

# Proportional pressure relief valve, pilot operated, with on-board elec- tronics (OBE) and position feedback

RE 29163/07.05

1/12

## Type DBEBE10Z

Nominal size 10  
Unit series 1X  
Maximum working pressure A, B, X 315 bar, Y 2 bar  
Maximum flow rate  $Q_{nom}$  120 l/min



## List of Contents

Contents	Page
Features	1
Ordering data	2
Preferred types, symbol	2
Function, sectional diagram	3
Technical data	4 to 6
On-board trigger electronics	7 and 8
Characteristic curves	9
Unit dimensions	10

## Features

- Pilot operated valves with position feedback and on-board electronics for limiting system pressure (pilot oil internal only)
- Adjustable through the position of the armature against the compression spring
- With position control, minimal hysteresis  $< 1\%$ , rapid response times, see Technical Data
- Pressure limitation to a safe level even with faulty electronics (solenoid current  $I > I_{max}$ )
- For subplate attachment, mounting hole configuration to ISO 5781-AG-06-2-A  
Subplates as per catalog sheet RE 45055 (order separately)
- Plug-in connector to DIN 43563-AM6, see catalog sheet RE 08008 (order separately)
- Data for the on-board trigger electronics  
Complies with CE, EMC directives EN 61000-6-2: 2002-08 and EN 61000-6-3: 2002-08
  - $U_B = 24 V_{nom}$  DC
  - Electrical connection 6P+PE
  - Signal actuation
    - Standard 0...+10 V (A1)
    - Version 4...20 mA (F1)
  - Valve curve calibrated at the factory

## Ordering data

DBEB	E	10	Z	-1X/	XY	G24	K31	A1	M	*
------	---	----	---	------	----	-----	-----	----	---	---

Proportional pressure relief valve with inductive position transducer on the cone

With on-board electronics = E

Nominal size = 10

Mounting hole configuration to ISO 5781-AG-06-2-A = Z

Unit series 10 to 19 (10 to 19: installation and connection dimensions unchanged) = 1X

### Max. pressure stage

up to 180 bar = 180

up to 315 bar = 315

Relief port X

Pilot oil port Y = XY

Further information in plain text

M = NBR seals, suitable for mineral oils (HL, HLP) to DIN 51524

### Interface for trigger electronics\*

A1 = Setpoint input 0...+10 V

K31 = Electrical connection **without** plug-in connector, with unit plug to DIN 43563-AM6 Order plug-in connector separately

G24 = Voltage supply of trigger electronics 24 V DC

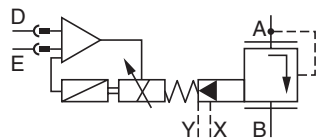
\* Variant "F1" (4...20 mA version) available on request

## Preferred types

Type...A1 (0... +10 V)	Material Number
DBEBE10Z-1X/180XYG24K31A1M	0 811 402 115
DBEBE10Z-1X/315XYG24K31A1M	0 811 402 116

## Symbol

For on-board electronics




## Function, sectional diagram

### General

Type DBEBE10Z proportional pressure relief valves are pilot operated and are used to limit system pressure.

They are actuated by means of a position-controlled proportional solenoid with on-board electronics.

The valve body contains a logic element (poppet valve) of the "normally closed" type. This is pilot operated and is in conical seat design.

