SINEAX 2I1
Passive DC Signal Isolator

CAMILLE BAUER

without power supply

CE 0102 Ex II (1) G bzw. II (2) G

Application

The DC signal isolator **SINEAX 2I1** (Fig. 1) serve to isolate **load-independent** DC current signals. It suppressed noise voltages and currents in a signal loop circuit.

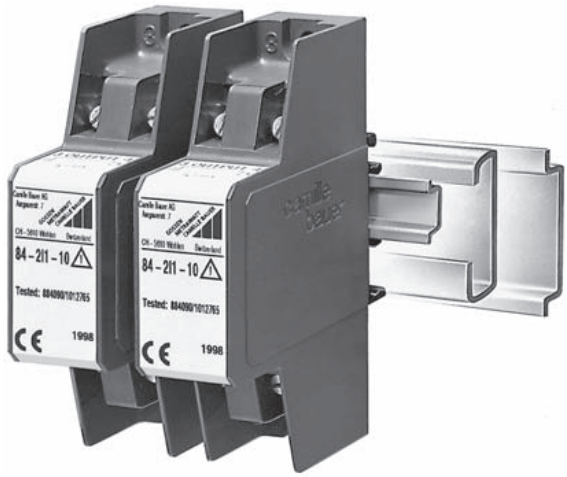

*Fig. 1. SINEAX 2I1 in housing **N** for rail or wall mounting.*

Features / Benefits

- **Electrically insulated between input and output / Prevents the transfer of interference voltages and currents, overcomes signal connection problems**
- **Input signal : Output signal = 1 : 1**
- **No power supply required / No additional wiring and no power supply unit**
- **Immune to transient voltages**
- **Single-channel**
- **Available in type of protection "Intrinsic safety" [EEx ib] IIC** (see "Table 2: Data on explosion protection")

Layout and mode of operation

The DC signal isolator comprises a DC chopper Z, an isolating stage T, a rectifier G and a multivibrator M (see Fig. 2). The DC chopper converts the load independent DC signal into an AC signal. This signal is passed through a ferrite-core transformer serving as an isolating stage. On the secondary side, it is rectified, smoothed and converted into a load-independent DC signal.

The chopper unit is controlled by a specially designed multivibrator which obtains its power from the input signal.

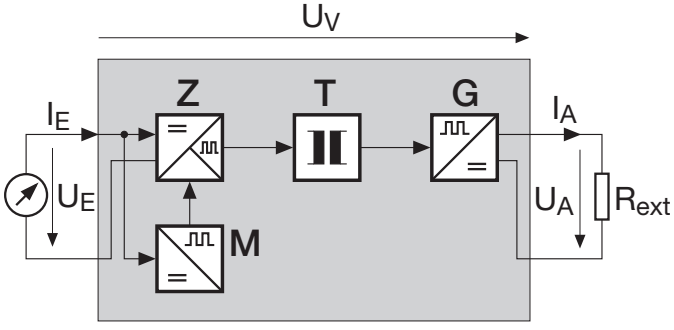

Fig. 2. Schematic diagram.

Technical data

General

MTBF:	Approx. 120 000 h per isolator

Input signal E

Input current (I_E):	Load-independent DC current 0...5 mA to 0...20 mA, 4...20 mA (all ranges are possible with the same type)
Max. input voltage:	$U_E \leq 15$ V (see "Application example, Fig. 10, page 4)
Permissible input ripple:	≤ 10%
Voltage loss U_V across signal isolator:	– non-intrinsically safe version approx. 3 V – intrinsically safe version approx. 6 V
Overload capacity:	≤ 50 mA continuous

Output signal A

Output signal (I_A):	Load-independent DC current
Transformation ratio:	1 : 1
Residual ripple in output current:	≤ 0.5% (7 kHz)
Time constant:	Approx. 100 ms
Output load voltage:	$U_A = U_E - U_V$ (Fig. 2)

