Pressure relief valve, pilot-operated, with pulling function, seat design with pressure sequencing and pressure cut-off stage

Type MHDBB and MHDBL

RE 64612
Edition: 2016-04

H7983_d

- Frame sizes 16, 22, 32
- Component series 3X
- Maximum operating pressure 420 bar
- Maximum flow 400 l/min

Features

- Screw-in cartridge valve
- For mobile applications
- Pressure rating 100 and 420 bar
- Available in 3 frame sizes (16, 22, 32)

Contents

Ordering code

01	02	03	04	05		06		07	08	09	10	11	12	13
MH			**K**	**9**	**–**	**3X**	**/**			**21**			**01**	*****

01	Mobile hydraulics	**MH**
02	Pressure / feed valve, pilot-operated [1] **with** hydraulic pressure sequencing stage	**DBB**
	Pressure / feed valve, pilot-operated [1] **with** hydraulic pressure cut-off stage	**DBL**
03	Size 16	**16**
	Size 22	**22**
	Size 32	**32**
04	Screw-in cartridge valve	**K**

Adjustment type

05	Adjustable via pressure sequencing/cut-off stage	**9**
06	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

Pressure rating [2]

07	Maximum set pressure 100 bar	**100**
	Maximum set pressure 420 bar	**420**

Pressure adjustment

08	**Without** pressure adjustment [3]	**no code**
	With pressure adjustment	**-...**[4]

Arithmetic gear ratio

09	(Only for version BB, pressure sequencing stage, different gear ratios upon request)	**21**

Seal material

10	NBR seals	**M**
	FKM seals	**V**
	Observe compatibility of seals with hydraulic fluids used! (Other seals upon request)	

Mounting cavity

11	M24 x 1 (NG16)	**FB**
	M28 x 1 (NG22)	**FC**
	M33 x 1 (NG32)	**FK**

Electrical connection

12	Imperial (G1/4")	**01**
13	Further details in the plain text	*****

[1] Minimum cracking pressure, see characteristic curves pages 6 and 7

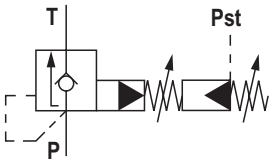
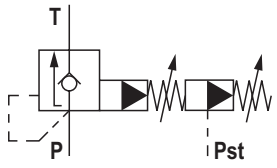
[2] The values refer to the screw-in cartridge valve. If the valve is installed in a housing, it has to be made sure that the set pressure of the screw-in cartridge valve does not exceed the value of the housing that might be lower!

[3] Valves whose pressure is not adjusted at the factory are delivered in pressure-relieved state.

[4] Example: Set to 300 bar: ...420-**300**..
(pressure adjustment at q_V max = 10 l/min)

☞ **Notice:** In the case of subsequent re-adjustment of valves set at the factory, the warranty will become void!

Valve types

Valve type, symbol	Type	Material no.	Mounting cavity (see page 9)	Characteristic curve (see pages 6 and 7)
	MHDBB 16 K9-3X/420/21VFB01	**R900936672**	FB	D1/E1
	MHDBB 22 K9-3X/100/21VFC01	**R900962778**	FC	D2/E2
	MHDBB 22 K9-3X/420/21VFC01	**R900936679**	FC	D2/E2
	MHDBB 32 K9-3X/100/21VFK01	**R900243973**	FK	D3/E3
	MHDBB 32 K9-3X/420/21VFK01	**R900936956**	FK	D3/E3
	MHDBL 16 K9-3X/420VFB01	**R900936656**	FB	D1/E1
	MHDBL 22 K9-3X/420VFC01	**R900936680**	FC	D2/E2
	MHDBL 32 K9-3X/420VFK01	**R900936721**	FK	D3/E3

Function, section

General
Pressure valves type MHDBB and MHDBL are pilot-operated pressure relief valves for block design installation. They are used for system pressure limitation. The system pressure can be set steplessly via the adjustment element (4).

Pressure relief function:
In the initial position the valves are closed.
The pressure in main port ① acts on the spool (1). Simultaneously, pressure is applied to the spring-loaded side of the spool (1) and to the pilot poppet (6) via nozzle (2). If the pressure in main port ① exceeds the value set at spring (5), the pilot poppet (6) opens. Hydraulic fluid flows from the spring-loaded side of the spool (1) via nozzle (3) and channel (7) into the main port ②. The resulting pressure drop moves the spool (1) and thus opens the connection from main port ① to ② while maintaining the pressure set at spring (5).

