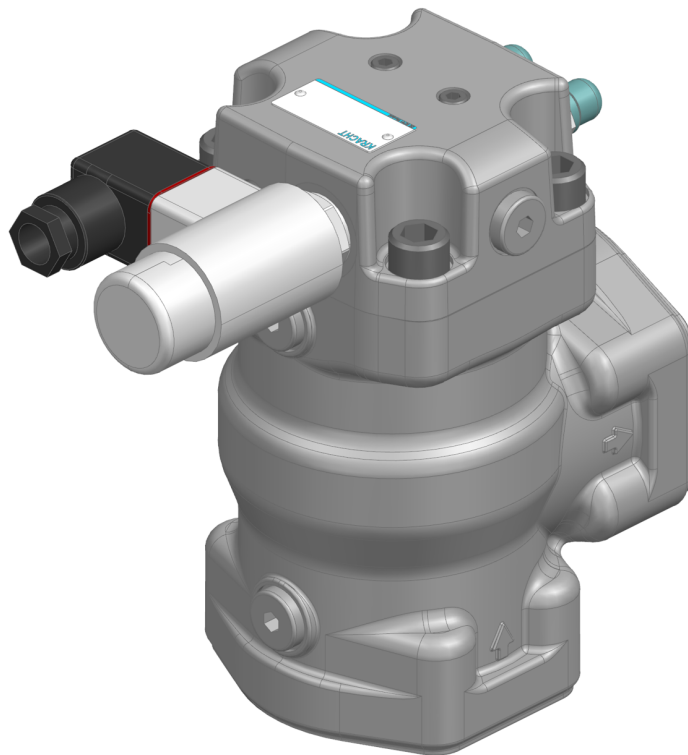


Operating instructions (Translation)



Pressure valve DV
English

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1 General

1.1 About the documentation

These operating instructions describe the installation, operation and maintenance of the following product:

Pressure valve DV

These operating instructions are an integral part of the product and must be kept in the immediate vicinity of the

product and accessible to the personnel at all time.

Different versions of the product are produced. Which version is concerned is stated on the device's type plate.

If you have any questions about this operating manual, please contact the manufacturer.

1.2 Manufacturer address

KRACHT GmbH
Gewerbestraße 20
D-58791 Werdohl
Tel: +49 2392 935-0
Fax: +49 2392 935-209
Email: info@kracht.eu
Web: www.kracht.eu

1.3 Other applicable documents

In addition to these instructions, also comply with the relevant instructions of plants or plant parts available or planned on site.

1.4 Symbols



DANGER

Identification of an immediate hazard, which can lead to death or severe bodily injury if not avoided.



WARNING

Identification of a potential medium risk hazard, which can lead to death or severe bodily injury if not avoided.



CAUTION

Identification of a possible low-risk hazard that can result in minor or moderate physical injury if not avoided.

ATTENTION

Identification of notes to prevent property damage.



NOTICE

Identification of basic safety instructions. Non-compliance can lead to hazards for people and the product



TIP

Identification of special user tips and other particularly useful or important information

2 Safety

2.1 Intended use

1. The product is determined for installation in pipes.
2. The product has been designed for operation with fluids.
Dry operation is not permitted.
3. Excessive amounts of undissolved gases present in the medium are unacceptable as they may lead to extreme pressure fluctuations, vibrations, and noise emission levels..
4. The product may only be operated when completely filled.
5. The fluid must be compatible with the materials used in the product. Chemical expertise is required for that. Be careful with ethylene oxide or other catalytically or exothermically reacting or self-decomposing substances. Please consult the manufacturer in cases of doubt.
6. The product may only be used in normal industrial atmospheres. If there are any aggressive substances in the air, always consult the manufacturer.
7. The product may only be operated in compliance with these operating instructions and the applicable documents.
Deviating operating conditions require the express approval of the manufacturer.
8. Use of the product for purposes other than those for which it is intended invalidates any warranty.

2.2 Personal qualification

The personnel charged with the assembly, operation and maintenance of the product must have the necessary qualifications.

This can be achieved through training or appropriate instruction.

The personnel must be familiar with the contents of these operating instructions.



NOTICE

Read the operating instructions in full before using the product.

2.3 Basic safety instructions



NOTICE

Basic safety instructions

Non-compliance can lead to hazards for people and the unit.

- a) Follow existing regulations for accident prevention and safety at work as well as the internal regulations of the operating company.
 - b) Ensure the greatest possible cleanliness.
 - c) Wear suitable personal protective equipment.
 - d) Do not remove type plates or other information or make them illegible or unrecognisable.
 - e) Do not make any technical modifications.
 - f) Comply with maintenance intervals.
 - g) Only use spare parts approved by the manufacturer.
-

2.4 Fundamental hazards



DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Before carrying out any work, depressurise the product and all connection pipes.
- b) Securely prevent the pressure from being restored during work.



WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Use only connections and lines approved for the expected pressure range.
- b) Securely prevent the permissible pressures from being exceeded, e.g. by using pressure relief valves or bursting discs.
- c) Pipelines must be designed in such a way that no tension e.g. caused by changes in length due to fluctuations in temperature can be transferred to the product.



WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury caused by splashing fluids.

- a) Note the permissible pressure setting range of the valve.
- b) Check the pressure setting (the valve must not block).

