

# Directional seat valves, direct operated, with solenoid actuation

## Type SEC



- Size 6
- Component series 2X
- Maximum operating pressure 400 bar
- Maximum flow 25 l/min

### Features

- 3/3, 4/2 or 4/3-way version
- Porting pattern according to ISO 4401-03-02-0-05
- Safe switching also with longer standstill periods under pressure
- Wet-pin DC solenoids with detachable coil
- 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
- Central connection possible via double valve mating connector
- Corrosion-protected version (240 h salt spray test according to EN ISO 9227)

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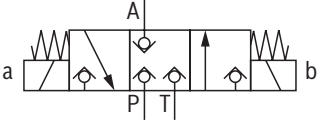
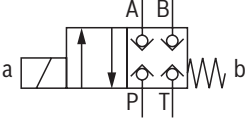
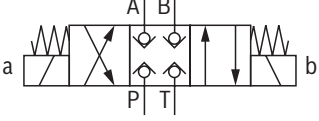
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Ordering code

|    |     |    |    |    |    |    |    |    |    |
|----|-----|----|----|----|----|----|----|----|----|
| 01 | 02  | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 |
|    | SEC | 6  |    | 2X | /  |    | N9 | K4 |    |

|    |              |     |
|----|--------------|-----|
| 01 | 3 main ports | 3   |
|    | 4 main ports | 4   |
| 02 | Seat valve   | SEC |
| 03 | Size 6       | 6   |

Symbols

|    |                                                                                   |              |     |
|----|-----------------------------------------------------------------------------------|--------------|-----|
| 04 |  | 3 main ports | E35 |
|    |  | 4 main ports | EB  |
|    |  |              | E   |

|    |                                                                                          |    |
|----|------------------------------------------------------------------------------------------|----|
| 05 | Component series 20 ... 29 (20 ... 29: unchanged installation and connection dimensions) | 2X |
|----|------------------------------------------------------------------------------------------|----|

Electrical voltages

|    |                                |                   |
|----|--------------------------------|-------------------|
| 06 | Direct voltage 12 V            | G12 <sup>1)</sup> |
|    | Direct voltage 24 V            | G24               |
| 07 | With concealed manual override | N9                |

Electrical connection

|    |                                                      |                  |
|----|------------------------------------------------------|------------------|
| 08 | Individual connection                                |                  |
|    | Connector 3-pole (2 + PE) according to EN 175301-803 | K4 <sup>2)</sup> |
| 09 | Without plug-in check valve                          | no code          |
|    | With check valve insert                              | P <sup>3)</sup>  |

Seal material (observe compatibility of seals with hydraulic fluid used, see page 5)

|    |           |         |
|----|-----------|---------|
| 10 | NBR seals | no code |
|    | FKM seals | V       |

1) Only with version "E".  
2) Mating connectors, separate order, see page 8 and data sheet 08006.  
3) Only with version "E.G24".

 Notice: ♦ = Preferred type

## Function

Directional control valves type SEC are solenoid-actuated directional seat valves. They control the start, stop and direction of a flow.

The directional control valves consist essentially of the housing, the electronic solenoids, as well as the hardened valve system.

It is to be ensured that the maximum flow indicated is not exceeded. If necessary, a screw-in throttle has to be used for flow limitation (see below).

Depending on the production tolerances, a pump or tank pre-opening of the valve occurs. For this reason, for valves of the same type, different pressure gradients can occur during the switching process.

One valve alone may not be used for holding loads or positions.

### Check valve insert

The check valve insert in P allows free flow rate of P→A/B and inhibits flow rate of A/B→P.

The check valve insert in T allows free flow of A/B→T and blocks T→A/B.

