Plug-in module SIRAX B 811
Power pack with additional functions

CAMILLE BAUER

for intelligent and conventional
2-wire transmitters

CE 0102 Ex II (1) G

Application

The power supply unit **SIRAX 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 SIRAX 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 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.

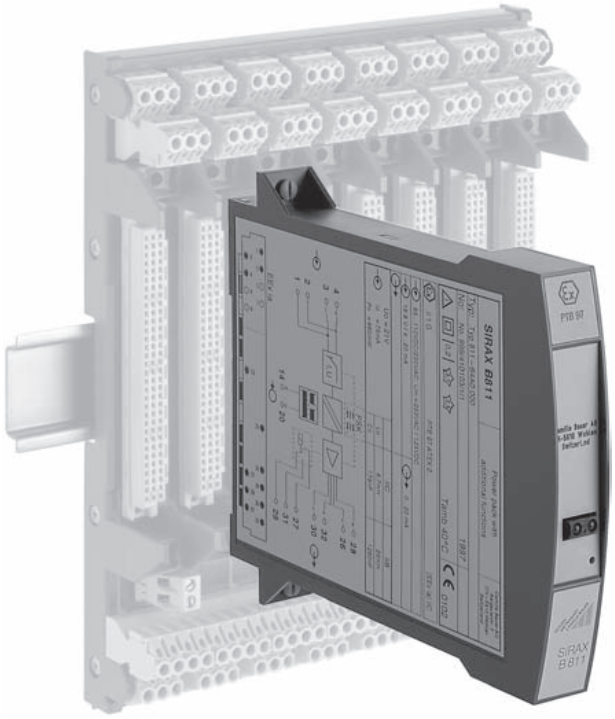

Fig. 1. Plug-in module SIRAX B 811 for plugging onto backplane BP 902.

Features / Benefits

- **Power pack plugs onto backplane** (mechanically latched by fasteners), **all electrical connections made to the backplane and not to the SIRAX B 811 / Thus no wiring when replacing devices**
- **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**
- **Available in type of protection "Intrinsically safe" [EEx ia] IIC** (see "Table 5: 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 = **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}: $R_{ext\ A1}\ //\ R_{ext\ A12}\ [k\Omega] \geq \frac{U_A\ [V]}{20\ mA}$

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} max. $[k\Omega] = \frac{15\ V\ (10\ V)}{I_{AN}\ [mA]}$

I_{AN} = Output circuit full-scale value

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

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

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

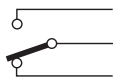
Signalling modes

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 · R_{ext} max. Voltage: 2 · 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 · 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%

Standards

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 00

Operating voltage: Measuring input < 30 V
Measuring outputs < 25 V
Output contact,
Power supply < 250 V

Rated insulation voltage: 253 V AC for all circuits

Contamination level: 2

Overvoltage category acc. to IEC 664: III for power supply
II for measuring input, measuring output and output contact

Electrical insulation: Power supply versus all other circuits, measuring input versus measuring output and output contact

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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 + 40 °C
Operating temperature:	–25 to + 40 °C, **Ex –20** to + 40 °C
Storage temperature:	–40 to + 70 °C
Annual mean relative humidity:	≤ 75%

Installation data

Housing:	Power pack in housing B17 for plugging onto backplane BP 902. Refer to Section “Dimensional drawing” for dimensions
Material of housing:	Lexan 940 (polycarbonate), Flammability Class V-0 acc. to UL 94, self-extinguishing, non-dripping, free of halogen
Designation:	SIRAX B 811
Mounting position:	Any
Electrical connections:	96-pin connector acc. to DIN 41 612, pattern C. Layout see Section “Electrical connections”
Coding:	Power pack supplied already coded. The rack is coded by the user by fitting the coding inserts supplied
Weight:	Approx. 0.18 kg

Standard versions

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

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

Version		Order Code	**Order No.**
Supply voltage:	≥ 16.9 V DC at 20 mA	811-64B0 000	**125 212**
Power supply:	85 … 110 V DC / 230 V AC		
Outputs A1 and A12*:	4 … 20 mA, R_{ext} ≤ 750 Ω		
FSK:	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		
Output contact for a measurement/supply circuit fault:	Without output contact,		

* 2nd output signal A12 for field indicator only

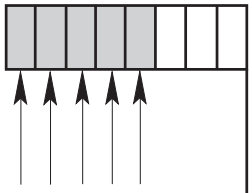
Table 4: Instruments in [EEx ia] IIC version + backplane BP 902-211

Delivery as set	Order Code	**Order No.**
Power pack (Order No. 125 212) together **with** backplane BP 902 (Order No. 120 046) (1 slot)	811-64B0 0000	**154 302**

The complete Order Code 811-6... ... according to “Table 5: Ordering informations” should be stated for other versions.