3 Device description

3.1 Functional principle

3.1.1 Pressure valve DV

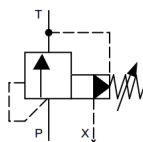
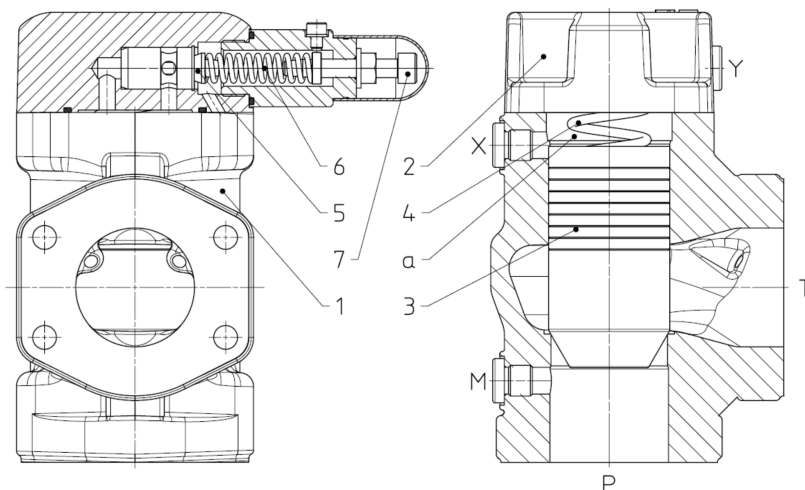
The Type DV pressure valves are hydraulically pilot-controlled pressure relief and pressure control valves for installation in hydraulic-system pipelines.

The device consists of a main valve (1) and - depending on the version - one or more pilot valves (2) with different functions. The control oil flow can be drained optionally internally to the tank (T) or externally on the connector (Y). When using the internal version, please note that fluctuating pressures on the connector (T) cause a corresponding change in the pressure setting.

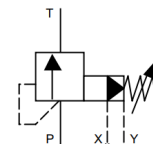
3.1.2 Pressure relief valve DV B

The DV B is a pilot-controlled pressure relief valve and is used to safeguard hydraulic circuits. The pressure adjusted at the adjustment spindle is kept mostly constant at the connection (P). The valve characteristics as a function of viscosity and flow rate must be taken into account here.

With the valve closed, both main valve piston (3) as well as pilot valve piston (5) are kept in the closed position by the force of the springs (4; 6). As soon as the pressure exceeds the pressure set with Setcrew (7), the pilot valve opens and the spring chamber (a) of the main valve is relieved to Tank (T). A pressure gradient arises between pressure port (P) and the spring chamber and the main valve piston opens, keeping the system pressure constant. The control oil can be drained internally or externally (Y) by choice. A measurement tap (M) and a port for external control oil regulation (X) are provided as standard.



internal control oil drain

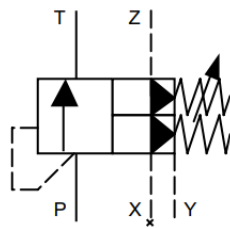
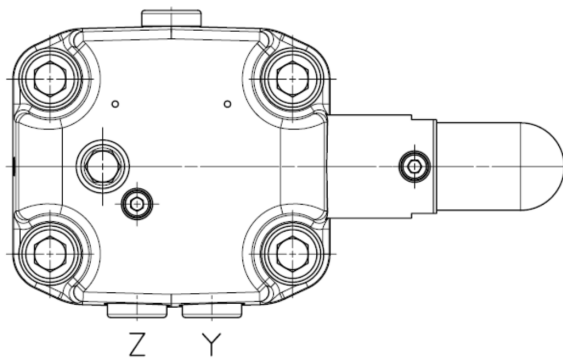


external control oil drain

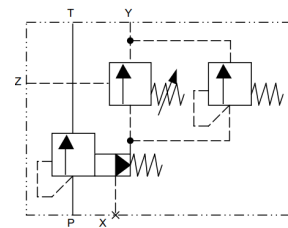
3.1.3 Pressure control valve DV R

The pressure control valve DV R is a pilot-controlled pressure relief valve with external hydraulic activation. Essentially, the function corresponds to that of the pressure relief valve DV B

However, it allows for the system pressure to be adjusted irrespective of the pressure losses occurring between the valve and the point of the external control oil tap. For this purpose, the pressure adjusted at the adjustment spindle is kept constant at the connection (Z). The valve characteristics as a function of viscosity and flow rate must be taken into account here. In addition, the valve features a nonadjustable overpressure protection mechanism.



Circuit symbol (simplified)



Circuit symbol (comprehensive)



TIP

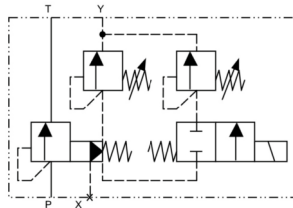
To ensure correct operation, an external control oil supply (pilot line) must be installed at the connection (Z).

3.1.4 Pressure stage control valve DV S

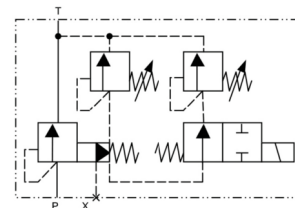
The pressure stage control valve is a pilot-operated pressure relief valve with minimum two or maximum three parallel arranged pilot valves which can be set to different pressures. The valve characteristics as a function of viscosity and flow rate must be taken into account here.

The basic setup corresponds to the DV B pressure relief valve. The device comes with a solenoid valve. It is used to switch between the different pressure stages. The solenoid valve is available in normally open (NO) or normally closed (NC) design for the 2-stage version. For the three-stage variant, a built-in 4/3-directional control valve is used. The control oil can be drained internally or externally (Y) by choice.

