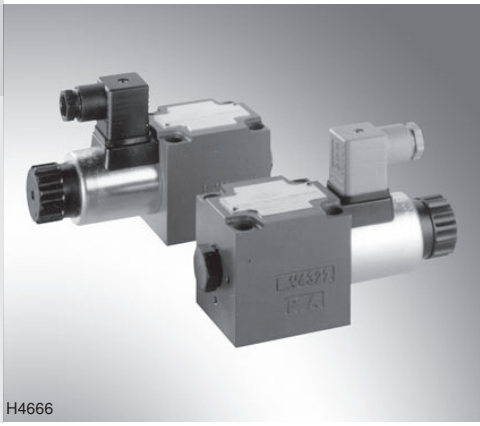
3/2 and 4/2 directional poppet valve with solenoid actuation

RE 22045/05.08 1/14
Replaces: 02.03

Type M-.SED



Size 10
Component series 1X
Maximum operating pressure 350 bar *[5076 psi]*
Maximum flow 40 l/min *[10.6 US gpm]*

Table of contents

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

Features

- Direct operated directional poppet valve with solenoid actuation
- Porting pattern to ISO 4401-05-04-0-05 and NFPA T3.5.1 R2-D05
- Subplates to data sheet RE 45054 (separate order)
- Blocked port is leak-free closed
- Reliable operation also after longer periods of standstill under pressure
- Wet-pin DC solenoids with detachable coil (AC voltage possible with rectifier)
- Solenoid coil can be rotated around 90°
- For changing the coil, the pressure-tight chamber needs not to be opened
- Electrical connection as individual connection
- With concealed manual override, optional
- Inductive position switches and proximity sensors (contact-free and floating), see RE 24830
- For further electrical connections, see RE 08010

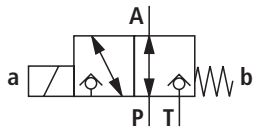
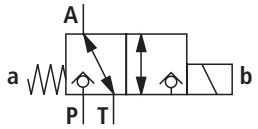
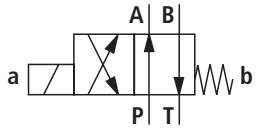
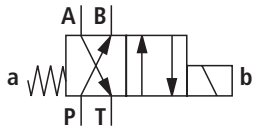
Ordering code

M–	SED	10		1X/350	C		

3 main ports **= 3**
4 main ports **= 4**

Poppet valve

Size 10 **= 10**

Symbols	Main ports	3	4	
		●	–	**= UK**
		●	–	**= CK**
		–	●	**= D**
		–	●	**= Y**

● = available

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

Operating pressure 350 bar *[5076 psi]* **= 350**

Solenoid, wet-pin (oil), with detachable coil **= C**

DC voltage 24 V **= G24**
DC voltage 205 V **= G205** [1)]
DC voltage 96 V **= G96**

For further ordering code for other voltages, see page 6

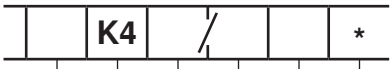
AC voltage mains (permissible voltage tolerance ± 10%)	**Nominal voltage of DC voltage solenoid when operated with AC voltage**	**Ordering code**
110 V - 50/60 Hz	96 V	**G96**
120 V - 60 Hz	110 V	**G110**
230 V - 50/60 Hz	205 V	**G205**

Standard types and devices are shown in the EPS (standard price list).

[1)] For connection to the AC voltage mains, a DC voltage solenoid **must** be used, which is controlled via a rectifier (see table above).

In the case of an individual connection, a large mating connector with integrated rectifier may be used (separate order).

[2)] For mating connectors, separate order, see page 3.



Further details in clear text

Seal material

No code = NBR seals
V = FKM seals
(other seals on request)
⚠ Attention!
Observe compatibility of seals with hydraulic fluid used!

No code = Without check valve insert, without throttle insert
P = With check valve insert
B12 = Throttle Ø1.2 mm *[0.0472 inch]*
B15 = Throttle Ø1.5 mm *[0.0591 inch]*
B18 = Throttle Ø1.8 mm *[0.0709 inch]*
B20 = Throttle Ø2.0 mm *[0.0787 inch]*
B22 = Throttle Ø2.2 mm *[0.0866 inch]*

Spool position monitoring

No code = Without position switch
QMAG24 = Monitored spool position “a“
QMBG24 = Monitored spool position “b“
For further details, see RE 24830

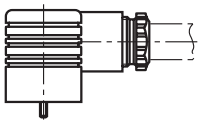
Electrical connection

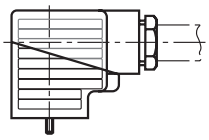
K4 [2] **=** Without mating connector
Individual connection with component plug to DIN EN 175301-803
For further electrical connections, see RE 08010

N9 = **With** concealed manual override
No code = **Without** manual override

Mating connectors to DIN EN 175301-803

For details and further mating connectors, see RE 08006





Valve side	Color	Material no.			
		Without circuitry	With indicator lamp 12 … 240 V	With rectifier 12 … 240 V	With indicator lamp and Zener diode suppressor circuit 24 V
a	Grey	**R901017010**	–	–	–
b	Black	**R901017011**	–	–	–
a/b	Black	–	**R901017022**	**R901017025**	**R901017026**

Function, section, symbols: 3/2 directional poppet valve

General

Directional valves of type M-.SED are direct operated directional poppet valves with solenoid actuation. They control the start, stop and direction of flow and basically consist of housing (1), solenoid (2), valve seats (7) and (11) and closing element (4).

Manual override (6) allows the valve to be operated without energization of the solenoid.

