

Releasable check valve type RHC and RHCE

Product documentation



Screw-in valve

Operating pressure p_{\max} :

700 bar

Flow rate Q_{\max} :

200 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.

Features and benefits:

- Screw-in valve
- Pressures up to 700 bar
- Flows up to 200 lpm
- Sturdy

Intended applications:

- Industrial hydraulics
- Construction machines

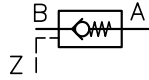


Releasable check valve type RHC and RHCE

2 Available versions, main data

2.1 Releasable check valve type RHC

Circuit symbol:



Order coding example:

RHC 4 V

Basic type and size Table 1 Basic type and size

Table 1 Basic type and size
Standard version

Basic type and size	Flow rate Q_{max} (lpm)	Pressure p_{max} (bar)	real pilot ratio ψ		Control oil volume (cm^3)
		with port A, B, Z	Main valve	Hydraulic release	
without hydraulic release, nominal pilot ratio 2.5:1					
RHC 1	15	700	2.6:1	--	0.1
RHC 2	35				0.2
RHC 3	55				0.4
RHC 4	100	500	2.5:1		0.8
RHC 5	150				1.5
RHC 6	200				2.65
without hydraulic release, nominal pilot ratio 4.5:1					
RHC 1/0	8	700	4.2:1	--	0.1
RHC 2/1	15		4.3:1		0.2
RHC 3/2	35		4.5:1		0.4
RHC 4/3	55	500	4.3:1		0.8
RHC 5/4	100				1.5
with hydraulic release, nominal pilot ratio 2.5:1					
RHC 1 V	15	700	2.6:1	10:1	0.1
RHC 3 V	55		2.5:1		0.4
RHC 4 V	100	500	2.8:1	12:1	0.8
RHC 5 V	150			19:1	1.5
RHC 6 V	200			2.5:1	12.9:1
with hydraulic release, nominal pilot ratio 4.5:1					
RHC 4/3 V	55	500	4.3:1	26:1	0.8
RHC 5/4 V	100			21:1	1.5

Version with thread and control piston sealing

(can be exchanged with standard version)

Basic type and size	Flow rate Q_{\max} (lpm)	Pressure p_{\max} (bar)	real pilot ratio ψ		Control oil volume (cm ³)
			with port A, B, Z		
			Main valve	Hydraulic release	
without hydraulic release, nominal pilot ratio 2.5:1					
RHC 11	15	700	2.6:1	--	0.1
RHC 21	35				0.2
RHC 31	55		2.5:1		0.4
RHC 41	100	500			0.8
RHC 51	150				2.8:1
without hydraulic release, nominal pilot ratio 4.5:1					
RHC 11/0	8	700	4.2:1	--	0.1
RHC 21/1	15		4.3:1		0.2
RHC 31/2	35		4.5:1		0.4
RHC 41/3	55	500	4.3:1		0.8
RHC 51/4	100				1.5
with hydraulic release, nominal pilot ratio 2.5:1					
RHC 11 V	15	700	2.6:1	10:1	0.1
RHC 31 V	55		2.5:1		0.4
RHC 41 V	100	500			12:1
RHC 51 V	150		2.8:1	19:1	1.5
with hydraulic release, nominal pilot ratio 4.5:1					
RHC 41/3 V	55	500	4.3:1	26:1	0.8
RHC 51/4 V	100			21:1	1.5

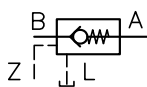
Version with thread and control piston sealing

(easy mounting, different mounting hole arrangement compared with standard version)

Basic type and size	Flow rate Q_{\max} (lpm)	Pressure p_{\max} (bar)	real pilot ratio ψ		Control oil volume (cm ³)
			with port A, B, Z		
			Main valve	Hydraulic release	
without hydraulic release, nominal pilot ratio 2.5:1					
RHC 13	15	700	2.6:1	--	0.1
RHC 23	35				0.2
RHC 33	55		2.5:1		0.4
RHC 43	100	500			0.8
RHC 53	150				2.8:1
without hydraulic release, nominal pilot ratio 4.5:1					
RHC 13/0	8	700	4.2:1	--	0.1
RHC 23/1	15		4.3:1		0.2
RHC 33/2	35		4.5:1		0.4
RHC 43/3	55	500	4.3:1		0.8
RHC 53/4	100				1.5
with hydraulic release, nominal pilot ratio 2.5:1					
RHC 13 V	15	700	2.6:1	10:1	0.1
RHC 33 V	55		2.5:1		0.4
RHC 43 V	100	500			12:1
RHC 53 V	150		2.8:1	19:1	1.5
with hydraulic release, nominal pilot ratio 4.5:1					
RHC 43/3 V	55	500	4.3:1	26:1	0.8
RHC 53/4 V	100			21:1	1.5

