

# Proportional pressure relief valve, pilot-operated, falling characteristic curve

**RE 18139-07/07.12** 1/12  
Replaces: 06.08

**Type KBVS.3B** (High-Performance)

Component size 3  
Component series A  
Maximum operating pressure 350 bar  
Maximum flow 200 l/min



H7139

## Overview of contents

Contents	Page
Features	1
Ordering code	2
Preferred types	2
Function, symbol	3
Technical data	4, 5
Characteristic curves	6
Minimum terminal voltage at the coil and relative duty cycle	7, 8
Unit dimensions	9
Mounting cavity	10
Available individual components	11

## Features

- Mounting cavity R/ISO 7789-33-01-0-98
- Pilot-operated valve for limiting a system pressure
- Suitable for mobile and industrial applications
- Operation by proportional solenoid
- Proportional solenoid with central thread and detachable coil
- Cartridge valve
- Control electronics: plug-in amplifier VT-SSPA1..
- Fine balancing of the command value/pressure characteristic curves possible externally on the control electronics
- Valves are adjusted to max. pressure by means of an adjustment screw
- In the event of a power failure, the maximum set pressure becomes effective

Information on available spare parts:  
[www.boschrexroth.com/spc](http://www.boschrexroth.com/spc)

## Ordering code

KBVS		3	B	A / L	C			V	*
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Pilot-operated proportional pressure relief valve

### Pressure stage

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

Component size 3 = 3

At command value = 0 the maximum pressure is set = B

Component series = A

<sup>1)</sup> Cable sockets (separate order), see RE 08006

<sup>2)</sup> See page 10

Further details in clear text

no code = Standard  
-8 = Coil 800 mA (see page 5)

### Seal material

V = FKM seals  
**⚠ Caution!**  
Observe compatibility of seals with the hydraulic fluid used!

### Electrical connection <sup>1)</sup>

K4 = Component plug 03-pin (2+PE) K4, DIN EN 175301-803

K40 = Component plug 02-pin K40 DT 04-2PA, make: Deutsch

C4 = Cable plug 02-pin C4/Z30 type: Junior-Timer

### Supply voltage

G12 = Control electronics 12 V DC

G24 = Control electronics 24 V DC

C = Proportional solenoid, wet pin

L = High-Performance and mounting cavity R/ISO 7789 <sup>2)</sup>

## Preferred types

Type	Material number
KBVSC3BA/LCG24K4V	R901042645
KBVSF3BA/LCG24K4V	R901042649
KBVSH3BA/LCG24K4V	R901047841
KBVSL3BA/LCG24K4V	R901032852
KBVSN3BA/LCG24K4V	R901041058
KBVSP3BA/LCG24K4V	R901042652
KBVSR3BA/LCG24K4V	R901022444

## Function, Symbol

### General

Valves of the KBVS type are pilot-operated proportional pressure relief valves of poppet design and used for limiting the pressure in hydraulic systems. They basically consist of a screwed-in proportional pilot valve (1) and the main valve (2). These valves can be used for infinitely adjusting the pressure to be limited in dependence upon the command value. At command value 0 or in the event of a power failure, the maximum pressure is set (fail-safe characteristics).

### Basic principle

The mechanics of the valve is factory-set to the maximum pressure. A command value for the proportional reduction of the system pressure is selected on the control electronics. The electronics controls the solenoid coil with electric current in dependence upon the command value, which causes the actual pressure adjustment in main port ① via pilot valve (1) and main valve (2).

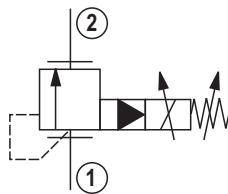
( $p_{\max}$  = command value 0;  $p_{\min}$  = command value max.)

Internal pilot oil supply and drain.

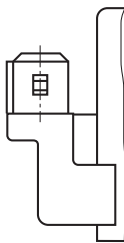
### Note!

Any tank pressures (main port ②) add to the set value in main port ①.

