

# 2/2- and 3/2-way directional seated valves type BVG 1 and BVP 1

for any flow direction, zero leakage, all ports pressure resistant

Pressure  $p_{\max}$  = 400 bar  
Flow  $Q_{\max}$  = 20 lpm

Additional valves with same function

- Type BVG 3, BVP 3      D 7400 ( $Q_{\max}$  = 50 lpm,  $p_{\max}$  = 315 bar)
- Type NBVP 16          D 7765 N ( $Q_{\max}$  = 20 lpm,  $p_{\max}$  = 400 bar, NG 6)
- Type BVE                D 7921 ( $Q_{\max}$  = 70 lpm,  $p_{\max}$  = 400 bar, cartridge valve)

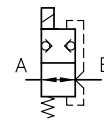
## 1. General, brief description

The 2/2- and 3/2-way directional valves type BVG 1 and BVP 1 are seated cone valves, which are available with solenoid, hydraulic, pneumatic, or manual actuation. All ports are equally pressure resistant, due to the internal pressure compensation. Valves featuring a spring return will return automatically into their idle position when not activated. The detented version will achieve its idle or working position after a brief impulse at the opposing solenoid.

### • Version for pipe connection



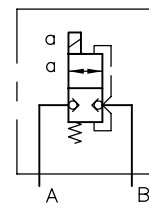
Example:  
Type BVG 1 S - G 24 - 1/4



### • Version for manifold mounting

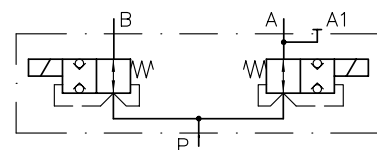


Example:  
Type BVP 1 R - WGM 230



### • Version as double valve (distribution valve)

Example:  
Type BVG 112 S - GM 24



## 2. Available versions

### 2.1 Type coding, main data

**BVP 1 R** - **WGM 230**  
**BVG 1 Z** - **H** - **3/8**  
**BVG 1 R** /**B 1,1 - A** - **1/4**

Version as double valve (distribution valve)  
 Type **BVG 112** see sect. 5.3

**Table 1:** Basic type

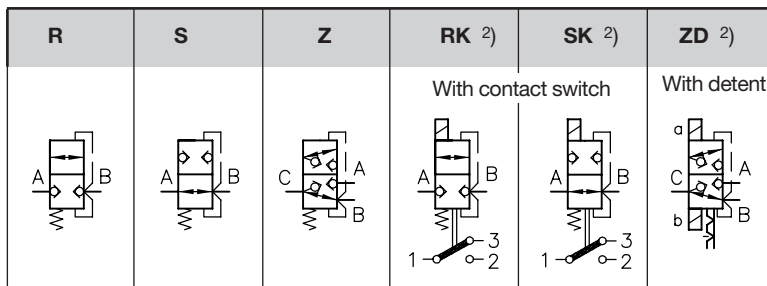
Coding	Description	Flow Q <sub>max</sub> (lpm)	Pressure p <sub>max</sub> (bar)	Ports A, B, C acc. to ISO 228/1 (BSPP)
<b>BVG 1</b>	Pipe connection ISO 228/1 (BSPP)	20	400/ 250 <sup>1)</sup>	<b>1/4</b> <b>3/8</b> optional
<b>BVP 1</b>	Manifold mounting			See dimensional drawing: Version with indiv. connection block, see sect. 5.2

Actuation, see table 4 on page 3

**Table 2:** Additional elements  
 (for ports A, B, and C, see also section 3.1 „Flow limitation“)

Additional element	Suited for	Coding <sup>4)</sup>	∅ (mm)	Additional element	Suited for	Coding <sup>4)</sup>	∅ (mm)
Orifice <sup>3)</sup>	BVG 1	<b>B 0,6</b>	0.6	Orifice	BVP 1 Z BVP 1 ZD	<b>B 0,8</b>	0.8
		<b>B 0,8</b>	0.8			<b>B 1,0</b>	1.0
		<b>B 1,1</b>	1.1			<b>B 1,2</b>	1.2
		<b>B 1,3</b>	1.3			<b>B 1,4</b>	1.4
		<b>B 1,5</b>	1.5				
Orifice	BVP 1 R BVP 1 RK BVP 1 S BVP 1 SK	<b>B 0,6</b>	0.6	Check valve (in A, B, or C)	BVP 1 Z BVP 1 ZD	<b>R</b>	---
		<b>B 0,8</b>	0.8				
		<b>B 1,1</b>	1.1				
		<b>B 1,3</b>	1.3				
		<b>B 1,5</b>	1.5				
		<b>B 2,0</b>	2.0				
		<b>B 2,5</b>	2.5				

**Table 3:** Flow pattern symbols



1) 250 bar applies to solenoid actuation coding GM..., WGM.. (acc. to table 4)

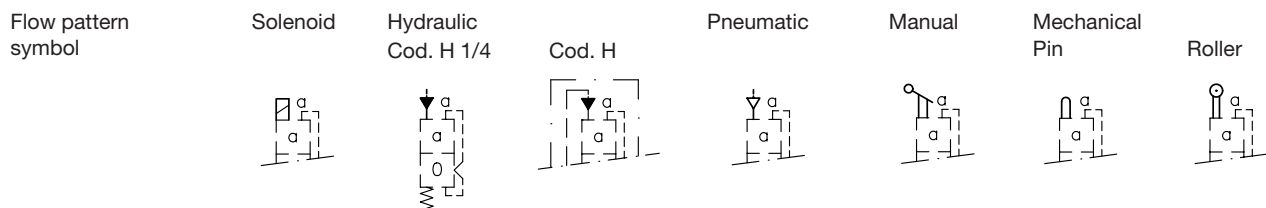
2) Only with solenoid actuation

3) Not possible with port size G 3/8 (BSPP)

