

Lifting/lowering valves type HSV

Product documentation



Operating pressure p_{\max} :

400 bar

Flow rate Q_{\max} :

160 lpm



D 7032

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1**Overview of the lifting/lowering valves type HSV**

Lifting/lowering valves are a combination of directional valves and flow valves.

The valve block type HSV provides the function of a 2/2-directional seated valve with electrical actuation for lowering the load. Adjustable throttle valves or flow control valves independent of the load control the lowering speed. An integral pressure-limiting valve restricts the maximum pressure.

The lifting/lowering valve type HSV is used to control lifting equipment with single-acting cylinders.

Features and benefits

- Optimum control of lifting and lowering function
- Compact design
- Zero leakage to prevent undesirable lowering of the load
- Integral overpressure protection
- High pressures up to 400 bar
- Optionally also with lowering function independent of load

Intended applications

- Cranes and lifting equipment
- Materials handling
- Road vehicle
- Mining machinery



Lifting/lowering valve type HSV

2 Available versions

Ordering example

HSV 21	R1	R	-150	-G 24
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2.1 "Basic type and size"

2.2 "Version and circuit symbol"

2.3 "Pressure adjustment"

Pressure setting (bar)

2.4 "Solenoid version"

2.1 Basic type and size

Type	Flow rate Q_{\max} (lpm)	Pressure p_{\max} (bar)	Connections	
			P	A, R, H
HSV 21	20	315	G 3/8	G 3/8
HSV 22	30	315	G 3/8	G 1/2
HSV 23	40	315	G 3/8	G 3/8
HSV 61	60	400	G 1/2	G 1/2
HSV 71	160	400	G 3/4	G 3/4

! DAMAGE

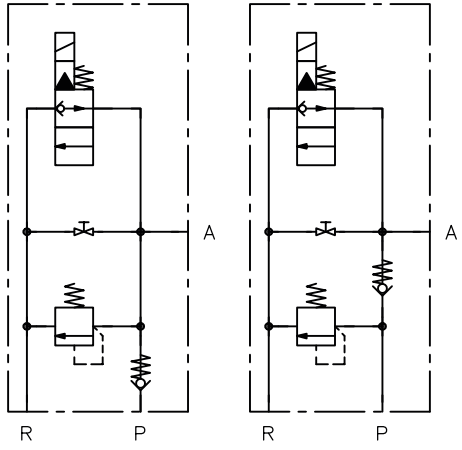
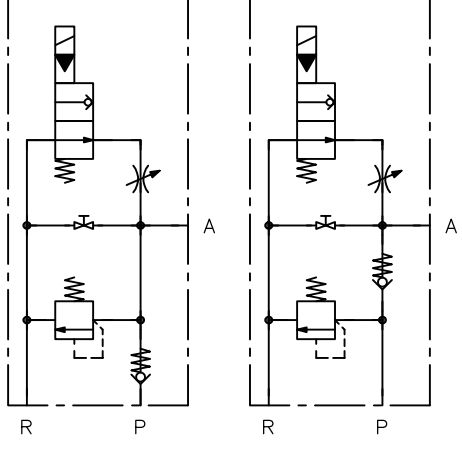
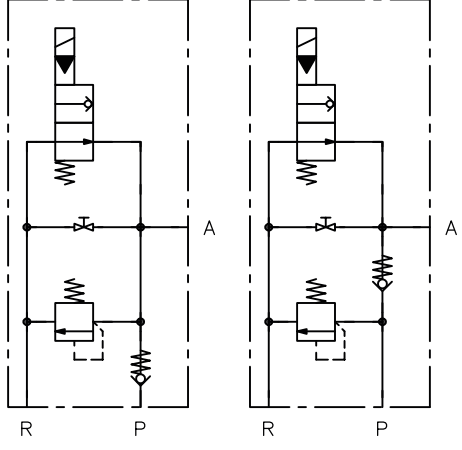
Valves of type HSV 21 are suitable for mounting on compact hydraulic power packs (see Chapter 6.1, "Mounting on compact hydraulic power packs").

Valves of type HSV 21, HSV 22 and HSV 23 can be mounted on a locally-made connection plate.

2.2 Version and circuit symbol

Coding	Description	Circuit symbol
HSV 21 R1 HSV 22 R1 HSV 21 R2 HSV 22 R2	Version with: <ul style="list-style-type: none"> - Throttle screw - Pressure-limiting valve type MVF 4 to D 7000 E/1 - 2-way directional seated valve type BVG 1 R, normally closed, to D 7765 - Check valve <ul style="list-style-type: none"> ▪ R1: Check valve on the pump side, pressure-limiting valve function and shock valve function ▪ R2: Check valve on the load side, pure pressure-limiting valve function 	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>R1</p> </div> <div style="text-align: center;"> <p>R2</p> </div> </div>
HSV 21 R3 HSV 22 R3 HSV 21 R4 HSV 22 R4	Version with: <ul style="list-style-type: none"> - Pressure-limiting valve type MVF 4 to D 7000 E/1 - 2-way directional seated valve type BVG 1 R, normally closed, to D 7765 - Check valve <ul style="list-style-type: none"> ▪ R3: Check valve on the pump side, pressure-limiting valve function and shock valve function ▪ R4: Check valve on the load side, pure pressure-limiting valve function 	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>R3</p> </div> <div style="text-align: center;"> <p>R4</p> </div> </div>
HSV 21 S1 HSV 22 S1 HSV 21 S2 HSV 22 S2	Version with: <ul style="list-style-type: none"> - Throttle screw - Pressure-limiting valve type MVF 4 to D 7000 E/1 - 2-way directional seated valve type BVG 1 S, normally open, to D 7765 - Check valve <ul style="list-style-type: none"> ▪ S1: Check valve on the pump side, pressure-limiting valve function and shock valve function ▪ S2: Check valve on the load side, pure pressure-limiting valve function 	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>S1</p> </div> <div style="text-align: center;"> <p>S2</p> </div> </div>

Coding	Description	Circuit symbol
HSV 21 S3 HSV 22 S3 HSV 21 S4 HSV 22 S4	Version with: <ul style="list-style-type: none"> - Pressure-limiting valve type MVF 4 to D 7000 E/1 - 2-way directional seated valve type BVG 1 S, normally open, to D 7765 - Check valve ▪ S3: Check valve on the pump side, pressure-limiting valve function and shock valve function ▪ S4: Check valve on the load side, pure pressure-limiting valve function 	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>S3</p> </div> <div style="text-align: center;"> <p>S4</p> </div> </div>
HSV 23 R6	Version with: <ul style="list-style-type: none"> - Pressure-limiting valve type MVF 54 to D 7000 E/1 - Check valve type RC 2 to D 6969 R - 2-way directional seated valve type EM 21 V, normally closed, to D 7490/1 - Flow control valve: A combination of throttle screw with pressure compensator as flow control valve - Drain screw ▪ R6: Check valve on the load side, pure pressure-limiting valve function 	<div style="text-align: center;"> <p>R6</p> </div>
HSV 61 R1 HSV 61 R2	Version with: <ul style="list-style-type: none"> - Throttle screw - Pressure-limiting valve type MVF 6 to D 7000 E/1 - Check valve type RB 3 to D 7445 - 2-way directional seated valve type EM 31 V, normally closed, to D 7490/1 - Drain screw ▪ R1: Check valve on the pump side, pressure-limiting valve function and shock valve function ▪ R2: Check valve on the load side, pure pressure-limiting valve function 	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>R1</p> </div> <div style="text-align: center;"> <p>R2</p> </div> </div>

