

3/2- and 2/2-way cartridge valve type BVE

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

Flow Q_{max} = 300 lpm
Perm. pressure p_{max} = 500 bar

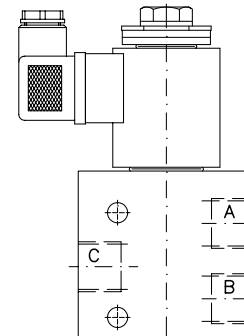
Additional valves with same function:

- Type EM, EMP D 7490/1
- Type BVG 1, 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 BVG 3, BVP 3 D 7400 (Q_{max} = 60 lpm, p_{max} = 315 bar)

Cartridge valve



Version with connection block



1. General

The solenoid actuated 2/2- and 3/2-way directional valves type BVE are designed as seated cone valves. All ports are equally pressure resistant due to the internal pressure compensation.

The valve returns automatically into its idle position because of the spring return, while not actuated. The valves are completely made of steel, with all functional internal components being hardened, permanently lubed by the hydraulic fluid.

As these valves are designed as cartridge valve, installation is most simple and quick.

The solenoid coil can be easily replaced, without opening the hydraulic system e.g. when a different voltage is required.

There are also individual connection blocks available for these valve, enabling direct pipe connection.

2. Available versions, main data

Order example:

BVE 3 Z - B 2,5 - G 24 - 1/2

Table 2,
see page 2

Table 4, see page 3

Table 3 and 3a, see page 3

Table 3, see page 2

	Flow Q_{max} (lpm)	Pressure p_{max} (bar)	Symbols		
			R	S	Z
BVE 1	20	500			
BVE 3	70	400			
BVE 5	300	400	Type BVE 5 only with symbol R		

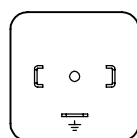
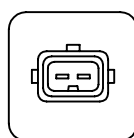
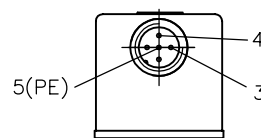
Table 2: Orifice (additional element) only available for versions with indiv. connection block for pipe connection, see table 4, For individual orders, see sect. 5.3

Basic type, size	Coding	Ø (mm)	System or accumulator charging pressure range
BVE 1.. - 1/4	B 0,6	0.6	≤ 500 bar
	B 0,8	0.8	≤ 500 bar
	B 1,1	1.1	≤ 500 bar
	B 1,3	1.3	≤ 400 bar
	B 1,5	1.5	≤ 210 bar
BVE 1.. - 3/8	--	(without hole)	--
	B 0,4	0.4	≤ 500 bar
	B 0,5	0.5	≤ 500 bar
	B 0,6	0.6	≤ 500 bar
	B 0,7	0.7	≤ 500 bar
	B 0,8	0.8	≤ 500 bar
	B 0,9	0.9	≤ 500 bar
	B 1,0	1.0	≤ 500 bar
	B 1,1	1.1	≤ 500 bar
	B 1,3	1.3	≤ 400 bar
	B 1,5	1.5	≤ 210 bar
	B 2,0	2.0	≤ 70 bar
	B 2,5	2.5	≤ 30 bar
B 4,0	4.0	--	
BVE 3.. - 1/2	B 2,5	2.5	≤ 320 bar
	B 3	3	≤ 170 bar
	B 3,5	3.5	≤ 90 bar
	B 4	4	≤ 50 bar
BVE 5.. - 1	B 3,0	3.0	≤ 400 bar
	B 4,0	4.0	≤ 400 bar
	B 5,0	5.0	≤ 400 bar
	B 6,0	6.0	≤ 190 bar

Table 3: Actuation solenoid

- Note:**
- The specified protection class is only valid when the plug is properly mounted.
 - Type BVE 5 only 24V DC

Electrical connection	Coding and nom. voltage				BVE 1	BVE 3	BVE 5	Protection class (IEC 60529)
	12V DC	24V DC	110 V 50/60 Hz	230 V 50/60 Hz				
DIN EN 175 301-803 A with plug	G 12	G 24	WG 110	WG 230	●	●	●	IP 65
DIN EN 175 301-803 A without plug	X 12	X 24	X 98	X 205	●	●	●	(IP 65)
DIN EN 175 301-803 A with LED-plug	L 12	L 24	--	--	●	●	● (only 24 V)	IP 65
DIN EN 175 301-803 A with LED-plug and 5 or 10 m cable	L 5 K.. L 10 K..	L 5 K.. L 10 K..	--	--	●	●	● (only 24 V)	IP 65
Co. AMP Junior Timer	AMP 12	AMP 24	--	--	●	●		IP 65
M12x1	--	M 24	--	--	●			IP 65
DEUTSCH	--	DT 24	--	--	●	●		IP 67

Connection pattern**G., X., L..****AMP..****M..****Table 3a:** Actuation solenoid options (only type BVE 1)

Coding	Description
without	standard
B	Actuation lock (only available for symbol R), for notes regarding use, see sect. 5.2
T	with detent

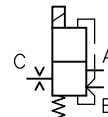
Table 4: Indiv. connection block

Basic type, size	Coding	Description	Ports A, B and C (ISO 228/1) (BSPP)
BVE 1	- 1/4	For pipe connection	G 1/4
	- 3/8		G 3/8
	- P	For manifold mounting	--
BVE 3	- 1/2	For pipe connection	G 1/2
BVE 5	- P	For manifold mounting	--
	- 1	For pipe connection	G 1

