Proportional pressure relief valve with on-board electronics (OBE) and position feedback

RE 29151/07.05 1/10

Type DBETBEX



Nominal size 6
Unit series 1X
Maximum working pressure P 315 bar, T 250 bar
Nominal flow rate Q_{nom} 1l/min

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Features

- Directly operated valves with position feedback and on-board electronics for limiting system pressure
- Adjustable through the position of the armature against the compression spring
- Position-controlled, minimal hysteresis $<0.2\,\%$, 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 4401-03-02-0-94. Subplates as per catalog sheet RE 45053 (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

DBETB	E	X – 1X /	G24	K31		M	*

Proportional pressure relief valve with inductive position transducer on the cone

With on-board electronics **= E**

Mounting hole configuration to ISO 4401-03-02-0-94 **= X**

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

Max. pressure stage
up to 80 bar **= 80**
up to 180 bar **= 180**
up to 250 bar **= 250**
up to 315 bar **= 315**

Voltage supply of trigger electronics 24 V DC **= G24**

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

Interface for trigger electronics
A1 = Setpoint input 0...+10 V
F1 = Setpoint input 4...20 mA

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

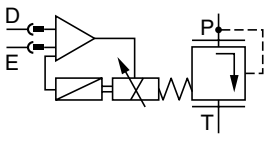
Further information in plain text

Preferred types

Type .....A1 (0...+10 V)	Material Number	Type .....F1 (4...20 mA)	Material Number
DBETBEX–1X/80G24K31A1M	0 811 402 072	DBETBEX–1X/80G24K31F1M	0 811 402 140
DBETBEX–1X/180G24K31A1M	0 811 402 071	DBETBEX–1X/180G24K31F1M	0 811 402 075
DBETBEX–1X/250G24K31A1M	0 811 402 073	DBETBEX–1X/315G24K31F1M	0 811 402 141
DBETBEX–1X/315G24K31A1M	0 811 402 070		

Symbol

For on-board electronics



Function, sectional diagram

General

Type DBETBEX proportional pressure relief valves are remote-controlled (pilot) valves in conical seat design. They are used to limit system pressure.
The valves are actuated by means of a proportional solenoid with on-board electronics.
With these valves, rapid response times with low hysteresis can be achieved.

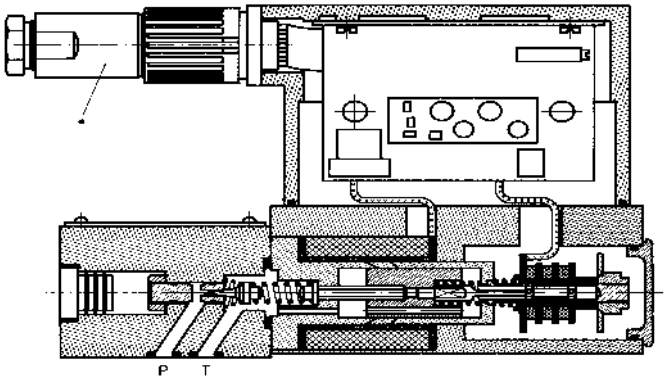
Basic principle

To adjust the system pressure, a setpoint is set in the trigger electronics. Based on this setpoint, the electronics control the position of the armature on the conical seat and on the compression spring.
The position control ensures extremely low hysteresis. The magnetic force determines the spring force until a new position is reached.

Pressure limitation for maximum safety

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

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



Valve body Proportional solenoid with position transducer

Accessories

Type			Material Number
(4 x) ISO 4762-M5x30-10.9	Cheese-head bolts		2 910 151 166
* 	Plug-in connectors 2P+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		Poppet valve
Actuation		Proportional solenoid with position control and OBE
Connection type		Subplate, mounting hole configuration NG6 (ISO 4401-03-02-0-94)
Mounting position		Optional
Ambient temperature range	°C	–20...+50
Weight	kg	2.7
Vibration resistance, test condition		Max. 25 g, shaken in 3 dimensions (24 h)

