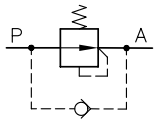
Pressure reducing valve type CDK

2/2-way design
for screwing into simple tapped holes (basic type)
or complete with connection blocks for pipe connection or manifold mounting

Further versions

• Pressure limiting valve type CMV, CSV	D 7710 MV
• Shut-off valve type CNE	D 7710 NE
• Throttle and shut-off type CAV	D 7711
• Check valve type CRK, CRB, CRH	D 7712
• Pressure-dependent shut-off valves type CDSV	D 7876
• Throttle and restrictor check valves type CQ, CQR, and CQV	D 7713
• Flow control valves type CSJ	D 7736
• Pressure reducing valves with tracked pressure switch type DK	D 7941

Pressure	$p_{max\ P}$ = 500 bar
	$p_{max\ A}$ = 500 bar
Flow	Q_{max} = 22 lpm



Basic type
(cartridge valve)

Version with connection block for direct pipe connection

1. General

The main purpose of pressure reducing valves utilized in a hydraulic system is to maintain a rather constant pressure on the consumer side (secondary pressure) even when the pressure at the inlet side (primary pressure) is higher and varying.
The common pressure reducing valves (spool design) require a return connection as there is always leakage. Whereas type CDK is designed as a 2/2-way valve acting like a seated valve in idle position.

Basic type (Cartridge valves):

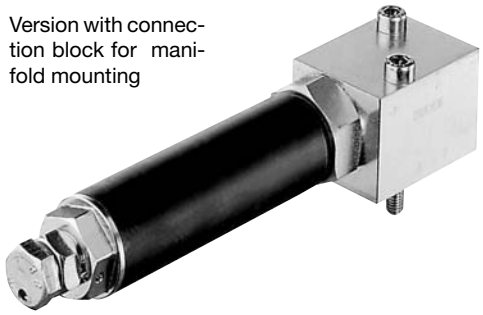
Type CDK 3	Standard version, usable for all applications.
Type CDK 32	Version with low pressure dependence intended for varying pump pressure and use at low pressure settings (Attention: Max. flow 6 lpm).
Type CDK 35	Version with low back pressure, but with higher sensivity to varying pump pressure.

For the characteristic differences of these valves, refer to table 1 in sect. 2.1 as well as "Pressure dependence" in sect. 3.
A reversed flow A→P of the open valve is possible as soon as the pressure on the primary side P drops below the one on the secondary side A. The illustration of the symbol is with a check valve on this page. This is omitted for the sake of simplicity in the rest of the pamphlet.
These valves are to be screwed into simply shaped tapped holes of a manifold body. The sealing of the inlet to outlet takes place at the contact area between the facial sealing edge of the screwed-in end of the valve body and the stepped shoulder of the core diameter at the location thread. Any standard steel drill (point angle 118°) automatically forms this stepped shoulder when the core diameter is drilled. Therefore reaming of the hole and bevels to help the seals slip in are not necessary. The sealing of the attached valve and its fixing at the manifold body are made by a sealing nut with a special thread seal and an O-ring.

Versions with connection blocks:

- For pipe connection (with/without pressure limiting valve)
- For manifold mounting (with/without pressure limiting valve)
- For manifold mounting (with/without pressure limiting valve) including adapter for direct pipe

Version with connection block for manifold mounting



2. Available versions, main data

2.1 Basic type (cartridge valve)

Example: **CDK 3 - 2 R - 180**
CDK 32 - 081 - 480

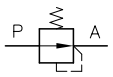
Pressure setting (bar) [1])

Adjustment:

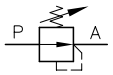
No coding.	Tool adjustable
R	Manually adjustable
H	Turn knob lockable

Symbol [2])

Tool adjustable



Manually adjustable



Lockable

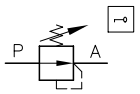


Table 1: Basic type

Basic type	Flow Q_{max} (lpm)	Pressure range from ... to (bar)							
		-08	**-081**	**-1**	**-11**	**-2**	**-21**	**-5**	**-51**
CDK 3	12	50...450	50...500	30...300	30...380	20...200	20...250	15...130	15...165
CDK 32	6	30...450	30...500	18...300	18...380	12...200	12...250	8...130	8...165
CDK 35	22	110...450	110...500	70...300	70...380	50...200	50...250	30...130	30...165

