

# Proportional pressure relief valve, pilot operated, increasing characteristic curve Type KBVS.0A



- ▶ Size 0
- ▶ Series A
- ▶ Maximum working pressure 420 bar
- ▶ Maximum flow 25 l/min

## Features

- ▶ Cartridge valve
- ▶ R/C019E mounting cavity
- ▶ Pilot operated proportional valve for limiting system pressure
- ▶ Suitable for mobile applications
- ▶ Actuated by proportional solenoid with central thread and removable coil
- ▶ Rotatable solenoid coil
- ▶ In case of power failure, minimum pressure is set
- ▶ Setpoint pressure characteristic curve can be finely calibrated using control electronics externally

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## Type code

|             |    |          |          |          |          |          |          |    |    |          |          |
|-------------|----|----------|----------|----------|----------|----------|----------|----|----|----------|----------|
| 01          | 02 | 03       | 04       | 05       | 06       | 07       | 08       | 09 | 10 | 11       | 12       |
| <b>KBVS</b> |    | <b>0</b> | <b>A</b> | <b>A</b> | <b>/</b> | <b>F</b> | <b>C</b> |    |    | <b>V</b> | <b>*</b> |

|    |  |             |
|----|--|-------------|
| 01 | Proportional pressure relief valve, pilot operated | <b>KBVS</b> |
|----|--|-------------|

### Pressure stage<sup>1)</sup>

|    |                            |          |
|----|----------------------------|----------|
| 02 | Up to 210 bar (on request) | <b>L</b> |
|    | Up to 250 bar (on request) | <b>N</b> |
|    | Up to 315 bar (on request) | <b>P</b> |
|    | Up to 350 bar (on request) | <b>R</b> |
|    | Up to 420 bar              | <b>T</b> |

|    |        |          |
|----|--------|----------|
| 03 | Size 0 | <b>0</b> |
|----|--------|----------|

|    |  |          |
|----|--|----------|
| 04 | If setpoint = 0, minimum pressure is set | <b>A</b> |
|----|--|----------|

|    |        |          |
|----|--------|----------|
| 05 | Series | <b>A</b> |
|----|--------|----------|

|    |  |          |
|----|--|----------|
| 06 | High-Performance and R/C019E mounting cavity (see page 11) | <b>F</b> |
|----|--|----------|

|    |   |          |
|----|---|----------|
| 07 | Proportional solenoid, switching in oil | <b>C</b> |
|----|---|----------|

### 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>  |

### Sealing material

|    |   |          |
|----|---|----------|
| 10 | FKM (fluoroelastomer), other seals on request | <b>V</b> |
|----|---|----------|

|    |                                   |           |
|----|-----------------------------------|-----------|
| 11 | Standard variant (no designation) |           |
|    | Preferred variant 24 V/800 mA     | <b>-8</b> |

|    |                               |          |
|----|-------------------------------|----------|
| 12 | Further details in plain text | <b>*</b> |
|----|-------------------------------|----------|

## Preferred types

| Type                 | Material number |
|----------------------|-----------------|
| KBVST0AA/FCG24K40V-8 | R901444686      |
| KBVST0AA/FCG24C4V-8  | R901488221      |

1) Other pressure stages on request

2) 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 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. Minimum pressure is set in case of power failure or if the setpoint value is 0.

