

# Pressure-reducing valve type DK, DZ and DLZ

## Product documentation



Directly controlled, manifold mounting

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:**

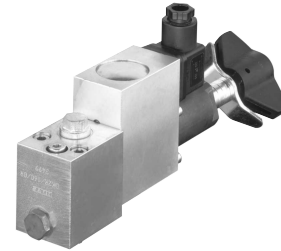
- Zero leakage in closed state

**Intended applications:**

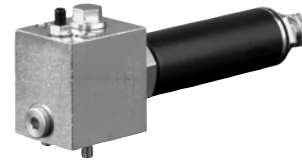
- General hydraulic systems
- Jigs
- Test benches

**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.



*Pressure reducing valve type DK with tracked pressure switch*



*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	Circuit symbol
No designation	Tool adjustable	
R	Manually adjustable, with lock nut	
H	Turn knob, lockable	



**Table 3 Pressure range**

Type	Flow rate $Q_{max}$ (lpm)	Pressure range $p_v$ 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	-
DK 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	-

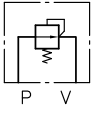
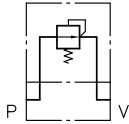
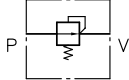
Coding -08 and -081: Not with type DLZ

Coding X: version with tapped plug 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 characteristics, see characteristics in <a href="#">Chapter 3, "Parameters"</a>	

**Table 5 Version**

Coding	Connection type	Circuit symbols (examples)
No designation	For manifold mounting	
-P 1/4	For pipe connection (G 1/4 (BSPP))	
-1/4	For direct pipe connection (G 1/4 (BSPP)) (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


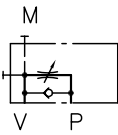
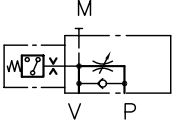
Pressure switch Table 8 Pressure switch

Sealing plate Table 7 Sealing plate

### Table 7 Sealing plate

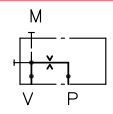
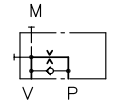
Type	Description
DE	Sealing plate with additional elements

### Table 8 Pressure switch

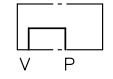
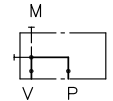
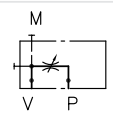
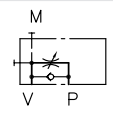
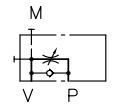
Coding	Description	Circuit symbol
0	Version without ports; pure cover or idle circulation plate	
2	Prepared for pressure switch	DE 2/..
3	DG 33 (200 to 450 bar)	
4	DG 34 (100 to 400 bar)	
5	DG 35 (20 to 250 bar)	
6	DG 36 (4 to 12 bar)	
7	DG 364 (4 to 50 bar)	
8	DG 365 (12 to 170 bar)	



**Table 9 Orifices**

Coding	Description	Orifice diameter	Circuit symbol
B 0.8 B 1.0 B 1.2 B 1.4	Orifice	Ø0.8 Ø1.0 Ø1.2 Ø1.4	
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	

**Table 9a Throttles**

Coding	Description	Circuit symbol
No designation	Throttle not included (cannot be retrofitted), only on type DE 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>Designation</b>	Directly controlled pressure reducing valve
<b>Design</b>	Ball seated valve
<b>Model</b>	Valve for pipe connection, manifold mounting valve
<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>Ports</b>	<ul style="list-style-type: none"> <li>▪ P = input (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: according to Part 1 to 3; ISO VG 10 to 68 according to DIN ISO 3448 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 for biologically degradable hydraulic fluids type HEPG (polyalkylene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C.
<b>Cleanliness level</b>	<b>ISO 4406</b> <hr style="width: 50%; margin-left: 0;"/> 21/18/15...19/17/13
<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 rate

### Operating pressure

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

### Static overload capacity

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)...	$\pm 1.3 \text{ bar}$	$\pm 0.9 \text{ bar}$	$\pm 0.6 \text{ bar}$	$\pm 0.4 \text{ bar}$
DK (DZ, DLZ) 2	$\pm 0.7 \text{ bar}$	$\pm 0.45 \text{ bar}$	$\pm 0.3 \text{ bar}$	$\pm 0.23 \text{ bar}$
DK (DZ, DLZ) 5	$\pm 2.7 \text{ bar}$	$\pm 1.7 \text{ bar}$	$\pm 1.2 \text{ bar}$	$\pm 0.8 \text{ bar}$

$p_p \pm 10 \text{ bar}$  results in a pressure change for A of  $p_A$

### Flow rate

$Q_{P \rightarrow A \max}$	= 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!

