Pre-fill valve

RE 20745/07.07 1/12
Replaces: 05.07

Type SFE

Size 25 to 100
Component series 1X
Maximum operating pressure 350 bar *[5076 psi]*
Maximum flow 2000 l/min *[528 US gpm]*

Table of contents

Information on available spare parts:
www.boschrexroth.com/spc

Features

- Cartridge valve
- Hydraulically piloted-to-open pre-fill valve (check valve)
- Installation in blocks or cylinders

Ordering code

SFE			0	–1X	/	M	*

Pre-fill valve

Size 25	= **25**
Size 32	= **32**
Size 40	= **40**
Size 50	= **50**
Size 63	= **63**
Size 80	= **80**
Size 100	= **100**

Type of connection

Block installation	= **P**
Cylinder installation [1]	= **Z**

Without pre-decompression = **0**

1X = Component series 10 to 19
(10 to 19: unchanged installation and connection dimensions)

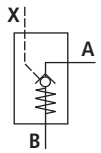
M = **Seal material**
NBR seals
(other seals on request)
⚠ Attention!
Oberve compatibility of seals with hydraulic fluid used!

Further details in clear text

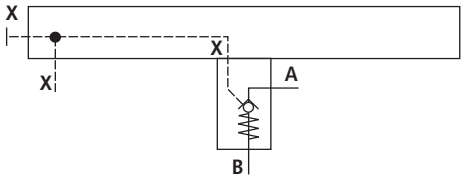
[1] Control cover of type “LFF“, incl. matched mounting kit (separate order, see page 8):
For sizes 25 and 32 control covers of type “LFA.D-7X/....F…“ (see RE 21010) can be used alternatively.

Symbols

Pre-fill valve type SFE



Pre-fill valve type SFE with control cover type LFF



Function, section

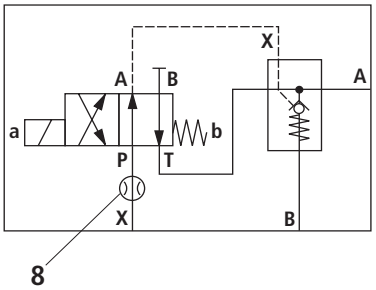
Valves of type SFE are hydraulically piloted to open check valves for installation in blocks or cylinders. They are used to leak-free isolate pressurised working circuits (e.g. press cylinder). Due to the favourable flow characteristics and low closing force of compression spring (5) at the main poppet, it is ideal for, among others, re-feed functions and filling the main cylinders on presses during fast closing movements.

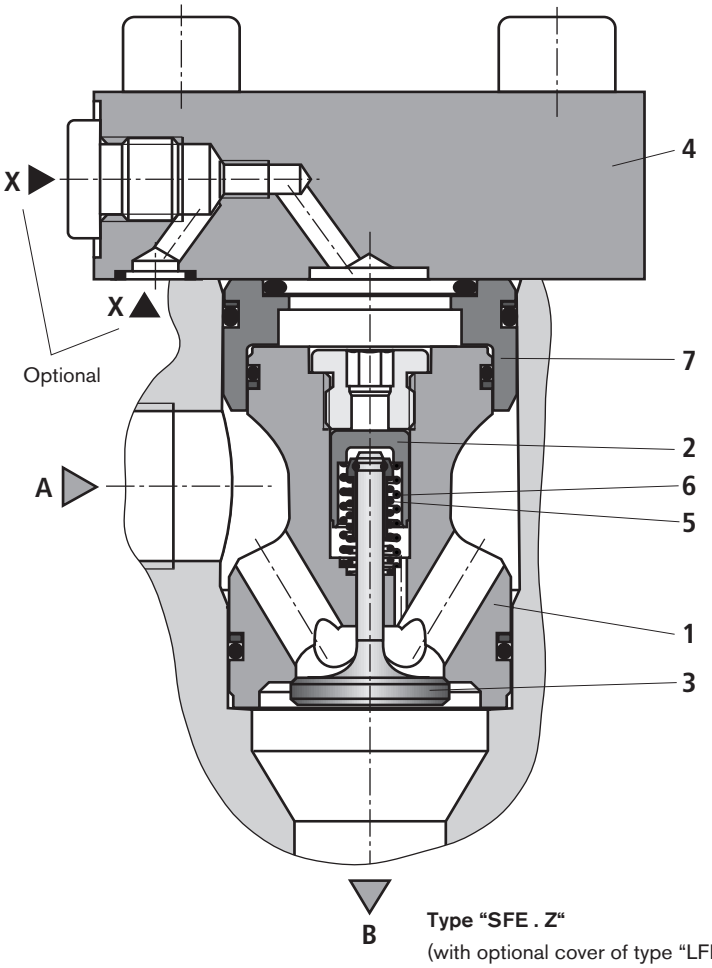
The valves basically consist of housing (1), pilot piston (2), main poppet (3), compression springs (5 and 6) and ring (7). Cover (4) must be ordered separately.

