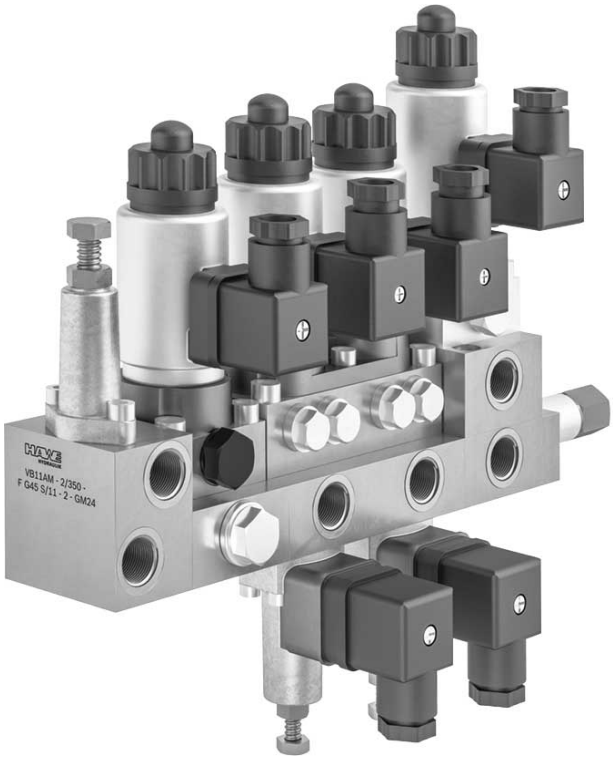
Valve bank (directional seated valve) type VB

Product documentation

Operating pressure p_{max}:	700 bar
Flow rate Q_{max}:	65 lpm



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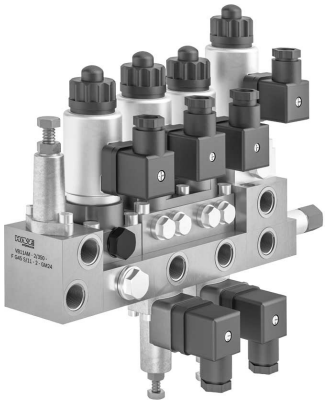
1 Overview of directional seated valve bank types VB 01... VB 31

The valve bank type VB combines valves in accordance with D 7300 and D 7300-12 to control independent consumers.
The valve bank comprises multiple directional seated valves of the types G, WG etc., which are connected in parallel. The directional seated valves are ball valves, and have zero leakage when closed. They are flange-mounted on sub-plates. These sub-plates are clamped between the connection block (P and R port) and the end plate via tension rods. Pressure switches and pressure-limiting valves can be integrated into the pump lines and/or load lines.
2/2, 3/2, 4/2, 3/3 and 4/3-way seated valves with different types of actuation are available. The valve bank can be mounted directly on compact hydraulic power packs using connection blocks.



Directional seated valve bank types VB 01... VB 31

Features and benefits:

- Compact hydraulic control systems for operating pressures of up to 700 bar
- Can be combined with compact hydraulic power packs for low-cost complete solutions
- No time-consuming installation due to combination with hydraulic power packs
- Modular system design makes repairs easy

Intended applications:

- Machine tools (cutting and non-cutting)
- Clamping tools, punching tools, fixtures
- Rubber and plastics machinery

2 Available versions, main data

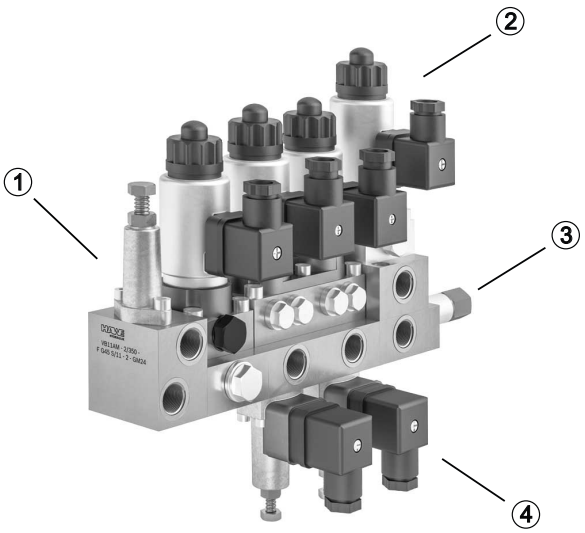
2.1 Order coding examples

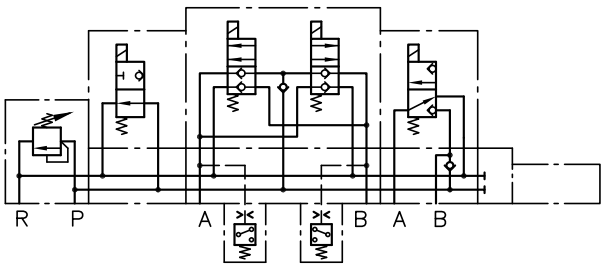
Example 1:

VB 11 AM - 2/350 - F G45 S/11 - 2 - GM 24

For allocation of coding and main data, see Chapter 2.2

Directional valve bank for pipe connection (identical actuation for all directional valves)





P = Pressure connection (pump)
R = Reflux port (to tank)
A, B = Consumer ports

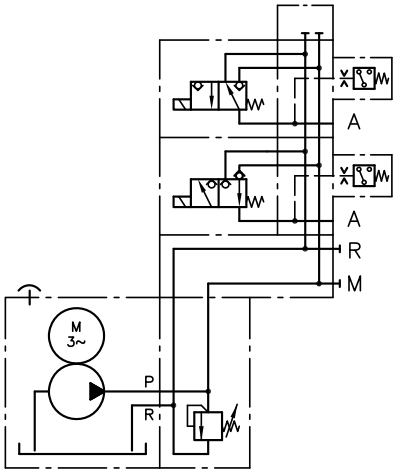
1 Connection block
2 Directional valves
3 End plate with extension
4 Pressure switch

Example 2:

KA 24 S/H 1.51 - A2/420	- VB 11 FM - R5H5 - 1 - G 24
	Directional valve bank for mounting on a compact hydraulic power pack

Pump order coding, e.g. KA 24 S/H 1.51 – A2/420 (in accordance with D 8010)

For allocation of directional valve bank coding and main data, see Chapter 2.2



P = Pressure connection (pump)
R = Return port
M = Pressure connection, e.g. for pressure gauge or measurement
A connection
= Consumer port

2.2 Order coding, overview

Order coding examples:

VB 11 VB 01	A F	M M/H	- 2/350	- FG45H3 - FR/N	- CZ2/180/5R/4	- HH	/11 /32	- 1 - 1	- GM 24 - WG 230

- Actuating solenoid "Table 5a"
- Valve bank – connection thread "Table 2"
- End plates and extensions "Table 13, 13a"
- Valve sections "Table 6 to 8b"
- Intermediate plates "Table 9 to 12a"
- Valve sections "Table 6 to 8b"
- Pressure-limiting valve with pressure setting (bar) "Table 3"
- Actuation "Table 4"
- Connection blocks or adapter plate "Table 3, 3a, 3b"
- Valve bank – basic type and size "Table 1"

NOTE
The forward slash indicates which valves (coding) belong to which actuation type (sequence). In this example: valves FR with actuation type M; valve N with actuation type H.

2.3 Valve bank – basic type, size and connection thread

Table 1: Valve bank – basic type and size

Type	Pressure p_{max} (bar)	Flow rate Q_{max} (lpm)
VB 01	500	6
VB 11	700	12
VB 21	500	25
VB 31	400	60

NOTE
Observe the configuration and planning instructions Chapter 6.2.

Table 2: Connecting thread

Coding	Ports (ISO 228-1)	VB 01	VB 11	VB 21	VB 31
1	G 1/4	●	●		
2	G 3/8		●	●	
3	G 1/2			●	●
4	G 3/4				●

2.4 Connection block or adapter plate

Table 3: Connection block for pipe connection

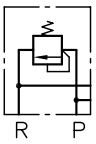
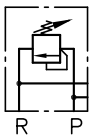
Coding	Description	Circuit symbol	VB 01	VB 11	VB 21	VB 31
A.-1/...	Pressure-limiting valve, fixed, die-cast zinc housing	A.-1/... A.-3/...	●	●	●	●
A.-2/...	Pressure-limiting valve, adjustable, die-cast zinc housing		●	●	●	●
A.-3/...	Pressure-limiting valve, fixed, steel housing, for pressure surges in the return line (> 20 bar).		●	●	●	●
A.-4/...	Pressure-limiting valve, adjustable, steel housing, for pressure surges in the return line (> 20 bar).	A.-2/... A.-4/... 	●	●	●	●
A.-5	Without pressure-limiting valve		●	●	●	●

Table 3a: Adapter plates for compact hydraulic power packs

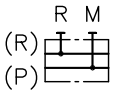
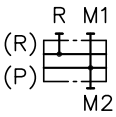
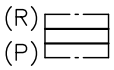
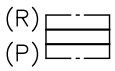
Coding	Description	Circuit symbol	VB 01	VB 11	VB 21
F	Without pressure-limiting valve Pressure-limiting valve in connection block on the hydraulic power pack		●	●	●
F1	Combination with connection blocks A...AB in accordance with D 6905 A/1 and D 6905 AB with compact hydraulic power packs		●		
G	Without pressure-limiting valve Pressure-limiting valve in connection block on the hydraulic power pack Combination with two-stage valve NE21 in accordance with D 7161 with compact hydraulic power packs	VB 11  VB 21: Direct mounting		●	●

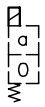
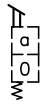
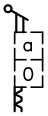
Table 3b: Adapter plates for tank mounting

Coding	Description	Circuit symbol	VB 01	VB 11	VB 21	VB 31
C	Without pressure-limiting valve Pressure-limiting valve in connection block on the hydraulic power pack Combination with hydraulic power packs type R.. in accordance with D 6010 H etc., Z.. in accordance with D 6820 and RZ.. in accordance with D 6910 H, for tank sizes D6 to D30 or B6 to B40		●	●	●	
D	Without pressure-limiting valve Pressure-limiting valve in connection block on the hydraulic power pack Combination with hydraulic power packs type R.. in accordance with D 6010 H etc., Z.. in accordance with D 6820, for tank sizes D50 or B50 and B75			●	●	●
E	Without pressure-limiting valve Pressure-limiting valve in connection block on the hydraulic power pack Combination with hydraulic power packs type R.. in accordance with D 6010 H etc., Z.. in accordance with D 6820, for tank sizes D100 and D250 or B100 to B400					●

NOTE
Observe the configuration and planning instructions Chapter 6.2.

2.5 Actuation and actuating solenoid

Table 4: Actuation and directional valves

Coding	Actuation type	Circuit symbol	VB 01	VB 11	VB 21	VB 31
M (series)	Solenoid		●	●	●	●
H	Hydraulic		●	●	●	●
P	Pneumatic			●	●	●
K	Roller			●	●	●
T	Pin			●	●	
F	Hand lever			●	●	●
D	Turn knob			●	●	

For further data, see D 7300, D 7300-12

Actuating solenoid

NOTE
The protection class is based on the versions with correctly mounted plugs.

Table 5: Version with interchangeable solenoid

Coding	Electrical connection	Nominal voltage		Protection class (IEC 60529)	VB 01	VB 11	VB 21	VB 31
		V AC	V DC					
X(G)M 12	Version with DIN plug DIN EN 175 301-803 A Coding X without line connector, coding G with line connector, coding L with LED plug, coding WG with rectifier in line connector, coding 5K, 10K with cast-on cable, 5 m,10 m long		12 V DC	IP 65		●		
X(G)M 24			24 V DC			●		
X(G)M 48			48 V DC			●		
X(G)M 98			98 V DC			●		
X(G)M 110			110 V DC			●		
X(G)M 205			205 V DC			●		
WGM 24		24 V AC 50/60 Hz		IP 65		●		
WGM 110		110 V AC 50/60 Hz				●		
WGM 230		230 V AC 50/60 Hz				●		
LM 12			12 V DC	IP 65		●		
LM 24			24 V DC			●		
L5KM 12			12 V DC			●		
L5KM 24			24 V DC			●		
L10KM 12			12 V DC			●		
L10KM 24			24 V DC			●		
X 24 EX 55 FM	Explosion-proof solenoid with terminal box not available for coding J, G **NOTE** An application-specific cable provided by the customer can be used. For cable fitting, see D 7300-12 "Electrical data". Relative duty cycle in accordance with Section 3.2 must be observed.		24 V DC	IP 67		●		

For further information, see D 7300-12.

NOTE
The protection class is based on the versions with correctly mounted plugs.

Table 5a: Version with compact solenoid

Coding	Electrical connection	Nominal voltage		Protection class (IEC 60529)	VB 01	*VB 11 (discontinued)*	VB 21	VB 31
		V AC	V DC					
G 12	Version with central plug connector MSD 2 for size 0, MSD1 for size 1 in accordance with D 7163		12 V DC	IP 54	●	●		
G 24			24 V DC		●	●		
G 48			48 V DC		●	●		
G 98			98 V DC		●	●		
G 110			110 V DC		●	●		
G 205			205 V DC		●	●		
X(G) 12	Version with DIN plug DIN EN 175 301-803 A Coding X without line connector, G with		12 V DC	IP 65			●	●
X(G) 24			24 V DC				●	●
X(G) 48			48 V DC				●	●
X(G) 98			98 V DC				●	●
X(G) 110			110 V DC				●	●
X(G) 205			205 V DC				●	●
A 12, N 12	Version with adapter for DIN plug in accordance with DIN EN 175 301-803 A, A without line connector in accordance with DIN 7163, N with, size 0: MSD 2 - MSD 3 and MSD 3-309 Size 1: MSD 1 - MSD 3 and MSD 3-309		12 V DC	IP 54	●	●		
A 24, N 24			24 V DC		●	●		
A 48, N 48			48 V DC		●	●		
A 98, N 98			98 V DC		●	●		
A 110, N 110			110 V DC		●	●		
A 205, N 205			205 V DC		●	●		
WG 110	Version with adapter for DIN plug in accordance with DIN EN 175 301-803 A Size 0: MSD 2 - MSD 3 and MSD 4-209 P10 Size 1: MSD 1 - MSD 3 and MSD 4-209 P10 Size 2, 3: MSD 4-209 P10	110 V AC 50/60 Hz	98 V DC	IP 54 (VB01, VB11)	●	●	●	●
WG 230		230 V AC 50/60 Hz	205 V DC	IP 65 (VB21, VB31)	●	●	●	●
L12	Version with LED plug, 5 k, 10 k with cast-on cable, 5 m or 10 m long		12 V DC	IP 54 (VB01, VB11) IP 65 (VB21, VB31)	●	●	●	●
L24			24 V DC		●	●	●	●
L5K 12			12 V DC		●	●	●	●
L5K 24			24 V DC		●	●	●	●
L10K 12			12 V DC		●	●	●	●
L10K 24			24 V DC		●	●	●	●

NOTE
Observe the configuration and planning instructions Chapter 6.2.

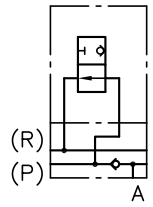
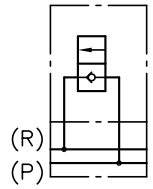
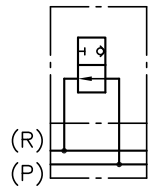
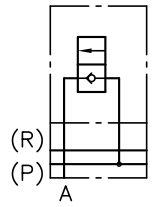
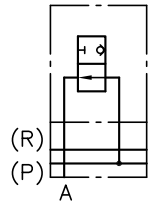
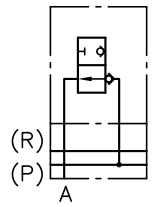
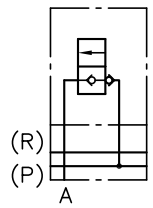
Other solenoid versions and solenoid voltages available on request.

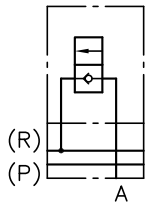
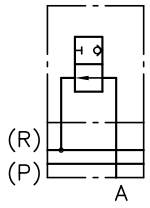
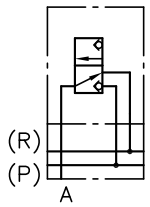
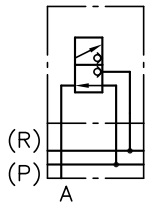
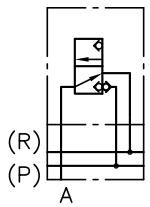
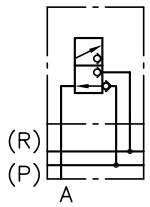
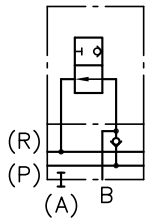
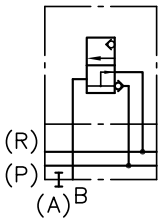
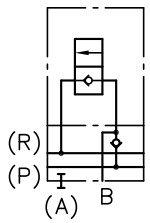
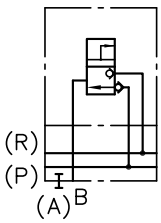
For further data, see D 7300, D 7300-12.

