Pressure valve type CMV, CMVZ, CSV, CSVZ

Product documentation

Directly controlled, screw-in valve

Operating pressure p_{max}:	500 bar
Flow rate Q_{max}:	60 l/min



D 7710 MV
07-2025 -1.8 en

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

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

Type CMV and CSV is a directly controlled valve that is damped as standard. Valve type CMV and CSV can be screwed in and can be integrated into manifolds. The necessary mounting holes are straightforward to make.

Type CMVZ and CSVZ is not influenced by the pressure conditions downstream and is therefore suitable for use in loss-free sequence control systems.

Features and advantages

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

Intended applications

- General hydraulic systems
- Test benches
- Hydraulic tools



Basic version (cartridge valve), adjustable



Basic version (cartridge valve), fixed setting

Types

Pressure-limiting valves type CMV

- Safeguards against exceeding the maximum permissible pressure for the system (safety valve) or limits operating pressures.

Pressure-limiting valves type CMV.. X - undamped

- For particular operating conditions, e.g. for preventing gradual pressure increases in blocked cylinder chambers when the temperature increases or with forced creeping piston movement as a result of external forces.
- Very small difference (hysteresis) between opening and shut-off pressure.

Sequence valves (pre-load valve) type CSV

- Generates a largely constant pressure difference between the inlet and outlet as long as there is a flow rate passing through.
- The flow in the opposite direction (return flow) is free due to a bypass check valve.

Control valves type CMVZ and CSVZ

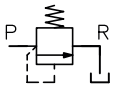
- Switching pressure (opening pressure) largely independent from the pressure on the outlet side.
- For use in sequence controls

2 Available versions

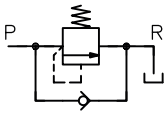
2.1 Screw-in valve (basic version)

Circuit symbol

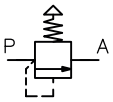
CMV



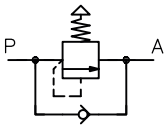
CSV



CMVZ



CSVZ



Ordering examples

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

2.2.1 "Single connection block"

Pressure setting Pressure setting within the various pressure ranges

Additional coding X For undamped version (in the case of type CMV)

2.1.2 "Adjustment"

Pressure range 2.1.1 "Basic type, size and pressure range"

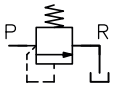
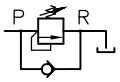
Basic type and size 2.1.1 "Basic type, size and pressure range"

2.1.1 Basic type, size and pressure range

Type	Description	Flow rate Q_{max} (lpm)	Pressure range from ... to (bar)			
			B	C	E	F
CMV 1	Pressure-limiting valve	20	100 ... 500	60 ... 315	30 ... 160	5 ... 80
CMV 2		40				
CMV 3		60				
CSV 2	Sequence valve	40	100 ... 500	60 ... 315	30 ... 160	5 ... 80
CSV 3		60				
CMVZ 2 **CSVZ 2**	Control valve	40	100 ... 500	60 ... 315	30 ... 160	15 ... 80 [1]

[1] A pressure setting of < 40 bar can only be achieved with a return pressure of > 5 bar

2.1.2 Adjustment

Coding	Description	Circuit symbols
without coding	Fixed, tool adjustable	
R	Manually adjustable, with lock nut	

2.2 Version with single connection block

Ordering example

CMVZ 2	C	R	-300	-1/4

-1/4 — 2.2.1 "Single connection block"

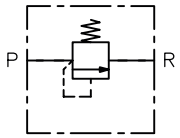
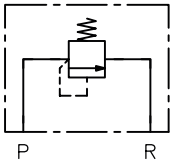
-300 — **Pressure setting** Pressure setting within the various pressure ranges

R — 2.1.2 "Adjustment"

C — **Pressure range** 2.1.1 "Basic type, size and pressure range"

CMVZ 2 — **Basic type and size** 2.1.1 "Basic type, size and pressure range"

2.2.1 Single connection block

Coding	Description	For type	Circuit symbol
without coding	Screw-in valve	--	see Chapter 2.1, "Screw-in valve (basic version)"
-1/4	For pipe connection (G 1/4)	CMV 1	
-3/8	For pipe connection (G 3/8)	CMV 1 CMV 2 CMVZ 2 CSV 2 CSVZ 2	
-1/2	For pipe connection (G 1/2)	CMV 3 CSV 3	
-P	For manifold mounting	CMV 2 CMVZ 2 CSV 2 CSVZ 2	

