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

Type M-.SEW

Size 10
Component series 1X
Maximum operating pressure 420/630 bar [6100/9150 psi]
Maximum flow 40 l/min [10.6 US gpm]

### Features

- Direct operated directional seat valve with solenoid actuation
- Porting pattern according to ISO 4401-05-04-0-05 and NFPA T3.5.1 R2-2002 D05
- Blocked connection tight
- Safe switching also with longer standstill periods under pressure
- Air-gap DC voltage solenoids with detachable coil (AC voltage possible by means of a rectifier)
- Solenoid coil can be rotated by 90°
- Electrical connection as individual connection (for more electrical connections see RE 08010)
- with concealed manual override, optional
- Inductive position switch (contactless), optional, see RE 24830.

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

<table>
<thead>
<tr>
<th>M-SEW 10</th>
<th>1X</th>
<th>M</th>
<th>K4</th>
<th>*</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 main ports</td>
<td>= 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 main ports</td>
<td>= 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seat valve Size 10</td>
<td>= 10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main ports</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Symbols

- **A**: Valve main port
- **P**: Pressure line
- **T**: Return line
- **b**: Port b
- **l**: Available

#### Component series 10 to 19

- **1X**: (10 to 19: unchanged installation and connection dimensions)

#### Operating pressure

- **420 bar [6100 psi]**
- **630 bar [9150 psi]**

#### Solenoid (air-gap) with detachable coil

- **G24**: DC voltage 24 V
- **G205**: DC voltage 205 V

#### Ordering code

- **K4**: electrical connection

<table>
<thead>
<tr>
<th>AC voltage mains (permissible voltage tolerance ±10 %)</th>
<th>Nominal voltage of the DC voltage solenoid in case of operation with AC voltage</th>
<th>Ordering code</th>
</tr>
</thead>
<tbody>
<tr>
<td>110 V - 50/60 Hz</td>
<td>96 V</td>
<td>G96</td>
</tr>
<tr>
<td>120 V - 60 Hz</td>
<td>110 V</td>
<td>G110</td>
</tr>
<tr>
<td>230 V - 50/60 Hz</td>
<td>205 V</td>
<td>G205</td>
</tr>
</tbody>
</table>

1) Mating connectors, separate order, see page 12.

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

In case of individual connections, a mating connector with integrated rectifier can be used (separate order, see page 12).

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**Standard types and units are contained in the EPS (standard price list).**
Function, section, symbols: 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 direction of the flow. It basically comprises a housing (1), the solenoid (2), the hardened valve system (3) and the spool (8) as closing element.

Basic principle
In the initial position, the spool (8) is pressed onto the seat by the spring (9), in spool position by the solenoid (2). The force of the solenoid (2) acts via the angled lever (6) and the ball (7) on the spool (8) which is sealed on two sides. The space 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). The valves can therefore be used up to 630 bar [9150 psi].

Note!
- 3/2-directional seat valves feature a “negative spool underlap”. For this reason, port T must always be connected. This means that during the switching process - when one valve seat starts to open until the other valve seat is closed - ports P-A-T are connected to 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!
Care must moreover be taken that the specified maximum flow is not exceeded! If required, a throttle insert must be used to limit the flow (see page 12).
Function, section, symbols: 4/2 directional seat valve

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

Function of the Plus-1 plate:

Initial position
The main valve is not operated. The spring (9) holds the ball (4) on the seat (11). Port P is blocked and A connected to T. Moreover, 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). P is now connected to B, and A to T.

Transition position
When the main valve is operated, the spool (8) 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 0
P is connected to A. Because 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”:

Schematic illustration: Initial position

The 3/2-directional seat valve

Type M-4SEW 10 Y...
**Technical data** (For applications outside these parameters, please consult us!)