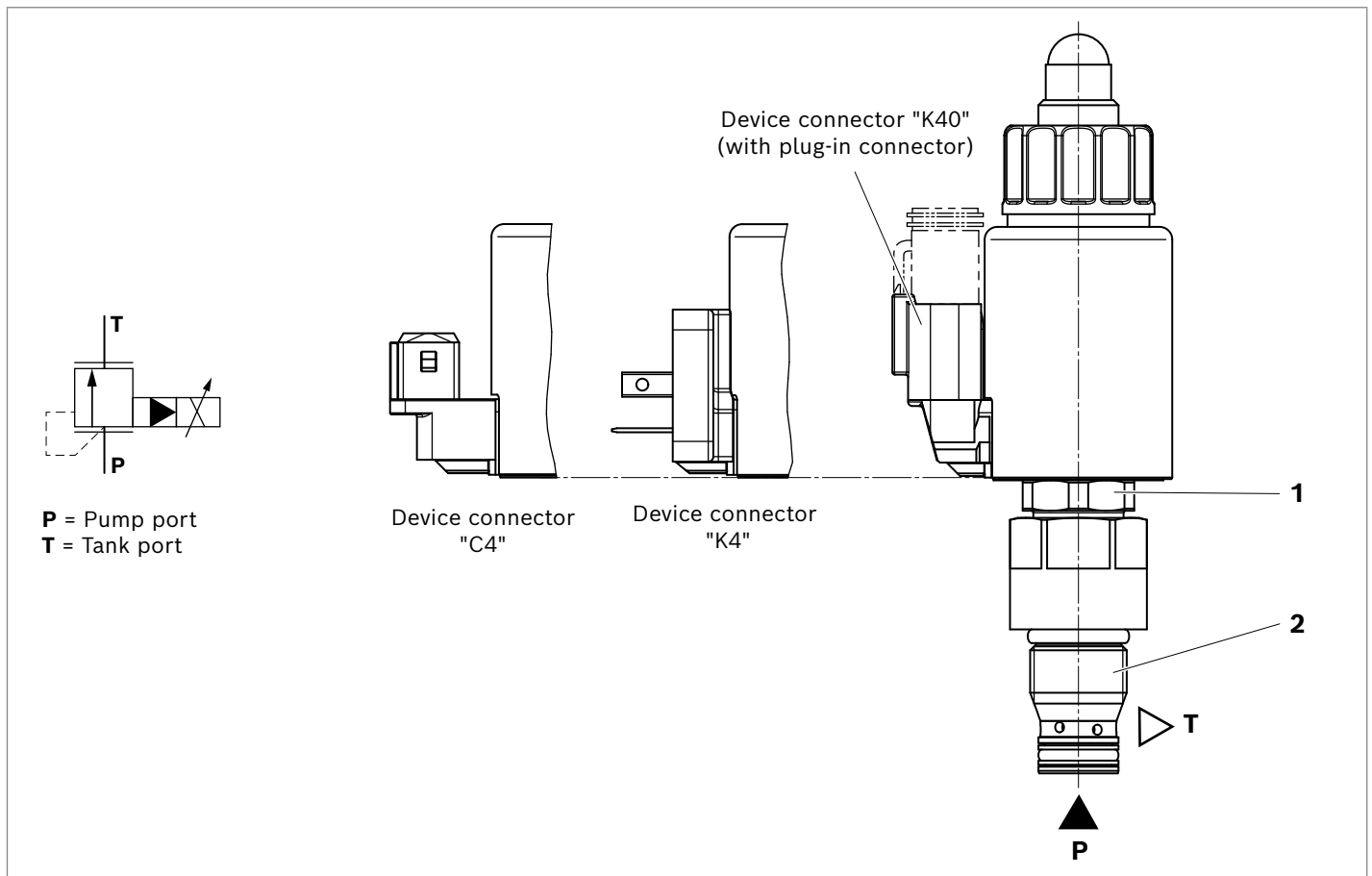
### Function

To proportionally increasing the system pressure, a setpoint is specified using the control electronics. Depending on this setpoint, 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. ( $p_{\max}$  = maximum setpoint;  $p_{\min}$  = setpoint of 0)

### Notice

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

### ▼ Type KBVS.0A..



## Technical data

| General                   |    |   |
|---------------------------|----|---|
| Weight                    | kg | 0.54  |
| Installation position     |    | Any – if it is ensured that no air can collect upstream the valve.<br>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 <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 x in positive; 3x in negative direction (6 single shocks total)  |
| DIN EN 60068-2-29: 03/95  | Continuous shock                       | Half sine 15 g/11 ms, 1000 x in positive; 1000x 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<br>93 % to 97 % RH, 2 cycles of 24 h   |
| Salt spray test in accordance with DIN 50021  |  |  |
|   | <b>h</b>                               | <b>720</b>   |
| → Varnishing generally not necessary. If varnishing, note reduced radiation output. |  |  |

