

RE 18375/2022-01-28  
 Replaces: 04.2012

**rexroth**  
 A Bosch Company

## Proportional pressure relief valve, pilot operated, decreasing characteristic curve KBVS.2B



H7683

- ▶ Size 2
- ▶ Series A
- ▶ Maximum working pressure 420 bar
- ▶ Maximum flow 250 l/min

### Features

- ▶ Cartridge valve
- ▶ R/FD 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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## 2 **KBVS.2B** | Proportional pressure relief valve Type code

### Type code

01	02	03	04	05	06	07	08	09	10	11	12	13
<b>KBVS</b>		<b>2</b>	<b>B</b>	<b>A</b>	<b>/</b>	<b>DD</b>	<b>C</b>		<b>Y</b>	<b>V</b>		<b>*</b>

#### Valve type

01	Proportional pressure relief valve, pilot operated	<b>KBVS</b>
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#### Pressure stage<sup>1)</sup>

02	Up to 315 bar	<b>P</b>
	Up to 420 bar	<b>T</b>

03	Size 2	<b>2</b>
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04	If setpoint value = 0, maximum pressure is set	<b>B</b>
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05	Series	<b>A</b>
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#### Mounting cavity

06	R/FD mounting cavity (see page 11)	<b>DD</b>
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07	Proportional solenoid, switching in oil	<b>C</b>
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#### Supply voltage

08	Control electronics 12 V DC	<b>G12</b>
	Control electronics 24 V DC	<b>G24</b>

#### Electrical connection<sup>2)</sup>

09	Device connector according to DIN EN 175301-803	<b>K4</b>
	Device connector 2-pin, DT 04-2P (DEUTSCH)	<b>K40</b>
	Device connector 2-pin, Junior Timer (AMP)	<b>C4</b>

10	Internal pilot oil supply, external pilot oil return	<b>Y</b>
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#### Sealing material

11	FKM (fluorocarbon rubber)	<b>V</b>
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#### Solenoid coil

12	Standard variant	<b>No code</b>
	24 V / 800 mA	<b>-8</b>

13	Further details in plain text	<b>*</b>
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### Preferred types

Type	Material number
KBVSP 2 BA/DDCG24K4YV	R901138473
KBVST 2 BA/DDCG24K40YV-8	R901233649

<sup>1)</sup> Other pressure stages on request

<sup>2)</sup> Plug-in connectors are not included in the scope of delivery and must be ordered separately, see data sheet 08006.

## Functional description

### General

Valves of type KBVS are pilot operated proportional pressure relief valves in seat 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