### General

<table>
<thead>
<tr>
<th></th>
<th>3/2-directional seat valve kg [lbs]</th>
<th>4/2 directional seat valve kg [lbs]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>2.0 [4.41]</td>
<td>3.5 [7.72]</td>
</tr>
<tr>
<td>Installation position</td>
<td>Any</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>°C [°F]</td>
<td></td>
</tr>
<tr>
<td>range</td>
<td>~30 to +50 [-22 to +122] (NBR seals)</td>
<td>~20 to +50 [-4 to +122] (FKM seals)</td>
</tr>
</tbody>
</table>

### Hydraulic

<table>
<thead>
<tr>
<th>Maximum operating pressure</th>
<th>bar [psi]</th>
<th>See performance limit page 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic fluid</td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>Hydraulic fluid temperature range</td>
<td>°C [°F]</td>
<td>~30 to +80 [-22 to +176] (NBR seals)</td>
</tr>
<tr>
<td>Viscosity range</td>
<td>mm²/s [SUS]</td>
<td>2.8 to 500 [15 to 2300]</td>
</tr>
<tr>
<td>Maximum permitted degree of contamination of the hydraulic fluid - cleanliness class according to ISO 4406 (c)</td>
<td>Class 20/18/15 3)</td>
<td></td>
</tr>
</tbody>
</table>

### Electrical

<table>
<thead>
<tr>
<th>Type of voltage</th>
<th>Available voltages 4) V</th>
<th>Direct voltage 12, 24, 42, 96, 110, 205, 220</th>
<th>Alternate voltage Only possible via rectifier (see page 12)</th>
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<tr>
<td>Voltage tolerance (nominal voltage)</td>
<td>%</td>
<td>±10</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>W</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Duty cycle</td>
<td>%</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Switching time according to ISO 6403</td>
<td>ms</td>
<td>25 to 60 (without rectifier)</td>
<td>30 to 70 (with rectifier)</td>
</tr>
<tr>
<td>Maximum switching frequency</td>
<td>Operating pressure ≤ 350 bar 1/h</td>
<td>15000</td>
<td>Operating pressure &gt; 350 bar 1/h</td>
</tr>
<tr>
<td>Protection class according to DIN EN 60529</td>
<td>IP 65 (with mating connector mounted and locked)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum surface temperature of the spool 5)</td>
<td>°C [°F]</td>
<td>120 [248]</td>
<td></td>
</tr>
</tbody>
</table>

1) Suitable for NBR and FKM seals
2) Only suitable for FKM seals
3) 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.
4) Special voltages upon request
5) 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!

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When establishing the electrical connection, the protective earthing conductor (PE ½) must be properly connected.
Characteristic curves (measured with HLP46, $\theta_{\text{Oil}} = 40 \pm 5 \, ^\circ\text{C} [104 \pm 9 \, ^\circ\text{F}]$)

\[ \Delta p - q_v \text{ characteristic curves} \]

3/2-directional seat valve

\[ \Delta p - q_v \text{ characteristic curves} \]

4/2-directional seat valve

Check valve insert

Throttle insert

1. M-3SEW 10 C ..., P to A
2. M-3SEW 10 C ..., A to T
3. M-3SEW 10 U ..., P to A
4. M-3SEW 10 U ..., A to T

1. M-4SEW 10 D ..., A to T
2. M-4SEW 10 D ..., P to A
3. M-4SEW 10 D ..., P to B
4. M-4SEW 10 D ..., B to T
**Performance limit** (measured with HLP46, $\vartheta_{\text{Oil}} = 40 \pm 5 \, ^\circ\text{C} [104 \pm 9 \, ^\circ\text{F}]$)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Comment</th>
<th>Maximum operating pressure in bar [psi]</th>
<th>Flow in l/min [US gpm]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>P</td>
<td>A</td>
</tr>
<tr>
<td><strong>2-way circuit</strong> Only as unloading function</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>Before switching from the initial position to the spool position, pressure must be applied in port A. $p_A \geq p_T$</td>
<td>420/630 [6100/9150]</td>
<td>100 [1450]</td>
</tr>
<tr>
<td>C</td>
<td>$p_A \geq p_T$</td>
<td>420/630 [6100/9150]</td>
<td>100 [1450]</td>
</tr>
<tr>
<td><strong>3-way circuit</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>$p_P \geq p_A \geq p_T$</td>
<td>420/630 [6100/9150]</td>
<td>100 [1450]</td>
</tr>
<tr>
<td>C</td>
<td>$p_P \geq p_A \geq p_T$</td>
<td>420/630 [6100/9150]</td>
<td>100 [1450]</td>
</tr>
<tr>
<td><strong>4-way circuit</strong> (flow only possible in the direction of arrow!)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Attention!**
Please observe the general notes on page 12!

