

3-way proportional pressure reducing valve, pilot-operated, rising characteristic curve

Type KTVS.1A

RE 18166

Edition 2016-04



- ▶ Component size 1
- ▶ Component series A
- ▶ Maximum operating pressure 210 bar
- ▶ Maximum flow 80 l/min

Features

- ▶ Screw-in cartridge valve
- ▶ Mounting cavity R/UNF10-03-0-06
- ▶ Pilot-operated 3-way proportional valve for system pressure reduction
- ▶ Suitable for mobile and industrial applications
- ▶ Operation by means of proportional solenoid with central thread and detachable coil
- ▶ Rotatable solenoid coil
- ▶ In case of power failure, the minimum pressure is set
- ▶ Fine adjustment of the command value pressure characteristic curve possible from the outside at the control electronics

Contents

Features	1
Ordering code	2
Function, symbol	3
Technical data	4 ... 6
Characteristic curves	7 ... 8
Minimum terminal voltage at the coil and relative duty cycle	9, 10
Dimensions	11
Mounting cavity	12
Available individual components	13
Further information	13

Ordering code

01	02	03	04	05	06	07	08	09	10	11	12
KTVS		1	A	A	/	F	C		V		*

01	Proportional pressure reducing valve, pilot-operated	KTVS
----	--	-------------

Pressure rating

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 (on request)	N
	Up to 315 bar (on request)	P
	Up to 350 bar (on request)	R

03	Component size 1	1
----	------------------	----------

04	With a command value = 0, the minimum pressure is set	A
----	---	----------

05	Component series	A
----	------------------	----------

06	High Performance and mounting cavity R/UNF-10-01-0-06 (see page 13)	F
----	---	----------

07	Proportional solenoid, wet-pin	C
----	--------------------------------	----------

Supply voltage

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

Electrical connection

09	Without mating connector, with connector according to DIN EN 175301-803	K4
	Without mating connector, with connector DT 04-2PA (Deutsch plug)	K40
	Without mating connector, with AMP Junior-Timer connector	C4

Seal material

10	FKM seals	V
	(other seals upon request) Attention! Observe compatibility of seals with hydraulic fluid used!	
11	Standard version	no code
	Coil 800 mA (see page 6)	-8
12	Further details in the plain text	*

¹⁾ Mating connectors, separate order, see data sheet 08006.

Valve types

Type	Material no.
KTVSC1AA/FCG24K40V	R901427603
KTVSF1AA/FCG24K40V	R901427610
KTVSH1AA/FCG24K40V	R901427609
KTVSL1AA/FCG24K40V	R901427613

Function, symbol

General

Valves of type KTVS are pilot-operated 3-way proportional pressure reducing valves in spool design and are used for pressure reduction in hydraulic systems. They mainly consist of the screwed in proportional pilot control valve (1) and the main valve (2).

These valves can be used for stepless adjustment of the pressure to be limited dependent on the command value.

Function

For the proportional increase in the system pressure, a command value is specified at the control electronics. Dependent on the command value, the solenoid coil is

electrically controlled by the electronic system for the actual pressure adjustment in the main port ① via pilot control valve (1) and main valve (2).

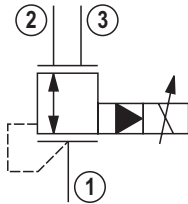
Further increasing system pressure (main port ②) does not have any effect on the pressure in the main port ① (pressure holding function). Pressure losses in main port ① (actuator) are compensated by the valve. If the pressure in the main port ① exceeds the set value, the piston is displaced against the spring and the main port ① is connected to ③.

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

Notice:

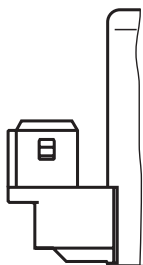
Occurring tank pressures (main port ③) are added to the values set in the main port ①.

Symbol

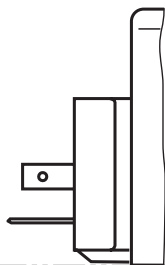


- ① = Main port 1 A
- ① = Main port 2 P
- ② = Main port 3 T

Version "C4"

