

Proportional flow control valve with integrated pressure compensator Type KUDSR

RE 18702

Edition: 12.2017

Replaces: 10.2016



H8125

- ▶ Size 3
- ▶ Component series B
- ▶ Maximum operating pressure 350 bar
- ▶ Maximum supply flow 120 l/min

Features

- ▶ Mounting cavity R/UNF-16-03-0-06
- ▶ Direct operated proportional valve for controlling the flow size
- ▶ Operation by means of proportional solenoid
- ▶ Detachable and rotatable solenoid coil (connector position freely selectable)
- ▶ With concealed manual override
- ▶ Screwable manual override with star handle, optional

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2 **KUDSR** | Proportional flow control valve
Type code (valve without coil)¹⁾

Type code (valve without coil)¹⁾

01	02	03	04	05	06	07	08	09	
KUDS	R	3		B	/	F	N9	V	*

Type

01	Proportional flow control valve with integrated pressure compensator, direct operated	KUDS
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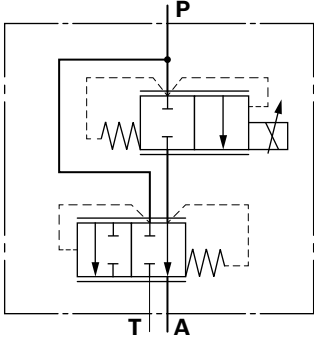
Maximum operating pressure

02	350 bar	R
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Size

03	Size 3	3
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Flow in port A

04	Symbol		80 l/min	C
			60 l/min	C1
			40 l/min	C2

Component series

05	Component series B	B
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Mounting cavity

06	High-Performance and mounting cavity R/UNF-16-03-0-06, see page 11	F
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Manual override

07	With concealed manual override	N9
	Screwable manual override with star handle (separate order, material no. R913009058, see page 12)	N14

Sealing material

08	FKM (fluoroelastomer) (other seals on request)	V
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09	Further details in the plain text	*
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Preferred types (valve without coil)¹⁾

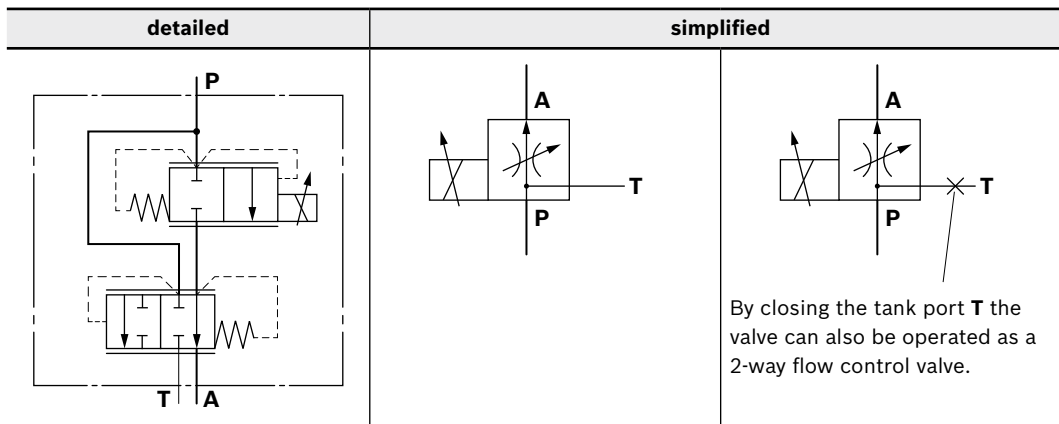
Type	Material no.
KUDSR3CB/FN9V	R901480558
KUDSR3C1B/FN9V	R901480554
KUDSR3C2B/FN9V	R901480557

¹⁾ Complete valves with mounted coil on request.

Available coils (separate order)

	Material no. for coil with connector ²⁾		
	"K4" 03pol (2+PE) DIN EN 175301-803	"K40" 02pol K40 DT 04-2PA, co. Deutsch	"C4" 02pol C4/Z30 AMP Junior-Timer
Direct voltage DC³⁾			
12 V (1.8 A)	R901022180	R901272648	R901022680
24 V (1.2 A)	R901022174	R901272647	R901022683

Symbols



P = Pump port
T = Tank port
A = Control pressure port

²⁾ Plug-in connectors separate order, see data sheet 08006.

³⁾ Other voltages upon request.

Functional description

General

The proportional flow control valve is a direct operated screw-in cartridge valve in spool design with integrated pressure compensator. It regulates the flow proportionally to the input signal in a stepless form from port **P** to **A**. Any excessive residual flow is led to the tank or to another actuator via port **T**.

The valve basically consists of housing, control spool, control spring, pressure compensator spool, orifice bush, pressure compensator spring as well as proportional solenoid **(1)** with central thread and detachable coil.

