RE 64660/2020-06-09
Replaces: 2020-01-22

rexroth
A Bosch Company

Proportional pressure reducing valve, direct operated, decreasing characteristic curve
Type DRE05FK

HAD8146

- Size 5
- Series 1X
- Maximum control pressure 30 bar
- Maximum working pressure 50 bar
- Maximum flow 30 l/min (at Δp ≤ 7 bar)

Features

- Direct operated proportional pressure reducing valve for reducing system pressure
- Cartridge valve
- Mounting cavity R/DRE 05
- Suitable for mobile applications
- Actuated via proportional solenoid
- In case of power failure, maximum pressure is set
- Self-air bleeding pole tube
- Main application: Gear shifting

Contents

Ordering details

01	02	03	04	05		06	07	08	09	10	11	12	13	14
DRE	**05**	**F**	**K**	**1X**	**/**			**A**		**N0**		**Z**	**V**	*****

Valve type

01	Proportional pressure reducing valve, direct operated, electric actuation	**DRE**
02	Size 5	**05**
03	Decreasing characteristic curve	**F**
04	Cartridge valve	**K**

Series

05	Series 10 to 19 (unchanged installation and connection dimensions)	**1X**

Maximum control pressure[1)]

06	30 bar	**30**

Filter

07	Filter in **P**	**P**
	Filters in **A** and **P**	**A**

08	Proportional solenoid, switching in oil	**A**

Supply voltage

09	Control electronics 12 V DC	**G12**
	Control electronics 24 V DC	**G24**

Manual override

10	**Without** manual override	**N0**

Electrical connection[2)]

11	Device connector 2-pin, DT 04-2P (DEUTSCH)	**K40**
	Device connector 2-pin, Junior Timer (AMP)	**C4**

Connector orientation

12	Radial	**Z**

Sealing material

13	FKM (fluoroelastomer)	**V**

14	Further details in plain text	*****

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

1) Other pressure stages on request
2) Plug-in connectors are not included in the scope of delivery and must be ordered separately, see data sheet 08006.

Preferred types

Type	Material number
DRE05FK1X/30PAG12N0K40ZV	R901466211
DRE05FK1X/30PAG24N0K40ZV	R901466209

Functional description

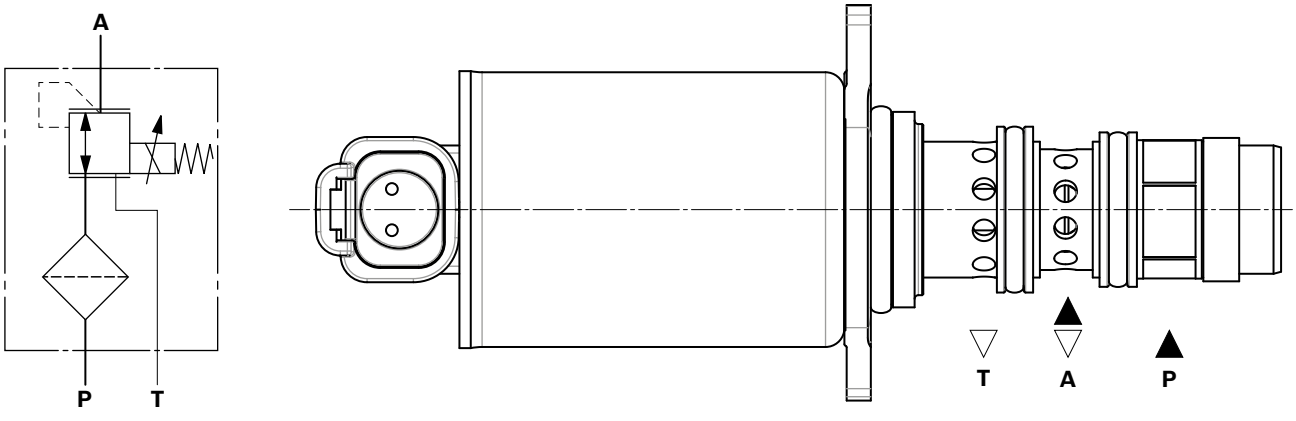
General

The proportional pressure reducing valve type DRE05FK 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**).
Maximum 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 control pressure port **A** 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 gears, couplings, pumps and directional valves, as well as for use in proportional pilot controls (particularly in the mobile applications area).

