SINEAX SI 815
Passive DC signal isolator

CAMILLE BAUER

with power supply transfer and without separate power supply connection,
versions available for FSK[1] and Ex and non-Ex
in housing N17 or S17 for rail and wall mounting

CE 0102 Ex II (1) G

Application

The signal isolator SINEAX SI 815 serves to electrically insulate the 4…20 mA input circuit of a 2-wire transmitter. It performs two tasks at the same time. Firstly it provides electrical insulation and secondly it conducts the power supply needed for measurement to the 2-wire transmitter without injecting into the circuit itself. Thus the isolator does not require an power supply connection itself.

Some versions of the SINEAX SI 815 are designed for FSK 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. This operate in conjunction with intrinsically safe 2-wire transmitters located in hazardous areas.

The signal isolator is supplied in two different housings depending on the number of transmitter channels to be isolated: SINEAX SI 815-5 with one transmitter channel to be isolated in housing Type N17 (Fig. 1) and SINEAX SI 815-1 with two channels in housing Type S17. Both types of housings are suitable for either rail or wall mounting.



Fig. 1. SINEAX SI 815-5 with one isolation and transmission channel, in housing N17, clipped onto a top-hat rail.



Fig. 2. SINEAX SI 815-1 with two isolation and transmission channels, in housing S17, screw hole mounting brackets pulled out.

Features / Benefits

- Electrically insulated output and input signal / Prevents the transfer of interference voltages and currents, overcomes signal connection problems
- Output signal = input signal = 4…20 mA
- Transmission of the power supply for 2-wire transmitters / Simple low-cost instrumentation
- No power supply required / Saves having to run and connect power supply leads
- Suitable for transmitting analogue 4…20 mA signals frequency-modulated by digital signal (FSK communication) / Enables operation in conjunction with an "intelligent" 2-wire transmitter designed for FSK and a HART or company-specific protocol
- "Intrinsically safe" version [EEx ia] IIC available (see "Table 4: Data on explosion protection")
- Snaps onto a DIN rail or screws onto a wall or panel / Adaptable to the circumstances at the place of installation
- Compact and narrow, housing only 17.5 mm wide / Low space requirement, high packing density, 27 devices fit into a 19″ rack

[1] *FSK = Frequency Shift Keying*

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Layout and mode of operation

The description below refers to a SINEAX SI 815 designed for FSK communication and having a **single** isolating and transmission channel.

The signal isolator comprises a series regulator LR, a DC chopper Z, an isolating stage T, a rectifier G, an oscillator O and a FSK converter W (see Fig. 3). E signifies the input signal[1] and A the output signal[1].

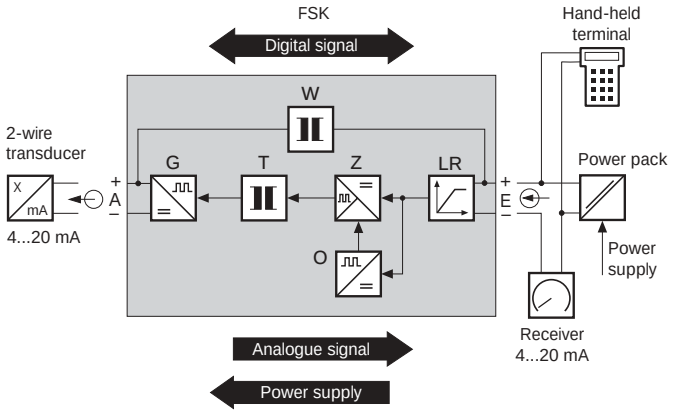


Fig. 3. Block diagram.

The series regulator limits the voltage of the impressed 4…20 mA input signal E to approx. 22 V and the chopper Z converts it to an AC signal. The latter can pass the transformer in the isolating stage and is then rectified again and smoothed to obtain the impressed analogue 4…20 mA output signal.

The chopper is controlled by the oscillator which draws its power supply from the input signal.

The FSK converter in the bypass provides the electrical insulation and transmits the frequency-modulated digital signal which is superimposed on the analogue 4…20 mA signal of the "intelligent" 2-wire transmitter and used to set its parameters and for requesting the transfer of measurements or status data.