Function (2-way)

With de-energized proportional solenoid **(1)**, the control spool that is always pressure-compensated to the actuating forces due to its structural design is held in the initial position by the control spring and blocks the flow between port **P** and **A**. By energizing the proportional solenoid **(1)**, the control spool is adjusted directly proportional to the electrical input signal and, via orifice-type cross-sections (with progressive flow characteristics), adjusts and connects the ports **P** and **A**. Due to the integrated pressure compensator spool together with the pressure compensator spring, the pressure drop across the valve is kept constant, independent of the pressures at **P** and **A**. In case of de-excitation of the proportional solenoid **(1)**, the control

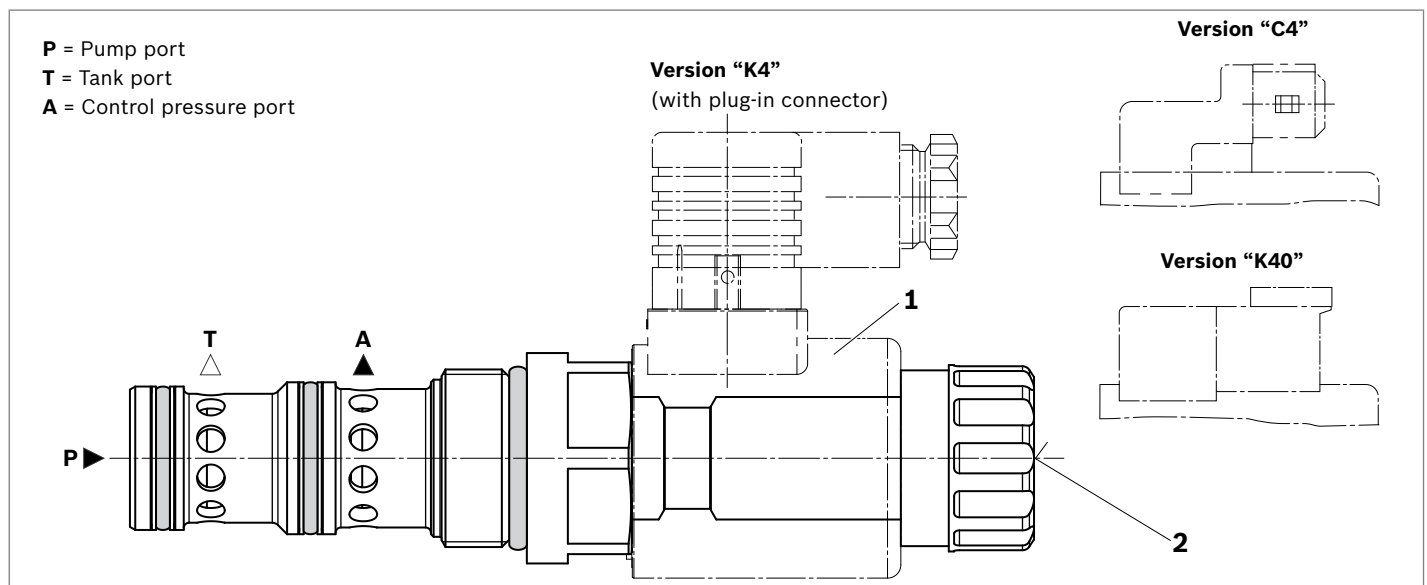
spring returns the control spool into its initial position. The entire flow must be dissipated via the upstream system pressure relief valve.

The manual override **(2)** allows for the adjustment of the valve without solenoid energization.

Function (3-way)

With de-energized proportional solenoid **(1)**, the control spool that is always pressure-compensated to the actuating forces due to its structural design is held in the initial position by the control spring and blocks the flow between port **P** and **A**. By energizing the proportional solenoid **(1)**, the control spool is adjusted directly proportional to the electrical input signal and, via orifice-type cross-sections (with progressive flow characteristics), adjusts and connects the ports **P** and **A**. Due to the integrated pressure compensator spool together with the pressure compensator spring, the pressure drop across the valve is kept constant, independent of the pressures at **P**, **T** and **A**. In case of excessive flow from **P**, the pressure compensator spool moves to the right and opens the connection **P** to **T**. In case of de-excitation of the proportional solenoid **(1)**, the control spring returns the control spool into its initial position. The entire flow is now directly led from port **P** to port **T**. The manual override **(2)** allows for the adjustment of the valve without solenoid energization.

▼ Type KUDSR3...



- 1** Proportional solenoid
- 2** Manual override

Technical data

General			
Weight		kg	0.97
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	See characteristic curve on page 9
Storage temperature range		°C	–20 to +80
Environmental audits			
Salt spray test according to DIN 50021		h	720
Surface protection DC solenoids		Coating according to DIN 50962-Fe//ZnNi with thick film passivation	
Hydraulic			
Maximum operating pressure	Port P	bar	350
Bypass pressure	Port T	bar	350 with q_{Vmax}
Priority pressure	Port A	bar	330 ... q_{Vmax}
Control pressure differential	P → A	bar	12 ... 15
Minimum pressure differential	P → A	bar	> 10
Maximum flow	Port P	l/min	120
Rated flow	P → A	l/min	80 (regulated)
Leakage		ml/min	< 100 (with Δp = 100 bar in P ; HLP46, ϑ_{oil} = 40°C)
Hydraulic fluid			See table on page 6
Hydraulic fluid temperature range		°C	–40 ... +100 (preferably +40 ... +50)
Viscosity range		mm²/s	5 ... 400 (preferably 10 ... 100)
Maximum admissible degree of contamination of the hydraulic fluid		Class 20/18/15 ¹⁾	
Cleanliness class according to ISO 4406 (c)			
Load cycles		Million	10
Hysteresis ²⁾		%	≤ 5
Range of inversion ²⁾		%	≤ 2
Response sensitivity ²⁾		%	≤ 1

Notice

For applications outside these parameters, please consult us!

