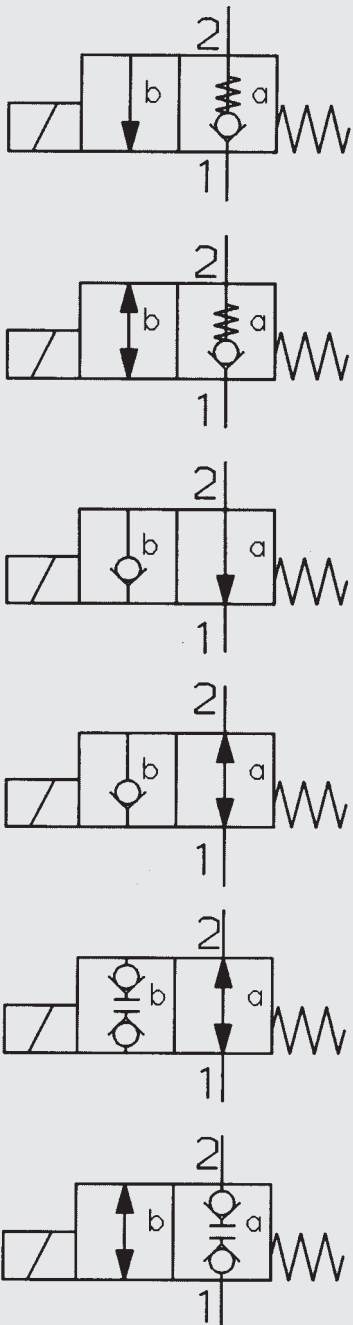


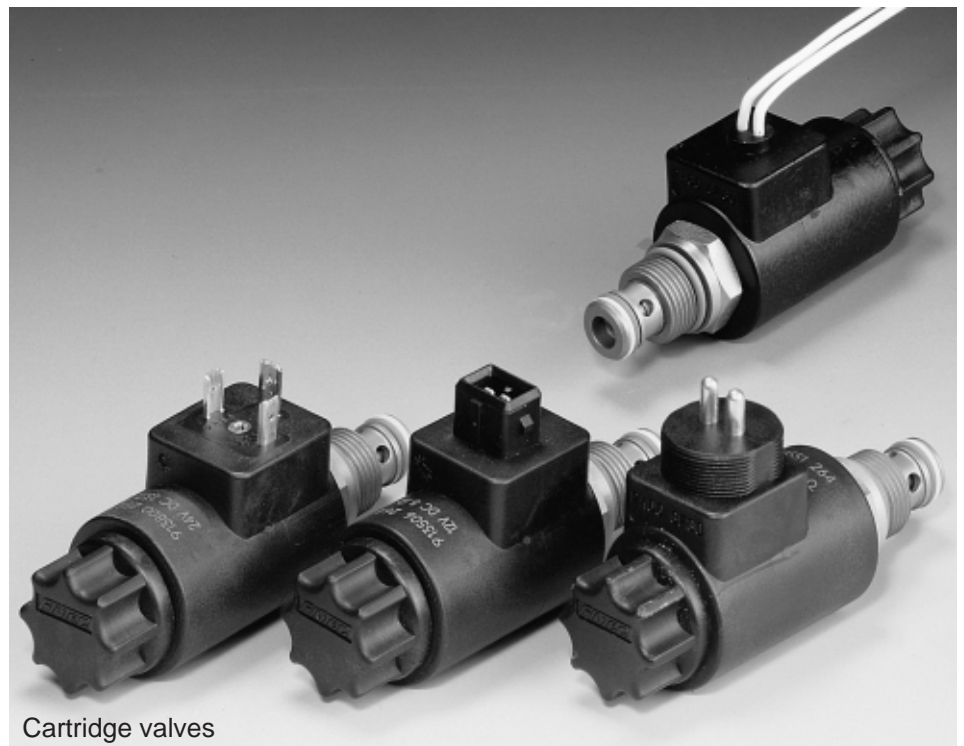


INTERNATIONAL

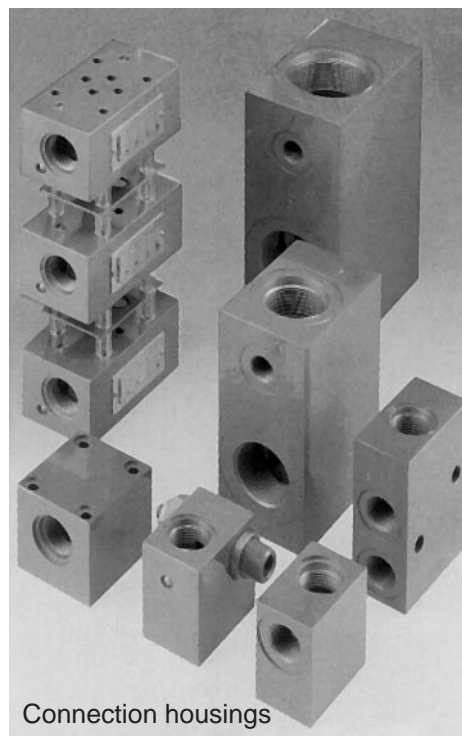
FLUTEC Solenoid Operated Directional Seat Valves 2 SV



