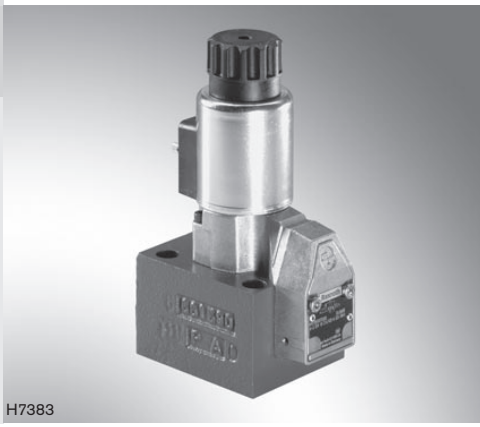
Rexroth
Bosch Group

2/2-, 3/2- and 4/2-way directional poppet valves, solenoid operated

RE 22058/07.06 1/14
Replaces: 06.06

Type M-.SEW



NG 6
Component series 3X
Maximum operating pressure 420/630 bar *[6100/9150 psi]*
Maximum flow 25 l/min *[6.6 gpm]*

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Mating connector	13
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Features

- Direct operated directional poppet valve with solenoid actuation
- Port pattern as per DIN 24340 form A NG6
- Port pattern as per ISO 4401-03-02-0-94, NFPA T3.5.1 MR1 and ANSI B93-7 D03 (with locating bore/anti-rotation pin)
- Safe operation even after long idle periods or standstill under pressure
- Air gap DC solenoids with removable coil (AC voltages possible via a rectifier plug)
- Solenoid coil can be rotated 90°
- Pressure-tight chamber need not be opened for coil replacement
- Individual electrical connection
- With concealed manual override, optional
- Inductive position indicator (contact-free), optional, see RE 24830

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

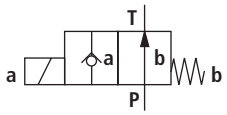
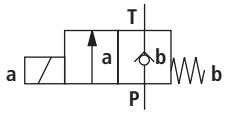
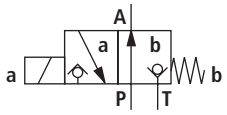
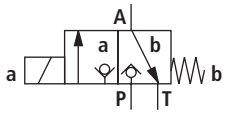
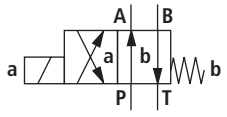
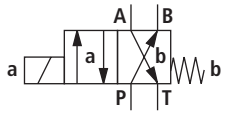
Order code

M–	SEW	6		3X/	M	

2 main ports = **2**
3 main ports = **3**
4 main ports = **4**

Poppet valve, direct operated

NG 6, ISO4401-3, NFPA/ANSI D03 Interface = **6**

Symbols	Main ports	2	3	4	
		●	–	–	= **P**
		●	–	–	= **N**
		–	●	–	= **U**
		–	●	–	= **C**
		–	–	●	= **D**
		–	–	●	= **Y**
		● = available			

Component series 30 to 39 = **3X**
(30 to 39: Unchanged installation and connection dimensions)

Operating pressure 420 bar *[6100 psi]* = **420**
Operating pressure 630 bar *[9150 psi]* = **630**

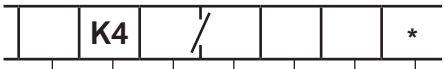
Solenoid (air gap) with removable coil = **M**

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

For further order codes for other voltages, see page 6

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

For standard types, see page 3.



Further details in clear text

No code = **Without** locating bore
/62 = **With** locating bore and anti-rotation pin ISO 8752-3x8-St

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

No code = Without check valve insert, without throttle orifice insert
P = With check valve insert
B12 = Throttle orifice Ø1.2 mm *[0.047"]*
B15 = Throttle orifice Ø1.5 mm *[0.059"]*
B18 = Throttle orifice Ø1.8 mm *[0.071"]*
B20 = Throttle orifice Ø2.0 mm *[0.079"]*
B22 = Throttle orifice Ø2.2 mm *[0.087"]*
Other orifices upon request

Accessories
Inductive position indicator, see RE 24830

No code = Without indicator
QMAG24 [2] **=** Indicator monitors position **a**
QMBG24 [2] **=** Indicator monitors position **b**

Electrical connection

K4 [3] **=** **Without** mating connector with connector as per DIN EN 175301-803

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

☞ **Note!**
Other types of actuators (e. g pneumatic, hydraulic, rotary knob, rotary knob with lock, plunger, lever, roller lever) upon request!

[1] When connecting to an AC voltage, a DC solenoid and an AC rectifier must be used (see table on page 2).
For individual connections a large mating connector with integrated rectifier can be used (**order separately, see page 13).**

[2] 420 bar version only

[3] Mating connectors, order separately, see page 13.

Standard types

Type	Material number
M-3SEW 6 C3X/420MG205N9K4	R900050514
M-3SEW 6 C3X/420MG24N9K4	R900566273
M-3SEW 6 C3X/420MG96N9K4	R900570252
M-3SEW 6 U3X/420MG205N9K4	R900050515
M-3SEW 6 U3X/420MG24N9K4	R900566283
M-3SEW 6 U3X/420MG96N9K4	R900570744

For additional standard types and components please contact Product Support.

Function, cross-section, symbols: 2/2 and 3/2 directional poppet valve

General

The type M-.SEW directional valve is a solenoid operated directional poppet valve. It controls the start, stop and direction of flow.
It basically consists of a housing (1), the solenoid (2), the hardened valve assembly (3) and the ball / spool (4) as the closing element.

