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

RE 18377
Edition: 11.2017

- Size 2
- Series B
- Maximum working pressure 420 bar
- Maximum flow 240 l/min

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

Contents

Type code

01	02	03	04	05		06	07	08	09	10	11	12
KBVS		**2**	**D**	**B**	**/**		**C**			**V**		*****

Valve type

01	Proportional pressure relief valve, pilot-operated	**KBVS**

Maximum control pressure

02	350 bar	**R**
	420 bar	**T**
03	Size 2	**2**
04	If setpoint = 0, maximum pressure is set, with anti-cavitation function	**D**
05	Series B	**B**

Mounting cavity

06	R/FC mounting cavity	**DC**
	R/LG mounting cavity	**DM**
07	Proportional solenoid, wet pin	**C**

Supply voltage

08	12 V DC electronic controls	**G12**
	24 V DC electronic controls	**G24**

Electrical connection[1)]

09	Device connector according to DIN EN 175301-803	**K4**
	DT04-2P (Deutsch) 2-pin device connector	**K40**
	Junior Timer (AMP) 2-pin device connector	**C4**

Sealing material

10	FKM (fluoroelastomer), other seals on request	**V**
11	Standard variant (no designation)	
	Preferred variant 24 V/800 mA	**-8**
12	Further details in plain text	*****

Preferred types

R/FC mounting cavity

Type	Material no.
KBVSR2DB/DCCG24K40V-8	R901468576
KBVST2DB/DCCG24K40V-8	R901198274
KBVST2DB/DCCG24C4V-8	R901432348

R/LG mounting cavity

Type	Material no.
KBVST2DB/DMCG24K40V-8	R901228604

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

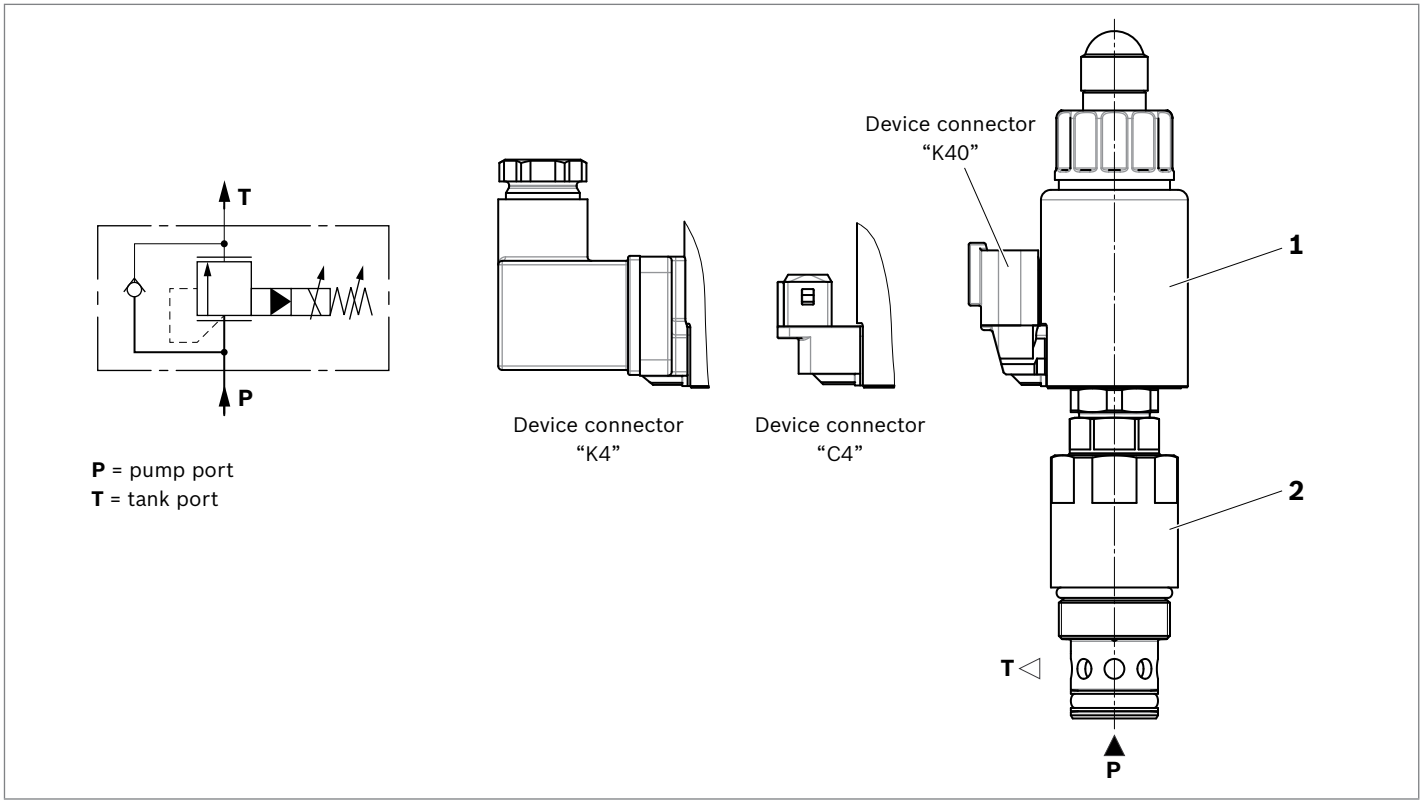
The valves come set at maximum mechanical pressure. To proportionally reduce the system pressure, a setpoint is specified using the electronic controls. Based on this setpoint, the electronics power the solenoid coil, which uses the pilot control valve (**1**) and main valve (**2**) to actually set the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