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

Pressure fluid			Hydraulic oil to DIN 51524...535, other fluids after prior consultation			
Viscosity range	recommended	mm^2/s	20...100			
	max. permitted	mm^2/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 [1]			
Direction of flow			See symbol			
Max. set pressure (at $Q = 1$ l/min)		bar	80	180	250	315
Minimum pressure (at $Q = 1$ l/min)		bar	3	4	5	8
			Note: At $Q_{max} = 1.5$ l/min the pressure levels stated here increase			
Max. mechanical pressure limitation level, e.g. when solenoid current $I > I_{max}$		bar	<85	<186	<258	<325
Max. working pressure (at $Q = 1$ l/min)		bar	Port P: 315			
Max. pressure		bar	Port T: 250			

Static/Dynamic

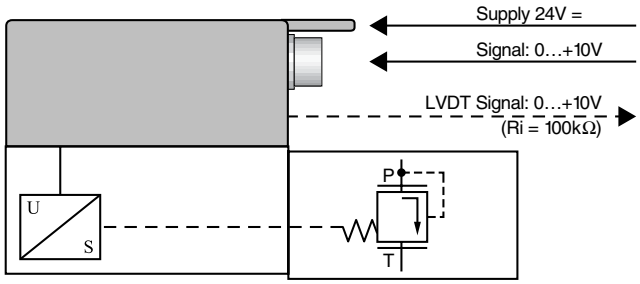
Hysteresis		%	≦ 0.2
Range of inversion		%	≦ 0.1
Manufacturing tolerance		%	≦ ±5
Response time	100 % signal change	ms	30
	10 % signal change	ms	10
Thermal drift			<1 % at $\Delta T = 40\,°C$
Conformity			CE EN 61000-6-2: 2002-08 EN 61000-6-3: 2002-08

[1] 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.

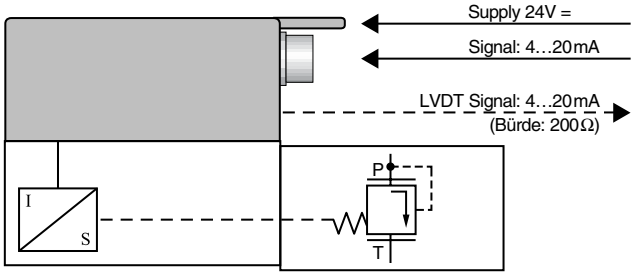
Technical data

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 Terminal A: Terminal B: 0 V		24 V DC Min. 21 V DC/max. 40 V DC Ripple max. 2 V DC
Power consumption		Solenoid ⊿ 45 mm = 40 VA max.
External fuse		2.5 A_F
Input, “standard” version Terminal D: U_E Terminal E:	A1	Differential amplifier, R_i = 100 kΩ 0...+10 V 0 V
Input, “mA signal” version Terminal D: I_{D-E} Terminal E: I_{D-E}	F1	Burden, R_{sh} = 200 Ω 4...20 mA Current loop I_{D-E} feedback
Max. voltage to differential inputs over 0 V		D → B E → B } max. 18 V DC
Test signal, “standard” version Terminal F: U_{Test} Terminal C:	A1	LVDT 0...+10 V Reference 0 V
Test signal, “mA signal” version Terminal F: I_{F-C} Terminal C: I_{F-C}	F1	LVDT signal 4...20 mA at external load 200...500 Ω max. 4...20 mA output 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 mm² up to 40 m 7 x 1 mm²
Calibration		Calibrated at the factory, see valve curve

