Hydraulic pilot operated check valves type RH
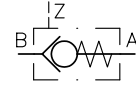
with central, favourable-flow design

Pressure p_{max} = 700 bar
Flow Q_{max} = 160 lpm

Symbol

1. General

These devices belong to the category of stop valves according to DIN ISO 1219-1, with blocked flow A → B, and free flow B → A . The blocked flow direction A → B can be re-opened by a hydraulic control system.

Application:

● Shutting off zero leakage hydraulic cylinders, when used together with directional spool valves (design related leakage)

● Return flow aid, when the return flow of cylinders with uneven area ratio exceeds the perm. flow rate of the connected directional valve.

● Hydraulically-actuated drain or circulation valve

These valves are available both with and without hydraulic pre-relief

The designs without pre-relief have a ball as valve element, which relatively quickly clears the full flow cross section area after deblocking. These valves are suited for most standard applications. An orifice in the control ports dampens the progression movement of the deblocking piston, adequately suppressing pressure surges (decompression shocks). If, despite this, such surges do occur during the test run, the use of a control line wound onto the throttle coil will provide such additional damping as may be necessary.

Control line port
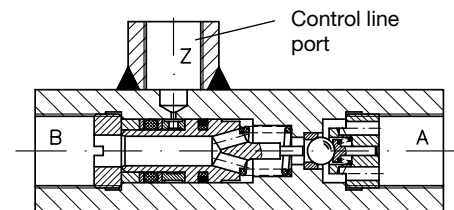
Designs with pre-relief are fitted with a spherically-ground valve piston instead of the ball (performing the function of a seated valve), plus a small, integrated ball check valve. When deblocking takes place, this ball check valve is forced up even before the valve piston opens, and clears an orifice area to provide surge-free decompression of the consumer volume. These valves are used mostly for high pressure and large consumer volume applications. The pre-relief effect is more effective, i.e. gentler, the lower the opening speed of the control piston becomes. This is achieved in this case too, as required, by means of a control line designed as a throttle coil. For further details, see section 3.1. (Maintaining the pressure).

Control line port

2.5

D 6105

Check valves type RH

October 2000-02
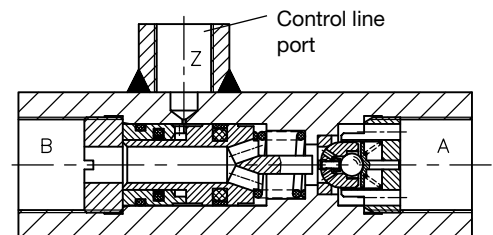
## 2. Types available, characteristic data

Coding,
main data

Basic type	with pre-relief	Pressure p_{max} (bar)	Flow Q_{max} aprox. (lpm)	Control volumes approx. (cm^3)	Ports DIN ISO 228/1 (BSPP) A, B	Z	Mass (weight) approx. (kg)
RH 1	---	700	15	0.15	G 1/4		0.4
RH 2	---	700	35	0.22	G 3/8		0.4
RH 3	**RH 3 V**	500	55	0.4	G 1/2	G 1/4	0.6
RH 4	**RH 4 V**	500	100	1	G 3/4		1.3
RH 5	**RH 5 V**	500	160	1.8	G 1		1.8

Design   Spring-loaded ball seated valve, zero leakage

Mounting   Any, in the pipe work

Installed position   Any

Surface coating   zinc galvanized

Control pressure p_{St} (bar)   For deblocking (p_B = 0 bar)   For deblocking the pre-relief

p_A (bar) Pressure at connection A →
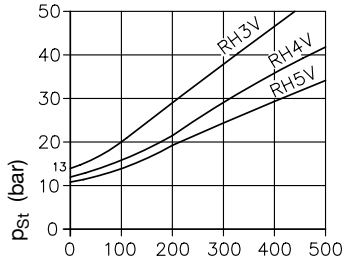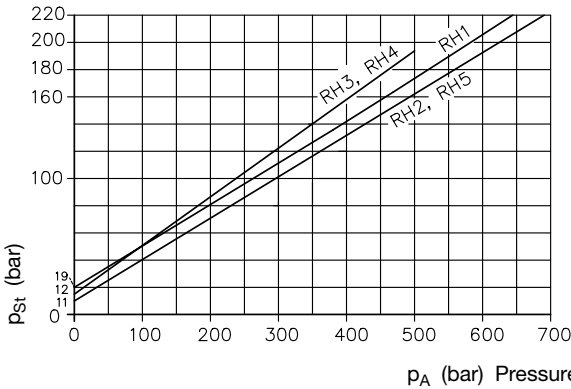
to hold open: $p_{St} = p_B + \Delta p + k$

p_B (bar) = Pressure on side B

Δp (bar) = Back pressure A → B according to Δp-Q curve
= 10 at RH 1 and RH 2
  7 at RH 3(V)
  8 at RH 4(V) and RH 5(V)

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.

