

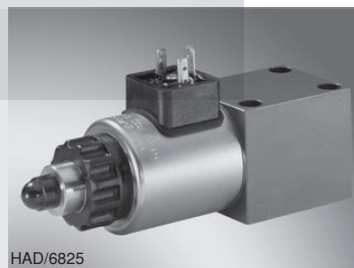
Proportional pressure relief valve, direct operated, without/with integrated electronics (OBE)

RE 29162/07.08
Replaces: 05.06

1/14

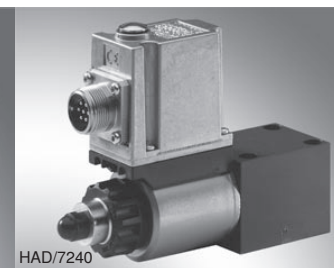
Types DBET and DBETE

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



HAD/6825

Type DBET-6X/..



HAD/7240

Type DBETE-6X/..

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Features

- Direct operated valve for limiting a system pressure
- Actuation by proportional solenoid
- Proportional solenoid with central thread and detachable coil
- For subplate mounting:
Porting pattern to ISO 4401-03-02-0-05
- Integrated electronics (OBE) on type DBETE:
 - Low manufacturing tolerance of command value/pressure characteristic curve
- External control electronics for type DBET
 - Amplifiers of modular design, Euro-card format, and as plug-in amplifiers
 - Independently adjustable up and down ramp
 - Fine-tuning of command value/pressure characteristic curve possible

Information on available spare parts:
www.boschrexroth.com/spc

Ordering code

DBET	6X/	G24	V	*
Proportional pressure relief valve For external control electronics With integrated electronics (OBE) = No code = E Component series 60 to 69 (60 to 69: unchanged installation and connection dimensions) = 6X Max. pressure rating Up to 50 bar Up to 100 bar Up to 200 bar Up to 315 bar Up to 350 bar Up to 420 bar = 50 = 100 = 200 = 315 = 350 = 420 Internal pilot oil drain External pilot oil drain = No code = Y Supply voltage of integrated electronics (OBE) 24 V DC voltage = G24			Further details in clear text Seal material V = FKM seals suitable for mineral oil (HL, HLP) to DIN 51524 Electronics interface A1 = F1 = No code = Command value 0 to 10 V Command value 4 to 20 mA On DBET Electrical connection for DBET: K4 = Without mating connector, with component plug to DIN EN 175301-803 for DBETE: K31 = Without mating connector, with component plug to DIN EN 175201-804	

Standard types

Type DBET		Type DBETE	
Type	Material no.	Type	Material no.
DBET-6X/50G24K4V	R901000842	DBETE-6X/50G24K31A1V	R901029966
DBET-6X/100G24K4V	R901000845	DBETE-6X/100G24K31A1V	R901029967
DBET-6X/200G24K4V	R901000846	DBETE-6X/200G24K31A1V	R901029968
DBET-6X/315G24K4V	R901000847	DBETE-6X/315G24K31A1V	R901029969
DBET-6X/350G24K4V	R901000848	DBETE-6X/350G24K31A1V	R901029970

Accessories (not included in the scope of supply)

- Subplates NG6 to data sheet RE 45052

• G 341/01 (G1/4), Material no. **R900424447**

• G 341/60 (G3/8), Material no. **R901027119**

– External control for type DBET:

• Analog amplifier VT-MSPA1-1-1X/V0/... of modular design to data sheet RE 30223

• Digital amplifier VT-VSPD-1-2X/V0/..-0-1 in Euro-card format to data sheet RE 30523

• Analog amplifier VT-VSPA1-2-1X/V0/... in Euro-card format to data sheet RE 30115

• Analog amplifier VT-SSPA1-1-1X/V0/0-24 as plug-in amplifier to data sheet RE 30265

Restrictions: No linearization of the command value/pressure characteristic curve, higher hysteresis and range of inversion
- Mating connectors (for details, see page 7)

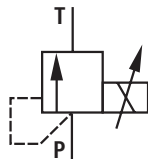
• For DBET: to DIN EN 175301-803, Material no. **R901017011**

• For DBETE: to DIN EN 175201-804, Material no. **R900021267** or **R900223890**

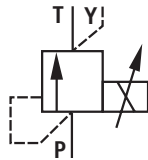
Symbols

For external control electronics (type DBET)

Internal pilot oil drain

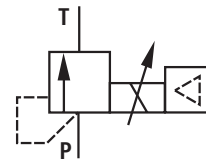


External pilot oil drain (Y)

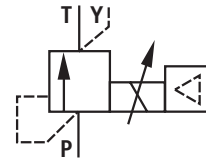


With integrated electronics (type DBETE)

Internal pilot oil drain



External pilot oil drain (Y)



Function, section

Allgemeines

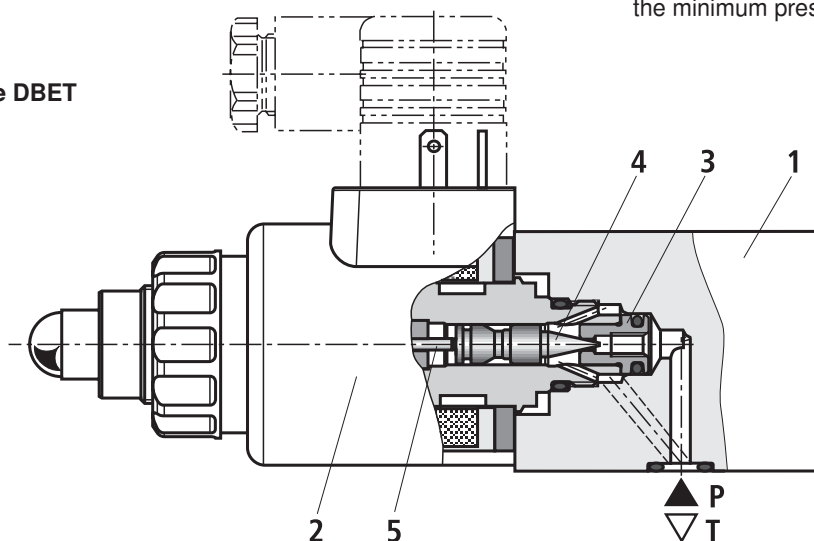
Proportional pressure relief valves of type DBET are remote control valves of poppet design and are used to limit a system pressure. They are actuated by a proportional solenoid with central thread and detachable coil. The inner chamber of the solenoid is connected with port T or Y and is filled with hydraulic fluid. These valves can be used to infinitely vary the system pressure to be limited in dependence upon the electrical command value.