2.2 Releasable check valve type RHCE with control piston relief via additional drain port

Circuit symbol:



Order coding example:

RHCE 33 V

Basic type and size Table 2 Basic type and size

Table 2 Basic type and size

Standard version

Basic type and size	Flow rate Q_{\max} (lpm)	Pressure p_{\max} (bar)		real pilot ratio ψ		Control oil volume (cm^3)
		with port		Main valve	Hydraulic release	
		A, B, Z	L			
without hydraulic release, nominal pilot ratio 2.5:1						
RHCE 1	15	700	unpressurised to the tank	2.6:1	--	0.1
RHCE 2	35					0.2
RHCE 3	55			500	2.5:1	10:1
RHCE 4	100	12:1				0.8
RHCE 5	150	2.8:1			19:1	1.5
RHCE 6	200				12.9:1	2.65
with hydraulic release, nominal pilot ratio 2.5:1						
RHCE 1 V	15	700	unpressurised to the tank	2.6:1	10:1	0.1
RHCE 3 V	55					0.4
RHCE 4 V	100	500		2.5:1	12:1	0.8
RHCE 5 V	150					
RHCE 6 V	200			12.9:1	2.65	

Version with thread and control piston sealing

(easy mounting, different mounting hole arrangement compared with standard version)

Basic type and size	Flow rate Q_{\max} (lpm)	Pressure p_{\max} (bar)		real pilot ratio ψ		Control oil volume (cm ³)
		with port		Main valve	Hydraulic release	
		A, B, Z	L			
without hydraulic release, nominal pilot ratio 2.5:1						
RHCE 13	15	700	unpressurised to the tank	2.6:1	--	0.1
RHCE 23	35					0.2
RHCE 33	55			500	2.5:1	10:1
RHCE 43	100	12:1				0.8
RHCE 53	150	2.8:1			19:1	1.5
RHCE 63	200	2.5:1			12.9:1	2.65
with hydraulic release, nominal pilot ratio 2.5:1						
RHCE 13 V	15	700	unpressurised to the tank	2.6:1	10:1	0.1
RHCE 33 V	55					0.4
RHCE 43 V	100	500		2.5:1	12:1	0.8
RHCE 53 V	150				19:1	1.5
RHCE 63 V	200			2.5:1	12.9:1	2.65
with hydraulic release, nominal pilot ratio 4.5:1						
RHCE 23/1 V	15	700	unpressurised to the tank	4.1:1	14.7:1	0.2

3 Parameters

Designation	Releasable check valve
Design	Spring-loaded ball seated valve
Model	Screw-in valve
Material	Balls made of rolling bearing steel All-steel version; valve-controlled housing part hardened, valve seat polished
Attachment	screwed in to the mounting hole of a housing body observe dimensional tolerance for threaded core drilling D1 in position 4, as well as footnote 1)
Tightening torques	See Chapter 4, "Dimensions"
Installation position	As desired
Ports	A, B = main passage Z = control port L = drain port unpressurised to the tank
Flow direction	B → A Free A → B blocked with zero-leakage in idle position (Z port depressurised) if there is no pressure at B or the pressure is lower than at A A → B free, if the valve is released with pilot pressure on Z (see also pilot pressure p_{st})
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 <hr/> 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.

Pressure and flow rate

Opening pressure

B → A Approx. 0.5 bar
with RHC 1/0 Approx. 1 bar

Pilot pressure p_{St} (bar)
(reference value calculation)

for releasing $p_{St} = \frac{p_S}{\psi} + 2.5$
for holding open $p_{St} \approx k p_B + \frac{\Delta p}{\psi} + 4.5$

