RE 18139-08/2022-01-28
Replaces: 07.2012

rexroth
A Bosch Company

Proportional pressure relief valve, pilot operated, increasing characteristic curve KBVS.3A

- Size 3
- Series A
- Maximum working pressure 350 bar
- Maximum flow 200 l/min

Features

- Cartridge valve
- Mounting cavity R/ISO 7789-33-01-0-98
- 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, minimum pressure is set
- Setpoint value pressure characteristic curve can be externally set using control electronics

Contents

Type code

01	02	03	04	05		06	07	08	09	10	11	12
KBVS		**3**	**A**	**A**	**/**	**L**	**C**			**V**		*****

Valve type

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

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**
03	Size 3	**3**
04	If setpoint value = 0, minimum pressure is set	**A**
05	Series	**A**

Mounting cavity

06	Mounting cavity R/ISO 7789 (see page 11)	**L**
07	Proportional solenoid, switching in oil	**C**

Supply voltage

08	Control electronics 12 V DC	**G12**
	Control electronics 24 V DC	**G24**

Electrical connection[1)]

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

Sealing material

10	FKM (fluorocarbon rubber)	**V**

Solenoid coil

11	Standard variant	**No code**
	24 V / 800 mA	**–8**
12	Further details in plain text	*****

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

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Preferred types

Type	Material number
KBVSC3AA/LCG24K4V	R901061858
KBVSF3AA/LCG24K4V	R901061859
KBVSH3AA/LCG24K4V	R901061869
KBVSL3AA/LCG24K4V	R901061873

Type	Material number
KBVSN3AA/LCG24K4V	R901061874
KBVSP3AA/LCG24K4V	R901061875
KBVSR3AA/LCG24K4V	R901061877

Functional description

General

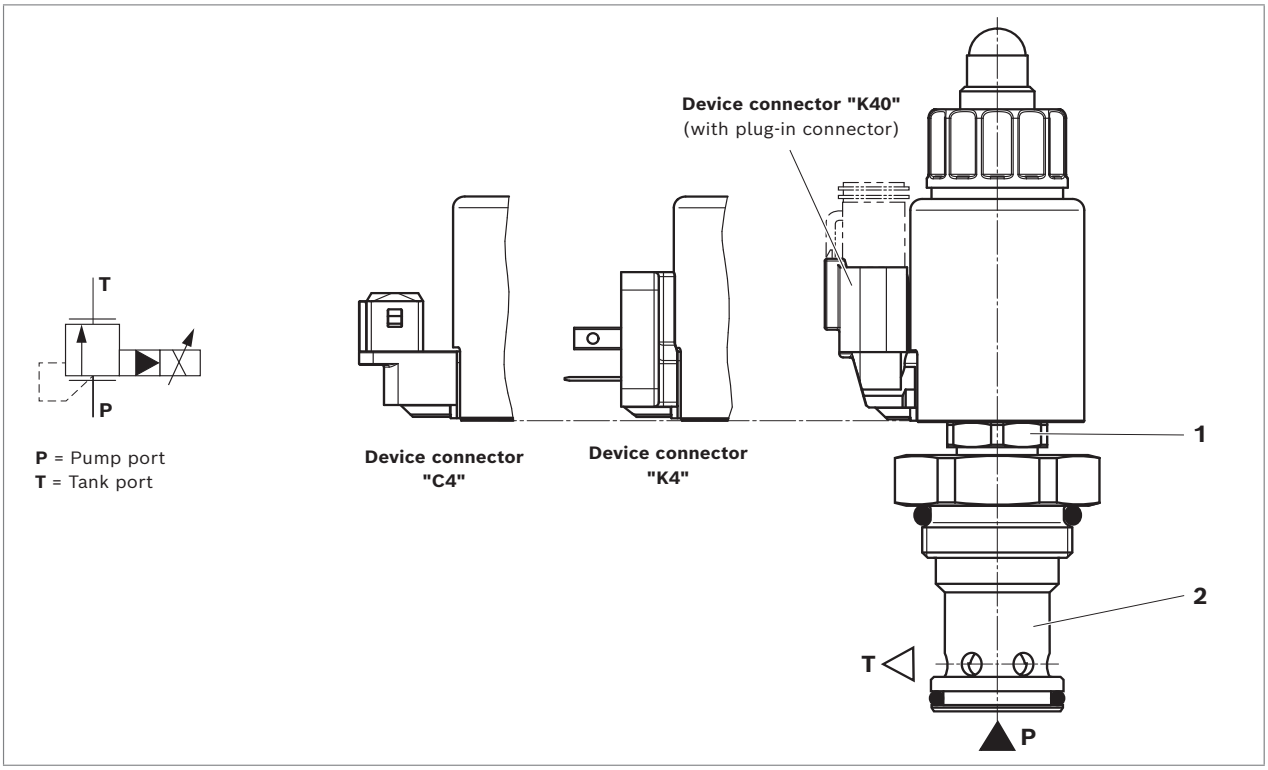
Valves of type KBVS are pilot operated proportional pressure relief valves in seat design and are used to limit the pressure in hydraulic systems. Their primary components are a screw-in proportional pilot control valve (**1**) and the main valve (**2**).
These valves can be used for infinitely adjusting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

