SINEAX B 811
Power pack with additional functions

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

CE 0102 ⟨Ex⟩ II (1) G

Application

The power supply unit **SINEAX B 811** (Figure 1 and 2) 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 SINEAX B 811 are **designed for FSK[1] 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** clipped onto a top-hat rail.*

*Fig. 2. SINEAX B 811 in housing **S17**, screw hole mounting brackets pulled out.*

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 6: Explosion protection data")
- **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**
- **Compact and narrow**

[1] *FSK = **F**requency **S**hift **K**eying*

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Technical Data

Input circuit (MSK)

Signal range I_E: 4…20 mA DC

Supply voltage U_S (at I_E = 20 mA):

24 V ± 7%	with standard (non-Ex) version, not designed for communications protocol
24 V ± 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

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

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 a jumper. The full burden voltage of 15 V is then available at output A1 instead of 10 V.

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

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

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 ± 15%	Standard (non-Ex)
85...230 V [1] DC / AC		
24... 60 V DC / AC	DC – 15...+ 33% AC ± 15%	Type of protection “Intrinsically safe” [EEx ia] IIC
85...230 V AC	± 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

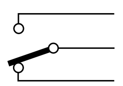
– **Increasing** output signal
  Output approx. 115% of full-scale value, e.g. 23 mA for output 0/4…20 mA
  or
  11.5 V for output 0/2…10 V

– **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 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 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

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

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Storage temperature:	–40 to + 70 °C
Annual mean relative humidity:	≤ 75% standard climatic rating ≤ 95% enhanced climatic rating
Vibration (IEC 68 T2/6):	2 g / 5…150…5 Hz; 1 Octave/min., 2 h
Shock (IEC 68 T2/27):	30 g / 11 ms

Installation data

Housing:	Housing **S17** See section “Dimensional drawings” for dimensions
Material of housing:	Lexan 940 (polycarbonate), flammability class V-0 acc. to UL 94, self-extinguishing, non-dripping, free of halogen
Mounting:	For snapping onto top-hat rail (35×15 mm or 35×7.5 mm) acc. to EN 50 022 or directly onto a wall or panel using the pull-out screw hole brackets
Position of use:	Any
Terminals:	DIN/VDE 0609 Screw terminals with wire guards, for light PVC wiring and max. 2×0.75 mm^2 or 1×2.5 mm^2
Weight:	Approx. 0.2 kg

Standard versions

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

Table 3: Instruments in standard-(non-Ex) version, (input circuit non intrinsically safe)

Version		Order Code	**Order No.**
Supply voltage:	24 V DC, ± 7% at 20 mA		
Power supply:	85 … 230 V DC / AC		
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 for a measurement/supply circuit fault:	Without output contact		
Climatic rating:	Standard climatic rating		
Outputs A1 and A12*:	0 … 20 mA, R_{ext} ≤ 750 Ω	811-12A0 0000	**126 856**
Outputs A1 and A12*:	4 … 20 mA, R_{ext} ≤ 750 Ω	811-12B0 0000	**126 864**

The complete order code 811 - 1... .... according to “Table 5: Specification and ordering information” should be stated for other versions.

** 2nd output signal A12 for field indicator only*

Table 4: 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 … 110 V DC / 230 V AC		
Outputs A1 and A12*:	4 … 20 mA, R_{ext} ≤ 750 Ω		
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 5: Specification and ordering information” should be stated for other versions.

** 2nd output signal A12 for field indicator only*

Table 5: Specification and ordering information (see also Tables 3 and 4 «Standard versions»)

Order Code **811 –**			
Features, Selection	*SCODE	no-go	
1. Mechanical design			
1) Housing S17			1 . . . .
2. Version / Power supply H (nominal voltage U_N)			
1) Standard / 24… 60 V DC/AC			. 1 . . . . . .
2) Standard / 85…230 V DC/AC			. 2 . . . . . .
3) [EEx ia] IIC / 24… 60 V DC/AC MSK intrinsically safe			. 3 . . . . . .
4) [EEx ia] IIC / 85…110 V DC MSK intrinsically safe 85…230 V AC			. 4 . . . . . .
Lines 3 and 4: Instrument [EEx ia] IIC, input circuit (MSK) EEx ia IIC			
3. Output signals / measuring outputs A1 and A12 *			
1) 0… 5 V, R_{ext} ≥ 250 Ω	CD		. . 1 . . . . .
2) 1… 5 V, R_{ext} ≥ 250 Ω	C		. . 2 . . . . .
3) 0…10 V, R_{ext} ≥ 500 Ω	CD		. . 3 . . . . .
4) 2…10 V, R_{ext} ≥ 500 Ω	C		. . 4 . . . . .
8) Non-standard [V]	CD		. . 8 . . . . .
9) Live zero [V]	C		. . 9 . . . . .
A) 0…20 mA, R_{ext} ≤ 750 Ω (500 Ω) **	DE		. . A . . . . .
B) 4…20 mA, R_{ext} ≤ 750 Ω (500 Ω) **			. . B . . . . .
Y) Non-standard [mA]	CD		. . Y . . . . .
Z) Live zero [mA]	C		. . Z . . . . .
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)			

