RE 22282-XC
Edition: 2019-10
Replaces: 04.16
RA78498479_AA

rexroth
A Bosch Company

Directional spool valves, direct operated, with fluidic actuation

Type WP ...XC, WH ...XC


H8020

- Size 6
- Component series 5X, 6X
- Maximum operating pressure 315 bar
- Maximum flow 60 l/min

CE

ATEX units
For potentially explosive atmospheres

Information on the explosion protection:

- Area of application in accordance with the Explosion Protection Directive 2014/34/EU: **IM2, II2G, II2D**
- Type of protection valve:
  - Ex h I Mb X according to EN 80079-38
  - Ex h IIC T6...T4 Gb X according to EN 80079-36
  - Ex h IIIC T80°C...T100°C Db X according to EN 80079-36

Features

- 4/3, 4/2 or 3/2-way version
- For intended use in potentially explosive atmosphere
- Porting pattern according to ISO 4401-03-02-0-05 (with or without locating hole)
- Operating methods:
  - pneumatic (WP)
  - hydraulic (WH)

Contents

☞ **Notice:** The documentation version with which the product was supplied is valid.

Ordering code

01	02	03	04	05	06	07		08	09	10		11	12	13
	W			**6**			**/**			**XC**	**/**			

01	3 main ports	**3**
	4 main ports	**4**
02	Directional valve	**W**

Type of actuation

03	Pneumatic	**P**
	Hydraulic	**H**
04	Ports, radial	**no code**
05	Size 6	**6**
06	Symbols; possible version see page 3 and 4	
07	Component series 50 ... 59 (50 ... 59: unchanged installation and connection dimensions) - version "H"	**5X**
	Component series 60 ... 69 (60 ... 69: unchanged installation and connection dimensions) - version "P"	**6X**

Spool return

08	**With** spring return	**no code**
	Without spring return	**O**
	Without spring return with detent	**OF**
09	**Without** manual override	**no code**
	With manual override	**N** [1]

Explosion protection

10	"Non-electrical devices"	**XC**
	For details, see information on the explosion protection page 7	
11	**Without** throttle insert	**no code**
	Throttle Ø 0.8 mm	**B08** [2]
	Throttle Ø 1.0 mm	**B10** [2]
	Throttle Ø 1.2 mm	**B12** [2]

Seal material (observe compatibility of seals with hydraulic fluid used, see page 7)

12	NBR seals	**no code**
	FKM seals	**V**
13	**Without** locating hole	**no code**
	With locating hole and locking pin ISO 8752-3x8-St	**/62**

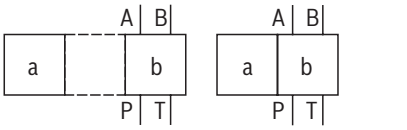
[1] Only version "P"

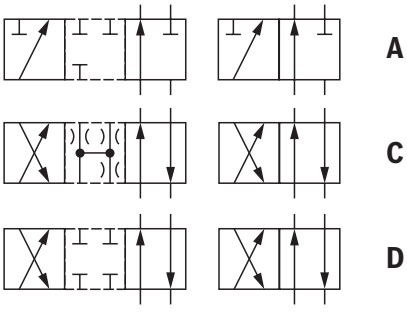
[2] Use if flow > performance limit of the valve, effective in channel P.

Spool positions

Ordering code	Spool positions		Version	
	2 pos.	3 pos.	"P"	"H"
no code	✓	✓	✓	✓
O	✓	–	✓	✓
OF	✓	–	✓	✓

Symbols

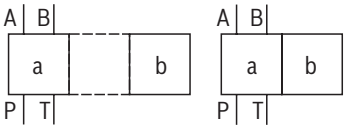


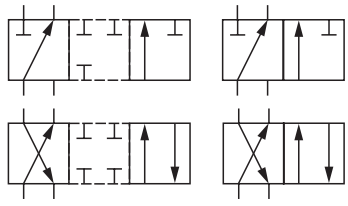


A

C

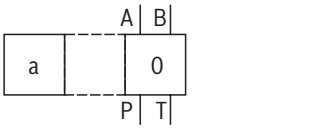
D

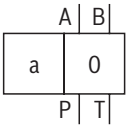




B

Y





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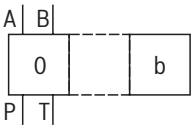

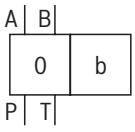

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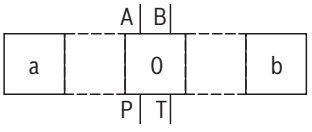
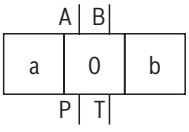
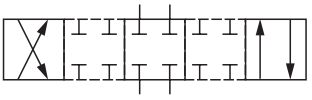
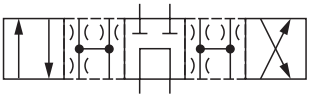


