

Pressure valves type CMV(Z) and CSV(Z)

cartridge valve for simple tapped holes

Pressure $p_{\max} = 500 \text{ bar}$
Flow $Q_{\max} = 60 \text{ lpm}$

See also valves with same mounting hole:

● Pressure controlled 2-way directional valve type CNE	D 7710 NE
● Shut-off and throttle valves type CAV	D 7711
● Check valves type CRK, CRB, CRH	D 7712
● Throttle and restrictor check valves type CQ, CQR, and CQV	D 7713
● Flow control valves type CSJ	D 7736
● Pressure reducing valves type CDK	D 7745
● Pressure-dependent shut-off valves type CDSV	D 7876

1. General information

The pressure valves illustrated here are pressure limiting, pre-load, and sequence valves. The unique design feature shared by these valve types is the easy to manufacture mounting hole at the manifold. 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 are made by a sealing nut with a special thread seal and an O-ring.

These pressure limiting valves are not suited for safeguarding pressure devices conforming the Pressure Equipment Directive 97/23/EC. Pressure limiting valves with unit approval should be used instead, see D 7000 TÜV, D 7710 TÜV, D 6905 TÜV.

- **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.

For flow rates from 20 up to 60 lpm, depending on size.

- **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).

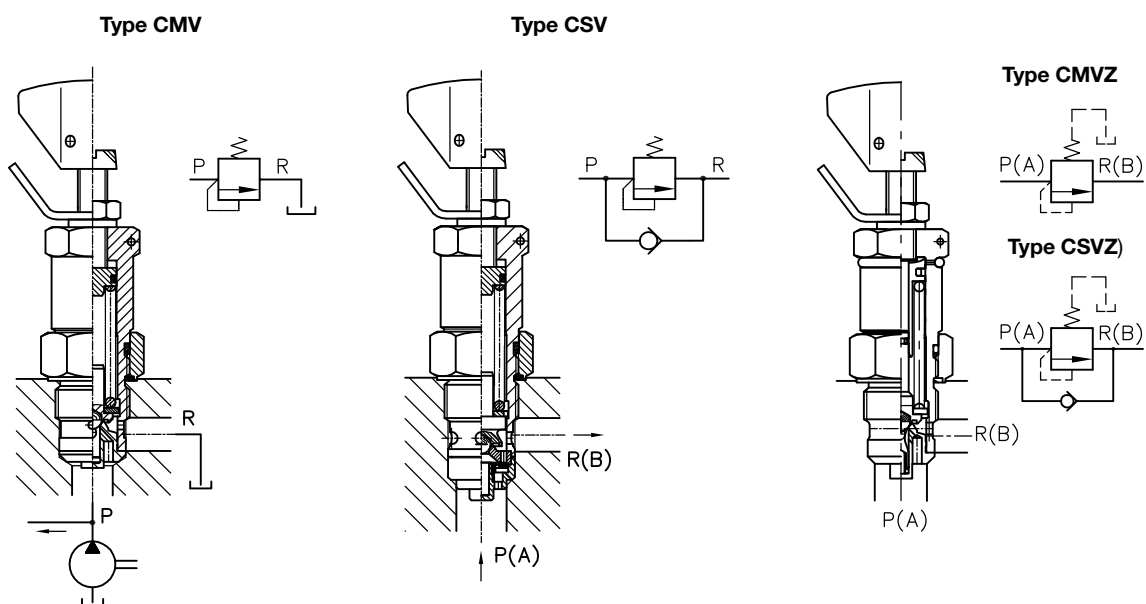
For flow rates from 40 and 60 lpm, depending on size.

- **Sequence valve type CMVZ and CSVZ**

The set pressure at this valve type remains almost uninfluenced from the pressure apparent at R. This makes this valve type ideally suited for all kind of sequence circuitries. This is achieved by generating an counter area relieved to the atmosphere which minimizes the forces applied onto the valve element by the pressure apparent at R.

