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# 1 Overview pressure control valve type CDK

Pressure reducing valves are a type of pressure control valve. They maintain a largely constant outlet pressure even at a higher and changing inlet pressure.

The valve type CDK can be screwed in and can be integrated into control blocks. The necessary mounting holes are straightforward to make. All versions have zero leakage when in the closed state.

## Features and benefits:

- Zero leakage in closed state

## 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 flow resistance, 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 Available versions, main data

### 2.1 Basic type (cartridge valve)

Symbol:



**Note**

Flow direction A → P not shown, see item "Flow direction" in [Chapter 3.1, "General"](#)

Order coding example:

CDK 3 -2	R	-1/4	-250
			Pressure setting (bar) Pressure reducing valve <sup>1)</sup>
	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	
H	Turn knob, lockable	

<sup>1)</sup> 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 single connection block for pipe connection

Example:

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

Pressure specification (bar) Pressure limiting valve


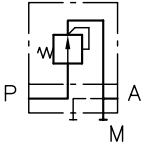
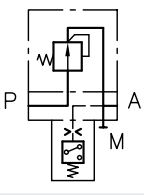
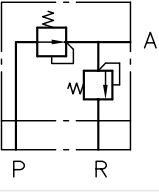
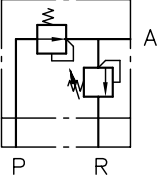
Pressure specification (bar) Pressure reducing valve (table 1 Basic version), see [Chapter 2.1, "Basic type \(cartridge valve\)"](#)

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 single connection block for manifold mounting

Order coding example:

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

**Adapter plate** For direct pipe connection


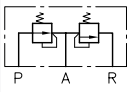
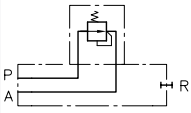
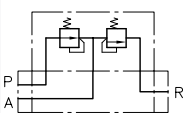
**Pressure specification (bar)** For the pressure limiting valve

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

**Single connection block** Table 5 Version with single connection block

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

**Table 5 Version with single 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 Parameters

### 3.1 General

<b>Description</b>	<b>Directly controlled 2-way pressure reducing valve</b>
<b>Design</b>	Ball seated valve
<b>Model</b>	Screw-in valve, valve for pipe connection, valve for manifold mounting
<b>Material</b>	Steel; nitrided valve housing, electrogalvanised sealing nuts and connection block, hardened and ground functional inner parts Balls made of rolling bearing steel
<b>Tightening torques</b>	See <a href="#">Chapter 4, "Dimensions"</a>
<b>Installation position</b>	As desired
<b>Connections</b>	<ul style="list-style-type: none"> <li>▪ P = inlet (pump or primary side)</li> <li>▪ A = consumer (secondary side)</li> <li>▪ M = pressure gauge connection</li> <li>▪ R = tank connection</li> </ul> <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 <a href="#">Chapter 4, "Dimensions"</a>.</p>
<b>Flow direction</b>	<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 gray; padding: 5px; margin-top: 10px;"> <p><b>Note</b></p> <p>A by-pass check valve is recommended if the flow A→P exaggerates the specification for <math>Q_{P \rightarrow A \max}</math> or pressure peaks or pulsation are anticipated.</p> </div>
<b>Hydraulic fluid</b>	<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 mm<sup>2</sup>/s opt. operation approx. 10... 500 mm<sup>2</sup>/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>
<b>Purity class</b>	<p><b>ISO 4406</b></p> <hr style="width: 50%; margin-left: 0;"/> <p>21/18/15...19/17/13</p>
<b>Temperatures</b>	<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, "Available versions, main data"](#)
- Return  $p_R \leq 20$  bar

### Static overload nominal volume

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	$\pm 1.3$ bar	$\pm 0.9$ bar	$\pm 0.6$ bar	$\pm 0.4$ bar	$p_P \pm 10$ bar results in a pressure change for A of $p_A$
CDK 32	$\pm 0.7$ bar	$\pm 0.45$ bar	$\pm 0.3$ bar	$\pm 0.23$ bar	
CDK 35	$\pm 2.7$ bar	$\pm 1.7$ bar	$\pm 1.2$ bar	$\pm 0.8$ 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 <a href="#">Chapter 3, "Parameters"</a>

