

## DBET(E)

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

Nominal size 6  
 Component series 6X  
 Maximum operating pressure 350 bar  
 Maximum flow: 2 L/min



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## Features

- 1 - Directly operated valves for limiting a system pressure
- 1 - Proportional solenoid with central thread and detachable coil
- 1 - For subplate mounting:
- 3 Porting pattern according to ISO 4401-03-02-0-05
- 4 - Integrated electronics (OBE) with type DBETE:
- 6 Using 32-bit high-speed processor, little manufacturing
- 7 tolerance of the command value pressure characteristic curve
- 10 - External control electronics with type DBET:
- 11 Amplifier with modular design (type RT-PSDM1) or plug-in amplifier (RT-PSGM), individually adjustable upwards and downwards ramp, fine adjustment of the command value pressure characteristic curve is possible

## Ordering details

| DBET | E  | - | 6X | / | 200 | Y  | G24 | K31 | / | A1 | M  | *  |
|------|----|---|----|---|-----|----|-----|-----|---|----|----|----|
| 01   | 02 |   | 03 |   | 04  | 05 | 06  | 07  |   | 08 | 09 | 10 |

|    |      |                                                      |
|----|------|------------------------------------------------------|
| 01 | DBET | Directly operated proportional pressure relief valve |
|----|------|------------------------------------------------------|

|    |         |                                  |
|----|---------|----------------------------------|
| 02 | No code | For external control electronics |
|    | E       | With integrated electronics      |

|    |    |                                                                                        |
|----|----|----------------------------------------------------------------------------------------|
| 03 | 6X | Component series 60 to 69 (60 to 69: Unchanged installation and connection dimensions) |
|----|----|----------------------------------------------------------------------------------------|

### Maximum pressure rating

|    |     |               |
|----|-----|---------------|
| 04 | 50  | Up to 50 bar  |
|    | 100 | Up to 100 bar |
|    | 200 | Up to 200 bar |
|    | 315 | Up to 315 bar |
|    | 350 | Up to 350 bar |

|    |         |                            |
|----|---------|----------------------------|
| 05 | No code | Pilot oil return internal  |
|    | Y       | Pilot oil return, external |

|    |     |                                                            |
|----|-----|------------------------------------------------------------|
| 06 | G24 | Supply voltage of the integrated electronics (OBE): 24V DC |
|----|-----|------------------------------------------------------------|

### Electrical connection

|    |     |                                                                                        |       |
|----|-----|----------------------------------------------------------------------------------------|-------|
| 07 | K4  | For type DBET: Without mating connector; connector DIN EN 175301-803 (separate order)  | DBET  |
|    | K31 | For type DBETE: Without mating connector; connector DIN EN 175201-804 (separate order) | DBETE |

### Electronics interface

|    |         |                                                                |       |
|----|---------|----------------------------------------------------------------|-------|
| 08 | No code | Optional RT-PSDM1/ RT-PSGM external amplifier (separate order) | DBET  |
|    | A1      | Command value 0 ... 10V                                        | DBETE |
|    | F1      | Command value 4 ... 20mA                                       |       |

|      |    |   |    |   |     |    |     |     |   |    |    |    |
|------|----|---|----|---|-----|----|-----|-----|---|----|----|----|
| DBET | E  | - | 6X | / | 200 | Y  | G24 | K31 | / | A1 | M  | *  |
| 01   | 02 |   | 03 |   | 04  | 05 | 06  | 07  |   | 08 | 09 | 10 |

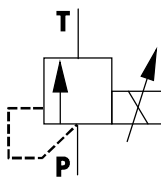
#### Seal material

|    |   |                                   |
|----|---|-----------------------------------|
| 09 | M | NBR seals                         |
|    | V | FKM seals                         |
| 10 | * | Further details in the plain text |

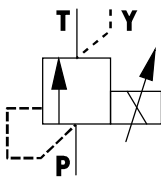
#### Symbols

##### For external control electronics (type DBET)

Pilot oil return internal

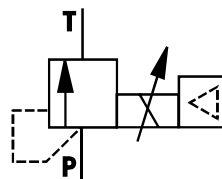


Pilot oil return, external (Y)

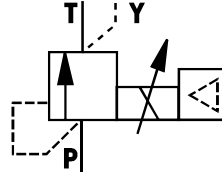


##### With integrated electronics (type DBETE)

Pilot oil return internal



Pilot oil return, external (Y)



## Functions, section

### General information

Type DBET proportional pressure relief valves are remote control valves with seat design and are used to limit a system pressure. Operation 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 the hydraulic fluid. Depending on the electric command value, these valves can be used to smoothly set the system pressure to be limited.

