

Releasable twin check valve type DRH

Product documentation



Operating pressure p_{\max} : 500 bar
Flow rate Q_{\max} : 140 lpm



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Check valves with hydraulic release are a type of check valve. They block one or both hydraulic consumer lines or are used as a hydraulically actuated drain or circulation valve.

In the closed state the check valve type DRH has zero leakage. It is a twin check valve for double-acting consumers. Available with hydraulic release. Hydraulic release suppresses relief surges that can occur at high pressure and with a large consumer volume.



Releasable twin check valve type DRH

Features and benefits:

- Pressures up to 500 bar
- with hydraulic release for smooth switching

Intended applications:

- Blocking of leak-free hydraulic cylinders

Versions:

- Pipe connection
- Manifold mounting

Check valves

- Used in all customary applications in which a consumer is controlled via a directional spool valve with a blocked or free pump through-flow or when several consumers are selectively actuated via directional spool valves in a parallel circuit. See [Chapter 6, "Circuit examples"](#). To release the pressure blocked at A or B, approximately 0.4 times the pressure is required on the other side. Versions with integrated pressure-limiting valves enable use in conjunction with hydraulic motors, pivoting or rotating cylinders (type DRHS or DRHCS with shock valves), or with miniature pressure-limiting valves make it possible to avoid slow pressure build-ups e.g. by expansion of volume with a rise in temperature (type DRH..SS).

Check valves with drain port

- For all applications where several consumers are actuated in series with the P → R pump through-flow. If a downstream directional spool valve is actuated, all upstream spool valves are loaded with the system pressure of the actuated consumer in the P → R through-flow, so that leakage oil slowly penetrates into the consumer connections and lines (see [Chapter 6, "Circuit examples"](#)). The continuous drainage of leakage oil via the separate leakage line prevents a gradual pressurisation with uncontrolled release and possible drifting of the consumers. The leakage outlet is closed when the check valve is in the released position.

Check valves with hydraulic release

- For applications where the basic version cannot be released due to unfavourable area or load ratios at the hydraulic cylinder (rod side). Relieving the hydraulic release takes approx. 0.1 times the pressure on the opposing side. The hydraulic release can be single-sided (type DRH..V) or on both sides (type DRH..VV).

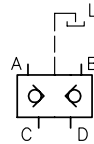
2 Available versions, main data

Circuit symbol:

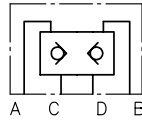
DRH 1
DRH 2
DRH 3



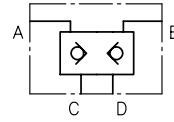
DRH 3 L
DRH 4 L
DRH 5 L



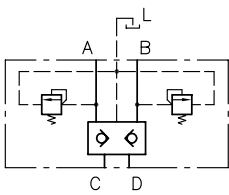
DRH 1 P
DRH 3 P



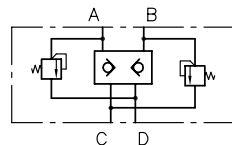
DRH 3 PG...



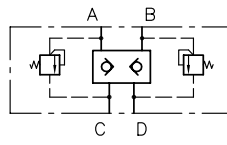
DRH 3 LSS-..



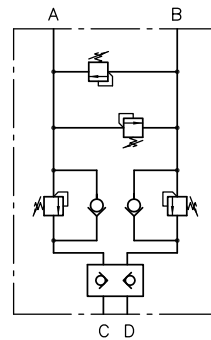
DRHS 2..



DRH 3 SS-..



DRHCS 2



DRH 2 A
DRH 2 MA



Order coding example:

DRH 3		
DRH 3 LSS	-	250
DRHCS 2	- 30/	100

Shock valve pressure setting (bar); see [Chapter 3, "Parameters"](#)
"Pressure setting ranges"

Pre-load pressure (bar)

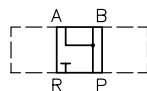
Basic type, size, function Table 1 Basic type, size, function