**Characteristics**

**Viscosity during measurements**  
approx. 60 mm<sup>2</sup>/s  
**p<sub>A</sub> - Q<sub>P→A</sub> - characteristics**

The setting applies if Q<sub>P→A</sub> → 0 lpm. If Q > 0, i.e. the connected consumer is moving, the secondary pressure p<sub>A</sub> drops slightly. The pressure p<sub>A</sub> is set according to the information in the order at p<sub>p</sub> ≈ 1.1 p<sub>A</sub>.



**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

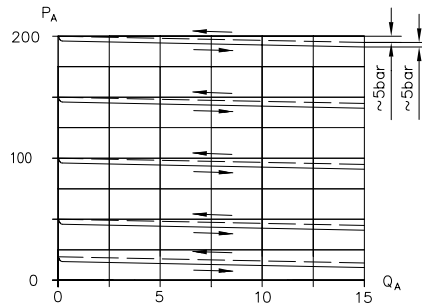


Figure 4: Q<sub>A</sub> flow (lpm), p<sub>A</sub> outlet pressure (bar)

**Δp - Q characteristics P→A or A→P**

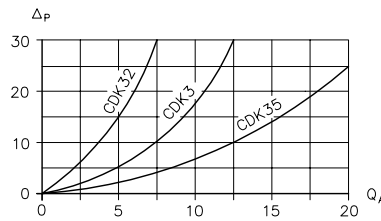


Figure 5: Q<sub>A</sub> flow (lpm); Δp flow resistance (bar)



**Note**

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

**Weight**

**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

## 4 Dimensions

All dimensions in mm, subject to change!