Pressure sequencing function (MHDBB)
By connecting pilot oil pressure to the external port ③, the piston (8) is pressurized. This increases the preload of the spring (5) and the maximum set system pressure.

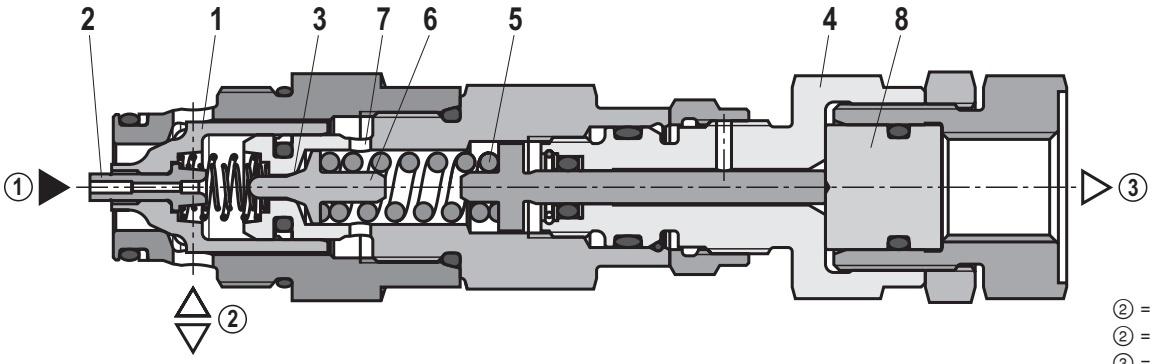
Pressurization at the external port ③ has an effect on the pressure at the main port ① at a ratio of 21:1.

Pressure shut-off function (MHDBL):
By connecting pilot oil pressure to the external port ③, the piston (8) is pressurized. This reduces the preload of the spring (5) and the maximum set system pressure.

Feed function:
The feed function makes up for insufficient oil volumes caused by leakage on response of pressure valves and in case of leading loads. If the pressure at main port ① is lower than at main port ②, the spool will be lifted out of its seat. Hydraulic fluid flows from main port ② to main port ①. Tank preloading should be ≥ 4 bar.

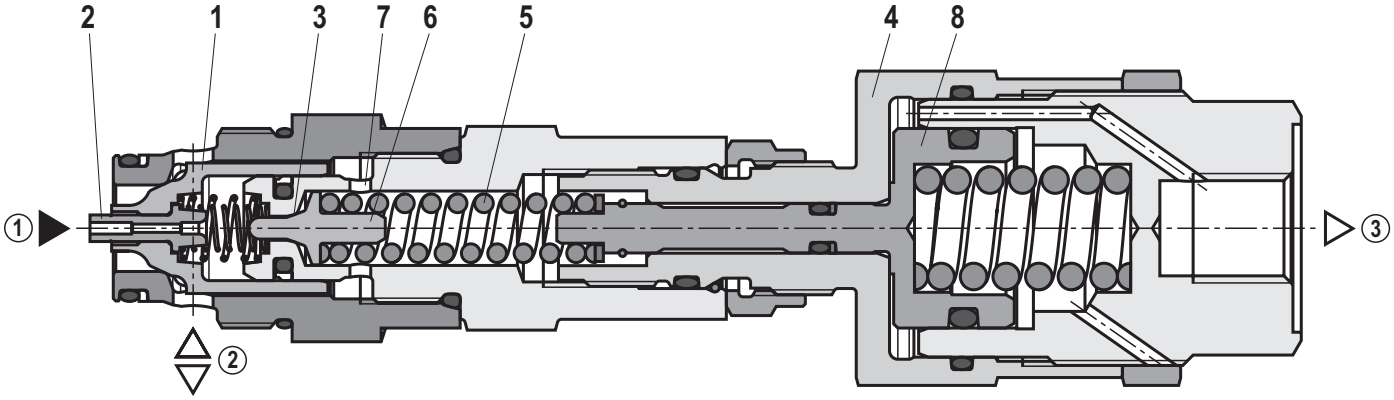
Notice:
- The maximum operating pressure is the sum of the set pressure and the return flow pressure at main port ②.
- Thanks to their design, pilot-operated pressure valves are virtually leakage oil-free.