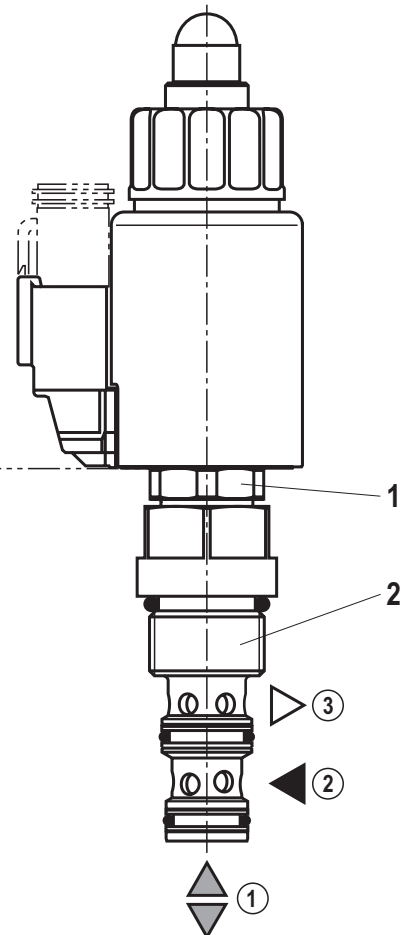


Version "K4"



Version "K40"

(with mating connector)



Type KTVS.1A..

Technical data

(For applications outside these parameters, please consult us!)

general		
Weight	kg	0.6
Installation position		Any - if it is ensured that no air can collect upstream of the valve. Otherwise, we recommend suspended installation of the valve.
Ambient temperature range	°C	−40 ... +120 (see pages 10 and 11)
Storage temperature	°C	−20 ... +80

Environmental audits		
Vibration test according to DIN EN 60068-2 / IEC 60068-2 / 2 axes (X/Y)		
DIN EN 60068-2-6: 05/96	Vibrations, sine-shaped	10 cycles (5 Hz ... 2000 Hz back to 5 Hz) with logarithmic frequency changing speed of 1 octave/min, 5 ... 57 Hz, amplitude 1.6 mm (p-p), 57 ... 2000 Hz, amplitude 10 g
IEC 60068-2-64: 05/93	Vibrations (random) and broadband noise	20 ... 2000 Hz, amplitude 0.1 g ² /Hz (14 g RMS/30 g peak), Testing time 24 h
DIN EN 60068-2-27: 03/95	Shocking	Half-sine 15 g / 11 ms, 3 x in positive, 3 x in negative direction (a total of 6 single shocks)
DIN EN 60068-2-29: 03/95	Bump test	Half-sine 15 g / 11 ms; 1000 x in positive, 1000 x in negative direction (a total of 2000 single shocks)
Indication per axis		
Climatic test according to EN 60068-2 / IEC 60068-2 (environmental audit)		
DIN EN 60068-2-1: 03/95	Storage temperature	−40 °C, duration 16 h
DIN EN 60068-2-2: 08/94		+110 °C, duration 16 h
DIN EN 60068-2-1: 03/95	Cold test	2 cycles −25 °C, duration 2 h
DIN EN 60068-2-2: 08/94	Dry heating test	2 cycles +120 °C, duration 2 h
IEC 60068-2-30: 1985	Humid heat, cyclic	Variant 2/ +25 °C ... +55 °C 93% to 97% relative humidity, 2 cycles à 24 h
Salt spray test according to DIN 50021		h 720

→ Coating generally not necessary. If the unit is coated nevertheless, the reduced heat dissipation capacity has to be observed.

Technical data

(For applications outside these parameters, please consult us!)

hydraulic			
Maximum operating pressure ¹⁾	► main port ①	bar	210
	► main port ②	bar	250
Maximum admissible return flow pressure	► main port ③	bar	210
Maximum set pressure ²⁾	See command value pressure characteristic curves on pages 7 ... 8		
Maximum set pressure with command value 0	See characteristic curves on pages 7 ... 8		
Maximum flow	l/min		80
Pilot oil	l/min		< 0.8
Leakage	ml/min		< 300 (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 ... +80
Viscosity range	mm ² /s		5 ... 400 (preferably 10 ... 100)
Maximum admissible degree of contamination of the hydraulic fluid Cleanliness class according to ISO 4406 (c)	Class 20/18/15 ³⁾		
Load cycles	5 million		
Hysteresis ⁴⁾	< 6% of the max. set pressure		
Turnover voltage ⁴⁾	< 0.5% of the max. set pressure		
Response sensitivity ⁴⁾	< 0.5% of the max. set pressure		
Manufacturing tolerance of the command value pressure characteristic curve	► Command value 100%	< 5% of the max. set pressure	
	► Command value 0	< 2% of the max. set pressure	
Step response ($T_u + T_g$) 0 → 100% and/or 100% → 0	ms	100 (depending on the system)	

Hydraulic fluid	Classification	Suitable sealing materials	Standards
Mineral oils	HL, HLP	FKM	DIN 51524
Bio-degradable	► Insoluble in water	FKM	VDMA 24568
	► Soluble in water	HEPG	



Important information on hydraulic fluids:

- For more information and data on the use of other hydraulic fluids, please refer to data sheet 90220 or contact us!
- There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.)!
- The flash point of the hydraulic fluids used must be 40 K higher than the maximum solenoid surface temperature.