Basic principle

The valve regulates the pressure in port **A** proportionally to the current on the solenoid.
The version **F** implies a decreasing characteristic curve, i.e. increasing current results in decreasing pressure (see characteristic curve page 6).
The proportional solenoid converts the electric current into mechanical force that acts on the control spool 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**).



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

Technical data

General			
Weight (approx.)		kg	0.4
Installation position			Any, horizontal preferred
Ambient temperature range		°C	–30 to +120
Salt spray test according to ISO 9227		h	720 (NSS test)
Solenoid surface protection			Coating according to DIN 50962-Fe//ZnNi with thick film passivation

Hydraulic					
Maximum control pressure	Port **A**	p_A	bar	30 (others on request)	
Maximum inlet pressure	Port **P**	p_E	bar	50 (90 bar including pressure peaks)	
Counter-pressure	Port **T**	p_T	bar	Depressurized (max. 30 bar) Counter-pressure increases set pressure, even when current I = 0	
Flow	**P** → **A** (Δp ≤ 7 bar)	q_V	l/min	30	
	A → **T** (Δp ≤ 10 bar)	q_V	l/min	30	
Average leakage flow	Port **T**	q_L	ml/min	80 (p_E = 40 bar; I = I_{max}; ν = 46 mm²/s)	
Average pilot flow			ml/min	400 (Δp = 10 bar; I = 0 A; ν = 46 mm²/s) (max. 600)	
Hydraulic fluid				See table on page 5	
Hydraulic fluid temperature range		ϑ	°C	–20 to +110 (standard) –40 to +120 (on request)	
Viscosity range		ν	mm²/s	3.7 to 5	limited function
				5 to 400	full function
				400 to 20000	limited function
Maximum admissible degree of contamination of hydraulic fluid fluid (cleanliness level) according to ISO 4406 (c)				Level 20/18/15 [1]	
Load cycles				10 mil.	
Hysteresis (within tolerance range)			bar	≤1.5 (40 % control pressure, PWM 125 Hz)	
Repeat accuracy			%	< 3 from maximum control pressure	
Step response (depending on system)	0 % → 100 %		ms	≤70	(50 bar in **P**; ν = 46 mm²/s, q_V = 0 l/min, dead volume in **A** = 140 cm³)
	100 % → 0 %		ms	≤50	
Mesh width mesh filter element	Port **P** (**A** optional)		µm	180	

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.
To select filters, visit www.boschrexroth.com/filter.
We recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$.

Electrical					
Voltage type				DC voltage	
Supply voltage		U	V	**12**	**24**
Maximum control current		I_{max}	mA	1450	690
Coil resistance	Cold value at 20 °C		Ω	4.1	17.5
Duty cycle (ED)[2)]			%	See characteristic curve on page 7	
Maximum coil temperature[2)]			°C	185	
Type of protection according to ISO 20653	Connector version "C4"			IP6K5 with installed and locked plug-in connector	
				IP6K7 and IP6K9K with Rexroth plug-in connector, Material no. R901022127	
	Connector version "K40"			IP6K5, IP6K7 and IP6K9K with installed and locked plug-in connector	
Connector orientation				As desired (rotatable)	
Control electronics (separate order)				Type RA... analog amplifier (data sheet 95230)	
				BODAS controller (data sheets 95204, 95205, 95206)	
Recommended PWM frequency Dither frequency (on request)[3)]			Hz	125	125
Design according to VDE 0580					

Notice

- The technical data was determined at a viscosity of ν = 46 mm²/s (HLP46; ϑ_{oil} = 40 °C).
- For applications outside these values, please consult us!
- For the electrical connection, a protective earth (PE ⏚) 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
Biodegradable	insoluble in water	HEES	FKM	ISO 15380	90221
	soluble in water	HEPG	FKM	ISO 15380	

