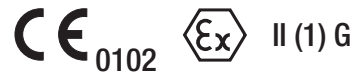


EURAX B 811

Power pack with additional functions



for intelligent and conventional
2-wire transmitters



EURAX plug-in module in Euro-format

Application

The power supply unit **EURAX B 811** (Fig. 1) provides the DC power supply for **2-wire transmitters** and transfers the measured variable unchanged to the **electrically insulated** output.

Conversion to a different signal range such as 0...5 mA or 1 ... 5 V (signal converter) is also possible.

Some versions of the EURAX B 811 are **designed for FSK¹ communication**. They are used in conjunction with “intelligent” 2-wire transmitters which are capable of dialogue and operation according to the FSK principle and the HART or user-specific protocol.

The series also includes “intrinsically safe” versions [EEx ia] IIC with an intrinsically safe measurement/supply circuit. These operate in conjunction with intrinsically safe 2-wire transmitters located in explosion hazard areas.

Provision is made for monitoring the measurement/supply circuit to detect short and open-circuits. Either of these faults is signalled by the fault signalling relay AF and the red LED. The output signals A1 and A12 can be set on the DIP switches to have a linear increasing or decreasing response.

The power pack fulfils all the important requirements and regulations concerning electromagnetic compatibility **EMC** and **Safe Isolation** (IEC 1010 resp. EN 61 010). It was developed and is manufactured and tested in strict accordance with the **quality assurance standard** ISO 9001.

Production QA is also certified according to guideline 94/9/EG.

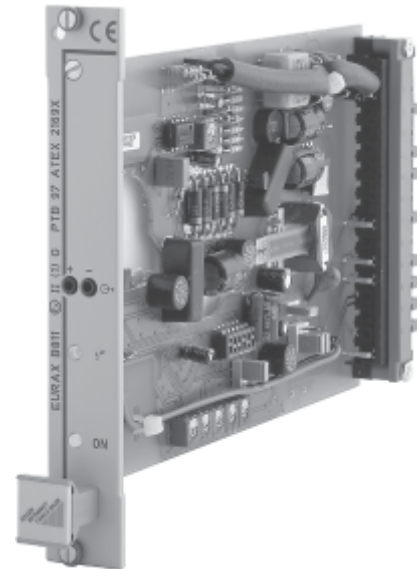


Fig. 1. EURAX B 811 as plug-in module, front plate width 4 TE.

Features / Benefits

- Designed for FSK communication, hand-held terminal connected to separate terminals or test sockets. This facilitates operation in conjunction with an “intelligent” 2-wire transmitter designed for FSK and with a HART or user-specific protocol
- Electrically insulated between input circuit, output and power supply / Fulfils IEC 1010 resp. EN 61 010
- AC/DC power supply / Universal
- Available in type of protection “Intrinsically safe” [EEx ia] IIC (see “Table 4: Data on explosion protection”)
- Measurement/supply circuit monitored for open and short-circuits / Faults signalled by red LED, signalling relay and/or device failure signal
- Output can be switched between 0...20 mA and 4...20 mA / Universal matching to suit downstream device
- Green LED signals a power supply failure

¹ FSK = Frequency Shift Keying

EURAX B 811

Power pack with additional functions

Technical data

Input circuit (MSK)

Signal range I_E : 4...20 mA DC

Supply voltage U_S (at $I_E = 20$ mA):

24 V \pm 7%	with standard (non-Ex) version, not designed for communications protocol
24 V \pm 7%	with standard (non-Ex) version, designed for FSK communication
> 16.9 V	with Ex versions, not designed for communications protocol
> 16.4 V	with Ex versions, designed for FSK communication

Current limiter: Electronic
At $I_E > 30$ mA, U_S is switched to 0 V for approx. 1 s.
 U_S is then automatically readjusted to its set-point

Max. line resistance: The maximum line resistance R_{line} permissible between the 2-wire transmitter and the supply unit depends on the voltage difference $U_S - U_M$:

$$R_{line} \text{ max.} = \frac{U_S - U_M}{20 \text{ mA}}$$

U_S = Supply voltage for 2-wire transmitter

U_M = Min. operating voltage of the 2-wire transmitter

Measuring output \rightarrow

Output signals A1 and A12

(see Section "Electrical connections")

The output signals A1 and A12 can be load-independent DC voltages U_A or currents I_A .

