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

cartridge valve for simple tapped holes

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

See also valves with same mounting hole:

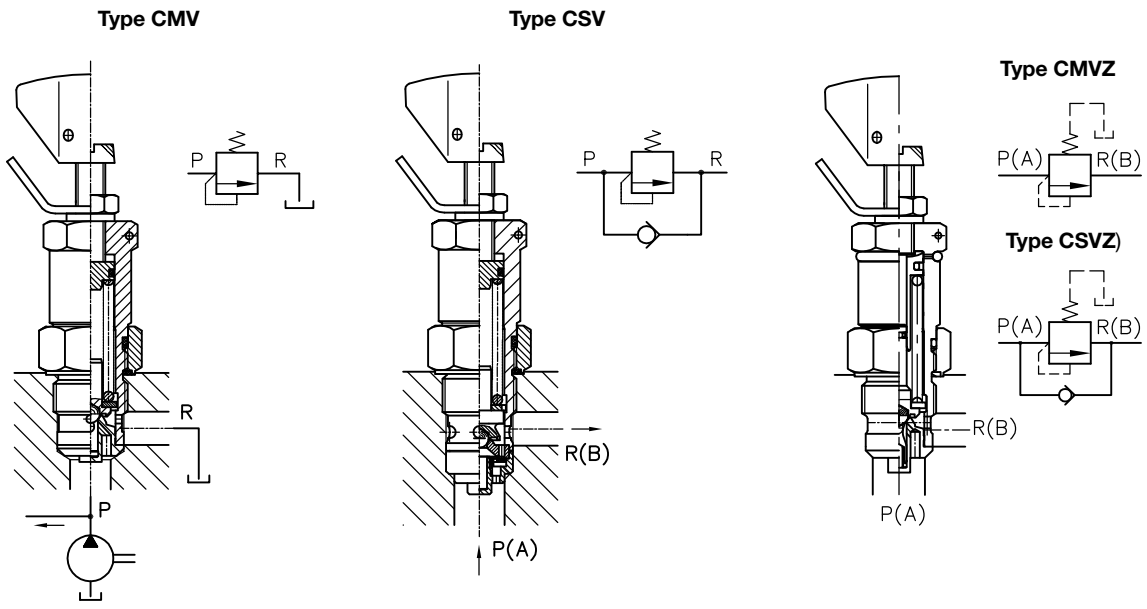
• Pressure controlled 2-way directional valve type CNE	D 7710 NE
• Shut-off and throttle valves type CAV	D 7711
• Check valves type CRK, CRB, CRH	D 7712
• Throttle and restrictor check valves type CQ, CQR, and CQV	D 7713
• Flow control valves type CSJ	D 7736
• Pressure reducing valves type CDK	D 7745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

- **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 system pressure up to 500 bar and flow from 20 up to 60 lpm, (dep. 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 system pressure up to 315 bar and flow from 40 and 60 lpm, dep. 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.

Schematic cross-sectional drawings and symbols



2. Available versions, main data

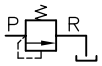
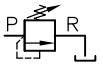
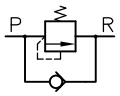
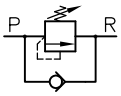
Order examples: Pressure limiting valve **CMV 1 C R X- 200-1/4**
Pre-load valve **CSV 3 F - 60**

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) B	C	E	F	Tapped journal metric fine thread conforming ISO	Torque [1] Housing (Nm)	Sealing nut (Nm)	Symbols 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)

Attention:
It is necessary to check pressure variation with pressure gauge!