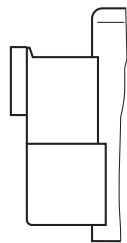
### Symbol



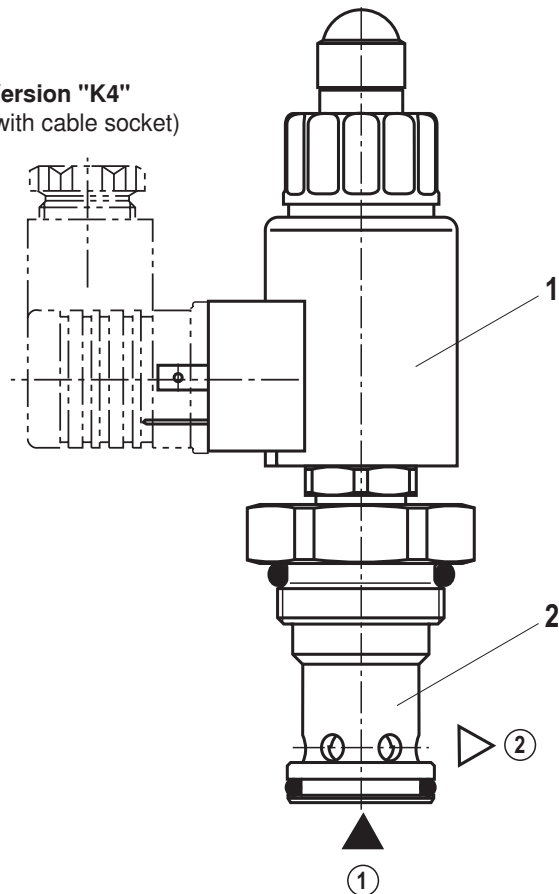
### Version "C4"



### Version "K40"



### Version "K4" (with cable socket)



**Technical data** (for applications outside these parameters, please consult us!)**general**

Weight	kg	0,7
Installation orientation		Optional, if it can be ensured that no air can collect upstream of the valve. Otherwise, we recommend that the valve be mounted in a suspended position.
Ambient temperature range	°C	-20 to +120 (-40 to +110 for fan drives)
Storage temperature range	°C	-20 to +80

## Environmental tests:

**Vibration test according to DIN EN 60068-2 / IEC 60068-2 / 2 axes (X/Z)**

DIN EN 60068-2-6: 05/96	Vibration, sinusoidal	10 cycles at 5 to 2000 to 5 Hz with a logarithmic frequency change 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 <sup>2</sup> /Hz (10 g RMS/30 g peak), testing time 30 min
DIN EN 60068-2-27: 03/95	Shock test	Half sine 15 g / 11 ms; 3 x in pos., 3 x in neg. direction (6 individual shocks in total)
DIN EN 60068-2-29: 03/95	Bump test	Half sine 25 g / 6 ms; 1000 x in pos., 1000 x in neg. direction (2000 individual shocks in total)

## Details per axis

**Climatic test according to DIN EN 60068-2 / IEC 60068-2 (environmental testing):**

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 at -25 °C, dwell time 2 h
DIN EN 60068-2-2: 08/94	Dry heat test	2 cycles at +120 °C, dwell time 2 h
IEC 60068-2-30: 1985	Damp heat, cyclical	Variant 2/ +25 °C to +55 °C 93 % to 97 % relative humidity, 2 cycles, 24 h each

**Salt spray test: 720 h according to DIN 50021**

→ Finish painting generally not required. Should you nevertheless wish to apply a finish coat, observe the reduced heat dissipation capacity.

**hydraulic**

Max. operating pressure <sup>1)</sup> (main port ①)	bar	350
Max. permissible return flow pressure (main port ②)	bar	210
Maximum set pressure <sup>2)</sup>		See command value/pressure characteristic curves on page 6
Minimum set pressure at max. command value		See characteristic curves on page 6
Maximum flow	l/min	200 (with pressure stage 350 bar max. 100 l/min)
Hydraulic fluid		See page 5
Hydraulic fluid temperature range	°C	-20 to +80 (-20 to +110 for fan drives)
Viscosity range	mm <sup>2</sup> /s	12 to 800
Max. permissible degree of contamination of the hydraulic fluid - cleanliness class acc. to ISO 4406 (c)		Class 20/18/15 <sup>3)</sup>

<sup>1)</sup> **⚠ Caution!** The maximum operating pressure is added up from the set pressure and the return flow pressure!


<sup>2)</sup> **⚠ Caution!** The valves are factory-set. In the case of subsequent re-adjustment, the warranty will become void!

<sup>3)</sup> The cleanliness class stated for the components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, increases the service life of components.