Coding	Description	Circuit symbol
<p>HSV 61 R3 HSV 61 R4</p>	<p>Version with:</p> <ul style="list-style-type: none"> - Pressure-limiting valve type MVF 6 to D 7000 E/1 - Check valve type RB 3 to D 7445 - 2-way directional seated valve type EM 31 V, normally closed, to D 7490/1 - Drain screw <ul style="list-style-type: none"> ▪ R3: Check valve on the pump side, pressure-limiting valve function and shock valve function ▪ R4: Check valve on the load side, pure pressure-limiting valve function 	<p>R3 R4</p> 
<p>HSV 61 S1 HSV 61 S2</p>	<p>Version with:</p> <ul style="list-style-type: none"> - Throttle screw - Pressure-limiting valve type MVF 6 to D 7000 E/1 - Check valve type RB 3 to D 7445 - 2-way directional seated valve type EM 31 S, normally open, to D 7490/1 - Drain screw <ul style="list-style-type: none"> ▪ S1: Check valve on the pump side, pressure-limiting valve function and shock valve function ▪ S2: Check valve on the load side, pure pressure-limiting valve function 	<p>S1 S2</p> 
<p>HSV 61 S3 HSV 61 S4</p>	<p>Version with:</p> <ul style="list-style-type: none"> - Pressure-limiting valve type MVF 6 to D 7000 E/1 - Check valve type RB 3 to D 7445 - 2-way directional seated valve type EM 31 S, normally closed, to D 7490/1 - Drain screw <ul style="list-style-type: none"> ▪ S3: Check valve on the pump side, pressure-limiting valve function and shock valve function ▪ S4: Check valve on the load side, pure pressure-limiting valve function 	<p>S3 S4</p> 

Coding	Description	Circuit symbol
HSV 71 R4	<p>Version with:</p> <ul style="list-style-type: none"> – Pressure-limiting valve – Check valve type RB 4 to D 7445 – 2-way directional seated valve type EM 41 V, normally closed, to D 7490/1 – Drain screw <ul style="list-style-type: none"> ▪ R4: Check valve on the load side, pure pressure-limiting valve function 	<p>R4</p>
HSV 71 S4	<p>Version with:</p> <ul style="list-style-type: none"> – Pressure-limiting valve – Check valve type RB 4 to D 7445 – 2-way directional seated valve type EM 41 S, normally open, to D 7490/1 – Drain screw <ul style="list-style-type: none"> ▪ S4: Check valve on the load side, pure pressure-limiting valve function 	<p>S4</p>

2.3 Pressure adjustment

Coding	Description	Circuit symbol
Without coding	Fixed	
R	Adjustable	

2.4 Solenoid version

Coding	Electrical connection	Rated voltage	HSV 21 HSV 22	HSV 23 HSV 61	HSV 71
G 12, X 12	EN 175 301-803 A	12 V DC	●	●	●
G 24, X 24	<ul style="list-style-type: none"> ▪ G: with male connector (MSD 3-309 to D 7163) ▪ X: without male connector ▪ L: with male connector with LED (SVS 296365 to D 7163) ▪ L5K: with male connector with LED and 5 m cable (L5K-VZP to D 7163 Erg. 78/1) ▪ L10K: with male connector with LED and 10 m cable (L10K-VZP to D 7163 Erg. 78/1) 	24 V DC	●	●	●
G 48, X 48		48 V DC	●	●	●
G 98, X 98		98 V DC	●	●	●
G 205, X 205		205 V DC	●	●	●
L 12		12 V DC	●		
L 24	24 V DC	●			
L5K 24	24 V DC	●			
L10K 24	24 V DC	●			
WG 110	<ul style="list-style-type: none"> ▪ WG: with male connector with alternating rectifier (MSD4-209-P10 to D 7163) 	110 V DC	●		
WG 230		230 V DC	●		
AMP 12	AMP Junior Timer	12 V DC		●	●
AMP 24		24 V DC		●	●
AMP 48		48 V DC		●	●
DT 12	GERMAN (DT 04-2P)	12 V DC		●	●
DT 24		24 V DC		●	●
DTL 24	MIL-DTL-38999 series III	24 V DC		●	
ITT 24	MIL-VG 95234	24 V DC		●	
S 12	SCHLEMMER (bayonet PA 6)	12 V DC			●
S 24		24 V DC		●	●
K 12	KOSTAL (M27x1)	12 V DC			●
K 24		24 V DC		●	●
M 24	M12x1	24 V DC		●	●
F 24	Free cable ends 600 mm	24 V DC			●

Solenoid version for potentially explosive atmospheres

Only in combination with HSV 21 and HSV 22

Coding	Description
X 24 EX 55 FM	Explosion-proof solenoid in terminal box. For additional details, see the operating instructions B ATEX .

3 Parameters

3.1 General data

Designation	Lifting/lowering valve
Design	Valve combination consisting mainly of a directional seated valve in conical seat version, pressure-limiting valve in ball seat version, check valve in ball seat version or as small manifold check valve
Model	Valve combination for pipe connection and manifold mounting
Material	Valve block HSV 21, HSV 22, HSV 61, HSV 71: Galvanised steel Valve block HSV 23: Steel, nitrided surface
Attachment	Through holes (see Chapter 4, "Dimensions")
Installation position	any
Line connection	Pipe thread ISO 228-1 (see Chapter 4, "Dimensions")
Ports/connections	<ul style="list-style-type: none"> ▪ P = Pump ▪ A = Consumer ▪ R = Reflux
Flow direction	Lifting P → A Lowering A → R
Hydraulic fluid	Hydraulic fluid, according to DIN 51 524 Parts 1 to 3; ISO VG 10 to 68 according to DIN ISO 3448 Viscosity range: 4 - 1500 mm ² /s Optimal operating range: approx. 10 - 500 mm ² /s Also suitable for biologically degradable hydraulic fluids type HEPG (polyalkylene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C.
Cleanliness level	ISO 4406 <u>20/17/14</u>
Temperatures	Environment: approx. -40 to +80 °C, hydraulic fluid: -25 to +80 °C, pay attention to the viscosity range. Start temperature: down to -40 °C is permissible (take account of the start viscosities!), as long as the steady-state temperature is at least 20 K higher during subsequent operation. Biologically degradable hydraulic fluids: note manufacturer specifications. With consideration for the seal compatibility, not above +70°C.

3.2 Pressure and volumetric flow

Operating pressure	p_{max} , see Chapter 2.1, "Basic type and size"
Flow rate	Q_{max} , see Chapter 2.1, "Basic type and size"

3.3 Weight

Type

HSV 21, HSV 22, HSV 23	= 2.2 kg
HSV 61	= 2.5 kg
HSV 71	= 3.1 kg

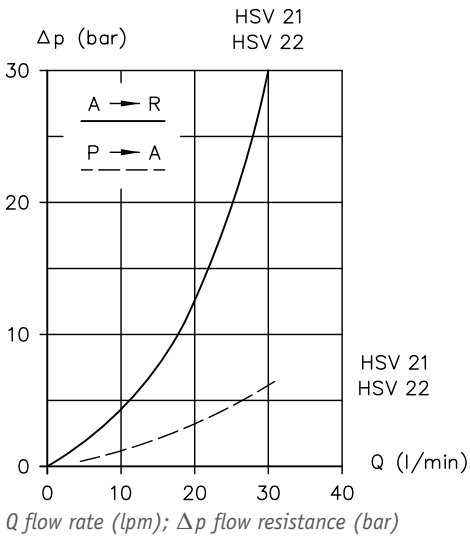
3.4 Characteristic lines

Δp -Q characteristic lines

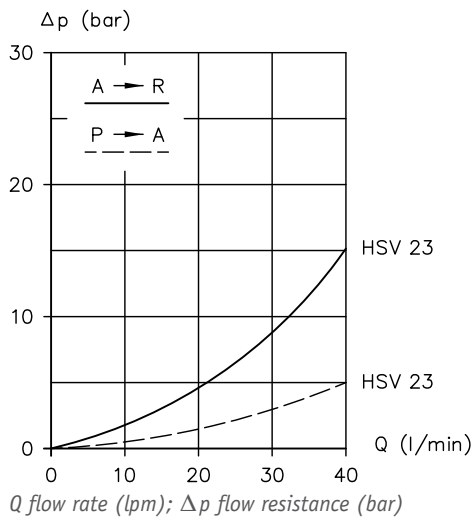
Viscosity of the hydraulic fluid approx. 60 mm²/s