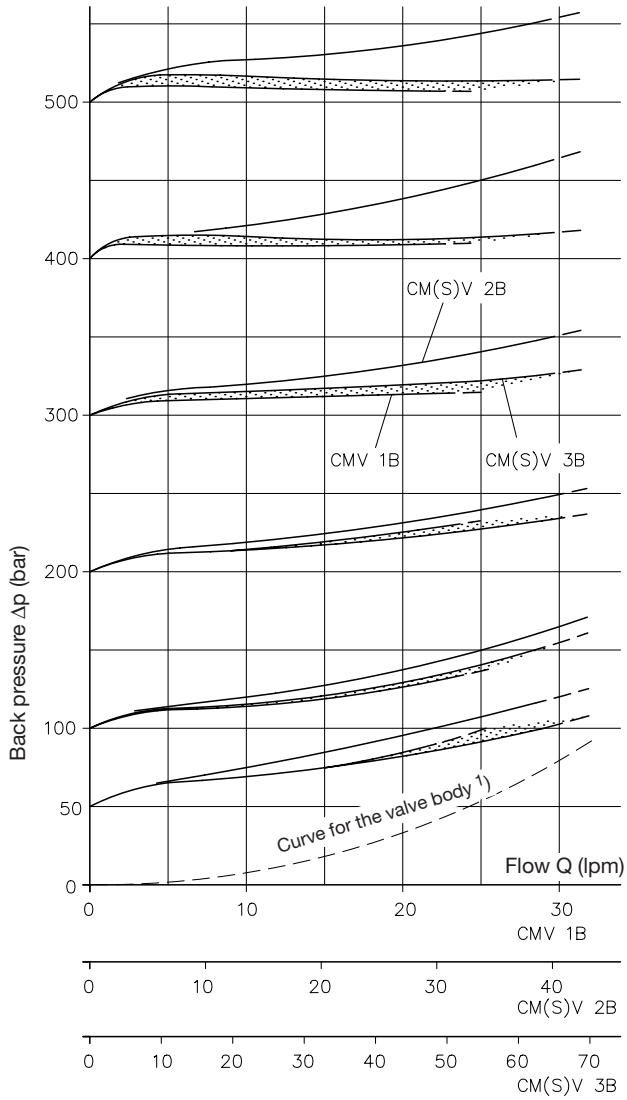
Pressure range	Approx. pressure variation (bar) per turn CMV 1	CMV(Z) 2 CSV(Z) 2	CMV 3 CSV 3
B	94	100	65
C	51	55	51
E	33	19	17
F	12	10	9

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.

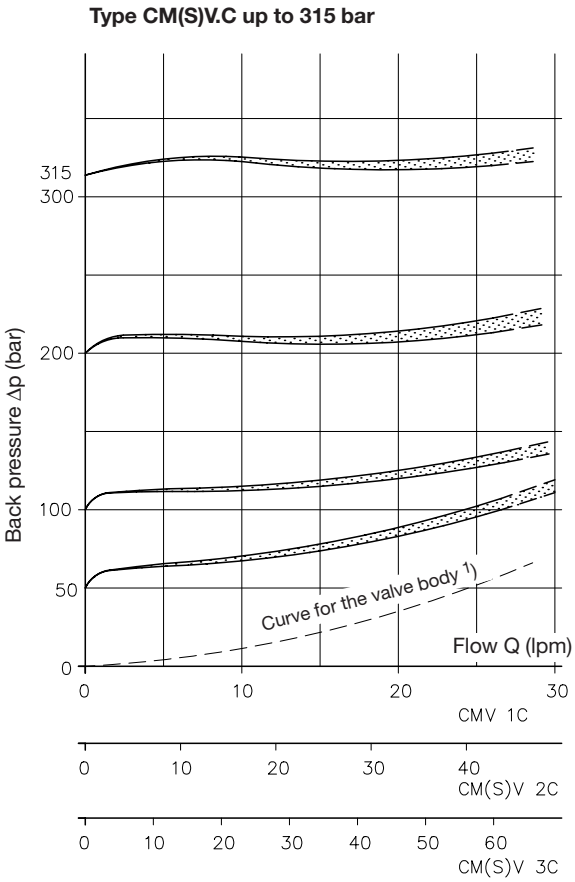
Temperature Ambient: approx. -40 ... +80 °C
Fluid: -25 ... +80°C, Note the viscosity range!
Permissible temperature during start: -40°C (observe start-viscosity!), as long as the service temperature is at least 20K higher for the following operation.
Biologically degradable pressure fluids: Observe manufacturer's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

Δp-Q curves (guideline) type CM(S)V...

