Releasable check valve type HRP

Product documentation

Relieved, manifold mounting

Operating pressure p_{max}:	700 bar
Flow rate Q_{max}:	400 lpm

D 5116
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HAWE HYDRAULIK

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Contents

1 Overview of releasable check valve type HRP

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 valve or idle circulation valve.
In the closed state the check valve type HRP has zero leakage. A leakage line relieves the rear of the control piston. Due to this separate relief the control behaviour of the valve is independent of the pressure in the return.
A solenoid valve can be optionally flange-mounted to arbitrarily control the check valve with the load pressure on the consumer side. The check valve type HRP is available with hydraulic release. Hydraulic release suppresses relief surges that can occur at high pressure and with a large consumer volume.

Releasable check valve type HRP

Features and benefits:

- Manifold mounting valve for pressures up to 700 bar
- Flows up to 400 lpm
- Electrically controlled
- With hydraulic release for smooth switching

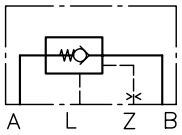
Intended applications:

- Industrial hydraulics and mobile hydraulics

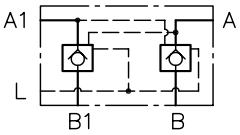
2 Available versions, main data

Circuit symbol:

HRP



HRPD



Order coding example:

HRP 2 **- B 0,4**

Orifice in the control port Z Table 4 Orifice in the control port Z

Basic type and size Table 1 Basic type and size

HRP 7V **- X**

Additional control port X Table 3 Additional control port X

Basic type and size Table 1 Basic type and size

HRP 4V **- WG 3 - 0 B 0,4 - WG 230**

Optionally mounted directional seated valve Table 2 Optionally mounted directional seated valve

Basic type and size Table 1 Basic type and size

Table 1 Basic type and size

Basic type and size		Description	Flow rate Q_{max} approx. (lpm)	Pressure range p_{max} (bar)		Control volume (cm^3)
Normal design	With hydraulic release			A, B, Z	L	
HRP 1	--	Single valve Manifold mounting	20	700	unpressurised to the tank	0.2
HRP 2	--		35			0.4
HRP 3	HRP 3V		50	500		0.5
HRP 4	HRP 4V	Single valve Manifold mounting Optionally mounted directional seated valve (Table 2)	80			1.3
HRP 5	HRP 5V		140			2.5
--	HRP 7V (-X)		400			13.8
--	HRPD 3V	Twin valve	50			0.5

Table 2 Optionally mounted directional seated valve

3/2-way directional seated valve		Nominal voltage U_N	For mounting on	HRP is released if
according to D 7300	according to D 7470 A/1			
G 3-0 B 0,4 - G 24	WH 1H B 0,4 - G 24	24 V DC	HRP 4., HRP 5.	Solenoid valve energised
WG 3-0 B 0,4 - WG 230	WH 1H B 0,4 - WG 230	230 V AC 50/60 Hz		
G 3-1 B 0,6 - G 24	--	24 V DC	HRP 7V	
WG 3-1 B 0,6 - WG 230	--	230 V AC 50/60 Hz		
GZ 3-0 B 0,4 - G 24	WH 1M B 0,4 - G 24	24 V DC	HRP 4., HRP 5.	Solenoid valve de-energised
WGZ 3-0 B 0,4 - WG 230	WH 1M B 0,4 - WG 230	230 V AC 50/60 Hz		
GZ 3-1 B 0,6 - G 24	--	24 V DC	HRP 7V	
WGZ 3-1 B 0,6 - WG 230	--	230 V AC 50/60 Hz		
Reactive plate; port X sealed with tapped plug			HRP 7V - X	--

Table 3 Additional control port X

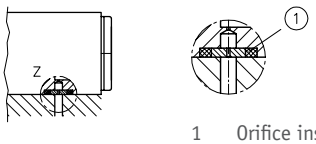
Type	Description	Ports (BSPP)
HRP 7V	Without port X	G 1/4
HRP 7V - X	With reactive plate and tapped plug	
HRP 7V - GZ 3-1 B 0,6 - G 24	Port X open	

Note
The orifice serves to protect the directional seated valve against overloading.