Version A1: Standard

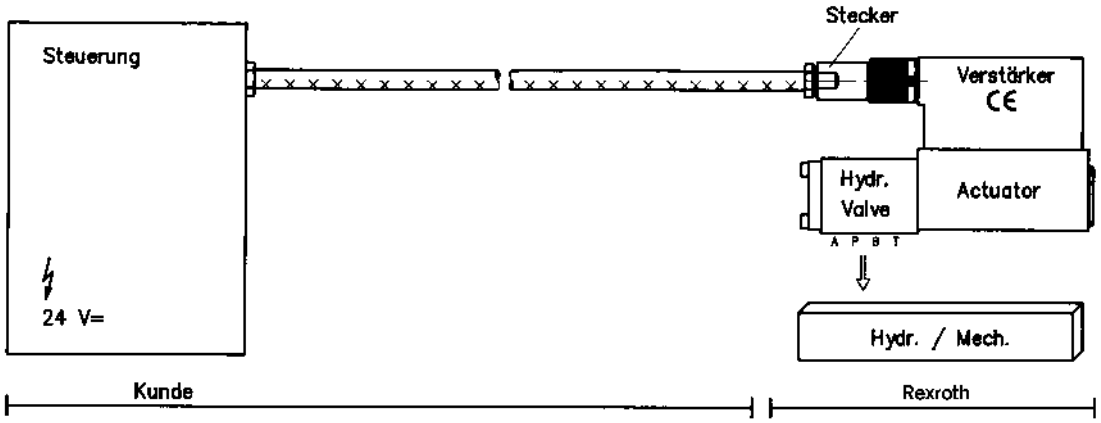


Version F1: mA signal



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^2 up to 20 m long
- 1.0 mm^2 up to 40 m long

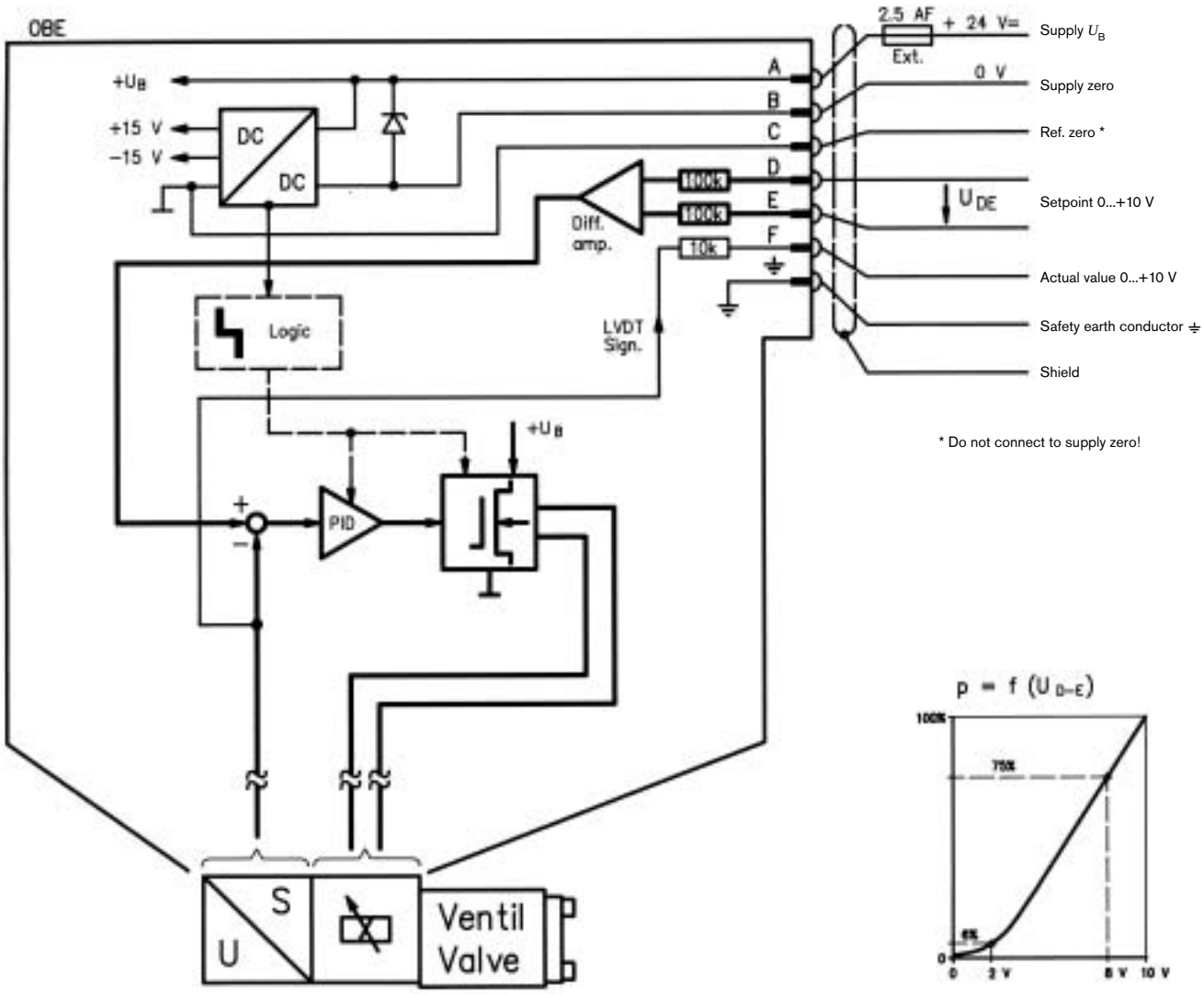
Outside Ø:
- 9.4...11.8 mm – Pg11
- 12.7...13.5 mm – Pg16

