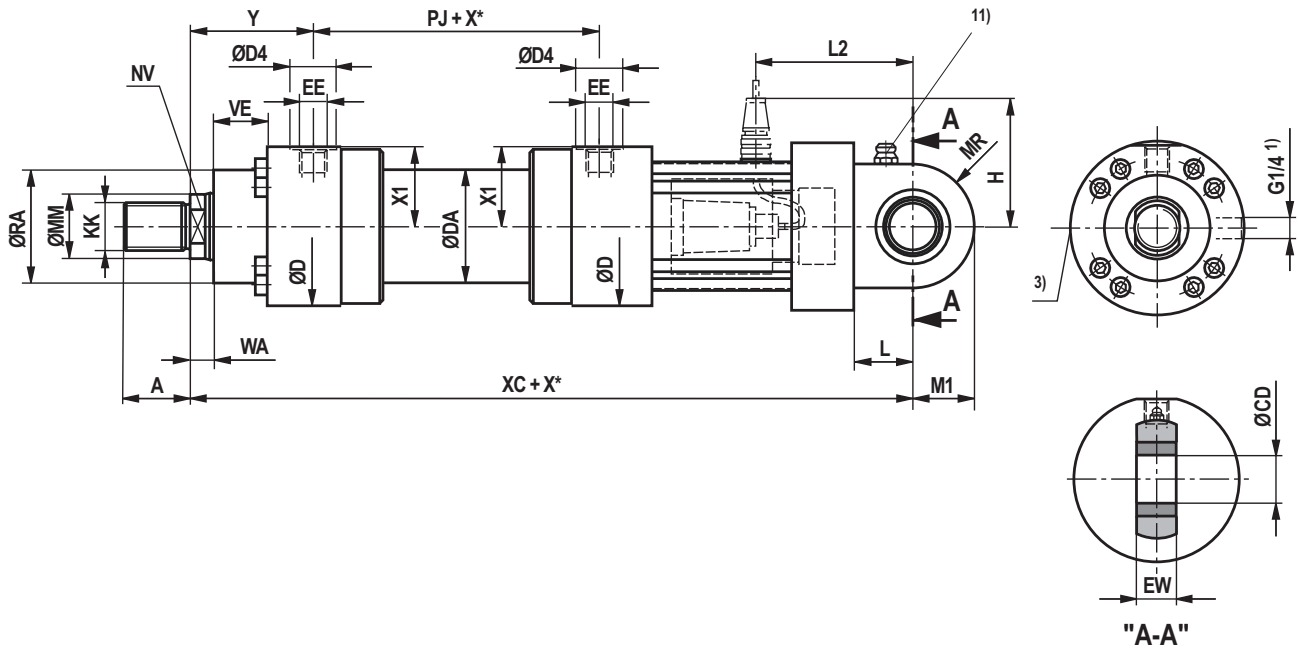
see page 34, 35



Swivel eye at base CSH1: MP3

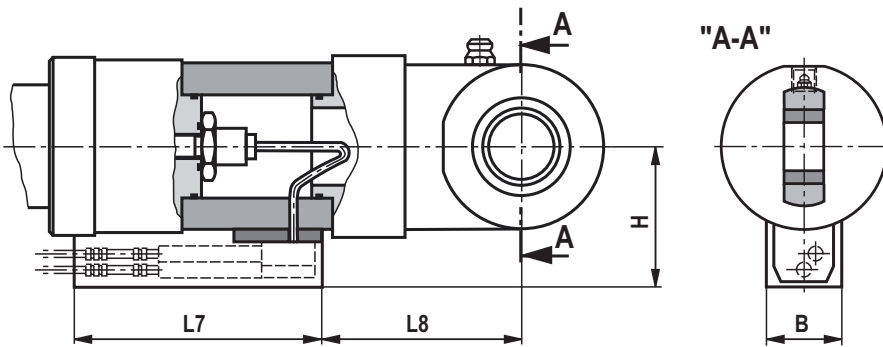
CSH1 MP3; AL-Ø 40 to 200 mm

for position measurement system output "C", "F" and "D"



CSH1 MP3; AL-Ø 40 to 200 mm

for position measurement system output "N" and "P"



Dimensions CSH1: MP3 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4)	EE 4)	Y	PJ	X* max
40	28	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	1000
50	28/36	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	1000
63	36/45	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	2000
80	45/56	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	2000
100	56/70	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	3000
125	70/90	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	3000
140	90/100	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	3000
160	100/110	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	3000
180	110/125	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	3000
200	125/140	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	3000

ØAL	ØMM	X1	WA	XC	L	MR	M1	ØCD H11	EW -0,4	ØRA	VE	L2	H 14)	H 13)	L7	L8	B
40	28	41	14	417	32,5	31	28	25	23	52	40	98	115	106	200	75	64
50	28/36	48,5	18	430	37,5	36	32,5	30	28	65	40	103	120	113	200	80	64
63	36/45	56,5	22	480	45	42	40	35	30	75	45	116	130	122	200	93	64
80	45/56	67	20	515	50	52	50	40	35	95	45	132	125	133	200	104	64
100	56/70	82	30	560	60	65	62,5	50	40	115	55	145	135	148	200	117	64
125	70/90	99	32	620	70	70	70	60	50	135	60	172	145	166	200	148	64
140	90/100	109,5	35	665	75	82	82	70	55	155	70	182	155	176	200	156	64
160	100/110	129	40	720	85	95	95	80	60	200	80	200	165	196	200	168	64
180	110/125	142,5	40	775	90	113	113	90	65	220	90	222	175	210	200	189	64
200	125/140	152	40	815	115	125	125	100	70	235	95	237	190	217	200	206	64

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

X*max = Max. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Throttle valve only with end position cushioning "E" (180° for bleeding)

4) Flange connections see separate table pages 36 and 37

5) Thread design „G“

6) Thread design „A“

11) Standard design „W“

Grease nipple cone head form A according to DIN 71412

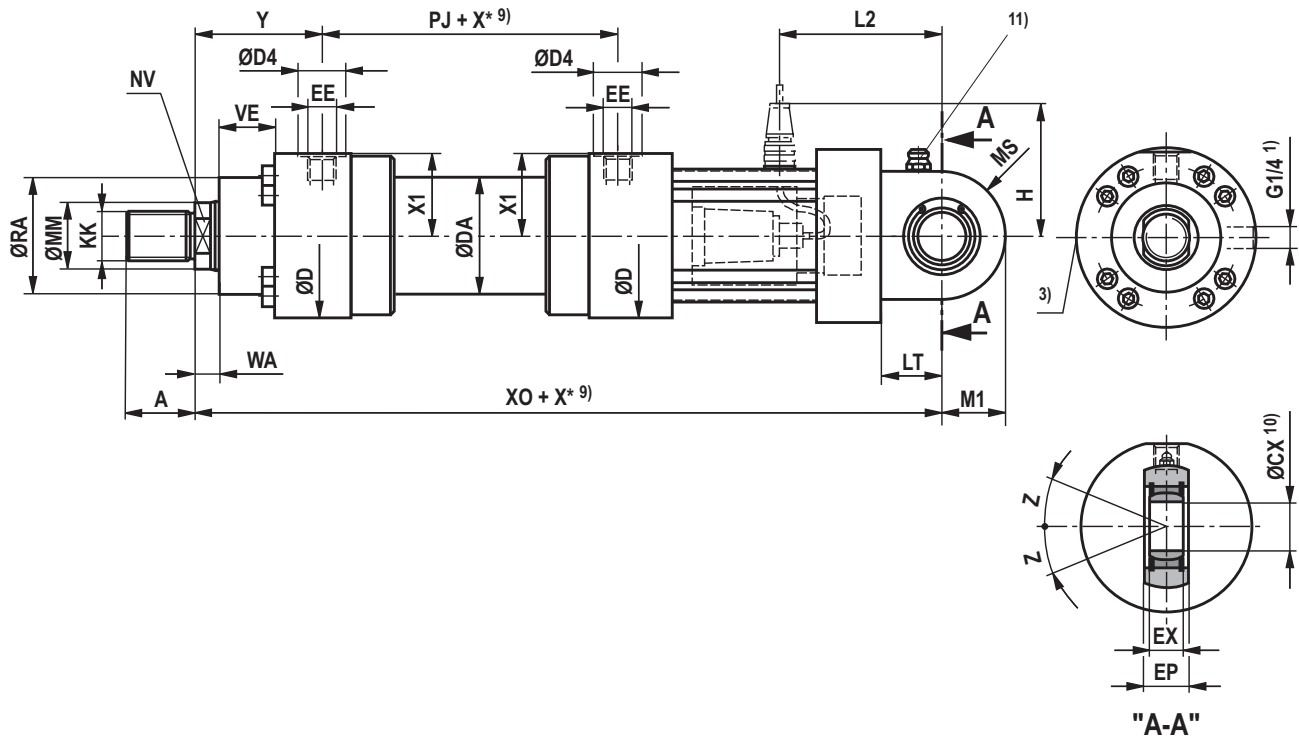
13) Dimensions for position transducer output „N“ and „P“

14) Dimensions for position transducer output „C“, „F“ and „D“

Self-aligning clevis at base CSH1: MP5

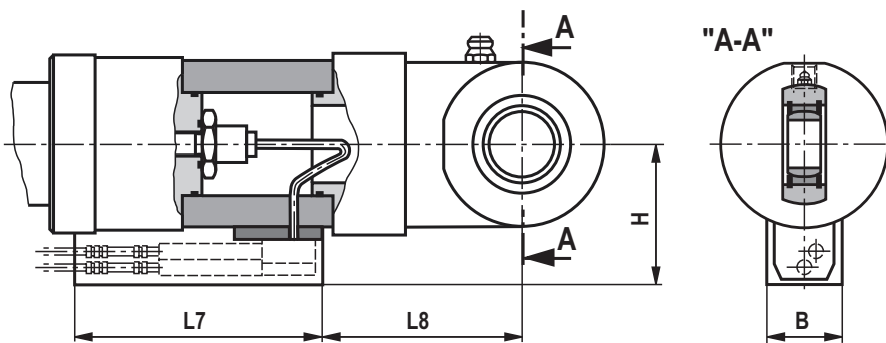
CSH1 MP5

for position measurement system output "C", "F" and "D"



CSH1 MP5

for position measurement system output "N" and "P"



Dimensions CSH1: MP5 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4)	EE 4)	Y	PJ	X1	X* max
40	28	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	41	1000
50	28/36	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48,5	1000
63	36/45	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56,5	2000
80	45/56	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67	2000
100	56/70	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82	3000
125	70/90	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99	3000
140	90/100	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109,5	3000
160	100/110	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129	3000
180	110/125	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142,5	3000
200	125/140	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152	3000
220	140/160	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174	3000
250	160/180	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194	3000
280	180/200	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210	3000
320	200/220	-	-	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	242	3000

ØAL	ØMM	WA	XO	X* min	LT	M1	MS	ØCX	EP -0,4	EX	Z	ØRA	VE	L2	H 14)	H 13)	L7	L8	B
40	28	14	417	-	32,5	28	31	25 _{-0,010}	23	20 _{-0,12}	7°	52	40	98	115	106	200	75	64
50	28/36	18	430	-	37,5	32,5	36	30 _{-0,010}	28	22 _{-0,12}	6°	65	40	103	120	113	200	80	64
63	36/45	22	480	-	45	40	42	35 _{-0,012}	30	25 _{-0,12}	6°	75	45	116	130	122	200	93	64
80	45/56	20	515	-	50	50	52	40 _{-0,012}	35	28 _{-0,12}	7°	95	45	132	125	133	200	104	64
100	56/70	30	560	-	60	62,5	65	50 _{-0,012}	40	35 _{-0,12}	6°	115	55	145	135	148	200	117	64
125	70/90	32	620	-	70	70	70	60 _{-0,015}	50	44 _{-0,15}	6°	135	60	172	145	166	200	148	64
140	90/100	35	665	-	75	82	82	70 _{-0,015}	55	49 _{-0,15}	6°	155	70	182	155	176	200	156	64
160	100/110	40	720	-	85	95	95	80 _{-0,015}	60	55 _{-0,15}	6°	200	80	200	165	196	200	168	64
180	110/125	40	775	-	90	113	113	90 _{-0,020}	65	60 _{-0,20}	5°	220	90	222	175	210	200	189	64
200	125/140	40	815	-	115	125	125	100 _{-0,020}	70	70 _{-0,20}	7°	235	95	237	190	217	200	206	64
220	140/160	40	960	-	125	150 ¹²⁾	140 ¹²⁾	110 _{-0,020}	80	70 _{-0,20}	6°	270	115	280	205	254	200	248	64
250	160/180	40	1000	-	140	168 ¹²⁾	158 ¹²⁾	110 _{-0,020}	80	70 _{-0,20}	6°	300	125	300	220	269	200	263	64
280	180/200	40	1105	31	150	188 ¹²⁾	178 ¹²⁾	120 _{-0,020}	90	85 _{-0,20}	6°	325	130	330	270	276	200	295	64
320	200/220	40	1210	-	175	210 ¹²⁾	200 ¹²⁾	140 _{-0,020}	110	90 _{-0,20}	7°	365	155	375	300	309	200	340	64

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

X*max = Max. stroke length

X*min = Min. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Throttle valve only with end position cushioning "E" (180° for bleeding)

4) Flange connections see separate table pages 36 and 37

5) Thread design „G“

6) Thread design „A“

9) Observe the min. stroke length "X*min"

10) Related bolt Ø m6;

related bolt Ø j6 with maintenance-free spherical bearing

11) Standard design „W“

Grease nipple cone head form A according to DIN 71412

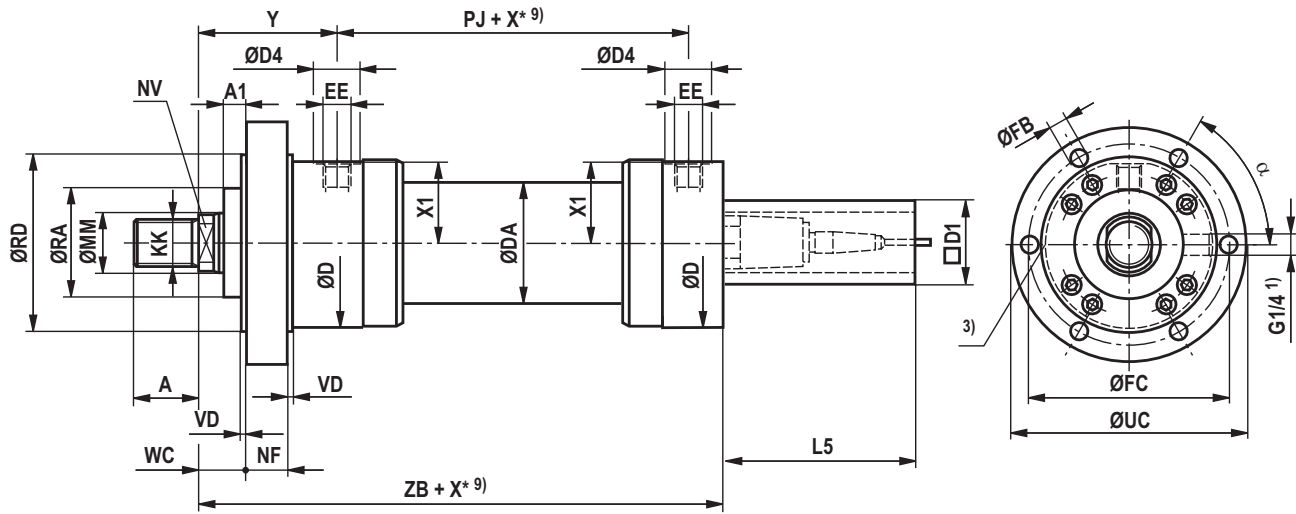
12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting

13) Dimensions for position transducer output „N“ and „P“

14) Dimensions for position transducer output „C“, „F“ and „D“

Round flange at head CSH1: MF3

CSH1 MF3



Dimensions CSH1: MF3 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4)	EE 4)	Y	PJ	X1	L5	X* max
40	28	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	41	166	1000
50	28/36	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48,5	166	1000
63	36/45	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56,5	166	2000
80	45/56	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67	166	2000
100	56/70	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82	166	3000
125	70/90	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99	166	3000
140	90/100	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109,5	166	3000
160	100/110	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129	166	3000
180	110/125	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142,5	166	3000
200	125/140	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152	166	3000
220	140/160	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174	166	3000
250	160/180	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194	166	3000
280	180/200	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210	166	3000
320	200/220	-	-	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243	166	3000

ØAL	ØMM	ØRD e8	WC	VD	NF	A1	ZB	X* min	ØFB H13	ØFC js13	ØUC -1	α	ØRA	D1 max
40	28	90	19	5	30	0	235	-	9	108	130	60°	52	80
50	28/36	110	23	5	30	0	243	-	11	130	160	60°	65	96
63	36/45	130	27	5	35	0	287	-	13,5	155	185	60°	75	96
80	45/56	145	25	5	35	0	312	-	13,5	170	200	60°	95	96
100	56/70	175	35	5	45	0	352	-	17,5	205	245	60°	115	96
125	70/90	210	37	5	50	0	392	-	22	245	295	60°	135	96
140	90/100	230	45	10	50	0	430	-	22	265	315	60°	155	96
160	100/110	275	50	10	60	0	475	-	30	325	385	60°	200	96
180	110/125	300	50	10	70	0	515	-	30	360	420	60°	220	96
200	125/140	320	50	10	75	0	535	-	33	375	445	60°	235	96
220	140/160	370	60	10	85	20	635	-	33	430	490	60°	270	96
250	160/180	415	70	10	85	30	659	-	39	485	555	60°	300	96
280	180/200	450	65	10	95	25	744	31	39	520	590	60°	325	96
320	200/220	510	65	10	120	25	815	-	45	600	680	60°	365	96

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

X*max = Max. stroke length

X*min = Min. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Throttle valve only with end position cushioning "E" (180° for bleeding)

4) Flange connections see separate table pages 36 and 37

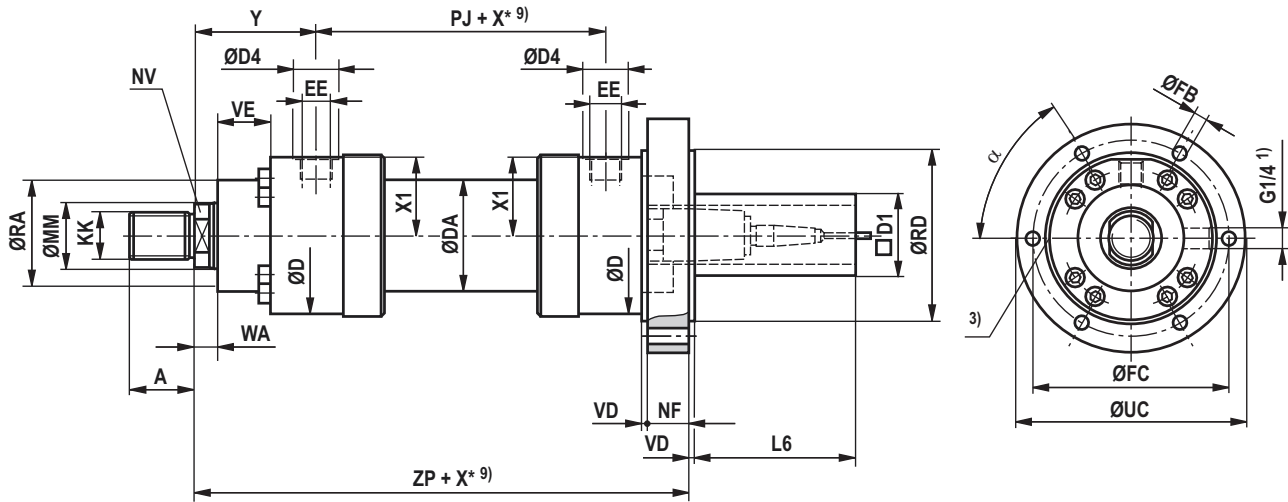
5) Thread design „G”

6) Thread design „A”

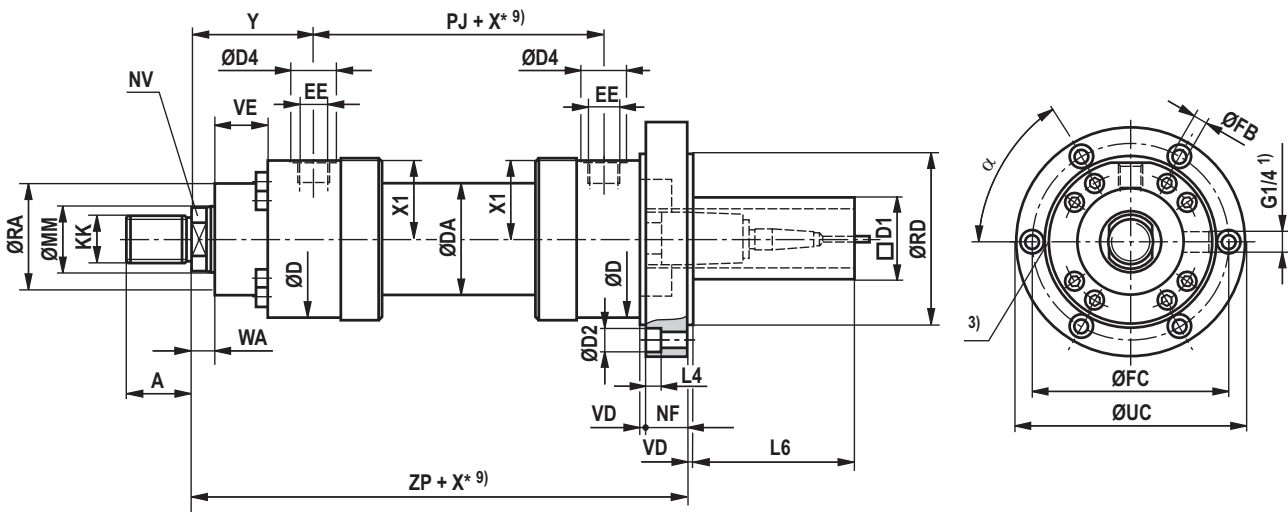
9) Observe the min. stroke length "X*min"

Round flange at base CSH1: MF4

CSH1 MF4; ØAL 40 to 100 mm



CSH1 MF4; ØAL 125 to 320 mm



Dimensions CSH1: MF4 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4)	EE 4)	Y	PJ	X1	L4	ØD2	X* max
40	28	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	41	0	0	1000
50	28/36	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48,5	0	0	1000
63	36/45	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56,5	0	0	2000
80	45/56	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67	0	0	2000
100	56/70	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82	0	0	3000
125	70/90	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99	21,5	33	3000
140	90/100	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109,5	21,5	33	3000
160	100/110	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129	28,5	43	3000
180	110/125	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142,5	28,5	43	3000
200	125/140	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152	32	48	3000
220	140/160	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174	32	48	3000
250	160/180	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194	38	57	3000
280	180/200	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210	38	57	3000
320	200/220	-	-	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243	44	66	3000

ØAL	ØMM	WA	ZP	X* min	NF	VD	ØRD e8	ØFB H13	ØFC js13	ØUC -1	α	ØRA	VE	L6	D1 max
40	28	14	265	-	30	5	90	9	108	130	60°	52	40	166	80
50	28/36	18	274	-	30	5	110	11	130	160	60°	65	40	166	96
63	36/45	22	310	-	35	5	130	13,5	155	185	60°	75	45	166	96
80	45/56	20	330	-	35	5	145	13,5	170	200	60°	95	45	143	96
100	56/70	30	390	-	45	5	175	17,5	205	245	60°	115	55	123	96
125	70/90	32	432	-	50	5	210	22	245	295	60°	135	60	121	96
140	90/100	35	475	-	50	10	230	22	265	315	60°	155	70	111	96
160	100/110	40	535	-	60	10	275	30	325	385	60°	200	80	96	96
180	110/125	40	585	-	70	10	300	30	360	420	60°	220	90	86	96
200	125/140	40	615	-	75	10	320	33	375	445	60°	235	95	76	96
220	140/160	40	720	-	85	10	370	33	430	490	60°	270	115	71	96
250	160/180	40	744	-	85	10	415	39	485	555	60°	300	125	71	96
280	180/200	40	839	31	95	10	450	39	520	590	60°	325	130	61	96
320	200/220	40	935	-	120	10	510	45	600	680	60°	365	155	36	96

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

X*max = Max. stroke length

X*min = Min. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Throttle valve only with end position cushioning "E" (180° for bleeding)

4) Flange connections see separate table pages 36 and 37

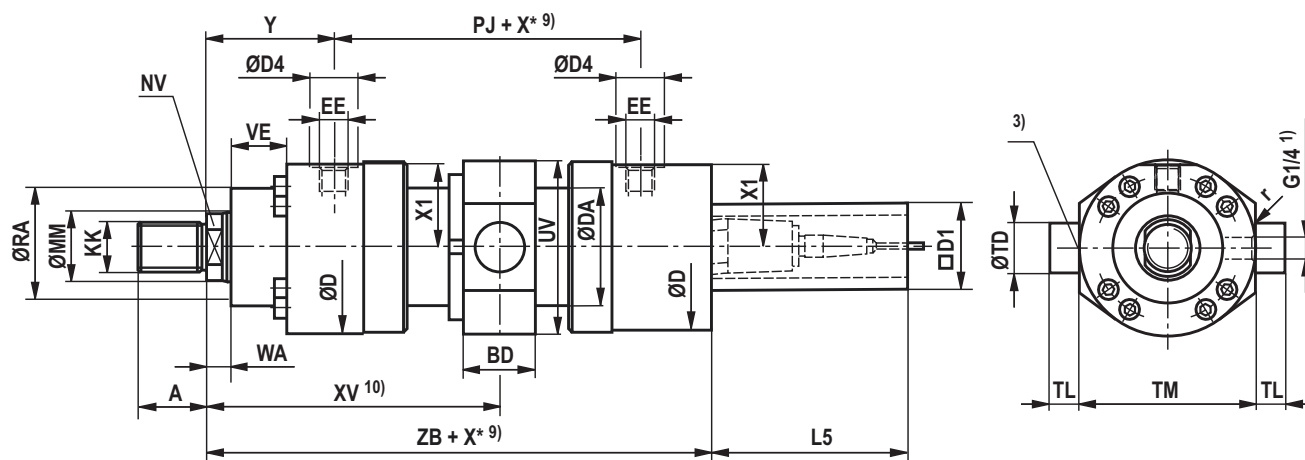
5) Thread design „G”

6) Thread design „A”

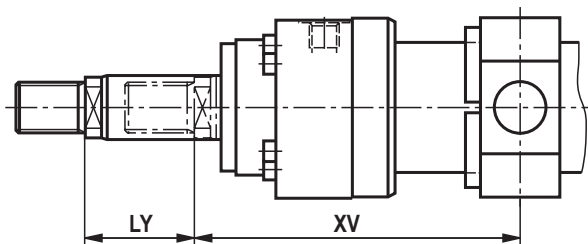
9) Observe the min. stroke length "X*min"

Trunnion CSH1: MT4

CSH1 MT4



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



Dimensions CSH1: MT4 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4)	EE 4)	Y	PJ	X1	WA	L5	X* max
40	28	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	41	14	166	1000
50	28/36	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48,5	18	166	1000
63	36/45	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56,5	22	166	2000
80	45/56	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67	20	166	2000
100	56/70	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82	30	166	3000
125	70/90	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99	32	166	3000
140	90/100	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109,5	35	166	3000
160	100/110	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129	40	166	3000
180	110/125	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142,5	40	166	3000
200	125/140	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152	40	166	3000
220	140/160	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174	40	166	3000
250	160/180	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194	40	166	3000
280	180/200	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210	40	166	3000
320	200/220	-	-	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243	40	166	3000

ØAL	ØMM	ZB	X* min	XV 11) cent	XV 10) min	XV 10) max	BD	UV 12)	ØTD e8	TL js16	TM h13	r	ØRA	VE	D1 max
40	28	235	22	139+X*/2	150	136+X*	38	97	30	20	95	1,6	52	40	80
50	28/36	243	32	147+X*/2	163	140+X*	38	111	30	20	115	1,6	65	40	96
63	36/45	287	47	166,5+X*/2	190	155+X*	48	129	35	20	130	2	75	45	96
80	45/56	312	58	177+X*/2	206	160+X*	58	153	40	25	145	2	95	45	96
100	56/70	352	79	209,5+X*/2	249	185+X*	78	183	50	30	175	2	115	55	96
125	70/90	392	91	237,5+X*/2	283	207+X*	98	220	60	40	210	2,5	135	60	96
140	90/100	430	121	265,5+X*/2	326	220+X*	118	243	65	42,5	230	2,5	155	70	96
160	100/110	475	142	305+X*/2	376	254+X*	128	282	75	52,5	275	2,5	200	80	96
180	110/125	515	158	331+X*/2	410	272+X*	138	310	85	55	300	2,5	220	90	96
200	125/140	535	194	344+X*/2	441	267+X*	168	331	90	55	320	2,5	235	95	96
220	140/160	635	155	405+X*/2	482,5	327,5+X*	135	377	100	60	370	2,5	270	115	96
250	160/180	659	175	429+X*/2	516,5	341,5+X*	145	417	110	65	410	2,5	300	125	96
280	180/200	744	336	469,5+X*/2	637,5	301,5+X*	165	448	130	70	450	2,5	325	130	96
320	200/220	815	180	502,5+X*/2	592,5	412,5+X*	195	513	160	90	510	2,5	365	155	96

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

X*max = Max. stroke length

X*min = Min. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Throttle valve only with end position cushioning "E" (180° for bleeding)

4) Flange connections see separate table pages 36 and 37

5) Thread design „G“

6) Thread design „A“

9) Observe the min. stroke length "X*min"

10) When ordering, always specify the "XV" dimension in the clear text. Preferred XV dimension: Observe the trunnion position in the cylinder center XVmin and XVmax

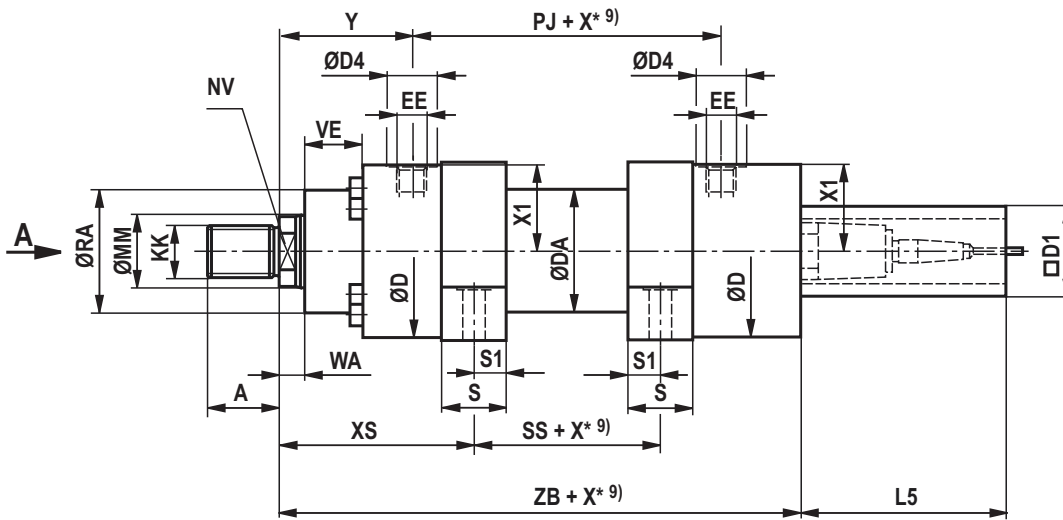
11) XVcent recommendation: Trunnion position in cylinder center

12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting

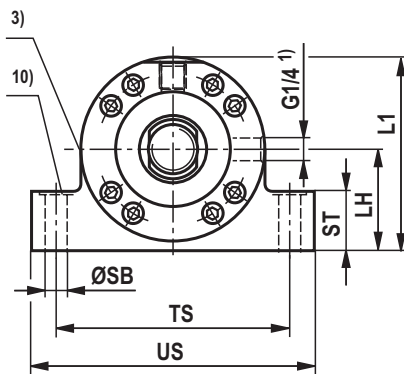
Important installation information: During installation, it must be ensured that the trunnion bearings are installed up to the trunnion shoulders. Any non-compliance may reduce the product's service life.

Foot mounting CSH1: MS2

CSH1 MS2; ØAL 40 to 320 mm



View A



Dimensions CSH1: MS2 (dimensions in mm)

ØAL	ØMM	KK 5)	A 5)	KK 6)	A 6)	NV	ØD	ØDA	ØD4 2)	EE 4)	EE 4)	Y	PJ	X1	WA	L5	X* max
40	28	M16x1,5	16	M18x2	30	16/22	88	52	34	G1/2	M22x1,5	79	120	41	14	166	1000
50	28/36	M22x1,5	22	M24x2	35	22/30	102	62	34	G1/2	M22x1,5	87	120	48,5	18	166	1000
63	36/45	M28x1,5	28	M30x2	45	30/36	120	78	42	G3/4	M27x2	100	133	56,5	22	166	2000
80	45/56	M35x1,5	35	M39x3	55	36/46	140	95	42	G3/4	M27x2	104	146	67	20	166	2000
100	56/70	M45x1,5	45	M50x3	75	46/60	170	125	47	G1	M33x2	124	171	82	30	166	3000
125	70/90	M58x1,5	58	M64x3	95	60/75	206	150	58	G1 1/4	M42x2	135	205	99	32	166	3000
140	90/100	M65x1,5	65	M80x3	110	75/85	226	170	58	G1 1/4	M42x2	156	219	109,5	35	166	3000
160	100/110	M80x2	80	M90x3	120	85/95	265	190	65	G1 1/2	M48x2	185	240	129	40	166	3000
180	110/125	M100x2	100	M100x3	140	95/110	292	210	65	G1 1/2	M48x2	199	264	142,5	40	166	3000
200	125/140	M110x2	110	M110x4	150	110/120	310	235	65	G1 1/2	M48x2	205	278	152	40	166	3000
220	140/160	M120x3	120	M120x4	160	120/140	355	273	65	G1 1/2	M48x2	242	326	174	40	166	3000
250	160/180	M120x3	120	M120x4	160	140/160	395	305	65	G1 1/2	M48x2	266	326	194	40	166	3000
280	180/200	M130x3	130	M150x4	190	160/180	425	343	65	G1 1/2	M48x2	282	375	210	40	166	3000
320	200/220	-	-	M160x4	200	180/200	490	394	65	G1 1/2	M48x2	287	431	243	40	166	3000

ØAL	ØMM	XS	ZB	SS	X* min	S	S1	ØSB H13	ST	TS js13	US 12) -1	LH	L1 12)	ØRA	VE	D1 max
40	28	114	235	50	-	30	15	11	32	110	140	45	93	52	40	80
50	28/36	124,5	243	45	-	35	17,5	11	37	130	161	55	110	65	40	96
63	36/45	142	287	49	-	40	20	13,5	42	150	183	65	129	75	45	96
80	45/56	151	312	52	2	50	25	17,5	47	180	220	75	149	95	45	96
100	56/70	179	352	61	3	60	30	22	57	210	260	90	181	115	55	96
125	70/90	200	392	75	-	70	35	26	67	255	313	105	215	135	60	96
140	90/100	230,5	430	70	19	85	42,5	30	72	290	359	115	235	155	70	96
160	100/110	272,5	475	65	44	105	52,5	33	77	330	402	135	277	200	80	96
180	110/125	296,5	515	69	50	115	57,5	40	92	360	445	150	305	220	90	96
200	125/140	307,5	535	73	56	125	62,5	40	97	385	471	160	322	235	95	96
220	140/160	367,5	635	75	100	155	77,5	45	102	445	541	185	373	270	115	96
250	160/180	391,5	659	75	100	155	77,5	52	112	500	610	205	414	300	125	96
280	180/200	407,5	744	124	171	155	77,5	52	127	530	641	225	449	325	130	96
320	200/220	440	815	125	85	190	95	62	142	610	732	255	512	365	155	96

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

X*max = Max. stroke length

X*min = Min. stroke length

1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)

2) Ø D4 max. 0.5 mm deep

3) Throttle valve only with end position cushioning "E" (180° for bleeding)

4) Flange connections see separate table pages 36 and 37

5) Thread design „G”

6) Thread design „A”

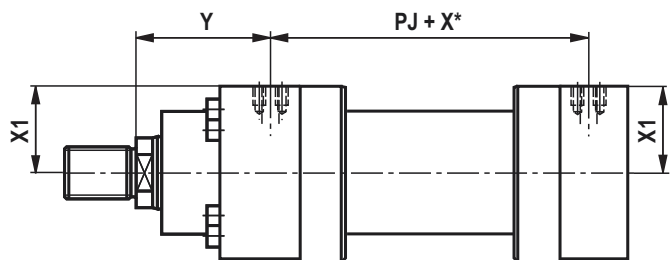
9) Observe the min. stroke length "X*min"

10) Recess 2 mm deep, for hexagon socket head cap screws; ISO 4762 – The screws must not be subjected to shear force. Force distribution via additional external fitting strips.

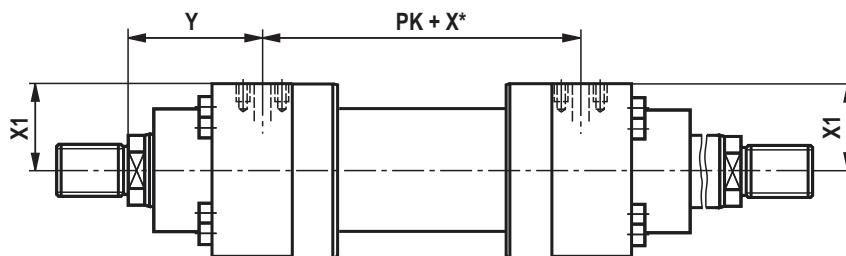
12) The specified dimensions are maximum values, tolerance classes 342 according to ISO 9013 Thermal cutting

Flange connections

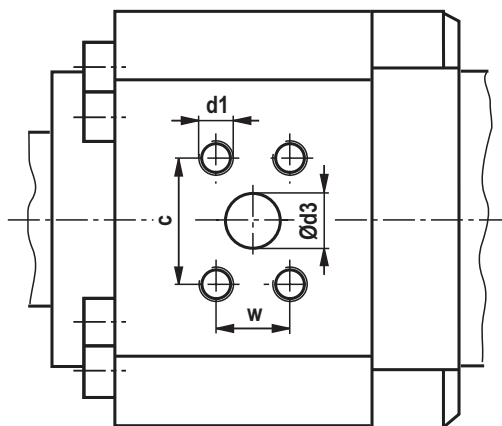
CDH1/CSH1



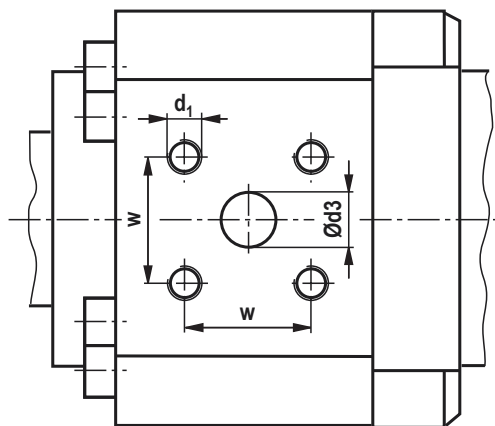
CGH1



Porting pattern for rectangular flange according to ISO 6162-2 table 2 type 1



Porting pattern for square flange according to ISO 6164 table 2



Flange connections

Dimensions (dimensions in mm)

ØAL	Version „D“ ISO 6162-2 tab.2 type1 (400 bar) (\triangleq SAE 6000 PSI)											Version „H“ ISO 6164 tab.2 (400 bar)								
	Y	PJ PK	X1	Ød ₃	Ød ₃ ⁴⁾	c ±0,25	w ±0,25	d ₁	t ₁ ¹⁾	t ₁ ²⁾	p ³⁾	Y	PJ PK	X1	Ød ₃	w ±0,25	d1	t ₁ ¹⁾	t ₁ ²⁾	p ³⁾
40	-	-	-	-	-	-	-	-	-	-	-	78	122	40,5	10	24,7	M6	12,5	10	400
50	-	-	-	-	-	-	-	-	-	-	-	86	122	48	10	24,7	M6	12,5	10	400
63	-	-	-	-	-	-	-	-	-	-	-	99	135	57	13	29,7	M8	16	13	400
80	102,5	149	65	13	1/2"	40,5	18,2	M8	16	14	400	103	148	67	13	29,7	M8	16	15	400
100	124	171	80,5	13	1/2"	40,5	18,2	M8	16	16	400	123	173	81,5	19	35,4	M8	16	16	400
125	135	205	97,5	19	3/4"	50,8	23,8	M10	20	20	400	131,5	212	99	25	43,8	M10	20	20	400
140	152	227	107	25	1"	57,2	27,8	M12	24	24	400	152	227	109	25	43,8	M10	20	20	400
160	184	242	127	25	1"	57,2	27,8	M12	24	24	400	182,5	245	128	32	51,6	M12	24	24	400
180	199	264	139,5	32	1 1/4"	66,6	31,8	M14	26	26	400	199	264	142	32	51,6	M12	24	24	400
200	205	278	149	32	1 1/4"	66,6	31,8	M14	26	26	400	201,5	285	149,5	38	60,1	M16	30	30	400
220	242	326	168	38	1 1/2"	79,3	36,5	M16	30	30	400	242	326	171	38	60,1	M16	30	30	400
250	266	326	189	38	1 1/2"	79,3	36,5	M16	30	30	400	266	326	192	38	60,1	M16	30	30	400
280	282	375	204	38	1 1/2"	79,3	36,5	M16	30	30	400	282	375	207	38	60,1	M16	30	30	400
320	287	431	236	51	2"	96,8	44,5	M20	36	36	400	287	431	240	51	69,3	M16	30	30	400

Dimensions see page 10 to 21, and/or pages 24 to 35

ØAL = Piston Ø

X* = Stroke length

1) Thread depth for seal design M, T, G, L, R, S and V

2) Thread depth for seal design A and B

3) Max. operating pressure for related flanges in bar

4) Flange porting pattern according to ISO 6162-2 tab. 2 type 1 corresponds to flange porting pattern according to SAE 6000 PSI

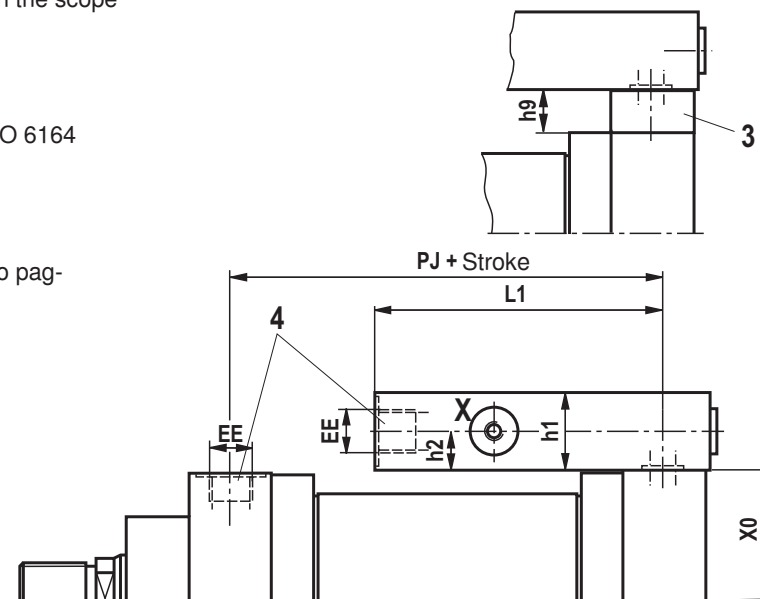
Subplates for valve mounting (SL and SV valve)

Note:

Valves, fittings and piping are **not** included in the scope of delivery!

- 1 Port B to the piston side according to ISO 6164
- 2 Bore for locating pin
- 3 Adapter plate for MT4 type of mounting (part of the scope of delivery for MT4)
- 4 Line connection "B" dimensions see also pages 10 to 21 as well as pages 24 to 35

Installation situation with MT4



Important notice

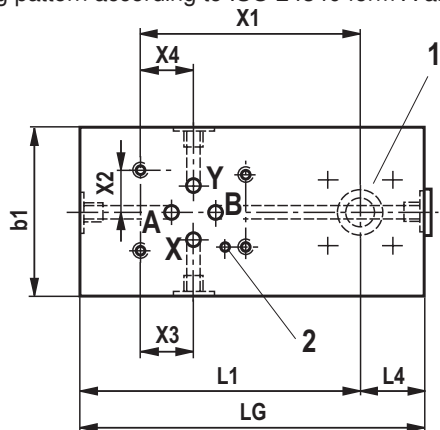
Subplates for SL and SV valves (isolator valves)

Note:

Seal designs T, G, L, R, S and V are not designed for the static holding function!

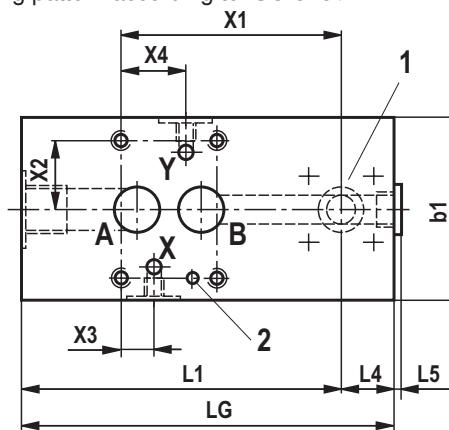
Size 6

Porting pattern according to ISO 24340 form A and ISO 4401



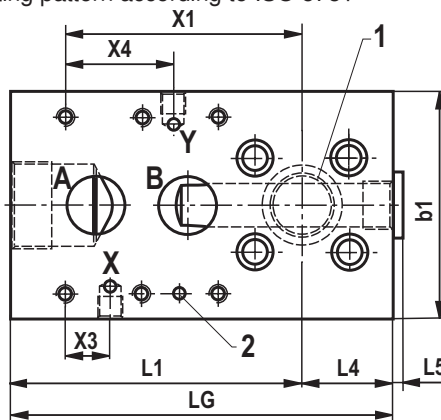
Size 10 and 20

Porting pattern according to ISO 5781

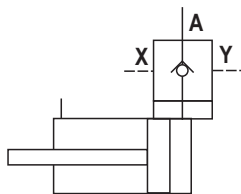


Size 30

Porting pattern according to ISO 5781



Piping symbol

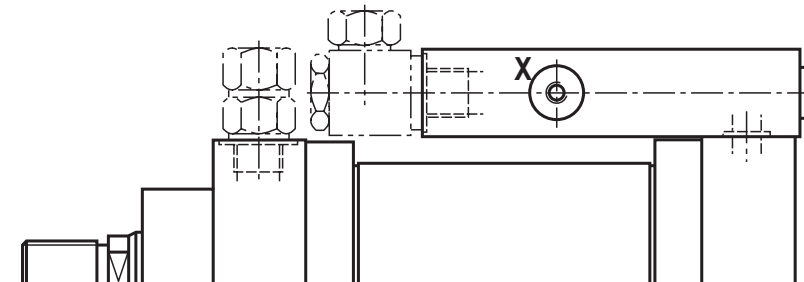


Subplates for valve mounting (SL and SV valve – dimensions in mm)

ØAL	Valve size	PJ	EE	Stroke min ¹		X0	Plate dimensions							Port size, porting pattern						Position point Valve	
				2)	3)		L1	L4	L5	LG	b1	h1	h9	h2	A	X	Y	X3	X4	X1	X2
40	6	121	G1/2	50	50	40,5	90	20	4	110	55	40	10	20	G1/2	G1/4	G1/4	21,5	21,5	65,5	15,5
50	6	121	G1/2	50	50	48,0	90	20	4	110	55	40	10	20	G1/2	G1/4	G1/4	21,5	21,5	65,5	15,5
63	6	134	G3/4	64	64	57,0	100	25	5	125	55	47	20	23,5	G3/4	G1/4	G1/4	21,5	21,5	70,5	15,5
	10	134	G3/4	64	64	57,0	105	25	5	130	85	47	20	23,5	G3/4	G1/4	G1/4	21,4	21,4	73	33,3
80	6	147	G3/4	58	58	67,0	100	25	5	125	55	47	20	23,5	G3/4	G1/4	G1/4	21,5	21,5	70,5	15,5
	10	147	G3/4	58	58	67,0	105	25	5	130	85	47	20	23,5	G3/4	G1/4	G1/4	21,4	21,4	73	33,3
100	10	172	G1	50	79	81,5	102	28	5	130	85	50	20	25	G1	G1/4	G1/4	21,4	21,4	70	33,3
125	10	208,5	G1 1/4	60	91	99,0	115	35	5	150	85	60	30	30	G1 1/4	G1/4	G1/4	21,4	21,4	80	33,3
	20	208,5	G1 1/4	60	91	99,0	140	35	5	175	100	60	30	30	G1 1/4	G1/4	G1/4	20,8	39,7	95	39,7
140	10	223	G1 1/4	50	121	109,0	115	35	5	150	85	60	30	30	G1 1/4	G1/4	G1/4	21,4	21,4	80	33,3
	20	223	G1 1/4	50	121	109,0	140	35	5	175	100	60	30	30	G1 1/4	G1/4	G1/4	20,8	39,7	95	39,7
160	10	242,5	G1 1/2	60	142	128,0	120	40	5	160	85	70	30	35	G1 1/2	G1/4	G1/4	21,4	21,4	90	33,3
	20	242,5	G1 1/2	60	142	128,0	135	50	5	185	100	70	30	35	G1 1/2	G1/4	G1/4	20,8	39,7	105	39,7
	30	242,5	G1 1/2	60	142	128,0	160	50	5	210	125	70	30	35	G1 1/2	G1/4	G1/4	24,6	59,6	130	48,4
180	10	264	G1 1/2	50	158	142,0	120	40	5	160	85	70	30	35	G1 1/2	G1/4	G1/4	21,4	21,4	90	33,3
	20	264	G1 1/2	50	158	142,0	135	50	5	185	100	70	30	35	G1 1/2	G1/4	G1/4	20,8	39,7	105	39,7
	30	264	G1 1/2	50	158	142,0	160	50	5	210	125	70	30	35	G1 1/2	G1/4	G1/4	24,6	59,6	130	48,4
200	10	281,5	G1 1/2	30 ⁴⁾	194	149,5	130	45	5	175	95	70	20	35	G1 1/2	G1/4	G1/4	21,4	21,4	100	33,3
	20	281,5	G1 1/2	30 ⁴⁾	194	149,5	140	45	5	185	100	70	20	35	G1 1/2	G1/4	G1/4	20,8	39,7	115	39,7
	30	281,5	G1 1/2	30 ⁴⁾	194	149,5	165	45	5	210	125	70	20	35	G1 1/2	G1/4	G1/4	24,6	59,6	140	48,4

ØAL = Piston Ø

¹⁾ The information only applies to the following connection situation!



²⁾ Not for MT4

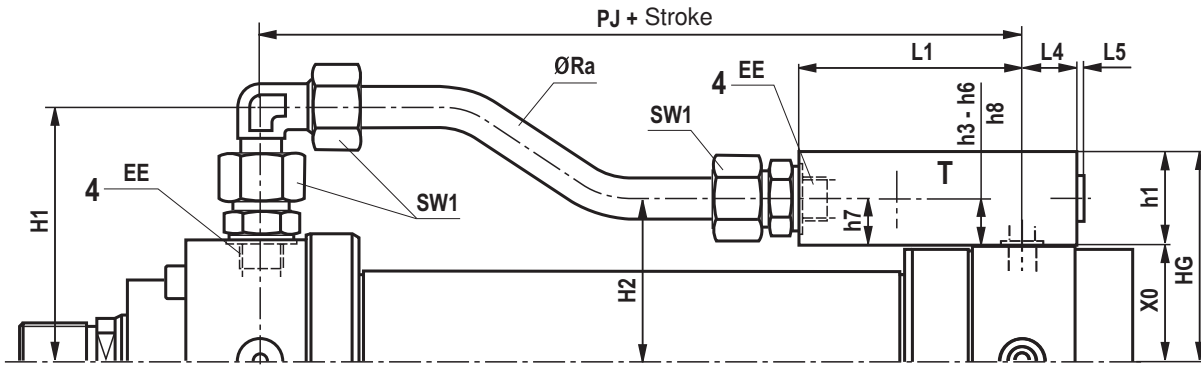
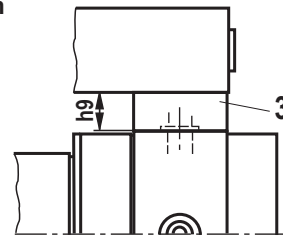
³⁾ Only for MT4

⁴⁾ With type of mounting "MS2", observe X*min on page 21 and/or 35

Subplates for valve mounting (directional and high-response valves)

- 1 Port B to the piston side according to ISO 6164
- 2 Bore for locating pin
- 3 Adapter plate for MT4 type of mounting (part of the scope of delivery for MT4)
- 4 Line connection "B" dimensions see also pages 10 to 21 as well as pages 24 to 35

Installation situation with MT4

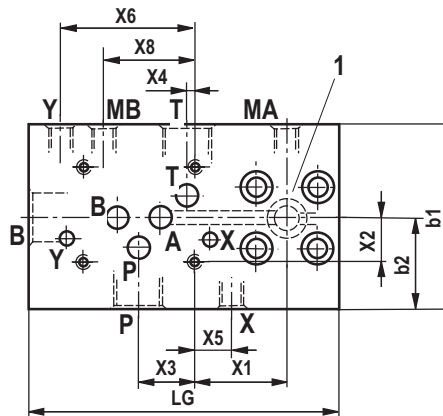
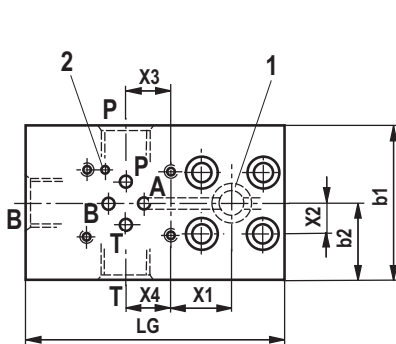


Size 6

Porting pattern according to ISO 24340 form A and ISO 4401

Size 10

Porting pattern according to ISO 24340 form A and ISO 4401

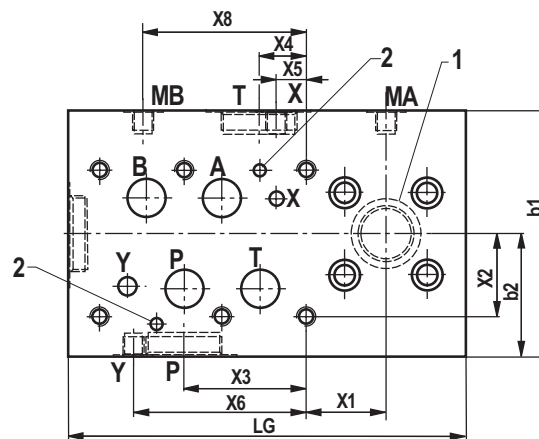
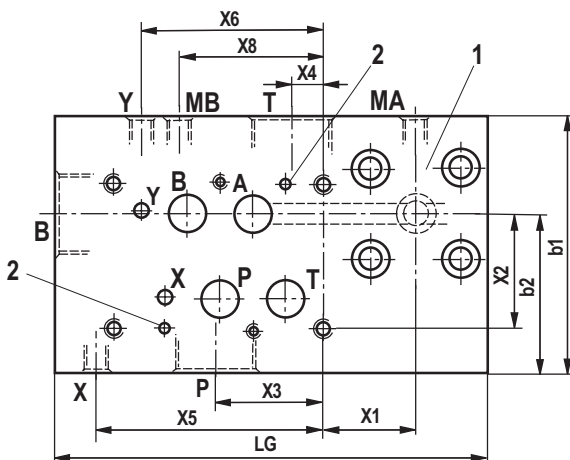


Size 16

Porting pattern according to ISO 24340 form A and ISO 4401

Size 25

Porting pattern according to ISO 24340 form A and ISO 4401



With larger stroke lengths and depending on the piston diameter, the pipeline is mounted at the cylinder pipe using pipe supports. A maximum of two sandwich plates is admissible.

Subplates for valve mounting (directional and high-response valves – dimensions in mm)

ØAL	Valve size	PJ	EE	Stroke min	Plate dimensions																
					L1	L4	L5 max	H1	H2 ¹⁾	H2 ²⁾	SW1	ØRa	b1	h1	LG	HG ¹⁾	HG ²⁾	b2	X0	h7	h9
40	6	121	G1/2	242	90	20	4	96,0	60,5	70,5	30	16,0x2,5	65	40	110	80,5	90,5	32,5	40,5	20	10
50	6	121	G1/2	242	90	20	4	103,5	68,0	78,0	30	16,0x2,5	65	40	110	88,0	98,0	32,5	48,0	20	10
63	6	134	G3/4	276	100	25	5	121,5	80,5	100,5	36	20,0x3,0	75	47	125	104,0	124,0	37,5	57,0	23,5	20
	10	134	G3/4	301	125	25	5	121,5	80,0	100,0	36	20,0x3,0	90	70	150	127,0	147,0	45	57,0	23	20
80	6	147	G3/4	263	100	25	5	132,0	90,5	110,5	36	20,0x3,0	75	47	125	114,0	134,0	37,5	67,0	23,5	20
	10	147	G3/4	288	125	25	5	132,0	90,0	110,0	36	20,0x3,0	90	70	150	137,0	157,0	45	67,0	23	20
100	10	172	G1	317	132	28	5	155,0	111,5	131,5	46	25,0x4,0	90	80	160	161,5	181,5	45	81,5	30	20
125	10	208,5	G1 1/4	330	135	35	5	177,5	134,0	164,0	50	30,0x5,0	105	95	170	194,0	224,0	52,5	99,0	35	30
	16	208,5	G1 1/4	370	175	35	5	177,5	144,0	174,0	50	30,0x5,0	120	100	210	199,0	229,0	60	99,0	45	30
140	10	223	G1 1/4	315	135	35	5	188,0	144,0	174,0	50	30,0x5,0	105	95	170	204,0	234,0	52,5	109,0	35	30
	16	223	G1 1/4	355	175	35	5	188,0	154,0	184,0	50	30,0x5,0	120	100	210	209,0	239,0	60	109,0	45	30
160	10	242,5	G1 1/2	399	150	40	5	218,0	163,0	193,0	60	38,0x6,0	105	95	190	223,0	253,0	52,5	128,0	35	30
	16	242,5	G1 1/2	429	180	40	5	218,0	178,0	208,0	60	38,0x6,0	125	105	220	233,0	263,0	62,5	128,0	50	30
	25	242,5	G1 1/2	449	200	50	0	218,0	183,0	213,0	60	38,0x6,0	155	110	250	238,0	268,0	77,5	128,0	55	30
180	10	264	G1 1/2	377	150	40	5	231,5	177,0	207,0	60	38,0x6,0	105	95	190	237,0	267,0	52,5	142,0	35	30
	16	264	G1 1/2	407	180	40	5	231,5	192,0	222,0	60	38,0x6,0	125	105	220	247,0	277,0	62,5	142,0	50	30
	25	264	G1 1/2	427	200	50	0	231,5	197,0	227,0	60	38,0x6,0	155	110	250	252,0	282,0	77,5	142,0	55	30
200	10	281,5	G1 1/2	365	155	50	5	241,0	184,5	204,5	60	38,0x6,0	110	95	205	244,5	264,5	55	149,5	35	20
	16	281,5	G1 1/2	400	190	50	5	241,0	199,5	219,5	60	38,0x6,0	125	105	240	254,5	274,5	62,5	149,5	50	20
	25	281,5	G1 1/2	420	210	50	0	241,0	204,5	224,5	60	38,0x6,0	155	110	260	259,5	279,5	77,5	149,5	55	20

ØAL	Valve size	Port size, porting pattern																Position point Valve	
		P	X3	h3	T	X4	h4	X	X5	h5	Y	X6	h6	MA	MB	X8	h8	X1	X2
40	6	G1/2	21,5	20	G1/2	21,5	20	-	-	-	-	-	-	-	-	-	-	25	15,5
50	6	G1/2	21,5	20	G1/2	21,5	20	-	-	-	-	-	-	-	-	-	-	25	15,5
63	6	G3/4	21,5	23,5	G3/4	21,5	23,5	-	-	-	-	-	-	-	-	-	-	30	15,5
	10	G3/4	27	33	G3/4	3,5	33	G1/4	18	47	G1/4	65,0	47	G1/4	G1/4	60	17	45	21,4
80	6	G3/4	21,5	23,5	G3/4	21,5	23,5	-	-	-	-	-	-	-	-	-	-	30	15,5
	10	G3/4	27	33	G3/4	3,5	33	G1/4	18	47	G1/4	65,0	47	G1/4	G1/4	60	17	45	21,4
100	10	G1	27	30	G1	3,5	40	G1/4	18	57	G1/4	65,0	57	G1/4	G1/4	58	20	52	21,4
125	10	G1 1/4	27	35	G1 1/4	3,5	45	G1/4	20	72	G1/4	65,0	72	G1/4	G1/4	55	25	55	21,4
	16	G1 1/4	52	32	G1 1/4	15	32	G1/4	76,5	75	G1/4	88,0	80	G1/4	G1/4	88	40	45	40
140	10	G1 1/4	27	35	G1 1/4	3,5	45	G1/4	20	72	G1/4	65,0	72	G1/4	G1/4	55	25	55	21,4
	16	G1 1/4	52	32	G1 1/4	15	32	G1/4	76,5	75	G1/4	88,0	80	G1/4	G1/4	88	40	45	40
160	10	G1 1/2	27	35	G1 1/2	3,5	45	G1/4	20	72	G1/4	65,0	72	G1/4	G1/4	55	25	60	21,4
	16	G1 1/2	57	35	G1 1/2	15	34	G1/4	76,5	80	G1/4	86,0	85	G1/4	G1/4	86	45	50	40
	25	G1 1/2	77	42	G1 1/2	30	34	G1/4	19	90	G1/4	109,0	90	G1/4	G1/4	103	50	50	52,1
180	10	G1 1/2	27	35	G1 1/2	3,5	45	G1/4	20	72	G1/4	65,0	72	G1/4	G1/4	55	25	60	21,4
	16	G1 1/2	57	35	G1 1/2	15	34	G1/4	76,5	80	G1/4	86,0	85	G1/4	G1/4	86	45	50	40
	25	G1 1/2	77	42	G1 1/2	30	34	G1/4	19	90	G1/4	109,0	90	G1/4	G1/4	103	50	50	52,1
200	10	G1 1/2	27	35	G1 1/2	3,5	45	G1/4	19	72	G1/4	62,0	72	G1/4	G1/4	50	25	72	21,4
	16	G1 1/2	57	35	G1 1/2	15	34	G1/4	76,5	80	G1/4	86,0	85	G1/4	G1/4	86	45	60	40
	25	G1 1/2	77	42	G1 1/2	30	34	G1/4	19	90	G1/4	109,0	90	G1/4	G1/4	103	50	60	52,1

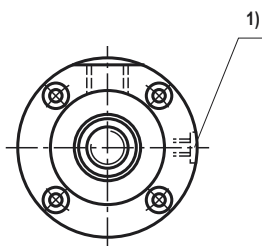
ØAL = Piston Ø

²⁾ Only for MT4¹⁾ Not for MT4

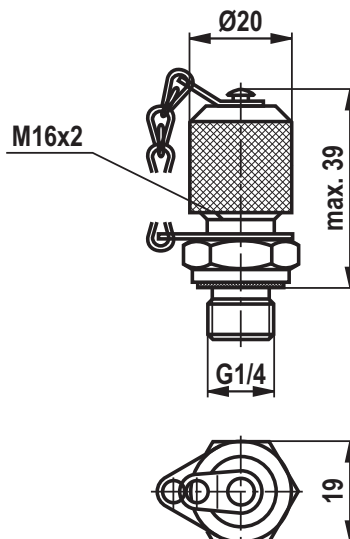
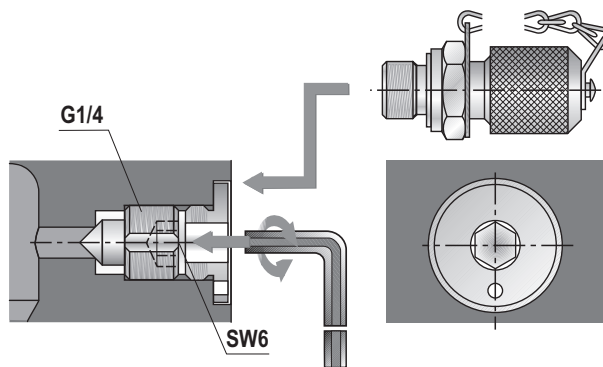
Bleeding / threaded coupling (dimensions in mm)

By default, a patented safety bleeding device against unintended screwing out in head and base is delivered for all cylinders.

The port allows for the installation of a threaded coupling with check valve for pressure measurement or contamination-free bleeding. Threaded coupling with check valve function, i.e. it can also be connected when the system is pressurized.



1) Bleeding: With view to the piston rod, the position is offset by 90° in relation to the line connection (clockwise)



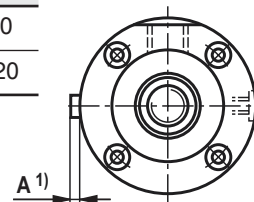
Scope of delivery: Threaded coupling **G1/4**
 SCREW JOINT AB 20-11/K1 G1/4 with seal ring of NBR
 Material no. **R900009090**
 SCREW JOINT AB 20-11/K1V G1/4 with seal ring of FKM
 Material no. **R900001264**

Throttle valve (dimensions in mm)

ØAL	40	50	63	80	100	125	140	160	180	200	220	250	280	320
Protrusion A ¹⁾	1	0	0	0	0	0	0	0	0	0	9,5	0	0	0
Nominal width	4	4	4	5	5	8	8	8	8	8	20	20	20	20

ØAL = Piston Ø

1) Throttle valve only with end position cushioning "E" (180° for bleeding) Protrusion A in closed condition



Proximity switch

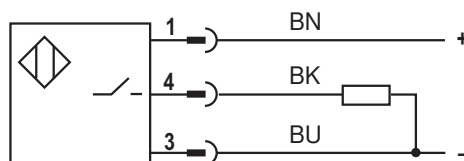
Inductive proximity switches are used as reliable end position control for hydraulic cylinders. They are an important element for the safe and exact monitoring of safety equipment, lockings and/or other machine functions in their end position by means of the output of signals. The proximity switch which is high-pressure-resistant up to 500 bar works in a contactless

manner. Consequently, it is wear-free. The proximity switch is set at the factory. The switching distance must not be adjusted. The lock nut of the proximity switch is marked at the factory using sealing wax. On versions with proximity switch, the cylinders are provided with proximity switches on both sides.

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

Function type		PNP normally open contact
Admissible pressure	bar	500
Operating voltage	V DC	10 ... 30
	Including residual ripple	%
		≤ 15
Voltage drop	V	≤ 1.5
Rated operating voltage	V DC	24
Rated operating current	mA	200
Idle current	mA	≤ 8
Residual current	μA	≤ 10
Repetition accuracy	%	≤ 5
Hysteresis	%	≤ 15
Ambient temperature range	°C	-25 ... +80
Temperature drift	%	≤ 10
Switching frequency	Hz	1000
Protection class	Active area	IP 68
	Proximity switch	IP 67
Housing material		Material no. 1.4104

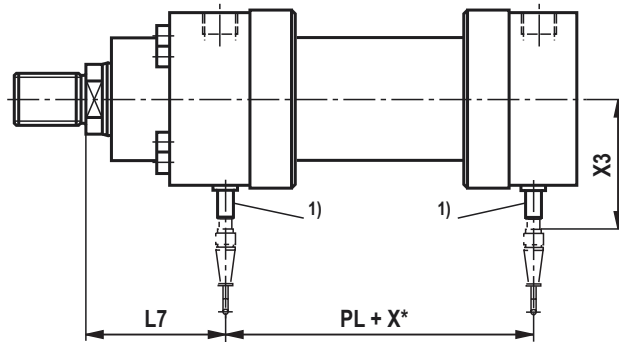
Pin assignment



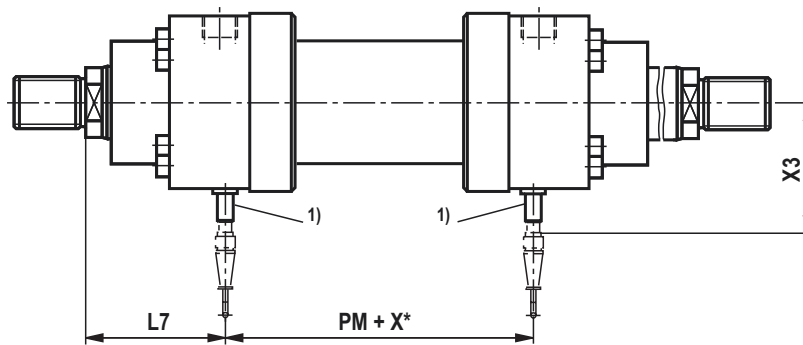
BN brown
BK black
BU blue

Proximity switch

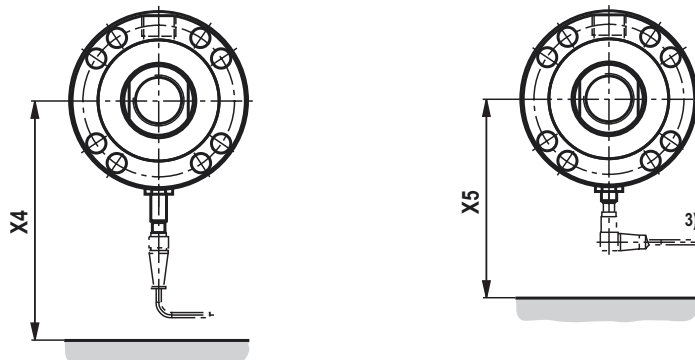
CDH1



CGH1



Installation space for mating connector



Mating connector with 5 m cable

Material no. **R900026512**

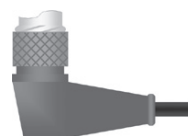
(mating connector is **not** included in the scope of delivery, must be ordered separately)

Mating connector, angled with 5 m cable

(**position of the cable outlet cannot be defined**)

Material no. **R988064311**

(mating connector is **not** included in the scope of delivery, must be ordered separately)



Proximity switch

Dimensions (dimensions in mm)

ØAL	ØMM	PL	PM	L7	X3	X4	X5
40	22 28	112	112	83	94	170	125
50	28 36	110	110	92	98	175	130
63	36 45	125	125	104	103	180	135
80	45 56	138	138	108	108	185	140
100	56 70	161	161	129	116	195	150
125	70 90	189	189	143	126	205	160
140	90 100	209	209	161	146	225	180
160	100 110	228	228	191	151	230	185
180	110 125	254	254	204	159	235	190
200	125 140	264	264	212	166	245	200
220	140 160	310	310	250	177 ²⁾	255	– ³⁾
250	160 180	310	310	274	187 ²⁾	265	– ³⁾
280	180 200	369	369	285	189 ²⁾	275	– ³⁾
320	200 220	415	415	295	209 ²⁾	285	– ³⁾

Dimensions see pages 10 to 21

ØAL = Piston Ø

ØMM = Piston rod Ø

X* = Stroke length

1) The proximity switch is always located opposite of the line connection

2) Piston Ø 220 - 320 mm
Proximity switch not protruding

3) Piston Ø 220 - 320 mm
Angled mating connector not possible

Position measurement system

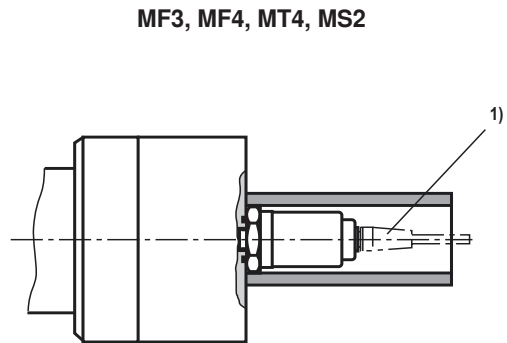
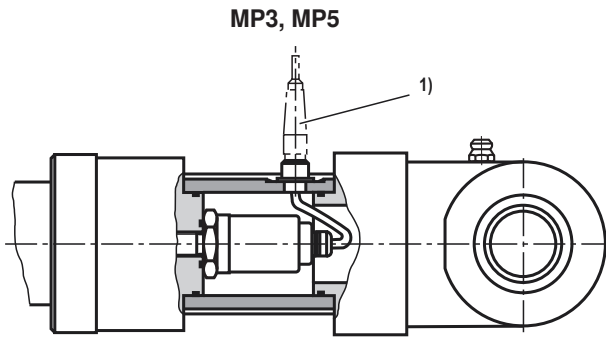
The position measurement system that is pressure-resistant up to 500 bar works in a contactless and absolute manner. The basis of this position measurement system is the magnetostrictive effect. Here, the coincidence of two magnetic fields triggers a torsion pulse. This pulse runs on the waveguide inside the gauge from the measuring point to the sensor head. The running time is constant and almost temperature-independent. It is proportional to the position of the solenoid and thus a measure for the actual position value and is converted in the sensor into a direct analog or digital output.

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

Operating pressure		bar	250
Analog output		V	0 to 10
	Load resistance	k Ω	≥ 5
	Resolution		unlimited
Analog output		mA	4 to 20
	Load resistance	Ω	0 to 500
	Resolution		unlimited
Digital output			SSI 24 bit gray-coded
	Resolution	μm	5
	Direction of measurement		asynchronously forward
Linearity (absolute accuracy)	Analog	% mm	$\leq \pm 0.02\%$ (referred to measurement length) min. ± 0.05
	Digital	% mm	$\leq \pm 0.01\%$ (referred to measurement length) min. ± 0.04
Reproducibility		% mm	± 0.001 (referred to measurement length) min. ± 0.0025
Hysteresis		mm	≤ 0.004
Supply voltage		V DC	24 ($\pm 10\%$ with analog output)
	Current consumption	mA	100
	Residual ripple	% s-s	≤ 1
	Current consumption	V DC mA	24 (+20 %/-15 % with digital output) 70
	Residual ripple	% s-s	≤ 1
Protection class	Pipe and flange		IP 67
	Sensor electronics		IP 65
Operating temperature	Sensor electronics	$^{\circ}\text{C}$	-40 to +75
Temperature coefficient	Voltage	ppm/ $^{\circ}\text{C}$	70
	Current	ppm/ $^{\circ}\text{C}$	90

Position measurement system

Types of mounting



1) For analog output:

6-pole Amphenol mating connector

Material no. **R900072231**

(mating connector is **not** included in the scope of delivery, must be ordered separately)



1) For digital output:

7-pole Amphenol mating connector

Material no. **R900079551**

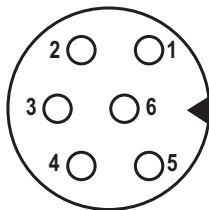
(mating connector is **not** included in the scope of delivery, must be ordered separately)



Pin assignment

Position measurement system (analog output)

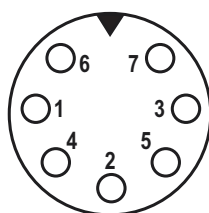
Connector (view to pin side)



Pin	Cable	Signal / current	Signal / voltage
1	Gray	4 ... 20 mA	0 ... 10 V
2	Pink	DC ground	DC ground
3	Yellow	Not used	Not used
4	Green	DC ground	DC ground
5	Brown	+24 V DC (+20 % / -15 %)	+24 V DC (+20 % / -15 %)
6	White	DC ground (0 V)	DC ground (0 V)

Position measurement system (digital output)

Connector (view to pin side)

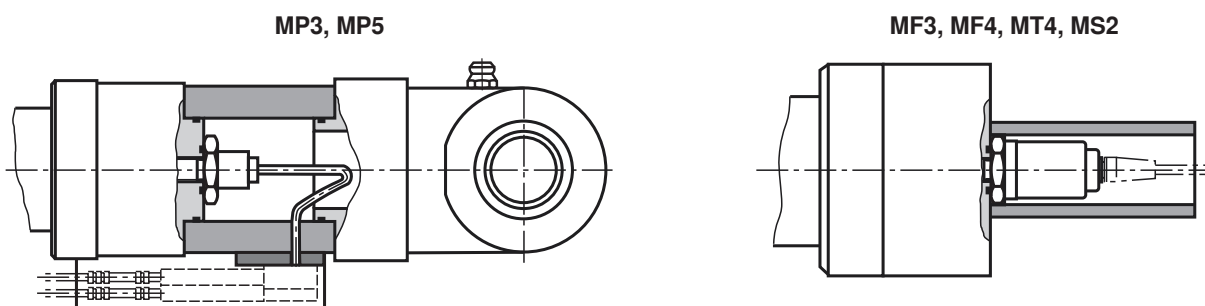


Pin	Cable	Signal / SSi
1	Gray	Data (-)
2	Pink	Data (+)
3	Yellow	Clock (+)
4	Green	Clock (-)
5	Brown	+24 V DC (+20 % / -15 %)
6	White	DC ground (0 V)
7	-	Not used

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

Output	Interface	Profibus-DP system
	Data record	Profibus-DP (EN 61158)
	Transmission rate	Max. 12 MB/s
Measurement accuracy	Travel resolution	1 μm to 1000 μm selectable as parameter
	Velocity	With 5 μm travel resolution: 0.64 mm/s to 500 mm; 0.43 mm/s to 2000 mm; 0.21 mm/s to 4500 mm; 0.14 mm/s to 7600 mm Measurement length With 2 μm travel resolution: 2.5 times smaller values
	Linearity	< +/-0.01 % F.S. (Minimum +/-50 μm)
	Repeatability	< +/-0.001 % F.S. (Minimum +/-2.5 μm)
	Temperature coefficient	< 15 ppm/ $^{\circ}\text{C}$
	Hysteresis	< 4 μm
	Application conditions	Operating temperature
Protection class		Profile: IP65 Rod: IP 67 with proper coupling plug assembly
Standards, EMC test		Interference emissions according to EN 61000-6-3 Interference resistance according to EN 61000-6-2 EN 61000-4-2/3/4/6, level 3/4, criterion A, CE-tested
Electrical connection	Operating voltage	24 VDC (-15 / +20 %)

Please ask for the complete technical data!

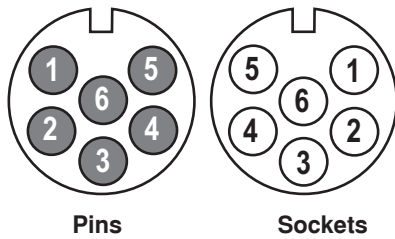
Types of mounting

The output of the position measurement system is by default always rotated by 180° to the selected position of the hydraulic connection in the cylinder base.

Mating connector is **not** included in the scope of delivery, must be ordered separately.

Pin assignment for Profibus

Pin assignment for Profibus D63



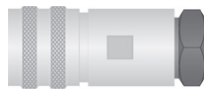
Pin	Cable	Function
1	Green	RxD/TxD-N (bus)
2	Red	RxD/TxD-P (bus)
3	—	DGND (terminating resistor) *
4	—	VP (terminating resistor) *
5	Black	+24 VDC (-15 / +20 %)
6	Blue	DC ground (0 V)
—	Yellow/ green	Shield compensating line, is usually not to be connected

* Only with sockets

Mating connectors for D63



Signal input
6-pin mating connector M16
Material no. R900705950 (socket)



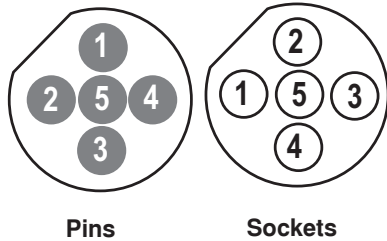
Signal output
6-pin mating connector M16
Material no. R900705951 (pins)



Signal output
6-pin end plug M16
Material no. R900722518 (pins)

Pin assignment for Profibus D53

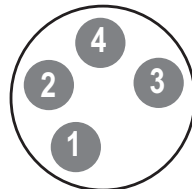
Bus



Pin	Cable	Function
1	—	VP+5 (terminating resistor) *
2	Green	RxD/TxD-N (bus)
3	—	DGND (terminating resistor) *
4	Red	RxD/TxD-P (bus)
5	Shield	Shield

* Only with sockets

Supply



Pin	Cable	Function
1	Brown	+24 VDC (-15 / +20 %)
2	White	Not used
3	Blue	DC ground (0 V)
4	Black	Not used

View connector side

Mating connectors for D53



Signal input
5-pin mating connector M12-B
Material no. R900773386 (socket)

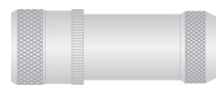


Signal output
5-pin mating connector M12-B
Material no. R901091655 (pins)



Signal output
5-pin end plug M12-B
Material no. R901070126 (pins)

Supply for D53



4-pin mating connector M8
Material no. R901132799



Connection cable 5 m
with 4-pin mating connector M8
Material no. 901213191

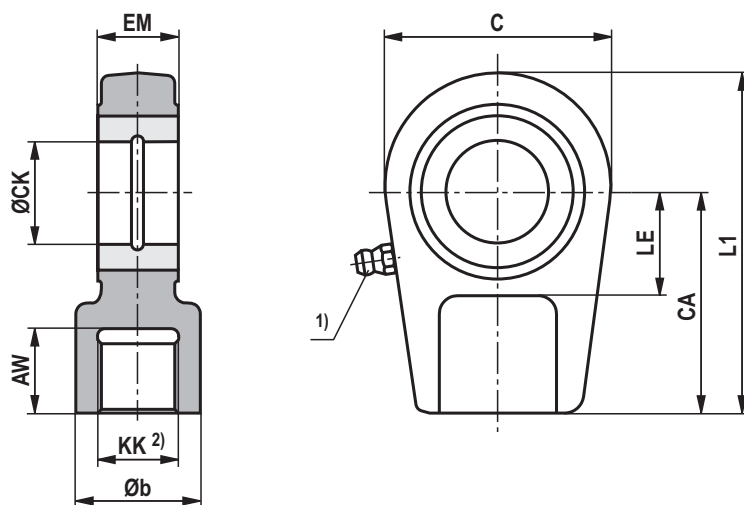
Connection cable 10 m
with 4-pin mating connector M8
Material no. 913008737

Connection cable 15 m
with 4-pin mating connector M8
Material no. 913008738

Mating connector is **not** included in the scope of delivery, must be ordered separately.

Plain clevis CSA (dimensions in mm)

ØAL 40 to 200 mm



ØAL	Type	Material no.	AW	Øb	C	CA	ØCK H11	EM -0,4	KK	LE	L1	m ³⁾ kg	C_0 ⁴⁾ kN	F_{adm} ⁵⁾ kN
40	CSA 16	R900303150	17	28	56	50	25	23	M16x1,5	25	80	0,43	72	25,9
50	CSA 22	R900303151	23	34	64	60	30	28	M22x1,5	30	94	0,7	106	38,2
63	CSA 28	R900303152	29	44	78	70	35	30	M28x1,5	40	112	1,1	153	55,1
80	CSA 35	R900303153	36	55	94	85	40	35	M35x1,5	45	135	2,0	250	90,0
100	CSA 45	R900303154	46	70	116	105	50	40	M45x1,5	55	168	3,3	365	131,4
125	CSA 58	R900303155	59	87	130	130	60	50	M58x1,5	65	200	5,5	400	144,0
140	CSA 65	R900303156	66	93	154	150	70	55	M65x1,5	75	232	8,6	540	194,4
160	CSA 80	R900303157	81	125	176	170	80	60	M80x2	80	265	12,2	670	241,2
180	CSA100	R900303158	101	143	206	210	90	65	M100x2	90	323	21,5	980	352,8
200	CSA110	R900303159	111	153	230	235	100	70	M110x2	105	360	27,5	1120	403,2

The specified dimensions are maximum values and may vary depending on the manufacturer.