**Characteristic curves**

Oil viscosity approx. 60 mm<sup>2</sup>/s  
 $p_A - Q_{P \rightarrow A}$  - characteristics

The pressure setting applies for  $Q_{P \rightarrow A} \rightarrow 0$  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  $p_p \approx 1.1 p_A$ .



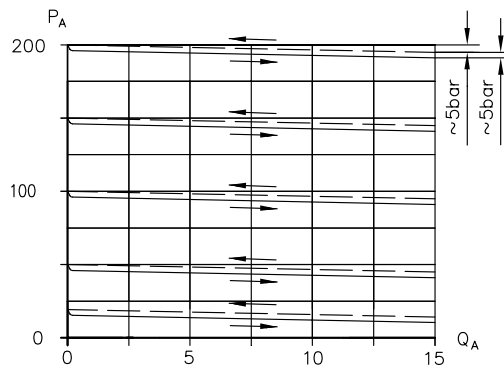
**Caution**

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

Risk of minor injury.

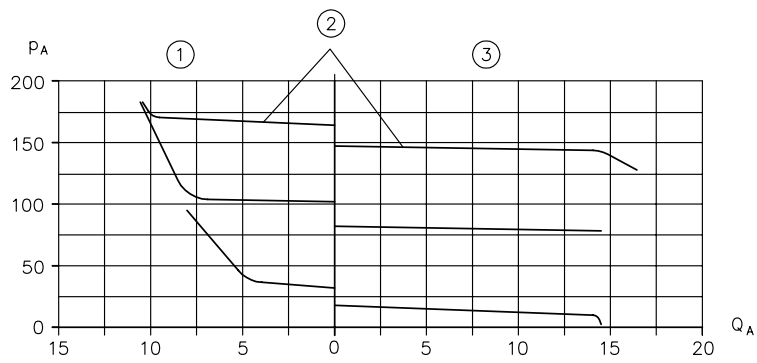
- Always monitor the pressure gauge when setting and changing the pressure.

**Type DK, DZ**



$Q_A$  flow rate (lpm);  $p_A$  outlet pressure (bar)

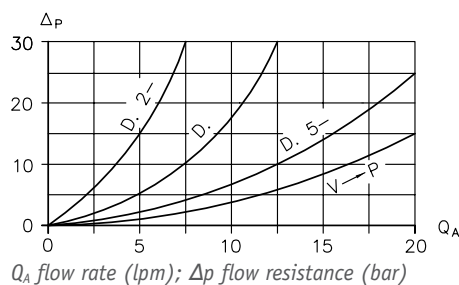
**Type DLZ**



$Q_A$  flow rate (lpm);  $p_A$  outlet pressure (bar)

- Overpressure function
- Same pressure setting
- Pressure reducing function

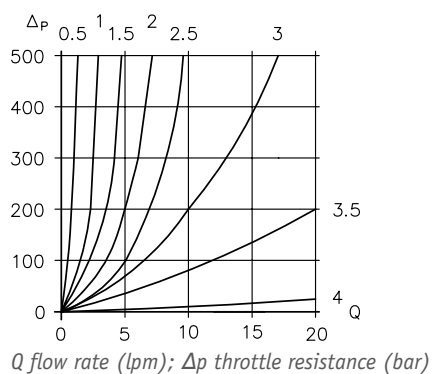
**$\Delta p$  - Q characteristics P→A or A→P**