The valves basically consist of housing (1), proportional solenoid (2), valve seat (3) and valve poppet (4).

Basic principle

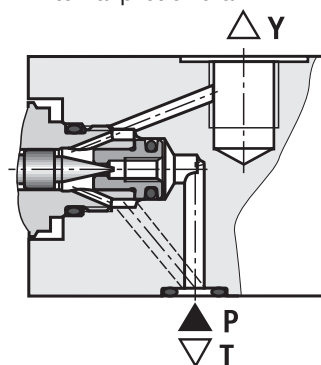
To adjust the system pressure, a command value is provided to the control electronics. Depending on this command value, the electronics applies an electric current to the solenoid coil. The proportional solenoid converts the electric current into a mechanical force, which acts via armature plunger (5) to valve poppet (4). Valve poppet (4) is pressed on valve seat (3) and closes the connection between port P and T or Y. When the hydraulic force that acts on valve poppet (4) is equal to the magnetic force, the valve regulates the set pressure by lifting valve poppet (4) off valve seat (3) thus allowing hydraulic fluid to flow from port P to T or Y. With a zero command value the control electronics applies only a minimum control current to proportional solenoid (2), which results in the minimum pressure.

Type DBET

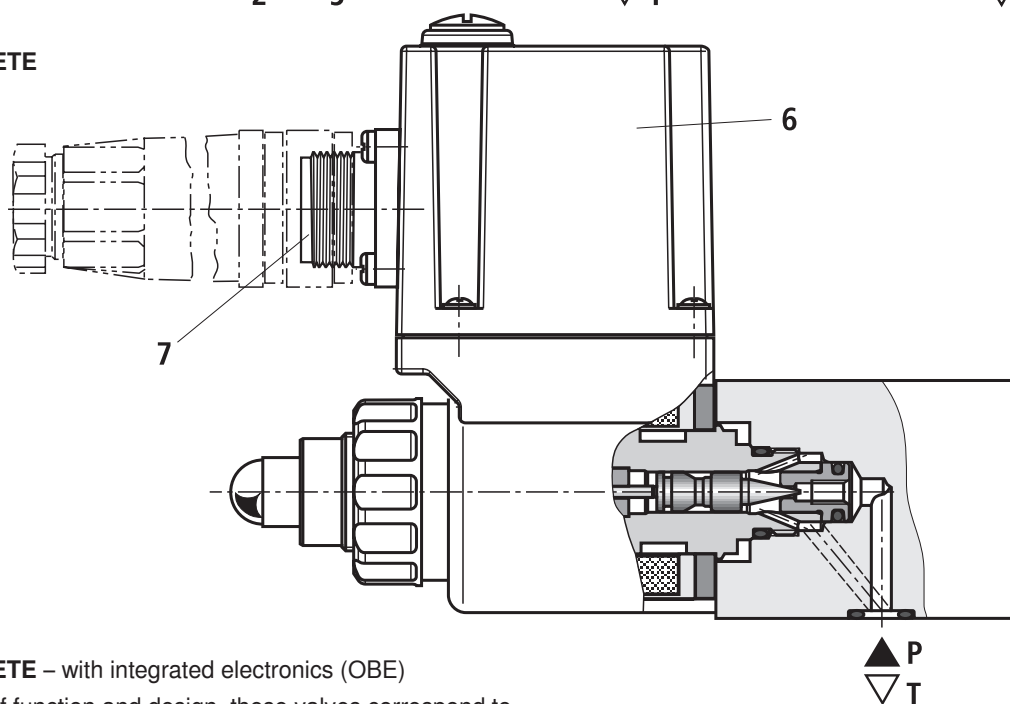


Type DBET...Y

External pilot oil drain



Type DBETE



Type DBETE – with integrated electronics (OBE)

In terms of function and design, these valves correspond to type DBET. In addition, housing (6) with the control electronics is provided on the proportional solenoid.

The supply and command value voltage is applied to component plug (7).

The command value/pressure characteristic curve is fine-tuned in the factory with low manufacturing tolerances.

For further details on the control electronics, see pages 6 and 8.

Technical data (for applications outside these parameters, please consult us!)**General**

Type		DBET	DBETE
Weight	kg	2.0	2.15
Installation position		Optional	
Storage temperature range	°C	-20 to +80	
Ambient temperature range	°C	-20 to +70	-20 to +50

Hydraulic (measured with HLP 46; $\vartheta_{oil} = 40 \text{ °C} \pm 5 \text{ °C}$)

Type		DBET	DBETE
Maximum operating pressure	Port P	420	
Maximum pressure setting	Pressure rating 50 bar	bar	50
	Pressure rating 100 bar	bar	100
	Pressure rating 200 bar	bar	200
	Pressure rating 315 bar	bar	315
	Pressure rating 350 bar	bar	350
	Pressure rating 420 bar	bar	420
Minimum pressure setting (with command value 0 V or 4 mA)	bar	See characteristic curves on page 11	
Return flow pressure	Port T or Y	bar	Separately at zero pressure to tank
Maximum flow	l/min	2 ¹⁾	
Hydraulic fluid		Mineral oil (HL, HLP) to DIN 51524, further hydraulic fluids on request!	
Hydraulic fluid temperature range	°C	-20 to +80	
Viscosity range	mm ² /s	20 to 380, preferably 30 to 46	
Permissible maximum degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406(c)		Class 20/18/15 ²⁾	
Hysteresis	%	< 4 of set max. pressure	
Range of inversion	%	< 0.5 of set max. pressure	
Response sensitivity	%	< 0.5 of set max. pressure	
Linearity (flow 0.8 l/min)	%	±3 of set max. pressure	
Tolerance of command value/pressure characteristic curve referred to 0.8 l/min; increasing pressure	At command value 20 %	%	< ±1.5 of set max. pressure ³⁾
	At command value 100 %	%	< ±5 of set max. pressure ⁴⁾ < ±1.5 of set max. pressure
Step response ($T_u + T_g$) 0 → 100 % and 100 % → 0 Line volume < 20 cm ³ ; $q_v = 0.8 \text{ l/min}$	ms	80 (depending on system!)	

