

# 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            | $\pm 10$ 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 with maritime execution (formerly GL, Germanischer Lloyd)**

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   |

<sup>1</sup> 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  
 $\pm 1$  to  $\pm 20$  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  
 $\pm 1$  to  $\pm 10$  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<br>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 <sup>1</sup>     |                                | Output                |            |
|----------------------------------|--------------------------------|-----------------------|------------|
| Generator voltage U <sub>G</sub> | Bus bar voltage U <sub>S</sub> | unipolar              | bipolar    |
| leading ( $f_G = f_S$ )          |                                | $> I_{\text{AN}} / 2$ | positive   |
| missing <sup>2</sup>             | nominal value                  |                       |            |
| nominal value                    | missing <sup>2</sup>           | indefinite            | indefinite |
| missing <sup>2</sup>             | missing <sup>2</sup>           |                       |            |

<sup>1</sup> With power supply switched on

<sup>2</sup> 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)<br>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<br>230 V, power supply<br>40 V, output                   |

|               |  |
|---------------|--|
| Test voltage: | 50 Hz, 1 min. acc. to EN 61 010-1<br>3700 resp. 5550 V, inputs versus all other circuits as well as outer surface<br>3250 V, inputs versus each other<br>3700 V, power supply versus output as well as outer surface<br>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 <b>P13/70</b>  |
| 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<br>$2 \times 2,5 \text{ mm}^2$ 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

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

EN 60 068-2-27: Shock

Acceleration: 3 x50 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

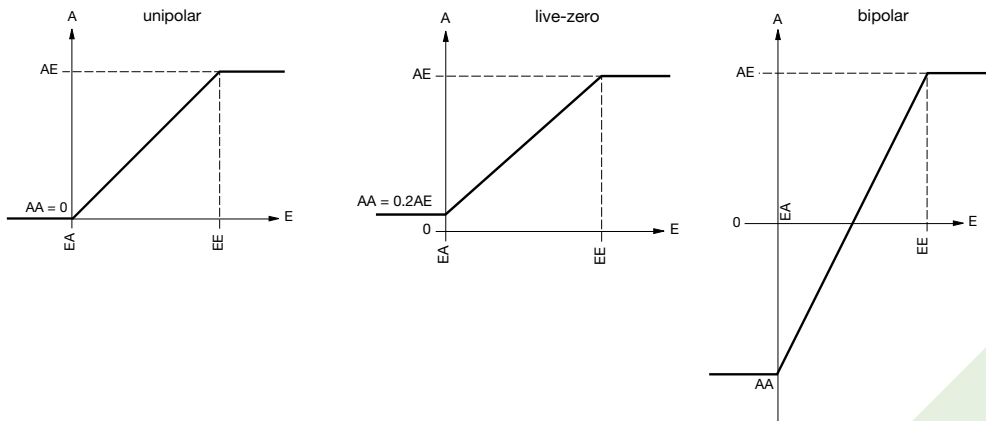
### Maritime product features (formerly GL, Germanischer Lloyd)

GL Type approval certificate: No. 12 261-98 HH

Ambient category: C

Vibration: 0.7 g

### Output characteristic



Legend:  
*E* = Input  
*EA* = Input start value  
*EE* = Input end value  
*A* = Output  
*AA* = Output start value  
*AE* = Output end value

**Table 2: Specification and ordering information**

| Description  | *Blocking code                   | no-go with blocking code | Article No./ Feature |
|--|----------------------------------|--------------------------|----------------------|
| <b>SINEAX G537</b>   | <b>Order code 537 - xxxx xxx</b> |                          | 537 -                |
| <b>Features, Selection</b>   |                                  |                          |                      |
| <b>1. Mechanical design</b>  |                                  |                          |                      |
| Housing P13/70 for rail mounting   |                                  |                          | 4                    |
| <b>2. Nominal input frequency</b>  |                                  |                          |                      |
| 50 Hz  |                                  |                          | 1                    |
| 60 Hz  |                                  |                          | 2                    |
| Non-standard<br>≥ 16 to 800 Hz<br>With power supply from measuring input min. 40 Hz,<br>max. 400 Hz                            | [Hz]                             |                          | 9                    |
| <b>3. Nominal input voltage</b>  |                                  |                          |                      |
| Generator and bus bar:   |                                  |                          |                      |
| $U_N = 100$ V  |                                  | A                        | 1                    |
| $U_N = 230$ V  |                                  | A                        | 2                    |
| Non-standard<br>≥ 10 to 690 V<br>With power supply from measuring input min. 24 V,<br>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 |
|---|----------------|--------------------------|----------------------|
| <b>SINEAX G537</b> <span style="float: right;"><b>Order code 537 - xxxx xxx</b></span>  |                |                          | 537 -                |
| <b>Features, Selection</b>  |                |                          |                      |
| <b>4. Measuring range</b><br>- 120 ... 0 ... 120 °el  |                |                          | 1                    |
| Non-standard [°el]<br>Measuring range within - 180 ... 0 ... + 180 °el, but unambiguous output value up to - 170 ... 0 ... + 170 °el; measuring span ≥ 20 °el / Measuring range bipolar symmetrical |                |                          | 9                    |
| <b>5. Output signal</b><br>0 ... 20 mA  |                |                          | 1                    |
| 4 ... 20 mA   |                |                          | 2                    |
| Non-standard 0 ... 1.00 to 0 ... < 20, [mA]<br>- 1.00 ... 0 ... 1.00 to - 20 ... 0 ... 20 (symmetrical)<br>1 ... 5 to < (4 ... 20) (AA / AE = 1 / 5)  |                |                          | 9                    |
| 0 ... 10 V  |                |                          | A                    |
| Non-standard 0 ... 1.00 to 0 ... < 10, [V]<br>- 1.00 ... 0 ... 1.00 to - 10 ... 0 ... 10 (symmetrical)<br>0.2 ... 1 to 2 ... 10 (AA / AE = 1 / 5)<br>AA = Output start value, AE = Output end value |                |                          | Z                    |
| <b>6. Power supply</b><br>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                    |
| <b>7. Response time</b><br>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