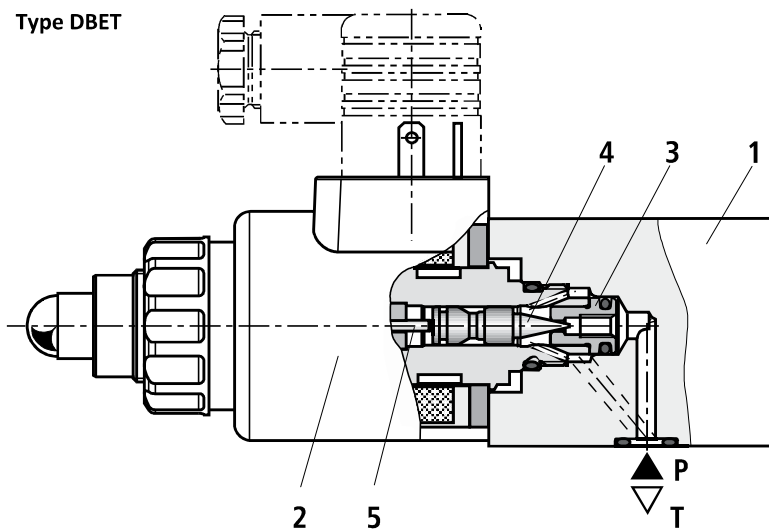
The valves mainly consist of the housing (1), the proportional solenoid (2), the valve seat (3) and the valve poppet (4).

### Basic principle

For the setting of the system pressure, a command value is specified

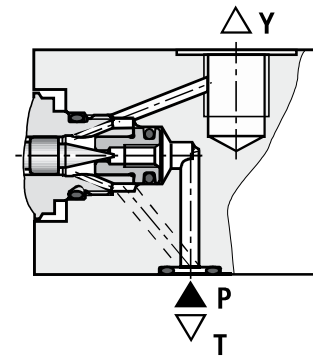
at the control electronics. Depending on the command value, the electronics actuate the solenoid with electric current. The proportional solenoid converts the electric current into mechanical force that acts on the valve poppet (4) via the armature plunger (5). The valve poppet (4) presses on the valve seat (3) and interrupts the connection between port P and T or Y. If the hydraulic force on the valve poppet (4) equals the solenoid force, the valve controls the set pressure by lifting the valve poppet (4) off the valve seat (3) and thus enabling hydraulic fluid to flow from port P to T or Y. If the command value is zero, the control electronics only applies the minimum control current to the proportional solenoid (2) and the minimum set pressure is applied.

### Type DBET

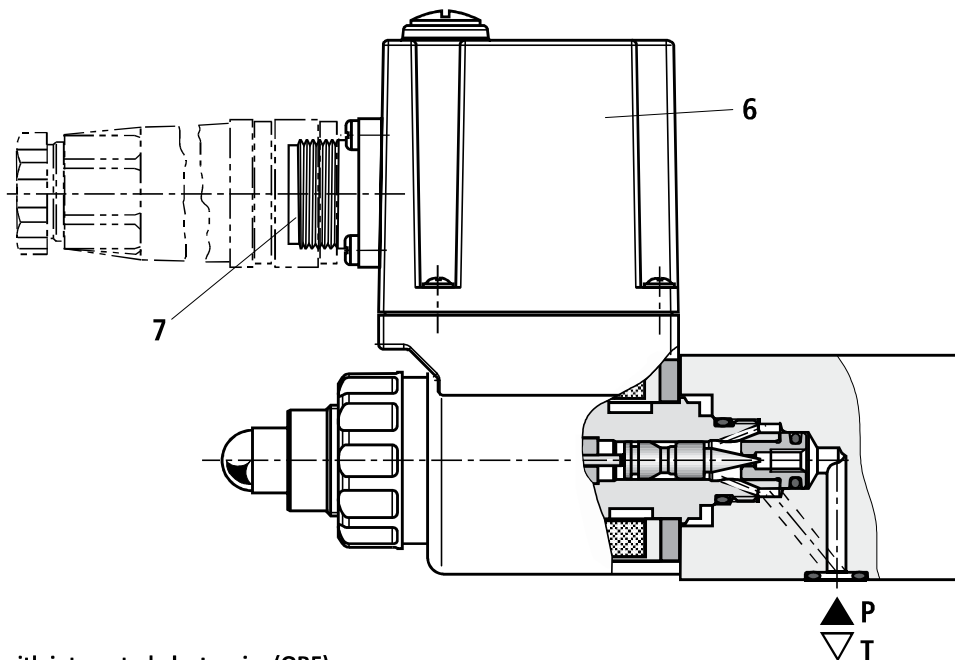


### Type DBET...Y

Pilot oil return, external



### Type DBETE



### Type DBETE – with integrated electronics (OBE)

In terms of function and design, these valves correspond to type DBET. On the proportional solenoid, there is a housing (6) with the control electronics. Supply and command value voltage are applied at the connector (7). At the factory, the command value pressure characteristic curve is adjusted with little manufacturing tolerance.

For more information on the control electronics, see page 7.