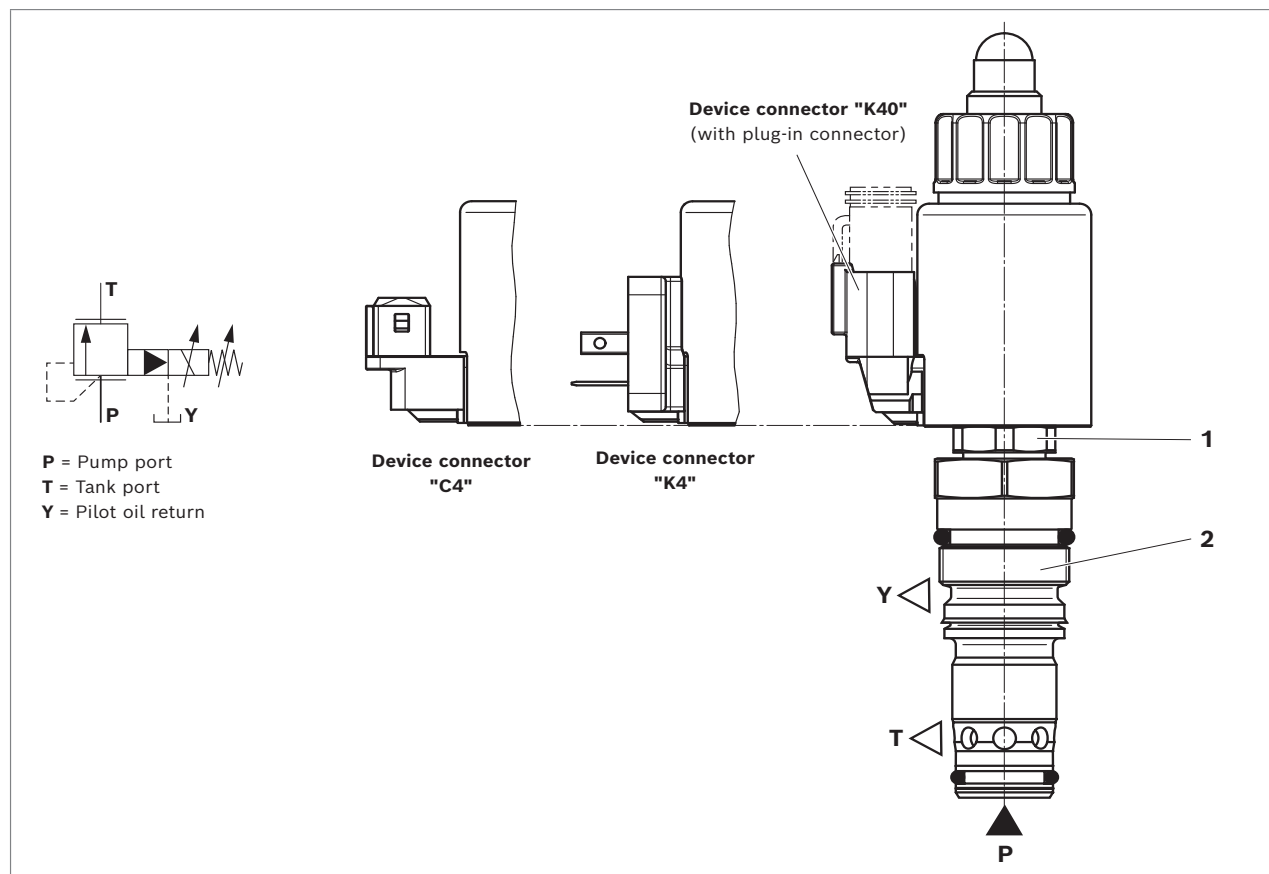
The valves are mechanically set to maximum pressure at the factory. To proportionally decrease the system pressure, a setpoint value is specified using the control electronics. Depending on this setpoint value, the electronics controls the solenoid coil with electric current, which uses the pilot control valve (1) and main valve (2) to actually set the pressure at port P.

( $p_{\max}$  = setpoint value of 0;  $p_{\min}$  = maximum setpoint)  
The pilot oil return is carried out externally via port Y.

### Notice

Occurring return flow pressures (port Y) are added to the set value at port P.

### ▼ KBVS.2B...



## 4 **KBVS.2B** | Proportional pressure relief valve Technical data

### Technical data

General		
Weight (approx.)	kg	0.66
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	-20 ... +120 (see pages 8 and 9)
Storage temperature range	°C	-20 ... +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 <sup>2</sup> /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
<b>Salt spray test in accordance with DIN 50021 h 720</b>		
→ Varnishing generally not necessary. If varnishing, note reduced radiation output.		

#### Notice

For applications outside these values, please consult us!

## Proportional pressure relief valve | KBVS.2B Technical data

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Hydraulic				
Maximum working pressure <sup>1)</sup>	Port <b>P</b>	$p_A$	bar	420
Maximum return flow pressure	Port <b>T, Y</b>	$p_T$	bar	30
Maximum set pressure <sup>2)</sup>		$p_{E\max}$		See setpoint value pressure characteristic curve on page 7
Minimum set pressure at maximum setpoint value		$p_{E\min}$		See characteristic curves page 7
Maximum flow	<b>P → T</b>	$q_v$	l/min	250
Hydraulic fluid				See table below
Hydraulic fluid temperature range		$\vartheta$	°C	-20 ... +80
Viscosity range		$\nu$	mm <sup>2</sup> /s	15 ... 380
Maximum admissible degree of contamination of hydraulic fluid Cleanliness level per ISO 4406 (c)				Level 20/18/15 <sup>3)</sup>
Hysteresis <sup>4)</sup>				< 4% of maximum set pressure
Turnover voltage <sup>4)</sup>				< 0.5% of maximum set pressure
Responsiveness <sup>4)</sup>				< 0.5% of maximum set pressure
Setpoint value 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		$t$	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-dissolving, there may be an accumulation of zinc.

- 1) The maximum working pressure is the aggregate of set pressure and return flow pressure (port **Y**)!
- 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).