Basic principle

When de-energized the ball / spool (4) is pressed onto the seat by the spring (9), and into the energized position by the solenoid (2). The solenoid (2) acts via the lever (6) and lever ball (7) on the actuator pin (8), which is sealed on both sides. The chamber between the two sealing elements is connected with port P. The valve system (3) is thereby pressure balanced with regard to the actuating forces (solenoid or return spring). These valves can therefore be used up to a pressure of 630 bar *[9139 psi]*.

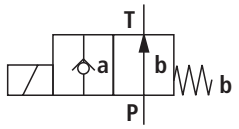
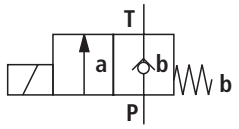
☞ **Note!**

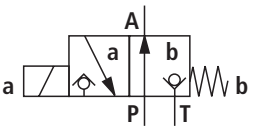
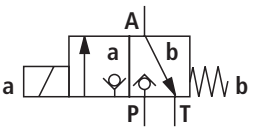
– The 3/2-way poppet valves have a "negative switching overlap". Therefore port T must always be connected to tank. This means that during the switching process – from the start of opening one valve seat to the closing of the other seat – all of the ports P–A–T are connected with each other. This, however takes place in such a short space of time that in most applications it is irrelevant.
– The hand override (10) makes it possible to actuate the valve without energizing the solenoid.

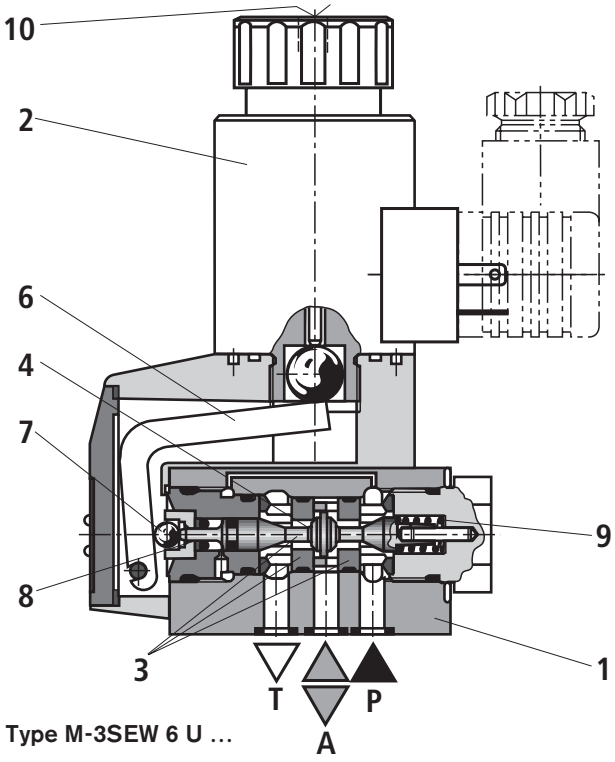
⚠ **Caution!**

– Care has to be taken to ensure that the stated maximum flows are not exceeded! If necessary a throttle orifice for flow limitation has to be fitted (see page 13).

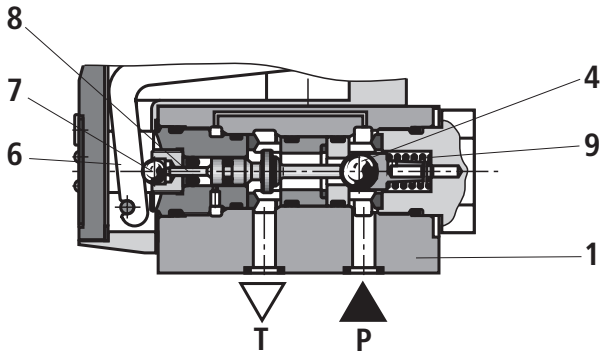
The following configurations are available:

2/2-way poppet valve	
Symbol **P**	
De-energized position	P and T connected
Energized position	P closed
Symbol **N**	
De-energized position	P closed
Energized position	P and T connected

3/2-way poppet valve	
Symbol **U**	
De-energized position	P and A connected, T closed
Energized position	P closed, A and T connected
Symbol **C**	
De-energized position	P closed, A and T connected
Energized position	P and A connected, T closed



Type M-3SEW 6 U …



Type M-2SEW 6 N …

Function, cross-section, symbols, schematic illustration: 4/2 directional poppet valve

In combination with a sandwich plate, called a **"plus-1 plate"**, under the 3/2-way poppet valve, this valve can then beused as a 4/2-way poppet valve.

Function of the plus-1 plate:

– De-energized position:
The main valve is not actuated. The spring (9) holds the ball (4.1) on the seat (11). Port P is blocked and A is connected to Tank. A control line runs from A to the bore side area of the pilot spool (12), thereby unloading it to tank thru A. The pressure applied via P will hold the ball (13) onto seat (14). Thus allowing P to be connected to B and A connected to T.

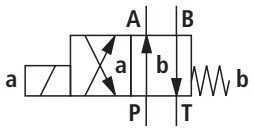
– Transition position:
When the main valve is actuated, the spool (4.2) is pushed against the spring (9) and then pressed onto the seat (15). This results in the closure of port T, while P, A and B are briefly connected.

