

SINEAX B 811

Power Pack with additional Functions

for intelligent and conventional 2-wire transmitters,
in housing S17 for rail and wall mounting

CE₀₁₀₂  II (1) G

Application

The power supply unit **SINEAX B 811** (Figure 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 to 5 mA or 1 to 5 V (signal converter) is also possible.

Some versions of the SINEAX 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 instrument fulfils all the important requirements and regulations concerning electromagnetic compatibility **EMC** and **Safety** (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. SINEAX B 811 in housing S17.

- Output can be switched between 0 to 20 mA and 4 to 20 mA / Universal matching to suit downstream device
- Green power on LED
- Compact and narrow

Technical data

Input circuit (MSK)

Signal range I_E : 4 to 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

Features / Benefits

- Designed for FSK communication, hand-held terminal connected to separate terminals. 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 part 2
- AC/DC power supply / Universal
- “Intrinsically safe” version [EEx ia] IIC available (see “Table 5: Explosion protection data”)
- Measurement/supply circuit monitored for open and short-circuits / Faults signalled by red LED, signalling relay and/or device failure signal

¹ FSK = Frequency Shift Keying

SINEAX B811

Power Pack with additional Functions

Current limiter: Electronic
At $I_E > 30 \text{ mA}$, 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 $U_S - U_M$:

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

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

If the load of the burden across output A1 already exceeds 250 Ω , the resistor can be disconnected by changing the position of a jumper. The full burden voltage of 15 V is then available at output A1 instead of 10 V.

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

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

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

Residual ripple: $< 1\% \text{ p.p., DC to } 10 \text{ kHz}$

Response time (IEC 770): Approx. 200 ms

Output characteristic: Linear

Measuring output

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 to 5, 1 to 5, 0 to 10 or 2 to 10 V

Non-standard ranges: 0 to > 5 to 0 to 15 V
resp. live-zero
 $> (1 \text{ to } 5)$ to 3 to 15 V

Short-circuit current: $\leq 40 \text{ mA}$

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

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

Residual ripple: $< 1\% \text{ p.p., DC to } 10 \text{ kHz}$

DC current signals I_A

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

Non-standard ranges: 0 to 1 to 0 to $< 20 \text{ mA}$
resp. live-zero
0.2 to 1 to $< (4 \text{ to } 20) \text{ mA}$

Open-circuit voltage: Approx. -7 to $+22 \text{ V}$

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.

Power supply H

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

Table 1: Nominal voltages and tolerances

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

¹ For power supplies $> 125 \text{ V}$, the auxiliary circuit should include an external fuse with a rating $\leq 20 \text{ A DC}$.

Power input: Approx. 2.5 W resp. $\leq 4.5 \text{ VA}$

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 to 35 kHz

Input circuit monitor

Pick-up level:

- Open-circuit
Input current $< 3.6 \text{ mA}$,
adjustable in the works between 1 and 4 mA
- Short-circuit
Input current $> 21 \text{ mA}$
adjustable in the works between 20 and 23 mA

SINEAX B811

Power Pack with additional Functions

Signalling modes

Output signals
A1 and A12:

- Output signal **linear** response
For an open-circuit output
0 mA (with 4 to 20 mA)
– 5 mA (with 0 to 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 to 20 mA
or
11.5 V for output 0/2 to 10 V
- **Decreasing** output signal
(only possible for live zero)
Output approx. 10% of full-scale value,
e.g. 2 mA for output 4 to 20 mA
or 1 V for output 2 to 10 V

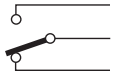
Frontplate signals:

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: $\leq 2 \text{ A} / 250 \text{ V}$ (500 VA) DC: $\leq 1 \text{ A} / 0.1 \dots 250 \text{ V}$ (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 erreur $\leq \pm 0.2\%$
Including linearity and reproducibility errors

Reference conditions:

Ambient temperature

23 °C, $\pm 2 \text{ K}$

Power supply

24 V DC $\pm 10\%$ and 230 V AC
 $\pm 10\%$

Output burden

Current: $0.5 \cdot R_{\text{ext}}$ max.
Voltage: $2 \cdot R_{\text{ext}}$ min.