Table 5: Ordering informations (see also Table 3 and 4: "Standard versions")

Order Code **811 –**					
Features, Selection				*SCODE	no-go
1. Mechanical design					
6) Housing B17 (for plugging onto backplane BP 902, see data sheets BP 902)					
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 signals / measuring outputs A1 and A12*					
1) 0… 5 V, $R_{ext} \geq 250\ \Omega$				CD	
2) 1… 5 V, $R_{ext} \geq 250\ \Omega$				C	
3) 0…10 V, $R_{ext} \geq 500\ \Omega$				CD	
4) 2…10 V, $R_{ext} \geq 500\ \Omega$				C	
8) Non-standard		[V]		CD	
9) Live zero		[V]		C	
A) 0…20 mA, $R_{ext} \leq 750\ \Omega$ (500 Ω)**				DE	
B) 4…20 mA, $R_{ext} \leq 750\ \Omega$ (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 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					
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".*

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Order Code **811 –**			
Features, Selection	*SCODE	no-go	
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 . . . . .

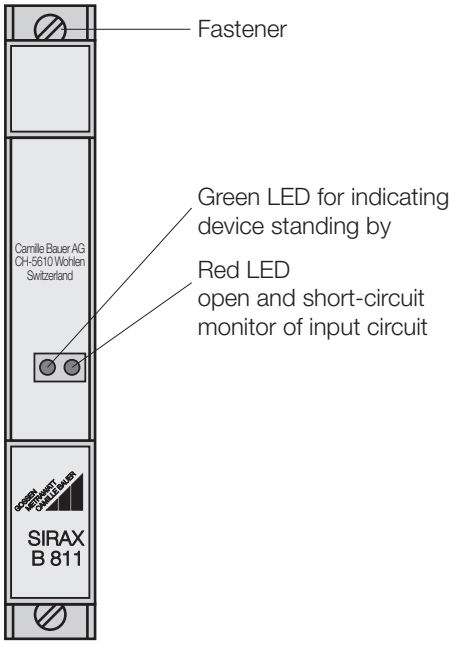
** Lines with letter(s) under "no-go" cannot be combined with preceding lines having the same letter under "SCODE".*

Table 6: Data on explosion protection ⟨Ex⟩ II (1) G

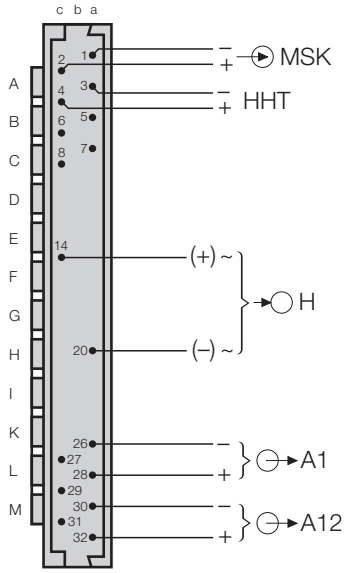
Order Code	Type of protection	Measuring circuit input	Output, power supply relays contacts	Type examination certificate	Mounting location
811-63.. ... 811-64.. ...	[EEx ia] IIC	**U_o = 21 V** **I_o = 75 mA** **P_o = 660 mW** Trapezium characteristic IIC: L_o 6.7 mH, C_o 178 nF IIB: L_o 25 mH, C_o 1.26 µF	U_m = 253 V AC resp. 125 V DC	PTB 97 ATEX 2083	**Outside** the hazardous area

