PASSIVE DC SIGNAL ISOLATOR WITHOUT POWER SUPPLY

SINEAX 2I1
EURAX 2I1

DC signal isolators (Figs. 1 and 2) serve to isolate load-independent DC current signals.

Features / Benefits

- **Transformation ratio 1 : 1**
- **Self-powered**
- **Overcomes signal connection problems**
- **Prevents transmission of interfering voltages and currents**
- **Immune to transient voltages**
- **High RF noise rejection capability (used as a computer input filter)**
- **Up to 4 DC isolators on a single plug-in module**
- **Input or output in IS-version, type of protection intrinsic safety EEx ib IIC**

Layout and mode of operation

The DC signal isolator comprises a DC chopper Z, an isolating stage T, a rectifier R and a multivibrator M (see Fig. 3). 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.

Depending on type no., 1, 2 or 4 independent isolators can be mounted on one plug-in module.

Technical data

General

MTBF:	Approx. 120 000 h per isolator

Input

Input current (I_I):	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:	$V_I \leq 15$ V
Permissible input ripple:	≤ 10%
Voltage loss V_L across isolation transformer:	– non-intrinsically safe version approx. 3 V – intrinsically safe version approx. 6 V
Overload capacity:	≤ 50 mA continuous

Output

Output signal (I_O):	Load-independent DC current
Transformation ratio:	1 : 1

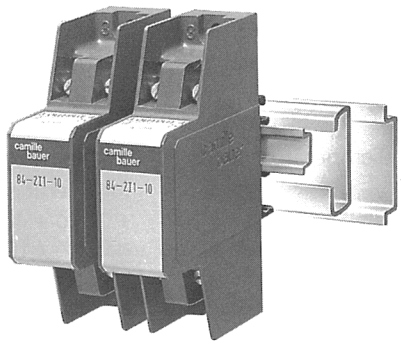

Fig. 1. SINEAX 2I1, for rail mounting.

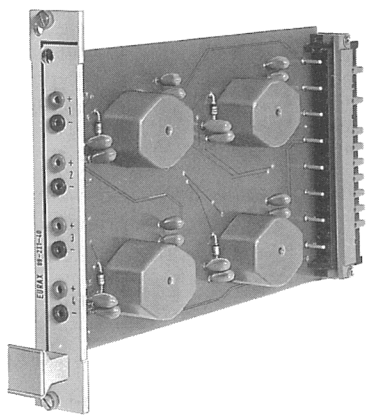

Fig. 2. EURAX 2I1 with the special feature "test sockets", front plate width 4 TE.

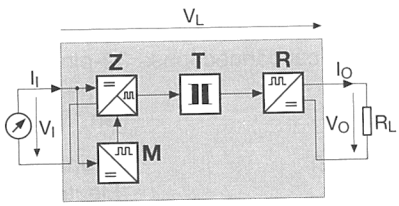

Fig. 3. Schematic diagram.

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Residual ripple in output current:	≤ 0.5% (7 kHz)
Time constant:	Approx. 100 ms
Output load voltage:	$V_O = V_I - V_L$ (Fig. 3)

Accuracy

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_I	0...20 mA
External load R_L	250 Ω
Additional error:	
Dependence on output load	< + 0.1% / 100 Ω if R_L < 250 Ω < – 0.1% / 100 Ω if R_L > 250 Ω
Temperature error	< 0.1% / 10 K for operating range within + 10 to + 40 °C < 0.2% / 10 K for operating range outside the above limits but between – 25 to + 55 °C

Installation data for surface mounted housing

Mechanical design:	Type N of plastic for rail or wall mounting. Dimensions see section "Dimensional diagrams")
Mounting version:	For snap mounting on G-type rail or cap type rail (see section "Dimensional diagrams")
Mounting position:	Any
Electrical connections:	Screw terminals with indirect wire pressure, suitable for max. 2 × 1.5 mm² or 1 × 2.5 mm²
Weight:	Approx. 100 g