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

### General

| Type                      |    | DBET        | DBETE       |
|---------------------------|----|-------------|-------------|
| Mounting orientation      |    | any         |             |
| Storage temperature range | °C | -20~+80     |             |
| Ambient temperature range | °C | -20 ... +70 | -20 ... +50 |
| Weight                    | Kg | 2.0         | 2.15        |

### Hydraulic (HLP46 at 40 °C ± 5 °C)

|                                                                                                                       |                        |                    |                                                          |                                     |
|-----------------------------------------------------------------------------------------------------------------------|------------------------|--------------------|----------------------------------------------------------|-------------------------------------|
| Maximum operating pressure                                                                                            | Port P                 | bar                | 350                                                      |                                     |
| Maximum set 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                                                      |                                     |
| Minimum set pressure (at command value 0 V or 4 mA)                                                                   |                        | bar                | See characteristic curves on page 9                      |                                     |
| Return flow pressure                                                                                                  | Port T and/or Y        | bar                | Separately at zero pressure to the tank                  |                                     |
| Maximum flow                                                                                                          |                        | l/min              | 2 <sup>1)</sup>                                          |                                     |
| Hydraulic fluid                                                                                                       |                        |                    | DIN51524...535 for other hydraulic fluid, please consult |                                     |
| Hydraulic fluid temperature range                                                                                     |                        | °C                 | -20 ... +80 (preferably +40 ... +50)                     |                                     |
| Viscosity range                                                                                                       |                        | mm <sup>2</sup> /s | 20 ... 380 (preferably 30 ... 45)                        |                                     |
| Maximum permitted degree of contamination of the hydraulic fluid                                                      |                        |                    | ISO4406:1999 20/18/15 <sup>2)</sup>                      |                                     |
| Hysteresis                                                                                                            |                        | %                  | < 4% of the maximum set pressure                         |                                     |
| Range of inversion                                                                                                    |                        | %                  | < 0.5% of the maximum set pressure                       |                                     |
| Response sensitivity                                                                                                  |                        | %                  | < 0.5% of the maximum set pressure                       |                                     |
| Linearity (flow 0.8 L/min)                                                                                            |                        | %                  | < ±3% of the maximum set pressure                        |                                     |
| Manufacturing tolerance of the command value pressure characteristic curve, related to 0.8 L/min; pressure increasing | at command value 20 %  | %                  | < ±1.5% <sup>3)</sup> of the maximum set pressure        |                                     |
|                                                                                                                       | at command value 100 % | %                  | < ±5% <sup>4)</sup> of the maximum set pressure          | < ±1.5% of the maximum set pressure |
| Step response (Tu + Tg) 0 → 100 % or 100 % → 0                                                                        |                        | ms                 | 80 (depending on the system)                             |                                     |
| line volume < 20 cm <sup>3</sup> ; q <sub>v</sub> = 0.8 L/min                                                         |                        |                    |                                                          |                                     |

- 1) Observe flow limitation for pressure ratings 315, 350 and 420 bar (page 8).
- 2) 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.
- 3) Zero point calibration at the factory.
- 4) it can be adjusted by gain Gx on the external control electronics.

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

| Electrical                                          |                     |                                               |                   |
|-----------------------------------------------------|---------------------|-----------------------------------------------|-------------------|
| Type                                                |                     | DBET                                          | DBETE             |
| Minimum solenoid current                            | mA                  | $\leq 100$                                    |                   |
| Maximum solenoid current                            | mA                  | $1600 \pm 10\%$                               |                   |
| Solenoid coil resistance                            | Cold value at 20 °C | $\Omega$                                      | 5.5               |
|                                                     | Maximum hot value   | $\Omega$                                      | 8.05              |
| Duty                                                | %                   | 100                                           |                   |
| Electrical connection                               |                     | DIN EN 175301-803                             | DIN EN 175201-804 |
| Electric, integrated electronics (OBE)              |                     |                                               |                   |
| Supply voltage                                      | Nominal voltage     | VDC                                           | 24                |
|                                                     | Lower limit value   | VDC                                           | 21                |
|                                                     | Upper limit value   | VDC                                           | 35                |
| Current consumption                                 |                     | A                                             | 1.5               |
| External fuse protection                            |                     | A                                             | 2, slow-blowing   |
| Inputs                                              | Voltage, A1         | V                                             | 0 ... 10          |
|                                                     | Current, F1         | mA                                            | 4 ... 20          |
| Protection class of the valve according to EN 60529 |                     | IP65 with mating connector mounted and locked |                   |

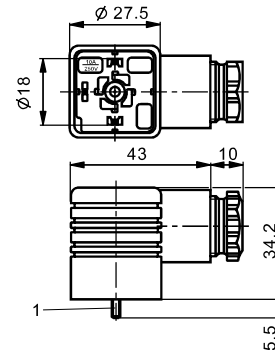
## Electrical connection

**For type DBET, with component plug to DIN EN 175301-803 (separate order)**

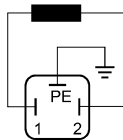
Solenoid b, color black

Separate order under material no. HP18110741

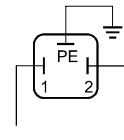
Fixing screw: M3, torque 0.5 Nm



Connection to component plug

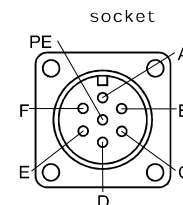
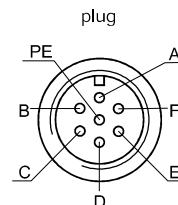
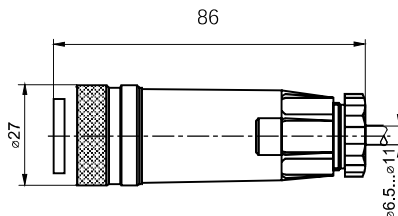