4) Part No. for spare parts order etc. see section 5.1 "Appendix"

**Table 4:** Actuation modes

Actuation	Pressure p <sub>max</sub> (bar)	For flow pattern symbols	Coding			Main data, also see section 3.2
			with plug	Plug with LED	Without plug	
Solenoid	400	R (RK), S (SK), Z (ZD)	<b>G 12</b> <b>G 24</b> <b>WG 110</b> <sup>2)</sup> <b>WG 230</b> <sup>2)</sup>	<b>L 12</b> <b>L 24</b> --- ---	<b>X 12</b> <b>X 24</b> <b>X 98</b> <b>X 205</b>	U <sub>N</sub> = 12 V DC U <sub>N</sub> = 24 V DC U <sub>N</sub> = 110 V AC, 50/60 Hz (98 V DC) U <sub>N</sub> = 230 V AC, 50/60 Hz (205 V DC)
	250	R, S, Z	<b>GM 12</b> <sup>3)</sup> <b>GM 24</b> <sup>3)</sup> <b>WGM 110</b> <sup>2) 3)</sup> <b>WGM 230</b> <sup>2) 3)</sup>	<b>LM 24</b> <b>LM 24</b> --- ---	<b>XM 12</b> <b>XM 24</b> <b>XM 98</b> <b>XM 205</b>	U <sub>N</sub> = 12 V DC U <sub>N</sub> = 24 V DC U <sub>N</sub> = 110 V AC, 50/60 Hz (98 V DC) U <sub>N</sub> = 230 V AC, 50/60 Hz (205 V DC)
	220	all	<b>G 24 EX</b> <sup>1)</sup>	---	---	U <sub>N</sub> = 24 V DC
Hydraulic	400	R, S, Z	<b>H 1/4</b>	External control oil port G 1/4 (BSPP)		Control: p <sub>contr. min</sub> = 24 bar p <sub>contr. max</sub> = 400 bar
			<b>H</b>	Control oil port (type BVP 1)		
Pneumatic	400		<b>P</b>	External control port G 1/4 (BSPP)		Control: p <sub>contr. min</sub> = 3 bar p <sub>contr. max</sub> = 15 bar
Manual	400		<b>A</b>			Actuation torque: approx. 1.5 ... 3 Nm
Manual with detent	400		<b>CD</b>	with hand lever		Actuation torque: approx. 1.5 ... 3 Nm
			<b>KD</b> <sup>4)</sup>	without handlever		
Mechanical	400		<b>T</b>	Pin		Actuation force: F = approx. 80 ... 190 N
		<b>K</b>	Roller		Actuation force: F = approx. 22 ... 35 N	

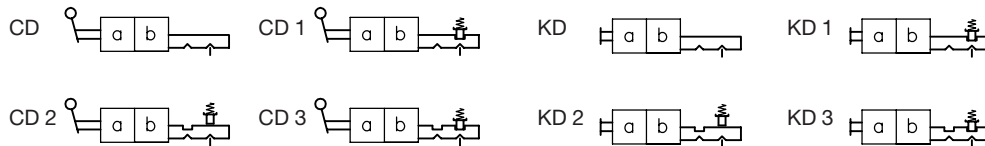


- 1) Explosion-proof version
- 2) DC-solenoid (98 V DC, 205 V DC) with bridge rectifier in the device socket
- 3) These symbols, together with solenoids GM, WGM, LM, XM, cost less than versions G, WG etc. but the max. pressure rating is lower!
- 4) actuation via tool, a/f 13

**Table 4 a:** Additionally locked at actuations CD and KD

--	without (no coding)	<b>2</b>	switching position a
<b>1</b>	switching position b	<b>3</b>	in switching position a and b

Symbols



### 3. Further characteristic data

#### 3.1 General and hydraulic data

Installed position Any

Overlap with 3/2-way directional valves Negative (overlap only apparent during transition from one to the other end position). All ports are interconnected during the switching process.

Operating pressure According to table 4, sect. 2.1

Static overload capacity Ports A, B, and C approx.  $2 \times p_{max}$

Housing material and surface coating Steel, gas nitrided (basic valve)

Mass (weight) approx. kg	Complete with actuation	BVG(P) 1 R BVG(P) 1 S	BVG 1 Z BVP 1 Z	BVG(P) 1 RK BVG(P) 1 SK	BVP 1 ZD BVG 1 ZD
Solenoid	G., G 24 EX, L., X., WG., M..	1.0	1.2	1.2	1.7
	GM., LM., XM., WGM..	0.9	1.1	1.0	1.5
Hydraulic	H, H 1/4	0.6	0.8	---	---
Pneumatic	P	0.5	0.7	---	---
Manual	A	0.9	1.1	---	---
Manual Without detent	CD	0.9	1.1	---	---
	KD				
Mechanical	T	0.6	0.8	---	---
	K	0.9	1.1	---	---

Pressure fluid Hydraulic oil conf. DIN 51514 part 1 to 3: ISO VG 10 to 68 conf. DIN 51519  
 Viscosity limits: min. approx. 4, max. approx. 1500 mm<sup>2</sup>/sec.  
 Optimal operation: approx. 10 ... 500 mm<sup>2</sup>/sec  
 Also suitable for 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, pay attention to the viscosity range!  
 Start temperature down to -40°C are allowable (Pay attention to the viscosity range during start!), as long as the operation temperature during subsequent running is at least 20K higher. Biological degradable pressure fluids: Pay attention to manufacturer's information. With regard to the compatibility with sealing materials do not exceed +70°C.