3. Additional parameters

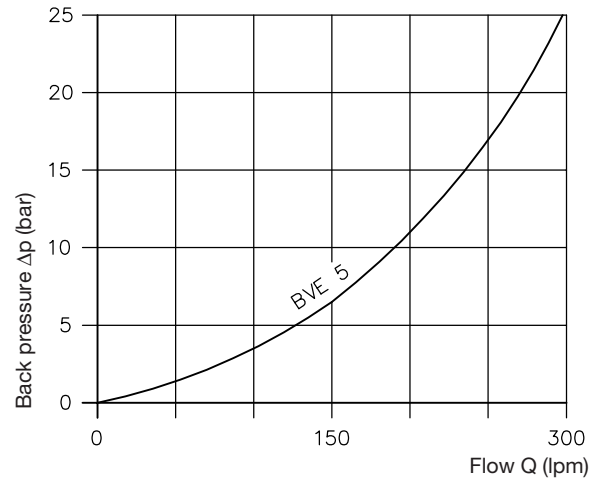
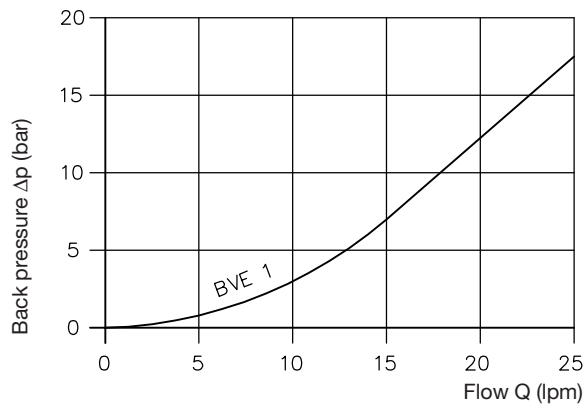
3.1 General and hydraulic

Installed position	Any	
Over lapping at 3/2-way directional valves	Negative (transition from one to the other valve position is only completed in the respective end position). All ports are interconnected until the end position is achieved.	
Operating pressure	see table 1	
Material and surface treatment	Steel, DIN 50979-Fe ZnNi 8 Steel, zinc galvanized / gas nitrided	BVE 1 and BVE 5 BVE 3
Mass (weight)	Basic type	Cartridge valve Indiv. connection block
	BVE 1	0.5 kg + 0.8 kg
	BVE 3	0.7 kg + 0.7 kg
	BVE 5	3.8 kg + 3.8 kg
Hydraulic fluid	Hydraulic oil acc. to DIN 51524 table 1 to 3; ISO VG 10 to 68 acc. to DIN 51519 Viscosity range: min. approx. 4; max. approx. 1500 mm ² /s Optimal operation range: approx. 10 ... 500 mm ² /s Also suitable are biologically degradable pressure fluids type HEPG (Polyalkylenglykol) and HEES (synth. ester) at operation 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.	
Flow limitation	It is necessary to limit the flow down to the permissible range depending on the system pressure via throttles (see sect. 2). 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.. these should be installed in port C. For more detailed information, see table 2, section 2	

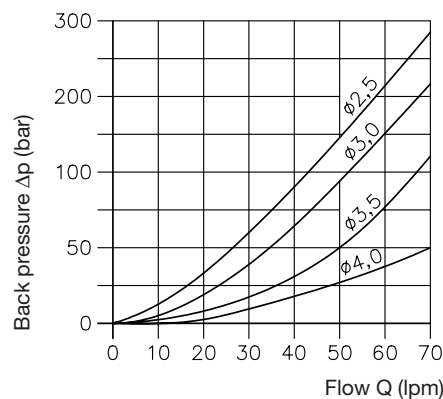
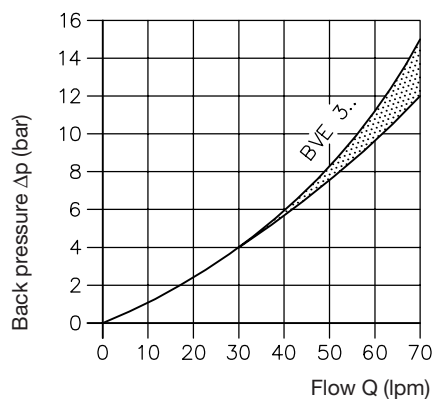


Δp-Q-curve

Basic valves



Orifice (add. element)



Ölviskosität während der Messung ca. 60 mm²/s

3.2 Electrical data

Nom. voltage	U_N		12V DC	24V DC	98V DC	205V DC	
Nom. power	P_N	BVE 1 BVE 3 BVE 5	26.2 W 35.1 W	26.5 W (30 W) 32.7 W 63 W	24.8 W 31.4 W	28 W 30.2 W	
Nom. current	I_N	BVE 1 BVE 3 BVE 5	2.34 A 2.5 A 4.76 A	1.17 A 1.4 A 2.45 A	0.28 A 0.33 A 0.63 A	0.14 A 0.16 A 0.33 A	
Switching times approx. ms		On 50 ... 60 (type BVE 5 approx. 100 ms) Off 50 ... 60 (type BVE 5 approx. 100 ms)				Relative duty cycle: 100% ED (Specification on the solenoid)	
Switchings / h		approx. 2000 (rather even distributed)				Reference value and restriction in the operation	
Insulation material class		F; Contact temperature approx. 85...95°C (solenoid housing) with an ambient temperature of 20°C. Classification F permits a max. winding temperature of approx. 150°C; This won't be exceeded if the guideline figures for %ED are observed during operation. The thermal load of the coil may be reduced when an economy circuit is employed.					
Protection class		Depending on actuation solenoid, see table 3					
Connector and connection		Depending on actuation solenoid, see table 3					
Required connectors		DC-voltage		AC-voltage			
Coding AMP.. Co. AMP Junior 2-pole, Coding 1		G.. X..	AMP.. G.. EX	L..	WG 110..		
Coding G.., X.., L.. DIN EN 175 301-803 A							
		M.. 					
Cut-off energy		Guideline for max: approx. < 10 Ws + approx. 10% when measuring at U_N					
Additional solenoid voltages Type BVE 1, BVE 3		48V DC 80V DC					

Electrical data for ex-proof solenoids

ATEX-Certificate of conformity
Coding

Oper. duration
Duty cycle
Nom. voltage U_N
Power P_N

Restrictions for use:

Ambient temperature
max. fluid temperature
el. protection against overload (conf. IEC 60127)
Surface coating

TÜV-A 03ATEX 0017 X
⊗ II 2 G Ex d IIB + H2 T4
⊗ II 2 D Ex mbD 21 T135°C
100% ED
IP 67 (IEC 60529)
24 V DC
23 W

-35 ... +40°C
+70°C
 $I_F < 1.6 A-T$
Housing galvanically zinc coated
Coil and connection cavity are moulded

Attention: Protect the complete valve against direct sun light.