The performance limits were determined when the solenoids were at operating temperature, at 10% undervoltage and without tank pre-loading.
Unit dimensions: 3/2-directional seat valve (dimensions in mm)
Unit dimensions: 4/2 directional seat valve, version “420” (dimensions in mm [inch])

Position explanations and valve mounting screws see page 11.
**Unit dimensions:** 4/2 directional seat valve, version “630” (dimensions in mm [inch])

Position explanations and valve mounting screws see page 11.
Unit dimensions

1 Solenoid “a”
2 Concealed manual override “N9”
3 Mating connector without circuitry (separate order, see page 12)
4 Mating connector with circuitry (separate order, see page 12)
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 $M_a = 4 \cdot 1 \text{ Nm} \left\{ 2.95 - 0.74 \text{ ft-lbs} \right\}$

Attention!
- Ports B and TB are provided on 3/2-directional seat valves in version “420” as blind counterbore, and not provided for version “630”.
- Port TB is provided as blind counterbore on 4/2 directional seat valves in version “420”.
- Ports B and TB are not provided on 4/2 directional seat valves in version “630”.

Valve mounting screws

3/2-directional seat valve (separate order)
- 420 bar [6100 psi] version:
  4 hexagon socket head cap screws metric
  ISO 4762 - M6 x 40 - 10.9-flZn-240h-L
  (friction coefficient $\mu_{\text{total}} = 0.09$ to 0.14);
  Tightening torque $M_a = 12.5 \text{ Nm} \left\{ 9.2 \text{ ft-lbs} \right\} \pm 10 \%$,
  Material no. R9130001058
  or
  4 hexagon socket head cap screws
  ISO 4762 - M6 x 40 - 10.9 (self procurement)
  (friction coefficient $\mu_{\text{total}} = 0.12$ to 0.17);
  Tightening torque $M_a = 15.5 \text{ Nm} \left\{ 11.4 \text{ ft-lbs} \right\} \pm 10 \%$

4 hexagon socket head cap screws UNC
1/4-20 UNC x 1 1/2” (self procurement)
(friction coefficient $\mu_{\text{total}} = 0.19$ to 0.24 according to ASTM-574);
Tightening torque $M_a = 20 \text{ Nm} \left\{ 14.8 \text{ ft-lbs} \right\} \pm 15 \%$,
Material no. R978600710

- 630 bar [9150 psi] version:
  4 hexagon socket head cap screws metric
  ISO 4762 - M8 x 60 - 10.9-flZn-240h-L
  (friction coefficient $\mu_{\text{total}} = 0.09$ to 0.14);
  Tightening torque $M_a = 30 \text{ Nm} \left\{ 22.1 \text{ ft-lbs} \right\} \pm 10 \%$,
  Material no. metric R913000217
  or
  4 hexagon socket head cap screws
  ISO 4762 - M8 x 60 - 10.9 (self procurement)
  (friction coefficient $\mu_{\text{total}} = 0.09$ to 0.14);
  Tightening torque $M_a = 20 \text{ Nm} \left\{ 14.8 \text{ ft-lbs} \right\} \pm 15 \%$,
  (friction coefficient $\mu_{\text{total}} = 0.12$ to 0.17 according to ISO 4762);
  Tightening torque $M_a = 14 \text{ Nm} \left\{ 10.3 \text{ ft-lbs} \right\} \pm 15 \%$,
  Material no. R978600717