¹⁾ Observe flow limitation for pressure ratings 315, 350 and 420 bar (page 10)

²⁾ The cleanliness classes specified for components must be adhered to in hydraulic systems.
Effective filtration prevents malfunction and, at the same time, prolongs the service life of components.
For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086 and RE 50088.

³⁾ Zero point calibration in the factory

⁴⁾ Adjustment possible on external control electronics

Technical data (for applications outside these parameters, please consult us!)

Electrical

Minimum solenoid current		mA	≤ 100
Maximum solenoid current		mA	1600 ± 10 %
Solenoid coil resistance	Cold value at 20 °C	Ω	5.5
	Max. hot value	Ω	8.05
Duty cycle		%	100

Electrical, integrated electronics (OBE)

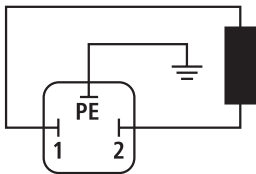
Supply voltage	Nominal voltage	VDC	24
	Lower limit value	VDC	21
	Upper limit value	VDC	35
Current consumption		A	≤ 1.5
Required fuses		A	2, slow-blowing
Inputs	Voltage	V	0 to 10
	Current	mA	4 to 20
Output	Actual current value	mV	1 mV △ 1mA
Type of protection of the valve to EN 60529			IP 65 with mating connector mounted and locked

 **Note!**
For details with regard to **environment simulation testing** in the field of EMC (electromagnetic compatibility), climate and me-
chanical stress, see RE 29162-U (declaration on environmental compatibility).

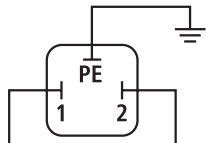
Electrical connection (dimensions in mm)

Type DBET

Connection to component plug

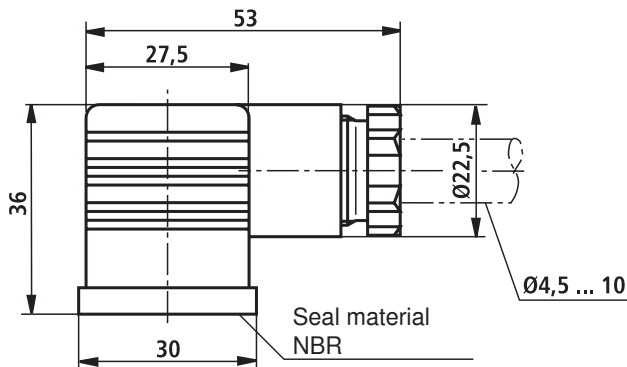
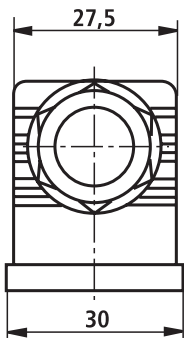


Connection to mating connector



to amplifier

Mating connector (black) to
DIN EN 175301-803
Material no. **R901017011**
(separate order)

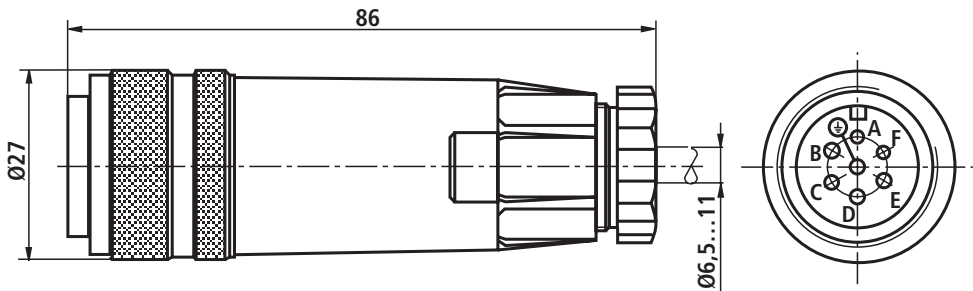


Type DBETE

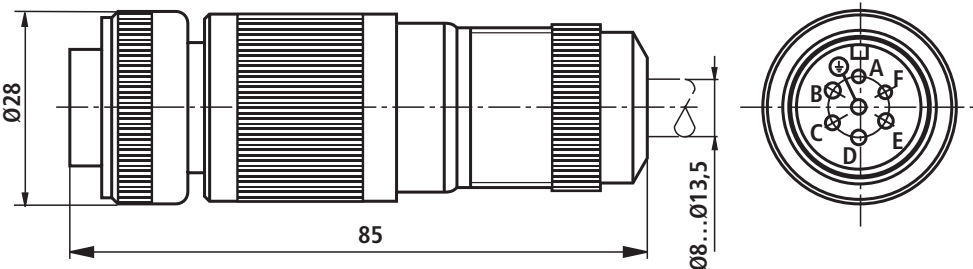
Component plug pinout	Contact	Pinout of interface “A1”	Pinout of interface “F1”
Supply voltage	A	24 VDC (u(t) = 21 V to 35 V); $I_{max} \leq 1.5\text{ A}$	
	B	0 V	
Actual value reference potential	C	Reference contact F; 0 V	Reference contact F; 0 V
Differential amplifier input	D	0 to 10 V; $R_i = 100\text{ k}\Omega$	4 to 20 mA; $R_i = 100\text{ }\Omega$
	E	Command value reference potential	
Measuring output (actual value)	F	0 to 1.6 V actual value (1 mV $\triangleq$ 1 mA) Load resistance > 10 k Ω	
Protective earth conductor	PE	Connected to solenoid and valve body	