**Restrictions for version with ex-proof solenoid!**

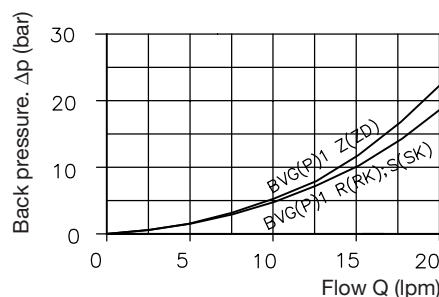
**Attention:** Observe the restrictions regarding the perm. duty cycles of the solenoids in sect. 3.2!

Flow  $Q_{max}$  acc. to sect. 2.1

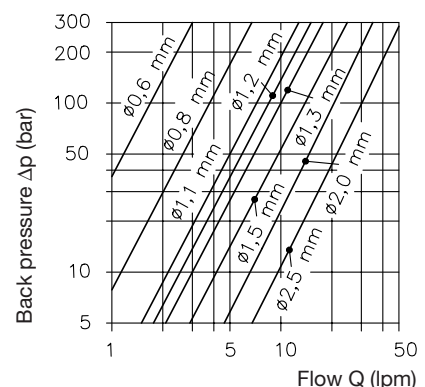
Flow limitation It is necessary to limit the flow down to the permissible range depending on the system pressure via orifices (see sect. 2.1). This applies to all circuits fed by an accumulator or when connected to high pressure circuits fed by high delivery pumps.  
 The orifice must be located on the accumulator side always. With valves version ..Z.. it is installed in port C as standard. It must be specified in uncoded text, when the orifices are desired in ports A or B. For more detailed information, see table 2, section 2.1.  
 The check valve prevents an unintended reversal of the flow direction. Mounting possibility like with orifices.



$\Delta p$ -Q-curve Basic valves



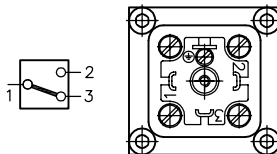
Additional orifices (Other diameters may be interpolated)



Viscosity during measurements approx. 60 mm<sup>2</sup>/sec

Electrical data for  
contact switch

Type	V4NC SET 7 Co. SAIA-Burgess
Mech. service life	$5 \times 10^6$
Electr. service life (approx. cycles)	12 V, 3 A = $0.05 \times 10^6$ , 100 mA = $3 \times 10^6$ ( $\cos \varphi = 1$ )
Power supply	12 V DC, 5 A 24 V DC, 5 A To ensure save function the min. current specifications must be maintained; $I_{\min}$ (12 V DC) = 10 mA, $I_{\min}$ (24 V DC) = 100 mA
Plug	DIN EN 175 301-803
Protection class (properly assembled)	IP 65 (acc. to IEC 60529)
Circuitry	Idle position 1-3 Working position 1-2



### 3.2 Actuators

#### Solenoid

		All solenoids are built and tested acc. to VDE 0580									
Coding		G 12 L 12 X 12	GM 12 LM 12 XM 12	G 24 L 24 X 24	GM 24 LM 24 XM 24	G 24 EX --- ---	WG 110 --- ---	WGM 110 --- ---	WG 230 --- ---	WGM 230 --- ---	
Nom. voltage	$U_N$ (V)	12	12	24	24	24	110	110	230	230	
		DC-voltage					AC-voltage AC, 50 and 60 Hz				
Nom. power	$P_N$ (W)	29.4	26.2	27.6	26.5	23.4	28.6	24.8	30.2	28	
Connection and circuitry Version G, GM, L, LM, WG, WGM: Plug conf. DIB DIN EN 175 301-803 A All plugs For additional plugs, see D 7163  Version G 24 EX: Cable cross section 3x0.5 mm <sup>2</sup> , Cable length 3 m, option 10 m (cable ÖLFLEX-440P ® Co. LAPP, D-70565 Stuttgart)		DC-voltage Type G... (applies also to the switches)			Type L..			AC-voltage Type WG..			
Switching time (reference value)		On or Off: approx. 50...60 ms, 2-3 longer with WG						Relative duty cycle during operation (100% ED stamping on the solenoid)			
Switchings/hour		approx. 2000, approximately evenly distributed									
Actuation pulse		Symbole ZD: approx. 500 ms									
Protection class		IP 65 (IEC 60529) (plug properly mounted) IP 67 (IEC 60529) with G 24 EX									
Insulation material class		F									
Contact. temperature		approx. 120°C, with ambient temperature 20°C									
Switch-off energy		WA ≤ 0.4 Ws									
Surface coating (solenoid)		DIN 50961-Fe/Zn 12 bk cC									

#### Electrical data for ex-proof solenoids

ATEX-Certificate of conformity	TÜV-A 12ATEX 0006 X
Coding	⊕ II 2 G Ex d IIB + H2 T4 Gb ⊕ II 2 D Ex tb IIIC T135°C Db
Oper. duration	100% ED
Duty cycle	IP 67 (IEC 60529)
Nom. voltage $U_N$	24 V DC
Power $P_N$	23 W
<b>Restrictions for use:</b>	
Ambient temperature	-35 ... +40°C
max. fluid temperature	+70°C
el. protection against overload (conf. IEC 60127)	$I_F < 1.6 A-T$
Surface coating	Housing galvanically zinc coated Coil and connection cavity are moulded

**Attention:** Protect the complete valve against direct sun light.

Observe the operation manuals B 03/2004 and B ATEX!

