

SINEAX G537

Transducer for Phase Angle Difference

Carrying rail housing P13/70

Application

The transducer **SINEAX G537** (Fig. 1) converts the phase angle difference of two synchronised supplies 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 G537 in housing P13/70 clipped onto a top-hat rail.

Features / Benefits

- **Measuring inputs:** Sine, rectangular or distorted wave forms of nominal input voltages with dominant fundamental waves

| Measured variables | Nominal input voltages | Measuring range limits |
|------------------------|------------------------|----------------------------------------|
| Phase angle difference | 10 to 690 V | ± 10 to $< \pm 180^\circ\text{el}$ |

- **Measuring output:** Unipolar, bipolar or live zero output variables
- **Measuring principle:** Measurement of the zero crossing interval
- **AC/DC power supply / Universal**
- **Standard as marine version per Lloyd's Register of Shipping**

Nominal input voltage U_N : Generator and bus bar
10 ... 230 V or 230 ... 690 V
(max. 230 V with power supply from voltage measuring input)

Sensitivity: 10 ... 120% U_N

Own consumption: $< U_N \cdot 1.5$ mA per measuring input

Overload capacity:

| Measured quantities U_N | Number of applications | Duration of one application | Interval between two successive applications |
|---------------------------|------------------------|-----------------------------|----------------------------------------------|
| $1,2 \times U_N^1$ | — | perman. | — |
| $2 \times U_N^1$ | 10 | 1 s | 10 s |

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

Technical data

General

Measured quantity: Phase angle difference
Measuring principle: Measurement of the zero crossing interval

Measuring inputs \rightarrow

Measuring range: See Section «Specification and ordering information»
Nominal frequency f_N : 16 to 800 Hz

Measuring output \rightarrow

Load independent
DC current: 0 ... 1 to 0 ... 20 mA resp. live-zero
1 ... 5 to 4 ... 20 mA
 ± 1 to ± 20 mA
Burden voltage: + 15 V, resp. - 12 V
Load independent
DC voltage: 0 ... 1 to 0 ... 10 V resp. live-zero
0.2 ... 1 to 2 ... 10 V
 ± 1 to ± 10 V

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| | |
|-------------------------------------------------|-----------------------------------------------------------------------------------------|
| Load capacity: | Max. 4 mA |
| Voltage limit under $R_{\text{ext}} = \infty$: | $\leq 25 \text{ V}$ |
| Current limit under overload: | Approx. $1.3 \times I_{\text{AN}}$ at current output Approx. 30 mA at voltage output |
| Residual ripple in output current: | $< 0.5\% \text{ p.p.}$ |
| Nominal value of response time: | 4 periods of the measuring frequency |
| Other ranges: | 2, 8 or 16 periods of the measuring frequency |

Behaviour of output current in different operating states:

| Operating state ¹ | | Output | |
|----------------------------------|--------------------------------|-----------------------|------------|
| Generator voltage U _G | Bus bar voltage U _S | unipolar | bipolar |
| leading ($f_G = f_S$) | | $> I_{\text{AN}} / 2$ | positive |
| missing ² | nominal value | | |
| nominal value | missing ² | indefinite | indefinite |
| missing ² | missing ² | | |

¹ With power supply switched on

² E.g. switched off or fault condition

Accuracy (acc. to EN 60 688)

| | |
|------------------|-------------|
| Reference value: | Output span |
| Basic accuracy: | Class 0.5 |

Reference conditions

| | |
|---------------------|--------------------------------------|
| Ambient temperature | 15 ... 30 °C |
| Input voltage | $U_G = 0.8 \dots 1.2 U_S$ |
| Frequency | $f_N \pm 10\%$ |
| Wave form | Sine |
| Power supply | At nominal range |
| Output burden | $\Delta R_{\text{ext}} \text{ max.}$ |

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 (against earth): | 230 V resp. 400 V, inputs 230 V, power supply 40 V, output |

| | |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test voltage: | 50 Hz, 1 min. acc. to EN 61 010-1 3700 resp. 5550 V, inputs versus all other circuits as well as outer surface 3250 V, inputs versus each other 3700 V, power supply versus output as well as outer surface 490 V, output versus outer surface |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Power supply →○

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

Table 1: Rated voltages and permissible variations

| Rated voltage | Tolerance |
|---------------------|-------------------|
| 85 ... 230 V DC, AC | DC – 15 ... + 33% |
| 24 ... 60 V DC, AC | AC $\pm 15\%$ |

or

Power supply from voltage measuring input:

24...60 V AC or 85...230 V AC

Option:

Connect to the low tension to terminals 12 and 13
24 V AC or 24 ... 60 V DC

Power consumption:

3 VA

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. 0.27 kg |

Connecting terminals

| | |
|----------------------------------------------------|---------------------------------------------------------------------------------|
| Connection element: | Screw-type terminals with indirect wire pressure |
| Permissible cross section of the connection leads: | $\leq 4.0 \text{ mm}^2$ single wire or $2 \times 2,5 \text{ mm}^2$ fine wire |

Environmental conditions

| | |
|------------------------|----------------------|
| Operating temperature: | – 10 to + 55 °C |
| Storage temperature: | – 40 to + 70 °C |
| Relative humidity: | $\leq 75\%$, no dew |
| Altitude: | 2000 m max. |
| Indoor use statement! | |

Ambient tests

| | |
|----------------|-------------------|
| EN 60 068-2-6: | Vibration |
| Acceleration: | $\pm 2 \text{ g}$ |

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| | | | | |
|--------------------------|----------------------------------------------------------------|---------------------------|----------------------------|------------------|
| Frequency range: | 10 ... 150 ... 10 Hz, rate of frequency sweep: 1 octave/minute | Germanischer Lloyd | Type approval certificate: | No. 12 261-98 HH |
| Number of cycles: | 10, in each of the three axes | | Ambient category: | C |
| EN 60 068-2-27: | Shock | | Vibration: | 0.7 g |
| Acceleration: | 3 x 50 g 3 chocs 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 | | | |

Output characteristic

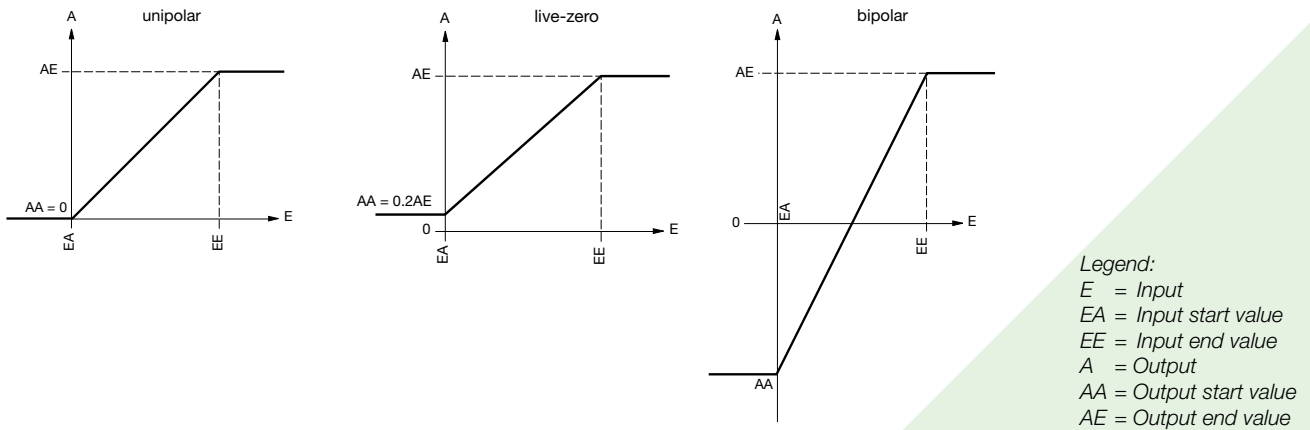


Table 2: Specification and ordering information

| Description | *Blocking code | no-go with blocking code | Article No./ Feature |
|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------------|----------------------|
| SINEAX G537 | Order code 537 - xxxx xxx | | 537 - |
| Features, Selection | | | |
| 1. Mechanical design | | | |
| Housing P13/70 for rail mounting | | | 4 |
| 2. Nominal input frequency | | | |
| 50 Hz | | | 1 |
| 60 Hz | | | 2 |
| Non-standard ≥ 16 to 800 Hz With power supply from measuring input min. 40 Hz, max. 400 Hz | [Hz] | | 9 |
| 3. Nominal input voltage | | | |
| Generator and bus bar: | | | |
| $U_N = 100\text{ V}$ | | A | 1 |
| $U_N = 230\text{ V}$ | | A | 2 |
| Non-standard ≥ 10 to 690 V With power supply from measuring input min. 24 V, max. 230 V, see feature 6, lines 3 and 4 | [V] | | 9 |
| 3 phase system: Input voltage = phase to phase voltage | | | |