For the selection of filters, see [www.boschrexroth.com/filter](http://www.boschrexroth.com/filter)

**Technical data** (for applications outside these parameters, please consult us!)**hydraulic**

Hysteresis	< 4 % of max. set pressure
Range of inversion	< 0.5 % of max. set pressure
Response sensitivity	< 0.5 % of max. set pressure
Tolerance of the command value/pressure	– Command value 100 % – Command value 0
characteristic curve	< 2 % of max. set pressure < 5 % of max. set pressure
Step response ( $T_u + T_g$ ) 0 → 100 % or 100 % → 0	ms 100 (depends on system)

Hydraulic fluid	Classification	Suitable sealing materials	Standards
Mineral oils	HL, HLP	FKM	DIN 51524
Bio-degradable	– Insoluble in water	HEES	VDMA 24568
	– Soluble in water	HEPG	
 <b>Important information on hydraulic fluids!</b> ▶ For more information and data on the use of other hydraulic fluids refer to data sheet 90220 or contact us! ▶ There may be limitations regarding the technical valve data (temperature, pressure range, service life, maintenance intervals, etc.)!		▶ The flash point of the hydraulic fluids used must be 40 K higher than the maximum solenoid surface temperature. ▶ <b>Bio-degradable:</b> When using bio-degradable hydraulic fluids that are simultaneously zinc-soluble, zinc may accumulate in the fluid.	

**electrical**

Supply voltage	V	12 DC	24 DC	"-8" / 24 DC
Maximum control current	mA	max. nominal current 1760 mA	max. nominal current 1200 mA	max. nominal current 800 mA
Coil resistance	– Cold value at 20 °C	Ω 2,3	4,8	11,5
	– Max. hot value	Ω 3,8	7,9	18,9
Duty cycle	%	100 <sup>4)</sup>		
Maximum coil temperature <sup>5)</sup>	°C	150		
Type of protection acc. to VDE 0470-1 (DIN EN 60529), DIN 40050-9	– Version "K4"	IP 65 with cable socket mounted and locked		
	– Version "C4"	IP 66 with cable socket mounted and locked		
		IP 69K with Rexroth cable socket (material no. R901022127)		
	– Version "K40"	IP 69K with cable socket mounted and locked		
Control electronics <sup>6)</sup>		Plug-in amplifier VT-SSPA1		
Rating according to VDE 0580				

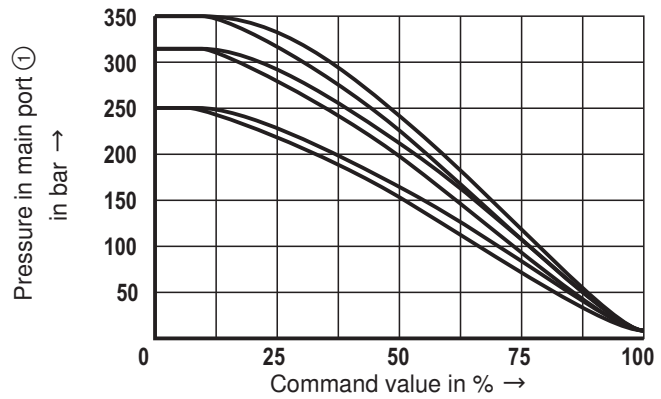
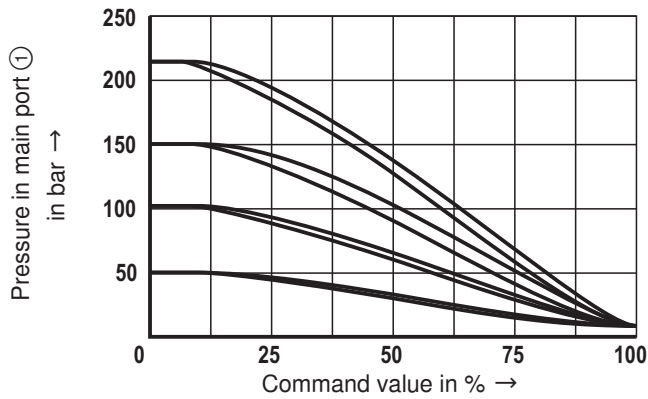
<sup>4)</sup> In the case of use at heights > 2000 m above MSL we recommend that you consult the manufacturer.

<sup>5)</sup> Due to the surface temperatures occurring on solenoid coils, the European standards ISO 13732-1 and EN 982 must be observed!