The valves allow a free flow from A to B. In the opposite direction, main poppet (3) is held on the seat by compression spring (5) and the pressure effective in port B. The pressure in pilot port X pushes pilot piston (2) downwards against compression spring (6), which causes main poppet (3) to be pushed off its seat. The fluid can now also flow through the valve in the opposite direction.

⚠ Attention!
For the opening process, a nozzle insert (8) must be installed in the assigned pressure channel of the upstream directional valve (see table and symbol):

Size	Nozzle Ø in mm *[inch]*
25	0.5 *[0.0197]*
32	0.8 *[0.0315]*
40	0.8 *[0.0315]*
50	0.8 *[0.0315]*
63	0.8 *[0.0315]*
80	1.0 *[0.0394]*
100	1.0 *[0.0394]*





Type “SFE . Z“
(with optional cover of type “LFF“)

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

General

Size		25	32	40	50	63	80	100
Weight	kg *[lbs]*	0.53 *[1.17]*	1.05 *[2.31]*	1.94 *[4.28]*	3.20 *[7.06]*	6.48 *[14.29]*	10.30 *[22.71]*	22.15 *[48.83]*
Installation position		Optional						
Ambient temperature range	°C *[°F]*	–30 to +80 *[–22 to +176]* (NBR seals)						

Hydraulic

Maximum operating pressure	– Ports B, P	bar *[psi]*	350 *[5076]*
	– Port X	bar *[psi]*	150 *[2175]*
	– Port A	bar *[psi]*	16 *[232]*
Cracking pressure [1]		bar *[psi]*	approx. 0.2 *[1.74]*
Maximum flow		l/min *[US gpm]*	See Applications on page 11
Hydraulic fluid			Mineral oil (HL, HLP) to DIN 51524; fast bio-degradable hydraulic fluids to VDMA 24568 (see also RE 90221); HETG (rape seed oil); other hydraulic fluids on request
Hydraulic fluid temperature range		°C *[°F]*	–30 to +80 *[–22 to +176]* (NBR seals)
Viscosity range		mm^2/s *[SUS]*	10 to 800 *[45 to 3720]*
Permissible max. degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)			Class 20/18/15 [2]

[1] Pressure differential across the main poppet to overcome the spring force.

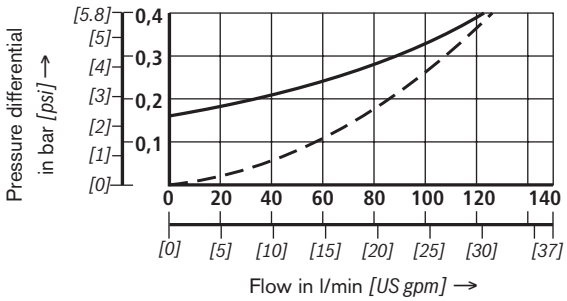
[2] The cleanliness classes specified for components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, prolongs the service life of components.

For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086, RE 50087 and RE 50088.

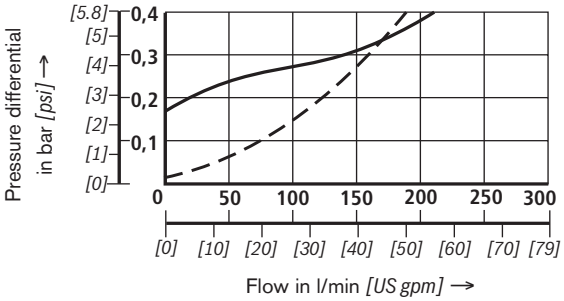
Characteristic curves (measured with HLP46, $\vartheta_{oil\ (\nu = 190\ SUS)}$ = 40 °C ± 5 °C *[104 °F ± 9 °F]*)

Pressure differential Δp between ports A and B in dependence on flow q_V when the fluid flows in the suction direction.