Lifting/lowering valves

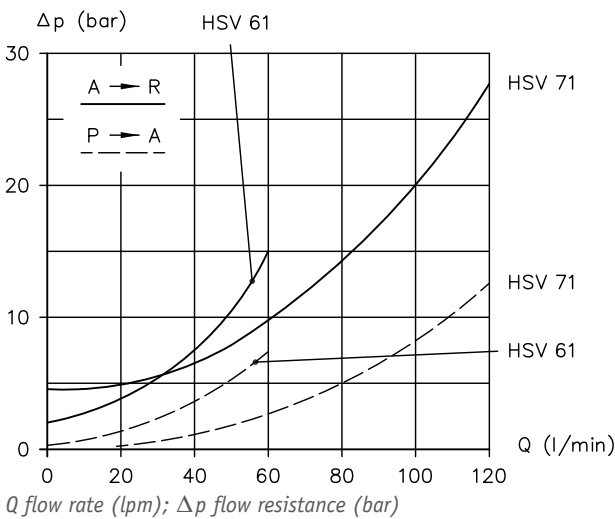
HSV 21, HSV 22



HSV 23

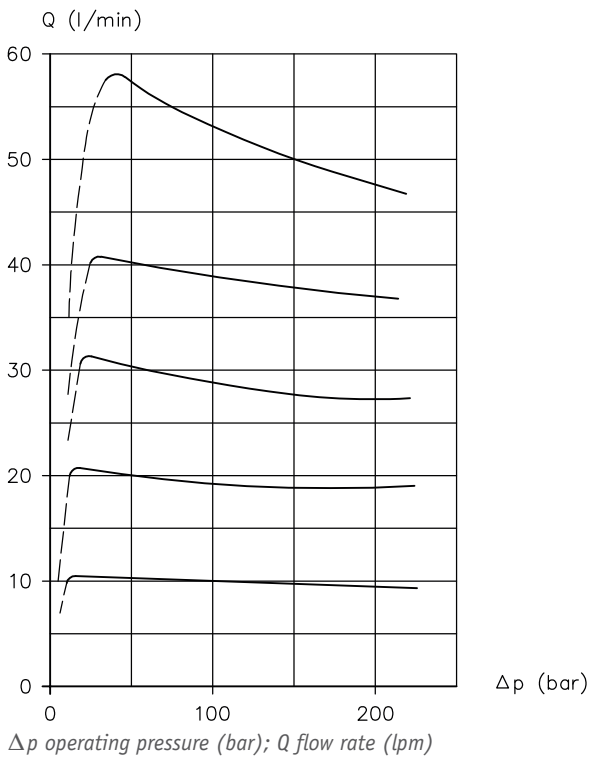


HSV 61, HSV 71



2-way flow control valve

HSV 23 R6



3.5 Electrical data

Electrical actuation with standard solenoid

Type	HSV 21		HSV 22		HSV 23		HSV 61		HSV 71		
Nominal voltage U_N	24 V DC	(WG 230) 205 V DC	24 V DC	(WG 230) 205 V DC	24 V DC	(WG 230) 205 V DC	24 V DC	(WG 230) 205 V DC	24 V DC	(WG 230) 205 V DC	
Current, cold I_{20}	--	--	--	--	0.89 A	0.1 A	0.89 A	0.1 A	1.33 A	0.15 A	
Limit current I_G	--	--	--	--	0.62 A	--	0.62 A	--	0.93 A	--	
Nominal power P_N	26.4 W	26.6 W	26.4 W	26.6 W	21 W	21 W	21 W	21 W	30 W	30 W	
Switching time (reference values)	ON	100 ms	200 ms	100 ms	200 ms	50 ms	100 ms	50 ms	100 ms	50 ms	100 ms
	OFF	80 ms	160 ms	80 ms	160 ms	150 ms	300 ms	150 ms	300 ms	150 ms	300 ms
Switching operations	max. approx. 2000/h (understood as approximately evenly distributed)										
For further data see solenoid valve publication...	D 7765					D 7490/1					

Electrical actuation with explosion-proof solenoid

DAMAGE

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

Refer to the applicable operating instructions for operating thresholds, classifications, electrical parameters and electrical connections.

Coding

Operating instructions with declaration of conformity

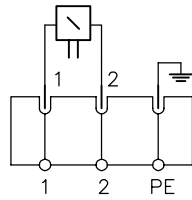
X 24 EX 55 FM

- [B ATEX](#)
- [B 40/2017 \(EX22\)](#)

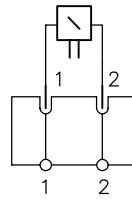
Circuit diagrams

DC voltage

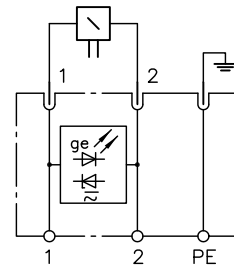
G .., X ..



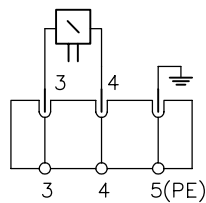
DT .., K .., S .., AMP .., F ..



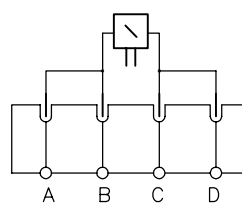
L ..



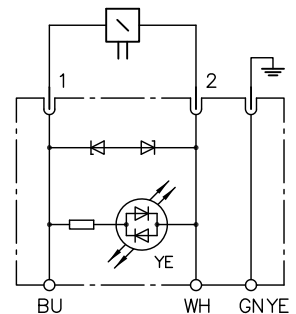
M ..



ITT .., DTL ..

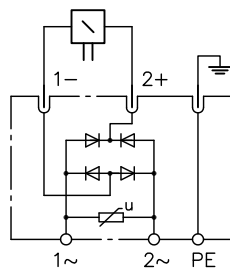


L5K .., L10K ..