Technical data

General		
Weight (approx.)	kg	0.81
Installation position		Anywhere air cannot build up in front of the valve. Otherwise we recommend installing the valve facing downward.
Ambient temperature range	°C	–40 to 120 (see pages 8 and 9)
Storage temperature range	°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, 5–57 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 g^2/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		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				
Maximum working pressure[1)]	Port **P**	p_E	bar	420
Maximum return flow pressure	Port **T**	p_T	bar	210
Maximum set pressure[2)]				See setpoint pressure characteristic curve on page 7
Maximum set pressure when setpoint is 0				See characteristic curve on page 7
Maximum flow	**P** → **T**	q_V	l/min	240
Pilot flow			l/min	< 0.8
Leakage flow		q_L	ml/min	< 80 (pilot control valve closed and HLP46, ϑ_{Oil} = 40 °C)
Hydraulic fluid				See table on page 6
Hydraulic fluid temperature range		ϑ	°C	–40 to 80
Viscosity range		v	mm²/s	5 to 400 (preferably 10 to 100)
Maximum admissible degree of contamination of hydraulic fluid, cleanliness level as per ISO 4406 (c)				Class 20/18/15[3)]
Load change				2 mil.
Hysteresis[4)]				< 7% 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 100%			< 2% of maximum set pressure
	Setpoint 0			< 5% of maximum set pressure
Step response (T_u + T_g) 0 → 100%/100% → 0		t	ms	100 (depending on system)

Electrical						
Voltage type				DC voltage		
Supply voltages		U	V	**12**	**24**	**24 (“–8”)**
Maximum solenoid current		I_{max}	mA	1760	1200	800
Coil resistance	Cold value at 20 °C	R	Ω	2.3	4.8	11.5
	Maximum warm value	R	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 DIN/EN 60529	Connector version “K4”			IP 65 with installed and locked plug-in connector		
	Connector version “C4”			IP 66 with installed and locked plug-in connector		
				IP 69K with Rexroth plug-in connector (material no. R901022127)		
	Connector version “K40”			IP 69K with installed and locked plug-in connector		
Electronic controls (sold separately)				Type RA analog amplifier (data sheet 95230)		
				Type RC BODAS controller (data sheets 95204, 95205, 95206)		
Recommended dither frequency (PMW)			Hz	200		
Design according to VDE 0580						

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).

Hydraulic fluid

Hydraulic fluid		Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils		HL, HLP	FKM	DIN 51524	90220
Biodegradable	insoluble in water	HEES	FKM	ISO 15380	90221
	soluble in water	HEPG	FKM	ISO 15380	90221

Notice

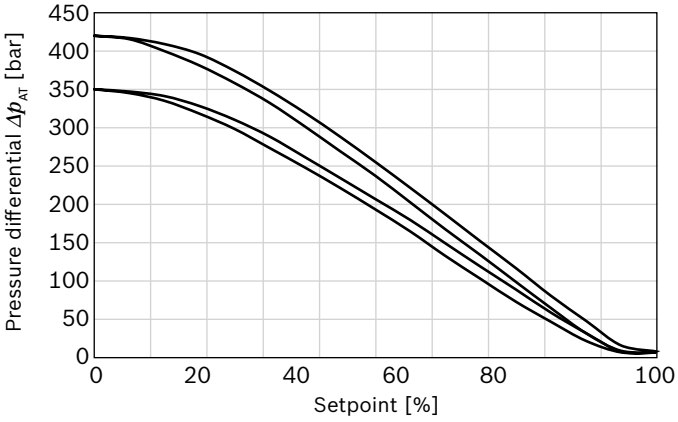
- Further information and details on using other hydraulic fluids are available in the above data sheets or on request.
- Restrictions are possible with the technical valve data (temperature, pressure range, service life, maintenance intervals, etc.).
- The flash point of the hydraulic fluid used must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