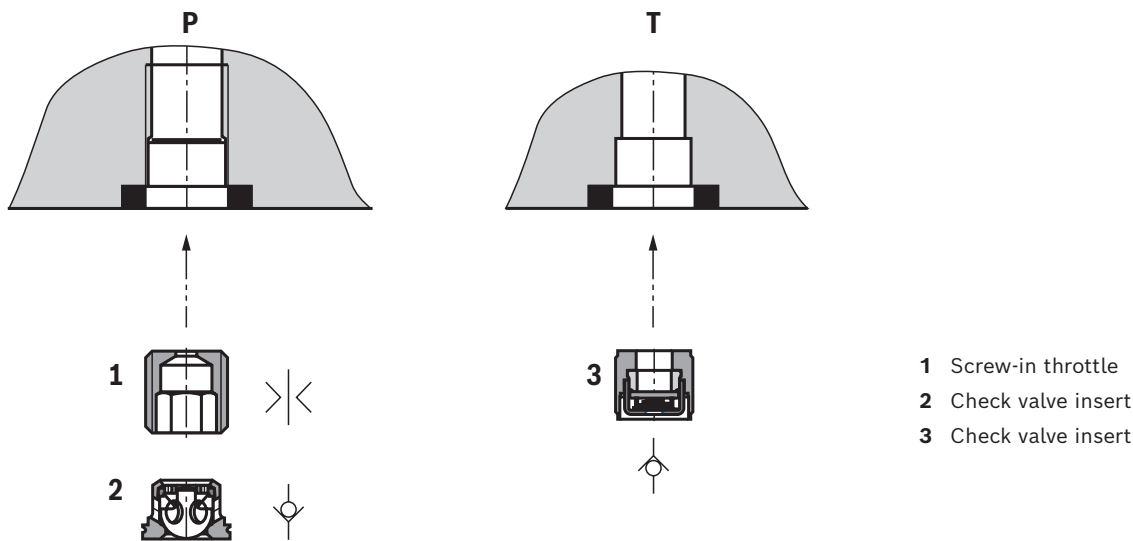
### Screw-in throttle

The use of a screw-in throttle is required if, due to prevailing operating conditions, flows which exceed the performance limit of the valve can occur during the switching processes.

Examples:

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

For available screw-in throttles and check valve insert, refer to page 8.



**Technical data**

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

| General                                |                              |                                                                     |                                                    |
|----------------------------------------|------------------------------|---------------------------------------------------------------------|----------------------------------------------------|
| Type of connection                     |                              | Subplate mounting                                                   |                                                    |
| Porting pattern                        |                              | ISO 4401-03-02-0-05                                                 |                                                    |
| Mass                                   | ► 3/3 directional seat valve | kg                                                                  | 2.4                                                |
|                                        | ► 4/2 directional seat valve | kg                                                                  | 2.1                                                |
|                                        | ► 4/3 directional seat valve | kg                                                                  | 2.4                                                |
| Installation position                  |                              | Any                                                                 |                                                    |
| Ambient temperature range              |                              | °C                                                                  | –40 ... +80 (NBR seals)<br>–20 ... +50 (FKM seals) |
| Protection class according to EN 60529 |                              | IP65 (if suitable and correctly mounted mating connectors are used) |                                                    |

| Hydraulic                                                                                                      |                 |                              |                                                                        |
|----------------------------------------------------------------------------------------------------------------|-----------------|------------------------------|------------------------------------------------------------------------|
| Maximum operating pressure                                                                                     | ► Ports A, B, P | bar                          | 400                                                                    |
|                                                                                                                | ► Port T        | bar                          | $p_T < p_P$ ; $p_T < p_A$ ; $p_T < p_B$ ; however, max. 50 (energized) |
| Hydraulic fluid                                                                                                |                 | See table, page 5            |                                                                        |
| Hydraulic fluid temperature range                                                                              |                 | °C                           | –25 ... +80 (NBR seals)<br>–20 ... +80 (FKM seals)                     |
| Viscosity range                                                                                                |                 | mm <sup>2</sup> /s           | 4 ... 500                                                              |
| Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c) |                 | Class 20/18/15 <sup>1)</sup> |                                                                        |
| Maximum flow                                                                                                   |                 | l/min                        | 20 <sup>2)</sup>                                                       |

<sup>1)</sup> 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 life cycle of the components.