Basic principle

To proportionally increase 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} = maximum setpoint value; p_{min} = setpoint of 0)
Pilot oil supply and return are carried out internally.

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

▼ **KBVS.3A...**



Technical data

General		
Weight (approx.)	kg	0.7
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 1.5 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 0.05 g^2/Hz (10 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 25 g/6 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**	p_A	bar	350
Maximum return flow pressure	Port **T**	p_T	bar	210
Maximum set pressure[2)]		$p_{E\,max}$		See setpoint value pressure characteristic curve on page 7
Minimum set pressure at setpoint value 0		$p_{E\,min}$		See characteristic curves page 7
Maximum flow	**P** → **T**	q_V	l/min	200 (with pressure stage 350 bar max. 100 l/min)
Hydraulic fluid				See table below
Hydraulic fluid temperature range		ϑ	°C	–20 ... +80
Viscosity range		ν	mm²/s	15 ... 380
Maximum admissible degree of contamination of hydraulic fluid Cleanliness level per ISO 4406 (c)				Level 20/18/15[3)]
Hysteresis				< 6% of maximum set pressure
Turnover voltage				< 0.5% of maximum set pressure
Responsiveness				< 0.5% of maximum set pressure
Setpoint value pressure characteristic curve tolerance	Setpoint value 100%			< 5% of maximum set pressure
	Setpoint value 0			< 2% 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!
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.

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Electric						
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 (ED)[4]			%	100 (See characteristic curve page 8 and 9)		
Maximum coil temperature[5]			°C	150		
Type of protection according to ISO 20653	Connector version "K4"			IP6K5[6]		
	Connector version "C4"			IP6K6K[6]		
				IP6K9K[6] (only with Rexroth type R901022127)		
	Connector version "K40"			IP6K7 and IP6K9K[6]		
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	300		
Design according to VDE 0580						

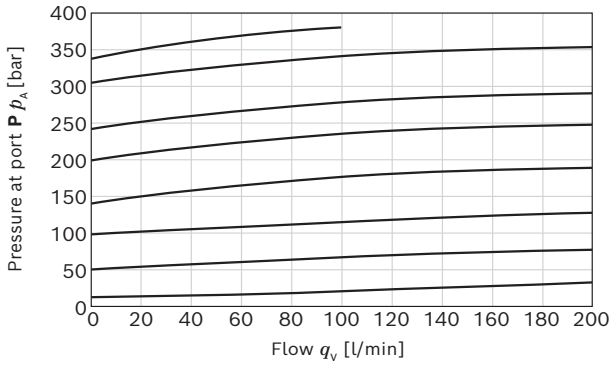
Notice
For the electrical connection, a protective earth (PE ⏚) connection is mandatory based on the specification.