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

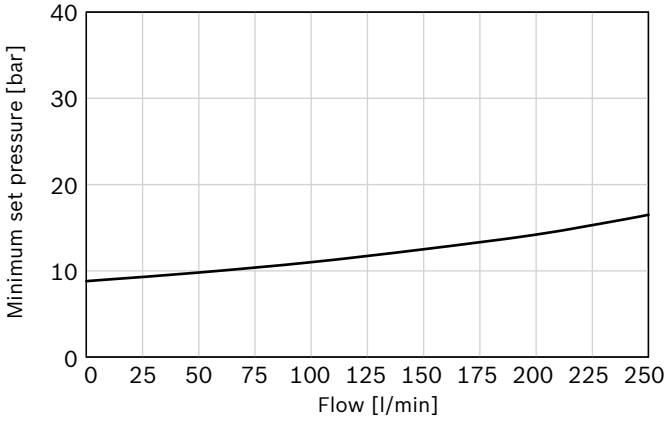
6) Due to the surface temperatures that can occur in the solenoid coil, ISO standards 13732-1 and 4413 should be observed.

Characteristic curves

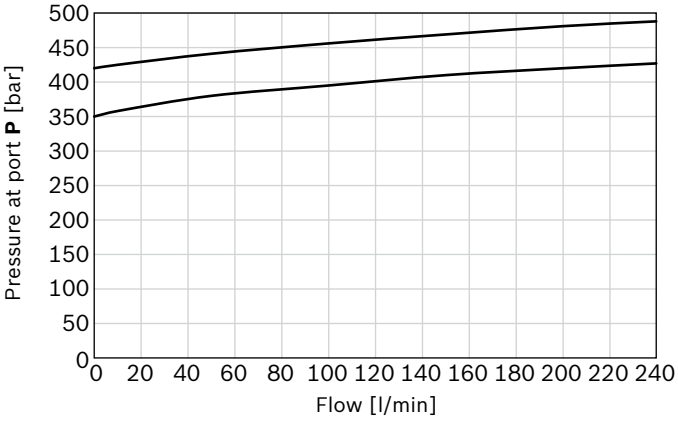
▼ **Pressure at port P depending on setpoint; flow = 20 l/min**



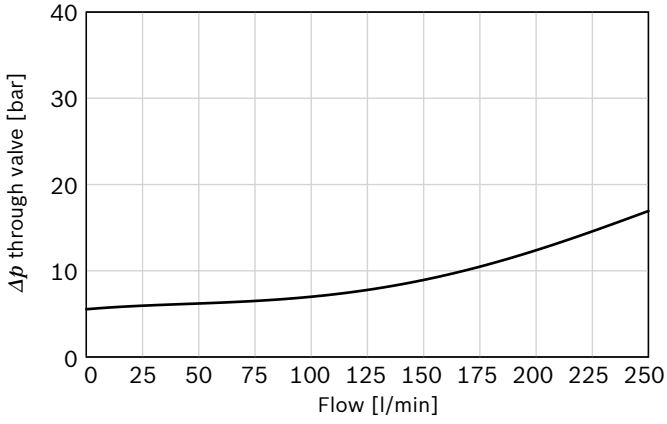
▼ **Minimum set pressure p_{min} at port P with I_{nom} depending on flow**