3 Parameters

3.1 General data

Version	Directly controlled pressure valves
Design	Ball seated valves
Model	Screw-in valve, valve for pipe connection, manifold mounting valve
Material	Steel; Valve housing nitrided; sealing nut and connection block electrogalvanised; Hardened and ground functional inner parts Balls made of rolling bearing steel
Installation position	Any
Ports/connections	▪ P = inlet (pump side) ▪ R = outlet (reflux or downstream) All connections can be fully subjected to pressure. Connections are not marked on the valve housing.
Hydraulic fluid	Hydraulic fluid, according to DIN 51 524 Parts 1 to 3; ISO VG 10 to 68 according to DIN ISO 3448 Viscosity range: 4 - 1500 mm^2/s Optimal operating range: approx. 10 - 500 mm^2/s Also suitable for biologically degradable hydraulic fluids type HEPG (polyalkylene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C.
Cleanliness level	**ISO 4406** 21/18/15...19/17/13
Temperatures	Environment: approx. -40 to +80 °C, hydraulic fluid: -25 to +80 °C, pay attention to the viscosity range. Start temperature: down to -40 °C is permissible (take account of the start viscosities!), as long as the steady-state temperature is at least 20 K higher during subsequent operation. Biologically degradable hydraulic fluids: note manufacturer specifications. With consideration for the seal compatibility, not above +70°C.

3.2 Pressure and volumetric flow

Operating pressure	On the pump side p_{max} = 500 bar
Flow rate	see Chapter 2.1.1, "Basic type, size and pressure range"
Static overload capacity	approx. 2 x p_{max} (tightened and sealing nuts locked)

3.3 Weight

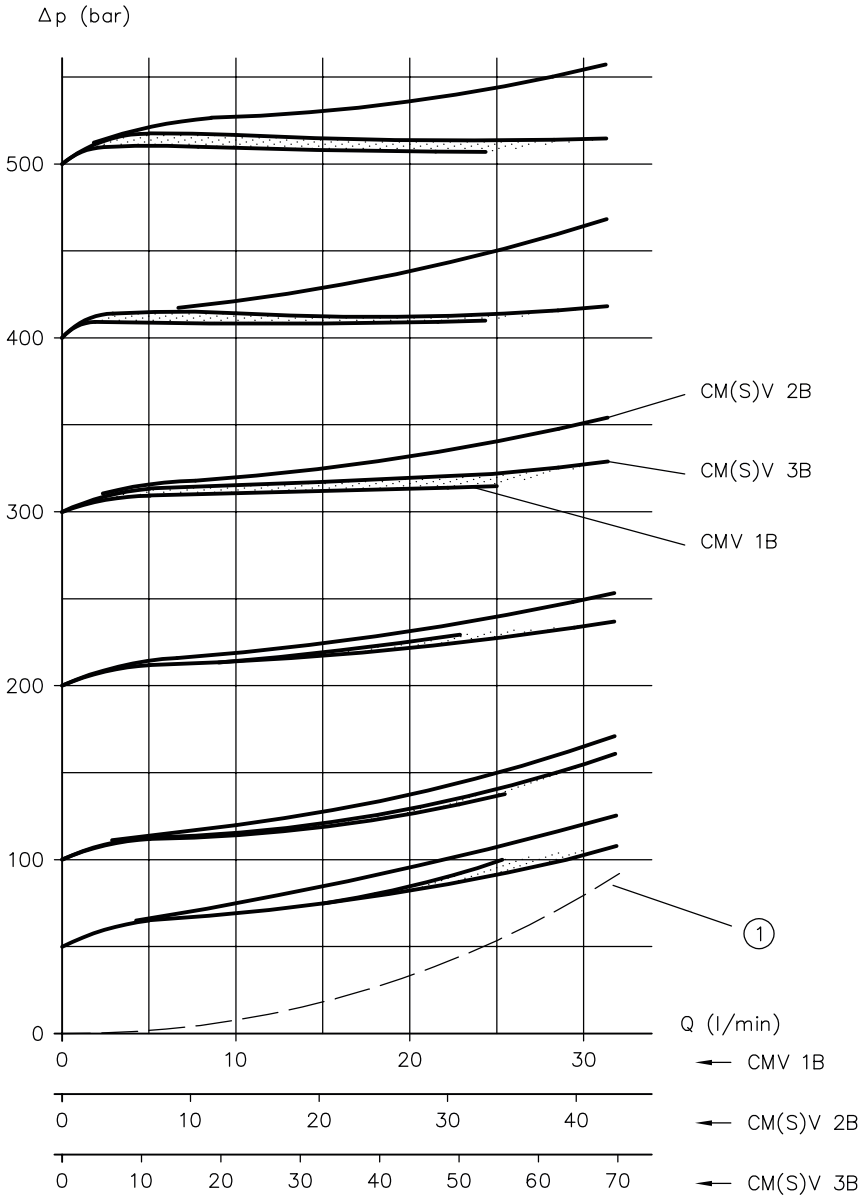
Pressure-limiting valve	**Type**	
	CMV 1	= 90 g
	CMV 2	= 160 g
	CMV 3	= 280 g
Sequence valve	**Type**	
	CSV 2	= 170 g
	CSV 3	= 300 g
Control valves	**Type**	
	CMVZ 2	= 170 g
	CSVZ 2	= 180 g
Version with single connection block	**Coding**	
	-1/4	= + 260 g
	-3/8	= + 260 g
	-1/2	= + 420 g
	-P	= + 260 g
Tapped plug + sealing ring	**Coding**	
	M16x1.5	= approx. 40 g
	M20x1.5	= approx. 70 g
	M24x1.5	= approx. 100 g
Tapped plug and locking tapped plug, complete	**Coding**	
	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