AC voltage

WG 110, WG 230

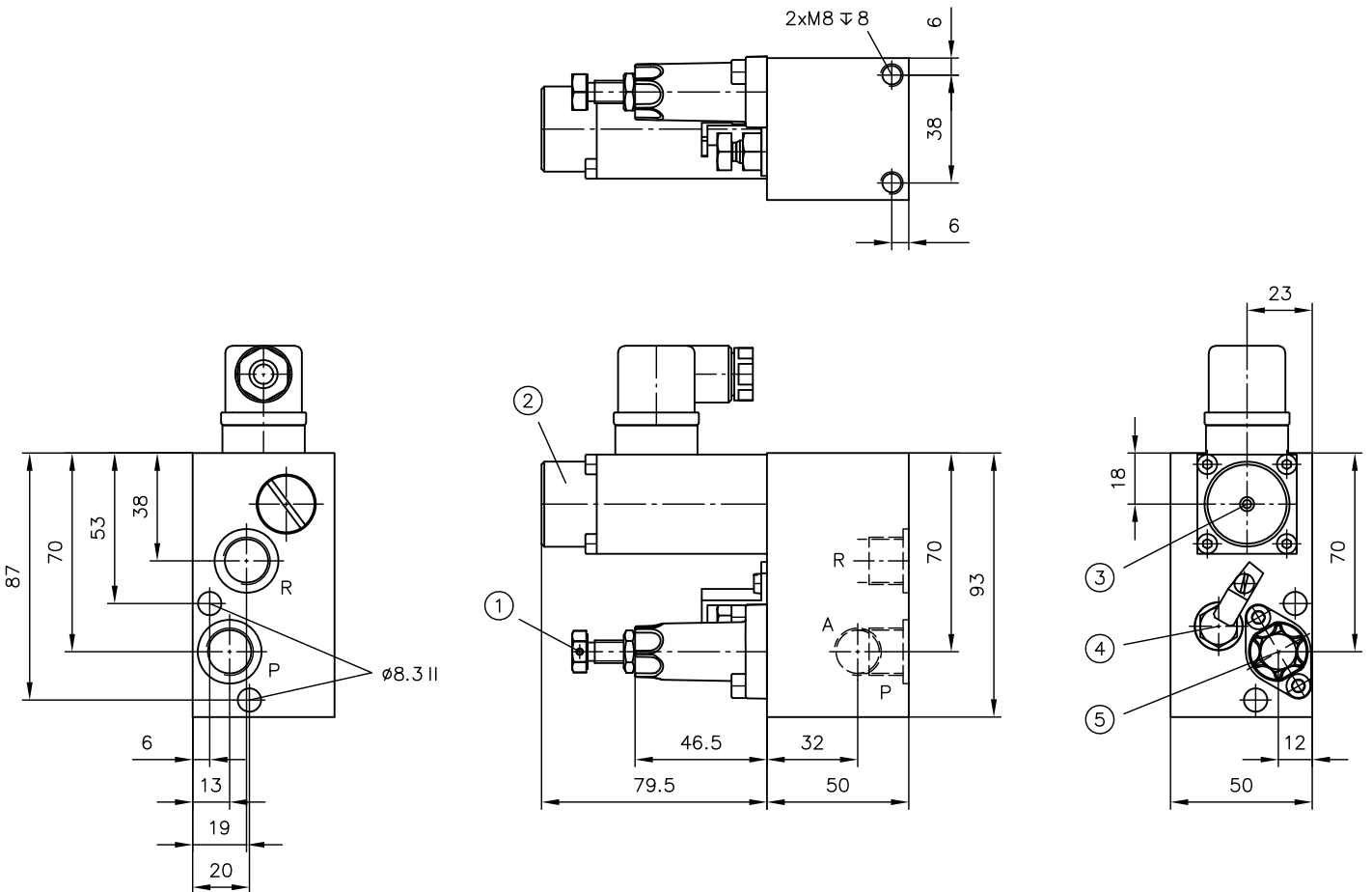


4 Dimensions

All dimensions in mm, subject to change.

4.1 Type HSV 21 and HSV 22

HSV 21, HSV 22



- 1 Sealing option
- 2 Solenoid version
- 3 Manual override
- 4 Version with or without throttle
- 5 Pressure-limiting valve

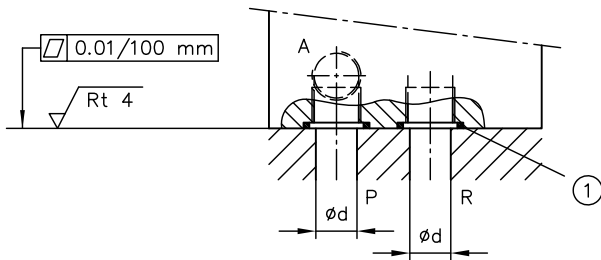
Type	Ports (ISO 228-1)		
	P	A	R
HSV 21	G 3/8	G 3/8	G 3/8
HSV 22	G 3/8	G 1/2	G 1/2

Connection plate

DAMAGE

The valve can be mounted on a locally-made connection plate. Sealing at the connections is then provided by O-rings. Two hexagon socket screws ISO 4762-M8x65-8.8-A2H are required for attachment.

Caution: The connection plate is not supplied by HAWE.



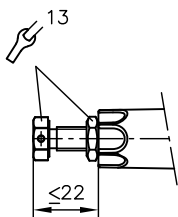
Type	$\varnothing d$		O-ring NBR 90 Sh	
	P	R	P	R
HSV 21	14	14	18x2.5	18x2.5
HSV 22	14	19	18x2.5	22x2.5