**Note**

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

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



**Weight**

**Basic version**

**Type**

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

**Pressure switch**

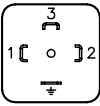
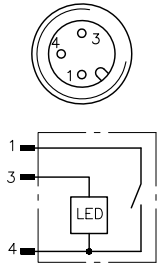
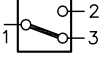
DG 3..	= 0.3 kg
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**Version with single connection block**

- P 1/4	+ 0.3 kg
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### 3.2 Electrical data

#### Electrical data for pressure switch

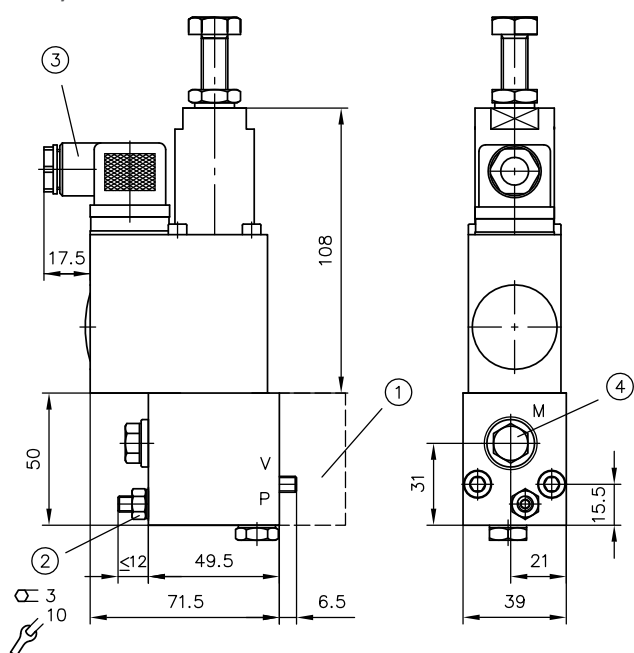
Type	XCG3 by SAIA-Burgess		
Mechanical service life	10 x 10 <sup>6</sup>		
Electrical service life (approx. switching actions)	12 V, 4 A = 0.35 x 10 <sup>6</sup> (cos φ = 1)		
Switching current	<b>Nominal voltage U<sub>N</sub></b>	<b>Switching current (A)</b>	<b>IP protection class</b>
	12 V DC	5	65
	24 V DC	5	65
	230 V AC	10	65
			<b>Connection, male connector</b>
			DIN EN 175 301-803
			DIN EN 175 301-803
			DIN EN 175 301-803
	<p><b>Note</b> Ensure the pipe screw connection is correctly assembled. In the event of strong vibrations, secure the accumulator to prevent it from coming loose.</p>		
	<p><b>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>		
Male connector, electrical connection, protection class	DIN EN 175 301-803	M12x1	
	IP 65 (according to IEC 529)	IP 67 (according to IEC 529)	
	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 Pressure reducing valves type DK, DZ, DLZ

DK ../..



- 1 Single connection block
- 2 Throttle screw
- 3 Electrical connection according to table 6
- 4 Pressure gauge connection G 1/4 (BSPP)



#### Caution

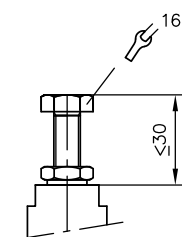
**Risk of injury from releasing the pressurised throttle screw too far!**

Risk of minor injury.

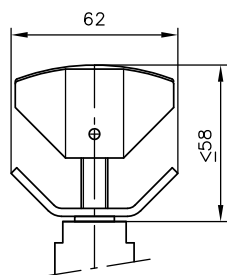
- Only unscrew the throttle screw up to the maximum dimension on the dimension drawing or up to the red ring marking. The throttle screw cannot be structurally secured inside the device.
- Please document the risk in the operating manual or in the system's operating and maintenance manual.

