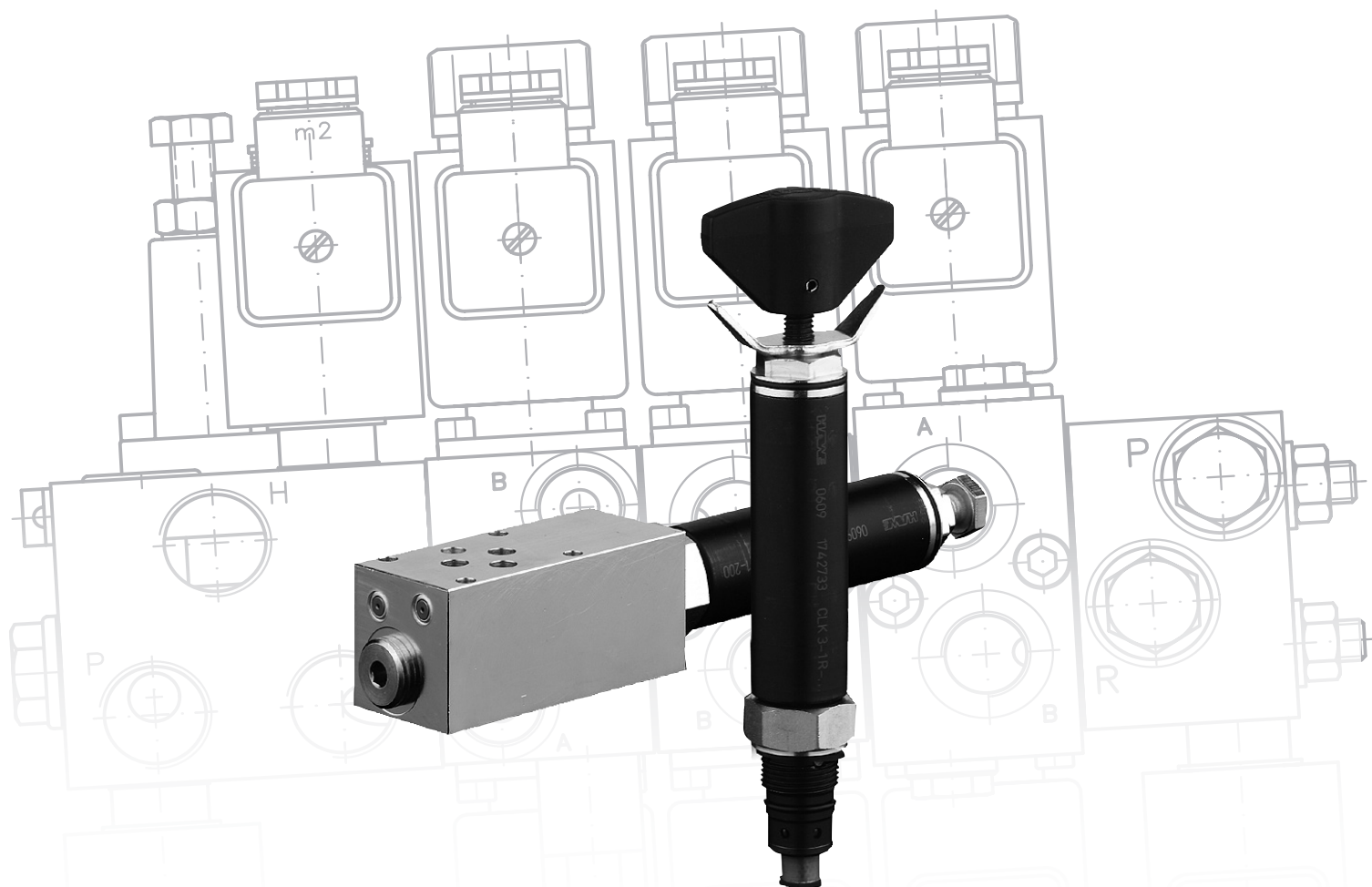
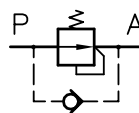


Pressure reducing valves type CDK

No leakage, directly controlled

Adjustment: With tools
Manually

$p_{\max} A$: 500 bar
 $p_{\max} P$: 500 bar
 Q_{\max} : 22 lpm



Product documentation
D 7745

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1**Overview pressure control valves type CDK**

The task of pressure reducing valves is to maintain a largely constant outlet pressure despite a higher and changing inlet pressure. These valves are used when a secondary circuit has to be fed with a lower but constant pressure level by a main (primary) oil circuit with a higher and varying pressure level. The valve described here is directly controlled. Compared with conventional, piston-type pressure reducing valves suffering from leaking oil, where an additional drain port is required, this type is designed according to the two-way principle, i.e. it has zero leakage when in a closed state. These valves can be screwed into the easily produced threaded holes.

Features and benefits:

- Zero leakage in closed state
- Version with integrated overpressure function

Intended applications:

- General hydraulic systems
- Jigs
- Test benches

Design:

- Type CDK 3 - standard version, can be used for all applications.
- Type CDK 32 - version with low pressure dependence on changing pump (inlet) pressure and for usage at low pressure settings.
- Type CDK 35 - version with low back pressure, however with higher pressure dependence on changing pump (inlet) pressures.