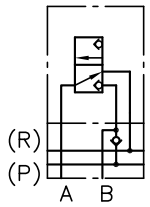
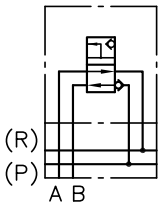
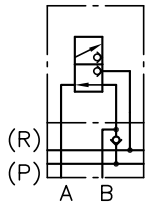
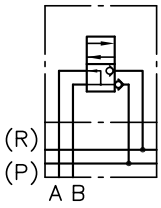
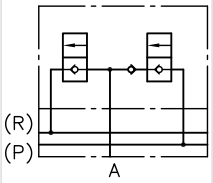
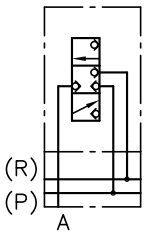
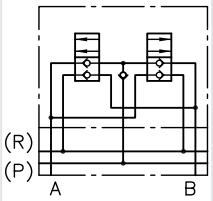
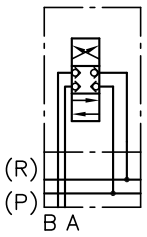
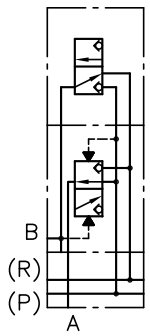
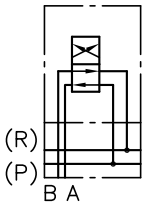
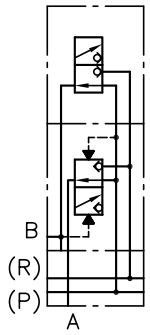
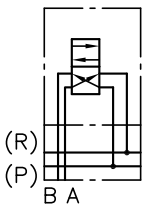
2.6 Valve sections

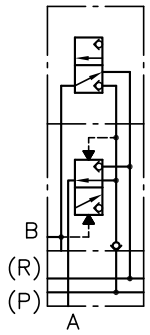
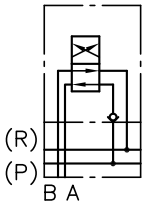
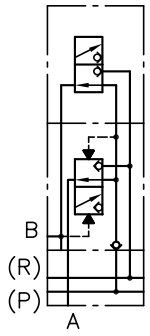
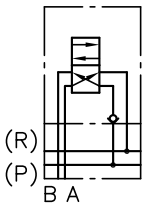
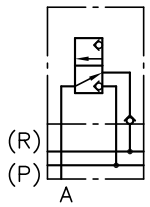
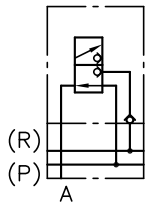
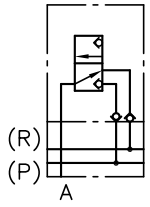
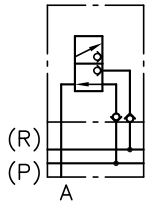
2.6.1 Valve sections without pressure switch

Table 6: Valve sections

Coding	Description	Circuit symbol	Simplified circuit symbol	VB 01	VB 11	VB 21	VB 31
A	Idle circulation valve Normally open contact P → R with consumer port A in P				● G 1/4 only	●	●
D	Idle circulation valve N/C contact P → R			●	●	●	●
F	Idle circulation valve Normally open contact P → R			●	●	●	●
B	2/2-way valve N/C contact P → A			●	●	●	●
C	2/2-way valve Normally open contact P → A			●	●	●	●
E	2/2-way valve Normally open contact P → A with check valve in P			●	●	●	●
Q	2/2-way valve N/C contact P → A with check valve in P			●	●	●	●

Coding	Description	Circuit symbol	Simplified circuit symbol	VB 01	VB 11	VB 21	VB 31
P	2/2-way valve N/C contact A → R			●	●	●	●
O	2/2-way valve Normally open contact A → R			●	●	●	●
H	3/2-way valve A → R			●	●	●	●
L	3/2-way valve P → A			●	●	●	●
N	3/2-way valve with check valve in P A → R			●	●	●	●
R	3/2-way valve with check valve in P P → A			●	●	●	●
Y	3/2-way valve with check valve in P A → R Idle circulation valve			●	●	●	●
I	3/2-way valve with check valve in P A → R Idle circulation valve			●	●	●	●

Coding	Description	Circuit symbol	Simplified circuit symbol	VB 01	VB 11	VB 21	VB 31
S	4/2-way valve with check valve in P A → R P → B			●	●	●	●
T	4/2-way valve with check valve in P P → A P → B			●	●	●	●
J	3/3-way valve P, A closed Solenoid A, B			●	●	●	●
G	4/3-way valve P, A, B closed Solenoid A, B			●	●	●	●
HX	4/2-way valve P → A B → R				● G 1/4 only		
LX	4/2-way valve P → B A → R				● G 1/4 only		

Coding	Description	Circuit symbol	Simplified circuit symbol	VB 01	VB 11	VB 21	VB 31
NX	4/2-way valve with check valve in P P → A B → R				● G 1/4 only		
RX	4/2-way valve with check valve in P P → B A → R				● G 1/4 only		
K	3/2-way valve with return pressure stop in R A → R			●	●		
M	3/2-way valve with return pressure stop in P P → A			●	●		
U	3/2-way valve with check valve in P and return pressure stop in R A → R			●	●		
V	3/2-way valve with check valve in P and return pressure stop in R P → A			●	●		

NOTE
Observe the configuration and planning instructions Chapter 6.2.

2.6.2 Valve sections with pressure switches

Order coding examples:

VB 01	**- H**	**3**		**- 1**	- G 24
VB 11	**- G**	**3**	**4**	**- 2**	- G 24

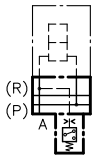
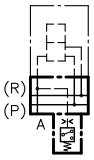
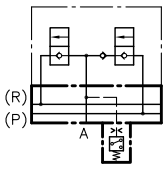
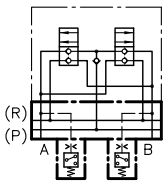
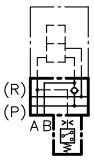
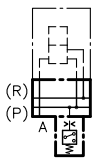
Connecting thread "Table 2"

Pressure switch in port B "Table 7"

Pressure switch in port A or P "Table 7"

Valve sections with pressure switches "Table 7"

Table 7: Valve sections with pressure switches

Coding	Pressure switch	Adjustment range (bar)	Description	Circuit symbol		VB 01	VB 11
2	Without PS	--	**PS in port A** For circuit symbol B, C, E, Q (2/2-way valve) plus circuit symbol H, L, N, R, K, M, U, V (3/2-way valve) and circuit symbol J (3/3-way valve) and circuit symbol S, T, HX, LX, NX, RX (4/2-way valve) **PS in ports** **A and B** For circuit symbol G (4/3-way valve)	B to Q  	H to V  	●	●
3	DG 33	200 ... 700					
4	DG 34	100 ... 400					
5	DG 35	20 ... 250					
36	DG 36	4 ... 12					
64	DG 364	4 ... 50					
65	DG 365	12 – 170		J  G  	S to RX  		
62	Without PS	--	**PS in port P** For circuit symbol H, L, N; R, K, M, U, V (3/2-way valve)	H to V  		●	●
6	DG 33	200 ... 700					
7	DG 34	100 ... 400					
8	DG 35	20 ... 250					
66	DG 36	4 ... 12					
665	DG 365	12 ... 170					

2.7 Intermediate plates

2.7.1 Intermediate plate with 2-way pressure reducing valve

Order coding examples:

VB 11	- CZ 2	/180	/5R	/7

- /7 — Pressure switch "Table 8b"
- /5R — Additional element (check valve in P)
- /180 — Pressure setting (bar)
- - CZ 2 — Pressure reducing valve "Table 8a"

Table 8: Intermediate plate with 2-way pressure reducing valve in P gallery

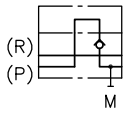
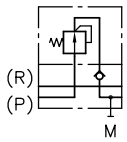
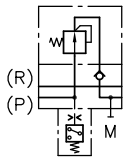
Coding	Pressure p_{max} (bar)	Description	Circuit symbol	VB 01	VB 11
CZ X /5R	500	Without pressure reducing valve Check valve in P		●	●
CZ../.../5R	500	with pressure reducing valve Check valve in P		●	●
CZ../.../5R/..	500	With pressure reducing valve and pressure switch Check valve in P		●	●

Table 8a: Pressure reducing valves

Coding	Pressure reducing valve	Pressure p_{max} (bar)	Flow rate Q_{max} (lpm)	Description
CZ X	Without CDK (prepared)	--	--	Pressure reducing valve type CDK 3 in accordance with D 7745
CZ 081/...	CDK 3-081	50 ... 500	12	
CZ 08/...	CDK 3-08	50 ... 450	12	
CZ 1/...	CDK 3-1	30 ... 300	12	
CZ 11/...	CDK 3-11	30 ... 310	12	
CZ 2/...	CDK 3-2	20 ... 200	12	
CZ 21/...	CDK 3-21	20 ... 250	12	
CZ 5/...	CDK 3-5	15 ... 130	12	
CZ 51/...	CDK 3-51	15 ... 165	12	
CZ 25/...	CDK 32-5	8 ... 130	6	
CZ 251/...	CDK 32-51	8 – 165	6	
CZ 55/...	CDK 35-5	30 ... 130	22	
CZ 551/...	CDK 35-51	30 ... 165	22	

Table 8b: Pressure switches

Coding	Pressure switches	Adjustment range (bar)	Description
/2	Without PS (prepared)	--	Pressure switch type DG in accordance with D 5440 (mechanical pressure switch)
/3	DG 33	200 ... 700	
/4	DG 34	100 ... 400	
/5	DG 35	20 ... 250	
/6	DG 36	4 ... 12	
/7	DG 365	12 ... 170	
/8	DG 364	4 ... 50	

NOTE
Observe the configuration and planning instructions Chapter 6.2.

2.7.2 Intermediate plate with 3-way pressure reducing valve

Order coding examples:

VB 01 =	ADV 1	**- Z1**	**3**		- 1	- G 24
VB 11 =	ADV 11	**- Z1**	**7**	**5**	- 2	- G 24

Pressure switch "Table 9b"

Pressure range "Table 9a"

Intermediate plate with 3-way pressure reducing valve Table 9

Table 9: Intermediate plate with 3-way pressure reducing valve in P gallery

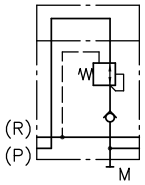
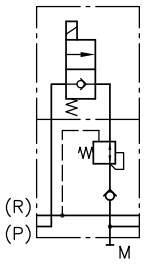
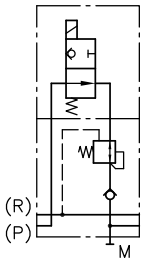
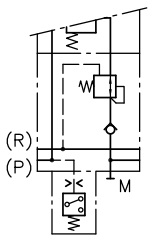
Coding	Pressure p_{max} (bar)	Description	Circuit symbol	VB 01	VB 11
Z.	300	Standard version		●	●
Z1.	300	With 2/2-way valve, neutral position closed		●	●
Z2.	300	With 2/2-way valve, neutral position open		●	●
Z...	300	With pressure switch DG 3. Z11.. - Z18.. Z21.. - Z28..		●	●

Table 9a: Pressure ranges

Coding	Pressure p_{max} (bar)	Description	Circuit symbol
1	160 ... 250	Fixed	
2	60 ... 160		
3	30 ... 120		
4	10 ... 30		
5	160 ... 250	Adjustable	
6	60 ... 160		
7	30 ... 120		
8	10 ... 30		

Table 9b: Pressure switches

Coding	Pressure switches	Adjustment range (bar)	Description
2	Without PS	--	Pressure switch type DG in accordance with D 5440 (mechanical pressure switch)
4	DG 34	100 ... 400	
5	DG 35	20 ... 250	
6	DG 36	4 ... 12	
64	DG 364	4 ... 50	
65	DG 365	12 ... 170	

NOTE
Observe the configuration and planning instructions Chapter 6.2.

2.7.3 Intermediate plate with pressure switch

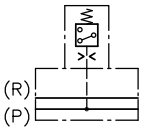
Order coding examples:

VB 11	- 3	3

Pressure switch Table 10

Intermediate plate with pressure switch in P gallery Table 10

Table 10: Intermediate plate with pressure switches in P gallery

Coding	Pressure switches	Adjustment range (bar)	Description	Circuit symbol	VB 01	VB 11
32	Without PS	--	Pressure switch type DG in accordance with D 5440 (mechanical pressure switch)		●	●
33	DG 33	200 ... 700				
34	DG 34	100 ... 400				
35	DG 35	20 ... 250				
36	DG 36	4 ... 12				
365	DG 365	12 ... 170				
364	DG 364	4 ... 50				

NOTE
Observe the configuration and planning instructions Chapter 6.2.

2.7.4 Intermediate plate with pressure-limiting and restrictor check valve

Order coding examples:

VB 21 | - R9 | 1 | /250

- /250 — Pressure setting (bar)
- 1 — Pressure-limiting valve "Table 11a"
- - R9 — Directional valve with pressure-limiting and restrictor check valve in A gallery Table 11

Table 11: Directional valve with pressure-limiting and restrictor check valve in A gallery

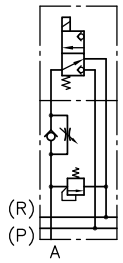
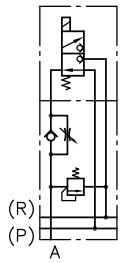
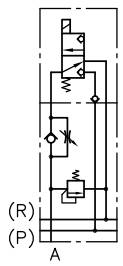
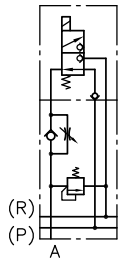
Coding	Circuit symbol	VB 21	VB 31
H9. /...		●	●
L9. /...		●	●
N9. /...		●	●
R9. /...		●	●

Table 11a: Pressure-limiting valve in A

Coding	Description	Circuit symbol
.1 /...	Pressure-limiting valve, fixed	
.2 /...	Pressure-limiting valve, adjustable	

NOTE
Observe the configuration and planning instructions Chapter 6.2.

2.7.5 Intermediate plate with 2-way flow control valve

Order coding examples:

VB 31	- SE 2	15	/1	- G 24

- **Solenoid voltage**
- **Control orifice flow rate** Table 12a
- **Intermediate plate with 2-way flow control valve** Table 12

Table 12: Intermediate plate with 2-way flow control valve in P gallery

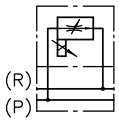
Coding	Description	Circuit symbol	VB 31
SE2	For more technical and electrical data on the proportional flow control valve, see D 7557/1 (type SE 2-2..).		●

Table 12a: Control orifice

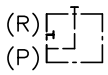
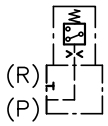
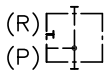
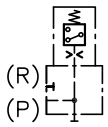
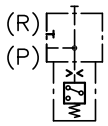
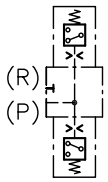
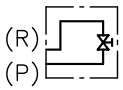
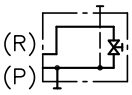
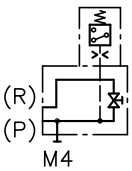
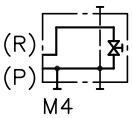
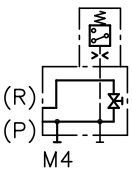
Coding	Flow rate Q_{max} (lpm)
6/1	6
15/1	15
30/1	30
36/1	36
50/1	50

NOTE
Observe the configuration and planning instructions Chapter 6.2.

2.8 End plates and extensions

Table 13: End plates

Pressure switches type DG 3 in accordance with D 5440 See "Table 10" (mechanical pressure switches).