A1 and A12 are not electrically insulated; the same value is available at both outputs.

DC voltage signals U_A

Standard ranges for U_A : 0...5, 1...5, 0...10 or 2...10 V

Non-standard ranges: 0...> 5 to 0...15 V resp. live zero
> (1...5) to 3...15 V

Short-circuit current: ≤ 40 mA

Load capacity U_{A1}/U_{A12} : 20 mA

Load impedance U_{A1}/U_{A12} : $R_{ext A1} // R_{ext A12} [\text{k}\Omega] \geq \frac{U_A [\text{V}]}{20 \text{ mA}}$

Residual ripple: < 1% p.p., DC ... 10 kHz

DC current signals I_A

Standard ranges for I_A : 0...20 mA or 4...20 mA selected by jumpers

Non-standard ranges: 0...1 to 0...< 20 mA resp. live zero
0.2...1 to < (4...20) mA

Open-circuit voltage: Approx. - 7...+ 22 V

Burden voltage I_{A1} : 15 V without communication
10 V (15 V) with communication*

*When a hand-held terminal is connected to the field output A12, the voltage across the burden at output A1 reduces to 10 V. Digital communication requires a minimum burden at output A1 of 250 Ω . A 250 Ω resistor is therefore connected across the output circuit. If the load of the burden across output A1 already exceeds 250 Ω , the resistor can be disconnected by changing the position of the jumpers J 204 and J 205. The full burden voltage of 15 V is then available at output A1 instead of 10 V.

External resistance I_{A1} : $R_{ext} \text{ max.} [\text{k}\Omega] = \frac{15 \text{ V (10 V)}}{I_{AN} [\text{mA}]}$

I_{AN} = Output circuit full-scale value

Burden voltage I_{A12} : < 0.3 V (field indicator)

External resistance I_{A12} : $R_{ext} \text{ max.} [\text{k}\Omega] = \frac{0.3 \text{ V}}{I_{AN} [\text{mA}]}$

Residual ripple: < 1% p.p., DC ... 10 kHz

Response time (IEC 770): Approx. 200 ms

Output characteristic: Linear

Power supply H \rightarrow

AC/DC power pack (DC and 45...400 Hz)

Table 1: Nominal voltages and tolerances

Nominal voltage U_N	Tolerance	Instrument version
24... 60 V DC / AC	DC -15...+ 33% AC \pm 15%	Standard (non-Ex)
85...230 V ¹ DC / AC		
24... 60 V DC / AC	DC - 15...+ 33% AC \pm 15%	Type of protection "Intrinsically safe" [Ex ia] IIC
85...230 V AC	\pm 10%	
85...110 V DC	-15...+ 10%	

¹ For power supplies > 125 V, the auxiliary circuit should include an external fuse with a rating ≤ 20 A DC.

Power input: Approx. 2.5 W resp. ≤ 4.5 VA

Communication

Bi-directional communication of digital signals with an "intelligent" 2-wire transmitter designed for FSK and a HART or company-specific protocol.

