

SINEAX/EURAX U 700, Electrical Transducer for arithmetical AC voltage difference

The electrical transducer **SINEAX/EURAX U 700** measures the difference between two AC voltages, i.e. their arithmetical means (not the vectorial difference).

Available as output signal is a load-independent DC current or voltage, varying in proportion to the AC voltage difference. This output signal enables several receivers to be operated simultaneously – such as indicators, recorders, controllers etc. These may be located both close to the measuring point (field installation) or at a distance from it (control room).

The instrument is supplied in carrying rail housing SINEAX U 700 (Fig. 1) or as a plug-in module EURAX U 700 (Fig. 2).

Features / Benefits

- Measuring principle: Active rectifier
- Output signal: Load-independent DC current or impressed DC voltage

Mode of operation

The AC voltages U_G and U_S to be compared are isolated by instrument transformers, then actively rectified and smoothed. The arithmetical difference ($\Delta U = U_G - U_S$) of the two DC voltages, which is proportional to the measured values is passed through an amplifier and appears as a load independent DC output current or voltage.

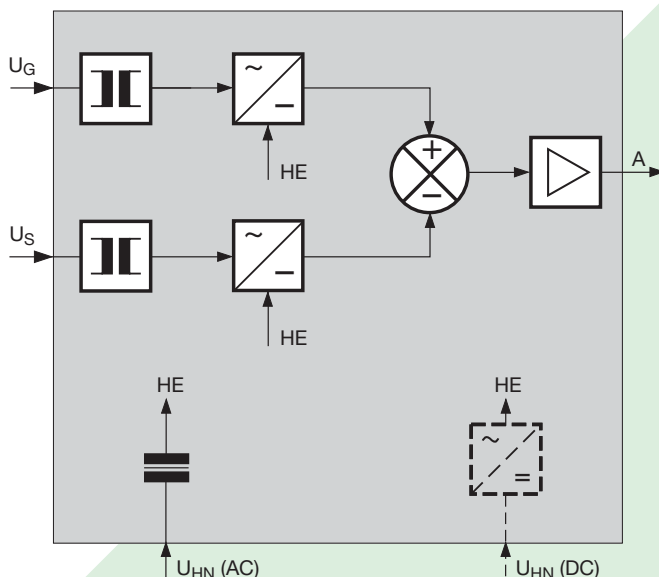


Fig. 3. Block diagram: U_G = Generator voltage,
 U_S = Bus voltage.



Fig. 1. SINEAX U 700 in carrying rail housing E16.



Fig. 2. EURAX U 700 as plug-in module for 19" rack-mounted case, front plate width 7 TE.

Technical Data

Mechanical design: In carrying rail housing SINEAX U 700 or as plug-in module EURAX U 700

Input variables U_G and U_S

Measuring range ΔU : $\pm 20\% U_N$
Nominal input voltage U_N : For both inputs a value between 10 V and 500 V

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Nominal frequency f_N :	50 or 60 Hz
Own consumption:	Approx. $U_N \cdot 2$ mA
Threshold:	< 0.05%
Overload capacity (per input):	$1.5 \times U_N$ continuous $2 \times U_N$ during 10 s $3 \times U_N$ during 2 s

Output signal A

Output variable I_A :	Load-independent DC current or voltage, proportional to ΔU ($\Delta U = U_G - U_S$) U_G = generator voltage U_S = bus voltage
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Standard ranges of I_A :	0 ... 1.00 to 0 ... 20 mA 1 ... 5 to 4 ... 20 mA - 1.00 ... 0 ... 1.00 to - 20 ... 0 ... 20 mA Burden voltage ± 15 V External resistance
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$$R_{\text{ext max.}} [\text{k}\Omega] = \frac{15 \text{ V}}{I_{AN} [\text{mA}]}$$

I_{AN} = full scale output

Standard ranges of U_A :	0 ... 1.00 to 0 ... 15 V - 1.00 ... 0 ... 1.00 to - 15 ... 0 ... 15 V 0.2 ... 1 to 3 ... 15 V Load capacity max. 10 mA External resistance
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$$R_{\text{ext}} [\text{k}\Omega] > \frac{U_A [\text{V}]}{10 [\text{mA}]}$$

FSO variation:	Approx. $\pm 2\%$
Current limitation:	I_A max. approx. 30 mA
Residual ripple in output current:	< 2% p.p.
Response time:	≤ 500 ms

Behaviour of output current in different operating states:

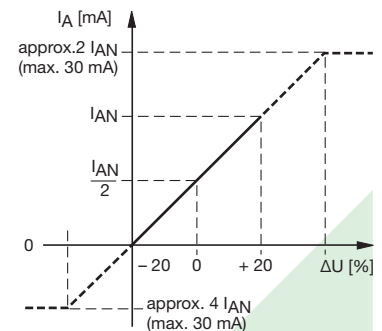
Operating state ¹⁾		Output	Display
Generator voltage	Bus voltage		
$U_G > U_S$		unipolar	$> I_{AN} / 2$
		bipolar	positive
missing ²⁾	nominal value	unipolar	approx. - 2 mA
		bipolar	approx. - 1,5 I_{AN}
nominal value	missing ²⁾	unipolar	missing ²⁾
		bipolar	
missing ²⁾	missing ²⁾	unipolar	approx. $I_{AN} / 2$
		bipolar	approx. 0

Behaviour of output current when generator measuring range is exceeded

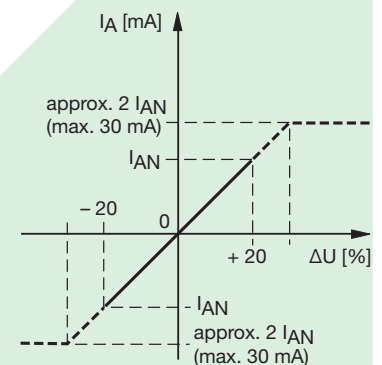
(Bus voltage = nominal value)

Unipolar output:

Any value between 0...1 and 0...20 mA
(Burden voltage ≤ 15 V)
 $U_B = I_A \text{ max.} \cdot R_{\text{ext}}$

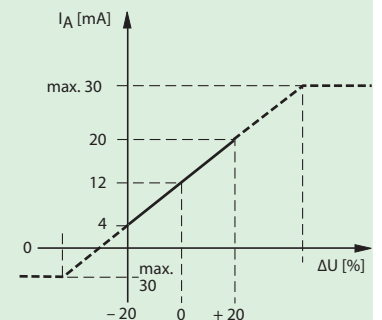


Symmetrical bipolar output: Any value between ± 1 and ± 20 mA
(Burden voltage $\leq \pm 15$ V)
 $U_B = I_A \text{ max.} \cdot R_{\text{ext}}$



Live zero signal output:

4...20 mA
(Burden voltage ≤ 15 V)
 $U_B = I_A \text{ max.} \cdot R_{\text{ext}}$



Accuracy (acc. to DIN/IEC 688-1)

Reference value:	Output span
Basic accuracy:	Class 0.5

1) With power supply switched on
2) e.g. switched off or fault condition

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Reference conditions:

Ambient temperature	23 °C ± 5 °C
Input voltage	Within measuring range
Frequency f_n	± 10%
Waveform	sine-wave
Distortion factor	< 0.5%
Power supply U_{HN}	± 20% with AC 20 to 135 V with DC
Output burden	0... R_{ext} max. at I_A R_{ext} min. ...∞ at U_A

Influence effects (maximum values) (included in basic error)

Linearity error	± 0.1%
Frequency influence f_n ± 10%	± 0.05%
Dependence on external resistance ΔR_{ext} max.	± 0.05%
Distortion factor ($K < 0.5\%$)	± 0.2%
Power supply influence (ΔU_H max.)	± 0.05%

Additional errors (maximum values)

Temperature influence (-25...+ 55 °C)	± 0.1% / 10 K
External field influence 0.5 mT	± 0.1%
Distortion factor influence ($K < 10\%$)	± 0.4 · K (%)

Electromagnetic compatibility

Influence:	< 2%
IEC 801-2:	Electrostatic discharge (ESD) Housing: ± 6 kV contact ± 6 kV air
IEC 801-3:	Electromagnetic fields 20 – 500 MHz, 10 V/m CW ITU frequencies 10 V/m influence < 2%
IEC 801-4:	Electrical fast transient / Burst influence, input and output lines Burst: ± 1 kV, 5/50 µs, 5 kHz, 2 min. Asymmetrical Burst: ± 2 kV, 5/50 µs, 5 kHz
IEC 801-5:	Interference test Surge ± 1 kV AC, ± 0.5 kV = symmetrical Surge ± 2 kV AC, ± 1.0 kV = asymmetrical

Power supply U_{HN}

AC voltage:	230, 115 V~, ± 20%, 42 to 70 Hz Power input ≤ 4.5 VA
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DC voltage:	24 to 110 V-, - 15 ... + 33% Power input ≤ 4 W
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Regulations

