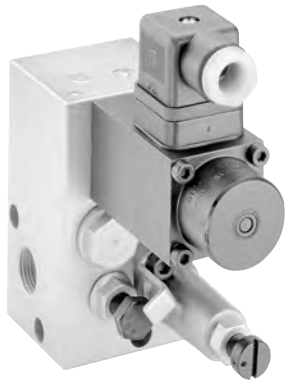
Lifting / Lowering valve type HSV

Flow Q_{max} = 160 lpm
Pressure p_{max} = 400 bar

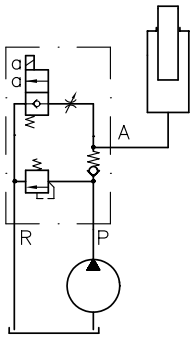
Type HSV 21(22)



Type HSV 61

Example circuit

Type HSV 21 R2 - 150 - G 24



1. General information

This valve combination type HSV is preferably used for controlling lifting equipment with one or two single acting hydraulic cylinders.

The valve consists of:

- Solenoid actuated 2/2-way directional seated valve for lowering the lifted load
- Adjustable throttle valve (optional) for limiting the drop rate
- The 2-way flow control valve, available as option for valves type HSV 23-R6, ensure a largely load independent drop rate.
- Pressure limiting valve for the limitation of the permissible load (max. operation pressure). Factory set to 220 bar, adjustable up to 400 bar.
- Check valve prevents load pressure from acting on the switched off pump, when the load is lifted and prevents e.g. reverse rotation of the pump. The location of the check valve in relation to the pressure limiting valve depends on the application. Version R2 and R4 (S2 and S4) prevents uncontrolled lowering of the load in case the pressure limiting valve is „floating“ (load pressure in the range of the set pressure).

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2. Available versions, main data

Order examples: **HSV 21 - R2 R-150 - G 24**

HSV 41 - R1 - WG 230

Table 1: Basic type

Coding	Flow Q_{max} [4] (lpm)	Pressure p_{max} (bar)	Ports conforming ISO 228/1 (BSPP) resp. SAE J514 (SAE-10) P	A, R, H	J
HSV 21 [1]	20	315	G 3/8		---
HSV 22 [1]	30	315	G 3/8	G 1/2	---
HSV 23 [1] [3]	40	315	G 3/8		---
HSV 61	60	400	G 1/2		---
HSV 71 [2]	160	400	G 3/4		---

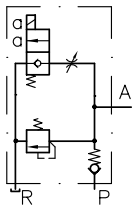
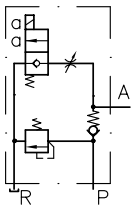
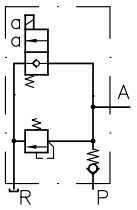
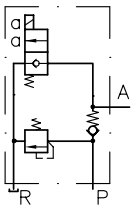
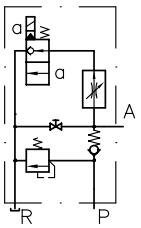
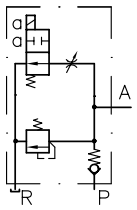
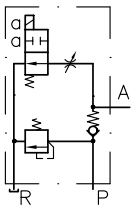
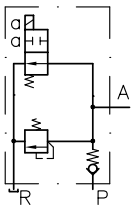
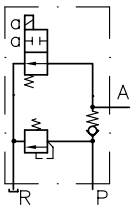
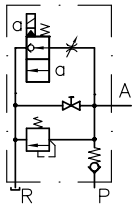
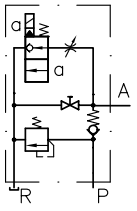
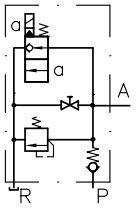
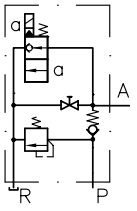
Table 4: Nom. voltage of the solenoid

Standard (with plug)	without plug	with plug featuring LED's	Nom. voltage
G 12	**X 12**	**L 12**	12 V DC
G 24	**X 24**	**L 24**	24 V DC
G 24 EX [5]	---	---	
G 24 EX 55 FM [5]	---	---	
WG 230	---	---	230 V AC 50 / 60 Hz
G 205	**X 205**	---	205 V DC
Other voltages on request !			

