

# Directional seated valve type BVE

## Product documentation



Operating pressure  $p_{\max}$ :

500 bar

Flow rate  $Q_{\max}$ :

300 l/min



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**1****Overview of directional seated valve type BVE**

Directional seated valves are a type of directional valve. Their function is to direct the flow of hydraulic medium in certain directions, therefore connecting the relevant connections, or shutting off the flow with zero leakage. By this means they control the movement of the actuators in a hydraulic system.

The directional seated valve type BVE is a screw-in valve. 2/2 and 3/2 directional seated valves are available. All connections can be subjected to the same pressures.

Type BVE 1F according to D 7921 F can be used for highly viscous media (e.g. lubricating grease).

Appropriate connection blocks enable direct pipe connection or manifold mounting.

**Features and advantages**

- Any flow direction
- Large range of plug options
- Long service life thanks to hardened seat
- Large number of single connection blocks

**Intended applications**

- Construction and construction materials machinery
- Handling and assembly technology
- Machines for forestry purposes



*Directional seated valve type BVE 3*

## 2 Available versions

### Ordering example

BVE 3	Z	-G 24	T	-1/2	-B 2,5
					2.6 "Orifices/check valves (additional elements)"
					2.5 "Single connection block"
					2.4 "Actuating solenoid addition (type BVE 1 only)"
					2.3 "Actuating solenoid"
					2.2 "Circuit symbol"
					2.1 "Basic type and size"

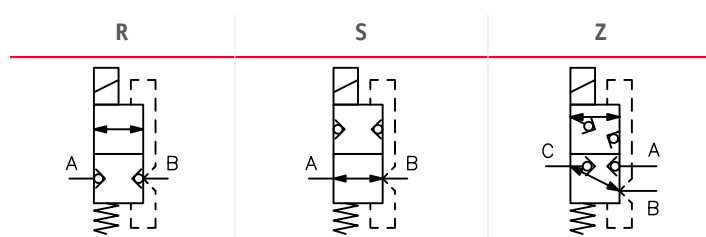
### 2.1 Basic type and size

Type	Flow rate $Q_{max}$ (l/min)	Pressure $p_{max}$ (bar)
BVE 1	20	500
BVE 3	70	400
BVE 5	300	400

#### NOTICE

Operating pressures depend on solenoid version see Chapter 3.1, "General data"

### 2.2 Circuit symbol



#### NOTICE

BVE 5 circuit symbol R only.

## 2.3 Actuating solenoid

### ! NOTICE

The specifications regarding the IP protection class apply for versions featuring a properly assembled male connector.

Coding	Electrical connection	Nominal voltage		Protection class (IEC 60529)	BVE 1	BVE 3	BVE 5
		V AC	V DC				
X 12, G 12	EN 175 301-803 A		12 V DC	IP 65	●	●	●
X 24, G 24	<ul style="list-style-type: none"> <li>▪ X: without connector</li> <li>▪ G: with line connector MSD3-309</li> <li>▪ L: with LED connector</li> <li>▪ WG: with alternating rectifier in line connector</li> <li>▪ 5k: with cast-on cable 5 m long</li> <li>▪ .24/18W: if lower output required</li> </ul>		24 V DC		●	●	●
X 24/8W G 24/8W			24 V DC		●		
X 24/18W G 24/18W			24 V DC		●		
X 48, G 48			48 V DC		●	●	
X 98, G 98			98 V DC		●	●	●
X 205, G 205			205 V DC		●	●	●
L 12			12 V DC		●	●	
L 24			24 V DC		●	●	
L 24/8W			24 V DC		●		
L 24/18W			24 V DC		●		
L5K 12			12 V DC		●	●	
L5K 24			24 V DC		●	●	
L5K 24/8W			24 V DC		●		
L5K 24/18W			24 V DC		●		
WG 110		110 V AC 50/60 Hz	98 V DC		●	●	●
WG 230		230 V AC 50/60 Hz	205 V DC		●	●	●
AMP 12	AMP Junior Timer 2-pole		12 V DC		●	●	
AMP 24			24 V DC		●	●	
DT 12	DEUTSCH plug (DT 04-2P)		12 V DC		IP 67	●	●
DT 24	DEUTSCH plug (DT 04-2P)		24 V DC		IP 67	●	●
M 24	M12x1				IP 65	●	
S 24	Bayonet Pa6 Schlemmer		24 V DC		IP 67	●	●
X 24 EX 55 FM	ATEX		24 V DC	IP 66/67	●		
X 24 EX M 55 FM	ATEX, metric connection						

### ! NOTICE

**For electrical connection according to ATEX:**

Observe electrical data for explosion-proof solenoids, [see Chapter 3.5.1, "Electrical data for explosion-proof solenoids"](#).

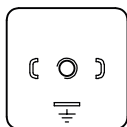
### ! NOTICE

**Solenoid for electrical connection according to ATEX in combination with connection blocks/sub-plates:**

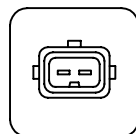
When using a connection block that you have prepared yourself: The minimum volume of the connection block must not be undershot, [see Chapter 3.5.1, "Electrical data for explosion-proof solenoids"](#).

**Connection pattern**

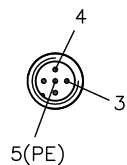
G .., X .., L .., WG ..



AMP ..



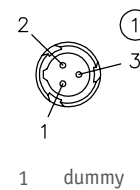
M ..



DT ..



S ..



**2.4 Actuating solenoid addition (type BVE 1 only)**

Coding	Description
Without coding	Series
<b>B</b>	Blocking (circuit symbol R only)
<b>T</b>	Manual operation, engaging
<b>T1</b>	Manual operation, not engaging (spring return mechanism)

**!** **NOTICE**  
For use of blocking see Chapter 6.3.1, "Blocking (coding B)"

## 2.5 Single connection block

Coding	Description	Circuit symbols	Connections A, B, C ISO 228-1, ANSI B1.20.3	BVE 1	BVE 3	BVE 5
-1/4	Pipe connection	R, S, Z	G 1/4	●		
-3/8			G 3/8	●		
-1/4-VP	Pipe connection with thread position type VP 1 R, S, Z according to D 7915, p <sub>max</sub> = 400 bar		G 1/4	●		
-3/8-VP			G 3/8	●		
-1/2-VP			G 1/2	●		
-1/2-G	Pipe connection with thread position type GR(S)2-2 according to D 7300, not possible with solenoids ..X 24 EX 55 FM, ..X 24 EX M 55 FM	R, S	G 1/2	●		
-P	Manifold mounting	R, S, Z	--	●		
-P1	Manifold mounting, flange pattern type BVP 1 R(S) according to D 7765, p <sub>max</sub> = 400 bar, BVP 11 R(S) according to D 7400 up to 320 bar, do not use for new projects.	R, S	--	●		
-P-VP	Manifold mounting, flange pattern type VP 1 R, S, Z according to D 7915, p <sub>max</sub> = 400 bar, type GR(S)2-12 according to D 7300-12, p <sub>max</sub> = 500 bar	R, S, Z	--	●		
-P-WN	Manifold mounting, flange pattern type WN 1/WH 1 D(Q, F, E, H, N) according to D 7470 A/1, p <sub>max</sub> = 350/450 bar WN1/WH1 M(R) cannot be replaced in valve banks, switching direction inverted. Circuit symbol Z not possible with solenoids ..X 24 EX 55 FM, ..X 24 EX M 55 FM	R, S, Z	--	●		
-P-BP	Manifold mounting, flange pattern type BVP 1 Z according to D 7765, p <sub>max</sub> = 400 bar BVP 11 Z, 2 R(S) and BVP 2 Z according to D 7400, p <sub>max</sub> = 320 bar Circuit symbol R(S) not possible with solenoids ..X 24 EX 55 FM, ..X 24 EX M 55 FM, do not use for new projects.		--	●		
-1/4 NPTF	Pipe connection	R, S	1/4-18 NPTF	●		
-3/8 NPTF			3/8-18 NPTF	●		
-1/4 NPTF-VP	Pipe connection with thread position type VP 1 R, S according to D 7915, p <sub>max</sub> = 400 bar		1/4-18 NPTF	●		
-3/8 NPTF-VP			3/8-18 NPTF	●		
-1/2 NPTF-VP			1/2-18 NPTF	●		
-1/2 NPTF-G	Manifold mounting, flange pattern type GR(S)2-2 according to D 7300, p <sub>max</sub> = 500 bar, not possible with solenoid ..X 24 EX 55 FM, ..X 24 EX M 55 FM			1/2-18 NPTF	●	
-1/2	Pipe connection	R, S, Z	G 1/2		●	
-1/2-BVG	Pipe connection with thread position type BVG 3 according to D 7400, p <sub>max</sub> = 320 bar	R, S, Z	G 1/2		●	
-P	Manifold mounting	R, S, Z	--		●	
-P-PA	Manifold mounting with flange pattern type BVP 3 R(S) according to D 7400, with adapter plate, do not use for new projects.	R, S	--		●	
-P-BP	Manifold mounting with flange pattern type BVP 3 Z according to D 7400, do not use for new projects.	Z	--		●	



Coding	Description	Circuit symbols	Connections A, B, C ISO 228-1, ANSI B1.20.3	BVE 1	BVE 3	BVE 5
-1	Pipe connection	R	G 1			●
-P	Manifold mounting	R	--			●

**! NOTICE**

Note the max. operating pressures and flow rates of the valves and connection blocks, see corresponding publications.

## 2.6 Orifices/check valves (additional elements)

only for version with single connection block.

Coding	For type	Description
B 0,4 B 0,5 B 0,6 B 0,8 B 1,1 B 1,3 B 1,5	BVE 1.. - 1/4	Orifice Ø (mm) 0,4 0,5 0,6 0,8 1,1 1,3 1,5
B 0,4 B 0,5 B 0,6 B 0,7 B 0,8 B 0,9 B 1,0 B 1,1 B 1,3 B 1,5 B 2,0	BVE 1.. - 3/8	Orifice Ø (mm) 0,4 0,5 0,6 0,7 0,8 0,9 1,0 1,1 1,3 1,5 2,0
B 0,8	BVE 1.. - 1/2 - G	Orifice Ø (mm) 0,8
B 0,6 B 0,8 B 1,1 B 1,3 B 1,5 B 2,0 R	BVE 1.. - BP BVE 1.. - P1	Orifice Ø (mm) 0,6 0,8 1,1 1,3 1,5 2,0 Check valve ER 12
B 0,8 B 1,0 B 1,2 B 1,4 B 1,6 B 1,8 B 2,0 R	BVE 1 - P	Orifice Ø (mm) 0,8 1,0 1,2 1,4 1,6 1,8 2,0 Check valve ER 12
B 0,4	BVE 1.. - P - WN	Orifice Ø (mm) 0,4

Coding	For type	Description
B 0,6 B 0,7 B 0,8 B 1,2		0,6 0,7 0,8 1,2
R		Check valve EK 01
B 2,5 B 3,0 B 3,5 B 4,0	BVE 3.. - 1/2 BVE 3.. - 1/2 BVG	Orifice Ø (mm) 2,5 3,0 3,5 4,0
B 2,5 B 3,0 B 3,5 B 4,0	BVE 3.. - P BVE 3 ..- BP BVE 3.. - PA	Orifice Ø (mm) 2,5 3,0 3,5 4,0
B 3,0 B 4,0 B 5,0 B 6,0	BVE 5.. - 1	Orifice Ø (mm) 3,0 4,0 5,0 6,0
B 3,0 B 4,0 B 5,0 B 6,0	BVE 5.. - P	Orifice Ø (mm) 3,0 4,0 5,0 6,0



**NOTICE**

For flow diagrams see Chapter 3.4, "Characteristic lines"

## 3 Parameters

### 3.1 General data

<b>Designation</b>	2/2, 3/2-way directional seated valves
<b>Design</b>	Cone-seated valve
<b>Model</b>	Screw-in valve
<b>Material</b>	<p>steel</p> <ul style="list-style-type: none"> <li>▪ Coil housing zinc-nickel coated</li> <li>▪ Valve housing/solenoid pipe type BVE 1, BVE 5 zinc-nickel coated, type BVE 3 nitrided</li> <li>▪ Connection blocks zinc-nickel coated</li> <li>▪ Connection block type BVE 3... -1/2 electrogalvanised</li> </ul>
<b>Attachment</b>	Screw-in valve, on connection block for manifold mounting, pipe connection
<b>Overlap for 3/2-way directional valves</b>	Negative, transition from one flow direction to the other is completed only in the stroke end position. During switching, all ports are open to each other.
<b>Tightening torque</b>	see Chapter 4, "Dimensions"
<b>Installation position</b>	Any
<b>Flow direction A, B, C</b>	Any, according to circuit symbol Chapter 2.2, "Circuit symbol"
<b>Hydraulic fluid</b>	<p>Hydraulic fluid, according to DIN 51 524 Parts 1 to 3; ISO VG 10 to 68 according to DIN ISO 3448</p> <p>Viscosity range: 4 - 800 mm<sup>2</sup>/s</p> <p>Optimal operating range: approx. 10 - 200 mm<sup>2</sup>/s</p> <p>Also suitable for biologically degradable hydraulic fluids type HEPG (polyalkylene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C.</p>
<b>Cleanliness level</b>	<p><b>ISO 4406</b></p> <hr style="width: 20%; margin-left: 0;"/> <p>21/18/15...19/17/13</p>
<b>Temperatures</b>	<p>Environment: approx. -40 to +80 °C, hydraulic fluid: -25 to +80 °C, pay attention to the viscosity range.</p> <p>Start temperature: down to -40 °C is permissible (take account of the start viscosities!), as long as the steady-state temperature is at least 20 K higher during subsequent operation.</p> <p>Biologically degradable hydraulic fluids: note manufacturer specifications. With consideration for the seal compatibility, not above +70°C.</p> <div style="border: 1px solid gray; padding: 10px; margin-top: 10px;"> <p><b>! NOTICE</b></p> <p>Observe the correct duty cycle, see Chapter 3.5, "Electrical data"</p> <p>Observe the restrictions for explosion-proof solenoids.</p> </div>

**! NOTICE**

Version for highly viscous media (e.g. lubricating grease), see D 7921 F.

Type BVE 1 R(S) is suitable for mounting hole for proportional valves type PMVE 1 according to D 8143.

Standard seals NBR/TPU, versions with special seals (PYD operating pressure  $p_{max} = 250$  bar) available on request.

