

Proportional pressure relief valve, pilot operated, decreasing characteristic curve **KBVS.1B**



- ▶ Size 1
- ▶ Series A
- ▶ Maximum working pressure 420 bar
- ▶ Maximum flow 80 l/min

Features

- ▶ Cartridge valve
- ▶ R/UNF10-01-0-06 mounting cavity
- ▶ Pilot operated proportional valve for limiting system pressure
- ▶ Suitable for mobile and industrial applications
- ▶ Actuated by proportional solenoid with central thread and removable coil
- ▶ Rotatable solenoid coil
- ▶ In case of power failure, maximum pressure is set
- ▶ Setpoint value pressure characteristic curve can be finely calibrated using control electronics externally

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Type code (valve without coil)¹⁾

01	02	03	04	05	06	07	08
KBVS		1	B	A	/	F	V *

Valve type

01	Proportional pressure relief valve, pilot operated	KBVS
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Pressure stage

02	Up to 50 bar	C
	Up to 100 bar	F
	Up to 150 bar	H
	Up to 210 bar	L
	Up to 250 bar	N
	Up to 315 bar	P
	Up to 350 bar	R
	Up to 420 bar	T

03	Size 1	1
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04	If setpoint value = 0, maximum pressure is set	B
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05	Series	A
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06	High Performance and R/UNF-10-01-0-06 mounting cavity (see page 11)	F
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Sealing material

07	FKM (fluorocarbon rubber), other seals on request	V
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08	Further details in plain text	*
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Preferred types (valve without coil)¹⁾

Type	Material number	Type	Material number
KBVSC1BA/FV	R901325098	KBVSN1BA/FV	R901325107
KBVSF1BA/FV	R901325099	KBVSP1BA/FV	R901325109
KBVSH1BA/FV	R901325102	KBVSR1BA/FV	R901325111
KBVSL1BA/FV	R901325105	KBVST1BA/FV	R901325112

Available coils (order separately)

Material number for coil with device connector ²⁾			
DC voltage ³⁾	"K4"	"K40"	"C4"
	03pol (2+PE) DIN EN 175301-803	02pol K40 DT 04-2PA, Fa. DEUTSCH	02pol C4/Z30 AMP Junior Timer
12 V	R901002932	R901003055	R901003044
24 V/1200 mA	R901002319	R901003053	R901003026
24 V/800 mA	R901049962	R901050010	R901049963

1)

Complete valves with mounted coil on request.

2)

Plug-in connectors are not included in the scope of delivery and must be ordered separately, see data sheet 08006.

3)

Additional voltages available on request.

Functional description

General

Valves of type KBVS are pilot operated proportional pressure relief valves of spool design and are used to limit the pressure in hydraulic systems. Their primary components are a screw-in proportional pilot control valve (1) and the main valve (2). These valves can be used for infinitely adjusting the pressure to be limited depending on the setpoint value. Maximum pressure is set in case of power failure or if the setpoint value is 0.

