

# Proportional flow control valve, with integrated pressure compensator

## Type KUDSR

**RE 18702**

Edition: 2016-02

Replaces: 05.12



H7659

- ▶ Size 3
- ▶ Component series A
- ▶ Maximum operating pressure 350 bar
- ▶ Maximum 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 with central thread and detachable coil
- ▶ Rotatable solenoid coil
- ▶ With concealed manual override
- ▶ Screwable manual override with star handle, optional

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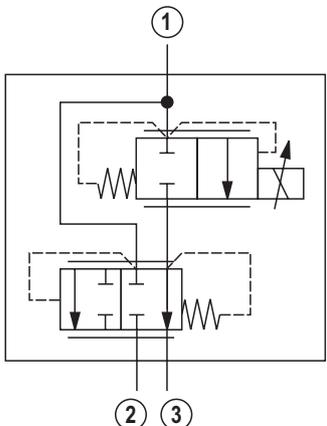
**Ordering code** (valve without coil) <sup>1)</sup>

01 02 03 04 05 06 07 08 09

<b>KUDS</b>	<b>R</b>	<b>3</b>		<b>A</b>	<b>/</b>	<b>F</b>	<b>N9</b>	<b>V</b>	<b>*</b>
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01	Proportional flow control valve, with integrated pressure compensator, direct operated	<b>KUDS</b>
02	Maximum operating pressure 350 bar	<b>R</b>
03	Size 3	<b>3</b>

**Symbol**

04		Flow in the main port ③	
		80 l/min	<b>C</b>
		60 l/min	<b>C1</b>
		40 l/min	<b>C2</b>

05	Component series	<b>A</b>
06	High Performance and mounting cavity R/UNF-16-03-0-06, see page 13	<b>F</b>
07	<b>With</b> concealed manual override <sup>2)</sup>	<b>N9</b>

**Seal material**

08	FKM seals (other seals upon request) Attention! Observe compatibility of seals with hydraulic fluid used!	<b>V</b>
09	Further details in the plain text	<b>*</b>

<sup>1)</sup> Complete valves with mounted coil on request.

<sup>2)</sup> Screwable manual override with star handle "**N14**"  
(separate order, material no. **R913009058**, see page 12).

**Valve types** (without coil) <sup>1)</sup>

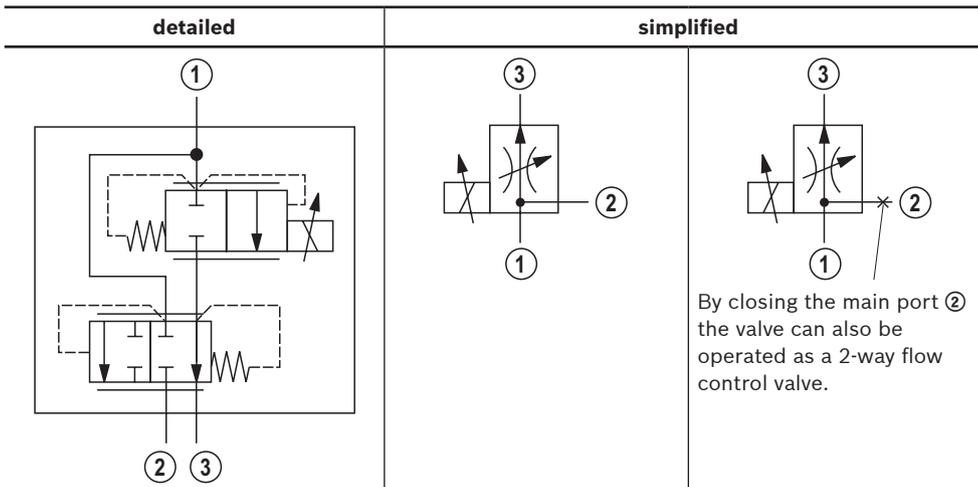
Type	Material no.
KUDSR3CA/FN9V	<b>R901255657</b>
KUDSR3C1A/FN9V	<b>R901287409</b>
KUDSR3C2A/FN9V	<b>R901265879</b>

**Available coils** (separate order) <sup>1)</sup>

Direct voltage DC <sup>4)</sup>	Material no. for coil with connector <sup>3)</sup>		
	"K4" 03pol (2+PE) DIN EN 175301-803	"K40" 02pol K40 DT 04-2PA, co. Deutsch	"C4" 02pol C4/Z30 AMP Junior-Timer
12 V (1.8 A)	<b>R901022180</b>	<b>R901272648</b>	<b>R901022680</b>
24 V (1.2 A)	<b>R901022174</b>	<b>R901272647</b>	<b>R901022683</b>

<sup>3)</sup> Mating connectors, separate order, see data sheet 08006.

<sup>4)</sup> Other voltages upon request.