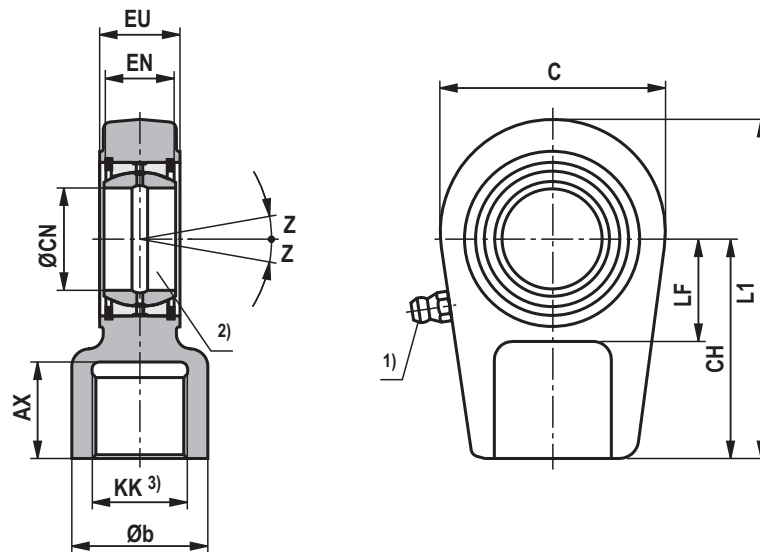
The following values are excluded: CA, CK, EM, KK

ØAL = Piston Ø

- 1) Lubricating nipple, cone head form A according to DIN 71412
- 2) The plain clevis must always be screwed against the piston rod shoulder
- 3) m = Weight plain clevis in kg
- 4) C_0 = Static load rating of the plain clevis
- 5) F_{adm} = Max. admissible load of the plain clevis with oscillatory or alternating loads

Self-aligning clevis CGA (dimensions in mm)

ØAL 40 to 280 mm



ØAL	Type	Material no.	AX min	Øb max	C	CH	ØCN ²⁾	EN	EU -0,4	KK	L1	LF min	Z	m ⁴⁾ kg	C ₀ ⁵⁾ kN	F _{adm} ⁶⁾ kN
40	CGA 16	R900303125	17	26	56	50	25 _{-0,010}	20 _{-0,12}	23	M16x1,5	80	28	7°	0,43	72	25,9
50	CGA 22	R900303126	23	33	64	60	30 _{-0,010}	22 _{-0,12}	28	M22x1,5	94	30	6°	0,7	106	38,2
63	CGA 28	R900303127	29	41	78	70	35 _{-0,012}	25 _{-0,12}	30	M28x1,5	112	38	6°	1,1	153	55,1
80	CGA 35	R900303128	36	50	94	85	40 _{-0,012}	28 _{-0,12}	35	M35x1,5	135	45	7°	2,0	250	90,0
100	CGA 45	R900303129	46	62	116	105	50 _{-0,012}	35 _{-0,12}	40	M45x1,5	168	55	6°	3,3	365	131,4
125	CGA 58	R900303130	59	76	130	130	60 _{-0,015}	44 _{-0,15}	50	M58x1,5	200	65	6°	5,5	400	144,0
140	CGA 65	R900303131	66	87	154	150	70 _{-0,015}	49 _{-0,15}	55	M65x1,5	232	75	6°	8,6	540	194,4
160	CGA 80	R900303132	81	106	176	170	80 _{-0,015}	55 _{-0,15}	60	M80x2	265	80	6°	12,2	670	241,2
180	CGA100	R900303133	101	125	206	210	90 _{-0,020}	60 _{-0,20}	65	M100x2	323	90	5°	21,5	980	352,8
200	CGA110	R900303134	111	139	230	235	100 _{-0,020}	70 _{-0,20}	70	M110x2	360	105	7°	27,5	1120	403,2
220	CGA120	R900303135	125	153	265	265	110 _{-0,020}	70 _{-0,20}	80	M120x3	407,5	115	6°	40,7	1700	612,0
250	CGA120	R900303135	125	153	265	265	110 _{-0,020}	70 _{-0,20}	80	M120x3	407,5	115	6°	40,7	1700	612,0
280	CGA130	R900303136	135	173	340	310	120 _{-0,020}	85 _{-0,20}	90	M130x3	490	140	6°	76,4	2900	1044,0

The specified dimensions are maximum values and may vary depending on the manufacturer.

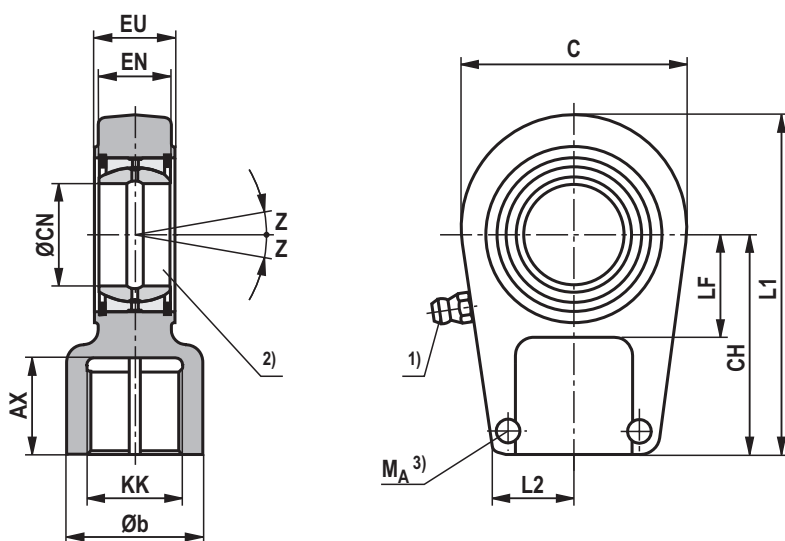
The following values are excluded: CH, CN, EN, EU, KK

ØAL = Piston Ø

- 1) Lubricating nipple, cone head form A according to DIN 71412
- 2) Related bolt Ø m6;
related bolt Ø j6 with maintenance-free spherical bearing
- 3) The self-aligning clevis must always be screwed against the shoulder of the piston rod
- 4) **m** = Weight self-aligning clevis in kg
- 5) **C₀** = Static load rating of the self-aligning clevis
- 6) **F_{adm}** = Max. admissible load of the self-aligning clevis with oscillatory or alternating loads

Self-aligning clevis CGAK (clampable) (dimensions in mm)

ØAL 40 to 280 mm



ØAL	Type	Material no.	AX min	Øb max	C	CH	ØCN ²⁾	EN	EU -0,4	KK
40	CGAK 16	R900303162	17	26	56	50	25 _{-0,010}	20 _{-0,12}	23	M16x1,5
50	CGAK 22	R900303163	23	33	64	60	30 _{-0,010}	22 _{-0,12}	28	M22x1,5
63	CGAK 28	R900303164	29	41	78	70	35 _{-0,012}	25 _{-0,12}	30	M28x1,5
80	CGAK 35	R900303165	36	50	94	85	40 _{-0,012}	28 _{-0,12}	35	M35x1,5
100	CGAK 45	R900303166	46	62	116	105	50 _{-0,012}	35 _{-0,12}	40	M45x1,5
125	CGAK 58	R900303167	59	76	130	130	60 _{-0,015}	44 _{-0,15}	50	M58x1,5
140	CGAK 65	R900303168	66	87	154	150	70 _{-0,015}	49 _{-0,15}	55	M65x1,5
160	CGAK 80	R900303169	81	106	176	170	80 _{-0,015}	55 _{-0,15}	60	M80x2
180	CGAK100	R900321655	101	125	206	210	90 _{-0,020}	60 _{-0,20}	65	M100x2
200	CGAK110	R900321691	111	139	231	235	100 _{-0,020}	70 _{-0,20}	70	M110x2
220	CGAK120	R900321621	125	155	266	265	110 _{-0,020}	70 _{-0,20}	80	M120x3
250	CGAK120	R900321621	125	153	265	265	110 _{-0,020}	70 _{-0,20}	80	M120x3
280	CGAK130	R900322015	135	173	340	310	120 _{-0,020}	85 _{-0,20}	90	M130x3

Self-aligning clevis CGAK (clampable) (dimensions in mm)

$\varnothing AL$	Type	L1	L2 max	LF	Z	Clamping screws ISO 4762-10.9	M_A ³⁾ Nm	m ⁴⁾ kg	C_0 ⁵⁾ kN	F_{adm} ⁶⁾ kN
40	CGAK 16	80	24	28	7°	M8	30	0,43	72	25,9
50	CGAK 22	94	26	30	6°	M8	30	0,7	106	38,2
63	CGAK 28	112	34	38	6°	M10	54	1,1	153	55,1
80	CGAK 35	135	39	45	7°	M10	59	2,0	250	90,0
100	CGAK 45	168	46	55	6°	M12	100	3,3	365	131,4
125	CGAK 58	200	61	65	6°	M16	250	5,5	400	144,0
140	CGAK 65	232	66	75	6°	M16	250	8,6	540	194,4
160	CGAK 80	265	81	80	6°	M20	490	12,2	670	241,2
180	CGAK100	323	91	90	5°	M20	490	21,5	980	352,8
200	CGAK110	360	101	105	7°	M24	840	27,5	1120	403,2
220	CGAK120	407,5	111	115	6°	M24	840	40,7	1700	612,0
250	CGAK120	407,5	111	115	6°	M24	840	40,7	1700	612,0
280	CGAK130	490	129	140	6°	M24	840	76,4	2900	1044,0

The specified dimensions are maximum values and may vary depending on the manufacturer.

The following values are excluded: CH, CN, EN, EU, KK

$\varnothing AL$ = Piston \varnothing

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

2) Related bolt $\varnothing m6$;
related bolt $\varnothing j6$ with maintenance-free spherical bearing

3) M_A = Tightening torque
The self-aligning clevis must always be screwed against the shoulder of the piston rod. Afterwards, the clamping screws must be tightened with the specified tightening torque.

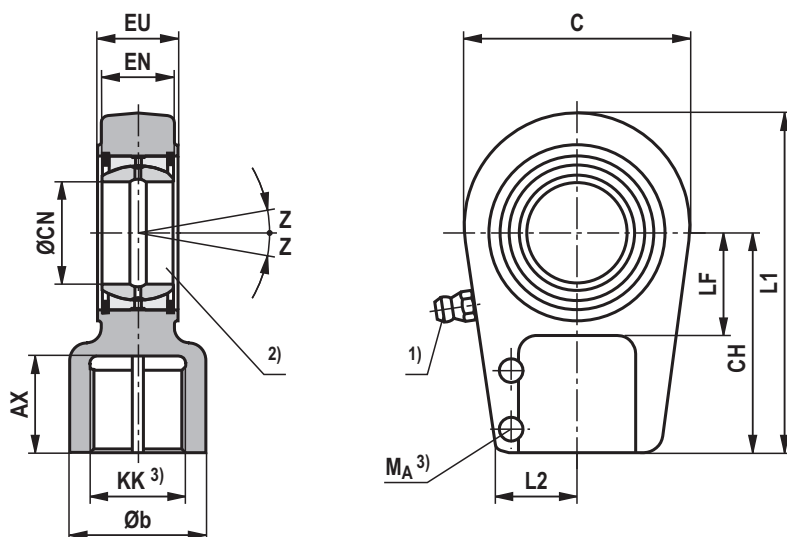
4) m = Weight self-aligning clevis in kg

5) C_0 = Static load rating of the self-aligning clevis

6) F_{adm} = Max. admissible load of the self-aligning clevis with oscillatory or alternating loads

Self-aligning clevis CGAS (clampable) (dimensions in mm)

ØAL 40 to 320 mm



ØAL	Type	Material no.	AX min	Øb max	C max	CH	ØCN ²⁾	EN	EU -0,4	KK
40	CGAS 25	R900303137	30	28	56	65	25 _{-0,010}	20 _{-0,12}	23	M18x2
50	CGAS 30	R900303138	35	34	64	75	30 _{-0,010}	22 _{-0,12}	28	M24x2
63	CGAS 35	R900303139	46	46	78	90	35 _{-0,012}	25 _{-0,12}	30	M30x2
80	CGAS 40	R900303140	56	57	94	105	40 _{-0,012}	28 _{-0,12}	35	M39x3
100	CGAS 50	R900303141	76	70	116	135	50 _{-0,012}	35 _{-0,12}	40	M50x3
125	CGAS 60	R900303142	96	87	130	170	60 _{-0,015}	44 _{-0,15}	50	M64x3
140	CGAS 70	R900303143	112	111	154	195	70 _{-0,015}	49 _{-0,15}	55	M80x3
160	CGAS 80	R900303144	122	129	176	210	80 _{-0,015}	55 _{-0,15}	60	M90x3
180	CGAS 90	R900303145	142	153	211	250	90 _{-0,020}	60 _{-0,20}	65	M100x3
200	CGAS100	R900303146	152	170	230	275	100 _{-0,020}	70 _{-0,20}	70	M110x4
220	CGAS110	R900303147	162	180	264	300	110 _{-0,020}	70 _{-0,20}	80	M120x4
250	CGAS110	R900303147	162	180	264	300	110 _{-0,020}	70 _{-0,20}	80	M120x4
280	CGAS120	R900303148	192	210	340	360	120 _{-0,020}	85 _{-0,20}	90	M150x4
320	CGAS140	R900317314	210	230	380	420	140 _{-0,025}	90 _{-0,25}	110	M160x4

Self-aligning clevis CGAS (clampable) (dimensions in mm)

$\varnothing AL$	Type	L1 max	L2 max	LF min	Z ³⁾	Clamping screws ISO 4762-10.9	M_A ⁴⁾ Nm	m ⁵⁾ kg	C_0 ⁶⁾ kN	F_{adm} ⁷⁾ kN
40	CGAS 25	95	24	25	7-8°	M8	30	0,65	82	27,1
50	CGAS 30	109	28	30	6-7°	M8	30	1,0	122	40,3
63	CGAS 35	132	36	40	6-7°	M10	59	1,5	177	58,4
80	CGAS 40	155	39	44	7°	M12	100	2,4	287	94,7
100	CGAS 50	198	45	55	6-7°	M12	100	4,8	422	139,3
125	CGAS 60	240	59	65	6-7°	M16	250	8,6	522	172,3
140	CGAS 70	279	70	75	6°	M16	250	12,2	707	233,3
160	CGAS 80	305	85	80	6°	M20	490	18,4	870	287,1
180	CGAS 90	366	91	90	5°	M20	490	31,6	1284	423,7
200	CGAS100	400	95	105	7°	M20	490	34	1460	481,8
220	CGAS110	443	106	115	6°	M24	840	44	2024	667,9
250	CGAS110	443	106	115	6°	M24	840	44	2024	667,9
280	CGAS120	540	122	140	6°	M24	840	75	2970	980,1
320	CGAS140	620	129	185	7°	M30	1700	160	3350	1105,5

The specified dimensions are maximum values and may vary depending on the manufacturer.

The following values are excluded: CH, CN, EN, EU, KK

$\varnothing AL$ = Piston \varnothing

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

2) Related bolt $\varnothing m6$;
related bolt $\varnothing j6$ with maintenance-free spherical bearing

3) Dimensions may differ depending on the manufacturer

4) M_A = Tightening torque

The self-aligning clevis must always be screwed against the shoulder of the piston rod. Afterwards, the clamping screws must be tightened with the specified tightening torque.

5) m = Weight self-aligning clevis in kg

6) C_0 = Static load rating of the self-aligning clevis

7) F_{adm} = Max. admissible load of the self-aligning clevis with oscillatory or alternating loads

Buckling

The admissible stroke length with flexibly guided load and a factor of 3.5 for safety against buckling can be seen from 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

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

2. Calculation according to Tetmajer

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

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

v = 3.5 (safety factor)

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

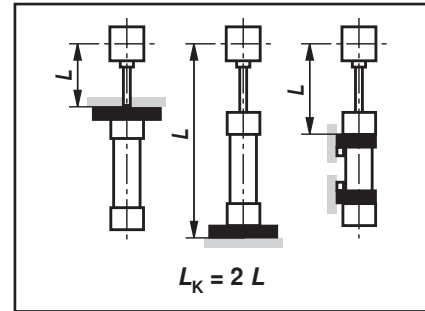
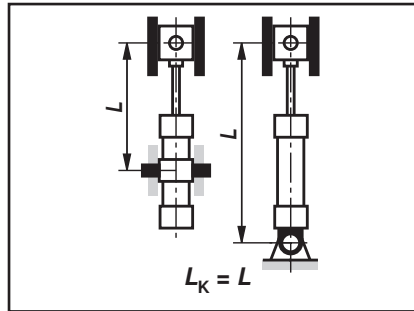
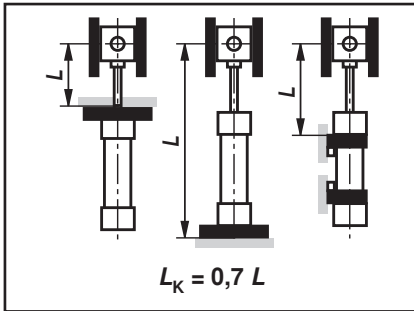
d = Piston rod Ø in mm

λ = Slenderness ratio

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

R_e = Yield strength of the piston rod material

Influence of the type of mounting on the buckling length:



Admissible stroke length (dimensions in mm)

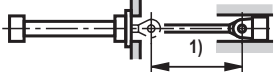
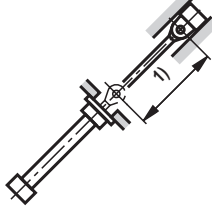

Type of mounting CDH1/CSH1 ²⁾: MP3, MP5

ØAL	ØMM	Admissible stroke length with									Installation position
		100 bar			160 bar			250 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
40	22	195	200	215	130	135	140	40	45	55	0°
	28	385	400	445	295	300	320	215	220	225	
50	28	285	295	310	205	210	215	120	130	135	45°
	36	535	555	625	425	430	460	320	325	335	
63	36	390	400	440	290	295	305	200	205	210	90°
	45	655	685	790	530	545	585	410	415	430	
80	45	500	515	560	375	385	400	240	260	280	0°
	56	815	850	980	665	680	735	520	525	545	
100	56	610	630	705	470	480	505	280	295	355	45°
	70	985	1030	1240	820	845	930	650	660	695	
125	70	770	800	900	600	615	650	360	380	465	90°
	90	1295	1360	1670	1095	1130	1265	885	900	955	
140	90	1145	1200	1430	945	970	1070	740	755	790	0°
	100	1400	1475	1840	1190	1230	1390	965	985	1050	
160	100	1230	1285	1530	1010	1040	1140	790	800	840	45°
	110	1480	1555	1930	1250	1290	1455	1005	1030	1090	
180	110	1305	1365	1630	1065	1095	1200	825	840	880	90°
	125	1675	1765	2210	1420	1470	1670	1150	1175	1260	
200	125	1500	1580	1930	1240	1290	1430	985	1005	1060	0°
	140	1865	1965	2520	1590	1660	1910	1305	1340	1440	
220	140	1620	1710	2180	1360	1415	1630	1090	1120	1200	45°
	160	2075	2200	3000	1810	1890	2280	1510	1560	1730	
250	160	1885	1990	2570	1600	1670	1930	1300	1330	1440	90°
	180	2330	2475	3370	2040	2135	2570	1710	1770	1960	
280	180	2075	2200	2900	1775	1880	2170	1450	1490	1620	0°
	200	2510	2670	3700	2200	2310	2820	1850	1920	2140	
320	200	2170	2300	3070	1850	1940	2290	1500	1550	1700	45°
	220	2590	2760	3850	2260	2380	2920	1890	1960	2200	

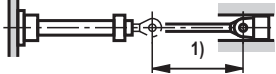
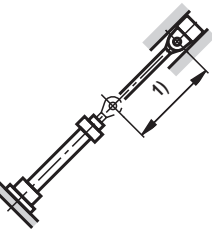
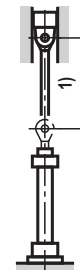
¹⁾ Adm. Stroke length

Admissible stroke length (dimensions in mm)

Type of mounting CDH1/CGH1/CSH1 ²⁾: MF3

ØAL	ØMM	Admissible stroke length with									Installation position
		100 bar			160 bar			250 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
40	22	895	915	980	730	735	760	440	450	510	0°  45°  90° 
	28	1400	1415	1630	1180	1205	1275	970	980	1010	
50	28	1180	1200	1280	955	965	995	700	730	780	
	36	1785	1855	2160	1530	1570	1695	1275	1290	1340	
63	36	1520	1560	1690	1250	1270	1315	1010	1015	1035	
	45	2000	2000	2000	1875	1925	2000	1570	1595	1670	
80	45	1855	1905	2000	1540	1560	1630	1140	1180	1280	
	56	2000	2000	2000	2000	2000	2000	1910	1940	2000	
100	56	2250	2320	2500	1880	1910	2010	1300	1360	1580	
	70	3000	3000	3000	2770	2860	3000	2360	2400	2550	
125	70	2760	2860	3000	2330	2375	2520	1580	1680	1990	
	90	3000	3000	3000	3000	3000	3000	3000	3000	3000	
140	90	3000	3000	3000	3000	3000	3000	2770	2820	2980	
	100	3000	3000	3000	3000	3000	3000	3000	3000	3000	
160	100	3000	3000	3000	3000	3000	3000	2980	3000	3000	
	110	3000	3000	3000	3000	3000	3000	3000	3000	3000	
180	110	3000	3000	3000	3000	3000	3000	3000	3000	3000	
	125	3000	3000	3000	3000	3000	3000	3000	3000	3000	
200	125	3000	3000	3000	3000	3000	3000	3000	3000	3000	
	140	3000	3000	3000	3000	3000	3000	3000	3000	3000	
220	140	5400	5680	6000	4800	4980	5780	4120	4220	4560	
	160	6000	6000	6000	5820	6000	6000	5150	5330	6000	
250	160	6000	6000	6000	5450	5660	6000	4720	4840	5290	
	180	6000	6000	6000	6000	6000	6000	5730	5920	6000	
280	180	6000	6000	6000	6000	6000	6000	5270	5420	5970	
	200	6000	6000	6000	6000	6000	6000	6000	6000	6000	
320	200	6000	6000	6000	6000	6000	6000	6000	6000	6000	
	220	6000	6000	6000	6000	6000	6000	6000	6000	6000	

Type of mounting CDH1/CSH1 ²⁾: MF4

ØAL	ØMM	Admissible stroke length with									Installation position
		100 bar			160 bar			250 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
40	22	325	340	370	245	250	260	105	110	140	0°  45°  90° 
	28	565	590	695	465	475	520	365	370	385	
50	28	455	470	515	350	360	375	220	230	265	
	36	770	805	960	640	660	725	515	525	550	
63	36	600	620	710	475	490	520	350	370	380	
	45	930	975	1210	790	820	920	645	660	700	
80	45	760	785	895	610	625	670	395	420	495	
	56	1150	1210	1495	985	1020	1145	810	825	875	
100	56	905	945	1120	745	765	835	420	460	620	
	70	1370	1445	1880	1190	1235	1440	995	1020	1100	
125	70	1175	1225	1460	980	1010	1105	580	620	835	
	90	1815	1920	2560	1600	1670	1980	1365	1400	1540	
140	90	1600	1695	2190	1390	1440	1670	1150	1180	1275	
	100	1915	2030	2770	1695	1770	2130	1440	1490	1650	
160	100	1730	1825	2350	1490	1550	1790	1235	1265	1365	
	110	2030	2155	2910	1790	1870	2240	1520	1565	1720	
180	110	1850	1950	2510	1590	1655	1900	1310	1340	1450	
	125	2295	2440	3000	2030	2130	2570	1730	1785	1980	
200	125	2110	2230	2270	1835	1910	2250	1530	1575	1720	
	140	2540	2700	3000	2265	2380	2930	1945	2010	2260	
220	140	2250	2400	3350	1990	2090	2550	1685	1740	1950	
	160	2800	2990	4500	2530	2680	3480	2220	2310	2700	
250	160	2615	2780	3900	2320	2435	3000	1980	2050	2300	
	180	3140	3360	5050	2850	3010	3910	2500	2610	3050	
280	180	2850	3050	4400	2550	2680	3370	2190	2270	2600	
	200	3370	3610	5550	3070	3250	4300	2700	2820	3330	
320	200	3000	3210	4700	2680	2830	3590	2100	2390	2750	
	220	3500	3750	5800	3180	3370	4480	2790	2920	3460	

Admissible stroke length (dimensions in mm)

Type of mounting CDH1/CGH1/CSH1 ²⁾: MT4 trunnion in cylinder center

ØAL	ØMM	Admissible stroke length with									Installation position
		100 bar			160 bar			250 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
40	22	340	345	365	250	255	260	130	135	145	
	28	590	605	665	470	480	500	365	370	375	
50	28	460	470	495	350	355	365	245	250	260	
	36	790	815	910	645	655	690	510	515	525	
63	36	610	625	675	475	485	500	360	365	370	
	45	965	1000	1140	800	815	870	635	645	665	
80	45	770	790	850	605	615	635	440	455	475	
	56	1190	1235	1410	990	1010	1080	795	805	830	
100	56	930	955	1060	745	755	795	490	510	595	
	70	1430	1490	1770	1210	1240	1360	985	1000	1045	
125	70	1185	1225	1360	960	980	1030	640	670	780	
	90	1885	1970	2390	1620	1665	1850	1340	1360	1430	
140	90	1675	1710	2060	1410	1415	1575	1140	1155	1205	
	100	2020	2115	2610	1735	1790	2010	1440	1465	1555	
160	100	1805	1880	2210	1510	1550	1680	1215	1230	1285	
	110	2140	2240	2740	1830	1885	2100	1505	1535	1620	
180	110	1925	2005	2360	1605	1650	1790	1290	1310	1360	
	125	2420	2540	3000	2080	2150	2420	1720	1755	1865	
200	125	2130	2230	2690	1790	1840	2040	1440	1465	1540	
	140	2610	2750	3000	2250	2330	2670	1865	1910	2050	
220	140	2490	2510	3150	2050	2120	2400	1685	1720	1835	
	160	3000	3170	4230	2640	2750	3260	2240	2310	2530	
250	160	2750	2900	3660	2380	2460	2810	1970	2020	2160	
	180	3350	3540	4750	2960	3090	3670	2520	2600	2850	
280	180	3040	3210	4140	2640	2750	3170	2210	2260	2440	
	200	3620	3840	5210	3210	3360	4040	2750	2830	3140	
320	200	3210	3390	4410	2790	2900	3380	2320	2380	2580	
	220	3770	4000	5450	3340	3490	4200	2850	2930	3250	

Type of mounting CDH1/CGH1/CSH1 ²⁾: MS2

ØAL	ØMM	Admissible stroke length with									Installation position
		100 bar			160 bar			250 bar			
		0°	45°	90°	0°	45°	90°	0°	45°	90°	
40	22	825	840	885	645	650	665	370	375	410	
	28	1305	1350	1535	1085	1110	1180	875	885	910	
50	28	1075	1100	1175	855	865	890	610	625	675	
	36	1680	1750	2000	1430	1465	1590	1175	1190	1240	
63	36	1405	1440	1570	1135	1155	1200	895	900	920	
	45	2000	2000	2000	1760	1810	1990	1460	1480	1555	
80	45	1730	1780	1960	1410	1435	1500	1000	1050	1155	
	56	2000	2000	2000	2000	2000	2000	1785	1820	1920	
100	56	2110	2180	2440	1740	1770	1870	1140	1220	1440	
	70	3000	3000	3000	2620	2710	3000	2210	2260	2400	
125	70	2600	2695	3000	2170	2210	2360	1400	1480	1820	
	90	3000	3000	3000	3000	3000	3000	2890	2970	3000	
140	90	3000	3000	3000	3000	3000	3000	2585	2635	2800	
	100	3000	3000	3000	3000	3000	3000	3000	3000	3000	
160	100	3000	3000	3000	3000	3000	3000	2760	2810	2990	
	110	3000	3000	3000	3000	3000	3000	3000	3000	3000	
180	110	3000	3000	3000	3000	3000	3000	2940	3000	3000	
	125	3000	3000	3000	3000	3000	3000	3000	3000	3000	
200	125	3000	3000	3000	3000	3000	3000	3000	3000	3000	
	140	3000	3000	3000	3000	3000	3000	3000	3000	3000	
220	140	5090	5370	6000	4490	4670	5470	3820	3910	4260	
	160	6000	6000	6000	5510	5800	6000	4850	5020	5750	
250	160	5790	6000	6000	5150	5370	6000	4420	4540	4990	
	180	6000	6000	6000	6000	6000	6000	5420	5630	6000	
280	180	6000	6000	6000	5700	5960	6000	4930	5070	5630	
	200	6000	6000	6000	6000	6000	6000	6000	6000	6000	
320	200	6000	6000	6000	6000	6000	6000	5200	5400	6000	
	220	6000	6000	6000	6000	6000	6000	6000	6000	6000	

With longer strokes, an extended guide and/or the use of guide rings may be reasonable for increasing the service life, depending on the respective application and installation position. Recommendation on request.

²⁾ With CSH1, observe the maximum stroke length "X*max", pages 24 to 35

End position cushioning

End position cushioning:

The objective is to reduce the velocity of a moved mass, whose center of gravity lies on the cylinder axis to a level, at which neither the cylinder nor the machine into which the cylinder is installed is damaged. For velocities above 20 mm/s, we recommend the use of an end position cushioning feature, which absorbs energy without requiring the use of additional equipment. It must, however, always be verified whether end position cushioning is also required for lower velocities with large masses.

Damping capacity:

When decelerating masses via end position cushioning, the structural-inherent cushioning capacity must not be exceeded. Cylinders with end position cushioning can achieve their full cushioning capacity only over the entire stroke length.

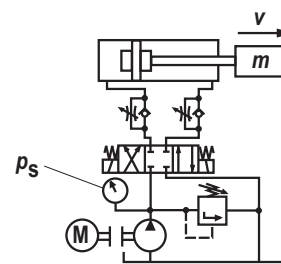
With the adjustable end position cushioning version "E", a throttle valve is additionally provided when compared with version "D". End position cushioning version "E" allows cycle times to be optimized. The maximum cushioning capacity can only be achieved when the throttle valve is closed.

The calculation depends on the factors weight, velocity, system pressure and installation position. For this reason, mass and velocity are used to determine the characteristic D_m and system pressure and installation position to determine the characteristic D_p .

These two characteristics are used for verifying the admissible damping capacity in the "damping capacity" diagram. The intersection point of the characteristics D_m and D_p must always be below the damping capacity curve of the selected cylinder. The values in the diagrams refer to an average oil temperature of +45 to +65 °C with the throttle valve being closed.

For special applications with very short stroke times, high velocities or large masses, cylinders with special end position cushioning versions can be offered on request.

When fixed or adjustable stops are used, special measures must be taken!



Formulas:

$$D_m = \frac{m}{10^K} ; K = kv(0,5-v)$$

m = Moved weight in kg

v = Stroke velocity in m/s

kv = See table page 60

Extension for CDH1 and CSH1

$$D_p = p_s - \frac{m \cdot 9,81 \cdot \sin \alpha}{A_1 \cdot 10}$$

Retraction for CDH1, CGH1 and CSH1; extension for CGH1

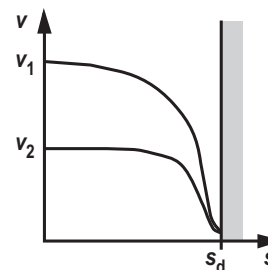
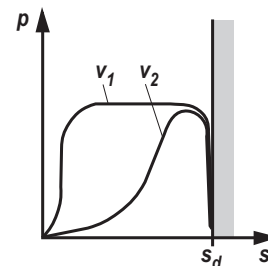
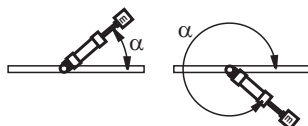
$$D_p = p_s + \frac{m \cdot 9,81 \cdot \sin \alpha}{A_3 \cdot 10}$$

p_s = System pressure in bar

A_1 = Piston area in cm² (see page 4)

A_3 = Annulus area in cm² (see page 4)

α = Angle to the horizontal in degrees



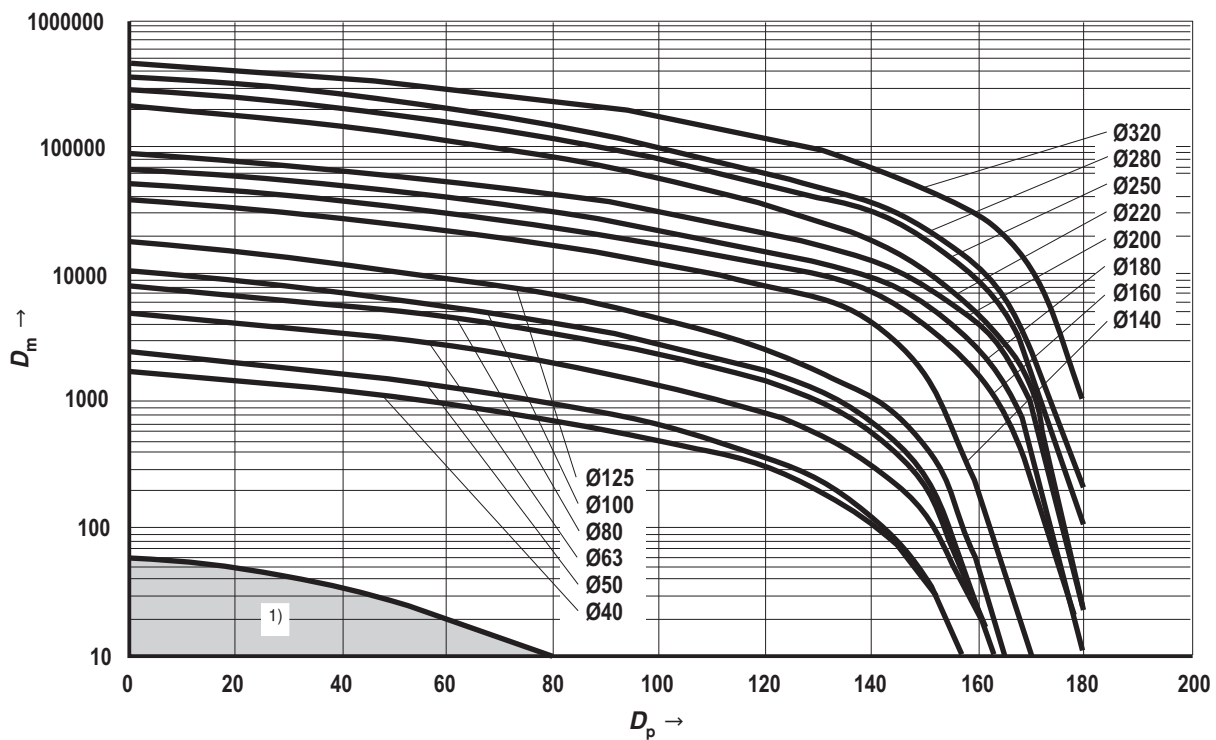
Damping length

ØAL mm	40	50	63	80	100	125	140	160	180	200	220	250	280	320
Head side	21	20	23	25	25	25	33	33	37	37	76	81	86	90
Base side	21	20	23	25	25	25	33	33	37	37	76	81	86	90

End position cushioning

ØAL mm	40	50	63	80	100	125	140	160	180	200	220	250	280	320
kv ①	2,85	2,97	2,56	2,82	3,51	3,02	2,53	2,65	2,91	2,76	2,85	2,95	3,11	3,13
kv ②	3,1	3,25	2,85	2,85	3,52	2,91	2,53	2,93	2,95	2,95	2,93	3,1	3,12	3,07
kv ③	2,95	3,1	2,73	3,1	3,51	2,95	2,51	2,91	2,95	2,91	2,93	2,93	3,15	3,25

Damping capacity: Extension for CDH1 and CSH1, with kv ①

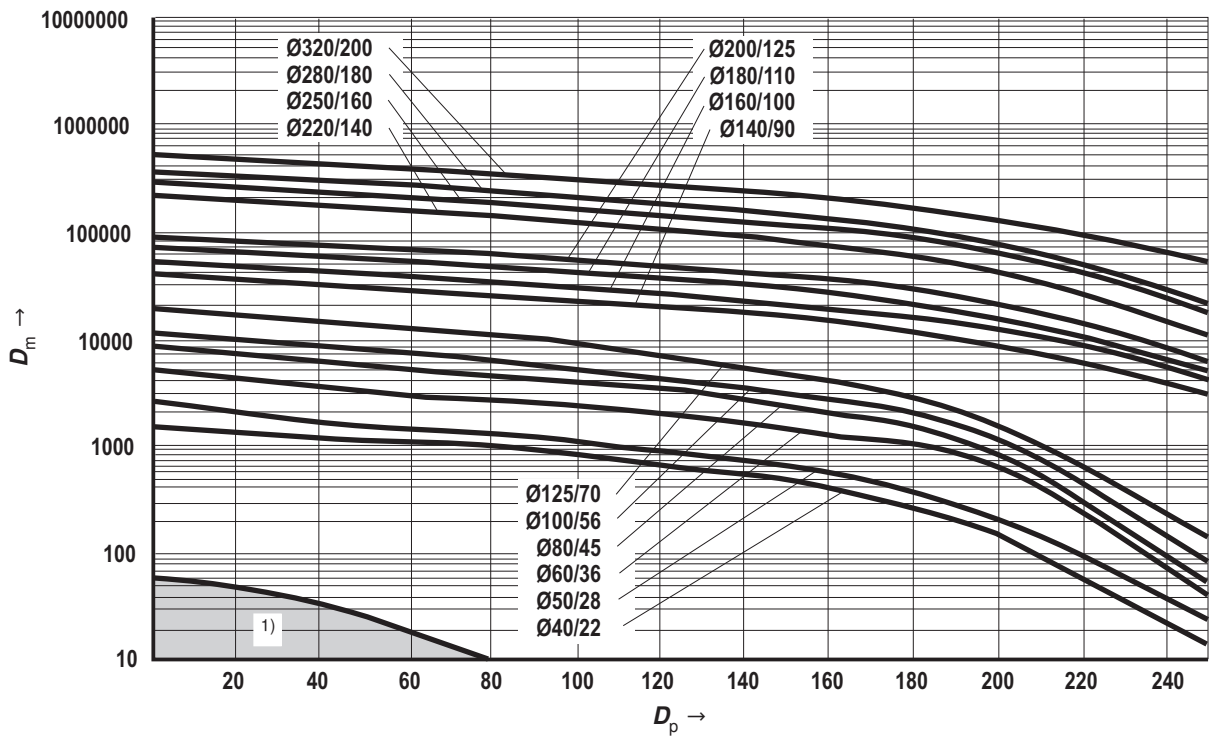


ØAL = Piston Ø

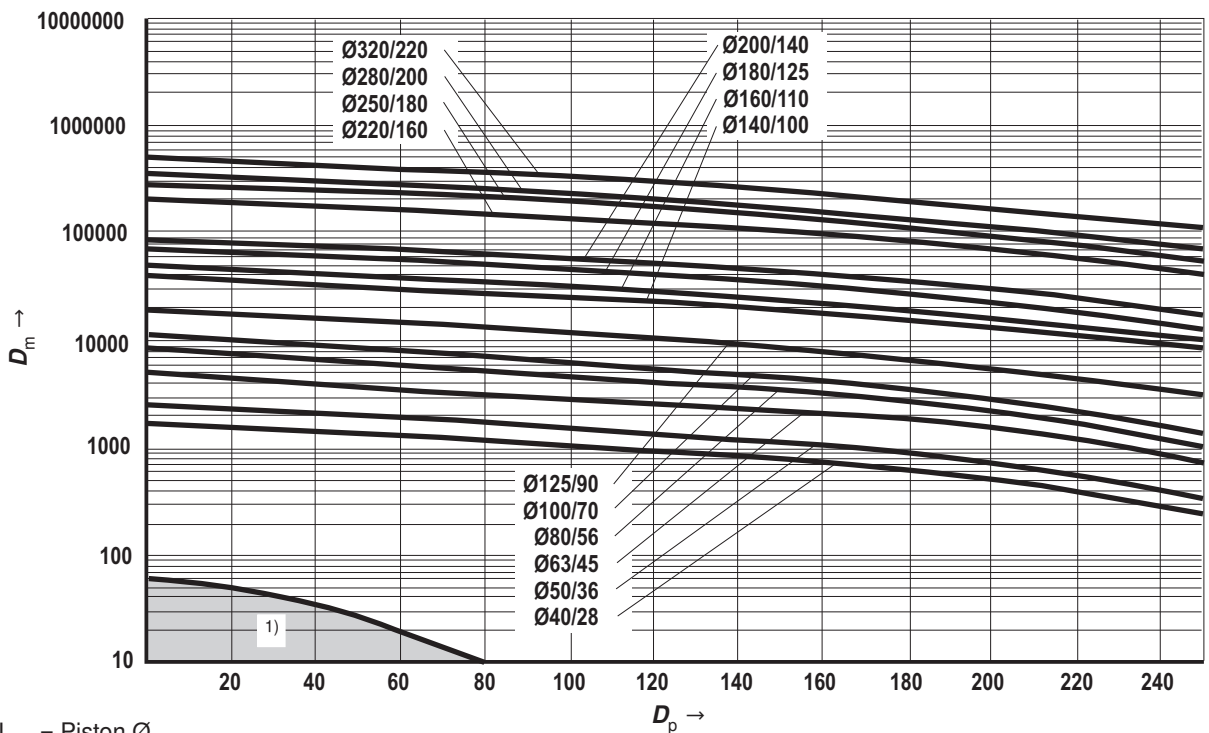
1) If with standard applications the calculated intersection point of D_m and D_p is within the marked area, we recommend designing the cylinder without end position cushioning.

End position cushioning

Damping capacity: Retraction for CDH1, CGH1 and CSH1; extension for CGH1 with k_v ②



Damping capacity: Retraction for CDH1, CGH1 and CSH1; extension for CGH1 with k_v ③



ØAL = Piston Ø

1) If with standard applications the calculated intersection point of D_m and D_p is within the marked area, we recommend designing the cylinder without end position cushioning.

Selection criteria for seals

Work and environmental conditions		Seal versions								
		M	G	V	L	A	B	T	R	S
Medium / temperature	Medium HL, HLP / operating temperature medium -20 °C to +80 °C	++	++	++	++	++	++	++	++	++
	Medium HFA / operating temperature medium +5 °C to +55 °C	+/-	+/-	+/-	+/-	+	+/-	++	+/-	+/-
	Medium HFC / operating temperature medium -20 °C to +60 °C	-	++	-	-	+/-	-	++	-	-
	Medium HFD-R / operating temperature medium -15 °C to +80 °C	-	-	++	-	-	++	-	-	++
	Medium HFD-U / operating temperature medium -15 °C to +80 °C	-	-	++	-	-	++	-	-	++
	Ambient and rod temperature in the area of the piston rod from -20 °C to +80 °C ¹⁾	++	+	+ ²⁾	++	++	+ ²⁾	+	++	++ ²⁾
	Extended ambient and rod temperature in the area of the piston rod from +80 °C to +120 °C	-	-	++	-	-	+	-	-	++
Function / velocity...	Static holding function more than 10 minutes: Attention! Application- and temperature-dependent	++	+	+	+	++	++	+	+	+
	Static holding function short-term < 1 minute	++	++	++	++	++	++	++	++	++
	Robust application conditions: Steel works, mining, thin ice	++	++	++	++	++	++	-	++	-
	Zero point control, hardly amplitude, frequency max. 5 Hz, not longer than 5 minutes	-	-	-	+/-	-	-	++	+	++
	Cylinder velocity min. 0.001 m/sec stick-slip behavior	++	+	+	++	-	-	++	++	++
	Cylinder velocity from 0.01 m/sec to 0.5 m/sec ³⁾	++	+	+	++	+	+	++	++	++
	Cylinder velocity > 0.5 m/sec to max. 0.8 m/sec ³⁾	-	+/-	+/-	++	-	-	++	+	++
	Stroke > 1.0 m	+/-	++	++	++	++	++	++	++	++
	Standstill period (wear)	++	+/-	+/-	++	+/-	-	++	++	++
Undissolved air in the oil ⁴⁾	-	+	+	+	-	-	+	+	+	

++ = very good + = good +/- = conditional, depending on the application parameters - = unsuitable

General technical data in corresponding data sheets will remain valid!

- 1) Moreover, observe the corresponding medium temperature range
- 2) Lower temperature limit -15 °C
- 3) Standard line connections not designed for that velocity
- 4) - Seal is destroyed / + Seal is not directly destroyed, leaks may occur

Generally, a medium temperature of approx. 40 °C is recommended. The specified values are to be regarded as guidelines; depending on the application, it may be necessary to check the suitability of the seal system.

Seal kits ¹⁾

CDH1 – Standard

ØAL	ØMM	Material no. for seal design								
		M	G	V	L	A	B	T	R	S
40	22	R900850072	R961006000	R961006035	R961006070	R900860270	R900859816	R900849536	R961006105	R900861000
	28	R900851087	R961006002	R961006037	R961006072	R900859445	R900859770	R900858841	R961006107	R900861001
50	28	R900850181	R961006003	R961006038	R961006073	R900860928	R900860938	R900857535	R961006108	R900861002
	36	R900849392	R961006005	R961006040	R961006075	R900851515	R900860940	R900860277	R961006110	R900861004
63	36	R900850191	R961006006	R961006041	R961006076	R900860930	R900851206	R900860278	R961006111	R900861005
	45	R900847956	R961006008	R961006043	R961006078	R900851638	R900859678	R900847855	R961006113	R900861007
80	45	R900851086	R961006009	R961006044	R961006079	R900854708	R900860942	R900860280	R961006114	R900861008
	56	R900850905	R961006011	R961006046	R961006081	R900854718	R900851205	R900856180	R961006116	R900861010
100	56	R900853936	R961006012	R961006047	R961006082	R900860470	R900860944	R900860282	R961006117	R900861011
	70	R900853382	R961006014	R961006049	R961006084	R900856094	R900860946	R900860285	R961006119	R900861013
125	70	R900853966	R961006015	R961006050	R961006085	R900854709	R900860948	R900860286	R961006120	R900861014
	90	R900857949	R961006017	R961006052	R961006087	R900856095	R900855464	R900856102	R961006122	R900861016
140	90	R900858281	R961006018	R961006053	R961006088	R900860932	R900860951	R900860289	R961006123	R900861017
	100	R900853965	R961006019	R961006054	R961006089	R900856096	R900860952	R900860290	R961006124	R900849080
160	100	R900855683	R961006020	R961006055	R961006090	R900860468	R900860953	R900860291	R961006125	R900861018
	110	R900851146	R961006021	R961006056	R961006091	R900860933	R900860954	R900857536	R961006126	R900861019
180	110	R900856497	R961006023	R961006058	R961006093	R900860934	R900860955	R900852561	R961006128	R900861020
	125	R900848603	R961006024	R961006059	R961006094	R900860935	R900860956	R900860292	R961006129	R900861021
200	125	R900860294	R961006025	R961006060	R961006095	R900860936	R900860957	R900860295	R961006130	R900861022
	140	R900856431	R961006026	R961006061	R961006096	R900860937	R900860958	R900860293	R961006131	R900861023
220	140	R900888100	R961006027	R961006062	R961006097	R900888116	R900888140	R900888108	R961006132	R900888132
	160	R900888101	R961006028	R961006063	R961006098	R900888117	R900888141	R900888109	R961006133	R900888133
250	160	R900888102	R961006029	R961006064	R961006099	R900888118	R900888142	R900888110	R961006134	R900888134
	180	R900888103	R961006030	R961006065	R961006100	R900888119	R900888143	R900888111	R961006135	R900888135
280	180	R900888104	R961006031	R961006066	R961006101	R900888120	R900888144	R900888112	R961006136	R900888136
	200	R900888105	R961006032	R961006067	R961006102	R900888121	R900888145	R900888113	R961006137	R900888137
320	200	R900888106	R961006033	R961006068	R961006103	R900888122	R900888146	R900888114	R961006138	R900888138
	220	R900888107	R961006034	R961006069	R961006104	R900888123	R900888147	R900888115	R961006139	R900888139

ØAL = Piston Ø

ØMM = Piston rod Ø

¹⁾ Seal kits for proximity switches and subplate mounting
separate material no.

Seal kits ¹⁾

CGH1 – Standard

ØAL	ØMM	Material no. for seal design								
		M	G	V	L	A	B	T	R	S
40	22	R900867251	R961006221	R961006256	R961006291	R900866746	R900867132	R900868888	R961006326	R900868942
	28	R900867252	R961006223	R961006258	R961006293	R900866747	R900867133	R900868889	R961006328	R900868943
50	28	R900867253	R961006224	R961006259	R961006294	R900866748	R900867134	R900868890	R961006329	R900868944
	36	R900864930	R961006226	R961006261	R961006296	R900866750	R900867136	R900868892	R961006331	R900868946
63	36	R900867260	R961006227	R961006262	R961006297	R900866751	R900867137	R900868893	R961006332	R900868947
	45	R900867262	R961006229	R961006264	R961006299	R900866753	R900867139	R900868895	R961006334	R900868949
80	45	R900867263	R961006230	R961006265	R961006300	R900866754	R900867140	R900868896	R961006335	R900868950
	56	R900867265	R961006232	R961006267	R961006302	R900866756	R900867142	R900868898	R961006337	R900868952
100	56	R900867266	R961006233	R961006268	R961006303	R900866757	R900867143	R900868899	R961006338	R900868953
	70	R900867268	R961006235	R961006270	R961006305	R900866759	R900867146	R900868901	R961006340	R900868955
125	70	R900867269	R961006236	R961006271	R961006306	R900866760	R900867147	R900868902	R961006341	R900867906
	90	R900867270	R961006238	R961006273	R961006308	R900866762	R900867149	R900868904	R961006343	R900868957
140	90	R900867271	R961006239	R961006274	R961006309	R900866763	R900867150	R900868905	R961006344	R900868958
	100	R900867272	R961006240	R961006275	R961006310	R900866764	R900867151	R900868906	R961006345	R900868959
160	100	R900867273	R961006241	R961006276	R961006311	R900866765	R900867152	R900868907	R961006346	R900868960
	110	R900867274	R961006242	R961006277	R961006312	R900866766	R900867153	R900868908	R961006347	R900868961
180	110	R900867275	R961006244	R961006279	R961006314	R900866767	R900867154	R900868909	R961006349	R900868962
	125	R900867276	R961006245	R961006280	R961006315	R900866768	R900867155	R900868910	R961006350	R900868963
200	125	R900867277	R961006246	R961006281	R961006316	R900866769	R900867156	R900868911	R961006351	R900868964
	140	R900867278	R961006247	R961006282	R961006317	R900866770	R900867157	R900868912	R961006352	R900868965
220	140	R900888020	R961006248	R961006283	R961006318	R900888036	R900888060	R900888028	R961006353	R900888052
	160	R900888021	R961006249	R961006284	R961006319	R900888037	R900888061	R900888029	R961006354	R900888053
250	160	R900888022	R961006250	R961006285	R961006320	R900888038	R900888062	R900888030	R961006355	R900888054
	180	R900888023	R961006251	R961006286	R961006321	R900888039	R900888063	R900888031	R961006356	R900888055
280	180	R900888024	R961006252	R961006287	R961006322	R900888040	R900888064	R900888032	R961006357	R900888056
	200	R900888025	R961006253	R961006288	R961006323	R900888041	R900888065	R900888033	R961006358	R900888057
320	200	R900888026	R961006254	R961006289	R961006324	R900888042	R900888066	R900888034	R961006359	R900888058
	220	R900888027	R961006255	R961006290	R961006325	R900888043	R900888067	R900888035	R961006360	R900888059

ØAL = Piston Ø

ØMM = Piston rod Ø

¹⁾ Seal kits for proximity switches and subplate mounting
separate material no.

Seal kits ¹⁾

CDH1 – Standard + additional option F

ØAL	ØMM	Material no. for seal design					
		M+F	G+F	V+F	T+F	R+F	S+F
40	22	R900861024	R961006140	R961006167	R900861049	R961006194	R900861099
	28	R900861025	R961006142	R961006169	R900861050	R961006196	R900861100
50	28	R900861026	R961006143	R961006170	R900861051	R961006197	R900861101
	36	R900861028	R961006145	R961006172	R900861053	R961006199	R900861103
63	36	R900861029	R961006146	R961006173	R900861054	R961006200	R900861104
	45	R900861031	R961006148	R961006175	R900861056	R961006202	R900861106
80	45	R900861032	R961006149	R961006176	R900861057	R961006203	R900861107
	56	R900861034	R961006151	R961006178	R900861059	R961006205	R900861109
100	56	R900861035	R961006152	R961006179	R900861060	R961006206	R900861112
	70	R900861037	R961006154	R961006181	R900861062	R961006208	R900861115
125	70	R900861038	R961006155	R961006182	R900861063	R961006209	R900861117
	90	R900861040	R961006157	R961006184	R900861065	R961006211	R900861122
140	90	R900861041	R961006158	R961006185	R900861066	R961006212	R900861124
	100	R900861042	R961006159	R961006186	R900861067	R961006213	R900861126
160	100	R900861043	R961006160	R961006187	R900861068	R961006214	R900861128
	110	R900861044	R961006161	R961006188	R900861069	R961006215	R900861130
180	110	R900861045	R961006163	R961006190	R900861070	R961006217	R900861133
	125	R900861046	R961006164	R961006191	R900861071	R961006218	R900861135
200	125	R900861047	R961006165	R961006192	R900861072	R961006219	R900861142
	140	R900861048	R961006166	R961006193	R900861073	R961006220	R900861143

CGH1 – Standard + additional option F

ØAL	ØMM	Material no. for seal design					
		M+F	G+F	V+F	T+F	R+F	S+F
40	22	R900868998	R961006361	R961006388	R900869025	R961006415	R900869092
	28	R900868999	R961006363	R961006390	R900869026	R961006417	R900869093
50	28	R900869000	R961006364	R961006391	R900869027	R961006418	R900869094
	36	R900869002	R961006366	R961006393	R900869029	R961006420	R900869096
63	36	R900869003	R961006367	R961006394	R900869030	R961006421	R900869097
	45	R900869005	R961006369	R961006396	R900869032	R961006423	R900869099
80	45	R900869006	R961006370	R961006397	R900869033	R961006424	R900869100
	56	R900869008	R961006372	R961006399	R900869035	R961006426	R900869102
100	56	R900869009	R961006373	R961006400	R900869036	R961006427	R900869103
	70	R900869013	R961006375	R961006402	R900869038	R961006429	R900869105
125	70	R900869014	R961006376	R961006403	R900869039	R961006430	R900869106
	90	R900869016	R961006378	R961006405	R900869041	R961006432	R900869108
140	90	R900869017	R961006379	R961006406	R900869042	R961006433	R900869109
	100	R900869018	R961006380	R961006407	R900869043	R961006434	R900869110
160	100	R900869019	R961006381	R961006408	R900869044	R961006435	R900869111
	110	R900869020	R961006382	R961006409	R900869045	R961006436	R900869112
180	110	R900869021	R961006384	R961006411	R900869046	R961006438	R900869113
	125	R900869022	R961006385	R961006412	R900869047	R961006439	R900869114
200	125	R900869023	R961006386	R961006413	R900869048	R961006440	R900869115
	140	R900869024	R961006387	R961006414	R900869049	R961006441	R900869116

ØAL = Piston Ø
 ØMM = Piston rod Ø

¹⁾ Seal kits for proximity switches and subplate mounting separate material no.

Seal kits ²⁾

CSH1

ØAL	ØMM	Material no. for seal design						
		M	G	V	L	T	R	S
40	28	R900861025	R961006142	R961006169	R961006072	R900861050	R961006196	R900861100
50	28	R900861026	R961006143	R961006170	R961006073	R900861051	R961006197	R900861101
	36	R900861028	R961006145	R961006172	R961006075	R900861053	R961006199	R900861103
63	36	R900861029	R961006146	R961006173	R961006076	R900861054	R961006200	R900861104
	45	R900861031	R961006148	R961006175	R961006078	R900861056	R961006202	R900861106
80	45	R900861032	R961006149	R961006176	R961006079	R900861057	R961006203	R900861107
	56	R900861034	R961006151	R961006178	R961006081	R900861059	R961006205	R900861109
100	56	R900861035	R961006152	R961006179	R961006082	R900861060	R961006206	R900861112
	70	R900861037	R961006154	R961006181	R961006084	R900861062	R961006208	R900861115
125	70	R900861038	R961006155	R961006182	R961006085	R900861063	R961006209	R900861117
	90	R900861040	R961006157	R961006184	R961006087	R900861065	R961006211	R900861122
140	90	R900861041	R961006158	R961006185	R961006088	R900861066	R961006212	R900861124
	100	R900861042	R961006159	R961006186	R961006089	R900861067	R961006213	R900861126
160	100	R900861043	R961006160	R961006187	R961006090	R900861068	R961006214	R900861128
	110	R900861044	R961006161	R961006188	R961006091	R900861069	R961006215	R900861130
180	110	R900861045	R961006163	R961006190	R961006093	R900861070	R961006217	R900861133
	125	R900861046	R961006164	R961006191	R961006094	R900861071	R961006218	R900861135
200	125	R900861047	R961006165	R961006192	R961006095	R900861072	R961006219	R900861142
	140	R900861048	R961006166	R961006193	R961006096	R900861073	R961006220	R900861143
220	140	R900888100	R961006027	R961006062	R961006097	R900888108	R961006132	R900888132
	160	R900888101	R961006028	R961006063	R961006098	R900888109	R961006133	R900888133
250	160	R900888102	R961006029	R961006064	R961006099	R900888110	R961006134	R900888134
	180	R900888103	R961006030	R961006065	R961006100	R900888111	R961006135	R900888135
280	180	R900888104	R961006031	R961006066	R961006101	R900888112	R961006136	R900888136
	200	R900888105	R961006032	R961006067	R961006102	R900888113	R961006137	R900888137
320	200	R900888106	R961006033	R961006068	R961006103	R900888114	R961006138	R900888138
	220	R900888107	R961006034	R961006069	R961006104	R900888115	R961006139	R900888139

ØAL = Piston Ø

ØMM = Piston rod Ø

²⁾ Seal kits for position measurement system and subplate mounting separate material no.

Seal kits

Only for proximity switches

ØAL	Material no. for seal design								
	M / M+F	T / T+F	G / G+F	L	R / R+F	A	S / S+F	V / V+F	B
40 to 200	R900885938						R900885939		
220 to 320	R900894997						R900894998		

Only for subplate mounting

ØAL	Material no. for seal design	
	M, T, G, L, R, A	S, B, V
40	R961006022	R961006243
50	R961006022	R961006243
63	R961006057	R961006278
80	R961006057	R961006278
100	R961006092	R961006313
125	R961006127	R961006348
140	R961006127	R961006348
160	R961006162	R961006383
180	R961006162	R961006383
200	R961006189	R961006410

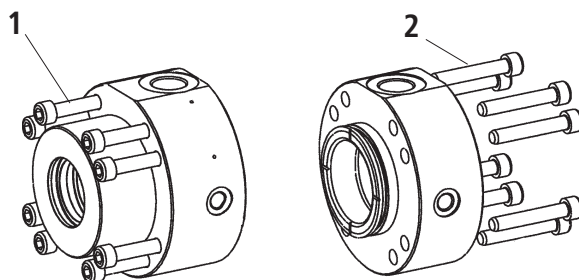
Only for position measurement system

ØAL	Material no. for seal design	
	M, T, G, L, R	S, V
40	R900885935	R900885937
50	R900894958	R900894979
63	R900894959	R900894980
80	R900894960	R900894981
100	R900894961	R900894982
125	R900894962	R900894983
140	R900894963	R900894985
160	R900894964	R900894986
180	R900894973	R900894987
200	R900894974	R900894988
220	R900894975	R900894989
250	R900894976	R900894991
280	R900894977	R900894993
320	R900894978	R900894994

ØAL = Piston Ø

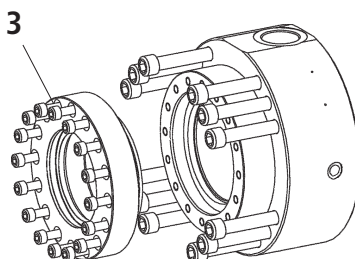
Tightening torques

Screws: Head and base (item 1 and 2)



Series	Piston Ø	Screw	Quantity	Quality class	Tightening torque
CDH1 / CGH1 / CSH1	40	M8	4	10.9	23 Nm
CDH1 / CGH1 / CSH1	50	M8	8	10.9	20 Nm
CDH1 / CGH1 / CSH1	63	M8	8	10.9	30 Nm
CDH1 / CGH1 / CSH1	80	M10	8	10.9	55 Nm
CDH1 / CGH1 / CSH1	100	M12	8	10.9	100 Nm
CDH1 / CGH1 / CSH1	125	M16	8	10.9	200 Nm
CDH1 / CGH1 / CSH1	140	M16	12	10.9	170 Nm
CDH1 / CGH1 / CSH1	160	M16	12	10.9	220 Nm
CDH1 / CGH1 / CSH1	180	M20	12	10.9	350 Nm
CDH1 / CGH1 / CSH1	200	M20	12	10.9	410 Nm
CDH1 / CGH1 / CSH1	220	M20	16	10.9	460 Nm
CDH1 / CGH1 / CSH1	250	M24	16	10.9	700 Nm
CDH1 / CGH1 / CSH1	280	M24	16	10.9	800 Nm
CDH1 / CGH1 / CSH1	320	M30	16	10.9	1500 Nm

Screws: Seal cover (item 3))

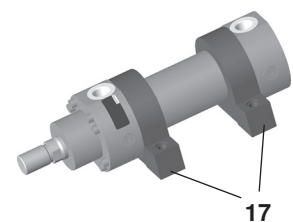
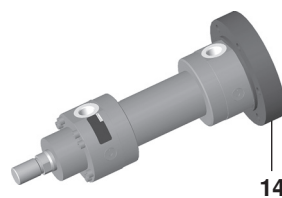
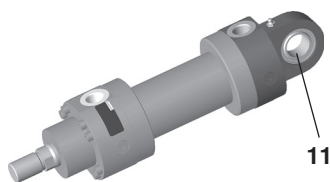
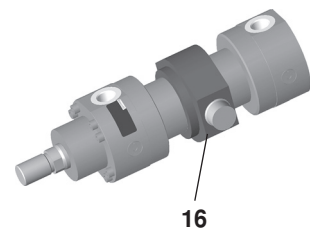
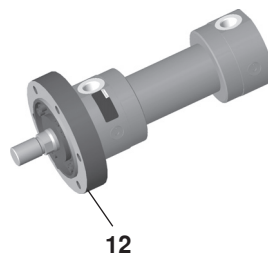
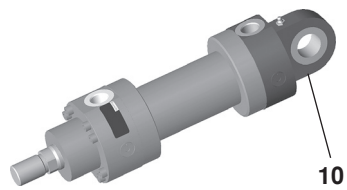
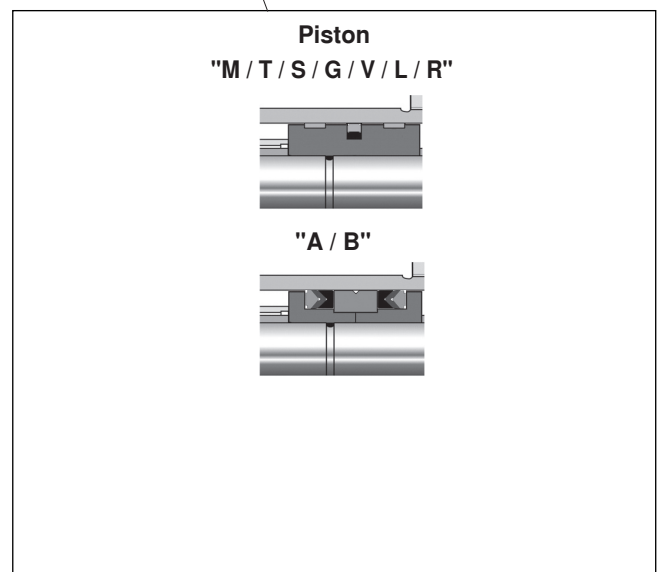
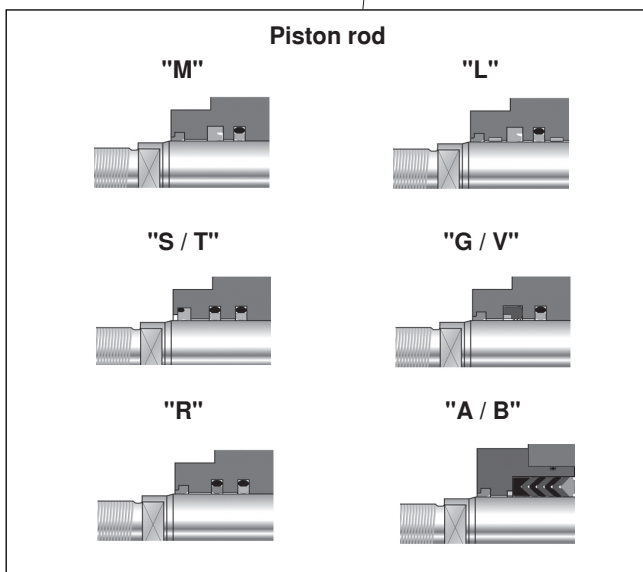
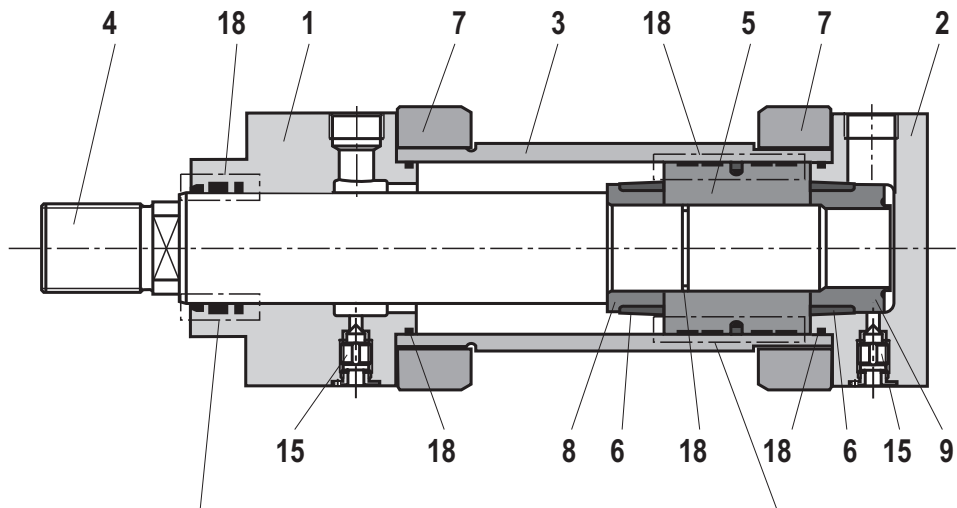


Only with seal design "A" and "B"

Series	Piston Ø	Piston rod Ø	Screw	Quantity	Quality class	Tightening torque
CDH1 / CGH1	160	100	M10	16	10.9	60 Nm
		110				
CDH1 / CGH1	180	110	M12	16	10.9	80 Nm
		125				
CDH1 / CGH1	200	125	M12	16	10.9	90 Nm
		140				
CDH1 / CGH1	220	140	M12	16	10.9	90 Nm
		160		24		
CDH1 / CGH1	250	160	M12	24	10.9	90 Nm
		180				
CDH1 / CGH1	280	180	M12	24	10.9	90 Nm
		200				
CDH1 / CGH1	320	200	M12	24	10.9	90 Nm
		220	M16	16		230 Nm

Spare parts: Series CDH1

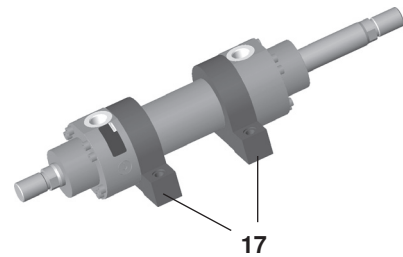
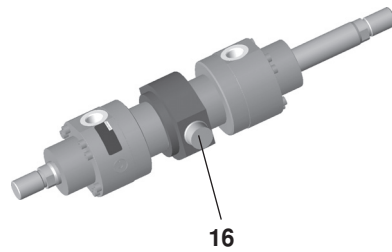
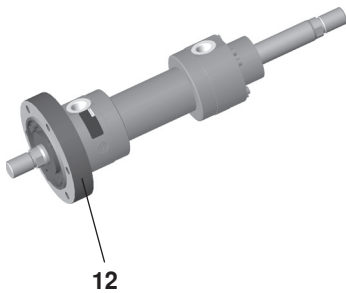
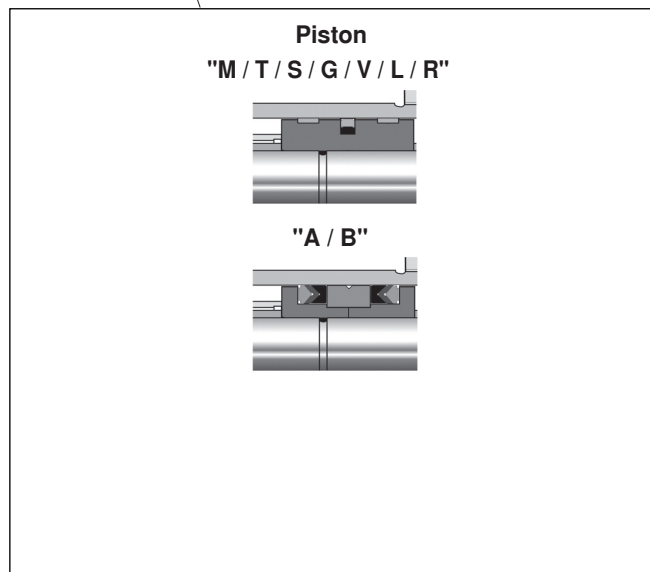
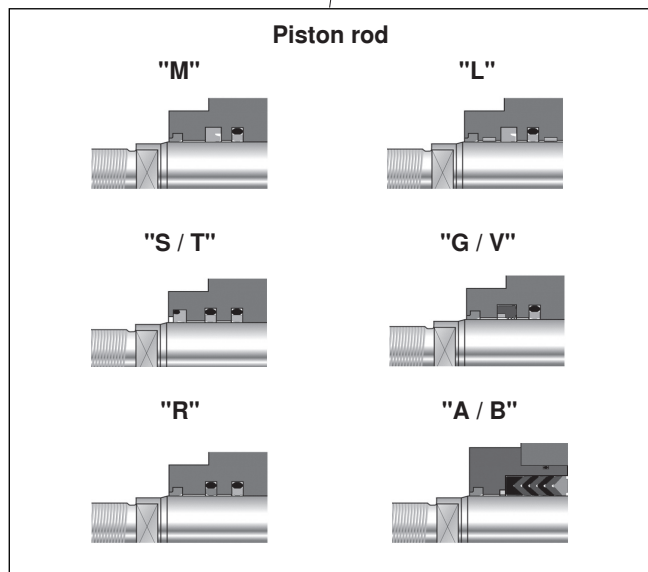
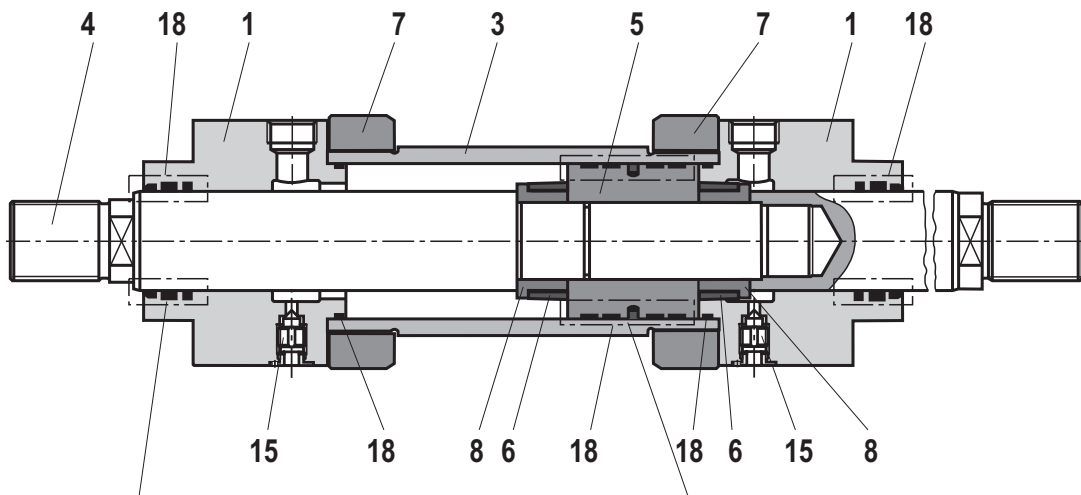
CDH1



- | | | | |
|--------------|----------------|---------------------|--------------|
| 1 Head | 6 Damping bush | 11 Base MP5 | 17 Foot MS2 |
| 2 Base | 7 Flange | 12 Round flange MF3 | 18 Seal kit: |
| 3 Pipe | 8 Socket | 14 Round flange MF4 | Scraper |
| 4 Piston rod | 9 Socket | 15 Bleeding | Rod seal |
| 5 Piston | 10 Base MP3 | 16 Trunnion MT4 | Piston seal |
| | | | O-ring |
| | | | Guide ring |

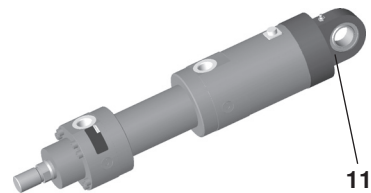
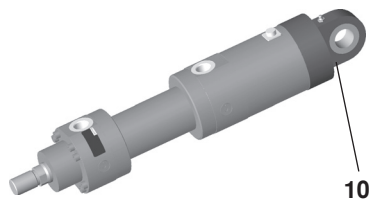
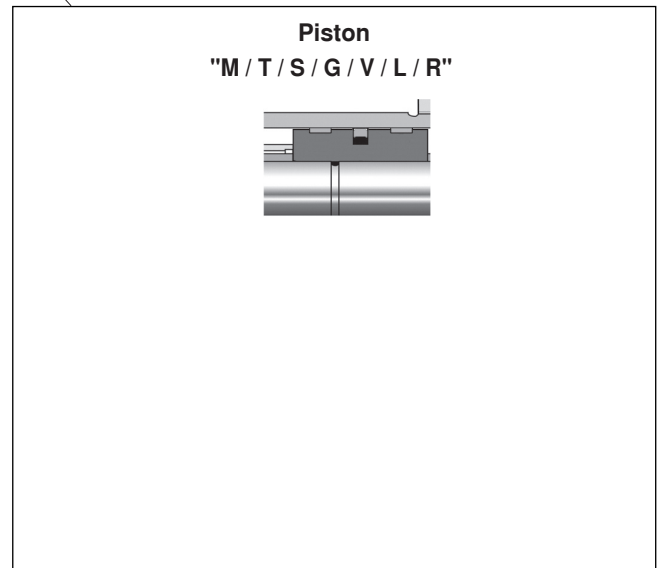
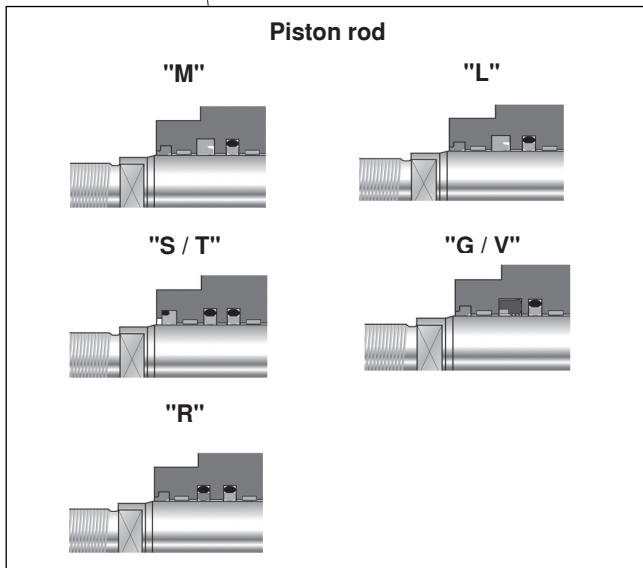
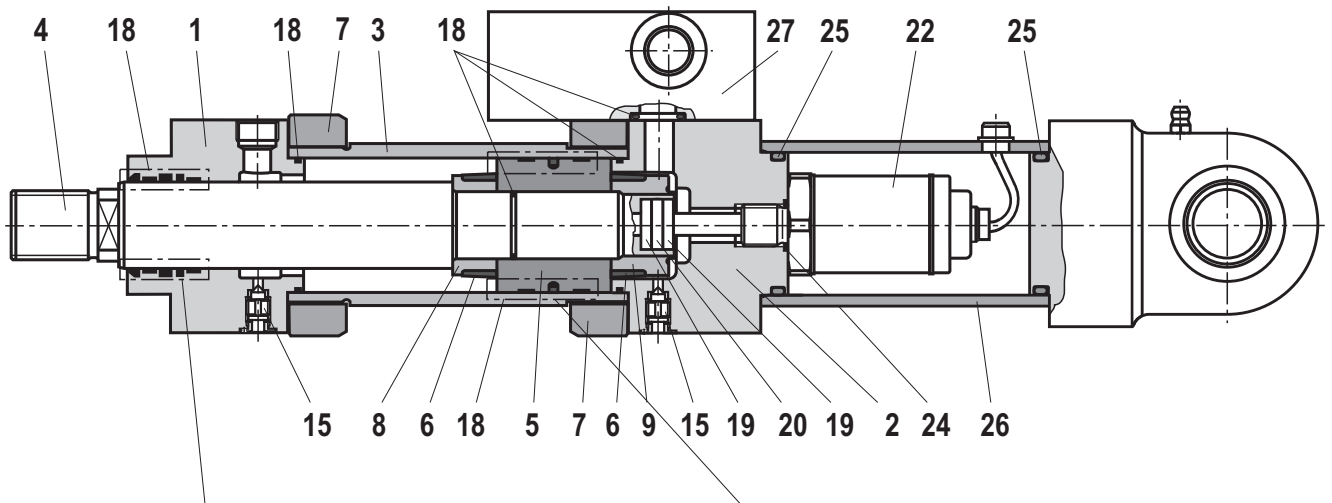
Spare parts: Series CGH1

CGH1



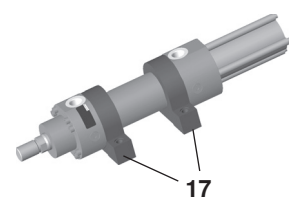
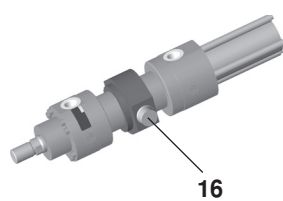
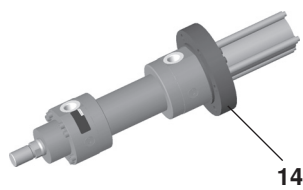
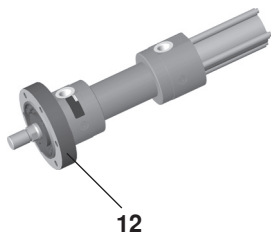
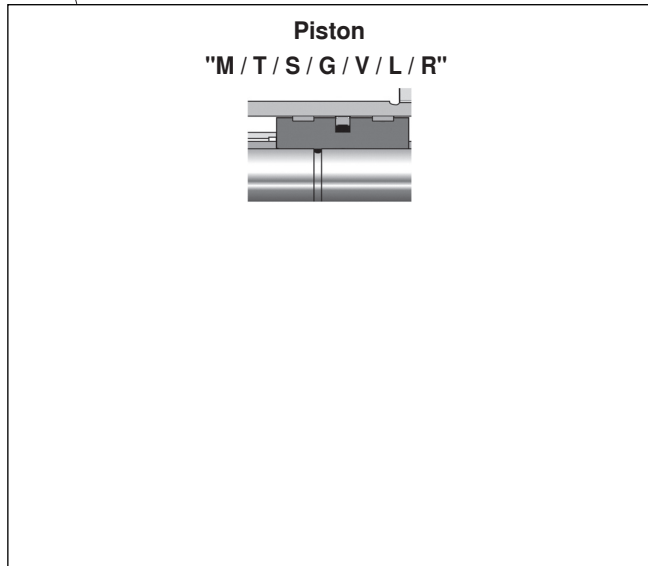
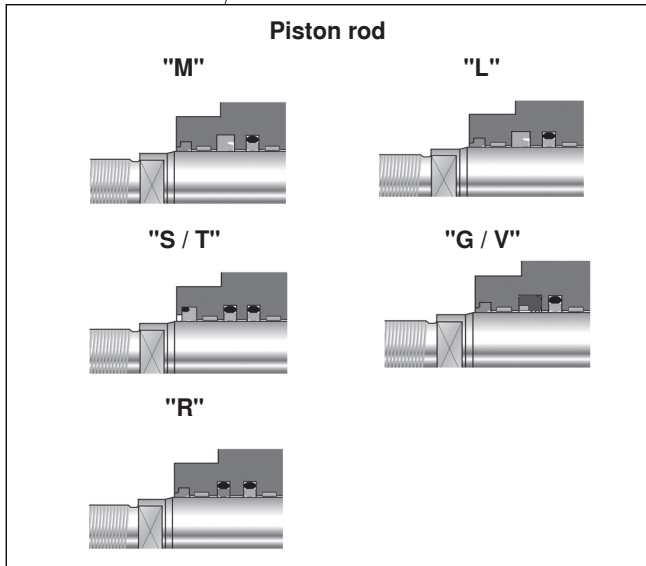
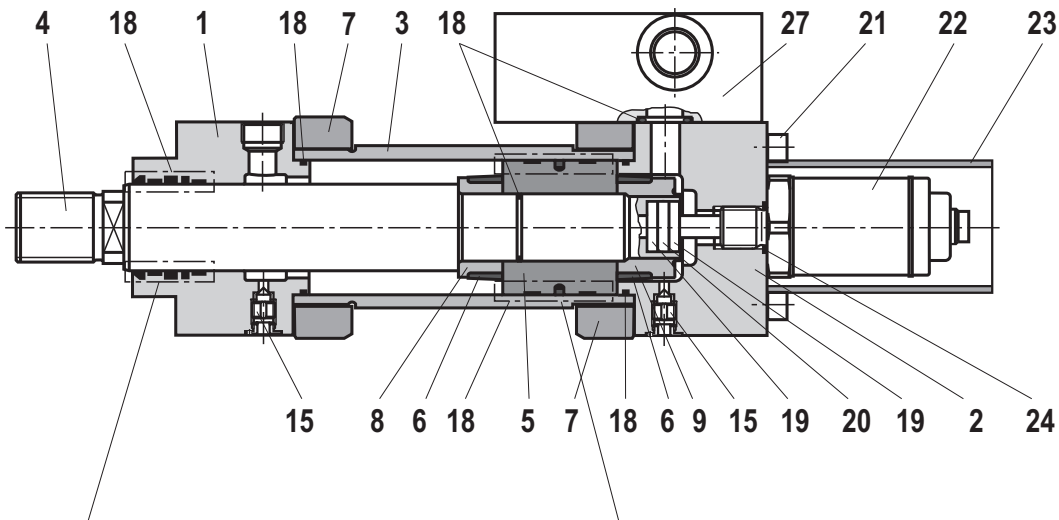
- | | |
|----------------|---------------------|
| 1 Head | 12 Round flange MF3 |
| 3 Pipe | 15 Bleeding |
| 4 Piston rod | 16 Trunnion MT4 |
| 5 Piston | 17 Foot MS2 |
| 6 Damping bush | 18 Seal kit: |
| 7 Flange | Scraper |
| 8 Socket | Rod seal |
| | Piston seal |
| | O-ring |
| | Guide ring |

Spare parts: Series CSH1 MP3 and MP5



- | | | | |
|--------------|----------------|--------------|------------------------|
| 1 Head | 6 Damping bush | 11 Base MP5 | 19 Insulating socket |
| 2 Base | 7 Flange | 15 Bleeding | 20 Solenoid |
| 3 Pipe | 8 Socket | 18 Seal kit: | 22 Position transducer |
| 4 Piston rod | 9 Socket | Scraper | 24 Seal |
| 5 Piston | 10 Base MP3 | Rod seal | 25 Seal |
| | | Piston seal | 26 Protective pipe |
| | | O-ring | 27 Subplate |
| | | Guide ring | |

Spare parts: Series CSH1 MF3, MF4, MT4 and MS2



- | | | | |
|----------------|---------------------|-----------------|-----------------------------------|
| 1 Head | 7 Flange | 16 Trunnion MT4 | 19 Insulating socket |
| 2 Base | 8 Socket | 17 Foot MS2 | 20 Solenoid |
| 3 Pipe | 9 Socket | 18 Seal kit: | 21 Hexagon socket head cap screws |
| 4 Piston rod | 12 Round flange MF3 | Scraper | 22 Position transducer |
| 5 Piston | 14 Round flange MF4 | Rod seal | 23 Protective pipe |
| 6 Damping bush | 15 Bleeding | Piston seal | 24 Seal |
| | | O-ring | 27 Subplate |
| | | Guide ring | |

Cylinder weight

Piston ØAL mm	Piston rod ØMM mm	CD/CS cylinder with 0 mm stroke length					Per 100 mm stroke length kg	CG cylinder with 0 mm stroke length			Per 100 mm stroke length kg
		MP3 ¹⁾ MP5 ¹⁾ kg	MP3 ²⁾ MP5 ²⁾ kg	MF3 MF4 kg	MT4 kg	MS2 kg		MF3 kg	MT4 kg	MS2 kg	
40	22	7	12	9	9	9	0,9	10	9	9	1,2
	28	7	12	9	9	9	1,0	10	9	10	1,5
50	28	10	16,5	14	12	12	1,2	15	14	14	1,6
	36	10	16,5	14	12	13	1,5	15	14	14	2,3
63	36	16	25,5	22	19	19	2,1	24	21	21	2,9
	45	16	25,5	22	19	20	2,6	24	22	22	3,8
80	45	25	35	30	29	31	2,9	34	33	35	4,1
	56	26	36	31	30	32	3,6	35	34	36	5,5
100	56	43	58,5	52	50	52	4,6	59	56	58	6,6
	70	44	59,5	53	51	53	5,7	60	58	60	8,8
125	70	79	99	93	91	90	7,3	103	101	100	10,3
	90	80	100	95	93	92	9,2	106	105	104	14,2
140	90	111	137	127	130	131	10,7	145	147	148	15,7
	100	112	138	128	131	132	11,9	146	149	150	18,1
160	100	168	205	198	200	209	12,6	230	233	241	18,8
	110	169	206	200	202	210	13,9	234	236	244	21,4
180	110	236	283	270	269	278	14,7	314	312	322	22,1
	125	239	286	272	271	281	16,8	319	318	327	26,5
200	125	306	361	348	346	358	19,0	369	367	380	28,6
	140	309	364	351	349	361	21,5	376	373	386	33,5
220	140	452	556	515	479	509	27,1	598	562	593	39,1
	160	452	556	515	479	509	30,9	598	562	593	46,7
250	160	582	710	664	618	649	32,7	784	739	770	48,5
	180	582	710	664	618	649	36,9	784	739	770	56,9
280	180	753	950	846	784	822	44,2	981	919	957	64,2
	200	753	950	846	784	822	48,8	981	919	957	73,4
320	200	1125	1404	1290	1180	1222	55,2	1452	1343	1385	79,8
	220	1125	1404	1290	1180	1222	60,4	1452	1343	1385	90,2

ØAL = Piston Ø

ØMM = Piston rod Ø

¹⁾ Weight without position measurement system

²⁾ Weight with position measurement system

Notes

Notes

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Notes

Internal gear pump

PGF Series 2X and 3X

RE 10213

Edition: 05.2015

Replaces: 04.2014



- ▶ Fixed displacement
- ▶ Frame sizes 1, 2 and 3
- ▶ Sizes 1.7 to 40
- ▶ Maximum pressure 250 bar
- ▶ Displacement 1.7 to 40 cm³

Features

- ▶ Low operating noise
- ▶ Low flow pulsation
- ▶ High efficiency even at low viscosity due to sealing gap compensation
- ▶ Long service life due to slide bearings and sealing gap compensation
- ▶ Suitable for a wide viscosity and speed range
- ▶ Excellent suction characteristics
- ▶ All frame sizes and sizes can be combined with each other
- ▶ Can be combined with PGH internal gear pumps, PV7 vane pumps and axial piston pumps
- ▶ Valve technology can be integrated in the cover on request
- ▶ Use:
 - For drives in the medium-output and medium-pressure range in industrial applications, such as machine tools.
 - At high operating pressure for endurant drives in mobile applications, such as lifting devices, fans and spreaders.