[1]) If no desired pressure specification is indicated, the valve will be set at HAWE to the max. pressure of the respective pressure range

[2]) The check valve function in direction A→P is not illustrated for the sake of simplicity (see description in sect. 1)

2.2 Version with connection block for pipe connection

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

Basic type (cartridge valve) acc. to sect. 2.1

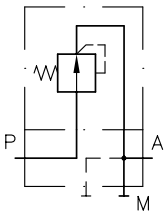
Pressure specification (bar) for the pressure limiting valve

Table 2: Connection blocks

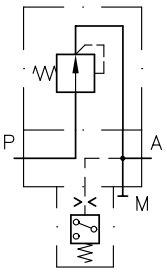
Connection block	Optional components: Pressure switch – Coding	Type acc.to D 5440	Adjustment range (bar)
- 1/4	**- DG 33**	DG 33	200 ... 700
	- DG 34	DG 34	100 ... 400
	- DG 35	DG 35	40 ... 210
	- DG 36	DG 36	4 ...12
	- DG 364	DG 364	4 ... 50
	- DG 365	DG 365	12 ... 170
Ports A, P, and M = G1/4 DIN ISO 228/1 (BSPP)	Pressure limiting valve type MVF 4.. acc. to D 7000 E/1 – coding	Adjustability during service	
	S	Tool adjustable	
	SR	Manually adjustable	

Symbols

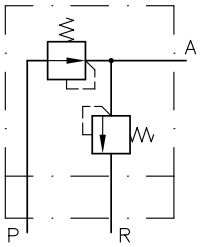
.. - 1/4



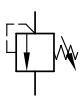
.. - 1/4 - DG ..



.. - 1/4 S



.. - 1/4 SR



2.3 Version with connection block for manifold mounting

Example:

CDK 35 - 5 R **- P** - 100
CDK 3 - 2 **- SP** - 180**/300**
CDK 3 - 2 **- SP** - 180**/300 - 1/4**

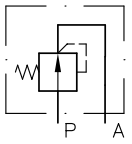
Basic type (cartridge valve) acc. to sect. 2.1

Table 3: Connection block, pressure limiting valve

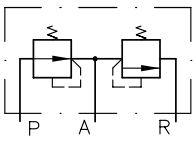
Coding	Pressure limiting valve	Adjustability during service
- P	Without	
- SP	Type MVF 4.. acc. to D 7000 E/1	Only tool adjustable vers.!

Symbols

.. - P

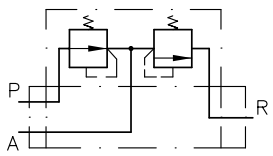


.. - SP



Pressure specification (bar) for the pressure limiting valve

Table 4: Adapter plate (connection block) for direct pipe connection

Coding	Ports P, R, and A	Symbols
- 1/4	G 1/4 DIN ISO 228/1 (BSPP)	

3. Further characteristic data

Nomination	Directly controlled pressure reducing valve, leakagefree in idle position
Design	2/2-way directional ball seated valve
Material	Steel body gas nitrided, sealing nut galv. zinc plated, internal functional parts hardened and ground, balls made of bearing quality steel
Installation position	Any
Port coding	P = Inlet (pump or primary side) A = Consumer (secondary side) M = Pressure gauge R = Tank (return) Intended only for circuit and assembly plans. Port coding is only stamped at the connection block of the version for direct pipe connection or for manifold mounting. This coding is not stamped at the cartridge valve alone!
Permissible pressure	Pump side $p_{P\,max}$ = 500 bar Consumer side $p_{A\,max}$ see table 1, max. 500 bar Return p_R ≤ 20 bar
Static overload capacity	approx. 2 x p_{max} at tightened state and with sealing nut locked
Flow	$Q_{P\rightarrow A\,max}$ = 6 lpm (CDK 32) 12 lpm (CDK 3) 22 lpm (CDK 35) $Q_{A\rightarrow P\,max}$ = 25 lpm (see note at "Direction of flow")
Direction of flow	P→A (Pressure reducing function) A→P This only occurs if the pressure on the primary side is lower than on the consumer side. **Attention:** A by-pass check valve is recommended if the flow A→P exaggerates the specification for $Q_{p\rightarrow Amax}$ or pressure peaks or pulsation are anticipated.
Pressure fluid	Hydraulic oil conforming DIN 51514 part 1 to 3: ISO VG 10 to 68 conforming DIN 51519. Viscosity limits: min. approx. 4, max. approx. 1500 mm^2/s; opt. operation approx. 10... 500 mm^2/s. Also suitable are biologically degradable pressure fluids types HEPG (Poly-alkylenglycol) and HEES (Synth. Ester) at service temperatures up to approx. +70°C
Temperature	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 con-sideration of the compatibility with seal material not over +70 °C.

