

2/2- and 3/2-way directional seated valves type BVG and BVP

for any flow direction, zero leakage
all ports pressure resistant

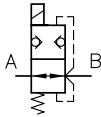
Perm. pressure $p_{\max} = 320$ bar
Perm. flow $Q_{\max} = 50$ lpm

Additional valves with same function:

- Type BVG 11(12 and 2), BVP 11(2) see appendix, sect. 5.1, Run-out design do not use for new layouts!
- Type BVG, BVP 1 D 7765 ($Q_{\max} = 20$ lpm, $p_{\max} = 400$ bar)
- Type NBVP 16 D 7765 N ($Q_{\max} = 20$ lpm, $p_{\max} = 400$ bar)
- Type BVE D 7921 ($Q_{\max} = 70$ lpm, $p_{\max} = 400$ bar)
- Type VP D 7915 ($Q_{\max} = 15$ lpm, $p_{\max} = 400$ bar)

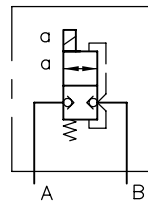
Design for pipe connection

Example: Type BVG 3 S-G 24



Design for manifold mounting

Example: Type BVP 3 R-G 12



1. General

These 2/2- and 3/2-way directional cone seated valves are available with electrical, hydraulic or pneumatic actuation. All ports are equally pressure resistant due to the internal pressure balance.

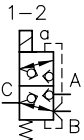
The zero or idle position is achieved automatically if the valve is not actuated due to spring return. They are of all steel design and all functionally essential internal parts are hardened and run maintenance free in oil; Cones and seats are ground.

2. Available versions, main data

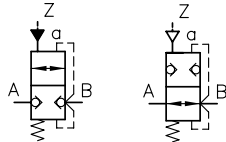
Order examples: **BVG 3 R/B 2,5 - WG 230**
BVP 3 Z - P

Complete symbols
 (The actuation symbols apply to all flow symbols)

Pipe connection

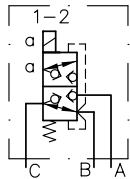


BVG 3 Z - G...
 BVG 3 Z - WG...

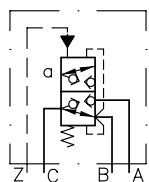


BVG 3 R - H BVG 3 S - P

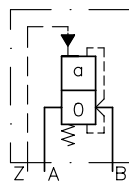
Manifold mounting



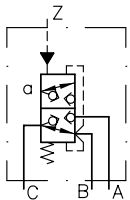
BVP 3 Z - G...
 BVP 3 Z - WG...



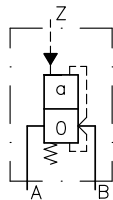
BVP 3 Z - H



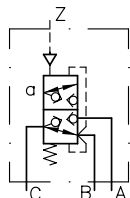
BVP 3 R(S) - H



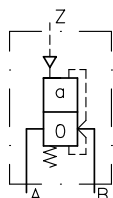
BVP 3 Z - H 1/4



BVP 3 R(S) - H 1/4



BVP 3 Z - P



BVP 3 R(S) - P

Table 1: Basic type and size ¹⁾

| Coding | Design and connection | Flow Q _{max} (lpm) | Pressure P _{max} (bar) |
|--------------|--|-----------------------------|---------------------------------|
| BVG 3 | Pipe connection G 1/2 ISO 228/1 (BSPP) | 50 | 320 |
| BVP 3 | Manifold mounting | 50 | 320 |

Table 2: Symbols

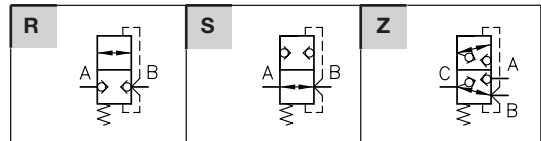


Table 3: Orifices
 (in ports A, B, and C, see also sect. 3.1)

| Coding | Ø (mm) | No. for subsequent orders | | System or accumulator pressure range |
|---------------|-----------------|---------------------------|--------------|--------------------------------------|
| | | BVG 3.. | BVP 3.. | |
| B 2,5 | 2.5 | 7405 014 b | 7405 013-2,5 | about 300 bar |
| B 3 | 3 | 7405 014 c | 7405 013-3,0 | about 200 bar |
| B 3,5 | 3.5 | 7405 014 d | 7405 013-3,5 | about 150 bar |
| B 4 | 4 | 7405 014 e | 7405 013-4,0 | about 100 bar |
| ²⁾ | 0 ²⁾ | 7405 014 a | 7405 013 | -- |

Table 4: Actuations

| Actuation | Coding | | | Main data, see also sect. 3.2 |
|-------------------|--|--|---|---|
| | with plug | Plug with LED | without plug | |
| Solenoid | G 12 G 24 WG 110 WG 230 | L 12 L 24 --- --- | X 12 X 24 X 98 X 205 | U _N = 12 V DC U _N = 24 V DC U _N = 110 V AC, 50/60 Hz (98 V DC) ³⁾ U _N = 230 V AC, 50/60 Hz (205 V DC) ³⁾ |
| Hydraulic | H | | | Control pressure: p _{contr min} = 24 bar p _{contr max} = 320 bar |
| | H 1/4 | Ext. control port G 1/4 (BSPP). Only with type BVP 3 ! | | |
| Pneumatic | P | Ext. control port G 1/4 (BSPP) | | Control pressure: p _{contr min} = 4 bar p _{contr max} = 15 bar |
| Actuation symbols | Solenoid | Hydraulic Coding H 1/4 | Hydraulic Coding H | Pneumatic |
| | | | | |

