Pressure reducing valve type CLK

Product documentation

Screw-in valve, versions with single connection block

Operating pressure p_{max}:	500 bar
Flow rate Q_{max}:	22 lpm

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HAWE HYDRAULIK

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1 Overview of pressure reducing valves type CLK

Pressure reducing valves are a type of pressure valve. They maintain a largely constant outlet pressure even at a variable (higher) inlet pressure. In hydraulic systems with multiple consumers, each individual consumer can be assigned a pressure reducing valve. This way, each consumer's pressure can be set to a lower level separately.

The pressure reducing valve type CLK features override compensation. If external forces cause secondary pressure to exceed the set value, it will thus act as a pressure-limiting valve.

The type CLK is a screw-in model and can thus be easily integrated into custom manifolds. Special versions are available for use at low pressure settings or with low pressure dependence, e.g. when pump (inlet) pressure is highly variable.

Pressure reducing valve type CLK

Features and benefits

- Zero leakage when closed
- Connection blocks for pipe connection
- Zinc-nickel corrosion protection as standard

Intended applications

- Machine tools
- Brake controls
- Test benches
- Testing machinery

2 Available versions

2.1 Basic version screw-in valve

Circuit symbol

Ordering example

CLK 3 CLK 32	-2 -51	R	-180 -20

Pressure setting (bar)

2.1.3 "Pressure adjustment"

2.1.2 "Pressure range"

2.1.1 "Basic type and size"

NOTE

If no pressure setting is stated, the valve is set to the maximum value of the corresponding pressure range ex-works.

2.1.1 Basic type and size

Type	Description	Max. operating pressure p_{max} (bar)	Max. flow rate Q_{max} (lpm)
CLK 3	Standard version, can be used for any application	500	12
CLK 32	Version with low pressure dependence on changing pump inlet pressure and for usage at low pressure settings	500	6
CLK 35	Version with low flow resistance, however with higher pressure dependence on changing pump inlet pressures	500	22

2.1.2 Pressure range

Type	Pressure range p_A from ... to (bar)					
	-1	-11	-2	-21	-5	-51
CLK 3	30 to 300	30 to 380	20 to 200	20 to 250	15 to 130	15 to 165
CLK 32	18 to 300	18 to 380	12 to 200	12 to 250	8 to 130	8 to 165
CLK 35	70 to 300	70 to 380	50 to 200	50 to 250	30 to 130	30 to 165

2.1.3 Pressure adjustment

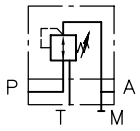
Coding	Description	Circuit symbol
Without coding	Fixed, tool adjustable	
R	Manually adjustable, with lock nut	
H	Turning knob, lockable	

2.2 Version with single connection block for pipe connection

CLK 3 | **-5** | **R** | **-100** | **-1/4**

- -1/4 → 2.2.1 "Connection block"
- -100 → **Pressure setting (bar)**
- R → 2.1.3 "Pressure adjustment"
- -5 → 2.1.2 "Pressure range"
- CLK 3 → 2.1.1 "Basic type and size"

2.2.1 Connection block

Coding	Description	Connection	Circuit symbol
-1/4	▪ Pipe connection	G 1/4	
-9/16-18 UNF		9/16-18 UNF	
-1/4-18 NPTF		1/4-18 NPTF	