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

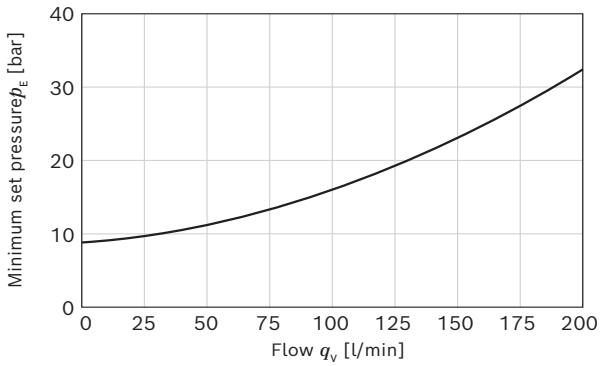
p-q_V flow characteristic curves

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

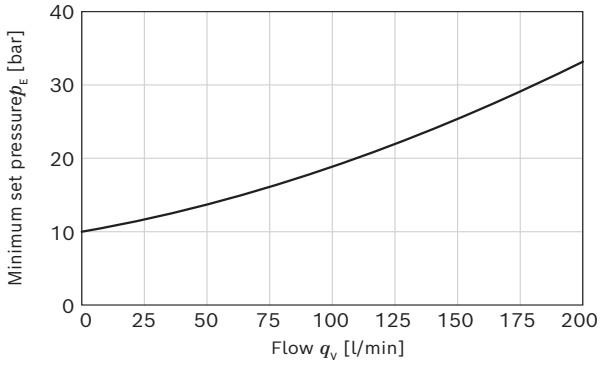


Minimum set pressure p_E at port P depending on flow at setpoint value 0
(The characteristic curves were measured without back-pressure at port **T**.)

▼ **Pressure stage 50 to 250 bar**

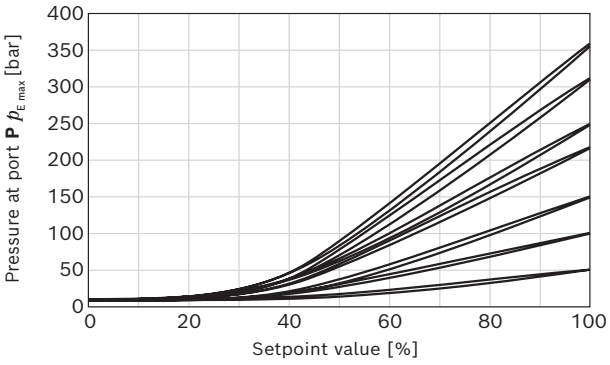


▼ **Pressure stage 315 and 350 bar**



p-I characteristic curves

▼ **Pressure at port P depending on the setpoint value**
(Flow = 20 l/min)



Notice
Characteristic curves measured with HLP46, ϑ_{oil} = 40±5 °C and 24 V coil.

