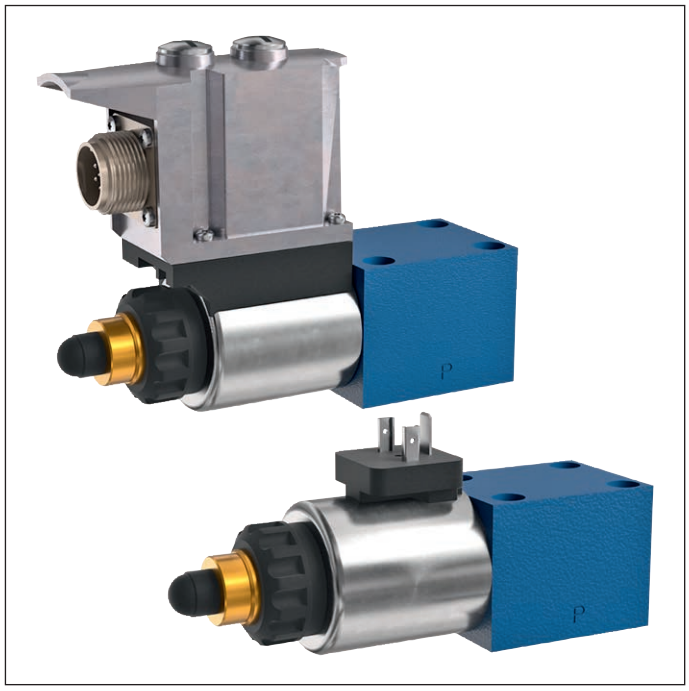
RE 29162
Edition: 2025-04
Replaces: 2013-06

rexroth
A Bosch Company

Proportional pressure relief valves, direct operated, without or with integrated electronics (OBE)

Type: DBET and DBETE



- Size 6
- Component series 6X
- Maximum operating pressure 420 bar
- Maximum flow 2 l/min

Features

- Subplate mounting
- Porting pattern according to ISO 4401-03-02-0-05
- Operation by means of proportional solenoid
- Proportional solenoid with central thread and detachable
- Integrated electronics (OBE) (type DBETE)
  - Low manufacturing tolerance of the pressure command value characteristic curve
- External control electronics (type DBET)
  - Amplifier in modular design, euro-card format and as plug-in amplifier
  - Individually adjustable upwards and downwards ramp
  - Fine adjustment of the command value pressure characteristic curve possible

Contents

Ordering code

01	02		03		04	05	06	07	08	09	10	11
DBET		**–**	**6X**	**/**			**G24**					*****

01	Proportional pressure relief valve	**DBET**
02	For external control electronics	**no code**
	With integrated electronics (OBE)	**E** ◇
03	Component series 60 ... 69 (60 ... 69: unchanged installation and connection dimensions)	**6X**

Pressure rating

04	50 bar	**50** ◇
	100 bar	**100** ◇
	200 bar	**200** ◇
	315 bar	**315** ◇
	350 bar	**350** ◇
	420 bar	**420**
05	Pilot oil return internal	**no code** ◇
	External pilot oil return	**Y**

Supply voltage

06	Direct voltage 24 V	**G24**

Coil

07	1600 mA	**no code** ◇
	800 mA (only with external control electronics)	**-8** [1]

Electrical connection

08	**– Type DBET**	
	Connector, 3-pole (2 + PE) according to EN 175301-803	**K4** [2]
	– Type DBETE	
	Connector, 7-pole (6 + PE) according to EN 175201-804	**K31** [2] ◇

Electrical interface

09	External control electronics	**no code**
	Command value input 0 ... 10 V; actual value output 0 ... 10 V	**A1** ◇
	Command value input 4 ... 20 mA; actual value output 4 ... 20 mA	**F1**

Seal material (observe compatibility of seals with hydraulic fluid used, see page 6)

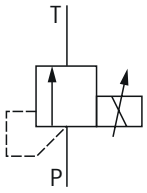
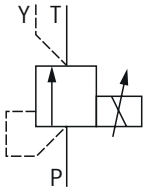
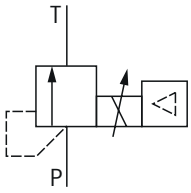
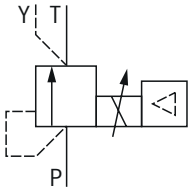
10	NBR seals	**M**
	FKM seals	**V** ◇
11	Further details in the plain text	

[1] Replacement for component series 5X (see characteristic curve on page 10). All data given in the data sheet refers to the "1600 mA coil" design.

[2] Mating connectors, separate order, see page 15 and data sheet 08006.

☞ **Notice:** ◇ = Preferred type

Symbols

"DBET"	"DBET...Y"	"DBETE"	"DBETE..Y"
			

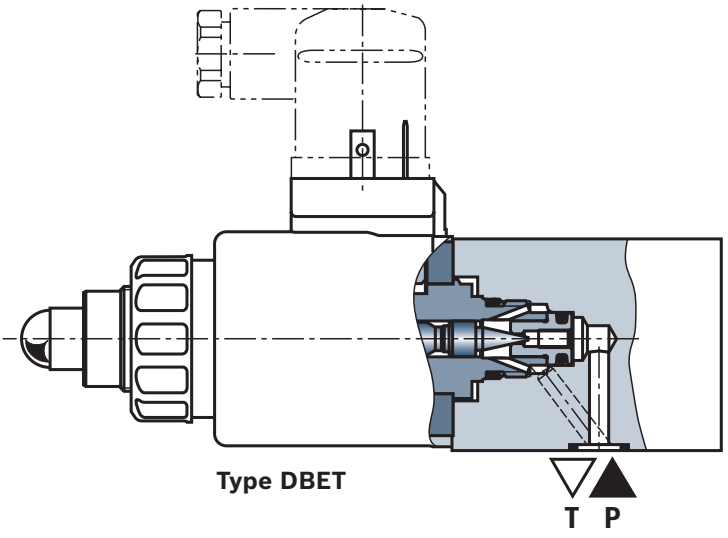
Function, section

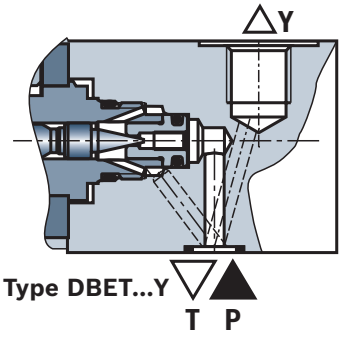
General information

Proportional pressure relief valves of type DBET are remote control valves with seat design and are used for system pressure limitation. Operation is effected by means of a proportional solenoid with central thread and detachable coil. The interior of the solenoid is connected to port T or Y and is filled with hydraulic fluid. Dependent on the electric command value, these valves can be used to steplessly set the system pressure to be limited.
The valves mainly consist of the housing (1), a proportional solenoid (2), the valve seat (3) and the valve poppet (4).