<sup>2)</sup> 25 l/min at operating pressure up to 280 bar

## Technical data

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

| Hydraulic fluid | Classification       | Suitable sealing materials                                                                  | Standards | Data sheet |
|-----------------|----------------------|---------------------------------------------------------------------------------------------|-----------|------------|
| Mineral oils    | HL, HLP              | NBR, FKM                                                                                    | DIN 51524 | 90220      |
| Bio-degradable  | ► insoluble in water | HETG                                                                                        | ISO 15380 | 90221      |
|                 |                      | HEES                                                                                        |           |            |
|                 | ► soluble in water   | HEPG                                                                                        | ISO 15380 |            |
| Flame-resistant | ► containing water   | HFC (Fuchs: Renolin ZAF DT 46, Renolin ZAF 46 D VW; Shell: D971; Castrol: E4-HZZ 46 Hyspin) | ISO 12922 | 90223      |



### Important information on hydraulic fluids:

- For further information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.).
- The ignition temperature of the hydraulic fluid used must be 50 K higher than the maximum surface temperature.
- **Bio-degradable and flame-resistant – containing water:**  
If components with galvanic zinc coating (e.g. version "J3" or "J5") or parts containing zinc are used, small amounts of dissolved zinc may get into the hydraulic system and cause accelerated aging of the hydraulic fluid. Zinc soap may form as a chemical reaction product, which may clog filters, nozzles and solenoid valves – particularly in connection with local heat input.

### ► Flame-resistant – containing water:

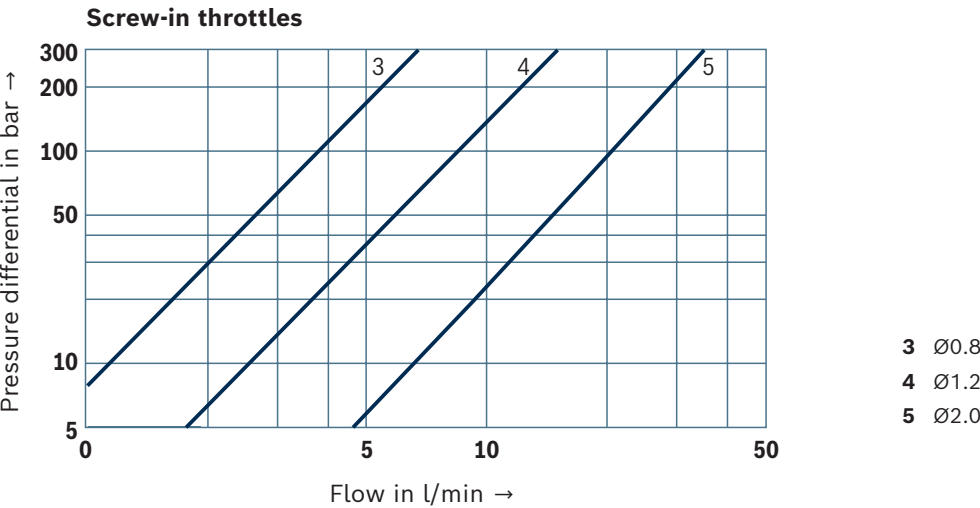
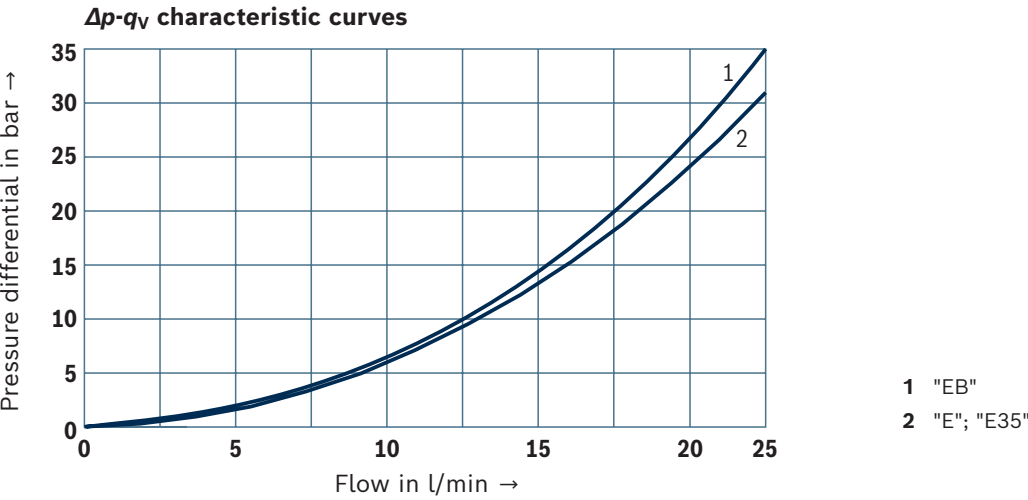
- Due to the increased cavitation tendency with HFC hydraulic fluids, the life cycle of the component may be reduced by up to 30% as compared to the use with mineral oil HLP. In order to reduce the cavitation effect, it is recommended – if possible specific to the installation – backing up the return flow pressure in ports T to approx. 20% of the pressure differential at the component.
- Dependent on the hydraulic fluid used, the maximum ambient and hydraulic fluid temperature must not exceed 50 °C. In order to reduce the heat input into the component, a maximum duty cycle of 50% in continuous operation has to be set for on/off valves (measuring time 300 s). If this is not possible due to the function, an energy-reducing control of these components is recommended, e.g. via a PWM plug-in amplifier.

