

Pressure valve type CMV, CMVZ, CSV and CSVZ

Product documentation



Directly controlled, screw-in valve

Operating pressure p_{\max} : 500 bar

Flow rate Q_{\max} : 60 lpm



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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 (reflux).

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

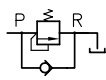


Figure 4: Type CSV



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	Figure 7: Example type CMV Figure 8: Example type CSV

2.2 Version with single connection block

Order coding example:

CMVZ C R -300 -1/4

Single connection block Table 3 Version with single 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 single 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 <hr/> 21/18/15...19/17/13
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 nominal volume	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

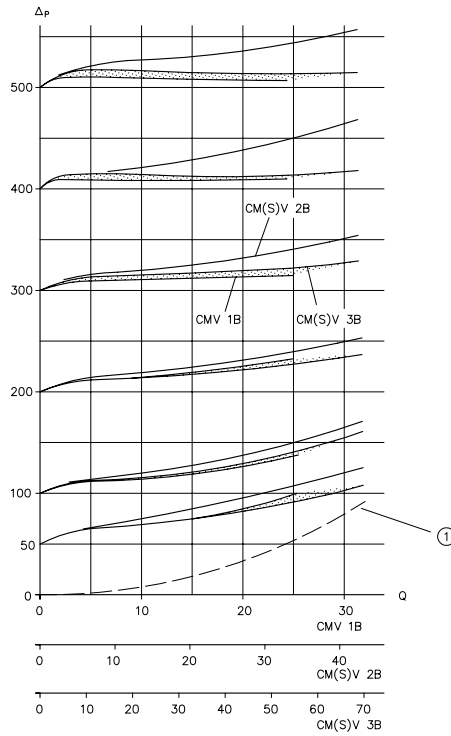


Figure 9: Q Flow (lpm); Δp Flow resistance (bar)

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

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

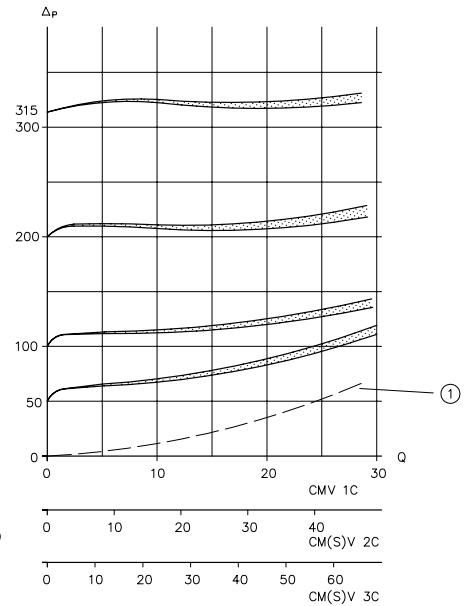


Figure 10: Q Flow (lpm); Δp Flow resistance (bar)

- 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

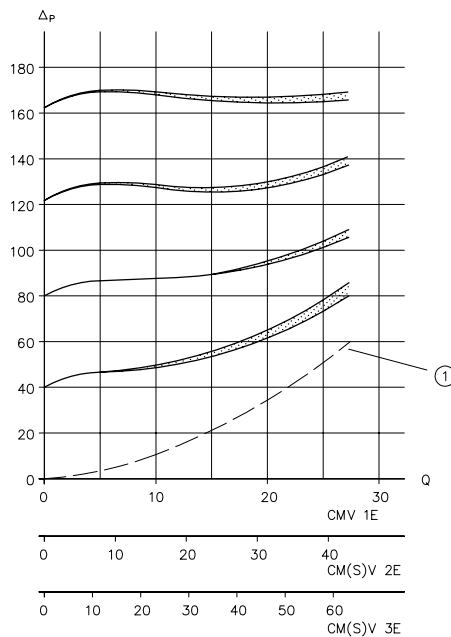


Figure 11: Q Flow (lpm); Δp Flow resistance (bar)