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Accuracy data

Reference value:	20 mA
Deviation from specified characteristic under reference conditions:	Max. ± 0.1%
Reference conditions:	
Ambient temperature	23 °C ± 1 K
Input current I_E	0...20 mA
External load R_{ext}	250 Ω
Additional error:	
Dependence on output load	< + 0.1% / 100 Ω if R_{ext} < 250 Ω < – 0.1% / 100 Ω if R_{ext} > 250 Ω
Temperature influence	< 0.1% / 10 K for + 10 ≤ t ≤ + 40 °C < 0.2% / 10 K for – 25 ≤ t ≤ + 10 °C and for + 40 ≤ t ≤ + 55 °C

Installation data

Mechanical design:	Housing type N in plastic for rail or wall mounting. (Dimensions see Section “Dimensional drawings”)
Mounting versions:	For snap mounting on G-type rail or cap-type rail (see Section “Dimensional drawings”)
Mounting position:	Any
Electrical connections:	Screw terminals with indirect wire pressure, suitable for max. 2 × 1.5 mm^2 or 1 × 2.5 mm^2
Weight:	Approx. 100 g

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: 1994
Max. surge voltage:	5 kV, 1.2/50 µs surge withstand test IEC 255.4 and Surge withstand test, as per IEEE-Std. 472-1975. Common-mode and differential-mode between any two terminals
Electrical design:	Acc. to EN 61 010
Protection:	Housing IP 40 acc. to EN 60 529 Terminals IP 20
Test voltage:	4 kV, 50 Hz, 1 min.

Environmental conditions

Operating temperature:	– 25 to + 55 °C for standard version **– 20 to + 40 °C** for Ex versions
Storage temperature:	– 40 to + 70 °C
Relative humidity of annual mean:	≤ 75% standard climatic rating ≤ 90% improved climatic rating

Table 1: Type overview

Description	Type	Article Number
Standard version	84-2I1-10	154 253
Improved climatic rating	84-2I1-10	154 261
Intrinsically safe input	84-2I1-11	154 279
Intrinsically safe output	84-2I1-12	154 287

Table 2: Data on explosion protection ⟨Ex⟩ II (2) G resp. II (1) G

Type	Article Number	Type of protection	Electrical data acc. to Certificates Input	Output	Type examination certificate	Mounting location
84-2I1-11	154 279	[EEx ib] IIC	**L_i = 0** **C_i = 0** for connection to certified intrinsically safe circuit with following maximum values: **U_i = 30 V** **I_i = 100 mA**	U_m = 253 V AC resp. 125 V DC	PTB 98 ATEX 2176	**Outside** the hazardous area
84-2I1-12	154 287	[EEx ia] IIC	U_m = 253 V AC resp. 125 V DC	**U_o = 12,6 V** **I_o = 100 mA** **P_o = 315 mW** lin. characteristic IIC / IIB L_o: 4 mH / 15 mH C_o: 1.15 µF / 7.4 µF		

Electrical connections

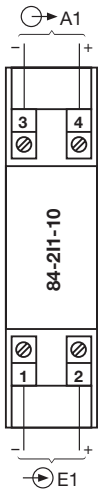
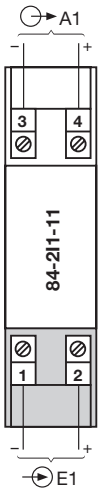


Fig. 3.
Type 84-2I1-10
standard version (non-I.S.).



Terminals 1, 2 blue

Fig. 4.
Type 84-2I1-11
Intrinsically safe input.

Terminals 3, 4 blue

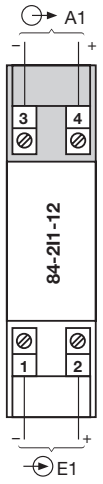


Fig. 5.
Type 84-2I1-12
Intrinsically safe output.