3.4 Characteristic lines

Viscosity of the hydraulic fluid approx. 60 mm²/s

Pressure-limiting valve

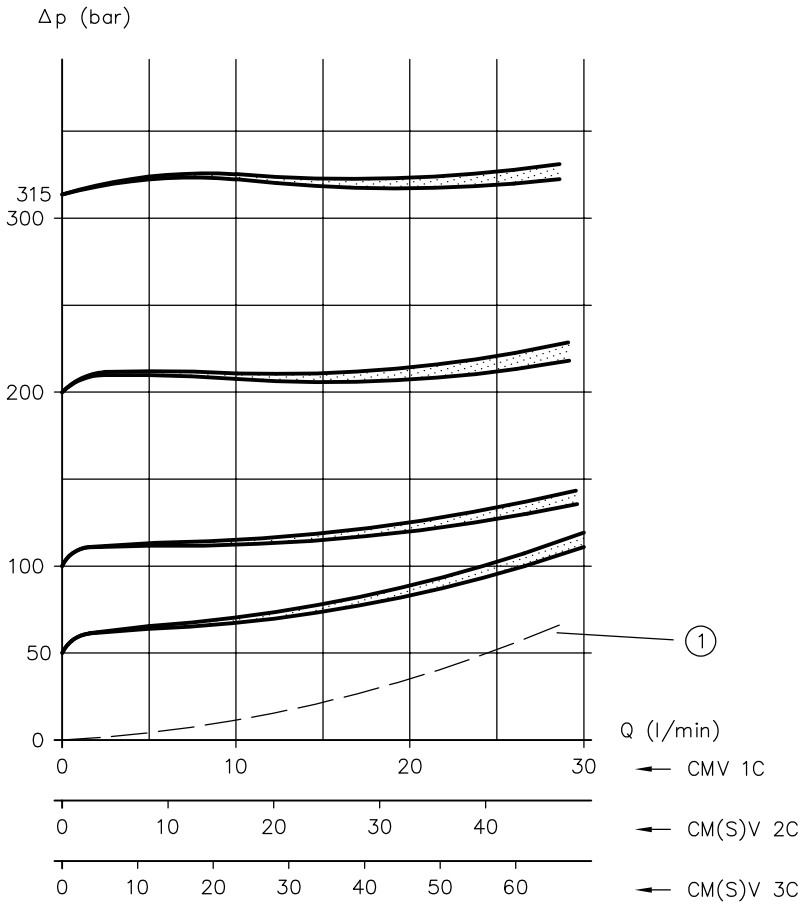
CMV.B, CSV.B up to 500 bar



Q flow rate (l/min); Δp flow resistance (bar)

1 Inherent characteristic curve, no setting possible below this curve

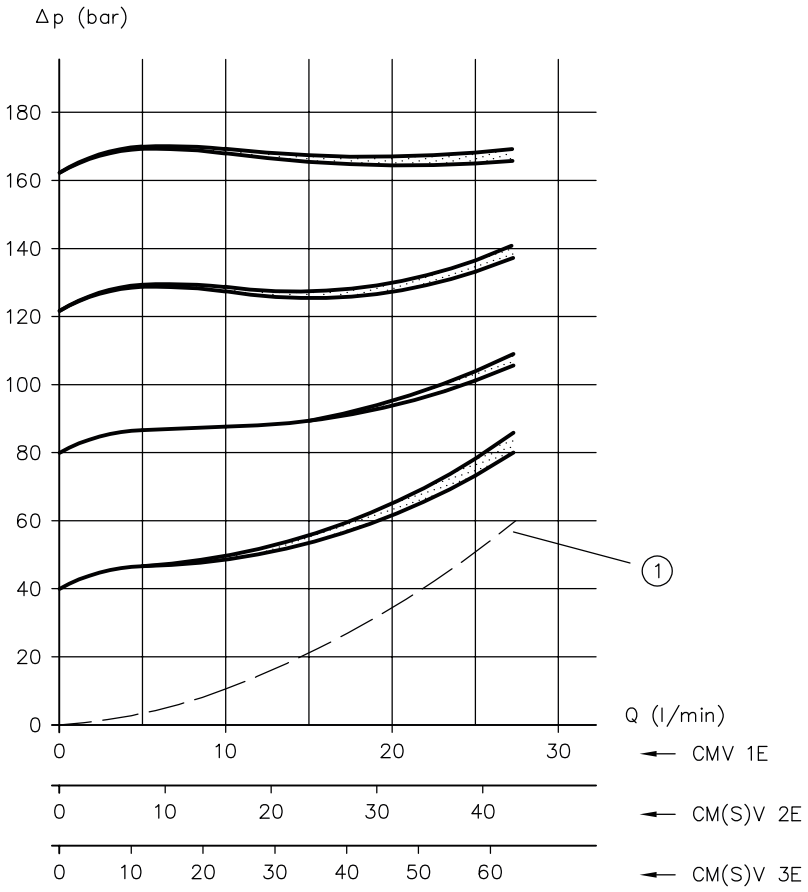
CMV.C, CSV.C up to 315 bar



Q flow rate (l/min); Δp flow resistance (bar)