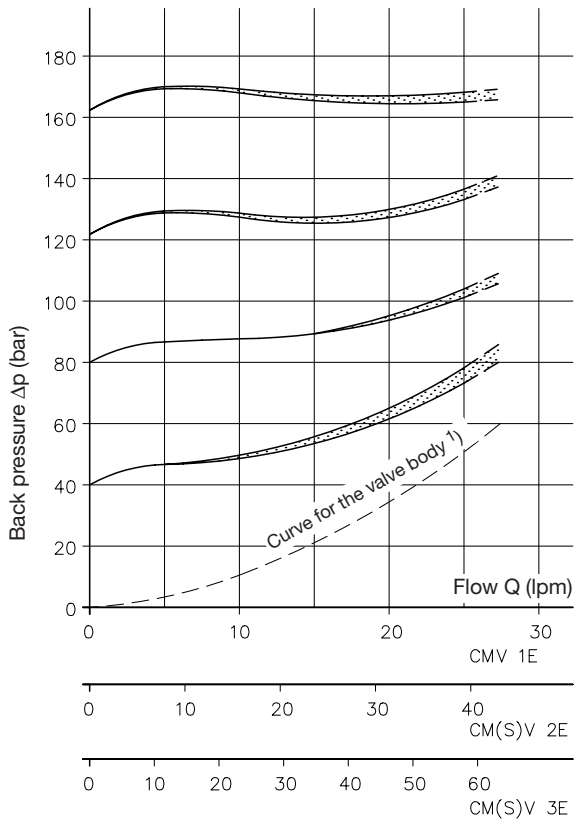
Type CM(S)V.B up to 500 bar



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

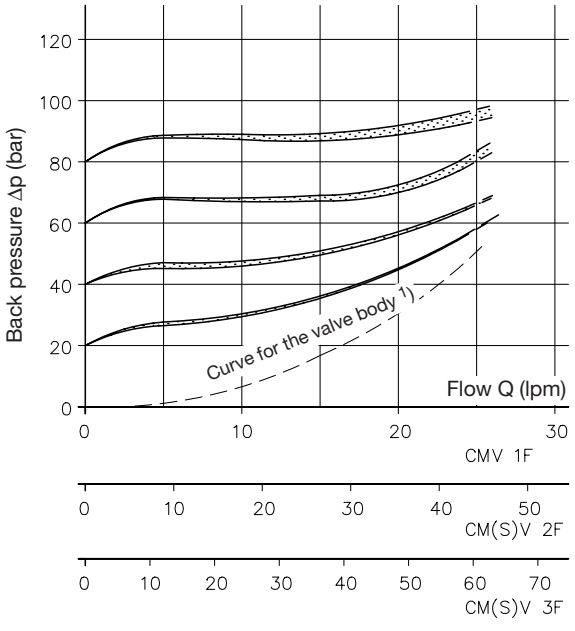


Type CM(S)V.E up to 160 bar



1) There is no setting below this curve achievable

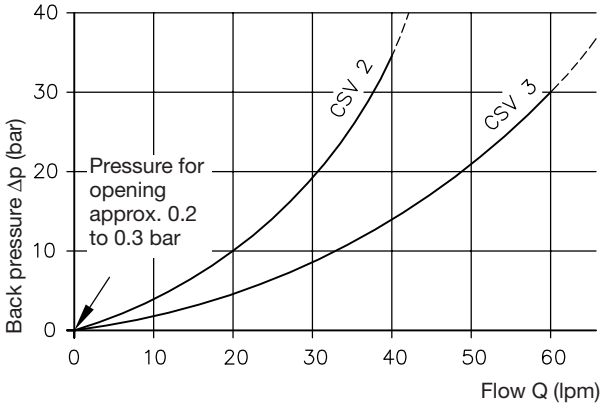
Type CM(S)V.F up to 80 bar



Δp-Q curves (guideline)

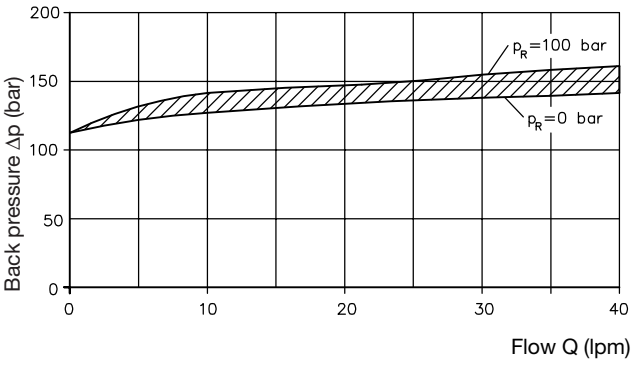
Type CSV(Z) (pressure sequence valve)