Important

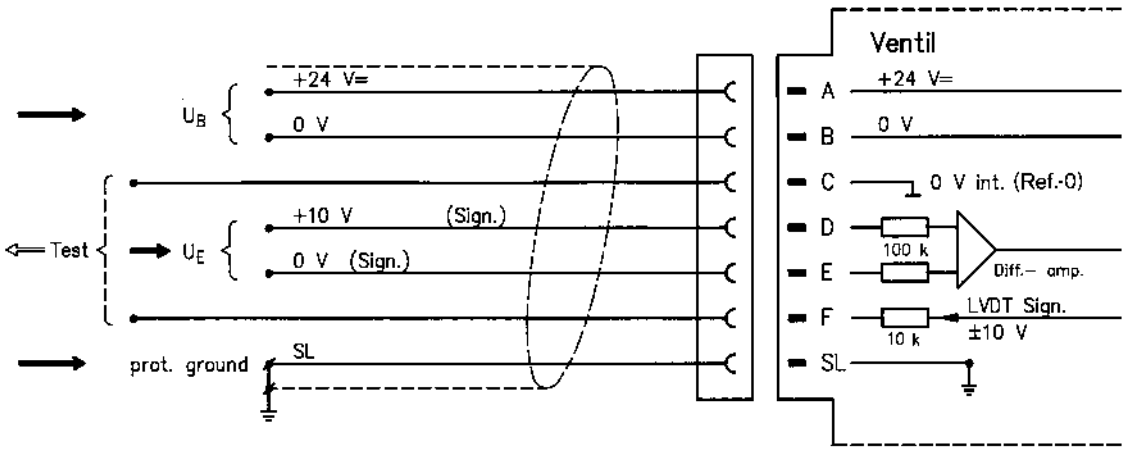
Voltage supply 24 V DC nom,
if voltage drops below 18 V DC, rapid shutdown resembling "Enable OFF" takes place internally.
In addition, with the "mA signal" version:
$I_{D-E} \geqq 3$ mA – valve is active
$I_{D-E} \leqq 2$ mA – valve is deactivated.
Electrical signals emitted via the trigger electronics (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