¹⁾ Type BVG 11(12, 2) and BVP 11(2) see appendix, sect. 5.1, Run-out design do not use for new layouts!
²⁾ Undrilled for customized diameter acc. to Δp-Q-curve of the orifices, sect. 3.1
³⁾ DC-solenoid (98 V DC, 205 V DC) with plug featuring a bridge rectifier circuit

3. Further parameters

3.1 General and hydraulic

Installation position

Any

Overlapping with 3/2-way directional valves

Negative (transverse of one into the other flow direction is only completed when the switching position is achieved). All passages are interconnected during the switching operation.

Operating pressure

$p_{max} = 320$ bar

Static overload capacity

Ports A, B, and C approx. $2 \times p_{max}$ (640 bar)

Body material and surface coating

Steel, zinc galvanized

Mass (weight) approx. kg

| Complete with actuation | BVG 3 R BVG 3 S | BVG 3 Z | BVP 3 R BVP 3 S | BVP 3 Z |
|-------------------------|--------------------|---------|--------------------|---------|
| Solenoid | 2.3 | 3.3 | 2.3 | 2.4 |
| Hydraulic | 1.9 | 2.9 | 1.9 | 2.0 |
| Pneumatic | 1.9 | 2.6 | 1.9 | 1.7 |

Pressure fluid

Hydraulic oil conforming DIN 51514 part 1 to 3: ISO VG 10 to 68 conforming to DIN 51519. Viscosity limits: min. approx. 4, max. approx. 1500 mm²/s; opt. operation approx. 10... 500 mm²/s. Also suitable are biological degradable pressure fluids types HEPG (Polyalkylenglycol) and HEES (Synth. Ester) at service temperatures up to approx. +70°C.

Temperature

Ambient: approx. -40 ... +80°C
 Fluid: -25 ... +80°C, Note the viscosity range !
 Permissible temperature during start: -40°C (Observe start-viscosity!), as long as the service temperature is at least 20K higher for the following operation.
 Biological degradable pressure fluids: Note manufacturer's specifications. By consideration of the compatibility with seal material not over +70°C.
Attention: Observe the restriction regarding the operation duration in sect. 3.2. !

Perm. flow

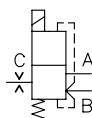
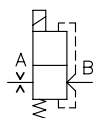
Q_{perm} acc. to sect. 2 applies to $p_{max} = 320$ bar with solenoid actuation in usual pump circuits. With pressure < 150 bar (solenoid actuated) or with all other actuation modes Q_{perm} may be exceeded up to 50% as long as the back pressure is permissible.

Flow limitation

The max. flow has to be limited (depending on the pressure) by means of orifices in the case of accumulator circuits or if connected to high pressure circuits (circulation lines or central supplies) down to the specified Q_{max} (see sect. 2).

2/2-way-valve

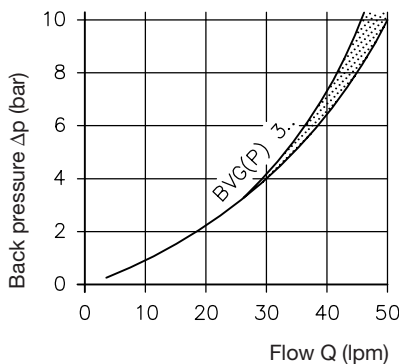
3/2-way-valve



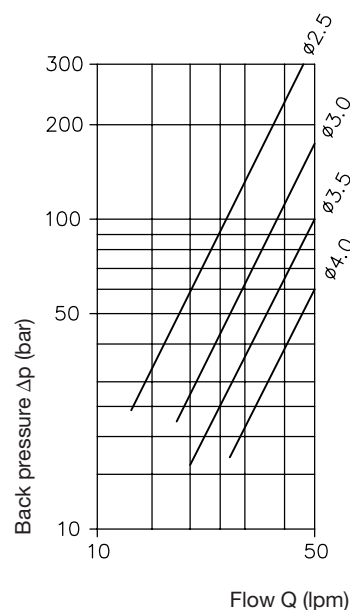
These orifices must be located always on the accumulator side. With valves type ..Z..- they are installed in port C. If mounting in port A or B is requested, this has to stated in uncoded text. For detailed description see table 3, sect. 2.