Table 1 Basic type, size, function

Basic type (Threaded connection)	DRH 1	DRH 2 DRH 2 JIS DRH 2 M DRH 2 A DRH 2 MA	DRH 3	DRH 4	DRH 5
With shock valves (e.g. for hydraulic motors additionally with pre-load valves)	--	DRHS 2 DRHCS 2	--	--	--
Protection against a slow pressure build-up	--	--	DRH 3 SS	--	--
Manifold mounting	DRH 1 P	--	DRH 3 P	--	--
Additional drain port, see Chapter 1, "Overview of releasable twin check valve type DRH"	--	--	DRH 3 L DRH 3 LSS	DRH 4 L	DRH 5 L
Version with hydraulic release (single side A-C)	DRH 1 V	--	DRH 3 V DRH 3 PV DRH 3 LV DRH 3 SSV-.. DRH 3 LSSV-..	DRH 4 V DRH 4 LV	DRH 5 V DRH 5 LV
Version with hydraulic release (both sides A-C and B-D)	DRH 1 VV DRH 1 PVV DRH 1 PGVV	--	DRH 3 VV DRH 3 PVV DRH 3 LVV DRH 3 SSVV DRH 3 LSSVV-.. DRH 3 LSSVV-..	DRH 4 VV DRH 4 LVV	DRH 5 VV DRH 5 LVV
Flow rate Q_{max} (lpm)	16	30	60	90	140
Operating pressure (bar)	500	500	500	400	400

i Note

- For all versions: Check valves cannot be used in conjunction with directional spool valves with the circuit symbol of the differential circuit in any switching position, e.g. with coding C, Y or B according to [D 5650/1](#) etc.



- Threads in accordance with ISO 228-1, DIN 13 T6 (metric, type DRH.M) or JIS B2351-1 (Type DRH.JIS).
- Type DRH 2 A, DRH 2 MA – single-sided releasable check valves to reduce the need for additional pipework

3 Parameters

General information

Description	Releasable check valve	
Design	Spring-loaded ball seated valve	
Model	Pipe connection or manifold mounting	
Material	Balls made of rolling bearing steel Steel; electro-galvanised valve housing	
Mounting	Threaded hole (see Chapter 4, "Dimensions")	
Installation position	As desired	
Surface treatment	Electrogalvanised	
Pressure setting ranges	DRHS 2, DRHCS 2 20 to 80 bar The pressure specified when ordering 80 to 160 bar determines the spring installed and thus 160 to 315 bar the pressure range 315 to 500 bar	DRH 3(L) SS Up to 500 bar Only factory-set setting
Hydraulic fluid	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 ² /s opt. operation approx. 10... 500 mm ² /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	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 considera- tion of the compatibility with seal material not over +70°C.	

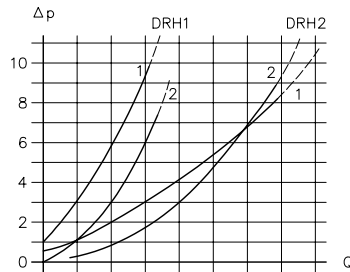
Characteristic curves

Oil viscosity approx. 50 mm²/s

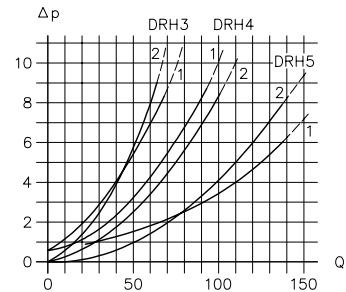
Curve 1: C → A
D → B

Curve 2: A → C
B → D

(released)



Δp flow resistance (bar); Q flow rate (lpm)



Δp flow resistance (bar); Q flow rate (lpm)

Pilot pressure p_{st} (bar) on the feed side (reference value)

