

SINEAX / EURAX 211

Passive DC signal isolator

without power supply

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

Application

The DC signal isolator **SINEAX/EURAX 211** (Figs. 1 and 2) serve to isolate **load-independent** DC current signals. It suppressed noise voltages and currents in a signal loop circuit.

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
- Up to 4 DC signal isolators on a single plug-in module
- Available in type of protection "Intrinsic safety" [Ex ib] IIC (see "Table 4: Data on explosion protection")



Fig. 1. SINEAX 211 in housing **N** for rail or wall mounting.

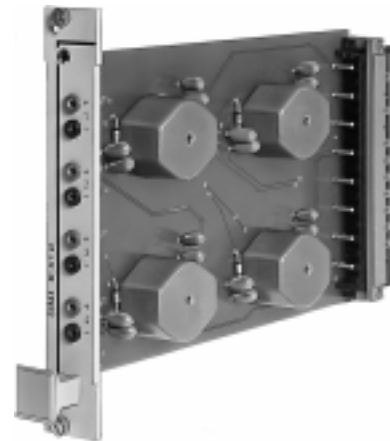


Fig. 2. EURAX 211 with the special feature "Test sockets", front plate width **4 TE**.

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.

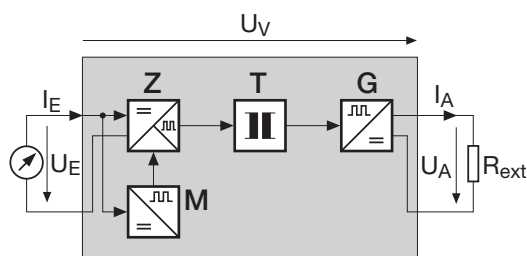


Fig. 3. Schematic diagram.

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. 19, page 8)

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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. 3)

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 $R_{ext} < 250 \Omega$ < - 0.1% / 100 Ω if $R_{ext} > 250 \Omega$
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 for surface mounted housing

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

Installation data for plug-in module

Type:	Plug-in range module in Euro-PCB format, 100 × 160 mm (see Section "Dimensional drawings")
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Space needed:	Front plate width 4 TE (20.02 mm)
Front plate colour:	Grey RAL 7032
Designation:	EURAX 2I1
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 89-211-10/-11/-12 approx. 120 g Type 89-211-20/-21/-22 approx. 150 g Type 89-211-40 approx. 210 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 Plug-in module IP 00 acc. to EN 60 529
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

Environmental conditions

Climatic rating:	Climatic class 3Z acc. to VDI/VDE 3540
Operating temperature:	- 25 to + 55 °C for standard version SINEAX - 20 to + 40 °C, EURAX - 20 to + 55 °C for Ex versions
Storage temperature:	- 40 to + 70 °C
Relative humidity of annual mean ^④ :	≤ 75% standard climatic rating

^① and ^④ see Section "Special features"

Table 1: 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.)

Table 2: Specification and ordering informations

Order Code 880 –							
Features, Selection		*SCODE	no-go				
1. Mechanical design							
2) Plug-in module (EURAX) for 19" rack-mounted case				2			
5) Housing type N (SINEAX) *		B		5			
2. Version							
1) Standard, non intrinsically safe		C		. 1			
2) [Ex ib] IIC, intrinsically safe		D		. 2			
3. Number of isolation circuits							
1) 1 DC signal isolator		E		. . 1			
2) 2 DC signal isolators		F	B	. . 2			
3) 4 DC signal isolators		G	BD	. . 3			
Line 2 and 3: For EURAX only							
Line 3: With Ex-version not possible							
4. Input / output variants E and A							
1) E1...E4 standard, A1...A4 standard			D	. . . 1			
2) E1 intrinsically safe , A1 standard			CFG	. . . 2			
3) E1 + E2 intrinsically safe , A1 + A2 standard			BCEG	. . . 3			
4) E1 standard, A1 intrinsically safe			CFG	. . . 4			
5) E1 + E2 standard, A1 + A2 intrinsically safe			BCEG	. . . 5			

* Where signal isolators are required for wall mouting, attention must be drawn to the fact when ordering and a corresponding base plate will be fitted.