Basic principle

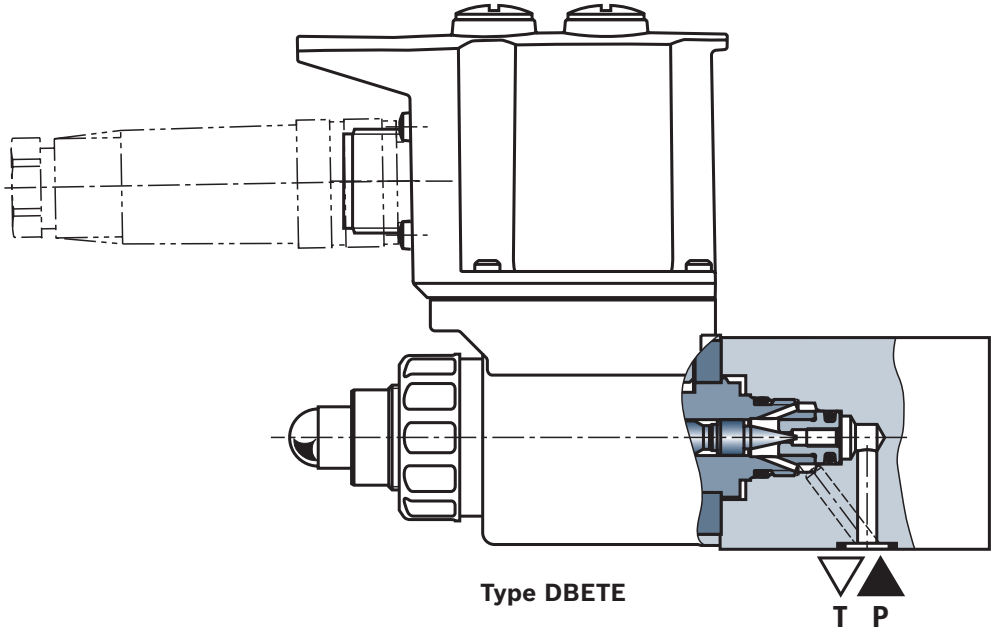
For the setting of the system pressure, a command value is specified at the control electronics. Dependent on the command value, the electronics actuate the solenoid coil with electric current. The proportional solenoid converts the electric current into mechanical force that acts on the valve poppet (4) via the armature plunger (5).
The valve poppet (4) pushes onto the valve seat (3) and blocks the connection between port P and T or Y. If the hydraulic force which acts on the valve poppet (4) is equal to the solenoid force, the valve regulates the set pressure by lifting the valve poppet (4) from the valve seat (3) allowing hydraulic fluid to flow from port P→T or Y. If the command value is zero, the control electronics only apply the minimum control current to the proportional solenoid (2) and the minimum set pressure is applied.





Function, section: Type DBETE

Type DBETE – with integrated electronics (OBE)
With regard to function and set-up, they correspond to valve type DBET.
The integrated electronics unit (OBE) is located on the proportional solenoid. Supply and command value voltage are applied at the connector (7). The pressure command value characteristic curve is adjusted at the factory with a minimal manufacturing tolerance between the individual units.



Type DBETE

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

General			
Type of connection			Subplate mounting
Porting pattern			ISO 4401-03-02-0-05
Weight	▶ "DBET"	kg	2.0
	▶ "DBETE"	kg	2.15
Installation position			Any
Ambient temperature range	▶ "DBET"	°C	–20 ... +70 (NBR seals) –15 ... +70 (FKM seals)
	▶ "DBETE"	°C	–20 ... +60 (NBR seals) –15 ... +60 (FKM seals)
Maximum storage time		Years	1 (if the storage conditions are observed, refer to the operating instructions 07600-B)
Maximum relative humidity (no condensation)		%	97
Protection class according to EN 60529			IP65 (if suitable and correctly mounted mating connectors are used)
$MTTF_D$ value according to EN ISO 13849		Years	150 (for further details see data sheet 08012) [1]
Sine test according to EN 60068-2-6			5 ... 2000 Hz / maximum of 10 g / 10 cycles / 3 axes
Noise test according to EN 60068-2-64			20 ... 2000 Hz / 10 g_{RMS} / 24 h / 3 axes
Transport shock according to EN 60068-2-27			15 g / 11 ms / 3 shocks / 3 axes
Conformity	▶ CE according to EMC Directive 2014/30/EU, tested according to		EN 61000-6-2 and EN 61000-6-3
	▶ UKCA according to Electromagnetic Compatibility Regulations SI 2016/1091, tested according to		EN 61000-6-2 and EN 61000-6-3
	▶ RoHS Directive		2011/65/EU [2]

Hydraulic			
Maximum operating pressure	▶ Port P	bar	420
	▶ Port T, Y	bar	Separately depressurized to the tank
Hydraulic fluid [3]			See table on page 6
Hydraulic fluid temperature range (flowed-through)		°C	–20 ... +80 (NBR seals) –15 ... +80 (FKM seals)
Viscosity range	▶ Recommended	mm^2/s	30 ... 46
	▶ Maximum admissible	mm^2/s	20 ... 380
Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c)			Class 20/18/15 [4]
Maximum flow		l/min	2 [3]
Maximum set pressure		bar	50; 100; 200; 315; 350; 420
Minimum set pressure (command value 0 V or 4 mA)		bar	See characteristic curves on page 12

1) Voltage supply "OBE" switched off.
2) The product fulfills the substance requirements of the RoHS Directive 2011/65/EU.
3) Observe flow limitation for pressure ratings 315, 350 and 420 bar (see page 11).
4) 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.