While the digital signal is transferred by the SINEAX SI 815 in **both** directions to support a dialogue with the 2-wire transmitter, the analogue signal and the power supply only flow in **one** direction. The analogue signal, however, passes the signal isolator from the transmitter side to the supply/receiver side and the power supply in the opposite direction.

The power supply is provided either by an **active** receiver (display, recorder, limit monitor and/or controller **with** integrated 4…20 mA measurement/**supply** module, PLC, PLS etc.) or a power supply unit in series with a **passive** receiver (see Fig. 3).

[1] *"Input" and "output" in this case refer to the direction of power supply flow.*

Technical Data

Input signal E

(Input circuit between signal isolator and power pack)

DC current signal I_E: 4 … 20 mA

Voltage U_E: 12 … 30 V DC

Overload capacity: ≤ 50 mA continuous

Output signal A

(Input circuit between signal isolator and 2-wire transmitter)

DC current signal I_A: 4 … 20 mA

Voltage U_A (for I_E = 20 mA and U_E = 22 V):

> 19.3 V	with standard (non-Ex) version, not designed for communications protocol
> 18.5 V	with standard (non-Ex) version, designed for FSK communication
> 14.3 V	with Ex versions, not designed for communications protocol
> 13.3 V	with Ex versions, designed for FSK communication

Voltage drop $U_V = U_E - U_A$ (at U_E) 12 … 22 V):

< 2.7 V	with standard (non-Ex) version, not designed for communications protocol
< 3.5 V	with standard (non-Ex) version, designed for FSK communication
< 7.7 V	with Ex versions, not designed for communications protocol
< 8.7 V	with Ex versions, designed for FSK communication

Residual ripple: < 20 mV ss (120 kHz)

Time constant: Approx. 5 ms

Accuracy data

Error: < ± 0,2%
(Reference value 20 mA of output signal, including typical linearity error < ± 0.1%)

Reference conditions

DC current signal I_E: 4 … 20 mA DC

Ambient temperature: 23 °C, ± 1 K

Voltage U_E: 12 … 30 V DC

Additional error

Temperature coefficient: < 50 ppm/K

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Installation data

Mechanical design: Housing N17 or housing S17 Dimensions see section “Dimensional drawings”

Material of housing: Lexan 940 (polycarbonate). Flammability Class V-0 acc. to UL 94, self-extinguishing, non-dripping, free of halogen

Mounting: Snap onto top-hat rail 35×7.5 or 35×15 mm (acc. to EN 50 022) or direct panel mounting with 2 screws and
– adapter (for SI 815-5....)
– pull-out screw hole brackets (for SI 815-1....)

Mounting position: Any

Electrical connections: Screw terminals with wire guards for light PVC wiring and max. 2×0.75 mm² or 1×2.5 mm²

Weight:

approx. 100 g	SI 815-5.... (housing N17)
approx. 170 g	SI 815-1.... (housing S17) with 2 isolation and transmission channels, without FSK communication
approx. 190 g	with FSK communication

Regulations

Test voltage kV, 50 Hz, 1 min.

2.3 kV	SI 815-5.... (housing N17) non-Ex and Ex versions (output signal “intrinsically safe”)	Input versus output
2.3 kV	SI 815-1.... (housing S17) non-Ex and Ex versions (output signals “intrinsically safe”)	Inputs versus outputs Inputs versus inputs Outputs versus outputs

Surge voltage kV, 1.2/50 µs:

4.25 kV	SI 815-5.... (housing N17) non-Ex and Ex versions (output signal “intrinsically safe”)	Input versus output
4.25 kV	SI 815-1.... (housing S17) non-Ex and Ex versions (output signals “intrinsically safe”)	Inputs versus outputs Inputs versus inputs Outputs versus outputs

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 design: Acc. to EN 61 010

Protection (acc. to EN 60 529): Housing IP 40 Terminals IP 20

Rated insulation voltage: 250 V AC

Contamination level: 2

Overvoltage category: II

Ambient conditions

Operating temperature: – 25 to + 55 °C
– 20 to + 55 °C (for the Ex versions: output signal(s) “intrinsically safe”)

Storage temperature: – 40 to + 70 °C

Annual mean relative humidity: ≤ 75% standard climatic rating ≤ 95% improved climatic rating

