

# Proportional pressure reducing valve, direct operated, increasing characteristic curve FTDRE 4 K



- ▶ Size 4
- ▶ Series 4X
- ▶ Maximum control pressure 18, 30 bar
- ▶ Maximum working pressure 100 bar
- ▶ Maximum flow 5 l/min (at  $\Delta p = 7$  bar)

## Features

- ▶ Direct-operated proportional pressure reducing valve for reducing system pressure
- ▶ Cartridge valve
- ▶ Suitable for mobile and industrial applications
- ▶ Actuation via proportional solenoid
- ▶ In case of power failure, minimum pressure is set
- ▶ Recommended control electronics:  
Mobile amplifier type RA and RC

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## Type code

01	02	03	04	05	06	07	08	09	10	11	
<b>FTDRE</b>	<b>4</b>	<b>K</b>	<b>4X</b>	<b>/</b>		<b>A</b>			<b>V</b>	<b>-8</b>	<b>*</b>

### Valve type

01	Proportional pressure reducing valve, non-standard design, electrical actuation	<b>FTDRE</b>
02	Size 4	<b>4</b>
03	Cartridge valve	<b>K</b>

### Series

04	Series 40 to 49 or 4A to 4Z (unchanged installation and connection dimensions)	<b>4X</b>
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### Maximum control pressure

05	18 bar	<b>18</b>
	30 bar	<b>30</b>

06	Proportional solenoid, switching in oil	<b>A</b>
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### Supply voltage

07	Control electronics 12 V DC	<b>G12</b>
	Control electronics 24 V DC	<b>G24</b>

### Manual override

08	With manual override	<b>No code</b>
	Without manual override	<b>N0</b>

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

09	Device connector 2-pin, DT 04-2P (DEUTSCH)	<b>K40</b>
	Device connector 2-pin, Junior Timer (AMP)	<b>C4</b>

### Sealing material

10	FKM (fluorocarbon rubber)	<b>V</b>
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11	Further details in plain text	<b>*</b>
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### Notice

For valve types other than those listed in the data sheet, consultation is required!

## Preferred types

Type	Material no.
FTDRE 4 K4X/30AG12C4V-8	R901545997
FTDRE 4 K4X/30AG12K40V-8	R901545998
FTDRE 4 K4X/30AG24C4V-8	R901545994
FTDRE 4 K4X/30AG24K40V-8	R901545995
FTDRE 4 K4X/30AG12N0C4V-8	R901545961
FTDRE 4 K4X/30AG12N0K40V-8	R901545962
FTDRE 4 K4X/30AG24N0C4V-8	R901545959
FTDRE 4 K4X/30AG24N0K40V-8	R901545960

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

## Functional description

### General

The proportional pressure reducing valve type FTDRE 4 K is a direct-operated cartridge valve in 3-way version.

It reduces the control pressure (port **A**) proportional to the solenoid current and works largely independently from the inlet pressure (port **P**).

Minimum pressure is set in case of power failure or if the setpoint value is 0. The actuation takes place via a proportional solenoid. The inside of the solenoid is connected with the port **T** and filled with hydraulic fluid. With these valves, the system pressure can be reduced continuously depending on the electrical setpoint value. The valve is suitable for actuating couplings, pumps and directional valves, as well as for use in proportional pilot controls (particularly in the mobile area, but also for industrial applications).

