Check valve, pilot operated

RE 21460/09.11 1/8
Replaces: 08.11

Type SV and SL

Size 6
Component series 6X
Maximum operating pressure 315 bar
Maximum flow 60 l/min

H6090

Table of contents

Features

- For subplate mounting
- Porting pattern according to ISO 4401-03-02-0-05 and ISO 5781-03-04-0-00
- For the leak-free blocking of one actuator port
- With internal or external pilot oil return, optional
- Various cracking pressures, optional
- With or without pre-opening, optional
- Check valve installation separately available
- Corrosion-resistant design, optional

- More information:
  - Subplates — Data sheet 45052
  - Hydraulic fluids on mineral oil basis — Data sheet 90220
  - Reliability characteristics according to EN ISO 13849 — Data sheet 08012

Ordering code

S		6	P		–6X/		*

Pilot oil return internal **= V**
Pilot oil return external **= L**

Size 6 **= 6**

For subplate mounting **= P**

With pre-opening **= A**
Without pre-opening **= B**

Cracking pressure
See page 5
= 1
= 2
= 3
= 4 [1)]

6X = Component series 60 to 69
(60 to 69: Unchanged installation and connection dimensions)

No code = None
J50 = Galvanic coating
DIN 50979 - Fe//Zn8//Cn//T0
(thick-layer passivation)

Corrosion resistance (outside)

No code = NBR seals
V = FKM seals
(other seals upon request)

Seal material [2)]

Further details in the plain text

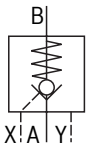
[1)] Only version "B"

[2)] The selection of the seal material depends on the operating parameters (fluid, temperature, etc.)

Symbols

Type SV (pilot oil return internal)

Type SL (pilot oil return external)



Function, section

The isolator valve type SV/SL is a pilot operated check valve for subplate mounting. It is used for the leak-free blocking of one actuator port, also in case of longer standstill times.

The valve basically consists of a housing (1), a seat poppet (2), a compression spring (3), a control spool (4) as well as of a pre-opening as ball seat valve (7), which is optional.

The seat valve can be flown through from A to B without external pilot pressure.

Condition: $p_A > p_B$ + cracking pressure (compression spring). In the opposite direction, the seat valve closes hydraulically tight.

A sufficiently high pilot pressure at port X moves the control spool (4) in the direction of the seat valve and pushes the seat poppet (2) out of its seat. This allows for a free flow in both directions (active keeping open).

In order to ensure that the seat valve actively opens, the pressure conditions on both sides of the control spool (4) are just as important as the area ratio at the seat poppet (2) or (7).

This results in the following available options for the types

- SV (large spool face A_2 (6) connected with p_A) or
- SL (small front face A_4 (8) connected with p_A)

as well as for the versions with pre-opening "A" and without pre-opening "B".

Version "A" (with pre-opening)

This valve is provided with an additional pre-opening. By pressurization at the X port, the control spool (4) is moved to the right. As a result, the ball (7) is pushed off the seat first and the seat poppet (2) afterwards.

☞ Notices!

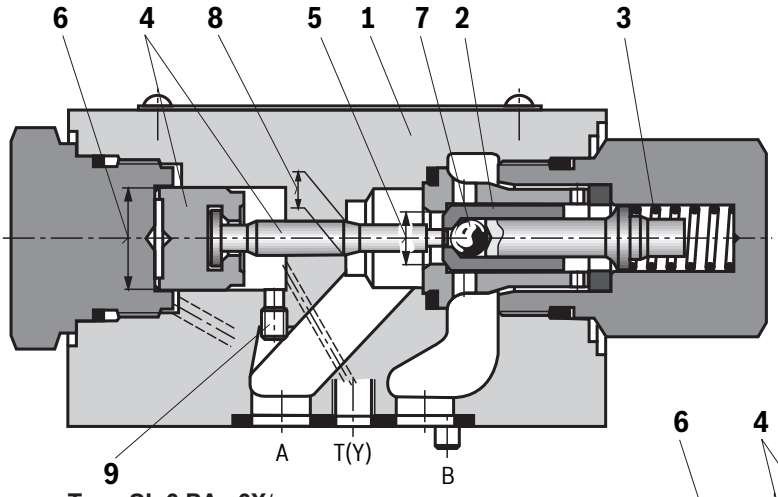
Version "A":

- Due to the two-stage structure with enlarged control open ratio, safe unloading is also possible with lower pilot pressure.
- Avoidance of switching shocks due to dampened decompression of the pressure volume on the actuator side.