Table 3: Pressure limiting valve (with option of pre-sure setting in bar.
Example: HSV 21 R2R-**150**-G 24

No coding		Tool adjustable	**R**	 Manually adjustable

Table 2: Design, flow pattern of the solenoid valve and location of the check valve in relation to the pressure limiting valve

Basic type	With throttle valve		Without throttle valve		With 2-way flow control valve
HSV 21 [1] HSV 22 [1]	**R 1**	**R 2**	**R 3**	**R 4**	**R 6**
					HSV 23 
	S 1	**S 2**	**S 3**	**S 4**	
					
HSV 61 HSV 71 [2]	**R 1**	**R 2**	**R 3**	**R 4**	
					

[1] Suited for mounting onto compact hydraulic power packs, see appendix in sect. 5

[2] Only available as version ...S4 and R4, featuring a tool adjustable pressure limiting valve.

[3] Only available as version ...R6

[4] See also Δp-Q-curves in sect. 3.1

[5] Explosion-proof version (only available as type HSV 21 and HSV 22!)

3. Additional parameter

3.1 General and hydraulic data

Nomenclature, design: 2/2-way directional seated valve (cone seated valve), solenoid actuated, combined with a pressure limiting, a throttle and a check valve in one valve body.

Pipe connection:
P = Inlet for pressurized oil
A, H, J = Consumer
R = Return
ISO 228/1 (BSPP), for pipe fittings with male thread shape B, DIN 2852 page 2

Mounting position: Any

Mass (weight):

Type	HSV 21(22, 23)	HSV 61	HSV 71
approx kg	2.2	2.5	3.1

Flow direction: P → A lifting; A → R lowering
The function of the valves rule ports P, R and A(H, J) and mustn‘t be interchanged. R is the return port always (Δp < 20 bar)

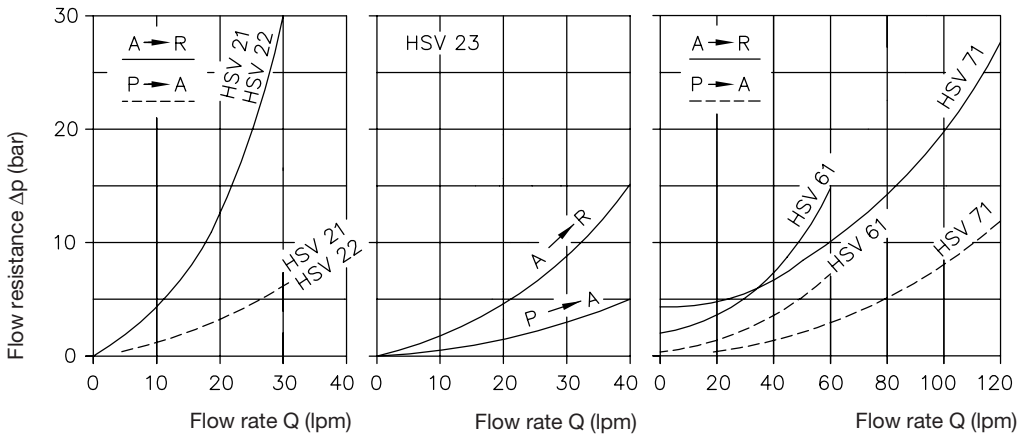
Perm. pressure: max. 400 bar

Perm. flow: see section 2 and Δp-Q-curves

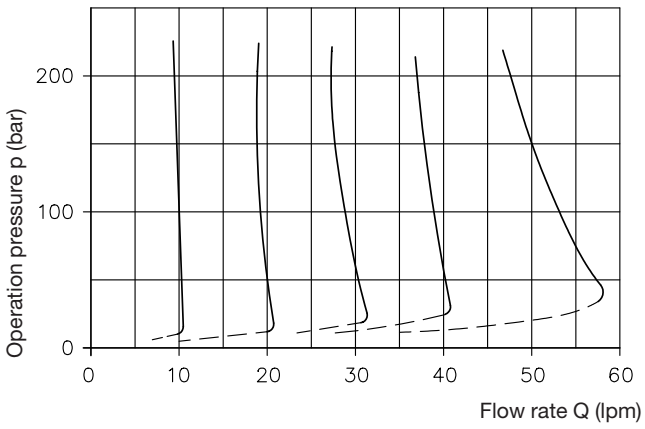
Pressure fluid: Hydraulic oil conforming DIN 51524 part 1 to 3: ISO VG 10 to 68 conforming DIN 51519.
Viscosity limits: min. approx. 4, max. approx. 1500 mm²/sec;
opt. operation approx. 10... 500 mm²/sec .
Also suitable for biological degradable pressure fluids types HEPG (Polyalkylenglycol) and HEES (Synth. Ester) at service temperatures up to approx. +70°C