Version with connection blocks:

- For pipe connection (without/with pressure-limiting valve)
- For manifold mounting (without/with pressure-limiting valve)
- For manifold mounting (without/with pressure-limiting valve) with adapter plate for pipe connection



Figure 1: Basic version (cartridge valve)



Figure 2: Version with connection block for direct pipe connection

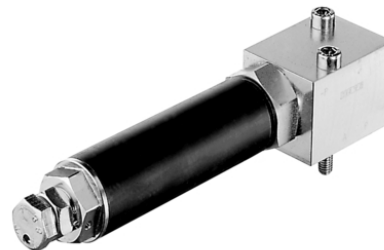
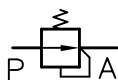


Figure 3: Version with connection block for manifold mounting

2 Versions available, main data

2.1 Basic type (cartridge valve)

Symbol:



Note

The check valve function in direction A → P is not illustrated for the sake of simplicity.

Example:

CDK 3 -2	R	-1/4	-250
			Pressure setting (bar) Pressure reducing valve ¹⁾
		Version	Table 3 Version with single connection block
		Adjustment	Table 2 Adjustment

Basic type and pressure range Table 1 Basic version

Table 1 Basic version

Basic type	Flow Q_{max} (lpm)	Pressure range p_A from ... to (bar)							
		-08	-081	-1	-11	-2	-21	-5	-51
CDK 3	12	50 ... 450	50 ... 500	30 ... 300	30 ... 380	20 ... 200	20 ... 250	15 ... 130	15 ... 165
CDK 32	6	30 ... 450	30 ... 500	18 ... 300	18 ... 380	12 ... 200	12 ... 250	8 ... 130	8 ... 165
CDK 35	22	110 ... 450	110 ... 500	70 ... 300	70 ... 380	50 ... 200	50 ... 250	30 ... 130	30 ... 165

Table 2 Adjustment

Coding	Description	Symbol
No designation	Tool adjustable	
R	Manually adjustable, with lock nut	
V	Turn knob, self-locking	
H	Turn knob, lockable	

¹⁾ If no desired pressure specification is indicated, the valve will be set at HAWE to the max. pressure of the respective pressure range

2.2 Version with connection block for pipe connection

Example:

CDK 3 -5 R	-1/4 -DG 365	-100	
CDK 35 -2	-1/4 SR	-200	/250

Pressure specification (bar) Pressure limiting valve


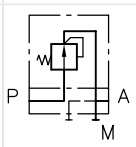
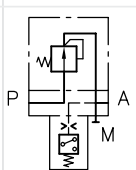
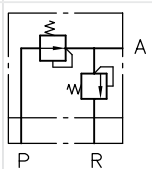
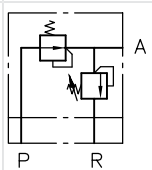
Pressure specification (bar) Pressure reducing valve (table 1 Basic version), see [Chapter 2.1, "Basic type \(cartridge valve\)"](#)

Version with pressure switch/pressure-limiting valve Table 3 Versions with single connection block, Table 4 Versions with pressure switch

Basic type and pressure range Table 1 Basic version, see [Chapter 2.1, "Basic type \(cartridge valve\)"](#)

Table 3 Designs with single connection block

Table 4 Versions with pressure switch

Coding	Description	Symbol
No designation	Screw-in valve	
..-1/4	For pipe connection	
..-1/4 - DG..	As 1/4, with additional pressure switch in the consumer line	
..-1/4 S	As 1/4, with additional pressure limiting valve, tool adjustable	
..-1/4 SR	As 1/4, with additional pressure limiting valve, manually adjustable, with lock nut	

Coding	
- DG 33	200 ... 700
- DG 34	100 ... 400
- DG 35	40 ... 210
- DG 36	4 ... 12
- DG 364	4 ... 50
- DG 365	12 ... 170

2.3 Version with connection block for manifold mounting

CDK 35 -5 R -SP -100 /300 - 1/4

Adapter plate For direct pipe connection

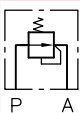
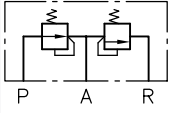
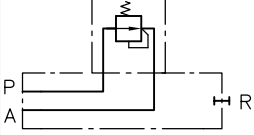
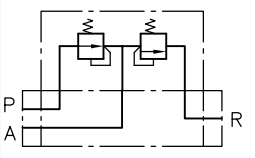
Pressure specification (bar) For the pressure limiting valve

Pressure specification (bar) Table 1 Basic version, see [Chapter 2.1, "Basic type \(cartridge valve\)"](#)

Connection block Table 5 Version with connection block

Basic type and pressure range Table 1 Basic version, see [Chapter 2.1, "Basic type \(cartridge valve\)"](#)

Table 5 Version with connection block

Coding	Description	Symbol
P	For manifold mounting	
SP	For manifold mounting, additionally with pressure-limiting valve, permanently set, tool adjustable	
P-...-1/4	Identical to P, with adapter plate for pipe connection	
SP-...-1/4	Identical to SP, with adapter plate for pipe connection	

