

Directional spool valves, direct-operated, with solenoid actuation, fast-switching

Type WES



- ▶ Size 8
- ▶ Component series 1X
- ▶ Maximum operating pressure 350 bar
- ▶ Maximum flow 300 l/min

Features

- ▶ 3/2-way version
- ▶ Cartridge valve
- ▶ Fast switching, clocked DC solenoid
- ▶ Control via analog amplifier

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Ordering code

01	02	03	04	05	06	07	08	09	10	11	12		
3	WES	8	P	1X	K	/	A	G24	CK50	/	V	SO1	*

01	3 main ports (P, A, (A1+A2))	3
02	Directional spool valve, direct-operated, fast-switching	WES
03	Size 8	8

Symbol

04	Normally open	P
05	Component series 10 ... 19 (10 ... 19: unchanged installation and connection dimensions)	1X
06	Cartridge valve	K
07	Fast-switching solenoid coil	A
08	Direct voltage, clocked 24 V	G24

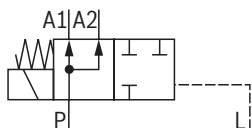
Electrical connection

09	Connection line 5 m, with braided wire 2 x 1.5 mm ²	CK50
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Seal material (observe compatibility of seals with hydraulic fluid used, see page 4)

10	FKM seals	V
11	Improved switch-off power limit	SO1
12	Further details in the plain text	*

Symbol



Notice:

Representation according to DIN ISO 1219-1.

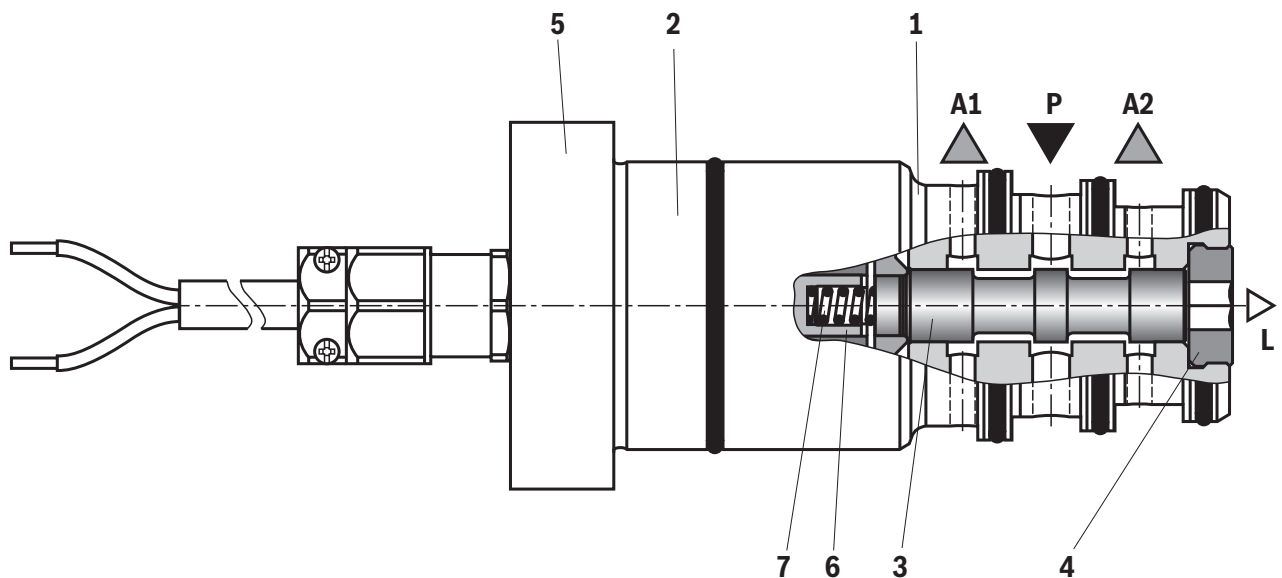
Function, section

Directional valves of type WES are fast-switching solenoid-actuated directional spool valves. Electrical and hydraulic components are combined in a compact design. These components control the start and stop of the flow. The directional valve basically consists of the housing (1), an integrated solenoid (2), the control spool (3), a thread ring (4), mounting plate (5) and one stop bushing (6) with return spring (7).

The fast-switching solenoids (2) are controlled via a booster amplifier supplying a pulse-width modulated voltage and current signal. To achieve the specified switching time and flow values, a defined current profile must be complied with (see page 6).