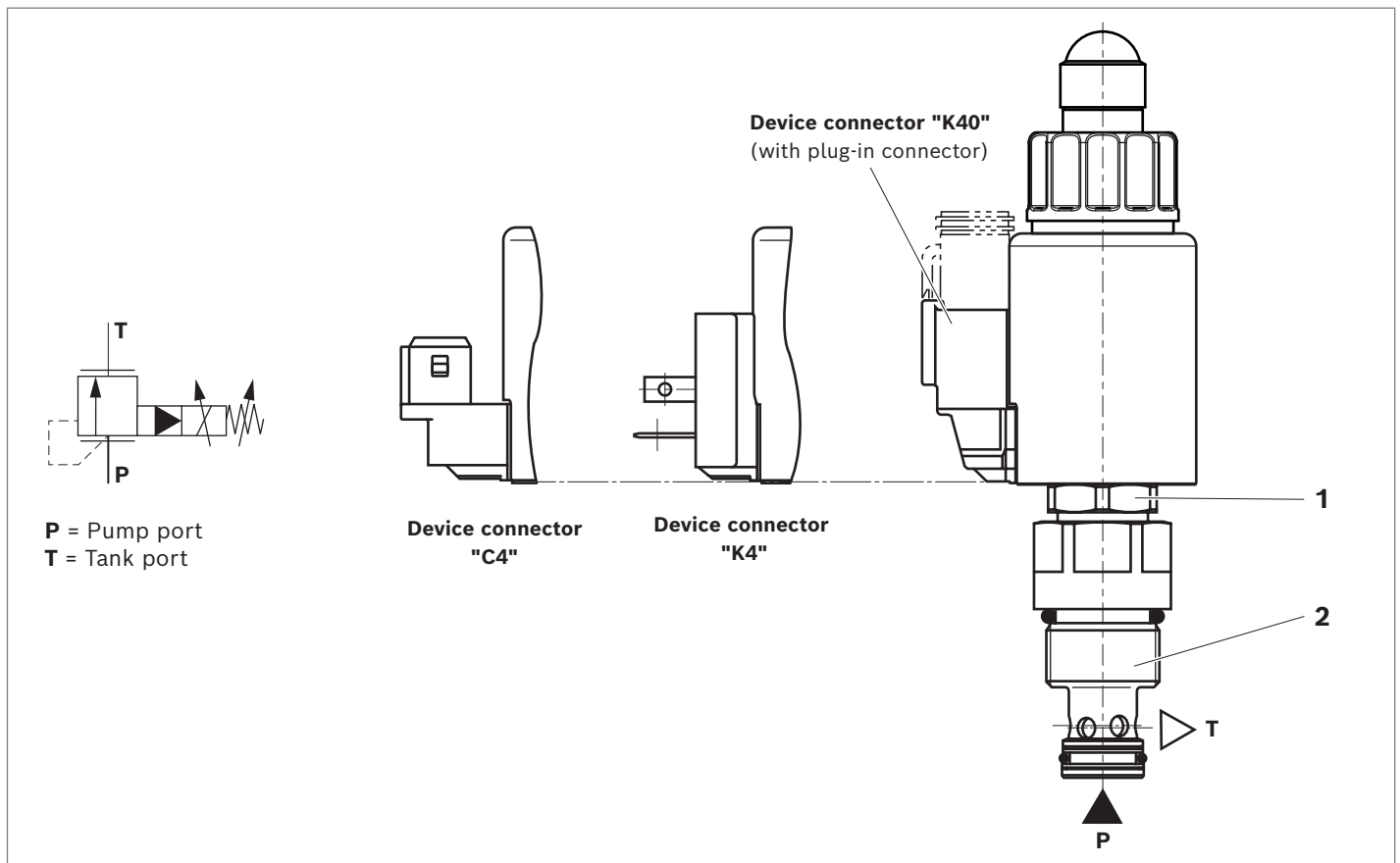
Basic principle

The valves come preset at maximum mechanical pressure. To proportionally decrease the system pressure, a setpoint value is specified using the control electronics. Depending on this setpoint value, the electronics power the solenoid coil, which uses the pilot control valve (1) and main valve (2) to actually set the pressure at port P. ($p_{\max}$ = setpoint value of 0; $p_{\min}$ = maximum setpoint)

Notice

Occurring tank pressures (port T) are added to the set value at port P.

▼ Type KBVS.1B..



Technical data

General		
Weight	kg	0.75
Installation position		Any - if it is ensured that no air can collect upstream the valve. Otherwise we recommend suspend installation of the valve.
Ambient temperature range	°C	−40 to +120 (see pages 8 and 9)
Storage temperature	°C	−20 to +80

Environmental testing

Vibration test in accordance with DIN EN 60068-2/IEC 60068-2/two axes (X/Y)		
DIN EN 60068-2-6: 05/96	Sinusoidal vibration	10 cycles (5 Hz to 2000 Hz back to 5 Hz) with logarithmic sweep rate of 1 oct/min, 5 to 57 Hz, amplitude 1.6 mm (p–p), 57 to 2000 Hz, amplitude 10 g
IEC 60068-2-64: 05/93	Vibration (random) and broadband noise	20 to 2000 Hz, amplitude 0.1 g ² /Hz (14 g RMS/30 g peak), testing time 24 h
DIN EN 60068-2-27: 03/95	Shock	Half sine 15 g/11 ms; 3× in positive, 3× in negative direction (6 single shocks total)
DIN EN 60068-2-29: 03/95	Continuous shock	Half sine 15 g/11 ms; 1000× in positive, 1000× in negative direction (2000 single shocks total)
Indication per axis		
Climate test in accordance with DIN/EN 60068-2/IEC 60068-2 (environmental audit)		
DIN EN 60068-2-1: 03/95	Storage temperature	−40 °C, dwell time 16 h
DIN EN 60068-2-2: 08/94		+110 °C, dwell time 16 h
DIN EN 60068-2-1: 03/95	Cold test	2 cycles, −25 °C, dwell time 2 h
DIN EN 60068-2-2: 08/94	Dry heat test	2 cycles, +120 °C, dwell time 2 h
IEC 60068-2-30: 1985	Humid heat, cyclical	Variant 2/ +25 °C to +55 °C 93 % to 97 % RH, 2 cycles of 24 h
Salt spray test in accordance with DIN 50021		
	h	720
→ Varnishing generally not necessary. If varnishing, note reduced radiation output.		