### Notice

For applications outside these values, please consult us!

| Hydraulic   |  |                               |  |
|---|--|-------------------------------|--|
| Maximum working pressure <sup>1)</sup>  | Port <b>P</b>  | bar                           | 420  |
| Maximum permissible return flow pressure  | Port <b>T</b>  | bar                           | 210  |
| Maximum set pressure <sup>2)</sup>  | See setpoint pressure characteristic curve on page 7 |                               |  |
| Maximum set pressure when setpoint is 0   | See characteristic curve on page 7                   |                               |  |
| Maximum flow  |  | l/min                         | 25   |
| Pilot oil   |  | l/min                         | < 0.8  |
| Leakage   |  | ml/min                        | < 450 (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 <sup>2</sup> /s            | 5 to 400 (preferably 10 to 100)  |
| Maximum admissible degree of contamination of hydraulic fluid<br>Cleanliness level per ISO 4406 (c) | Class 20/18/15 <sup>3)</sup>                         |                               |  |
| Load cycles   | 2 m  |                               |  |
| 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 pressure characteristic curve tolerance  | Setpoint 100 %                                       | < 2 % of maximum set pressure |  |
|   | Setpoint 0   | < 5 % of maximum set pressure |  |
| Step response ( $T_u + T_g$ )<br>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      |
| Biodegradable   | insoluble in water | HEES                       | ISO 15380 | 90221      |
|                 | soluble in water   | HEPG                       | ISO 15380 |            |

### 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.
- ▶ **Biodegradable:** If biodegradable hydraulic fluids are used that are also zinc-solvent, 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.  
To select filters, visit [www.boschrexroth.com/filter](http://www.boschrexroth.com/filter).
- 4) Measured with analog amplifier of type RA2-1/10, see data sheet 95230 (PWM = 300 Hz).

| <b>Electric</b>                           |                         |   |              |                   |
|---|-------------------------|---|--------------|-------------------|
| Voltage type                              |                         |   | DC voltage   |                   |
| Supply voltage                            | V                       | <b>12 DC</b>  | <b>24 DC</b> | <b>"-8"/24 DC</b> |
| Maximum solenoid current                  | mA                      | 1760  | 1200         | 800               |
| Coil resistance                           | Cold value at 20 °C     | Ω   | 2.3          | 4.8               |
|   | Maximum warm value      | Ω   | 3.8          | 7.9               |
| Duty cycle                                | %                       | See characteristic curve on pages 8 and 9 <sup>5)</sup>             |              |                   |
| 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)      |                         | Connector proportional amplifier type VT-SSPA1..., data sheet 30116 |              |                   |
|   |                         | Analog amplifier type RA..., data sheet 95230                       |              |                   |
|   |                         | BODAS controller type RC..., data sheets 95204, 95205, 95206        |              |                   |
| Recommended dither frequency (PMW)        | Hz                      | 300   |              |                   |
| 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!

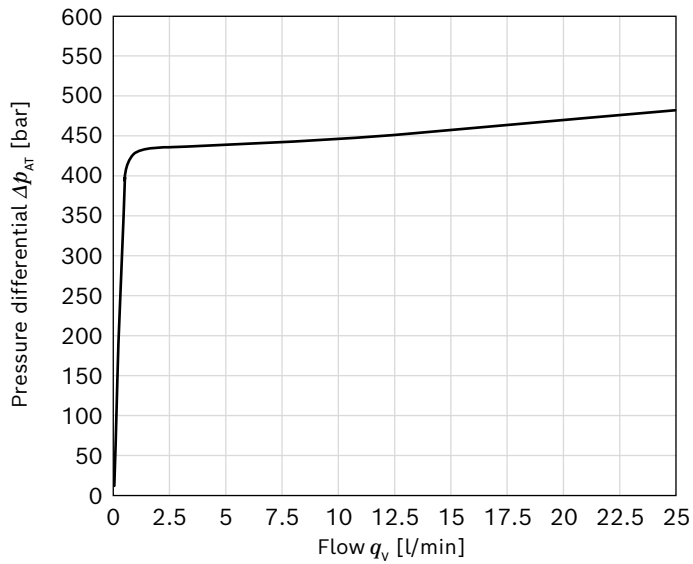
7) With installed and locked plug-in connector. Plug-in connectors are not included in the scope of delivery and must be ordered separately, see data sheet 08006.