### 3.2 Pressure and volumetric flow

Operating pressure $p_{max}$	X, G, L, WG, AMP, DT, M, S	X 24/8W, G 24/8W, L 24/8W X 24/18W, G 24/18W, L 24/18W
	<b>Connection A, B, C</b>	<b>Connection A, B, C</b>
	BVE 1: 500 bar BVE 3: 400 bar BVE 5: 400 bar	BVE 1: 250 bar
	<b>X 24 EX 55 FM, X 24 EX M 55 FM</b>	
	<b>Connection A, B, C</b>	
	BVE 1: 400 bar	
Flow rate $Q_{max}$	X, G, L, WG, AMP, DT, M, S	X 24/8W, G 24/8W, L 24/8W X 24/18W, G 24/18W, L 24/18W
	BVE 1: 20 l/min BVE 3: 70 l/min BVE 5: 300 l/min	BVE 1: 5 l/min
	<b>X 24 EX 55 FM, X 24 EX M 55 FM</b>	
	BVE 1: 20 l/min	
	see Chapter 2.1, "Basic type and size"	
Static overload capacity	approx. $2 \times p_{max}$ , applies for valve in rest position	
Flow limit	For accumulator circuits or when connected to high-pressure circuits with large pump delivery flow rates (ring lines, centralised supplies): Flow rates need to be limited according to system pressure – by orifices to $Q_{max}$ see Chapter 2.6, "Orifices/ check valves (additional elements)", page 9. The orifice must always be located on the accumulator side.	
	For valves with connection block: Orifice or check valve is used with	
	<ul style="list-style-type: none"> <li>▪ Circuit symbol Z: in port C or P (type ...P-WN)</li> </ul>	
	<ul style="list-style-type: none"> <li>▪ For circuit symbol R, S: in port A or P (type ...P-WN)</li> </ul>	

### 3.3 Weight

Screw-in valve	<b>Type</b>	
	BVE 1	= 0.5 kg
	BVE 3	= 0.7 kg
	BVE 5	= 3.8 kg
Single connection block	<b>Type BVE 1 R(S)</b>	
	- 1/4	= 0.6 kg
	- 3/8	= 0.6 kg
	- 1/4 - VP	= 0.85 kg
	- 3/8 - VP	= 0.85 kg
	- 1/2 - VP	= 1.1 kg
	- 1/2 - G	= 1.4 kg
	- P	= 0.6 kg
	- P1	= 0.5 kg
	- P - VP	= 0.45 kg
	- P - BP	= 0.5 kg
	- 1/2 - NPTF	= 1.4 kg
	- 1/4 - NPTF	= 0.65 kg
	- 3/8 - NPTF	= 0.6 kg
	- 1/4 - NPTF - VP	= 0.85 kg
	- 3/8 - NPTF - VP	= 0.85 kg
	- 1/2 - NPTF - VP	= 1.1 kg
	<b>Type BVE 1 Z</b>	
	- 1/4	= 0.9 kg
	- 3/8	= 0.85 kg
	- 1/4 - VP	= 1.1 kg
	- 3/8 - VP	= 1.0 kg
	- 1/2 - VP	= 1.3 kg
	- P	= 0.75 kg
	- P - VP	= 0.65 kg
	- P - BP	= 0.8 kg
	<b>Type BVE 3 R(S)</b>	
	- 1/2	= 1.1 kg
	- 1/2 - BVG	= 1.1 kg
	- P	= 1.1 kg
	- P - PA	= 1.6 kg
	<b>Type BVE 3 Z</b>	
	- 1/2	= 1.4 kg
- 1/2 - BVG	= 1.4 kg	
- P	= 1.4 kg	
- P - BP	= 1.25 kg	
<b>Type BVE 5 R</b>		
- 1	= 5.8 kg	
- P	= 4.3 kg	
Adapter plate	<b>Type BVE 3 R(S)</b>	
	- PA	= + 0.5 kg

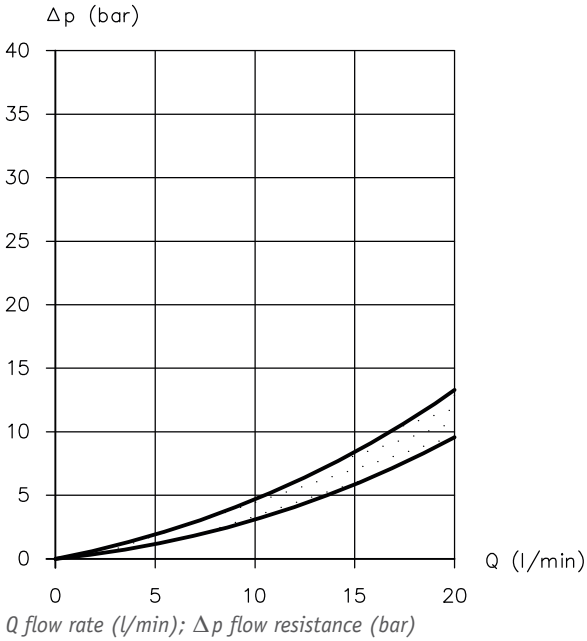
### 3.4 Characteristic lines

Viscosity of the hydraulic fluid approx. 60 mm<sup>2</sup>/s

#### Basic valve

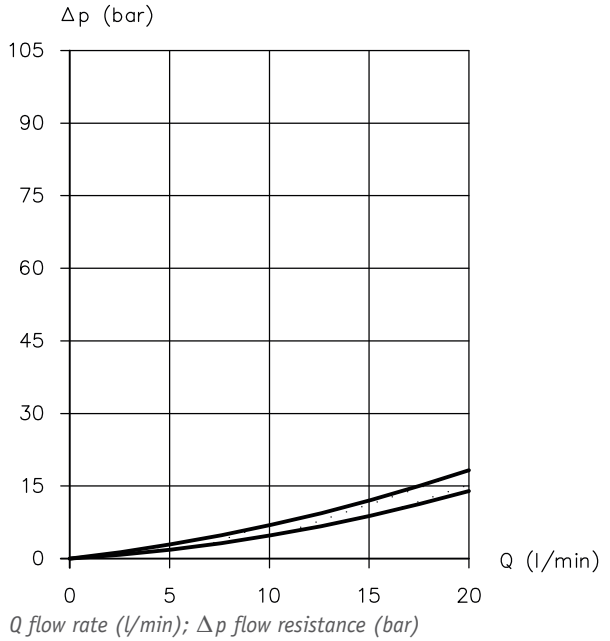
##### BVE 1 - Z

C → A, C → B, A → C



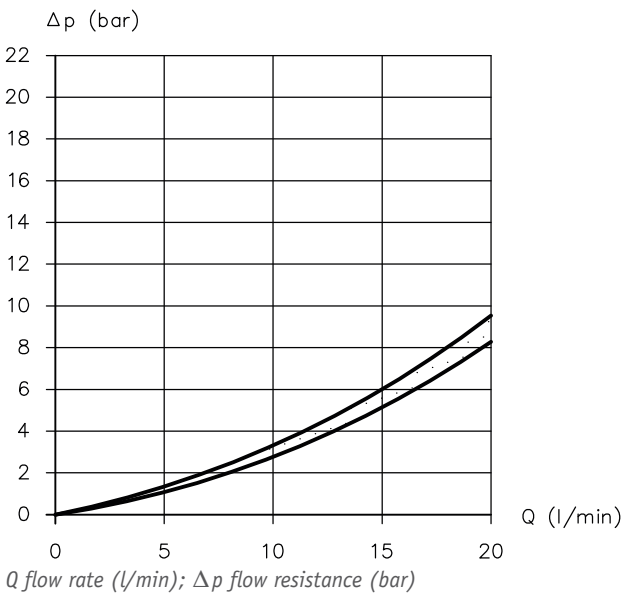
##### BVE 1 - Z

B → C

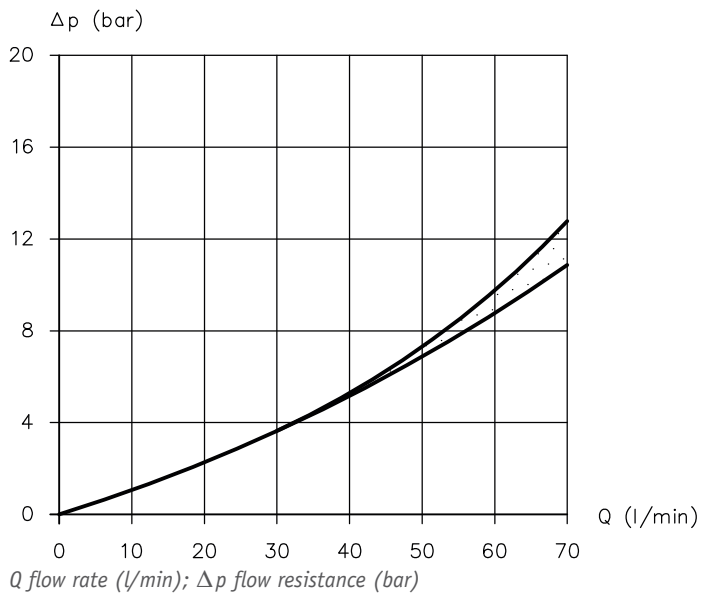


##### BVE 1 - R, BVE 1 - S

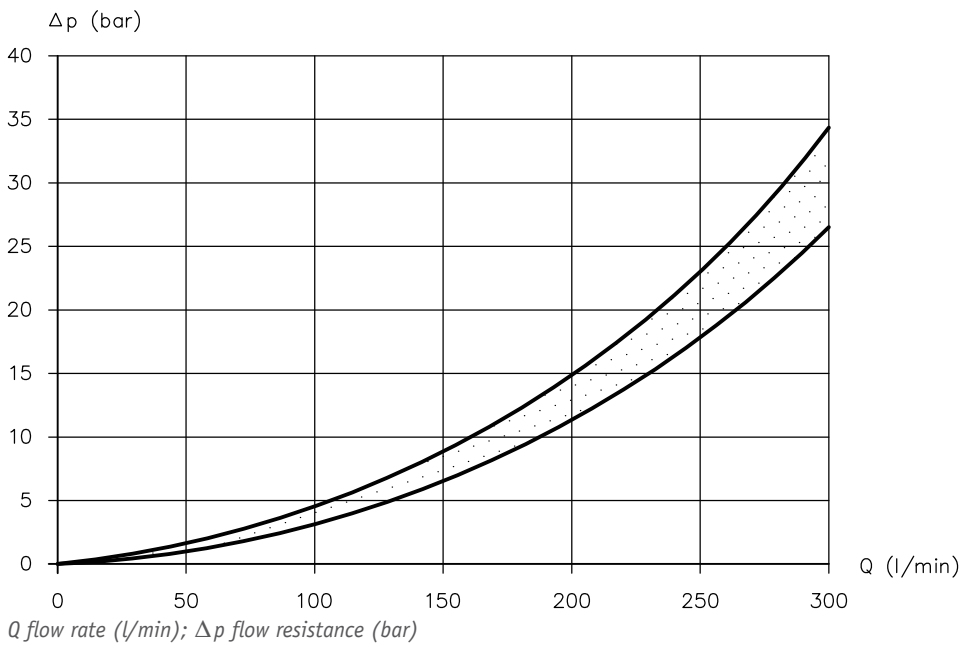
A → B, B → A



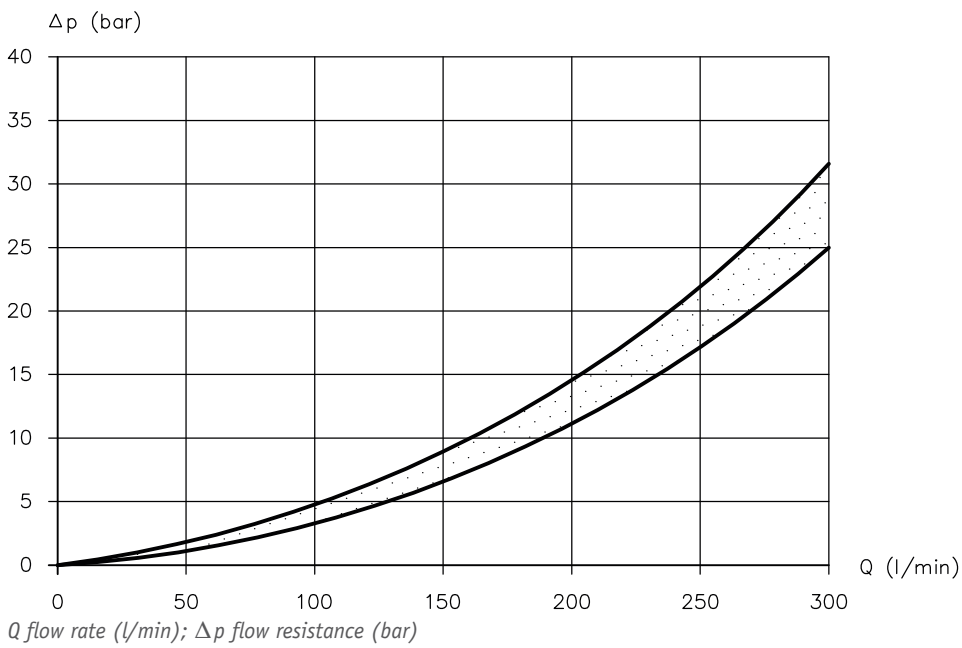
##### BVE 3



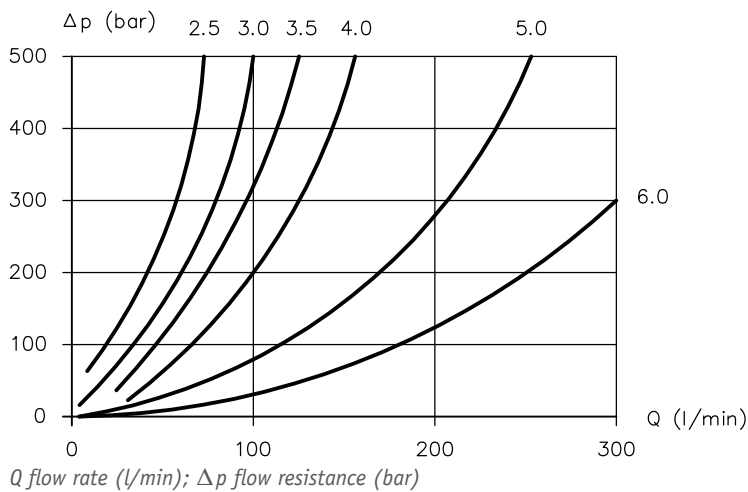
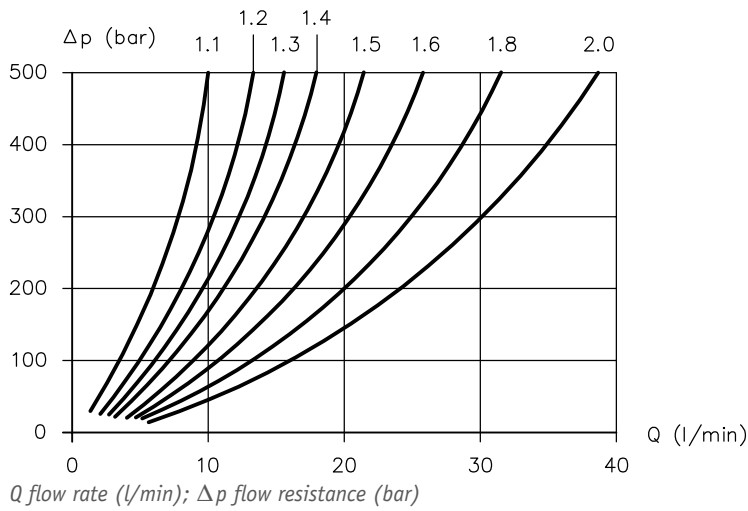
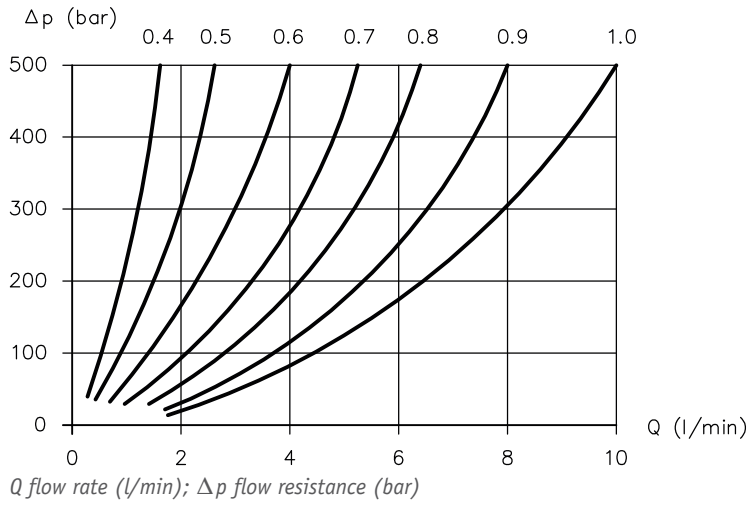
**BVE 5**  
**A → B**