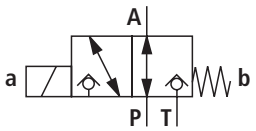
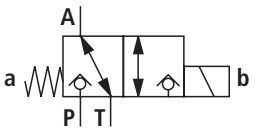
Basic principle

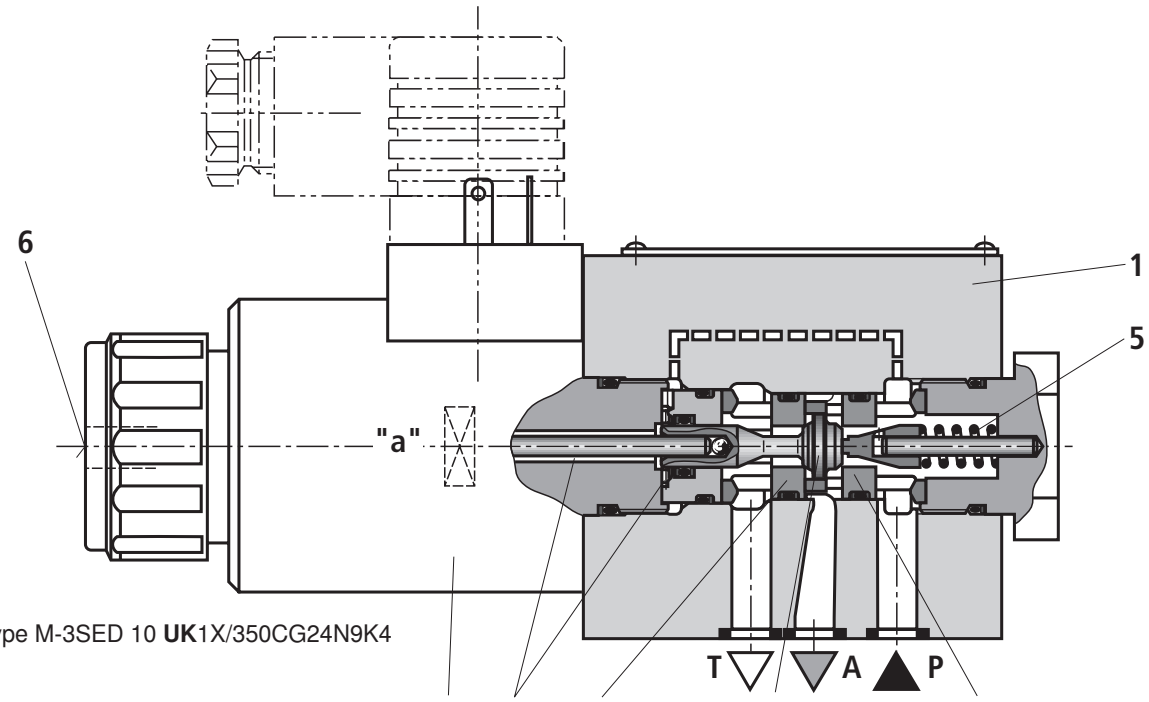
The starting position of the valve (normally open “UK“ or normally closed “CK“) is determined by the arrangement of spring (5). Chamber (3) behind closing element (4) is connected to port P and closed against port T. The valves are therefore pressure-balanced in relation to the actuating forces (solenoid and spring).

Due to the special closing element (4) ports P, A and T can be loaded up to a maximum operating pressure (350 bar *[5076 psi]*) and the flow directed in both directions (see symbols)!

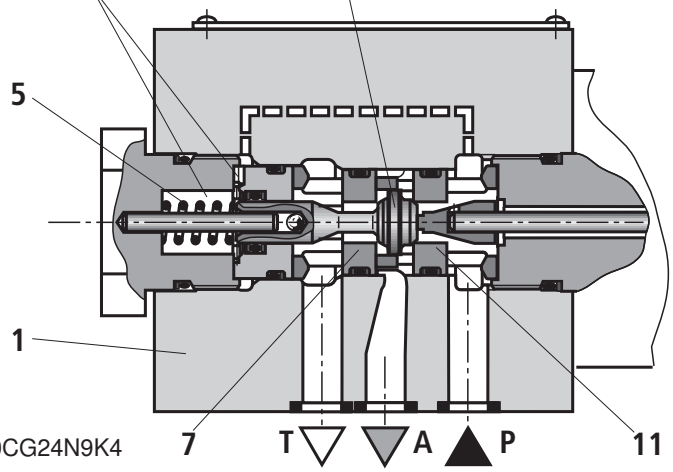
In the starting position, closing element (4) is pressed by spring (5) onto seat (11), and in the operated position, it is pressed by solenoid (2) onto seat (7). The flow is leak-free blocked.

Symbols

Variant “UK“	Variant “CK“
	



Type M-3SED 10 **UK**1X/350CG24N9K4



Type M-3SED 10 **CK**1X/350CG24N9K4

Function, section, symbols: 4/2 directional poppet valve

With the help of a sandwich plate, the **Plus-1-Plate**, under the 3/2 directional poppet valve, the function of a 4/2 directional poppet valve can be realized.

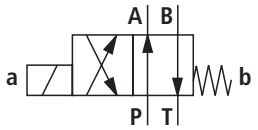
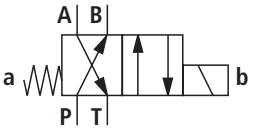
Function of the Plus-1-Plate