Seismic test: 5 g, < 200 Hz, 2 h in each of 3 directions

Shock test: 50 g, 10 shocks in each of 3 directions

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Standard versions in housing N17 for rail or wall mounting

The following signal isolator versions are available as standard instruments. It is only necessary to quote the Order No.:

Table 1: Instruments in standard (non-Ex) version (input *and* output signal *non intrinsically safe*)

Description	Field communications protocol	Climatic rating	Order Code	Order No.
Passive DC signal isolator, standard (non-Ex) version, input signal E: 4…20 mA, output signal A: 4…20 mA, with 1 isolation and transmission channel	Without FSK communication	standard	815 - 51100	999 279
	With FSK communication	standard	815 - 51110	999 295

Table 2: Instruments in version [EEx ia] IIC (output signal intrinsically safe)

Description	Field communications protocol	Climatic rating	Order Code	Order No.
Passive DC signal isolator, [EEx ia] IIC, input signal E: 4…20 mA non intrinsically safe, output signal A: 4…20 mA intrinsically safe, with 1 isolation and transmission channel	Without FSK communication	standard	815 - 52100	999 310
	with FSK communication	standard	815 - 52110	999 336

The complete Order Code 815-.... and/or a description should be stated for other versions (see “Table 3: Specification and ordering information”).

Table 3: Specification and ordering information (see also “Table 1 and 1: Standard versions”)

Order Code 815 –			
Features, Selection	*SCODE	no-go	
1. Mechanical design			
1) Housing S17	B		1 . . . . .
5) Housing N17	C		5 . . . . .
2. Version			
1) Standard (non-Ex) Output signal(s) non-intrinsically safe			. 1 . . . . .
2) [EEx ia] IIC, Output signal(s) intrinsically safe			. 2 . . . . .

Table 3 continued on next page!

Order Code 815 –			
Features, Selection	*SCODE	no-go	
3. Number of isolation and transmission channels			
1) 1 channel (interface)		B	1 . . . . .
2) 2 channels (interfaces)		C	2 . . . . .
Line 1: “1 channel” only available for signal isolators in housing Type N17 Line 2: “2 channels” only available for signal isolators in housing Type S17			
4. Field communications protocol			
0) Without FSK communication			. 0 . . . . .
1) With FSK communication, 1 channel		B	. 1 . . . . .
2) With FSK communication, 2 channels		C	. 2 . . . . .
5. 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 4: Data on explosion protection ⟨Ex⟩ II (1) G

Order Code	Type of protection	Electrical data acc. to Certificates Output			Input	Type Examination Certificate	Mounting location
815-521..	[EEx ia] IIC	U_o = 23.1 V I_o = 100 mA P_o = 580 mW linear characteristic			U_m = 253 V AC resp. 125 V DC	PTB 97 ATEX 2111	Outside the hazardous area
815-122..			IIC	IIB		PTB 97 ATEX 2101	
		L_o	4 mH	15 mH			
		C_o	140 nF	1,02 µF			

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Electrical connections

Signal isolator in housing *N17*
with *one* isolation and transmission channel

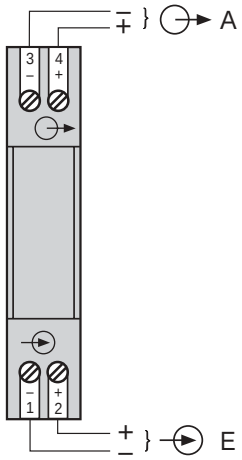


Fig 4. SINEAX SI 815-511..,
Standard (non-Ex) version
and
SINEAX SI 815-521..,
Ex version
(output signal A “intrinsically safe”).

Signal isolator in housing *S17*
with *two* isolation and transmission channels

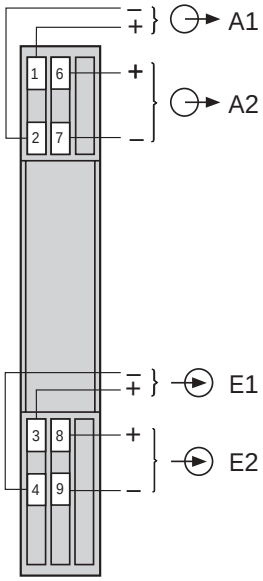


Fig. 5. SINEAX SI 815-112..,
Standard (non-Ex) version
and
SINEAX SI 815-122..,
Ex version
(output signals A1 and A2 “intrinsically safe”).