– Energized position:
P is connected to A. As the pump pressure acts via A on the large area of the pilot spool (12), ball (13) is pushed onto seat (16). Thus, B is connected to T and P to A. Ball (13) in the plus-1 plate has a "positive switching overlap".

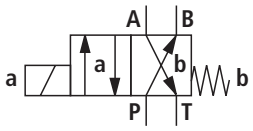
⚠ Caution!
In order to prevent pressure intensification when single-rod cylinders are used, the annulus area of the cylinder must be connected to port A.

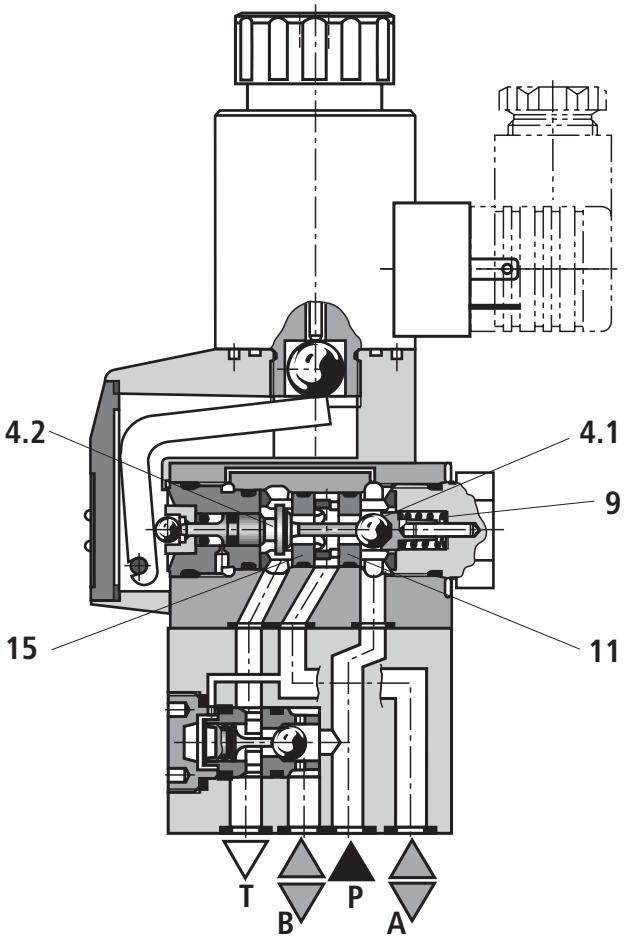
The use of the Plus-1 plate allows the following configurations:

Symbol D:



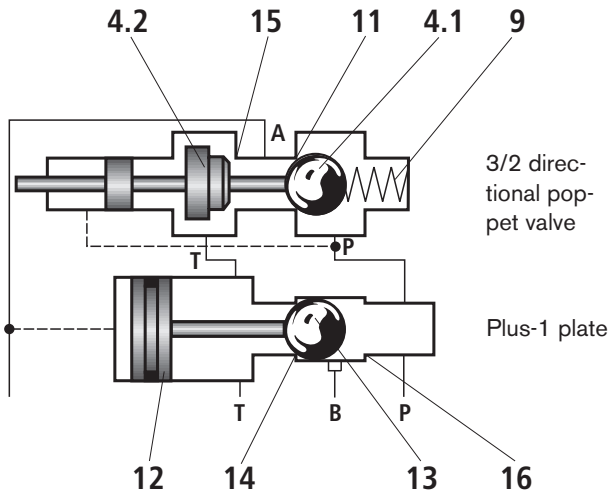
Symbol Y:





Type M-4SEW 6 Y …

Schematic illustration: De-energized position



Technical data (for applications exceeding these parameters, please consult product support!)

General

Weight	– 2/2 directional poppet valve	kg *[lbs]*	1.5 *[3.3]*
	– 3/2 directional poppet valve	kg *[lbs]*	1.5 *[3.3]*
	– 4/2 directional poppet valve	kg *[lbs]*	2.3 *[5.1]*
Installation orientation			Unrestricted
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 power limits on page 9
Maximum flow	l/min *[gpm]*	25 *[6.6]*
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 upon 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]*
Max. permissible degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)		Class 20/18/15 [3]

Electrical

Voltage type			DC	AC
Available voltages [4]		V	12, **24**, 42, 96, 110, 205, 220	Possible only in conjunction with rectifier (see page 13)
Voltage tolerance (nominal voltage)		%	±10	
Power consumption		W	30	
Duty cycle		%	100	
Switching time (as per ISO 6403)	– ON	ms	25 to 40 (without rectifier) 30 to 55 (with rectifier)	
	– OFF		10 to 15 (without rectifier) 35 to 55 (with rectifier)	
Maximum switching frequency		1/h	15000	
Type of protection (as per DIN EN 60529)			IP 65 with mating connector mounted and secured	
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 and RE 50088.

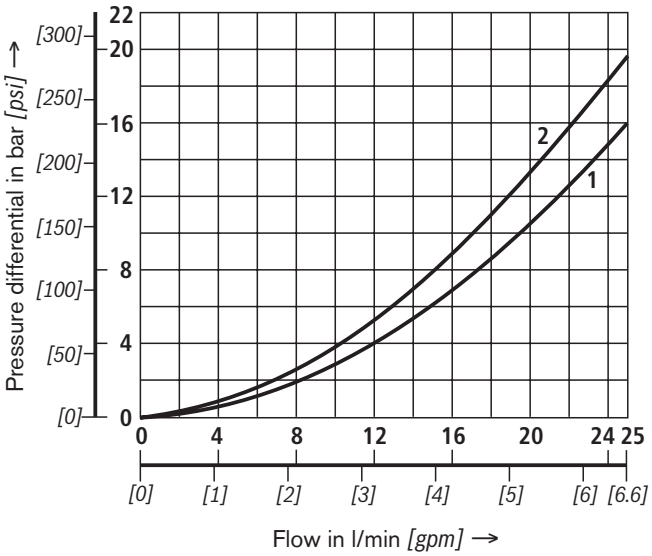
[4] Special voltages upon request

[5] Due to the surface temperatures of solenoid coils, observe European standards EN563 and EN982!