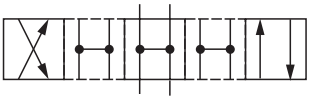




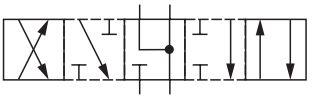
E[1)]



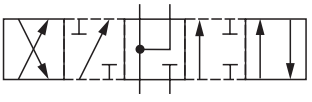
G



H



J

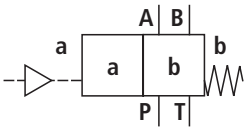
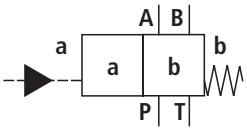
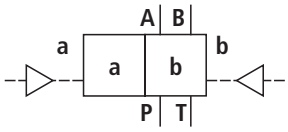
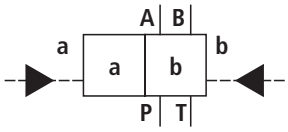
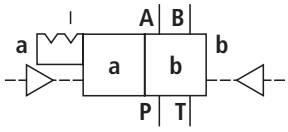
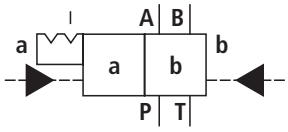
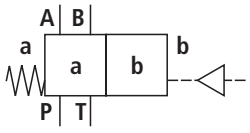
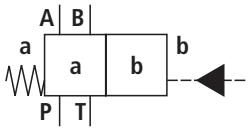
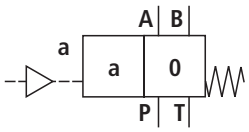
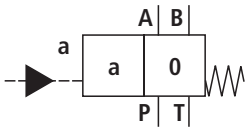
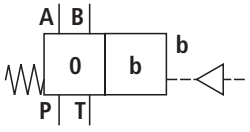
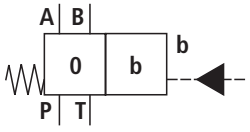
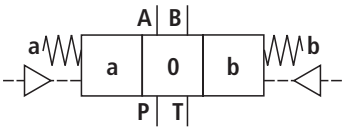
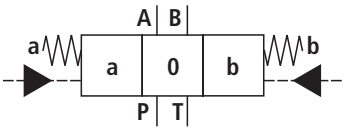


M

[1)] **Example:**
Symbol E with spool position "a" → ordering code ..**EA**..
Symbol E with spool position "b" → ordering code ..**EB**..

☞ **Notes:**
Representation according to DIN ISO 1219-1.
Hydraulic interim positions are shown by dashes.

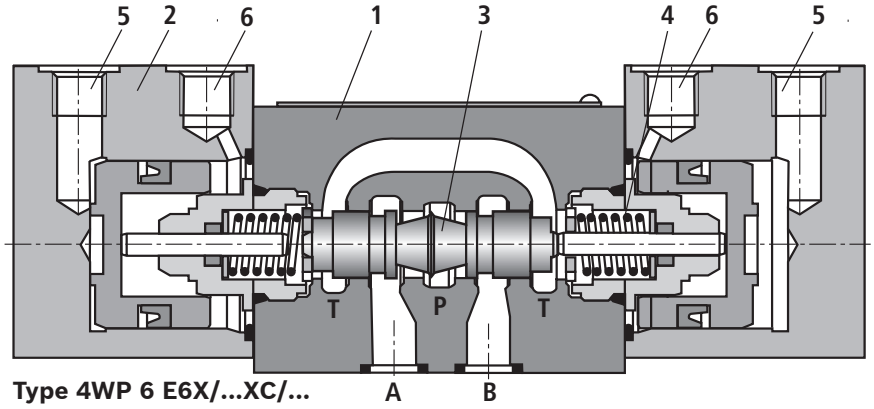
Operating methods

Symbol	Ordering code: Actuating side	Ordering code: Spool return	Type of actuation: "P" (pneumatic)	Type of actuation: "H" (hydraulic)
A, C, D				
		../O..		
		../OF..		
B, Y				
E, G, H, J, M	"a" [1] = .A			
	"b" [1] = .B			
				