* *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”*

Continuation of Table 5 see on next page!

Continuation of Table 5: «Specification and ordering information»

Order Code **811 –** ☐☐☐☐

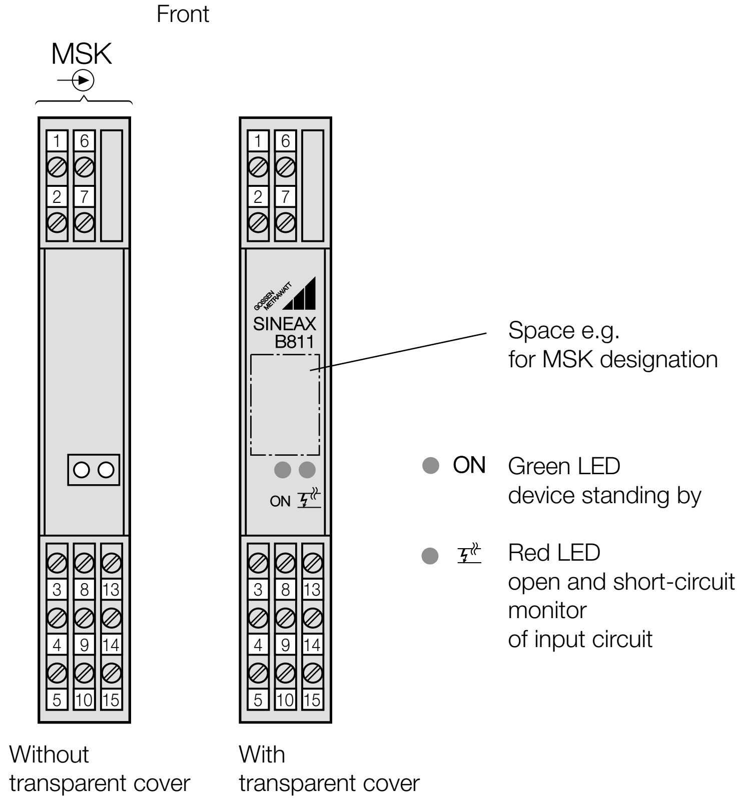
Features, Selection	*SCODE	no-go	
4. FSK (field communications protocol)			
0) Not designed for communications protocol			0 . . . .
1) Designed for FSK communication, at field output A12		C	1 . . . .
2) Designed for FSK communication, at measuring output A1		CE	2 . . . .
Line 1: With output 0…20 / 4…20 mA only 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			. 0 . . . . . .
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			. 1 . . . . . .
6. Response to an input circuit			
0) Output signal linear response			. . 0 . . . . .
1) Increasing output signal >>>			. . 1 . . . . .
2) Decreasing output signal <<<		D	. . 2 . . . . .
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 contact			. . . 0 . . . .
1) Output contact relay energized			. . . 1 . . . .
2) Output contact relay de-energized			. . . 2 . . . .
8. Climatic rating			
0) Standard climatic rating			. . . . 0 . . .
1) Improved climatic rating			. . . . 1 . . .

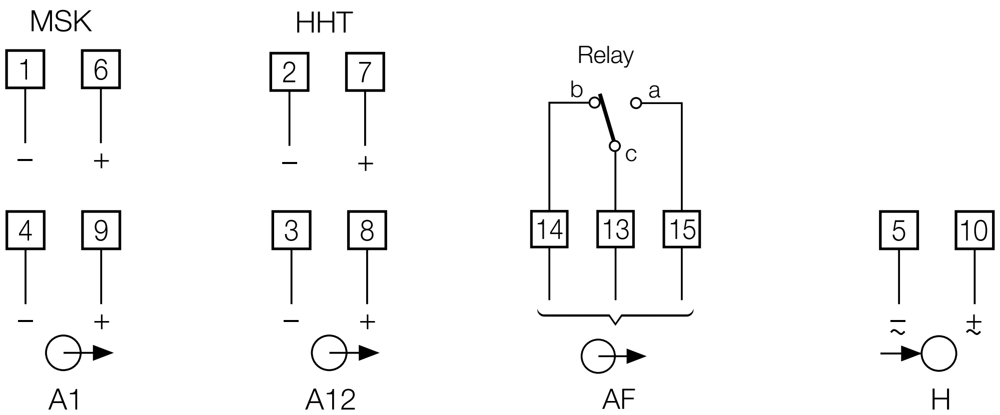
** Lines with letter(s) under “no-go” cannot be combined with preceding lines having the same letter under “SCODE”.*