1 O-ring

Pressure adjustment

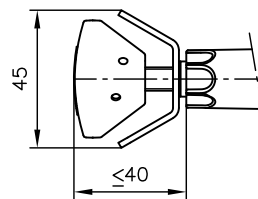
Adjustment device without coding

Fixed



Adjustment device coding R

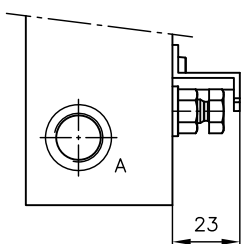
Adjustable



Throttle

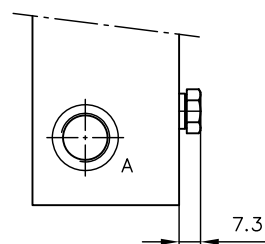
With throttle screw

- HSV 21/22 R1
- HSV 21/22 R2
- HSV 21/22 S1
- HSV 21/22 S2



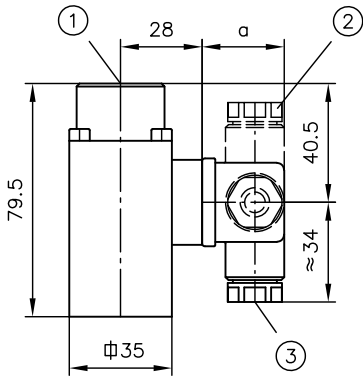
Without throttle screw

- HSV 21/22 R3
- HSV 21/22 R4
- HSV 21/22 S3
- HSV 21/22 S4



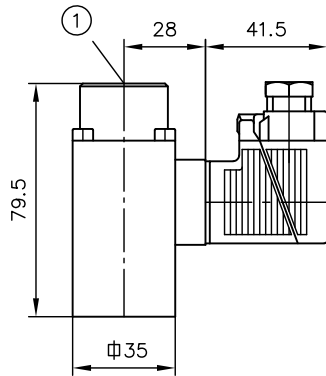
Solenoid versions

Coding **X, G, WG**



- 1 Manual override
- 2 Plug can be mounted offset 4x 90°
- 3 Cable fitting

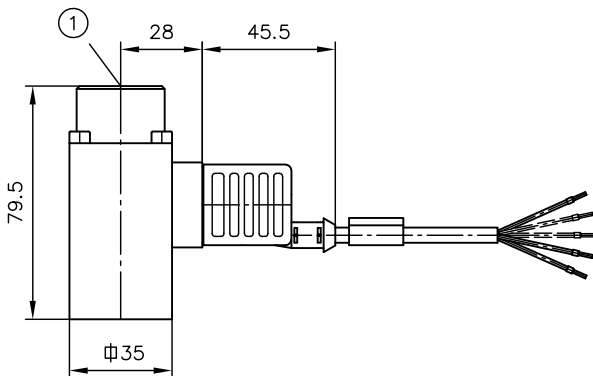
Coding **L**



- 1 Manual override

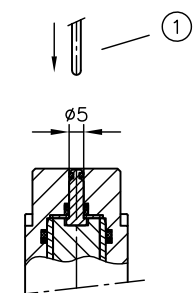
Version	a
G	28
WG	34,5

Coding **L5K 24, L10K 24**



- 1 Manual override

Manual override



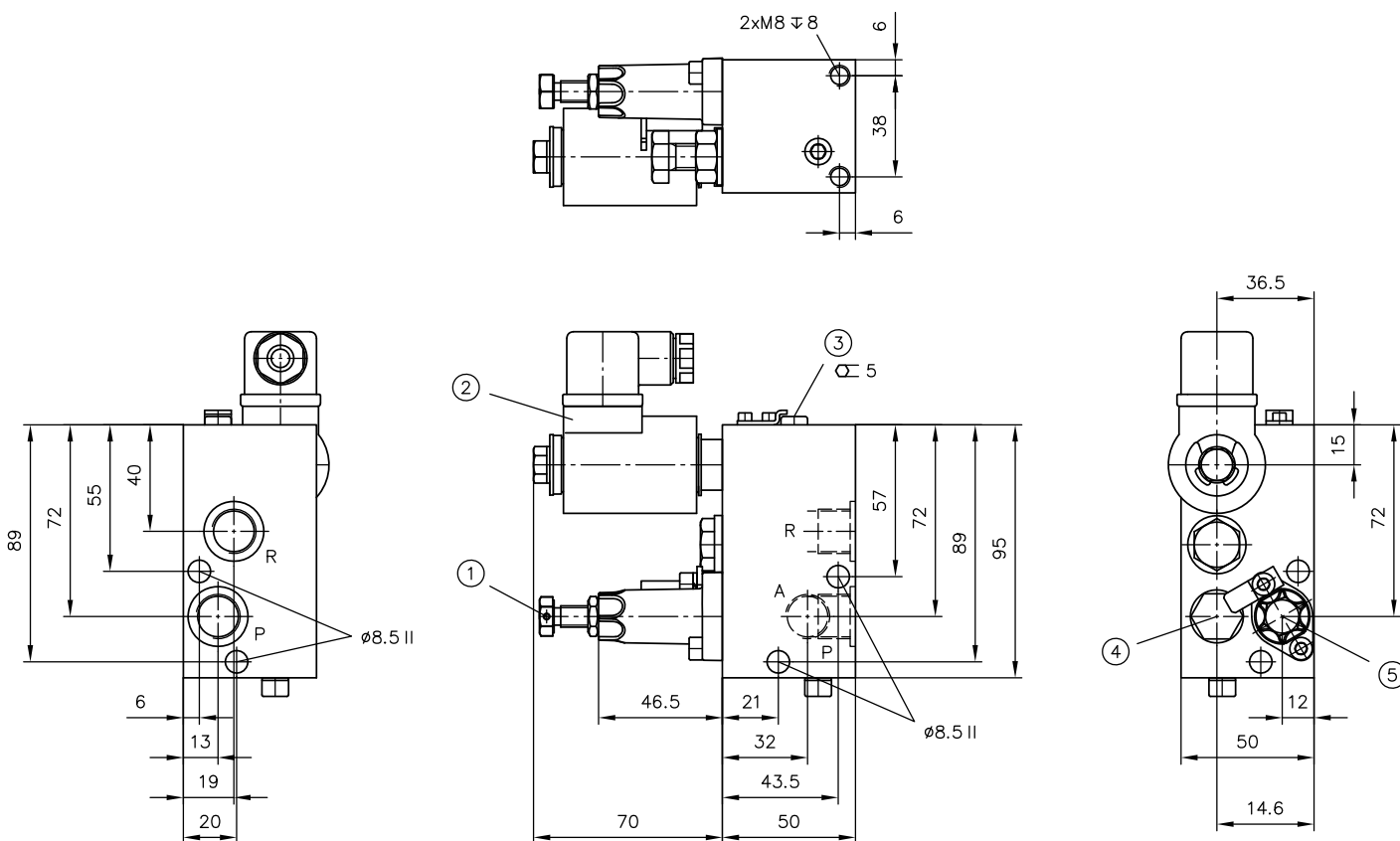
To actuate the valve:

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

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

4.2 Type HSV 23 R6

HSV 23 R6



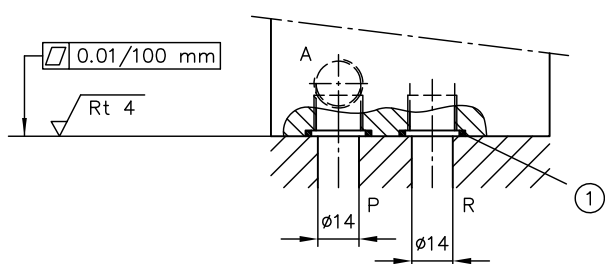
- 1 Sealing option
- 2 Solenoid version
- 3 Drain valve
- 4 Adjustable measuring throttle for the counterbalance valve (0) ... 40 lpm
- 5 Pressure-limiting valve

Ports (ISO 228-1)

P, A, R G 3/8

Connection plate

! DAMAGE
The valve can be mounted on a locally-made connection plate. Sealing at the connections is then provided by O-rings. Two hexagon socket screws ISO 4762-M8x65-8.8-A2H are required for attachment.
Caution: The connection plate is not supplied by HAWE.

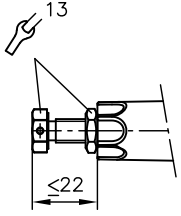


- 1 O-ring 18x2.5 NBR 90 Sh

Pressure adjustment

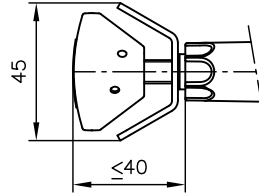
Adjustment device
without coding

Fixed



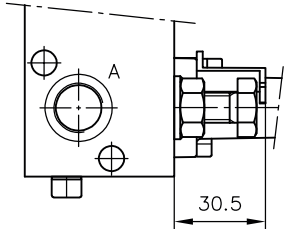
Adjustment device
coding R

Adjustable



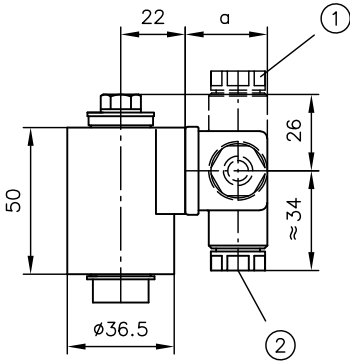
Throttle

With throttle screw
HSV 23 R6

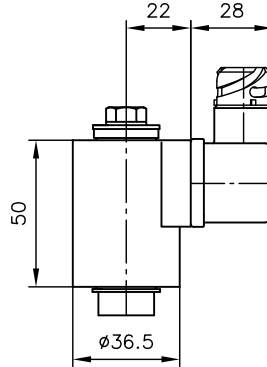


Solenoid versions

Coding X, G



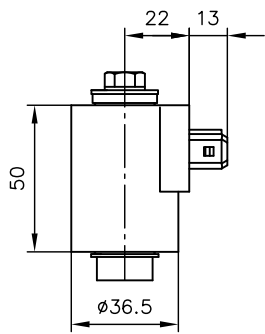
Coding S



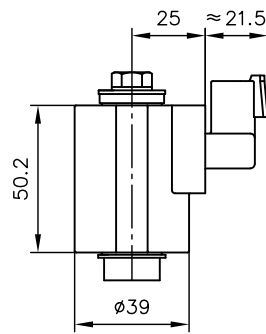
- 1 Plug can be mounted offset 4x 90°
- 2 Cable fitting