1 Inherent characteristic curve, no setting possible below this curve

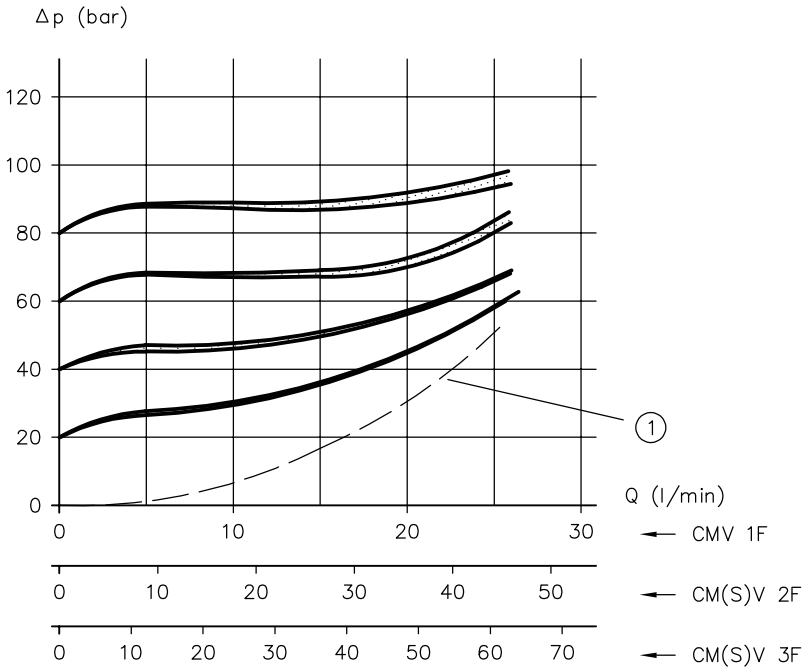
CMV.E, CSV.E up to 160 bar



Q flow rate (l/min); Δp flow resistance (bar)

1 Inherent characteristic curve, no setting possible below this curve

CMV.F, CSV.F up to 80 bar



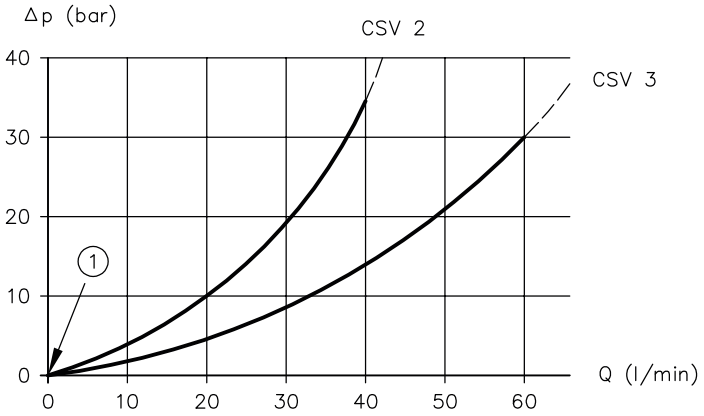
Q flow rate (l/min); Δp flow resistance (bar)

1 Inherent characteristic curve, no setting possible below this curve

Sequence valve

R → P return flow

CSV



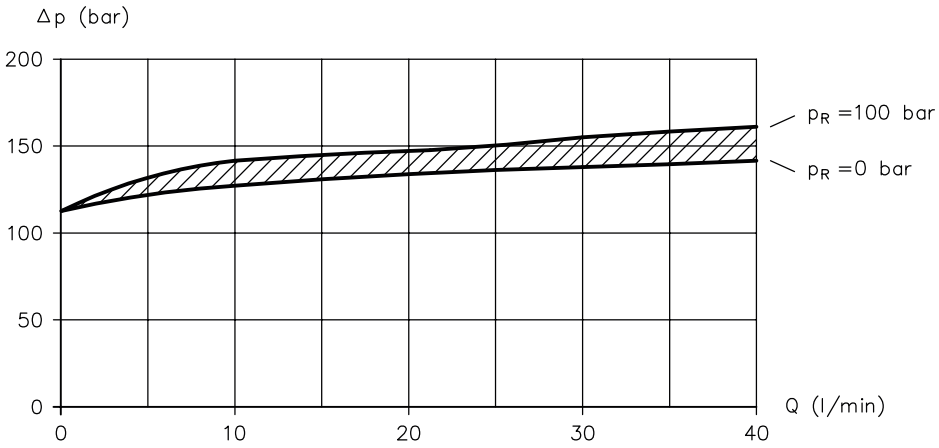
Q flow rate (l/min); Δp flow resistance (bar)