MHDBB



② = Main port (P)
② = Main port (T)
③ = External port (Pst)

MHDBL



Technical data
(For applications outside these parameters, please consult us!)

general		
Weight	kg	See table on page 8 for dimensions
Installation position		Any
Ambient temperature range	°C	–20 ... +80
Storage temperature range	°C	–20 ... +80

Environmental audits	
Surface protection	The valves do not feature any surface protection! Surface protection has to be ensured by painting the components or the entire assembly (e.g. valve with housing).

hydraulic			
Maximum operating pressure	▶ Main port ① (P)	bar	100; 420
	▶ Main port ② (T)	bar	50
Max. pilot pressure	▶ External port ③ (Pst)	bar	30
Maximum flow	▶ Port P-T	l/min	See characteristic curves on pages 6 and 7
	▶ Port T-P	l/min	See characteristic curves on pages 6 and 7
Hydraulic fluid			See table below
Hydraulic fluid temperature range		°C	–30 ... +80 (NBR seal) –20 ... +80 (FKM seal)
Viscosity range		mm^2/s	10 ... 380
Maximum admissible degree of contamination of the hydraulic fluid Cleanliness class according to ISO 4406 (c)			Class 20/18/15 [1]
Tested load cycles		LW	2 million [2]

Hydraulic fluid		**Classification**	**Suitable sealing materials**	**Standards**
Mineral oils		HL, HLP	NBR, FKM	DIN 51524
Bio-degradable	▶ Insoluble in water	HEES	NBR, FKM	ISO 15380
	▶ Soluble in water	HEPG	FKM	ISO 15380

☞ **Important information on hydraulic fluids:**
- ▶ For more information and data on the use of other hydraulic fluids, please refer to data sheet 90220 or contact us!
- ▶ There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.)!

Bio-degradable: If bio-degradable hydraulic fluids are used that are also zinc-solving, there may be an accumulation of zinc.

1) The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.
For selection of filters, see data sheets 50070, 50076, 50081, 50086 and 50088. We recommend using a filter with a minimum retention rate of $ß_{10} \geq 75$.

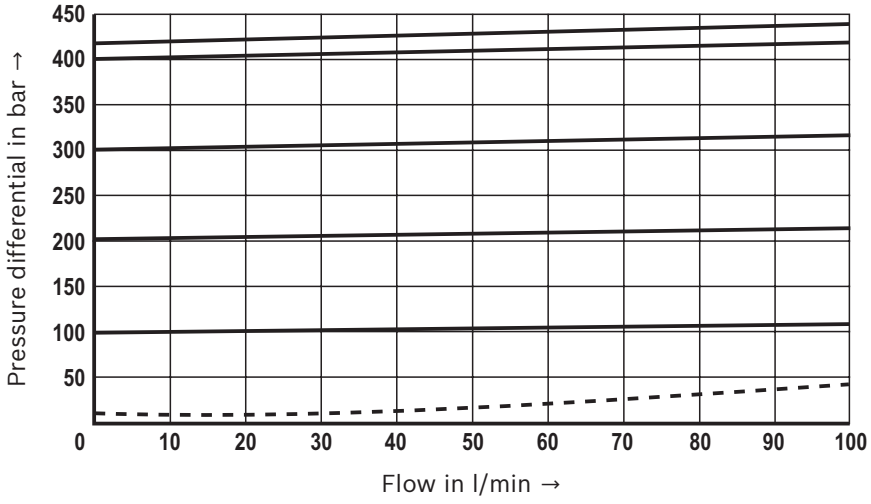
2) Rexroth standard test condition (HPL46; ϑ_{oil} = 40 °C)

☞ **Notice:**
- ▶ The technical data was determined at a viscosity of v = 41 mm^2/s (HLP46; ϑ_{oil} = 40 °C)
- ▶ The following documentation must be observed:
Data sheet 64020-B1 Hydraulic valves for mobile applications
- ▶ When exchanging screw-in cartridge valves, provide for the correct tightening torque!
- ▶ Minimum cracking pressure, see characteristic curves page 6 and 7
- ▶ For use of the valves at an operating pressure of < 30 bar and a flow capacity of < 30 l/min, valves of another design are to be selected from our valve program.

