

Miniature pressure valves type MVG, MVE and MVP Pressure limiting and sequence valves

Operation pressure p_{max} = 700 bar
Flow Q_{max} = 8 lpm

1. General information

Pressure valves are mainly used for influencing the pressure in hydraulic systems and for safeguarding them (DIN ISO 1219-1). They are not suited for safeguarding pressure devices acc. to Pressure Equipment Directive 97/23/EC. There are also versions available featuring unit approvals, see D 7000 TÜV, D 7710 TÜV, D 6905 TÜV.

- **Pressure limiting valves** protect from non permissible pressure peaks (safety valve) or limit the max. achievable operation pressure.
- **Sequence valves** reduce the upstream apparent pressure by a fixed value.

2. Available versions, main data

Order example:

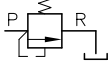
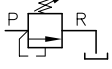
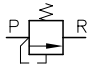
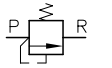
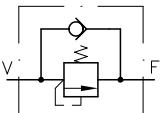
MVE 14 MR - 120

Desired pressure setting (bar); without specification, see sect. 5.2

Table 2: Adjustability during operation

No coding	Standard, tool adjustable
R	Manually adjustable; Not available for type MVGC
F	Push button; Not available for type MVGC

Table 1: Basic type

Basic type and size	Pressure range (bar)	Flow (lpm)	Connection manner	Brief description, symbols
MVG 13 H	20 ... 700	5	Corner valve for pipe connection: Ports P and R = G 1/4 ISO 228/1 (BSPP)	Pressure limiting valve  Tool adjustable
MVG 13 M	20 ... 450	5		
MVG 14 H	10 ... 400	8		
MVG 14 M	0 ... 200	8		
MVG 14 N	0 ... 50	5	Manifold mounting valve: Dimensional drawing, see section 4	Valve for only one flow direction (work direction)  Manually adjustable or Sequence valve ¹⁾  Tool adjustable
MVP 13 H	20 ... 700	5		
MVP 13 M	20 ... 450	5		
MVP 14 H	10 ... 400	8		
MVP 14 M	0 ... 200	8		
MVP 14 N	0 ... 50	8		
MVE 13 H	20 ... 700	5	Cartridge valve: Mounting hole, see dimensional drawing in section 4	Sequence valve ¹⁾  Tool adjustable
MVE 13 M	20 ... 450	5		
MVE 14 H	10 ... 400	8		
MVE 14 M	0 ... 200	8		
MVE 14 N	0 ... 50	8		
MVGC 13 H	20 ... 700	5	Corner valve for pipe connection: Ports F and V = G 1/4 ISO 228/1 (BSPP)	Valve for both flow direction (Work direction and free return) Sequence valve ¹⁾  Only tool adjustable version
MVGC 14 H	10 ... 400	8		
MVGC 14 M	0 ... 200	8		
MVGC 14 N	0 ... 50	8		

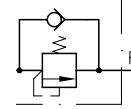
¹⁾ The max. permissible pressure at R is 400 bar, when utilized as sequence valve !

Manually adjustable versions of type MVG.., MVP.. and MVE.. shouldn't be selected, when adjustability during operation is required above 100 bar. These valve should be set only while the system is depressurized !

Type MVG..



Type MVGC..



Type MVP..



Type MVE..



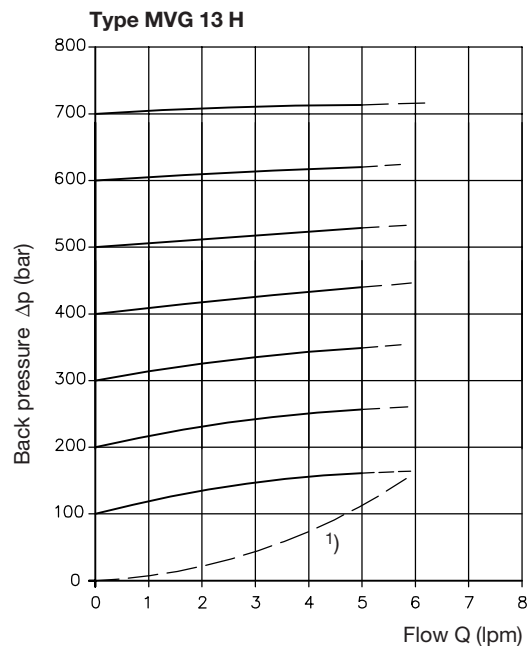
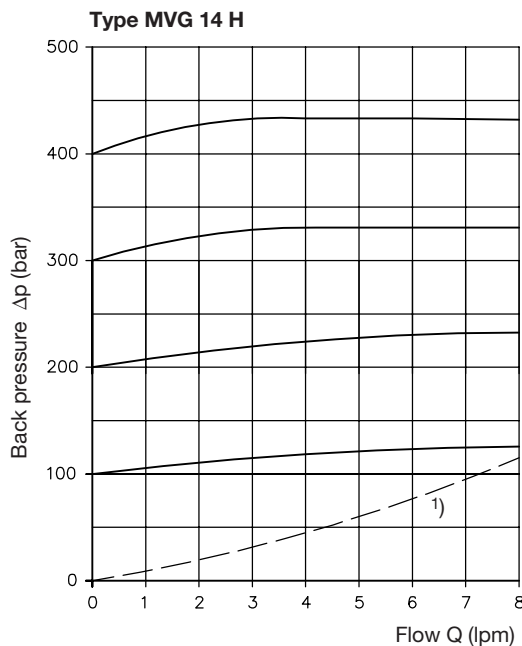
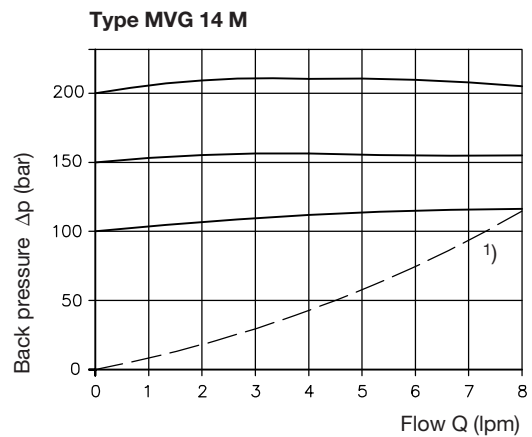
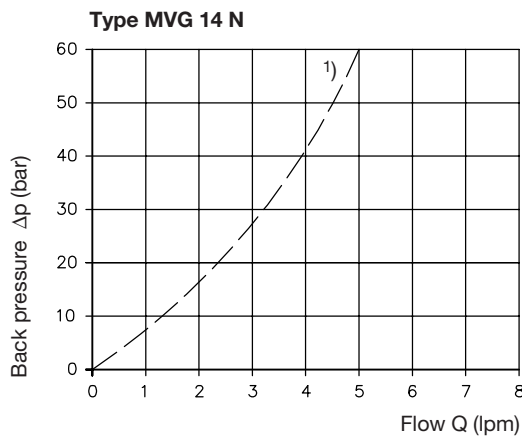
3. Further parameters

Installed position: Any
 Surface coating: Zinc galvanized
 Hydraulic fluid: Fluids acc. to DIN 51524 table 1 to 3; ISO VG 10 to 68 acc. to DIN 51519
 Viscosity range: min. approx. 4; max. approx. 1500 mm²/s
 Optimal operation range: approx. 10...500 mm²/s
 Also suitable are biologically degradable pressure fluids of the type HEPG (Polyalkylenglycol) and HEES (synth. Ester) at operation temperatures up to approx. +70°C.

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

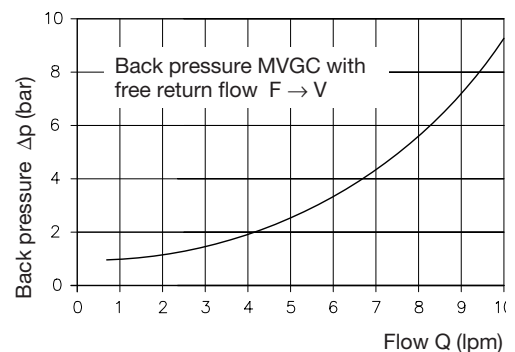
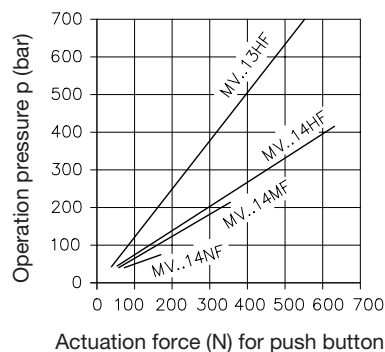
Mass (weight)	Type	MVG..	MVP..	MVE..	MVGC..
approx. kg		0.3	0.3	0.1	0.3

Curves



Viscosity of the fluid during tests approx. 60 mm²/s

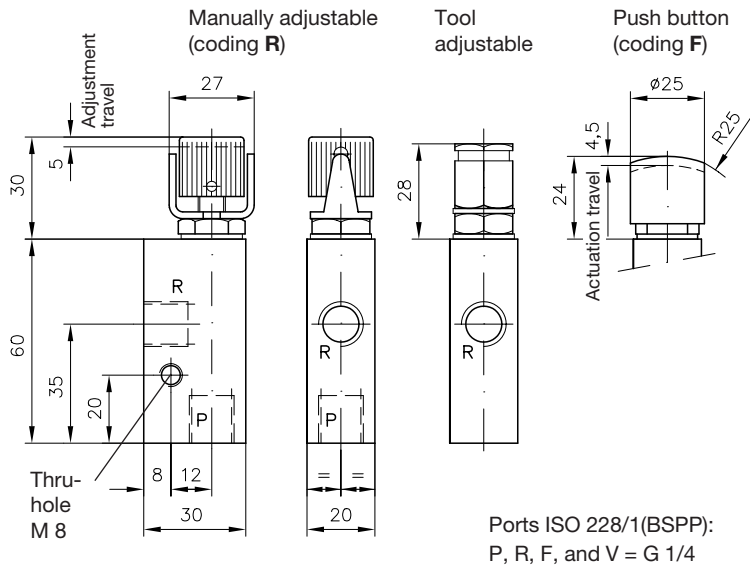
1) Characteristic back pressure of the housing with spring completely decompressed. Any pressure setting below this curve can't be achieved.



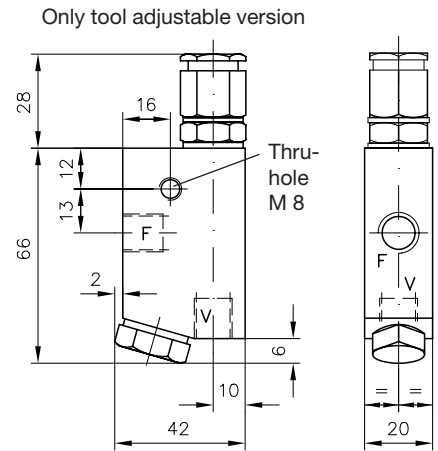
4. Unit dimensions

All dimensions in mm, subject to change without notice !

Type MVG

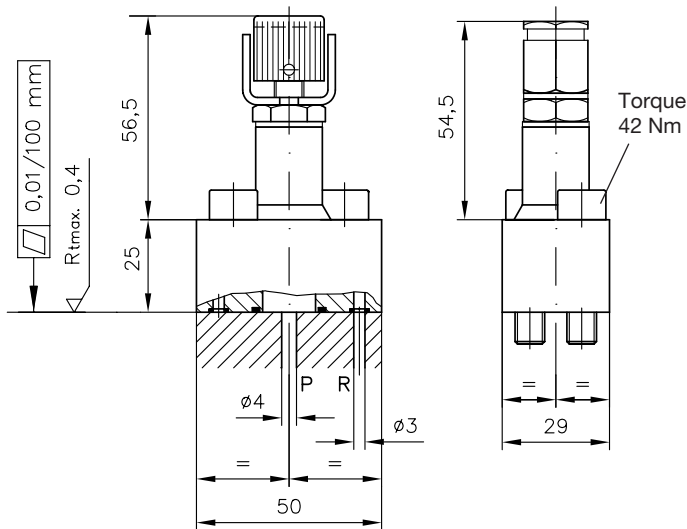


Type MVGC



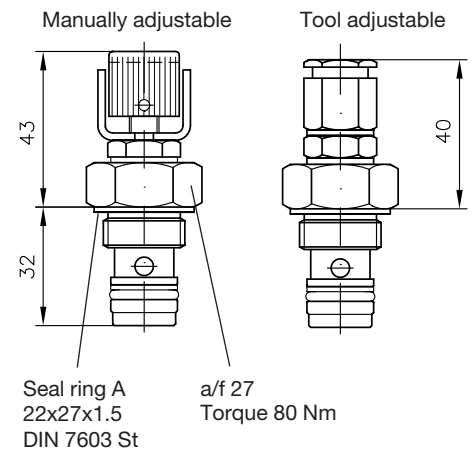
Type MVP

For missing data (also coding F) see above !

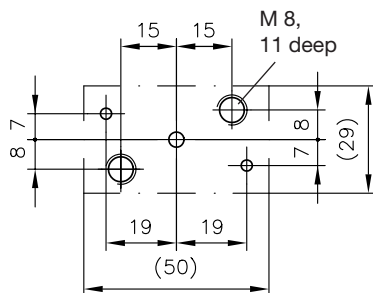


Type MVE

For missing data (also coding F) see above !



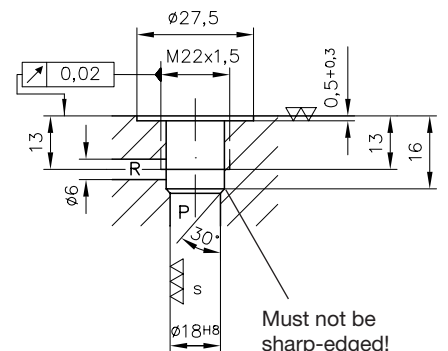
Hole pattern of the manifold (top view)



Sealing of the ports ISO 228/1 (BSPP):

- P = O-ring 17.12x2.62
- R = O-ring 4.47x1.78

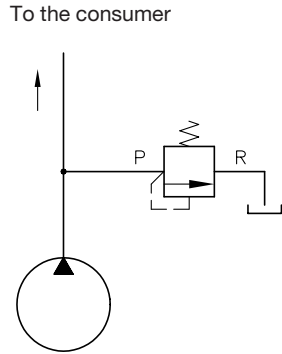
Mounting hole



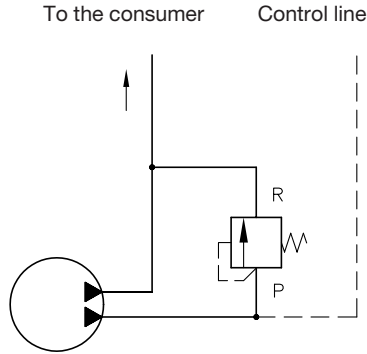
5. Appendix

5.1 Typical application examples

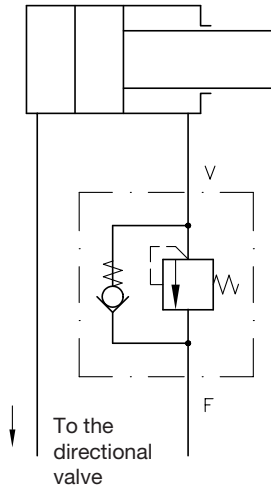
Type MVG..., MVP..., and MVE.. for safe guarding a hydraulic system against excess pressure



Type MVG..., MVP..., and MVE.. for maintaining a certain minimum pressure level e.g. at a control line



Type MVGC generates a certain counter pressure for a consumer

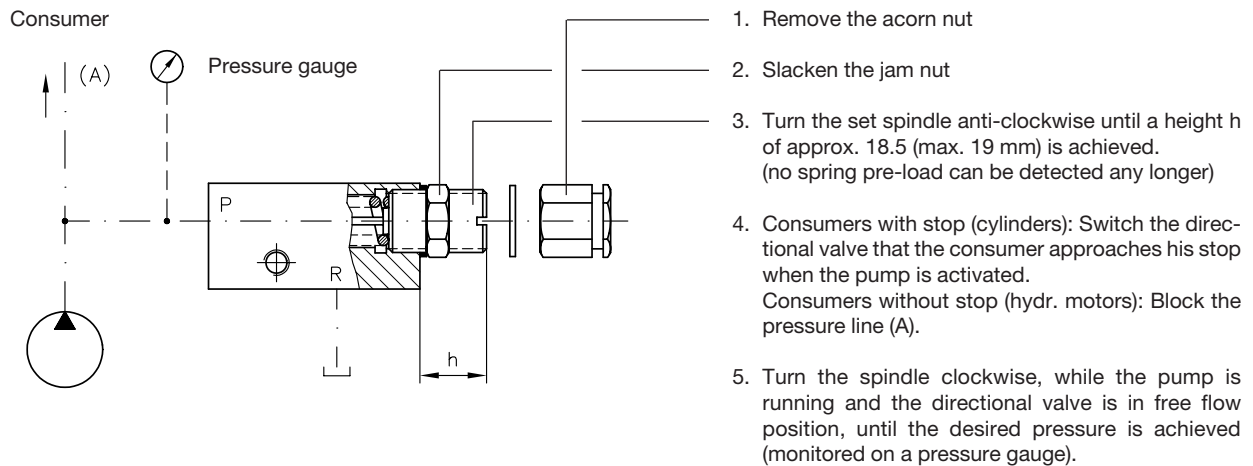


5.2 Valve adjustment

The tool adjustable valves are available with the following settings off the shelf:

MV... 13 H	400 bar
MV... 14 H	400 bar
MV... 14 M	200 bar
MV... 14 N	30 bar

These valves will be delivered with above setting, when no pressure setting is specified with the order. Therefore it might occasionally be necessary to set the valve on site. Any pressure adjustment should be monitored by a pressure gauge and while the pump is running! The listed pressure alternations per revolution of the set spindle are only a rough guideline.



Type	Pressure variation per turn ¹⁾
MV... 13 H	≈ 370 bar
MV... 14 H	≈ 200 bar
MV... 14 M	≈ 90 bar
MV... 14 N	≈ 20 bar

¹⁾ Pump delivery
 $Q_e \approx 2.5 \text{ lpm}$

Piloted pressure valves type DV, DVE, DF

and pilot valves type PV and PG

Pressure p_{max} = 420 bar
Flow Q_{max} = 120 lpm

1. General

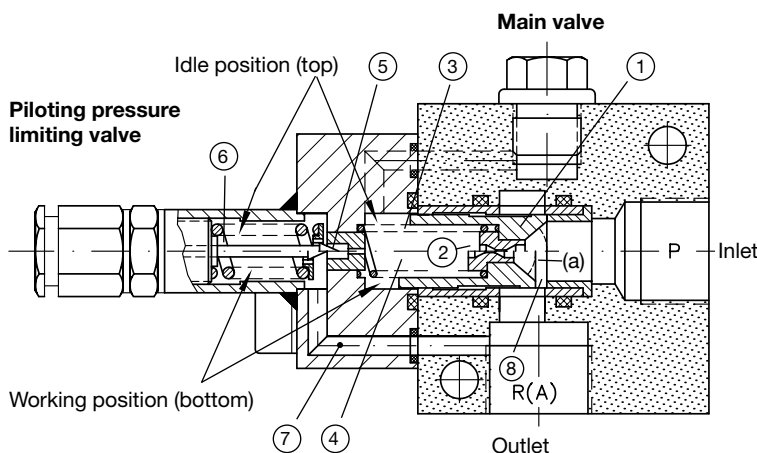
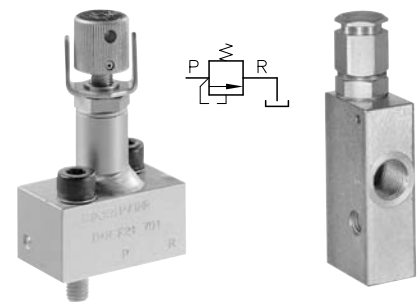
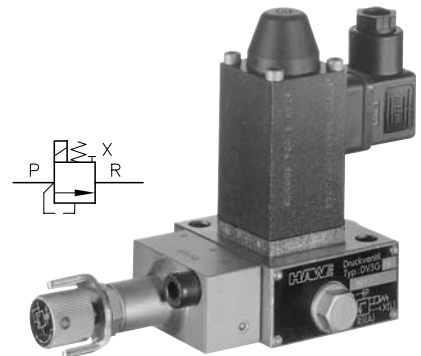
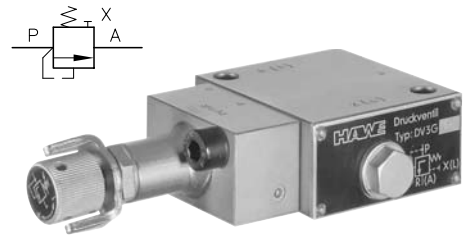
The main purpose of pressure valves is to rule the pressure in hydraulic systems (acc. to DIN ISO 1219-1).

- **Pressure limiting valves** serve to protect hydraulic systems from unpermissible peak pressures (safety valves) or to limit the max. permissible working pressure. They close the inlet to the outlet and only give way if the set pressure is achieved. This pressure setting is maintained rather constant, independent from the flow, due to the generous internal diameters.
- **Pressure sequence valves** maintain a constant pressure difference, rather independent from the flow quantity, between inlet and outlet.
- **Feed valves** block the flow until the set pressure is achieved and then when this figure is exceeded they do open and allow the flow to pass with very little back pressure.

Pressure valves type DV, DVE or DF are hydraulically piloted. They consist of a main and a pilot valve. The main valve has a spool ① sliding rather frictionless in a bushing and is pressure compensated via the throttle ②. It is forced in closed idle position via a spring ③ blocking inlet P to the outlet R(A).

The spring cavity (control cavity) ④ is blocked to the outlet duct ⑦ by means of valve cone ⑤ at the piloting valve. The spring ⑥ rules the response pressure of the valve. As soon as this pressure is reached oil starts to flow: Inlet P → throttle ② → valve cone ⑤ → outlet ⑦ (control oil flow). The pressure within the control cavity ④ is higher due to the back pressure generated at throttle ② which adds to the inlet pressure. This hydraulic force pushes the piston in direction of the spring until the spring force and the back pressure occurring ahead of the throttle are balanced again. The oil flow leaving port R(A) is depressurized to the set value by the throttling section ⑧ whose cross section area is ruled by the foresaid forces. This flow is only slightly reduced by the required control oil. The back pressure of the two pressure ranges (up to 100 and up to 420 bar) available is only 2 or 5 bar, due to the low pre-load of the spring.

Valve type DV may be a pressure limiting, a pressure sequence or a feed valve only depending on whether the control oil flow is fed to R(A) or to X(L) (see above and schematic drawing at sect. 2.3). The valve can be arbitrarily operated, e.g. idle pump circulation, various pressure steps, etc. when additional valves are connected to the control cavity, see also sect. 5.1).



- ① Valve piston and bushing (mated)
- ② Throttle
- ③ Valve spring
- ④ Control cavity
- ⑤ Valve cone (piloting valve)
- ⑥ Adjustment spring (piloting valve)
- ⑦ Drain duct (piloting valve)
- ⑧ Throttle section for pump delivery P → R(A)

- (a) Screen filter, protecting the throttle section from coarse contaminations that may occur

2. Types available, main data

2.1 Piloted pressure valves (For pilot valves see sect. 2.2)

Coding example: **DV 3 GHR .. - WN 1F - G 24 - 250**

Table 1: Basic type

Coding	Valve type
DV	Pressure valve with internal leakage oil drain
DVE	Pressure valve with external leakage oil drain
DF	Remote-control valve (remote-control press. compensator)

Table 2: Size

Coding	3	4	5
Flow Q_{max} (l/min)	40	80	120

Table 3: Connection mode

Coding	Connection	Size		
		3	4	5
G	Pipe connection	G 1/2 DIN ISO 228/1	G 3/4 (BSPP)	G 1 (BSPP)
P	Manifold mounting	---	For ports, see dimens. draw.	

Table 4: Pressure range (guideline figures) the lower figure depends on the flow (see sect. 3)

Coding	N	H	Piloting valve PG 1N(H) (acc. to sect. 2.2) determines the pressure range, when selecting „N“ or „H“ for valves type DF.
Setting ¹⁾ from ... to ... (bar)	2 ... 100	5 ... 350 5 ... 420 ²⁾	
Opening pressure in no-load operat. (bar) pump idle circulation	2	5	

2.2 Servo valves (pilot valves)

Layout (schematic)	Coding				Remarques
	Pipe connection	Manifold mounting	Pressure range (bar)	Pressure setting ¹⁾	
	PG 1 N	PV 1 N	2 ... 100	Tool adjustable, adjust. after loosening the lock nut	Type PG 1 ... serves for remote control of valves type DF acc. to 2.1 via port X (see sect. 2.3, illustrations 4a to 4c) and for additional pressure control of valves type DV (see sect. 3) Type PV 1 is mounted directly onto valve type DV(E) acc. to sect. 2.1, see also sect. 2.3, illustrations 1a to 3b
	PG 1 H	PV 1 H	5 ... 420		
	PG 1 NR PG 1 NF	PV 1 NR PV 1 NF	2 ... 100	Adjustable via turn knob or spherical push button (see table 5)	
	PG 1 HR PG 1 HF	PV 1 HR PV 1 HF	5 ... 420		
	When DV valves are changed over to DVE valves, a plug disk (V 5585 035) must be inserted (refer to sect. 2.3. illustrations 3a and 3b)				If type DVE is utilized as feed valve, orifice disc B 5585 034 will reduce the required control oil flow by approx. 40 % (see sect. 3).
	A 4350 007 Only necessary for converting versions DV or DVE to version DF, see also table 7 and ²⁾ from port X of version DF . .				

¹⁾ Customer-made pressure settings or pressure adjustments must be monitored with a pressure gauge!
²⁾ See table 7 as well; if valve type DF.. acc. to table 1 is intended for this pressure range, pls. state: DF..-420

Pressure spec. in bar, refer also to table 4

Table 7: Optional directly mounted 2/2-way solenoid valve acc. to D 7470 A/1 for solenoid actuated, arbitrary idle pump circulation. no valve = coding superfluous

Coding	Idle pump circulation,	Pressure range up to ... (bar) (see table 4)	Tension nominale					
			G 12	G 24	G 98	G 205	WG 110	WG 230
WN 1F	valve de-energized	350	12V	24V	98V	205V	110V	230V
WN 1D	valve ener-gized		DC	AC 50 and 60 Hz				
WH 1F	valve de-energized	420	For other further voltages and plug versions see D 7470 A/1					
WH 1D	valve energized							

Table 6: Orifice disc

No coding	Standard version	If the leakage oil level causes difficulty when a DVE valve is employed as a sequence valve (refer to sect. 3), this can be reduced to approx. 60 % by the orifice plate.
B	With orifice disc (only DVE)	

Table 5: Adjustability during operation

No coding	Standard, tool adjustable
R	Manually adjustable
F	Pin head Spherical push button

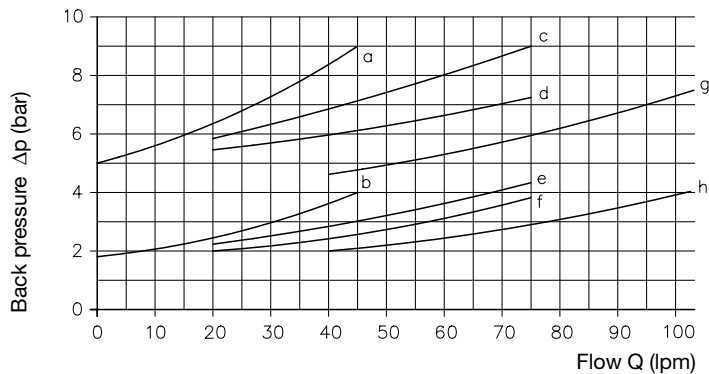
2.3 The various types of pilot-controlled pressure valves (see also circuit diagrams in appendix sect. 5.1)

Layout (schematic) Main valve and servo valve form a structural unit	Fig.	Function	Symbol	Control oil drain and notes
<p>Coding example: DV 4 PHR - 280</p>	1a	Pressure limiting valve		Control oil drain: internal Avoid back pressure at R, otherwise external control oil drain ill. 3a
	1b	Sequence pressure valve		Control oil drain: internal Valve ist installed in line to consumer
<p>Coding example: DV 5 GNR - WN1F - G 24 - 90</p>	2	Pressure limiting valve with 2/2-way valve for solenoid actuated, arbitrary idle pump circulation		Control oil drain: internal Avoid back pressure at R, if necessary do not connect to main return line but fit separate return line to tank
<p>Coding example: DVE 4 PHRB - 250</p>	3a	Pressure limiting valve		Control oil drain: external Back pressure at R does not affect value of pressure setting
	3b	Follow up valve (sequence valve)		Control oil drain: external Use orifice plate only if drain flow rate to high (sect. 3). Use adjust knob to set higher actuat. force!
<p>Coding example: DF 5 GN</p> <p>The function of the remote-controlled piston valve is determined by the type and connection of the servo valve (pressure- or direct. control valve)</p>	4a	Pressure limiting valve		Control oil drain: external The servo valve is a pressure valve to sect. 2.2. If the back pressure is high or variable run servo valve return line directly the oil reservoir.
	4b	Differential pressure valve		Control oil drain: external The servo valve is a pressure valve to sect. 2.2.
	4c	Follow up valve (sequence valve)		Control oil drain: external The servo valve is a pressure valve acc. to sect. 2.2.
	4d	2/2-way valve (drain or straight way valve)		Control oil drain: external The pilot valve is a 2/2-way-valve type WN(H)1D acc. D 7470 A/1

3. Additional parameters

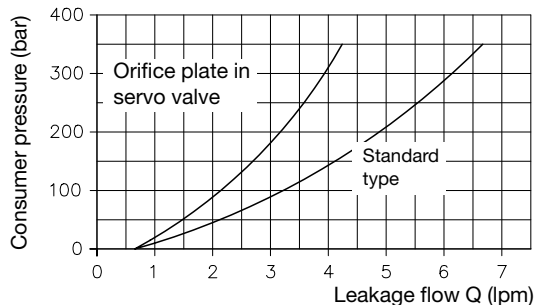
Nomenclature	Piloted pressure valve, symbol see section 2.3	Servo valve, symbol see section 2.3						
Design	Spool valve	Seated valve						
Type of mounting	2 thru-holes in housing	Tapped hole in housing						
Connection size conforming DIN ISO 228/1 (BSPP)	Pipe thread G 1/2, G 3/4, G 1 (BSPP) or manifold mounting	Pipe thread G 1/4 (BSPP) (PG 1..) manifold mounting (PV 1..)						
Mass (weight)	Size and design							
	...3G	...4G	...5G	...4P	...5P	PG 1..	PV 1..	
	1.1 kg	1.5 kg	2.0 kg	2.0 kg	2.5 kg	0.3 kg	0.3 kg	
	add. 0.6 kg for solenoid valve							
Installed position	Any							
Direction of flow	P → R (A)							
Operating pressure	P, R(A) and X(L) = 420 bar							
Pressure fluid	Hydraulic oil conforming DIN 51 524 part 1 to 3; ISO VG 10 to 68 conforming DIN 51 519 Viscosity limits: min. approx. 4; max. approx. 1500 mm ² /s opt. operation: approx. 10...500 mm ² /s Also suitable for biological degradable pressure fluids types HEPG (Polyalkylenglycol) and HEES (Synth. Ester) at service temperatures up to approx. +70 °C							
Temperature range	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 Biological degradable pressure fluids: Observe manufacturer's specifications. Considering the compatibility with seal material not over +70 °C. Observe the additional information in D 7470 A/1 sect. 2.2.1, when a solenoid valve is mounted and the ambient temperature is higher than 35 °C.							

Curves
(= lowest adjustable pressure as well as back pressure with valves DV...-WN(H)1F(D))



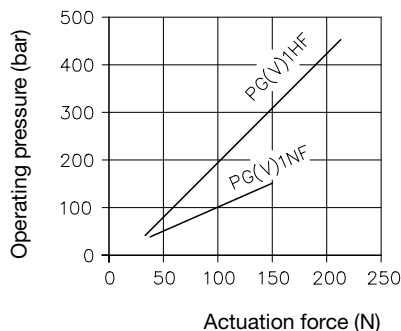
- a) DV(E) 3 GH
- b) DV(E) 3 GN
- c) DV(E) 4 PH
- d) DV(E) 4 GH
- e) DV(E) 4 PN
- f) DV(E) 4 GN
- g) DV(E) 5 GH
- DV(E) 5 PH
- h) DV(E) 5 GN
- DV(E) 5 PN

Control oil flow in feed valves depends on the consumer pressure.



The leakage flow increases as the consumer pressure rises, and in the extreme case amounts to about 6.5 lpm without the orifice disc, or about 4.3 lpm with the disc, (applies to a cracking pressure setting of 10 bar and a consumer pressure of 350 bar). At pressure below the set value, the leakage rate amounts to about 0.7 lpm, independant from the pressure setting.

Actuation force with spherical push button



Pressure adjustment (without coding or coding R acc. to table 5)

Coding (table 4)	Δp/turn
N	20 bar/turn
H	70 bar/turn

Oil viscosity during measurement 60 mm²/s

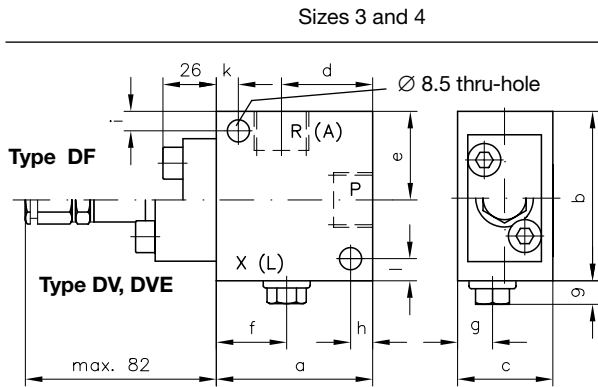
4. Dimensions of units

All dimensions in mm. Subject to change without notice!

4.1 Pressure valves without built-on solenoid control valve

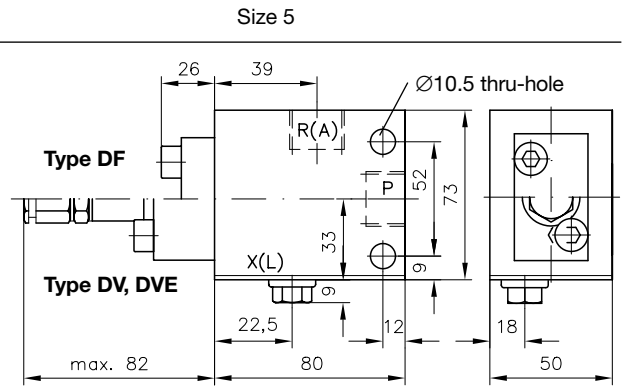
Servo valves or cover plates see section 4.3 and 4.4

For threaded connections



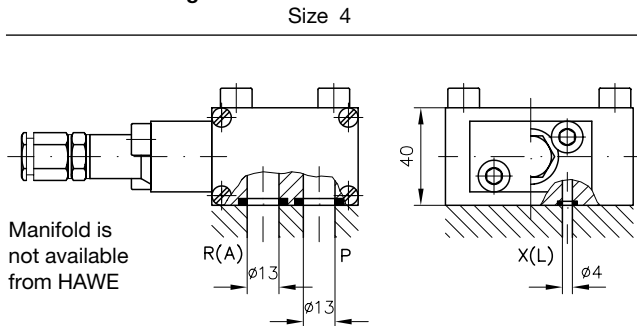
Size	a	b	c	d	e	f	g	h	i	k	l
3	60	65	30	35	34	27	11	8.5	7.5	8.5	8.5
4	65	71	40	38.5	39	25	15	10	10	7	11

Ports acc. to. P, R(A) = G 1/2 Size 3
 DIN ISO 228/1 G 3/4 Size 4
 (BSPP): X(L) = G 1/4 all sizes

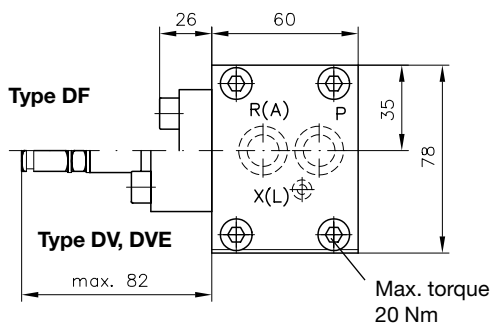


Ports acc. to. P, R(A) = G 1
 DIN ISO 228/1 X(L) = G 1/4
 (BSPP):

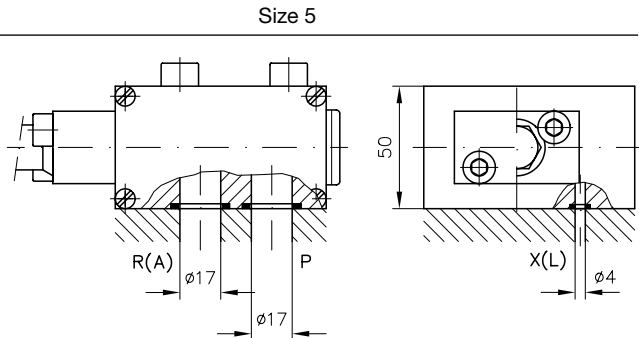
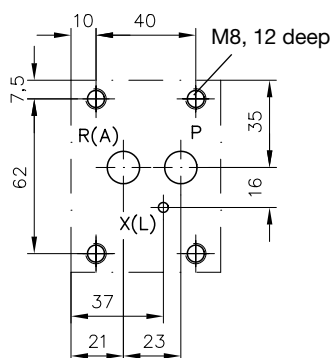
Manifold mounting



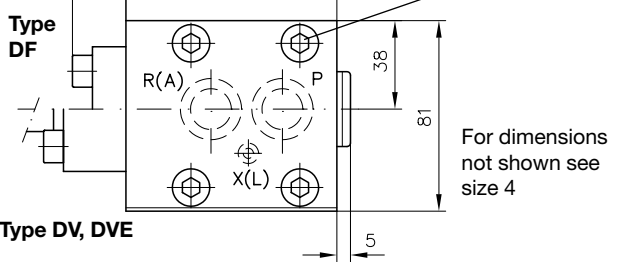
Manifold is not available from HAWE



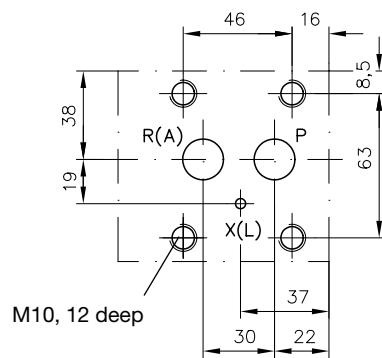
Hole pattern of the base plate (top view)



Max. torque 42 Nm



Hole pattern of the base plate (top view)



4.2 Pressure valves with built-on solenoid valve type WN(H) 1F(D) acc. to D 7470 A/1

Missing dates: Main valves see sect. 4.1
2/2-way solenoid valve see D 7470 A/1

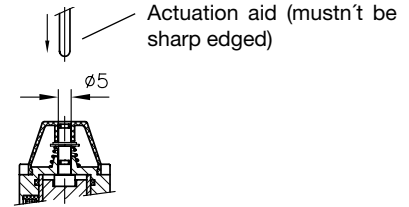
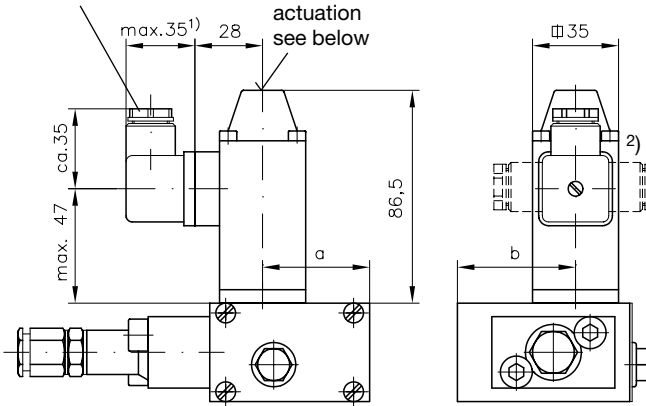
Pipe connection

Size 3, 4 and 5

Cable gland
Pg 9

For manual
emergency
actuation
see below

Manual emergency actuation



Size	a	b
3	35	38
4	41	46
5	41	49

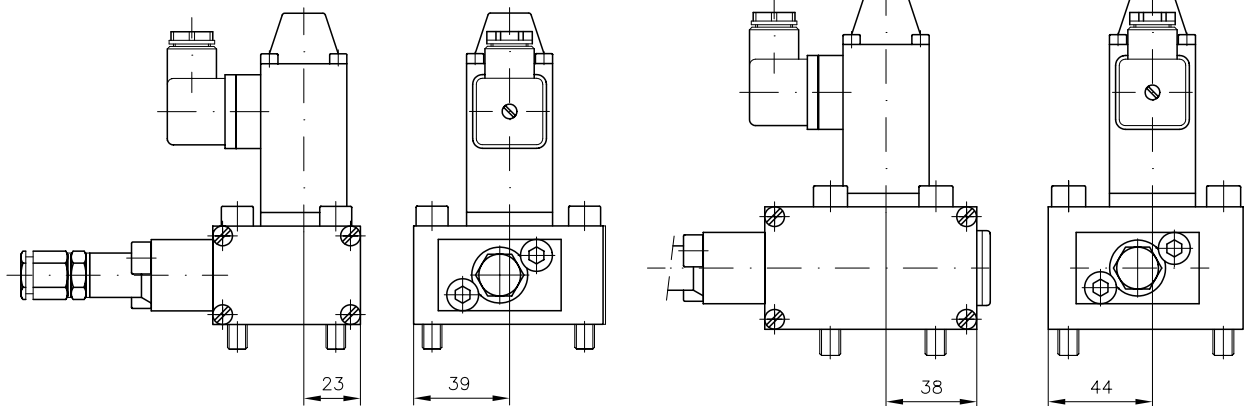
1) This dimension depends on the manufacturer and may be up to 40 mm acc. to DIN 43650

2) Plug may be rotated by 90° to the right or left side

Manifold mounting

Size 4

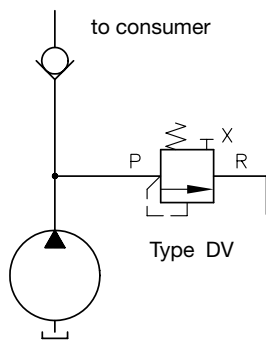
Size 5



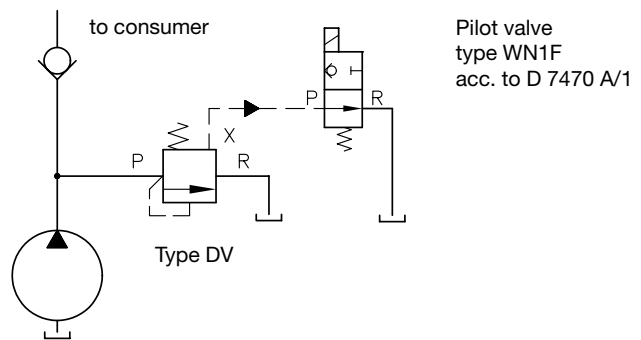
5. Appendix

5.1 Typical circuit diagrams for sect. 2.3

Circuit diagram for picture 1a

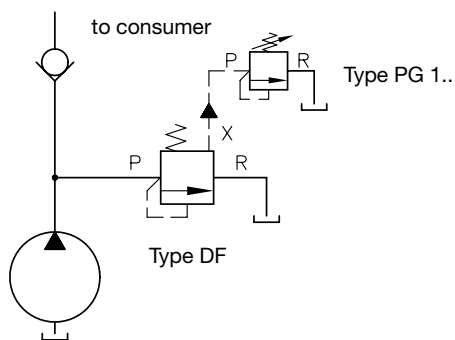


Use as pressure limiting valve

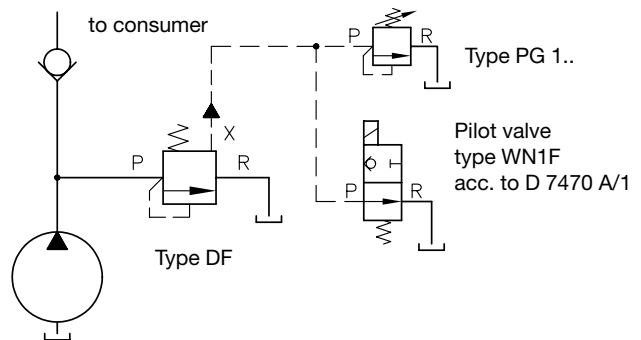


Use as a pressure limiting valve with remote-controlled idle connection for the pump

Circuit diagram for picture 4a

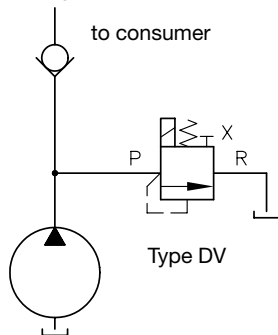


The pilot valve can be installed at the control desk for example

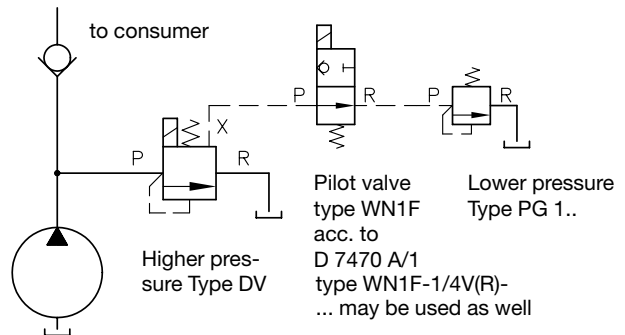


Use as a pressure limiting valve with remote adjustment of pressure and idle connection for the pump

Circuit diagram for picture 2

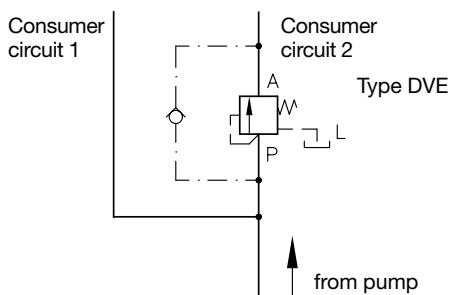


Use as a pressure limiting valve with additional electrical idle connection



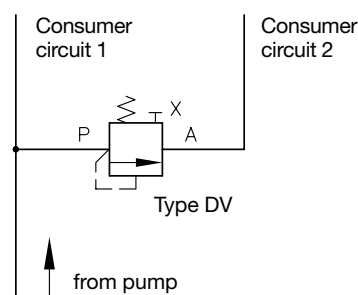
Electrical control of two different pressures and additional electrical idle connection

Circuit diagram for picture 3b



If the two consumer circuits are controlled by a common directional control valve, a check valve (dot-dash line) should be fitted to provide for the return flow from circuit 2.

Circuit diagram for picture 1b

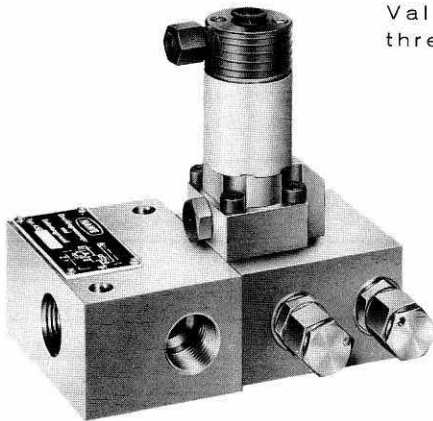


Provision of a constant pressure difference between consumer circuit 1 and 2, if a 2/2-way pilot valve (e.g. to 7470 A/1 with orifice!) is fitted at X leading to the tank, consumer circuit 2 can be operated at same pressure as circuit 1 if required (less the opening resistance in accordance with the $\Delta p - Q$ characteristics).