Coding	Description	Circuit symbols	VB 01	VB 11	VB 21	VB 31
No designation	No additional function		●	●	●	●
/0	Prepared with one pressure switch /0			●		
/.	With one pressure switch /3, /4, /5, /6, /64, /65			●		
/00	Prepared with two pressure switches /00			●		
/.0	With two pressure switches mounted in Position 1, prepared in Position 2 /30, /40, /50, /60, /640, /650			●		
/0.	With two pressure switches prepared in Position 1, mounted in Position 2 /03, /04, /05, /06, /064, /065			●		
/..	With two pressure switches mounted in Positions 1 and 2 /33 ... /6565			●		
/2	With drain valve /2		●	●		
/02	Prepared with drain valve and one pressure switch /02		●	●		
/.2	With drain valve and one pressure switch /32, /42, /52, /62, /642/ /652		●	●		
/002	With drain valve and two pressure switches /002		●	●		
/.02	With drain valve and two pressure switches Mounted in Position 1 Prepared in Position 2 /302, /402, /502, /602, /6402/, /6502		●	●		

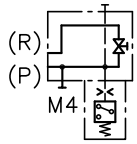
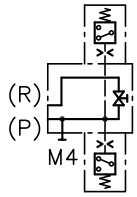
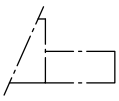
Coding	Description	Circuit symbols	VB 01	VB 11	VB 21	VB 31
/0.2	With drain valve and two pressure switches Prepared in Position 1 Mounted in Position 2 /032, /042, /052, /062, /0642/, /0652		●	●		
/..2	With drain valve and two pressure switches Mounted in Positions 1 and 2 /332 ... /65652		●	●		

Table 13a: Extensions

Coding	Description	Circuit symbol	VB 01	VB 11
/11 /...11	With space for one (11) or two (12) retrofitted valves, including base plate (see Chapter 4.5 and Chapter 5.3.1). The coding can be added to the ends of the end plate versions listed above, e.g. VB01FM-FHH/11 VB01FM-FHH/365 12 VB01FM-FHH/62 11		●	●
/12 /...12			●	●

3 Parameters

3.1 General information

Designation	Valve bank
Design	Section structure; max. 12 valves (VB 01 and VB 11) or 10 valves VB 21, VB 31 combinable, circuit symbols G and J counted as 2 valves
Model	Manifold mounting valve
Material	Steel; valve housing electrogalvanised; functional internal parts hardened and polished Coil housing zinc-nickel, electrogalvanised
Attachment	See Chapter 4, "Dimensions"
Overlap	Negative, transition from one flow direction to the other is completed only in the stroke end position. During switching, all passages are connected to each other.
Installation position	Any; vertical with actuating part upwards preferred
Connections	P. = Pump port R. = Return port A, B = Consumer ports M. = Pressure gauge connection
Flow direction	Only in the direction of the arrow on the circuit symbol See "Table 1". The connections P (pump connection), R (reflux), A and B (consumers) are determined by the internal action of the valve and cannot be changed.
Hydraulic fluid	Hydraulic oil: according to DIN 51 524 Part 1 to 3; ISO VG 10 to 68 according to DIN 51 519 Viscosity range: min. approx. 4; max. approx. 800 mm^2/s Optimal operating range: approx. 10 ... 200 mm^2/s Also suitable for biologically degradable pressure fluids type HEPG (polyalkylene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C.
Cleanliness level	**ISO 4406** 21/18/15...19/17/13
Temperatures	Ambient: approx. -40 ... +80°C, Fluid: -25 ... +80°C, Note the viscosity range! Permissible temperature during start: -40°C (observe start-viscosity!), as long as the service temperature is at least 20K higher for the following operation. Biologically degradable pressure fluids: Observe manufacturer's specifications. By consideration of the compatibility with seal material not over +70°C.

NOTE

Observe the restrictions for explosion-proof solenoids.

Observe the correct duty cycle, See Chapter 3.2.

Weight

Connection block

Coding	VB 01	VB 11	VB 21	VB 31
A.-1/..., A.-3/...	0.5 kg	0.7 kg	1.2 kg	1.4 kg
A.-2/..., A.-4/...	0.5 kg	0.7 kg	1.2 kg	1.4 kg
A.-5	0.2 kg	0.4 kg	0.5 kg	1.1 kg

Adapter plate (for mounting on hydraulic power packs)

Coding	VB 01	VB 11	VB 21	VB 31
C	0.5 kg	0.3 kg	0.4 kg	--
D	--	0.6 kg	0.8 kg	1.0 kg
E	--	--	--	1.0 kg
F, F1	0.4 kg	0.5 kg	0.5 kg	--
G	--	0.6 kg	--	--

Directional seated valve with electric actuation, complete with sub-plate, including proportional weight for tension rod (for weight deviations for other actuation types, see D 7300, D 7300-12)

Coding	VB 01	VB 11	VB 21	VB 31
A, B, C, D, E, F, H L, N, O, P, Q, R	0.6 kg	1.1 kg	2.0 kg	4.5 kg
J	1.3 kg	2.3 kg	4.6 kg	9.1 kg
G	1.4 kg	2.5 kg	4.7 kg	9.2 kg
I, Y, S, T	1.3 kg	2.3 kg	4.6 kg	9.1
HX, LX, NX, RX	--	2.4 kg	--	--
Per pressure switch DG 3.	+0.3 kg	+0.3 kg	--	--

End plates

Coding	VB 01	VB 11	VB 21	VB 31
Series (without designation)	0.1 kg	0.2 kg	0.3 kg	0.8 kg
/2	0.1 kg	--	--	--
/0, /00	--	0.4 kg	--	--
/02, /002	0.3 kg	0.4 kg	--	--
/3 to /65	0.5 kg	0.7 kg	--	--
/33 to /6565	0.8 kg	1.0 kg	--	--
/32 to /652	0.6 kg	1.0 kg	--	--
/332 to /65652	0.9 kg	1.3 kg	--	--
Extension /11	0.1 kg	0.1 kg	--	--
Extension /12	0.1 kg	0.2 kg	--	--

Intermediate plate with pressure reducing valve

Coding	VB 01	VB 11
CZ X	0.5 kg	0.8 kg
CZ 08/.. to CZ 551/...	1.2 kg	1.5 kg
Z1 to Z8	1.1 kg	1.1 kg
Z11 to Z28	1.3 kg	1.8 kg
Z114 to Z2865	1.6 kg	2.1 kg
Per pressure switch DG 3.	+0.3 kg	+0.3 kg

Intermediate plate with pressure switch DG 3

Coding	VB 01	VB 11
-33 to 365	0.4 kg	0.5 kg

Intermediate plate with pressure-limiting and throttle valve

Coding	VB 01	VB 11	VB 21	VB 31
.9. /...	--	--	3.2 kg	8.3 kg

Intermediate plate with flow control valve

Coding	VB 01	VB 11	VB 21	VB 31
SE 2 .../1	--	--	--	2.8 kg

Additional elements

Coding	VB 01	VB 11	VB 21	VB 31
Reactive plate	0.1 kg	0.1 kg	0.1 kg	0.1 kg

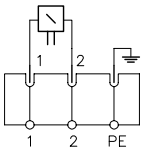
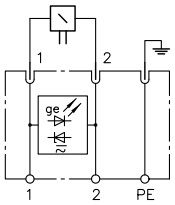
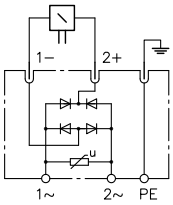
3.2 Electrical data

NOTE

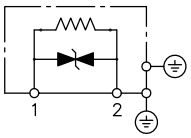
- Observe the correct duty cycle; see D 7300, D 7300-12.
- Observe the restrictions for explosion-proof solenoids.
- Outdoor use, comparative protection class for mechanical part IP 40 (DIN EN 60529)

For further technical data, see D 7300, D 7300-12

Circuit diagrams

DC voltage	**G (M).., X (M)..**	**L (M) ..**
		
AC voltage	**WG (M) 110, WG (M) 230**	
		

Electrical data for explosion-proof solenoids

ATEX declaration of conformity	FM 18ATEX0019 X
Marking	⟨Ex⟩II 2G Ex db IIB+H2 T4 Gb ⟨Ex⟩II 2D Ex tb IIIC T135°C Db
Approvals	ATEX, IECEx, NEC, CEC
Protection class	IP 66/67 (IEC 60529), minimum requirement, depending on the cable fitting and cable
Nominal voltage U_N	24 V DC
Nominal power P_N	23 W
Circuit diagram	
Electrical connection	Maximum cross-section 1.5 mm² Minimum cross-section 0.5 mm²
Protective circuit	Voltage protection diode

Other properties	Cable fitting: ADE 1F2-CAP 808 674 V1 NPT .“ (T <= 140°C, O 4.5...8.5 mm) ADE 1F2-CAP 808 694 V1 NPT .“ (T <= 140°C, O 7...12 mm) **NOTE** The cable fitting must be ordered separately.
Ambient temperature	-40°C ... +55°C
Relative duty cycle	The duty cycle ED [%] depends on the ambient temperature and the cable type being used.

Cable type	Ambient temperature	
	40°C	55°C
Single valve		
90°C	Duty cycle 75%	Duty cycle 50%
105°C	Duty cycle 100%	Duty cycle 75%
125°C	Duty cycle 100%	Duty cycle 100%
Linking, adjacent valves		
90°C	Duty cycle 50%	Duty cycle 25%
105°C	Duty cycle 75%	Duty cycle 50%
125°C	Duty cycle 100%	Duty cycle 100%

For the definition of the duty cycle [%]: see B ATEX, Chapter 2.3 "Safety instructions"

Dimensioning sub-plate	**Single valve** Block volume 65 250 mm³, block dimensions 29 mm x 45 mm x 50 mm **Linking, adjacent valves** Block volume 57 500 mm³, block dimensions 25 mm x 46 mm x 50 mm linking width 46 mm
Max. medium temperature	+70°C
Electrical protection against overload (in accordance with IEC 60127)	I_F < 1.6 A-T
Surface protection	Electrogalvanised housing

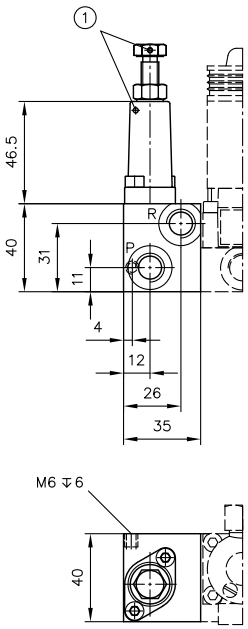
4 Dimensions

All dimensions in mm, subject to change.

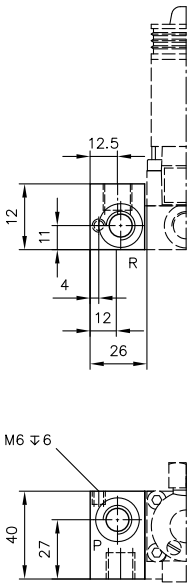
4.1 Connection blocks and transition plates

4.1.1 Connection blocks for pipe connection

VB 01 A. - 1(2, 3, 4)



VB 01 A. - 5

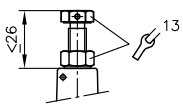


1 Sealing option

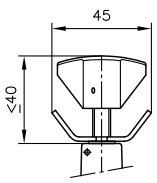
	Ports (ISO 228-1)
R, P	G 1/4

Adjustment

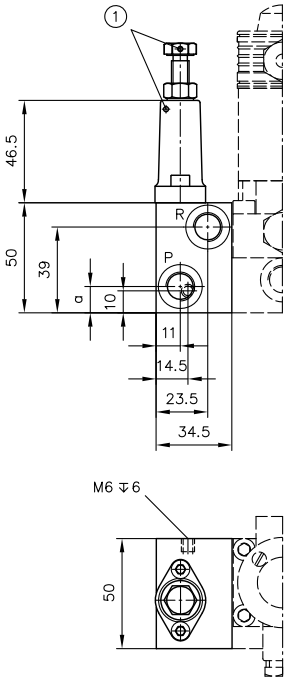
Fixed



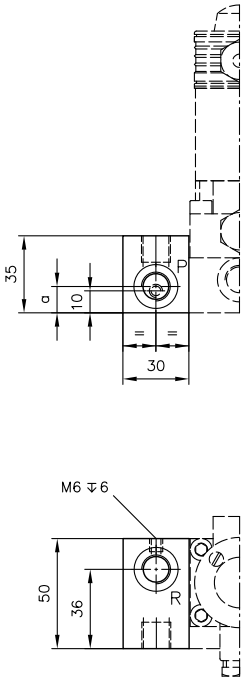
Adjustable



VB 11 A .- 1(2, 3, 4)



VB 11 A. - 5

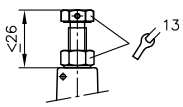


1 Sealing option

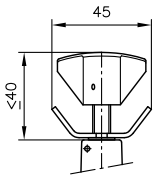
	Ports (ISO 228-1)	a
R, P	G 1/4	12
	G 3/8	14

Adjustment

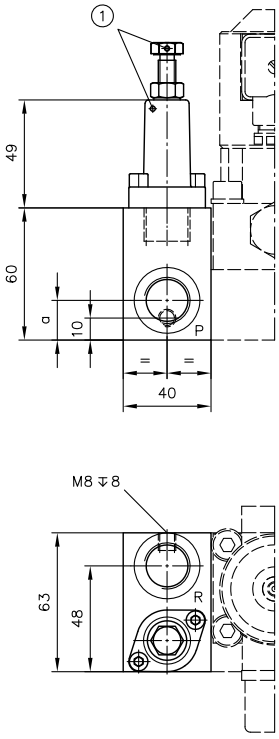
Fixed



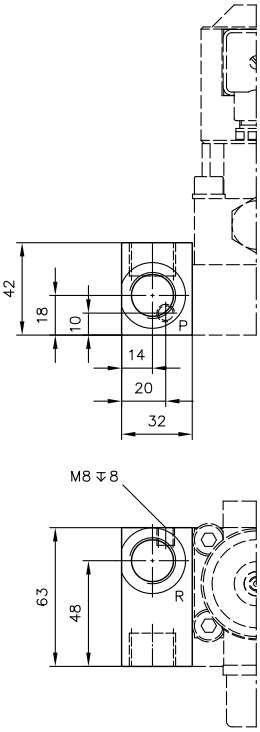
Adjustable



VB 21 A. - 1(2, 3, 4)



VB 21 A. - 5

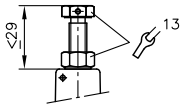


1 Sealing option

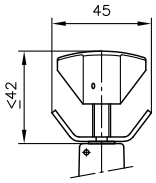
	Ports (ISO 228-1)	a
R, P	G 3/8	18
	G 1/2	20

Adjustment

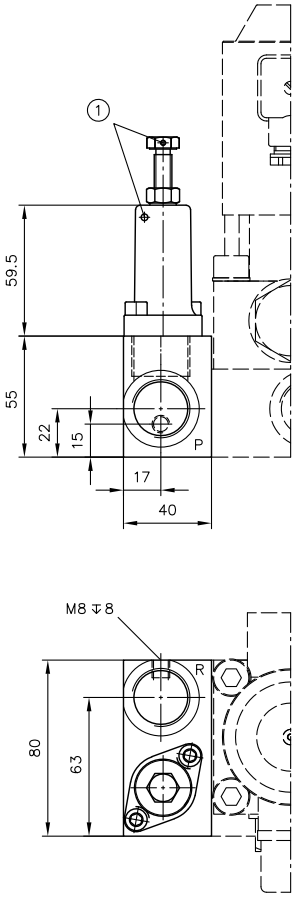
Fixed



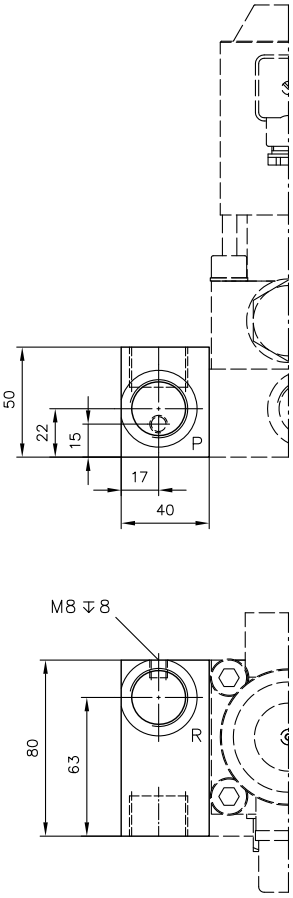
Adjustable



VB 31 A. - 1(2, 3, 4)



VB 31 A. - 5

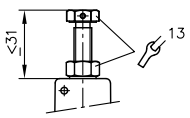


1 Sealing option

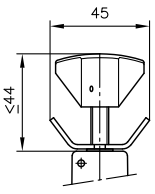
	Ports (ISO 228-1)
R, P	G 3/4
	G 1/2

Adjustment

Fixed

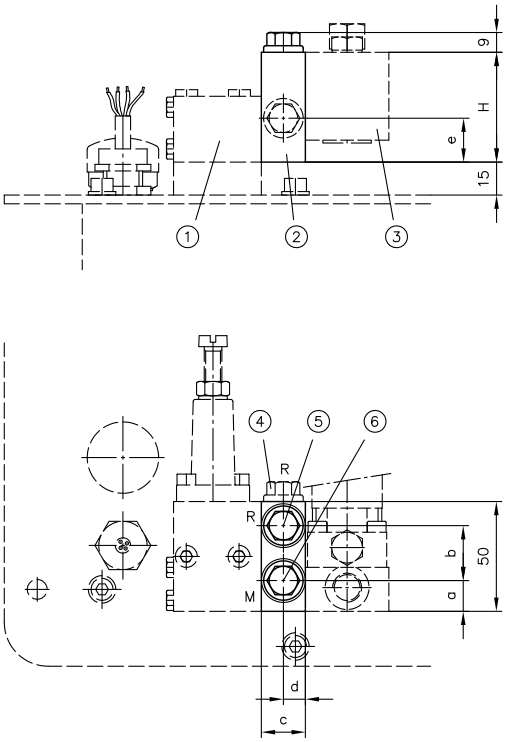


Adjustable



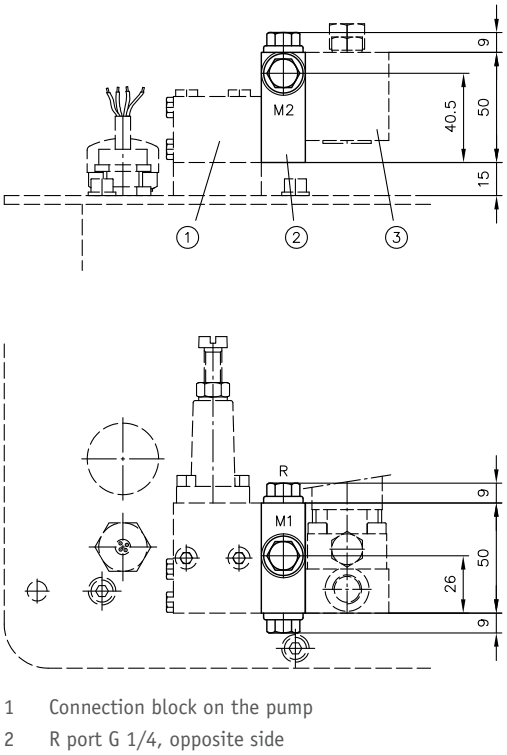
4.1.2 Adapter plates for compact/standard hydraulic power packs