up to 350 bar
up to 30 l/min



Cartridge valves



Connection housings

1. DESCRIPTION

1.2. GENERAL

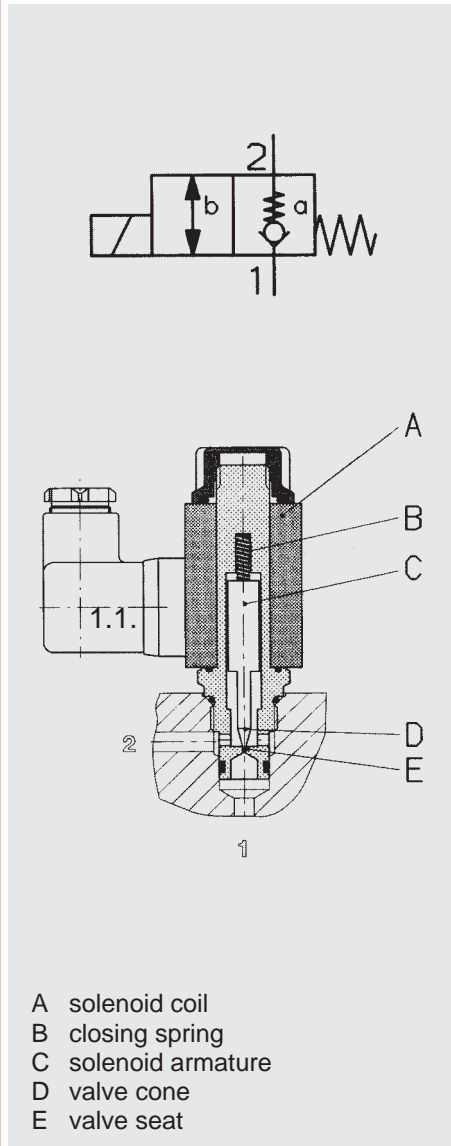
According to DIN-ISO 1219, FLUTEC 2/2 seat valves, type 2SV are directional valves for oil hydraulic systems which open and close a flow path. The valves are designed as direct-operated or pilot-operated cone seat valves and are electro-magnetically actuated by means of pressure-tight, wet-pin solenoids. The 2SV directional seat valves are designed for a flow rate of up to 30 l/min and have the following advantages:

- cartridge valve with standardised installation dimensions means that it is flexible and suited to many different applications
- in the closed position the flow paths are shut off by means of a cone seat
- minimal wear and long life due to hardened and polished control elements
- high level of switching safety even after long periods of non-actuation at high pressure
- long life and low noise level due to wet-pin solenoid armature
- the compact design allows space-saving installation in connection housings and control blocks
- simple assembly and service-friendly cartridge valve technology
- electro-magnetic actuation available in all standard international DC and AC voltages
- many types of electrical connections
- low electrical power consumption at high hydraulic switching capacity
- solenoid coils can be rotated through 360° and exchanged without opening the hydraulic system

A wide range of connection housings is available for optimum adaptation to a multitude of applications.

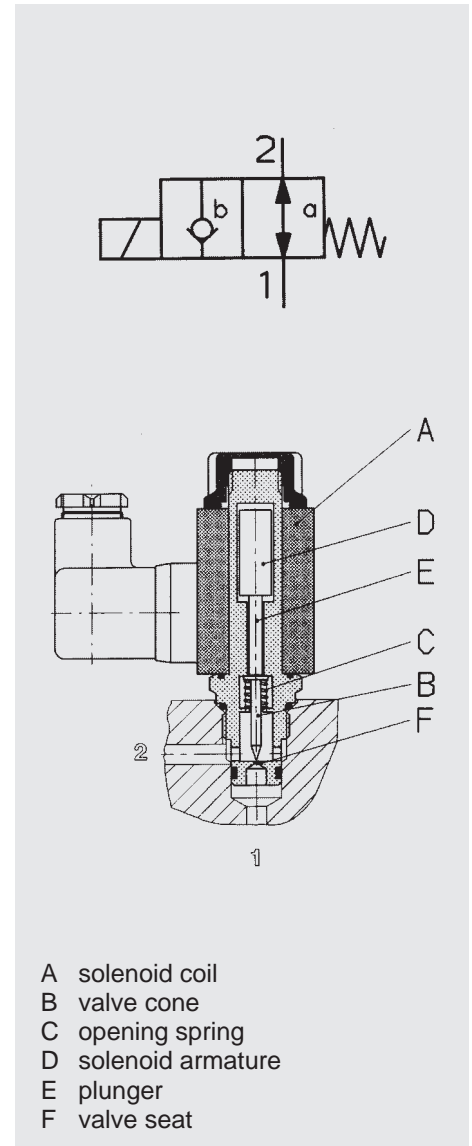
1.3. FUNCTION

1.3.1. 2SV1E1Z



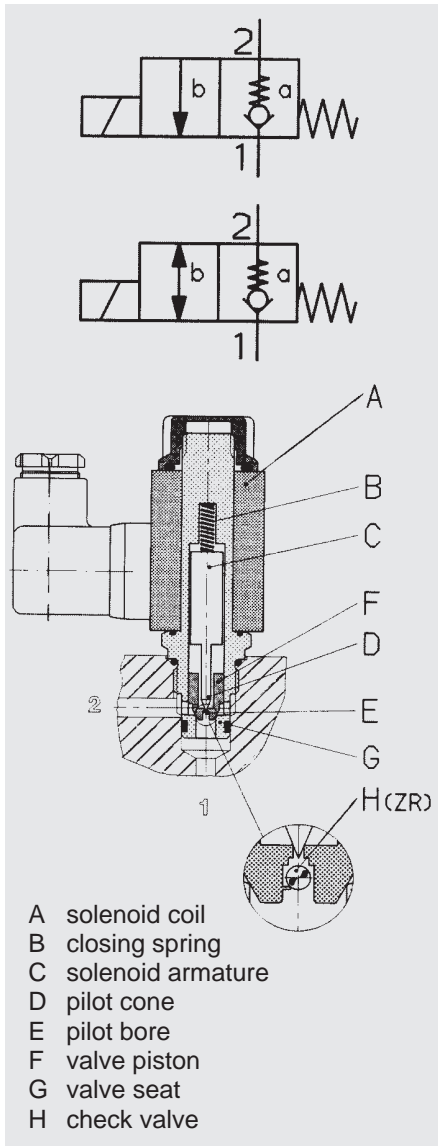
With a non-energised solenoid coil the closing spring pushes the valve cone via the solenoid armature onto the valve seat. The valve is now closed from port 2 to port 1. In the opposite direction from port 1 to port 2 there is free flow through the valve. The valve cone opens at a pressure differential of approx. 30 bar (check valve function). If the solenoid coil is energised by applying the operating voltage, the solenoid armature produces the opening stroke against the force of the closing spring. The valve cone is thereby pulled off its seat and there is now free flow through the valve from port 2 to port 1 and in the opposite direction from port 1 to port 2.