Temperature: Ambient: approx. -40...+80°C; Fluid: -25...+80°C, pay attention to the viscosity range!
Start temperature down to -40°C are allowable (Pay attention to the viscosity range during start!), as long as the operation temperature during subsequent running is at least 20K higher. Biological degradable pressure fluids: Pay attention to manufacturer‘s information. With regard to the compatibility with sealing materials do not exceed +70°C.
Restrictions for version with ex-proof solenoid!

Δp-Q-curves



2-way flow control valve (with type HSV 23-R6)



Oil viscosity during tests approx. 60 mm²/s

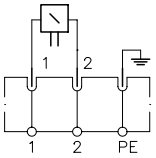
3.2 Electrical data

Type	HSV 21(22)		HSV 23		HSV 61		HSV 71	
	G 24 G 24 EX [2]) G 24 EX 55 FM	WG 230 [1])	G 24	WG 230 [1])	G 24	WG 230 [1])	G 24	WG 230 [1])
Nom. voltage U_N	24 V DC	230 V AC 50/60 Hz	24 V DC	230 V AC 50/60 Hz	24 V DC	230 V AC 50/60 Hz	24 V DC	230 V AC 50/60 Hz
For further data see solenoid valve type ... acc. to pamphlet ...	BVG 1 BVP 1 D 7765		EM 21V D 7490/1		EM 31V D 7490/1		EM 41V D 7490/1	
Nom. power P_N (W)	26.4	26.6	21	21	21	21	30	30
Switching time (guideline) ms on	100	200	50	100	50	100	50	100
Switching time (guideline) ms off	80	160	150	300	150	300	150	300
Switchings	max. approx. 2000 (roughly even distributed)							
Protection mode	IP 65, acc. to IEC 60529 (plug properly mounted)							

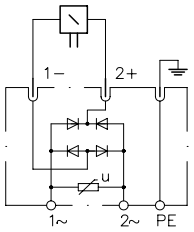
Plugs (connection and circuitry)

All plugs DIN EN 175 301-801 A

DC-voltage coding G 24



AC-voltage coding WG 230



Terminals at the solenoid

The valve order coding always includes the plug.
Additionally available plugs (for more details, see D 7163):

Device socket	Order coding for all valves
with LED and safety circuit with 2 diodes	SVS 296048 SVS 3129020
with clamp diode	MSD 3-209 C1

[1]) With bridge rectifier in the plug (solenoid 205 V DC)

[2]) Only available for type HSV 21 and HSV 22. For detailed information, see below.

Electrical data for ex-proof solenoids

Coding G 24 EX	
Certificate acc. to ATEX	TÜV-A 03ATEX 0017 X ⟨Ex⟩ II 2G Ex d B + H2 T4 Gb ⟨Ex⟩ II 2D Ex tb IIIC T135°C Db
Oper. duration	100% ED
Duty cycle	IP 67 (IEC 60529)
Nom. voltage U_N	24 V DC
Nominal power P_N	23 W
Restrictions for use:	
Ambient temperature	-35 ... +40°C
max. fluid temperature	+70°C
el. protection against overload (conf. IEC 60127)	I_F < 1.6 A-T
Surface coating	Housing galvanically zinc coated Coil and connection cavity are moulded
Electrical connection	3x0.5 mm²
Cable length	3 m, 10 m, (cable ÖLFLEX-440P ® Co. LAPP, D-70565 Stuttgart)

Attention: Protect the complete valve against direct sun light.