Table 6: Explosion protection data Ex II (1) G

Order code	Type of protection	Measuring circuit input	Output, power supply relays contacts	Certificates	Mounting location
811-13/14...	[EEx ia] IIC	**U_o = 21 V** **I_o = 75 mA** **P_o = 660 mW** Trapezium characteristic 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	Type examination certificate PTB 97 ATEX 2083	**Outside** the hazardous area

Electrical connections





N/O contact: a – c
N/C contact: b – c

MSK = Input circuit
(terminal allocation according to type, see "Table 7")

A1 = Measuring output

A12 = 2nd measuring output (field indicator) voltage drop across field indicator or milliammeter ≤ 300 mV, resp. connection for hand-held terminal

AF = Output contact for monitoring the input circuit (fault signalling output)
Refer to the figure "relay" for details

HHT = Hand-held terminal

H = Power supply

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Configuration

1. Switching output signals A1 and 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. 3).

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 6 to 9). 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. 3).

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. 3).

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…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. 3).

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
Relays de-energised	OFF	ON

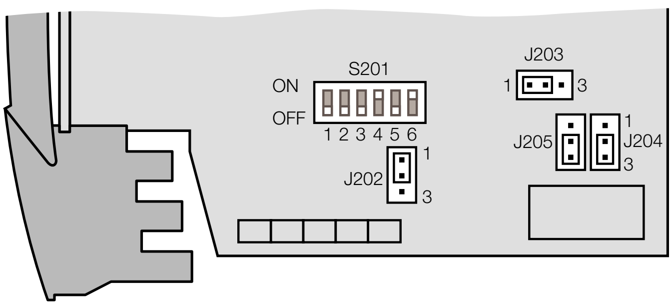


Fig. 3. Positions of the DIP switches S 201 and jumpers J 202 to J 205.

Table 7: Terminal allocation

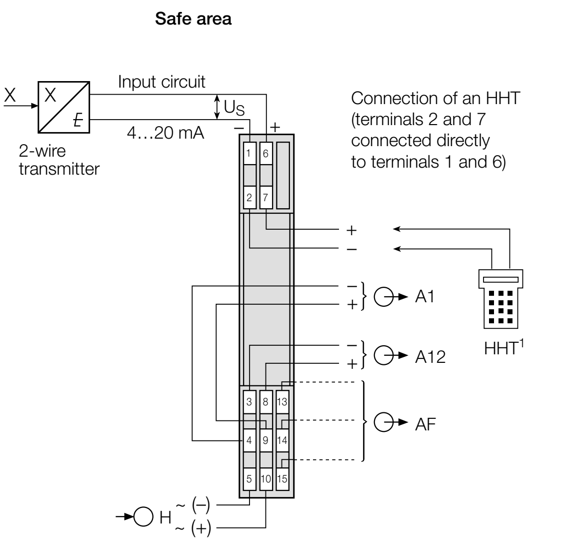
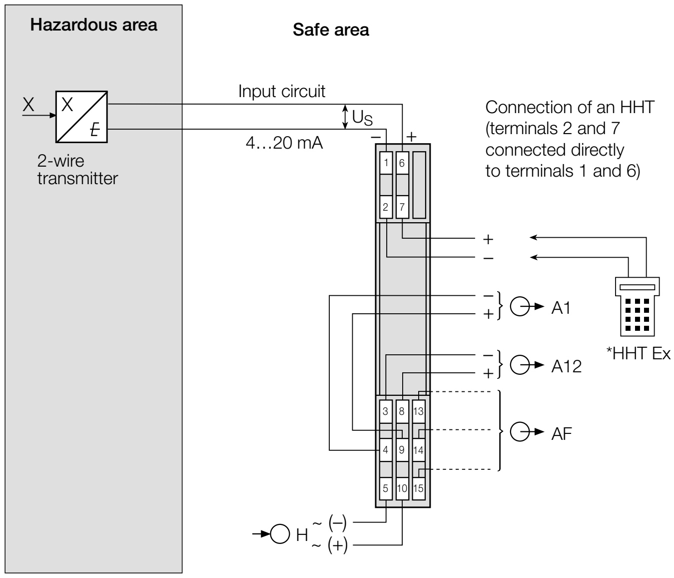


*Fig. 4. SINEAX Type 811-1..**0** .... .,*
Non-Ex input and output circuits,
*supply voltage U_S **24 V DC,***
not designed for FSK.