Table 4 Orifice in the control port Z

Basic type and size	Coding	∅ (mm)
HRP 1 HRP 2 HRP 3. HRP 4. HRP 5.	B 0,4	0.4
	B 0,6	0.6
	B 0,8	0.8
HRP 7	EB 1 - 0,4	0.4
	EB 1 - 0,6	0.6
	EB 1 - 0,8	0.8
	EB 1 - 1,0	1.0
	EB 1 - 2,0	2.0

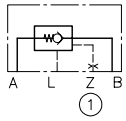
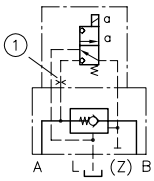
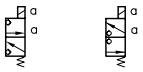
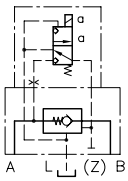
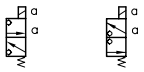
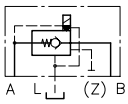
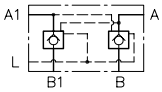
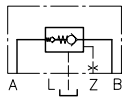
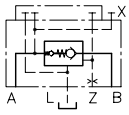
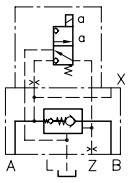
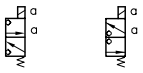
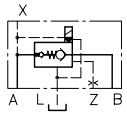
Order coding example: HRP 2 - **B 0,4**



1 Orifice insert

Note
Orifice inserts to prevent relief surges. It should be noted that excessively strong damping can increase the closing time of the opened valve.

Circuit symbols

Basic type and size	Circuit symbol	With mounted directional seated valve
HRP 1 **HRP 2** **HRP 3.** **HRP 4.** **HRP 5.**	 1 Orifice in Z	HRP ... -G(WG)...  1 Orifice in directional seated valve -G 3-0 -GZ 3-0 -WG 3-0 -WGZ 3-0  HRP .. -WH 1...  -WH 1H -WH 1M  Simplified representation (for hydraulic schematic) 
HRPD 3V		
HRP 7V	 HRP 7V - X 	HRP 7V -G(WG)...  -G 3-1 -GZ 3-1 -WG 3-1 -WGZ 3-1  Simplified representation (for hydraulic schematic) 

3 Parameters

3.1 General

General data

Description	Releasable check valve, relieved
Design	Spring-loaded ball seated valve, zero-leakage
Model	Manifold mounting
Material	Balls made of rolling bearing steel Steel; valve housing galvanized zinc plated; hardened and ground functional inner parts
Installation position	As desired
Ports	A, B = consumer (main passage) Z = control port L = drain port (piston chamber relief)
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 consideration of the compatibility with seal material not over +70°C. **Note** With mounted directional seated valve and ambient temperature of above 35°C, observe the relevant notes in D 7300 and D 7470 A/1!

Weight

Type	
HRP 1	= approx. 0.3 kg
HRP 2	= approx. 0.4 kg
HRP 3.	= approx. 0.7 kg
HRPD 3V	= approx. 1.7 kg
HRP 4.	= approx. 1.2 kg
HRP 5.	= approx. 1.9 kg
HRP 7V	= approx. 7.9 kg
HRP 7V - X	= approx. 8.0 kg

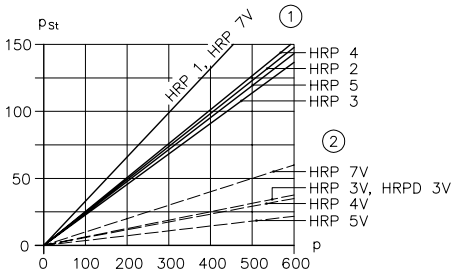
Type	With directional seated valve	
HRP 4.	-G(WG) ...	= 0.4 kg
HRP 4.	-WH 1...	= 0.6 kg
HRP 5.	-G(WG) ...	= 0.4 kg
HRP 5.	-WH 1...	= 0.6 kg
HRP 7V	-G(WG) ...	= 0.7 kg

Characteristic curves

Oil viscosity approx. 60 mm²/s

Δp-Q characteristics
Control pressure p_{St} (bar) at port Z with p_B = 0 bar (pressure at port B)

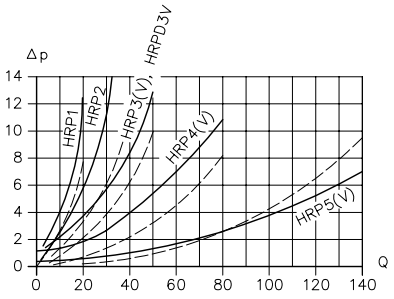
For releasing



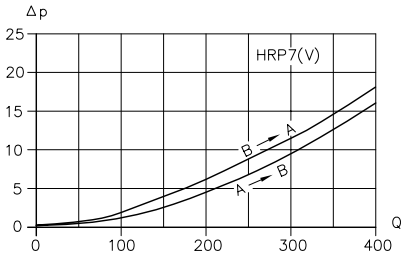
p pressure (bar); p_{Pil} pilot pressure (bar)