Contents

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Multiple pump units	22
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Ordering code

01	02	03	04	05	06	07	08	09	10	11
PG	F		-	/				V		*

Type

01	Internal gear pump, fixed displacement, gap compensated	PG
----	---	-----------

Series

02	Medium-pressure pump, maximum pressure 250 bar	F
----	--	----------

Frame size (BG)

03	BG1	1
	BG2	2
	BG3	3

Series

		BG1	BG2	BG3	
04	Series 20 to 29 (20 to 29: unchanged installation and port dimensions)	●	●	-	2X
	Series 30 to 39 (30 to 39: unchanged installation and port dimensions)	-	-	●	3X

Size

		NG	
05	BG1	1.7	1,7
		2.2	2,2
		2.8	2,8
		3.2	3,2
		4.1	4,1
		5.0	5,0
	BG2	6.3	006
		8.0	008
		11.0	011
		13.0	013
		16.0	016
		19.0	019
	BG3	22.0	022
		20.0	020
		25.0	025
		32.0	032
		40.0	040

Direction of rotation

06	Viewed on drive shaft	clockwise	R
		counter-clockwise	L

Drive shaft

07	Parallel keyed shaft, ISO 3019-2	A
	Parallel keyed shaft, ISO 3019-2 with through drive	E
	Splined shaft to SAE J744 with involute tooth system according to ANSI B92.1a	J
	Two surfaces for open-jaw coupling	N
	Two surfaces for open-jaw coupling with through drive	L
	Tapered shaft 1:5 with through drive ¹⁾	O

Line connections

08	Line thread according to ISO 228-1	01
	Suction and pressure port according to SAE J518	07
	Square flange port, metric fastening thread	20

¹⁾ With adapter for LKW auxiliary drive

01	02	03		04		05	06	07	08	09	10	11
PG	F		-		/					V		*

Seal material

09	FKM (fluor-caoutchouc)	V
----	------------------------	----------

Mounting flange

10	Special flange according to ISO 7653-1985 (for truck auxiliary drive)	K4
	4-hole mounting flange according to ISO 3019-2 and VDMA 24560 Part 1	E4
	2-hole mounting flange according to ISO 3019-1	U2
	2-hole mounting flange, spigot diameter 32 mm (BG1), spigot diameter 52 mm (BG2 and BG3)	M
	2-hole mounting flange, spigot diameter 50 mm	P
	2-hole mounting flange, spigot diameter 45.24 mm	P1
	2-hole mounting flange, spigot diameter 63 mm	P2

Optional

11	Feeder valve	N
	Cover for mounting the next frame size down	K

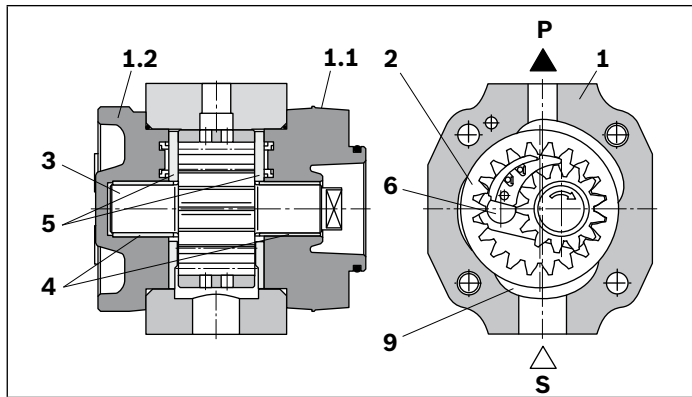
12	Further parameters in clear text	*
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Type	Material number
PGF2-2X/011RE01VE4	R900932271

Not all of the variants according to the ordering code are possible! Please select the desired pump with the help of the selection table on pages 9 to 20 or after consultation with Bosch Rexroth!

Special options are available on request, e.g., integrated pressure-relief valves.

Functional description



Design

PGF hydraulic pumps are leak-gap-compensated internal gear pumps with a fixed displacement. They consist basically of: housing (1), bearing cover (1.1), cover (1.2), ring gear (2), pinion shaft (3), slide bearings (4), axial discs (5) and stop pin (6) as well as the segment assembly (7) which is composed of a segment (7.1), segment carrier (7.2) and the sealing rolls (7.3).

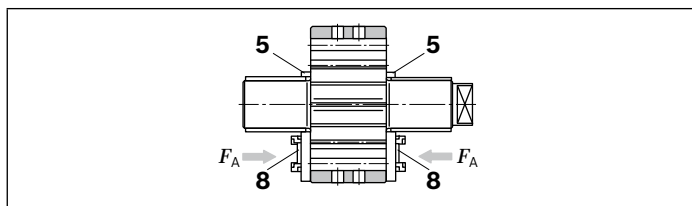
Suction and displacement process

The hydrodynamically supported pinion shaft (3) drives the internally toothed ring gear (2) in the direction of rotation shown.

During rotation, the volume is increased in the suction area over an angle of approx. 180°. A negative pressure is generated and fluid flows into the chambers.

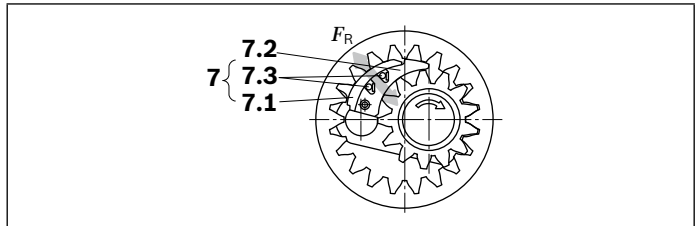
The sickle-shaped segment assembly (7) separates the suction chamber from the pressure chamber. Within the pressure chamber, the teeth of the pinion shaft (3) mesh with the tooth spaces of the ring gear (2). The fluid is then displaced through the pressure channel (P).

Axial compensation



The axial compensation force F_A acts in the area of the pressure chamber and is generated by the pressure zone (8) in the axial discs (5). The axial, longitudinal gaps between rotating and fixed parts are therefore extremely small and ensure optimum axial sealing of the pressure chamber.

Radial compensation



The radial compensation force F_R acts on the segment (7.1) and segment carrier (7.2).

The area ratios and the position of the sealing rolls (7.3) between the segment and segment carrier are designed to provide virtually gap-free sealing between the ring gear (2), the segment assembly (7) and the pinion shaft (3).

Spring elements under the sealing rolls (7.3) ensure adequate contact pressure, even at very low pressures.

Hydrodynamic and hydrostatic bearing

The forces acting on the pinion shaft (3) are absorbed by hydrodynamically lubricated radial slide bearings (4) while those acting on the ring gear (2) are absorbed by the hydrostatic bearing (9).

Splines

Involute splining was selected for the gear. Their long length of contact results in a low flow and pressure pulsation; these low pulsation rates contribute greatly to the low-noise operation.

Used materials

Housing (1), bearing cover (1.1), cover (1.2) and axial discs (5): Aluminum alloy

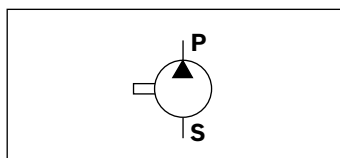
Ring gear (2), pinion shaft (3) and stop pin (6): Steel

Slide bearing (4): Copper-tin with steel back

Segment (7.1) and segment carrier (7.2): Brass alloy

Sealing rolls (7.3): Plastic

▼ Symbol



Technical data

Frame size		BS	1	1	1	1	1	1
Size		NG	1.7	2.2	2.8	3.2	4.1	5.0
Displacement, geometric	V_g	cm ³	1.7	2.2	2.8	3.2	4.1	5.0
Input speed	n_{min}	rpm	600	600	600	600	600	600
	n_{max}	rpm	4500	3600	4000	3600	3600	3600
Operating pressure, absolute								
Inlet	p	bar	0.6 to 3	0.6 to 3	0.6 to 3	0.6 to 3	0.6 to 3	0.6 to 3
Outlet	continuous	p_N	bar	180	210	210	210	180
	intermittend ¹⁾	p_{max}	bar	210	250	250	250	210
Flow (at $n = 1450$ rpm, $p = 10$ bar, $v = 30$ mm ² /s)	q_v	l/min	2.4	3.2	4.1	4.6	6.0	7.2
Power consumption								
Minimum required Drive power (at $p \approx 1$ bar)	P_{input}	kW	0.75	0.75	0.75	0.75	0.75	0.75
Moment of inertia (around drive axis)	J	kgm ²	0.000012	0.000013	0.000015	0.000017	0.000021	0.000026
Weight ²⁾	m	kg	0.8	0.9	1.0	1.0	1.1	1.3
Shaft loading	Radial and axial forces (e.g., belt pulley) only after consultation							
Type of mounting	Flange mounting							

Frame size		BS	2	2	2	2	2	2
Size		NG	6.3	8	11	13	16	22
Displacement, geometric	V_g	cm ³	6.5	8.2	11	13.3	16	22
Input speed	n_{min}	rpm	600	600	600	600	600	600
	n_{max}	rpm	3600	3600	3600	3600	3600	3000
Operating pressure, absolute								
Inlet	p	bar	0.6 to 3	0.6 to 3	0.6 to 3	0.6 to 3	0.6 to 3	0.6 to 3
Outlet	continuous	p_N	bar	210	210	210	210	180
	intermittend ¹⁾	p_{max}	bar	250	250	250	250	210
Flow (at $n = 1450$ rpm, $p = 10$ bar, $v = 30$ mm ² /s)	q_v	l/min	9.4	11.9	16	19.3	23.3	31.9
Power consumption								
Minimum required Drive power (at $p \approx 1$ bar)	P_{input}	kW	0.75	0.75	0.75	0.75	0.75	1.1
Moment of inertia (around drive axis)	J	kgm ²	0.000074	0.000090	0.00012	0.00014	0.00016	0.00019
Weight ²⁾	m	kg	2.1	2.2	2.4	2.6	2.7	3.1
Shaft loading	Radial and axial forces (e.g., belt pulley) only after consultation							
Type of mounting	Flange mounting							

1) Maximum 6 s, up to 15% of duty cycle, maximum 2×10^6 load cycles

2) For pumps with 2-hole mounting as flanged version
 ► Frame size 2 approx. 0.9 kg heavier
 ► Frame size 3 approx. 1.0 kg heavier

Frame size		BS	3	3	3	3	
Size		NG	20	25	32	40	
Displacement, geometric	V_g	cm ³	20.6	25.4	32.5	40.5	
Input speed	n_{min}	rpm	500	500	500	500	
	n_{max}	rpm	3600	3200	3000	2500	
Operating pressure, absolute							
Inlet	p	bar	0.6 to 3	0.6 to 3	0.6 to 3	0.6 to 3	
Outlet	continuous	p_N	bar	210	210	210	180
	intermittend ¹⁾	p_{max}	bar	250	250	250	210
Flow (at $n = 1450$ rpm, $p = 10$ bar, $v = 30$ mm ² /s)	q_v	l/min	29.9	36.8	47.1	58.7	
Power consumption							
Minimum required Drive power (at $p \approx 1$ bar)	P_{input}	kW	1.1	1.5	1.5	1.5	
Moment of inertia (around drive axis)	J	kgm ²	0.00029	0.00035	0.00043	0.00053	
Weight ²⁾	m	kg	3.3	4.1	4.5	4.9	
Shaft loading	Radial and axial forces (e.g., belt pulley) only after consultation						
Type of mounting	Flange mounting						
Hydraulic fluid							
Permissible hydraulic fluid ³⁾	HL mineral oil according to DIN 51524 Part 1/HLP, mineral oil according to DIN 51524 Part 2 HEES fluids according to DIN ISO 15380 HEPR fluids according to DIN ISO 15380						
Operating temperature range	-20 to +100 °C						
Ambient temperature range	-20 to +60 °C						
Viscosity range	10 to 300 mm ² /s ²						
Permissible starting viscosity	2000 mm ² /s ²						
Maximum permissible degree of contamination of the hydraulic fluid	Class 20/18/15 ⁴⁾						
Cleanliness level according to ISO 4406 (c)							
Permissible radial loading of the pinion shaft	On request						

Note

- ▶ Please contact us if the unit is to be used outside the specified values.
- ▶ Observe our specifications according to data sheet 90220.

1) Maximum 6 s, up to 15% of duty cycle, maximum 2×10^6 load cycles

2) For pumps with 2-hole mounting as flanged version
 ▶ Frame size 2 approx. 0.9 kg heavier
 ▶ Frame size 3 approx. 1.0 kg heavier

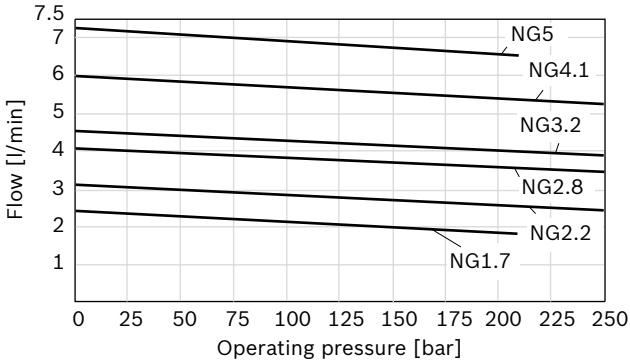
3) Other hydraulic fluids on request

4) Cleanliness levels specified for the components must be maintained in the hydraulic systems. Effective filtration prevents malfunctions and simultaneously extends the service life of the components.

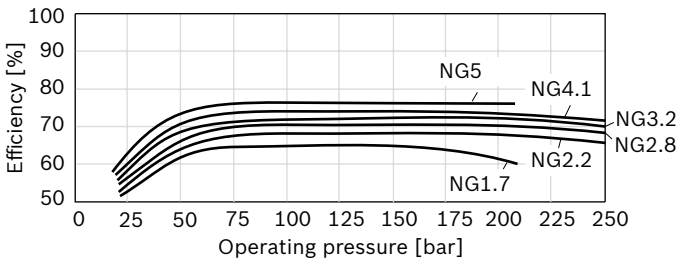
Characteristic curves

Frame size 1

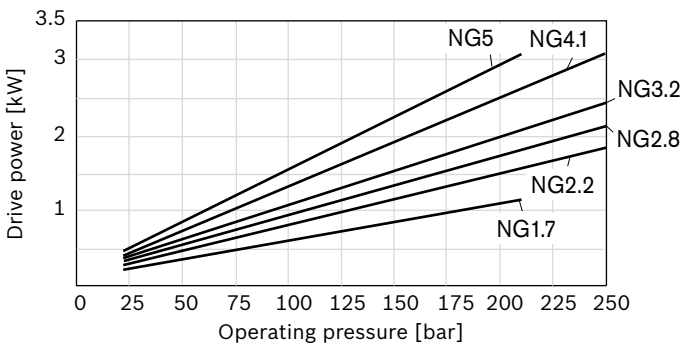
▼ Flow



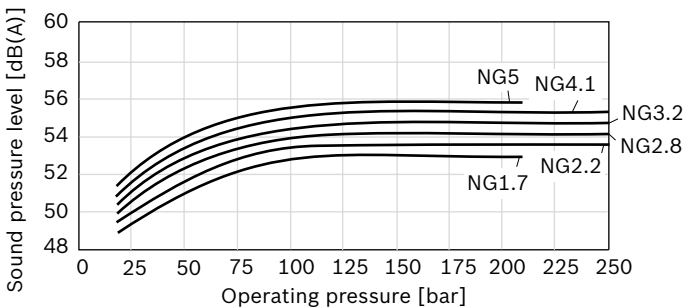
▼ Efficiency



▼ Drive power

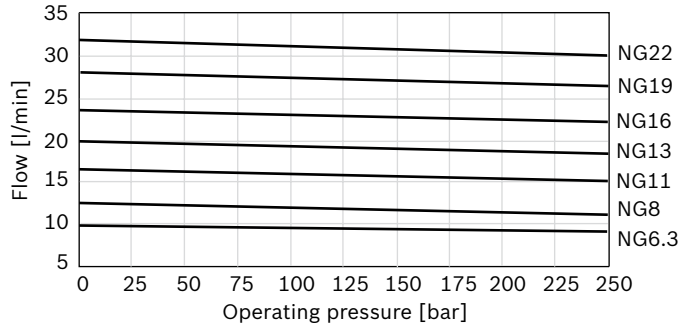


▼ Sound pressure level

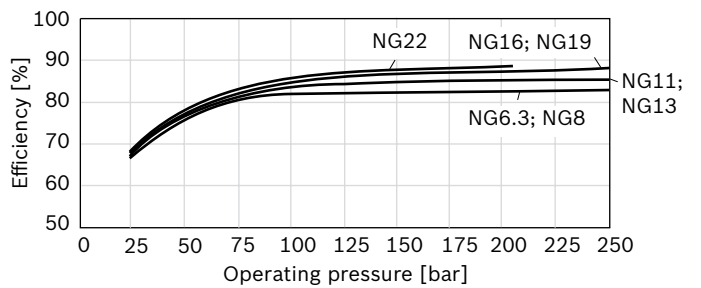


Frame size 2

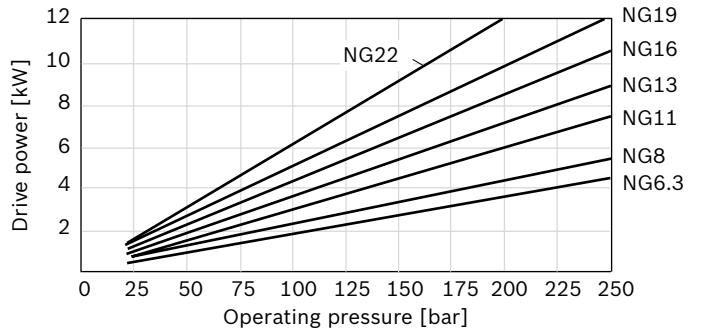
▼ Flow



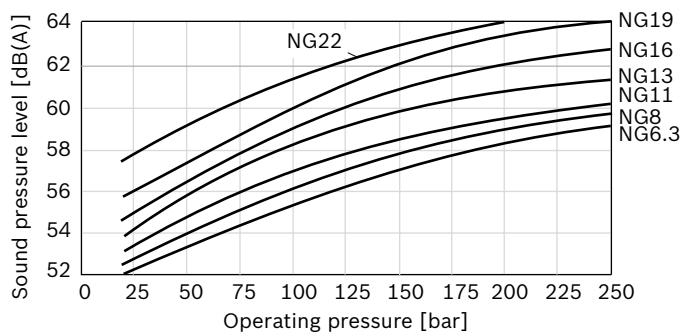
▼ Efficiency



▼ Drive power



▼ Sound pressure level

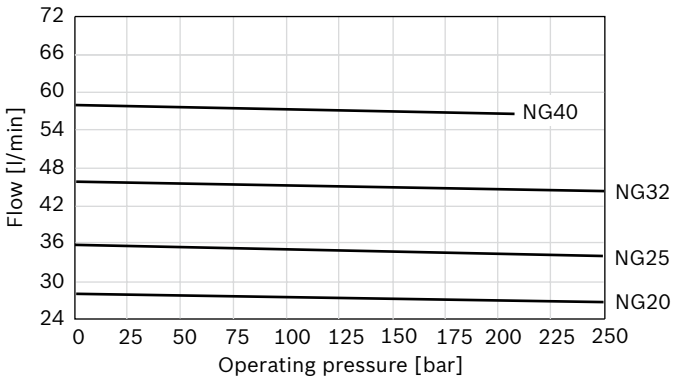


Note

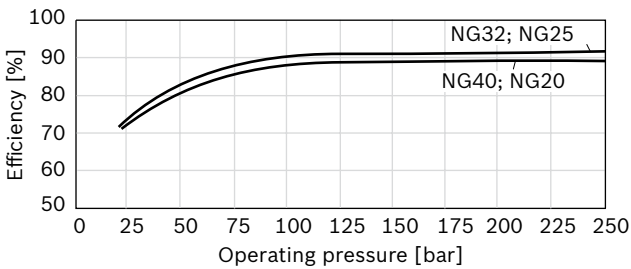
- ▶ Characteristics measured at $n = 1450$ rpm; $v = 46$ mm²/s; $\theta = 40$ °C
- ▶ Sound pressure level measured in acoustic room according to DIN 45635, Sheet 26; Distance: microphone – pump = 1 m

Frame size 3

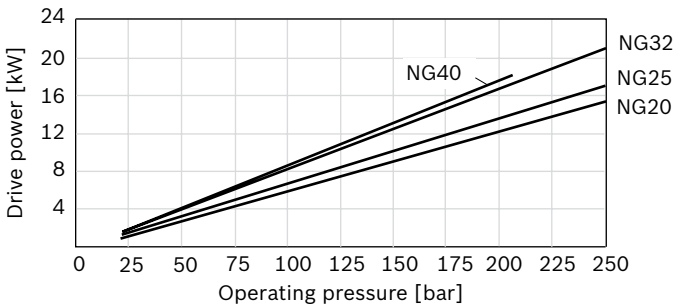
▼ **Flow**



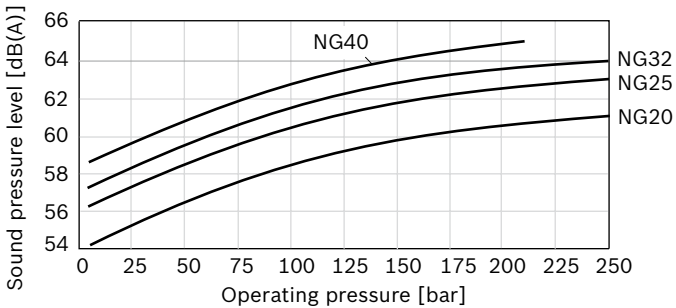
▼ **Efficiency**



▼ **Drive power**

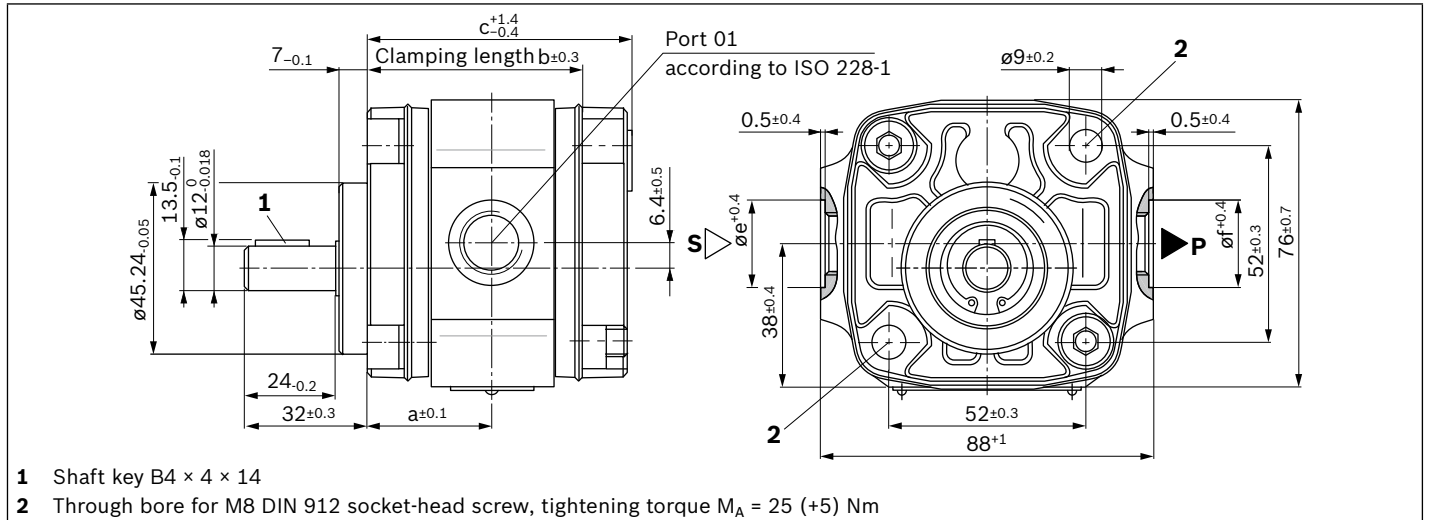


▼ **Sound pressure level**

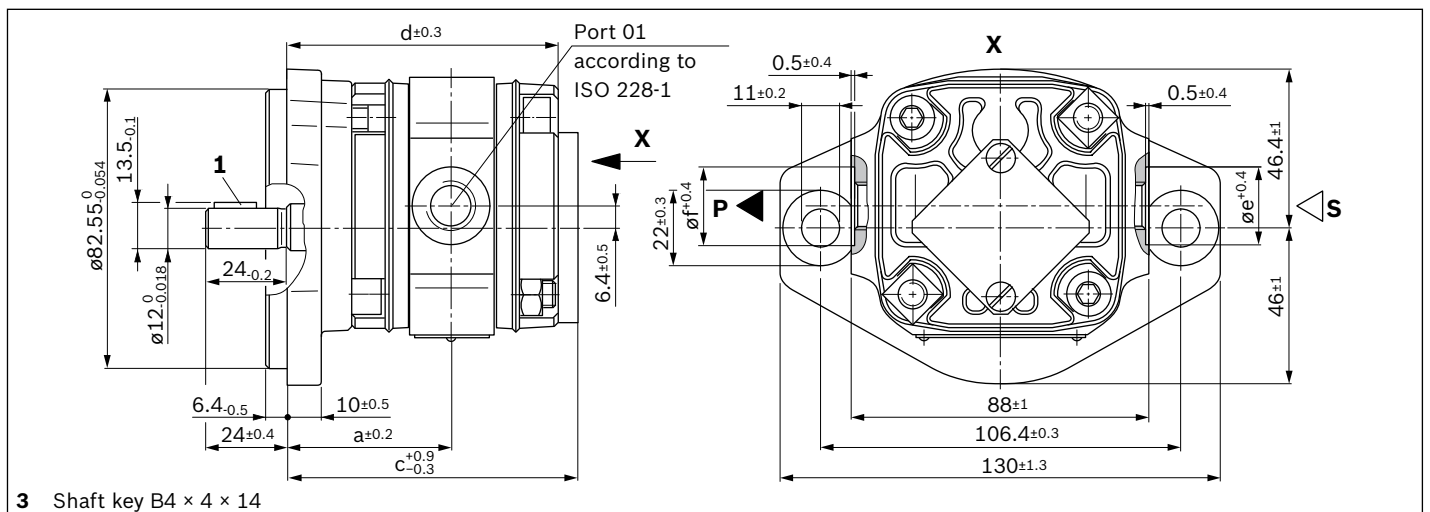


Note

- ▶ Characteristics measured at $n = 1450$ rpm; $v = 46$ mm²/s; $\theta = 40$ °C
- ▶ Sound pressure level measured in acoustic room according to DIN 45635, Sheet 26; Distance: microphone – pump = 1 m

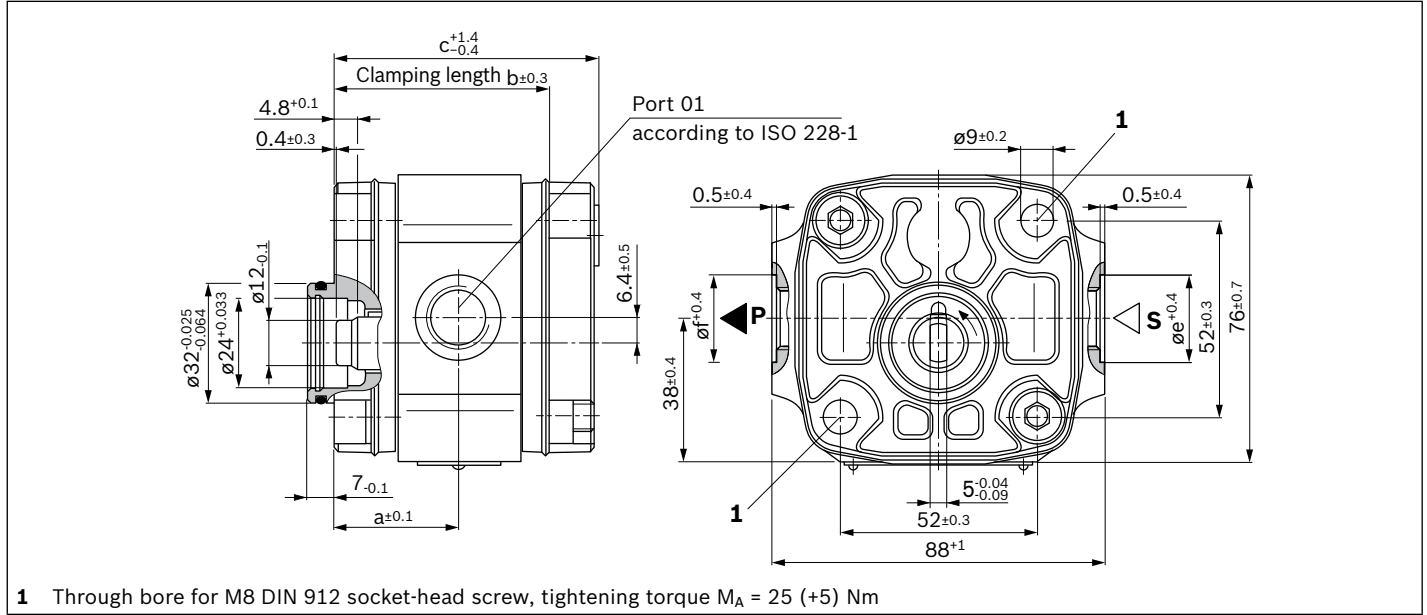
Dimensions frame size 1**Parallel keyed shaft, DIN 6885, without through drive**

Type	Material numbers	a	b	c	$\varnothing e$	$\varnothing f$	Suction port S according to ISO 228-1	Pressure port P according to ISO 228-1
PGF1-2X/ 1,7 R A 01VP1 R900932132		29.6	49.1	61.1	23	23	G1/4; 14 deep	G1/4; 12.5 deep
2,2 R A 01VP1 R900932133		29.6	49.1	61.1	23	23	G1/4; 14 deep	G1/4; 12.5 deep
2,8 R A 01VP1 R900932134		30.7	51.4	63.4	26	23	G3/8; 14 deep	G1/4; 12.5 deep
3,2 R A 01VP1 R900932135		31.5	53.0	65	26	23	G3/8; 14 deep	G1/4; 12.5 deep
4,1 R A 01VP1 R900932136		33.4	56.7	68.7	26	26	G3/8; 14 deep	G3/8; 12.5 deep
5,0 R A 01VP1 R900932137		35.2	60.4	72.4	27	26	G1/2; 14 deep	G3/8; 12.5 deep

Parallel keyed shaft, DIN 6885, with through drive

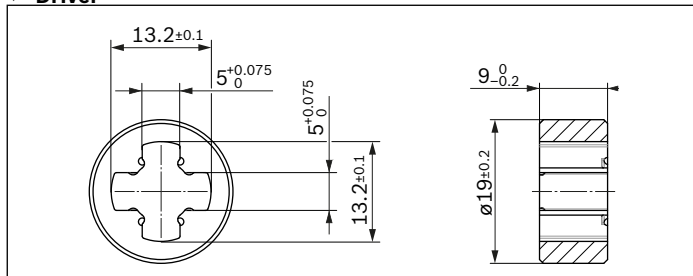
Type	Material numbers	a	c	d	$\varnothing e$	$\varnothing f$	Suction port S according to ISO 228-1	Pressure port P according to ISO 228-1
PGF1-2X/ 1,7 R E 01VU2 R900086159		48.6	85.7	79.7	23	23	G1/4; 14 deep	G1/4; 12.5 deep
2,2 R E 01VU2 R900086160		48.6	85.7	79.7	23	23	G1/4; 14 deep	G1/4; 12.5 deep
2,8 R E 01VU2 R900086161		49.7	88.0	82.0	26	23	G3/8; 14 deep	G1/4; 12.5 deep
3,2 R E 01VU2 R900086162		50.5	89.6	83.6	26	23	G3/8; 14 deep	G1/4; 12.5 deep
4,1 R E 01VU2 R900086163		52.4	93.3	87.3	26	26	G3/8; 14 deep	G3/8; 12.5 deep
5,0 R E 01VU2 R900086164		54.2	97.0	91.0	27	26	G1/2; 14 deep	G3/8; 12.5 deep

Shaft for open-jaw coupling, without through drive, rear pump



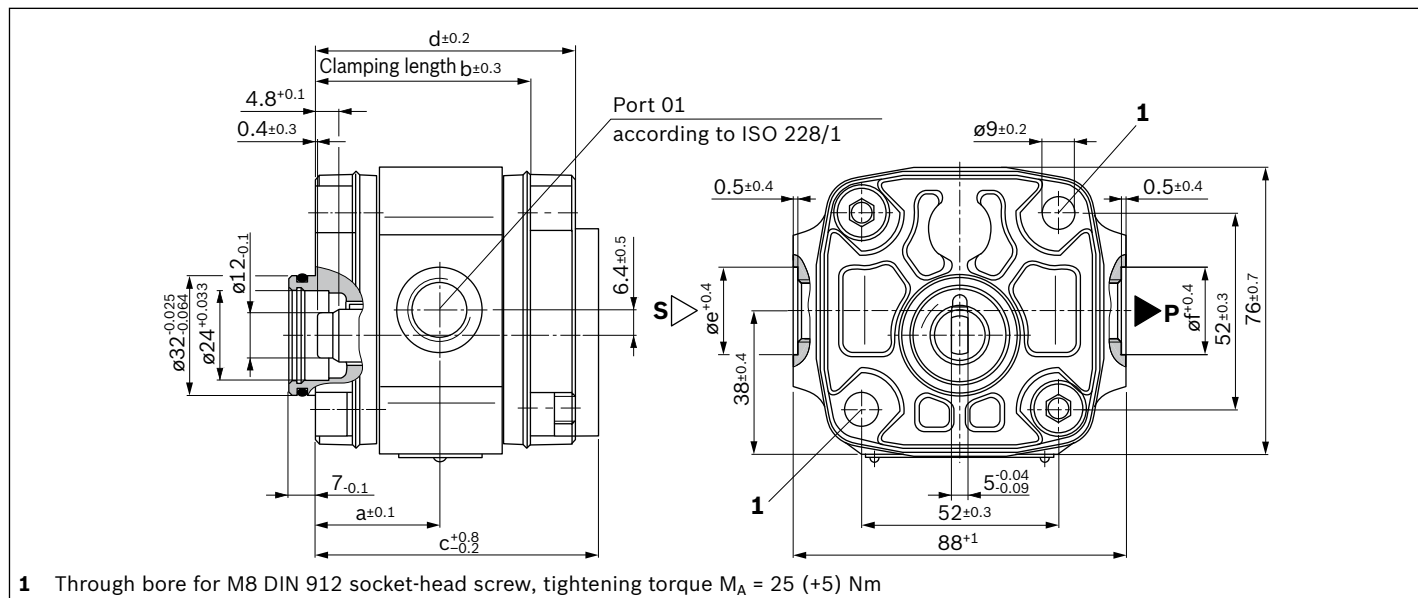
Type	Material numbers	a	b	c	øe	øf	Suction port S according to ISO 228-1	Pressure port P according to ISO 228-1
PGF1-2X/ 1,7 L N 01VM	R900086147	29.6	49.1	61.1	23	23	G1/4; 14 deep	G1/4; 12.5 deep
2,2 L N 01VM	R900086148	29.6	49.1	61.1	23	23	G1/4; 14 deep	G1/4; 12.5 deep
3,2 L N 01VM	R900086150	31.5	53.0	65	26	23	G3/8; 14 deep	G1/4; 12.5 deep
4,1 L N 01VM	R900932131	33.4	56.7	68.7	26	26	G3/8; 14 deep	G3/8; 12.5 deep

▼ **Driver**



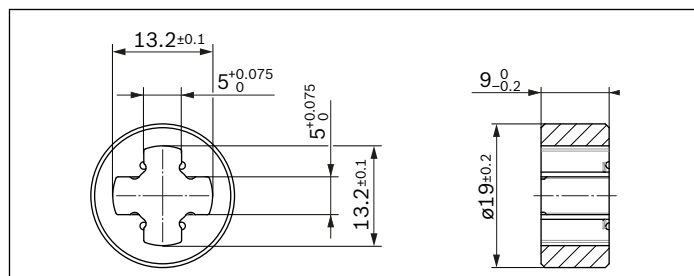
The driver (material number R900984336) is included in the scope of supply.

Shaft for open-jaw coupling, with through drive, middle or rear pump



Type			Material numbers	a	b	c	d	øe	øf	Suction port S according to ISO 228-1	Pressure port P according to ISO 228-1
PGF1-2X/ 1,7	R	L	01VM R900086165	29.6	49.1	66.7	60.7	23	23	G1/4; 14 deep	G1/4; 12.5 deep
			R900932093								
2,2	R	L	01VM R900086166	29.6	49.1	66.7	60.7	23	23	G1/4; 14 deep	G1/4; 12.5 deep
			R900932094								
2,8	R	L	01VM R900932138	30.7	51.4	69.0	63.0	26	23	G3/8; 14 deep	G1/4; 12.5 deep
			R900951293								
3,2	R	L	01VM R900086168	31.5	53.0	70.6	64.6	26	23	G3/8; 14 deep	G1/4; 12.5 deep
			R900951294								
4,1	R	L	01VM R900086169	33.4	56.7	74.3	68.3	26	26	G3/8; 14 deep	G3/8; 12.5 deep
			R900088913								
5,0	R	L	01VM R900086170	35.2	60.4	78.0	72.0	27	26	G1/2; 14 deep	G3/8; 12.5 deep
			R900951295								

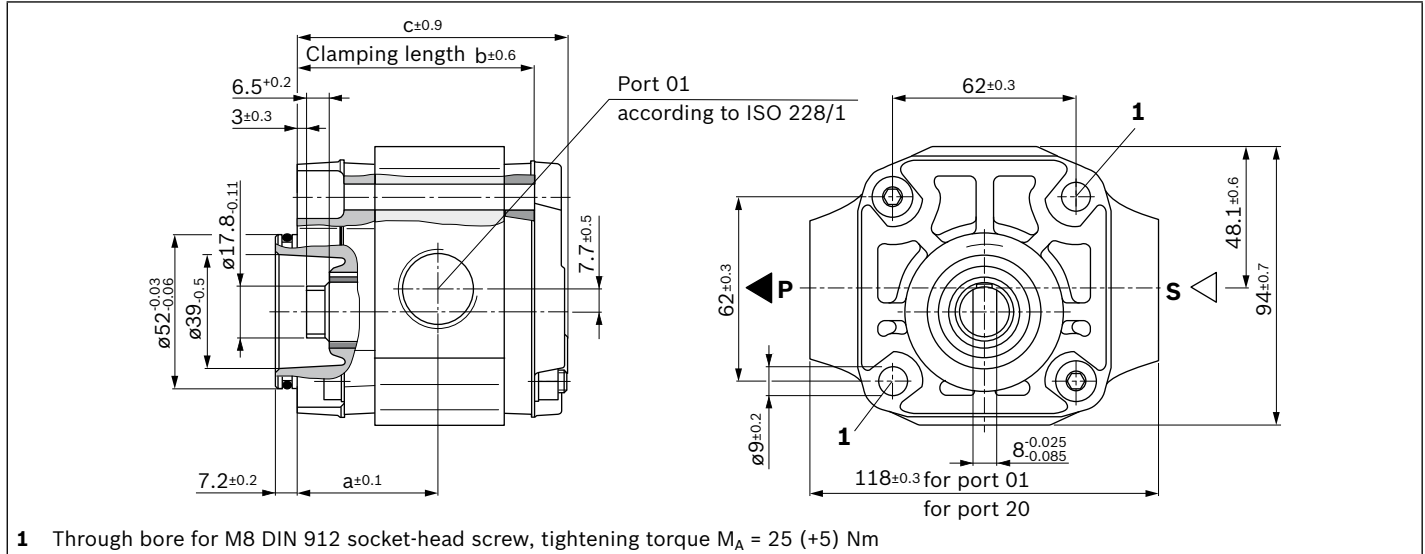
▼ Driver



The driver (material number R900984336) is included in the scope of supply.

Dimensions frame size 2

Shaft for open-jaw coupling, without through drive, rear pump

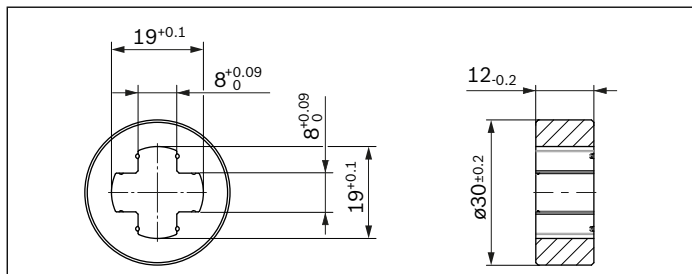


Type	Material numbers	a	b	c	Port standard	Port optional
PGF2-2X/	006 L N 01VM R900563948	46	76	87.2	01	20
	008 L N 01VM R900062364	47.8	79.5	90.7	01	20
	011 L N 01VM R900077364	50.5	85	96.2	01	20
	013 L N 20VM R900034010	53	90	101.2	20	01
	016 L N 20VM R900033354	55.5	95	106.2	20	01
	019 L N 20VM R900932120	58.5	101	112.2	20	01
	022 L N 20VM R900081192	61.5	107	118.2	20	-

▼ Port 01, line thread according to ISO 228-1

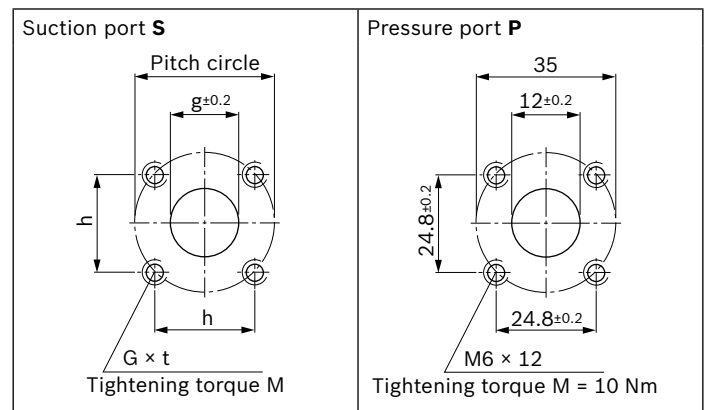
NG	Suction port S	Pressure port P
006, 008, 011, 013	G3/4; 16 deep	G1/2; 14 deep
016, 019	G1; 18 deep	G1/2; 14 deep

▼ Driver



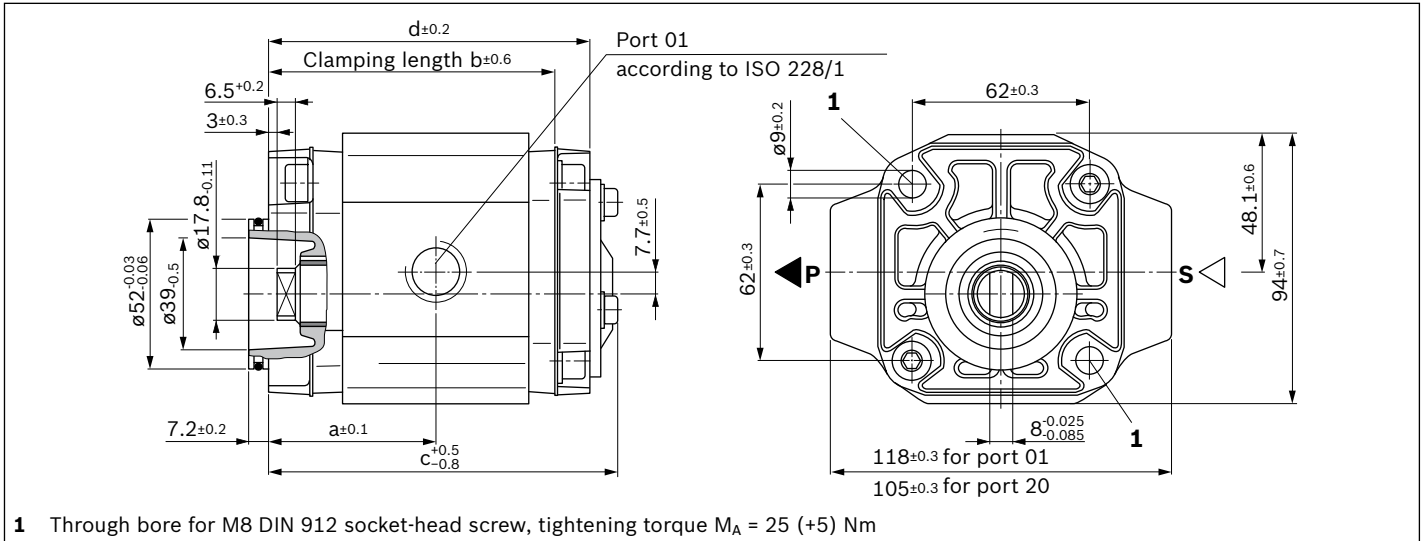
The driver (material number R900981428) is included in the scope of supply.

▼ Port 20, square flange port



NG	g	h	Pitch circle	G	t	M [Nm]
006, 008, 011, 013, 016	20	28.3±0.2	40	M6	10	10
019, 022	26	38.9±0.3	55	M8	12	25

Shaft for open-jaw coupling, with through drive, middle or rear pump

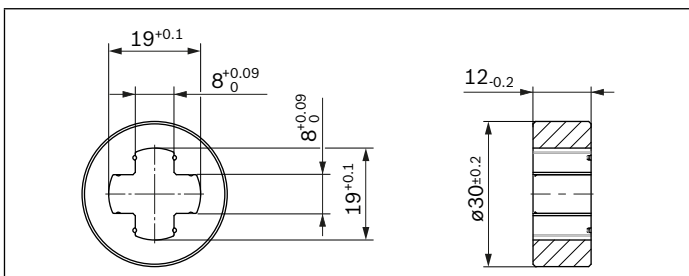


Type			Material numbers	a	b	c	d	Port standard	Port optional
PGF2-2X/ 006	R	L	01VM	46	76	98.2	87.1	01	20
		L							
008	R	L	01VM	47.8	79.5	101.7	90.6	01	20
		L							
011	R	L	01VM	50.5	85	107.2	96.1	01	20
		L							
013	R	L	20VM	53	90	112.2	101.1	20	01
		L							
016	R	L	20VM	55.5	95	117.2	106.1	20	01
		L							
019	R	L	20VM	58.5	101	123.2	112.1	20	01
		L							
022	R	L	20VM	61.5	107	129.2	118.1	20	-
		L							

▼ **Port 01, line thread according to ISO 228-1**

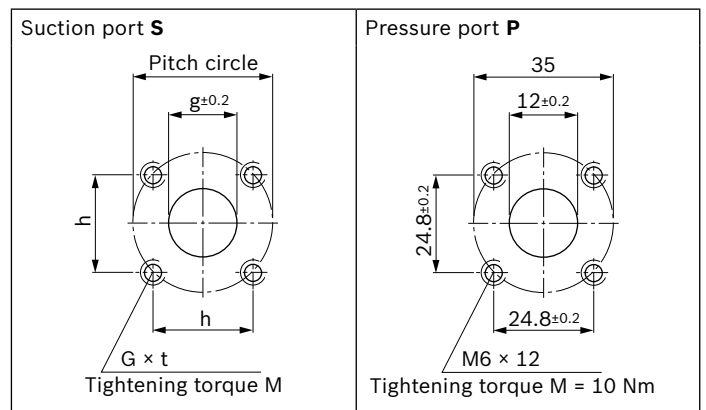
NG	Suction port S	Pressure port P
006, 008, 011, 013	G3/4; 16 deep	G1/2; 14 deep
016, 019	G1; 18 deep	G1/2; 14 deep

▼ **Driver**



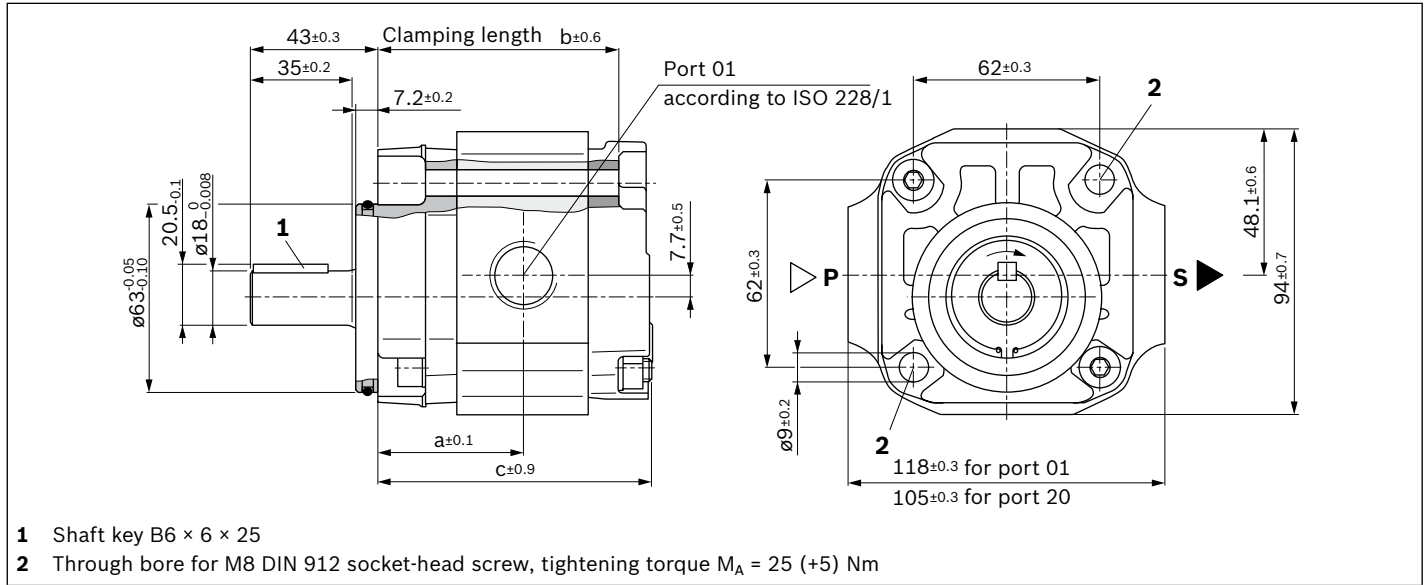
The driver (material number R900981428) is included in the scope of supply.

▼ **Port 20, square flange port**



NG	g	h	Pitch circle	G	t	M [Nm]
006, 008, 011, 013, 016	20	28.3 ± 0.2	40	M6	10	10
019, 022	26	38.9 ± 0.3	55	M8	12	25

Parallel keyed shaft, DIN 6885, without through drive

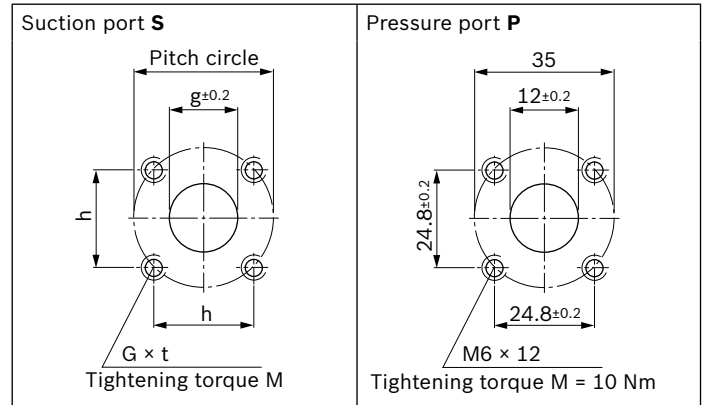


Type	Material numbers	a	b	c	Port standard	Port optional
PGF2-2X/ 006 R A 01VP2	R900932272	46	76	87.2	01	20
008 R A 01VP2	R900564037	47.8	79.5	90.7	01	20
011 R A 01VP2	R900568523	50.5	85	96.2	01	20
013 R A 20VP2	R900032712	53	90	101.2	20	01
016 R A 20VP2	R900932275	55.5	95	106.2	20	01
019 R A 20VP2	R900571401	58.5	101	112.2	20	01

▼ **Port 01, line thread according to ISO 228-1**

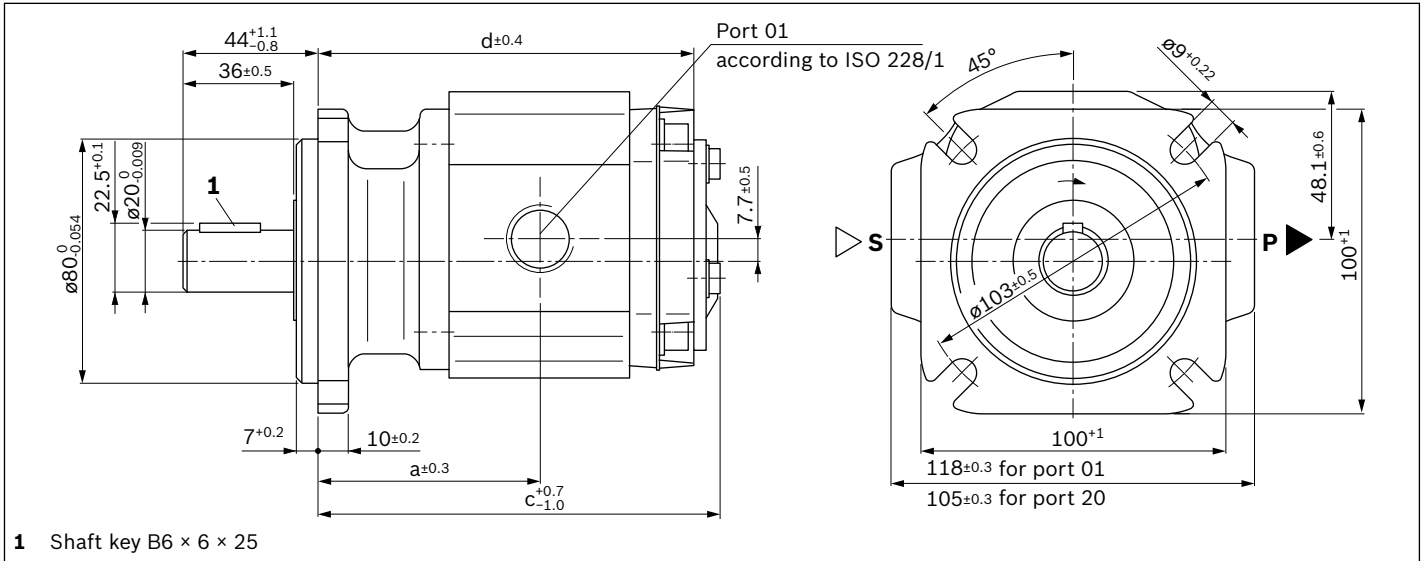
NG	Suction port S	Pressure port P
006, 008, 011, 013	G3/4; 16 deep	G1/2; 14 deep
016, 019	G1; 18 deep	G1/2; 14 deep

▼ **Port 20, square flange port**



NG	g	h	Pitch circle	G	t	M [Nm]
006, 008, 011, 013, 016	20	28.3 ± 0.2	40	M6	10	10
019, 022	26	38.9 ± 0.3	55	M8	12	25

Parallel keyed shaft, DIN 6885, with through drive

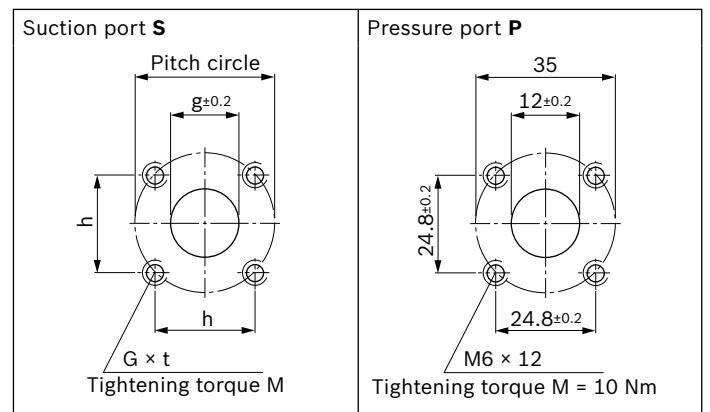


Type	Material numbers	a	c	d	Port standard	Port optional
PGF2-2X/ 006 R E 01VE4	R900932265	63	115.2	104.1	01	20
008 R E 01VE4	R900932266	64.8	118.7	107.6	01	20
011 R E 01VE4	R900932271	67.5	124.2	113.1	01	20
013 R E 20VE4	R900943181	70	129.2	118.1	20	01
016 R E 20VE4	R900932193	72.5	134.2	123.1	20	01
019 R E 20VE4	R900943182	75.5	140.2	129.1	20	01
022 R E 20VE4	R900932126	78.5	146.2	135.1	20	-

▼ Port 01, line thread according to ISO 228-1

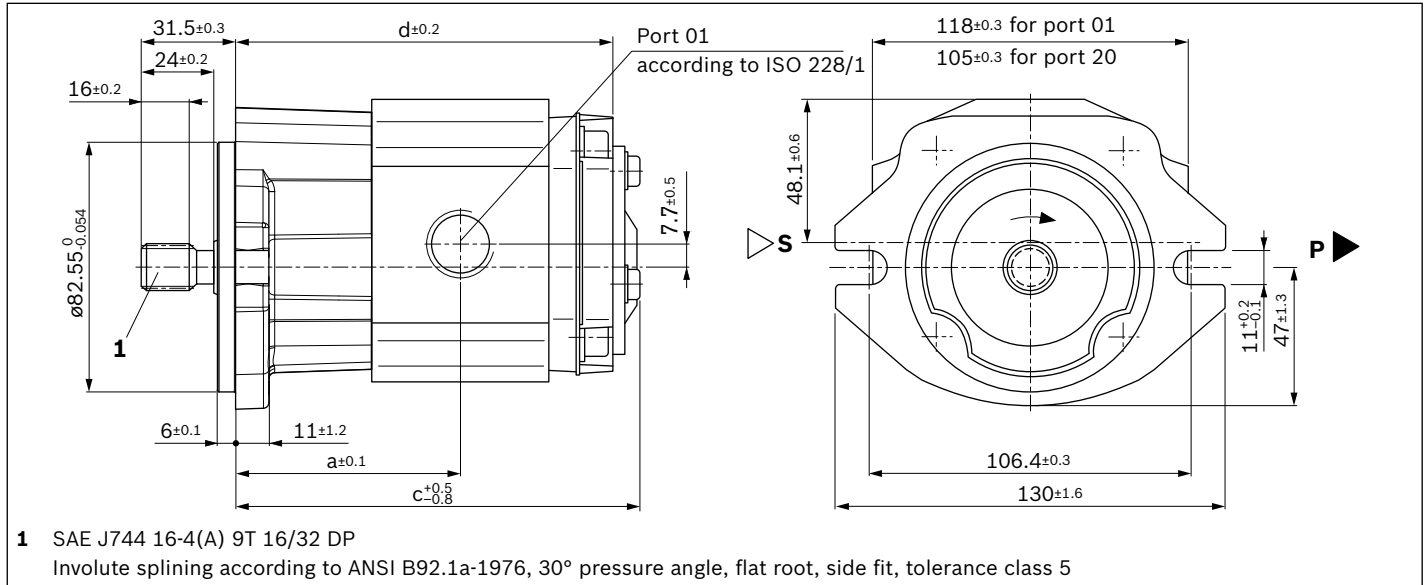
NG	Suction port S	Pressure port P
006, 008, 011, 013	G3/4; 16 deep	G1/2; 14 deep
016, 019	G1; 18 deep	G1/2; 14 deep

▼ Port 20, square flange port



NG	g	h	Pitch circle	G	t	M [Nm]
006, 008, 011, 013, 016	20	28.3±0.2	40	M6	10	10
019, 022	26	38.9±0.3	55	M8	12	25

Splined shaft, with through drive

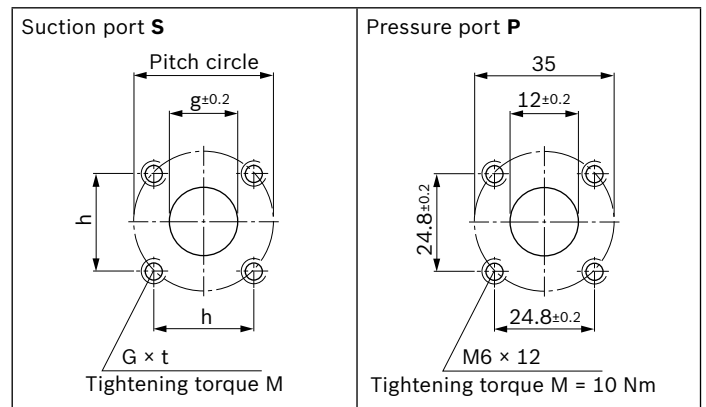


Type	Material numbers	a	c	d	Port standard	Port optional	
PGF2-2X/006	R J 01VU2	R900931660	65	117.2	106.1	01	20
	L	R900247697					
008	R J 01VU2	R900953363	66.8	120.7	109.6	01	20
	L	R900247698					
011	R J 01VU2	R900938281	69.5	126.2	115.1	01	20
	L	R900247699					
013	R J 20VU2	R900932264	72	131.2	120.1	20	01
	L	R900969259					
016	R J 20VU2	R900932085	74.5	136.2	125.1	20	01
	L	R900936173					
019	R J 20VU2	R900022882	77.5	142.2	131.1	20	01
	L	R900984300					
022	R J 20VU2	R900054053	80.5	148.2	137.1	20	-
	L	R900935718					

▼ **Port 01, line thread according to ISO 228-1**

NG	Suction port S	Pressure port P
006, 008, 011, 013	G3/4; 16 deep	G1/2; 14 deep
016, 019	G1; 18 deep	G1/2; 14 deep

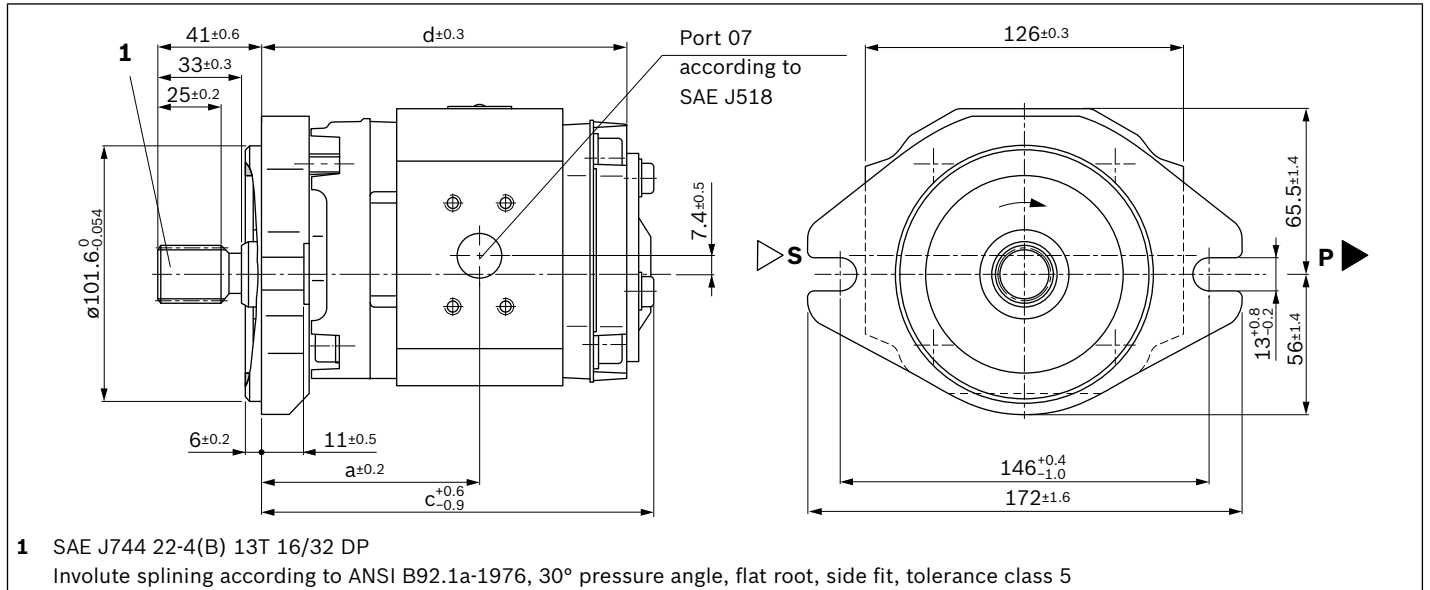
▼ **Port 20, square flange port**



NG	g	h	Pitch circle	G	t	M [Nm]
006, 008, 011, 013, 016	20	28.3±0.2	40	M6	10	10
019, 022	26	38.9±0.3	55	M8	12	25

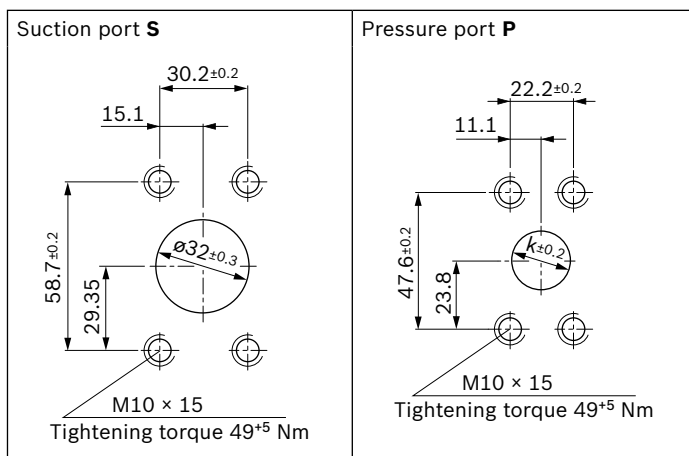
Dimensions frame size 3

Splined shaft, with through drive



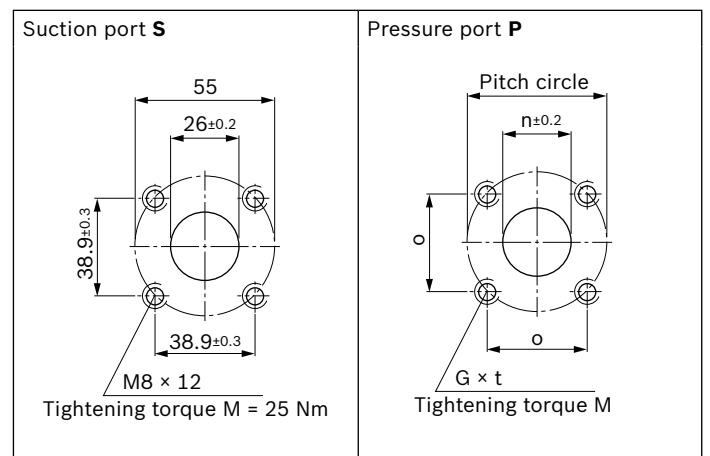
Type	Material numbers	a	c	d	Port standard	Port optional
PGF3-3X/ 020	R J 07VU2 R900983792	79.5	145.6	134.5	07	20
	L R900948466					
025	R J 07VU2 R900029617	82.5	151.6	140.5	07	20
	L R900950057					
032	R J 07VU2 R900029561	87	160.6	149.5	07	20
	L R900984213					
040	R J 07VU2 R900931426	92	170.6	159.5	07	-
	L R900969266					

▼ Port 07, suction and pressure port according to SAE J518



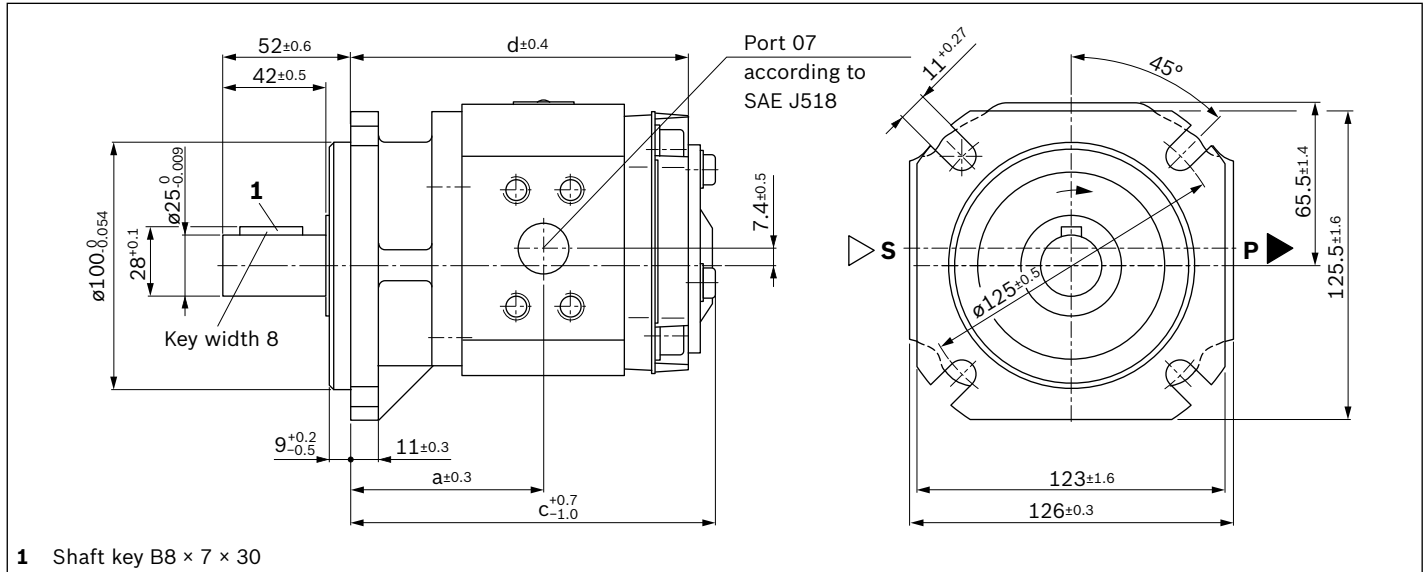
NG	k	Suction port S	Pressure port P
020, 025	16	1 1/4 in	3/4 in
032, 040	20	1 1/4 in	3/4 in

▼ Port 20, square flange port



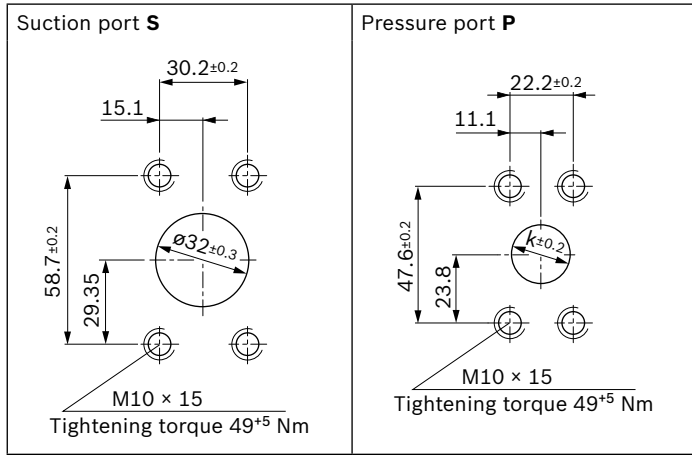
NG	n	o	Pitch circle	G	t	M [Nm]
020, 025	12	24.8±0.2	35	M6	10	10
032	20	38.9±0.3	55	M8	12	25

Parallel keyed shaft, DIN 6885, without through drive



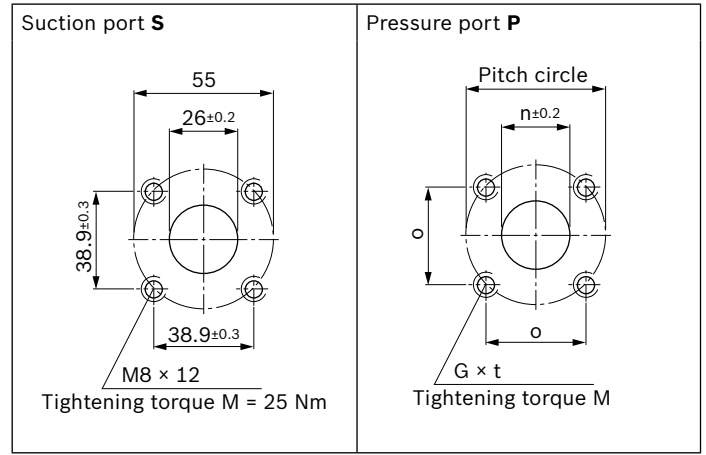
Type	Material numbers	a	c	d	Port standard	Port optional
PGF3-3X/ 020 R E 07VE4	R900063299	71	137.1	126	07	20
025 R E 07VE4	R900932088	74	143.1	132	07	20
032 R E 07VE4	R900932112	78.5	152.1	141	07	20
040 R E 07VE4	R900932111	83.5	162.1	151	07	-

▼ **Port 07, suction and pressure port according to SAE J518**



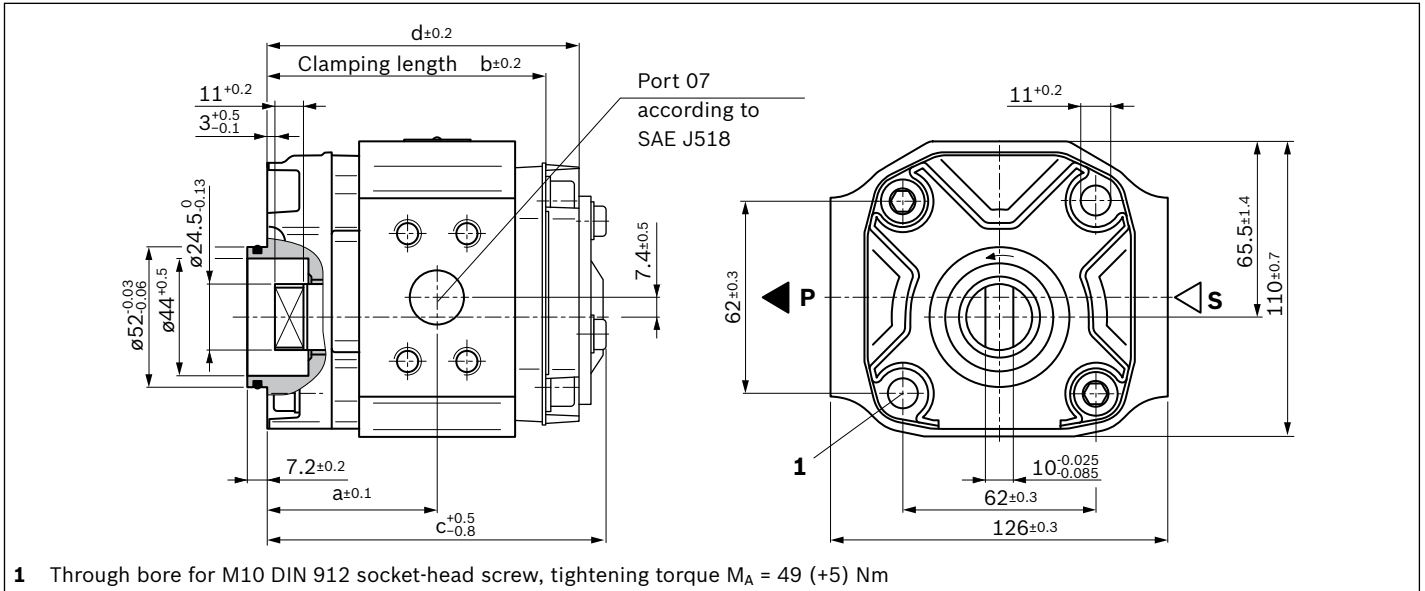
NG	k	Suction port S	Pressure port P
020, 025	16	1 1/4 in	3/4 in
032, 040	20	1 1/4 in	3/4 in

▼ **Port 20, square flange port**



NG	n	o	Pitch circle	G	t	M [Nm]
020, 025	12	24.8±0.2	35	M6	10	10
032	20	38.9±0.3	55	M8	12	25

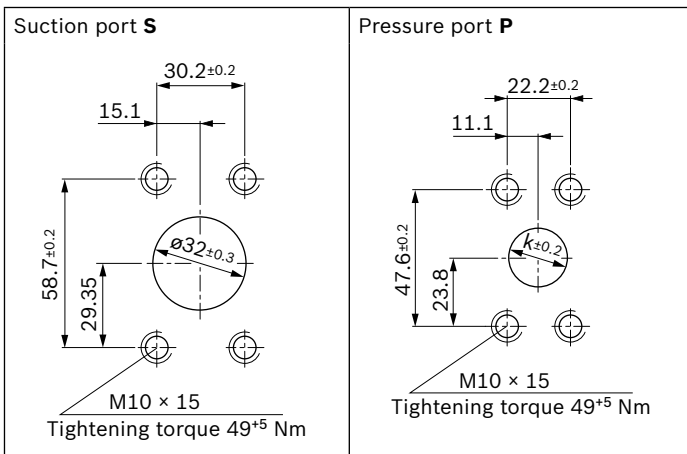
Shaft for open-jaw coupling, with through drive, middle or rear pump



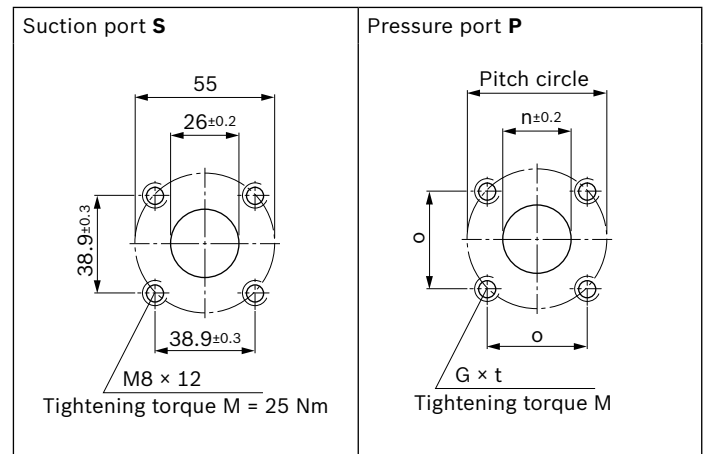
1 Through bore for M10 DIN 912 socket-head screw, tightening torque $M_A = 49 (+5)$ Nm

Type	Material numbers	a	b	c	d	Port standard	Port optional	
PGF3-3X/ 020	R L 07VM	R900073539	60.5	99.5	126.6	115.5	07	20
	L	R900758721						
025	R L 07VM	R900932121	63.5	105.5	132.6	121.5	07	20
	L	R900960119						
032	R L 07VM	R900074369	68	114.5	141.6	130.5	07	20
	L	R900034370						
040	R L 07VM	R900083281	73	124.5	151.6	140.5	07	-
	L	R900058224						

▼ **Port 07, suction and pressure port according to SAE J518**



▼ **Port 20, square flange port**

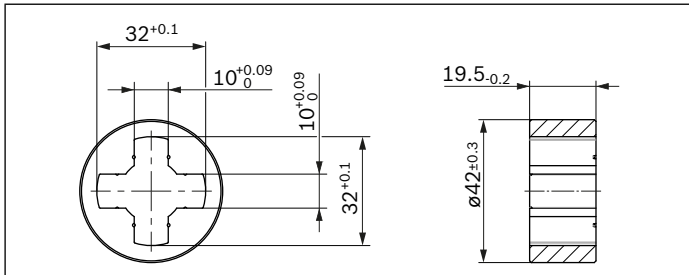


NG	k	Suction port S	Pressure port P
020, 025	16	1 1/4 in	3/4 in
032, 040	20	1 1/4 in	3/4 in

NG	n	o	Pitch circle	G	t	M [Nm]
020, 025	12	24.8±0.2	35	M6	10	10
032	20	38.9±0.3	55	M8	12	25

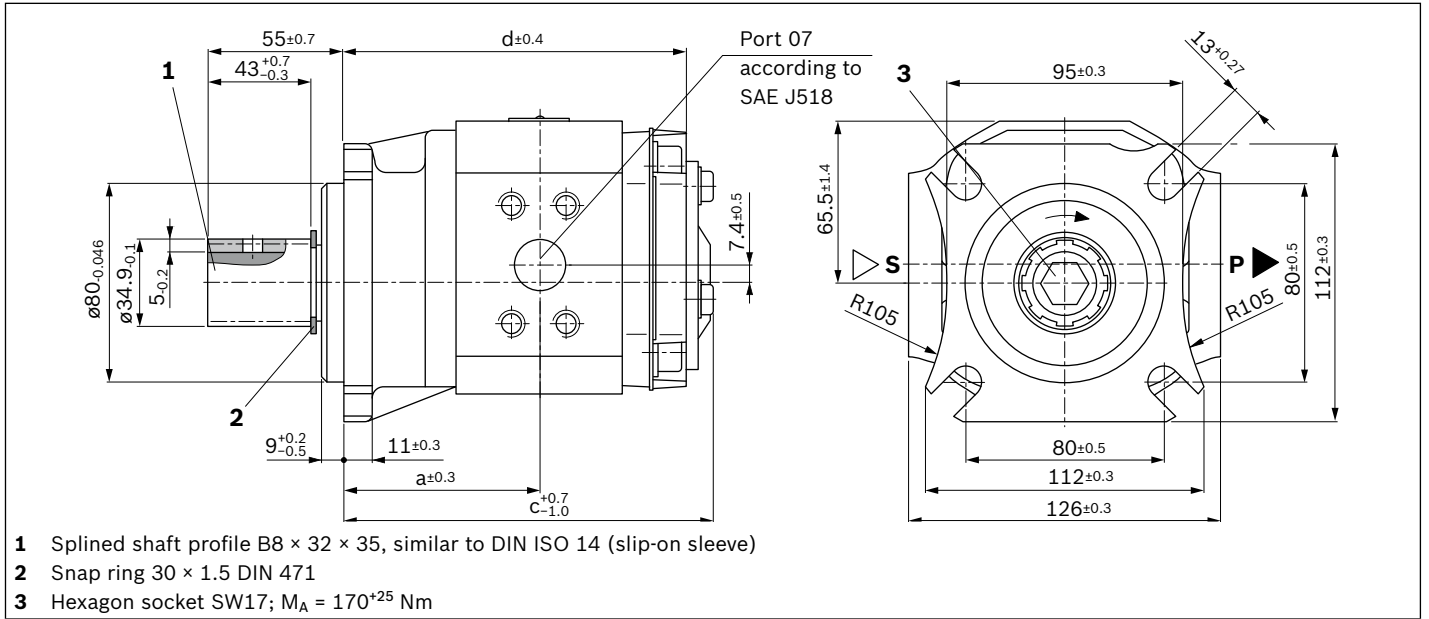
Driver see page 20

▼ **Driver**



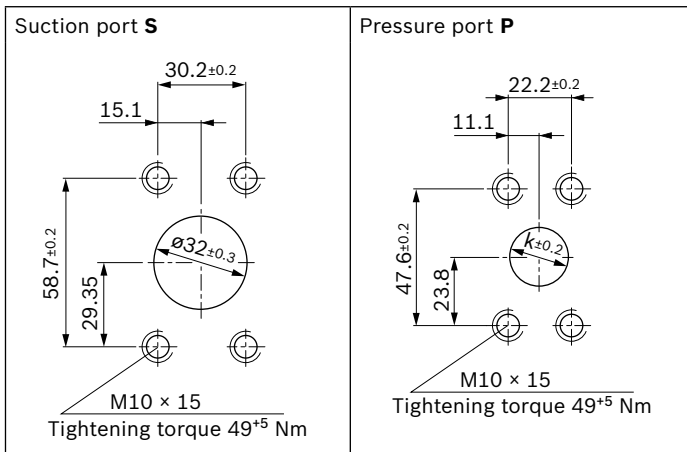
The driver (material number R900983603) is included in the scope of supply.