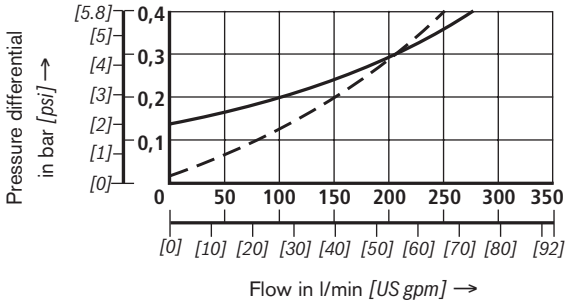
Size 25



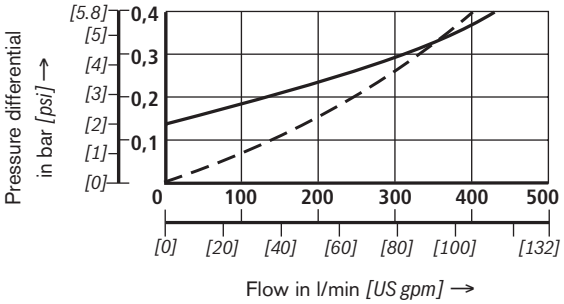
Size 32



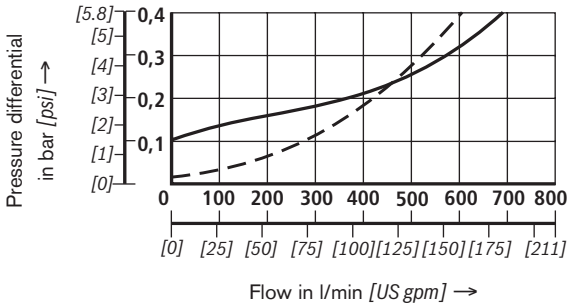
Size 40



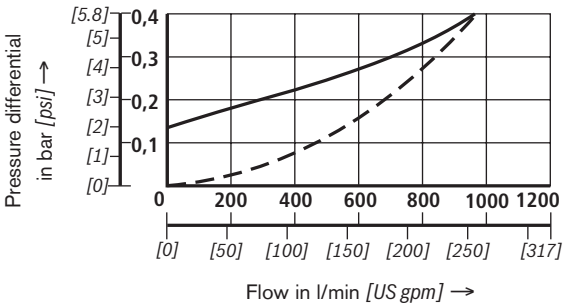
Size 50



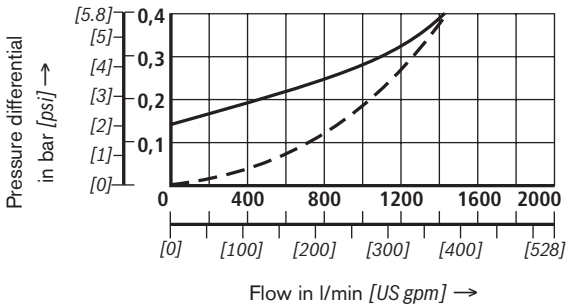
Size 63



Size 80



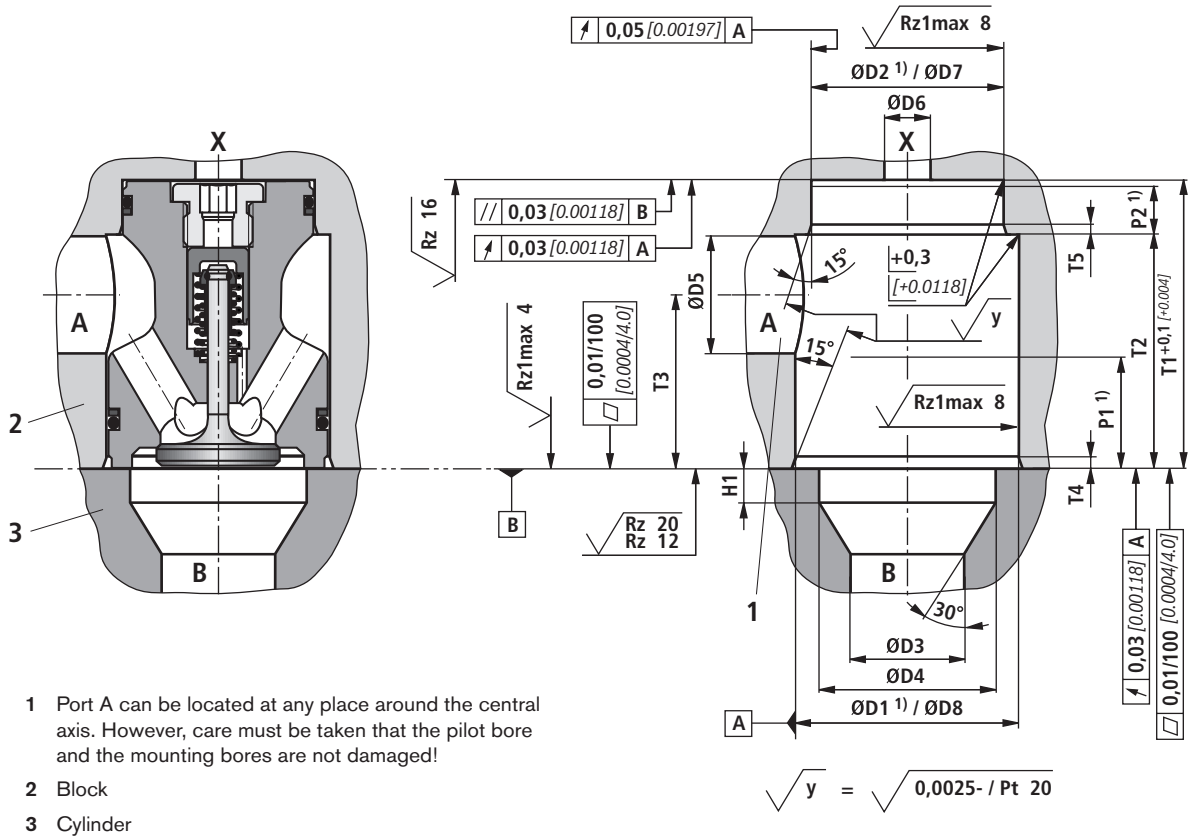
Size 100



A to B ——————

B to A — — —

Mounting cavity for block installation, type SFE . P (dimensions in mm *[inch]*)



1 Port A can be located at any place around the central axis. However, care must be taken that the pilot bore and the mounting bores are not damaged!