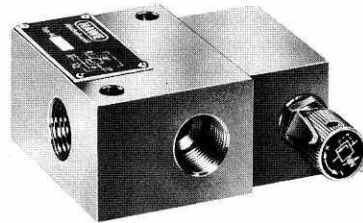
Pressure Valves

Series A, indirectly controlled, with check valve and servo valves

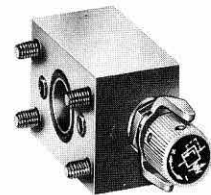
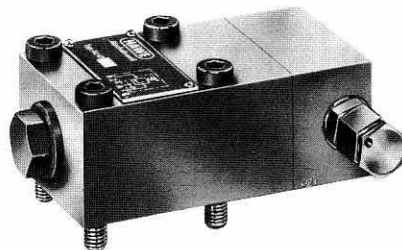
Flow rates up to 120 l/min
Operating pressure up to 350 bar



Valve for threaded connection



Servo valve



Valve for plate mounting

1. General

The main function of pressure valves is to control the pressure in hydraulic systems (DIN standard 24 300). The following basic functions are obtained for Serie A, depending on the combined action of the valve elements:

- a) Pressure limiting valves type AS... provide protection against unacceptable peak pressures (safety valves) or limit the working pressure to its maximum permissible value.
- b) AL... type cut-off valves (idle valves) are used for pump circulation control systems in hydraulic circuits with and without accumulators or for relieving a low-pressure circuit in a two-stage system. If used in single-stage systems, a certain pulsation of the pump oil flow is required for operational reasons to achieve the switch-over jump. Observe the remarks in the middle of Sect. 3.3 or address your questions to HAWE.
- c) Relief valves type AE... are used for pump rotation control systems with the control pressure being taken from a secondary systems (external-source pressure).
- d) Dual functions a) + b), a) + c) or b) + c) by combining appropriate servo valves

2. Description

Main valve section

consisting of housing with threaded connections or for base-plate connection, spring-loaded spool in floating, strainfree liner, and check valve at the actuator end. The main valve section (pressure compensator) can only function in conjunction with a servo valve. The passage P → R is either blocked or released, depending on the working position of the servo valve and the resulting pressure difference between the feed end P and the spring chamber.

Servo pressure valve

which opens by system pressure or external pressure depending on the functional design of the active valve elements, and which gives the basic functions listed in Section 1 in connection with the main valve. As an optional feature, it can be supplemented by a 2/2-way solenoid valve in accordance with pamphlet 6540 (note restrictions in Section 4.1) for solenoid-operated circulation connections, and combined with an additional servo pressure valve, resulting in additional basic functions.

Also refer to schematic diagrammatical drawings Section 3.3

3. Available types
3.1. Type code and main data

ASE.4GH/MR-GR 2-0-300/...

Pressure specification in bar (only for factory-adjusted model).
Also see pressure range

Additionally built-on solenoid-operated 2/2-way seated valve for idling connection (for further details also see pamphlet 6540)	Identification	input voltage 1)	Power required	relative duty cycle	protection	electrical state for relief (idling)
1) special voltage upon request	GS 2-0	24 V =	15 W	100% ED	IP 54	de-energised
	GR 2-0					energised
	WS 2-0	220 V ~	14 W		IP 65	de-energised
	WR 2-0					energised
	without	without built-on electrovalve				

ED = Duty cycle

Pressure range	Identification		setting from/to (bar)			admissible servo pressure see item 3.2
	factory-adjust.	variable	Type AS	Type AL	Type AE	
	M	MR	3...200	30...200	3...200	
	H	HR	5...350	40...350	5...300	

Line connection	Identification	connection	Size		
			3	4	5
	G	threaded pipe connection	R 1/2"	R 3/8"	R 1"
	P	plate mounting	for line connection with threaded stem form B DIN 3852		
			corresp. to nominal size 16	corresponds to nominal size 20	

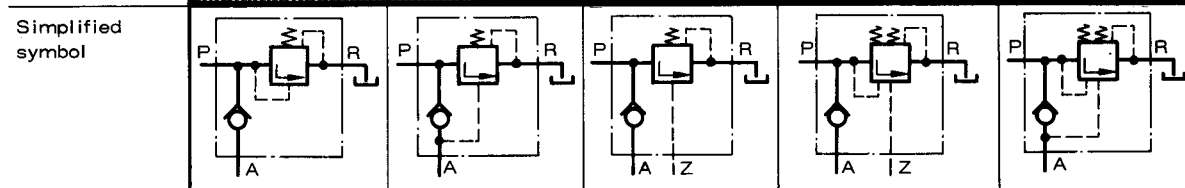
Size and maximum flow	Code No.	3	4	5	Δp - Q - characteristic lines see item 3.2
	Flow (l/min)		50	80	

Servo pressure valve	Identification	external connection R 1/4" for	Remarks	
		without	not avail.	normal type
	F	control oil feed connection X	connection X for external relief (idling)	cannot be combined with built-on solenoid-operat. 2/2-way seated valve
	T	control oil drain connection T	Connect. T for non-pressurised draining of control oil when back press. in R	

Valve type

Identification	pressure limiting valve	cut-off valve	external pressure-controlled relief valve	pressure limiting valve and press.-controlled relief valve	cut-off valve and press.-controlled relieve valve
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Identification	AS	AL	AE	ASE	ALE
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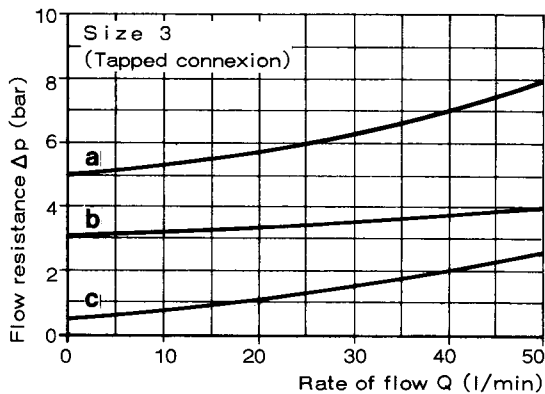
complete presentation of symbols and schematic diagrammetrical drawings of all possible variations see item 3.3

Weight (approx. kg)	Size 3	1,8	2,4
	Size 4	2,2 (threaded connection)	1,9 (plate mounting)
Size 5	4,1		4,7
Notes	with built-on electrovalve additionally 0,4-		

3.2. Additional Characteristics

Description and Schematic diagramme	see Sections 3.1 and 3.3
Construction	spool valve with a downstream ball check valve
Mounting	two throughholes in the housing
Unit dimensions	see Sections 6.1 and 6.2
Orientation	optional, in units with a built-on solenoid, preferably with the solenoid upright
Direction of flow	P → A or P → R
Pressure fluid	hydraulic oil 9...68 mm ² /s at 40... 50°C
Viscosity range	min. limit approx. 4, max. limit approx. 1500 mm ² /s optimum range approx. 10...500 mm ² /s
Temperatures	oil: -30...+80°C, with type AL as an inherently-controlled cut-off valve -20...+ 80°C ambience: -35...+ 80°C, with a built-on solenoid 100% Duty cycle up to + 40°C 50% Duty cycle up to + 60°C 25% Duty cycle up to + 70°C
Pressure	max. and min. variable pressure dependent on the valve type, see Sect. 3.1 max. pilot pressure 500 bar (static loading capacity of connexions A and Z)
AL as an inherently-controlled cut-off or charging valve	shifting difference: operating position is interrupted when the pressure on consumer side A falls below the set pressure by approx. 20%.

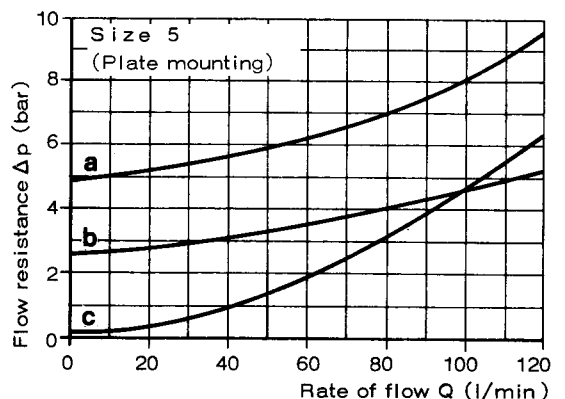
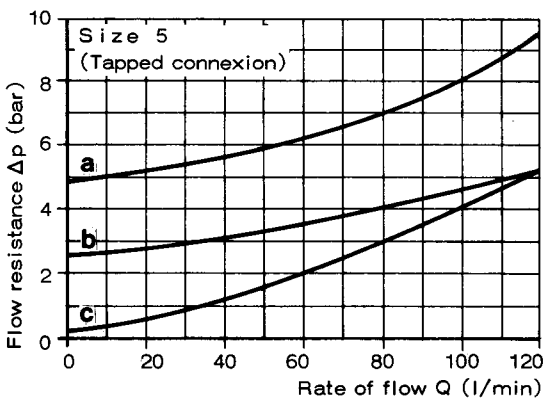
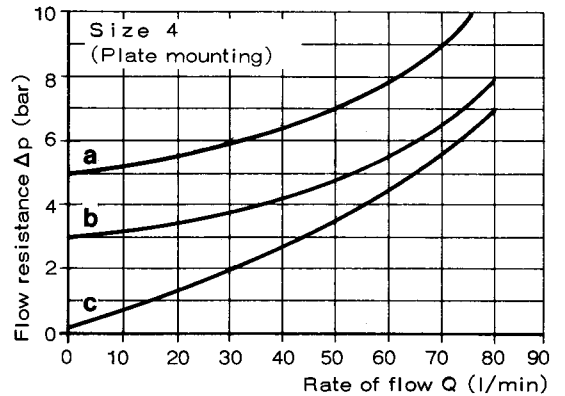
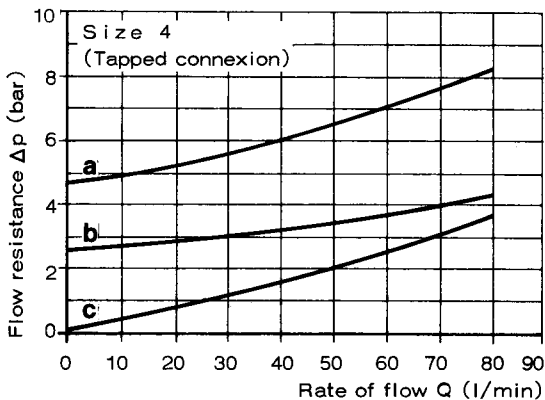
Δp - Characteristics



Explanation of the curves:

Direction of flow	Curve	Type
P → R	a	AS ... GH and AS ... PH
	b	AS ... GM and AS ... PM AL ... GM(H) and AL ... PM(H) AE ... GM(H) and AE ... PM(H)
P → A	c	all types

Oil viscosity during measurement = 63 mm²/s

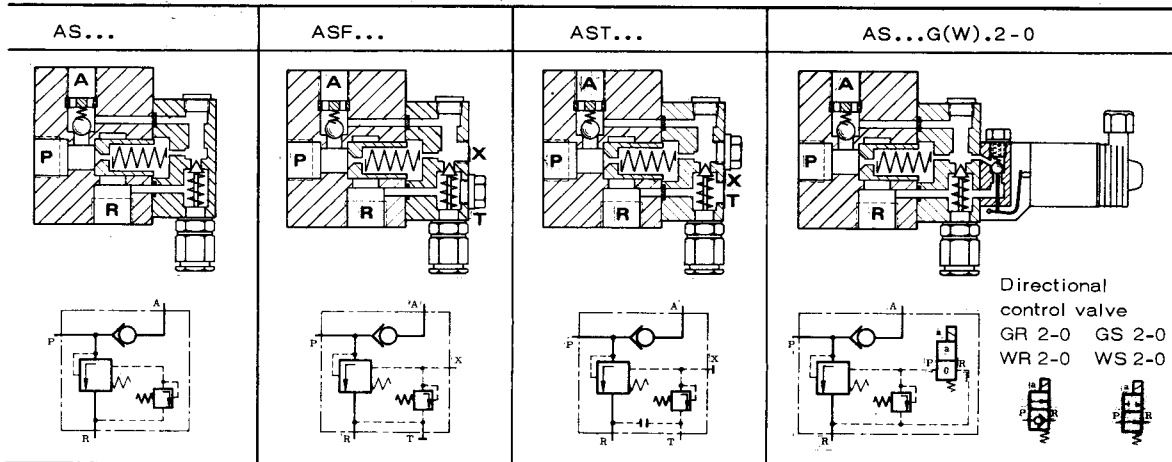


3.3. Diagrammatic representation and symbol

Pressure limiting valve

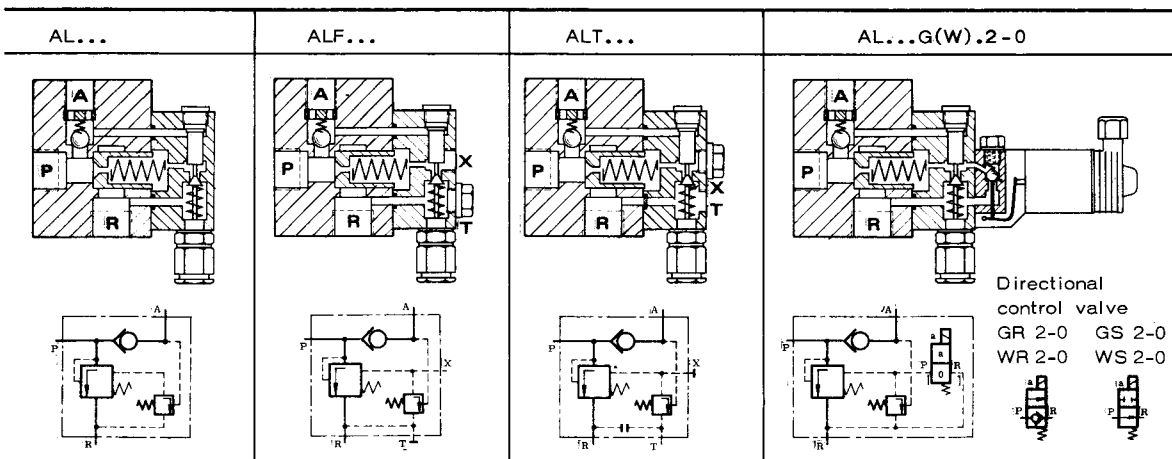
Used as a pressure limiting valve (system-pressure controlled) type AS..., facility for remote-controlled relief (idling connection) for type ASF... by pressure relieving the remote-control connection X, for type AS...G.2-0 by means of electrical signal to the built-on 2/2-way valve. Type AST... for external, non-pressurised control oil draining via the connection X, if a back-pressure at R is not to affect the pressure valve.

When it is used as an auxiliary valve the control oil flow via T is between 0,7 l/min and 7 l/min, depending on the difference between actuator pressure at R and the auxiliary pressure P (see Example 2 in Section 5.1)



Cut off-valve

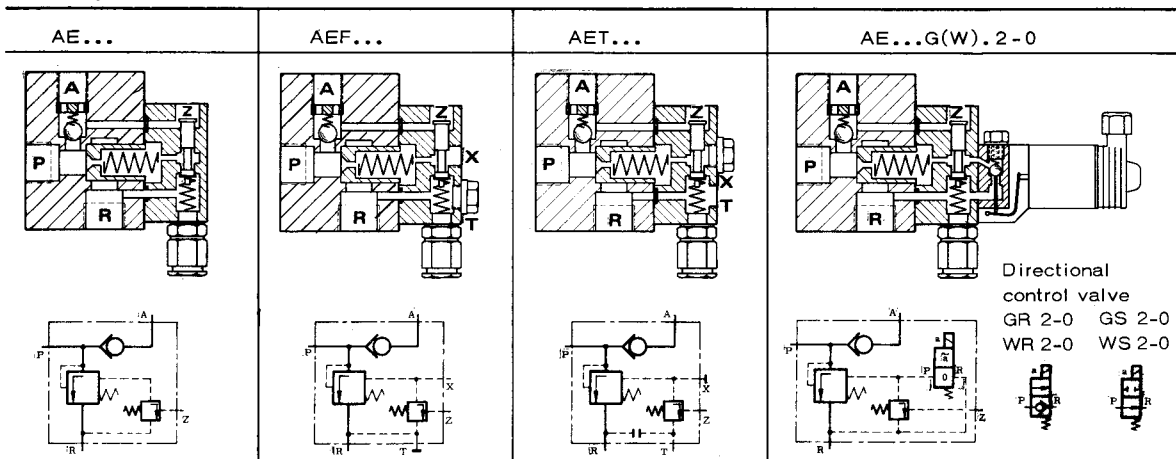
Can be used as a pressure limiting valve (inherently controlled) and as a cut-off valve. Conditions for use: when the LA valve is used as a cut-off valve (for pump circulation) in single-stage systems, a certain pressure pulsation is required to achieve the switch-over jump. The valve must therefore be placed as close to the pump as possible in accumulator charging control systems; the same applies as well to low-pulsation pumps (internally toothed gear pumps, vane pumps). In circulation control systems without accumulators, the consumer volume including the line attached to connection A should amount to at least 1000 cm³. Conduct a trial run to check to see that the system is functioning properly. Additional idling connection by pressure relieving via the remote-control connection X for type ALF or electrically for type AL...G.2-0. Type ALT... for external, non-pressurised oil draining via connection T, if a back-pressure at R is not to affect the pressure set value.



Pressure-controlled relief valve with external-pressure control oil connection Z

Used as a straight relief valve (external-pressure controlled), type AE. Passage P → R = closed if the control pressure at Z is less than the pressure set value, P → R = free if the control pressure at Z is higher than the pressure set value. Additional relief connection by pressure relieving via the remote-control connection X for type AEF... or electrically for type AET...G.2-0. Type AET... for external, non-pressurised control oil draining via connection T if a back-pressure at R is not to affect the pressure set value.

Note: The types AE... do not constitute pressure limiting valves, the pressure protection of the pump must be provided separately.



4. Available Pilot Valve Designs

Pilot valves can be employed only for inherent or external pressure control of spring-loaded variable valves such as the main valve in Sect.3. The D 1P... and A 1P... types are not suitable as pressure limiting valves to safeguard oil systems because their flow characteristics are not designed for such use (see Sect.4.2). Valves such as those in pamphlet D 3726 must be used in such cases. The E 1P... type can be used in principle for the externally controlled relief of optional oil control systems up to approx. 4l/min. Refer to the $\Delta p - Q$ characteristic in Section 4.2. The same applies to the A 1P type.

4.1. Type Code and Main Data

D1PH-WS2-0-250

Pressure specification in bar (only for factory-adjusted model) Also see pressure range	2/2-way valve for solenoid-controllable relief functions		only possible for size D and A, not E and ... F, ... T. Data see item 3.1!		
	Pressure range		Identification factory-adjusted	variable	Setting from - to (bar) Type D.. Type A.. Type E..
Size and Connection	Size		Connection		admissible servo pressures mentioned below
	Code Number	Flow	Identif.		
	1	4 l/min	P	Plate mounting	
Design and Nomenclature	Seat-type valve			Piston valve	
	press. limiting valve	press. limiting valve and relief valve with control pressure connection Z		relief valve with ext. control pressure connection Z	
Identification	normal	D	A	E	0,6
	ext. secondary press. connect. X	DF	AF	EF	
	ext. tank connection T	DT	AT	ET	
	double servo valve	D(A)1P.../E 1P D(A)1P.../EF 1P D(A)1P.../ET 1P		the valves D and A can be combined to double valves with E, EF and ET	1,2
Weight ¹⁾ approx. kg					

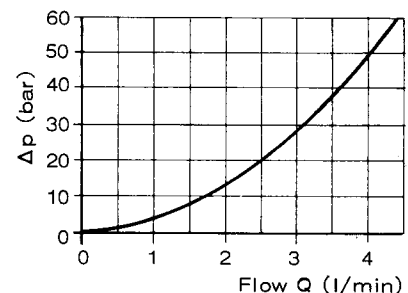
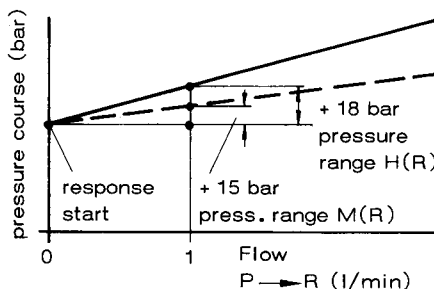
1) as far as possible with solenoid valve + 0,4 kg

4.2. Additional Characteristic Values

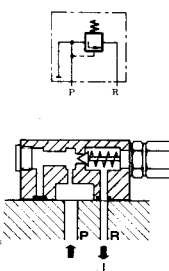
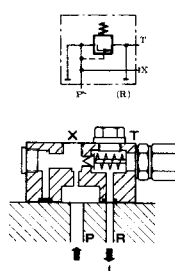
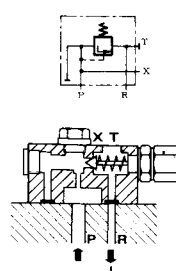
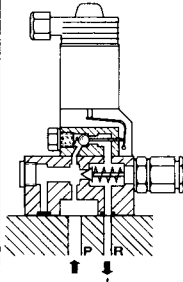




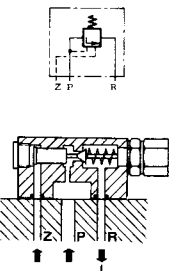
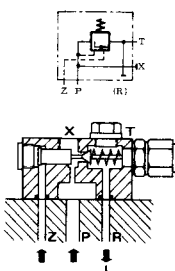
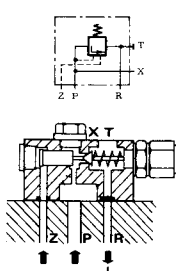
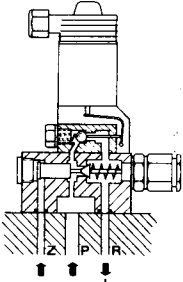




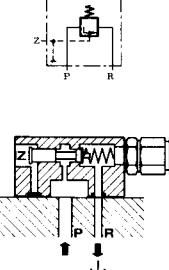
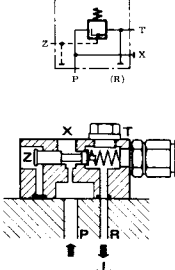
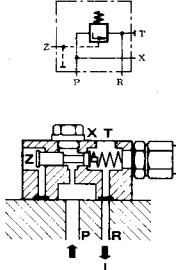
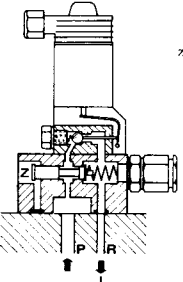




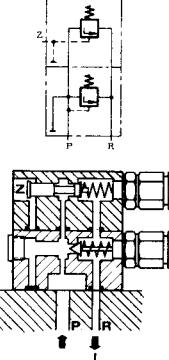
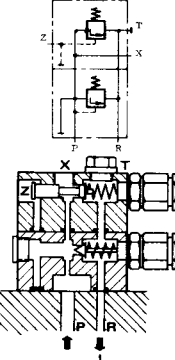
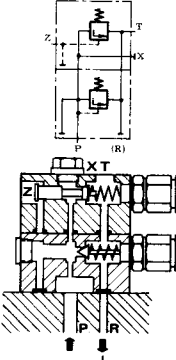
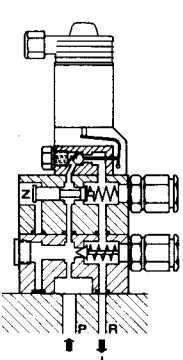




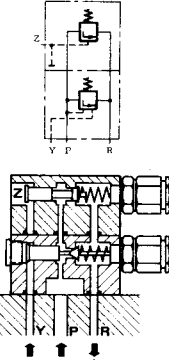
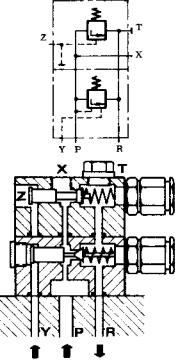
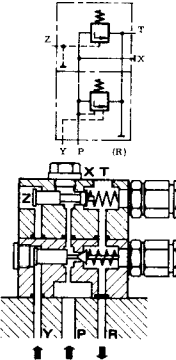
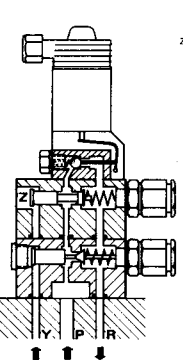




- Mounting by four M6 x 35(65) DIN 912
- Dimensions of units see item 6.3
- Installed position as desired
- Flow direction only P → R
- Pressure fluid see item 3.2
- Temperatures see item 3.2
- $\Delta p - Q$ - characteristics characteristic as pressure limiting valve
Type D and A (not discharged)

Flow resistance for type A and E in discharged condition (control pressure on Z)

Oil viscosity during test 63 mm²/s
Attention: + 15 and + 18 bar only recommended values!

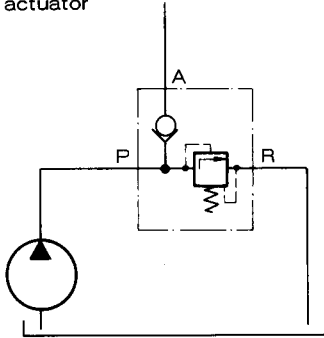


4.3. Diagrammatical representation and symbol

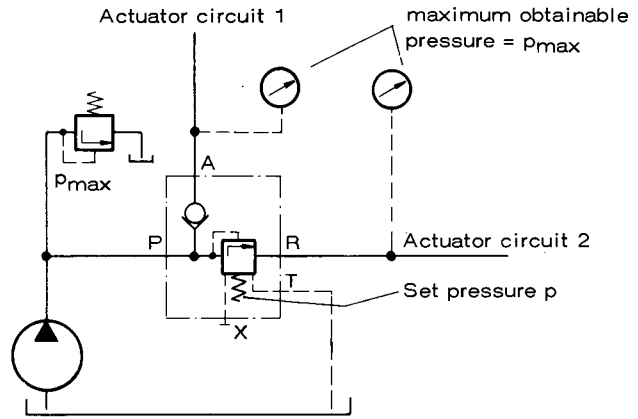
<p>For use as pressure limiting valve</p> <p>It functions as a pressure limiting valve, but can only be used as a servo valve for controllable, spring-loaded poppet or piston valves according to the main valve type shown in Section 3. For general pressure protection see the equipment shown in leaflet 3726. Relief facility by electrical signal for type ...-G(W).2-0</p>	<p>D 1P...</p> 	<p>DF 1P...</p> 	<p>DT 1P...</p> 	<p>D 1P...G(W).2-0</p>  <p>Directional control valve</p> <p>GR 2-0 </p> <p>WR 2-0 </p> <p>GS 2-0 </p> <p>WS 2-0 </p>
<p>For use as pressure limiting and relief valve (cut-off valve)</p> <p>It functions as a pressure limiting valve, with relief facility by control pressure at Z. It serves to pilot-control spring loaded poppet and piston valves according to the main valve type shown in Section 3. Additional relief facility by electrical signal for type ...-G(W).2-0</p>	<p>A 1P...</p> 	<p>AF 1P...</p> 	<p>AT 1P...</p> 	<p>A 1P...G(W).2-0</p>  <p>Directional control valve</p> <p>GR 2-0 </p> <p>WR 2-0 </p> <p>GS 2-0 </p> <p>WS 2-0 </p>
<p>For use as relief valve</p> <p>It functions as a relief valve. Relief is effected by control pressure at Z. No function as a pressure limiting valve. Pressure protection of a control oil circuit e.g. by using valves according to leaflet 3726. Additional relief facility by electrical signal for type ...-G(W).2-0</p>	<p>E 1P...</p> 	<p>EF 1P...</p> 	<p>ET 1P...</p> 	<p>E 1P...G(W).2-0</p>  <p>Directional control valve</p> <p>GR 2-0 </p> <p>WR 2-0 </p> <p>GS 2-0 </p> <p>WS 2-0 </p>
<p>For use as pressure limiting and relief valve</p> <p>It combines the functions of a pressure limiting valve (D 1P...) and relief valve by means of the control pressure (E...), see also data on single valves. Additional relief facility by electrical signal for type ...-G(W).2-0/...</p> <p>In the diagrammatical representation of type ...-G(W).2-0/... the solenoid valve has been offset for better clarity. For specified position see symbol.</p>	<p>D 1P.../E 1P...</p> 	<p>D 1P.../EF 1P...</p> 	<p>D 1P.../ET 1P...</p> 	<p>D 1P...G(W).2-0/E 1P...</p>  <p>Directional control valve</p> <p>GR 2-0 </p> <p>WR 2-0 </p> <p>GS 2-0 </p> <p>WS 2-0 </p>
<p>For use as press. limiting cut-off and relief valve</p> <p>It combines the functions of a pressure limiting valve (A 1P...) that can be relieved by the control pressure, and a relief valve (E...) that can be released by a second control pressure. Additional relief facility by electrical signal for type ...-G(W).2-0/...</p> <p>In the diagrammatical representation of type ...-G(W).2-0/... the solenoid valve has been offset for better clarity. For specified position see symbol.</p>	<p>A 1P.../E 1P...</p> 	<p>A 1P.../EF 1P...</p> 	<p>A 1P.../ET 1P...</p> 	<p>A 1P...G(W).2-0/E 1P...</p>  <p>Directional control valve</p> <p>GR 2-0 </p> <p>WR 2-0 </p> <p>GS 2-0 </p> <p>WS 2-0 </p>

5. Exemplary Circuits
Indirectly controlled pressure valves
Pressure limiting valves type AS...

Directional valve, actuator

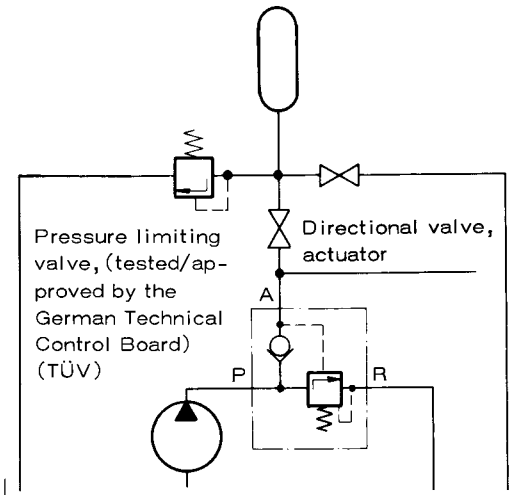


Pressure protection of pump, check valve prevents reaction of actuator back-pressure on the (e.g. switched-off) pump or the pressure limiting valve

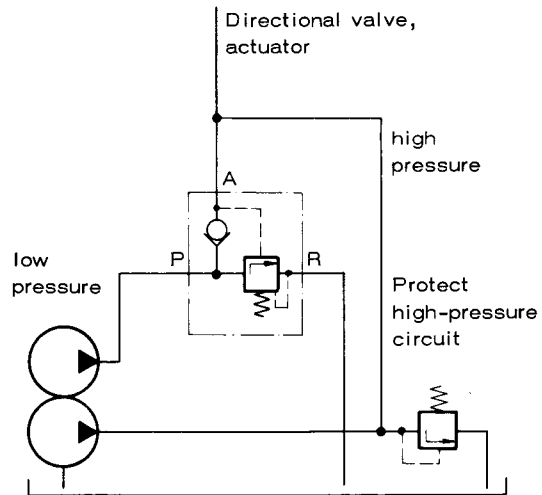


Use as an AST... as pressure sequence or auxiliary valve. Actuator circuit 2 receives pressure oil only if the set pressure is exceeded, control oil flow draining via T between 0,7 l/min in below 10 bar and 7 l/min at approx. 350 bar depending on pressure setting p against actuator pressure at R.

Cut-off valve (idle valve) type AL...

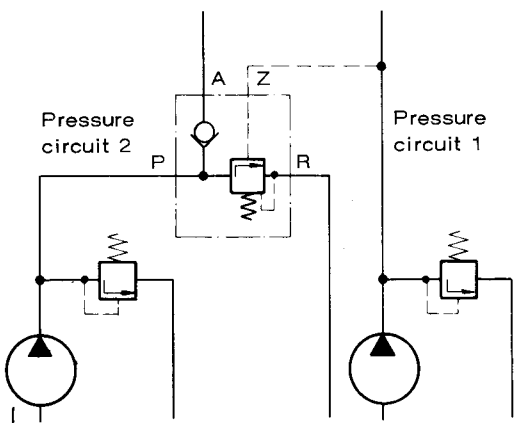


Use as an Accumulator Valve
When used as an accumulator valve, factors inherent in the system (pressure magnitude, accumulator size, type and size of pump) play a special role.
Discuss your operations planning with our consulting engineers.



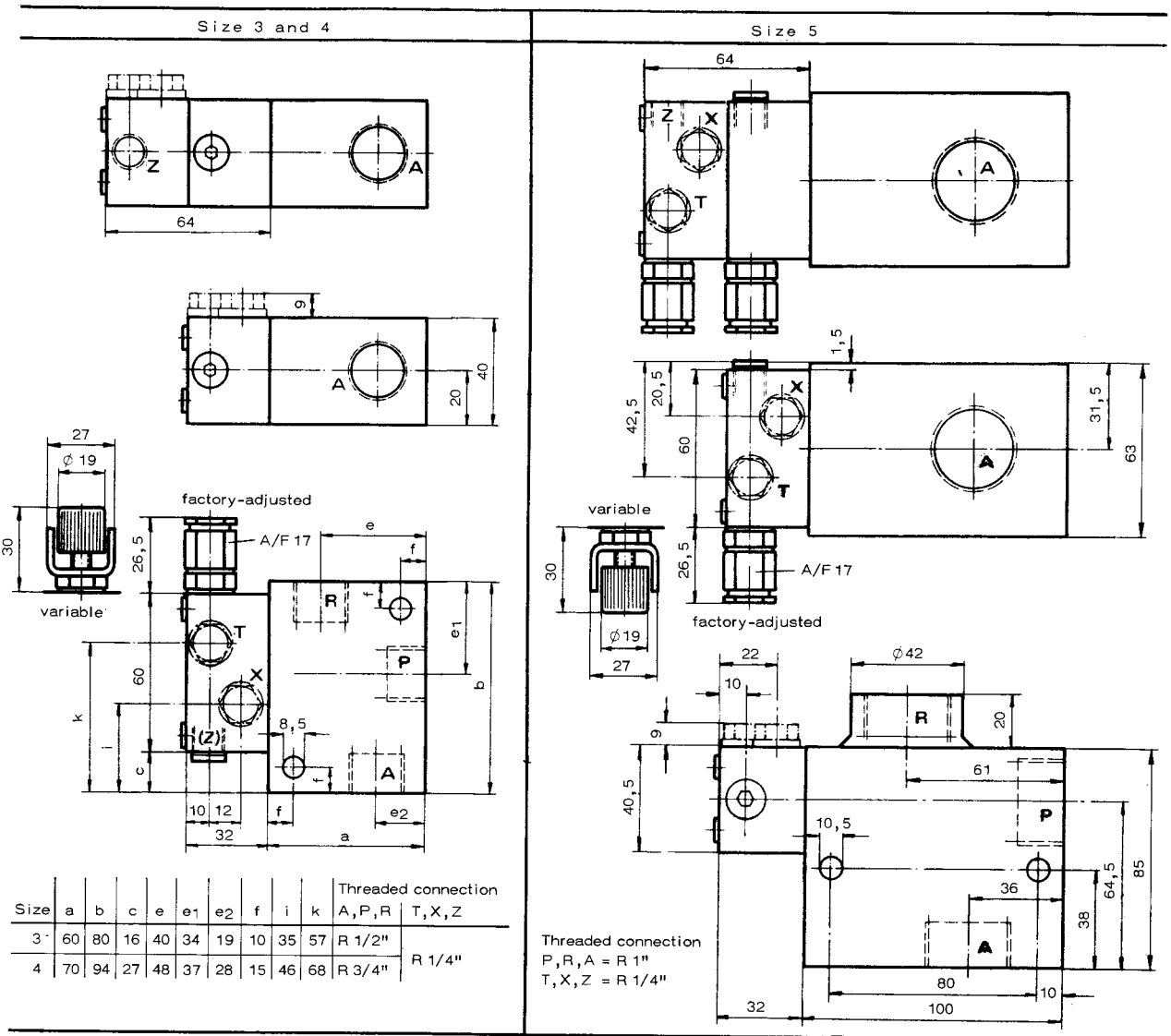
Use as a cut-off valve for the low-pressure oil flow in a two stage circuit when the set pressure value is exceeded, the high-pressure oil flow must be protected separately.

Relief valve type AE...



Pressure circuit 2 is bypassed, irrespective of its pressure setting, if the relief pressure value is reached or exceeded in pressure circuit 1

6. Dimensions of Units All dimensions are in millimetres. Subject to change without notice!
 6.1. Pressure valve with threaded connections



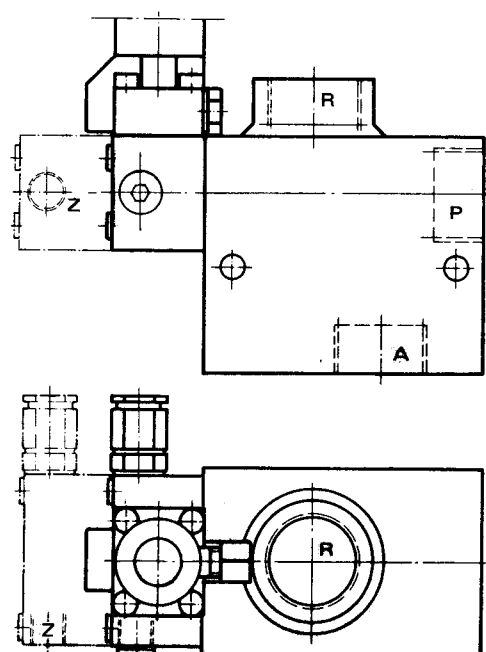
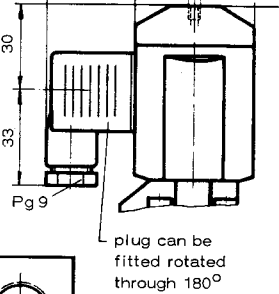
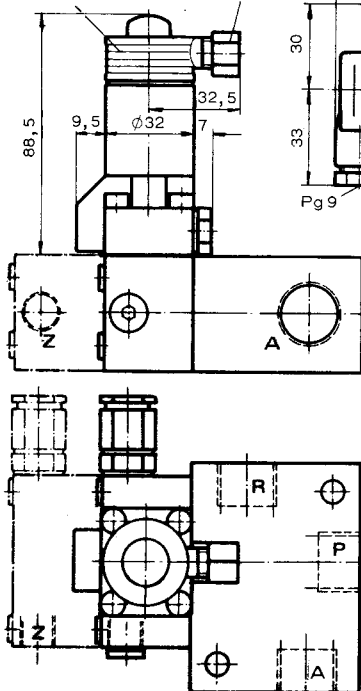
Model with built-on directional seated valve according to pamphlet 6540

Direct current model (G.2-0)

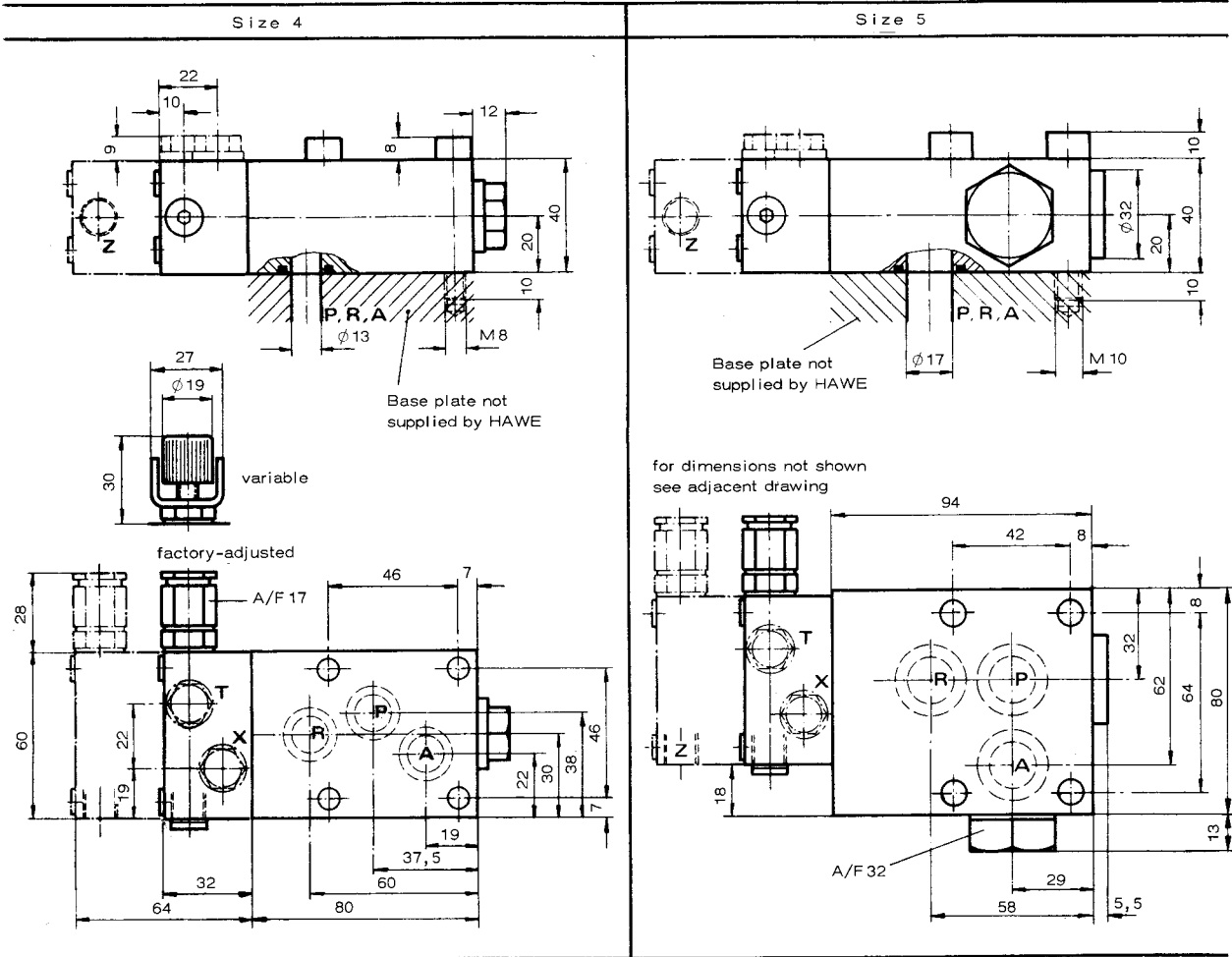
Alternating current model (W.2-0)

plug can be fitted rotated through 180° suitable for 6 φ cable

M3, 6 deep for manual emergency operation



6.2. Pressure valves for plate mounting



Model with built-on solenoid operated directional seated valve according to pamphlet 6540

Direct current model (G.2-0)

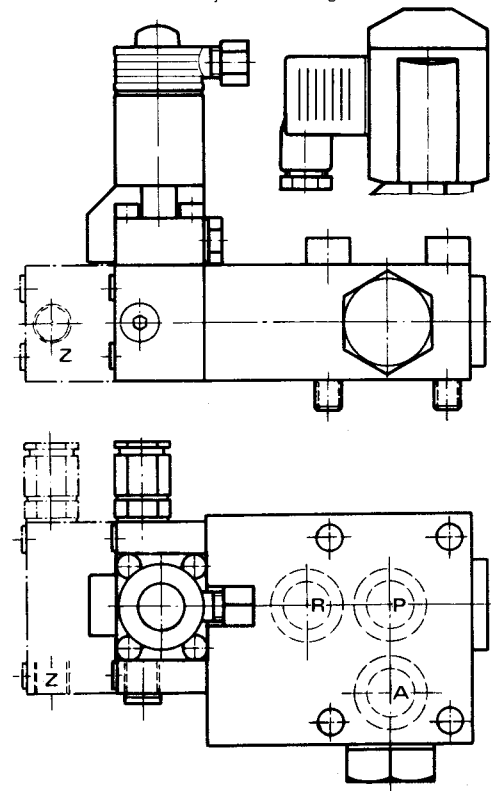
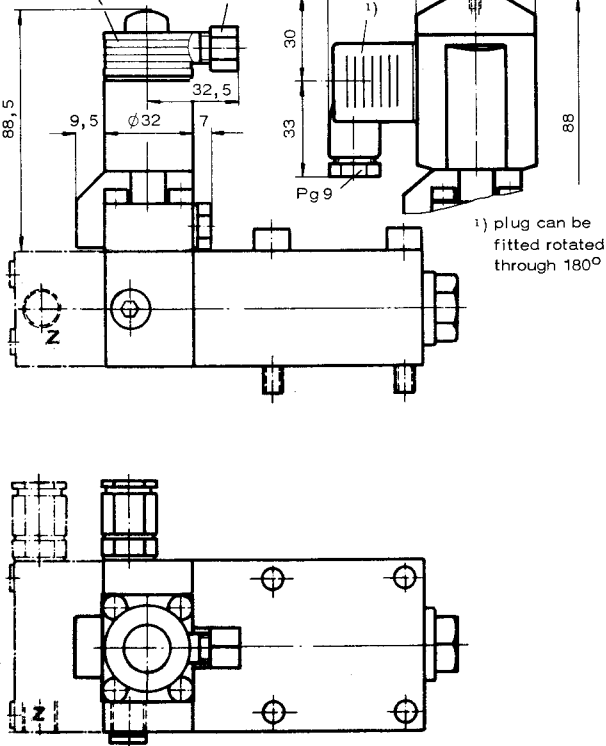
Alternating current model (W.2-0)

plug can be fitted rotated through 180°

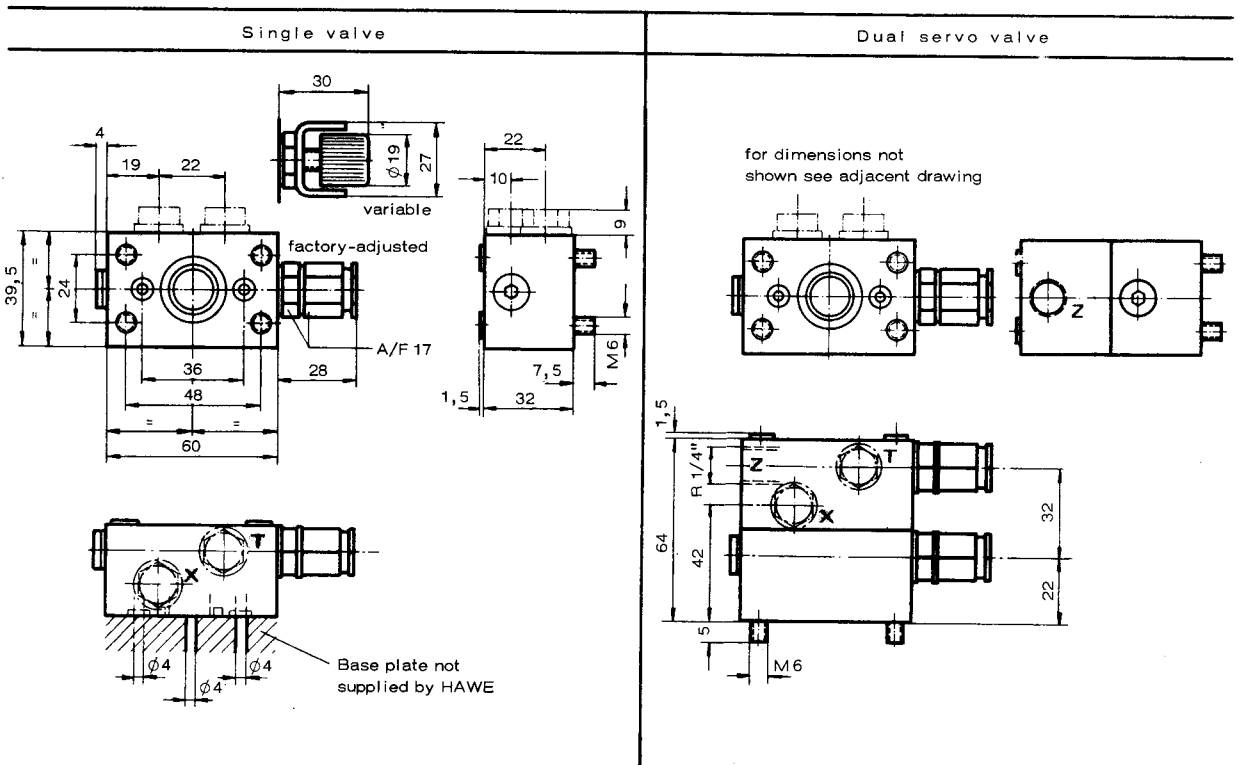
suitable for Ø6 cable

M3, 6 deep for manual emergency operation

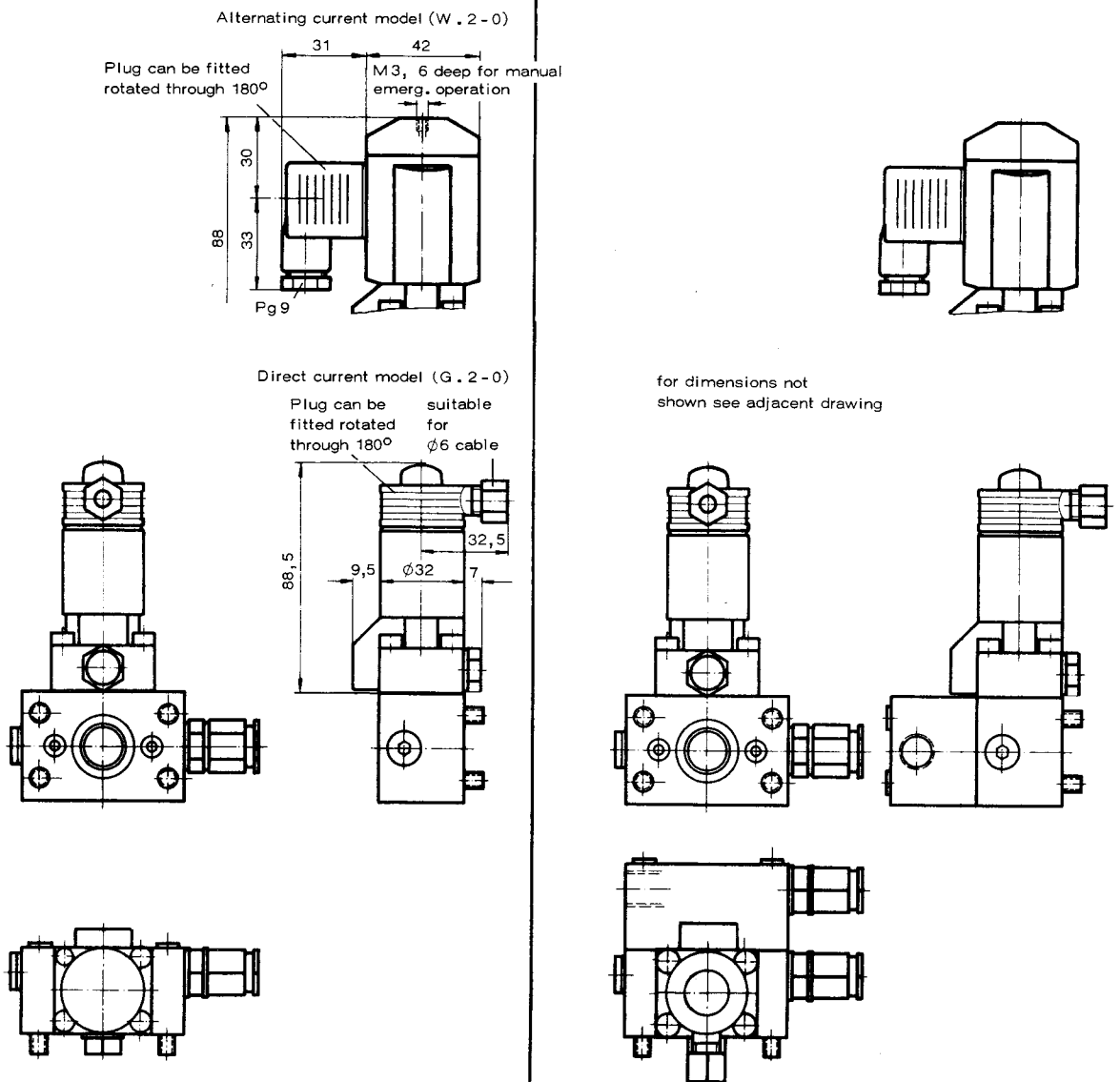
for dimensions not shown see adjacent drawing



6.3. Servo valves



Model with built-on solenoid operated directional seated valve according to pamphlet 6540



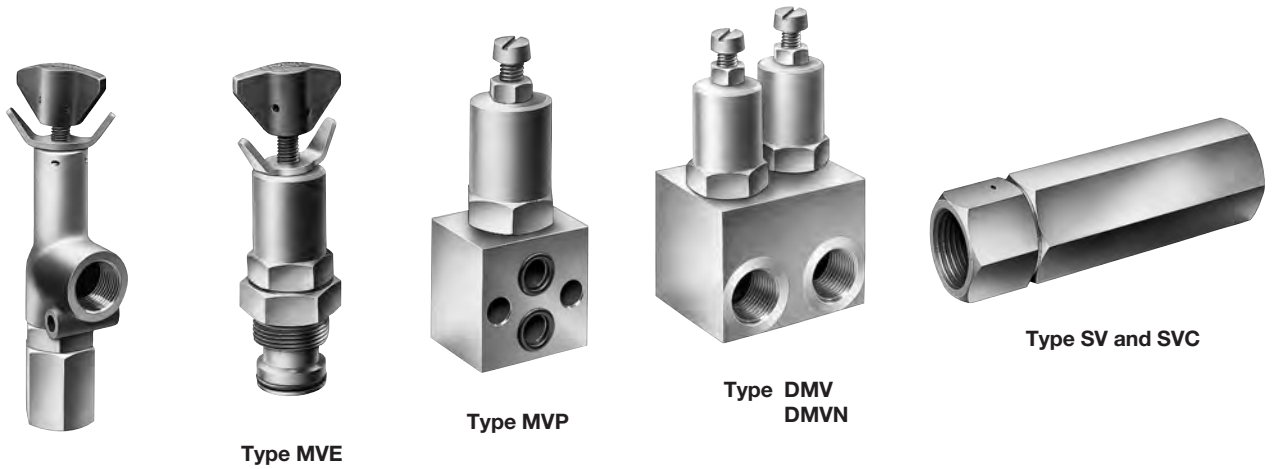
Pressure valves type MV.., DMV.. and SV..