Mating connectors to DIN EN 175201-804, soldered contacts for cable cross-section 0.5 to 1.5 mm²

Plastic version,
Material no. **R900021267**
(separate order)



Metal version,
Material no. **R900223890**
separate order

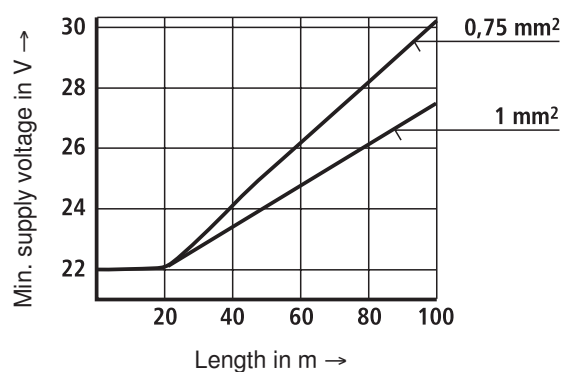


Electrical connection

Connection cable for type DBETE

- Recommendation: 6-wire, 0.75 or 1 mm² plus protective earth conductor and shield
- Connect shield to PE only on the supply side
- Permissible max. length 100 m

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



Integrated electronics (OBE) of type DBETE

Function

The electronics is supplied with voltage via connections A and B. The command value is applied to differential amplifier connections D and E.

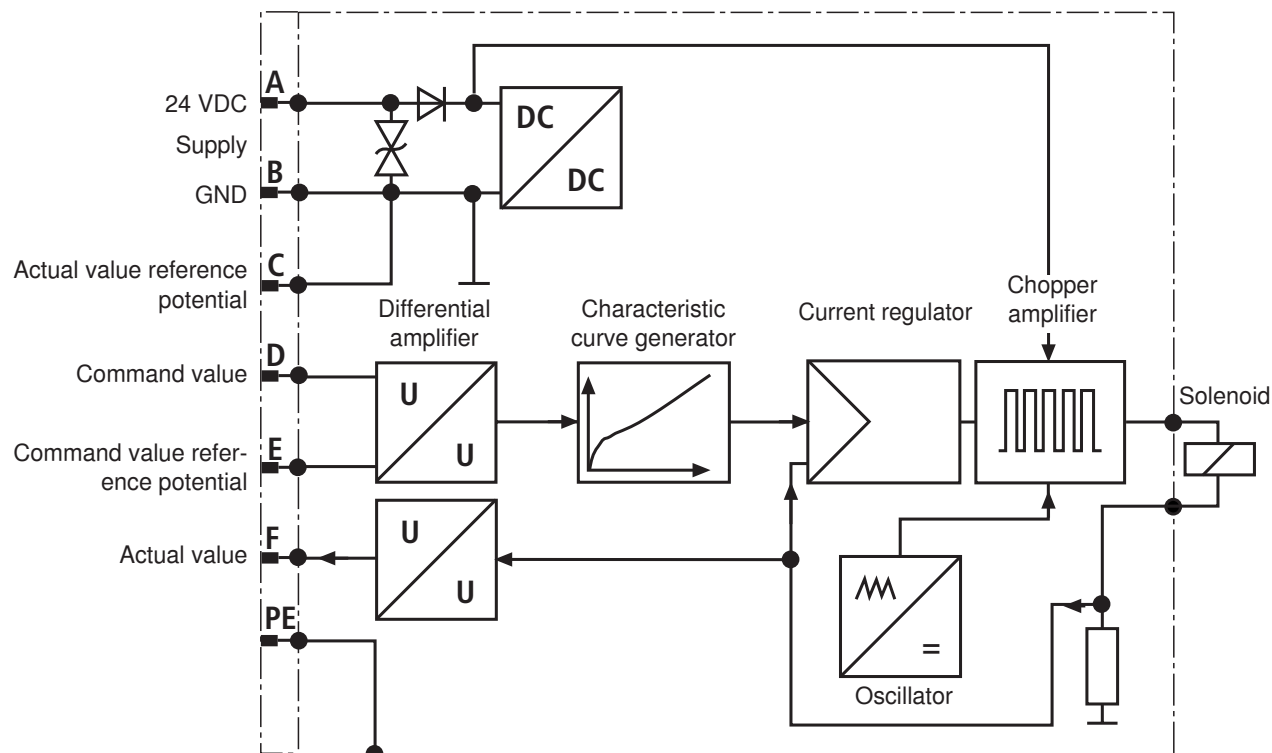
With the help of the characteristic curve generator, the command value/solenoid current characteristic curve is adjusted to the valve so that non-linearities in the hydraulics are compensated for and a linear command value/pressure characteristic curve is obtained.

The current regulator regulates the solenoid current independently of the solenoid coil resistance.

The power stage of the electronics for controlling the proportional solenoid is a chopper amplifier with a clock frequency of ca. 180 Hz to 400 Hz. The output signal is pulse-width-modulated (PWM).