Switch symbols Pressure stage 035

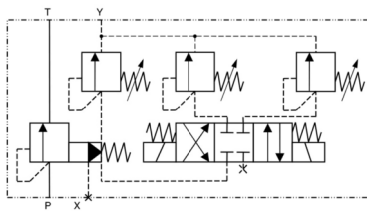


Control oil:
external control oil drain (Y), Magnetic valve: normally closed



Control oil:
internal control oil drain, Magnetic valve: normally open

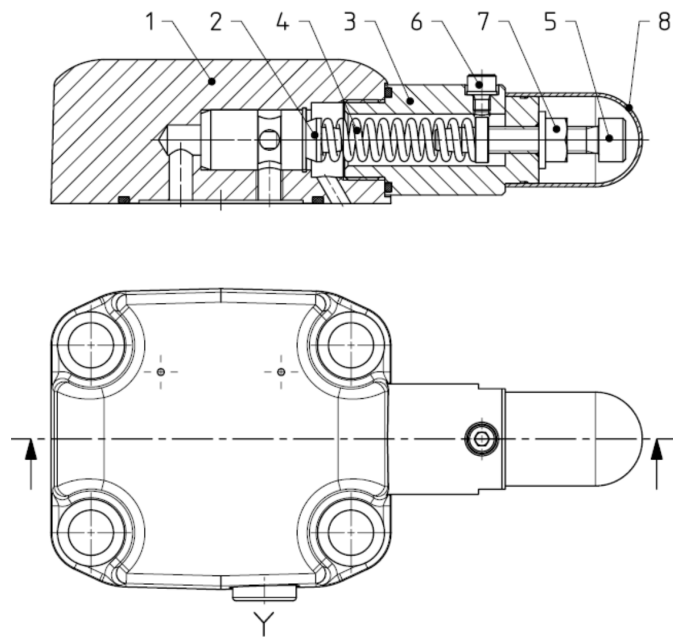
Switch symbols Pressure stage 030



Control oil:
external control oil drain (Y)

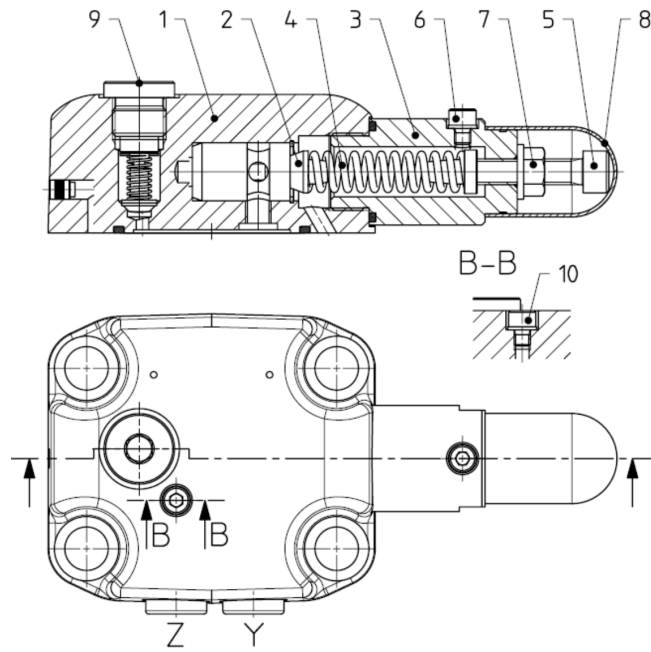
3.2 Variants

Pilot valve DV B

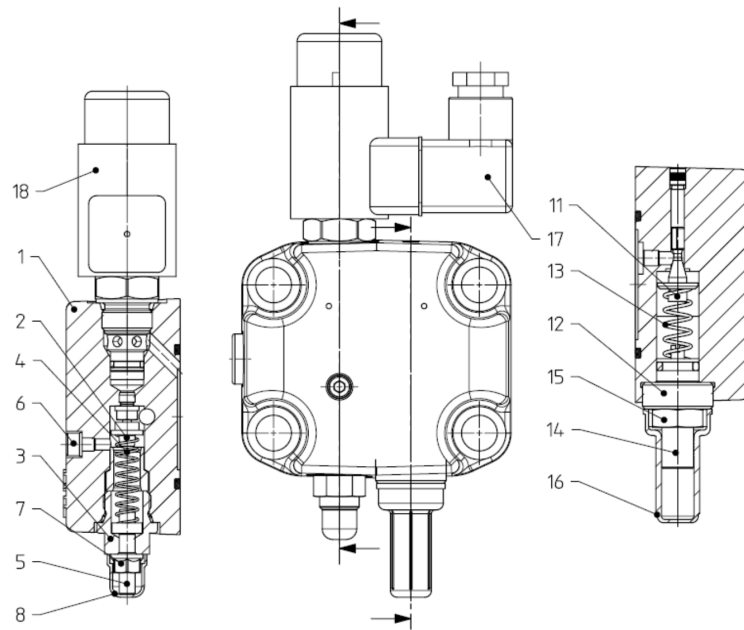


- | | | | |
|---|------------------|---|--------------------|
| 1 | Housing | 2 | Pilot valve piston |
| 3 | Cap screw | 4 | Compression spring |
| 5 | Adjustment screw | 6 | Venting screw |
| 7 | Collar nut | 8 | Protective cap |

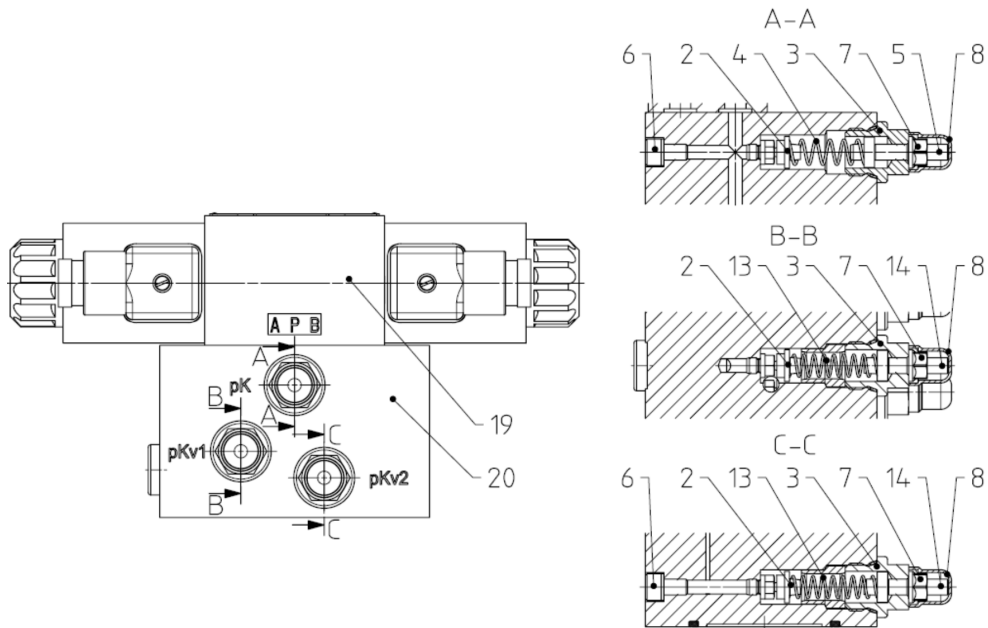
Pilot valve DV R



- | | |
|---------------------------|----------------------|
| 1 Housing | 2 Pilot valve piston |
| 3 Cap screw | 4 Compression spring |
| 5 Adjustment screw | 6 Venting screw |
| 7 Collar nut | 8 Protective cap |
| 9 Maximum pressure relief | 10 Venting screw |