For flow rates to 40 lpm.

Schematic cross-sectional drawings and symbols



2. Available versions, main data

Order examples: Pressure limiting valve
Pre-load valve

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

X = Suffix for version without dampening
(only available for type CMV..!)

Connection block for direct pipe connection
Ports A and B ISO 228/1 (BSPP)
- **1/4** = G 1/4 with type CMV 1
- **3/8** = G 3/8 with type CMV 1, CMV(Z) 2, CSV(Z) 2
- **1/2** = G 1/2 with type CMV 3, CSV 3
- **P** = Manifold mounting
for type CMV(Z) 2, CSV(Z) 2

Desired pressure setting (bar)
within the various pressure ranges

Adjustability during operation
No coding = Tool adjustable
R = Manually adjustable (not avail. for type CNE..!)

Nomination	Basic type and size	Flow Q _{max} approx (lpm)	Pressure range adjustable from ... to ... (bar)				Tapped journal metric fine thread conforming ISO	Torque 1)		Symbols	
			B	C	E	F		Housing (Nm)	Sealing nut (Nm)	Tool adjustable	Manually adjustable (coding R)
Pressure limiting valve	CMV 1	20	(0) ... 500	(0) ... 315	(0) ... 160	(0) ... 80	M16x1.5	40	35		
	CMV 2	40					M20x1.5	50	40		
	CMV 3	60					M24x1.5	70	60		
Pressure sequence valve	CSV 2	40	(0) ... 500	(0) ... 315	(0) ... 160	(0) ... 80	M20x1.5	50	40		
	CSV 3	60					M24x1.5	70	60		
Sequence valve	CMVZ 2 CSVZ 2	40	(0) ... 500	(0) ... 315	(0) ... 160	(0) ... 80	M20x1.5	50	40		

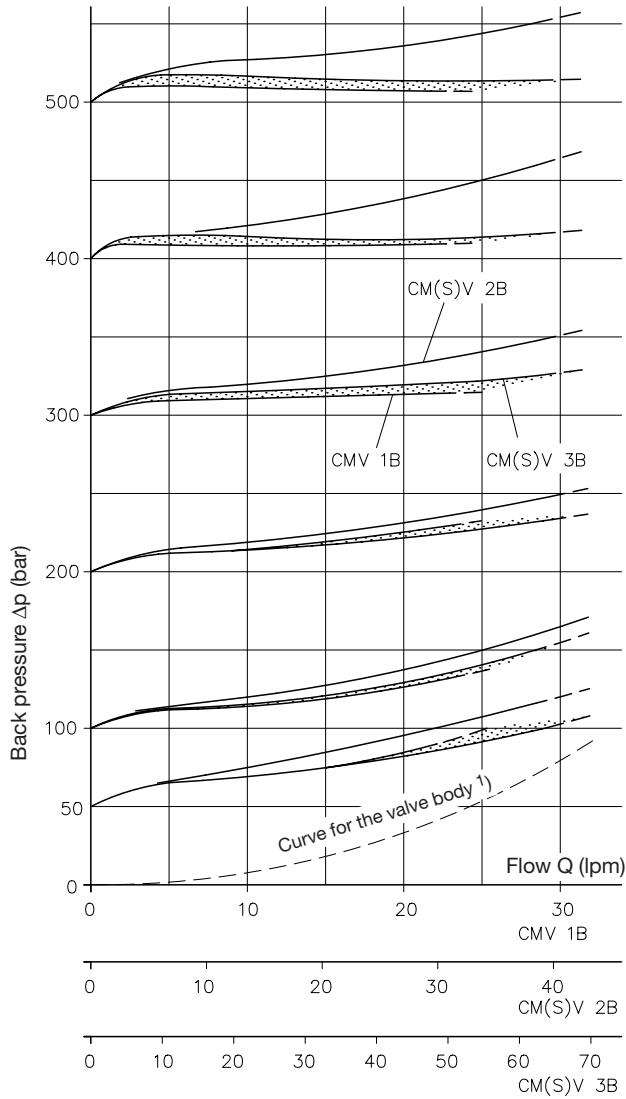
1) This applies to manifolds made of steel, spheroidal cast and other common material (e.g. light alloy). For perm. torque, see sect. 4 ++