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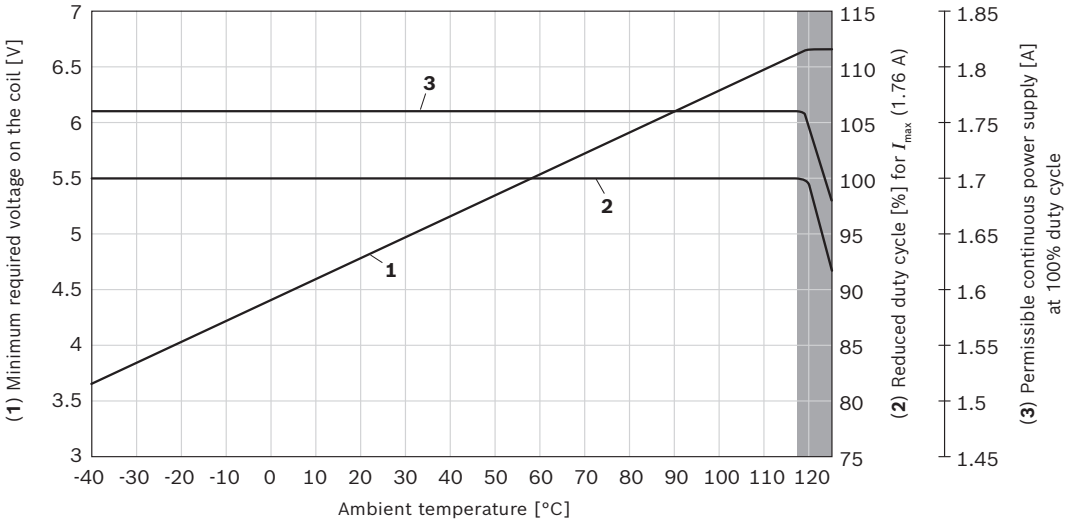
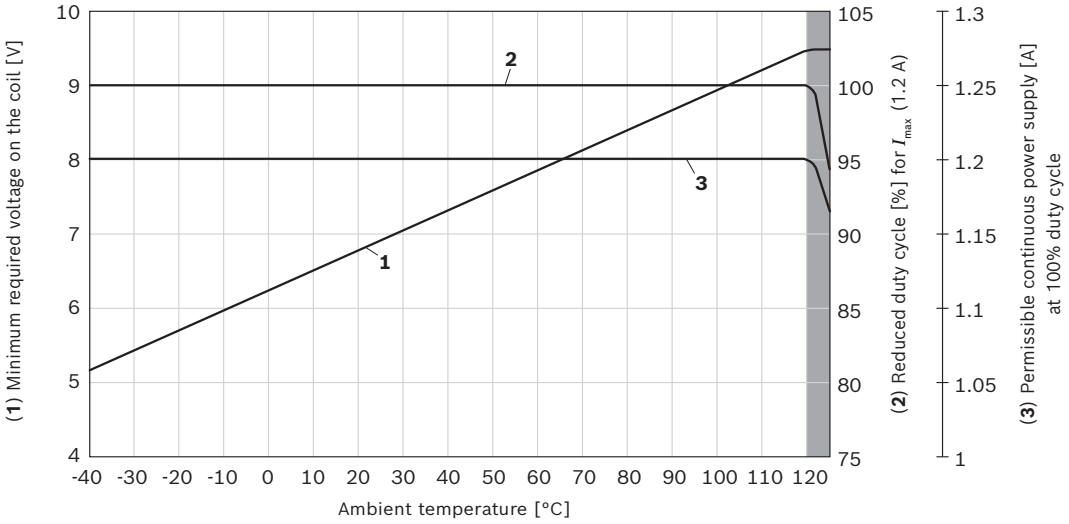
Permissible working range