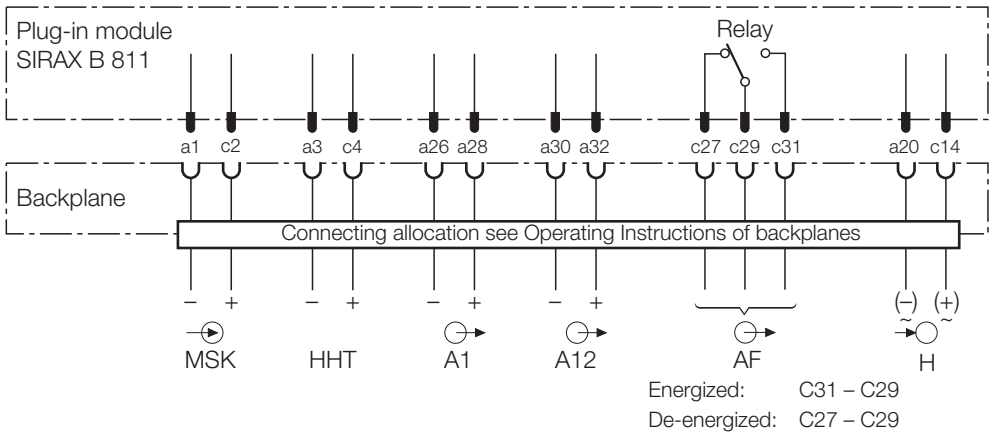
Electrical connections

SIRAX B 811
Front



SIRAX B 811
Rear





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

A1 = Measuring output

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

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

HHT = Hand-held terminal

H = Power supply

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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 SIRAX 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 ... 20mA 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

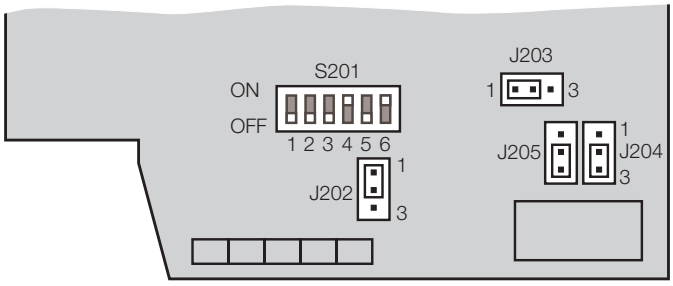
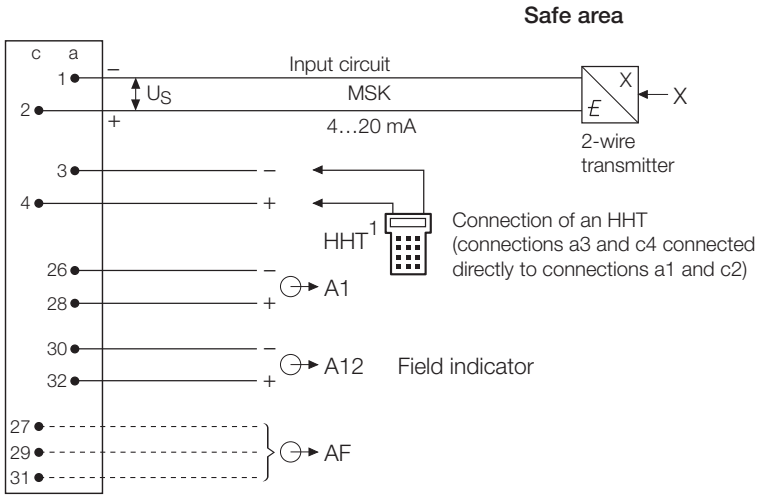
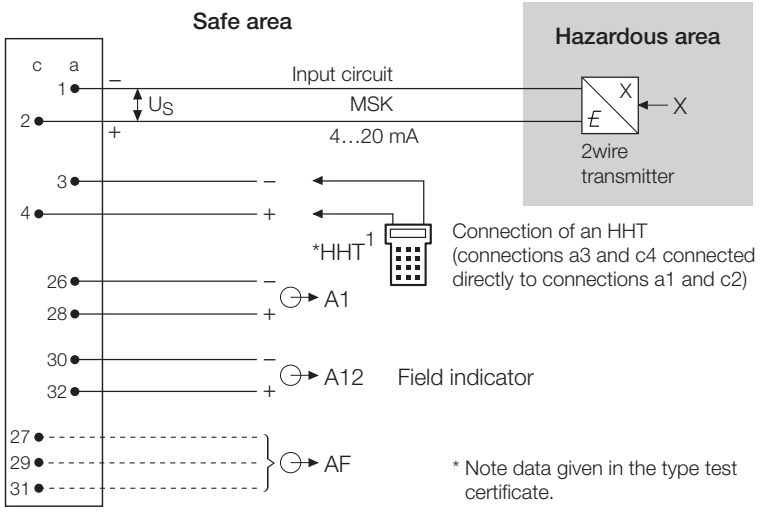
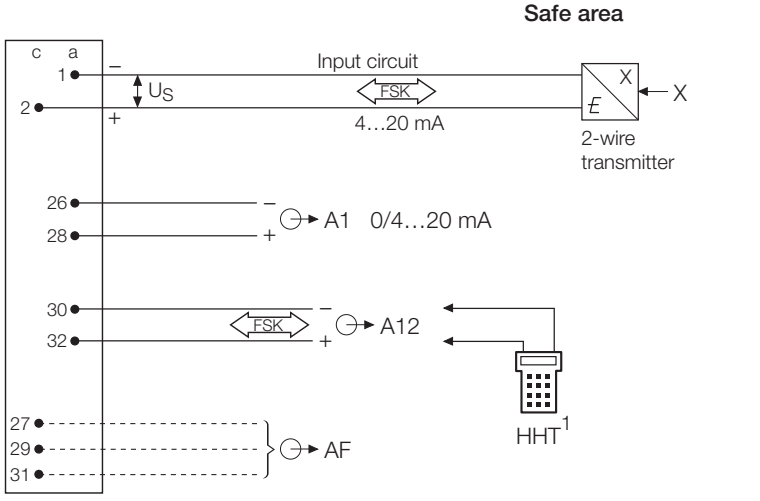