The force of the solenoid (2) acts on the control spool (3) and pulls the latter from its initial position to the blocked switching position. This way, the direction of flow from P to A1 and A2 is blocked.

After switching off of the solenoid (2), the return spring (7) pushes the control spool (3) back to its initial position.



Technical data

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

General			
Weight	► Valve	kg	1.2
	► Valve with 5 m cable	kg	1.9
Installation position			any
Ambient temperature range	°C		+20 ... +85
Transport temperature range	°C		-40 ... +85
Storage temperature range	°C		-20 ... +50
Maximum surface temperature of the valve ^{1:2)}	°C		+85 (in installed condition)
Life cycle rating B ₁₀ value ³⁾	Switching cycles		675 million

Hydraulic			
Maximum operating pressure	bar		350
Maximum flow	l/min		300
Hydraulic fluid			See table below
Hydraulic fluid temperature range	°C		+40 ... +70 (HL, HLP) +60 ... +70 (SAE 40)
Viscosity range	mm ² /s		15 ... 46 (HL, HLP) 35 ... 55 (SAE 40)
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)			Class 21/19/15 ⁴⁾

Hydraulic fluid	Classification	Suitable sealing materials	Standards
Mineral oils	HL, HLP	FKM	DIN 51524
Motor oils	Exxon Mobil Mobilgard M440 (SAE 40), Shell Rimula R3+ (SAE 40)	FKM	

**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 40 K higher than the maximum solenoid surface temperature.

- 1) Possible surface temperature > +50 °C, provide contact protection.
- 2) Operating conditions: installed in control block +70 °C, hydraulic fluid temperature +70 °C
- 3) Observe seal replacement intervals (see page 10).
- 4) 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!)

Electric		
Voltage type		Direct voltage
Performance rating according to VDE 0580 ²⁾	W	25
Duty cycle (ED)	%	≤50 (S1 according to VDE 0580)
Switching time according to ISO 6403	▶ ON	ms ≤7
	▶ OFF	ms ≤5
Maximum switching frequency ²⁾	Hz	10
Protection class according to DIN EN 60529		IP66 (at proper installation of the connection line)
Thermal class of insulation according to VDE 0580		B
Thermal class of enameled copper wire according to VDE 0580		200
Protection class according to VDE 0580		III (protective extra-low voltage)
Overvoltage category according to VDE 0580		III
Upper limit temperature of coil winding	°C	< +125
Ohmic resistance (incl. 5 m connection line)	Ω	0.78 (at +20 °C coil temperature)
		1.06 (at maximum admissible coil temperature)

Control electronics

To achieve the technical data of the valve, the fast-switching valve solenoid must be operated with the following voltage and current profile 14/12/3 A (boost/pick-up/hold) (see also page 6):

Boost voltage (U_1)	V	60 -6
Current	▶ Boost (I_1 ; peak)	A 14 ±1
	▶ Pick-up (I_2 ; average)	A 12 ±0.5
	▶ Hold (I_3 ; average)	A 3 ±0.5
	▶ Pick-up hysteresis (I_4 ; peak-peak)	A ≤1
	▶ Hold hysteresis (I_5 ; peak-peak)	A ≤1
Pick-up time (t_3)	ms	5 +0.5
Decay time	▶ Hold (t_4)	ms ≤0.2
	▶ Idle (t_5)	ms ≤0.4
PWM frequency	Hz	freely clocking
Operating voltage / pulse voltage	V	24 ±10 %

Electrical connection

The valve solenoid is equipped with an electrical connection "CK50" according to the following specifications. The electrical connection of the solenoid is polarity-independent. The two-core connection line (black) cannot be exchanged.