Pressure limiting valves, differential pressure regulators

Pressure p_{max} = 700 bar
 Flow Q_{max} = 160 lpm

Additional versions

- Versions as assembly kit see D 7000 E/1
- Versions with component approval (TÜV inspected) see D 7000 TÜV



Type MV and MVS
MVC

1. General

Pressure valves primarily influence the pressure in hydraulic installations (DIN ISO 1219-1). The types listed here are to complete following tasks:

The pressure relief valves are not suited for safeguarding pressure devices acc. to Pressure Equipment Directive 97/23/EC. There are also versions available featuring unit approvals, see D 7000 TÜV, D 7710 TÜV, D 6905 TÜV.

• Pressure limiting valve

Protection against exceeding the maximum pressures approved for the system (relief valve) or limiting the working pressures. All valves listed in this leaflet can be used for this purpose.

• Differential pressure regulator

Generation of a constant pressure difference between the inlet and outlet of the flow. Valves with a housing in steel or spheroidal casting can be used for this purpose (see list of types on sect. 3.1).

• Pressure limiting valve without damping

For special operating conditions, e.g. to prevent creeping pressure rises in sealed cylinder chambers during temperature rise or compulsory creeping piston movement because of externally induced forces. Very low difference between opening and reseal pressure.

2. Typical construction

Means of adjustment with adjustable version

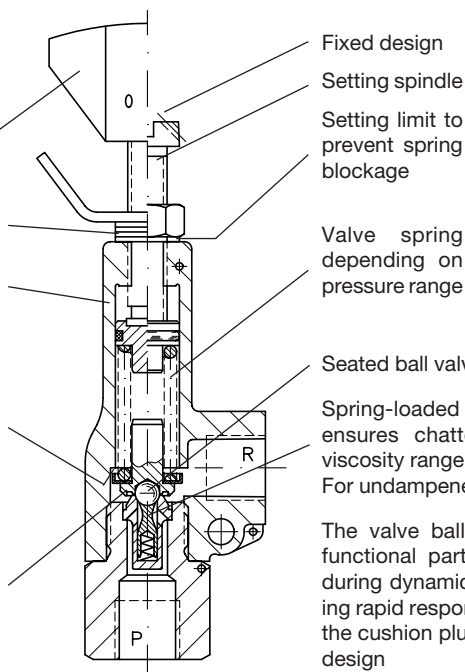
(Coding R = Wing screw
 Coding V and H = Turn knob, see section 3.1)

Washer to limit the adjustment distance (see section 5)

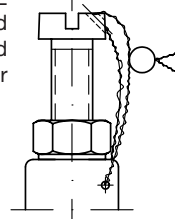
Valve housing (spring dome) in zinc die casting, spheroidal casting or in steel for maximum adaption to local installation conditions (inline or manifold mounting, cartridge version)

Stroke limitation prevents the valve ball from being lifted out too far when the spring is completely relieved or when the flow through the valve is too high, also prevents the dampening plunger from blocking the flow passage.

Dynamically acting lift aid results in a pressure setting, which is rather flow independent (constant pressure characteristics)



Lead seal provision (Lead sealing is available from HAWE when added in uncoded text to your order)



3. Types available

3.1 Type code and main data

Order examples:

MVP 4 A - 650
MV 53 B R X
DMV 4 B/C - 300/200 Desired pressure setting (bar) (without specification, see table 2)

X = Undamped version acc. to sect. 1

Table 1: Basic type and Size

Brief description	Connection size and thread		Spring dome material		
	Basic type Size	ISO 228/1 (BSPP)			
Pressure limiting valve	Corner valve for pipe mounting (tapped ports P and R)	41	G 1/4	Zinc die casting Perm. pressure P = 700 bar R = 20 bar see sect. 3.2	
		42	G 3/8		
		52	G 3/8		
		53	G 1/2		
		63	G 1/2		
		64	G 3/4		
Pressure limiting valve and sequence valves	Corner valve for pipe mounting (tapped ports P and R)	41	G 1/4	Spheroidal casting Perm. pressure P = 700 bar R = 500 bar see sect. 3.2	
		42	G 3/8		
		52	G 3/8		
		53	G 1/2		
		63	G 1/2		
		64	G 3/4		
	Screw-in valve (for manifold mounting)	MVE	4	Stepped bore, see dimension. drawing	Steel: Perm. pressure P = 700 (400) bar R = 350 bar
			5		
			6		
			8		
Valve for (manifold mounting)	MVP	4	Manifold, see dimensional drawing	Steel: Perm. pressure P = 700 (400) bar R = 350 bar	
		5			
		6			
		8			
For inline installation in a pipe system (tapped hole at P and R)	SV	42	G 3/8	Steel: Perm. pressure P = 700 (400) bar R = 500 (400) bar	
		53	G 1/2		
		64	G 3/4		
		85	G 1		
Pressure limiting valve (as shock valve), pipe mounting	Double valve for hydraulic motor (tapped hole at P and R)	41	G 1/4	Steel: Perm. pressure P and R = 350 bar	
		42	G 3/8		
		52	G 3/8		
		53	G 1/2		
		63	G 1/2		
		64	G 3/4		
		84	G 3/4		
		85	G 1		
Pressure limiting valve with suction valve for cylinders, (tapped hole at A, B, R)	DMVN	42	G 3/8	Steel: Perm. pressure A, B = 350 bar R = 20 bar	
		53	G 1/2		
		64	G 3/4		
Single valve with thru-holes (tapped hole at P and R)	MVT	63	G 1/2	Steel: Perm. pressure P and R = 315 bar	
		1) 3) 5)			
Pressure limiting valve with free return R → P via a by-pass check valve	Corner valve, pipe mounting	46	G 3/8	Spheroidal casting Perm. pressure P and R = 500 bar	
		56	G 1/2		
		66	G 3/4		
		47	G 3/8 (A)		
		58	G 1/2 (A)		
	For inline installation in a pipe system	SVC	46	G 3/8	Steel: Perm. pressure P and R = 500 bar
			56	G 1/2	
			66	G 3/4	
			47	G 3/8 (A)	
			58	G 1/2 (A)	
69	G 3/4 (A)				

Table 3: Adjustment (during operation)

Without coding	Standard, tool adjustable
R	Manually adjustable (Wing screw+wing nut)
V 5) 8)	Turn knob (self-locking)
H 5) 10)	Turn knob lockable Keys conforming the regulations of the automotive industry; One key is scope of delivery (usually anyway in the possession of the authorized work staff)

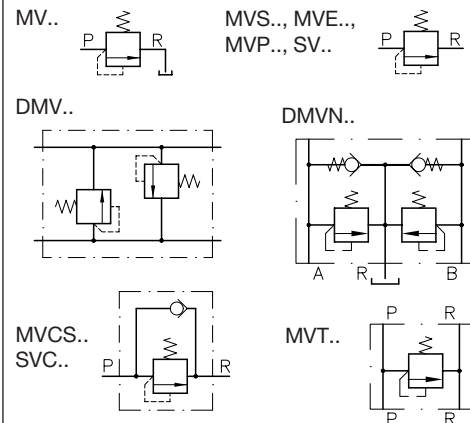
Table 2: Pressure range and flow

Attention: The pressure will be set acc. to the table below, if not ordered otherwise

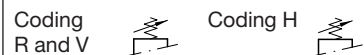
Pressure range	A 3)	B	C	E	F
(0) 4) ...	700	500	315	160	80
... P _{max} (bar)	Size 4, 5, 6				
	Size 8	400 9)	315	160	---
Pressure setting from HAWE (bar) 2)	450	400	315	160	80
Corresponding flow Q _{max} (lpm)	Size 4	12	20		
	Size 5	20	40		
	Size 6	40	75		
	Size 8	100	160		

Symbols

Illustration of the standard version (tool adjustable)



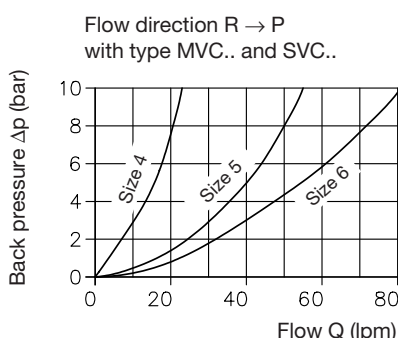
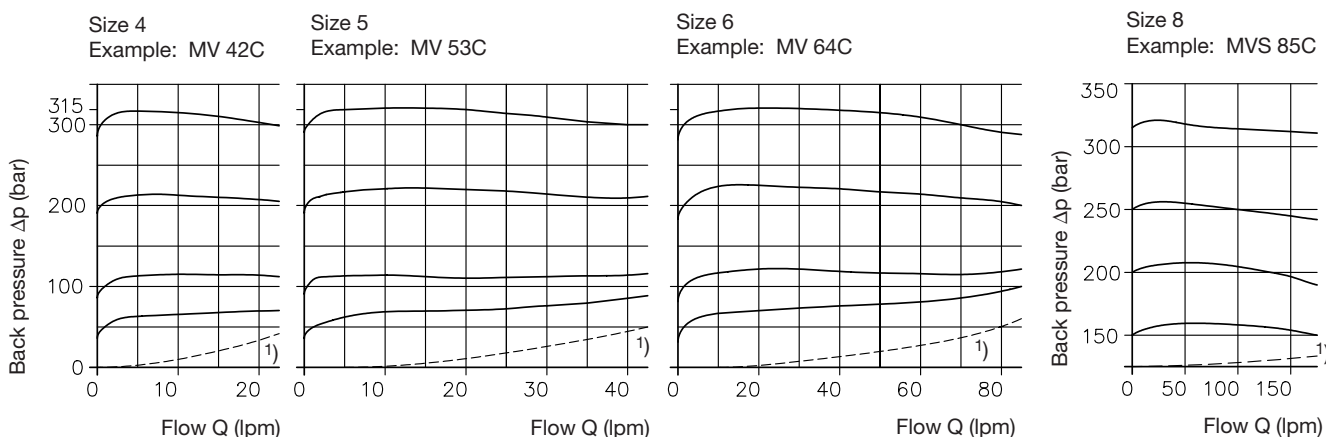
Additional adjustability:



- 1) Tool adjustable version only
- 2) When not specified in the order
- 3) Pressure range coding A not avail. for type DMV, DMVN, MVT, MVCS, and SVC
- 4) A setting below 0.2 P_{max} is not effective. The min. pressure that can be achieved, when the spring is completely decompressed depends on the valve related back pressure and the flow (sect. 3.2)
- 5) Not available as size 8
- 6) Suction valves serve for the volume compensation, preventing the formation of a vacuum within hydraulic cylinders
- 8) Coding V not available for type MVS 4
- 9) Pressure range B not available for type SV 85
- 10) Coding H not available for type MVE 4 and MVP 4

3.2 Additional data

Nomenclature and design	Pressure valve controlled directly, ball seated design																																																							
Intended application	Zinc die-casting: Standard model for normal production conditions Spheroidal casting: For rough operation conditions; where mechanical shocks or vibrations cannot be avoided (automotive engineering). Also when there are pressure surges in the return pipe.																																																							
Mounting and installet position	Dep. on type, either freely suspended in the pipe work, secured via a thru-hole or screw-in or manifold mounting; arbitrary installation position																																																							
Line connection	Steel or spheroidal cast parts zinc galvanized; Spring domes made of zinc pressure die-casting are untreated																																																							
Flow direction	P → R, with SVC and MVCS free return flow R → P (Attention: Observe Q_{max} sect. 3.1, table 2)																																																							
Mass (weight) approx. kg	<table border="1"> <thead> <tr> <th>Size</th> <th>MV</th> <th>MVS</th> <th>MVE</th> <th>MVP</th> <th>SV</th> <th>DMV</th> <th>DMVN</th> <th>MVT</th> <th>MVCS</th> <th>SVC</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>0.2</td> <td>0.2</td> <td>0.2</td> <td>0.3</td> <td>0.2</td> <td>0.7</td> <td>0.8</td> <td>---</td> <td>0.3</td> <td>0.3</td> </tr> <tr> <td>5</td> <td>0.3</td> <td>0.3</td> <td>0.3</td> <td>0.5</td> <td>0.3</td> <td>1.3</td> <td>1.5</td> <td>---</td> <td>0.4</td> <td>0.4</td> </tr> <tr> <td>6</td> <td>0.5</td> <td>0.5</td> <td>0.4</td> <td>0.8</td> <td>0.7</td> <td>1.8</td> <td>2.4</td> <td>1.3</td> <td>0.7</td> <td>0.9</td> </tr> <tr> <td>8</td> <td>---</td> <td>2.0</td> <td>1.0</td> <td>1.6</td> <td>0.9</td> <td>4.5</td> <td>---</td> <td>---</td> <td>---</td> <td>---</td> </tr> </tbody> </table>	Size	MV	MVS	MVE	MVP	SV	DMV	DMVN	MVT	MVCS	SVC	4	0.2	0.2	0.2	0.3	0.2	0.7	0.8	---	0.3	0.3	5	0.3	0.3	0.3	0.5	0.3	1.3	1.5	---	0.4	0.4	6	0.5	0.5	0.4	0.8	0.7	1.8	2.4	1.3	0.7	0.9	8	---	2.0	1.0	1.6	0.9	4.5	---	---	---	---
Size	MV	MVS	MVE	MVP	SV	DMV	DMVN	MVT	MVCS	SVC																																														
4	0.2	0.2	0.2	0.3	0.2	0.7	0.8	---	0.3	0.3																																														
5	0.3	0.3	0.3	0.5	0.3	1.3	1.5	---	0.4	0.4																																														
6	0.5	0.5	0.4	0.8	0.7	1.8	2.4	1.3	0.7	0.9																																														
8	---	2.0	1.0	1.6	0.9	4.5	---	---	---	---																																														
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 mm ² /s, opt. operation approx. 10... 500 mm ² /s. 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; Note the viscosity range ! Permissible temperature during start: -40°C (Note start-viscosity!), as long as the service temperature is at least 20K higher for the following operation. Biological degradable pressure fluids: Note manufacturer's specifications. By consideration of the compatibility with seal material not over +70°C.																																																							
Δp-Q-characteristics	Characteristic curve shown with example MV..C (basic tendency, there are certain differences depending on the pressure range and the housing shape of the various basic types) An increased return back pressure will transform the curves into positive Δp-figures.																																																							



Oil viscosity during testing 50 mm²/s

Pressure variations (apply to all valves acc. to sect. 3.1). Rough guide line figures (valve idling) per one turn of the set screw.

Pressure range (bar)	Travel f_{max} (mm) / Δp (bar) per one turn ²⁾			
	Size 4	Size 5	Size 6	Size 8
A 0 ... 700	4.5 / 195 (4.3 / 220)	8.4 / 105 (9.1 / 140)	7.4 / 120 (7 / 180)	---
B 0 ... 500 (400)	6.3 / 100 (6.1 / 110)	9.7 / 65 (10 / 90)	7.9 / 80 (7 / 130)	9 / 68
C 0 ... 315	7.1 / 55 (6.5 / 65)	7.7 / 51 (7.2 / 80)	10.2 / 35 (9.3 / 62)	13 / 37 (12.8 / 57)
E 0 ... 160	10.5 / 19 (8 / 27)	12 / 17 (11.2 / 26)	11.5 / 17.5 (10 / 29)	12.5 / 20 (12.4 / 30)
F 0 ... 80	10.5 / 9.5 (7.2 / 15)	11.5 / 9 (7.3 / 20)	12.5 / 8 (9.7 / 15)	---

Attention: Any pressure re-adjustment should be monitored with a pressure gauge! For adjustment instruction, see section 5

1) Design related characteristic back pressure with spring relieved (static pressure value 0 bar). Pressure below this limit line cannot be achieved, see also footnote 4), sect. 3.1

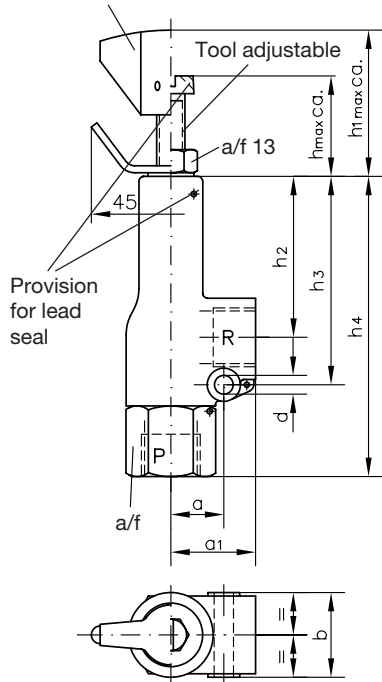
2) Figures in brackets apply to type SV and SVC

4. Dimensions of units

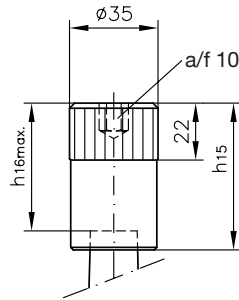
All dimensions are in mm, subject to change without notice!

Type MV 4(5, 6) and MVS 4(5, 6)

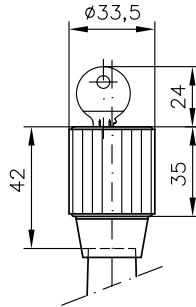
Means of adjustment coding R



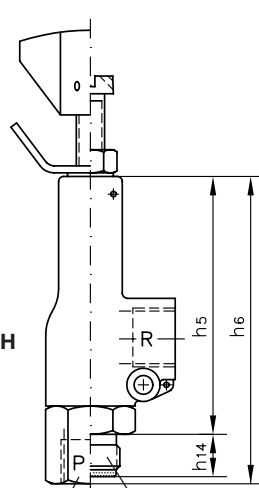
Means of adjustment coding V



Means of adjustment coding H



Type MVCS 4(5, 6)

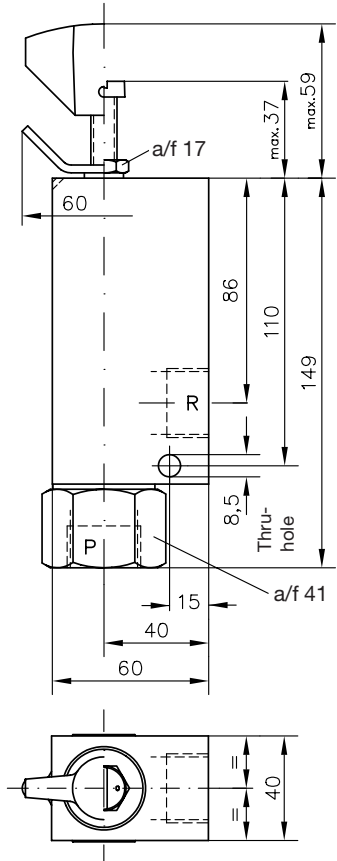


MVCS..6 MVCS..7(8, 9)

Tapped holes shap X Tapped journal shape B

similar to DIN 3852 page 2

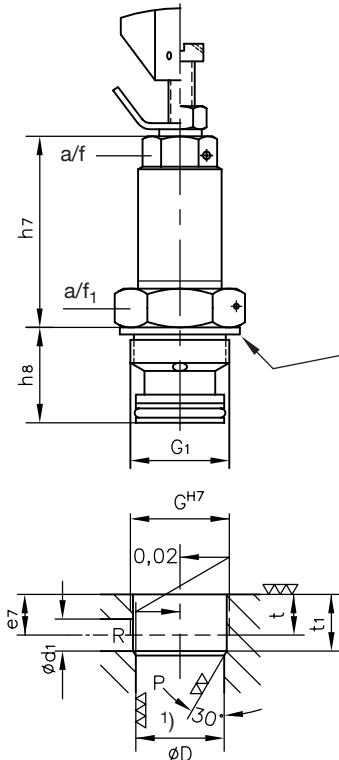
Type MVS 8



Size	a	a ₁	b	d	h	h ₁	h ₂	h ₃	h ₄	h ₅	h ₆	h ₁₄	h ₁₅	h ₁₆	a/f
4	15	24	24	5.3	28	40	46	61	86	72	85.5	13	58	41	22
5	18	30	29	6.4	31	42	49	66	95	82	100.5	15	58	41	27
6	20	35	36	6.4	31	44	62	82	117	100	120	17	64	56	30

For port size, see section 3.1

Type MVE 4(5, 6, 8)

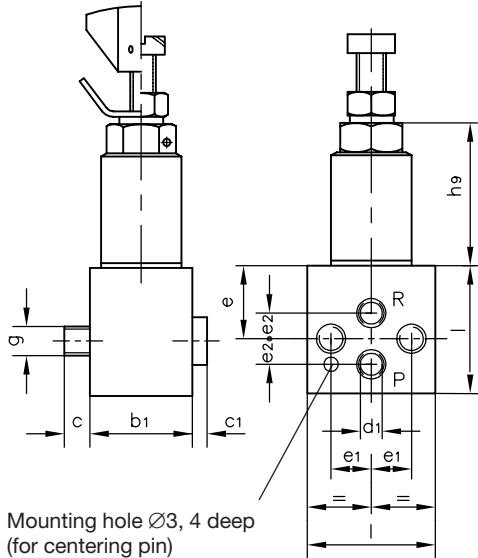


1) at pressure below 315 bar there is also a rougher surface ∇ ($R_a = 1.6$; $R_t = 16$) permissible

Size	Sealing ring DIN 7603...
4	A 22x27x1.5 (St)
5	A 28x34x2 (St)
6	A 30x36x2 (St)
8	A 40x49x2 (St)

Size	Thread G and G1
4	M22x1.5
5	M28x1.5
6	M30x1.5
8	M40x1.5

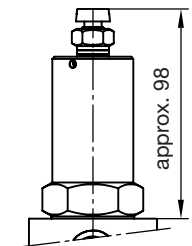
Type MVP 4(5, 6, 8)



Sealing of ports P and R:

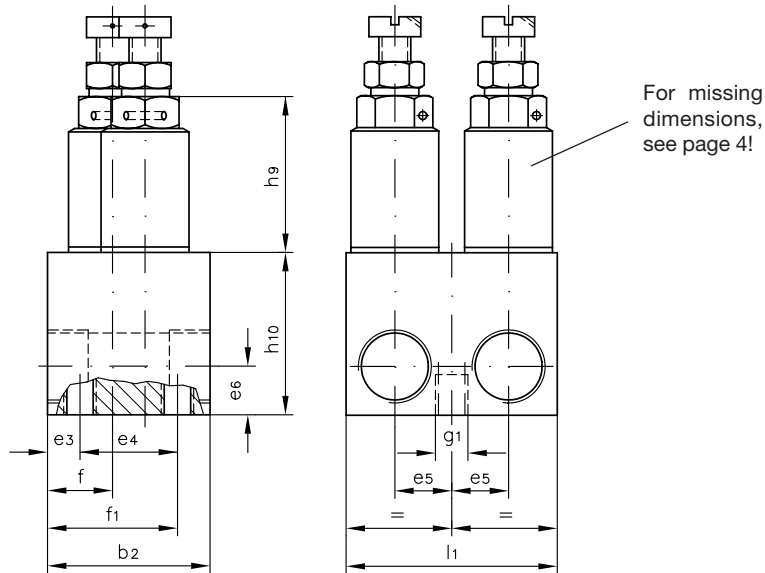
Size	4	5	6	8, 8 A
O-ring NBR 90 Sh	8x2	10x2	13.95x2.62	18.76x2.62

Type MVP 8 A



Size	h ₇	h ₈	D	e ₇	d ₁	t	t ₁	a/f	a/f ₁	Torque for steel (Nm)	Size	b ₁	c	c ₁	d ₁	e	e ₁	e ₂	g	h ₉	l
4	48	26	18 ^{H8}	12	6	12	15	22	27	80	4	28	7	8	6	20	11	7	M8	39	35
5	53.5	27	25 ^{H8}	11.5	9	9	16	27	32	120	5	32	8	8	9	21	13.5	9	M8	42	40
6	65.5	32	25 ^{H8}	14	12	10	19	30	36	160	6	35	10	10	12	26	17	11	M10	51.5	50
8	90	40	36 ^{H8}	19	16	12	27	41	46	300	8, 8 A	50	15	12	16	30	20	13	M12	75	60

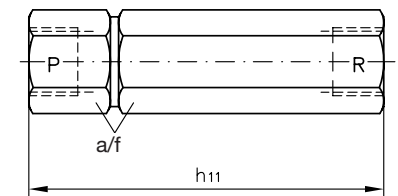
Type DMV 4(5, 6, 8)



Size	b ₂	e ₃	e ₄	e ₅	e ₆	f	f ₁	g ₁	h ₉	h ₁₀	l ₁
4	40	8	24	14	12	16	24	M 8, 10 deep	39	40	52
5	50	10	30	18	15	19	31	M 8, 10 deep	42	50	65
6	60	10	40	21	18	23	37	M 10, 12 deep	51.5	60	75
8	80	10	60	27	25	30.5	49.5	M 10, 12 deep	75	80	96

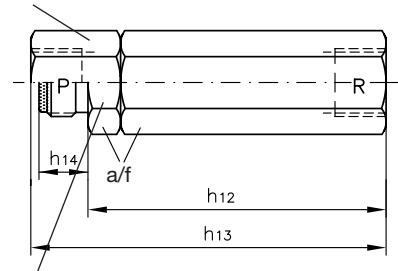
For port size, see section 3.1

Type SV 4(5, 6, 8)



Type SVC 4(5, 6)

SVC..6: Tapped holes 1) form X



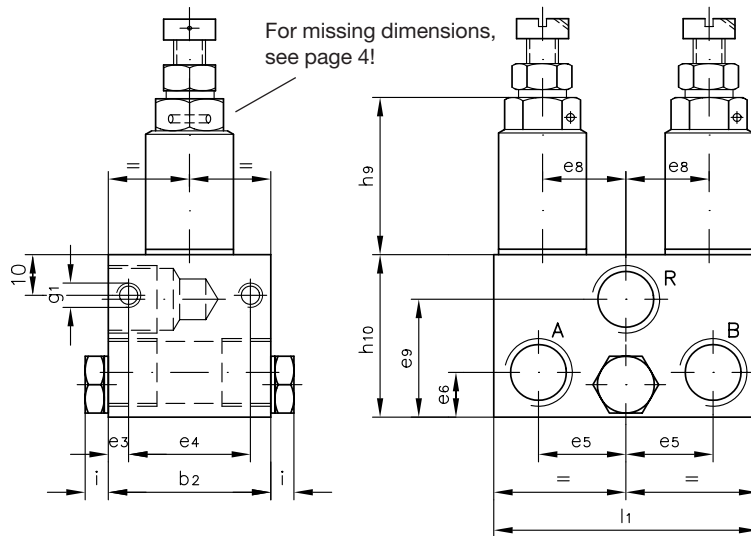
SVC..7(8, 9): Threaded stem 1) form B

Size	h ₁₁	h ₁₂	h ₁₃	h ₁₄	a/f
4	87	73	87	13	22
5	104	90	109	15	27
6	129	112	132	17	32
8	157	---	---	---	41

For port size, see section 3.1

1) similar to DIN 3852 page 2

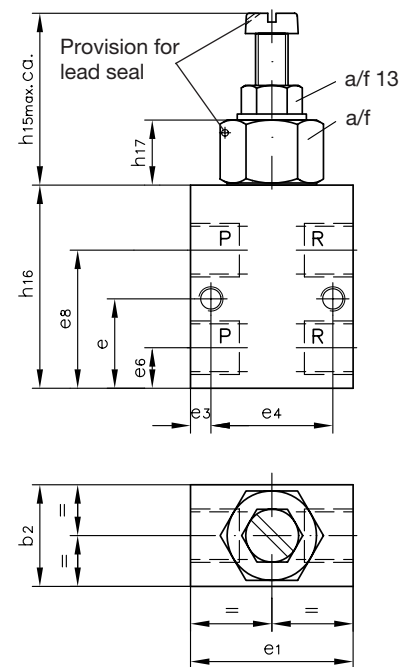
Type DMVN 42(53, 64)



Size	b ₂	e ₃	e ₄	e ₅	e ₆	e ₈	e ₉	g ₁	h ₉	h ₁₀	i	l ₁
4	40	5	30	21.5	11	20.5	29	M6, 10 deep	39	40	9	65
5	50	7.5	35	27	14	26.5	36	M8, 12 deep	42	50	9	82
6	60	9	42	32	16.5	32	44	M10, 12 deep	51.5	60	5	97

For port size, see section 3.1

Type MVT 63



Size	b ₂	e	e ₁	e ₃	e ₄	e ₆	e ₈	h ₁₅	h ₁₆	h ₁₇	a/f
6	35	32	50	7	36	14	50	52	70	27	30

For port size, see section 3.1

5. Adjustment instruction

The valves are delivered with proper setting from HAWE, when specified in your order (e.g. MV 53C - 250 bar). Washers prevent unauthorized increasing of the set pressure at adjustable valves. The pressure will be set acc. to they table 2 in sect. 3.1, if not ordered otherwise. Any pressure adjustment should be monitored by a pressure gauge and while the pump is running.

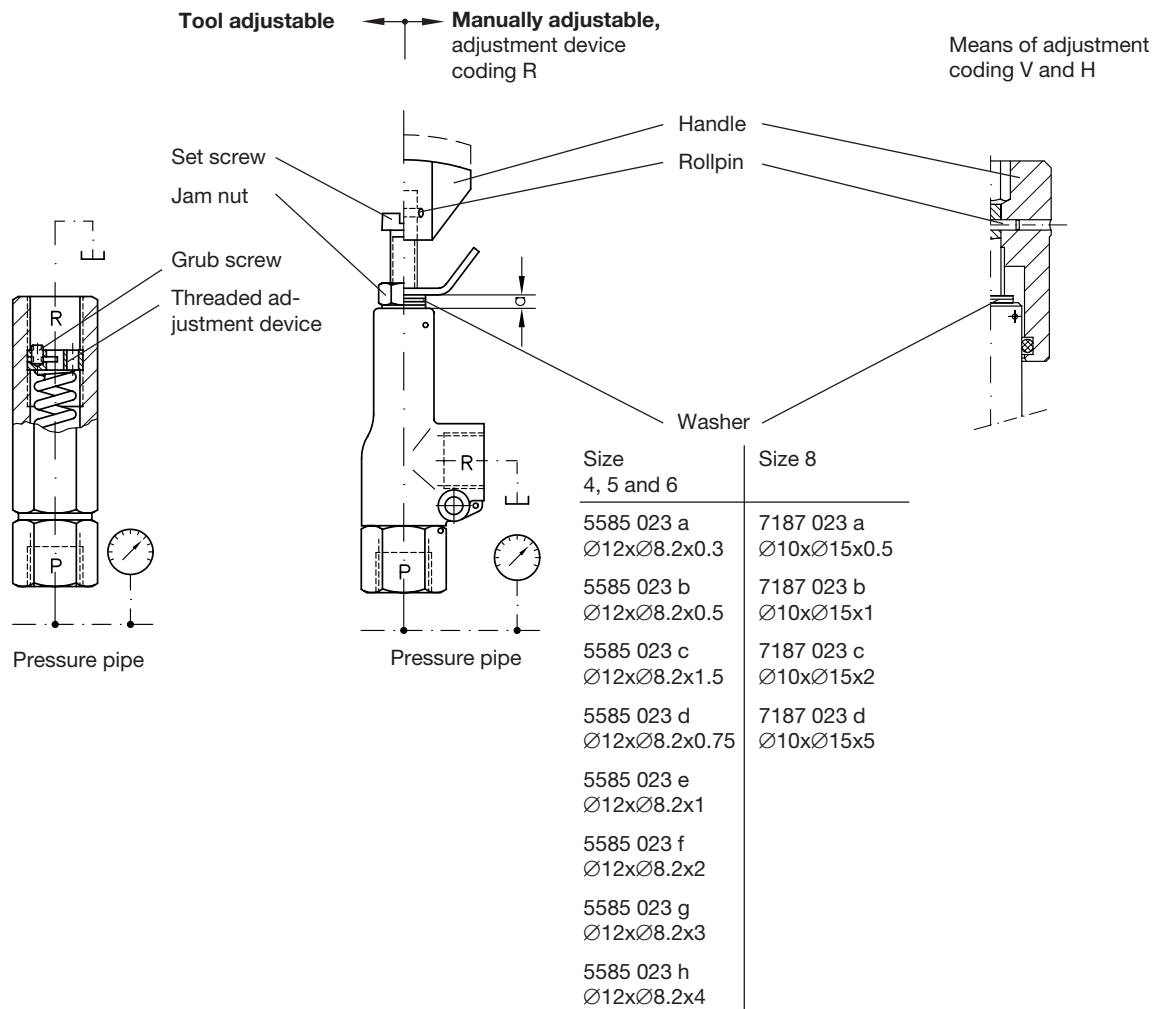
● Reduction of the setting

1. Pressure gauge connected to the pressure pipe (pressure gallery)
2. Type MV... and DMV(N): Loosen the lock nut (remove lead seal if necessary)
Type SV(C): Loosen grub screw
3. Turn the adjustment device counter clockwise (monitored by a pressure gauge)
4. Tighten the lock nut / grub screw after finished procedure. Renew the lead seal if required

● Raising of the setting

Observe the p_{max} figures stated in section 3.1 !

In principle proceed as above. Pressure increase when turned clockwise. Washers usually prevent unauthorized increasing of the pressure with manually adjustable versions. It is therefore necessary to remove enough of them (after driving the rollpin out of the winged handle) before the increased pressure can be set. Again any pressure adjustment should be monitored by a pressure gauge. After finishing the setting procedure sufficient washers, the winged locknut, the winged handle and the rollpin must be reinstalled.



Note: The pressure reading on the dial during adjustment, while the pump is running is always corresponding to this flow. Flow deviations will cause a slightly differing response pressure, depending on the design related back pressure of the valve housing (see sect. 3.2). Please add to your order coding in uncoded text „set at start of response“ when required e.g. for a pressure limiting valve intended for a hand pump $Q \approx 0$ lpm.

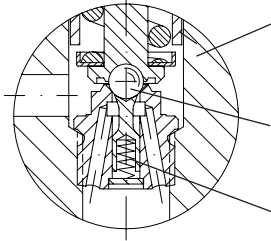
Pressure limiting valves - assembly kits

Pressure $p_{max} = 700$ bar; Flow $Q_{max} = 160$ lpm

These pressure limiting valves are ideally suited to be integrated in customer furnished valve housings or manifolds. The table below lists the available assembly kits, consisting of valve seat + valve ball, spring etc. The basic valve design is similar to the pressure limiting valves (with/without damping) illustrated in pamphlet D 7000/1.

The pressure relief valves are not suited for safeguarding pressure devices acc. to Pressure Equipment Directive 97/23/EC. There are also versions available featuring unit approvals, see D 7000 TÜV, D 7710 TÜV, D 6905 TÜV.

Special benefits:

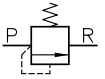


A travel stop prevents too high lift of the valve ball with the damping piston then jamming the valve passage. This could occur otherwise when the spring is completely decompressed or at excessive flow rates.

Ball seated valve with an dynamically acting lifting aid, making the pressure setting rather unaffected from the respective flow.


The spring loaded damping piston with its long guide prevents chatter over a wide viscosity range. For pressure limiting valves without damping, see D 7000/1 sect. 1

Flow pattern symbols

Standard, tool adjustable 

Manually adjustable:

Coding R and V 

Coding H 

1. Available versions, main data

Order examples:

MVA 6 A
MVD 5 B R X

Basic type coding, design

Version and coding		Spring dome made of steel	
Spring dome made of zinc die-casting	Perm. pressure at P = 700 bar	Perm. pressure at R = 200 bar	Perm. pressure at R = 350 bar
Perm. pressure at P = 700 bar	MV..4 = 300 bar		
Perm. pressure at R = 20 bar			
Valves with peened valve seat			
MVF ¹⁾	MVB	MVH MVJ ³⁾	MVZ ¹⁾
Valves with screwed-in valve seat			
MVD ¹⁾	MVA ¹⁾	MVK ¹⁾	MVU ¹⁾

X = Undamped version (see D 7000/1 sect. 1)

Adjustability during operation

No coding	Standard, tool adjustable (Slotted screw and jam nut)
R	Manually adjustable (Wing screw and wing nut)
V ¹⁾ ⁴⁾	Turn knob (self locking)
H ¹⁾ ⁴⁾	Turn knob, with lock Keys conforming the regulations of the automotive industry; One key is scope of delivery (usually anyway in the possession of the authorized work staff)

Pressure range

Coding	A	B	C	E	F
(0) ²⁾ ... p_{max} (bar)	700	500 400 ⁵⁾	315	160	80

Size

Coding	Flow Q_{max} (lpm) with pressure range (coding)				
	A	B	C	E	F
4	12	20	20	20	20
5	20	40	40	40	40
6	40	75	75	75	75
8	---	160	160	160	---

1) Only available with size 4, 5 and 6

2) Settings below 10 ... 15% of p_{max} are not recommended. The lowest, achievable pressure with the spring completely decompressed, depends also on the design related back pressure (dep. on flow), see D 7000/1, sect. 3.2)

3) Only size 6 available, perm. pressure at R = 50 bar

4) Only types MVF, MVB, MVD, and MVA

5) Only size 8

2. Unit dimensions

All dimensions in mm, subject to change without notice !

2.1 Valves with peened seat

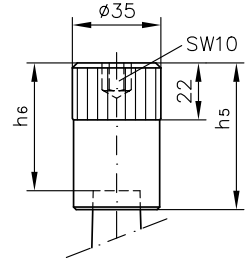
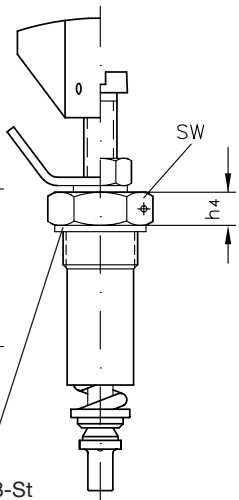
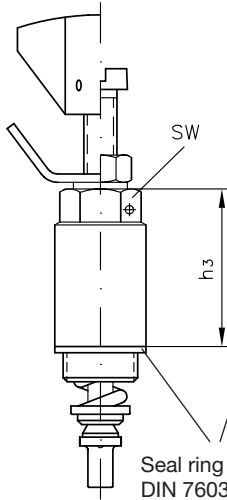
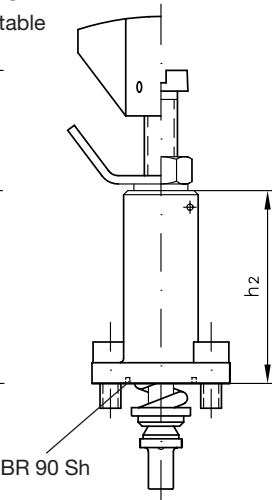
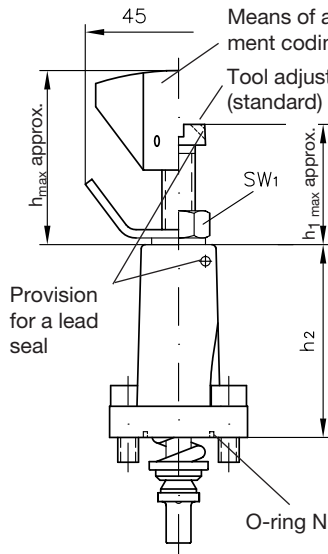
Type MVF 4(5, 6)

Type MVB 4(5, 6, 8)

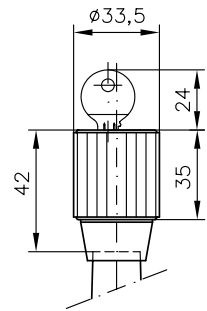
Type MVH 4(5, 6, 8)
MVJ 6

Type MVZ 4(5, 6)

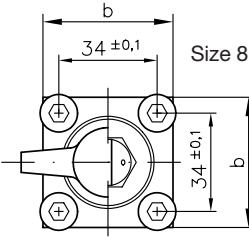
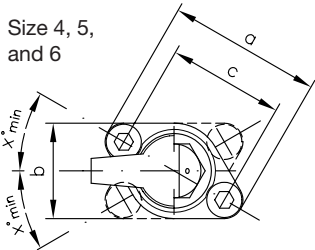
Means of adjustment coding V



Means of adjustment coding H



Size 4, 5, and 6



Size	4	5	6	8
O-ring	15.6x1.78	18.77x1.78	22x2	29.82x2.62

SW = a/f

2) in type MVZ 4

Torque for steel (Nm)

Mounting screws flange body

MVF MVB MVH(Z) MVJ 6

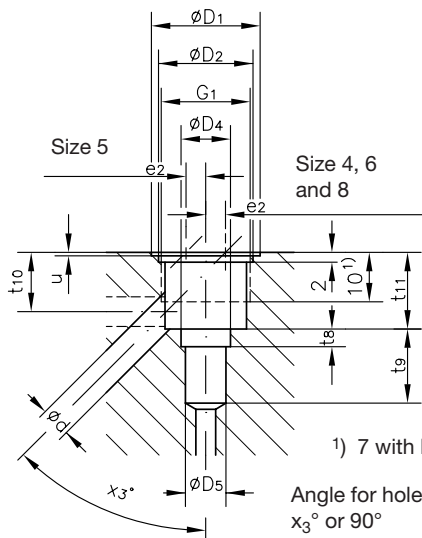
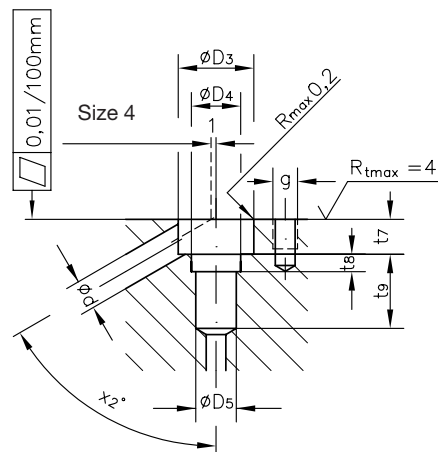
Size	a	b	c	h	h ₁	h ₂	h ₃	h ₄	h ₅	h ₆	x	SW	SW ₁	Seal ring DIN 7603-..	Torque for steel (Nm)			
															MVF	MVB	MVH(Z)	MVJ 6
4	37	23	28 ± 0.1	40	26	46.5	38	8	58	41	30°	17/22 2)	13	A 18x22x1.5	5...5.5	5.5...6	50	---
5	41	28	32 ± 0.1	42	29	49	42.5	10.5	58	41	35°	27	13	A 22x27x1.5	5...5.5	5.5...6	60	---
6	49	30	38 ± 0.1	44	29	59.5	52.5	8.5	64	56	35°	30	13	A 26x30x2	9...9.5	9.5...10	160	100
8	--	45	---	59	37	83	74	---	---	---	---	41	17	A 33x39x2	---	39	300	---

Mounting holes:

For type MVF.. and MVB..