3 Parameters

3.1 General data

Designation	Directly controlled pressure reducing valve, with overpressure function
Design	Ball seated valve
Model	Screw-in valve, valve for pipe connection
Material	▪ Screw-in valve: steel, ZnNi coated ▪ Connection blocks: steel, ZnNi coated or galvanised ▪ Hardened and ground functional inner parts
Installation position	As desired
Tightening torque	see Chapter 4, "Dimensions"
Ports/connections	▪ P = input (pump side or primary side) ▪ A = consumer (secondary side) ▪ M = pressure gauge connection ▪ T = tank connection **NOTE** Markings apply to hydraulic schematics and assembly plans only. The markings are not stamped onto the valve housing. The ports are stamped on the versions for pipe connection.
Flow direction	P → A: pressure reducing function A → P: only possible if the pressure on the pump side is lower than the consumer pressure. **NOTE** In the case of flow rates of A → P with more than $Q_{P \rightarrow A\ max}$ or if pressure surges or pressure pulsations are to be expected, a separate bypass check valve needs to be used.
Hydraulic fluid	Hydraulic fluid, according to DIN 51 524 Parts 1 to 3; ISO VG 10 to 68 according to DIN ISO 3448 Viscosity range: 4 - 1500 mm²/s Optimal operating range: approx. 10 - 500 mm²/s Also suitable for biologically degradable hydraulic fluids type HEPG (polyalkylene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C.
Cleanliness level	**ISO 4406** 21/18/15...19/17/13
Temperatures	Environment: approx. -40 to +80 °C, hydraulic fluid: -25 to +80 °C, pay attention to the viscosity range. Start temperature: down to -40°C is permissible (observe start viscosities) as long as the steady-state temperature is at least 20K higher during subsequent operation. Biologically degradable hydraulic fluids: note manufacturer specifications. With consideration for the seal compatibility, not above +70°C.

3.2 Weight

3.2.1 Weight of screw-in valve

Screw-in valve	**Type**	
	CLK..	= 0.7 kg

3.2.2 Weight of single connection blocks

Version with single connection block	**Coding**	
	- 1/4	= 1.3 kg
	- 9/16-18 UNF	= 1.3 kg
	- 1/4-18 NPTF	= 1.3 kg

3.3 Pressure and volumetric flow

Operating pressure

- Pump side $p_{p\ max}$ = 500 bar
- Consumer side $p_{A\ max}$, see Chapter 2.1.2, "Pressure range"
- Reflux $p_T \leq 20$ bar

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.

Type	Pressure range (bar)			
	-08 -081	**-1 -11**	**-2 -21**	**-5 -51**
CLK 3	± 1.3	± 0.9	± 0.6	± 0.4
CLK 32	± 0.7	± 0.45	± 0.3	± 0.23
CLK 35	± 2.7	± 1.7	± 1.2	± 0.8

p_p ± 10 bar results in a pressure change for A of p_A

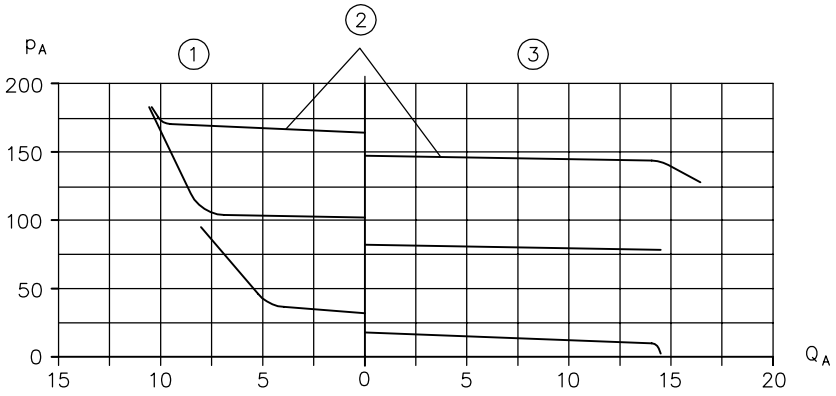
Flow rate

$Q_{P\rightarrow A\ max}$	= 6 lpm	(CLK 32)
	= 12 lpm	(CLK 3)
	= 22 lpm	(CLK 35)
$Q_{A\rightarrow P\ max}$	= 25 lpm	see Chapter 3.1, "General data" Information concerning flow direction
$Q_{A\rightarrow T\ max}$	see Chapter 3.4, "Characteristic lines"	