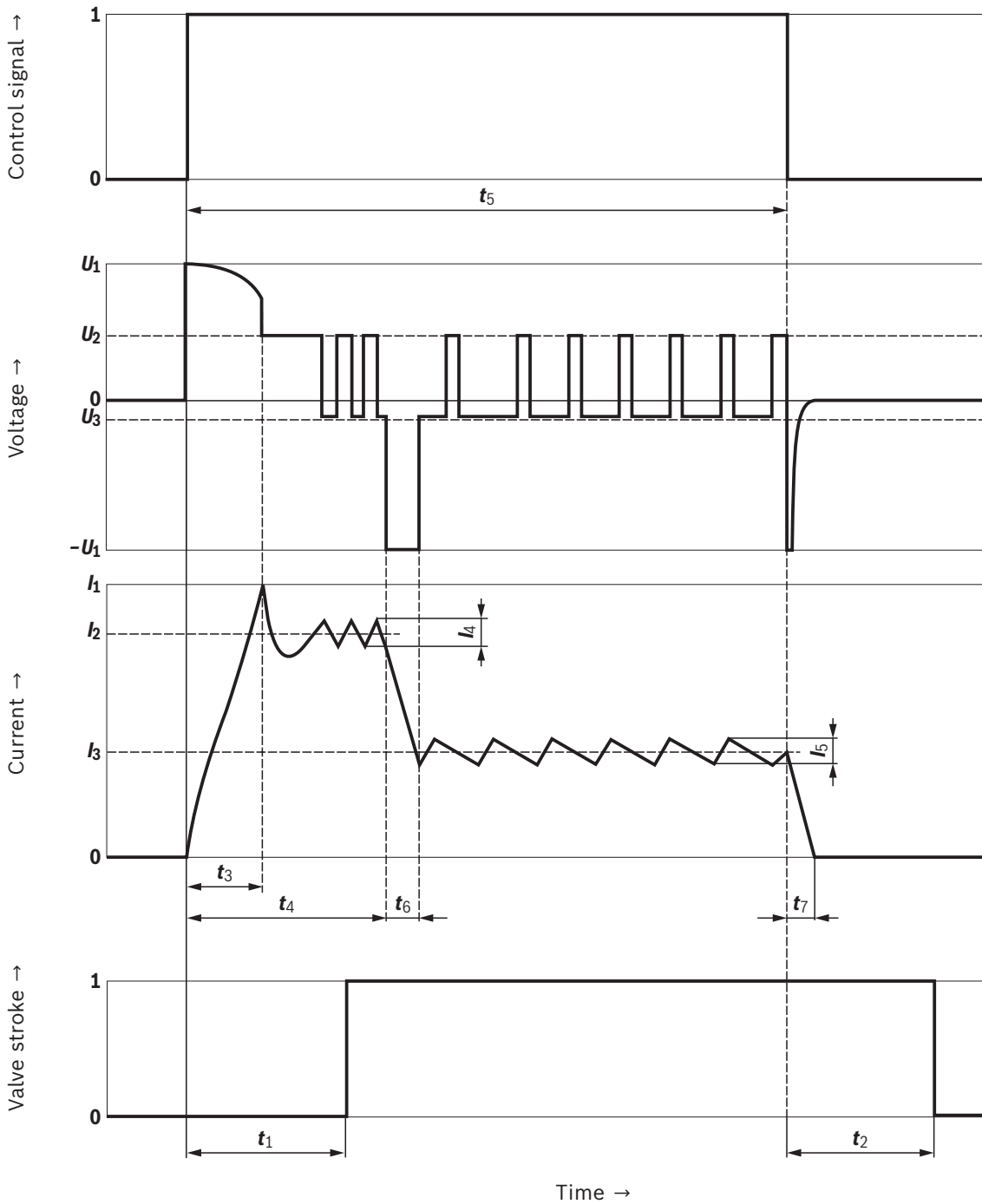
Connection line		two-core
Line cross-section	mm ²	1.5
Line diameter	mm	7.3/7.9 oval
Length	m	5

²⁾ Operating conditions: installed in control block +70 °C, hydraulic fluid temperature +70 °C

Notices:

- ▶ The solenoid coil requires current-controlled operation.
- ▶ The booster amplifier is not included in the scope of delivery.