Notice

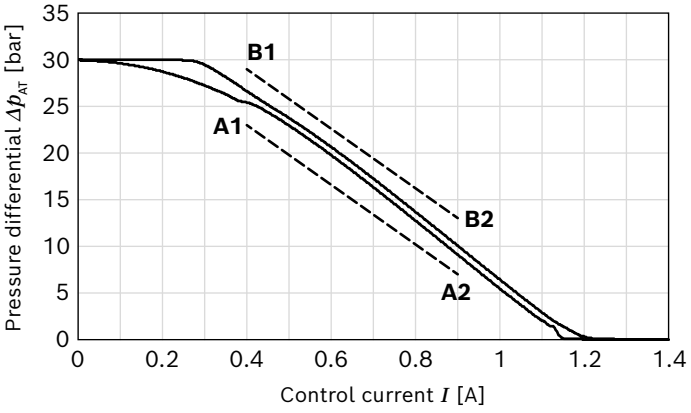
- Further information and details on using other hydraulic fluids are available in the above data sheets or on request.
- Restrictions are possible with the technical valve data (temperature, pressure range, service life, maintenance intervals, etc.)!
- The flash point of the hydraulic fluid used must be 40 K above the maximum solenoid surface temperature.
- **Biodegradable:** If biodegradable hydraulic fluids are used that are also zinc-solving, 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) The dither frequency shall be optimized in accordance with the application.
The operating temperature range is to be observed.

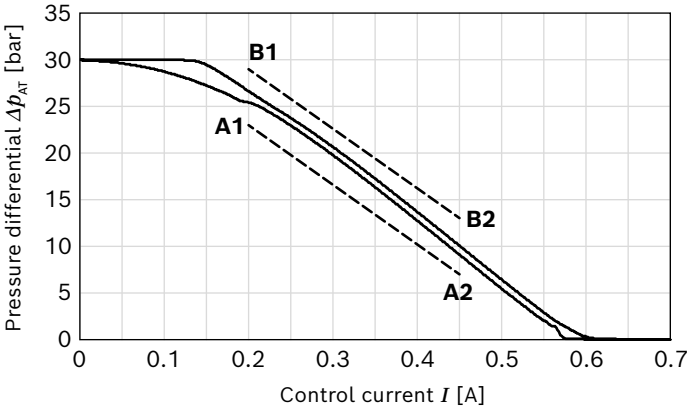
Characteristic curves

Δp-I-characteristic curves with tolerance band

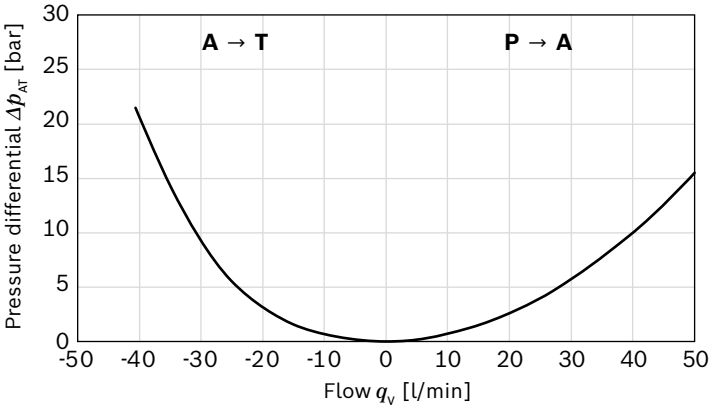
▼ **Control pressure 30 bar, 12 V**



▼ **Control pressure 30 bar, 24 V**



Δp-q_V-flow characteristic curve

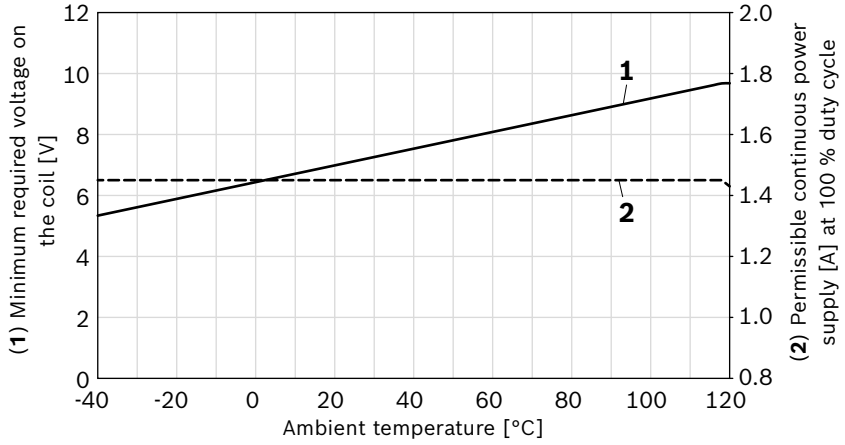


Notice
Characteristic curves measured with HLP46,
ϑ_{oil} = 40$^{\pm 5}$ °C.

