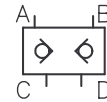


Twin check valves with hydraulic release type DRH

for oil-hydraulic installations

Pressure $p_{\max} = 500 \text{ bar}$

Flow $Q_{\max} = 140 \text{ lpm}$



Symbols
(for basic version)

1. General

Twin check valves with hydraulic release (check valve) belong to that group of stop valves which stop the flow preferably in one direction and permit free flow in the opposite direction. This unit consists of two check valves for two separate flows where automatic closure is alternately offset by the feed pressure (DIN ISO 1219-1). They are used mainly to cut off (pressure retention) the operating positions or to fix the neutral position, with zero leakage, at double-acting, non-leaking consumers in conjunction with directional spool valves that show design related leakage.



- **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 connection. Refer to the block diagram in section 5. To release the pressure blocked off at A or B, approximately 0.4 times the pressure is required on the other side.

Models with integrated pressure limiting valves facilitate use in conjunction with hydraulic motors, pivoting or rotating cylinders (type DRHS resp. DRHCS with shock valves) or with miniature pressure limiting valves, making it possible to avoid slow pressure build-up, e.g. by expansion of volume with a rise in temperature (type DRH..SS).

- **Check valves with leakage port**

For all application cases where several directional spool valves (internal leakage) are connected in series. If a downstream directional spool valve is actuated, all upstream valves are loaded with the system pressure of the actuated consumer in the $P \rightarrow R$ through-flow so that leakage oil slowly penetrates into the consumer connections and lines (see example sect. 5).

The continuous drain of leakage oil via the separate leakage oil line prevents a gradual pressure build-up with uncontrollable release and possible drifting of the consumers. The leakage oil port is closed when the check valve is in the released position.

- **Check valves with pre-release**

For all application cases, where the basic valve version cannot be released due to a unfavorable area ratio or load conditions at the hydraulic cylinder (rod side). Relieving the pre-release takes approx. 10% of the pressure on the opposing side.

The pre-release can be single sided (type DRH..V) or on both sides (type DRH .. VV).

2. Available versions, main data

Order examples: **DRH 3** Basic version (standard)
DRH 3 LSS - 250 Valves with additional
DRHCS 2 - 30/100 functions
Desired pressure setting (bar); see also sect. 3
"Adjustable pressure ranges"
Pre-load pressure (bar)

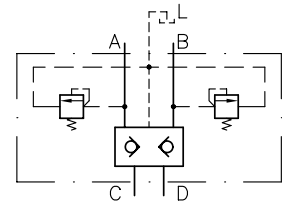
Table 1:

Basis type, size,
function

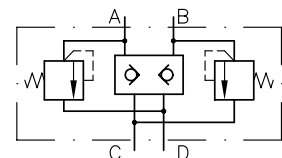
Basic version (tapped ports)	DRH 1	DRH 2	DRH 3	DRH 4	DRH 5
With shock valves (e.g. for hydraulic motors with additional sequence valves)	--	DRHS 2 DRHCS 2	--	--	--
Safeguard for slow pressure build-up	--	--	DRH 3 SS	--	--
Manifold mounting	--	--	DRH 3 P	--	--
Additional leakage port, see sect. 1			DRH 3 L DRH 3 LSS	DRH 4 L	DRH 5 L
Version with pre-relief (one-sided A-C)	--	--	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 pre-relief (both sides A-C and B-D)	--	--	DRH 3 VV DRH 3 PVV DRH 3 LVV DRH 3 SSVV-- DRH 3 LSSVV--	DRH 4 VV DRH 4 LVV	DRH 5 VV DRH 5 LVV
Flow Q_{\max} (lpm)	16	30	60	90	140
Pressure	500	500	500	400	400

Symbols

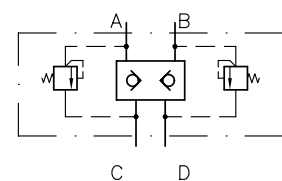
DRH 3 LSS--



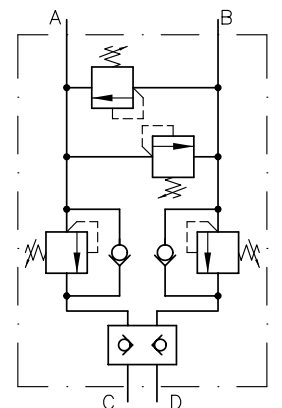
DRHS 2..