ψ Pilot ratio, see tables [Chapter 2, "Available versions, main data"](#)

p_A = Pressure at A

p_B = Pressure at B

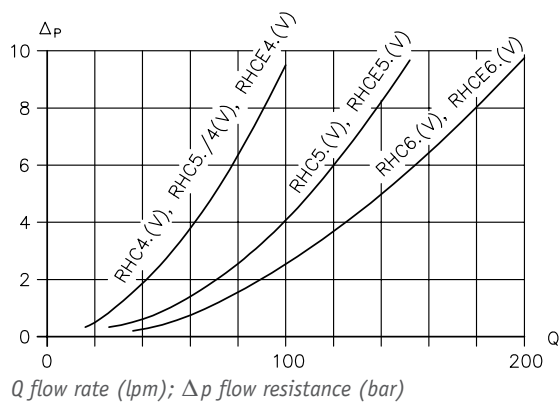
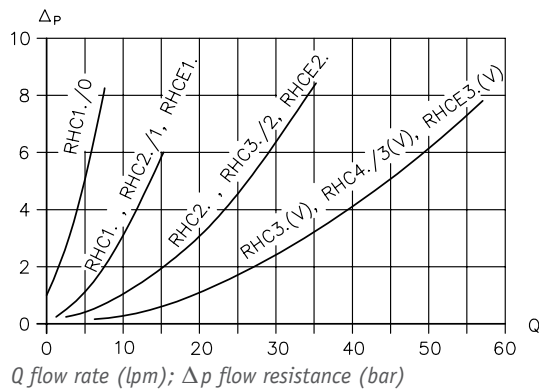
Δp see following characteristics

k = 1 with type RHC
 = 0.05 ... 0.1 with type RHCE

Characteristics

Oil viscosity approx. 60 mm²/s

Δp -Q characteristics



Weight

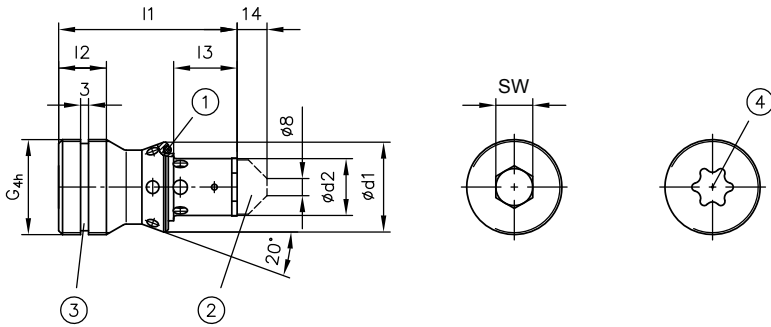
Type

RHC 1, RHC 11, RHC 13	= 20 g
RHC 1 V, RHC 11 V, RHC 13 V	= 20 g
RHC 1/0, RHC 11/0, RHC 13/0	= 20 g
RHC 2, RHC 21, RHC 23	= 40 g
RHC 2/1, RHC 21/1, RHC 23/1	= 40 g
RHC 3, RHC 31, RHC 33	= 70 g
RHC 3/2, RHC 31/2, RHC 33/2	= 70 g
RHC 3 V, RHC 31 V, RHC 33 V	= 70 g
RHC 4, RHC 41, RHC 43	= 140 g
RHC 4/3, RHC 41/3, RHC 43/3	= 140 g
RHC 4 V, RHC 41 V, RHC 43 V	= 140 g
RHC 4/3 V, RHC 41/3 V, RHC 43/3 V	= 140 g
RHC 5, RHC 51, RHC 53	= 250 g
RHC 5/4, RHC 51/4, RHC 53/4	= 250 g
RHC 5 V, RHC 51 V, RHC 53 V	= 250 g
RHC 5/4 V, RHC 51/4 V, RHC 53/4 V	= 250 g
RHC 6	= 500 g
RHC 6 V	= 500 g
RHCE 1, RHCE 13	= 20 g
RHCE 2, RHCE 23, RHCE 23/1 V	= 40 g
RHCE 3, RHCE 33	= 70 g
RHCE 3 V, RHCE 33 V	= 70 g
RHCE 4, RHCE 43	= 140 g
RHCE 4 V, RHCE 43 V	= 140 g
RHCE 5, RHCE 53	= 250 g
RHCE 5 V, RHCE 53 V	= 250 g
RHCE 6, RHCE 63	= 500 g
RHCE 6 V, RHCE 63 V	= 500 g

4 Dimensions

All dimensions in mm, subject to change.