Impulse voltage protection:	5 kV, 1.2/50 µs, 0.5 Ws acc. to IEC 255 – 4 Cl. III
HF-surge compatibility:	2.5/1 kV, 1 MHz, 400 surges/s acc. to IEC 255 – 4 Cl. III
Electrical standards:	Acc. to DIN 57 410 and 57 411
Housing protection:	SINEAX U700 (carrying rail housing E16), IP 40 Terminals IP 20 EURAX U700 (plug-in module) IP 00 acc. to EN 60 529
Test voltage:	4 kV / 50 Hz / 1 min. between isolated circuits and versus housing (SINEAX U700)

Environmental conditions

Climatic rating:	Operating temperature -10...+ 55 °C Storage temperature - 40...+ 70 °C Relative humidity ≤ 75% annual mean
Altitude:	2000 m max.
Indoor use statement!	

Installation data for SINEAX U700

Dimensions:	Carrying rail housing E16 (see section «Dimensional drawings»)
Housing protection:	IP 40 acc. to IEC 529
Mounting position:	Any
Electrical connections:	Screw-type terminals with indirect wire pressure, for max. 2 × 2,5 mm ² or 1 × 6 mm ² . Protection IP 20 acc. EN 60529
Weight:	Approx. 1.0 kg

Installation data for EURAX U700

Dimensions:	Plug-in module in Euro format, 100 × 160 mm, 7 E (E = 5.08 mm) (see Section «Dimensional drawings»)
Housing protection:	IP 00 acc. to DIN 40 050
Front plate colour:	Grey RAL 7032
Mounting position:	Any
Electrical connections:	32-pole plug acc. to DIN 41 612, pattern F (contact fitting see Section «Electrical connections») Protection IP 00 acc. to EN 60529
Weight:	Approx. 0.6 kg

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Specification and ordering information

Description	*Blocking code	No-go with blocking code	Article No./ Feature
SINEAX/EURAX U 700 Order Code U700 - xxxx xxxx			U700 –
Features, Selection			
1. Mechanical design			
Plug-in module for 19" rack-mounted case (EURAX)			2
Carrying rail housing type E16 (SINEAX)			3
2. Measuring range			
Measuring range $\pm 20\%$			1
Non-standard $\geq \pm 15\%$ to $\leq \pm 25\%$ [%]			9
3. Nominal frequency			
Nominal frequency 50 Hz			1
Nominal frequency 60 Hz			2
Non-standard from 16.67 to 500 Hz [Hz]			9
4. Nominal input voltage (generator and bus)			
100/ $\sqrt{3}$ V;			A
110/ $\sqrt{3}$ V;			B
100 V;			C
110 V;			D
200 V;			E
230 V;			F
400 V;			G
500 V;			H
Non-standard ≥ 10.00 ; to < 500 ; [V;V]			Z
With a 3-phase system the nominal input voltage to be shown as phase to phase voltage . For transformer connection add semicolon with primary/secondary, voltage in V, e.g. ;6600/110 (in line D) or 120;144000/120 (in line Z, non-standard). For uneleven values show 2 positions after the comma.			
5. Output signal			
Non-standard [mA]			9
Non-standard [V]			Z
Line 9: 0 ... > 1.00 to 0 ... < 20 1 ... 5 to $< (4 \dots 20)$ $> (-1.00 \dots 0 \dots 1.00)$ to $< (-20 \dots 0 \dots 20)$ Line Z: 0 ... 1.00 to 0 ... 15 0.2 ... 1 to 3 ... 15 $-1.00 \dots 0 \dots 1.00$ to $-15 \dots 0 \dots 15$			
6. Power supply			
115 V, 50/60 Hz			2
230 V, 50/60 Hz			3
Non-standard 50/60 Hz (> 24 to 400) [V]			9
Un 24 ... 110 V DC			A

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Description	*Blocking code	No-go with blocking code	Article No./ Feature
SINEAX/EURAX U 700 Order Code U700 - xxxx xxxx			U700 –
Features, Selection			
7. Test certificate			
Without test certificate			0
Test certificate in German			D
Test certificate in English			E
8. Special features			
Without special features (Order Code complete)			0
With special features (line 1), specify full text, availability on inquiry: – Test sockets on front plate at EURAX version – Output residual ripple $\leq 0.5\%$ p.p. (instead of 2% p.p.) – Extended time constant, up to max. 500 ms (higher residual ripple)			1

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

Electrical connections

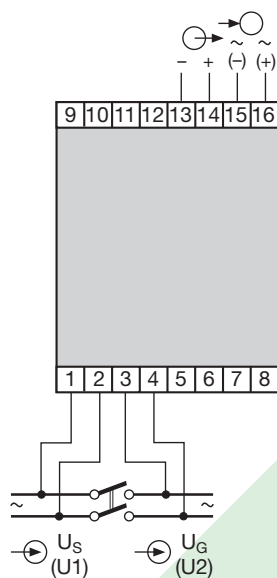


Fig. 4. SINEAX U700.