Δp-Q curves   Apply to flow direction B → A and deblocked direction A → B
Opening pressure B → A   0.2 ... 0.3 bar


Oil viscosity during measurement 60mm^2/s
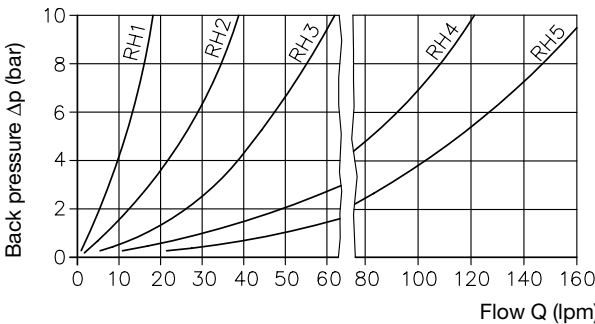
With viscosities exceeding approx. 500 mm^2/s, a greater Δp rise must be taken into account with the smaller types (RH 1...RH3).

3.   Function modes

- **Maintaining the pressure**

Preventing a pressure loss at the pressurized cylinder side when directional spool valves with design related leakage are used. To avoid decompression shock, which can occur in particular with large pressurized oil volumes if deblocking takes place suddenly, an orifice is provided in the control port. If this throttling effect is inadequate due to special operating conditions, then a suitable large control line wound onto the throttle coil can be used to reduce the decompression shock. The primary hydraulic pre-relief on types RH. . .V only takes effect if the control line is designed as described in the form of a throttle coil, and is thus capable of slowing down the switching speed sufficiently.

Rigid working resistance
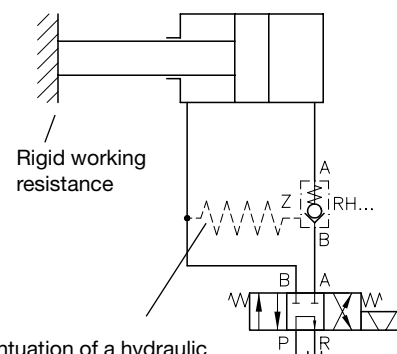
Control line attentuation of a hydraulic throttle coil
(2.. .4m hydraulic pipe 6 x 1.5 or 6 x 2)

- **Holding raised loads**

In cases involving upright cylinders or cylinders hanging downwards in particular, the weight of the load may cause a piston speed equal to or greater than that determined by the pump delivery flow. The effect of this may be that the control pressure required to keep the system open, as shown in sect. 2.1, cannot be built up. The result of this is valve flutter due to periodic opening and closing. Depending on the load conditions, this can be remedied by exploiting the dampening effect of the control line (as shown in sect. 3.1) or by braking the load by means of a sequence valve (e.g. type SVC...to pamphlet 7000/1) or a throttle valve (type RD to pamphlet 2570). See also pamphlet 7100 for special load retention valves. Caution: There is a risk that, with cylinders working down wards, in certain circumstances pressure rises may occur on the load side which exceed the load pressure until the stop valve actuates. The reason for this is that the control pressure adds to the load side pressure in a ratio A1/A3. If necessary, our Technical Department should be consulted for recommendations aimed at avoiding this.
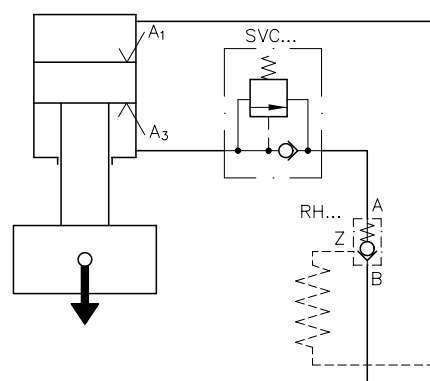
- **Return relief**

This is used if the return flow $Q_R = Q_e \dfrac{A_1}{A_3}$

the directional valve becomes too great when the piston moves in.

The most favourable dimension for the stop valve is determined by taking the flow resistance value Δp for A → R from the directional valve data sheet, which would occar at Q_e. Then look for the Δp-Q-characteristic for the RH valve on the reverse side of the page which most closely approximates the Δp value (A → B) already found at the flow rate Q_R - Q_e.
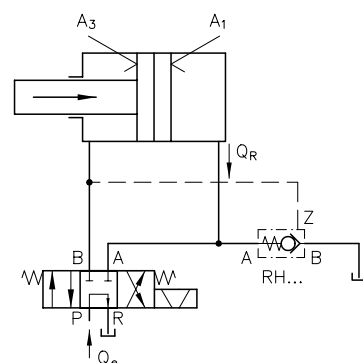
4.   Unit dimensions
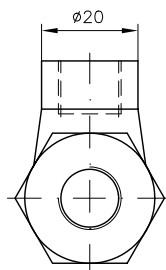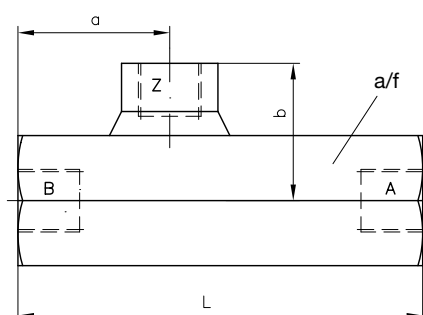
Type	Ports DIN ISO 228/1 (BSPP)		L	a	b	a/f
	A, B	Z				
RH 1	G 1/4		84	31.5	27	24
RH 2	G 3/8		90	32	28.5	27
RH 3 (V)	G 1/2	G 1/4	100	36.5	31	32
RH 4 (V)	G 3/4		126	45	35.5	41
RH 5 (V)	G 1		143	52	38	46

All dimensions are in mm. Subject to change without notice !