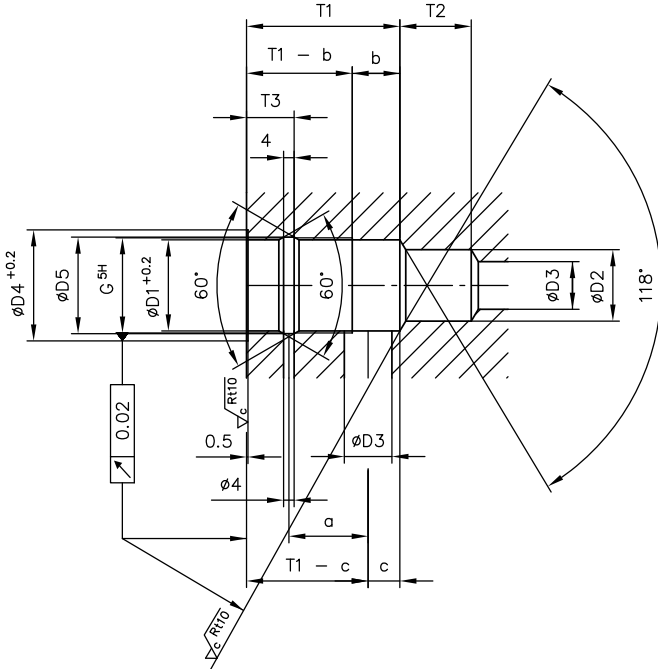
4.1 Check valves, type RHC 1 ... 6(V)



- 1 O-ring NBR 90 Shore
- 2 only with type RHC 6(V)
- 3 Sealing ring with type RHC 11 ... 51(V)
- 4 Hexalobular socket ISO 10664-70 (Torx ® TX70), only with type RHC 5(V)

Mounting hole

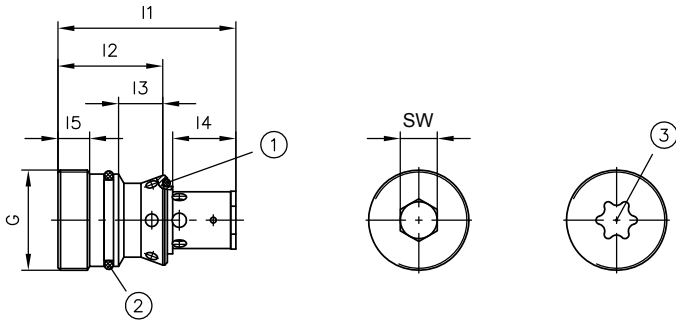
Finished with tapped plugs DIN 908 and DIN 910 sealing rings according to DIN 7603



Type	G	l1	l2	l3	Ød1	Ød2	SW	O-ring	Tightening torque M _{max} (Nm)
RHC 1(V) RHC 11(V)	M16x1.5	32.2	10	10.7	14	9	6	10x1.5	40
RHC 1/0 RHC 11/0		29.5		7.7					
RHC 2 RHC 21	M20x1.5	37.9	12	12.9	18	11	8	12.42x1.78	75
RHC 2/1 RHC 21/1		36.2		11.2		10			
RHC 3(V) RHC 31(V)	M24x1.5	47.2	13.5	15.2	22	13	10	15.3x2.4	100
RHC 3/2 RHC 31/2		45.4		13.4		11			
RHC 4(V) RHC 41(V)	M30x1.5	56	15	20.5	28	17.5	12	20.29x2.62	140
RHC 4/3(V) RHC 41/3(V)		51.7		16.2		16			
RHC 5(V) RHC 51(V)	M36x1.5	67.5	18.5	24	34	21.5	Torx [®] TX70	25.07x2.62	200
RHC 5/4(V) RHC 51/4(V)		64.2		20.7		20			
RHC 6(V)	M42x1.5	83	23	29	39.5	27	19	31.42x2.62	350

	a	b	c	ØD1	ØD2	ØD3	ØD4	ØD5	T1	T2	T3	Sealing ring on the tapped plug
RHC 1(V) RHC 11(V) RHC 1/0 RHC 11/0	15	9	7	14.4	11	8	20	16.5	35	13	15	16x20x1.5
RHC 2 RHC 21 RHC 2/1 RHC 21/1	18	10	6	18.4	14	10	24	20.5	38	17	16	20x24x1.5
RHC 3(V) RHC 31(V) RHC 3/2 RHC 31/2	22	15	9	22.4	16	12	29	24.5	45	19	16	24x29x2
RHC 4(V) RHC 41(V) RHC 4/3(V) RHC 41/3(V)	24	15	10	28.4	22	15	36	30.5	50	24	18	30x36x2
RHC 5(V) RHC 51(V) RHC 5/4(V) RHC 51/4(V)	30	18	12	34.4	27	18	42	36.5	58	27	18	36x42x2
RHC 6(V)	42	28	12	40.4	32	20	50	42.5	71	42	19	42x49x2