**B → A**



**Orifices**



**i** **INFORMATION**  
Orifices 5.0 and 6.0 are estimated values!

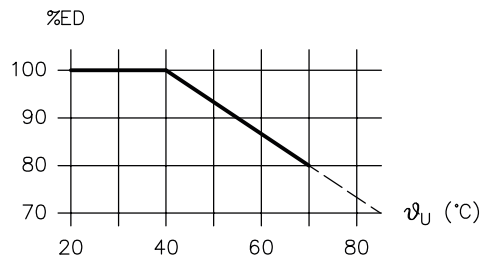


### 3.5 Electrical data

Nominal power P <sub>N</sub>	12 V DC	24 V DC	48 V DC	98 V DC	205 V DC
	<b>X, G, L, WG, AMP, DT, M</b>				
BVE 1	26.2 W	26.5 W	26.1 W	24.8 W	28 W
BVE 3	37.2 W	32.7 W	29.9 W	33 W	30.2 W
BVE 5	57 W	60 W	--	62 W	67 W
<b>X 24/8W, G 24/8W, L 24/8W</b>					
BVE 1	--	8 W	--	--	--
<b>X 24/18W, G 24/18W, L 24/18W</b>					
BVE 1	--	18.6 W	--	--	--
<b>X 24 EX 55 FM, X 24 EX M 55 FM</b>					
BVE 1	--	23 W	--	--	--
Nominal current I <sub>N</sub>	12 V DC	24 V DC	48 V DC	98 V DC	205 V DC
	<b>X, G, L, WG, AMP, DT, M</b>				
BVE 1	2.2 A	1.1 A	0.75 A	0.25 A	0.14 A
BVE 3	3.12 A	1.36 A	0.62 A	0.34 A	0.15 A
BVE 5	4.76 A	2.45 A	--	0.63 A	0.33 A
<b>X 24/8W, G 24/8W, L 24/8W</b>					
BVE 1	--	0.33 A	--	--	--
<b>X 24/18W, G 24/18W, L 24/18W</b>					
BVE 1	--	0.78 A	--	--	--
Limit current I <sub>G</sub>	12 V DC	24 V DC	48 V DC	98 V DC	205 V DC
	<b>X 24 EX 55 FM, X 24 EX M 55 FM</b>				
BVE 1	--	0.67 A	--	--	--
Switching times	BVE 1: on 30 to 40 ms off 30 to 40 ms		BVE 3: on 50 to 60 ms off 50 to 60 ms		BVE 5: on 100 ms off 100 ms
	for <b>.24/8W</b> and <b>WG..</b> 2 - 3 times longer Values are reference values and apply for hydraulic fluid!				
Switching operations	approx. 2000/h, to be seen as approximately evenly distributed				
Contact temperature	120°C at 20°C ambient temperature				
Insulation material class	F, H for plug option DT				

Relative duty cycle  
100% duty cycle (specified  
on solenoid)

Duty cycle as a function of temperature



$\vartheta$  Ambient temperature (°C); % duty cycle,  $T = 5$  min

**NOTICE**

The thermal load of the coil can be reduced by means of an economy circuit, for example.

Protection class

Depending on the actuating solenoid see Chapter 2.3, "Actuating solenoid"

Electrical connection

Depending on the actuating solenoid see Chapter 2.3, "Actuating solenoid"

Cut-off energy

approx. < 1 Ws of reference value from measurements at nominal voltage  $U_N$

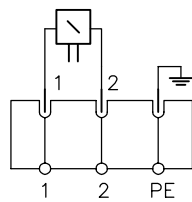
other solenoid voltages

Special voltages and plug options upon request

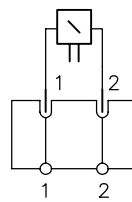
**Circuit diagrams**

DC voltage

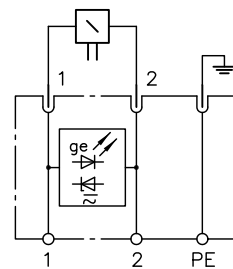
G .., X ..



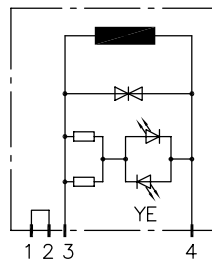
AMP .., DT .., S ..



L ..

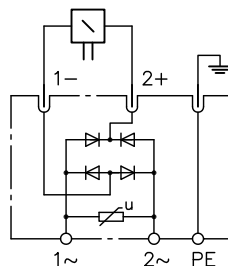


M ..



AC voltage

WG ..



### 3.5.1 Electrical data for explosion-proof solenoids

**! NOTICE**

When using solenoids for potentially explosive atmospheres, it is essential to observe the operating instructions [B ATEX](#) and the separate operating instructions for the respective solenoid.

Refer to the applicable operating instructions B 22 (EX22) for operating thresholds, classifications, electrical parameters and electrical connections.

Coding	Operating instructions with declaration of conformity
X 24 EX 55 FM	<ul style="list-style-type: none"> <li>▪ B ATEX</li> </ul>
X 24 EX M 55 FM	<ul style="list-style-type: none"> <li>▪ B 22 (EX22)</li> </ul>

**Dimensioning  
Sub-plates**

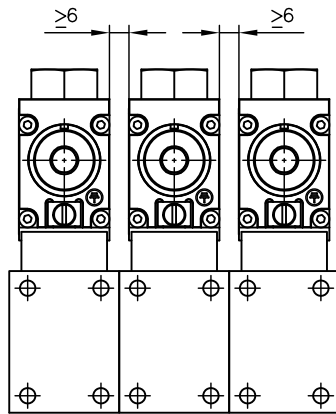
**Minimum volume for heat  
dissipation**

Valves arranged individually or next to one another, mounted in a block

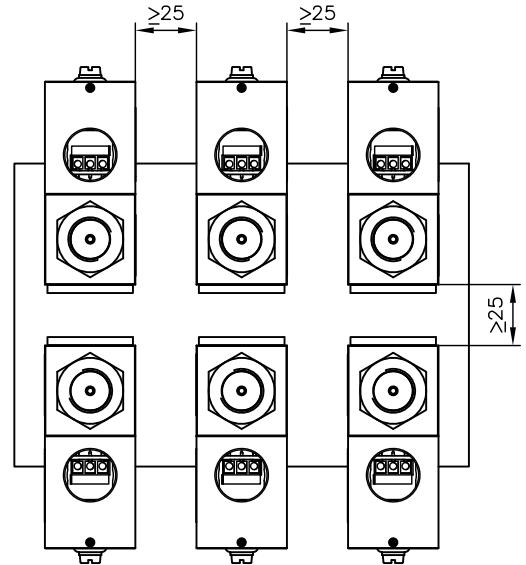
**Arrangement for individual connection blocks**

	Arranged in single row	Arranged in multiple rows	Single connection block
min. distance between magnet surfaces	6 mm	25 mm	--
min. volume per solenoid	152 200 mm <sup>3</sup>	192 300 mm <sup>3</sup>	61 250 mm <sup>3</sup>

**Arranged in single row**



**Arranged in multiple rows**



Valves arranged individually or next to one another with HAWE connection block for manifold mounting, mounted on a sub-plate

**Connection blocks in row per solenoid**

Coding	Circuit symbol	Min. volume of HAWE connection block (mm <sup>3</sup> )	Min. volume of customer-specific sub-plate (mm <sup>3</sup> )
- P	R, S	58 050	94 170
	Z	112 230	39 990
- P1	R, S	82 320	69 900
- P BP	Z	114 400	37 820
- P-WN	R, S	49 000	103 220
- P-VP	R, S	72 000	80 220
	Z	108 000	44 220

**NOTICE**

**Solenoid for electrical connection according to ATEX in combination with connection blocks/sub-plates:**

When using a single connection block with coding P, P1, P-VP, P-WN: Observe the minimum volume of the additional sub-plate to be used, only for use with anti-twist protection, see Chapter 4.1, "Screw-in valve type BVE 1".

**CAUTION**

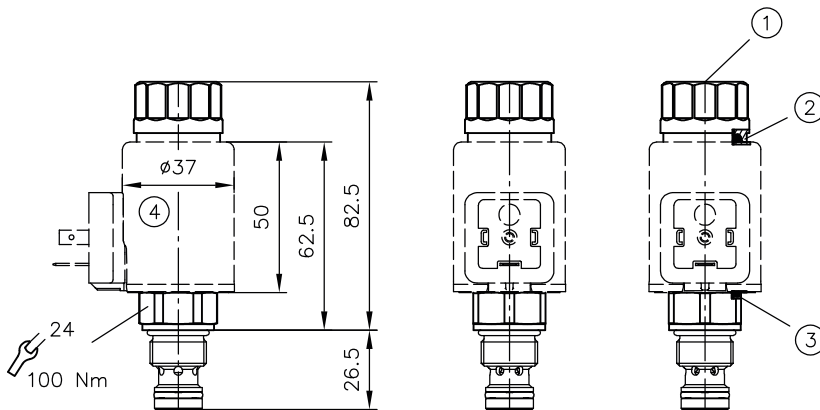
- Take particular care during assembly and dismantling work!
- The surfaces must not be damaged under any circumstances!

## 4 Dimensions

All dimensions in mm, subject to change.

### 4.1 Screw-in valve type BVE 1

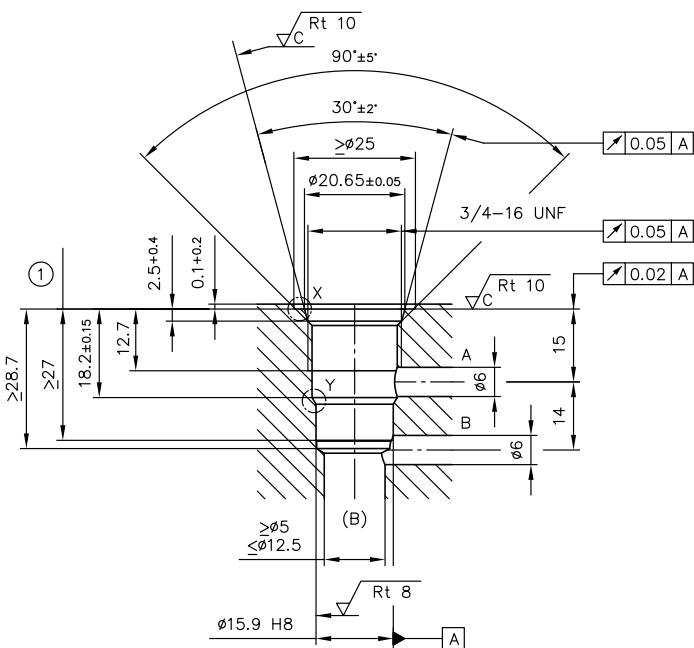
#### BVE 1 R(S)



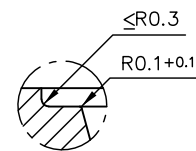
Solenoid versions and solenoid addition  
see Chapter 4.1.1, "Solenoid versions"

- 1 Manual override
- 2 Sealing between coil and nut
- 3 Sealing between coil and valve cartridge
- 4 Excitation system can be pivoted through 360°

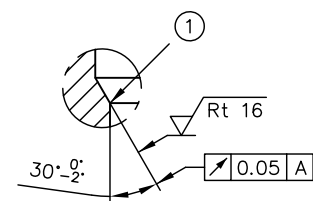
#### Mounting hole



#### Detail X



#### Detail Y



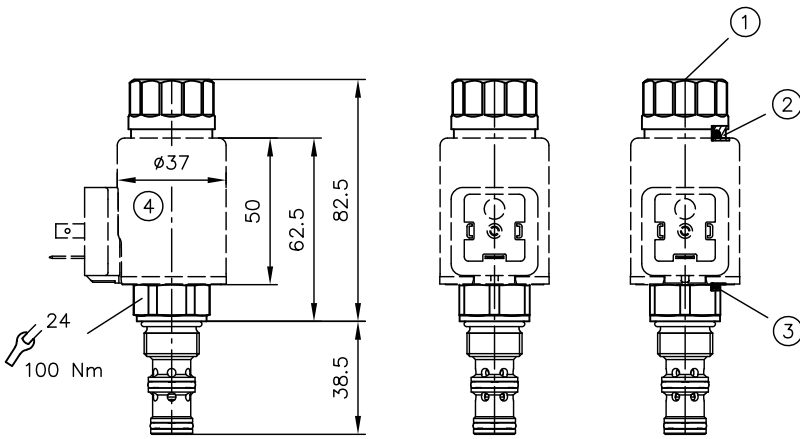
- 1 Round off edge max. R0.2

- 1 Reaming depth

#### NOTICE

For tools for creating the mounting hole see Chapter 6.4, "Additional elements".

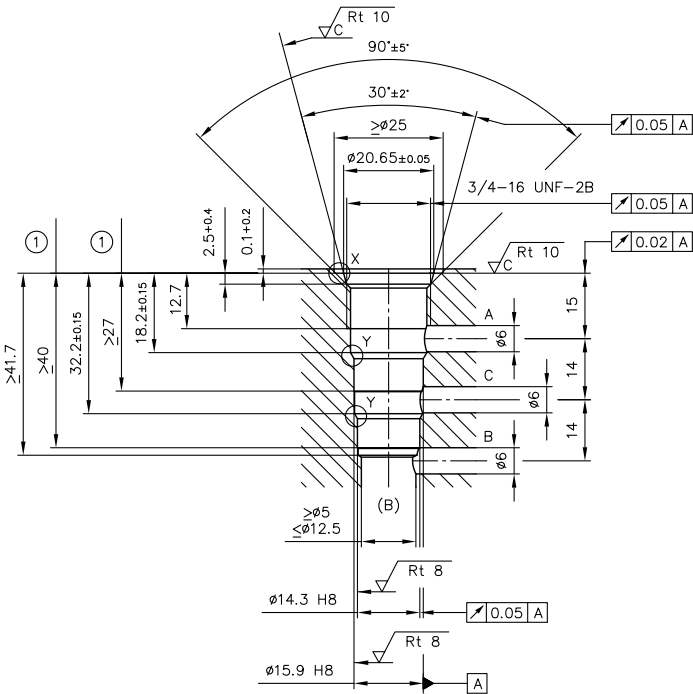
**BVE 1 Z**



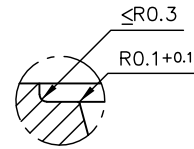
Solenoid versions and solenoid addition see Chapter 4.1.1, "Solenoid versions"

- 1 Manual override
- 2 Sealing between coil and nut
- 3 Sealing between coil and valve cartridge
- 4 Excitation system can be pivoted through 360°

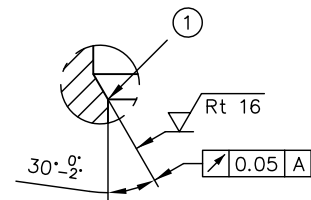
**Mounting hole**



**Detail X**



**Detail Y**



- 1 Round off edge max. R0.2

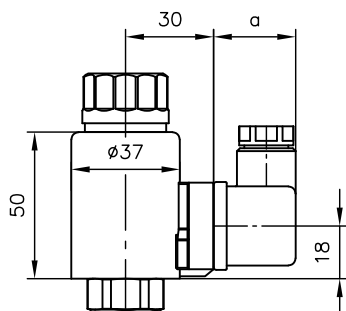
- 1 Reaming depth

**NOTICE**

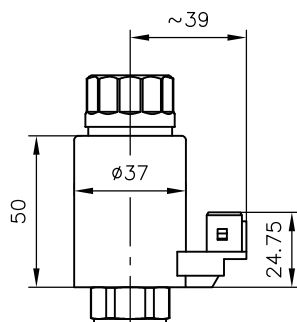
For tools for creating the mounting hole see Chapter 6.4, "Additional elements".