### Adjustment

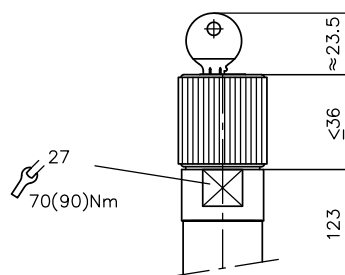
No designation



Coding R



Coding H

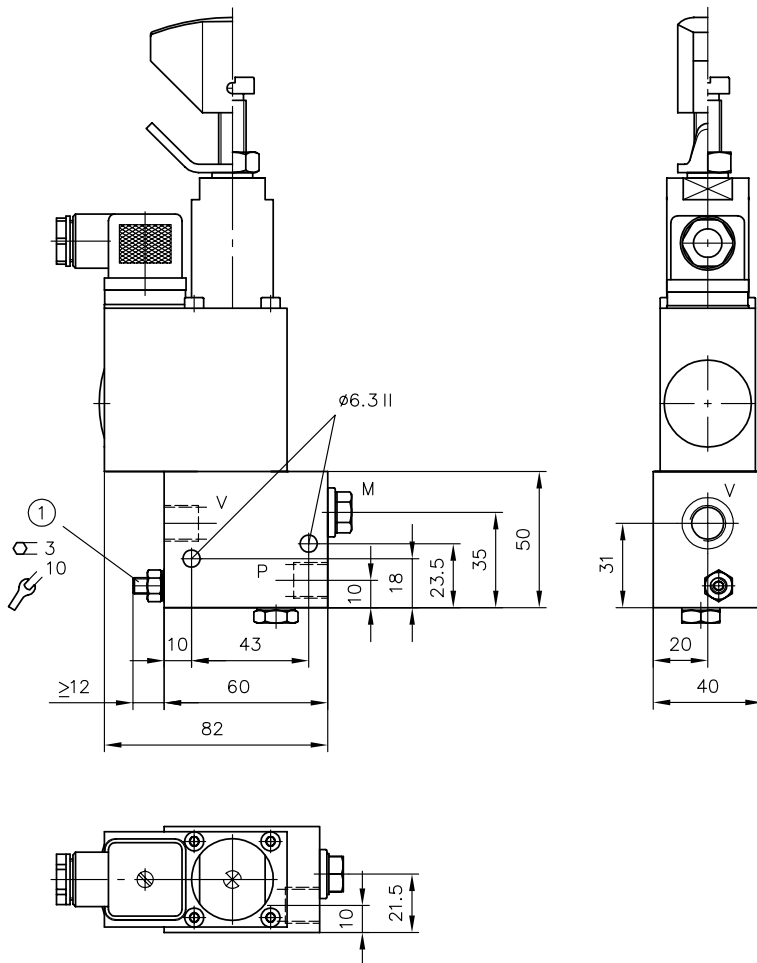






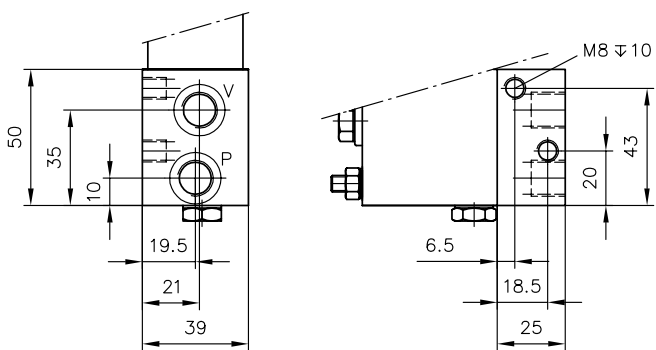
## 4.2 Version with single connection block for pipe connection

DK ../.. - 1/4



1 Throttle screw

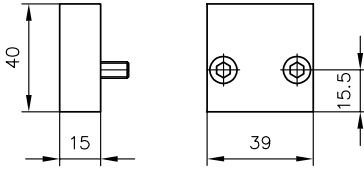
DK (DZ, DLZ) ../.. P - 1/4



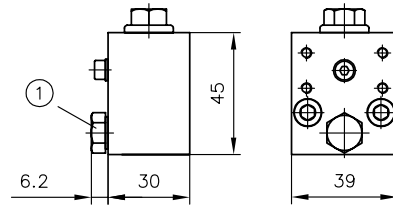
Ports P, V and M: G 1/4 (BSPP)

### 4.3 Sealing plates type DE

DE 0

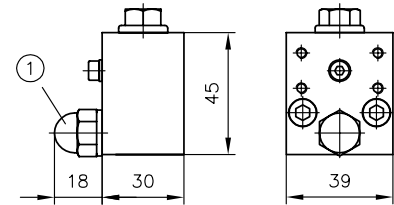


DE 2/B...  
DE 8/B...



