

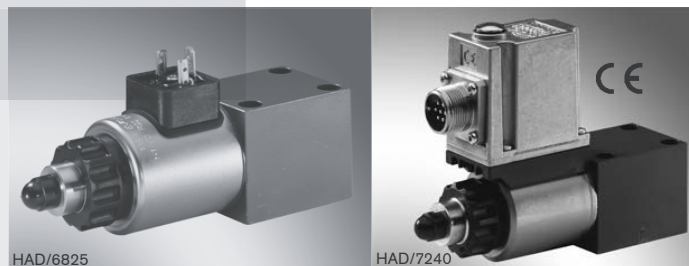
Proportional pressure relief valve direct operated, without/with integral control electronics (OBE)

RE 29162/05.06
Replaces: 10.05

1/12

Types DBET and DBETE

Nominal 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/..

Overview of contents

Inhalt	Seite
Features	1
Ordering details	2
Preferred types, symbols	2
Function, section	3
Technical data	4 and 5
Electrical connections, plug-in connectors	6
Integrated control electronics (OBE) for type DBETE	7
Characteristic curves	8 and 10
Unit dimensions, type DBET	11
Unit dimensions, type DBETE	12

Features

- Direct operated valve for limiting a system pressure
- Operated via a proportional solenoid
- Proportional solenoid with central thread and removable coil
- For subplate mounting:
Porting pattern to ISO 4401-03-02 subplates to catalogue sheet RE 45052, (separate order, see pages 11 and 12)
- Integrated control electronics (OBE) for type DBETE:
 - Low example spread of the command value-pressure-characteristic curve
- CE: For the type DBETE with integrated control electronics the EMC directive 89/336/EG is complied with
 - EN 61000-6-3: 2005-08
 - The compliance of the identified products with the specifications of the stated directive can be proven by fully complying with the stated standards (see page 5 „Environmental simulation test“).
- External control electronics for type DBET (separate order, see page 5)
 - Analogue amplifier in Eurocard format and modular design
 - Independent up and down ramps
 - Fine calibration of the command value-pressure-characteristic curve is possible externally on the control electronics

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

Ordering details

	DBET	6X/		G24		*	
Proportional pressure relief valve							Further details in clear text
For external control electronics	= No code						Seal material V = FKM seals, suitable for mineral oil (HL, HLP) to DIN 51524
With integrated electronics (OBE)	= E						
Component series 60 to 69 (60 to 69: unchanged installation and connection dimensions)	= 6X						Electronic interfac A1 or F1 for the DBETE: A1 = Command value input 0 to 10 VDC F1 = Command value input 4 to 20 mA No code = for the DBET
Max. pressure stage							
Up to 50 bar	= 50						Electrical connections for the DBET: K4 = Without plug-in connector, with component plug to DIN EN 175301-803 Plug-in connector, separate order, see page 6
Up to 100 bar	= 100						
Up to 200 bar	= 200						for the DBETE: K31 = Without plug-in connector, with component plug to DIN EN 175201-804 Plug-in connector, separate order, see page 6
Up to 315 bar	= 315						
Up to 350 bar	= 350						
Up to 420 bar	= 420						
Pilot oil drain internal	= No code						
Pilot oil drain external	= Y						
Control electronics supply voltage 24 V DC	= G24						

Other types of protection on request!

Preferred types

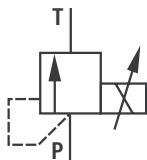
Type DBET	
Type	Material No.
DBET-6X/50G24K4V	R901000842
DBET-6X/100G24K4V	R901000845
DBET-6X/200G24K4V	R901000846
DBET-6X/315G24K4V	R901000847
DBET-6X/350G24K4V	R901000848

Type DBETE	
Type	Material No.
DBETE-6X/50G24K31A1V	R901029966
DBETE-6X/100G24K31A1V	R901029967
DBETE-6X/200G24K31A1V	R901029968
DBETE-6X/315G24K31A1V	R901029969
DBETE-6X/350G24K31A1V	R901029970

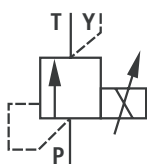
Symbols

For external control electronics (type DBET)

Pilot oil drain internal

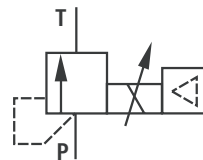


Pilot oil drain external (Y)

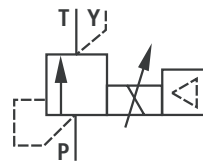


With integrated control electronics (type DBETE)

Pilot oil drain internal



Pilot oil drain external (Y)



