

# Pressure-reducing valve type DK, DZ and DLZ

## Product documentation



No leakage, directly controlled

Operating pressure  $p_{\max}$ : 500 bar

Flow rate  $Q_{\max}$ : 22 lpm



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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 pressure reducing valve type DK features a tracked pressure switch, e.g. pressure and switch are set simultaneously with an adjustment device. 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 DK - version with tracked pressure switch. The pressure switch monitors the closing movement of the pressure reducing valve on reaching the pressure value set on the consumer side. It can be connected as a normally closed or normally open contact to suit the application. The special feature is the common adjustment device for pressure reducing valve and pressure switch.
- Type DZ - with this type, the pressure reducing valve type CDK as per [D 7745](#) is applied.
- Type DLZ - with this type, the pressure reducing valve type CLK as per [D 7745 L](#) is applied. In contrast to type CDK, this type of valve features an overpressure function. intended to prevent creeping pressure increases or pressure peaks.
- Type DE - sealing plate. The sealing plate can be used instead of the types DK or DZ (same hole pattern). A pressure switch can also be fitted.

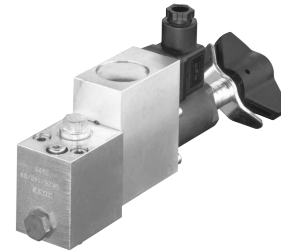


Figure 1: Pressure reducing valve type DK with tracked pressure switch



Figure 2: Pressure reducing valve type DZ

## 2 Available versions, main data

### 2.1 Pressure reducing valves type DK, DZ and DLZ

Circuit symbol:



Order coding example:

DK 2		R	/160	/OR	-P 1/4	-G
DZ 2	-08		/450	/4R		

Male connector version Table 6 Male connector (only on type DK)

Connection block Table 5 Version

Additional elements Table 4 Additional element

Pressure setting Pressure setting within the various pressure ranges

Adjustment Table 2 Adjustment

Pressure ranges Table 3 Pressure ranges

Type Table 1 Type

**Table 1 Type**

Coding	Description	Circuit symbol
DK	2-way pressure reducing valve with tracked pressure switch	
DZ	2-way pressure reducing valve	
DLZ	Pressure reducing valve with overpressure function	

**Table 2 Adjustment**

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



**Table 3 Pressure range**

Type	Flow $Q_{max}$ (lpm)	Pressure range $p_A$ from ... to (bar)								
		-08	-081	-1	-11	-2	-21	-5	-51	X
DK DZ DLZ	12	50 ... 450	50 ... 500	30 ... 300	30 ... 380	20 ... 200	20 ... 250	15 ... 130	15 ... 165	-
2 DZ 2 DLZ 2	6	30 ... 450	30 ... 500	18 ... 300	18 ... 380	12 ... 200	12 ... 250	8 ... 130	8 ... 165	-
DK 5 DZ 5 DLZ 5	22	110 ... 450	110 ... 500	70 ... 300	70 ... 380	50 ... 200	50 ... 250	30 ... 130	30 ... 165	-

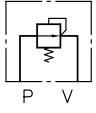
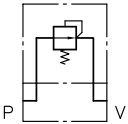
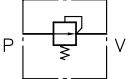
Coding **-08** and **-081**: not for type DLZ

Coding **X**: version with locking screw instead of type CDK or CLK, not with type DK

**Table 4 Additional elements**

Coding	Description	Circuit symbol
0 R	Not included (throttle can be retrofitted)	
42 R 46 R	Precision throttle valve For throttle characteristic see characteristics in <a href="#">Chapter 3, "Parameters"</a>	

**Table 5 Version**

Coding	Port type	Circuit symbols (examples)
No designation	For manifold mounting	
-P 1/4	For pipe connection (G 1/4)	
-1/4	For direct pipe connection (G 1/4) (only on type DK)	

**Table 6 Male connector (only on type DK)**

Coding	Description	Version
G	With male connector	Male connector (DIN EN 175 301-803)
X	Without male connector	
L	With male connector with LED	
L5K L10K	With male connector with LED and 5 or 10 m cable	
M	With LED and mounting flange M12 x 1 (in compliance with DESINA)	

## 2.2 Sealing plates type DE

Order coding example:

DE	0	
DE	2	/0
DE	4	/BE 1,0

Orifices and throttles Table 9 Orifices and Table 9a Throttles

Pressure switch Table 8 Pressure switch

Sealing plate Table 7 Sealing plate

**Table 7 Sealing plate**

**Table 8 Pressure switch (type DG 3. in accordance with D 5440)**

Type	Description	Coding	Description	Switching symbol
DE	Sealing plate with additional elements	0	Version without ports; pure cover or bypass plate	
		2	Prepared for pressure switch	DE 2/..
		3	DG 33 (200 ... 450 bar)	
		4	DG 34 (100 ... 400 bar)	
		5	DG 35 (20 ... 250 bar)	
		6	DG 36 (4 ... 12 bar)	
		7	DG 364 (4 ... 50 bar)	
		8	DG 365 (12 ... 170 bar)	

**Table 9 Orifices**

**Table 9a Throttles**

Coding	Description	Orifice diameter	Switching symbol	Coding	Description	Switching symbol
B 0,8 B 1,0 B 1,2 B 1,4	Orifice	Ø0.8 Ø1.0 Ø1.2 Ø1.4		No designation	Throttle not included (cannot be retrofitted), only on type DE 0	
BE 0,8 BE 1,0	Restrictor check valve (Type BE 0 in accordance with <a href="#">D 7555 B</a> )	Ø0.8 Ø1.0		0	Throttle not included (can be retrofitted)	
				1	Throttle screw (Type Q 20 in accordance with <a href="#">D 7730</a> )	
				2	Throttle check valve (Type QR 20 in accordance with <a href="#">D 7730</a> )	
				3	Throttle check valve (Type QV 20 in accordance with <a href="#">D 7730</a> )	

**3.1 General**

<b>Description</b>	<b>Directly controlled pressure reducing valve</b>
<b>Design</b>	Ball seated valve
<b>Model</b>	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>Installation position</b>	As desired
<b>Connections</b>	<ul style="list-style-type: none"> <li>▪ P = inlet (pump or primary side)</li> <li>▪ V = consumer (secondary side)</li> <li>▪ M = pressure gauge connection</li> <li>▪ T = tank connection</li> </ul>
<b>Flow direction</b>	P→V: Pressure reducing function V→P: Only possible if the pressure on the pump side is less than the consumer pressure.
<b>Hydraulic fluid</b>	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.
<b>Purity class</b>	<b>ISO 4406</b> <u>21/18/15...19/17/13</u>
<b>Temperatures</b>	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.



## Pressure and flow

### Operating pressure

- $p_{P \max}$  on the pump side = 500 bar
- For  $p_{V \max}$  on the consumer side, see table for pressure range in [Chapter 2, "Available versions, main data"](#)
- Return  $p_T \leq 20$  bar

### Static overload nominal volume

Approx.  $2 \times p_{\max}$

### 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	
DK (DZ, DLZ)...	$\pm 1.3$ 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 $p_A$
DK (DZ, DLZ) 2	$\pm 0.7$ bar	$\pm 0.45$ bar	$\pm 0.3$ bar	$\pm 0.23$ bar	
DK (DZ, DLZ) 5	$\pm 2.7$ bar	$\pm 1.7$ bar	$\pm 1.2$ bar	$\pm 0.8$ bar	

### Flow

$Q_{P \rightarrow A \max}$  = 6 lpm (DK 2, DZ 2, DLZ 2)  
 = 12 lpm (DK, DZ, DLZ)  
 = 22 lpm (DK 5, DZ 5, DLZ 5)



#### Note

Observe the [D 7788](#)  $Q_{\max}$  of the valves in conjunction with valve banks type BVZP!

**Characteristics**

Viscosity during measurements  
approx. 60 mm<sup>2</sup>/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 DK, DZ

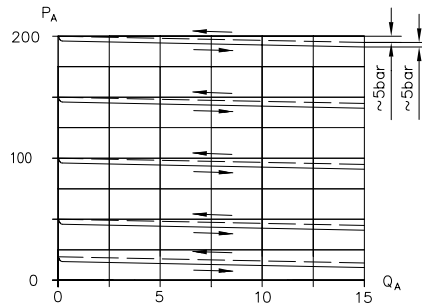


Figure 3:  $Q_A$  flow (lpm),  $p_A$  outlet pressure (bar)