¹⁾ The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components. Available filters can be found at www.boschrexroth.com/filter.

²⁾ Measured with analog amplifier type RA2-1/10 according to data sheet 95230 (PWM = 100 Hz).

Elektric				
Voltage type		Direct voltage		
Supply voltages ³⁾		V	12 DC	24 DC
Maximum solenoid current		A	1.8	1.2
Coil resistance	Cold value at 20°C	Ω	3.3	7.2
	Max. hot value	Ω	5.8	13.0
Duty cycle (ED)		%	see characteristic curve on page 9	
Maximum coil temperature ⁴⁾		°C	150	
Protection class according to VDE 0470-1 (DIN EN 60529) DIN 40050-9	Version “K4”	IP 65 with plug-in connector mounted and locked		
	Version “C4”	IP 66 with plug-in connector mounted and locked		
		IP 69K with Rexroth plug-in connector (Material no. R901022127)		
	Version “K40”	IP 69K with plug-in connector mounted and locked		
PWM signal (recommendation)		Hz	100 (Analog amplifier type RA... Data sheet 95230)	
Control electronics (separate order)		Analog amplifier module type VT-MSPA1...		Data sheet 30223
		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
Design according to VDE 0580				

Notice

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

³⁾ Other voltages on request

⁴⁾ Due to the surface temperatures of the solenoid coils, the standards ISO 13732-1 and ISO 4413 need to be adhered to!

Hydraulic fluid

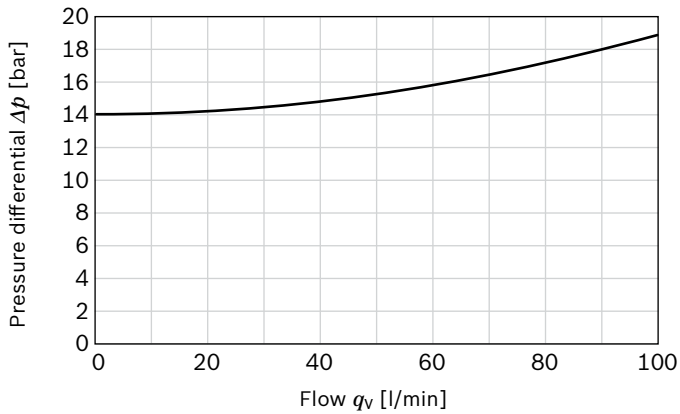
Hydraulic fluid		Classification	Suitable sealing material	Standards	Data sheet
Mineral oils		HL, HLP	FKM	DIN 51524	90220
Bio-degradable	Insoluble in water	HEES	FKM	ISO 15380	90221
	Soluble in water	HEPG	FKM	ISO 15380	90221

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 fluids used must be 40 K above the maximum solenoid surface temperature.
- **Bio-degradable:** When using biodegradable hydraulic fluids that are also zinc-solving, zinc may accumulate in the fluid.

Characteristic curves

▼ Δp - q_V -characteristic curve – port P → T (A open, orifice closed)