3. Further data

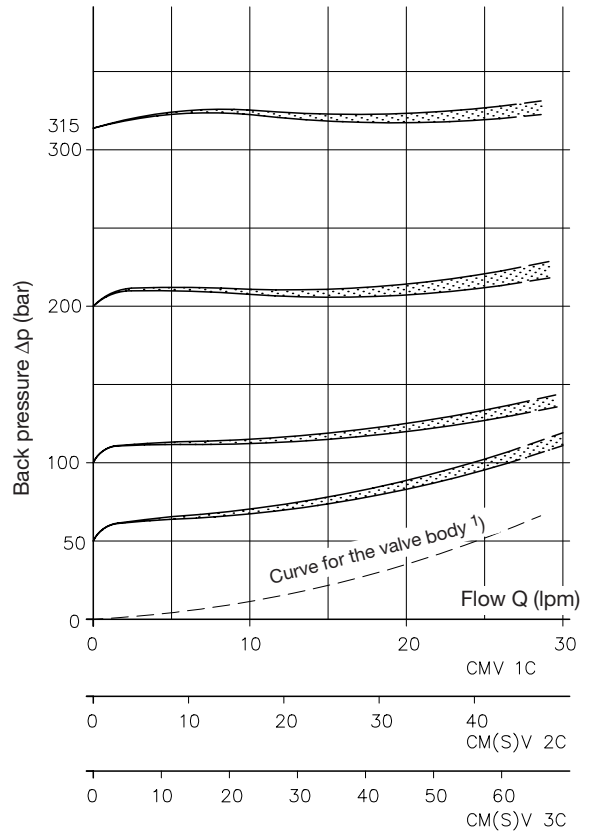
Nomenclature	Directly controlled pressure valve, cartridge type			
Design	Ball seated valves			
Material	Steel. Valve body gas nitrided, sealing nut and connection block zinc galvanized, internal functional parts hardened and ground, balls made of bearing quality steel			
Installation position	Any			
Port coding	P = Inlet (pump side) R = Outlet (return or carry-on) (all ports pressure resistant)	Port codings only for circuit plans and assembly instructions. These may be found in the overview on page 1 or at the dimensional drawings in sect. 4 ++. No codings are applied to the valve body.		
Mass (weight)	Type CMV 1 = approx. 90 g CMV 2 = approx. 160 g CMV 3 = approx. 280 g CMVZ 2 = approx. 170 g	Type CSV 2 = approx. 150 g CSV 3 = approx. 300 g CSVZ 2 = approx. 160 g	Connection block - 1/4 = + 260 g - 3/8 = + 260 g - 1/2 = + 420 g - P = + 260 g	
Pressure alteration (rough guideline)	Pressure range	Approx. pressure variation (bar) per turn		
Attention: It is necessary to check pressure variation with pressure gauge!		CMV 1	CMV(Z) 2 CSV(Z) 2	CMV 3 CSV 3
	B	94	100	65
	C	51	55	51
	E	33	19	17
	F	12	10	9
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 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 (guideline) type CM(S)V...