Influencing factors:

Temperature

$< \pm 0.1\%$ per 10 K

Burden influence

$< \pm 0.1\%$ with current output
 $< 0.2\%$ with voltage output,
if $R_{\text{ext}} > 2 \cdot R_{\text{ext min.}}$

Long-time drift

$< \pm 0.3\%$ / 12 months

Switch-on drift

$< \pm 0.2\%$

Common and transverse
mode influence

$< \pm 0.2\%$

Output + or –
connected to ground:

$< \pm 0.2\%$

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):

Housing IP 40
Terminals IP 20

Operating voltages:

$< 300 \text{ V}$ between all insulated
circuits

Contamination level:

2

Overvoltage category
acc. to IEC 664:

III for power supply
II for measuring input, measuring
output and output contact

Double insulation:

- Power supply versus all other
circuits,
- Measuring input versus measuring
output and output contact
- Measuring output versus output
contact

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.

Environmental conditions

Commissioning temperature: -10 to $+55 \text{ °C}$

Operating temperature:

-25 to $+55 \text{ °C}$,
Ex -20 to $+55 \text{ °C}$

Storage temperature:

-40 to $+70 \text{ °C}$

Annual mean
relative humidity:

$\leq 75\%$ standard climatic rating
 $\leq 95\%$ enhanced climatic rating

Vibration (IEC 68 T2/6):

2 g / 5 to 150 to 5 Hz;
1 octave/min., 2 h

SINEAX B811

Power Pack with additional Functions

Shock (IEC 68 T2/27):	30 g / 11 ms	Mounting:	For snapping onto top-hat rail (35 x 15 mm or 35 x 7,5 mm) acc. to EN 50 022
Altitude:	2000 m max.		or
Indoor use statement!			directly onto a wall or panel using the pull-out screw hole brackets
Installation data			
Housing:	Housing S17 See section "Dimensional drawings" for dimensions	Position of use:	Any
		Terminals:	DIN/VDE 0609 Screw terminals with wire guards, for light PVC wiring and max. 2 x 0.75 mm ² or 1 x 2.5 mm ²
Material of housing:	Lexan 940 (polycarbonate) flammability class V-0 acc. to UL 94, self-extinguishing, non-dripping, free of halogen	Weight:	Approx. 0.2 kg

Standard version

When ordering, it is only necessary to quote the **Order No.:**

Table 3: Instrument in version [EEx ia] IIC, (input circuit intrinsically safe)

Version		Order Code	Order No.
Supply voltage	≥ 16.9 V DC at 20 mA	811-14B0 0000	107 400
Power supply:	85 to 110 V DC / 230 V AC		
Outputs A1 and A12*:	4 to 20 mA, $R_{ext} \leq 750 \Omega$		
FSK (field communications protocol):	Not designed for communications protocol		
Input circuit fault detection:	Open-circuit < 3.6 mA, short-circuit > 21 mA		
Response to an input circuit:	Output signal linear response		
Response of the output contact AF for a measurement/supply circuit fault:	Without relay, without output contact		
Climatic rating:	Standard climatic rating		

The complete order code 811 - 1... according to "Table 4: Specification and ordering information" should be stated for other versions.

* 2nd output signal A12 for field indicator only

Table 4: Specification and ordering information (see also Table 3: "Standard versions")

Description	*Blocking code	No-go with blocking code	Article No./ Feature
SINEAX B811-	Order Code 811-xxxx xxxx		811 -
Features, Selection			
1. Mechanical design Housing S17			1
2. Version / Power supply H (nominal voltage U_N)			
Standard / 24 to 60 V DC/AC			1
Standard / 85 to 230 V DC/AC			2
[EEx ia] IIC MSK intrinsically safe / 24 to 60 V DC/AC			3
[EEx ia] IIC MSK intrinsically safe / 85 to 110 V DC, 85 to 230 V AC			4
Lines 3 and 4: Instrument [EEx ia] IIC, input circuit (MSK) EEx ia IIC			