Installation data for plug-in module

Type:	Plug-in range module in Euro-PCB format 100 × 160 mm (see section "Dimensional diagrams")
Space needed:	Front plate width 4 TE (20.02 mm)
Front plate colour:	Grey RAL 7032
Mounting position:	Any
Electrical connections:	32-pin connector as per DIN 41 612, forme F. Contact fitting acc. to section "Electrical connections"
Coding:	Coding pins broken out (see section "Electrical connections")
Weight:	Type 89-2I1-10/-11/-12 approx. 120 g Type 89-2I1-20/-21/-22 approx. 150 g Type 89-2I1-40 approx. 210 g

Regulations

Max. surge voltage:	5 kV, 1.2/50 µs surge withstand test IEC 255.4 as per IEEE-Std. 472-1975 Common-mode and differential-mode between any two terminals
Electrical design:	Acc. to IEC 348
Protection:	Housing IP 40 acc. to IEC 529 Terminals IP 20 Plug-in module IP 00 acc. to IEC 529
Test voltage:	Housing 4 kV, 50 Hz, 1 min. Plug-in module (1) 2 kV, 50 Hz, 1 min. all current circuits against each other. Output 1 against jumper "module unplugged" 1.5 kV
Radio interference voltage acc. to VDE 0875:	Interference level N

Environmental conditions

Climatic rating (4) :	Climatic class 3Z acc. to VDI/VDE 3540, but temperature continuously – 25 °C to + 55 °C. Annual mean relative humidity ≤ 75% (application class HVE as per DIN 40 040) **Ex – 20 °C to + 40 °C**
Storage temperature range:	– 40 °C to + 70 °C

(1) and (4) see section «Special features»

Type overview

Types	Mechanical design	No. of isolators	Available versions
84 – 2I1 – 10	Housing type N	1	Standard version (non-I.S.)
84 – 2I1 – 11		1	Intrinsically safe input
84 – 2I1 – 12		1	Intrinsically safe output
89 – 2I1 – 10	Plug-in module	1	Standard version (non-I.S.)
89 – 2I1 – 11		1	Intrinsically safe input 1
89 – 2I1 – 12		1	Intrinsically safe output 1
89 – 2I1 – 20		2	Standard version (non-I.S.)
89 – 2I1 – 21		2	Intrinsically safe input 1 and 2
89 – 2I1 – 22		2	Intrinsically safe output 1 and 2
89 – 2I1 – 40		4	Standard version (non-I.S.)

Coding of the variants

Order Code **880 –**				
Features, Selection		*SCODE	no-go	
1. Mechanical design				
2) EURAX plug-in module for 19″ (Type 89-2I1)		A		2 . . . . .
5) SINEAX housing N (Type 84-2I1)		B		5 . . . . .
2. Version				
1) Standard version		C		. 1 . . . . .
2) IS-version CENELEC [EEx ib] IIC		D		. 2 . . . . .
3) IS-version SEV [EEx ib] IIC		D		. 3 . . . . .
4) Version FM AIS/I/1/ABCD		D	A	. 4 . . . . .
3. Number of isolation circuits				
1) 1 DC signal isolator	2I1 – 1	E		. . 1 . . . . .
2) 2 DC signal isolators (for EURAX only)	2I1 – 2	F	B	. . 2 . . . . .
3) 4 DC signal isolators (for EURAX only)	2I1 – 4	G	BD	. . 3 . . . . .
4. Input / output variants				
1) Input and output standard			D	. . . 1 . . . .
2) Input 1 intrinsically safe			CFG	. . . 2 . . . .
3) Input 1 and 2 intrinsically safe (for EURAX only)			BCEG	. . . 3 . . . .
4) Output 1 intrinsically safe			CFG	. . . 4 . . . .
5) Output 1 and 2 intrinsically safe (for EURAX only)			BCEG	. . . 5 . . . .
5. Special features				
0) No special features: Order No. complete		Y		. . . . 0 . . .
1) Special feature: The features to be omitted must be marked hereafter with / (slant line) in the order No. until reaching the required feature				. . . . 1 . . .
6. Increased test voltage (EURAX)				
A) Test voltage 4 kV, 50 Hz, 1 min. (Restriction see ①)			BY	. . . . . A . .