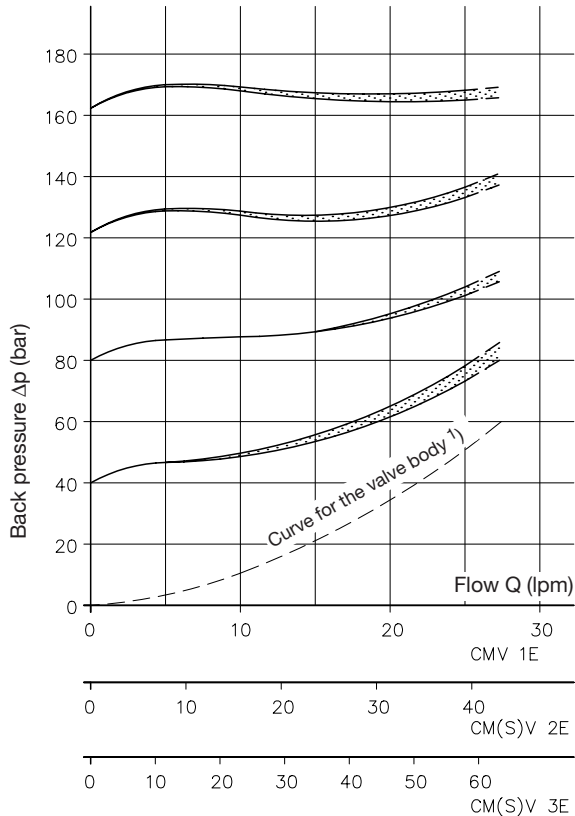
Type CM(S)V.B up to 500 bar



Type CM(S)V.C up to 315 bar

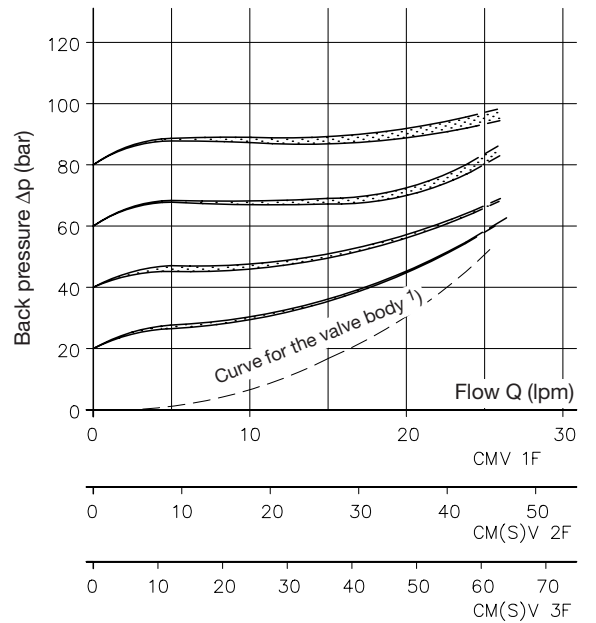


Type CM(S)V.E up to 160 bar



1) There is no setting below this curve achievable

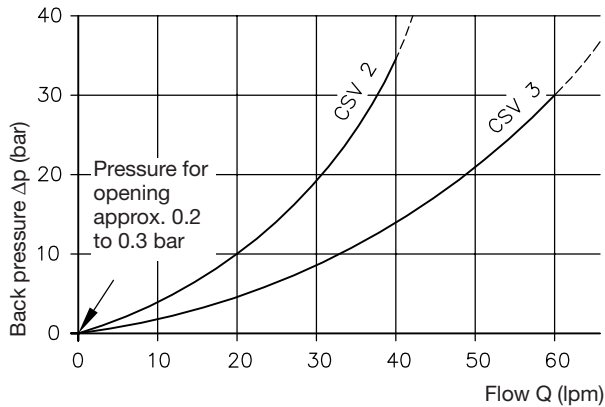
Type CM(S)V.F up to 80 bar



Δp -Q curves (guideline)