Version	a
G	28
WG	34,5

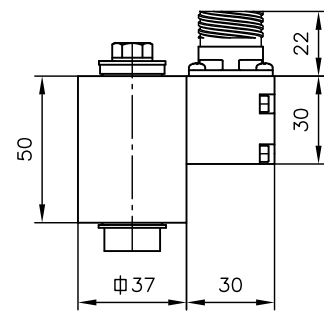
Coding **AMP**



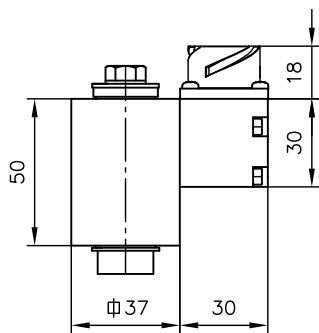
Coding **DT**



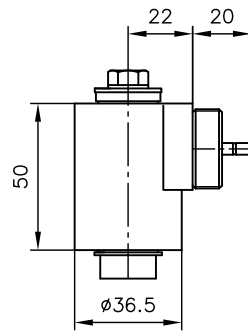
Coding **DTL**



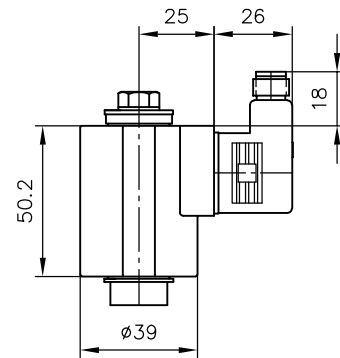
Coding **ITT**



Coding **K**

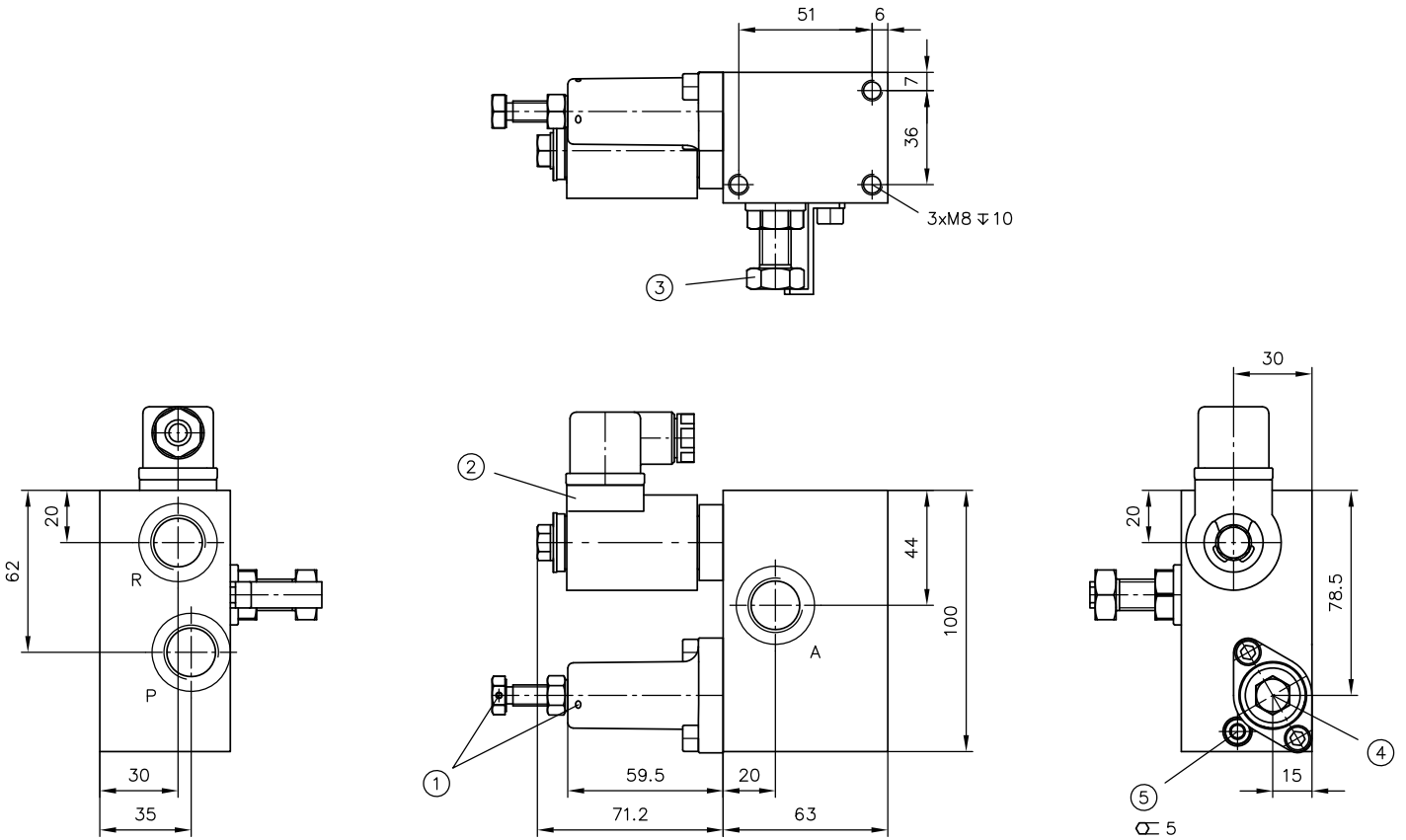


Coding **M**



4.3 Type HSV 61

HSV 61



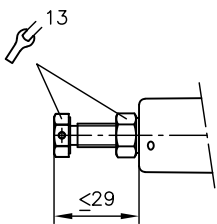
- 1 Sealing option
- 2 Solenoid version
- 3 Version with or without throttle
- 4 Pressure-limiting valve
- 5 Drain valve

Ports (ISO 228-1)

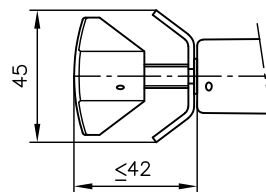
P, A, R G 1/2

Pressure adjustment

Adjustment device
without coding

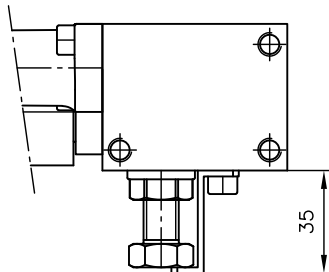


Adjustment device
coding R

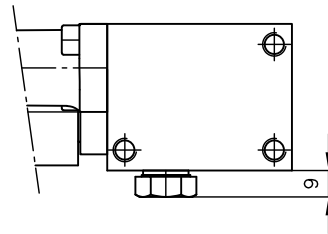


Throttle

With throttle screw
HSV 61 R1
HSV 61 R2
HSV 61 S1
HSV 61 S2

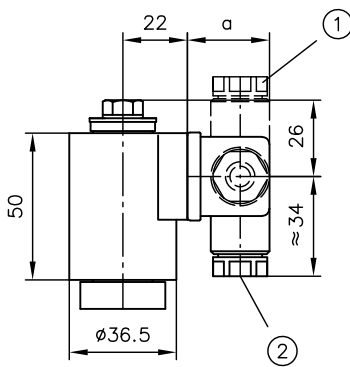


Without throttle screw
HSV 61 R3
HSV 61 R4
HSV 61 S3
HSV 61 S4



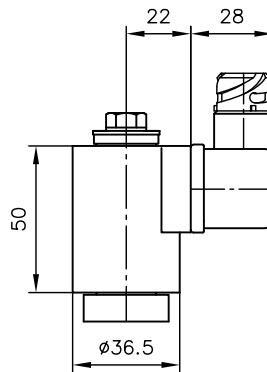
Solenoid versions

Coding **X, G**



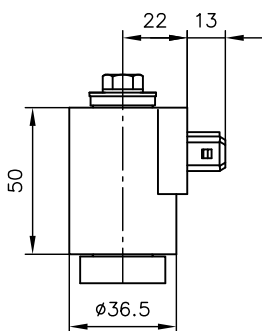
- 1 Plug can be mounted offset 4x 90°
- 2 Cable fitting