2 Block

3 Cylinder

For connection dimensions, see page 8.

Tolerances:

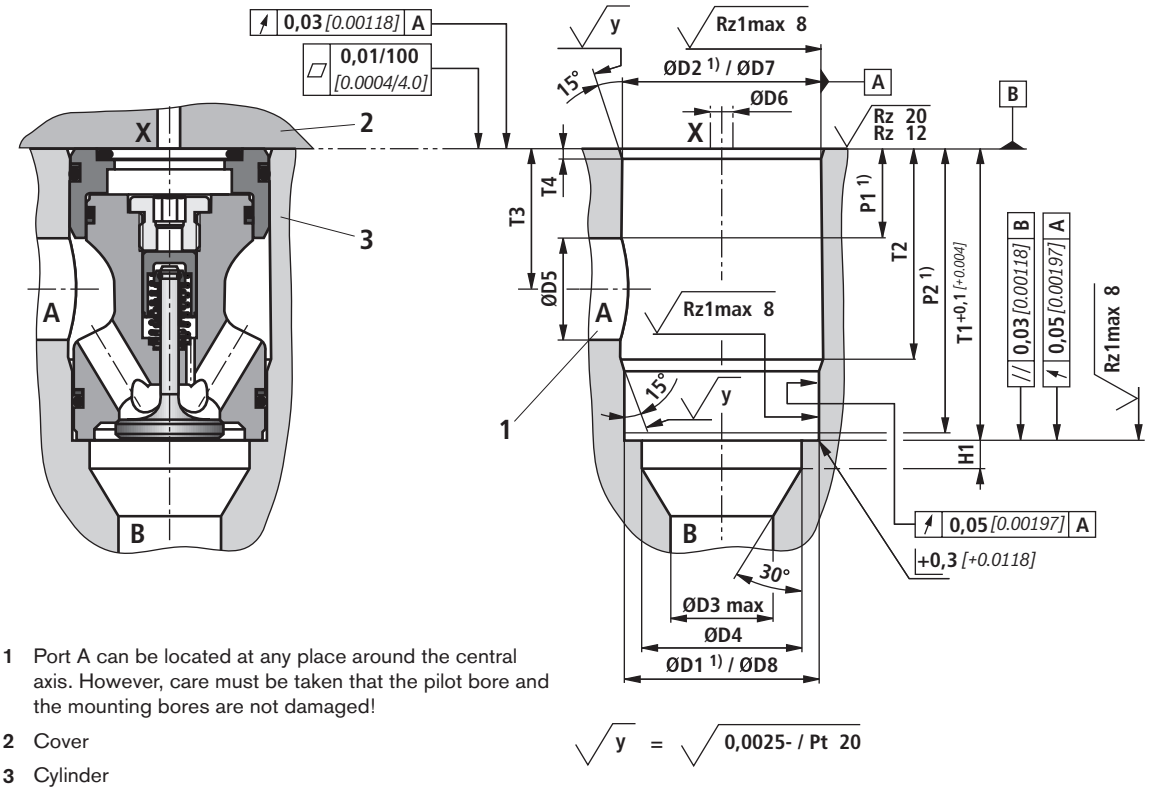
– General tolerances ISO 2768-mK

– Tolerancing principle ISO 8015

Size	ØD1H7 ØD8	ØD2H7 ØD7	ØD3$_{-5}$ *[−0.197]*	ØD4	ØD5	ØD6	H1	P1 1)	P2 1)	T1$^{+0,1}$ *[+0.004]*	T2	T3	T4	T5
25	43 *[1.69]*	37 *[1.46]*	25 *[0.984]*	36 *[1.42]*	25 *[0.984]*	7 *[0.276]*	7 *[0.276]*	30 *[1.18]*	13 *[0.512]*	70 *[2.76]*	56 *[2.20]*	43,5 *[1.71]*	2,5 *[0.098]*	2,5 *[0.098]*
32	58 *[2.28]*	50 *[1.97]*	31 *[1.22]*	46 *[1.81]*	32 *[1.26]*	7 *[0.276]*	9 *[0.354]*	30 *[1.18]*	13 *[0.512]*	78 *[3.07]*	63 *[2.48]*	47 *[1.85]*	2,5 *[0.098]*	2,5 *[0.098]*
40	75 *[2.95]*	55 *[2.17]*	40 *[1.57]*	58 *[2.28]*	40 *[1.57]*	7 *[0.276]*	11 *[0.433]*	26 *[1.02]*	16 *[0.63]*	81 *[3.19]*	63 *[2.48]*	43 *[1.69]*	3 *[0.118]*	3 *[0.118]*
50	90 *[3.54]*	68 *[2.68]*	50 *[1.97]*	71 *[2.79]*	50 *[1.97]*	7 *[0.276]*	14 *[0.551]*	31 *[1.22]*	20 *[0.787]*	100 *[3.94]*	78 *[3.07]*	53 *[2.09]*	4 *[0.157]*	3 *[0.118]*
63	120 *[4.72]*	90 *[3.54]*	63 *[2.48]*	90 *[3.54]*	60 *[2.36]*	7 *[0.276]*	16 *[0.629]*	32 *[1.26]*	23 *[0.906]*	114 *[4.49]*	89 *[3.50]*	59 *[2.32]*	4 *[0.157]*	4 *[0.157]*
80	145 *[5.71]*	110 *[4.33]*	78,5 *[3.09]*	107 *[4.21]*	76 *[2.99]*	7 *[0.276]*	18 *[0.709]*	36 *[1.42]*	23 *[0.906]*	134 *[5.28]*	109 *[4.29]*	71 *[2.79]*	5 *[0.197]*	5 *[0.197]*
100	180 *[7.09]*	135 *[5.31]*	95 *[3.74]*	132 *[5.19]*	93 *[3.66]*	7 *[0.276]*	30 *[1.18]*	60 *[2.36]*	30 *[1.18]*	180 *[7.09]*	148 *[5.83]*	101 *[3.98]*	8 *[0.315]*	8 *[0.315]*