Voltage and current profile



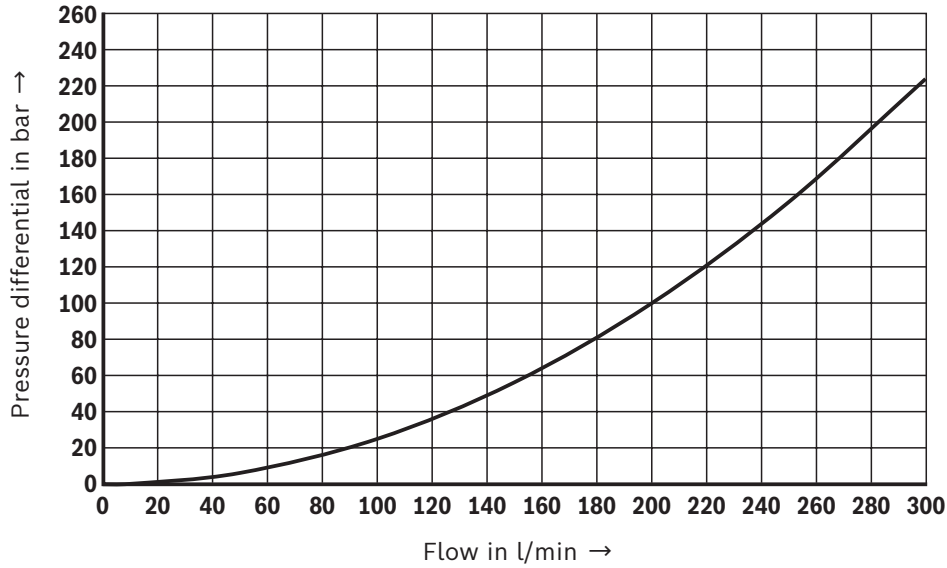
- t_1 Attraction time
- t_2 Fall time
- t_3 Boost time (boost phase)
- t_4 Pick-up time
- t_5 Actuation time
- t_6 Decay to hold time
- t_7 Decay to idle time

- I_1 Boost current (peak)
- I_2 Pick-up current (average)
- I_3 Hold current (average)
- I_4 Pick-up current hysteresis (peak-peak)
- I_5 Hold current hysteresis (peak-peak)
- U_1 Boost voltage
- U_2 Operating voltage
- U_3 Diode voltage

Characteristic curves

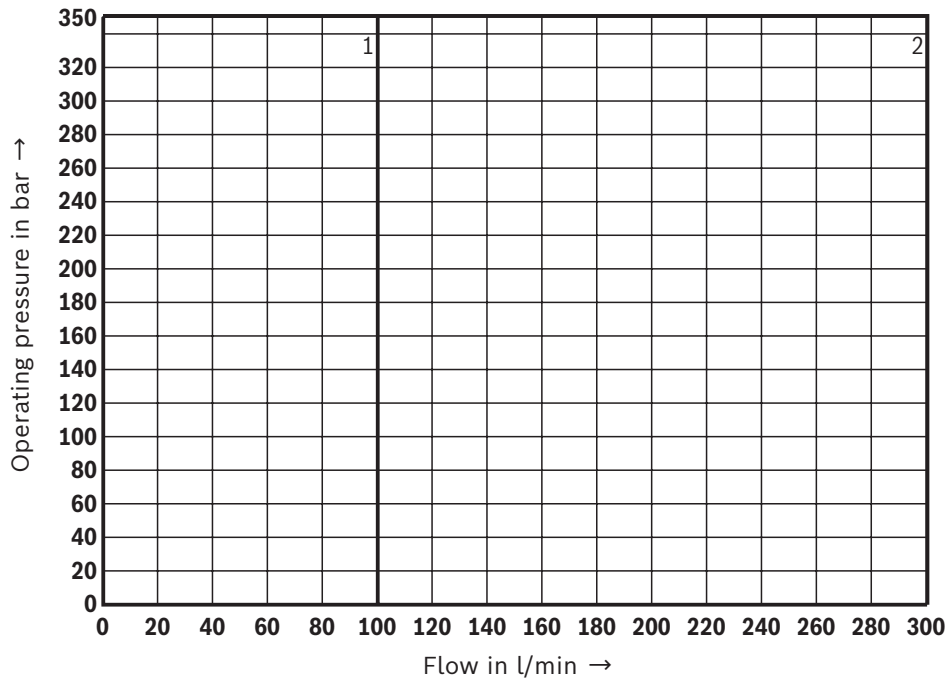
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Δp - q_v characteristic curves - P → A (A1+A2)