Further characteristic data

Pressure specification

The pressure setting p_A will be set in the factory with $p_P \approx 1.1\ p_A$.

Pressure alternations

The actual pressure p_A being received will vary slightly as it directly depends on the pressure at the primary side p_P due to a internal design based ratio.

Pressure change Δp_A (bar) at p_p ± 10 bar

Basic type	Pressure range			
	-08 -081	-1 -11	-2 -21	-5 -51
CDK 3	± 1.3	± 0.9	± 0.6	± 0.4
CDK 32	± 0.7	± 0.45	± 0.3	± 0.2
CDK 35	± 2.7	± 1.7	± 1.2	± 0.8

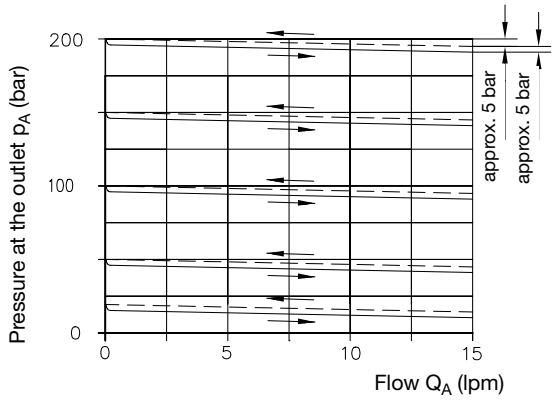
$$\Delta p = \frac{(p_p - p_a)}{10} \cdot k = 1{,}3$$

Curves

p_A - $Q_{P\rightarrow A}$ - curves

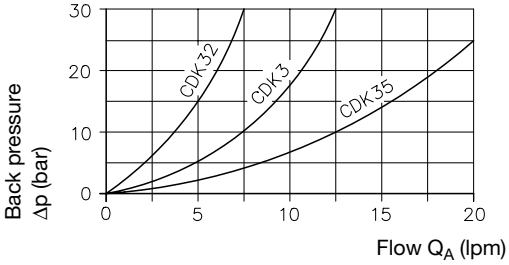
The set pressure applies to flow $Q_{P\rightarrow A} \rightarrow 0$ lpm. With flow Q > 0, i.e. the consumer is moving, the pressure on the secondary side p_A will drop slightly. This effect can be usually neglected during service.

Note: A pressure gauge should be used whenever the pressure setting is adjusted or altered!



Δp - Q - curve
P→A or A→P

Attention:
Obey the note
in "Direction of flow" (page 3)



Mass (weight)