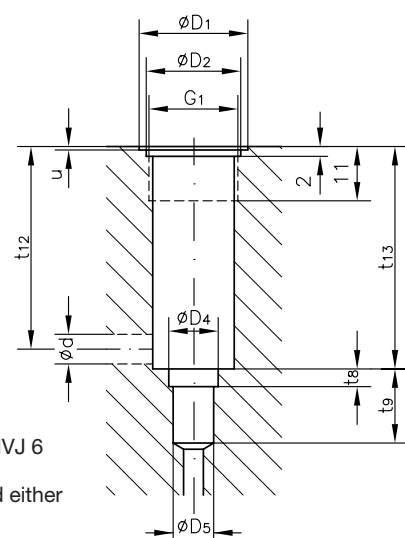
For type MVH.. and MVJ 6

For type MVZ..



1) 7 with MVJ 6

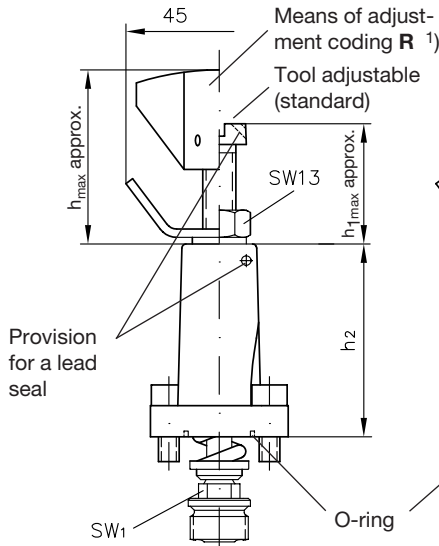
Angle for hole d either x₃° or 90°



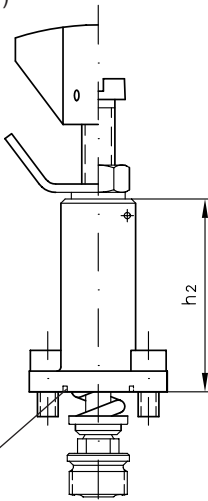
Size	G ₁	D ₁	D ₂	D ₃	D ₄	D ₅	d	e ₂	g	t ₇	t ₈	t ₉	t ₁₀	t ₁₁	t ₁₂	t ₁₃	u	x ₂	x ₃
4	M 18x1.5	22	18.2	15.3	10 ± 0.1	8.2	6	4	M5, 6 deep	7	3.6 ± 0.1	15	12	15.5	41	45	0.7	60°	45°
5	M 22x1.5	27	22.2	19	12 ± 0.1	10.4	9	2	M5, 7 deep	10	3.5 ± 0.1	20	13	18	45	50	1	60°	30°
6	M 26x1.5	30	26.2	22	16 ± 0.1	13	12	4	M6, 7 deep	14	4 ± 0.1	24	14.5	21	58	64.5	1	55°	45°
8	M 33x1.5	39	33.2	29	20 ± 0.1	17	16	--	M8, 9 deep	17	7.5 ± 0.1	26	16.5	25	--	--	1	35°	45°

2.2 Valves with one screw-in seat

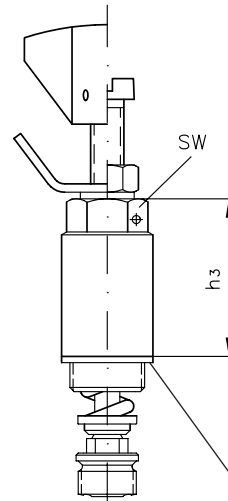
Type MVD 4(5, 6)



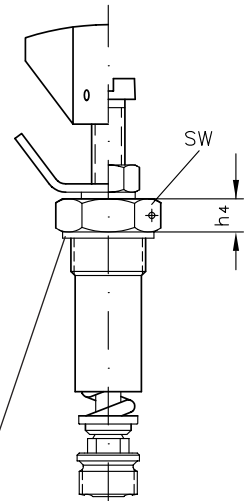
Type MVA 4(5, 6)



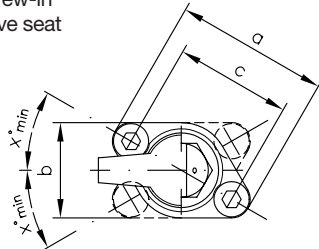
Type MVK 4(5, 6)



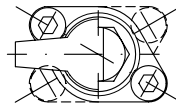
Type MVU 4(5, 6)



Screw-in valve seat



Size	4	5	6
O-ring NBR 90 Sh	15.6x1.78	18.77x1.78	22x2



Seal ring
DIN 7603-St (size 4 and 6)
DIN 7603-Cu (size 5)

1) For means of adjustment coding V and H, see sect. 2.1

Size	a	b	c	h	h ₁	h ₂	h ₃	h ₄	x	SW	SW ₁	Seal ring DIN 7603-..	Torque for steel (Nm)			
													Mounting screws flange body MVD	Screw-in spring dome MVK, MVU	Screw-in valve seat	
4	37	23	28 ± 0.1	40	26	46.5	38	8	30°	22	10	A 18x22x1.5	5 ... 5.5	5.5 ... 6	50	35
5	41	28	32 ± 0.1	42	29	49	42.5	10.5	35°	27	13	A 22x27x1.5	5 ... 5.5	5.5 ... 6	60	70
6	49	30	38 ± 0.1	44	29	59.5	52.5	8.5	35°	30	13	A 26x30x2	9 ... 9.5	9.5 ... 10	160	90

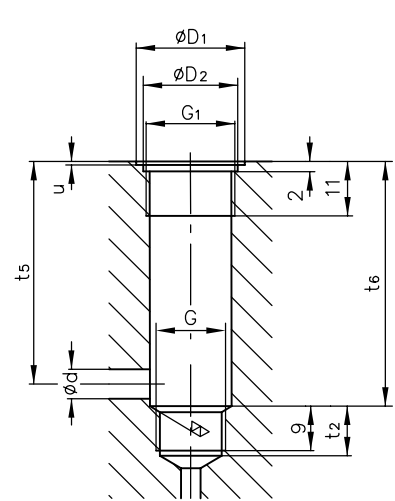
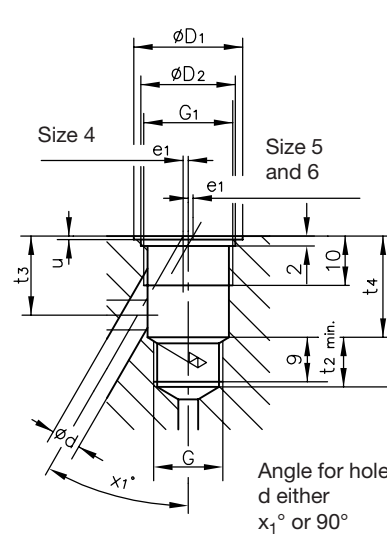
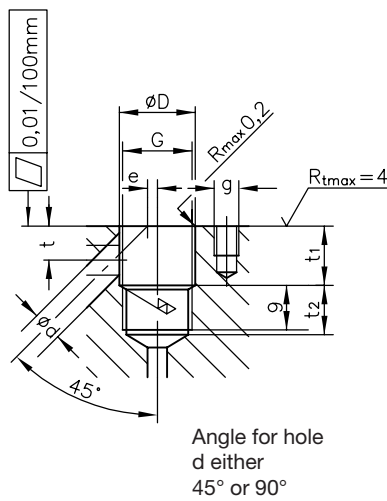
SW = a/f

Mounting holes:

For type MVD.. and MVA..

For type MVK..

For type MVU..

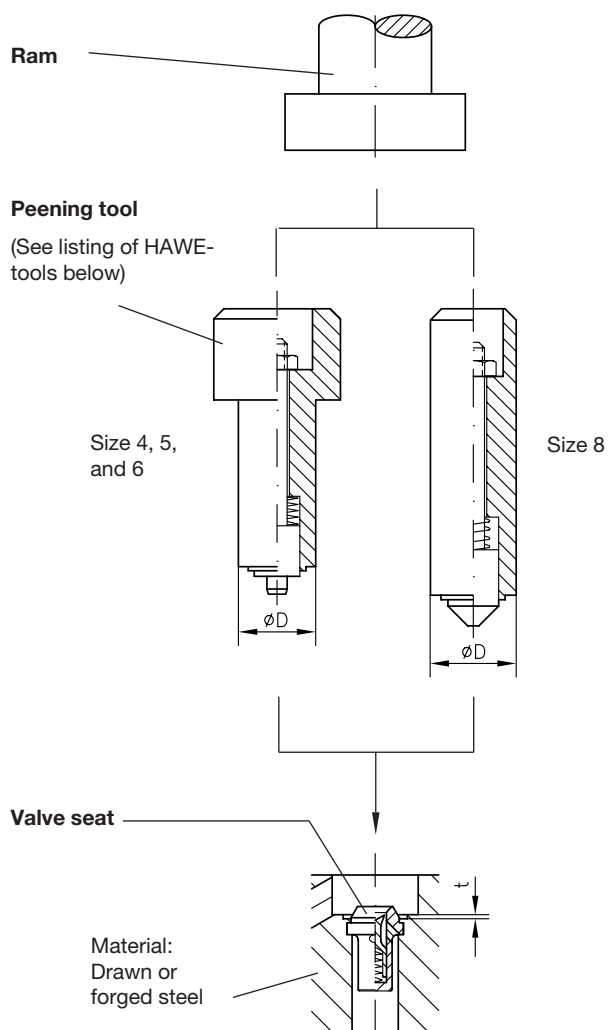


Size	G	G ₁	D	D ₁	D ₂	d	e	e ₁	g	t	t ₁	t ₂	t ₃	t ₄	t ₅	t ₆	u	x ₁
4	M 14x1.5	M 18x1.5	15.5	22	18.2	6	2	1	M5, 6 deep	7	12	10	16	20.5	45	49.5	0.7	30°
5	M 16x1.5	M 22x1.5	19	27	22.2	9	2.5	2.5	M5, 7 deep	8	14.5	15	17	22.5	49	54.5	1	40°
6	M 20x1.5	M 26x1.5	22	30	26.2	12	1	1	M6, 7 deep	12	19.5	19	18	25.5	62	69	1	40°

3. Mass (weight) approx. g

Type	MVD	MVA	MVK	MVU	MVF	MVB	MVH	MVJ	MVZ
Size 4	130	140	130	100	120	130	120	---	90
Size 5	160	190	200	160	150	180	190	---	150
Size 6	250	290	270	230	230	270	250	250	210
Size 8	---	---	---	---	---	700	700	---	---

4. Assembly and peening manual for type MVF, MVB, MVH, MVJ, and MVZ



Material:
Drawn or
forged steel

Attention:

For shape and dimensions of the valve seat's mounting hole, see mounting notes (page 2 and 3)

Tool order codings

Size	MVF MVB	MVH	MVJ	MVZ
4	W1-201	W1-309/1	---	1)
5	W1-310/3	W1-310/1	---	1)
6	W1-311/2	W1-311/1	W1-311/1	1)
8	W1-304	W1-304/1	---	---

1) On enquiry

Suited for valve	D	Peening depth t (mm)	Peening force (N) ²⁾
MVF(B, H) 4	15.25 - 0.05	0.7 +0.05	approx. 50000
MVZ 4	16.3 - 0.1		
MVF(B, H) 5	18.8 - 0.1	0.7 +0.05	approx. 65000
MVZ 5	20.3 - 0.1		
MVF(B, H, J) 6	21.9 - 0.1	0.8 +0.1	approx. 100000
MVZ 6	24.3 - 0.1		
MVB(H) 8	28.9 - 0.1	0.7 +0.05	approx. 90000

2) It is recommended to increase the peening force in steps always checking the resulting peening depth t until the specified figures are achieved.

Safety valve with unit approval type MV..X.. , SV..X..



Operating pressure p_{max} = 450 bar
Flow Q_{max} = 100 lpm

Safety valve type CMVX 2.. with unit approval see D 7710 TÜV

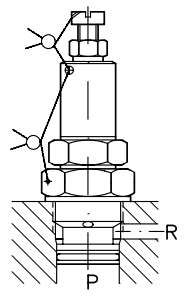
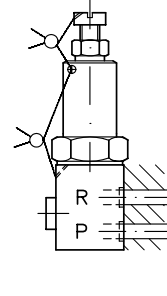
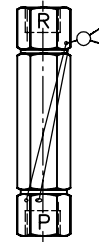
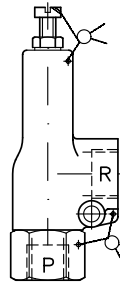
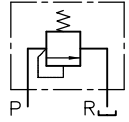
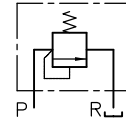
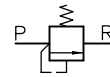
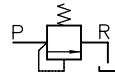
These safety valves are intended for accumulators in hydraulic circuits, covering the following regulations:

- Pressure device regulation 97/23 EC
- Operational safety regulation date 27.09.2002 / Use of Work Equipment Directive 2009/104/EC
- AD regulations 2000, sheet A2 (latest release)

1. General

These safety valves are available in three housing designs and three sizes. Selection is via the intended pressure setting (pressure range) and the intended flow (permissible flow), i.e. pump delivery flow must be lower than the flow rating of the valve (see in tables of sect. 2.1, 2.2, and 2.3).

The desired pressure setting has to be stated at the end of the order coding as the valve will be set accordingly before it is lead sealed at HAWE. This setting will be also integrated in the unit approval No. stamped on the valve body.



Elbow valve for direct pipe connection (page 1)

Inline valve for direct pipe connection (page 2)

Valve for manifold mounting (page 2)

Valve, cartridge design (page 2)

2. Available versions, main data

2.1 Elbow valve for direct pipe connection

Order coding example: **MXV 42 B - 350**

Type, order coding		Unit approval coding	Nom.- \varnothing of cone and seat (mm)	Perm. flow Q_{perm} (lpm)	Pressure range $p_{min} \dots p_{max}$ (bar)	Tapped ports conf. ISO 228/1 (BSPP)		
Spring housing made of spheroidal casting	zinc die casting							
MVSX 41 E	MXV 41 E	TÜV.SV.14 - 738.4.F.8.p	4	8	90 ... 160	MVSX 41 and MXV 41 = G 1/4		
MVSX 42 E	MXV 42 E				80 ... 160			
MVSX 41 C	MXV 41 C			TÜV.SV.14 - 738.4.F.10.p	10		316 ... 450	MVSX 42 and MXV 42 = G 3/8
MVSX 42 C	MXV 42 C							
MVSX 41 B	MXV 41 B	TÜV.SV.13 - 708.5.F.20.p	5	20	80 ... 100	MVSX 52 and MXV 52 = G 3/8		
MVSX 42 B	MXV 42 B							
MVSX 52 E	MXV 52 E	TÜV.SV.13 - 708.5.F.40.p	5	40	101 ... 140	MVSX 53 and MXV 53 = G 1/2		
MVSX 53 E	MXV 53 E							
MVSX 52 E	MXV 52 E	TÜV.SV.13 - 708.5.F.50.p	5	50	141 ... 160	MVSX 63 and MXV 63 = G 1/2		
MVSX 53 E	MXV 53 E							
MVSX 52 D	MXV 52 D	TÜV.SV.13 - 709.6.F.30.p	6	30	100 ... 140	MVSX 64 and MXV 64 = G 3/4		
MVSX 53 D	MXV 53 D							
MVSX 63 E	MXV 63 E	TÜV.SV.13 - 709.6.F.60.p	6	60	141 ... 160	MVSX 64 and MXV 64 = G 3/4		
MVSX 64 E	MXV 64 E							
MVSX 63 D	MXV 63 D	TÜV.SV.13 - 709.6.F.80.p	6	80	161 ... 210	MVSX 64 and MXV 64 = G 3/4		
MVSX 64 D	MXV 64 D							
MVSX 63 C	MXV 63 C	TÜV.SV.13 - 709.6.F.80.p	6	80	211 ... 315	MVSX 64 and MXV 64 = G 3/4		
MVSX 64 C	MXV 64 C							
MVSX 63 B	MXV 63 B	TÜV.SV.13 - 709.5.F.60.p	5	60	316 ... 450			
MVSX 64 B	MXV 64 B							



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D 7000 TÜV

2.2 Inline valve for direct pipe connection

Coding example: **SVX 42 C - 200**

Type, order coding	Unit approval coding	Nom.-Ø of cone and seat (mm)	Perm. flow Q_{perm} (lpm)	Pressure range $P_{min} \dots P_{max}$ (bar)	Tapped ports conf. ISO 228/1 (BSPP)
SVX 42 E	TÜV.SV.10 - 1109.4.F.3.p	4	3	80 ... 120	SVX 42 = G 3/8
	TÜV.SV.10 - 1109.4.F.4.p		4	120 ... 160	
SVX 42 C	TÜV.SV.10 - 1109.4.F.3,5.p	4	3,5	160 ... 250	
	TÜV.SV.10 - 1109.4.F.6.p		6	250 ... 300	
SVX 42 B	TÜV.SV.10 - 1109.4.F.6.p	4	6	300 ... 430	

2.3 Valve for manifold mounting

Coding example: **MVPX 4 E - 100**

Type, order coding	Unit approval coding	Nom.-Ø of cone and seat (mm)	Perm. flow Q_{perm} (lpm)	Pressure range $P_{min} \dots P_{max}$ (bar)
MVPX 4 E	TÜV.SV.14 - 738.4.F.10.p	4	10	80 ... 160
MVPX 4 C			10	161 ... 315
MVPX 4 B			10	316 ... 450
MVPX 5 E	TÜV.SV.13 - 708.5.F.20.p	5	20	80 ... 100
	TÜV.SV.13 - 708.5.F.25.p		25	101 ... 160
MVPX 5 D	TÜV.SV.13 - 708.5.F.30.p		30	161 ... 210
MVPX 6 E	TÜV.SV.13 - 709.6.F.30.p	6	30	100 ... 140
	TÜV.SV.13 - 709.6.F.60.p		60	141 ... 160
MVPX 6 D	TÜV.SV.13 - 709.6.F.50.p		50	161 ... 210
MVPX 6 C	TÜV.SV.13 - 709.6.F.60.p		60	211 ... 315
MVPX 6 B	TÜV.SV.13 - 709.5.F.60.p	5	60	316 ... 450

2.4 Cartridge valve

Coding example: **MVEX 6 E - 100 - 3/4 A**

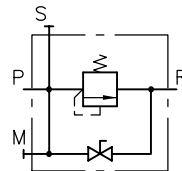
Table 1

Type, order coding	Unit approval coding	Nom.- \varnothing of cone and seat (mm)	Perm. flow Q_{perm} (lpm)	Pressure range $p_{min} \dots p_{max}$ (bar)
MVEX 4 E	TÜV.SV.14 - 738.4.F.10.p	4	10	80 ... 160
MVEX 4 C			10	161 ... 315
MVEX 4 B			10	316 ... 450
MVEX 5 E	TÜV.SV.13 - 708.5.F.10.p	5	10	100 ... 140
	TÜV.SV.13 - 708.5.F.16.p		16	141 ... 160
MVEX 5 D	TÜV.SV.13 - 708.5.F.20.p		20	161 ... 210
MVEX 6 E	TÜV.SV.13 - 709.6.F.90.p	6	90	100 ... 140
	TÜV.SV.13 - 709.6.F.100.p		100	141 ... 160
MVEX 6 D			100	161 ... 210
MVEX 6 C			100	211 ... 315
MVEX 6 B	TÜV.SV.13 - 709.5.F.30.p	5	30	316 ... 450

Table 1: Connection block for type MVEX 6

- 1/2 A	P and R = G 1/2, with drain valve
- 3/4 A	P and R = G 3/4, with drain valve

Symbol



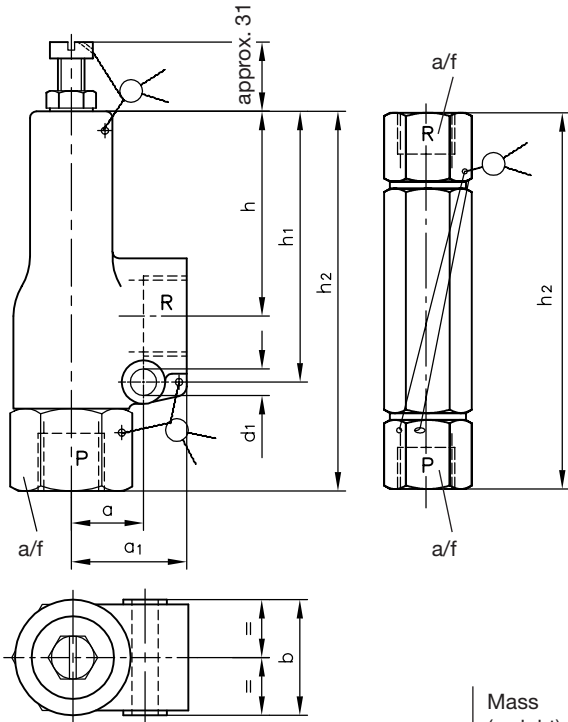
3. Additional parameter

Nomenclature and design	Directly acting safety valve, seated cone design
Installed position	Any
Flow direction	P→R, P = pump; R = return (pressure less)
Pressure fluid	Hydraulic oil acc. to DIN 51524 table 1 to 3; ISO VG 10 to 68 conf. DIN 51 519 Also suitable are biologically degradable pressure fluids of the type HEPG (Polyalkylenglycol) and HEES (synth. Ester) at operation temperature up to approx. +70°C.
Oper. viscosity	Approx. 12 ... 230 mm ² /s
Contamination rating	21/18/15 conf. ISO 4406
Temperature	Ambient: approx. -40 ... +80°C; Fluid: -20 ... +80°C, pay attention to the viscosity range! See also D 5488/1 sect. 3. Biological degradable pressure fluids: Pay attention to manufacturer's information. With regard to the compatibility with sealing materials do not exceed +70°C.
Static overload capacity	2 x p_{max}

4. Unit dimensions

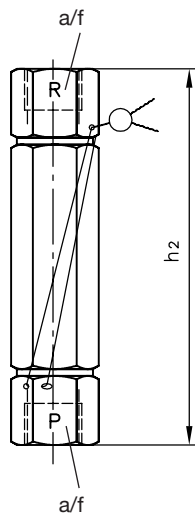
All dimensions in mm, subject to change without notice!

Type MV(S)X .. and MVX ..

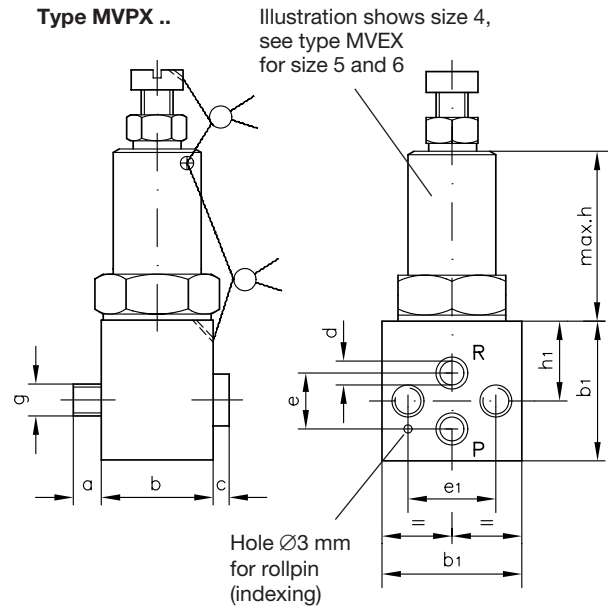


Type	a	a1	b	d1	h	h1	h2	a/f	Mass (weight) approx. (kg)
MV(S)X 41..	15	24	24	5.5	46	61	86	22	0.2
MV(S)X 42..	-	-	-	-	-	-	-	-	-
MV(S)X 52..	18	30	29	6.5	49	66	95	27	0.3
MV(S)X 53..	-	-	-	-	-	-	-	-	-
MV(S)X 63..	20	35	36	6.5	62	82	117	32	0.5
MV(S)X 64..	-	-	-	-	-	-	-	-	-
SVX 42..	-	-	-	-	-	-	110	22	0.2

Type SVX ..



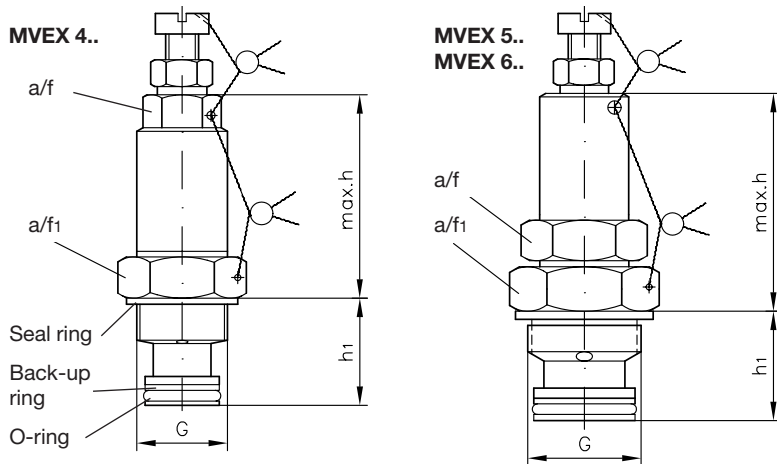
Type MVPX ..



Type	a	b	b1	c	d	e	e1	g
MVPX 4..	7	28	35	8	6	14	22	M8
MVPX 5..	8	32	40	8	9	18	27	M8
MVPX 6..	10	35	50	10	12	22	34	M10

Type	h	h1	Sealing of ports P and R via O-rings NBR 90 Sh	Mass (weight) approx. (kg)
MVPX 4..	39.5	20	8x2	0.3
MVPX 5..	44	21	10x2	0.5
MVPX 6..	53.5	26	13.95x2.62	0.8

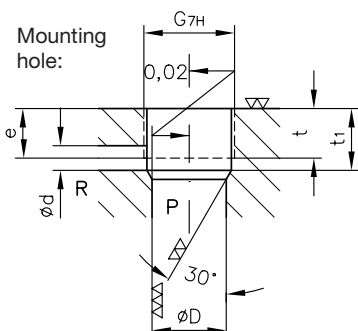
Type MVEX .. Attention: Observe the notes regarding installation in sect. 5!



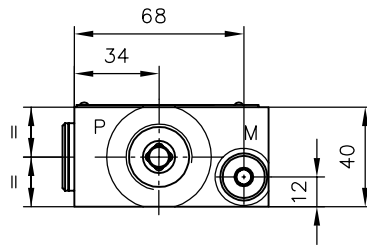
Type	h	h1	D	e	d	t	t1
MVEX 4..	49.5	26	18 ^{H8}	12	6	12	15
MVEX 5..	55	27	25 ^{H8}	11.5	9	9	16
MVEX 6..	67	32	25 ^{H8}	14	12	10	19

Type	a/f	a/f1	G
MVEX 4..	17	27	M 22x1.5
MVEX 5..	27	32	M 28x1.5
MVEX 6..	30	36	M 30x1.5

Type	Seal ring	O-ring NBR 90 Sh	Back-up ring Part No	Mass (weight) approx. (kg)
MVEX 4..	A 22x27x1.5 DIN 7603-St	12.37x2.62	5660 002	0.2
MVEX 5..	A 28x34x2 DIN 7603-Cu	20.29x2.62	3771 003	0.3
MVEX 6..	A 30x36x2 DIN 7603-Cu	20.29x2.62	3771 003	0.4

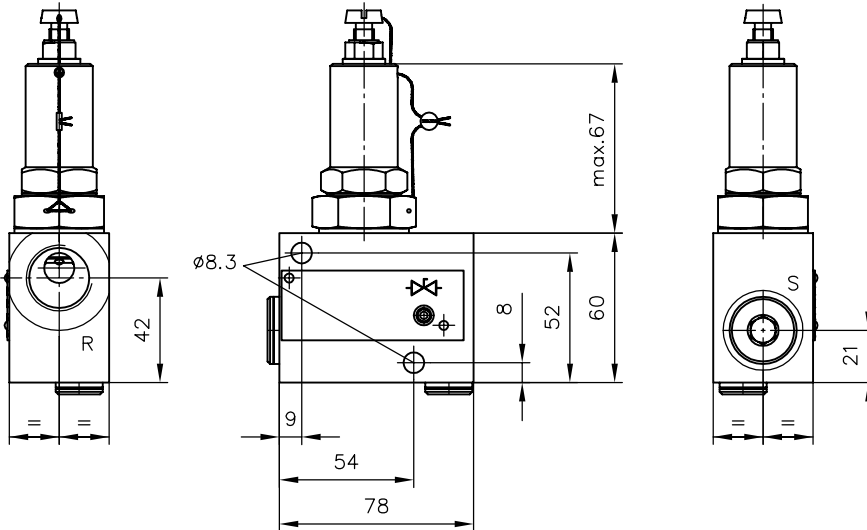


Type MVEX 6-... - 3/4 A
- 1/2 A



Tapped ports conf.
ISO 228/1 (BSPP):

	P, R	S	M
- 3/4 A	G 3/4	G 1/2	G 1/4
- 1/2 A	G 1/2	G 1/2	G 1/4



5. Notes assembly, operation and maintenance

The mounting of the safety valves has to be undertaken with special care. The regulations stated in the pressure device regulation have to be observed. The regular check routines depend on the regulations for safety valves and systems in your country. The illustrated flow direction is mandatory. The correct connection of pump line P and return line R is illustrated in the symbols at „General“ on page one.

The return line R has to be connected to the tank and must show a sufficient internal diameter. The max. torque specifications for type MVX, MVSX and type SVX must not be exceeded.

Attention: Support the valve while tightening the pipe fittings.

The mounting screws of the manifold mounting valves type MVPX, the cartridge valves type MVEX has to be torqued as specified.

Use only a/f1 to torque the valve type MVEX in the mounting hole of the manifold!

Attention: Do not damage the wire of the lead seal!

Max. torque for pipe fittings at port P and R

Type	Max. torque (Nm)			Type	Max. torque (Nm)			Type	Max. torque (Nm)		
	P	R			P	R			P	R	
MVSX	41	45	45	MVX	41	45	40	SVX	42	70	70
	42	70	70		42	70	65				
spheroidal casting	52	70	70	zinc die casting	52	70	65				
	53	140	140		53	140	90				
	63	140	140		63	140	90				
	64	230	230		64	230	90				

Max. torque for the mounting screws and for the cartridge valve body (see page 4)

Type	Max. torque			Type	Max. torque		
	g	(Nm)			a/f1	(Nm)	
MVPX	4..	M8	25	MVEX	4..	27	80
	5..	M8	25		5..	32	120
	6..	M10	50		6..	36	160

The valve should be installed at a well protected spot or an additional protective cover should be provided to prevent external damage.

Care has to be taken that no contamination enters the valve during installation and operation.

The contamination class stated in sect. 3 „Additional parameter“ must not be exceeded!

ZERTIFIKAT ◆ CERTIFICATE ◆ CERTIFICADO ◆ CERTIFIKAT ◆ 认证证书 ◆ CERTIFICATE ◆ ZERTIFIKAT



CERTIFICATE

The Certification Body of
TÜV SÜD Industrie Service GmbH,
 a Notified Body of the Pressure Equipment Directive (PED),

certifies that

HAWE Hydraulik SE
 Streifeldstraße 25
 81673 München, Germany

with the production plant
 85356 Freising, Kulturstraße 44, Germany

implemented, operates and maintains a quality
 assurance system as described in the Pressure Equipment
 Directive (97/23/EC)/Annex III, Module D

for the scope of

**production of directly acting spring loaded safety valves
 for hydraulic fluids**

acc. to EC Type-Examinations

The audit with the report number IS-DDB-MUC-Q-031-13 proves that the
 quality assurance system fulfils the PED requirements.

The manufacturer is authorized to provide the pressure equipment
 produced within the scope of the assessed quality assurance system with
 the following Notified Body number:

CE 0036

Certificate No.: DGR-0036-QS-843-13

valid until August 11th, 2016

Mannheim, July 10th, 2013

TÜV SÜD Industrie Service GmbH Tel.: +49 621 39 51 15
 Dudenstraße 28 Fax: +49 621 39 55 94
 68167 Mannheim e-mail: mannia.john@tuv-sued.de

Mannia John
 Mannia John
 Member of

Notified Body No.: 0036

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TÜV SÜD Industrie Services - PED-QA-Certification Body - 68167 Mannheim - Germany

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ZERTIFIKAT CERTIFICATE

(Konformitätsbescheinigung) / (of conformity)

EG-Baumusterprüfung

EC type-examination
 nach Richtlinie 97/23/EG / according to directive 97/23/EC
 Zertifikat-Nr. / Certificate No.: 07 202 1042 Z 0462/1 3/D

Name und Anschrift des Herstellers **HAWE Hydraulik SE**
 Name and address of bestmfr/ **Streifeldstraße 25**
 manufacturer: **D-81673 München**

Hiermit wird bescheinigt, dass das unten genannte EG-Baumuster die Anforderungen der
 Richtlinie 97/23/EG erfüllt. We hereby certify that the type examination mentioned below fulfils the requirements
 of directive 97/23/EC.

Geprüft nach Richtlinie 97/23/EG

Tested according to 97/23/EC

Prüfbericht-Nr. / Test report No.:

1042 P 0462/13/D

Beschreibung des Baumusters
 (Druckgerät):

Sicherheitsventil
 direkt wirkend, federbeistellt
 Typen MVX, MVPX, MVEX und MVSX in den Nenngrößen 4, 6 und 6
 (Rohrleitungsanschluss-, Plattenbau- oder Einschraubventil),
 Temperaturen zwischen -20°C und 80 °C
 für Hydrauliksystemen gemäß Herstellerangaben
 Einstelldrücke zwischen 80 und 450 bar

Fertigungsstätte/Place of manufacture:

**HAWE Hydraulik SE,
 Streifeldstraße 25, D-81673 München
 01.10.2022**

Gültig bis/ valid until:

Hannover, 13.03.2013

Zertifizierungsstelle für Druckgeräte
 der TÜV NORD Systems
 GmbH & Co. KG



Dipl.-Ing. A. Hoyer

Benannte Stelle/ Notified Body, 3043



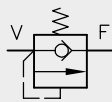
Mitglied der
 member of
 CONFEDERATION EUROPEENNE
 D'ORGANISMES DE CONTROLE

Pre-load check valves type VR

Screw-in valve or housing version

Operating pressure p_{\max} : 315 bar
Volumetric flow Q_{\max} : 120 lpm

Symbol:



Product documentation

D 7340

11-2014-1.0

SOLUTIONS FOR A WORLD UNDER PRESSURE

HAWE
HYDRAULIK

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1 Overview of Pre-load check valves type VR

Pre-load valves, also called sequence valves are a type of pressure control valve. They generate a largely constant pressure gradient between the inlet and outlet on the valve. In the opposite direction the flow can pass freely. In the normal position the valve has minor leakage.

The sequence valve type VR is available as a screw-in valve and in a housing version for in-line installation.

The primary application area is in return lines for oscillation damping, mainly in lifting equipment, lifting platforms, handling systems and in lifting gantries as fall protection.

Features and benefits:

- Compact screw-in valve

Intended applications:

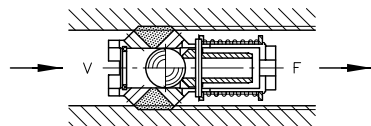
- Lifting equipment
- Lifting platforms
- Handling technology



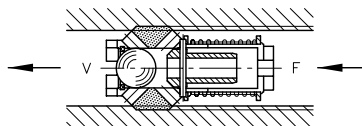
Figure 1: Screw-in cartridge

2 Available versions, main data

Volumetric flow pre-loaded in direction V → F



Free flow in direction V → F



Order coding example:

VR 33	C
VR 25	E
VR 47 27	C

Versions Table 2: Versions

Basic type and size Table 1: Basic type and size

Table 1: Basic type and size

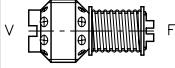

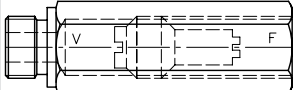
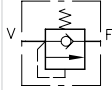
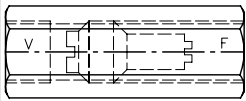
Basic type and size	Volumetric flow (reference value) Q_{max} (lpm)	Thread	Pre-load pressure $\Delta p_{V \rightarrow F}$ (opening pressure) (bar)					
			3	5	7	9	12	15
VR 1.	15	G 1/4 (BSPP)	●	●	●	●	●	●
VR 1. 14	15	M 14x1.5	●	●	●	●	●	●
VR 2.	40	G 3/8 (BSPP)	●	●	●	●	●	●
VR 2. 18	40	M 18x1.5	●	●	●	●	●	●
VR 3.	65	G 1/2 (BSPP)	●	●	●	●	●	
VR 3. 22	65	M 22x1.5	●	●	●	●	●	
VR 4.	120	G 3/4 (BSPP)	●	●	●	●	●	
VR 4. 27	120	M 27x2	●	●	●	●	●	



Note

Thread in accordance with ISO 228/1 (BSPP) or DIN 13 T6 (metric)

Table 2: Versions

Model	Description	View	Circuit symbol
C	Screw-in cartridge		
E	Tapped journal on one side		
G	Pipe connection on both sides		



Note

No housing version for screw-in cartridge with metric thread

3 Parameters

3.1 General

Designation	Pre-load valve (sequence valve)
Design	Ball valve
Model	Screw-in cartridge, housing version
Material	Steel; nitrided valve housing, electrogalvanised sealing nuts and connection block, hardened and ground functional inner parts
Mounting	Screw in cartridge C up to end of the thread and tighten (wedging effect); for tightening torque see Section 4
Installation position	As desired
Flow direction	V → F (pre-loaded) F → V (free flow)
Surface	Single valves blank, housing version electrogalvanised
Hydraulic fluid	Hydraulic oil conforming DIN 51 524 part 1 to 3; ISO VG 10 to 68 conforming DIN 51 519 Viscosity limits: min. approx. 4, max. approx. 1500 mm ² /s opt. operation approx. 10... 500 mm ² /s. Also suitable are biologically degradable pressure fluids types HEPG (Poly-alkylenglycol) and HEES (Synth. Ester) at service temperatures up to approx. +70°C.
Purity class	ISO 4406 <hr/> 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.

Pressure and volumetric flow

Operating pressure	315 bar
Static overload capacity	3x p
Volumetric flow	15 ... 120 lpm, see " Available versions, main data ", Table 1

Characteristic curves

Viscosity during measurements
approx. 50 mm²/s

Flow direction V → F

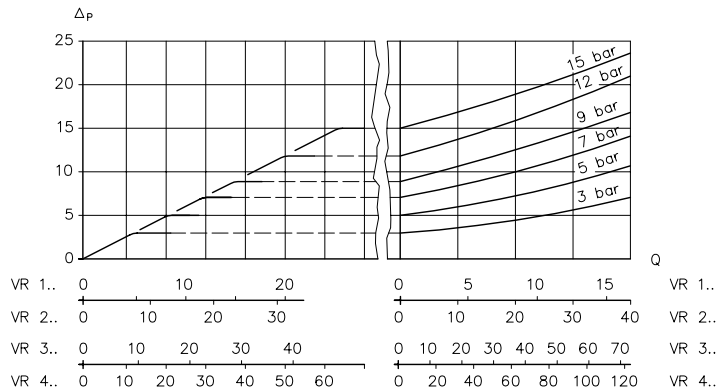


Figure 2: Q volumetric flow (lpm); Δp flow resistance (bar)

Leakage flow (cm³/min) below the opening pressure; reference valve (thread section approx. 30%)

Volumetric flow Q (lpm) above the opening pressure (pre-loaded)

Flow direction F → V (free flow)

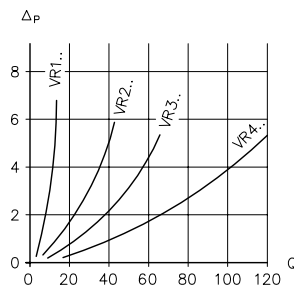


Figure 3: Q volumetric flow (lpm); Δp flow resistance (bar)

Weight

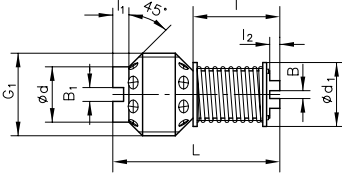
Type VR 1..C	= approx. 15 g
Type VR 1..G	= approx. 110 g
Type VR 1..E	= approx. 123 g
Type VR 2..C	= approx. 25 g
Type VR 2..G	= approx. 140 g
Type VR 2..E	= approx. 160 g
Type VR 3..C	= approx. 40 g
Type VR 3..G	= approx. 240 g
Type VR 3..E	= approx. 280 g
Type VR 4..C	= approx. 80 g
Type VR 4..G	= approx. 370 g
Type VR 4..E	= approx. 400 g

4 Dimensions

All dimensions in mm, subject to change!

Screw-in cartridge

Type VR ... C



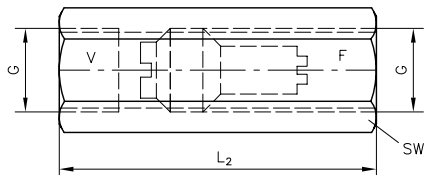
Note

Screw in VR..C up to end of the thread and tighten (see tightening torque)

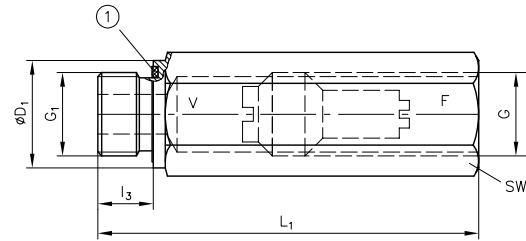
Type	G_1	B	B_1	L	l	l_1	l_2	$\varnothing d$	$\varnothing d_1$	Tightening torque max. (Nm)
VR 1..	G 1/4 A (BSPP)	1,2	2	31	18	4	2	8,5	10,5	5
VR 1. 14	M14x1.5									
VR 2..	G 3/8 A (BSPP)	1,2	2,5	36	19	4	2	11	13	6
VR 2. 18	M18x1.5									
VR 3..	G 1/2 A (BSPP)	2	3,5	42	23,5	4	2,5	14	16,2	10
VR 3. 22	M22x1.5									
VR 4..	G 3/4 A (BSPP)	2	4	54	28	7	3,5	17	20	15
VR 4. 27	M27x1.5									

Housing version

Type VR ... G



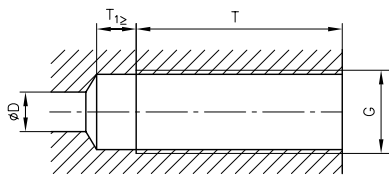
Type VR ... E



1 Special thread seal

Type	G (BSPP)	G ₁ (BSPP)	∅D ₁	L ₁	L ₂	l ₃	SW
VR 1..	G 1/4	G 1/4 A	11	78	66	11,5	19
VR 2..	G 3/8	G 3/8 A	22	82	70	12	22
VR 3..	G 1/2	G 1/2 A	27	96	80	14	27
VR 4..	G 3/4	G 3/4 A	32	106	100	16	32

4.1 Creating the mounting hole



Type	G (BSPP)	D	T	T ₁
VR 1..	G 1/4	5	40	7
VR 2..	G 3/8	8	46	8
VR 3..	G 1/2	12	53	10
VR 4..	G 3/4	16	66	12

5.1 Designated use

This fluid-power product has been designed, manufactured and tested acc. to standards and regulations generally applicable in the European Union and left the plant in a safe and fault-free condition.

To maintain this condition and ensure safe operation, operators must observe the information and warnings in this documentation.

This fluid-power product must be installed and integrated in a hydraulic system by a qualified staff who is familiar with and observes the general engineering principles and relevant applicable regulations and standards.

In addition, application-specific features of the system or installation location must be taken into account if relevant.

This product may only be used as a pressure-limiting valve within oil-hydraulic systems.

The product must be operated within the specified data. This documentation contains the technical parameters for various product versions.

**Note**

Non-compliance will void any warranty claims made against HAWE Hydraulik.

5.2 Assembly information

The hydraulic accumulator must be integrated in the system via state of the art connection components (screw fittings, hoses, pipes, etc.). The hydraulic system must be shut down as a precautionary measure prior to dismounting; this applies in particular to systems with hydraulic accumulators.

5.2.1 Screwing in the basic version

**Note**

Screw in VR..C up to end of the thread and tighten (see tightening torque)

Type	Tightening torque (Nm)
VR 1	5
VR 2	6
VR 3	10
VR 4	15

5.2.2 Creating the mounting hole

See description in [Chapter 4, "Dimensions"](#).

5.3 Operating instructions

Product, pressure and/or flow settings

All statements in this documentation must be observed for all product, pressure and/or flow settings on or in the hydraulic system.



Caution

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

- Always monitor the pressure gauge when setting or changing the pressure.

Filtering and purity of the hydraulic fluid

Soiling in the fine range, e.g. abraded material and dust, or in the macro range, e.g. chips, rubber particles from hoses and seals, can cause significant malfunctions in a hydraulic system. It is also to be noted that new hydraulic fluid "from the drum" does not necessarily meet the highest purity requirements.

For trouble-free operation pay attention to the purity of the hydraulic fluid (see also purity class in [Chapter 3, "Parameters"](#)).

5.4 Maintenance information

This product is largely maintenance-free.

Conduct a visual inspection to check the hydraulic connections for damage at regular intervals, but at least once per year. If external leaks are found, shut down and remedy.

Check the device surfaces for dust deposits at regular intervals (but at least annually) and clean the device if required.

6.1 Order coding for housing

Type	Housing construction	
	E	G
VR 1..	6920 130/1	7340 050
VR 2..	7340 065	7340 060
VR 3..	6920 008/2	7340 070
VR 4..	7340 085	7340 080

Type	Special thread seal
VR 1..	DRV 100 116-NB 650
VR 2..	DRV 100 147-NB 650
VR 3..	DRV 100 185-NB 650
VR 4..	DRV 100 239-NB 650

Additional versions

- [Pressure-limiting valve type MV, SV and DMV: D 7000/1](#)
- [Pressure-limiting valve and pre-load valve type MVG, MVE, and MVP: D 3726](#)
- [Pressure valve type CMV, CMVZ, CSV and CSVZ: D 7710 MV](#)

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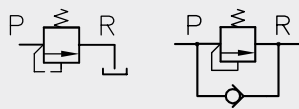
Pressure valve type CMV, CMVZ, CSV and CSVZ

Directly controlled, cartridge valve

Pressure p_{\max} : 500 bar

Volume V_{\max} : 60 lpm

Circuit symbol:



Product documentation

D 7710 MV

08-2013-1.3

SOLUTIONS FOR A WORLD UNDER PRESSURE

HAWE
HYDRAULIK

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1 Overview of pressure valves type CMV, CMVZ, CSV, CSVZ

Pressure-limiting valves and sequence valves are types of pressure control valves. Pressure-limiting valves safeguard the system against excessive system pressure or limit the operation pressure. Sequence valves generate a constant pressure difference between the inlet and outlet flow.

Type is a directly controlled valve that is damped as standard. Undamped variants are also available for special operating conditions. Versions that correspond to the Pressure Equipment Directive are also available. Type CMVZ and CSVZ is not influenced by the pressure conditions downstream and is therefore suitable for use in loss-free sequence control systems.

Valve type CMV and CSV can be screwed-in and can be integrated into control blocks. The necessary mounting holes are straightforward to make.

Features and benefits:

- Operating pressures up to 500 bar
- Various adjustment options
- Easily produced mounting hole

Intended applications:

- General hydraulic systems
- Test benches
- Hydraulic tools

Pressure relief valve type CMV

- It protects hydraulic systems against exceeding the max. permissible system pressure (safety valve) or serves to limit the pressure during service.

Pressure limiting valve type CMV.. X - without dampening

- Intended for special operation conditions e.g. prevention of unintended, creeping cylinder movements due to external loads or pressure rise in otherwise blocked cylinders induced by a temperature rise.
- Very little discrepancy between opening and closing pressure (low hysteresis).

Pre-load valve type CSV

- This valve generates a largely constant pressure difference between inlet and outlet, as long as there is a flow.
- A check valve allows free flow in the opposite direction (return flow).