Frequency range: 500 Hz ... 35 kHz

Input circuit monitor

- Pick-up level:
- Open-circuit
Input current < 3.6 mA,
adjustable in the works between
1 and 4 mA
 - Short-circuit
Input current > 21 mA
adjustable in the works between
20 and 23 mA

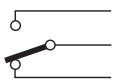
Signalling modes

- Output signals
A1 and A12:
- Output signal **linear** response
For an open-circuit output
0 mA (with 4...20 mA)
– 5 mA (with 0...20 mA)
For a short-circuit
output approx. 26 mA
 - **Increasing** output signal
Output approx. 115% of full-scale
value, e.g.
23 mA for output 0/4...20 mA
or 11.5 V for output 0/2...10 V
 - **Decreasing** output signal
(only possible for live zero)
Output approx. 10% of full-scale
value, e.g.
2 mA for output 4...20 mA
or 1 V for output 2...10 V

Frontplate signals: Failure signalled by red LED

Output contact AF: 1 relay, 1 potentially-free changeover contact (see Table 2)

Table 2: Type of output contact

Symbol	Material	Contact rating
	Gold flashed silver alloy	AC: ≤ 2 A / 250 V (500 VA) DC: ≤ 1 A / 0.1...250 V (30 W)

Relay approved by UL, CSA, TÜV, SEV

Direction of action: Adjustable by switch
– Relay "energized" or "de-energized"
in the case of a failure

Accuracy data (acc. to DIN/IEC 770)

Basic accuracy: Limit error ≤ ± 0.2%
Including linearity and reproducibility errors

Reference conditions:

Ambient temperature 23 °C, ± 2 K
Power supply 24 V DC ± 10% and 230 V AC ± 10%
Output burden Current: $0.5 \cdot R_{ext}$ max.
Voltage: $2 \cdot R_{ext}$ min.

Influencing factors:

Temperature < ± 0.1% per 10 K
Burden influence < ± 0.1% with current output
< 0.2% with voltage output,
if $R_{ext} > 2 \cdot R_{ext}$ min.
Long-time drift < ± 0.3% / 12 months
Switch-on drift < ± 0.2%
Common and transverse
mode influence < ± 0.2%
Output + or –
connected to ground: < ± 0.2%

Regulations

Electromagnetic compatibility: The standards DIN EN 50 081-2 and
DIN EN 50 082-2 are observed
Intrinsically safe: Acc. to DIN EN 50 020: 1996-04
Electrical standards: Acc. to IEC 1010 resp. EN 61 010
Protection (acc. to IEC 529
resp. EN 60 529): IP 00
Operating voltage: < 300 V between all insulated
circuits
Contamination level: 2
Overvoltage category
acc. to IEC 664: III for power supply
II for measuring input, measuring out-
put and output contact
Double insulation: – Power supply versus all circuits
– Measuring input versus measuring
output and output contact
– Measuring output versus output
contact
– Front plate versus all circuits

EURAX B 811

Power pack with additional functions

Test voltage: Power supply versus measuring input, measuring output and output contact 3.7 kV, 50 Hz, 1 min.

Measuring input versus measuring output 2.3 kV, 50 Hz, 1 min.

Measuring output versus output contact 2.3 kV, 50 Hz, 1 min.

Frontplate versus all circuits 2.3 kV, 50 Hz, 1 min.

Environmental conditions

Climatic rating: Climate class 3Z acc. to VDI/VDE 3540

Commissioning temperature: – 10 to + 55 °C

Operating temperature: – 25 to + 55 °C, **Ex – 20** to + 55 °C

Storage temperature: – 40 to + 70 °C

Annual mean relative humidity: ≤ 75%

Altitude: 2000 m max.

Indoor use statement!

Installation data

Housing: Plug-in module for 19" rack-mounted case, Euro format 100 × 160 mm.

Space requirement: 4 TE (20.02 mm) (see Section "Dimensional drawing")

Front plate colour: Grey RAL 7032

Designation: EURAX B 811

Mounting position: Any

Electrical connections: 32-pole plug acc. to DIN 41 612, pattern F

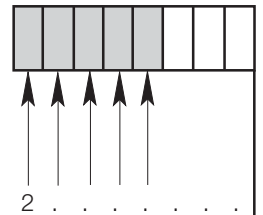
Contact layout see Section "Electrical connections"

Coding: By coding pins, removed/not removed, see Section "Electrical connections"