Δp -Q-curve

Basic valve



Additional orifices



Viscosity of the oil during tests approx. 60 mm²/s

3.2 Actuators

Solenoid

| | | | | | |
|--------------|-----------|---|----------------------|-------------------------------|-------------------------------|
| | | The solenoids are manufactured and tested conforming VDE 0580 | | | |
| Coding | | G 12 L 12 X 12 | G 24 L 24 X 24 | WG 110 --- --- | WG 230 --- --- |
| Nom. voltage | U_N (V) | 12 (DC-voltage) | 24 (DC-voltage) | 110 (AC-voltage, 50/60 Hz) | 230 (AC-voltage, 50/60 Hz) |
| Nom. power | P_N (W) | 33.2 | 30.0 | 32.8 | 33.0 |

Plug DIN EN 175 301-803 (circuitry and symbol)
All plugs
For additional plugs, see D 7163

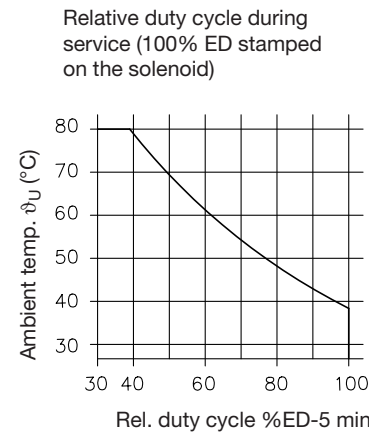
DC-voltage
Type G...

Type L..

AC-voltage
Type WG..

Solenoid terminals

| | |
|----------------------------|--|
| Switching time (guideline) | ON or OFF: approx. 50 ... 60 ms; with WG.. approx. 2-3 times prolonged |
| Switchings / hour | approx. 2000/h to be regarded as approx. evenly distributed |
| Protection class | IP 65 (IEC 60529) (plug properly mounted) |
| Insulation material class | F |
| Contact temperature | approx. 98°C, at 20°C ambient temperature |
| Cut-off energy | $WA \leq 0.5$ Ws |
| Surface coating (solenoid) | DIN 50961-Fe/Zn 12 bk cC |



| | | Hydraulic (Coding H, H 1/4) | Pneumatic (Coding P) |
|--|------------------|-----------------------------------|--------------------------------------|
| Control pressure | $P_{contr\ min}$ | 24 bar | 4 bar |
| | $P_{contr\ max}$ | 320 bar | 15 bar |
| Perm. residual pressure in the control line for safe return to idle position | | < 2 bar | --- |
| Static over load capacity of Z | | approx. 1.5 $p_{contr\ max}$ bar | approx. 1.5 $p_{contr\ max}$ bar |
| Control oil volume (geom.) | | 0.6 cm ³ | 3 cm ³ |
| Housing material and surface coating | | Steel (body) galv. zinc plated | Light alloy (body) black anodized |

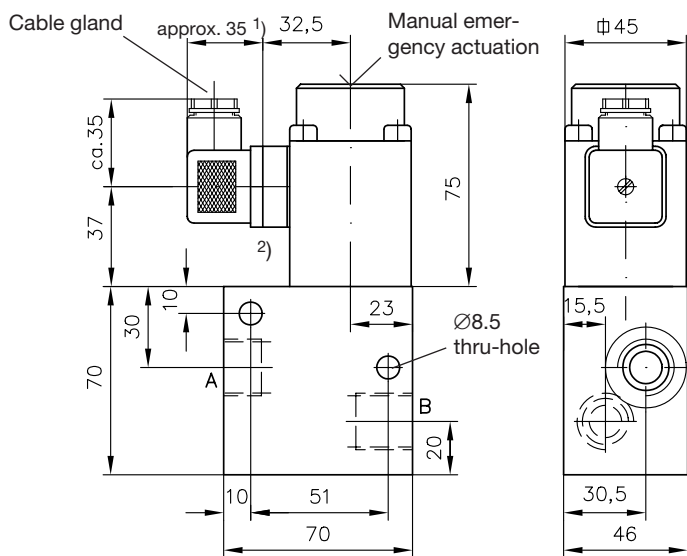
4. Unit dimensions

All dimensions are in mm and subject to change without notice!

4.1 Version for pipe connection

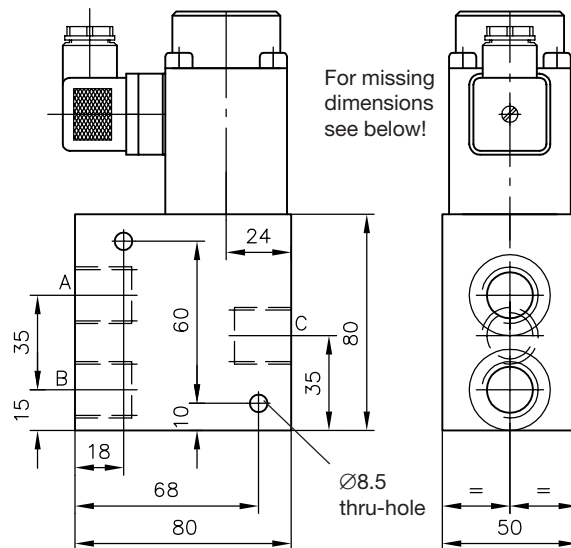
Illustrations are with solenoid actuation (coding **G..** or **WG..**), for other actuations see below

Type BVG 3 R(S)



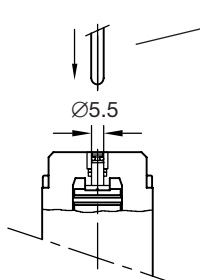
Ports conf. ISO 228/1 (BSPP):
A and B = G 1/2

Type BVG 3 Z



Ports conf. ISO 228/1 (BSPP):
A, B, and C = G 1/2

Manual emergency actuation



Actuation aid
(do not use any sharp-edged parts)

The valve may be actuated by pressing down the brass bolt visible from above by means of a steel pin or a screw driver etc.