### Basic principle

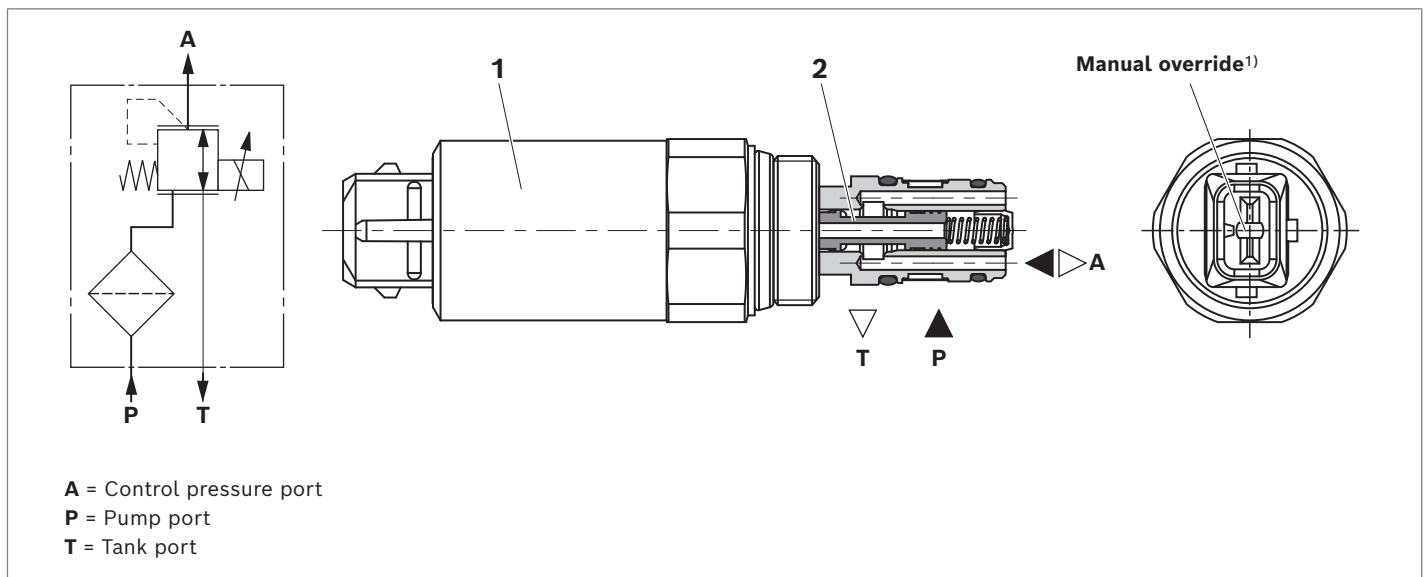
The valve regulates the pressure in port **A** proportionally to the current on the solenoid.

The proportional solenoid (1) converts the electric current into mechanical force that acts on the control spool (2) via the anchor. The control spool controls the connection between the main ports.

### Notice

- ▶ Occurring tank pressure (port **T**) is added to the control pressure (port **A**).
- ▶ In an uninstalled state or in a system that is not vented completely, the valve must not be energized, as the entering air otherwise has a significant negative effect on the dynamic behavior of the valves.

### ▼ Section and symbol



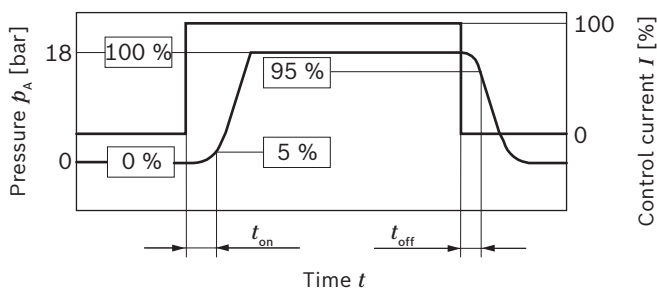
<sup>1)</sup> Not in Version "N0". Actuated by pin tool.  
 Connector must be removed to actuate manual override (versions "C4" and "K40"). Maximum number of matings is 10 (Specification AMP 108-18013).

## Technical data

General		
Weight (approx.)	kg	0.19
Installation position		Any; the position of the electrical connection should preferably be hanging down (with the valve in horizontal position or with the electrical connection pointing upwards, a minimum counter-pressure must be generated so that the valve remains filled with oil).
Ambient temperature range	°C	-30 ... +120
Salt spray test according to ISO 9227	h	600 (NSS test)
Solenoid surface protection		Coating according to ISO 19598-Fe//ZnNi with thick film passivation