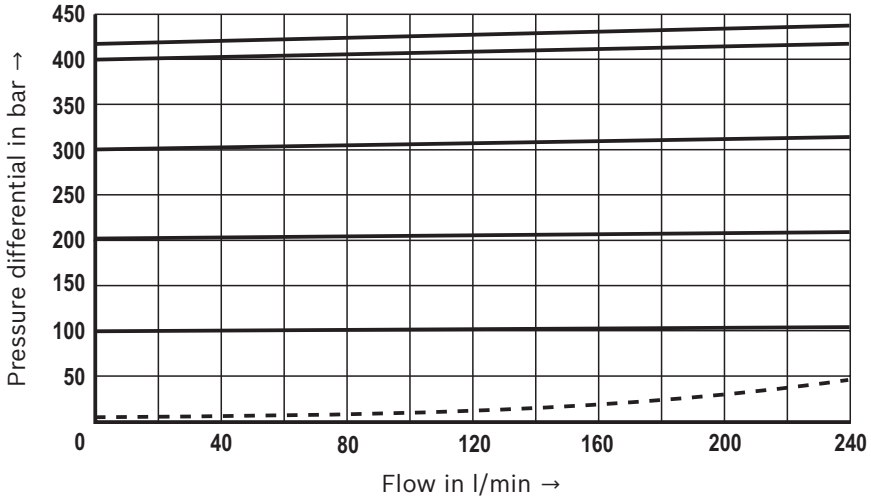
Characteristic curves

(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

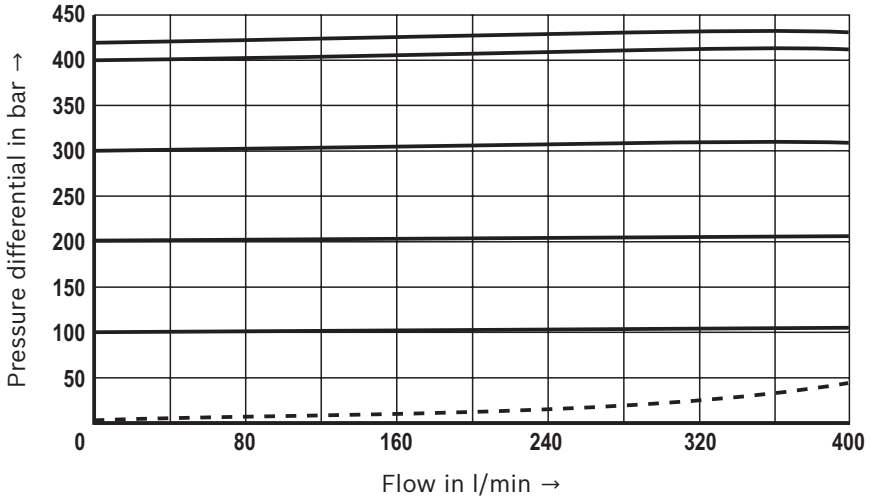
Δp-q_V-characteristic curves – "D1"



Δp-q_V-characteristic curves – "D2"



Δp-q_V-characteristic curves – "D3"