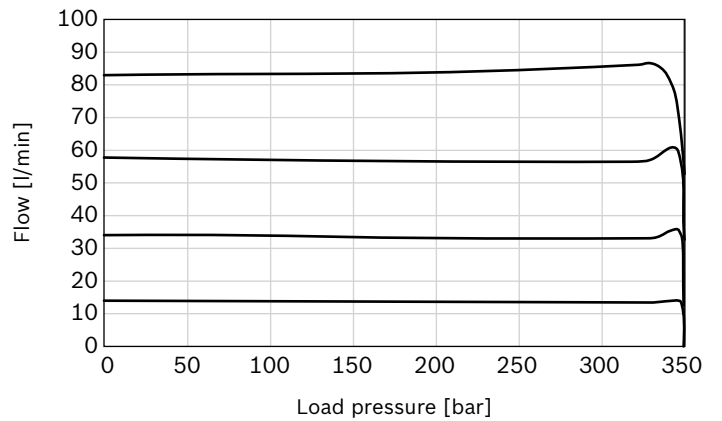


Notice

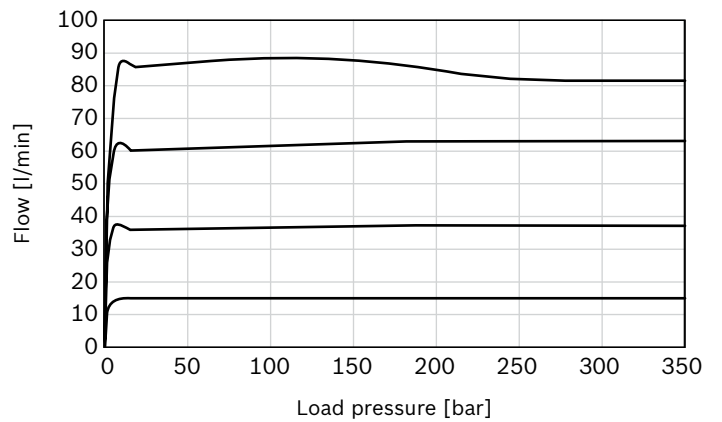
Characteristic curves measured with HLP46, $\vartheta_{oil} = 40 \pm 5^\circ\text{C}$ and 24 V coil.

Version “C” ($q_V P = 80$ l/min)

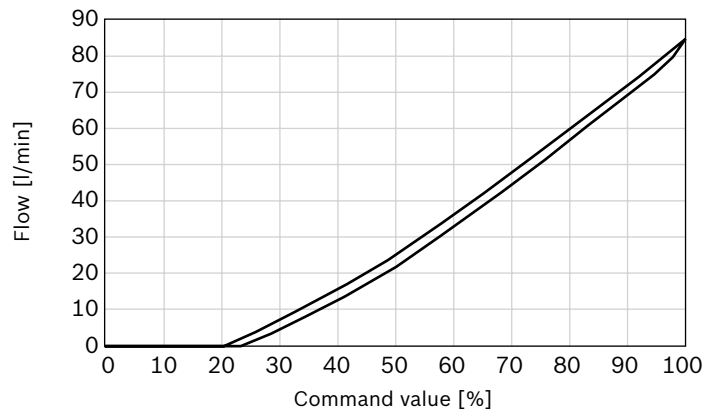
▼ Regulated flow at port A as a function of the load pressure 3-way function (port T open to the tank)



▼ Regulated flow at port A as a function of the load pressure 2-way function (port T closed)

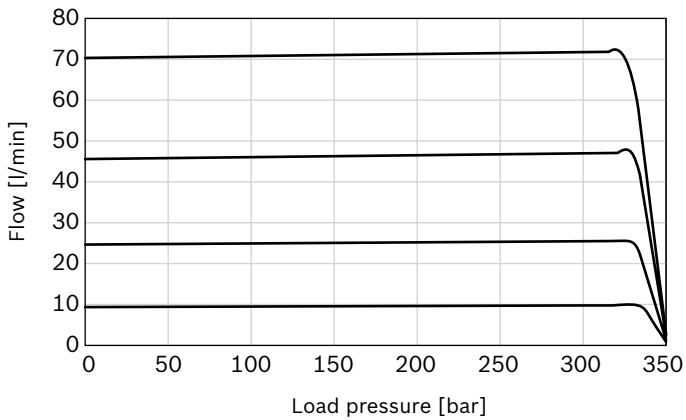


▼ Regulated flow at port A as a function of the command value

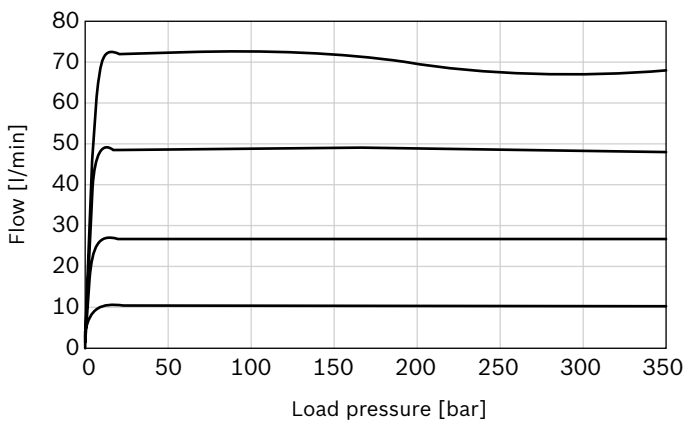


Version “C1” ($q_V P = 60 \text{ l/min}$)

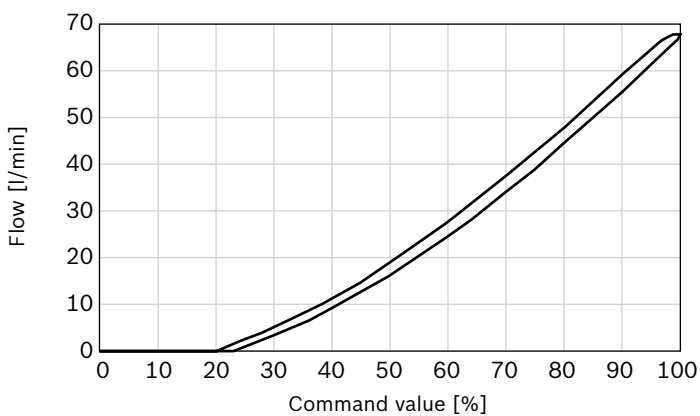
▼ **Regulated flow at port A as a function of the load pressure**
3-way function (port T open to the tank)