** Note data given in the conformity certificate.*

*Fig. 5. SINEAX Type 811-1..**0** .... .,*
Intrinsically safe input circuit,
*supply voltage U_S **16.9 V DC,***
not designed for FSK.

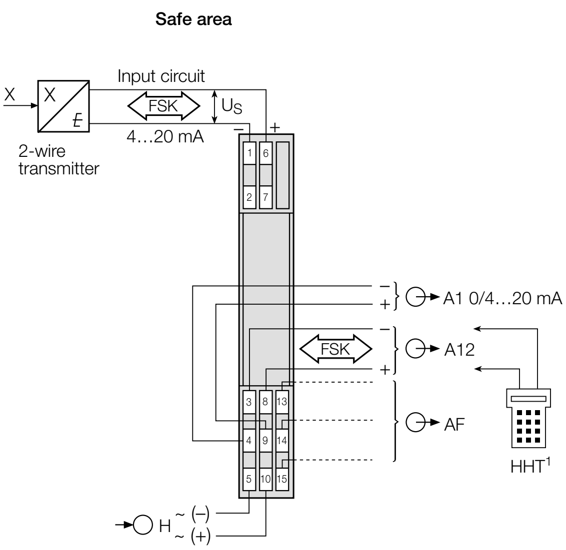


*Fig. 6. SINEAX Type 811-1..**1** .... .,*
Non-Ex input and output circuits,
*supply voltage U_S **24 V DC,***
designed for FSK.
Hand held terminal connected to
***field output A12**.*

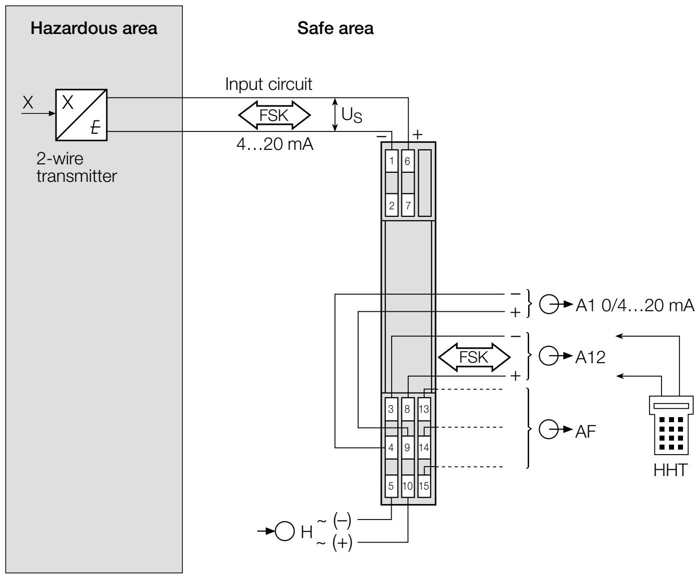


*Fig. 7. SINEAX Type 811-1..**1** .... .,*
Intrinsically safe input circuit,
*supply voltage U_S **16.4 V DC,***
designed for FSK.
*Hand held terminal connected to **field output A12**.*

[1] HHT = Hand held terminal

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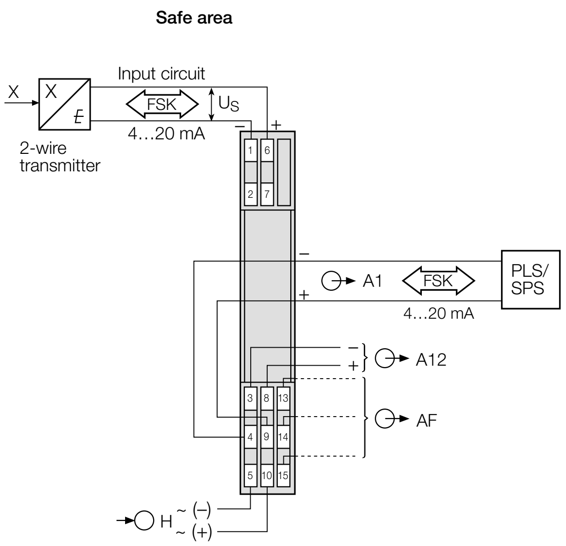