Performance limit

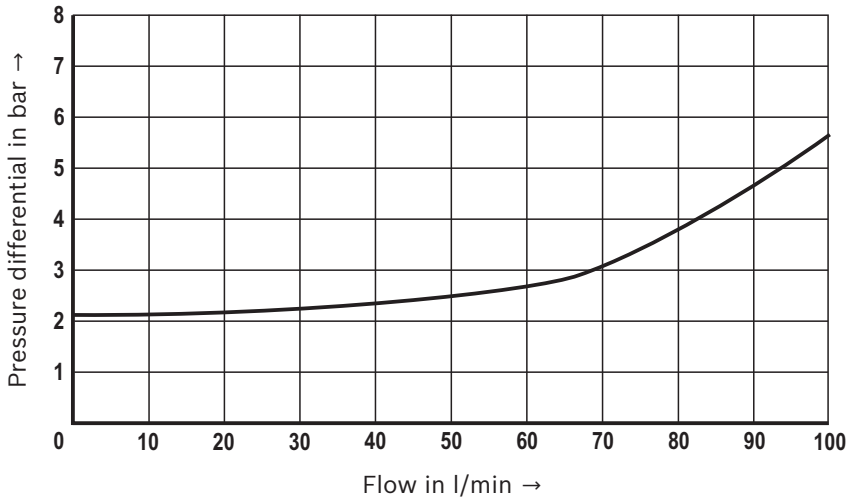
☞ **Notice:**

- The characteristic curves apply to an output pressure p_T = 0 bar over the entire volume range and without housing resistance.
- They refer to the specified nominal values of the pressure ratings (100, 420).
- Below the nominal pressure, the characteristic curves become increasingly steeper.

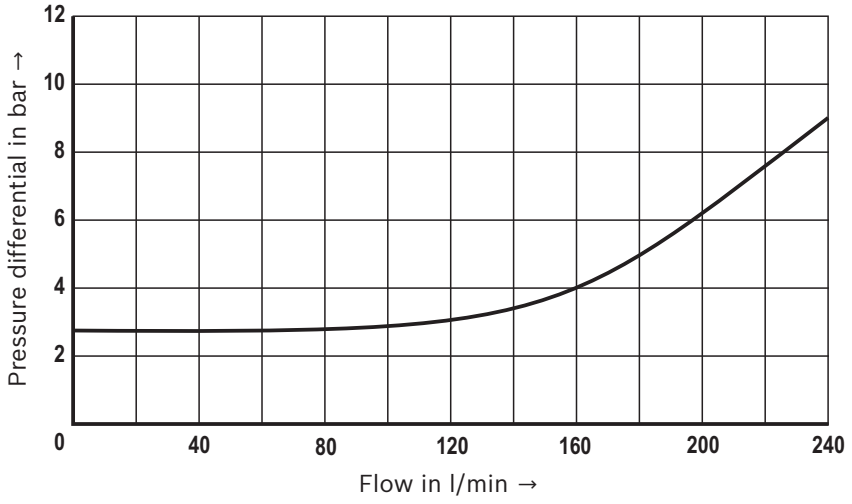
Characteristic curves

(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

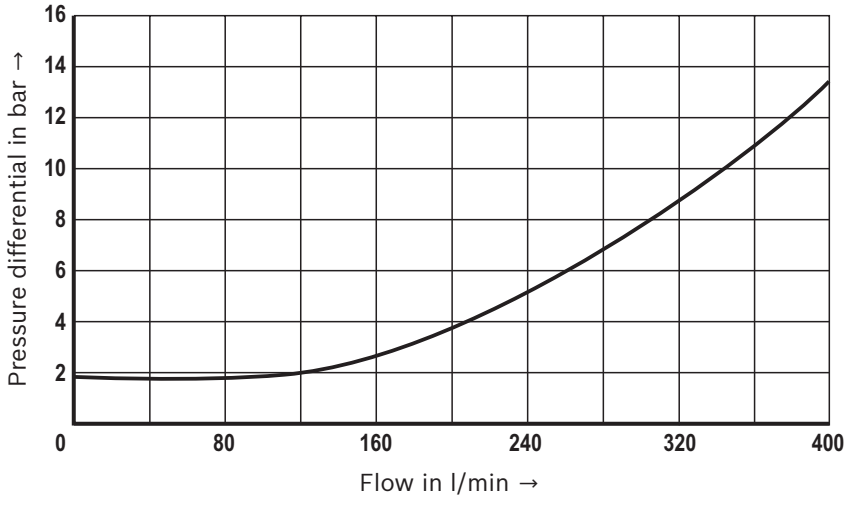
***Δp-q*$_V$-characteristic curves – "E1"**