Weight: Approx. 0.18 kg

Table 3: Ordering informations

Order Code 811 –				
Features, Selection	*SCODE	no-go		
1. Mechanical design				
2) Plug-in module for 19" rack-mounted case				
2. Version / Power supply H (nominal voltage U_N)				
1) Standard	/ 24... 60 V	DC/AC		
2) Standard	/ 85...230 V	DC/AC		
3) [EEx ia] IIC MSK intrinsically safe	/ 24... 60 V	DC/AC		
4) [EEx ia] IIC MSK intrinsically safe	/ 85...110 V 85...230 V	DC AC		
Lines 3 and 4: Instrument [EEx ia] IIC, input circuit (MSK) EEx ia IIC				
3. Output signal / measuring outputs A1 and A12*				
1) 0... 5 V, R _{ext} ≥ 250 Ω		CD		
2) 1... 5 V, R _{ext} ≥ 250 Ω		C		
3) 0...10 V, R _{ext} ≥ 500 Ω		CD		
4) 2...10 V, R _{ext} ≥ 500 Ω		C		
8) Non-standard	[V]	CD		
9) Live zero	[V]	C		
A) 0...20 mA, R _{ext} ≤ 750 Ω (500 Ω)**		DE		
B) 4...20 mA, R _{ext} ≤ 750 Ω (500 Ω)**				
Y) Non-standard	[mA]	CD		
Z) Live zero	[mA]	C		
Line 8: [V] 0...> 5 to 0...15				
Line 9: [V] > (1...5) to 3...15				
Line Y: [mA] 0...1 to 0...< 20				
Line Z: [mA] 0.2...1 to < (4...20)				
4. FSK (field communications protocol)				
0) Not designed for communications protocol				
1) Designed for FSK communication, at field output A12			C	
2) Designed for FSK communication, at measuring output A1			CE	
Line 1: With output 0...20 / 4...20 mA				
Line 2: With output 4...20 mA only				
5. Input circuit fault detection				
Open / Short-circuit detection:				
0) Open-circuit < 3.6 mA; short-circuit > 21 mA				
1) Open-circuit; short-circuit [mA]				
Open-circuit: Values from 1 to 4 mA				
Short-circuit: Values from 20 to 23 mA				
e.g. [mA]: 2;22				



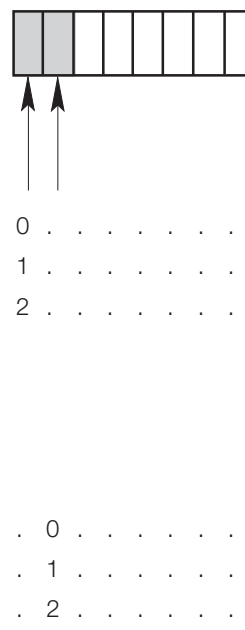
* A12 – according to instrument version – for connection with a field indicator or hand-held terminal only

** External resistance dependent on the position of jumper J 204 / J 205, see Section technical data "Measuring output".

EURAX B 811

Power pack with additional functions

Order Code 811 –																					
Features, Selection											*SCODE	no-go									
6. Response to an input circuit																					
0) Output signal linear response																					
1) Increasing output signal >>>																					
2) Decreasing output signal <<<												D									
Line 1: Output approx. 115% of full-scale																					
Line 2: Output approx. 10% of full-scale with live zero signal only																					
7. Response of the output contact AF for a measurement / supply circuit fault																					
0) Without output relay																					
1) Output contact relay energized																					
2) Output contact relay de-energized																					



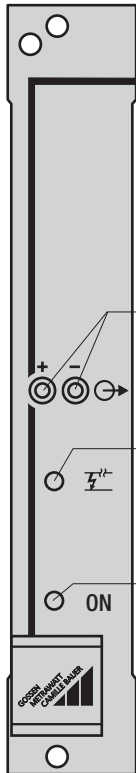
* Lines with letter(s) under "no-go" cannot be combined with preceding lines having the same letter under "SCODE".