Notice
 For applications outside these values, please consult us!

Hydraulic			
Maximum working pressure ¹⁾	Port P	bar	420
Maximum return flow pressure	Port T	bar	210
Maximum set pressure ²⁾	See setpoint value pressure characteristic curve on page 7		
Minimum set pressure at maximum setpoint value	See characteristic curve on page 7		
Maximum flow		l/min	80
Leakage		ml/min	< 200 (at $\Delta p = 250$ bar; closed pilot control valve and HLP46, $\vartheta_{oil} = 40$ °C)
Hydraulic fluid	See table below		
Hydraulic fluid temperature range		°C	–40 to +80
Viscosity range		mm ² /s	5 to 400 (preferably 10 to 100)
Maximum admissible degree of contamination of hydraulic fluid Cleanliness level per ISO 4406 (c)	Class 20/18/15 ³⁾		
Load cycles	10 mil.		
Hysteresis ⁴⁾	< 4 % of maximum set pressure		
Turnover voltage ⁴⁾	< 0.5 % of maximum set pressure		
Responsiveness ⁴⁾	< 0.5 % of maximum set pressure		
Setpoint pressure characteristic curve tolerance	Setpoint value 100%	< 2 % of maximum set pressure	
	Setpoint value 0	< 5 % of maximum set pressure	
Step response ($T_u + T_g$) 0 → 100 % or 100 % → 0		ms	100 (depending on system)

Hydraulic fluid

Hydraulic fluid		Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils		HL, HLP	FKM	DIN 51524	90220
Environmentally acceptable	Insoluble in water	HEES	FKM	ISO 15380	90221
	Soluble in water	HEPG	FKM	ISO 15380	90221

Notice

- Further information and details on using other hydraulic fluids are available in the above data sheets or on request.
- Restrictions are possible with the technical valve data (temperature, pressure range, service life, maintenance intervals, etc.)!
- The flash point of the hydraulic fluid used must be 40 K above the maximum solenoid surface temperature.
- **Environmentally acceptable:** If environmentally acceptable hydraulic fluids are used that are also zinc-solving, there may be an accumulation of zinc.

1) The maximum working pressure is the aggregate of set pressure and return flow pressure!
 2) The valves come preset. Changing the settings voids the warranty.

3) Cleanliness levels specified for the components must be maintained in the hydraulic systems. Effective filtration prevents malfunctions and simultaneously extends the service life of the components.

4) Measured with analog amplifier of type RA2-1/10, see data sheet 95230 (PWM = 200 Hz).

Electric					
Voltage type			DC voltage		
Supply voltage		V	12 DC	24 DC	"-8"/24 DC
Maximum solenoid current		mA	1760	1200	800
Coil resistance	Cold value at 20 °C	Ω	2.3	4.8	11.5
	Maximum warm value	Ω	3.8	7.9	18.9
Duty cycle		%	See characteristic curve on pages 8 and 9 ⁵⁾		
Maximum coil temperature ⁶⁾		°C	150		
Type of protection according to ISO 20653	Connector version "K4"		IP6K5 ⁷⁾		
	Connector version "C4"		IP6K6K ⁷⁾		
			IP6K9K ⁷⁾ (only with Rexroth type R901022127)		
	Connector version "K40"		IP6K7 and IP6K9K ⁷⁾		
Control electronics (separate order)			Proportional amplifier type VT-SSPA1, data sheet 30116		
			Proportional amplifier type VT-MSPA, data sheet 30232		
			Analog amplifier type RA, data sheet 95230		
			BODAS controller type RC, data sheets 95204, 95205, 95206		
Recommended dither frequency (PMW)		Hz	200		
Design according to VDE 0580					

Notice

For the electrical connection, a protective earth (PE $\perp$) connection is mandatory based on the specification.