1) Fit

Mounting cavity for cylinder installation, type SFE . Z (dimensions in mm *[inch]*)



1 Port A can be located at any place around the central axis. However, care must be taken that the pilot bore and the mounting bores are not damaged!

2 Cover

3 Cylinder

$\sqrt{y} = \sqrt{0{,}0025\text{- / Pt } 20}$

Tolerances:

- General tolerances ISO 2768-mK
- Tolerancing principle ISO 8015

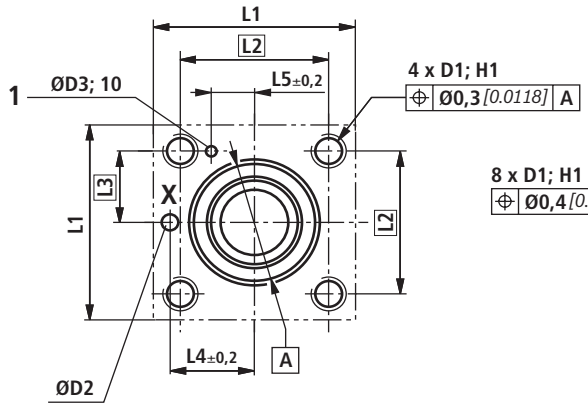
For connection dimensions, see page 8.

Size	ØD1H7 ØD8	ØD2H7 ØD7	ØD3$_{-5}$ *[−0.197]*	ØD4	ØD5	ØD6	H1	P1 1)	P2 1)	T1$^{+0,1}$ *[+0.004]*	T2	T3	T4
25	43 *[1.69]*	45 *[1.77]*	25 *[0.984]*	36 *[1.42]*	25 *[0.984]*	7 *[0.276]*	7 *[0.276]*	27 *[1.06]*	83 *[3.27]*	85 *[3.35]*	60 *[2.36]*	41 *[1.61]*	2,5 *[0.098]*
32	58 *[2.28]*	60 *[2.36]*	31 *[1.22]*	46 *[1.81]*	32 *[1.26]*	7 *[0.276]*	9 *[0.354]*	28 *[1.10]*	89,5 *[3.50]*	91,5 *[3.60]*	66 *[2.60]*	44 *[1.73]*	2,5 *[0.098]*
40	75 *[2.95]*	78 *[3.07]*	40 *[1.57]*	58 *[2.28]*	40 *[1.57]*	7 *[0.276]*	11 *[0.433]*	30 *[1.18]*	91 *[3.58]*	93 *[3.66]*	71 *[2.80]*	50 *[1.97]*	3 *[0.118]*
50	90 *[3.54]*	93 *[3.66]*	50 *[1.97]*	71 *[2.79]*	50 *[1.97]*	7 *[0.276]*	14 *[0.551]*	34 *[1.34]*	110 *[4.33]*	112 *[4.41]*	85 *[3.35]*	59 *[2.32]*	4 *[0.157]*
63	120 *[4.72]*	123 *[4.84]*	63 *[2.48]*	90 *[3.54]*	60 *[2.36]*	7 *[0.276]*	16 *[0.629]*	40 *[1.57]*	128 *[5.04]*	130 *[5.12]*	101 *[3.98]*	71 *[2.80]*	4 *[0.157]*
80	145 *[5.71]*	150 *[5.91]*	78,5 *[3.09]*	107 *[4.21]*	76 *[2.99]*	7 *[0.276]*	18 *[0.709]*	40 *[1.57]*	148 *[5.83]*	150 *[5.91]*	117 *[4.61]*	79 *[3.11]*	5 *[0.197]*
100	180 *[7.09]*	185 *[7.28]*	95 *[3.74]*	132 *[5.19]*	100 *[3.94]*	7 *[0.276]*	30 *[1.18]*	50 *[1.97]*	188 *[7.40]*	200 *[7.87]*	152 *[5.98]*	101 *[3.98]*	8 *[0.315]*