3.4 Characteristic lines

Oil viscosity approximately 60 mm²/s

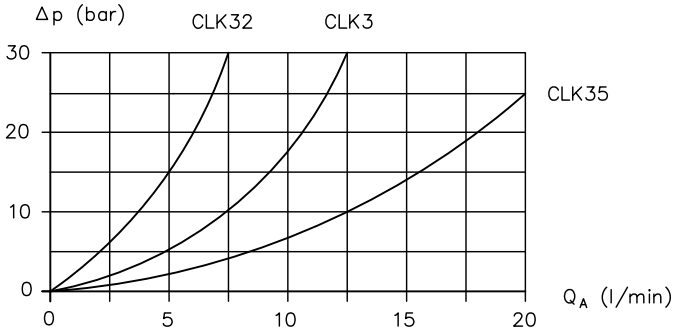
p_A - $Q_{P \rightarrow A}$ - characteristic lines



1 Overpressure function
2 Same pressure setting
3 Pressure reducing function

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

Δp-Q characteristic line P → A or A → P



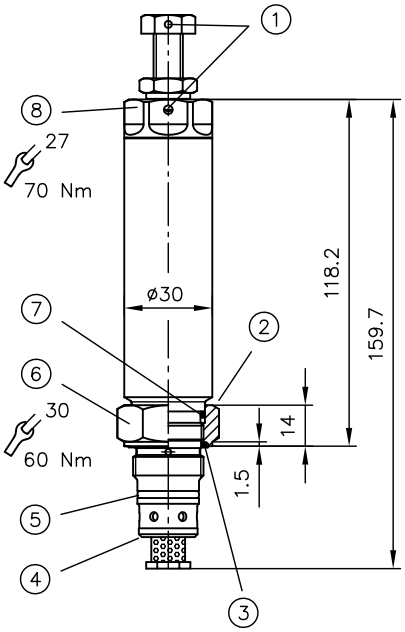
DAMAGE
Note information concerning flow direction (see Chapter 3.1, "General data").

4 Dimensions

All dimensions in mm, subject to change.

4.1 Basic version screw-in valve

CLK 3..

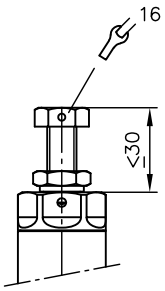


1 Sealing option
2 Stopper
3 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52x26.88x1.68
4 Sealing nut
5 O-ring 18.77x1.78 P 5001
6 Sealing nut
7 O-ring 21.95x1.78 AU 90 S
8 Valve housing

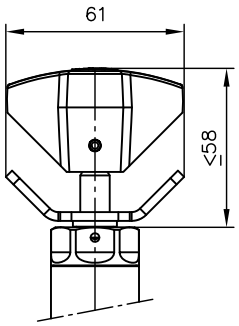
DAMAGE
Note information on thread and mounting hole counterbore (see Chapter 5.2, "Assembly information").