1 Version with orifice

DE 2/...  
DE 8/...



1 Version with throttle screw

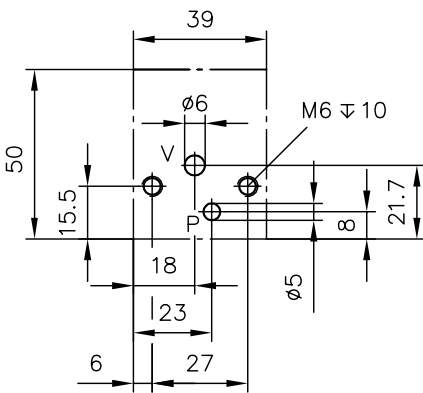


**Note**

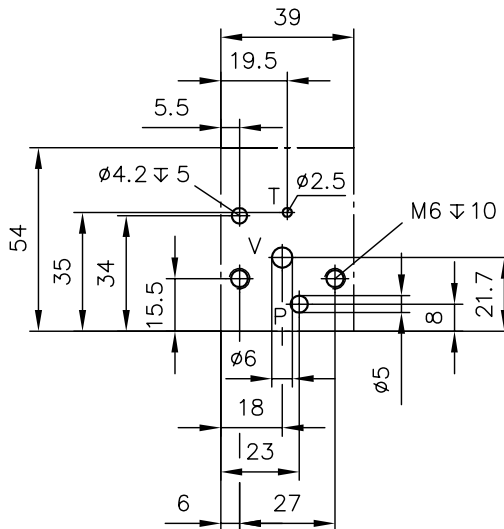
Please pay attention to the information on adjusting the throttles in [Chapter 5, "Assembly, operation and maintenance recommendations"](#).

### 4.4 Base plate hole pattern

DE, DK, DZ



DLZ



## 5 Assembly, operation and maintenance recommendations

### 5.1 Intended application

This valve is intended exclusively for hydraulic applications (fluid engineering). The valve meets high technical safety standards and regulations for fluid.

The user must observe the safety measures and warnings in this documentation.

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 qualified personnel.
- The product must only be operated within the specified technical parameters. The technical parameters are described in detail in this documentation.
- The operating and maintenance manual of the specific complete system must also always be observed.

If the product can no longer be operated safely:

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 connection components that comply with market requirements (screw fittings, hoses, pipes, etc.).

The hydraulic system must be shut down correctly prior to dismantling; this applies in particular to hydraulic systems with hydraulic accumulators.



#### **Danger**

**Risk to life caused by sudden movement of the hydraulic drives when dismantled incorrectly!**

Risk of serious injury or death.

- Depressurise the hydraulic system.
- Perform safety measures in preparation for maintenance.

#### 5.2.1 Making base plate

See hole pattern in [Chapter 4.4, "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!

Risk of minor injury.

- Always monitor the pressure gauge when setting and 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"](#).

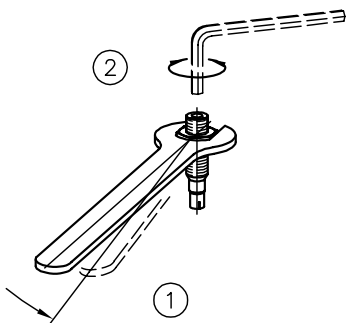
## 5.4 Maintenance information

This product is largely maintenance-free.

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

Clean the device surface of dust deposits and dirt at regular intervals, but at least once per year.

### 5.4.1 Adjusting throttle



- Loosening
- Adjustment

- Only loosen the seal-lock nut slightly (1).
- 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



### Note

- For the largest throttle adjustment travel, the ring marking becomes visible. Unscrewing further does not change (decrease) the flow cross section any more. 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 thread turns is reduced and if unscrewed too far under high pressure, the throttle screw may rip out.
- Incorporate this into the documentation for the complete system.