Hydraulic				
Maximum control pressure	Port <b>A</b>	$p_A$	bar	18, 30
Maximum inlet pressure	Port <b>P</b>	$p_E$	bar	100
Counter-pressure	Port <b>T</b>	$p_T$	bar	Depressurized (max. 30 bar) Counter-pressure increases set pressure, even when current $I = 0$ A
Flow ( $\Delta p = 7$ bar)	<b>P</b> → <b>A</b>	$q_{V \min}$	l/min	≥ 5
		$q_{V \max}$	l/min	12
Maximum leakage flow	Port <b>T</b>	$q_L$	cm <sup>3</sup> /min	≤ 100 ( $p_E = 100$ bar; control current $I = 0$ A)
Maximum pilot flow			cm <sup>3</sup> /min	≤ 350 ( $p_E = 100$ bar, $q_{VA} = 0$ l/min; control current $I = I_{\max}$ )
Hydraulic fluid				See table on page 5
Hydraulic fluid temperature range		$\vartheta$	°C	-30 ... +120
Viscosity range		$\nu$	mm <sup>2</sup> /s	10 ... 380
Maximum admissible degree of contamination of hydraulic fluid, cleanliness level as per ISO 4406 (c)				Level 20/18/15 <sup>1)</sup>
Load cycles				10 mil.
Maximum step response during control current change (see characteristic curve below)		$t_{\text{on}}$	ms	≤ 40
		$t_{\text{off}}$	ms	≤ 20
Mesh width mesh filter element	Port <b>P</b>		µm	180

### ▼ Maximum step response



1) 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.

We recommend a filter with a minimum retention rate of  $\beta_{10} \geq 75$ .

<b>Electric</b>				
Voltage type	DC voltage			
Supply voltage	$U$	V	<b>12</b>	<b>24</b>
Maximum control current	$I_{max}$	mA	1800	800
Coil resistance	Cold value at 20 °C	$R$	$\Omega$	2.4
Duty cycle	%			
Maximum coil temperature <sup>2)</sup>	°C			
Type of protection according to ISO 20653	Connector version "C4"	IP6K5 <sup>3)</sup>		
		IP6K7 and IP6K9K <sup>3)</sup> (only with Rexroth plug-in connector, material no. R901022127)		
	Connector version "K40"	IP6K7 and IP6K9K <sup>3)</sup>		
Control electronics (separate order)	Type RA... analog amplifier (data sheet 95230) BODAS controller (data sheets 95204, 95205, 95206)			
PW modulation <sup>4)</sup>	Hz		200	
Design according to VDE 0580				

### Notice

- ▶ For applications outside these values, please consult us!
- ▶ The technical data was determined at a viscosity of  $\nu = 32 \text{ mm}^2/\text{s}$  (HLP32;  $\vartheta_{oil} = 40 \pm 5 \text{ °C}$ ).

### Notice

For the electrical connection, a protective earth (PE  $\perp$ ) connection is mandatory based on the specification.

### Hydraulic fluid

Hydraulic fluid	Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils	HL, HLP	FKM	DIN 51524	90220
Environmentally acceptable	insoluble in water	FKM	ISO 15380	90221
	Soluble in water	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.

2) Due to the occurring surface temperatures of the solenoid coils, the standards ISO 13732-1 and ISO 4413 must be observed!

3) With assembled and locked plug-in connector

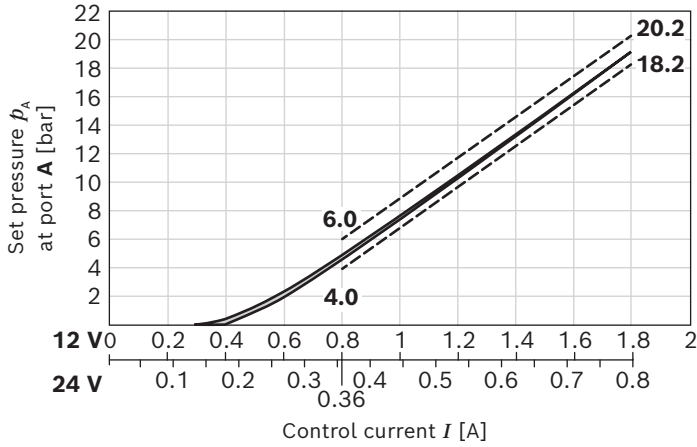
4) The PWM frequency shall be optimized in accordance with the application.

The operating temperature range is to be observed.