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6 **KBVS.2B** | Proportional pressure relief valve  
Technical data

Electric						
Voltage type			DC voltage			
Supply voltages		<i>U</i>	V	<b>12</b>	<b>24</b>	<b>24 ("–8")</b>
Maximum solenoid current		<i>I</i> <sub>max</sub>	mA	1760	1200	800
Coil resistance	Cold value at 20 °C	<i>R</i>	Ω	2.3	4.8	11.5
	Maximum warm value	<i>R</i>	Ω	3.8	7.9	18.9
Duty cycle (ED) <sup>5)</sup>			%	See characteristic curve on pages 8 and 9)		
Maximum coil temperature <sup>6)</sup>			°C	150		
Type of protection according to ISO 20653	Connector version "K4"			IP6K5 <sup>7)</sup>		
	Connector version "C4"			IP6K6K <sup>7)</sup>		
				IP6K9K <sup>7)</sup> (only with Rexroth type R901022127)		
	Connector version "K40"			IP6K7 and IP6K9K <sup>7)</sup>		
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.

<sup>5)</sup> Consult the manufacturer if planning to use > 2000 m above sea level.  
<sup>6)</sup> Due to the occurring surface temperatures of the solenoid coils, the standards ISO 13732-1 and ISO 4413 must be observed!

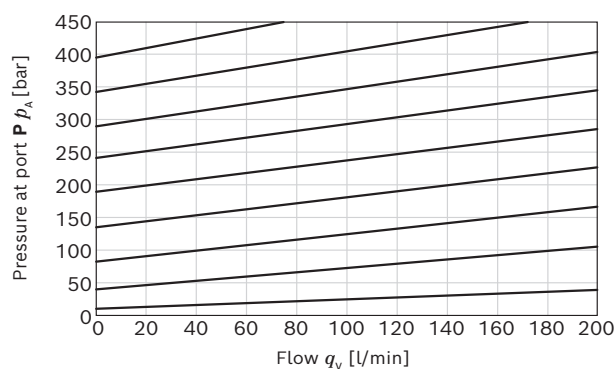
<sup>7)</sup> With installed and locked plug-in connector. Plug-in connectors are not included in the scope of delivery and must be ordered separately, see data sheet 08006.

## Characteristic curves

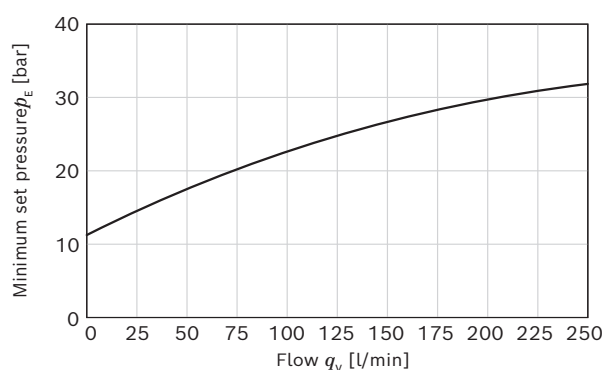
### $p$ - $q_v$ flow characteristic curves

#### ▼ Pressure at port P depending on flow

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



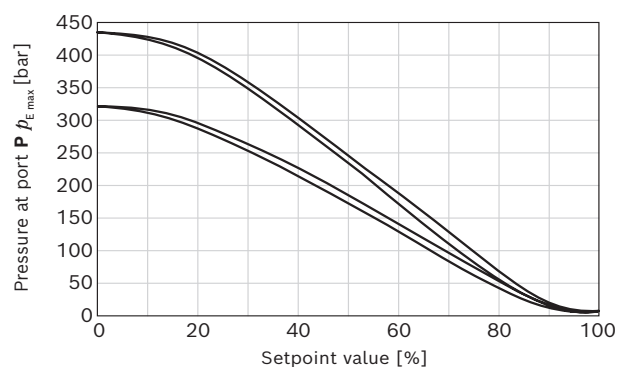
#### ▼ Minimum set pressure $p_E$ at port P depending on flow at setpoint value 100%



### $p$ - $I$ characteristic curves

#### ▼ Pressure at port P depending on the setpoint value

(Flow = 20 l/min)