⁵⁾ Consult the manufacturer if planning to use > 2000 m above sea level.

⁶⁾ Due to the occurring surface temperatures of the solenoid coils, the standards ISO 13732-1 and ISO 4413 must be observed!

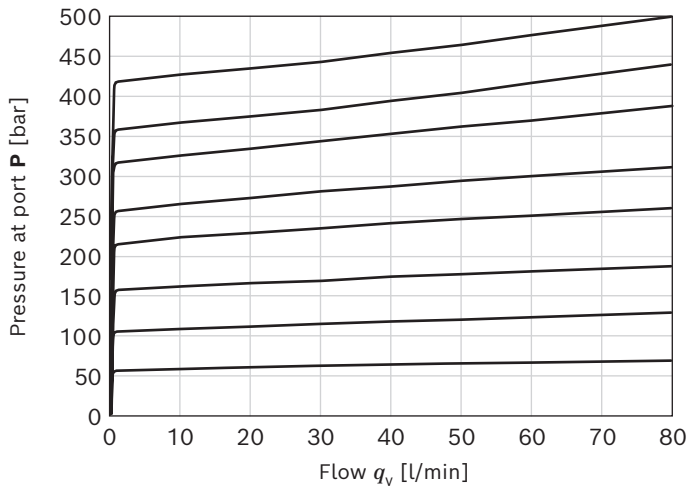
⁷⁾ With installed and locked plug-in connector. Plug-in connectors are not included in the scope of delivery and must be ordered separately, see data sheet 08006.

Characteristic curves

p - q_v flow characteristic curves

▼ Pressure at port P depending on flow

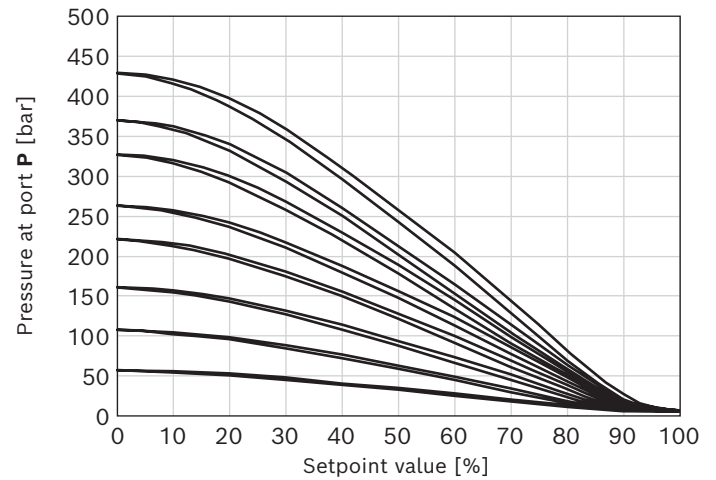
(The characteristic curves were measured without back-pressure at port T)



p -I characteristic curves

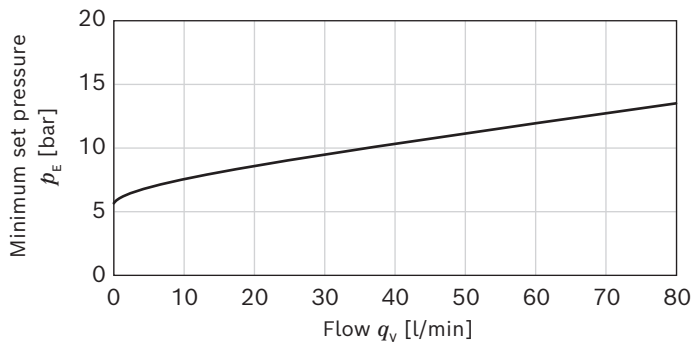
▼ Pressure at port P depending on the setpoint value

(Flow = 10 l/min)