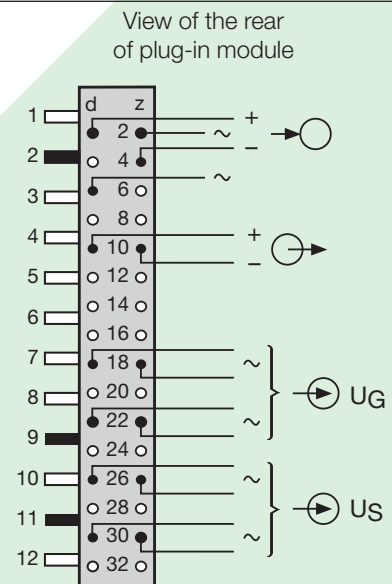


Fig. 5. EURAX U700.

- ⊖ ⊕ Input
- ⊖ ⊕ Output
- ⊖ ⊕ Power supply
- ⊖ ⊕ U_G Measuring input generator voltage
- ⊖ ⊕ U_S Measuring input bus voltage

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

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Dimensional drawings

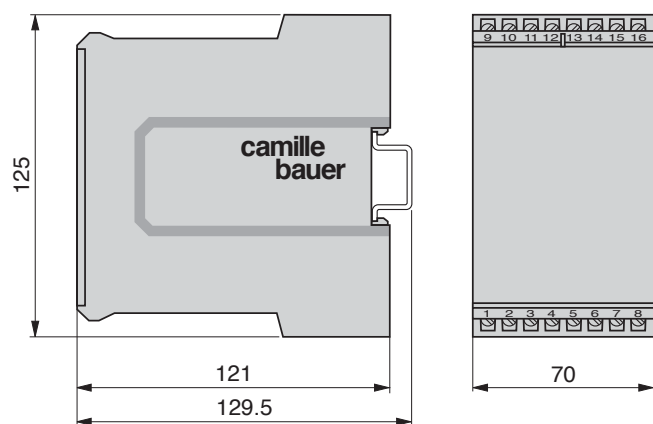


Fig. 6. Housing type E16 clipped onto a top-hat rail EN 50 022, 35 x 15 mm or 35 x 7.5 mm.

Releasing the transducer

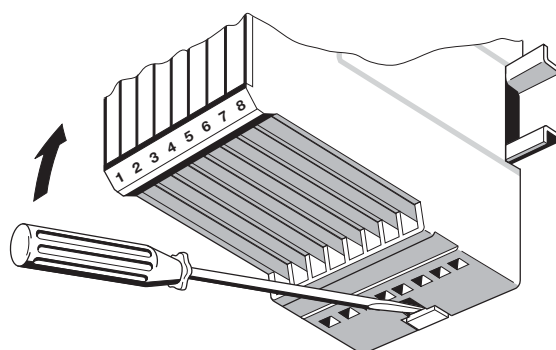


Fig. 8

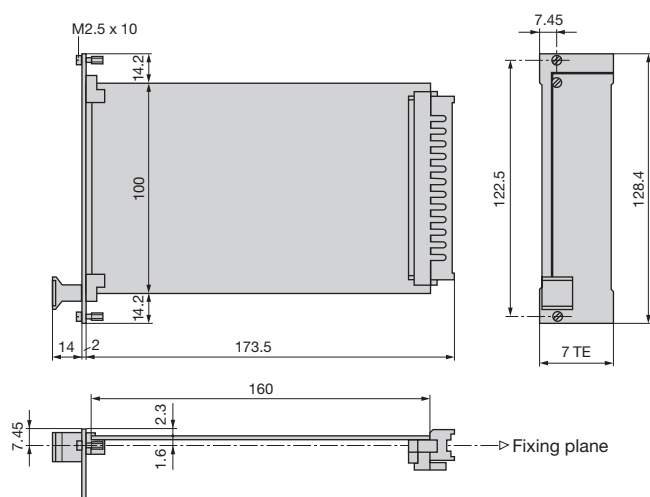


Fig. 7. EURAX plug-in module, front plate width 7 TE.

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