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

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

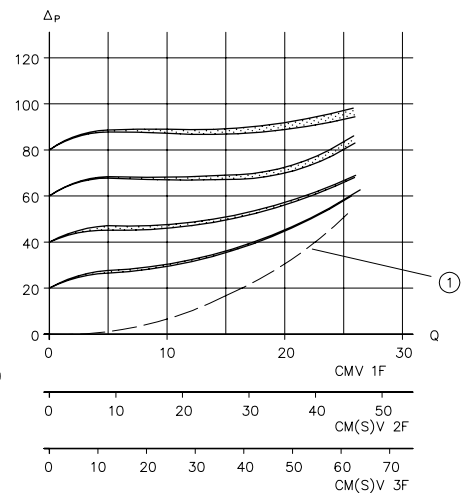


Figure 12: Q Flow (lpm); Δp Flow resistance (bar)

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

Type CSV

Pressure sequence valve, R→P reflux

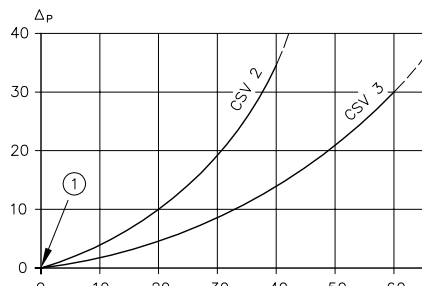


Figure 13: Q Flow (lpm), Δp Flow resistance (bar)

1 Pressure for opening approx. 0.2 to 0.3 bar

Type CMVZ 2, CSVZ 2

Sequence valve, relation flow to Flow resistance (example)

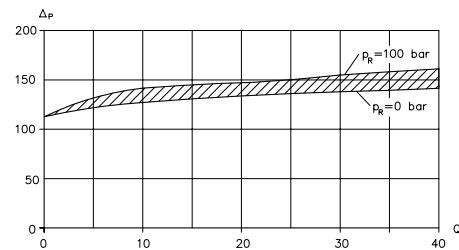


Figure 14: Q Flow (lpm), Δp Flow resistance (bar)

Weight

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

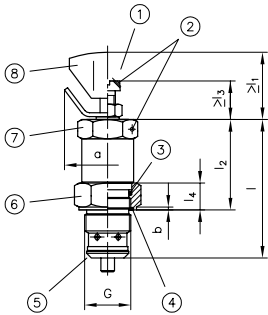
- 1/4	= + 260 g
- 3/8	= + 260 g
- 1/2	= + 420 g
- P	= + 260 g

4 Dimensions

All dimensions in mm, subject to change!

4.1 Basic version (cartridge valve)

Pressure limiting valve CMV and sequence valve type CMVZ

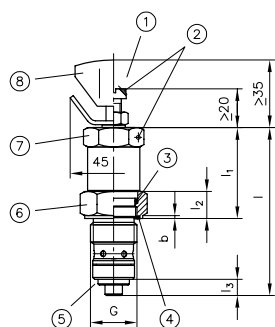


- 1 Tool adjustable
- 2 Provision for lead seal
- 3 O-ring
- 4 Seal
- 5 Sealing edge
- 6 Sealing nut a/f2
- 7 Valve housing a/f1
- 8 Manually adjustable

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	Sealing 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