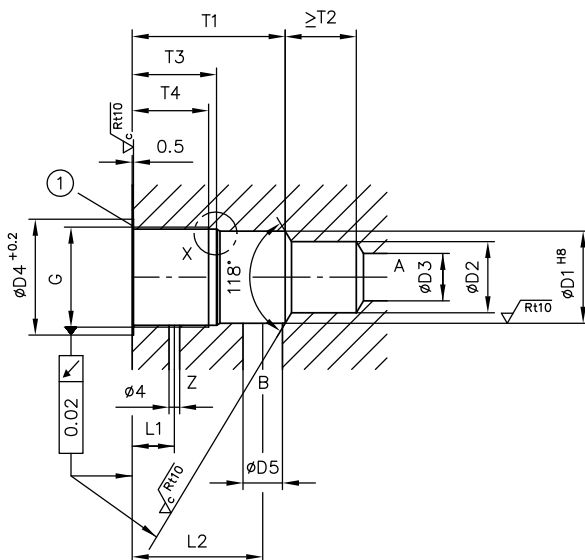
4.2 Check valves, type RHC 13 ... 53/4(V)



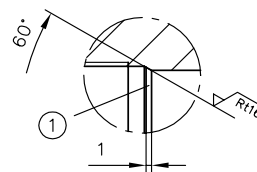
- 1 O-ring 1 NBR 90 Shore
- 2 O-ring 2 AU 90 Shore (type RHC 43.. NBR 90 Shore)
- 3 Hexalobular socket ISO 10664-70 (Torx ® TX70), only with type RHC 53(V)

Mounting hole

Finished with tapped plugs DIN 908 and DIN 910 sealing rings according to DIN 7603



Detail "X"



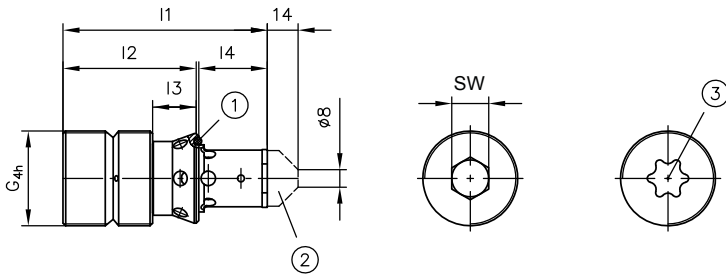
- 1 Edge burr-free !
max. R 0.3 rounded

- 1 Sealing ring

Type	G	l1	l2	l3	l4	l5	SW	O-ring 1	O-ring 2	Tightening torque M _{max} (Nm)
RHC 13(V)	M20x1.5	33	21.5	7.5	10.5	5.5	6	10x1.5	14x1.78	40
RHC 13/0		29	20.5	6.5	7	5				
RHC 23	M22x1.5	38.5	25	9	13	6.5	8	12.42x1.78	15.6x1.78	75
RHC 23/1		36	23	8.5	11	5.5				
RHC 33(V)	M26x1.5	47	30	12	15	7.5	10	15.3x2.4	20.35x1.78	100
RHC 33/2		46	28.5	11	13.5					
RHC 43(V)	M36x1.5	55.5	33	14	20.5	9	12	20.29x2.62	28.3x1.78	140
RHC 43/3(V)		52	32.5	13	16					
RHC 53(V)	M38x1.5	67.5	41.5	18.5	24	12	Torx® TX70	25.07x2.62	29.82x2.62	200
RHC 53/4(V)		65	40	16	21					

	L1	L2	ØD1 ^{H8}	ØD2	ØD3	ØD4	ØD5	T1	T2	T3 ^{+0.5}	T4	t	Sealing ring on the tapped plug
RHC 13(V) RHC 13/0	15	33	18	11	8	24	6	36	13.5	24	21	0.5	20x24x1.5
RHC 23	14	34	19	14	10	27	8.5	39	17	24	21	1	22x27x1.5
RHC 23/1	13	33						38		23	20		
RHC 33(V) RHC 33/2	16	40	24	16	12	31	11	46.5	20	28	25	0.5	26x31x2
RHC 43(V)	18	45	32	22	15	42	13	52	28	32	29	1	36x42x2
RHC 43/3(V)									24				
RHC 53(V) RHC 53/4(V)	16	49.5	35	27	18	44	15	58	27	32	29	1	38x44x2