1.3.2. 2SV1E1Y



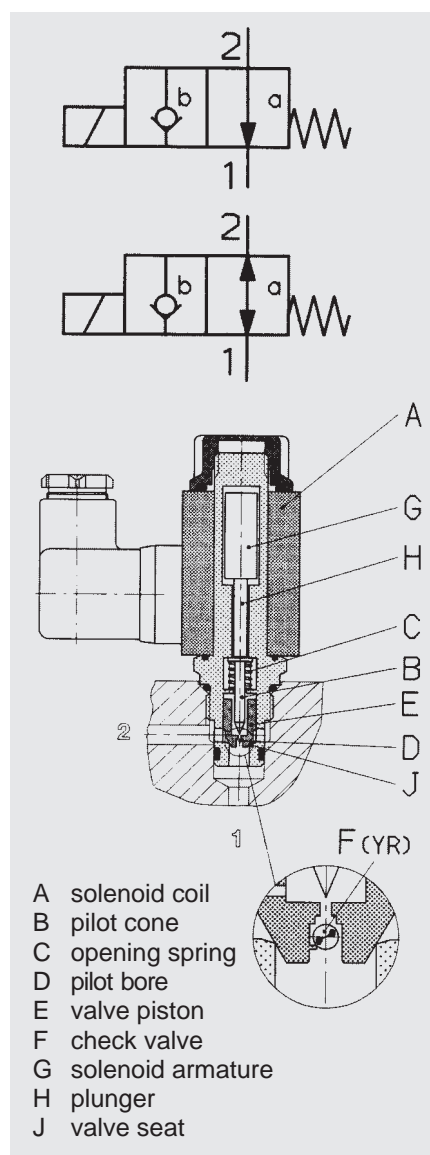
With a non-energised solenoid coil the valve cone is held by the opening spring in the rear switching position. The valve is open and there is free flow through the valve from port 2 to port 1 and in the opposite direction from port 1 to port 2. If the solenoid coil is energised by applying the operating voltage, the solenoid armature produces the closing stroke. In so doing it pushes the valve cone via the plunger onto the valve seat against the force of the opening spring. The valve is now closed from port 2 to port 1. In the opposite direction the solenoid force keeps the valve closed up to a pressure differential of approx. 400 bar.

1.2.3. 2SV5E2Z and 2SV5E2ZR



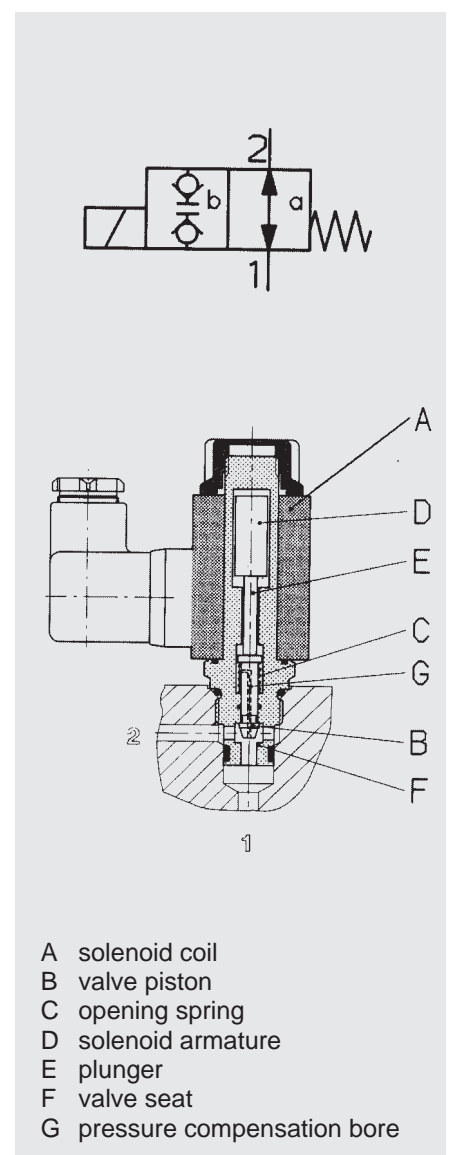
With a non-energised solenoid coil the closing spring pushes the pilot cone via the solenoid armature onto its seat on the pilot bore and the valve piston onto the valve seat. The valve is closed from port 2 to port 1. In the opposite direction from port 1 to port 2 there is free flow through the valve. The valve piston opens at a pressure differential of approx. 1 bar (check valve function). If the solenoid coil is energised by applying the operating voltage, the solenoid armature produces the opening stroke against the force of the closing spring. The pilot cone is pulled off its seat and opens the pilot bore which relieves pressure from behind the valve piston and hydraulically pushes the valve piston into the opening position. There is now free flow through the valve from port 2 to port 1. Only valve type 2SV5E2ZR has free flow from port 1 to port 2 in this switching position due to the check valve built into the valve piston.