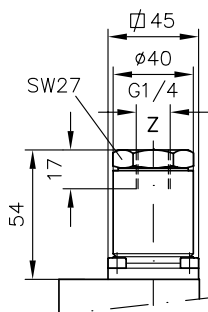
Note: All pressure apparent at port B loads on the cross section of the brass bolt $\varnothing 5.5$ i.e. 100 bar or 240 N !

1) **Note:** This dimension is depending on the manufacturer and can be up to max. 40 mm acc. to DIN EN 175 301-803!

2) When required the solenoid may be rotated to the valve body by another $4 \times 90^\circ$ in addition to the standard assembly position illustrated here.

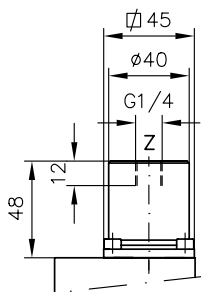
Hydraulic actuation

Coding **H 1/4**



Pneumatic actuation

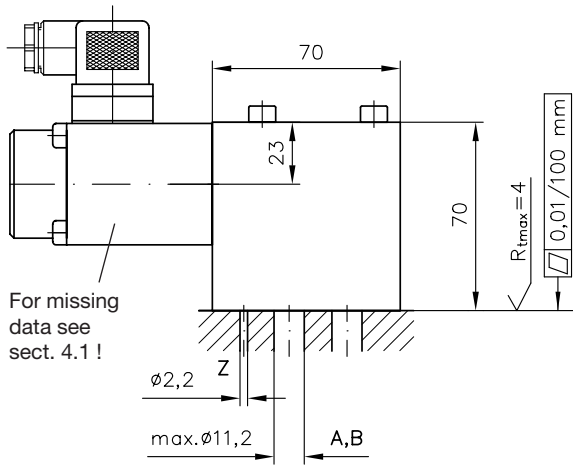
Coding **P**



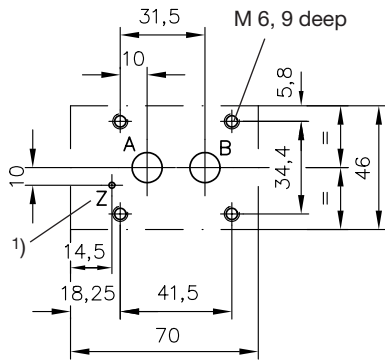
4.2 Version for manifold mounting

Illustrations are with solenoid actuation (coding **G..** or **WG..**), for other actuations see below 4.1

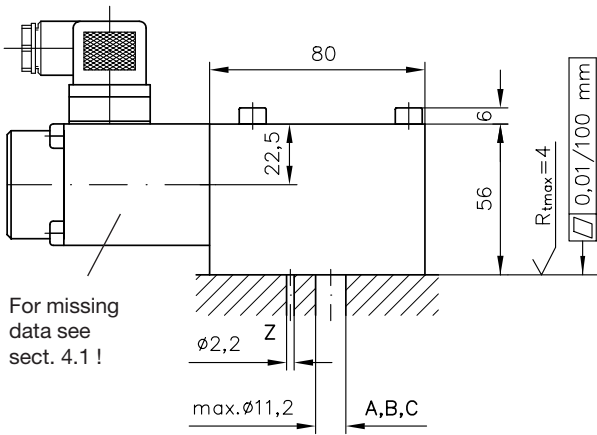
Type BVP 3 R(S)



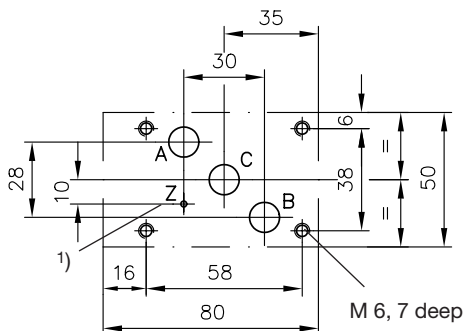
Hole pattern of the manifold (top view)



Type BVP 3 Z

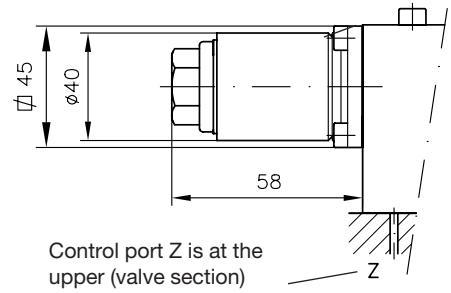


Hole pattern of the manifold (top view)

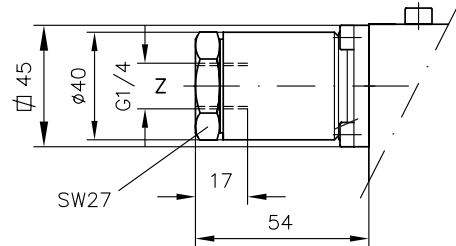


Hydraulic actuation

Coding **H**

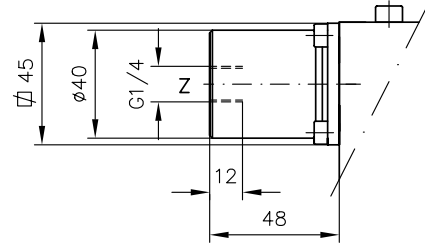


Coding **H 1/4**



Pneumatic actuation

Coding **P**



Sealing of ports A, B, and C via O-rings 13.95x2.62 NBR 90 Sh

Port Z: via O-ring 2.54x1.78 NBR 90 Sh

Available as spare part, seal-kit DS 7400-3 incl. O-rings for actuation coding H, H 1/4.