Table 4: Data on explosion protection  **II (1) G**

Order Code	Type of protection	Measuring circuit input	Output, power supply, relays contacts	Type examination certificate	Mounting location									
811-23.. ... 811-24.. ...	[EEx ia] IIC	$U_o = 21 \text{ V}$ $I_o = 75 \text{ mA}$ $P_o = 660 \text{ mW}$ Trapezium characteristic	$U_m = 253 \text{ V AC}$ resp. 125 V DC	PTB 97 ATEX 2169X	Outside the hazardous area									
		<table border="1"> <tr> <td></td> <td>IIC</td> <td>IIB</td> </tr> <tr> <td>L_o</td> <td>6.7 mH</td> <td>25 mH</td> </tr> <tr> <td>C_o</td> <td>178 nF</td> <td>1.26 μF</td> </tr> </table>		IIC	IIB	L_o	6.7 mH	25 mH	C_o	178 nF	1.26 μF			
	IIC	IIB												
L_o	6.7 mH	25 mH												
C_o	178 nF	1.26 μF												

Electrical connections

EURAX B 811
Front

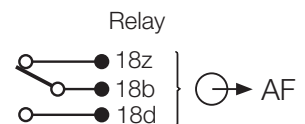
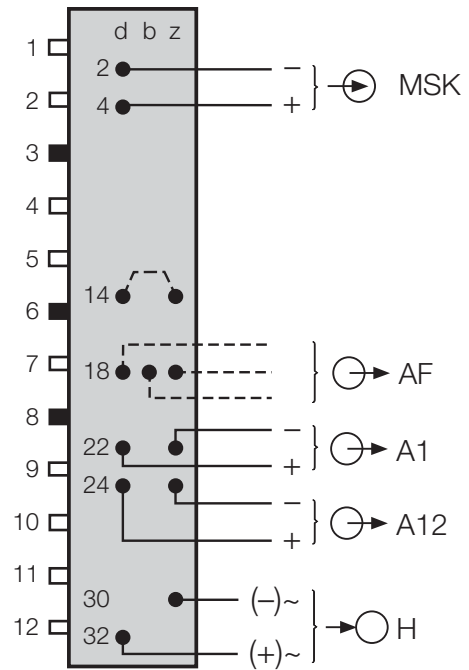


Test sockets for signal A12
(acc. to instrument version for
connection with a field indicator
or hand-held terminal)

Red LED
Open and short-circuit
monitor of input circuit

Green LED
Device standing by

EURAX B 811
Rear



Energized:
18d – 18b

De-energized:
18z – 18b

□ = Coding pin

■ = Coding pin broken out (on Ex version the coding pin 1 is broken out additionally)

● = Contact fitted

MSK = Input circuit
(terminal allocation according to type, see "Table 5")

A1 = Measuring output

A12 = According to instrument version for connection with a field indicator or hand-held terminal only

AF = Output contact (fault signalling output) for monitoring the input circuit, (optionally)

HHT = Connection of a hand-held terminal

H = Power supply

* A safety circuit may be looped via the jumper, for signalling "module withdrawn" or "module not plugged in properly", with Ex version not possible

EURAX B 811

Power pack with additional functions

Configuration

1. Switching output signals A1 / A12 between the signal ranges 0...20 mA or 4...20 mA

The range of the outputs can be switched from 0...20 mA to 4...20 mA or vice versa depending on the positions of jumpers J 202 and J 203 (Fig. 2).

Output signals A1 / A12	Position of jumpers	
	J 202	J 203
4 ... 20 mA	1	1
0 ... 20 mA	3	3

2. Communication connector

Connect the communication connector to output A1 or A12 (Figures 5 to 8). Signals are then transferred in both directions between the hand-held terminal and the transmitter via the EURAX B 811.

When using the field output A12, the 250 Ω burden connected across output A12 in the power supply unit can be switched in and out of circuit with the aid of jumpers J 204 and J 205 (Fig. 2).