▼ **Regulated flow at port A as a function of the load pressure**
2-way function (port T closed)

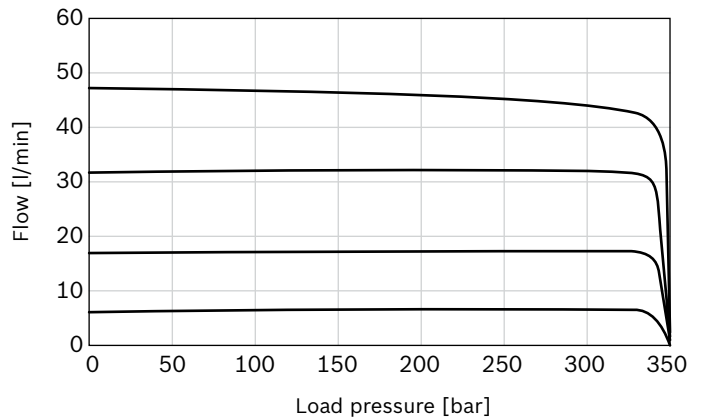


▼ **Regulated flow at port A as a function of the command value**

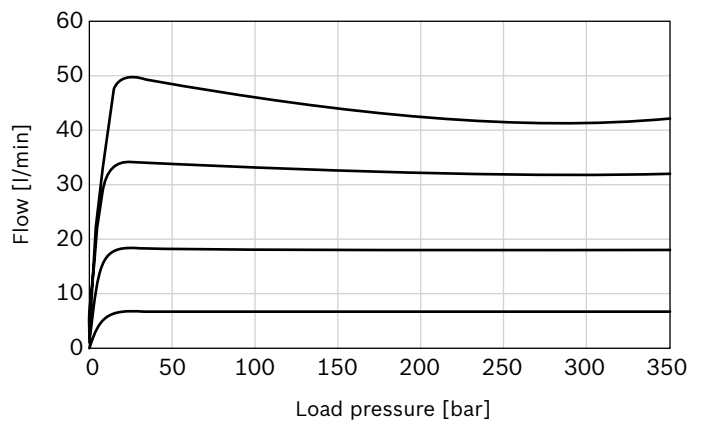


Version “C2” ($q_V P = 40 \text{ l/min}$)

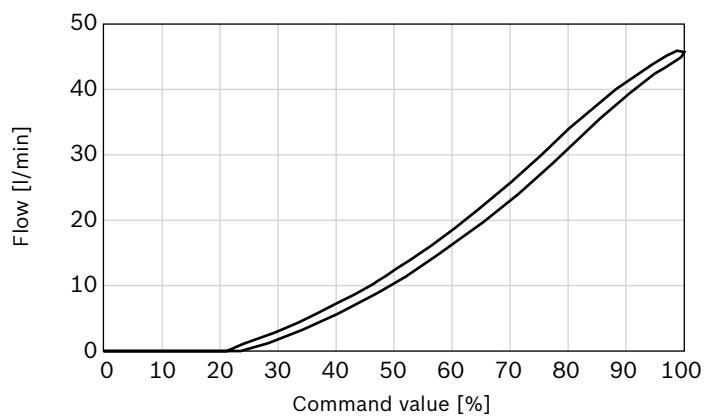
▼ **Regulated flow at port A as a function of the load pressure**
3-way function (port T open to the tank)



▼ **Regulated flow at port A as a function of the load pressure**
2-way function (port T closed)



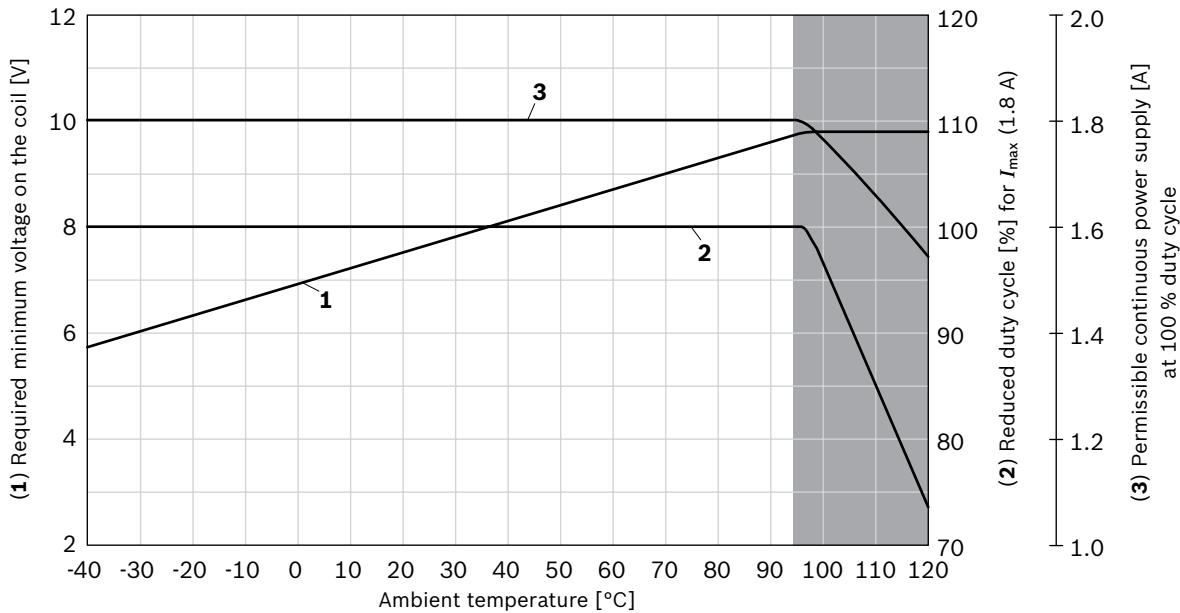
▼ **Regulated flow at port A as a function of the command value**