3.1 General

Description	Directly controlled 2-way pressure control valve		
Design	Ball seated valve		
Model	Screw-in valve, valve for pipe connection, valve for manifold mounting		
Material	Steel; nitrided valve housing, electrogalvanised sealing nuts and connection block, hardened and ground functional inner parts Balls made of rolling bearing steel		
Tightening torques	See Chapter 4, "Dimensions"		
Installation position	As desired		
Connections	<ul style="list-style-type: none"> ■ P = inlet (pump or primary side) ■ A = consumer (secondary side) ■ M = pressure gauge connection ■ R = tank connection <p>Coding applies to circuit diagrams and assembly plans only. The coding is not stamped onto the valve housing. The ports are stamped on the versions for pipe connection and versions for manifold mounting. The coding can be found in the schematic overviews or the dimension diagrams in Chapter 4, "Dimensions".</p>		
Flow direction	<p>P→A: Pressure reducing function A→P: Only possible if the pressure on the pump side is less than the consumer pressure.</p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p>i Note</p> <p>A by-pass check valve is recommended if the flow A→P exaggerates the specification for $Q_{P \rightarrow A \text{ max}}$ or pressure peaks or pulsation are anticipated.</p> </div>		
Hydraulic fluid	<p>Hydraulic oil conforming DIN 51 524 part 1 to 3; ISO VG 10 to 68 conforming DIN 51 519 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 (Poly-alkylenglycol) and HEES (Synth. Ester) at service temperatures up to approx. +70°C.</p>		
Purity class	ISO 4406 21/18/15...19/17/13	NAS 1638 12 ... 8	SAE T 490 ≥ 6
Temperatures	<p>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.</p>		

Pressure and flow

Operating pressure

- $p_{P \max}$ on the pump side = 500 bar
- For $p_{A \max}$ on the consumer side, see table for basic version in [Chapter 2, "Versions available, main data"](#)
- Return $p_R \leq 20$ bar

Static overload capacity

Approx. $2 \times p_{\max}$ - tightened and sealing nuts locked

Pressure dependence

The pressure ratio as designed causes a slight change to the actual pressure p_A in conjunction with a variable pump pressure p_P .

Basic type	Pressure range				
	-08 -081	-1 -11	-2 -21	-5 -51	
CDK 3	± 1.3 bar	± 0.9 bar	± 0.6 bar	± 0.4 bar	$p_P \pm 10$ bar results in a pressure change for A of p_A
CDK 32	± 0.7 bar	± 0.45 bar	± 0.3 bar	± 0.23 bar	
CDK 35	± 2.7 bar	± 1.7 bar	± 1.2 bar	± 0.8 bar	

Flow

$Q_{P \rightarrow A \max}$	= 6 lpm	(CDK 32)
	= 12 lpm	(CDK 3)
	= 22 lpm	(CDK 35)
$Q_{A \rightarrow P \max}$	= 25 lpm	See information in Chapter 3, "Parameters"

Characteristics

Viscosity during measurements
approx. 60 mm²/s
 $p_A - Q_{P \rightarrow A}$ - characteristics

The setting applies if $Q_{P \rightarrow A} \rightarrow 0$ lpm. If $Q > 0$, i.e. the connected consumer is moving, the secondary pressure p_A drops slightly.
The pressure p_A is set according to the information in the order at $p_p \approx 1.1 p_A$.



Caution

Risk of injury on overloading components due to incorrect pressure settings!

- Always monitor the pressure gauge when setting or changing the pressure.

Type CDK

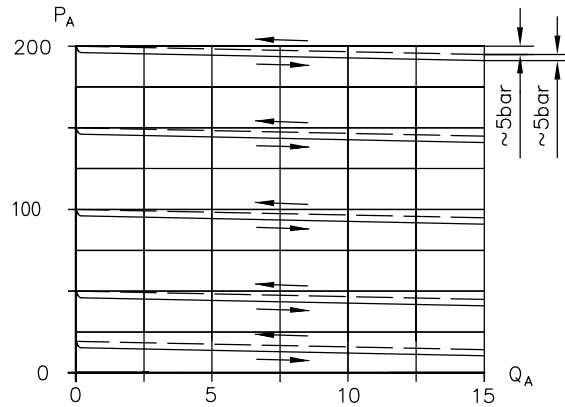


Figure 4: Q_A flow (lpm), p_A outlet pressure (bar)

$\Delta p - Q$ characteristics $P \rightarrow A$ or $A \rightarrow P$

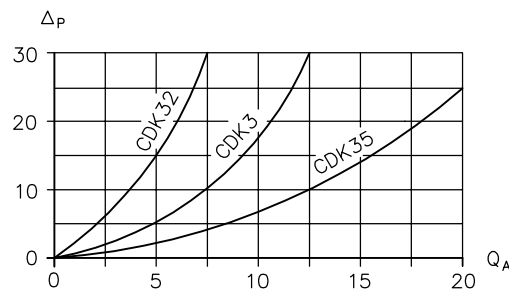


Figure 5: Q_A flow (lpm); Δp back pressure (bar)



Note

For this purpose, please also observe the additional information under the point "Flow direction".

Mass**Basic version (cartridge valve)**

Type CDK.. = 0.7 kg

Version with single connection block

Type CDK..

- 1/4 = 1.3 kg

- 1/4 - DG.. = 1.6 kg

- 1/4 S(SR) = 1.6 kg

- P = 1.1 kg

- SP = 1.6 kg

- SP-../..-1/4 = 2.0 kg

All dimensions in mm, subject to change!

4.1 Dimensions - Basic type (cartridge valve)

Type CDK 3..