<sup>6)</sup> Separate order, see RE 30116

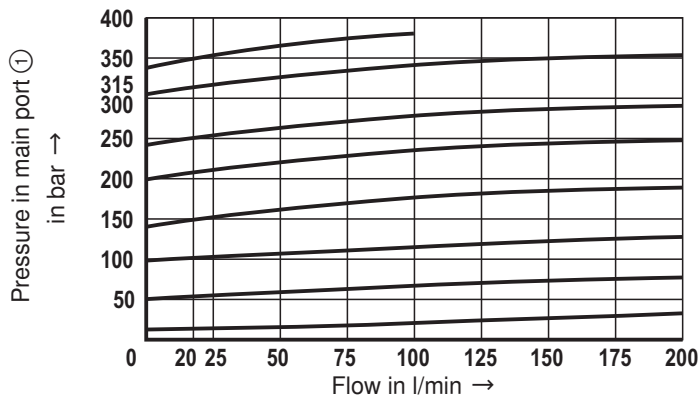
**Characteristic curves** (measured with HLP46,  $\vartheta_{oil} = 40 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$  and 24 V coil)

**Pressure in main port ① in dependence on command value. Flow = 20 l/min**



**Pressure in main port ① in dependence on flow.**

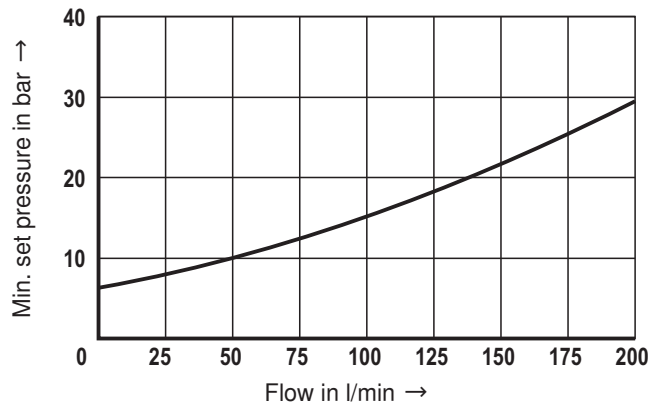
(The characteristic curves were measured without backpressure in main port ②.)



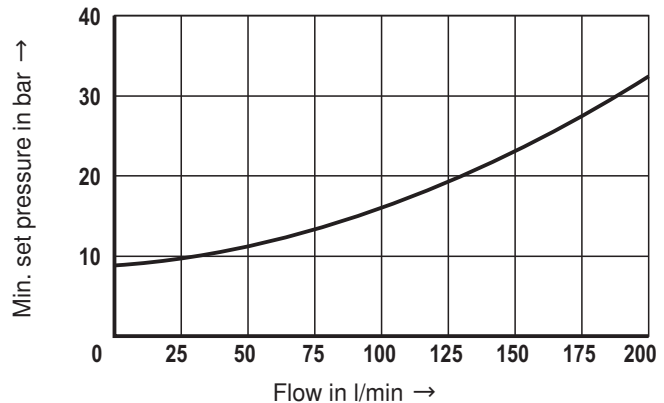
**Minimum set pressure in main port ① at command value 100 %.**

(The characteristic curves were measured without backpressure in main port ②.)