When making the electrical connection, properly connect the ground conductor (PE ⏚).

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

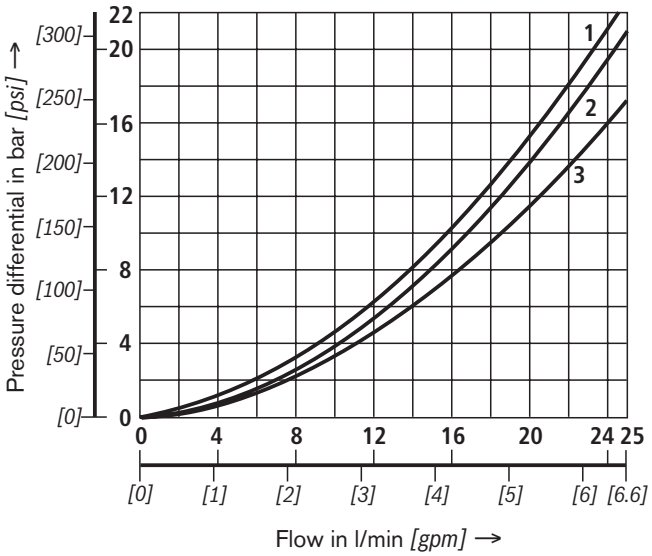
Δp-q_V characteristic curves
2/2 directional poppet valve



