

2/2, 3/2 and 4/2 directional seat valve with solenoid actuation

RE 22058/07.09
Replaces: 07.06

1/14

Type M-.SEW

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



H7383

Table of contents

Contents	Page
Features	1
Ordering code	2, 3
Function, section, symbols	4, 5
Technical data	6
Characteristic curves	7, 8
Performance limit	9
Unit dimensions	10 to 12
Valve mounting screws	12
Mating connectors	13
Throttle insert	13
Check valve insert	13
General notes	13

Features

- Direct operated directional seat valve with solenoid actuation
- Porting pattern according to DIN 24340 form A
- Porting pattern according to ISO 4401-03-02-0-05 and NFPA T3.5.1 R2-2002 D03 (**with** locating hole)
- Safe switching also with longer standstill periods under pressure
- Air-gap DC solenoids with detachable coil (AC voltage possible by means of a rectifier)
- Solenoid coil can be rotated by 90°
- The coil can be changed without having to open the pressure-tight chamber
- Electrical connection as individual connection (for more electrical connections, see RE 08010)
- with concealed manual override, optional
- Inductive position switch (contactless), see RE 24830

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

Ordering code

		M	SEW	6	3X/	M	
2 main ports		= 2					
3 main ports		= 3					
4 main ports		= 4					
Seat valve, direct operated							
Size 6				= 6			
Main ports		2	3	4			
Symbols		●	–	–	= P		
		●	–	–	= N		
		–	●	–	= U		
		–	●	–	= C		
		–	–	●	= D		
		–	–	●	= Y		
		● = Available					
Component series 30 to 39 (30 to 39: unchanged installation and connection dimensions)					= 3X		
Operating pressure 420 bar [6100 psi]					= 420		
Operating pressure 630 bar [9150 psi]					= 630		
Solenoid, air-gap, with detachable coil					= M		
DC voltage 24 V					= G24		
DC voltage 205 V					= G205 ¹⁾		
DC voltage 96 V					= G96		
For further ordering codes for other voltages, see page 6							

AC voltage mains (permissible voltage tolerance ±10%)	Nominal voltage of the DC solenoid in case of operation with alternating 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

	K4	/			*
					Further details in the plain text
				No code =	without locating hole
				/62 =	with locating hole and locating pin ISO 8752-3x8-St
				No code =	NBR seals
				V =	FKM seals
					(other seals upon 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 Ø 1.2 mm [0.047 inch]
				B15 =	Throttle Ø 1.5 mm [0.059 inch]
				B18 =	Throttle Ø 1.8 mm [0.071 inch]
				B20 =	Throttle Ø 2.0 mm [0.079 inch]
				B22 =	Throttle Ø 2.2 mm [0.087 inch]
					Other orifices upon request
				No code =	Spool position monitoring
				QMAG24²⁾ =	without position switch
				QMBG24²⁾ =	Monitored spool position "a"
					Monitored spool position "b"
					For further details see RE 24830
				K4³⁾ =	Electrical connection
					without mating connector, individual connection with connector according to DIN EN 175301-803
				N9 =	with concealed manual override
				No code =	without manual override

 Note!

For more types of actuation (e.g. pneumatic, hydraulic, rotary knob, rotary knob with lock, plunger, hand lever, roller actuation), see RE 22340 or upon request!

¹⁾ For connection to the AC voltage mains, a DC solenoid **must** be used, which is controlled via a rectifier (see table page 3).

A mating connector with integrated rectifier can be used (separate order, see page 13).

²⁾ Only version "420"

³⁾ Mating connectors, separate order, see page 13.

**Standard types and units are contained in the
EPS (standard price list).**

Function, section, symbols: 2/2 and 3/2 directional seat valve

General

The directional valve type M-.SEW is a directional seat valve with solenoid actuation. It controls start, stop and flow direction. The directional valve basically comprises of the housing (1), the solenoid (2), the hardened valve system (3) as well as the ball / the spool (4) as closing element.

Basic principle

In the initial position, the ball / the spool (4) is pressed onto the seat by the spring (9), in spool position by the solenoid (2). The force of solenoid (2) acts via the angled lever (6) and the ball (7) on the actuating plunger (8) that is sealed on two sides. The chamber between the two sealing elements is connected to port P. Thus, the valve system (3) is pressure-compensated in relation to the actuating forces (solenoid or return spring). Thus, the valves can be used up to 630 bar.

Notes!