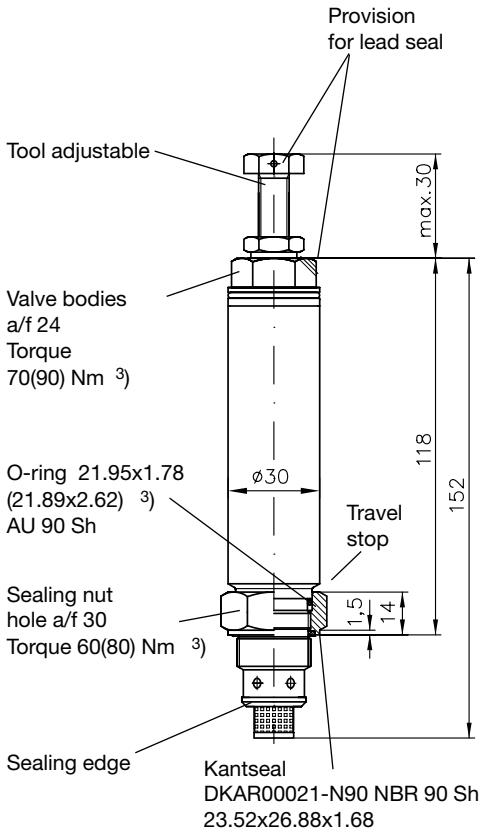
Basic type (cartridge valve)	Type CDK..	= 0.7 kg
Combinations with connection block::	Type CDK..-.. -1/4	= 1.3 kg
	-1/4-DG..	= 1.6 kg
	-1/4 S(SR)	= 1.6 kg
	-P	= 1.1 kg
	-SP	= 1.6 kg
	-P-../..-1/4	= 1.5 kg
	-SP-../..-1/4	= 2.0 kg

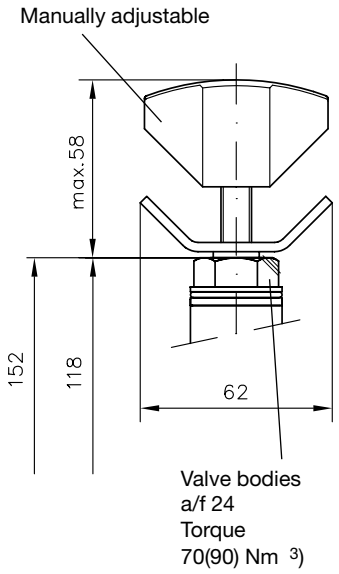
4. Unit dimensions

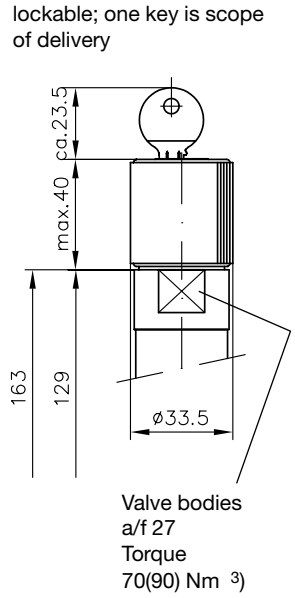
All dimensions are in mm and are subject to change without notice!

4.1 Basic type (cartridge valve)

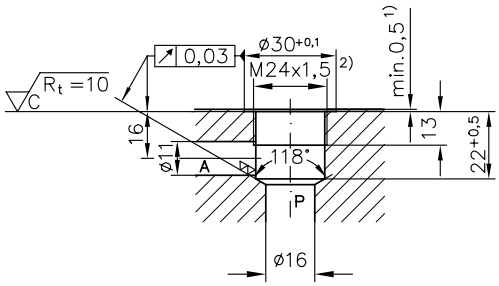
Type CDK 3, CDK 32, and CDK 35







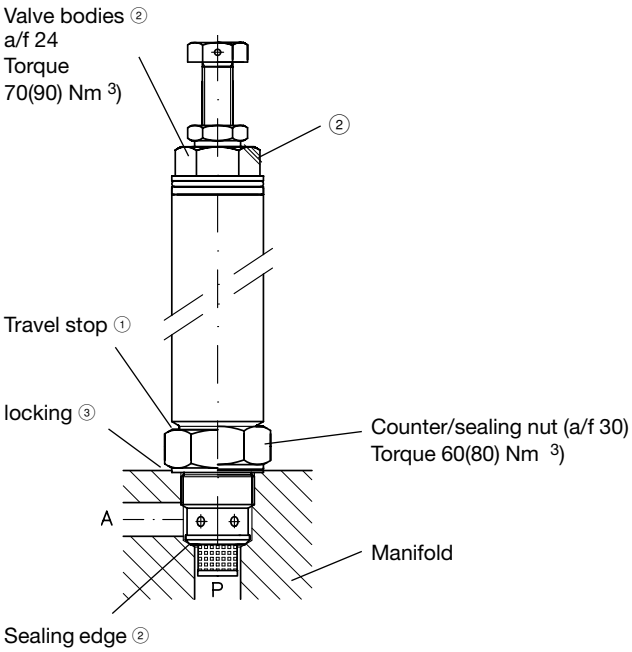
Mounting hole
(tapped plugs see page 7)