To release:

$$p_{st} \approx 0.4 p_{A(B)} + 3$$

$p_{A(B)}$ Pressure (bar) on the blocked side A or B

Hydraulic release for release:

$$p_{stV} \approx 0.1 p_{A(B)} + 12$$

To keep open: ¹

$$p_{st} \approx 0.5 \Delta p_{A(B)} + p_{C(D)} + k$$

$\Delta p_{A(B)}$ Flow resistance curve 2 at released port A or B

$p_{C(D)}$ Pressure (bar) on the outflow side C or D

k
 ≈ 6 DRH 1 and DRH 2
 ≈ 4 DRH 3
 ≈ 3 DRH 4 and DRH 5

Weight

Type

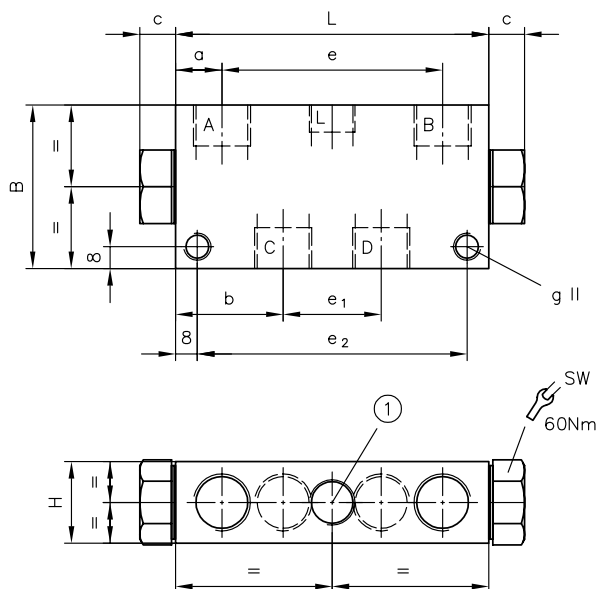
DRH 1	= approx. 0.5 kg
DRH 2	= approx. 1.2 kg
DRHS 2	= approx. 1.5 kg
DRHCS 2	= approx. 1.8 kg
DRH 3	= approx. 1.6 kg
DRH 4	= approx. 2.9 kg
DRH 5	= approx. 5.5 kg

¹ A (dragging) load in the direction of the consumer movement may cause flutter at the check valve. This can be prevented by installing a restrictor check valve between the check valve and consumer. Suitable for this purpose are types QR, QV according to [D 7730](#) or type RD according to [D 7540](#). Alternatively use type DRHCS ...

4 Dimensions

All dimensions in mm, subject to change.

DRH 1 ... 5 (L, V, VV)



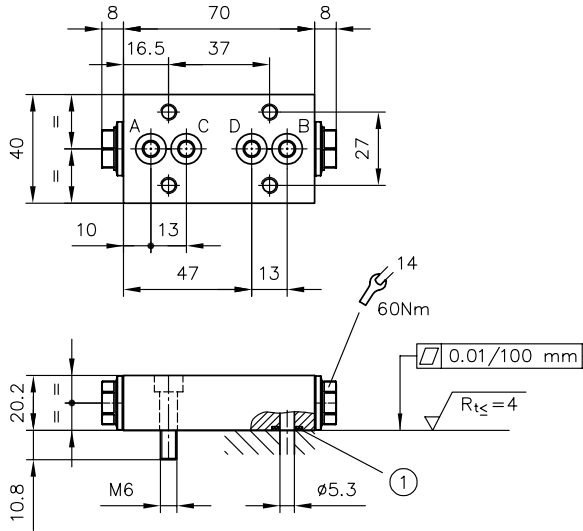
1 Port L for type DRH..L only

Connections (ISO 228-1)

	A, B, C, D	L
DRH 1	G 1/4 (BSPP)	--
DRH 2	G 3/8 (BSPP)	--
DRH 2 JIS	G 3/8-JIS (BSPP)	--
DRH 2 M	M16x1.5	--
DRH 3	G 1/2 (BSPP)	--
DRH 3L		G 3/8 (BSPP)
DRH 4	G 3/4 (BSPP)	--
DRH 4L		G 1/2 (BSPP)
DRH 5	G 1 (BSPP)	--
DRH 5L		G 3/4 (BSPP)