Coding **S**

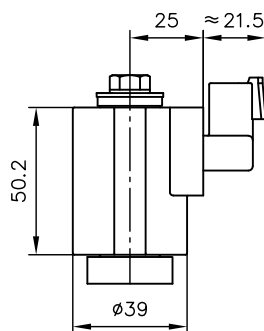


Version	a
G	28
WG	34,5

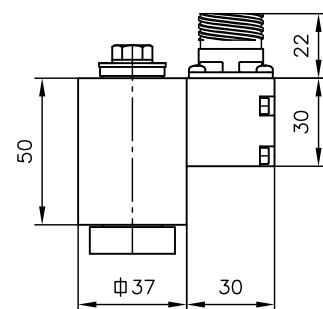
Coding **AMP**



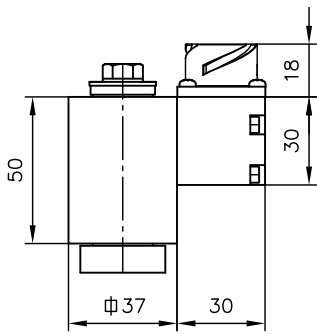
Coding **DT**



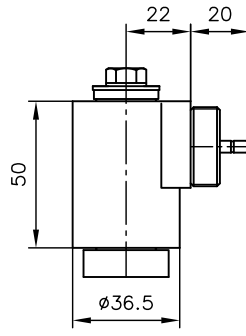
Coding **DTL**



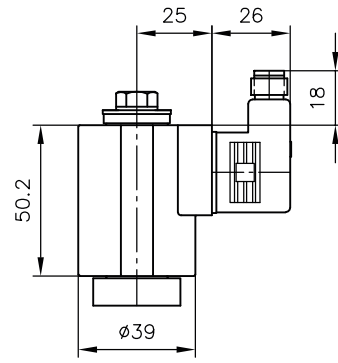
Coding ITT



Coding K

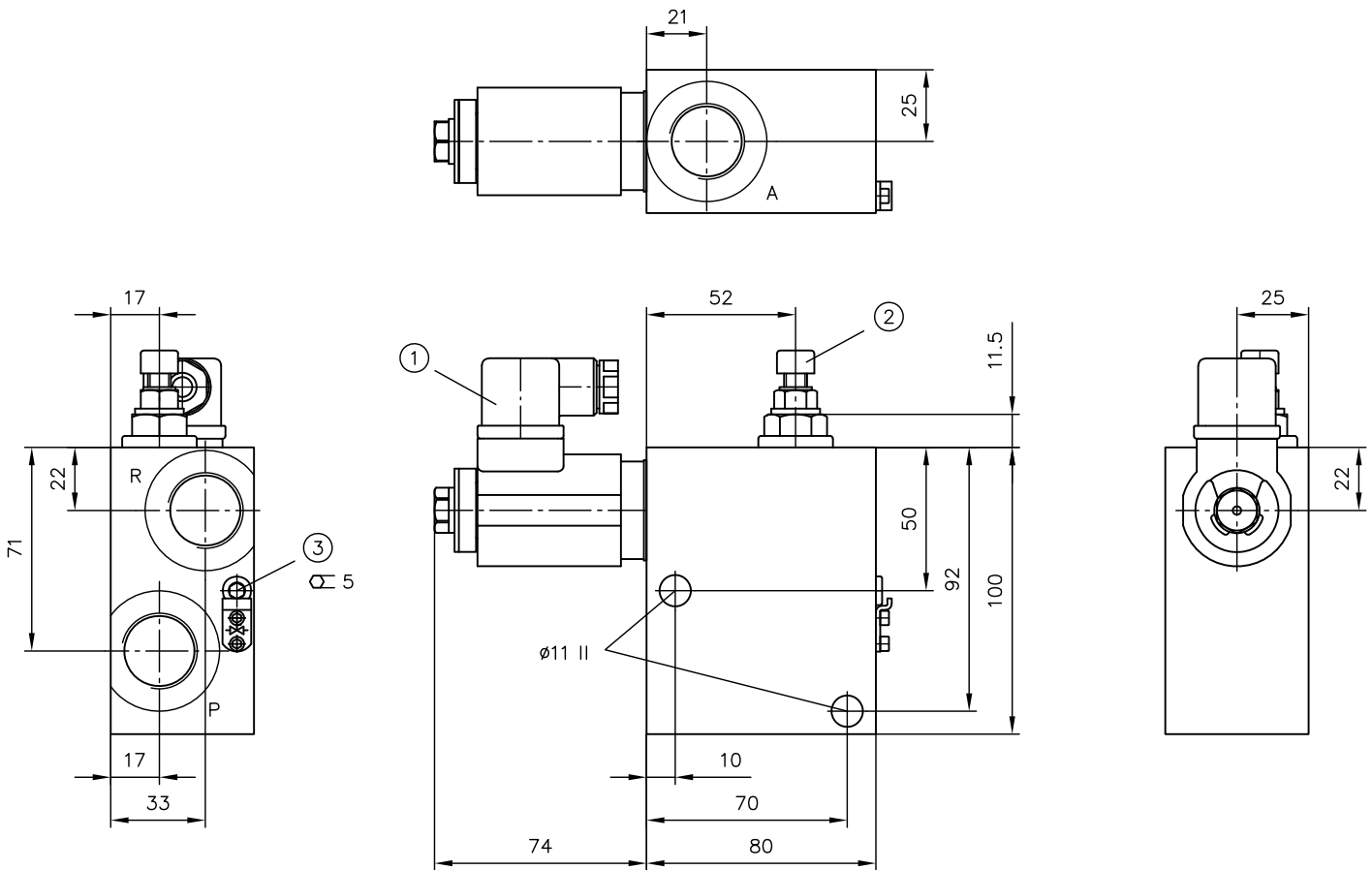


Coding M



4.4 Type HSV 71

HSV 71



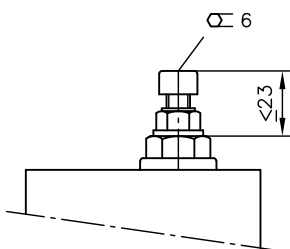
- 1 Solenoid version
- 2 Pressure-limiting valve
- 3 Drain valve

Ports (ISO 228-1)

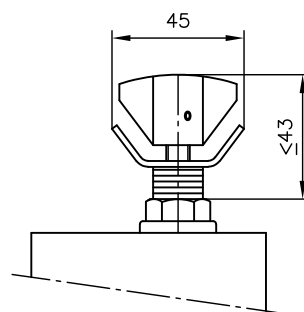
P, A, R	G 3/4
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Pressure adjustment

Adjustment device
without coding

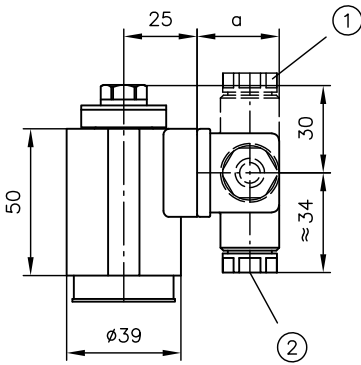


Adjustment device
coding R



Solenoid versions

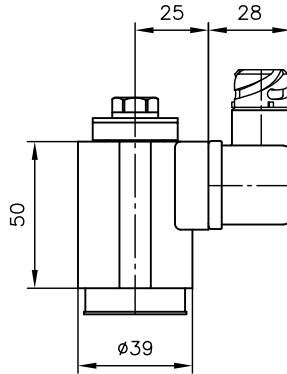
Coding X, G



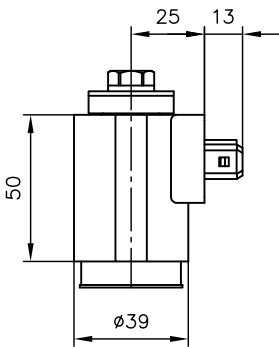
- 1 Plug can be mounted offset 4x 90°
- 2 Cable fitting