R→P return flow



Type CMVZ 2, CSVZ 2

Relation flow to back pressure (example)

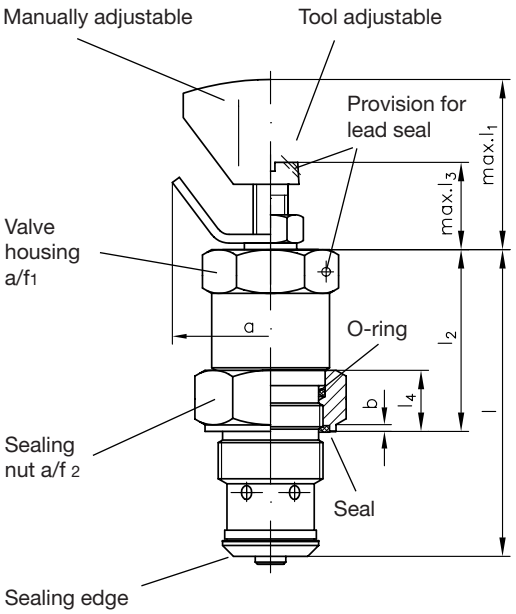


Viscosity during measurements approx. 60 mm²/s

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

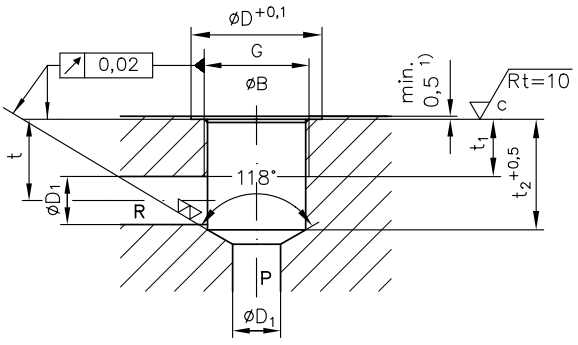


Note for assembly, see sect. 4.3

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

			Torque (Nm)		Seal	O-ring AU 90 Sh
Type	a/f_1	a/f_2	a/f_1	a/f_2		
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

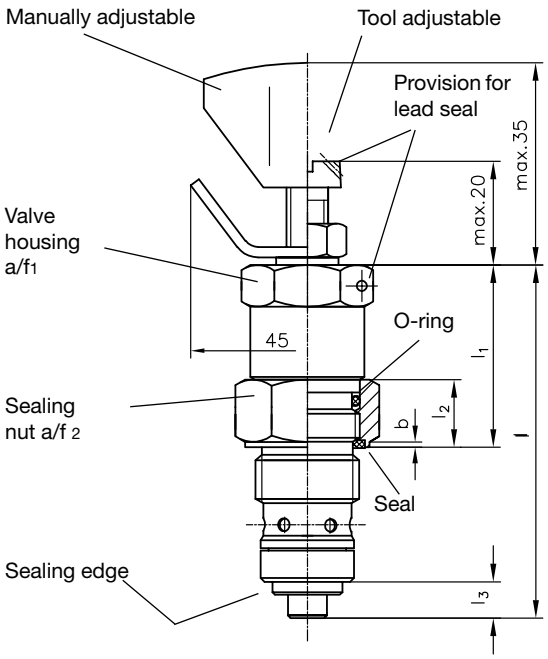


Type	G	D	D_1	t	t_1	t_2	Thread sink B_{max}
CMV 1	M16x1.5	22	8	13	11	18	$\varnothing 16^{+0.2}$
CMV(Z) 2	M20x1.5	24	10	14	13	20	$\varnothing 20^{+0.2}$
CMV 3	M24x1.5	30	11	16	13	22	$\varnothing 24^{+0.2}$