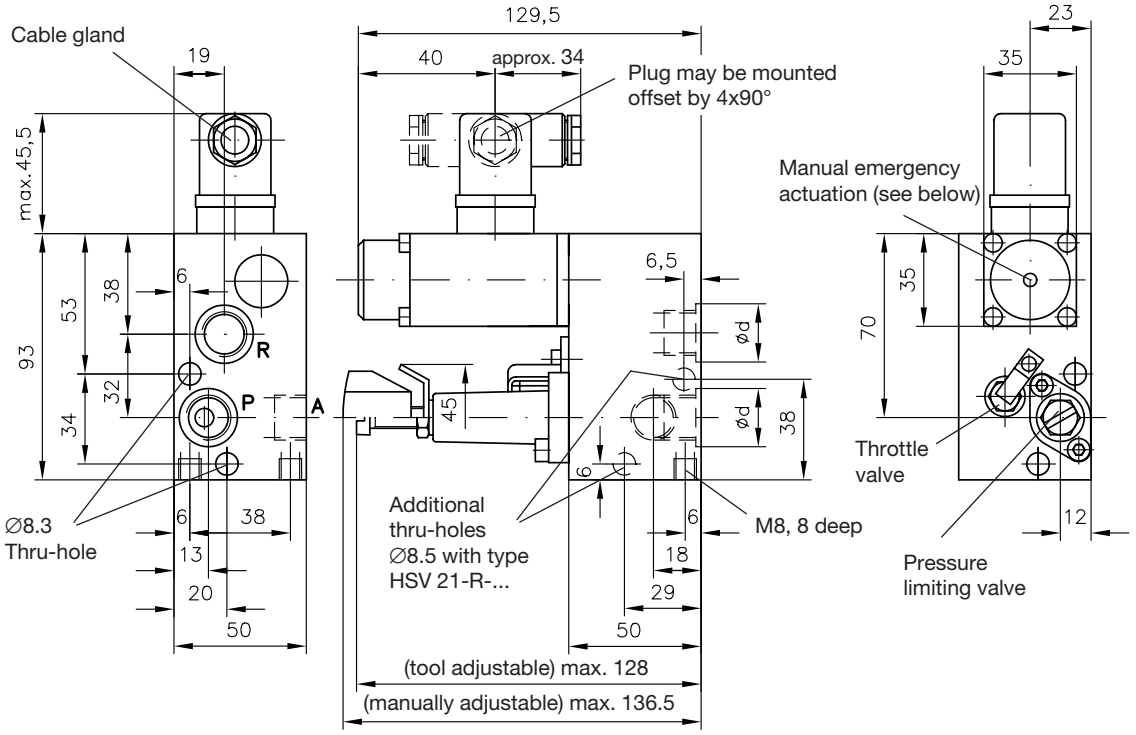
Observe the operation manuals B 03/2004 (G 24 EX), B 24/2012 (G 24 EX 55 FM) and B ATEX !
Electrical lay-out and testing conforming EN 60079-0, VDE 0170-1, VDE 0170-5

Coding G 24 EX 55 FM	
Certificate acc. to ATEX	FM 13ATEX 0071 X ⟨Ex⟩ II 2G Ex d IIB T4 Gb ⟨Ex⟩ II 2D Ex tb IIIC T135°C Db
Certificate acc. to IECEx	IECEx FMG 13.0027 X Ex d IIB T4 Gb Ex tb IIIC T135°C Db
Certificate acc. to NEC500 and CEC Anex J	XP, Class I, Div. 1, Grp C, D, T4
Certificate acc. to NEC500 CEC Section 18	DIP, Class II, Div. 1, Grp E, F, G, T4 DIP, Class III, Div. 1 & 2
Certificate acc. to NEC505	Class I, Zone 1, AEx d IIB T4
Certificate acc. to NEC506	Zone 21, AEx tb IIIC T135°C
Certificate acc. to CEC Section 18	Class I, Zone 1, Ex d IIB T4
Oper. duration	100% ED
Duty cycle	IP 67 (IEC 60529)
Nom. voltage U_N	24 V DC
Nominal power P_N	23 W
Restrictions for use:	
Ambient temperature	-40 ... +55°C
max. fluid temperature	+70°C
el. protection against overload (conf. IEC 60127)	I_F < 1.6 A-T
Surface coating	Housing galvanically zinc coated Coil and connection cavity are moulded
Electrical connection	3x1.0 mm²
Cable length	3 m, 10 m, (cable ÖLFLEX Power Multi ® Co. LAPP, D-70565 Stuttgart)