Pressure adjustment (guidline)
Attention: Any pressure re-adjustment should be monitored with a pressure gauge !

Coding	Δp/revolution (bar/rev)	Coding	Δp/revolution (bar/rev)
08	37	081	46
1	25	11	31
2	16	21	20
5	10	51	12

Assembly notes



① Before screwing the valve body into the manifold slacken the counter /sealing nut until the travel stop.

② Screw in the valve body (a/f 24) and tighten with the correct torque. The metallic sealing of the inlet to the outlet takes place at the contact area of the facial sealing edge and the stepped shoulder of the core diameter at the location thread.

③ Retighten the counter/sealing nut (a/f 30) with the correct torque.

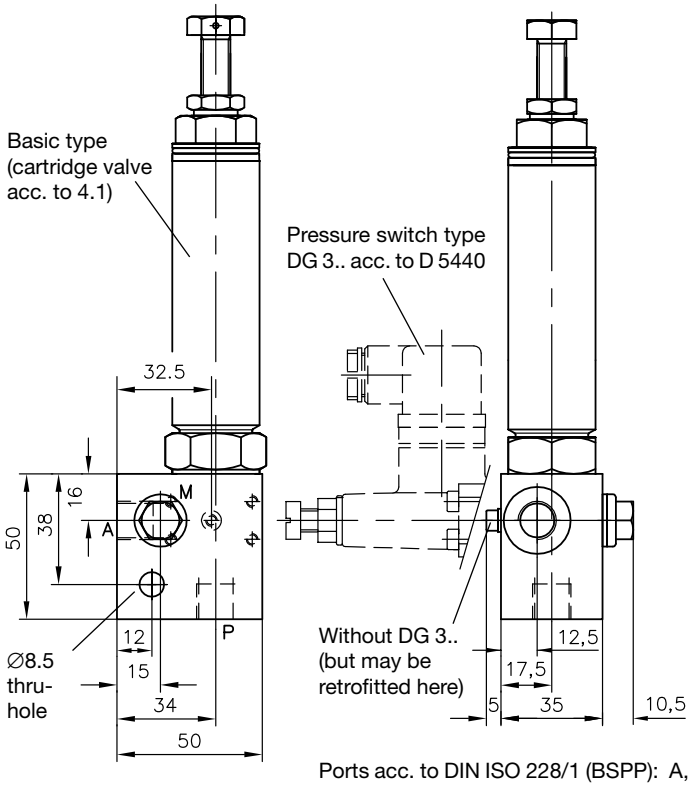
1) If pressure at A exceeds 100 bar a counter bore is required to allow proper sealing!

2) Thread counter bore max. ∅24+0.2

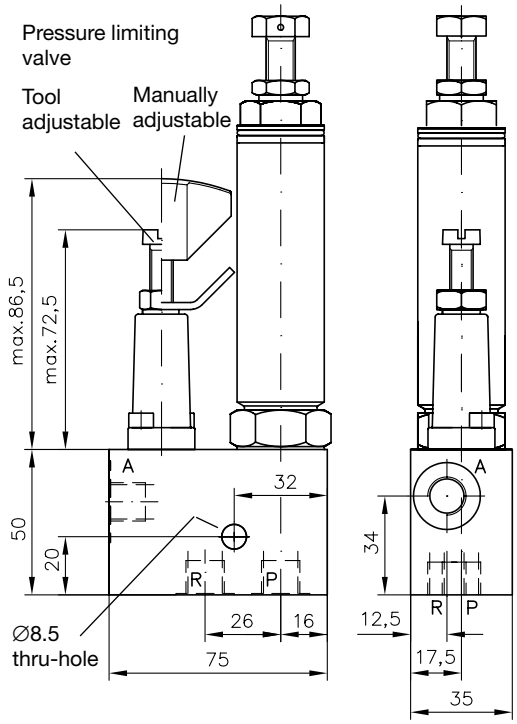
3) Figures in brackets apply to type CDK 3-08 (-081)

4.2 Version with connection block for pipe connection

Type CDK 3(32, 35) - .. - 1/4 and CDK 3(32, 35) - .. - 1/4 - DG..