Fig. 2. Positions of the DIP switches S 201 and jumpers J 202 to J 205.

Table 7: Plug allocation

Instruments version	Wiring diagram / Plug arrangements
Type 811-61.**0**... 811-62.**0**... Non-Ex input circuit, supply voltage U_S **= 24 V DC,** **not designed for FSK.** Fig.3	
Type 811-63.**0**... 811-64.**0**... **Intrinsically safe input circuit,** supply voltage U_S **= 16.9 V DC,** **not designed for FSK.** Fig. 4	
Type 811-61.**1**... 811-62.**1**... Non-Ex input circuit, supply voltage U_S **= 24 V DC,** **designed for FSK.** Hand held terminal connected to **field output A12**. Fig.5	

[1] *HHT = Hand-Held-Terminal*

Continuation of “Table 7: Plug allocation” see on next page!

Plug-in module SIRAX B 811
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Continuation “Table 7: Plug allocation”

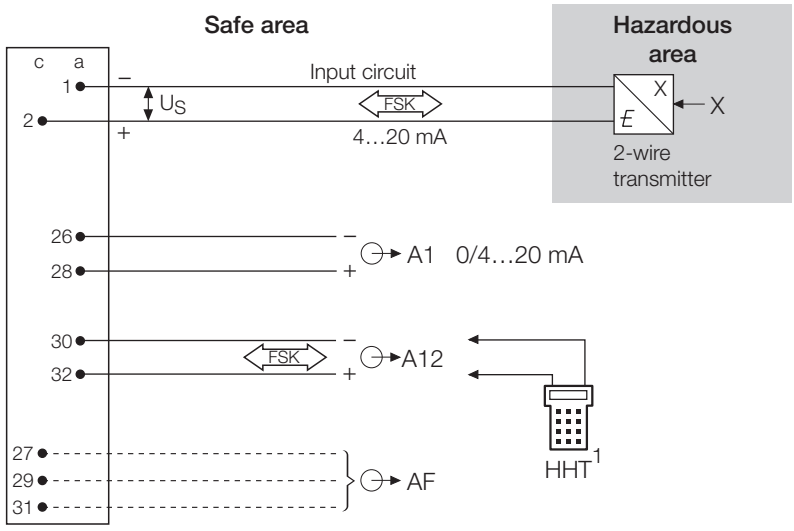
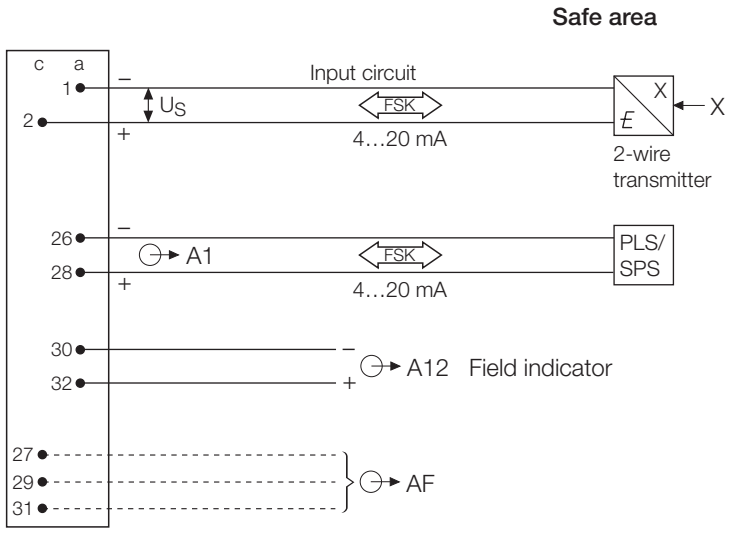
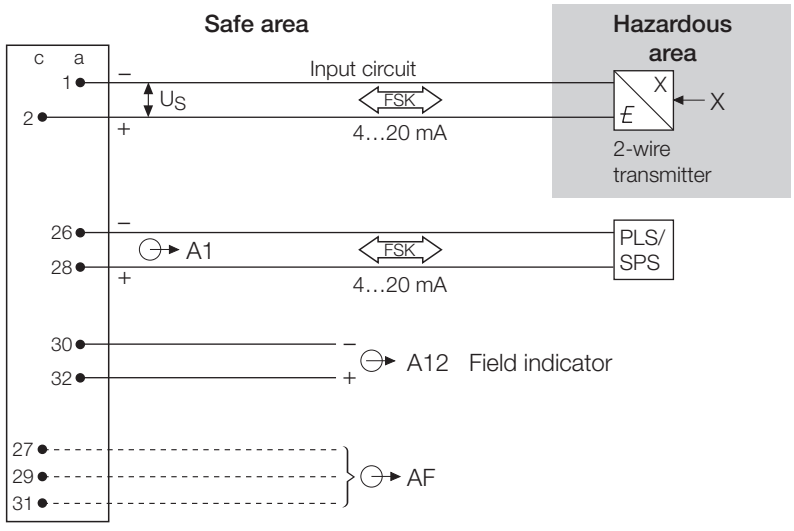
Instruments version	Wiring diagram / Plug arrangements
Type 811-63.**1**... 811-64.**1**... **Intrinsically safe input circuit,** supply voltage U_S **= 16.4 V DC,** **designed for FSK.** Hand held terminal connected to **field output A12**. Fig. 6	