Electrical lay-out and testing conforming EN 60079, VDE 0170-1, VDE 0170-5

		Hydraulic (coding H 1/4)	Pneumatic (coding P)	Manual (coding A, CD, KD)	Mechanical (coding T) (coding K)	
Control pressure	$p_{contr. min}$	24 bar	3 bar	---	---	---
	$p_{contr. max}$	400 bar	15 bar	---	---	---
Permissible residual pressure in the control line for save return into the idle position		< 2 bar	---	---	---	---
Prot. Z overload capacity		approx. 1.5 $p_{contr. max}$ bar	approx. 1.5 $p_{contr. max}$ bar	---	---	---
Control displacement (geometric)		1.4 cm <sup>3</sup>	9.3 cm <sup>3</sup>	---	---	---
Housing material and surface coating		Steel (control housing) galvanized	Light alloy (control housing) black anodized	Steel (lever housing) gas nitrided	Steel (control housing) gas nitrided	
Actuation moment		---	---	approx. 1.5 ... 3 Nm	---	---
Actuation force		---	---	---	approx. 80...190 N	approx. 22...35 N

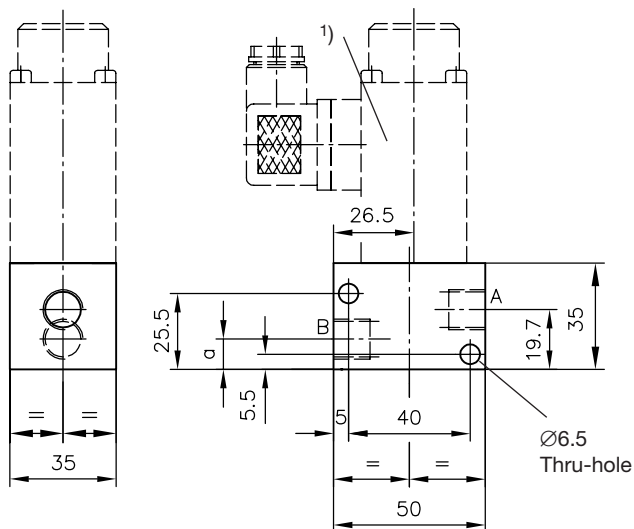
## 4. Unit dimensions

All dimensions in mm, subject to change without notice!

### 4.1 Valve section

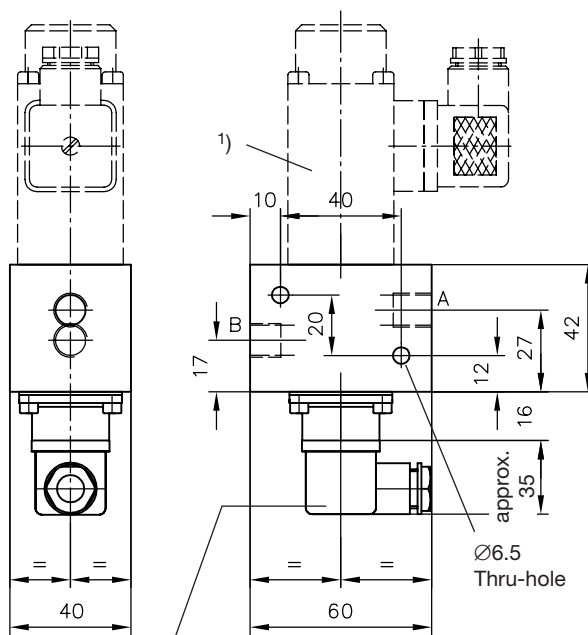
Version for pipe connection

#### Type BVG 1 R(S)



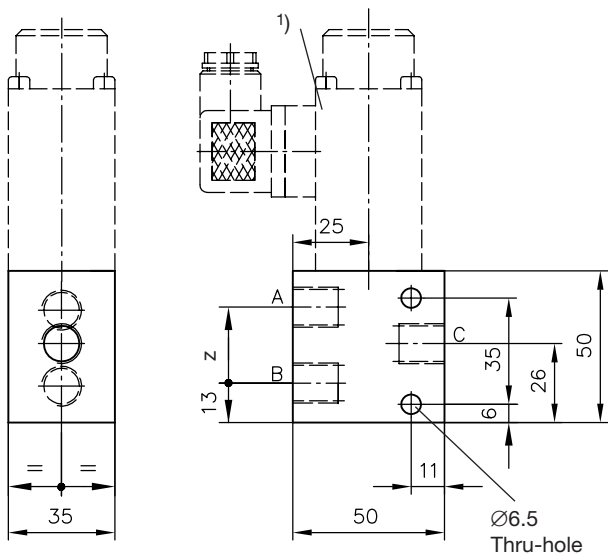
	a
BVG 1 R(S) - 1/4	10
BVG 1 R(S) - 3/8	12

#### Type BVG 1 RK(SK)



Switch  
(For missing data of the plug, see solenoid actuation section 4.2)