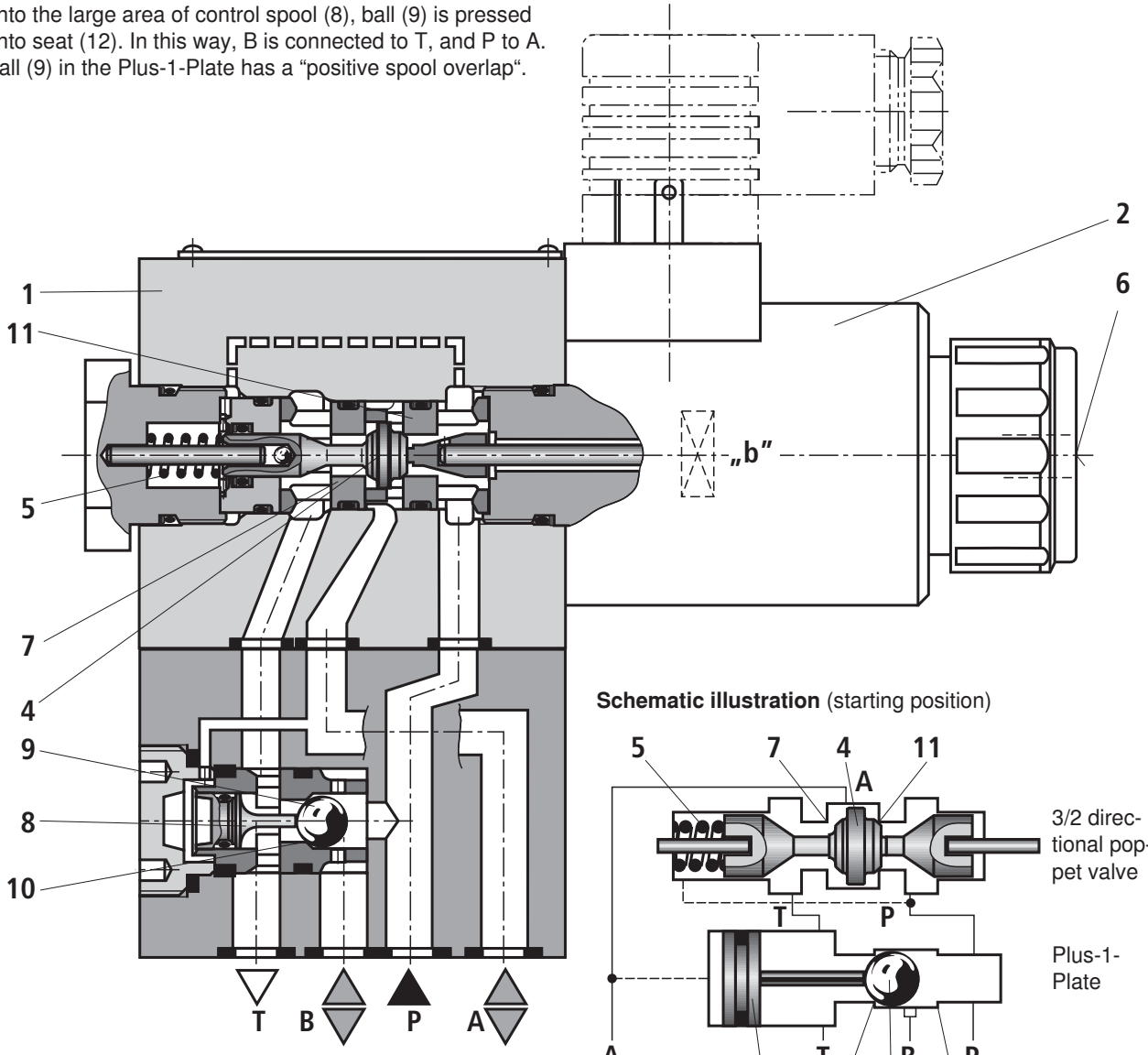
- Starting position:
  The main valve is not operated. Spring (5) holds closing element (4) on seat (11). Port P is closed, and A connected to T. In addition, a pilot line connects A to the large area of control spool (8), which is thus unloaded to the tank. The pressure applied via P now shifts ball (9) onto seat (10). P is now connected to B, and A to T.
- Transitional position:
  When the main valve is operated, closing element (4) is shifted against spring (5) and pressed onto seat (7). This closes port T, while P, A and B are briefly connected.
- Operated position:
  P is connected to A. Because the pump pressure acts via A onto the large area of control spool (8), ball (9) is pressed onto seat (12). In this way, B is connected to T, and P to A. Ball (9) in the Plus-1-Plate has a “positive spool overlap“.

⚠ Attention!

To avoid pressure intensification when single-rod cylinders are used, the annulus area of the cylinders must be connected to A.

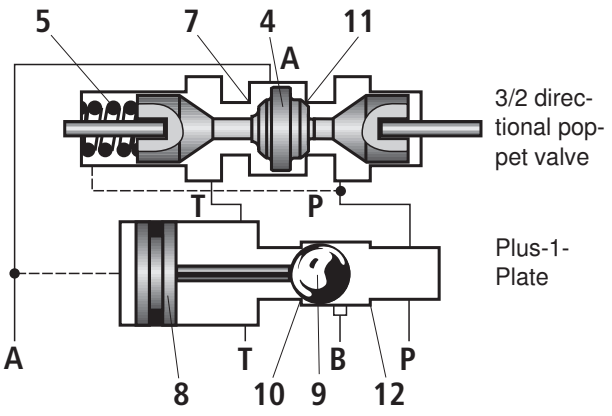
The use of the Plus-1-Plate and the seat arrangement offer the following options:

Variant “D“	Variant “Y“
	



Type M-4SED 10 **Y**1X/350CG24N9K4

Schematic illustration (starting position)



3/2 directional poppet valve

Plus-1-Plate

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

General

Weight	– 3/2 directional poppet valve	kg *[lbs]*	2.6 *[5.7]*
	– 4/2 directional poppet valve	kg *[lbs]*	3.9 *[8.6]*
Installation orientation			Optional
Ambient temperature range		°C *[°F]*	–30 to +50 *[–22 to +122]* (NBR seals) –20 to +50 *[–4 to +122]* (FKM seals)

Hydraulic

Maximum operating pressure	bar *[psi]*	See Performance limit on page 8
Maximum flow	l/min *[US gpm]*	40 *[10.6]*
Hydraulic fluid		Mineral oil (HL, HLP) to DIN 51524 [1]; fast bio-degradable hydraulic fluids to VDMA 24568 (see also RE 90221); HETG (rape seed oil) [1]; HEPG (polyglycols) [2]; HEES (synthetic esters) [2]; other hydraulic fluids on request
Hydraulic fluid temperature range	°C *[°F]*	–30 to +80 *[–22 to +176]* (NBR seals) –20 to +80 *[–4 to +176]* (FKM seals)
Viscosity range	mm^2/s *[SUS]*	2.8 to 500 *[35 to 2320]*
Permissible max. degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)		Class 20/18/15 [3]

Electrical

Type of voltage			DC voltage	AC voltage
Available voltages [4]		V	12, **24**, 42, 96, 110, 205, 220	Only possible via rectifier (see page 3)
Voltage tolerance (nominal voltage)		%	±10	
Power consumption		W	30	
Duty cycle		%	100	
Switching time to ISO 6403	– ON	ms	20 to 50	
	– OFF		5 to 25 (without rectifier) 30 to 50 (with rectifier)	
Maximum switching frequency		1/h	15000	
Type of protection to DIN EN 60529			IP 65 with mating connector mounted and locked	
Maximum coil temperature [5]		°C *[°F]*	150 *[302]*	

[1] Suitable for NBR and FKM seals

[2] Suitable only for FKM seals

[3] 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.