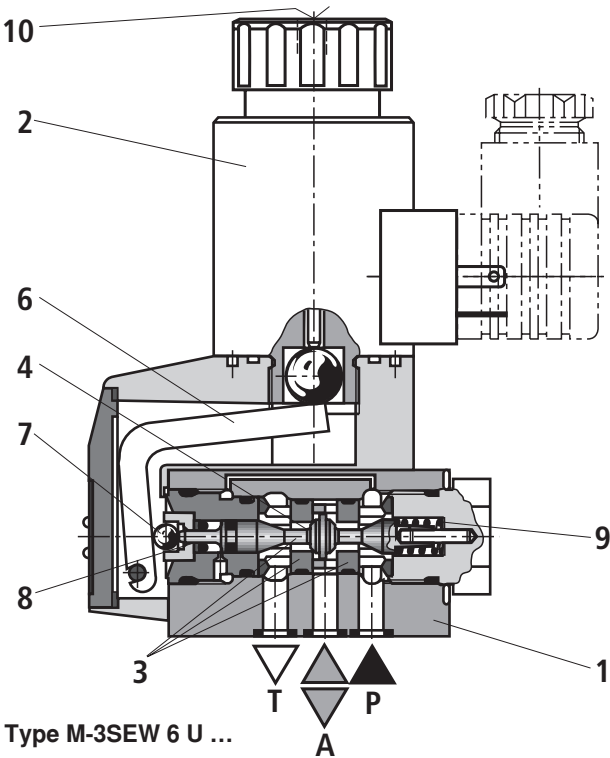
- The 3/2 directional seat valves have a “negative spool underlap”. Therefore, port T must always be connected. That means that during the switching process – from the starting of the opening of one valve seat to the closing of the other valve seat – ports P–A–T are connected with each other. This process takes, however, place within such a short time that it is irrelevant in nearly all applications.
- The manual override (10) allows for the switching of the valve without solenoid energization.

Attention!

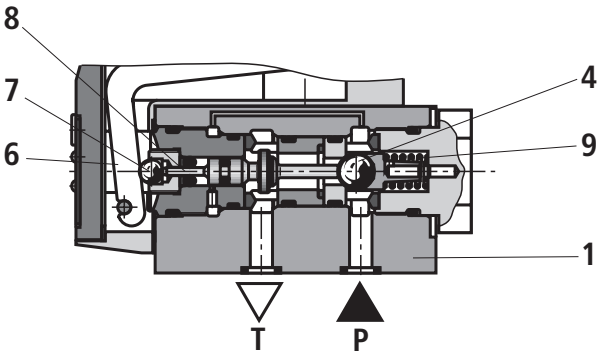
It has to be made sure that the specified maximum flow is not exceeded! A throttle insert must be used for limiting the flow, if necessary (see page 13).

The seat arrangement offers the following options:

2/2 directional seat valve	
Symbol “P”	
Initial position	P and T connected
Spool position	P blocked
Symbol “N”	
Initial position	P blocked
Spool position	P and T connected
3/2 directional seat valve	
Symbol “U”	
Initial position	P and A connected, T blocked
Spool position	P blocked, A and T connected
Symbol “C”	
Initial position	P blocked, A and T connected
Spool position	P and A connected, T blocked



Type M-3SEW 6 U ...



Type M-2SEW 6 N ...

Function, section, symbols, schematic illustration: 4/2 directional seat valve

With a sandwich plate, the **Plus-1 plate**, under the 3/2 directional seat valve, the function of a 4/2 directional seat valve is achieved.

Function of the Plus-1 plate

– Initial position:

The main valve is not operated. The spring (9) holds the ball (4.1) on the seat (11). Port P is blocked and A connected to T. Apart from that, one pilot line is connected from A to the large area of the control spool (12), which is thus unloaded to the tank. The pressure applied via P now pushes the ball (13) onto the seat (14). Now, P is connected to B, and A to T.

– Transition position:

When the main valve is operated, the spool (4.2) is shifted against the spring (9) and pressed onto the seat (15). During this, port T is closed, P, A, and B are briefly connected to each other.

– Spool position:

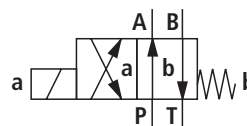
P is connected to A. As the pump pressure acts via A on the large area of the control spool (12), the ball (13) is pressed onto the seat (16). Thus, B is connected to T, and P to A. The ball (13) in the Plus-1 plate has a “positive spool underlap”.

Attention!