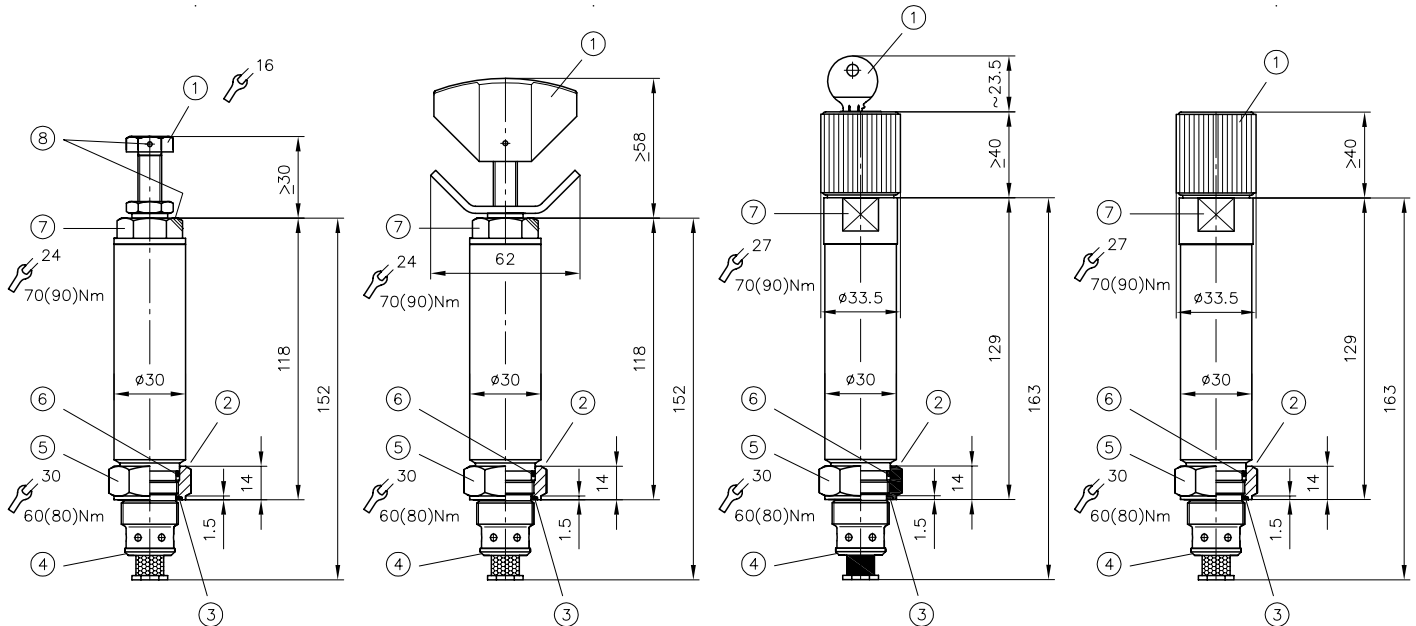


Figure 6: Without coding, tool adjustable

Figure 7: Coded R, manually adjustable

Figure 8: Coded H, lockable

Figure 9: Coded V, self-locking

- | | | | |
|--|---|---|---|
| 1 Screw with lock nut | 1 Turn knob | 1 Key (not included) | 1 Turn knob |
| 2 Stopper | 2 Stopper | 2 Stopper | 2 Stopper |
| 3 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52 x 26.88 x 1.68 | 3 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52 x 26.88 x 1.68 | 3 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52 x 26.88 x 1.68 | 3 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52 x 26.88 x 1.68 |
| 4 Sealing edge | 4 Sealing edge | 4 Sealing edge | 4 Sealing edge |
| 5 Sealing nut ¹⁾ | 5 Sealing nut ¹⁾ | 5 Sealing nut ¹⁾ | 5 Sealing nut ¹⁾ |
| 6 O-ring 21.95 x 1.78 (21.89 x 2.62) ¹⁾ AU 90 S | 6 O-ring 21.95x1.78 (21.89x2.62) ¹⁾ AU 90 Sh | 6 O-ring 21.95x1.78 (21.89x2.62) ¹⁾ AU 90 Sh | 6 O-ring 21.95x1.78 (21.89x2.62) ¹⁾ AU 90 Sh |
| 7 Valve housing ¹⁾ | 7 Valve housing ¹⁾ | 7 Valve housing ¹⁾ | 7 Valve housing ¹⁾ |
| 8 Sealing option | | | |



Note

For this purpose, please also observe the information on threads and on producing requirements in the section on assembly information.

¹⁾ Values in brackets apply to pressure ranges of type CDK 3..-08(-081)

4.2 Mounting hole

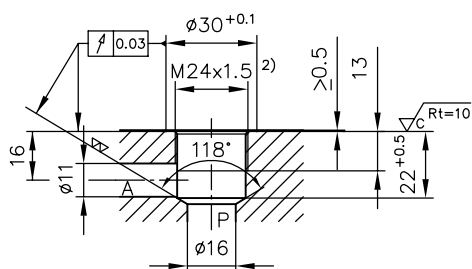


Figure 10: Mounting hole Type CDK

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.

The stepped shoulder is depicted with the normal 118° drill sharpening angle for steel.

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. Additionally the passage between port A and T is sealed at the screw-in port and the internal piston.

Counterbore $0.5^{+0.2}$ (max. $\varnothing 30^{+0.1}$), exclusively required for pressures at A in excess of 100 bar .