VB 01 F
VB 11 F
VB 21 F



1 Connection block on the pump
2 Adapter plates
3 Other directional valve bank, such as Chapter 4.1
4 Reflux port for VB 11 F
5 Reflux port for VB 01 F, VB 21 F
6 Pressure connection, e.g. for pressure gauge or pressure switch

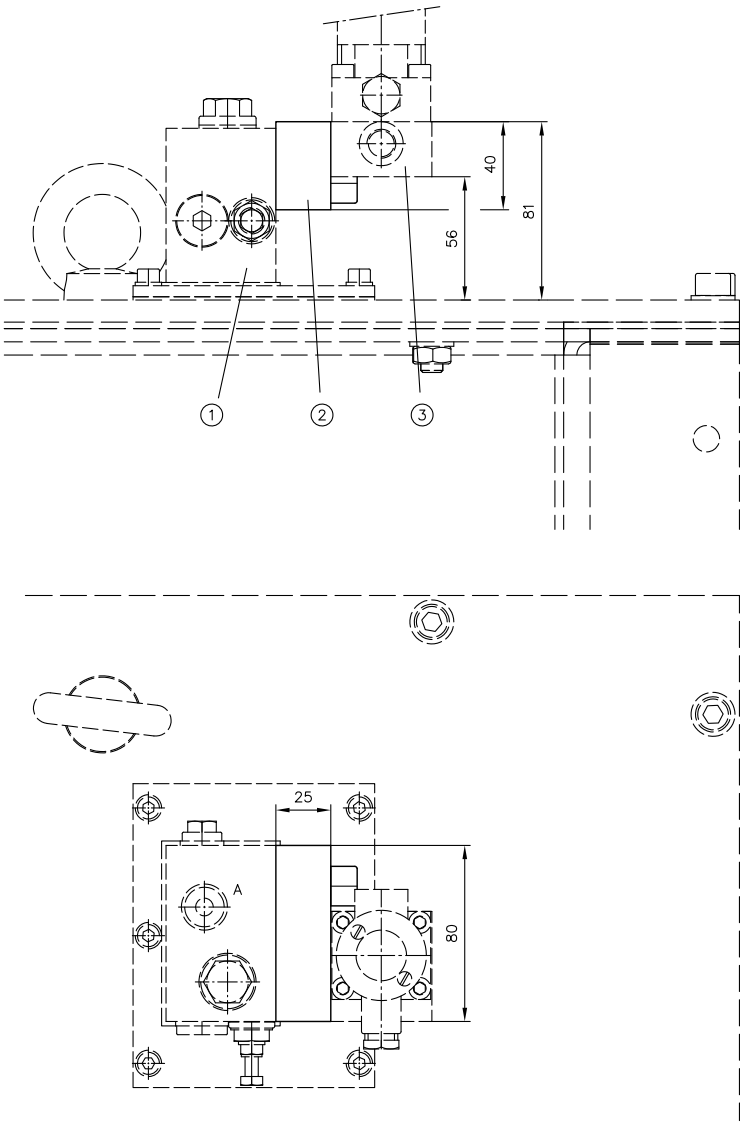
VB 01 F1



1 Connection block on the pump
2 R port G 1/4, opposite side
3 Other directional valve bank, such as Chapter 4.1

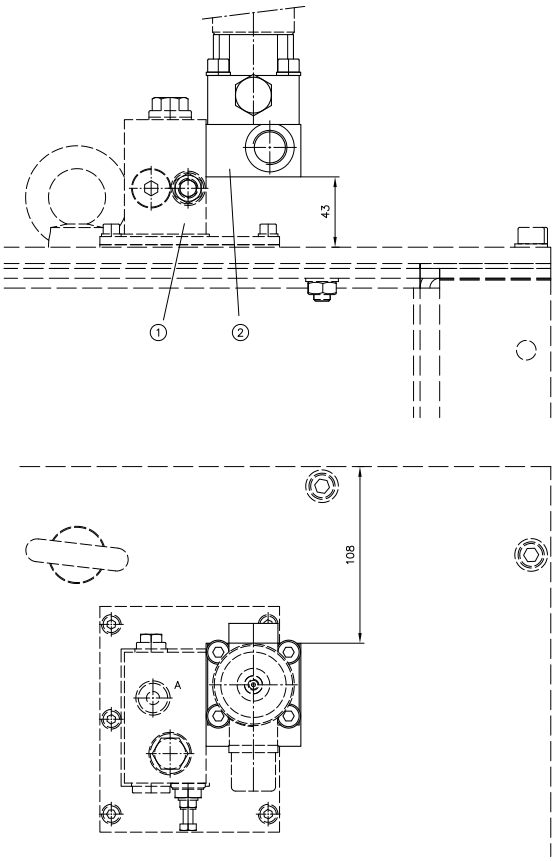
Type	H	a	b	c	d	e	Ports (ISO 228/1) M, R
VB 01 F	50	14	25	20	10	--	G 1/4
VB 11 F	60	30	--	25	15	20	G 1/4
VB 21 F	75	11	26.5	25	12.5	--	G 1/4

VB 11 G



1 Two-stage valve type NE 21.. in accordance with D 7161
2 Adapter plate
3 Other directional valve bank, such as Chapter 4.1

VB 21 G

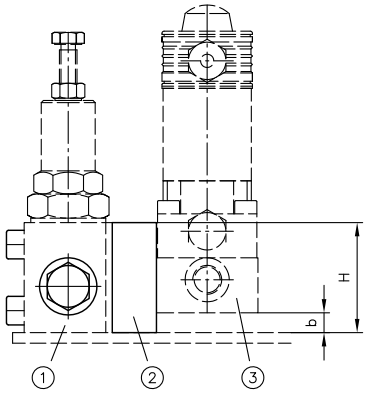


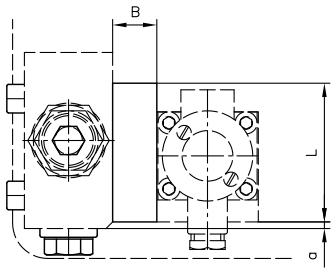
1 Two-stage valve type NE 21.. in accordance with D 7161
2 Other directional valve bank, such as Chapter 4.1

Mounting on two-stage valve type NE 21.. on standard hydraulic power pack type FXU in accordance with D 6020

4.1.3 Adapter plates for mounting on tank

VB .. C
VB .. D
VB .. E





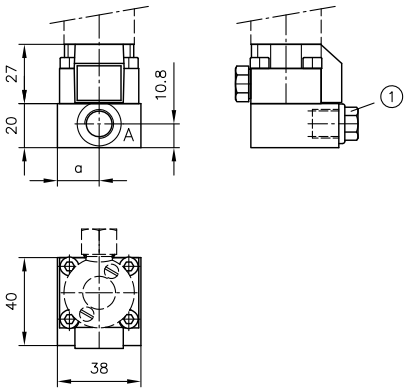
1 Connection block on the pump
(version depending on size of cover plate, see D 6010 H)
2 Adapter plate
3 Other directional valve bank, such as Chapter 4.1

Type	B	H	L	a	b
VB 01 C	20	50	60	5	9
VB 11 C	20	50	63	3	9
VB 21 C	20	50	63	2	9
VB 11 D	30	50	65	12	5
VB 21 D	30	50	65	14	5
VB 31 D	35	50	82	14	5
VB 31 E	30	60	80	19	5

4.2 Valve sections

VB 01

Coding **D, F, H, L, N, R, B, C, Q, E, P, O**

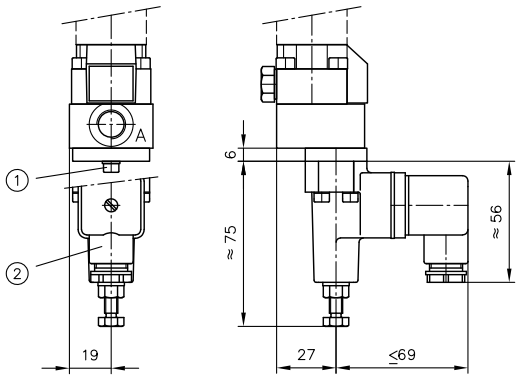


Coding	a
D, F, H, L, N, R	19
B, C, Q, E	15
P, O	23

1 Only for coding D, F

With pressure switch

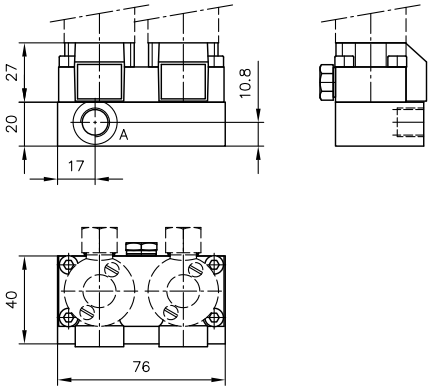
Coding **H, L, N, R, B, C, E, Q**



1 Coding 2, 62
2 DG 3.., coding 3 ... 65 or 6 ... 665

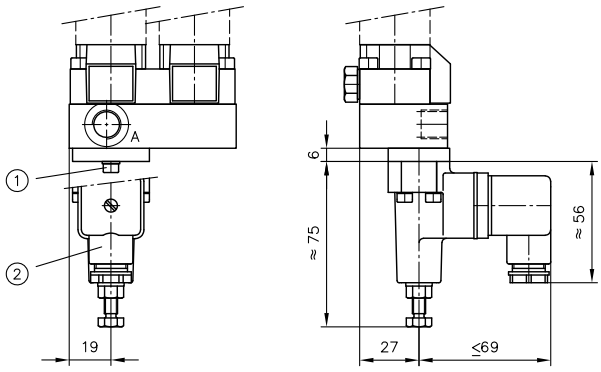
	Ports (ISO 228-1)
A	G 1/4

Coding **J**



With pressure switch

Coding **J**

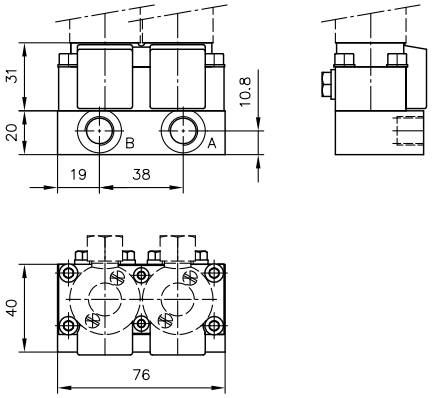


1 Coding 2, 62

2 DG 3.., coding 3 ... 65 or 6 ... 665

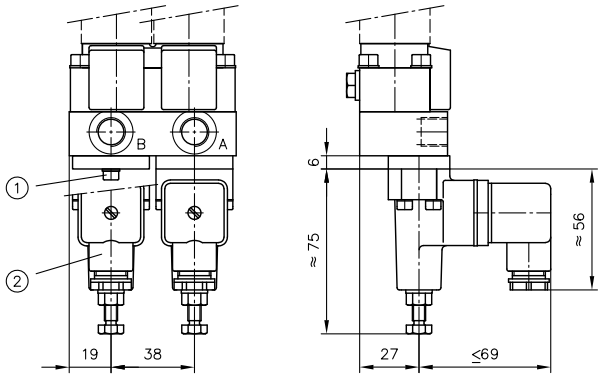
	Ports (ISO 228-1)
A	G 1/4

Coding **G**



With pressure switch

Coding **G**

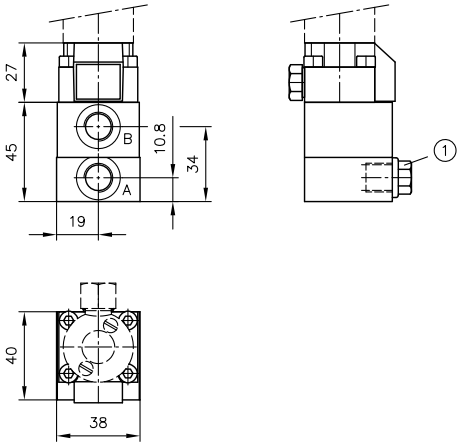


1 Coding 2, 62

2 DG 3.., coding 3 ... 65 or 6 ... 665

	Ports (ISO 228-1)
A, B	G 1/4

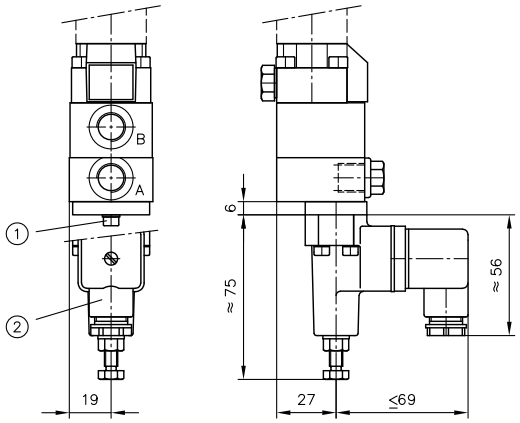
Coding **S, T, Y, I**



1 Only for coding Y, I

With pressure switch

Coding **S, T, Y, I**

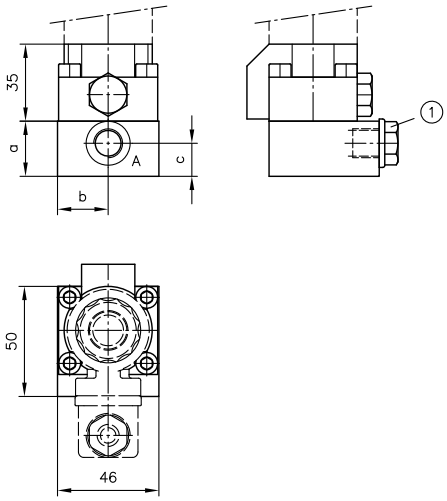


1 Coding 2, 62

2 DG 3.., coding 3 ... 65 or 6 ... 665

	Ports (ISO 228-1)
A, B	G 1/4

Coding **A, D, F, H, L, N, R, B, C, Q, E, P, O**

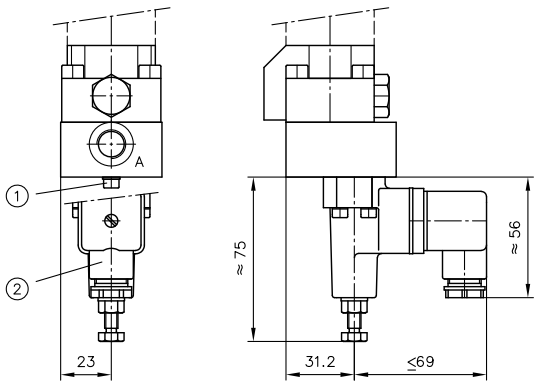


1 Only for coding D, F

Coding	a	b	c	
			G 1/4	G 3/8
D, F, H, L, N, R	25	23	15	14
B, C, Q, E	25	28	15	14
P, O	25	18	15	14
A	30	26	20	--

