

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

RE 29159/07.05

1/10

Type DBEBE6X

Nominal size 6
Unit series 1X
Maximum working pressure P 315 bar, T 250 bar
Maximum flow rate 40 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
- Position-controlled, 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 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

DBEB

E

6

X

1X

G24

K31

M

*

Proportional pressure relief valve with inductive position transducer on the cone

With on-board electronics = E

Nominal size = 6

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 315 bar = 315

Voltage supply of trigger electronics = G24

24 V DC

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

F1 = Setpoint input 4...20 mA

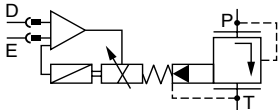
K31 = **Electrical connection without** plug-in connector, with unit plug to DIN 43563-AM6
Order plug-in connector separately

Preferred types

TypeA1 (0...+10 V)	Material Number	TypeF1 (4...20 mA)	Material Number
DBEBE6X-1X/80G24K31A1M	0 811 402 078	DBEBE6X-1X/80G24K31F1M	0 811 402 084
DBEBE6X-1X/180G24K31A1M	0 811 402 077	DBEBE6X-1X/180G24K31F1M	0 811 402 079
DBEBE6X-1X/315G24K31A1M	0 811 402 076		

Symbol

For on-board electronics



Function, sectional diagram

General

Type DBEBE6X proportional pressure relief valves are pilot valves that are used to limit system pressure. The valves are actuated by means of a position-controlled proportional solenoid with on-board electronics.

With these valves, rapid response times with low hysteresis can be achieved.

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

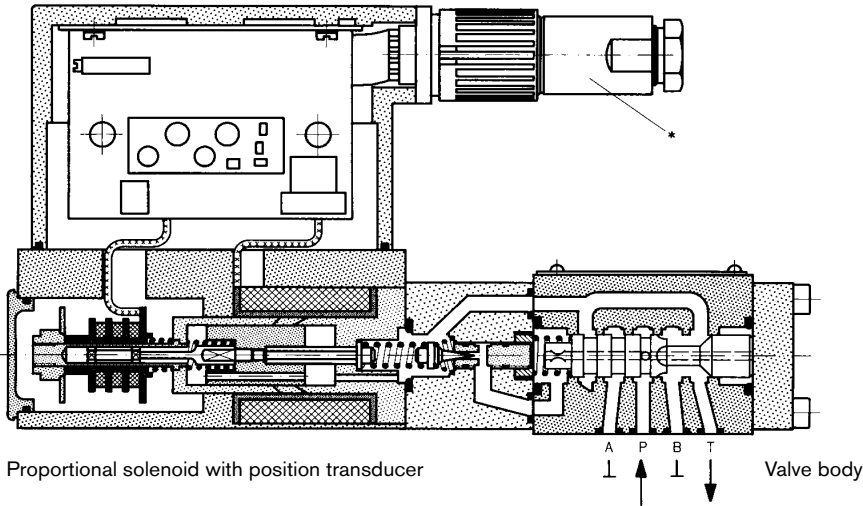
Basic principle

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 through a bore hole at <0.6 l/min. The “ p_{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_{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-M5x30-10.9	Cheese-head bolts	2 910 151 166
	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	Spool 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	3.4
Vibration resistance, test condition	Max. 25 g, shaken in 3 dimensions (24 h)	

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

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	315
Minimum pressure (at $Q = 1$ l/min)	bar	7	8	10
Max. mechanical pressure limitation level, e.g. when solenoid current $I > I_{\max}$	bar	<90	<190	<325
Max. working pressure	bar	Port P: 315		
Max. pressure	bar	Port T: 250		
Pilot oil flow		l/min	approx. 0.6	
Max. flow		l/min	40	

Static/Dynamic

Hysteresis	%	≡ 1		
Manufacturing tolerance	%	≡ ±5		
Response time	100 % signal change	ms	70	Response time at: Q = 10 l/min (values depend on the dead volume)
	10 % signal change	ms	15	
Thermal drift	<1 % at ΔT = 40°C			
Conformity	<div>CE</div> EN 61000-6-2: 2002-08 EN 61000-6-3: 2002-08			

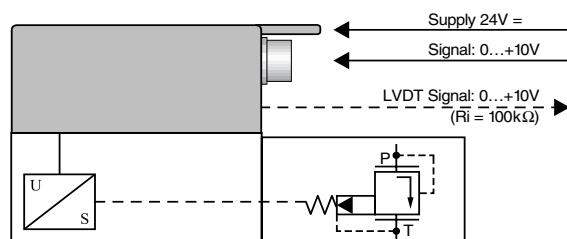
¹⁾ The purity classes stated for the components must be complied with in hydraulic systems.
Effective filtration prevents problems and also extends the service life of components.
For a selection of filters, see catalog sheets RE 50070, RE 50076 and RE 50081.