1.2.4. 2SV5E2Y and 2SV5E2YR



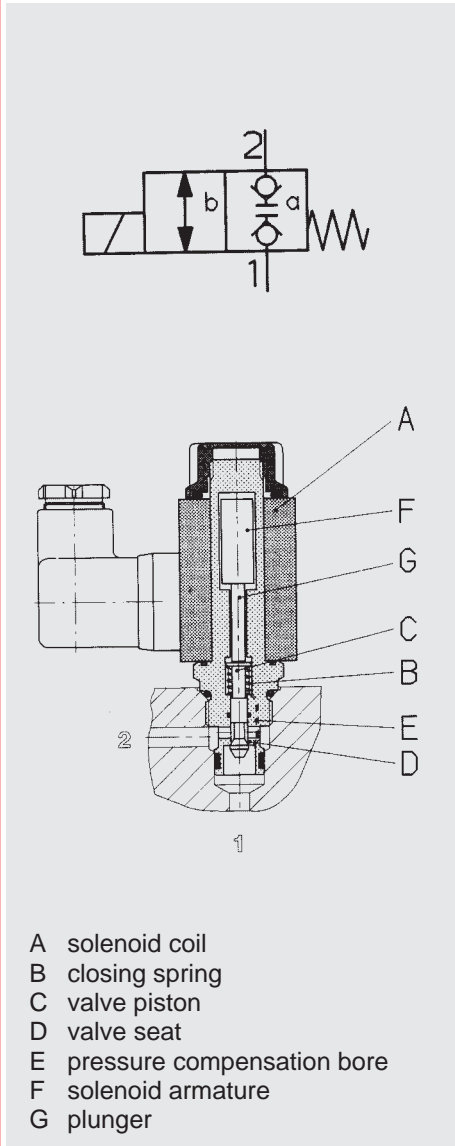
With a non-energised solenoid coil the pilot cone is held by the opening spring in the rear switching position. The pilot bore is open. This relieves pressure from behind the valve piston which is hydraulically kept in the open position. There is free flow through the valve from port 2 to port 1. Only valve type 2SV5E2YR has free flow in the opposite direction from port 1 to port 2 in this switching position due to the check valve built into the valve piston. If the solenoid coil is energised by applying the operating voltage, the solenoid armature produces the closing stroke. In so doing it pushes the pilot cone via the plunger onto its seat in the valve piston against the force of the opening spring, thereby closing the pilot bore. The area behind the valve piston is pressurised and the valve piston is pushed onto the valve seat. The valve is now closed from port 2 to port 1. In the opposite direction the solenoid force keeps the valve closed up to a pressure differential of approx. 20 bar.

1.2.5. 2SV5E1V



With a non-energised solenoid coil the valve piston is held by the opening spring in the rear switching position. The valve is open and there is free flow through the valve from port 1 to port 2 and in the opposite direction from port 2 to port 1. If the solenoid coil is energised by applying the operating voltage, the solenoid armature produces the closing stroke. In so doing it pushes the valve piston via the plunger onto the valve seat against the force of the opening spring. Port 1 is connected with the back of the piston via the pressure compensation bore. The hydraulic forces on the valve piston are thereby compensated. The valve is now closed from port 1 to port 2 and in the opposite direction from port 2 to port 1.

1.2.6. 2SV5E1W



- A solenoid coil
- B closing spring
- C valve piston
- D valve seat
- E pressure compensation bore
- F solenoid armature
- G plunger

With a non-energised solenoid coil the closing spring pulls the valve piston onto the valve seat. Port 1 is connected with the back of the piston via the pressure compensation bore. The hydraulic forces on the valve piston are thereby compensated. The valve is closed from port 1 to port 2 and in the opposite direction from port 2 to port 1.

If the solenoid coil is energised by applying the operating voltage, the solenoid armature produces the opening stroke. In so doing it pushes the valve piston via the plunger into the open position against the force of the closing spring. There is now free flow through the valve from port 2 to port 1 and in the opposite direction from port 1 to port 2.

1.3. APPLICATION

The 2SV...2/2 directional seat valves are used in oil hydraulic systems where the starting and stopping of an oil flow must be controlled and a positive shut-off is required.

The **2SV5E2Z** seat valve can be used, for example, as an electrically operated check valve to control lifting devices. With a non-energised solenoid coil there is free flow through the valve from port 1 to port 2 for lifting the device. When the pump is switched off it is kept in position until the solenoid coil is energised to lower the device.

The **2SV5E2Y** seat valve can be used as a normally open valve, e.g. as a safety release valve in oil hydraulic systems. With a non-energised solenoid coil the valve acts as a bypass valve between the pressure line and the tank to ensure that no pressure can build up in the system until the solenoid coil is energised and the valve closes. A suitable arrangement of the valve ensures automatic pressure release of the hydraulic system in the event of a power cut or emergency switch-off.

The **2SV5E1V** and **2SV5E1W** seat valves are especially used where a positive shut-off is required in both directions, e.g. in the supply and drainage of double-acting cylinders.

The **2SV1E1Z** and **2SV1E1Y** seat valves are particularly suitable for use as pilot valves due to their low flow rate.

1.4. RECOMMENDATIONS

- To ensure faultless operation, the operating limits regarding flow rate and operating pressure must be observed.
- Flow through the valves must only be in the directions indicated by an arrow in the symbols (see point 2.1.1.)
- When fitting the valves into control blocks and housings, the appropriate torque must be observed (see point 3)!
- Prior to electrical commissioning, the suitability of the actuating solenoid for the existing operating voltage with regard to type and amount of voltage must be ensured. If used with AC current, a bridge rectifier connector socket must be used.