Function, section

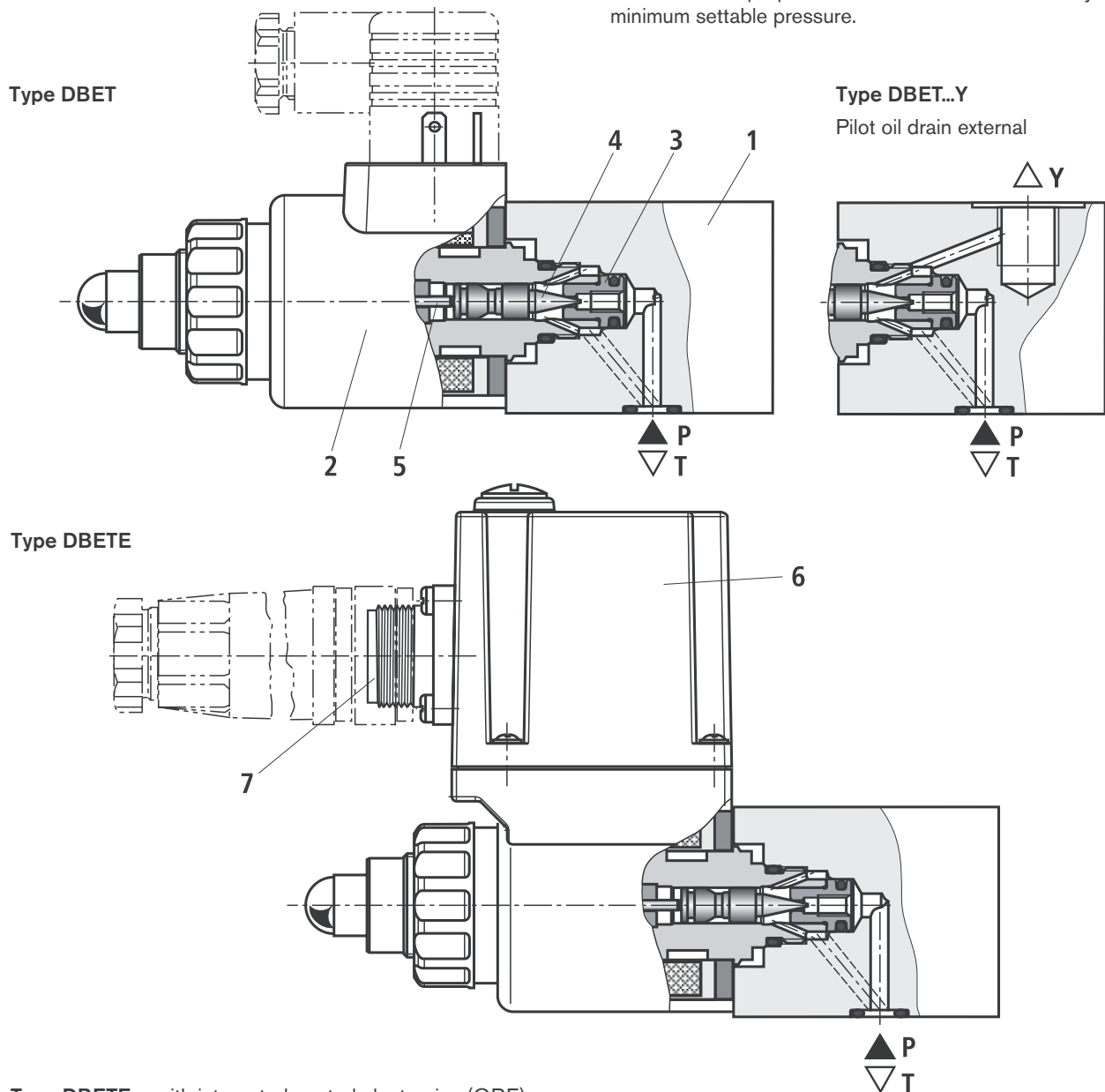
General

The type DBET proportional pressure relief valves are fine control valves of poppet design and are used to limit a system pressure. They are operated by a proportional solenoid with central thread and removable coil. The inner chamber is connected with port T or Y and is filled with pressure fluid. With these valves it is possible to infinitely vary the system pressure, which is to be limited, in relation to the electrical command value.

These valves basically comprise of the housing (1), a proportional solenoid (2), the valve seat (3) and the valve poppet (4).

Basic principle

To adjust the system pressure a command value is applied to the control electronics. The electronics apply an electrical current to the solenoid which is in relation to the command value. The proportional solenoid converts the electrical current into a mechanical force that acts via the armature pin (5) on the valve poppet (4). The valve poppet (4) presses directly onto the valve seat (3) and closes the connection between P and T or Y. If the hydraulic force on the valve poppet (4) is the same as the solenoid force, then the valve controls the set pressure in that the valve poppet (4) lifts off the valve seat (3) and permits pressure fluid to flow from port P to T or Y. At a zero command value the control electronics only apply a minimum control current to the proportional solenoid (2) and thereby sets the minimum settable pressure.



Type DBETE

Type DBETE – with integrated control electronics (OBE)

The function and design of this valve is the same as the valve type DBET. On the proportional solenoid there is an additional housing (6) which contains the control electronics.

The supply and command value voltages are fed to the

component plug (7). The command value-pressure-characteristic curve is factory pre-set to a low example spread. For further details regarding the control electronics, see page 5 to 7.

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

General			DBET	DBETE
Installation	Optional			
Storage temperature range	°C	-20 to +80		
Ambient temperature range	°C	-20 to +70	-20 to +50	
Weight	kg	2.0	2.15	
Hydraulic (measured with HLP 46; $\vartheta_{oil} = 40 \text{ °C} \pm 5 \text{ °C}$)			DBET	DBETE
Max. operating pressure	Port P	420		
Max. settable pressure	Pressure stage 50 bar	bar	50	
	Pressure stage 100 bar	bar	100	
	Pressure stage 200 bar	bar	200	
	Pressure stage 315 bar	bar	315	
	Pressure stage 350 bar	bar	350	
	Pressure stage 420 bar	bar	420	
Min. settable pressure (with a zero command value 0 V or 4 mA)	bar	See char. curves on pages 10		
Return pressure	Port T or Y	bar	Separate and at zero pressure to tank	
Max. flow	L/min	2 ¹⁾		
Pressure fluid	Mineral oil (HL, HLP) to DIN 51524 Other pressure fluids on request!			
Pressure fluid temperature range	°C	-20 to +80		
Viscosity range	mm ² /s	20 to 380 preferably to 30 to 46		
Maximum permissible contamination degree of pressure fluid Cleanliness class to ISO 4406 (c)	class 20/18/15 ²⁾			
Hysteresis	%	< 4 of the max. settable pressure		
Reversal span	%	< 0.5 of the max. settable pressure		
Response sensitivity	%	< 0.5 of the max. settable pressure		
Linearity (flow 0.8 l/min)	%	±3 of the max. settable pressure		
Example spread of the com. value-pressure-char. curves at 0.8 l/min; pressure rising	At com. value 20%	%	< ±1.5 of the max. settable pressure ³⁾	
	At com. value 100%	%	< ±5 of the max. settable pressure ⁴⁾	< ±1.5 of the max. settable pressure
Step response ($T_u + T_g$) 0 → 100% or 100% → 0 Pipe volume < 20 cm ³ ; $q_V = 0.8 \text{ l/min}$	ms	80 (depending on the system!)		

¹⁾ Take into account the notes regarding flow limitation on pages 8 and 9, pressure stages 315 and 350 bar

²⁾ The cleanliness class stated for the components must be adhered too in hydraulic systems. Effective filtration prevents faults from occurring and at the same time increases the component service life.
For the selection of filters see catalogue sheets RE 50070, RE 50076, RE 50081, RE 50086 and RE 50088.