With pressure switch

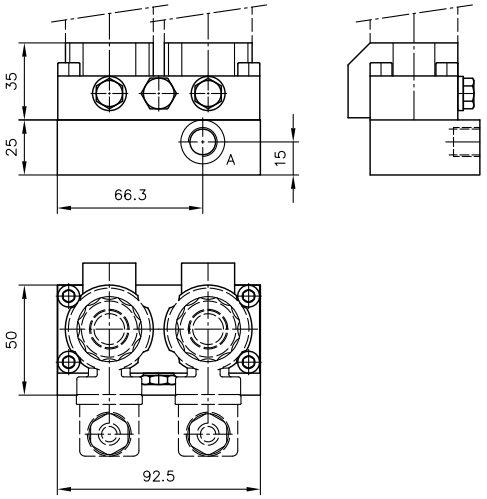
Coding **H, L, N, R, B, C, E, Q**



1 Coding 62
2 DG 3.., coding 3 ... 65 or 6 ... 665

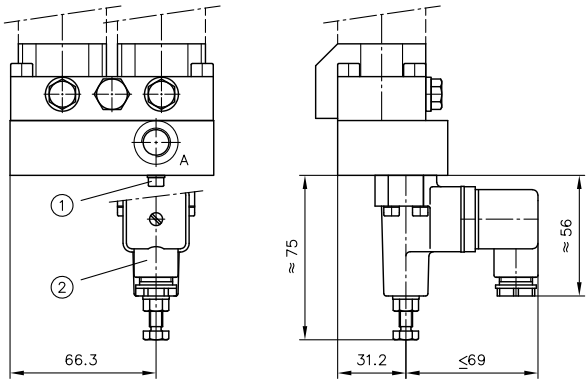
	Ports (ISO 228-1)
A	G 1/4
	G 3/8

Coding **J**



With pressure switch

Coding **J**

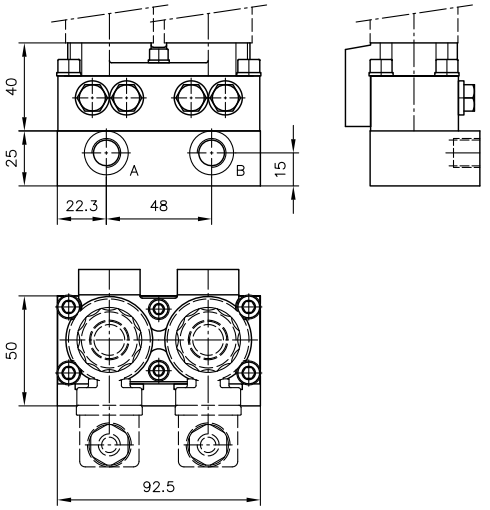


1 Coding 62

2 DG 3.., coding 3 ... 65 or 6 ... 665

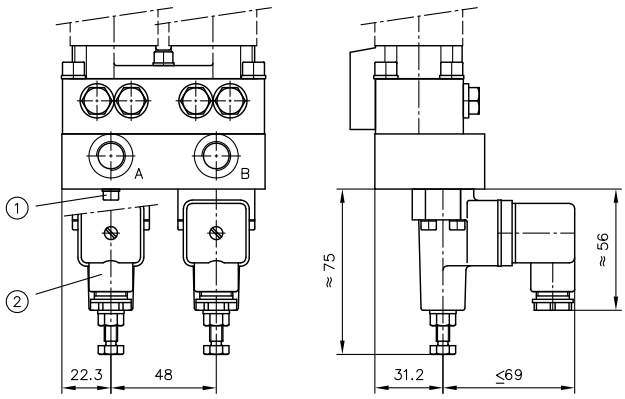
	Ports (ISO 228-1)
A	G 1/4
	G 3/8

Coding **G**



With pressure switch

Coding **G**

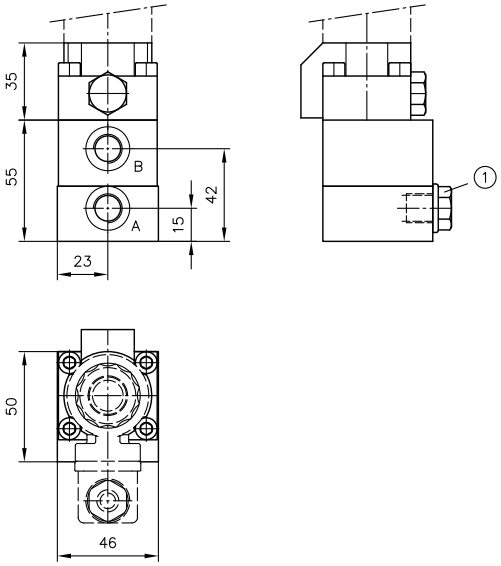


1 Coding 62

2 DG 3.., coding 3 ... 65 or 6 ... 665

	Ports (ISO 228-1)
A, B	G 1/4
	G 3/8

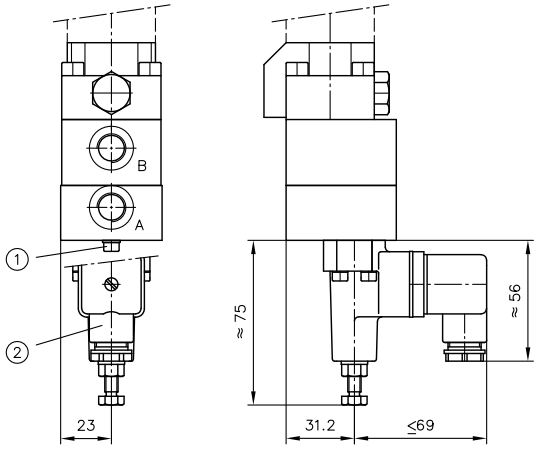
Coding **S, T, Y, I**



1 Only for coding Y, I

With pressure switch

Coding **S, T, Y, I**

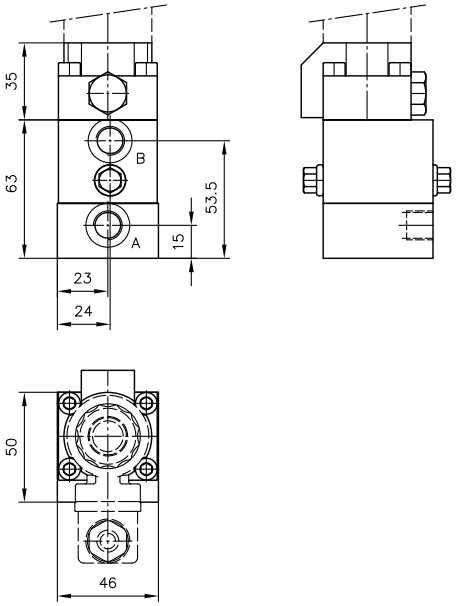


1 Coding 62

2 DG 3.., coding 3 ... 65 or 6 ... 665

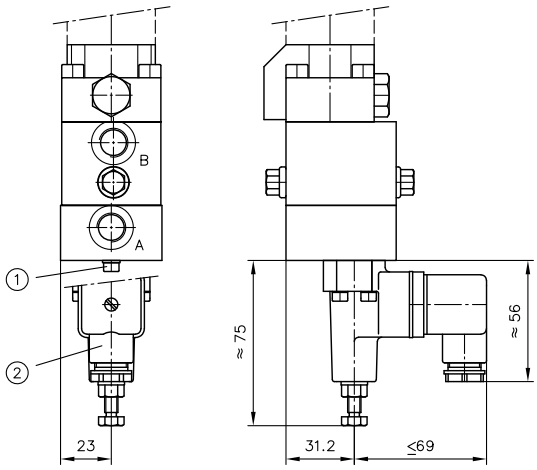
	Ports (ISO 228-1)
A, B	G 1/4
	G 3/8

Coding **HX, LX, NX, RX**



With pressure switch

Coding **HX, LX, NX, RX**

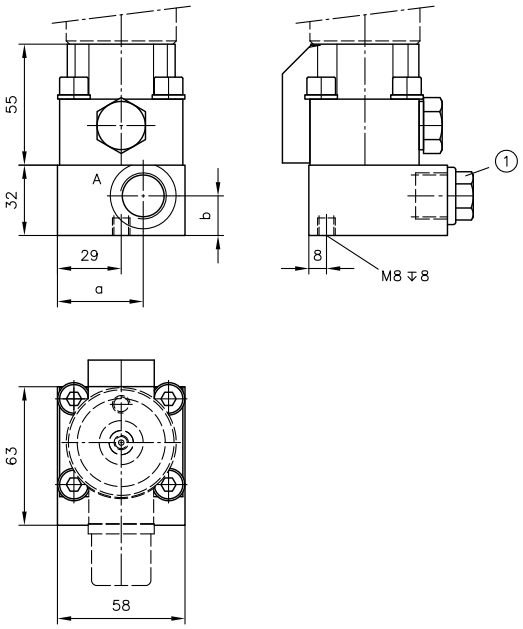


1 Coding 62

2 DG 3.., coding 3 ... 65 or 6 ... 665

	Ports (ISO 228-1)
A, B	G 1/4
	G 3/8

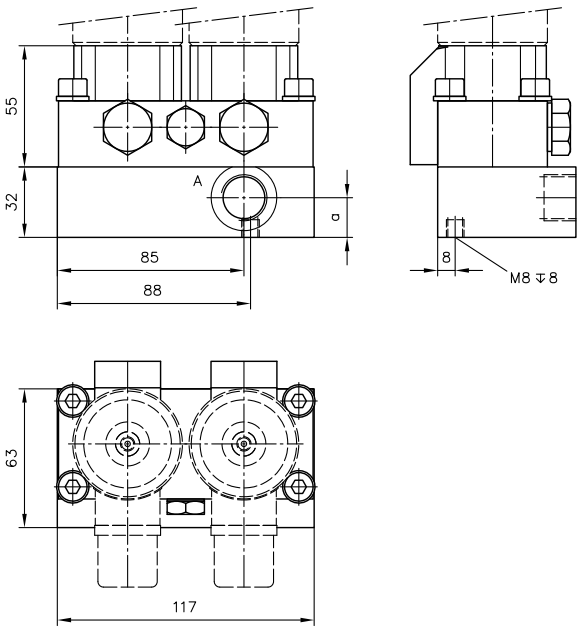
Coding **A, D, F, H, L, N, R, B, C, Q, E, P, O**



1 Only for coding D, F

Coding	a	b	
		G 3/8	G 1/2
A, D, F, H, L, N, R, B, C, Q, E	36	20	18
P, O	25	20	18

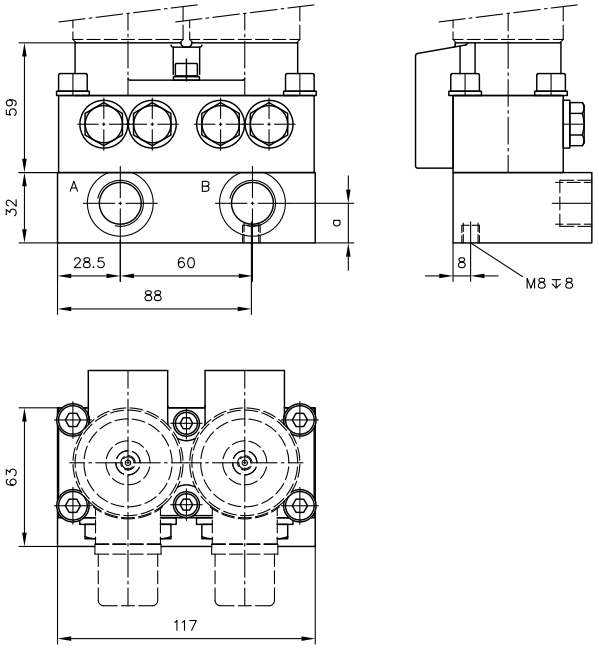
Coding **J**



	a
G 3/8	20
G 1/2	18

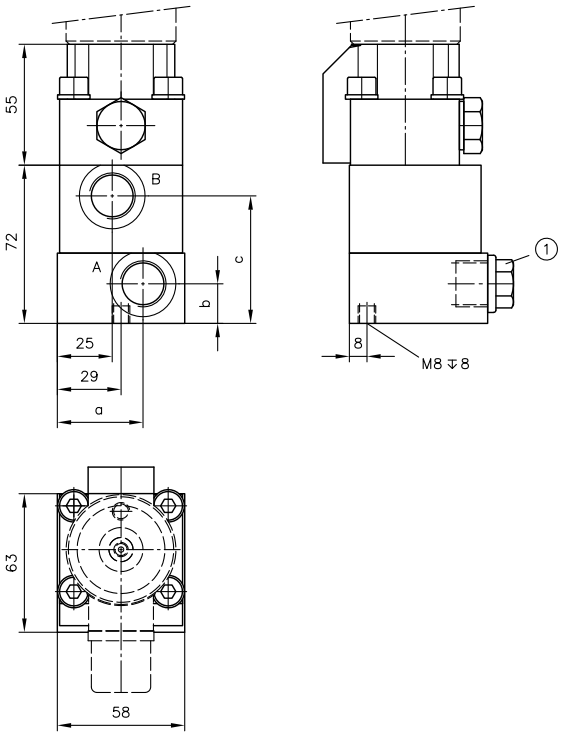
	Ports (ISO 228-1)
	G 3/8
A	G 1/2

Coding **G**



	a
G 3/8	20
G 1/2	18

Coding S, T, Y, I

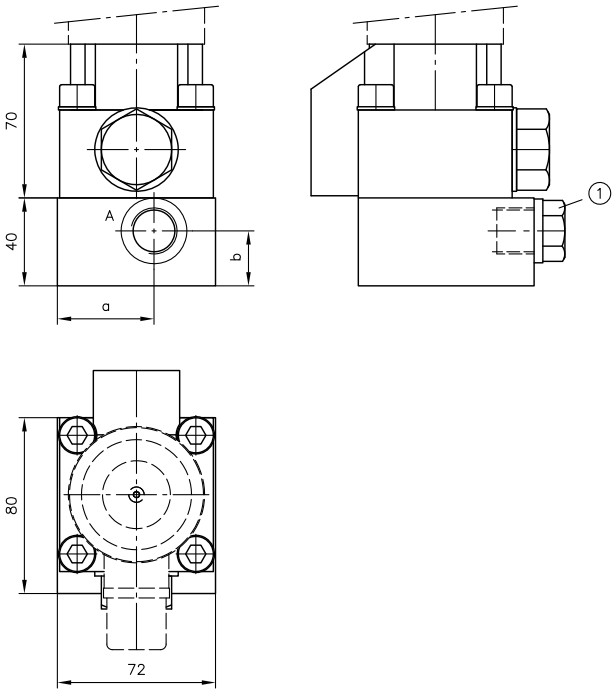


	a	b	c
G 3/8	36	20	56
G 1/2	34	18	58

	Ports (ISO 228-1)
	G 3/8
A, B	G 1/2

1 Only for coding Y, I

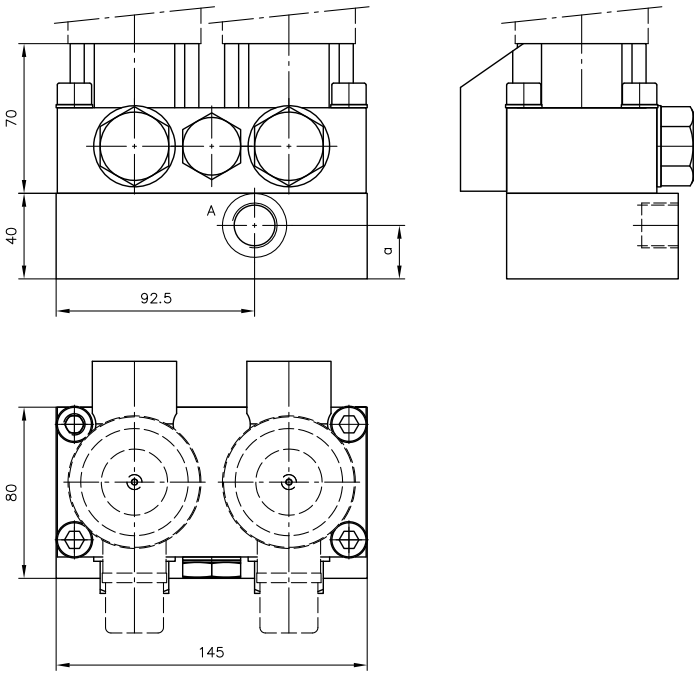
Coding **A, D, F, H, L, N, R, B, C, Q, E, P, O**