**Symbols**


## Function

### General

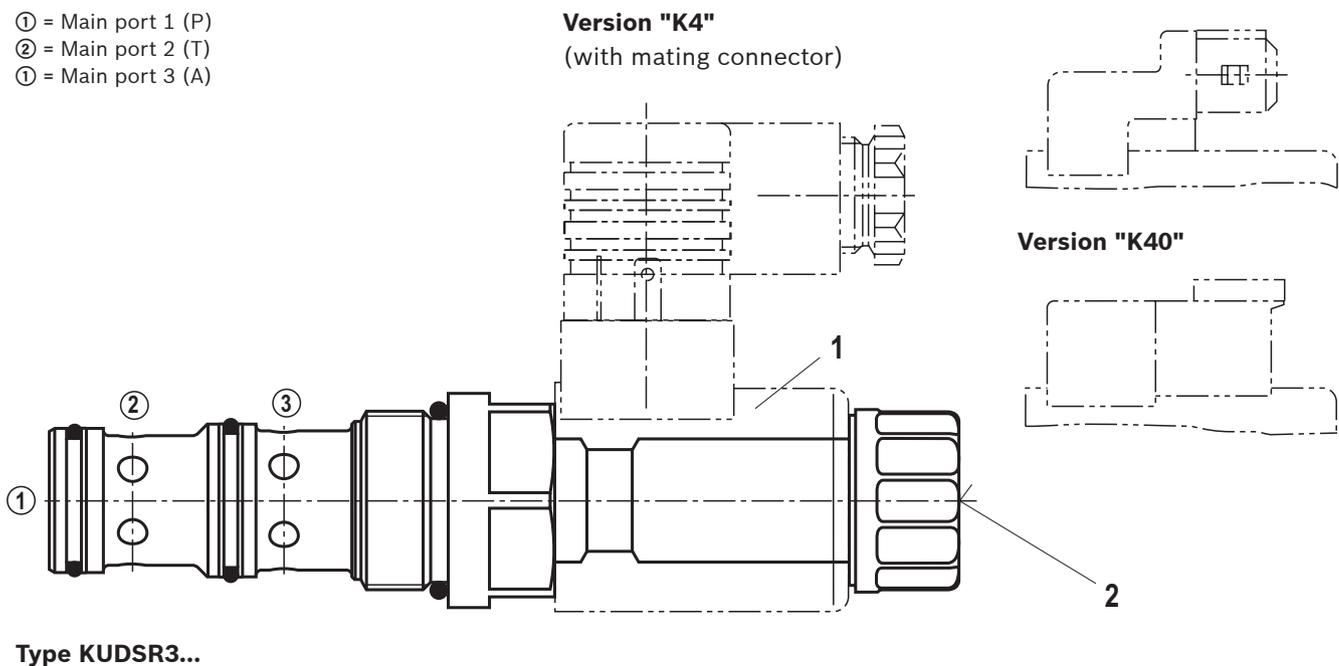
The proportional flow control valve is a direct operated screw-in cartridge valve in spool design with integrated pressure compensator. It regulates the flow proportionally to the input signal in a stepless form from main port ① to ②. Any excessive residual flow is led to the tank or to another actuator via port ③.

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

### Function

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 main port ① and ③. 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 main ports ① and ③. Due to the integrated pressure compensator piston together with the pressure compensator spring, the pressure drop across the valve is kept constant, independent of the pressures at ①, ② and ③. In case of excessive flow from ①, the pressure compensator piston moves to the right and opens the connection ① to ②. 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 main port ① to main port ②. The manual override (2) allows for the adjustment of the valve without solenoid energization.

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



## Technical data

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

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 page 11)
Storage temperature range	°C	-20 ... +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	▶ Main port ①	bar	350
Bypass pressure	▶ Main port ②	bar	350 with $q_{Vmax}$
Prio pressure	▶ Main port ①	bar	330 with ... $q_{Vmax}$
Control pressure differential	▶ ① to ③	bar	12 ... 15
Minimum pressure differential	▶ ① to ③	bar	> 10
Maximum flow	▶ Main port ①	l/min	120
Rated flow	▶ ① to ③	l/min	80 (regulated)
Leakage		ml/min	< 100 (with $\Delta p = 100$ bar in ①; HLP46, $\vartheta_{oil} = 40$ °C)
Hydraulic fluid			See table below
Hydraulic fluid temperature range		°C	-40 ... +100 (preferably +40 ... +50)
Viscosity range		mm <sup>2</sup> /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 <sup>1)</sup>
Load cycles		Million	10
Hysteresis <sup>2)</sup>		%	≤ 5
Range of inversion <sup>2)</sup>		%	≤ 2
Response sensitivity <sup>2)</sup>		%	≤ 1

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	

#### 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 has to be 40 K above 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.

<sup>1)</sup> 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](http://www.boschrexroth.com/filter).

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

**Technical data**

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

<b>electric</b>			
Voltage type		Direct voltage	
Supply voltages <sup>3)</sup>	V	12 DC	24 DC
Maximum solenoid current	A	1.8	1.2
Coil resistance	▶ Cold value at 20 °C	Ω	3.3
	▶ Max. hot value	Ω	5.8
Duty cycle	%	see characteristic curve page 11	
Maximum coil temperature <sup>4)</sup>	°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. <b>R901022127</b> )	
	▶ Version "K40"	IP 69K with mating connector mounted and locked	
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			

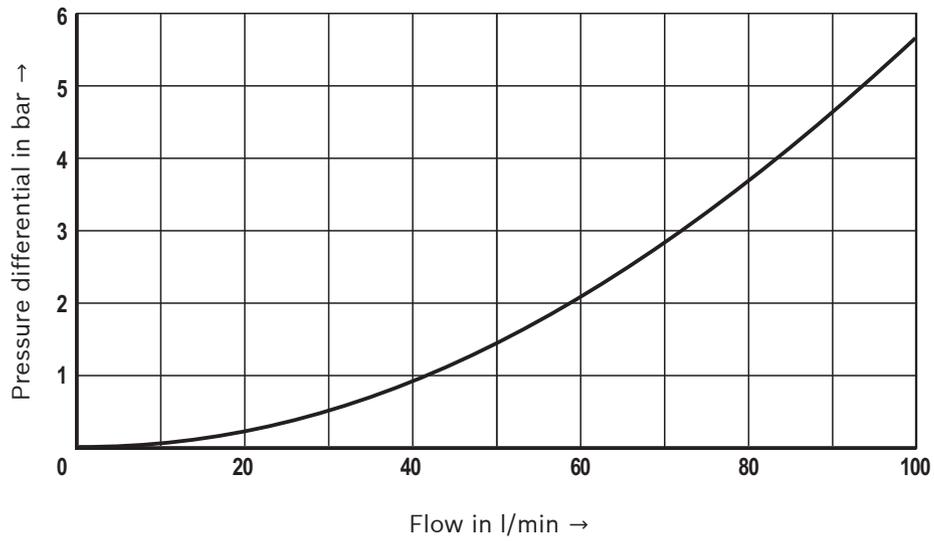
<sup>3)</sup> Other voltages upon request<sup>4)</sup> Due to the surface temperatures of the solenoid coils, the standards ISO 13732-1 and ISO 4413 need to be adhered to!