Sequence valve type CMVZ and CSVZ

- Switching pressure (opening pressure) largely independent from the pressure on the outlet side.
- For use in sequence controls.



Figure 1: Basic version (cartridge valve), adjustable



Figure 2: Basic version (cartridge valve), fixed setting

2 Available versions, main data

2.1 Basic version (cartridge valve)

Symbol:

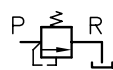


Figure 3: Type CMV

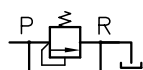


Figure 4: Type CSV



Figure 5: Type CMVZ

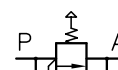


Figure 6: Type CSVZ

Order coding examples:

CMV 1	C	R	X	-200	-1/4
CSV 3	F			-60	

Single connection block Table 3 Design with single connection block

Pressure setting Pressure setting within the various pressure ranges

Suffix for version X Without dampening (for type CMV)

Adjustment Table 2 Adjustment

Pressure range Table 1 Type, size and pressure range

Type and size Table 1 Type, size and pressure range

Table 1 Type, size and pressure range

Type and size	Flow Q _{max} (lpm)	Pressure range from ... to (bar)				Description
		B	C	E	F	
CMV 1	20	100 ... 500	60 ... 315	30 ... 160	15 ... 80	Pressure limiting valve
CMV 2	40					
CMV 3	60					
CSV 2	40	100 ... 500	60 ... 315	30 ... 160	15 ... 80	Pressure sequence valve
CSV 3	60					
CMVZ 2	40	100 ... 500	60 ... 315	30 ... 160	15 ... 80	Sequence valve
CSVZ 2						

Table 2 Adjustment

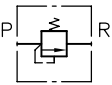
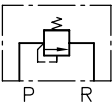
Coding	Description	Symbols
No coding	Tool adjustable	
R	Manually adjustable, with lock nut	<p>Figure 7: Example type CMV</p> <p>Figure 8: Example type CSV</p>

2.2 Version with connection block

Order coding example:

CMVZ	C	R	-300	-1/4
				Connection block Table 3 Version with connection block Pressure setting Pressure setting within the various pressure ranges Adjustment Table 2 Adjustment Pressure range Table 1 Type, size and pressure range Type and size Table 1 Type, size and pressure range

Table 3 Version with connection block

Coding	Description	For type	Symbol (example)
No Coding	Cartridge valve		See Chapter 2, "Available versions, main data"
- 1/4	For direct pipe connection (G 1/4 (BSPP))	CMV 1	
- 3/8	For direct pipe connection (G 3/8 (BSPP))	CMV 1 CMV 2 CMVZ 2 CSV 2 CSVZ 2	
- 1/2	For direct pipe connection (G 1/2 (BSPP))	CMV 3 CSV 3	
- P	For manifold mounting	CMV 2 CMVZ 2 CSV 2 CSVZ 2	

3 Parameters

3.1 General

General information

Nomenclature	Directly controlled pressure valves
Design	Ball seated valves
Model	Screw-in valve, valve for pipe connection, valve for manifold mounting
Material	Steel; nitrided valve housing, electrogalvanised sealing nuts and connection block, hardened and ground functional inner parts Balls made of rolling bearing steel
Installation position	Any
Port	<ul style="list-style-type: none"> ■ P = Inlet (pump side) ■ R = Outlet (return or carry-on) ■ (all ports pressure resistant) <p>Coding applies to circuit diagrams and assembly plans only. The coding is not stamped onto the valve housing. The coding can be found in the schematic overviews or the dimension diagrams in Chapter 4, "Dimensions".</p>
Hydraulic fluid	Hydraulic oil conforming DIN 51 524 part 1 to 3; ISO VG 10 to 68 conforming DIN 51 519 Viscosity limits: min. approx. 4, max. approx. 1500 mm ² /s opt. operation approx. 10... 500 mm ² /s. Also suitable are biologically degradable pressure fluids types HEPG (Poly-alkylenglycol) and HEES (Synth. Ester) at service temperatures up to approx. +70°C.
Purity class	ISO 4406 <u>21/18/15...19/17/13</u>
Temperature	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.

Pressure and volumetric flow

Operating pressure	On the pump side $p_{\max} = 500$ bar
Static overload capacity	Approx. $2 \times p_{\max}$ – tightened and sealing nuts locked
Volumetric flow	In accordance with Chapter 2, "Available versions, main data" Table 1 Basic version

Curves

Viscosity during measurements
approx. 60 mm²/s

Type CMV.B, CSV.B up to 500 bar

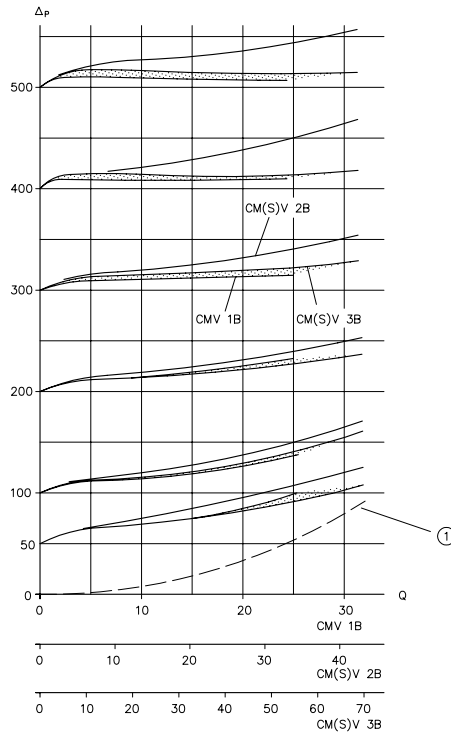


Figure 9: Q Flow (lpm); Δp Flow resistance (bar)

- 1 Curve for the valve body, there is no setting below this curve achievable

Type CMV.C, CSV.C up to 315 bar

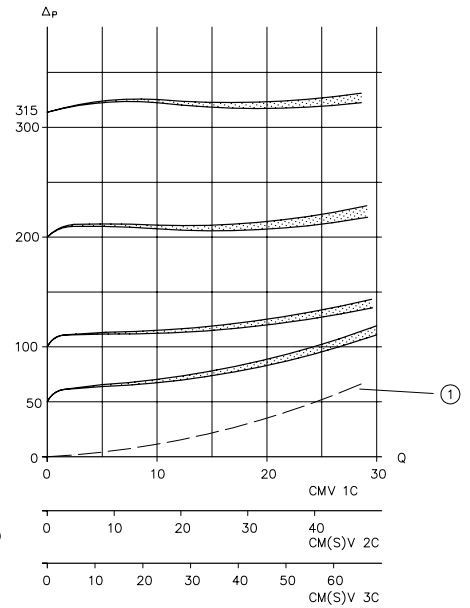


Figure 10: Q Flow (lpm); Δp Flow resistance (bar)

- 1 Curve for the valve body, there is no setting below this curve achievable

Viscosity during measurements
approx. 60 mm²/s

Type CMV.E, CSV.E up to 160 bar

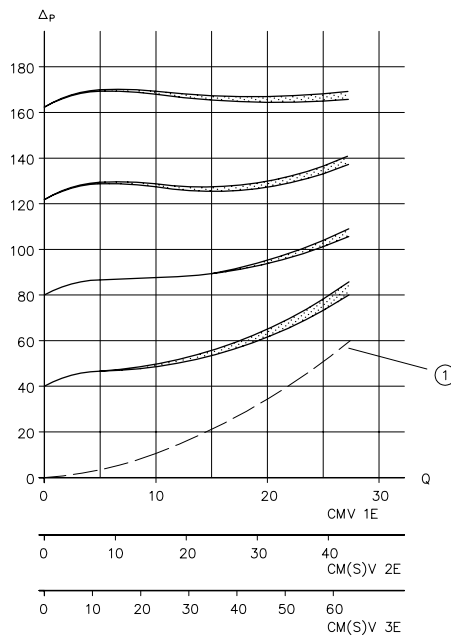


Figure 11: Q Flow (lpm); Δp Flow resistance (bar)

- 1 Curve for the valve body, there is no setting below this curve achievable

Type CMV.F, CSV.F up to 80 bar

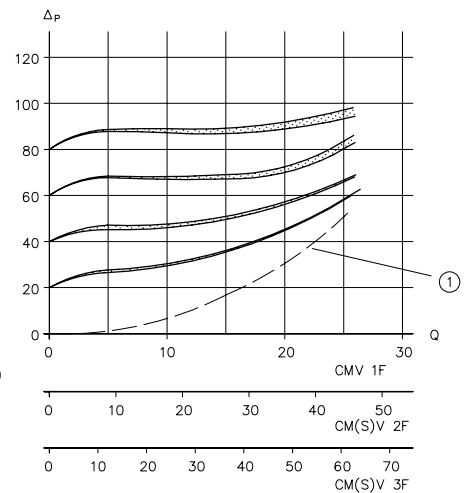


Figure 12: Q Flow (lpm); Δp Flow resistance (bar)

- 1 Curve for the valve body, there is no setting below this curve achievable

Type CSV

Pressure sequence valve, R→P Return flow

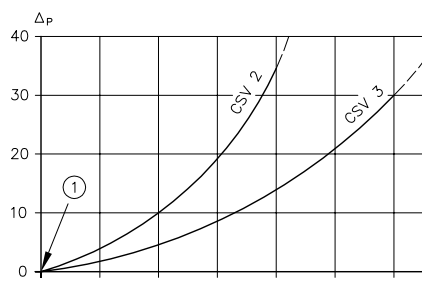


Figure 13: Q Flow (lpm), Δp Flow resistance (bar)

1 Pressure for opening approx. 0.2 to 0.3 bar

Type CMVZ 2, CSVZ 2

Sequence valve, relation flow to Flow resistance (example)

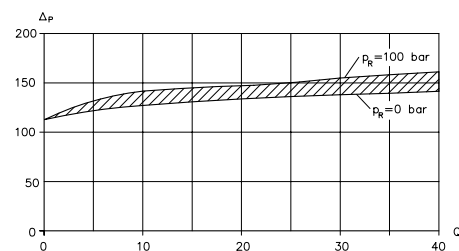


Figure 14: Q Flow (lpm), Δp Flow resistance (bar)

Mass

Basic version

Pressure limiting valve

Type CMV 1	= approx. 90 g
Type CMV 2	= approx. 160 g
Type CMV 3	= approx. 280 g

Pressure sequence valve

Type CSV 2	= approx. 170 g
Type CSV 3	= approx. 300 g

Sequence valve

Type CMVZ 2	= approx. 170 g
Type CSVZ 2	= approx. 180 g

Version with connection block

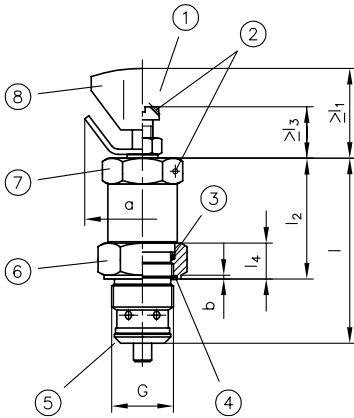
- 1/4	= + 260 g
- 3/8	= + 260 g
- 1/2	= + 420 g
- P	= + 260 g

4 Dimensions

All dimensions in mm, subject to change!

4.1 Basic version (cartridge valve)

Pressure limiting valve CMV and sequence valve type CMVZ

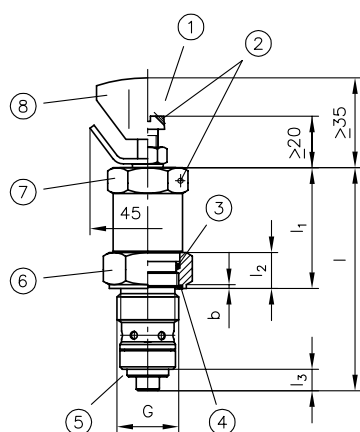


- 1 Tool adjustable
- 2 Provision for lead seal
- 3 O-ring
- 4 Seal
- 5 Sealing edge
- 6 Sealing nut a/f2
- 7 Valve housing a/f1
- 8 Manually adjustable

Type and size	G	a	b	l	l ₁	l ₂	l ₃	l ₄
CMV 1	M16x1.5	35	1	51	27	30	18	12
CMV 2 CMVZ 2	M20x1.5	45	1	59	35	37	20	13
CMV 3	M24x1.5	45	1.5	79	35	48	20	14

Type and size	Width across flats		Torque (Nm)		Seal	O-ring AU 90 Sh
	a/f1	a/f2	a/f1	a/f2		
CMV 1	17	22	40	35	KANTSEAL DKAR 00016-N90	14x1.78
CMV 2 CMVZ 2	22	24	50	40	KANTSEAL DKAR 00018-N90	17.17x1.78
CMV 3	27	30	70	60	KANTSEAL DKAR 00021-N90	21.95x1.78

Pre-load valve type CSV and sequence valve type CSVZ



- 1 Tool adjustable
- 2 Provision for lead seal
- 3 O-ring
- 4 Seal
- 5 Sealing edge
- 6 Sealing nut a/f2
- 7 Valve housing a/f1
- 8 Manually adjustable

Type and size	G	b	l	l ₁	l ₂	l ₃
CSV 2	M20x1.5	1	69	38.5	13	5.5
CSVZ 2						
CSV 3	M24x1.5	1.5	87	47	14	10

Type and size	Width across flats		Torque (Nm)		Seal	O-ring AU 90 Sh
	a/f1	a/f2	a/f1	a/f2		
CSV 2	22	24	50	40	KANTSEAL DKAR 00018-N90	17.17x1.78
CSVZ 2						
CSV 3	27	30	70	60	KANTSEAL DKAR 00021-N90	21.95x1.78

4.2 Mounting hole

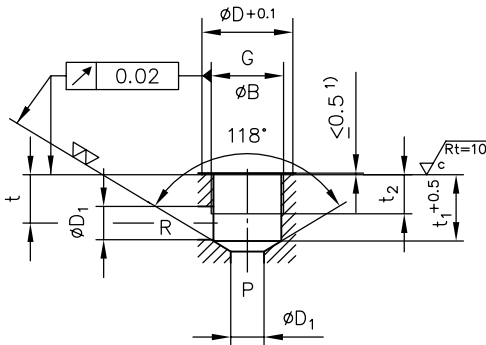


Figure 15: Mounting hole type CMV, CMVZ

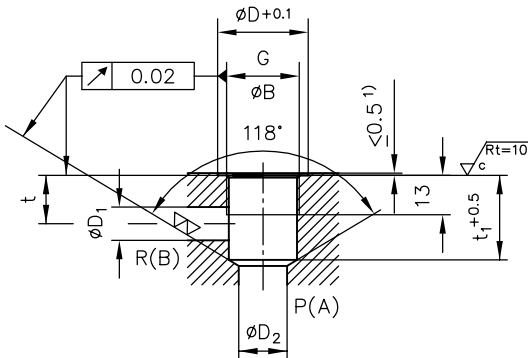


Figure 16: Mounting hole type CSV, CSVZ

The sealing of the inlet to outlet takes place at the contact area between the facial sealing edge of the screwed-in end of the valve body and the stepped shoulder of the core diameter at the location thread. The stepped shoulder is depicted with the normal 118° drill sharpening angle for steel. Therefore reaming of the hole and bevels to help the seals slip in are not necessary. The sealing of the attached valve and its fixing at the manifold body are made by a sealing nut with a special thread seal and an O-ring. Additionally the passage between port A and T is sealed at the screw-in port and the internal piston.

Type	G	$\varnothing D$	$\varnothing D_1$	t	t ₁	t ₂	Thread sink B _{max}
CMV 1	M 16x1.5	22	8	13	18	11	$\varnothing 16^{+0.2}$
CMV 2 CMVZ 2	M 20x1.5	24	10	14	20	13	$\varnothing 20^{+0.2}$
CMV 3	M 24x1.5	30	11	16	22	13	$\varnothing 24^{+0.2}$
Type	G	$\varnothing D$	$\varnothing D_1$	$\varnothing D_2$	t	t ₁	Thread sink B _{max}
CSV 2 CSVZ 2	M 20x1.5	24	10	14	14	24	$\varnothing 20^{+0.2}$
CSV 3	M 24x1.5	30	11	16	16	28	$\varnothing 24^{+0.2}$



Note

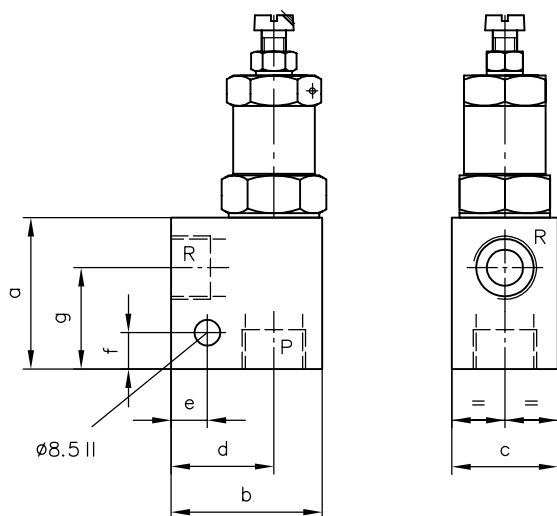
For tapped plugs for the mounting holes, see [Chapter 4, "Dimensions"](#)

Information für counterbore see ¹⁾

¹⁾ Counterbore of at least 0.5 mm required if the pressure at connection R exceeds 100 bar!

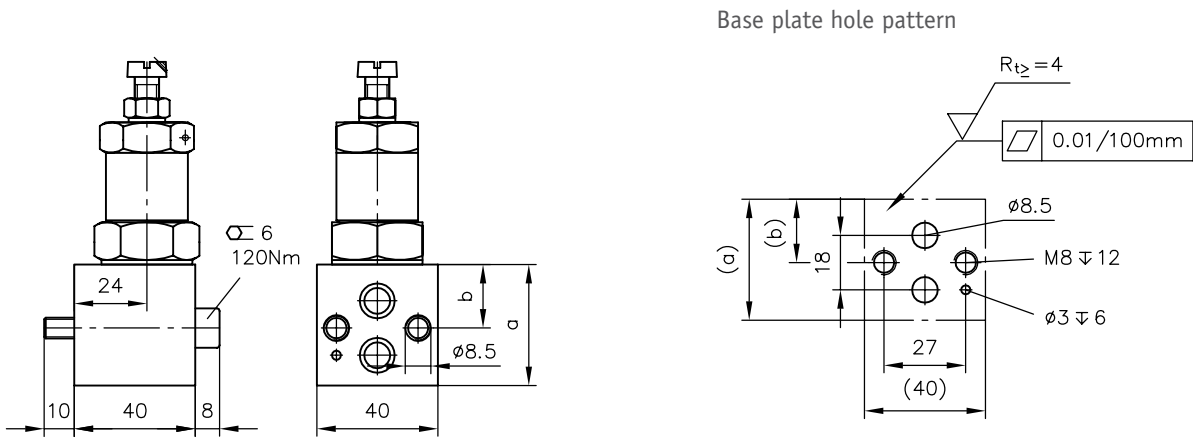
4.3 Version with connection block

Direct pipe connection



Type and size	Ports P and R (ISO 228/1) (BSPP)	a	b	c	d	e	f	g
CMV 1.. -1/4	G 1/4	40	40	25	27	10	10	26
CMV 1.. -3/8	G 3/8	40	40	25	27	10	10	26
CMV 2.. -3/8 CMVZ 2.. -3/8	G 3/8	45	42	32	27	12	12	30.5
CMV 3.. -1/2	G 1/2	50	50	35	34	12	12	33.5
CSV 2.. -1/4 CSVZ 2.. -1/4	G 1/4	45	42	32	27	15	15	31
CSV 2.. -3/8 CSVZ 2.. -3/8	G 3/8	45	42	32	27	15	15	31
CSV 3.. -1/2	G 1/2	55	50	35	34	12	12	39

Manifold mounting



Type	a	b	Sealing	Mounting
CMV 2 CMVZ 2	40	21	2x O-ring 10x2 NBR 90 Sh	2x Skt. head screw ISO 4762-M8x50-8.8A2K
CSV 2 CSVZ 2	48	30	2x O-ring 10x2 NBR 90 Sh	2x Skt. head screw ISO 4762-M8x50-8.8A2K

4.4 Tapped plugs

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

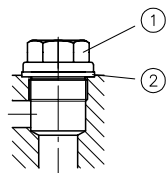


Figure 17: Passage open

- 1 Tapped plug a/f4
- 2 Seal ring

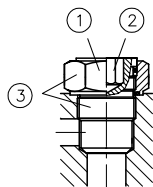


Figure 18: Passage blocked

- 1 Lock nuts and sealing nut a/f6
- 2 Screw part a/f5
- 3 Locking tapped plug complete

Type and size	Passage open			Passage blocked					
	Tapped plug			Seal ring	Tapped blockage / plug combination complete				
				DIN 7603-Cu	Tapped part			Counter / sealing nut	
	DIN 910	a/f4	Torque (Nm)		Drawing No.	a/f5	Torque (Nm)	a/f6	Torque(Nm)
CMV 1	M16x1.5	17	40	A16x22x1.5	Z 7712 003	8	40	22	35
CMV 2 CMVZ 2	M20x1.5	19	50	A20x24x1.5	Z 7712 013	10	50	24	40
CSV 2 CSVZ 2	M20x1.5	19	50	A20x24x1.5	Z 7715 019	10	50	24	40
CMV 3	M24x1.5	22	70	A25x30x2	Z 7710 029	12	70	30	60
CSV 3	M24x1.5	22	70	A25x30x2	Z 7710 029	12	70	30	60
Mass (weight)	M16x1,5 + Seal ring = approx. 40 g M20x1.5 + Seal ring = approx. 70 g M24x1.5 + Seal ring = approx. 100 g			Z 7712 003 = approx. 60 g Z 7712 013 = approx. 85 g Z 7715 019 = approx. 95 g Z 7710 029 = approx. 140 g Z 7715 029 = approx. 150 g					

5 Installation, operation and maintenance information

5.1 Designated use

This fluid-power product has been designed, manufactured and tested acc. to standards and regulations generally applicable in the European Union and left the plant in a safe and fault-free condition.

To maintain this condition and ensure safe operation, operators must observe the information and warnings in this documentation.

This fluid-power product must be installed and integrated in a hydraulic system by a qualified staff who is familiar with and observes the general engineering principles and relevant applicable regulations and standards.

In addition, application-specific features of the system or installation location must be taken into account if relevant.

This product may only be used as a pressure-limiting valve as a pump within oil-hydraulic systems.

The product must be operated within the specified data. This documentation contains the technical parameters for various product versions.



Note

Non-compliance will void any warranty claims made against HAWE Hydraulik.

5.2 Assembly information

The hydraulic accumulator must be integrated in the system via state of the art connection components (screw fittings, hoses, pipes, etc.). The hydraulic system must be shut down as a precautionary measure prior to dismounting; this applies in particular to systems with hydraulic accumulators.

5.2.1 Screwing in the basic version (cartridge valve)

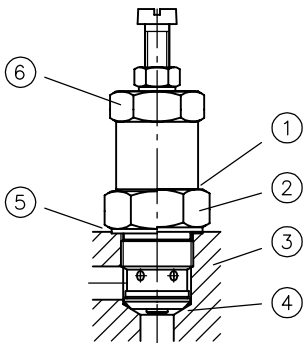


Figure 19: Screwing in the cartridge valve

- 1 Travel stop
- 2 Counter / sealing nut a/f2
- 3 Manifold
- 4 Sealing edge to counter
- 5 Valve body a/f1

1. Before screwing in the valve body loosen the counter/sealing nut until the travel stop.
2. Screw in the valve body and tighten with the specified torque. The metallic sealing of the inlet to the outlet is formed between the facial sealing edge of the valve body and the shoulder of the stepped hole in the manifold.
3. Tighten counter/sealing nut with specified torque.

Type and size	Valve body		Counter / sealing nut	
	Width across flats a/f1	Torque (Nm)	Width across flats a/f2	Torque (Nm)
CMV 1	17	40	22	35
CMV 2 CMVZ 2 CSV 2 CSVZ 2	22	50	24	40
CMV 3 CSV 3	24	70	30	60

5.2.2 Set the pressure

If no pressure adjustment value is stated, the valve is set to the maximum value of the corresponding pressure range ex-works.

The following table shows the reference values.

Pressure range	Approx. pressure variation (bar) per turn		
	CMV 1	CMV 2 CMVZ 2 CSV 2 CSVZ 2	CMV 3 CSV 3
B	94	100	65
C	51	55	51
E	33	19	17
F	12	10	9

Pressure range B to F compare also [Chapter 2, "Available versions, main data"](#) Table 1



Caution

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

- Always monitor the pressure gauge when setting or changing the pressure.

5.2.3 Creating the mounting hole

See description in [Chapter 4.2, "Mounting hole"](#)

5.3 Operating instructions

Product, pressure and/or flow settings

All statements in this documentation must be observed for all product, pressure and/or flow settings on or in the hydraulic system.



Caution

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

- Always monitor the pressure gauge when setting or changing the pressure.

Filtering and purity of the hydraulic fluid

Soiling in the fine range, e.g. abraded material and dust, or in the macro range, e.g. chips, rubber particles from hoses and seals, can cause significant malfunctions in a hydraulic system. It is also to be noted that new hydraulic fluid "from the drum" does not necessarily meet the highest purity requirements.

For trouble-free operation pay attention to the purity of the hydraulic fluid (see also purity class in [Chapter 3, "Parameters"](#)).

5.4 Maintenance information

This product is largely maintenance-free.

Conduct a visual inspection to check the hydraulic connections for damage at regular intervals, but at least once per year. If external leaks are found, shut down and remedy.

Check the device surfaces for dust deposits at regular intervals (but at least annually) and clean the device if required.

6 Other information

6.1 Schematic cross-sectional drawings and symbols

Type CMV

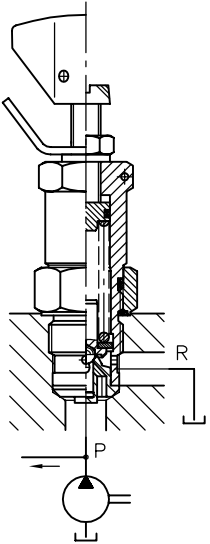


Figure 20: Type CMV

Type CSV

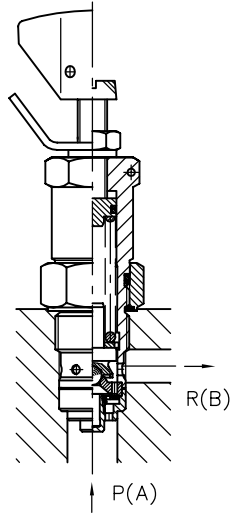


Figure 21: Type CSV

Type CMVZ
Type CSVZ

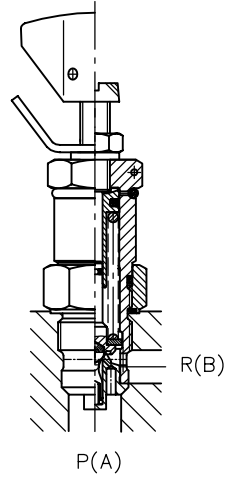


Figure 22: Type CMVZ

Figure 23: Type CSVZ

Additional versions

- [Pressure-limiting valve, with unit approval type CMVX:
D 7710 TÜV](#)
- [Throttle valve and shut-off valve CAV: D 7711](#)
- [Check valve type CRK, CRB and CRH: D 7712](#)
- [Pressure-dependent shut-off valve type CDSV: D 7876](#)
- [Throttle valve and throttle check valve type CQ, CQR and CQV:
D 7713](#)
- [Pressure-reducing valve type CDK: D 7745](#)
- [Pressure-reducing valve type CLK: D 7745 L](#)
- [Flow control valve type CSJ: D 7736](#)
- [Pressure-controlled shut-off valve type CNE: D 7710 NE](#)

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Safety valve type CMVX 2.. with unit approval



as cartridge valve for installation in simple tapped holes

Operating pressure $p_{max} = 500$ bar; Flow $Q_{max} = 28$ lpm

These safety valves are intended for accumulators in hydraulic circuits, covering the following regulations:

- Pressure device regulation 97/23 EC
- Operational safety regulation date 27.09.2002 / Use of Work Equipment Directive 2009/104/EG
- AD regulations 2000, sheet A2 (latest release)

1. General

The safety valve is designed as cartridge valve, which is screwed into simply shaped tapped holes (M 20x1.5) at a manifold body. The sealing of the inlet to outlet takes place at the contact area between the facial sealing edge of the screwed-in end of the valve body and the stepped shoulder of the core diameter at the location thread. Any standard steel drill (point angle 118°) automatically forms this stepped shoulder when the core diameter is drilled. Therefore reaming of the hole and bevels to help the seals slip in are not necessary.

The sealing of the attached valve and its fixing at the manifold body is via a sealing nut with a special thread seal and an O-ring.

Selection in the table below is via the intended pressure setting, where the valve should respond (observe pressure range) and the required flow (within the perm. flow rate), depending on the pump delivery flow of the system.

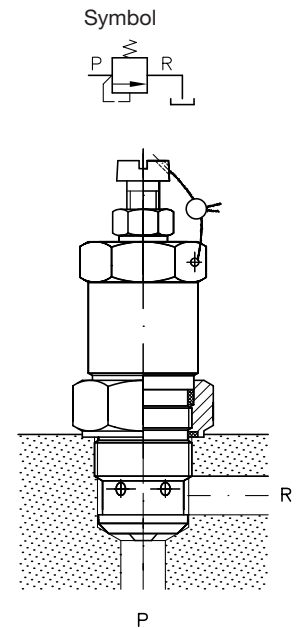
The desired pressure setting has to be stated at the end of the order coding as the valve will be set accordingly before it is lead sealed at HAWE. This setting will be also integrated in the unit approval No. stamped on the valve body.

2. Available versions, main data

Selection in the table below is via the intended pressure setting (pressure range) and the intended flow (perm. flow).

The desired pressure setting has to be stated at the end of the order coding as the valve will be set accordingly before it is lead sealed at HAWE. This setting will be also integrated in the unit approval No. stamped on the valve body.

Type, coding	Permissible flow $Q_{perm.}$ (lpm)	Pressure range $p_{min} \dots p_{max}$ (bar)	Unit approval coding	
			TÜV.SV.14 - 983 .4.F.	G. p
CMVX 2 G	15	20 ... 40	TÜV.SV.14 - 983 .4.F.	15. ...
	18	41 ... 65		18. ...
CMVX 2 F	23	66 ... 90	TÜV.SV.14 - 983 .4.F.	23. ...
	20	91 ... 110		20. ...
CMVX 2 E	22	111 ... 130	TÜV.SV.14 - 983 .4.F.	22. ...
	28	131 ... 170		28. ...
CMVX 2 C	16	171 ... 200	TÜV.SV.14 - 983 .4.F.	16. ...
	20	201 ... 260		20. ...
CMVX 2 B	28	261 ... 350	TÜV.SV.14 - 983 .4.F.	28. ...
	12	351 ... 395		12. ...
CMVX 2 B	16	396 ... 430	TÜV.SV.14 - 983 .4.F.	16. ...
	20	431 ... 500		20. ...



3. Further parameters

Nomenclature, design	Directly acting pressure limiting valve, seated cone design
Installed position	Any
Installation	Screwed in and locked in customer furnished manifolds. See also notes regarding the installation in sect. 5
Weight	0.16 kg
Flow direction	P→R; P = pump, R = return (pressure less)
Pressure fluid	Hydraulic oil acc. to DIN 51524 table 1 to 3; ISO VG 10 to 68 conf. DIN 51 519 Also suitable are biologically degradable pressure fluids of the type HEPG (Polyalkylenglycol) and HEES (synth. Ester) at operation temperature up to approx. +70°C.
Oper. viscosity	Approx. 12 ... 230 mm ² /s
Contamination rating	21/18/15 conf. ISO 4406
Temperature	Ambient: approx. -40...+80°C; Fluid: -20...+80°C, pay attention to the viscosity range! See also D 5488/1 sect. 3. Biological degradable pressure fluids: Pay attention to manufacturer's information. With regard to the compatibility with sealing materials do not exceed +70°C.
Static overload capacity	2 x p_{max}



HAWE HYDRAULIK SE
STREITFELDSTR. 25 • 81673 MÜNCHEN

D 7710 TÜV

Pressure limiting valves type SVP 6 and SVP..30(34)

preferably for mounting on to hydraulic power packs type R (acc. to D 6010 H) and type Z (acc. to D 6820)
Supplement to pamphlet D 7000 E/1

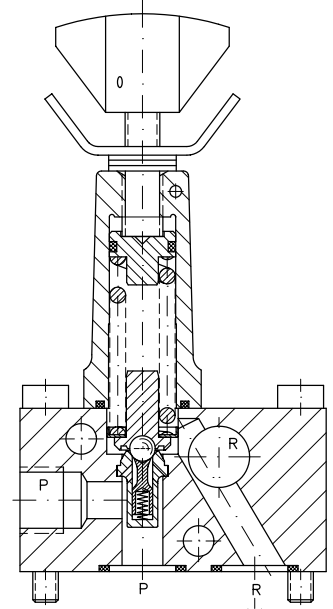
Pressur p_{max} = 700 bar
Flow Q_{max} = 80 lpm

1. General

Pressure limiting valves are used in hydraulic systems to protect them against exceeding the permitted max. pressure or to limit the operation pressures.

The pressure limiting valves type SVP 6 and SVP..30(34) are intended and designed for direct mounting onto hydraulic power packs type R (D 6010 H) and Z (D 6820). They may be used as well for direct mounting onto customer furnished manifolds enabling direct lateral connection of directional seated or spool valve banks.

Cross sectional drawing of type SVP 6...



2. Available versions, main data

Order examples:

SVP 6 C - 280 Version with assembly kit type MVF 6.. acc. to D 7000 E/1

SVP 6 B R

SVP R 30 A

Version with welded on spring dome

Note: Type coding applies to the single device.
A different coding is used, when part of the order coding for a complete power pack, see the respective pamphlet.

Pressure setting (see also sect. 5)

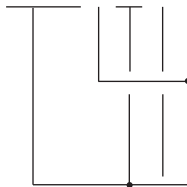
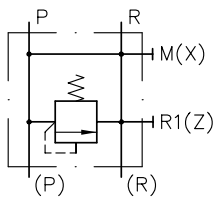


Table 1: Basic type, size

Coding	Flow Q_{max} (lpm)	Ports conf. DIN ISO 228/1 (BSPP)	bottom side	Direct mounting on to hydraulic power packs (D 6010 H, D 6820)	Directional valve banks suitable for lateral mounting
SVP 6	75	P, R = G 1/2 M(X) = G 1/4 R1(Z) = G 1/4	See dimensional drawings in sect. 4 ++	Tank: B 50 and B 75 Cover plate: D 50	Directional seated valves: BWH 2(3) D-.. D 7470 B/1 VB 11(21, 31) -.. D 7302 Directional spool valve: SKP(H) 27(37)-.. D 7230 SWR(P) 1 D-.. D 7450 SWR 2 D-.. D 7451
SVP..30	60	P, R = G 3/4		Tank: B 100 to B 400 Cover plate: D 100 and D 250	Directional spool valve: SKP(H) 28(38)-.. D 7230
SVP..34	80	X, Z = G 1/2			

Flow pattern symbols
Illustration represents tool adjustable versions. (for manually adjustable versions, see table 3)

Type SVP 6..



Type SVP..30
SVP..34

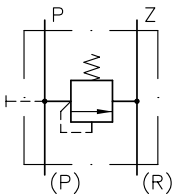


Table 2: Pressure ranges

Coding	A	B	C	D	E	F	Note:
(0) ... SVP 6	700	500	315	---	160	80	Settings < 0.1 ... 0.15 of p_{max} . do not make sense. The lowest pressure that can be achieved also depends on the apparent flow (see Δp -Q curves).
... p_{max} SVP..30 (bar)	300	---	---	---	---	---	
SVP..34	---	200	---	150	---	---	

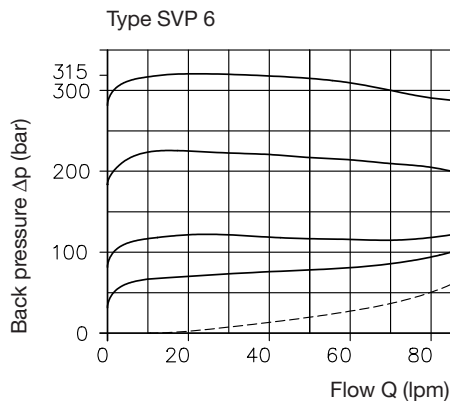
Table 3: Adjustability during operation

no coding	Standard, tool adjustable	Symbols
R	Manually adjustable	Coding R and V
V	Turn knob (self locking)	
H	Lockable turn knob (BKS-lock) Suited for keys conforming to the standards of the motor industry. Key is not scope of delivery (Key is only in the possession of the authorized operators)	Only available for type SVP 6! Coding H

3. Further parameters

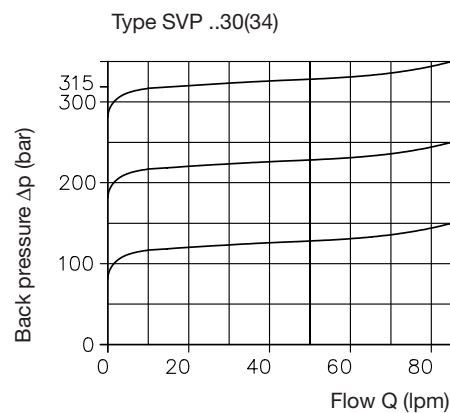
Nomenclature and design	Pressure valves directly actuated, ball seated type
Installed position	Any
Surface	Steel parts zinc galvanized; spring dome from zinc pressure die-cast (type SVP 6)
Mass (weight)	SVP 6 = approx. 2 kg SVP..30(34) = approx. 3 kg
Pressure fluid	Hydraulic oil conforming DIN 51514 part 1 to 3: ISO VG 10 to 68 conforming DIN 51519. Viscosity limits: min. approx. 4, max. approx. 1500 mm ² /s; opt. operation approx. 10... 500 mm ² /s. Also suitable are biologically 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, 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.

Δp-Q curves



The curves shown at the example SVP 6 C (Guideline, slight differences depending on pressure). Any pressure apparent at R will raise these Δp-figures.

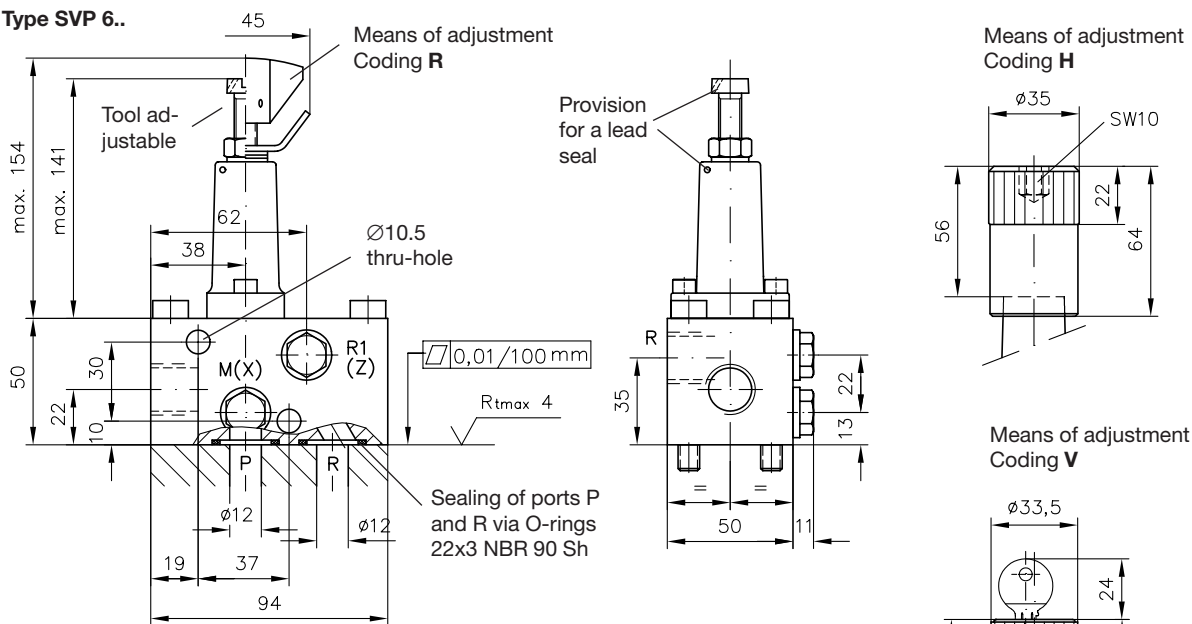
Δp-curve for the valve body, spring decompressed (static pressure 0 bar). No pressure setting can be achieved below this line, see also note in table 2, sect. 2.



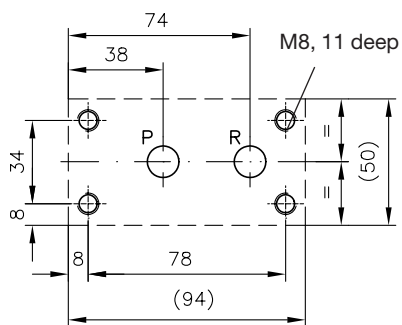
Viscosity during measurements approx. 50 mm²/s

4. Unit dimensions All dimension in mm and subject to change without notice!

Type SVP 6..

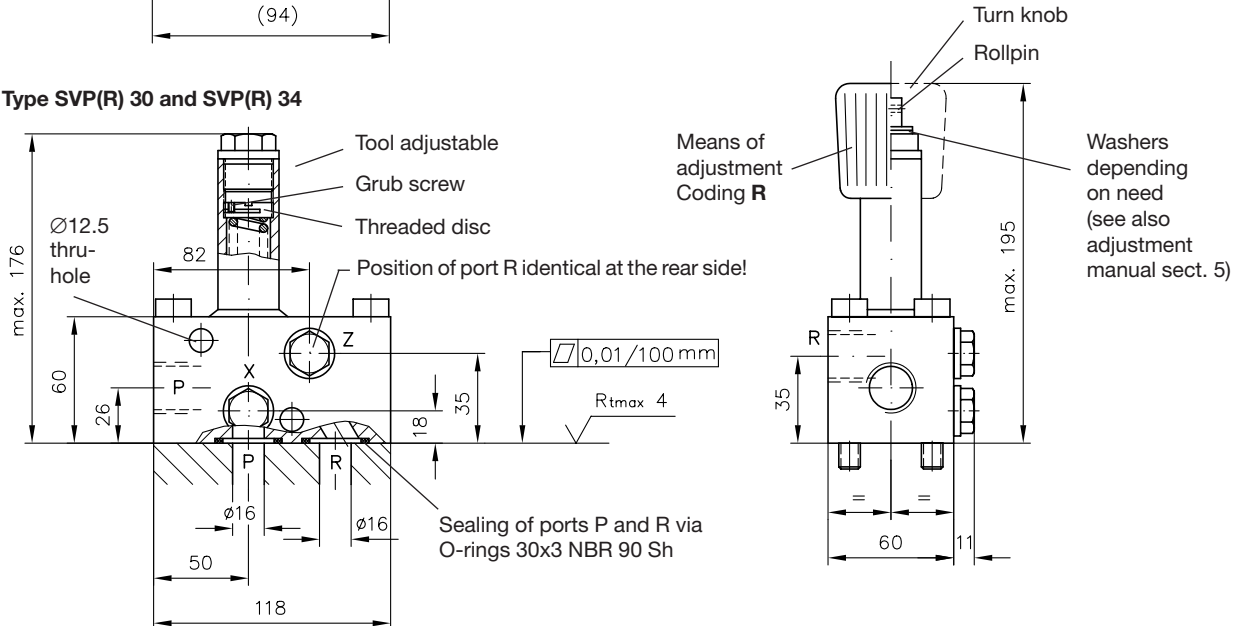


Hole pattern of the manifold (top view)

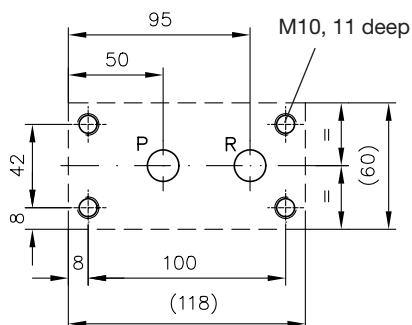


Ports acc. to DIN ISO 228/1: (BSPP)
 P and R = G 1/2
 M(X) and R1(Z) = G 1/4

Type SVP(R) 30 and SVP(R) 34



Hole pattern of the manifold (top view)



Ports acc. to DIN ISO 228/1: (BSPP)
 P and R = G 3/4
 X and Z = G 1/2

5. Adjustment manual

These valve are pre-set at HAWE when a pressure is specified in the order coding (e.g. SVP 6 C-250). Unauthorized raising of the pressure is prevented by washers. When a pressure specification is missing, these valves are set at the specified max. pressure for the respective spring (see table 2 in sect. 2).

Any modification of the pressure setting on site should be performed while the pump is running and should be monitored by a pressure gauge.

● Reduction of the pressure setting (for tool adjustable versions)

1. Connect a pressure gauge to the P-line
2. Type SVP 6: Loosen the lock nut (remove the lead seal when apparent)
Type SVP 30(34): Remove the tapped plug and loosen the grub screw
3. Turn the adjustment element (slotted head screw / threaded disc) counter clockwise, while monitoring the effect on the pressure gauge (running pump)
4. Retighten the lock nut / grub screw after the adjustment is finished.
Type SVP 30(34): Reinstall the tapped plug.

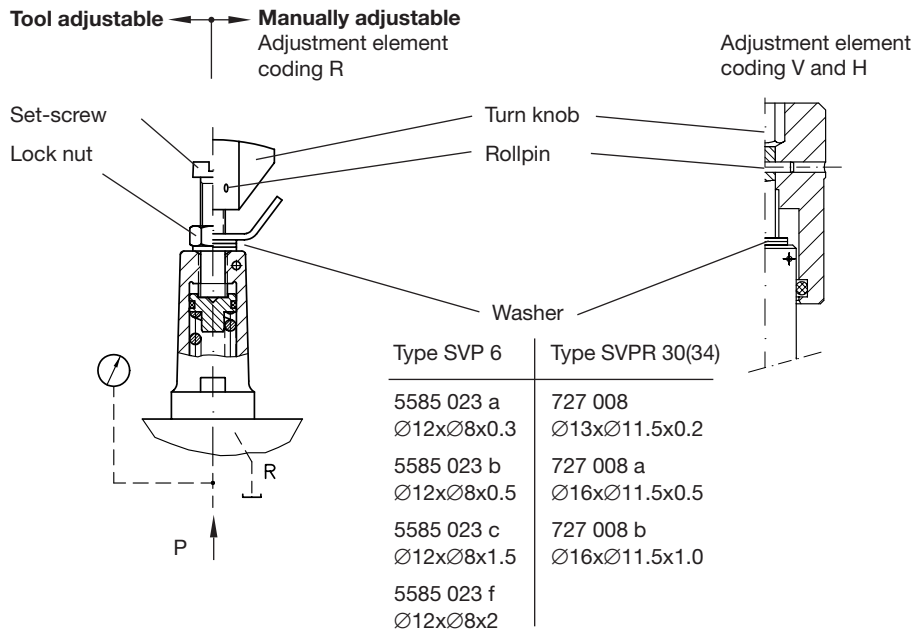
● Raise of the pressure setting (for manually adjustable version)

Observe pressure rating p_{max} acc. to table 2, in sect. 2!

Basically proceed as above. Raise of the setting is by turning the adjustment element clockwise. The washers which usually prevent that the pressure is increased can be removed after the rollpin is driven out and the turn knob / winged nut are removed. Remove only as much washers as required to achieve the desired pressure setting. Use always a pressure gauge while changing the setting. Reinstall winged nut, turn knob, and rollpin.

Illustration type SVP 6

(type SVP(R) 30 and SVP(R) 34 are similar, see dimensional drawings in sect. 4)



Note: The pressure read at the pressure gauge while the pump is running is always dependant on the respective flow. There is a slight flow dependance for some of these valve (see curve in sect. 3).
(Extreme case: Manual pump, flow ≈ 0 lpm).