***Δp-q*$_V$-characteristic curves – "E2"**



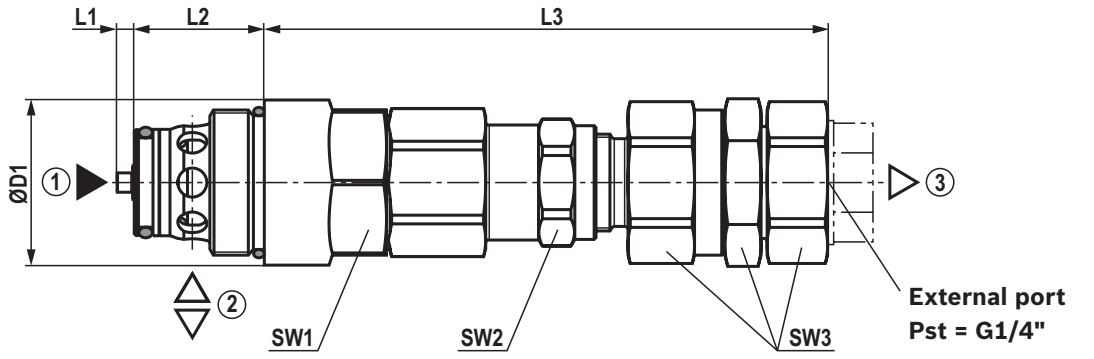
***Δp-q*$_V$-characteristic curves – "E3"**



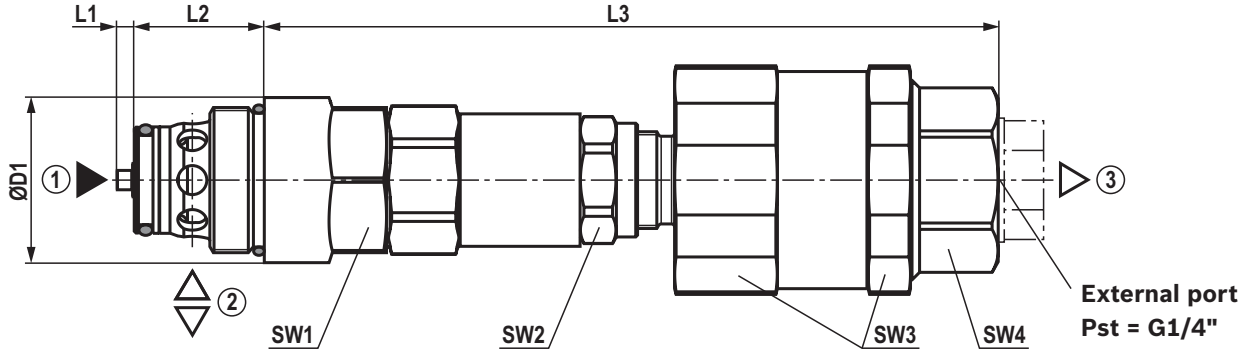
☞ **Notice:**

- The characteristic curves apply to an output pressure p_T = 0 bar over the entire volume range and without housing resistance.
- They refer to the specified nominal values of the pressure ratings (100, 420).
- Below the nominal pressure, the characteristic curves become increasingly steeper.

Dimensions
(dimensions in mm)



Type	ØD1	L1	L2	L3	Wrench size			Tightening torque in Nm [1]		Weight in kg
					SW1	SW2	SW3	SW1	SW2	
MHDBB 16 K9-3X/ ...VFB01	27.3	3	21.5	93	24	19	24	90	15	0.30
MHDBB 22 K9-3X/ ...VFC01	32	3	31.5	91	30	19	24	100	15	0.40
MHDBB 32 K9-3X/ ...VFK01	37	5	36	90	34	19	24	150	15	0.50



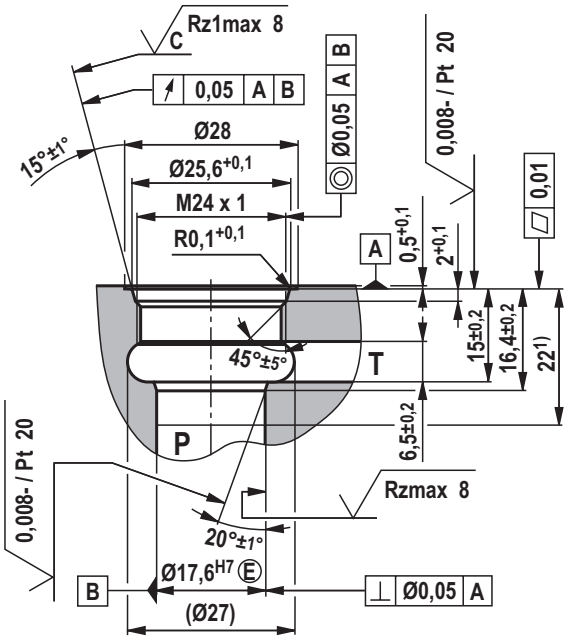
Type	ØD1	L1	L2	L3	Wrench size				Tightening torque in Nm [1]		Weight in kg
					SW1	SW2	SW3	SW4	SW1	SW2	
MHDBL 16 K9-3X/ ...VFB01	27.3	3	21.5	121	24	19	36	27	90	15	0.53
MHDBL 22 K9-3X/ ...VFC01	32	3	31.5	119	30	19	36	27	100	15	0.66
MHDBL 32 K9-3X/ ...VFK01	37	5	36	118	34	19	36	27	150	15	0.75