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

Hydraulic fluid		Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils		HL, HLP, HLPD, HVLP, HVLPD	NBR, FKM	DIN 51524	90220
Bio-degradable	▶ insoluble in water	HETG	FKM	ISO 15380	90221
		HEES	FKM		
	▶ soluble in water	HEPG	FKM	ISO 15380	
Flame-resistant	▶ water-free	HFDU (glycol base)	FKM	ISO 12922	90222
		HFDU (ester base)	FKM		
		HFDR	FKM		
	▶ containing water	HFC (Fuchs: Hydrotherm 46M, Renosafe 500; Petrofer: Ultra Safe 620; Houghton: Safe 620; Union: Carbide HP5046)	NBR	ISO 12922	90223

☞ **Important information on hydraulic fluids:**
- For further information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- There may be restrictions on the technical data (temperature, pressure range, life cycle, maintenance intervals, etc.).
- The ignition temperature of the hydraulic fluid used must be 50 K higher than the maximum surface temperature.
- **Bio-degradable and flame-resistant – containing water:**
  If components with galvanic zinc coating (e.g. version "J3" or "J5") or parts containing zinc are used, small amounts of dissolved zinc may get into the hydraulic system and cause accelerated aging of the hydraulic fluid. Zinc soap may form as a chemical reaction product, which may clog filters, nozzles and solenoid valves – particularly in connection with local heat input.
- **Flame-resistant – containing water:**
  Due to an increased cavitation tendency with the use of HFC hydraulic fluids, the life cycle of the component may be reduced by up to 30% as compared to use with HLP mineral oil. In order to reduce the cavitation effect, it is recommended – if possible specific to the installation – backing up the return flow pressure in ports T to approx. 20% of the pressure differential at the component.

Static/dynamic			
Hysteresis [5]		%	<4
Range of inversion [5]		%	<0.5
Response sensitivity [5]		%	<0.5
Manufacturing tolerance [5]	▶ Command value 20%	%	<±1.5 [6]
	▶ Command value 100%		
	– "DBET"	%	<±5 [7]
	– "DBETE"	%	<±1.5
Linearity [5]		%	±3
Step response $T_u + T_g$ [8]	▶ 0→100%; 100 →0%	ms	80 (system dependent)

[5] Of the maximum set pressure
[6] Zero point calibration at the factory
[7] Possible comparison of the external control electronics
[8] Line volume <20 cm³, ***qV*** = 0 l/min

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

Electric				
Version			"G24"	"G24-8"
Maximum solenoid current		mA	1600±10%	800±5%
Solenoid coil resistance	▶ Cold value at 20 °C	Ω	5.5	20.6
	▶ Maximum hot value	Ω	8.05	33

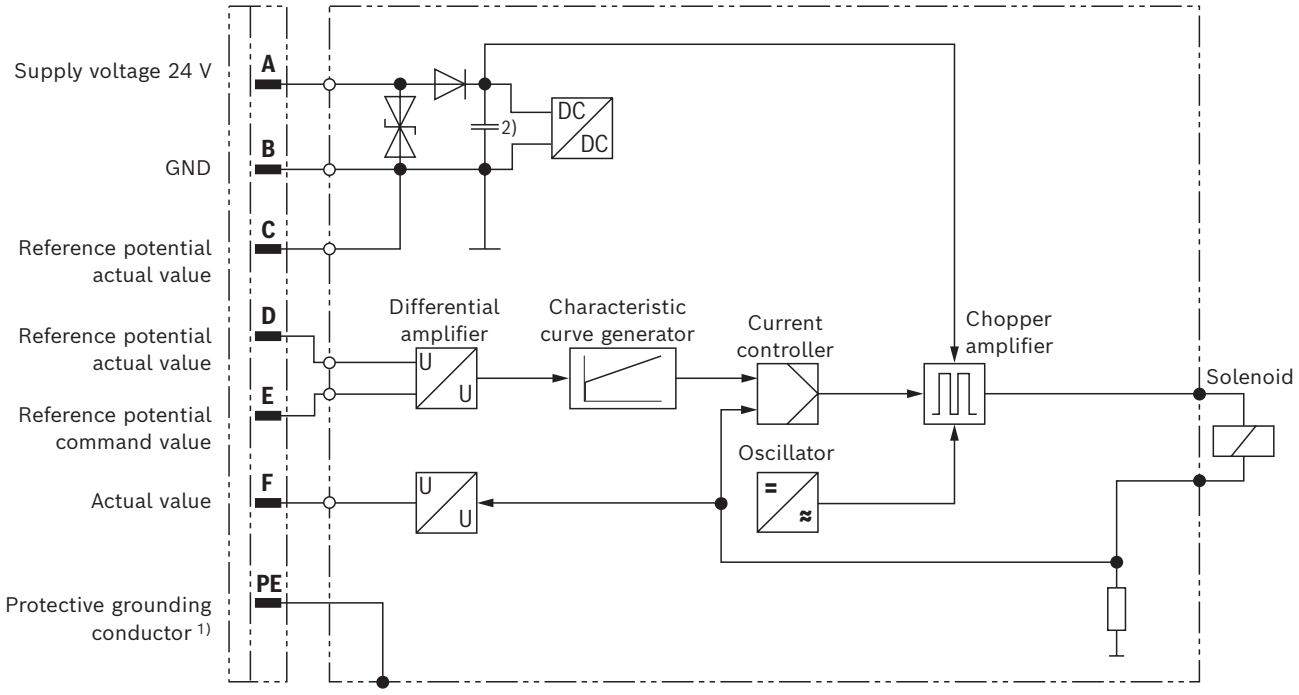
Electrical, integrated electronics (OBE) – interface "A1"				
Supply voltage	▶ Nominal value		VDC	24
	▶ Minimum		VDC	21
	▶ Maximum		VDC	35
	▶ Maximum residual ripple		Vpp	2.5
	▶ Maximum power consumption		VA	40
	▶ Current consumption during operation [1]	Rated current	A_{eff}	≤1.5
		Impulse current	A	3.2
	▶ Fuse protection, external		A_T	2 (time-lag)
Charging capacity (externally effective)			µF	<50
Relative duty cycle time according to VDE 0580				S1 (continuous operation)
Functional ground and screening				See pin assignment, page 9
Command value (differential amplifier)	▶ Measurement range		V	0 ... 10
	▶ Input resistance		Ω	>100
Actual value (test signal)	▶ Output range		V	0 ... 10
	▶ Minimum load impedance		kΩ	>2