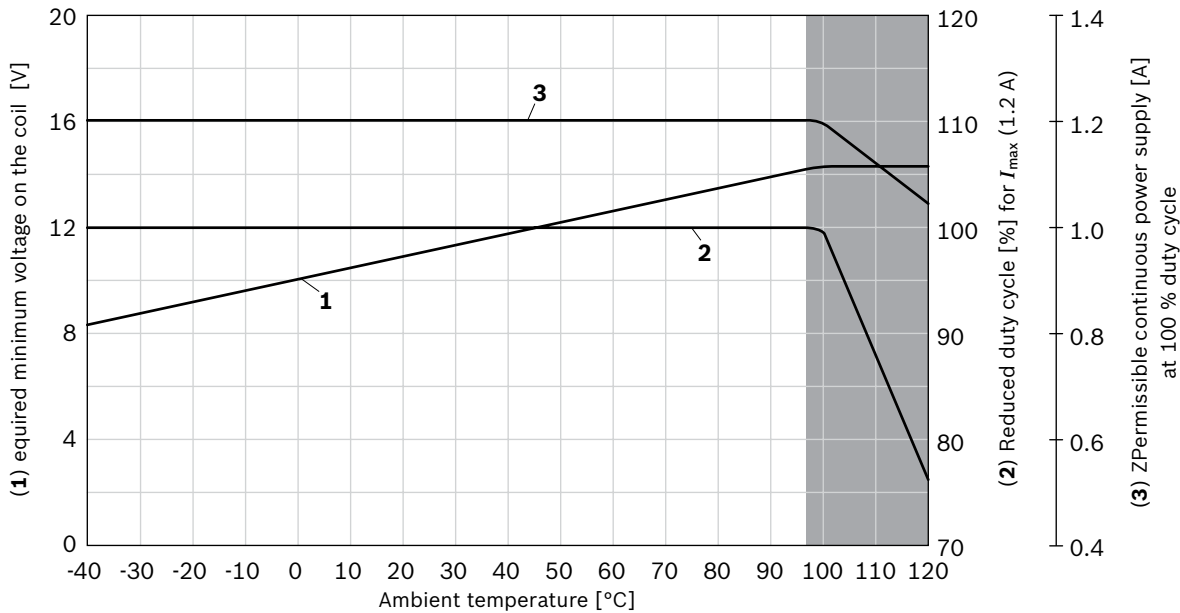
Permissible working range

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

▼ Version "G12"



▼ Version "G24"