#### Notice

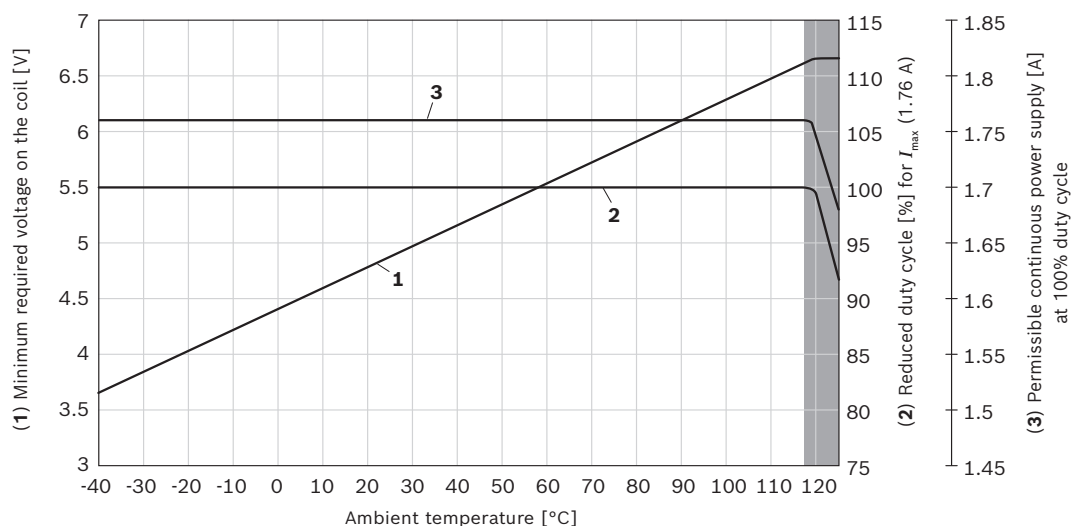
Characteristic curves measured with HLP46,  
 $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$  and 24 V coil.