1 M-2SEW 6 **N** …, P to T

2 M-3SEW 6 **P** …, P to T

Δp-q_V characteristic curves
3/2 directional poppet valve

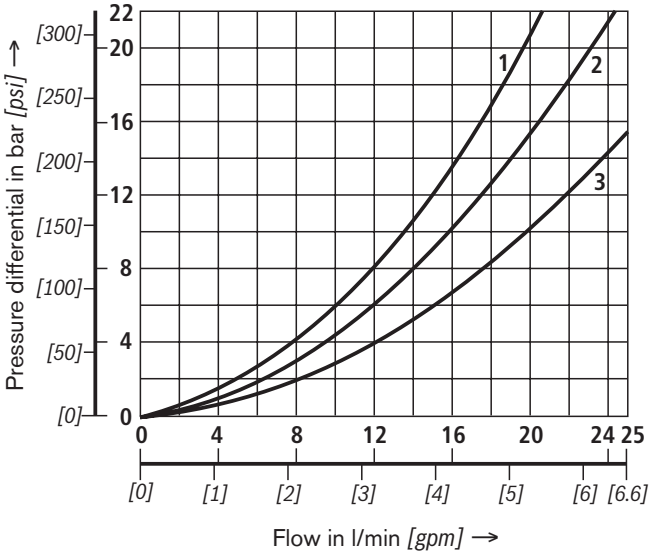


1 M-3SEW 6 **U** / **C** …, A to T

2 M-3SEW 6 **U** …, P to A

3 M-3SEW 6 **C** …, P to A

Δp-q_V characteristic curves
4/2 directional poppet valve



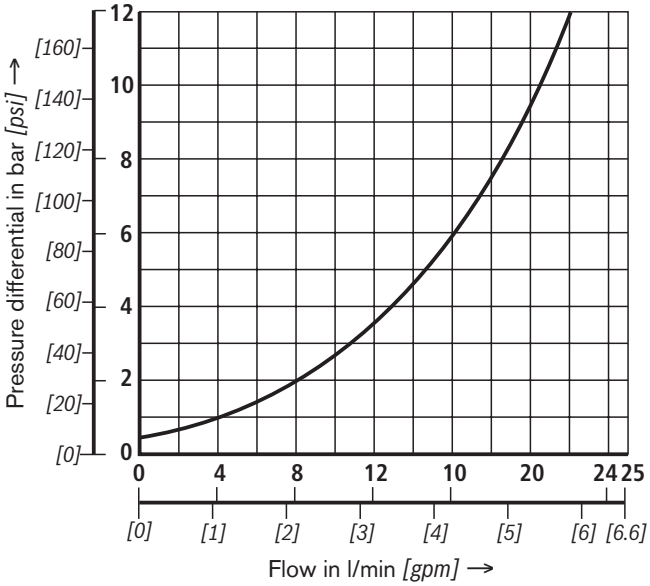
1 M-4SEW 6 **D** / **Y** …, A to T

2 M-4SEW 6 **D** / **Y** …, P to A

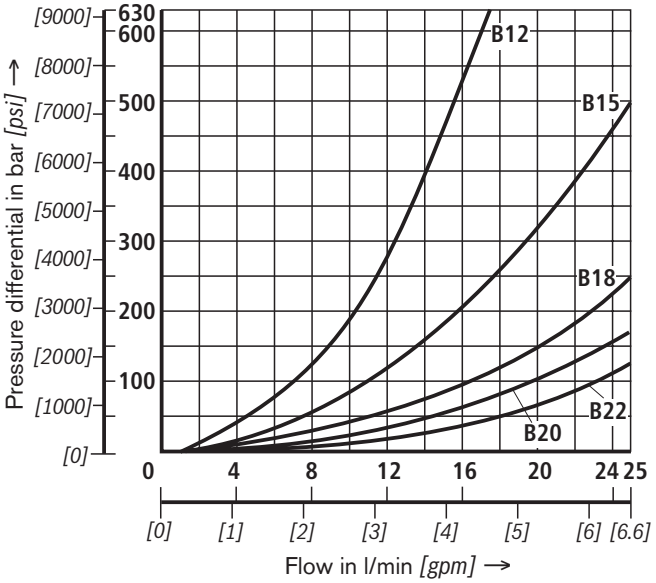
3 M-4SEW 6 **D** / **Y** …, P to B and B to T

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

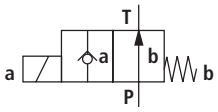
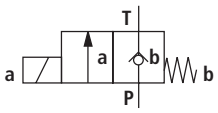
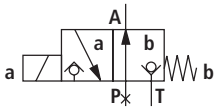
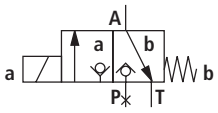
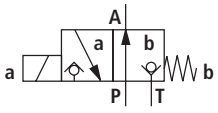
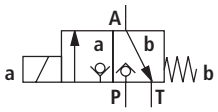
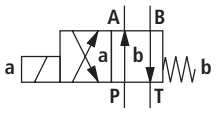
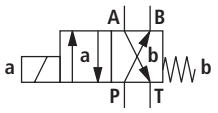
Δp-q_V characteristic curves
Check valve insert



Δp-q_V characteristic curves
Throttle orifice inserts



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

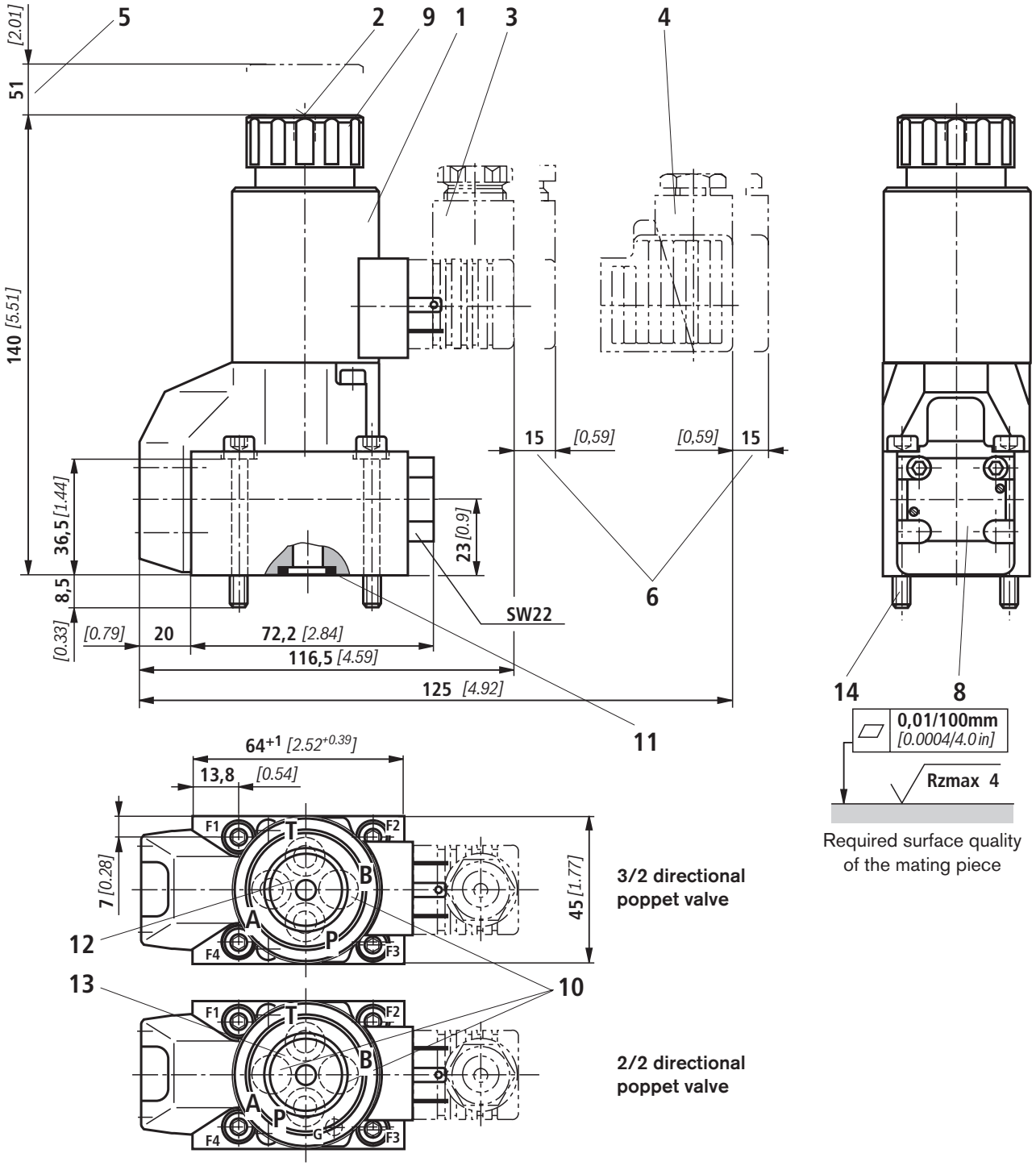
	Symbol		Remark	Maximum operating pressure in bar *[psi]*				Flow in l/min *[gpm]*
				P	A	B	T	
2-way circuit (2/2 directional poppet valve)	**P**		$p_P \geq p_T$	420/630 *[6100/ 9150]*			100 *[1450]*	25 *[6.6]*
	N			420/630 *[6100/ 9150]*			100 *[1450]*	25 *[6.6]*
2-way circuit (3/2 directional poppet valve) only for unloading function	**U**		Before switching from the initial position to the switched position, pressure must be present in port A. $p_A \geq p_T$		420/630 *[6100/ 9150]*		100 *[1450]*	25 *[6.6]*
	C		$p_A \geq p_T$		420/630 *[6100/ 9150]*		100 *[1450]*	25 *[6.6]*
3-way circuit	**U**		$p_P \geq p_A \geq p_T$	420/630 *[6100/ 9150]*	420/630 *[6100/ 9150]*		100 *[1450]*	25 *[6.6]*
	C			420/630 *[6100/ 9150]*	420/630 *[6100/ 9150]*		100 *[1450]*	25 *[6.6]*
4-way circuit (flow inly possible in the direction of the arrow!)	**D**		3/2 directional valve (symbol **U**) in conjunction with Plus-1 plate: $p_P > p_A \geq p_B > p_T$	420/630 *[6100/ 9150]*	420/630 *[6100/ 9150]*	420/630 *[6100/ 9150]*	100 *[1450]*	25 *[6.6]*
	Y		3/2 directional valve (symbol **C**) in conjunction with Plus-1 plate: $p_P > p_A \geq p_B > p_T$	420/630 *[6100/ 9150]*	420/630 *[6100/ 9150]*	420/630 *[6100/ 9150]*	100 *[1450]*	25 *[6.6]*