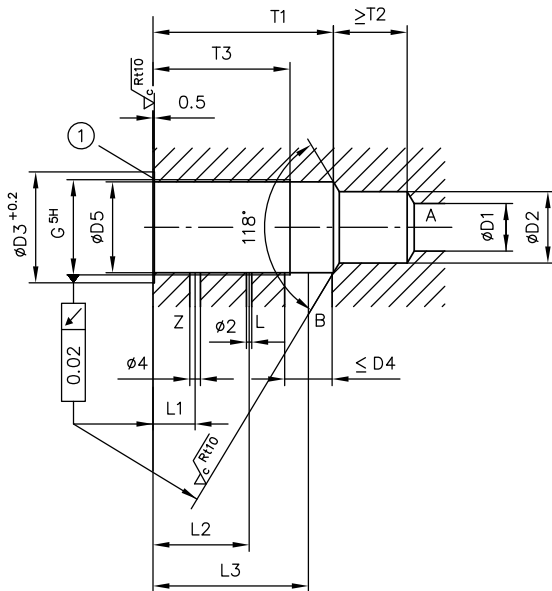
4.3 Check valves, type RHCE 1 ... 6(V)



- 1 O-ring NBR 90 Shore
- 2 only with RHCE 6(V)
- 3 Hexalobular socket ISO 10664-70 (Torx ® TX70), only with type RHCE 5(V)

Mounting hole

Finished with tapped plugs DIN 908 and DIN 910 sealing rings according to DIN 7603

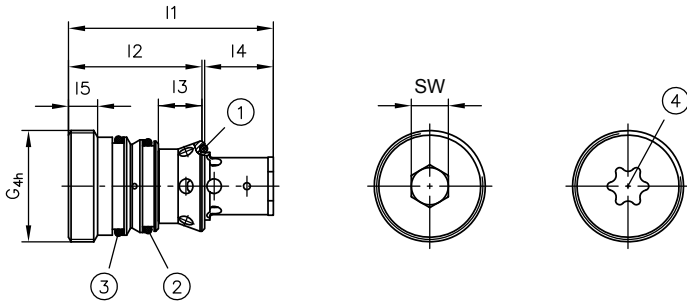


- 1 Sealing ring

Type	G	l1	l2	l3	l4	SW	O-ring	Tightening torque M _{max} (Nm)
RHCE 1(V)	M16x1.5	38	26	8.5	11	6	10x1.5	40
RHCE 2	M20x1.5	45	30.5	10.5	12	8	12x2	75
RHCE 3(V)	M24x1.5	56	38	14	16	10	15.3x2.4	100
RHCE 4(V)	M30x1.5	63	40.5	14.5	20	12	20.29x2.62	140
RHCE 5(V)	M36x1.5	77	50.5	16.5	25	Torx® TX70	25.07x2.62	200
RHCE 6(V)	M42x1.5	99	59	15	29	19	31.42x2.62	350

	L1 ±0.1	L2 ±0.1	L3 ±0.1	ØD1	ØD2	ØD3	ØD4	ØD5	T1 +0.5	T2	T3 +0.5	Sealing ring on the tapped plug
RHCE 1(V)	12	22	35	8	11	20	8	14.4	39.5	13	32	16x20x1.5
RHCE 2	14	24	41	10	14	25	10	18.4	46	16	36	20x24x1.5
RHCE 3(V)	16	29	48	12	16	29	12	22.5	55	19	42	24x29x2
RHCE 4(V)	16	31	50	14	22	36	14	28.4	58	24	45	30x36x2
RHCE 5(V)	16	36.5	59	18	27	42	18	34.4	68.5	28	52	36x42x2
RHCE 6(V)	16	43	67	20	32	50	20	40.4	77.5	42	60	42x49x2