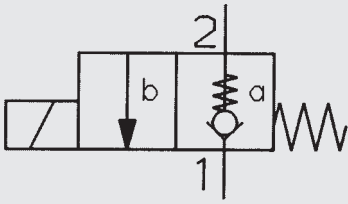
2. TECHNICAL SPECIFICATIONS

2.1. GENERAL

2.1.1. Designation and symbol

Function Z

(Nominal width 5, pilot-operated)

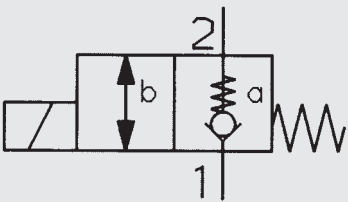


Function ZR

(Nominal width 5, pilot-operated) and

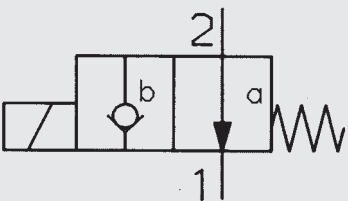
Function Z

(Nominal width 1, direct-operated)



Function Y

(Nominal width 5, pilot-operated)

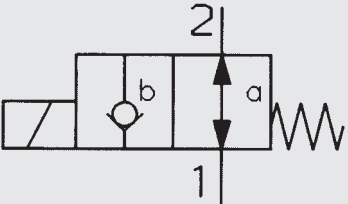


Function YR

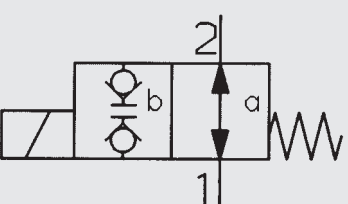
(Nominal width 5, pilot-operated) and

Function Y

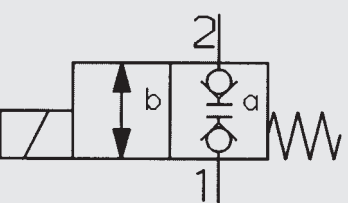
(Nominal width 1, direct-operated)



Function V



Function W



2.1.2 Model code (also Order Example)

2SV 5 E 2 Z . X / G 24 -Z4 - N

2-way seat valve

Size

- 1 = flow rate up to 3 l/min (functions Y and Z)
- 5 = flow rate up to 20 l/min (functions V and W)
flow rate up to 30 l/min (functions Z, ZR, Y and YR)

Type of connection

Cartridge valve

Type code

- 1 = direct-operated
size 1: functions Z and Y
size 5: functions V and W
- 2 = pilot-operated
size 5: (functions Z, ZR, Y and YR)

Function (see 2.1.1.)

Z
ZR
Y
YR
V
W

Series

(Determined by manufacturer)

Type of voltage for actuating solenoid (see 2.3.2.)

- G = DC
- W = AC (rectified connector)

Nominal voltage for actuating solenoid (see 2.3.3.)

- 24 = 24 V DC (for voltage type G)
- 110 = 110 V 50/60 Hz AC (for voltage type W)
- 230 = 230 V 50/60 Hz AC (for voltage type W)

Type of actuating solenoid (see 2.3.1.)

- if no details given = with plug to DIN 43650
for connecting an appropriate connector
 - K = with KOSTAL threaded connection M27x1
for nominal voltages up to 24 V DC
 - T = with 2-pole AMP Junior timer plug
for nominal voltages up to 48 V DC
 - L = with flying leads (0.75 mm² cable cross section)
for nominal voltages up to 48 V DC
- others on request

Type of connection for actuating solenoid

- if no details given = without connector
 - Z4 = connector to DIN 43650-AF2-PG11
 - Z5 = large connector
 - Z5L = large connector with lamp
 - Z27 = KOSTAL connector, only available if K type solenoid ordered
- for AC type, connector is automatically supplied with bridge rectifier insert

Hand emergency operation (see 2.3.11.)

- if no details given = without hand emergency
- N = pin type operation
- NG = thumb pressure operation
symbols V, W, Y, YR only

Standard models

Model code	Symbol	Stock no. (order no.)
2SV1E1Y.X/G24-Z4		710402
2SV5E2Y.X/G24-Z4 2SV5E2Y.X/W230-Z4		710406 710407
2SV1E1Z.X/G24-Z4		710400
2SV5E2Z.X/G24-Z4 2SV5E2Z.X/W230-Z4		710404 710405
2SV5E1V.X/G24-Z4 2SV5E1V.X/W230-Z4		711236 711046
2SV5E1W.X/G24-Z4 2SV5E1W.X/W230-Z4		710408 710409

Please quote stock number when ordering.
Delivery for non-standard models is longer and the price is higher.

2.1.3. **Type of construction**
Seat valve
direct- or pilot-operated

2.1.4. **Type of mounting**
Cartridge valve

2.1.5. **Mounting position**
Optional

2.1.6. **Weight**
2SV.E...0.42 kg

2.1.7. **Direction of flow**
According to symbol, only permissible in direction of arrow

2.1.8. **Ambient temperature range**
Min. -20 °C
Max. +40 °C

2.1.9. **Materials**
Valve body:
high tensile steel
Closing elements:
hardened polished steel

Seals:
FPM and Teflon

2.1.10. **Type of connection**
Suitable connection housings with installation dimensions 06020 are available (see separate housing brochure no. E 5.252.../...)

2.1.11. **Nominal size**
Size = 1 (2SV1...)
Size = 5 (2SV5...)