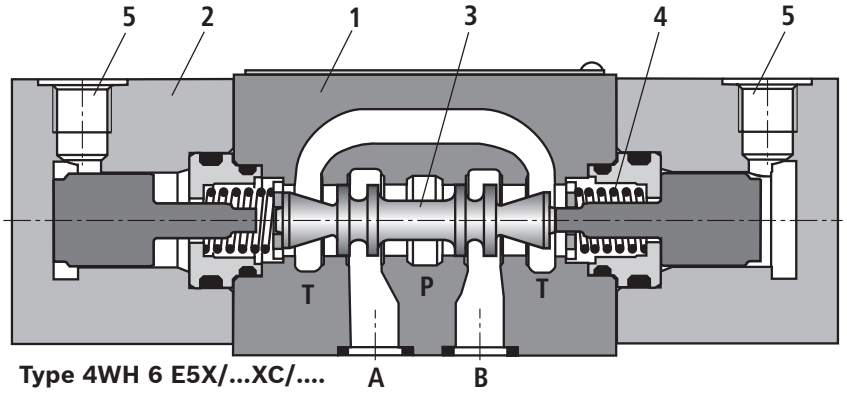
[1] See symbols on page 3

Function, section

General information
Valves of type WP...XC and WH...XC are fluidically actuated directional spool valves. They control start, stop and direction of flow.
The directional valves basically consist of housing (1), one or two types of actuation (2) (hydraulic, pneumatic actuation cylinder), the control spool (3), and one or two return springs (4).
The connections for the control are arranged radially (type WP) (5).
The bleeding ports (6) must be connected and led to a place outside the potentially explosive area.
In the de-energized condition, the control spool (3) is held in the central or initial position by the return springs (4) (except for impulse spools).
The control spool (3) is moved to the desired spool position by means of the operating methods.



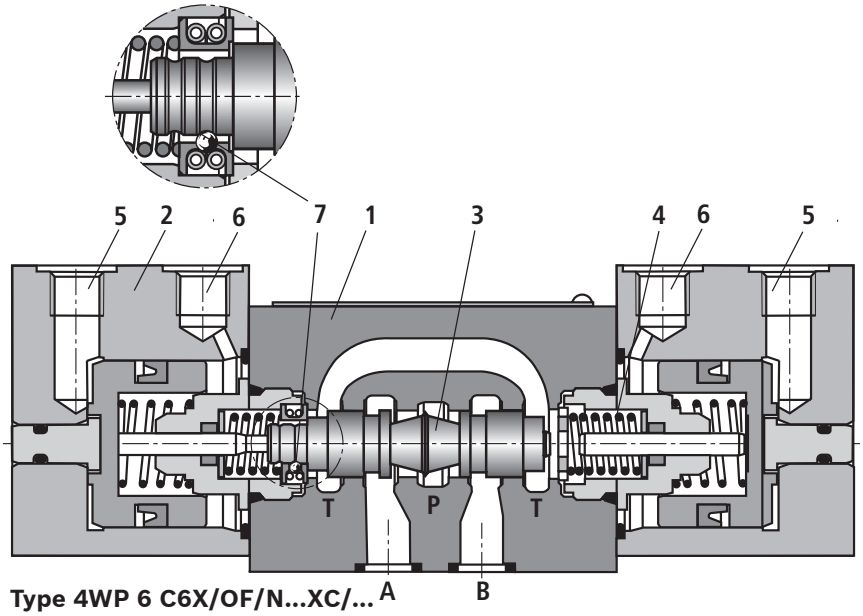
Type 4WP 6 E6X/...XC/...



Type 4WH 6 E5X/...XC/....

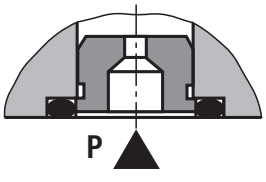
Without spring return, with detent "OF"
Directional valves with hydraulic or pneumatic operation are also available as 2-spool position valve with detent (7). If actuation elements with detent are used, each spool position can be fixed.

Without spring return "O"
If actuation elements without return springs and without detent are used, there is no defined spool position in the non-operated condition.



Type 4WP 6 C6X/OF/N...XC/...

Throttle insert
The use of a throttle insert is required when due to prevailing operating conditions, flows can occur during the switching processes, which exceed the performance limit of the valve.



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

General				
Version			"P"	"H"
Weight	▶ 1 actuation cylinder	kg	approx. 1.8	approx. 2.0
	▶ 2 actuation cylinders	kg	approx. 2.0	approx. 2.2
Installation position			any [1]	
Ambient temperature range		°C	–20 ... +80	
Storage temperature range		°C	+5 ... +40	
Maximum storage time		Years	1	
Maximum admissible acceleration a_{max}		g	10	
Surface protection			Galvanized	
Maximum surface temperature		°C	See information on explosion protection, page 7	

Hydraulic				
Maximum operating pressure	▶ Port P, A, B	bar	315	
	▶ Port T		160	With symbols A or B, port T must be used as leakage oil connection if the operating pressure exceeds the admissible tank pressure. **2 bar minimum preload pressure required.**
Minimum pilot pressure		bar	4 (see characteristic curve page 8)	6 ... 10 > tank pressure [2]
Maximum pilot pressure		bar	10	200
Pilot volume		cm^3	4.24	1.23
Maximum flow		l/min	60	
Flow cross-section (spool position 0)	▶ Symbol Q	mm^2	approx. 6% of nominal cross-section	
	▶ Symbol W	mm^2	approx. 3% of nominal cross-section	
Hydraulic fluid			see table page 7	
Hydraulic fluid temperature range		°C	–20 ... +80 (NBR seals) –15 ... +80 (FKM seals)	
Viscosity range		mm^2/s	2.8 ... 500	
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)			Class 20/18/15 [3]	
Maximum switching frequency		1/h	7200	

1) With version "O" (symbol A, C and D) horizontal

2) Performance limits dependent on the minimum pilot pressure, see page 10

3) The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.
Available filters can be found at www.boschrexroth.com/filter.