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Order Code 880 –									
Features, Selection		*SCODE		no-go					
5. Special features									
0) Without		Y							0
1) With									1
Without special features (line 0): Order code complete. With special feature (line 1): The features to be omitted must be marked hereafter with / (slant line) in the order code until reaching the required feature									
6. Increased test voltage (EURAX) ①									
A) Input signals against output signals and against front plate 4 kV, 50 Hz, 1 min. instead of 2 kV, 50 Hz, 1 min.				BY					. A
7. Test sockets (EURAX) ②									
A) With (1 pair) for A1				BFGY					. . A
B) With (2 pairs) for A1, A2				BEGY					. . B
C) With (4 pairs) for A1, A2, A3, A4				BEFY					. . C
Voltage drop over field indicator resp. mA-meter ≤ 300 mV Ex versions only for short term connection of a passive measuring instrument. Attention! Test voltage: Sockets versus front plate only 2 kV									
8. Safety current loop (EURAX) ③									
A) "Module withdrawn" with jumper on transducer PCB and 2 additional contacts on connector				BDY					. . . A
9. Improved climatic rating ④									
A) Annual mean relative humidity ≤ 90% instead of ≤ 75%				Y				 A

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

① to ④ see Table 3 "Special features"

Table 3: Special features

<p>Nature of special features</p> <p>Test voltage (EURAX)</p> <p>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</p> <p>Test sockets (EURAX)</p> <p>② Fitted on front plate (voltage drop over milliammeter ≤ 300 mV) Ex version only for short term connection of a passive measuring instrument</p>	<p>Nature of special features</p> <p>Safety current loop "module withdrawn" (EURAX) (not possible for Ex version)</p> <p>③ With jumper on transducer PCB and 2 additional contacts on connector Limitation: Output 1 against jumper "module withdrawn": 1.5 kV</p> <p>Improved climatic rating</p> <p>④ Annual mean relative humidity ≤ 90% instead of ≤ 75%</p>
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Table 4: Data on explosion protection Ex II (2) G resp. II (1) G