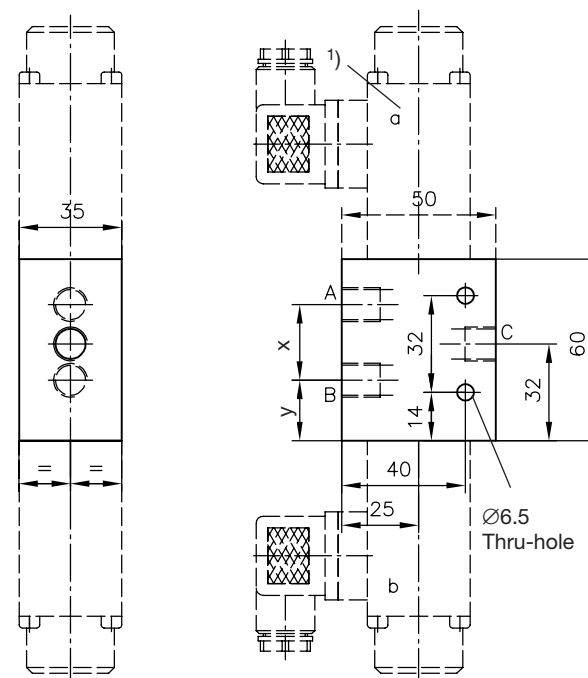
#### Type BVG 1 Z



Ports conf. ISO 228/1 (BSPP):  
A, B, and C = optional G 1/4 or G 3/8

Ports (BSPP)	z	x	y
G 1/4	25	24	20
G 3/8	27	26	18.5

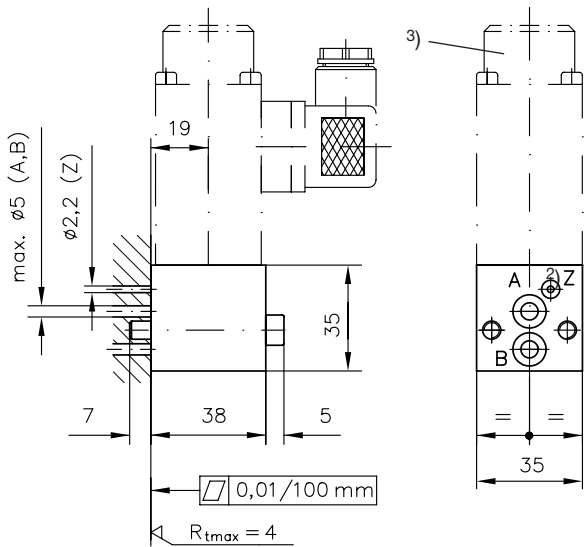
#### Type BVG 1 ZD



1) For dimension of the differing actuations, see section 4.2!

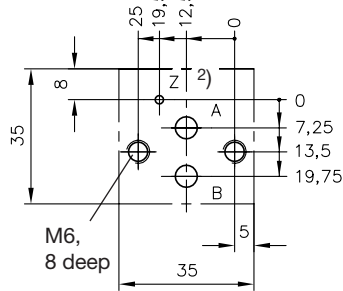
**Version for manifold mounting**

**Type BVP 1 R(S)**

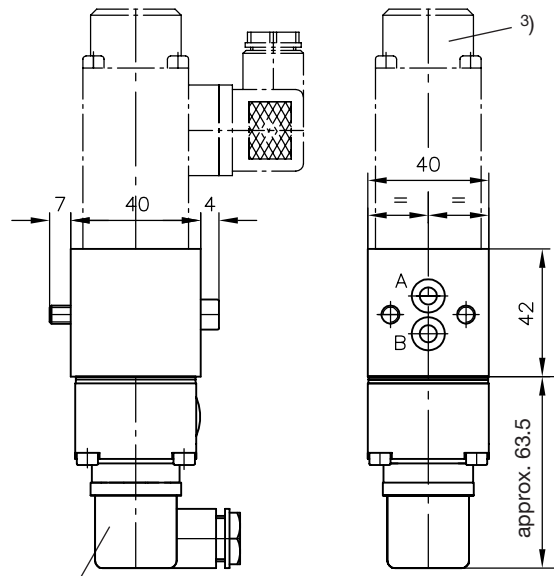


**Hole pattern manifold**  
(view from top)

Sealing of the ports via  
O-ring NBR 90 Sh 1):  
A, B = 7.65x1.78  
Z = 2.54x1.78

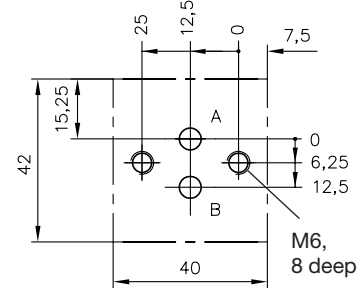


**Type BVP 1 RK(SK)**

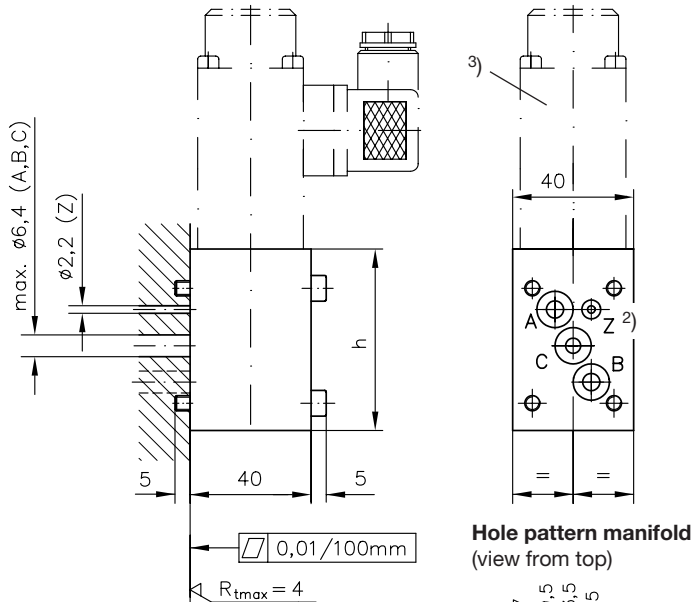


Switch  
(For missing data of  
the plug, see  
solenoid actuation  
section 4.2)