Technical data

(for applications outside these values, please consult us!)

Hydraulic fluid		Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils		HL, HLP, HLPD	NBR, FKM	DIN 51524	90220
Bio-degradable	▶ Insoluble in water	HETG	FKM	ISO 15380	90221
		HEES	FKM		
	▶ Soluble in water	HEPG	FKM	ISO 15380	
Flame-resistant	▶ Containing water	HFC (Fuchs: Hydrotherm 46M, Renosafe 500; Petrofer: Ultra Safe 620; Houghton: Safe 620; Union: Carbide HP5046)	NBR	ISO 12922	90223

☞ **Important information on hydraulic fluids:**

- ▶ For further information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- ▶ There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.).
- ▶ The ignition temperature of the hydraulic fluid used must be 50 K higher than the maximum surface temperature.
- ▶ **Bio-degradable and flame-resistant – containing water:**
  If components with galvanic zinc coating (e.g. version "J3" or "J5") or parts containing zinc are used, small amounts of dissolved zinc may get into the hydraulic system and cause accelerated aging of the hydraulic fluid. Zinc soap may form as a chemical reaction product, which may clog filters, nozzles and solenoid valves – particularly in connection with local heat input.
- ▶ **Flame-resistant – containing water:**
  - – Due to increased cavitation tendency with HFC hydraulic fluids, the life cycle of the component may be reduced by up to 30% as compared to the use with mineral oil HLP. In order to reduce the cavitation effect, it is recommended – if possible specific to the installation – to back up the return flow pressure in ports T to approx. 20% of the pressure differential at the component.
  - – Dependent on the hydraulic fluid used, the maximum ambient and hydraulic fluid temperature must not exceed 50 °C. In order to reduce the heat input into the component, a maximum duty cycle of 50% in continuous operation has to be set for on/off valves (measuring period 300 s). If this is not possible due to the function, an energy-reducing control of these components is recommended, e.g. via a PWM plug-in amplifier.

Information on explosion protection				
Area of application according to Directive 2014/34/EU		IM2	II2G	II2D
Type of protection of valve according to EN 80079-36 / EN 80079-38 [4]		EX h I Mb X	Ex h IIC T6... T4 Gb X	Ex h IIIC T80°C... T100°C Db X
Maximum surface temperature [5]	°C	100		
Temperature class [6]		–	T6 ... T4	–
Temperature [7]	°C	–	–	80 ... 100

4) Ex h: structural safety c according to EN 80079-37.

5) Surface temperature > 50 °C, provide contact protection.

6) The specification T4 refers to the maximum hydraulic fluid and ambient temperature. At hydraulic fluid and ambient temperature up to a maximum of 60 °C, use in temperature class T6 is possible.

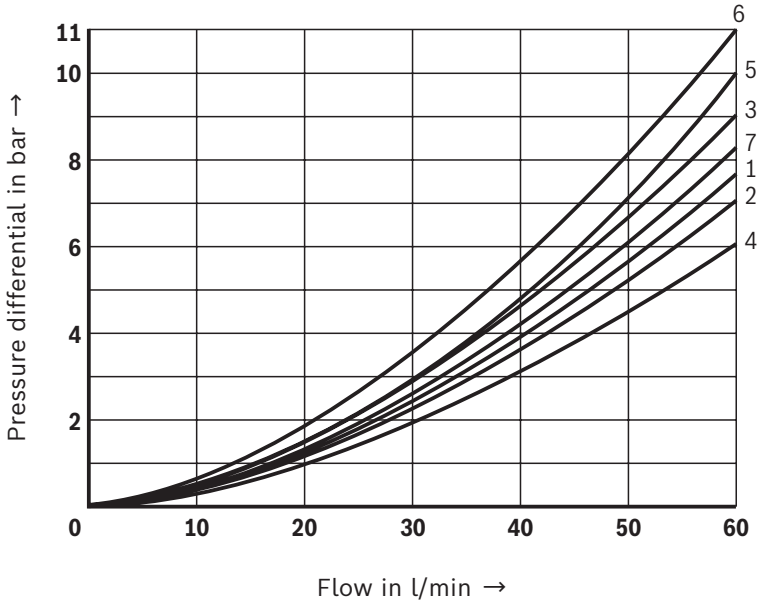
7) The maximum surface temperature of 100 °C refers to the maximum hydraulic fluid and ambient temperature. At hydraulic fluid and ambient temperature up to a maximum of 60 °C, the maximum surface temperature is reduced to 80 °C.