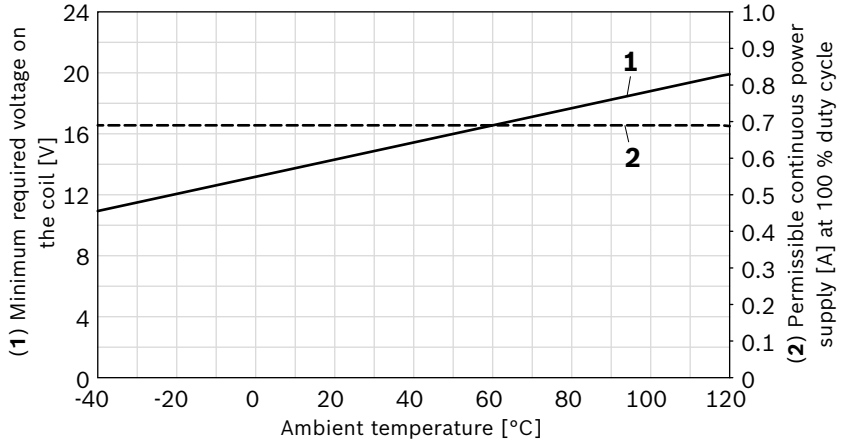
Permissible working range

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

▼ **12 V** (R_{nom} = 4.1 Ω; $\vartheta_{coil\ max}$ = 185 °C; I_{nom} = 1.45 A)



▼ **24 V** (R_{nom} = 17.5 Ω; $\vartheta_{coil\ max}$ = 185 °C; I_{nom} = 0.69 A)