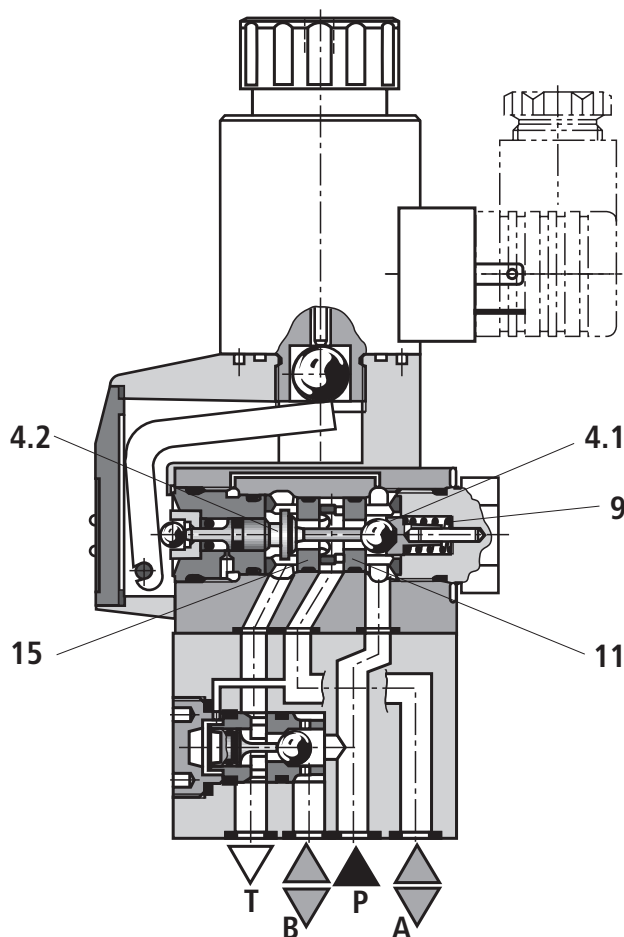
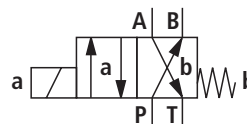
To prevent pressure intensification in conjunction with single-rod cylinders, the annulus area of the cylinder must be connected to A.

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

Symbol “D”:

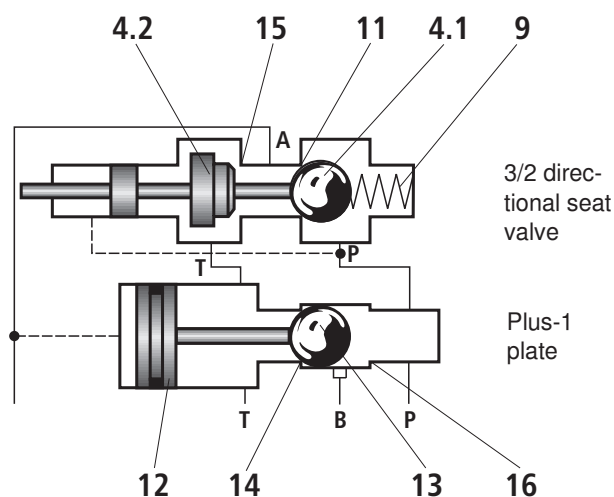


Symbol “Y”:



Type M-4SEW 6 Y ...

Schematic illustration: Initial position



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

Weight	– 2/2 directional seat valve	kg [lbs]	1.5 [3.3]
	– 3/2 directional seat valve	kg [lbs]	1.5 [3.3]
	– 4/2 directional seat valve	kg [lbs]	2.3 [5.1]
Installation position			Any
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 page 9
Maximum flow	l/min [gpm]	25 [6.6]
Hydraulic fluid	Mineral oil (HL, HLP) according to DIN 51524 ¹⁾ ; fast biodegradable hydraulic fluids according 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]
Maximum permitted degree of contamination of the hydraulic fluid - cleanliness class according to ISO 4406 (c)		Class 20/18/15 ³⁾

electrical

Type of voltage		Direct voltage	Alternate voltage
Available voltages ⁴⁾	V	12, 24 , 42, 96, 110, 205, 220	Only possible with rectifier (see page 13)
Voltage tolerance (nominal voltage)	%	±10	
Power consumption	W	30	
Duty cycle	%	100	
Switching time according to 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	– Operating pressure ≤ 350 bar	1/h	15000
	– Operating pressure > 350 bar	1/h	3600
Protection class according to DIN EN 60529		IP 65 (with mating connector mounted and locked)	
Maximum surface temperature of the coil ⁵⁾		°C [°F]	120 [248]

¹⁾ Suitable for NBR and FKM seals²⁾ Only suitable for FKM seals³⁾ 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.

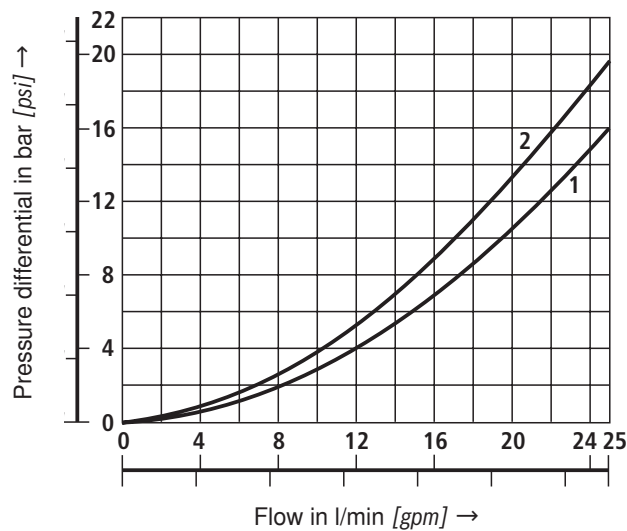
For selecting the filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086, RE 50087 and RE 50088.