Adjustment

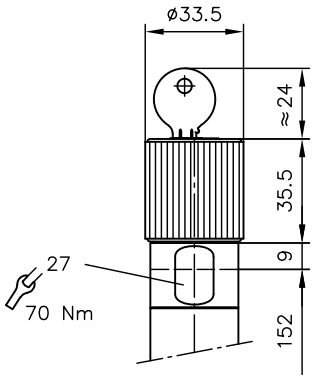
Without coding



Coding **R**

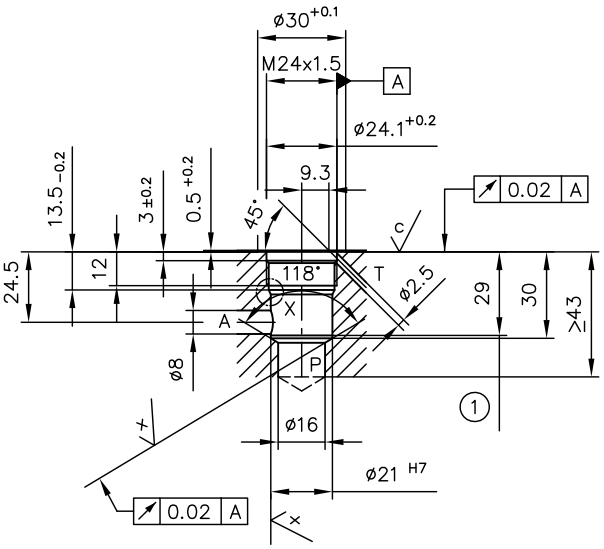


Coding **H**

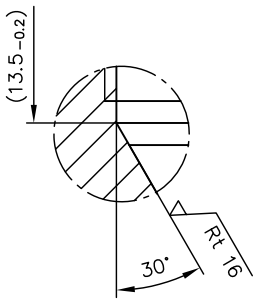


Mounting hole

- Location for sealing (inlet to outlet): at the contact area between the facial sealing edge of the tapped journal of the valve housing and the stepped shoulder of the tapping hole of the location thread.
- Drilling the stepped shoulder: Use the normal drill sharpening angle of 118°.
- Therefore reaming of the hole and bevels to help the seals slip in are not necessary.
- The screwed-in valve is sealed against and locked to the device body using a sealing nut with a fitting seal and O-ring.



Detail "X"



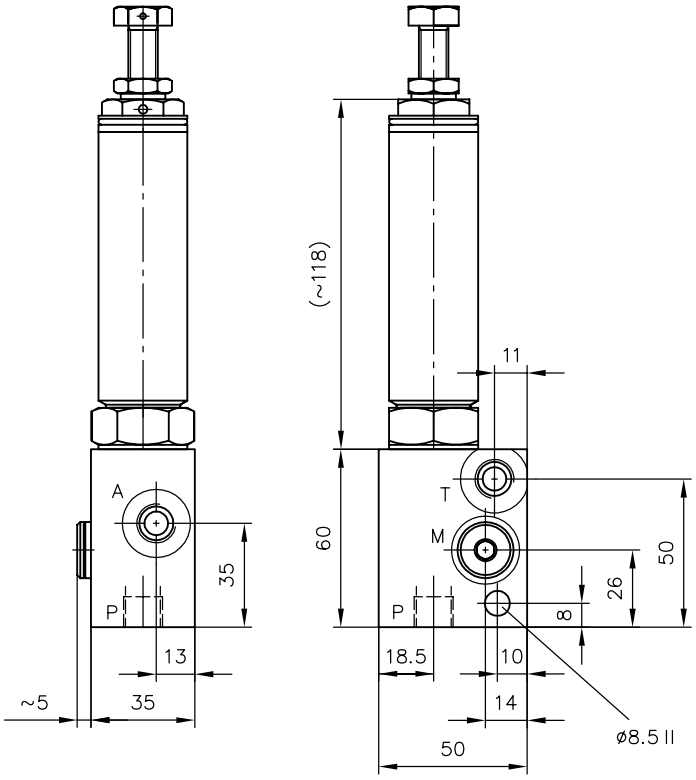
1 Reaming depth

NOTE

Counterbore $0.5^{+0.2}$ (max. ∅$30^{+0.1}$) only necessary for pressures at A beyond 100 bar.