① see section “Special features”

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Order Code **880 –**			
Features, Selection	*SCODE	no-go	
7. Test sockets (EURAX) ②			
Test voltage: Sockets versus front plate 2 kV!			
A) With test sockets for 1 output, 1 pair		BFGY	A . . . . .
B) With test sockets for 2 outputs, 2 pairs		BEGY	B . . . . .
C) With test sockets for 4 outputs, 4 pairs		BEFY	C . . . . .
Ex versions only for short term connection of a passive measuring instrument. Voltage drop over mA-meter ≤ 300 mV			
8. Safety current loop «module withdrawn» (EURAX) ③			
A) With bridge on transducer PCB and 2 additional contacts on connector (not possible for Ex version)		BDY	. A . . . . .
9. Climatic rating ④			
A) Improved climatic rating, Cl. 3Z (HVR, DIN 40 040)		Y	. . A . . . .

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

② to ④ see section "Special features"

Data on explosion protection

Certificates		**EN 50 014 / 50 020 CENELEC PTB-VDE 0171/5.78** (Ex)	**SEV (Switzerland)** (+S)	**USA** FM APPROVED
SINEAX 84 – 2I1	Type of protection Marking	Type of protection "Intrinsic safety" [EEx ib] IIC	Type of protection (+S) "Intrinsic safety" [EEx ib] IIC	ASSOCIATED APPARATUS IS (Entity) per mfg dwg FM 894312 Class I, Div.1 GRPS ABCD HAZ. LOC.
	Certificate designations	Certificate of conformity PTB Nr. Ex-81/2196	Admission Nr. 93,5 51069,01	File No. J.I. 2N8A1.AX
	Mounting location	**Outside the hazardous area.** The input circuit or the output circuit may be led into zone 1.		**Outside the hazardous area.** CLASS I, DIVISION 1
	Input circuit (for type 84-2I1-11)	Type of protection "Intrinsic safety" EEx ib IIC for connection to certified intrinsically safe circuits with following maximum values: U ≤ 26 V I ≤ 100 mA L_i and C_i are negligible	Type of protection "Intrinsic safety" EEx ib IIC Max. values ≤ 26 V ≤ 100 mA L_i and C_i are negligible	V_{max} = 18.9 V I_{max} = 0 mA L_a = 1000 mH C_a = 360 nF
	Output circuit (for type 84-2I1-12)	Type of protection "Intrinsic safety" EEx ib IIC Max. values U ≤ 12.6 V I ≤ 100 mA P ≤ 0.3 W L_a = 3 mH C_a = 800 nF		V_{max} = 12.6 V I_{max} = 124 mA L_a = 2.3 mH C_a = 700 nF
	Note	The input circuit is electrically isolated from the output circuit up to 375 V.		Connection acc. to drawing FM 894 312

Certificates		EN 50 014 / 50 020 CENELEC PTB-VDE 0171/5.78 (Ex)	SEV (Switzerland) (S)
EURAX 89 – 2I1	Type of protection Marking	Type of protection "Intrinsic safety" [EEx ib] IIC	Type of protection (S) "Intrinsic safety" [EEx ib] IIC
	Certificate designations	Certificate of conformity PTB Nr. Ex-81/2131 X	Admission Nr. 93,5 51069,02
	Mounting location	**Outside the hazardous area.** The input circuit or the output circuit may be led into zone 1.	
	Input circuit (for types 89-2I1-11 and 89-2I1-21)	Type of protection "Intrinsic safety" EEx ib IIC for connection to certified intrinsically safe circuits with following maximum values: U ≤ 26 V I ≤ 100 mA L_i and C_i are negligible	Type of protection "Intrinsic safety" EEx ib IIC Max. values ≤ 26 V ≤ 100 mA L_i and C_i are negligible
	Output current (for types 89-2I1-12 and 89-2I1-22)	Type of protection "Intrinsic safety" EEx ib IIC Max. values U ≤ 12.6 V I ≤ 100 mA L_a = 3 mH C_a = 800 nF P ≤ 0.3 W	Type of protection "Intrinsic safety" EEx ib IIC Max. values U ≤ 12.6 V I ≤ 100 mA P < 0.3 W L_a 3 mH C_a 800 nF
	Note	The input circuit is electrically isolated from the output circuit up to 375 V. The instruments must be installed in such a way that at least protection class IP 20 acc. to IEC publication 144 is attained.	The input circuit is electrically isolated from the output circuit up to 375 V. The instruments must be installed in such a way that at least protection class IP 20 acc. to IEC publication 529 is attained.