**Pressure stage 50 to 250 bar**

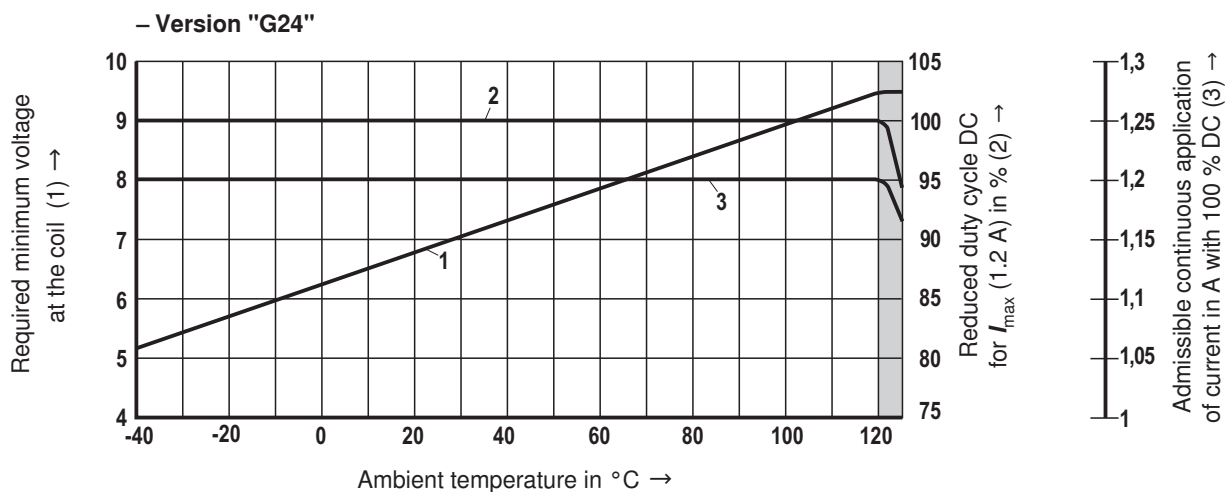
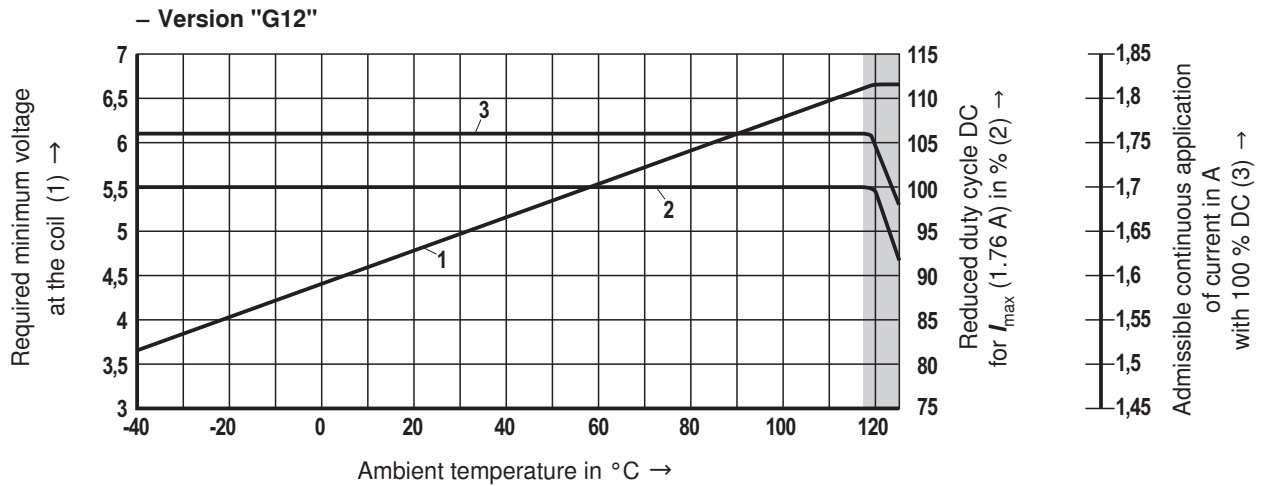



**Pressure stage 315 and 350 bar**



## Minimum terminal voltage at the coil and relative duty cycle

### Admissible working range against the ambient temperature



 Limited valve performance

#### Notice!

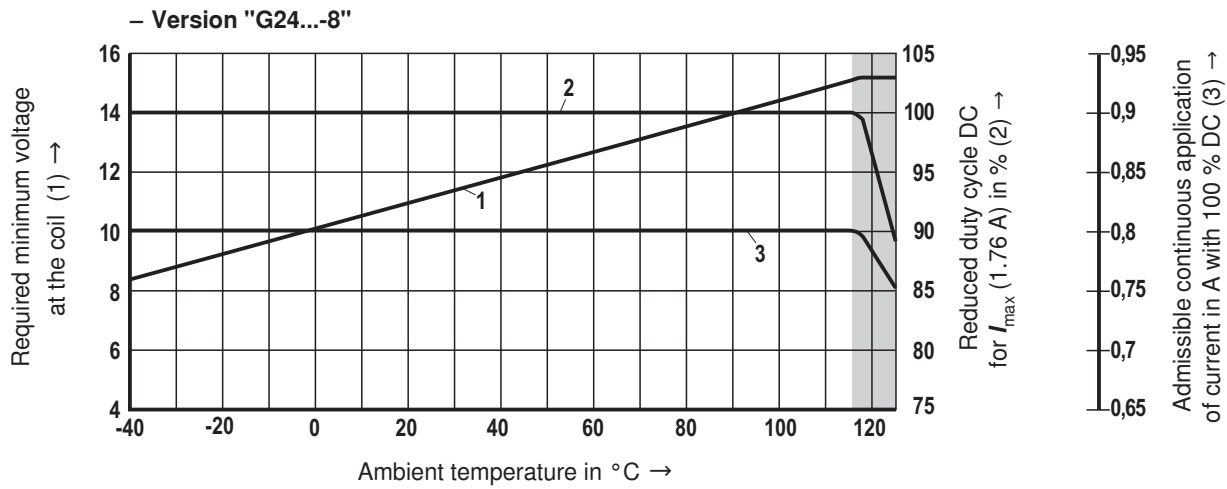
The characteristic curves have been determined for coils with valve with medium test block size (80 x 80 x 80 mm), without flow in calm air.