Electrical, integrated electronics (OBE) – interface "F1"				
Supply voltage	▶ Nominal value		VDC	24
	▶ Minimum		VDC	21
	▶ Maximum		VDC	35
	▶ Maximum residual ripple		Vpp	2.5
	▶ Maximum power consumption		VA	40
	▶ Current consumption during operation [1]	Rated current	A_{eff}	≤1.5
		Impulse current	A	3.2
	▶ Fuse protection, external		A_T	2 (time-lag)
Charging capacity (externally effective)			µF	<50
Relative duty cycle time according to VDE 0580				S1 (continuous operation)
Functional ground and screening				See pin assignment, page 9
Command value	▶ Input current range		mA	4 ... 20
	▶ Input resistance		Ω	100 (+2 V diode path)
Actual value (test signal)	▶ Output range		mA	4 ... 20
	▶ Maximum load		Ω	475

[1] The making current peak is usually higher (depending on power supply unit, supply line and capacities).

☞ **Notice:**
EMC Directive conditions see page 15.

Block diagram/pin assignment



1) The protective grounding conductor (PE) is connected to the valve housing.

2) The charging of the capacitor (100 µF) upon connection of the supply voltage results in a current peak (dependent on the power supply).

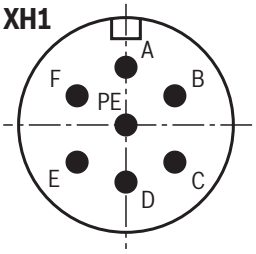
Notice:
Electrical signals provided via the integrated electronics (e.g. actual value) must not be used to switch off safety-relevant machine functions.

Electrical connections and assignment

Connector pin assignment "XH1", 6-pole + PE according to DIN 43563

Pin	Interface assignment	
	"A1"	"F1"
A	Supply voltage	Supply voltage
B	GND	GND
C	Reference potential actual value (connect with GND on control side)	Reference potential actual value (connect with GND on control side; current loop $I_{F\text{-}C}$ feedback)
D	Command value	Command value
E	Reference potential command value (connect with GND on control side)	Reference potential command value (connect with GND on control side; current loop $I_{D\text{-}E}$ feedback)
F	Actual value	Actual value
PE	Functional ground (directly connected to the valve housing)	

XH1

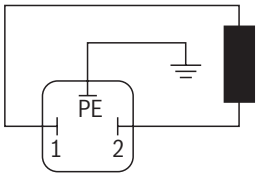
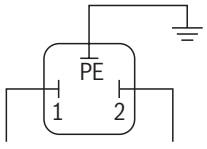


	Command value
"A1"	0 ... +10 V
"F1"	4 ... 20 mA

Connection cable:
- Up to 20 m cable length type LiYCY 7 x 0.75 mm²
- Up to 40 m cable length type LiYCY 7 x 1.0 mm²
- EMC-compatible installation, see page 15.

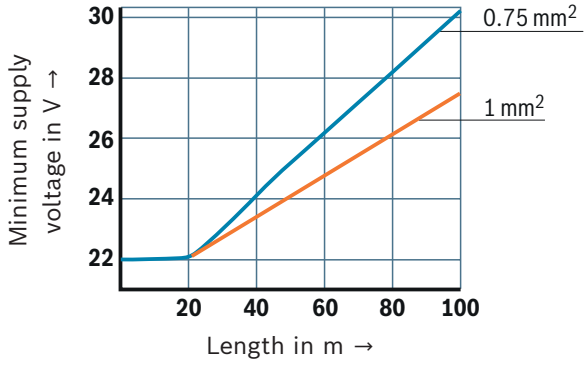
Notice:
Mating connectors, separate order, see page 15 and data sheet 08006.

Type DBET

Connection at device connector	Connection at mating connector
	

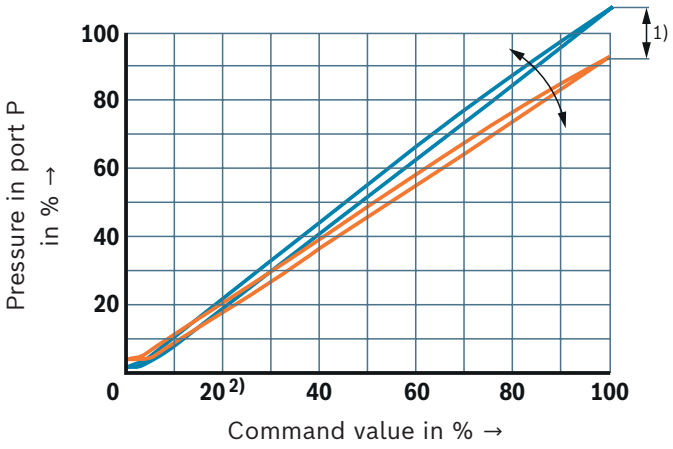
Connection cable (recommendation):
- 2-wire, 0.75 or 1 mm² plus protective grounding conductor and screening
- Only connect the screening to PE on the supply side
- Maximum admissible length = 100 m

The minimum supply voltage at the power supply unit depends on the length of the supply line (see diagram).