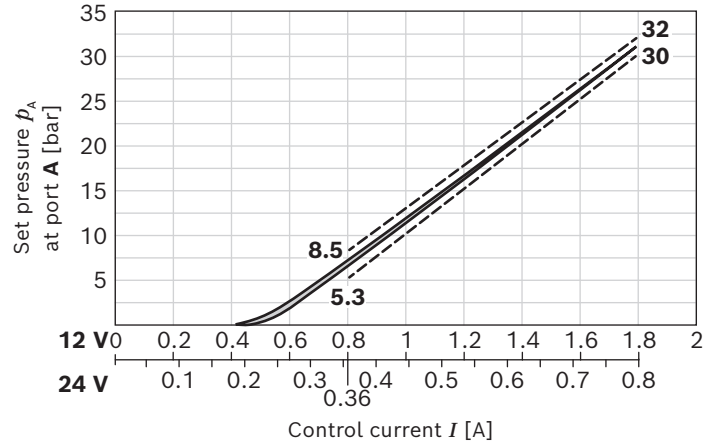
## Characteristic curves

### $p$ - $I$ characteristic curves with tolerance band

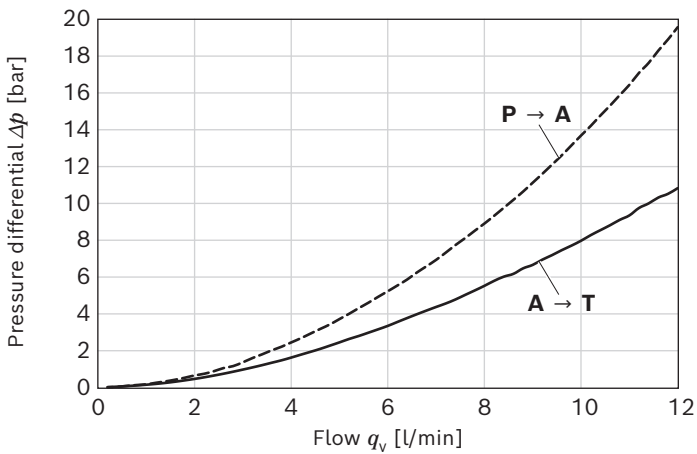
#### ▼ Control pressure 18 bar



#### ▼ Control pressure 30 bar



### $\Delta p$ - $q_v$ flow characteristic curves



#### Notice

Characteristic curves measured with HLP32,  $\vartheta_{oil} = 40 \pm 5$  °C.

#### Measuring conditions

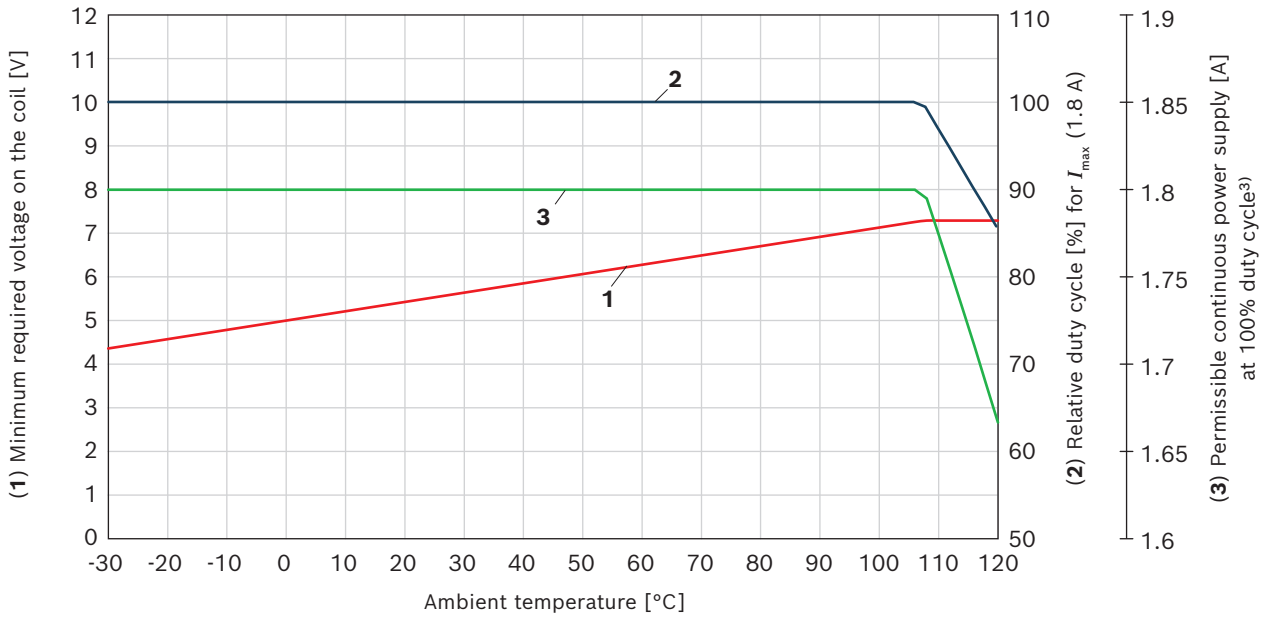
Amplifier		RA analog amplifier (Data Sheet 95230)
PW modulation	Hz	200
Inlet pressure	bar	50
Dead volume at control pressure port <b>A</b>	ml	135