Depending on the installation conditions (block size, flow, air circulation, etc.) there may be a better heat dissipation. Thus, the area of application is broadened.

In single cases, more unfavorable conditions may lead to limitations of the area of application.

## Minimum terminal voltage at the coil and relative duty cycle

### Admissible working range against the ambient temperature



Limited valve performance

#### Notice!

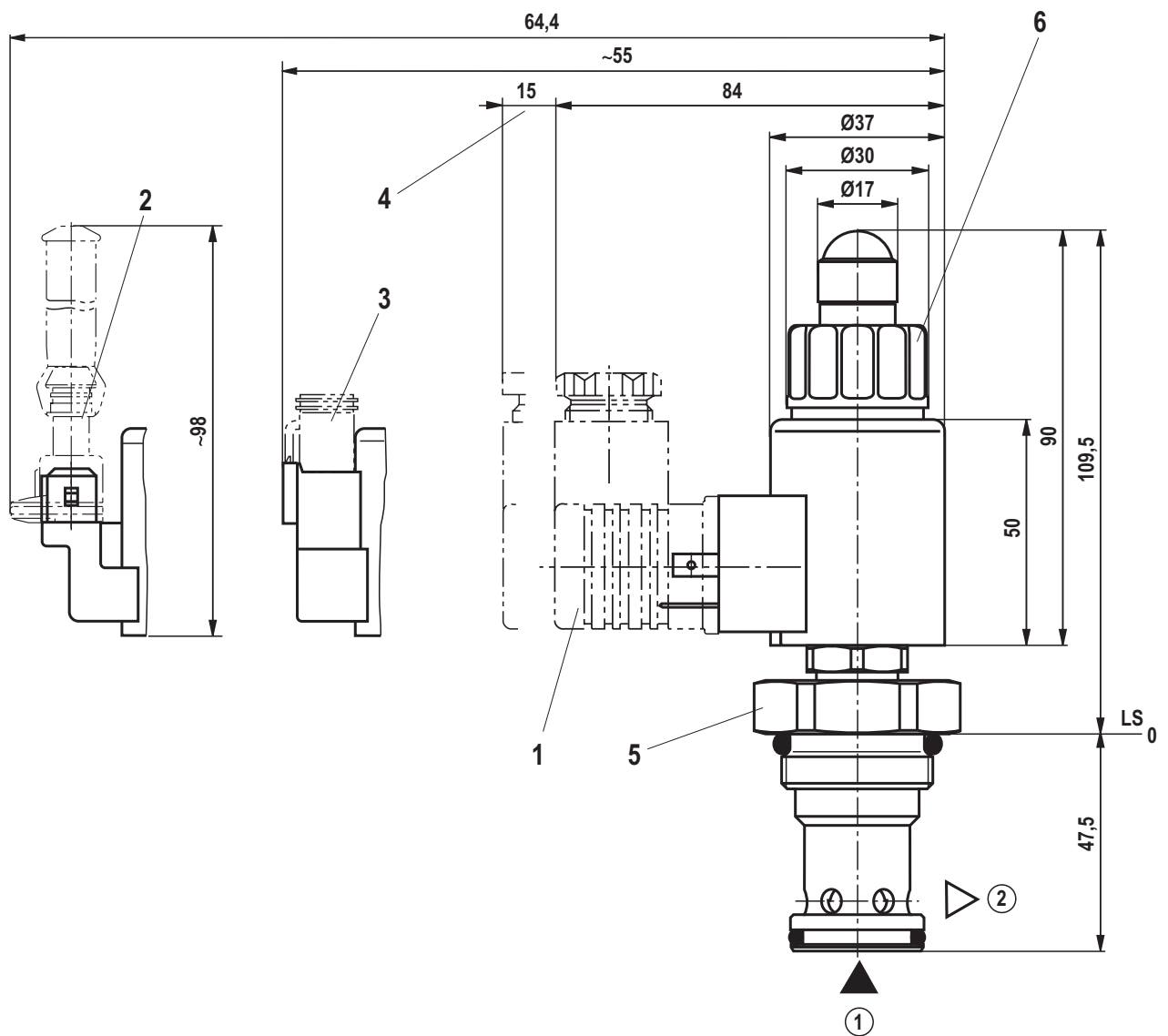
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## Unit dimensions (dimensions in mm)