● Pressure variation

Rough guideline (valve closed)
per turn of the set screw

Type	Pressure range (bar)	Travel f_{max} (mm)	Pressure raise per 1 turn (bar)
SVP 6..	A 0 ... 700	7.4	120
	B 0 ... 500	7.9	80
	C 0 ... 315	10.2	35
	E 0 ... 160	11.5	17.5
	F 0 ... 80	12.5	8
	SVP.. 30	A 0 ... 300	19
SVP.. 34	B 0 ... 200	24	16.2
	D 0 ... 150	20	17.5

Pressure reducing valves type VDM

hydraulically piloted

Flow Q_{\max} = 120 lpm
Pressure p_{\max} = 400 bar

1. General and description

Pressure reducing valves are pressure valves, which are used to keep the outlet pressure constant within narrow limits, even with a varying but higher inlet pressure (DIN ISO 1219).

They are used in hydraulic circuits in which for operational reasons a secondary circuit with a lower pressure value branches off an existing oil circuit without affecting the higher pressure. This means that the pressure set at the pressure reducing valve (outlet pressure) remains constant irrespective of a further increase in the main circuit (inlet pressure).

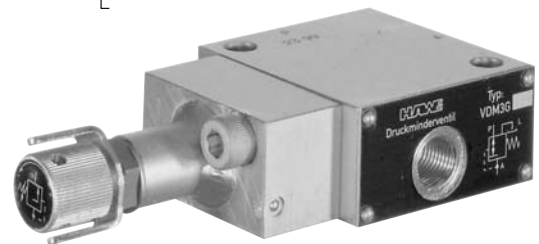
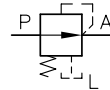
● Function

The pressure reducing valve described here is hydraulically pilot operated. It comprises the main valve which has as its main functional component a spring-loaded piston known as a metering orifice. This piston is controlled by a flanged-on pressure limiting where the valve (pilot valve) required outlet pressure is actually set. The piston continuously alters the cross-section of the passage through the main valve as a function of the inlet pressure, so that the throttle resistance of this will rise or fall by the same amount as the increase or decrease in the input pressure. This way the outlet pressure, which represents the difference between inlet pressure and throttle resistance, is kept constant. The control flow which is needed for the control movement of the piston is led off as leakage oil flow to the outside via the pilot valve.

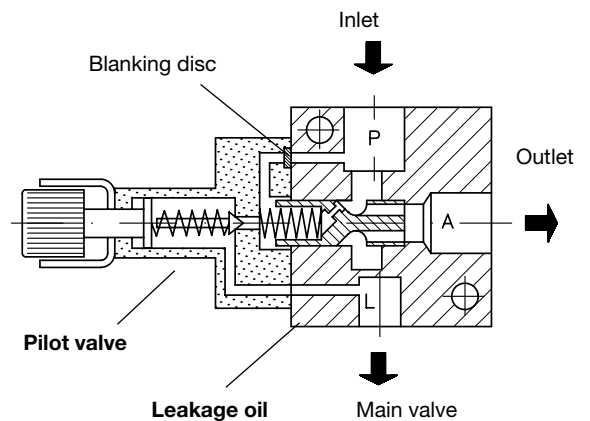
● Construction

The main and pilot valve are made completely of steel. The main functional components, such as the piston and liner of the main valve and the seating and valve cone of the pilot valve, are hardened and ground.

Photo shows version for direct pipe connection



Simplified illustration



2. Types available, main data

Example:

VDM 3 GHR - 250

Pressure specification (bar) for max. outlet pressure

Table 1: Basic type



Coding	Description and symbol
VDM	Hydraulic pilot-operated pressure reducing valve; L (control oil run-off) non-pressurized to the tank 
VDX	Hydraulic remote-controlled pressure reducing valve; Pilot control valve PG 1.. acc. to D 4350 connected to port L and ongoing non-pressurized to the tank 

Table 3: Hydraulic connection

Coding	Connection mode	Size		
		3	4	5
G	Direct pipe connection	G 1/2	G 3/4	G 1
P	Manifold mounting	---	See dimensional drawings	

Table 4: Pressure range (bar)

Coding	Adjust. range for outlet pressure	Max. inlet pressure	Max. pressure diff. between inlet and outlet pressure
N	8 ... 100	400	300
H	10 ... 400	400	300

Note: Only set or adjust the pressure while monitoring the pressure

Table 2: Size

Coding	3	4	5
Flow Q_{max} (lpm)	40	70	120

Table 5: Adjustability in operation (always applies to the outlet pressure)

without	Standard, tool adjustable
R	Manually adjustable
F	Spherical push button

3. Hydraulic data

Design

Pressure reducing valve, spool valve design

Mounting type

Manifold mounting or via mounting holes, depending on type (see section 5)

Installation position

Any

Flow direction

Operating direction always $P \rightarrow A$, free reverse flow is possible (see $\Delta p-Q$ characteristic), P = Inlet (primary side), A = Consumer (secondary side)

Leakage oil (Control oil run-off)

On all valves approx. 0.40 lpm, irrespective of the pressure setting. Emerges at L. Run non-pressurized to the tank.

Pressure fluid

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

Temperature

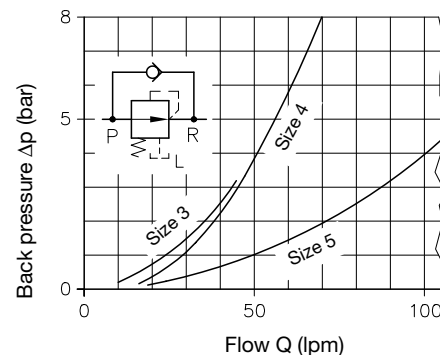
Ambient: approx. -40 ... +80 °C
Fluid: -25 ... +80°C, Note the viscosity range !
Permissible temperature during start: -40°C (Note start-viscosity!), as long as the service temperature is at least 20K higher for the following operation. Biological degradable pressure fluids: Note manufacturer's specifications. By consideration of the compatibility with seal material not over +70 °C.

Mass (weight) approx. kg

VDM 3G .. = 1.1 VDM 4P .. = 2.0 for VDX... also 0.3 kg
VDM 4G .. = 1.5 VDM 5P .. = 2.5 (weight share for PG 1 acc. to D 4350)
VDM 5G .. = 2.0

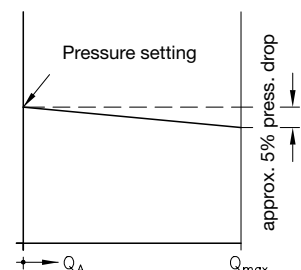
$\Delta p-Q$ -characteristics

A flow in the reverse direction $A \rightarrow P$ is only possible if the pilot control valve is closed, i.e. below the set outlet pressure (control piston in open basic position). The reflux should not be greater than approx. 50 % of Q_{max} here. If a reversal of the flow direction can be expected during the adjustment operation (control piston in throttle position), the control piston would block the reflux. In such cases or if full reflux must be possible for control reasons, it is necessary to install a bypass check valve.



Oil viscosity during the measurement 32 mm²/s

$\Delta p - Q_A$ - characteristic

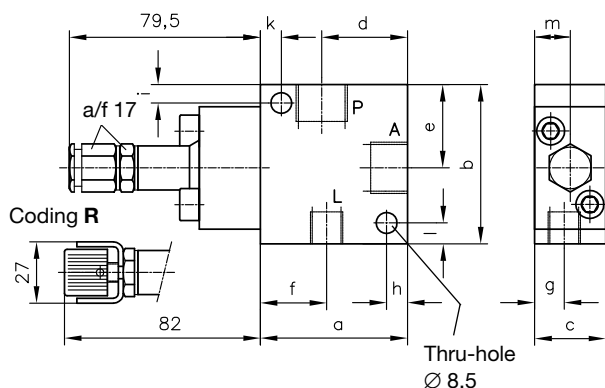


4. Unit dimensions

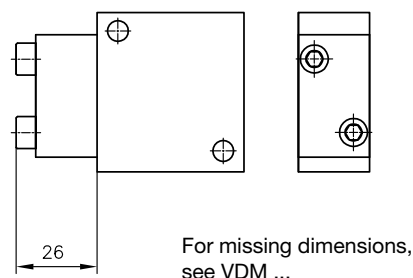
All dimensions are in mm, subject to change without notice!

4.1 Valve for direct pipe connection

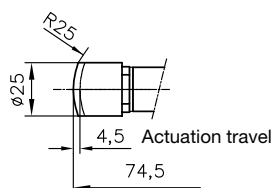
Type VDM 3G and VDM 4G



Type VDX 3G and VDX 4G



Coding F (spherical push button)

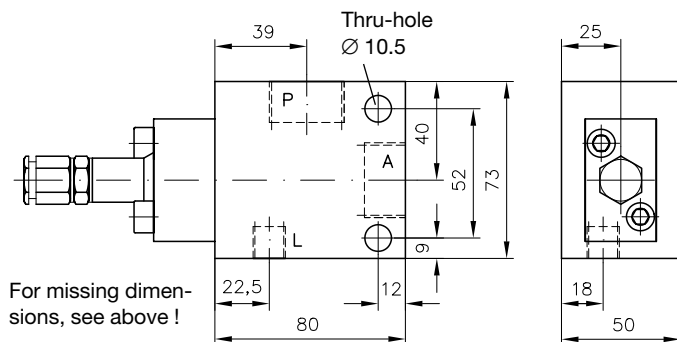


Coding	Pressure alternation per turn ¹⁾
N	≈ 20 bar
H	≈ 70 bar

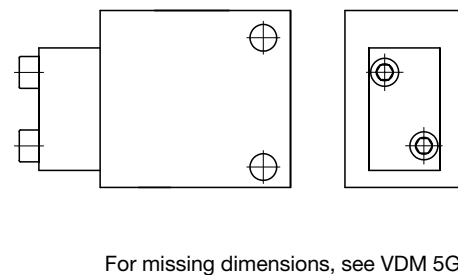
¹⁾ Test rig pump
Q_e = 2.5 lpm

Type	a	b	c	d	e	f	g	h	i	k	l	m	Ports acc. to DIN ISO 228/1 (BSPP)	
													P and A	L
VDM 3G	60	65	30	35	34	27	11	8.5	7.5	8.5	8.5	15	G 1/2	G 1/4
VDM 4G	65	71	40	38.5	39	26	15	10	10	7	11	20	G 3/4	G 1/4

Type VDM 5G



Type VDX 5G

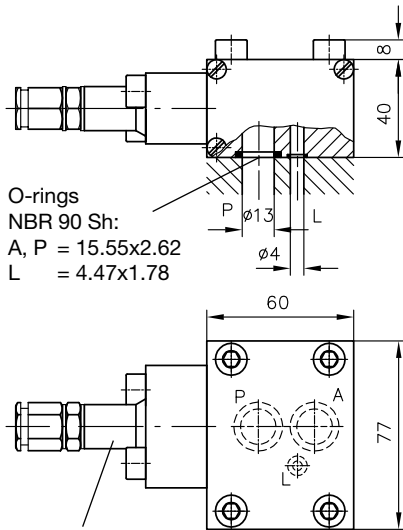


Ports acc. to DIN ISO 228/1 (BSPP):

- P and A = G 1
- L = G 1/4

4.2 Manifold mounting

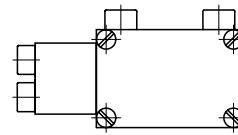
Type VDM 4P



O-rings
NBR 90 Sh:
A, P = 15.55x2.62
L = 4.47x1.78

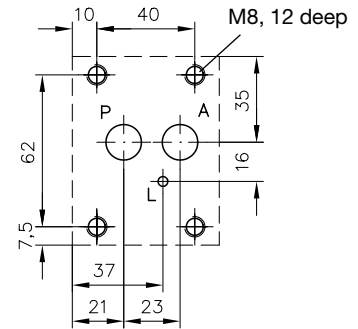
For missing dimensions
of the pilot valve, see
sect. 4.1 !

Type VDX 4P

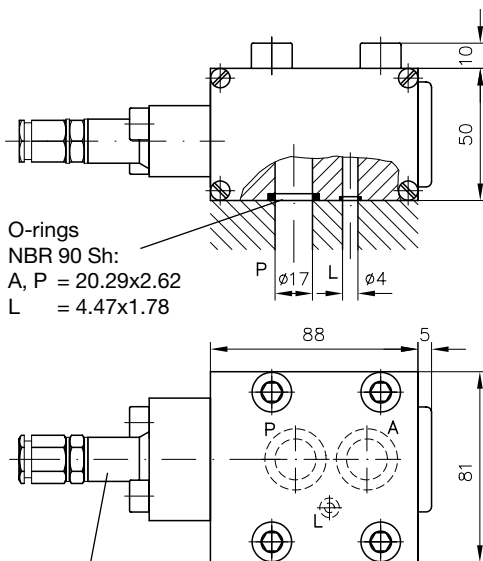


For missing dimensions, see VDM 4P

Hole pattern of the manifold (top view)



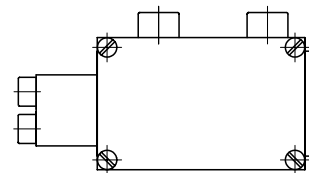
Type VDM 5P



O-rings
NBR 90 Sh:
A, P = 20.29x2.62
L = 4.47x1.78

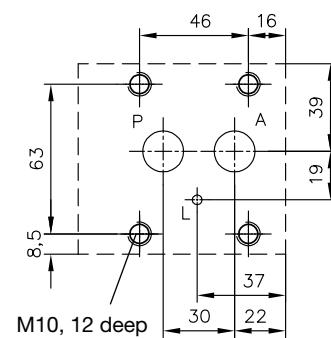
For missing dimensions
of the pilot valve, see
sect. 4.1 !

Type VDX 5P



For missing dimensions, see VDM 5P

Hole pattern of the manifold (top view)



Pressure reducing valves type ADM

Non-piloted, for hydraulic systems

Operation pressure $p_{\max P} = 315 \text{ bar}$
 $p_{\max A} = 250 \text{ bar}$
 Flow $Q_{\max} = 60 \text{ lpm}$



1. General information

Pressure reducing valves are pressure valves. Their task is to keep the outlet pressure constant, despite a higher and changing inlet pressure (ISO 1219-1). They are used in hydraulic systems where a second oil circuit with a lower pressure level (secondary circuit) is to be branched from an oil circuit with a higher pressure level (primary circuit), without the affecting the higher pressure in the primary circuit.

2. Available versions, main data

Order example: **ADM 22 D R - 110**



Table 1: Basic type, size

Conne- ction	Coding	Flow P→A Q_{\max} (lpm)	Port size ISO 228/1 (BSPP)		Mass (weight) (kg)
			P u. A	L	
Pipe con- nection	ADM 11	12	G 1/4	G 1/4	0.6
	ADM 21	25	G 1/4		0.7
	ADM 22	25	G 3/8		0.7
	ADM 32	60	G 3/8		1.0
	ADM 33	60	G 1/2		1.0
Manifold mounting	ADM 11 P	12	See dimension- al drawings in section 4		0.6
	ADM 22 P	25			0.9
	ADM 33 P	60			1.1

Table 2: Pressure range for outlet A

Coding	Pressure range (bar) adjustable from $p_{A \min}$ to $p_{A \max}$			The pressure figures apply to $Q_{P \rightarrow A} = 0 \text{ lpm}$, i.e. the con- sumer has achieved its end position and doesn't move any further (static pressure). See also $p_A - Q_{P \rightarrow A}$ curves!
	ADM 11	ADM 2..	ADM 3..	
A	160 ... 250	160 ... 250	130 ... 250	
C	60 ... 160	45 ... 160	30 ... 160	
D	30 ... 120	30 ... 120	25 ... 100	
F	10 ¹⁾ ... 50	10 ¹⁾ ... 30	15 ¹⁾ ... 25	

Table 3: Means of adjustment during operation

Coding	Description	Symbols
without	Standard, tool adjustable	Standard R and V
R	Manually adjustable (Wing screw + wing nut)	
V	Turn knob (self locking)	H T and TS
H	Turn knob with lock (Keys conforming the standards of the auto- motive industry; The key is scope of delivery but also in posses- sion of the authorized maintenance staff)	
T	Pin (with light alloy spring dome), only available for ADM(P) 11 Note: Pressure must not exceed 20 bar at L and therefore should be routed separately to the tank!	T and TS
TS	Pin (with steel spring dome), only available for ADM(P) 11 Note: For applications where the pressure exceeds 20 bar at L	

1) Flow should not exceed 40% of Q_{\max}

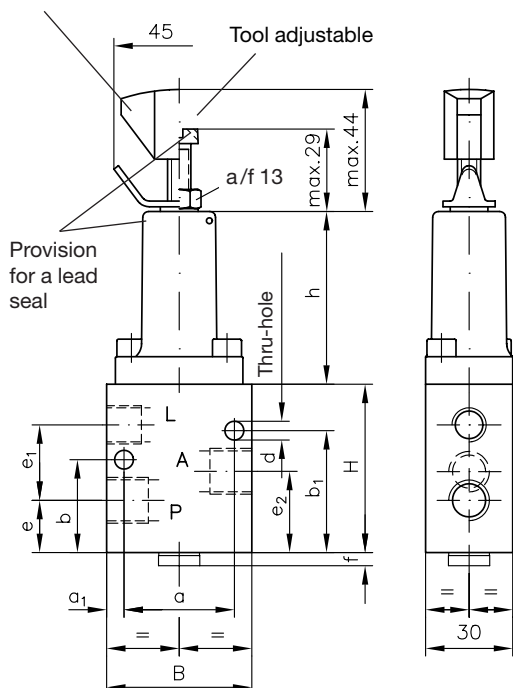
2) The valve will be set to its max pressure, when the pressure specification is missing.

4. Unit dimensions

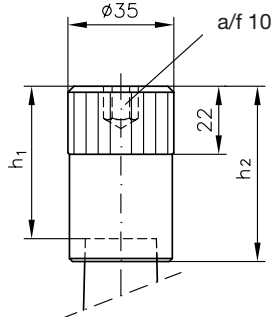
All dimensions in mm, subject to change without notice !

4.1 Valve for pipe connection

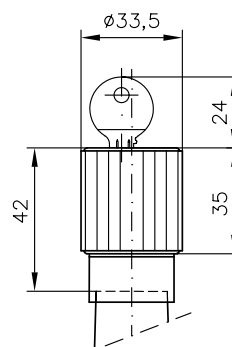
Means of adjustment coding R



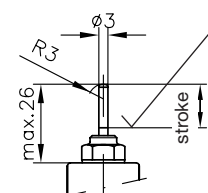
Means of adjustment coding V



Means of adjustment coding H



Means of adjustment coding T (TS)



The actuation is designed for axial direction loads only, any side loads are not permissible !

Attention:

Do not exceed the end position for the adjustment device!
The actuator (cam) should be designed in such a way that either a mechanical stop is provided or the permissible can not be exceeded.

Pressure range (coding)	Actuation	
	Stroke (mm)	Force (N)
A	7.5	570
C	12.5	385
D	13	260
F	16.5	67

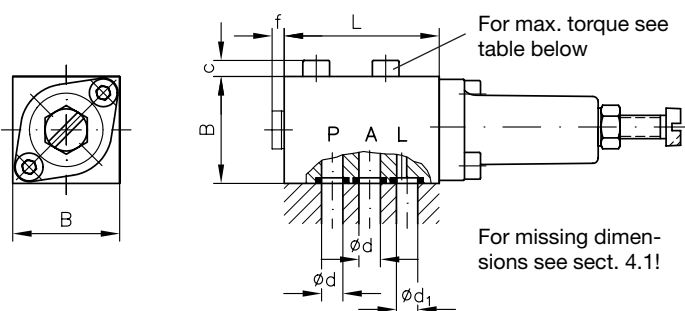
Ports ISO 228/1 (BSPP):

Type	B	H	a	a1	b	b1	d	e	e1	e2	f	h	h1	h2
ADM 11	45	50	33	6	26.5	36.5	6.5	15	23	25	3.5	49.5	41	58
ADM 21(22)	50	58	38	6	32	42	6.5	18	26	28	3.5	49.5	41	58
ADM 32(33)	60	70	40	10	10	58	9	28	28	40	8	59.5	56	64

Type	P and A	L
ADM 11(21)	G 1/4	G 1/4
ADM 22(32)	G 3/8	G 1/4
ADM 33	G 1/2	G 1/4

4.2. Valve for manifold mounting

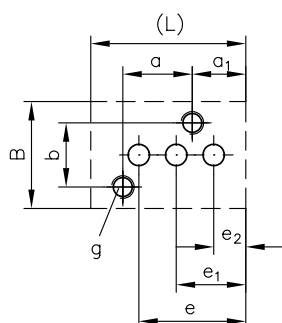
Only the tool adjustable version is illustrated here. For other actuations coding R, V, H, and T(TS), see sect. 4.1!



Adjustment of the pressure reducing valve (rough guideline)

Pressure range Coding	Δp/revolution (bar/rev)	
	ADM 11..	ADM 2.., ADM 3..
A	55	49
C	43	14
D	12	11
F	4	2

Hole pattern of the manifold (top view)



Type	B	L	a	a1	b	c	d	d1	e	e1	e2
ADM 11 P	35	50	24	17	24	6	6	6	35	22.5	10
ADM 22 P	40	58	26	20	24	6	8	8	40	26	12
ADM 33 P	40	70	40	14	28	8	10	8	42	25	9

Type	f	g	Perm. torque (Nm)	O-rings NBR 90 Sh for ports	
				A and P	L
ADM 11 P	3.5	M6x45	9.5	7.65x1.78	
ADM 22 P	3.5	M6x50	9.5	9.25x1.78	
ADM 33 P	8	M8x50	23	12x2	9.25x1.78

Non-piloted miniature pressure reducing valves type ADC, ADM, ADME, and AM

Cartridge valves - Versions with housing

Pressure p_{\max} = 400 bar
Flow Q_{\max} = 10 lpm

Type ADC 1 - 15 - 1/4



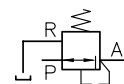
Type AM 1 - 20 - 1/4



Type AM 11. - 25



Type AM 1 - 20



1. General, usage

Pressure control valves belong to the group of pressure valves and their task is to keep the outlet pressure constant, despite a higher and changing inlet pressure (DIN ISO 1219-1).

They are used in hydraulic systems where a second oil circuit with a lower pressure level (secondary circuit) is to be branched from a circuit with a higher pressure level (primary circuit), without the higher pressure in the primary circuit being affected.

Pressure fluctuation in the main circuit caused by a system's various functions are kept away from the pre-control circuit, by reducing the pressure to a consistent level in the range of about 20...30 bar. The switching operation of all hydraulic devices being actuated in such a manner can be influenced by e.g. directional spool valves type HSR(F) acc. to D 7493 ++ or PSL(V) acc. to D 7700 ++.

Types ADM 1.. and ADME 1.. were especially designed to cope with larger flows.

The pressure reducing valves are available as cartridge valves, designs for direct pipe connection or for manifold mounting.

2. Types available, main data

Coding, Symbol Screw-in cartridge	Housing design		max. pressure (bar)		Flow $Q_{A \max}$ (lpm)	Sectional views and symbols (examples)
	for direct pipe connection	for manifold mounting	Outlet A (Recomm. value) ²⁾ $p_A \pm \text{approx. } 15\%$ (bar)	Inlet P p_E (bar)		
ADC 1 - 15	ADC 1 - 15 - 1/4	---	18	315	2	Type ADC 1 - 15
ADC 1 - 25	ADC 1 - 25 - 1/4	---	30			
ADC 1 K - 25 ¹⁾	ADC 1 K - 25 - 1/4 ¹⁾	---	25			
AM 1 - 20	AM 1 - 20 - 1/4	---	20	400	2	
AM 1 - 25	AM 1 - 25 - 1/4	---	25			
---	---	AM 11 F - 5	5	400	2	
---	---	AM 11 F - 10	10			
---	---	AM 11 F - 15	15			
---	---	AM 11 F - 20	20			
AM 1 E - 20	AM 1 E - 20 - 1/4	AM 11 E - 20	20	400	2	Type AM 1 - 20 - 1/4
AM 1 E - 25	AM 1 E - 25 - 1/4	AM 11 E - 25	25			
AM 1 E - 30	AM 1 E - 30 - 1/4	AM 11 E - 30	30			
AM 1 E - 35	AM 1 E - 35 - 1/4	AM 11 E - 35	35			
AM 1 E - 40	AM 1 E - 40 - 1/4	---	40			
AM 1 D - 40	AM 1 D - 40 - 1/4	---	40	400	2	
AM 1 D - 45	AM 1 D - 45 - 1/4	---	45			
AM 1 D - 50	AM 1 D - 50 - 1/4	---	50			
AM 1 D - 55	AM 1 D - 55 - 1/4	---	55			
AM 1 D - 60	AM 1 D - 60 - 1/4	---	60			
AM 1 C - 60	---	AM 11 C - 60	60	400	2	
AM 1 C - 70	---	AM 11 C - 70	70			
AM 1 C - 80	---	AM 11 C - 80	80			
AM 1 C - 90	---	AM 11 C - 90	90			
AM 1 C - 100	---	AM 11 C - 100	100			
---	ADM 1 - 15	---	15	315	8	Type AM 11 E - 25
---	ADM 1 - 20	---	25			
---	ADM 1 - 30	---	28			
---	ADM 1 - 40	---	40			
---	ADM 1 - 50	---	50			
---	ADM 1 - 70	---	70			
ADME 1 - 15	ADM 1 K - 15 ¹⁾	---	15	315	8	
ADME 1 - 20	---	---	20			
ADME 1 - 30	---	---	30			
ADME 1 - 50	---	---	50			
ADME 1 - 70	---	---	70			

¹⁾ Adjustable version (adjustment by means of tools, see section 4).

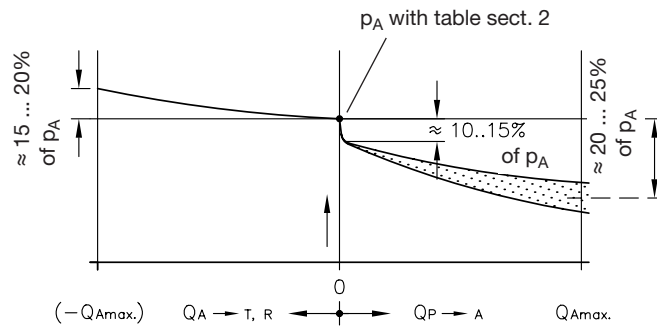
The specified pressure p_A represents the max. pressure setting, p_{\min} approx. 5 bar

²⁾ For notes regarding the pressure adjustment, see section 3

3. Other characteristic data

Designation	Directly controlled pressure control valve with overdrive compensation							
Type	Spool valve							
Material	Screw-in cartridge: Screw nitrided Hole diamond-honed Regulator piston made of stainless steel (type ADC 1.., AM 1(11)..) bearing steel (type ADM..), case-hardened and polished. Bore and piston polish-deburred Control edges feature optimum resistance to wear caused by the erosion and cavitation effect of the fluid in flux. Housing: Zinc galvanized; This together with the nitrous hardened components ensures a good corrosion protection of the surface.							
Connection	Cartridge valve: Mounting hole, see unit dimensions section 4.1 Housing version: Direct pipe connection design (G 1/4 ISO 228/1 (BSPP) and DIN 3852 E) Manifold mounting design (hole pattern, see section 4.2)							
Installation position	Any							
Flow direction	Operating direction P→A Free return A→P only permissible to limited extent, see Δp -Q-characteristic Over drive A→T(R) see p_A - Q_A curve below							
Port P and A R	see table, pos. 2 max. 20 bar							
Leakage oil	Type ADC 1(K) - .. = approx. 0.5 lpm at $p_E \approx 300$ bar Type AM 1(E, D, C) - .. ADM(E) 1- .. AM 11... = approx. 0.1 lpm at $p_E \approx 300$ bar (depends largely on thread tolerance)							
Mass (weight) approx. g	Type	ADC 1 - ..	ADC 1K - 25	AM 1 - ..	AM 1E - .. AM 1D - .. AM 1C - ..	AM 11...	ADM 1 - ..	ADME 1 - ..
	Screw-in cartridge	30	45	30	70	---	---	50
	Housing design	320	340	340	380	200	350	---
Pressure fluid	Hydraulic fluid (DIN 51524 table 1 to 3); ISO VG 10 to 68 (DIN 51519) Viscosity range: min. 4; max. 800 mm ² /sec; Optimal operation range: 10...200 mm ² /sec Also suitable are biodegradable pressure fluids of the type HEPG (Polyalkylenglycol) and HEES (synth. Ester) at operation temperatures up to +70°C.							
Temperature	Ambient: -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 consequent running is at least 20K (Kelvin) higher. Biodegradable pressure fluids: Pay attention to manufacturer's information. With regard to the compatibility with sealing materials do not exceed +70°C.							

$p_A - Q_A$ curve
(tendency)



Oil viscosity during
the measurement
approx. 60 mm²/sec

Overdrive

Overdrive compensation occurs when the consumer is forced back against p_A by an external force. In this case, the valve acts like a pressure limiting valve from $A \rightarrow T(R)$.

Free return $A \rightarrow P$

A free return flow $A \rightarrow P$ is only possible, if the valve was previously unloaded, i.e. in the open idle position $P \rightarrow A$ (return flow must not exceed 1/3 of $Q_{A \max}$). A bypass check valve is required, when a return flow $A \rightarrow P$ is desired with minimized hindrance.

**Pressure adjustment
via washers**

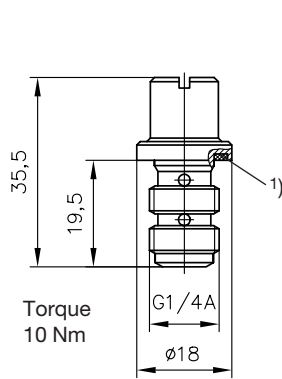
Type	AM 1 E - 20...40 AM 1 D - 40...60 AM 11 E(F) - ...	AM 1 C - ... AM 11 - ...	ADM 1 - 20...30 ADME 1 - 20...30 ADME 1 - 50...70
Washer (HAWE-No.)	7625 525 (per washer 0.75 mm approx. $\Delta p = 5$ bar)	7625 549 (per washer 0.4 mm approx. $\Delta p = 5$ bar)	7434 006 a 0.5 mm 7434 006 b 1.0 mm 7434 006 c 2.0 mm (dep. on demand)

4. Dimensions of units

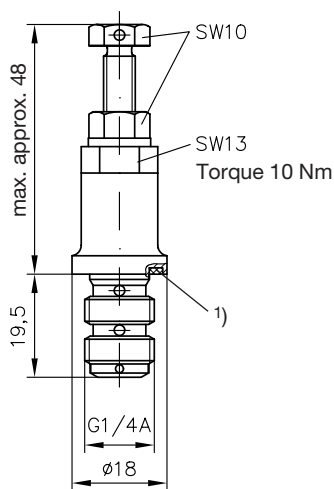
All dimensions are in mm, subject to change without notice!

4.1 Screw-in cartridge

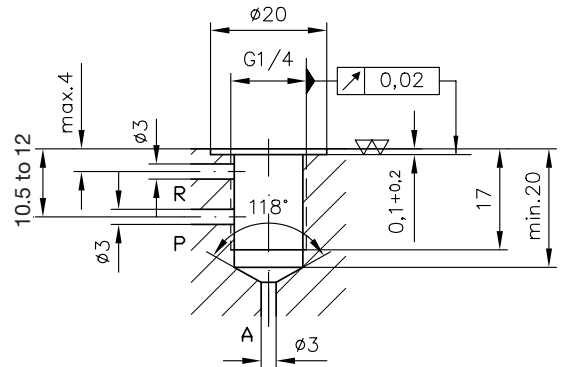
Type ADC 1 - ..



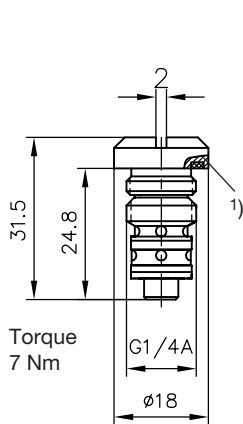
Type ADC 1K - 25



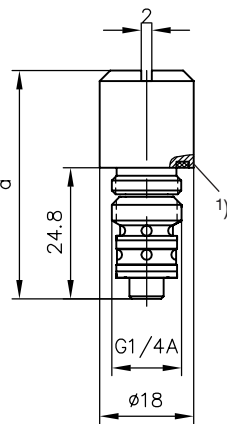
Mounting hole for type ADC 1 - .. and ADC 1K - 25



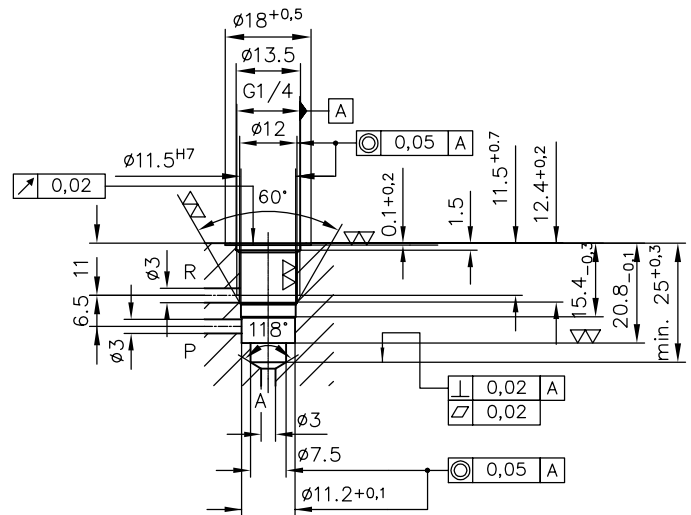
Type AM 1 - 20(25)



Type AM 1E(D, C) - ..



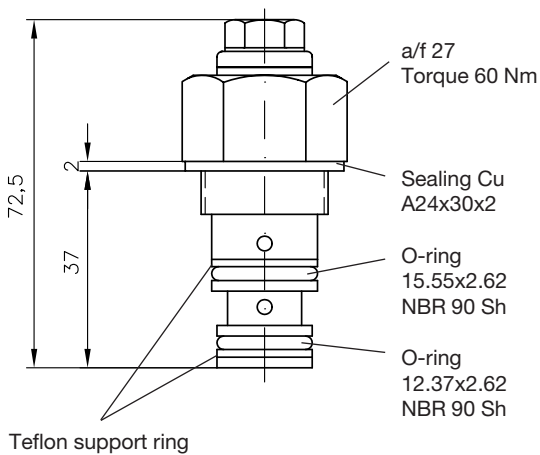
Mounting hole for type AM 1 - 20(25), AM 1E(D, C) - ..



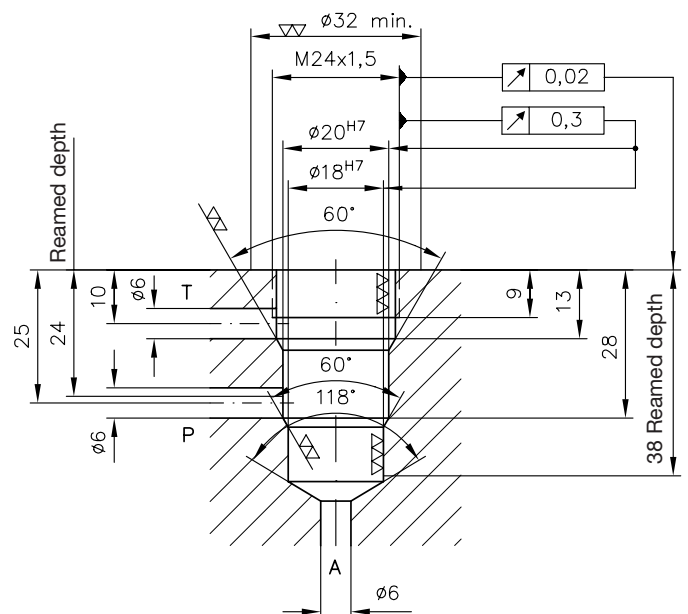
1) ERMETO EOLASTIC-seal (coding: ED R 1/4")

	a (mm)
AM 1 E(D)	43.5
AM 1 C	57.4

Type ADME 1 - ..

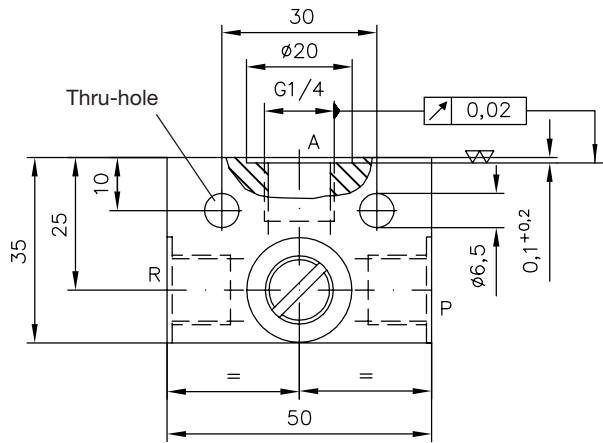
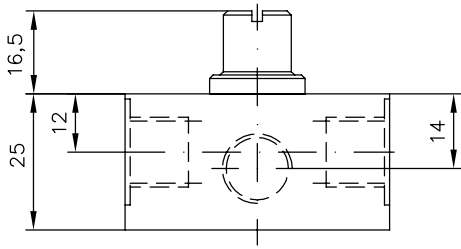


Mounting hole for type ADME 1 - ..



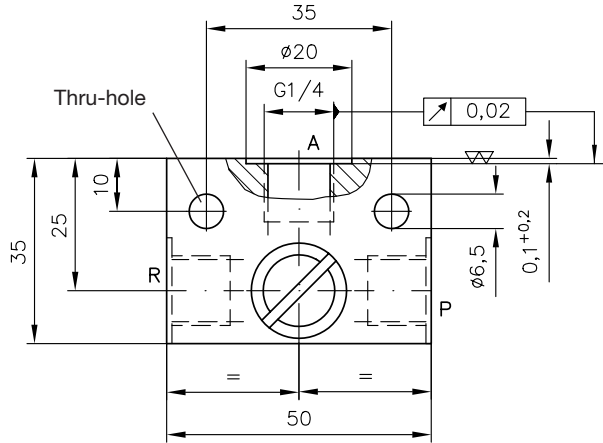
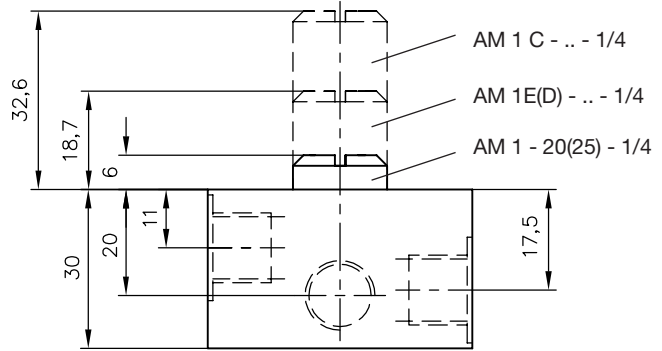
4.2 Housing design

Type ADC 1 - ... - 1/4



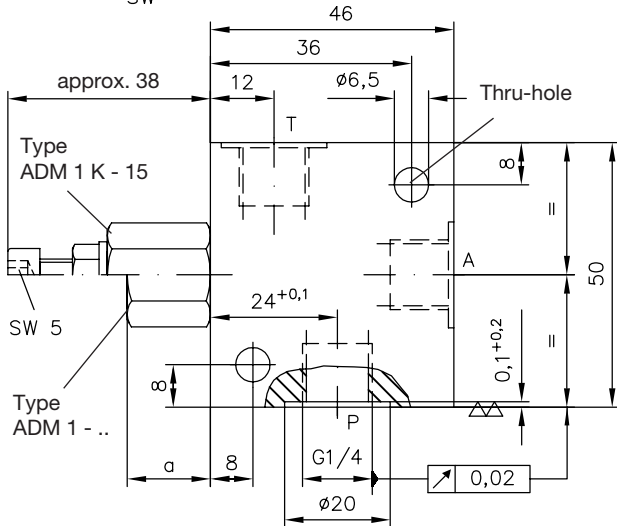
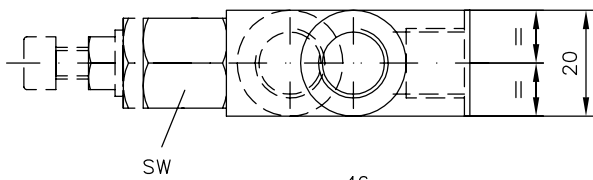
Ports A, P, and R = G 1/4 ISO 228/1 (BSPP)

Type AM 1 - 20(25) - 1/4
AM 1 E(D, C) - ... - 1/4

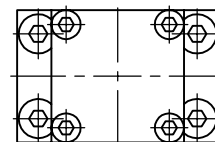
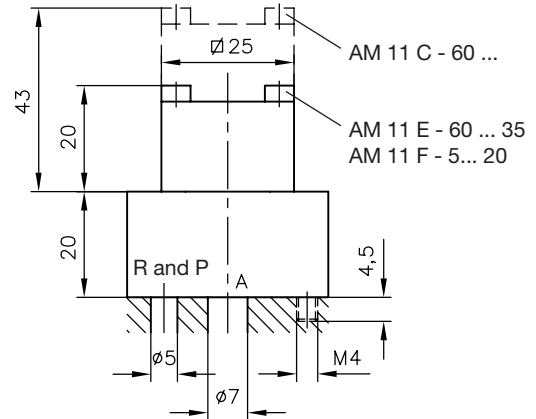
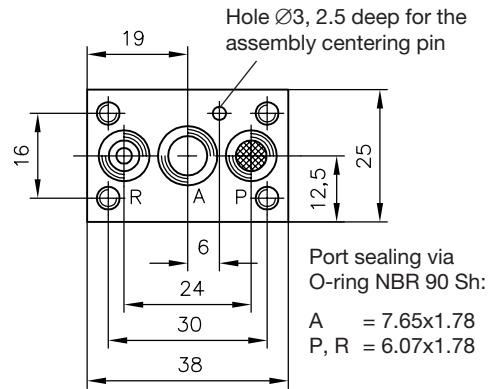


Ports A, P, and R = G 1/4 ISO 228/1 (BSPP)

Type ADM 1 - ... and ADM 1 K - 15



Type AM 11 ...



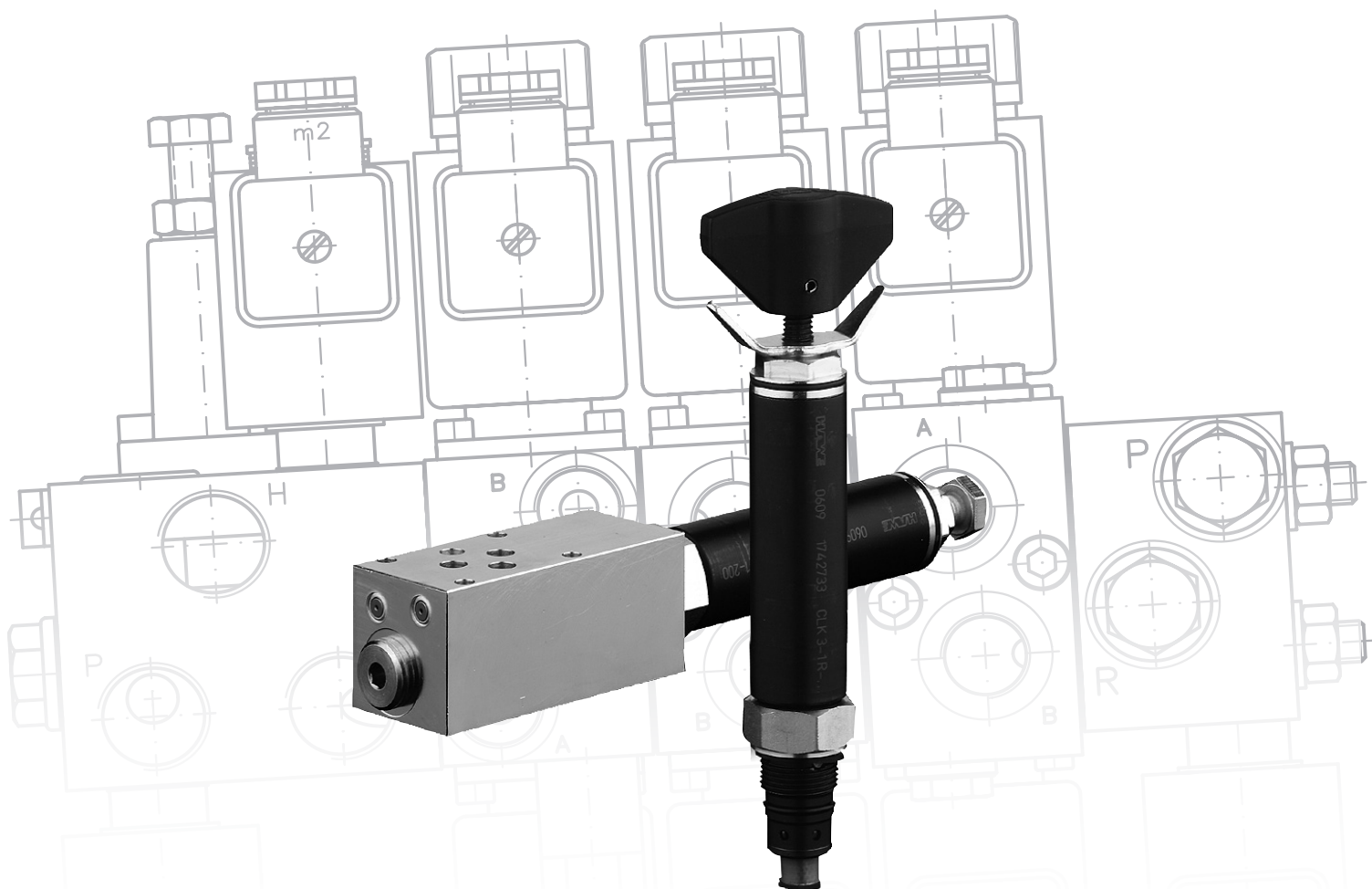
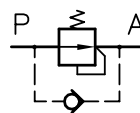
Type	a	a/f	Ports A, P, and T	Torque
ADM 1 - 15	15	17	G 1/4 ISO 228/1 (BSPP)	20 Nm
ADM 1 - 20				
ADM 1 - 30				
ADM 1 - 40	21	19	G 1/4 ISO 228/1 (BSPP)	20 Nm
ADM 1 - 50				
ADM 1 - 70				

Pressure reducing valves type CDK

No leakage, directly controlled

Adjustment: With tools
Manually

p_{\max} A: 500 bar
 p_{\max} P: 500 bar
 Q_{\max} : 22 lpm



Product documentation
D 7745

07-2013-1.3

HAWE Hydraulik SE - Streitfeldstr. 25 • 81673 München

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1 Overview pressure control valves type CDK

The task of pressure reducing valves is to maintain a largely constant outlet pressure despite a higher and changing inlet pressure. These valves are used when a secondary circuit has to be fed with a lower but constant pressure level by a main (primary) oil circuit with a higher and varying pressure level. The valve described here is directly controlled. Compared with conventional, piston-type pressure reducing valves suffering from leaking oil, where an additional drain port is required, this type is designed according to the two-way principle, i.e. it has zero leakage when in a closed state. These valves can be screwed into the easily produced threaded holes.

Features and benefits:

- Zero leakage in closed state
- Version with integrated overpressure function

Intended applications:

- General hydraulic systems
- Jigs
- Test benches

Design:

- Type CDK 3 - standard version, can be used for all applications.
- Type CDK 32 - version with low pressure dependence on changing pump (inlet) pressure and for usage at low pressure settings.
- Type CDK 35 - version with low back pressure, however with higher pressure dependence on changing pump (inlet) pressures.

Version with connection blocks:

- For pipe connection (without/with pressure-limiting valve)
- For manifold mounting (without/with pressure-limiting valve)
- For manifold mounting (without/with pressure-limiting valve) with adapter plate for pipe connection



Figure 1: Basic version (cartridge valve)



Figure 2: Version with connection block for direct pipe connection

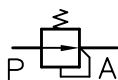


Figure 3: Version with connection block for manifold mounting

2 Versions available, main data

2.1 Basic type (cartridge valve)

Symbol:



Note

The check valve function in direction A → P is not illustrated for the sake of simplicity.