## Permissible working range

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

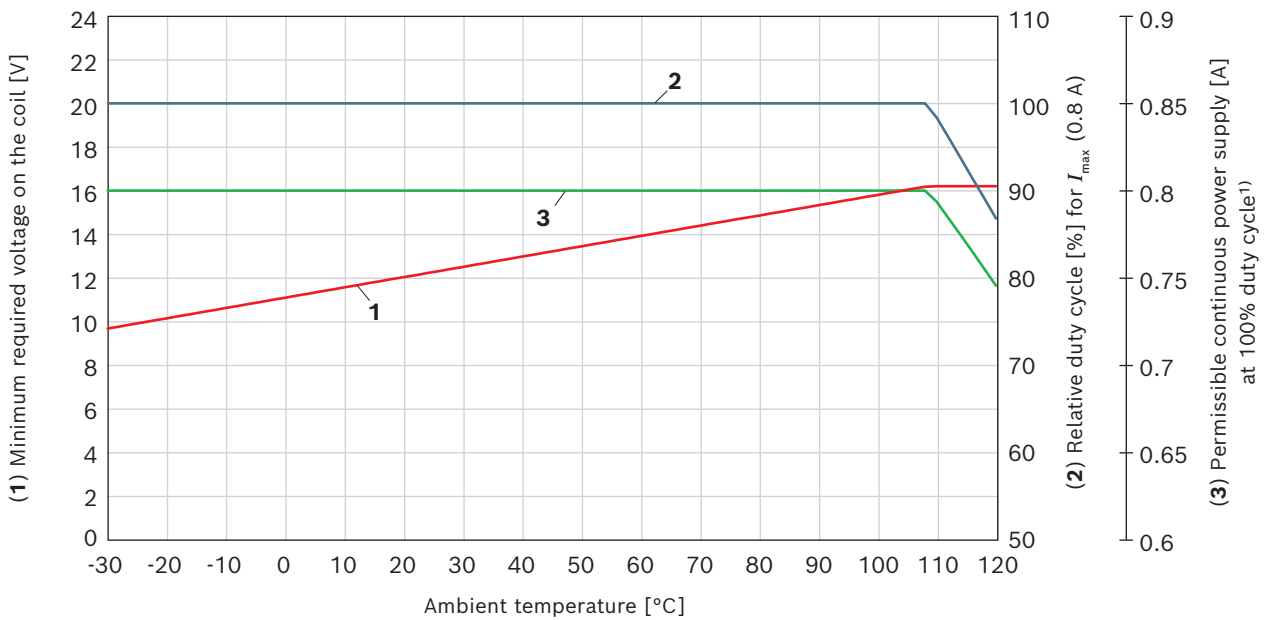
#### Version "G12"

▼ Control pressure 18 and 30 bar, ( $U = 12\text{ V}$ ;  $R_{\text{nom}} = 2.4\ \Omega$ ;  $I_{\text{max}} = 1.8\text{ A}$ )