Type DLZ

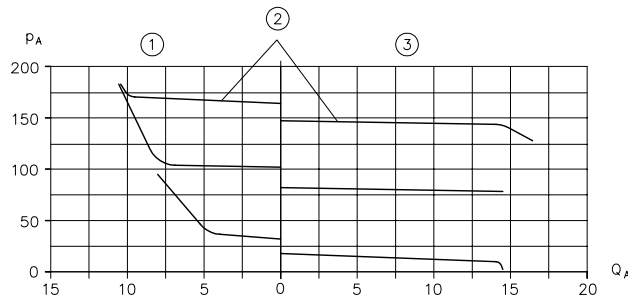


Figure 4:  $Q_A$  flow (lpm);  $p_A$  outlet pressure (bar)

- 1 Overpressure function
- 2 Same pressure setting
- 3 Pressure reducing function

### $\Delta p$ - Q characteristics P→A or A→P

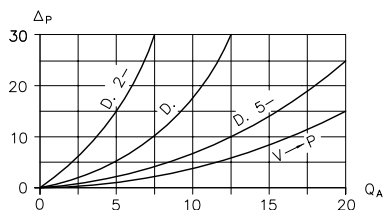


Figure 5:  $Q_A$  flow (lpm);  $\Delta p$  flow resistance (bar)



#### Note

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

### $\Delta p$ - Q characteristics, precision throttle valve, coded 42 R

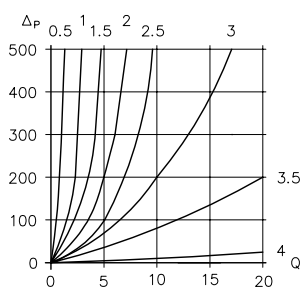


Figure 6:  $Q$  flow (lpm);  $\Delta p$  throttle resistance (bar)

### Weight

#### Basic version

Type DK	= 1.4 kg
Type DZ, DLZ	= 1.4 kg
Type DE 0	= 0.2 kg
Type DE ./..	= 0.7 kg

#### Pressure switch



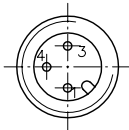
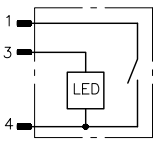
Type DG 3..	= 0.3 kg
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#### Version with single connection block

- P 1/4	+ 0.3 kg
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Electrical data for contact switch

Electrical data for pressure switch

<b>Type</b>	XCG3 by SAIA-Burgess			
<b>Mechanical service life</b>	10 x 10 <sup>6</sup>			
<b>Electrical lifetime (approx. switching actions)</b>	12 V, 4 A = 0.35 x 10 <sup>6</sup> (cos φ = 1)			
<b>Switching current</b>	<b>Nominal voltage U<sub>N</sub></b>	<b>Switching current (A)</b>	<b>IP protection class</b>	<b>Connection, device connector class</b>
	12 V DC	5	65	DIN EN 175 301-803 A
	24 V DC	5	65	DIN EN 175 301-803 A
	230 V AC	10	65	DIN EN 175 301-803 A
<p><b>i Note</b> Ensure the pipe screw connections are correctly fitted. In the event of strong vibrations, secure the accumulator to prevent it from coming loose.</p>				
<p><b>i Note</b> To ensure a safe contact, the current must not fall below these minimum values; I<sub>min</sub> (12 V DC) = 10 mA, I<sub>min</sub> (24 V DC) = 100 mA</p>				
<b>Device connector, electrical connection, protection class</b>	DIN EN 175 301-803		M12x1	
	IP 65 (in acc. with IEC 60529)		IP 67 (in acc. with IEC 60529)	
	Normal position 1-3 Switching position 1-2		(LED indicator reverse polarity protected) Switching position 1-4	
	 		 	

## 4 Dimensions

All dimensions in mm, subject to change!

