SINEAX TI 807
Passive DC signal isolator

CAMILLE BAUER

without power supply,
Ex- and non-Ex version, in housing N17 or S17
for rail and wall mounting

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

Application

The signal isolator **SINEAX TI 807** serves to electrically insulate the analogue DC signal in the range 0…20 mA which depending on version is then converted to a current or voltage signal (0…20 mA or 0…10 V). It operates passively and does not require a separate power supply, but derives the little auxiliary energy it needs from the DC signal.

The series of isolators also includes "intrinsically safe" explosion-proof versions with either an intrinsically safe **input** signal [EEx i**b**] IIC **or** intrinsically safe **output** signal [EEx i**a**] IIC. They are thus suitable for use in connection with intrinsically safe equipment installed in the hazardous area.

The signal isolator is supplied in two different housings depending on the number of transmitter channels to be isolated: SINEAX TI 807-5 with **one** transmitter channel to be isolated in housing Type **N17** (Fig. 1) and SINEAX TI 807-1 with **two** or **three** channels in housing Type **S17** (Fig. 2). Both types of housing are suitable for either rail or wall mounting.



*Fig. 1. SINEAX TI 807-5 with **one** isolation and transmission channel, in housing **N17**, clipped onto a top-hat rail.*



*Fig. 2. SINEAX TI 807-1 with **two** or **three** isolation and transmission channels, in housing **S17**, screw hole mounting brackets pulled out.*

Features / Benefits

- **Electrically insulated analogue DC signals 0…20 mA / Prevents the transfer of interference voltages and currents. Solves grounding problems in meshed signal networks**
- **Highly accurate / Performs its isolating function with negligible transmission error**
- **No power supply needed / Saves wiring costs and is easy to install in existing plants**
- **Available in type of protection "Intrinsic safety" [EEx ib] IIC or [EEx ia] IIC** (see "Table 6: 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**

Layout and mode of operation

The description below refers to SINEAX TI 807-5 with **one** isolation and transmission channel.

The DC signal isolator comprises a DC chopper Z, an isolating stage T, a rectifier G and an oscillator O.

The chopper converts the DC input signal E = 0…20 mA to an AC signal which is transformed with electrical insulation, rectified, smoothed and appears at the output as a DC **current** signal A = 0…20 mA (Fig. 3, left). Versions with a DC output **voltage** signal A = 0…10 V have a resistive burden of 500 Ω through which the current flows (Fig. 3, right).

The chopper is controlled by the oscillator which obtains its power from the DC signal.

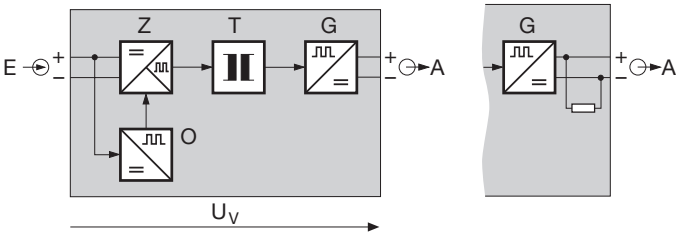


Fig. 3. Block diagram for a function unit.

SINEAX TI 807
Passive DC signal isolator

Technical data

Input signal E

DC current signal I_E: 0…20 mA

Max. permissible current: 50 mA

Voltage limiter: Non-Ex version: 27 V ± 5% (with zener diode)
Ex version: 18 V, ± 5%

Output signal A

(DC current **or** DC voltage)

DC current signal I_A: 0…20 mA

Voltage drop U_V:

< 2.8 V	with standard (non-Ex) version
< 4.7 V	with Ex versions (input signal(s) "intrinsically safe")
< 6.3 V	with Ex versions (output signal(s) "intrinsically safe")

Max. burden:

1000 Ω	with standard (non-Ex) version
500 Ω	with Ex versions (input signal(s) "intrinsically safe")
500 Ω	with Ex versions (output signal(s) "intrinsically safe")

Limit: Approx. 40 mA

Residual ripple: < 20 mV ss

Time constant: Approx. 3 ms

Response time[1] acc. to IEC 770: Approx. 15 ms

DC voltage signal U_A: 0…10 V

Voltage drop U_V:

< 2.8 V	with standard (non-Ex) version
< 4.7 V	with Ex versions (input signal(s) "intrinsically safe")
< 6.3 V	with Ex versions (output signal(s) "intrinsically safe")

Internal resistance: 500 Ω

Limit:

< 26 V	with standard (non-Ex) version
< 16 V	with Ex versions (input signal(s) "intrinsically safe")
< 16 V	with Ex versions (output signal(s) "intrinsically safe")