Version	a
G	28
WG	34,5

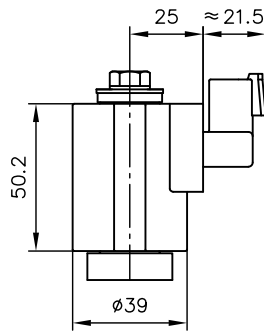
Coding S



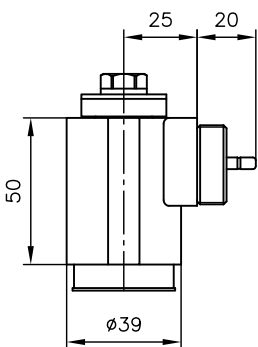
Coding AMP



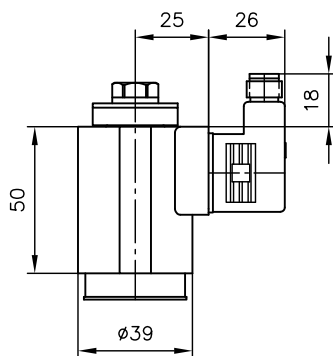
Coding DT



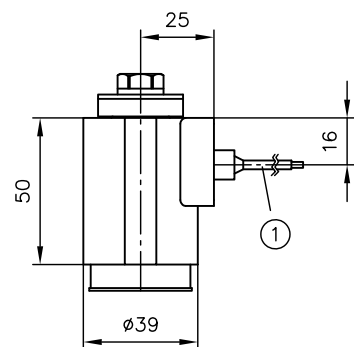
Coding K



Coding M



Coding F



- 1 Approx. 600 mm

5 Installation, operation and maintenance information

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

5.1 Intended use

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

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

Essential requirements for the product to function correctly and safely:

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

If the product can no longer be operated safely:

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

5.2 Assembly information

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

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

DANGER

Sudden movement of the hydraulic drives when disassembled incorrectly

Risk of serious injury or death

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

5.3 Operating instructions

Observe product configuration and pressure/flow rate.

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

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

DAMAGE

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

CAUTION

Overloading components due to incorrect pressure settings.

Risk of minor injury.

- 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 product. Contamination can cause irreparable damage.

Examples of fine contamination include:

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

! DAMAGE

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

Damage to the product is possible.

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

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

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

5.4 Maintenance information

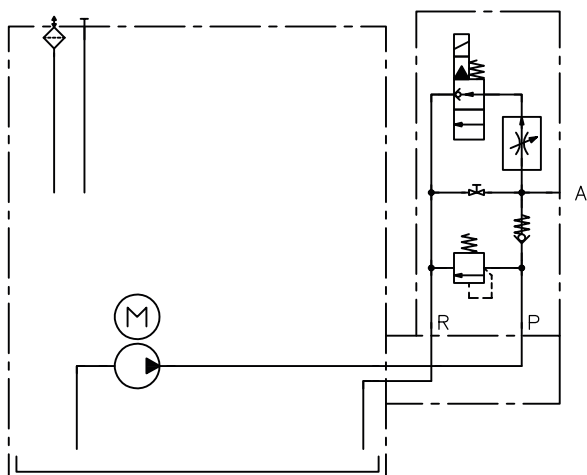
Check regularly (at least once a year) by visual inspection whether the hydraulic connections are damaged. If external leakages are found, shut down and repair the system.

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

6 Other information

6.1 Mounting on compact hydraulic power packs

Circuit symbol



Ordering example

INKA 1 V00 -H0,64

HSV 23 R6-G24

Mounted lifting/lowering valve

Available types to [Chapter 2, "Available versions"](#):

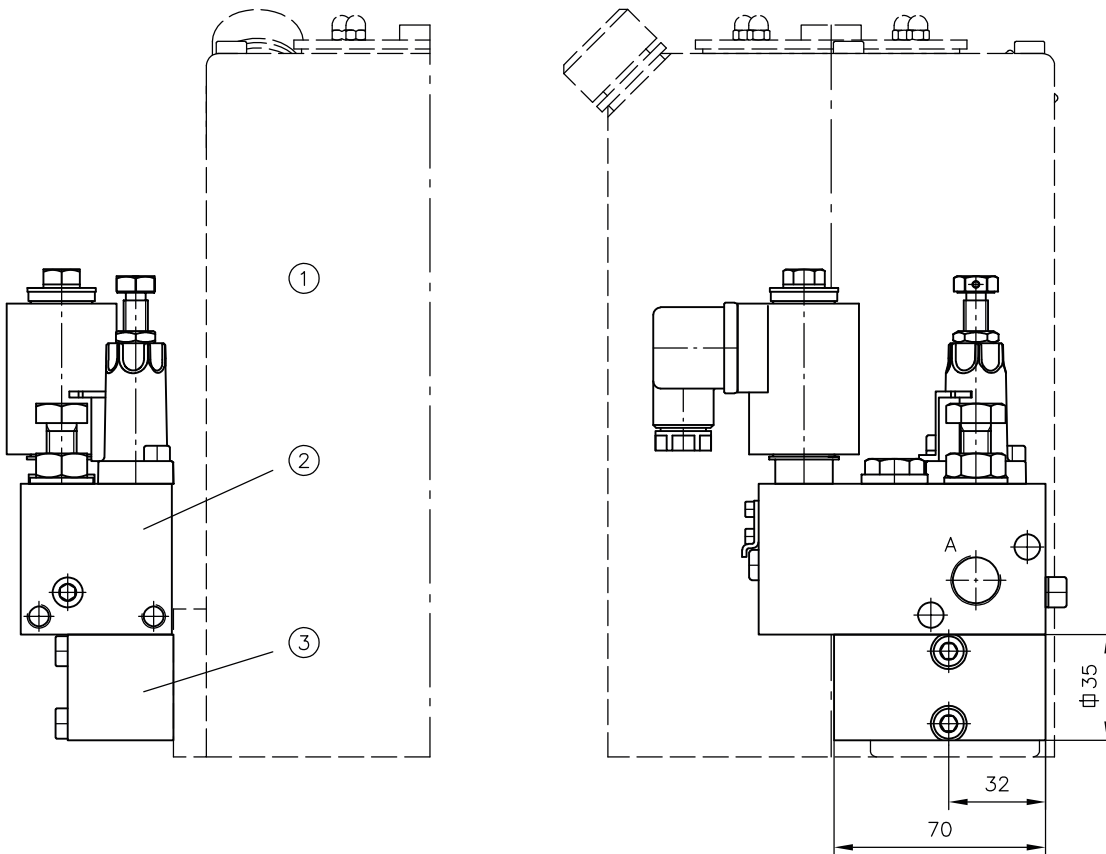
- HSV 21...
- HSV 23 R6

Compact hydraulic power pack

Available types:

- HC to D 7900
- INKA to D 8132-1
- MPN to D 7207
- HK to D 7600-3, D 7600-4
- KA to D 8010, D 8010-4

Dimensions



- 1 see the relevant publications for the missing dimensions of the compact hydraulic power pack
- 2 Dimensions of HSV 23-R6-.. see [Chapter 4.2](#)
- 3 Order number for the connection block (complete): 6905 911

References

Application

- Compact hydraulic power pack type MPN and MPNW: D 7207
- Compact hydraulic power pack type HK 3: D 7600-3
- Compact hydraulic power pack type HK 4: D 7600-4
- Compact hydraulic power pack type INKA 1: D 8132-1
- Compact hydraulic power pack type KA and KAW size 2: D 8010
- Compact hydraulic power pack type HC and HCW: D 7900