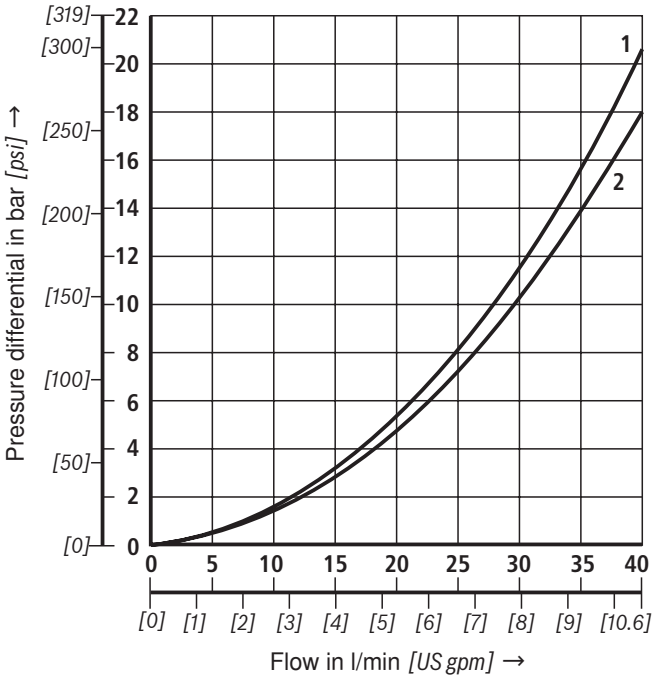
[4] Special voltages on request

[5] Due to the surface temperatures of solenoid coils, observe standards ISO 13732-1 and EN 982!

When establishing the electrical conection, properly connect the protective earth conductor (PE ⏚).

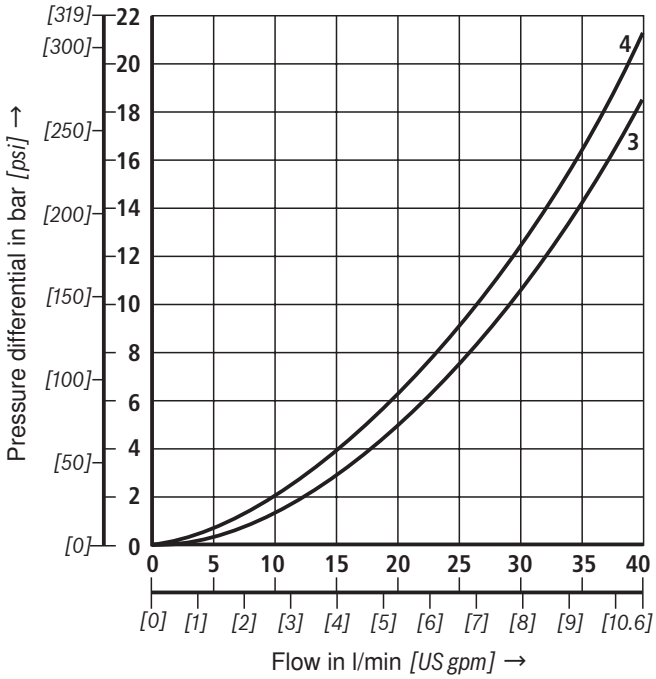
Characteristic curves (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

Δp-q_V characteristic curves
3/2 directional poppet valve



1 P to A
2 A to T

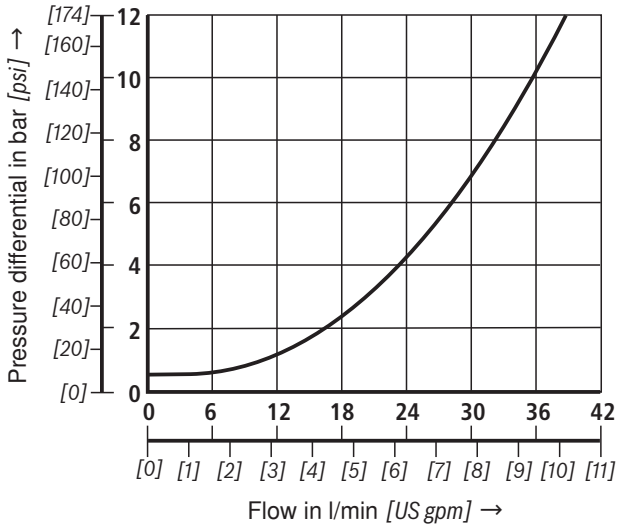
Δp-q_V characteristic curves
4/2 directional poppet valve



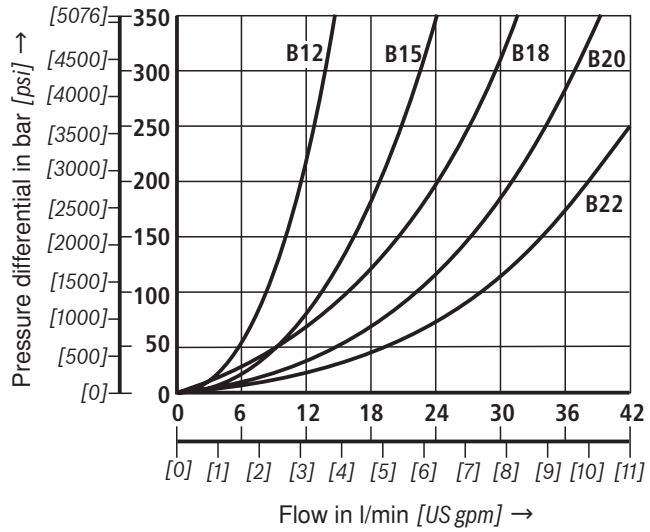
3 A to T
P to B

4 B to T
P to A

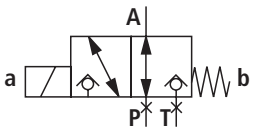
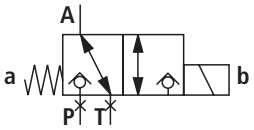
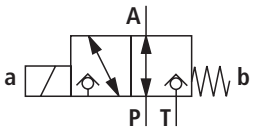
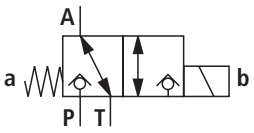
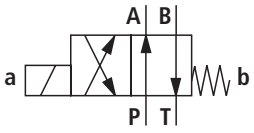
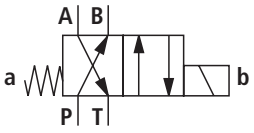
Δp-q_V characteristic curves
Check valve insert