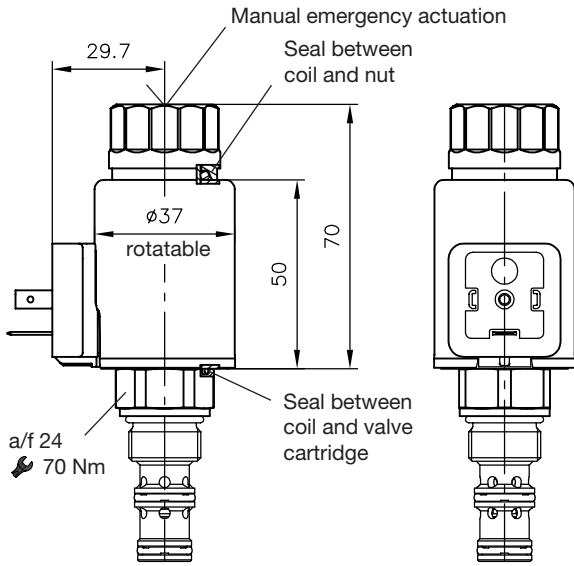
Observe the operation manuals B 03/2004 and B ATEX!
Electrical lay-out and testing conforming EN 60079, VDE 0170-1, VDE 0170-5

4. Unit dimensions

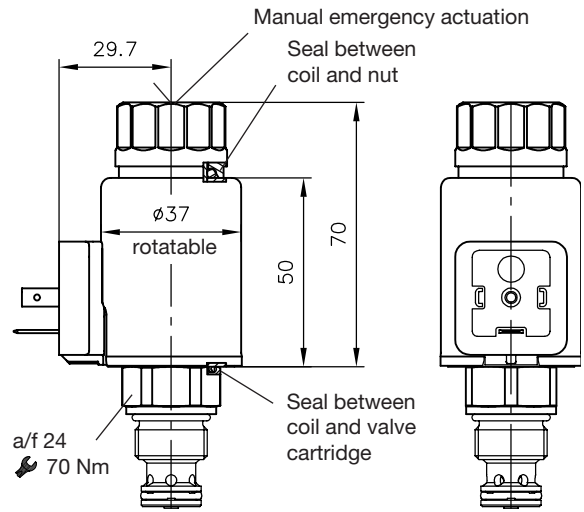
All dimensions in mm, subject to change without notice!

4.1 Cartridge valve type BVE 1

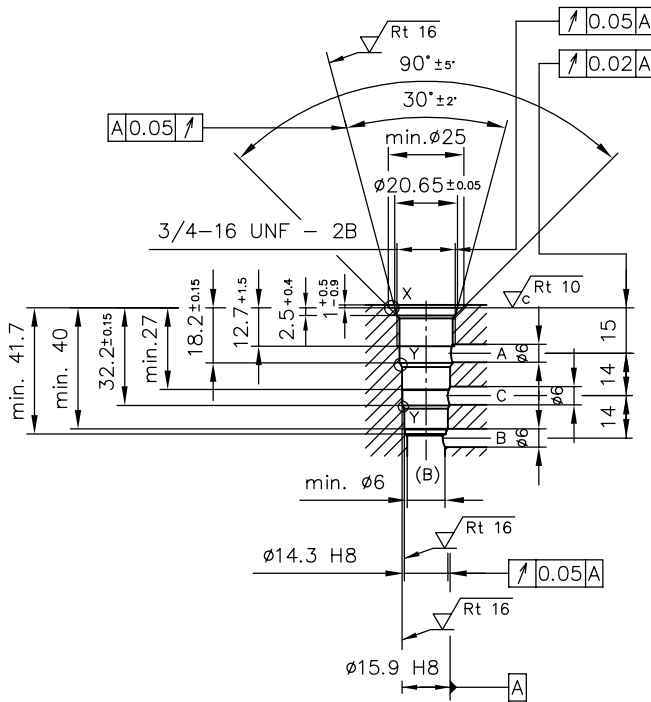
Type BVE 1 Z



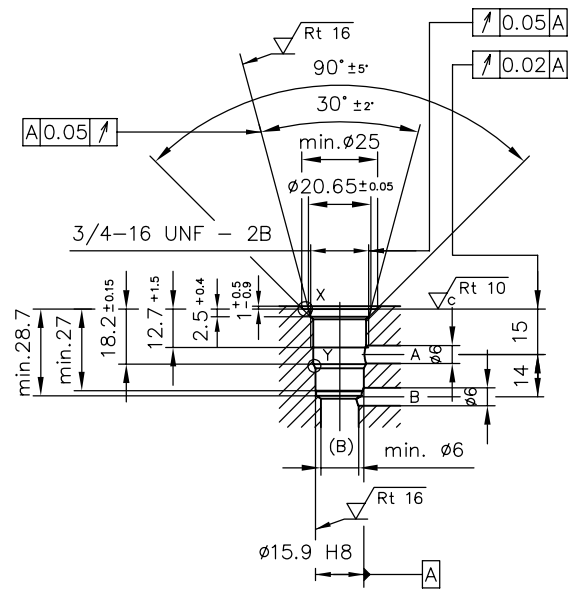
Type BVE 1 R, BVE 1 S



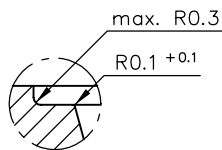
Mounting hole for type BVE 1 Z



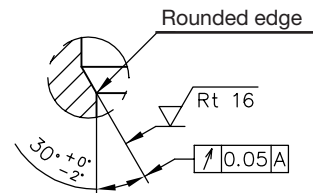
Mounting hole for type BVE 1 R, BVE 1 S



Detail at "X"