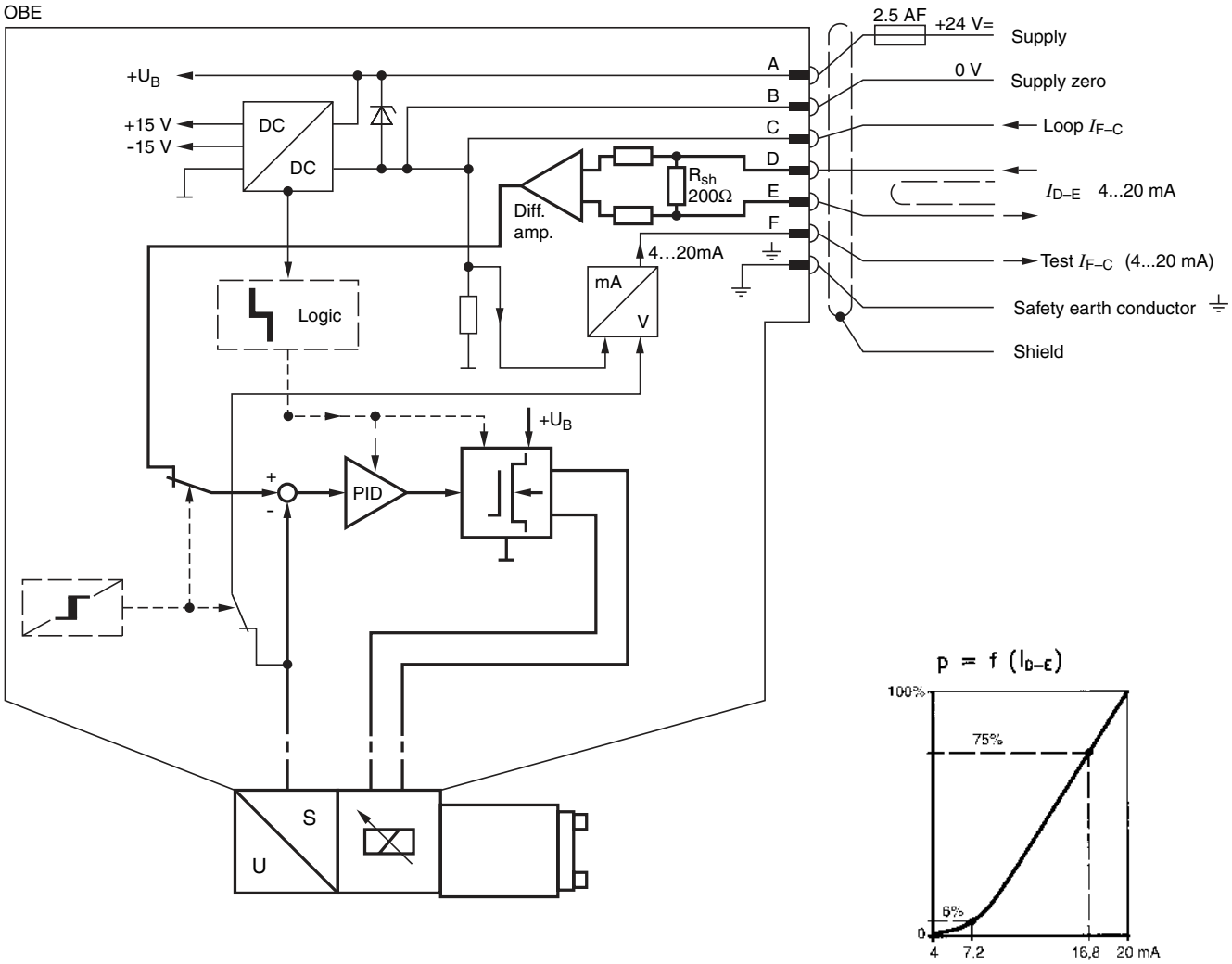


Pin assignment
Version A1: U_{D-E} 0...+10 V
(R_i = 100 kΩ)