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| Description | *Blocking code | no-go with blocking code | Article No./ Feature |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------------------|----------------------|
| SINEAX G537 Order code 537 - xxxx xxx | | | 537 - |
| Features, Selection | | | |
| 4. Measuring range – 120 ... 0 ... 120 °el | | | 1 |
| Non-standard [°el] Measuring range within – 180 ... 0 ... + 180 °el, but unambiguous output value up to – 170 ... 0 ... + 170 °el; measuring span ≥ 20 °el | | | 9 |
| 5. Output signal 0 ... 20 mA | | | 1 |
| 4 ... 20 mA | | | 2 |
| Non-standard 0 ... 1.00 to 0 ... < 20, [mA] – 1.00 ... 0 ... 1.00 to – 20 ... 0 ... 20 (symmetrical) 1 ... 5 to < (4 ... 20) (AA / AE = 1 / 5) | | | 9 |
| 0 ... 10 V | | | A |
| Non-standard 0 ... 1.00 to 0 ... < 10, [V] – 1.00 ... 0 ... 1.00 to – 10 ... 0 ... 10 (symmetrical) 0.2 ... 1 to 2 ... 10 (AA / AE = 1 / 5) AA = Output start value, AE = Output end value | | | Z |
| 6. Power supply 85 ... 230 V DC, AC | | | 1 |
| 24 ... 60 V DC, AC | | | 2 |
| Internal from measuring input (24 ... 60 V AC) | | A | 3 |
| Internal from measuring input (85 ... 230 V AC) | | | 4 |
| Connect to the low tension 24 V AC / 24 ... 60 V DC | | | 5 |
| 7. Response time 4 periods of the input frequency (standard) | | | 1 |
| 2 periods of the input frequency | | | 2 |
| 8 periods of the input frequency | | | 3 |
| 16 periods of the input frequency | | | 4 |

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

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Electrical connections

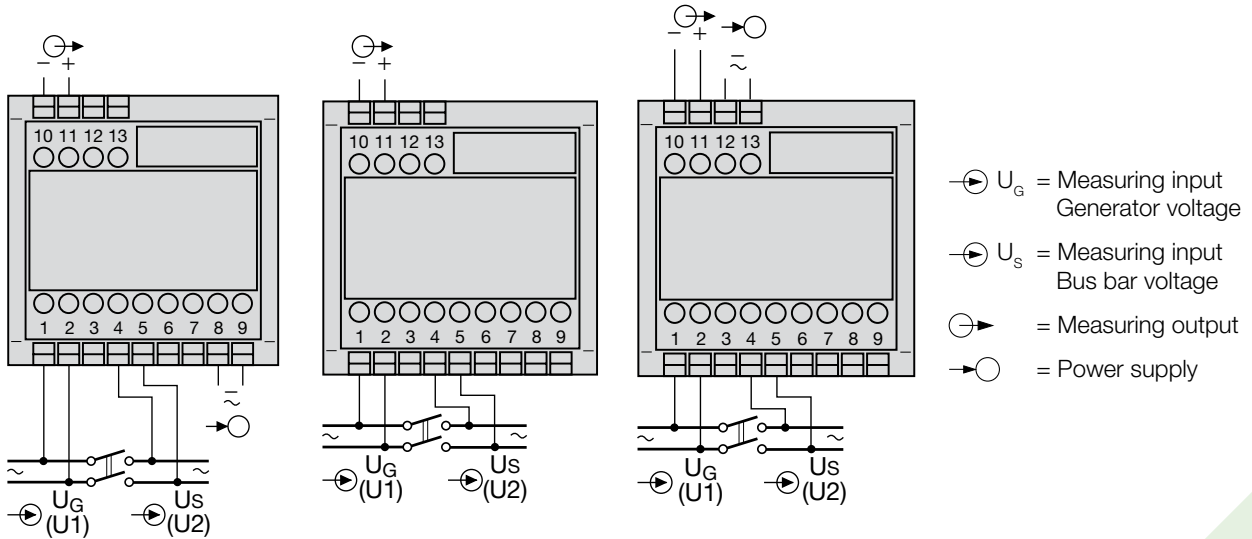


Fig. 2. Power supply connected to terminals 8 and 9.

Fig. 3. Power supply internal from measuring input, without separated power supply.

Fig. 4. Power supply connected to the low tension terminal side 12 and 13

Dimensional drawing

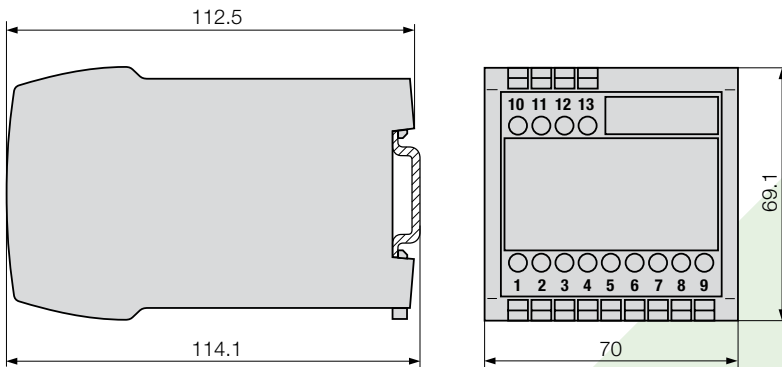


Fig. 5. Housing **P13/70** clipped onto a top-hat rail (35 x 15 or 35 x 7.5 mm, acc. to EN 50 022).

Standard accessories

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

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