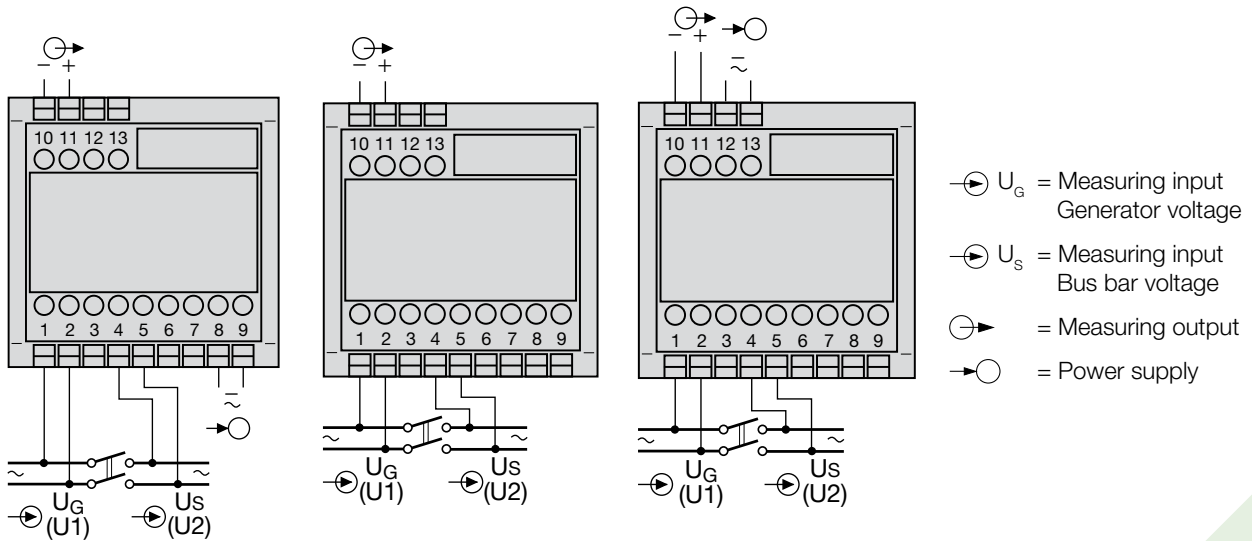


Fig. 2. Power supply connected to terminals 8 and 9.

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

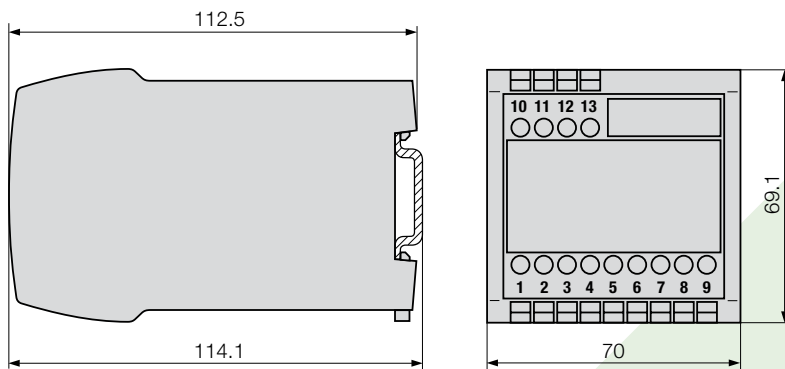


Fig. 5. Housing **P13/70** clipped onto a top-hat rail (35 x 15 or 35 x 7.5 mm, acc. to EN 50 022).

### Standard accessories

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

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