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



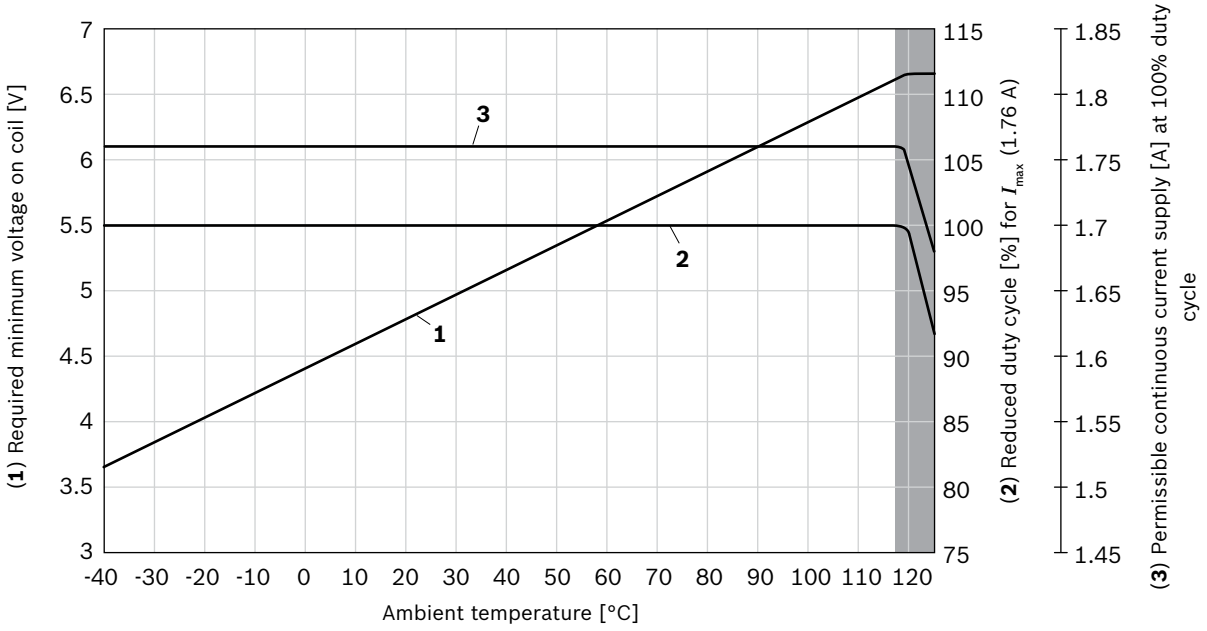
▼ **Anti-cavitation function**



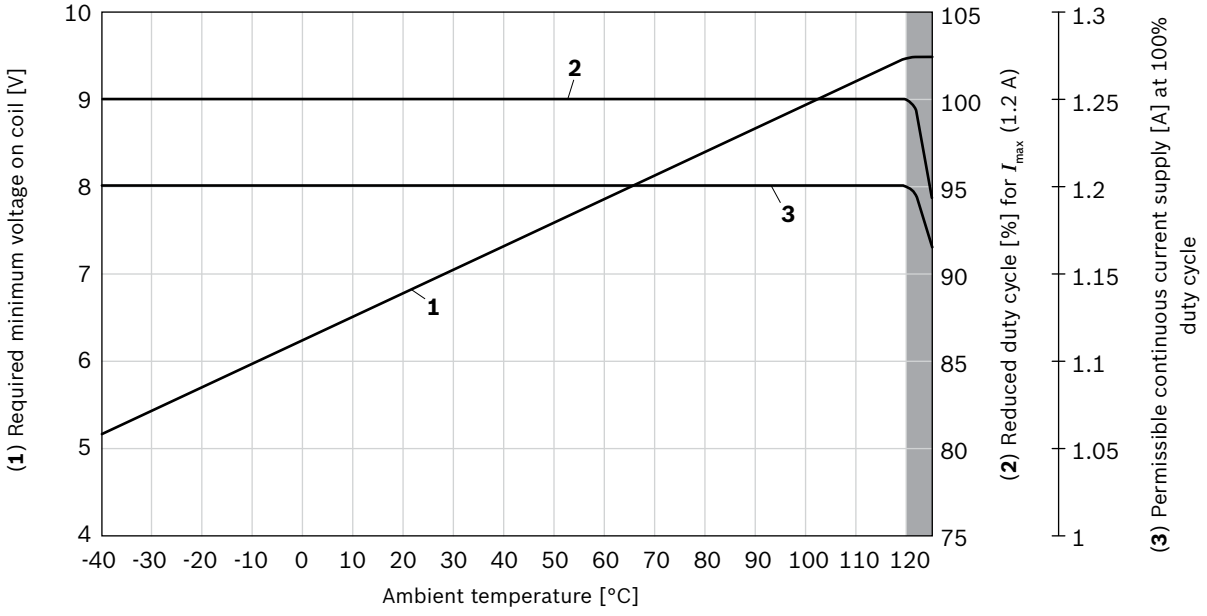
Permissible working range

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

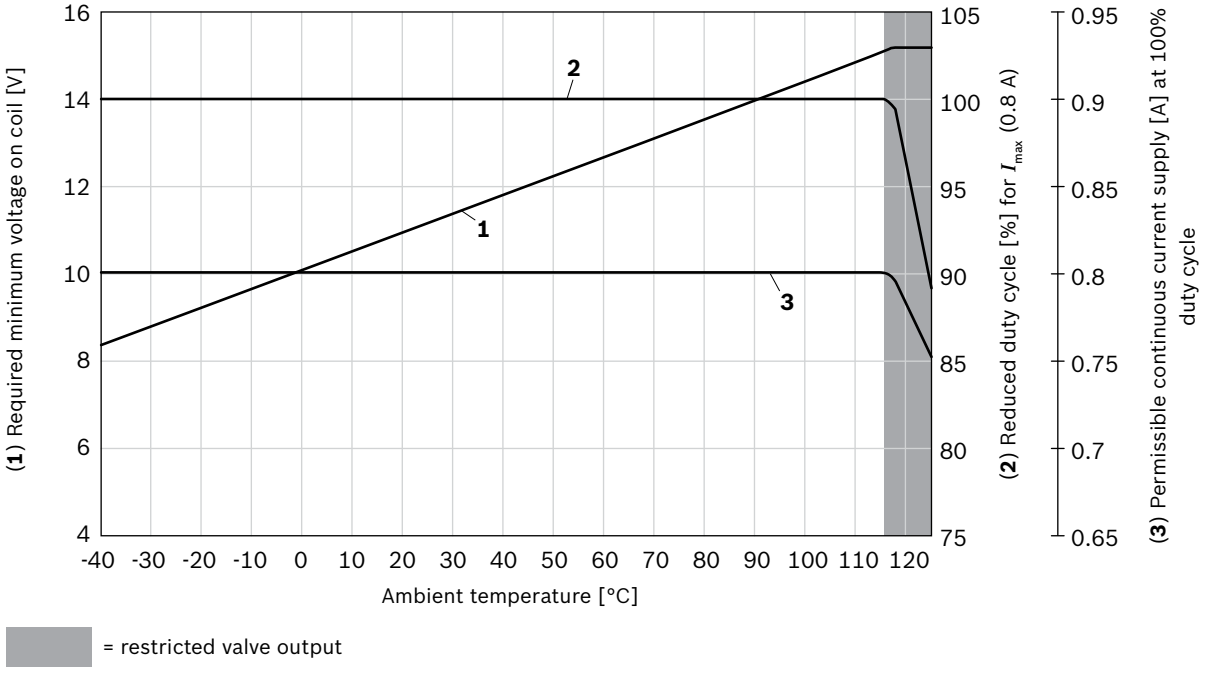