## Characteristic curves

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

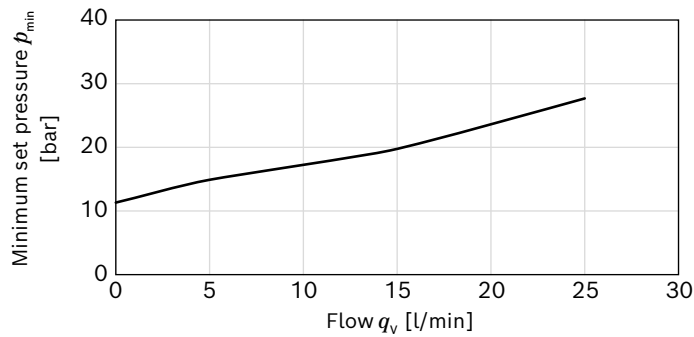
#### ▼ Pressure at port P depending on flow

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



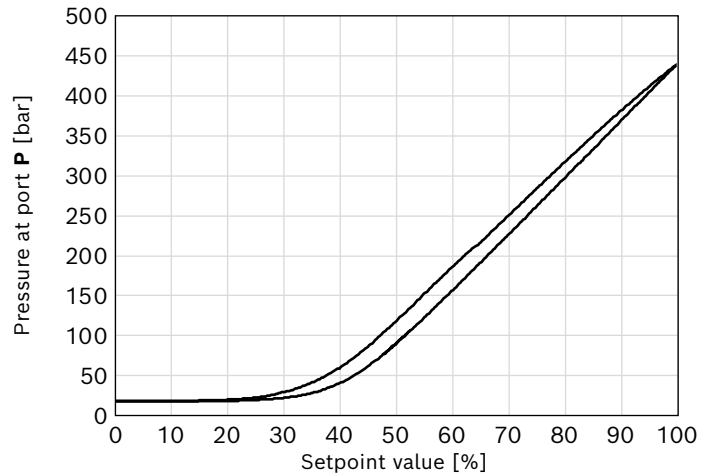
#### ▼ Minimum set pressure

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



