Proportional pressure relief valve, pilot-operated, with anti-cavitation function, decreasing characteristic curve
Type KBVS.2DB

Features
- Cartridge valve
- Mounting cavity R/FC and R/LG
- 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
- Valve adjusted to maximum pressure by setting spindle
- In event of power failure, maximum set pressure is set
- Setpoint pressure characteristic curve can be externally set using electronic controls

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KBVS.2DB | Proportional pressure relief valve

Type code

<table>
<thead>
<tr>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
<th>05</th>
<th>06</th>
<th>07</th>
<th>08</th>
<th>09</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>KBVS</td>
<td>2</td>
<td>D</td>
<td>B</td>
<td>/</td>
<td>C</td>
<td>V</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Valve type

01 Proportional pressure relief valve, pilot-operated  

Maximum control pressure

02 350 bar
420 bar  

03 Size 2  

04 If setpoint = 0, maximum pressure is set, with anti-cavitation function  

Mounting cavity

06 R/FC mounting cavity  

R/LG mounting cavity  

07 Proportional solenoid, wet pin  

Supply voltage

08 12 V DC electronic controls  

24 V DC electronic controls  

Electrical connection

09 Device connector according to DIN EN 175301-803  

DT04-2P (Deutsch) 2-pin device connector  

Junior Timer (AMP) 2-pin device connector  

Sealing material

10 FKM (fluoroelastomer), other seals on request  

11 Standard variant (no designation)  

Preferred variant 24 V/800 mA  

Further details in plain text  

Preferred types

<table>
<thead>
<tr>
<th>R/FC mounting cavity</th>
<th>R/LG mounting cavity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Material no.</td>
</tr>
<tr>
<td>KBVSR2DB/DCCG24K40V-8</td>
<td>R901468576</td>
</tr>
<tr>
<td>KBVST2DB/DCCG24K40V-8</td>
<td>R901198274</td>
</tr>
<tr>
<td>KBVST2DB/DCCG24C4V-8</td>
<td>R901432348</td>
</tr>
</tbody>
</table>

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

General
The KBVS.2DB proportional pressure reducing valve is a pilot-operated, seated cartridge valve. It is used to limit the pressure in hydraulic systems. Its primary components are a screw-in proportional pilot control valve (1) and the main valve (2). Based on the setpoint, these valves can be used to continuously adjust the pressure. If the setpoint is zero or in case of power failure, the maximum pressure is set (fail-safe response).

Basic principle
The valves come set at maximum mechanical pressure. To proportionally reduce the system pressure, a setpoint is specified using the electronic controls. Based 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.

\( p_{\text{max}} = \) setpoint of 0; \( p_{\text{min}} = \) maximum setpoint

Anti-cavitation function
The anti-cavitation function replaces inadequate hydraulic fluid volume caused, e.g. by leaks, pressure valve response or leading loads.
If the pressure at port P is less than that at port T, the control spool is raised from its seat. Hydraulic fluid then flows from port T to port P.

Notice
Any pressure from the tank (port T) is added to the set value at port P.

KBVS.2DB...DC (FC mounting cavity)

\[ P = \text{pump port} \quad T = \text{tank port} \]
# Technical data

## General

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (approx.) (kg)</td>
<td>0.81</td>
</tr>
<tr>
<td>Installation position</td>
<td>Anywhere air cannot build up in front of the valve. Otherwise we recommend installing the valve facing downward.</td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>°C</td>
</tr>
</tbody>
</table>

## 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, 5–57 Hz, amplitude 1.6 mm (p–p), 57–2000 Hz, amplitude 10 g

- **IEC 60068-2-64: 05/93**
  - Vibration (random) and broadband noise
  - 20–2000 Hz, amplitude 0.1 g²/Hz (14 g RMS/30 g peak), testing time 24 hr

- **DIN/EN 60068-2-27: 03/95**
  - Shock
  - Half sine 15 g/11 ms; 3x in each direction (6 single shocks total)

- **DIN/EN 60068-2-29: 03/95**
  - Continuous shock
  - Half sine 15 g/11 ms; 1000x in each direction (2000 single shocks total)

### Information per axis

- **Climate test in accordance with DIN/EN 60068-2/IEC 60068-2/ (environmental test)**
  - **DIN/EN 60068-2-1: 03/95**
    - Storage temperature
    - −40 °C, dwell time 16 hr
  - **DIN/EN 60068-2-2: 08/94**
    - Storage temperature
    - 110 °C, dwell time 16 hr
  - **DIN/EN 60068-2-1: 03/95**
    - Cold test
    - 2 cycles, −25 °C, dwell time 2 hr
  - **DIN/EN 60068-2-2: 08/94**
    - Dry heat test
    - 2 cycles, 120 °C, dwell time 2 hr
  - **IEC 60068-2-30: 1985**
    - Humid heat, cyclical
    - Variant 2/25–55°C 93–97% RH, 2 cycles of 24 hr

### Salt spray test in accordance with DIN 50021

- **hr**
  - 720

→ Varnishing generally not necessary. If varnishing, note reduced radiation output.