▼ Minimum set pressure p_E at port P depending on flow at setpoint value 100 %

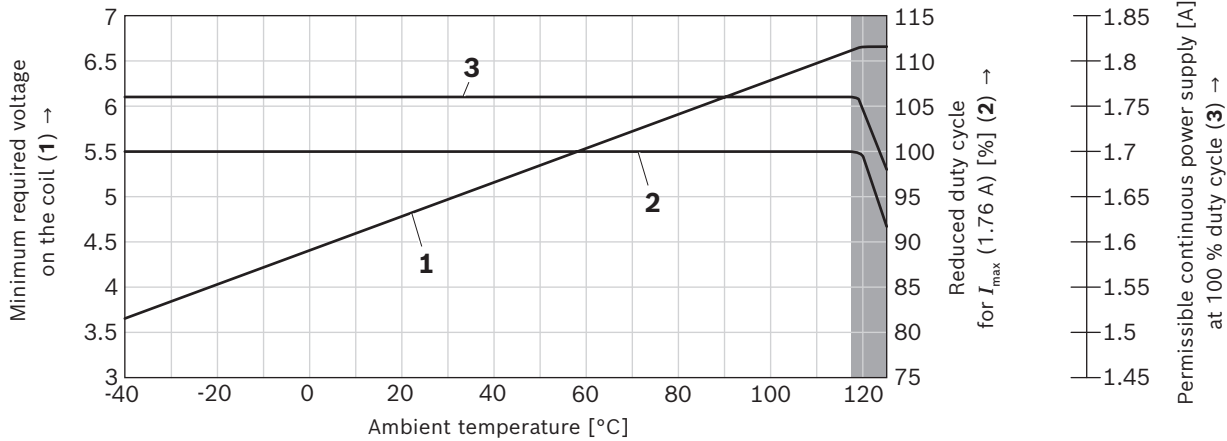
(The characteristic curve was measured without back-pressure at port T)



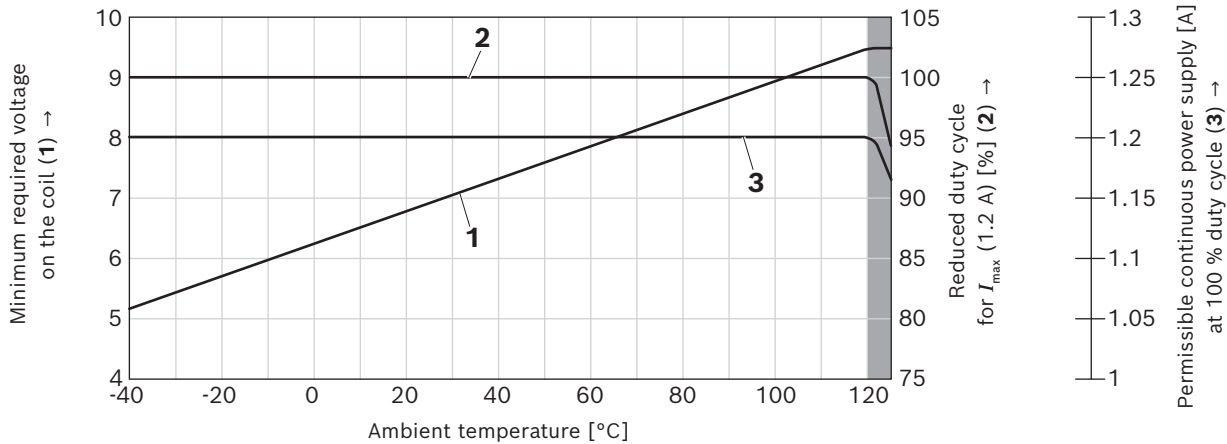
Permissible working range

Minimum terminal voltage on the coil and relative duty cycle depending on the ambient temperature

▼ Version "G12"



▼ Version "G24"