⁴⁾ Special voltages upon request⁵⁾ Due to the temperatures occurring at the surfaces of the solenoid coils, the standards ISO 13732-1 and EN 982 need to be adhered to!

When establishing the electrical connection, the protective earthing conductor (PE $\perp$) has to be connected properly.

Characteristic curves (measured with HLP46, $\vartheta_{\text{Oil}} = 40 \pm 5 \text{ }^{\circ}\text{C}$ [$104 \pm 9 \text{ }^{\circ}\text{F}$])

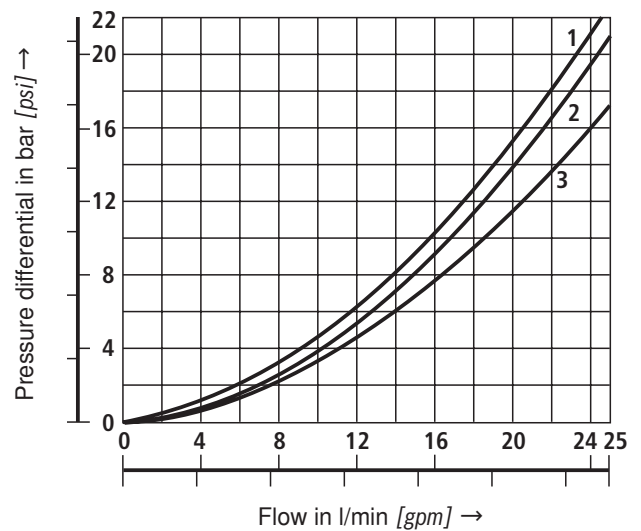
Δp - q_v characteristic curves
2/2 directional seat valve