Δp-q_V characteristic curves
Throttle insert



Performance limit (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C *[104 °F ±9 °F]*)

	Symbol		Remark	Maximum operating pressure in bar *[psi]*				Flow in l/min *[US gpm]*
				P	A	B	T	
2-way circuit	**UK**		With a 2/2-way circuit, port P **or** T must be plugged by the customer!	350 *[5076]*	350 *[5076]*		350 *[5076]*	40 *[10.6]*
	CK			350 *[5076]*	350 *[5076]*		350 *[5076]*	40 *[10.6]*
3-way circuit	**UK**			350 *[5076]*	350 *[5076]*		350 *[5076]*	40 *[10.6]*
	CK			350 *[5076]*	350 *[5076]*		350 *[5076]*	40 *[10.6]*
4-way circuit (flow only possible in the direction of the arrow!)	**D**		3/2 directional valve (symbol "UK") in conjunction with Plus-1-Plate: $p_P \geq p_A \geq p_B \geq p_T$	350 *[5076]*	350 *[5076]*	350 *[5076]*	$p_P/p_A/p_B$ –40 *[10.6]*	40 *[10.6]*
	Y		3/2 directional valve (symbol "CK") in conjunction with Plus-1-Plate: $p_P \geq p_A \geq p_B \geq p_T$	350 *[5076]*	350 *[5076]*	350 *[5076]*	$p_P/p_A/p_B$ –40 *[10.6]*	40 *[10.6]*

⚠ Attention!

Please observe the general notes below!

The performance limit was established when the solenoid had reached the operating temperature, at 10% undervoltage and no precharging of the tank.

General notes

Poppet valves can be used according to the symbols and the assigned operating pressures and flows (see Performance limits above).

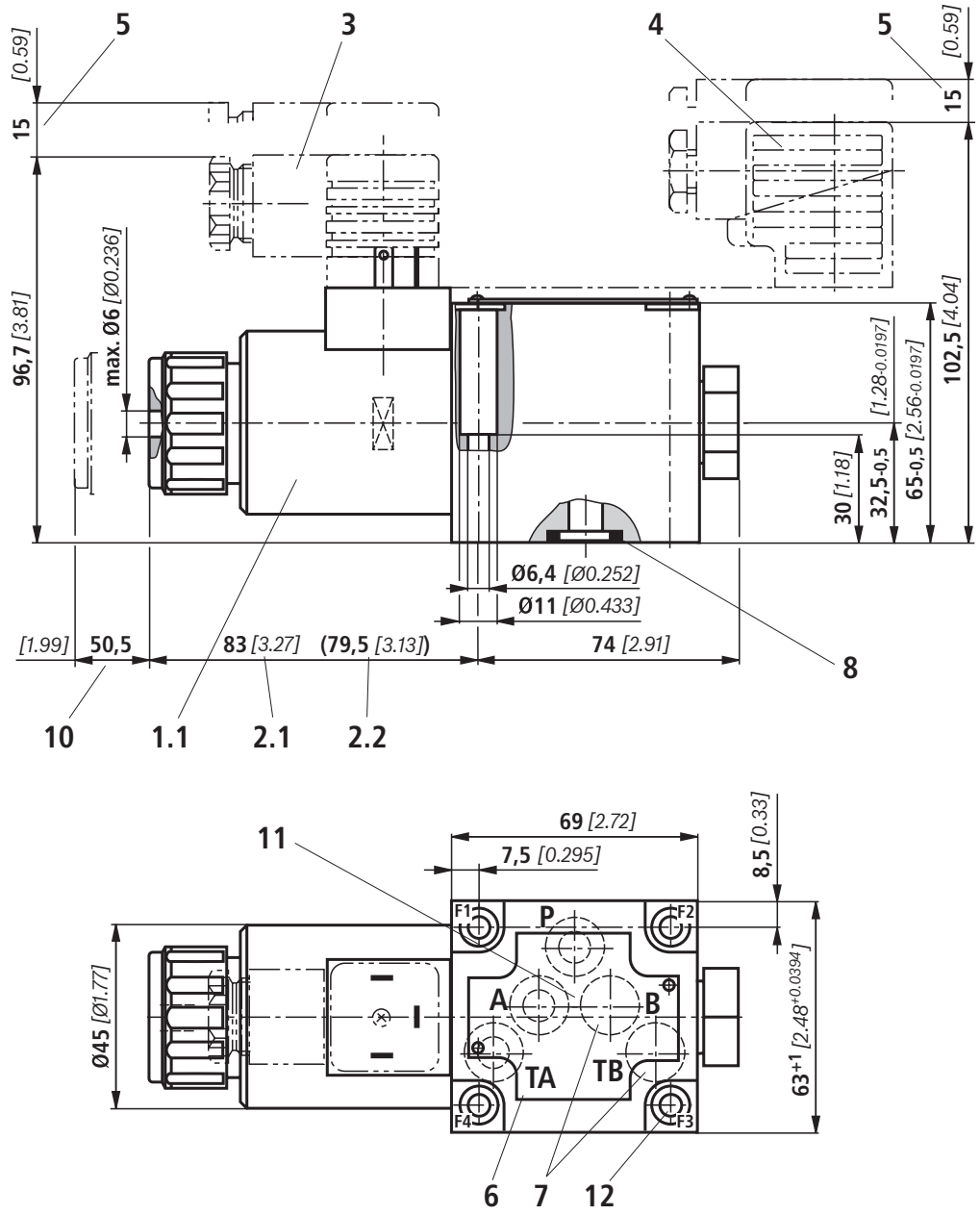
To ensure reliable operation, the following points must strictly be observed:

- Poppet valves feature a negative spool overlap, that is, during the switching process, a certain amount of leakage oil is produced. However, this process takes place within such a short time so that it is irrelevant in nearly all applications.
- The specified maximum flow must not be exceeded (if required, install throttle insert for limiting the flow, see page 13)!