4. Unit dimensions

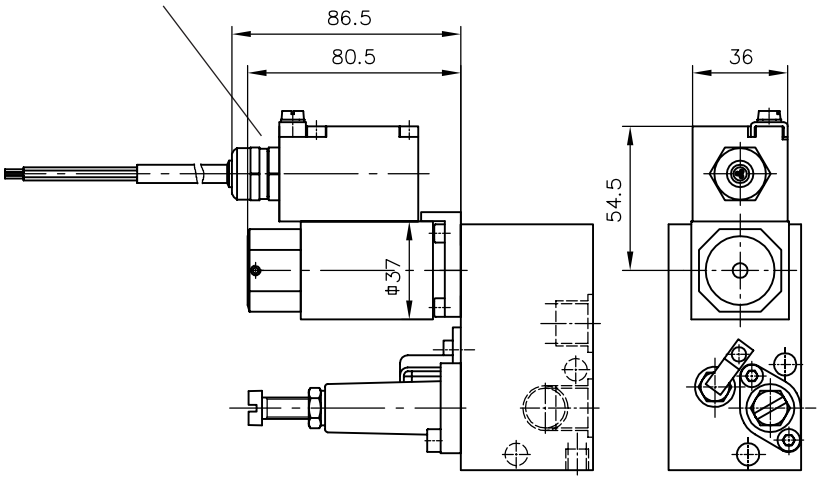
All dimensions are in mm and subject to change without notice!

4.1 Type HSV 21-.. and HSV 22-...



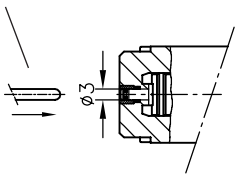
G 24 EX

Ex-proof solenoid

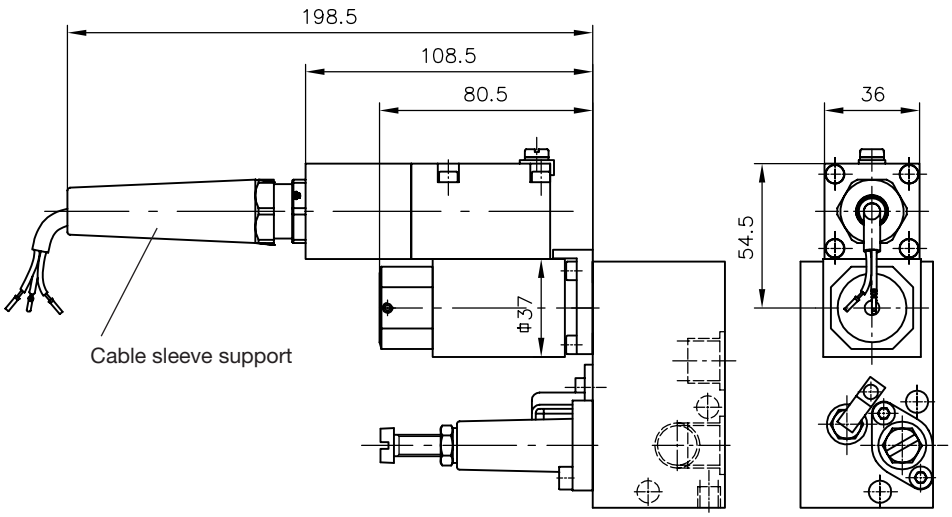


Manual emergency actuation

Actuation aid (max ∅2.5 mm)
Do not use any sharp edged parts.
Actuation force ≦ 10 N