E1 = Input signal
A1 = Output signal

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Dimensional drawings

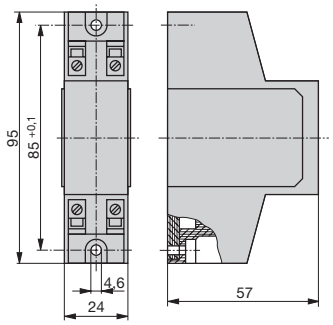


Fig. 6. SINEAX 2I1 for wall mounting.

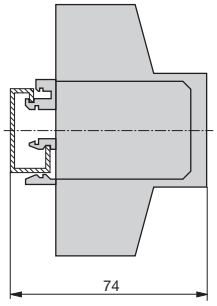


Fig. 7. SINEAX 2I1 for mounting on G-type rail, EN 50 035 – G32.

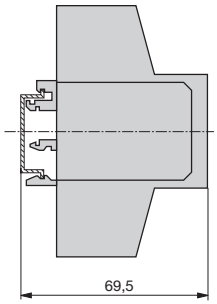


Fig. 8. SINEAX 2I1 for mounting on cap-type rail, EN 50 022-35 × 7.5.

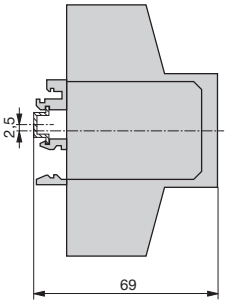
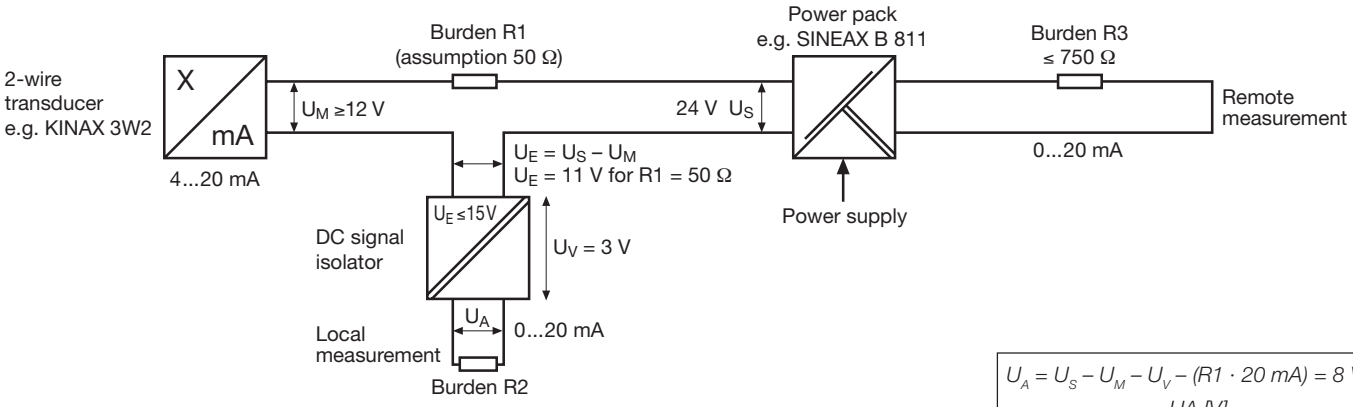


Fig. 9. SINEAX 2I1 for mounting on cap-type rail, EN 50 045-15 × 5,5.

Application example

The output signal generated by the KINAX 3W2 is needed both for local and remote measurement.

Problem:
Is the burden R2 connected across the output signal of the isolating transformer type 84-2I1-10 sufficient for local measurement? If not, then use, for example, SINEAX TV 808.



$U_A = U_S - U_M - U_V - (R1 \cdot 20\ mA) = 8\ V$

$Burden\ R2\ [\Omega] = \frac{UA\ [V]}{0.02\ [A]} = 400\ \Omega$

Fig. 10. Typical circuit with an isolating transformer SINEAX 84-2I1-10, transmitter KINAX 3W2 for angular measurement and a power supply unit SINEAX B 811.

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