⚠ Attention!

Please take into account the “General guidelines” stated on page 13!

The power limits were determined with the solenoids at operating temperature, 10% undervoltage and with the tank not pressurized.

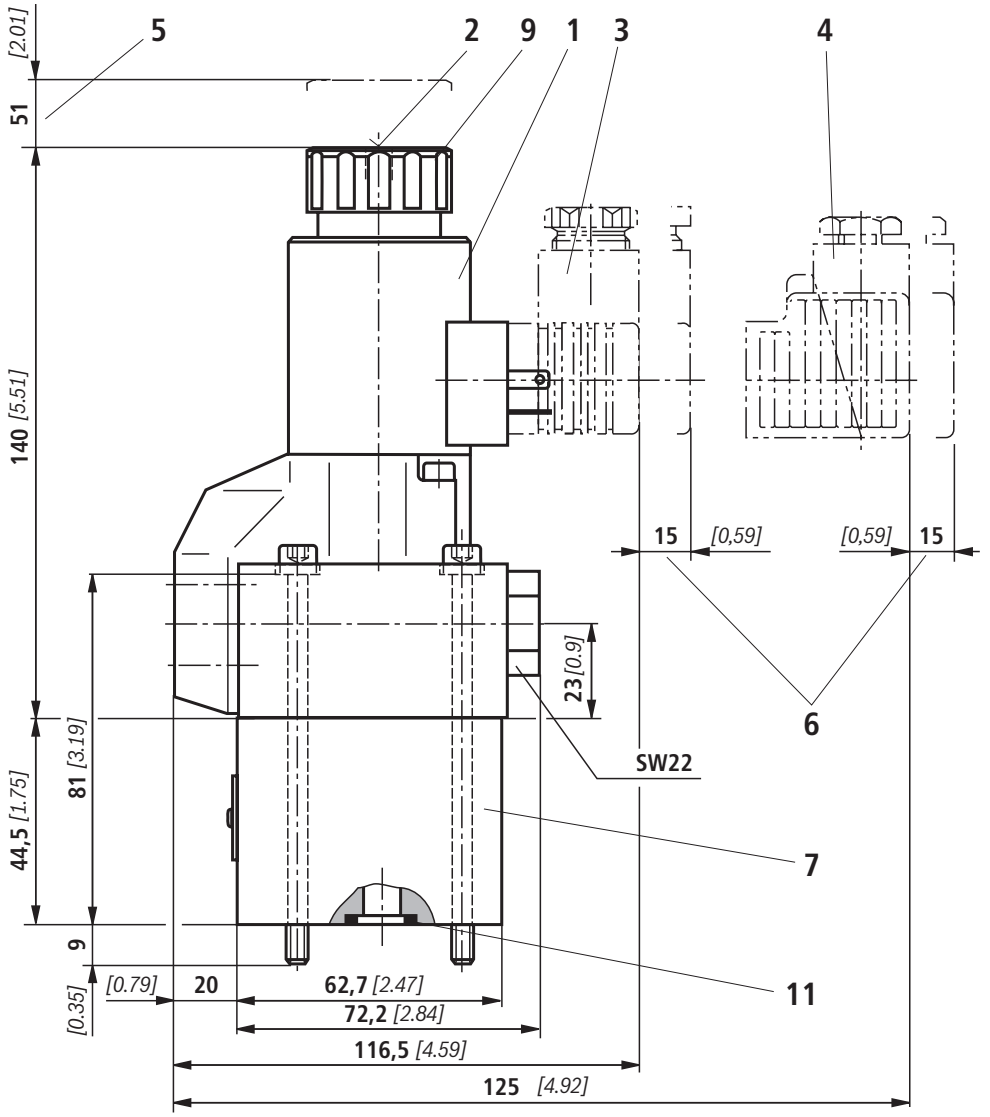
Dimensions: 2/2 directional poppet valve and 3/2 directional poppet valve
(nominal dimensions in mm *[inch]*)