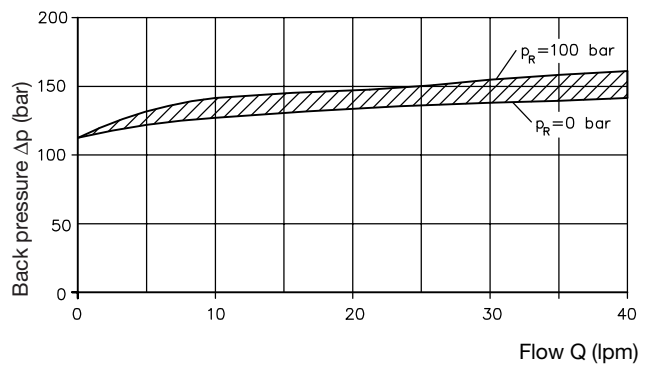
Type CSV(Z) (pressure sequence valve)

R→P return flow



Type CMVZ 2, CSVZ 2

Relation flow to back pressure (example)

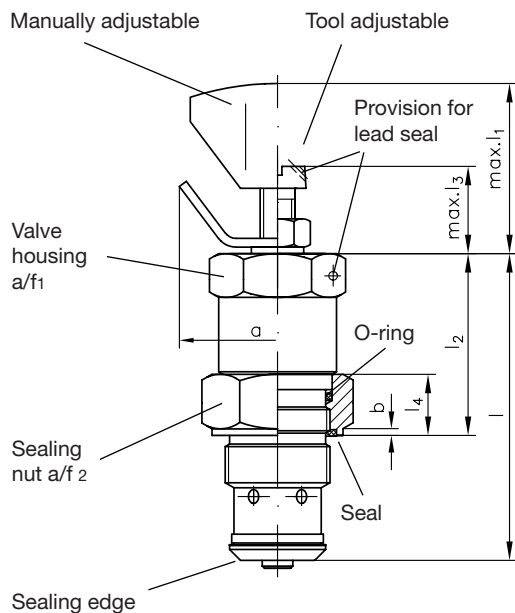


Viscosity during measurements approx. 60 mm²/s

4. Unit dimensions

All dimension in mm and subject to change without notice!

4.1 Pressure limiting valve type CMV and sequence valve type CMVZ

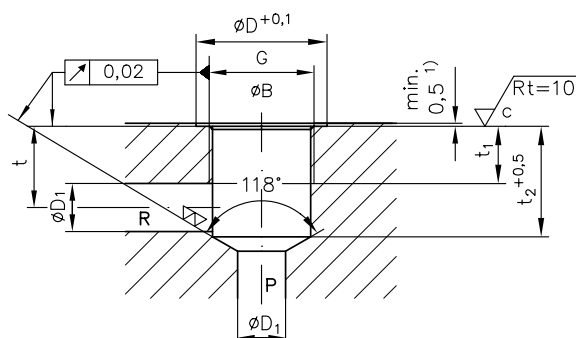


Note for assembly, see sect. 4.3

Type	a	b	l	l ₁	l ₂	l ₃	l ₄
CMV 1	35	1	52	27	32	18	12
CMV(Z) 2	45	1	59	35	37	20	13
CMV 3	45	1.5	72	35	47	20	14

Type	a/f1	a/f2	Torque (Nm)		Seal	O-ring AU 90 Sh
CMV 1	17	22	40	35	Kantseal DKAR 00016-N90	14x1.78
CMV(Z) 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