Connection to plug-in connector

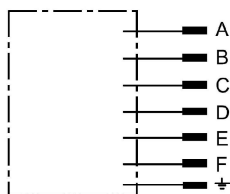


To amplifier

**For type 4WREE(with integrated control electronics): connector conforming to DIN EN 175201-804 (Need to order separately)**



Pin allocation of the component plug



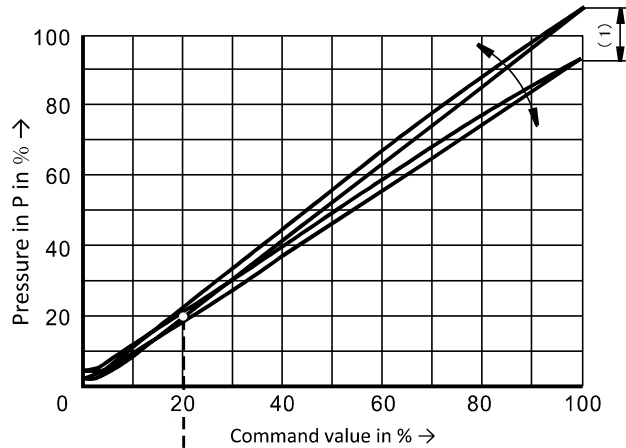
Metal nut structure (preferred model)  
 Order separately, Order No.: R00050406  
 Plastic nut structure Order separately,  
 Order No.: R00050408  
 All-metal structure Order separately,  
 Order No.: R00050407

| Function                        | Slot | Allocation interface A1                                    | Allocation interface F1                            |
|---------------------------------|------|------------------------------------------------------------|----------------------------------------------------|
| Supply voltage                  | A    | 24VDC (19.4~35VDC), $I_{max} = 2\text{ A}$                 |                                                    |
|                                 | B    | 0 V                                                        |                                                    |
| Ref. potential actual value     | C    | reference contact F; $R_e > 50\text{ k}\Omega$             | reference contact F; $R_e < 10\text{ }\Omega$      |
| Differential amplifier input    | D    | $\pm 10\text{ V com. value;}$<br>$R_e > 50\text{ k}\Omega$ | 4...20 mA com. value;<br>$R_e > 100\text{ }\Omega$ |
|                                 | E    | ref. potential com. value                                  |                                                    |
| Measurement output (act. value) | F    | $\pm 10\text{ V act. value,}$<br>(limiting load 5 mA)      | 4...20 mA act. value,<br>load max. 300 $\Omega$    |
|                                 | PE   | Connected with cooling body and valve housing              |                                                    |

## Characteristic curves (HLP46 at 40 °C ± 5 °C)

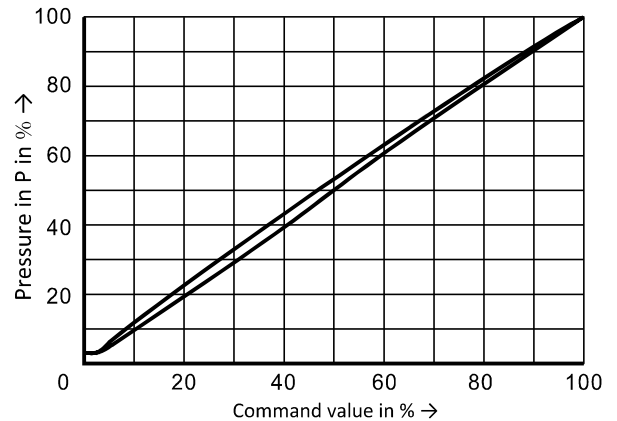
Pressure in port P depending on the command value (flow = 0.8 L/min)

Type DBET



At 20 % zero point  
calibration at the factory

Type DBETE

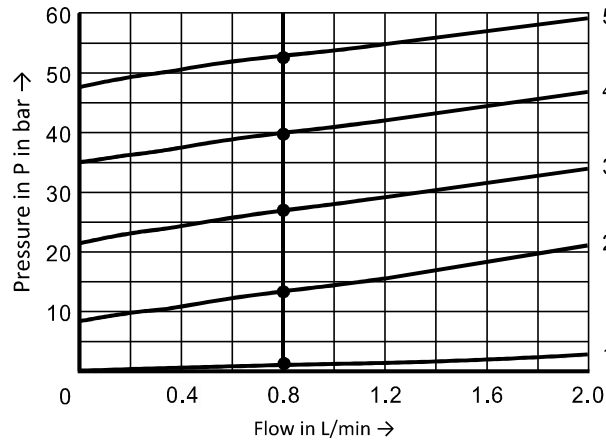


- (1) With valve type DBET, the manufacturing tolerance at the external amplifier can be changed using the command value attenuator potentiometer "Gw".