³⁾ Zero point calibration is factory pre-set

⁴⁾ Calibration is possible on the control electronics

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

Electrical			DBET	DBETE
Supply voltage	Nominal voltage	VDC	24	
	Lower limiting value	VDC	21	
	Upper limiting value	VDC	35	
Min. control current (with a 0 V or 4 mA com. value)		mA	100	
Max. control current		mA	1600 ¹⁾	1600
Coil resistance	Cold value at 20°C	Ω	5.5	
	Max. warm value	Ω	8.05	
Duty		%	100	
Electrical connentions	Component plug and plug-in connector to		DIN EN 175301-803	DIN EN 175201-804
Valve protection to EN 60529			IP65 with mounted and locked plug-in connector	

Control electronics ²⁾			DBET	DBETE
			External amplifier	Integrated into the valve, see page 11
• Amplifier in Eurocard format (separate order) to catalogue sheet RE 30115	Analogue		VT-VSPA1-2-1X VT-VSPA1K-2-1X	–
• Amplifier of modular design (separate order) to catalogue sheet RE 30223	Analogue		VT-MSPA1-1-1X	–

¹⁾ Dependent on the amplifier, see control electronics (external amplifier)

²⁾ Plug-in proportional amplifier VT-SSPA1-1-1X/V0/0-24 on enquiry.

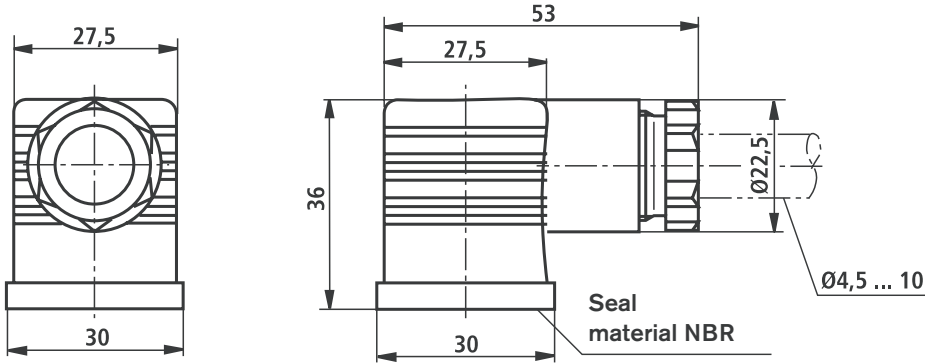
(In this case, the characteristic curves and technical data specified in this data sheet are invalid!)

 **Note!**

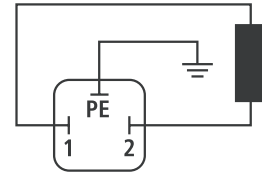
For details regarding the **environmental simulation test** covering EMC (electro-magnetic compatibility), climate and mechanical loading see RE 29162-U (declaration regarding environmental compatibility).

Electrical connections, plug-in connectors

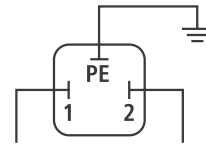
For type DBET (for external control electronics)
 Plug-in connector (black) to DIN EN 175301-803
 Separate order under Material No. **R901017011**



Component plug connections



Plug-in connector connections

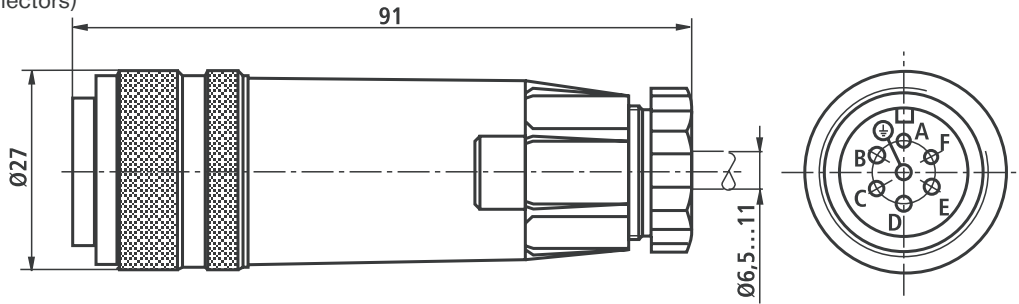


To amplifier

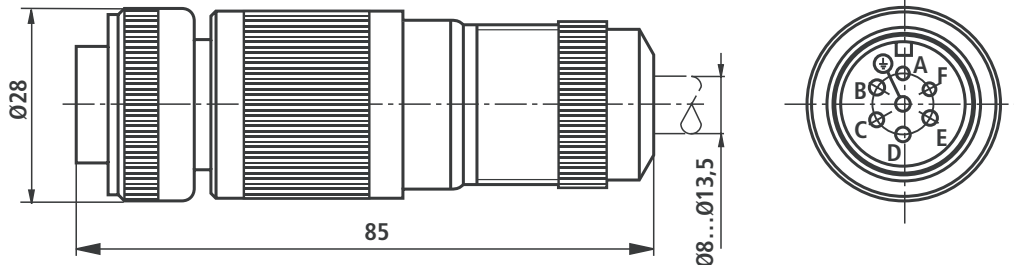
For type DBETE – with integrated control electronics (OBE)
 Plug-in connector to DIN EN 175201-804

For pin allocation see block circuit diagram on page 7
 Soldered contacts: from 0.5 to 1.5 mm²
 (valid for both plug-in connectors)

Material No. **R900021267**
 (plastic version)
 Separate order



Material No. **R900223890**
 (metal version)
 Separate order



Component plug pin allocation for type DBETE¹⁾

	Contact	Interface „A1“ pin allocation	Interface „F1“ pin allocation
Supply voltage	A	24 VDC ($u(t) = 21 \text{ V to } 35 \text{ V}$); $I_{\text{max}} \leq 2 \text{ A}$	
	B	0 V	
Act. value ref. potential	C	Ref. contact F; 0 V	Ref. contact F; 0 V
Differential amplifier input	D	0 to 10 V $R_e > 100 \text{ k}\Omega$	4...20 mA; $R_e > 100 \Omega$
	E	Command value ref. potential	
Measurement output (act. value)	F	0 to 1.6 V act. value ($1 \text{ mV} \triangleq 1 \text{ mA}$) ohmic resistance $> 10 \text{ k}\Omega$	
	PE	Connected with the solenoid and valve housing	

¹⁾ Also see the supply voltage on page 7

Integrated control electronics (OBE), for type DBETE

Function

The electronics are supplied with a voltage via connections „A“ and „B“. The command value is applied to the differential amplifier connections „D“ and „E“. The ramp generator forms from a command value jump (0%...100% or 100%...0%) a delayed increase or decrease of the solenoid current. The increase and decrease times are fixed and cannot be changed.

