Throttle and shut-off valves type CAV

for screw in into simple tapped holes

Pressure p_{max} = 500 bar
Flow Q_{max} = 50 lpm

Further cartridge valves:

- Pressure relief valves type CMV and CSV — D 7710 MV
- Pressure controlled shut-off valves type CNE — D 7710 NE
- Check valves type CRK, CRB, CRH — D 7712
- Throttle 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

Manually adjustable version
CAV..
CAV..R
CAV..V

Tool adjustable version (with lock nut)
CAV..K
CAV..RK
CAV..RD

Turn knob (self-locking)
CAV..D
CAV..RD
CAV..VD

1. General information

Throttle valves belong, according to DIN 1219-1, to the flow valves. With these valves it is possible to adjust a variable pressure difference, thereby determing the flow between inlet and outlet. This characteristic is used e.g. to simply adjust the velocity of cylinders in accumulator circuits and to limit the flow in control circuits etc.
Valves type CAV are of slot type design i.e. a slot forms the throttling cross section area. The slot has a constant width over the complete adjustment travel, therefore the cross section variation is linear. Because of this feature, the throttle has a superior adjustment characteristic when compared with ordinary tapered (annular gap) throttles. Due to the well designed ratio between depth and width, the slot is less sensitive to micro debris than tapered throttles. The throttling cross section is positioned at one point on the perimeter for slot type throttles whereas an annular gap is spread over the complete perimeter acting like a gap filter at fine adjustments.
CAV type throttle and shut-off valves are available in various sizes and versions. In principle all these valves are to be screwed into the simply shaped tapped holes of 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 is 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.

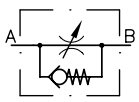
Symbols

Type CAV..(K)

with throttle / shut-off characteristic in both directions of flow

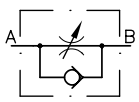
Type CAV..R(K)

with throttle / shut-off characteristic in direction of the thread and free return flow against it



Type CAV..V(K)

with free return flow in direction of the thread and throttle / shut-off characteristic against it



2. Available versions , main data

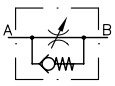
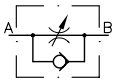
Order examples: **CAV 2R**

CAV 1V K - 1/4

Version with connection block (only with type CAV 1)
Ports A and B DIN ISO 228/1 (BSPP)
- 1/4 = G 1/4
- 3/8 = G 3/8

Adjustment (during operation)

Coding	Description
without	Standard, (wing screw + wing nut)
K	Tool adjustable version see sect. 5.2
D	Turn knob

Description and symbol	Basic type and size	Pressure p_{max} (bar)	Flow Q_{max} approx. (lpm) [1]	Tapped journal metric fine thread conforming ISO DIN 13 T6	Max. torque Valve body (Nm) [2]	Max. torque Sealing nut (Nm) [2]
Throttling and blocking direction A → B and B → A 	**CAV 1**	500	30	M 16x1.5	40	35
	CAV 2		50	M 20x1.5	50	40
Throttling and blocking direction B → A, free flow A → B 	**CAV 1R**	500	15	M 16x1.5	40	35
	CAV 2R		25	M 20x1.5	50	40
Throttling and blocking direction A → B, free flow B → A 	**CAV 1V**	500	15	M 16x1.5	40	35
	CAV 2V		25	M 20x1.5	50	40

[1]) Valve fully opened

[2]) This applies to manifolds made of steel, nodular cast iron or other common materials, e.g. light alloy

3. Further data

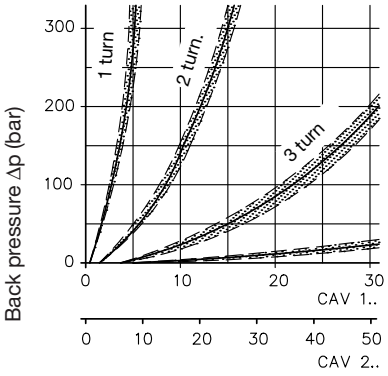
Nomination	Throttle and shut-off valve cartridge
Design	Slot type throttle, depending on version with/without by-pass check valve
Material	Steel body gas nitrided, sealing nut zinc galvanized, internal functional parts hardened and ground. For screw in into manifolds made of steel, cast iron and other materials (e.g. light alloy)
Installation position	Any
Port coding	A and B in flow diagrams and assembly drawings, only. See schematic drawings sect. 1 and dimensional drawings sect. 3. The port codings are not stamped onto the valve body
Static overload capacity	approx. 2 x p_{max} at tightened state and with sealing nut locked
Direction of flow	Arbitrary; blocked, throttled or free; see also cross-sectional drawings sect. 1 and table in sect. 2
Blocked position	B→A (CAV ..R..) and A→B (CAV ..V..); a completely closed throttle is not leakagefree tight
Permissible pressure	p_{max} = 500 bar
Opening pressure	CAV 1(2)R approx. 0.2 ... 0.4 bar A → B CAV 1(2)V 0 bar B → A (valve disc not spring loaded)
Mass (weight)	Type CAV 1.. = 50 g; type CAV 2.. = 70 g connection block - 1/4, - 3/8 = + 260 g
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 mm²/s; opt. operation approx. 10... 500 mm²/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, observe 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: Note manufacturer's specifications. By consideration of the compatibility with seal al not over +70°C