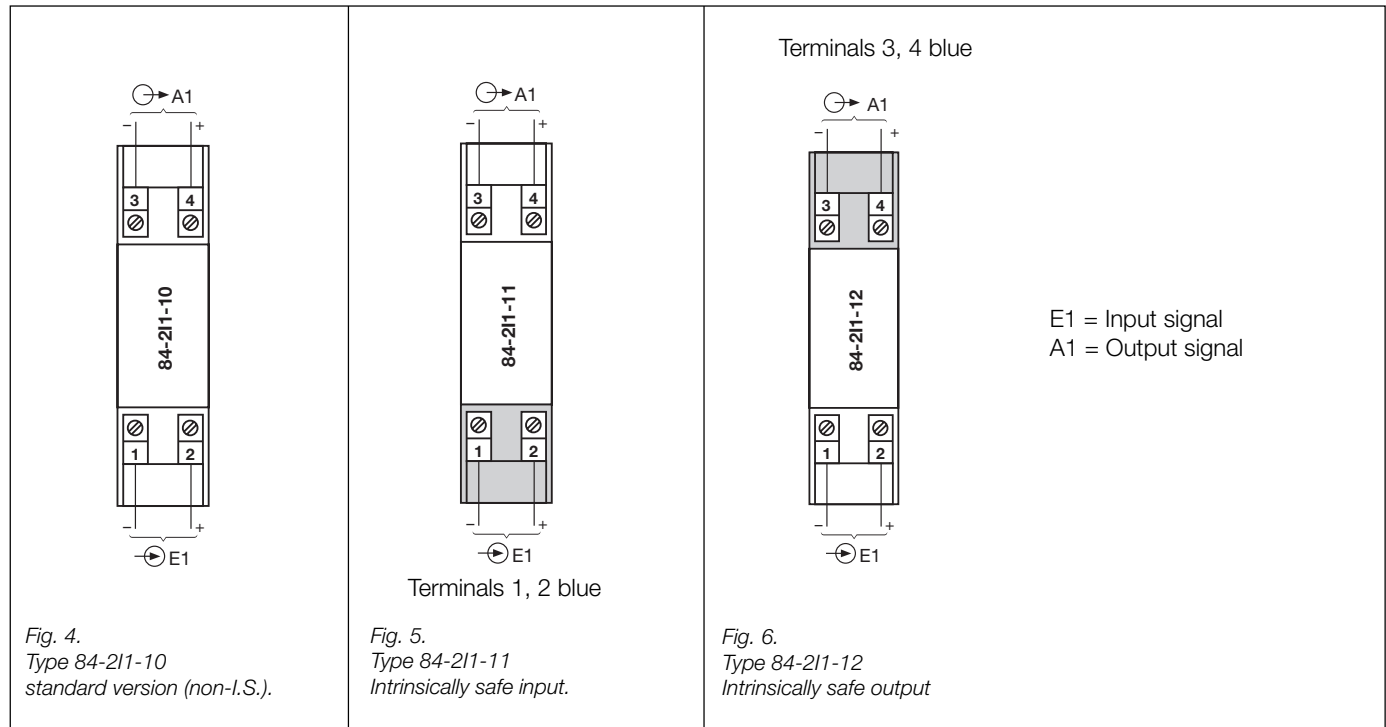
Order Code		Type of protection	Electrical data acc. to Certificates Input	Output	Type examination certificate	Mounting location									
SINEAX	84-211-11	[EEx ib] IIC	$L_i = 0$ $C_i = 0$ for connection to certified intrinsically safe circuit with following maximum values: $U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$	$U_m = 253 \text{ V AC}$ resp. 125 V DC	PTB 98 ATEX 2176	Outside the hazardous area									
	84-211-12	[EEx ia] IIC	$U_m = 253 \text{ V AC}$ resp. 125 V DC	$U_o = 12.6 \text{ V}$ $I_o = 100 \text{ mA}$ $P_o = 315 \text{ mW}$ lin. characteristic											
				<table border="1"> <thead> <tr> <th></th> <th>IIC</th> <th>IIB</th> </tr> </thead> <tbody> <tr> <td>L_o</td> <td>4 mH</td> <td>15 mH</td> </tr> <tr> <td>C_o</td> <td>1.15 μF</td> <td>7.4 μF</td> </tr> </tbody> </table>				IIC	IIB	L_o	4 mH	15 mH	C_o	1.15 μF	7.4 μF
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EUPAX	89-211-11/21	[EEx ib] IIC	$L_i = 0$ $C_i = 0$ for connection to certified intrinsically safe circuit with following maximum values: $U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$	$U_m = 253 \text{ V AC}$ resp. 125 V DC	PTB 98 ATEX 2177 X	Outside the hazardous area									
	89-211-12/22	[EEx ia] IIC	$U_m = 253 \text{ V AC}$ resp. 125 V DC	$U_o = 12.6 \text{ V}$ $I_o = 100 \text{ mA}$ $P_o = 315 \text{ mW}$ lin. characteristic											
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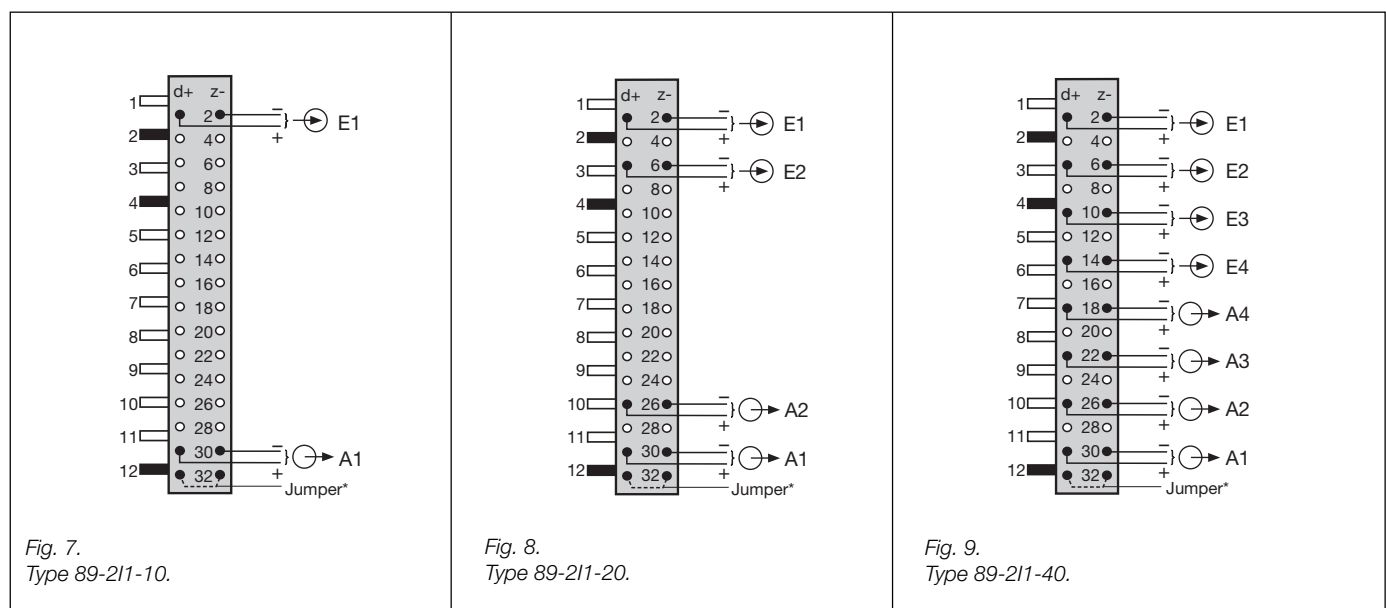
Electrical connections