### $p$ - $I$ characteristic curves; flow = 10 l/min

#### ▼ Pressure stage 420 bar



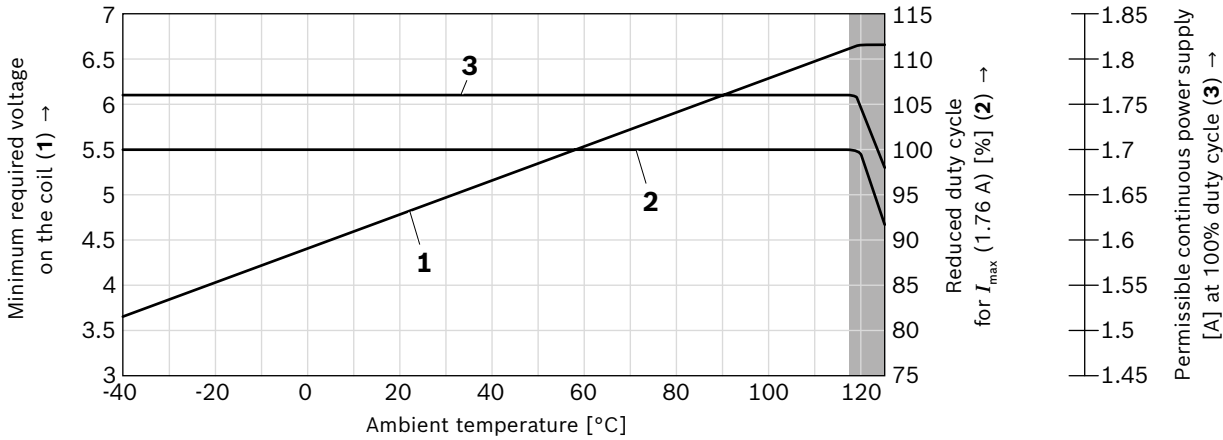
#### Notice

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

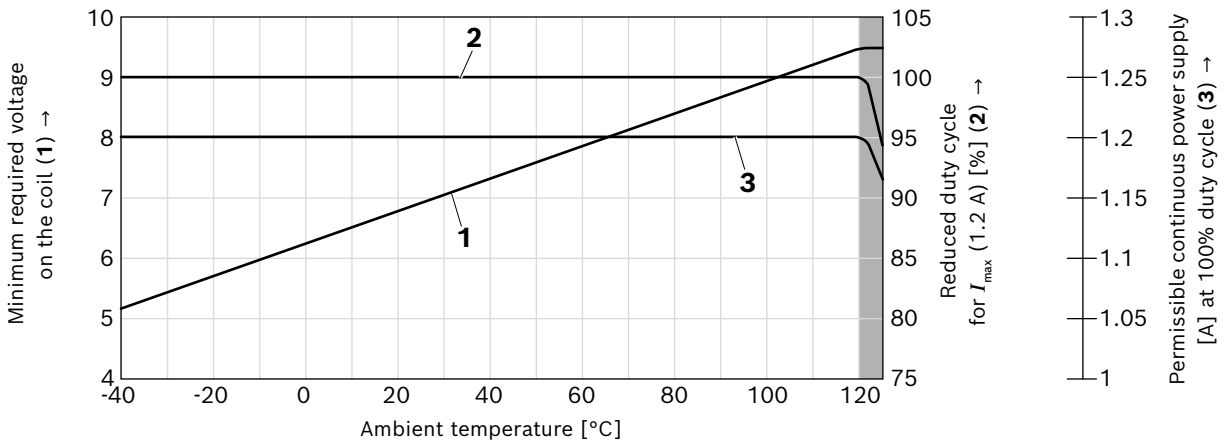
## Permissible working range

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