1 Releasing via main valve
2 Releasing via hydraulic release

For holding open



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



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

p_{St} = a Δp + b p_B + c

where

Δp = Flow resistance (bar)
A → B acc. to Δp-Q characteristics (below)

p_B = pressure (bar) at port B

Type	a	b	c
HRP 1	0.235	0.03	4.8
HRP 2	0.22	0.03	3.7
HRP 3 HRP 3V HRPD 3V	0.21	0.11	3.7
HRP 4 HRP 4V	0.235	0.07	3.0
HRP 5 HRP 5V	0.22	0.05	3.7
HRP 7V	0.32	0.04	3.2

With hydraulic release

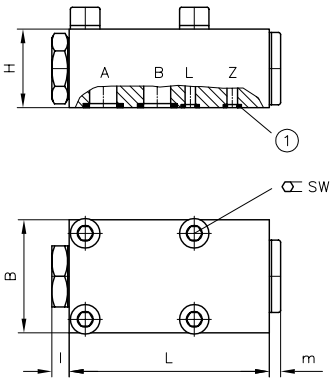
B → A
A → B

4 Dimensions

All dimensions in mm, subject to change.

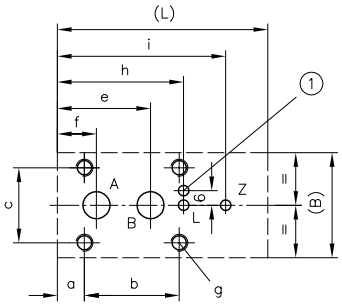
4.1 Basic version

HRP 1, HRP 2, HRP 3, HRP 4, HRP 5

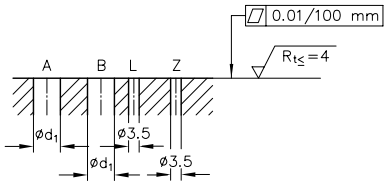


1 Sealing of the ports with O-ring NBR 90 Sh (see table)

Base plate hole pattern



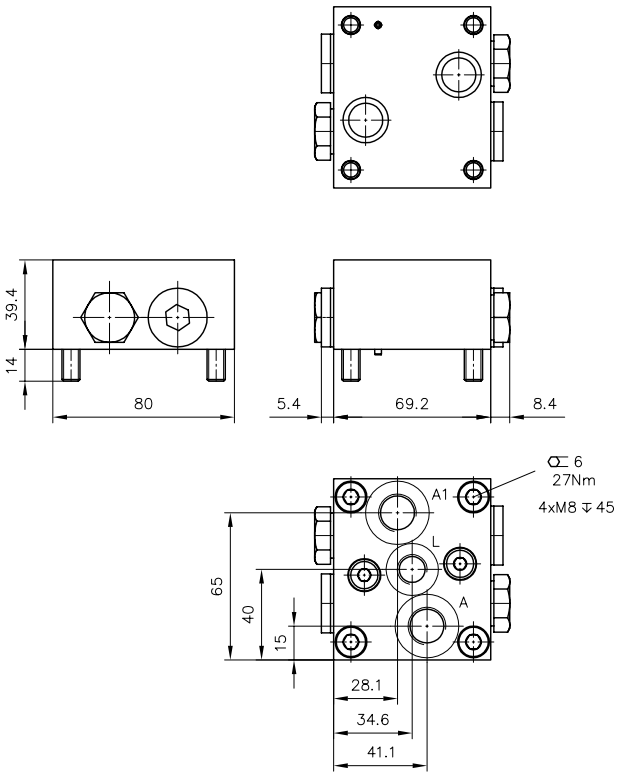
1 For HRP 3 and HRP 3V



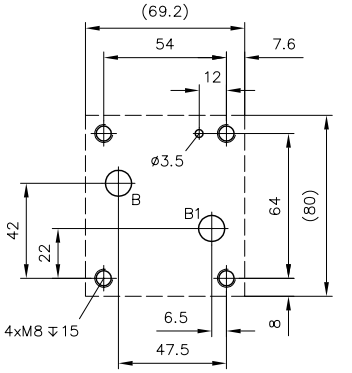
Type	L	B	H	a	b	c	f	e	h	i	l	m	∅d_1	g
HRP 1	62	25	20	5.5	26	18	10	21	36	50	6	3.5	5	M4, 5 deep
HRP 2	65	30	25	7	24	22	12.5	26	38.5	52	9	4	6.5	M5, 5 deep
HRP 3.	70	35	35	9	26	25	13	31	42	56	9	4	9	M6, 10 deep
HRP 4.	88	50	35	7	48	38	17	37	53	71	10.5	5	11	M8, 10 deep
HRP 5.	102	60	40	10	48	42	21	44	62	85	13.5	5	14	