8 **KBVS.2B** | Proportional pressure relief valve  
Permissible working range

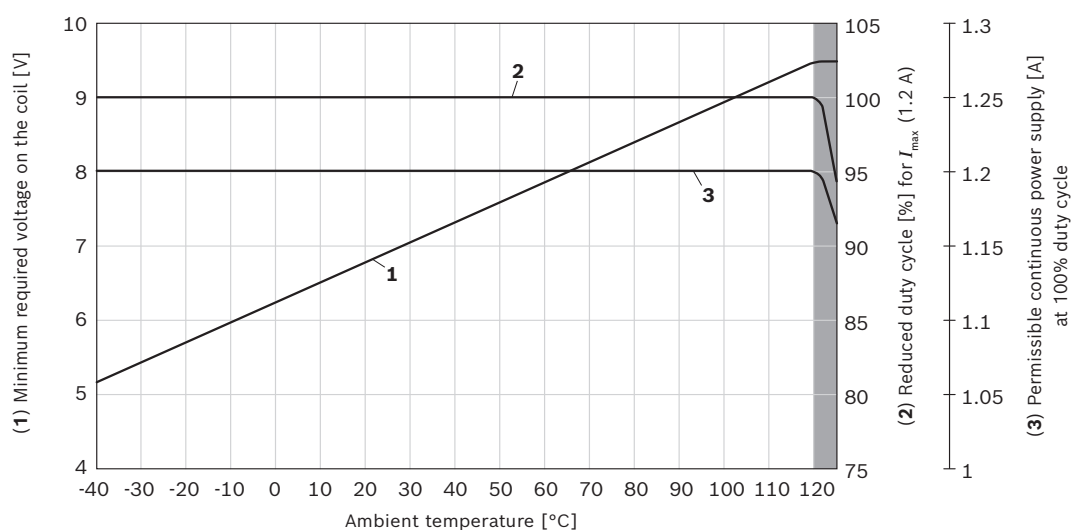
## Permissible working range

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

#### ▼ Version "G12"



#### ▼ Version "G24"



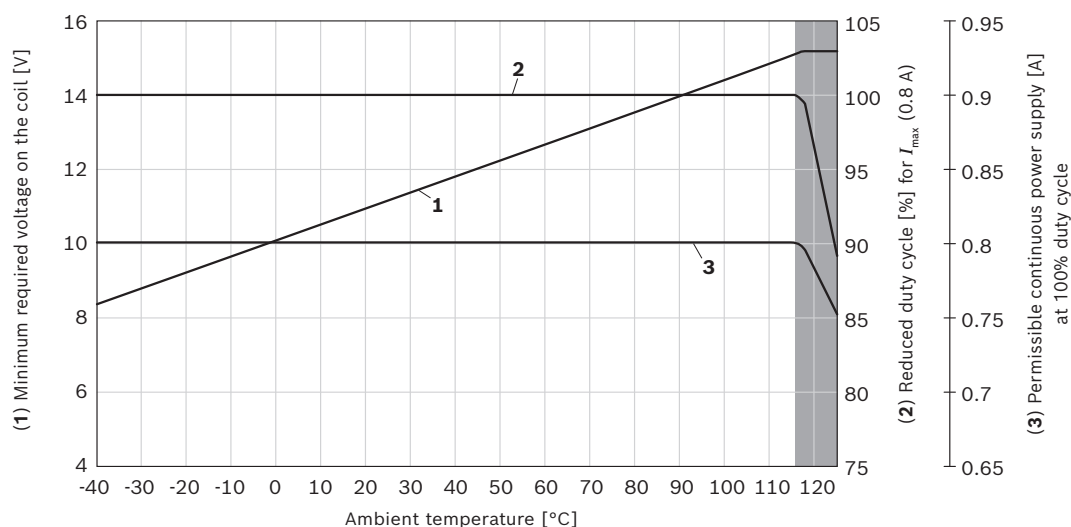
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▼ Version "G24...-8"



 = 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.

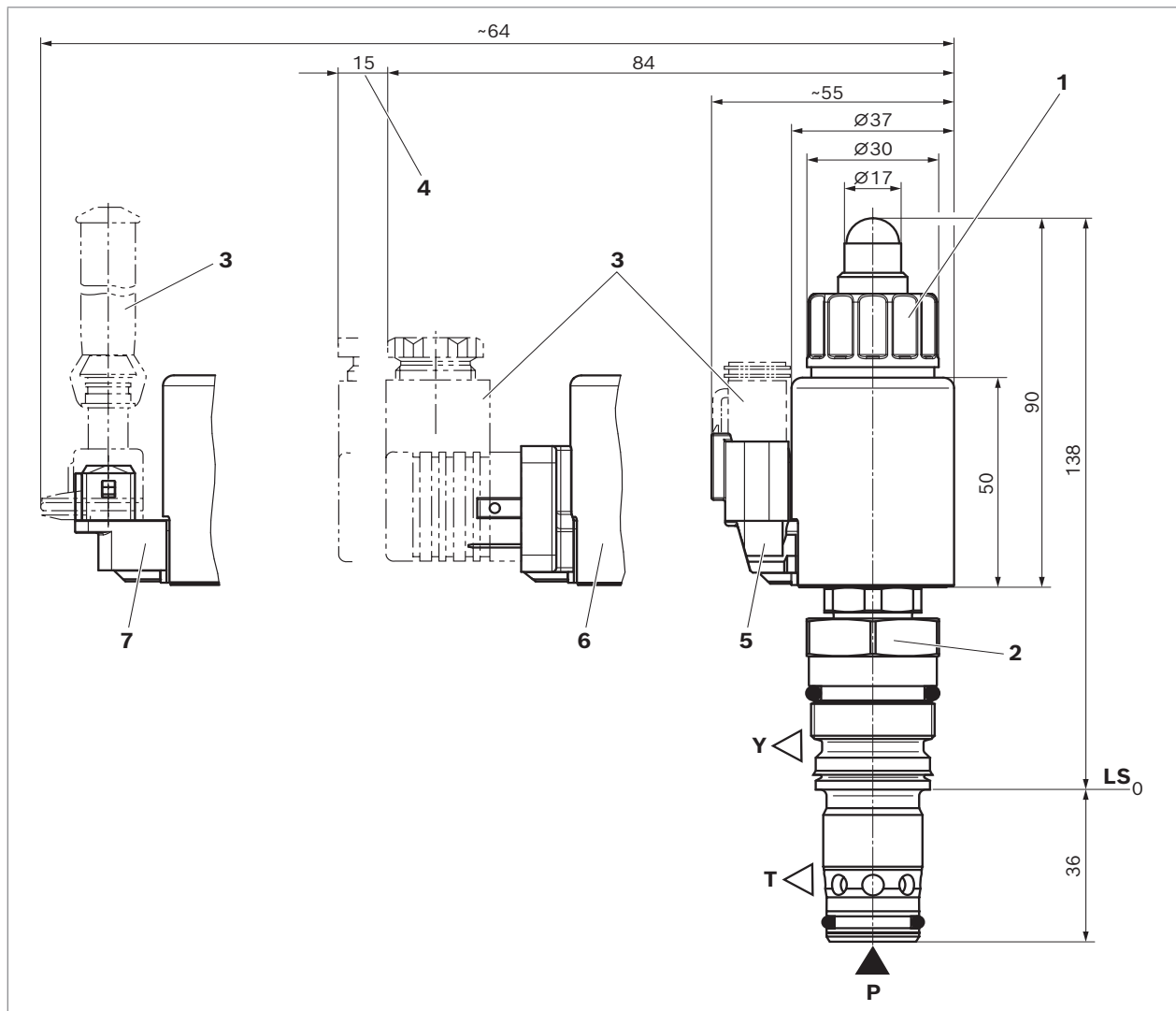
In specific instances, unfavorable conditions may limit the range of applications.