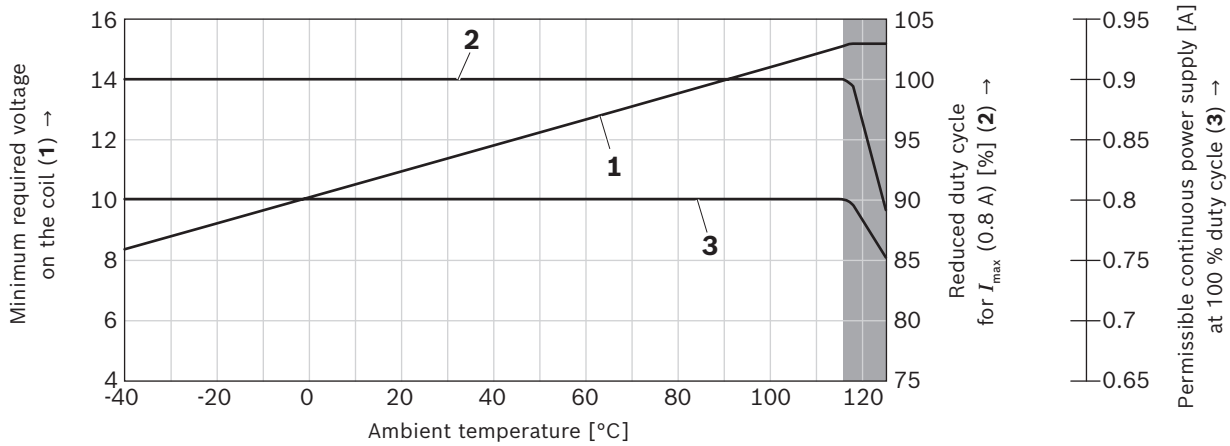
 = Limited valve performance

Notice

The characteristic curves were determined for coils with valve for medium test block size (80 x 80 x 80 mm), w/o flow in still air.

Depending on installation conditions (block size, flow, air circulation, etc.), heat dissipation may be better. This increases the range of applications. In specific instances, unfavorable conditions may limit the range of applications.

▼ Version "G24..-8"