- Bio-degradable: If bio-degradable hydraulic fluids are used that are also zinc-solvent, there may be an accumulation of zinc.

- ¹⁾ The maximum operating pressure is added up from the set pressure and the return flow pressure!
- ²⁾ The valves are set at the factory. In the case of subsequent re-adjustment, the warranty will become void!
- ³⁾ The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components.
For the selection of the filters see www.boschrexroth.com/filter
- ⁴⁾ Measured with analog amplifier type RA2-1/10, see data sheet 95230 (PWM = 300 Hz).

Technical data

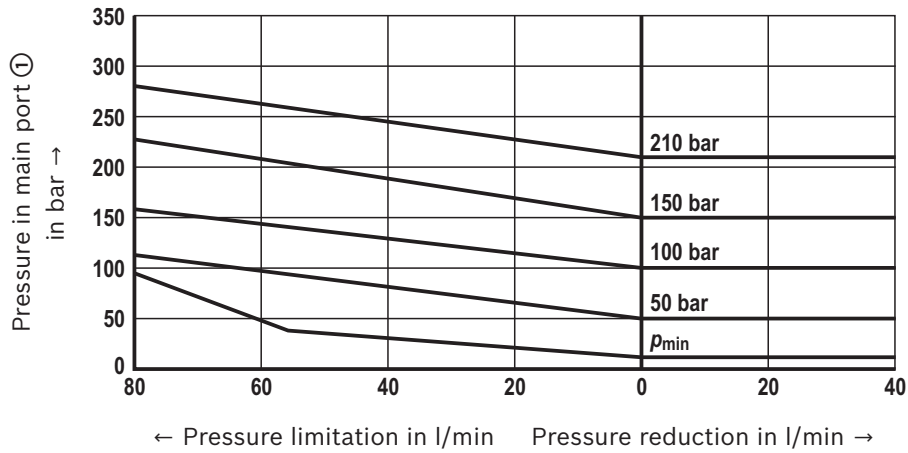
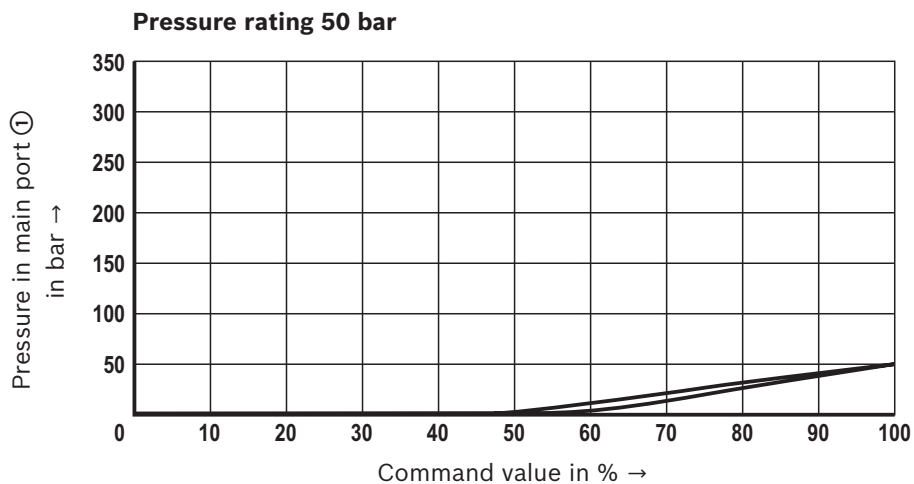
(For applications outside these values, please consult us!)

electric					
Voltage type		Direct voltage			
Supply voltages		V	12 DC	24 DC	"-8" / 24 DC
Maximum solenoid current		mA	1760	1200	800
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		%	See characteristic curves on pages 10 and 11 ⁵⁾		
Maximum coil temperature ⁶⁾		°C	150		
Protection class according to VDE 0470-1 (DIN EN 60529) DIN 40050-9	► Version "K4"	IP 65 with mating connector mounted and locked			
	► Version "C4"	IP 66 with mating connector mounted and locked			
		IP 69K with Rexroth mating connector (material no. R901022127)			
	► Version "K40"	IP 69K with mating connector mounted and locked			
Control electronics (separate order)		Plug-in proportional amplifier type VT-SSPA1...			Data sheet 30116
		Analog amplifier type RA...			Data sheet 95230
		BODAS control unit type RC...			Data sheet 95200
Recommended dither frequency (PMW)		Hz	250		
Design according to VDE 0580					

⁵⁾ In case of use in altitudes > 2000 m a.s.l., we recommend consulting the manufacturer.

⁶⁾ Due to the surface temperatures of the solenoid coils, the standards ISO 13732-1 and ISO 4413 need to be adhered to!