SINEAX B811

Power Pack with additional Functions

Description	*Blocking code	No-go with blocking code	Article No./ Feature
SINEAX B811- Order Code 811-xxxx xxxx			811 –
Features, Selection			
3. Output signals / measuring outputs A1 and A12**			
0 to 5 V, $R_{ext} \geq 250 \Omega$	CD		1
1 to 5 V, $R_{ext} \geq 250 \Omega$	C		2
0 to 10 V, $R_{ext} \geq 500 \Omega$	CD		3
2 to 10 V, $R_{ext} \geq 500 \Omega$	C		4
Non-standard [V] 0 to > 5 to 0 to 15 [V]	CD		8
Live zero [V] > (1 to 5) bis 3 to 15 [V]	C		9
0 to 20 mA, $R_{ext} \leq 750 \Omega$ (500 Ω)***	DE		A
4 to 20 mA, $R_{ext} \leq 750 \Omega$ (500 Ω)***			B
Non-standard [mA] 0 to 1 to 0 to < 20 [mA]	CD		Y
Live zero [mA] 0.2 to 1 to < (4 to 20) [mA]	C		Z
4. FSK (field communications protocol)			
Not designed for communications protocol			0
Designed for FSK communication, at field output A12 (with output 0 to 20 / 4 to 20 mA)		C	1
Designed for FSK communication, at measuring output A1 (with output 4 to 20 mA only)		CE	2
5. Input circuit fault detection			
Open / short-circuit detection:			
Open-circuit < 3.6 mA; short-circuit > 21 mA			0
Open-circuit; short-circuit [mA]			1
Open-circuit: Values from 1 to 4 mA Short-circuit: Values from 20 to 23 mA e.g. [mA]: 2;22			
6. Response to an input circuit			
Output signal linear response			0
Increasing output signal >>> (Output approx. 115% of full-scale)			1
Decreasing output signal <<< (Output approx. 10% of full-scale, with live zero signal only)		D	2
7. Response of the output contact AF for a measurement/supply circuit fault			
Without output contact			0
Output contact relay energized			1
Output contact relay de-energized			2
8. Climatic rating			
Standard climatic rating			0
Improved climatic rating			1

* Lines with letter(s) under "No-go with blocking code" cannot be combined with preceding lines having the same letter under "Blocking code".