Example:

CDK 3 -2	R	-1/4	-250
			Pressure setting (bar) Pressure reducing valve ¹⁾
	Version	Table 3 Version with single connection block	
	Adjustment	Table 2 Adjustment	

Basic type and pressure range Table 1 Basic version

Table 1 Basic version

Basic type	Flow Q_{max} (lpm)	Pressure range p_A from ... to (bar)							
		-08	-081	-1	-11	-2	-21	-5	-51
CDK 3	12	50 ... 450	50 ... 500	30 ... 300	30 ... 380	20 ... 200	20 ... 250	15 ... 130	15 ... 165
CDK 32	6	30 ... 450	30 ... 500	18 ... 300	18 ... 380	12 ... 200	12 ... 250	8 ... 130	8 ... 165
CDK 35	22	110 ... 450	110 ... 500	70 ... 300	70 ... 380	50 ... 200	50 ... 250	30 ... 130	30 ... 165

Table 2 Adjustment

Coding	Description	Symbol
No designation	Tool adjustable	
R	Manually adjustable, with lock nut	
V	Turn knob, self-locking	
H	Turn knob, lockable	

¹⁾ If no desired pressure specification is indicated, the valve will be set at HAWE to the max. pressure of the respective pressure range

2.2 Version with connection block for pipe connection

Example:

CDK 3 -5 R	-1/4 -DG 365	-100	/250
CDK 35 -2	-1/4 SR	-200	

Pressure specification (bar) Pressure limiting valve


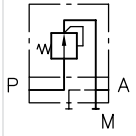
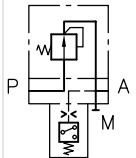
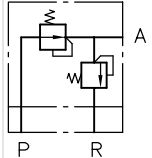
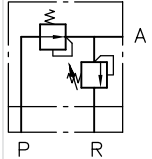
Pressure specification (bar) Pressure reducing valve (table 1 Basic version), see [Chapter 2.1, "Basic type \(cartridge valve\)"](#)

Version with pressure switch/pressure-limiting valve Table 3 Versions with single connection block, Table 4 Versions with pressure switch

Basic type and pressure range Table 1 Basic version, see [Chapter 2.1, "Basic type \(cartridge valve\)"](#)

Table 3 Designs with single connection block

Table 4 Versions with pressure switch

Coding	Description	Symbol
No designation	Screw-in valve	
..-1/4	For pipe connection	
..-1/4 - DG..	As 1/4, with additional pressure switch in the consumer line	
..-1/4 S	As 1/4, with additional pressure limiting valve, tool adjustable	
..-1/4 SR	As 1/4, with additional pressure limiting valve, manually adjustable, with lock nut	

Coding	
- DG 33	200 ... 700
- DG 34	100 ... 400
- DG 35	40 ... 210
- DG 36	4 ... 12
- DG 364	4 ... 50
- DG 365	12 ... 170

2.3 Version with connection block for manifold mounting

CDK 35 -5 R -SP -100 /300 - 1/4

Adapter plate For direct pipe connection

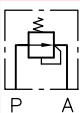
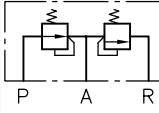
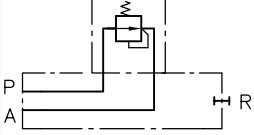
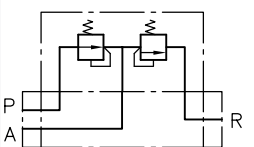
Pressure specification (bar) For the pressure limiting valve

Pressure specification (bar) Table 1 Basic version, see [Chapter 2.1, "Basic type \(cartridge valve\)"](#)

Connection block Table 5 Version with connection block

Basic type and pressure range Table 1 Basic version, see [Chapter 2.1, "Basic type \(cartridge valve\)"](#)

Table 5 Version with connection block

Coding	Description	Symbol
P	For manifold mounting	
SP	For manifold mounting, additionally with pressure-limiting valve, permanently set, tool adjustable	
P-...-1/4	Identical to P, with adapter plate for pipe connection	
SP-...-1/4	Identical to SP, with adapter plate for pipe connection	

3 Parameters

3.1 General

Description	Directly controlled 2-way pressure control valve		
Design	Ball seated valve		
Model	Screw-in valve, valve for pipe connection, valve for manifold mounting		
Material	Steel; nitrided valve housing, electrogalvanised sealing nuts and connection block, hardened and ground functional inner parts Balls made of rolling bearing steel		
Tightening torques	See Chapter 4, "Dimensions"		
Installation position	As desired		
Connections	<ul style="list-style-type: none"> ■ P = inlet (pump or primary side) ■ A = consumer (secondary side) ■ M = pressure gauge connection ■ R = tank connection <p>Coding applies to circuit diagrams and assembly plans only. The coding is not stamped onto the valve housing. The ports are stamped on the versions for pipe connection and versions for manifold mounting. The coding can be found in the schematic overviews or the dimension diagrams in Chapter 4, "Dimensions".</p>		
Flow direction	<p>P→A: Pressure reducing function A→P: Only possible if the pressure on the pump side is less than the consumer pressure.</p> <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p>i Note A by-pass check valve is recommended if the flow A→P exaggerates the specification for $Q_{P \rightarrow A \max}$ or pressure peaks or pulsation are anticipated.</p> </div>		
Hydraulic fluid	<p>Hydraulic oil conforming DIN 51 524 part 1 to 3; ISO VG 10 to 68 conforming DIN 51 519 Viscosity limits: min. approx. 4, max. approx. 1500 mm²/s opt. operation approx. 10... 500 mm²/s. Also suitable are biologically degradable pressure fluids types HEPG (Poly-alkylenglycol) and HEES (Synth. Ester) at service temperatures up to approx. +70°C.</p>		
Purity class	ISO 4406	NAS 1638	SAE T 490
	21/18/15...19/17/13	12 ... 8	≥ 6
Temperatures	<p>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.</p>		

Pressure and flow

Operating pressure

- $p_{P \max}$ on the pump side = 500 bar
- For $p_{A \max}$ on the consumer side, see table for basic version in [Chapter 2, "Versions available, main data"](#)
- Return $p_R \leq 20$ bar

Static overload capacity

Approx. $2 \times p_{\max}$ - tightened and sealing nuts locked

Pressure dependence

The pressure ratio as designed causes a slight change to the actual pressure p_A in conjunction with a variable pump pressure p_P .

Basic type	Pressure range				
	-08 -081	-1 -11	-2 -21	-5 -51	
CDK 3	± 1.3 bar	± 0.9 bar	± 0.6 bar	± 0.4 bar	$p_P \pm 10$ bar results in a pressure change for A of p_A
CDK 32	± 0.7 bar	± 0.45 bar	± 0.3 bar	± 0.23 bar	
CDK 35	± 2.7 bar	± 1.7 bar	± 1.2 bar	± 0.8 bar	

Flow

$Q_{P \rightarrow A \max}$	= 6 lpm	(CDK 32)
	= 12 lpm	(CDK 3)
	= 22 lpm	(CDK 35)
$Q_{A \rightarrow P \max}$	= 25 lpm	See information in Chapter 3, "Parameters"

Characteristics

Viscosity during measurements
approx. 60 mm²/s
p_A - Q_{P→A} - characteristics

The setting applies if Q_{P→A} → 0 lpm. If Q > 0, i.e. the connected consumer is moving, the secondary pressure p_A drops slightly. The pressure p_A is set according to the information in the order at p_p ≈ 1.1 p_A.



Caution

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

- Always monitor the pressure gauge when setting or changing the pressure.

Type CDK

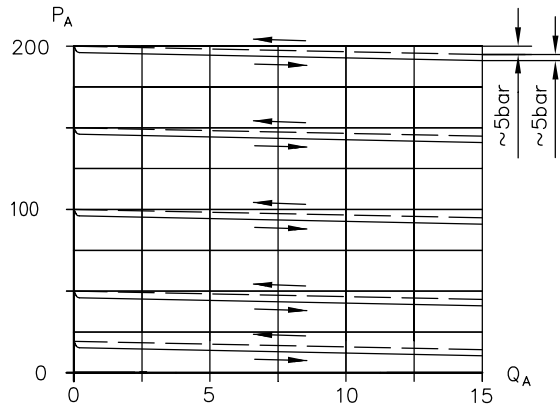


Figure 4: Q_A flow (lpm), p_A outlet pressure (bar)

Δp - Q characteristics P→A or A→P

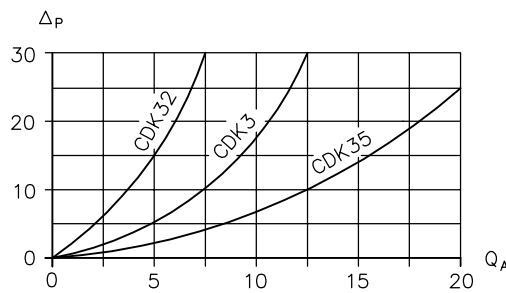


Figure 5: Q_A flow (lpm); Δp back pressure (bar)



Note

For this purpose, please also observe the additional information under the point "Flow direction".

Mass**Basic version (cartridge valve)**

Type CDK.. = 0.7 kg

Version with single connection block

Type CDK..

- 1/4 = 1.3 kg

- 1/4 - DG.. = 1.6 kg

- 1/4 S(SR) = 1.6 kg

- P = 1.1 kg

- SP = 1.6 kg

- SP-../..-1/4 = 2.0 kg

4 Dimensions

All dimensions in mm, subject to change!

4.1 Dimensions - Basic type (cartridge valve)

Type CDK 3..

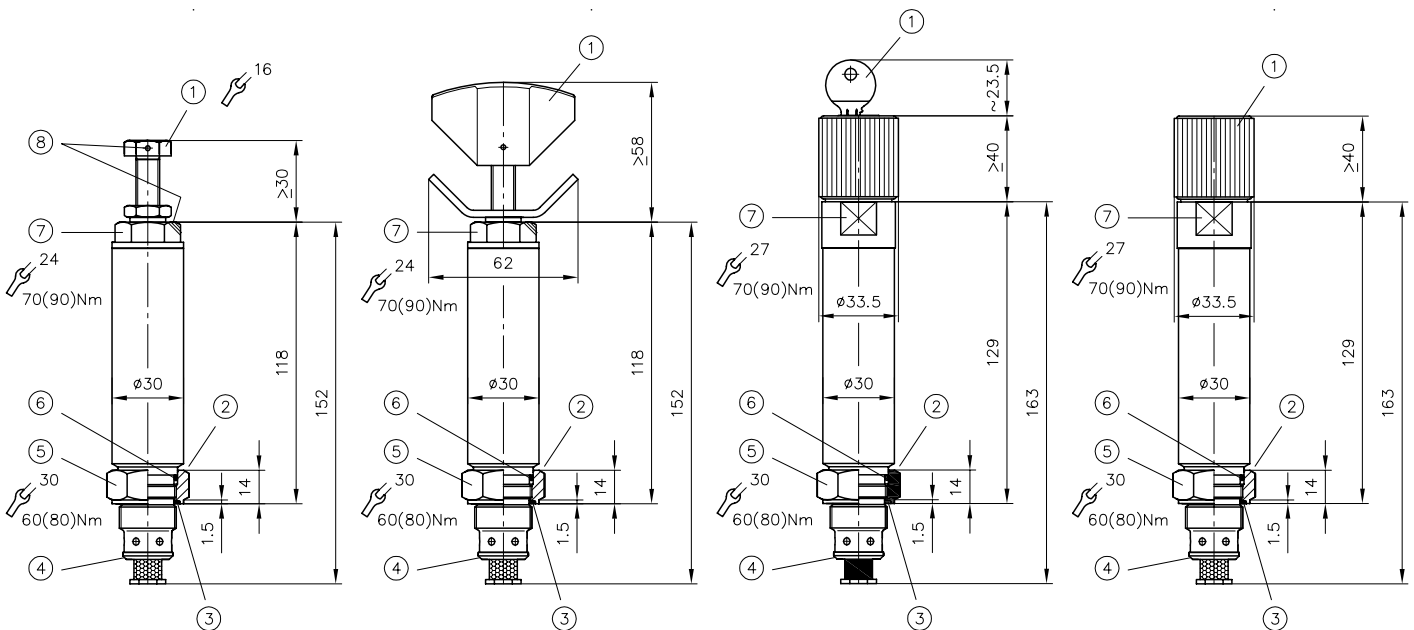


Figure 6: Without coding, tool adjustable

Figure 7: Coded R, manually adjustable

Figure 8: Coded H, lockable

Figure 9: Coded V, self-locking

- 1 Screw with lock nut
- 2 Stopper
- 3 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52 x 26.88 x 1.68
- 4 Sealing edge
- 5 Sealing nut ¹⁾
- 6 O-ring 21.95 x 1.78 (21.89 x 2.62) ¹⁾ AU 90 S
- 7 Valve housing ¹⁾
- 8 Sealing option

- 1 Turn knob
- 2 Stopper
- 3 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52 x 26.88 x 1.68
- 4 Sealing edge
- 5 Sealing nut ¹⁾
- 6 O-ring 21.95x1.78 (21.89x2.62) ¹⁾ AU 90 Sh
- 7 Valve housing ¹⁾

- 1 Key (not included)
- 2 Stopper
- 3 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52 x 26.88 x 1.68
- 4 Sealing edge
- 5 Sealing nut ¹⁾
- 6 O-ring 21.95x1.78 (21.89x2.62) ¹⁾ AU 90 Sh
- 7 Valve housing ¹⁾

- 1 Turn knob
- 2 Stopper
- 3 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52 x 26.88 x 1.68
- 4 Sealing edge
- 5 Sealing nut ¹⁾
- 6 O-ring 21.95x1.78 (21.89x2.62) ¹⁾ AU 90 Sh
- 7 Valve housing ¹⁾



Note

For this purpose, please also observe the information on threads and on producing requirements in the section on assembly information.

¹⁾ Values in brackets apply to pressure ranges of type CDK 3.-08(-081)

Type CDK ...- 1/4 S

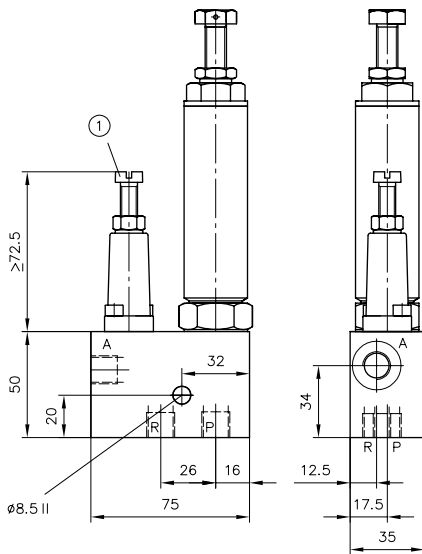


Figure 13: with pressure limiting valve, tool adjustable

1 Pressure-limiting valve, tool adjustable

Ports acc. to ISO 228/1 (BSPP): A, P, R and M = G 1/4

Type CDK 3...- 1/4 SR

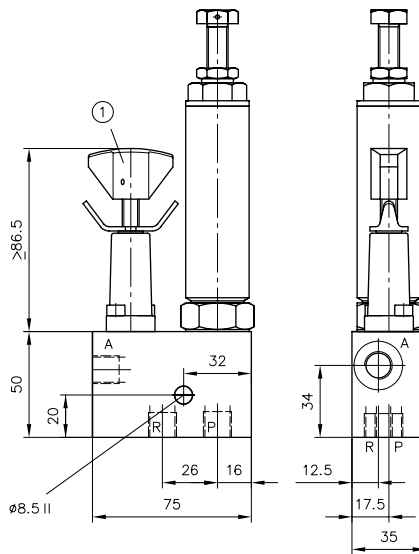


Figure 14: with pressure limiting valve, manually adjustable

1 Pressure-limiting valve, manually adjustable

4.4 Dimensions - Version with connection block for manifold mounting

Type CDK 3 ...- P

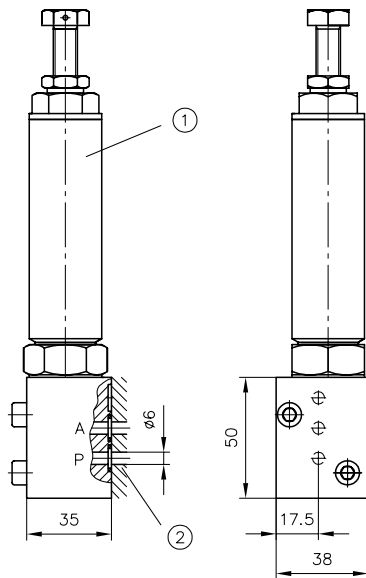


Figure 15: for manifold mounting

1 Basic type (screw-in valve in accordance with sec. 4.1)
2 Sealing with O-rings 7.65 x 1.78 NBR 90 Sh

Type CDK 3 ...- SP

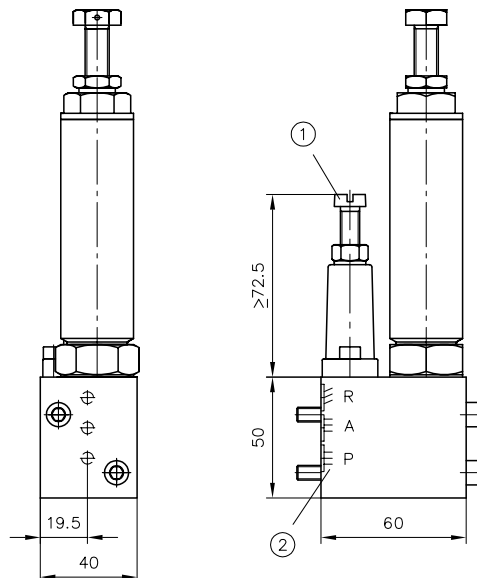


Figure 16: with pressure limiting valve, tool adjustable

1 Pressure-limiting valve
2 Connection block

For this purpose, please observe the hole pattern in [Chapter 4.5, "Base plate hole pattern"](#).

Type CDK 3 (32, 35) - ... - P - ../.. - 1/4

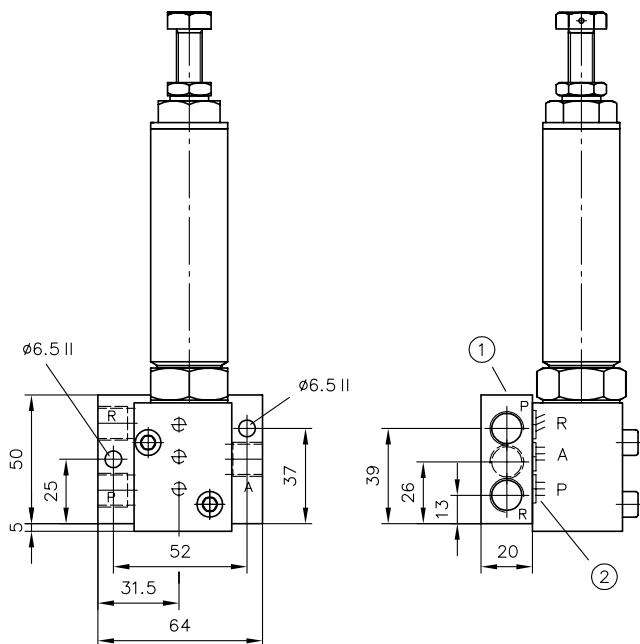


Figure 17: with adapter plate

- 1 Adapter plate (connection block for pipe connection)
- 2 Sealing with O-rings 7.65 x 1.78 NBR 90 Sh

Type CDK 3 (32, 35) - ... - SP - ../.. - 1/4

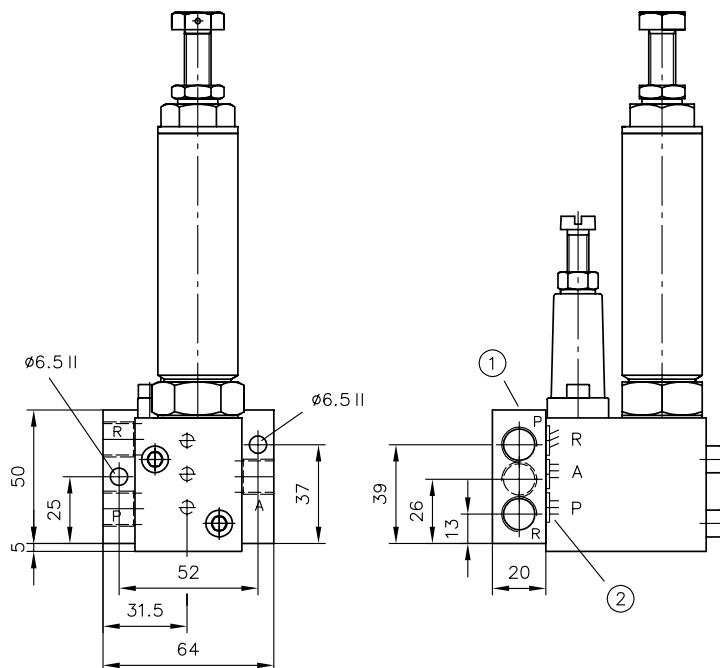


Figure 18: with adapter plate and pressure limiting valve, tool adjustable

- 1 Adapter plate (connection block for pipe connection)
- 2 Sealing with O-rings 7.65 x 1.78 NBR 90 Sh

Ports acc. to ISO 228/1 (BSPP): A, P, and R = G 1/4

4.5 Base plate hole pattern

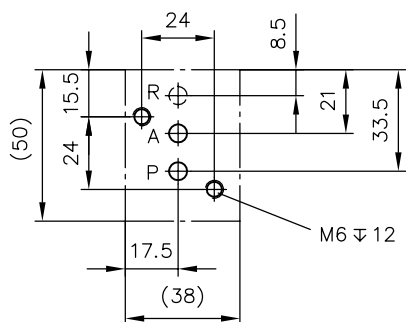


Figure 19: Hole pattern type ADM 11 P

The hole pattern corresponds to type ADM 11 P in accordance with D 7120. The O-ring counterbore for the drain port R (or L) is present, but is only required on the type CDK..-SP.

4.6 Tapped plugs

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

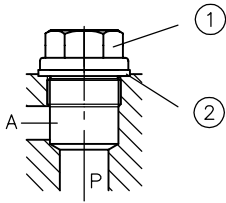


Figure 20: Passage open

- 1 Tapped plug M 24x1.5 DIN 910
- 2 O-ring A 25x30x2 DIN 7603-Cu

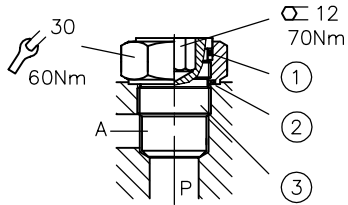


Figure 21: Passage closed

- 1 O-ring 21.95x1.78 AU 90 Sh
- 2 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52 x 26.88 x 1.68
- 3 Tapped plug and locking tapped plug complete order no.. 7710 029

5**Installation, operation and maintenance information****5.1 Designated use**

This fluid-power product has been designed, manufactured and tested using standards and regulations generally applicable in the European Union and left the plant in a safe and fault-free condition.

To maintain this condition and ensure safe operation, operators must observe the information and warnings in this documentation.

This fluid-power product must be installed and integrated in a hydraulic system by a qualified specialist who is familiar with and adheres to general engineering principles and relevant applicable regulations and standards.

In addition, application-specific features of the system or installation location must be taken into account if relevant.

This product may only be used as a pressure control valve within oil-hydraulic systems.

The product must be operated within the specified technical parameters. This documentation contains the technical parameters for various product versions.

**Note**

Non-compliance will void any warranty claims made against HAWE Hydraulik.

5.2 Assembly information

The hydraulic system must be integrated in the equipment with standard connection components that comply with market requirements (screw fittings, hoses, pipes, etc.). The hydraulic system must be shut down as a precautionary measure prior to dismounting; this applies in particular to systems with hydrostatic accumulators.

5.2.1 Screw in basic type (cartridge valve)

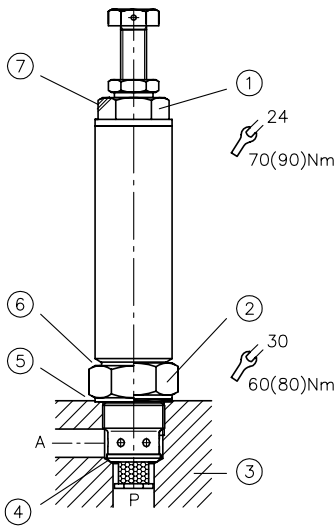


Figure 22: Valve body type CDK

1. Before screwing in the valve body loosen the counter/sealing nut until the travel stop.
2. Screw in the valve body and tighten with the specified torque. The metallic sealing of the inlet to the outlet is formed between the facial sealing edge of the valve body and the shoulder of the stepped hole in the manifold.
3. Tighten counter/sealing nut with specified torque.

1. Valve housing ¹⁾
2. Lock nuts and sealing nuts ¹⁾
3. Basic body
4. Sealing edge
5. Locking
6. Stopper
7. Sealing option

5.2.2 Adjusting pressure

If no desired pressure specification is indicated, the valve will be set at HAWE to the max. pressure of the respective pressure range.

Reference values for pressure adjustment

Pressure adjustment Pressure limiting valve		Pressure adjustment Pressure limiting valve		Pressure adjustment Pressure limiting valve	
Coding	Δp /revolution (bar/rev)	Coding	Δp /revolution (bar/rev)	Pressure range (bar)	Δp /revolution (bar/rev)
08	37	081	46	... 500	100
1	25	11	31	... 315	55
2	16	21	20	... 160	19
5	10	51	12	... 80	9.5



Caution

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

- Always monitor the pressure gauge when setting or changing the pressure.

¹⁾ Values in brackets apply to pressure ranges of type CDK 3.-08 (-81)

5.2.3 Creating the mounting hole

See description in [Chapter 4.2, "Mounting hole"](#).

5.2.4 Making base plate

The hole pattern corresponds to type ADM 11 P in accordance with D 7120. The O-ring counterbore for the drain port R (or L) is present, but is only required on the type CDK..-SP.

See hole pattern in [Chapter 4.5, "Base plate hole pattern"](#)

5.3 Operating instructions

Product, pressure and/or flow settings

All statements in this documentation must be observed for all product, pressure and/or flow settings on or in the hydraulic system.



Caution

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

- Always monitor the pressure gauge when setting or changing the pressure.

Filtering and purity of the hydraulic fluid

Soiling in the fine range, e.g. abraded material and dust, or in the macro range, e.g. chips, rubber particles from hoses and seals, can cause significant malfunctions in a hydraulic system. It is also to be noted that new hydraulic fluid "from the drum" does not necessarily meet the highest purity requirements.

For trouble-free operation pay attention to the purity of the hydraulic fluid (see also purity class in [Chapter 3, "Parameters"](#)).

5.4 Maintenance information

This product is largely maintenance-free.

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

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

Check the device surfaces for dust deposits at regular intervals (but at least once per year) and clean the device if required.

6 Other information

6.1 Planning information

Due to the leak-free sealing in the closed state, on usage in control circuits with long pressure retention times without switching processes (e.g. with separate pallet clamping) pressure changes may occur under certain circumstances. Pressure increases can occur, for instance, on temperature rises (e.g. sunlight) or the additional action of external loads, pressure drops (with pump switched off) due to temperature drops (cooling at night) or load removal.

These effects are particularly noticeable with short, rigid pipe connections. Hoses and additional volume (e.g. AC 13 miniature accumulator in accordance with [D 7571](#)) help to compensate such (negative) pressure fluctuations.

The ratio of thermal expansion coefficient to coefficient of compressibility (theoretically 1:10, i.e. $\Delta T = 1K \rightarrow \Delta p \approx 10 \text{ bar}$) is based on the fact described above. As consumers, pipes and hoses will yield in reality (based on experience) a ratio of approx. 1:1 can be assumed.

6.2 Application examples

Example of a version with large flows $Q_{A \rightarrow P}$
Example: $Q_P = 15 \text{ lpm}$ [formula]

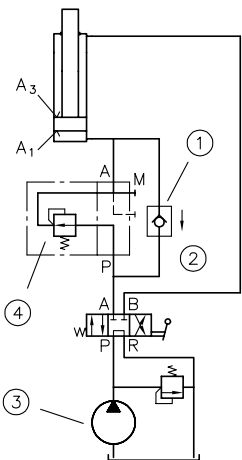


Figure 23: Application example for large flows

- 1 e.g. type RK 2G in acc. with D 7445
- 2 $Q_{\text{return}} = 45 \text{ lpm}$
- 3 $Q_P = 15 \text{ lpm}$
- 4 Type CDK 3-2-1/4

Example of a version with undesired return flow

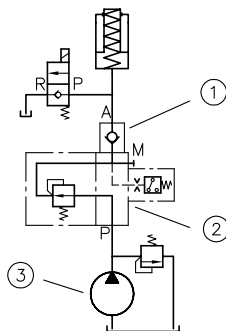


Figure 24: Application example for undesired return flow

- 1 e.g. type RK 1E in acc. with D 7445 (shown here screwed into port A of the CDK 3 valve)
- 2 Type CDK 3- 2-1/4-DG 34

Use in the valve bank, shown here with seated valves type BVZP 1 in acc. with D 7785 B
BVZP 1 A - 1/300 - G22/0
- G22/CZ2/100/4/2
- WN1H/10/4
- 1 - 1 - G 24

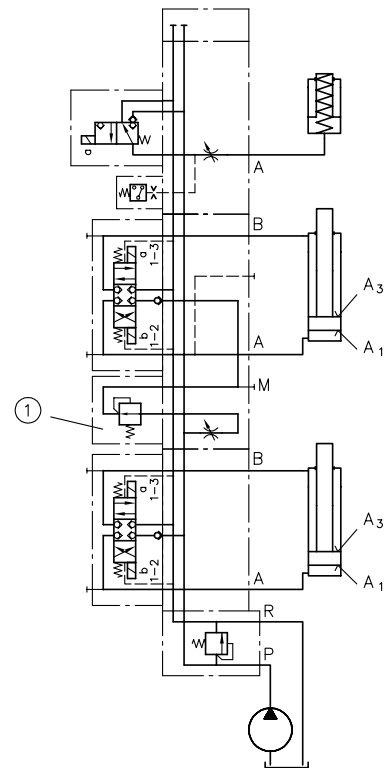


Figure 25: Application example in the valve bank

- 1 Type CDK 3-2-100 shown here incorporated as -/CZ 2/100...

Additional versions

- [Pressure reducing valve, type CLK: D 7745 L](#)
- [2-way pressure reducing valves type DK: D 7941](#)
- [Pressure valves type CMV, CMVZ and CSV, CSVZ: D 7710 MV](#)
- [Pressure controlled the 2-way directional valve type CNE: D 7710 NE](#)
- [Throttle and shut-off valves type CAV: D 7711](#)
- [Shut-off valve cartridges, type CRK, CRB and CRH: D 7712](#)
- [Pressure-dependent shut-off valve type CDSV: D 7876](#)
- [Throttle and restrictor check valves type CQ, CQR, and CQV: D 7713](#)
- [2-way pressure reducing valves type DK: D 7941](#)
- [Two-way flow valves, type SB: D 6920](#)

Utilized at

- [Directional seated valve banks, types VB 01 .. to VB 41 ...: D 7302](#)
- [Directional seated and directional spool valve banks, types BWN 1 and BWH 1: D 7470 B/1](#)
- [Directional seated valve banks, type BVZP 1: D 7785 B](#)
- [Valve bank type BA: D 7788](#)
- [Valve bank type BVH: D 7788 BV](#)
- [Intermediate plate type NZP hole pattern conforming NG 6 \(DIN 24 340-A6\): D 7788 Z](#)

Headquarter

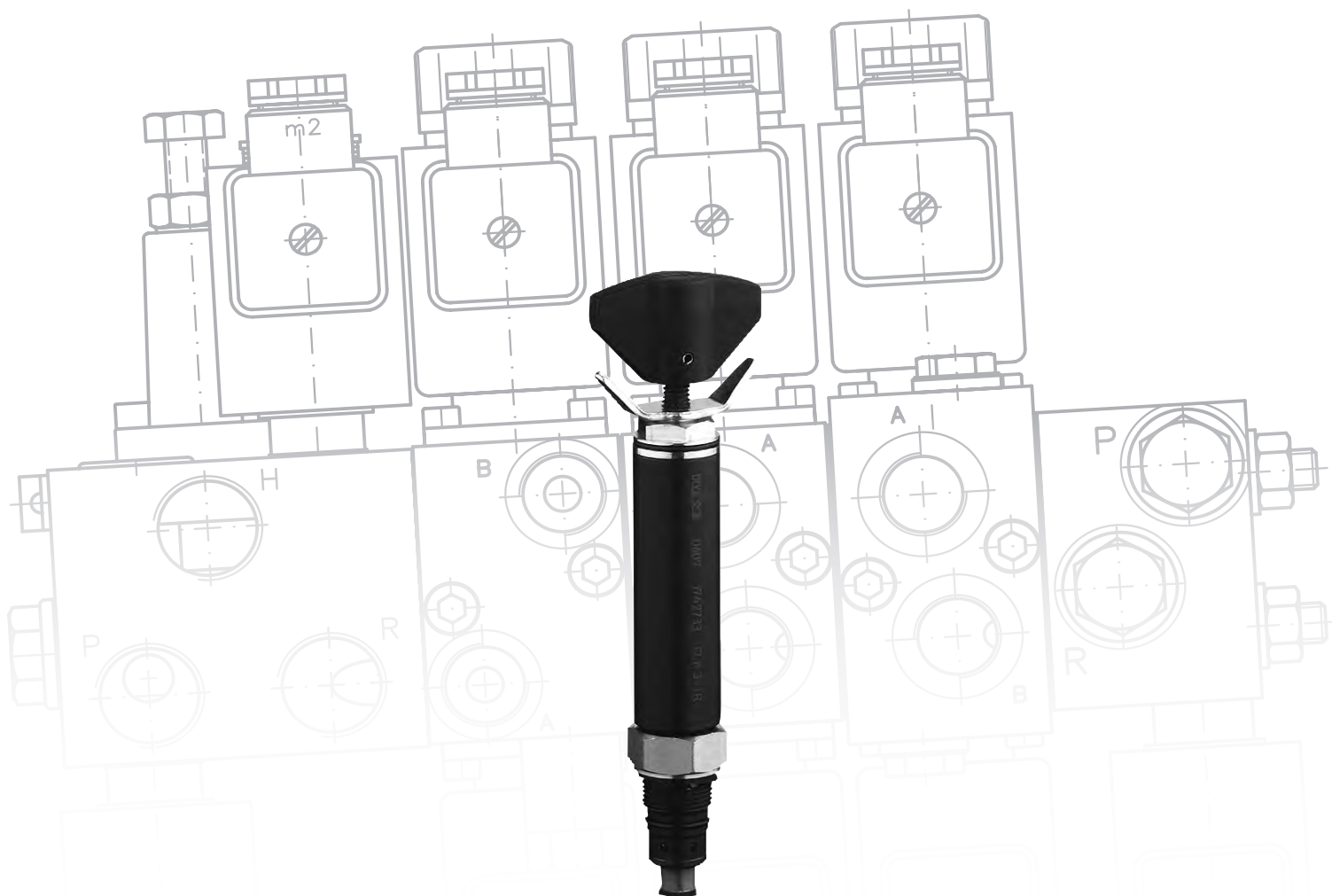
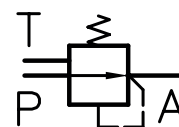
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Fax: +49 89 37 91 00-12 69
e-mail: info@hawe.de
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Pressure control valves type CLK

Free of leakage oil, directly controlled by overpressure function

Adjustability: With tools
Manually

$p_{\max P}$: 500 bar
 $p_{\max A}$: 380 bar
 Q_{\max} : 22 l/min



Product documentation

D 7745 L

07-2013-1.1

HAWE Hydraulik SE - Streitfeldstr. 25 • 81673 München

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1

General information pressure reducing valve type CLK

The task of pressure reducing valves is to maintain a largely constant outlet pressure despite a higher and changing inlet pressure. These valves are used when a secondary circuit has to be fed with a lower but constant pressure level by a main (primary) oil circuit with a higher and varying pressure level. The valve described here is directly controlled. Compared with conventional, piston-type pressure reducing valves suffering from leaking oil, where an additional drain port is required, this type is designed according to the two-way principle, i.e. it has zero leakage when in a closed state. Type CLK has an integrated safety valve function. A reversal of the flow direction is possible up to approx. $2 \times Q_{\max}$. These valves can be screwed into the easily produced threaded holes.



Image 1: Version with connection block for direct pipe connection



Image 2: Basic type (cartridge valve)

Features and benefits:

- Zero leakage in closed state
- Version with integrated overpressure function

Intended applications:

- General hydraulic systems
- Jigs
- Test benches

Basic Versions:

- Type CLK 3 - Standard version, usable for all applications.
- Type CLK 32 - Version with low pressure dependence intended for varying pump pressure and use at low pressure settings (Attention: max. flow 6 lpm).
- Type CLK 35 - Version with low back pressure, but with higher sensitivity to varying pump pressure.

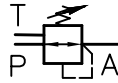
Versions with connection blocks:

- For pipe connection

2 Available versions, main data

2.1 Basic type (cartridge valve)

Symbol:



Note

The check valve function in direction A → P is not illustrated for the sake of simplicity.

Example:

CLK 3 -2			-180
CLK 32 -51	R	-1/4	-20
		Pressure setting (bar)	Pressure reducing valve ¹⁾
	Version	Table 3 Version with single connection block	
	Adjustment	Table 2 Adjustment	
Basic type and pressure range			Table 1 Basic type

Table 1 Basic type

Basic type	Flow Q_{max} (lpm)	Pressure range p_A from ... to (bar)					
		-1	-11	-2	-21	-5	-51
CLK 3	12	30 ... 300	30 ... 380	20 ... 200	20 ... 250	15 ... 130	15 ... 165
CLK 32	6	18 ... 300	18 ... 380	12 ... 200	12 ... 250	8 ... 130	8 ... 165
CLK 35	22	70 ... 300	70 ... 380	50 ... 200	50 ... 250	30 ... 130	30 ... 165

Table 2 Adjustment

Coding	Description	Symbol
No designation	Tool adjustable	
R	Manually adjustable, with lock nut	
H	Turn knob, lockable	

¹⁾ If no desired pressure specification is indicated, the valve will be set at HAWE to the max. pressure of the respective pressure range.

2.2 Version with connection block for direct pipe connection

Order example:



CLK 3 -5R -1/4 -100


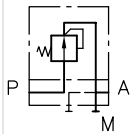
Pressure setting (bar) Pressure reducing valve ¹⁾

Version Table 3 Version with connection block for direct pipe connection

Adjustment Table 2 Adjustment, see [Chapter 2.1, "Basic type \(cartridge valve\)"](#)

Basic type and pressure range Table 1 Basic type, see [Chapter 2.1, "Basic type \(cartridge valve\)"](#)

Table 3 Designs with single connection block

Coding	Description	Symbol
No designation	Screw-in valve	
..-1/4	For pipe connection	

¹⁾ If no desired pressure specification is indicated, the valve will be set at HAWES to the max. pressure of the respective pressure range

3 Parameters

3.1.1 General

General information

Nomenclature	Directly controlled pressure reducing valve, with safety valve function		
Design	Directional ball seated valve		
Model	Screw-in valve, valve for pipe connection		
Material	Steel body gas nitrided, connection block galv. zinc plated, internal functional parts hardened and ground Balls made of bearing quality steel		
Torques	See Chapter 4, "Dimensions"		
Installation position	Any		
Port	<ul style="list-style-type: none"> ■ P = Inlet (pump or primary side) ■ A = Consumer (secondary side) ■ T = Tank (return) <p>Coding applies to circuit diagrams and assembly plans only. The coding is not stamped onto the valve housing. The ports are stamped on the versions for pipe connection and versions for manifold mounting. The coding can be found in the schematic overviews or the dimension diagrams in Chapter 4, "Dimensions".</p>		
Direction of flow	<p>P→A: Pressure reducing function A→P: this only occurs, if the pressure on the primary side is lower than on the consumer side.</p> <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p>i Note A by-pass check valve is recommended if the flow A→P exaggerates the specification for $Q_{P \rightarrow A \max}$ or pressure peaks or pulsation are anticipated.</p> </div>		
Pressure fluid	Hydraulic oil conforming DIN 51 524 part 1 to 3; ISO VG 10 to 68 conforming DIN 51 519 Viscosity limits: min. approx. 4, max. approx. 1500 mm ² /s opt. operation approx. 10... 500 mm ² /s. Also suitable are biologically degradable pressure fluids types HEPG (Poly-alkylenglycol) and HEES (Synth. Ester) at service temperatures up to approx. +70°C.		
Purity class	ISO 4406	NAS 1638	SAE T 490
	21/18/15...19/17/13	12 ... 8	≥ 6
Temperature	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.		

Pressure and flow

Permissible pressure

- Pump side $p_{P \max} = 500 \text{ bar}$
- Return $p_T \leq 20 \text{ bar}$

Static overload capacity

Pressure deviation

The primary side p_P due to a internal design based ratio. The actual pressure p_V being received will vary slightly as it directly depends on the pressure at.

Basic type	Pressure range				At $p_P \pm 10 \text{ bar}$ a pressure variation p_V will be apparent at A
	-08 -081	-1 -11	-2 -21	-5 -51	
CLK 3	$\pm 1.3 \text{ bar}$	$\pm 0.9 \text{ bar}$	$\pm 0.6 \text{ bar}$	$\pm 0.4 \text{ bar}$	
CLK 32	$\pm 0.7 \text{ bar}$	$\pm 4.5 \text{ bar}$	$\pm 0.3 \text{ bar}$	$\pm 0.23 \text{ bar}$	
CLK 35	$\pm 2.7 \text{ bar}$	$\pm 1.7 \text{ bar}$	$\pm 1.2 \text{ bar}$	$\pm 0.8 \text{ bar}$	

Flow

$Q_{P \rightarrow A \max}$	= 6 lpm	(CLK 32)
	= 12 lpm	(CLK 3)
	= 22 lpm	(CLK 35)
$Q_{A \rightarrow P \max}$	= 25 lpm	See information in Chapter 3, "Parameters"
$Q_{A \rightarrow T \max}$	See characteristic curves in Chapter 3, "Parameters"	

Curves

Viscosity during measurements
approx. 60 mm²/s
p_A - Q_{P→A} - Curves

The set pressure applies to flow Q_{P→A}→0 lpm. With flow Q > 0, i.e. the consumer is moving, the pressure on the secondary side p_A will drop slightly.



Caution

Danger of injury due to incorrect pressure settings!

- Always monitor the pressure gauge when setting or changing the pressure.

Type CLK

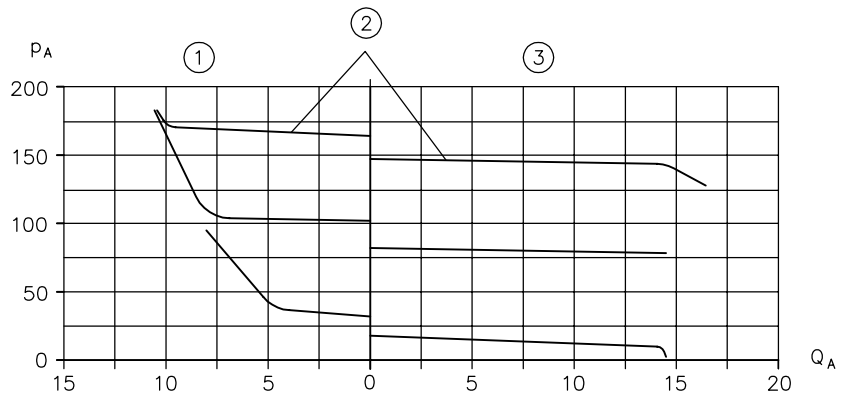


Image 3: Q_A Flow (lpm); p_A Pressure (bar)

- 1 Safety valve function
- 2 identical pressure setting
- 3 Pressure reducing function

Δp - Q - Curve P→A or A→P

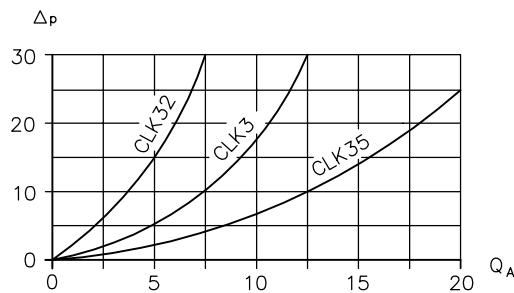


Image 4: Q_A Flow (lpm); Δp Back pressure (bar)



Note

For this purpose, please also observe the additional information under the point "Flow direction".

Mass

Basic type (cartridge valve)

Type CLK.. = 0.7 kg

Version with connection block

Type CLK..

- 1/4 = 1.3 kg

4 Dimensions

All dimensions in mm, subject to change.

4.1 Basic type (cartridge valve)

Type CLK 3..

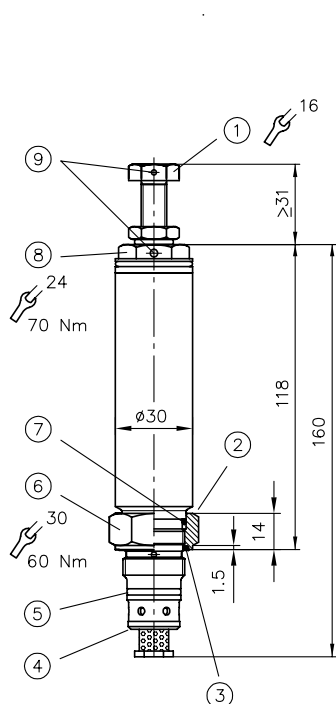


Image 5: Without coding, tool adjustable

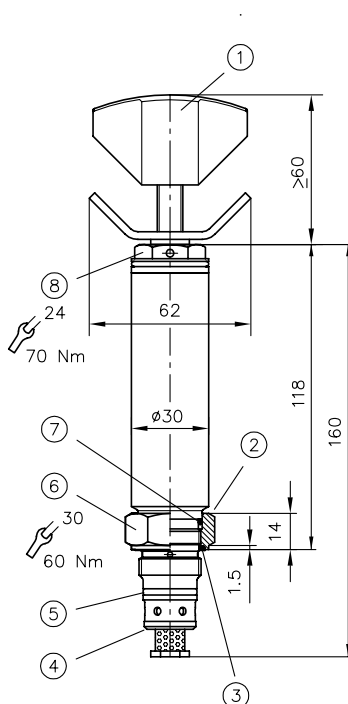


Image 6: Code R, manually adjustable

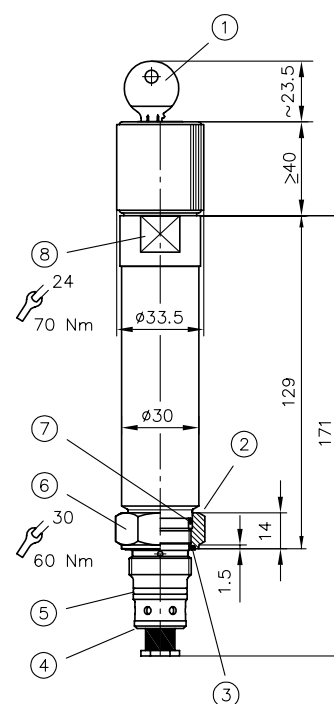


Image 7: Code H, lockable

- 1 Screw with lock nut
- 2 Travel stop
- 3 KANTSEAL DKAR00021-N90 NBR 90 Sh
23.52x26.88x1.68
- 4 Sealing edge
- 5 O-ring 18.77x1.78 P 5001
- 6 Sealing nut hole
- 7 O-ring 21.95x1.78 AU 90 Sh
- 8 Valve body
- 9 Provision for lead seal

- 1 Turn knob
- 2 Travel stop
- 3 KANTSEAL DKAR00021-N90 NBR 90 Sh
23.52x26.88x1.68
- 4 Sealing edge
- 5 O-ring 18.77x1.78 P 5001
- 6 Sealing nut hole
- 7 O-ring 21.95x1.78 AU 90 Sh
- 8 Valve body

- 1 Key (is scope of delivery)
- 2 Travel stop
- 3 KANTSEAL DKAR00021-N90 NBR 90 Sh
23.52x26.88x1.68
- 4 Sealing edge
- 5 O-ring 18.77x1.78 P 5001
- 6 Sealing nut hole a/f 30
- 7 O-ring 21.95x1.78 AU 90 Sh
- 8 Valve body a/f 24



Note

For this purpose, please also observe the information on threads and on counterboring the mounting hole requirements in the section on assembly information.

