

Throttle valve and restrictor check valve type CQ, CQR, CQV

Product documentation



Screw-in valve

Operating pressure $p_{\max}$:

700 bar

Flow rate $Q_{\max}$:

50 l/min



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1 Overview of throttle valve and restrictor check valve type CQ, CQR, CQV

Throttle valves are a type of flow valve. They affect the flow rate for single and double-acting consumers.

The throttle valve type CQ and the restrictor check valve type CQR and CQV are, as slotted throttles, insensitive to micro contamination. It regulates in one flow direction and permits free flow in the other direction. The double spindle sealing enables leakage-free adjustment, even under pressure.

The valve type CQ, CQR and CQV can be screwed-in and can be integrated into control blocks. The necessary mounting holes are straightforward to make. Due to their design, the valves cannot be closed completely without leakage.

Features and advantages

- Zero leakage adjustment when under pressure
- Operating pressure up to 700 bar
- Various precision control ranges

Intended applications

- Speed regulation in hydraulic lifting devices



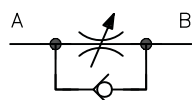
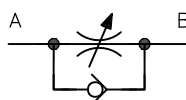
Throttle valve and restrictor check valve type CQ, CQR, CQV

2 Available versions

2.1 Screw-in valve (Basic version)

Circuit symbol

CQ

CQR

CQV


Ordering examples

CQ 2
CQR 2

D

-1/4

2.2 "Version with single connection block"

2.1.2 "Adjustability in operation"

2.1.1 "Basic type and size"

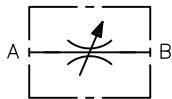
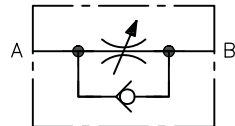
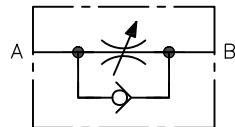
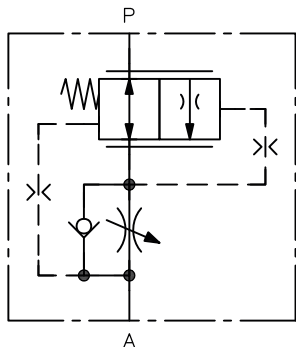
2.1.1 Basic type and size

Type	Description	Pressure p _{max} (bar)	Flow rate Q _{max} (l/min)
Standard			
CQ 2	- Single throttle - Throttling A → B and B → A largely the same	700	50
CQR 2	- Restrictor check valve - Throttling B → A		
CQV 2	- Restrictor check valve - Throttling A → B		
with precision control range			
CQ 22	- Single throttle - Throttling A → B and B → A largely the same	700	30
CQR 22	- Restrictor check valve - Throttling B → A		
CQV 22	- Restrictor check valve - Throttling A → B		
with strong precision control range			
CQ 23	- Single throttle - Throttling A → B and B → A largely the same	700	10
CQR 23	- Restrictor check valve - Throttling B → A		
CQV 23	- Restrictor check valve - Throttling A → B		

2.1.2 Adjustability in operation

Coding	Description
without coding	- Fixed, tool adjustable - not for type CQ 23, CQR 23, CQV 23
D	- Turning knob - not for type CQ 23, CQR 23, CQV 23
D3	Turning knob Ø 35 mm

2.2 Version with single connection block

Coding	Description	Circuit symbol
Pipe connection		
-1/4	G 1/4 (ISO 228-1)	CQ  CQR  CQV 
-3/8	G 3/8 (ISO 228-1)	
-3/8 JIS	G 3/8 (JIS B 2351 (0))	
Manifold mounting		
-P-DW	- Flow control function P → A - Flow direction A → P in accordance with built-in CQ 2 valve Only in combination with type CQ 2. and CQV 2. Q_{max} = CQ 2 ~ 30 l/min CQ 22 ~ 30 l/min CQ 23 ~ 10 l/min	