1 Opening pressure approx. 0.2 ... 0.3 bar

Control valve

As a function of return pressure (example)

CMVZ 2, CSVZ 2



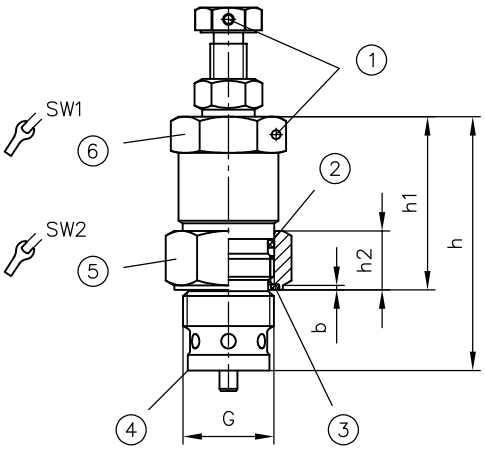
Q flow rate (l/min); Δp flow resistance (bar)

4 Dimensions

All dimensions in mm, subject to change.

4.1 Screw-in valve (basic version)

Pressure-limiting valve type CMV and control valve type CMVZ



1 Sealing option
2 O-ring
3 Fitting seal
4 Sealing edge
5 Sealing nut
6 Valve housing

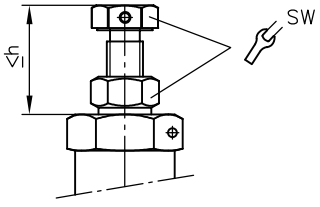
SW = Width across flats

Type	G	b	h	h1	h2	SW1	SW2	Tightening torque (Nm)	
								SW1	SW2
CMV 1	M16x1.5	1	51	30	12	17	22	40	35
CMV 2 CMVZ 2	M20x1.5	1	59	37	13	22	24	50	40
CMV 3	M24x1.5	1,5	72	48	14	27	30	70	60

Type	Fitting seal	O-ring AU 90 Sh
CMV 1	KANTSEAL DKAR 00016-N90	14x1.78
CMV 2 CMVZ 2	KANTSEAL DKAR 00018-N90	17.17x1.78
CMV 3	KANTSEAL DKAR 00021-N90	21.95x1.78

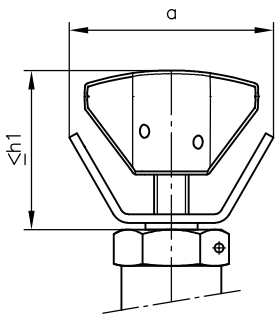
Adjustment

without coding
fixed



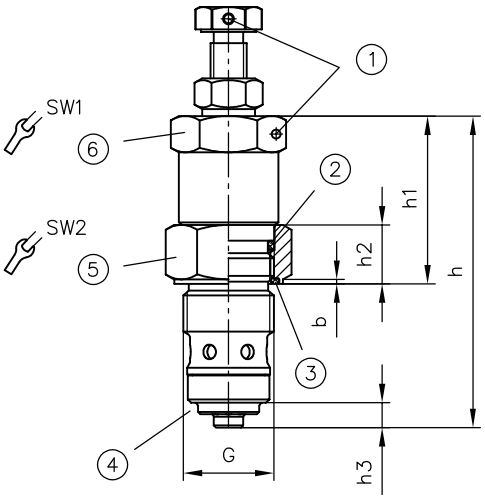
SW = Width across flats

Coding **R**
Manually adjustable



Type	a	h	h1	SW
CMV 1	35	18	27	10
CMV 2 CMVZ 2	45	20	35	13
CMV 3	45	20	35	13

Sequence valve type CSV and control valve type CSVZ



1 Sealing option
2 O-ring
3 Fitting seal
4 Sealing edge
5 Sealing nut
6 Valve housing

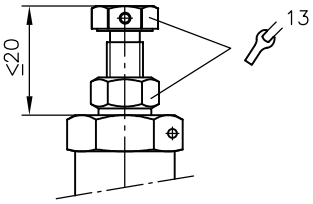
SW = Width across flats

Type	G	b	h	h1	h2	h3	SW1	SW2	Tightening torque (Nm)	
									SW1	SW2
CSV 2 CSVZ 2	M20x1.5	1	69	38,5	13	5,5	22	24	50	40
CSV 3	M24x1.5	1,5	87	47	14	10	27	30	70	60

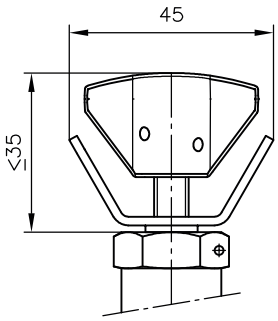
Type	Fitting seal	O-ring AU 90 Sh
CSV 2 CSVZ 2	KANTSEAL DKAR 0018-N90	17.17x1.78
CSV 3	KANTSEAL DKAR 00021-N90	21.95x1.78