2.2. HYDRAULIC DETAILS

2.2.1. **Nominal pressure**
 $p_N = 350 \text{ bar}$

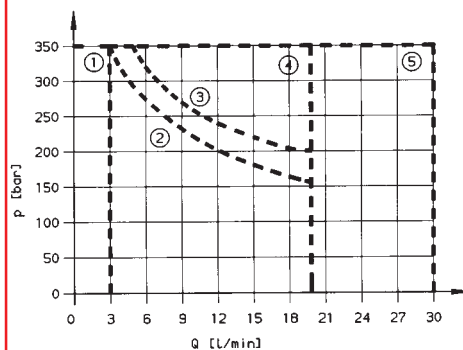
2.2.2. **Cracking pressure**
Function Z and ZR with flow direction from port 1 to port 2 and solenoid coil non-energised.
Size 1... $p_0 = 30 \text{ bar}$
Size 5... $p_0 = 1 \text{ bar}$

2.2.3. **Pressure fluid**
Hydraulic oil to DIN 51524 Part 1 and 2. For other fluids, please contact our Sales/ Technical department.

2.2.4. **Temperature range of hydraulic fluid**
Min. -20 °C
Max. +80 °C

2.2.5. **Viscosity range**
Min. 10 mm²/s
Max. 380 mm²/s

2.2.6. **Flow rate, pressure-dependent Performance limit**



Size 1

Function	Curve
Z	1
Y	1

Size 5

Function	Curve
Z, ZR	5
Y, YR	5
V	4
W (1→2)	3
W (2→1)	2

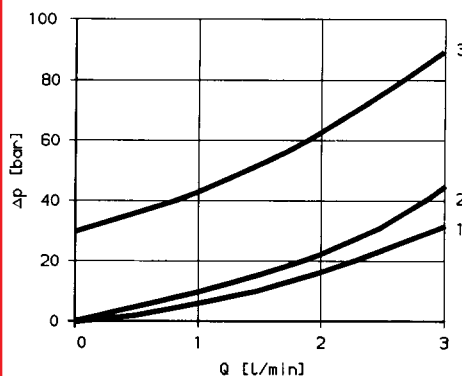
2.2.7. **Filtration**

Maximum permissible contamination level of the operating fluid to NAS 1638, Class 10. We therefore recommend using a filter with a minimum retention rate of $\beta_{20} \geq 100$. The fitting of filters and regular replacement of the filter element guarantees correct functioning, reduces wear and tear and increases the service life.

2.2.8. **Pressure drop, dependant on flow rate**

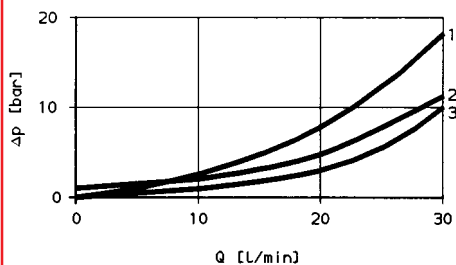
Measured at $v = 34 \text{ mm}^2/\text{s}$

Size 1
2SV1
Function Z and Y



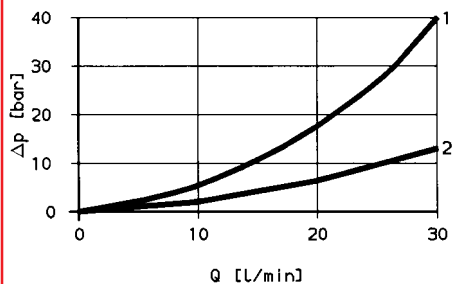
Function	Curve	
	Flow direction 2 → 1	Flow direction 1 → 2
Z energised	1	1
Z de-energised	–	3
Y de-energised	2	1

Size 5
2SV5...
Function Z and ZR



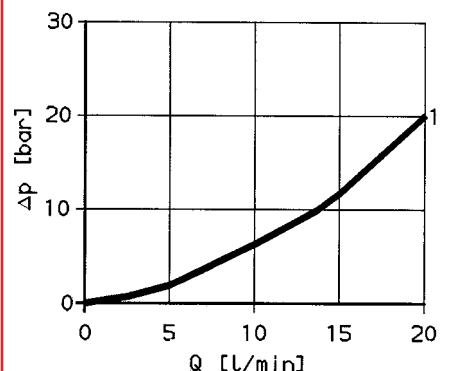
Function	Curve	
	Flow direction 2 → 1	Flow direction 1 → 2
Z energised	1	–
Z de-energised	–	2
ZR energised	1	3
ZR de-energised	–	2

2SV5...
Function Y and YR



Function	Curve	
	Flow direction 2 → 1	Flow direction 1 → 2
Y de-energised	1	–
YR de-energised	1	2

2SV5...
Function V and W



Function	Curve	
	Flow direction 2 → 1	Flow direction 1 → 2
V de-energised	1	1
W energised	1	1

2.3. ELECTRICAL SPECIFICATIONS

2.3.1. **Type of operation**

Electro-magnetic operation by means of pressure-tight, wet-pin single stroke solenoids to VDE 0580.

Types of solenoid:

- Actuating solenoid with plug to DIN 43650 standard for general industrial applications, available for nominal voltages up to 230 V DC and up to 240 V AC. For dimensions, see point 3.
- Actuating solenoid with KOSTAL plug for use in mobile applications, only available for nominal voltages up to 24 V DC. For dimensions see point 3.
- Actuating solenoid with AMP Junior timer 2 pole plug for mobile applications, available for nominal voltages up to 48 V DC. For dimensions, see point 3.
- Actuating solenoid with flying leads, available for nominal voltages up to 48 V DC. For dimensions, see point 3.

2.3.2. **Type of voltage**

DC solenoid (code G)
For use with AC (code W), the required DC is produced by using bridge rectifier connector socket.

2.3.3. **Nominal voltage**

Standard voltages available:
Voltage type G: 24 V
Voltage type W: 230 V
Other voltages in the range 6 to 240 V are available on request.