 EN 61000-6-2: 2002-08  
EN 61000-6-3: 2002-08

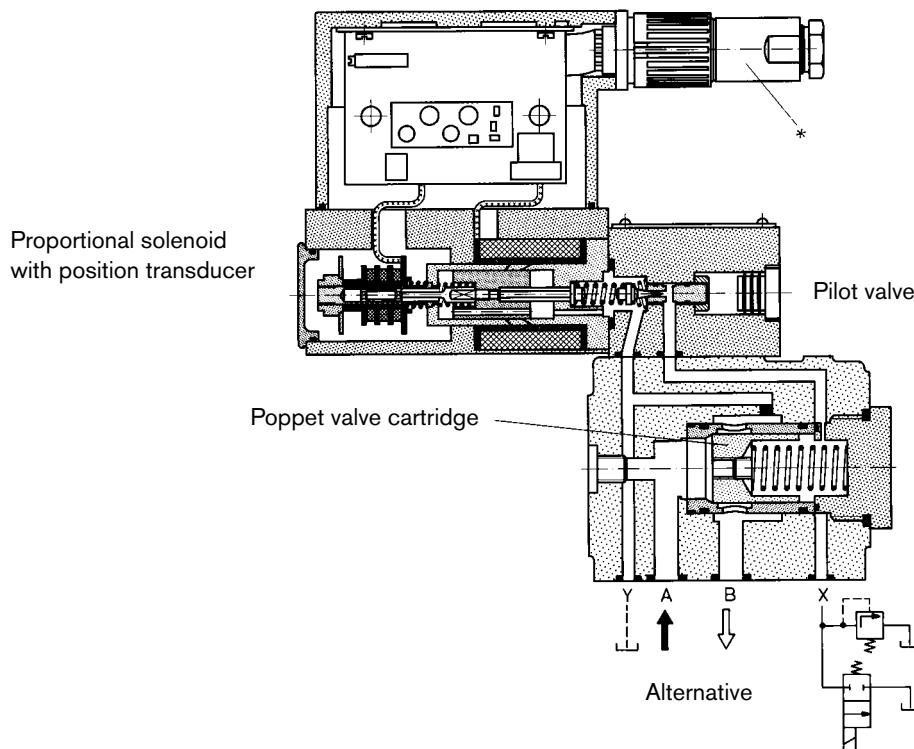
### Basic principle

To adjust the system pressure, a setpoint is set in the trigger electronics. Based on this setpoint, the electronics control the position-controlled solenoid.



The proportional solenoid maintains its position against a spring force, which is proportionate to the system pressure. The pilot stage is supplied with pilot oil at a flow rate of <math><0.8 \text{ l/min}</math> through a bore. The " $p_{\text{max}}$ " pressure stage is determined by the cone and seating bore configuration.

#### Pressure limitation for maximum safety

If a fault occurs in the electronics, so that the solenoid current ( $I_{\text{max}}$ ) would exceed its specified level in an uncontrolled manner, the pressure cannot rise above the level determined by the maximum spring force.



### Accessories

Type		Material Number	
(4 x)  ISO 4762-M10x80-10.9	Cheese-head bolts	2 910 151 309	
* 	Plug-in connectors 6P+PE, see also RE 08008	KS	1 834 482 022
		KS	1 834 482 026
		MS	1 834 482 023
		MS	1 834 482 024
		KS 90°	1 834 484 252

### Testing and service equipment

Test box type VT-PE-TB3, see RE 30065

Measuring adapter 6P+PE type VT-PA-2, see RE 30068


## Technical data

General		
Construction	Pilot stage	Poppet valve
	Main stage	Pressure relief valve
	Valve cartridge	Poppet valve, normally closed, with pilot oil bore
Actuation		Proportional solenoid with position control and OBE
Connection type		Subplate, mounting hole configuration NG10 (ISO 5781-AG-06-2-A)
Mounting position		Optional
Ambient temperature range	°C	-20...+50
Weight	kg	7.8
Vibration resistance, test condition		Max. 25 g, shaken in 3 dimensions (24 h)

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

Pressure fluid		Hydraulic oil to DIN 51524...535, other fluids after prior consultation	
Viscosity range,	recommended mm <sup>2</sup> /s	20...100	
	max. permitted mm <sup>2</sup> /s	10...800	
Pressure fluid temperature range	°C	-20...+70	
Maximum permitted degree of contamination of pressure fluid Purity class to ISO 4406 (c)		Class 18/16/13 <sup>1)</sup>	
Direction of flow		See symbol	
Max. set pressure (at $Q_{min} = 1\text{ l/min}$ )	bar	180	315
Minimum pressure (at $Q_{min} = 1\text{ l/min}$ )	bar	6	8
Max. mechanical pressure limitation level, e.g. when solenoid current $I > I_{max}$	bar	< 190	< 325
Max. working pressure	bar	Port A, B: 315	
		Port Y: ≤ 2 external pilot oil drain	
		Port X: 315 relief port	
Internal pilot oil flow	l/min	≤ 0.8	
Max. flow	l/min	120 for $Q_{max}$ , see Characteristic Curves	

### Static/Dynamic

Hysteresis	%	≤ 1
Manufacturing tolerance for $p_{max}$	%	≤ ±5, see Characteristic Curves
Response time 100% signal change	ms	≈ 80 dependent on dead volume or system volume
Thermal drift		< 1% at $\Delta T = 40\text{ °C}$
Conformity		 EN 61000-6-2: 2002-08 EN 61000-6-3: 2002-08

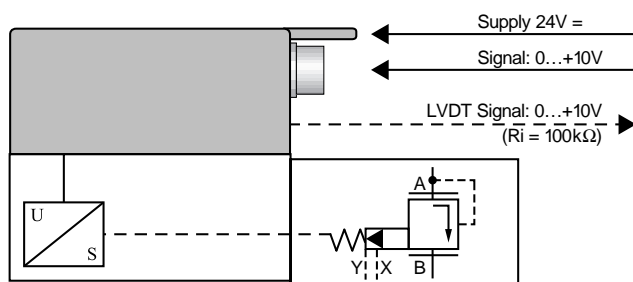
<sup>1)</sup> The purity classes stated for the components must be complied with in hydraulic systems. Effective filtration prevents problems and also extends the service life of components. For a selection of filters, see catalog sheets RE 50070, RE 50076 and RE 50081.