**When establishing the electrical connection, the protective earthing conductor (PE  $\perp$ ) must be connected correctly.**

**Characteristic curves**

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

$\Delta p$ - $q_V$  characteristic curve – main port ① to ② (③ open, orifice closed)

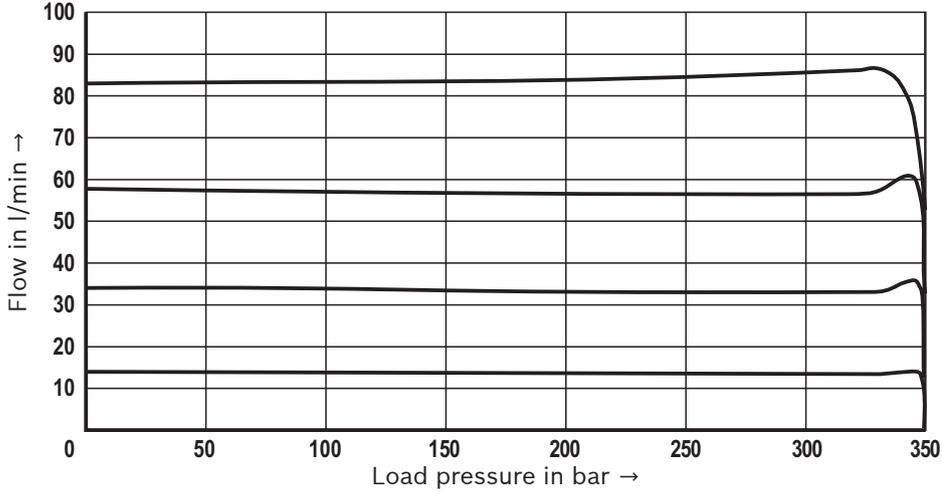


**Characteristic curves: Version "C"**

(measured with HLP46,  $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$  and  $q_{V①} = 80 \text{ l/min}$ )

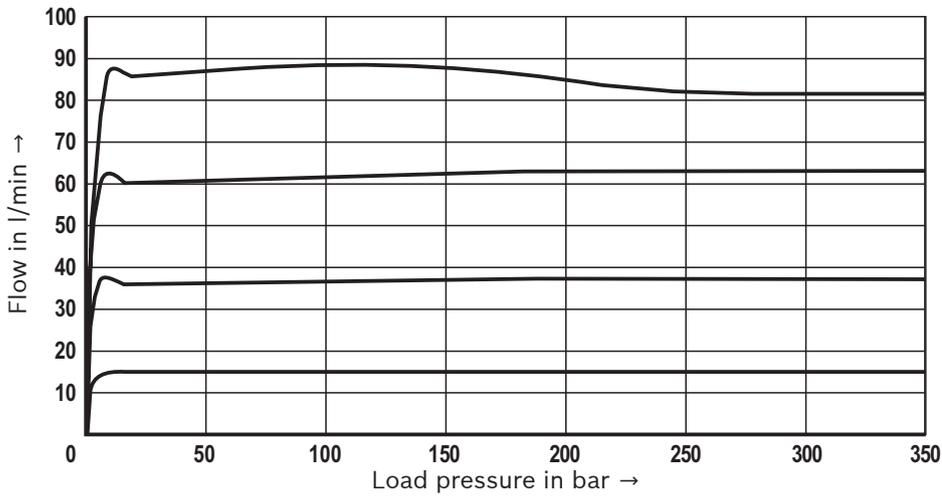
**Regulated flow at main port ③ as a function of the load pressure**

3-way function (main port ② open to the tank)

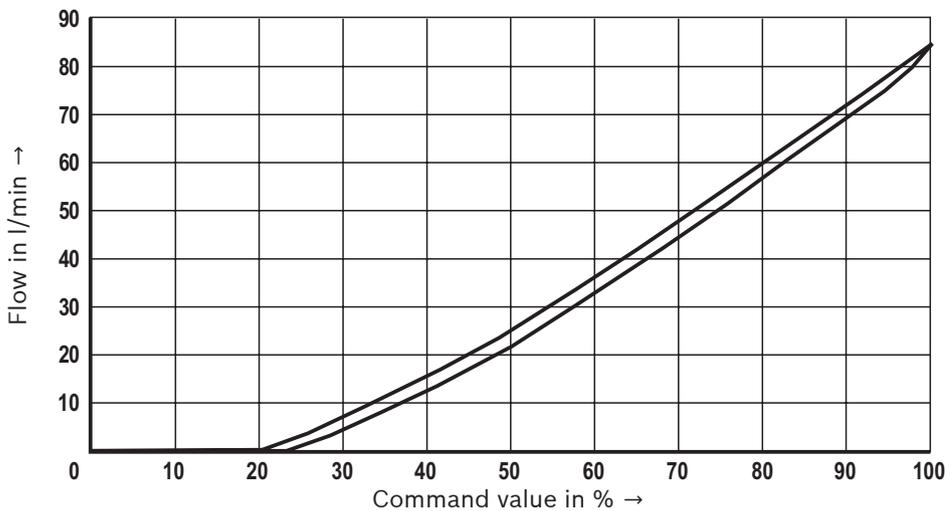


**Regulated flow at main port ③ as a function of the load pressure**

2-way function (main port ② closed)