** 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"

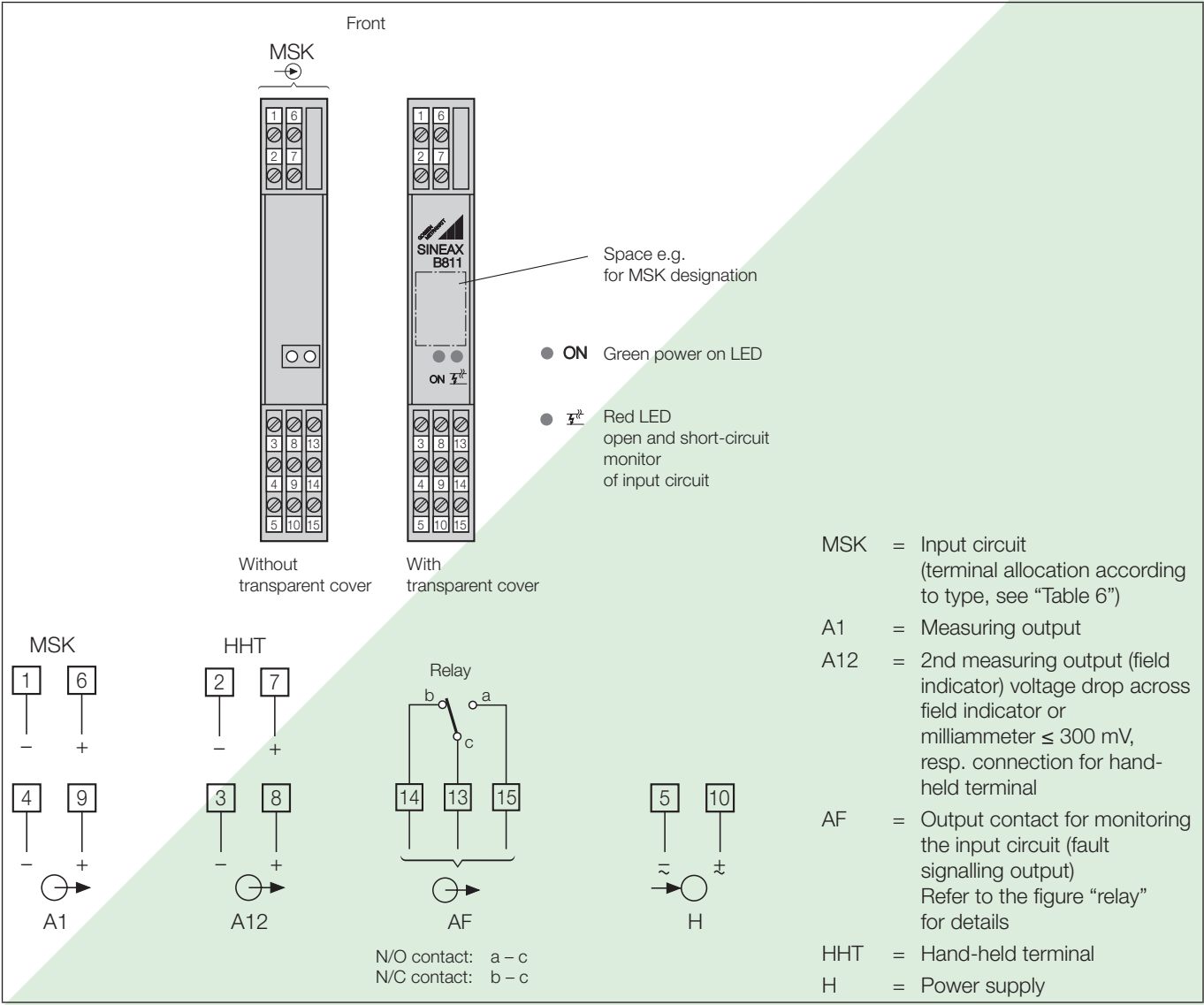
SINEAX B811

Power Pack with additional Functions

Table 5: Explosion protection data  II (1) G

Order code	Type of protection	Measuring circuit input	Output, Power supply relays contacts	Certificates	Mounting location									
811-13.. ... 811-14.. ...	[EEx ia] IIC	U_o = 21 V I_o = 75 mA P_o = 660 mW Trapezium characteristic <table><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	U _m = 253 V AC resp. 125 V DC	PTB 97 ATEX 2083	Outside the hazardous area
	IIC	IIB												
L _o	6.7 mH	25 mH												
C _o	178 nF	1.26 μF												

Electrical connections



SINEAX B811

Power Pack with additional Functions

Configuration

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

The range of the outputs can be switched from 0 to 20 mA to 4 to 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 to 20 mA	1	1
0 to 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 SINEAX 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 to 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 to 20 mA only Voltage across A1 burden: 15 V	1	3
Measuring output A1 Output signal range 4 to 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 (only with live zero signal)	OFF	ON