Adjustment

without coding
fixed



coding **R**
Manually adjustable



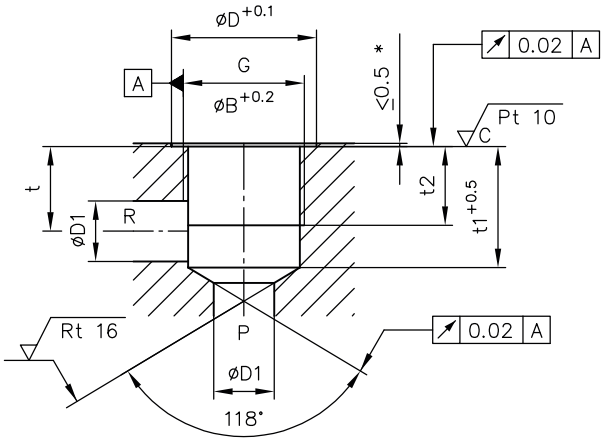
4.2 Mounting hole

INFORMATION

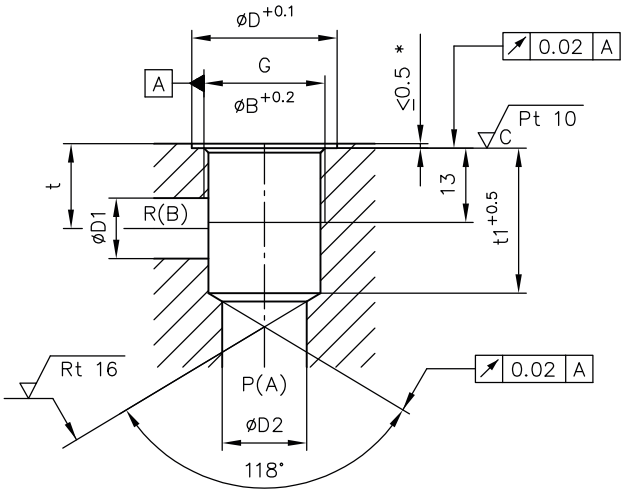
The screwed-in valve is sealed against and locked to the device body using a sealing nut with a fitting seal and O-ring.

- Sealing inlet to outlet: at the contact area between the facial sealing edge of the tapped journal of the valve housing and the stepped shoulder of the tapping hole of the location thread.
- Drilling the stepped shoulder: use the normal drill point angle of 118°.
- Therefore reaming of the hole and bevels to help the seals slip in are not necessary.

CMV, CMVZ



CSV, CSVZ



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

Type	G	∅D	∅D1	∅D2	t	t1	t2	Thread counterbore ∅B_{max}
CMV 1	M16x1.5	22	8	--	13	18	11	16
CMV 2 CMVZ 2	M20x1.5	24	10	--	14	20	13	20
CMV 3	M24x1.5	30	11	--	16	22	13	24
CSV 2 CSVZ 2	M20x1.5	24	10	14	14	24	--	20
CSV 3	M24x1.5	30	11	16	16	28	--	24

INFORMATION

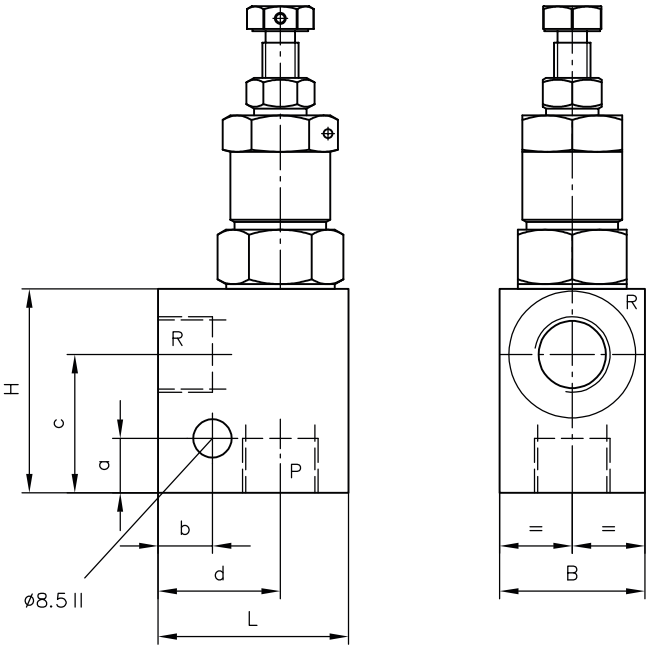
For tapped plugs for the mounting holes, see Chapter 4.4, "Tapped plugs"