Residual ripple: < 20 mV ss

Time constant: Approx. 3 ms

Response time[1] acc. to IEC 770: Approx. 15 ms

Accuracy data

Error limits: < ± 0.1%
(Reference value 20 mA of output signal, typical linearity error included)
< ± 0.2%
(Reference value 10 V of output signal, typical linearity error included)

Reference conditions

DC current signal I_E: 0…20 mA

Ambient temperature: 23 °C ± 1 K

Output burden: 250 Ω
(at DC **current** output signal)
≥ 5 MΩ
(at DC **voltage** output signal)

Additional error

Burden influence: < 0.05% / 100 Ω
(at DC **current** output signal)

Temperature coefficient: < 50 ppm/K

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: Snapping onto top-hat rail 35 × 7.5 or 35 × 15 mm (acc. to EN 50 022)
or
directly onto a wall with 2 screws and
– adapter (for TI 807-5....)
– pull-out screw hole brackets (for TI 807-1....)

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

[1] This is the time which transpires before the output signal reaches the error limit of 1% for a step change of the input signal from 0 ⌟⌜ 90%.

Weight:

approx. 100 g	TI 807-5.... (housing N17)
approx. 180 g	TI 807-1.... (housing S17) with 2 isolation and transmission channels
approx. 200 g	TI 807-1.... (housing S17) with 3 isolation and transmission channels

Regulations

Test voltage kV, 50 Hz, 1 min.:

4.0 kV	TI 807-5.... (housing N17) standard (non-Ex) version	Input versus output
2.3 kV	TI 807-5.... (housing N17) Ex versions (input or output signal "intrinsically safe")	
2.3 kV	TI 807-1.... (housing S17) non-Ex **and** Ex versions (input or output signals "intrinsically safe")	Inputs versus outputs Inputs versus inputs Outputs versus outputs

Surge voltage kV, 1.2/50 µs:

5.0 kV	TI 807-5.... (housing N17) Standard (non-Ex) version	Input versus output
4.25 kV	TI 807-5.... (housing N17) Ex versions (input or output signal "intrinsically safe")	
4.25 kV	TI 807-1.... (housing S17) non-Ex **and** Ex-versions (input or output signals "intrinsically safe")	Inputs versus outputs Inputs versus outputs 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 IEC 1010 resp. EN 61 010
Contamination level:	2
Overvoltage category:	II
Protection (acc. to IEC 529 resp. EN 60529):	Housing IP 40 Terminals IP 20

Ambient conditions

Operating temperature:	–25 to + 55 °C **–20** to + 55 °C (for the Ex versions: input or 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:	50 g, 10 shocks in each of 3 directions

Standard version in housing N17 for rail or wall mounting

The following signal isolator versions are available as standard versions. 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	Climatic rating	Output signal	Order Code	**Order No.**
Passive **DC signal isolator**, Standard (non-Ex) version, input signal 0…20 mA, with 1 isolation and transmission channel	standard	0…20 mA	807 – 51100	999 154

SINEAX TI 807
Passive DC signal isolator

Table 2: Instruments in [EEx ib] IIC version (input signal intrinsically safe)

Description	Climatic rating	Output signal	Order Code	**Order No.**
Passive **DC signal isolator**, [EEx ib] IIC, input signal intrinsically safe 0…20 mA, output signal non intrinsically safe, with 1 isolation and transmission channel	standard	0…20 mA	807 – 52100	999 196

Table 3: Instruments in [EEx ia] IIC version (output signal intrinsically safe)

Description	Climatic rating	Output signal	Order Code	**Order No.**
Passive **DC signal isolator**, [EEx ia] IIC, input signal non intrinsically safe 0…20 mA, output signal intrinsically safe, with 1 isolation and transmission channel	standard	0…20 mA	807 – 56100	999 170

Standard versions in housing S17 for rail and wall mounting

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

Table 4: Instruments in standard (non-Ex) version (input *and* output signal *non intrinsically safe*)

Description	Number of channels	Output signal	Order Code	**Order No.**
Passive **DC signal isolator**, standard (non-Ex) version, input signal 0…20 mA, standard climatic rating	2 channels	0…20 mA	807 – 11200	995 061
	3 channels	0…20 mA	807 – 11300	996 936

The complete Order Code 807-.... and/or a description should be stated for other versions (see "Table 5: Specification and ordering information").

Table 5: Specification and ordering information (see also "Tables 1 to 4: Standard versions")

Order Code **807 –**			
Features, Selection	*SCODE	no-go	
1. Mechanical design			
1) Housing S17	B		1 . . . . .
5) Housing N17	C		5 . . . . .
2. Version			
1) Standard (non-Ex), input **and** output signal(s) **non intrinsically safe**			. 1 . . . . .
2) [EEx ib] IIC, input signal(s) **intrinsically safe**			. 2 . . . . .
6) [EEx ia] IIC, output signal(s) **intrinsically safe**			. 6 . . . . .