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

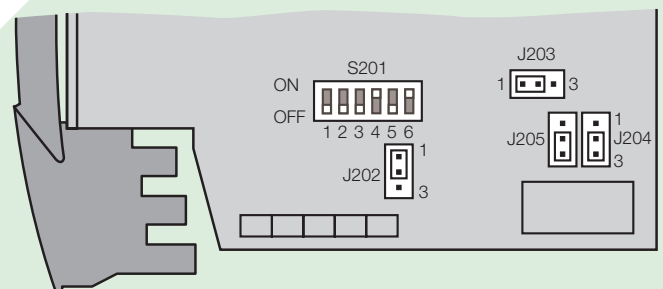
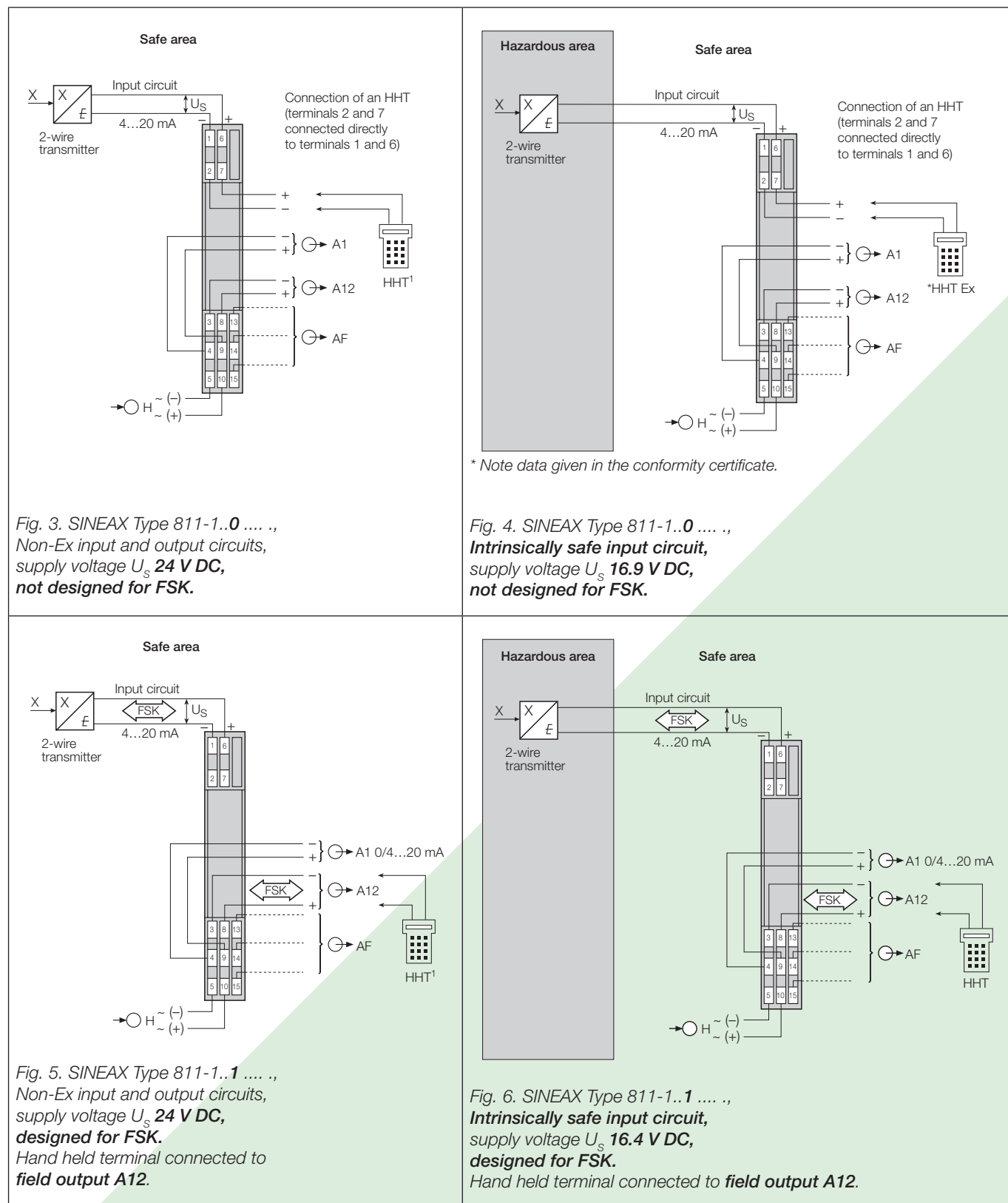


Fig. 2. Positions of the DIP switches S 201 and jumpers J 202 to J 205.

SINEAX B811

Power Pack with additional Functions

Table 6: Terminal allocation



¹ HHT = Hand-Held-Terminal

Continuation of "Table 6: Terminal allocation" see on next page!

SINEAX B811

Power Pack with additional Functions

Continuation "Table 6: Terminal allocation"

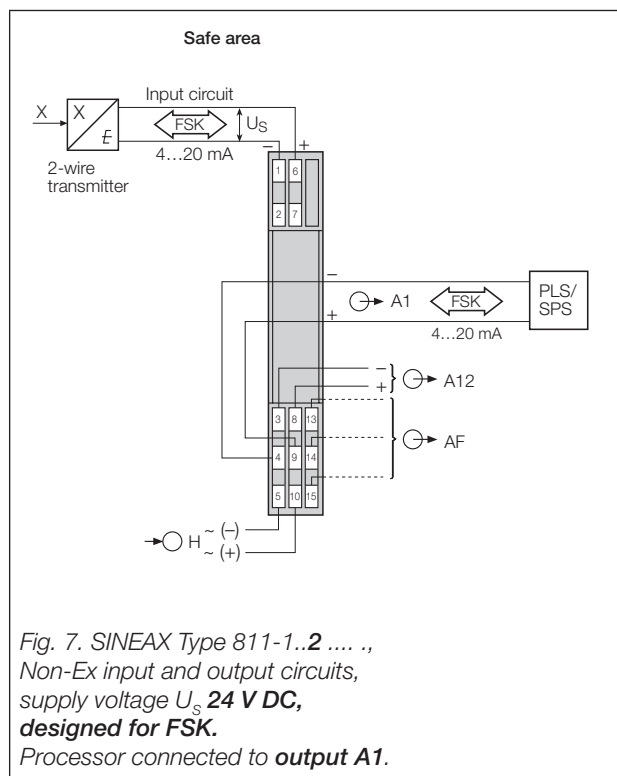


Fig. 7. SINEAX Type 811-1..2, Non-Ex input and output circuits, supply voltage U_s 24 V DC, designed for FSK. Processor connected to output A1.