### 4.1 Dimensions type DK, DZ, DLZ

#### Type DK ../..

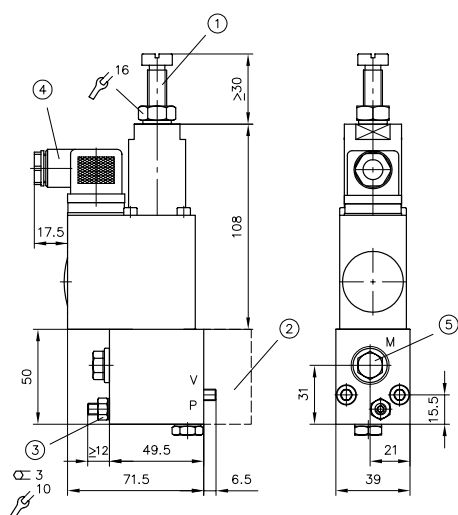


Figure 7: Coding not included, fixed setting

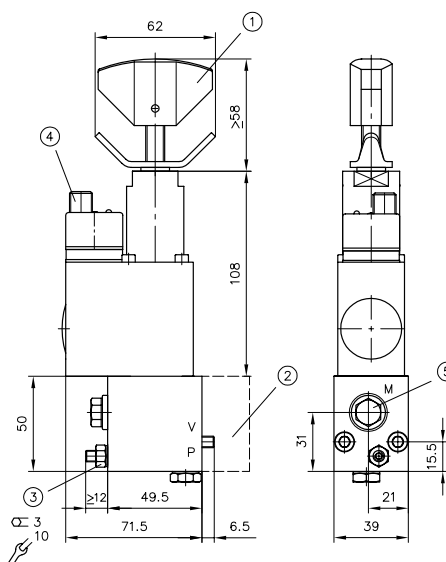


Figure 8: Coding R, adjustable

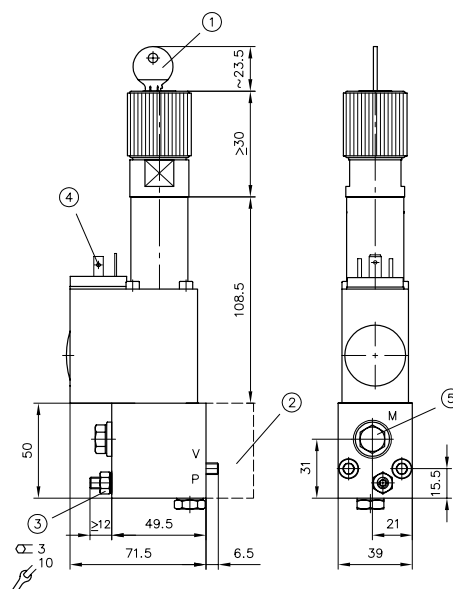


Figure 9: Coding H, lockable

- 1 Screw with lock nut
- 2 Single connection block
- 3 Throttle screw  
Electrical connection (here: Coding G according to Table 6)
- 4
- 5 Pressure gauge connection G 1/4

- 1 Turn knob
- 2 Single connection block
- 3 Throttle screw  
Electrical connection (here: Coding M according to Table 6)
- 4
- 5 Pressure gauge connection G 1/4

- 1 Turn knob
- 2 Single connection block
- 3 Throttle screw  
Electrical connection (here: Coding X according to Table 6)
- 4
- 5 Pressure gauge connection G 1/4



#### Caution

#### Risk of injury from releasing the pressurised throttle screw too far!

- Do not release the throttle screw any further than the max. measurements indicated in the dimension diagram and not beyond the red ring marking. It cannot be structurally secured inside the device!
- Please document the risk in the operator's handbook or in the system's operating and maintenance manual.