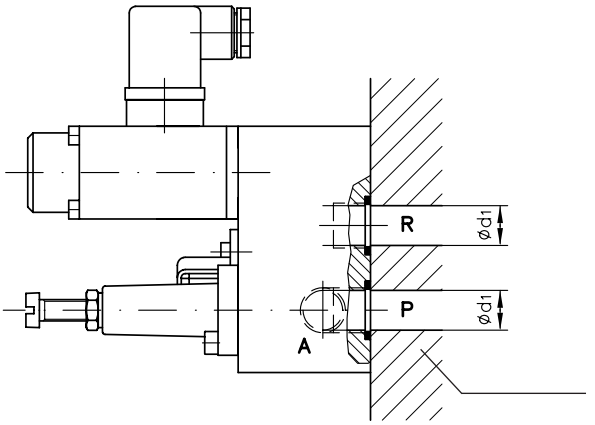


G 24 EX 55 FM



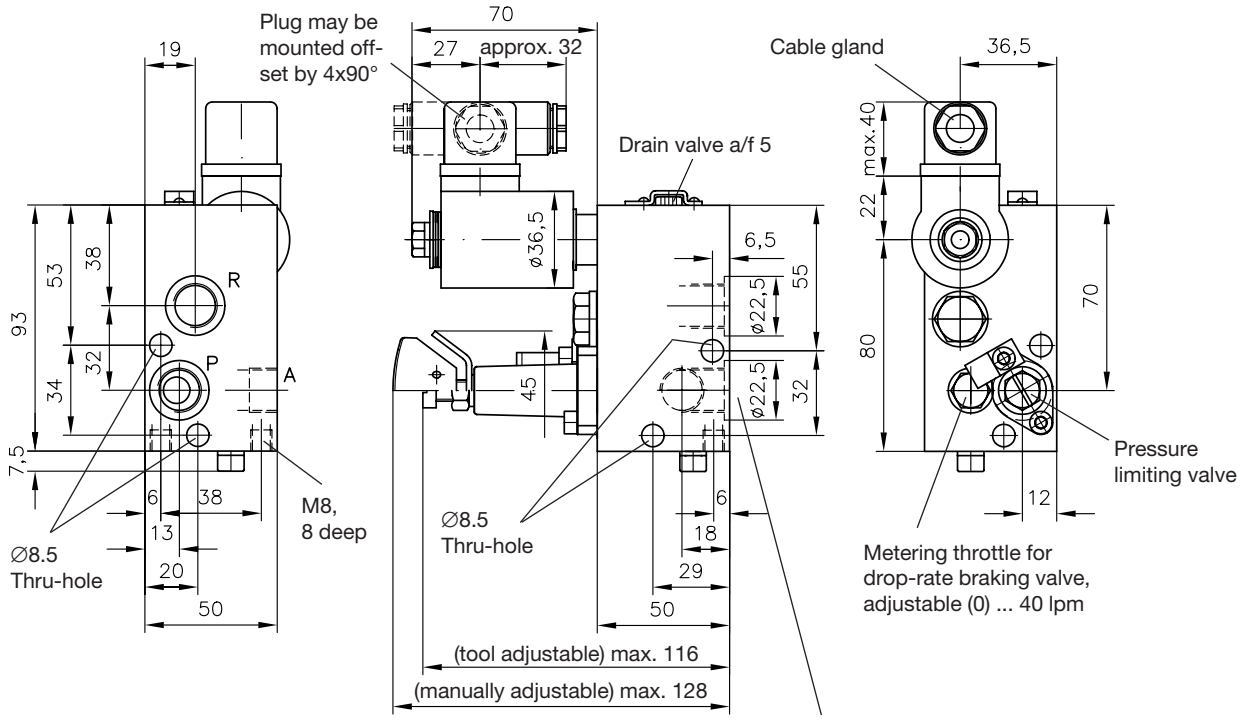
Important notes:

This valve may be mounted onto customer furnished manifold also. The ports will then be sealed to the outside by O-rings.
Two socket head bolts ISO 4762-M8x65-10.9-A2K are required for mounting.