Tapered shaft, with through drive

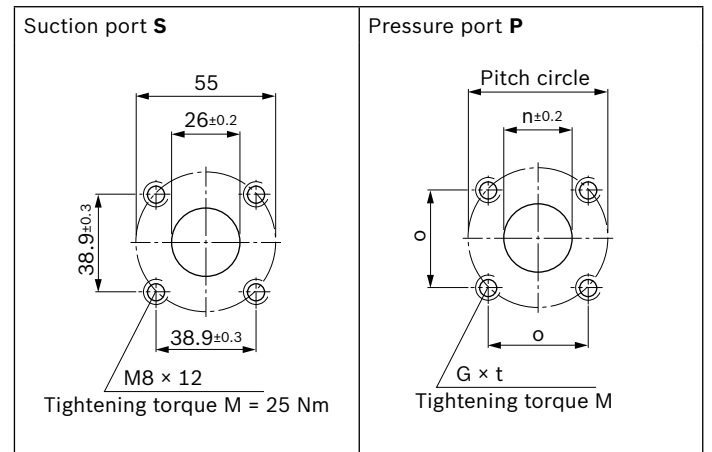


Type	Material numbers	a	c	d	Port standard	Port optional	
PGF3-3X/ 020	R 0 07VK4	R900969302	71	137.1	126	07	20
	L	R900619706					
025	R 0 07VK4	R900943169	74	143.1	132	07	20
	L	R900619710					
032	R 0 07VK4	R900943168	78.5	152.1	141	07	20
	L	R900943167					

▼ **Port 07, suction and pressure port according to SAE J518**



▼ **Port 20, square flange port**



NG	k	Suction port S	Pressure port P
020, 025	16	1 1/4 in	3/4 in
032	20	1 1/4 in	3/4 in

NG	n	o	Pitch circle	G	t	M [Nm]
020, 025	12	24.8±0.2	35	M6	10	10
032	20	38.9±0.3	55	M8	12	25

Multiple pump units

Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13								
P3	GF2	/	022	+	GF2	/	011	+	GF1	/	2.8				+		+			

Type

01	2-fold	P2
	3-fold	P3

02	Series of the first pump ¹⁾	
----	--	--

03	Size of the first pump ¹⁾	
----	--------------------------------------	--

04	Series of the second pump ¹⁾	
----	---	--

05	Size of the second pump ¹⁾	
----	---------------------------------------	--

06	Series of the third pump ¹⁾	
----	--	--

07	Size of the third pump ¹⁾	
----	--------------------------------------	--

Direction of rotation

08	Viewed on drive shaft	clockwise	R
		counter-clockwise	L

Drive shaft of the first pump

09	Parallel keyed shaft, ISO 3019-2 with through drive	E
	Splined shaft to SAE J744 with involute tooth system according to ANSI B92.1a	J
	Two surfaces for open-jaw coupling with through drive	L

Wire connections for the first pump

10	Pipe thread according to ISO 228-1	01
	Suction and pressure port according to SAE J518	07
	Square flange port, metric fastening thread	20

Wire connections for the second pump

11	Pipe thread according to ISO 228-1	01
	Suction and pressure port according to SAE J518	07
	Square flange port, metric fastening thread	20

Wire connections for the third pump

12	Pipe thread according to ISO 228-1	01
	Suction and pressure port according to SAE J518	07
	Square flange port, metric fastening thread	20

Mounting flange of the first pump

13	Special flange according to ISO 7653-1985 (for truck power take-off)	K4
	4-hole mounting flange according to ISO 3019-2 and VDMA 24560 Part 1	E4
	2-hole mounting flange according to ISO 3019-1	U2
	2-hole mounting flange, spigot diameter 32 mm (BG1), spigot diameter 52 mm (BG2 and BG3)	M
	2-hole mounting flange, spigot diameter 50 mm	P

1) Detailed information see ordering code page 2

General project planning notes

Intended use

Internal gear pumps are intended for the assembly of hydraulic drive systems in machine and system construction.

Technical data

The system or machine manufacturer must ensure compliance with the permissible technical data and operating conditions. The pump itself does not contain a device to prevent operation outside the permissible data. It is possible to operate the pump outside of the permissible technical data to a certain extent; the express written consent from Bosch Rexroth is, however, required.

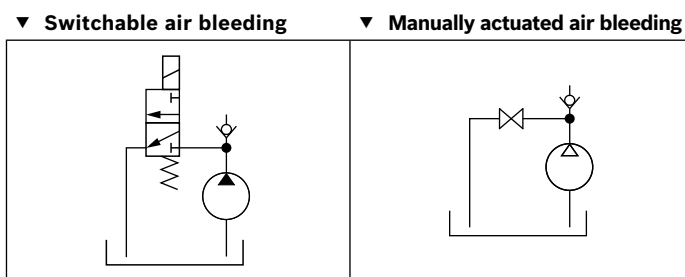
All specified technical performance features are median values and apply with the specified general conditions. In case of modifications to the general conditions (e.g., viscosity), the technical data may change as well. Scatter corresponding to the relevant state of technology is possible.

Hydraulic project planning

Air bleeding option for commissioning

For Rexroth PGF.-2/3X internal gear pumps, a manual or switchable air bleeding option for the initial commissioning or any recommissioning after maintenance and repair work is to be provided. The air bleeding point is to be set in the pressure line before the first valve or check valve. Air bleeding may be performed with a maximum counter pressure of 0.2 bar.

Examples of air bleeding circuits



Suction line

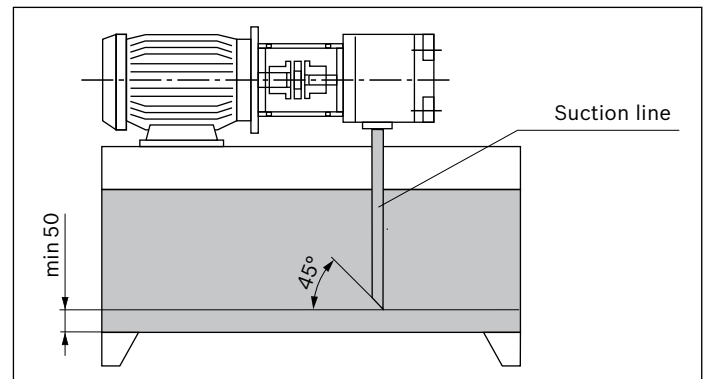
The line cross sections are to be dimensioned for the specified flows such that an ideal suction speed of 0.6 to 1.2 m/s is achieved on average. The suction speed should not exceed a maximum value of 2 m/s.

The suction cross sections at the pump itself are designed for the maximum flow and therefore serve only as reference. In case of continuous operation at rotational speeds lower than the permissible maximum speed, the suction tube diameter is also to be dimensioned smaller than the suction port of the pump depending on the actual suction speed.

Overall, the suction line is to be designed so that the permissible inlet operating pressure is maintained. Bends and a combination of suction lines from several pumps are to be avoided. If the use of a suction filter is unavoidable, it must be ensured on the system side that the lowest permissible inlet operating pressure is not exceeded even if the filter is contaminated.

Ensure the air tightness of the transitions and the pressure resistance of the suction hose with respect to the external air pressure.

The immersion depth of the suction pipe should be selected as large as possible (at least 100 mm at the lowest fluid level). Depending on the internal reservoir pressure, the viscosity of the operating medium and the flow conditions within the reservoir, no vortex may form even at maximum flow. There is otherwise a risk of air being drawn in. Return fluid and case drain fluid must not be immediately be drawn in again.



Pressure line

Sufficient burst resistance of the pipes, hoses and connecting elements must be ensured for pressure lines. The cross sections should be based on the maximum flow in order to avoid additional excessive loading of the pump due to back-pressure. Here, you must also take into account the pipe losses over the entire pressure line length and other line resistances (e.g., bends, pressure filters).

Pressure safeguarding

The PGF internal gear pump does not include any devices for adherence to the maximum operating pressure. The setting and safeguarding of the permissible operating pressure must be ensured on the system side.

The pressure-relief valves necessary for this purpose are to be designed with consideration given to the maximum flow and the rate of pressure increase that will occur such that the permissible intermittent operating pressure is not exceeded.

Pressure holding function

In the variable-speed drive, the pump can also be temporarily operated in the pressure holding function below the specified minimum rotational speed. The holding time and the rotational speed necessary for this purpose are a function of the operating viscosity and the pressure level. For the design, please contact Bosch Rexroth's technical sales department.

In the deactivated state (rotational speed = 0), a leakage flow flows through the pump back into the reservoir, depending on the load pressure. If this is to be prevented, a check valve is to be used.

When using a check valve, please observe the note on the air bleeding option for commissioning, page 23.

Mechanical project planning

Mounting

On the machine side, the screws are to be accessible in such a way that the required tightening torque can be applied. The screw tightening torque is oriented towards the operating conditions and elements involved in the screw connection and is to be specified by the manufacturer during project planning of the power unit, the machine, or the system.

Reservoir

When designing the reservoir or selecting a suitable standard reservoir, the following requirements are to be observed:

- ▶ Select the largest possible reservoir volume, depending on the continuous or average flow, which is needed in order to allow separation of air bubbles by means of sufficient dwell time of the medium in the reservoir. The air separation ability of the used hydraulic fluid is also of importance here.
- ▶ Provide settling zones for the hydraulic fluid in the reservoir in order to allow for air separation.
- ▶ Provide guiding plates in order to allow contamination at the reservoir bottom to be deposited outside the pump suction area.
- ▶ Generously dimension the reservoir surfaces depending on the heat output to be dissipated via the reservoir walls.

Required power unit functions

At a minimum, the hydraulic power units should be equipped with the following features:

- ▶ Reservoirs that are designed so that the internal pressure corresponds to the ambient pressure should be equipped with ventilation filters for pressure compensation purposes.
- ▶ The hydraulic fluid should only be filled using filling nozzles that eliminate the possibility of filling with unfiltered fluid.
- ▶ The ingress of contamination or moisture must be avoided. If used in highly contaminated environments, the reservoir must, for this purpose, be precharged by means of air pressure. If cleaning of the reservoir exterior is planned or anticipated during the period of use, reservoir bushings for pipes, lines, or hoses are to be selected so that a secure seal is ensured against external pressurization with a water jet.

Place of installation and ambient conditions

With places of installation at a geodetic height of more than 1000 m, the pump is to be arranged in or below the reservoir or the reservoir is to be precharged by means of compressed air in order to ensure the permissible minimum inlet pressure. A short suction line with large cross section is to be selected; bends should not be used.

When installing the pump more than 10 m below the reservoir, the reduction of the inlet pressure to the maximum permissible value must be ensured by means of additional measures.

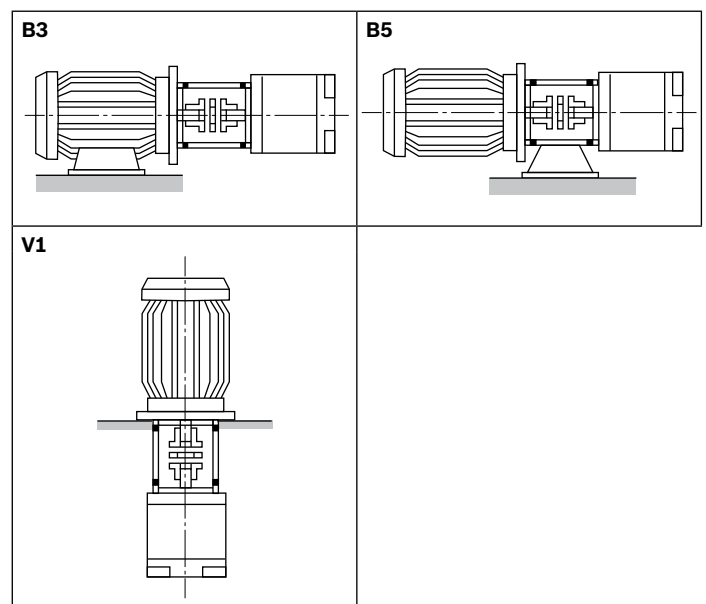
If operating the pump in salt-containing or corrosive environments or if there is a possibility of pressurization with strongly abrasive substances, it must be ensured on the system side that the shaft seal ring and the sealing area of the shaft do not make direct contact with the environment.

Drive

Electric motor + pump support + coupling + pump

- ▶ No radial or axial forces permissible on the pump drive shaft!
- ▶ Motor and pump must be exactly aligned!
- ▶ Always use a coupling that is suitable for compensating for shaft offsets!

Installation positions



Pump combinations

- ▶ With pump combinations, make sure that the operating data approved for the pump type concerned can be complied with in every step.
- ▶ Combined pumps must all have the same direction of rotation.
- ▶ The pump with the highest torque, variable pumps or pumps with intermittent pressure loading should be specified as the first step in the pump combination.
- ▶ The engineer must verify the maximum through-drive torque for every application. This also applies for existing (coded) pump combinations.
- ▶ The sum of all input torques in a pump combination may not exceed the permissible input torque of the first pump.

▼ Maximum input torque [Nm]

Shaft	N	L	A	E	J	O
PGF1	14	14	30	30	–	–
PGF2	70	70	95	140	90	–
PGF3	140	140	–	230	230	260

▼ Formula for input torque

$$T = \frac{\Delta p \times V \times 0.0159}{\eta_{\text{hydr.-mech.}}} \quad [\text{Nm}]$$

Key

- T = Input torque [Nm]
- Δp = Operating pressure [bar]
- V = Displacement [cm³]
- η = Hydraulic mechanical efficiency

▼ Maximum output torque [Nm]

Shaft	L	E	J
PGF1	14	14	–
PGF2	70	70	70
PGF3	140	140	140

- ▶ Common suction is not possible.
- ▶ For reasons of strength and stability, we recommend using ISO 4-hole mounting flanges according to VDMA "E4" for combinations of three or more pumps
- ▶ Before operating pump combinations with different media, please consult Bosch Rexroth.
- ▶ PGF combinations are installed without combination parts and are not sealed against each other.

Selection

- ▶ The front pump must have shaft version **E, J** or **L**.
- ▶ The middle pump must have shaft version **L**.
- ▶ The rear pump must have shaft version **N**.
- ▶ If a pump of the next smaller frame size is to be mounted, the designation of the first pump must end with "**K**" (e.g., PGF3 + PGF2 ⇒ front pump: PGF3-3X/032RJ07VU2K)

Dimensions

- ▶ The dimensions of the ports are the same as for single pumps (see page 9 to 20).
- ▶ The total length of the pump combination is calculated by adding up dimensions "d" of the single pumps (see pages 9 to 20)
- ▶ With the combination of PGF2 and PGF1, the installation length of the PGF2 (dimension d) increases by 4.5 mm. With the combination of PGF3 and PGF2, the installation length of the PGF3 (dimension d) increases by 2 mm. With the combination of PGF3 and PGF1, the installation length of the PGF3 (dimension d) increases by 12.5 mm.

Maintenance schedule and operational safety

For safe operation and a long service life of the pump, a maintenance schedule must be prepared for the power unit, the machine, or the system. The maintenance schedule must ensure that the specified or permissible operating conditions of the pump are complied with over the entire period of use.

In particular, compliance with the following operating parameters is to be ensured:

- ▶ The required oil cleanliness
- ▶ The operating temperature range
- ▶ The filling level of the operating medium

Furthermore, the pump and the system are to be checked for changes to the following parameters on a regular basis:

- ▶ Vibrations
- ▶ Noise
- ▶ Temperature difference between pump – fluid in the reservoir
- ▶ Foaming in the reservoir
- ▶ Leak-proofness

Changes to these parameters indicate component wear (e.g., diesel engine, coupling, pump, etc.). The reason is to be determined and remedied immediately.

In order to achieve high operational safety of the pump in the machine or system, we recommend checking the aforementioned parameters continuously and automatically and the automatic shut-down in case of changes exceeding the usual fluctuations in the specified operating range.

Plastic components of drive couplings should be replaced regularly, though after no more than 5 years. The corresponding manufacturer's specifications are paramount.

For preventive maintenance of the pump, we recommend having the seals replaced after an operating period of no more than 5 years by an authorized Bosch Rexroth service company.

Accessories

Pump safety block

For limiting the operating pressure and for the pump circulation at zero pressure, we recommend our pump safety blocks of type DBA... according to data sheet 25890.

Automatic air bleeding during commissioning is, however, not possible via DBA blocks. In this case, we recommend separate, manual air bleeding.

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ELEKTROMOTORJI ELEKTROMOTORI ELECTRIC MOTORS

IEC-International Electrotechnical Commission



- **Niskonapetostni Asinhronski Elektromotorji**
»visok izkoristek motorjev IE2«
- **Niskonaponski Asinhroni Elektromotori**
»motori visoke korisnosti IE2«
- **Low voltage Induction Electric Motors**
»high efficiency motors IE2«

Izkoristki trifaznih enohitrostnih elektromotorjev so skladni s standardom IEC 60034-30 in EU direktivo 640/2009

Korisnost trofaznih jednobrzinskih elektromotora u skladu je sa propisom IEC 60034-30 i EU direktivu 640/2009

Efficiency classes of single speed three-phase electric motors are comply with standard IEC 60034-30 and EU Regulation 640/2009

PODATKI ZA NAROČILO TRIFAZNIH ASINHRONSKIH ELEKTROMOTORJEV

Standardne izvedbe

Enohitrostne elektromotorje z nogami, z normalno lego priključne omarice, z obliko IM B3 (IM B6, IM B7, IM B8, IM V5, IM V6) in brez zaščite, ki po obratovalnih podatkih in dimenzijah ustrezajo podatkom iz obratovalnih tabel in merskih skic tega kataloga, veljajo za elektromotorje normalne izvedbe. Pri naročanju elektromotorjev normalne izvedbe je potrebno navesti tip elektromotorja in obliko (npr.: T 112 2M2 IM B3).

Vse ostale izvedbe elektromotorjev veljajo za posebne izvedbe.

Posebne izvedbe

Pri naročanju elektromotorjev posebne izvedbe je potrebno, poleg podatkov za elektromotorje normalne izvedbe, podati še vse posebnosti.

Običajne posebnosti elektromotorjev so lahko:

1. prirobne in prigradne oblike
2. oblika IM B9 (brez ležajnega štita in ležaja na strani D)
3. nestandardna prirobnica
4. nestandardna obratovalna napetost in vrsta zagona (direktni ali zagon zvezda - trikot)
5. nestandardna frekvenca
6. izolacija višjega razreda
7. končina gredi samo na strani N
8. končina gredi na strani D in N
9. nestandardna končina gredi
10. nestandardna lega priključne omarice
11. prigraditev stikala
12. stopnje vibracij R
13. spremenjena stopnja mehanske zaščite IP
14. brez priključne omarice

Pri naročilu elektromotorjev s prirobnicami je potrebno podati sledeče:

- a) pri prirobnih in prigradnih elektromotorjih: tip elektromotorja, obliko in velikost prirobnice (npr.: T 132 2S4 IM B5 FF265, 3T 80 A4/2 IM B14 FT130)
- b) pri prirobnih in prigradnih elektromotorjih z nogami: tip elektromotorja, obliko in velikost prirobnice (npr.: T 90 L8/4 IM B34 FT 130).

Po posebnem dogovoru dobavljamo sledeče elektromotorje:

1. neventilirane
2. za obratovanje v spremenjenih klimatskih razmerah (tropska izvedba)
3. za pogon ventilatorjev v sušilnicah lesa in opeke
4. za intermitirani pogon
5. za posebne pogoje zagona (pogosti ali dolgotrajni zagoni)
6. vgradne
7. za spremenjeno moč
8. z večjimi konstrukcijskimi spremembami
9. z vgrajenimi elementi za popolno termično zaščito (katalog, stran 10)
10. s tujim hlajenjem (konstantno hlajenje neodvisno od hitrosti vrtenja)

PODACI ZA NARUDŽBU TROFAZNIH ASINHRONIH ELEKTROMOTORA

Standardne izvedbe

Jednobrziinske elektromotore sa nožicama, sa normalnim položajem priključne kutije, sa oblikom IM B3 (IM B6, IM B7, IM B8, IM V5, IM V6) i bez zaštite koji prema tehničkim podacima i dimenzijama odgovaraju podacima iz tabela i mjernih skica iz tog kataloga, smatramo elektromotorima normalne izvedbe. Kod naručivanja elektromotora normalne izvedbe potrebno je navesti tip i oblik elektromotora (npr.: T 112 2M2 IM B3).

Sve ostale izvedbe elektromotora smatramo posebnima.

Posebne izvedbe

Kod naručivanja elektromotora posebne izvedbe potrebno je, pored podataka koji se traže za elektromotore normalne izvedbe, navesti još i sve posebnosti.

Uobičajne posebnosti elektromotora mogu biti:

1. oblici s prirobnicama i prigradni oblici
2. oblik IM B9 (bez ležajnog štita i ležaja na strani D)
3. nestandardna prirobnica
4. nestandardan pogonski napon i vrsta zaleta (direktni zalet ili zvijezda - trokut)
5. nestandardna frekvencija
6. izolacija višeg razreda
7. kraj osovine samo na strani N
8. kraj osovine na strani D i N
9. nestandardni kraj osovine
10. nestandardni položaj priključne kutije
11. ugrađena sklopka
12. stupanj vibracija R
13. promijenjeni stupanj mehanske zaštite IP
14. bez priključne kutije

Kod naručivanja elektromotora s prirobnicama, potrebno je navesti slijedeće:

- a) za elektromotore s prirobnicom i prigradne elektromotore: tip elektromotora, oblik i veličinu prirobnice (npr.: T 132 2S4 IM B5 FF 265, 3T 80 A4/2 IM B14 FT130)
- b) za elektromotore s prirobnicom i za prigradne elektromotore s nožicama: tip elektromotora, oblik, veličinu prirobnice (npr.: T 90 L8/4 IM B34 FT130).

Prema posebnom dogovoru isporučujemo slijedeće elektromotore:

1. neventilirane
2. za pogon u posebnim klimatskim prilikama (tropska izvedba)
3. za pogon ventilatora u sušionicama drveta i opeke
4. za intermitirani pogon
5. za posebne uvjete zaleta (učestala uklapanja ili dugotrajni zaleti)
6. za ugradnju
7. za promijenljivu snagu
8. s većim konstrukcijskim promijenama
9. s ugrađenim elementima za potpunu termičku zaštitu (katalog, strana 10)
10. sa vanjskim hlajenjem (konstantno hlajenje neovisno od okretaja elektromotora)

DATA FOR ORDERING THREE-PHASE INDUCTION ELECTRIC MOTORS

Standard Designs

Single-speed foot-mounted electric motors with standard position of the terminal box, of IM B3 (IM B6, IM B7, IM B8, IM V5, IM V6) shape and without protection, complying in terms of operating data and dimensions with the data of this Catalogue tables and drawings, are considered to be electric motors of standard version. When ordering such electric motors, it is necessary to indicate their type and shape (e.g.: T112 2M2 IM B3).

Any other versions of electric motors are considered as special designs.

Special Designs

When placing orders for special models of electric motors, please, indicate beside data for standard version motors, also all the distinctive characteristics.

Regular features of electric motors are as follows:

1. Flange-mounted and externally mounted designs
2. IM B9 shape (without bearing plate and bearing on side D)
3. Non-standard flange
4. Special operating voltage and type of starting (with direct or star - delta starting)
5. Special frequency
6. Higher class insulation
7. Shaft end only on side N
8. Shaft end on sides N and D
9. Non-standard shaft end
10. Non-standard position of terminal box
11. Mounting of switch
12. R vibration levels
13. Modified degree of IP mechanic protection
14. Without terminal box

When placing orders for electric motors with flanges, please, add the following information:

- a) with flange-mounted and externally mounted electric motors: type of electric motor, shape and size of flange (e. g.: T 132 2S4 IM B5 FF265; 3T80 A4/2 IM B14 FT130)
- b) with flange-mounted and foot-mounted electric motors: type of electric motor, shape and size of flange (e.g.: T90 L8/4 IM B34 FT130).

Upon special agreement we supply the following electric motors:

1. Non-ventilated electric motors
2. Electric motors operating in changed climatic conditions (tropical version)
3. Electric motors for fan drives in drying plants for timber and bricks
4. Electric motors for intermittent drive
5. Electric motors for special starting conditions (frequent or prolonged starts)
6. Built-in models
7. Electric motors for changed power output
8. Electric motors with considerable changes in Design
9. Electric motors with incorporated elements for complete thermal protection (Catalogue, Page 10)
10. Electric motors with external cooling (permanent cooling independent from electric motor speed)

PODATKI ZA NAROČILO ENOFAZNIH ASINHRONSKIH ELEKTROMOTORJEV

Standardne izvedbe

Elektromotorje oblike IM B3 (IM B6, IM B7, IM B8, IM V5, IM V6), ki po obratovalnih podatkih in dimenzijah ustrezajo podatkom iz pogonskih tabel in merskih skic tega kataloga, smatramo za elektromotorje normalne izvedbe. Pri naročanju enofaznih elektromotorjev normalne izvedbe je treba navesti tip elektromotorja in obliko (npr.: 3EK 80 A2 IM B3; 3ESK 80 A2 IM B3; ESK 90 S2 IM B6; EKSK 112 M4 IM B3).

Vse ostale izvedbe elektromotorjev smatramo za posebne izvedbe.

Posebne izvedbe

Pri naročanju enofaznih elektromotorjev posebne izvedbe je potrebno poleg podatkov za elektromotorje normalne izvedbe, podati še vse posebnosti.

Običajne posebnosti enofaznih elektromotorjev so lahko:

1. prirobne in prigradne oblike
2. oblika IM B9
3. nestandardna prirobnica
4. nestandardna obratovalna napetost
5. nestandardna frekvenca
6. izolacija višjega razreda
7. končina gredi na strani N - pri tipih ESK(T) 90 in EKSK(T) 112 do $\varnothing=25\text{mm}$
8. končina gredi na strani D in N
9. nestandardna končina gredi
10. nestandardna lega priključne omarice
11. prigraditev stikala
12. spremenjena stopnja mehanske zaščite IP
13. termična zaščitna stikala
14. brez priključne omarice

Po posebnem dogovoru dobavljamo tudi:

1. neventilirane elektromotorje
2. elektromotorje, ki obratujejo v spremenjenih klimatskih pogojih
3. elektromotorje s povečanim zagonskim momentom
4. vgradne elektromotorje
5. elektromotorje s termičnimi zaščitnimi stikali z avtomatskim ponovnim vklopom
6. elektromotorje z manjšim številom vrtljajev (npr.: 6-polni)
7. elektromotorje z večjimi konstrukcijskimi spremembami
8. elektromotorje s spremenjeno nazivno močjo

PODACI ZA NARUDŽBU JEDNOFAZNIH ASINHRONIH ELEKTROMOTORA

Standardne izvedbe

Elektromotore oblike IM B3 (IM B6, IM B7, IM B8, IM V5, IM V6), koji prema pogonskim podacima i dimenzijama odgovaraju podacima iz tabela i mjernih skica iz ovog kataloga, smatramo elektromotorima normalne izvedbe. Kod naručivanja jednofaznih elektromotora normalne izvedbe treba navesti tip i oblik elektromotora (npr.: 3EK 80 A2 IM B3; 3ESK 80 A2 IM B3; ESK 90 S2 IM B6; EKSK 112 M4 IM B3).

Sve ostale izvedbe elektromotora smatramo posebnima.

Posebne izvedbe

Kod naručivanja jednofaznih elektromotora posebne izvedbe potrebno je, pored podataka za elektromotore normalne izvedbe, navesti još i sve posebnosti.

Uobičajene posebnosti jednofaznih elektromotora mogu biti:

1. oblik s priрубnicom i ugradni oblik
2. oblik IM B9
3. nestandardna priрубnica
4. nestandardni pogonski napon
5. nestandardna frekvencija
6. izolacija višjeg razreda
7. kraj osovine na strani N - kod tipova ESK(T) 90 i EKSK(T) 112 do $\varnothing=25\text{mm}$
8. kraj osovine na strani D i N
9. nestandardni kraj osovine
10. nestandardni položaj priključne kutije
11. ugrađena sklopka
12. promijenjeni stupanj mehaničke zaštite IP
13. ugrađena termička zaštitna sklopka
14. bez priključne kutije

Prema posebnom dogovoru isporučujemo također:

1. neventilirane elektromotore
2. elektromotore za pogon u posebnim klimatskim uvjetima
3. elektromotore s povečanim zaletnim momentom vrtnje
4. ugradne elektromotore
5. elektromotore s termičkim zaštitnim sklopkama s automatskim ponovnim uklapanjem
6. elektromotore s manjom brzinom vrtnje (na primjer: 6-polni)
7. elektromotore s većim konstrukcijskim promijenama
8. elektromotore s promijenjenom nazivnom snagom

DATA FOR ORDERING SINGLE-PHASE INDUCTION ELECTRIC MOTORS

Standard Designs

Electric motors of IM B3 (IM B6, IM B7, IM B8, IM V5, IM V6) shape, complying as to their operating data and dimensions with data from performance tables and dimensional outlines of this catalogue, are considered as standard electric motor versions. When placing orders for single-phase electric motors of standard design, it is necessary to indicate their types and shapes (e.g.: 3EK 80 A2 IM B3, 3ESK 80A2 IM B3, ESK 90 S2 IM B6, EKSK 112 M4 IM B3). All other versions of electric motors are considered as special designs.

Special Designs

When placing orders for single-phase electric motors of special design, please, indicate together with the data of standard version electric motors also all specific characteristics.

Single-phase electric motors standard features:

1. Flange-mounted and externally mounted designs
2. IM B9 shape
3. Special flange
4. Special operating voltage
5. Special frequency
6. Higher class insulation
7. Shaft-end on side N with ESK(T) 90 and EKSK(T) 112 types up to $F=25\text{mm}$
8. Shaft end on sides D and N
9. Special shaft end
10. Non-standard position of terminal box
11. Mounting of switch
12. Modified degree of IP mechanic protection
13. Thermal switches
14. Without terminal box

Upon special order we also supply:

1. Non-ventilated electric motors
2. Electric motors designed to operate in changed climatic conditions
3. Electric motors with increased starting torque
4. Built-in electric motors
5. Electric motors with thermal switches in winding
6. Lower-speed electric motors (e.g.: 6-pole)
7. Electric motors with considerable changes in design
8. Electric motors with changed nominal power output

TRIFAZNI ASINHRONSKI ELEKTRO- MOTORJI ZAPRTE IZVEDBE S KRATKOSTIČNO KLETKO

Osnovna oblika IM B3



3T 80 IM B3

Splošno

Katalog vsebuje podatke trifaznih asinhronskih elektromotorjev T, 2T in 3T s kratkostično kletko, zaščitne stopnje IP 54, za območje moči od 0,06kW do 7,5kW (11kW). Elektromotorji so grajeni v skladu s predpisi mednarodne elektrotehnične komisije IEC. Elektromotorji ustrezajo standardom IEC 60034, IEC 60072, IEC 60085 in DIN VDE 0530 T1.

Uporaba

Elektromotorji so primerni za najširšo uporabo v industriji, obrti in kmetijstvu.

Mehanska izvedba

Zaščitna stopnja in način hlajenja

Elektromotorji so grajeni za zaščitno stopnjo IP 54 po IEC 60034-5. Zaščita IP 54 preprečuje dotik delov pod napetostjo ter dotik notranjih rotirajočih delov. Elektromotor je grajen tako, da ne dopušča vdora škodljivega prahu in vode tudi pri škropljenju vode z vseh strani. Pri postavitvi elektromotorja na prostem, in to predvsem v vertikalnem položaju, priporočamo dodatni pokrov, ki ščiti elektromotor proti vdoru vode vzdolž gredi elektromotorja. Normalni elektromotorji so grajeni brez lukenj za odtok kondenzne vode. V primerih, kjer je zaradi klimatskih vplivov na elektromotor možno, da nastopi kondenzat, je treba luknje za odtok kondenzne vode pri naročanju posebej zahtevati. Hlajenje je izvedeno z zunanjim ventilatorjem na gredi elektromotorja in z notranjim, ki vrtniči zrak s pomočjo kril na rotorju elektromotorja (IEC 60034-6).

Oblike

Oznake oblik elektromotorjev so definirane s kraticami po IEC 60034-7. Osnovne oblike so: IM B3, IM B5 in IM B14. Iz teh oblik je možno izvesti vse oblike, prikazane v tabeli. Iz elektromotorja oblike IM B3 je možno s premontažo (razen 3T 80) izvesti elektromotor oblike IM B5 ali IM B14. V tem primeru je potrebno elektromotorju odviti noge in zamenjati ležajni ščit oblike IM B3 s ščitom oblike IM B5 ali IM B14 ter skrajšati spojne vijake. Elektromotorjem serije 2T je potrebno tudi zatesniti navojne izvrtine za pritržitev nog.

TROFAZNI ASINHRONSKI KAVEZNI ELEKTROMOTORI ZATVORENE IZVEDBE

Osnovni oblik IM B3



2T 71 IM B3

Općenito

Katalog sadrži podatke trofaznih kavezničkih elektromotora T, 2T i 3T mehaničke zaštite IP 54, za područje snage od 0,06kW do 7,5kW (11kW). Elektromotori su izrađeni u skladu s propisima međunarodne elektrotehničke komisije IEC. Elektromotori odgovaraju standardima IEC 60034, IEC 60072, IEC 60085 i DIN VDE 0530 T1.

Upotreba

Elektromotori su prikladni za najširu upotrebu u industriji, zanatstvu i poljoprivredi.

Mehanička izvedba

Stupanj mehaničke zaštite i način hlađenja

Izvedba elektromotora odgovara stupnju mehaničke zaštite IP 54 prema IEC 60034-5. Zaščita IP 54 onemogućava namjeren dodir dijelova pod naponom kao i unutrašnjih rotirajućih dijelova. Elektromotor je građen tako, da je unutrašnjost motora zašćitena od prodiranja štetne prašine i prskanja vode iz svih pravaca. Kod montaže elektromotora na otvorenom prostoru, naročito u vertikalnom položaju, preporučujemo poseban štit koji će štitiiti elektromotor od prodora vode uzduž osovine elektromotora. Normalni elektromotori izrađuju se bez rupa za odvod kondenzata. U slučajevima, gdje se zbog klimatskih prilika može pojaviti kondenzat, potrebno je kod narudžbe posebno zahtijevati izradu rupa za odvod kondenzata. Hlađenje je izvedeno vanjskim ventilatorom na osovini motora i s unutrašnjim koji miješa zrak pomoću lopatica na rotoru elektromotora (IEC 60034-6).

Oblici

Oznake oblika elektromotora su definirane kraticama prema IEC 60034-7. Osnovni oblici su: IM B3, IM B5 i IM B14. Iz ovih oblika moguće je izvesti sve u tabeli prikazane oblike. Iz elektromotora oblika IM B3, moguće je premontažom (osim motora 3T 80) izvesti elektromotor oblika IM B5 ili IM B14. U tom slučaju potrebno je elektromotoru odviti noge i zamijeniti ležajni štit oblika IM B3 s ležajnim štitom oblika IM B5 ili IM B14, te skratiti spojne vijke. Elektromotorima iz serije 2T treba također zabrtviti rupe za pričvršćenje nogu.

THREE-PHASE SQUIRREL-CAGE INDUCTION ELECTRIC MOTORS OF CLOSED DESIGN

Basic shape IM B3



T 100 IM B3

General

Given in the Catalogue are specifications of three-phase range T, 2T and 3T squirrel-cage electric motors of the IP 54 degree of protection for outputs ranging from 0,06kW to 7,5kW (11kW). The electric motors are built in compliance with IEC Regulations (International Electrotechnical Commission), and conform to IEC 60034, IEC 60072, IEC 60085, as well as DIN VDE 0530 T1 standards.

Application

Electric motors are suitable for the widest usage in the fields of industry, craft and agriculture.

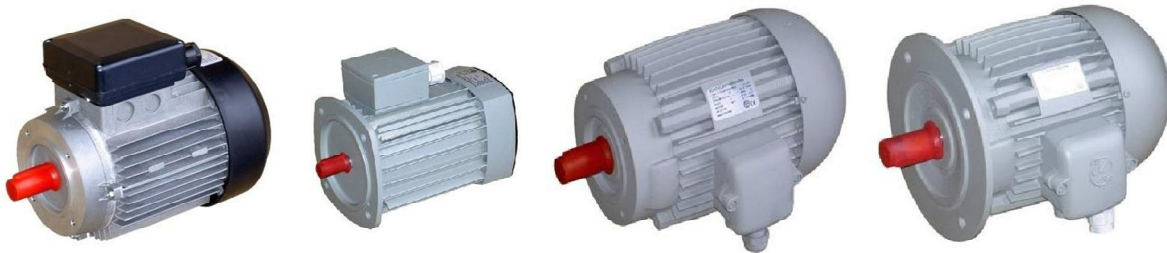
Mechanical design

Degree of Protection and Mode of Cooling

Electric motors are built for the IP 54 degree acc. to IEC 60034-5 of protection. The IP 54 protection prevents from coming in contact with the live parts and interior rotating parts. The design of an electric motor does not allow penetration of dust or water even when jets are coming from all sides. With the open-air installation of electric motors, especially in a vertical position, it is recommended to use an additional cover against penetration of water along the electric motor shaft. Standard versions are constructed without condensation drain holes. If, however, condensed water may occur as a result of climatic effects on the electric motors, a special requirement is to be made for drain holes when placing orders. Cooling is provided through an external fan, placed on the electric motor shaft, and the interior one where air whirls by means of wings attached to the electric motor rotor (IEC 60034-6).

Shapes

Designations of electric motor shapes are defined with abbreviations according to IEC 60034-7. Basic shapes are: IM B3, IM B5 and IM B14. Derived from these shapes (except electric motor 3T 80) may be all other shapes given in Table. With a preassembly the electric motor of IM B3 shape may be modified into electric motors of IM B5 or IM B14 shapes. In such cases the feet of T series electric motor must be removed, the bearing bracket of IM B3 shape replaced with the bearing bracket of IM B5 or IM B14 shapes, and the clamping bolts slightly shortened. 2T series electric motor threaded borings for fastening of feet must be sealed.



3T 80 IM B14 FT100

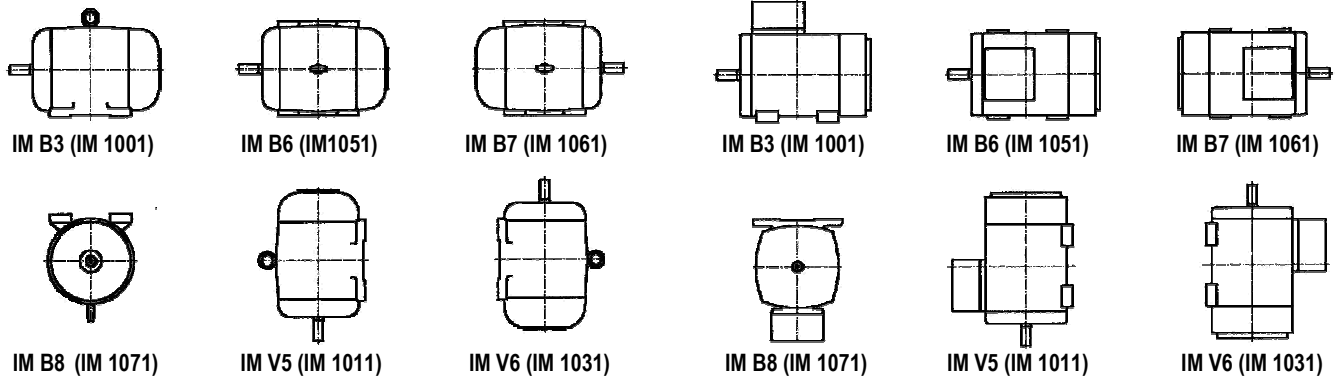
2T 71 IM B5 FF130

T 100 IM B14 FT130

T 100 IM B5 FF215

Oblike elektromotorjev T, 2T, 3T / Oblici elektromotora T, 2T, 3T / Electric Motor Shapes T, 2T, 3T

Elektromotorji z nogami / Elektromotori s nogama / Electric Motors with Feet



IM B3 (IM 1001)

IM B6 (IM1051)

IM B7 (IM 1061)

IM B3 (IM 1001)

IM B6 (IM 1051)

IM B7 (IM 1061)

IM B8 (IM 1071)

IM V5 (IM 1011)

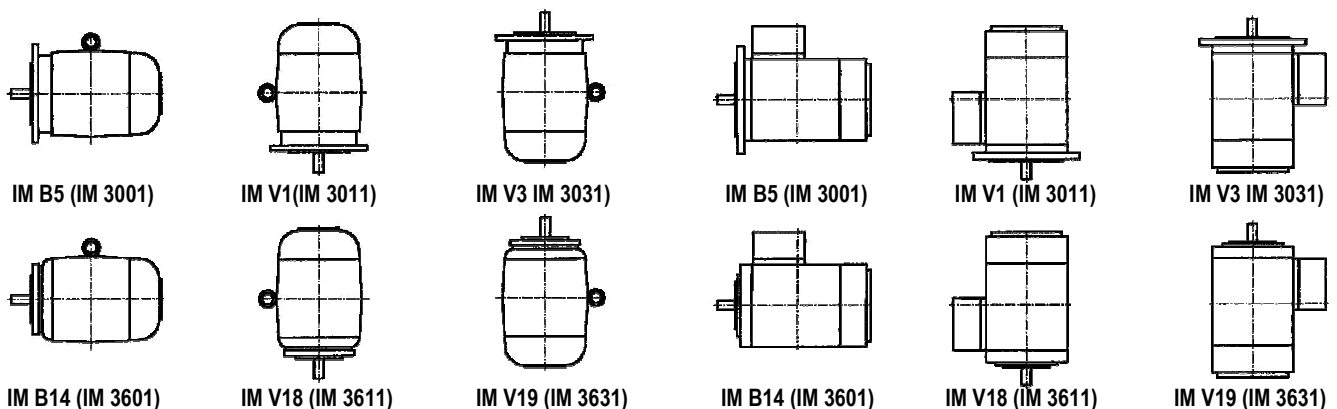
IM V6 (IM 1031)

IM B8 (IM 1071)

IM V5 (IM 1011)

IM V6 (IM 1031)

Prigradni in priradni elektromotorji / Elektromotori sa prirubnicom i prigradni elektromotori / Externally-and Flange-Mounted Electric Motors



IM B5 (IM 3001)

IM V1 (IM 3011)

IM V3 (IM 3031)

IM B5 (IM 3001)

IM V1 (IM 3011)

IM V3 (IM 3031)

IM B14 (IM 3601)

IM V18 (IM 3611)

IM V19 (IM 3631)

IM B14 (IM 3601)

IM V18 (IM 3611)

IM V19 (IM 3631)

Elektromotorji z nogami in prirubnico / Elektromotori s nogama i prirubnicom / Foot and Flange Mounted Electric Motors



IM B34 (IM 2101)

IM B35 (IM 2001)

IM B34 (IM 2101)

IM B35 (IM 2001)

Standardne konstrukcijske izvedbe trifaznih asinhronskih elektromotorjev zaprte izvedbe s kratkostično kletko: velikosti 2T 56-71, 3T 80

Ohišje statorjev in noge so profilne izvedbe iz aluminijeve litine. Ležajni ščiti in omarica (pri 3T 80 tudi ohišje) so izdelani iz aluminijeve litine po postopku tlačnega livanja. Ležajni ščiti in statorska ohišja so izvedeni s hladilnimi rebri in nastavki, skozi katera se s spojnimi vijaki privijejo stator in ležajna ščita. Nogi nalegata na nastavka in sta pritrjeni z nožnimi vijaki na stator (pri 3T 80 so noge ulite skupaj z ohišjem). Ležajni ščiti so pri velikosti 80 v pestu na DS ojačani z obroči iz sintra. Priradni ščiti (IM B5) so okrogle oblike.

Standardne konstrukcijske izvedbe trofaznih asinhronih kavezskih elektromotora, zatvorene izvedbe: velikosti 2T 56-71, 3T 80

Kučište statora i noge su izrađeni iz profila od Al-legure. Ležajni štitovi i kutija (kod 3T 80 i kučište) su izrađeni od kvalitetne Al-legure postupkom tlačnog livanja. Ležajni štitovi i statorska kučišta su izrađeni s rashladnim rebri i nastavcima, kroz koja se pomoću spojnih vijaka međusobno pričvrste stator i ležajni štitovi. Noge naliježu na nastavke i pričvršćene su nožnim vijcima na stator (kot 3T 80 noge su na kučištu). Glavina ležajnih štitova, kod veličina 80, je ojačana prstenom od sintera DS. Prirubni štitovi (IM B5) su okruglog oblika.

Standard Designs of Three-Phased Squirrel-Cage Closed Type Induction Electric Motors Size: 2T 56-71, 3T 80

Stator housing and feet of profile design are made of aluminium alloy. The endshield and the box at 3T 80 also housing are made of die cast aluminium. The endshields and stator housings are designed with cooling ribs and with four reinforced ribs through which the stator and end plates are screwed by means of the connecting bolts. The feet lie against the supports and are fixed on to the stator by means of foot bolts. At 3T 80 the feet are cast together with the housing. The bearing brackets when 80 of size, are reinforced with sinter rings in hub. The flange shields (IM B5) are of round shape.

Na gred je natisnjen polipropilenski ventilator, ki deluje neodvisno od smeri vrtenja. Ščitnik ventilatorja je pritrjen na ležajni ščit. Oba sta oblikovana tako, da usmerjata zadosten pretok hladilnega zraka po površini elektromotorja.

Polipropilenski ventilator koji je pričvršćen na osovinu, djeluje neovisno o smjeru vrtnje. Štitnik ventilatora je pričvršćen na ležajni štit, a oba su oblikovana tako da usmjeravaju dovoljno količinu rashladnog zraka uzduž površine elektromotorja.

Polypropilen fan attached on the shaft operates independently of the direction of rotation. The fan cap is fixed to the bearing bracket and both are shaped so as to direct sufficient cooling air over the electric motor surface.

Velikosti T 90-132

Ohišja statorjev, ležajni ščiti, noge, ventilatorji (samo T 112, T 132) in ventilatorske kape so izdelani iz kvalitetne aluminijeve litine po postopku tlačnega litja. Ležajni ščiti in statorska ohišja so izvedeni s hladilnimi rebri. Na statorju in ležajnih ščitih so štiri ojačana rebra, skozi katera se s spojnimi vijaki privijejo stator in ležajni ščit. Nogi nalegata na ojačana rebra in sta pritrjeni z nožnimi vijaki na stator. Ležajni ščiti so v pestu ojačani z obroči iz sintra. Noge so konstruirane tako, da so na notranji in zunanji strani ojačane z rebri. Ventilator na gredi elektromotorja omogoča zadosten pretok zraka in deluje neodvisno od smeri vrtenja. Ventilatorska kapa je pritrjena na ležajni ščit na strani N in je oblikovana tako, da usmerja hladilni zrak po površini elektromotorja. Prirobni in prigradni ščiti so izdelani iz sive litine.

Veličine T 90-132

Kučiče statora, ležajni štitovi, noge, ventilatorji (samo T 112, T 132) i ventilatorske kape izrađeni su od kvalitetne Al-legure postupkom tlačnog livanja. Ležajni štitovi i statorska kućiča izrađeni su s rashladnim rebrima. Na statoru i ležajnim štitovima nalaze se četiri ojačana rebra, kroz koja se pomoću spojnih vijaka međusobno pričvrste stator i ležajni štitovi. Noge nalježu na ojačana rebra te su pričvršćene na stator nožnim vijcima. Glavina ležajnih štitova je ojačana prstenom od sintera. Noge su konstruisane tako, da su ojačane rebrima sa vanjske i unutrašnje strane. Ventilator na osovinu omogućava dovoljan protok zraka i djeluje nezavisno od smjera vrtnje. Ventilatorska kapa je pričvršćena na strani ležajnog štita N, te je oblikovana tako da usmjerava rashladni zrak uzduž površine elektromotorja. Prirobni i prigradni štitovi su izrađeni od sivog liva.

Size T 90-132

The stator housings, bearing brackets, feet, fans (only T 112, T 132) and fan caps are made from the high quality die cast aluminium ("Silumin"). The end plates and stator housings are designed with cooling ribs and with four reinforced ribs through which the stator and end plates are screwed by means of the connecting bolts. The feet lie against the reinforced ribs and are fixed by means of foot bolts on to the stator. In hub, the bearing brackets are reinforced with singer rings. The feet are reinforced with ribbons on interior and exterior side. The fan allows a sufficient air inflow and runs independently from the direction of rotation. The fan cap is fixed to the bearing bracket on the side N and is shaped so as to direct the cooling air over the electric motor surface. The flange and built in shields are made of grey cast iron.

Konstruksijska izvedba

1 Stator	23 Vijak podnožja omarice
2 Ohišje statorja odlito	24 Vijak podnožja omarice
3 Ohišje statorja - stiskan profil	25 Podnožna plošča
4 Rotor	26 Vijak za ozemljitev
5 Ležajni ščit, D	27 Podložka
6 Ležajni ščit, N	28 Vijak omarice
7 Kroglični ležaj, D	29 Prikjučna plošča
8 Kroglični ležaj, N	30 Vijak prikjučne plošče
9 Krožničasta vzmet	31 Vijak za električni spoj s pripadajočimi maticami, podložkami in spojko
10 Spojni vijak	32 Pokrov omarice
11 Matica spojnega vijaka	33 Tesnilka pokrova omarice
12 Ventilacijski del	34 Vijak pokrova
13 Ventilator	35 Uvodnica
15 Tolerančni obroč	36 Tesnilka uvodnice
16 Ventilatorska kapa	37 Tablica z nazivnimi podatki
17 Vijak	D - Pogonska stran motorja
18 Noga	N - Stran, nasprotna pogonski
19 Vijak noge	
20 Moznik	
21 Priključna omarica	
22 Tesnilka podnožja omarice	

Konstruksijska izvedba

1 Stator	22 Brtvilo podnožja kutije
2 Kučiče statora odliveno	23 Vijak podnožja kutije
3 Kučiče statora odliveno	24 Elastična podložka
4 Rotor	25 Ploča podnožja
5 Ležajni štit, D	26 Vijak za uzemljenje
6 Ležajni štit, N	27 Podložka
7 Kuglični ležaj, D	28 Vijak kutije
8 Kuglični ležaj, N	29 Priključna ploča
9 Elastični prsten	30 Vijak priključne ploče
10 Spojni vijak	31 Vijak za električni spoj s odgovarajućim maticama, podložkama i spojkom
11 Matica spojnog vijka	32 Poklopac kutije
12 Ventilacijski dio	33 Brtvilo poklopca kutije
13 Ventilator	34 Vijak poklopca
15 Tolerancijski prsten	35 Uvodnica
16 Ventilatorska kapa	36 Brtvilo uvodnice
17 Vijak	37 Tablica s nazivnim podacima
18 Noga	D - Pogonska strana motorja
19 Vijak noge	N - Strana, suprotna pogonski
20 Utorni klin	
21 Priključna kutija	

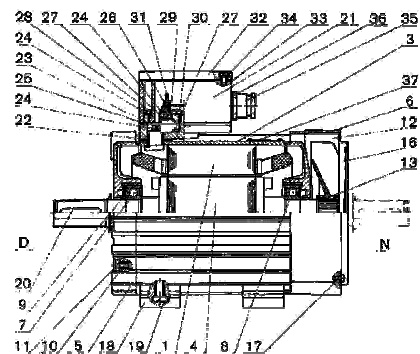
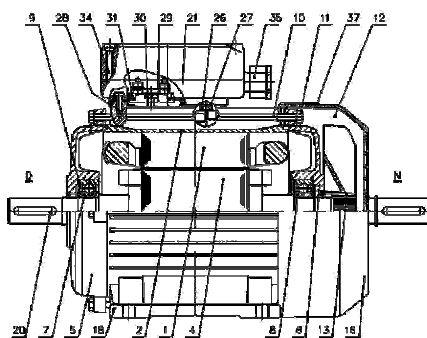
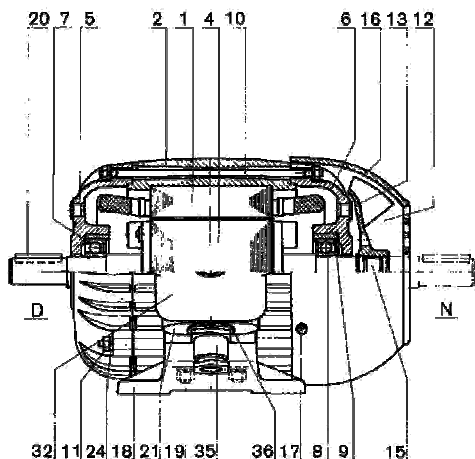
Construction Design

1 Stator	22 Terminal box sealing ring
2 Die-cast stator housing	23 Basic plate screw
3 Alu-profile stator housing	24 Spring washer
4 Rotor	25 Basic plate
5 Endshield D	26 Earthing screw
6 Endshield N	27 Washer
7 Ball bearing D	28 Terminal box screw
8 Ball bearing N	29 Connection plate
9 Cup spring	30 Connection plate screw
10 Connection bolt	31 Screw for electrical connection with nuts, washers and connection pieces
11 Connection bolt nut	32 Terminal box cover
12 Ventilation part	33 Terminal box cover sealing
13 Fan	34 Cover screw
15 Tolerance ring	35 Cable inlet
16 Fan cup	36 Cable inlet sealing
17 Screw	37 Name plate
18 Feet	D - Driving side
19 Feet screw	N - Non-driving side
20 Dowel pin	
21 Terminal box	

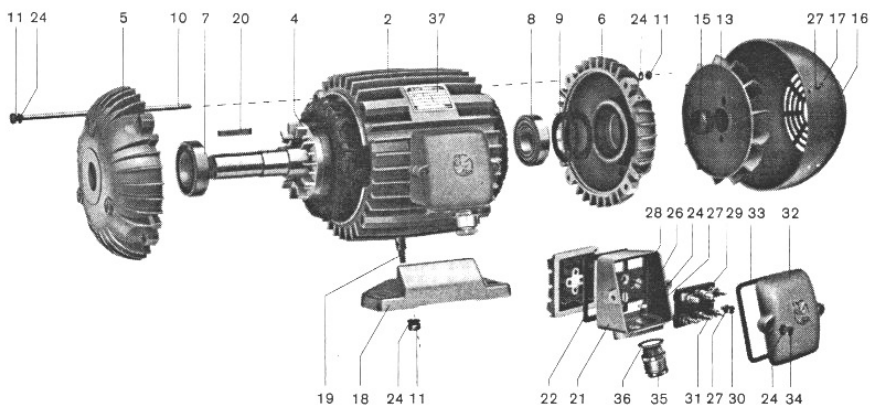
Konstruksijska izvedba T 100 IM B3, 3T 80 IM B3 in 2T 71 IM B3

Konstruksijska izvedba T 100 IM B3, 3T 80 IM B3 i 2T 71 IM B3

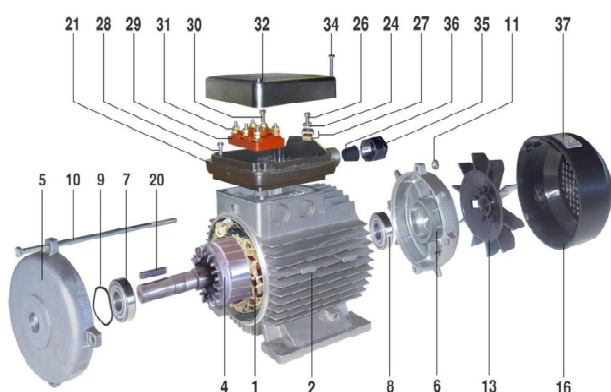
Construction design T 100 IM B3, 3T 80 IM B3 and 2T 71 IM B3



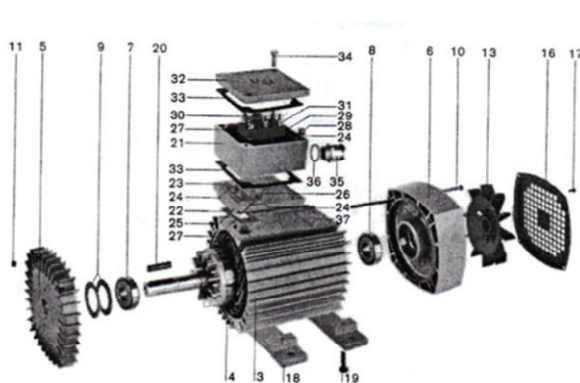
Elektromotor razstavljen Tip T 100 IM B3
Elektromotor rastavljen Tip T 100 IM B3
Electric Motor T 100 IM B3 Disassembled



Elektromotor razstavljen Tip 3T 80 IM B3
Elektromotor rastavljen Tip 3T 80 IM B3
Electric Motor 3T 80 IM B3 Disassembled



Elektromotor razstavljen Tip 2T 71 IM B3
Elektromotor rastavljen Tip 2T 71 IM B3
Electric Motor 2T 71 IM B3 Disassembled



Tipska označba / Oznaka tipa / Type Designation

Ključ tipske oznake / Ključ oznake tipa / Structure of Type Designation

T		100	2	L	2	IM B3
2T, 3T						

- Oblika po IEC / Oblik po IEC / Shape according to IEC
- Število polov / Broj pola / Number of poles
- Stator / Stator / Stator
- IE2 (IEC 60034-30:2008)
- Velikost po IEC / Veličina po IEC / Size according to IEC
- Dopolnilne oznake izvedbe / Dopunske oznake izvedbe / Additional designation of model
- Osnovna izvedba / Osnovna izvedba / Basic model

Osnovna izvedba s črko T pomeni trifazni elektromotor, 2T pomeni drugo generacijo, 3T pomeni tretjo generacijo trifaznega elektromotorja. Dopolnilne oznake izvedbe so:

- A - avtomatska termična zaščita (bimetal)
- B - elektromotor z varnostno zavoro
- C - povišana moč
- E - elektronska termična zaščita (termistor)
- G - elektromotor za gorilec
- M - povišan vrtilni moment
- N - neventiliran elektromotor
- O - elektromotor odprte izvedbe
- V - vgradni elektromotor

Možne so tudi kombinacije gornjih izvedb. Oznaka velikosti po IEC pove višino gredi elektromotorja. Črke S, M in L označujejo dolžino ohišja, črke A in B označujejo dolžino statorskih paketov v enakem ohišju. V oznaki za obliko elektromotorja po IEC je potrebno navesti eno izmed oblik, ki so prikazane na str. 4 (ali ostale po IEC 60034-7).

Osnovna oznaka sa slovom T znači trofazni elektromotor, 2T znači drugo generacijo, 3T znači trečo generacijo trofaznog elektromotorja.

- Dopunske oznake izvedbe su:
- A - avtomatska termička zaščita (bimetal)
 - B - elektromotor sa sigurnosnom kočnicom
 - C - povečana snaga
 - E - elektronska termička zaščita (termistor)
 - G - elektromotor za gorionik
 - M - povečani moment vrtnje
 - N - neventilirani elektromotor
 - O - elektromotor otvorene izvedbe
 - V - ugradni elektromotor

Moguće su također kombinacije gornjih izvedbi. Oznaka veličine po IEC označava visinu osovine elektromotorja. Slova S, M i L označavaju dužinu kućišta, a slova A i B označavaju dužinu statorskih paketa u istom kućištu. U oznaci za oblik elektromotorja po IEC, potrebno je navesti jedan od oblika koji su prikazani na stranici 4 (ili ostale po IEC 60034-7).

The basic model marked with letter T stands for the three-phase electric motor, 2T stands for the second and 3T for the third generation of electric motor.

- Additional model designations are as follows:
- A - automatic thermal protection (bimetal)
 - B - electric motor with safety brake
 - C - increased power output
 - E - electronic thermal protection (thermistor)
 - G - electric motor for burner
 - M - increased torque
 - N - non-ventilated electric motor
 - O - open-design electric motor
 - V - built-in electric motor

Possible are also combinations of the above mentioned designs. The designation of size acc. to IEC standards defines the height of electric motor shaft. The letters S, M, L stand for the housing length, the letters A, B for the length of stator packages of an equal housing. The designation of the electric motor shape according to IEC must be completed with one of the shapes illustrated on Page 4 (or other according to IEC 60034-7).

Končne gredi, rotorji

Normalne izvedbe elektromotorjev so grajene z eno cilindrično končino gredi po DIN 748 T3. Rotorji so dinamično balansirani z moznikom, zaradi tega se morajo prigradni elementi - jermenice in podobno, balansirati na gladkem trnu. Pri izvedbi elektromotorja s končno gredi na strani N je potrebno paziti, da prigradena jermenica ne ovira normalnega dotoka hladilnega zraka.

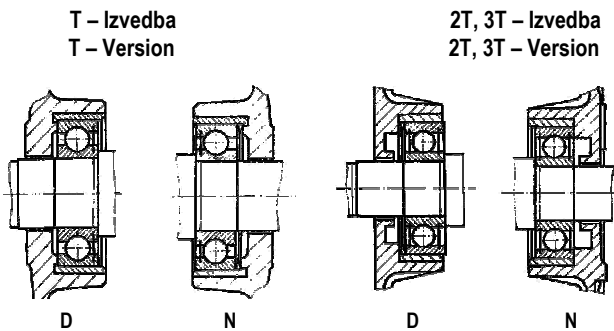
Opletanje, centričnost in pravokotnost

Pri standardni izvedbi so: opletanje končne gredi, centričnost in pravokotnost končne gredi nasproti prirobnici v dopustnih mejah po IEC 60072 (DIN 42955).

Vležajenje

Elektromotorji so vležajeni na obeh straneh s kvalitetnimi in izdatno dimenzioniranimi krogličnimi ležaji. Ležaji so dvostranske zaprte izvedbe. Dodatno jih ne mažemo. Grajeni so za temperaturno območje od -30°C do 120°C. V aksialni smeri so prednapeti s krožničastimi vzmetmi. Krožničasti vzmeti sta v trifaznih in enofaznih elektromotorjih T in EK velikosti 90-132 nameščeni na strani N. Pri 2T, 3T, 2EK, 3EK ter pri enofaznih elektromotorjih z zagonskim kondenzatorjem in centrifugalnim stikalom na strani D. Minimalna zračna reža med gredjo in skozno izvrtino ležajnega ščita preprečuje vdor vode in prahu v ležajni prostor.

Vležajenje / Ležaji / Bearing



Ležaji prenašajo tudi aksialne sile, ki nastopajo pri normalnem obratovanju elektromotorja v vodoravni in predvsem v navpični legi elektromotorja. Teža rotorja in jermenice v navpični legi leži znatno pod mejo dopustne aksialne obremenitve ležaja. V primerih, kjer nastopajo zaradi posebnih zahtev prigradnje oziroma načina uporabe večje aksialne obremenitve, je potreben posvet s strokovnjaki podjetja.

Priključna omarica

Na elektromotorjih velikosti 90-132 je priključna omarica privita na nastavek, ki je izveden na sredini statorskega ohišja in je nameščen na desni strani, če gledamo s pogonske strani elektromotorja. Pri velikosti 90 in 112 se lahko na zahtevo prestavi tudi na zgornjo stran elektromotorja, pri vseh ostalih pa samo na levo stran.

Pri velikostih 56-80 je priključna omarica privita na ohišje statorja na D strani. Nameščena je na zgornji strani elektromotorja. V priključni omarici je poleg priključne plošče tudi označen vijak za ozemljitev. Omarico je mogoče zavrteti za 90°, 180° in 270°. Omarica je izvedena v zaščitni stopnji IP 55 po IEC 60034-5. Konstruirana je tako, da je možen neoviran dostop do sponk in ozemljitvenega vijaka, ko snamemo pokrov.

Krajevi osovine, rotorji

Normalne izvedbe elektromotorja su grajene sa jedno cilindričnim krajem osovine po DIN 748 T3. Rotorji su dinamički balansirani s klinom, zbog toga moraju prigradni elementi remenica i slično biti balansirani na glatkom trnu. Kod izvedbe elektromotorja s krajem osovine na strani N, potrebno je pripaziti da prigradena remenica ne ometa dotok zraka za hlađenje.

Koncentrična vrtnja, centričnost i okomitost

Kod standardne izvedbe su: koncentrična vrtnja (udar), centričnost i okomitost krajeva osovine prema prirobnici u dozvoljenim granicama odstupanja po IEC 60072 (DIN 42955).

Ležaji

U elektromotore su ugrađeni, na obje strane, kvalitetni i izdašno dimenzionirani kuglični ležaji. Ležaji su objestrano zatvorene izvedbe. Dodatno podmazivanje nije potrebno. Građeni su za područje temperature od -30°C do 120°C. U aksijalnom smjeru su prenapregnuti elastičnim prstenovima. Elastični prstenovi su u trofaznim i jednofaznim elektromotorima T i EK veličine 90-132 namješteni na strani N, a kod veličine 2T, 3T i 2EK, 3EK i kod jednofaznih elektromotora s pogonskim kondenzatorom i centrifugalnom sklopkom na strani D. Minimalni zračni raspor između osovine i provrtine u ležajnom štitu sprečava prodor vode i prašine u prostor ležaja.

Shaft Ends, Rotors

Standard electric motor models are designed with one cylindrical shaft end according to DIN 748 T3. Rotors are dynamically balanced by means of a dowel pin. Consequently, the pulleys and similar built on elements must be balanced on the smoothing mandrel. With electric models where shaft end is mounted on the side N, care must be taken to prevent the pulley from hindering the normal cooling air inflow.

Rattling, Centricity and Rectangularity

In standard designs, rattling, centricity and rectangularity of the shaft end, when compared to the flange, are within permissible limits according to IEC 60072 (DIN 42955).

Bearings

On both sides, electric motors are fitted with high quality and well dimensioned ball bearings. The bearings of double-sided closed design are not additionally greased. They are designed for the temperature range from -30°C to 120°C. They are prestressed in axial direction with plate springs. In three-phase and single-phase electric motors (T 90 to T 132 and EK), the plate springs are placed on the side N. With 2T, 3T, 2EK, 3EK and single-phase electric motors fitted with a starting capacitor and a centrifugal switch, the plate springs are placed on the side D. A minimum air gap between the shaft and the bore of the bearing bracket prevents water and dust from entering the bearing area.

Tabela ležajev / Tabela ležaja / Table of bearings

Velikost motorja po IEC Veličina motora po IEC Size of electric motor acc. - to IEC	Kroglični ležaj stran D in N Kuglični ležaj strana D i N Ball bearing page D and N	Dimenzije (mm) Dimensions (mm)
56	6001 2Z C3	12x28x8
63	6201 2Z C3	12x32x10
71	6202 2Z C3	15x35x11
80	6204 2Z C3	20x47x14
90	6205 2Z C3	25x52x15
100	6206 2Z C3	30x62x16
112	6206 2Z C3	30x62x16
132	6308 2Z C3	40x90x23

Ležaji prenose također aksijalne sile, koje nastaju kod normalnog rada elektromotora u horizontalnom, a naročito u vertikalnom položaju. Težina rotora i remenice u vertikalnom položaju nalazi se znatno ispod dopuštene granice aksijalnog opterećenja ležaja. U slučajevima, kada nastupaju zbog posebnih zahtjeva prigradnje, odnosno načina upotrebe, veća aksijalna opterećenja, potrebno je posavjetovati se sa stručnjacima poduzeća.

Bearings transmit also axial forces occurring by normal electric motor operation in a horizontal and especially in a vertical mounting position. The weight of the rotor and pulley is in a vertical position considerably lower than the permissible axial bearing loads. When, however, greater axial loads occur due to specific requirements or modes of application, contact the manufacturer's experts for advice.

Priključna kutija

Na elektromotorima veličine 90-132, je priključna kutija pričvršćena na nastavak, koji je izveden u sredini statorskog kućišta, te je smješten na desnoj strani, gledano sa pogonske strane elektromotora. Kod veličine 90 i 112, može se na zahtjev premjestiti i na gornju stranu elektromotora, a kod svih ostalih na lijevu stranu.

Kod veličine 56-80, priključna kutija je pričvršćena na kućište statora na strani D, smještena je na gornjoj strani elektromotora. U priključnoj kutiji nalazi se pored priključne ploče također označen vijak za uzemljenje. Priključnu kutiju je moguće premjestiti za 90°, 180° i 270°. Kutija je izrađena sa zaštitnim stupnjem IP 55 po IEC 60034-5. Konstruirana je tako, da je nakon skidanja poklopca, moguć nesmetan pristup do stezaljki i vijka za uzemljenje.

Terminal Box

The terminal box is screwed on to a lug in the middle of the stator housing and on the right side, if viewed from the electric motor drive side, in the electric motors 90 to 132 of size. With size of 90 to 112 the terminal box may be moved, upon a special request of a customer, upwards to the upper side of the electric motor, whereas with all other models only to the left side. With sizes 56 to 80 the terminal box is screwed on to stator housing on the side D, on the upper side of electric motor. In addition to the switch panel the terminal box also contains a marked earthing screw. The position of the terminal box may be changed by 90°, 180° and 270°. It is designed in IP 55 degree of protection acc. to IEC 60034-5. Its design allows a direct access to terminals and the earthing screw after the cover being removed. Cable glands are metal.

Priključna omarica / Priključna kutija / Terminal Box

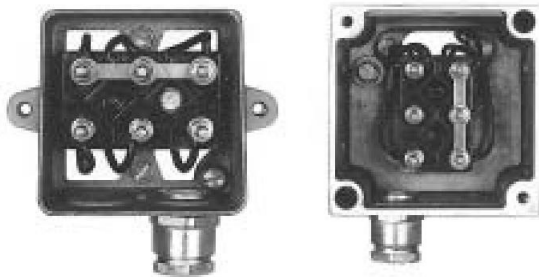


Tabela uvodnic / Tabela uvodnica / Table of cable Glands

Velikost motorja po IEC Veličina motora po IEC Electric motor size acc. to IEC	Kabelska uvodnica Kabelska uvodnica Dimensions of cable gland	Število Broj Number of Uvodnic Uvodnica Cable glands	Dovoljeni zunanji premer kabela (mm) Dozvoljeni vanjski promjer kabela (mm) Permissible diameter cable ext (mm)
56-71	PG 13,5	1	10 do 12
80	PG 13,5	1	10 do 12
90	PG 16	1	12 do 14
100	PG 16	1	12 do 14
112	PG 16	1	12 do 14
132	PG 21	1	19 do 21

Površinska zaščita

Elektromotorji so normalno obarvani s sivim zaščitnim lakom po RAL 7030. Obdelane površine so zaščitene proti koroziji.

Površinska zaštita

Elektromotori su normalno obojeni sivim zaštitnim lakom po RAL 7030. Obradene površine su zaštićene protiv korozije.

Surface protection

Electric motors are coated with grey protection paint according to RAL 7030. Treated surfaces are protected against corrosion.

Prigradnja stikal

Na vse tipe elektromotorjev se lahko prigradi omarica z vgrajenim stikalom (tabela) na mestu normalne priključne omarice. Izdelana je iz aluminijeve litine po postopku tlačnega litja.

Stikalo je na zgornji strani omarice. Normalno je uvodnica nameščena pri velikosti 56 - 90 proti N strani, pri velikosti 100, 112 in 132 pa na spodnji strani omarice. Omarico je mogoče zavrteti tudi v položaje obmote za 90°, 180° in 270°.

Ugradnja sklopki

Na sve tipove elektromotora moguće je ugraditi priključnu kutiju s ugrađenom sklopkom, prema tabeli, na mjestu normalne priključne kutije. Izrađena je iz Al-legure postupkom tlačnog livenja. Sklopka se nalazi na gornjoj strani kutije. Kod veličina 56 - 90, je uvodnica normalno smještena prema strani N, a kod veličina 100, 112 i 132 na donjoj strani priključne kutije. Priključnu kutiju je moguće premontirati i u položaje obmote za 90°, 180° i 270°.

Mounting of Switches

All electric motor models may be fitted with a panel with built-in switch (Table) which is attached in the place of the standard switch board. It is made of aluminium casting upon the die casting procedure.

The switch is placed on the top of the panel. The cable gland is in sizes 56 to 90 usually positioned on the side N, with sizes 100, 112 and 132 on the bottom side of the panel. The position of the panel may, however, be changed also by 90°, 180° and 270°.

Elektromotor s prigradenim stikalom. Elektromotor s prigradenom sklopkom. Electric motor with built-in switch

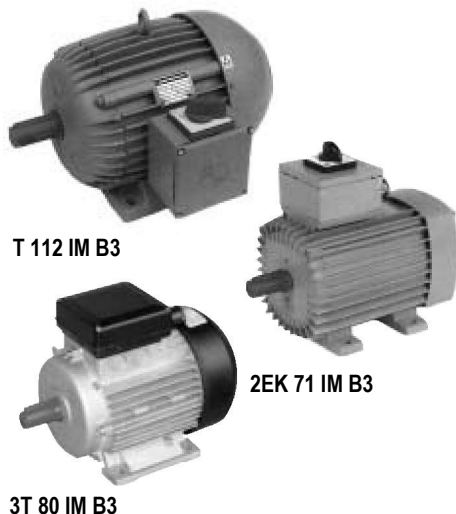


Tabela stikal za trifazne elektromotorje

Vrste stikal

- Vklopno - izklopno tripolno stikalo
- Reverzno tripolno stikalo
- Zvezda - trikot stikalo
- Preklopno stikalo za elektromotorje z dvema številoma vrtljajev

Tabela sklopki za trofazne elektromotore

Vrste sklopki

- Uklopno - isklopna trolpolna sklopka
- Reverzna trolpolna sklopka
- Zvijezda - trokut sklopka
- Preklopna sklopka za elektromotore s dvije brzine vrtnje

Table of Switches for Three-Phase Electric Motors

Types of Switches

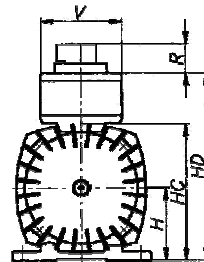
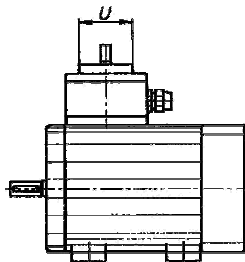
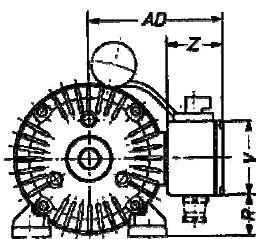
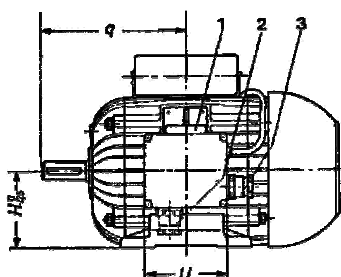
- On/Off three-pole switch
- Reversible three-pole switch
- Star - triangle switch
- Connection switch for electric motors with two rotational speeds

Elektromotor / Elektromotor / Electric motor

Pomen števil ter dimenzije trifaznih in enofaznih elektromotorjev s prigradenim stikalom (katalog, stran 9).

Značenje brojeva i dimenzije trifaznih i jednofaznih elektromotora sa prigradenom sklopkom (katalog, strana 9).

Code of numbers and Dimensions of Three- and Single- Phased Electric Motors with Built-in Switch (Catalogue, Page 9).



EK

2T

Dimenzije trifaznih in enofaznih elektromotorjev s prigradenim stikalom
Dimenzije trofaznih i jednofaznih elektromotora sa prigradenom sklopkom
Dimensions of Three- and Single-Phased Electric Motors with Built-in Switch

Velikost motorja po IEC Veličina motora po IEC Electric motor size acc. to IEC	H	HC	HD	AD	q	U	V	Z	R	Kabelske uvodnice Kabelske uvodnice Cable glands
56	56	105	157	-	-	70	70	-	30	PG 13,5
63	63	118	167	-	-	70	70	-		
71	71	133	182	-	-	70	70	-	30	PG 13,5
80	80	160	204	-	-	90	90	-		
90 S, 2S	90	-	-	156,5	156	100	85	66	52	PG 16
90 L, 2L		-	-		168,5					
100 L, 2L	100	-	-	186,5	193	112	112	86	44	
112 M, 2M	112	-	-	198	200				56	
132 S, 2S	132	-	-	218	239				76	PG 21
132 M, 2M		-	-		258					

Številke pomenijo:

1. V omarico je mogoče vgraditi eno od stikal, navedenih v tabeli stikal
2. Normalni položaj uvodnice pri tipih T 100, T 112 in T 132
3. Normalni položaj uvodnice pri tipu T 90

Brojevi znače:

1. U kutiju je moguće ugraditi jednu od sklopki navedenih u tabeli sklopki
2. Normalni položaj uvodnice kod tipa T 100, T 112 i T 132
3. Normalni položaj uvodnice kod tipa T 90

The numbers signify:

1. Built into the panel may be one of the switches, given in Table of switches for three-phase electric motors
2. Normal position of the cable gland with T 100, T 112, and T 132 type
3. Normal position of cable gland with T 90 type

Električna izvedba

Nazivna moč

Moči, navedene v tabelah, so nazivne moči, ki jih elektromotorji oddajajo na gredeh pri trajni obremenitvi, pri nazivni napetosti in frekvenci, pri okoliški temperaturi, ki ni višja od 40°C in pri nadmorski višini do 1000m.

Sprememba moči

Moč elektromotorja se lahko zmanjša ali zveča, če se spremenijo sledeči obratovalni pogoji:

1. če se spremeni omrežna napetost ali frekvenca za več kot ±6%
2. če se spremenijo hladilni pogoji
3. če obratujejo elektromotorji pri posebnem pogonu
4. če morajo elektromotorji ustrezati še drugim predpisom razen Publ. IEC 60034-1, 60034-2 oziroma DIN VDE 0531 T1.

Napetost in frekvenca

Standardni elektromotorji so motorji grajeni za priključek na omrežje Δ 230V / Y 400V, 50Hz ali Δ 265V / Y 460V, 60Hz za moči do vključno 3kW. Motorji večjih moči so grajeni za napetosti omrežja Δ 400V / 50Hz in Δ 460V / 60Hz.

Dovoljeno odstopanje od nazivne napetosti ali frekvence znaša ±6%. Po posebnem naročilu izdelujemo elektromotorje za napetosti v območju od 110V do 600V ter za frekvenco 50 in 60Hz. Kadar se napetost in frekvenca spremenita istočasno v istem razmerju, elektromotorja ni treba predelati. Tako lahko elektromotor, ki je grajen za 400V / 50Hz priključimo na omrežje 460V / 60Hz. Pri tem bo naraslo število vrtljajev za približno 20% in moč se bo povečala za približno 15%. Vendar pa moramo upoštevati, da se pri določenih pogojih vrtilni moment bremena spreminja z naraščanjem števila vrtljajev.

Sprememba hladilnih pogojev

Normalna temperatura hladilnega okoliškega zraka je do 40°C. Odstopanje od te temperature povzroča sledeče spremembe moči:

Temperatura hladilnega zraka	30°C	40°C	50°C	60°C
Odstotek od nazivne moči	106%	100%	90%	80%

Električna izvedba

Nazivna snaga

Snage, navedene u tabelama, su nazivne snage, tj. snage koje prenose elektromotori na osovine kod trajnog opterećenja uz nazivni napon i frekvenciju, kod temperature okoline ne veće od 40°C i na nadmorskoj visini do 1000m.

Promjena snage

Snaga motora može se smanjiti ili povećati ako se promijene slijedeći pogonski uvjeti:

1. ako se promijeni napon ili frekvencija za više od ±6%
2. ako se promijene uvjeti hlađenja
3. ako motori rade u posebnem pogonu
4. ako moraju elektromotori odgovarati još i drugim propisima, osim Publ. IEC 60034-1, 60034-2 od. DIN VDE 0531 T1.

Napon i frekvencija

Standardni elektromotori su motori, građeni za priključak na mrežu od Δ 230V / Y 400V 50Hz ili Δ 265V / Y 460V 60Hz za snage do uključno 3kW. Motori većih snaga su građeni za napon omrežja od Δ 400V / 50Hz i Δ 460V / 60Hz.

Dozvoljeno odstupanje od nazivnog napona ili frekvencije je ±6%. Prema posebnoj narudžbi izrađujemo elektromotore za napone od 110V do 600V i za frekvenciju od 50 i 60Hz. Kada se napon i frekvencija promijene istovremeno i proporcionalno, elektromotor nije potrebno preradivati. Tako možemo elektromotor, građen za 400V / 50Hz priključiti na mrežu od 460V / 60Hz. Kod toga će se brzina vrtnje povećati za oko 20%, a snaga će porasti za oko 15%. Ipak treba uzeti u obzir, da se kod određenih pogona moment tereta mijenja s porastom brzine vrtnje.

Promjena uvjeta hlađenja

Normalna temperatura rashladnog zraka okoline je do 40°C. Odstupanje od ove temperature uzrokuje slijedeće promjene snage:

Temperatura rashladnog zraka	30°C	40°C	50°C	60°C
Procenat od nazivne snage	106%	100%	90%	80%

Electrical design

Rated Power Output

The values indicated in Table refer to rated power outputs delivered by electric motors on shafts at constant load, rated voltage and frequency, ambient temperature not exceeding 40°C and at the above sea-level of up to 1000m.

Modification of Power Output

The changes of operating conditions, given below, may result in an increase or decrease of the electric motor output:

1. If mains voltage or frequency changes by more than ±6%
2. If cooling conditions change
3. If electric motors run at non standard drive
4. If, in addition to IEC Publ. 60034-1, 60034-2 and/or DIN VDE 0531 T1, the electric motors must comply also with other regulations.

Voltage and Frequency

Standard electric motors are build for connection to the mains at Δ 230V / Y 400V, 50Hz or Δ 265V / Y 460V, 60 Hz for the output of up to 3kW. More powerful motors are built for the mains voltages of Δ 400V / 50Hz and Δ 460V / 60Hz. Permissible rated voltage and frequency tolerance is ± 6%.

Upon a special request, electric motors for the voltage ranging from 110V to 600V and the frequency within 50 and 60Hz may be manufactured.

If voltage and frequency change simultaneously and in the same ratio, modification of the electric motor is no more required. Thus the electric motor designed for 400V / 50Hz may be connected to the mains at 460V / 60Hz. As a consequence, the number of revolutions will increase by 20%, and power output by approximately 15%. It is, nevertheless, necessary to take into consideration that with certain drives the load torque changes with the increase in r.p.m.

Change of Cooling Conditions

Normal temperature of the cooling ambient air is up to 40°C. In the event of deviations from this temperature, the power changes occur as follows:

Cooling air temperature	30°C	40°C	50°C	60°C
Percentage of rated power	106%	100%	90%	80%

Elektromotor lahko obremenimo z nazivno močjo pri postavitvi na nadmorsko višino višjo od 1000m, če je temperatura okoliškega zraka za vsakih nadaljnjih 100m višine nižja za približno 0,8°C.

Posebni pogon

Za posebni pogon velja vsak pogon, ki zahteva povečane čase zagona, pogoste vklope ali spremembe smeri vrtenja, intermitirajoči pogon in podobno. Za intermitirajoči pogon po DIN VDE 0530 T1, vrsta pogona S3, lahko elektromotorje bolj obremenimo (glej tabelo):

Relativni vklopni čas (ED%)	15%	25%	40%	60%
Odstotek od nazivne moči	pribl. 145%	pribl. 130%	pribl. 120%	pribl. 108%

Pri tem se razmerje zagonskega in omahnega vrtilnega momenta nasproti nazivnemu v istem razmerju zmanjša.

Drugi predpisi

Elektromotorje za vgradnjo na ladje in za povišano okoliško temperaturo ter elektromotorje, ki ustrezajo predpisom čezmorskih držav, izdelujemo po dogovoru.

Izkoristek (η) faktor moči ($\cos\phi$)

Izkoristek in faktor moči za nazivno moč, napetost in frekvenco sta navedena v tabelah s tehničnimi podatki. Tolerance so v skladu z IEC Publ. 60034 in DIN VDE 0530 T1.

Izolacija

Izolacija elektromotorjev ustreza razredu izolacije F po IEC Publ. 60034 oziroma Publ. 60085 in DIN VDE 0530 T1. Segrevanje navitij elektromotorjev pri nazivnih močeh v tabelah pa ustreza razredu izolacije B. Izolacija navitja je v standardni izvedbi tropska in je uporabna tako za normalne klimatske razmere, kakor tudi za zelo vlažne prostore.