### 4.1 Dimensions - Basic type (cartridge valve)

#### Type CDK 3..

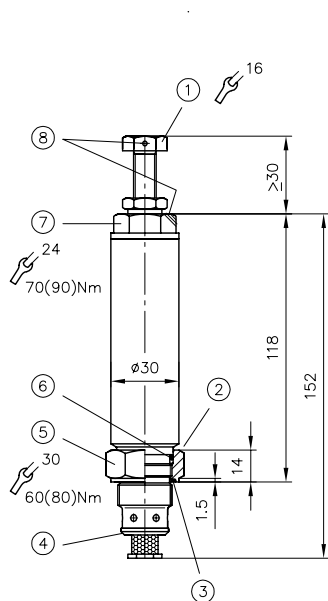


Figure 6: Without coding, tool adjustable

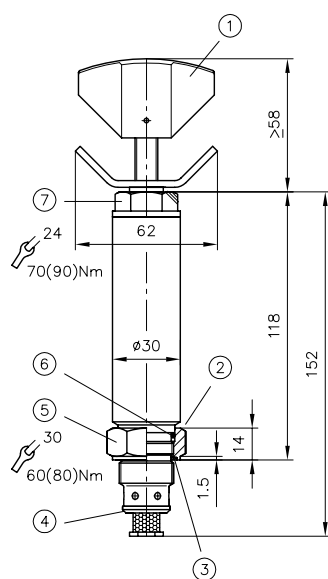


Figure 7: Coded R, manually adjustable

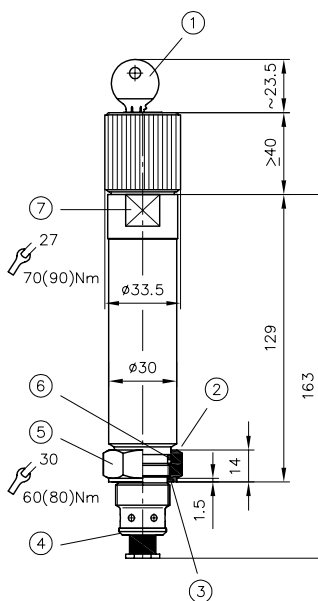


Figure 8: Coded H, lockable

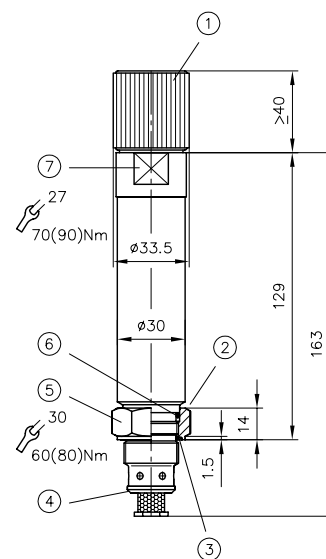


Figure 9: Coded V, self-locking

- 1 Screw with lock nut
- 2 Stopper
- 3 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52 x 26.88 x 1.68
- 4 Sealing edge
- 5 Sealing nut <sup>1)</sup>
- 6 O-ring 21.95 x 1.78 (21.89 x 2.62) <sup>1)</sup> AU 90 S
- 7 Valve housing <sup>1)</sup>
- 8 Sealing option

- 1 Turn knob
- 2 Stopper
- 3 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52 x 26.88 x 1.68
- 4 Sealing edge
- 5 Sealing nut <sup>1)</sup>
- 6 O-ring 21.95x1.78 (21.89x2.62) <sup>1)</sup> AU 90 Sh
- 7 Valve housing <sup>1)</sup>

- 1 Key (not included)
- 2 Stopper
- 3 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52 x 26.88 x 1.68
- 4 Sealing edge
- 5 Sealing nut <sup>1)</sup>
- 6 O-ring 21.95x1.78 (21.89x2.62) <sup>1)</sup> AU 90 Sh
- 7 Valve housing <sup>1)</sup>

- 1 Turn knob
- 2 Stopper
- 3 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52 x 26.88 x 1.68
- 4 Sealing edge
- 5 Sealing nut <sup>1)</sup>
- 6 O-ring 21.95x1.78 (21.89x2.62) <sup>1)</sup> AU 90 Sh
- 7 Valve housing <sup>1)</sup>