Performance limits

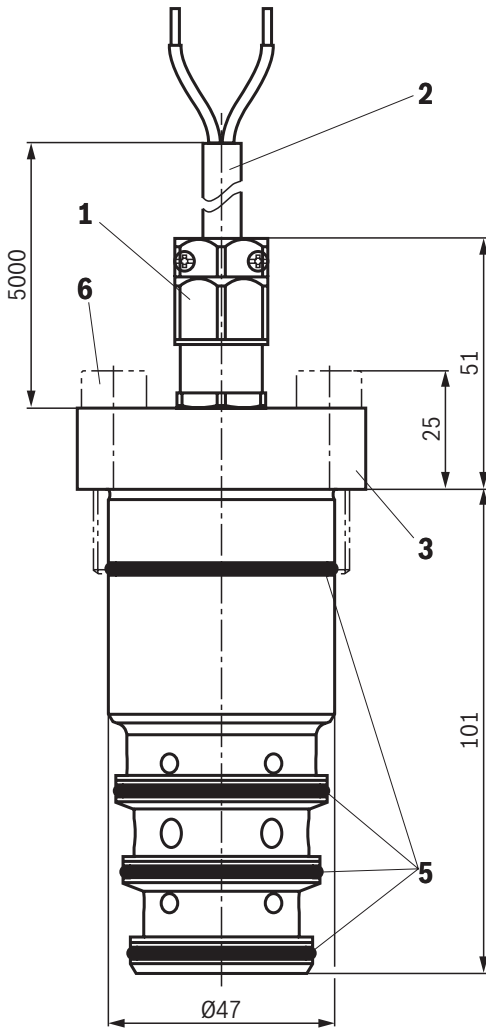
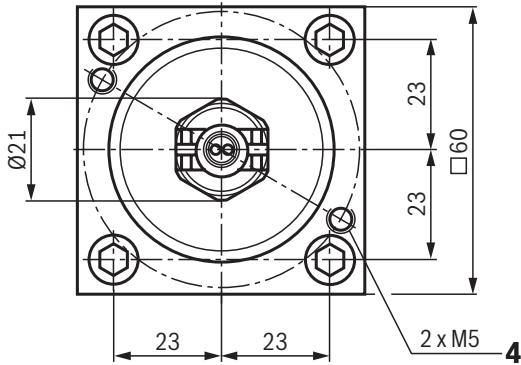
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)



- 1 ON
- 2 OFF

Dimensions

(dimensions in mm)



- 1 Cable bushing
 - 2 Connection line, two-core
 - 3 Mounting plate
 - 4 Disassembly bores
 - 5 Outer seal rings
 - 6 Valve mounting screws (self procurement)
- 4 hexagon socket head cap screws ISO 4762 - M8 x 35 - 10.9**

**4 hexagon socket head cap screws UNC
ASME B18.3-5/16-18UNC x 1-1/2" ASTM-A574**


(friction coefficient $\mu_{\text{total}} = 0.19 \dots 0.24$);

Tightening torque $M_A = 41 \text{ Nm} \pm 10\%$,

(friction coefficient $\mu_{\text{total}} = 0.12 \dots 0.17$);

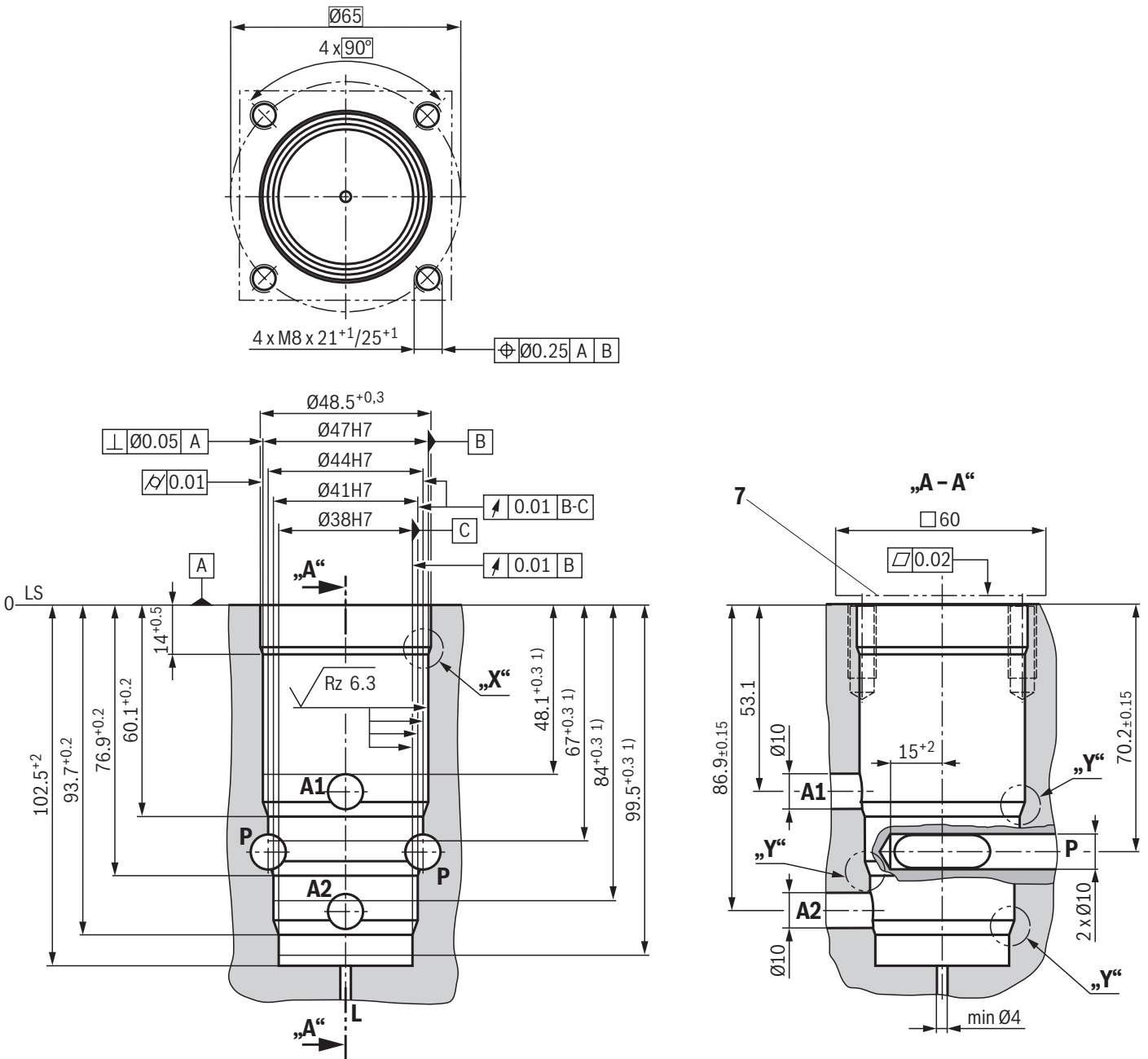
Tightening torque $M_A = 30 \text{ Nm} \pm 10\%$