Zagon elektromotorjev

Elektromotorje, ki so grajeni za napetost Δ 230V / Y 400V je mogoče zaganjati samo direktno, elektromotorje za napetost Δ 400V pa tudi s stikalom zvezda - trikot. V tem primeru moramo računati s tem, da nam zagonski vrtilni moment in zagonski tok v stiku zvezda padeta na približno 1/3 vrednosti, ki so podane v tabelah.

Termična zaščita elektromotorjev

Uporabniki elektromotorjev si lahko ščitijo elektromotorje sami na ta način, da uporabijo zaščitna stikala. Pri izbiri stikal morajo upoštevati tolerance za napetost, frekvenco, izkoristek (η) in faktor moči ($\cos\phi$). Pri izbiri zaščitnih stikal je treba upoštevati navodila proizvajalcev teh stikal. Na željo naročnikov vgrajujemo v navitja elektromotorjev avtomatska termična zaščitna stikala (bimetale) ali termična tipala (termistorje), s katerimi lahko izvedemo popolno zaščito elektromotorjev. Avtomatska termična zaščitna stikala so za elektromotorje manjših moči lahko vezana neposredno v tokokrog navitij, za večje moči je potrebno dodatno prigraditi kontaktorje. K termičnim tipalom je potrebno dodatno prigraditi elektronske izklopne naprave. Opisani vrsti zaščite delujeta neodvisno od zunanjih vplivov ali vrste pogonov, ker reagirata samo na temperaturo navitij. S termičnimi tipali je elektromotor popolnoma zaščiten proti kratkim stikom, preobremenitvam in pred izpadi faze. Avtomatska termična zaščitna stikala so za elektromotorje manjših moči vezana neposredno v tokokrog navitij, za večje moči pa je potrebno dodatno prigraditi kontaktorje.

Elektromotor možemo opteretiti s nazivnom snagom, ako ga montiramo na nadmorskoj višini, višoj od 1000m, ukoliko je temperatura zraka okoline za svakih daljnih 100m niža za oko 0,8°C.

Poseban pogon

Posebnim pogonom smatramo svaki pogon, koji traži povećano vrijeme zaleta, česta uklapanja ili promjenu smjera vrtnje, intermitirajuće pogone i slično. Za intermitirajući pogon po DIN VDE 0530 T1, vrsta pogona S3, možemo elektromotore više opteretiti za slijedeće vrijednosti:

Relativno uklopno vrijeme (ED%)	15%	25%	40%	60%
Procenat od nazivne snage	pribl. 145%	pribl. 130%	pribl. 120%	pribl. 108%

Pri tome se odnos zakretnog i prekretnog momenta vrtnje prema nazivnom smanji u istom omjeru.

Drugi propisi

Elektromotore za pogon brodova i za povećane okolne temperature, kao i elektromotore koji odgovaraju propisima prekomorskih zemalja, izrađujemo prema dogovoru.

Korisnost (η) i faktor snage ($\cos\phi$)

Korisnost i faktor snage za nazivnu snagu, napon i frekvenciju su navedeni u tabelama tehničkih podataka. Odstupanja su u skladu s IEC Publ. 60034 i DIN VDE 0530 T1.

Izolacija

Izolacija elektromotora odgovara razredu izolacije F po IEC Publ. 60034, odnosno Publ. 60085 i DIN VDE 0530 T1. Zagrijavanje namota elektromotora kod nazivnih snaga u tabelama pak odgovara razredu izolacije B. Izolacija namota u normalnoj izvedbi je tropska te odgovara za upotrebu kako u normalnim klimatskim uvjetima, tako i za jako vlažne prostore.

Zalet elektromotora

Elektromotore koji su građeni za napon od Δ 230V / Y 400V možemo pustiti u pogon samo direktno, a elektromotore za napon Δ 400V također sa sklopom zvijezda - trokut. U tom slučaju moramo računati s time, da zaletni moment i zaletna struja u spoju zvijezda padnu na približno 1/3 vrijednosti, datih u tabelama.

Termička zaštita elektromotora

Korisnici elektromotora mogu sami zaštititi svoje elektromotore, tako da upotrebe zaštitne sklopke. Pri izboru sklopke moraju korisnici voditi računa o odstupanjima napona, frekvencije, korisnosti (η) i faktora snage ($\cos\phi$). Kod izbora zaštitnih sklopki treba se držati uputa proizvođača istih. Na želju kupaca ugrađujemo u namote elektromotora automatske zaštitne termičke sklopke (bimetale) ili termičke elemente (termistore) pomoću kojih možemo izvesti potpunu zaštitu elektromotora. Automatske termičke zaštitne sklopke se, za elektromotore malih snaga, mogu vezati direktno u strujni krug namotaja, za veće snage treba dodatno prigraditi kontaktore. Termistorima je potrebno dodati elektronsku napravu za isklapanje. Opisane zaštite deluju neovisno o vanjskim utjecajima i vrsti pogona jer reaguju samo na temperaturu namota. Zaštita, izvedena termistorima potpuno štiti motor od kratkog spoja, preopterećenja i ispada faze. Automatske termičke zaštitne sklopke nisu dovoljno efikasna zaštita protiv kratkog spoja, zato što ugrađeni bimetalni spojevi sporo reaguju na brzo povećanje temperature namota.

An electric motor may be loaded by the rated power output when placed in a position exceeding 1000m above the sea level, if the ambient air temperature for every subsequent 100m of height is lower by about 0,8°C.

Non-Standard Drive

The non-standard drive is every drive requiring longer starting times, frequent switching or changing of direction of rotation, intermittent run, and the like. At intermittent operation according to DIN VDE 0530 T1, of S3 drive type, the electric motors may be overloaded by the following values:

Relative cut in time (ED%)	15%	25%	40%	60%
Percentage of rated power	approx. 145%	approx. 130%	approx. 120%	approx. 108%

As a consequence, the ratio between the starting and breakdown torques against the rated torque lowers in the same proportion.

Other Regulations

The electric motors designed for installation in ships and higher ambient temperatures, as well as the electric motors complying with oversea countries regulations, are manufactured upon special demands.

Efficiency (η) and Power Output ($\cos\phi$)

The efficiency and power output factor for rated power output, as well as frequency and voltage are illustrated in Tables with technical data. Tolerances are in compliance with IEC, Public. 60034, and DIN VDE 0530 T1.

Insulation

The insulation of electric motors is in compliance with the F insulation class acc., to IEC, Publ. 60034 and/or Publ. 60085, as well as according to DIN VDE 0530 T1. Heating of electric motors windings at rated powers, given in Tables, complies with the B insulation class. With standard versions the insulation of windings is of tropical type, applicable to normal climatic conditions and very damp rooms.

Starting of Electric Motors

The electric motors, built for the voltage of Δ 230V / Y 400V, may be started only directly, whereas those built for the voltage of Δ 400V with the star - delta switch. In such cases it is expected starting torque and starting current to fall by approximately one third of the values given in Tables.

Thermal Protection of Electric Motors

Users can protect their electric motors themselves by fitting them with protection switches. When choosing proper switches, tolerances for voltage, frequency, efficiency (η) and power output factor ($\cos\phi$) must be taken into consideration, as well as the instructions, of the manufacturers of such switches. Upon customer's wishes, automatic thermal cut-out switches (bimetals) or thermal sensors (thermistors) may be incorporated in windings in order to achieve complete protection of electric motors. With electric motors with lower power output, the automatic thermal cut-out switches are directly connected to the winding circuit, whereas with those of higher outputs, additional contactors must be fitted into. Electronic switch-out devices must be additionally mounted to thermal sensors. The above types of thermal protection are independent from exterior influences or types of drives since they react only to the temperature of windings. With thermal sensors fitted electric motors are fully protected against short circuit overload or phase failures. The automatic thermal cut-out switches are not efficient enough in the event of short circuits, as the built-in bimetal reacts too slowly considering a sharp increase in temperature of the winding.

Elektromotorji za več hitrosti vrtenja

Elektromotorji za dve hitrosti vrtenja

Normalni elektromotorji za dve hitrosti vrtenja so izvedeni ali z enim navitjem v Dahlander stiku Δ/YY (za pogon ventilatorja v stiku Y/YY), s katerim dosežemo spremembo vrtljajev v razmerju 1:2 ter druga razmerja s PAM navitji ali z dvema ločenima navitjema v stiku Y/Y , s katerim dosežemo različna razmerja vrtljajev. Po posebni želji izdelamo elektromotorje za dve hitrosti vrtenja tudi za druge moči, druga razmerja števila vrtljajev in drugi stik kot so navedeni v tabelah.

Normalna napetost je 400V, 50Hz. Možen je le direkten zagon.

Elektromotorji za tri hitrosti vrtenja

Elektromotorji za tri hitrosti vrtenja so izdelani z dvema ločenima navitjema. Eno je v vezavi Dahlander, v stiku Δ/YY , drugo pa v stiku Y . V tabeli s tehničnimi podatki so navedene osnovne kombinacije. Po posebni želji kupcev lahko izdelamo elektromotorje za tri hitrosti vrtenja z drugimi razmerji moči, vrtljajev in stikov ($Y/Y/YY$). Normalna napetost je 400V, 50Hz. Možen je le direkten zagon.

Elektromotorji z zmanjšanimi (reduciranimi) vibracijami stopnje R

Elektromotorji z zmanjšanimi vibracijami se uporabljajo pretežno tam, kjer lahko vibracije povzročajo poškodbe, na primer v industriji obdelovalnih strojev, na brusnih strojih, preciznih strožnicah, preciznih vrtalnih in rezkalnih strojih in podobno.

Z ozirom na stopnje vibracij deli IEC 60034-14 (DIN ISO 2373) elektromotorje v 3 skupine: N, R in S (glej tabelo).

N - normalni elektromotorji, ki so navedeni v katalogu;

R - elektromotorji z reduciranimi vibracijami, ki jih izdelujemo za vse osnovne izvedbe elektromotorjev po posebnem naročilu;

S - elektromotorji z zelo majhnimi vibracijami za posebne pogoje, ki jih ne izdelujemo.

Stopnja vibracij je največja učinkovita vrednost hitrosti vibracij v frekvenčnem območju od 10Hz do 1000Hz, merjena po IEC 60034-14, DIN ISO 2373. Te vrednosti pri elektromotorjih z zmanjšanimi vibracijami dosežemo s konstrukcijskimi spremembami vleženja, s posebnimi krogličnimi ležaji in s točnejšo izdelavo. Vsi elektromotorji so balansirani z moznikom na gredi. Prenosni elementi, kot so jermenice, zobniki in slično, morajo biti balansirani brez moznika.

Stopnja vibracij	Območje števila vrtljajev (min^{-1})	Mejne vrednosti hitrosti vibracij v_{ef} (mm/s) Tip 56-132
N	Od 600 do 3600	1,8
R	Od 600 do 1800 >1800 do 3600	0,71 1,12

Zunanje dimenzije, izvedba priključnih omaric, hlajenje kakor tudi podatki glede norm, napetosti in frekvence, moči, oblike in zaščite so enake kot pri osnovni obliki trifaznih elektromotorjev.

Elektromotorji s višje brzina vrtnje

Elektromotorji s dvije brzine vrtnje

Normalni motorji s dvije brzine vrtnje su izvedeni ili s jednim namotom u Dahlander spoju Δ/YY , (za pogon ventilatora u spoju Y/YY) s kojim postižemo promjene brzine u omjeru 1:2 te ostale omjere s PAM namoti ili s dva odvojena namota u spoju Y/Y , pomoću kojih postižemo ostale omjere brzine vrtnje. Na posebnu želju izrađujemo elektromotore za dvije brzine vrtnje i za druge snage, druge omjere brzine vrtnje i drugačije spojeve od onih, koji su navedeni u tabelama.

Normalni napon je 400V, 50Hz. Moguć je jedino direktni zalet.

Elektromotorji s tri brzine vrtnje

Elektromotorji s tri brzine vrtnje su izrađeni s dva odvojena namota. Jedan je u Dahlander spoju Δ/YY , a drugi u spoju Y . U tabeli tehničkih podataka navedene su osnovne kombinacije. Na posebnu želju kupaca možemo izraditi elektromotore s tri brzine vrtnje s drugim omjerom snaga, brzina i spojeva ($Y/Y/YY$).

Normalni napon je 400V, 50Hz. Moguć je jedino direktni zalet.

Elektromotorji sa smanjenim (reduciranim) vibracijama stupnja R

Elektromotorji sa smanjenim vibracijama se pretežno upotrebljavaju tamo, gdje vibracije mogu izazvati oštećenja na primjer u industriji strojeva za obradu, u pogonu brusilica, preciznih tokarskih strojeva, preciznih bušilica, glodalica i slično.

S obzirom na stupanj vibracija dijeli IEC 60034-14 (DIN ISO 2373) elektromotore u grupe: N, R i S (vidi tabelu).

N - normalni elektromotori, koji su navedeni u katalogu;

R - elektromotori sa smanjenim vibracijama, koje izrađujemo za sve osnovne izvedbe po posebnoj narudžbi.

S - elektromotori s vrlo malenim vibracijama za posebne uvjete, koje ne izrađujemo.

Stupanj vibracija je največja učinkovita vrijednost brzine vibracija u frekvenčnom području od 10Hz do 1000Hz, mjerena po IEC 60034-14, DIN ISO 2373. Ove vrijednosti kod elektromotora sa smanjenim vibracijama postižemo s konstrukcijskim promjenama uleženja, posebnim kugličnim ležajima i s točnijom izradom. Svi elektromotori su balansirani na osovini pomoću klina. Prijenosni elementi, kao što su remenice, zupčanci i slično, se moraju balansirati bez klina.

Stupanj vibracija	Područje broja okretaja (min^{-1})	Grafične vrijednosti brzina vibracija v_{ef} (mm/s) Tip 56-132
N	Od 600 do 3600	1,8
R	Od 600 do 1800 >1800 do 3600	0,71 1,12

Vanjske dimenzije, izvedba priključnih kutija, hlajenje, kao i podaci koji se odnose na standarde, napon, frekvenciju, snagu, oblik, i zaštitu su isti kao kod osnovnog oblika trifaznih elektromotora.

Multi-Speed Electric Motors

Two-Speed Electric Motors

Traditional electric motors for two rotational speeds are designed either with a single Dahlander winding in the Δ/YY connection (for fan start in connection with Y/YY), through which a change in rotations is achieved within 1:2 ratio or other ratio with PAM windings or with two separate windings in the Y/Y connection through which the other rotations are obtained. Upon special request two-speed electric motors of different power outputs, different rotation ratios and different connections than those given in Tables, may be manufactured. The normal voltage is 400V, 50Hz. Only direct starting is possible.

Three-Speed Electric Motors

Three-Speed electric motors are constructed with two separate windings, one in the Dahlander Δ/YY connection, and the other in Y connection. Basic combinations are given in Technical specifications table. Upon special requests of customers also three-speed electric motors with different ratios of power, rotation and connections ($Y/Y/YY$) may be made. The normal voltage is 400V, 50Hz. Only direct starting is possible.

Electric Motors with Reduced R Degree Vibrations

Electric motors with reduced vibrations are designed to be used primarily in those areas where vibrations cause damages, i.e. in industry of processing machines, on grinding machines, precision lathes, precision drilling and turning machines, and the like. With regard to degrees of vibrations, electric motors are divided, according to IEC 60034-14 (DIN ISO 2373), into 3 groups: N, R and S (see Table).

N - Conventional electric motors, given in the Catalogue

R - Electric motors with reduced vibrations, designed upon special requests in all basic versions

S - Electric motors with extremely low vibrations designed for meeting special conditions; not available

The degree of vibration means the highest effective value of vibration speed within the frequency range of 10Hz up to 1000Hz, measured according to IEC 60034-14 (DIN ISO 2373).

These values are obtained in electric motors with reduced vibrations through design modifications of embedment, special ball bearings and more accurate manufacture. All electric motors are balanced by means of a dowel pin on the shaft, Transmission elements like belts, gears, etc., must be balanced without the dowel pin.

Degree of vibration	R. p. m. range (min^{-1})	Limit vibration speed values v_{ef} (mm/s) Tip 56-132
N	Od 600 do 3600	1,8
R	Od 600 do 1800 >1800 do 3600	0,71 1,12

Outside dimensions, terminal box design, cooling as well as data on standards, voltages and frequency, power output, shape and protection, are the same as with the basic shape of three-phase electric motors.

Obratovalni podatki trifaznih asinhronskih elektromotorjev IE2

Normalna napetost: Δ 230V / Y 400V, frekvenca 50Hz; zaščitna stopnja IP 54; način hlajenja: IC 411. Pri elektromotorjih moči nad 3kW je normalna napetost Δ 400V, frekvenca 50Hz.

Pogonski podatki trofaznih asinhronih elektromotorja IE2

Normalan napon: Δ 230V / Y 400V, frekvenca 50Hz; stupanj zaštite: IP 54; način hlajenja: IC 411. Kod elektromotora snage iznad 3kW je normalni napon Δ 400V, frekvenca 50Hz.

Operating Data of Three-Phase Induction Electric Motors IE2

Normal voltage: Δ 230V / Y 400V, frequency 50Hz; degree of protection: IP 54; cooling mode: IC 411. With electric motors of power output exceeding 3kW, normal voltage is Δ 400V, frequency of 50Hz.

Nazivna moč Nazivna snaga Rated power	Tip motorja Tip motora Type	Hitrost vrtenja Brzina vrtnje Rotational speed	Izkoristek Korisnost Efficiency	Izkoristek Korisnost Efficiency	Izkoristek Korisnost Efficiency	Faktor moči Faktor snage Power factor	Nazivni tok Nazivna struja Rated current	Iz / In	Mz / Mn	Mm / Mn	Vztrajnostni moment Moment inercije Moment on inertia	Masa za obliko IMB3 Masa za oblik IMB3 Mass for IMB3 (kg)
P (kW)		(min ⁻¹), (rpm)	(IEC 60034-30)	P=100%	P=75%	cos ϕ	In (A)				J (kgm ²)	
2p=2			3000 min⁻¹			400V / 50Hz						
0,09	2T 56 A2	2700		56,0	52,0	0,70	0,33	3,0	2,7	3,0	0,00019	3,1
0,12	2T 56 B2	2700		58,0	56,0	0,80	0,38	3,5	2,8	2,8	0,00028	3,6
0,18	2T 63 A2	2740		66,0	64,0	0,79	0,50	3,5	2,2	2,25	0,00022	3,4
0,25	2T 63 B2	2750		68,0	67,0	0,83	0,64	3,9	2,4	2,4	0,00030	3,8
0,37	2T 71 A2	2750		72,0	72,0	0,78	0,95	3,7	2,3	2,5	0,00031	5,3
0,55	2T 71 B2	2775		75,0	76,0	0,80	1,32	4,3	2,35	2,5	0,00042	6,3
0,75	3T 80 2A2	2830	IE2	78,0	77,5	0,87	1,6	6,0	3,0	3,0	0,00096	9,6
1,1	3T 80 2B2	2830	IE2	80,3	81,0	0,86	2,3	5,9	3,0	3,1	0,0012	10,6
1,5	T 90 2S2	2810	IE2	81,3	81,5	0,82	3,25	5,8	3,3	3,5	0,0021	15,0
2,2	T 90 2L2	2830	IE2	83,3	84,0	0,85	4,48	6,1	3,1	3,3	0,0030	18,8
3	T 100 2L2	2855	IE2	84,7	85,5	0,85	6,0	6,8	3,2	3,5	0,0047	24,5
4	T 112 2M2	2860	IE2	85,8	87,0	0,87	7,7	7,1	3,0	3,5	0,0070	31,0
5,5	T 132 2SA2	2890	IE2	87,0	88,0	0,87	10,5	6,9	3,0	3,6	0,014	45,5
7,5	T 132 2SB2	2900	IE2	88,2	88,5	0,88	14,0	7,9	3,0	3,8	0,022	60,0
9,2	T 132 MB2*	2860		87,0	87,0	0,91	16,8	7,6	3,6	3,6	0,0296	62,1
11	T 132 MB2*	2840		83,0	83,0	0,89	21,4	6,6	3,5	3,6	0,0296	62,4
2p=4			1500 min⁻¹			400V / 50Hz						
0,06	2T 56 A4	1300		45,0	42,0	0,64	0,30	2,2	2,1	2,3	0,00019	3,0
0,09	2T 56 B4	1300		46,0	44,0	0,65	0,44	2,2	2,2	2,3	0,00028	3,6
0,12	2T 63 A4	1340		59,0	57,0	0,72	0,41	2,7	2,0	2,1	0,00022	3,7
0,18	2T 63 B4	1310		62,0	61,0	0,67	0,63	2,6	2,1	2,2	0,00030	4,1
0,25	2T 71 A4	1400		68,0	68,0	0,70	0,72	3,6	2,0	2,2	0,00050	5,5
0,37	2T 71 B4	1390		68,0	69,0	0,75	1,04	3,6	1,8	2,1	0,00067	6,2
0,55	3T 80 A4	1400		75,0	77,0	0,76	1,4	4,0	2,2	2,5	0,0012	8,5
0,75	3T 80 2B4	1400	IE2	79,6	81,3	0,76	1,79	4,7	2,6	2,9	0,0018	10,6
1,1	T 90 2S4	1410	IE2	81,6	82,5	0,77	2,55	5,4	2,6	3,0	0,0030	17,6
1,5	T 90 2L4	1410	IE2	82,8	82,8	0,71	3,68	4,9	3,1	3,5	0,0035	18,0
2,2	T 100 2LA4	1410	IE2	84,3	84,5	0,79	4,8	4,8	2,2	2,6	0,0072	25,0
3	T 100 2LB4	1415	IE2	85,5	85,8	0,77	6,6	4,7	2,4	2,7	0,0080	27,0
4	T 112 2M4	1430	IE2	86,8	87,0	0,79	8,4	5,6	2,3	2,8	0,0138	35,3
5,5	T 132 2S4	1440	IE2	87,7	88,0	0,80	11,4	6,4	2,6	3,5	0,022	51,0
7,5	T 132 2M4	1450	IE2	88,7	88,9	0,79	15,5	7,3	3,2	3,8	0,0296	62,0
9,2	T 132 MB4*	1440		87,0	87,6	0,82	18,7	6,8	2,8	3,5	0,0296	61,4
11	T 132 MB4*	1420		85,0	87,0	0,83	22,8	6,9	3,3	3,6	0,0296	61,9
2p=6			1000 min⁻¹			400V / 50Hz						
0,18	2T 71 A6	920		57,0	54,0	0,59	0,78	2,5	1,9	2,2	0,00050	5,5
0,25	2T 71 B6	910		60,0	59,0	0,62	0,97	2,6	1,8	2,0	0,00067	6,2
0,37	3T 80 A6	900		61,0	60,0	0,67	1,3	2,9	2,1	2,2	0,0015	8,7
0,55	3T 80 B6	900		67,0	68,0	0,67	1,76	3,2	2,3	2,4	0,0022	10,9
0,75	T 90 2S6	925	IE2	75,9	75,5	0,66	2,17	3,3	2,2	2,5	0,0035	17,0
1,1	T 100 L6	930	IE2	78,1	78,5	0,67	3,0	4,3	2,1	2,5	0,0055	22,7
1,5	T 100 2L6	920	IE2	79,8	81,5	0,69	3,95	3,7	2,0	2,3	0,0075	26,7
2,2	T 112 2M6	940	IE2	81,8	82,3	0,73	5,3	4,5	2,3	2,6	0,0117	35,3
3	T 132 2S6	945	IE2	84,0	84,0	0,79	6,5	4,8	1,9	2,4	0,026	42,3
4	T 132 2MA6	945	IE2	85,0	85,5	0,75	9,1	4,85	2,05	2,6	0,034	50,8
5,5	T 132 2MB6	960	IE2	88,0	88,0	0,76	11,9	5,4	2,1	2,7	0,043	59,3

Nazivna moč Nazivna snaga Rated power	Tip motorja Tip motora Type	Hitrost vrtenja Brzina vrtnje Rotational speed	Izkoristek Korisnost Efficiency	Izkoristek Korisnost Efficiency	Izkoristek Korisnost Efficiency	Faktor moči Faktor snage Power factor	Nazivni tok Nazivna struja Rated current	lz / ln	Mz / Mn	Mm / Mn	Vztrajnostni moment Moment inercije Moment on inertia	Masa za obliko IM B3 Masa za oblik IM B3 Mass for IM B3
P (kW)		(min ⁻¹), (rpm)	(IEC 60034-30)	P=100%	P=75%	cos φ	ln (A)				J (kgm ²)	(kg)
2p=8			750 min⁻¹			400V / 50Hz						
0,09	2T 71 A8	680		41,0	39,0	0,54	0,58	1,9	1,6	2,0	0,00050	5,5
0,12	2T 71 B8	690		43,0	40,0	0,53	0,75	2,0	1,9	2,3	0,00067	6,2
0,18	3T 80 A8	670		54,0	52,0	0,60	0,79	2,4	2,0	2,2	0,0015	8,6
0,25	3T 80 B8	670		58,0	56,0	0,62	1,0	2,6	2,0	2,2	0,0022	10,9
0,37	T 90 S8	695		54,0	53,0	0,57	1,7	2,4	1,6	2,0	0,0030	13,5
0,55	T 90 L8	690		62,0	61,0	0,58	2,2	2,5	1,8	2,0	0,0035	17
0,75	T 100 LA8	690		67,0	67,0	0,67	2,4	2,9	1,7	2,2	0,0085	19
1,1	T 100 LB8	690		71,0	71,0	0,68	3,3	3,3	1,9	2,2	0,011	23
1,5	T 112 M8	700		78,0	79,0	0,71	3,9	3,6	1,8	2,1	0,0117	32
2,2	T 132 S8	705		77,0	78,0	0,74	5,6	4,5	2,0	2,4	0,026	42,3
3	T 132 M8	710		78,0	79,0	0,76	7,3	4,4	2,0	2,3	0,034	50,8
4	T 132 MB8	715		79,0	79,0	0,76	9,6	5,0	2,1	2,5	0,043	59,3

Pomen oznak Značenje oznaka Designation	nazivni tok ln = nominalna struja rated current	zagonski tok lz = zaletna struja starting current	nazivni vrtilni moment Mn = nazivni moment vrtnje rated torque	zagonski vrtilni moment Mz = zaletni moment vrtnje starting torque	max. (omahni) vrtilni moment Mm = max. (pokretni) moment vrtnje max. Torque
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* ni po IEC standardu / * nije po IEC standardu / * is not under IEC standard

Obratovalni podatki trifaznih asinhronskih elektromotorjev za dve hitrosti vrtenja

Normalna napetost: 400V, frekvenca 50Hz; zaščitna stopnja IP 54; način hlajenja: IC 411. Sinhronska hitrost vrtenja $n_s=1500/3000, 1000/1500, 750/1500$ vrtljajev v minuti.

Pogonski podatki trofaznih asinhronskih elektromotorja za dve brzine vrtnje

Normalan napon: 400V, frekvenca 50Hz; stupanj zaštite: IP 54; način hlajenja: IC 411. Sinhrona brzina vrtnje $n_s=1500/3000, 1000/1500, 750/1500$ okretaja u minuti.

Operating Data of 2-Speed Three-Phase Induction Electric Motors

Normal voltage: 400V, frequency 50Hz; degree of protection: IP 54; cooling mode: IC 411. Synchronous speed $n_s=1500/3000, 1000/1500, 750/1500$ rpm.

Nazivna moč Nazivna snaga Rated power P (kW)	Tip motorja Tip motora Type	Hitrost vrtenja Brzina vrtnje Rotational speed (min ⁻¹), (rpm)	Nazivni tok Nazivna struja Rated current ln (A)	lz / ln	Mz / Mn	Vztrajnostni moment Moment inercije Moment on inertia J (kgm ²)	Masa za obliko IM B3 Masa za oblik IM B3 Mass for IM B3 (kg)
Izvedba z enim Dahlander navitjem $n_s=1500/3000 \text{ min}^{-1}$, 4/2 - polni, stik Δ/YY Izvedba s jednim namotom Dahlander $n_s=1500/3000 \text{ min}^{-1}$, 4/2 - polni, spoj Δ/YY Model with a single winding in Dahlander connection $n_s=1500/3000 \text{ min}^{-1}$, 4/2 - pole, Δ/YY connection							
0,25/0,33	2T 71 A4/2	1400/2800	0,78/0,92	3,1/3,5	1,55/1,8	0,00050	5,4
0,3/0,45	2T 71 B4/2	1400/2800	0,85/1,1	3,4/3,7	1,4/1,6	0,00067	6,2
0,45/0,65	3T 80 A4/2	1400/2770	1,25/1,95	4,0/3,5	2,3/2,05	0,0012	8,7
0,65/0,85	3T 80 B4/2	1370/2800	1,6/2,1	3,9/4,3	2,0/2,1	0,0016	10,2
1,0/1,25	T 90 S4/2	1390/2700	2,5/3,6	3,5/3,2	1,9/2,1	0,0030	13,5
1,4/1,8	T 90 L4/2	1400/2820	3,25/4,5	4,3/4,1	2,0/2,3	0,0035	17
2,0/2,5	T 100 LA4/2	1400/2800	4,5/6,0	4,3/4,3	1,9/2,2	0,0055	22,8
2,5/3,0	T 100 LB4/2	1410/2830	5,5/7,1	4,7/4,8	2,1/2,85	0,0072	25,6
3,4/4,0	T 112 M4/2	1430/2860	7,0/8,9	5,6/5,9	2,1/2,4	0,012	33
4,9/5,9	T 132 S4/2	1440/2870	10,6/13,7	6,0/6,0	2,2/3,0	0,0194	48,3
7,3/8,5	T 132 M4/2	1440/2890	15,1/17,0	5,8/6,7	2,0/2,7	0,0296	59,3
Izvedba z dvema ločenima navitjema $n_s=1000/1500 \text{ min}^{-1}$, 6/4 - polni, stik Y/Y Izvedba s dva odvajena namota $n_s=1000/1500 \text{ min}^{-1}$, 6/4 - polni, spoj Y/Y Model with two separate windings $n_s=1000/1500 \text{ min}^{-1}$, 6/4 - polni, Y/Y connection							
0,25/0,34	3T 80 A6/4	920/1400	1/1,25	2,7/3,1	1,9/2,1	0,0015	8,8
0,37/0,55	3T 80 B6/4	910/1400	1,2/1,8	2,9/4	1,7/1,95	0,0022	11,1
0,45/0,75	T 90 S6/4	935/1405	1,7/2,05	2,7/3,8	1,4/2,0	0,0030	13,5
0,65/1,1	T 90 L6/4	930/1420	1,95/2,6	3/3,9	1,5/1,7	0,0035	17
0,9/1,3	T 100 LA6/4	940/1440	2,85/3,4	3,2/4,3	1,5/1,7	0,0055	23
1,1/1,6	T 100 LB6/4	940/1440	3,3/4	3,3/4,5	1,5/1,7	0,0072	25,6
1,8/2,2	T 112 M6/4	960/1470	4,75/5,5	4,5/6,0	1,8/1,9	0,012	33
2,4/3,5	T 132 S6/4	970/1460	7,4/8,6	5,2/6,7	2,3/2,5	0,0194	48,3
3,5/5,0	T 132 MB6/4	970/1450	8,0/10,5	5,8/5,6	2,2/2,0	0,043	60,5

Operational data of three-phase asynchronous motors for two speeds

Operating data of three-phase asynchronous motor for two speeds

Operating Data of 2-Speed Three-Phase Induction Electric Motors

Nazivna moč Nazivna snaga Rated power P (kW)	Tip motorja Tip motora Type	Hitrost vrtenja Brzina vrtnje Rotational speed (min ⁻¹), (rpm)	Nazivni tok Nazivna struja Rated current In (A)	Iz / In	Mz / Mn	Vztrajnostni moment Moment inercije Moment on inertia J (kgm ²)	Masa za obliko IM B3 Masa za oblik IM B3 Mass for IM B3 (kg)
Izvedba z enim navitjem PAM n _s =1000/1500 min ⁻¹ , 6/4 - polni, stik Δ/YY Izvedba s jednim namotom PAM n _s =1000/1500 min ⁻¹ , 6/4 - polni, spoj Δ/YY Model with a single winding PAM n _s =1000/1500 min ⁻¹ , 6/4 - pole, Δ/YY connection							
0,63/0,9	T 90 S6/4	930/1420	2,18/2,37	3,1/4,5	2,0/2,0	0,0030	13,5
0,9/1,3	T 90 L6/4	920/1420	3/3,4	3,6/4,7	2,4/2,2	0,0035	17
1,3/1,9	T 100 LA6/4	930/1430	3,23/4,56	3,7/4,8	1,8/1,7	0,0055	23
1,5/2,1	T 100 LB6/4	930/1430	4,09/7,75	3,7/5,2	1,9/1,8	0,0072	25,6
2,3/3,1	T 112 M6/4	950/1440	6,17/7	4,0/5,9	1,6/1,8	0,012	33
3,1/4,4	T 132 S6/4	950/1440	8,07/9,7	4,7/6,1	2,1/2,2	0,0194	48,3
4,1/5,7	T 132 M6/4	960/1450	9,7/11,4	5,2/7,5	2,2/2,4	0,0262	57,9
Izvedba z enim Dahlander navitjem n _s =750/1500 min ⁻¹ , 8/4 - polni, stik Δ/YY Izvedba s jednim namotom Dahlander n _s =750/1500 min ⁻¹ , 8/4 - polni, spoj Δ/YY Model with a single winding in Dahlander connection n _s =750/1500 min ⁻¹ , 8/4 - pole, Δ/YY connection							
0,22/0,37	3T 80 A8/4	670/1340	1,05/0,95	2,0/3,1	1,8/1,6	0,0015	8,8
0,3/0,55	3T 80 B8/4	670/1340	1,4/1,4	2,2/3,3	2,0/1,6	0,0022	10,9
0,4/0,75	T 90 S8/4	670/1360	1,75/1,9	2,4/3,3	2,7/2,1	0,0030	13,5
0,5/1,0	T 90 L8/4	700/1380	2,3/2,55	2,7/3,9	2,1/1,5	0,0035	17
0,7/1,3	T 100 LA8/4	700/1410	3,14/3,14	2,66/4,28	2,15/1,6	0,0055	23
0,9/1,7	T 100 LB8/4	690/1390	3,6/4,0	2,8/3,9	1,8/1,4	0,0072	25,6
1,6/2,5	T 112 M8/4	710/1430	4,4/5,6	3,7/4,2	2,0/1,8	0,012	32
2,2/3,2	T 132 S8/4	710/1430	6,0/8,0	3,4/3,8	1,3/1,5	0,0167	42,5
3,0/4,4	T 132 M8/4	710/1430	8,4/10,6	3,5/4,5	1,5/1,6	0,034	51
4,0/6,0	T 132 MB8/4	710/1440	10,5/13,3	4,0/5,2	1,6/2,0	0,0296	60

Operational data of three-phase asynchronous motors for two speeds for fan drive

Operating data of three-phase asynchronous motor for two speeds for fan drive

Operating Data of 2-Speed Three-Phase Induction Electric Motors Designed for Fan Drive

Nazivna moč Nazivna snaga Rated power P (kW)	Tip motorja Tip motora Type	Hitrost vrtenja Brzina vrtnje Rotational speed (min ⁻¹), (rpm)	Nazivni tok Nazivna struja Rated current In (A)	Iz / In	Mz / Mn	Vztrajnostni moment Moment inercije Moment on inertia J (kgm ²)	Masa za obliko IM B3 Masa za oblik IM B3 Mass for IM B3 (kg)
Izvedba z enim Dahlander navitjem n _s =1500/3000 min ⁻¹ , 4/2 - polni, stik Y/YY Izvedba s jednim namotom Dahlander n _s =1500/3000 min ⁻¹ , 4/2 - polni, spoj Y/YY Model with a single winding in Dahlander connection n _s =1500/3000 min ⁻¹ , 4/2 - pole, Y/YY connection							
0,1/0,4	2T 71 A4/2	1400/2770	0,27/1,14	3,5/3,4	1,5/1,7	0,00050	5,5
0,14/0,55	2T 71 B4/2	1390/2760	0,35/1,33	3,4/3,6	1,5/1,7	0,00067	6,2
0,15/0,7	3T 80 A4/2	1390/2760	0,37/1,81	4,0/3,7	1,9/1,9	0,0012	8,7
0,25/1,0	3T 80 B4/2	1370/2760	0,6/2,3	3,3/3,9	1,6/1,8	0,0016	10,3
0,35/1,4	T 90 S4/2	1390/2760	0,82/3,71	4,3/3,6	2,0/2,3	0,0030	13,7
0,5/2,0	T 90 L4/2	1390/2760	1,14/4,56	3,9/4,1	1,7/2,1	0,0035	17,3
0,65/2,5	T 100 LA4/2	1400/2800	1,52/5,89	4,1/4,4	1,8/2,3	0,0055	22,6
0,8/3,2	T 100 LB4/2	1400/2800	1,81/6,94	4,1/4,5	1,6/2,1	0,0072	25,5
1,1/4,4	T 112 M4/2	1440/2850	2,2/9,1	4,7/5,6	1,5/2,1	0,012	33,4
1,5/6,0	T 132 S4/2	1420/2820	3,2/11,9	4,6/5,4	1,6/2,5	0,0194	48,3
2,0/8,0	T 132 M4/2	1430/2850	3,9/15,2	5,2/6,3	2,0/3,0	0,0296	58,3
2,5/10,0	T 132 M4/2	1430/2850	4,47/18,05	5,3/6,3	1,7/2,4	0,0296	59,8
Izvedba z enim Dahlander navitjem n _s =750/1500 min ⁻¹ , 8/4 - polni, stik Y/YY Izvedba s jednim namotom Dahlander n _s =750/1500 min ⁻¹ , 8/4 - polni, spoj Y/YY Model with a single winding in Dahlander connection n _s =750/1500 min ⁻¹ , 8/4 - pole, Y/YY connection							
0,05/0,22	2T 71 A8/4	650/1400	0,26/0,67	1,8/3,3	1,3/1,7	0,00050	5,4
0,08/0,32	2T 71 B8/4	650/1410	0,41/1,0	1,7/3,2	1,1/1,8	0,00067	6,2
0,12/0,5	3T 80 A8/4	650/1370	0,48/1,7	2,3/2,7	1,5/1,4	0,0015	8,8
0,18/0,7	3T 80 B8/4	695/1395	1,1/2,2	2,1/3,6	1,6/2,7	0,0022	11
0,3/1,2	T 90 S8/4	700/1400	1,62/2,76	2,2/4,1	1,2/2,1	0,0030	13,6
0,35/1,5	T 90 L8/4	700/1400	1,8/3,5	2,3/3,9	1,2/2,1	0,0035	16,8
0,5/2,0	T 100 LA8/4	700/1420	1,52/4,37	3,2/5,1	1,4/2,1	0,0055	23,1
0,7/2,8	T 100 LB8/4	690/1420	2,28/6,89	3,0/4,2	1,5/1,8	0,0072	25,6
0,9/3,6	T 112 M8/4	720/1450	3,52/9,31	3,2/5,7	1,3/2,6	0,012	32,2
1,1/4,6	T 132 S8/4	710/1450	3,1/10,2	3,5/6,6	1,2/2,4	0,0194	47,1
1,6/6,4	T 132 M8/4	710/1460	4,6/14,3	3,5/7,5	1,4/2,6	0,0262	58,1

Obratovalni podatki trifaznih asinhronskih elektromotorjev za tri hitrosti vrtenja

Pogonski podatki trofaznih asinhronih elektromotora za tri brzine vrtnje

Operating Data of 3-Speed Three-Phase Induction Electric Motors

Normalna napetost: 400V; frekvenca: 50Hz; zaščitna stopnja: IP 54; način hlajenja: IC 411

Normalni napon: 400V; frekvencija: 50Hz; stupanj zaščite: IP 54; način hlajenja: IC 411

Normal voltage: 400V; frequency: 50Hz; protection: IP 54; cooling mode: IC 411

Nazivna moč Nazivna snaga Rated power P (kW)	Tip motorja Tip motora Type	Hitrost vrtenja Brzina vrtnje Rotational speed (min ⁻¹), (rpm)	Nazivni tok Nazivna struja Rated current In (A)	lz / ln	Mz / Mn	Vztrajnostni moment Moment inercije Moment on inertia J (kgm ²)	Masa za obliko IM B3 Masa za oblik IM B3 Mass for IM B3 (kg)
Izvedba z enim navitjem Dahlander in z ločenim navitjem n _s =1000/1500/3000 min ⁻¹ , 6/4/2 - polni, stik Y/Δ/YY Izvedba s jednim namotom Dahlander i sa odvojenim namotom n _s =1000/1500/3000 min ⁻¹ , 6/4/2 - polni, spoj Y/Δ/YY Model with a single winding in Dahlander connection and a separate winding n _s =1000/1500/3000 min ⁻¹ , 6/4/2 - pole, Y/Δ/YY connection							
0,37/0,45/0,55	T 90 S6/4/2	960/1440/2900	1,43/1,52/2,19	3,2/4,1/4,1	1,7/2,3/2,3	0,0030	14
0,55/0,65/0,75	T 90 L6/4/2	950/1440/2920	1,8/2,1/2,6	3,4/4,2/4,7	1,9/1,8/2,0	0,0035	17
0,75/1,1/1,3	T 100 LA6/4/2	960/1460/2905	2,7/3,0/3,9	3,2/4,2/4,5	1,8/1,6/2,0	0,0055	23
1,0/1,4/1,8	T 100 LB6/4/2	940/1450/2900	2,9/3,6/4,6	3,3/4,7/4,9	1,6/1,7/1,9	0,0072	26
1,5/2,2/2,4	T 112 M6/4/2	970/1460/2930	4,2/5,2/6,9	4,6/5,3/6,0	1,9/1,6/2,1	0,012	33
2,5/3,0/4,0	T 132 S6/4/2	960/1460/2890	6,8/6,9/9,5	4,3/6,1/5,7	1,6/1,7/2,1	0,0194	48,3
3,5/4,5/6,0	T 132 M6/4/2	965/1460/2910	8,7/9,3/12,1	5,1/6,5/6,9	1,96/1,9/2,2	0,0296	59,3
Izvedba z enim navitjem Dahlander in z ločenim navitjem n _s =750/1000/1500 min ⁻¹ , 8/6/4 - polni, stik Δ/Y/YY Izvedba s jednim namotom Dahlander i sa odvojenim namotom n _s =750/1000/1500 min ⁻¹ , 8/6/4 - polni, spoj Δ/Y/YY Model with a single winding in Dahlander connection and a separate winding n _s =750/1000/1500 min ⁻¹ , 8/6/4 - pole, Δ/Y/YY connection							
0,18/0,22/0,25	T 90 S8/6/4	710/960/1450	1,2/0,95/0,76	2,2/3,0/4,7	1,7/1,7/2,2	0,0030	14
0,25/0,3/0,73	T 90 L8/6/4	720/960/1450	1,7/1,1/1,0	2,5/3,5/5,5	2,2/2,0/2,3	0,0035	17
0,45/0,55/0,75	T 100 LA8/6/4	715/965/1435	2,7/2,4/1,9	2,6/2,5/5,0	1,9/1,9/2,0	0,0055	23
0,55/0,7/0,9	T 100 LB8/6/4	710/960/1435	3,0/2,7/2,2	2,6/3,1/5,0	1,9/1,9/2,0	0,0072	26
0,9/1,1/1,4	T 112 M8/6/4	720/970/1460	3,6/3,2/2,9	3,0/4,1/5,6	1,6/1,65/1,4	0,012	33
1,6/2,2/2,8	T 132 S8/6/4	730/970/1460	7,3/6,8/6,6	3,3/4,3/5,9	2,0/1,7/1,6	0,0194	48,3
2,0/2,8/3,8	T 132 M8/6/4	725/970/1450	7,9/7,5/8,5	3,95/4,65/6,3	2,1/1,6/1,55	0,0296	59,3

Pomen oznak Značenje oznaka Designation	nazivni tok In = nominalna struja rated current	zagonski tok Iz = zaletna struja starting current	nazivni vrtilni moment Mn = nazivni moment vrtnje rated torque	zagonski vrtilni moment Mz = zaletni moment vrtnje starting torque	max. (omahni) vrtilni moment Mm = max. (pokretni) moment vrtnje max. torque
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Dimenzije trifaznih asinhronskih elektromotorjev

Dimenzije trofaznih asinhronih elektromotora

Dimensions of Three-Phase Induction Electric Motors

Oblika z nogami:

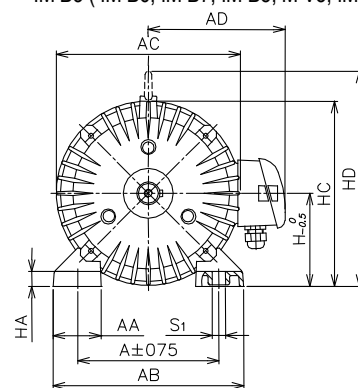
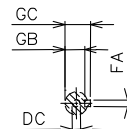
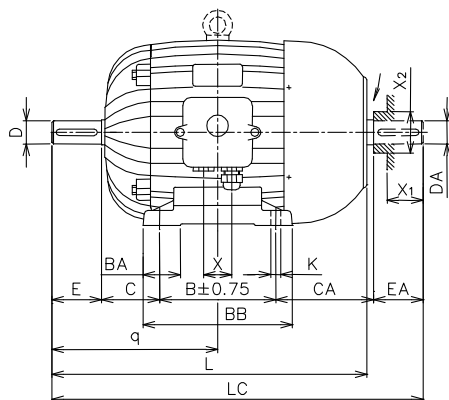
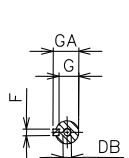
Oblak sa nogama:

Foot-Mounted model:

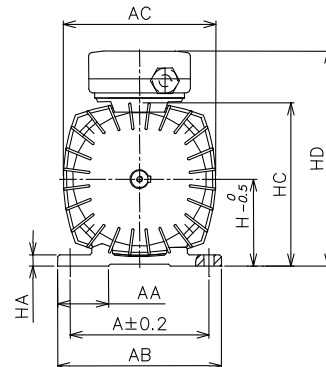
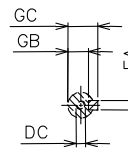
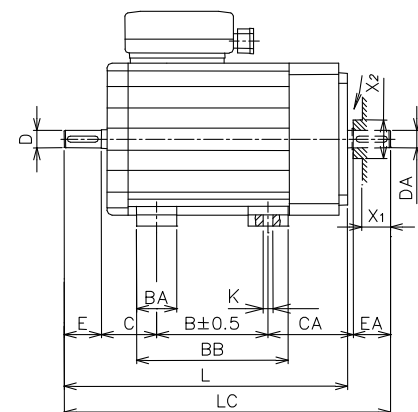
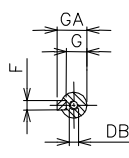
IM B3 (IM B6, IM B7, IM B8, M V5, IM V6)

IM B3 (IM B6, IM B7, IM B8, M V5, IM V6)

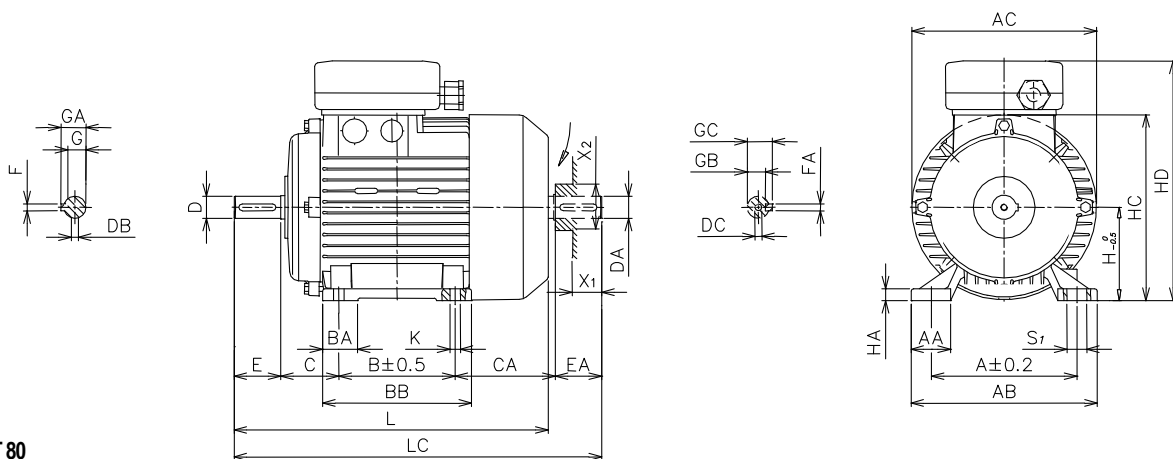
IM B3 (IM B6, IM B7, IM B8, M V5, IM V6)



T 90 ... T 132



2T 56 ... 2T 71



3T 80

Tip elektromotorja Tip elektromotora Type of Electric Motors	A	AA	AB	AC	AD	B	BA	BB	C	CA	D,DA	DB,DC	E,EA	F,FA
	k6													
2T 56 A, B	90	34	106	99	-	71	24	95	36	53	9	M3	20	3
2T 63 A, B	100	38	118	110	-	80	28	108	40	60,5	11	M4	23	4
2T 71 A, B	112	41	132	124	-	90	32	122	45	67	14	M5	30	5
3T 80 2A, 2B, A, B	125	34	160	159	-	100	30	128	50	86	19	M6	40	6
T 90 2S2, S2, 4, 6, 8	140	45	180	177	138	100	40	130	56	101	24	M8	50	8
T 90 2S4, 2S6	140	45	180	177	138	100	40	130	56	126	24	M8	50	8
T 90 2L2, 4, 6; L2, 4, 6, 8	140	45	180	177	138	125	40	155	56	126	24	M8	50	8
T 100 2L, 2LA, 2LB, L, LA, LB	160	48	205	196	154	140	48	172	63	112	28	M10	60	8
T 112 2M, M	190	58	230	222	166	140	45	180	70	118	28	M10	60	8
T 132 2S4, 6; 2SA, 2SB, S, SA, SB	216	62	266	260	207	140	58	188	89	155,5	38	M12	80	10
T 132 2SB2	216	62	266	260	207	140	58	188	89	193,5	38	M12	80	10
T 132 2M, 2MA, 2MB; M, MA, MB	216	62	266	260	207	178	58	226	89	155,5	38	M12	80	10

Tip elektromotorja Tip elektromotora Type of Electric Motors	G,GB	GA,GC	H	HA	HC	HD	K	L	LC	Q	S ₁	X	X ₁ *	X ₂ *
														max.
2T 56 A, B	7,2	10,2	56	7	105	157	6,6	176	200	-	-	-	12	30
2T 63 A, B	8,6	12,5	63	8	118	167	8	198,5	226,5	-	-	-	15	30
2T 71 A, B	11,1	16,1	71	9	133	182	8	227,5	262	-	-	-	15	30
3T 80 2A, 2B, A, B	15,5	21,5	80	10	160	204	9	270	316	-	17	-	25	40
T 90 2S2, S2, 4, 6, 8	19,9	26,9	90	13	178,5	-	9	303	357	156	12	34	25	40
T 90 2S4, 2S6	19,9	26,9	90	13	178,5	-	9	328	382	168,5	12	34	25	40
T 90 2L2, 4, 6; L2, 4, 6	19,9	26,9	90	13	178,5	-	9	328	382	168,5	12	34	25	40
T 100 2L, 2LA, 2LB, L, LA, LB	23,9	30,9	100	15	198	-	12	372	435	193	14	34	40	50
T 112 2M, M	23,9	30,9	112	18	223	258	12	380	448	200	16	34	40	50
T 132 2S4, 6; 2SA, 2SB, S, SA, SB	33,3	41,3	132	22	262	307	12	454,5	544,5	239	16	38	55	60
T 132 2SB2	33,3	41,3	132	22	262	307	12	492,5	582,5	258	16	38	55	60
T 132 2M, 2MA, 2MB; M, MA, MB	33,3	41,3	132	22	262	307	12	492,5	582,5	258	16	38	55	60

Premer konca gredi ima toleranco k6 po ISO.
 Moznik in utor sta izdelana po DIN 6885 T1.
 * Prostor za vstop zraka.

Promjer kraja osovine ima toleranco k6 po ISO.
 Utorni klin i utor so izrađeni po DIN 6885 T1.
 * Prostor za ulaz zraka.

The shaft end diameter has the tolerance K6 acc. to ISO. The
 dowel pin and groove are designed acc. to DIN 6885 T1.
 * Air inlet space.

Dimenzije trifaznih asinhronskih elektromotorjev

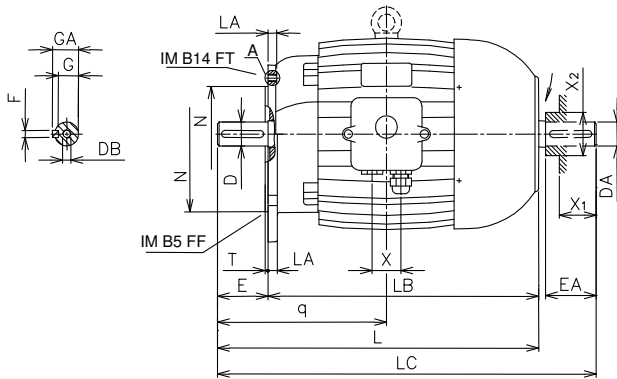
Prigradna oblika: IM B14 (IM V18, IM V19)
 Prirobna oblika: IM B5 (IM V1, IM V3)

Dimenzije trofaznih asinhronih elektromotora

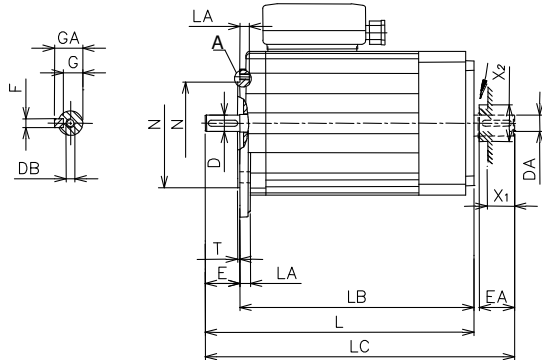
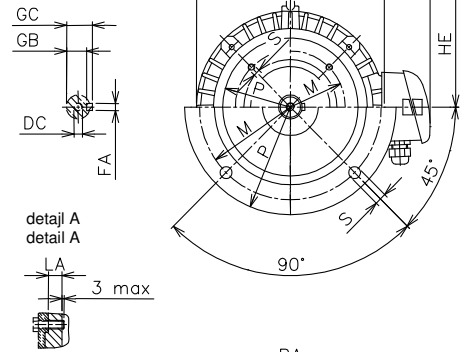
Prigradni oblik: IM B14 (IM V18, IM V19)
 Prirobni oblik: IM B5 (IM V1, IM V3)

Dimensions of Three-Phase Induction Electric Motors

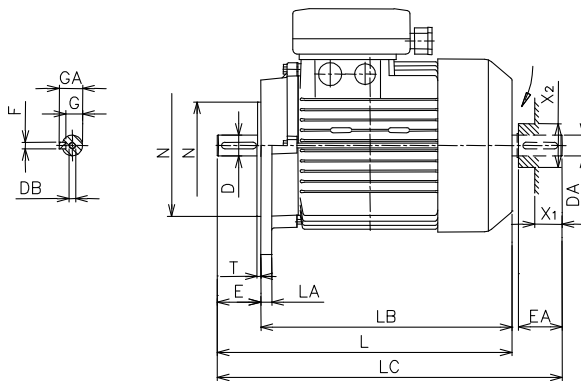
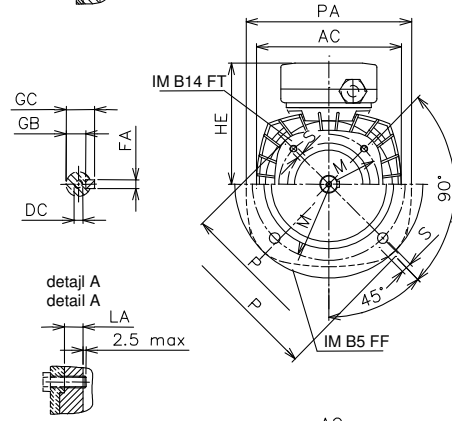
Built-in model: IM B14 (IM V18, IM V19)
 Foot-mounted flange model: IM B5 (IM V1, IM V3)



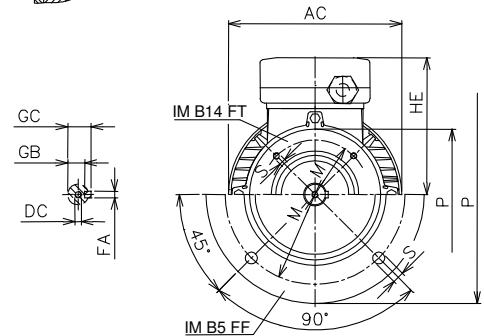
T 90 ... T 132



2T 56 ... 2T 71



3T 80



TIP TYPE	Vel. prir. Flange s.	B14, B5 B34, B35		A	AA	AB	AC	AD	B	BA	BB	C	CA	D, DA k6	DB, DC	E, EA	F, FA	G, GB	GA, GC
2T 56 A, B	FT 65	Oblika IM - Shape IM	90	34	106	99	-	71	24	95	36	53	9	M3	20	3	7,2	10,2	
	FF 100																		
	FT 75																		
2T 63 A, B	FT 100		100	38	118	110	-	80	28	108	40	60,5	11	M4	23	4	8,6	12,5	
	FF 115																		
	FT 85																		
2T 71 A, B	FT 115		112	41	132	124	-	90	32	122	45	67	14	M5	30	5	11,1	16,1	
	FF 130																		
	FT 100																		
3T 80 2A, 2B, A, B	FT 130		125	34	160	159	-	100	30	128	50	86	19	M6	40	6	15,5	21,5	
	FF 165																		
	FT 115																		
T 90 2S2, S2, 4, 6, 8	FT 130		140	45	180	177	138	100	40	130	56	101	24	M8	50	8	19,9	26,9	
	FF 165																		
	FT 115																		
T 90 2S4, 2S6	FT 130	140	45	180	177	138	100	40	130	56	126	24	M8	50	8	19,9	26,9		
	FF 165																		
	FT 115																		
T 90 2L2, 4, 6 L2, 4, 6, 8	FT 130	140	45	180	177	138	125	40	155	56	101	24	M8	50	8	19,9	26,9		
	FF 165																		
	FT 130																		
T 100 2L, 2LA, 2LB, L, LA, LB	FT 165	160	48	205	196	151	140	48	172	63	112	28	M10	60	8	23,9	30,9		
	FF 215																		
	FT 130																		
T 112 2M, M	FF 215	190	58	230	222	166	140	45	180	70	118	28	M10	60	8	23,9	30,9		
	FF 215																		
	FT 215																		
T 132 2S4, 6, 2SA 2SB, S, SA, SB	FF 265	216	62	266	260	207	140	58	188	89	156	38	M12	80	10	33,3	41,3		
	FF 265																		
	FT 215																		
T 132 2SB2	FF 265	216	62	266	260	207	140	58	188	89	194	38	M12	80	10	33,3	41,3		
	FF 265																		
	FT 215																		
T 132 2M, 2MA 2MB, M, MA, MB	FF 265	216	62	266	260	207	178	58	226	89	156	38	M12	80	10	33,3	41,3		
	FF 265																		
	FT 215																		

Dimenzije trifaznih asinhronskih elektromotorjev

Prigradna oblika z nogami: IM B34
 Prirobna oblika z nogami: IM B35

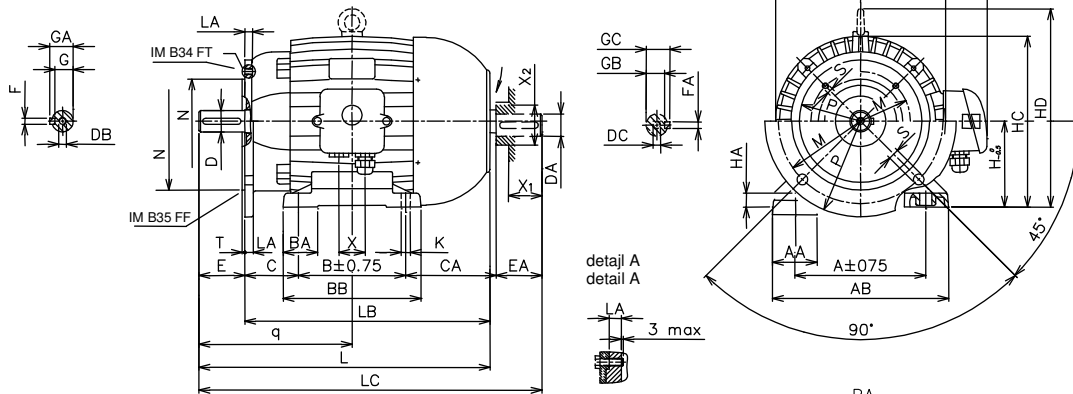
Dimenzije trofaznih asinhronih elektromotora

Prigradni oblik sa nogama: IM B34
 Prirobna oblik sa nogama: IM B35

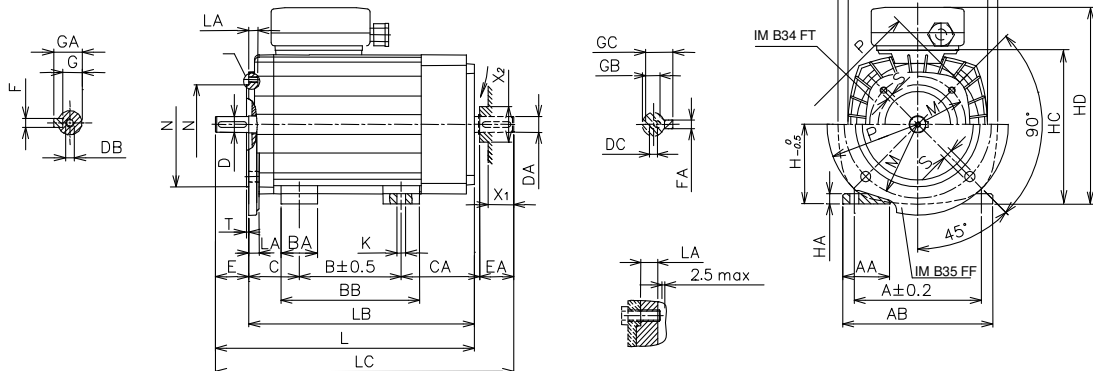
Dimensions of Three-Phase Induction Electric Motors

Foot-mounted built-in model: IM B34
 Foot-mounted flange model: IM B35

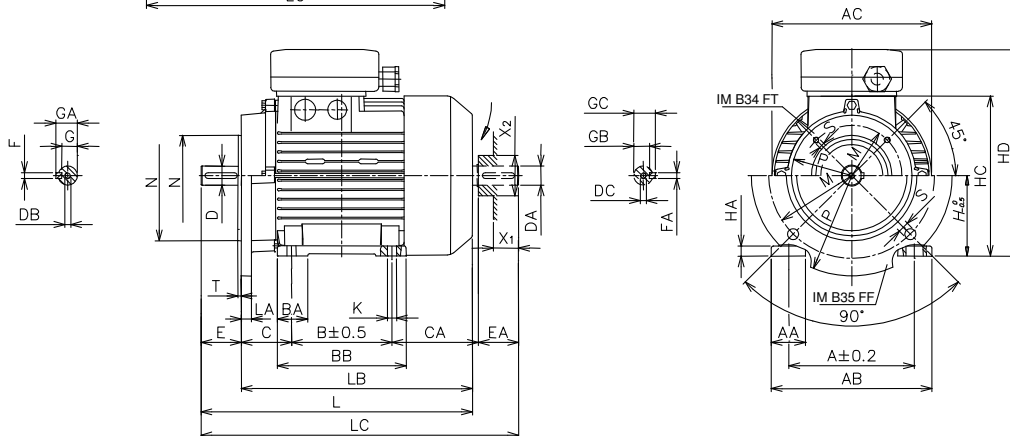
T 90 ... T 132



2T 56 ... 2T 71



3T 80



H	HA	HC	HD	HE	K	L	LA	LB	LC	M	N	P	PA	S	T	q	X	X1*	X2*
-0.5										+0.2	i6							max.	max.
56	7	105	157	101	6,6	176	8	156	200	65	50	80	-	M5	2,5	-	-	12	30
										85	70	105		M6	2,5				
										100	80	120	109	7	3				
63	8	118	167	104	8	199	8	176	227	75	60	90	-	M5	2,5	-	-	15	30
										100	80	120		M6	3				
										115	95	140	123	9	3				
71	9	133	182	111	8	228	10	198	262	85	70	105	-	M6	2,5	-	-	15	30
										115	95	140		M8	3				
										130	110	160	140	9	3,5				
80	10	160	204	124	9	270	12	230	316	100	80	120	-	M6	3	-	-	25	40
										130	110	160		M8	3,5				
										165	130	200		11					
90	13	179	-	-	9	303	10	253	357	115	95	140	-		3	156	34	25	40
										130	110	160		M8	3,5				
										165	130	200		11,5					
90	13	179	-	-	9	328	10	278	382	115	95	140	-	M8	3	169	34	25	40
										130	110	160			3,5				
										165	130	200		11,5					
90	13	179	-	-	9	328	10	278	382	115	95	140	-	M8	3	193	34	25	40
										130	110	160			3,5				
										165	130	200		11,5					
100	15	198	-	-	12	372	10	312	435	130	110	160	-	M8	3,5	193	34	40	50
										165	130	200		M10					
										215	180	250		14	4				
112	18	223	258	146	12	380	10	320	448	130	110	160	-	M8	3,5	200	34	40	50
										165	130	200		M10					
										215	180	250		14	4				
132	22	262	307	175	12	455	16	375	545	215	180	250	-	M12	4	239	38	55	60
										265	230	300							
132	22	262	307	175	12	494	16	413	583	215	180	250	-	M12	4	258	38	55	60
										265	230	300							
132	22	262	307	175	12	494	16	413	583	215	180	250	-	M12	4	258	38	55	60
										265	230	300							

* Prostor za vstop zraka.

* Prostor za ulaz zraka.

* Air inlet space.

ENOFAZNI ASINHRONSKI ELEKTROMOTORJI ZAPRTE IZVEDBE S KRATKOSTIČO KLETKO

Splošno

Katalog vsebuje podatke enofaznih elektromotorjev s kratkostično kletko za območje moči od 0,045kW do 2,2kW. Vgradne mere so v skladu s priporočili IEC publikacija 60072. Elektromotorji ustrezajo predpisom DIN VDE 0530 T1.

Mehanska izvedba

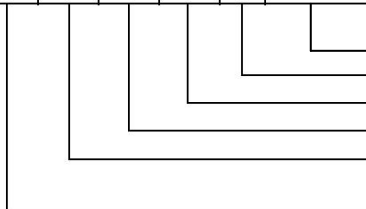
Enofazni elektromotorji so po konstrukcijski izvedbi podobni trifaznim elektromotorjem IEC. Normalna oblika je IM B3, zaščitna stopnja pa je IP 54. Kondenzatorji so pritrjeni na zgornji strani ohišja statorja s posebnimi objemkami in spojeni s priključno sponko v omarici. Avtomatska termična zaščitna stikala in termična tipala so vgrajena v navitja elektromotorjev. Elektromotorji (3)ESK in (3)EKSK imajo vgrajeno centrifugalno stikalo v ležajnem ščitu na strani N.

Na enofaznih elektromotorjih je prigraden en ali več kondenzatorjev. V enofaznih elektromotorjih so vgrajeni enaki ležaji, kot v trifaznih elektromotorjih enakih velikosti, razen v elektromotorjih z zagonskim kondenzatorjem (EKSK 100 in EKSK 112), kjer so na N strani vgrajeni ležaji 6205 2Z.

Tipška označba

Iz tipške označbe elektromotorja so razvidne električna izvedba, velikost, število polov in oblika elektromotorja. Oznaka velikosti po IEC pove že tudi višino končine gredi elektromotorja.

2EK,3EK 2ESK,3ESK	A	90	L	4	IM B 3
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JEDNOFAZNI ASINHRONSKI KAVEZNI ELEKTROMOTORI ZATVORENE IZVEDBE

Općenito

Katalog sadrži podatke jednofaznih kaveznih elektromotora za područje snage od 0,045kW do 2,2kW. Ugradne mjere odgovaraju preporukama IEC publikacija 60072. Elektromotori su građeni prema propisima DIN VDE 0530 T1.

Mehanička izvedba

Jednofazni elektromotori su po konstrukcijskoj izvedbi slični trofaznim IEC elektromotorima. Normalni oblik je IM B3, a stupanj zaštite je IP 54. Kondenzatori su pričvršćeni na gornju stranu kućišta statora posebnim objemkama i spojeni su na priključnu stezaljku u priključnoj kutiji. Avtomatske termičke zaštitne sklopke i termistori su ugrađeni u namot elektromotora. Elektromotori (3)ESK i (3)EKSK imaju na strani N u ležajnom štitu ugrađenu centrifugalnu sklopku.

Na jednofaznim elektromotorima je prigraden jedan ili više kondenzatora. U jednofaznim elektromotorima su ugrađeni isti ležaji kao kod trofaznih elektromotora jednakih veličina, osim kod elektromotora sa zagonskim kondenzatorom (EKSK 100 i EKSK 112), gdje su na strani N ugrađeni ležaji 6205 2Z.

Oznaka tipa

Iz oznake tipa elektromotora vidna je električna izvedba, veličina, broj polova, i oblik elektromotora. Oznaka veličine po IEC nam pokazuje i visinu kraja osovine elektromotora.

SINGLE-PHASE SQUIRREL-CAGE INDUCTION ELECTRIC MOTORS OF CLOSED DESIGN

General

The Catalogue includes the data on single-phase squirrel-cage type electric motors for power range within 0,045kW up to 2,2kW. Installation dimensions are in compliance with the IEC Recommendations, Publ 60072. The electric motors comply with DIN VDE 0530 T1 Regulations.

Mechanical Design

The construction of single phase electric motors is similar to the construction of three-phase IEC electric motors. The standard shape is IM B3, and the degree of protection IP 54. Capacitors are fitted to the upper side of the stator housing by means of special clamps, and connected with a terminal in the terminal box. Automatic thermal cut-out switch, provided with manual or automatic reclose is built into the terminal box. Automatic thermal cut-out switches and thermal sensors are fitted in electric motor windings. With (3)ESK and (3)EKSK electric motors a centrifugal switch is mounted into the end shield on the side N.

One or more capacitors are built into the single-phase electric motors. The latter are fitted with the bearings identical to those in the three-phase electric motors of the same size, except for electric motors with starting capacitors (EKSK 100 and EKSK 112), where the 6205 2Z bearings are built in on the side N.

Type Designation

Type designation of an electric motor shows electrical design, size, number of poles and shape of the electric motor. The designation of size, according to IEC, also gives the height of the electric motor shaft end.

Oblika po IEC / Oblik po IEC / Shape according to IEC
Število polov / Broj pola / Number of poles
Stator / Stator / Stator

Velikost po IEC / Veličina po IEC / Size according to IEC
Dopolnilne oznake izvedbe / Dopunske oznake izvedbe / Additional designation of model

Osnovna izvedba / Osnovna izvedba / Basic model

Opis tipške oznake elektromotorja

Osnovna izvedba:

- E- enofazni asinhronski elektromotor, 2E pomeni drugo generacijo, 3E tretjo generacijo enofaznih elektromotorjev
- K- elektromotor s pogonskim kondenzatorjem
- SK- elektromotor s centrifugalnim stikalom in zagonskim kondenzatorjem
- KSK- elektromotor s centrifugalnim stikalom, zagonskim in pogonskim kondenzatorjem

Dopolnilne oznake izvedbe:

- A - avtomatska termična zaščita (bimetal)
- B - elektromotor z varnostno zavoro
- C - povišana moč
- E - elektronska termična zaščita (termistor)
- G - elektromotor za gorilec
- M - povišan vrtilni moment
- N - neventiliran elektromotor
- O - elektromotor odprte izvedbe
- V - vgradni elektromotor

Opis oznake tipa elektromotora

Osnovna izvedba:

- E- jednofazni asinhronski motor, 2E znači drugo generacijo, 3E znači tretjo generacijo elektromotora
- K- elektromotor s pogonskim kondenzatorom
- SK- elektromotor s centrifugalnom sklopkom i zaletnim kondenzatorom
- KSK- elektromotor s centrifugalnom sklopkom te zaletnim i pogonskim kondenzatorom

Dopunske oznake izvedbe:

- A - automatska termička zaštita (bimetal)
- B - elektromotor sa sigurnosnom kočnicom
- C - povećana snaga
- E - elektronska termička zaštita (termistor)
- G - elektromotor za gorionik
- M - povećani moment vrtnje
- N - neventilirani elektromotor
- O - elektromotor otvorene izvedbe
- V - ugradni elektromotor

Explanation to Type Designation

Basic design:

- E- single-phase induction electric motor (2E = second, 3E = third generation of single-phase electric motors)
- K- electric motor with running capacitor
- SK- electric motor with centrifugal switch and starting capacitor
- KSK- electric motor with centrifugal switch, starting and running capacitors

Additional model designations:

- A - automatic thermal protection (bimetal)
- B - electric motor with security brake
- C - increased power
- E - electronic thermal protection (Thermistor)
- G - electric motor designed for burner
- M - increased torque
- N - non ventilated electric motor
- O - open-design electric motor
- V - built-in electric motor

Oznaka veličnosti po IEC pove višino gredi elektromotorja. Črke S, M in L označujuje dolžino ohišja, črki A in B označujeta dolžino statorskih paketov v enakem ohišju. V oznaki za obliko elektromotorja po IEC je potrebno navesti eno izmed oblik, ki so prikazane na strani 4 (ali ostale po IEC 60034-7).

Prigradnja stikal

Tudi na enofazne tipe elektromotorjev od velikosti 56 do 112 se lahko prigradi omarica z vgrajenim stikalom vklop-izklop. Omarica je iste izvedbe kot v merski skici na strani 8.

Električna izvedba

Nazivna moč

Moči, navedene v tabelah so nazivne moči, ki jih elektromotorji oddajajo na gredeh pri trajni obremenitvi, pri nazivni napetosti in frekvenci, pri okoliški temperaturi, ki ni višja od 40°C in pri nadmorski višini do 1000m.

Sprememba moči

Moč elektromotorja se lahko zmanjša ali zveča, če se spremenijo sledeči obratovalni pogoji:

1. če se spremeni omrežna napetost ali frekvenca za več kot $\pm 6\%$
2. če se spremenijo hladilni pogoji
3. če obratujejo elektromotorji pri posebnem pogonu
4. če morajo elektromotorji ustrezati še drugim predpisom razen IEC 60034 oziroma DIN VDE 0530 T1.

Napetost in frekvenca

Standardni elektromotorji so elektromotorji grajeni za priključek na omrežje 230V, 50Hz. Po posebni zahtevi lahko izdelamo elektromotorje tudi za druge napetosti in frekvence.

Izvedbe

Glede na izvedbo pomožne faze delimo enofazne elektromotorje na:

- a.) enofazne elektromotorje s trajno priključenim, to je pogonskim kondenzatorjem
- b.) enofazne elektromotorje z zagonskim kondenzatorjem
- c.) enofazne elektromotorje z zagonskim in pogonskim kondenzatorjem.

a) Elektromotorji s pogonskim kondenzatorjem

Tipaska oznaka za te elektromotorje je (2)(3)EK (na primer: EK 90 L4). Kondenzatorji teh elektromotorjev so med obratovanjem trajno priključeni. Izdelani so iz metalizirane polipropilenske folije. Zaradi relativno majhnih zagonskih momentov (glej tabelo) in velikih sposobnosti prenašanja kratkotrajnih preobremenitev, so ti elektromotorji zelo primerni za obratovanje strojev in naprav, kot so ventilatorji, cirkularke, brusilni in polirni stroji, razni mešalniki, rotodinamične črpalke, razni mlinci in stiskalnice, ki nimajo prigradenih velikih vztrajnostnih mas in ki se zaganjajo neobremenjeni ipd. Pri teh elektromotorjih je še značilno, da so tokovi v praznem teku večkrat enako veliki kot pri obremenitvi. Zato se ti elektromotorji v praznem teku enako segrevajo kot pri obremenitvi.

b) Elektromotorji z zagonskim kondenzatorjem in centrifugalnim stikalom

Ti elektromotorji imajo tipasko oznako (2)(3) ESK (na primer: ESK 90 L2). Kondenzatorji teh elektromotorjev so priključeni le kratek čas ob zagonu. Ko je število vrtljajev dovolj veliko, izklopi centrifugalno stikalo zagonski kondenzator in pomožno fazo.

Oznaka veličine po IEC nam pokazuje visinu osovine elektromotora. Slova S, M i L označuju duljinu kućišta, a slova A i B označuju duljinu statorskih paketa u istom kućištu. U oznaci za oblik elektromotora po IEC je treba navesti jedan od oblika, prikazanih na stranici 4 (ili ostale po IEC 60034-7).

Prigradnja sklopke

Kutiju s ugrađenom sklopkom uklop-isklop moguće je prigraditi također na jednofazne elektromotore, veličine 56 do 112. Kutija je iste izvedbe kao na mjernoj skici na stranici 8.

Električna izvedba

Nazivna snaga

Snage, navedene u tabelama, su nazivne snage koje elektromotori prenose na osovine kod trajnog opterećenja, kod nazivnog napona i frekvencije, pri temperaturi okoline koja nije viša od 40°C, na nadmorskoj višini do 1000m.

Promjena snage

Snaga elektromotora može se povećati ili smanjiti ako se promijene slijedeći pogonski uvjeti:

1. ako se promijeni napon mreže ili frekvencija za više od $\pm 6\%$
2. ako se promijene uvjeti hlađenja
3. ako elektromotori rade u posebnom pogonu
4. ukoliko moraju elektromotori odgovarati još i drugim propisima, osim IEC 60034 odnosno DIN VDE 0530 T1.

Napon i frekvencija

Standardni elektromotori su elektromotori građeni za priključak na mrežu od 230V, 50Hz. Na poseban zahtjev možemo izraditi elektromotore i za ostale napone i frekvencije.

Izvedbe

S obzirom na izvedbu pomožne faze dijelimo jednofazne elektromotore na:

- a.) jednofazne elektromotore s trajno priključenim tj. pogonskim kondenzatorom
- b.) jednofazne elektromotore sa zaletnim kondenzatorom
- c.) jednofazne elektromotore sa zaletnim i pogonskim kondenzatorom.

a) Elektromotori s pogonskim kondenzatorom

Tipaska oznaka za ove elektromotore je (2)(3)EK (na primjer: EK 90 L4). Kondenzatori tih elektromotora su za vrijeme rada trajno priključeni. Izrađeni su iz metalizirane polipropilenske folije. Zbog relativno malih zaletnih momenata vrtnje (vidi tabelu) i velikih sposobnosti podnošenja kratkotrajnih opterećenja ovi su elektromotori vrlo pogodni za pogon strojeva i naprava, kao što su ventilatori, cirkularke, brusni i polirni strojevi, razne mješalice, rotodinamičke pumpe, razni mlinci i prese koji nemaju ugrađene velike mase inercije i čiji zalet je bez tereta. Za ove elektromotore je karakteristično da je struja često u praznom hodu ista kao kod opterećenja. Zbog toga se ovi elektromotori u praznom hodu jednako zagrijavaju kao kod opterećenja.

b) Elektromotori sa zaletnim kondenzatorom i centrifugalnom sklopkom

Ovi elektromotori imaju oznaku tipa (2)(3) ESK (na primjer: ESK 90 L2). Kondenzatori tih elektromotora su priključeni samo na kratko vrijeme zaleta. Kada je brzina vrtnje dovoljno velika, centrifugalna sklopka isklopi zaletni kondenzator i pomoćnu fazu.

The letters S, M, L stand for housing length whereas the letters A and B add the length of stator packages of an equal housing. The designation for electric motor shape according to IEC must be completed with one of the shapes, indicated on Page 4 (or others according to IEC 60034-7).

Mounting of Switches

Single-phase electric motors of the size 56 to 112 may be fitted with a terminal box with built-in on/off switch. The terminal box is of the same design as the one on Table of dimensions, Page 8.

Electric Design

Rated Power

The values for power output, given in Tables, are rated outputs generated by electric motors on shafts at permanent load, at rated voltage and frequency, ambient temperature not exceeding 40°C, and on the above-sea level of up to 1000m.

Change in Power

The power of electric motors may increase or decrease with regard to change in operating conditions:

1. if the mains voltage of frequency change by more than $\pm 6\%$
2. if cooling conditions are altered
3. if electric motors run at non-standard drive
4. if electric motors must comply not only with IEC34 or DIN VDE 0530 T1 but also with other regulations.

Voltage and Frequency

Standard single-phase electric motors are built for the connection to 230V, 50 Hz, mains voltage. Upon special request electric motors for other voltages and frequencies may be constructed.

Design

Considering the design of an auxiliary winding, single-phase electric motors are divided into:

- a.) Single-phase electric motors with permanently connected, i.e. running capacitor
- b.) Single-phase electric motors with a starting capacitor
- c.) Single-phase electric motors with a starting and running capacitor.

a) Electric Motors with Running Capacitor

The type designation for these motors is (2)(3) EK (e. g.: EK 90 L4). The capacitors of such electric motors are constantly connected during the operation. They are made of metal-covered polypropylene foil. Due to relative low starting torques (see Table) and relatively great abilities in standing short-term loads, these electric motors are extremely suitable for driving machines and devices, such as fans, circular saws, grinding and polishing machines, various mixers, rotodynamic pumps, mills and presses that have no built-in heavy masses, of inertia or start with lower load. Typical of these electric motors is that the currents in no-load running are very often as high as when loaded. As a consequence, when without load such motors heat up to the same extent as when fully loaded.

b) Electric Motors with Starting Capacitor and Centrifugal Switch

The type designation of these electric motors is (2)(3) ESK (e. g.: ESK 90 L2). The capacitors of such electric motors are connected for a short period of time only at the start. When rotational speed is high enough, the centrifugal switch disconnects the starting capacitor and auxiliary winding.

Kapacitivnosti kondenzatorjev so velike, zato uporabljamo elektrolitne kondenzatorje. Zagonski vrtilni momenti so relativno veliki in znašajo do 250% nazivnega momenta. Elektromotorji so primerni za najtežje zagone in obratovanja, kot so: obratovanje kompresorjev ter drugih težjih kmetijskih strojev, raznih stiskalnic, mlinov in podobno. Ti elektromotorji imajo pri zagonu precej velike tokove in zato povzročajo na šibkih omrežjih velike padce napetosti. Da bi omogočili zagon tudi v takih pogojih, so ti elektromotorji grajeni tako, da zaganjajo še pri napetosti 195 V pri polni obremenitvi. Večina teh elektromotorjev ima tudi precejšnje termične rezerve, tako da jim tudi daljše obremenitve ali obratovanje pri nekoliko nižani napetosti (približno 200V) ne škodujejo.

c) Elektromotorji s pogonskim in zagonskim kondenzatorjem ter s centrifugalnim stikalom

Tipška oznaka je EKSK (na primer EKSK 112 M4), oziroma, EKSKA ali EKSKA, če imajo vgrajeno zaščito. Ti elektromotorji združujejo v sebi značilne lastnosti elektromotorjev pod a in b.

Termična zaščita

Tudi enofazne elektromotorje si lahko ščitijo uporabniki sami z zaščitnimi stikali (glej str. 10). Na željo naročnikov pa vgrajujemo v elektromotorje:

1. Avtomatsko termično zaščito (bimetal v navitju elektromotorja) - oznaka A
2. Elektronsko termično zaščito (termistor v navitju elektromotorja) - oznaka E

Elektronska termična zaščita predstavlja popolno zaščito elektromotorja, ker reagira v naslednjih primerih:

1. Kratki stik (elektromotor zavrt)
2. Pretežki zagon (elektromotor je obremenjen s prevelikim bremenom)
3. Preobremenitev (elektromotor je obremenjen s prevelikim bremenom)
4. Prenizka ali previsoka napetost mreže oziroma frekvenca
5. Nezadostna ventilacija (onemogočen pretok ali previsoka temperatura hladilnega zraka in drugo)

Avtomatska termična zaščita z bimetalnim stikalom v navitju elektromotorja v primeru kratkega stika in pretežkega zagona ni najbolj učinkovita zaradi prepočasnega reagiranja. Avtomatska termična zaščitna stikala so za manjše moči elektromotorjev lahko vezana v tokokrog navitij, za večje moči je potrebno dodatno prigraditi kontaktorje.

Termično zaščitno stikalo z avtomatskim ponovnim vklopom pa samo ponovno vključi elektromotor po njegovi ohladitvi. Ta stikala se lahko uporabljajo samo tam, kjer to dovoljujejo varnostni predpisi. Njihova uporaba ni dovoljena pri elektromotorjih, ki poganjajo stroje in naprave, pri katerih lahko trenutni in nepričakovani ponovni zagon elektromotorja povzroči telesno poškodbo uporabnika (npr. pri krožnih žagah, mizarskih strojih, brusnih strojih, itd).