## Technical data

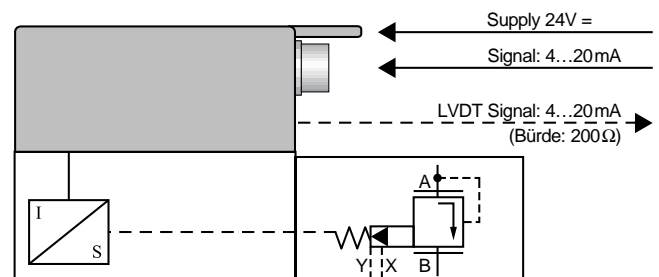
Electrical, trigger electronics integrated in valve		
Cyclic duration factor	%	100%
Degree of protection		IP 65 to DIN 40050 and IEC 14434/5
Connection		Plug-in connector 6P+PE, DIN 43563
Supply voltage		24 V DC <sub>nom</sub>
Terminal A:		Min. 21 V DC/max. 40 V DC
Terminal B: 0 V		Ripple max. 2 V DC
Power consumption		Solenoid $\square$ 45 mm = 40 VA max.
External fuse		2.5 A <sub>F</sub>
Input, "standard" version	A1	Differential amplifier, $R_i = 100 \text{ k}\Omega$
Terminal D: $U_E$		0...+10 V
Terminal E:		0 V
Input, "mA signal" version	F1*	Burden, $R_{sh} = 200 \Omega$
Terminal D: $I_{D-E}$		4...20 mA
Terminal E: $I_{D-E}$		Current loop $I_{D-E}$ feedback
Max. voltage to differential inputs over 0 V		$D \rightarrow B$ } max. 18 V DC $E \rightarrow B$ }
Test signal, "standard" version	A1	LVDT
Terminal F: $U_{\text{Test}}$		0...+10 V
Terminal C:		Reference 0 V
Test signal, "mA signal" version	F1*	LVDT signal 4...20 mA at external load 200...500 $\Omega$ max.
Terminal F: $I_{F-C}$		4...20 mA output
Terminal C: $I_{F-C}$		Current loop $I_{F-C}$ feedback
Safety earth conductor and shield		See pin assignment (installation in conformity with CE)
Recommended cable		See pin assignment up to 20 m 7 x 0.75 mm <sup>2</sup> up to 40 m 7 x 1 mm <sup>2</sup>
Calibration		Calibrated at the factory, see valve curve