Characteristic curves: Type DBET (measured with HLP46, ϑ_{oil} = 40±5 °C)

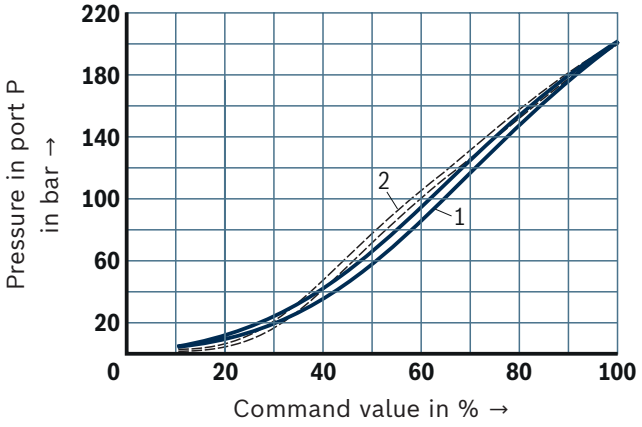
Pressure in port P dependent on the command value (flow = 0.8 l/min)



1) In order to be able to adjust several valves to the same characteristic curve, the manufacturing tolerance can - with version "DBET" - be changed at the external amplifier (see page 15) using the command value attenuator "G". In this connection, do not set the pressure higher than the maximum set pressure of the pressure rating with command value 100%.

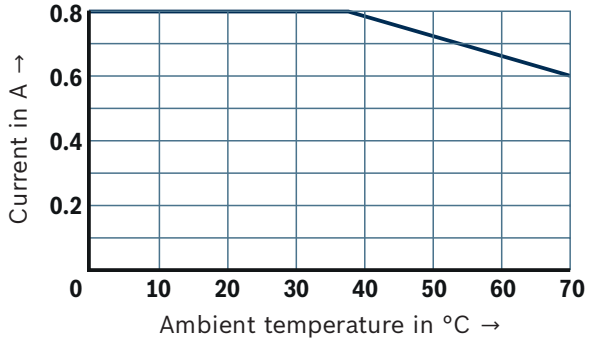
2) At 20% zero point calibration at the factory

Pressure in port P dependent on the command value
800 mA coil; amplifier VT-MSPA1-2X; pressure rating 200 bar (exemplary of all pressure ratings)



1 Component series 6X
2 Component series 5X

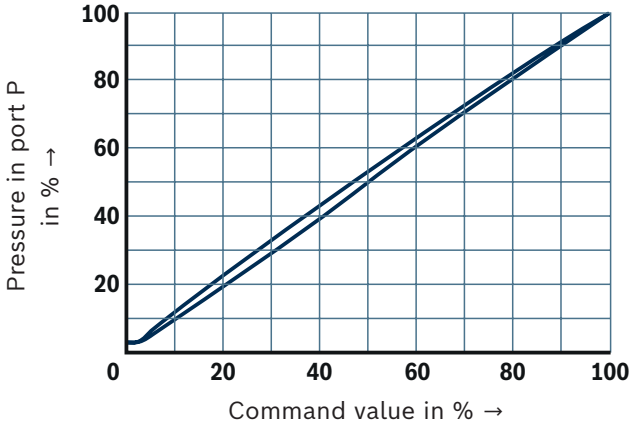
Current drop with increasing ambient temperature 24 V, 100% duty cycle)



Notice:
Typical characteristic curves which are subject to tolerance variations.

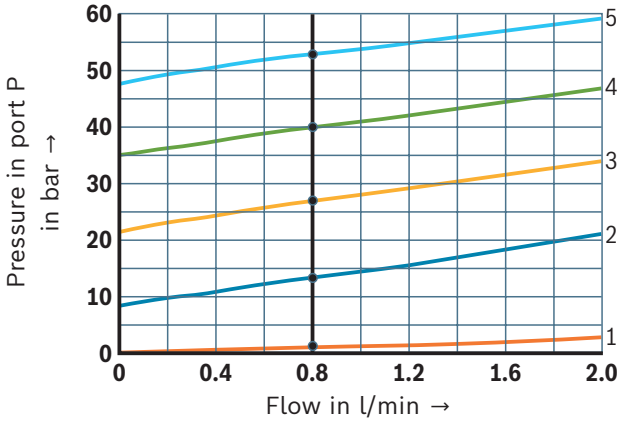
Characteristic curves: Type DBETE (measured with HLP46, ϑ_{oil} = 40±5 °C)

Pressure in port P dependent on the command value (flow = 0.8 l/min)