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

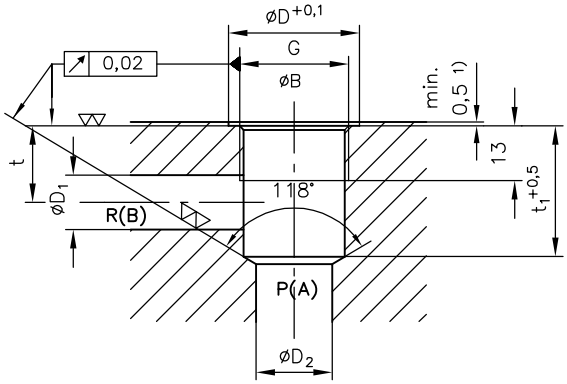


Note for assembly, see sect. 4.3

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) a/f_1	Torque (Nm) a/f_2	Seal
CSV(Z) 2	22	24	50	40	Kantseal DKAR 00018-N90
CSV 3	27	30	70	60	Kantseal DKAR 00021-N90

Mounting hole



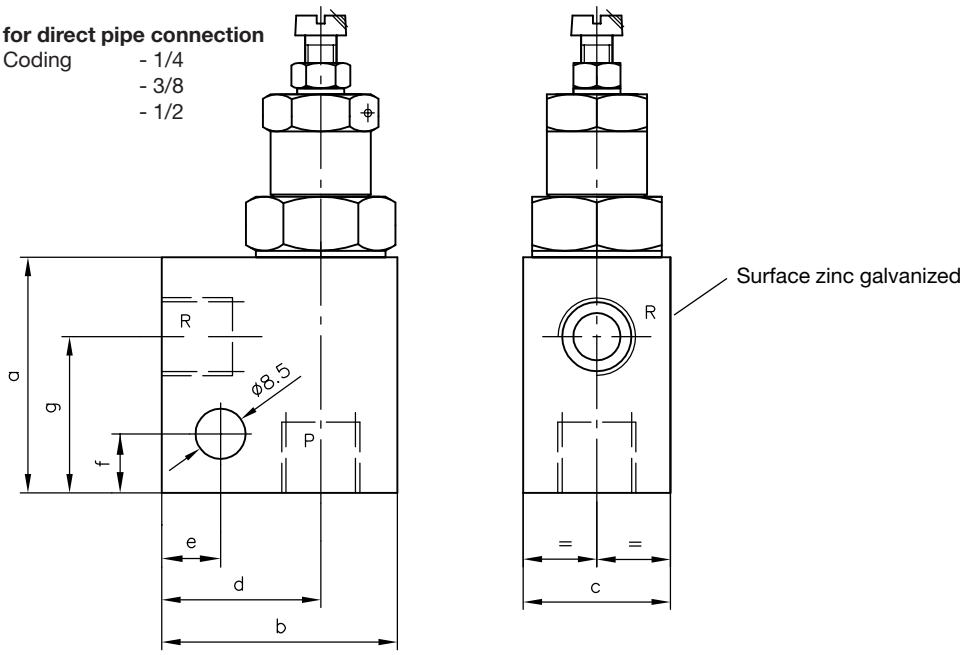
Type	G	D	D_1	D_2	t	t_1	Thread sink B_{max}
CSV(Z) 2	M20x1.5	24	10	14	14	24	∅20 +0.2
CSV 3	M24x1.5	30	11	16	16	28	∅24 +0.2

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

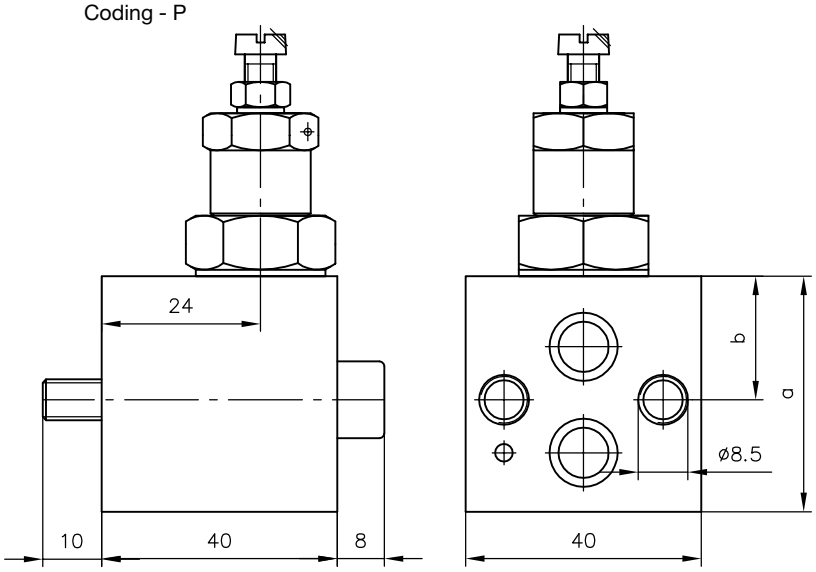
for direct pipe connection
Coding - 1/4
- 3/8
- 1/2