### 4.1.1 Solenoid versions

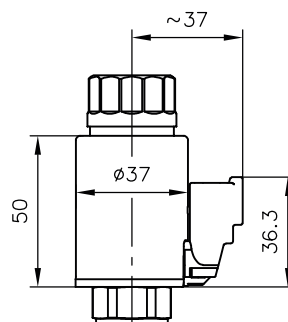
WG .., G .., L .., X ..



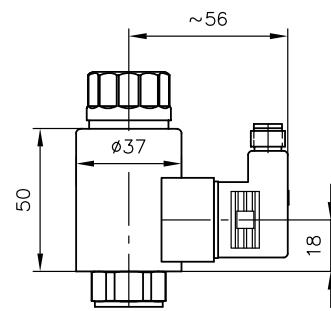
AMP ..



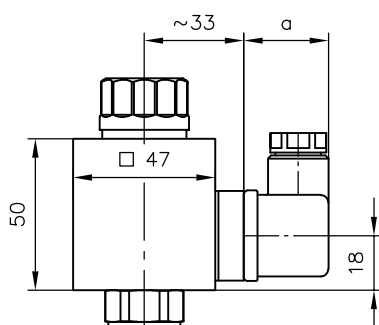
DT ..



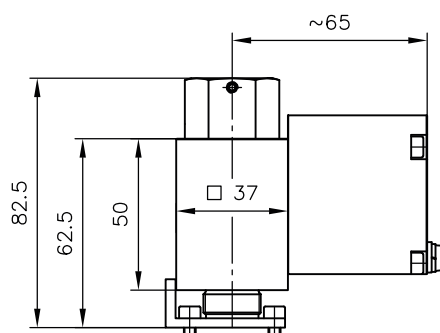
M ..



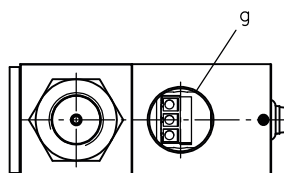
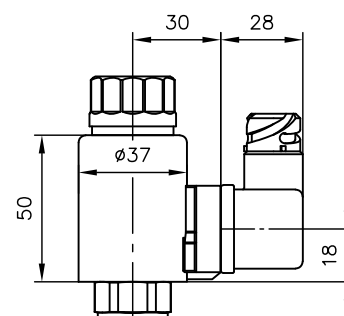
.24/18W



X 24 EX 55 FM  
X 24 EX M 55 FM



S ..

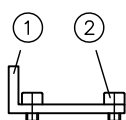


Version	a
G, GM	28 *
WG, WGM	34.5 *

Coding	g
X 24 EX 55 FM	1/2-14 NPT
X 24 EX M 55 FM	M20x1.5-6H

\* Up to 40 mm depending on the manufacturer

### Anti-twist protection

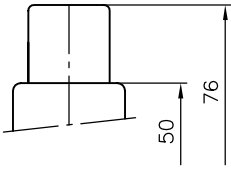


- 1 Anti-twist protection 7750 412
- 2 2x cylinder screw ISO 4762 M4x50-12.9 screwed in diagonally

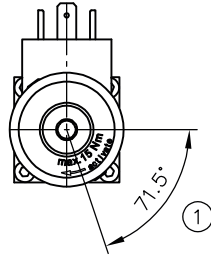
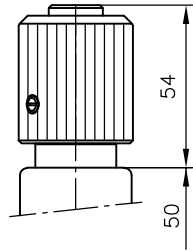
**NOTICE**  
 For solenoids for electrical connection according to ATEX: use anti-twist protection!

**Solenoid additions**

- .. B



- .. T, - .. T1

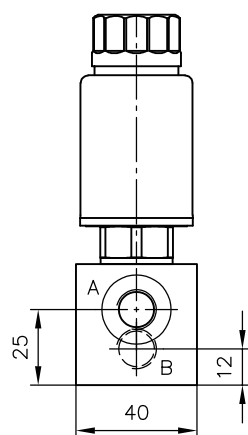
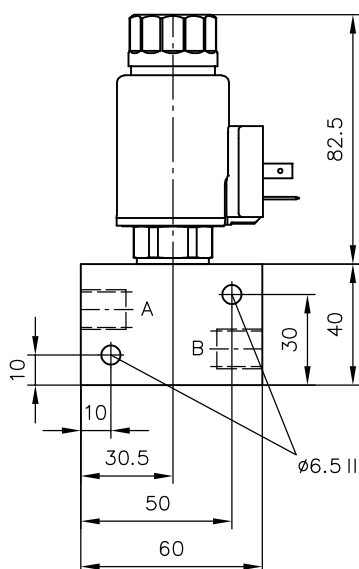


1 Maximum adjustment torque 15 Nm

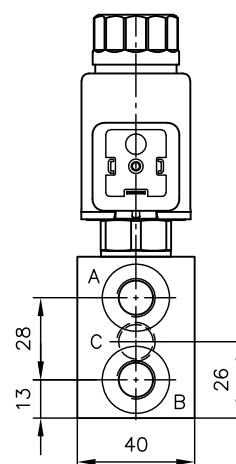
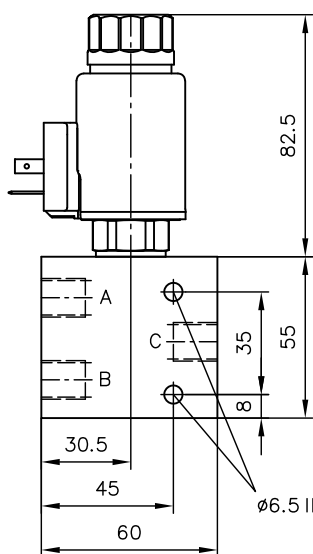


## 4.1.2 Versions with single connection block

BVE 1 R(S) - ... - 1/4 (NPTF)  
BVE 1 R(S) - ... - 3/8 (NPTF)



BVE 1 Z - ... - 1/4  
BVE 1 Z - ... - 3/8

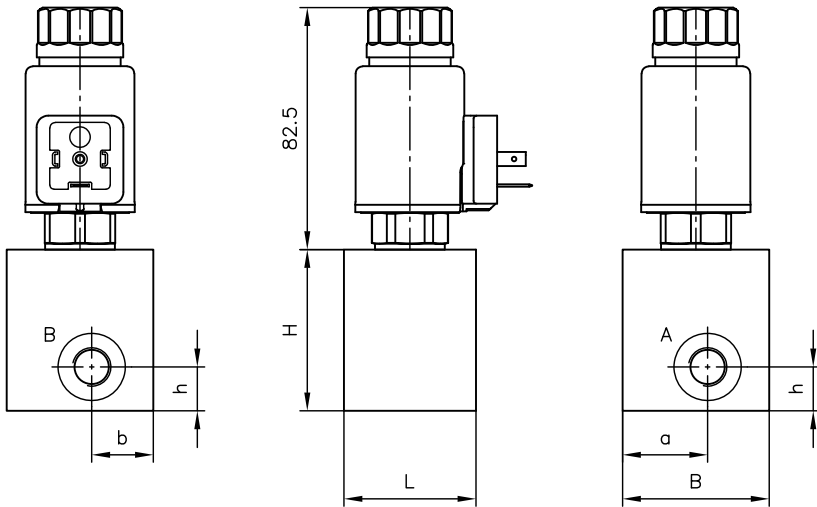


### Coding

### Connections

	Connections	
	ISO 228-1	ANSI B1.20.3
	A, B, C	A, B
- 1/4	G 1/4	--
- 3/8	G 3/8	--
- 1/4 NPTF	--	1/4-18 NPTF
- 3/8 NPTF	--	3/8-18 NPTF

BVE 1 R(S) - ... - 1/4 (NPTF) - VP  
 BVE 1 R(S) - ... - 3/8 (NPTF) - VP  
 BVE 1 R(S) - ... - 1/2 (NPTF) - VP

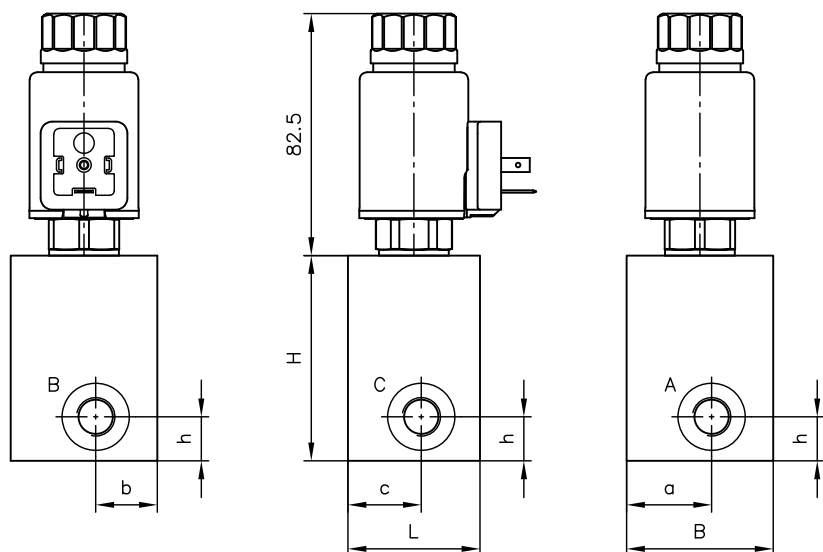


**Coding**

**Connections**

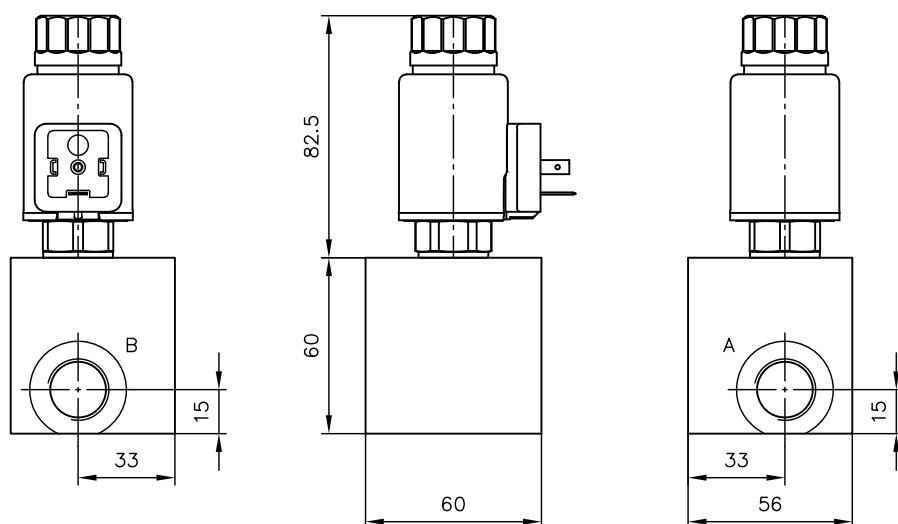
	L	B	H	a	b	c	h	ISO 228-1	ANSI B1.20.3
								A, B	A, B
- 1/4 - VP	45	50	55	29	21	25	15	G 1/4	--
- 1/4 NPTF - VP								--	1/4-18 NPTF
- 3/8 - VP	45	50	55	27	23	27	15	G 3/8	--
- 3/8 NPTF - VP								--	3/8-18 NPTF
- 1/2 - VP	50	50	65	25	25	25	22,5	G 1/2	--
- 1/2 NPTF - VP								--	1/2-14 NPTF

BVE 1 Z - ... - 1/4 - VP  
 BVE 1 Z - ... - 3/8 - VP  
 BVE 1 Z - ... - 1/2 - VP



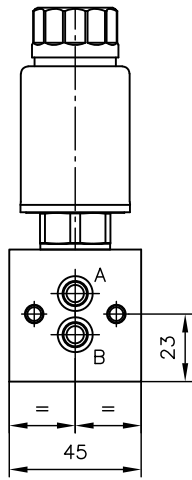
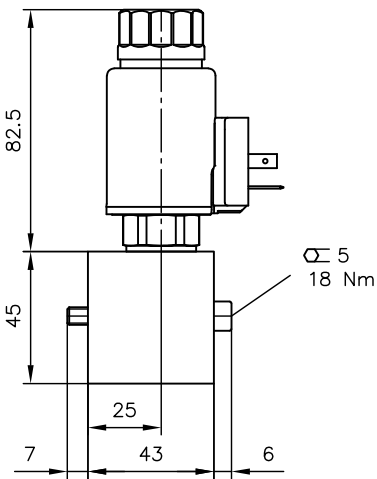
Coding	L	B	H	a	b	c	h	Ports according to ISO 228-1 A, B, C
- 1/4 - VP	45	50	70	29	21	25	15	G 1/4
- 3/8 - VP	45	50	70	27	23	27	15	G 3/8
- 1/2 - VP	50	50	80	20	20	25	22,5	G 1/2

BVE 1 R(S) ... - 1/2 - G  
 BVE 1 R(S) ... - 1/2 NPTF - G

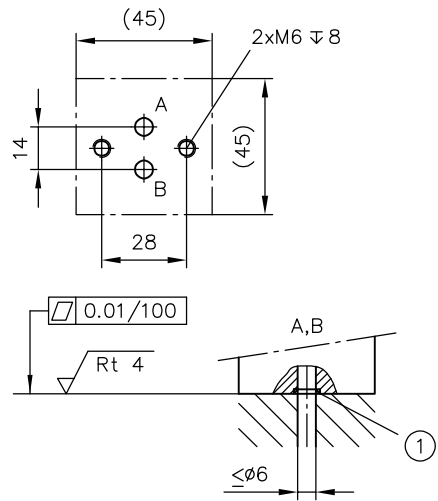


Coding	Ports according to ISO 228-1 and ANSI B1.20.3 A, B
- 1/2 - G	G 1/2
- 1/2 NPTF - G	1/2-18 NPTF