1 Only for coding D, F

Coding	a	b	
		G 1/2	G 3/4
A, D, F, H, L, N, R, B, C, Q, E	44	25	25
P, O	28	22	22

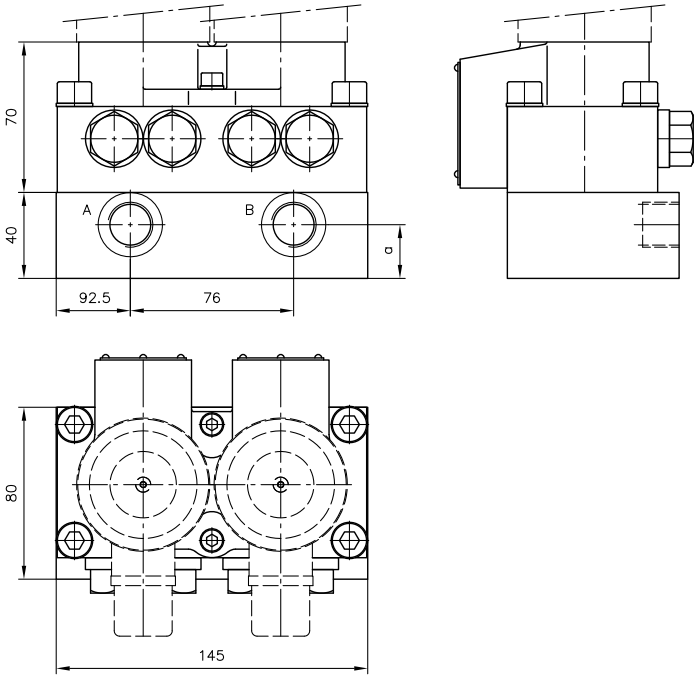
Coding **J**



	a
G 1/2	25
G 3/4	22

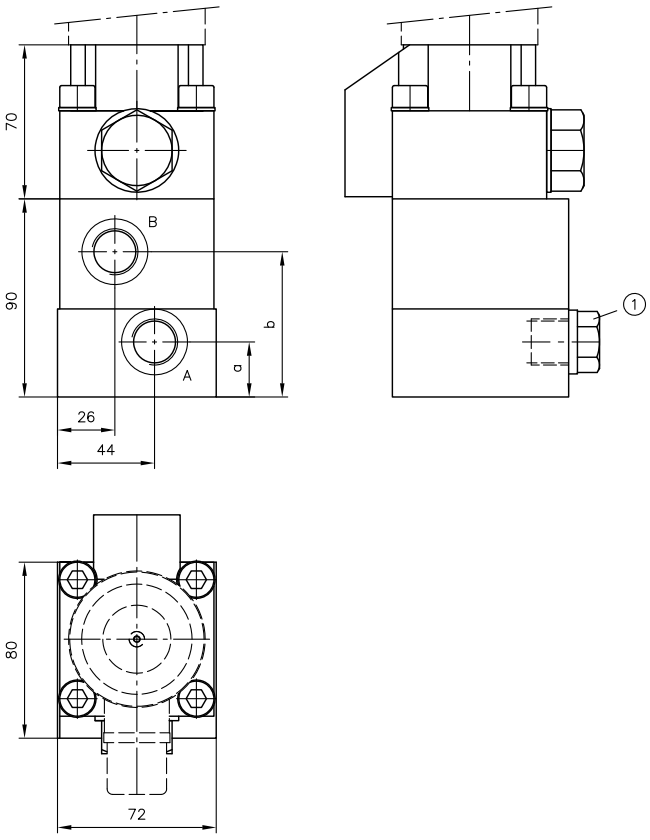
	Ports (ISO 228/1)
	G 1/2
A	G 3/4

Coding **G**



	a
G 1/2	25
G 3/4	22

Coding **S, T, Y, I**



	a	b
G 1/2	25	66
G 3/4	22	68

	Ports (ISO 228/1)
	G 1/2
A, B	G 3/4

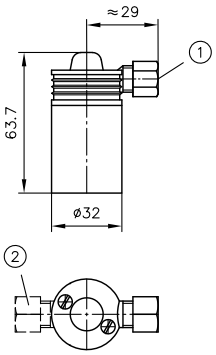
1 Only for coding Y, I

4.3 Actuations

4.3.1 Solenoid actuation

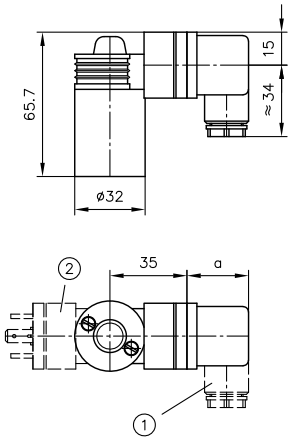
VB 01

Coding **G**



1 Suitable for cable ∅6
2 Plug connector can be mounted offset by 180°

Coding **N, WG**

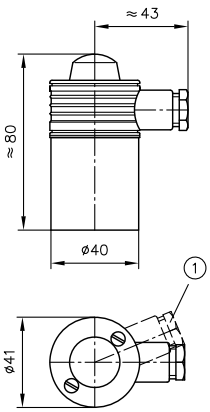


1 Can each be mounted offset by 90°
2 Adapter can be mounted offset by 180°

Coding **A**

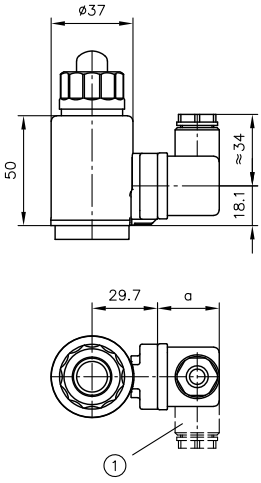
VB 11

Coding **G**



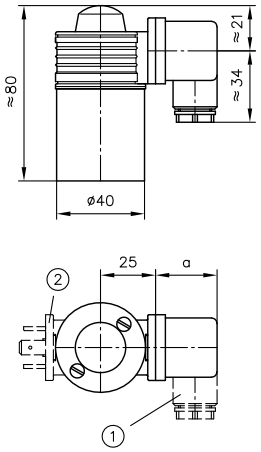
1 Can each be mounted offset by 22.5°

Coding **GM, WGM, LM, L5KM**



1 Can each be mounted offset by 90°

Coding **N, WG**



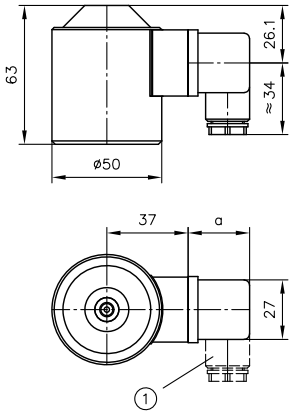
1 Can each be mounted offset by 90°
2 Adapter can be mounted offset by 180°

Coding **A**

Version	a
GM, LM, L5KM, N	28
WGM, WG	34.5

VB 21

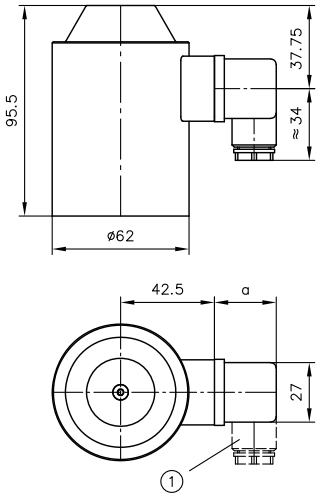
Coding **G, WG**



1 Can each be mounted offset by 90°

VB 31

Coding **G, WG**

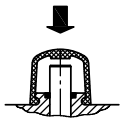
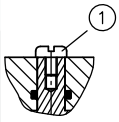
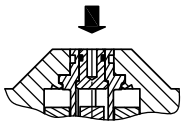
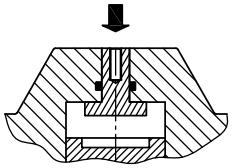


VB 21 ... VB 31

Coding **X** (without plug)

Version	a
G	28
WG	34.5

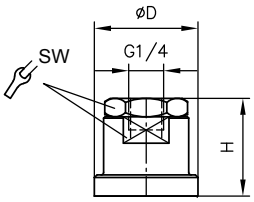
Manual override

Size	Max. operating force (N)	Comment	Image
VB 01	35	Pressing the magnetic pin protruding under the rubber cap	 Size 0 and 1
VB 11	80		
VB 21	150	If necessary, push override pin in using a suitable pointed tool (e.g. screwdriver)  1 Manual override can be disabled manually by screwing in a screw M3x5 DIN 921	
VB 31	250		

4.3.2 Hydraulic and pneumatic actuation

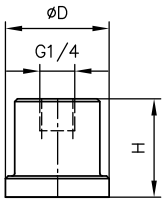
Hydraulic

Coding **H**



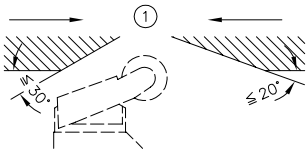
Pneumatic

Coding **P**



Coding	Size	∅D	H	SW
H	VB 01	32	44	27
	VB 11	39	36	27
	VB 21	49	52	32
	VB 31	60	77	41
P	VB 11	39	36	--
	VB 21	49	39	--
	VB 31	60	52	--

4.3.3 Mechanical actuation

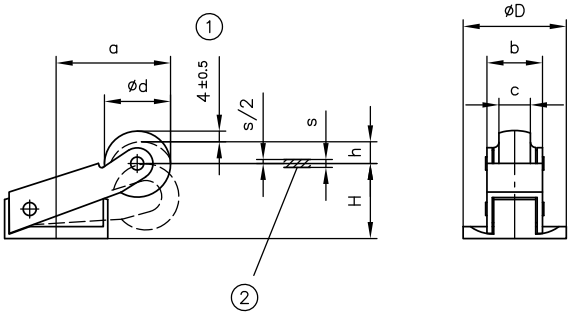


Switching curve for roller lever

1 Start-up direction

Roller

Coding **K**

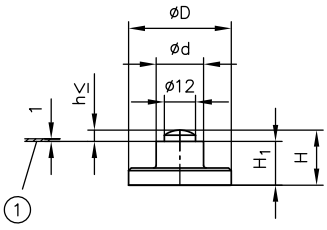


1 Free travel

2 Do not use as stop!

Pin

Coding **T**



1 Do not use as stop!

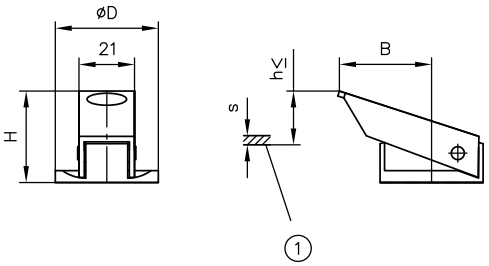
Coding	Size	∅D	∅d	H	H1	a	b	c
K	VB 11	39	25	28	--	42	21	12
	VB 21	49	25	31	--	41	21	12
	VB 31	60	35	46	--	62.5	26	15
T	VB 11	39	18	20.5	16.5	--	--	--
	VB 21	49	22	25.5	20.5	--	--	--

Coding	Size	Switching travel (mm)		
		Switching position range	Functional travel	Start of function
		s	h	(H + h)
K	VB 11	3 ±0.5	10.5 ±0.5	38.5 ±0.5
	VB 21	4 ±0.5	15.5 ±0.5	46.5 ±0.5
	VB 31	6 ±0.5	30 ±0.5	78 ±0.5
T	VB 11	--	4	--
	VB 21	--	5	--

4.3.4 Manual actuation

Hand lever

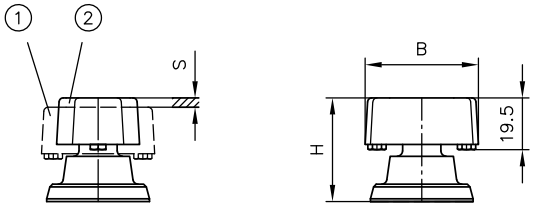
Coding **F**



1 Do not use as stop!

Turn knob

Coding **D**



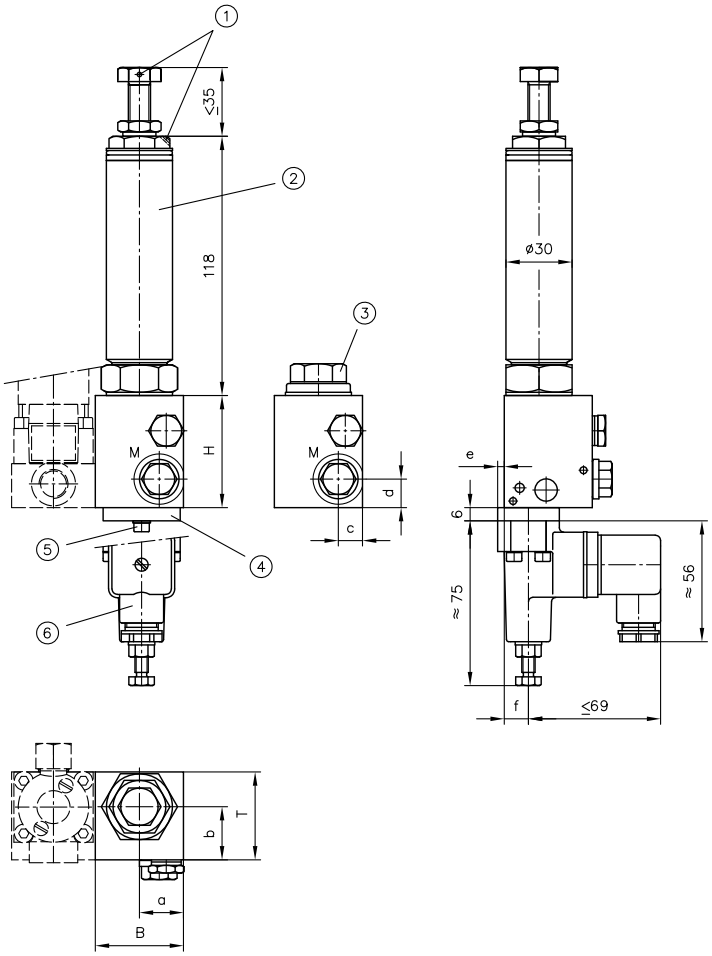
1 Switching position a
2 Switching position 0

Coding	Size	∅D	H	B	Switching travel (mm)	
					s	h_{max}
F	VB 11	39	37	34.5	3.5	20.5
	VB 21	49	43	32	4	23.5
	VB 31	60	70	56.5	10	45
D	VB 01	--	38	43	3.5	--
	VB 11	--	40	43	3.5	--
	VB 21	--	47	52	5	--

4.4 Intermediate plates

4.4.1 Intermediate plate with 2-way pressure reducing valve

Coding
-CZ 08/.., -CZ 1/.., -CZ 2/..
-CZ 5/.., -CZ 25/.., -CZ 55/..



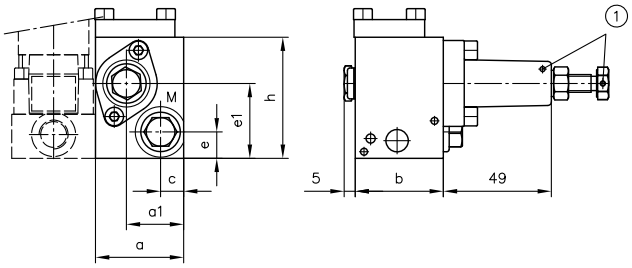
1 Sealing option
2 Pressure reducing valve CZ
3 Pressure reducing valve CZ X
4 Only for type VB 01
5 Without PS
6 With PS

Type	B	T	H	a	b	c	d	e	f
VB 01	40	40	51	20	19	11	13	3	11
VB 11	47	50	50	23.5	24.2	9.5	13.5	--	31.2

	Connection (ISO 228-1)
M	G 1/4

4.4.2 Intermediate plate with 3-way pressure reducing valve

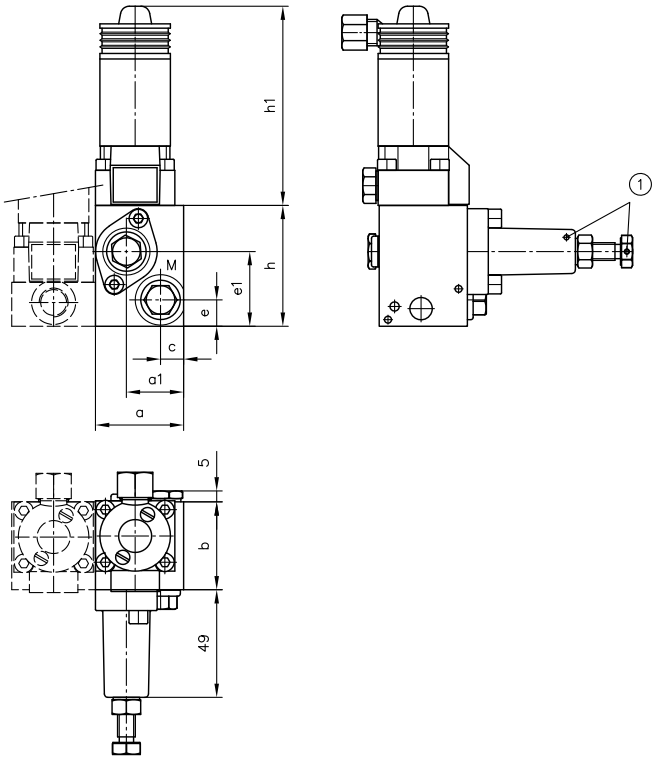
Coding **Z1 ... Z8**



1 Sealing option

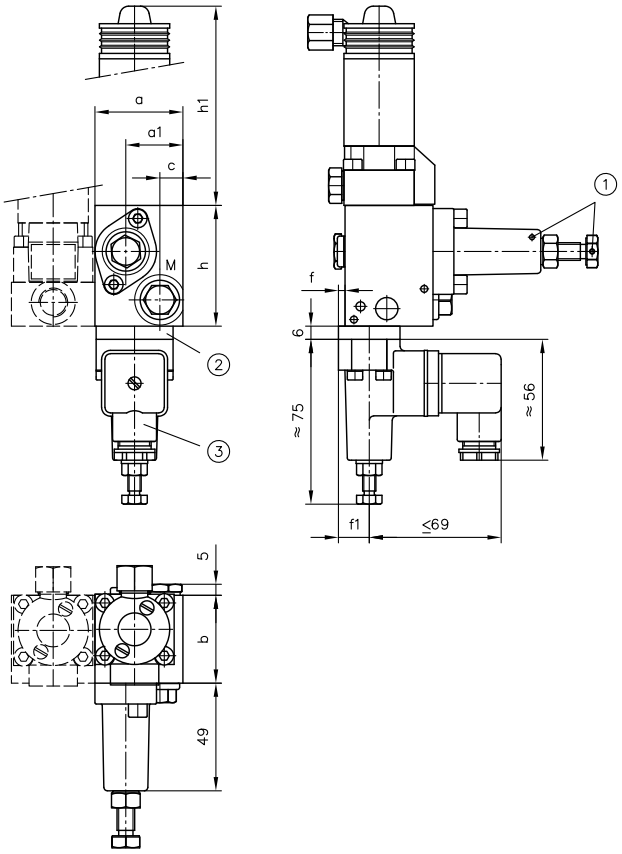
	Ports (ISO 228-1)
M	G 1/4

Coding **Z11 ... Z28**



1 Sealing option

Coding **Z114 ... Z2865**

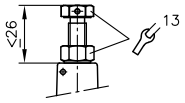


1 Sealing option
2 Only for type VB 01
3 With DG..

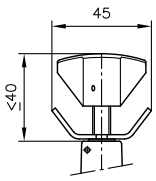
Type	a	a1	b	c	∅d	e	e1	e2	f	f1	h	h1	h2
VB 01	40	26	40	10.5	32	12	34	13	3	11	55	81	90
VB 11	47	23.5	50	10	42	13.5	35	21	--	31	50	75	115