4.3 Dimensions - Version with connection block for pipe connection

Type CDK 3..- 1/4

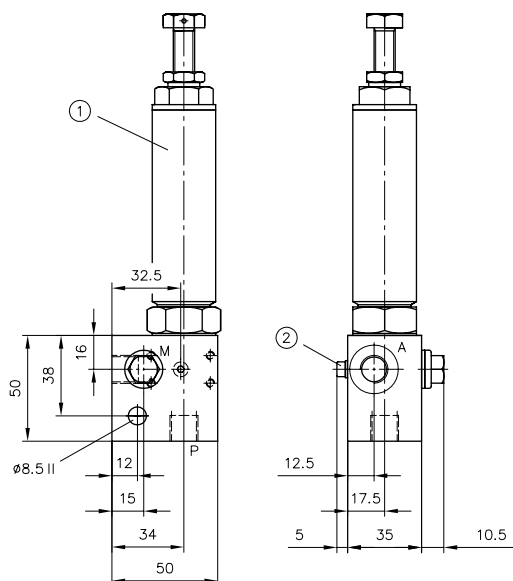


Figure 11: with pipe connection

- 1 Basic type (screw-in valve in accordance with section 4.1)
- 2 Without DG 3.. (can be retrofitted here)

Type CDK 3..- 1/4 - DG..

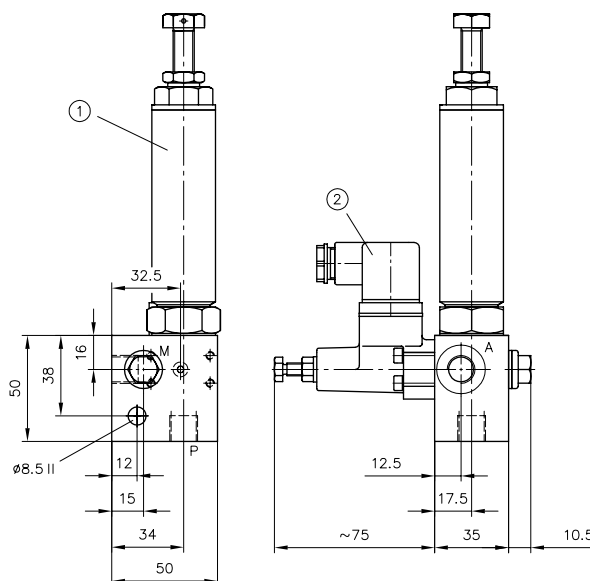


Figure 12: with pressure switch, tool adjustable

- 1 Basic type (screw-in valve in accordance with section 4.1)
- 2 Pressure switch DG 3.. in accordance with D 5440

Type CDK ...- 1/4 S

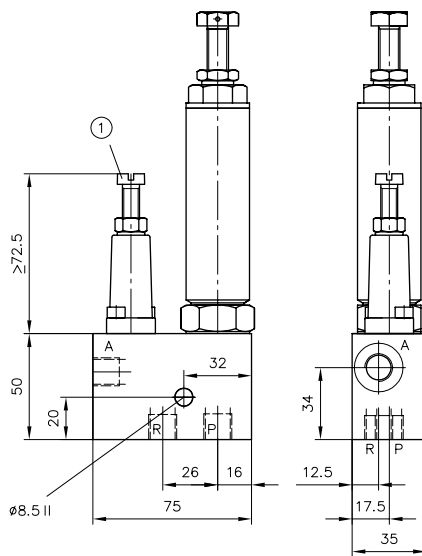


Figure 13: with pressure limiting valve, tool adjustable

- 1 Pressure-limiting valve, tool adjustable

Ports acc. to ISO 228/1 (BSPP): A, P, R and M = G 1/4

Type CDK 3...- 1/4 SR

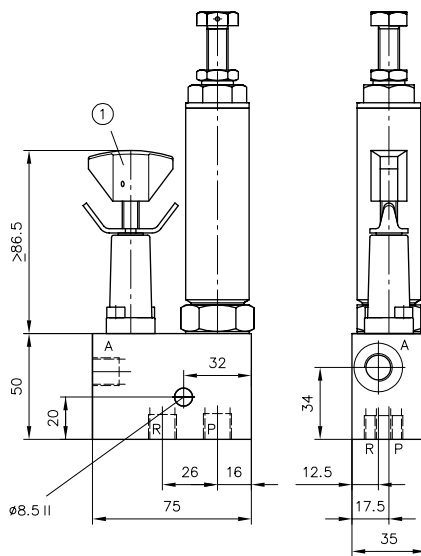


Figure 14: with pressure limiting valve, manually adjustable

- 1 Pressure-limiting valve, manually adjustable

4.4 Dimensions - Version with connection block for manifold mounting

Type CDK 3 ...- P

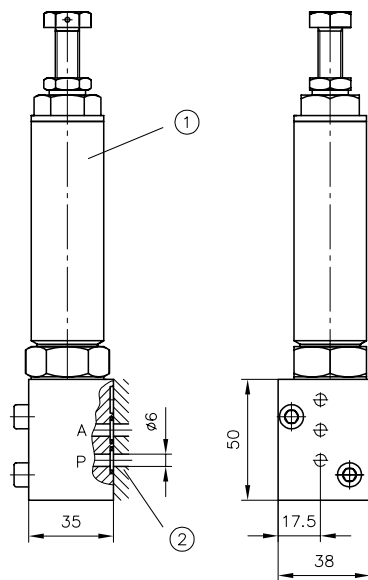


Figure 15: for manifold mounting

- 1 Basic type (screw-in valve in accordance with sec. 4.1)
2 Sealing with O-rings 7.65 x 1.78 NBR 90 Sh