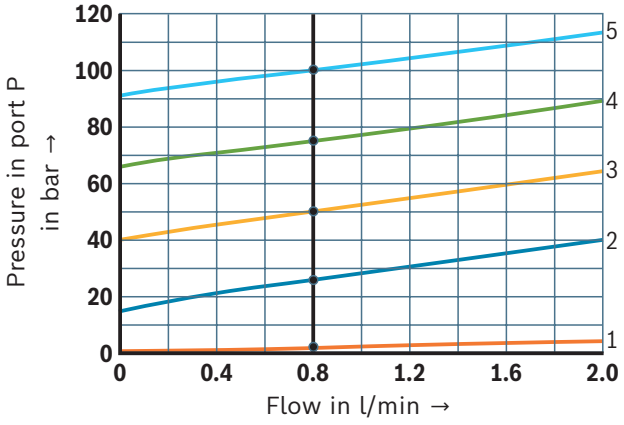


Pressure in port P dependent on the flow

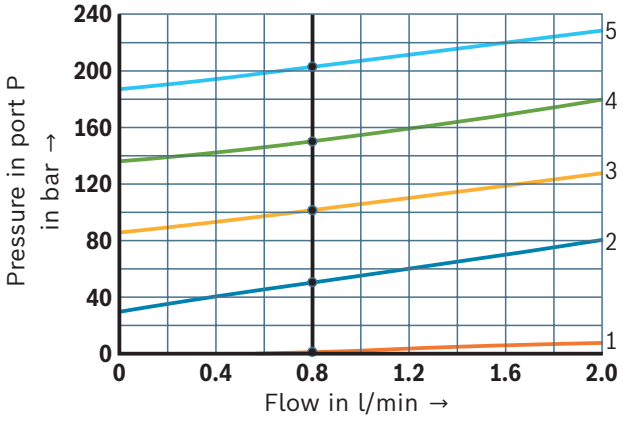
Pressure rating 50 bar



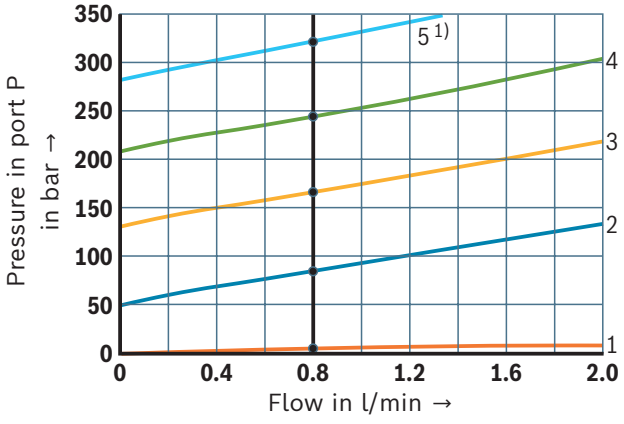
Pressure rating 100 bar



Pressure rating 200 bar



Pressure rating 315 bar



1 Command value 0%
2 Command value 25%
3 Command value 50%
4 Command value 75%
5 Command value 100%

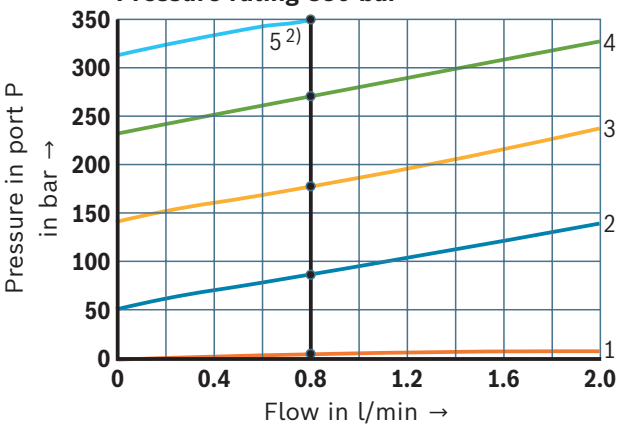
1) The command value must not exceed the maximum flow of 1.4 l/min.

☞ **Notice:**
Typical characteristic curves which are subject to tolerance variations.

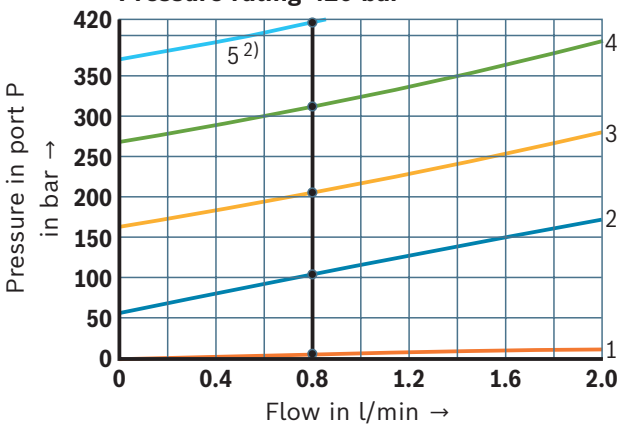
Characteristic curves: Type DBETE (measured with HLP46, ϑ_{oil} = 40±5 °C)

Pressure in port P dependent on the flow

Pressure rating 350 bar



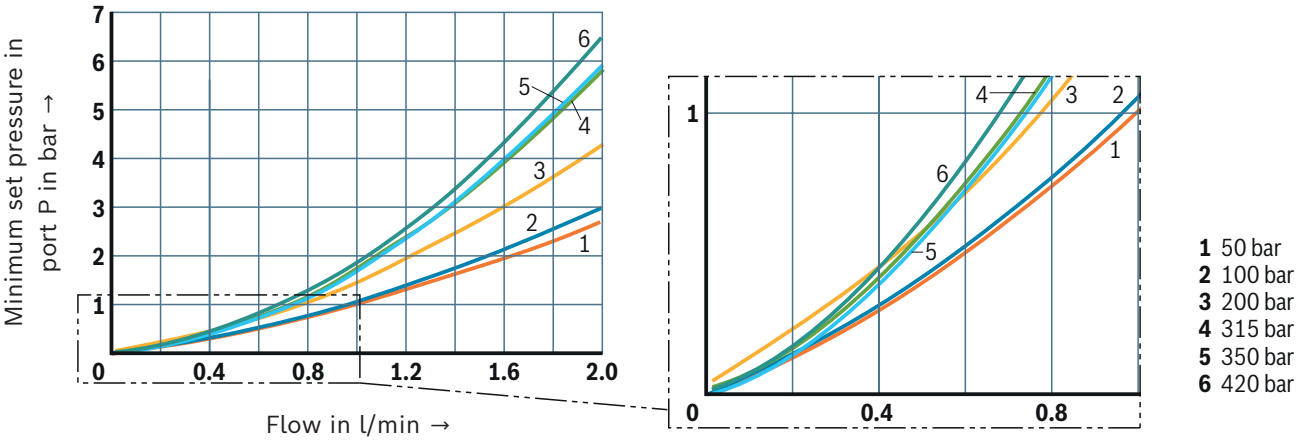
Pressure rating 420 bar



1 Command value 0%
2 Command value 25%
3 Command value 50%
4 Command value 75%
5 Command value 100%

2) The command value must not exceed the maximum flow of 0.8 l/min.