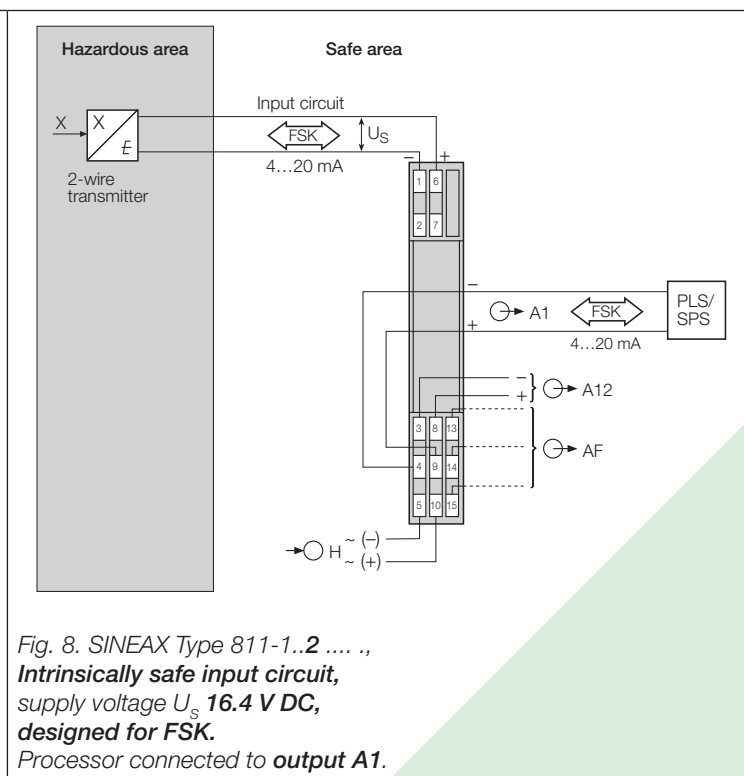


Fig. 8. SINEAX Type 811-1..2, Intrinsically safe input circuit, supply voltage U_s 16.4 V DC, designed for FSK. Processor connected to output A1.

Dimensional drawings

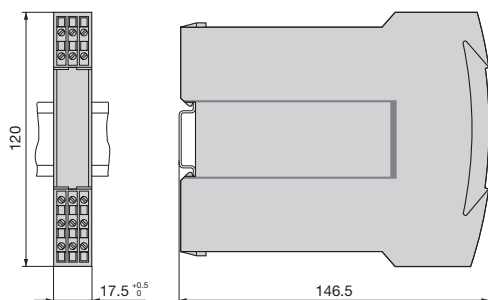


Fig. 9. SINEAX B 811 in housing S17 clipped onto a top-hat rail (35x15 mm or 35x7.5 mm, acc. to EN 50 022).

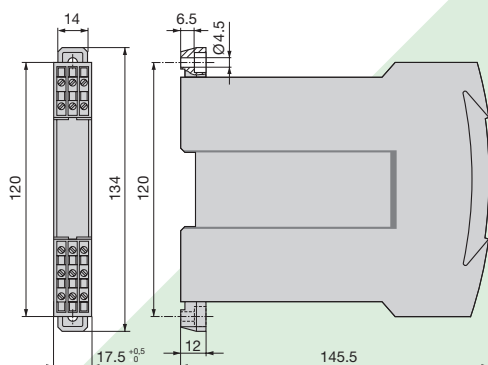


Fig. 10. SINEAX B 811 in housing S17 screw hole mounting brackets pulled out.

Standard accessories

- 1 Operating Instructions in three languages: German, French, English
- 2 Withdrawing handle (for opening the housing)
- 2 Labels (under transparent cover)
- 1 Type examination certificate (only for "Intrinsically safe" explosion-proof devices)

CAMILLE BAUER
Rely on us.

Camille Bauer AG
Aargauerstrasse 7
CH-5610 Wohlen / Switzerland
Phone: +41 56 618 21 11
Fax: +41 56 618 35 35
e-Mail: info@camillebauer.com
www.camillebauer.com