Type CDK 3 ...- SP

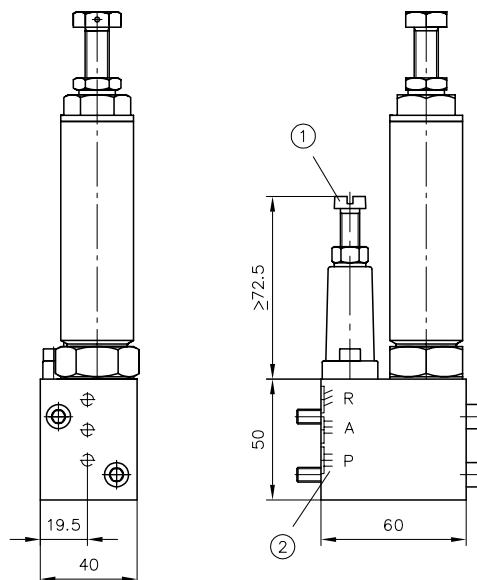


Figure 16: with pressure limiting valve, tool adjustable

- 1 Pressure-limiting valve
2 Connection block

For this purpose, please observe the hole pattern in [Chapter 4.5, "Base plate hole pattern"](#).

Type CDK 3 (32, 35) - .. - P - ../.. - 1/4

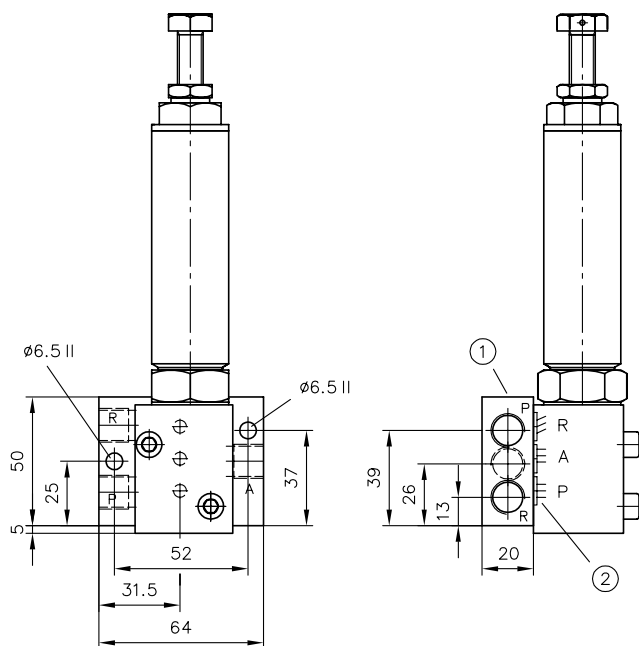


Figure 17: with adapter plate

- 1 Adapter plate (connection block for pipe connection)
- 2 Sealing with O-rings 7.65 x 1.78 NBR 90 Sh

Type CDK 3 (32, 35) - .. - SP - ../.. - 1/4

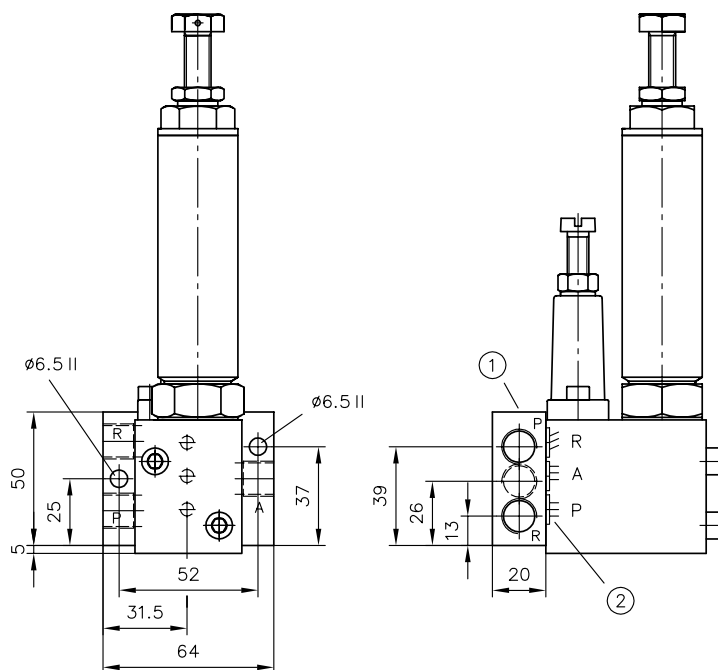


Figure 18: with adapter plate and pressure limiting valve, tool adjustable

- 1 Adapter plate (connection block for pipe connection)
- 2 Sealing with O-rings 7.65 x 1.78 NBR 90 Sh

Ports acc. to ISO 228/1 (BSPP): A, P, and R = G 1/4

4.5 Base plate hole pattern

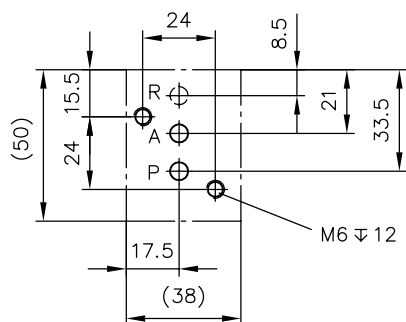


Figure 19: Hole pattern type ADM 11 P

The hole pattern corresponds to type ADM 11 P in accordance with D 7120. The O-ring counterbore for the drain port R (or L) is present, but is only required on the type CDK..-SP.