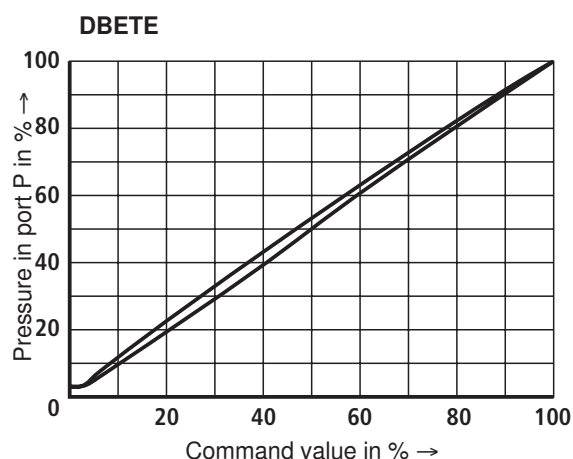
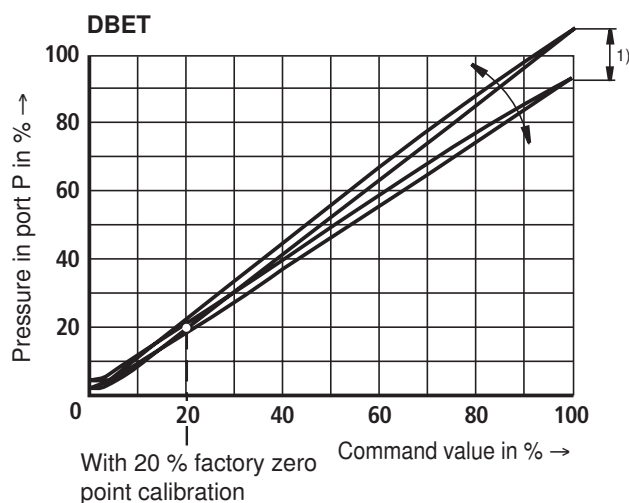
For testing the solenoid current, a voltage, which is proportional to the solenoid current, can be measured on the plug-in connector between Pin F(+) and Pin C(-). **1 mV** corresponds to a solenoid current of **1 mA**.

Block circuit diagram



Characteristic curves (measured with HLP 46, $\vartheta_{\text{oil}} = 40\text{ °C} \pm 5\text{ °C}$)

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

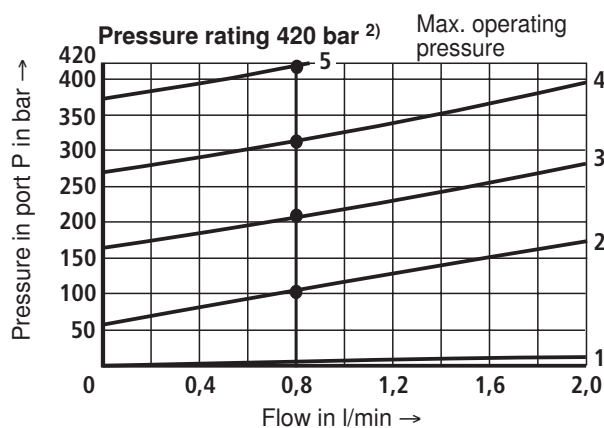
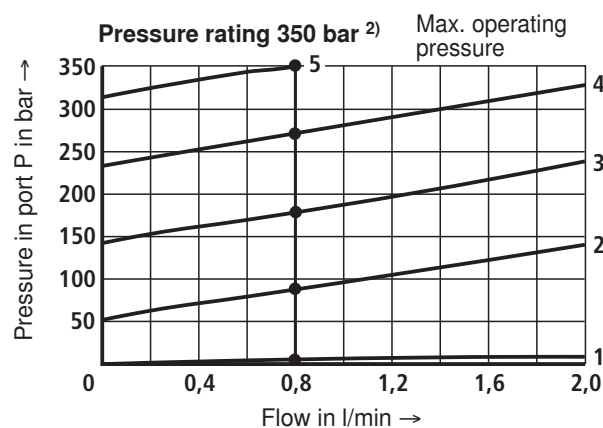
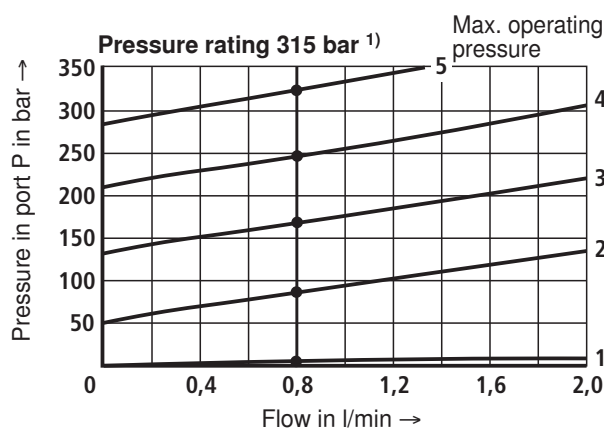
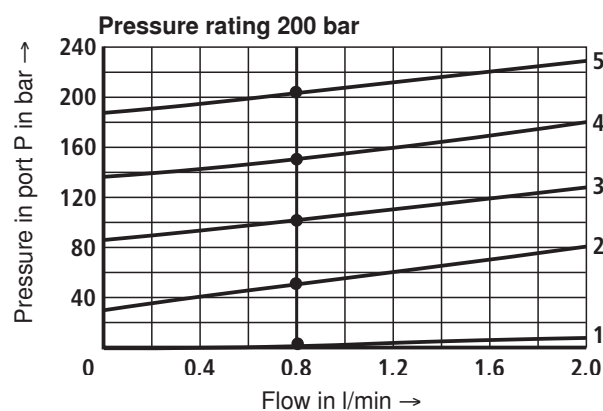
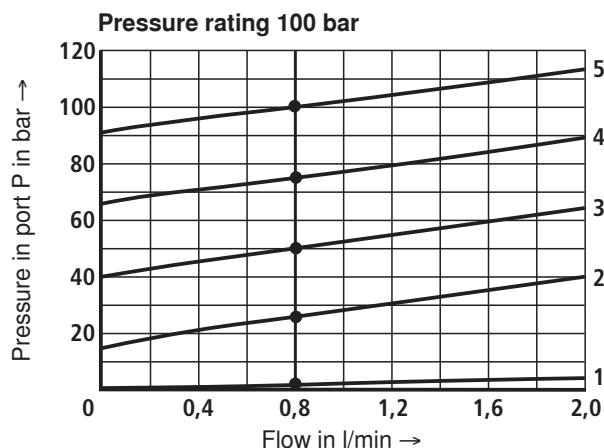
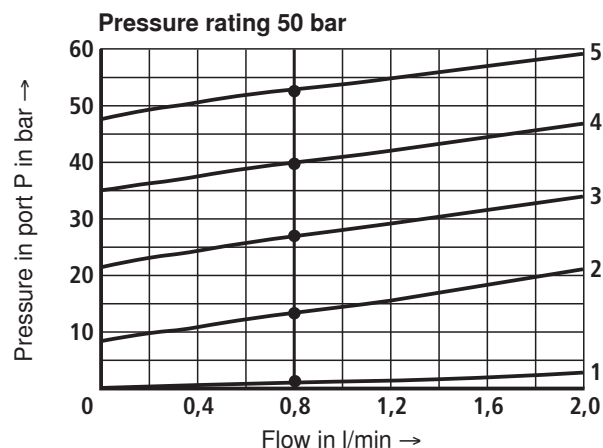