Technical data

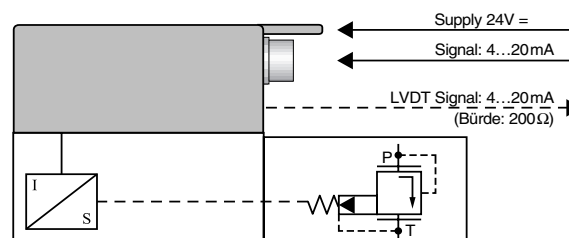
Electrical, trigger electronics integrated in valve

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		24 V DC _{nom}
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 _F
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		$\left. \begin{matrix} D \rightarrow B \\ E \rightarrow B \end{matrix} \right\} \text{max. } 18 \text{ V DC}$
Test signal, "standard" version	A1	LVDT
Terminal F: U_{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 Ω 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 ² up to 40 m 7 x 1 mm ²
Calibration		Calibrated at the factory, see valve curve

Version A1: Standard

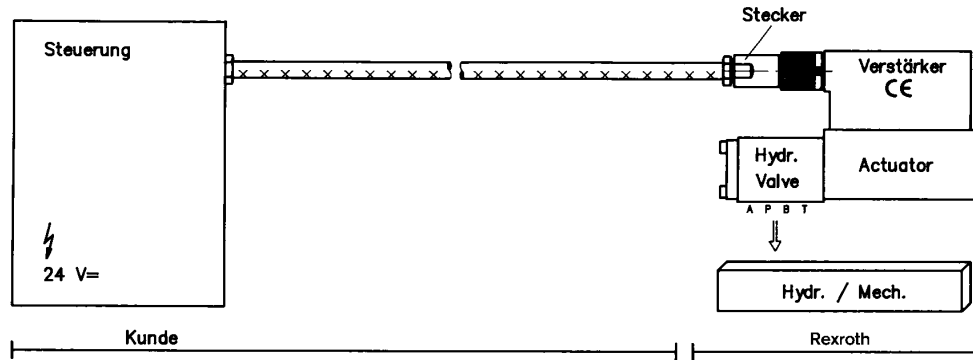


Version F1: mA signal



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 mm² up to 20 m long
 - 1.0 mm² 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.

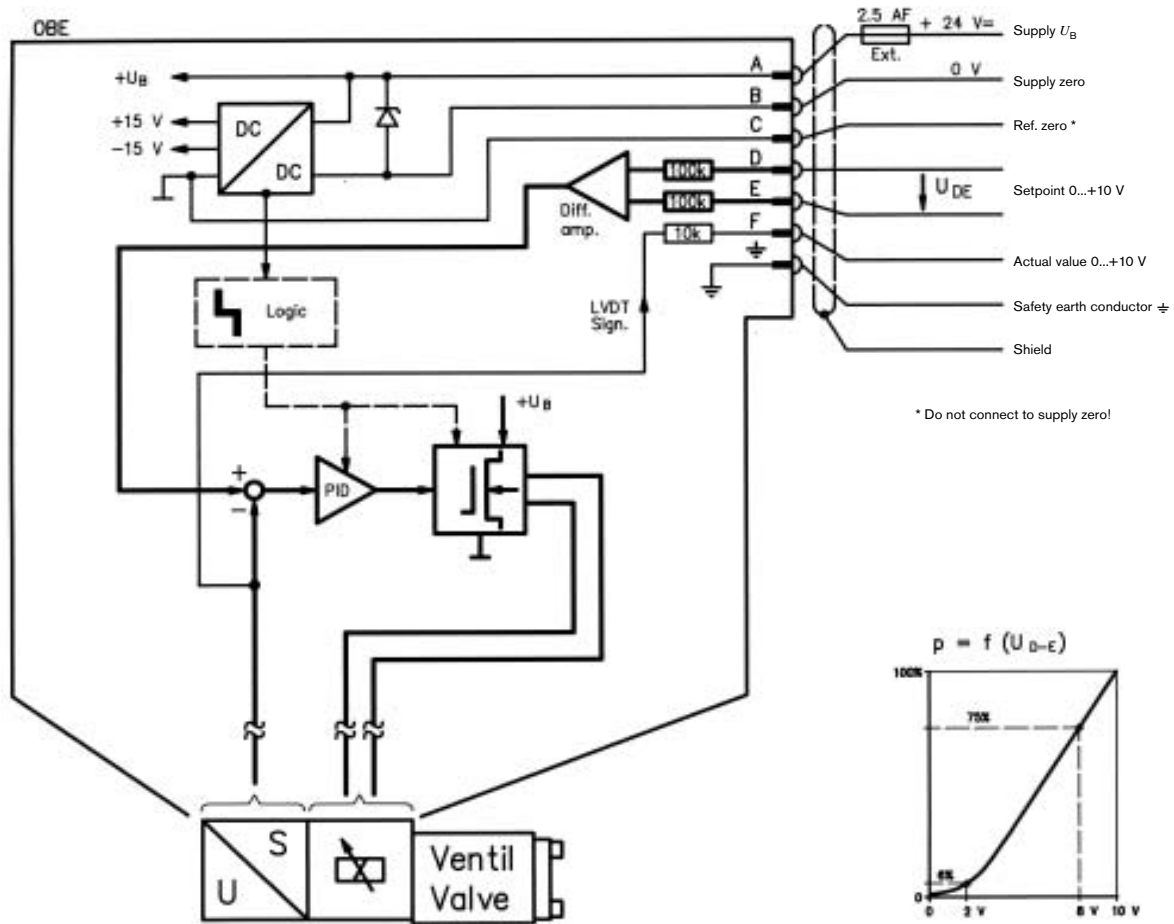
Electrical signals emitted via the trigger electronics (e.g. actual values) must not be used to shut down safety-relevant machine functions!