Order Code **807 –**			
Features, Selection	*SCODE	no-go	
3. Number of isolation and transmission channels			
1) 1 channel (interface)		B	1 . . . . .
2) 2 channels (interfaces)		C	2 . . . . .
3) 3 channels (interfaces)		C	3 . . . . .
Line 1: "1 channel" **only** available for signal isolators in the housing type **N17**. Lines 2 and 3: "1 and 3 channels" **only** available for signal isolators in the housing type **S17**.			
4. Output signal(s) A or A1 and A2 or A1, A2 and A3			
0) 0 … 20 mA			. 0 . . . . .
1) 0 … 10 V, 1 channel		B	. 1 . . . . .
2) 0 … 10 V, 2 channels		C	. 2 . . . . .
3) 0 … 10 V, 3 channels		C	. 3 . . . . .
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 6: Data on explosion protection ⟨Ex⟩ II (2) G resp. II (1) G

Order Code	Type of protection	Electrical data acc. to Certificates Input	Output	Type Examination Certificate	Mounting location
807-52...	[EEx ib] IIC	**L_i = 24 µH** **C_i = 0** for connection to certified intrinsically safe circuit with the following maximum values: **U_i = 33 V** **I_i = 150 mA**	U_m = 253 V AC resp. 125 V DC	PTB 97 ATEX 2112	**Outside** the hazardous area
807-56...	[EEx ia] IIC	U_m = 253 V AC resp. 125 V DC	**U_o = 15.75 V** **I_o = 100 mA** **P_o = 400 mW** linear characteristic IIC: L_o 4 mH, C_o 478 nF IIB: L_o 15 mH, C_o 2.88 µF		

Continuation of Table 6 see on next page!

SINEAX TI 807
Passive DC signal isolator

Table 6: Data on explosion protection (Continuation)

Order Code	Type of protection	Electrical data acc. to Certificates Input	Output	Type Examination Certificate	Mounting location
807-12...	[EEx ib] IIC	**L_i = 24 µH** **C_i = 0** for connection to certified intrinsically safe circuit with the following maximum values: **U_i = 33 V** **I_i = 150 mA**	U_m = 253 V AC resp. 125 V DC	PTB 97 ATEX 2102	**Outside** the hazardous area
807-16...	[EEx ia] IIC	U_m = 253 V AC resp. 125 V DC	**U_o = 15.75 V** **I_o = 100 mA** **P_o = 400 mW** linear characteristic IIC: L_o 4 mH, C_o 478 nF IIB: L_o 15 mH, C_o 2.88 µF		

Electrical connections

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

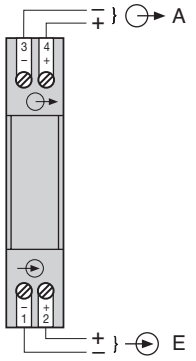


Fig. 4.
SINEAX TI 807-511..,
standard (non-Ex) version
and
SINEAX TI 807-561..,
Ex versions
(output signal A "intrinsically safe")

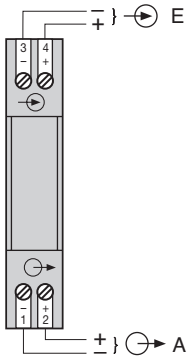


Fig. 5.
SINEAX TI 807-521..,
Ex version
(input signal E "intrinsically safe")

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

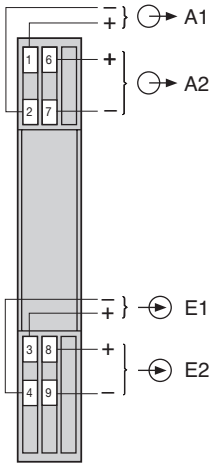


Fig. 6.
SINEAX TI 807-112..,
standard (non-Ex) version
and
SINEAX TI 807-162..,
Ex versions
(output signals A1 and A2
"intrinsically safe")

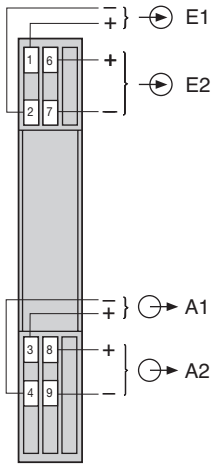


Fig. 7.
SINEAX TI 807-122..,
Ex version
(input signals E1 and E2
"intrinsically safe")

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

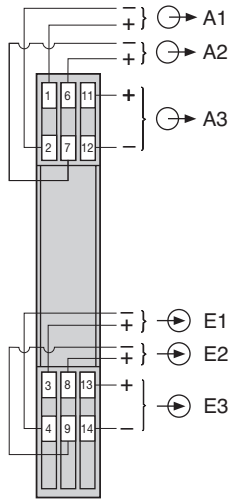


Fig. 8.
SINEAX TI 807-113..,
standard (non-Ex) version
and
SINEAX TI 807-163..,
Ex version
(output signals A1, A2 and A3
"intrinsically safe")