DRH 3 SS--



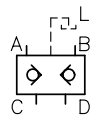
DRHCS 2



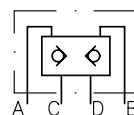
DRH 1(2...5)



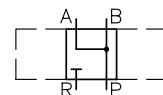
DRH 3(4, 5) L



DRH 3 P



Functioning for all designs: Check valve cannot be used in conjunction with directional control valves with the symbols of the differential circuit in any (arbitrary) switching position, e.g. with coding C, Y or B acc. to D 5650/1 etc.



3. Additional characteristic data

Design	spring-loaded ball-type seat valve		
Mounting	tapped hole (refer to dimensions of units)		
Installed position	optional		
Surface termination	Zinc galvanized		
Pressure medium	DRHS 2, DRHCS 2		DRH 3(L) SS
	20 ... 80 bar	The pressure cited when ordering determines the spring installed and thus the pressure range	up to 500 bar, factory setting only
	80 ... 160 bar		
	160 ... 315 bar		
	315 ... 500 bar		
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 (Polyalkylenglycol) 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 consideration of the compatibility with seal material not over +70 °C.		

Mass (weight)

Type	DRH 1	DRH 2	DRHS 2	DRHCS	DRH 3...	DRH 4 (L)	DRH 5 (L)
approx. (kg)	0.5	1.2	1.5	1.8	1.6	2.9	5.5

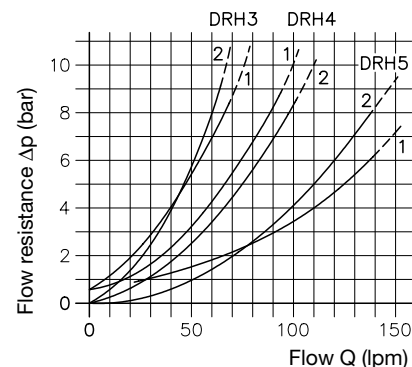
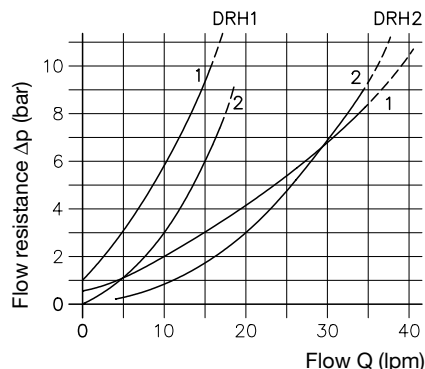
 Δp -Q-curves

Curve 1: C → A
D → B

Curve 2: A → C
B → D

(released)

Viscosity during measurements approx. 60 mm²/s



Control pressure p_{St} (bar)
on the feed side
(recommended value)

to release:

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

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

Pre-relief for release:

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

to 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 connection A or B

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

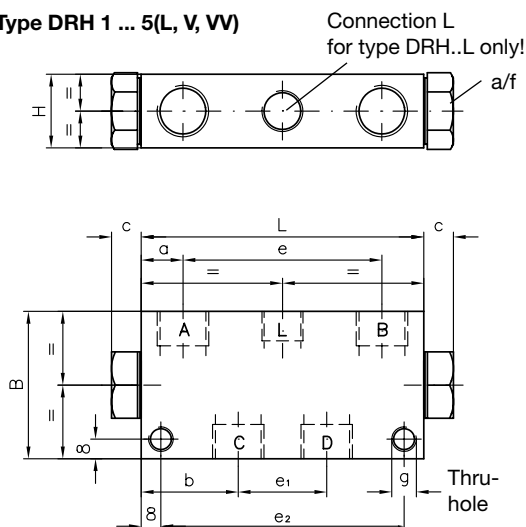
k
≈ 6 DRH 1 and DRH 2
4 DRH 3
3 DRH 4 and DRH 5

1) A dragging load in direction of the consumer movement might cause squealing of the check valve. This can be prevented by installing a restrictor check valve between check valve and consumer. Suitable for that purpose are type QR, QV acc. to D 7730 or type RD acc. to D 7540. Alternatively type DRHCS ... could be used.

4. Dimensions

All dimensions in mm, subject to change without notice!