**Hole pattern manifold**  
(view from top)



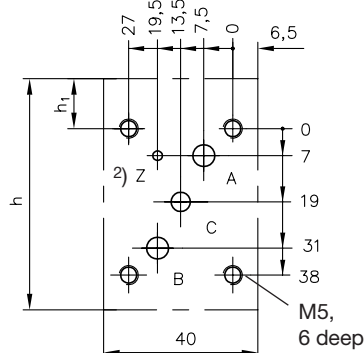
**Type BVP 1 Z**



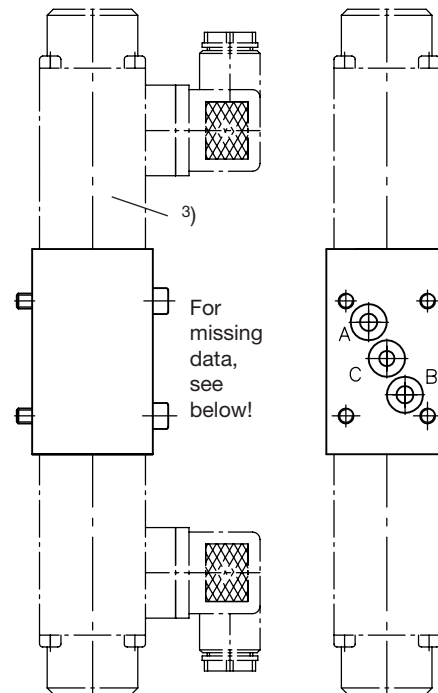
**Hole pattern manifold**  
(view from top)

Type	h	h <sub>1</sub>
BVP 1-Z	53	8
BVP 1-ZD	60	13

Sealing of the ports via  
O-ring NBR 90 Sh 1):  
A, B, C = 8.73x1.78  
Z = 2.54x1.78



**Type BVP 1 ZD**



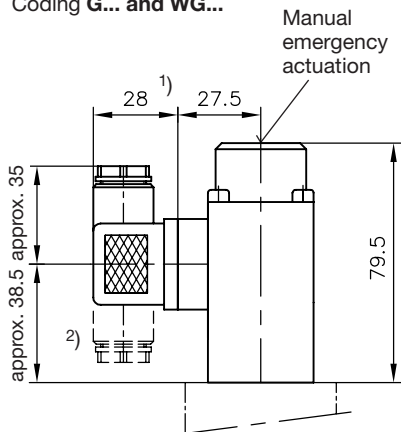
- 1) Part of seal kit DS 7765-1  
(including O-rings for actuation H, H 1/4)
- 2) Port Z only with actuation coding H
- 3) For dimension of the differing actuations,  
see section 4.2!



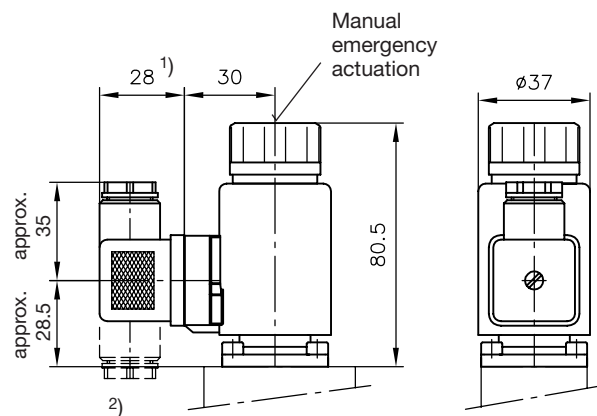
## 4.2 Actuators

### Electrical actuation

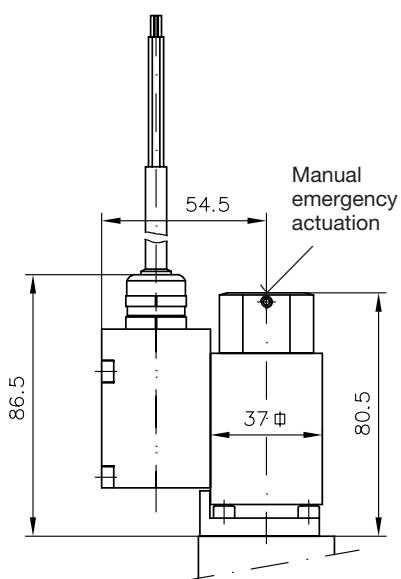
Coding **G... and WG...**



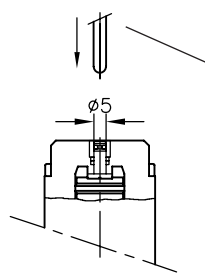
Coding **GM... and WGM...**



Coding **G 24 EX**



### Manual emergency operation



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

The valve can be actuated, if required, by pushing the emergency actuation pin inward (visible from the top side) by means of a screw driver or similar.

**Attention:**  
The pressure apparent at port B acts as a counter force resulting in approx. 195 N at 100 bar!

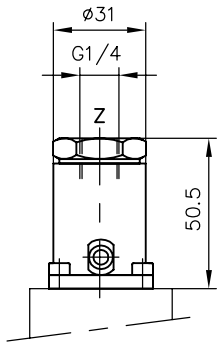
1) **Attention:** This dimension is depending on the manufacturer and can be max. 40 mm acc. to DIN EN 175 301-803 A.

2) Both solenoid and plug may be rotated 4x90°.

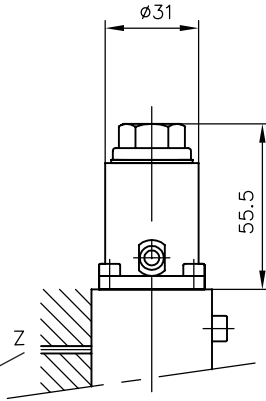
**Hydraulic actuation**

Coding **H 1/4**  
(with BVP 1)

Coding **H**  
(with BVG 1)



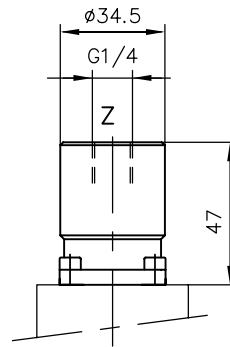
Coding **H**  
(with BVP 1)



Control port Z is located at the valve element (section 4.1!)