¹⁾ On valve DBET, the tolerance can be adjusted on the **external amplifier** (for type and data sheet, see page 2) using command value attenuator potentiometer "Gw". The digital amplifier can be set by means of parameter "Limit". Here, the control current according to the technical data must not be exceeded.

In order that several valves can be matched to the same characteristic curve, at a command value of 100 %, the pressure must not be set higher than the maximum pressure setting.

Characteristic curves (measured with HLP 46, $\vartheta_{\text{oil}} = 40 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$)

Pressure in port P in dependence on flow



Valid for all pressure ratings:

Curve 1 at 0 % command value

Curve 2 at 25 % command value

Curve 3 at 50 % command value

Curve 4 at 75 % command value

Curve 5 at 100 % command value ^{1; 2)}

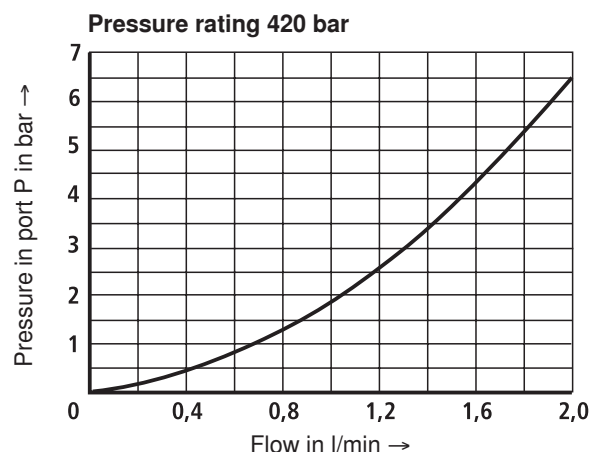
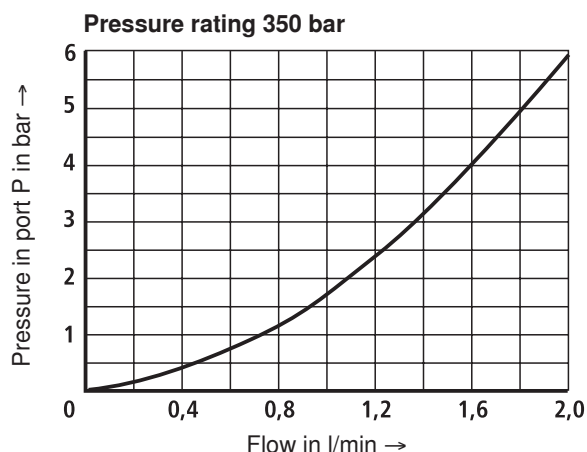
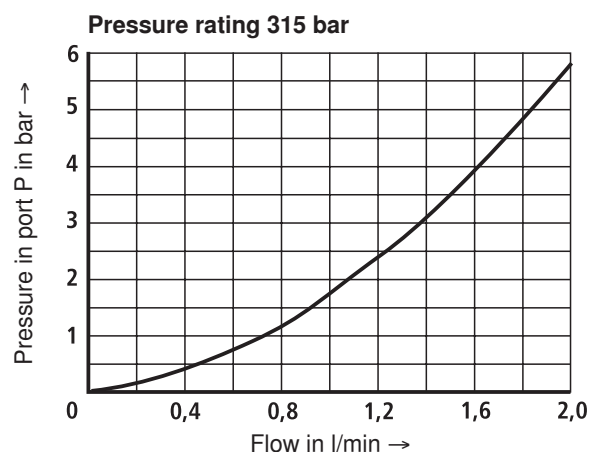
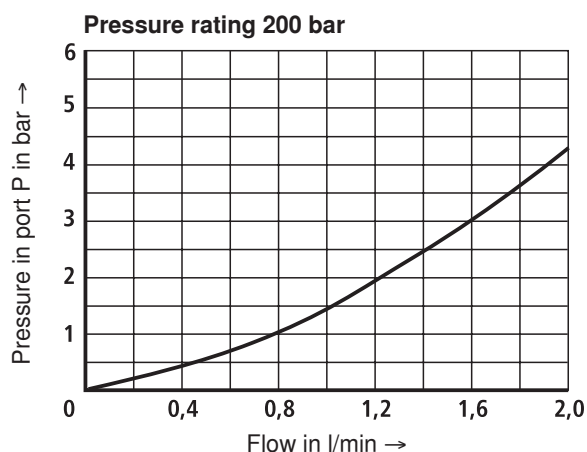
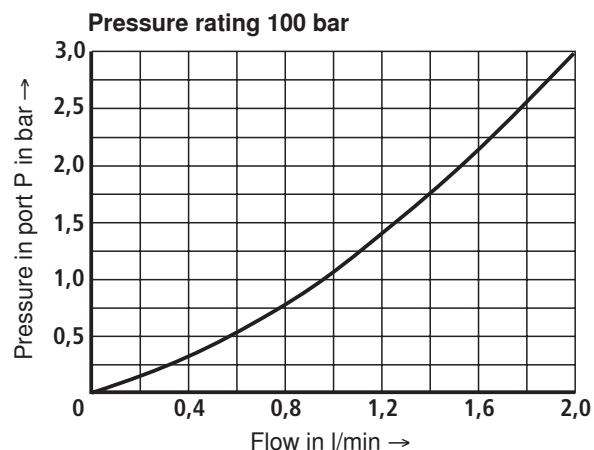
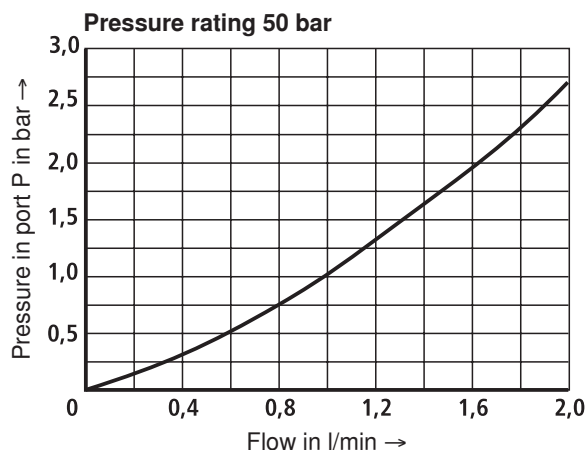
The characteristic curves were measured without backpressure in port T measured. ($p_T = 0 \text{ bar}$)