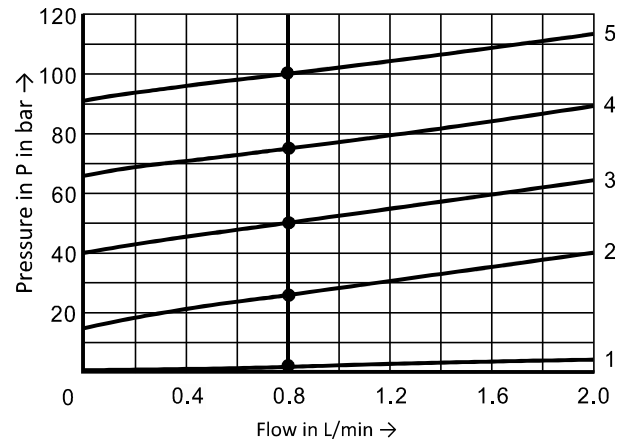
## Characteristic curves (HLP46 at 40 °C ± 5 °C)

Pressure in port P depending on the flow

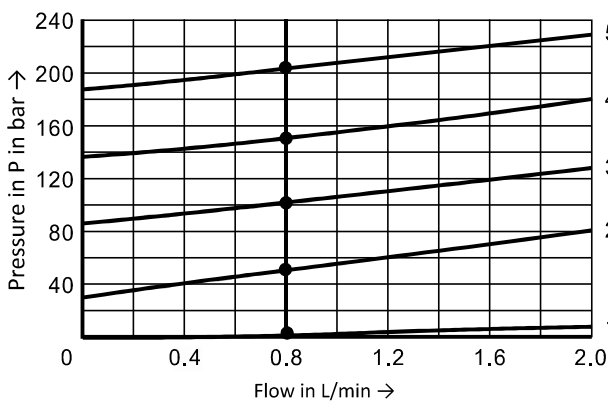
Pressure stage 50 bar



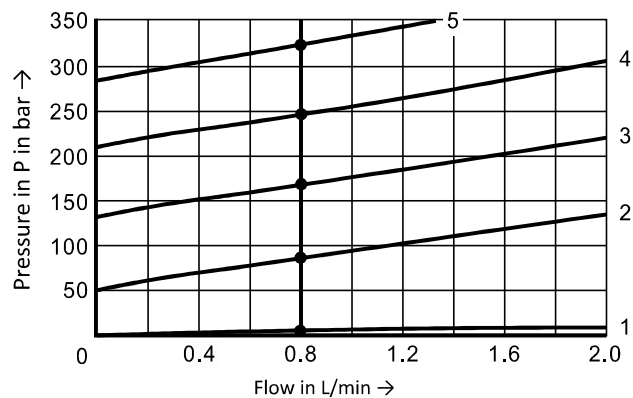
Pressure stage 100 bar



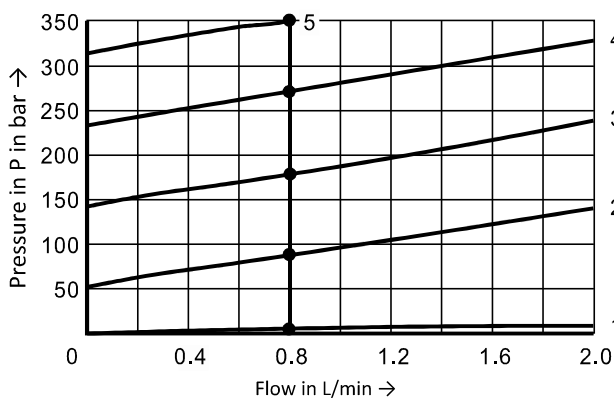
Pressure stage 200 bar<sup>2)</sup>



Pressure stage 315 bar<sup>1)</sup>



Pressure stage 350 bar<sup>2)</sup>



- 1) In the case of characteristic curve 5, the command value may not exceed the maximum flow of 1.4 L/min
- 2) In the case of characteristic curve 5, the command value may not exceed the maximum flow of 0.8 L/min

Applicable for all pressure ratings:

Curve 1 at 0 % of the command value

Curve 2 at 25 % of the command value

Curve 3 at 50 % of the command value

Curve 4 at 75 % of the command value

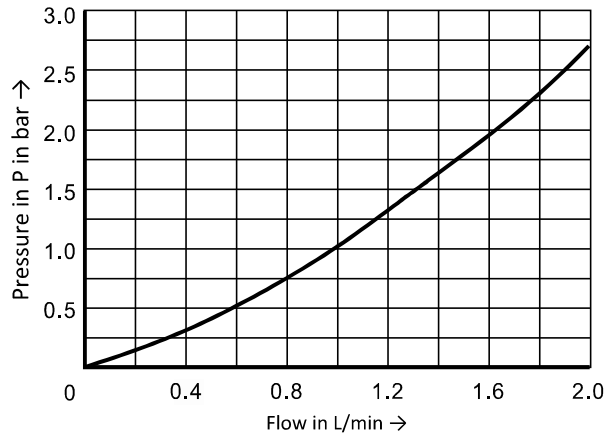
Curve 5 at 100 % of the command value 1; 2)

