

# SINEAX G 537

## Transducer for Phase Angle Difference

Carrying rail housing P13/70



### Application

The transducer **SINEAX G 537** (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 G 537 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 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

<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  $f_N$ : 50 or 60 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 $R_{\text{ext}} = \infty$ :	$\leq 25$ 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:	$< 0.5\%$ 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:	$\Delta\varphi = 90^\circ$
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
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### Power supply →○

AC/DC power pack (DC or 40 ... 400 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:	Approx. 2 W resp. 4 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 $2 \times 2.5 \text{ mm}^2$ fine wire

### Environmental conditions

Operating temperature:	– 10 to + 55 °C
Storage temperature:	– 40 to + 70 °C
Relative humidity of annual mean:	$\leq 75\%$
Altitude:	2000 m max.
Indoor use statement!	

### Ambient tests

EN 60 068-2-6:	Vibration
Acceleration:	$\pm 2$ 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 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

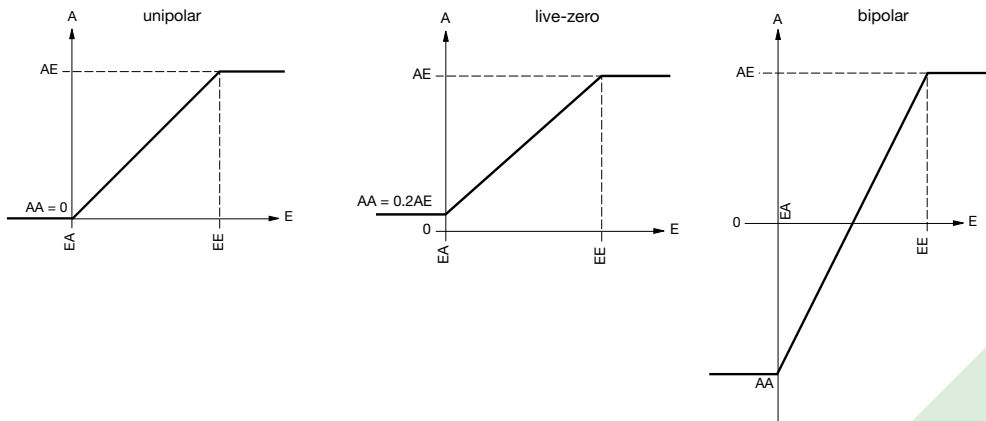
### Germanischer Lloyd

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 G 537</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 [Hz] ≥ 10 to 1500 Hz With power supply from measuring input min. 40 Hz, max. 400 Hz			9
<b>3. Nominal input voltage</b>			
Generator and bus bar:			
$U_N = 100\text{ V}$	A		1
$U_N = 230\text{ V}$	A		2
Non-standard [M] ≥ 10 to 690 V With power supply from measuring input min. 24 V, max. 230 V, see feature 6, lines 3 and 4			9
3 phase system: Input voltage = phase to phase voltage			

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## Transducer for Phase Angle Difference

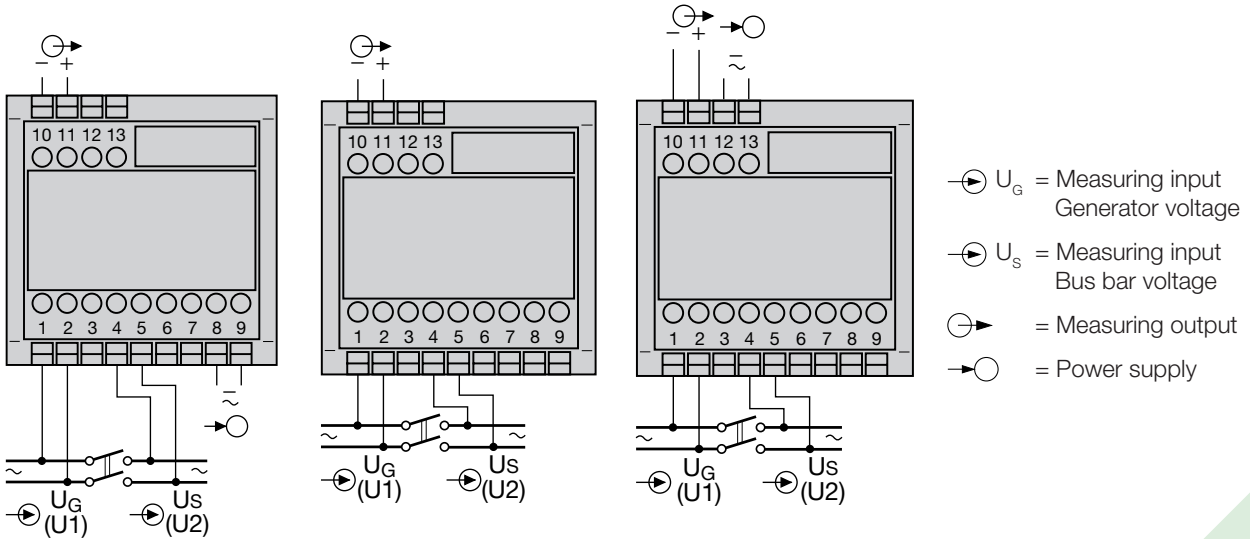
Description	*Blocking code	no-go with blocking code	Article No./ Feature
<b>SINEAX G 537</b> <span style="float: right;">Order code 537 - xxxx xxx</span>			537 -
<b>Features, Selection</b>			
<b>4. Measuring range</b> - 120 ... 0 ... 120 °el			1
Non-standard [°el] Measuring range within - 180 ... 0 ... + 180 °el, but unambiguous output value up to - 175 ... 0 ... + 175 °el; measuring span ≥ 20 °el			9
<b>5. Output signal</b> 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
<b>6. Power supply</b> 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> 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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## Transducer for Phase Angle Difference

### Electrical connections



### Dimensional drawing

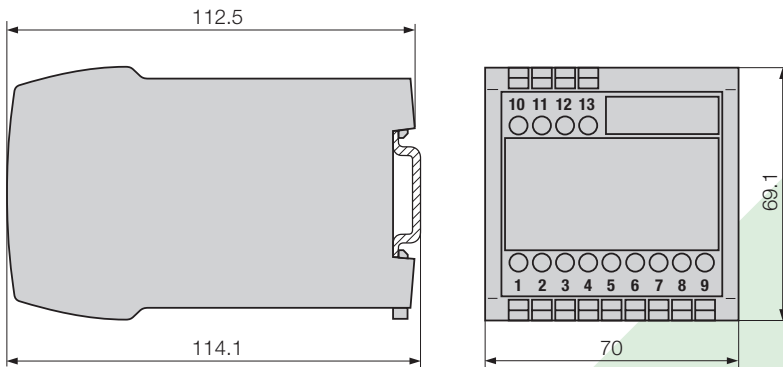


Fig. 5. Housing **P13/70** clipped onto a top-hat rail (35 x 15 or 35 x 7.5 mm, acc. to EN 50 022).

### Standard accessories

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

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