Notice

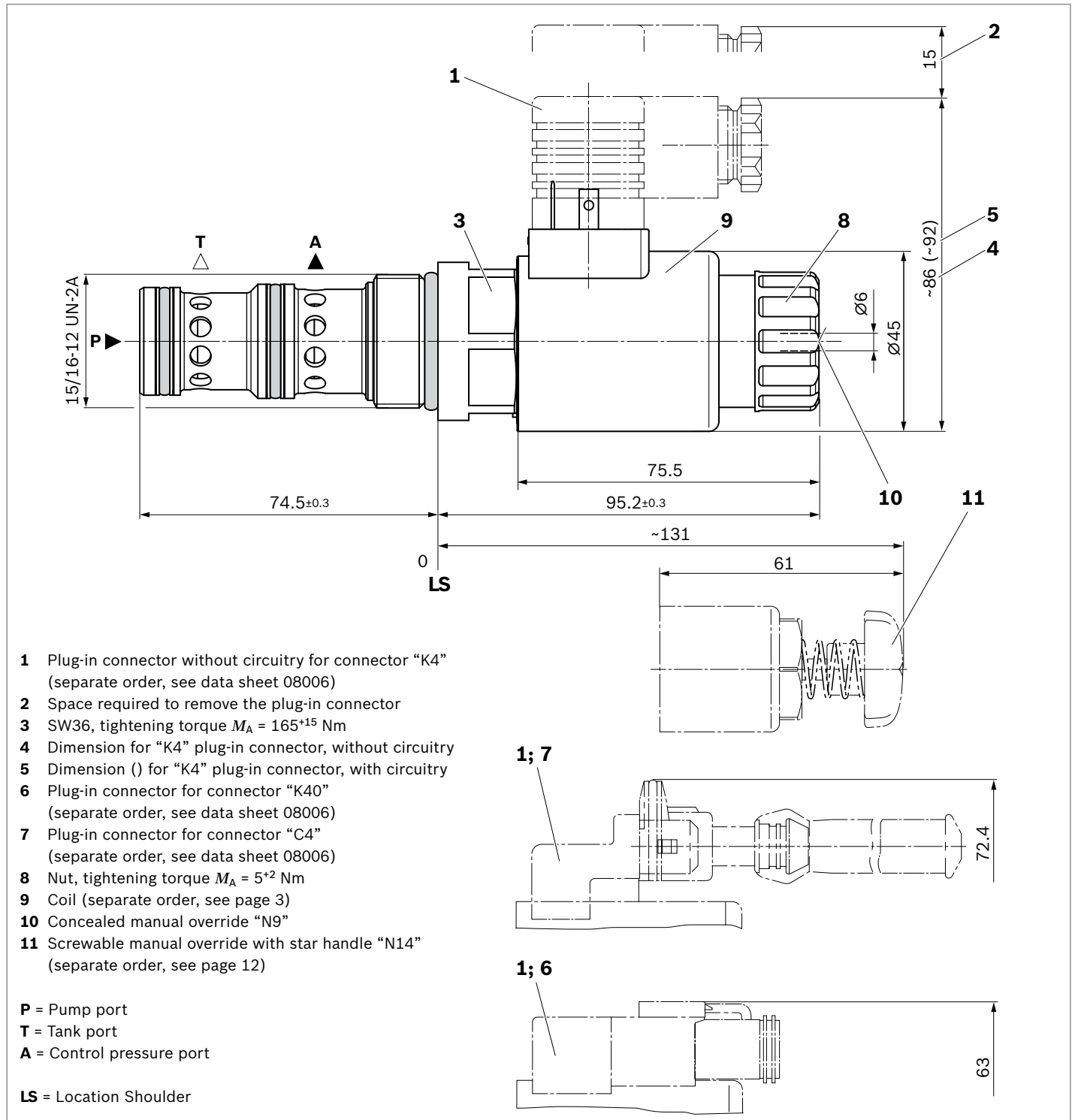
The characteristic curves have been determined for coils with valve with medium test block size (80 × 80 × 80 mm), without flow in calm air.

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.