3.1 General data

Designation	Throttle and restrictor check valve
Design	Slotted throttle
Model	▪ Screw-in valve ▪ Valve for pipe connection ▪ Manifold mounting valve
Material	Steel; Hardened and ground functional inner parts
Tightening torque	see Chapter 4, "Dimensions"
Installation position	As desired
Surface protection	Housing and sealing nut electrogalvanised
Flow direction	▪ In the throttled direction: depending on the setting, see Chapter 3.4, "Characteristic lines" ▪ The flow rate values are viscosity-dependent.
Hydraulic fluid	Hydraulic fluid, according to DIN 51524 Parts 1 to 3; ISO VG 10 to 68 according to DIN ISO 3448 Viscosity range: 4 - 1500 mm²/s Optimal operating range: approx. 10 - 500 mm²/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	$p_{\max} = 700 \text{ bar}$
Flow rate	see Chapter 2.1.1, "Basic type and size"

3.3 Weight

Single valve	Type	
	CQ 2	= 90 g
	CQR 2	= 90 g
	CQV 2	= 90 g
Single connection block	Coding	
	-1/4	= 320 g
	-3/8	= 320 g
	-P-DW	= 450 g

3.4 Characteristic lines

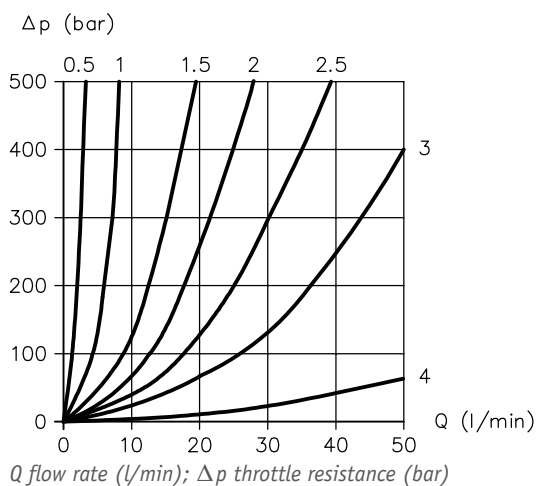
Viscosity of the hydraulic fluid approx. 50 mm²/s

Δp -Q characteristic lines

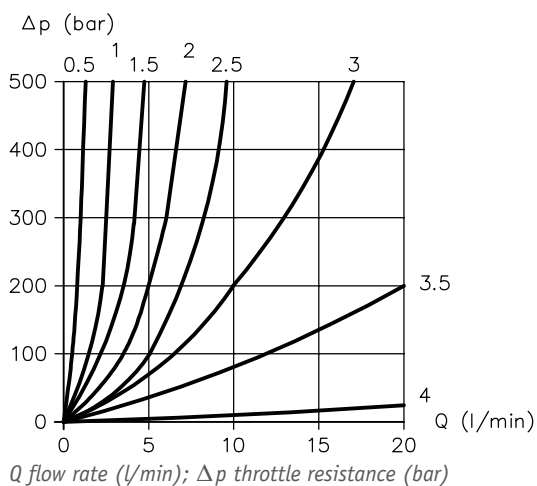
Throttled flow direction

Reference values per revolution of the adjusting spindle counted from the closed state