The characteristic curves were measured without counter pressure in port T. ( $p_T = 0$  bar)

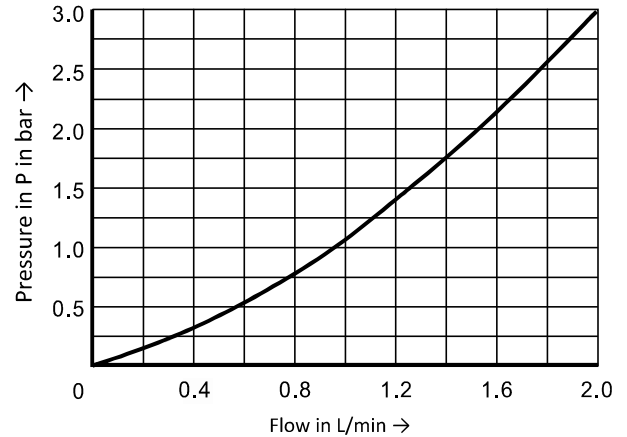
## Characteristic curves (HLP46 at 40 °C ± 5 °C)

Minimum set pressure in port P with command value 0 V and/or 4 mA depending on the flow

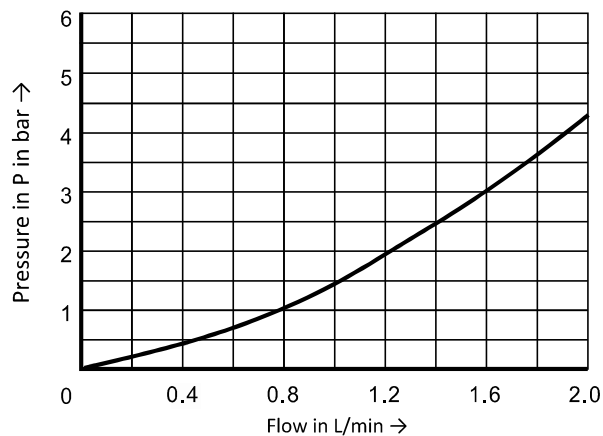
Pressure stage 50 bar



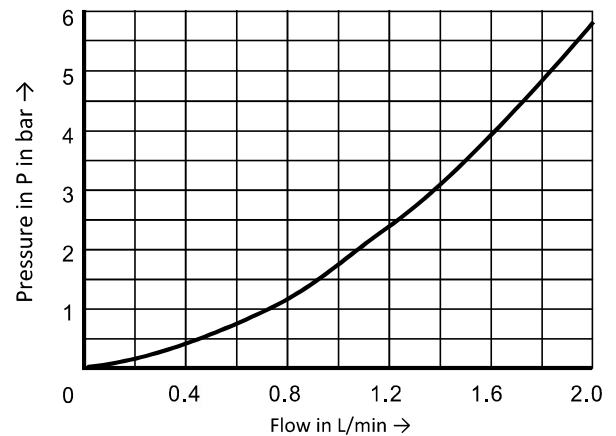
Pressure stage 100 bar



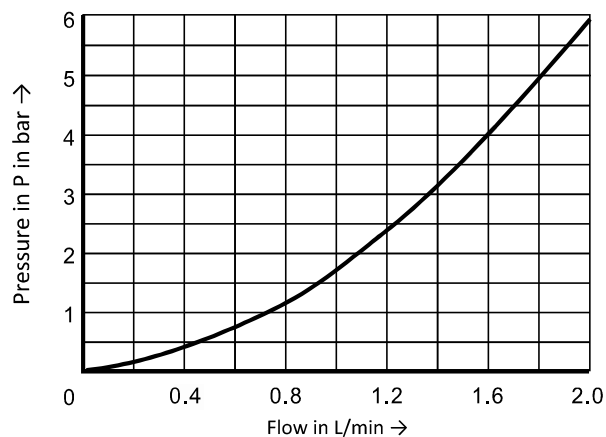
Pressure stage 200 bar



Pressure stage 315 bar

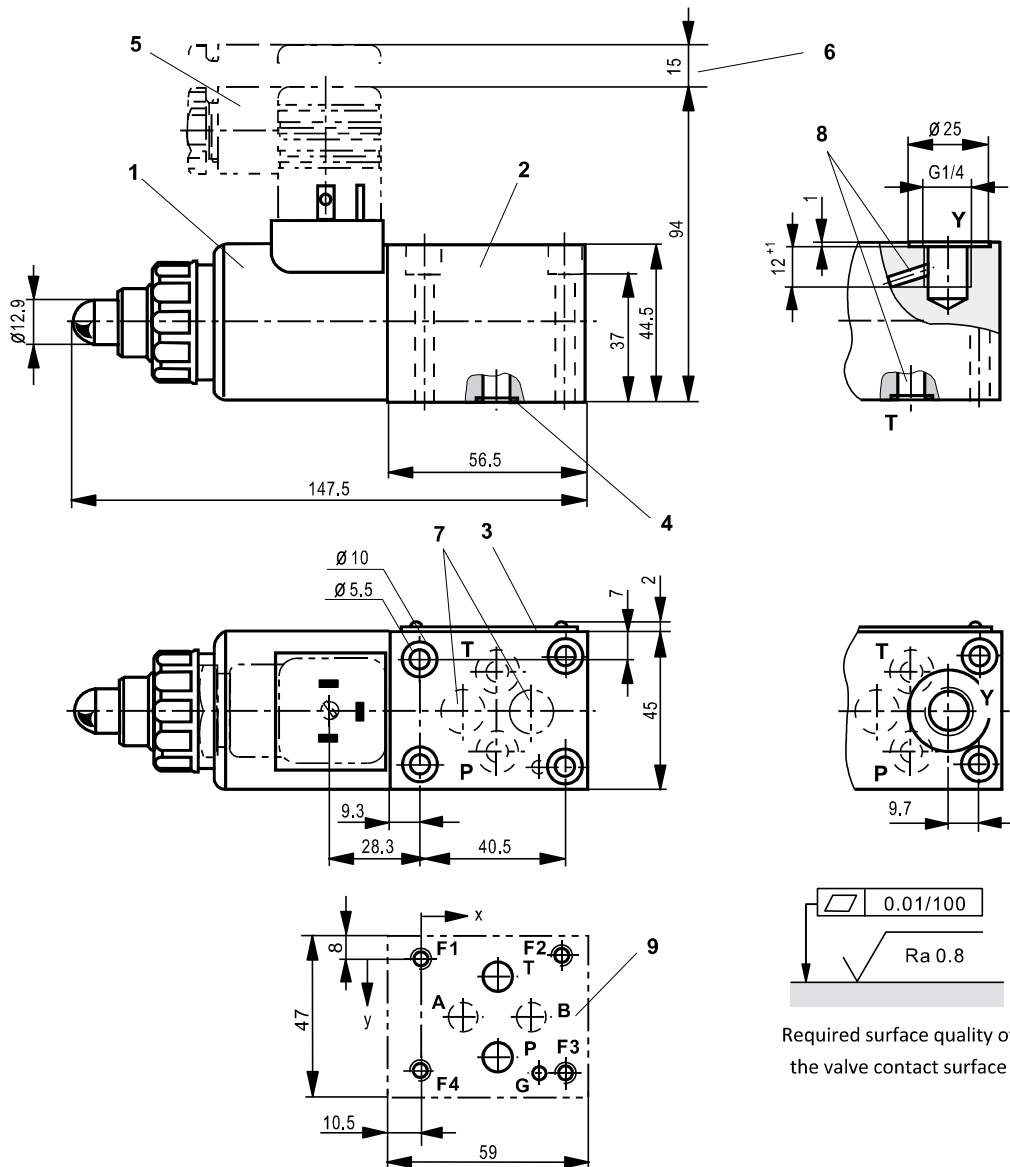


Pressure stage 350 bar



## Unit dimensions (dimensions in mm)

### Type DBET



Required surface quality of the valve contact surface

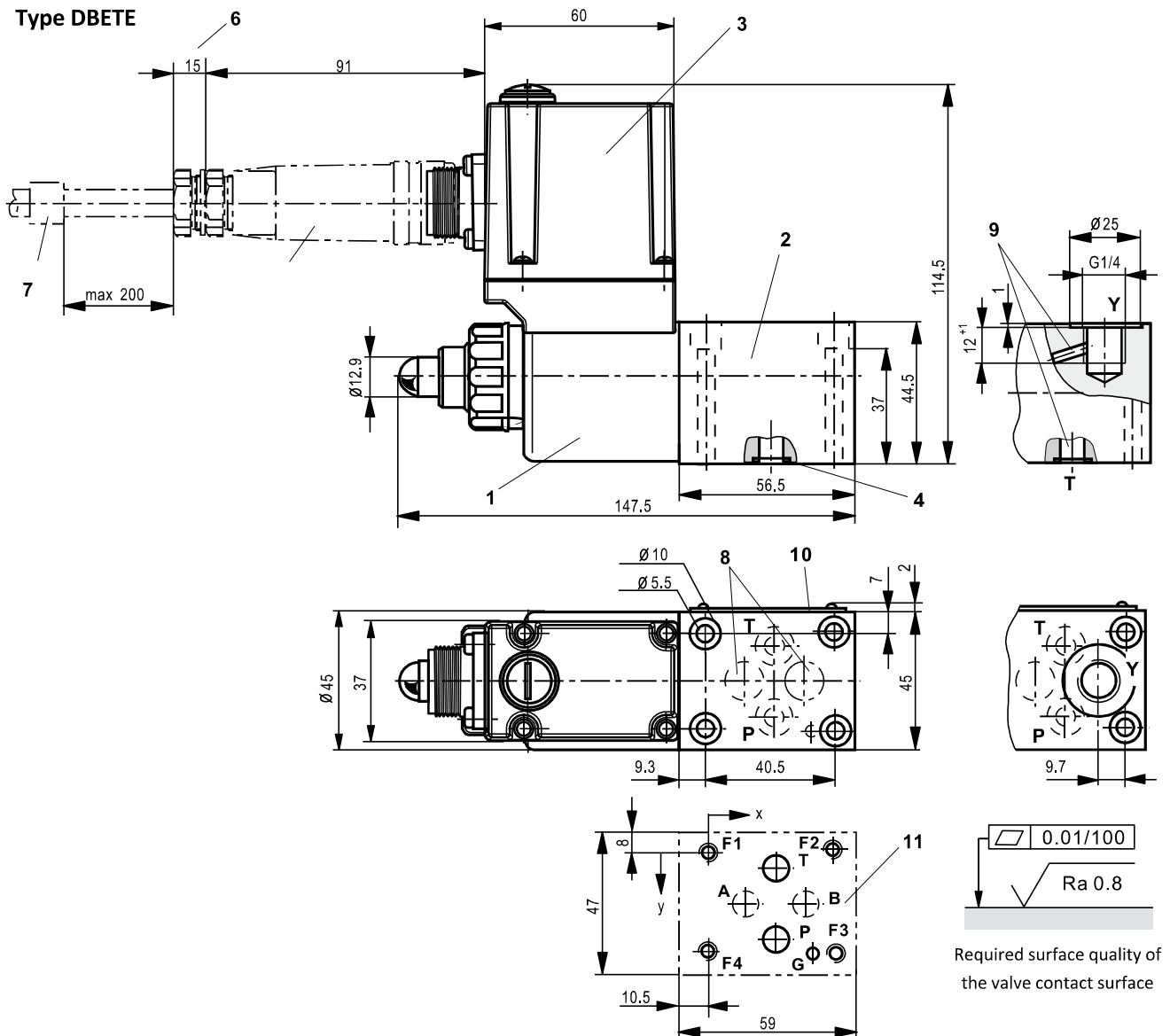
| Dimensions in mm       | P       | A       | T       | B       | F1 | F2    | F3    | F4 | G     |
|------------------------|---------|---------|---------|---------|----|-------|-------|----|-------|
| <b>Diameter/thread</b> | 7.5 max | 7.5 max | 7.5 max | 7.5 max | M5 | M5    | M5    | M5 | 4     |
