SINEAX U553
Transducer for AC Voltage

With power supply
RMS value measurement
Carrying rail housing P13/70

Application

The transducer **SINEAX U553** (Fig. 1) converts a sinusoidal or a distorted AC voltage into a **load independent** DC current or a **load independent** DC voltage proportional to the measured value.

The transducer fulfils all the important requirements and regulations concerning electromagnetic compatibility **EMC** and **Safety** (IEC 1010 resp. EN 61 010). It was developed and is manufactured and tested in strict accordance with the **quality assurance standard** ISO 9001.

Fig. 1. Transducer SINEAX U553 in housing **P13/70** clipped onto a top-hat rail.

Features / Benefits

● **Measuring input: AC voltage, sine or distorted wave forms, RMS value measurement**

Measured variable	Measuring range limits
AC voltage	0 … 20 to 0 … 690 V

● **Measuring output: Unipolar and live-zero output variables**

● **Measuring principle: Logarithmic method**

● **AC/DC power supply / Universal**

● **Standard version as per Germanischer Lloyd**

The output amplifier transforms the measuring signal into an impressed DC current output signal A.

The electronic components are supplied with voltage H from the mains supply unit H.
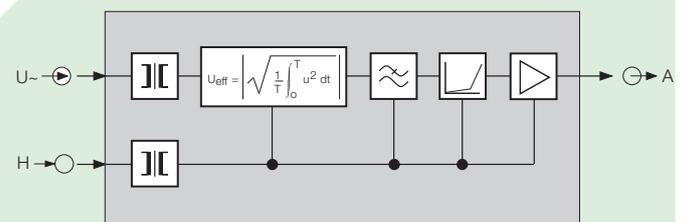
Fig. 2. Block diagram.

Mode of operation

Input signal U~ is galvanically separated from the mains network using a transformer.

The following mathematical expression is then formed using a root-mean-square value computer

$$U_{eff} = \left| \sqrt{\frac{1}{T} \int_{O}^{T} u^2 \, dt} \right|$$

Following filtration by means of an active filter, the transformation properties of the measuring transducer are determined in the succeeding characteristics circuit.

Technical data

General

Measured quantity:	AC voltage
	Sine or distorted wave forme
	RMS value measurement
Measuring principle:	Logarithmic method

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Measuring input E ⊕→

Nominal frequency f_N: 50/60 or 400 Hz

Nominal input voltage U_N
(measuring range end
value): 0 … 20 to 0 … 690 V

Setting: Admissible alteration of full-scale output, variable sensitivity, adjustable with potentiometer

Setting range
$0.85 … 1.15 \cdot U_N$ (± 15%)
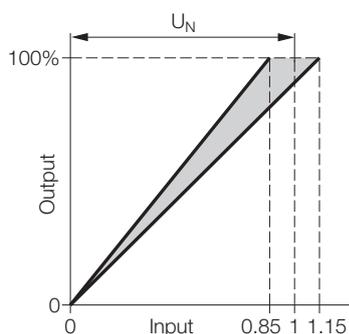
Own consumption: ≤ 1 VA with input end value

Overload capacity:

Measured quantity U_N	Number of applications	Duration of one application	Interval between two successive applications
$1.2 \cdot U_N$ [1]	——	continuously	——
$2 \cdot U_N$ [1]	10	1 s	10 s

[1] But max. 264 V with power supply from measuring input

Measuring output A ⊖→

Load-independent
DC current: 0 … 1 to 0 … 20 mA
resp. live-zero
0.2 … 1 to 4 … 20 mA

Burden voltage: 15 V

External resistance: R_{ext} max. $[k\Omega] = \dfrac{15\ V}{I_{AN}\ [mA]}$

I_{AN} = Output current end value

Load-independent
DC voltage: 0 … 1 to 0 … 10 V
resp. live-zero
0.2 … 1 to 2 … 10 V

External resistance: $R_{ext}\ [k\Omega] \geq \dfrac{U_A\ [V]}{2\ mA}$

Current limit
under overload: ≤ 1.5 · I_{AN} at current output
Approx. 10 mA at voltage output

Voltage limit under
$R_{ext} = \infty$: ≤ 25 V

Residual ripple in
output current: ≤ 0.5% p.p. at setting time 300 ms
≤ 2% p.p. at setting time 50 ms

Setting time: 50 ms or 300 ms

Power supply H →◯

AC/DC power pack (DC or 50/60 Hz)

Table 1: Rated voltages and permissible variations

Rated voltage	Tolerancd
85 … 230 V DC / AC	DC – 15 … + 33%
24 … 60 V DC / AC	AC ± 15%

Option: Connected to the low tension terminal side 12 and 13
24 V AC or 24 … 60 V DC

Power consumption: 3 VA

Accuracy (acc. to EN 60 688)

Reference value: Output end value

Basic accuracy: Class 0.5

Reference conditions:

Ambient temperature 15 … 30 °C

Input variable Rated operating range

Frequency f_N ± 2 Hz

Curve shape Sine-wave

Crest factor $\sqrt{2}$

Power supply In rated range

Output burden Current: $0.5 \cdot R_{ext}$ max.
Voltage: $2 \cdot R_{ext}$ min.