Special features

Nature of special features
Test voltage (EURAX)
① 4 kV, 50 Hz, 1 min. Limitations: Output 1 against jumper "module withdrawn": 1.5 kV Chassis against jumper "module withdrawn": 2.5 kV Version with test sockets: Test sockets versus front plate 2.0 kV
Test sockets (EURAX)
② Fitted on front plate (Voltage drop over milliammeter ≤ 300 mV) EEx version only for short term connection of a passive measuring instrument

Nature of special features
Safety current loop "module withdrawn" (EURAX) (Not possible for Ex versions)
③ With bridge on transducer PCB and 2 additional contacts on connector Limitation: Output 1 against jumper "module withdrawn": 1.5 kV
Climatic rating
④ Climate class 3Z acc. to VDI/VDE 3540, but temperature continuously – 25 °C to +55 °C, **Ex – 20 °C to + 40 °C.** Annual mean relative humidity ≤ 90% (Application class HVR acc. to DIN 40 040)

Electrical connections

SINEAX 2I1 in surface mounted housing

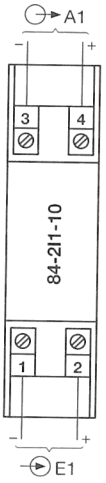
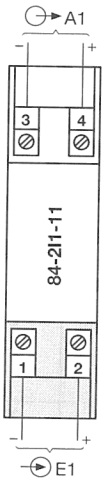


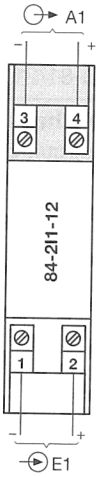
Fig. 4.
Type 84-2I1-10
standard version (non-I.S.)



Terminals 1, 2 blue

Fig. 5.
Type 84-2I1-11
Intrinsically safe input.

Terminals 3, 4 blue



E1 = Input signal
A1 = Output signal

Fig. 6.
Type 84-2I1-12
Intrinsically safe output.

EURAX 2I1 as plug-in module (showing rear of module)

Standard version (non-I.S.)

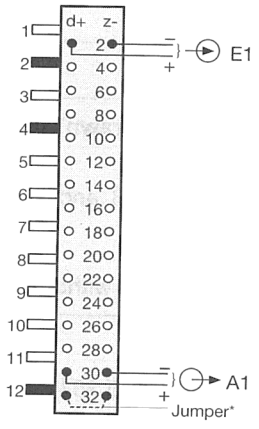


Fig. 7.
Type 89-2I1-10.

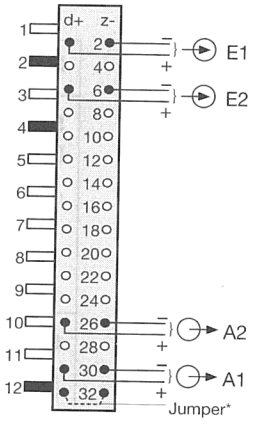


Fig. 8.
Type 89-2I1-20.

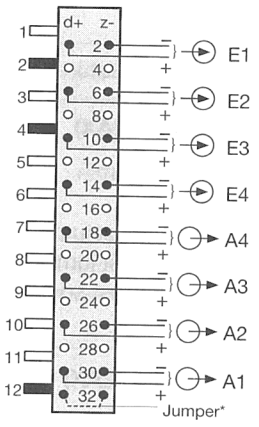


Fig. 9.
Type 89-2I1-40.

Version with intrinsically safe inputs

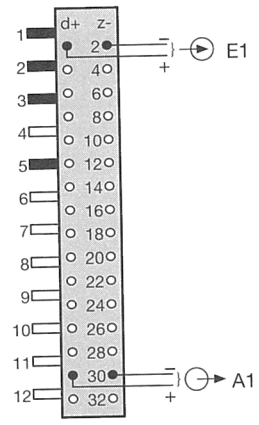


Fig. 10.
Type 89-2I1-11.

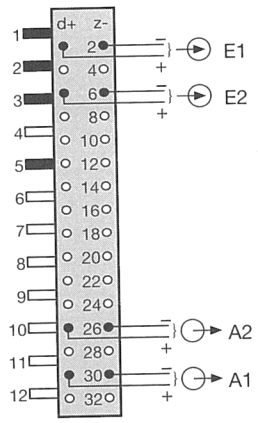


Fig. 11.
Type 89-2I1-21.