\* Variant "F1" (4...20 mA version) available on request

### Version A1: Standard

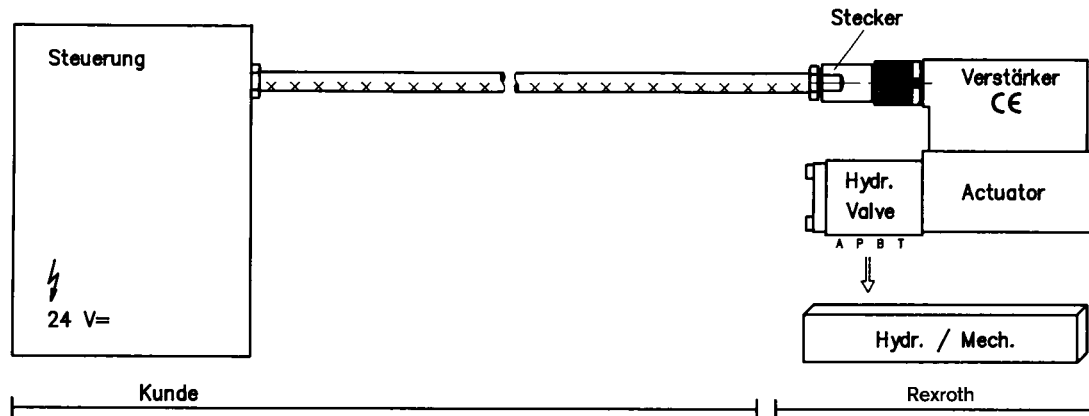


### \* Version F1: mA signal



## Connection

For electrical data, see page 5 and  
Operating Instructions 1 819 929 083



### Technical notes for the cable

- Version:**
- Multi-wire cable
  - Extra-finely stranded wire to VDE 0295, Class 6
  - Safety earth conductor, green/yellow
  - Cu braided shield
- Type:**
- e.g. Ölflex-FD 855 CP (from Lappkabel company)
- No. of wires:**
- Determined by type of valve, plug type and signal assignment
- Cable Ø:**
- 0.75 mm<sup>2</sup> up to 20 m long
  - 1.0 mm<sup>2</sup> up to 40 m long
- Outside Ø:**
- 9.4...11.8 mm – Pg11
  - 12.7...13.5 mm – Pg16