Warm-up time ≤ 5 min.

Influence effects (maxima):
included in basic error

Frequency 40 … 400 Hz, ± 0.3%
30 … 1000 Hz, ± 0.5%

Crest factor 1 … 2.5 ± 0.2%
> 2.5 … 6 ± 0.5%

Safety

Protection class: II (protection isolated, EN 61 010)

Housing protection: IP 40, housing
(test wire, EN 60 529)
IP 20, terminals
(test finger, EN 60 529)

Contamination level: 2

Overvoltage category: III

Rated insulation voltage
(versus earth): 400 V, input
230 V, power supply
40 V, output

Test voltage: 50 Hz, 1 min. acc. to EN 61 010-1

3700 resp. 5550 V, input versus all other circuits as well as outer surface

3700 V, power supply versus output as well as outer surface

490 V, output versus outer surface

Installation data

Mechanical design: Housing **P13/70**

Material of housing: Lexan 940 (polycarbonate), flammability Class V-0 acc. to UL 94, self-extinguishing, non-dripping, free of halogen

Mounting: For rail mounting

Mounting position: Any

Weight: Approx. 0.3 kg

Connecting terminals

Connection element: Screw-type terminals with indirect wire pressure

Permissible cross section
of the connection leads: ≤ 4.0 mm^2 single wire or
2 × 2.5 mm^2 fine wire

Environmental conditions

Operating temperature: – 10 to + 55 °C

Storage temperature: – 40 to + 70 °C

Relative humidity of: ≤ 75%, no dew

Altitude: 2000 m max.

Indoor use statement!

Ambient tests

EN 60 068-2-6: Vibration

Acceleration: ± 2 g

Frequency range: 10 … 150 … 10 Hz, rate of frequency sweep:
1 octave/minute

Number of cycles: 10, in each of the three axes

EN 60 068-2-27: Shock

Acceleration: 3 × 50 g
3 shocks each in 6 directions

EN 60 068-2-1/-2/-3: Cold, dry heat, damp heat

IEC 1000-4-2/-3/-4/-5/-6
EN 55 011: Electromagnetic compatibility

Germanischer Lloyd

Type approval certificate: No. 12 259-98 HH

Ambient category: C

Vibrations: 0.7 g

Table 2: Specification and ordering information

Designation		*Blocking code	No-go with blocking code	Article No./ Feature
SINEAX U553	**Order Code 553 - xxxx xx**			553 –
Features, Selection				
1. **Mechanical design**				
Housing P13/70 for rail mounting				4
2. **Nominal input frequency**				
50/60 Hz				1
400 Hz				3

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Designation		*Blocking code	No-go with blocking code	Article No./ Feature
SINEAX U553	Order Code 553 - xxxx xx			553 –
Features, Selection				
3. Measuring range				
0 … 100 / $\sqrt{3}$		A		A
0 … 110 / $\sqrt{3}$		A		B
0 … 100		B		C
0 … 110		B		D
0 … 116.66		B		E
0 … 120		B		F
0 … 125		B		G
0 … 133.33		B		H
0 … 150		B		J
0 … 250		C		K
0 … 500*		C		L
Non-standard [V]				Z
0 … 20 to 0 … 690 V With power supply from measuring input min. 24 V / max. 230 V, see feature 5, lines 3 and 4. * Max. 400 V nominal value of the network against earth (operating voltage acc. to EN 61 010)				
4. Output signal				
0 … 20 mA, $R_{ext} \leq 750\ \Omega$				1
4 … 20 mA, $R_{ext} \leq 750\ \Omega$				2
Non-standard [mA]				9
0 … 1.00 to 0 … < 20 0.2 … 1 to < (4 … 20)				
0 … 10 V, $R_{ext} \geq 5\ k\Omega$				A
Non-standard [V]				Z
0 … 1.00 to 0 … < 10 0.2 … 1 to 2 … 10				
5. Power supply				
85 … 230 V DC / AC				1
24 … 60 V DC / AC				2
From measuring input ≥ 24 … 60 V AC			BC	3
From measuring input ≥ 85 … 230 V AC			AC	4
Connected to the low tension terminal side 12 and 13 24 V AC / 24 … 60 V DC				5
6. Setting time				
0.3 s				1
50 ms				2

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

Electrical connections

Fig. 3. Power supply connected to terminals 8 and 9.