1 M-2SEW 6 **N** ..., P to T

2 M-3SEW 6 **P** ..., P to T

Δp - q_v characteristic curves
3/2 directional seat valve

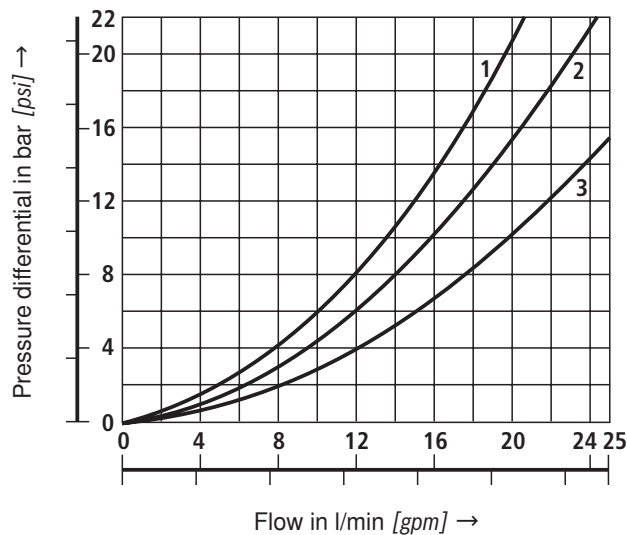


1 M-3SEW 6 **U**
C ..., A to T

2 M-3SEW 6 **U** ..., P to A

3 M-3SEW 6 **C** ..., P to A

Δp - q_v characteristic curves
4/2 directional seat valve



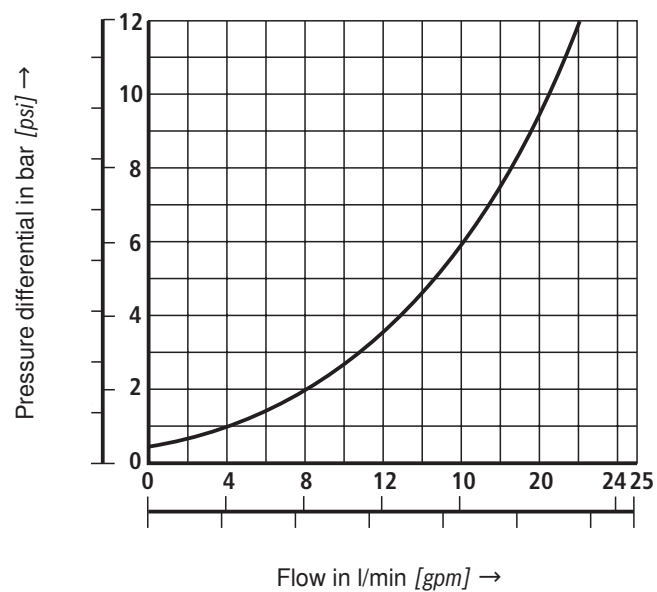
1 M-4SEW 6 **D**
Y ..., A to T

2 M-4SEW 6 **D**
Y ..., P to A

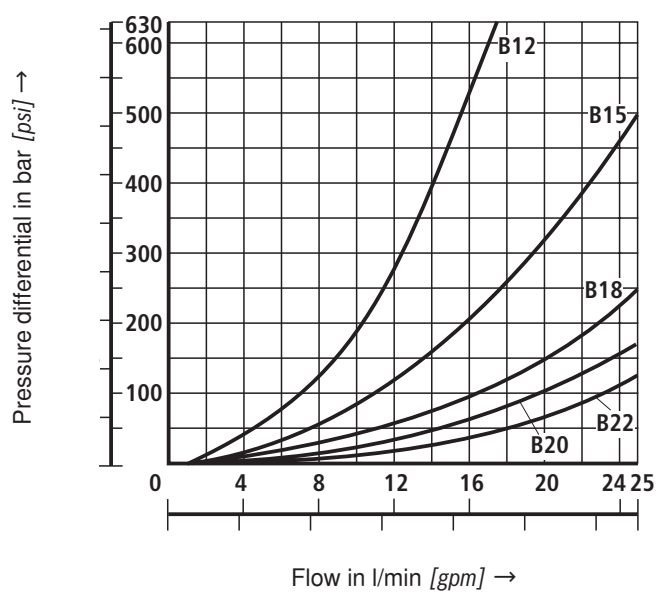
3 M-4SEW 6 **D**
Y ..., P to B and B to T

Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^{\circ}\text{C}$ [$104 \pm 9 \text{ }^{\circ}\text{F}$])

Δp - q_v characteristic curves
Check valve insert



Δp - q_v characteristic curves
Throttle insert



Performance limit (measured with HLP46, $\vartheta_{\text{Oil}} = 40 \pm 5 \text{ }^{\circ}\text{C}$ [$104 \pm 9 \text{ }^{\circ}\text{F}$])

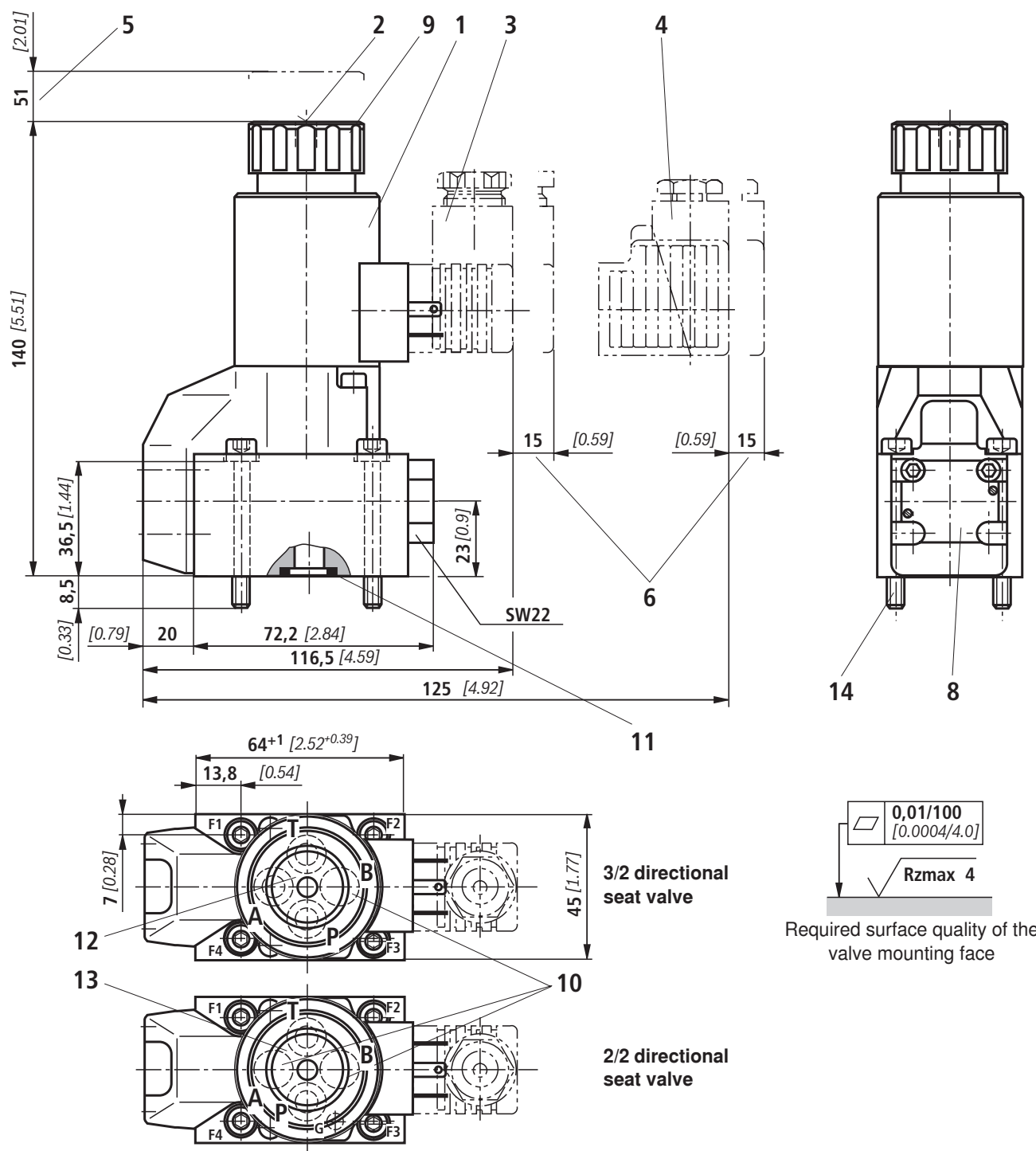
	Symbol	Comment	Maximum operating pressure in bar [psi]				Flow in l/min [gpm]
			P	A	B	T	
2-way circuit (2/2 directional seat valve)	P 	$p_P \geq p_T$	420/630 [6100/ 9150]			100 [1450]	25 [6.6]
	N 		420/630 [6100/ 9150]			100 [1450]	25 [6.6]
2-way circuit (3/2 directional seat valve) Only as unloading function	U 	Before switching from the initial position to the spool position, pressure must be applied to 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 only possible in the direction of arrow!)	D 	3/2 directional valve (symbol "U") in connection 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 connection 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!