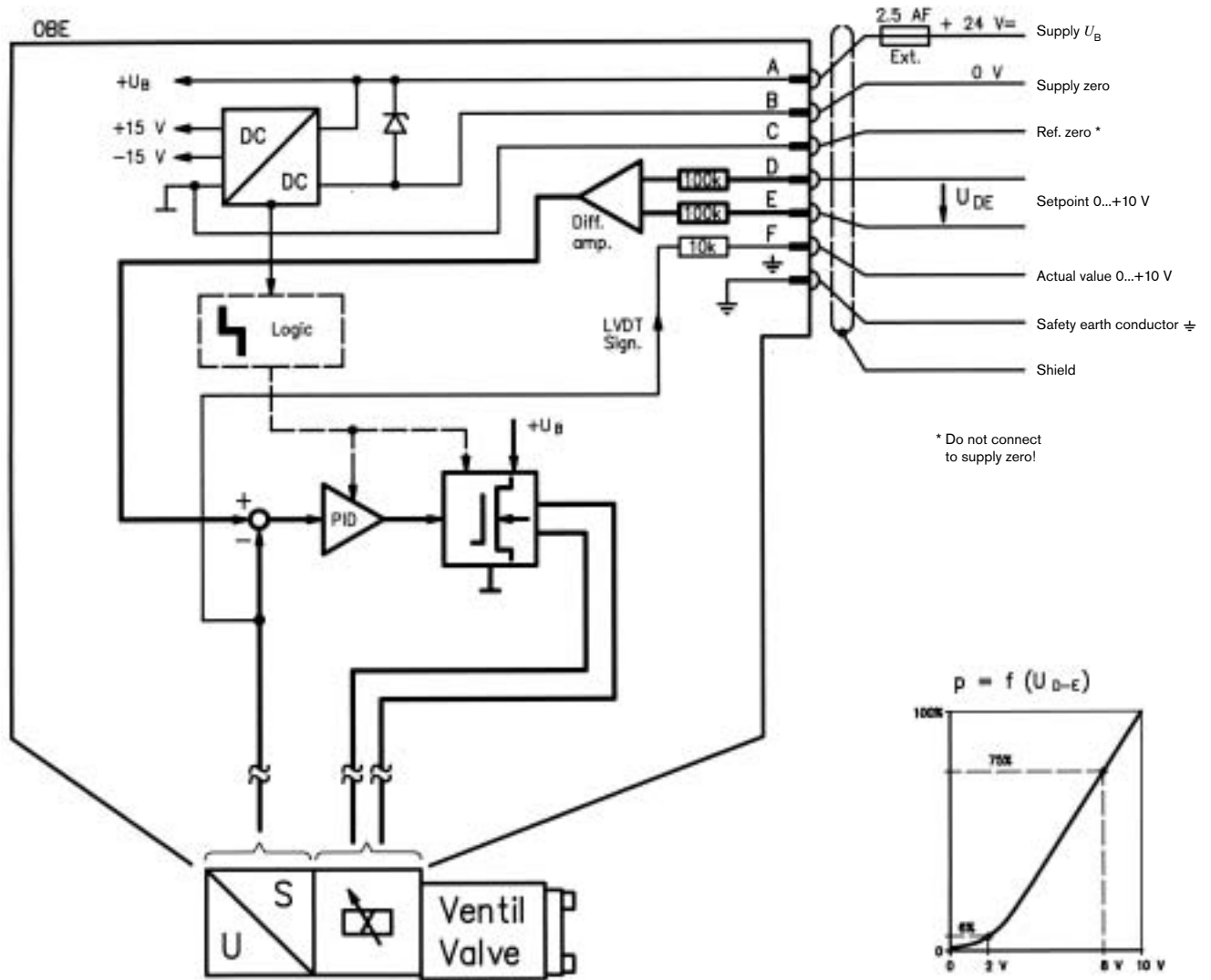
### Important

Power supply 24 V DC nom.,  
if voltage drops below 18 V DC, rapid shutdown resembling "Enable OFF" takes place internally.  
In addition, with the "mA signal" version:  
 $I_{D-E} \geq 3 \text{ mA}$  – valve is active  
 $I_{D-E} \leq 2 \text{ mA}$  – valve is deactivated.  
Electrical signals emitted via the trigger electronics (e.g. actual values) must not be used to shut down safety-relevant machine functions!  
(See also European Standard, "Technical Safety Requirements for Fluid-Powered Systems and Components – Hydraulics", EN 982.