Fig. 4. Power supply internal from measuring input, without separated power supply connected.

Fig. 5. Power supply connected to the low tension terminal side 12 and 13.
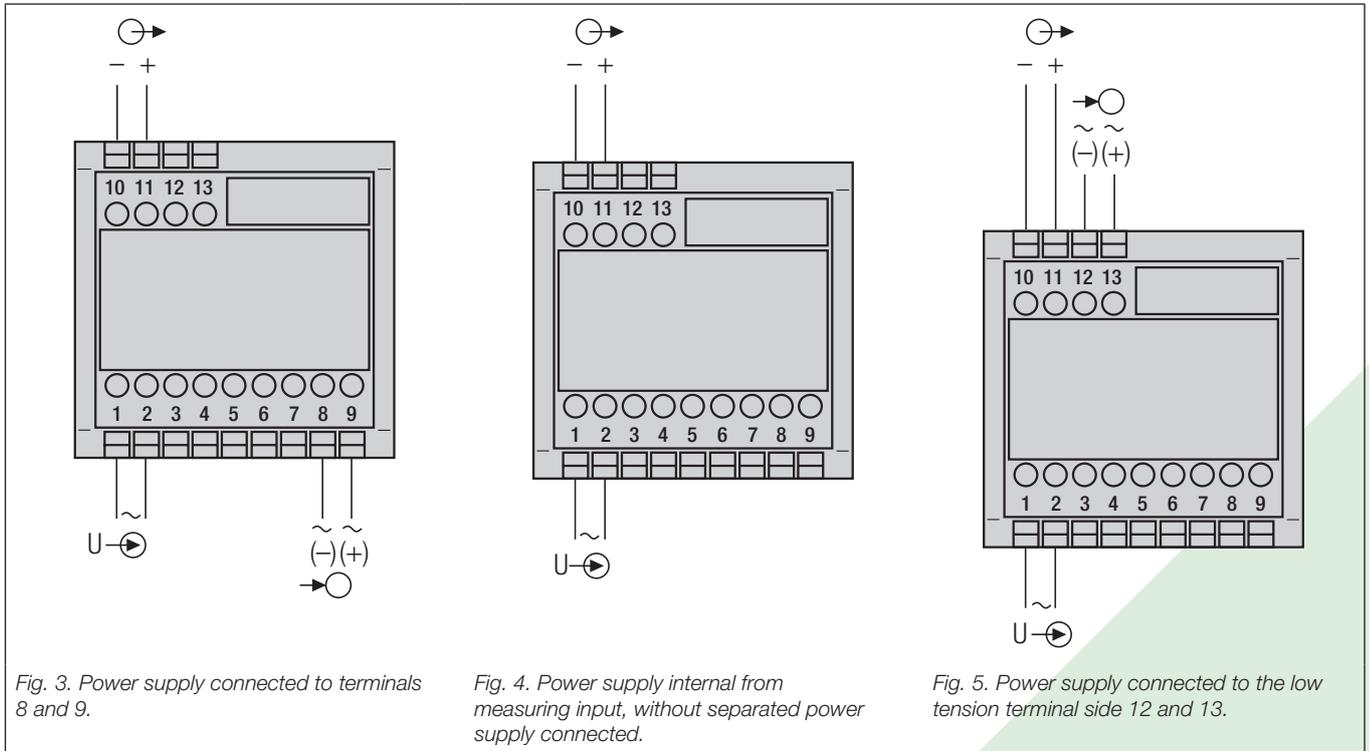
= Measuring input

= Measuring output

= Power supply

Dimensional drawing


112.5

69.1

114.1

70
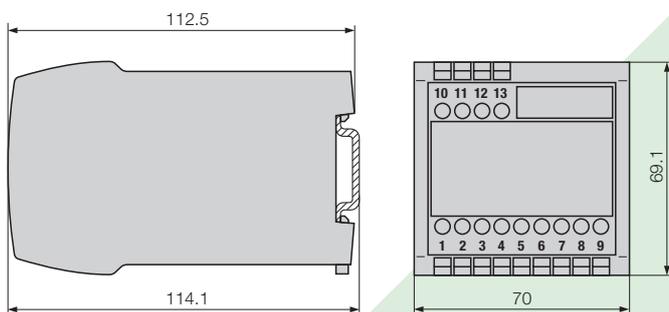
Fig. 6. SINEAX U553 in housing **P13/70** clipped onto a top-hat rail (35 ×15 mm or 35×7.5 mm, acc. to EN 50 022).

Standard accessories

1 Operating Instructions in three languages: German, French, English

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