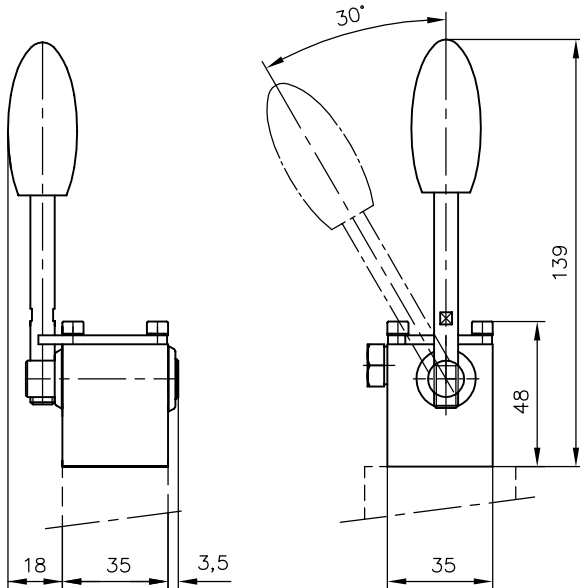
**Pneumatic actuation**

Coding **P**

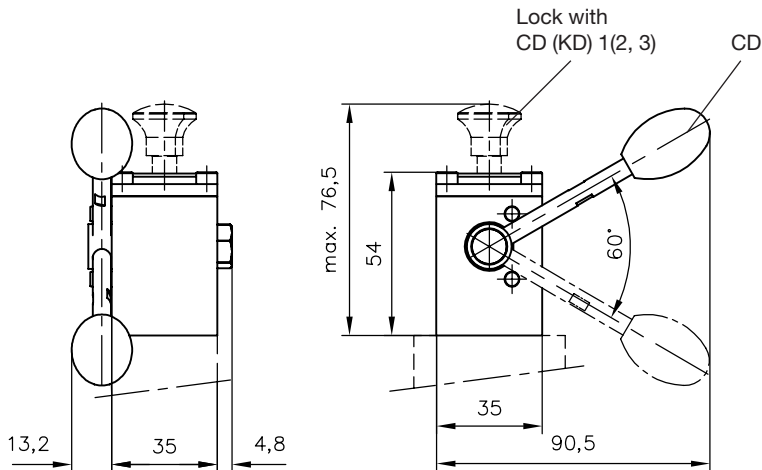


**Manual actuation**

Coding **A**



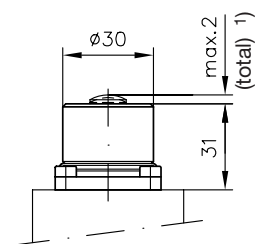
Coding **CD, KD**



Continuation actuations

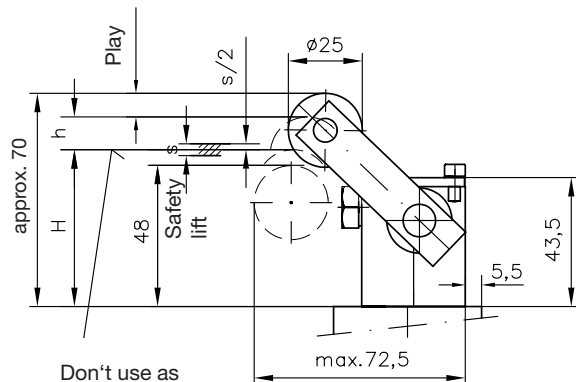
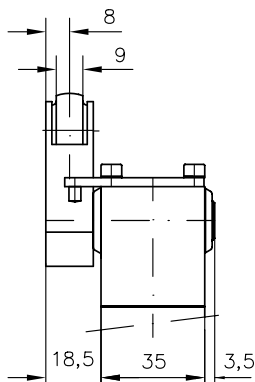
**Mechanical actuation**

Coding T



1) Shares: 0.5 mm play  
1 mm operation travel  
0.5 mm safety lift

Coding K



Actuation force F  
for 100 ... 400 bar:  
Type BVG(P) 1 R-T = 80 ... 140 N  
BVG(P) 1 Z(S)-T = 140 ... 190 N

Working stroke (mm) with	BVG(P) 1 R-K	BVG(P) 1 S-K	BVG(P) 1 Z-K
Start of function (H+h)	66	66	66
Functional travel h	14	10	14
Switching position range s	---	±1	±1
Actuation force N	approx. 26	approx. 22	approx. 35

**5. Appendix**  
**5.1 Parts No. for orifices (retrofitting)**

Coding	Suited for type	Parts No.
<b>without hole</b>	BVG 1.-1/4	7406 012 a
<b>B 0,6</b>		7406 012 b
<b>B 0,8</b>		7406 012 c
<b>B 1,1</b>		7406 012 d
<b>B 1,3</b>		7406 012 f
<b>B 1,5</b>		7406 012 h
<b>without hole</b>	BVP 1 R(S)	7921 012
<b>B 0,6</b>		7921 012-0,6
<b>B 0,8</b>		7921 012-0,8
<b>B 1,1</b>		7921 012-1,1
<b>B 1,3</b>		7921 012-1,3
<b>B 1,5</b>		7921 012-1,5
<b>B 2,0</b>		7921 012-2,0
<b>B 2,5</b>		7921 012-2,5

Coding	Suited for type	Parts No.
<b>without hole</b>	BVP 1 Z	7785 018
<b>B 0,8</b>		7785 018 a
<b>B 1,0</b>		7785 018 b
<b>B 1,2</b>		7785 018 c
<b>B 1,4</b>		7785 018 d
<b>R</b>	BVP 1 Z(ZD)	ER 12