▼ **Version “G12”**



▼ **Version “G24”**



▼ **Version “G12...–8”**



= restricted valve output

Notice

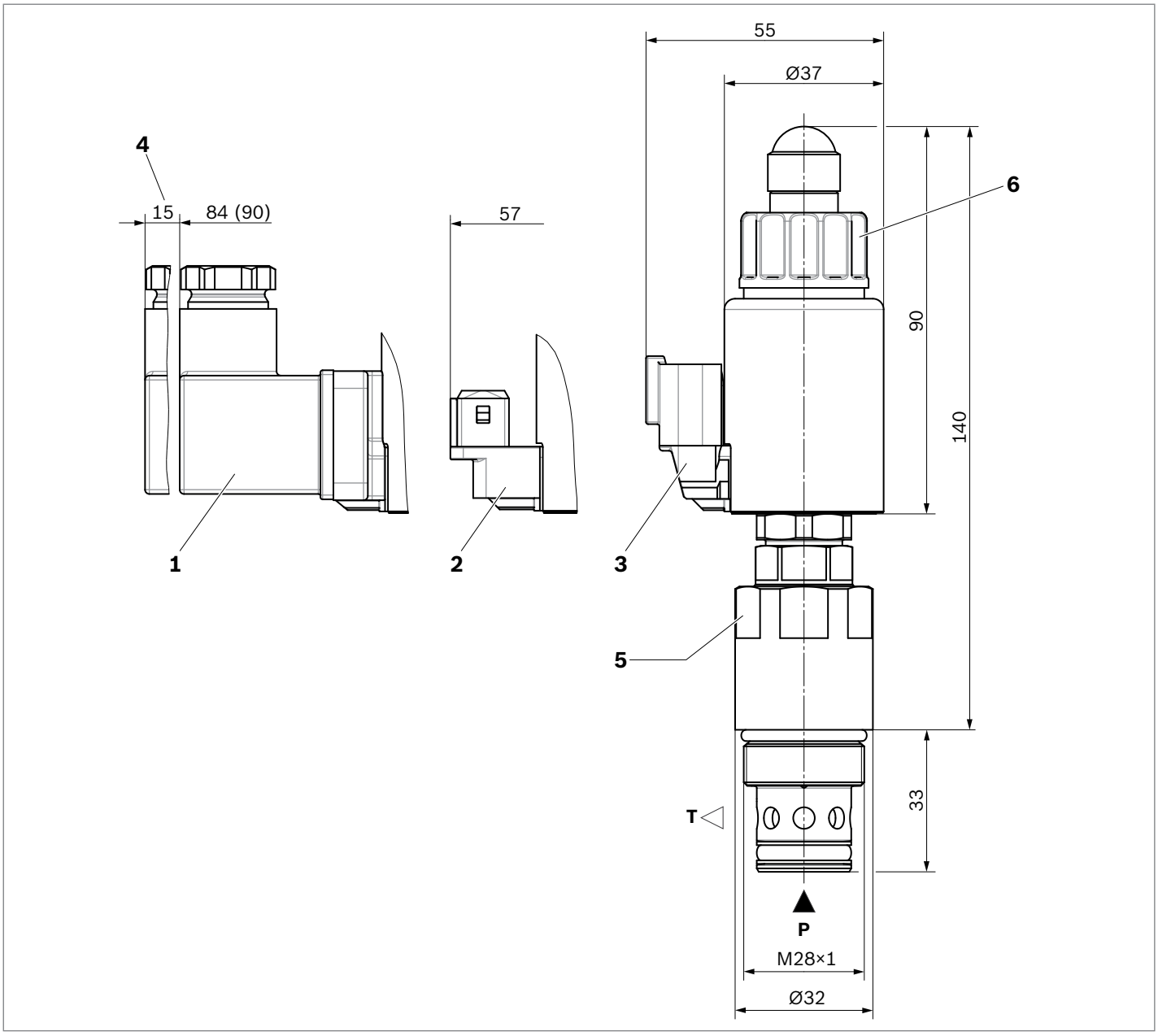
The characteristic curves were determined for coils with valve for medium test block size (80 x 80 x 80 mm), w/o flow in still air.