Communication connected to:	Position of jumpers	
	J 204	J 205
Field output A12* integrated 250 Ω resistor in circuit , the burden at measuring output A1 is reduced 250 Ω. Choice of A1 output signal range 0/4 ... 20 mA. Voltage across A1 burden: 10 V	1	1
Field output A12* integrated 250 Ω resistor not in circuit , the burden at measuring output A1 is not reduced. A1 output signal range 4 ... 20 mA only. Voltage across A1 burden: 15 V	1	3
Measuring output A1 Output signal range 4 ... 20 mA Voltage across A1 burden: 15 V	3	3

*See "Measuring output" in the "Technical data" section

3. Response of the output signals A1 and A12 for a fault in the measurement / supply circuit

The response of the output signals A1 and A12 can be set with the aid of switches 1 and 2 on the DIP switch S 201 (Fig. 2).

Response of output signals A1 and A12 for a short or open-circuit of the measurement/supply circuit	DIP switch S 201	
	Switch 1	Switch 2
Linear output signal	ON	OFF
Increasing output signal	OFF	OFF
Decreasing output signal (with live zero signal only)	OFF	ON

Fault	Output linear behaviour	Output driving upscale	Output driving downscale
Break	0 mA (with output 4...20 mA) – 5 mA (with output 0...20 mA)	Approx. 115% of full scale end value e.g. 23 mA with output 0/4...20 mA or 11.5 V with output 0/2...10 V	(with live zero only) Approx. 10% of full scale end value e.g. 2 mA with output 4...20 mA or 1 V with output 2...10 V
Short-circuit	Approx. 26 mA with output 0/4...20 mA		

4. Response of the output contact AF for a fault in the measurement / supply circuit

The response of the fault signalling relay can be set with the aid of switches 3 and 4 on the DIP switch S 201 (Fig. 2).

Operating sense of the fault signalling relay AF in the event of a fault	DIP switch S 201	
	Switch 3	Switch 4
Relay energised	ON	OFF
Relay de-energised	OFF	ON

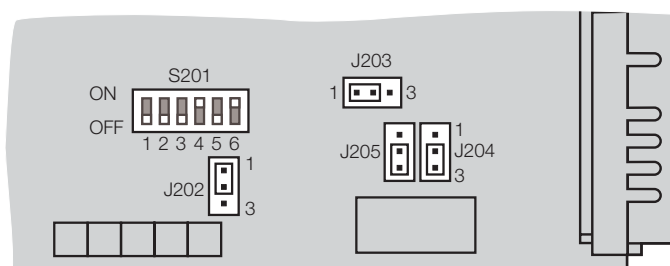


Fig. 2. Positions of the DIP switches S 201 and jumpers J 202 to J 205.

Table 5: Plug allocation

Instruments version	Wiring diagram / Plug arrangements
<p>Type 811-21.0... 811-22.0...</p> <p>Non-Ex input circuit, supply voltage U_S 24 V DC, not designed for FSK.</p> <p>Fig. 3</p>	<p style="text-align: center;">Safe area</p>
<p>Type 811-23.0... 811-24.0...</p> <p>Intrinsically safe input circuit, supply voltage U_S 16.9 V DC, not designed for FSK.</p> <p>Fig. 4</p>	<p style="text-align: center;">Safe area</p>
<p>Type 811-21.1... 811-22.1...</p> <p>Non-Ex input circuit, supply voltage U_S 24 V DC, designed for FSK.</p> <p>Hand held terminal connected to field output A12 or to test sockets</p> <p>Fig. 5</p>	<p style="text-align: center;">Safe area</p>

¹ HHT = Hand held terminal

Continuation "Table 5: Plug allocation" see on next page!