**BVE 1 R(S) - ... - P**

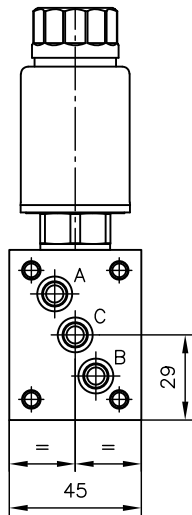
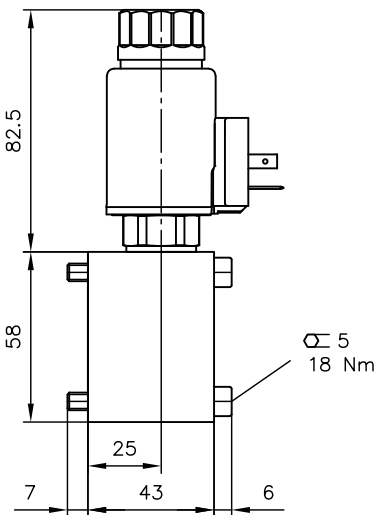


**Hole pattern of the base plate**

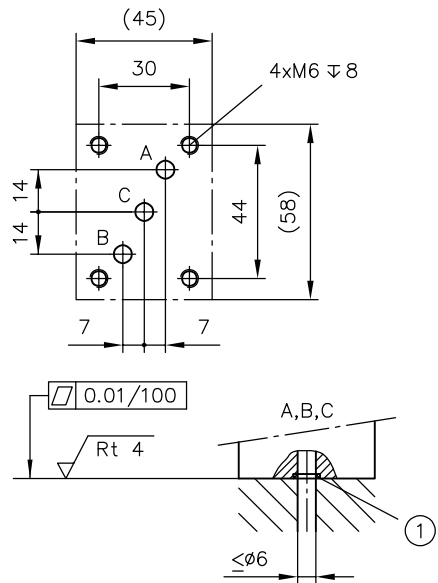


1 O-ring 8.73x1.78 TPU 94 Sh / P 5001

**BVE 1 Z - ... - P**

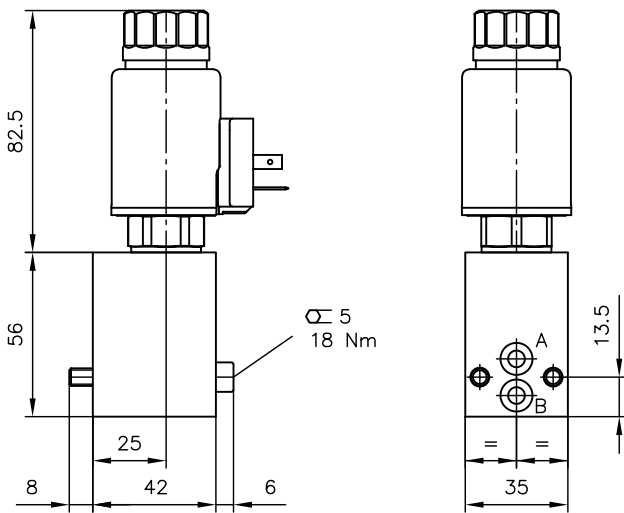


**Hole pattern of the base plate**

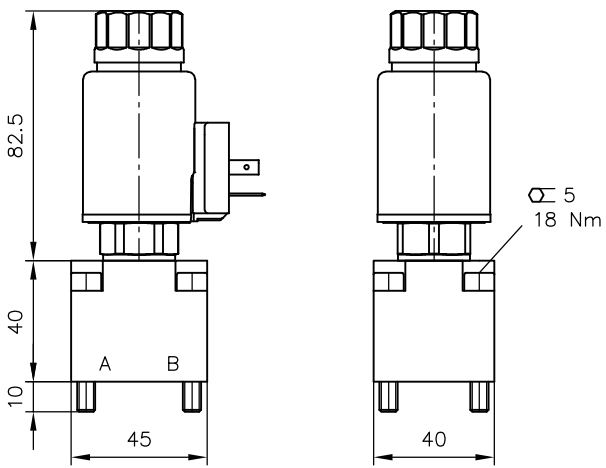


1 O-ring 8.73x1.78 TPU 94 Sh / P 5001

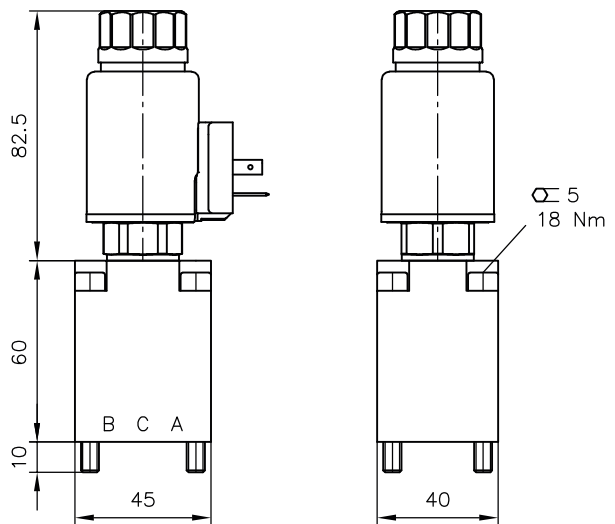
**BVE 1 R(S) - ... - P1**



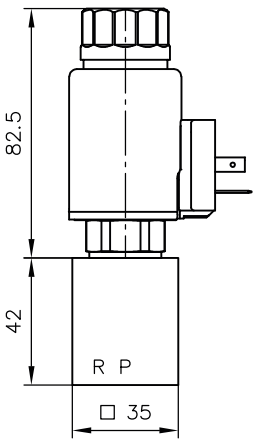
**BVE 1 R(S) - P - VP**



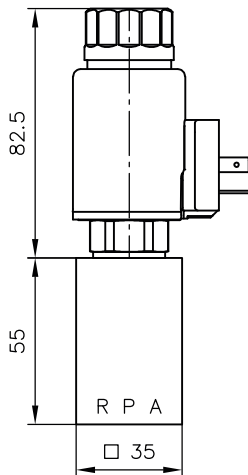
**BVE 1 Z - P - VP**



BVE 1 R(S) - ... - P - WN



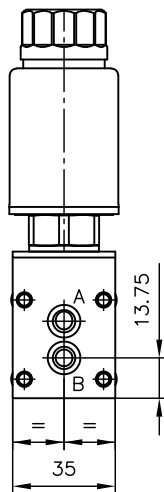
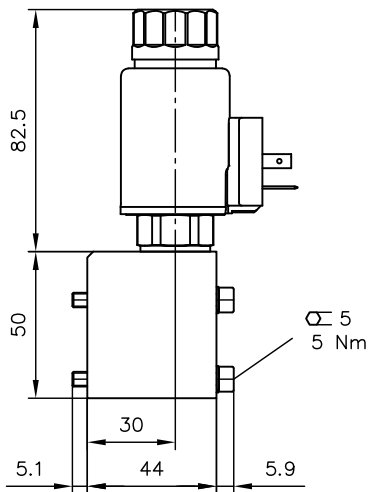
BVE 1 Z - ... - P - WN



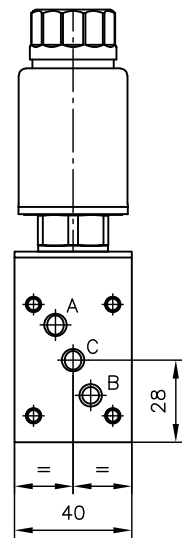
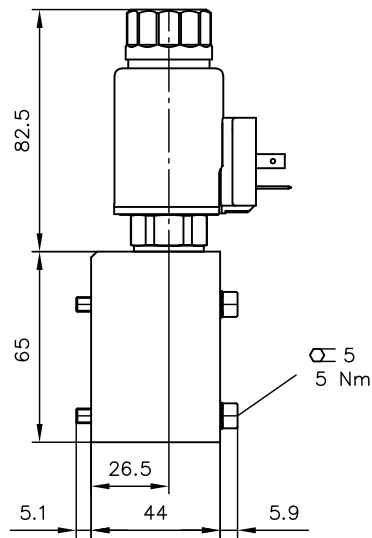
**NOTICE**

- WN1/WH1 H(N): Port P corresponds to A, A corresponds to C, R corresponds to B

BVE 1 R(S) - ... - P - BP

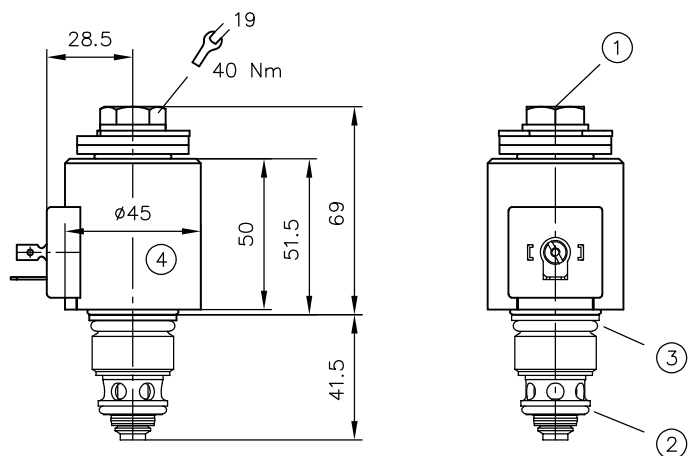


BVE 1 Z - ... - P - BP



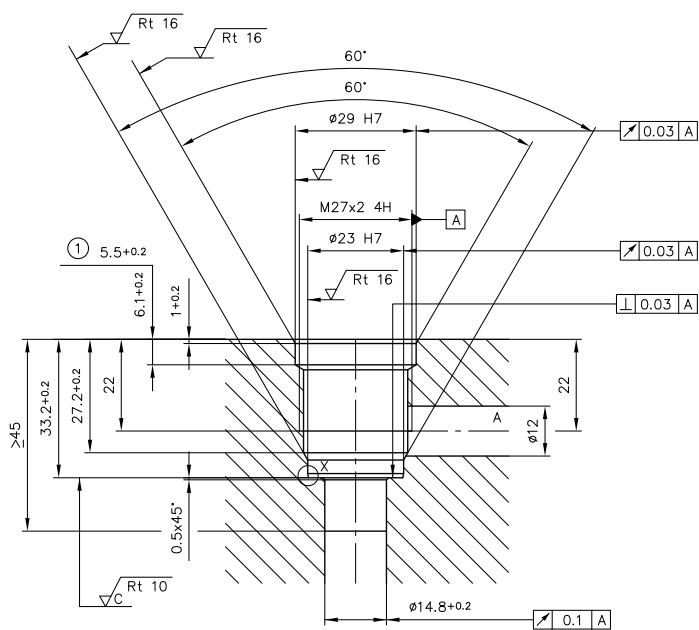
## 4.2 Screw-in valve type BVE 3

### BVE 3 R(S)



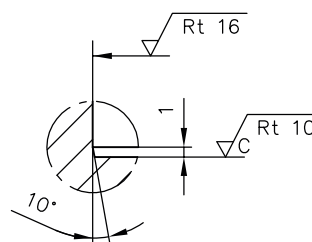
- 1 Manual override
- 2 O-ring 17.12x2.62 NBR 90 Sh
- 3 O-ring 21x3.53 polyurethane 95 Sh
- 4 Excitation system can be pivoted through 360°

### Mounting hole

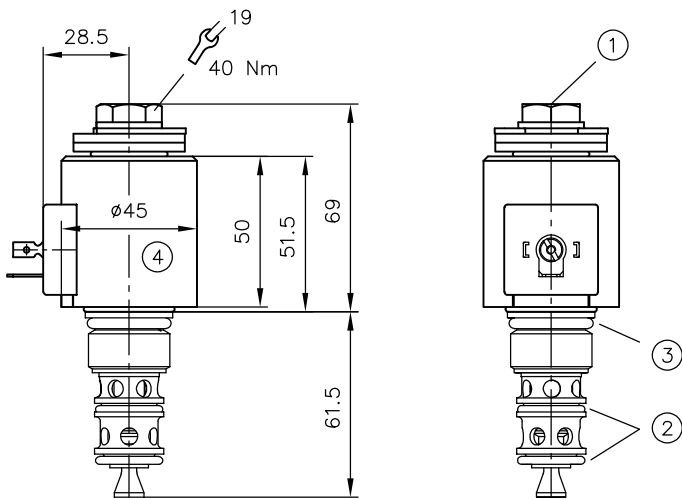


- 1 Reaming depth

### Detail X

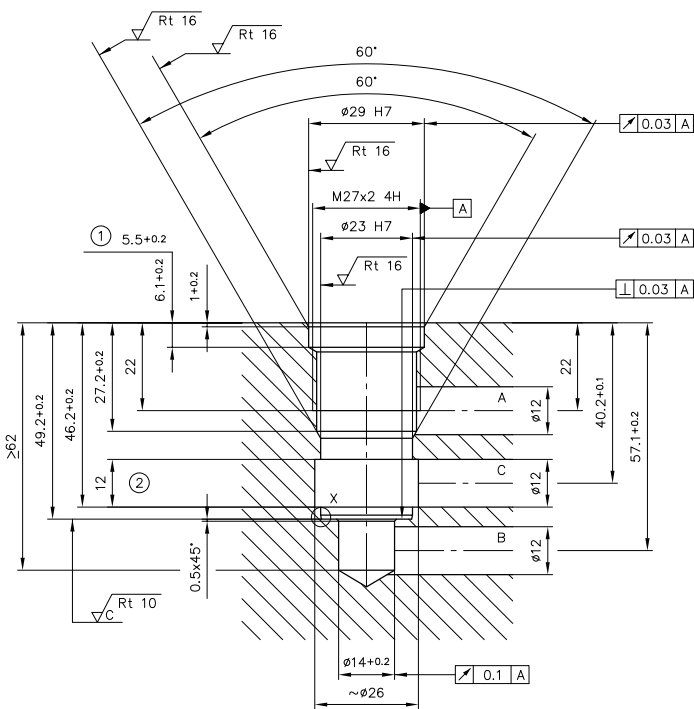


**BVE 3 Z**

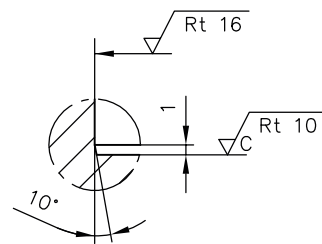


- 1 Manual override
- 2 O-ring 17.12x2.62 NBR 90 Sh
- 3 O-ring 21x3.53 polyurethane 95 Sh
- 4 Excitation system can be pivoted through 360°

**Mounting hole**



**Detail X**

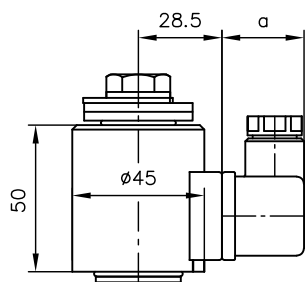


- 1 Reaming depth
- 2 Groove as required!

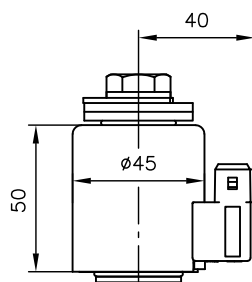


## 4.2.1 Solenoid versions

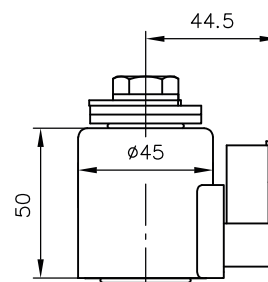
WG .., G .., X ..



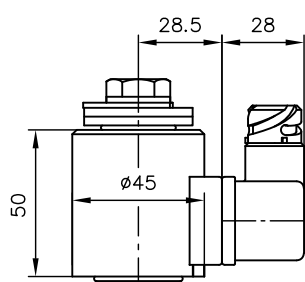
AMP ..