(See also European Standard, "Technical Safety Requirements for Fluid-Powered Systems and Components – Hydraulics", EN 982).

On-board trigger electronics

Circuit diagram/pin assignment

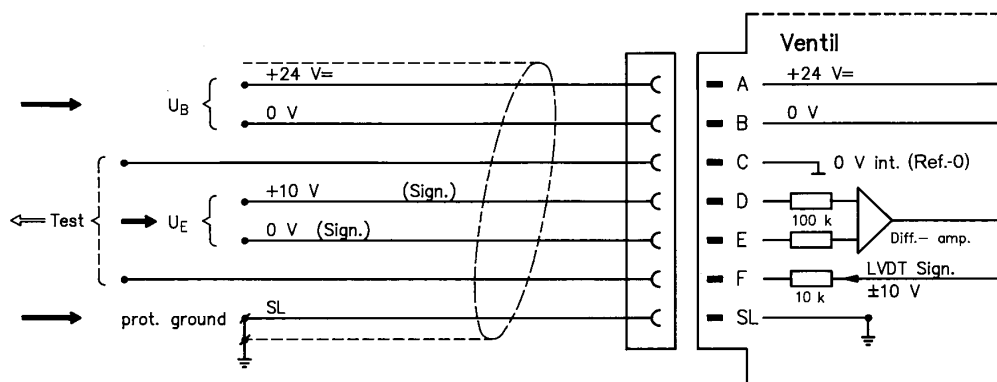
Version A1: U_{D-E} 0...+10 V



Pin assignment

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

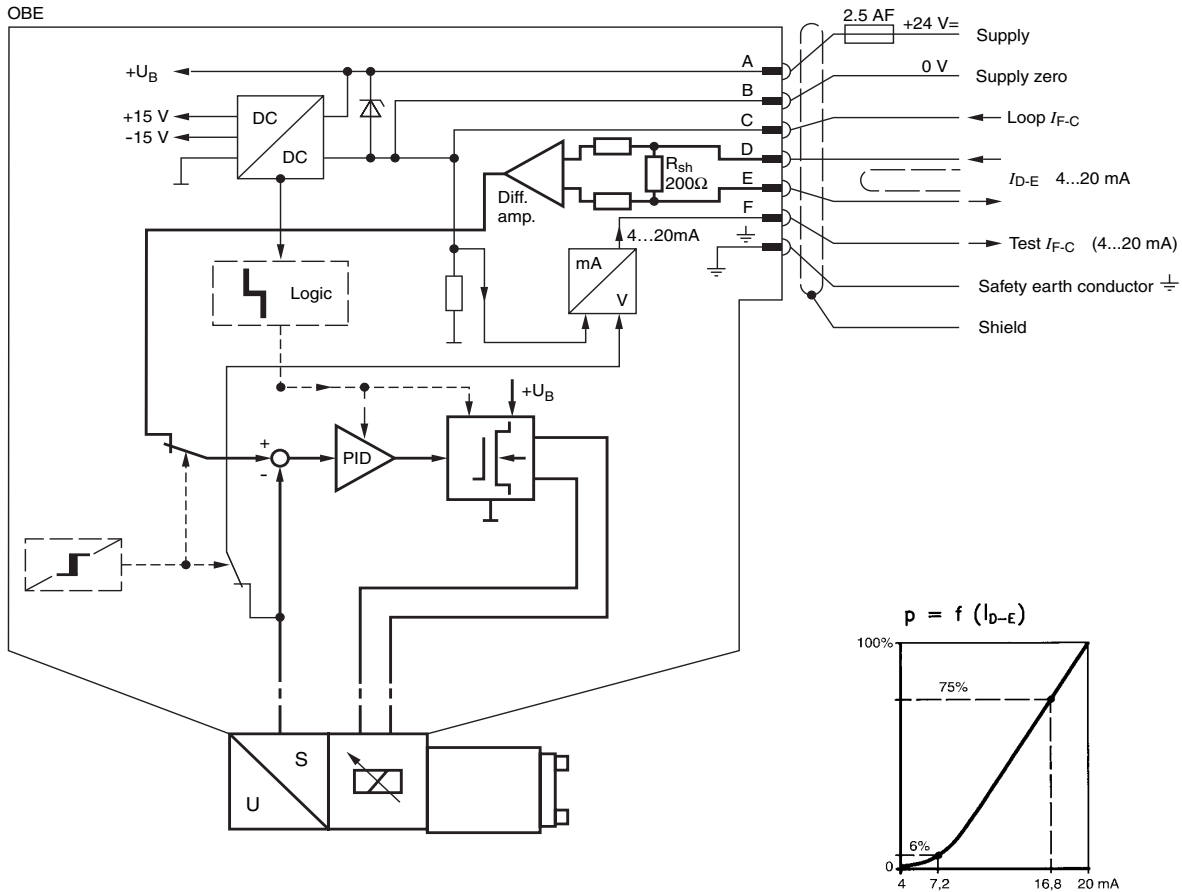