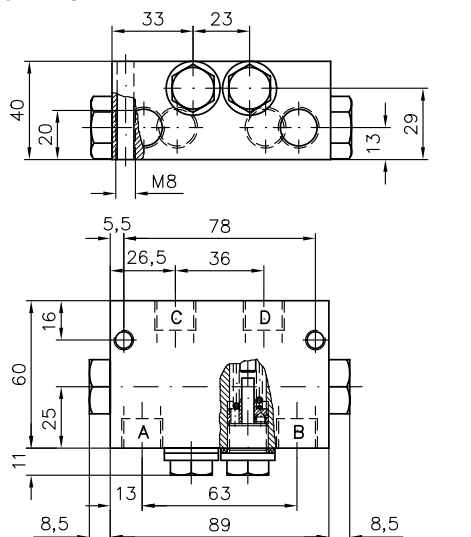
Type DRH 1 ... 5(L, V, VV)



Type	Connection acc. to DIN ISO 228/1 (BSP) A, B, C, D	Connection L	L	B	H	a/f
DRH 1	G 1/4	---	70	45	20	19
DRH 2	G 3/8	---	89	60	30	22
DRH 3	G 1/2	---	115	60	30	27
DRH 3L	G 3/8	---	---	---	---	---
DRH 4	G 3/4	---	150	70	40	32
DRH 4L	G 1/2	---	---	---	---	---
DRH 5	G 1	---	195	80	50	41
DRH 5L	G 3/4	---	---	---	---	---

Type	a	b	c	e	e1	e2	g
DRH 1	10	21	8	50	28	54	M6
DRH 2	13	26.5	10	63	36	73	M8
DRH 3(L)	17	39.5	13	81	36	99	M10
DRH 4(L)	22	47.5	15.5	106	55	134	M10
DRH 5(L)	27.5	65	17	140	65	179	M10

Type DRHS 2

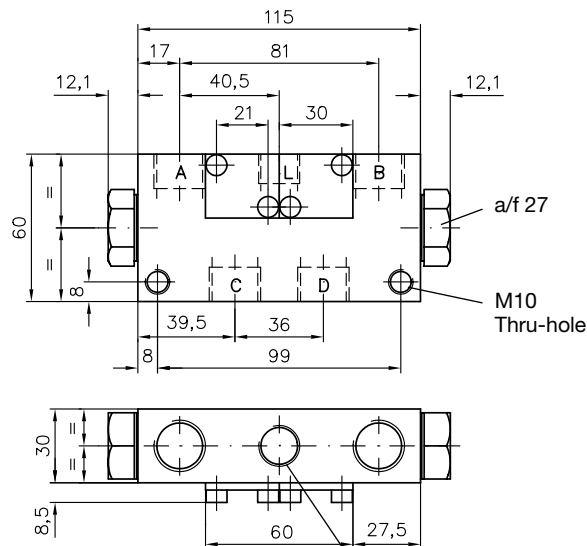


Pressure adjustment for type DRHS 2:

After removing the tapped plug and loosening the grub screw, the pressure can be adjusted by a threaded disc within the respective pressure range (check with a pressure gauge!):

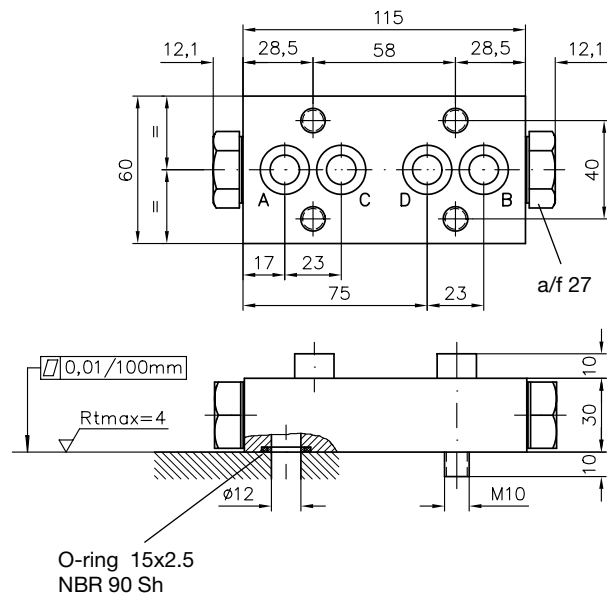
Pressure range sect. 3	Δp (bar) per 1 turn	Adjust. value lowest
20 ... 80 bar	≈ 9.5 bar	approx. 15 bar
80 ... 160 bar	≈ 19 bar	approx. 30 bar
100 ... 315 bar	≈ 55 bar	approx. 90 bar
315 ... 500 bar	≈ 100 bar	approx. 150 bar