Version "B":

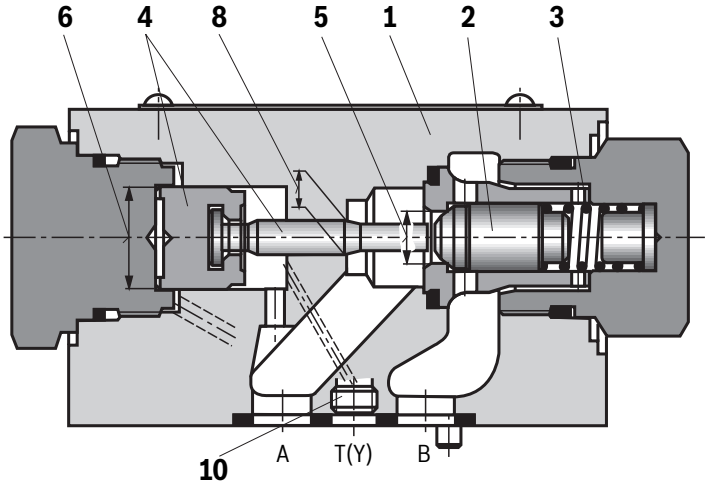
- In case of valves without pre-opening, the included pressure volume may be unloaded suddenly. Resulting switching shocks may not only lead to noise formation but also to early wear at installed components.

The conversion of type SV to type SL is possible by replacing the plugs (9) and (10). One of the both plugs must always be installed!



Type SL 6 PA.–6X/…

Type	Plug (9)	Plug (10)
SV	M3 (open)	M6 x 1 (closed)
SL	M3 (closed)	M6 x 1 (open)



Type SV 6 PB.–6X/…

5 Area A_1 (seat poppet)
6 Area A_2 (control spool)
7 Area A_3 (ball)
8 Area A_4 (control spool)

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

general

Weight	kg	Approx. 0.8
Installation position		Any
Ambient temperature range	°C	–30 to +80 (NBR seals) –20 to +80 (FKM seals)
MTTFd values according to EN ISO 13849	Years	150 (for further details see data sheet 08012)

hydraulic

Maximum operating pressure		bar	315
Maximum flow		l/min	60
Pilot pressure		bar	5 to 315
Hydraulic fluid		°C	See table below
Hydraulic fluid temperature range (at the valve's working ports)			–30 to +80 (NBR seals) –20 to +80 (FKM seals)
Viscosity range		mm^2/s	2.8 to 500
Maximum permitted degree of contamination of the hydraulic fluid - cleanliness class according to ISO 4406 (c)			Class 20/18/15 [1)]
Direction of flow			See Symbols on page 2
Pilot volume	– Port X	cm^3	0.68
	– Port Y (only type SL)	cm^3	0.58
Control area ratio (For areas, see sectional drawing on page 3)	– Version "A"		A_3/A_2 ~ 1/13
	– Version "B"		A_1/A_2 ~ 1/3
			A_4/A_2 ~ 1/7

Hydraulic fluid		**Classification**	**Suitable sealing materials**	**Standards**
Mineral oils and related hydrocarbons		HL, HLP, HVLP	NBR, FKM	DIN 51524
Environmentally compatible	– Insoluble in water	HEES	NBR, FKM	ISO 15380
		HEPR	FKM	
	– Soluble in water	HEPG	FKM	ISO 15380
Flame-resistant	– Water-free	HFDU, HFDR	FKM	ISO 12922
	– Water-containing	HFC	NBR	ISO 12922