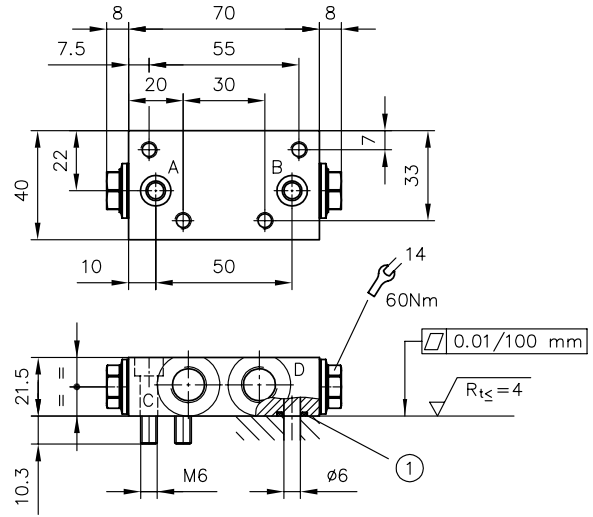
Type	L	B	H	SW	a	b	c	e	e ₁	e ₂	g
DRH 1	70	45	20	14	10	21	8	50	28	54	M6
DRH 2	89	60	30	22	13	26.5	10	63	36	73	M8
DRH 3 DRH 3L	115	60	30	27	17	39.5	13	81	36	99	M10
DRH 4 DRH 4L	150	70	40	32	22	47.5	15.5	106	55	134	M10
DRH 5 DRH 5L	195	80	50	41	27.5	65	17	140	65	179	M10

DRH 1 P (VV)



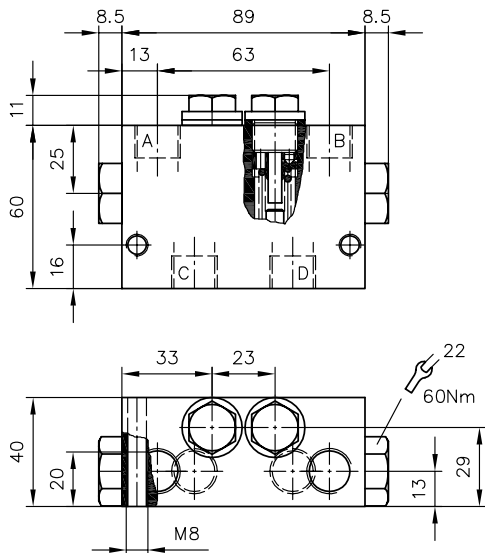
1 O-ring 7.65x1.78 NBR 90 Sh

DRH 1 PG VV



1 O-ring 7.65x1.78 NBR 90 Sh

DRHS 2



Pressure adjustment for type DRHS 2:

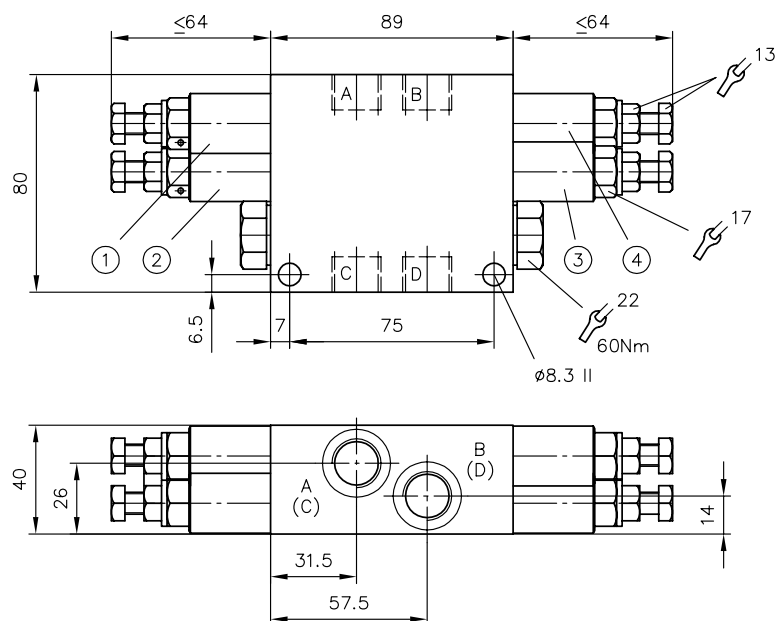
After undoing the tapped plug and loosening the grub screw, the pressure can be adjusted with a threaded washer within the respective pressure range (monitor the pressure gauge!):