	HSV 21-.. P and R	HSV 22-... R	HSV 22-... P
Thread ISO 228/1 (BSPP)	G 3/8	G 1/2	G 3/8
Ød	22.5	26.5	22.5
Ød_1	14	19	14
O-ring NBR 90 Sh	18x2.5	22x2.5	18x2.5

4.2 Type HSV 23-R6/...

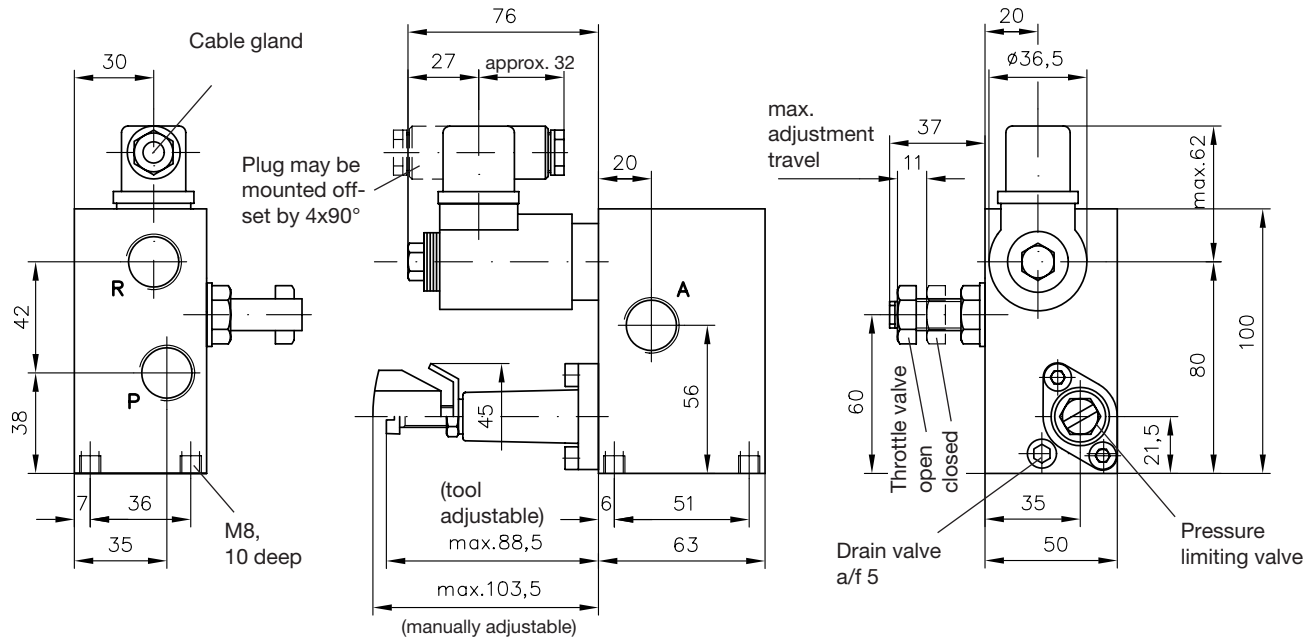


Ports conforming ISO 228/1 (BSPP):
A, P, and R = G 3/8

Important notes:

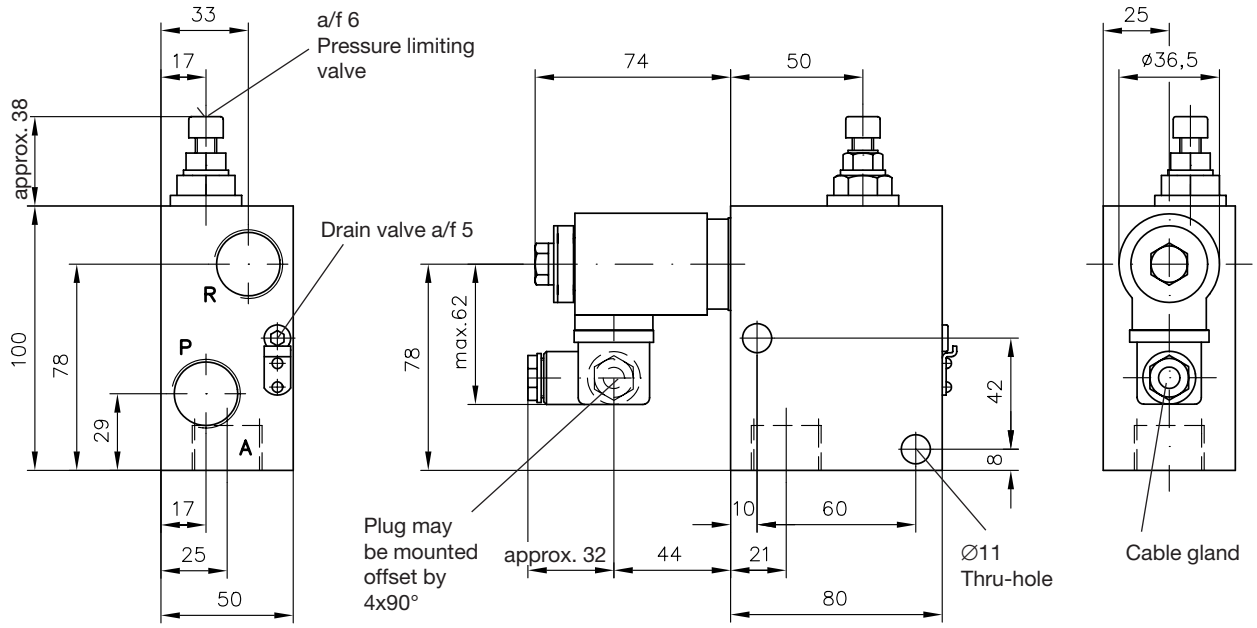
This valve may be mounted onto customer furnished manifold also. The ports will then be sealed to the out-side by O-rings 18x2.5 NBR 90 Sh (customer furnished).
Two socket head bolt ISO 4762-M8x65-10.9-A2K are required for mounting.