Pilot valve DV S (Pressure stage 035)

- | | | | |
|----|--------------------|----|--------------------|
| 1 | Housing | 2 | Pilot valve piston |
| 3 | Cap screw | 4 | Compression spring |
| 5 | Adjustment screw | 6 | Venting screw |
| 7 | Collar nut | 8 | Protective cap |
| 11 | Pilot valve piston | 12 | Cap screw |
| 13 | Compression spring | 14 | Adjustment screw |
| 15 | Collar nut | 16 | Protective cap |
| 17 | Device plug | 18 | Magnet coil |

Pilot valve DV S (Pressure stage 030)

- | | |
|----------------------|-----------------------|
| 2 Pilot valve piston | 3 Cap screw |
| 4 Compression spring | 5 Adjustment screw |
| 6 Venting screw | 7 Collar nut |
| 8 Protective cap | 13 Compression spring |
| 14 Adjustment screw | 15 Directional valve |
| 16 Valve cover | |

3.3 Type key

Ordering example												
DV B	50	S	2	F	1	S	025	S	1	C	3	/001
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.

Explanation of type key			
1. Product name			
DV B	Pressure relief valve	DV R	Pressure control valve
DV S	Pressure stage control valve		
2. Nominal			
50; 80			
3. Design			
S	Seat valve	V	Slide valve
4. Housing material			
2	EN-GJS-400-15		
5. Seal material			
F	FKM		
6. Actuation type			
1	Adjustment screw, manuel		
7. Hydraulic connection			
S	Flange connection SAE (ISO 6162-1 / SAEJ518) internal control oil drain	Y	Flange connection SAE (ISO 6162-1 / SAEJ518) external control oil drain
8. Pressure stage (Pressure setting ranges)			
009	3...9 bar	012	3...12 bar
025	3...25 bar	030	6...30 bar
035	3...35 bar	070	8...70 bar
140	15...140 bar	210	15...210 bar
9. Fluid temperature			
S	Standard		
10. Viscosity / damping			
1	Standard	3	Vibration damped, damping nozzle
11. Hydraulic control			
A	Without	C	2/2-Directional valve, normally closed
O	2/2-Directional valve, normally open	D	4/3-Directional, centred
M	Maximum pressure relief		
12. Electrical voltage			
1	12 V DC	2	24 V DC
3	230 V / 50 Hz		

Explanation of type key
13. Special number
Special numbers [► 17]

3.4 Special numbers

Special number	Description
001	Strong damping

4 Technical data

4.1 General

General information			
Design	Seat valve, hydraulically pilot controlled		
Nominal (NG)	50; 80		
Fixing type	Pipeline installation		
Housing connection ⁽¹⁾	50	Flange connection	SAE 2"
	80		SAE 3"
Actuation type	mechanical, Adjustment screw		
Mounting position	Any		
Max. Flow rate	Q	60% of the delivery rate [l/min]	
Viscosity	v _{min.}	4 mm ² /s	
	v _{max.}	1000 mm ² /s	
Operating pressure	p _{max.}	50	210 bar
		80	140 bar
Oil cleanliness	NAS 1638 Class 9 ISO 4406:1999 Code 20/18/15		
Permissible media	Hydraulic oil DIN 51524/25 Lubricating fluids without abrasive components ((Petrols, solvents, etc. are not permissible))		

⁽¹⁾ Flange connection : DIN ISO 6162-1 (SAE J518)



TIP

Preferred fitting position

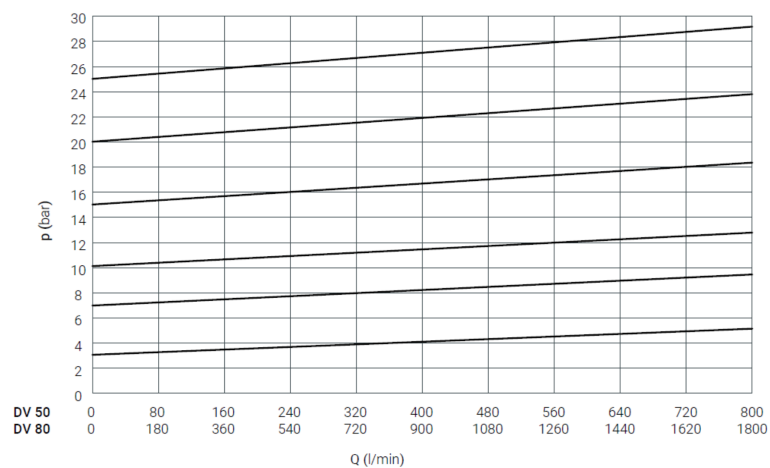
Whenever possible, install the device in a horizontal position, i.e., the pilot valve and connections in a lateral position.