Connections acc. to
DIN ISO 228/1: (BSP)
A, B, C and D = G 3/8

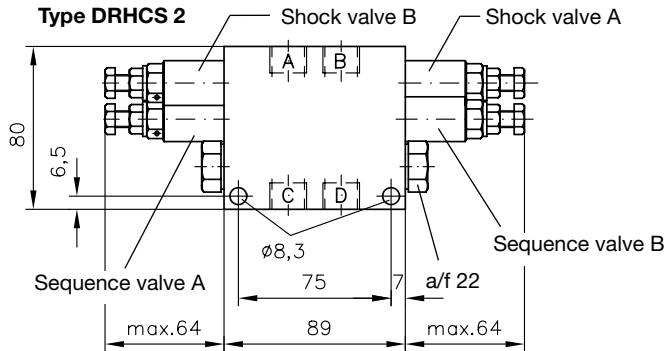
Type DRH 3 SS (V, VV) and DRH 3 LSS (V, VV)

Connections acc. to
DIN ISO 228/1 (BSPP):
A, B, C, and D = G 1/2
L = G 3/8

Connection L for
type DRH 3L ... only!

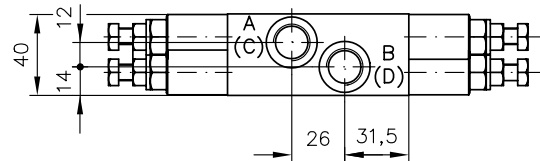
Type DRH 3P (V, VV)

O-ring 15x2.5
NBR 90 Sh

Type DRHCS 2

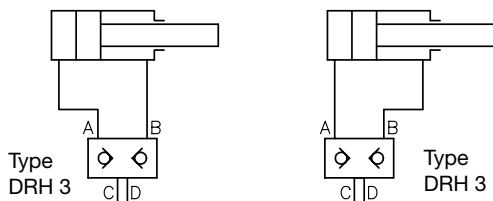
Pressure adjustment
at type DRHCS 2:
Identical for shock and
sequence valve (check
with a pressure gauge
always!)

Pressure range sect. 3	Δp (bar) per 1 turn
20 ... 80 bar	≈ 9,5 bar
80 ... 160 bar	≈ 9 bar
160 ... 315 bar	≈ 55 bar
315 ... 500 bar	≈ 100 bar

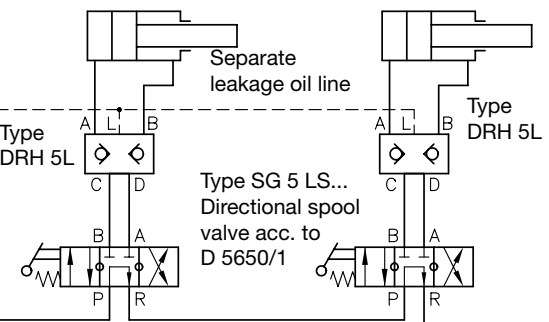
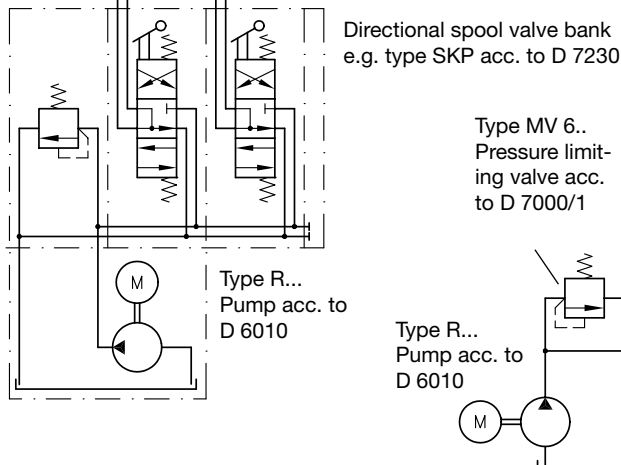


5. Example circuit

Type P... cylinder acc. to D 2055/1

**Example 1:**

General application with a connected in parallel

**Example 2:**

Application for shipbuilding with directional
spool valves connected in series