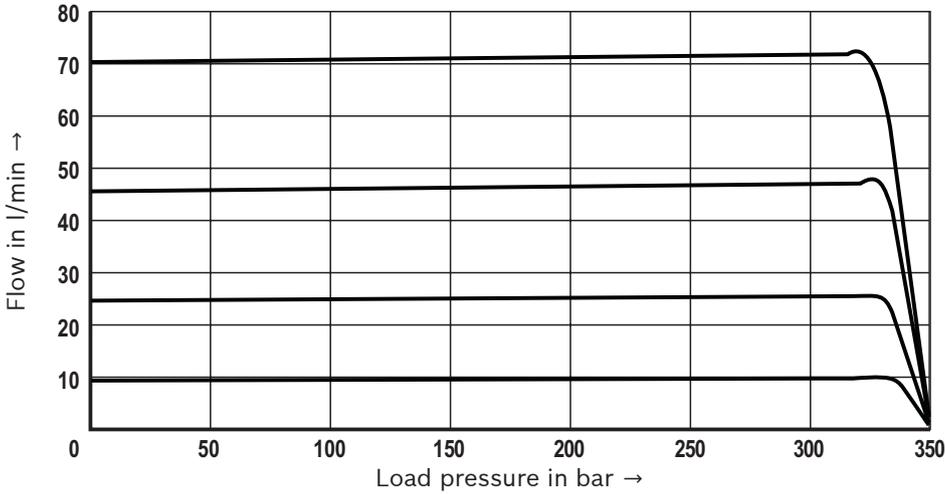


**Regulated flow at main port ③ as a function of the command value**

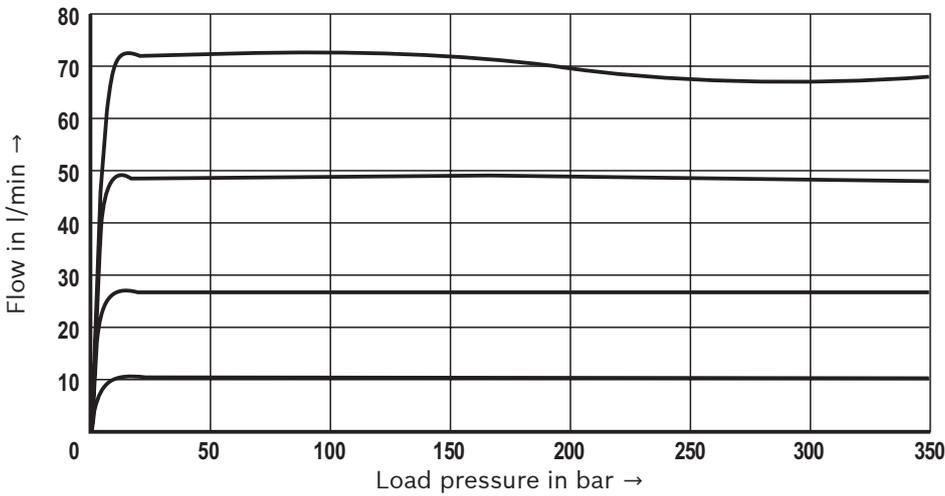


**Characteristic curves:** Version "C1"  
 (measured with HLP46,  $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$  and  $q_{V①} = 60 \text{ l/min}$ )

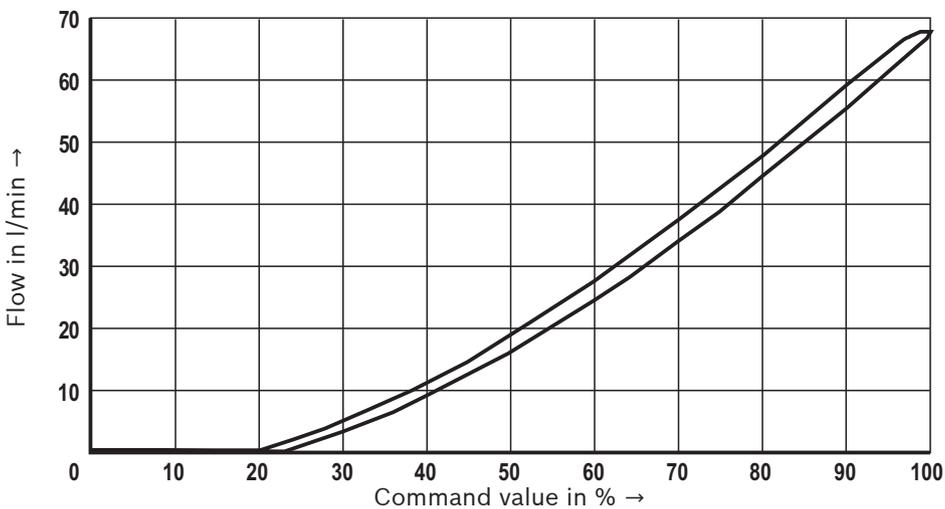
**Regulated flow at main port ③ as a function of the load pressure**  
 3-way function (main port ② open to the tank)