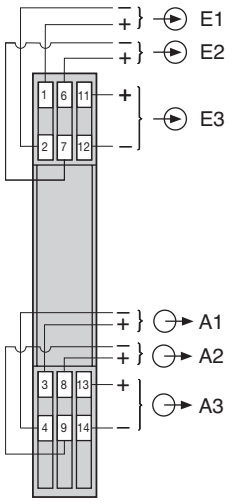


Fig. 9.
SINEAX TI 807-123..,
Ex version
(input signals E1, E2 and E3
"intrinsically safe")

Dimensional drawings

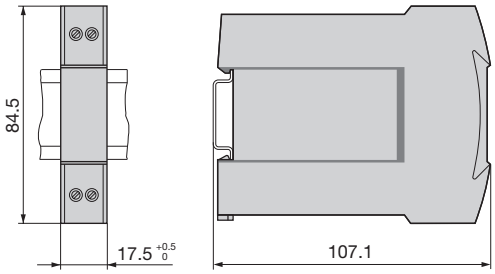


*Fig. 10. SINEAX TI 807-5.... (housing **N17**) clipped onto a top-hat rail (35 × 7.5 or 35 × 15 mm, acc. to EN 50 022).*

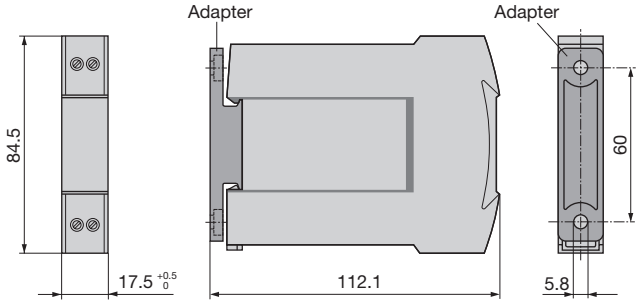


*Fig. 11. SINEAX TI 807-5.... (housing **N17**) with adapter for directly wall mounting.*

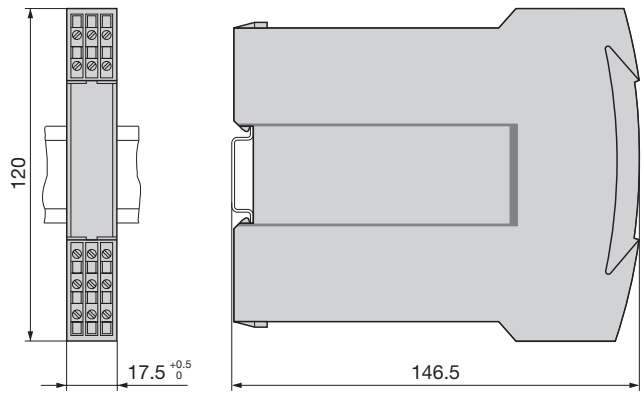


*Fig. 12. SINEAX TI 807-1.... (housing **S17**) clipped onto a top-hat rail (35 × 7.5 or 35 × 15 mm, acc. to EN 50 022).*

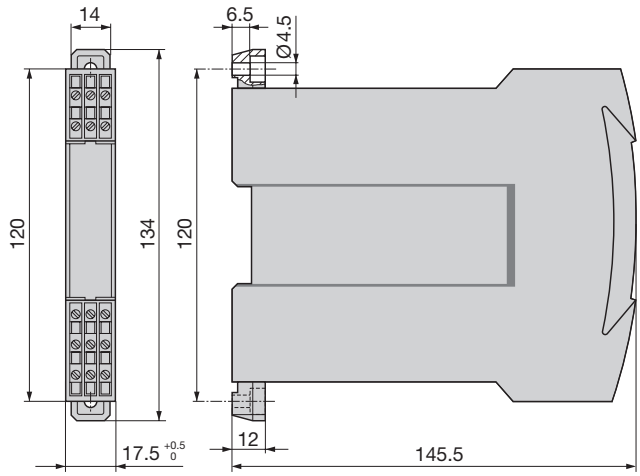


*Fig. 13. SINEAX TI 807-1.... (housing **S17**) screw hole mounting brackets pulled out.*

SINEAX TI 807
Passive DC signal isolator

Standard accessories

1 Adapter (for signal isolators TI 807-5...., variants in housing type **N17** only)

1 Operating Instructions each in German, French and English for SINEAX TI 807-5 in housing type **N17**

1 Operating Instructions in three languages: German, French and English for SINEAX TI 807-1 in housing type **S17**

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

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