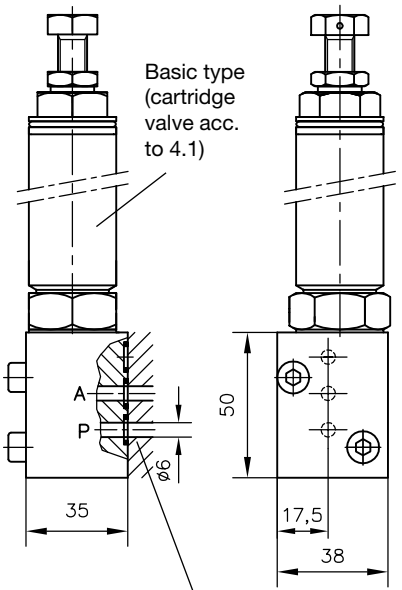
Type CDK 3(32, 35) - .. - 1/4 S(SR)



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

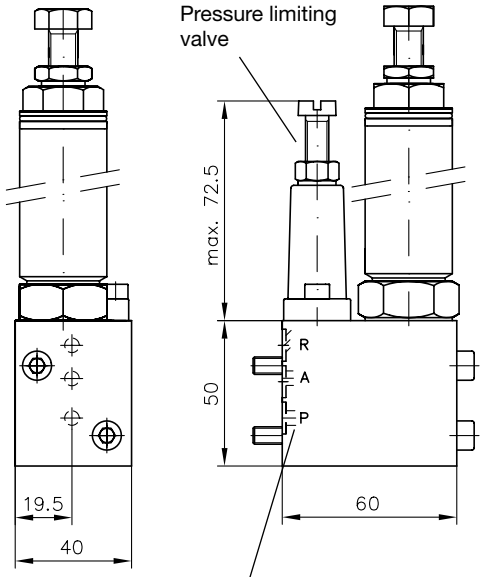
4.3 Version with connection block for manifold mounting

Type CDK 3(32, 35) - .. - P



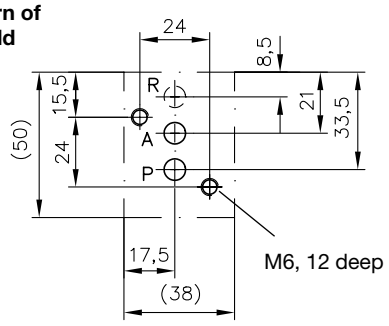
Ports acc. to DIN ISO 228/1 (BSPP):
A, P, and R = G 1/4

Type CDK 3(32, 35) - .. - SP



Sealing via O-rings 7.65x1.78 NBR 90 Sh
(The hole pattern is equal to type ADM 11 P acc. to D 7120. The O-ring-cavety exists for drain line R (or L). Here only needed with type CDK..-SP).

Hole pattern of the manifold
(top view)