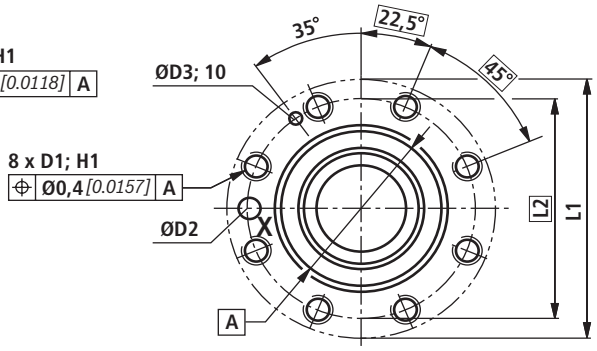
1) Fit

Mounting cavity and connection dimensions to DIN ISO 7368 (dimensions in mm *[inch]*)

Sizes 25 to 63



Sizes 80 and 100



1 Bore for locating pin

Tolerances:
- General tolerances ISO 2768-mK
- Tolerancing principle ISO 8015

Size	25	32	40	50	63	80	100
ØD1	M12	M16	M20	M20	M30	M24	M30
ØD2$_{-0,5}$ *[−0.0196]*	6 *[0.236]*	8 *[0.315]*	10 *[0.394]*	10 *[0.394]*	12 *[0.472]*	16 *[0.63]*	20 *[0.787]*
ØD3H13	5 *[0.197]*	5 *[0.197]*	5 *[0.197]*	8 *[0.315]*	8 *[0.315]*	10 *[0.394]*	10 *[0.394]*
H1	25 *[0.984]*	35 *[1.38]*	45 *[1.77]*	45 *[1.77]*	65 *[2.56]*	50 *[1.97]*	63 *[2.48]*
L1	85 *[3.35]*	102 *[4.02]*	125 *[4.92]*	140 *[5.51]*	180 *[7.09]*	250 *[9.84]*	300 *[11.8]*
L2	58 *[2.28]*	70 *[2.76]*	85 *[3.35]*	100 *[3.94]*	125 *[4.92]*	200 *[7.87]*	245 *[9.65]*
L3	29 *[1.14]*	35 *[1.38]*	42,5 *[1.65]*	50 *[1.97]*	62,5 *[2.44]*	–	–
L4	33 *[1.30]*	41 *[1.61]*	50 *[1.97]*	58 *[2.28]*	75 *[2.95]*	–	–
L5	16 *[0.63]*	17 *[0.669]*	23 *[0.906]*	30 *[1.18]*	38 *[1.50]*	–	–

Ordering code: Control cover with remote control connection

LFF		D	−1X	/	F		M

Size 25 = **25** [1]
Size 32 = **32** [1]
Size 40 = **40**
Size 50 = **50**
Size 63 = **63**
Size 80 = **80**
Size 100 = **100**

Control cover = **D**

Component series 10 to 19 = **1X**
(10 to 19: unchanged installation and connection dimensions)

Remote control connection = **F**

Seal material
M = NBR seals
(other seals on request)
⚠ Attention!
Observe compatbility of seals with hydraulic fluid used

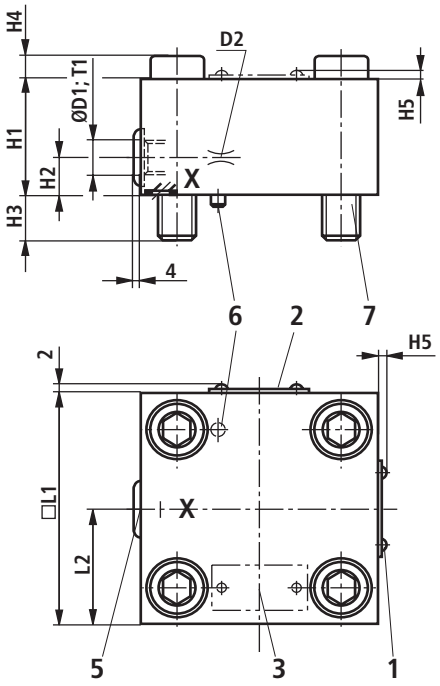
X[2] = Nozzle in channel (Ø in 1/10 mm)

[1] Alternatively, control covers of type "LFA.D-7X/....F…" (see RE 21010) may be used.