SINEAX 211 in surface mounted housing

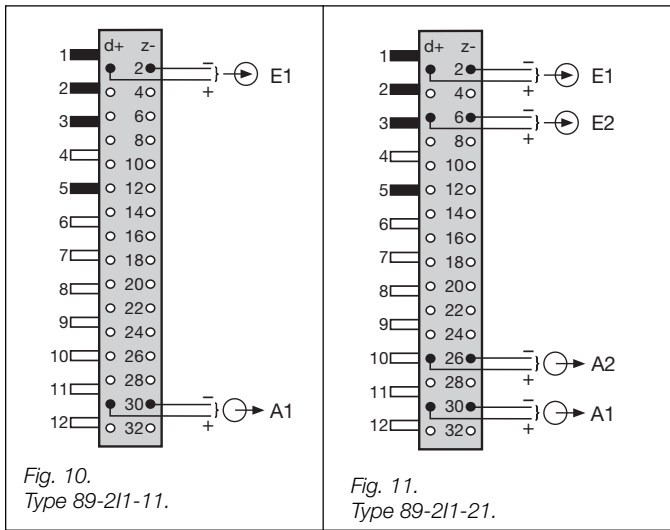


EURAX 211 as plug-in module (showing rear of module)

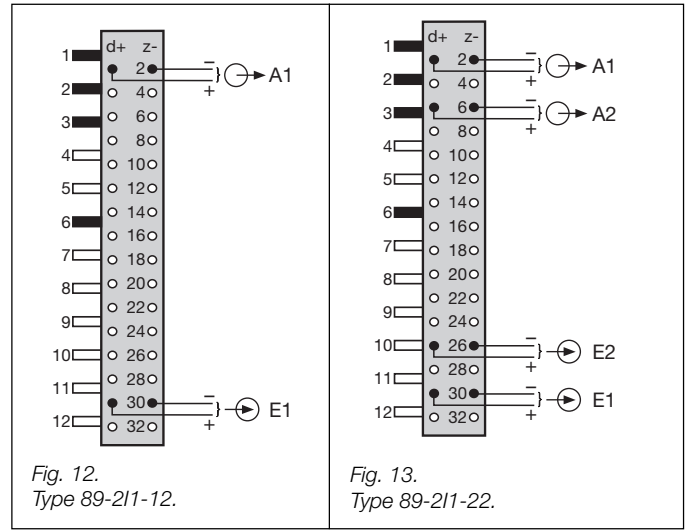
Standard version (non-I.S.)



Version with intrinsically safe **inputs**



Version with intrinsically safe **outputs**



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".

□ = Coding pin
■ = Coding pin broken out
● = Contact fitted
○ = No contact
See "Special features ③"

Dimensional drawings

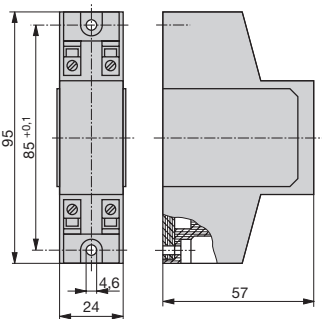


Fig. 14. SINEAX 211 for wall mounting.

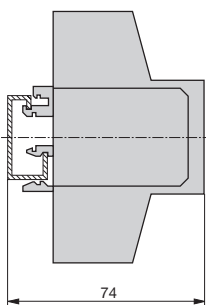


Fig. 15. SINEAX 211 for mounting on G-type rail, EN 50 035 - G32.