**Regulated flow at main port ③ as a function of the load pressure**  
 2-way function (main port ② closed)



**Regulated flow at main port ③ as a function of the command value**

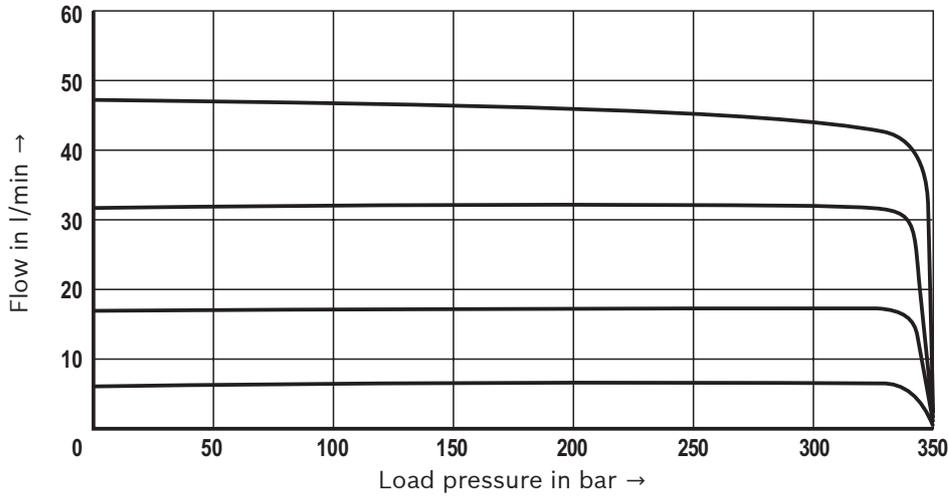


**Characteristic curves: Version "C2"**

(measured with HLP46,  $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$  and  $q_{V①} = 40 \text{ l/min}$ )

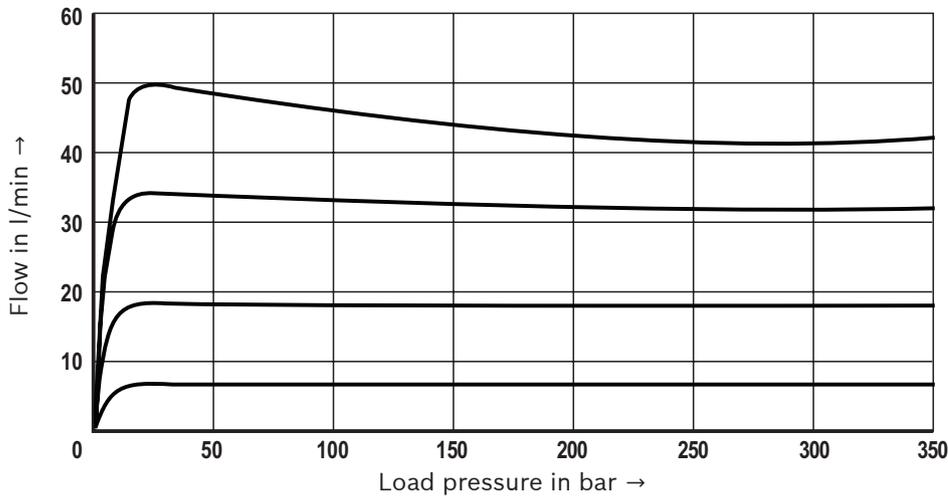
**Regulated flow at main port ③ as a function of the load pressure**

3-way function (main port ② open to the tank)

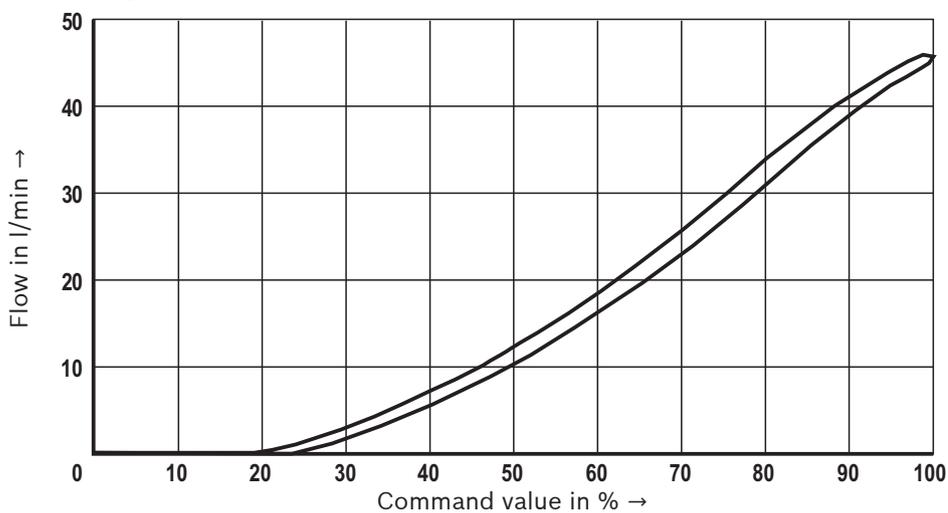


**Regulated flow at main port ③ as a function of the load pressure**

2-way function (main port ② closed)