## Notice

Please contact us if the unit will be used outside the specified values.
### Hydraulic

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum working pressure</td>
<td>$p_w$</td>
<td>bar</td>
<td>420</td>
</tr>
<tr>
<td>Maximum return flow pressure</td>
<td>$p_t$</td>
<td>bar</td>
<td>210</td>
</tr>
<tr>
<td>Maximum set pressure</td>
<td>$p_s$</td>
<td>bar</td>
<td>See characteristic curve on page 7</td>
</tr>
<tr>
<td>Maximum set pressure when setpoint is 0</td>
<td>$p_s$</td>
<td>bar</td>
<td>See characteristic curve on page 7</td>
</tr>
<tr>
<td>Maximum flow</td>
<td>$q_v$</td>
<td>l/min</td>
<td>240</td>
</tr>
<tr>
<td>Pilot flow</td>
<td></td>
<td>l/min</td>
<td>&lt; 0.8</td>
</tr>
<tr>
<td>Leakage flow</td>
<td>$q_l$</td>
<td>ml/min</td>
<td>&lt; 80 (pilot control valve closed and HLP46, $\vartheta_{oi}$ = 40 °C)</td>
</tr>
<tr>
<td>Hydraulic fluid</td>
<td></td>
<td></td>
<td>See table on page 6</td>
</tr>
<tr>
<td>Hydraulic fluid temperature range</td>
<td>$\vartheta$</td>
<td>°C</td>
<td>−40 to 80</td>
</tr>
<tr>
<td>Viscosity range</td>
<td>$\nu$</td>
<td>mm²/s</td>
<td>5 to 400 (preferably 10 to 100)</td>
</tr>
<tr>
<td>Maximum admissible degree of contamination of hydraulic fluid, cleanliness level as per ISO 4406 (c)</td>
<td></td>
<td></td>
<td>Class 20/18/15</td>
</tr>
<tr>
<td>Load change</td>
<td></td>
<td></td>
<td>2 mil.</td>
</tr>
<tr>
<td>Hysteresis</td>
<td></td>
<td></td>
<td>&lt; 7% of maximum set pressure</td>
</tr>
<tr>
<td>Turnover voltage</td>
<td>$t_{ov}$</td>
<td>ms</td>
<td>&lt; 0.5% of maximum set pressure</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>$t_{res}$</td>
<td>ms</td>
<td>&lt; 0.5% of maximum set pressure</td>
</tr>
<tr>
<td>Setpoint pressure characteristic curve tolerance</td>
<td></td>
<td></td>
<td>Setpoint 100% &lt; 2% of maximum set pressure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Setpoint 0 &lt; 5% of maximum set pressure</td>
</tr>
<tr>
<td>Step response ($T_u + T_g$) $0 \rightarrow 100% / 100% \rightarrow 0$</td>
<td>$t$</td>
<td>ms</td>
<td>100 (depending on system)</td>
</tr>
</tbody>
</table>

### Electrical

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage type</td>
<td>DC voltage</td>
</tr>
<tr>
<td>Supply voltages</td>
<td>$U$</td>
</tr>
<tr>
<td>Maximum solenoid current</td>
<td>$I_{max}$</td>
</tr>
<tr>
<td>Coil resistance</td>
<td>$R$</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Duty cycle</td>
<td>%</td>
</tr>
<tr>
<td>Maximum coil temperature</td>
<td>°C</td>
</tr>
<tr>
<td>Type of protection according to DIN/EN 60529</td>
<td>Connector version “K4”</td>
</tr>
<tr>
<td></td>
<td>Connector version “C4”</td>
</tr>
<tr>
<td></td>
<td>Connector version “K40”</td>
</tr>
<tr>
<td>Electronic controls (sold separately)</td>
<td>Type RA analog amplifier (data sheet 95230)</td>
</tr>
<tr>
<td></td>
<td>Type RC BODAS controller (data sheets 95204, 95205, 95206)</td>
</tr>
<tr>
<td>Recommended dither frequency (PMW)</td>
<td>Hz</td>
</tr>
<tr>
<td>Design according to VDE 0580</td>
<td></td>
</tr>
</tbody>
</table>

### Notice

For the electrical connection, specification requires a protective earth (PE) conductor.

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.

4) Measured with Type RA2-1/10 analog amplifier, see data sheet 95230 (PWM = 300 Hz).