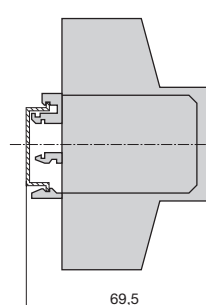


Fig. 16. SINEAX 211 for mounting on cap-type rail, EN 50 022-35 x 7.5.

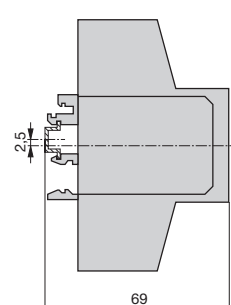


Fig. 17. SINEAX 211 for mounting on cap-type rail, EN 50 045-15 x 5.5.

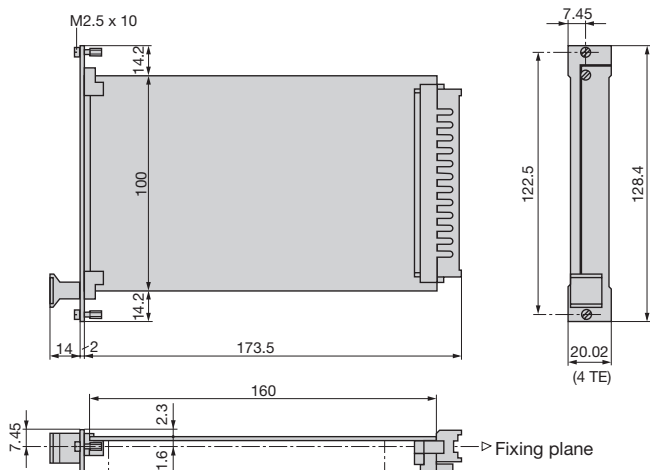


Fig. 18. EURAX 211, front plate width 4 TE.

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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 84-211-10 sufficient for local measurement? If not, then use, for example, SINEAX TV 808.

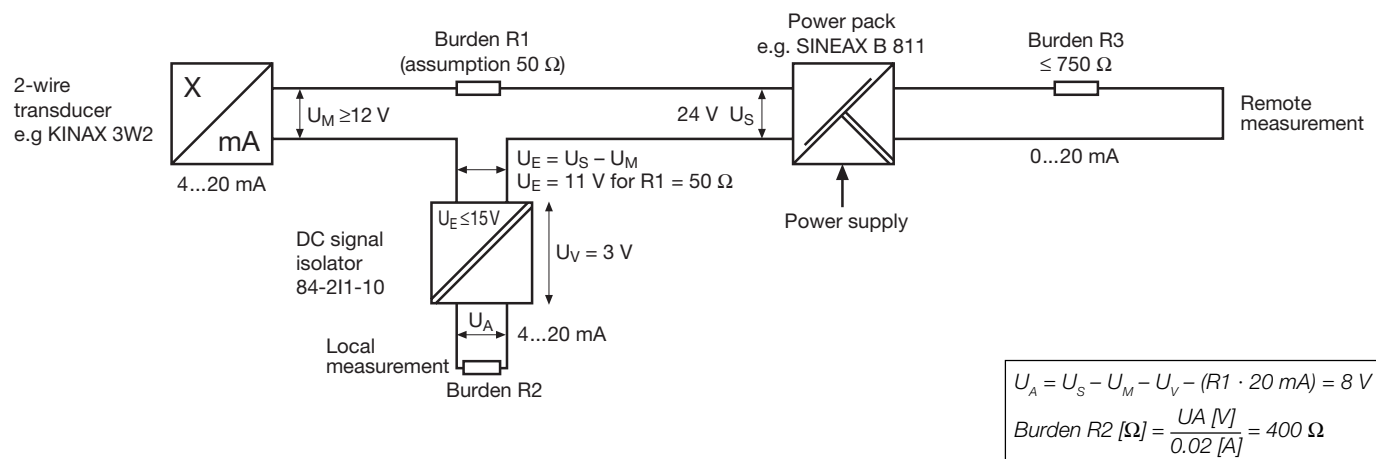


Fig. 19. Typical circuit with an isolating transformer SINEAX 84-211-10, a transmitter KINAX 3W2 for angular measurement and a power supply unit SINEAX B 811.