### On-board trigger electronics

#### Circuit diagram/pin assignment

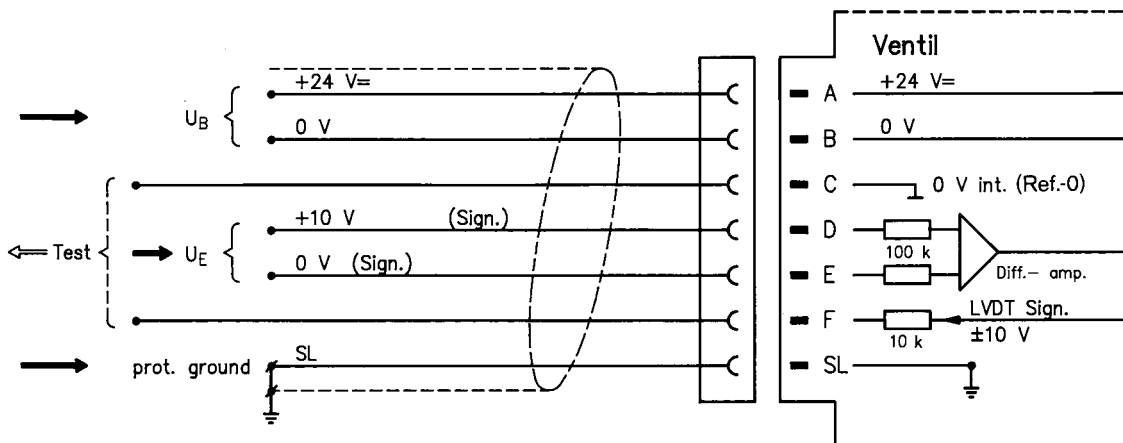
Version A1:  $U_{D-E}$  0...+10 V



#### Pin assignment

Version A1:  $U_{D-E}$  0...+10 V

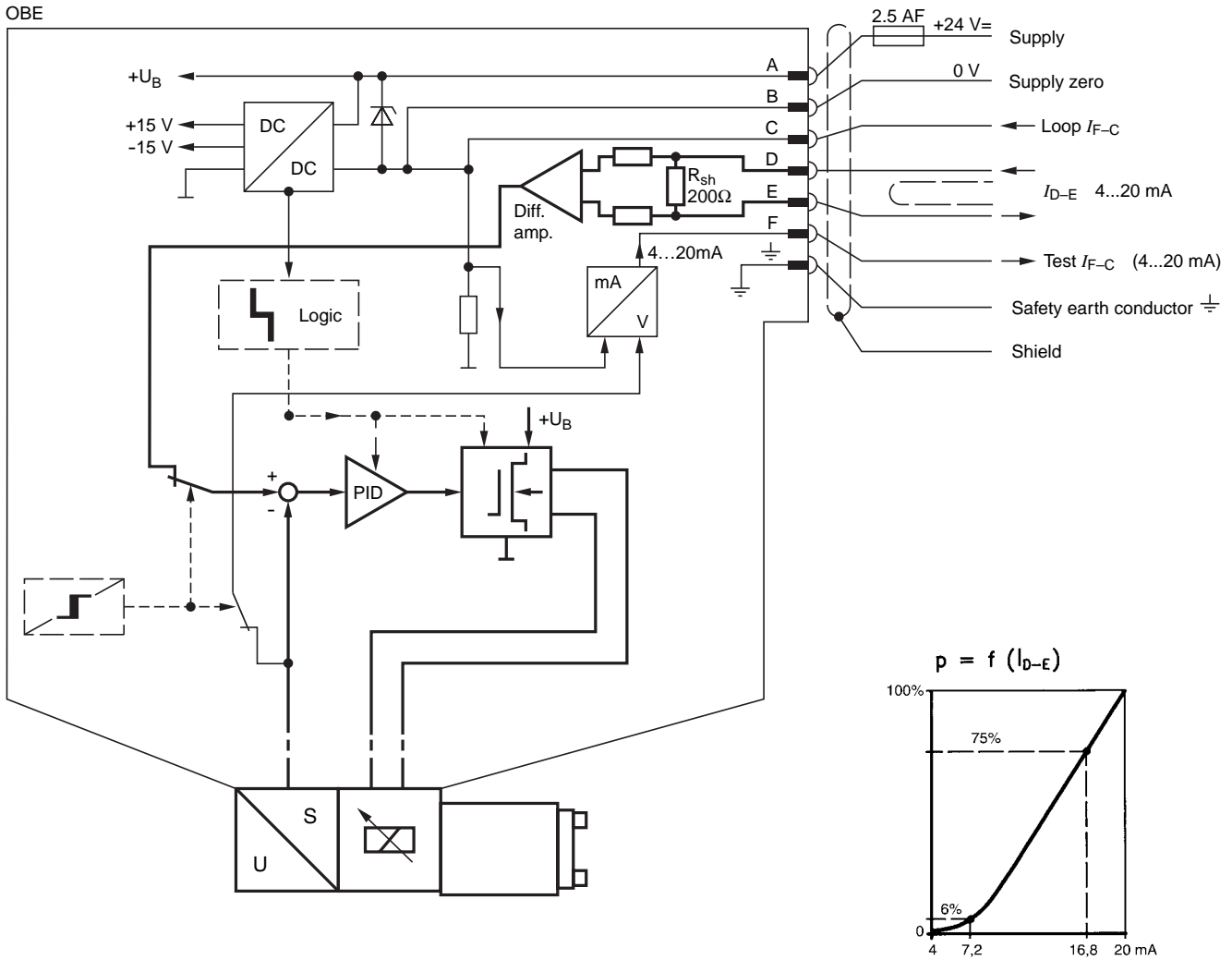
( $R_i = 100\text{ k}\Omega$ )