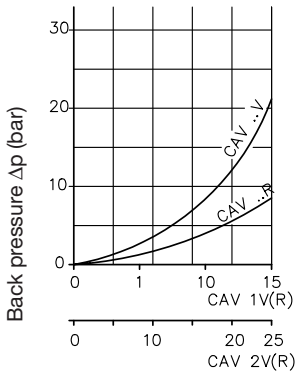
Δp-Q curves

Throttling curves

Guideline per turn, counted from blocked position

Direction of free flow

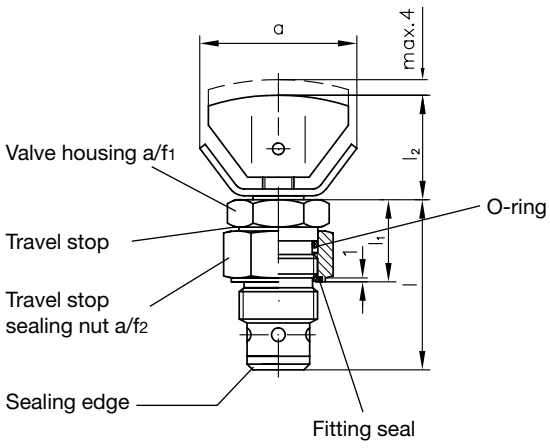




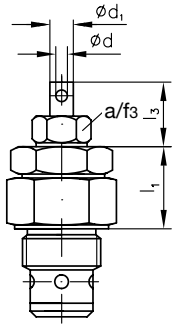
Viscosity during measurements approx. 60 mm²/s

4. Unit dimensions

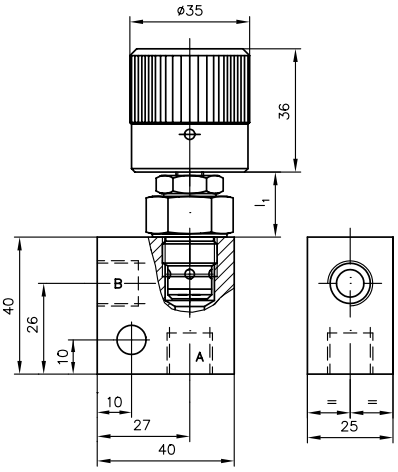
Type CAV 1 (R, V)
CAV 2 (R, V)



Type CAV 1 (R, V)K
CAV 2 (R, V)K



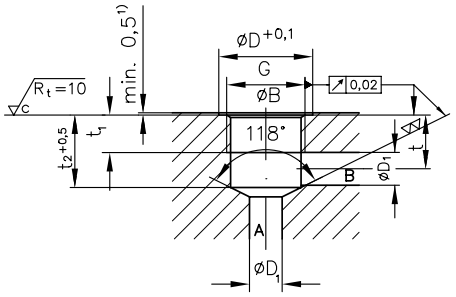
Type CAV 1 (R, V)D (- 1/4, - 3/8)
CAV 2 (R, V)D



Ports A and B DIN ISO 228/1 (BSPP)
- 1/4 = G 1/4
- 3/8 = G 3/8

Surface zinc galvanized

Mounting hole



1) If pressure exceeds 100 bar at B, sinking is required!