*Fig. 8. SINEAX Type 811-1..**2** .... .,*
Non-Ex input and output circuits,
*supply voltage U_S **24 V DC,***
designed for FSK.
*Processor connected to **output A1**.*

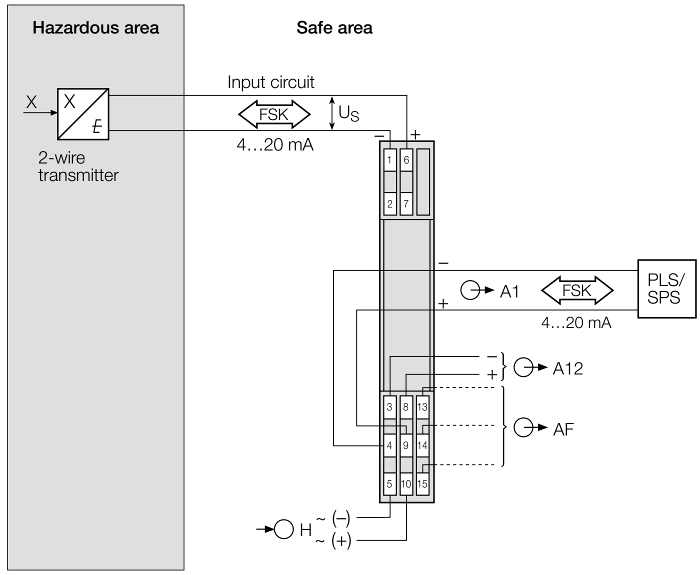

*Fig. 9. SINEAX Type 811-1..**2** .... .,*
Intrinsically safe input circuit,
*supply voltage U_S **16.4 V DC,***
designed for FSK.
*Processor connected to **output A1**.*

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)

Dimensional drawings

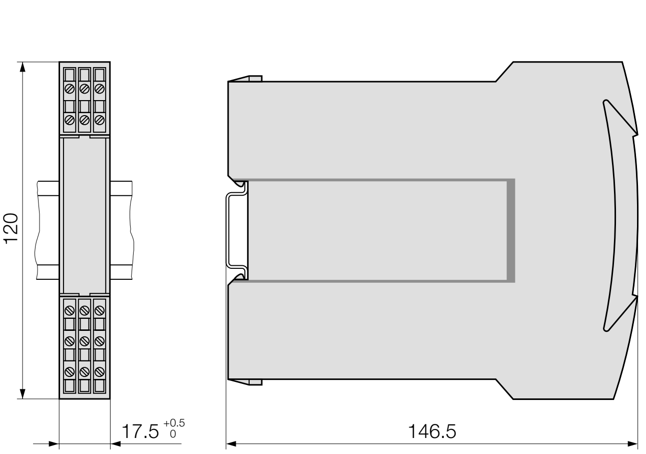

*Fig. 10. SINEAX B 811 in housing **S17** clipped onto a top-hat rail (35×15 mm or 35×7.5 mm, acc. to EN 50 022).*

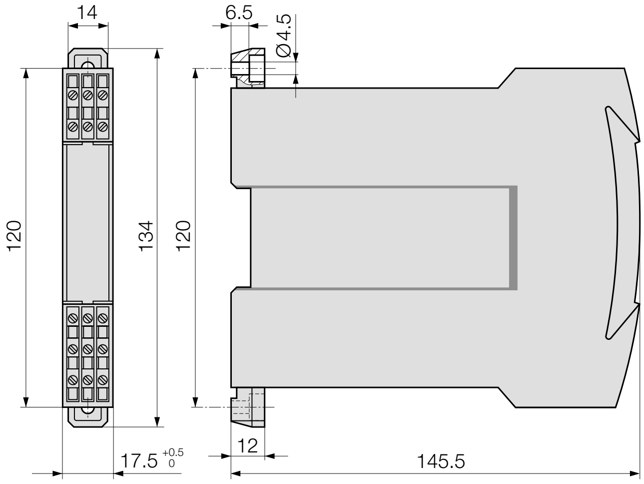

*Fig. 11. SINEAX B 811 in housing **S17** screw hole mounting brackets pulled out.*

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Printed in Switzerland • Subject to change without notice • Edition 03.99 • Data sheet No. B 811-1 Le

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