**6****Other information****6.1 Planning information**

The pressure reducing valve is zero-leakage when closed. The pressure may therefore change if the product is used in control circuits with long pressure holding periods without switching. For example, this is the case in control circuits in which pallets are clamped separately.

The pressure may increase if the temperature increases (e.g. in the event of sun exposure) or if influenced by additional external loads. When the pump is switched off: The pressure can drop if the temperature falls (e.g. cooling down at night) or if loads are removed.

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.

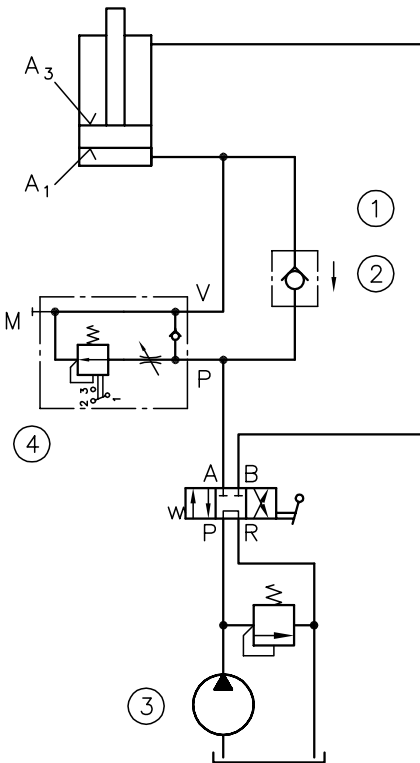
With the integrated overpressure function of the pressure reducing valve, gradual pressure increases or pressure peaks are avoided.

## 6.2 Application examples

Example for a design with large flow rates  
 $Q_{V \rightarrow P}$  (return flow 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 in accordance with [D 7445](#)

2  $Q_{\text{return}} = 45 \text{ lpm}$

3  $Q_p = 15 \text{ lpm}$

4 DK 2 R/200/4 R -1/4

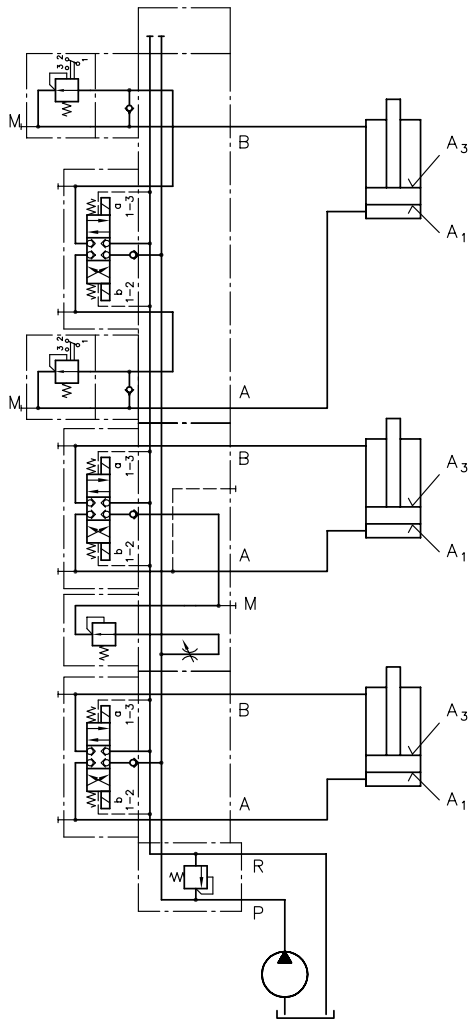
Use in the valve bank, shown here with seated valves type BVZP 1 in accordance with [D 7788](#)

**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



## Further information

### Additional versions

- Pressure-reducing valve type CDK: D 7745
- Pressure-reducing valve type CLK: D 7745 L
- Pressure-reducing valve type ADM: D 7120
- Pressure-reducing valve type ADC, ADM, ADME and AM: D 7458
- Intermediate plate type NZP: D 7788 Z