Avtomatska termična zaščita (bimetal v navitju elektromotorja) avtomatsko ponovno vključi elektromotor (do velikosti 80 bimetal direktno vključi in izključi elektromotor, pri večjih tipih pa so potrebne dodatne vklopne naprave-kontaktorji). Pri elektronski termični zaščiti se izklopna elektronika lahko priredi za avtomatski ali ročni ponovni vklop.

Termična zaščitna stikala določamo v skladu z IEC 60034-11. Avtomatska termična zaščitna stikala so za manjše moči elektromotorjev lahko direktno vezana v tokokrog navitij, za večje moči pa je potrebno dodatno prigraditi kontaktorje.

Kapacitivnosti kondenzatorja su velike pa zato uporabljamo elektrolitične kondenzatore. Zaletni momenti vrtnje su relativno veliki i iznose do 250% nazivnog momenta vrtnje. Ovi elektromotori su pogodni za najteže zalet i pogone kao npr. pogon kompresora i težih poljoprivrednih strojeva, raznih preša, mlinova i slično. Ovi elektromotori imaju pri zaletu prilično velike zaletne struje i zato prouzrokuju na slabim mrežama velike padove napona. Kako bi omogućili zalet i u ovakvim uvjetima, građeni su tako da je moguć zalet i kod 195 V pri punom opterećenju. Većina ovih elektromotora ima prilične termičke rezerve tako da im ne štete duža opterećenja ili pogon kod smanjenog napona (približno 200V).

c) Elektromotori s pogonskim i zaletnim kondenzatorom i centrifugalnom sklopkom

Tipška oznaka EKSK (na primjer EKSK 112 M4), odnosno EKSKA ili EKSKA ako imaju ugrađenu termičku zaštitu. Ovi elektromotori ujedinjavaju u sebi osobine elektromotora pod a i b.

Termička zaštita

Korisnici mogu sami zaštititi također jednofazne elektromotore pomoću zaštitnih sklopki (vidi stranicu 10). Na želju kupaca ugrađujemo u elektromotore:

1. Automatsku termičku zaštitu (bimetal u namotu elektromotora) - oznaka A
2. Elektronsku termičku zaštitu (termistor u namotu elektromotora) - oznaka E

Elektronska termička zaštita predstavljaju potpunu zaštitu elektromotora jer reaguju u slijedećim uvjetima:

1. Kratki spoj (blokiran elektromotor)
2. Preteški zalet (elektromotor je opterećen s prevelikim teretom)
3. Preopterećenje (elektromotor je opterećen s prevelikim teretom)
4. Preniski ili previsoki napon mreže ili frekvencije
5. Nedovoljna ventilacija (onemogućen dotok ili previsoka temperatura rashladnog zraka i drugo)

Avtomatska termička zaštita s bimetalnom sklopkom u namotu elektromotora u slučaju kratkog spoja ili preteškog zaleta nije dovoljno efikasna zbog presporog reagovanja bimetala. Avtomatske termičke sklopke su za manje snage elektromotora direktno vezane u strujni krug namota, dok je za veće snage potrebna dodatna prigradnja kontaktora.

Termička zaštitna sklopka s avtomatskim ponovnim uklopanjem sama ponovo uklopi elektromotor, čim se dovoljno ohladi. Ove sklopke se smiju upotrebljavati samo tamo, gdje to dozvoljavaju sigurnosni propisi.

Njihova primjena nije dozvoljena za elektromotore koji služe za pogon strojeva i naprava kod kojih trenutno i neočekivano uklopanje može prouzrokovati tjelesnu povredu korisnika (npr.: kod pile cirkularke, kod stolarskih i brusnih strojeva, vršalica itd.).

Avtomatska termička zaštita (bimetal u namotu elektromotora) avtomatsko ponovno uklopi elektromotor (do veličine 80 bimetal direktno uklopi i isklopi elektromotor, dok su za veće tipove potrebne dodatne uklopne naprave - kontaktorji). Kod elektronske termičke zaštite se isklopna elektronika može prirediti za avtomatsko ili ručno ponovno uklopanje.

Termičke zaštitne sklopke određujemo u skladu s publ. IEC 60034-11. Avtomatske termičke sklopke su za manje snage elektromotora direktno vezane u strujni krug namota dok je za veće snage potrebna dodatna prigradnja kontaktora.

Due to high capacitances, electrolytic capacitors are used. Also the starting torques are relatively high and account for 250% of the rated torque. Electric motors are suitable for the starts and operations in toughest conditions: driving of compressors, harvesting machines and other heavy agricultural machines, various presses, mills, etc. Relatively high starting currents result in high drops of voltage in weak mains. In order to ensure starting also in such conditions, the electric motors are designed so as to still allow starting at 195 V when fully loaded. The majority of such electric motors have considerable thermal reserves to prevent damages even during prolonged loads or operations at slightly reduced voltage (approximately 200V).

c) Electric Motors with Running and Starting Capacitors and Centrifugal Switch

The type designation is EKSK (e.g.: EKSK 112 M4), and/or, EKSKA or EKSKA, if they are provided with protection. These electric motors join all the characteristics of the above electric motors under a and b.

Thermal Protection

Single-phase electric motors may be protected by users them-selves by means of motor protection (see Page 10).

Upon special customer's requests, electric motors may be fitted with:

1. Automatic thermal protection (bimetal in motor winding) – designated with A
2. Electronic thermal protection (thermistor in motor winding) - designated with E

Electronic thermal protection represent complete protection of electric motors, since it reacts in the following events:

1. Short-circuits (electric motor is braked)
2. To difficult start (electric motor is overloaded)
3. Overload (electric motor is overloaded)
4. Mains voltage/frequency is to low/high
5. Insufficient ventilation (hindered air flow or to high cooling air temperature etc.)

Automatic thermal protection with bimetal switch in motor winding is in cases of short circuit and to heavy starting not efficient enough due to slow reaction of the bimetal.

Automatic thermal protection switches can be for lower power electric motors direct connected into winding.

Thermal protection switch restarts the electric motor after cooling down. These switches may be used only where their application is allowed by safety regulations. They are not to be applied with electric motors driving machines and devices where sudden and unexpected electric motor restart may result a body injure to a user (e.g.: with a circular saw, woodworking machines, grinding machines, harvesters, etc.).

Automatic thermal protection (bimetal in motor winding) always restarts the electric motor up to the electric motor size 80 directly, whereas additional cut-in devices - contactors are required with larger types. As far as electronic thermal protection is concerned, the cut-out electronics may be adapted to automatic or manual reclose.

Thermal cut-out switches are specified in accordance with IEC 60034-11 Regulation. Automatic thermal protection (bimetal) for low power electric motors can be connected directly to the current circuit. For electric motor with bigger rated power is required additional contactors.

Obratovnalni podatki enofaznih asinhronskih elektromotorjev

Standardna napetost: 230V, frekvenca: 50Hz.

Elektromotorji s pogonskim kondenzatorjem

Pogonski podatki jednofaznih asinhronskih elektromotora

Napon: 230V, frekvenca: 50Hz.

Elektromotorji s pogonskim kondenzatorom

Operating Data of Single-phase Induction Electric Motors

Normal voltage: 230V, frequency: 50Hz.

Electric motors with running capacitor



3EK 80 IM B3



2EK 71 IM B3



EK 90 IM B3

Tip motorja Tip motora Type	Nazivna moč Nazivna snaga Power kW	Obratovnalne vrednosti pri nazivni moči Pogonske vrednosti kod nazivne snage Operating values rated power				Iz / In	Mz / Mn	Mm/Mn	Masa za obliko IM B3 Masa za oblik IM B3 Mass for IM B3 kg	Kondenzator Capacitor	
		Hitrost vrtenja Brzina vrtnje Rotational speed min-1, rpm	Nazivni tok pri Nazivna struja kod Rated current at 230V A	Izkoristek Korisnost Efficiency η %	Faktor moči Faktor snage Power factor cos ϕ					Kapacitivnost Kapacitete Capacitance μ F	Napetost Napon Voltage V
2-polni / 2-pole		<i>Sinhronska hitrost vrtenja / Sinhronska brzina vrtnje / Synchronous speed</i>							$n_s = 3000\text{min}^{-1}$		
2EK 56 A2	0,06	2710	0,53	51	0,99	2,4	0,80	1,7	3	3	400
2EK 56 B2	0,09	2770	0,75	53	0,99	2,9	0,70	1,75	3,5	4	400
2EK 63 A2	0,12	2830	0,95	61	0,92	3,0	0,50	2,0	3,6	4	400
2EK 63 B2	0,18	2830	1,35	61	0,95	3,3	0,50	1,9	4	6,3	400
2EK 71 A2	0,25	2850	1,67	67	0,96	3,4	0,50	2,0	5,6	10	400
2EK 71 B2	0,37	2860	2,28	72	0,97	3,8	0,50	2,0	6,6	12	400
3EK 80 A2	0,55	2800	3,7	66	0,98	2,9	0,50	1,9	8,6	18	400
3EK 80 B2	0,75	2830	4,8	69	0,98	3,7	0,50	2,2	10,3	25	400
EK 90 S2	1,1	2800	6,6	74	0,97	3,8	0,60	2,1	15,4	2x16	400
EK 90 L2	1,5	2860	9,5	74	0,92	5,0	0,60	3,0	19,5	2x25	400
4-polni / 4-pole		<i>Sinhronska hitrost vrtenja / Sinhronska brzina vrtnje / Synchronous speed</i>							$n_s = 1500\text{min}^{-1}$		
2EK 56 A4	0,045	1330	0,60	38	0,86	1,7	0,66	1,5	2,9	2	400
2EK 56 B4	0,06	1350	0,74	44	0,84	1,9	0,70	1,6	3,4	3	400
2EK 63 A4	0,09	1350	0,87	51	0,93	2,2	0,65	1,7	4,0	4	400
2EK 63 B4	0,12	1380	1,1	56	0,88	2,3	0,60	1,6	4,3	5	400
2EK 71 A4	0,18	1400	1,35	62	0,94	2,7	0,55	1,7	5,7	8	400
2EK 71 B4	0,25	1400	1,7	64	0,99	3,0	0,50	2,2	6,5	12	400
3EK 80 A4	0,37	1410	2,55	64	0,98	3,3	0,60	2,0	8,8	16	400
3EK 80 B4	0,55	1410	3,5	69	0,99	3,5	0,60	1,9	10,7	25	400
EK 90 S4	0,75	1400	4,78	73	0,93	3,5	0,60	2,2	15	25	400
EK 90 L4	1,1	1410	7,1	73	0,92	3,7	0,60	2,1	19	2x16	400

Pomen oznak Značenje oznaka Designation	nazivni tok In = nominalna struja rated current	zagonski tok Iz = zaletna struja starting current	nazivni vrtilni moment Mn = nazivni moment vrtnje rated torque	zagonski vrtilni moment Mz = zaletni moment vrtnje starting torque	max. (omahni) vrtilni moment Mm = max. (pokretni) moment vrtnje max. torque
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Obratovalni podatki enofaznih asinhronskih elektromotorjev

Standardna napetost: 230V, frekvenca: 50Hz.

Elektromotorji z zagonskim kondenzatorjem in elektromotorji z zagonskim ter pogonskim kondenzatorjem

Zagon s centrifugalnim stikalom.

Pogonski podatki jednofaznih asinhronih elektromotora

Napon: 230V, frekvencija: 50Hz.

Elektromotori sa zaletnim kondenzatorom i elektromotori sa zaletnim i pogonskim kondenzatorom

Zalet sa centrifugalnom sklopkom.

Operating Data on Single-phase Induction Electric Motors

Normal voltage: 230V, frequency: 50Hz.

Electric Motors with Starting Capacitor and Electric Motors with Starting and Running Capacitor

Starting with centrifugal switch.



ESK 90 IM B3



EKS 112 IM B3



3ESK 80 IM B3



EKS 90 IM B3

Tip motorja Tip motora Type	Nazivna moč Nazivna snaga Power kW	Obratovalne vrednosti pri nazivni moči Pogonske vrednosti kod nazivne snage Operating values rated power				Iz / In	Mz / Mn	Mm/Mn	Masa za obliko IM B3 Masa za obliko IM B3 Mass for IM B3 kg	Kondenzator Capacitor	
		Hitrost vrtenja Brzina vrtnje Rotational speed min-1, rpm	Nazivni tok pri Nazivna struja kod Rated current at 230V A	Izkoristek Korisnost Efficiency η %	Faktor moči Faktor snage Power factor cos ϕ					Kapacitivnost Kapacitet Capacitance μ F	Napetost Napon Voltage V
2-polni / 2-pole		<i>Sinhronska hitrost vrtenja / Sinhronska brzina vrtnje / Synchronous speed</i>							$n_s = 3000\text{min}^{-1}$		
3ESK 80 A2	0,37	2900	4,16	58	0,66	4,3	2,3	2,4	9,2	56	320
3ESK 80 B2	0,55	2900	5,4	62	0,71	4,7	2,1	2,2	10,9	71	320
ESK 90 S2-1	0,75	2870	5,83	71	0,79	4,5	2,3	2,1	15,3	90	320
ESK 90 S2	1,1	2860	8,8	72	0,75	4,2	2,0	2,0	15,5	112	320
ESK 90 L2	1,5	2860	11,4	71	0,84	4,4	1,7	2,0	19,0	120	320
EKS 100 2L2	2,2	2910	14,8	77	0,85	5,4	2,0	2,5	23,3	140 8	320 500
4-polni / 4-pole		<i>Sinhronska hitrost vrtenja / Sinhronska brzina vrtnje / Synchronous speed</i>							$n_s = 1500\text{min}^{-1}$		
3ESK 80 A4	0,25	1440	3,0	57	0,64	3,6	2,9	2,1	9,5	45	320
3ESK 80 B4	0,37	1410	4,2	56	0,71	3,7	2,35	1,9	11,3	56	320
ESK 90 S4-1	0,55	1440	5,45	65	0,67	4,1	2,5	2,1	14,8	71	320
ESK 90 S4	0,75	1420	7,56	65	0,66	3,5	2,3	1,75	15,0	71	320
ESK 90 L4	1,1	1430	9,7	68	0,72	4,0	2,0	1,8	18,5	90	320
EKS 100 LB4	1,5	1440	13,1	74	0,71	4,3	2,2	2,2	22,2	112 8	320 500
EKS 112 M4	2,2	1460	16,7	80	0,72	5,2	2,2	2,4	33,8	140 8	320 500

Pomen oznak Značenje oznaka Designation	nazivni tok In = nominalna struja rated current	zagonski tok Iz = zaletna struja starting current	nazivni vrtilni moment Mn = nazivni moment vrtnje rated torque	zagonski vrtilni moment Mz = zaletni moment vrtnje starting torque	max. (omahni) vrtilni moment Mm = max. (pokretni) moment vrtnje max. torque
---	---	---	--	--	---

Dimenzije enofaznih asinhronskih elektromotorjev

Elektromotorji s pogonskim kondenzatorjem v pomožni fazi. Oblika z nogami: IM B3 (IM B6, IM B7, IM B8, IM V5, IM V6)

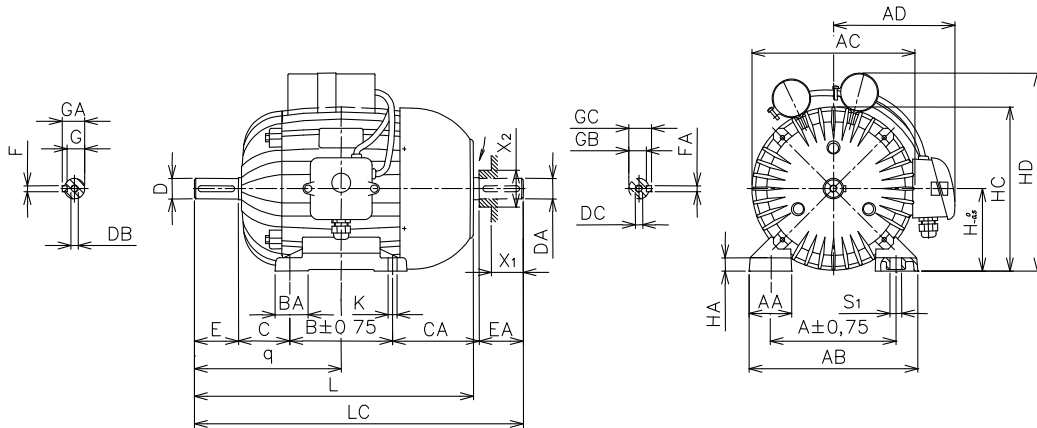
Dimenzije jednofaznih asinhronih elektromotora

Elektromotorji sa pogonskim kondenzatorom u pomožnoj fazi. Oblik sa nogama: IM B3 (IM B6, IM B7, IM B8, IM V5, IM V6)

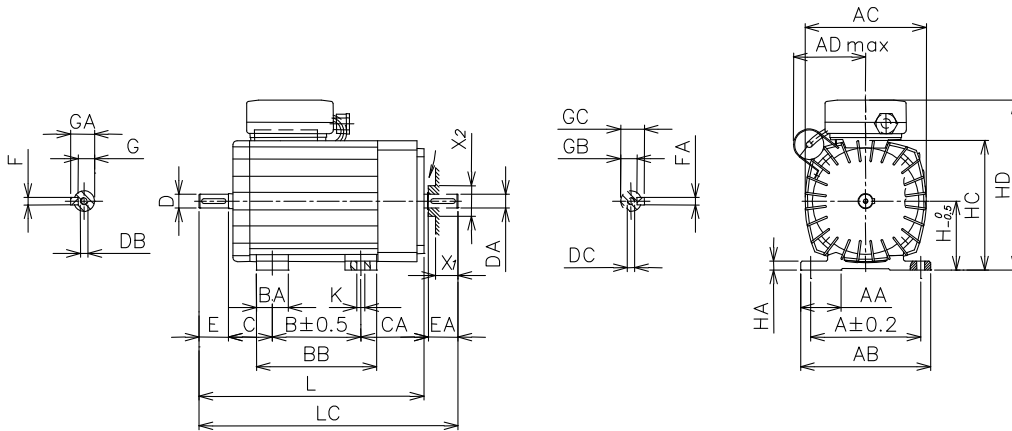
Dimensions of Single-phase Induction Electric Motors

Electric Motors with running capacitor in auxiliary phase. Model with feet IM B3 (IM B6, IM B7, IM B8, IM V5, IM V6)

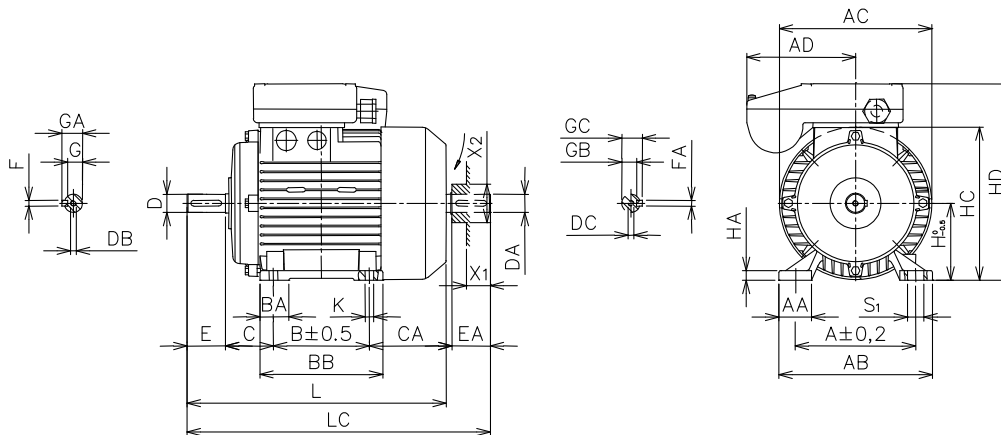
EK 90



2EK56 ... 2EK71



3EK 80



Tip elektromotorja Tip elektromotora Type of Electric Motor	A	AA	AB	AC	AD	B	BA	BB	C	CA	D	DA	DB	DC	E	EA
												k6	k6			
2EK 56 A, B	90	34	106	99	70	71	24	95	36	53	9	9	M3	M3	20	20
2EK 63 A, B	100	38	118	110	73	80	28	108	40	60,5	11	11	M4	M4	23	23
2EK 71 A, B	112	41	132	124	88	90	32	122	45	67	14	14	M5	M5	30	30
3EK 80, A, B	125	34	160	159	115	100	30	128	50	86	19	19	M6	M6	40	40
3ESK 80, A, B										126						
EK 90 S	140	45	180	177	138	125	40	130	56	101	24	24	M8	M8	50	50
ESK 90 S										120						
EK 90 L							101	28	M10	60						
ESK 90 L							123									
EKSK 100 L, LB	160	48	205	196	151	140	48	172	63	96	28					
EKSK 112 M	190	58	230	222	166		45	180	70	117						

Premer konca gredi ima toleranco k6 po ISO. Moznik in utorn sta izdelana po DIN 6885 T1.

Promjer kraja osovine ima toleranciju k6 po ISO. Utorni klin i utorn su izrađeni po DIN 6885 T1.

Shaft end diameter has the tolerance k6 acc. to ISO. Dowel pin and groove are designed acc. to DIN 6885 T1.

Dimenzije enofaznih asinhronskih elektromotorjev

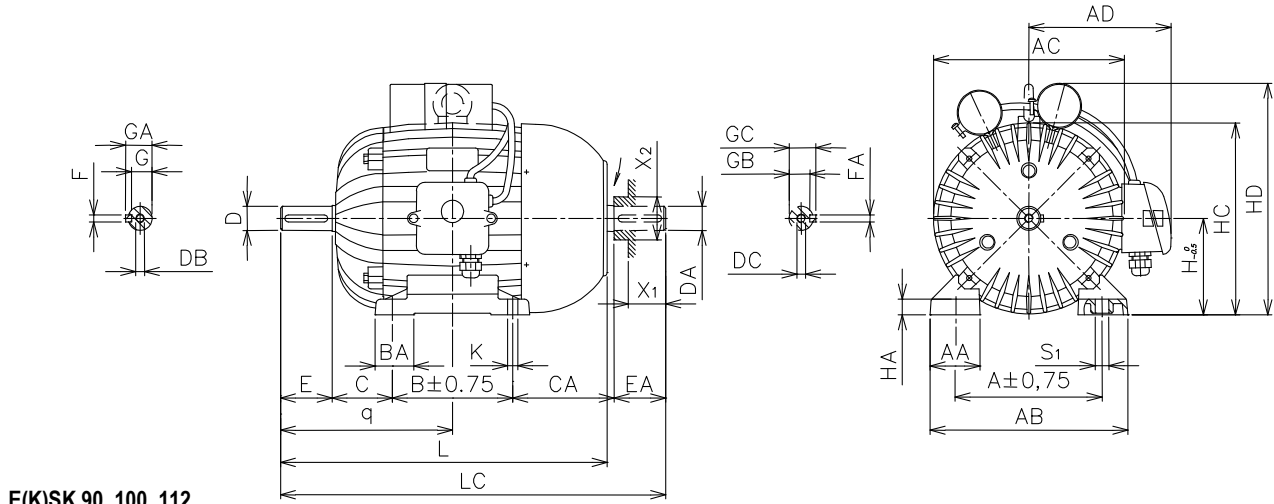
Elektromotorji z zagonskim kondenzatorjem in elektromotorji z zagonskim in pogonskim kondenzatorjem ter s centrifugalnim stikalom v pomožni fazi. Oblika z nogami: IM B3 (IM B6, IM B7, IM B8, IM V5, IM V6)

Dimenzije jednofaznih asinhronih elektromotora

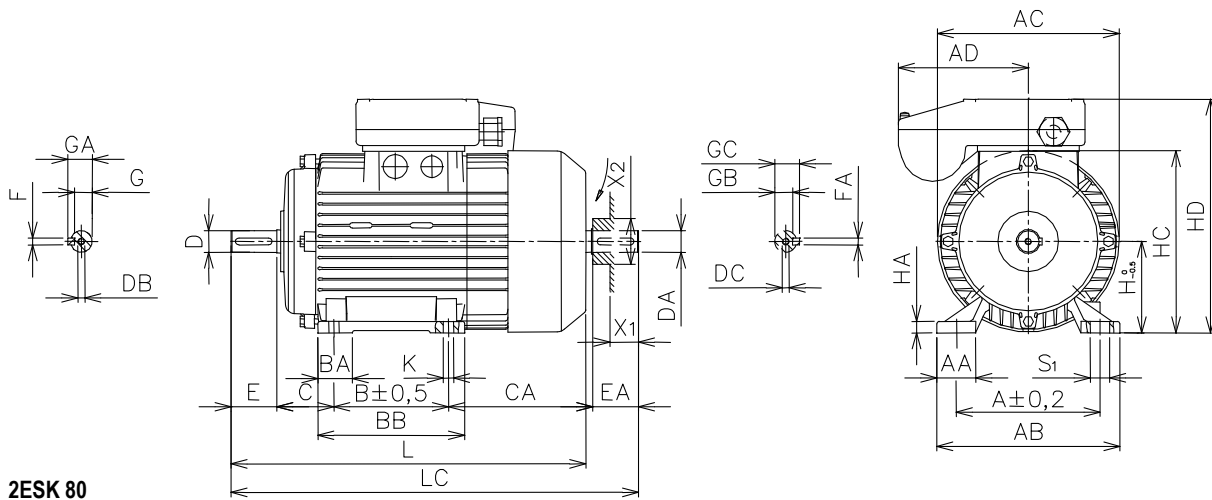
Elektromotori sa zaletnim kondenzatorom i elektromotori sa zaletnim i pogonskim kondenzatorom te centrifugalnom sklopkom u pomožnoj fazi. Oblik sa nogama: IM B3 (IM B6, IM B7, IM B8, IM V5, IM V6)

Dimensions of Single-Phase Induction Electric Motors

Electric motors with starting capacitor and electric motors with starting and running capacitor and centrifugal switch in auxiliary phase. Model with feet: IM B3 (IM B6, IM B7, IM B8, IM V5, IM V6)



E(K)SK 90, 100, 112



2ESK 80

Tip elektromotorja Tip elektromotora Type of Electric Motor	F, FA	G	GA	GB	GC	H	HA	HC	HD	K	L	LC	s ₁	q	x ₁ *	x ₂ *
															max	max
2EK 56 A, B	3	7,2	10,2	7,2	10,2	56	7	105	157	6,6	176	200	-	-	12	30
2EK 63 A, B	4	8,6	12,5	8,6	12,5	63	8	118	167	8	198,5	226,5	-	-	15	30
2EK 71 A, B	5	11,1	16,1	11,1	16,1	71	9	133	182	8	227,5	262	-	-	15	30
3EK 80, A, B	6	15,5	21,5	15,5	21,5	80	10	160	204	9	270	316	17	-	25	40
3ESK 80, A, B											310	356	17	-		
EK 90 S	8	19,9	26,9	19,9	26,9	90	13	178,5	227	9	303	357	12	156	25	40
ESK 90 S											322	376				
EK 90 L											329	382				
ESK 90 L											351	404				
EKSK 100 L, LB											373	425				
EKSK 112 M	23,9	30,9	100	15	198	255	12	373	425	14	193					
						112	18	223	275	12	380	437	16	200		

* Prostor za vstop zraka.

* Prostor za ulaz zraka.

* Air inlet space.

Vse mere so neobvezne. Obvezne mere so vnesene v potrjene merske skice, ki jih lahko zahtevate pri naročilu.

Sve mjere su neobavezne. Obavezne mjere su unesene u potvrđene mjernje skice koje možete dobiti na zahtjev kot narudžbe.

All dimensions are not obligatory. Obligatory dimensions are indicated in approved drawings and may be required when placing your orders.

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Elektromotorji

- ❖ enofazni in trifazni elektromotorji
- ❖ elektromotorji z zunanjim rotorjem
- ❖ elektromotorji za klimatske naprave
- ❖ specialni elektromotorji za sušilnice
- ❖ specialni vgradni elektromotorji

Črpalke

- ❖ horizontalne, vertikalne, normirane, podvodne in hladilne črpalke
- ❖ samosesalne črpalke
- ❖ črpalke za umazano vodo
- ❖ črpalke za agresivne medije, hidroblokji, hidropostaje
- ❖ fekalne postaje
- ❖ črpalke za črpanje utekočinjenega CO₂
- ❖ črpalke za pomivalne stroje

Ostali izdelki

- ❖ rineži (elektrohidravlični mehanizmi)
- ❖ potopna propelerska mešala
- ❖ krmilne omare

Ostalo:

- ❖ livarske storitve
- ❖ storitve mehanske obdelave

PROIZVODNI PROGRAM

Elektromotori

- ❖ jednofazni i trifazni elektromotori
- ❖ elektromotori sa vanjskim rotorom
- ❖ elektromotori za klimatske naprave
- ❖ specijalni elektromotori za sušionice
- ❖ specijalni ugradni elektromotori

Pumpe

- ❖ horizontalne, vertikalne, normirane, podvodne i bunarske pumpe za čistu vodu
- ❖ samousisne pumpe
- ❖ pumpe za prljavu vodu
- ❖ pumpe za agresivne medije, hidroblokovi, hidrostanice
- ❖ fekalne stanice
- ❖ pumpe za pumpanje tečnog CO₂
- ❖ pumpe za strojeve za pranje

Ostali proizvodi

- ❖ potiskivači (elektrohidraulični mehanizmi)
- ❖ potopne propelerske mješalice
- ❖ upravljački ormarići

Ostalo

- ❖ lijevarske usluge
- ❖ usluge mehaničke obrade

PRODUCTION RANGE

Electric Motors

- ❖ single and three-phase motors
- ❖ external rotor motors
- ❖ electric motors for air condition
- ❖ special electric motors for drying plants
- ❖ special built-in electric motors

Pumps

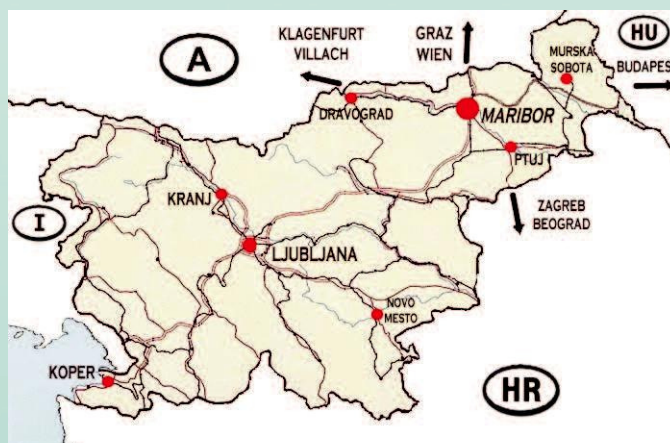
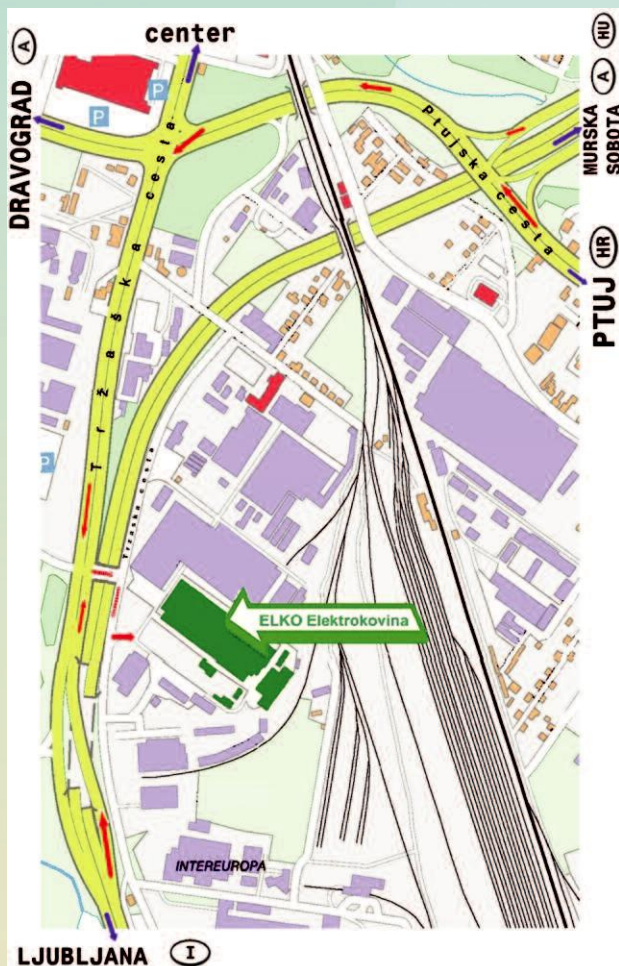
- ❖ horizontal, vertical, single stage pumps in standard design and submersible pumps
- ❖ self-priming pumps
- ❖ sewage pumps
- ❖ waste water pumps
- ❖ booster pump units
- ❖ booster systems
- ❖ pumps for handling liquid gas
- ❖ coolant pumps

Other products

- ❖ thrustors-electrohydraulic mechanisms
- ❖ sinking mixers
- ❖ control boxes

Other

- ❖ casting
- ❖ mechanical machining



ELKO

ELKO ELEKTROKOVINA

Proizvodnja elektromotorjev, črpalk in livarna Maribor d.o.o.

Tržaška c. 23, 2000 Maribor, SLOVENIJA
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elko@elkomb.si ; www.elkomb.si

Safety valves, directly operated

RE 25010-XC-B2/06.09
Replaces: **09.08**

Type DBDH...1X/...XC...E

Nominal size (NG) 4...30
Unit series 1X



Safety valves for potentially explosive atmospheres

Part II Technical Data Sheet



Information on safety:

Range of application as type-tested valve in accordance with the Pressure Equipment Directive 97/23/EG

Information on explosion protection:

Range of application in accordance with the Explosion Protection Directive and type of protection

– Ranges of application as per Directive 94/9/EG:

II2, II2G, II2D

– Type of protection of valve: c (EN 13463-5:2004-03)

What you need to know about these Operating Instructions

These Operating Instructions apply to the explosion-proof version of Rexroth valves, and consist of the following three parts:

- Part I General Information RE 07010-X-B1
- Part II Technical Data Sheet RE 25010-XC-B2
- Part III Product-specific Instructions RE 25010-XC-B3

RE 25010-XC-B0

You can find further information on the correct handling of Rexroth hydraulic products in our publication "General Product Information on Hydraulic Products", RE 07008.

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Contents	Page
Features	2
Ordering data and scope of delivery	3
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Function, sectional diagram, symbol	4
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Characteristic curves for maximum permitted flow rate	6
Important information for operation in accordance with the Pressure Equipment Directive 97/23/EG	7
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Unit dimensions	12 ... 16

Features

- As ATEX units in accordance with Directive 94/9/EG for ranges of application: **IM2, II2G, II2D**
- As type-tested safety valves in accordance with Pressure Equipment Directive 97/23/EG
- As screw-in valve (cartridge)
- For threaded connection
- For sub plate mounting
- Adjustment with hand wheel

Function, sectional diagram, symbol

Valves of the type DBDH...1X/...XC...E are type-tested, directly operated pressure relief valves which conform to the Pressure Equipment Directive 97/23/EG. They are employed for reducing system pressure and are intended for use as safety valves.

When the preset response pressure is exceeded in the P duct, the valves react and connect the P and T ducts internally. The valves are available in different versions: as screw-in valve "K" for screwing into blocks, as a valve with threaded connection "G", or as a valve for subplate mounting "P" ("G" and "P" are not possible with size NG4).

The screw-in valve itself, which is used in all versions, basically consists of the sleeve (7), spring (6), cone (5.1, response pressure up to 400 bar) or ball (5.2, response pressure 405 bar and over), valve seat (4) and setting element (8).

The spring presses the cone (5.1) or the ball (5.2) against the valve seat (4). The response pressure is factory-set to a fixed value using the setting element, then the valve is sealed.

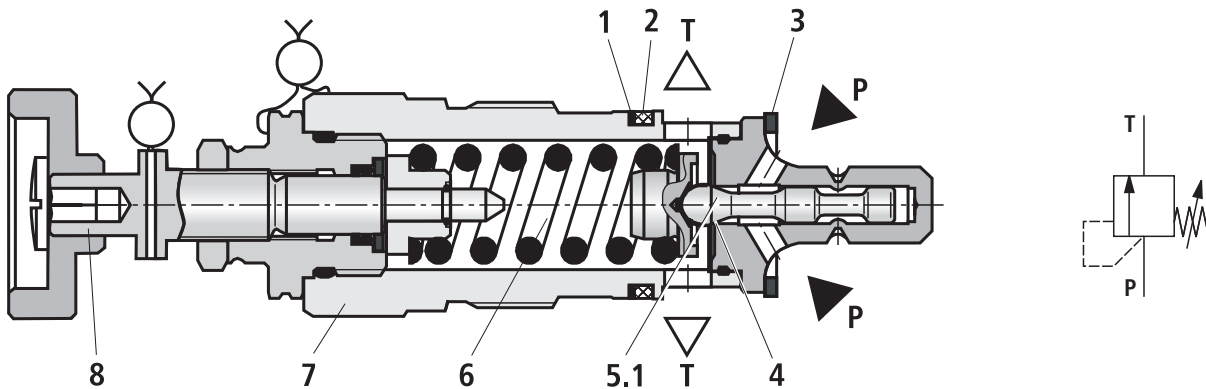
The P duct is connected to the system. The pressure predominating in the system acts on the cone or the ball. If the pressure in the P duct rises above the value set by the pretension of the spring, the cone or the ball lifts up from the valve seat against the spring force, and connects the P and T ducts. The pressure fluid flows out of the P duct into the T duct. Design measures limit the maximum possible lift of the cone.

The valves are available with graduated response pressures (in 5 bar increments). The valve spring can be relieved of tension using the hand wheel, and the response pressure can be reduced from the factory setting without having to remove the seal. To do this, please refer to Part III of the Operating Instructions, RE 25010-XC-B3, section 5.3.

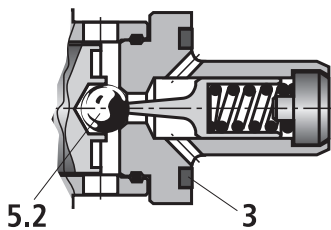
Example illustration with symbol:

Screw-in valve **DBDH 10 K1X/...XC...E**

Response pressure 30 ... 400 bar

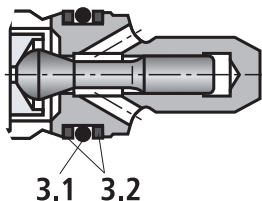


Response pressure 405 ... 630 bar (ball poppet valve NG10)



Screw-in valve type Typ **DBDH 4 K1X/...XC...E**

Response pressure 60 ... 500 bar



- P P duct
- T T duct
- 1, 2 O-rings on valve body
- 3 Axial or radial sealing of single seal
- 3.1, 3.2 Sealing elements of axial or radial seal of multiple seal
- 4 Valve seat
- 5.1 Valve cone
- 5.2 Valve ball
- 6 Spring
- 7 Sleeve
- 8 Hand wheel setting element

Technical data

General

Installation position		Optional
Ambient temperature range	°C	-20 ... +80 (FKM-seals) -30 ... +80 (NBR-seals)
Storage temperature range	°C	-20 ... +80 (FKM-seals) -30 ... +80 (NBR-seals)
Dimensions, weight		See "Unit dimensions" from page 12
Surface protection for versions "G" and "P"		Paint, layer thickness max. 100 µm
Degree of protection to EN 60529:1991+A1:2000		IP 65

Hydraulic

(measured at a viscosity of $\nu = 32 \text{ mm}^2/\text{s}$ and a pressure fluid temperature of 40°C)

Set response pressure	bar	See last number of component identification mark
Maximum back pressure in flow line	bar	See page 8 ... 11 "Characteristic curves ... with back pressure in the flow line"
Maximum flow rate	l/min	See penultimate number of component identification mark and page 6 onwards, "Characteristic curves for maximum permitted flow rate"
Pressure fluid		Mineral oil (HL, HLP) to DIN 51524, other pressure fluids available on request Ignition temperature $> 180^\circ \text{C}$
Pressure fluid temperature range When used as a safety valve	°C	-15 ... +60 ¹⁾
Viscosity range When used as a safety valve	mm ² /s	12 ... 230 ¹⁾
Maximum permitted degree of contamination of pressure fluid purity class to ISO 4406 (c)		Class 20/18/15

Operating limits

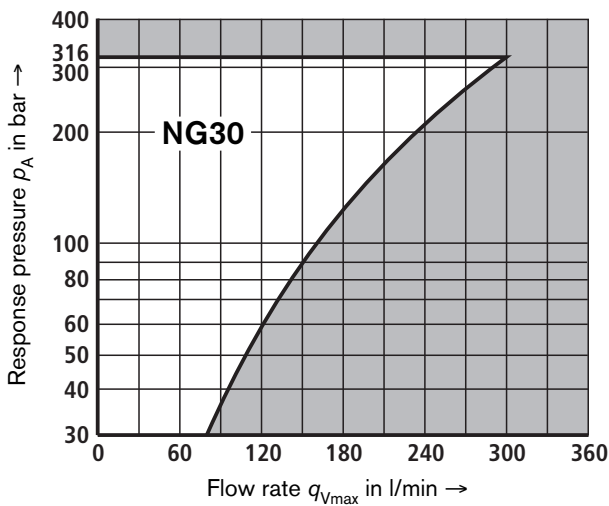
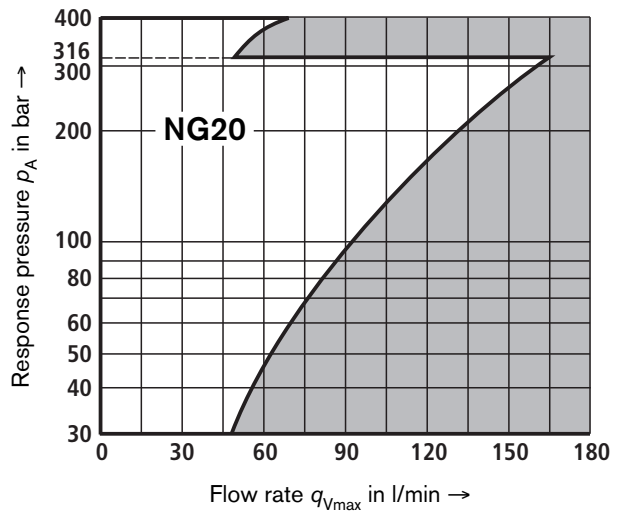
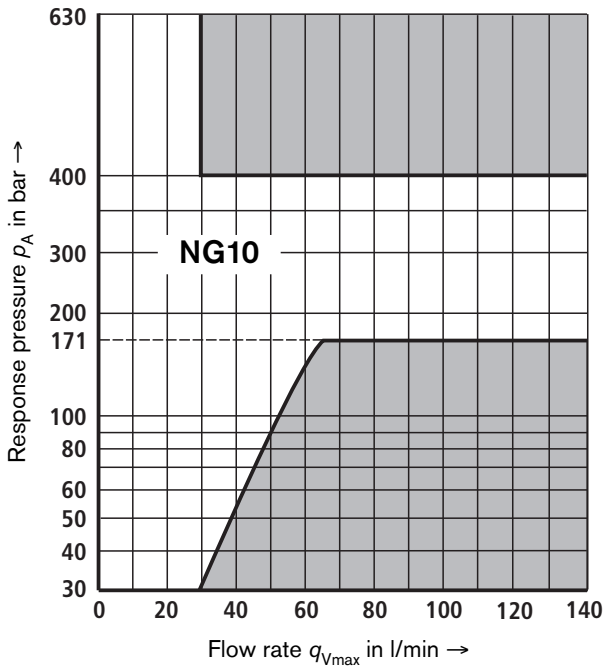
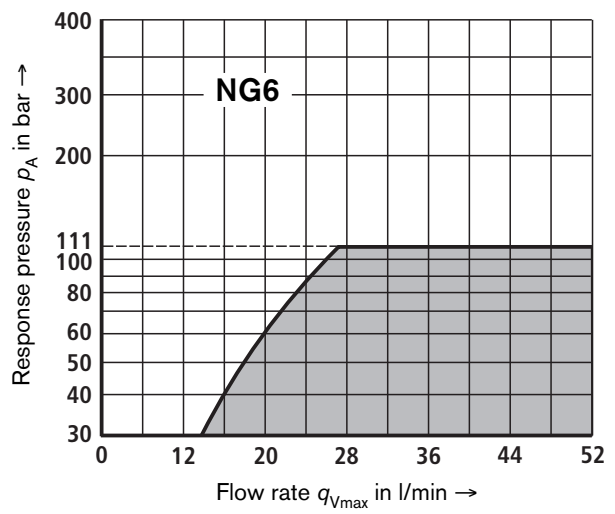
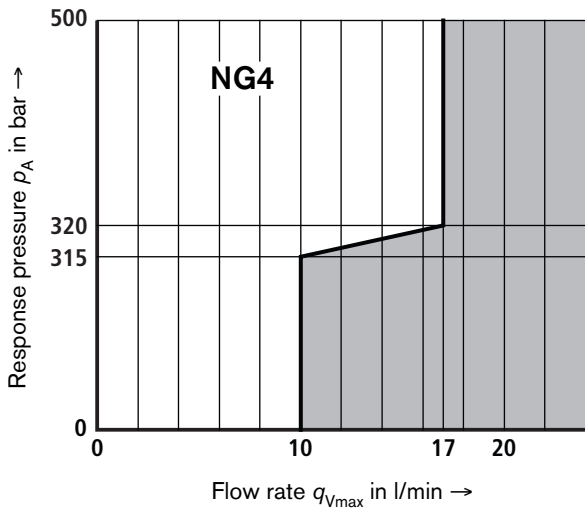
NG	Response pressure p_A in bar	Max. flow rate $q_{V\text{max}}$ in l/min
4	60 ... 315	10
	320 ... 500	17
6, 10, 20, 30	See characteristic curves and last number of component identification mark	See characteristic curves and last number of component identification mark

Information on explosion protection

Range of application as per Directive 94/9/EG	IM2, II2G	IM2, II2D
Type of protection of valve	c (EN 13463-5:2004-03)	c (EN 13463-5:2004-03)
Maximum surface temperature Temperature class	°C 125 T4	114 -
Degree of protection	-	IP 65
Special conditions for safe use	The screw-in valve (cartridge) must not be painted!	

¹⁾ If the valve is not employed as a safety valve in accordance with Pressure Equipment Directive 97/23/EG, the temperature of the pressure fluid must not exceed $+80^\circ \text{C}$, the viscosity must not exceed $800 \text{ mm}^2/\text{s}$.

Characteristic curves for maximum permitted flow rate



Note:

Value pairs that are **located in the gray areas** of the characteristic curves **cannot** be achieved with the valve!

The characteristic curves presented here apply solely to a back pressure of 0 bar in the flow line.

Important information for operation in accordance with the Pressure Equipment Directive 97/23/EG

- Before you order a type-tested safety valve, please note that at the desired response pressure p , the maximum permitted flow rate $q_{V_{\max}}$ of the safety valve is greater than the maximum possible flow rate of the system/accumulator which the valve is intended to protect.

With this in mind, please note the appropriate regulations.

- In accordance with Pressure Equipment Directive 97/23/EG, the system pressure may not increase due to the flow rate by more than 10 % of the set response pressure (see component code). The maximum permitted flow rate $q_{V_{\max}}$ specified in the component code must not be exceeded. Flow lines from safety valves must exit safely. It must not be possible for fluid to collect in the flow system (see AD2000, code of practice A2).

Essential notes for use!

- The response pressure specified in the component code is factory-set at a flow rate of 2 l/min.
- The maximum permitted flow rate specified in the component code applies to applications without back pressure in the flow line (port T).
- If the seal on the safety valve is removed, the valve no longer conforms to the Pressure Equipment Directive!
- The requirements of the Pressure Equipment Directive and the AD2000 code of practice A2 must be observed!
- We strongly recommend that type-tested safety valves are secured by means of wiring and sealing to the housing/block (bore hole available in setting element), to prevent their unauthorized removal from the screw-in housing/block.

Note

The rising flow rate causes the system pressure to increase by the amount of the back pressure in the flow line (port T).

Note AD2000 code of practice A2, item 6.3.

In order to ensure that this rise in system pressure due to the flow rate does not exceed 10 % of the set response pressure, the permitted flow rate must be reduced as a function of the back pressure in the flow line (port T) (see pages 8 to 11).

Characteristic curves NG4 with back pressure in the flow line

As far as possible, the valve should basically be operated with no back pressure in the flow line. If there is back pressure in the flow line, the maximum possible flow rate is reduced. There is a relationship between the maximum permitted back pressure p_T in the flow line and the flow rate q_{V1} , which can be seen in the characteristic curves below.

The curves for intermediate response pressure values that are not shown below must be calculated by means of interpolation. When the flow rate is around zero, the maximum permitted back pressure p_T is 10 % of the respective response pressure. As the flow rate increases, the maximum permitted back pressure p_T decreases.

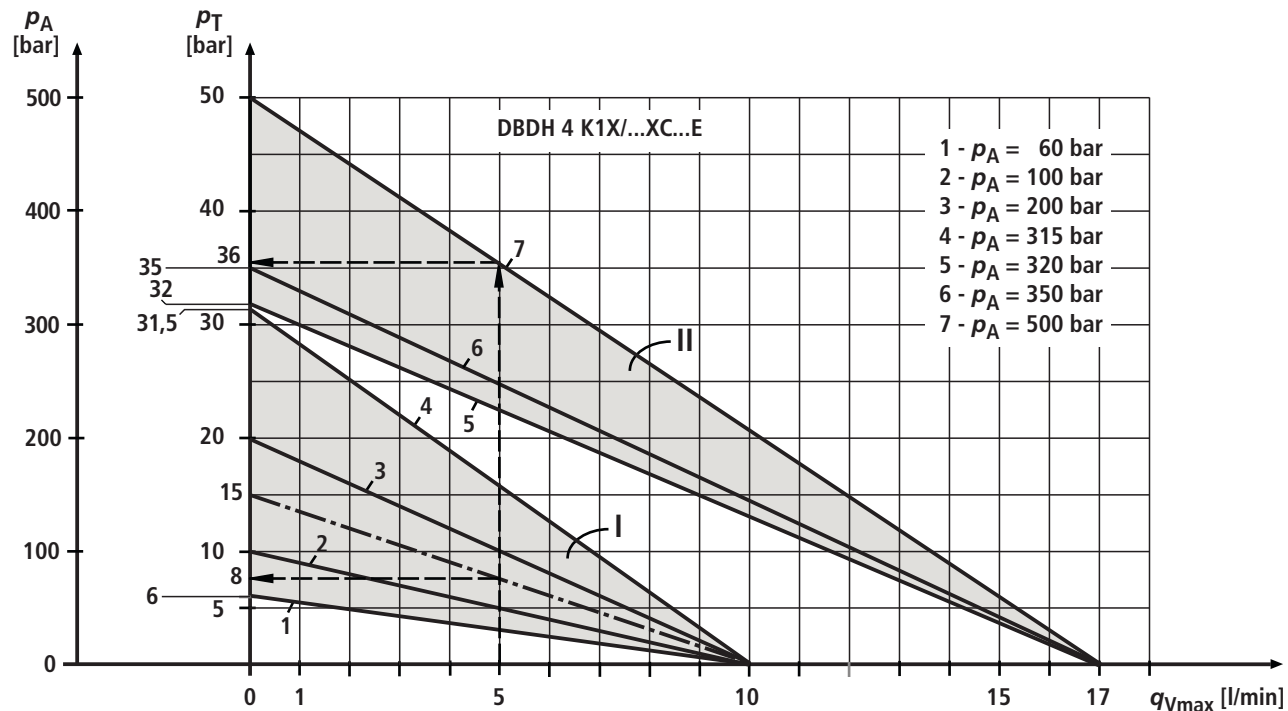


Diagram for determining the maximum permitted back pressure p_T in the flow line at port T of the valve as a function of the flow rate q_{Vmax} for DBDH 4K1X/...XC...E valves with different q_{Vmax} response pressures p_A .

p_A Response pressure in bar

p_T Maximum permitted back pressure in the flow line (port T) in bar

q_{Vmax} Max. maximum flow rate in l/min

■ I Interpolation area I, for DBDH 4K1X/...XC...E valves with response pressure $p_A = 60 \dots 315$ bar and maximum flow rate $q_{Vmax} = 10$ l/min

■ II Interpolation area II, for DBDH 4K1X/...XC...E valves with response pressure $p_A = 320 \dots 500$ bar and maximum flow rate $q_{Vmax} = 17$ l/min

Interpolation of intermediate values from the diagram

1. Enter the 1/10 value of the response pressure p_A on the p_T axis.
2. From the above point, draw a straight line to where the q_{Vmax} axis crosses zero, keeping inside the interpolation area (here, 10 l/min for interpolation area I or 17 l/min for interpolation area II).
3. On the q_{Vmax} axis, enter the system flow rate that is not to be exceeded.
4. For this value, ascertain the maximum permitted back pressure on the basis of the line on the p_T axis that you have just drawn.

Example 1 with available curve

System/accumulator flow rate that is not to be exceeded: $q_{Vmax} = 5$ l/min

Safety valve set to: $p_A = 500$ bar.

From the diagram (see arrows, curve 7), read the maximum permitted back pressure p_T of approx. 36 bar.

Example 2 with interpolated curve

System/accumulator flow rate that is not to be exceeded: $q_{Vmax} = 5$ l/min

Safety valve set to: $p_A = 150$ bar.

Value to be entered on the p_T axis: $1/10 \times 150 \text{ bar} = 15 \text{ bar}$.

From the diagram (see arrows, dotted curve), read the maximum permitted back pressure p_T of approx. 8 bar.

Characteristic curves NG6 with back pressure in the flow line

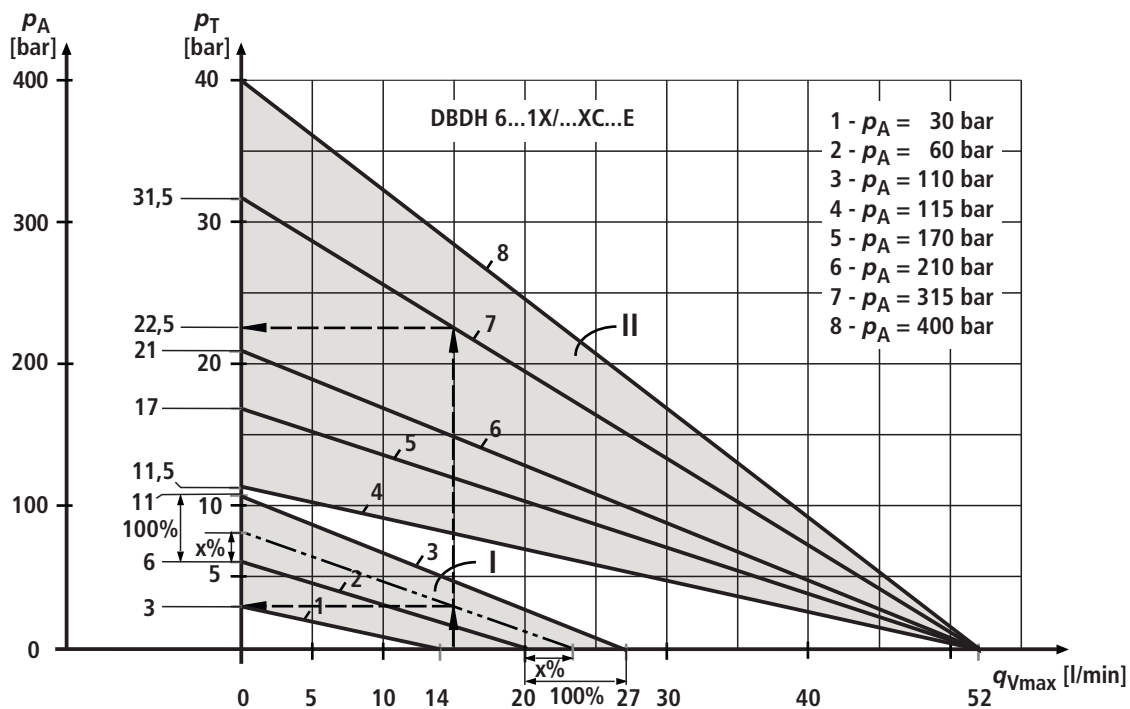


Diagram for determining the maximum permitted back pressure p_T in the flow line at port T of the valve as a function of the flow rate q_{Vmax} for DBDH 6...1X/...XC...E valves with different response pressures p_A .

p_A Response pressure in bar

p_T Maximum permitted back pressure in the flow line (port T) in bar

q_{Vmax} Max. maximum flow rate in l/min

▣ I Interpolation area I, for DBDH 6...1X/...XC...E valves with response pressure $p_A = 30 \dots 110$ bar and maximum flow rate $q_{Vmax} = 14 \dots 27$ l/min

▣ II Interpolation area II, for DBDH 6...1X/...XC...E valves with response pressure $p_A = 115 \dots 400$ bar and maximum flow rate $q_{Vmax} = 52$ l/min

Interpolation of intermediate values in the diagram

1. Enter the 1/10 value of the response pressure p_A on the p_T axis.
2. Determine the neighboring, lower and higher curve from this point. The point entered on p_T divides the section between the lower and higher curve on the p_T axis with a certain percentage
3. On the q_{Vmax} axis, divide the section between neighboring, lower and higher curves, using the same percentage as the section on the p_T axis. Draw a straight line from the point where the q_{Vmax} axis crosses zero, which you have just determined, and the previously entered value on the p_T axis.
4. On the q_{Vmax} axis, enter the system flow rate that is not to be exceeded.
5. For this value, ascertain the maximum permitted back pressure on the basis of the line on the p_T axis that you have just drawn.

Determining the permitted back pressure

Example 1 with available curve

System/accumulator flow rate that is not to be exceeded: $q_{Vmax} = 15$ l/min

Safety valve set to: $p_A = 315$ bar.

From the diagram (see arrows, curve 7), read the maximum permitted back pressure p_T of approx. 22.5 bar.

Example 2 with interpolated curve

System/accumulator flow rate that is not to be exceeded: $q_{Vmax} = 15$ l/min

Safety valve set to: $p_A = 80$ bar.

Value to be entered on the axis designated as p_T : $1/10 \times 80$ bar = 8 bar.

From the diagram (see arrows, dotted curve), read the maximum permitted back pressure p_T of approx. 3 bar.

Characteristic curves NG10 with back pressure in the flow line

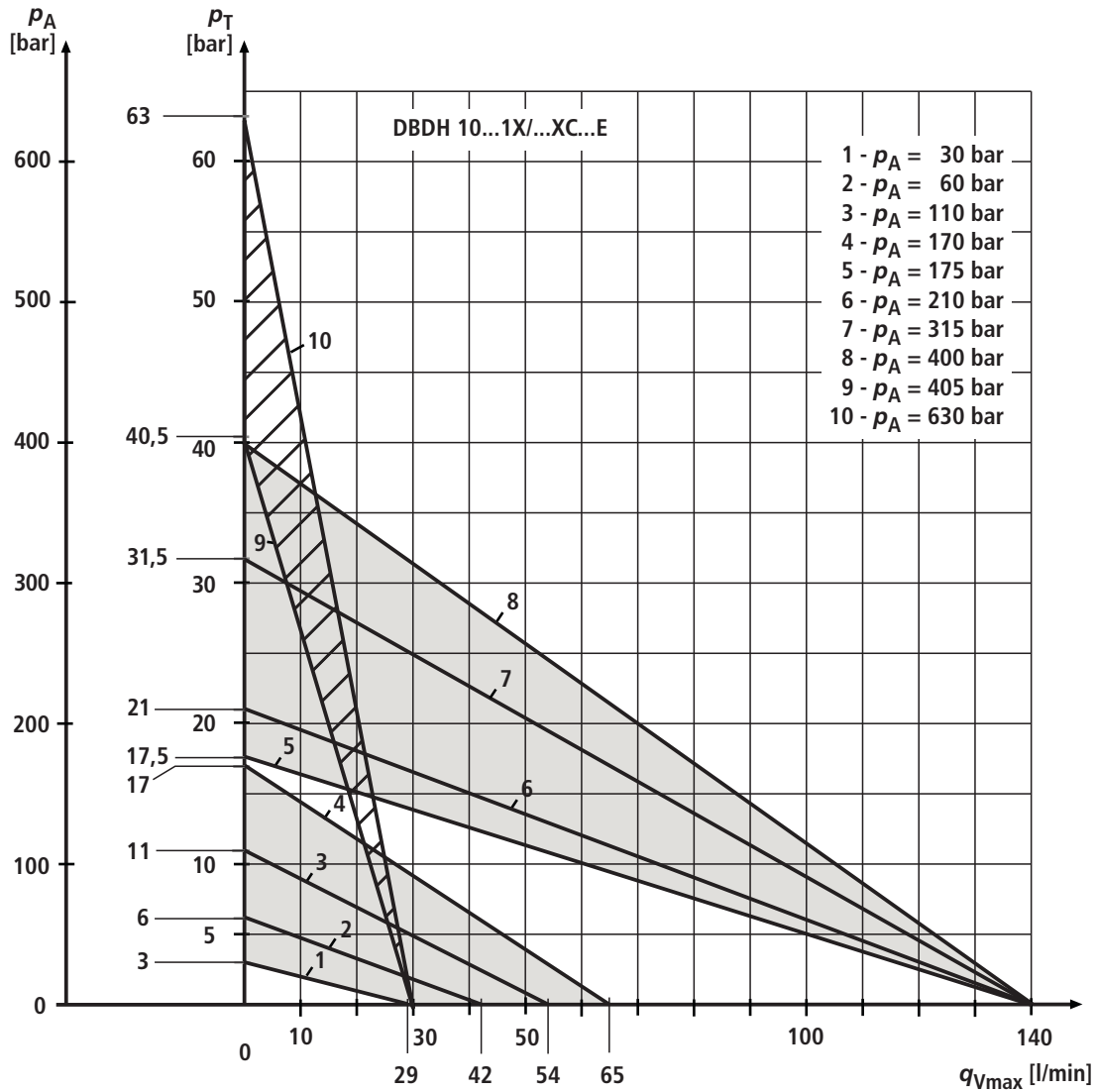


Diagram for determining the maximum permitted back pressure p_T in the flow line at port T of the valve as a function of the flow rate q_{Vmax} for DBDH 10...1X/...XC...E valves with different response pressures p_A .

Intermediate values can be ascertained with the aid of interpolation. Please refer to the explanations on the previous pages for the interpolation process.

- p_A Response pressure in bar
- p_T Maximum permitted back pressure in the flow line (port T) in bar
- q_{Vmax} Max. maximum flow rate in l/min
- Interpolation areas

Characteristic curves NG20 and NG30 with back pressure in the flow line

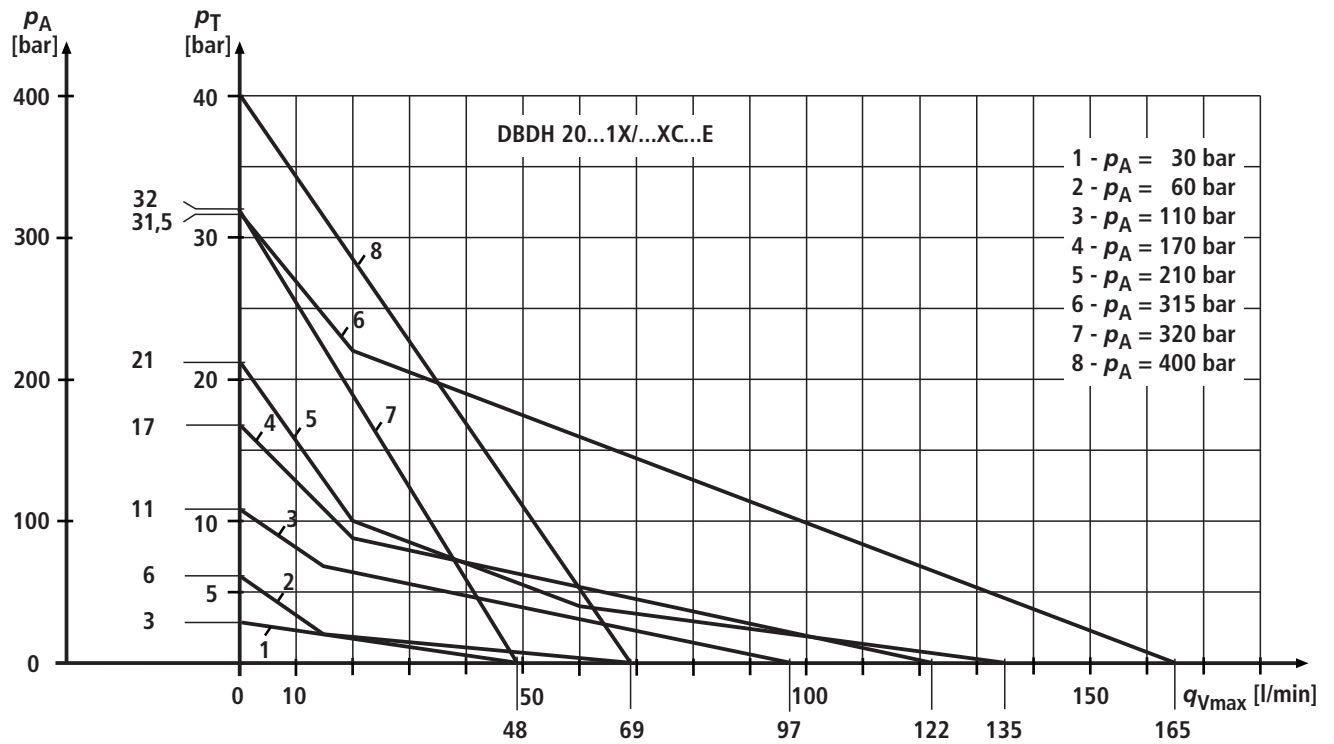
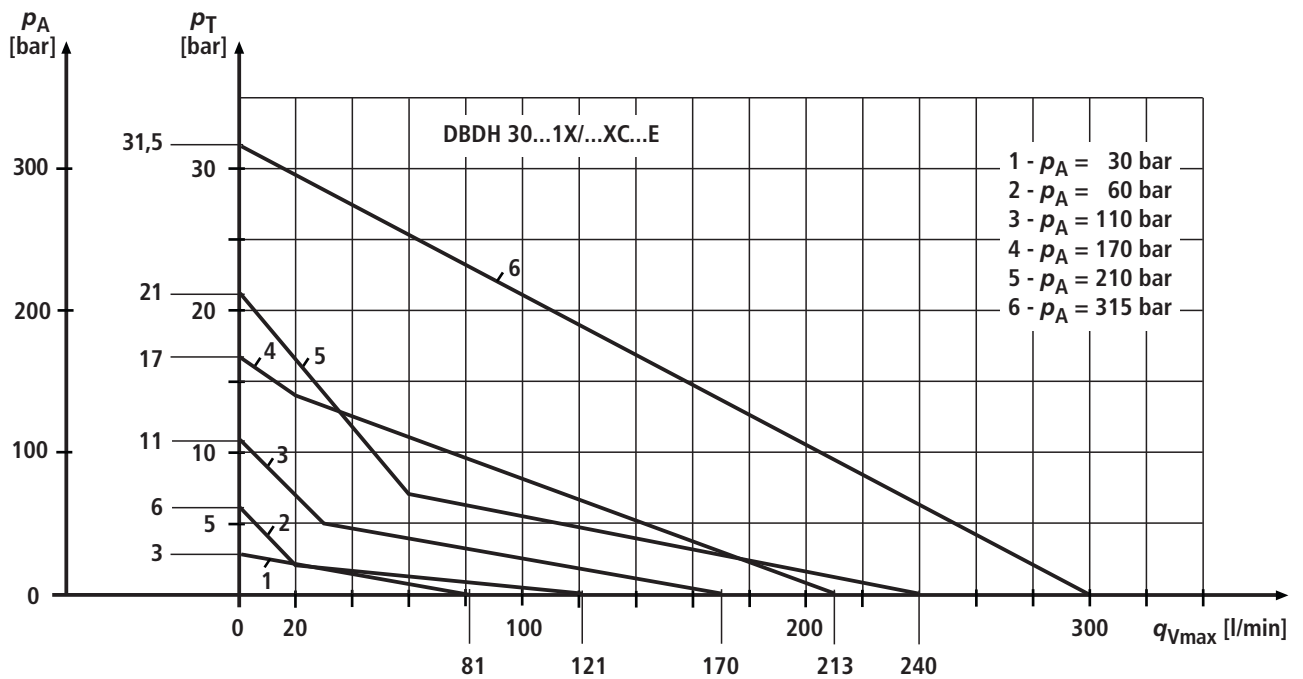
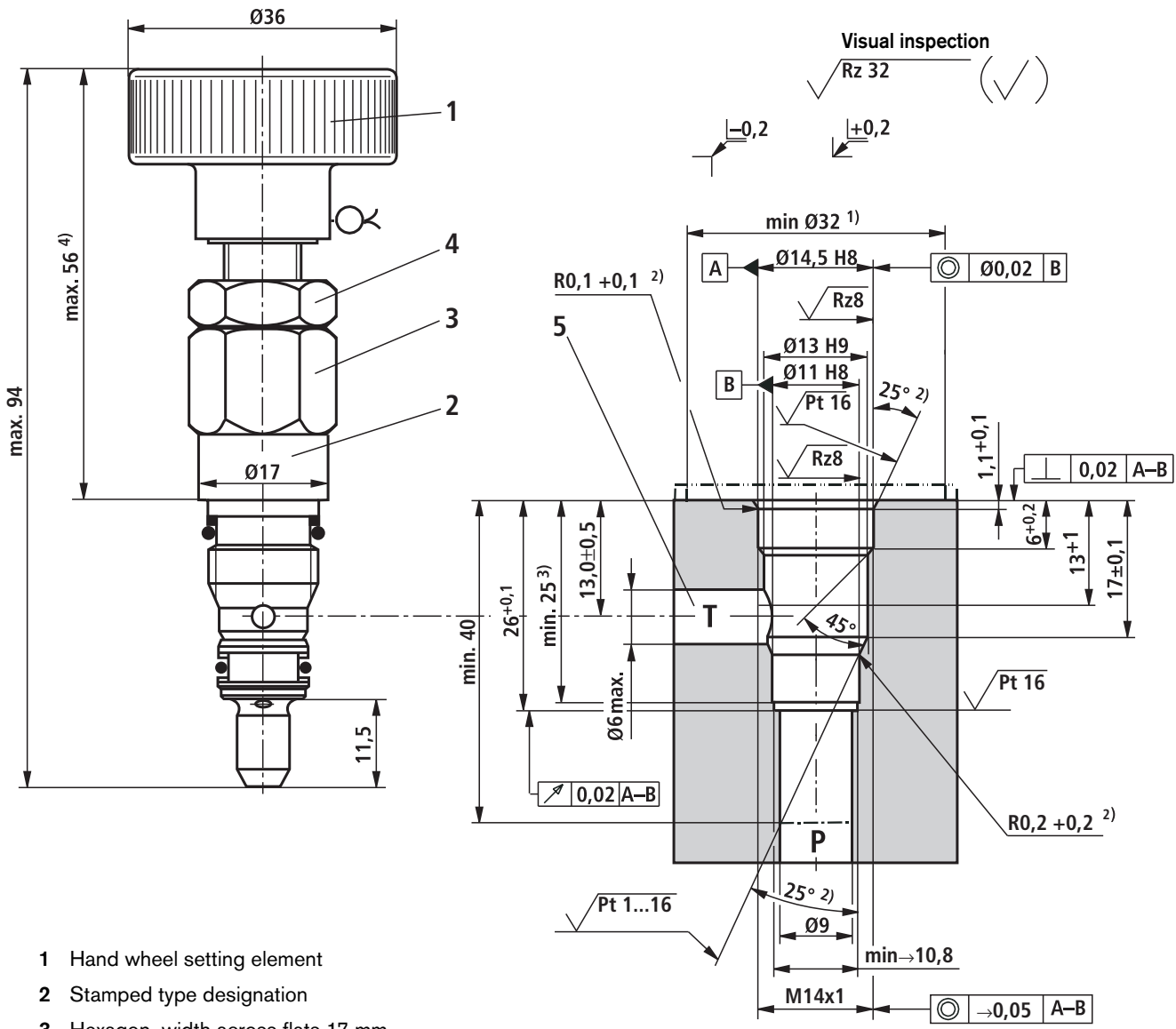


Diagram for determining the maximum permitted back pressure p_T in the flow line at port T of the valve as a function of the flow rate q_{Vmax} for DBDH 20...1X/...XC...E valves (diagram above) and DBDH 30...1X/...XC...E valves (diagram below) with different response pressures p_A .

Intermediate values can be ascertained with the aid of interpolation. Please refer to the explanations on the previous pages for the interpolation process.



Unit dimensions: Screw-in valve NG4 (in mm)

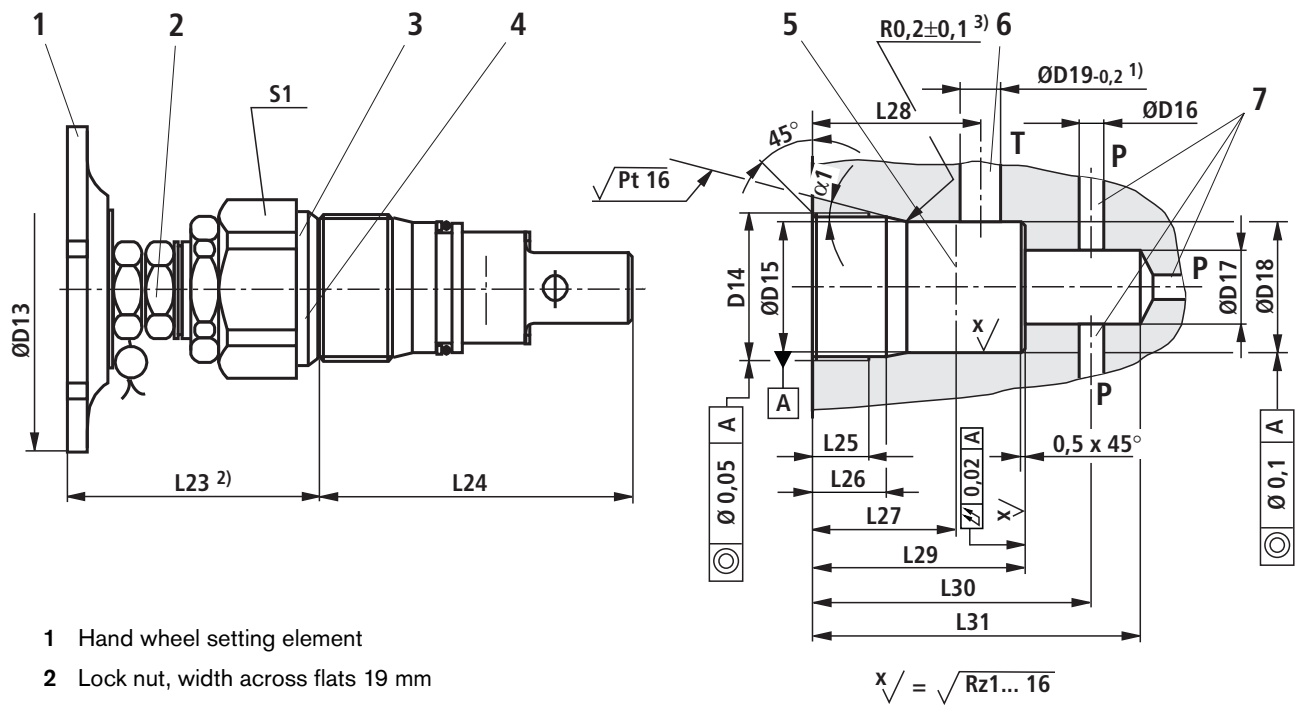


- 1 Hand wheel setting element
- 2 Stamped type designation
- 3 Hexagon, width across flats 17 mm
- 4 Lock nut, width across flats 17 mm
- 5 Port T, anywhere on the perimeter

Tolerancing: DIN 7167
 General tolerances: ISO 2768-mk

- 1) Minimum diameter in recess
- 2) All edges of sealing ring insertion taper rounded and free from burrs
- 3) Fitting depth
- 4) Maximum dimension with response pressure at lowest setting

Unit dimensions: Screw-in valves NG6 to NG30 (in mm)



- 1 Hand wheel setting element
- 2 Lock nut, width across flats 19 mm
- 3 Stamped component code
- 4 Stamped type designation and response pressure
- 5 Fitting depth
- 6 Port T, anywhere on perimeter
- 7 Port P, anywhere on perimeter or on end face

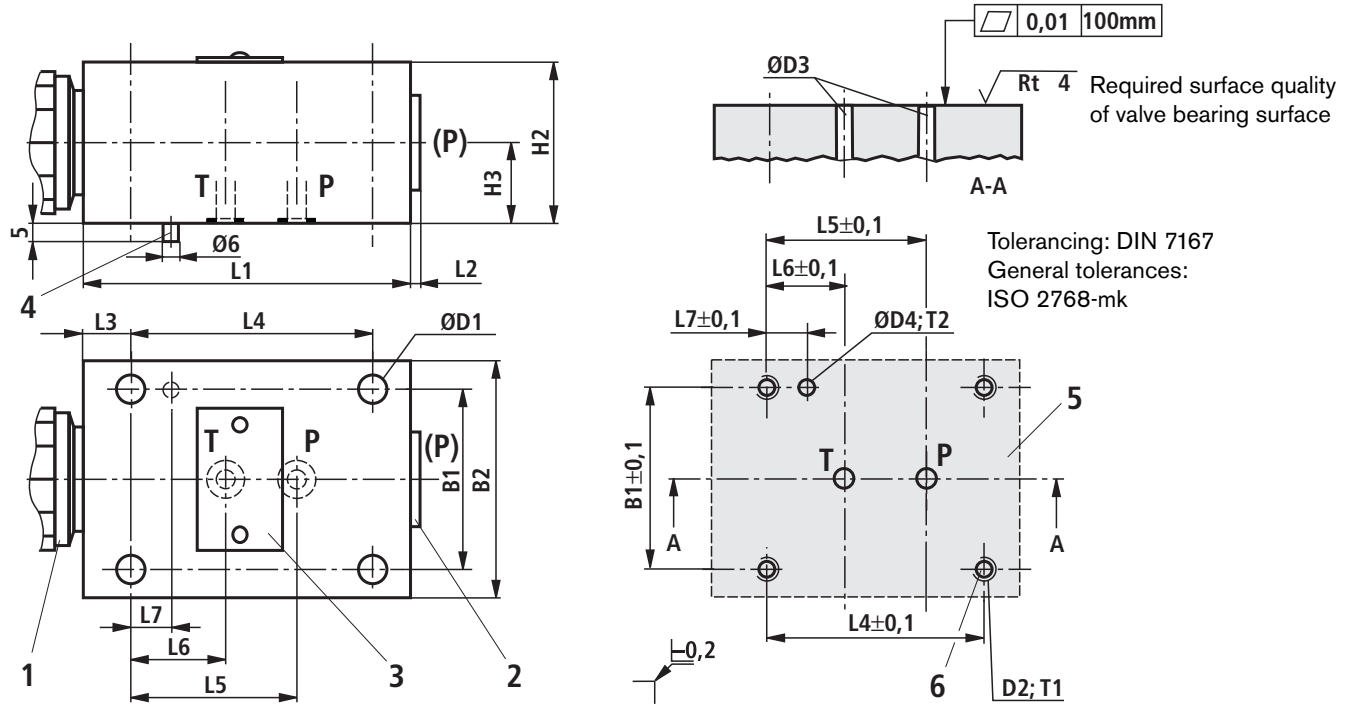
Tolerancing: DIN 7167
 General tolerances: ISO 2768-mk

- ¹⁾ Maximum dimension
- ²⁾ Maximum dimension with response pressure at lowest setting
- ³⁾ Edge of sealing ring insertion taper rounded and free from burrs

Screw-in valve					
NG	ØD13	L23	L24	S1	Weight
6	40	81	64,5	32	ca. 0.4 kg
10	40	77	77	36	ca. 0.5 kg
20	40	71	106	46	ca. 1 kg
30	80	97	131	60	ca. 2.2 kg

Screw-in bore hole														
NG	D14	ØD15	ØD16	ØD17	ØD18	ØD19	L25	L26	L27	L28	L29	L30	L31	α1
6	M28 x 1.5	25 ^{H9}	6	15	24.9 ^{+0.152} _{-0.2}	12	15	19	30	36	45	56.5 ± 5.5	65	15°
10	M35 x 1.5	32 ^{H9}	10	18.5	31.9 ^{+0.162} _{-0.2}	15	18	23	35	41.5	52	67.5 ± 7.5	80	15°
20	M45 x 1.5	40 ^{H9}	20	24	39.9 ^{+0.162} _{-0.2}	22	21	27	45	55	70	91.5 ± 8.5	110	20°
30	M60 x 2	55 ^{H9}	30	38.75	54.9 ^{+0.174} _{-0.2}	34	23	29	45	63	84	113.5 ± 11.5	140	20°

Unit dimensions: Sub plate mounting, NG6 to NG30 (in mm)



- 1 Screw-in valve, example illustration ¹⁾
- 2 Connecting bore (P), e.g. for pressure measurement, sealed when supplied with screw plug (see dimension table for (P))
Not available for NG10 with pressure stages > 400 bar
- 3 Nameplate
- 4 Locating pin
- 5 Valve bearing surface
- 6 Four valve fastening bores

In order to ensure a secure connection, use only the following valve fastening bolts (order separately):

- 4 hexagon socket head cap screws
ISO 4762...-fIZn-240h-L
(coefficient of friction $\mu_{total} = 0.09$ to 0.14)

Valve fastening bolts to ISO 4762 ²⁾			
NG	Dimensions	Property class	Material number
6	M6 x 50	10.9	R913000151
10	M8 x 70	10.9	R913000149
20	M8 x 90	12.9	R913000150
30	M10 x 110	12.9	R913000148

²⁾ Appropriate specified bolts to DIN 912 may also be used as an alternative.