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

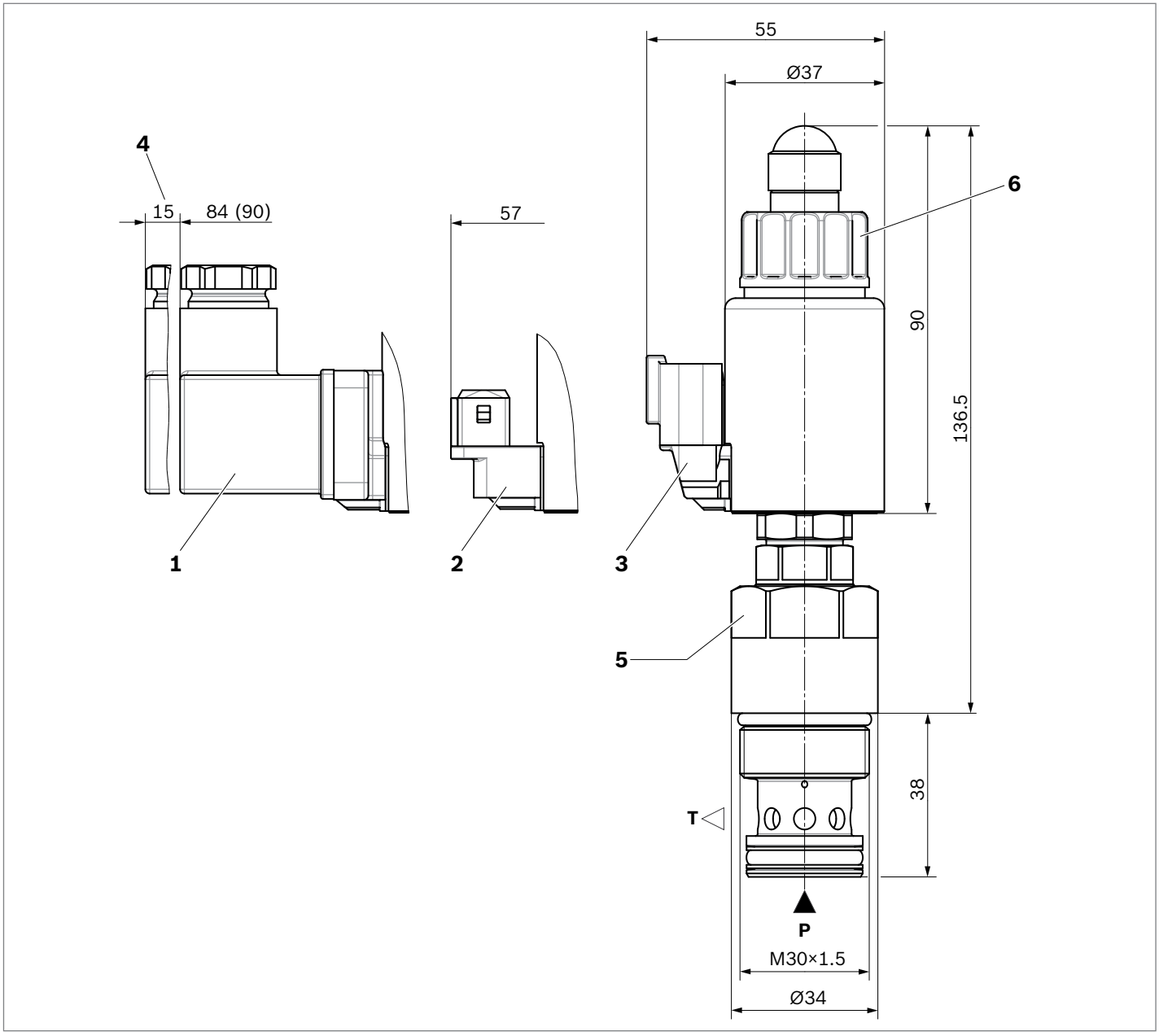
▼ **KBVS.2DB...DC (version for FC mounting cavity)**