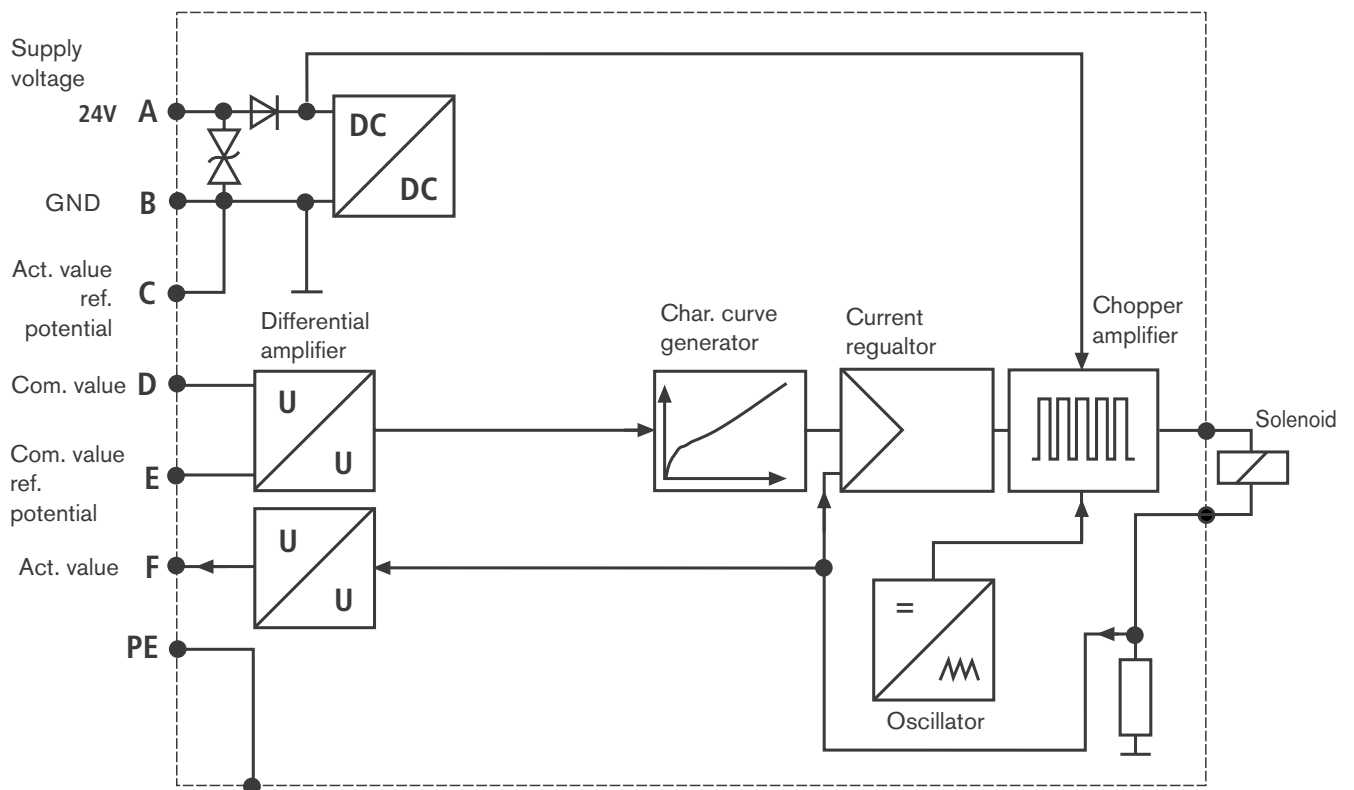
Via the characteristic curve generator the command value-solenoid-characteristic curve is so matched to the valve so that nonlinearities in the hydraulics are compensated for and a linear command value-pressure-characteristic curve results.

The current controller regulates the solenoid current independent of the solenoid coil resistance.

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

To test the solenoid current it is possible, at the plug, to measure a voltage between pin „F“(+) and pin „C“(-), that reacts in proportion to the solenoid current. **1 mA** solenoid current is **1 mV**.

Block circuit diagram



Supply voltage

Power supply with rectifier

Single phase rectification or AC bridge:

$$U_{\text{eff}} = 21 \text{ to } 35 \text{ V}$$

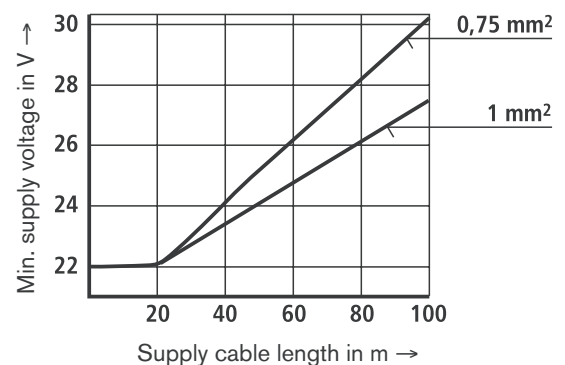
Output current: $I_{\text{eff}} = \text{max. } 1.85 \text{ A}$

Supply cable:

- Recommended 6-core 0.75 or 1 mm² plus earth and screen
- Outside diameter is dependent on the plug-in connector (page 6)
- Only connect the screen to PE on the supply side
- Max. permissible length 100 m