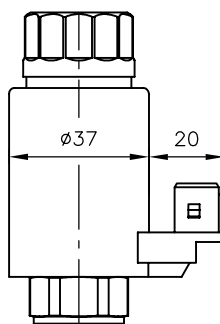
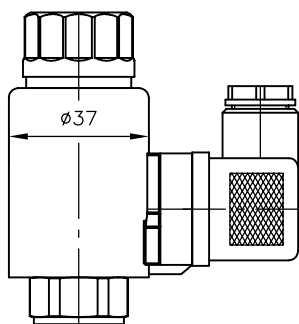
Detail at "Y"



Solenoid version

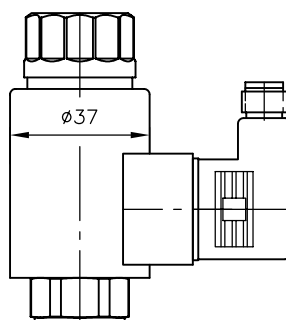
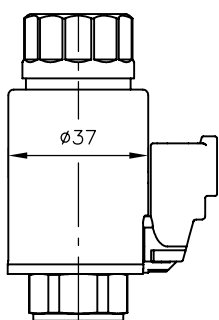
- G..
- L..
- X.. (without plug)

- AMP..



- DT..

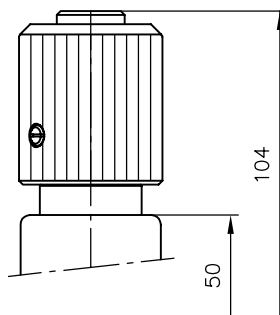
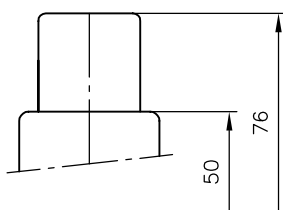
- M..



Actuation solenoid option

- .. B

- .. T



Order coding for spare parts (e.g. replacement)

Coil system:

	Coding	Order No.
Solenoid coil	G12, L12, X12	7329 785-12V
	G24, L24, X24	7329 785-24V
	G48, X48	7329 785-48V
	G72, X72	7329 785-72V
	G80, X80	7329 785-80V
	WG110, X98	7329 785-98V
	WG230, X205	7329 785-230V
	AMP12	7329 051-12V
	AMP24	7329 051-24V
	M24	7329 788-24
	DT24	7329 791-24V

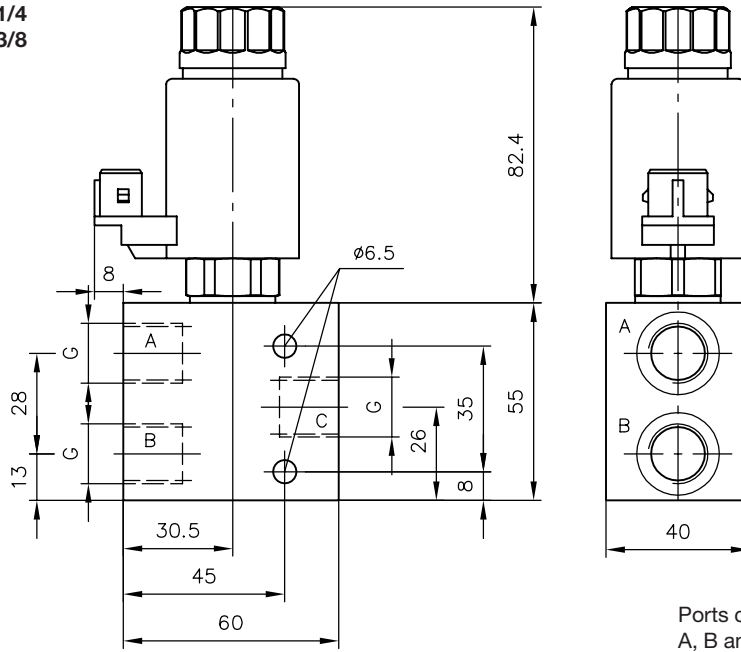
Plug:

Coding	Nomenclature
G..	MSD 3-309
L..	SVS 3129020
WG..	MSD 4-209 P10
L 5 K..	7163 112/1
L 10 K..	7163 118