Mounting hole

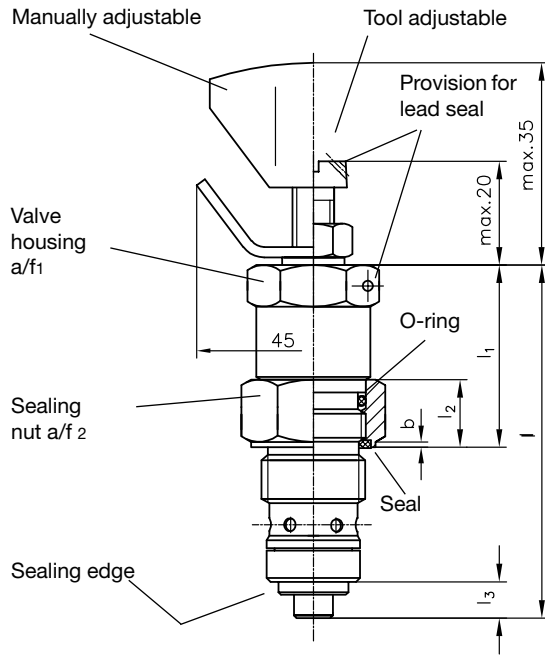


Type	G	D	D ₁	t	t ₁	t ₂	Thread sink B _{max}
CMV 1	M16x1.5	22	8	13	11	18	Ø16 ^{+0.2}
CMV(Z) 2	M20x1.5	24	10	14	13	20	Ø20 ^{+0.2}
CMV 3	M24x1.5	30	11	16	13	22	Ø24 ^{+0.2}

Note: Tapped plugs for the mounting holes, see sect. 4.4

1) A counter bore of 0.5 mm is required, if the pressure at R exceeds 100 bar!

4.2 Pre-load valve type CSV and sequence valve type CSVZ

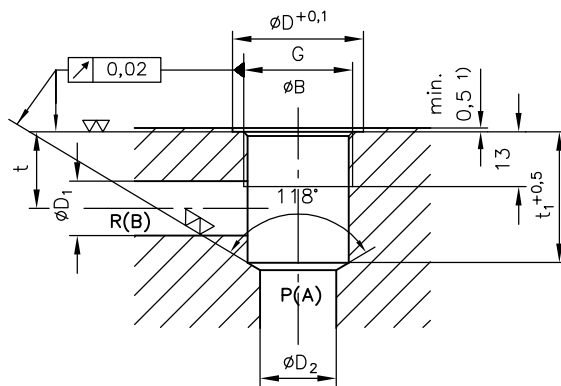


Note for assembly, see sect. 4.3

Type	b	l	l ₁	l ₂	l ₃	O-ring AU 90 Sh
CSV(Z) 2	1	69	38.5	13	5.5	17.17x1.78
CSV 3	1.5	87	47	14	10	21.95x1.78

Type	a/f ₁	a/f ₂	Torque (Nm)		Seal
			a/f ₁	a/f ₂	
CSV(Z) 2	22	24	50	40	Kantseal DKAR 00018-N90
CSV 3	27	30	70	60	Kantseal DKAR 00021-N90

Mounting hole



Type	G	D	D ₁	D ₂	t	t ₁	Thread sink B _{max}
CSV(Z) 2	M20x1.5	24	10	14	14	24	∅20+0.2
CSV 3	M24x1.5	30	11	16	16	28	∅24+0.2

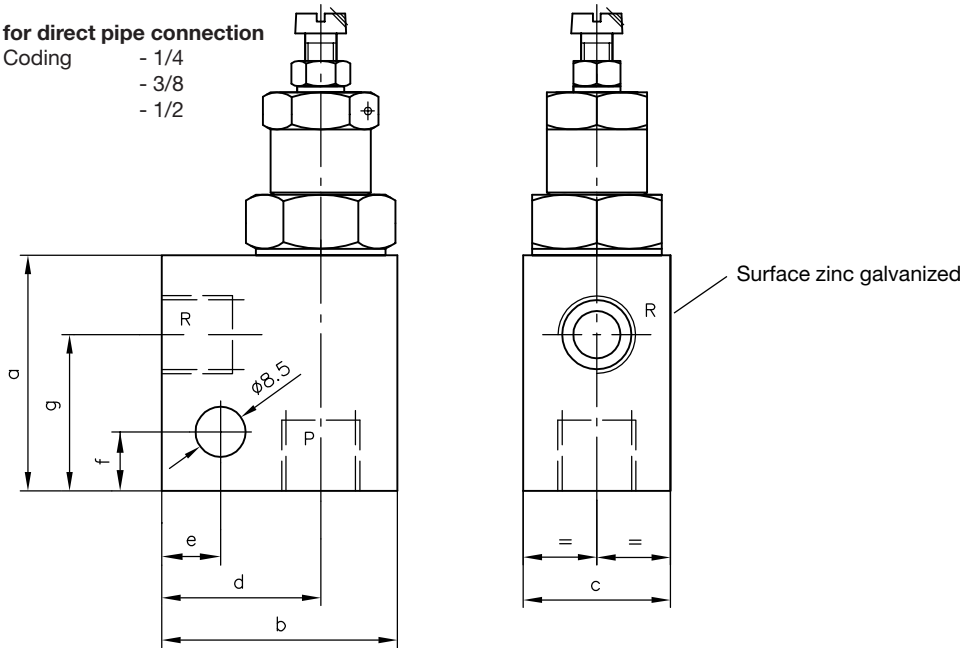
1) A counter bore of 0.5 mm is required, if the pressure at R exceeds 100 bar!