¹⁾ See page 13 for dimensions

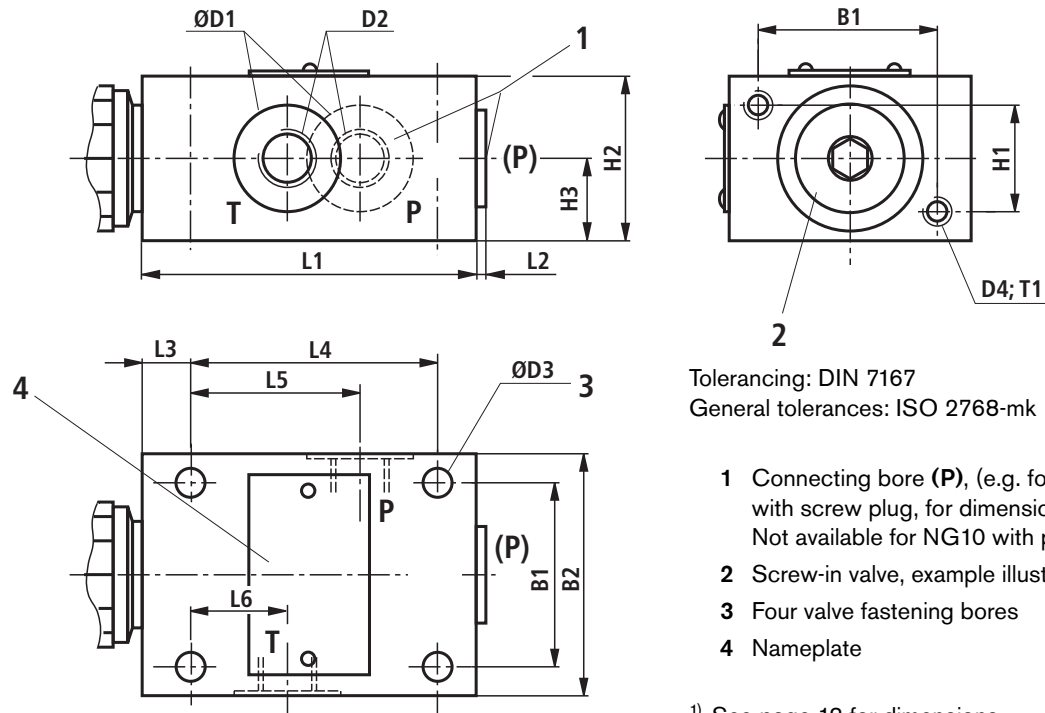
Pressure relief valve

NG	B1	B2	ØD1	H2	H3	L1	L2	L3	L4	L5	L6	L7	(P)	Weight
6	45	60	6.6	40	20	80	4	15	55	40	20	15	G1/4	ca. 1.5 kg
10	60	80	9	60	30	100	4	20	70	45	21	15	G1/2	ca. 3.7 kg
20	70	100	9	70	35	135	5.5	20	100	65	34	15	G3/4	ca. 6.4 kg
30	100	130	11	90	45	180	5.5	25	130	85	35	15	G1 1/4	ca. 13.9 kg

NG	Maximum overall length with response pressure at lowest setting
6	165
10	181
20	212
30	283

Detail dimensions of mounting hole configurations										
NG	B1	D2	ØD3	ØD4	L4	L5	L6	L7	T1	T2
6	45	M6	6	7.5	55	40	20	15	15	6.5
10	60	M8	10	7.5	70	45	21	15	15	6.5
20	70	M8	20	7.5	100	65	34	15	22	6.5
30	100	M10	30	7.5	130	88	35	15	22	6.5

Unit dimensions: Threaded connection, NG6 to NG30 (in mm)



Tolerancing: DIN 7167
 General tolerances: ISO 2768-mk

- 1 Connecting bore **(P)**, (e.g. for pressure measurement), with screw plug, for dimensions see D2
 Not available for NG10 with pressure stages > 400 bar
- 2 Screw-in valve, example illustration ¹⁾
- 3 Four valve fastening bores
- 4 Nameplate

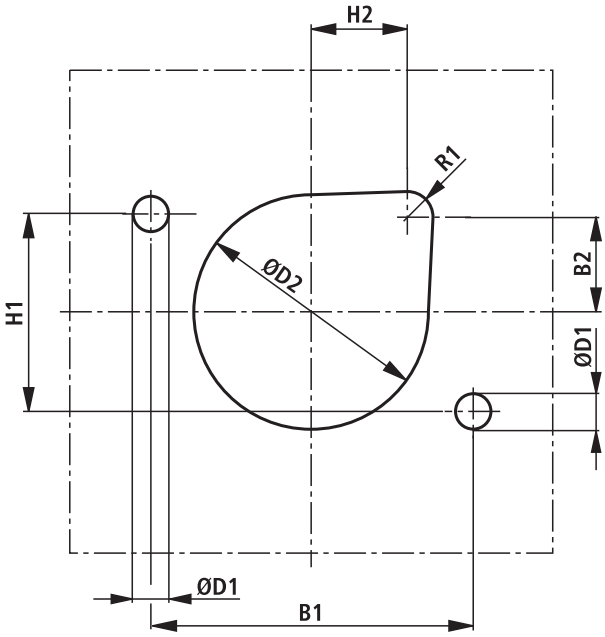
¹⁾ See page 13 for dimensions

Pressure relief valve

NG	B1	B2	ØD1	D2	ØD3	D4	H1	H2	H3	L1	L2	L3	L4	L5	L6	T1	(P)	Weight
6	45	60	25	G1/4	6.6	M6	25	40	20	80	4	15	55	40	20	10	G1/4	ca. 1.5 kg
10	60	80	34	G1/2	9	M8	40	60	30	100	4	20	70	48	21	15	G1/2	ca. 3.7 kg
20	70	100	47	G1	9	M8	50	70	35	135	5.5	20	100	65	34	18	G1	ca. 6.4 kg
30	100	130	65	G1 1/2	11	M10	60	90	45	180	5.5	25	130	85	35	20	G1 1/2	ca. 13.9 kg

NG	Maximum overall length with response pressure at lowest setting
6	165
10	181
20	212
30	283

Unit dimensions: Cut-out in sheet metal for valve mounting in version for subplate mounting (in mm)



NG	B1	B2	H1	H2	ØD1 ^{H13}	ØD2 ^{H13}	R1
6	45	12.5	25	22.5	7	40	8
10	60	20.5	40	20.5	9	44	8
20	70	24	50	24	9	55	8
30	100	29.5	60	29.5	11	73	8

Characteristics / Ordering Code

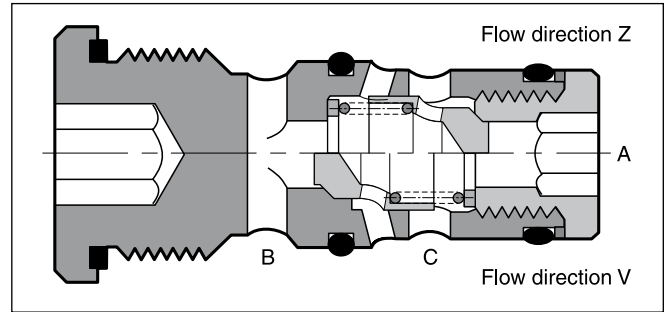
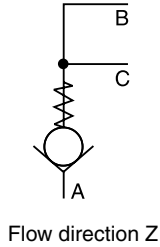
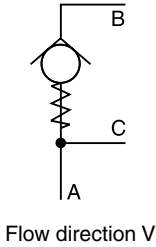
The check valve series SPV and SPZ are designed as threaded cartridge valves. All parts are assembled in one unit and easy to mount.

Features

- Little space required
- Leak-free
- Easy assembly



Ports



Ordering code

	—	SP		B	030	E		M
Seal		Check valve	Flow direction	Design series	Factory norm, direct operated	Threaded cartridge	Valve size	Spring 0.3 bar

Code	Seal
omit	NBR
V	FPM

Code	Flow direction
V	Port B → A and C
Z	Port A → B and C

Bold letters =
Short-term availability

Code	Size
06	NG06
10	NG10

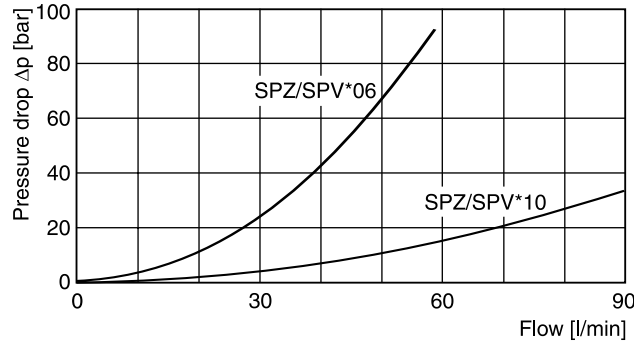
Technical data

General	
Design	Threaded cartridge valve
Nominal size	NG06 NG10
Mounting position	Unrestricted
Ambient temperature	[°C] -40 ... +60
Weight	[kg] 0.5 0.8
Hydraulic	
Flow direction	See symbols
Fluid	Hydraulic oil according to DIN 51524...51525
Viscosity, permitted	[cSt] / [mm²/s] 20 ... 380
recommended	[cSt] / [mm²/s] 30 ... 80
Fluid temperature	[°C] -20 ... +60
Filtration	ISO 4406 (1999); 18/16/13
Nominal pressure	[bar] 350
Opening pressure	[bar] 0.3
Flow	[l/min] 40 60

SPV-SPZ UK.INDD CM 06.06.14

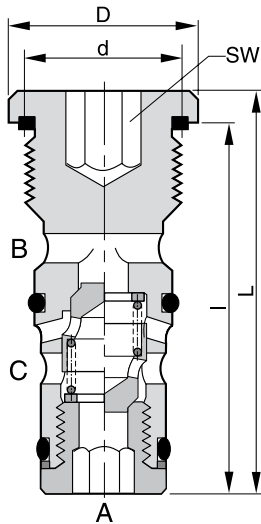
Performance Curves / Dimensions

$\Delta p/Q$ performance curve



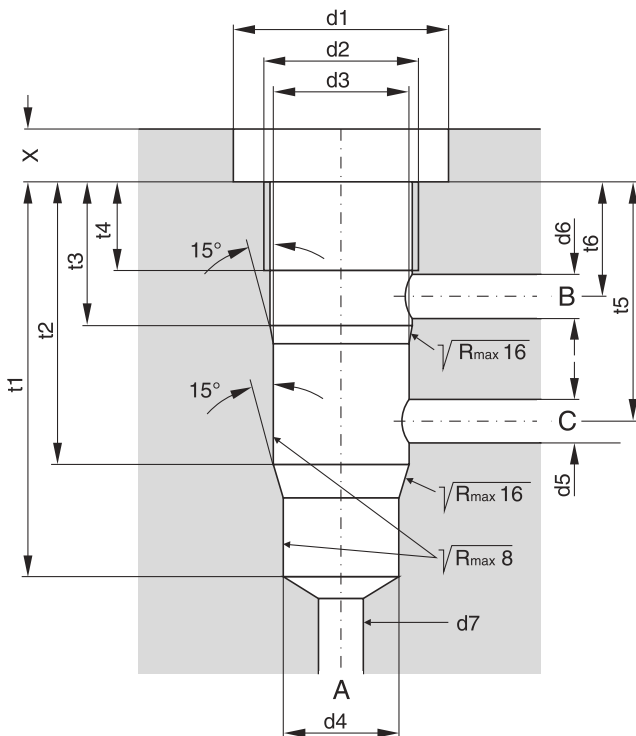
Characteristic curves measured with HLP46 at 50 °C.

Dimensions



Dimensions	NG06	NG10
D	23	29
L	48	70
d	M18x1.5	M24x1.5
l	42.5	64
SW	8	12
Tightening torque ¹⁾ [Nm] ± 15 %	40	65

Mounting cavity



Dimensions	NG06	NG10
d1	25	35
d2	M18 x 1.5	M24 x 1.5
d3 ^{H7}	16	22
d4 ^{H7}	14	20
d5 _{max.}	6	9
d6 _{max.}	6	9
d7 _{max.}	13.5	19.5
t1	45	68
t2	32	51
t3	16	20
t4	10	15
t5	27.5	40
t6	12	14.5
X	6	7

Seal kits

NG	NBR seals	FPM seals
06	SK-SPV/ZB0E06	SK-SPV/ZB0E06V
10	SK-SPV/ZB0E10	SK-SPV/ZB0E10V

¹⁾ Please note the material specification for tightening torque in chapter 12, "accessories"

Inline filters with filter element according to DIN 24550

Type 245LEN0040 to 0400; 245LE0130, 0150

RE 51421

Edition: 2014-08

Replaces: 07.11



245LEN_d

- ▶ Size according to **DIN 24550**: 0040 to 0400
- ▶ additional sizes: 0130, 0150
- ▶ Nominal pressure 250 bar [3628 psi]
- ▶ Connection up to G1 1/2; SAE 1 1/2; SAE 24
- ▶ Operating temperature: -10 °C to +100 °C [+14 °F to +212 °F]

Features

Inline filters are used in hydraulic systems for separating solid materials from fluids and lubricating oils. They are intended for attachment in pipelines.

They distinguish themselves by the following:

- ▶ Filters for inline installation
- ▶ Special highly efficient filter materials
- ▶ Filtration of very fine particles and high dirt holding capacity across a broad pressure differential range
- ▶ High collapse resistance of the filter elements
- ▶ By default equipped with mechanical optical maintenance indicator with memory function
- ▶ Various, optional electronic switching elements, modular design
- ▶ Optional bypass valve integrated in the filter housing
- ▶ High filtration performance due to the tangential cyclone-effect flow path

Contents

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Ordering code filter

01	02	03	04	05	06	07	08	09
245LE	N		-			-	-	

Series

01	Inline filter 250 bar [3628 psi]	245LE
----	----------------------------------	-------

Filter element

02	With filter element according to DIN 24550	N
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Size

03	LEN...	0040 0063 0100 0160 0250 0400
	LE...	0130 0150

Filter rating in μm

04	Absolute (ISO 16889; $\beta_x(c) \geq 200$)	Glass fiber material, not cleanable	H3XL H6XL H10XL H20XL
	Nominal	Stainless steel wire mesh, cleanable	G10 G25 G40 G60 G100

Pressure differential

05	Max. admissible pressure differential of the filter element 30 bar [435 psi] – Filter with bypass valve	A00
	Max. admissible pressure differential of the filter element 330 bar [4786 psi] – Filter without bypass valve	B00

Maintenance indicator

06	Maintenance indicator, mech./optical, switching pressure 2.2 bar [31.9 psi] – bypass cracking pressure 3.5 bar [51 psi]	V2.2
	Maintenance indicator, mech./optical, switching pressure 5.0 bar [72.5 psi] – bypass cracking pressure 7.0 bar [101 psi]	V5.0

Seal

07	NBR seal	M
	FKM seal	V

Ordering code filter

01	02	03	04	05	06	07	08	09
245LE	N		-		-	-	-	-

Connection

08	Frame size		0040	0063-0100	0130-0150	0160-0400	
	Connection						
	G1/2	Pipe thread according to ISO 228	●	X			R2
	G3/4		X	X			R3
	G1		X	●	X		R4
	G1 1/4				●	X	R5
	G1 1/2				X	●	R6
	SAE 1 1/2"	SAE flange 6,000 psi				X	S6
	SAE 10	Pipe thread according to SAE J1926	X				U3
	SAE 12			X			U4
	SAE 20				X		U5
	SAE 24					X	U6
			●	Standard connection			
			X	Alternative connection			

Supplementary information

09	Manufacturer's inspection certificate M according to DIN 55350 T18	Z1
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Order example:

245LEN0100-H10XLA00-V5,0-M-R4

Further versions (filter materials, connections,...) are available on request.

Preferred types

245LE(N) preferred types, NBR seal, flow specifications for 30 mm²/s [143 SUS]

Inline filter with bypass, filter rating 3 µm

Type	Flow in l/min [gpm] at $\Delta p = 1.5 \text{ bar}$ [21.75 psi] ¹⁾	Material no. Filter				Material no. Replacement element
245LEN0040-H3XLA00-V5,0-M-..	29 [6.1]	..R2	R928030024	..U3	R928030216	R928006645
245LEN0063-H3XLA00-V5,0-M-..	44 [7.9]	..R4	R928030025	..U4	R928030217	R928006699
245LEN0100-H3XLA00-V5,0-M-..	61 [11.6]	..R4	R928030026	..U4	R928030218	R928006753
245LE0130-H3XLA00-V5,0-M-..	101 [19.5]	..R5	R928030027	..U5	R928030219	R928022274
245LE0150-H3XLA00-V5,0-M-..	123 [23.5]	..R5	R928030028	..U5	R928030220	R928022283
245LEN0160-H3XLA00-V5,0-M-..	184 [34.9]	..R6	R928030029	..U6	R928030221	R928006807
245LEN0250-H3XLA00-V5,0-M-..	261 [50.2]	..R6	R928030030	..U6	R928030222	R928006861
245LEN0400-H3XLA00-V5,0-M-..	330 [66.0]	..R6	R928030031	..U6	R928030223	R928006915

Inline filter with bypass, filter rating 6 µm

Type	Flow in l/min [gpm] at $\Delta p = 1.5 \text{ bar}$ [21.75 psi] ¹⁾	Material no. Filter				Material no. Replacement element
245LEN0040-H6XLA00-V5,0-M-..	48 [12.7]	..R2	R928030280	..U3	R928030472	R928006646
245LEN0063-H6XLA00-V5,0-M-..	78 [20.6]	..R4	R928030281	..U4	R928030473	R928006700
245LEN0100-H6XLA00-V5,0-M-..	82 [21.7]	..R4	R928030282	..U4	R928030474	R928006754
245LE0130-H6XLA00-V5,0-M-..	152 [40.2]	..R5	R928030283	..U5	R928030475	R928022275
245LE0150-H6XLA00-V5,0-M-..	170 [45.0]	..R5	R928030284	..U5	R928030476	R928022284
245LEN0160-H6XLA00-V5,0-M-..	245 [64.7]	..R6	R928030285	..U6	R928030477	R928006808
245LEN0250-H6XLA00-V5,0-M-..	310 [81.9]	..R6	R928030286	..U6	R928030478	R928006862
245LEN0400-H6XLA00-V5,0-M-..	400 [105.7]	..R6	R928030287	..U6	R928030479	R928006916

Inline filter with bypass, filter rating 10 µm

Type	Flow in l/min [gpm] at $\Delta p = 1.5 \text{ bar}$ [21.75 psi] ¹⁾	Material no. Filter				Material no. Replacement element
245LEN0040-H10XLA00-V5,0-M-..	58 [15.3]	..R2	R928030536	..U3	R928030728	R928006647
245LEN0063-H10XLA00-V5,0-M-..	98 [18.2]	..R4	R928030537	..U4	R928030729	R928006701
245LEN0100-H10XLA00-V5,0-M-..	84 [22.2]	..R4	R928030538	..U4	R928030730	R928006755
245LE0130-H10XLA00-V5,0-M-..	172 [45.4]	..R5	R928030539	..U5	R928030731	R928022276
245LE0150-H10XLA00-V5,0-M-..	196 [51.8]	..R5	R928030540	..U5	R928030732	R928022285
245LEN0160-H10XLA00-V5,0-M-..	281 [74.2]	..R6	R928030541	..U6	R928030733	R928006809
245LEN0250-H10XLA00-V5,0-M-..	330 [87.2]	..R6	R928030542	..U6	R928030734	R928006863
245LEN0400-H10XLA00-V5,0-M-..	420 [111.0]	..R6	R928030543	..U6	R928030735	R928006917

¹⁾ An appropriate differential pressure via the filter and measuring device according to ISO 3968. The differential pressure measured on the maintenance indicator is lower.

Ordering code accessories

(dimensions in mm [inch])

Electronic switching element for maintenance indicators

01	02	03
WE	-	-

Maintenance indicator

01	Electronic switching element	WE
----	------------------------------	-----------

Type of signal

02	1 switching point	1SP
	2 switching points, 3 LED	2SP
	2 switching points, 3 LED and signal suppression up to 30 °C [86 °F]	2SPSU

Connector

03	Round plug-in connection M12 x 1, 4-pole	M12 x 1
	Rectangular plug-in connection, 2-pole, design A according to EN-175301-803	EN175301-803

Material numbers of the electronic switching elements

Material no.	Type	Signal	Switching points	Connector	LED
R928028409	WE-1SP-M12 x 1	Changeover	1	M12 x 1	without
R928028410	WE-2SP-M12 x 1	Normally open (at 75%) / normally closed contact (at 100%)	2		3 pieces
R928028411	WE-2SPSU-M12 x 1				
R928036318	WE-1SP-EN175301-803	Normally closed contact	1	EN 175301-803	without

Mating connectors

for electronic switching element with round plug-in connection M12 x 1

Mating connector suitable for K24 4-pole, M12 x 1 with screw connection, cable gland Pg9.

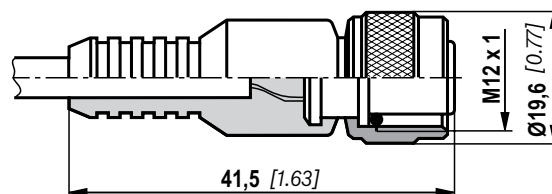
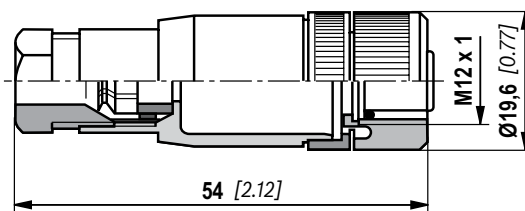
Material no. R900031155

Mating connector suitable for K24-3m 4-pole, M12 x 1 with potted-in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

Core marking: **1** brown **2** white
 3 blue **4** black

Material no. R900064381



For more round plug-in connections and technical data refer to data sheet 08006.

Order example:

Inline filter with mechanical optical maintenance indicator for $p_{nom.} = 250 \text{ bar [3628 psi]}$ with bypass valve, size 0100, with filter element 10 μm and electronic switching element M12x1 with 1 switching point for hydraulic fluid mineral oil HLP according to DIN 51524.

Filter with mech. optical maintenance indicator: 245LEN0100-H10XLA00-V5,0-M-R4

Material no. R928030538

Switching element: WE-1SP-M12 x 1

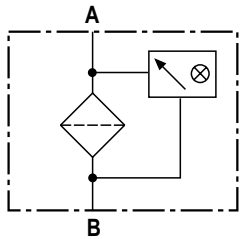
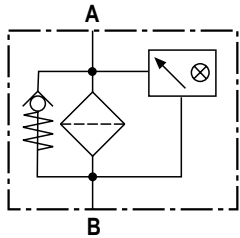
Material no. R928028409

Mating connector: Mating connector suitable for K24 4-pole, M12 x 1 with screw connection, cable gland Pg9.

Material no. R900031155

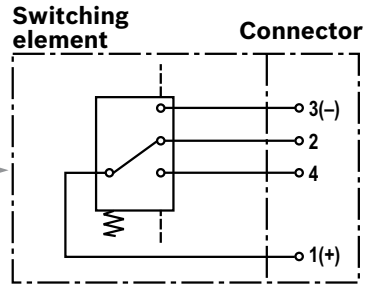
Symbols

Inline filter with bypass and mechanical indicator

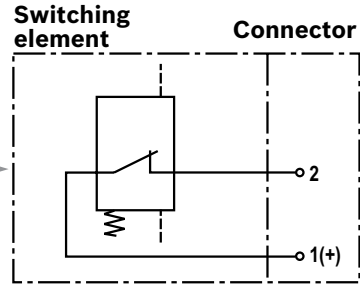


Inline filter without bypass and with mechanical indicator

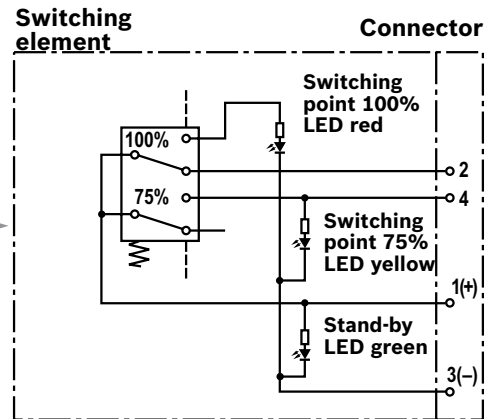
Electronic switching element for maintenance indicator



WE-1SP-M12 x 1

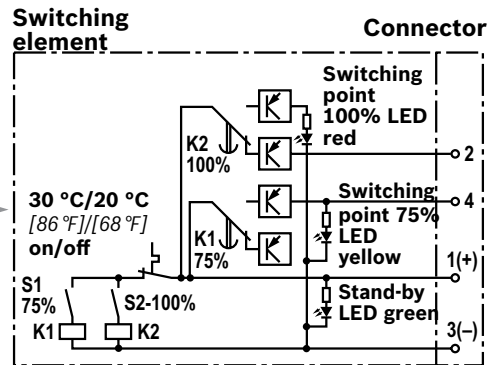


WE-1SP-EN175301-803



WE-2SP-M12 x 1

Circuit diagram drawn in plugged condition (operating state)



WE-2SPSU-M12 x 1

Circuit diagram drawn in plugged condition at temperature > 30 °C [86 °F] (operating condition)

Function, section

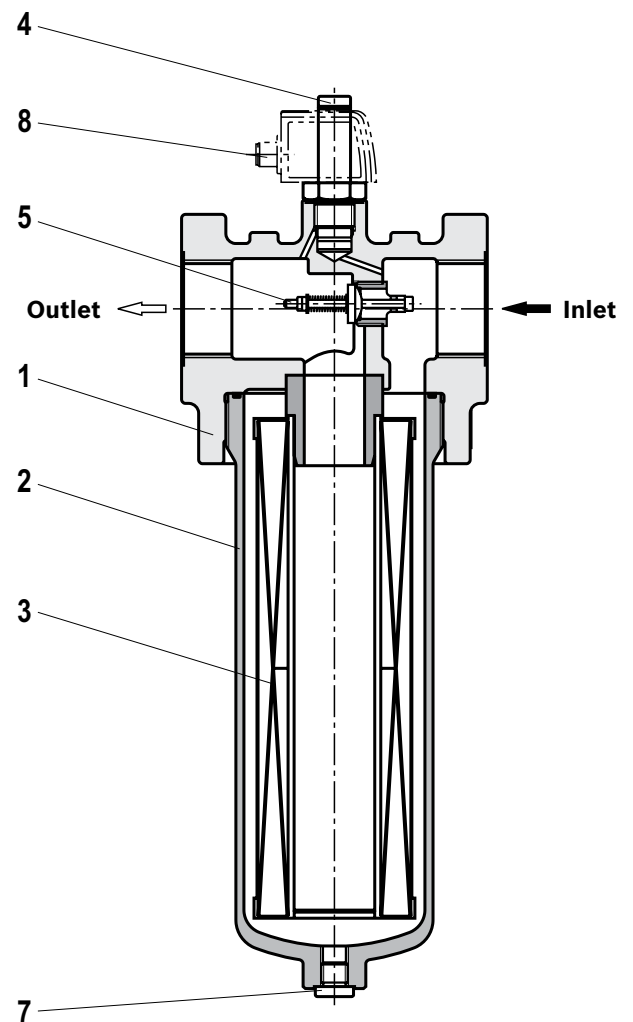
The 245LE(N) inline filter is suitable for inline installation. It basically consists of filter head (1), a screwable filter bowl (2), filter element (3) as well as mechanical optical maintenance indicator (4). In case of filters with low-pressure-differential-stable filter elements (= code letter pressure differential A), there is an assembled bypass valve (5) as standard.

Via the inlet, the fluid reaches the filter element (3) where it is cleaned. The dirt particles filtered out collect in the filter element (3). Via the outlet, the filtered fluid enters the hydraulic circuit.

The filter housing and all connection elements are designed so that pressure peaks - as they may e.g. occur in case of abrupt opening of large control valves due to the accelerated fluid quantity - can be securely absorbed. As of size 0160, the standard equipment comprises a drain screw (7).

By default, the filter is equipped with mechanical optical maintenance indicator (4). The electronic switching element (8) which has to be ordered separately is attached to the mechanical optical maintenance indicator (4) and held by means of a locking ring.

The electronic switching elements with 1 or 2 switching points are connected via a mating connector according to IEC-60947-5-2 or via a cable connection according to EN17301-803.



WARNING!

- ▶ If the maintenance indicator is not observed while the element is exchanged, the bypass valve will open if the pressure differential increases. This means that part of the volume flow enters unfiltered into the clean side of the filter. Effective filtration is therefore no longer guaranteed.

Technical data

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

General						
Installation position		vertical				
Ambient temperature range		°C [°F]	-10 ... +65 [+14 ... +149]; (short periods down to -30 [-22])			
Storage conditions	- NBR seal	°C [°F]	40 ... +65 [-40 ... +149]; max. relative air humidity 65%			
	- FKM seal	°C [°F]	-20 ... +65 [-4 ... +149]; max. relative air humidity 65%			
Weight	- Filter	Size	0040	0063	0100	0130
		kg [lbs]	3.2 [7.10]	3.8 [8.40]	4.2 [9.30]	6.95 [15.30]
		Size	0150	0160	0250	0400
		kg [lbs]	7.25 [16]	11.5 [25.40]	12.2 [26.90]	13.8 [30.40]
	- Filter bowl	Size	0040	0063	0100	0130
		kg [lbs]	0.57 [1.26]	1.03 [2.27]	1.44 [3.17]	1.93 [4.25]
		Size	0150	0160	0250	0400
		kg [lbs]	2.27 [5.00]	2.49 [5.49]	3.33 [7.34]	4.72 [10.41]
Volume	Size	0040	0063	0100	0130	
		l [US gal]	0.21 [0.06]	0.38 [0.10]	0.53 [0.14]	0.76 [0.20]
	Size	0150	0160	0250	0400	
		l [US gal]	0.96 [0.25]	1.13 [0.30]	1.6 [0.42]	2.4 [0.63]
Material	- Filter head	GGG				
	- Filter bowl	Steel				
	- Bypass valve	Aluminum / steel / POM				
	- Seals	NBR or FKM				
	- Optical maintenance indicator	Brass				
	- Electronic switching element	Plastic PA6				

Hydraulic			
Maximum operating pressure	bar [psi]	250 [3628]	
Hydraulic fluid temperature range	°C [°F]	-10 ... +100 [+14 ... +212]	
Minimum conductivity of the medium	pS/m	300	
Fatigue strength according to ISO 10771	Load cycles	> 10 ⁶ with max. operating pressure	
Type of pressure measurement of the maintenance indicator	Pressure differential		
Assignment: Response pressure of the maintenance indicator / cracking pressure of the bypass valve		Response pressure of the maintenance indicator	Cracking pressure of the bypass valve
	bar [psi]	2.2 ± 0.3 [31.9 ± 4.4]	3.5 ± 0.35 [50.8 ± 5.1]
	bar [psi]	5.0 ± 0.5 [72.5 ± 7.3]	7.0 ± 0.5 [101.5 ± 7.3]
Filtration direction	From the outside to the inside		

Technical data

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

Electric (electronic switching element)				
Electrical connection		Round plug-in connection M12 x 1, 4-pole		Standard connection EN 175301-803
	Version	WE-1SP- M12 x 1	WE-2SP- M12 x 1	WE-2SPSU- M12 x 1 WE-1SP- EN175301-803
Contact load, direct voltage	A_{max}	1		
Voltage range	V_{max}	150 (AC/DC)	10 ... 30 (DC)	250 (AC)/200 (DC)
Max. switching power with resistive load	W	20		70
Switching type	- 75% signal	-	Normally open contact	-
	- 100% signal	Changeover	Normally closed contact	Normally closed contact
	- 2SPSU		Signal interconnection at 30 °C [86 °F], return switching at 20 °C [68 °F]	
Display via LEDs in the electronic switching element 2SP...			Stand-by (LED green); 75% switching point (LED yellow) 100% switching point (LED red)	
Protection class according to EN 60529	IP	67		65
Ambient temperature range	°C [°F]	-25 ... +85 [-13... +185]		
For direct voltage above 24 V, spark extinguishing is to be provided for protecting the switching contacts.				
Weight	- electronic switching element	kg [lbs]	0.1 [0.22]	

Filter element				
Glass fiber material H.XL		Single-use element on the basis of inorganic fiber		
		Filtration ratio according to ISO 16889 up to $\Delta p = 5 \text{ bar [72.5 psi]}$	Achievable oil cleanliness according to ISO 4406 [SAE-AS 4059]	
Particle separation	H20XL	$\beta_{20(c)} \geq 200$	19/16/12 ... 22/17/14	
	H10XL	$\beta_{10(c)} \geq 200$	17/14/10 ... 21/16/13	
	H6XL	$\beta_{6(c)} \geq 200$	15/12/10 ... 19/14/11	
	H3XL	$\beta_{5(c)} \geq 200$	13/10/8 ... 17/13/10	
Admissible pressure differential	- A00	bar [psi]	30 [435]	
	- B00	bar [psi]	330 [4785]	

Compatibility with permitted hydraulic fluids

Hydraulic fluid	Classification	Suitable sealing materials	Standards
Mineral oil	HLP	NBR	DIN 51524
Biodegradable	- insoluble in water	HETG	VDMA 24568
		HEES	
	- soluble in water	HEPG	VDMA 24568
Flame-resistant	- water-free	HFDU, HFDR	VDMA 24317
	- containing water	HFAS	DIN 24320
		HFAE	
		HFC	
		NBR	VDMA 24317



Important information on hydraulic fluids!

- For more information and data on the use of other hydraulic fluids, please refer to data sheet 90220 or contact us!
- **Flame-resistant – containing water:** Due to possible chemical reactions with materials or surface coatings of machine and system components, the service life with these hydraulic fluids may be less than expected.

Filter materials made of filter paper (P) may not be used, filter elements with glass fiber material have to be used instead.

- **Biodegradable:** If filter materials made of filter paper are used, the filter life may be shorter than expected due to material incompatibility and swelling.

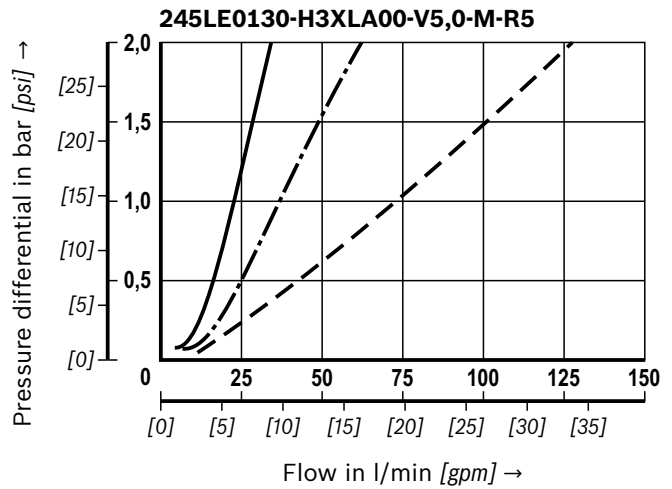
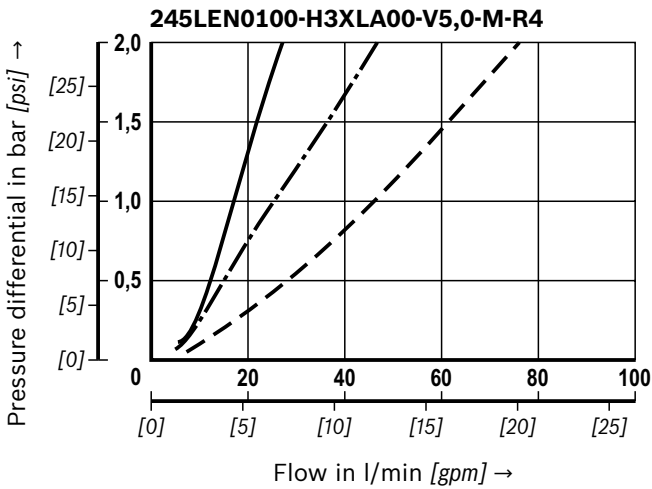
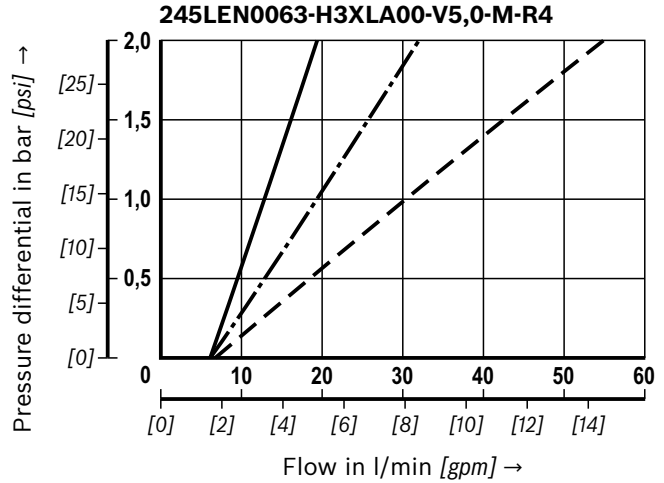
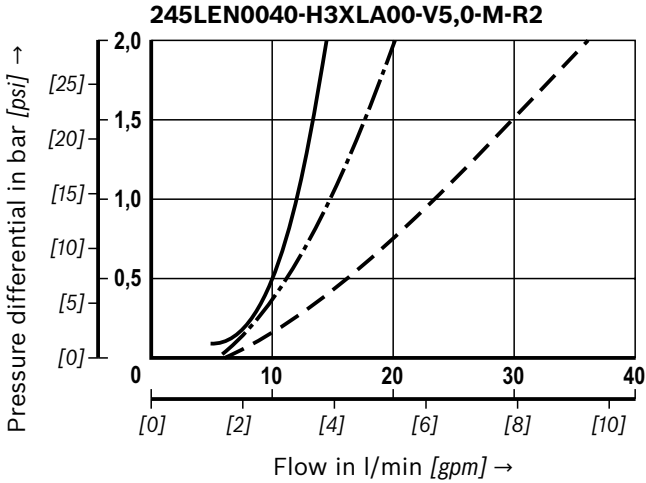
Characteristic curves

(measured with mineral oil HLP46 according to ISO 3968)

Spec. weight: < 0.9 kg/dm³ Δp-Q-characteristic curves for complete filters recommended initial Δp for design = 1.5 bar [21.75 psi]

A proper filter design is made possible by our online “Bosch Rexroth FilterSelect” design software.

Oil viscosity:
 ——— 140 mm²/s [649 SUS]
 - · - · 68 mm²/s [315 SUS]
 - - - 30 mm²/s [143 SUS]



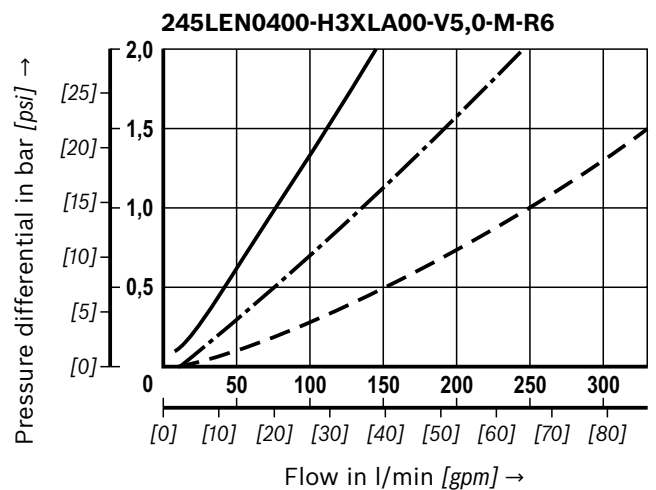
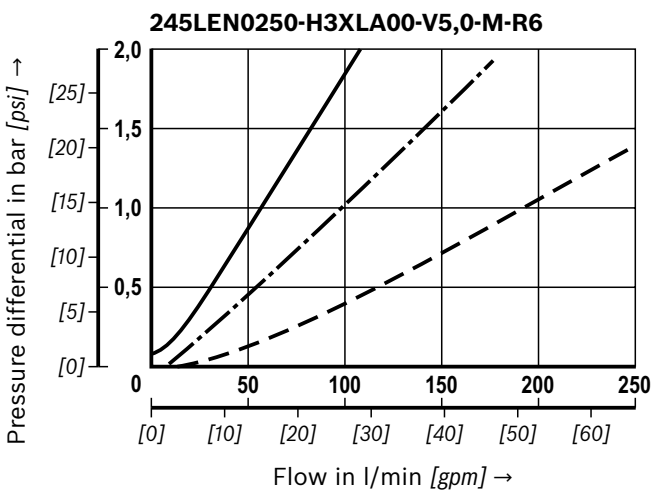
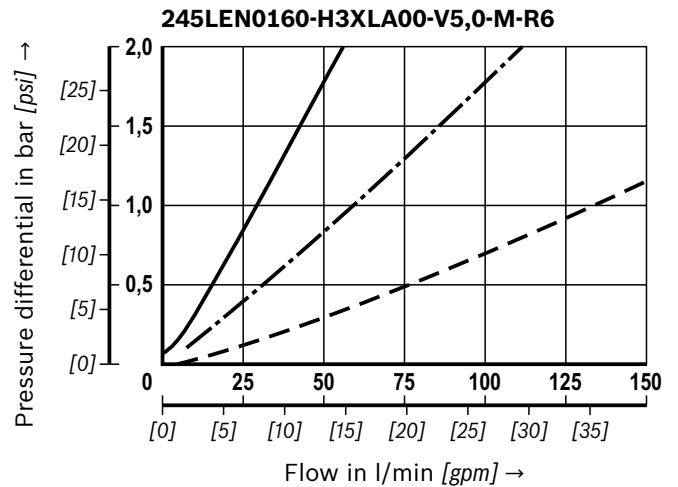
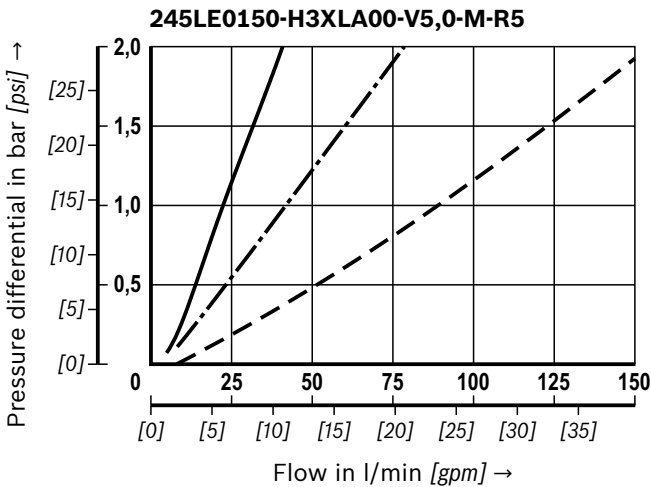
Characteristic curves
(measured with mineral oil HLP46 according to ISO 3968)

H3XL

Spec. weight: < 0.9 kg/dm³ Δp-Q-characteristic curves for complete filters recommended initial Δp for design = 1.5 bar [21.75 psi]

A proper filter design is made possible by our online “Bosch Rexroth FilterSelect” design software.

Oil viscosity:
 ——— 140 mm²/s [649 SUS]
 - · - · 68 mm²/s [315 SUS]
 - - - 30 mm²/s [143 SUS]



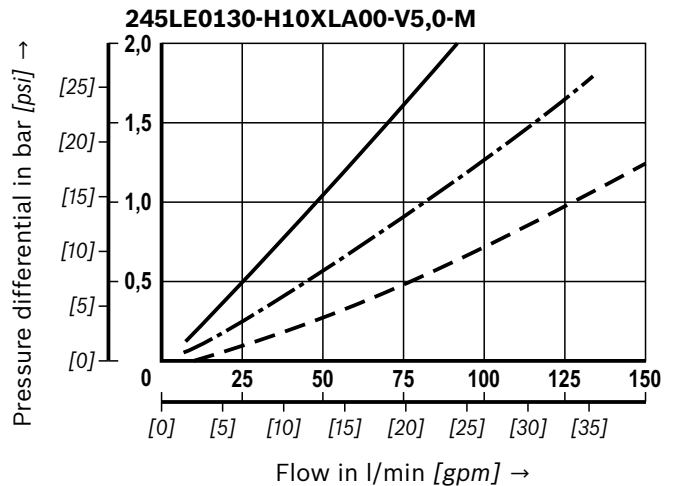
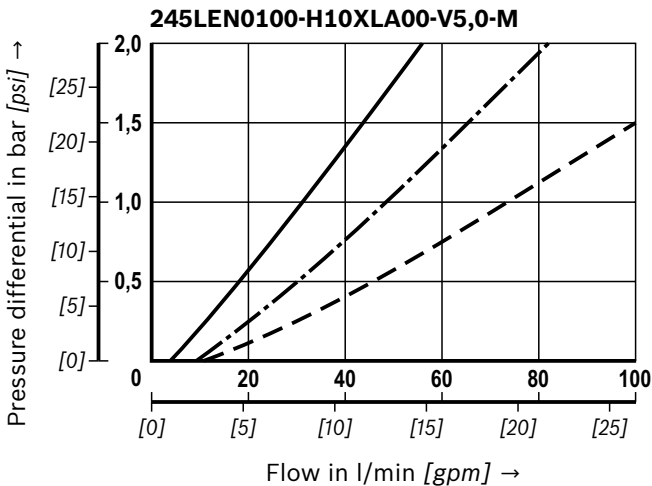
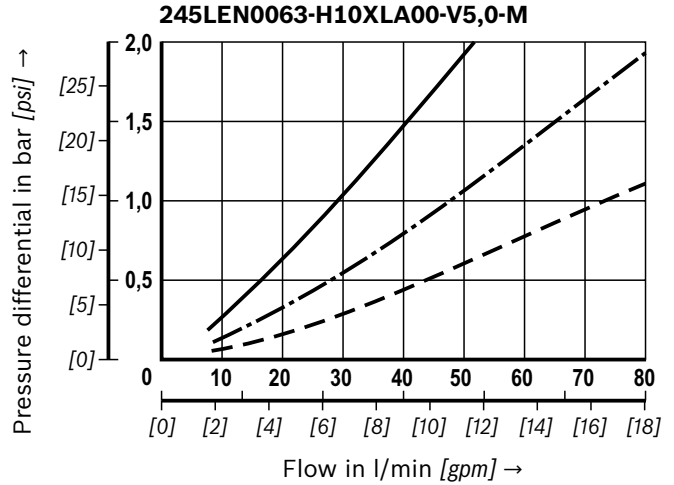
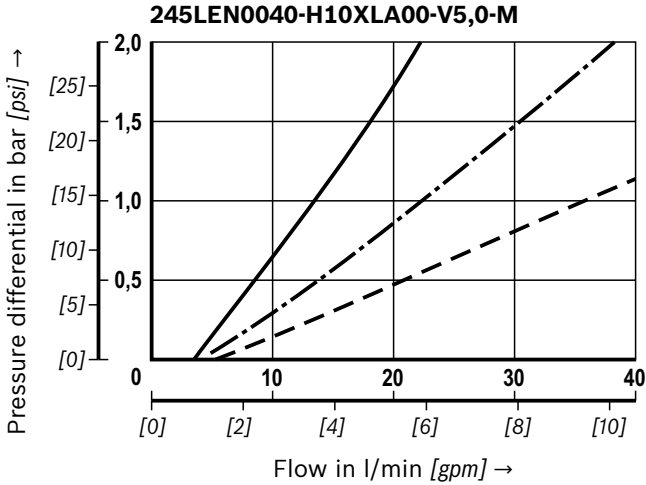
Characteristic curves

(measured with mineral oil HLP46 according to ISO 3968)

Spec. weight: < 0.9 kg/dm³
 Δp-Q-characteristic curves for complete filters recommended initial Δp for design = 1.5 bar [21.75 psi]

A proper filter design is made possible by our online “Bosch Rexroth FilterSelect” design software.

Oil viscosity:
 ——— 140 mm²/s [649 SUS]
 - · - · 68 mm²/s [315 SUS]
 - - - 30 mm²/s [143 SUS]



Characteristic curves (measured with mineral oil HLP46 according to ISO 3968)

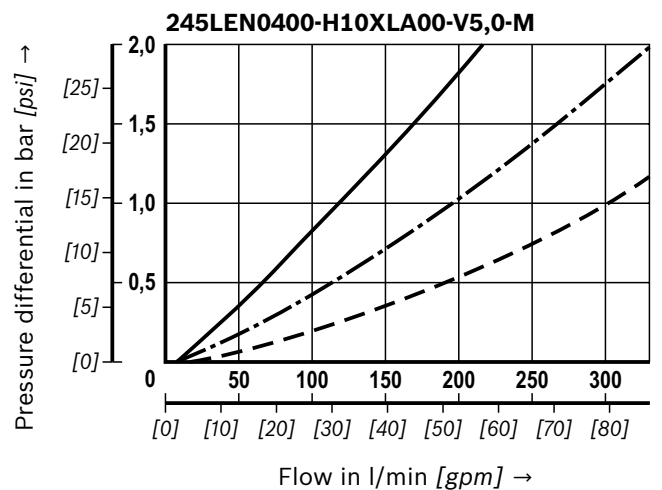
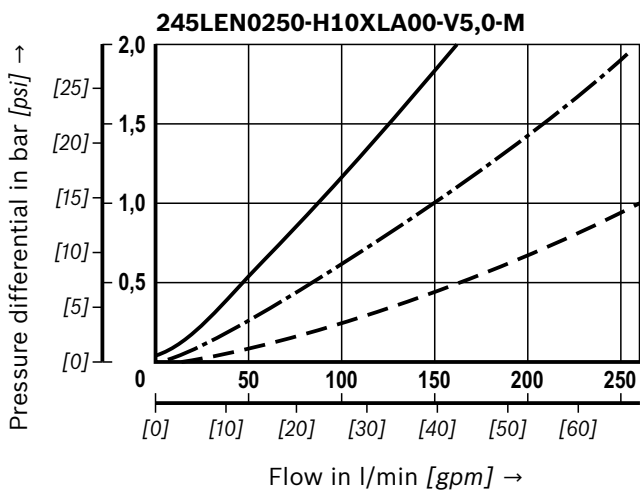
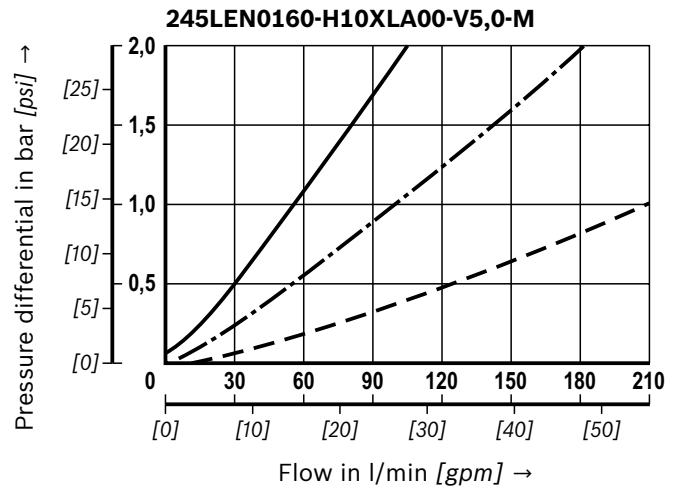
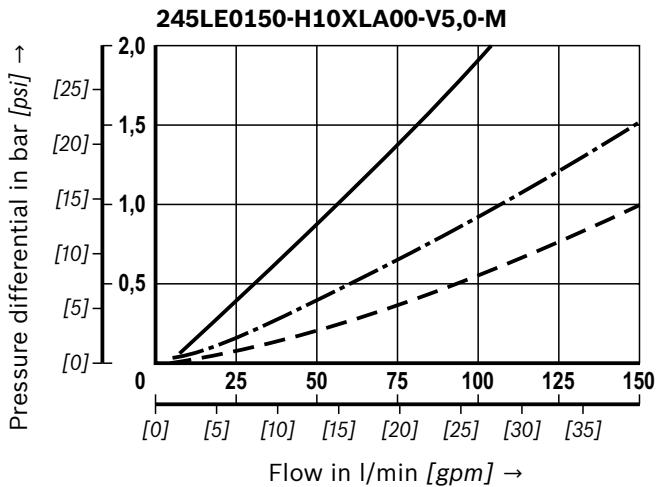
H10XL

Spec. weight: < 0.9 kg/dm³

Δp -Q-characteristic curves for complete filters recommended
initial Δp for design = 1.5 bar [21.75 psi]

A proper filter design is made possible by our online
“Bosch Rexroth FilterSelect” design software.

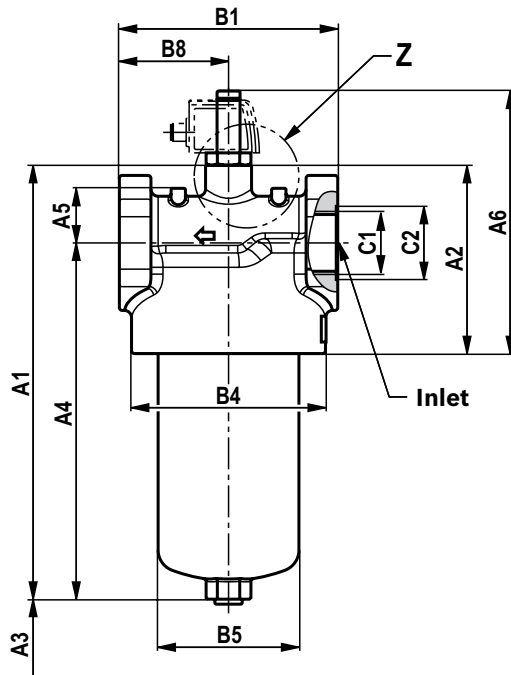
Oil viscosity:
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 - · - · 68 mm²/s [315 SUS]
 - - - 30 mm²/s [143 SUS]



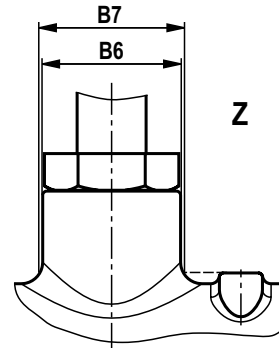
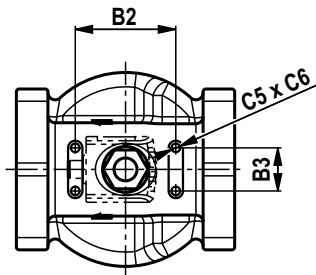
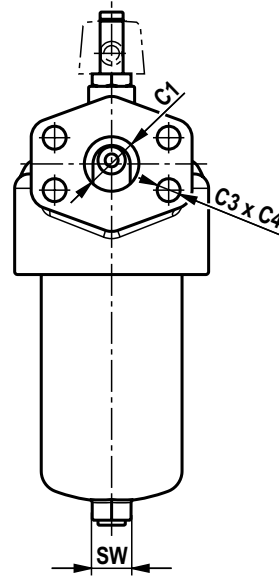
Dimensions: 245LE(N) NG0040 ... NG0400

(Dimensions in mm [inch])

Pipe thread
connections
UNF thread



Connection SAE 1 1/2"
- 3000 psi



Dimensions: NG0040 ... NG0400

(Dimensions in mm [inch])

Type	A1	A2	A3 ¹⁾	A4	A5	A6
245LEN0040	200 [7.87]	94 [3.70]	120 [4.72]	156 [6.14]	25 [0.98]	146 [5.75]
245LEN0063	264 [10.39]			220 [8.66]		
245LEN0100	354 [13.94]			310 [12.20]		
245LE0130	324 [12.76]	121 [4.76]	140 [5.51]	270 [10.63]	38 [1.50]	173 [6.81]
245LE0150	374 [14.72]			320 [12.60]		
245LEN0160	356 [14.02]	131 [5.16]	120 [4.72]	302 [11.89]		183 [7.20]
245LEN0250	392 [15.43]			338 [13.31]		
245LEN0400	542 [21.34]			488 [19.21]		

Type	B1 ²⁾	B2	B3	ØB4	ØB5	ØB6	ØB7	B8
245LEN0040	92 [3.62]	60 [2.36]	25 [0.98]	85 [3.35]	55 [2.17]	32 [1.26]	34 [1.34]	46 [1.81]
245LEN0063								
245LEN0100								
245LE0130	122 [4.80]	80 [3.15]	30 [1.18]	116 [4.57]	77 [3.03]		32 [1.26]	61 [2.40]
245LE0150								
245LEN0160	152 [5.98]	70 [2.76]	135 [5.31]	98 [3.86]	76 [2.99]			
245LEN0250								
245LEN0400								

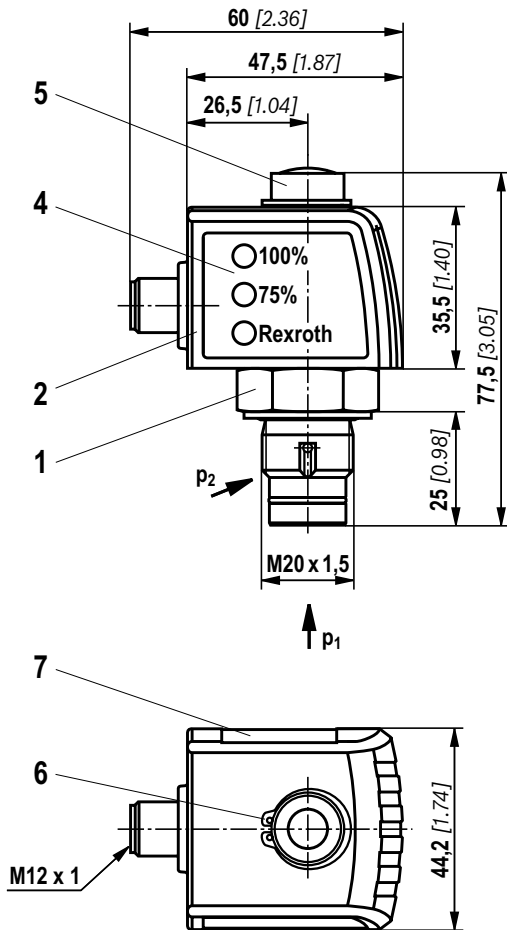
Type	C1 connection					C3	C4	C5	C6	SW
	Standard R...	ØC2	Optional U...	ØC2	Optional S...					
245LEN0040	G1/2	28 [1.10]	SAE 10 7/8-14 UNF-2B	41 [1.61]	-	M16	22 [0.87]	M6	8 [0.31]	19 [0.75]
245LEN0063	G1	41 [1.61]	SAE 12 1 1/16-12 UN-2B							
245LEN0100										
245LE0130	G1 1/4	51 [2.01]	SAE 20 1 5/8-12 UN-2B	58 [2.28]						24 [0.94]
245LE0150										
245LEN0160	G1 1/2	56 [2.20]	SAE 24 1 7/8-12 UN-2B	65 [2.56]	SAE 1 1/2" 3000 psi	27 [1.06]				
245LEN0250										
245LEN0400										

¹⁾ Servicing height for filter element exchange

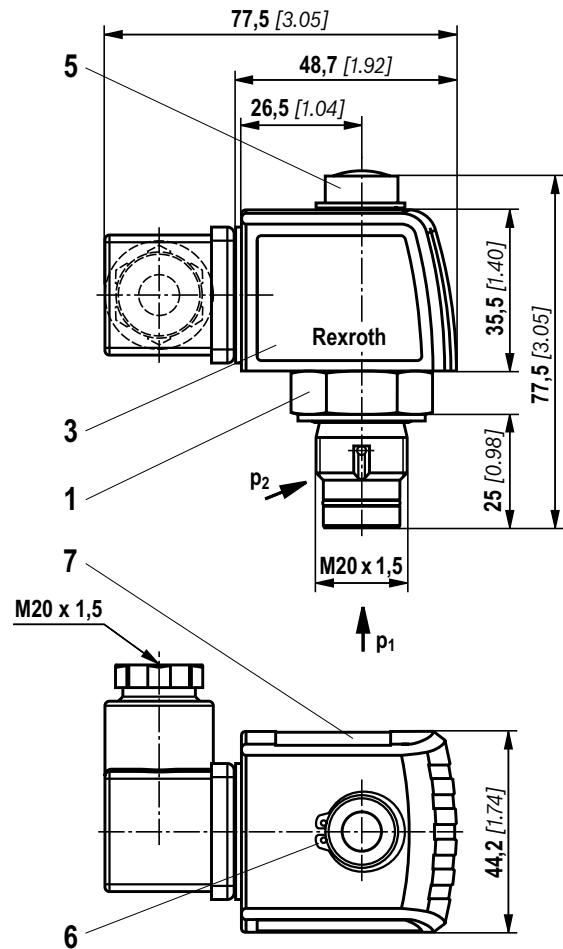
²⁾ Dimension B1 is reduced with SAE flanges by 4 mm [0.16 inch]

Maintenance indicator (dimensions in mm [inch])

Pressure differential indicator with mounted switching element M12 x 1



Pressure differential indicator with mounted switching element EN-175301-803



- 1 Mechanical optical maintenance indicator; max. tightening torque $M_{A \max} = 50 \text{ Nm}$ [36.88 lb-ft]
- 2 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); round plug-in connection M12 x 1, 4-pole
- 3 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); rectangular plug-in connection EN175301-803
- 4 Housing with three LEDs: 24 V =
green: Stand-by
yellow: Switching point 75%
red: Switching point 100%
- 5 Visual indicator bistable
- 6 Locking ring DIN 471-16 x 1, **material no. R900003923**
- 7 Name plate

Notices:

Representation contains mechanical optical maintenance indicator (1) and electronic switching element (2) (3).

**Ordering code
spare parts**

Filter element

01	02	03	04	05	06
2.			-	-	0

Filter element

01	Design	2.
----	--------	----

Size

02	LEN...	0040 0063 0100 0160 0250 0400
	LE...	0130 0150

Filter rating in µm

03	Absolute (ISO 16889; β _{x(c)} ≥ 200)	Glass fiber material, not cleanable	H3XL H6XL H10XL H20XL
	Nominal	Stainless steel wire mesh, cleanable	G10 G25 G40 G60 G100

Pressure differential

04	Max. admissible pressure differential of the filter element 30 bar [435 psi] – Filter with bypass valve	A00
	Max. admissible pressure differential of the filter element 330 bar [4786 psi] – Filter without bypass valve	B00

Bypass valve

05	without bypass valve	0
----	-----------------------------	---

Seal

06	NBR seal	M
	FKM seal	V

Order example:

2,0100 H3XL-A00-0-M

For detailed information on Rexroth filter elements please refer to data sheet 51420.

Preferred program replacement filter element

Replacement filter element 3 micron		Replacement filter element 6 micron		Replacement filter element 10 micron	
R928006645	2,0040 H3XL-A00-0-M	R928006646	2,0040 H6XL-A00-0-M	R928006647	2,0040 H10XL-A00-0-M
R928006699	2,0063 H3XL-A00-0-M	R928006700	2,0063 H6XL-A00-0-M	R928006701	2,0063 H10XL-A00-0-M
R928006753	2,0100 H3XL-A00-0-M	R928006754	2,0100 H6XL-A00-0-M	R928006755	2,0100 H10XL-A00-0-M
R928022274	2,0130 H3XL-A00-0-M	R928022275	2,0130 H6XL-A00-0-M	R928022276	2,0130 H10XL-A00-0-M
R928022283	2,0150 H3XL-A00-0-M	R928022284	2,0150 H6XL-A00-0-M	R928022285	2,0150 H10XL-A00-0-M
R928006807	2,0160 H3XL-A00-0-M	R928006808	2,0160 H6XL-A00-0-M	R928006809	2,0160 H10XL-A00-0-M
R928006861	2,0250 H3XL-A00-0-M	R928006862	2,0250 H6XL-A00-0-M	R928006863	2,0250 H10XL-A00-0-M
R928006915	2,0400 H3XL-A00-0-M	R928006916	2,0400 H6XL-A00-0-M	R928006917	2,0400 H10XL-A00-0-M

Ordering code spare parts

Mechanical optical maintenance indicator

01	02	03	04	05	06
W	O	-	D01	-	-

01	Maintenance indicator	W
----	-----------------------	----------

02	Mechanical optical indicator	O
----	------------------------------	----------

Version

03	Pressure difference, modular design	D01
----	-------------------------------------	------------

Switching pressure

04	2.2 bar [32 psi]	2,2
	5.0 bar [72.5 psi]	5,0

Seal

05	NBR seal	M
	FKM seal	V

Max. operating pressure

06	Switching pressure 2.2 bar [32 psi], 160 bar [2321 psi]	160
	Switching pressure 5.0 bar [72.5 psi], 450 bar [6527 psi]	450

Mechanical optical maintenance indicator	Material no.
WO-D01-2.2-M-160	R901025312
WO-D01-2.2-V-160	R901066233
WO-D01-5,0-M-450	R901025313
WO-D01-5,0-V-450	R901066235

**Ordering code
spare parts**

Seal kit

01	02	03	04
D	245LE		-

01	Seal kit	D
----	-----------------	----------

02	Series	245LE
----	---------------	--------------

Size

03	NG0040-0100	N0040-0100
	Size 0130-0150	0130-0150
	NG0160-0400	N0160-0400

Seal

04	NBR seal	M
	FKM seal	V

Material no.	Seal kit
R928028016	D245LEN0040-0100-M
R928028214	D245LE0130-0150-M
R928028017	D245LEN0160-0400-M
R928047988	D245LEN0040-0100-V
R928048951	D245LE0130-0150-V
R928039838	D245LEN0160-0400-V

Assembly, commissioning, maintenance

Installation

- ▶ The max. operating pressure of the system must not exceed the max. admissible operating pressure of the filter (see type plate).
- ▶ During assembly of the filter (see also chapter “Tightening torque”), the flow direction (direction arrows) and the required servicing height of the filter element (see chapter “Dimensions”) are to be considered.
- ▶ Easy filter element exchange is guaranteed in the installation position filter bowl vertically downwards. The maintenance indicator must be arranged so it is easily viewed in operation.
- ▶ Remove the plastic plugs in the filter inlet and outlet.
- ▶ Ensure that the system is assembled without tension stress.
- ▶ The optional electronic maintenance indicator is connected via the electronic switching element with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held by means of the locking ring.

Commissioning

- ▶ Commission the system.

Notice:

There is no bleed function provided at the filter.

Maintenance

- ▶ If at operating temperature, the red indicator pin reaches out of the mechanical optical maintenance indicator and/or if the switching process in the electronic switching element is triggered, the filter element is contaminated and needs to be replaced and cleaned respectively.
More details see data sheet 51450
- ▶ The material number of the corresponding replacement filter element is indicated on the name plate of the complete filter. It must comply with the material number on the filter element.
- ▶ Decommission the system.
- ▶ The operating pressure is to be built up on the system side.

Notice:

There is no bleed function provided at the filter.

- ▶ Via the drain screw (from size 0160 fitted by default), the oil on the dirt side can be drained.
- ▶ Screw off the filter bowl.
- ▶ Remove the filter element from the spigot by rotating it slightly.
- ▶ Clean the filter components, if necessary.
- ▶ Check the seals at the filter bowl for damage and renew them, if necessary.
For suitable seal kits refer to chapter “Spare parts”.
- ▶ Filter elements made of wire mesh can be cleaned. For detailed cleaning instructions refer to data sheet 51420.
- ▶ Install the new or cleaned filter element on the spigot again by slightly rotating it.
- ▶ The filter is to be assembled in reverse order.
- ▶ The torque specifications (Tightening torques chapter) are to be observed.
- ▶ Commission the system.

WARNING!

- ▶ Assemble and disassemble only with depressurized system!
- ▶ Filter is pressurized!
- ▶ Remove the filter bowl only if it is not under pressure!
- ▶ Do not exchange the optical/mechanical maintenance indicator while the filter is under pressure!
- ▶ If the flow direction is not considered during assembly, the filter element will be destroyed. Particle contaminates could enter the system and damage the downstream components.

Notices:

- ▶ All maintenance of the filter should be performed by trained specialists.
- ▶ Proper function and safety are only guaranteed if original Bosch Rexroth filter elements and spare parts are used.
- ▶ Warranty becomes void if the delivered item is changed by the ordering party or third parties or improperly mounted, installed, maintained, repaired, used or exposed to environmental condition that do not comply with the installation conditions.

Tightening torques (dimensions in mm [inch])

Mounting

Series 245...	LEN0040	LEN0063	LEN0100	LE0130	LE0150	LEN0160	LEN0250	LEN0400
Screw/tightening torque with $\mu_{\text{total}} = 0.14$	M6 / 4.5 Nm \pm 10%							
Quantity	4							
Recommended property class of screw	8.8							
Minimum screw-in depth	6 + 1 mm [0.24 + 0.04 in]							

Filter bowl and maintenance indicator

Series 245...	LEN0040	LEN0063	LEN0100	LE0130	LE0150	LEN0160	LEN0250	LEN0400
Tightening torque filter bowl	50 Nm + 10 Nm							
Tightening torque maintenance indicator	max. 50 Nm							
Tightening torque cubic connector screw switching element EN-175301-803	M3/0.5 Nm							

Directives and standardization

Classification according to the Pressure Equipment Directive

The inline filters for hydraulic applications according to 51421 are pressure holding equipment according to article 1, section 2.1.4 of the Pressure Equipment Directive 97/23/EC (PED). However, based on the exception in article 1, section 3.6 of the PEG, hydraulic filters are

exempt from the PED if they are not classified higher than category I (guideline 1/19).

The fluids from the chapter “Compatibility with approved pressure fluids” were considered for the classification. They do not receive a CE mark.

Use in explosive areas according to directive 94/9/EC (ATEX)

The inline filters according to 51421 are no equipment or components in the sense of directive 94/9/EC and are not provided with a CE mark. It has been proven with the ignition risk analysis that these inline filters do not have own ignition sources acc. to DIN EN 13463-1:2009.

According to DIN EN 60079-11:2012, electronic maintenance indicators with a switching point:

WE-1SP-M12 x 1 **R928028409**

WE-1SP-EN175301-803 **R928036318**

are simple, electronic operating equipment that do not have an own voltage source. This simple, electronic operat-

ing equipment may - according to DIN EN 60079-14:2012 - in intrinsically safe electric circuits (Ex ib) be used in systems without marking and certification.

The inline filters and the electronic maintenance indicators described here can be used for the following potentially explosive areas:

	zone suitability	
Gas	1	2
Dust	21	22

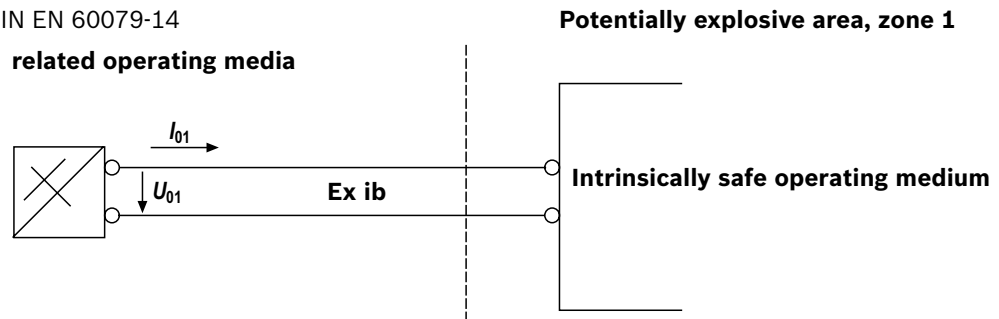
Directives and standardization

Complete filter with mech./opt. Maintenance indicator			
Use /assignment		Gas 2G	Dust 2D
Assignment		Ex II 2G c IIC TX	Ex II 2D c IIC TX
Conductivity of the medium	pS/m	min	300
Dust accumulation		max	–
			0.5 mm

electronic switching element in the intrinsically safe electric circuit			
Use /assignment		Gas 2G	Dust 2D
Assignment		Ex II 2G Ex ib IIB T4 Gb	Ex II 2D Ex ib IIIC T100°C Db
perm. intrinsically safe electric circuits		Ex ib IIC, Ex ic IIC	Ex ib IIIC
Technical data		Values only for intrinsically safe electric circuit	
Switching voltage	Ui	max	150 V AC/DC
Switching current	Ii	max	1.0 A
Switching power	Pi	max	1.3 W T4 T _{max} 40 °C
		max	1.0 W T4 T _{max} 80 °C
Surface temperature ¹⁾		max	–
			100 °C
inner capacity	Ci		negligible
inner inductivity	Li		negligible
Dust accumulation		max	–
			0.5 mm

¹⁾ The temperature depends on the temperature of the medium in the filter and must not exceed the value specified here.

Possible circuit according to DIN EN 60079-14



⚠ WARNING!

- ▶ Explosion hazard due to high temperature!
The temperature depends on the temperature of the medium in the hydraulic circuit and must not exceed the value specified here. Measures are to be taken so that in the explosive area, the max. admissible ignition temperature is not exceeded.
- ▶ When using the inline filters in accordance with 51 421 in potentially explosive areas, appropriate equipo-

tential bonding has to be ensured. The filter is preferably to be grounded via the mounting screws. It has to be noted in this connection that paintings and oxidic protective layers are not electrically conductive.

- ▶ During filter element exchanges, the packaging material is to be removed from the replacement element outside the explosive area

👉 Notices:

- ▶ Maintenance only by trained specialists, instruction by the machine end-user acc. to DIRECTIVE 1999/92/EC appendix II, section 1.1
- ▶ Warranty is only applicable when using genuine Rexroth spare parts

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Tank mounted return line filter with filter element according to DIN 24550

Type 10TEN0040 to 1000; 10TE2000 and 2500

RE 51424

Edition: 2014-05

Replaces: 06.11



H7855_d

- ▶ Size according to **DIN 24550**: 0040 to 1000
- ▶ additional sizes: 2000, 2500
- ▶ Nominal pressure 10 bar [145 psi]
- ▶ Connection up to 4"
- ▶ Operating temperature -10 °C to $+100\text{ °C}$ [14 °F to 212 °F]

Features

The tank mounted return line filters are designed for installation on fluid tanks. Their function is to separate solid materials from fluids.

They distinguish themselves by the following:

- ▶ Filter for tank mounting
- ▶ Special highly efficient filter materials
- ▶ Filtration of very fine particles and high dirt holding capacity across a broad pressure differential range
- ▶ High collapse resistance of the filter elements
- ▶ Optionally equipped with mechanical optical maintenance indicator with memory function
- ▶ Available as an option with different electrical switching elements, modular design
- ▶ By default, the filters are equipped with a bypass valve integrated in the filter housing
- ▶ Optional measuring port

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Ordering code filter

Sizes 0040 to 0100

01	02	03		04	05		06		07		08		09		09		09		09
10TE	N		-		A00	-		-		-		-		-		-		-	

Series

01	Return line filter, simple 10 bar [145 psi]	10TE
----	---	------

Filter element

02	With filter element according to DIN 24550	N
----	---	---

Size

03	TEN... Filter element according to DIN 24550	0040 0063 0100
----	--	----------------------

Filter rating in µm

04	Nominal	Paper, not cleanable	P10 P25
	Nominal	Stainless steel wire mesh, cleanable	G10 G25 G40 G60 G100
	Absolute (ISO 16889; $\beta_{x(c)} \geq 200$)	Glass fiber material, not cleanable	H3XL H6XL H10XL H20XL
	Absolute (ISO 16889; $\beta_{x(c)} \geq 200$)	Water-absorbing, not cleanable	AS3 AS6 AS10 AS20

Pressure differential

05	Max. admissible pressure differential of the filter element 30 bar [435 psi] – Filter with bypass valve	A00
----	--	-----

Maintenance indicator

06	Without maintenance indicator – bypass cracking pressure 3.5 bar [51 psi]	0
	Pressure gauge ¹⁾ 0...6 bar [0...87 psi] right – bypass cracking pressure 3.5 bar [51 psi]	MR
	Maintenance indicator, aluminum, mech.-optical, switching pressure 2.2 bar [32 psi], with additional pressure gauge ¹⁾ 0...6 bar [0...87 psi] right – bypass cracking pressure 3.5 bar [51 psi]	MRV2,2
	Maintenance indicator, polyamide, mech./optical, switching pressure 2.2 bar [32 psi] – bypass cracking pressure 3.5 bar [51 psi]	P2.2
	Maintenance indicator, aluminum, mech./optical, switching pressure 0.8 bar [11.6 psi] – bypass cracking pressure 3.5 bar [51 psi]	V0.8
	Maintenance indicator, aluminum, mech./optical, switching pressure 1.5 bar [21.8 psi] – bypass cracking pressure 3.5 bar [51 psi]	V1.5
	Maintenance indicator, aluminum, mech./optical, switching pressure 2.2 bar [32 psi] – bypass cracking pressure 3.5 bar [51 psi]	V2.2

Seal

07	NBR seal	M
	FKM seal	V

¹⁾ When using a pressure gauge, the maximum permissible operating pressure is reduced to 6 bar [87 psi].

Ordering code filter

Sizes 0040 to 0100

01	02	03	04	05	06	07	08	09	09	09	09
10TE	N		-		A00	-	-	-	-	-	-

Main inlet

08	Frame size	0040	0063-0100	
	Connection			
	G 3/4	●	X	R3
	G 1	X	●	R4
	1 1/16-12 UN -2B [SAE 12]	X	X	U4
	1 5/16-12 UN -2B [SAE 16]	X	X	U9
<input checked="" type="checkbox"/> Standard connection <input type="checkbox"/> Alternative connection				

Supplementary information (Multiple specifications possible)

09	Breathing filter	F
	Ventilation filter with surge protection	FN
	Threaded coupling right (not possible with pressure gauge right)	MR
	without bypass valve	NB
	Outlet pipe L110 mm [10.92 cm]	R110
	Outlet pipe L150 mm [5,9 in]	R150
	Outlet pipe L250 mm [9.8 inch]	R250

Order example:

10TEN0040-H10XLA00-P2,2-M-R3

Further versions (filter materials, connections,...) are available on request.

Ordering code filter

sizes 0160 to 2500

01	02	03	04	05	06	07	08	09	09
10TE				- A00	-	-	-	-	-

Series

01	Return line filter, simple 10 bar [145 psi]	10TE
----	---	------

Filter element

02	With filter element according to DIN 24550 (only with frame size 0160 - 1000)	N
----	--	---

Size

03	TEN... Filter element according to DIN 24550	0160 0250 0400 0630 1000
	TE... (Filter elements according to Bosch Rexroth standard)	2000 2500

Filter rating in μm

04	Nominal Paper, not cleanable	P10 P25
	Nominal Stainless steel wire mesh, cleanable	G10 G25 G40 G60 G100
	Absolute (ISO 16889; $\beta_{x(c)} \geq 200$) Glass fiber material, not cleanable	H3XL H6XL H10XL H20XL
	Absolute (ISO 16889; $\beta_{x(c)} \geq 200$) Water-absorbing, not cleanable	AS3 AS6 AS10 AS20

Pressure differential

05	Max. admissible pressure differential of the filter element 30 bar [435 psi] – Filter with bypass valve	A00
----	--	-----

Maintenance indicator

06	Without maintenance indicator – bypass cracking pressure 3.5 bar [51 psi]	0
	Pressure gauge ¹⁾ 0...6 bar [0...87 psi] right – bypass cracking pressure 3.5 bar [51 psi]	ML
	Maintenance indicator, aluminum, mech.-optical, switching pressure 2.2 bar [32 psi], with additional pressure gauge ¹⁾ 0...6 bar [0...87 psi] right – bypass cracking pressure 3.5 bar [51 psi]	MLV2.2
	Maintenance indicator, polyamide, mech./optical, switching pressure 2.2 bar [32 psi] – bypass cracking pressure 3.5 bar [51 psi]	P2.2
	Maintenance indicator, aluminum, mech./optical, switching pressure 0.8 bar [11.6 psi] – bypass cracking pressure 3.5 bar [51 psi]	V0.8
	Maintenance indicator, aluminum, mech./optical, switching pressure 1.5 bar [21.8 psi] – bypass cracking pressure 3.5 bar [51 psi]	V1.5
	Maintenance indicator, aluminum, mech./optical, switching pressure 2.2 bar [32 psi] – bypass cracking pressure 3.5 bar [51 psi]	V2.2

Seal

07	NBR seal	M
	FKM seal	V

¹⁾ When using a pressure gauge, the maximum permissible operating pressure is reduced to 6 bar [87 psi].

Ordering code filter

sizes 0160 to 2500

01	02	03	04	05	06	07	08	09	09
10TE				- A00	-	-	-	-	-

Main inlet

08	Frame size	0160	0250	0400	0630	1000	2000	2500	
	Connection								
	G 1 1/4	●	X						R5
	G 1 1/2	X	●						R6
	SAE 1 1/4" - 3000 psi	X	X			-			S5
	SAE 1 1/2" - 3000 psi	X	X						S6
	1 7/8-12 UN 2B [SAE 24]	X	X						U6
	SAE 2" - 3000 psi			●	X				S8
	SAE 2 1/2" - 3000 psi			X	●				S9
	SAE 3" - 3000 psi					●	X	X	S10
	SAE 4" - 3000 psi					X	●	●	S12
<p>● Standard connection</p> <p>X Alternative connection</p>									

Supplementary information (Multiple specifications possible)

09	Threaded coupling left (not possible with pressure gauge left)	ML
	without bypass valve	NB

Order example:

10TEN0630-H10XLA00-P2,2-M-S9

Further versions (filter materials, connections,...) are available on request.

Preferred types

Filter rating 3 µm, 6 µm, 10 µm and 20 µm

Filter type	Flow in l/min [gpm] with $v = 30 \text{ mm}^2/\text{s}$ [142 SUS] and $\Delta p = 0.5 \text{ bar}$ [7.25 psi] ¹⁾	Connection	Material no.	Connection	Material no.
10TEN0040-H3XLA00-P2,2-M-...	23 [6.1]	..R3	R928041292	..U4	R928041293
10TEN0063-H3XLA00-P2,2-M-...	35 [9.2]	..R4	R928041294	..U9	R928041295
10TEN0100-H3XLA00-P2,2-M-...	52 [13.7]	..R4	R928041296	..U9	R928041297
10TEN0160-H3XLA00-P2,2-M-...	105 [27.7]	..R5	R928041298	..S5	R928041299
10TEN0250-H3XLA00-P2,2-M-...	160 [42.3]	..R6	R928041300	..S6	R928041301
10TEN0400-H3XLA00-P2,2-M-...	290 [76.6]	..S8	R928041302	..S9	R928041303
10TEN0630-H3XLA00-P2,2-M-...	410 [108.3]	..S9	R928041304	..S8	R928041305
10TEN1000-H3XLA00-P2,2-M-...	560 [147.9]	..S10	R928041306	..S12	R928041307
10TE2000-H3XLA00-P2,2-M-...	900 [237.7]	..S12	R928041308	..S10	R928041309
10TE2500-H3XLA00-P2,2-M-...	1100 [290.6]	..S12	R928041310	..S10	R928041311

10TEN0040-H6XLA00-P2,2-M-...	40 [10.6]	..R3	R928052853	..U4	R928052854
10TEN0063-H6XLA00-P2,2-M-...	58 [15.3]	..R4	R928052855	..U9	R928052856
10TEN0100-H6XLA00-P2,2-M-...	76 [20.1]	..R4	R928052857	..U9	R928052858
10TEN0160-H6XLA00-P2,2-M-...	179 [47.3]	..R5	R928044990	..S5	R928053324
10TEN0250-H6XLA00-P2,2-M-...	248 [65.5]	..R6	R928046782	..S6	R928048118
10TEN0400-H6XLA00-P2,2-M-...	442 [116.8]	..S8	R928046816	..S9	R928052860
10TEN0630-H6XLA00-P2,2-M-...	545 [144.0]	..S9	R928044949	..S8	R928044930
10TEN1000-H6XLA00-P2,2-M-...	910 [240.4]	..S10	R928046825	..S12	R928052861
10TEN2000-H6XLA00-P2,2-M-...	1310 [346.1]	..S12	R928052862	..S10	R928052264
10TEN2500-H6XLA00-P2,2-M-...	1440 [380.4]	..S12	R928052863	..S10	R928044973

10TEN0040-H10XLA00-P2,2-M-...	43 [11.3]	..R3	R928041271	..U4	R928041272
10TEN0063-H10XLA00-P2,2-M-...	62 [16.4]	..R4	R928041273	..U9	R928041274
10TEN0100-H10XLA00-P2,2-M-...	80 [21.1]	..R4	R928041275	..U9	R928041276
10TEN0160-H10XLA00-P2,2-M-...	190 [50.2]	..R5	R928041277	..S5	R928041278
10TEN0250-H10XLA00-P2,2-M-...	260 [68.7]	..R6	R928041279	..S6	R928041280
10TEN0400-H10XLA00-P2,2-M-...	460 [121.5]	..S8	R928041281	..S9	R928041282
10TEN0630-H10XLA00-P2,2-M-...	560 [147.9]	..S9	R928041283	..S8	R928041284
10TEN1000-H10XLA00-P2,2-M-...	970 [256.2]	..S10	R928041285	..S12	R928041286
10TE2000-H10XLA00-P2,2-M-...	1350 [356.6]	..S12	R928041288	..S10	R928041289
10TE2500-H10XLA00-P2,2-M-...	1450 [383.0]	..S12	R928041290	..S10	R928041291

10TEN0040-H20XLA00-P2,2-M-...	62 [16.4]	..R3	R928041199	..U4	R928041200
10TEN0063-H20XLA00-P2,2-M-...	80 [21.1]	..R4	R928041201	..U9	R928041202
10TEN0100-H20XLA00-P2,2-M-...	95 [25.1]	..R4	R928041203	..U9	R928041204
10TEN0160-H20XLA00-P2,2-M-...	260 [68.7]	..R5	R928041205	..S5	R928041206
10TEN0250-H20XLA00-P2,2-M-...	320 [84.5]	..R6	R928041208	..S6	R928041209
10TEN0400-H20XLA00-P2,2-M-...	560 [147.9]	..S8	R928041210	..S9	R928041211
10TEN0630-H20XLA00-P2,2-M-...	630 [166.4]	..S9	R928041223	..S8	R928041224
10TEN1000-H20XLA00-P2,2-M-...	1270 [335.5]	..S10	R928041225	..S12	R928041226
10TE2000-H20XLA00-P2,2-M-...	1600 [422.7]	..S12	R928041228	..S10	R928041229
10TE2500-H20XLA00-P2,2-M-...	1680 [443.8]	..S12	R928041230	..S10	R928041231

¹⁾ An appropriate differential pressure via the filter and measuring device according to ISO 3968. The differential pressure measured on the maintenance indicator is lower.

Ordering code accessories

Electronic switching element for maintenance indicators

If an electronic switching element with signal suppression up to 30 °C [86 °F] is used (WE-2SPSU-M12 X 1, **R928028411**), it has to be ensured that the aluminum version of the mechanical-optical maintenance indicator must be used. These maintenance indicators are referred

to in the filter type key as “V0.8”, “V1.5” or “V2.2”. Also refer to the chapter "Spare parts and accessories".

The temperature-controlled signal processing does not work with mechanical-optical maintenance indicators made of polyamide.

01	02	03
WE	-	-

Maintenance indicator

01	electronic switching element	WE
----	------------------------------	-----------

Type of signal

02	1 switching point	1SP
	2 switching points, 3 LED	2SP
	2 switching points, 3 LED and signal suppression up to 30 °C [86 °F]	2SPSU

Connector

03	Round plug-in connection M12 x 1, 4-pole	M12x1
	Rectangular connector, 2-pole, design A according to EN-175301-803, only possible with “1SP” type of signal.	EN175301-803

Material numbers of the electronic switching elements

With the “mechanical-optical maintenance indicator” option (V..., P...), two mechanical optical maintenance indicators are installed at the factory. So you must always order two electric switching elements as optional accessories.

Material no.	Type	Signal	Switching points	Connector	LED
R928028409	WE-1SP-M12 x 1	Changeover	1	M12 x 1	No
R928028410	WE-2SP-M12 x 1	Normally open (at 75%) / normally closed contact (at 100%)	2		3 pieces
R928028411	WE-2SPSU-M12 x 1				
R928036318	WE-1SP-EN175301-803	Normally closed contact	1	EN 175301-803	No

Ordering code accessories

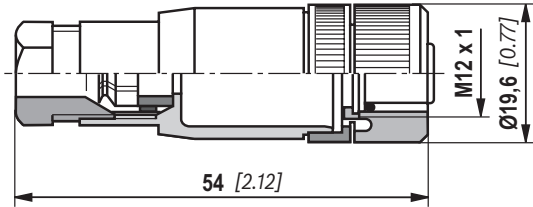
(dimensions in mm [inch])

Mating connectors according to IEC 60947-5-2

for electronic switching element with round plug-in connection M12 x 1

Mating connector suitable for K24 4-pole, M12 x 1 with screw connection, cable gland Pg9.