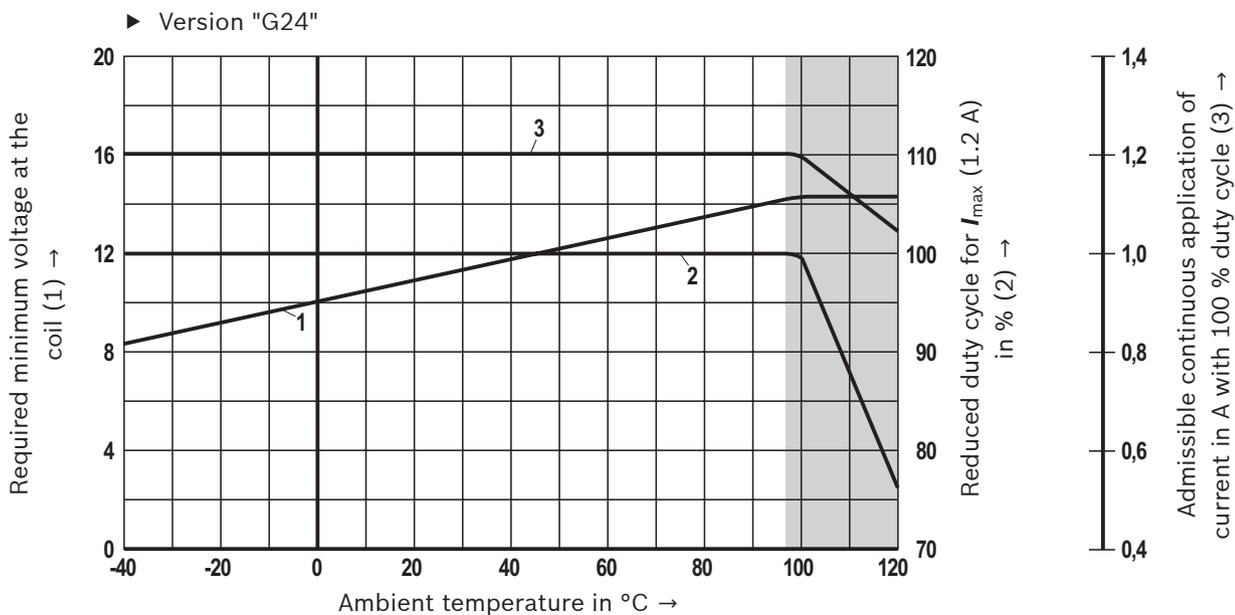
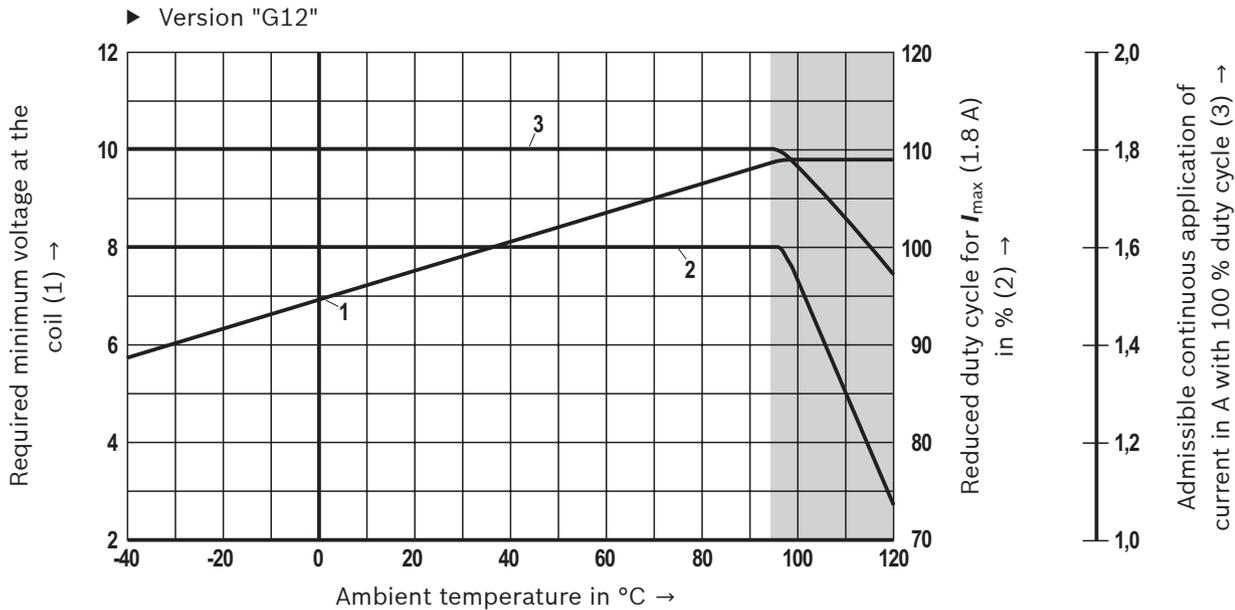