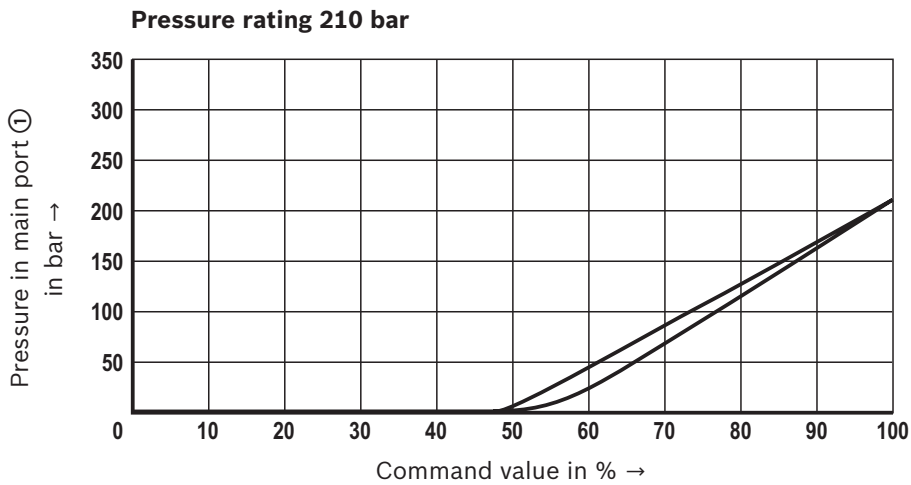
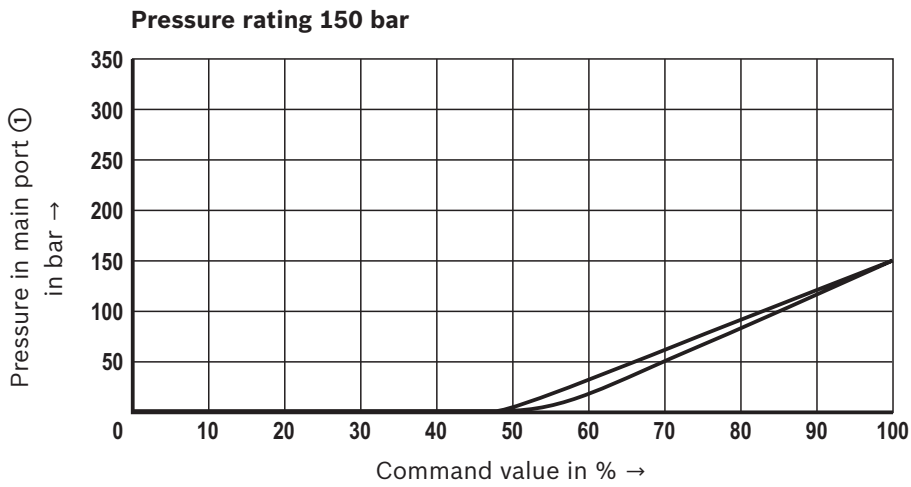
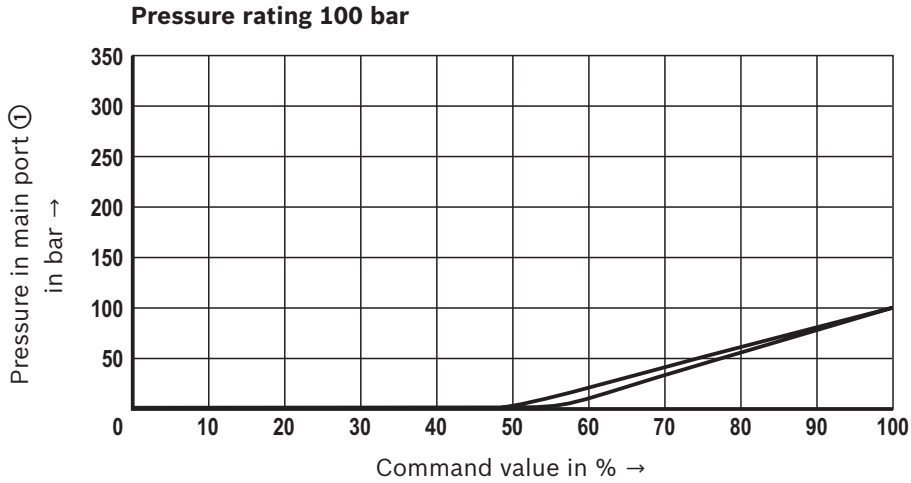
When establishing the electrical connection, the protective earthing conductor (PE $\frac{1}{2}$) must be connected correctly.