4.6 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 de-pending on application.

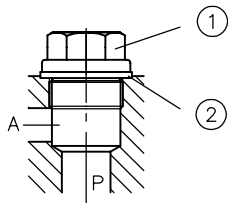


Figure 20: Passage open

- 1 Tapped plug M 24x1.5 DIN 910
- 2 O-ring A 25x30x2 DIN 7603-Cu

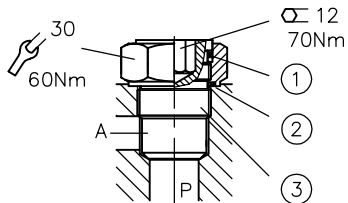


Figure 21: Passage closed

- 1 O-ring 21.95x1.78 AU 90 Sh
- 2 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52 x 26.88 x 1.68
- 3 Tapped plug and locking tapped plug complete order no.. 7710 029

5**Installation, operation and maintenance information****5.1 Designated use**

This fluid-power product has been designed, manufactured and tested using standards and regulations generally applicable in the European Union and left the plant in a safe and fault-free condition.

To maintain this condition and ensure safe operation, operators must observe the information and warnings in this documentation.

This fluid-power product must be installed and integrated in a hydraulic system by a qualified specialist who is familiar with and adheres to general engineering principles and relevant applicable regulations and standards.

In addition, application-specific features of the system or installation location must be taken into account if relevant.

This product may only be used as a pressure control valve within oil-hydraulic systems.

The product must be operated within the specified technical parameters. This documentation contains the technical parameters for various product versions.

**Note**

Non-compliance will void any warranty claims made against HAWES Hydraulik.

5.2 Assembly information

The hydraulic system must be integrated in the equipment with standard connection components that comply with market requirements (screw fittings, hoses, pipes, etc.). The hydraulic system must be shut down as a precautionary measure prior to dismounting; this applies in particular to systems with hydrostatic accumulators.

5.2.1 Screw in basic type (cartridge valve)

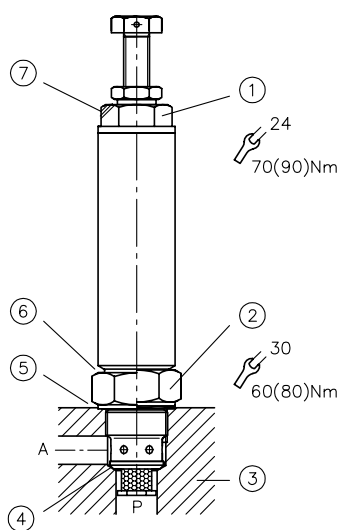


Figure 22: Valve body type CDK

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

1. Before screwing in the valve body loosen the counter/sealing nut until the travel stop.
2. Screw in the valve body and tighten with the specified torque. The metallic sealing of the inlet to the outlet is formed between the facial sealing edge of the valve body and the shoulder of the stepped hole in the manifold.
3. Tighten counter/sealing nut with specified torque.

5.2.2 Adjusting pressure

If no desired pressure specification is indicated, the valve will be set at HAWE to the max. pressure of the respective pressure range.

Reference values for pressure adjustment

Pressure adjustment Pressure limiting valve		Pressure adjustment Pressure limiting valve		Pressure adjustment Pressure limiting valve	
Coding	Δp /revolution (bar/rev)	Coding	Δp /revolution (bar/rev)	Pressure range (bar)	Δp /revolution (bar/rev)
08	37	081	46	... 500	100
1	25	11	31	... 315	55
2	16	21	20	... 160	19
5	10	51	12	... 80	9.5



Caution

Risk of injury on overloading components due to incorrect pressure settings!

- Always monitor the pressure gauge when setting or changing the pressure.

¹⁾ Values in brackets apply to pressure ranges of type CDK 3.-08 (-81)

5.2.3 Creating the mounting hole

See description in [Chapter 4.2, "Mounting hole"](#).

5.2.4 Making base plate

The hole pattern corresponds to type ADM 11 P in accordance with D 7120. The O-ring counterbore for the drain port R (or L) is present, but is only required on the type CDK..-SP.

See hole pattern in [Chapter 4.5, "Base plate hole pattern"](#)

5.3 Operating instructions

Product, pressure and/or flow settings

All statements in this documentation must be observed for all product, pressure and/or flow settings on or in the hydraulic system.



Caution

Risk of injury on overloading components due to incorrect pressure settings!

- Always monitor the pressure gauge when setting or changing the pressure.

Filtering and purity of the hydraulic fluid

Soiling in the fine range, e.g. abraded material and dust, or in the macro range, e.g. chips, rubber particles from hoses and seals, can cause significant malfunctions in a hydraulic system. It is also to be noted that new hydraulic fluid "from the drum" does not necessarily meet the highest purity requirements.

For trouble-free operation pay attention to the purity of the hydraulic fluid (see also purity class in [Chapter 3, "Parameters"](#)).