Note: Tapped plugs for the mounting holes, see sect. 4.4

4.3 Version with connection block

for direct pipe connection

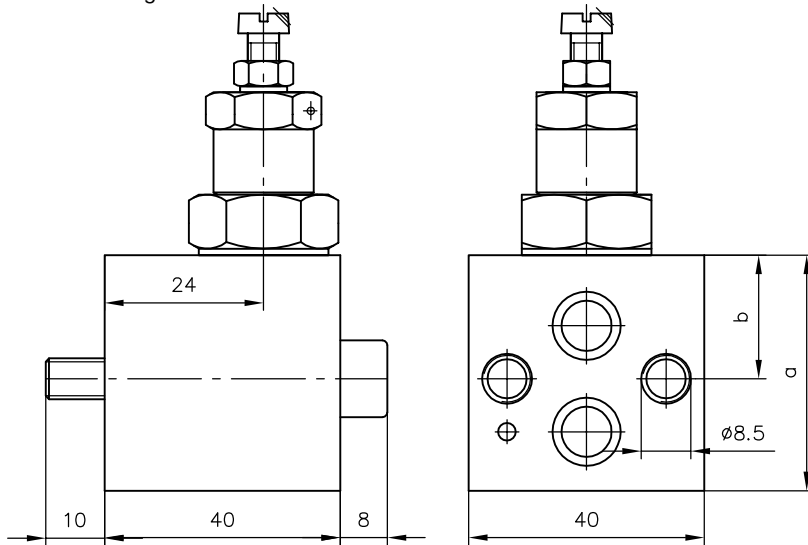
Coding - 1/4
- 3/8
- 1/2



Type	Ports A and B (P and R) ISO 228/1 (BSPP)	a	b	c	d	e	f	g	Dwg. No. for indiv. orders
CMV 1.. -1/4	G 1/4	40	40	25	27	10	10	26	7710 089
CMV 1.. -3/8	G 3/8	40	40	25	27	10	10	26	7710 090
CMV(Z) 2..-3/8	G 3/8	45	42	32	27	12	12	30.5	7710 091
CMV 3.. -1/2	G 1/2	50	50	35	34	12	12	33.5	7710 092
CSV(Z) 2..-1/4	G 1/4	45	42	32	27	11	15	31	7715 093
CSV(Z) 2..-3/8	G 3/8	45	42	32	27	11	15	31	7715 091
CSV 3.. -1/2	G 1/2	55	50	35	34	12	12	39	7715 092

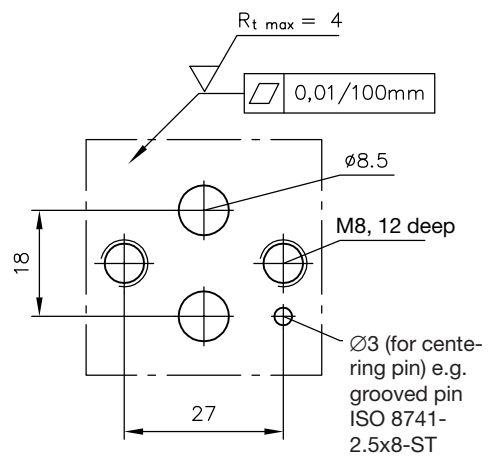
for manifold mounting

Coding - P



Type	a	b	Dwg. no. for indiv. orders
CMV(Z) 2	40	21	7710 095
CSV(Z) 2	48	30	7715 095