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 $M_A = 5^{+1}$ Nm

P = pump port
T = tank port

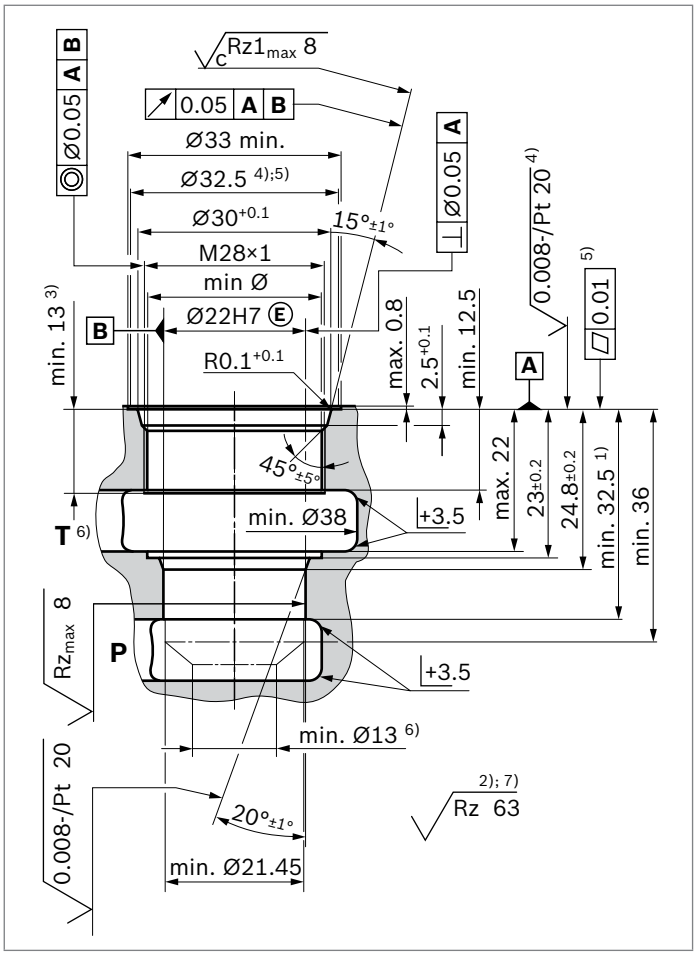
▼ **KBVS.2DB...DM (version for LG mounting cavity)**



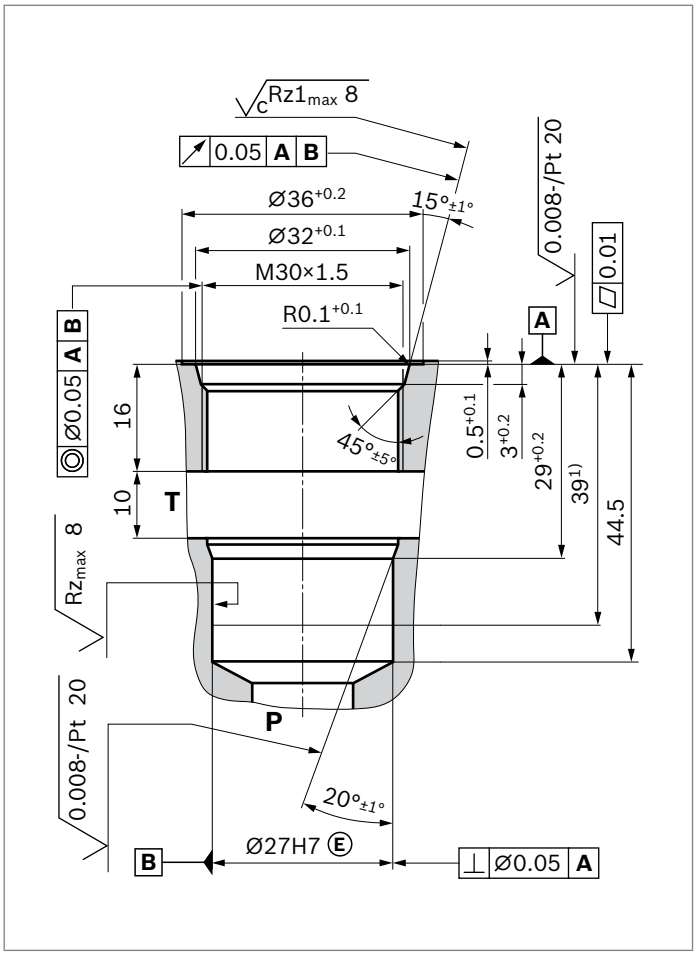
1 Plug-in connector for device connector “K4” (sold separately, see data sheet 08006)
2 Plug-in connector for device connector “C4” (sold separately, see data sheet 08006)
3 Plug-in connector for device connector “K40” (sold separately, see data sheet 08006)
4 Space required to remove plug-in connector
5 30 AF hexagonal, tightening torque M_A = $120^{\pm 12}$ Nm
6 Nut, tightening torque M_A = 5^{+1} Nm