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

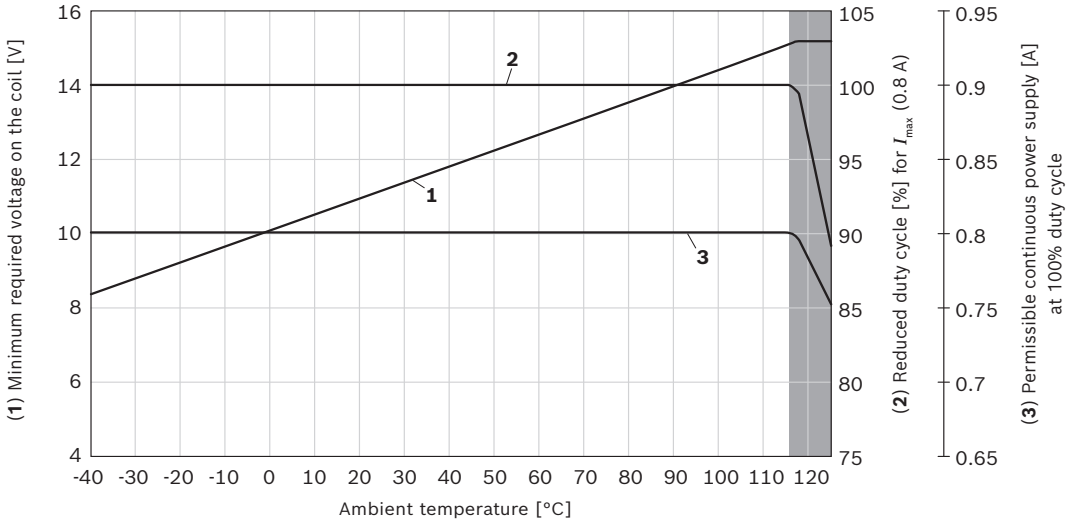
▼ **Version "G12"**



▼ **Version "G24"**



▼ **Version "G24...-8"**

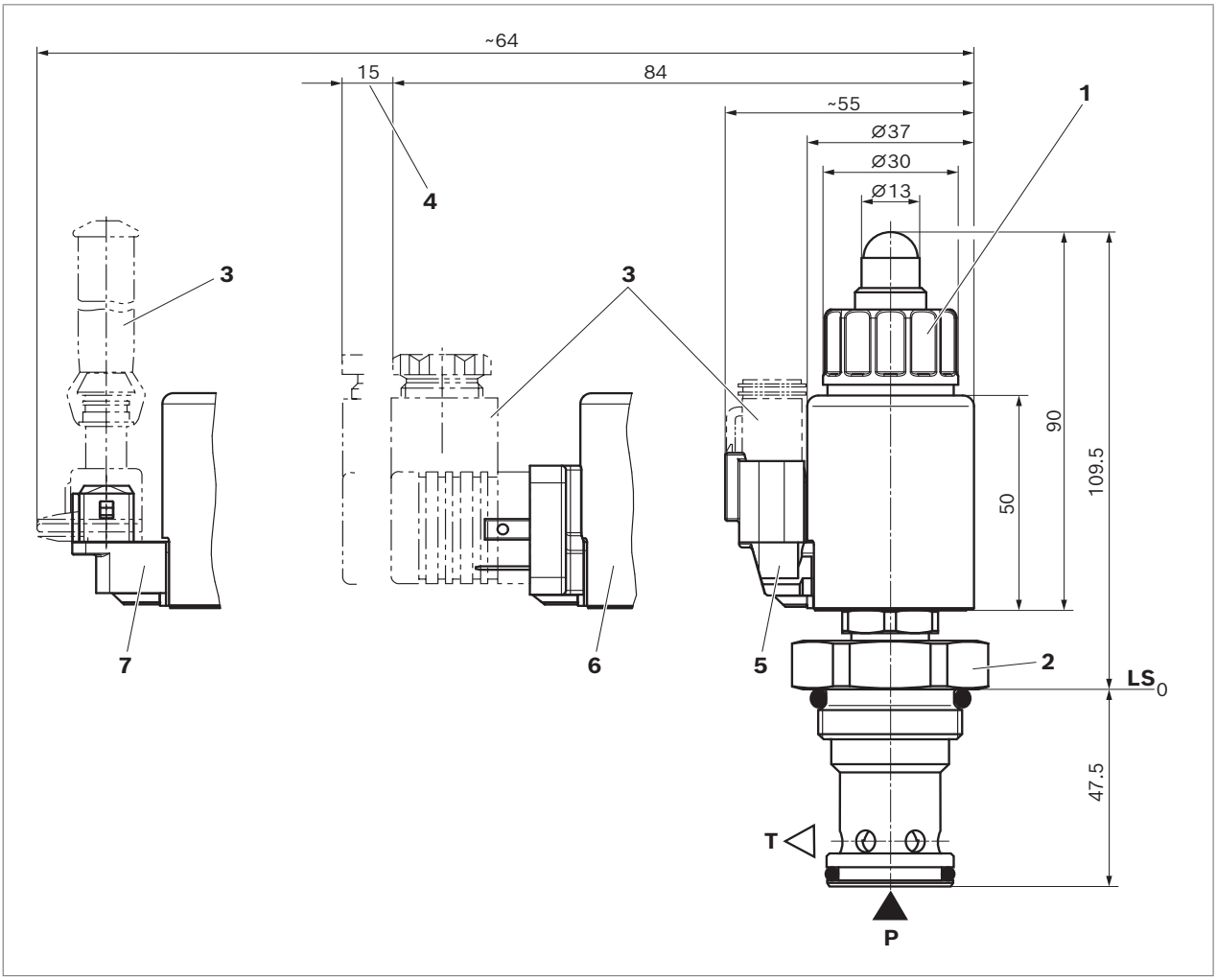


= Limited valve performance

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.

Dimensions

▼ **KBVS.3A**



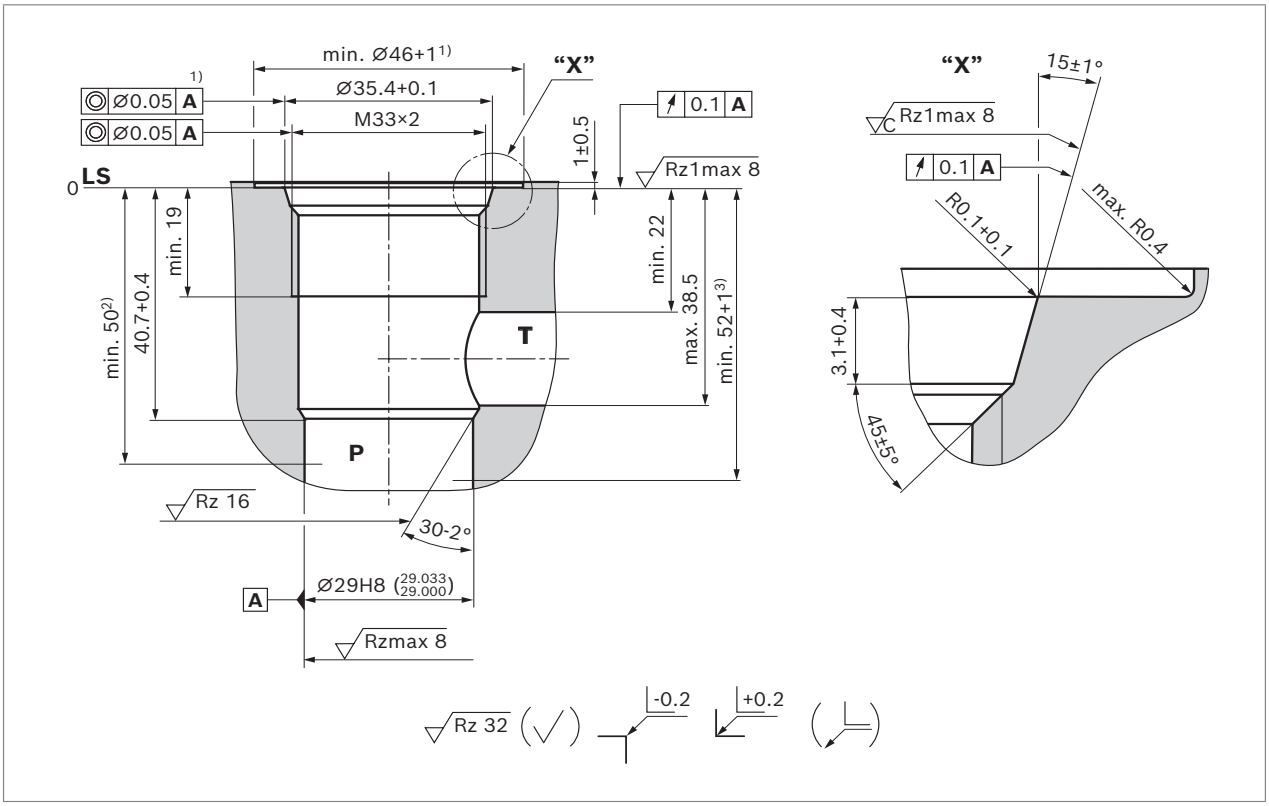
1 Nut, tightening torque M_A = 5+1 Nm
2 Hexagon SW41,
Tightening torque M_A = 100+20 Nm (< 250 bar)
Tightening torque M_A = 120+20 Nm (> 250 bar)
3 Plug-in connectors, separate order, see data sheet 08006
4 Space required to remove the plug-in connector
5 Device connector "K40"
6 Device connector "K4"
7 Device connector "C4"