1) Control port Z is only apparent at versions with hydraulic actuation coding H!

5. Appendix

5.1 Type BVG 11(12 and 2) or BVP 11(2)

Run-out design do not use for new layouts! (Alternative, type BVG 1 and BVP 1 acc. to D 7765)

Order examples:

BVG 11 R - G 24
BVP 2 S/B 1,5 - WG 230



Table 5: Basic type and size

| Coding | Design and connection | Flow Q_{max} (lpm) | Pressure p_{max} (bar) |
|---------------|----------------------------|----------------------|--------------------------|
| BVG 11 | G 1/4 Pipe connection | 12 | 320 |
| BVG 12 | G 3/8 connection ISO 228/1 | 20 ¹⁾ | |
| BVG 2 | G 3/8 (BSPP) | 20 | |
| BVP 11 | Manifold mounting | 12 | 320 |
| BVP 2 | | 20 | |

Table 6: Additional orifice (at ports A, B, and C, see also sect. 3.1)

| Basic type | Coding | Ø (mm) | for subsequent orders |
|-----------------|---------------|----------|-----------------------|
| BVG 11 | B 0,6 | 0.6 | 7406 012 b |
| | B 0,8 | 0.8 | 7406 012 c |
| | B 1,1 | 1.1 | 7406 012 d |
| | B 1,3 | 1.3 | 7406 012 f |
| | B 1,5 | 1.5 | 7406 012 h |
| | ²⁾ | 0 | 7406 012 a |
| BVG 2 | B 0,4 | 0.4 | 7400 003 k |
| | B 0,5 | 0.5 | 7400 003 l |
| | B 0,6 | 0.6 | 7400 003 d |
| | B 0,7 | 0.7 | 7400 003 m |
| | B 0,8 | 0.8 | 7400 003 e |
| | B 0,9 | 0.9 | 7400 003 n |
| | B 1,0 | 1.0 | 7400 003 o |
| | B 1,1 | 1.1 | 7400 003 g |
| | B 1,3 | 1.3 | 7400 003 h |
| | B 1,5 | 1.5 | 7400 003 c |
| | B 2,0 | 2.0 | 7400 003 f |
| | B 2,5 | 2.5 | 7400 003 i |
| | B 4,0 | 4.0 | 7400 003 b |
| | ²⁾ | 0 | 7400 003 a |
| BVP 11 BVP 2 | B 0,6 | 0.6 | 7921 012-0,6 |
| | B 0,8 | 0.8 | 7921 012-0,8 |
| | B 1,1 | 1.1 | 7921 012-1,1 |
| | B 1,3 | 1.3 | 7921 012-1,3 |
| | B 1,5 | 1.5 | 7921 012-1,5 |
| | B 2,0 | 2.0 | 7921 012-2,0 |
| | B 2,5 | 2.5 | 7921 012-2,5 |
| ²⁾ | 0 | 7921 012 | |

Table 7: Actuation modes

| Actuation | Coding, note |
|---|---|
| Solenoid  | G 12, L 12, X 12 G 24, L 24, X 24 WG 100, X 98 WG 230, X 205 G 24 EX ³⁾ Ex-proof design $U_N = 24 \text{ V DC}$; $p_{max} = 220 \text{ bar}$! |
| Manual  | A for type BVG 11(12) ! Body material and surface treatment = Steel (lever housing gas nitrated) Actuation torque = approx. 70 Nm at 320 bar |

Symbols (see table 2 sect. 2)

Attention: Symbol Z not available for type BVG 12 !

- 1) With solenoid actuation:
20 lpm up to 200 bar
12 lpm up to 320 bar and $\leq 80\%$ ED
see also sect. 3.1 "Flow"
- 2) Undrilled for customized diameter acc. to Δp -Q-curve of the orifices, sect. 3.1
- 3) Only with type BVP 11(2), not available for type BVG.. (housing dimensions too small - radiation insufficient)

Further parameters

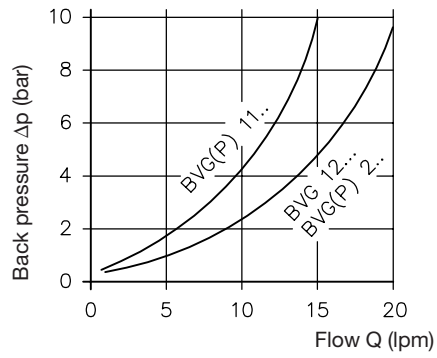
For general and electrical data see sect. 3.1 or 3.2