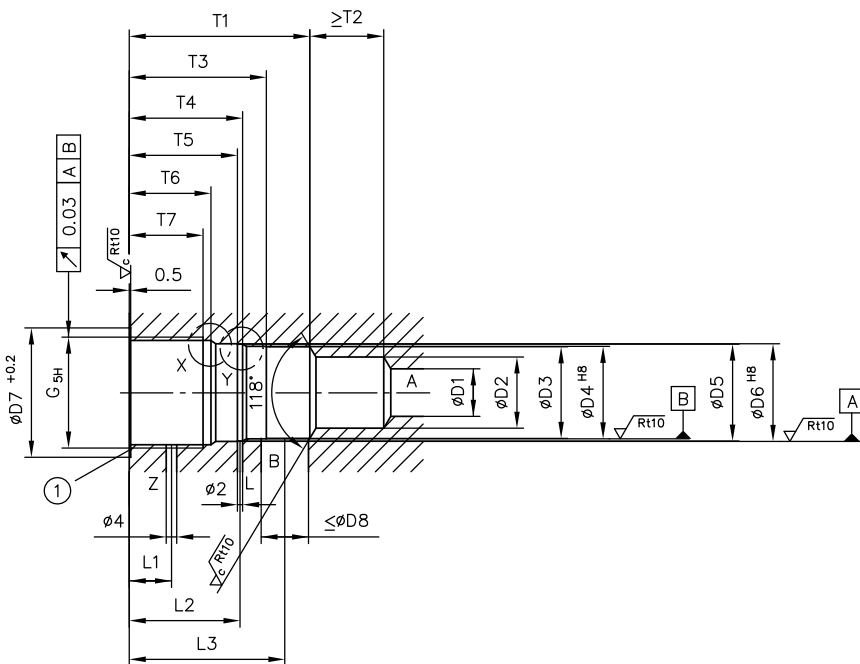
4.4 Check valves, type RHCE 13 ... 53/4(V)



- 1 O-ring 1 NBR 90 Shore
- 2 O-ring 3 NBR 90 Shore
- 3 O-ring 2 NBR 90 Shore
- 4 Hexalobular socket ISO 10664-70 (Torx ® TX70), only with type RHC 5(V)

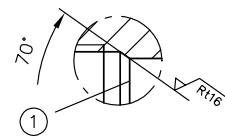
Mounting hole

Finished with tapped plugs DIN 908 and DIN 910 sealing rings according to DIN 7603

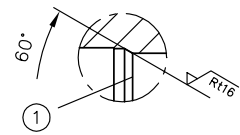


- 1 Sealing ring

Detail "X"



Detail "Y"



- 1 Edge burr-free !
max. R 0.3 rounded

Type	G	l1	l2	l3	l4	l5	SW	O-ring 1	O-ring 2	O-ring 3
RHCE 13(V)	M20x1.5	45	32.5	8.5	11	7	8	10x1.5	14x1.78	12x1.5
RHCE 23 RHCE 23/1(V)	M24x1.5	52	37	10.5	12	7.5	8	12x2	15.55x2.62	15.6x1.78
RHCE 33(V)	M27x2	59	41.5	14	16	7.5	10	15.3x2.4	18.72x2.62	18x2.5
RHCE 43(V)	M33x2	65	43.5	14.5	20	8	12	20.29x2.62	25.07x2.62	23.47x2.62
RHCE 53(V)	M42x1.5	78	50	16.5	25	11	Torx® TX70	25.07x2.62	31.42x2.62	29.82x2.62
RHCE 63(V)	M45x1.5	103	59	15	41	15.5	19	31.42x2.62	36x3	34x3

	L1	L2	L3	T1	T2	T3	T4	T5	T6	T7	Tightening torque M _{max} (Nm)
RHCE 13(V)	14	32.5	43.5	48	13	40	33	32	25.5	22.5	40
RHCE 23 RHCE 23/1(V)	14	34	47	52	16	43	35	34	26.5	22.5	75
RHCE 33(V)	16	36.5	52	59	19	46	38.5	37.5	29	25	100
RHCE 43(V)	16	37	53	60	24	48	38	37	30	25.5	140
RHCE 53(V)	16	42	59	68.5	28	52	43	41	31	28	200
RHCE 63(V)	16	48	67	77.5	42	59	49	47.5	38.5	33.5	350

	ØD1	ØD2	ØD3	ØD4	ØD5	ØD6	ØD7	ØD8	Sealing ring on the tapped plug
RHCE 13(V)	8	11	14.7	15	16.7	17	26	8	20x24x1.5
RHCE 23 RHCE 23/1(V)	10	14	18.7	19	20.7	21	29	10	24x29x2
RHCE 33(V)	12	16	22.7	23	23.7	24	32	12	27x32x2
RHCE 43(V)	14	22	27.7	28	29.7	30	39	14	33x39x2
RHCE 53(V)	18	27	34.7	35	36.7	37	49	18	42x49x2
RHCE 63(V)	20	32	39.7	40	41.7	42	52	20	52x45x2

5.1 Intended use

This valve is exclusively intended for hydraulic applications (fluid 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



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.

5.2.1 Creating the mounting hole

See description in [Chapter 4, "Dimensions"](#).

5.3 Operating instructions

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"](#).)