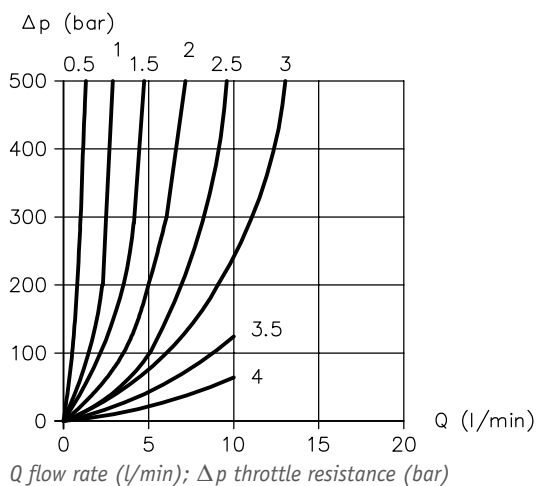
CQ. 2



CQ. 22

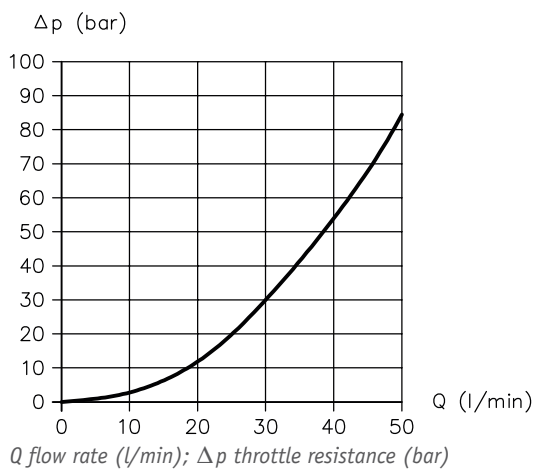


CQ. 23



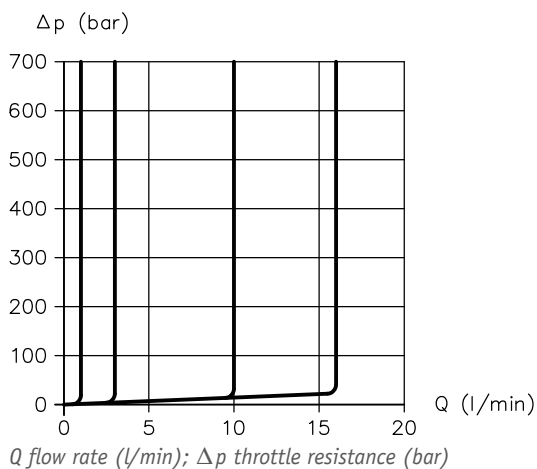
Free flow

- A → B (type CQR)
- B → A (type CQV)



CQ. 2nd -P-DW

(Flow control function)



NOTICE

Due to their design, valve types CQ, CQR and CQV cannot be closed completely without leakage.

Setting values type CQ 2. -P-DW

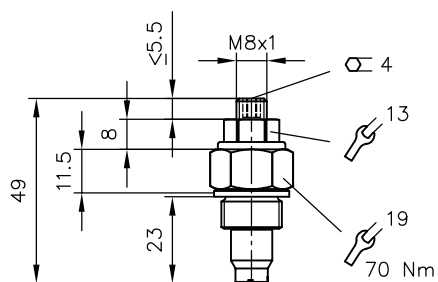
Revolution	Flow rate (l/min) Reference values		
	CQ. 2	CQ. 22	CQ. 23
0.5	0.7	0.15	0.15
1.0	2.4	0.45	0.45
1.5	3.8	0.75	0.75
2.0	5.2	1.05	0.9
2.5	7.0	1.4	1.3
3.0	9.8	2.1	1.95
3.5	15.4	4.1	3.6
4.0	29.5	29.5	5.6
4.5	29.5	29.5	8.35
open	29.5	29.5	10.3

4 Dimensions

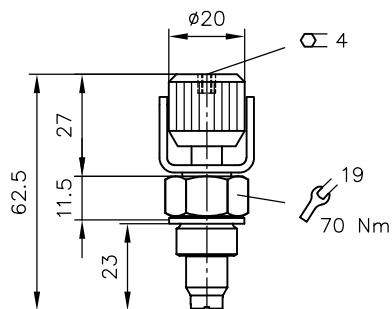
All dimensions in mm, subject to change.