Mass (weight) approx. kg

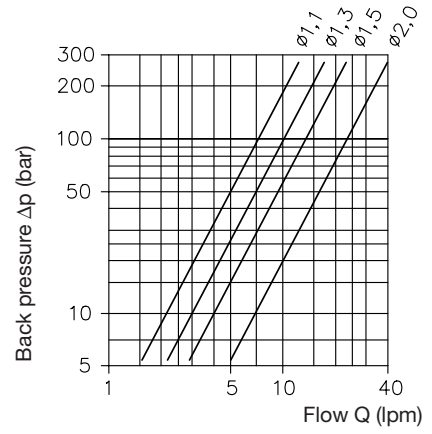
| | | | | |
|-------------------------|----------------------------|----------|-------------|----------|
| Complete with actuation | BVG 11 R(S) BVG 12 R(S) | BVG 11 Z | BVP 11 R(S) | BVP 11 Z |
| Solenoid | 1.0 | 1.6 | 0.9 | 1.0 |
| Manual | 0.6 | --- | --- | --- |
| Complete with actuation | BVG 2 R(S) | BVG 2 Z | BVP 2 R(S) | BVP 2 Z |
| Solenoid | 1.3 | 1.7 | 1.1 | 1.4 |

Δp -Q-curve

Basic valve



Additional orifices



Viscosity of the oil during tests approx. 60 mm²/s

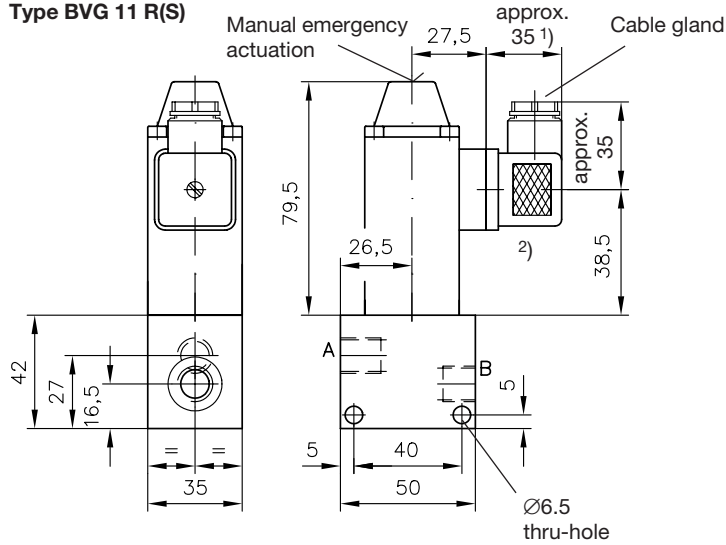
Unit dimensions

All dimensions are in mm and subject to change without notice!

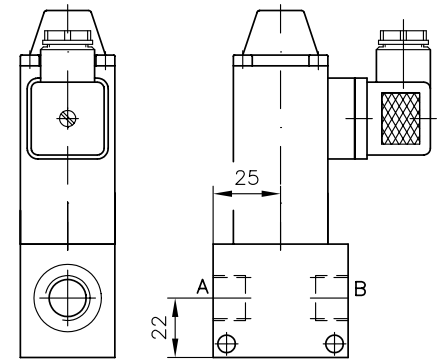
Version for pipe connection

Illustration with solenoid actuation (coding **G..** or **WG..**); For manual actuations, see below

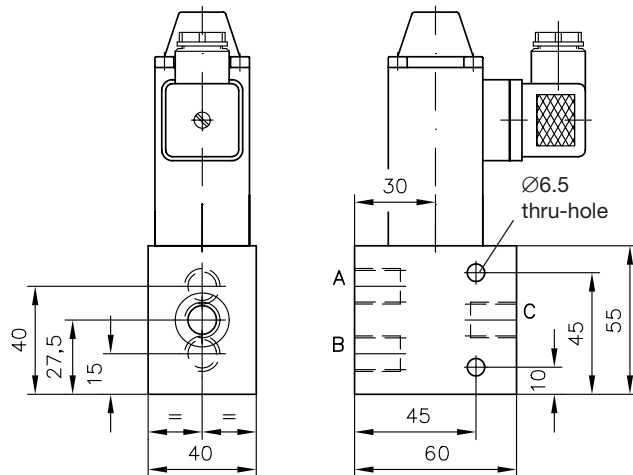
Type BVG 11 R(S)



Type BVG 12 R(S)

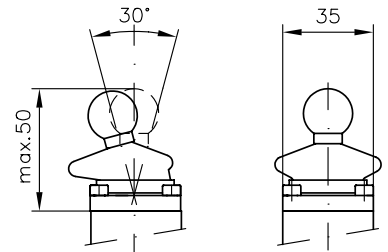


Type BVG 11 Z



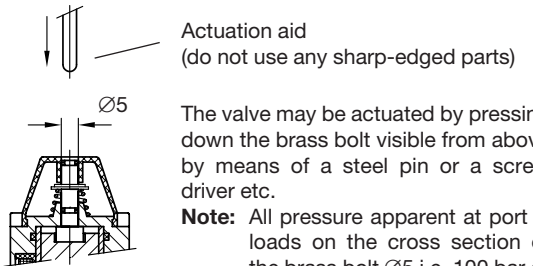
Manual emergency actuation

Coding **A** (applies to type BVG ..11(12))