¹⁾ With characteristic curve 5, the command value must not exceed the maximum flow of 1.4 l/min

²⁾ With characteristic curve 5, the command value must not exceed the maximum flow of 0.8 l/min

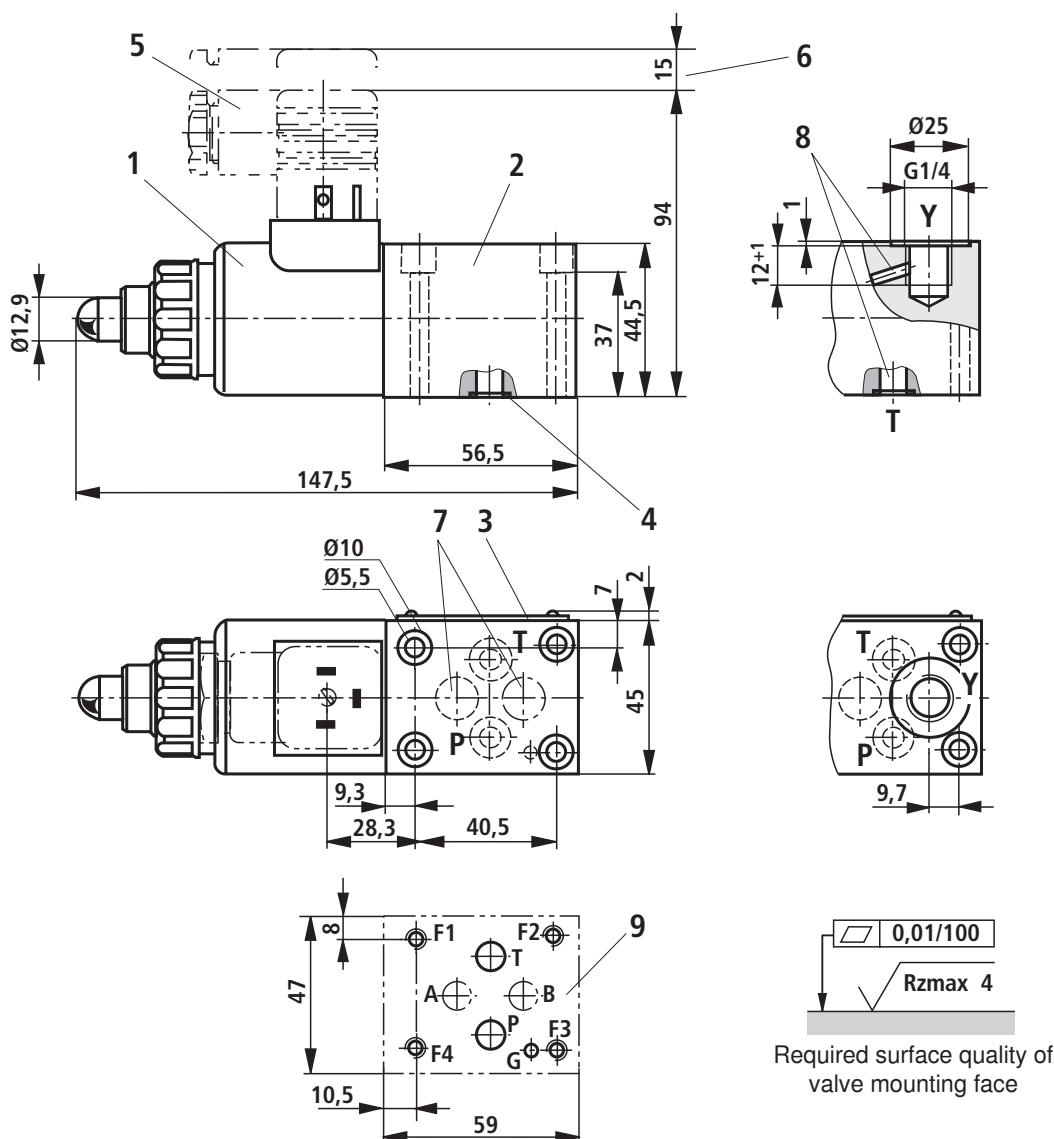
Characteristic curves (measured with HLP 46, $\vartheta_{\text{oil}} = 40 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$)

Min. set pressure in port P at command value 0 V or 4 mA in dependence on flow

**Note**The characteristic curves were measured without backpressure in port T. ($p_T = 0 \text{ bar}$)Min. control current $\leq 100 \text{ mA}$

(This current is obtained with command value 0 V or 4 mA!)