#### ▼ Version "G12"



#### ▼ Version "G24"

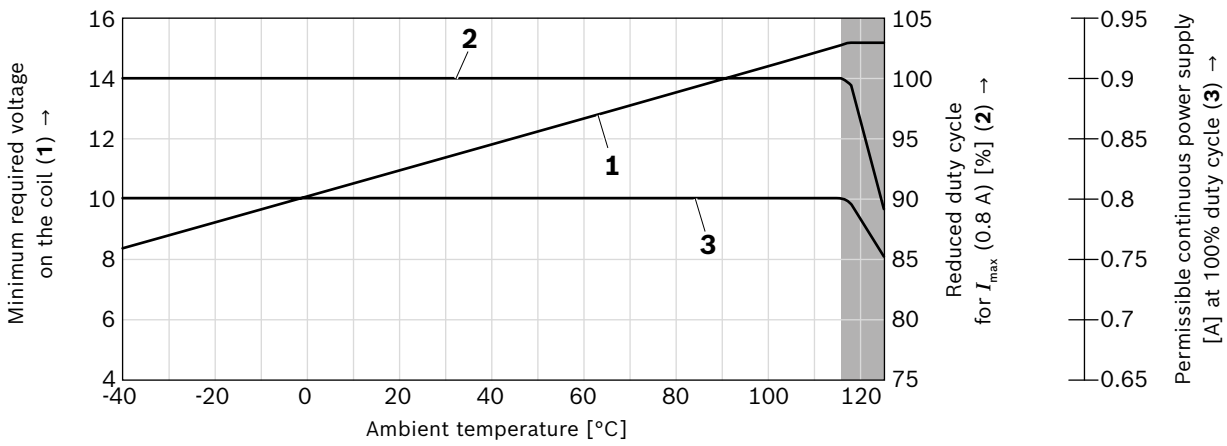


= Limited valve performance

**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"



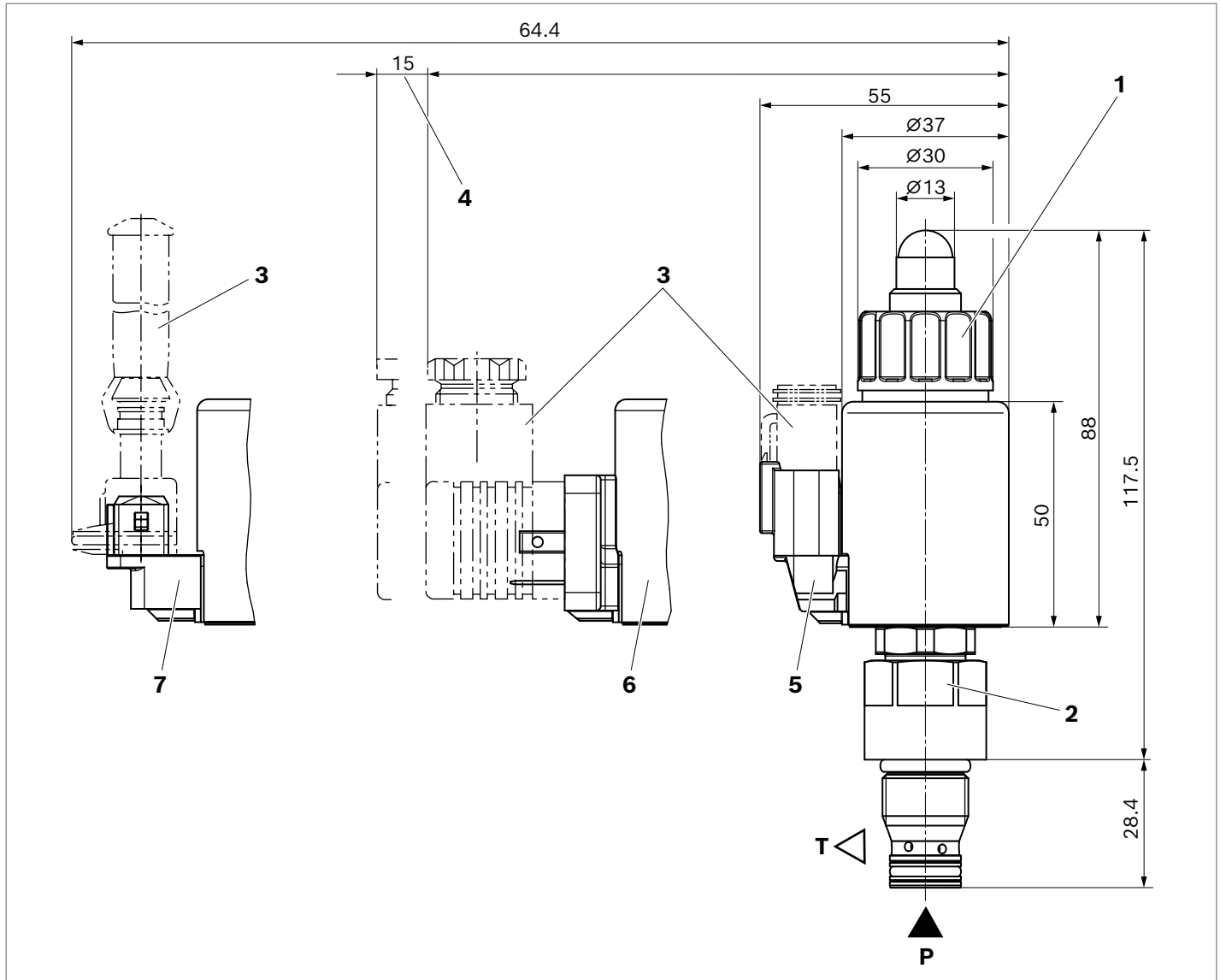
= Limited valve performance

**Notice**

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## Dimensions