Pressure range Chapter 3	Δp (bar) per 1 revolution	Lowest set value
20 to 80 bar	≈ 9.5 bar	Approx. 15 bar
80 to 160 bar	≈ 19 bar	Approx. 30 bar
100 to 315 bar	≈ 55 bar	Approx. 90 bar
315 to 500 bar	≈ 100 bar	Approx. 150 bar

Connections (ISO 228-1) (BSPP)

A, B, C, D	G 3/8
------------	-------

DRHCS 2



- 1 Shock valve B
- 2 Pre-load valve A
- 3 Pre-load valve B
- 4 Shock valve A

Pressure adjustment for type DRHCS 2:

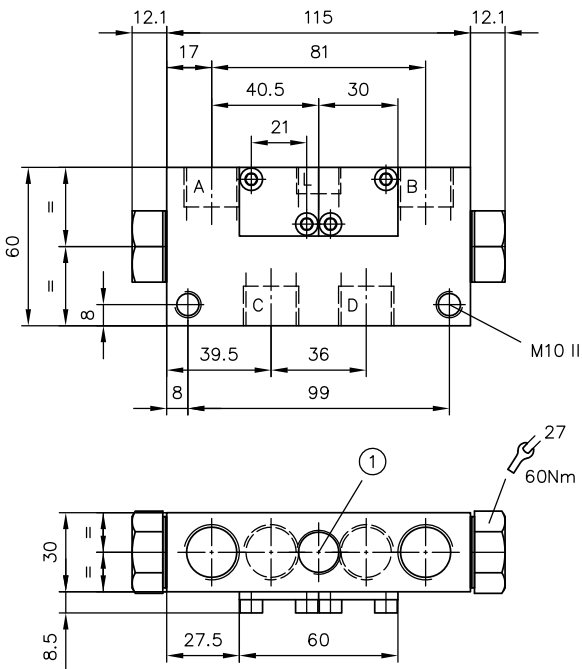
Identical for shock and pre-load valve (monitor the pressure gauge!):

Pressure range Chapter 3	Δp (bar) per 1 revolution
20 to 80 bar	≈ 9.5 bar
80 to 160 bar	≈ 9 bar
160 to 315 bar	≈ 55 bar
315 to 500 bar	≈ 100 bar

Connections (ISO 228-1) (BSPP)

A, B, C, D	G 3/8
------------	-------

DRH 3 SS (V, VV)
DRH 3 LSS (V, VV)

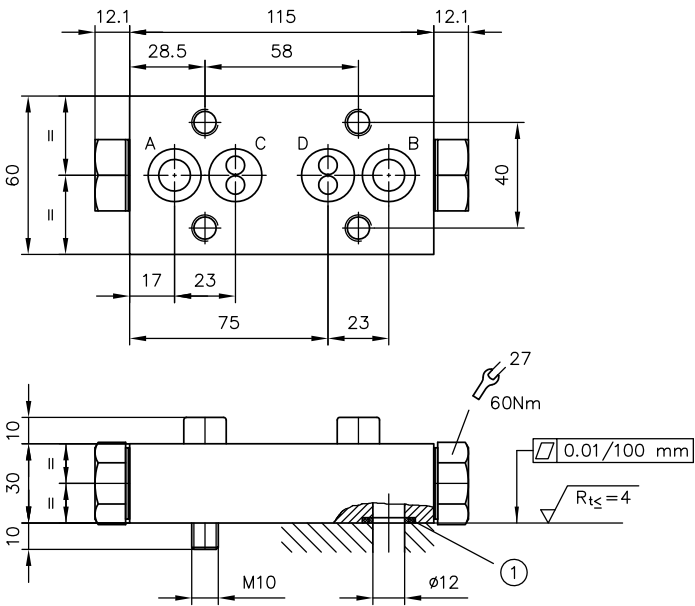


1 Port L only for type DRH 3 L...

Connections (ISO 228-1) (BSPP)

A, B, C, D	G 1/2
L	G 3/8

DRH 3 P (V, VV)



1 O-ring 15 x 2.5 NBR 90 Sh

5 Assembly, operation and maintenance recommendations

5.1 Intended use

This valve is exclusively intended for hydraulic applications (fluid engineering).