4.2 Pressure setting ranges

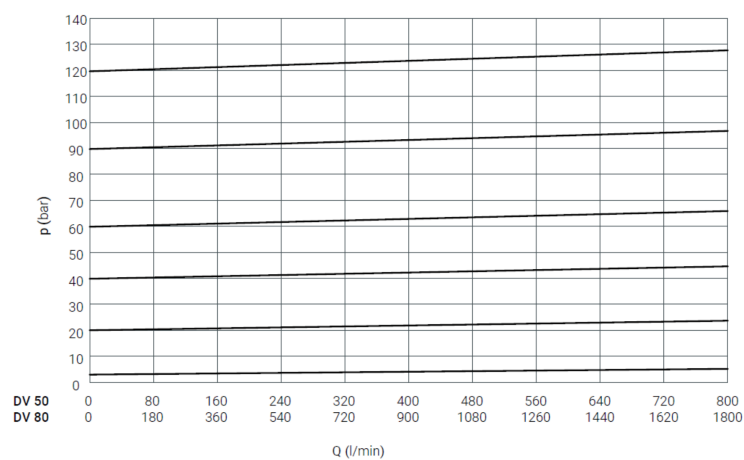
Valve type	Pressure stage	Pressure setting ranges [bar]
DV B	012	3...12 (Maximum pressure limit 12 bar)
	025	3...25
	070	8...70
	140	15...140 (NG 80)
	210	15...210 (NG 50)
DV R	009	3...9 (Maximum pressure limit 9 bar)
	025	3...25
DV S	030	6...20; 8...22; 10...30
	035	3...10; 10...35

4.3 Characteristic curves

Δp -Q- Characteristic curves (Viscosity = 34 mm²/s)
0...30 bar



0...140 bar



4.4 Permissible temperature range

Sealing material	Fluid temperature ϑ_m	
	$\vartheta_{m \min}$ [°C]	$\vartheta_{m \max}$ [°C]
FKM	-20	150
NBR		90

Sealing material	Ambient temperature ϑ_u	
	$\vartheta_{u \min}$ [°C]	$\vartheta_{u \max}$ [°C]
FKM	-20	60
NBR		



NOTICE

Note media-specific properties.

4.5 Material data

Housing	Seal	Compression spring	Other materials
EN-GJS-400-15	NBR	Spring steel	Steel (St)
	- - -		
	FKM		

4.6 Weight

Valve type	Nominal	Weight [kg]
DV B	50	9.7
	80	21.2
DV R	50	9.7
	80	21.2
DV S (Pressure stage 035)	50	9.8
	80	21.4
DV S (Pressure stage 030)	50	13.5

4.7 Dimensions

The dimensions of the product are given in the technical data sheets.

5 Transport and storage

5.1 General

- a) After receiving the delivery, check the product for transport damage.
 - b) If transport damage is found, the manufacturer and the transport company must be notified immediately. The product must then be replaced or repaired.
 - c) Dispose of packaging materials and used parts according to local regulations.
-

5.2 Transport



WARNING

Falling or toppling loads

Risk of injury during transport of large and heavy loads.

- a) Use only suitable means of transport and lifting gear with sufficient load-bearing capacity.
 - b) Attach lifting gear only to suitable places on the load.
 - c) Attach the lifting gear so that it cannot slip.
 - d) Note the centre of gravity of the load.
 - e) Avoid sudden, jerky movements, impacts and strong vibrations during transport.
 - f) Do not step under overhead loads, do not work under overhead loads.
-



NOTICE

Eyebolts can be screwed into the thread of the flanged connections to transport the product.

5.3 Storage

The product's function is tested in the factory with mineral hydraulic oil. The connections are then closed. The remaining residual oil preserves the internal parts for up to 6 months.

Bright metallic external parts are also protected against corrosion by suitable preservation measures for up to 6 months.

During storage, ensure a dry, dust-free and low-vibration environment. The product must be protected from weather, moisture and large temperature fluctuations. Comply with the recommended storage conditions.

Below the permissible ambient temperature ϑ_U , elastomer seals lose their elasticity and mechanical loading capacity, as the temperature is below the glass transition temperature. This process is reversible. Avoid the application of force on the product during storage below the permissible ambient temperature ϑ_U .

Products with EPDM seals are not mineral oil resistant and their function is not tested. The internal parts are not preserved. If the product is not put into operation immediately, all surfaces exposed to corrosion must be protected by suitable preservation measures. The same applies to products that are not tested for other reasons.

In case of storage for a longer period (> 6 months), all surfaces exposed to corrosion must be retreated with suitable preservatives.

If high humidity or an aggressive atmosphere is to be expected, additional suitable corrosion prevention measures must be taken.



NOTICE

Storage in corrosion protection bags (VCI) for maximum 6 months.

⚠ ATTENTION

Corrosion/chemical attack

Improper storage can make the product unusable.

- a) Use suitable preservation measures to protect exposed surfaces.
- b) Comply with the recommended storage conditions.

5.4 Storage conditions



TIP

Recommended storage conditions

- a) Storage temperature: 5 °C – 25 °C
- b) Relative humidity: < 70 %
- c) Protect elastomer parts from light, particularly direct sunlight.
- d) Protect elastomer parts from oxygen and ozone.
- e) Note the maximum storage period of elastomer parts:
 - ⇒ 5 years: AU (polyurethane rubber)
 - ⇒ 7 years: NBR, HNBR, CR
 - ⇒ 10 years: EPM, EPDM, FEP/PFTE, FEPM, FKM, FFKM, VMQ, FVMQ

6 Installation

6.1 Safety instructions for installation



DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Before carrying out any work, depressurise the product and all connection pipes.
- b) Securely prevent the pressure from being restored during work.



WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Use only connections and lines approved for the expected pressure range.
- b) Securely prevent the permissible pressures from being exceeded, e.g. by using pressure relief valves or bursting discs.
- c) Pipelines must be designed in such a way that no tension e.g. caused by changes in length due to fluctuations in temperature can be transferred to the product.

6.2 Mechanical installation

6.2.1 Preparation

- a) Check the product for transport damage and contamination.
 - b) Remove any preservative present.
 - ⇒ Only use cleaning agents that are compatible with the materials used.
 - ⇒ Do not use cleaning wool.
 - c) Compare the environmental and ambient conditions at the place of use with the permissible conditions.
 - ⇒ Expose the product only to low vibrations, see IEC 60034-14.
 - ⇒ Ensure sufficient accessibility for maintenance and repair.
-

6.2.2 General



CAUTION

Hot surfaces

Burns of the skin on contact.