Dimensional drawings

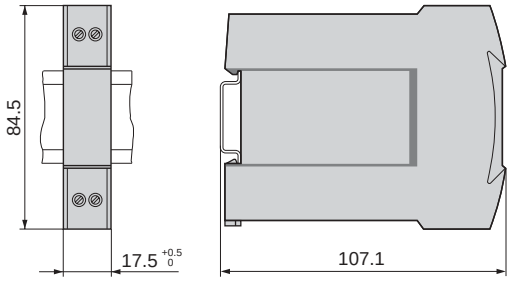


Fig. 6. SINEAX SI 815-5.... (housing N17) clipped onto a top-hat rail (35 × 7.5 or 35 × 15 mm, acc. to EN 50 022).

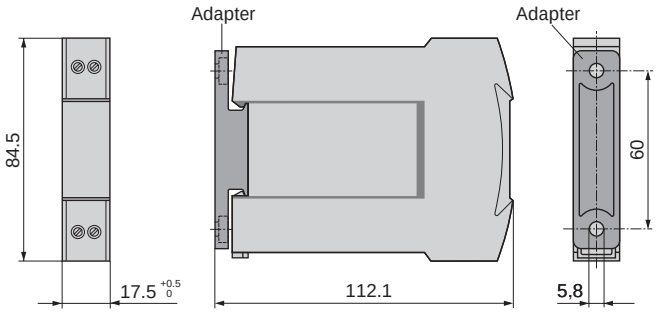


Fig. 7. SINEAX SI 815-5.... (housing N17) with adapter for wall mounting.

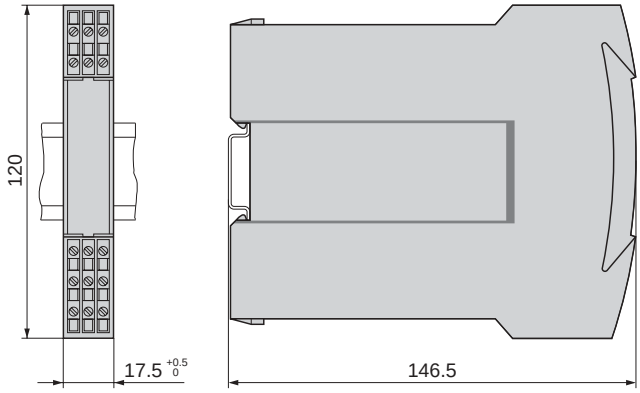


Fig. 8. SINEAX SI 815-1.... (housing S17) clipped onto a top-hat rail (35 × 7.5 or 35 × 15 mm, acc. to EN 50 022).

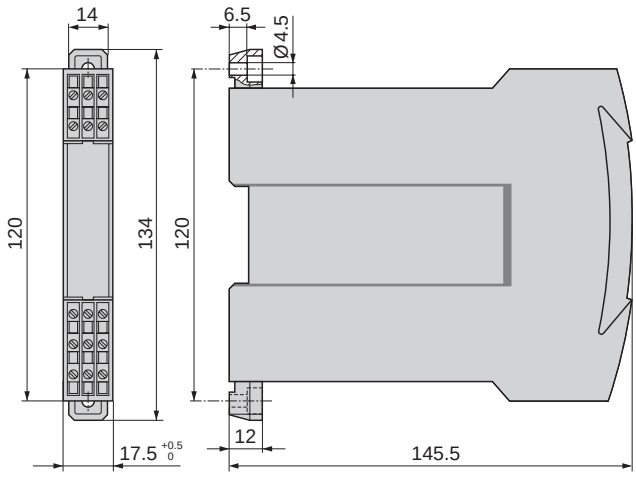


Fig. 9. SINEAX SI 815-1.... (housing S17) screw hole mounting brackets pulled out.

Standard accessories

1 Adapter (for signal isolator SI 815-5...., variants in housing Type N17)

1 Operating Instructions each in German, French and English for SINEAX SI 815-5 in housing Type **N17**

1 Operating Instructions in three languages: German, French and English for SINEAX SI 815-1 in housing Type **S17**

1 Type Examination Certificate (for instruments in type of protection “intrinsically safe” only)

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