NOTICE

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

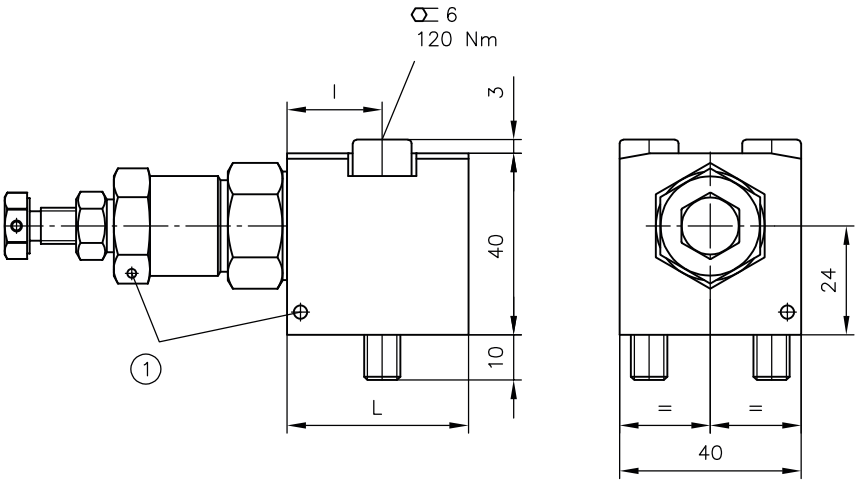
4.3 Version with single connection block

pipe connection



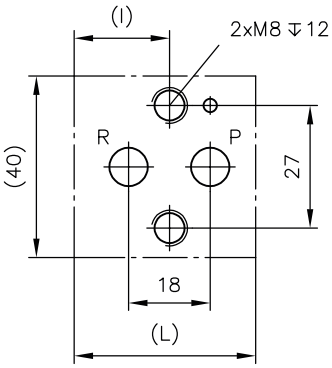
Type	H	L	B	a	b	c	d	Ports (ISO 228-1)
								P, R
CMV 1.. -1/4	40	40	25	10	10	26	27	G 1/4
CMV 1.. -3/8	40	40	25	10	10	26	27	G 3/8
CMV 2.. -3/8 CMVZ 2.. -3/8	45	42	32	12	12	30,5	27	G 3/8
CMV 3.. -1/2	50	50	35	12	12	33,5	34	G 1/2
CSV 2.. -1/4 CSVZ 2.. -1/4	45	42	32	15	11	31	27	G 1/4
CSV 2.. -3/8 CSVZ 2.. -3/8	45	42	32	15	11	31	27	G 3/8
CSV 3.. -1/2	55	50	35	12	12	39	34	G 1/2

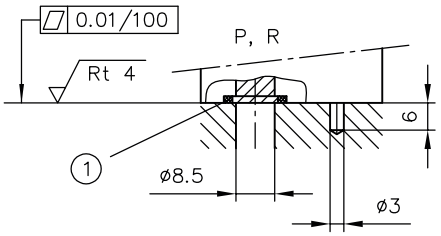
Manifold mounting



1 Sealing option

Hole pattern of the base plate





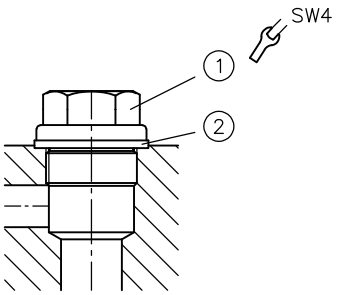
1 O-ring

Type	L	l	Sealing	Attachment
CMV 2 CMVZ 2	40	21	2x O-ring 10x2 NBR 90 Sh	2x cylinder screws ISO 4762-M8x50-8.8-A2K
CSV 2 CSVZ 2	48	30		

4.4 Tapped plugs

The mounting holes can be sealed with tapped plugs if necessary; for example, if the assembly of standardised basic bodies is to be carried out with or without screw-in valves as required.

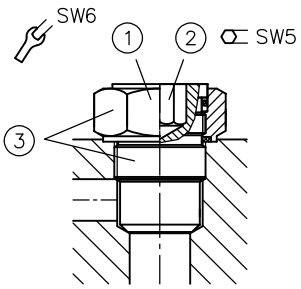
Passage open



SW = Width across flats

1 Tapped plug
2 Sealing ring

Passage blocked



1 Lock nuts and sealing nuts
2 Screw part
3 Tapped plug and locking tapped plug, complete

Type	Passage open				Passage blocked				
	Tapped plug			Sealing ring	Tapped plug and locking tapped plug, complete				
						Screw part		Lock nuts and sealing nuts	
	DIN 910	SW4	Tightening torque (Nm)	DIN 7603-Cu	Drawing no.	SW5	Tightening torque (Nm)	SW6	Tightening 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 7715 029	12	70	30	60

5 Installation, operation and maintenance information

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

5.1 Intended use

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

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

Essential requirements for the product to function correctly and safely:

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

If the product can no longer be operated safely:

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

5.2 Assembly information

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

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

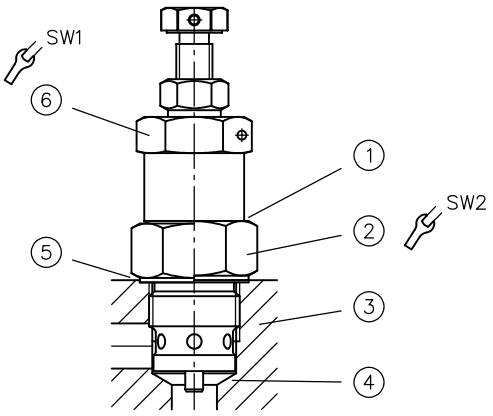
⚠ **DANGER**

Sudden movement of the hydraulic drives when disassembled incorrectly

Risk of serious injury or death

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

5.2.1 Screwing in and locking



SW = Width across flats

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

1. Before screwing in the valve: turn lock nuts and sealing nuts back as far as they will go.
2. Screw in the valve and tighten to the specified torque.
   ✓ The metallic sealing of the inlet to the outlet is formed between the facial sealing edge of the valve and the shoulder of the stepped hole in the basic body.
3. Tighten counter/sealing nut with specified torque.