4.1 Screw-in valve (Basic version)

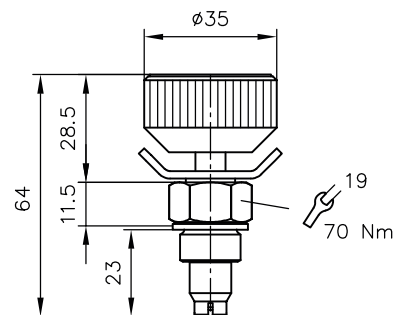
fixed



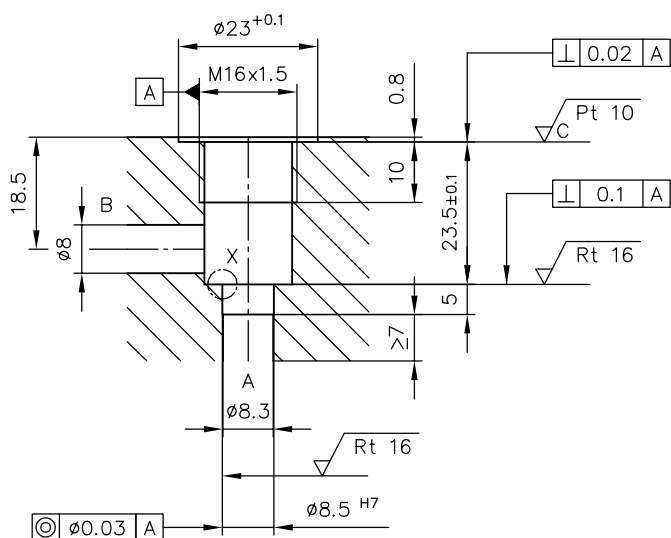
Coding **D**
(Turning knob)



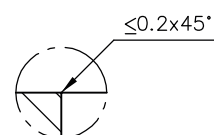
Coding **D3**
(Turning knob)