2.3.4. **Voltage tolerance**

– 5%
+ 10%

2.3.5. **Nominal current**

Depending on nominal voltage
G 24: 1.04 A
W 230: 0.13 A

2.3.6. **Power consumption**

$p_{20} = 26W$

2.3.7. **Switch-on time**

100% switch-on time = continuous operation
Minimum dimensions for connection housing: 50 x 50 x 30 mm

2.3.8. **Switching time**

Depending on symbol, pressure across individual ports and flow rate, the switch-on time is approximately 25 ms, switch-off time approximately 35 ms.

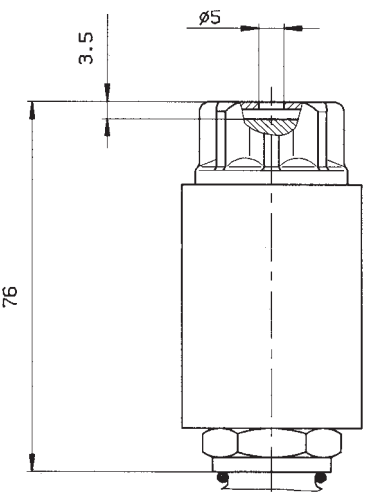
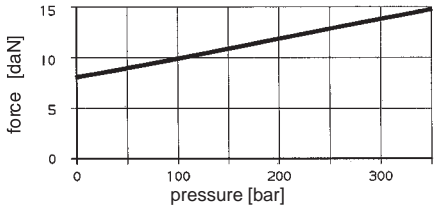
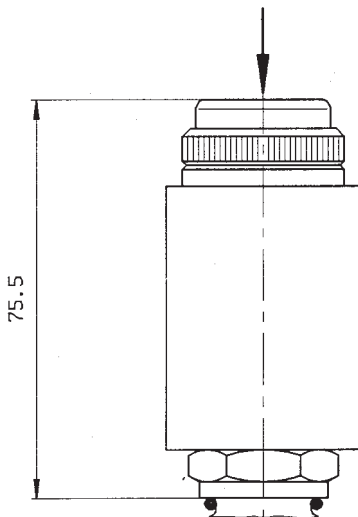
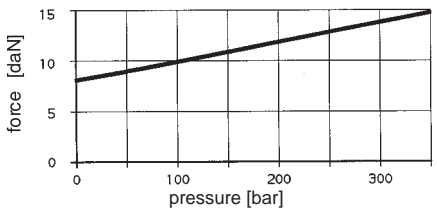
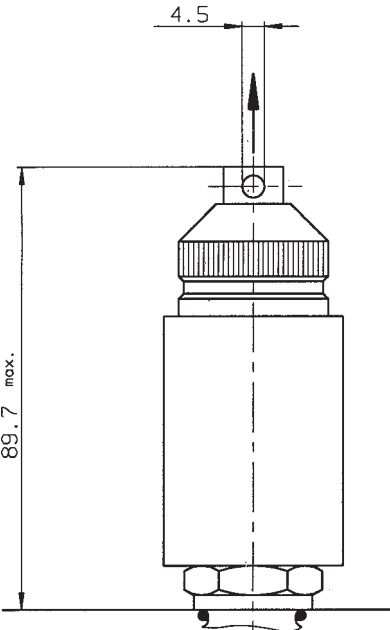
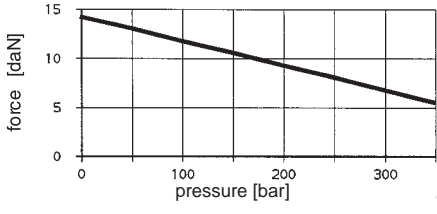
2.3.9. **Safety type to DIN 40050**

Z4, Z5 and Z5L: IP 65
Z27 (KOSTAL): IP 67
AMP Junior timer: IP 65
Flying leads: IP 65
These safety types apply for correctly fitted plugs.

2.3.10. **Switching frequency**

3,600 1/h

2.3.11. Emergency manual override

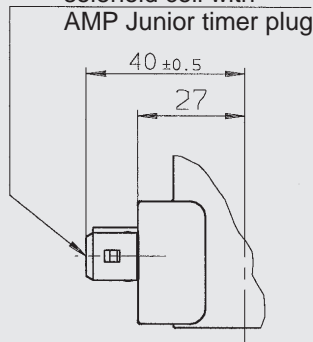
Dimensions	Notes	Actuating force												
	<p>N... pin type operation (pushing in) Manual operation by means of a pin. The opening has a diameter of 5 mm. The pin is countersunk by 3.5 mm. The operating stroke is 1.5 mm. The valve is switched as pressure is applied to the actuating mechanism by means of an appropriate pin. Available for function V, W, Y, YR.</p>	 <table border="1"> <caption>Actuating force data for N... pin type operation (pushing in)</caption> <thead> <tr> <th>pressure [bar]</th> <th>force [daN]</th> </tr> </thead> <tbody> <tr><td>0</td><td>8</td></tr> <tr><td>100</td><td>10</td></tr> <tr><td>200</td><td>12</td></tr> <tr><td>300</td><td>14</td></tr> <tr><td>350</td><td>15</td></tr> </tbody> </table>	pressure [bar]	force [daN]	0	8	100	10	200	12	300	14	350	15
pressure [bar]	force [daN]													
0	8													
100	10													
200	12													
300	14													
350	15													
	<p>NG... thumb pressure operation (rubber cap) Manual operation is possible without tool (thumb pressure). Available for functions V, W, Y, YR.</p>	 <table border="1"> <caption>Actuating force data for NG... thumb pressure operation</caption> <thead> <tr> <th>pressure [bar]</th> <th>force [daN]</th> </tr> </thead> <tbody> <tr><td>0</td><td>8</td></tr> <tr><td>100</td><td>10</td></tr> <tr><td>200</td><td>12</td></tr> <tr><td>300</td><td>14</td></tr> <tr><td>350</td><td>15</td></tr> </tbody> </table>	pressure [bar]	force [daN]	0	8	100	10	200	12	300	14	350	15
pressure [bar]	force [daN]													
0	8													
100	10													
200	12													
300	14													
350	15													
	<p>N... pin type operation (pulling out) The valve is switched as the actuating mechanism is pulled out using an appropriate tool. The operating stroke is 1.5 mm. Available for functions Z, ZR.</p>	 <table border="1"> <caption>Actuating force data for N... pin type operation (pulling out)</caption> <thead> <tr> <th>pressure [bar]</th> <th>force [daN]</th> </tr> </thead> <tbody> <tr><td>0</td><td>15</td></tr> <tr><td>100</td><td>12</td></tr> <tr><td>200</td><td>9</td></tr> <tr><td>300</td><td>6</td></tr> <tr><td>350</td><td>5</td></tr> </tbody> </table>	pressure [bar]	force [daN]	0	15	100	12	200	9	300	6	350	5
pressure [bar]	force [daN]													
0	15													
100	12													
200	9													
300	6													
350	5													