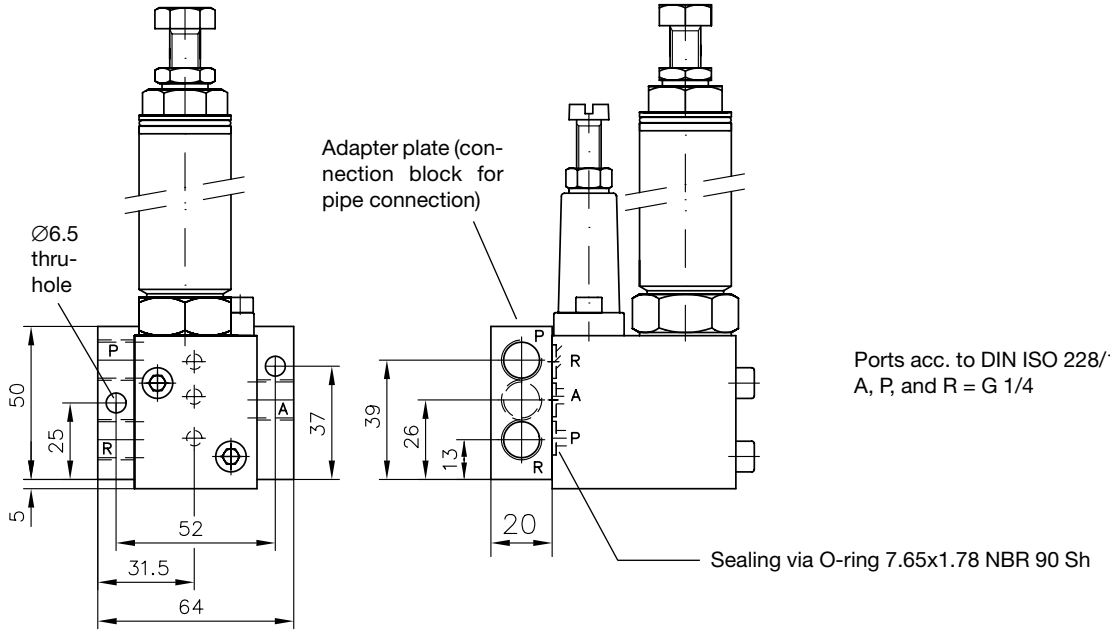


Pressure adjustment pressure limiting valve

Pressure range (bar/rev)	Δp/revolution (bar/rev)
... 500	100
... 315	55
... 160	19
... 80	9.5

For pressure adjustment of the pressure reducing valve, see sect. 4.1!

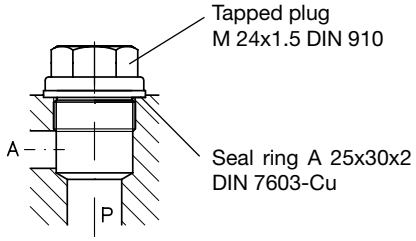
Type CDK 3(32, 35) - .. - SP - ../.. - 1/4
(Type CDK 3(32, 35) - .. - P - ../.. - 1/4 analogous)
For missing dimensions see page 6 below!



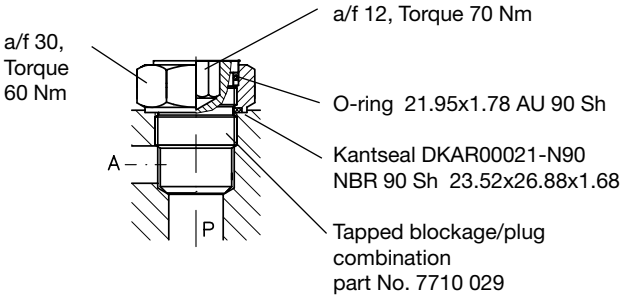
Tapped plugs

Mounting holes in the manifold may be blocked if required by tapped plugs, e.g. if uniform manufactured manifolds should be equipped with or without cartridge valves de-pending on application.