**Regulated flow at main port ③ as a function of the command value**



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

### Admissible working range dependent on the ambient temperature



Limited valve performance

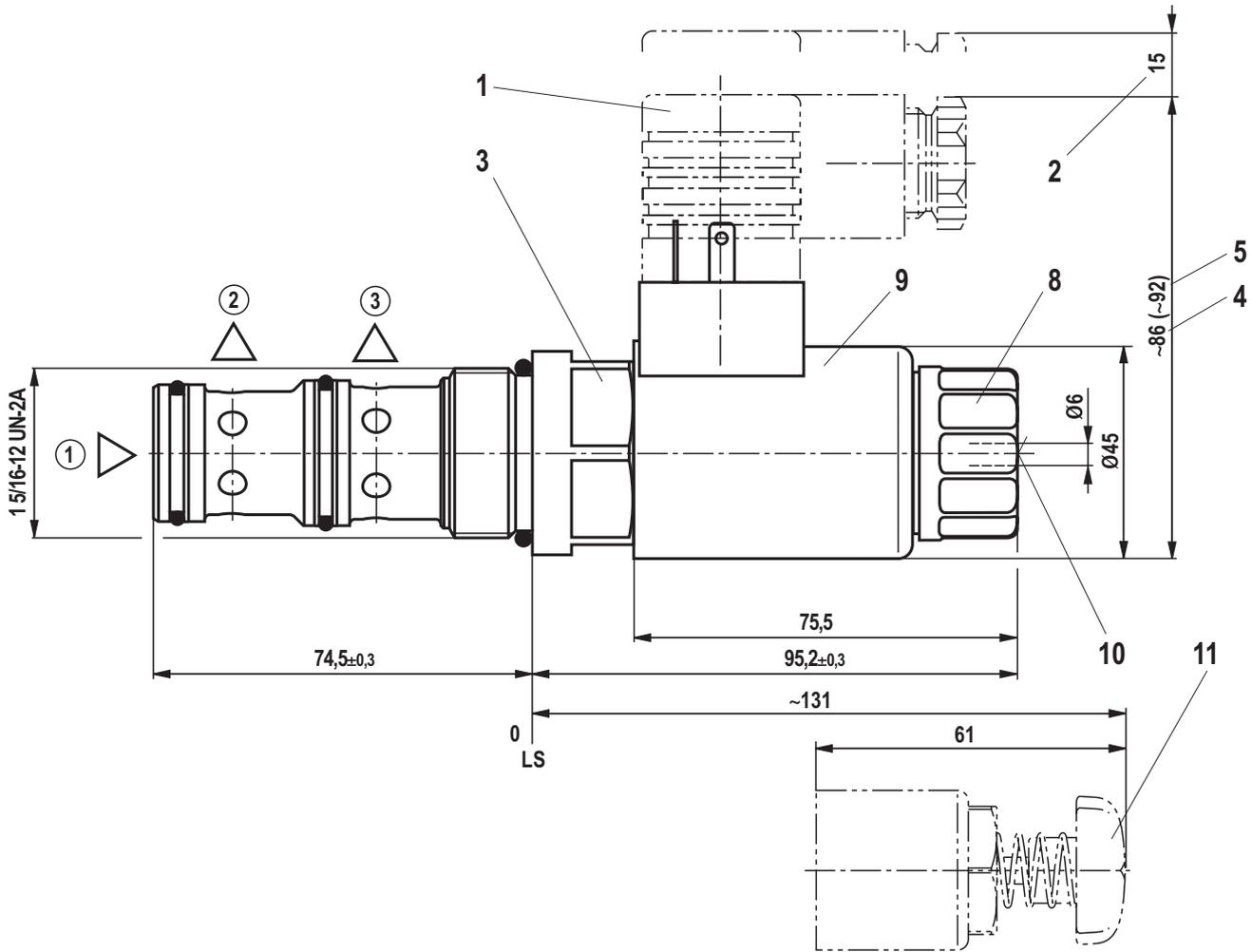
**Notices:**

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

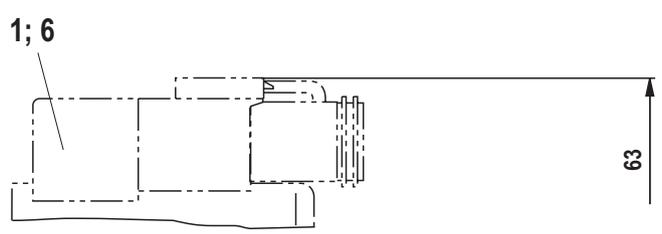
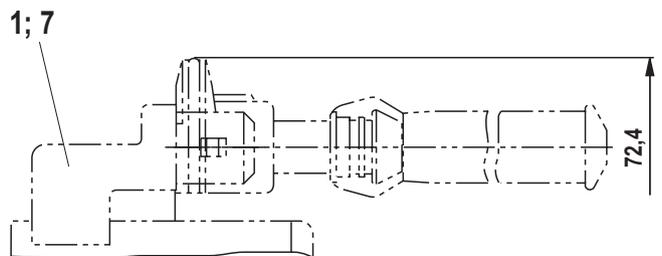
**Dimensions**  
(dimensions in mm)



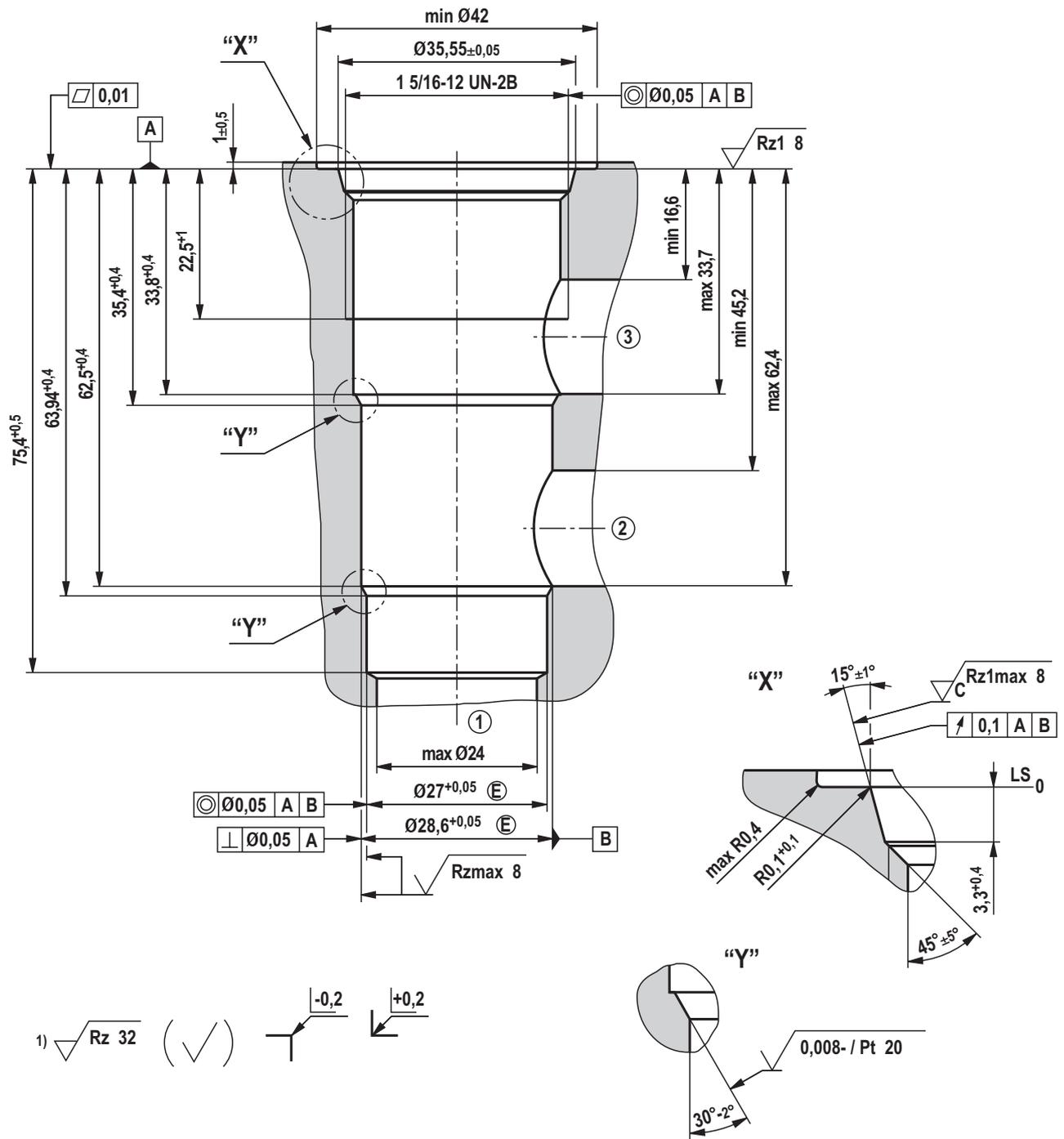
- ① = Main port 1 (P)
- ② = Main port 2 (T)
- ③ = Main port 3 (A)