DT ..



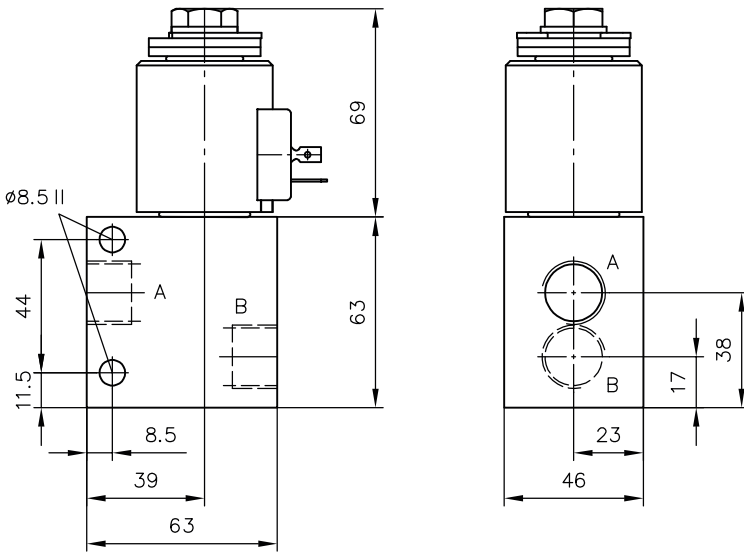
S ..