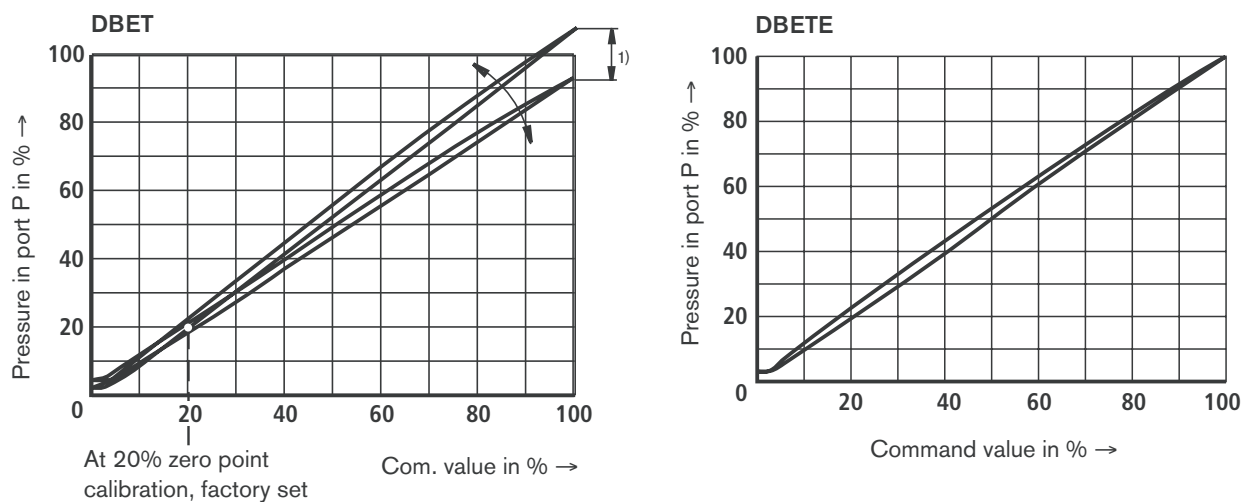
The minimum supply voltage at the power supply is dependent on the length of the supply cable (see diagram).

For lengths > 50 m a 2200 μF condenser must be fitted in the supply cable in the vicinity of the valve.



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

Pressure in port P in relation to the command value Flow = 0.8 l/min



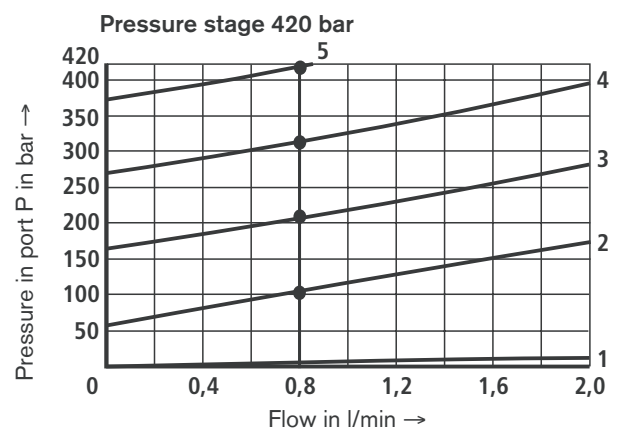
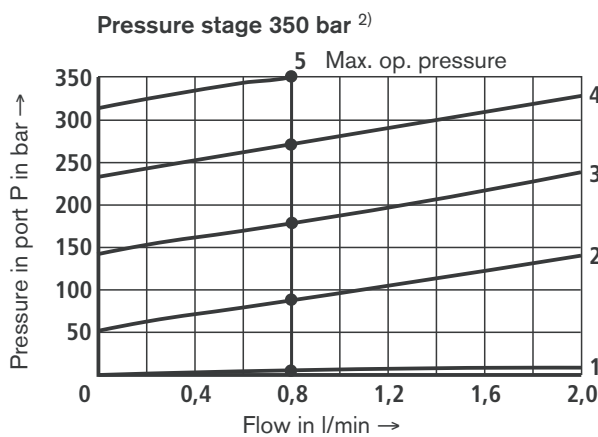
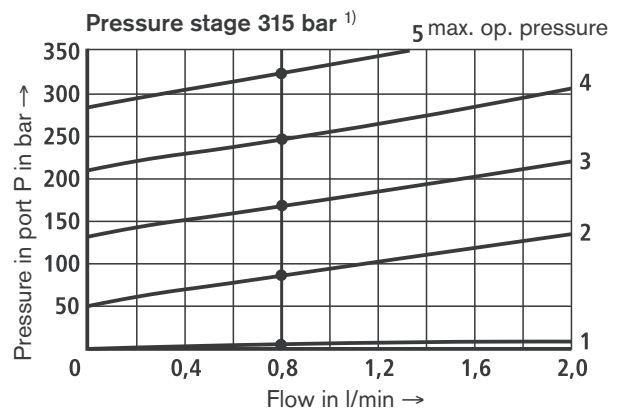
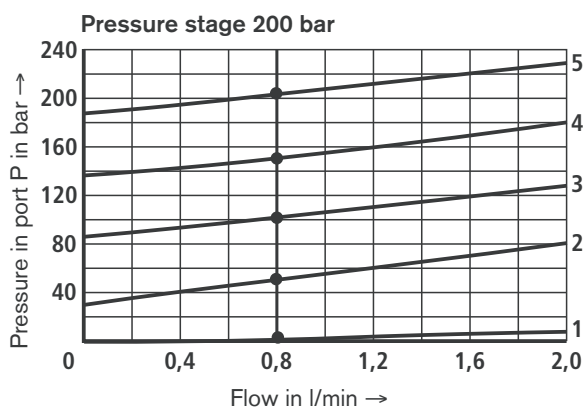
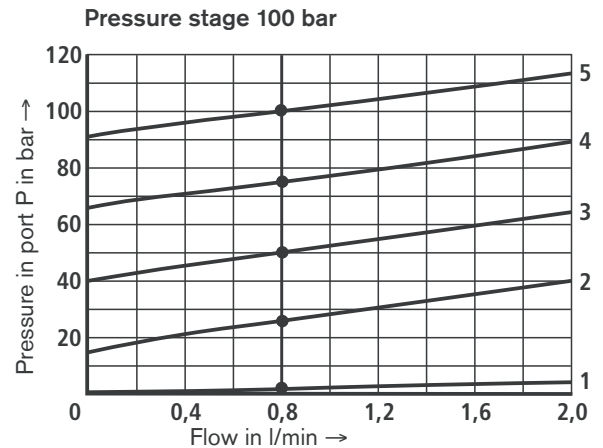
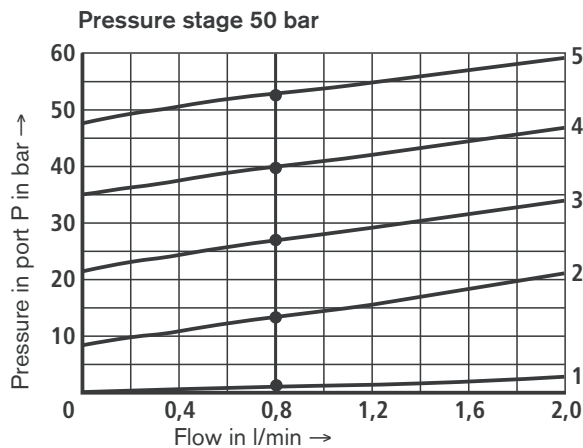
¹⁾ The tolerance can be changed at the external amplifier, for type and catalogue sheet see page 5, (command value attenuation potentiometer "Gw"). For a description, see the data sheet of the amplifier.