Characteristic curves(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^{\circ}\text{C}$ and 24 V coil)**Pressure-flow characteristic****Pressure in main port ① dependent on command value; flow = 0 l/min**

Characteristic curves

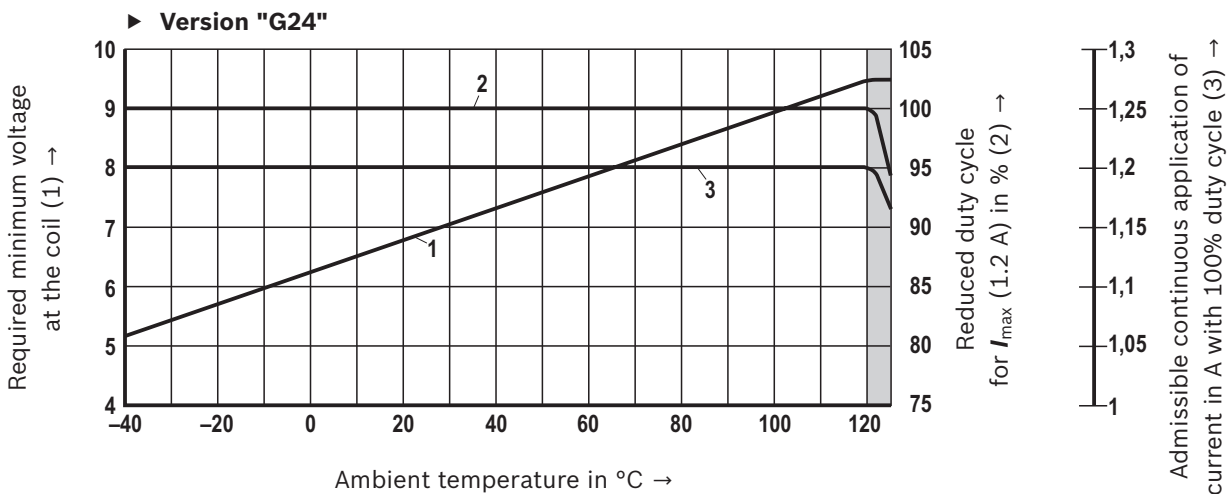
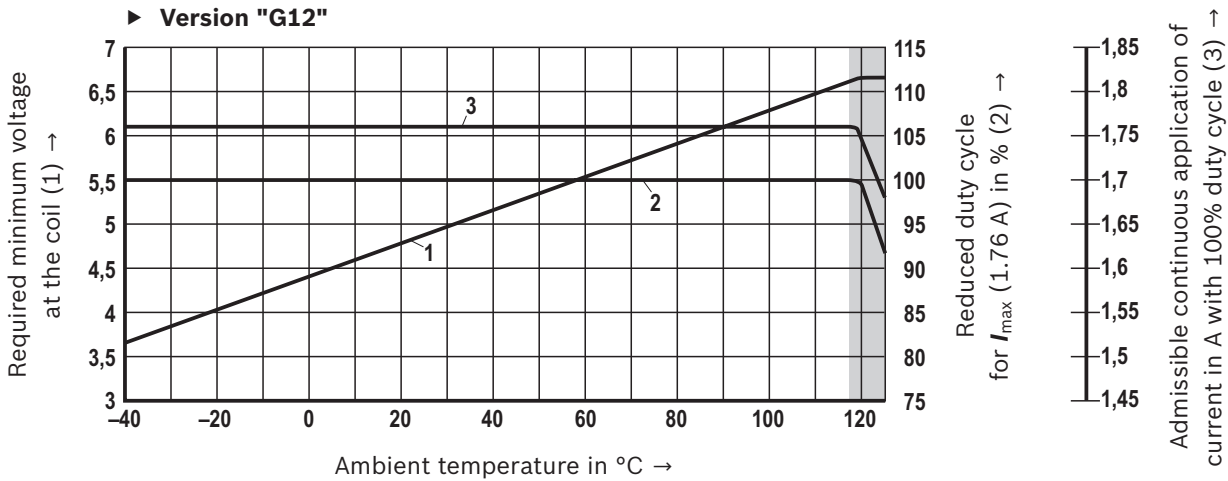
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^{\circ}\text{C}$ and 24 V coil)

Pressure in main port ① dependent on command value; flow = 0 l/min



Minimum terminal voltage at the coil and relative duty cycle

Admissible working range dependent on the ambient temperature



Limited valve performance



Notice:

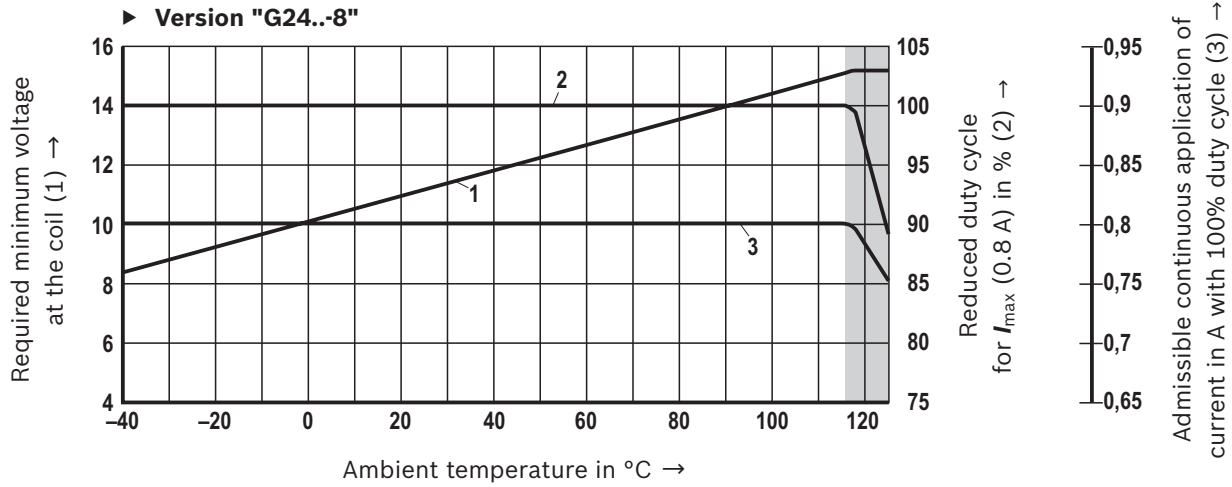
The characteristic curves have been determined for coils with valve and medium test block size (80 x 80 x 80 mm), without flow in calm air.

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 individual 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 dependent on the ambient temperature



Notice:

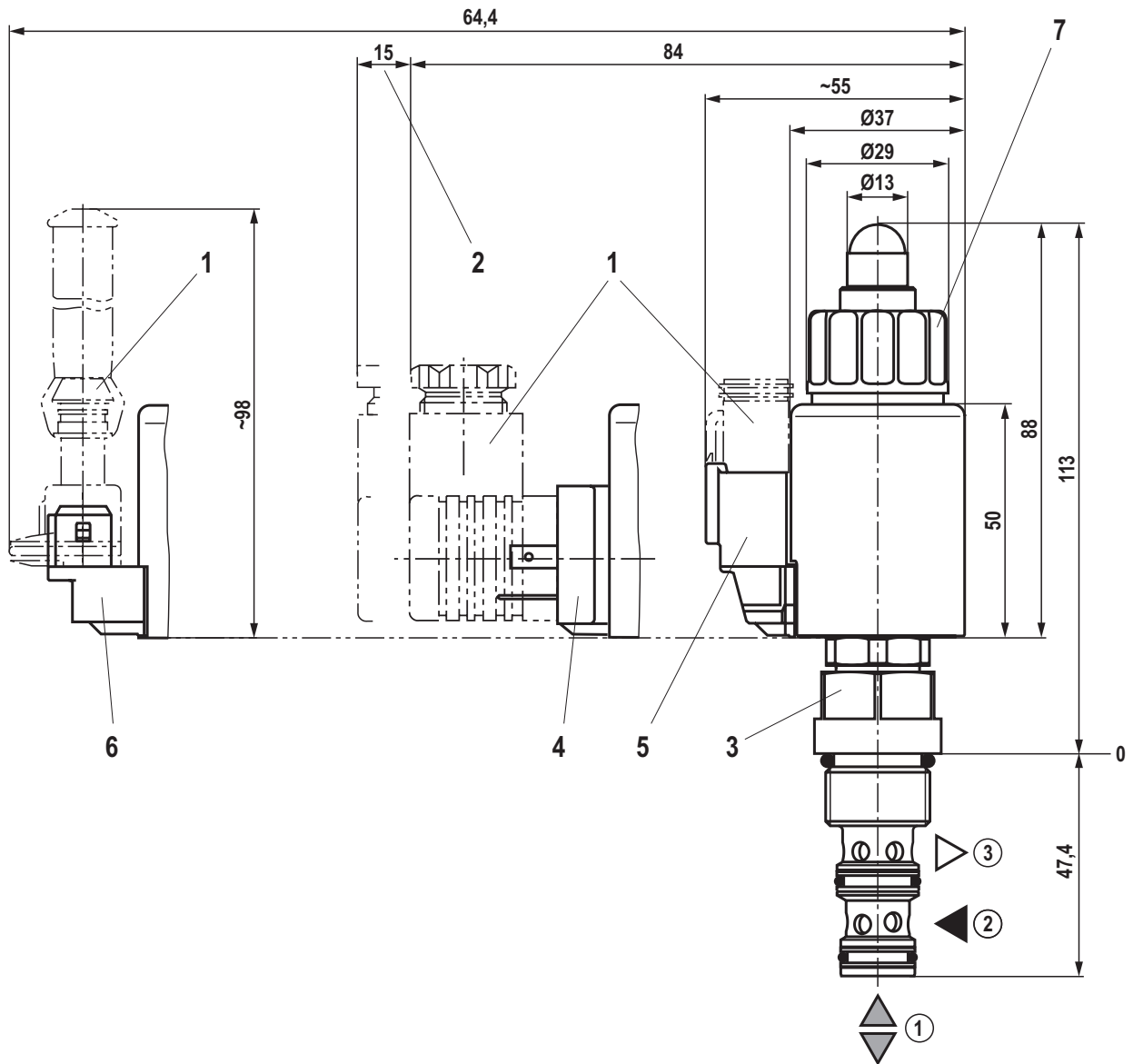
The characteristic curves have been determined for coils with valve and medium test block size (80 x 80 x 80 mm), without flow in calm air.