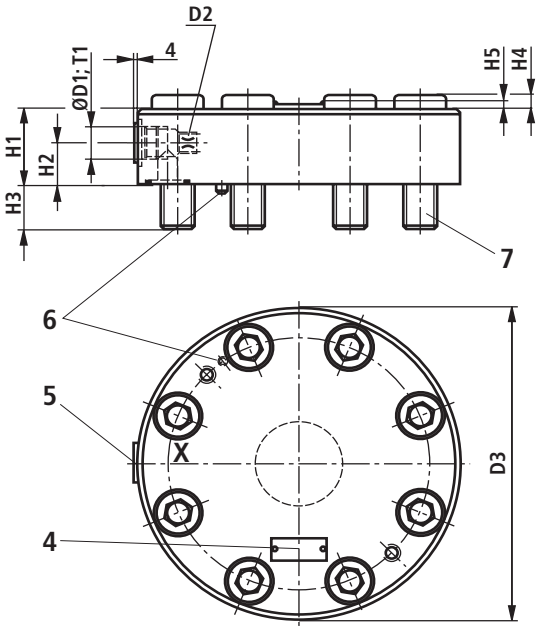
[2] Nozzle possible; if required, specify details (e.g. "…X10" for ***d*** = 1.0 mm)

Unit dimensions: Control cover with remote control connection (dimensions in mm *[inch]*)

Sizes 25 to 63



Sizes 80 and 100



1 Nameplate for size 25
2 Nameplate for size 32
3 Nameplate for sizes 40, 50, 63
4 Nameplate for sizes 80, 100
5 Port X optionally as threaded connection
6 Locating pin
7 Fixing screws, see page 10

Tolerances:
– General tolerances ISO 2768-mK
– Tolerancing principle ISO 8015

Size	25	32	40	50	63	80	100
ØD1	G1/4	G1/4	G1/2	G1/2	G3/4	G3/4	G1
D2	M6	M6	M8 x 1	M8 x 1	G3/8	G3/8	G1/2
D3	–	–	–	–	–	250 *[9.84]*	300 *[11.8]*
H1	30 *[1.18]*	35 *[1.38]*	60 *[2.36]*	68 *[2.68]*	82 *[3.23]*	70 *[2.76]*	75 *[2.95]*
H2	16 *[0.63]*	16 *[0.63]*	30 *[1.18]*	32 *[1.26]*	40 *[1.57]*	35 *[1.38]*	40 *[1.57]*
H3	24 *[0.945]*	28 *[1.10]*	32 *[1.26]*	34 *[1.34]*	50 *[1.97]*	34 *[1.34]*	38 *[1.50]*
H4	12 *[0.472]*	16 *[0.63]*	0	0	0	10 *[0.394]*	28 *[1.10]*
H5	2 *[0.079]*	2 *[0.079]*	0	0	0	0	2 *[0.079]*
□ L1	85 *[3.35]*	100 *[3.94]*	125 *[4.92]*	140 *[140]*	180 *[7.09]*	–	–
L2	42,5 *[1.65]*	50 *[1.97]*	72 *[2.83]*	80 *[3.15]*	90 *[3.54]*	–	–
T1	12 *[0.472]*	12 *[0.472]*	14 *[0.551]*	14 *[0.551]*	16 *[0.63]*	16 *[0.63]*	18 *[0.709]*

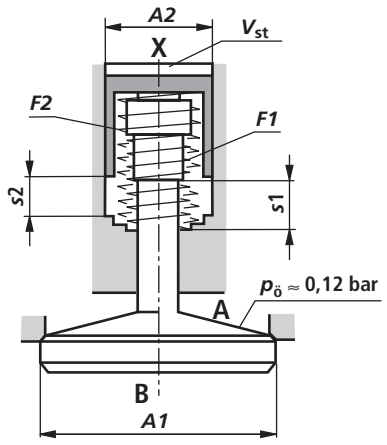
Fixing screws: Control cover with remote control connection [1)]

Size	Qty	Dimensions	Tightening torque M_T in Nm *[ft-lbs]*
25	4	M12 x 50	110 *[81.1]*
32	4	M16 x 60	270 *[199.1]*
40	4	M20 x 70	520 *[383.5]*
50	4	M20 x 80	520 *[383.5]*
63	4	M30 x 100	1800 *[1327.6]*
80	8	M24 x 90	900 *[663.8]*
100	8	M30 x 100	1800 *[1327.6]*

[1)] (included in the scope of supply)

Hexagon socket head cap screws, metric ISO 4762 - 10.9
Friction coefficient $\mu_{total} = 0.14$
(adjust in the case of differing surfaces)

Poppet geometry and determination of the minimum pilot pressure



A1 = Effective area of the main poppet
A2 = Effective area of the pilot piston
s1 = Stroke of main poppet
s2 = Stroke of pilot piston
F1 = Spring force of valve spring
F2 = Spring force of pilot piston compression spring
V_{st} = Pilot flow for opening the valve
$p_{ö}$ = Cracking pressure (pressure differential across the main poppet for overcoming spring force ***F1***)
p_{St} = Pilot pressure in port X
p_B = System pressure in port B

$$\text{Opening ratio} = \frac{\text{Pilot pressure } p_{St}}{\text{System pressure } p_B}$$