Plus-1-Plate:

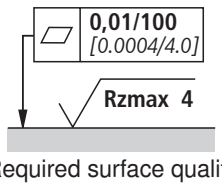
- When using the Plus-1-Plate (4/2 directional function), observe the following lower operating values: p_{min} = 8 bar *[116 psi]*, q_V > 3 l/min *[0.8 US gpm]*.
- Ports P, A, B and T are clearly assigned in accordance with their tasks. They must not be freely interchanged or plugged!
- Port T must always be connected.
- Observe the pressure level and pressure distribution!
- The fluid may only flow in the direction of the arrow!

Unit dimensions: 3/2 directional poppet valve, variant “UK“ (dimensions in mm)



For explanation of items, see 13.

Valve mounting screws (separate order)
4 hexagon socket head cap screws
ISO 4762 - M6 x 40 - 10.9-flZn-240h-L
Friction coefficient μ_{total} = 0.09 to 0.14,
tightening torque M_T = 12.5 Nm *[9.2 ft-lbs]* Nm ±10%,
Material no. **R913000058**

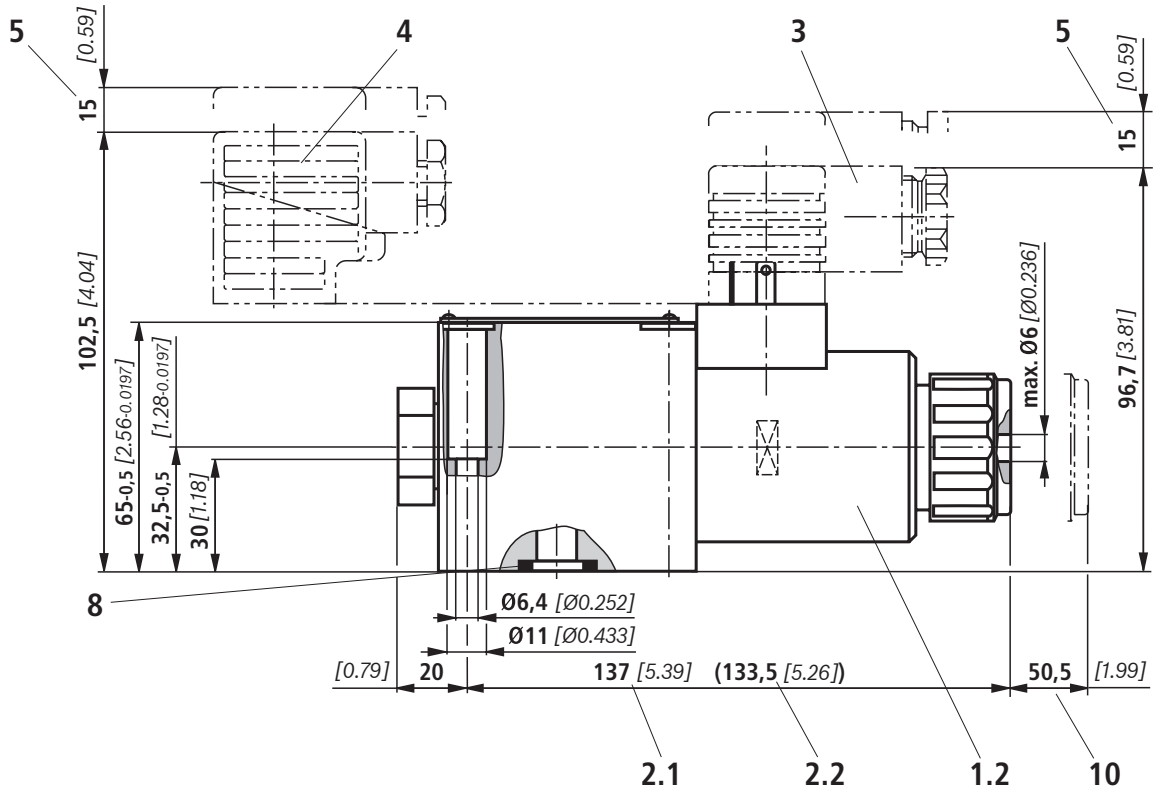


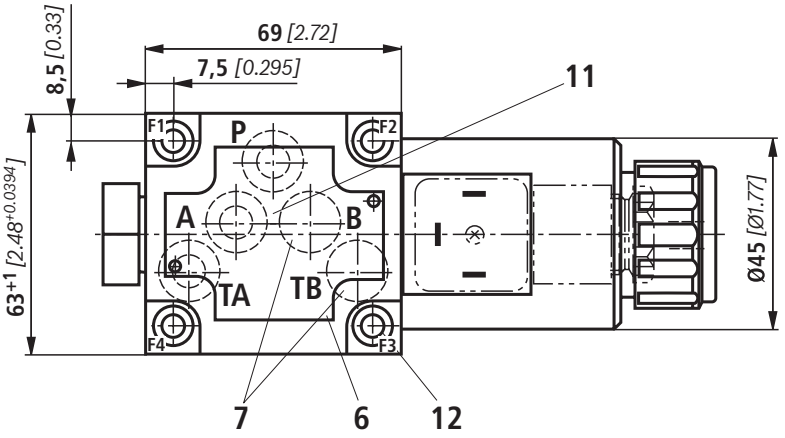
Required surface quality of valve mounting face

Subplates to data sheet RE 45054
(separate order)

G 66/01 (G3/8)
G 67/01 (G1/2)

Unit dimensions: 3/2 directional poppet valve, variant “CK“ (dimensions in mm)

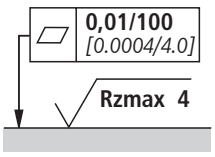




For explanation of items, see 13.