Unit dimensions: Type DBET (dimensions in mm)



- 1 Proportional solenoid
- 2 Valve housing
- 3 Nameplate
- 4 Identical seal rings for ports P, T, A and B
- 5 Mating connector to DIN EN 175301-803
- 6 Space required to remove mating connector
- 7 Blind countersinks A and B
- 8 On variant ..Y.. (external pilot oil drain)
port Y is internally connected to port T!
Port T is not plugged!
- 9 Machined valve mounting face,
porting pattern to ISO 4401-03-02-0-05
Deviating from standard: "A" and "B" channels are not drilled
Locating pin not included in the scope of supply

Valve mounting screws

(not included in the scope of supply)

4 hexagon socket head cap screws

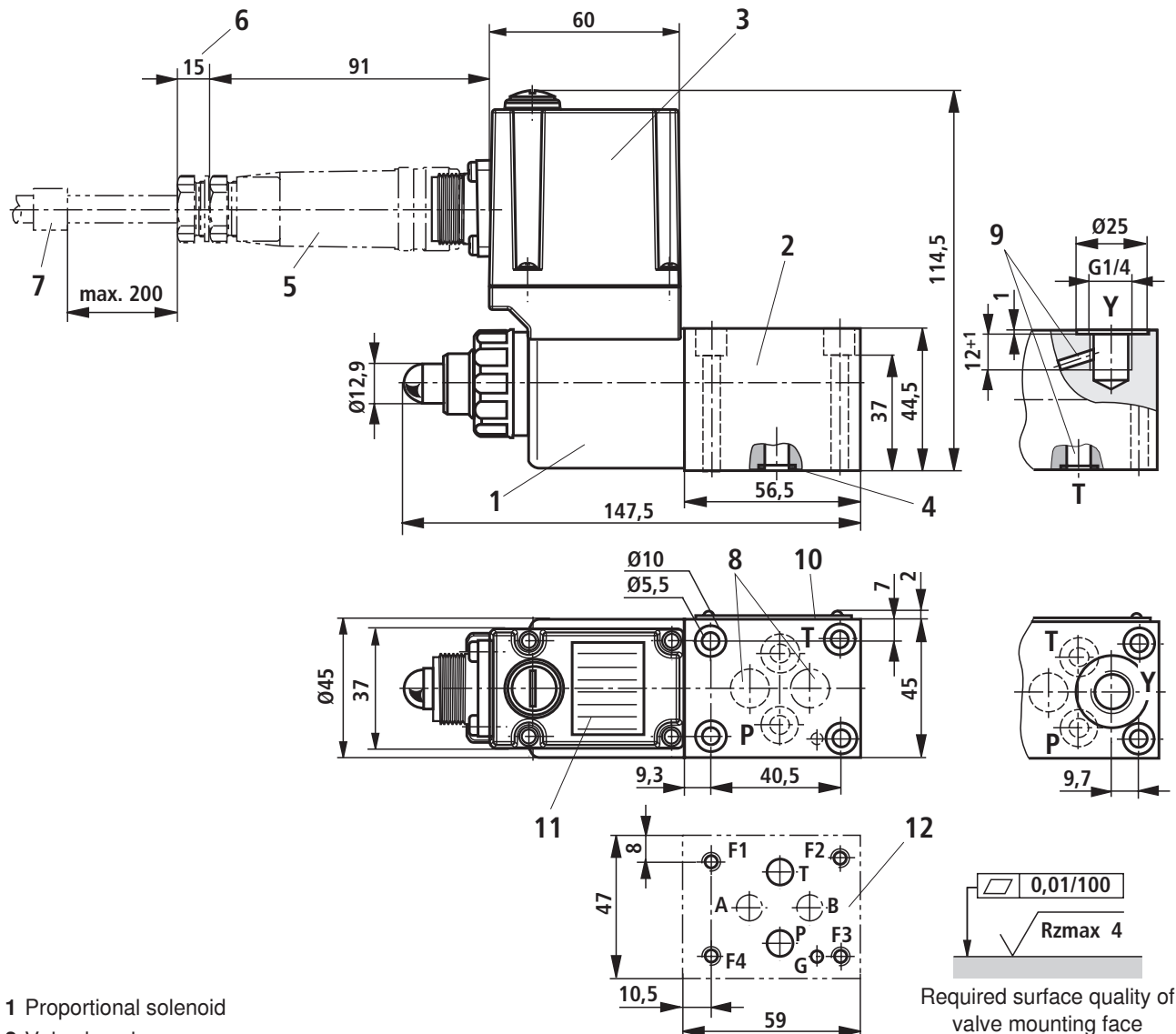
ISO4762-M5X45-10.9-fIZn-240h-L

(Friction coefficient, total: 0.09-0.14 to VDA 235-101),

$M_T = 7 \text{ Nm} \pm 10\%$

Material no.: **R913000140**

Unit dimensions: Type DBETE (dimensions in mm)



- 1 Proportional solenoid
- 2 Valve housing
- 3 Integrated electronics (OBE)
- 4 Identical seal rings for ports P, T, A and B
- 5 Mating connector to DIN EN 175301-804
- 6 Space required to remove mating connector
- 7 Cable mount
- 8 Blind countersinks A and B
- 9 On variant ..Y.. (external pilot oil drain)
port Y is internally connected to port T!
Port T is not plugged!
- 10 Nameplate
- 11 Block circuit diagram of integrated electronics (OBE)
- 12 Machined valve mounting face,
porting pattern to ISO 4401-03-02-0-05
Deviating from standard: "A" and "B" channels not drilled
Locating pin not included in the scope of supply

Valve mounting screws

(not included in the scope of supply enthalten)

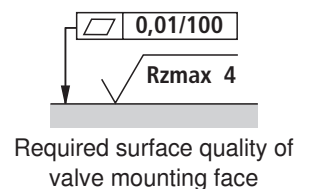
4 hexagon socket head cap screws

ISO4762-M5X45-10.9-f1Zn-240h-L

(Friction coefficient, total: 0.09-0.14 to VDA 235-101),

$M_T = 7 \text{ Nm} \pm 10\%$

Material no.: **R913000140**



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