### ▼ KBVS.0A

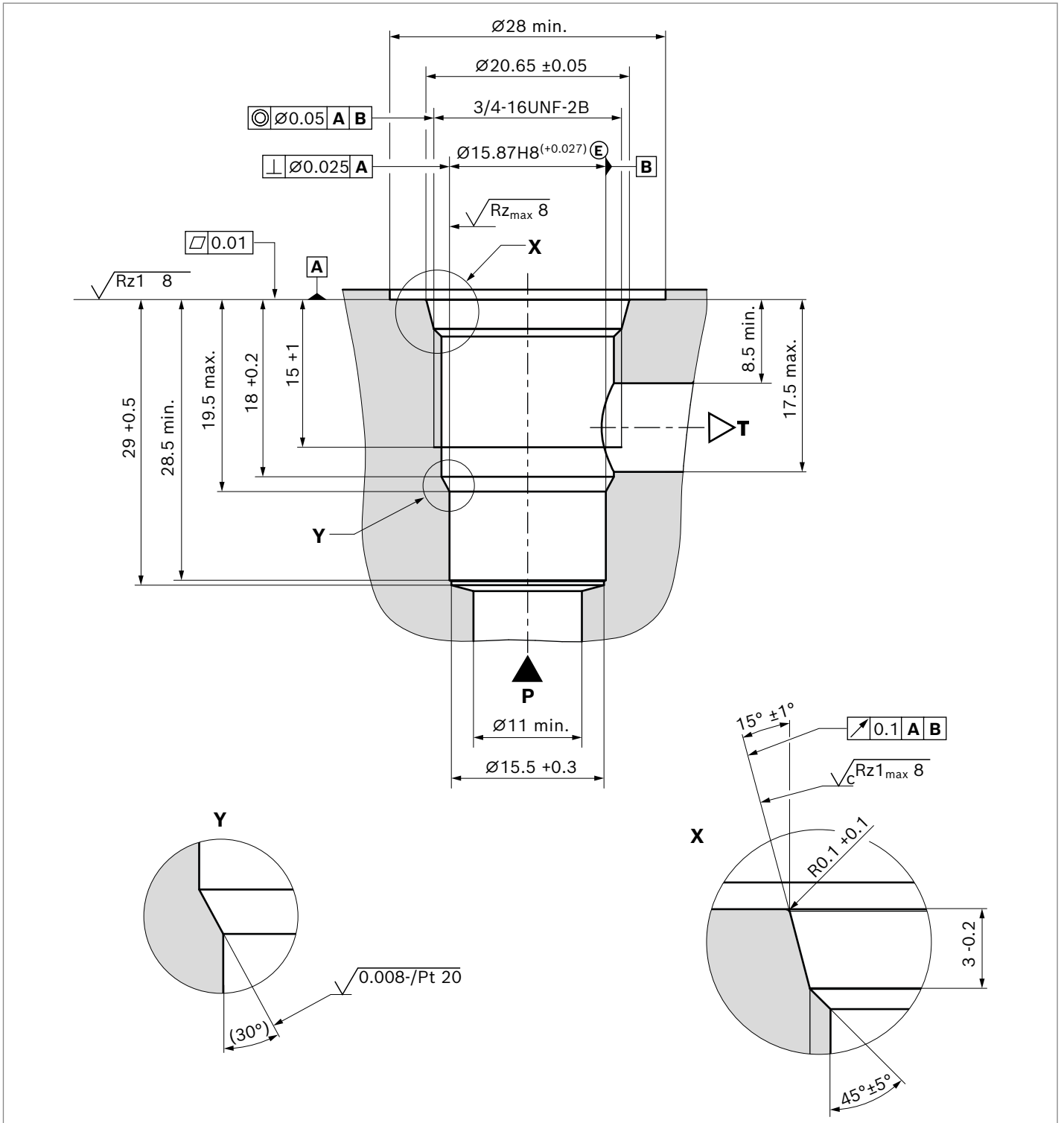


- 1 Nut, tightening torque  $M_A = 5^{+1}$  Nm
- 2 WAF 24, tightening torque  $M_A = 55^{+5}$  Nm.
- 3 Plug-in connectors, separate order, see data sheet 08006
- 4 Space required to remove the plug-in connector
- 5 Device connector "K40"
- 6 Device connector "K4"
- 7 Device connector "C4"