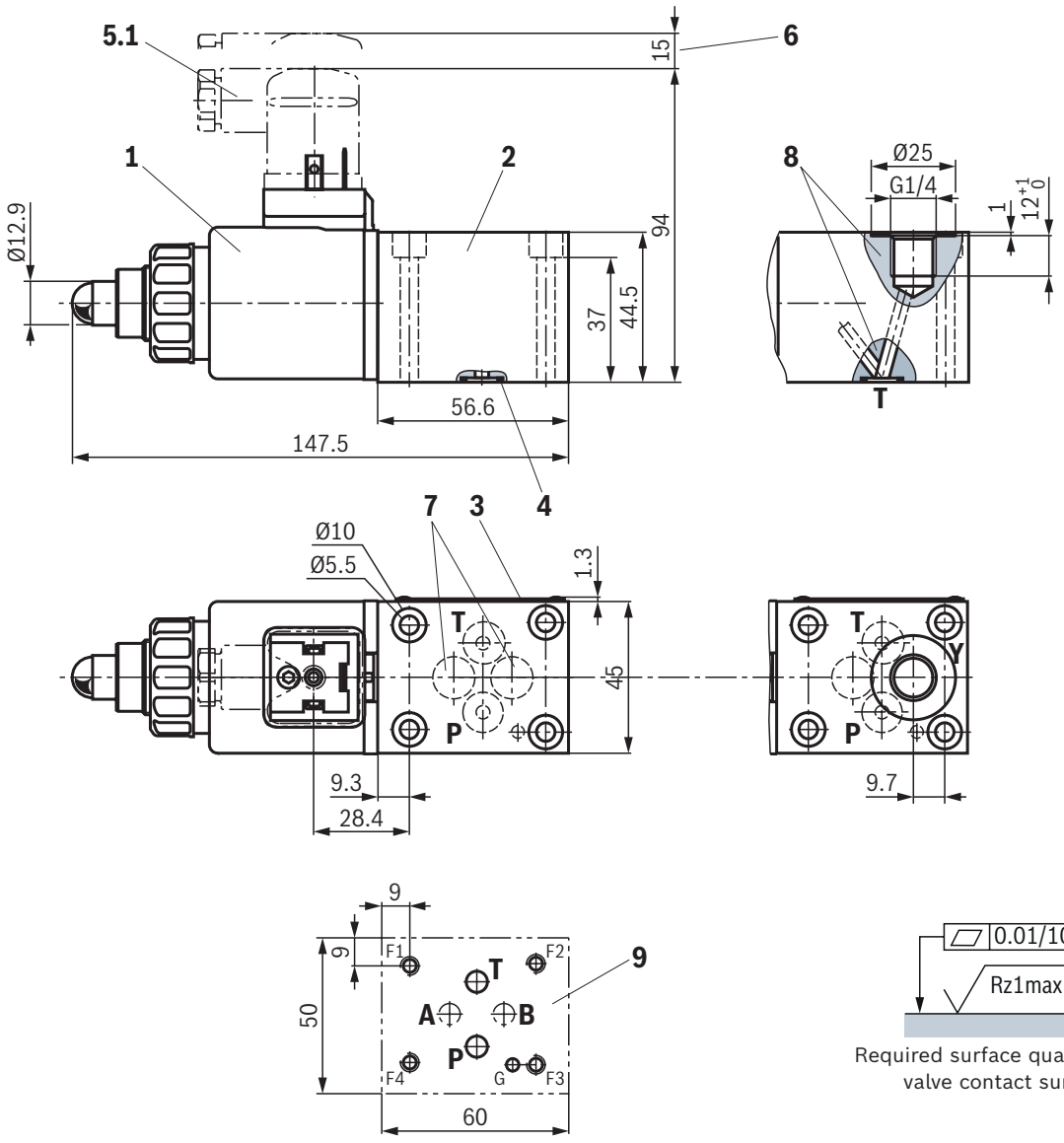
Minimum set pressure in port P dependent on the flow (command value 0 V or 4 mA)



1 50 bar
2 100 bar
3 200 bar
4 315 bar
5 350 bar
6 420 bar

Notice:
Typical characteristic curves which are subject to tolerance variations.

Dimensions: Type DBET (dimensions in mm)