Material no. R900031155

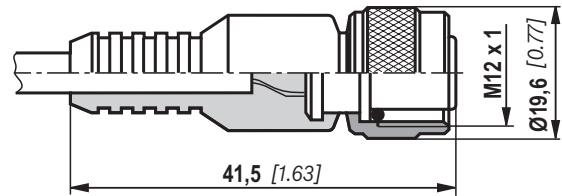


Mating connector suitable for K24-3m 4-pole, M12 x 1 with potted-in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

Core marking: 1 brown 2 white
3 blue 4 black

Material no. R900064381



For more round plug-in connections and technical data refer to data sheet 08006.

Order example:

Tank mounted return line filter with mechanical-optical maintenance indicator for $p_{nom.} = 10 \text{ bar [145 psi]}$, size 0100, with filter element 10 μm and electronic switching element M12 x 1 with 1 switching point for hydraulic fluid mineral oil HLP according to DIN 51524.

Filter with mech. optical maintenance indicator:	10TEN0100-H10XLA00-P2,2-M-R4	Material no.: R928041275
Switching element:	WE-1SP-M12 x 1	Material no.: R928028409
Mating connector:	Mating connector suitable for K24 4-pin, Material no. R900031155	
	M12 x 1 with screw connection,	
	Cable gland Pg9	

Ordering code accessories

(dimensions in mm [inch])

Outlet pipes

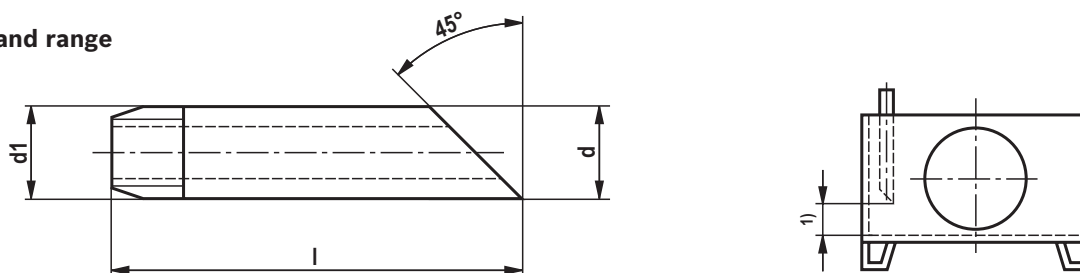
Outlet pipe, pluggable, size 0040-0100

The outlet pipes are plugged onto the filter bowl outlet piece. Correct seat is confirmed by an audible click. After plug-on, the outlet pipe can no longer be removed.

Material no.	Description
R928038744	ACC-R-10TEN0040-0100-R110
R928038745	ACC-R-10TEN0040-0100-R150
R928038746	ACC-R-10TEN0040-0100-R250

Outlet pipe, with threaded connection from size 0160

Dimensions and range



- 1) Recommended distance to tank bottom (unless otherwise specified): 60...160 mm [2.4...6.3 inch]
From a pipe length of 400 mm [15.75 inch], we strongly recommend fixing the outlet pipe by means of a tank-internal pipe bracket.

DN	d	Dimensions d1	l	galvanized	ES (stainless)	
				Description: PIPE AB23-03/R...	Description: PIPE AB23-03/R... -ES	
				Material no.	Material no.	
40 [1.57]	48.3 [1.90]	R 1 1/2	250 [9.84]	1 1/2 L = 250	R900109501	R900062066
			400 [15.75]	1 1/2 L = 400	R900083146	R900074878
			800 [31.50]	1 1/2 L = 800	R900029854	-
			1300 [51.18]	1 1/2 L = 1300	R900302230	-
			2000 [78.74]	1 1/2 L = 2000	R900229461	-
50 [1.97]	60.3 [2.37]	R 2	400 [15.75]	2 L = 400	R900727174	R900987657
			800 [31.50]	2 L = 800	R900029856	R900226706
80 [3.15]	88.9 [3.50]	R 3	160 [6.30]	3 L = 160	R900062845	-
			200 [7.87]	3 L = 200	R900061785	R900062067
			350 [13.78]	3 L = 350	R900084137	-
			650 [25.59]	3 L = 650	R900076923	R900757513
			800 [31.50]	3 L = 800	R900029838	R900987653

Thread:

Whitworth pipe thread according to DIN 2999 part 1, poppet 1:16

Material/surface treatment:

St 33-1 according to DIN 17100/galvanized (B) according to DIN 2444
1.4541

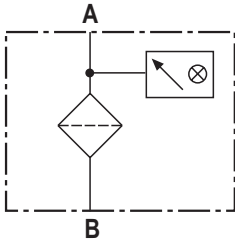
Order example/search term

Pipe according to DIN 2440 (ISO 65) with thread R 1 1/2 and L = 250 mm [9.84 inch], galvanized:

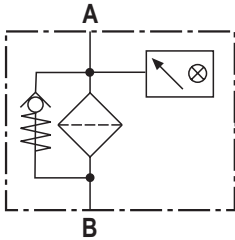
PIPE AB23-03/R 1 1/2 L = 250 material no. R900109501

Symbols

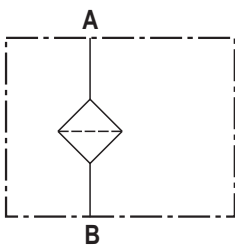
Tank mounted return line filter without bypass and with mechanical indicator



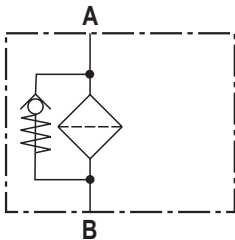
Tank mounted return line filter with bypass and mechanical indicator



Tank mounted return line filters without bypass

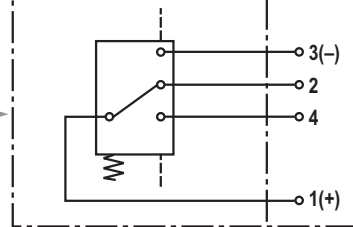


Tank mounted return line filters with bypass



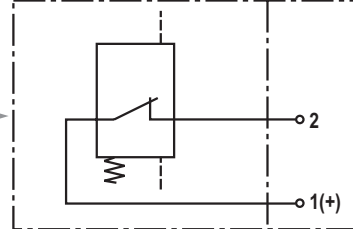
Electronic switching element for maintenance indicator

Switching element Connector



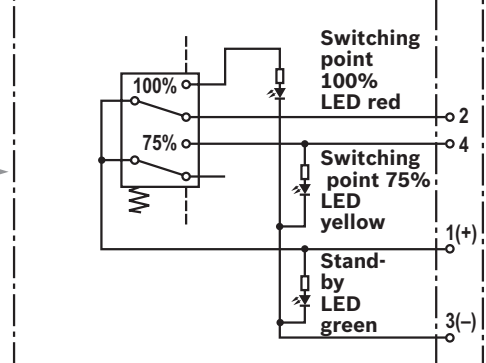
WE-1SP-M12 x 1

Switching element Connector



WE-1SP-EN175301-803

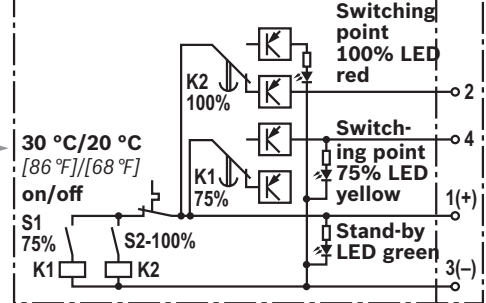
Switching element Connector



WE-2SP-M12 x 1

Circuit diagram drawn in plugged condition (operating state)

Switching element Connector



WE-2SPSU-M12 x 1

Circuit diagram drawn in plugged condition at temperature > 30 °C [86 °F] (operating state)

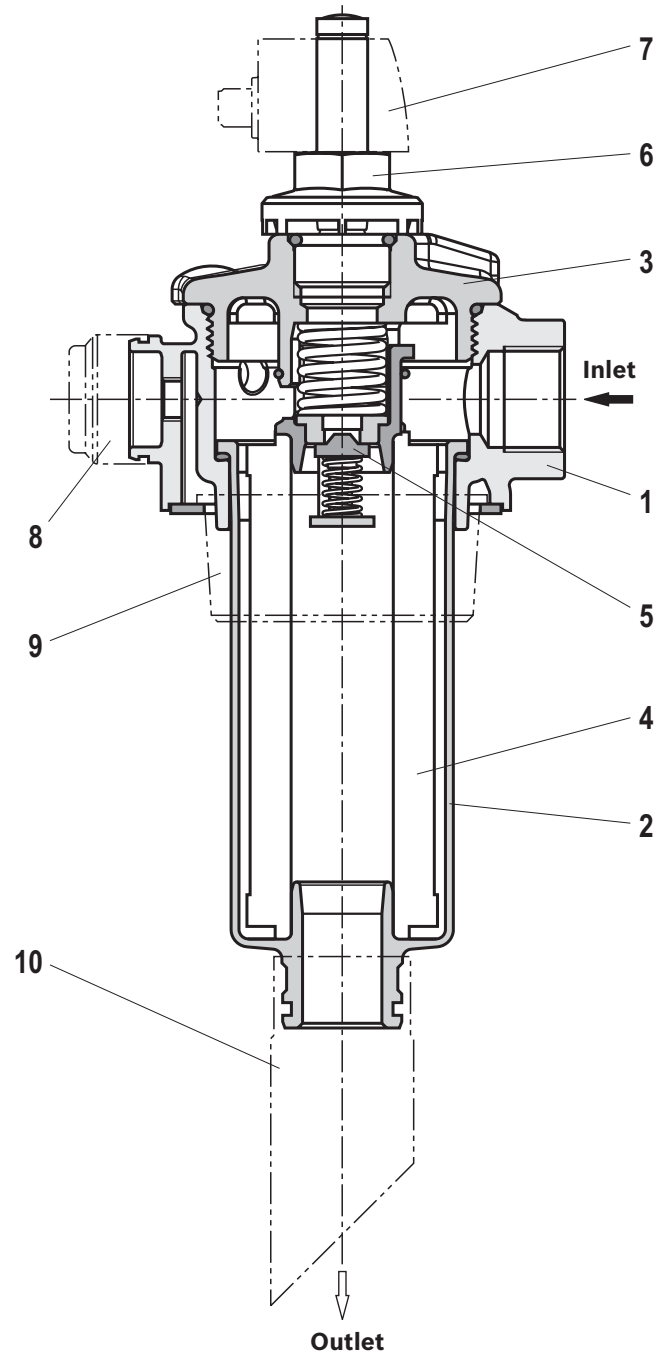
Function, section

The tank mounted return line filter is provided in the return line for direct attachment onto the tank of a hydraulic or lubrication system. It can also be used as filling or bypass filter. The filter basically consists of filter head (1) filter head (2), cover (3), filter element (4), as well as a bypass valve (5).

Optionally, the filter is equipped with mechanical optical maintenance indicator (6). The electronic maintenance indicator is connected via the electronic switching element (7) with 1 or 2 switching points (see p. 7), which has to be ordered separately.

During operation, the hydraulic fluid reaches the filter housing via the inlet; here, it flows through the filter element (4) from the outside to the inside and is cleaned according to the filter rating. The dirt particles filtered out settle in the filter head (2) and in the filter element (4). Via the outlet, the filtered hydraulic fluid enters the tank. In case of contamination, the necessary filter element exchange is displayed by the maintenance indicator (6). The electronic switching element (7) is attached to the mechanical optical maintenance indicator (6) and held by means of a locking ring.

Depending on the filter size, more additional functions are available (only for size 0040 - 0100) - e.g. a breathing filter (8), surge protection (9) or return pipes (10) in different lengths – also refer to the chapter “Ordering Codes Accessories”.



Type 10TEN0063

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

General							
Size	Size		0040	0063	0100	0160	0250
Weight	kg [lbs]		1.4 [3.09]	1.6 [3.53]	1.8 [3.97]	4.5 [9.92]	5.0 [11.03]
Size	Size		0400	0630	1000	2000	2500
Weight	kg [lbs]		8.0 [17.64]	10.0 [22.05]	18 [39.7]	21.5 [47.42]	27 [59.55]
Installation position			vertical				
Ambient temperature range	°C [°F]		-10 ... +65[+14...+149] (shortly down to -30 [-22])				
Storage conditions	- NBR seal	°C [°F]	-40 ... +65[-40...+149]; max. relative air humidity 65%				
	- FKM seal	°C [°F]	-20 ... +65[-4...+149]; max. relative air humidity 65%				
Material	- Filter cover		Carbon fiber reinforced plastic (sizes 0040...0100) Aluminum (sizes 0160...2500)				
	- Filter head		Aluminum				
	- Filter bowl		Carbon fiber reinforced plastic (sizes 0040...0630) Steel aluminized (sizes 1000...2500)				
	- Bypass valve		Plastic				
	- Visual Maintenance indicator (P2.2) (V...)		Plastic PA6				
	- Electronic switching element		Aluminum				
	- Pressure gauge		Plastic PA6				
	- Seals		Plastic				
	- Seals		NBR / FKM				
Surface requirement tank opening	- Roughness depth	R_z max.	µm	25 (10TDN0040...0100) and 6.3...16 (from 10TDN0160)			
	- Flatness	t_E max.	µm	0.3...0.5 (10TDN0040...0100) and 0.2 (from 10TDN0160)			
Hydraulic							
Maximum operating pressure	bar [psi]		10 [145]				
Hydraulic fluid temperature range	°C [°F]		-10...+100 [+14...+212]				
Minimum conductivity of the medium	pS/m		300				
Fatigue strength according to ISO 10771	Load cycles		> 10 ⁵ with max. operating pressure				
Type of pressure measurement of the maintenance indicator			Back pressure				
Assignment: Response pressure of the maintenance indicator / cracking pressure of the bypass valve	bar [psi]		Response pressure of the maintenance indicator		Cracking pressure of the bypass valve		
			without maintenance indicator		3.5 ± 0.35 [50.8±5.1]		
			with pressure gauge				
			V0.8 ± 0.15 [11.6 ± 2.2]				
			V1.5 ± 0.2 [21.8 ± 2.9]				
			V2.2 ± 0.3 [31.9 ± 4.4]				
	P2.2 +0.45/-0,25 [31.9(+6.4/-3,6)]						
Filtration direction			From the outside to the inside				

Technical data

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

Electric (electronic switching element)				
Electrical connection	Round plug-in connection M12 x 1, 4-pole			Standard connection EN 175301-803
Version	1SP-M12 x 1	2SP-M12 x 1	2SPSU-M12 x 1	1SP-EN175301-803
Contact load, direct voltage	$A_{max.}$	1		
Voltage range	$V_{max.}$	150 (AC/DC)	10-30 (DC)	250 (AC)/200 (DC)
max. switching power with resistive load	W	20		70
Switching type	- 75% signal	-	Normally open contact	-
	- 100% signal	Changeover	Normally closed contact	Normally closed contact
	- 2SPSU		Signal interconnection at 30 °C [86 °F], return switching at 20 °C [68 °F]	
Display via LEDs in the electronic switching element 2SP...			Stand-by (LED green); 75 % switching point (LED yellow) 100 % switching point (LED red)	
Protection class according to EN 60529 IP 65		IP 67		IP 65
Ambient temperature range	°C [°F]	-25...+85 [-13...+185]		
For direct voltage above 24 V, spark extinguishing is to be provided for protecting the switching contacts.				
Weight	electronic switching element: - with round plug-in connection M12x1	kg [lbs]	0,1 [0.22]	

Filter element				
Glass fiber material H.XL	Single-use element on the basis of inorganic fiber			
		Filtration ratio according to ISO 16889 up to $\Delta p = 5 \text{ bar [72.5 psi]}$	Achievable oil cleanliness according to ISO 4406 (SAE-AS 4059)	
Particle separation	H20XL	$\beta_{20(c)} \geq 200$	19/16/12 ... 22/17/14	
	H10XL	$\beta_{10(c)} \geq 200$	17/14/10 ... 21/16/13	
	H6XL	$\beta_{6(c)} \geq 200$	15/12/10 ... 19/14/11	
	H3XL	$\beta_{5(c)} \geq 200$	13/10/8 ... 17/13/10	
admissible pressure differential A	bar [psi]	30 [435]		

Compatibility with permitted hydraulic fluids

Hydraulic fluid	Classification	Suitable sealing materials	Standards
Mineral oil	HLP	NBR	DIN 51524
Biodegradable	- insoluble in water	HETG	VDMA 24568
		HEES	
	- soluble in water	HEPG	VDMA 24568
Flame-resistant	- water-free	HFDU, HFDR	VDMA 24317
	- containing water	HFAS	DIN 24320
		HFAE	
		HFC	



Important information on hydraulic fluids!

- For more information and data on the use of other hydraulic fluids, please refer to data sheet 90220 or contact us!
- **Flame-resistant – containing water:** due to possible chemical reactions with materials or surface coatings of machine and system components, the service life with these hydraulic fluids may be less than expected.

Filter materials made of filter paper (P) may not be used, filter elements with glass fiber material have to be used instead.

- **Biodegradable:** If filter materials made of filter paper are used, the filter life may be shorter than expected due to material incompatibility and swelling.

Characteristic curves: H3XL

(measured with mineral oil HLP46 according to DIN 51524)

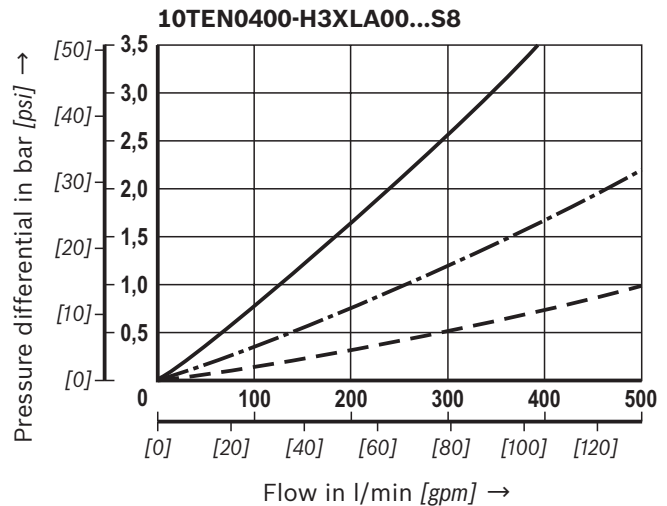
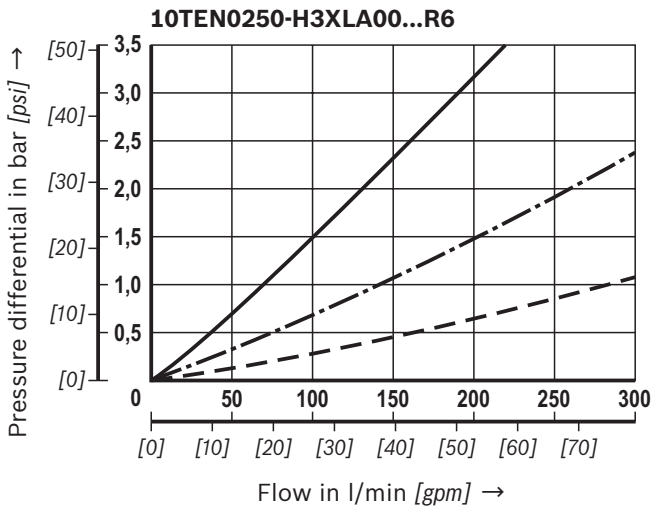
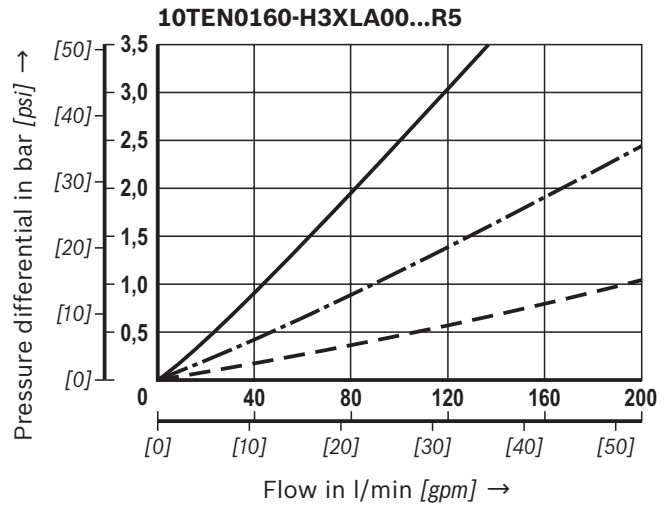
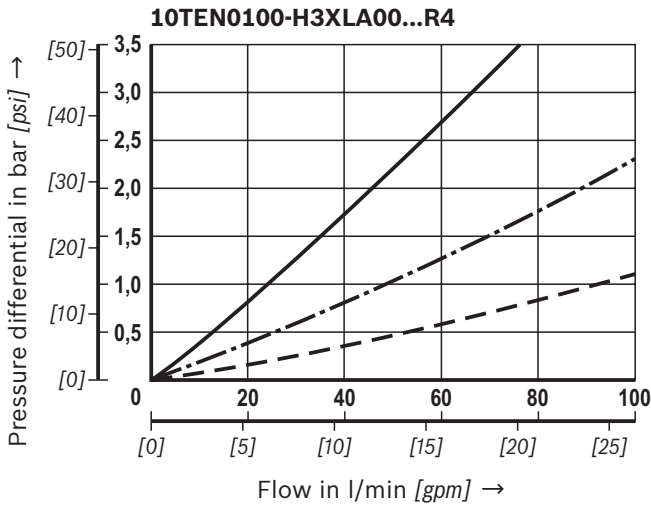
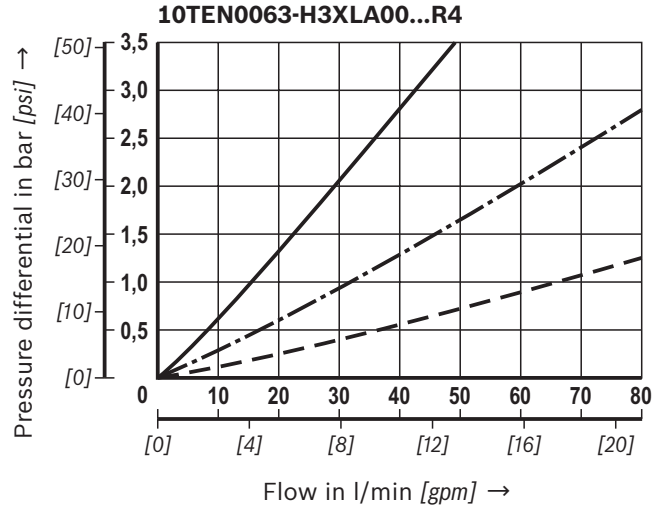
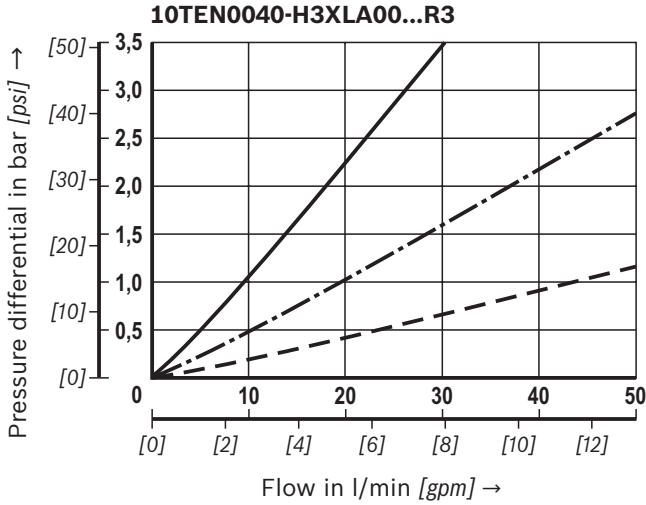
Spec. weight: < 0.9 kg/dm³

Δp -Q characteristic curves for complete filter

recommended initial Δp for design = 0.5 bar [7.25 psi]

Selection of the perfect filter is made possible by our online "Bosch Rexroth FilterSelect" design software.

Oil viscosity:
 — 140 mm²/s [649 SUS]
 - · - 68 mm²/s [315 SUS]
 - - - 30 mm²/s [142 SUS]



Characteristic curves: H3XL

(measured with mineral oil HLP46 according to DIN 51524)

Spec. weight: < 0.9 kg/dm³

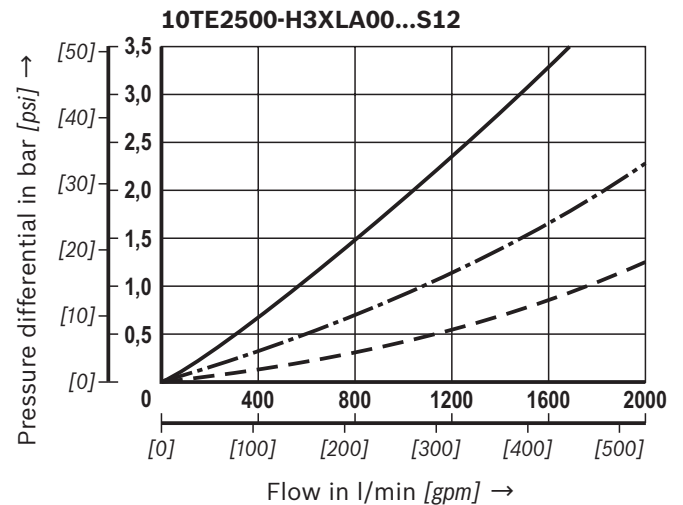
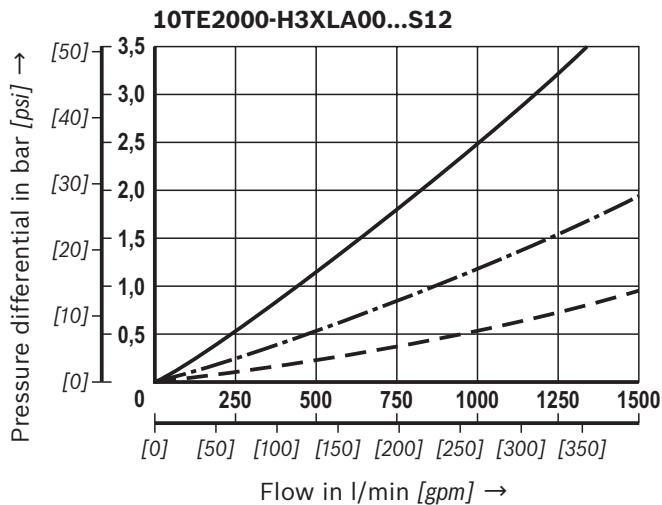
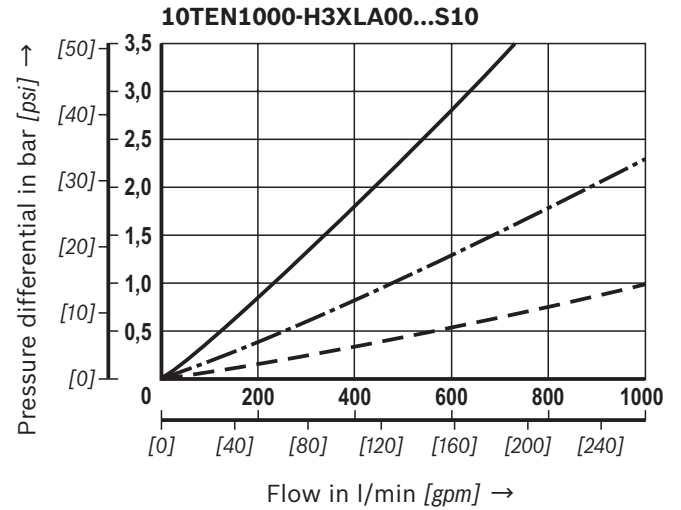
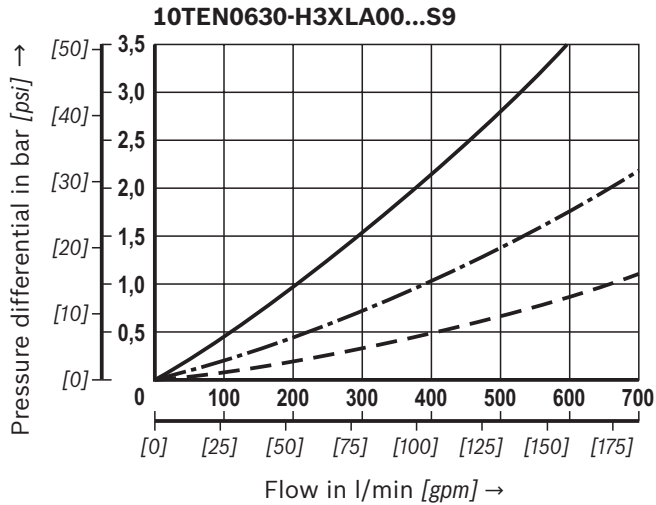
Δp -Q characteristic curves for complete filter

recommended initial Δp for design = 0.5 bar [7.25 psi]

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- 140 mm²/s [649 SUS]
- · - 68 mm²/s [315 SUS]
- - - 30 mm²/s [142 SUS]

Oil viscosity:



Characteristic curves: H10XL

(measured with mineral oil HLP46 according to DIN 51524)

Spec. weight: < 0.9 kg/dm³

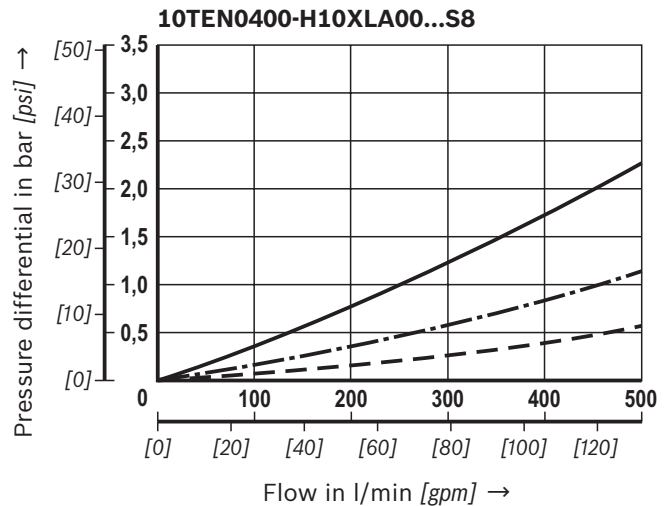
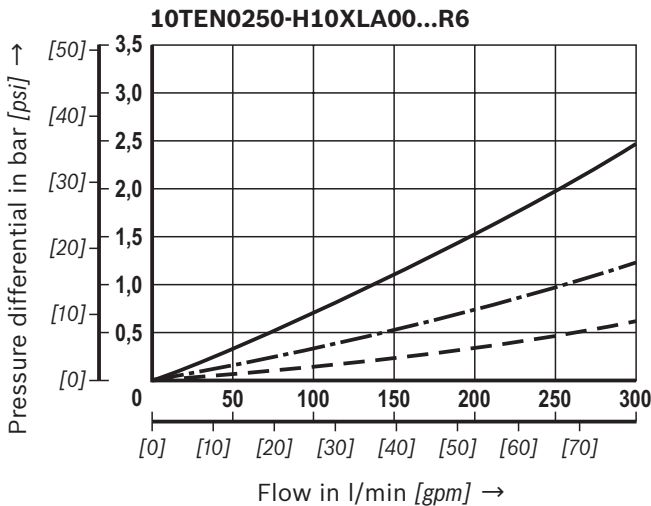
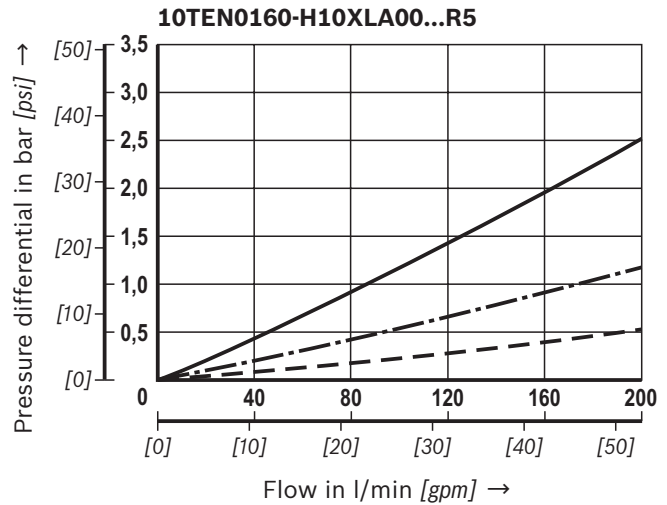
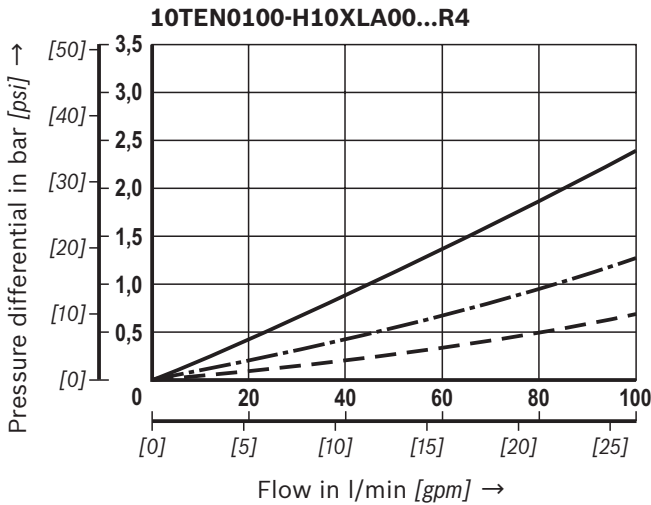
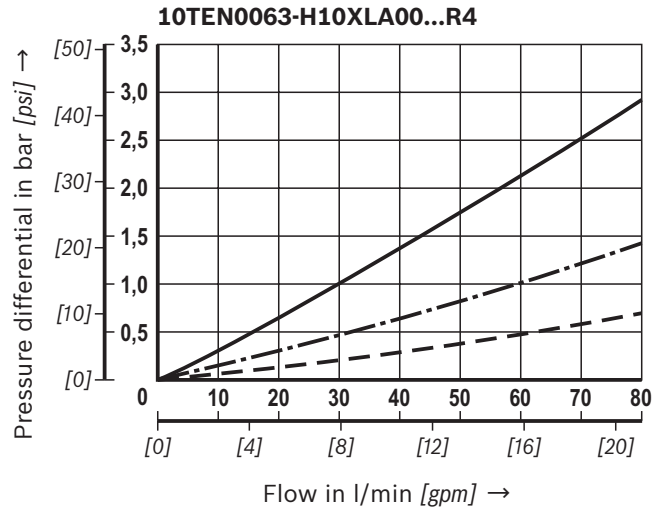
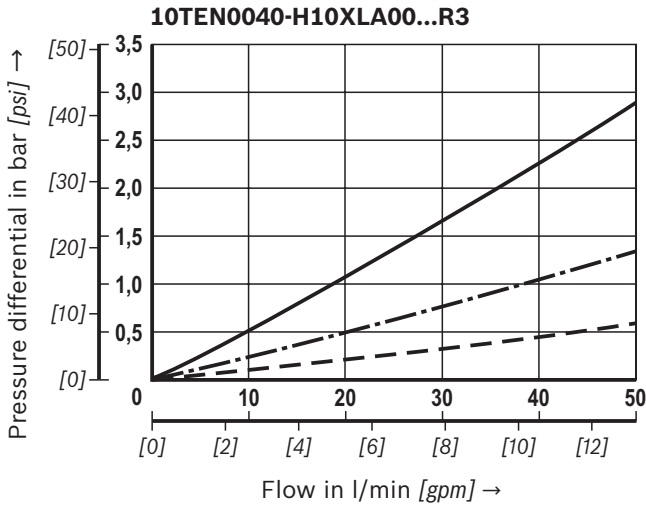
Δp -Q characteristic curves for complete filter

recommended initial Δp for design = 0.5 bar [7.25 psi]

Selection of the perfect filter is made possible by our online “Bosch Rexroth FilterSelect” design software.

- 140 mm²/s [649 SUS]
- · - 68 mm²/s [315 SUS]
- - - 30 mm²/s [142 SUS]

Oil viscosity:



Characteristic curves: H10XL

(measured with mineral oil HLP46 according to DIN 51524)

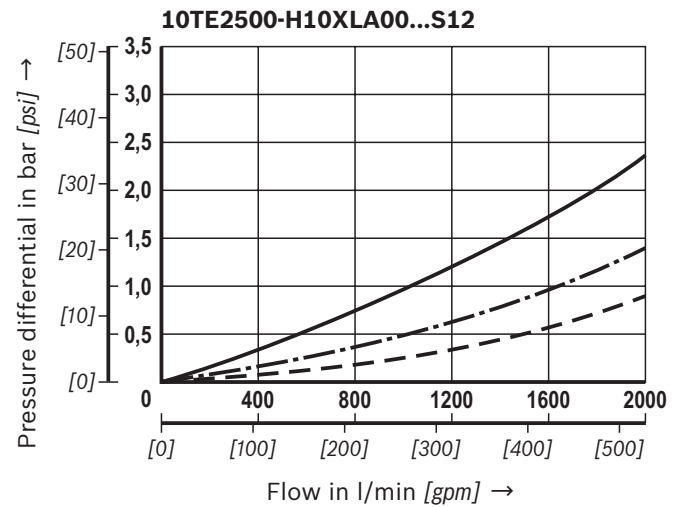
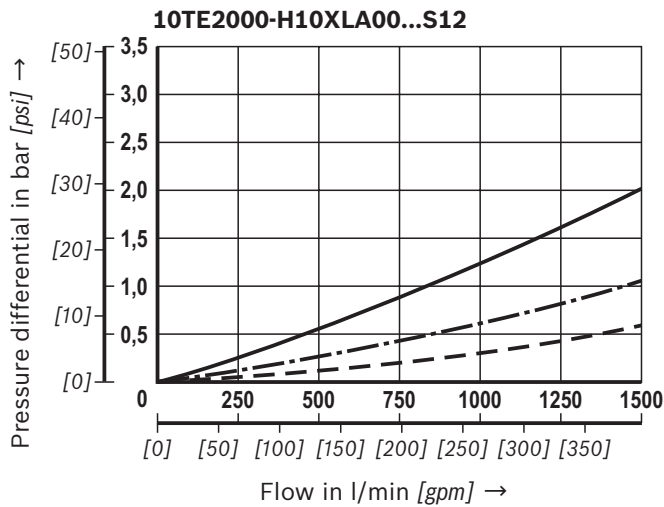
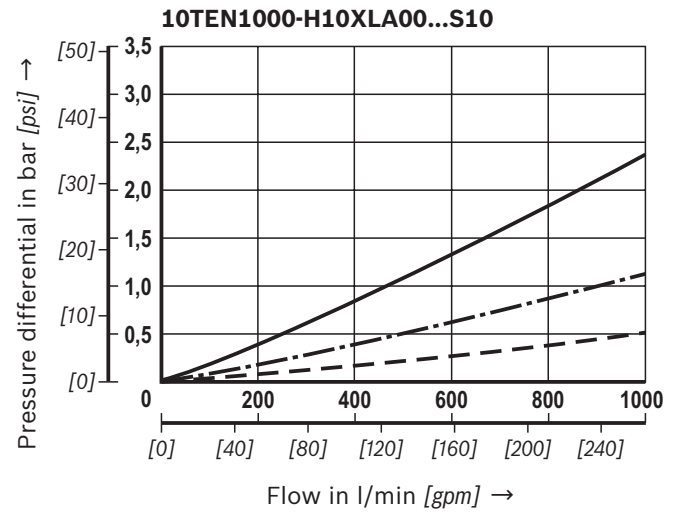
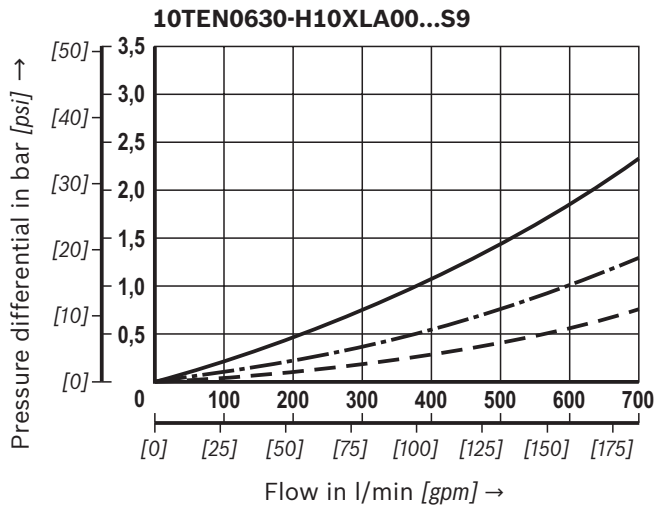
Spec. weight: < 0.9 kg/dm³

Δp -Q characteristic curves for complete filter

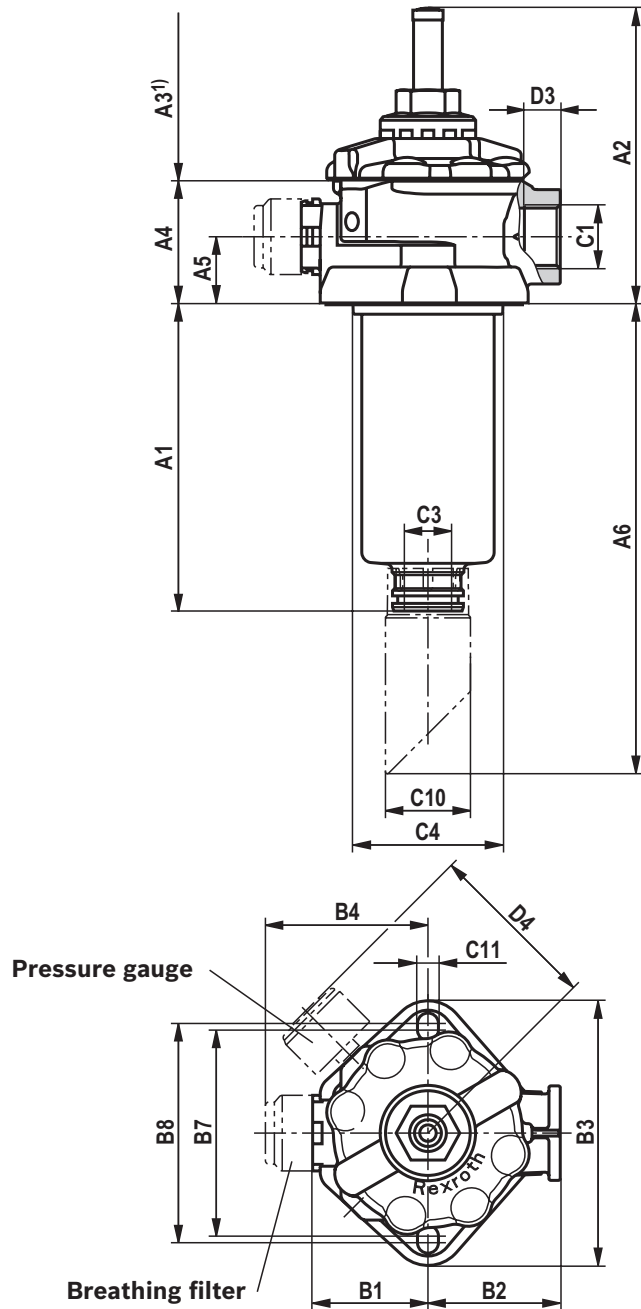
recommended initial Δp for design = 0.5 bar [7.25 psi]

Selection of the perfect filter is made possible by our online "Bosch Rexroth FilterSelect" design software.

Oil viscosity:
 — 140 mm²/s [649 SUS]
 - · - 68 mm²/s [315 SUS]
 - - - 30 mm²/s [142 SUS]



Dimensions: 10TEN0040, 0063, 0100
(dimensions in mm [inch])

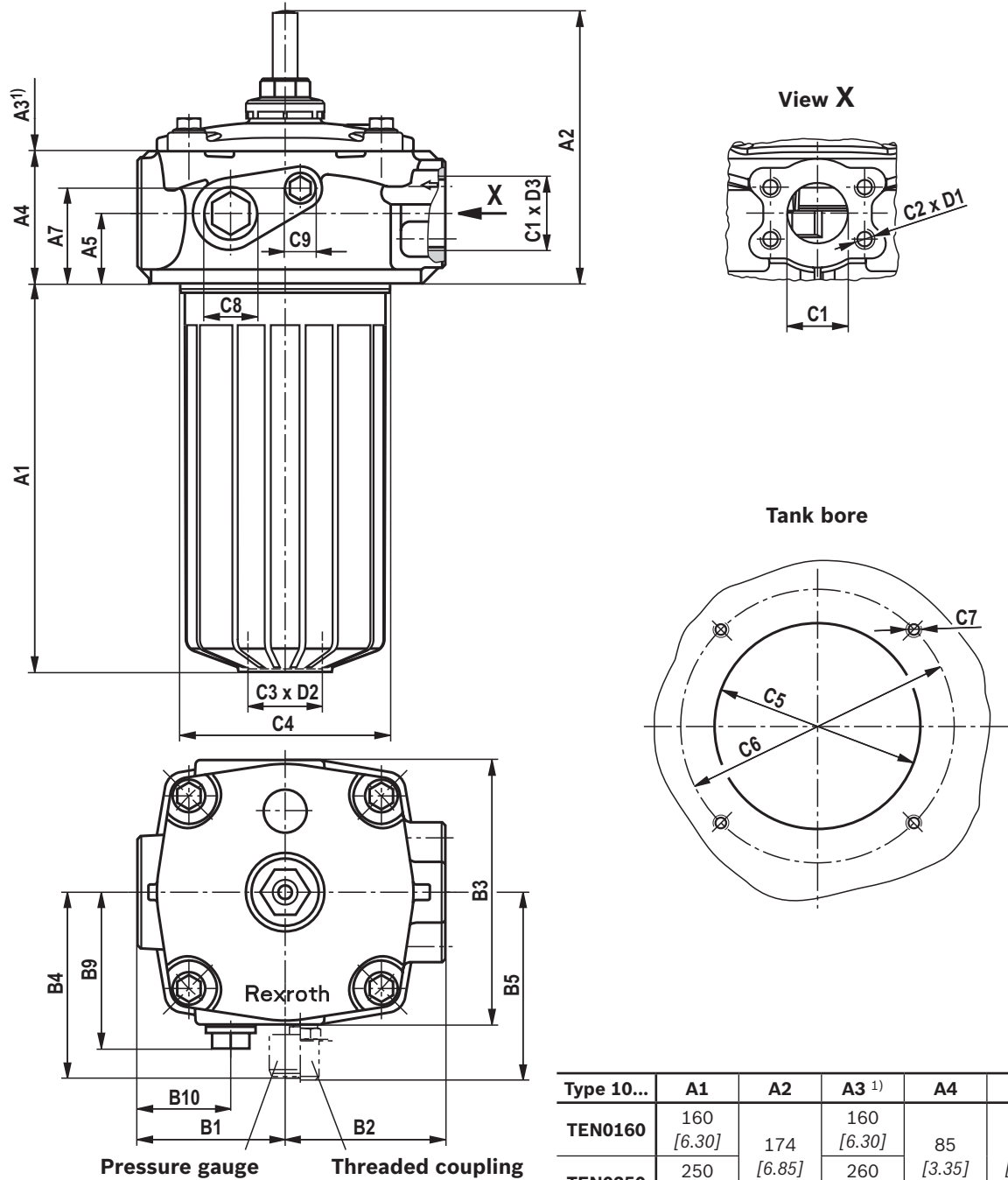


Type 10...	A1	A2	A3 ¹⁾	A4	A5	A6	
TEN0040	103 [4.06]		100 [3.94]			R110	190 [7.38]
						R150	230 [9.06]
						R250	330 [12.99]
TEN0063	163 [6.42]	155 [6.10]	160 [6.30]	65 [2.56]	35 [1.38]	R110	250 [9.84]
						R150	290 [11.42]
						R250	390 [15.35]
TEN0100	253 [9.96]		250 [9.84]			R110	340 [13.39]
						R150	380 [14.96]
						R250	480 [18.90]

¹⁾ Servicing height for filter element exchange

Type 10...	B1	B2	B3	B4	B7	B8	C1 connection		C3	ØC4	ØC5	ØC6	C7	ØC10	C11	D3	D4
							Standard	Optional									
TEN0040							G 3/4	G 1 1 1/16-12 UN-2B 1 5/16-12 UN-2B									
TEN0063	61 [2.40]	70 [2.76]	140 [5.51]	86 [3.39]	109 [4.29]	116 [4.57]	G 1	G 3/4 1 1/16-12 UN-2B 1 5/16-12 UN-2B	NW 25	80 [3.15]	90 [3.54]	115 [4.53]	M10	45 [1.77]	11 [0.43]	19 [0.75]	90 [3.54]
TEN0100							G 1	G 3/4 1 1/16-12 UN-2B 1 5/16-12 UN-2B									

Dimensions: 10TEN0160, 0250
(dimensions in mm [inch])



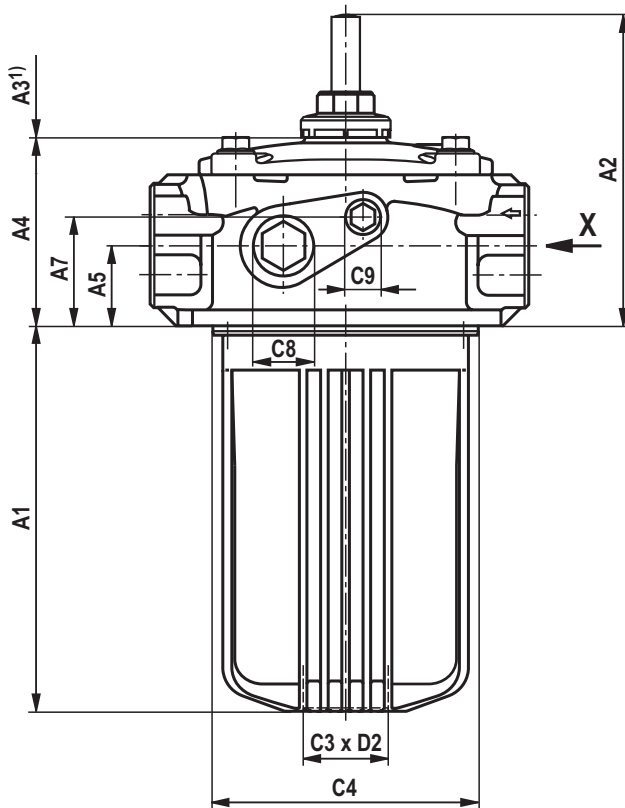
Type 10...	A1	A2	A3 ¹⁾	A4	A5	A7
TEN0160	160 [6.30]	174 [6.85]	160 [6.30]	85 [3.35]	45 [1.77]	60 [2.36]
TEN0250	250 [9.84]		260 [10.24]			

¹⁾ Servicing height for filter element exchange

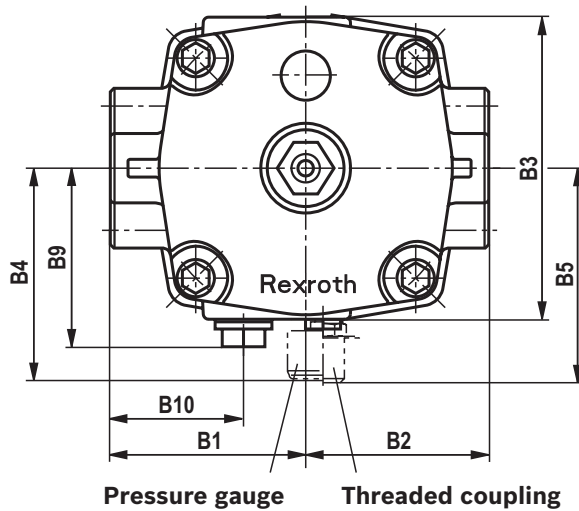
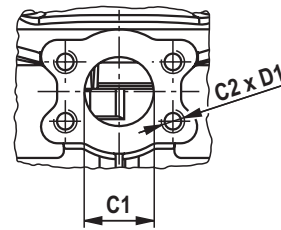
Type 10...	B1	B2	B3	B4	B5	B6	B9	B10	C1 connection		
									Standard	Optional	
TEN0160	95 [3.74]	103 [4.06]	170 [6.69]	120 [4.72]	116 [4.57]	153 [6.02]	100,5 [3.96]	60 [2.36]	G 1 1/4	G 1 1/2 SAE 1 1/2" 3000 psi	SAE 1 1/4" 3000 psi 1 7/8-12 UN-2B
TEN0250									G 1 1/2	G 1 1/4 SAE 1 1/2" 3000 psi	SAE 1 1/4" 3000 psi 1 7/8-12 UN-2B

Type 10...	C2	C3	ØC4	ØC5	ØC6	C7	C8	C9	D1	D2	D3
TEN0160	M12 M10	G 1 1/2	135 [5.31]	140 [5.51]	185 [7.28]	M10	G 3/4	G 1/4	20 (24) [0.79 (0.94)] 26 (30) [1.02 (1.18)]	26 [1.02]	22,5 [0.89]
TEN0250	M12 M10								20 (24) [0.79 (0.94)] 26 (30) [1.02 (1.18)]		

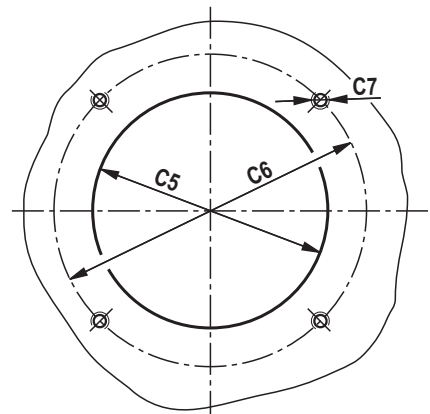
Dimensions: 10TEN0400, 0630
(dimensions in mm [inch])



View X



Tank bore

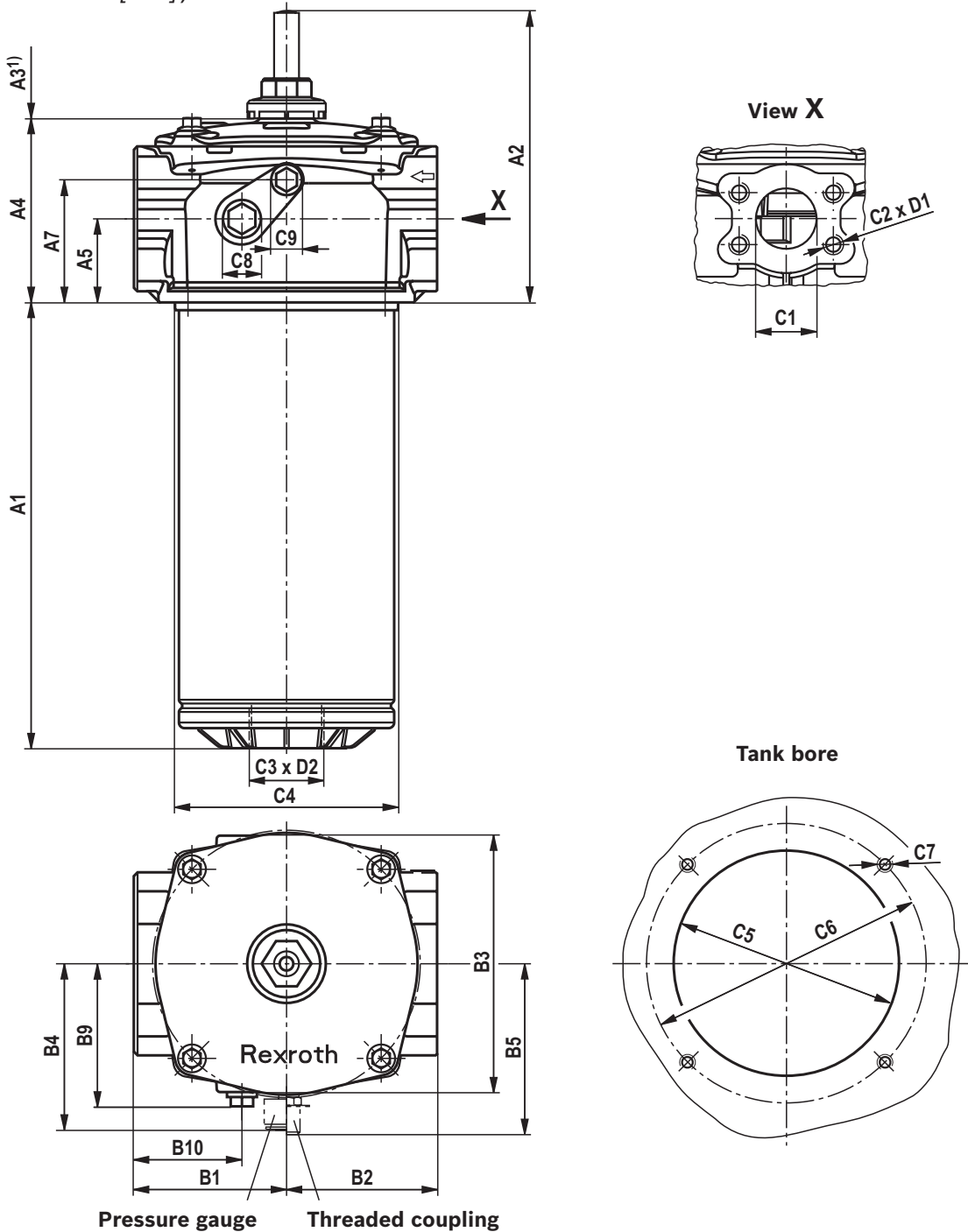


¹⁾ Servicing height for filter element exchange

Type 10...	A1	A2	A3 ¹⁾	A4	A5	A7	B1	B2	B3	B4	B5	B6	B9	B10
TEN0400	255 [10.04]	199 [7.83]	250 [9.84]	131 [5.16]	60 [2.36]	85 [3.35]	117 [4.61]	115 [4.53]	210 [8.27]	138 [5.43]	134 [5.28]	171 [6.73]	120 [4.72]	77 [3.03]
TEN0630	405 [15.94]		400 [15.75]											

Type 10...	C1 connection		C2	C3	ØC4	ØC5	ØC6	C7	C8	C9	D1	D2
	Standard	Optional										
TEN0400	SAE 2" 3000 psi	SAE 2 1/2" - 3000 psi	M12	G 2	175 [6.89]	178 [7.01]	220 [8.66]	M10	G 3/4	G 1/4	20 (24) [0.79 (0.94)]	25,5 [1.00]
TEN0630	SAE 2 1/2" - 3000 psi	SAE 2" 3000 psi										

Dimensions: 10TEN1000, 10TE2000, 10TE2500
(dimensions in mm [inch])

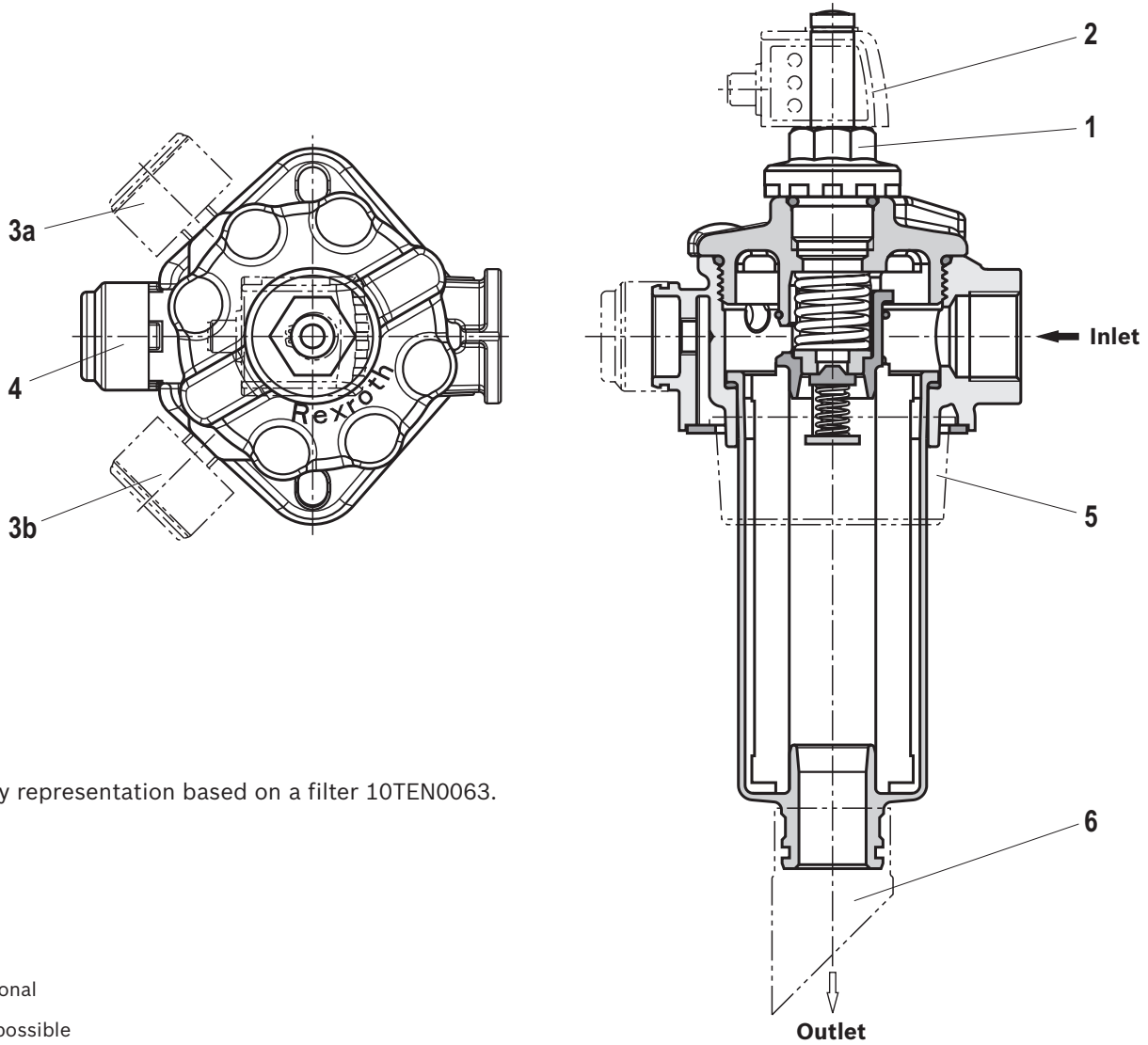


1) Servicing height for filter element exchange

Type 10...	A1	A2	A3 ¹⁾	A4	A5	A7	B1	B2	B3	B4	B5	B6	B9	B10
TEN1000	400 [15.75]	158 [6.22]	530 [20.87]	165 [6.50]	75 [2.95]	110 [4.33]	137 [5.39]	135 [5.31]	235 [9.25]	149 [5.87]	146 [5.75]	183 [7.20]	130,5 [5.14]	97 [3.82]
TE2000	758 [29.84]		880 [34.65]											
TE2500	993 [39.09]		1130 [44.49]											

Type 10...	C1 connection		C2	C3	ØC4	ØC5	ØC6	C7	C8	C9	D1	D2
	Standard	Optional										
TEN1000	SAE 3" 3000 psi	SAE 4" 3000 psi	M16	G 3	200 [7.87]	202 [7.95]	250 [9.84]	M10	G 3/4	G 1/4	26 (30) [1.02 (1.18)]	35 [1.38]
TE2000	SAE 4" 3000 psi	SAE 3" 3000 psi										
TE2500												

Options



Exemplary representation based on a filter 10TEN0063.

- Optional
- not possible

Ordering code	Maintenance indicator options	Item	Frame size	
			0040-0100	0160-2500
P2,2; V0,8; V1,5; V2,2	Mechanical optical maintenance indicator	1	●	●
MR	Pressure gauge right	3a	●	-
ML	Pressure gauge left	3b	-	●
V2,2MR	Mechanical optical maintenance indicator + pressure gauge right	1 + 3a	●	-
V2,2ML	Mechanical optical maintenance indicator + pressure gauge left	1 + 3b	-	●
plus R928...	Electronic switching element	See chapter "Accessories"		

Ordering code	Supplementary information options	Item	Frame size	
			0040-0100	0160-2500
F	Breathing filter	4	●	-
FN	Ventilation filter with surge protection	4 + 5	●	-
MR	Threaded coupling right (not possible with pressure gauge right)	3a	●	-
ML	Threaded coupling left (not possible with pressure gauge left)	3b	-	●
NB	Without bypass valve		●	●
R110	Outlet pipe 110 cm	6	● ¹⁾	-
R150	Outlet pipe 150 cm	6	● ¹⁾	-
R250	Outlet pipe 250 cm	6	● ¹⁾	-

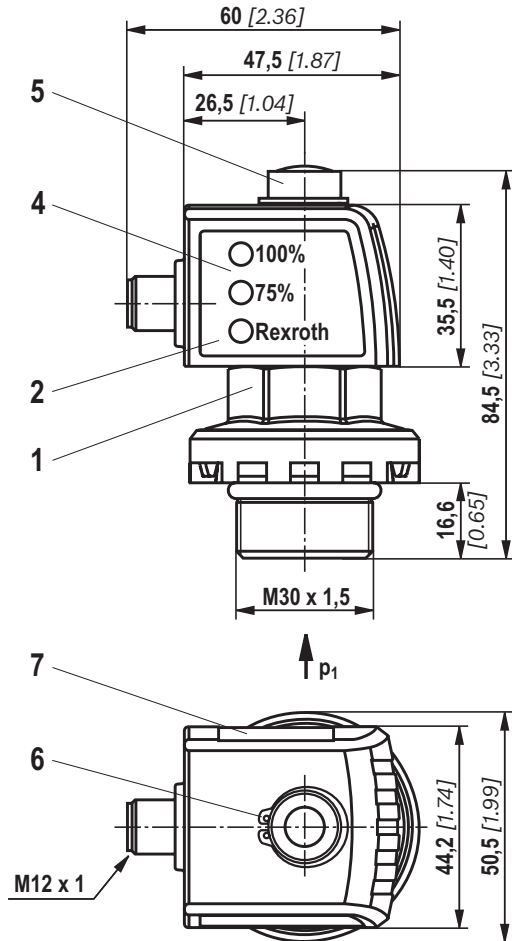
¹⁾ Outlet pipes for sizes 0040...0100 are to be ordered preferably pre-assembled over the complete filter.

Outlet pipes for other sizes must be ordered separately and are not pre-assembled.

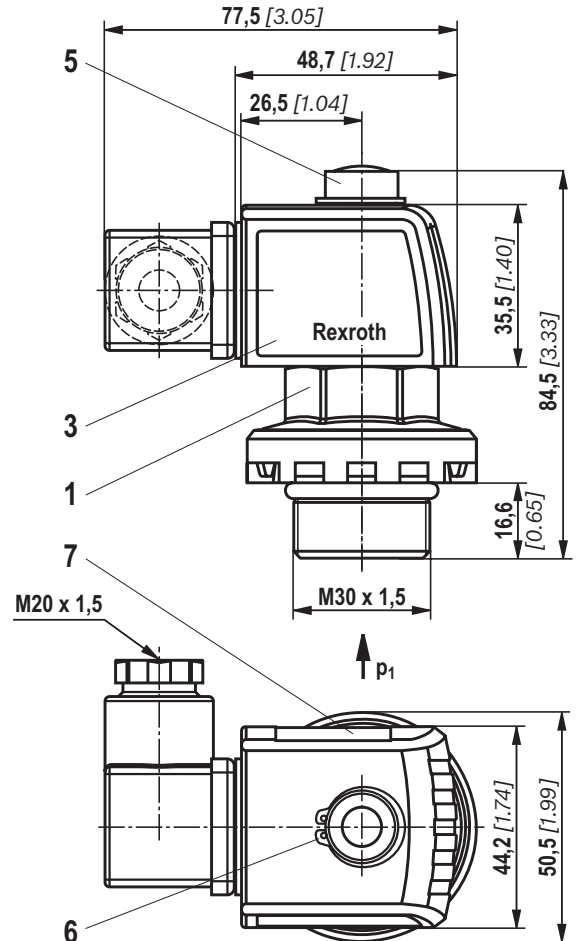
See chapter "Order Code Accessories".

Maintenance indicator (dimensions in mm [inch])

Electronic switching element with round plug-in connection M12 x 1, 4-pole



Electronic switching element with rectangular plug-in connection EN 175301-803



- 1 Mechanical optical maintenance indicator; max. tightening torque $M_{A \max} = 50 \text{ Nm}$ [36.88 lb-ft]
Tightening torque for back pressure indicator in PA6.6 $M_{A \max} = 35 \text{ Nm}$ [25.82 lb-ft]
- 2 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); plug-in connection M12 x 1, 4-pole
- 3 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); plug-in connection EN175301-803
- 4 Housing with three LEDs: 24V = green: Stand-by
yellow: Switching point 75%
red: Switching point 100%
- 5 Optical indicator bistable
- 6 Locking ring DIN 471-16 x 1,
Material no. R900003923
- 7 Name plate

Notices:

Representation contains mechanical optical maintenance indicator (1) and electronic switching element (2) (3).

If an electronic switching element with signal suppression up to 30 °C [86 °F] is used (WE-2SPSU-M12 X 1, **R928028411**), it has to be ensured that the aluminum version of the mechanical-optical maintenance indicator must be used. These maintenance indicators are referred to in the filter type key as "V0.8", "V1.5" or "V2.2".

See chapter "Order Code Spare Parts".

The temperature-controlled signal processing does not work with mechanical-optical maintenance indicators made of polyamide.

Ordering code spare parts

Filter element

01	02	03	04	05	06
1.			- A00	- 0	-

01	Design	1.
----	--------	----

Size

02	TEN... (Filter elements according to DIN 24550)	0040 0063 0100 0160 0250 0400 0630 1000
	TE... (Filter elements according to Bosch Rexroth standard)	2000 2500

Filter rating in μm

03	Nominal	Paper, not cleanable	P10 P25
	Nominal	Stainless steel wire mesh, cleanable	G10 G25 G40 G60 G100
	Absolute (ISO 16889); $\beta_{x(c)} \geq 200$	Glass fiber material, not cleanable	H3XL H6XL H10XL H20XL
	Absolute (ISO 16889); $\beta_{x(c)} \geq 200$	Water-absorbing, not cleanable	AS3 AS6 AS10 AS20

Pressure differential

04	Maximum admissible pressure differential of the filter element: 30 bar [435 psi]	A00
----	--	-----

Bypass valve

05	without bypass valve	0
----	----------------------	---

Seal

06	NBR seal	M
	FKM seal	V

Order example:

1,0100 H3XL-A00-0-M

For detailed information on Rexroth filter elements please refer to data sheet 51420.

Ordering code spare parts

Preferred program Replacement elements

Filter element type	Filter material/material no.			
	H3XL	H6XL	H10XL	H20XL
1.0040 ...A00-0-M	R928005835	R928005836	R928005837	R928005838
1.0063 ...A00-0-M	R928005853	R928005854	R928005855	R928005856
1.0100 ...A00-0-M	R928005871	R928005872	R928005873	R928005874
1.0160 ...A00-0-M	R928005889	R928005890	R928005891	R928005892
1.0250 ...A00-0-M	R928005925	R928005926	R928005927	R928005928
1.0400 ...A00-0-M	R928005961	R928005962	R928005963	R928005964
1.0630 ...A00-0-M	R928005997	R928005998	R928005999	R928006000
1.1000 ...A00-0-M	R928006033	R928006034	R928006035	R928006036
1.2000 ...A00-0-M	R928041312	R928048158	R928040797	R928041313
1,2500 ...A00-0-M	R928041314	R928046806	R928040800	R928041315

Mechanical optical maintenance indicator

01	02	03	04	05	06	07
W	O	-	S01	-	-	10

01	Maintenance indicator	W
02	mechanical optical indicator	O

Design

03	Back pressure, modular design	S01
----	-------------------------------	-----

Switching pressure

04	0.8 bar [12 psi] (not possible with plastic version)	0,8
	1.5 bar [22 psi] (not possible with plastic version)	1,5
	2.2 bar [32 psi]	2,2

Seal

05	NBR seal	M
	FKM seal	V

Max. nominal pressure

06	10 bar [145 psi]	10
----	------------------	----

Housing material

07	Plastic only 2.2 bar [32 psi] possible	PA
	Aluminum	without information

Mechanical optical maintenance indicator

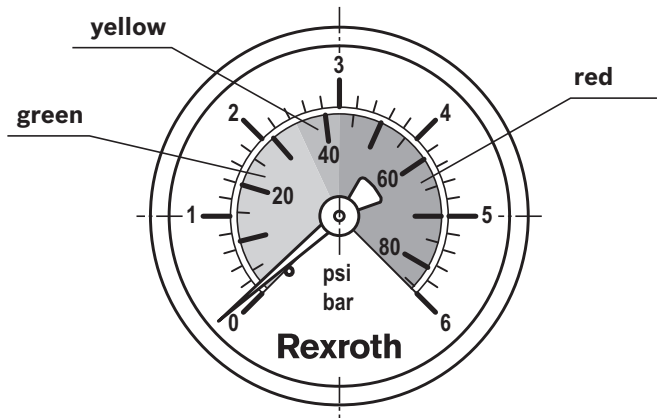
Material no.	Description
R928038773	WO-S01-0.8-M-10
R928038772	WO-S01-0.8-V-10
R928038776	WO-S01-1.5-M-10
R928038774	WO-S01-1.5-V-10
R901025310	WO-S01-2.2-M-10
R901066232	WO-S01-2.2-V-10
R928038771	WO-S01-2.2-M-10-PA
R928038769	WO-S01-2.2-V-10-PA

Ordering code spare parts

Pressure gauge ¹⁾

Material no.	Description
R928019224	M010 0-6 bar [0-87 psi], fluid connection R1/4, Ø 50 mm

¹⁾ When using a pressure gauge, the maximum permissible operating pressure is reduced to 6 bar [87 psi].



Breathing filter element

(only for 10TEN0040-0100) incl. plastic cap

Material no.	Description
R928019705	71.001 P5-S00-0-0

Seal kit

01	02	03	04	05
D	10TE		-	-

01	Seal kit	D
02	Series	10TE

Size

03	0040-0100	N0040-0100
	0160-0250	N0160-0250
	0400-0630	N0400-0630
	1000	N1000
	2000-2500	2000-2500

Seal

04	NBR seal	M
	FKM seal	V

Supplementary information

05	Breathing filter with oil mist separator (only for size 0040-0100)	FN
----	--	----

Seal kit

Material no.	Description
R928028013	D10TEN0040-0100-M
R928028014	D10TEN0160-0250-M
R928028015	D10TEN0400-0630-M
R928039806	D10TEN1000-M
R928039807	D10TE2000-2500-M
R928048445	D10TEN0040-0100-V

Material no.	Description
R928052864	D10TEN0160-0250-V
R928052765	D10TEN0400-0630-V
R928052865	D10TEN1000-V
R928052866	D10TE2000-2500-V
R928048707	D10TEN0040-0100-M-FN
R928048709	D10TEN0040-0100-V-FN

Assembly, commissioning, maintenance

Installation

- ▶ The max. operating pressure of the system must not exceed the max. admissible operating pressure of the filter (see type plate).
- ▶ Before the assembly, the hole pattern of the tank must be compared to the dimensions from the “Dimensions” chapter.
- ▶ Drain pipes as of a length of approx. 500 mm must be carried in a bracket in order to avoid oscillations caused by the fluid flow in the tank. It is moreover to be ensured that in case of maintenance works, the filter bowl and the outlet pipe are pulled out of the filter head together.
- ▶ During assembly of the filter (see also chapter “Tightening torque”), the flow direction (direction arrows) and the required servicing height of the filter element (see chapter “Dimensions”) are to be considered.
- ▶ Perfect functioning is only guaranteed in the installation position filter bowl vertically downwards and **on** the tank.
- ▶ The maintenance indicator must be arranged in a well visible way.
- ▶ Remove the plastic plugs in the filter inlet and outlet.
- ▶ Ensure that the system is assembled without tension stress.
- ▶ The optional electronic maintenance indicator is connected via the electronic switching element with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held by means of the locking ring. More details see data sheet 51450

Commissioning

Commission the system.

Notice:

There is no bleeding provided at the filter.

Maintenance

- ▶ If at operating temperature, the red indicator pin reaches out of the mechanical optical maintenance indicator and/or if the switching process in the electronic switching element is triggered, the filter element is contaminated and needs to be replaced and cleaned respectively. More details see data sheet 51420.
- ▶ The material number of the corresponding replacement filter element is indicated on the name plate of the complete filter. It must comply with the material number on the filter element.
- ▶ Switch off the system, discharge the filter on the pressure side.
- ▶ Screw off the filter cover (NG0040-0100) and/or loosen the screws (from NG0160) and remove the filter over upwards.

Notice:

Note that with lower ratings, it may take slightly longer to discharge the residual oil. If the filter element is removed before running off residue oil, dirty oil can occur on the clean side.

- ▶ Remove the filter element including the filter bowl. From frame size 0160, the filter bowls are equipped with removal brackets.
- ▶ Remove the filter element from the spigot in the filter bowl by rotating it slightly.
- ▶ Clean the filter components, if necessary.
- ▶ Check the seals at filter cover and filter bowl for damage and renew them, if necessary. For suitable seal kits refer to chapter “Order Codes Spare Parts”.
- ▶ Filter elements made of wire mesh can be cleaned. For detailed cleaning instructions refer to data sheet 51420.
- ▶ Install the new or cleaned filter element on the spigot again by slightly rotating it.
- ▶ The filter is to be assembled in reverse order. The torque specifications (“Tightening torques” chapter) are to be observed.

Assembly, commissioning, maintenance

WARNING!

- ▶ Assembly and disassembly only with depressurized system! For the filter element exchange refer to “Maintenance”.
- ▶ Tank is under pressure!
- ▶ Do not exchange the optical/mechanical maintenance indicator while the filter is under pressure!

Notices:

- ▶ All works at the filter only be trained specialists.
- ▶ Functioning and safety are only guaranteed if original Bosch Rexroth filter elements and spare parts are used.
- ▶ Warranty becomes void if the delivered item is changed by the ordering party or third parties or improperly mounted, installed, maintained, repaired, used or exposed to environmental condition that do not comply with the installation conditions.

Tightening torques (dimensions in mm [inch])

Tank mounting

Series 10...	TEN0040	TEN0063	TEN0100	TEN0160	TEN0250	TEN0400	TEN0630	TEN1000	TE2000	TE2500
Screw	M10 x 30			M10 x 25				M12 x 25		
Tank mounting										
Quantity	2			4						
Recommended property class of screw				8.8						
Tightening torque with $\mu_{total} = 0.14$				21 Nm \pm 10%				37 Nm \pm 10%		

Connection flange SAE 3000 psi

Series 10...	TEN0040	TEN0063	TEN0100	TEN0160	TEN0250	TEN0400	TEN0630	TEN1000	TE2000	TE2500
Connection variant	Thread			SAE 1 1/4" / SAE 1 1/2"		SAE 2" / SAE 2 1/2"		SAE 3" / SAE 4"		
Tank mounting screw				M10 / M12		M12		M16		
Quantity						4				
Recommended property class of screw	-					8.8				
Tightening torque with $\mu_{total} = 0.14$				33 Nm \pm 10 % / 60 Nm \pm 10 %		60 Nm \pm 10%		137 Nm \pm 10%		

Filter cover

Series 10...	TEN0040	TEN0063	TEN0100	TEN0160	TEN0250	TEN0400	TEN0630	TEN1000	TE2000	TE2500
Screw	Re-tighten by hand until stop, if necessary using an open-end wrench (SW19).			M10		M12				
Filter cover										
Quantity	-					4				
Recommended property class of screw	-					8.8				
Tightening torque with $\mu_{total} = 0.14$	-			21 Nm \pm 10%		37 Nm \pm 10%				

Maintenance indicator

Series	10TEN0040...10TEN1000, 10TE2000, 10TE2500
Tightening torque maintenance indicator, mechanical optical, aluminum, V...	50 Nm \pm 5 Nm
Tightening torque maintenance indicator, mechanical optical, PA, P2,2	35 Nm \pm 3 Nm
Tightening torque cubic connector screw switching element EN-175301-803	M3/0.5 Nm

Directives and standardization

classification according to Pressure Equipment Directive 97/23/EC

The return line filters for hydraulic applications according to 51424 are pressure holding equipment according to article 1, section 2.1.4 of the Pressure Equipment Directive 97/23/EC (PED). However, on the basis of the exception in article 1, section 3.6 of the PEG, hydraulic filters

are exempt from the PED if they are not classified higher than category I (guideline 1/19).

The fluids from the chapter “Compatibility with approved pressure fluids” were considered for the classification. They do not receive a CE mark.

Use in explosive areas according to directive 94/9/EC (ATEX)

The tank mounted return line filters according to 51424 are not equipment or components in the sense of directive 94/9/EC and are not provided with a CE mark. It has been proven with the ignition risk analysis that these inline filters do not have own ignition sources acc. to DIN EN 13463-1:2009.

According to DIN EN 60079-11:2012, electronic maintenance indicators with a switching point:

WE-1SP-M12 x 1 R928028409

WE-1SP-EN175301-803 R928036318

are simple, electronic operating equipment that do not

have an own voltage source. This simple, electronic operating equipment may - according to DIN EN 60079-14:2012 - in intrinsically safe electric circuits (Ex ib) be used in systems without marking and certification.

The tank mounted return line filters and the electronic maintenance indicators described here can be used for the following explosive areas:

	zone suitability	
Gas	1	2
Dust	21	22

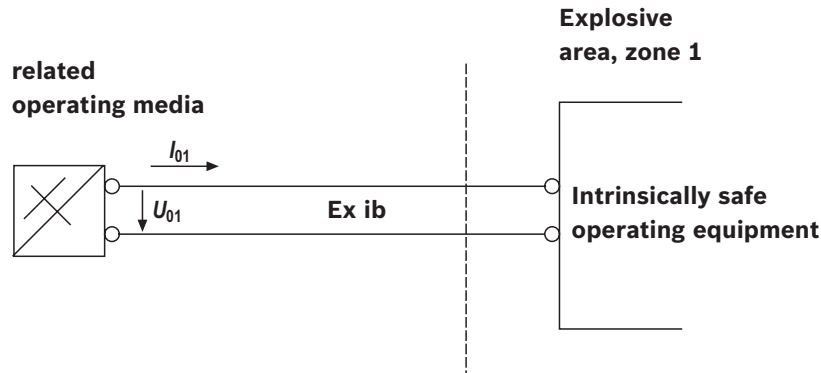
Complete filter with mech./opt. Maintenance indicator			
Use /assignment		Gas 2G	Dust 2D
Assignment		Ex II 2G c IIC T6	Ex II 2D c IIC T6
Conductivity of the medium	pS/m min		300
Dust accumulation	max	–	0.5 mm

electronic switching element in the intrinsically safe electric circuit			
Use /assignment		Gas 2G	Dust 2D
Assignment		Ex II 2G Ex ib IIB T4 Gb	Ex II 2D Ex ib IIIC T100°C Db
perm. intrinsically safe electric circuits		Ex ib IIC, Ex ic IIC	Ex ib IIIC
Technical data		Values only for intrinsically safe electric circuit	
Switching voltage	Ui max	150 V AC/DC	
Switching current	Ii max	1.0 A	
Switching power	Pi max	1.3 W T4 T _{max} 40 °C	750 mW T _{max} 40 °C
		1.0 W T4 T _{max} 80 °C	550 mW T _{max} 100 °C
Surface temperature ¹⁾		max	100 °C
inner capacity	Ci	negligible	
inner inductivity	Li	negligible	
Dust accumulation	max	–	0.5 mm

¹⁾ The temperature depends on the temperature of the medium in the filter and must not exceed the value specified here.

Directives and standardization

Possible circuit according to DIN EN 60079-14



⚠ WARNING!

- ▶ Explosion hazard due to high temperature!
The temperature depends on the temperature of the medium in the hydraulic circuit and must not exceed the value specified here. Measures are to be taken so that in the explosive area, the max. admissible ignition temperature is not exceeded.
- ▶ When using the tank mounted return line filters according to 51424 in explosive areas, appropriate equipotential bonding has to be ensured. The filter is preferably to be earthed via the mounting screws. It has to be noted in this connection that paintings and oxidic protective layers are not electrically conductive.
- ▶ During filter element exchanges, the packaging material is to be removed from the replacement element outside the explosive area

👉 Notices:

- ▶ Maintenance only by specialists, instruction by the machine end-user acc. to DIRECTIVE 1999/92/EC appendix II, section 1.1
- ▶ Functional and safety warranty only applicable when using genuine Rexroth spare parts

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Notes

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