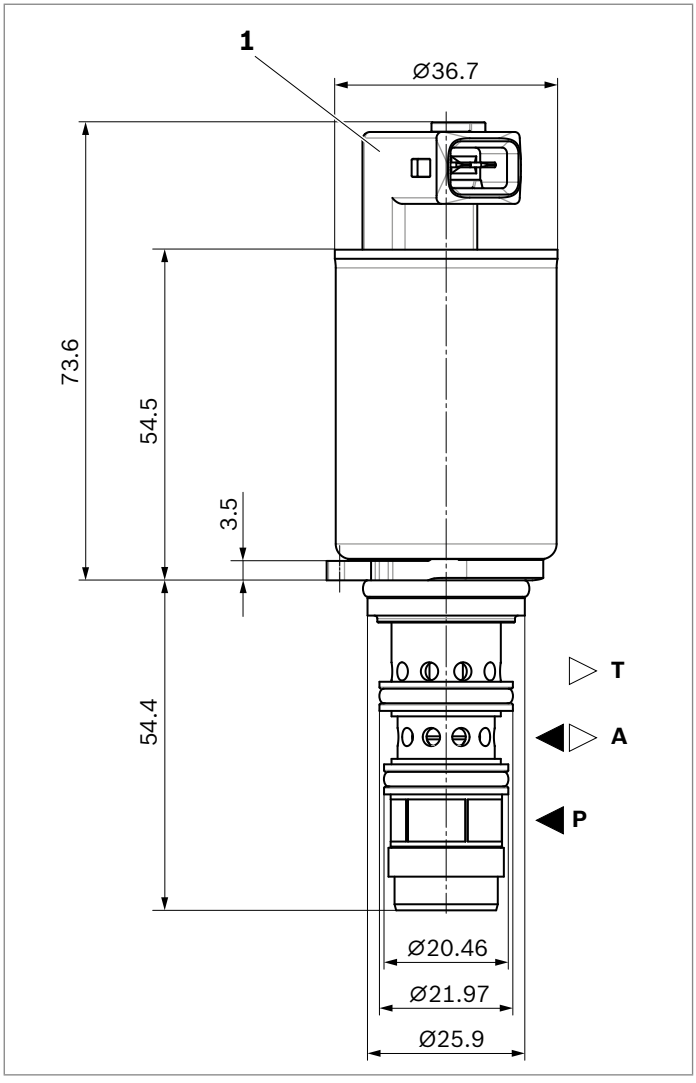


Notice

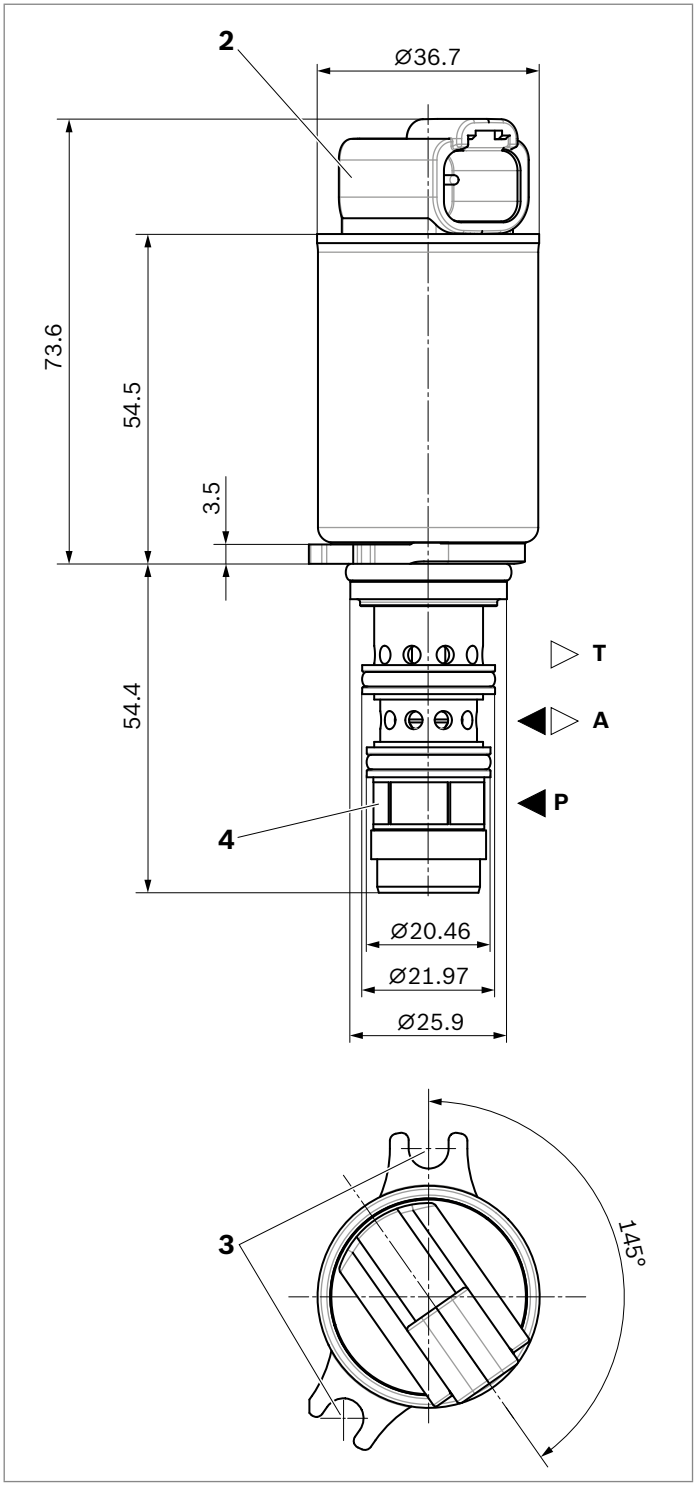
The characteristic curves were determined for coils with valve for medium test block size (80 x 80 x 80 mm), w/o flow in still air. Depending on installation conditions (block size, flow, air circulation, etc.) heat dissipation may be better. This increases the range of applications.
In specific instances, unfavorable conditions may limit the range of applications.