Required surface quality of the valve contact surface

1 Proportional solenoid

2 Valve housing

3 Name plate

4 Identical seal rings for ports P, T, A and B

5.1 Mating connector without circuitry for connector "K4" (separate order, see page 15 and data sheet 08006)

6 Space required for removing the mating connector

7 Blind counterbores A and B

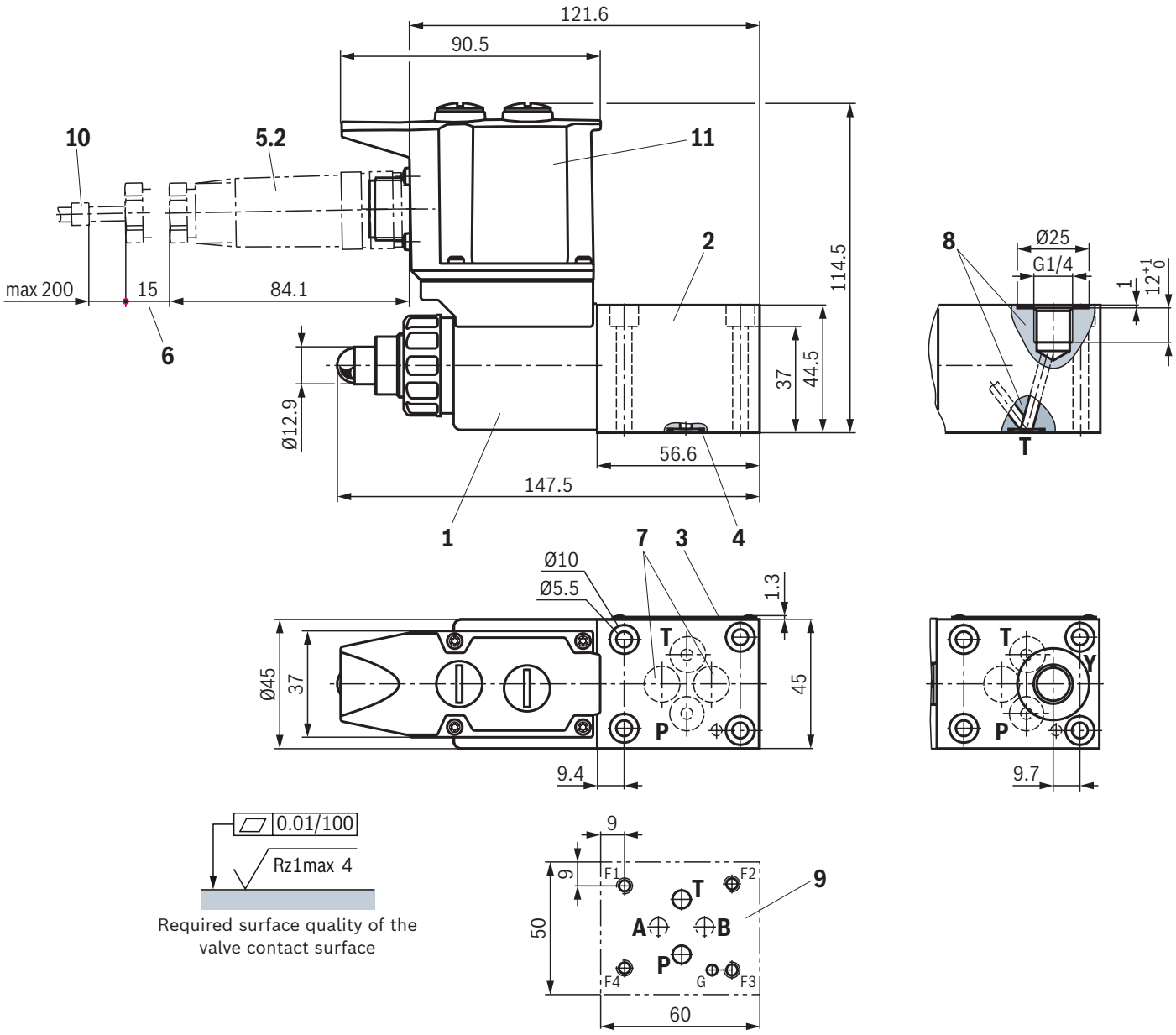
8 With version "Y" (external pilot oil return), port Y is connected internally to port T. Port T is not blocked.

9 Machined valve contact surface; porting pattern according to ISO 4401-03-02-0-05
Deviating from the standard:
- Channel A not drilled, blind counterbore with sealing
- Channel B not drilled, blind counterbore with sealing
- Locating pin not included in the scope of delivery

Valve mounting screws and **subplates**, see page 15.

Notice:
The dimensions are nominal dimensions which are subject to tolerances.

Dimensions: Type DBETE (dimensions in mm)



Required surface quality of the valve contact surface

1 Proportional solenoid

2 Valve housing

3 Name plate

4 Identical seal rings for ports P, T, A and B

5.2 Mating connector for version "A1" and "F1" (separate order, see page 15 and data sheet 08006)

6 Space required for removing the mating connector

7 Blind counterbores A and B

8 With version "Y" (external pilot oil return), port Y is connected internally to port T. Port T is not blocked.

9 Machined valve contact surface; porting pattern according to ISO 4401-03-02-0-05
Deviating from the standard:
- Channel A not drilled, blind counterbore with sealing
- Channel B not drilled, blind counterbore with sealing
- Locating pin not included in the scope of delivery

10 Cable fastening

11 Integrated electronics (OBE)

Valve mounting screws and **subplates**, see page 15.

Notice:
The dimensions are nominal dimensions which are subject to tolerances.

Dimensions

Valve mounting screws (separate order)

Size	Quantity	Hexagon socket head cap screws	Material number
6	4	**ISO 4762 - M5 x 45 - 10.9-ISO4042-ZnNi-5-Cn-T0** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 7 Nm ±10%	**R913048087**

☞ **Notice:**
The tightening torque of the hexagon socket head cap screws refers to the maximum operating pressure.

Subplates (separate order) with porting pattern according to ISO 4401-03-02-0-05 see data sheet 45100.

Accessories (separate order)

Mating connectors

Item [1]	Designation	Version	Short designation	Material number	Data sheet
5.1	Mating connector; for valves with "K4" connector, 2-pole + PE, design A	Without circuitry, M16 x 1.5, 0 ... 250 V, "b"	Z4	**R901017011**	08006
5.2	Mating connector; for valves with round connector, 6-pole + PE	Straight, metal, PG11	7PZ31...M	**R900223890**	08006

[1] See dimensions on pages 13 and 14.

External control electronics

	Type	Material number	Data sheet
Modular design	VT-MSPA1-2X/A5/000/000	R901439034	30232
Modular design	VT-MSPA1-2X/F5/000/000	R901439036	
Connector design	VT-SSPA1-1-1X/V0/0-24	R900779643	30116

EMC Directive requirements

- Shielded connection cables must be used for the electrical connection. The shielding must be placed on both sides.
- A metal mating connector must be used to make contact between the cable shielding and the valve.
- A separate EMC-approved power supply unit must be provided for each valve, e.g. one that is CE-compliant.
- The production of a low impedance connection is established via the professional installation of the valve on a grounded metal manifold block in the system.
- For electric supply lines over 30 m, overvoltage protection must be provided in the control cabinet.
- In a strong electro-magnetic environment, further EMC measures may be required, such as shielding of the complete device via metal housings or the use of ferrites on supply and signal lines.

Further information

▶ Hydraulic valves for industrial applications	Operating instructions 07600-B
▶ Subplates	Data sheet 45100
▶ Hydraulic fluids on mineral oil basis	Data sheet 90220
▶ Environmentally compatible hydraulic fluids	Data sheet 90221
▶ Flame-resistant, water-free hydraulic fluids	Data sheet 90222
▶ Flame-resistant hydraulic fluids – containing water (HFAE, HFAS, HFB, HFC)	Data sheet 90223
▶ Reliability characteristics according to EN ISO 13849	Data sheet 08012
▶ Assembly, commissioning and maintenance of hydraulic systems	Data sheet 07900
▶ Information on available spare parts	www.boschrexroth.com/spc

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