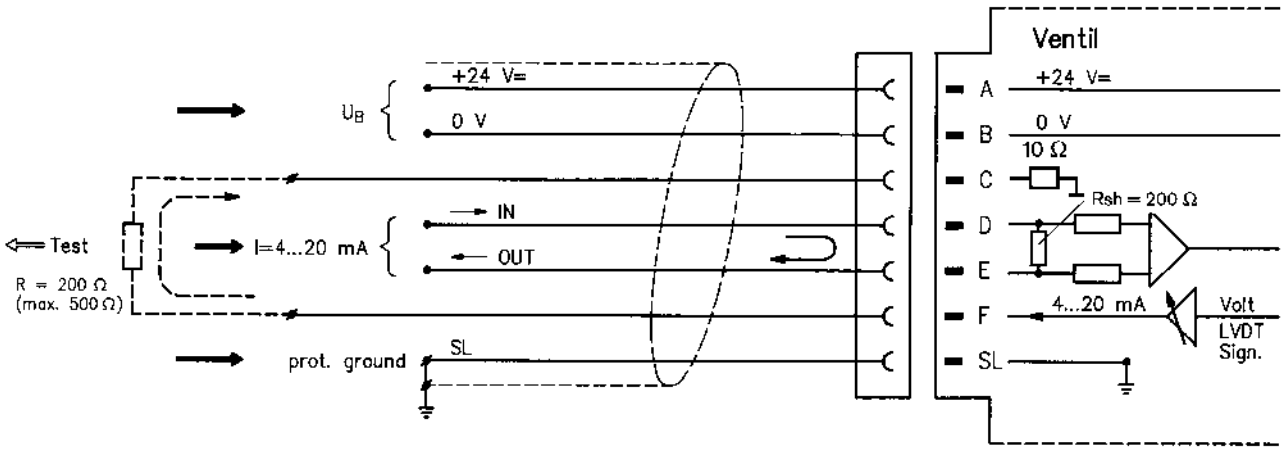


On-board trigger electronics

Circuit diagram/pin assignment
Version F1: I_{D-E} 4...20 mA

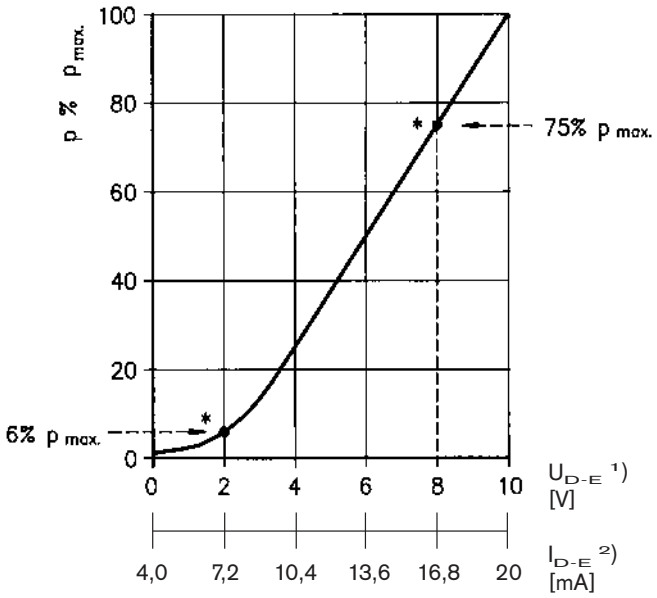


Pin assignment
Version F1: I_{D-E} 4...20 mA
(R_{sh} = 200 kΩ)