☞ **Special application conditions for safe application:**

- ▶ Maximum admissible dust layer thickness according to EN 60079-14.
- ▶ With version "P", the port for control may only be connected to a pressure supply with compressed air according to ISO 8573-1:2010 (7:4:4). For the generation of the compressed air, no air from the explosive area must be used.
- ▶ The ports to control and bleeding must not exceed a maximum air volume of 900 cm^3. (Prevention of an ignition of gas with leaky lines.)

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

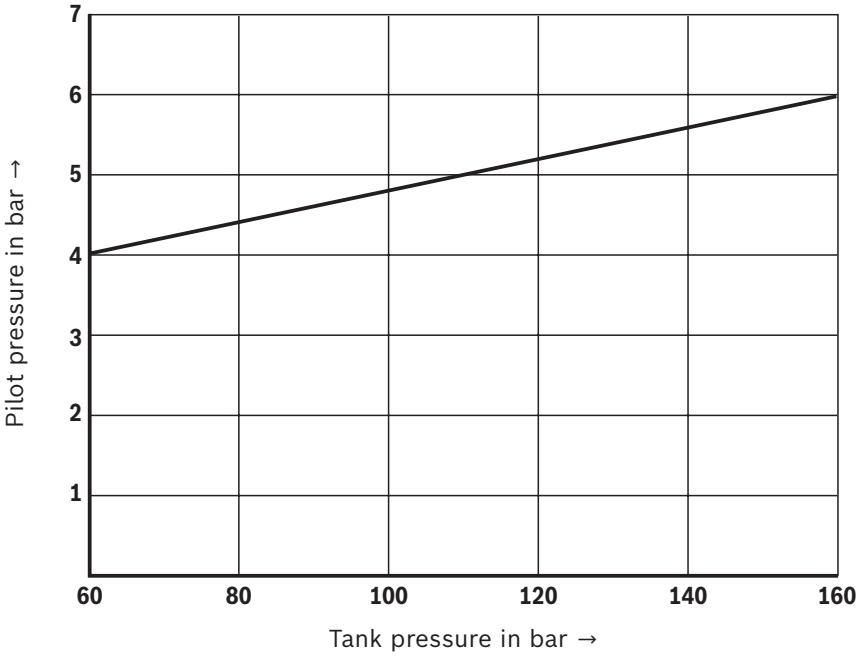
Δp-q_V characteristic curves



Symbols	Direction of flow			
	P–A	P–B	A–T	B–T
A	3	3	–	–
B	3	3	–	–
C	1	1	3	1
D	5	5	3	3
E	3	3	1	1
G	6	6	7	7
H	2	4	2	2
J	1	1	2	1
M	2	4	3	3
Y	5	5	3	3

7 Symbol "H" in central position (P→ T)

Minimum pilot pressure dependent on the tank pressure (version "P")

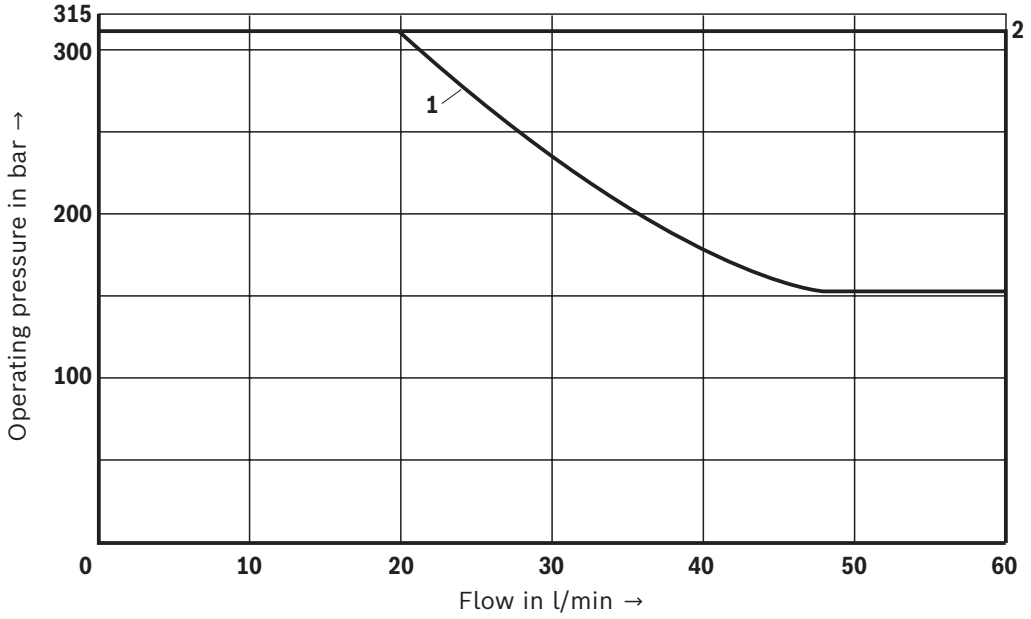


☞ **Notice:**
With higher tank pressures, the minimum pilot pressure must be raised according to this diagram.