Passage open



Passage closed



5. Appendix

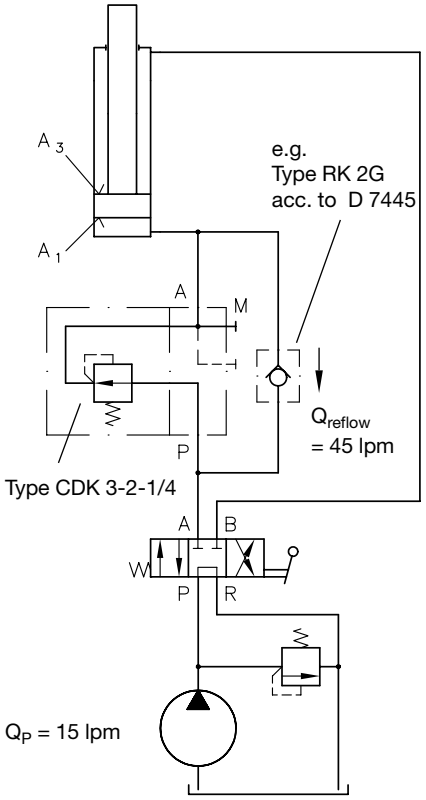
5.1 Instructions for use

Alternations of pressure may occur due to lack of leakage in closed state (idle position) if used in circuits where the pressure is maintained over a long period without switching operations e.g. clamping of work piece pallets. The pressure will rise if the temperature rises (e.g. radiation of the sun) or additional load is induced, pressure drops if the temperature drops (stand-still over night) or the load is reduced and the pump is switched off. These effects will be more pronounced with short and rigid piping. Hoses or additional volume (e.g. accumulators type AC 13 acc. to D 7571) will minimize these pressure variations.
The effects described above are caused by the ratio of temperature induced expandation and compression coefficient (theoretical 1:10, i.e.. $\Delta\vartheta = 1K = \Delta p \approx 10$ bar). A ratio of approx. 1:1 is realistic due to the flexibility of piping and tubing (backed by experience).

5.2 Application examples

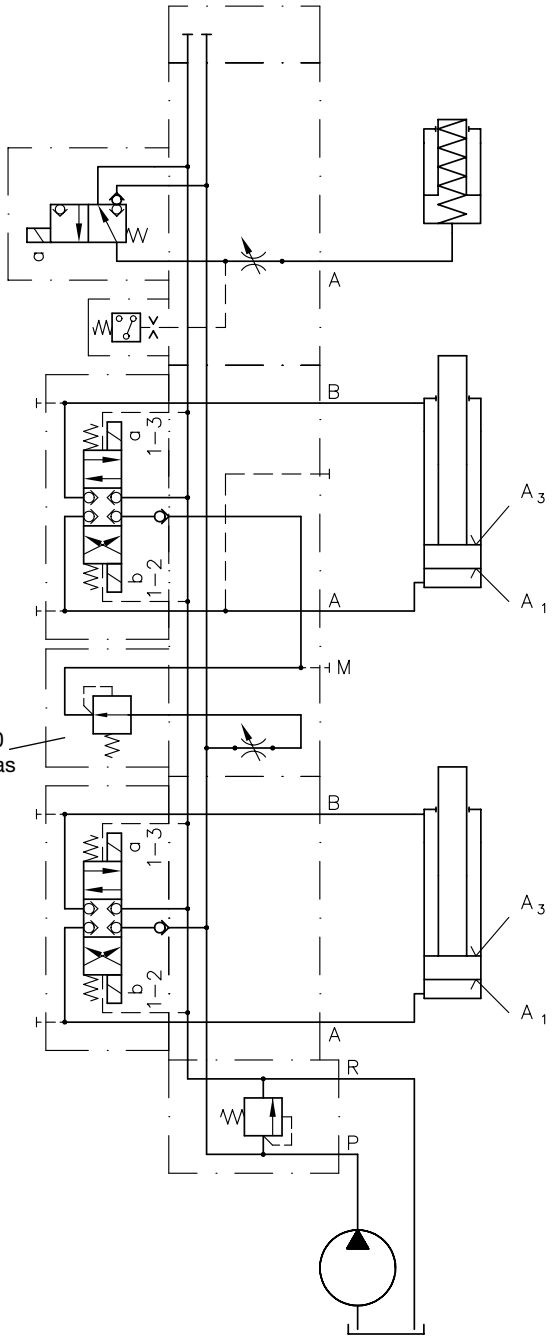
Example for a layout suitable for high flow $Q_{A \rightarrow P}$

Example : Q_P = 15 lpm $\frac{A_1}{A_3} = 3 \rightarrow Q_{reflow}$ = 45 lpm



Utilization in a valve bank, here directional seated valves type BVZP acc. to D 7785 B

BVZP1A - 1/300 - G22/0
- G22/CZ2/100/4/2
- WN1H/10/4
- 1 - 1 - G 24



Example for a lay-out where reflow has to be prevented