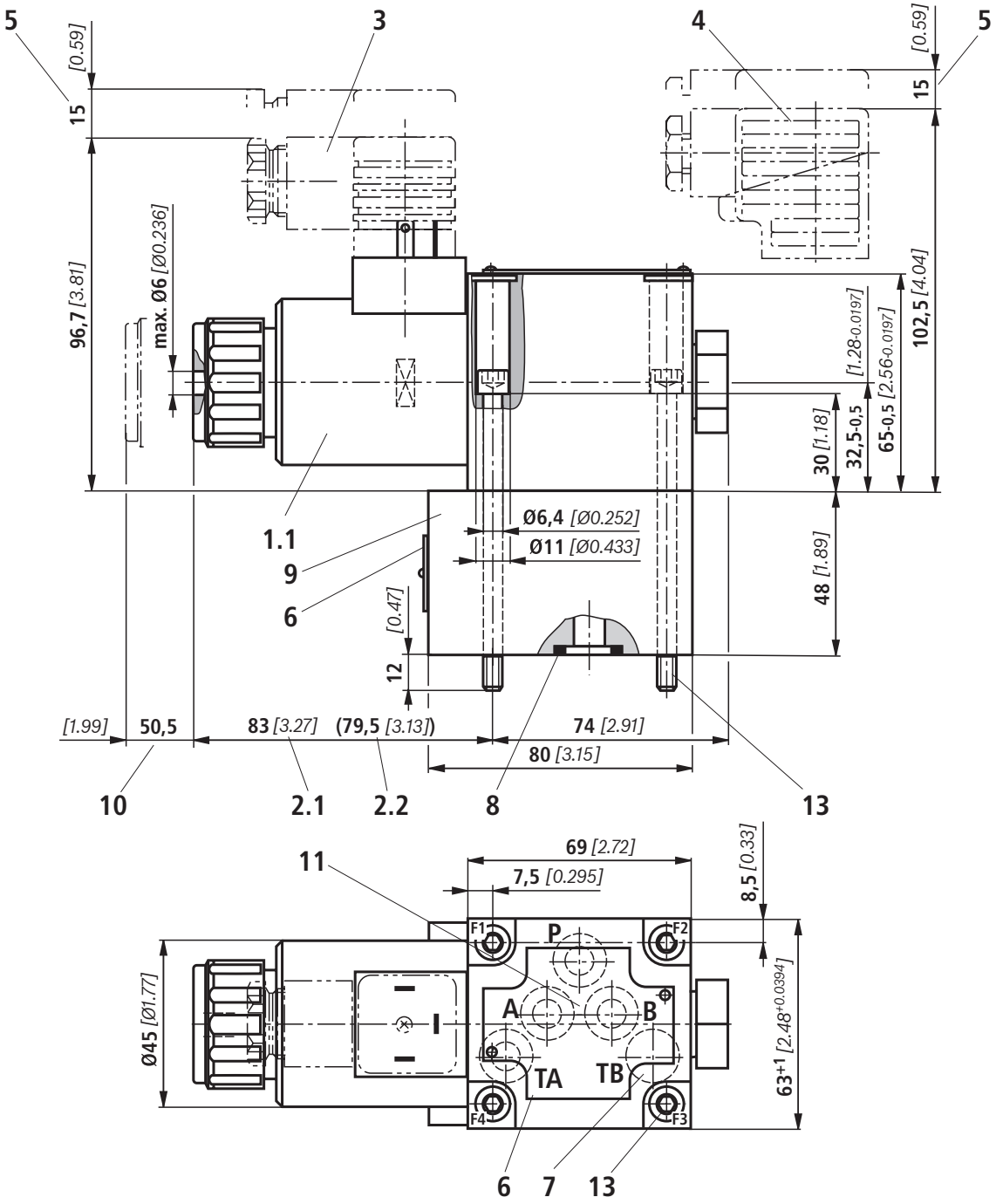
Valve mounting screws (separate order)
4 hexagon socket head cap screws
ISO 4762 - M6 x 40 - 10.9-flZn-240h-L
Friction coefficient μ_{total} = 0.09 to 0.14,
tightening torque M_T = 12.5 Nm *[9.2 ft-lbs]* Nm ±10%,
Material no. **R913000058**

Subplates to data sheet RE 45054
(separate order)
G 66/01 (G3/8)
G 67/01 (G1/2)



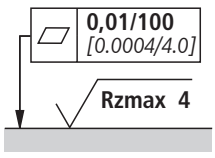
Required surface quality
of valve mounting face

Unit dimensions: 4/2 directional poppet valve, variant “D“ (dimensions in mm)



For explanation of items, see 13.

Valve mounting screws (included in scope of supply)
4 hexagon socket head cap screws
ISO 4762 - M6 x 90 - 10.9-flZn-240h-L
Friction coefficient μ_{total} = 0.09 to 0.14,
tightening torque M_A = 12.5 Nm *[9.2 ft-lbs]* Nm ±10%,
Material no. **R913000259**