Size	*A1* in cm^2 *[$inch^2$]*	*A2* in cm^2 *[$inch^2$]*	*s1* in mm *[inch]*	*s2* in mm *[inch]*	*F1* in N *[lbs]*	*F2* in N *[lbs]*	V_{st} in cm^3 *[$inch^3$]*	Opening ratio
25	5.31 *[0.823]*	1.33 *[0.206]*	6.2 *[0.244]*	5 *[0.197]*	6 to 14 *[1.35 to 3.15]*	38 to 70 *[8.54 to 15.74]*	0.66 *[0.0403]*	4.0
32	8.04 *[1.246]*	2.01 *[0.312]*	8.5 *[0.335]*	6.5 *[0.256]*	9 to 22 *[2.02 to 4.95]*	58 to 109 *[13.04 to 24.50]*	1.30 *[0.0793]*	4.0
40	13.52 *[2.096]*	3.14 *[0.487]*	10 *[0.394]*	7 *[0.276]*	14 to 29 *[3.15 to 6.52]*	93 to 162 *[20.91 to 36.42]*	2.20 *[0.1343]*	4.3
50	21.24 *[3.292]*	4.71 *[0.730]*	12.5 *[0.492]*	9 *[0.354]*	23 to 49 *[5.17 to 11.01]*	149 to 261 *[33.49 to 58.68]*	4.20 *[0.2563]*	4.5
63	32.67 *[5.064]*	7.07 *[1.096]*	14.5 *[0.571]*	11 *[0.433]*	35 to 63 *[7.87 to 14.16]*	206 to 348 *[46.31 to 78.23]*	7.80 *[0.4759]*	4.6
80	49.02 *[7.598]*	10.18 *[1.578]*	17 *[0.669]*	13 *[0.512]*	57 to 127 *[12.81 to 28.55]*	310 to 579 *[69.69 to 130.16]*	13.20 *[0.8055]*	4.8
100	73.13 *[11.335]*	15.90 *[2.465]*	22 *[0.866]*	16 *[0.63]*	81 to 193 *[18.21 to 43.39]*	476 to 952 *[107.01 to 214.02]*	25.5 *[1.5561]*	4.6

Example: Type SFE**32**...; $p_B = 30$ bar *[435 psi]*
$p_{St} = 4.0 \times 30$ bar *[435 psi]* $= 120$ bar *[1740 psi]*

Maximum flow q_V in l/min *[US gpm]* for re-feed function (A to B)

Size	25	32	40	50	63	80	100
Application 1	100 *[26.42]*	170 *[44.91]*	240 *[63.40]*	360 *[95.10]*	580 *[153.22]*	810 *[213.98]*	1210 *[319.65]*
Application 2	90 *[23.78]*	140 *[36.98]*	200 *[52.83]*	320 *[84.54]*	510 *[134.73]*	710 *[187.56]*	1070 *[282.66]*
Application 3	60 *[15.85]*	100 *[26.42]*	140 *[36.98]*	220 *[58.12]*	350 *[92.46]*	480 *[126.80]*	730 *[192.85]*
Application 4	50 *[13.21]*	70 *[18.49]*	100 *[26.42]*	160 *[42.27]*	260 *[68.69]*	360 *[95.102]*	540 *[142.65]*

⚠ Attention!

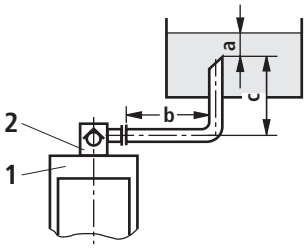
Improper dimensioning of the pre-fill valve and connection lines can cause cavitation effects. As a consequence, the reliability and service life of products may be affected!

⚠ Attention!

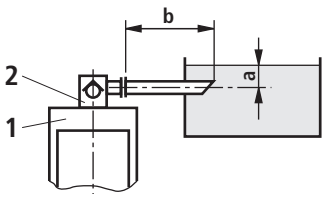
Too small a pre-fill valve or too small lines lead to the release of gases from hydraulic fluids with the associated consequences, and often to long-term damage on cylinder seals!

Applications

Application 1

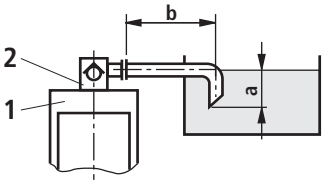


Application 2

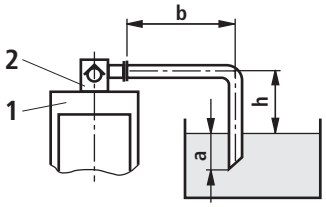


Size of the filling tank
min. 1.5 x cylinder volume

Application 3



Application 4



1 Cylinder

2 Pre-fill valve

a Min. 300 mm *[11.8 inch]* when the cylinder is extended

b Up to 1000 mm *[39.4 inch]* at specified maximum flow rates

c ≤ 500 *[19.7 inch]* mm

h 300 mm *[11.8 inch]* ≤ h ≤ 500 mm *[19.7 inch]*

☞ Note!

When in doubt, please consult us! It is often sufficient to select the pipe one size larger.