### On-board trigger electronics

#### Circuit diagram/pin assignment

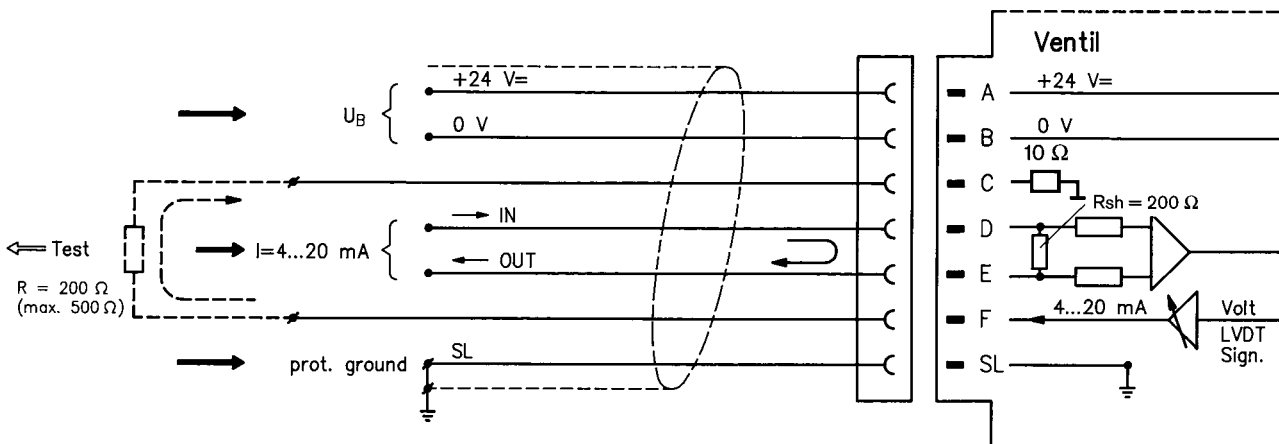
Version F1:  $I_{D-E}$  4...20 mA



#### Pin assignment 6P+PE

Version F1:  $I_{D-E}$  4...20 mA

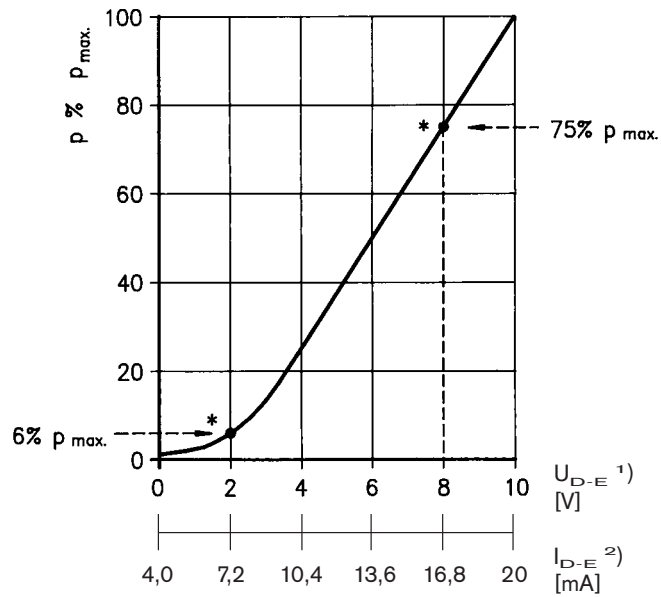
( $R_{sh} = 200 \text{ k}\Omega$ )





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

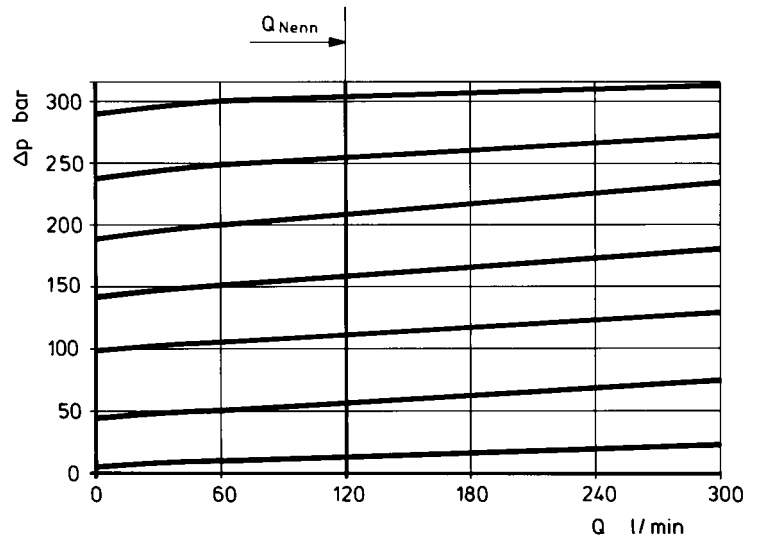
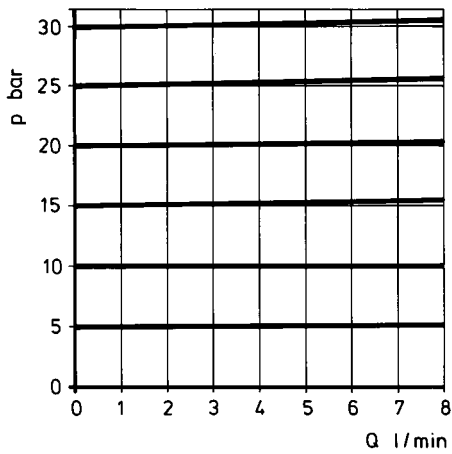
Pressure in port A as a function of the setpoint