Manual emergency actuation

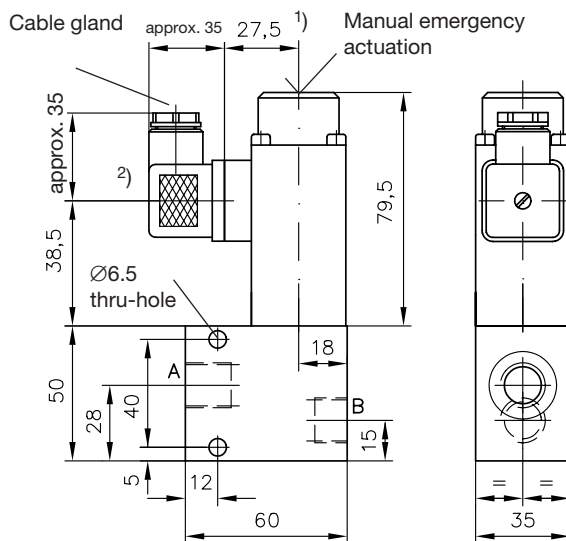
(applies to type BVG ..11(12 and 2))



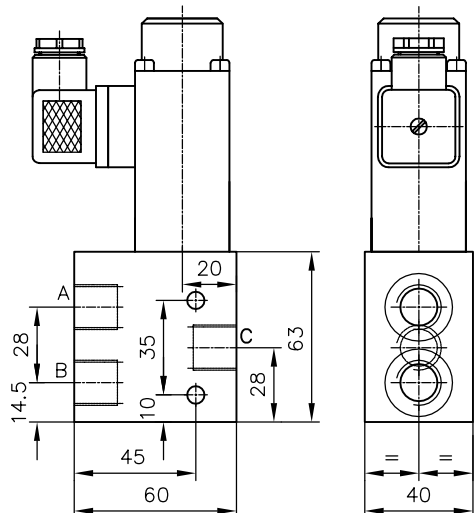
Ports conf. ISO 228/1 (BSPP):
A, B, and C = G 1/4 (BVG 11 R, S and Z)
= G 3/8 (BVG 12 R and S)

Note: All pressure apparent at port B loads on the cross section of the brass bolt $\varnothing 5$ i.e. 100 bar or 195 N!

Type BVG 2 R(S)



Type BVG 2 Z



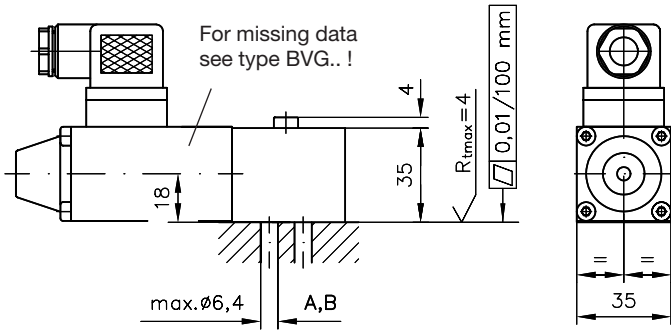
- 1) **Note:** This dimension is depending on the manufacturer and can be up to max. 40 mm acc. to DIN EN 175 301-803!
- 2) When required the solenoid may be rotated to the valve body by another $4 \times 90^\circ$ in addition to the standard assembly position illustrated here.

Ports conf. ISO 228/1 (BSPP):
A, B, and C = G 3/8

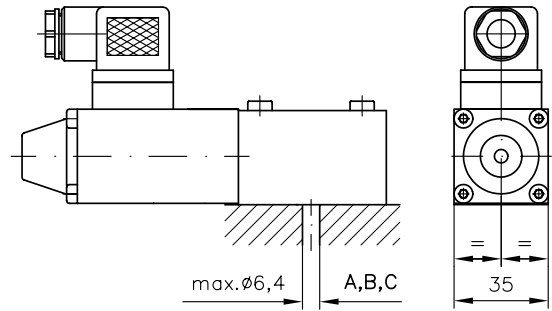
Version for manifold mounting

Illustration with solenoid actuation (coding **G..** or **WG..**), For manual actuations, see type BVG..

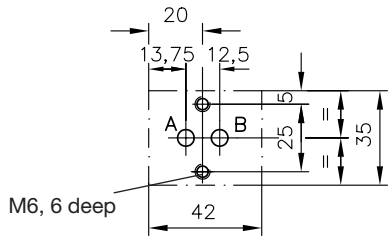
Type BVP 11 R(S)



Type BVP 11 Z



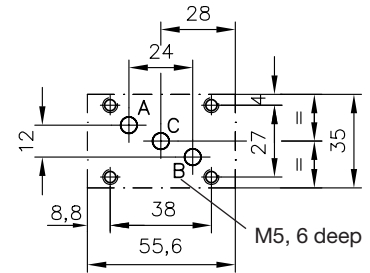
Hole pattern of the manifold (top view)



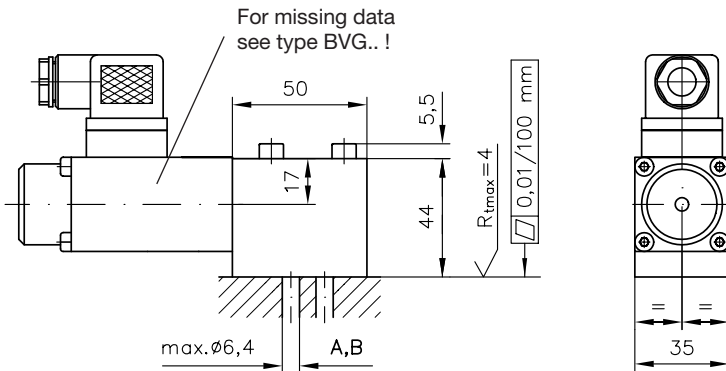
Sealing of ports A, B, and C via O-rings 7.65x1.78 NBR 90 Sh.