Performance limits: Version "P"
(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

☞ **Notice:**
The specified switching power limits are valid for operation with two directions of flow (e.g. from P to A and simultaneous return flow from B to T).

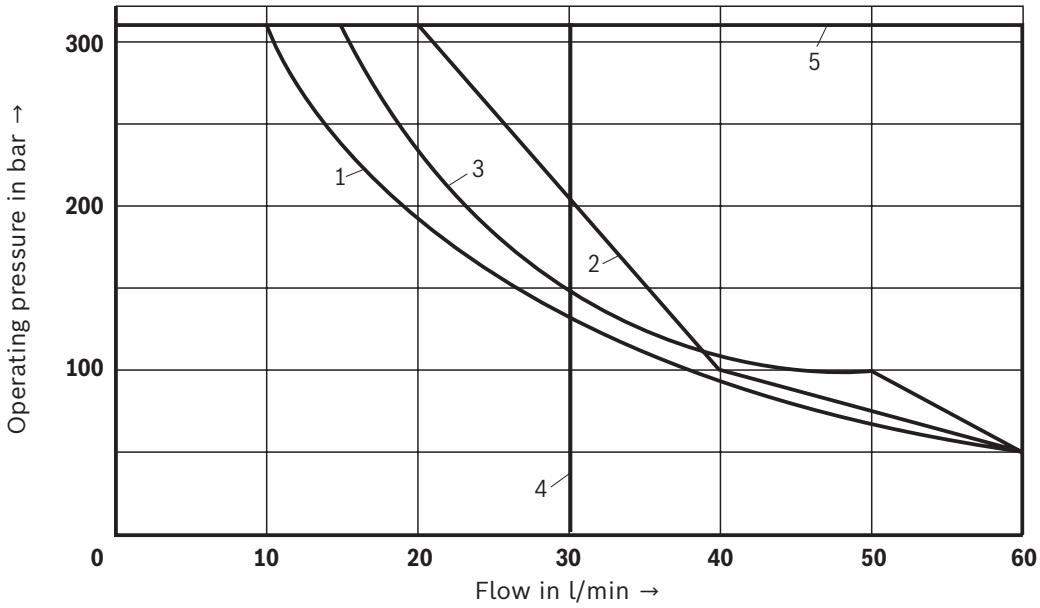
Due to the flow forces acting within the valves, the admissible switching power limits may be considerably lower with only one direction of flow (e. g. from P to A while port B is blocked).In such use cases, please consult us.



Characteristic curve	Symbol
1	A, B
2	A/O, C, C/O, D, D/O, E, G, H, J, M, Y

Performance limits: Version "H"
(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