Dimensions

▼ **DRE05FK, version "C4"**



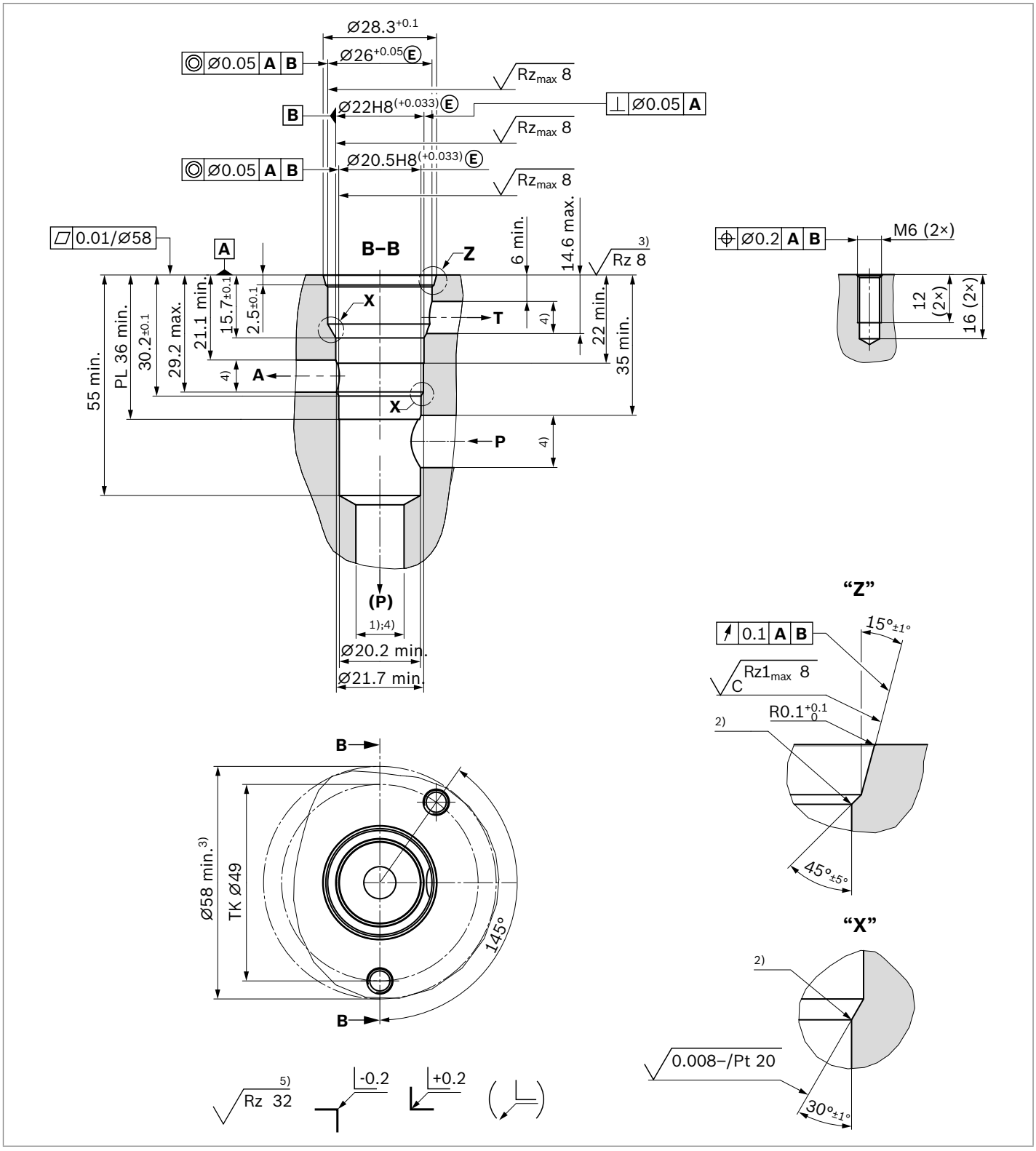
▼ **DRE05FK, version "K40"**



1 Plug-in connector for device connector "C4" (separate order, see Data Sheet 08006)
2 Plug-in connector for device connector "K40" (separate order, see Data Sheet 08006)
3 Recommended mounting bolts (separate order):
2 pieces M6×1-12-8.8 according to ISO 4762
tightening torque:
Aluminum: $M_A = 6^{+2}$ Nm
GGG40: $M_A = 6^{+2}$ Nm
steel: $M_A = 6^{+2}$ Nm
4 Filter on port **P** (optional on port **A**)