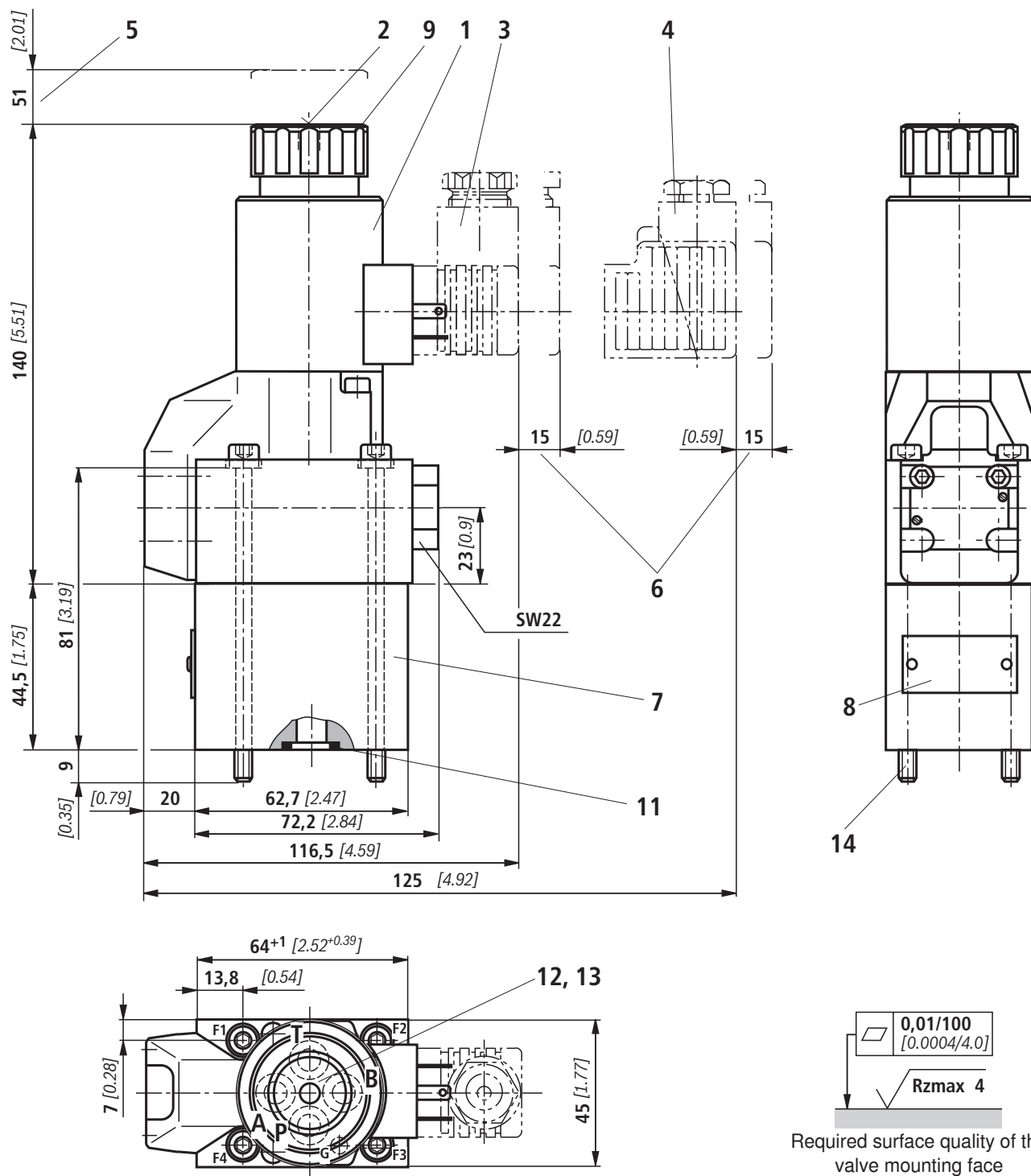
Please observe the general notes on page 13!