☞ **Important information on hydraulic fluids!**

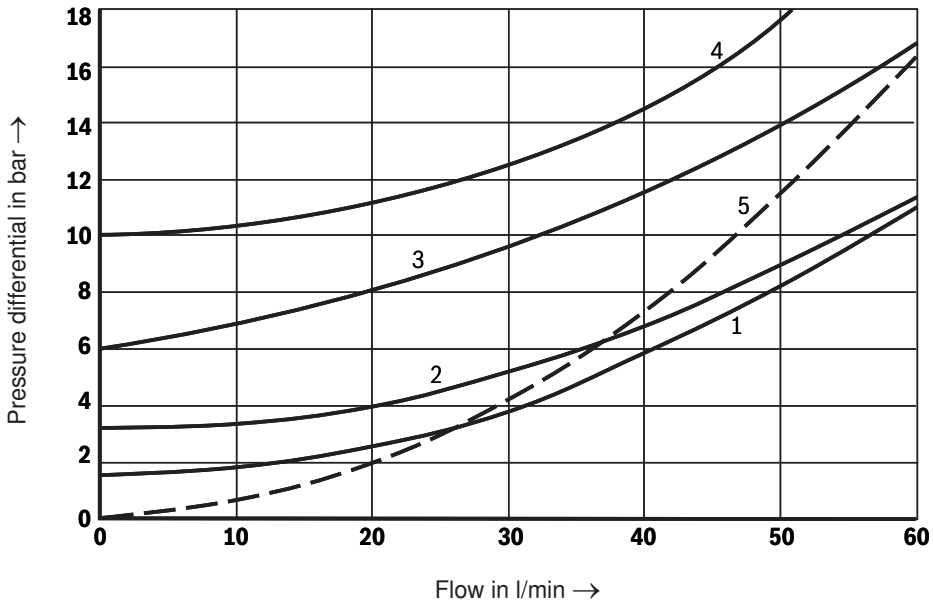
- For more information and data on the use of other hydraulic fluids refer to data sheet 90220 or contact us!
- There may be limitations regarding the technical valve data (temperature, pressure range, service life, maintenance intervals, etc.)!

[1)] The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the service life of the components.

For selecting the filters, see www.boschrexroth.com/filter.

Characteristic curves (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C)

Δp-q_V characteristic curves

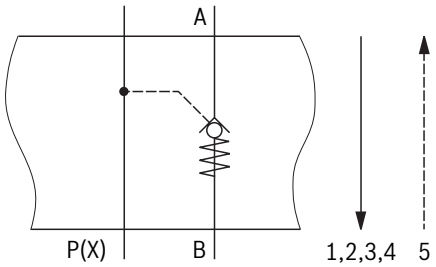


A to B

B to A

Cracking pressure:

1 1.5 bar
2 3 bar
3 6 bar
4 10 bar
5 Check valve controlled open via control spool



Calculation of the pilot pressure p_{St} depending on p_A and p_B

Version "A" (with pre-opening)

Balance of forces:

$$p_{St} \cdot A_2 - p_A^* \cdot (A_2 - A_4) - p_A \cdot A_4 - p_F \cdot A_1 + p_A \cdot A_1 - p_B \cdot A_3 = 0$$

Assumption: $p_A = 0$

$$p_{St} = \frac{1}{3} \cdot p_F + \frac{1}{13} \cdot p_B$$

Version "B" (without pre-opening)

Balance of forces:

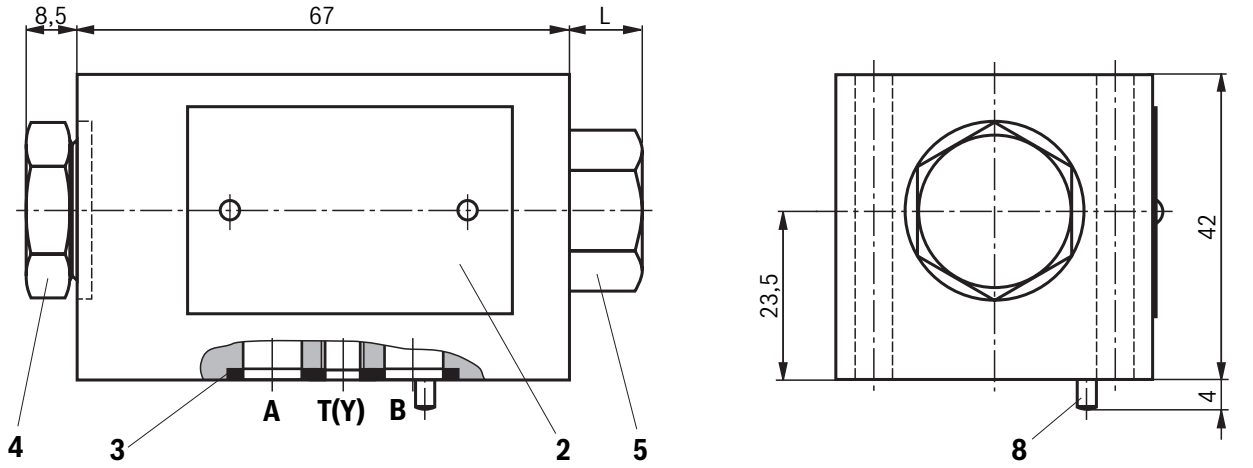
$$p_{St} \cdot A_2 - p_A^* \cdot (A_2 - A_4) - p_A \cdot A_4 - p_F \cdot A_1 + p_A \cdot A_1 - p_B \cdot A_1 = 0$$

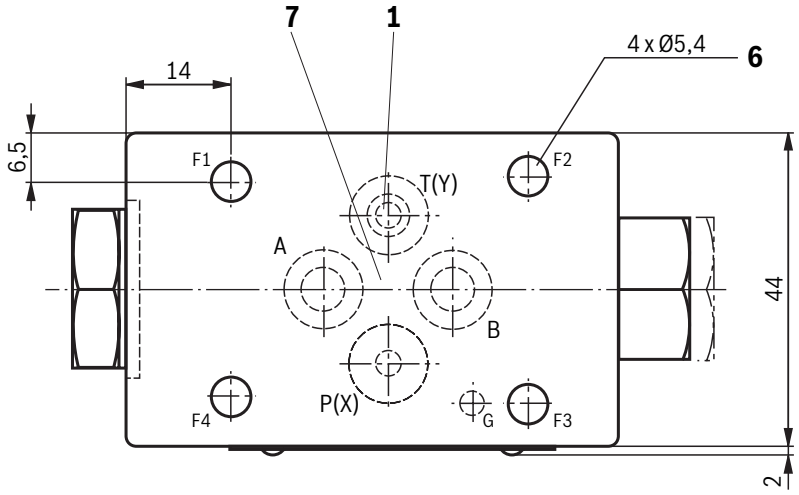
Assumption: $p_A = 0$

$$p_{St} = \frac{1}{3} \cdot p_F + \frac{1}{3} \cdot p_B$$

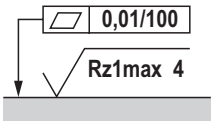
p_A^*	Depending on the type (for type SL: $p_A^* = 0$)
p_{St}	Pilot pressure
p_A	Working pressure in A
p_B	Working pressure in B
p_F	Cracking pressure (spring)
$A_1 - A_4$	For areas, see sectional drawing on page 3; Control area ratios, see page 4

Unit dimensions (dimensions in mm)





Version	**L** in mm	
	without pre-opening "B"	with pre-opening "A"
"1", "2", "3"	11	21.5
"4"	14	–



Required surface quality of the valve mounting face

1 Port Y (M6 x1; closed for type SV)

2 Name plate

3 Identical seal rings for ports A, B, P(X), (T)Y

4 Plug screw SW24 (pilot spool), tightening torque $M_A = 80^{+5}$ Nm

5 Plug screw SW22 (check valve uses), tightening torque $M_A = 25^{+5}$ Nm

6 Through hole for valve mounting screws

7 Porting pattern according to ISO 4401-03-02-0-05 and ISO 5781-03-04-0-00 (with locating hole and locating pin ISO 8752-3x8-St)

8 Locating pin ISO 8752-3x8-St

Valve mounting screws (separate order)

4 hexagon socket head cap screws ISO 4762 - M5 x 50 - 10.9
(with friction coefficient $\mu_{total} = 0,14$);
tightening torque $M_A = 8,9$ Nm ±10 %
(please adjust in case of modified surfaces; use torque power screwdriver!)