Type DK ../.. - 1/4

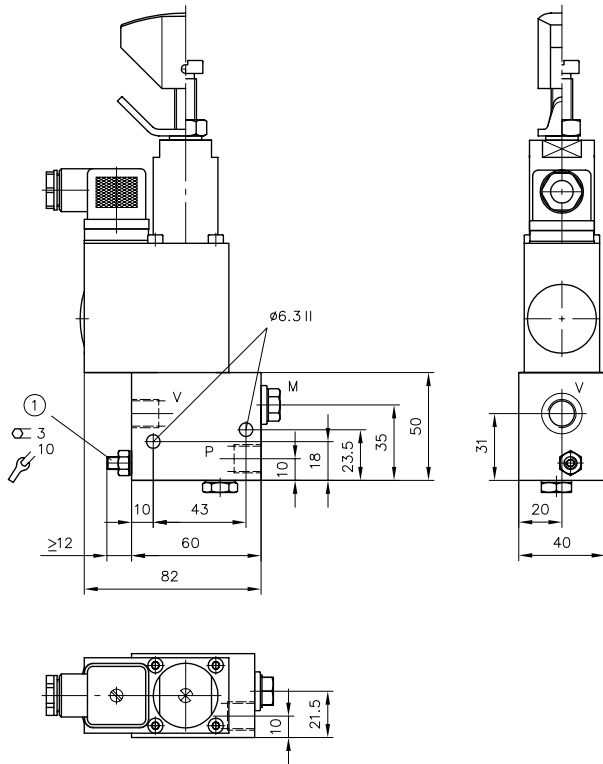


Figure 10: Direct pipe connection

1 Thread type throttle

Type DK ../.. P - 1/4

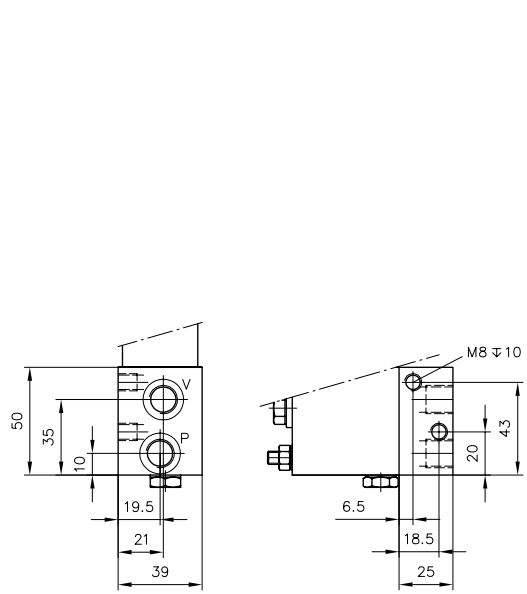


Figure 11: Single connection block for pipe connection

Ports P, V and M (ISO 228/1): G 1/4

**Type DZ, DLZ**

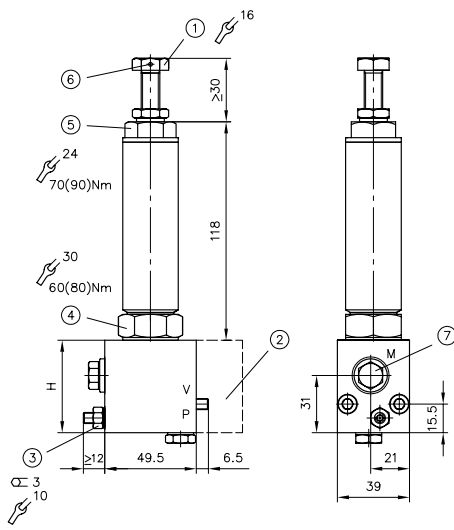


Figure 12: Fixed

- 1 Screw with lock nut
- 2 Single connection block
- 3 Throttle screw
- 4 Sealing nut <sup>1)</sup>
- 5 Valve housing <sup>1)</sup>
- 6 Sealing option
- 7 Pressure gauge connection G 1/4

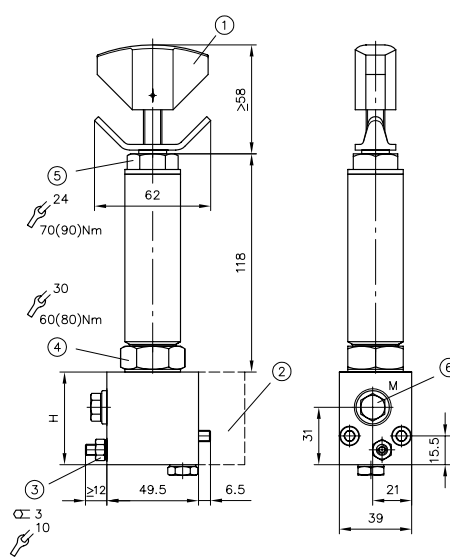


Figure 13: Adjustable

- 1 Turn knob
- 2 Single connection block
- 3 Throttle screw
- 4 Sealing nut <sup>1)</sup>
- 5 Valve housing <sup>1)</sup>
- 6 Pressure gauge connection G 1/4