Seal kit (O-rings): DS 7921-1

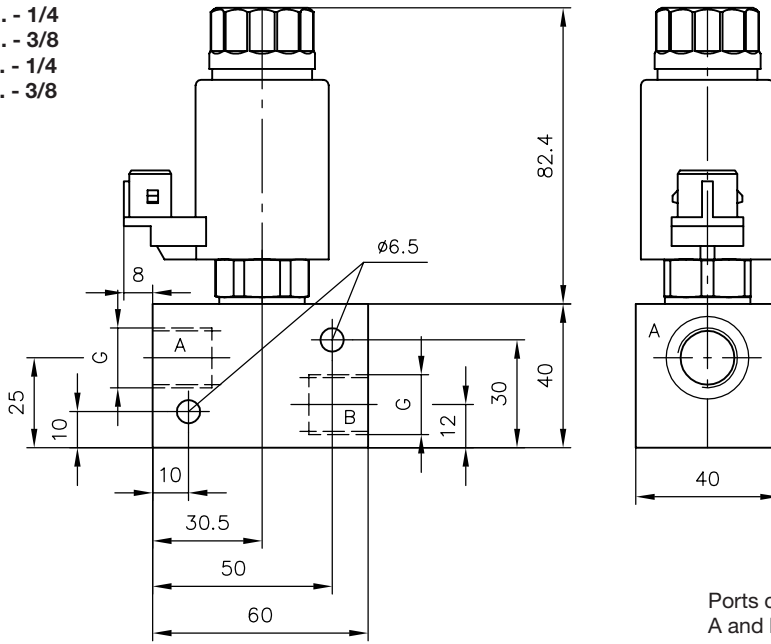
Version with indiv. connection block

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



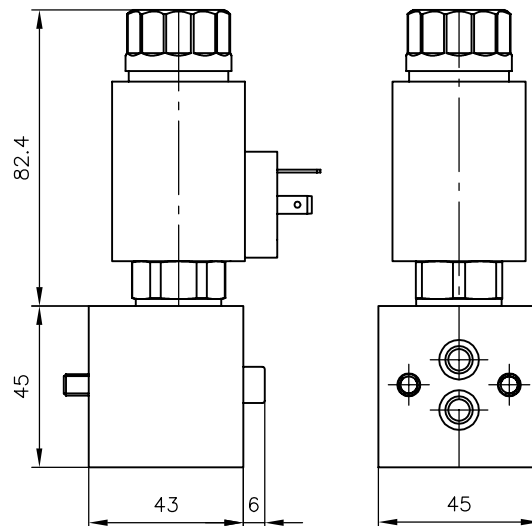
Ports conforming ISO 228/1 (BSPP):
 A, B and C = G 1/4 or G 3/8

Type **BVE 1 R - ... - 1/4**
BVE 1 R - ... - 3/8
BVE 1 S - ... - 1/4
BVE 1 S - ... - 3/8

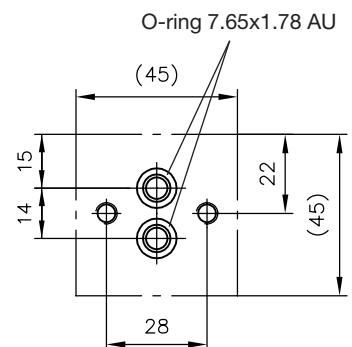


Ports conforming ISO 228/1 (BSPP):
 A and B = G 1/4 or G 3/8

Type **BVE 1 R - ... - P**
BVE 1 S - ... - P

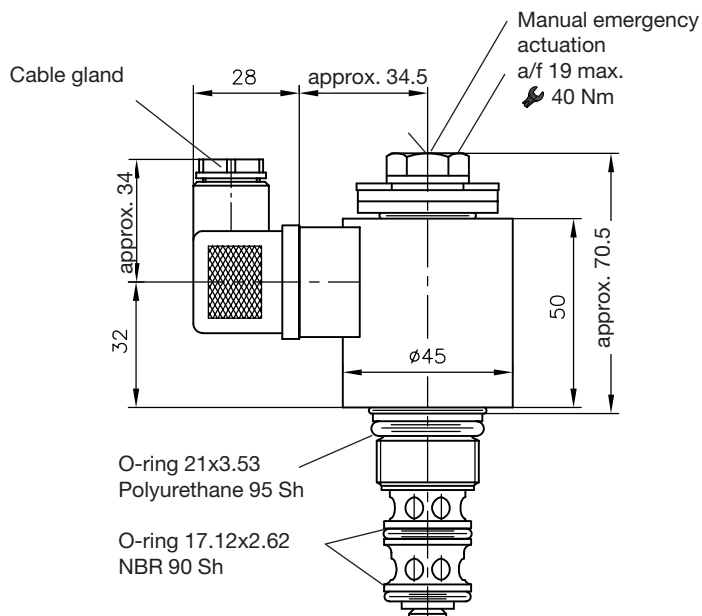


Hole pattern



O-ring 7.65x1.78 AU

4.2 Cartridge valve type BVE 3



Order coding for spare parts (e.g. replacement)

Coil system:

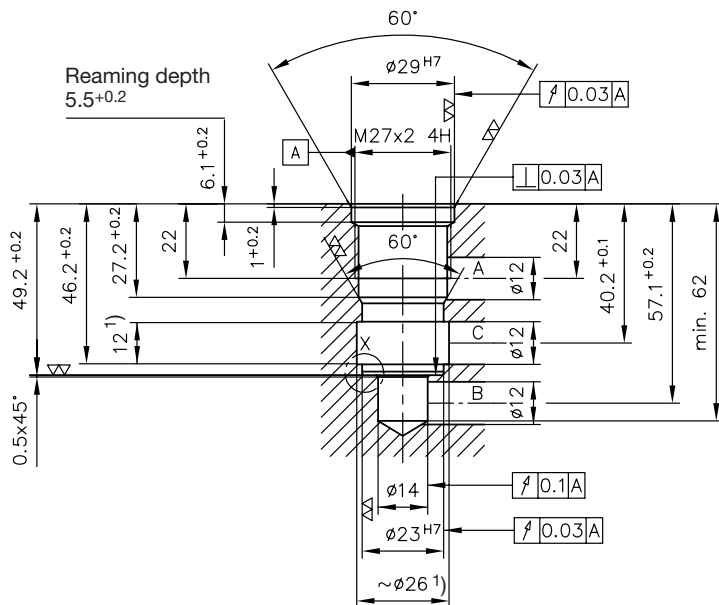
	Coding	Order No.
Solenoid coil	G12, L12, X12	7177 720-12V
	G24, L24, X24	7177 720-24V
	G48, X48	7177 720-48V
	G72, X72	7177 720-72V
	G80, X80	7177 720-80V
	WG110, X98	7177 720-98V
	WG230, X205	7177 720-205V

Plug:

Coding	Nomenclature
G..	MSD 3-309
L..	SVS 3129020
WG..	MSD 4-209 P10

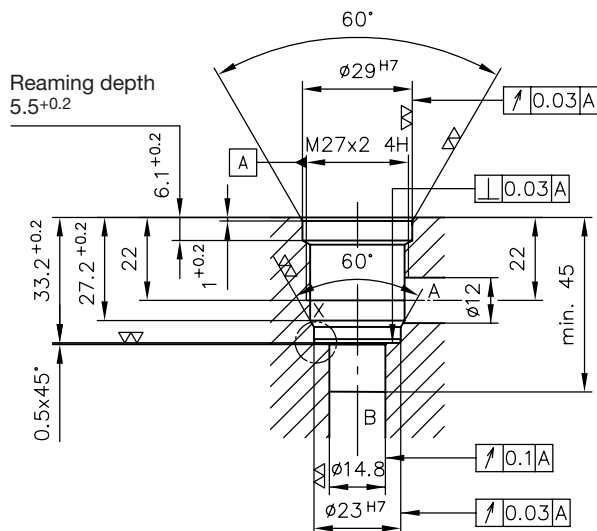
Seal kit (O-rings): DS 7921-3

Mounting hole for type BVE 3 Z

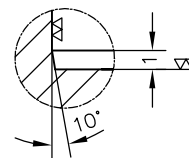


1) This groove improves the flow characteristic, but is not necessary for proper function

Mounting hole for type BVE 3 R and S

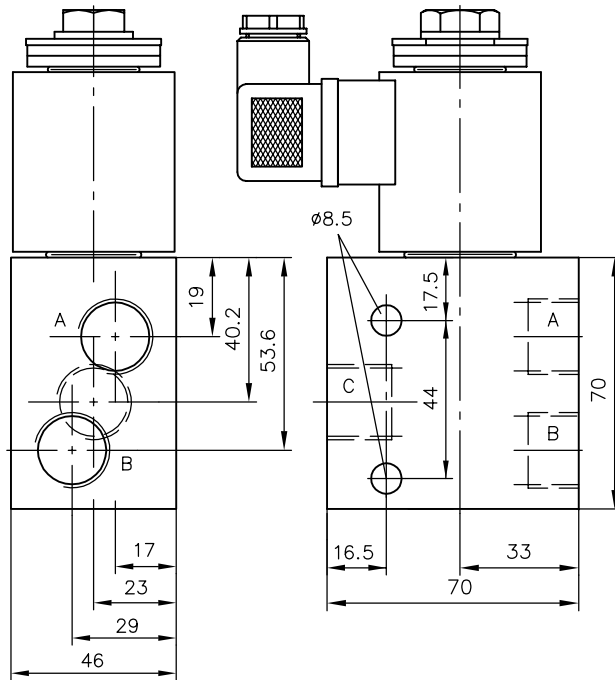


Detail at "X"



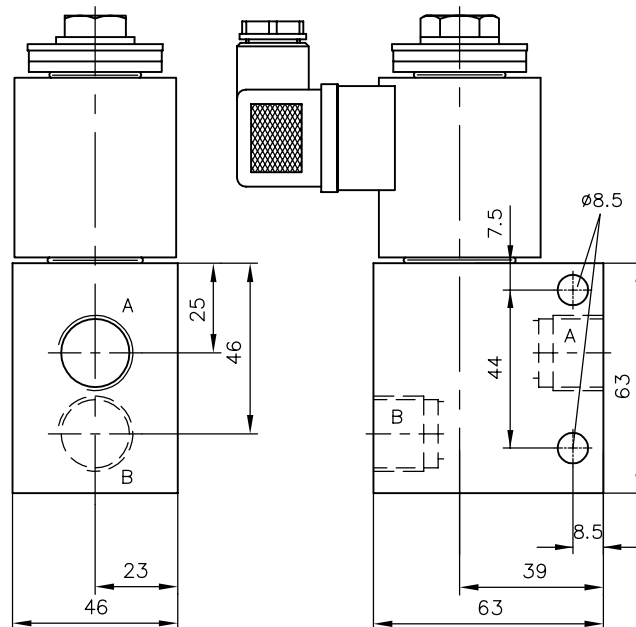
Version with indiv. connection block

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



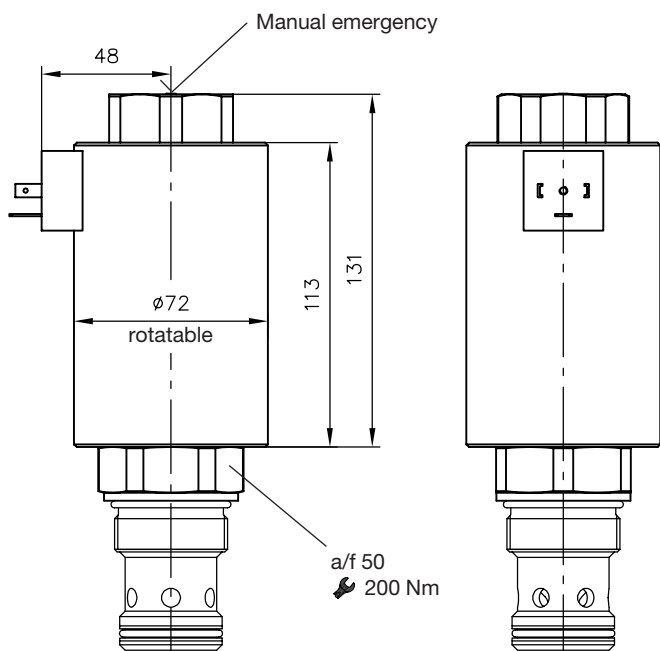
Ports conforming ISO 228/1 (BSPP):
A, B and C = G 1/2

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



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

4.3 Cartridge valve type BVE 5



Order coding for spare parts (e.g. replacement)

Coil system:

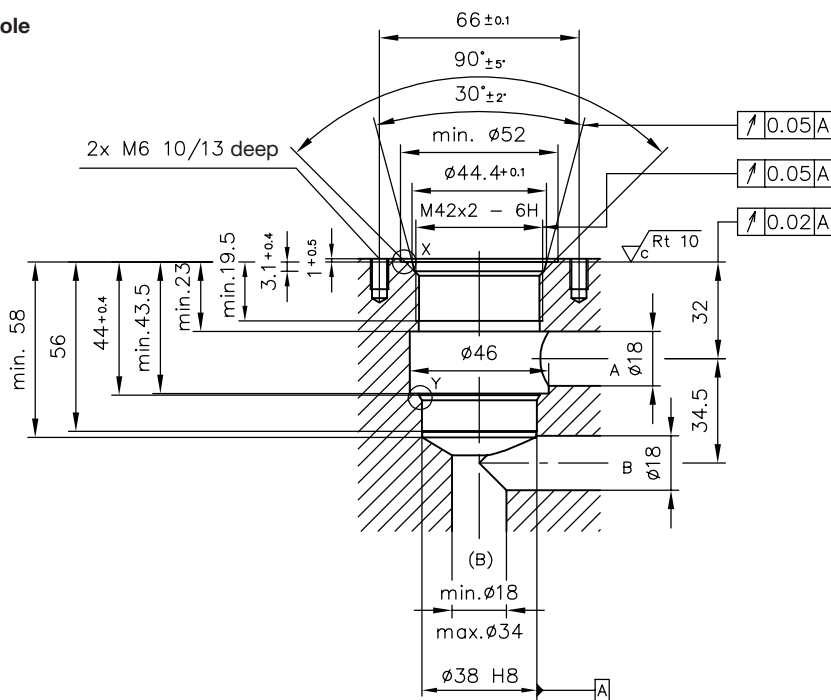
	Coding	Order No.
Solenoid coil	G24, L24, X24	7750 563-G24

Plug:

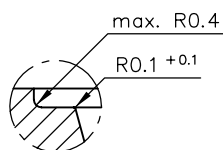
Coding	Nomenclature
G..	MSD 3-309
L..	SVS 3129020
L 5 K..	7163 112/1
L 10 K..	7163 118

Seal kit (O-rings): DS 7921-5

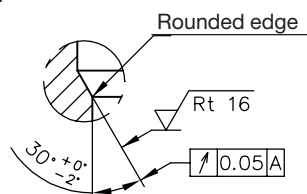
Mounting hole



Detail at "X"

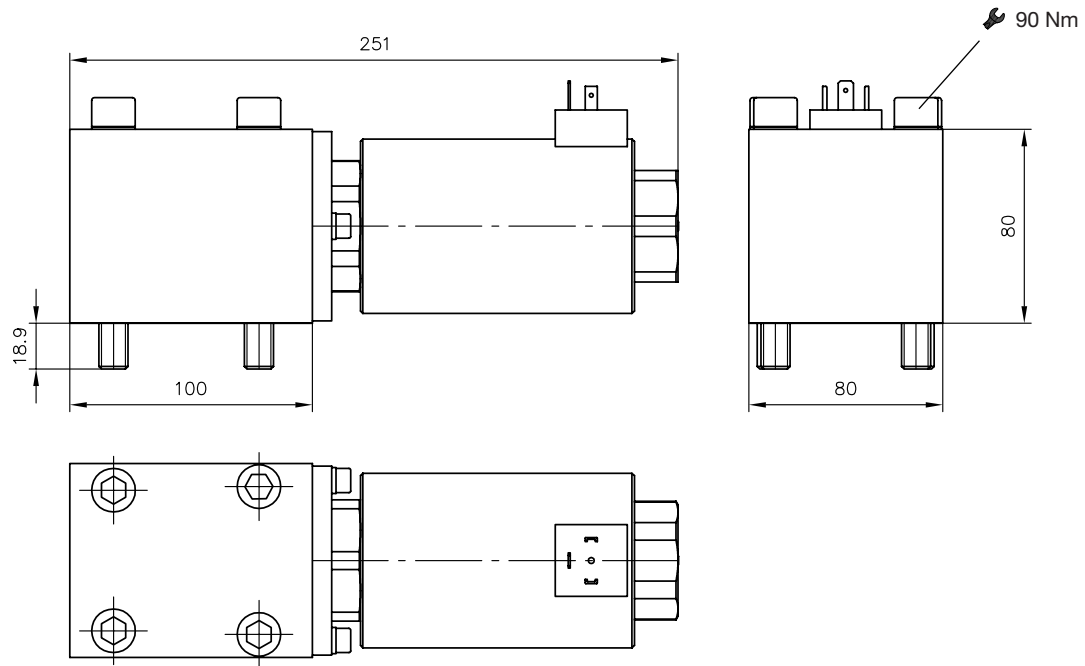


Detail at "Y"