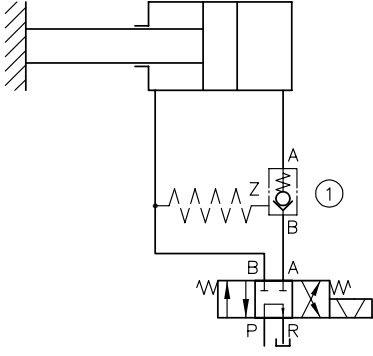
5.4 Maintenance information

This product is maintenance-free.

6 Other information

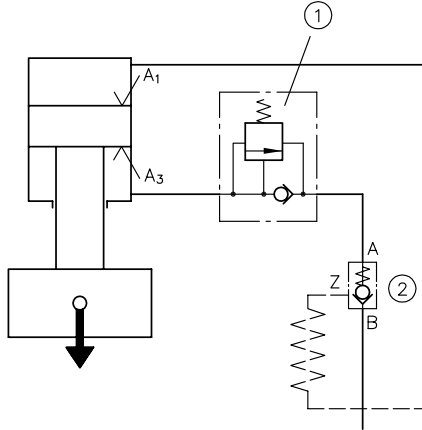
6.1 Typical application examples

Zero-leakage blockage of hydraulic cylinders
(Shown here with dampened control line)



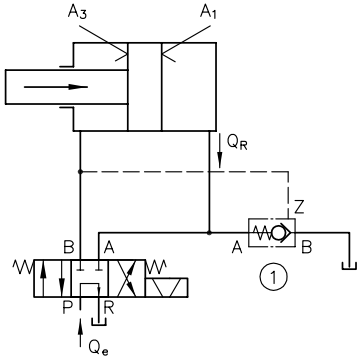
1 Type RHC

Use for pulling loads



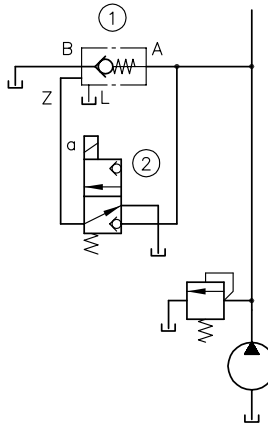
1 e.g. type SVC in accordance with [D 7000/1](#)
2 Type RHC

additional return flow relief for large flow rates
(A_1/A_3 is very high)



1 Type RHC

Use as idle circulation valve



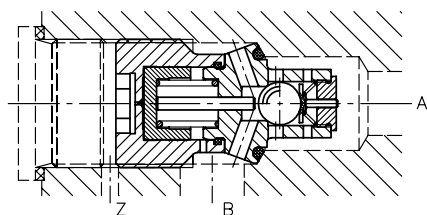
1 Type RHCE
2 e.g. type WH 1H-G 24 in accordance with [D 7470 A/1](#)

6.2 Planning information

Versions

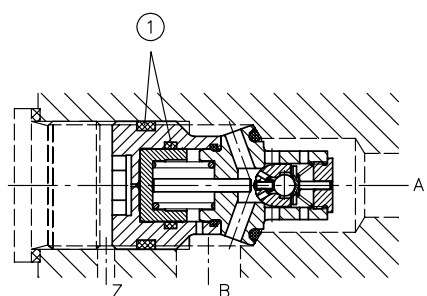
- Valves without hydraulic release (type RHC..)

The valve element is a ball. Quick release of the full flow cross section A → B during release. The switching speed of the piston is damped. This largely prevents an abrupt opening and possible decompression surges. If they do still occur during the test run, install an additional throttling point in the control oil supply line or use a valve with hydraulic release.



- Valves with hydraulic release (type RHC..V)

The valve element is a spherical ground piston (ball seat) with installed ball check valve, which is opened during release before the main piston and releases a throttling cross-section for the surge-free decompression of the consumer volume. To be used mainly for high operating pressures and large consumer volumes. Additional throttling of the control oil line increases the effectiveness of the hydraulic release.

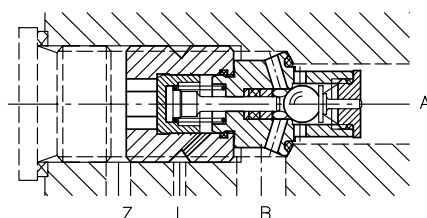


1 Additional sealing of the pilot pressure side

- Valves with control piston relief (type RHCE..)

Available without and with hydraulic release (see above).

This version enables an opening pressure that is largely independent from the return pressure (p_B). This is achieved via an additional control piston relief via the drain port L.



Further information

Additional versions

- Check valve type CRK, CRB and CRH: D 7712
- Releasable check valve type HRP: D 5116