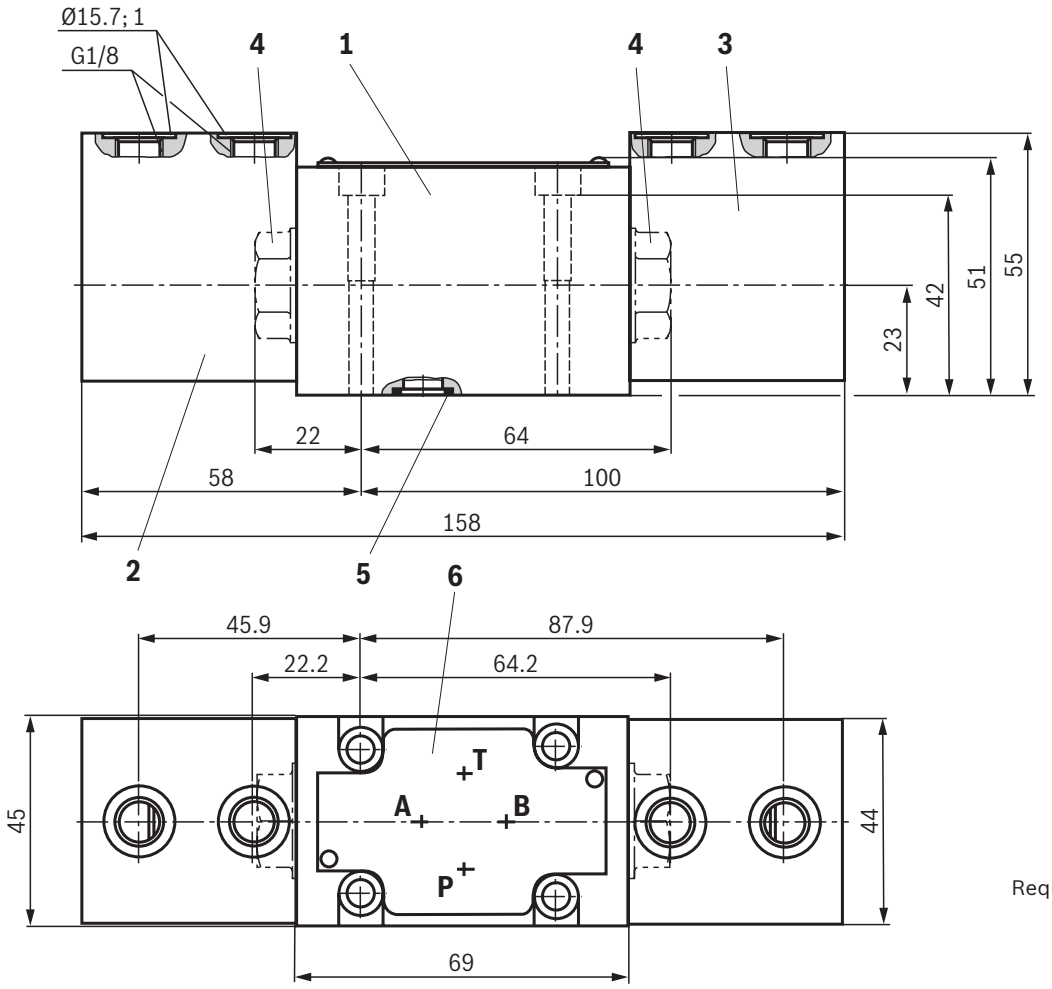
See notes page 9.

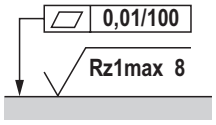


Pilot pressure 6 bar > tank pressure		
Spring return	**Characteristic curve**	**Symbol**
"no code" (with spring return)	1	A, B
	2	C, D, Y
	3	E, J, M
	4	G, H
"O"	5	A, C, D
"OF"		

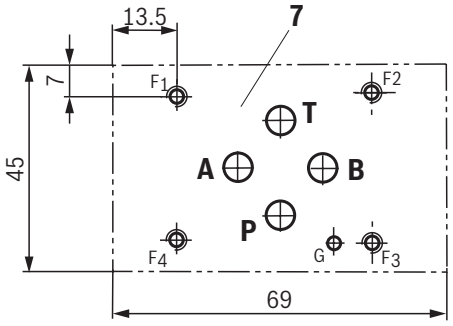
Pilot pressure 10 bar > tank pressure		
Spring return	**Characteristic curve**	**Symbol**
"no code" (with spring return)	1	A, B
	5	C, D, Y, E, G, H, J, M
"O"	5	A, C, D
"OF"		

Dimensions: Version "P"
(dimensions in mm)





Required surface quality of the valve contact surface



1 ▶ Valve with 2 spool positions and 2 actuation cylinders
▶ Valve with 3 spool positions and 2 actuation cylinders