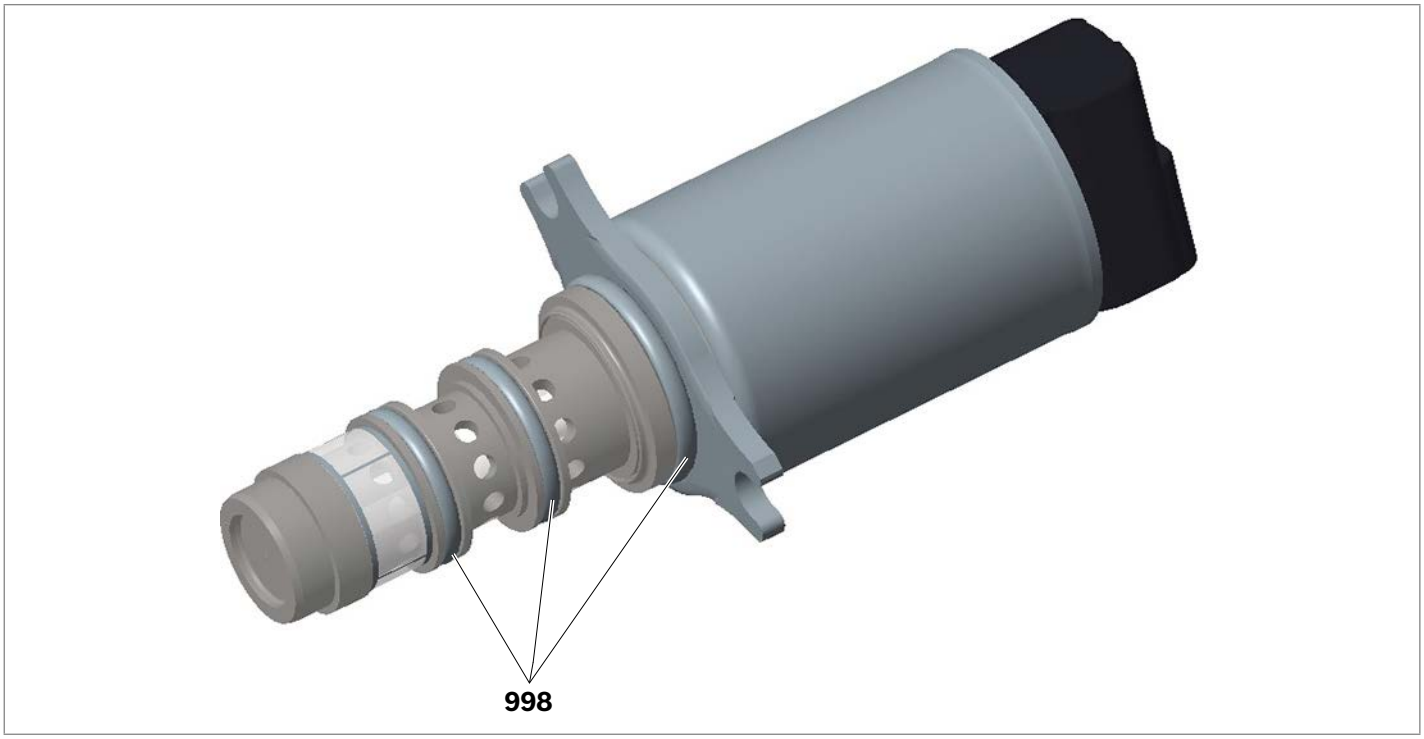
Mounting cavity

▼ **R/DRE 05; 3 main ports**



1) Optional position of **P**
2) Rounded and burr-free
3) Contact surface
4) Min. required cross-section: 47 mm²
5) Visual check

Available individual components



Item	Denomination	Material no.
998	Seal kit of the valve (FKM)	R961012042

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
- Selection of the filters www.boschrexroth.com/filter
- $MTTF_D$ values Data sheet 90294

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