5.4 Maintenance information

This product is largely maintenance-free.

Check that the product is securely fastened in the mounting hole at regular intervals, but at least once per year.

Conduct a visual inspection to check the hydraulic connections for damage at regular intervals, but at least once per year. If external leaks are found, shut down and repair the system.

Check the device surfaces for dust deposits at regular intervals (but at least once per year) and clean the device if required.

6 Other information

6.1 Planning information

Due to the leak-free sealing in the closed state, on usage in control circuits with long pressure retention times without switching processes (e.g. with separate pallet clamping) pressure changes may occur under certain circumstances. Pressure increases can occur, for instance, on temperature rises (e.g. sunlight) or the additional action of external loads, pressure drops (with pump switched off) due to temperature drops (cooling at night) or load removal.

These effects are particularly noticeable with short, rigid pipe connections. Hoses and additional volume (e.g. AC 13 miniature accumulator in accordance with [D 7571](#)) help to compensate such (negative) pressure fluctuations.

The ratio of thermal expansion coefficient to coefficient of compressibility (theoretically 1:10, i.e. $\Delta T = 1K \rightarrow \Delta p \approx 10 \text{ bar}$) is based on the fact described above. As consumers, pipes and hoses will yield in reality (based on experience) a ratio of approx. 1:1 can be assumed.

6.2 Application examples

Example of a version
with large flows $Q_{A \rightarrow P}$
Example: $Q_P = 15 \text{ lpm}$ [formula]

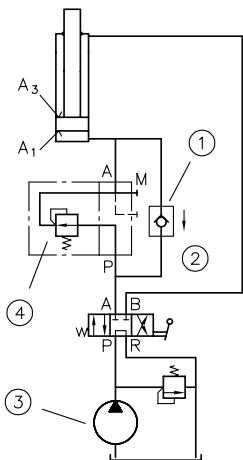


Figure 23: Application example for large flows

- 1 e.g. type RK 2G in acc. with D 7445
- 2 $Q_{\text{return}} = 45 \text{ lpm}$
- 3 $Q_P = 15 \text{ lpm}$
- 4 Type CDK 3-2-1/4

Example of a version
with undesired return flow

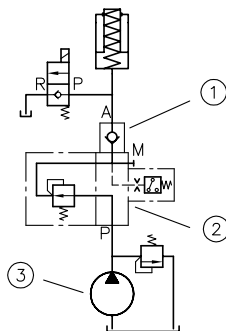


Figure 24: Application example for undesired return flow

- 1 e.g. type RK 1E in acc. with D 7445 (shown here screwed into port A of the CDK 3 valve)
- 2 Type CDK 3- 2-1/4-DG 34

Use in the valve bank,
shown here with seated valves type BVZP 1
in acc. with D 7785 B
BVZP 1 A - 1/300 - G22/0
- G22/CZ2/100/4/2
- WN1H/10/4
- 1 - 1 - G 24

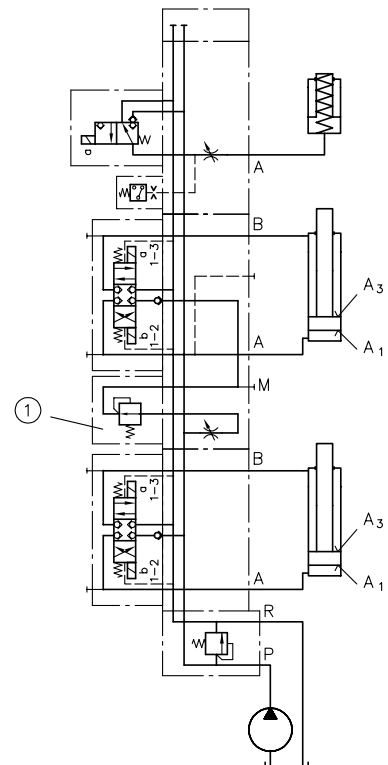


Figure 25: Application example in the valve bank

- 1 Type CDK 3-2-100 shown here incorporated as -/CZ 2/100...

Additional versions

- [Pressure reducing valve, type CLK: D 7745 L](#)
- [2-way pressure reducing valves type DK: D 7941](#)
- [Pressure valves type CMV, CMVZ and CSV, CSVZ: D 7710 MV](#)
- [Pressure controlled the 2-way directional valve type CNE: D 7710 NE](#)
- [Throttle and shut-off valves type CAV: D 7711](#)
- [Shut-off valve cartridges, type CRK, CRB and CRH: D 7712](#)
- [Pressure-dependent shut-off valve type CDSV: D 7876](#)
- [Throttle and restrictor check valves type CQ, CQR, and CQV: D 7713](#)
- [2-way pressure reducing valves type DK: D 7941](#)
- [Two-way flow valves, type SB: D 6920](#)

Utilized at

- [Directional seated valve banks, types VB 01 .. to VB 41 ...: D 7302](#)
- [Directional seated and directional spool valve banks, types BWN 1 and BWH 1: D 7470 B/1](#)
- [Directional seated valve banks, type BVZP 1: D 7785 B](#)
- [Valve bank type BA: D 7788](#)
- [Valve bank type BVH: D 7788 BV](#)
- [Intermediate plate type NZP hole pattern conforming NG 6 \(DIN 24 340-A6\): D 7788 Z](#)

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