- a) Take measures to prevent accidental touching of hot surfaces (< 60 °C).
-



TIP

Preferred fitting position

Whenever possible, install the device in a horizontal position, i.e., the pilot valve and connections in a lateral position.

6.3 Connection lines

6.3.1 General



WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Use only connections and lines approved for the expected pressure range.
- b) Securely prevent the permissible pressures from being exceeded, e.g. by using pressure relief valves or bursting discs.
- c) Pipelines must be designed in such a way that no tension e.g. caused by changes in length due to fluctuations in temperature can be transferred to the product.



NOTICE

Additional connections

- a) Provide measurement connections for pressure and temperature as near as possible on the device.
- b) If necessary, provide an option for filling and draining the device and line system.
- c) If necessary, provide an option for venting the device and line system.



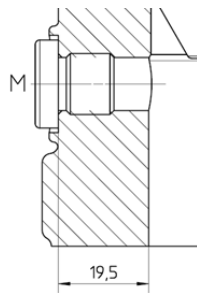
TIP

To ensure correct operation, an external control oil supply (pilot line) must be installed at the connection (Z).

6.3.2 Connection line installation

- a) Clean all lines.
 - ⇒ Do not use cleaning wool.
 - ⇒ Pickle and rinse welded pipes.
- b) Remove existing protective plugs.
- c) Install the lines.
 - ⇒ Comply with the manufacturer's instructions.
 - ⇒ Do not use any sealing materials such as hemp, Teflon tape or putty.

6.3.3 Installation of measuring connection



NOTICE

Measuring connection

The measuring connection M may be inserted to a maximum depth of 19.5 mm in the borehole.

7 Commissioning

7.1 Safety instructions for start-up



DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury caused by splashing fluids.

- a) Note the permissible pressure setting range of the valve.
- b) Check the pressure setting (the valve must not block).



WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Use only connections and lines approved for the expected pressure range.
- b) Securely prevent the permissible pressures from being exceeded, e.g. by using pressure relief valves or bursting discs.
- c) Pipelines must be designed in such a way that no tension e.g. caused by changes in length due to fluctuations in temperature can be transferred to the product.



CAUTION

Hot surfaces

Burns of the skin on contact.

- a) Wear protective gloves at temperatures $\geq 48^{\circ}\text{C}$.

7.2 General

The pilot valves come factory-set to the pressure desired by the customer. If applicable, the pressure needs to be corrected during commissioning as differing flow volumes and oil viscosities can cause changes in the valve characteristics.

Do not install the valve at the crest of the hydraulic system as air may accumulate and cause dysfunctions.



! WARNING

Failure of pressure bearing parts due to overload

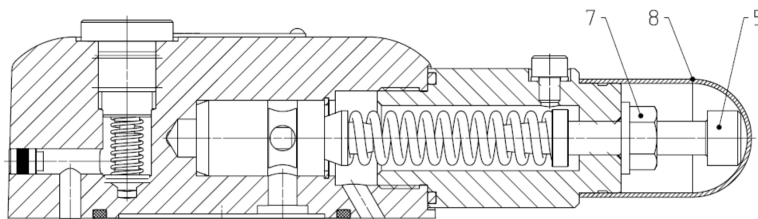
Risk of injury from flying parts.

Risk of injury caused by splashing fluids.

- a) Note the permissible pressure setting range of the valve.
- b) Check the pressure setting (the valve must not block).

7.3 Druckeinstellung

7.3.1 DV B und DV R



5 Adjustment screw

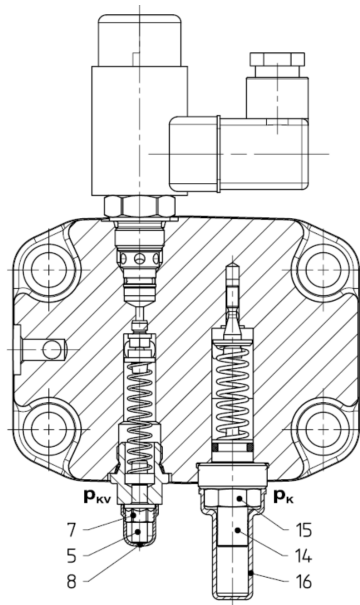
7 Protective cap

8 Collar nut

- a) Schutzkappe entfernen.
- b) Unscrew flange nut.
- c) Adjust pressure setting via the setscrew.
 - ⇒ Clockwise rotation = Pressure increase
 - ⇒ Counter-clockwise rotation = Pressure decrease
- d) Secure setscrew with union nut.
- e) Put on the protective cap.

7.3.2 DV S

Pressure stage 035



5 Adjustment screw

8 Protective cap

15 Collar nut

p_{Kv} 3...10 bar

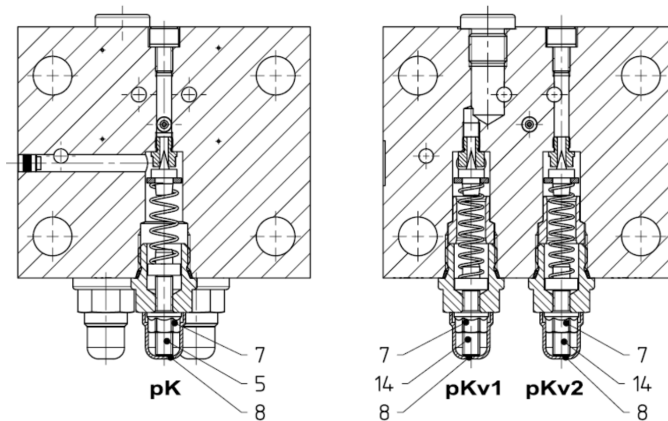
7 Collar nut

14 Adjustment screw

16 Protective cap

p_K 10...35 bar

Pressure stage 030



5 Adjustment screw

8 Protective cap

p_{Kv1} 6...20 bar

p_{Kv2} 8...22 bar

7 Collar nut

14 Adjustment screw

p_K 10...30 bar

- a) Schutzkappe entfernen.
- b) Unscrew flange nut.
- c) Adjust pressure setting via the setscrew.
 - ⇒ Clockwise rotation = Pressure increase
 - ⇒ Counter-clockwise rotation = Pressure decrease

- d) Secure setscrew with union nut.
 - e) Put on the protective cap.
-

7.4 Additional commissioning

- a) Open existing shut-off elements in front of and behind the product.
 - b) Vent the system at the highest possible point.
 - c) Check the operating data.
 - d) Document the operating data of the initial commissioning for later comparison.
 - e) Check all fittings for leaks and retighten if necessary.
-



TIP

Existing venting and drain plugs must always be closed during operation according to specification.