4.2 Version with single connection block for pipe connection

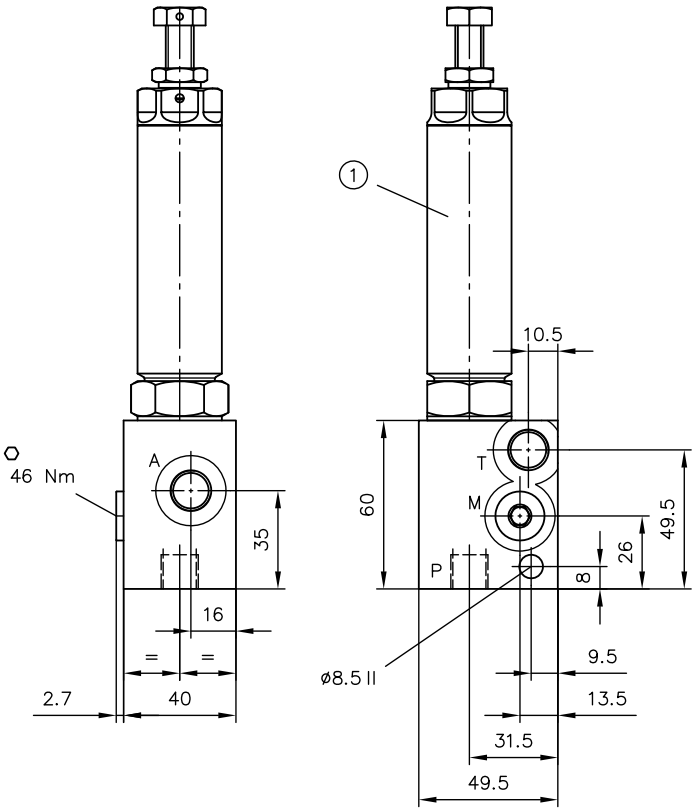
CLK 3.. - 1/4



1 Screw-in valve, see Chapter 4.1, "Basic version screw-in valve"

Coding	Ports P, A, M, T	
- 1/4	G 1/4	ISO 228-1

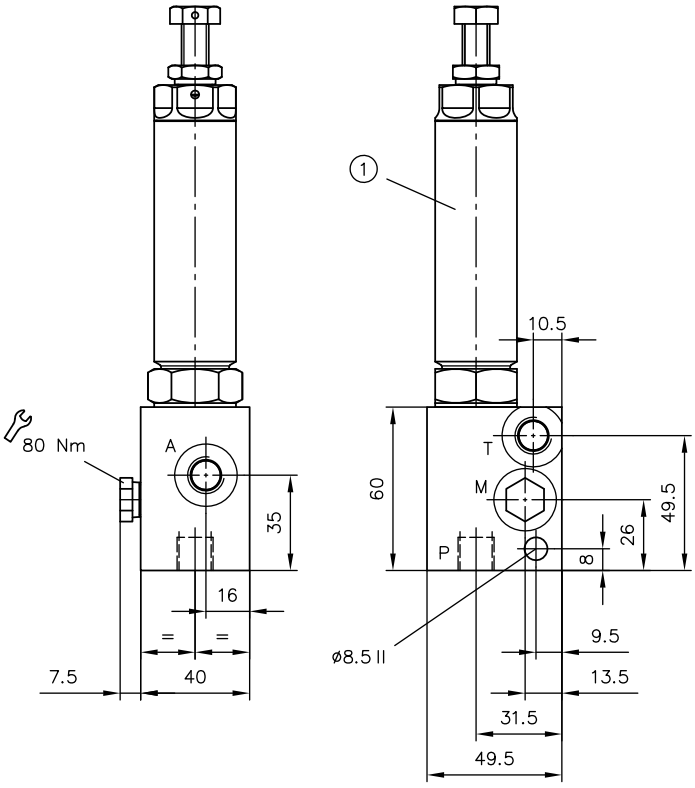
CLK 3.. - 9/16-18 UNF



1 Screw-in valve, as per Chapter 4.1, "Basic version screw-in valve"

Coding	Ports P, A, M, T	
- 9/16-18 UNF	9/16-18 UNF	ANSI B1.1, SAE-6

CLK 3.. - 1/4-18 NPTF



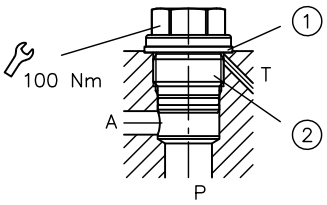
1 Screw-in valve, as per Chapter 4.1, "Basic version screw-in valve"

Coding	Ports P, A, M, T	
- 1/4-18 NPTF	1/4-18 NPTF	ANSI B1.20.3

4.3 Tapped plugs

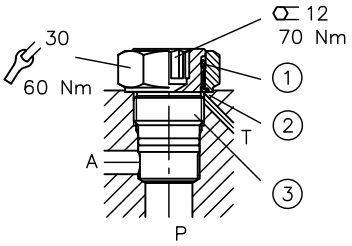
The mounting holes can be sealed with tapped plugs if necessary; for example, if the assembly of standardised basic bodies is to be carried out with or without screw-in valves as required.