4.3 Type HSV 61-..



Ports A, P, and R conforming ISO 228/1 (BSPP) = G 1/2

4.4 Type HSV 71-...



Ports conforming ISO 228/1 (BSPP):
A, P, and R = G 3/4

5. Appendix, mounting onto compact hydraulic power packs

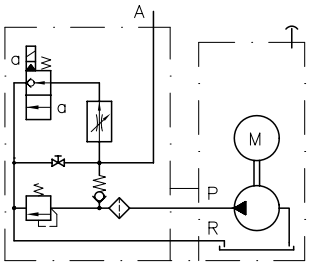
Order example: HC 24/0,64 - **HSV 23 - R6 - G 24**

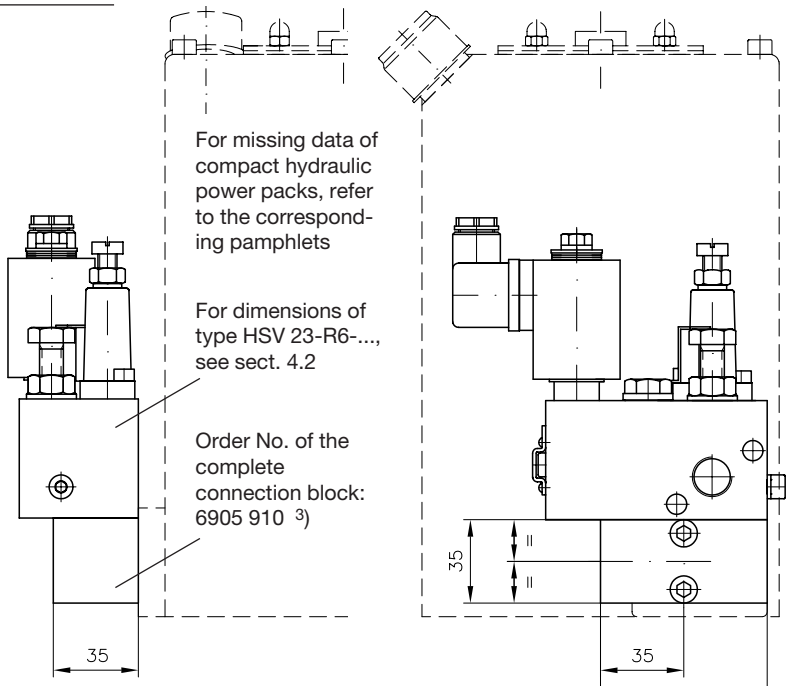
Compact hydraulic power pack
Suited types:

HC	acc. to	D 7900
MP	acc. to	D 7200 D 7200 H
MPN	acc. to	D 7207
HK	acc. to	D 7600-2 D 7600-3 D 7600-4
KA	acc. to	D 8010 D 8010-4

Directly mounted lifting/lowering valve acc. to sect. 2,
suited types: HSV 21.., HSV 23-R6

Example circuit corresponding to the order coding example above





3) Including O-rings and screw set