Type 811-61.**2**... 811-62.**2**... Non-Ex input circuit, supply voltage U_S **= 24 V DC,** **designed for FSK.** Processor connected to **output A1**. Fig. 7	
Type 811-63.**2**... 811-64.**2**... **Intrinsically safe input circuit,** supply voltage U_S **= 16.4 V DC,** **designed for FSK.** Processor connected to **output A1**. Fig. 8	

Table 8: Accessories and spare parts

Description	Order No.
Coding comb with 12 sets of codes (for coding the backplane BP 902)	107 971
Data card (for recording programmed settings)	130 633
Operating Instructions B 811-6 B d-f-e	125 254

Standard accessories

1 Operating Instructions SIRAX B 811, in three languages: German, French, English
1 Coding comb with 12 sets of codes
3 Data chards (for recording programmed settings)
1 Type examination certificate (only for instruments in type of protection “Intrinsically safe”)

Dimensional drawing

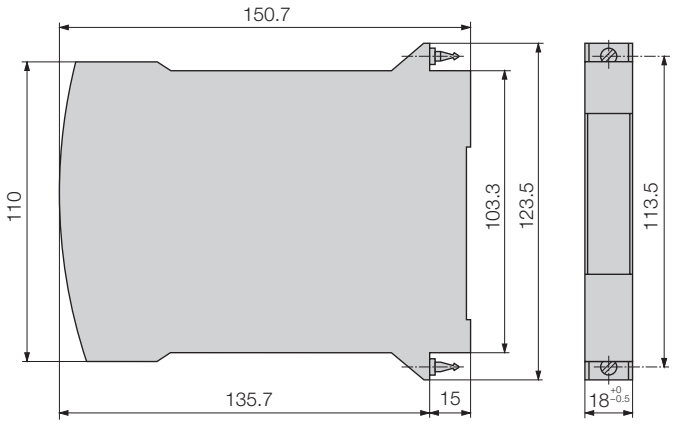


*Fig. 9. SIRAX B 811 in housing **B17.***

Printed in Switzerland • Subject to change without notice • Edition 01.04 • Data sheet No. B 811-6 Le

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