P = pump port
T = tank port

▼ **Mounting cavity for Version FC** (M28 × 1)



▼ **Mounting cavity for Version LG** (M30 × 1.5)



P = pump port
T = tank port

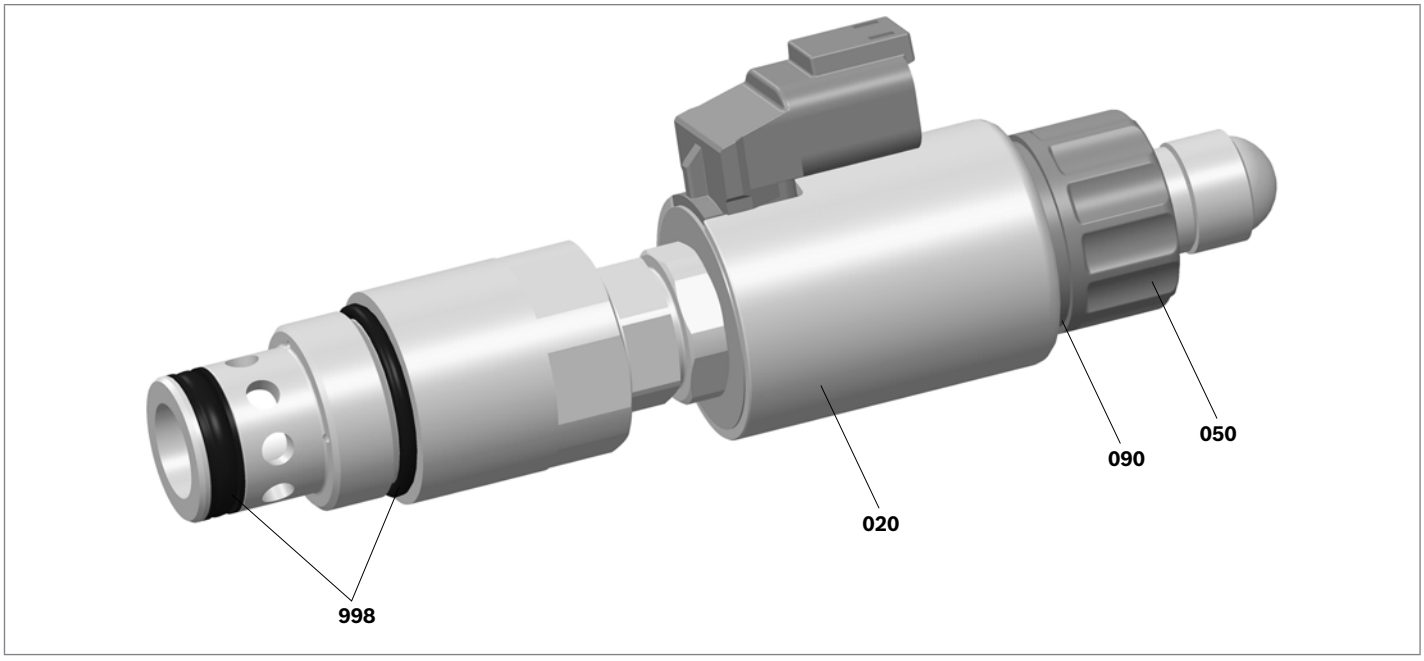
All seal ring insertion faces are rounded and free of burrs.

Standards:

Workpiece edges	ISO 13715
Form and position tolerance	ISO 1101
General tolerances for machining	ISO 2768-mK
Tolerance	ISO 8015
Surface quality	ISO 1302

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

Available individual components



Item	Designation		DC voltage	Material no.
020	Coil for single connection[1)]	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
050	Nut			R961010456
090	Seal kit for pilot valve			R961000376
998	Seal kit for DC valve version (FC mounting cavity)			R901109598
	Seal kit for DM valve version (LG mounting cavity)			R901109616

1) 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 controll unit — Type RC... — Data sheets 95204, 95205, 95206
- Matching housing for threaded port — Data sheet 25818

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