#### Version "G24"

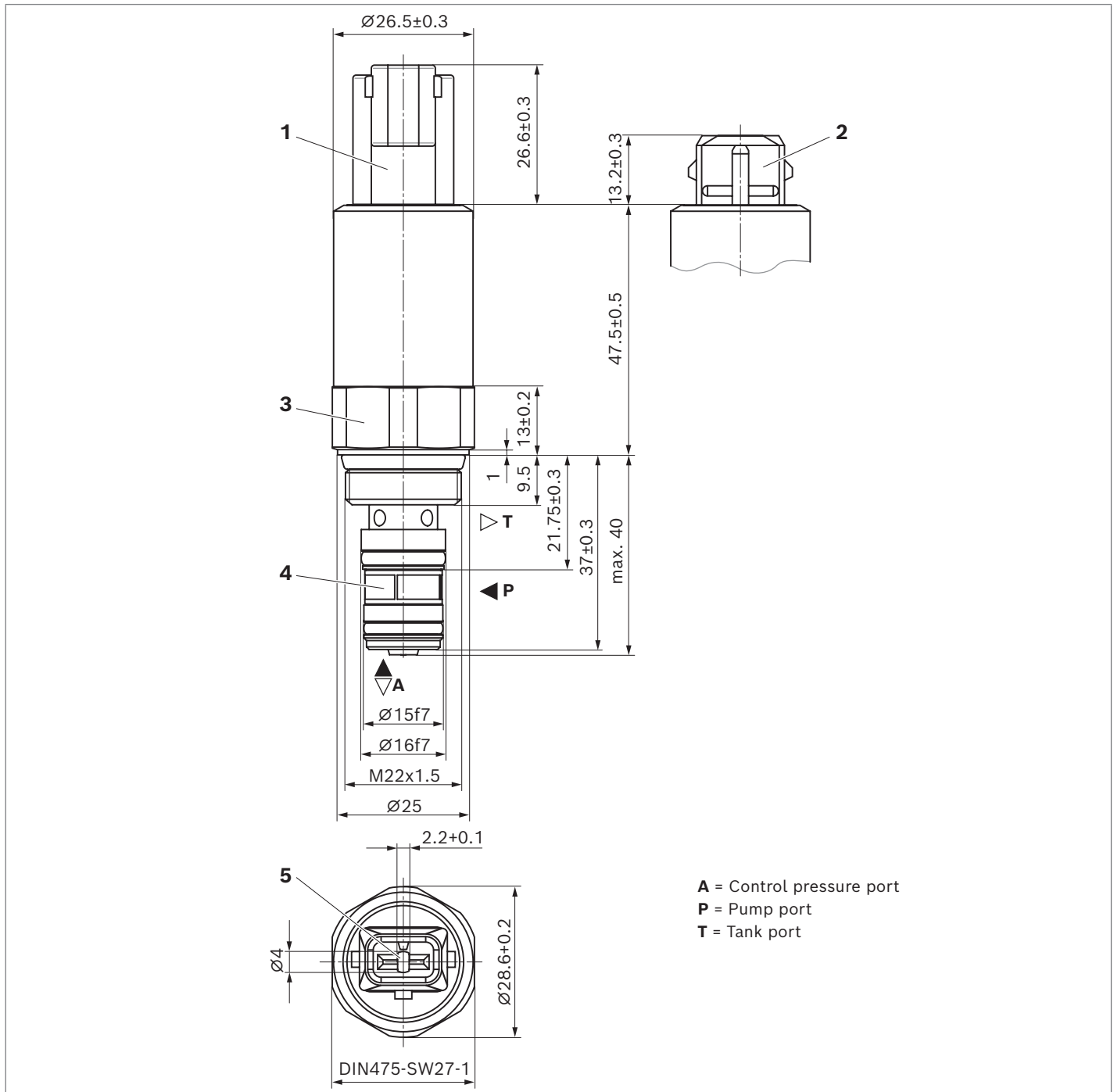
▼ Control pressure 18 and 30 bar, ( $U = 24\text{ V}$ ;  $R_{\text{nom}} = 12\ \Omega$ ;  $I_{\text{max}} = 0.8\text{ A}$ )



1) Duty cycle (DIN VDE 0580): S3 xx % 10 min.  
(xx see diagram (2) relative duty cycle)