## 10 KBVS.2B | Proportional pressure relief valve Dimensions

Dimensions [mm]

### Dimensions

#### ▼ KBVS.2B



- 1 Nut, tightening torque  $M_A = 5+1$  Nm
- 2 Hexagon SW30, tightening torque  $M_A = 92+10$  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
- Y = Pilot oil return
- LS = location shoulder

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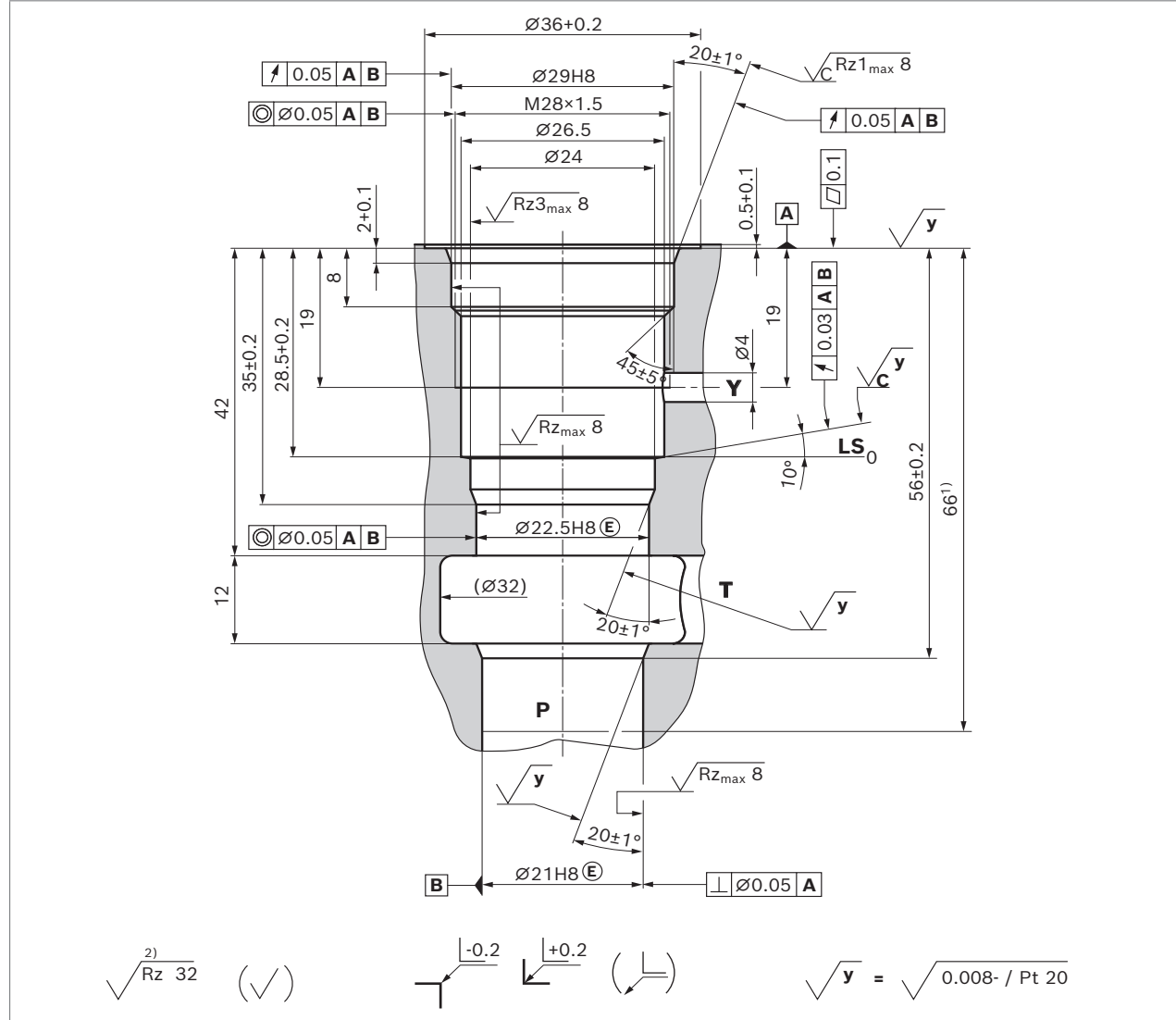
Dimensions [mm]