The valve demands high technical safety standards and regulations for fluid engineering and electrical engineering.

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:

1. Remove the product from operation and mark it accordingly
- ✓ It is then not permissible 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, etc.).

The hydraulic power pack must be shut down correctly prior to dismantling; this applies in particular to power packs 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.

5.3 Operating instructions

Product configuration and setting the pressure and flow rate

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

Note

- 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.

Purity and filtering of the hydraulic fluid

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

Examples of fine contamination include:

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

Note

Fresh hydraulic fluid from the drum does not always have the highest degree of purity. Under some circumstances the fresh hydraulic fluid must be filtered before use.

Pay attention to the cleanliness level of the hydraulic fluid in order to maintain faultless operation.
(Also see cleanliness level in [Chapter 3, "Parameters"](#)).

5.4 Maintenance information

This product is largely maintenance-free.

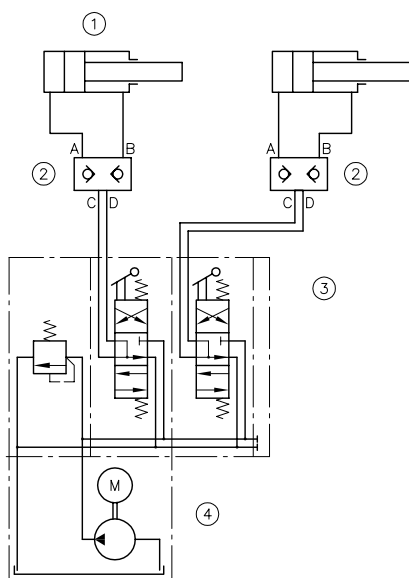
Conduct a visual inspection at regular intervals, but at least once per year, to check if the hydraulic connections are damaged. If external leakages are found, shut down and repair the system.

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

6 Circuit examples

Example 1:

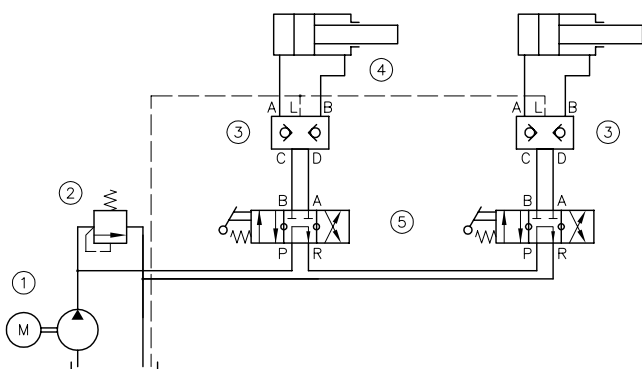
General application with directional spool valve



- 1 Cylinder type P.. according to [D 2055/1](#)
- 2 Type DRH 3
- 3 Directional spool valve
- 4 Pump type R according to [D 6010 H](#)

Example 2:

Application in shipbuilding with directional spool valves connected in series



- 1 Pump type R according to [D 6010 H](#)
- 2 Pressure-limiting valve type MV 6.. according to [D 7000/1](#)
- 3 Type DRH 5L
- 4 Separate leakage line
- 5 Directional spool valve type SG 5 LS according to [D 5650/1](#)

Further information

Additional versions

- Releasable check valve type RH: D 6105
- Check valve type CRK, CRB and CRH: D 7712
- Releasable check valve type HRP: D 5116
- Releasable check valve type RHC and RHCE: D 7165

Application

- Proportional directional spool valve, type PSL and PSV size 2: D 7700-2
- Proportional directional spool valve, type PSL, PSM and PSV size 3: D 7700-3
- Proportional directional spool valve, type PSL, PSM and PSV size 5: D 7700-5
- Proportional directional spool valve type PSLF, PSVF and SLF size 3: D 7700-3F
- Proportional directional spool valve type PSLF, PSVF and SLF size 5: D 7700-5F
- Directional spool valve bank type SWS: D 7951