2 Actuation cylinder "a"

3 Actuation cylinder "b"

4 Plug screw for valve with one actuation cylinder (2 spool positions)

5 Identical seal rings for ports P, A, B, T

6 Name plate

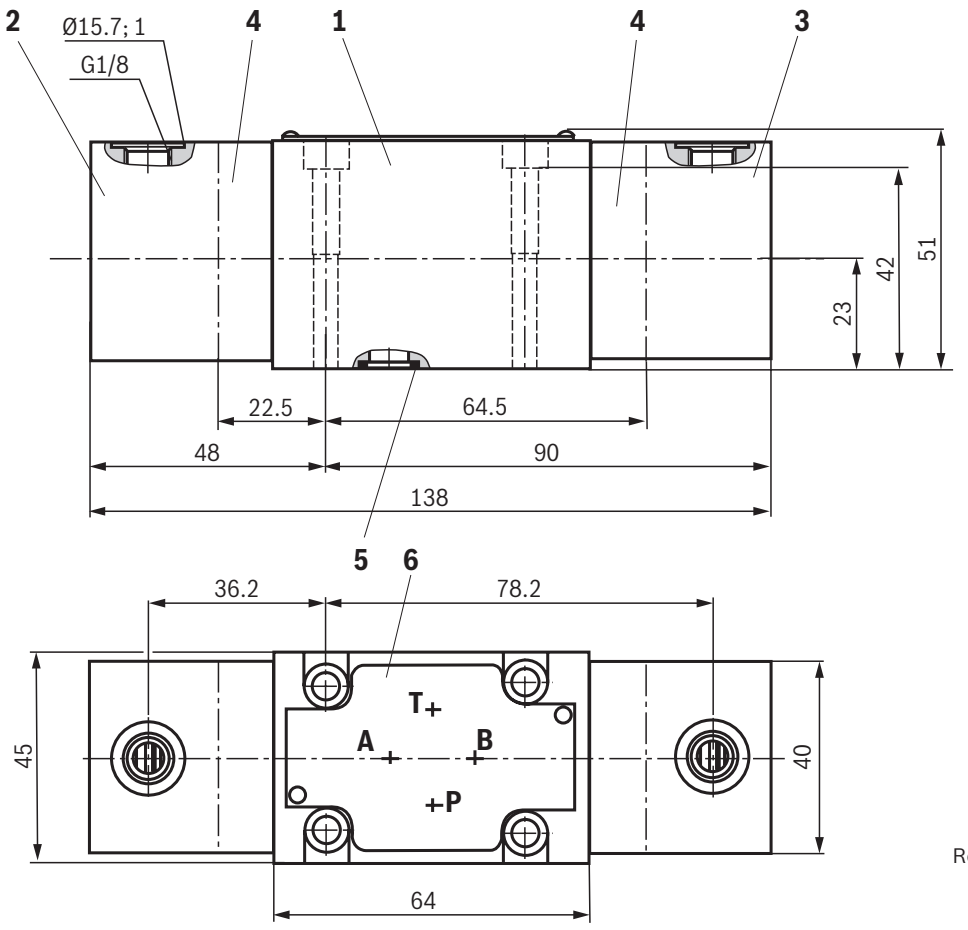
7 Porting pattern according to ISO 4401-03-02-0-05 (with or without locating hole)

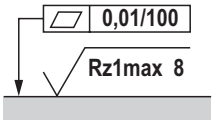
Valve mounting screws (separate order)
Only use valve mounting screws with the subsequently listed thread diameters and strength properties. Observe the screw-in depth.
4 hexagon socket head cap screws
ISO 4762 - M5 x 50 - 10.9
(friction coefficient μ_{total} = 0.09 ... 0.14);
Material no. **R913043758**

Subplates (separate order) with porting pattern according to ISO 4401-03-02-0-05 see data sheet 45100.

Notes:
- ▶ Subplates are no components in the sense of Directive 2014/34/EU and can be used after the manufacturer of the overall system has conducted an assessment of the risk of ignition. The "G...J3" versions are free from aluminum and/or magnesium and galvanized.
- ▶ The dimensions are nominal dimensions which are subject to tolerances.

Dimensions: Version "H"
(dimensions in mm)





Required surface quality of the valve contact surface

1 ▶ Valve with 2 spool positions and 2 actuation cylinders
▶ Valve with 3 spool positions and 2 actuation cylinders

2 Actuation cylinder "a"

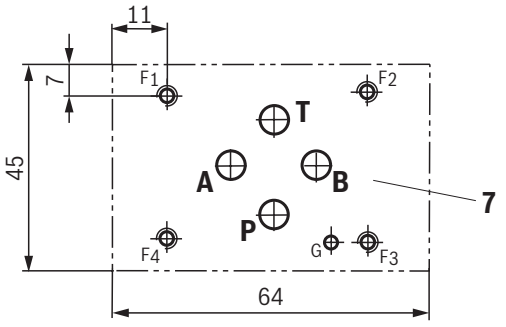
3 Actuation cylinder "b"

4 Cover for valve with one actuation cylinder (2 spool positions)

5 Identical seal rings for ports P, A, B, T

6 Name plate

7 Porting pattern according to ISO 4401-03-02-0-05 (with or without locating hole)



Valve mounting screws (separate order)
Only use valve mounting screws with the subsequently listed thread diameters and strength properties. Observe the screw-in depth.
4 hexagon socket head cap screws
ISO 4762 - M5 x 50 - 10.9
(friction coefficient μ_{total} = 0.09 ... 0.14);
Material no. **R913043758**

Subplates (separate order) with porting pattern according to ISO 4401-03-02-0-05 see data sheet 45100.

☞ **Notes:**
- ▶ Subplates are no components in the sense of Directive 2014/34/EU and can be used after the manufacturer of the overall system has conducted an assessment of the risk of ignition. The "G...J3" versions are free from aluminum and/or magnesium and galvanized.
- ▶ The dimensions are nominal dimensions which are subject to tolerances.

Further information

▶ Subplates	Data sheet 45100
▶ Hydraulic fluids on mineral oil basis	Data sheet 90220
▶ Environmentally compatible hydraulic fluids	Data sheet 90221
▶ Flame-resistant, water-free hydraulic fluids	Data sheet 90222
▶ Flame-resistant hydraulic fluids - containing water (HFAE, HFAS, HFB, HFC)	Data sheet 90223
▶ Directional spool valves, direct operated, with manual actuation	
▶ Selection of filters	
▶ Information on available spare parts	