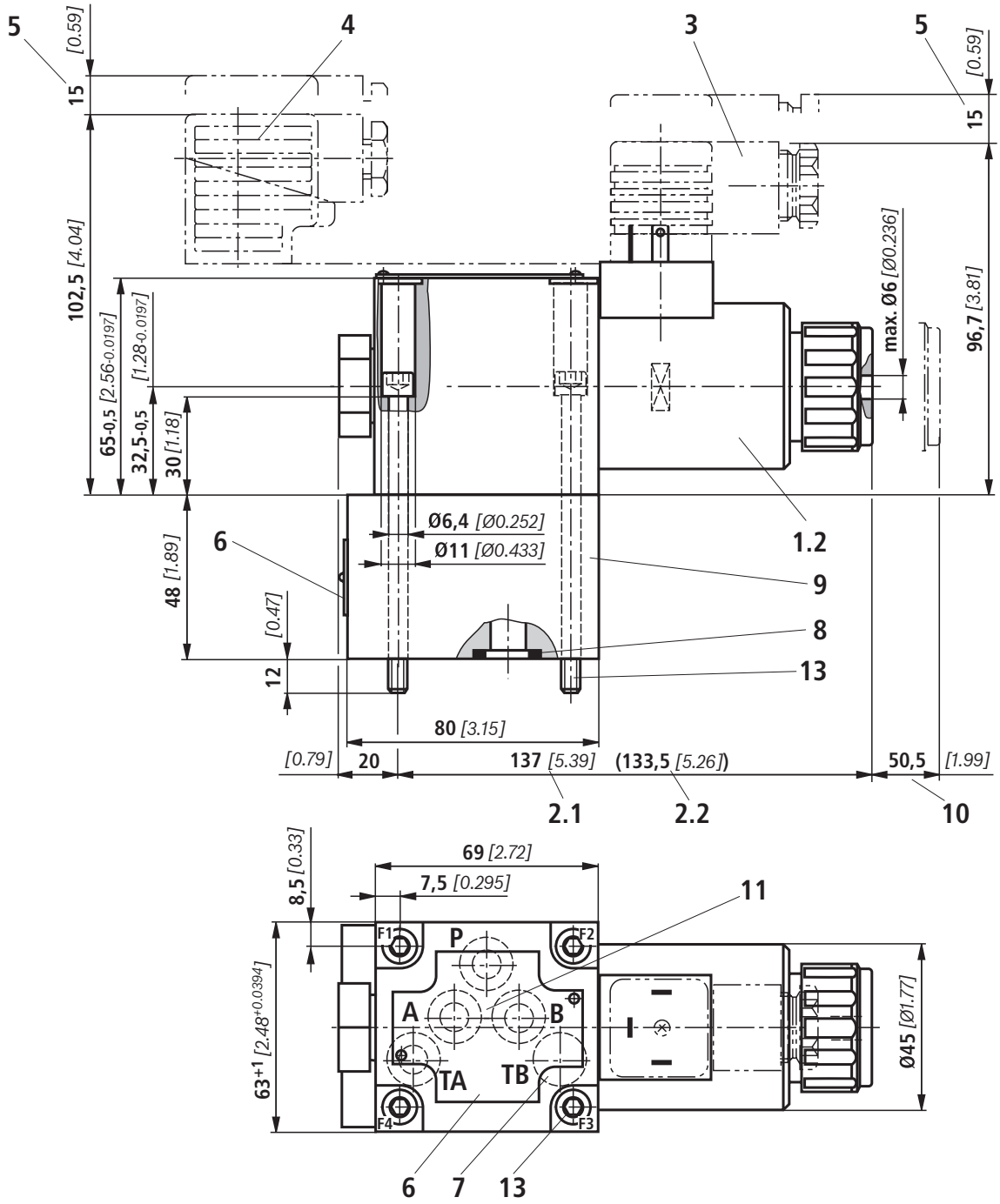


Required surface quality of valve mounting face

Subplates to data sheet RE 45054
(separate order)

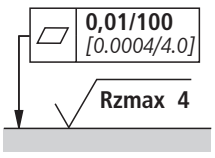
G 66/01 (G3/8)
G 67/01 (G1/2)

Unit dimensions: 4/2 directional poppet valve, variant “Y“ (dimensions in mm)



For explanation of items, see 13.

Valve mounting screws (included in scope of supply)
4 hexagon socket head cap screws
ISO 4762 - M6 x 90 - 10.9-flZn-240h-L
Friction coefficient μ_{total} = 0.09 to 0.14,
tightening torque M_T = 12.5 Nm *[9.2 ft-lbs]* Nm ±10%,
Material no. **R913000259**



Required surface quality
of valve mounting face

Subplates to data sheet RE 45054
(separate order)

G 66/01 (G3/8)
G 67/01 (G1/2)

Unit dimensions: Explanation of items

1.1 Solenoid “a“ (for further electrical connections, see RE 08010)

1.2 Solenoid “b“ (for further electrical connections, see RE 08010)

2.1 Dimension for solenoid **with concealed** manual override “**N9**“

2.2 Dimension for solenoid **without** manual override

3 Mating connector without circuitry (separate order, see page 3)

4 Mating connector with circuitry (separate order, see page 3)

5 Space required to remove mating connector

6 Nameplate

7 ⚠ **Attention!**

- On 3/2 directional poppet valves, ports B and TB are provided as blind countersink.
- On 4/2 directional poppet valves, port TB is provided as blind countersink.

8 Identical seal rings for ports A, B and T; seal ring for port P

9 Plus-1-Plate

10 Space required to remove coil

11 Porting pattern to ISO 4401-05-04-0-05 and NFPA T3.5.1 R2-D05

12 Valve mounting bores

13 Valve mounting screws, see pages 11 and 12

Throttle insert

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

Examples:

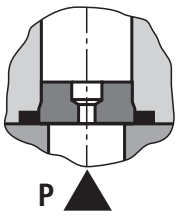
- Accumulator operation,
- Use as pilot control valve with internal pilot oil tapping.

3/2 directional poppet valve

The throttle insert is to be inserted into port P of the poppet valve.

4/2 directional poppet valve

The throttle insert is to be inserted into port P of the Plus-1-Plate.



Check valve insert

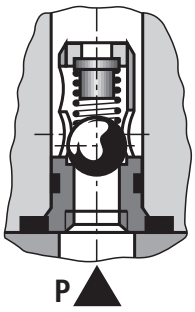
The check valve insert allows free flow from P to A and closes leak-free from A to P.

3/2 directional poppet valve

The check valve insert is to be inserted in port P of the poppet valve.

4/2 directional poppet valve

The check valve insert is to be inserted in port P of the Plus-1-Plate.



Notes

Bosch Rexroth AG
Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52 / 18-0
Fax +49 (0) 93 52 / 18-23 58
documentation@boschrexroth.de
www.boschrexroth.de

Notes

Bosch Rexroth AG
Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52 / 18-0
Fax +49 (0) 93 52 / 18-23 58
documentation@boschrexroth.de
www.boschrexroth.de

Notes

Bosch Rexroth AG
Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52 / 18-0
Fax +49 (0) 93 52 / 18-23 58
documentation@boschrexroth.de
www.boschrexroth.de