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4) Measured with Type RA2-1/10 analog amplifier, see data sheet 95230 (PWM = 300 Hz).
Hydraulic fluid

<table>
<thead>
<tr>
<th>Hydraulic fluid</th>
<th>Classification</th>
<th>Suitable sealing materials</th>
<th>Standards</th>
<th>Data sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral oils</td>
<td>HL, HLP</td>
<td>FKM</td>
<td>DIN 51524</td>
<td>90220</td>
</tr>
<tr>
<td>Biodegradable</td>
<td>insoluble in water</td>
<td>FKM</td>
<td>ISO 15380</td>
<td>90221</td>
</tr>
<tr>
<td></td>
<td>soluble in water</td>
<td>FKM</td>
<td>ISO 15380</td>
<td>90221</td>
</tr>
</tbody>
</table>

**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:** When using biodegradable hydraulic fluids that are also zinc-solving, zinc may accumulate in the fluid.

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5) Consult the manufacturer if planning to use > 2000 m above sea level.
6) Due to the surface temperatures that can occur in the solenoid coil, ISO standards 13732-1 and 4413 should be observed.
Characteristic curves

▼ Pressure at port P depending on setpoint; flow = 20 l/min

▼ Minimum set pressure $p_{\text{min}}$ at port P with $I_{\text{nom}}$ depending on flow

▼ Pressure at port P depending on flow
(The characteristic curves were measured without back-pressure at port T)

▼ Anti-cavitation function
Permissible working range

Minimum terminal voltage on the coil, relative duty cycle and permissible working range depending on the ambient temperature

▼ Version “G12”

▼ Version “G24”
Proportional pressure relief valve | KBVS.2DB
Permissible working range

Version “G12...–8”

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.
Dimensions

KBVS.2DB...DC (version for FC mounting cavity)

1. Plug-in connector for device connector "K4" (sold separately, see data sheet 08006)
2. Plug-in connector for device connector "C4" (sold separately, see data sheet 08006)
3. Plug-in connector for device connector "K40" (sold separately, see data sheet 08006)
4. Space required to remove plug-in connector
5. 30 AF hexagonal, tightening torque $M_a = 100 \pm 10$ Nm
6. Nut, tightening torque $M_a = 5 \times 10$ Nm

$P$ = pump port
$T$ = tank port
Proportional pressure relief valve | KBVS.2DB

**Dimensions [mm]**

**KBVS.2DB...DM (version for LG mounting cavity)**

1. Plug-in connector for device connector "K4" (sold separately, see data sheet 08006)
2. Plug-in connector for device connector "C4" (sold separately, see data sheet 08006)
3. Plug-in connector for device connector "K40" (sold separately, see data sheet 08006)
4. Space required to remove plug-in connector
5. 30 AF hexagonal, tightening torque $M_A = 120\pm12$ Nm
6. Nut, tightening torque $M_A = 5\pm1$ Nm

**Legend**

- **P** = pump port
- **T** = tank port

**Dimensions**

- $\phi 37$ mm
- $55$ mm
- $90$ mm
- $136.5$ mm
- $38$ mm
- $34$ mm
- $57$ mm
KBVS.2DB | Proportional pressure relief valve

Dimensions

▼ Mounting cavity for Version FC (M28 × 1)

▼ Mounting cavity for Version LG (M30 × 1.5)

P = pump port
T = tank port

All seal ring insertion faces are rounded and free of burrs.

Standards:

<table>
<thead>
<tr>
<th>Workpiece edges</th>
<th>ISO 13715</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form and position tolerance</td>
<td>ISO 1101</td>
</tr>
<tr>
<td>General tolerances for machining</td>
<td>ISO 2768-mK</td>
</tr>
<tr>
<td>Tolerance</td>
<td>ISO 8015</td>
</tr>
<tr>
<td>Surface quality</td>
<td>ISO 1302</td>
</tr>
</tbody>
</table>

1) Fit depth
2) Visual inspection
3) Thread depth
4) Coarseness up to d = 32.5 required
5) Evenness up to d = 32.5 required
6) Required opening cross-section for pump (P) and tank port (T) > 132 mm²
7) For casting channels

Bosch Rexroth AG, RE 18377/11.2017
Available individual components

<table>
<thead>
<tr>
<th>Item</th>
<th>Designation</th>
<th>DC voltage</th>
<th>Material no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>020</td>
<td>Coil for single connection&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Device connector “K4”</td>
<td>12 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24 V/800 mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Device connector “K40”</td>
<td>12 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24 V/800 mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Device connector “C4”</td>
<td>12 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24 V/800 mA</td>
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<tr>
<td>050</td>
<td>Nut</td>
<td></td>
<td></td>
</tr>
<tr>
<td>090</td>
<td>Seal kit for pilot valve</td>
<td>Device connector “C4”</td>
<td>12 V</td>
</tr>
<tr>
<td>998</td>
<td>Seal kit for DC valve version (FC mounting cavity)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seal kit for DM valve version (LG mounting cavity)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup> Replacing the solenoid coil may result in a change of ±5% in the factory pressure setting.
Related documentation

▶ Control electronics:
  – Analog amplifier module Type RA... Data sheet 95230
  – BODAS control unit Type RC... Data sheets 95204, 95205, 95206
▶ Matching housing for threaded port Data sheet 25818