[1] Friction coefficients, tightening torques, and preload forces interact with each other. The friction coefficients are influenced by the surface microstructure, material pairing, etc.
Thus, we recommend checking the mounting characteristics with original components and under boundary conditions

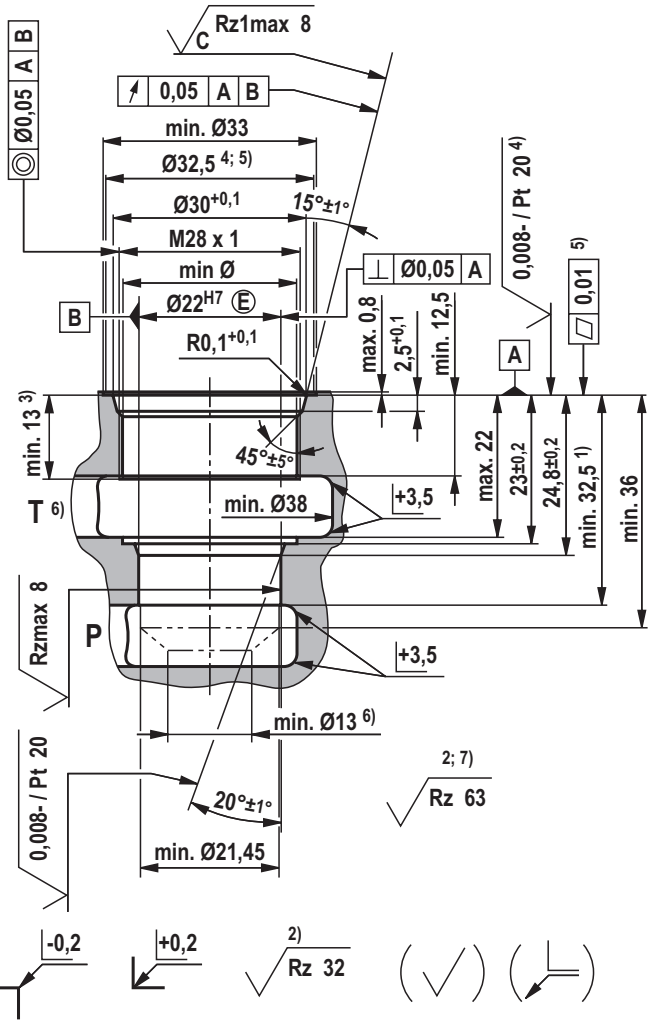
② = Main port (P)
② = Main port (T)
③ = External port (Pst)

Mounting cavity
(dimensions in mm)

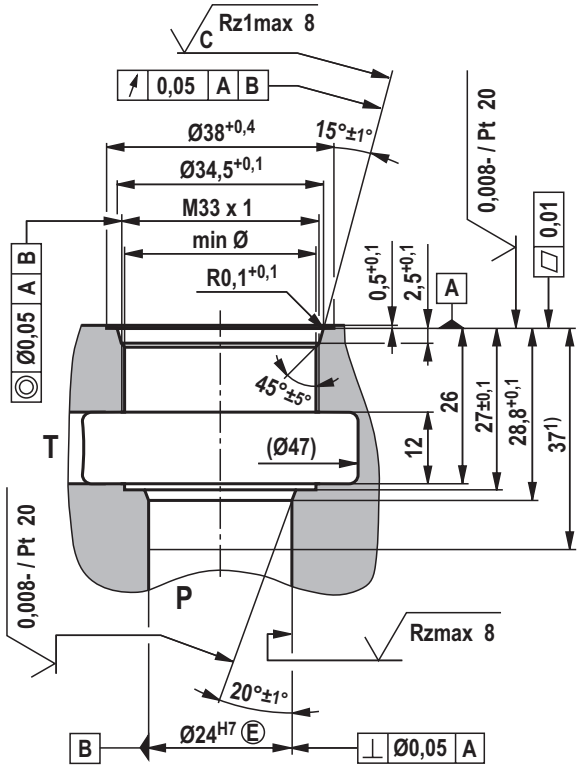
Version "FB" (M24 x 1)
(Drawing no. R901063585)