Max. permissible current 1750 mA (can be measured at amplifier measurement socket "I")

In order that more than one valve can be calibrated to the same characteristic curve, with a 100% command value the pressure should not be set higher than the maximum settable pressures stated on page 4.

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

Pressure in port P in relation to the flow



Valid for all pressure stages:

Curve 1 = 0 % command value

Curve 2 = 25 % command value

Curve 3 = 50 % command value

Curve 4 = 75 % command value

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

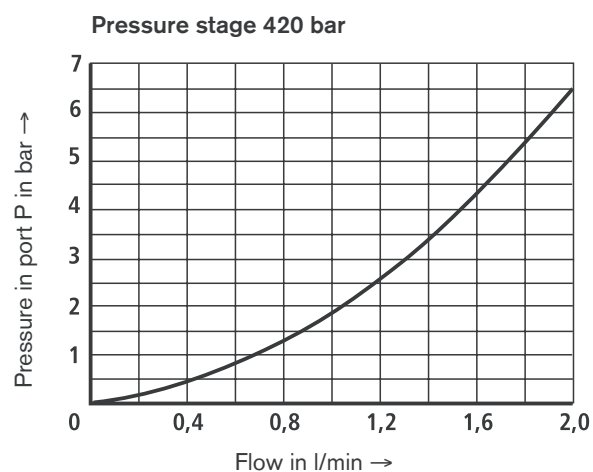
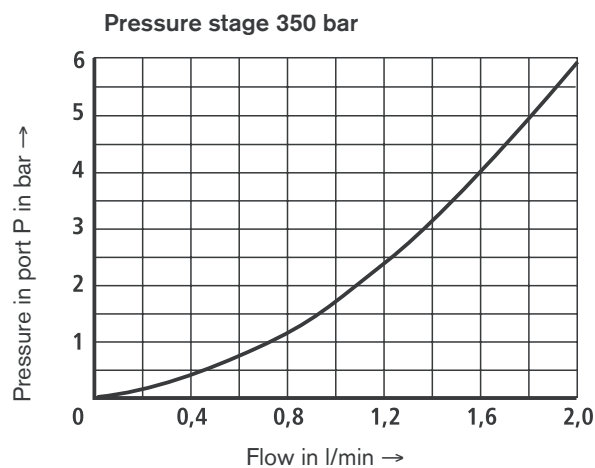
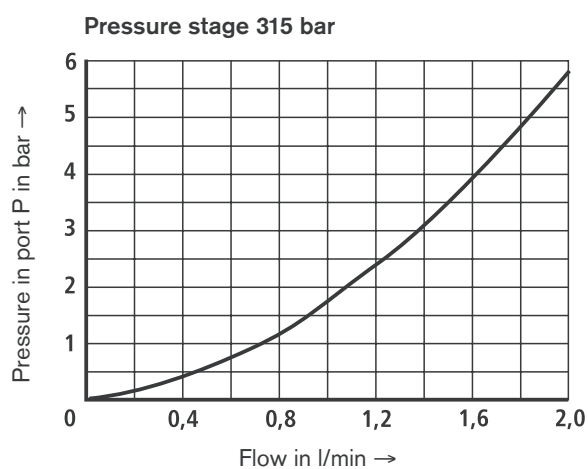
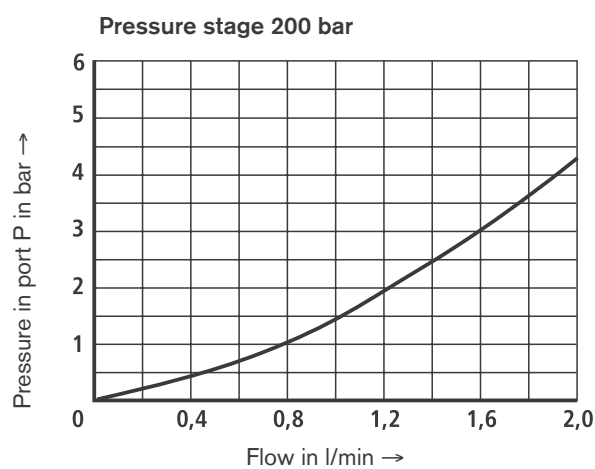
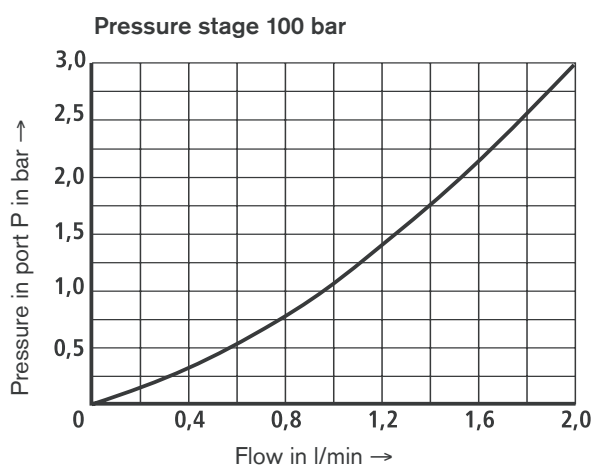
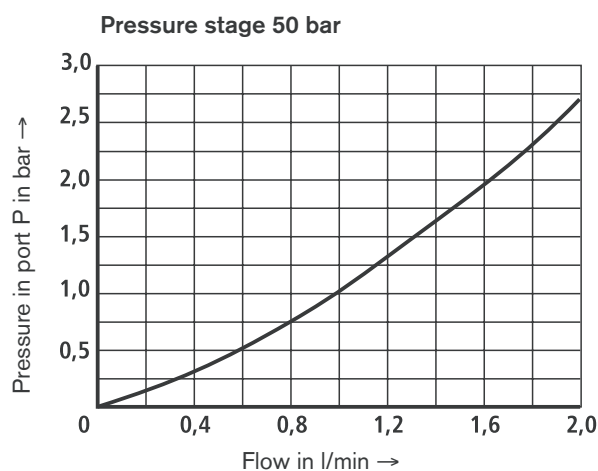
¹⁾ With characteristic curve 5, the command value must not exceed a flow of 1.4 l/min