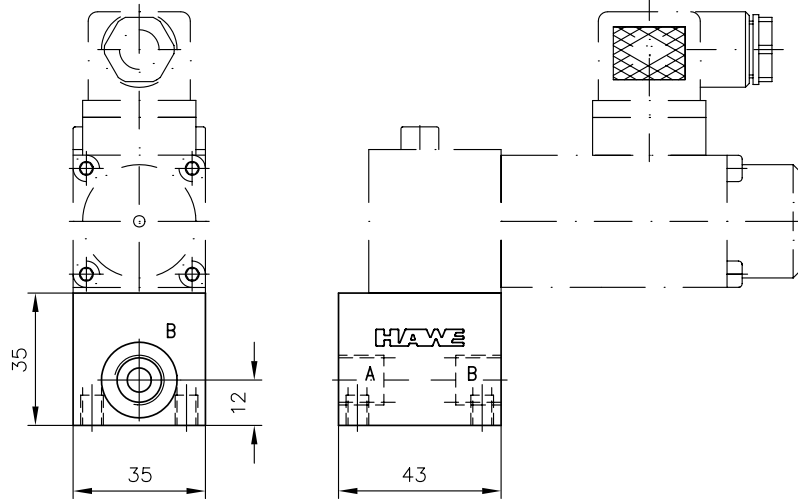
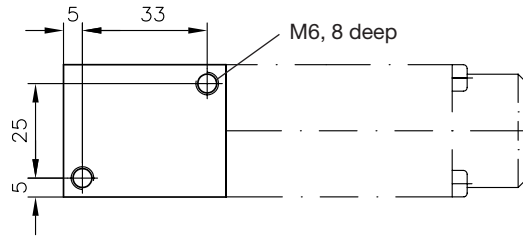
## 5.2 Individual connection block for valves type BVP 1

### Available versions

		Order No.
BVP 1	R(RK) - ... -	1/4 7921 092
	S(SK) - ... -	3/8 7921 093

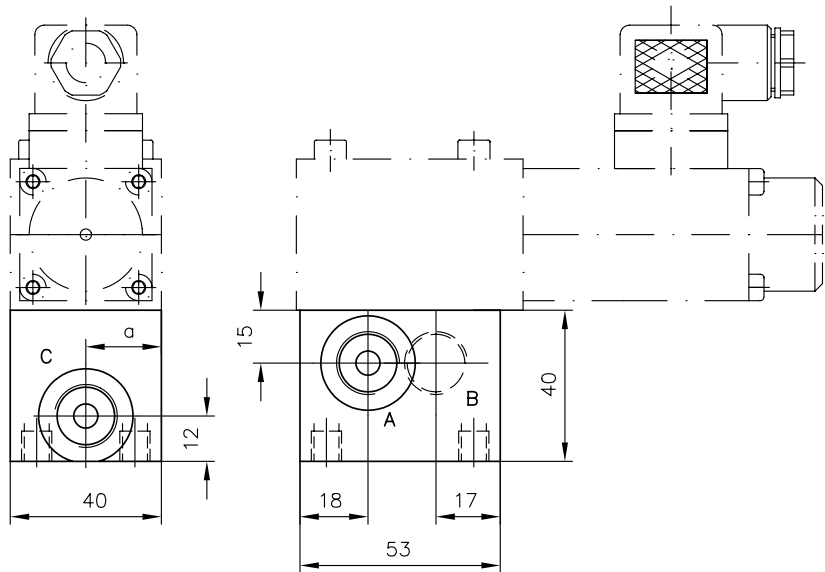
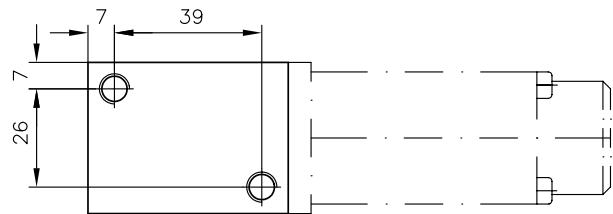
Ports conf. ISO 228/1 (BSPP):  
A and B = G 1/4 or G 3/8

### Dimensions



		Order No.	a
BVP 1	Z(ZD) - ... -	1/4 7921 094	20
		3/8 7921 095	24

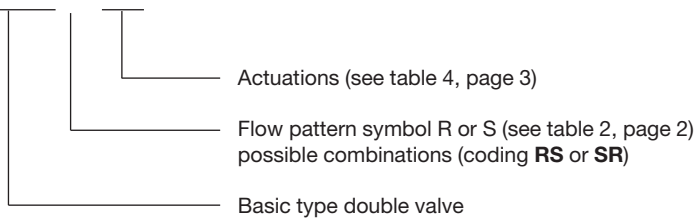
Ports conf. ISO 228/1 (BSPP):  
A, B, and C = G 1/4 or G 3/8



### 5.3 Double valve (distribution valve)

Order coding:

**BVG 112 R - G 24**

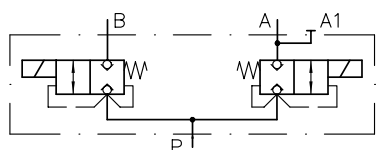


$Q_{max} = 20 \text{ lpm}$

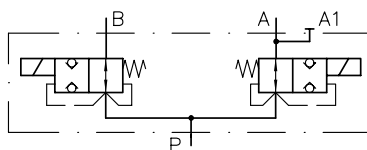
$P_{max}$  = According actuation (see table 4, page 3)

Flow pattern symbol (illustrated here with solenoid actuation)

**Type BVG 112 R - G 24**



**Type BVG 112 S - G 24**



#### Dimensions