EURAX B 811

Power pack with additional functions

Continuation "Table 5: Plug allocation"

Instruments version	Wiring diagram / Plug arrangements
<p>Type 811-23.1... 811-24.1...</p> <p>Intrinsically safe input circuit, supply voltage U_S 16.4 V DC, designed for FSK.</p> <p>Hand held terminal connected to field output A12 or to test sockets</p> <p>Fig. 6</p>	<p>Safe area</p> <p>1 d b z - Input circuit MSK</p> <p>2 $\uparrow U_S$</p> <p>4 +</p> <p>4...20 mA</p> <p>Hazardous area</p> <p>2-wire transmitter</p> <p>7 } AF</p> <p>8 } AF</p> <p>9 } AF</p> <p>10 } AF</p> <p>11 } AF</p> <p>12 } AF</p> <p>22 } A1 0/4...20 mA</p> <p>24 } A12</p> <p>30 } (-) ~</p> <p>32 } (+) ~ H</p> <p>HHT¹</p>
<p>Type 811-21.2... 811-22.2...</p> <p>Non-Ex input circuit, supply voltage U_S 24 V DC, designed for FSK.</p> <p>Processor connected to output A1</p> <p>Fig. 7</p>	<p>Safe area</p> <p>1 d b z - Input circuit MSK</p> <p>2 $\uparrow U_S$</p> <p>4 +</p> <p>4...20 mA</p> <p>Hazardous area</p> <p>2-wire transmitter</p> <p>7 } AF</p> <p>8 } AF</p> <p>9 } AF</p> <p>10 } AF</p> <p>11 } AF</p> <p>12 } AF</p> <p>22 } A1</p> <p>24 } A12 Field indicator</p> <p>30 } (-) ~</p> <p>32 } (+) ~ H</p> <p>PLS/SPS</p>
<p>Type 811-23.2... 811-24.2...</p> <p>Intrinsically safe input circuit, supply voltage U_S 16.4 V DC, designed for FSK.</p> <p>Processor connected to output A1</p> <p>Fig. 8</p>	<p>Safe area</p> <p>1 d b z - Input circuit MSK</p> <p>2 $\uparrow U_S$</p> <p>4 +</p> <p>4...20 mA</p> <p>Hazardous area</p> <p>2-wire transmitter</p> <p>7 } AF</p> <p>8 } AF</p> <p>9 } AF</p> <p>10 } AF</p> <p>11 } AF</p> <p>12 } AF</p> <p>22 } A1</p> <p>24 } A12 Field indicator</p> <p>30 } (-) ~</p> <p>32 } (+) ~ H</p> <p>PLS/SPS</p>

¹ HHT = Hand held terminal

Standard accessories

- 1 Operating Instructions EURAX B 811 in three languages:
German, French, English
- 1 Type examination certificate (only for instruments in type of protection "Intrinsically safe")

Dimensional drawing

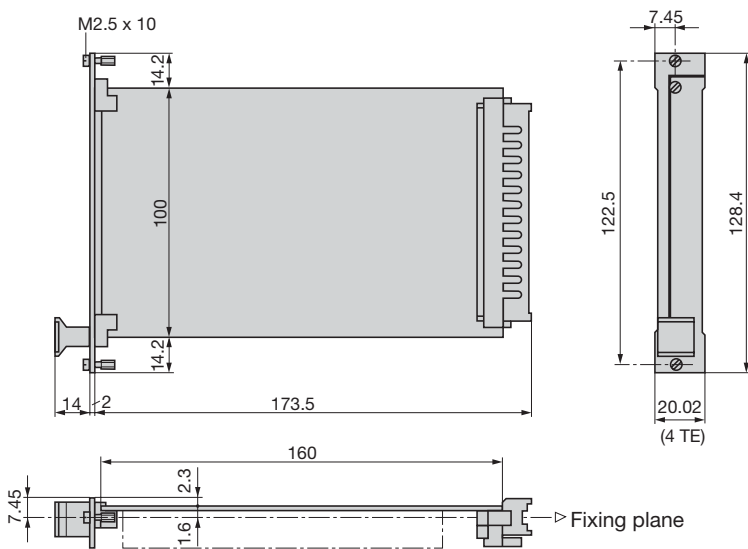


Fig. 9. EURAX B 811, front plate width 4 TE.

EURAX B 811

Power pack with additional functions

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