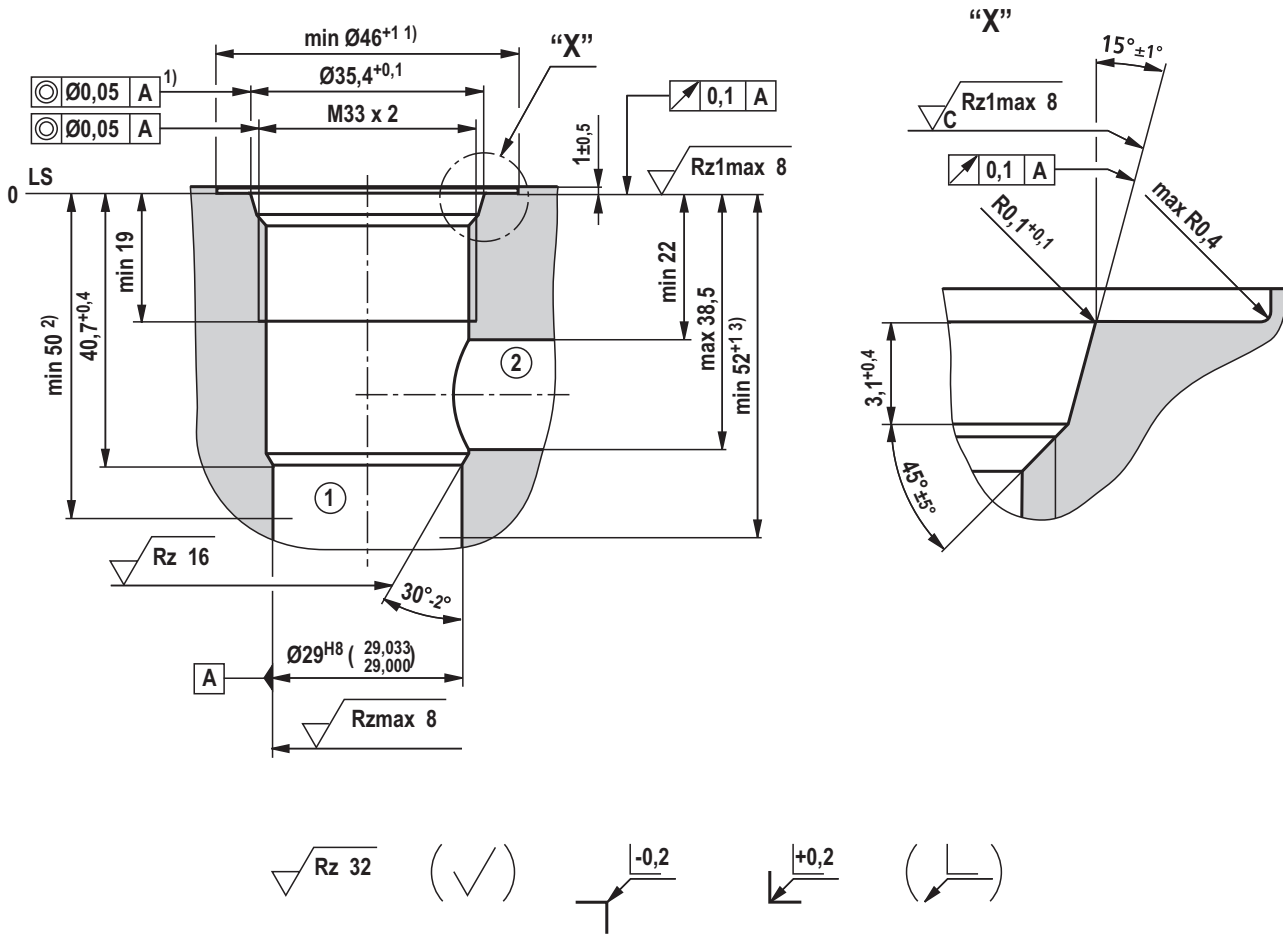
① = Main port 1

② = Main port 2

LS = Location shoulder

- 1 Cable socket for component plug "K4"  
(separate order, see RE 08006)
- 2 Cable socket for component plug "C4"  
(separate order, see RE 08006)
- 3 Cable socket for component plug "K40"  
(separate order, see RE 08006)
- 4 Space required to remove the plug-in connector
- 5 Hexagon SW41;  
– Tightening torque  $M_A = 100^{+20}$  Nm (< 250 bar)  
– Tightening torque  $M_A = 120^{+20}$  Nm (> 250 bar)
- 6 Solenoid nut, tightening torque  $M_A = 5^{+1}$  Nm