The performance limits were determined when the solenoids were at operating temperature, at 10% undervoltage and without tank pre-loading.

Unit dimensions: 2/2 directional seat valve and 3/2 directional seat valve
(dimensions in mm [inch])



Position explanations and valve mounting screws
see page 12.

Unit dimensions: 4/2 directional seat valve (dimensions in mm [inch])


Position explanations and valve mounting screws
see page 12.

Unit dimensions

- 1 Solenoid "a"
- 2 Concealed manual override "N9"
- 3 Mating connector **without** circuitry (separate order, see page 14)
- 4 Mating connector **with** circuitry (separate order, see page 14)
- 5 Space required for removing the coil
- 6 Space required for removing the mating connector
- 7 Plus-1 plate
- 8 Nameplate
- 9 Lock nut, tightening torque $M_A = 4 \text{ Nm}$ [2.95 ft-lbs]
- 10 **Attention!**
 - With 3/2 directional seat valves version "420", port B is designed as blind counterbore, in version "630", it is not available.
 - With 2/2 directional seat valves version "420", ports A and B are available as blind counterbore.
- 11 Identical seal rings for ports A, B, and T; Seal ring for port P
- 12 Porting pattern according to DIN 24340 form A
- 13 Porting pattern according to ISO 4401-03-02-0-05 and NFPA T3.5.1 R2-2002 D03 (**with** locating hole for locating pin ISO 8752-3x8-St, Material no. **R900005694**, included in the delivery)
- 14 Valve mounting screws see below

Valve mounting screws (included in the delivery)

2/2 and 3/2 directional seat valve

- Version "420":

4 hexagon socket head cap screws metric

ISO 4762 - M5 x 45 - 10.9-flZn-240h-L

(friction coefficient $\mu_{\text{total}} = 0.09$ to 0.14);

Tightening torque $M_A = 7 \text{ Nm}$ [5.2 ft-lbs] $\pm 10 \%$,

Material no. **R913000140**

or

4 hexagon socket head cap screws

ISO 4762 - M5 x 45 - 10.9 (self procurement)

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

Tightening torque $M_A = 8.1 \text{ Nm}$ [6 ft-lbs] $\pm 10 \%$

4 hexagon socket head cap screws UNC

10-24 UNC x 1 3/4" ASTM-574 (self procurement)

(friction coefficient $\mu_{\text{total}} = 0.19$ to 0.24 according to ASTM-574);

Tightening torque $M_A = 11 \text{ Nm}$ [8.1 ft-lbs] $\pm 15 \%$,

(friction coefficient $\mu_{\text{total}} = 0.12$ to 0.17 according to ISO 4762);

Tightening torque $M_A = 8 \text{ Nm}$ [5.9 ft-lbs] $\pm 10 \%$,

Material no. **R978802649**

- Version "630":

4 hexagon socket head cap screws metric

ISO 4762 - M6 x 45 - 10.9-flZn-240h-L

(friction coefficient $\mu_{\text{total}} = 0.09$ to 0.14);

Tightening torque $M_A = 12.5 \text{ Nm}$ [9.2 ft-lbs] $\pm 10 \%$,

Material no. metric **R913000258**

or

4 hexagon socket head cap screws

ISO 4762 - M6 x 45 - 10.9 (self procurement)

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

Tightening torque $M_A = 15.5 \text{ Nm}$ [11.5 ft-lbs] $\pm 10 \%$

4 hexagon socket head cap screws UNC

1/4-20 UNC x 1 3/4" ASTM-574 (self procurement)

(friction coefficient $\mu_{\text{total}} = 0.19$ to 0.24 according to ASTM-574);

Tightening torque $M_A = 20 \text{ Nm}$ [14.8 ft-lbs] $\pm 15 \%$,

(friction coefficient $\mu_{\text{total}} = 0.12$ to 0.17 according to ISO 4762);

Tightening torque $M_A = 14 \text{ Nm}$ [10.4 ft-lbs] $\pm 10 \%$,

Material no. **R978800711**

4/2 directional seat valve

- Version "420":

4 hexagon socket head cap screws metric

ISO 4762 - M5 x 90 - 10.9-flZn-240h-L

(friction coefficient $\mu_{\text{total}} = 0.09$ to 0.14);