Type	Valve housing		Lock nuts and sealing nuts	
	SW1	Tightening torque (Nm)	SW2	Tightening 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 Setting the pressure

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

Pressure range	Reference values: approx. pressure change (bar) per revolution		
	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

For pressure range B to F, see Chapter 2.1.1, "Basic type, size and pressure range"

NOTICE

- CMVZ 2 and CSVZ 2: in the case of pressure range F and pressure settings of < 40 bar, a return pressure of > 5 bar is required.

CAUTION

Overloading components due to incorrect pressure settings.

Risk of minor injury.

- Always monitor with a pressure gauge when setting and changing the pressure.

5.2.3 Creating the mounting hole

see Chapter 4.2, "Mounting hole"

5.3 Operating instructions

Observe product configuration and pressure/flow rate.

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

NOTICE

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

CAUTION

Overloading components due to incorrect pressure settings.
Risk of minor injury. Parts may burst or fly off, and uncontrolled leakage of hydraulic fluid.

- Pay attention to the maximum operating pressure of the pump, valves and fittings.
- Always monitor the pressure gauge when setting and changing the pressure.

Purity and filtering of the hydraulic fluid

Fine contamination can significantly impair the function of the product. Contamination can cause irreparable damage.

Examples of fine contamination include:

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

NOTICE

New hydraulic fluid from the manufacturer may not have the required purity.
Damage to the product is possible.

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

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

Additionally applicable document: D 5488/1 oil recommendations

5.4 Maintenance information

This product is largely maintenance-free.

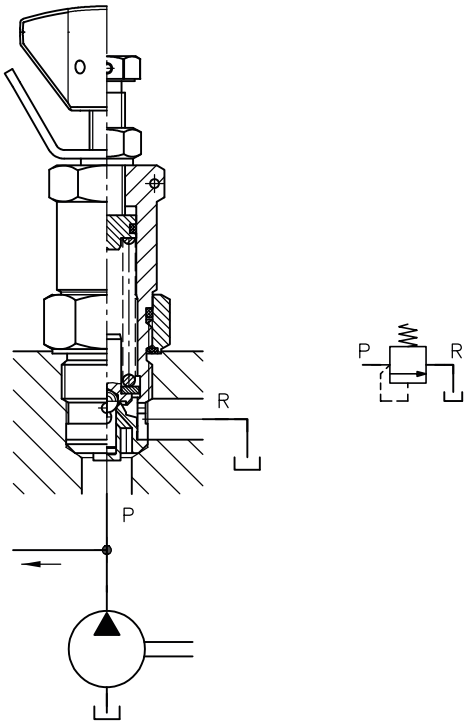
Check regularly (at least once a year) by visual inspection whether the hydraulic connections are damaged. If external leakages are found, shut down and repair the system.

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

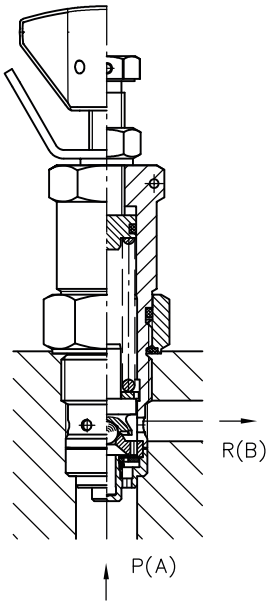
6 Other information

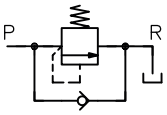
6.1 Schematic sectional drawings and circuit symbols

CMV

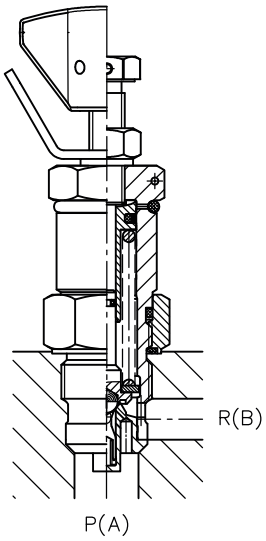


CSV

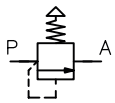




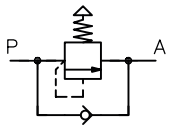
CMVZ, CSVZ



CMVZ



CSVZ



References

Additional versions

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

D 7710 MV 07-2025-1.8

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