²⁾ With pressure stage 350 bar, characteristic curve 5, the command value must not exceed a flow of 0.8 l/min

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

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

Min. settable pressure in port P with a 0 V or 4 mA command value in relation to the flow



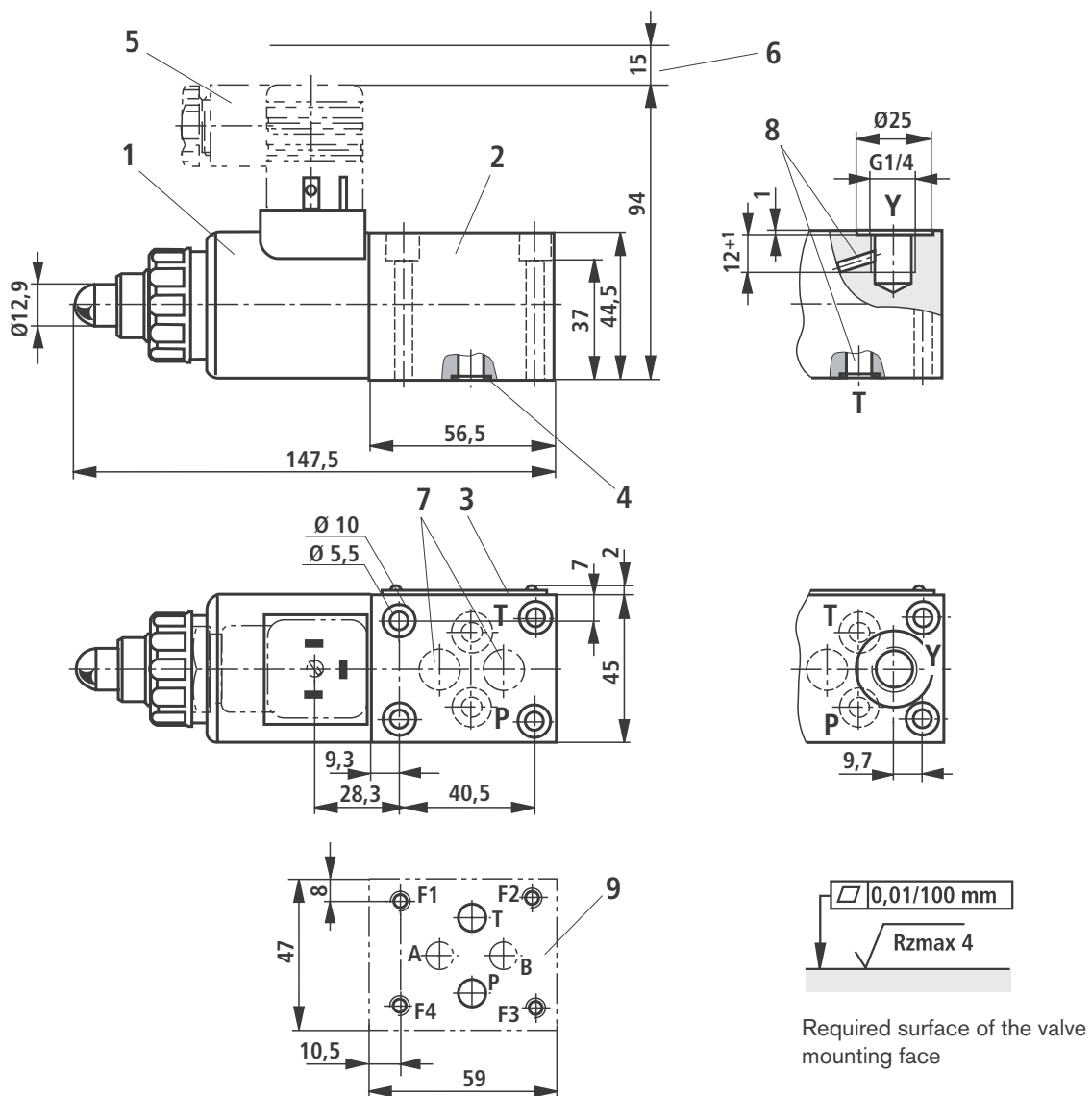
Note

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

Min. control current $\leq 100\text{ mA}$

(This current is set with a command value of 0 V or 4 mA)

Unit dimensions: type DBET (nominal dimensions in mm)



- 1 Proportional solenoid
- 2 Valve housing
- 3 Name plate
- 4 Same sealing rings for ports P, T, A and B
- 5 Plug-in connector to DIN EN 175301-803 (separate order, see page 6)
- 6 Space required to remove the plug-in connector
- 7 Blind counterbores A and B
- 8 With version ..Y.. (external pilot oil drain), port Y is internally connected to port T!
Port T is **not** plugged!
- 9 Machined valve mounting surface
port location to ISO 4401-03-02-0-05

Deviations from the standard:

- Locating pin is not provided
- „A“ and „B“ ports **are not** drilled

Subplates to catalogue sheet RE 45052 and valve fixing screws must be ordered separately.