## Dimensions

### ▼ FTDRE 4 K with screw-in thread



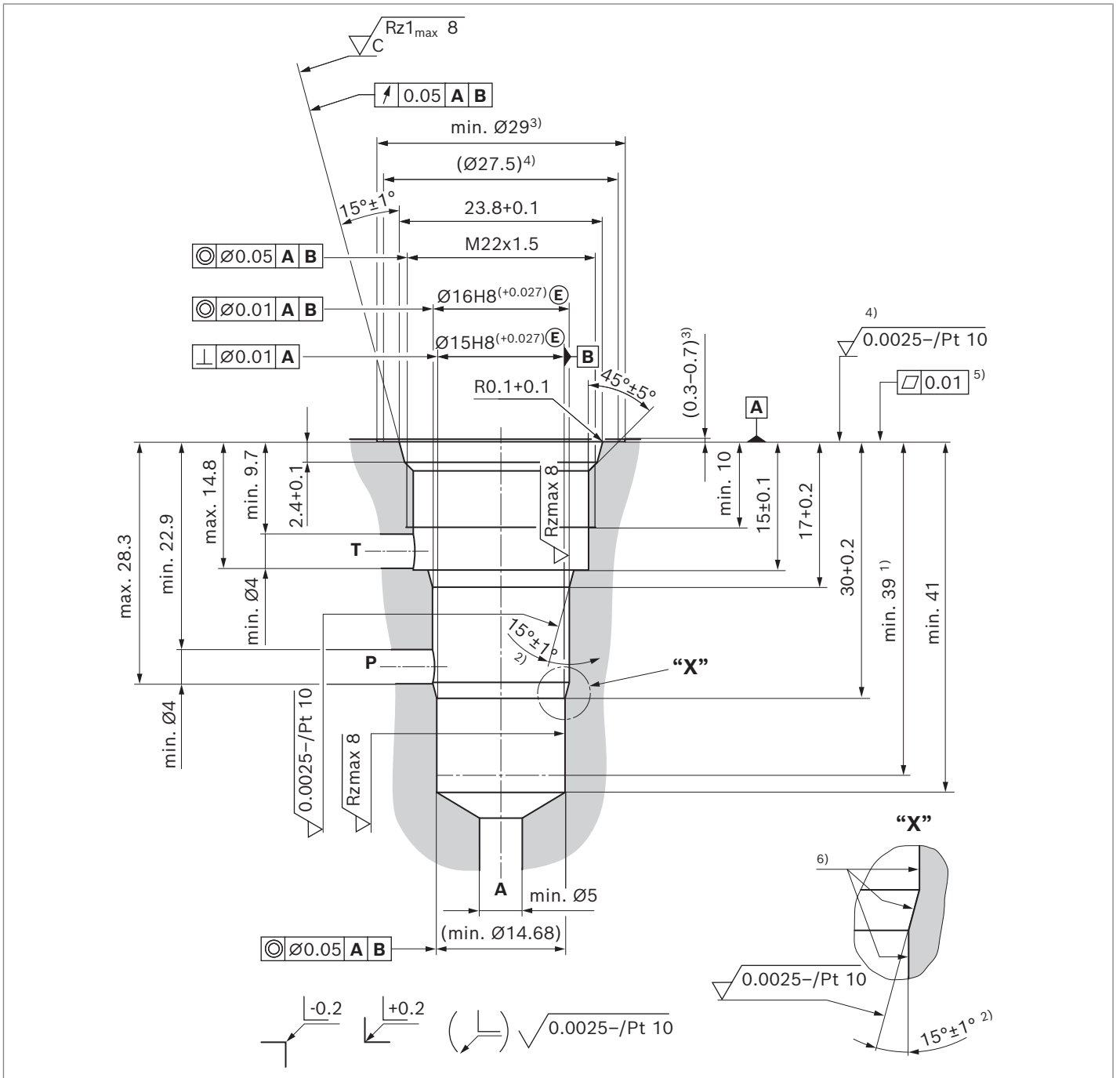
- |  |  |
|--|--|
| <p><b>1</b> Device connector "K40"<br/>(separate order, see data sheet 08006)</p> <p><b>2</b> Device connector "C4"<br/>(separate order, see data sheet 08006)</p> <p><b>3</b> Hexagon nut AF27; tightening torque <math>M_A = 15 \text{ Nm} \pm 10\%</math></p> | <p><b>4</b> Mesh filter 180 <math>\mu\text{m}</math></p> <p><b>5</b> Manual override (not in Version "N0").<br/>Actuated by pin tool. Connector must be removed to actuate manual override (versions "C4" and "K40"). Maximum number of matings is 10 (Specification AMP 108-18013).</p> |
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#### Notice

Aluminum, steel and casting as block material.  
Make sure that a minimum yield point of  $R_{p0.2} \geq 240 \text{ N/mm}^2$  is applied.