LS = Location shoulder

- 1 Mating connector without circuitry for connector "K4" (separate order, see data sheet 08006)
- 2 Space required to remove the mating connector
- 3 SW36, tightening torque  $M_A = 165^{+15}$  Nm
- 4 Dimension ( ) for "K4" mating connector, without circuitry
- 5 Dimension ( ) for "K4" mating connector, with circuitry
- 6 Mating connector for connector "K40" (separate order, see data sheet 08006)
- 7 Mating connector for connector "C4" (separate order, see data sheet 08006)
- 8 Nut, tightening torque  $M_A = 5^{+2}$  Nm
- 9 Coil (separate order, see page 3)
- 10 Concealed manual override "N9"
- 11 Screwable manual override with star handle "N14" (separate order, see page 3)



**Mounting cavity R/UNF16-03-0-06; 3 main ports; thread 1 5/16-12 UN-2B**  
(dimensions in mm)



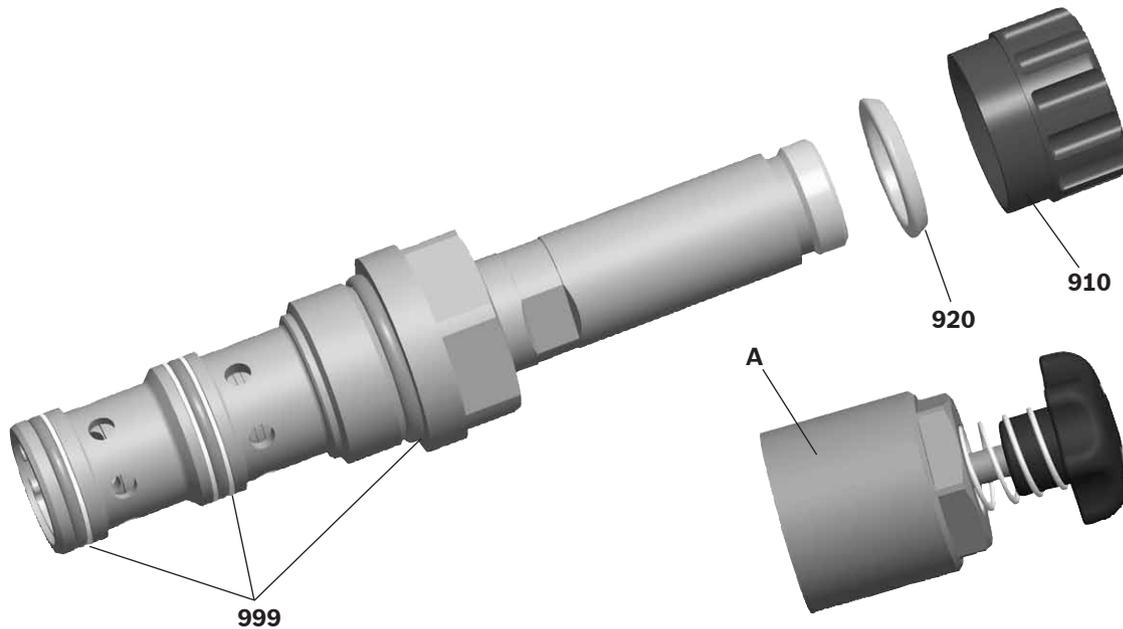
1) Visual inspection

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

LS = Location shoulder

All seal ring insertion faces are rounded and free of burrs

## Available individual components



Item	Denomination	Material no.
910	Nut	<b>R900029574</b>
920	Seal ring for pole tube	<b>R900002507</b>
999	Seal kit of the valve	<b>R961003236</b>
A	Manual override "N14"	<b>R913009058</b>

Coils, separate order, see page 3.

## Further information

### ► Control electronics:

- Analog amplifier module type VT-MSPA1...
- Plug-in proportional amplifier type VT-SSPA1...
- Analog amplifier type RA...
- BODAS control unit type RC...

Data sheet 30223

Data sheet 30116

Data sheet 95230

Data sheet 95200

### ► Selection of the filters

[www.boschrexroth.com/filter](http://www.boschrexroth.com/filter)

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## Notes

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