Tightening torque $M_A = 7 \text{ Nm}$ [5.2 ft-lbs] $\pm 10 \%$,

Material no. **R913000222**

or

4 hexagon socket head cap screws

ISO 4762 - M5 x 90 - 10.9 (self procurement)

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

Tightening torque $M_A = 8.1 \text{ Nm}$ [6 ft-lbs] $\pm 10 \%$

4 hexagon socket head cap screws UNC

10-24 UNC x 3 1/2" (self procurement)

(friction coefficient $\mu_{\text{total}} = 0.19$ to 0.24 according to ASTM-574);

Tightening torque $M_A = 11 \text{ Nm}$ [8.1 ft-lbs] $\pm 15 \%$,

(friction coefficient $\mu_{\text{total}} = 0.12$ to 0.17 according to ISO 4762);

Tightening torque $M_A = 8 \text{ Nm}$ [5.9 ft-lbs] $\pm 10 \%$,

Material no. **R978800696**

- Version "630":

4 hexagon socket head cap screws metric

ISO 4762 - M6 x 90 - 10.9-flZn-240h-L

(friction coefficient $\mu_{\text{total}} = 0.09$ to 0.14);

Tightening torque $M_A = 12.5 \text{ Nm}$ [9.2 ft-lbs] $\pm 10 \%$,

Material no. **R913000259**

or

4 hexagon socket head cap screws

ISO 4762 - M6 x 90 - 10.9 (self procurement)

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

Tightening torque $M_A = 15.5 \text{ Nm}$ [11.4 ft-lbs] $\pm 10 \%$

4 hexagon socket head cap screws UNC

1/4-20 UNC x 3 1/2" (self procurement)

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

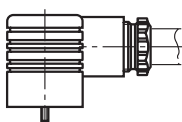
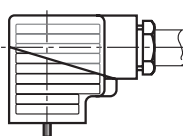
Tightening torque $M_A = 20 \text{ Nm}$ [14.8 ft-lbs] $\pm 15 \%$,

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

Tightening torque $M_A = 14 \text{ Nm}$ [10.4 ft-lbs] $\pm 10 \%$,

Material no. **R978800717**

Mating connectors according to DIN EN 175301-803

Details and further mating connectors are contained in RE 08006						
Connection	Valve side	Color	Material no.			
			without circuitry	with indicator light 12 ... 240 V	with rectifier 12 ... 240 V	with indicator light and Zener diode sup- pression circuit 24 V
M16 x 1.5	a	Gray	R901017010	–	–	–
	a/b	Black	R901017011	R901017022	R901017025	R901017026
1/2" NPT (Pg16)	a	Red/brown	R900004823	–	–	–
	a/b	Black	R900011039	R900057453	R900842566	–

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.

Examples:

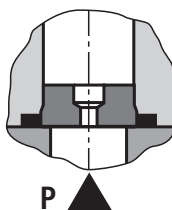
- Accumulator operation,
- Use as pilot control valve with internal pilot fluid tapping.

2/2 and 3/2 directional seat valve

The throttle insert is inserted in port P of the seat valve.

4/2 directional seat valve (see page 5)

The throttle insert is inserted in port P of the Plus-1 plate.



Check valve insert

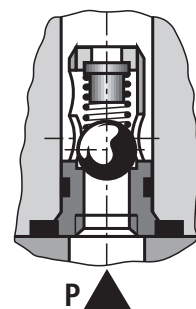
The check valve insert allows a free flow from P to A and closes A to P in a leak-free form.

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

The check valve insert is inserted in port P of the seat valve.

4/2 directional seat valve (see page 5)

The check valve insert is inserted in port P of the Plus-1 plate.



General notes

Seat valves can be used according to the spool symbols as well as the assigned operating pressures and flows (see performance limits page 7).

In order to ensure safe functioning, it is absolutely necessary to observe the following points:

- In order to switch the valve safely or maintain it in its spool position, the pressure situation must be as follows: $p_p \geq p_A \geq p_T$ (for design reasons).
- Seat valves have a negative spool underlap, i.e. during the switching process, leakage oil accrues. This process takes, however, place within such a short time that it is irrelevant in nearly all applications.
- The specified maximum flow must not be exceeded (use a throttle insert for limiting the flow, if necessary)!

Plus-1 plate:

- When the Plus-1 plate (4/2-directional function) is used, the following lower operating values must be taken into account: $p_{min} = 8 \text{ bar}$; $q_v > 3 \text{ l/min}$.
- The ports P, A, B and T are clearly determined according to the tasks. They must not be optionally exchanged or closed!
- With 3- and 4-way spool positions, port T must always be connected.
- Pressure level and pressure distribution must be observed!
- The flow is only permitted in the direction of arrow!

Notes

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

© This document, as well as the data, specifications and other information set forth in it, are the exclusive property of Bosch Rexroth AG. It may not be reproduced or given to third parties without its consent. The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.

Notes