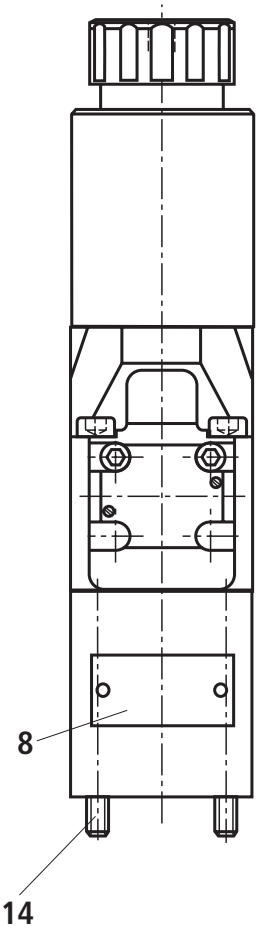


Required surface quality of the mating piece

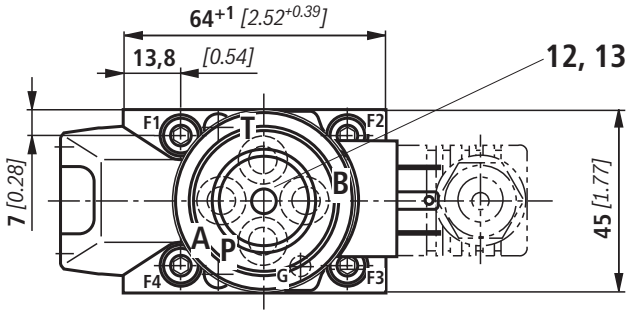
For item descriptions and valve mounting bolts see page 12.

Dimensions: 4/2 directional poppet valve (nominal dimensions in mm *[inch]*)





Required surface quality of the mating piece



For item descriptions and valve mounting bolts see page 12.

Dimensions

1 Solenoid **a** (ANSI coil designation see RE 08010)

2 Concealed manual override **N9**

3 Mating connector **without** circuitry (order separately, see page 13)

4 Mating connector **with** circuitry (order separately, see page 13)

5 Space required to remove coil

6 Space required to remove mating connector

7 Plus-1 plate

8 Nameplate

9 Hand nut, tightening torque $M_A = 4$ Nm *[2.95 ft-lbs]*

10 ⚠ **Attention!**
- On 3/2-way poppet valves for 420 bar version, port B is a blind counterbore, and is not present in the 630 bar version.
- On 2/2-way poppet valves for 420 bar version, ports A and B are blind counterbores.

11 Identical seal rings for ports A, B, P and T

12 Port pattern as per DIN 24340 form A, NG6

13 Port pattern as per ISO 4401-03-02-0-94, NFPA T3.5.1 MR1 and ANSI B93-7 D03 interface **(with** locating bore for anti-rotation pin ISO 8752-3x8-St, material number **R900005694**, included in the scope of supply)

14 For valve mounting bolts, see below

Valve mounting bolts (included in the scope of supply)

2/2 and 3/2 directional poppet valve

– 420 bar version:
4 socket head cap screws (SHCS) metric
ISO 4762 - M5 x 45 - 10.9-flZn-240h-L
(friction coefficient $\mu_{total} = 0.09$ to 0.14);
tightening torque $M_T = 7$ Nm *[5.2 ft-lbs]* ± 10%,
material number **R913000140**
or
4 socket head cap srews (SHCS)
ISO 4762 - M5 x 45 - 10.9 (self procurement)
(friction coefficient $\mu_{total} = 0.12$ to 0.17);
tightening torque $M_T = 8.1$ Nm *[6 ft-lbs]* ± 10%

4 socket head cap screws (SHCS) UNC
10-24 UNC x 1 3/4" ASTM-574 (self procurement)
(friction coefficient $\mu_{total} = 0.19$ to 0.24 as per ASTM-574);
tightening torque $M_T = 11$ Nm *[8.1 ft-lbs]* ± 10%,
(friction coefficient $\mu_{total} = 0.12$ to 0.17 as per ISO 4762);
tightening torque $M_T = 8$ Nm *[5.9 ft-lbs]* ± 10%,
material number **R978802649**

– 630 bar version:
4 socket head cap screws (SHCS) metric
ISO 4762 - M6 x 45 - 10.9-flZn-240h-L
(friction coefficient $\mu_{total} = 0.09$ to 0.14);
tightening torque $M_T = 12.5$ Nm *[9.2 ft-lbs]* ± 10%,
material number **R913000258**
or
4 socket head cap srews (SHCS)
ISO 4762 - M6 x 45 - 10.9 (self procurement)
(friction coefficient $\mu_{total} = 0.12$ to 0.17);
tightening torque $M_T = 15.5$ Nm *[11.5 ft-lbs]* ± 10%