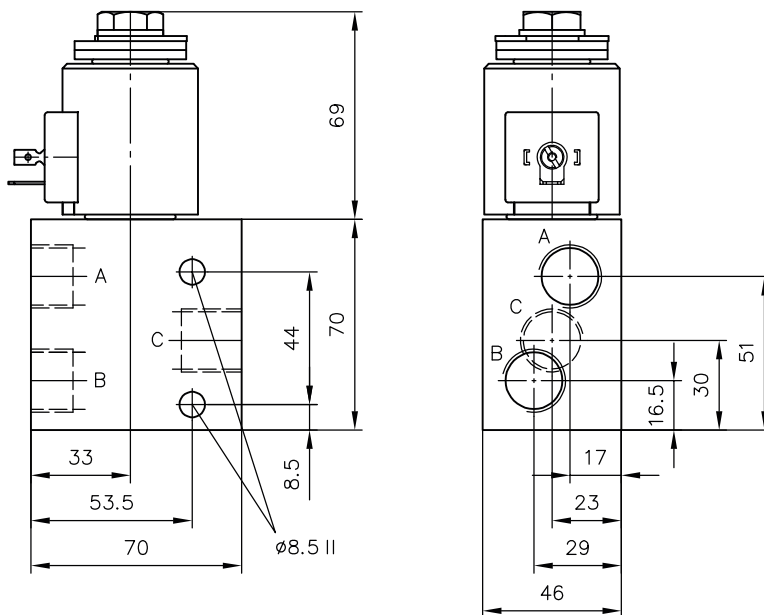
Version	a
G	28
GM	34,5

## 4.2.2 Versions with single connection block

### BVE 3 R(S) - ... - 1/2



### BVE 3 Z - ... - 1/2

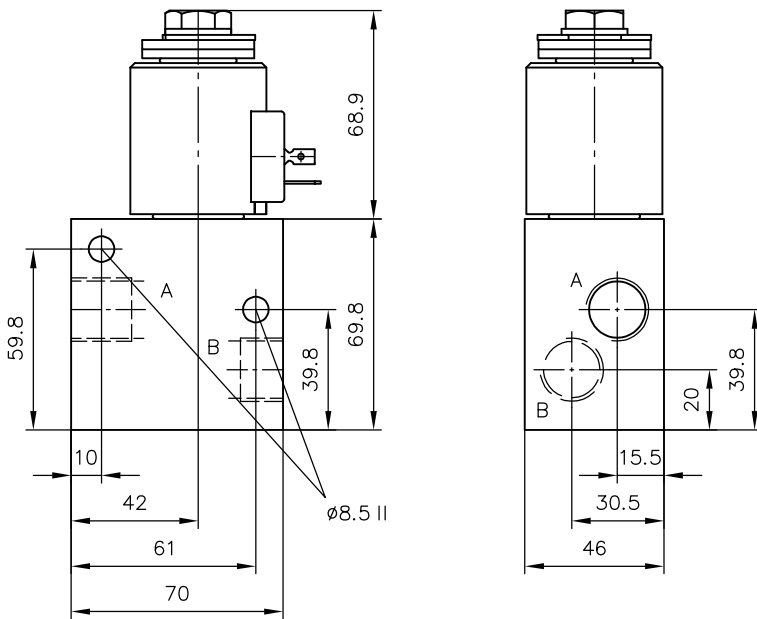


**Ports (ISO 228-1)**

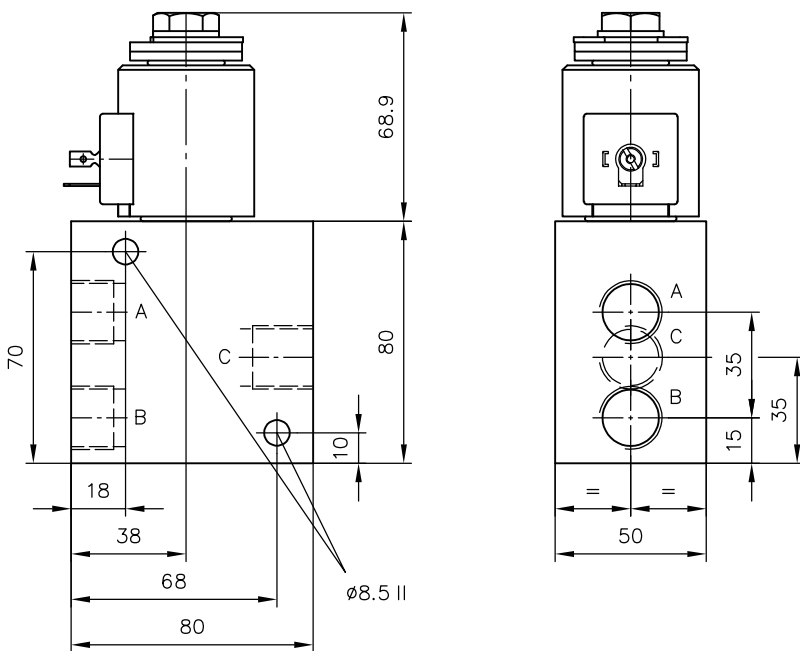
A, B, C

G 1/2

**BVE 3 R(S) - 1/2-BVG**



**BVE 3 Z - 1/2-BVG**

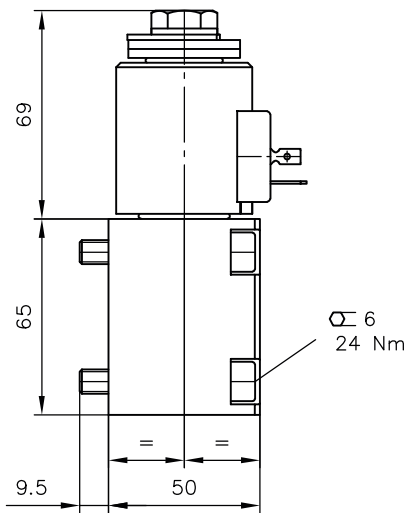


**Ports (ISO 228-1)**

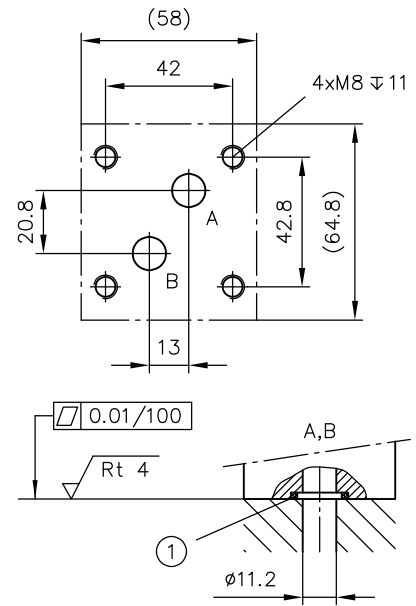
A, B, C

G 1/2

**BVE 3 R(S) - P**

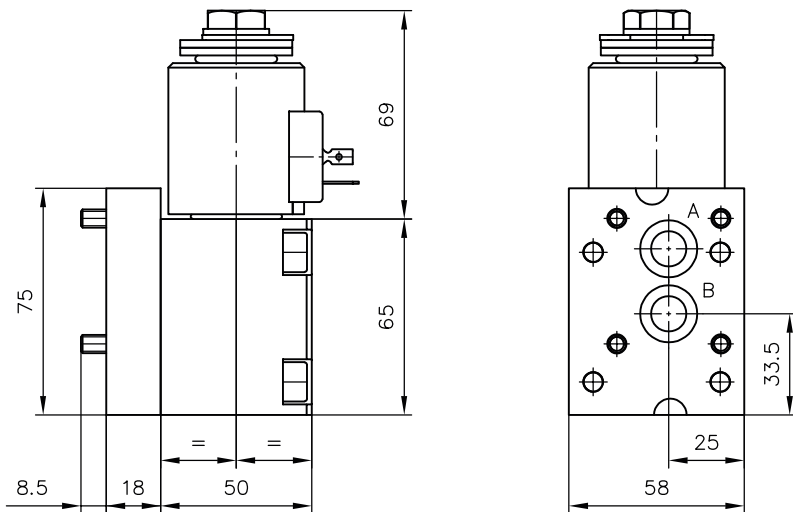


**Hole pattern of the base plate**

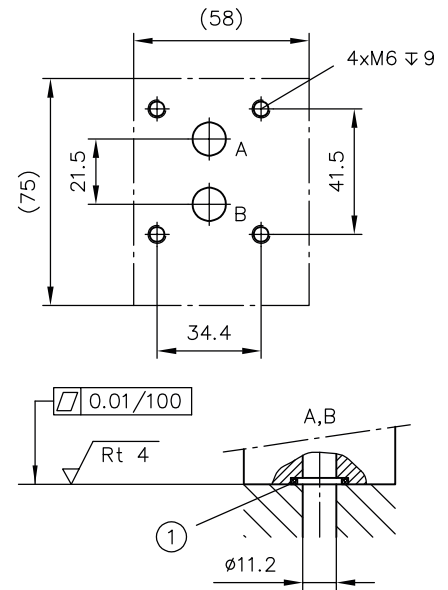


1 O-ring 13.95x2.62 NBR 90 Sh

**BVE 3 R(S) - P - PA**

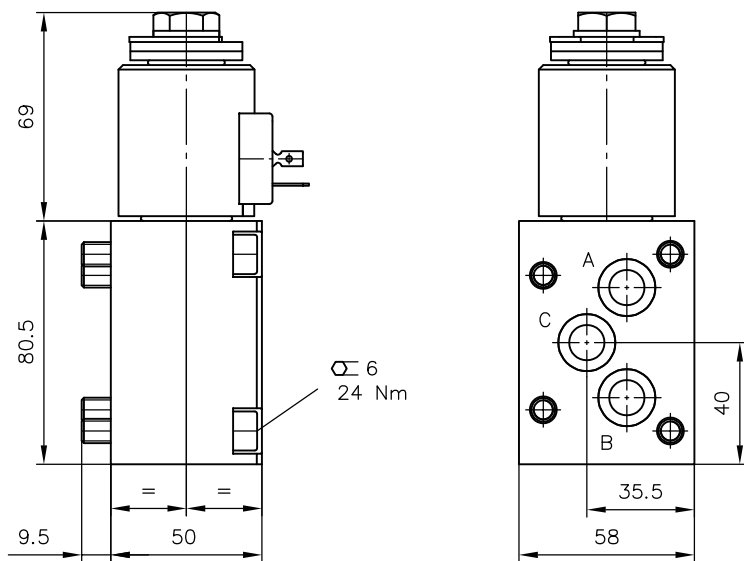


**Hole pattern with adapter plate**

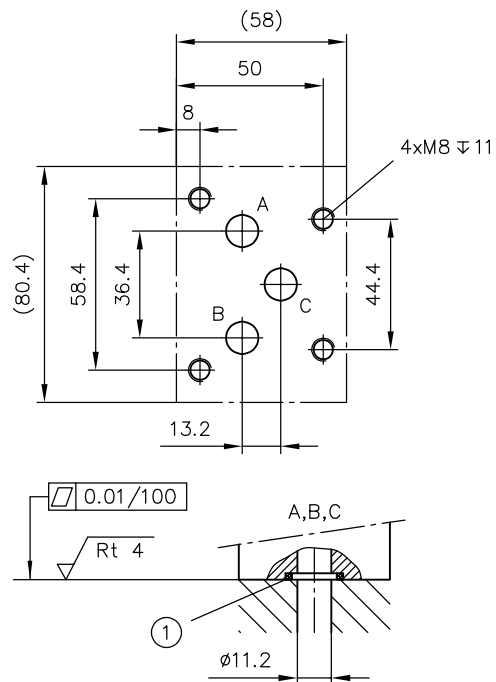


1 O-ring 13.95x2.62 NBR 90 Sh

**BVE 3 Z - P**

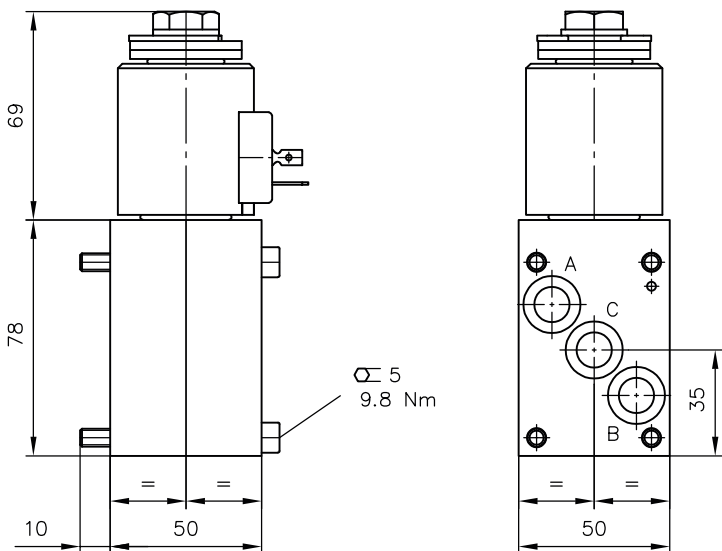


**Hole pattern of the base plate**

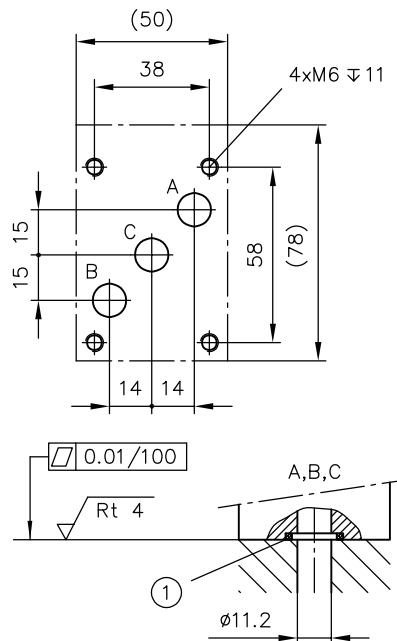


1 O-ring 13.95x2.62 NBR 90 Sh

**BVE 3 Z - P - BP**



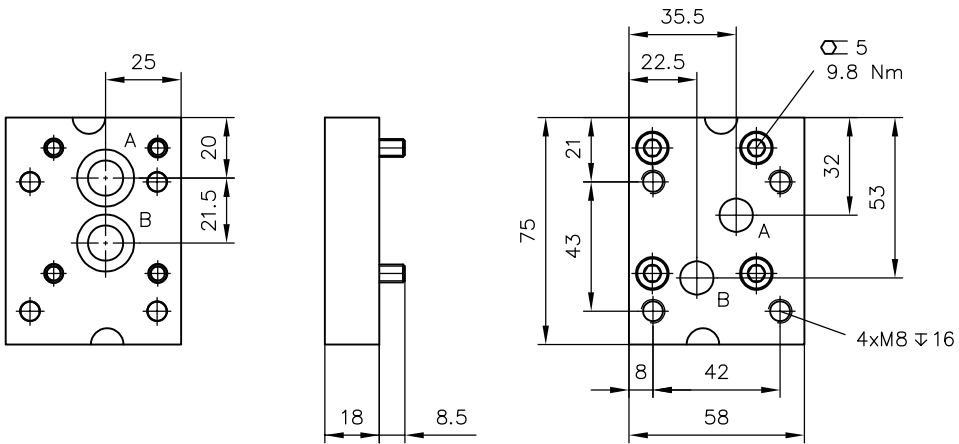
**Hole pattern of the base plate**



1 O-ring 13.95x2.62 NBR 90 Sh

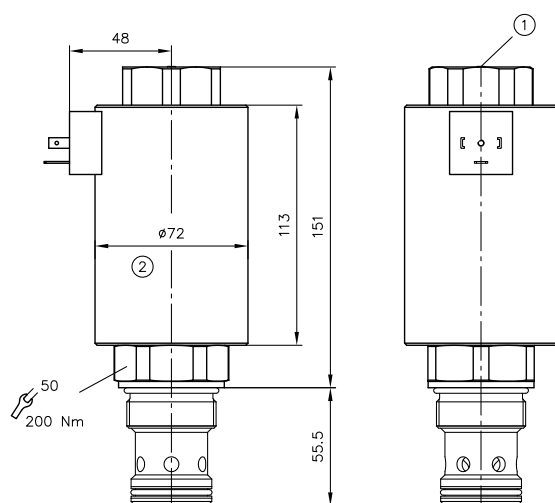
**Adapter plate**

BVE 3 R(S) - PA



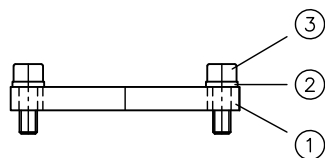
## 4.3 Screw-in valve type BVE 5

### BVE 5



- 1 Manual override
- 2 Excitation system can be pivoted through 360°

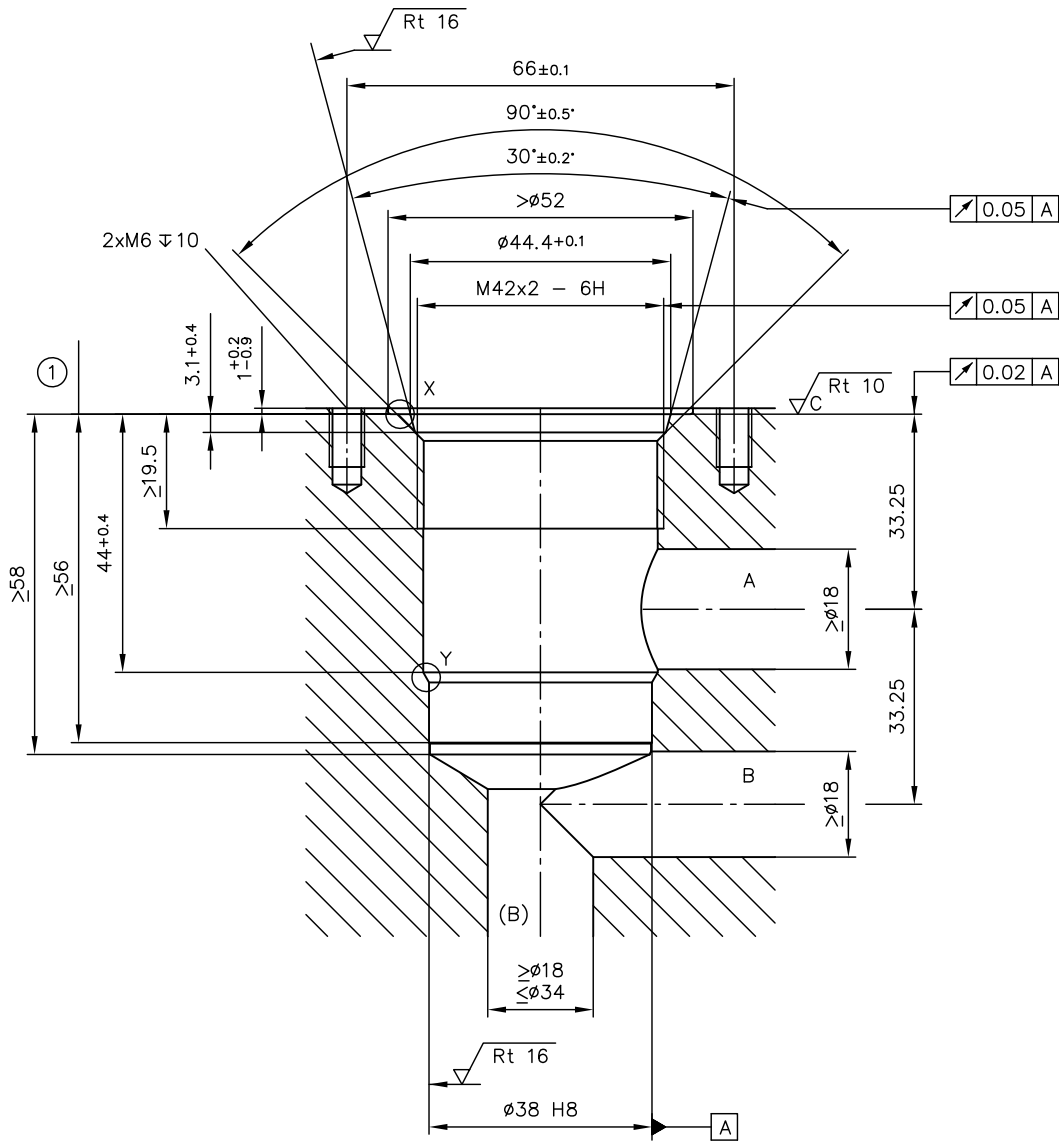
### Anti-twist protection



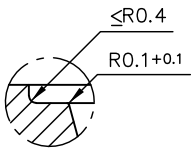
- 1 Ring
- 2 Wedge lock washer DIN 25001-M6
- 3 Cylinder screw ISO 4762 M6x16-A2-70

**NOTICE**  
Screw-in valve BVE 5 may be used only together with anti-twist protection!

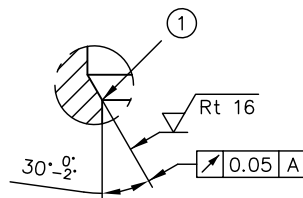
**Mounting hole**



**Detail of X**



**Detail Y**

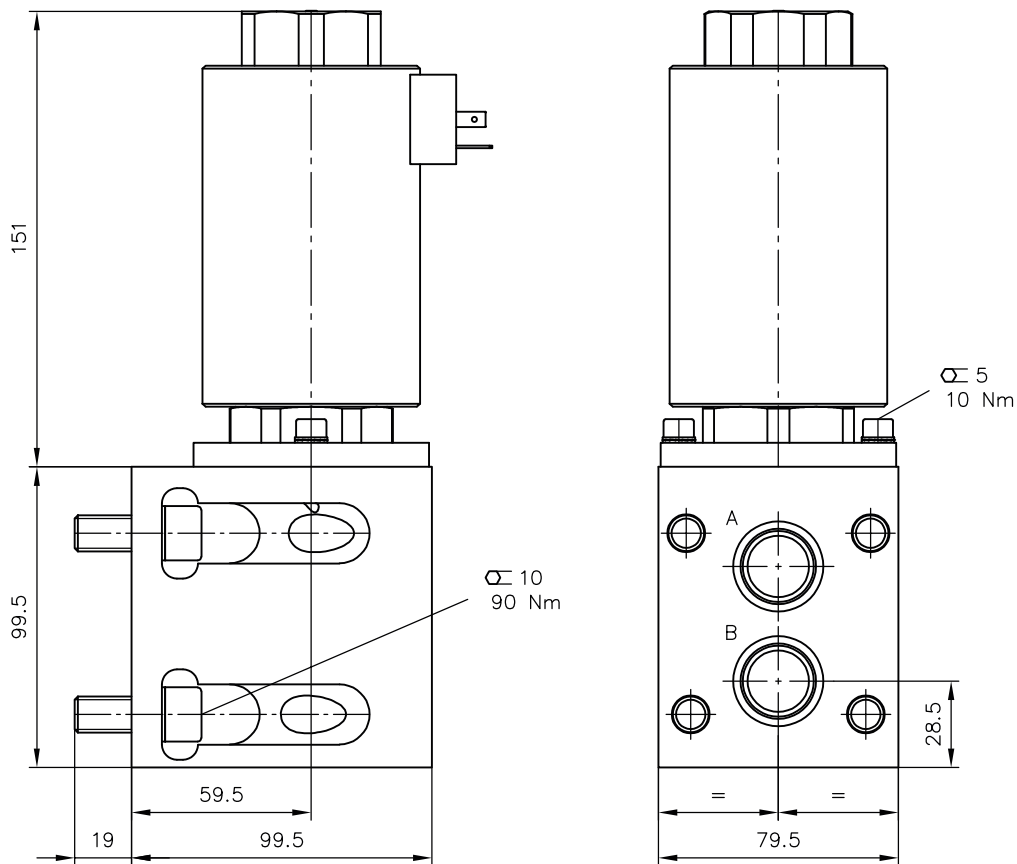


1 Round off edge max. R0.2

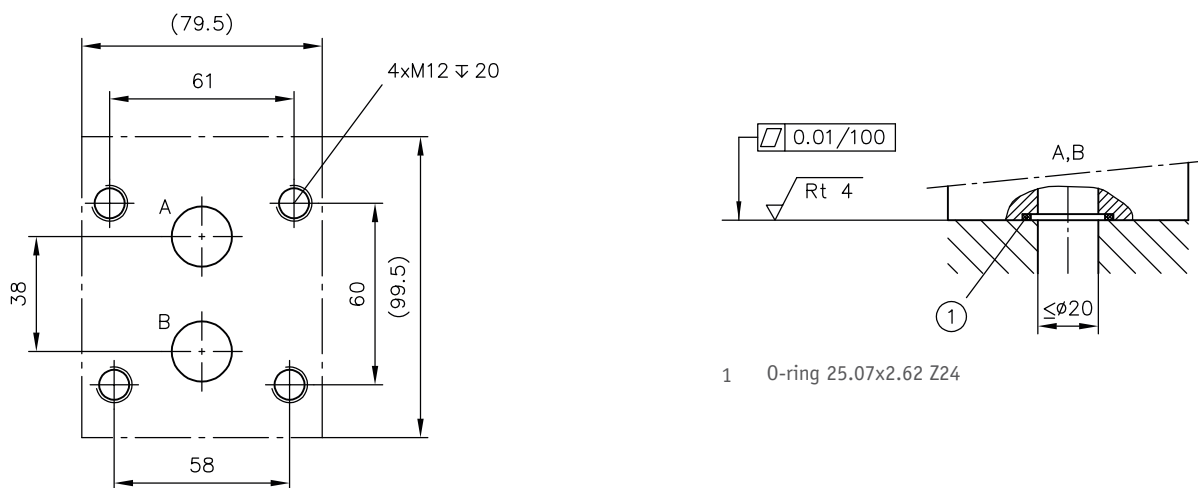


### 4.3.1 Versions with single connection block

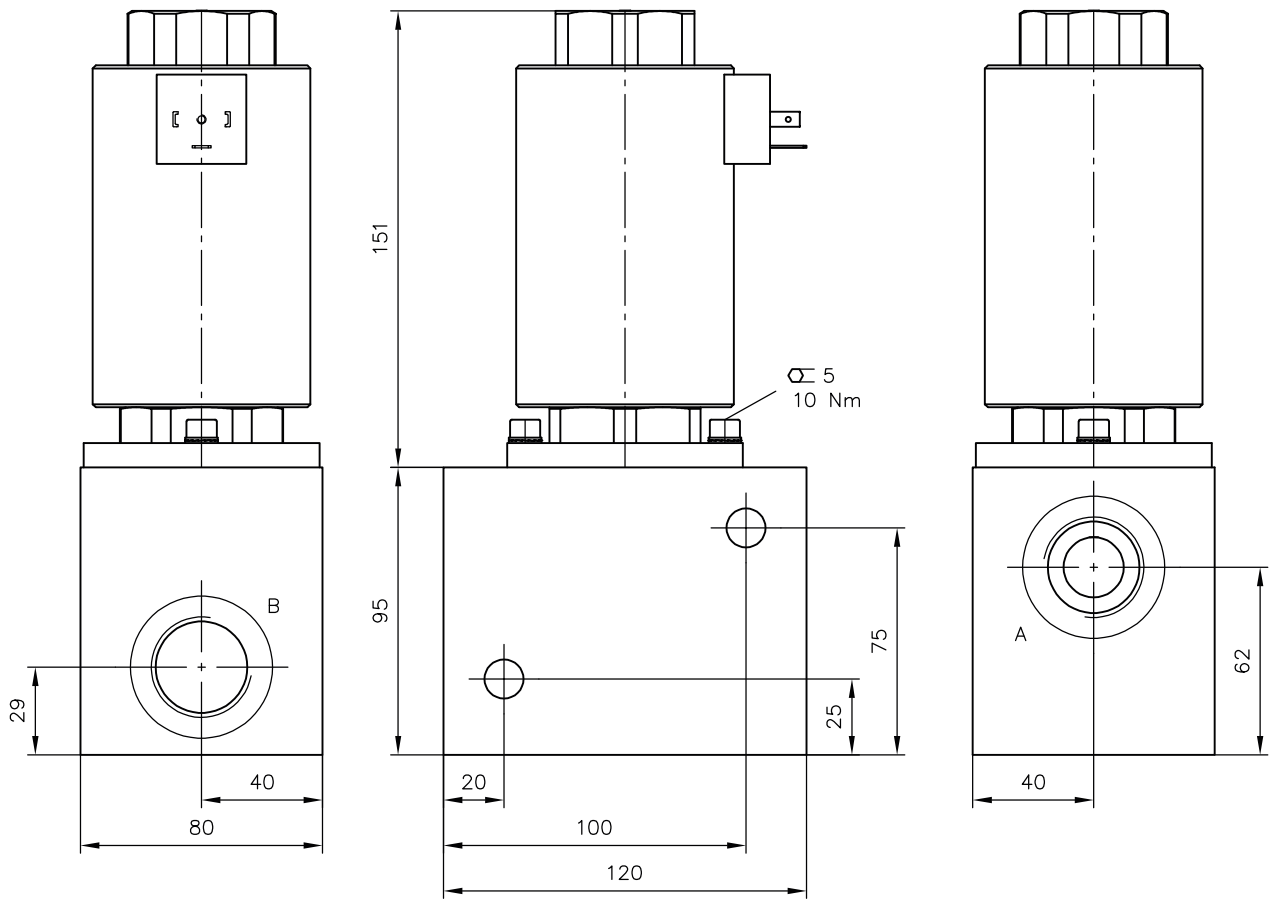
BVE 5 - ... - P



#### Hole pattern of the base plate



BVE 5 - ... - 1



**5****Installation, operation and maintenance information**

Observe the document B 5488 "General operating instructions for assembly, commissioning, and maintenance."