Adjustment

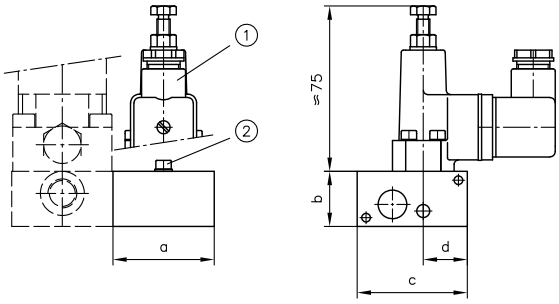
Fixed



Adjustable



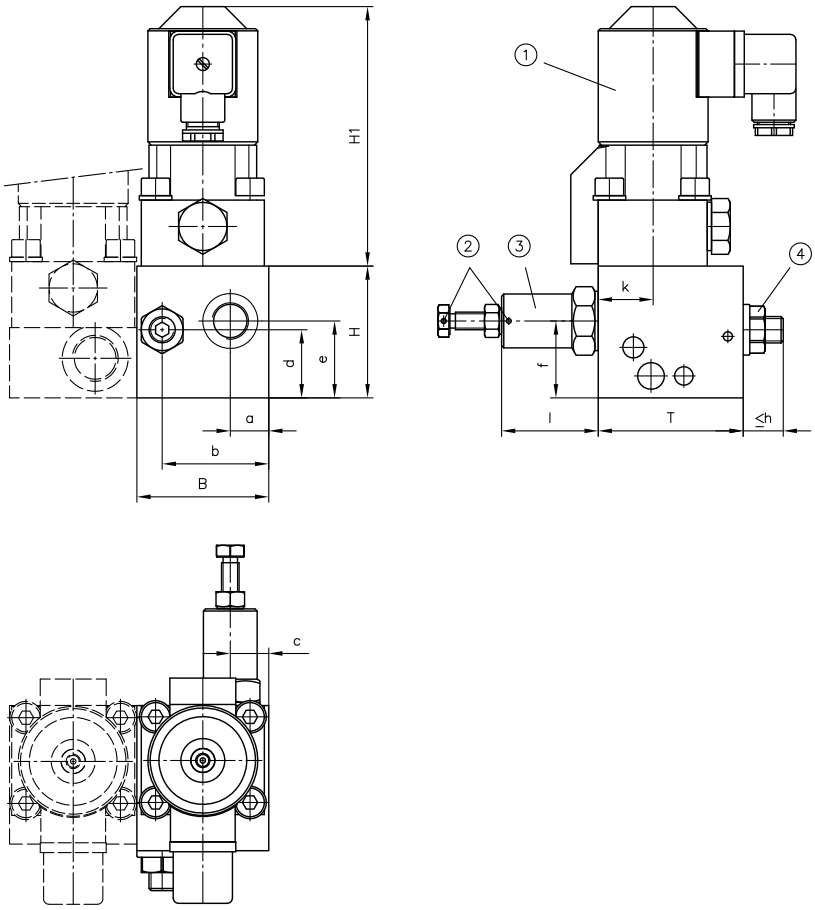
4.4.3 Intermediate plate with pressure switch



1 Coding - 33 ... 365
2 Coding - 32

Type	a	b	c	d
VB 01	38	20	40	19
VB 11	46	25	50	20

4.4.4 Intermediate plate with pressure-limiting and restrictor check valve

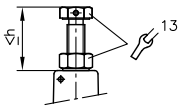


1 Cable fitting Pg 9
2 Sealing option
3 Pressure-limiting valve
4 Throttle screw (QR 4 or QR 5 in accordance with D 7050)

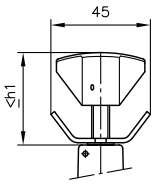
Type	B	T	H	H1	a	b	c	d	e	f	g	h	l
VB 21	60	66	60	126.5	17.5	31	17.5	35	35	35	25	16	44
VB 31	72	100	63	162	22	36	28	26	30	42	35	18	54

Adjustment

Fixed

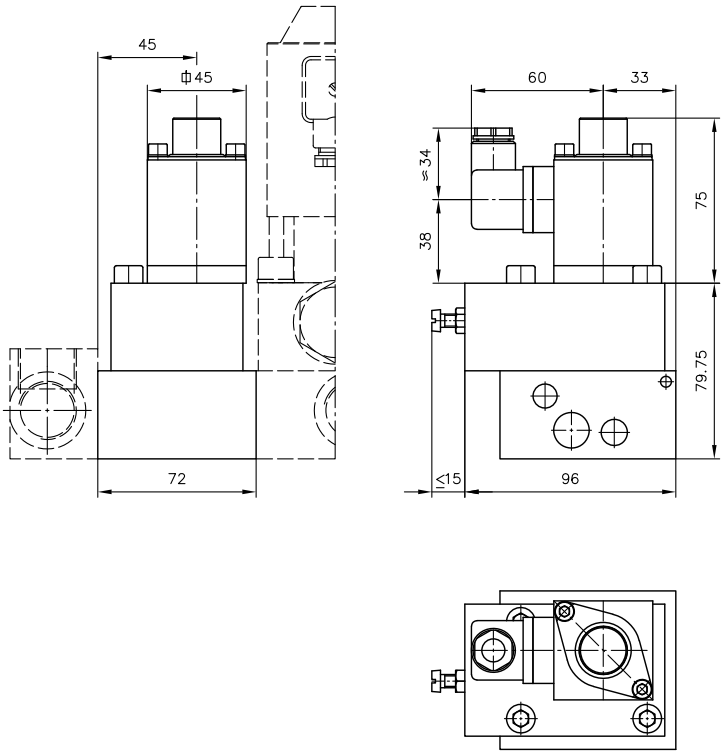


Adjustable



Type	h	h1
VB 21	29	42
VB 31	31	44

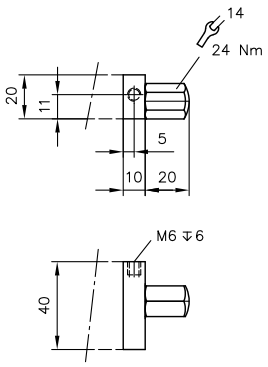
4.4.5 Intermediate plate with 2-way flow control valve



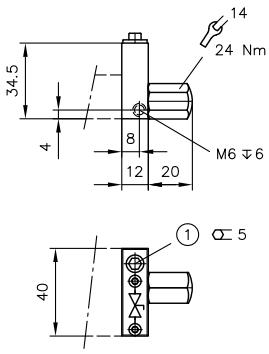
4.5 End plates

VB 01

No designation

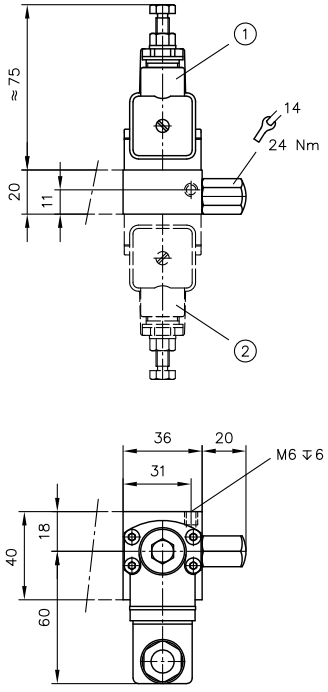


Coding **/2**



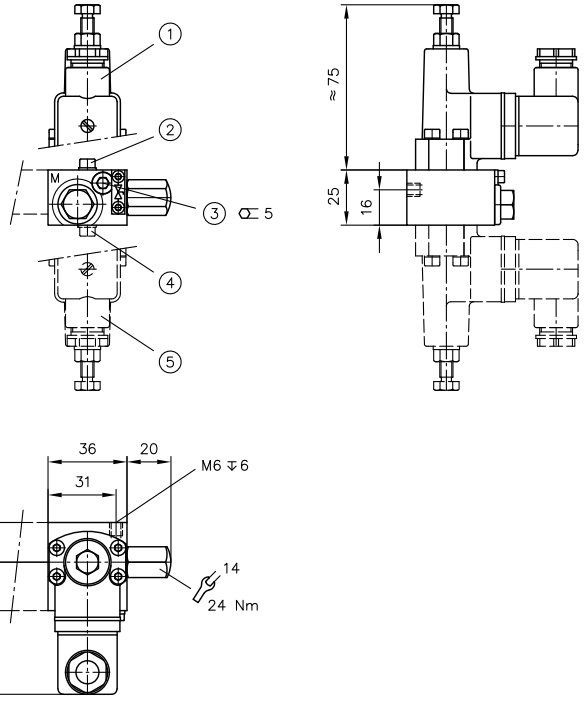
1 Drain screw

Coding **/3 ... 65, /33 ... 6565**



1 Coding /3 ... 65, /33 ... 6565
2 Coding /33 ... 6565

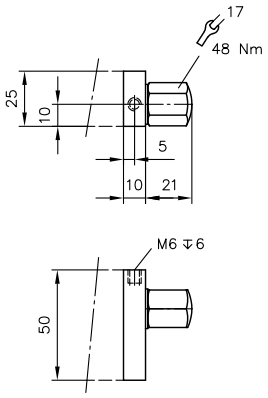
Coding
/02, /002
/32 ... 652, /332 ... 65652



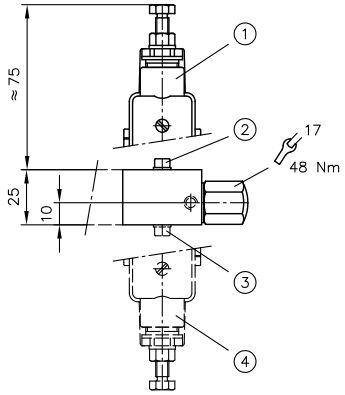
1 Coding /32 ... 652, /332 ... 65652
2 Coding /02, /002
3 Drain screw
4 Coding /002
5 Coding /332 ... 65652

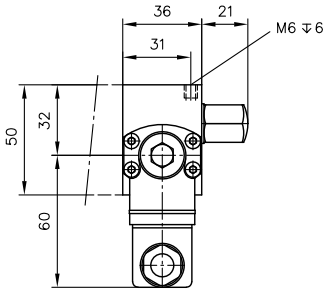
VB 11

No designation



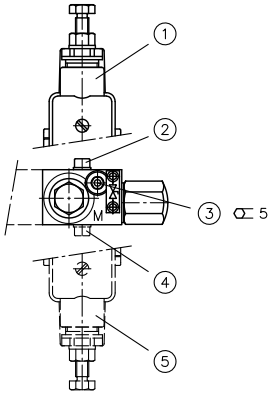
Coding
/0, /00, /.0, /0.
/3 ... 65, /33 ... 6565

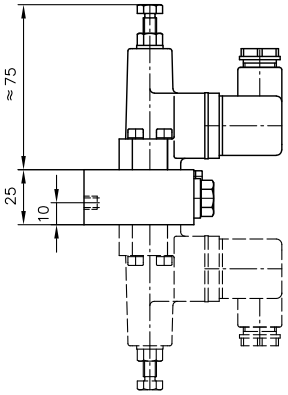


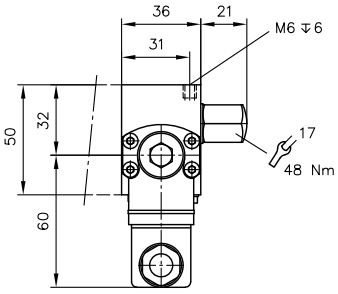


1 Coding /3 ... 65, /33 ... 6565, /.0
2 Coding /0, /00, /0.
3 Coding /00, /. 0
4 Coding 33 ... 6565, /0.

Coding
/02, /002
/32 ... 652, /332 ... 65652



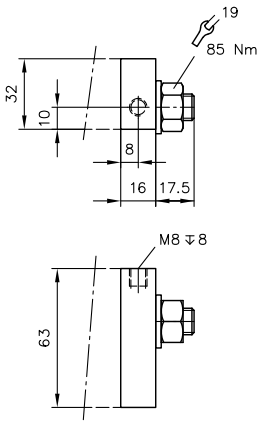




1 Coding /32 ... 652, /332 ... 65652
2 Coding /02, /002
3 Drain screw
4 Coding /002
5 Coding /332 ... 65652

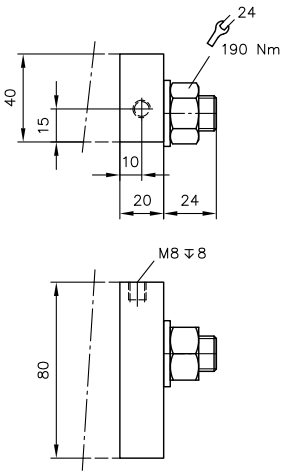
VB 21

No designation



VB 31

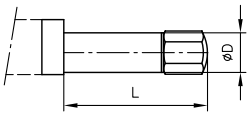
No designation



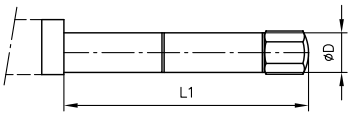
Extensions (free space) for one/two retrofitted valves

(For more information, see note Chapter 5.3.1, "Directional valve section – Installation")

Coding **/11, /...11**



Coding **/12, /...12**



Type	L	L1	∅D
VB 01	59	97	14
VB 11	66	110.5	18

Dimensions apply to all end plates.

5 Assembly, operation and maintenance recommendations

5.1 General information

Observe the document B 5488.

5.2 Intended use

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

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

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 qualified personnel.
- The product must only be operated within the specified technical parameters. The technical parameters are described in detail in this documentation.
- All components must be suitable for the operating conditions in the event of application in an assembly.
- The operating and maintenance manual of 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.

5.3 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 dismounting (in particular in combination with hydraulic accumulators).

⚠ **DANGER**

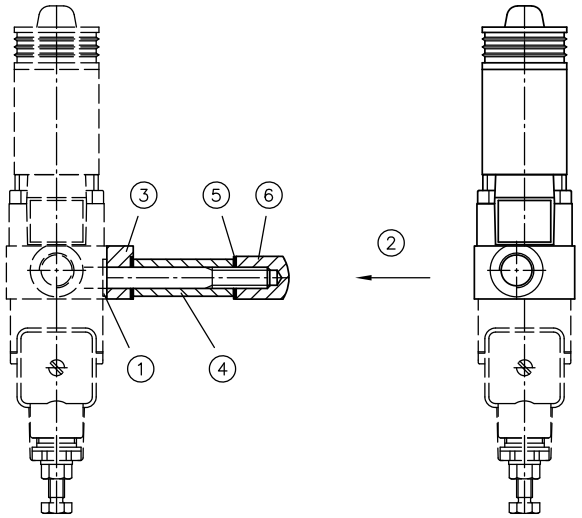
Risk to life caused by sudden movement of the hydraulic drives when dismantled incorrectly!

Risk of serious injury or death.

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

5.3.1 Directional valve section – Installation

For retroffiting in directional valve banks, e.g. instead of the free space in the end plates, /.11; /.12 for VB 01 and VB 11 Chapter 2.8 and Chapter 4.5; otherwise, order for new number of valves when extending the tension rod. The terms "valve section ..." and "for valve bank VB.." must be entered in the clear text.



1 When threading the valve section onto the tension rod, take care not to lose the O rings for the flange sides!

2 **Example**
End plate coding /11(12) comprising:

3 End plate with USIT ring

4 Spacer pipe for USIT ring

5 USIT ring

6 Cap nut

Valve sections to be retrofitted

Installation procedure:

1 Unscrew the nut(s) and pull all the parts off the tension rod, including the end plate
2 Thread the valve section on
3 Push the end plate on and tighten the cap nut(s) to the torque specified in the table below. For coding /. 11

Size	Tightening torque for tension rod fixtures (Nm)
VB 01	25
VB 11	40
VB 21	85
VB 31	190

Type	End plate with USIT ring	Spacer pipe *) HAWE no.	USIT ring	Cap nut HAWE no.
VB 01	U 8.7x16x1	7250 041	U 8.7x16x1	7250 015
VB 11	U 10.7x18x1.5	7251 041	U 10.7x18x1.5	7251 026

NOTE
*) For end plate coding /.12, two spacer pipes with a USIT ring between them, depending on size (only for VB 01 and VB 11).