| Electrical                                         |                                       |     |                           |      |
|----------------------------------------------------|---------------------------------------|-----|---------------------------|------|
| Voltage type                                       |                                       |     | Direct voltage            |      |
| Ordering code (voltage)                            |                                       |     | G12                       | G24  |
| Supply voltage <sup>3)</sup>                       | ► Nominal value                       | V   | 12                        | 24   |
|                                                    | ► Minimum                             | V   | 10.8                      | 21.6 |
|                                                    | ► Maximum                             | V   | 13.2                      | 26.4 |
|                                                    | ► Nominal power according to VDE 0580 | W   | 30                        |      |
| Relative duty cycle time according to VDE 0580     |                                       |     | S1 (continuous operation) |      |
| Maximum switching frequency                        |                                       | 1/h | 2000                      |      |
| Switching time according to ISO 6403 <sup>4)</sup> | ► ON                                  | ms  | 60                        |      |
|                                                    | ► OFF                                 | ms  | 60                        |      |

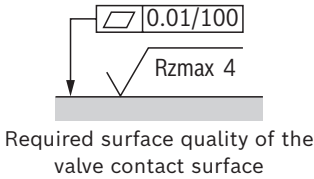
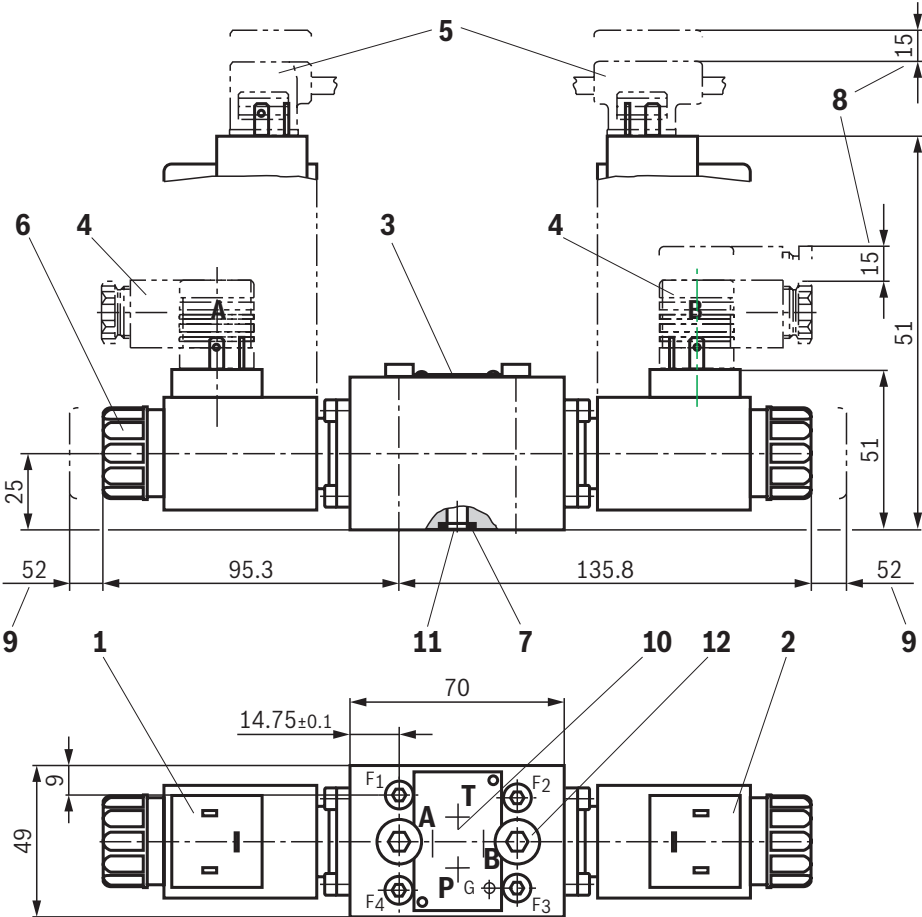
<sup>3)</sup> With properly connected protective grounding conductor (PE) and valve clamping surface connected to the protective grounding conductor system.