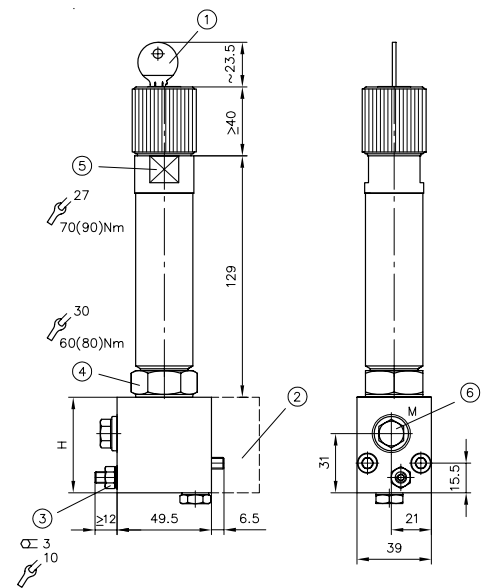


Figure 14: Lockable

- 1 Turn knob
- 2 Single connection block
- 3 Throttle screw
- 4 Sealing nut <sup>1)</sup>
- 5 Valve housing <sup>1)</sup>
- 6 Pressure gauge connection G 1/4

<sup>1)</sup> Values in brackets apply for type DZ. -08 (-081)

**Type DZ, DLZ ../.. P - 1/4**

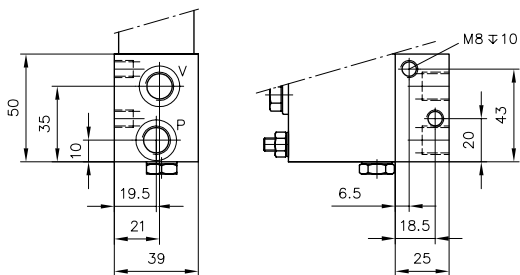
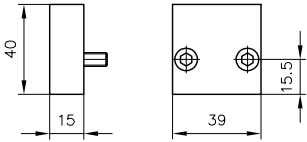


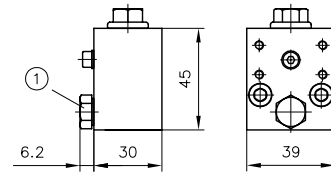
Figure 15: Single connection block for pipe connection

## 4.2 Dimensions type DE

### Type DE 0

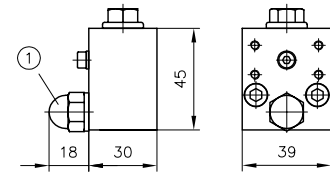


### Type DE 2/B... Type DE 8/B...



1 Version with orifice

### Type DE 2/... Type DE 8/...



1 Version with thread type throttle

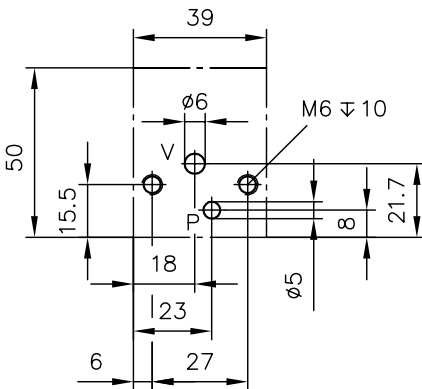


#### Note

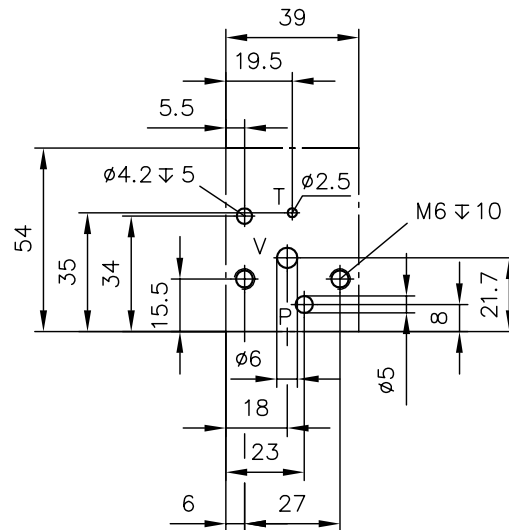
Please pay attention to the information on adjusting the throttles in [Chapter 5, "Installation, operation and maintenance information"](#).