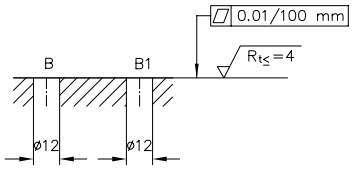
Type	SW	Tightening torque (Nm)	Sealing with O-ring	
			A, B	L, Z
HRP 1	3	2.6	6.07x1.78	4.47x1.78
HRP 2	4	5	7.65x1.78	
HRP 3.	5	9	9.2x2.62	
HRP 4.	6	22	12.37x2.62	
HRP 5.			15.55x2.62	

HRPD 3V



Base plate hole pattern

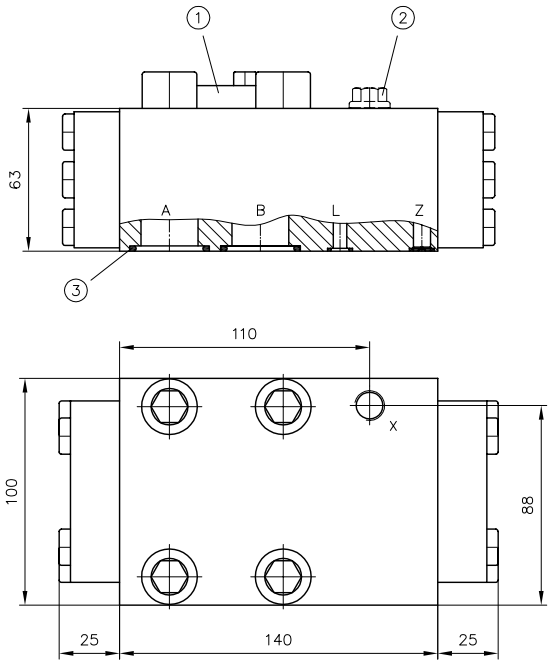




Connections (ISO 228-1(BSPP))

A, A1	G 3/8
L	G 1/4

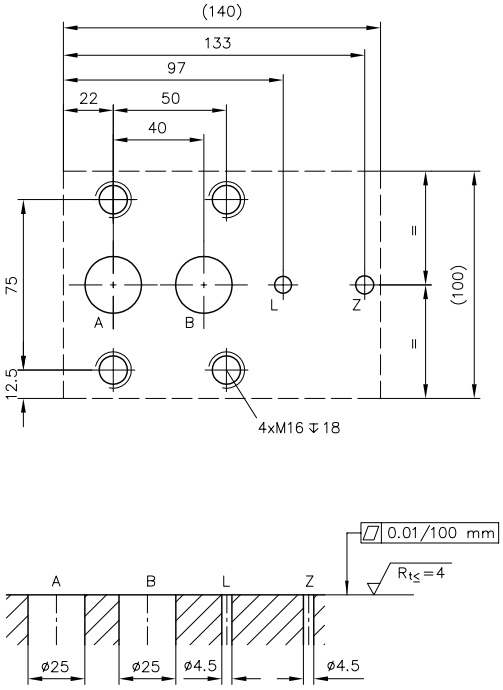
HRP 7V, HRP 7V-X



1 Reactive plate for HRP 7V-X
2 Port X (G 1/4) sealed for type HRP 7V-X.
3 Sealing of the ports with O-ring NBR 90 Sh (see table)

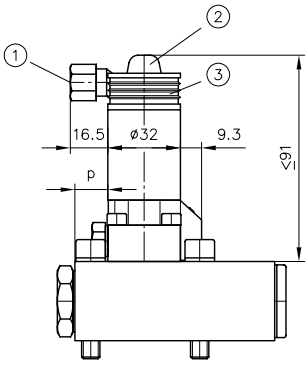
Type	Sealing with O-ring	
	A, B	L, Z
HRP 7V HRP 7V-X	29.2x3	8x1.5

Base plate hole pattern

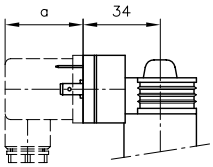


4.2 Version with directional seated valve

HRP 4. - G(WG) ...
HRP 5. - G(WG) ...