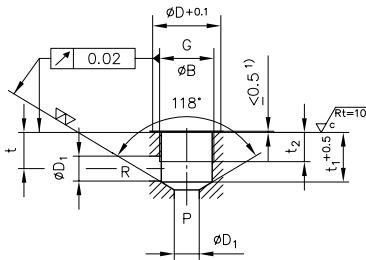


Figure 15: Mounting hole type CMV, CMVZ

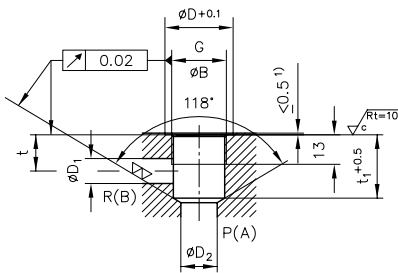


Figure 16: Mounting hole type CSV, CSVZ

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

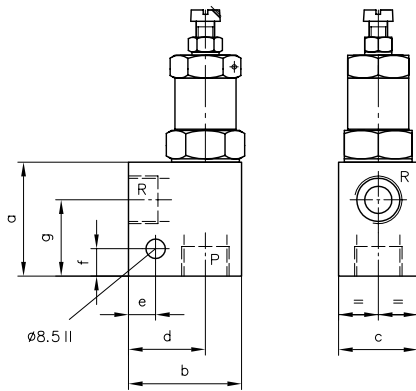
For tapped plugs for the mounting holes, see [Chapter 4, "Dimensions"](#)

Information für counterbore see ¹⁾

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

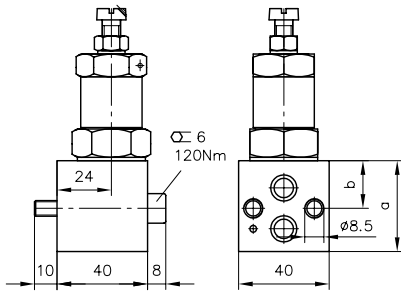
4.3 Version with single connection block

Direct pipe connection

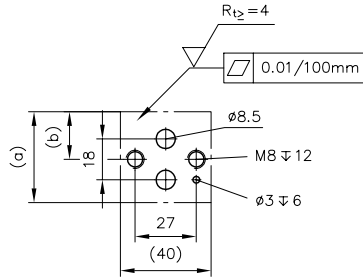


Type and size	Ports P and R (ISO 228/1) (BSPP)	a	b	c	d	e	f	g
CMV 1.. -1/4	G 1/4	40	40	25	27	10	10	26
CMV 1.. -3/8	G 3/8	40	40	25	27	10	10	26
CMV 2.. -3/8 CMVZ 2.. -3/8	G 3/8	45	42	32	27	12	12	30.5
CMV 3.. -1/2	G 1/2	50	50	35	34	12	12	33.5
CSV 2.. -1/4 CSVZ 2.. -1/4	G 1/4	45	42	32	27	15	15	31
CSV 2..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



Base plate hole pattern



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

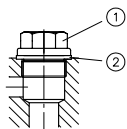


Figure 17: Passage open

- 1 Tapped plug a/f4
- 2 Seal ring

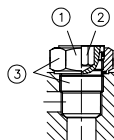


Figure 18: Passage blocked

- 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
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 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)

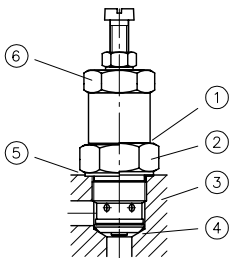


Figure 19: Screwing in the cartridge valve

- 1 Travel stop
- 2 Counter / sealing nut a/f2
- 3 Manifold
- 4 Sealing edge
- 5 to counter
- 6 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

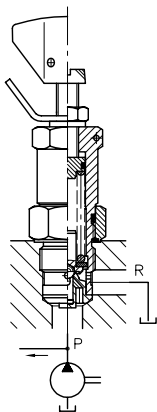


Figure 20: Type CMV

Type CSV

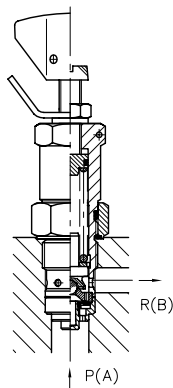


Figure 21: Type CSV

Type CMVZ
Type CSVZ

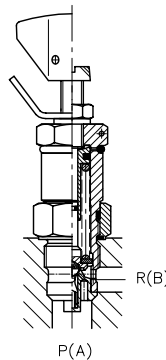


Figure 22: Type CMVZ

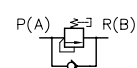


Figure 23: Type CSVZ

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