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

Dimensions

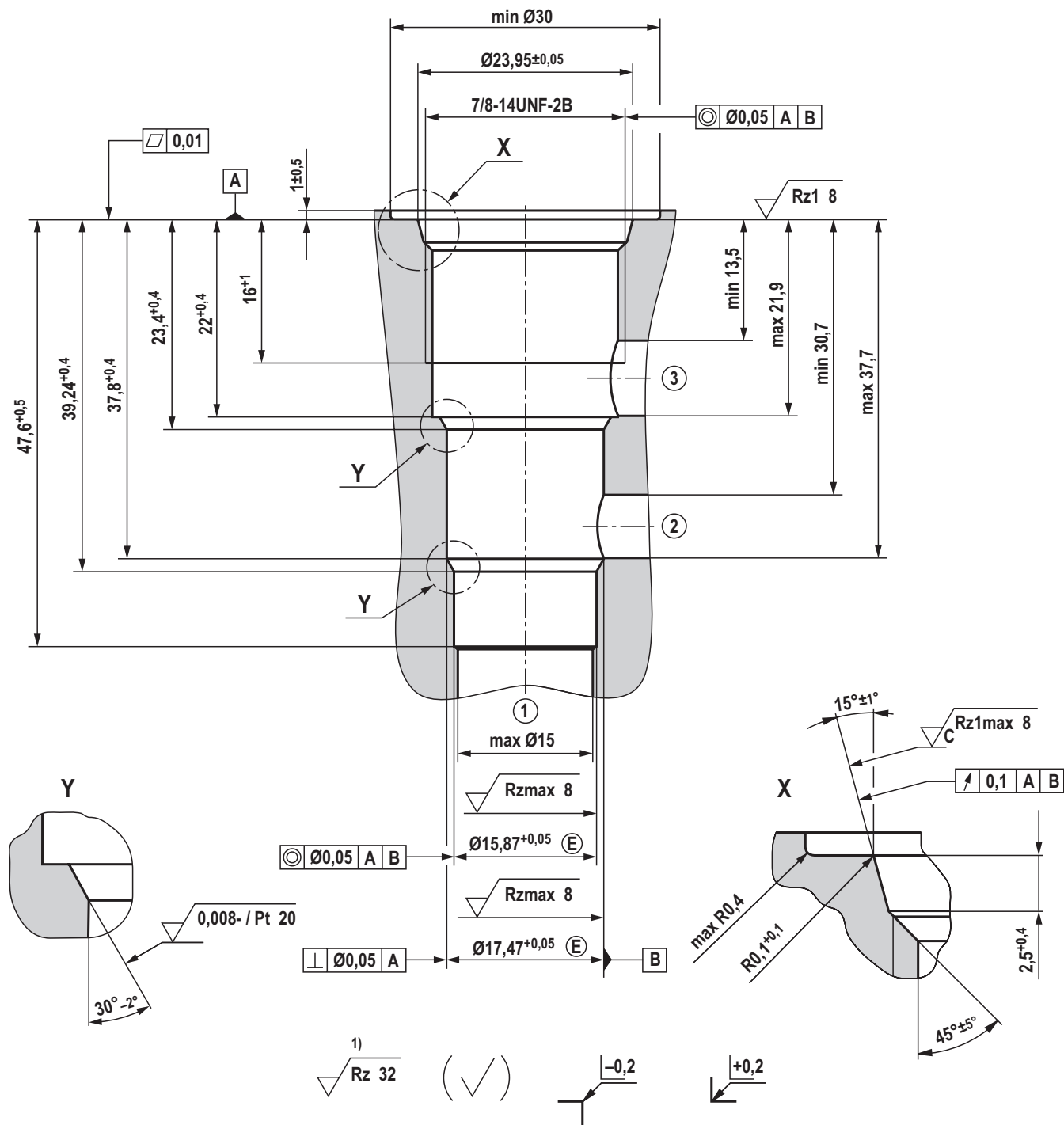
(dimensions in mm)