▒ = Limited valve performance

Notice

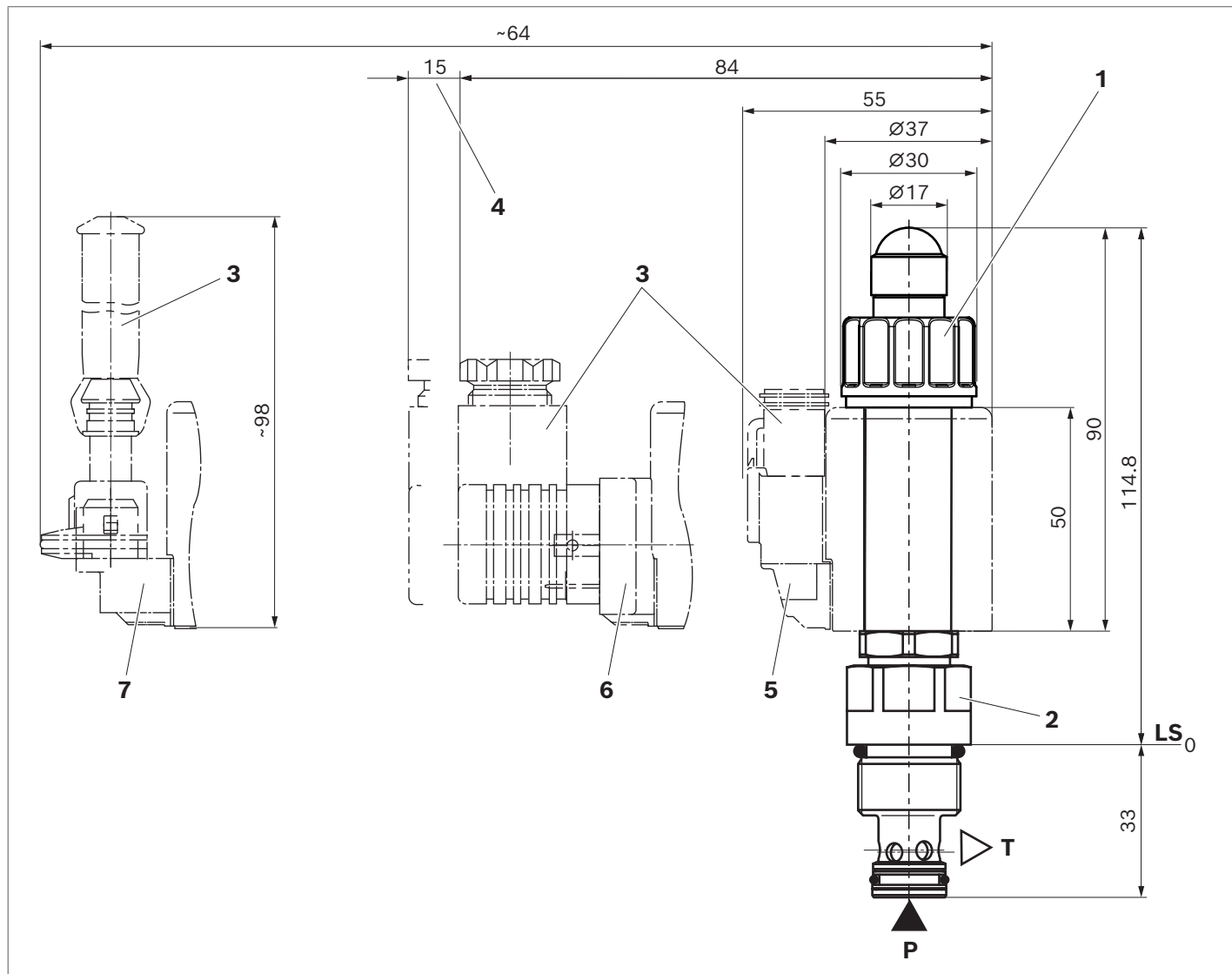
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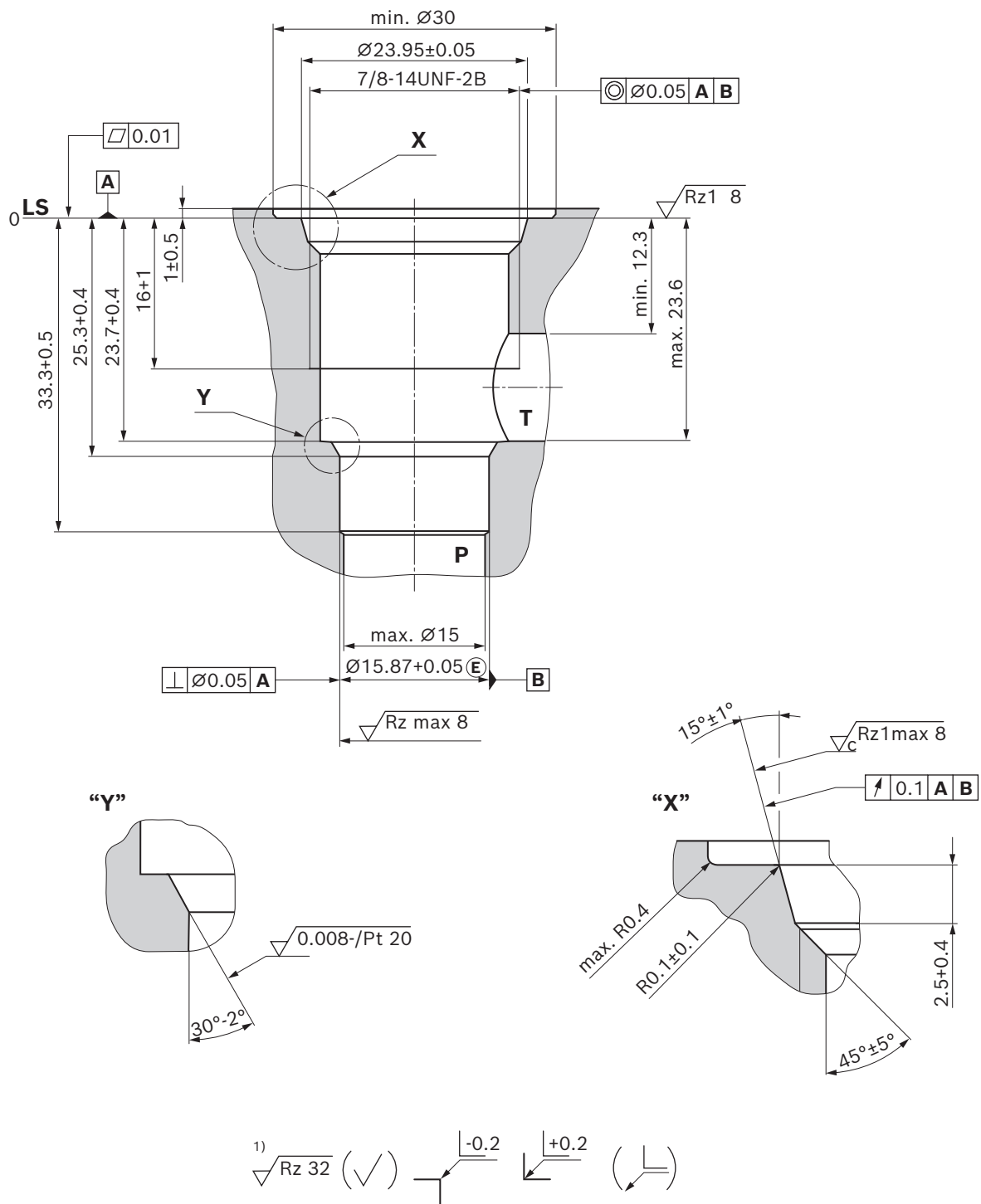
Dimensions