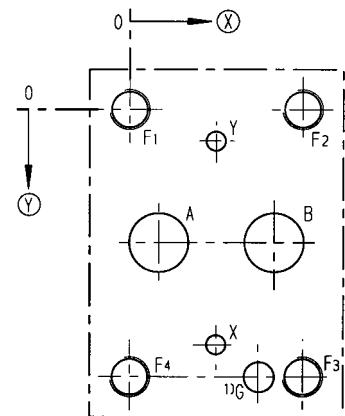
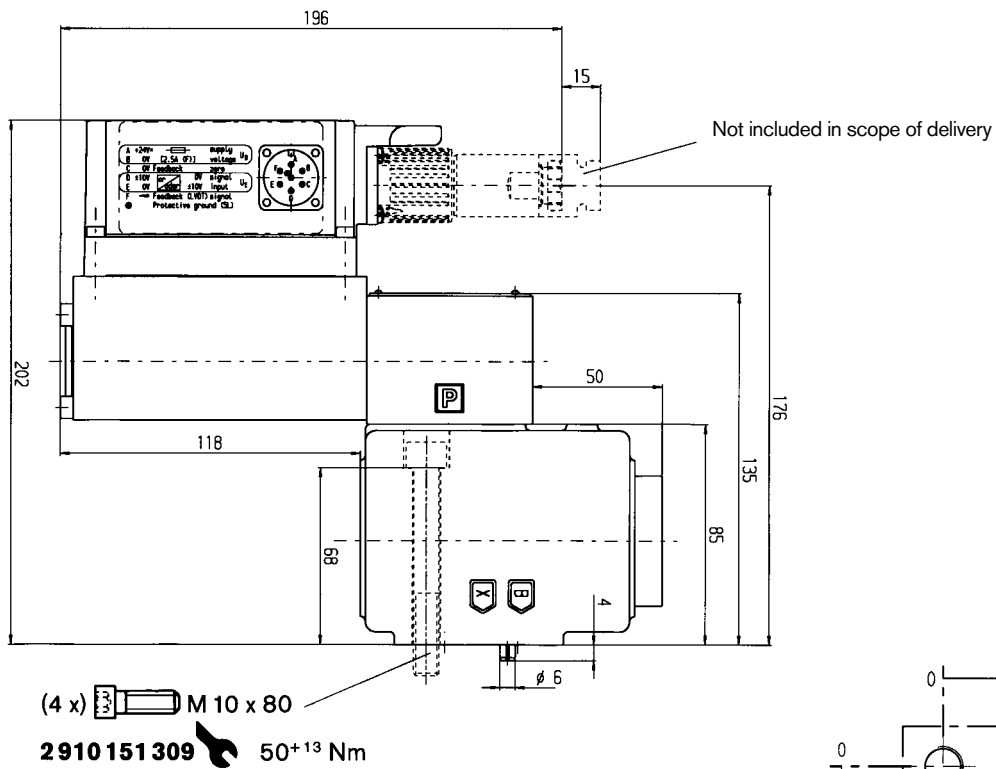
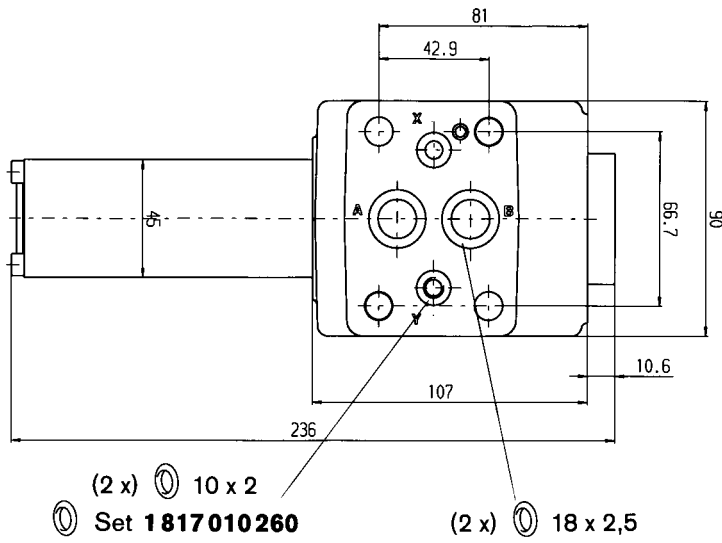
- \* Factory setting at  $Q = 1 \text{ l/min}$   
 $\pm 5\%$  manufacturing tolerance
- 1) Version:  $U_{D-E} = 0 \dots +10 \text{ V}$
- 2) Version:  $I_{D-E} = 4 \dots 20 \text{ mA}$

Pressure in port A as a function of the main stage nominal flow rate

$$p = f(Q)$$



Unit dimensions (nominal dimensions in mm)

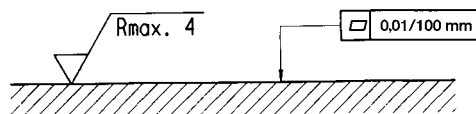


Mounting hole configuration: NG10 (ISO 5781-AG-06-2-A)

For subplates see catalog sheet RE 45055

Required surface quality of mating component

- 1) Deviates from standard
- 2) Thread depth:  
 Ferrous metal 1.5 x  $\varnothing$ \*  
 Non-ferrous 2 x  $\varnothing$
- \* NG10 min.10.5 mm



	A	B	X	Y	G	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>
$\otimes$	7.2	35.8	21.4	21.4	31.8	0	42.9	42.9	0
$\otimes$	33.35	33.35	58.7	7,9	66.7	0	0	66.7	66.7
$\varnothing$	14.7	14.7	4.8	4,8	7.5	M10 <sup>2)</sup>	M10 <sup>2)</sup>	M10 <sup>2)</sup>	M10 <sup>2)</sup>

**Notes**

---

## Notes

---