TIP

In order to ensure a constant and reliable function of the product, an initial maintenance of the product is recommended after several hours warm-up time (max. 24 h). This allows faults to be detected at an early stage.

8 Removal

8.1 Safety instructions for disassembly



DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Before carrying out any work, depressurise the product and all connection pipes.
- b) Securely prevent the pressure from being restored during work.



CAUTION

Hot surfaces

Burns of the skin on contact.

- a) At temperatures $\geq 48\text{ °C}$ allow the product to cool first.

8.2 General

- a) Depressurise and de-energise the system.
- b) Close existing shut-off elements in front of and behind the product.
- c) Open existing drain elements and undo connection lines. Collect and dispose of leaking media so that no hazard is created for persons or the environment.
- d) Dismantle the product.
- e) Clean the product.
- f) Seal the process connections and lines to prevent the ingress of dirt.



NOTICE

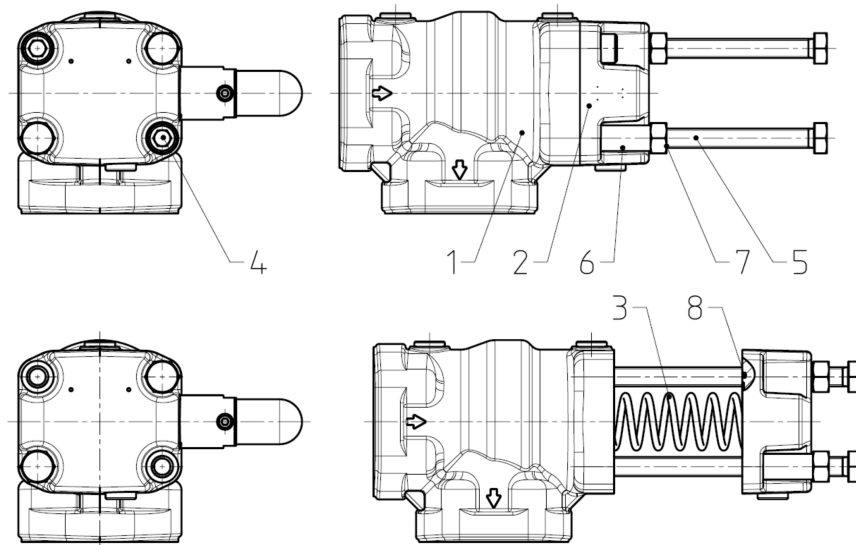
The concrete procedure for cleaning depends on the media being used.

- a) See the safety data sheet of the media in use.

8.3 Dismantling

A "disassembly kit" is required to disassemble and reassemble the valve.

The valve can be opened while attached to the piping by using the disassembly kit. However, to clean the valve it is recommended to remove the device from the piping.



- | | |
|----------------------|------------------------|
| 1 Main valve | 2 Pilot valve |
| 3 Compression spring | 4 Hexagon socket screw |
| 5 Hexagonal screw | 6 Spacer sleeve |
| 7 Hexagonal nut | 8 O-ring |

- a) Loosen and remove two opposite hexagon socket screws.
- b) Screw the hexagon screw together with the spacer sleeve and hexagon nut into the free threaded holes of the main valve.
- c) Manually tighten the hexagon screws and hexagon nuts.
- d) Loosen and remove the remaining hexagon socket screws.
- e) Loosen the hexagon nuts alternately by roughly 5 mm increments to detach the pilot valve from the main valve.
- f) Remove the hexagon screw from the main valve while the pressure spring is relaxed.
- g) Remove the pilot valve from the main valve.

8.3.1 Mounting:

- a) Pass two hexagon screws fitted with spacer sleeves and hexagon nuts through two diagonally opposite bores on the pilot valve and screw into the proper threaded bores of the main valve. Tighten manually.
 - b) Tighten the hexagon nuts alternately roughly by 5 mm increments to attach the pilot valve to the main valve.
 - c) O-ring seal must be installed correctly into the groove.
 - d) When the pilot valve is abutting the main valve, insert two hexagon socket screws into the free threaded holes and tighten manually.
 - e) Remove the hexagon screws together with the spacer sleeves and hexagon nuts.
 - f) Install the remaining hexagon socket screws.
 - g) Tighten the hexagon socket screw to a torque of 115 Nm.
-

9 Maintenance

9.1 Safety instructions for maintenance



DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



DANGER

Dismantling the valve cap

The valve cover stands under high spring pressure. Parts flying around uncontrolled or fluids squirting out lead to accidents with severe injuries or even result in death.

- a) The removal of the valve or the valve cover is not allowed.



WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Before carrying out any work, depressurise the product and all connection pipes.
- b) Securely prevent the pressure from being restored during work.



CAUTION

Hot surfaces

Burns of the skin on contact.

- a) At temperatures $\geq 48\text{ °C}$ allow the product to cool first.

9.2 Maintenance work



TIP

Checking and documentation of the operating data

Regular checking and documentation of all operating data helps to detect faults at an early stage.

- Perform the maintenance work according to specifications.
- Replace defective or worn components.
- If necessary, request spare parts lists and assembly drawings from the manufacturer.
- Document the type and scope of the maintenance work along with the operating data.
- Compare the operating data with the values of the initial commissioning.
In case of large deviations (> 10 %) determine the cause.
- Dispose of packaging materials and used parts according to local regulations.