E1...E4 = Input signal
A1...A4 = Output signal

* A safety circuit may be looped via the jumper, for signalling "module withdrawn" or "module not plugged in properly".

See "Special feature (3) "

Version with intrinsically safe outputs

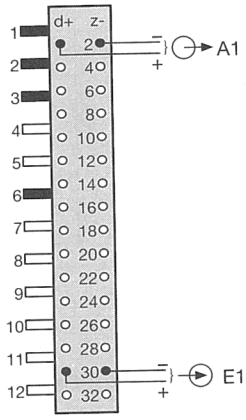


Fig. 12.
Type 89-2I1-12.

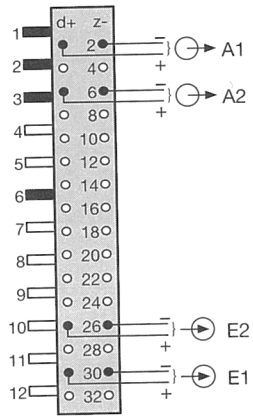


Fig. 13.
Type 89-2I1-22.

= Coding pin
= Coding pin broken out
= Contact fitted
= No contact

Dimensional diagrams

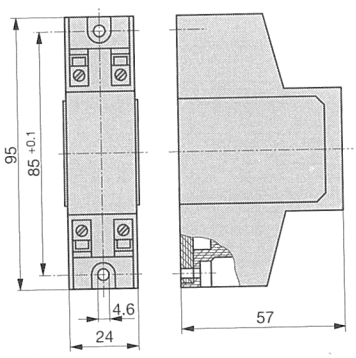


Fig. 14. SINEAX 2I1
for wall mounting.

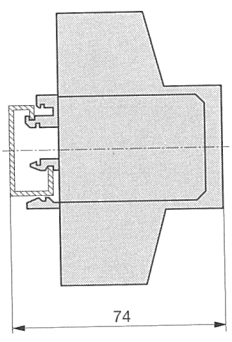


Fig. 15. SINEAX 2I1
for mounting on
G-type rail,
EN 50 035 – G32.

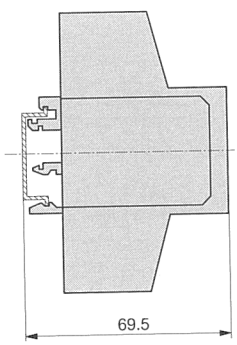


Fig. 16. SINEAX 2I1
for mounting on
cap type rail,
EN 50 022-35 × 7.5.

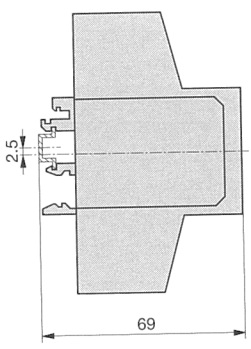


Fig. 17. SINEAX 2I1
for mounting on
cap type rail,
EN 50 045-15 × 5.5.

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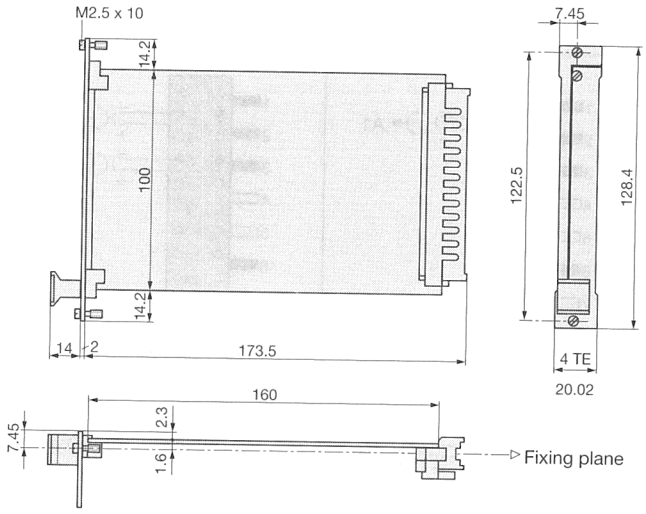

Fig. 18. EURAX 2I1, front plate width 4 TE.