## 4.3 Base plate hole pattern

### Type DE, DK, DZ



### Type DLZ





**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 Making base plate**

See hole pattern in [Chapter 4.3, "Base plate hole pattern"](#)

**5.3 Operating instructions**

The product is generally set by the manufacturer, although this can also be done by the customer. If the customer is setting the product, the information in this documentation must be observed in full.

**Caution**

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

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

The pressure ratio as designed causes a slight change to the actual pressure  $p_A$  in conjunction with a variable pump pressure. See Table Pressure dependence in [Chapter 3, "Parameters"](#).

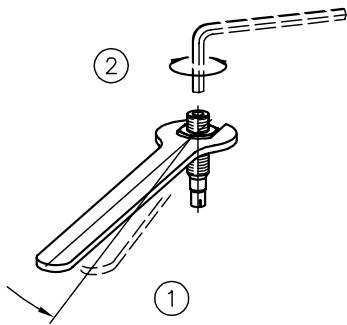
## 5.4 Maintenance information

This product is largely maintenance-free.

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.

### 5.4.1 Adjusting throttle



- 1 Loosening
- 2 Adjustment

1. Only loosen the seal-lock nut slightly (1).
  2. Adjust the throttle screw using a hex wrench (2).
- ✓ If the seal-lock nut is only loosened slightly, oil is prevented from escaping drop-by-drop.

Designation	Value
Width across flats hex wrench	SW 5
Width across flats seal-lock nut	SW 17
General figure for adjustment travel	5 mm

#### **i** Note

For the largest adjustment travel, the ring markings are visible. Unscrewing further does not change (decrease) the flow cross section any more. Therefore the  $\Delta p$  value is no longer affected.

An internal stopper to prevent further or complete unscrewing is not structurally possible. The red ring marking thus represents the end of the permissible adjustment travel. If this is exceeded, the number of the load-bearing turns of a thread is reduced and if it is unscrewed too far the throttle screw may rip out under high pressure.

Where necessary, this should be considered in the documentation for the complete system.

## 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.

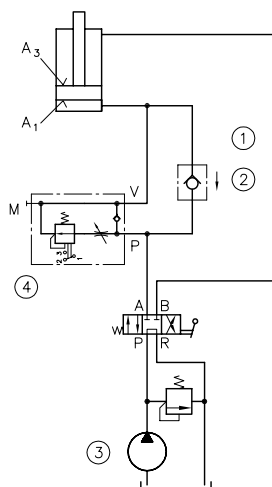
The integrated overpressure function in the pressure control valve is intended to prevent creeping pressure increases or pressure peaks.

### 6.2 Application examples

Example for a design with large flows  $Q_{V \rightarrow P}$  (reflux via bypass check valve)

Example:  $Q_p = 15 \text{ lpm}$

$A_1 / A_3 = 3 \rightarrow Q_{\text{Return}} = 45 \text{ lpm}$



- 1 e.g. RK 2G acc. to D 7445
- 2  $Q_{\text{return}} = 45 \text{ lpm}$
- 3  $Q_p = 15 \text{ lpm}$
- 4 DK 2 R/200/4 R -1/4

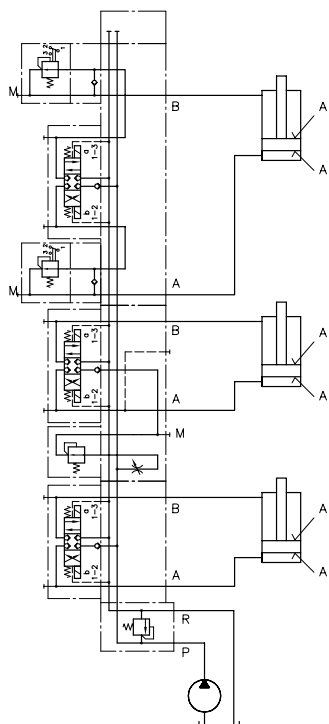
Usage in a valve bank, shown here with seated valves type BVZP 1 in acc. with [D 7788](#)

BVZP 1 A - 1/300 - G 22/0

- G 22/CZ 2/100/4/2

- G 22/G/ADK 2/200/0 R/BDK 2/160/0 R

- 1 - 1 - G 24



## Additional versions

- Pressure-reducing valve type CDK: D 7745
- Pressure-reducing valve type CLK: D 7745 L