NOTICE

Protective devices and notes

After maintenance and/or repair, reattach all protective devices and notices removed in the process to their original position.

9.3 Maintenance instructions

The following information provides recommendations for maintenance work and maintenance intervals for the product in use.

Depending on the actual loads occurring during operation, the type, scope and interval of the maintenance work may deviate from the recommendations. A mandatory maintenance plan must be drawn up by the installer/operating company.



TIP

In the course of preventive maintenance, it is advisable to replace wearing parts before the wear limit is reached.

With the appropriate know-how and sufficient equipment, the repair can also be carried out by the installer/operating company.

If necessary, request spare parts lists and assembly drawings from the manufacturer.
Please consult the manufacturer for this purpose.



NOTICE

Warranty

Any warranty will be void if not executed properly.

9.4 Maintenance table

9.4.1 Maintenance table

		First time after max. 24h	Daily	3000 operating hours	6000 operating hours	If necessary	Additional information
9.4.2	Check the operating pressure	2					
9.4.3	Check the media temperature	2					
9.4.4	Inspection valve function	2					
9.4.5	Check the condition of the operating fluid	2					
9.4.6	Check the equipotential bonding	2					
9.4.7	Noise test unusual noises		1				
9.4.8	Cleaning		1				
9.4.9	Visual inspection of leakage		1				
9.4.2	Check the operating pressure			2			
9.4.3	Check the media temperature			2			
9.4.4	Inspection valve function			2			
9.4.5	Check the condition of the operating fluid			2			
9.4.6	Check the equipotential bonding			2			
9.4.10	Visual inspection of valve condition				3		
9.4.11	Replacement valves					4	
9.4.12	Replace Other seals					5	

1 - 0,1 h; 2 - 0,2 h; 3 - 0,75 h; 4 - 0,5 h; 5 - 1 h

9.4.2 Check the operating pressure

The operating pressure is indicated by the pressure gauges.

- If there is no operating pressure, check the individual components of the product.
- Comply with the product-specific data sheets/operating instructions.

9.4.3 Check the media temperature

The media temperature is measured through the temperature sensor.

The values are displayed by the built-in controller in the electrical control system.

- If the media temperature is too high or too low, check the product components.
- Comply with the product-specific data sheets/operating instructions.

9.4.4 Inspection valve function

Attachment valves and valve cartridges must be actuated at regular intervals.

This is the only way to ensure proper function.

9.4.5 Check the condition of the operating fluid

Pay attention to colour (dark colouring), odour and milky turbidity.

- Replace operating fluid if necessary.

9.4.6 Check the equipotential bonding

Check the equipotential bonding for tight fit and proper functioning.

9.4.7 Noise test unusual noises

In this case, attention must be paid to increased noise or uneven operation (pump unit).

- In case of unusual noises, examine the individual components of the product and line fixings and check the operating medium for foaming.
- Comply with the product-specific data sheets/operating instructions.

9.4.8 Cleaning

Remove dust deposits and dirt with a damp, clean cloth.

9.4.9 Visual inspection of leakage

Care must be taken here to ensure that there is no leakage from the connections.

- In the event of leaks in the connections, the glands must be tightened and, if necessary, the seals replaced.

9.4.10 Visual inspection of valve condition

Valve cartridges and assembled valves are wearing parts. The components must be replaced if they are excessively worn. Important control points are the valve pistons and their housing with the mating surfaces.

9.4.11 Replacement valves

With the appropriate know-how and adequate equipment, the repair can also be carried out by the installer/operating company.

To this end, if necessary, request spare parts and assembly drawings from the manufacturer.

Only use spare parts approved by the manufacturer.

9.4.12 Replace Other seals

Repairs by manufacturer.

Consult the manufacturer.

10 Repair

10.1 Safety instructions for repairs



DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Before carrying out any work, depressurise the product and all connection pipes.
- b) Securely prevent the pressure from being restored during work.



CAUTION

Hot surfaces

Burns of the skin on contact.

- a) At temperatures $\geq 48\text{ °C}$ allow the product to cool first.

10.2 General

Corrective maintenance includes:

1. Troubleshooting
Finding damage, determining and localising the cause of the damage.
2. Damage repair
Removing the primary causes and replacing or repairing defective components. Repairs are generally carried out by the manufacturer.

Repair by the manufacturer

Before returning the product, fill out the return form. The form can be filled out online and is available to download as a pdf file or can be requested from the manufacturer.



NOTICE

Device contains hazardous substances

If the device has been operated with hazardous fluids it must be cleaned before it is returned. If this is not possible, the safety data sheet of the hazardous material must be provided in advance.

Repair by the installer/operating company

With the appropriate know-how and sufficient equipment, the repair can also be carried out by the installer/operating company. Please consult the manufacturer for this purpose.

- a) If necessary, request spare parts lists and assembly drawings from the manufacturer.
- b) Only use spare parts approved by the manufacturer.
- c) Dispose of packaging materials and used parts according to local regulations.



NOTICE

Warranty

Any warranty will be void if not executed properly.



NOTICE

Protective devices and notes

After maintenance and/or repair, reattach all protective devices and notices removed in the process to their original position.

10.3 Fault table

Fault	Potential causes	Possible measures
Increased noise		
Mechanical vibrations	Wobbling pressure relief valve	Increase valve opening pressure
	Air in the spring chamber	Vent the system
	Air in the spring chamber due to negative pressure at tank connection	Adapt installation situation
Leakage		
Seal failure	Lack of maintenance	Comply with maintenance intervals
		Replace seals
	Mechanical damage	Replace seals
	Thermal overload	Check operating data
		Replace seals
	Corrosion/chemical degradation	Check material compatibility
		Replace seals
Flange faces broken	Replace the product and/or flanges	
Valve does not respond		
	Valve blocked	Adjust valve
		Comply with the adjustment
Response pressure too high		
	Valve slide/valve seat/valve cone tight or jammed (Contaminated medium)	Clean the device
		Replace the device
		Provide filtration
Consult the manufacturer in the event of unidentifiable faults		