5.4 Operating instructions

Note product configuration and pressure / flow rate

The statements and technical parameters in this documentation must be strictly observed.
The instructions for the complete technical system must also always be followed.

NOTE

- 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

Risk of injury on overloading components due to incorrect pressure settings!
Risk of minor injury.

- Pay attention to the maximum operating pressure of the pump and the valves.
- 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 hydraulic component. Contamination can cause irreparable damage.

Examples of fine contamination include:

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

NOTE

Neue Druckflüssigkeit vom Hersteller hat nicht unbedingt die erforderliche Reinheit.
Beim Einfüllen von Druckflüssigkeit ist diese zu filtern.

In order to maintain faultless operation, ensure that the cleanliness level of the hydraulic fluid is correct.
(See Cleanliness level in Chapter 3, "Parameters")

Additionally applicable document: D 5488/1 Oil recommendations

5.5 Maintenance information

Conduct a visual inspection at regular intervals, but at least once per year, to check if the hydraulic connections are damaged. If external leakages are found, shut down and repair the system.

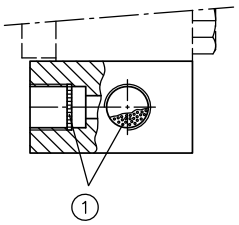
Clean the device surface of dust deposits and dirt at regular intervals, but at least once per year.

6 Other information

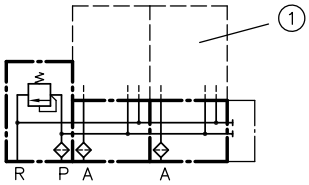
6.1 Accessories, spare and individual parts

6.1.1 Screen-filters installed as standard – D 7235

Directional seated valves are largely insensitive to the microfine, suspended contamination that is always present in hydraulic oil. However, occasional coarse contamination entrained by the flow of oil, such as torn particles of cuffs, scaling, swarf, etc., can lead to abrupt disturbances if it gets stuck in the valve gap and prevents the valve from closing. As such , the valves are already largely protected by screen filters installed at the factory (D 7300, item 4.2 and D 7300-12, item 6.1.1). To provide additional preventive protection, screen filters or filter screens are inserted in the line connections of directional valve banks VB 01... and VB 11.... The screen filters and filter elements are no substitute for conventional hydraulic filters. However, as practice shows, they are sufficient to protect small hydraulic systems against malfunctions. If such malfunctions occur, the first step should be to check the screen filters. For the sake of simplicity, the screen filters are not shown separately in the circuit symbols.



1 Screen filters and filter elements



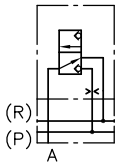
1 For detailed circuit symbols for directional valves, see Chapter 2.6.1, "Valve sections without pressure switch"

Screen filters Coding	Connections	
	A, B	P
VB 01 A VB 01 F	HFC 1/4 F	HFC 1/4 F
VB 11 A...	HFC 1/4 or HFC 3/8	HFC 1/4 or HFC 3/8
VB 11 F...	HFC 1/4 or HFC 3/8	HFC 1/4 F up to 2.1 lpm, without for more
VB 01 C	HFC 1/4 F	Screen 5017 010 in the transition plate
VB 11 C	HFC 3/8	

NOTE
For VB 01 A, F, C, use screen filters HFC 1/4 F with the flatter filter canisters 6406 017 due to the limited depth of the threaded holes for ports A and B; see D 7235. Please observe this notice when ordering parts for retrofitting (replacement).

6.1.2 Orifice insert D 6465

Circuit symbol:

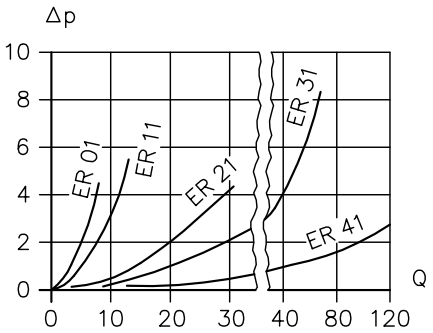


Order coding example:

VB 11 AM - 5 - FHHN - 2 - G 24

Valve H in Positions 2 and 3 with orifice insert EB 1 - 0.8

If orifice inserts in accordance with D 6465 are required at the inlets of valves B, C, O, P, H, L, Y, I, S, T and J for functional reasons (see Item 2.1.3 in D 7300 and Item 2.1 in D 7300-12), the clear text must be used to specify which valve (coding, position number counting from connection block) needs to be fitted with which orifice (type in accordance with D 6465) when ordering.



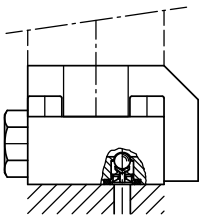
Q flow rate (lpm); Δp flow resistance (bar)

Oil viscosity approx. 60 mm²/s

Orifice insert Coding	VB 01	VB 11	VB 21	VB 31
B	EB 0 - 0.6	EB 01- 0.8	EB 2 - 1.2	EB 3 - 2.5

6.1.3 Return pressure stop

Check valves (coding K, M, U, V) can be installed in the reflux outlets R of the 3/2-way valves of sizes 0 and 1. They prevent pressure surges from the shared reflux line from affecting non-actuated, easily moved consumers with no load and thus causing uncontrolled advancing in systems where valves are connected in parallel and there is a connection between A → R. Such pressure surges can occur as a result of switching procedures.
The check valves are not suitable for blocking off the flow of hydraulic oil, which can occur as a result of switching combinations with other valves at R. The return pressure stop can be retrofitted.



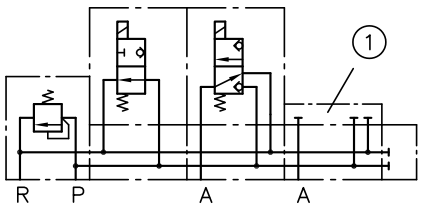
(Matches additional element S in D 7300 Item 3.1, Table 3)

Return pressure stop Coding	VB 01	VB 11
S	7332 000 a	7332 000 b

6.1.4 Reactive plate

Instead of a free space, See Chapter 2.8 a sub-plate with a reactive cover that has already been installed can also be used in any position when retrofitting a directional seated valve. The clear text must be used to specify which valve (coding, position number counting from connection block) needs to be fitted this way.

Circuit symbol:



1 Reactive plate (height 10 mm)

Order coding example:

VB 11 AM - 1/380 - FHH - 1 - G 24

Valve H in Position 3 with reactive plate 5000 099 (or 6540 039 (see below))

Individual parts

Type	Reactive plate	3x O rings NBR 90 Sh	4x screws ([Standards number/ designation])
VB 01	6540 039	3.7x1.78	M5x12-12.9 A2K
VB 11	5000 099	5x1.5	M6x20-12.9 A2K
VB 21	4900 099	10x2.2	M8x20-12.9 A2K
VB 31	5005 099	13.95x2.62	M10x40-12.9 A2K

6.2 Configuration and planning instructions

Basic type and size

The maximum pressure is determined based on the respective circuit symbol and the actuation type; see D 7300 Item 2 and 3.1 and D 7300-12 Table 1.

For pump delivery flows in the Q_{max} range, the flow resistances in D 7300 and D 7300-12 should be observed.
Please note: the valve sizes should be selected based not only on the pumps' delivery flow, but also on the largest flow rate resulting from the control procedure. Depending on the type of consumer in use (double-acting cylinder with uneven surface ratio), this may be larger than the pump delivery flow, e.g. in case of retraction or a differential circuit. In such cases, the valve size must be selected based on this flow rate.

Connection blocks and adapter plates

Steel spring dome only in case of pressure surges in the reflux line (> 20 bar), e.g. as a result of decompression surges when relieving the pressure from consumers with pressure storage capacity.
Adapter plates C, D do not have additional pressure switch at directional valve.

Adapter plates C for hydraulic power packs with two pressure connections D 6010 DB, D 6010 S limited number of valves for P1, overlap for P2, better to use connection block A here.

Other adapter plates S and L for mounting valve banks VB 11 on air-driven hydraulic power packs type LP, see D 7280 H.

Actuation and actuating solenoid

The solenoid voltage and solenoid version are specified at the end of the valve bank and apply to all solenoids. The specifications regarding the IP protection class apply to the solenoid and properly assembled line connector.

Valve sections

The actuation symbols must be added to the directional valve circuit symbols.

A maximum of 12 valves can be combined for VB 01 and VB 11, or 10 for VB 21 and VB 31, G and J must be counted as 2 valves; A, D or F only once and, where possible, as first vale in the block bank/order coding.

Arrange the directional valves in the block in an order that ensures directly adjacent valves are not both switched on at the same time for long periods (see "Section 6.1").

A, B = outlet (consumer ports) P, R = internal supply and drain (pump and reflux)

Valve sections with pressure switches

PS in port A or B
Cannot be combined with directional seated valves coding D, A, F, P, O, I or Y, or block banks VB..C or VB..D.

PS in P gallery
For directional seated valves coding H, K, L, M, N, R, U and V. Eliminates the need for an end plate with PS. Cannot be combined with block banks VB..C or VB..D.

Intermediate plate with pressure switch

If it is not possible to mount a pressure switch on the end plate, e.g. due to a lack of space, the same result can be achieved by installing a single sub-plate with a flanged-on pressure switch in any position in the valve bank.

Intermediate plate with 2-way pressure reducing valve

Maximum permissible inlet pressure 500 bar (P side). The pressure reducing valves can be inserted in any position in the valve bank, and regulate/reduce the pressure for the downstream (secondary side) directional valves and the consumers connected on that side, even if pressure is simultaneously relieved via upstream (primary-side) directional valves in case of high pressure levels.
Examples: Clamping cylinders with low pressure settings or pilot valves for electro-hydraulic low pressure remote control.
Pressure reducing valves type CDK 3.. in accordance with D 7745 are used. These valves are zero-leakage when closed (pump pressure higher than set secondary pressure). The check valve prevents unwanted oil reflux from the secondary to the primary (pump) side, end ensures that the pressure is always maintained reliably. In order to protect against impermissible excess pressure caused by increases in externally acting forces, the customer must install their own pressure-limiting valve in the load line if necessary. For information on the old version with the pressure reducing valve following the 3-way principle, see Item 2.7.2 Intermediate plates with 3-way pressure control valves.
2-way pressure reducing valve only available in fixed version. Setting can be adjusted after undoing a lock nut using a WAF 17 spanner (monitor the pressure gauge!).
Secondary pressure setting (pressure gauge display) at flow rate Q = 0 lpm (consumer in end position). The pressure drops slightly when hydraulic oil flows to the consumer.
Version CZ X with tapped plug, prepared for retrofitting a CDK 3....
Version CZ 25. with low pressure dependence for fluctuating pump (inlet) pressure and use with low pressure settings (caution: max. flow rate 6 lpm).
Version CZ 55. with low flow resistance, but a higher pressure dependence for fluctuating pump (inlet) pressures.

Intermediate plate with 3-way pressure reducing valve

Due to the constant leakage oil consumption that occurs as a result of the function, even when there is no flow of hydraulic oil to the secondary side, leakages on the primary side can only be prevented (where necessary) by versions Z11 ... Z28 (Z114 ... Z2865) with an upstream 2/2-way seated valve. This valve should be activated in accordance with its circuit symbol whenever hydraulic oil is removed. The secondary side is protected against leakage oil by a check valve downstream of the pressure reducing valve; this ensures that there is no pressure loss when the secondary consumer is sealed and the pump is switched off.
However, it also means that the pressure reducing valve cannot be used for secondary pressure limitation in this setup if increasing internal forces push the load on the consumer beyond the secondary pressure. The check valve prevents return flow via the pressure reducing valve, and thus prevents the consumer from failing if the pressure in it increases. In this case, the load line would need to be safeguarded by a pressure-limiting valve provided by the customer and made resilient.
For dimensional drawings, see Item 4.4.2.
Secondary pressure setting (pressure gauge display) at flow rate Q = 0 lpm (consumer in end position). The pressure drops slightly when hydraulic oil flows to the consumer.
Version with pressure switch DG 3., monitoring of the P gallery on the supply (primary) side.
Version Z1 ... Z8 (standard version) cannot be used with a pressure switch, as the leakage oil consumption would cause the pump motor controlled by the DG.. to keep switching on an off constantly.

Intermediate plate with pressure-limiting and throttle valve

The “press control valve” (3/2-way valve with pressure-limiting and throttle valve built into the sub-plate) can be inserted in any position in the valve bank (VB 21.. or VB 31..).

Intermediate plate with 2-way flow control valve for VB 31

The proportional 2-way flow control valve in the bypass to the tank is used to deliberately vary the speed of the controlled consumers. This is achieved by diverting the portion of the (pump) delivery flow that is not required to the tank. The valve section must be placed in the first position in the valve bank (downstream of the connection block).

End plates

When combining two pressure switches, the coding /65 (DG 36 first, DG 35 second) is not permitted due to the risk of it being mixed up with the coding for a pressure switch DG 365 (also /65); for this scenario, use /56 (DG 35 first; DG 36 second).

Heating of the solenoid

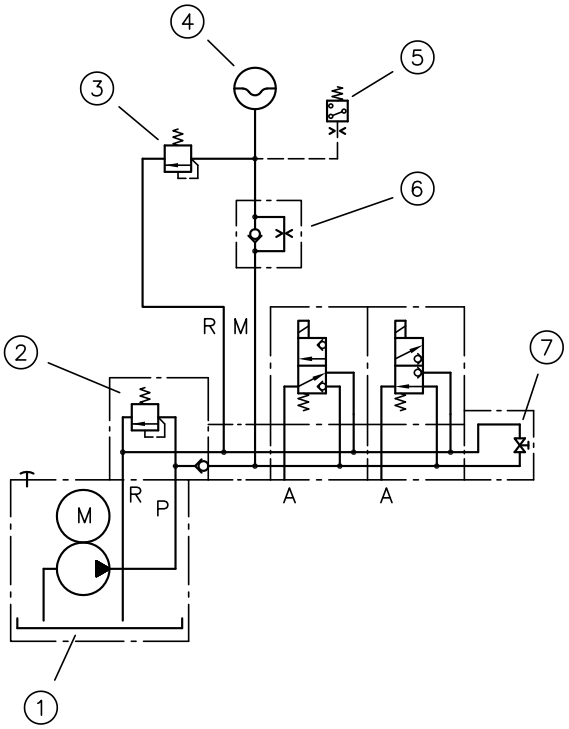
Due to the close proximity of adjacent solenoid valves in directional valve banks, heat dissipation into the valves' surroundings is limited. If actuated simultaneously and for longer duty cycles, directly adjacent valves would thermally hinder one another and heat each other up. As such, it is advisable to position at least one unactuated valve between any valves that need to be actuated simultaneously.

NOTE
This practice must be observed in scenarios where the duty cycle of the valves is very long. If this is not possible, the option of using an economy circuit should be looked into (see D 7813, D 7832, D 7833/1).

6.3 Application example for end plate and relief valve

Example:

Valve bank	VB 11 FM - HM/2 - 1 - G 24



1 Compact hydraulic power pack e.g. MPN in accordance with D 7207
2 Operating-pressure-limiting valve set to p_3 e.g. connection block AB in accordance with D 6905 AB
3 TÜV accumulator safety valve D 7000 TUV, e.g. set to p_4 or p_3
4 Accumulator, permissible operating pressure p_4
5 Pressure switch, e.g. set to p_2, for shutting off the pump
6 Restrictor check valve with fixed throttle, e.g. RDF... in accordance with D 7450
Orifice diameter must be selected based on the Δp-Q characteristics so that the permissible flow rate Q_{max} for the valve bank is not exceeded at the maximum possible operating pressure p_2.
7 End plate with drain valve

Pressure terms in accordance with CETOP RP62H

p_0 ... Accumulator gas filling pressure

p_1 ... Lower operating pressure of the hydraulic circuit

p_2 ... Upper operating pressure of the hydraulic circuit, e.g. also shut-off pressure for the pump motor

p_3 ... Pressure setting of the operating-pressure-limiting valve (e.g. $p_{2\ max}$)

p_4 ... Permissible operating gauge pressure of the hydraulic accumulator

NOTE
The accumulator safety valve with unit approval is used to protect the hydraulic accumulator from impermissible excess pressure. If necessary, it is factory-set to a fixed accumulator pressure (e.g. the maximum permissible accumulator pressure p_4 or a pressure that is still permissible for the hydraulic system $p_{3\ max}$) and sealed. The limit for the largest operating pressure planned for the hydraulic system p_2 or $p_{2\ max}$ is usually adjusted using the operating-pressure-limiting valve, shut-off valve (e.g. D 7529, D 6170 ALZ) or other devices (e.g. pump shut-off or circulation using pressure switch).

Further information

Additional versions

- Directional seated valve type G, WG and others: D 7300
- Directional seated valve type G with interchangeable coil: D 7300-12
- Directional valve bank type VB22: D 7302-22

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