Mounting hole



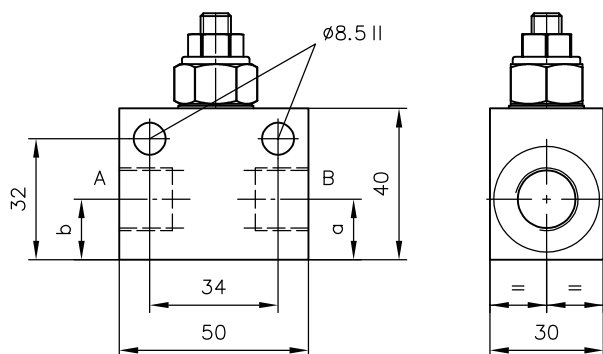
Detail X



4.2 Version with single connection block

Pipe connection

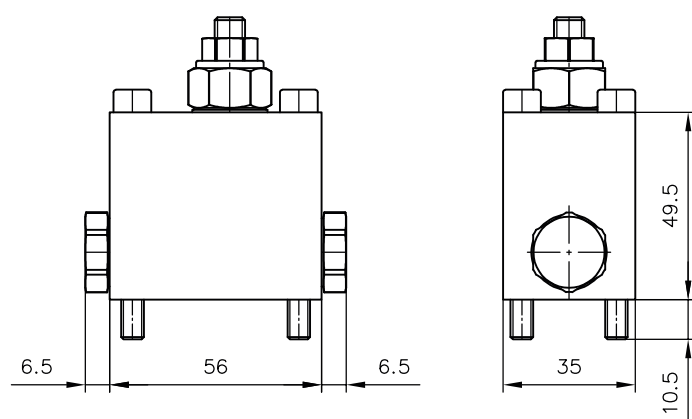
-1/4, -3/8, -3/8 JIS



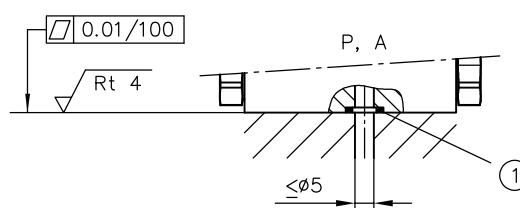
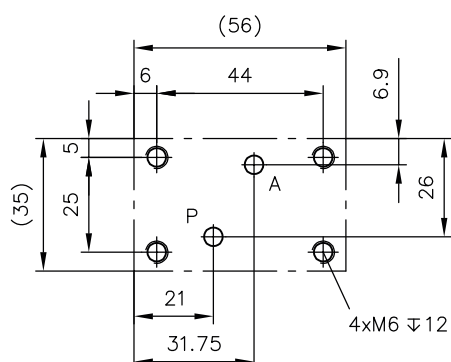
Coding	a	b	Ports
-1/4	18	15	G 1/4 (ISO 228-1)
-3/8	16	16	G 3/8 (ISO 228-1)
-3/8 JIS	16	16	G 3/8 JIS (JIS B 2351)

Manifold mounting

-P-DW



Hole pattern of the base plate

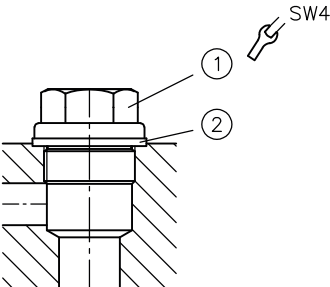


1 O-Ring 6.86x1.78 HNBR 90 Sh

4.3 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

Type	Passage open			
	Tapped plug			Sealing ring
	DIN 910	SW4	Tightening torque (Nm)	DIN 7603-Cu
	CQ ..2..	M16x1.5	17	40

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.).

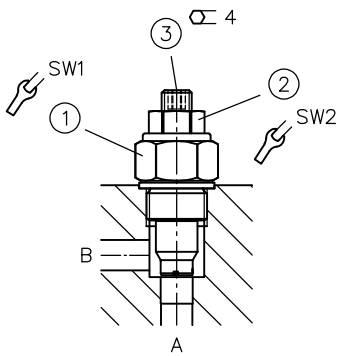
The product must be shut down correctly prior to disassembly (in particular in combination with hydraulic accumulators).

**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 the screw-in valve (basic version)



SW = Width across flats

- 1 Sealing nut
- 2 Lock nut
- 3 Adjustment spindle

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.
3. Tighten counter/sealing nut with specified torque.

Type	Lock nut		Sealing nut	
	SW2	Tightening torque (Nm)	SW1	Tightening torque (Nm)
CQ 2.				
CQR 2.	13	23 +3	19	70
CQV 2.				

5.2.2 Adjusting the throttle

The flow volume of the throttle can be adjusted by screwing in the adjustment spindle.

To adjust the throttle screw using a hex wrench, it is sufficient to loosen the lock nut slightly.

The double spindle sealing ensures leakage-free adjustment.

1. Loosen the lock nut (2) while holding the sealing nut (1) in place.
2. Adjust the throttle by screwing in the adjustment spindle (3).
3. Tighten the lock nut (2).

5.2.3 Creating the mounting hole

see Chapter 4, "Dimensions"

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.

Minor injuries. Flyaway or bursting parts 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

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 Accessories, spare and individual parts

Single connection blocks

Coding	Order coding
-1/4	7713 216
-3/8	7713 215
-3/8 JIS	7713 217

Seal

- Sealing ring DIN 7603-A8x13x1-St-ZnNi8
- Sealing ring DIN 7603-A16x20x1.5-St-ZnNi8

References

Additional versions

- Pressure valve type CMV, CMVZ, CSV and CSVZ: D 7710 MV
- Pressure-controlled shut-off valve type CNE: D 7710 NE
- Check valve type CRK, CRB and CRH: D 7712
- Flow control valve type CSJ: D 7736
- Pressure-reducing valve type CDK: D 7745
- Pressure-dependent shut-off valve type CDSV: D 7876
- Throttle valve and throttle check valve type Q, QR and QV: D 7730
- Throttle valve and throttle check valve type FG: D 7275