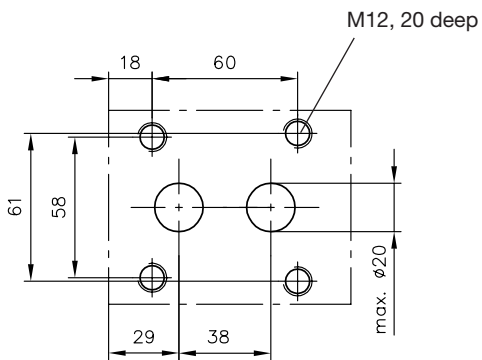


Version with indiv. connection block

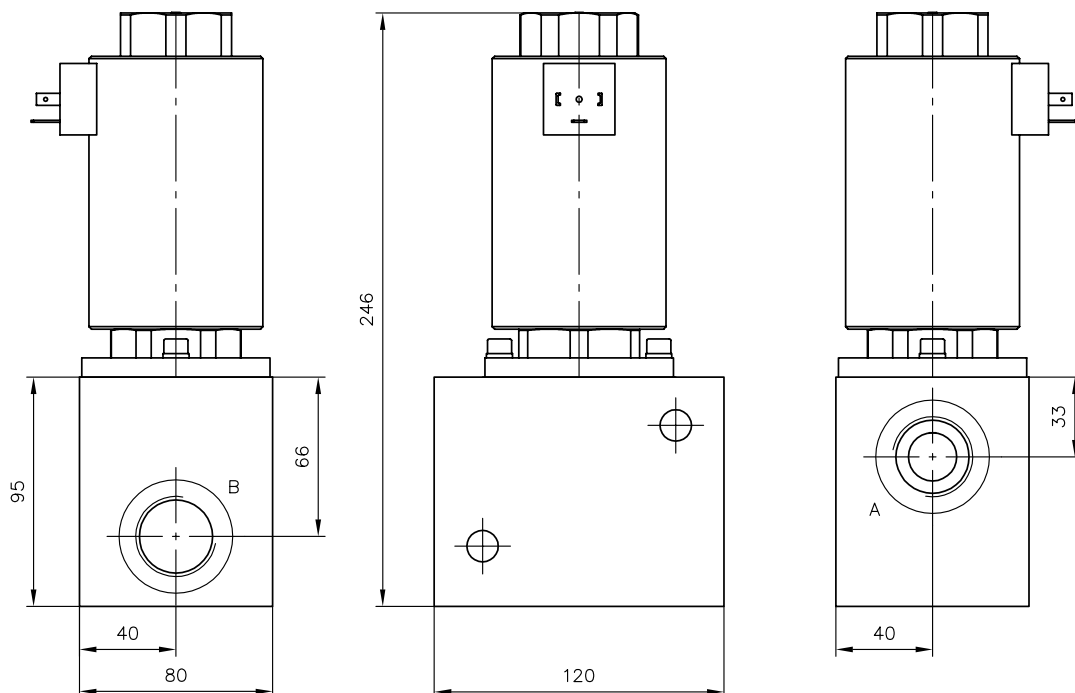
Type BVE 5 - ... - P



Hole pattern

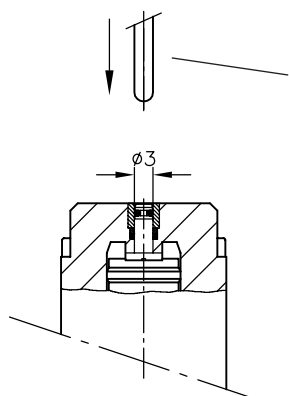


Type BVE 5 - ... - 1



5. Appendix

5.1 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.

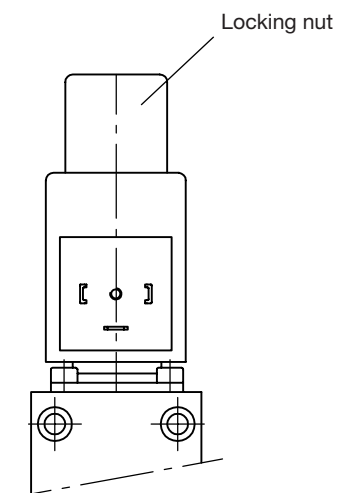
Attention: Any pressure at B puts a load on the brass pin, which results in a pressure dependent counter force. The pin diameter with type BVE 1 and 3 is $\varnothing 3$ mm, i.e. 100 bar Δ 70 N; whereas it is $\varnothing 4$ mm with type BVE 5, i.e. 100 bar Δ 125 N !

5.2 Actuation solenoid option B used as actuation lock (see table 3a)

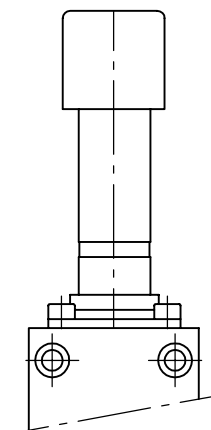
This actuation lock may be used as safety device e.g. during maintenance works or initial operation / set-up operation.

- Standard operation
 - Solenoid (coil) is mounted
 - The locking nut fixes the coil at the armature tube
 - Actuation is unlocked
 - Valve can be actuated via the solenoid
- Maintenance works / initial operation
 - Solenoid (coil) is not mounted
 - The locking nut is only lightly screwed onto the armature tube
 - Valve is fixed in working state

Standard operation







Maintenance works / initial operation



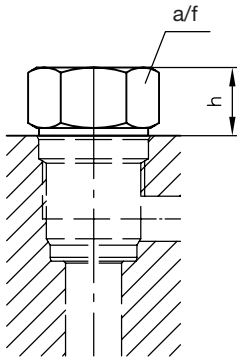
5.3 Options

Tapped plugs

Mounting holes in the manifold may be blocked if required by tapped plugs e.g. if uniform manufactured manifolds should be equipped with or without cartridge valves depending on application.

for type		Order coding
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

Tapped plug



Basic type	a/f	h
BVE 1	24	12.5
BVE 3	30	18.5
BVE 5	50	20

Blenden

for type	Coding	Ø (mm)	Order coding
BVE 1.. - 1/4	--	(without hole)	7406 012 a
	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
BVE 1.. - 3/8	--	(without hole)	7400 003 a
	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
BVE 3.. - 1/2	B 2,5	2.5	7405 014 b
	B 3	3.0	7405 014 c
	B 3,5	3.5	7405 014 d
	B 4	4.0	7405 014 e
BVE 5 - 1..	--	(without hole)	7750 562 -0.0
	B 3,0	3.0	7750 562 -3.0
	B 4,0	4.0	7750 562 -4.0
	B 5,0	5.0	7750 562 -5.0
	B 6,0	6.0	7750 562 -6.0