P = Pump port
T = Tank port

LS = location shoulder

Mounting cavity

▼ **R/ISO 7789-33-01-0-98; 2 ports; thread M33×2**



P = Pump port
T = Tank port

LS = location shoulder

1) Deviating from ISO 7789-33-01-0-98
2) Depth of fit
3) Optional

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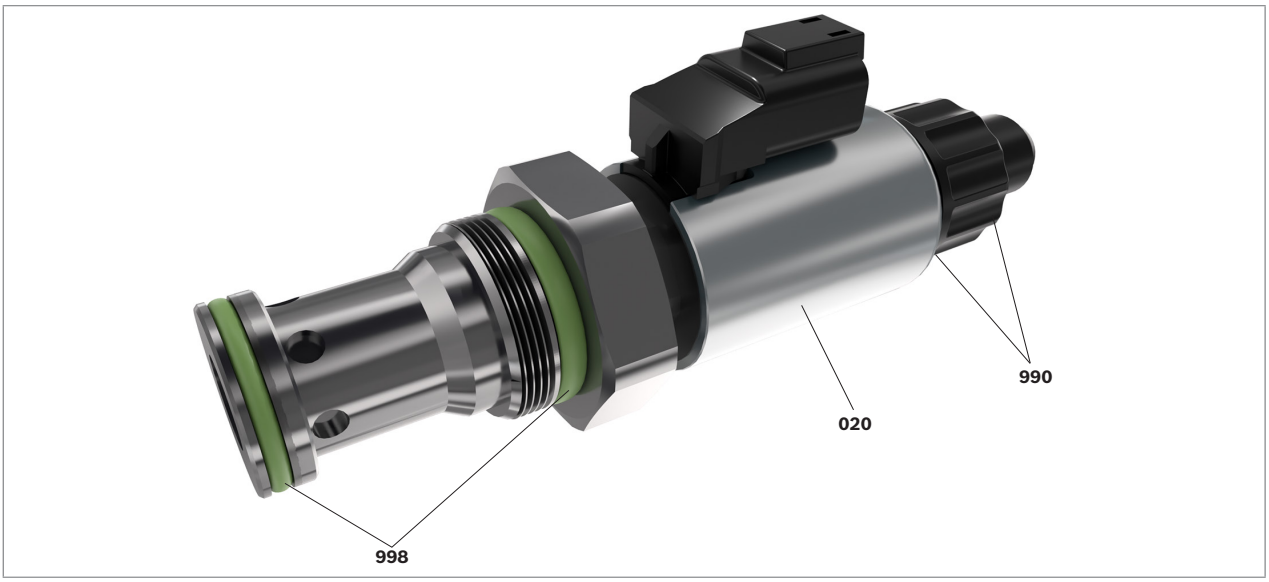
Available individual components



Item	Denomination		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
990	Nut and seal ring for pole tube			R961010456
998	Seal kit of main stage			R961001025

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
▶ $MTTF_D$ values		Data sheet 90294

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