Version "FC" (M28 x 1)
(Drawing no. RA50151421)



Version "FK" (M33 x 1)
(Drawing no. R901148145)



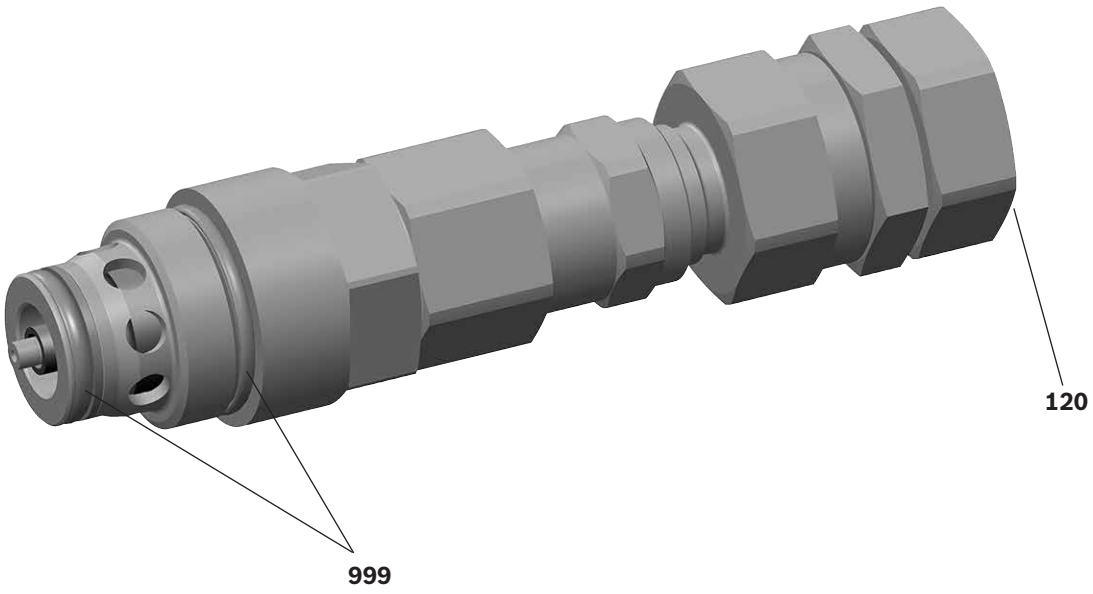
1) Depth of fit
2) Visual inspection
3) Thread depth
4) Roughness up to ø32.5 required
5) Levelness up to ø32.5 required
6) Required opening cross-section for pump (P) and tank port (T) > 132 mm²
7) For sprues

All seal ring insertion faces are rounded and free of burrs

Standards:

Workpiece edges	ISO 13715
Form and position tolerance	ISO 1101
General tolerances for metal-cutting procedures	ISO 2768 (mK)
Tolerance	ISO 8015
Surface condition	ISO 1302

Available individual components



Item	Denomination	Seal material	Material no.
120	Protective plug	–	**R900992908**
999	Seal kit of the valve for mounting cavity "FB"	FKM	**R961003378**
999	Seal kit of the valve for mounting cavity "FC"	FKM	**R961003380**
999	Seal kit of the valve for mounting cavity "FK"	FKM	**R961003389**

Seal kits with NBR seals upon request.

Bosch Rexroth AG
Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52/18-0
documentation@boschrexroth.de
www.boschrexroth.de

Notes

Bosch Rexroth AG
Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52 / 18-0
documentation@boschrexroth.de
www.boschrexroth.de

Notes

Bosch Rexroth AG
Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52/18-0
documentation@boschrexroth.de
www.boschrexroth.de