**Mounting cavity R/ISO 7789-33-01-0-98; 2 main ports; thread M33 x 2**  
(dimensions in mm)



1) Different from ISO 7789-33-01-0-98

2) Depth of fit

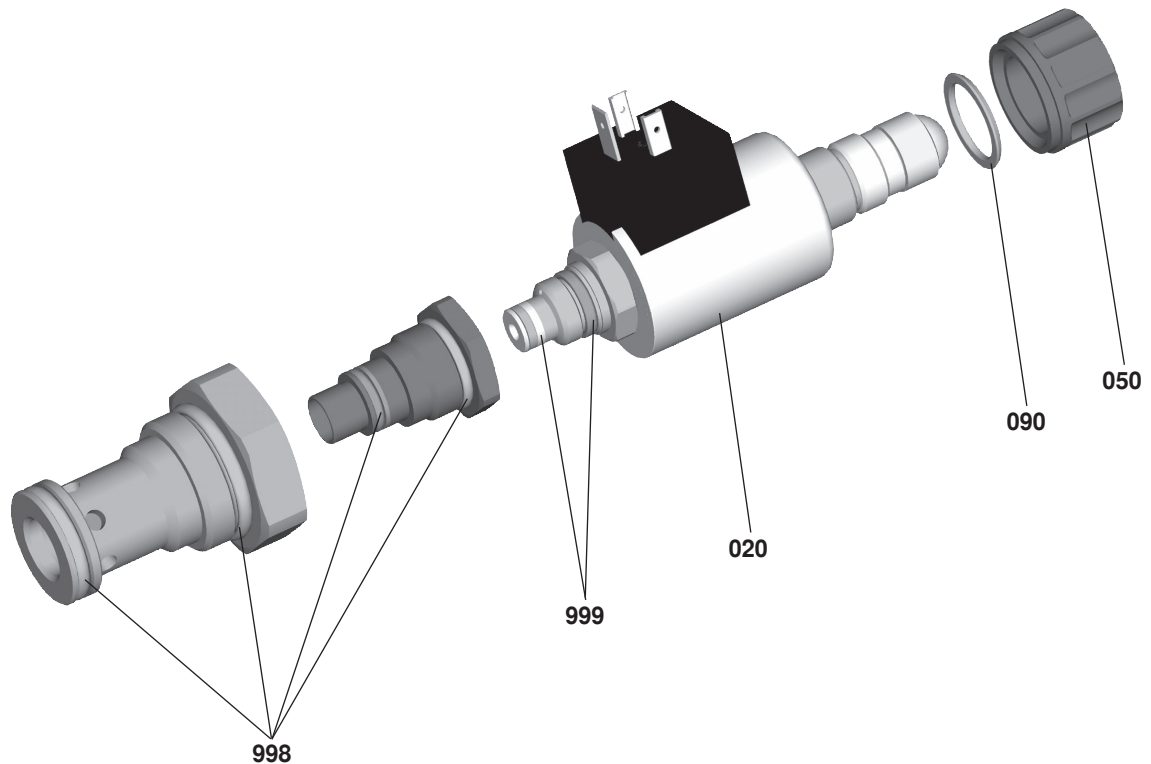
3) Optional

① = Main port 1

② = Main port 2

LS = Location shoulder

## Available individual components



Item	Designation		DC	Material no.
020	Coil for individual connection <sup>1)</sup>	Version K4	12 V 24 V 24 V / 800 mA	R901002932 R901002319 R901049962
		Version K40	12 V 24 V 24 V / 800 mA	R901003055 R901003053 R901050010
		Version C4	12 V 24 V 24 V / 800 mA	R901003044 R901003026 R901049963
050	Nut			R900992146
090	Seal ring for pressure tube			R900007769
998	Main stage seal kit			R961001025
999	Pilot valve seal kit			R961000376

<sup>1)</sup> **Note!**

After the solenoid coil was replaced, the factory-set pressure may change by  $\pm 5\%$ .

## Notes

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