<sup>4)</sup> The switching times were determined at a hydraulic fluid temperature of 40 °C and a viscosity of 46 cSt. Deviating hydraulic fluid temperatures can result in different switching times. Switching times change dependent on operating time and application conditions.

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



# Dimensions (dimensions in mm)



- 1 Solenoid "a"
- 2 Solenoid "b"
- 3 Name plate
- 4 Mating connector without/with circuitry for connector "K4" (separate order, see page 8 and data sheet 08006)
- 5 Double valve mating connector without/with circuitry for connector "K4" (separate order, see page 8 and data sheet 08006)
- 6 Mounting nut, tightening torque  $M_A = 5^{+1}$  Nm
- 7 Identical seal rings for ports A, B, P, T
- 8 Space required to remove the mating connector
- 9 Space required to remove the coil
- 10 Porting pattern according to ISO 4401-03-02-0-05

- 11 Additional elements (separate order, see page 8)
- 12 Optional G 1/8 port for pressure switches in actuator lines A and B; tightening torque  $M_A = 13$  Nm



## Notes:

- Maximum diameter for additional connection bores in block (A, B, P, and T) 6.8 mm. With larger diameters, there is a risk that the additional elements (plug-in components) may not remain in the position intended.
- The dimensions are nominal dimensions which are subject to tolerances.

## Valve mounting screws (included in the scope of delivery)

| Size | Quantity | Hexagon socket head cap screws                                                                                                         | Material number |
|------|----------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| 6    | 4        | ISO 4762 - M5 x 55 - 12.9<br>Friction coefficient $\mu_{\text{total}} = 0.09 \dots 0.14$ ; tightening torque $M_A = 9.3$ Nm $\pm 10\%$ | R913051416      |

Accessories (separate order)