($R_i = 100 \text{ k}\Omega$)



On-board trigger electronics

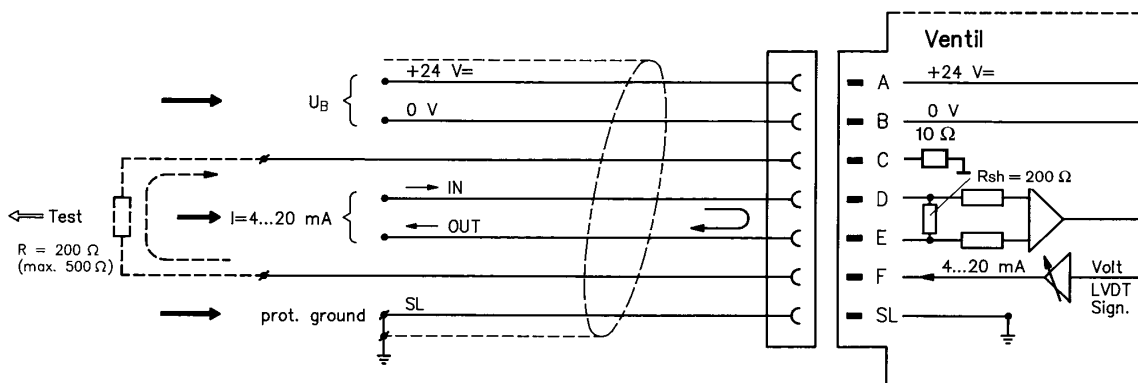
Circuit diagram/pin assignment

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



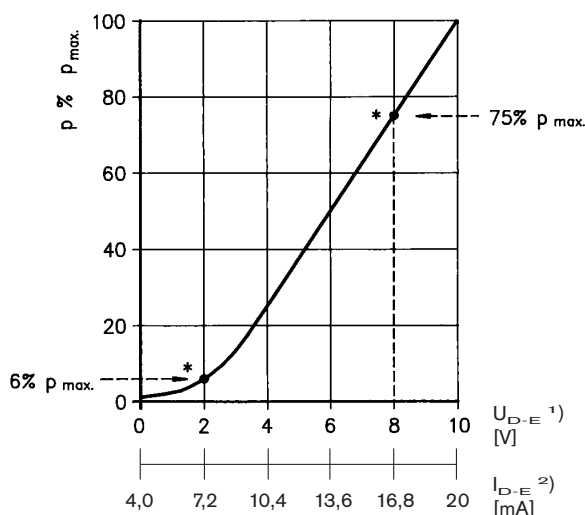
Pin assignment 6P+PE

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 P as a function of the setpoint