**Mounting cavity**



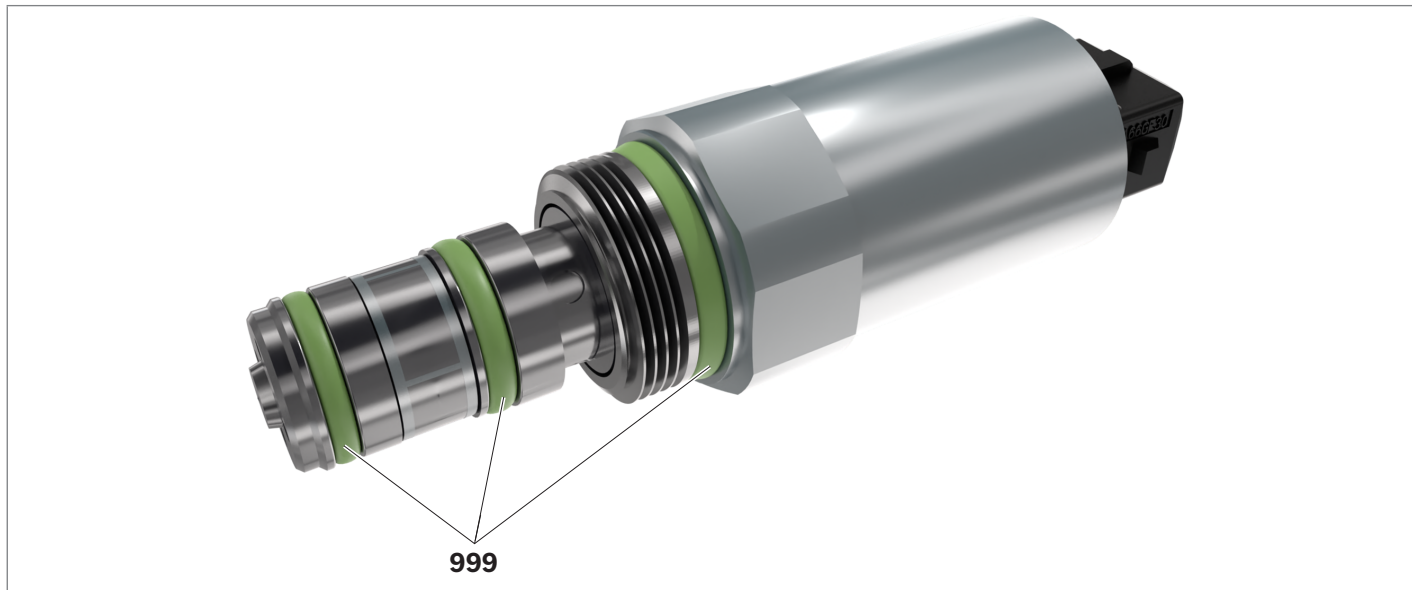
**Standards:**

Workpiece edges	DIN ISO 13715
Shape and position tolerance	DIN EN ISO 1101
General tolerances for machining	DIN ISO 2768-mK
Tolerance	DIN ISO 8015
Surface finish	DIN EN ISO 1302

- 1) Depth of fit
- 2) All seal ring insertion faces are rounded and free of burrs
- 3) If counterbore depth >1 mm → counterbore  $\varnothing \geq 33$  mm
- 4) Required roughness up to  $\varnothing 27.5$  mm
- 5) Required evenness up to  $\varnothing 27.5$  mm
- 6) Overall contour finished with mold tool

## Available individual components

### ▼ FTDRE 4 K with screw-in thread



Position	Denomination	Material no.
999	Seal kit of the valve (FKM)	R900846072

## Related documentation

- ▶ Control electronics:
  - 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<sub>D</sub> values                      Data sheet 90294

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