respectively with one washer **ASME B18.22.1-5/16-B**
(type B Narrow FBN)

 **Notice:**

- ▶ The specified tightening torques stated are guidelines when using screws with the specified friction coefficients and when using a manual torque wrench.
- ▶ The dimensions are nominal dimensions which are subject to tolerances.

Installation bore
(dimensions in mm)



1) Depth of fit

7 Mounting plate contact surface

LS Location shoulder

Notice:

- ▶ Minimum distance between the valve axes is ≥ 65 mm.
- ▶ Minimum edge distance from valve axis to installation block edge ≥ 49 mm.

Project planning information

- ▶ The drain line must be preloaded with a pressure of 3 ... 5 bar.
- ▶ Characteristic curves and technical data can only be achieved by the defined current profile of the control electronics (see page 6).
- ▶ The hydraulic system must be fully bled, see data sheet 07600.
- ▶ The connection line must be attached at a distance of <300 mm from the valve and secured against twisting.
- ▶ The minimum bending radius of the connection line of 5 x line diameter must not be fallen below.
- ▶ Do not pull at the connection line or valve connector.
- ▶ Do not paint over the name plate.
- ▶ After 2.5 years or 340 load cycles, replacement of the outer seals is recommended (material no. **R961009419**).
- ▶ The space required to remove the valve is 222 mm

Assembly

- ▶ Before installation, lubricate the outer seals at the valve with hydraulic fluid.
- ▶ Slide the valve by hand into the installation bore (see page 9).
- ▶ Tighten 4 hexagon socket head cap screws (pos. 6, page 8).
- ▶ After installation, there must not remain any gap between the mounting plate (pos. 3, page 8) and the block.

Disassembly

- ▶ Remove 4 hexagon socket head cap screws (pos. 6, page 8).
- ▶ Alternately screw 2 M5 hexagon socket head cap screws into the disassembly bores (pos. 4, page 8) until the valve is released from the installation bore by at least 4 mm.
- ▶ Remove the valve by hand from the installation bore.



Notices:

- ▶ For installation and disassembly, observe data sheet 07600-B.

Further information

- ▶ Hydraulic fluids on mineral oil basis
- ▶ Hydraulic valves for industrial applications
- ▶ General product information on hydraulic products
- ▶ Assembly, commissioning and maintenance of industrial valves
- ▶ Selection of the filters

Data sheet 90220

Data sheet 07600-B

Data sheet 07008

Data sheet 07300

www.boschrexroth.com/filter

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