Mating connectors and cable sets

| Pos. <sup>1)</sup> | Designation                                                                                                           | Version                                                             | Short designation | Material number | Data sheet |
|--------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------|-----------------|------------|
| 4                  | Mating connector;<br>for valves with "K4" connector,<br>2-pole + PE, design A                                         | Without circuitry, M16 x 1.5, 12 ... 240 V, "a"                     | Z4                | R901017010      | 08006      |
|                    |                                                                                                                       | Without circuitry, M16 x 1.5, 12 ... 240 V, "b"                     |                   | R901017011      |            |
|                    |                                                                                                                       | With indicator light, M16 x 1.5, 12 ... 240 V                       | Z5L               | R901017022      |            |
|                    |                                                                                                                       | With indicator light and Z-diode-suppressor,<br>M16 x 1.5, 24 V     | Z5L1              | R901017026      |            |
| 5                  | Cable sets<br>for valves with two solenoids<br>(double mating connector)<br>and device connector 'K4',<br>2-pole + PE | Without circuitry, M12 x 1, 24 V ± 10%                              | Z60               | R901207820      |            |
|                    |                                                                                                                       | With indicator light, M12 x 1, 24 V ± 10%                           | Z60L              | R901207819      |            |
|                    |                                                                                                                       | With indicator light and Z-diode-suppressor,<br>M12 x 1, 24 V ± 10% | Z60L8             | R901205511      |            |
|                    |                                                                                                                       | With free line end, 3 m, 12 ... 240 V                               | Z61               | R901207821      |            |
|                    |                                                                                                                       | With free line end, 5 m, 12 ... 240 V                               |                   | R901207822      |            |
|                    |                                                                                                                       | With free line end, with indicator light,<br>shielded 3 m, 24 V     | Z61L              | R901286065      |            |
| 4                  | Line connector<br>for valves with device connector<br>'K4', 2-pole + PE, design A                                     | With indicator light, adapter according to<br>DESINA; M12 x 1       | MSUD 41461        | R901495238      | –          |

Additional elements

| Pos. <sup>1)</sup> | Designation            | Channel | Material number |
|--------------------|------------------------|---------|-----------------|
| 11                 | Screw-in throttle Ø0.8 | P       | R901512816      |
|                    | Screw-in throttle Ø1.2 | P       | R901512856      |
|                    | Screw-in throttle Ø2.0 | P       | R901512857      |
|                    | Check valve insert     | P       | R901512854      |
|                    | Check valve insert     | T       | R901512855      |

<sup>1)</sup> See dimensions on page 7.

## Project planning information

- ▶ Actuation of the manual override is only possible up to a tank pressure of approx. 50 bar. Avoid damage to the bore of the manual override. Do not use sharp-edged objects.
- ▶ The shut-off of the solenoids creates voltage peaks, which can be reduced by the use of suitable diodes.
- ▶ For the assembly, commissioning and maintenance, see data sheet 07300
- ▶ In the set-up mode, a H position can be achieved by controlling both coils (only with the 4/3 directional seat valve with symbol "E"). In order to avoid the coils overheating, (according to VDE 0580) in the intermittent operation S3, a duty cycle of 10% may not be exceeded with a play time of 5 minutes or 50% at 70 seconds.

## Further information

- |                                                                              |                                                                        |
|------------------------------------------------------------------------------|------------------------------------------------------------------------|
| ▶ Hydraulic fluids on mineral oil basis                                      | Data sheet 90220                                                       |
| ▶ Environmentally compatible hydraulic fluids                                | Data sheet 90221                                                       |
| ▶ Flame-resistant, water-free hydraulic fluids                               | Data sheet 90222                                                       |
| ▶ Flame-resistant hydraulic fluids – containing water (HFAE, HFAS, HFB, HFC) | Data sheet 90223                                                       |
| ▶ Mating connectors and cable sets for valves and sensors                    | Data sheet 08006                                                       |
| ▶ Hydraulic valves for industrial applications                               | Operating instructions 07600-B                                         |
| ▶ Information on available spare parts                                       | <a href="http://www.boschrexroth.com/spc">www.boschrexroth.com/spc</a> |

**Notes**

## Notes

## Notes

Bosch Rexroth AG  
Industrial Hydraulics  
Zum Eisengießer 1  
97816 Lohr am Main, Germany  
Phone +49 (0) 93 52/40 30 20  
[my.support@boschrexroth.com](mailto:my.support@boschrexroth.com)  
[www.boschrexroth.com](http://www.boschrexroth.com)

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