Passage open



1 Sealing ring A25x30x2 DIN 7603-Cu
2 Tapped plug order no. 7745 405

Passage closed



1 O-ring 21.95x1.78 AU 90 Sh
2 KANTSEAL DKAR00021-N90 NBR 90 Sh 23.52x26.88x1.68
3 Tapped plug and locking tapped plug complete, order no. 7745 455

5 Installation, operation and maintenance information

Observe the document B 5488 “General operating instructions for assembly, commissioning, and maintenance.”

5.1 Intended use

This product is intended exclusively for hydraulic applications (fluid technology).

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

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 specialist personnel.
- ► The product must only be operated within the specified technical parameters described in detail in this document.
- ► All components must be suitable for the operating conditions when using an assembly.
- ► The operating instructions for the components, assemblies and the specific complete system must also always be observed.

If the product can no longer be operated safely:

1. 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 and compliant connection components (screw fittings, hoses, pipes, fixtures etc.).

The product must be shut down correctly prior to disassembly (in particular in combination with hydraulic accumulators).

⚠ **DANGER**

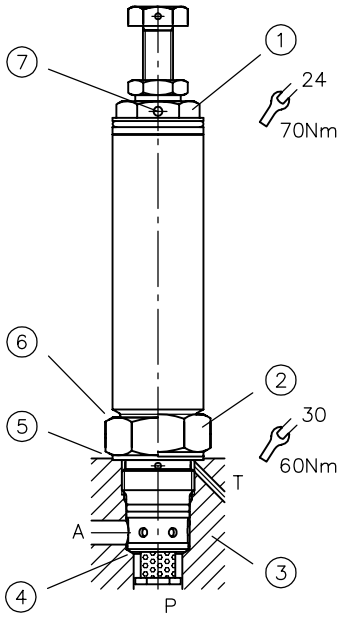
Sudden movement of the hydraulic drives when disassembled incorrectly

Risk of serious injury or death

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

5.2.1 Screwing in the screw-in valve

1. Before screwing in the valve, loosen the lock nut and sealing nut all the way to the travel stop.
2. Screw in the valve and tighten to the specified torque. The metallic sealing of the inlet to the outlet is formed between the facial sealing edge of the valve and the shoulder of the stepped hole in the basic body.
3. Tighten lock nut and sealing nut to specified torque.



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

5.2.2 Setting the pressure

CAUTION

Overloading components due to incorrect pressure settings.

Risk of minor injury.

- Pay attention to the maximum operating pressure of the pump and the valves.
- Always monitor the pressure gauge when setting and changing the pressure.

NOTE

If no pressure setting is stated, the valve is set to the maximum value of the corresponding pressure range ex-works.

Reference values for pressure adjustment

Coding	Δp/revolution (bar/R)	Coding	Δp/revolution (bar/R)
1	25	**11**	31
2	16	**21**	20
5	10	**51**	12

5.2.3 Creating the mounting hole

see "Mounting hole" in Chapter 4.1, "Basic version screw-in valve"

5.3 Operating instructions

Observe product configuration and pressure/flow rate.

The statements and technical parameters in this document must be strictly observed.
The instructions for the complete technical system must also always be followed.

DAMAGE

- ► Read the documentation carefully before usage.
- ► The documentation must be accessible to the operating and maintenance staff at all times.
- ► Keep documentation up to date after every addition or update.