4 socket head cap screws (SHCS) UNC
1/4-20 UNC x 1 3/4" ASTM-574 (self procurement)
(friction coefficient $\mu_{total} = 0.19$ to 0.24 as per ASTM-574);
tightening torque $M_T = 20$ Nm *[14.8 ft-lbs]* ± 10%,
(friction coefficient $\mu_{total} = 0.12$ to 0.17 as per ISO 4762);
tightening torque $M_T = 14$ Nm *[10.4 ft-lbs]* ± 10%,
material number **R978800711**

4/2 directional poppet valve

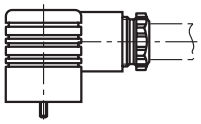
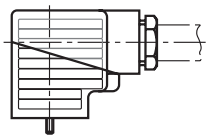
– 420 bar version:
4 socket head cap screws (SHCS) metric
ISO 4762 - M5 x 90 - 10.9-flZn-240h-L
(friction coefficient $\mu_{total} = 0.09$ to 0.14);
tightening torque $M_T = 7$ Nm *[5.2 ft-lbs]* ± 10%,
material number **R913000222**
or
4 socket head cap srews (SHCS)
ISO 4762 - M5 x 90 - 10.9 (self procurement)
(friction coefficient $\mu_{total} = 0.12$ to 0.17);
tightening torque $M_T = 8.1$ Nm *[6 ft-lbs]* ± 10%

4 socket head cap screws (SHCS) UNC
10-24 UNC x 3 1/2" (self procurement)
(friction coefficient $\mu_{total} = 0.19$ to 0.24 as per ASTM-574);
tightening torque $M_T = 11$ Nm *[8.1 ft-lbs]* ± 10%,
(friction coefficient $\mu_{total} = 0.12$ to 0.17 as per ISO 4762);
tightening torque $M_T = 8$ Nm *[5.9 ft-lbs]* ± 10%,
material number **R978800696**

– 630 bar version:
4 socket head cap screws (SHCS) metric
ISO 4762 - M6 x 90 - 10.9-flZn-240h-L
(friction coefficient $\mu_{total} = 0.09$ to 0.14);
tightening torque $M_T = 12.5$ Nm *[9.2 ft-lbs]* ± 10%,
material number **R913000259**
or
4 socket head cap srews (SHCS)
ISO 4762 - M6 x 90 - 10.9 (self procurement)
(friction coefficient $\mu_{total} = 0.12$ to 0.17);
tightening torque $M_T = 15.5$ Nm *[11.4 ft-lbs]* ± 10%

4 socket head cap screws (SHCS) UNC
1/4-20 UNC x 3 1/2" (self procurement)
(friction coefficient $\mu_{total} = 0.19$ to 0.24 as per ASTM-574);
tightening torque $M_T = 20$ Nm *[14.8 ft-lbs]* ± 10%,
(friction coefficient $\mu_{total} = 0.12$ to 0.17 as per ISO 4762);
tightening torque $M_T = 14$ Nm *[10.4 ft-lbs]* ± 10%,
material number **R978800717**

Mating connector (DIN EN 175301-803)

For details and additional mating connectors, see RE 08006						
			Material Numbers			
Cable gland	**Valve side**	**Color**	Without circuitry	With LED lamp 12 … 240 V	With rectifier 12 … 240 V	With LED lamp and Zener diode suppressor circuit 24 V
M16 x 1,5	a	grey	**R901017010**	–	–	–
	a/b	black	**R901017011**	**R901017022**	**R901017025**	**R901017026**
1/2“ NPT (Pg16)	a	red/brown	**R900004823**	–	–	–
	a/b	black	**R900011039**	**R900057453**	**R900842566**	–

Throttle orifice insert

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

Example:

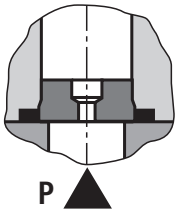
– Accumulator operation,
– Use as pilot control valve with internal pilot oil tapping.

2/2 and 3/2 directional poppet valve

The throttle insert is to be installed in port P of the poppet valve.

4/2 directional poppet valve (see page 5)

The throttle insert is to be installed in port P of the Plus-1 plate.



Check valve insert

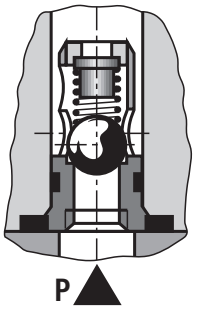
The check valve insert allows a free fluid flow from P to A and leak-free blockage of flow from A to P.

2/2 and 3/2 directional poppet valve (see page 4)

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

4/2 directional poppet valve (see page 5)

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



General notes

Poppet valves must be used in accordance with the spool symbols and the specified operating pressures and flows (see performance limit on page 7).

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

– In order to operate the valve safely and maintain the switched position, the pressure in p_P must be ≥ p_A ≥ p_T (for design reasons).
– Poppet valves feature a negative overlap, i.e. during the switching process, P-A-B leakage occurs. But this process is completed within such a short time that it is irrelevant in almost any application.
– The specified maximum flow must not be exceeded (if required, use a throttle insert to limit the flow)!

Plus-1 plate:

– When using the Plus-1 plate (4/2 directional function), the following lower operating values must be taken into account: $p_{min} = 8$ bar; $q_V > 3$ l/min.
– Ports P, A, B and T are strictly designated and assigned. They must not be interchanged nor plugged!
– Port T must always be connected in the case of a 3- and 4-way operation.
– Take note of the pressure level and pressure distribution!
– Flow is only permitted in the direction of the arrow!

Notes

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