1 Suitable for cable ∅6
2 Manual override
3 Plug can be mounted offset by 180°

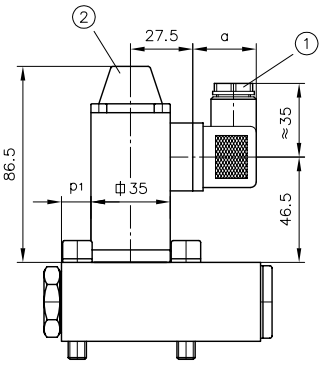


Coding	a
G..	28
WG..	34.5
L..	40

Type	p
HRP 4. - G(WG) ...	14.5
HRP 5. - G(WG) ...	17

For missing dimensions of directional seated valve (size 0) see D 7300.

HRP 4. - WG 1 ...
HRP 5. - WG 1 ...



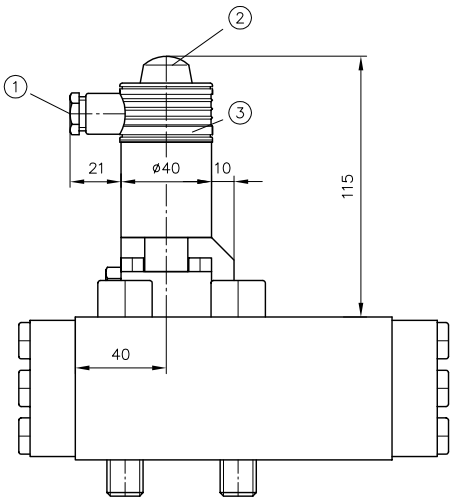
1 Plug x3, can be mounted offset by 90°, cable fitting
2 Manual override

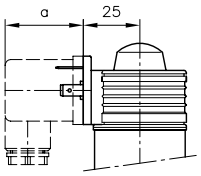
Coding	a
G..	28
WG..	34.5
L..	40

Type	p_1
HRP 4. -WH 1 ...	13.5
HRP 5. -WH 1 ...	17

For missing dimensions of directional seated valve type WH 1 see D 7470 A/1.

HRP 7V - G(WG) ...





Coding	a
G..	28
WG..	34.5
L..	40

1 Suitable for cable ∅6
2 Manual override
3 Plug can be mounted offset by 180°

For missing dimensions of directional seated valve (size 1) see D 7300.

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 dismounting; 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.

Adhere 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 Other information

6.1 Accessories, spare parts and separate components

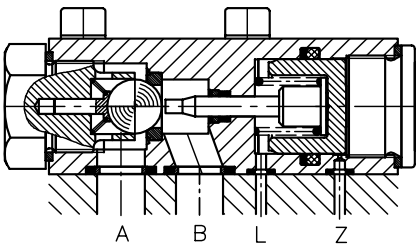
Coding	Suitable for	Drawing no. Orifice
B 0,4	HRP 1 ... 5	5585 038/1
B 0,6		5585 037/1
B 0,8		5585 034/1
EB 1 - 0 (undrilled)	HRP 7	5000 025
EB 1 - 0,4		5000 025 d
EB 1 - 0,6		5000 025 a
EB 1 - 0,8		5000 025 b
EB 1 - 1,0		5000 025 c
EB 1 - 2,0		5000 025 e

6.2 Planning information

Version

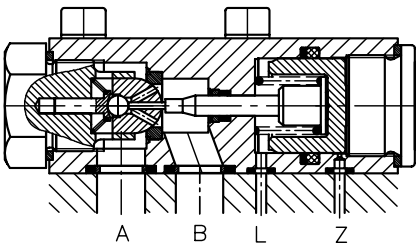
- Valves without hydraulic release

clear the full flow cross section relatively quickly when released. They are suitable for all normal operating cases. A restriction in the control port dampens the switching movement of the release piston, meaning that pressure surges (relief surges) are usually sufficiently suppressed. If they do still occur during the test run, the restriction of the release speed can be increased further with the additional incorporation of an orifice (Chapter 2, "Available versions, main data" Table 4).



- Valves with hydraulic release

are more suitable for high pressures and larger consumer volumes. The small ball check valve seated in the spherically ground main valve piston opens slightly earlier upon release, so that surge-free decompression can take place via the cross section, which acts as a throttle gap. The hydraulic release is all the more effective, i.e. the pressure reduction is all the smoother, the lower the opening speed of the control piston. With type HRP 7V, the lack of seals on the opening piston results in slight leakage from the control port Z to the drain port L. An additional orifice Chapter 2, "Available versions, main data" (Table 4) in the control port is often advisable.



Further information

Additional versions

- Releasable check valve type RH: D 6105
- Releasable twin check valve type DRH: D 6110
- Releasable check valve type RHC and RHCE: D 7165
- Check valve type CRK, CRB and CRH: D 7712
- Directional seated valve type G, WG and others: D 7300
- Directional seated valve type WN and WH: D 7470 A/1
- Orifice type EB: D 6465

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