Hole pattern

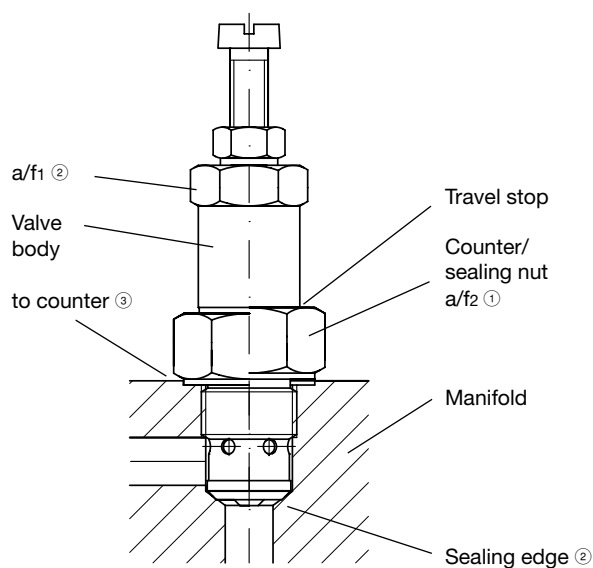


Sealing
2xO-ring 10x2 NBR 90 Sh

Mounting
2xskt. head screw ISO 4762-M8x50-8.8-A2K

4.4 Assembly instructions

Screw in and locking



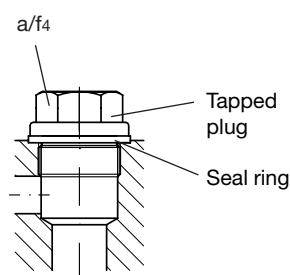
- ① Before screwing the valve body into the manifold loosen the counter/sealing nut until the travel stop.
- ② Screw in the valve body (a/f₁) and tighten with the correct tightening moment. The metallic sealing of the inlet to the outlet takes place at the contact area of the facial sealing edge and the stepped shoulder of the core diameter at the location thread.
- ③ Retighten the counter/sealing nut with the correct tightening moment.

Type and size	Valve body		Counter and sealing nut	
	a/f ₁	Torque (Nm)	a/f ₂	Torque (Nm)
CMV 1	17	40	22	35
CMV(Z) 2 CSV(Z) 2	22	50	24	40
CMV 3 CSV 3	24	70	30	60

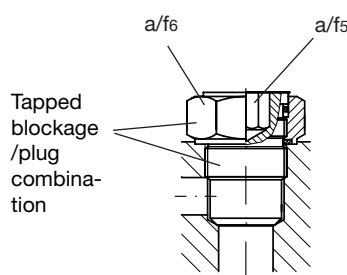
Tapped plugs

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



Passage blocked



Dimensions of the mounting holes acc. to sect. 4.1 to 4.2

Type and size	Passage open Tapped plug			Seal ring DIN 7603-Cu	Passage blocked Tapped blockage/plug combination complete				
	DIN 910	a/f ₄	Torque (Nm)		Drawing No.	Tapped part		Counter/sealing nut ¹⁾	
					a/f ₅	Torque (Nm)	a/f ₆	Torque (Nm)	
CMV 1	M16x1.5	17	40	A16x22x1.5	Z 7712 003	8	40	22	35
CMV(Z) 2	M20x1.5	19	50	A20x24x1.5	Z 7712 013	10	50	24	40
CSV(Z) 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
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					

¹⁾ For seals and O-rings see sect. 4.1 and 4.2