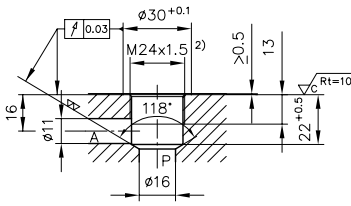


#### Note

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

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

## 4.2 Mounting hole



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**

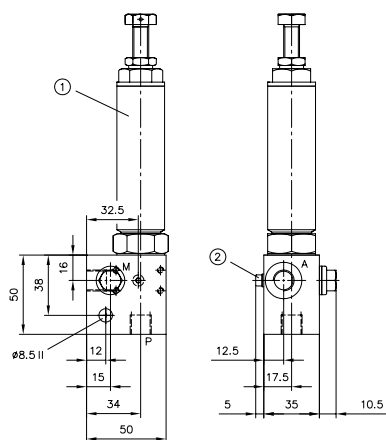


Figure 10: with pipe connection

- 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..**

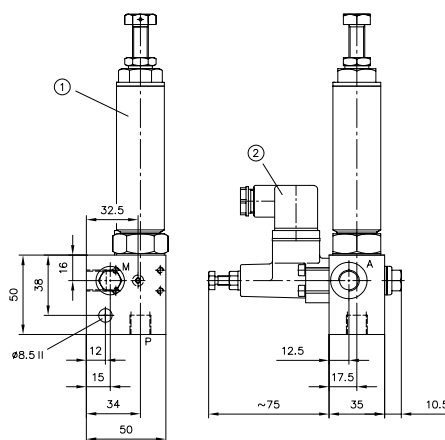


Figure 11: with pressure switch, tool adjustable

- 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**

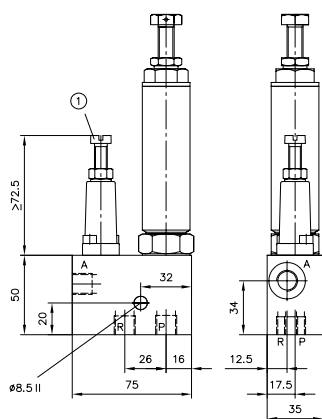


Figure 12: with pressure limiting valve, tool adjustable

- 1 Pressure-limiting valve, tool adjustable

**Type CDK 3..- 1/4 SR**

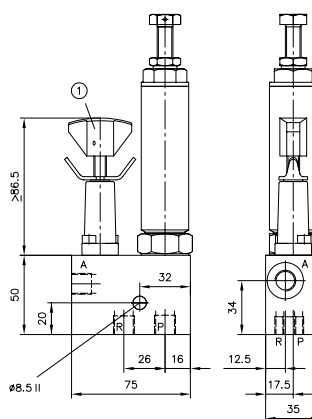


Figure 13: with pressure limiting valve, manually adjustable

- 1 Pressure-limiting valve, manually adjustable

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

## 4.4 Dimensions - Version with connection block for manifold mounting

Type CDK 3 -.- P

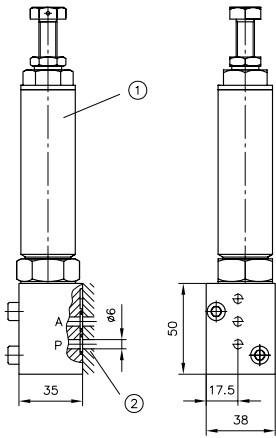


Figure 14: for manifold mounting

- 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

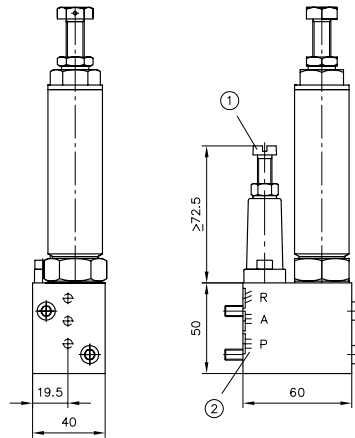


Figure 15: with pressure limiting valve, tool adjustable

- 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

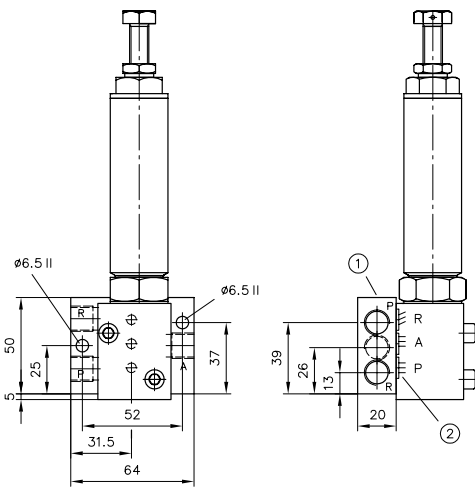


Figure 16: with adapter plate

- 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

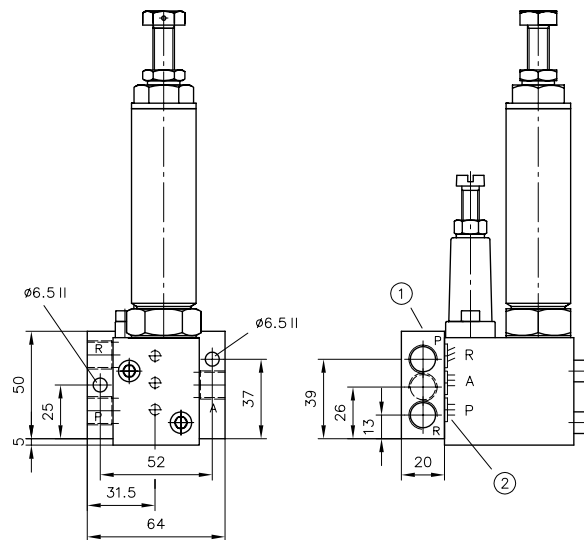


Figure 17: with adapter plate and pressure limiting valve, tool adjustable

- 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

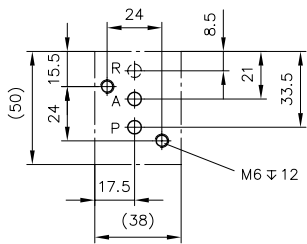


Figure 18: Hole pattern type ADM 11 P

The hole pattern corresponds to type ADM 11 P in accordance with D 7120. The Sealing 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.