▼ KBVS.1B

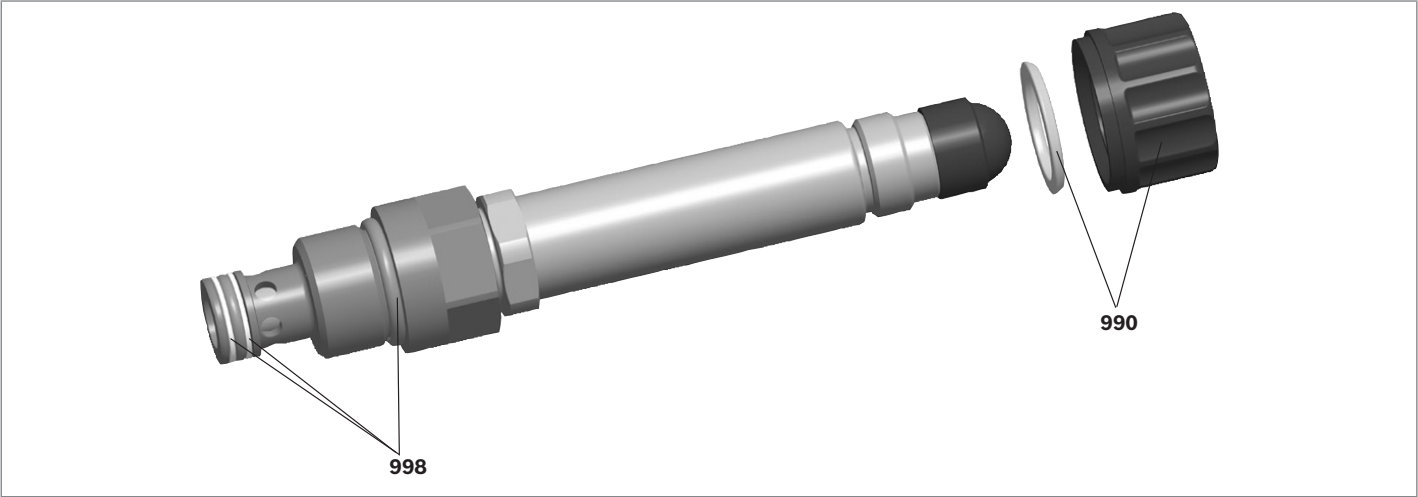


- 1** Nut, tightening torque $M_A = 5+1$ Nm
- 2** SW24, tightening torque $M_A = 55+5$ Nm
- 3** Plug-in connectors, separate order, see data sheet 08006
- 4** Space required to remove the plug-in connector
- 5** Device connector "K40"
- 6** Device connector "K4"
- 7** Device connector "C4"

- P** = Pump port
- T** = Tank port
- LS** = location shoulder

Mounting cavity▼ **R/UNF-10-01-0-06; 2 main ports; thread 7/8-14UNF-2B****P** = Pump port**T** = Tank port**LS** = location shoulder

Available individual components



Item	Denomination		DC voltage	Material number
	Coil for single connection ¹⁾	K4	12 V	R901002932
			24 V/1200 mA	R901002319
			24 V/800 mA	R901049962
		K40	12 V	R901003055
			24 V/1200 mA	R901003053
			24 V/800 mA	R901050010
		C4	12 V	R901003044
			24 V/1200 mA	R901003026
			24 V/800 mA	R901049963
990	Nut and seal ring for pole tube			R961010456
998	Seal kit of the valve			R961006735

1) Replacing the solenoid coil may result in a change of ±5% in the factory pressure setting.

Related documentation

► Control electronics:	– Valve amplifiers for proportional valves	Type VT-SSPA1	Data sheet 30116
	– Valve amplifiers for proportional valves (Top hat rail installation)	Type VT-MSPA	Data sheet 30232
	– Analog amplifier	Type RA	Data sheet 95230
	– BODAS controller	Type RC	Data sheets 95204, 95205, 95206
► Mineral oil-based hydraulic fluids			Data sheet 90220
► Environmentally acceptable hydraulic fluids			Data sheet 90221
► MTTF _p values			Data sheet 90294