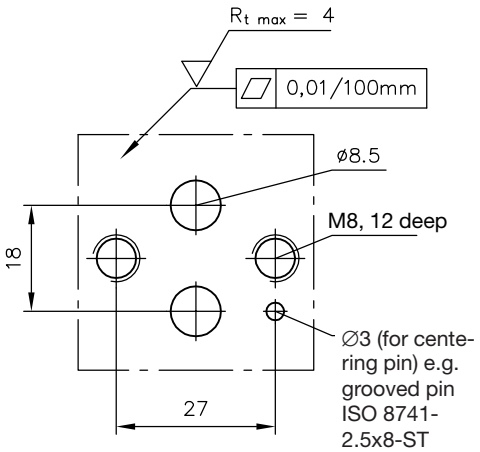
Surface zinc galvanized

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



Hole pattern



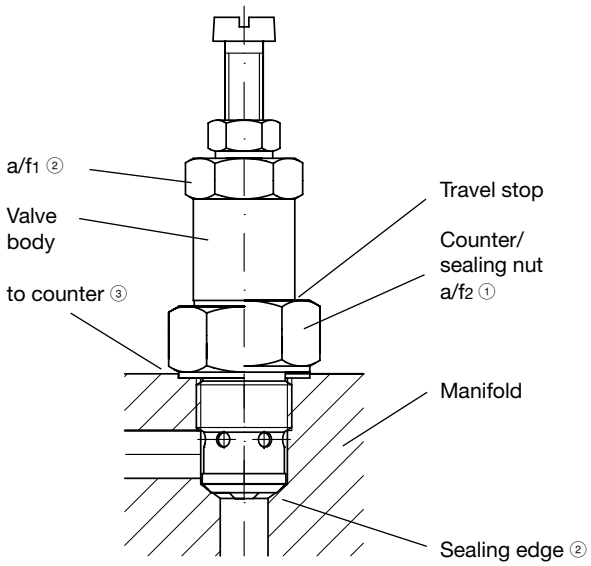
Type	a	b	Dwg. no. for indiv. orders
CMV(Z) 2	40	21	7710 095
CSV(Z) 2	48	30	7715 095

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.

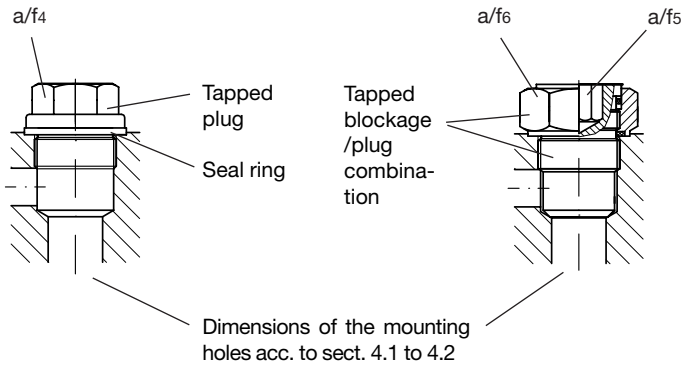
③ Retighten the counter/sealing nut with the correct tightening moment.

Type and size	Valve body		Counter and sealing nut	
	a/f1	Torque (Nm)	a/f2	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**



Type and size	Passage open Tapped plug			Seal ring	Passage blocked Tapped blockage/plug combination complete				
						Tapped part		Counter/ sealing nut [1]	
	DIN 910	a/f4	Torque (Nm)	DIN 7603-Cu	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(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