| <b>x</b>               | 21.5    | 12.7    | 21.5    | 30.2    | 0  | 40.5  | 40.5  | 0  | 33    |
| <b>y</b>               | 25.9    | 15.5    | 5.1     | 15.5    | 0  | -0.75 | 31.75 | 31 | 31.75 |

1. Proportional solenoid
2. Valve housing
3. Name plate
4. R-ring 9.81 x 1.5 x 1.78 (ports A, B, P, T)
5. Mating connector according to DIN EN 175301-803
6. Space required for removing the mating connector
7. Blind counter bores A and B

8. With version ..Y.. (external pilot oil return) port Y is internally connected to port T. Port T is not plugged.
9. porting pattern according to ISO 4401-03-02-0-05  
Deviating from the standard: "A" and "B" channels not drilled locating pin not included in the scope of delivery

Valve fixing screws: 4 GB/T 70.1 - M5 x 50 10.9  
Torque: 8.9 Nm ± 10 %

## Unit dimensions (dimensions in mm)



| Dimensions in mm       | P       | A       | T       | B       | F1 | F2    | F3    | F4 | G     |
|------------------------|---------|---------|---------|---------|----|-------|-------|----|-------|
| <b>Diameter/thread</b> | 7.5 max | 7.5 max | 7.5 max | 7.5 max | M5 | M5    | M5    | M5 | 4     |
| <b>x</b>               | 21.5    | 12.7    | 21.5    | 30.2    | 0  | 40.5  | 40.5  | 0  | 33    |
| <b>y</b>               | 25.9    | 15.5    | 5.1     | 15.5    | 0  | -0.75 | 31.75 | 31 | 31.75 |

1. Proportional solenoid
2. Valve housing
3. Integrated electronics (OBE)
4. R-ring 9.81 x 1.5 x 1.78 (ports A, B, P, T)
5. Mating connector according to DIN EN 175301-803
6. Space required for removing the mating connector
7. Cable fastening

8. Blind counter bores A and B
9. With version ..Y.. (external pilot oil return) port Y is internally connected to port T. Port T is not plugged.
10. Name plate
11. porting pattern according to ISO 4401-03-02-0-05  
Deviating from the standard: "A" and "B" channels not drilled locating pin not included in the scope of delivery

Valve fixing screws: 4 GB/T 70.1 - M5 x 50 10.9  
 Torque: 8.9 Nm ± 10 %