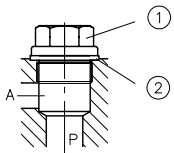


Figure 19: Passage open

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

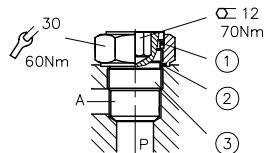


Figure 20: Passage closed

- 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 acc. to 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 staff who is familiar with and observes the 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 reducing valve within oil-hydraulic systems.

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



#### Note

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

### 5.2 Assembly information

The hydraulic accumulator must be integrated in the system via state of the art connection components (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 hydraulic accumulators.

#### 5.2.1 Screw in basic type (cartridge valve)

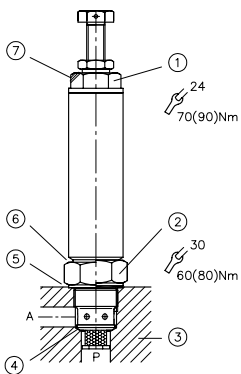


Figure 21: Valve body type CDK

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.
- ✓ Valve screwed in

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

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



## 5.2.2 Adjusting pressure

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

Reference values for pressure adjustment

Pressude adjustment Pressure limiting valve		Pressude adjustment Pressure limiting valve		Pressure adjustment Pressure limiting valve	
Coding	$\Delta p$ /revolution (bar/rev)	Coding	$\Delta p$ /revolution (bar/rev)	Pressure range (bar)	$\Delta p$ /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.

## 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 Sealing 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 remedy.

Check the device surfaces for dust deposits at regular intervals (but at least annually) 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]

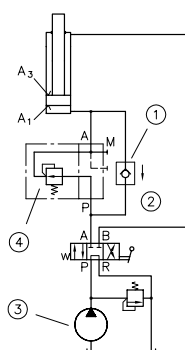


Figure 22: Application example for large flows

- 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 reflux

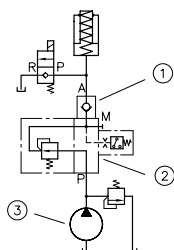


Figure 23: Application example for undesired reflux

- 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

BVZP 1 A - 1/300 - G22/0  
- G22/CZ2/100/4/2  
- WN1H/10/4  
- 1 - 1 - G 24

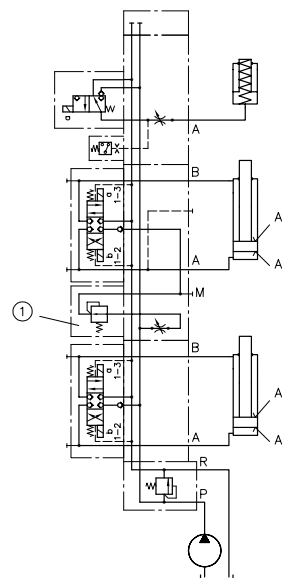


Figure 24: Application example in the valve bank

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

## Additional versions and use

### Additional versions

- Pressure-reducing valve type CLK: D 7745 L
- Pressure-reducing valve type DK, DZ and DLZ: D 7941
- Pressure valve type CMV, CMVZ, CSV and CSVZ: D 7710 MV
- Pressure-controlled shut-off valve type CNE: D 7710 NE
- Throttle valve and shut-off valve CAV: D 7711
- Check valve type CRK, CRB and CRH: D 7712
- Pressure-dependent shut-off valve type CDSV: D 7876
- Throttle valve and throttle check valve type CQ, CQR and CQV: D 7713
- Pressure control valves type DK, DZ and DLZ: D 7941
- Flow control valve (lowering brake valve) type SB and SQ: D 6920

### For use in

- Valve bank (directional seated valve) type VB: D 7302
- Valve bank (directional seated valve) type BWN and BWH: D 7470 B/1
- Valve bank (nominal size 6) type BA: D 7788
- Valve bank (directional seated valve) type BVH: D 7788 BV
- Intermediate plate type NZP: D 7788 Z