**5.1 Intended use**

This product is intended exclusively for hydraulic applications (fluid technology).

The user must observe the safety measures and warnings in this document.

**Essential requirements for the product to function correctly and safely:**

- ▶ All information in this documentation must be observed. This applies in particular to all safety measures and warnings.
- ▶ The product must only be assembled and put into operation by specialist personnel.
- ▶ The product must only be operated within the specified technical parameters described in detail in this document.
- ▶ All components must be suitable for the operating conditions when using an assembly.
- ▶ The operating instructions for the components, assemblies and the specific complete system must also always be observed.

**If the product can no longer be operated safely:**

1. Remove the product from operation and mark it accordingly.
  - ✓ It is then not permitted to continue using or operating the product.

**5.2 Assembly information**

The product must only be installed in the complete system with standard and compliant connection components (screw fittings, hoses, pipes, fixtures etc.).

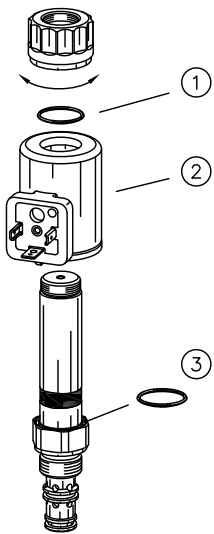
The product must be shut down correctly prior to disassembly (in particular in combination with hydraulic accumulators).

**DANGER****Sudden movement of the hydraulic drives when disassembled incorrectly**

Risk of serious injury or death

- ▶ Depressurise the hydraulic system.
- ▶ Perform safety measures in preparation for maintenance.

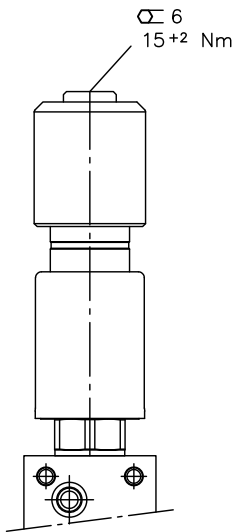
### 5.2.1 Replacing the solenoid



- 1 O-ring 18.75x2.62 NBR 90 Sh
- 2 Solenoid
- 3 O-ring 20.00x1.50 NBR 90 Sh

Solenoid: see Chapter 6.5, "Order coding for individual parts"

### 5.2.2 Adjusting the plug position



Plug position can be adjusted individually:

- ▶ Undo the manual override at the size 6 hex socket.
- ▶ Position the coil.
- ▶ Re-tighten the manual override at the size 6 hex socket.

## 5.3 Operating instructions

Observe product configuration and pressure/flow rate.

The statements and technical parameters in this document must be strictly observed.

The instructions for the complete technical system must also always be followed.

### **!** NOTICE

- ▶ Read the documentation carefully before usage.
- ▶ The documentation must be accessible to the operating and maintenance staff at all times.
- ▶ Keep documentation up to date after every addition or update.

### **!** CAUTION

#### **Overloading components due to incorrect pressure settings.**

Risk of minor injury. Parts may burst or fly off, and uncontrolled leakage of hydraulic fluid.

- Pay attention to the maximum operating pressure of the pump, valves and fittings.
- Always monitor the pressure gauge when setting and changing the pressure.

## Purity and filtering of the hydraulic fluid

Fine contamination can significantly impair the function of the product. Contamination can cause irreparable damage.

### Examples of fine contamination include:

- Swarf
- Rubber particles from hoses and seals
- Dirt due to assembly and maintenance
- Mechanical debris
- Chemical ageing of the hydraulic fluid

### **!** NOTICE

#### **New hydraulic fluid from the manufacturer may not have the required purity.**

Damage to the product is possible.

- ▶ Filter new hydraulic fluid to a high quality when filling.
- ▶ Do not mix hydraulic fluids. Always use hydraulic fluid that is from the same manufacturer, of the same type, and with the same viscosity properties.

For smooth operation, pay attention to the cleanliness level of the hydraulic fluid (cleanliness level see Chapter 3, "Parameters").

Additionally applicable document: [D 5488/1](#) oil recommendations

## 5.4 Maintenance information

Check regularly (at least once a year) by visual inspection whether the hydraulic connections are damaged. If external leakages are found, shut down and repair the system.

Clean the surface of the device regularly (at least once a year) (dust deposits and dirt).

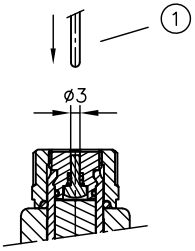
Check that the product is securely fastened in the mounting hole at regular intervals, but at least once per year.

## 6 Other information

### 6.1 Creating the mounting hole

see Chapter 4, "Dimensions"

### 6.2 Manual override



To actuate the valve:

- Use a steel pin or screwdriver etc. to depress the brass bolt (visible on the upper face).

Actuation forces	BVE 1	BVE 3	BVE 5
100 bar	160 N	200 N	350 N
200 bar	260 N	300 N	525 N
300 bar	340 N	380 N	700 N
400 bar	420 N	460 N	845 N
500 bar	520 N	--	--

1 Auxiliary tool for actuation (do not use parts with sharp edges)

#### NOTICE

Manual override with coding T or T1 is recommended for higher system pressures.

## 6.3 Accessories, spare and individual parts

To purchase spare parts, please see [HAWE Hydraulik interactive contact map](#).

### 6.3.1 Blocking (coding B)

In the case of circuit symbol R, blocking can be used for maintenance/set-up operation.

- Operating mode: normal operation
  - Solenoid (replaceable solenoid!) mounted
  - Blocking nut acts as a fixing element for the solenoid
  - Blocking is ineffective
  - Valve is actuated via the solenoid
  
- Maintenance/set-up operation mode
  - Solenoid (replaceable solenoid!) not mounted
  - Blocking nut screwed on hand-tight
  - Valve is in the actuated state



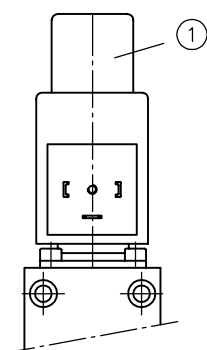
#### **DANGER**

#### **Sudden movement of the hydraulic drives**

Risk of serious injury or death.

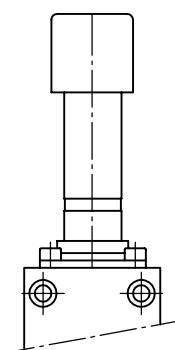
Prevent unintended movements by the consumers!

#### Normal operation



1 Blocking nut

#### Maintenance/set-up operation

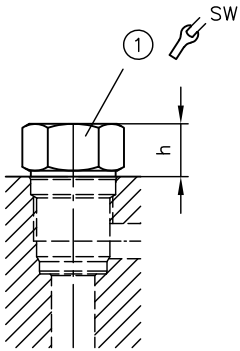


## 6.4 Additional elements

### Tapped plugs

The mounting holes can be sealed with tapped plugs if necessary; for example, if the assembly of standardised basic bodies is to be carried out with or without screw-in valves as required.

For type	Order coding	Circuit symbol
BVE 1 BVE 3 BVE 5	7750 181 Sk 7405 260 b 7750 524	
BVE 1 BVE 3 BVE 5	7750 191 Sk 7405 260 a 7750 526	
BVE 1 BVE 3	7750 181 Sk 7405 260 c	
BVE 1 BVE 3	7750 171 Sk 7405 260 d	



1 Tapped plug

Type	h	SW	Tightening torque (Nm)
BVE 1	12,5	24	100
BVE 3	18,5	30	40
BVE 5	20	50	200

### Step tools for creating the mounting hole

Tool	Order coding
Step drill BVE 1 R/S	2800 0001-00
Step drill BVE 1 Z	2800 0002-00
Reamer BVE 1 R/S	2800 0003-00
Step reamer BVE 1 Z	2800 0004-00



**Orifices**

For type	Coding	Diameter Ø (mm)	Order coding
<b>BVE 1.. - 1/4</b>	--	undrilled	3059 4126-00
	B 0,4	0,4	3059 4065-00
	B 0,5	0,5	3059 4066-00
	B 0,6	0,6	3059 4175-00
	B 0,8	0,8	3059 4265-00
	B 1,1	1,1	3059 4219-00
	B 1,3	1,3	3059 4182-00
	B 1,5	1,5	3059 4283-00
	B 2,0	2,0	3059 4117-00
<b>BVE 1.. - 3/8</b>	--	undrilled	3059 4079-00
	B 0,4	0,4	3059 4665-00
	B 0,5	0,5	3059 4666-00
	B 0,6	0,6	3059 4660-00
	B 0,7	0,7	3059 4667-00
	B 0,8	0,8	3059 4661-00
	B 0,9	0,9	3059 4668-00
	B 1,0	1,0	3059 4669-00
	B 1,1	1,1	3059 4662-00
	B 1,3	1,3	3059 4663-00
	B 1,5	1,5	3059 4187-00
	B 2,0	2,0	3059 4153-00
<b>BVE 1.. - 1/2 - G</b> <b>BVE 3.. - 1/2</b> <b>BVE 3.. - 1/2 - BVG</b>	--	undrilled	3059 4080-00
	B 0,8	0,8	3059 4165-00
	B 2,5	2,5	3059 4149-00
	B 3,0	3,0	3059 4150-00
	B 3,5	3,5	3059 4151-00
B 4,0	4,0	3059 4152-00	
<b>BVE 5 - 1..</b>	--	undrilled	3059 5066-00
	B 3,0	3,0	3059 5067-00
	B 4,0	4,0	3059 5068-00
	B 5,0	5,0	3059 5069-00
	B 6,0	6,0	3059 5076-00
<b>BVE 1 - P</b>	--	undrilled	3059 4664-00
	B 0,8	0,8	3059 4186-00
	B 1,0	1,0	3059 4295-00
	B 1,2	1,2	3059 4296-00
	B 1,4	1,4	3059 4297-00
	B 1,6	1,6	3059 4685-00
	B 1,8	1,8	3059 4686-00
	B 2,0	2,0	3059 4687-00
	ER 12	--	3012 8260-00
<b>BVE 1.. - BP</b> <b>BVE 1.. - P1</b>	--	undrilled	3059 4648-00
	B 0,6	0,6	3059 4649-00
	B 0,8	0,8	3059 4655-00
	B 1,1	1,1	3059 4650-00
	B 1,3	1,3	3059 4651-00
	B 1,5	1,5	3059 4652-00
	B 2,0	2,0	3059 4653-00
	ER 12	--	3012 8260-00
<b>BVE 1.. - P - WN</b>	B 0,4	0,4	3059 4192-00
	B 0,6	0,6	3059 4316-00
	B 0,7	0,7	3059 4193-00
	B 0,8	0,8	3059 4319-00
	B 1,2	1,2	3059 4194-00
	EK 01	--	3012 8005-00

For type	Coding	Diameter Ø (mm)	Order coding
BVE 3.. - P	--	undrilled	3059 4135-00
BVE 3.. - BP	B 2,5	2,5	3059 4129-00
BVE 3.. - PA	B 3,0	3,0	3059 4077-00
	B 3,5	3,5	3059 4240-00
	B 4,0	4,0	3059 4130-00
BVE 5.. - P	--	undrilled	3059 5077-00
	B 3,0	3,0	3059 5078-00
	B 4,0	4,0	3059 5079-00
	B 5,0	5,0	3059 5080-00
	B 6,0	6,0	3059 5081-00

## 6.5 Order coding for individual parts

### Screw-in valve type BVE 1

Excitation system:		Male connector:		
	Coding	Order no.	Coding	Order no.
Solenoid	G 12, L 12, X 12	4704 8692-00	G ..	6217 0002-00
	G 24, G 24, L 24, X 24, L5K 24	4704 8685-00	L ..	6217 8024-00
	G 48, X 48	4704 8695-00	WG ..	6217 6002-00
	G 72, X 72	4704 8696-00	L5K ..	6217 8088-00
	G 80, X 80	4704 8697-00	<b>Seal kit:</b>	
	WG 110, X 98, G 98, L 98	4704 8698-00	DS 7921-1 for BVE 1 Z	6800 8454-02
	G 110, X 110	4704 8699-00	DS 7921-2 for BVE 1 R/S	6964 0047-32
	WG 230, G 205, X 205, L 205	4704 8700-00		
	AMP 12	4704 8753-00		
	AMP 24	4704 8754-00		
	M 24	4704 4042-00		
	DT 24	4704 5330-00		
Solenoid 18 W	X 24/18W, G 24/18W, L 24/18W, L5K 24/18W	4704 9031-00		

### Screw-in valve type BVE 3

Excitation system:		Male connector:		
	Coding	Order no.	Coding	Order no.
Solenoid	G 12, L 12, X 12	4704 8702-00	G ..	6217 0002-00
	G 24, L 24, X 24	4704 8703-00	L ..	6217 8024-00
	G 48, X 48	4704 8704-00	WG ..	6217 6002-00
	G 72, X 72	4704 8765-00	L5K ..	6217 8088-00
	G 80, X 80	4704 8705-00	Seal kit (O-rings): DS 7921-3	
	WG 110, X 98, G 98, L 98	4704 8735-00		
	WG 230, X 205, G 205, L 205	4704 8739-00		
	S 24	4704 8731-00		
	DT 24	4704 4077-00		
	AMP 24	4704 4059-00		

### Screw-in valve type BVE 5

Excitation system:			Male connector:	
	Coding	Order no.	Coding	Order no.
Solenoid	G 12, L 12, X 12	4704 4097-00	G ..	6217 0002-00
			L ..	6217 8024-00
			WG ..	6217 6002-00
	G 24, L 24, X 24	4704 4057-00	Seal kit (O-rings): DS 7921-5	
	WG 110, G 98, L 98, X 98	4704 4060-00		
	WG 230, G 205, L 205, X 205	4704 4098-00		

### Anti-twist protection size 1

	Order no.
Anti-twist protection BVE 1- .. EX..	3407 4848-00
Cylinder screw	ISO 4762 M4x50-12.9-GEOMET500

### Anti-twist protection size 5

	Order no.
Anti-twist protection BVE 5 (part 1 - 3 complete)	6801 3964-01
1 Anti-twist protection	3407 4352-00
2 Wedge lock washer	DIN 25001-M6
3 Cylinder screw	ISO 4762 M6x16-A2-70

### Reactive plates

	Order no.
Reactive plate BVE 1 R(S) - P	3407 1228-00

## References

### Additional versions

- Directional seated valve type EM and EMP: D 7490/1
- Directional seated valve type BVG 1 and BVP 1: D 7765
- Directional seated valve type NBVP 16: D 7765 N
- Directional seated valve type BVE 1F: D 7921 F
- Directional seated valve type VP: D 7915
- Directional seated valve type ROLV: D 8144