**P** = Pump port  
**T** = Tank port

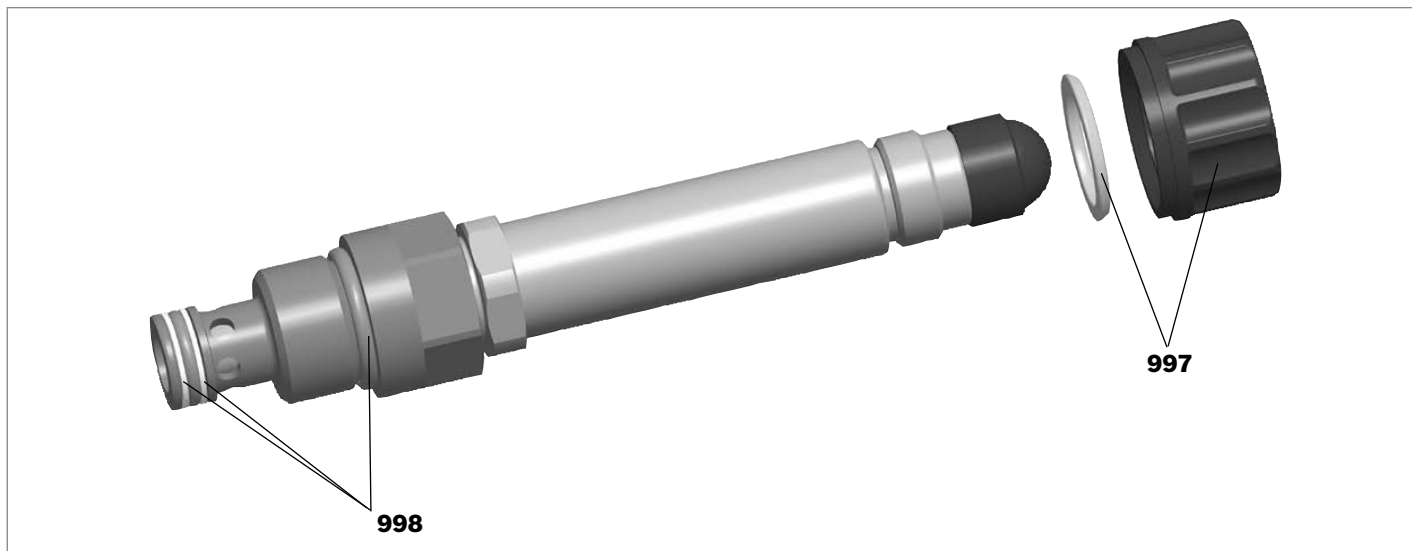
### Mounting cavity

▼ R/C019E; 2 main ports; 3/4-16UNF-2B thread



P = Pump port  
T = Tank port

## Available individual components



| Item | Denomination                             |     | DC voltage   | Material number |
|------|--|-----|--------------|-----------------|
|      | Coil for single connection <sup>1)</sup> | 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      |
| 997  | Nut and seal ring for pole tube          |     |              | R961010456      |
| 998  | Seal kit of the valve                    |     |              | R961011378      |

<sup>1)</sup> Replacing the solenoid coil may result in a change of  $\pm 5\%$  in the factory pressure setting.

## Related documentation

- ▶ Control electronics:
  - Valve amplifier for prop. valves    type VT-SSPA1...    Data sheet 30116
  - 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<sub>p</sub> values    Data sheet 90294
- ▶ Selection of the filters    [www.boschrexroth.com/filter](http://www.boschrexroth.com/filter)

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