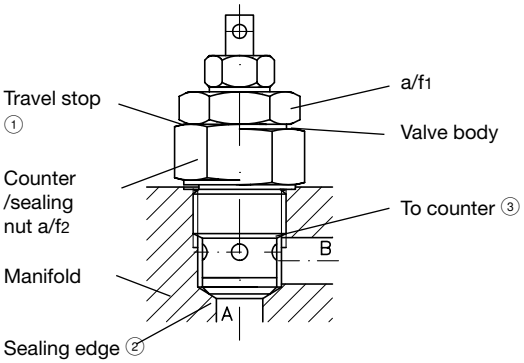
Type	Thread seal	O-ring AU 90 Sh
CAV 1..	Kantseal DKAR00016-N90	14x1.78
CAV 2..	Kantseal DKAR00018-N90	17.17x1.78

Type	D	D1	a	d	d1	l	l1	l2	l3	t	t1	t2	G	a/f1	a/f2	a/f3	Sinking B_{max}
CAV 1..	22	8	35	2	4.5	37	18	24	17	13	11	18	M 16x1.5	17	22	10	∅16$^{+0.2}$
CAV 2..	24	10	45	3	6	43	22	29	21	14	13	20	M 20x1.5	22	24	11	∅20$^{+0.2}$

All dimension in mm and subject to change without notice!

5. Assembly instructions

5.1 Screw in and locking



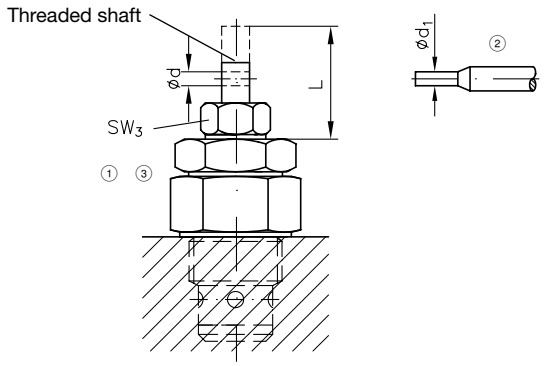
① Before screwing the valve body into the manifold, loosen the counter/sealing nut until the travel stop.

② Screw in the valve body (a/f1) and tighten with the correct 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 Tighten the counter/sealing nut with the correct torque.

Type and size	Valve body		Counter/sealing nut	
	Spanner size a/f1	Torque (Nm) 2)	Spanner size a/f2	Torque (Nm) 2)
CAV 1..	17	40	22	35
CAV 2..	22	50	24	40

5.2 Adjustment of type CAV..K



① Loosen lock nut

② Insert a pin shaped tool in the hole (∅ d) of the threaded shaft

Clockwise = reduction of the throttling cross section area (Δp rises)

Anti clockwise = reduction of the throttling cross section area (Δp falls)

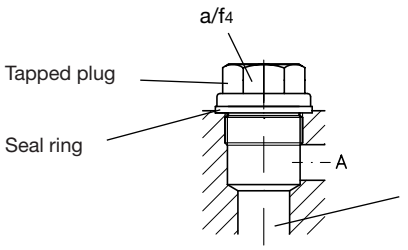
③ Re-tighten lock nut after adjustment

Type and size	L	Lock nut		Threaded shaft		
		Spanner size a/f3	Torque (Nm) 2)	Thread	∅d	∅d1 max.
CAV 1..	17	10	15	M 6	2	1.8
CAV 2..	21	13	30	M 8	3	2.8

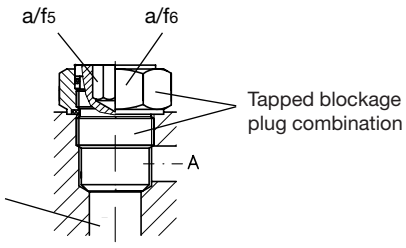
5.3 Tapped plugs

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 cartrige valves depending on application.

Passage open



Passage blocked



Type and size	Passage open: Tapped plug DIN 910	a/f4	Torque (Nm) 2)	Seal ring DIN 7603-Cu	Passage blocked: Tapped blockage/plug combination 1) Drawing-No.	Tapped part a/f5	Tapped part Torque (Nm) 2)	Counter sealing nut a/f6	Counter sealing nut Torque (Nm) 2)
CAV 1..	M 16x1.5	17	40	A 16x22x1.5	Z 7712 003	8	40	22	35
CAV 2..	M 20x1.5	19	50	A 20x24x1.5	Z 7712 013	10	50	24	40

1) For fitting seal and O-ring see sect. 4.

2) This applies to manifolds made of steel, nodular cast iron or other common materials, e.g. light alloy