Proportional pressure relief valve | **KBVS.2B**  
Mounting cavity

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## Mounting cavity

▼ R/FD; 3 ports; thread M28×1.5



### Standards:

Workpiece edges	DIN ISO 13715
Shape and position tolerance	DIN EN ISO 1101
General tolerances for machining	DIN ISO 2768-mK
Tolerance	DIN ISO 8015
Surface finish	DIN EN ISO 1302

- 1) Depth of fit  
2) Visual inspection

P = Pump port  
T = Tank port  
Y = Pilot oil return  
LS = location shoulder

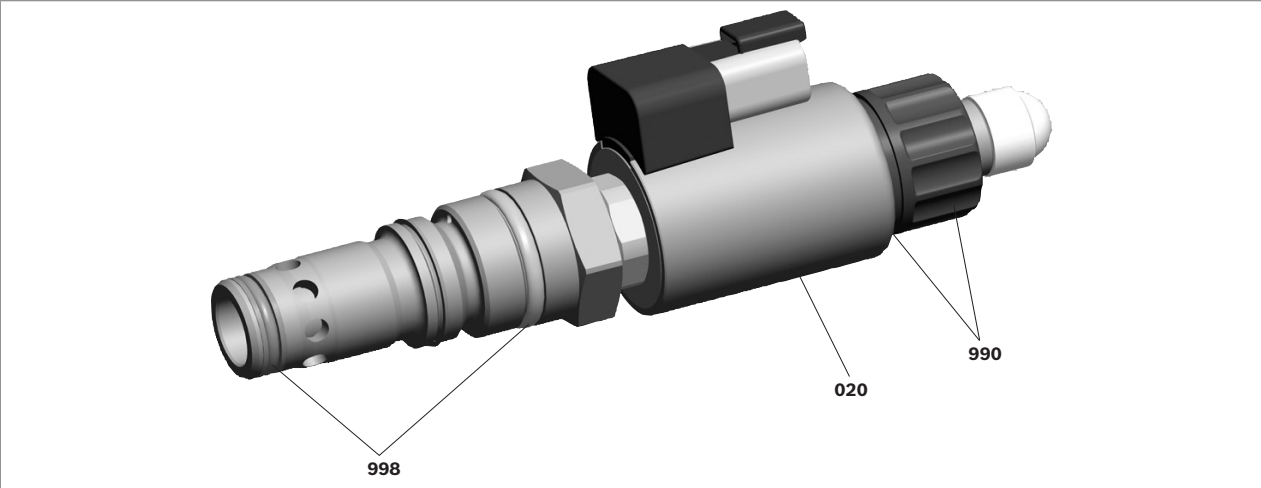
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12 **KBVS.2B** | Proportional pressure relief valve  
Available individual components

Available individual components



Item	Denomination		DC voltage	Material no.
020	Coil for single connection <sup>1)</sup>	Device connector "K4"	12 V	R901002932
			24 V	R901002319
			24 V / 800 mA	R901049962
		Device connector "K40"	12 V	R901003055
			24 V	R901003053
			24 V / 800 mA	R901050010
		Device connector "C4"	12 V	R901003044
			24 V	R901003026
			24 V / 800 mA	R901049963
990	Nut and seal ring for pole tube			R961010456
998	Seal kit of the valve			R901138335

<sup>1)</sup> 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
▶ Matching housing for threaded port		Data sheet 25818
▶ Mineral oil-based hydraulic fluids		Data sheet 90220
▶ Environmentally acceptable hydraulic fluids		Data sheet 90221
▶ MTTF <sub>D</sub> values		Data sheet 90294