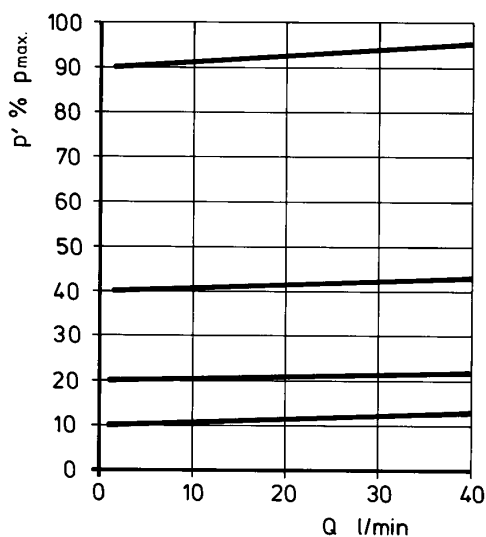


* Factory setting at $Q = 1$ l/min
 $\pm 5\%$ manufacturing tolerance

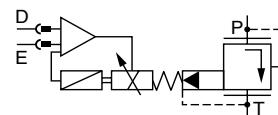
1) Version: $U_{D-E} = 0 \dots +10$ V

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

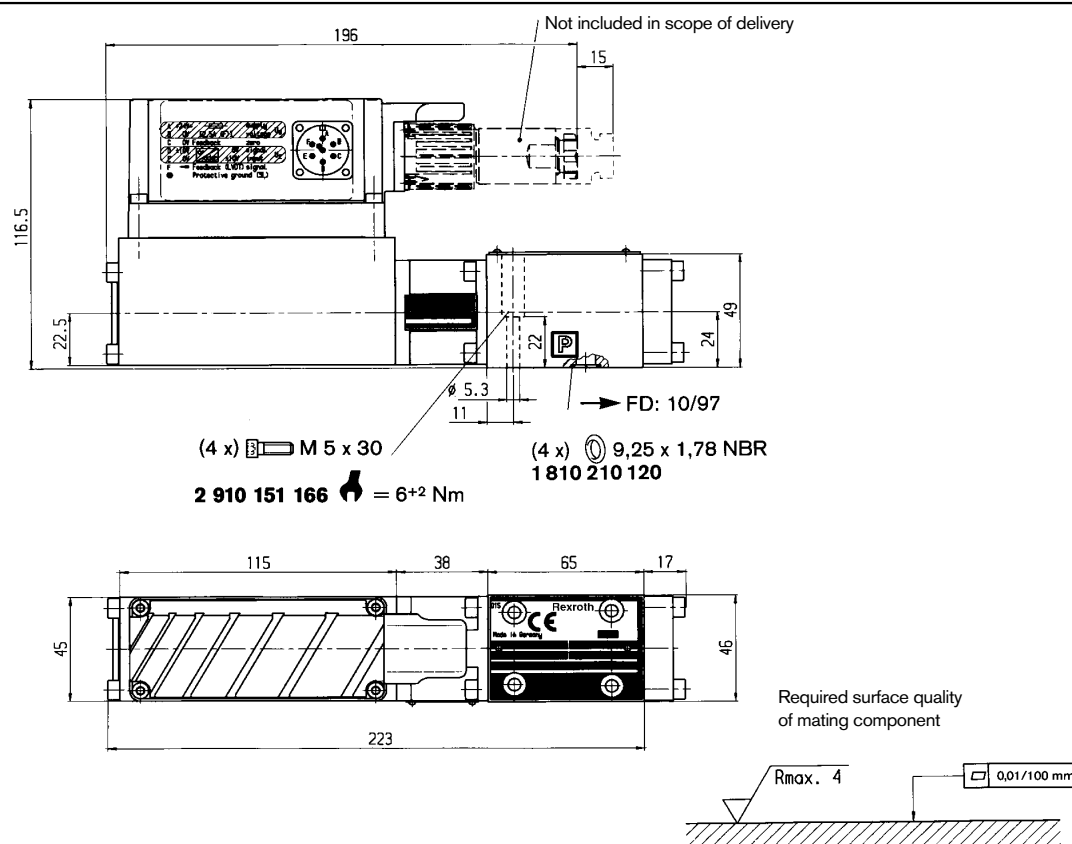
Pressure in port P proportionate to the maximum flow rate of the main stage



Set pressure
 $p' = f(Q_{P-T})$



Unit dimensions (nominal dimensions in mm)



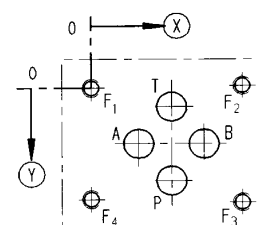
Mounting hole configuration: NG6 (ISO 4401-03-02-0-94)
For subplates see catalog sheet RE 45053

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⁾