Subplates:

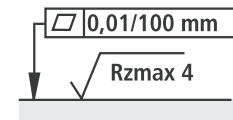
- G 341/01 (G 1/4)
- G 342/01 (G 3/8)
- G 502/01 (G 1/2)

Valve fixing screws:

(not included within the scope of supply)

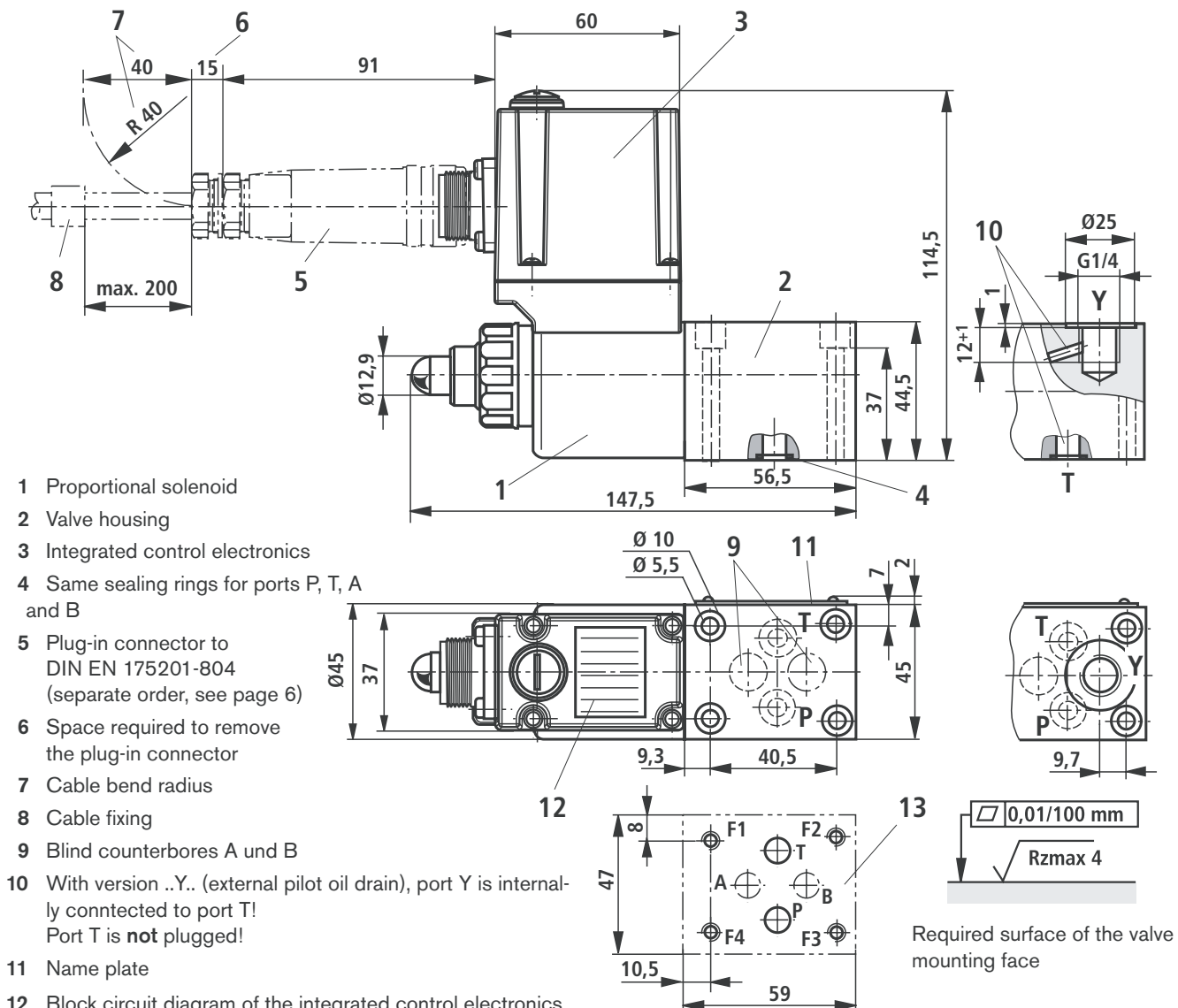
Due to strength (tensile) reasons only use the following valve fixing screws:

4 S.H.C.S. ISO 4762 - M5 x 45 - 10.9;
Coating to DIN EN ISO 10683 fZn - 240h - L
 (friction value 0.09 - 0.14 to VDA 235-101);
 $M_A = 7 \text{ Nm} \pm 10\%$
 separate order Mat. No. **R913000140**



Required surface of the valve mounting face

Unit dimensions: type DBETE (nominal dimensions in mm)



- 1 Proportional solenoid
- 2 Valve housing
- 3 Integrated control electronics
- 4 Same sealing rings for ports P, T, A and B
- 5 Plug-in connector to DIN EN 175201-804 (separate order, see page 6)
- 6 Space required to remove the plug-in connector
- 7 Cable bend radius
- 8 Cable fixing
- 9 Blind counterbores A und B
- 10 With version ..Y.. (external pilot oil drain), port Y is internally connected to port T! Port T is **not** plugged!
- 11 Name plate
- 12 Block circuit diagram of the integrated control electronics
- 13 Machined valve mounting surface, port location to ISO 4401-03-02-0-05
Deviations from the standard:
 - Locating pin is not provided
 - „A“ and „B“ ports **are not** drilled

Subplates to catalogue sheet RE 45052 and valve fixing screws must be ordered separately.

Subplates:

- G 341/01 (G 1/4)
- G 342/01 (G 3/8)
- G 502/01 (G 1/2)

Valve fixing screws:

(not included within the scope of supply)

Due to strength (tensile) reasons only use the following valve fixing screws:

4 S.H.C.S. ISO 4762 - M5 x 45 - 10.9;
Coating DIN EN ISO 10683 fIZn - 240h - L
 (friction value 0.09 - 0.14 to VDA 235-101);
 $M_A = 7 \text{ Nm} \pm 10\%$

Separate order Mat. No. **R913000140**