Available as spare part, seal-kit DS 7400-1.

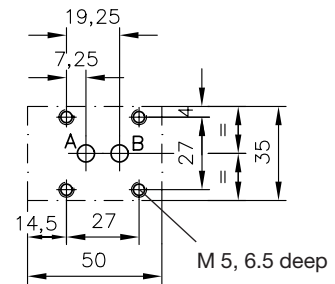
Hole pattern of the manifold (top view)



Type BVP 2 R(S)



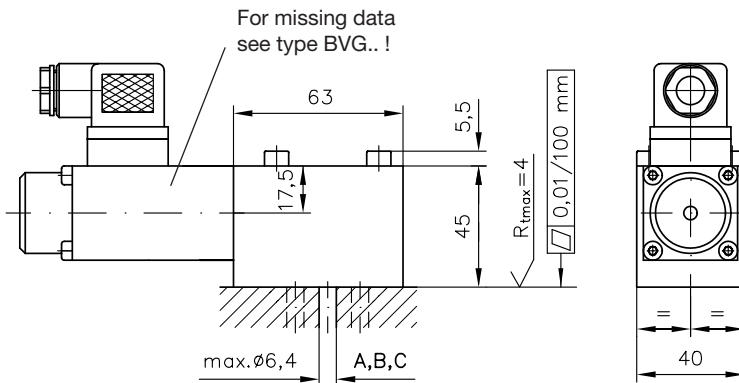
Hole pattern of the manifold (top view)



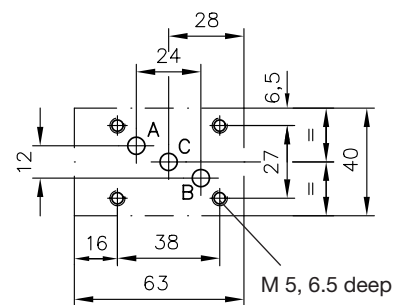
Sealing of ports A, B, and C via O-rings 7.65x1.78 NBR 90 Sh.

Available as spare part, seal-kit DS 7400-1.

Type BVP 2 Z



Hole pattern of the manifold (top view)



Sealing of ports A, B, and C via O-rings 7.65x1.78 NBR 90 Sh.

Available as spare part, seal-kit DS 7400-1.

5.2 2/2-way directional valve with by-pass check valve

There is a modified version of valve type BVG-2R available, which may be equipped with a check valve to by-pass the blocked passage B→A.

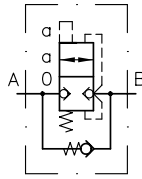
Order example: BVG R 2 R - ...

Coding like in sect. 5.1

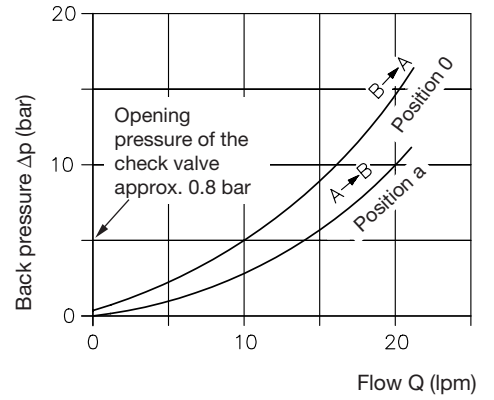
R = By-pass check valve

Note: Dimensional drawing and mass (weight) like type BVG 2 R acc. to sect. 5.1

Symbol



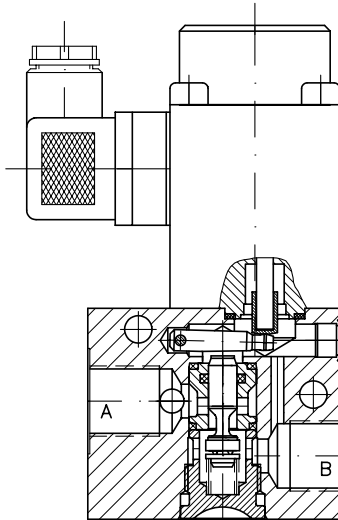
Δp -Q-curve



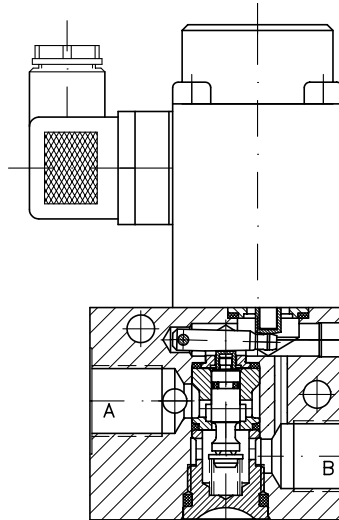
5.3 Schematic cross sectional views (standard versions acc. to sect. 2)

The schematic cross sectional views are represented here to show the functional principle, illustrated are valves in actuated state. They do apply to all actuations acc. to table 4.

Type BVG 3 R..



Type BVG 3 S..



Type BVG 3 Z..