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

Pressure in port P as a function of the setpoint
Nominal flow rate = 1 l/min

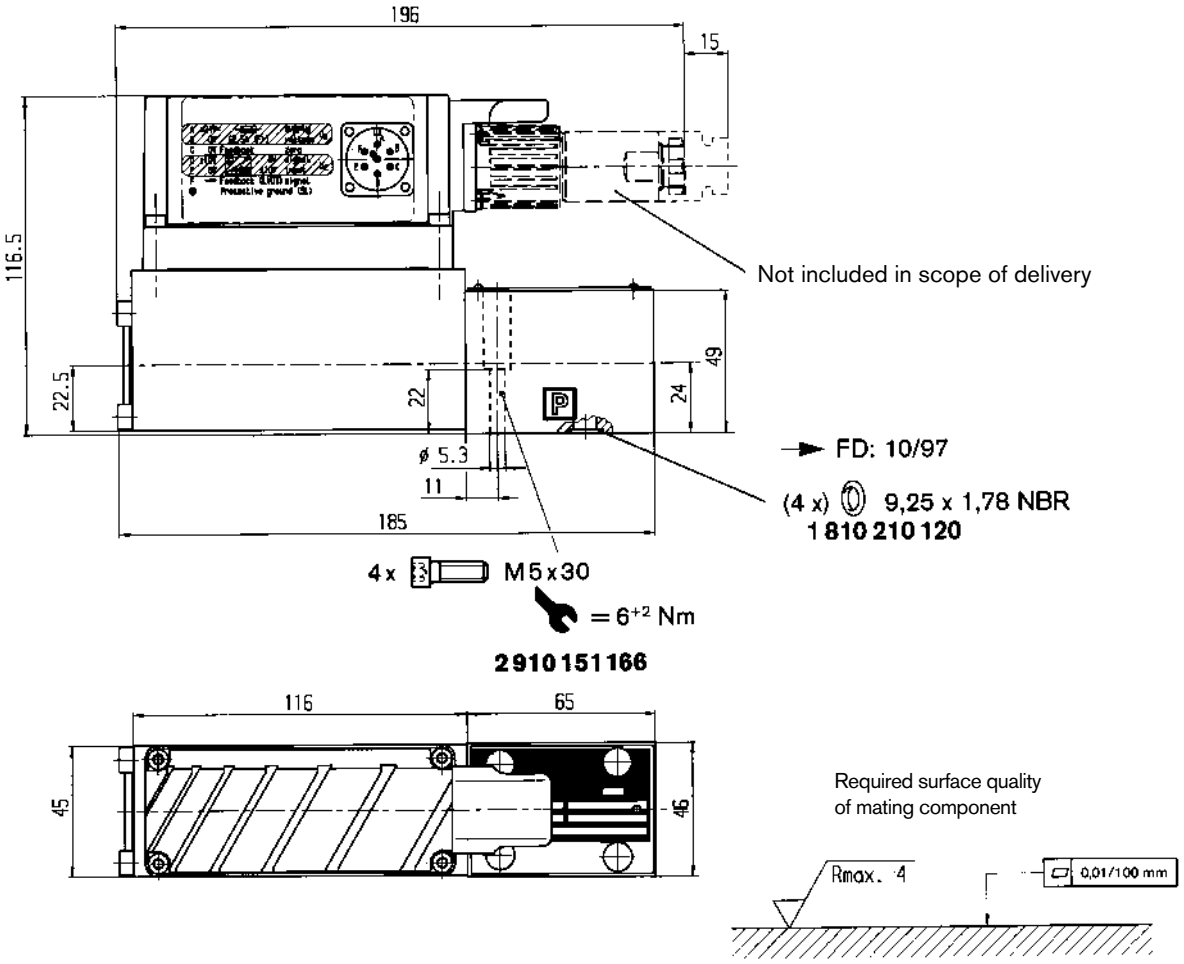


* Factory setting at $Q = 1$ l/min
±2 % manufacturing tolerance

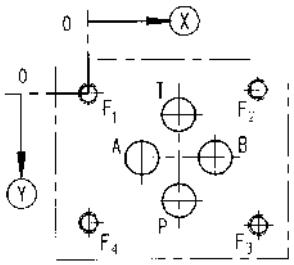
1) Version: $U_{D-E} = 0...+10$ V

2) Version: $I_{D-E} = 4...20$ mA

Unit dimensions (nominal dimensions in mm)



Mounting hole configuration: NG6 (ISO 4401-03-02-0-94)
For subplates, see catalog sheet RE 45053



[1] Deviates from standard

[2] Thread depth:
Ferrous metal 1.5 x Ø
Non-ferrous 2 x Ø

	P	A	T	B	F_1	F_2	F_3	F_4
Ⓧ	21.5	12.5	21.5	30.2	0	40.5	40.5	0
Ⓨ	25.9	15.5	5.1	15.5	0	–0.75	31.75	31
⌀	8 [1]	8 [1]	8 [1]	8 [1]	M5 [2]	M5 [2]	M5 [2]	M5 [2]

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