4/2 directional seat valve (included in scope of delivery)
- 420 bar [6100 psi] version:
  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 $M_a = 12.5 \text{ Nm} \left\{ 9.2 \text{ ft-lbs} \right\} \pm 10 \%$,
  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 $M_a = 15.5 \text{ Nm} \left\{ 11.4 \text{ ft-lbs} \right\} \pm 10 \%$

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 according to ASTM-574);
Tightening torque $M_a = 20 \text{ Nm} \left\{ 14.8 \text{ ft-lbs} \right\} \pm 15 \%$,
(friction coefficient $\mu_{\text{total}} = 0.12$ to 0.17 according to ISO 4762);
Tightening torque $M_a = 14 \text{ Nm} \left\{ 10.3 \text{ ft-lbs} \right\} \pm 15 \%$,
Material no. R978600717

- 630 bar [9150 psi] version:
  4 hexagon socket head cap screws metric
  ISO 4762 - M8 x 110 - 10.9-flZn-240h-L
  (friction coefficient $\mu_{\text{total}} = 0.09$ to 0.14);
  Tightening torque $M_a = 30 \text{ Nm} \left\{ 22.1 \text{ ft-lbs} \right\} \pm 10 \%$,
  Material no. R913000260
  or
  4 hexagon socket head cap screws
  ISO 4762 - M8 x 110 - 10.9 (self procurement)
  (friction coefficient $\mu_{\text{total}} = 0.12$ to 0.17);
  Tightening torque $M_a = 37 \text{ Nm} \left\{ 27.3 \text{ ft-lbs} \right\} \pm 10 \%$

4 hexagon socket head cap screws UNC
5/16-18 UNC x 4 1/4” (self procurement)
(friction coefficient $\mu_{\text{total}} = 0.19$ to 0.24);
Tightening torque $M_a = 40 \text{ Nm} \left\{ 29.5 \text{ ft-lbs} \right\} \pm 15 \%$,
(friction coefficient $\mu_{\text{total}} = 0.12$ to 0.17 according to ISO 4762);
Tightening torque $M_a = 28 \text{ Nm} \left\{ 20.7 \text{ ft-lbs} \right\} \pm 15 \%$
Mating connectors according to DIN EN 175301-803

Details and more mating connectors see RE 08006

<table>
<thead>
<tr>
<th>Connection</th>
<th>Valve side</th>
<th>Color</th>
<th>Material no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>M16 x 1.5</td>
<td>a</td>
<td>Gray</td>
<td>R901017010</td>
</tr>
<tr>
<td></td>
<td>a/b</td>
<td>Black</td>
<td>R901017011</td>
</tr>
<tr>
<td></td>
<td>a</td>
<td>Red/brown</td>
<td>R900004823</td>
</tr>
<tr>
<td></td>
<td>a/b</td>
<td>Black</td>
<td>R900011039 R900057453 R900842566</td>
</tr>
</tbody>
</table>

Material no.

- without circuitry
- with indicator light
- with rectifier
- with indicator light and Zener diode suppression circuit
- 12 ... 240 V
- 12 ... 240 V
- 24 V

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.

3/2 directional seat valve (see page 3)
The throttle insert is inserted in port P of the seat valve.

4/2 directional seat valve (see page 4)
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.

3/2-directional seat valve (see page 3)
The check valve insert is inserted in port P of the seat valve.

4/2 directional seat valve (see page 4)
The check valve insert is inserted in port P of the Plus-1 plate.

General Notes

- In order to switch the valve safely or maintain it in its spool position, the pressure situation must be as follows: \( P \geq A \geq T \) (for design reasons).
- Ports P, A and TA (3/2 directional seat valve) as well as P, A, B and TA (4/2 directional seat valve) are clearly assigned according to their function. They must not be exchanged or closed. The flow is only permitted in the direction of arrow.
- When the Plus-1 plate (4/2-directional function) is used, the following lower operating values must be taken into account:
  \( P_{\text{min}} = 8 \text{ bar}; \quad q_{\text{V}} > 3 \text{ l/min.} \)
- The total flow of the valve must not be exceeded.