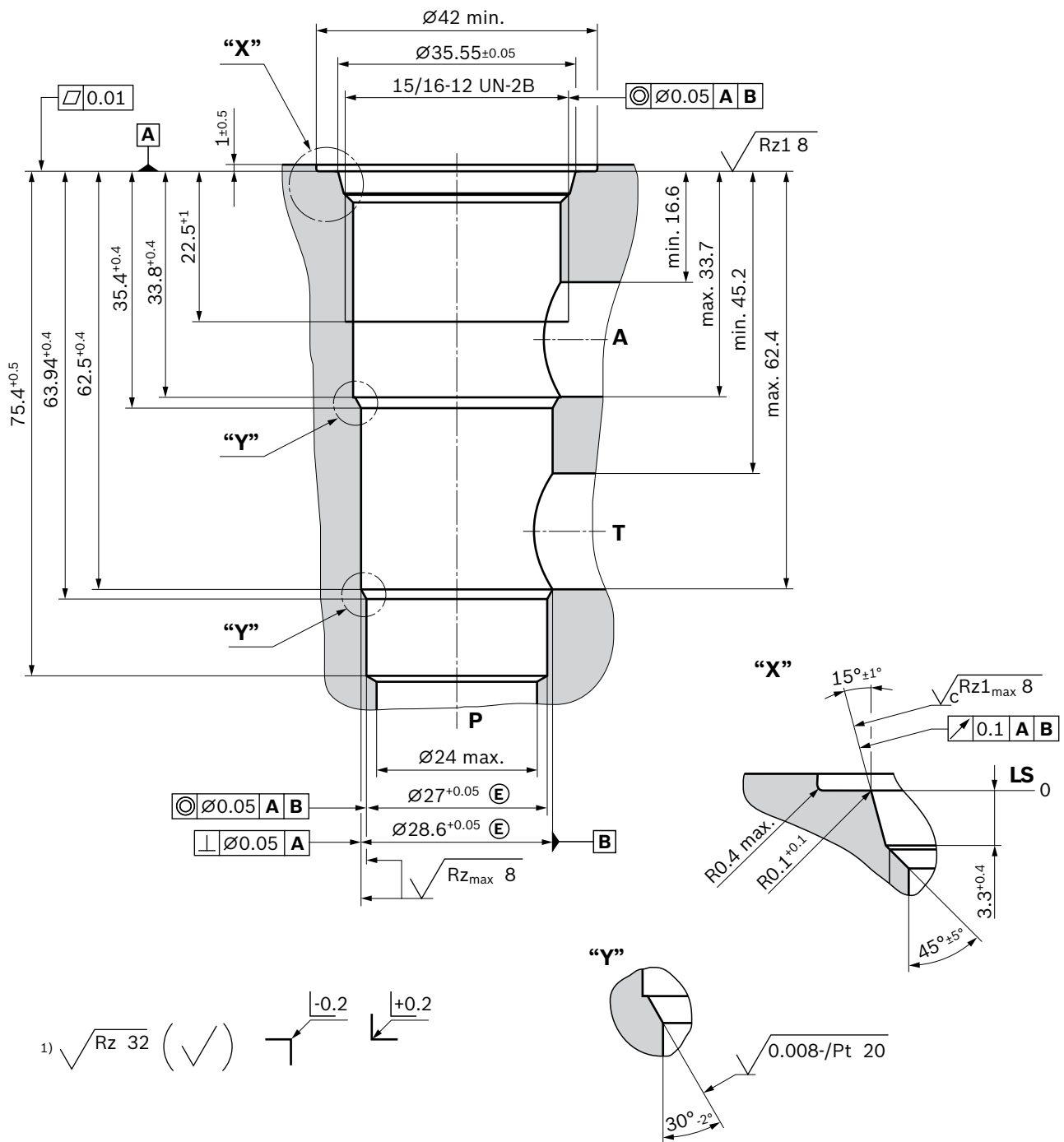
 = Limited valve performance

Dimensions



Mounting cavity

▼ R/UNF16-03-0-06; 3 main ports; thread 1 5/16-12 UN-2B



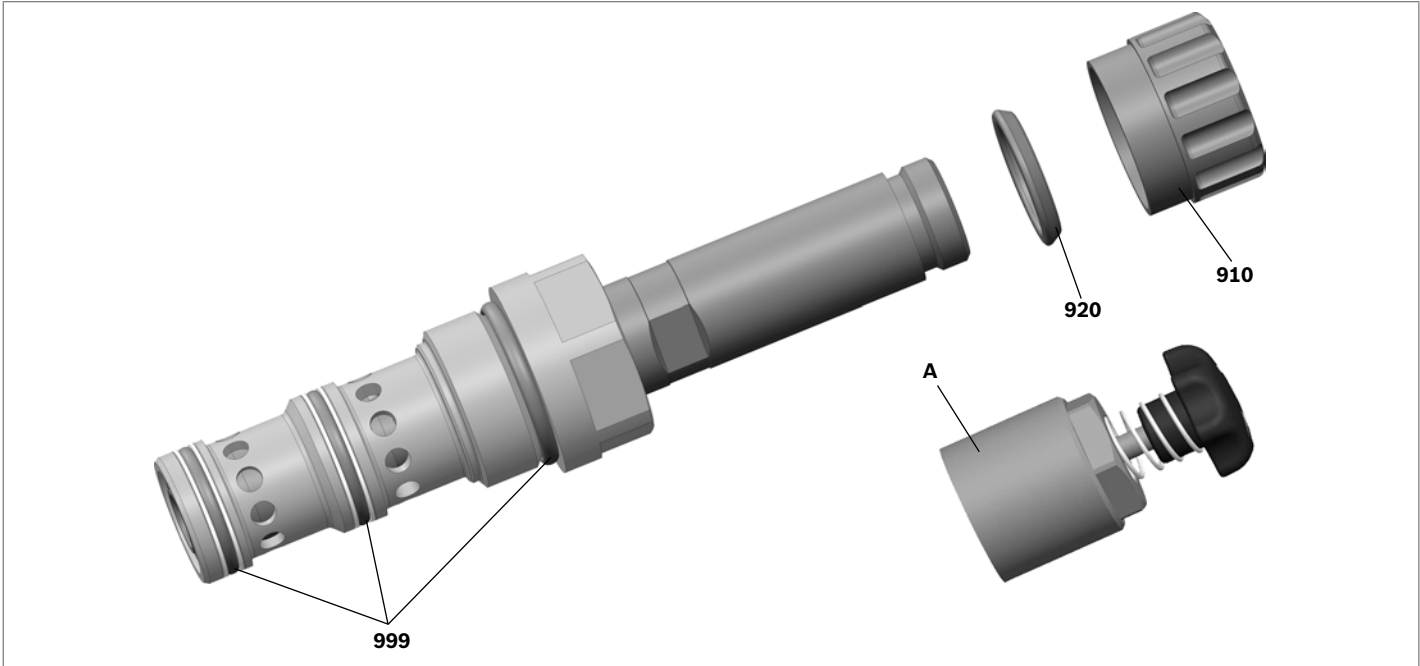
P = Pump port
T = Tank port
A = Control pressure port

LS = Location Shoulder

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

1) Visual inspection

Available individual components



Item	Denomination	Material no.
910	Nut	R900029574
920	Seal ring for pole tube	R900002507
999	Seal kit of the valve	R961005887
A	Manual override “N14”	R913009058

Coils separate order, see page 3.

Related documents

- Control electronics:
- Analog amplifier module

– Plug-in proportional amplifier

– Analog amplifier

– BODAS control unit

Type VT-MSPA1...

Type VT-SSPA1...

Type RA...

Type RC...

Data sheet 30223

Data sheet 30116

Data sheet 95230

Data sheet 95200
- Selection of the filters