CAUTION

Overloading components due to incorrect pressure settings.
Risk of minor injury.

- Pay attention to the maximum operating pressure of the pump and the valves.
- Always monitor the pressure gauge when setting and changing the pressure.

Purity and filtering of the hydraulic fluid

Fine contamination can significantly impair the function of the product. Contamination can cause irreparable damage.

Examples of fine contamination include:

- Swarf
- Rubber particles from hoses and seals
- Dirt due to assembly and maintenance
- Mechanical debris
- Chemical ageing of the hydraulic fluid

DAMAGE

New hydraulic fluid from the manufacturer may not have the required purity.
Damage to the product is possible.

- ► Filter new hydraulic fluid to a high quality when filling.
- ► Do not mix hydraulic fluids. Always use hydraulic fluid that is from the same manufacturer, of the same type, and with the same viscosity properties.

For smooth operation, pay attention to the cleanliness level of the hydraulic fluid (cleanliness level see Chapter 3, "Parameters").

Additionally applicable document: D 5488/1 Oil recommendations

5.4 Maintenance information

Check regularly (at least once a year) by visual inspection whether the hydraulic connections are damaged. If external leakages are found, shut down and repair the system.

Clean the surface of the device regularly (at least once a year) (dust deposits and dirt).

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

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 incident sunlight) 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.

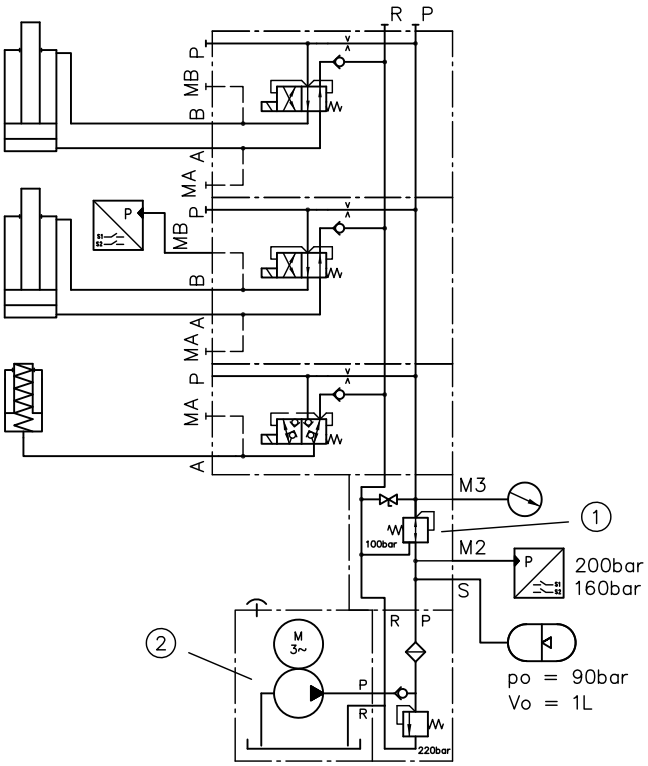
These effects are particularly noticeable with short, rigid pipe connections. Hose lines and additional volume (e.g. AC 13 miniature accumulator in accordance with D 7571) help to compensate such (negative) pressure fluctuations.

The above applies because of the ratio of thermal expansion coefficient to coefficient of compressibility (in theory 1:10, i.e. $\Delta T = 1K \rightarrow \Delta p \approx 10$ bar). As consumers, pipelines and hose lines 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

KA 28 1 S K/Z5.2
- A14/220
- BVH 11 LZD55/100/5 - AC 1002/90/22
- BVH 11 W /GM /R
- 1
- X24
- 3~400V 50Hz



1 Type CLK 3 - 1-100
2 Pump Q = 5 lpm

References

Additional versions

- Pressure-reducing valve type CDK: D 7745
- Pressure-reducing valve type DK, DZ and DLZ: D 7941
- Pressure-reducing valve type ADM: D 7120
- 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

Application

- 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

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