- 1 Mating connectors, separate order, see data sheet 08006
- 2 Space required to remove the mating connector
- 3 SW24, tightening torque $M_A = 55^{+5}$ Nm
- 4 Version "K4"
- 5 Version "K40"
- 6 Version "C4"
- 7 Nut, tightening torque $M_A = 5^{+1}$ Nm

- ① = Main port 1 A
- ② = Main port 2 P
- ③ = Main port 3 T

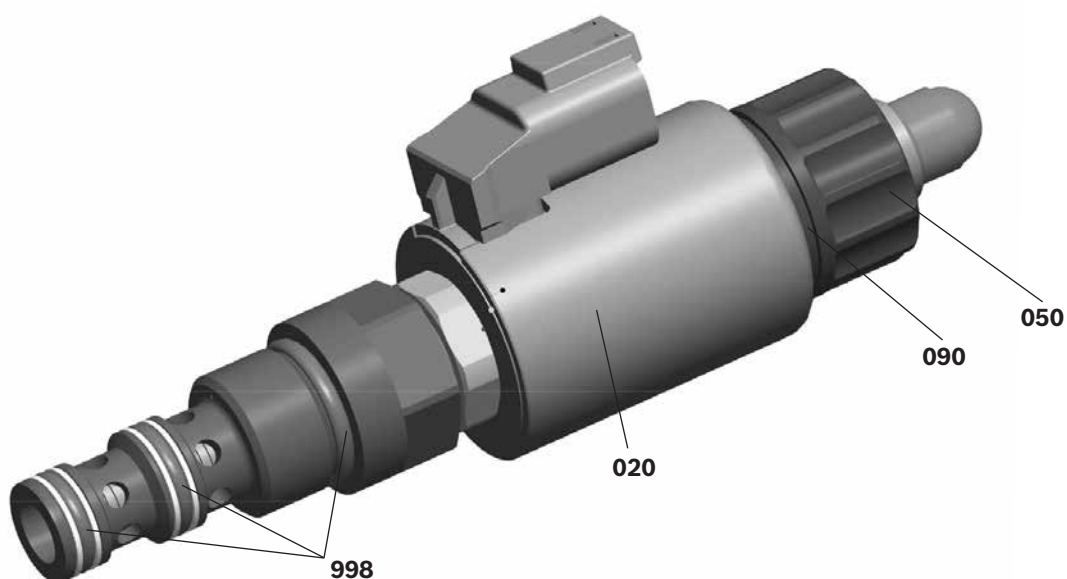
Mounting cavity R/UNF-10-01-0-06; 3 main ports; thread 7/8-14UNF-2B
(dimensions in mm)



- 1) Visual inspection

- ① = Main port 1 A
② = Main port 2 P
③ = Main port 3 T

Available individual components



Item	Denomination		Direct voltage	Material no.
020	Coil for individual connection ¹⁾	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
050	Nut			R900992146
090	Seal ring for pole tube			R900007769
998	Seal kit of the valve			R961011282

¹⁾ After exchange of the solenoid coil, the pressure set in the factory may change by $\pm 5\%$.

Further information

- Control electronics:
 - Plug-in proportional amplifier type VT-SSPA1...
 - Analog amplifier type RA...
 - BODAS control unit type RC...
- Selection of the filters

Data sheet 30116

Data sheet 95230

Data sheet 95200

www.boschrexroth.com/filter

Notes

Bosch Rexroth AG
Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52/ 18-0
documentation@boschrexroth.de
www.boschrexroth.de

© This document, as well as the data, specifications and other information set forth in it, are the exclusive property of Bosch Rexroth AG. It may not be reproduced or given to third parties or otherwise disposed of without our consent.
The data specified only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification.
Please note that our products are subject to a natural process of wear and aging.

Notes

Bosch Rexroth AG
Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52/18-0
documentation@boschrexroth.de
www.boschrexroth.de

© This document, as well as the data, specifications and other information set forth in it, are the exclusive property of Bosch Rexroth AG. It may not be reproduced or given to third parties without its consent.
The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.

Notes

Bosch Rexroth AG
Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52/ 18-0
documentation@boschrexroth.de
www.boschrexroth.de

© This document, as well as the data, specifications and other information set forth in it, are the exclusive property of Bosch Rexroth AG. It may not be reproduced or given to third parties without its consent.
The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.