4.2 Mounting hole

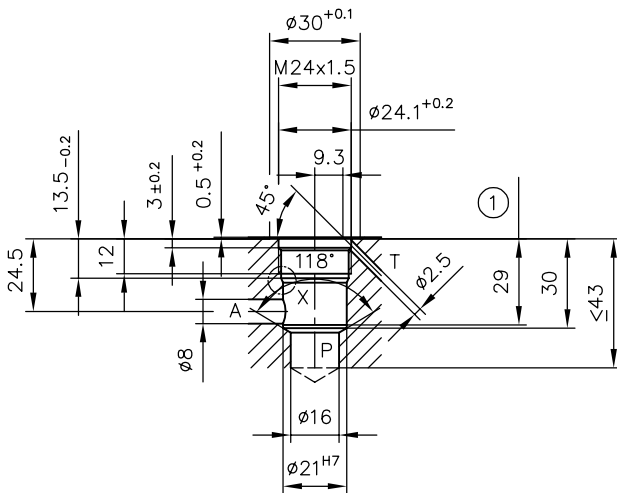


Image 8: Mounting hole Type CLK

1. Reaming depth

Detail "X"

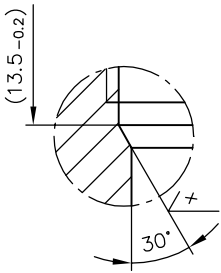


Image 9: Detail X

Counterbore $0.5^{+0.2}$ (max. $\varnothing 30^{+0.1}$), exclusively required for pressures at A in excess of 100 bar.

The sealing of the inlet to outlet takes place at the contact area between the facial sealing edge of the screwed-in end of the valve body and the stepped shoulder of the core diameter at the location thread.

The stepped shoulder is depicted with the normal 118° drill sharpening angle for steel.

Therefore reaming of the hole and bevels to help the seals slip in are not necessary.

The sealing of the attached valve and its fixing at the manifold body are made by a sealing nut with a special thread seal and an O-ring. Additionally the passage between port A and T is sealed at the screw-in port and the internal piston.

4.3 Version with connection block for direct pipe connection

Type CLK 3..- 1/4

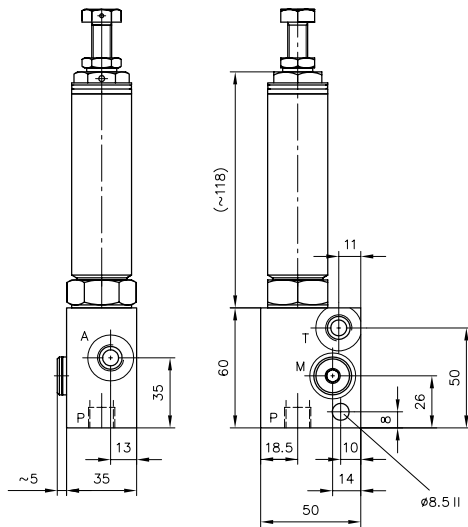


Image 10: Version with connection block for direct pipe connection

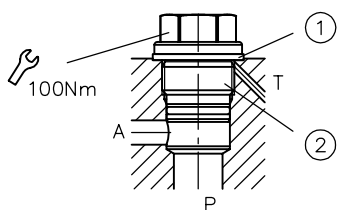
1. $\varnothing 8.5$ thru-hole

Ports conforming ISO 228/1: P, A, M, T = G 1/4 (BSPP)

4.4 Accessory - Tapped plugs

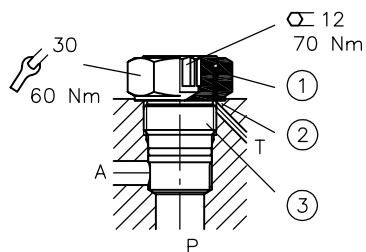
Mounting holes in the manifold may be blocked if required by tapped plugs, e.g. if uniform manufactured manifolds should be equipped with or without cartridge valves depending on application.

Passage open



- 1 Tapped plug M 24x1.5 DIN 910-Cu
- 2 Tapped blockage part No. 7745 405

Passage closed



- 1 O-ring 21.95x1.78 AU 90 Sh
- 2 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52x26.88x1.68
- 3 Tapped blockage/plug combination part No. 7745 455

5 Installation, operation and maintenance information

5.1 Designated use

This fluid-power product has been designed, manufactured and tested using standards and regulations generally applicable in the European Union and left the plant in a safe and fault-free condition.

To maintain this condition and ensure safe operation, operators must observe the information and warnings in this documentation.

This fluid-power product must be installed and integrated in a hydraulic system by a qualified specialist who is familiar with and adheres to general engineering principles and relevant applicable regulations and standards.

In addition, application-specific features of the system or installation location must be taken into account if relevant.

This product may only be used as a pressure reducing valve within oil-hydraulic systems.

The product must be operated within the specified technical parameters. This documentation contains the technical parameters for various product versions.



Note

Non-compliance will void any warranty claims made against HAWE Hydraulik.

5.2 Installation information

The hydraulic system must be integrated in the equipment with standard connection components that comply with market requirements (screw fittings, hoses, pipes, etc.). The hydraulic system must be shut down as a precautionary measure prior to dismantling; this applies in particular to systems with hydrostatic accumulators.

5.2.1 Screw in basic type (cartridge valve)

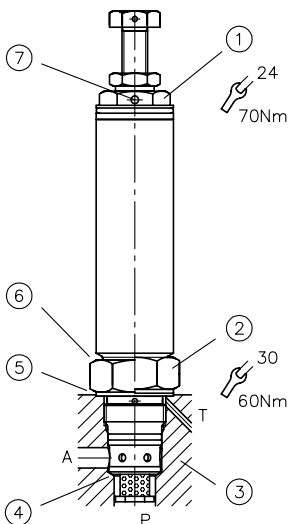


Image 11: Valve body Type CLK

1. Before screwing the valve body into the manifold slacken the counter /sealing nut until the travel stop.
2. Screw in the valve body (a/f 24) and tighten with the correct torque. The metallic sealing of the inlet to the outlet takes place at the contact area of the facial sealing edge and the stepped shoulder of the core diameter at the location thread.
3. Retighten the counter/sealing nut (a/f 30) with the correct torque.

1. Valve housing
2. Lock nuts and sealing nuts
3. Basic body
4. Sealing edge
5. Locking
6. Stopper
7. Sealing option

5.2.2 Adjusting pressure

If no desired pressure specification is indicated, the valve will be set at HAWES to the max. pressure of the respective pressure range.

Reference values for pressure adjustment

Pressude adjustment Pressure limiting valve		Pressude adjustment Pressure limiting valve	
Coding	Δp /revolution (bar/rev)	Coding	Δp /revolution (bar/rev)
1	25	11	31
2	16	21	20
5	10	51	12



Caution

Always monitor the pressure gauge when setting or changing the pressure!

5.2.3 Creating the mounting hole

See description in [Chapter 4.2, "Mounting hole"](#).

5.3 Operating instructions

The product is generally set by the manufacturer, although this can also be done by the customer. If the customer is setting the product, the information in this documentation must be observed in full.

The pressure ratio as designed causes a slight change to the actual pressure p_A in conjunction with a variable pump pressure. See the pressure dependence table in the [Chapter 3, "Parameters"](#).

5.4 Maintenance information

This product is largely maintenance-free.

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

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

Check the device surfaces for dust deposits at regular intervals (but at least once per year) and clean the device if required.

6 Additional information

6.1 Planning information

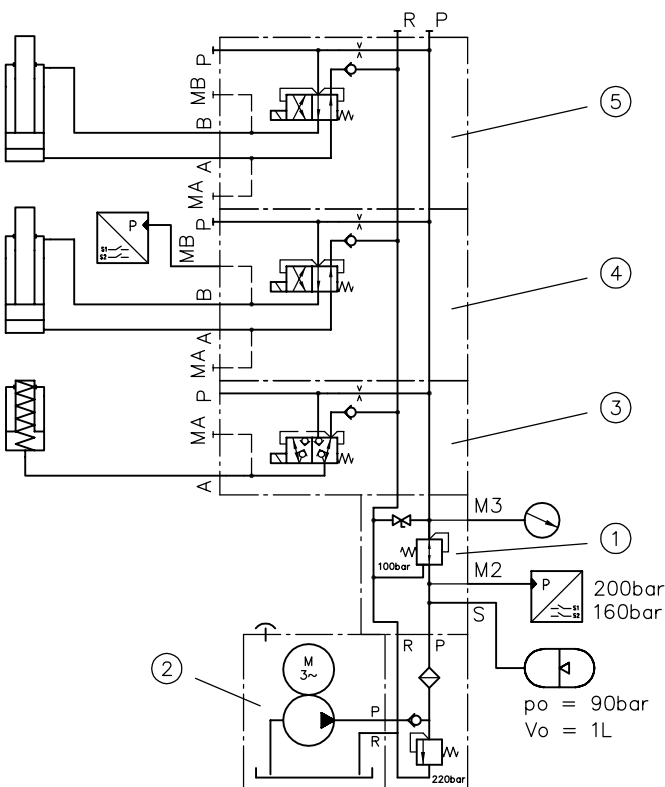
Alternations of pressure may occur due to lack of leakage in closed state (idle position) if used in circuits where the pressure is maintained over a long period without switching operations e.g. clamping of work piece pallets. The pressure will rise if the temperature rises (e.g. radiation of the sun) or additional load is induced, pressure drops if the temperature drops (stand-still over night) or the load is reduced and the pump is switched off.

These effects are particularly noticeable with short, rigid pipe connections. Hoses and additional volume (e.g. AC 13 miniature accumulator in accordance with D 7571) help to compensate such (negative) pressure fluctuations.

The effects described above are caused by the ratio of temperature induced expansion and compression coefficient (theoretical 1:10, i.e. $\Delta T = 1K \rightarrow \Delta p \sim 10 \text{ bar}$). A ratio of approx. 1:1 is realistic due to the flexibility of piping and tubing (backed by experience).

The integrated safety valve function of the pressure reducing valve is intended to prevent creeping pressure increases or pressure peaks.

6.2 Application examples



1. Type CLK 3 - 1-100
2. Pump Q = 5 lpm
3. Tool clamping (loosen)
4. Pallet clamping
5. Table clamping

Additional versions

- [Pressure reducing valve, type CDK: D 7745](#)
- [2-way pressure reducing valves type DK: D 7941](#)
- [Pressure valves type CMV, CMVZ and CSV, CSVZ: D 7710 MV](#)
- [Pressure controlled the 2-way directional valve type CNE: D 7710 NE](#)
- [Throttle and shut-off valves type CAV: D 7711](#)
- [Shut-off valve cartridges, type CRK, CRB and CRH: D 7712](#)
- [Pressure-dependent shut-off valve type CDSV: D 7876](#)
- [Throttle and restrictor check valves type CQ, CQR, and CQV: D 7713](#)
- [Two-way flow valves, type SB: D 6920](#)

Utilized at

- [Directional seated valve banks, type BVZP 1: D 7785 B](#)
- [Valve bank type BA: D 7788](#)
- [Valve bank type BVH: D 7788 BV](#)
- [Intermediate plate type NZP hole pattern conforming NG 6 \(DIN 24 340-A6\): D 7788 Z](#)

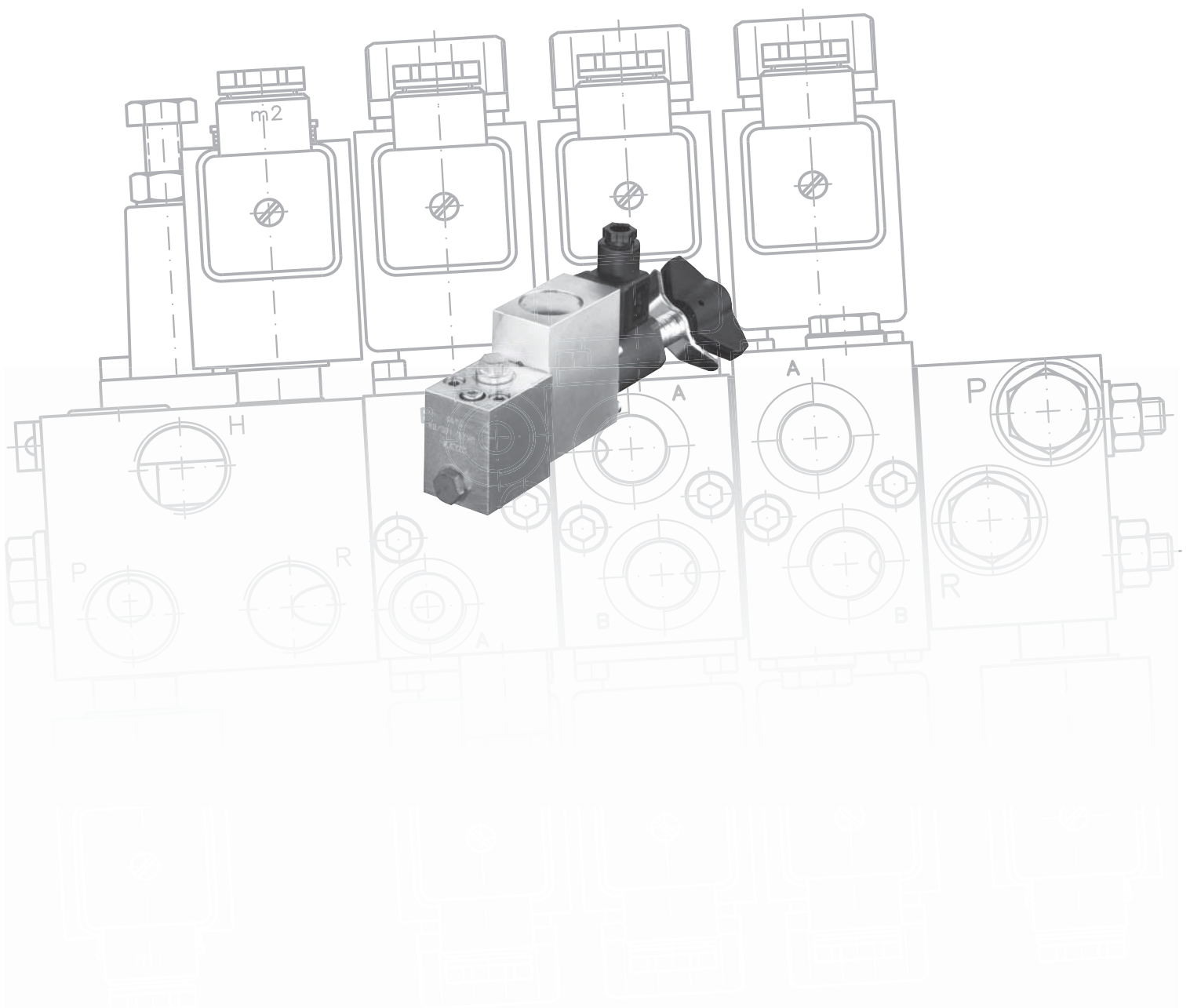
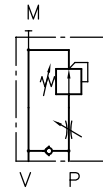
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81608 Munich, Germany
Tel. +49 (0)89 37 91 00-0
Fax +49 (0)89 37 91 00-12 69
e-mail: info@hawe.de
www.hawe.de

Pressure control valves type DK, DZ, DLZ and DE

No leakage, directly controlled

Operating pressure p_{\max} : 500 bar
Flow Q_{\max} : 22 lpm
Adjustability: With tools
Manually

Switching symbol:



Product documentation

D 7941

09-2013-1.0

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1 Overview pressure control valves type DK, DZ, DLZ, DE

The task of pressure reducing valves is to maintain a largely constant outlet pressure despite a higher and changing inlet pressure. These valves are used when a secondary circuit has to be fed with a lower but constant pressure level by a main (primary) oil circuit with a higher and varying pressure level. The valve described here is directly controlled. Compared with conventional, piston-type pressure reducing valves suffering from leaking oil, where an additional drain port is required, this type is designed according to the two-way principle, i.e. it has zero leakage when in a closed state.

If the primary pressure level at P is below that of the secondary side at V, a reversal of the flow $V \rightarrow P$ is possible with little pressure loss via the bypass check valve.

The 2-way pressure-reducing valve is designed as an individual valve for manifold mounting. It is incorporated in one block together with a bypass check valve for reducing the flow resistance of $V \rightarrow P$ and optionally a throttle or orifice (retrofitable) if required.

Features and benefits:

- Zero leakage in closed state
- Version with integrated overpressure function

Intended applications:

- General hydraulic systems
- Jigs
- Test benches

Design:

- Type DK - version with tracked pressure switch. The pressure switch monitors the closing movement of the pressure control valve on reaching the pressure value set on the consumer side. It can be connected as a normally closed or normally open contact to suit the application. The special feature is the common adjustment device for pressure control valve and pressure switch.
- Type DZ - on this type the pressure control valve type CDK in accordance [D 7745](#) is used.
- Type DLZ - on this type the pressure control valve type CLK in accordance with [D 7745 L](#) is used. In contrast to type CDK, this type of valve features an overpressure function, intended to prevent creeping pressure increases or pressure peaks.
- Type DE - sealing plate. The sealing plate can be used instead of the types DK or DZ (same hole pattern). A pressure switch can also be fitted.

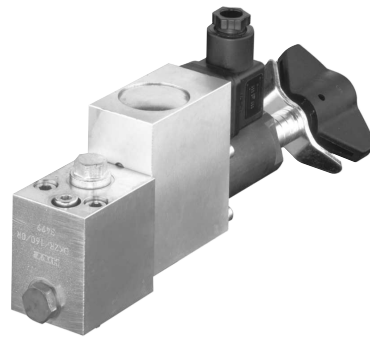


Figure 1: Pressure control valve type DK with tracked pressure switch



Figure 2: Pressure control valve type DZ

2 Versions available, main data

2.1 Pressure control valves type DK, DZ and DLZ

Switching symbol:



Order coding example:

DK 2		R	/160	/OR	-P 1/4	-G
DZ 2	-08		/450	/4R		

Device connector version Table 6 Device connector (only on type DK)

Connection block Table 5 Version

Additional elements Table 4 Additional element

Pressure setting Pressure setting within the various pressure ranges

Adjustment Table 2 Adjustment

Pressure ranges Table 3 Pressure ranges

Type Table 1 Type

Table 1 Type

Coding	Description	Switching symbol
DK	2-way pressure control valve with tracked pressure switch	
DZ	2-way pressure control valve	
DLZ	Pressure control valve with overpressure function	

Table 2 Adjustment

Coding	Description	Switching symbol
No designation	Tool adjustable	
R	Manually adjustable, with lock nut	
H	Turn knob, lockable	

Table 3 Pressure ranges

Type	Flow Q_{max} (lpm)	Pressure range p_V from ... to (bar)								
		-08	-081	-1	-11	-2	-21	-5	-51	X
DK DZ DLZ	12	50 ... 450	50 ... 500	30 ... 300	30 ... 380	20 ... 200	20 ... 250	15 ... 130	15 ... 165	-
DK 2 DZ 2 DLZ 2	6	30 ... 450	30 ... 500	18 ... 300	18 ... 380	12 ... 200	12 ... 250	8 ... 130	8 ... 165	-
DK 5 DZ 5 DLZ 5	22	110 ... 450	110 ... 500	70 ... 300	70 ... 380	50 ... 200	50 ... 250	30 ... 130	30 ... 165	-

Coding **-08** and **-081**: not with type DLZ

Coding **X**: version with locking screw instead of type CDK or CLK, not with type DK

Table 4 Additional elements


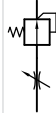
Coding	Description	Switching symbol
0 R	Not included (throttle can be retrofitted)	
42 R 46 R	Refined thread-type throttle For throttle characteristic see characteristics in Chapter 3, "Parameters"	

Table 5 Version

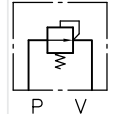
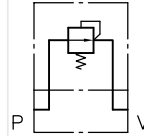
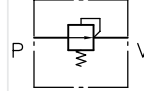
Coding	Port type	Switching symbols (examples)
No designation	For manifold mounting	
-P 1/4	For pipe connection (G 1/4)	
-1/4	For direct pipe connection (G 1/4) (only on type DK)	

Table 6 Plug (only at type DK)

Coding	Description	Version
G	With plug	Plug (DIN EN 175 301-803)
X	Without plug	
L	With plug with LED	
L5K L10K	With plug with LED and cable length 5 or 10 m	
M	Plug with LED with thread M12x1 (conf. DESINA)	

2.2 Sealing plates type DE

Order coding example:

DE	0	
DE	2	/0
DE	4	/BE 1,0

Orifices and throttles Table 9 Orifices and Table 9a Throttles

Pressure switch Table 8 Pressure switch

Sealing plate Table 7 Sealing plate

Table 7 Sealing plate

Table 8 Pressure switch (type DG 3. in accordance with D 5440)

Type	Description	Coding	Description	Switching symbol
DE	Sealing plate with additional elements	0	Version without ports; pure cover or bypass plate	
		2	Prepared for pressure switch	DE 2/..
		3	DG 33 (200 ... 450 bar)	
		4	DG 34 (100 ... 400 bar)	
		5	DG 35 (20 ... 250 bar)	
		6	DG 36 (4 ... 12 bar)	
		7	DG 364 (4 ... 50 bar)	
		8	DG 365 (12 ... 170 bar)	

Table 9 Orifices

Table 9a Throttles

Coding	Description	Orifice diameter	Switching symbol	Coding	Description	Switching symbol
B 0,8 B 1,0 B 1,2 B 1,4	Orifice	Ø0.8 Ø1.0 Ø1.2 Ø1.4		No designation	Throttle not included (cannot be retrofitted), only on type DE 0	
BE 0,8 BE 1,0	Restrictor check valve (type BE 0 in acc. with D 7555 B)	Ø0.8 Ø1.0		0	Throttle not included (can be retrofitted)	
				1	Throttle screw (Type Q 20 in acc. with D 7730)	
				3	Throttle check valve (Type QV 20 in acc. with D 7730)	

3.1 General

Description	Directly controlled pressure control valve		
Design	Ball seated valve		
Model	Valve for pipe connection, valve for manifold mounting		
Material	Steel; nitrided valve housing, electrogalvanised sealing nuts and connection block, hardened and ground functional inner parts Balls made of rolling bearing steel		
Installation position	As desired		
Connections	<ul style="list-style-type: none"> ■ P = inlet (pump or primary side) ■ V = consumer (secondary side) ■ M = pressure gauge connection ■ T = tank connection 		
Flow direction	P→V: Pressure reducing function V→P: Only possible if the pressure on the pump side is less than the consumer pressure.		
Hydraulic fluid	Hydraulic oil conforming DIN 51 524 part 1 to 3; ISO VG 10 to 68 conforming DIN 51 519 Viscosity limits: min. approx. 4, max. approx. 1500 mm ² /s opt. operation approx. 10... 500 mm ² /s. Also suitable are biologically degradable pressure fluids types HEPG (Poly-alkylenglycol) and HEES (Synth. Ester) at service temperatures up to approx. +70°C.		
Purity class	ISO 4406 21/18/15...19/17/13	NAS 1638 12 ... 8	SAE T 490 ≥ 6
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.		

Pressure and flow

Operating pressure	<ul style="list-style-type: none"> ■ $p_{P \max}$ on the pump side = 500 bar ■ For $p_{V \max}$ on the consumer side, see table for pressure range in Chapter 2, "Versions available, main data" ■ Return $p_T \leq 20$ bar
Static overload capacity	Approx. $2 \times p_{\max}$

Pressure dependence

The pressure ratio as designed causes a slight change to the actual pressure p_A in conjunction with a variable pump pressure p_p .

Basic type	Pressure range				$p_p \pm 10$ bar results in a pressure change for A of p_A
	-08 -081	-1 -11	-2 -21	-5 -51	
DK (DZ, DLZ)...	± 1.3 bar	± 0.9 bar	± 0.6 bar	± 0.4 bar	
DK (DZ, DLZ) 2	± 0.7 bar	± 0.45 bar	± 0.3 bar	± 0.23 bar	
DK (DZ, DLZ) 5	± 2.7 bar	± 1.7 bar	± 1.2 bar	± 0.8 bar	

Flow

$Q_{p \rightarrow A \max}$	= 6 lpm	(DK 2, DZ 2, DLZ 2)
	= 12 lpm	(DK, DZ, DLZ)
	= 22 lpm	(DK 5, DZ 5, DLZ 5)



Note

Observe the Q_{\max} of the valves in conjunction with valve banks type BVZP in accordance with D 7785 B!

Characteristics

Viscosity during measurements
approx. 60 mm²/s
p_A - Q_{P→A} - characteristics

The setting applies if Q_{P→A} → 0 lpm. If Q > 0, i.e. the connected consumer is moving, the secondary pressure p_A drops slightly. The pressure p_A is set according to the information in the order at p_p ≈ 1.1 p_A.



Caution

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

- Always monitor the pressure gauge when setting or changing the pressure.

Type DK, DZ

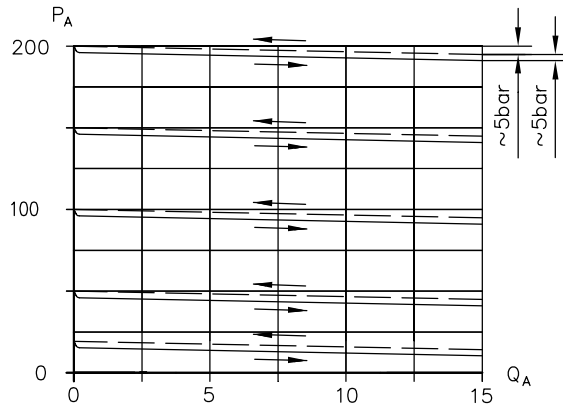


Figure 3: Q_A flow (lpm), p_A outlet pressure (bar)

Type DLZ

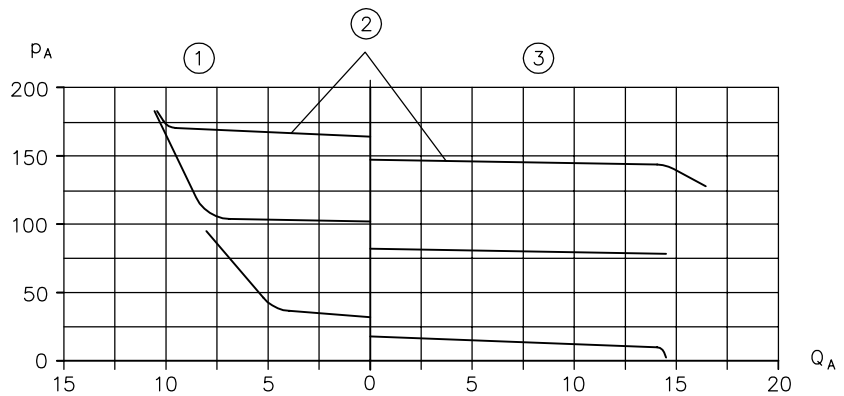


Figure 4: Q_A flow (lpm); p_A outlet pressure (bar)

- 1 Overpressure function
- 2 Same pressure setting
- 3 Pressure reducing function

Δp - Q characteristics P→A or A→P

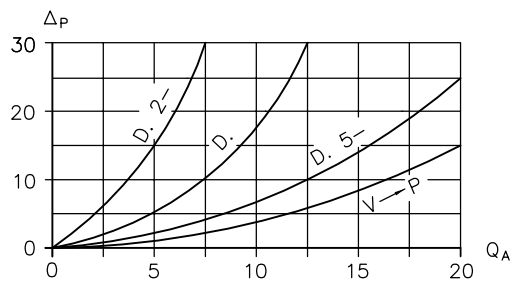


Figure 5: Q_A flow (lpm); Δp back pressure (bar)



Note

For this purpose, please also observe the additional information under the point "Flow direction".

Δp - Q characteristics, refined thread-type throttle, coded 42 R

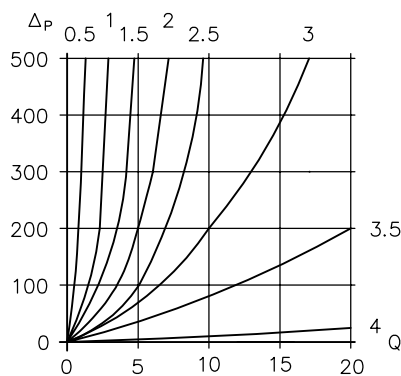


Figure 6: Q flow (lpm); Δp throttle resistance (bar)

Mass

Basic version

Type DK	= 1.4 kg
Type DZ, DLZ	= 1.4 kg
Type DE 0	= 0.2 kg
Type DE ./..	= 0.7 kg

Pressure switch

Type DG 3..	= 0.3 kg
-------------	----------

Version with single connection block

- P 1/4	+ 0.3 kg
---------	----------

Electrical data for contact switch

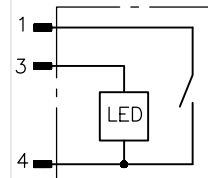
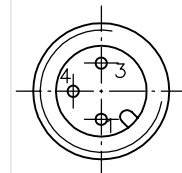
Electrical data for pressure switch

Type	XCG3 by SAIA-Burgess		
Mechanical service life	10 x 10 ⁶		
Electrical service life (approx. switching actions)	12 V, 4 A = 0.35 x 10 ⁶ (cos φ = 1)		
Switching current	Nominal voltage U _N	Switching current (A)	IP protection class
	12 V DC	5	65
	24 V DC	5	65
			Connection, device connector class
			DIN EN 175 301-803 A
			DIN EN 175 301-803 A

Note
Ensure the pipe screw connections are correctly fitted. In the event of strong vibrations, secure the accumulator to prevent it from coming loose.

Note
To ensure a safe contact, the current must not fall below these minimum values;
I_{min} (12 V DC) = 10 mA, I_{min} (24 V DC) = 100 mA

Device connector, electrical connection, protection class	DIN EN 175 301-803	M12x1
	IP 65 (in acc. with IEC 60529)	IP 67 (in acc. with IEC 60529)
	Normal position 1-3 Switching position 1-2	(LED indicator reverse polarity protected) Switching position 1-4



4 Dimensions

All dimensions in mm, subject to change!

4.1 Dimensions type DK, DZ, DLZ

Type DK ../..

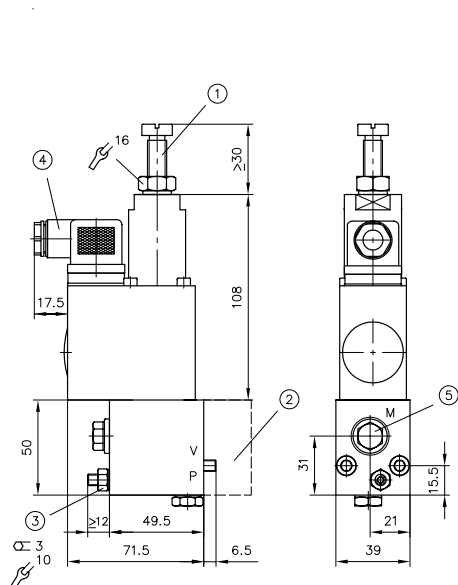


Figure 7: Coding not included, fixed setting

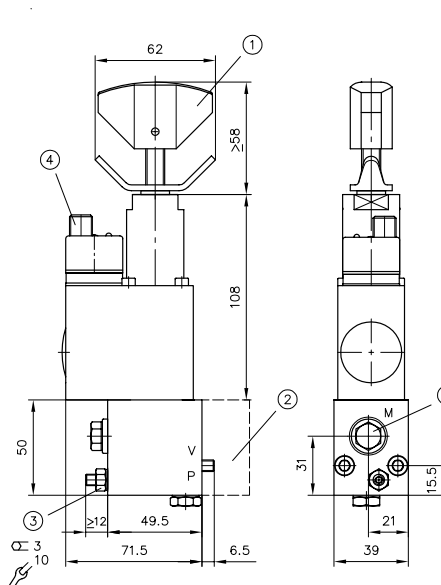


Figure 8: Coding R, adjustable

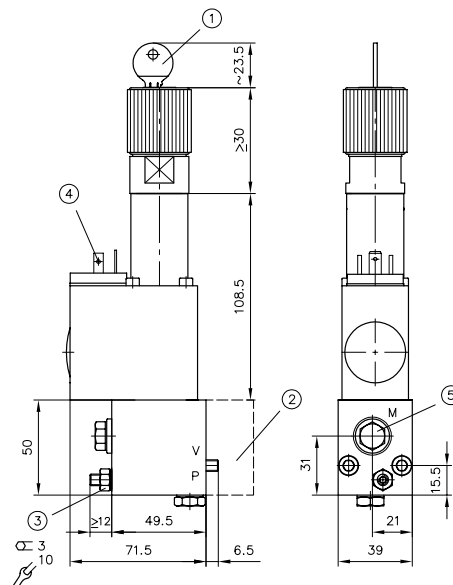


Figure 9: Coding H, lockable

- | | | | | | |
|---|---------------------------------------------------|---|---------------------------------------------------|---|---------------------------------------------------|
| 1 | Screw with lock nut | 1 | Turn knob | 1 | Turn knob |
| 2 | Single connection block | 2 | Single connection block | 2 | Single connection block |
| 3 | Thread type throttle | 3 | Thread type throttle | 3 | Thread type throttle |
| 4 | Electrical connection (here: coding G to table 6) | 4 | Electrical connection (here: coding M to table 6) | 4 | Electrical connection (here: coding X to table 6) |
| 5 | Port for pressure gauge G 1/4 (BSPP) | 5 | Port for pressure gauge G 1/4 (BSPP) | 5 | Port for pressure gauge G 1/4 (BSPP) |



Note

The throttle screw must not be screwed-out beyond the max. dimensions specified in the dimensional drawings. An internal mechanical stop can't be provided due to design reasons!

Type DK ../. - 1/4

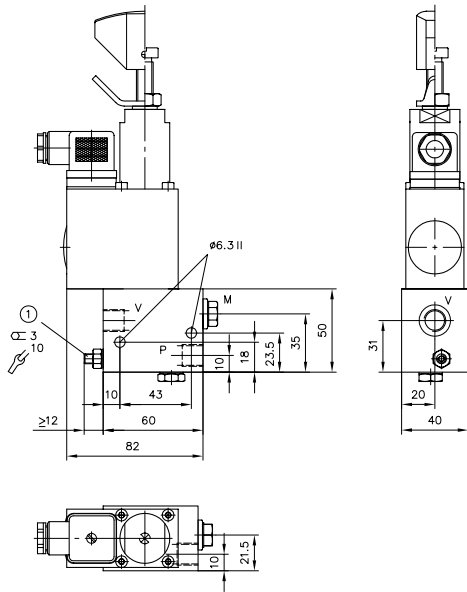


Figure 10: Pipe connection

- 1 Thread type throttle

Type DZ, DLZ

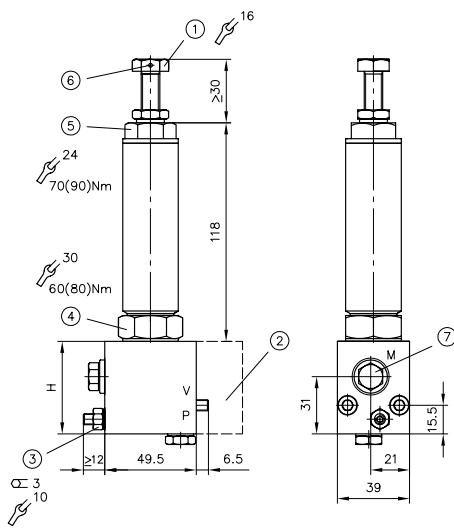


Figure 12: Fixed

- 1 Screw with lock nut
- 2 Single connection block
- 3 Thread type throttle
- 4 Sealing nut ¹⁾
- 5 Valve body ¹⁾
- 6 Provision for a lead seal
- 7 Port for pressure gauge G 1/4 (BSPP)

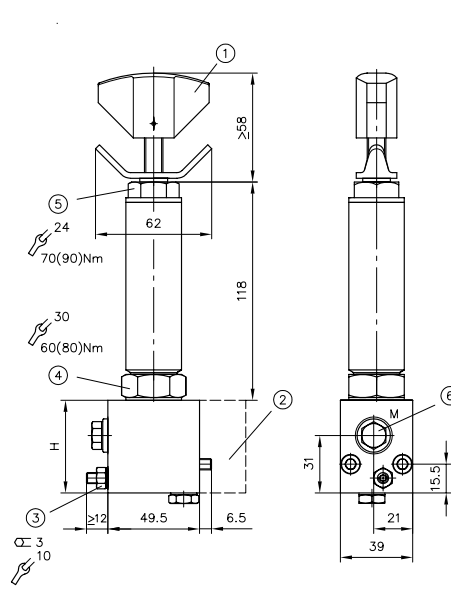


Figure 13: Adjustable

- 1 Turn knob
- 2 Single connection block
- 3 Thread type throttle
- 4 Sealing nut ¹⁾
- 5 Valve body ¹⁾
- 6 Port for pressure gauge G 1/4 (BSPP)

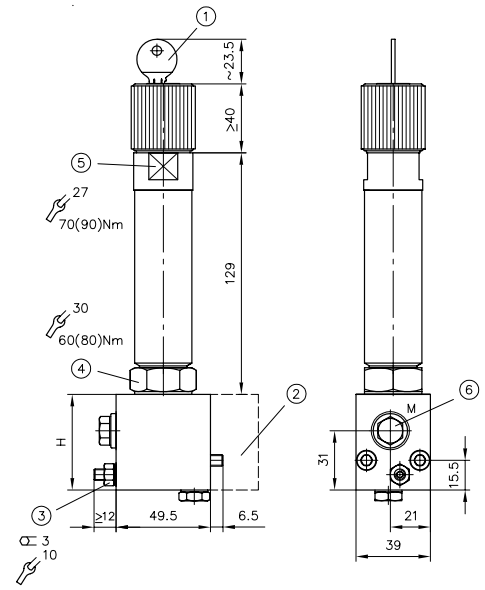


Figure 14: Lockable

- 1 Turn knob
- 2 Single connection block
- 3 Thread type throttle
- 4 Sealing nut ¹⁾
- 5 Valve body ¹⁾
- 6 Port for pressure gauge G 1/4 (BSPP)

¹⁾ Values in brackets apply for type DZ. -08 (-081)

Type DK ../. P - 1/4

(Single connection block)

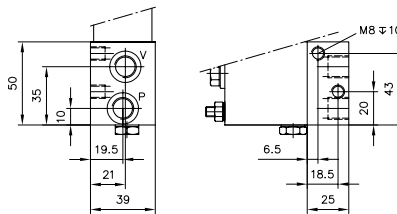


Figure 11: Pipe connection

Ports P, V and M (ISO 228/1): G 1/4

Type DZ, DLZ ../.. P - 1/4

(Single connection block)

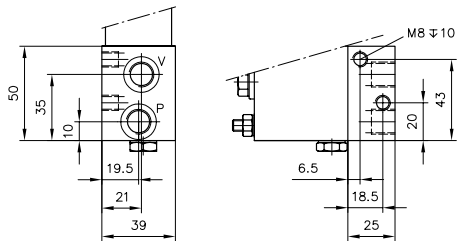


Figure 15: Direct line connection with connection block

4.2 Dimensions type DE

Type DE

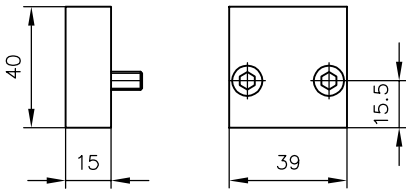


Figure 16: Type DE 0

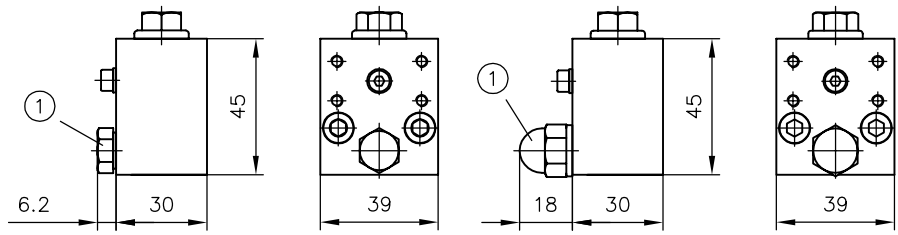


Figure 17: Type DE 2/B... DE 8/B...

Figure 18: Type DE 2/(0 ... 3) DE 8/(0 ... 3)

1 Version with orifice

1 Version with thread type throttle



Note

Please pay attention to the information on adjusting the throttles in [Chapter 5, "Installation, operation and maintenance information"](#).

4.3 Base plate hole pattern

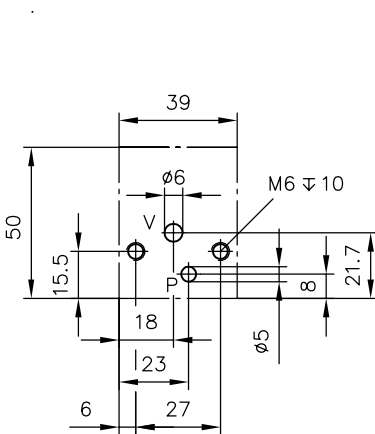


Figure 19: Hole pattern type DE, DK, DZ

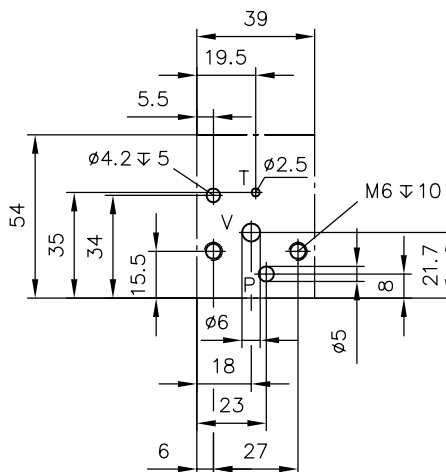


Figure 20: Hole pattern type DLZ

5

Installation, operation and maintenance information

5.1 Designated use

This fluid-power product has been designed, manufactured and tested using standards and regulations generally applicable in the European Union and left the plant in a safe and fault-free condition.

To maintain this condition and ensure safe operation, operators must observe the information and warnings in this documentation.

This fluid-power product must be installed and integrated in a hydraulic system by a qualified specialist who is familiar with and adheres to general engineering principles and relevant applicable regulations and standards.

In addition, application-specific features of the system or installation location must be taken into account if relevant.

This product may only be used as a pressure control valve within oil-hydraulic systems.

The product must be operated within the specified technical parameters. This documentation contains the technical parameters for various product versions.



Note

Non-compliance will void any warranty claims made against HAWES Hydraulik.

5.2 Assembly information

The hydraulic system must be integrated in the equipment with standard connection components that comply with market requirements (screw fittings, hoses, pipes, etc.). The hydraulic system must be shut down as a precautionary measure prior to dismounting; this applies in particular to systems with hydrostatic accumulators.

5.2.1 Making base plate

See hole pattern in [Chapter 4.3, "Base plate hole pattern"](#)

5.3 Operating instructions

The product is generally set by the manufacturer, although this can also be done by the customer. If the customer is setting the product, the information in this documentation must be observed in full.

Always monitor the pressure gauge when setting or changing the pressure!

The pressure ratio as designed causes a slight change to the actual pressure p_A in conjunction with a variable pump pressure. See Table Pressure dependence in [Chapter 3, "Parameters"](#).

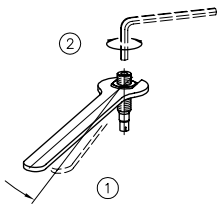
5.4 Maintenance information

This product is largely maintenance-free.

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

Check the device surfaces for dust deposits at regular intervals (but at least once per year) and clean the device if required.

5.4.1 Adjusting throttle



- 1 Loosening
- 2 Adjustment

1. Only loosen the seal-lock nut slightly (1).
2. Adjust the throttle screw using a hex wrench (2).

✓ If the seal-lock nut is only loosened slightly, oil is prevented from escaping drop-by-drop.



Note

For the largest adjustment travel, the ring markings are visible. Unscrewing further does not change (decrease) the flow cross section any more. Therefore the Δp value is no longer affected.

An internal stopper to prevent further or complete unscrewing is not structurally possible. The red ring marking thus represents the end of the permissible adjustment travel. If this is exceeded, the number of the load-bearing threads is reduced and if it is unscrewed too far the throttle screw may rip out under high pressure.

Where necessary, this should be considered in the documentation for the complete system.

Designation	Value
Width across flats hex wrench	SW 5
Width across flats seal-lock nut	SW 17
General figure for adjustment travel	5 mm

6 Other information

6.1 Planning information

Due to the leak-free sealing in the closed state, on usage in control circuits with long pressure retention times without switching processes (e.g. with separate pallet clamping) pressure changes may occur under certain circumstances. Pressure increases can occur, for instance, on temperature rises (e.g. sunlight) or the additional action of external loads, pressure drops (with pump switched off) due to temperature drops (cooling at night) or load removal.

These effects are particularly noticeable with short, rigid pipe connections. Hoses and additional volume (e.g. AC 13 miniature accumulator in accordance with D 7571) help to compensate such (negative) pressure fluctuations.

The ratio of thermal expansion coefficient to coefficient of compressibility (theoretically 1:10, i.e. $\Delta T = 1K \rightarrow \Delta p \approx 10 \text{ bar}$) is based on the fact described above. As consumers, pipes and hoses will yield in reality (based on experience) a ratio of approx. 1:1 can be assumed.

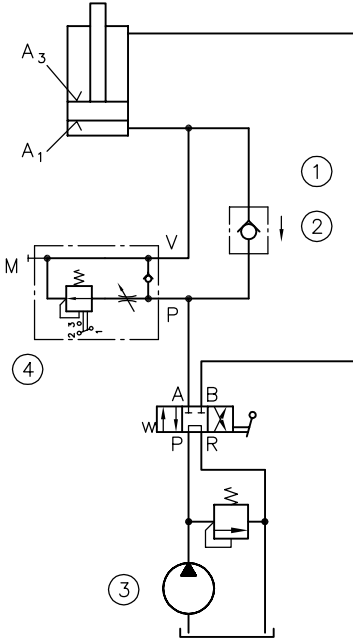
The integrated overpressure function in the pressure control valve is intended to prevent creeping pressure increases or pressure peaks.

6.2 Application examples

Example for a design with large flows $Q_{V \rightarrow P}$ (return flow via bypass check valve)

Example: $Q_p = 15 \text{ lpm}$

$A_1 / A_3 = 3 \rightarrow Q_{\text{Return}} = 45 \text{ lpm}$



- 1 e.g. RK 2G acc. to D 7445
- 2 $Q_{\text{return}} = 45 \text{ lpm}$
- 3 $Q_p = 15 \text{ lpm}$
- 4 DK 2 R/200/4 R -1/4

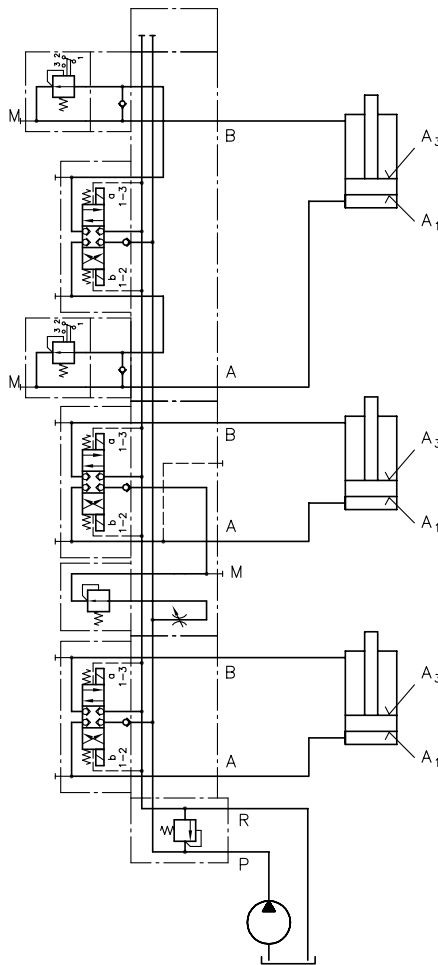
Usage in a valve bank, shown here with seated valves type BVZP 1 in acc. with D 7785 B

BVZP 1 A - 1/300 - G 22/0

- G 22/CZ 2/100/4/2

- G 22/G/ADK 2/200/0 R/BDK 2/160/0 R

- 1 - 1 - G 24



Additional versions

- [Pressure reducing valve, type CDK: D 7745](#)
- [Pressure reducing valve, type CLK: D 7745 L](#)

Use

- Directional seated valve banks type BVZP 1: **D 7785 B**

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