3. DIMENSIONS

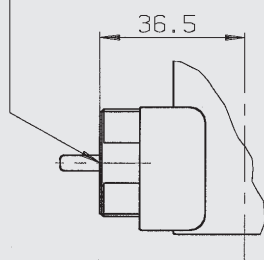
2SV..

2SV...

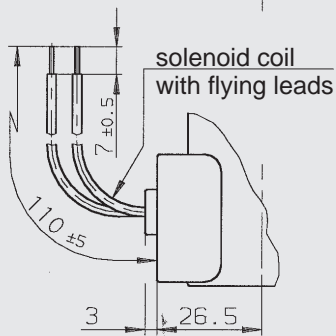
solenoid coil with AMP Junior timer plug



solenoid coil with KOSTAL screw connection M 27 x 1



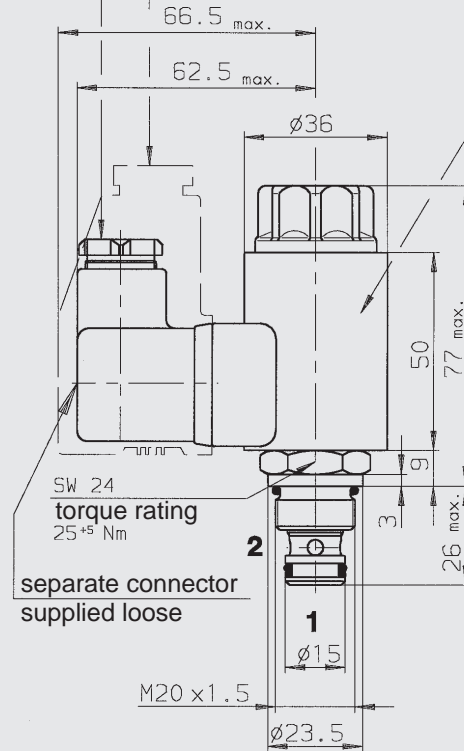
solenoid coil with flying leads



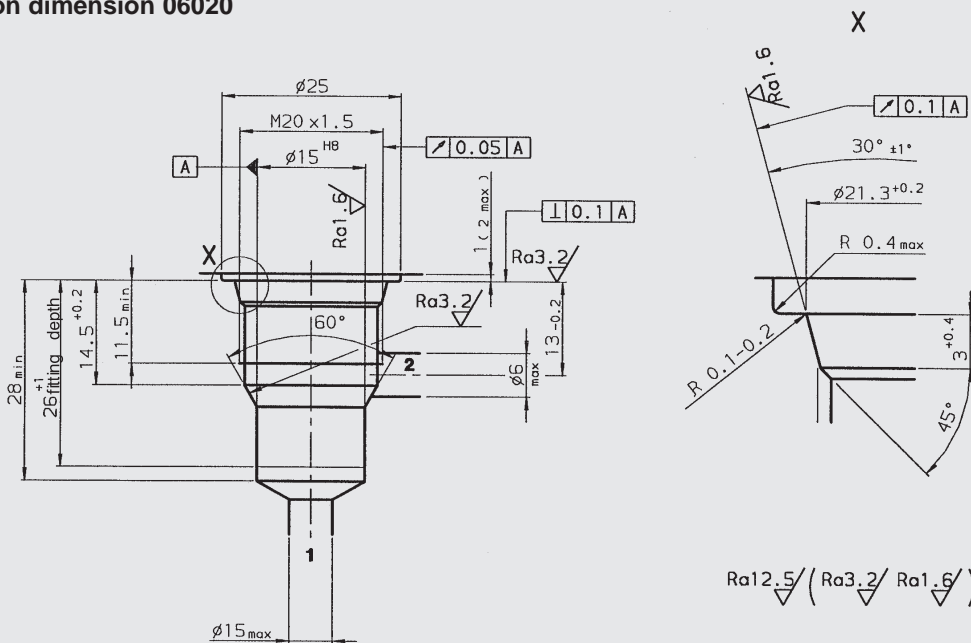
solenoid coil with plug to DIN 43650
after loosening mounting screw,
solenoid coils can be rotated
through 360°, removed and replaced

connector Z4

outline: connector Z5 and Z5L
connectors Z4, Z5 and Z5L can be
displaced by 4 x 90°;
cable connection: PG11



Installation dimension 06020



4. NOTE

All details in this brochure are subject to technical modifications.