SINEAX G 537
Transducer for phase angle difference

CAMILLE BAUER

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	± 10 to < ± 180 °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**

Technical data

General

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

Measuring inputs

Measuring range:	See Section "Specification and ordering information"
Nominal frequency f_N:	50 or 60 Hz
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 · 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 × U_N [1]	---	perman.	---
2 × U_N [1]	10	1 s	10 s

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

Measuring output

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
Load capacity:	Max. 4 mA
Voltage limit under $R_{ext} = \infty$:	≤ 25 V
Current limit under overload:	Approx. 1.3 × I_{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

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Behaviour of output current in different operating states:

Operating state[1]		Output	
Generator voltage UG	Bus bar voltage US	unipolar	bipolar
leading ($f_G = f_S$)		$> I_{AN} / 2$	positive
missing[2]	nominal value	indefinite	indefinite
nominal value	missing[2]		
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: $\Delta\varphi = 90°$
Basic accuracy: Class 0.5

Reference conditions:

Ambient temperature: 15…30 °C
Input voltage: $U_G = 0.8 \ldots 1.2\ U_S$
Frequency: $f_N \pm 10\%$
Wave form: Sine
Power supply: At nominal range
Output burden: $\Delta\ R_{ext}$ 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 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 40 … 400 Hz)

Table 1: Rated voltages and permissible variations

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

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 **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: ≤ 4.0 mm² single wire or
2 × 2.5 mm² fine wire

Environmental conditions

Operating temperature: – 10 to + 55 °C

Storage temperature: – 40 to + 70 °C

Relative humidity of annual mean: ≤ 75%

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. 12 261-98 HH

Ambient category: C

Vibration: 0.7 g

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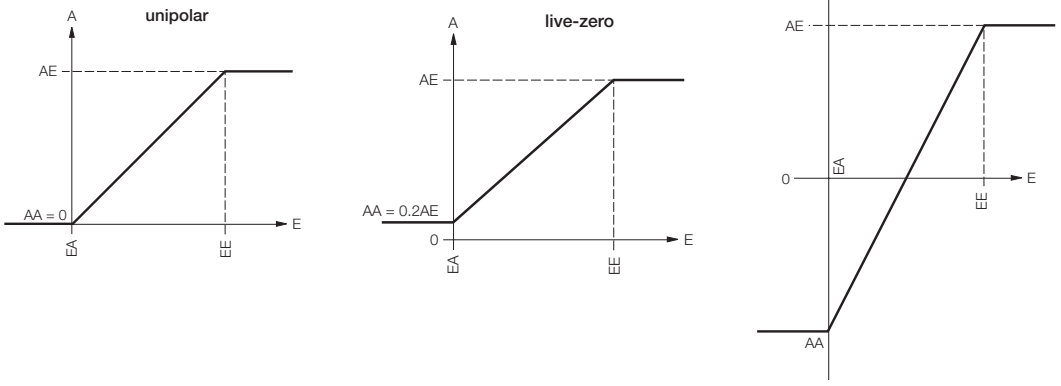
Output characteristic



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

Order Code **537 -**			
Features, Selection	*SCODE	no-go	
1. Mechanical design			
4) Housing P13/70 for rail mounting			4 . . . . .
2. Nominal input frequency			
1) 50 Hz			. 1 . . . . .
2) 60 Hz			. 2 . . . . .
9) Non-standard [Hz] ≥ 10 to 1500; With power supply from measuring input min. 40 Hz, max. 400 Hz			. 9 . . . . .
3. Nominal input voltage Generator and bus bar:			
1) U_N: 100 V	A		. . 1 . . . . .
2) U_N: 230 V	A		. . 2 . . . . .
9) Non-standard [V] ≥ 10.00 to 690; 3 phase system: Input voltage = phase to phase voltage With power supply from measuring input min. 24 V, max. 230 V, see feature 6, lines 3 and 4			. . 9 . . . . .
4. Measuring range			
1) – 120 … 0 … 120 °el			. . . 1 . . . .
9) Non-standard [°el] Measuring range within – 180…0…180, but unambiguous output value up to – 175…0…175 °el; measuring span ≤ 20 °el			. . . 9 . . . .
5. Output signal			
1) 0 … 20 mA			. . . . 1 . . .
2) 4 … 20 mA			. . . . 2 . . .
9) 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 . . .
A) 0 … 10 V			. . . . A . . .
Z) 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)			. . . . Z . . .
AA = Output start value, AE = Output end value			

Continuation of "Table 2: Specification and ordering information" see on next page!

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Continuation of “Table 2: Specification and ordering information”

Order Code **537 -**			
Features, Selection	*SCODE	no-go	
6. Power supply			
1) 85 … 230 V DC/AC			1 . . . . .
2) 24 … 60 V DC/AC			2 . . . . .
3) Internal from measuring input (24 V AC to 60 V AC)		A	3 . . . . .
4) Internal from measuring input (85 V AC to 230 V AC)			4 . . . . .
5) Connect to the low tension 24 V AC / 24 … 60 V DC			5 . . . . .
7. Response time			
1) 4 periods of the input frequency (Standard)			. 1 . . . . .
2) 2 periods of the input frequency			. 2 . . . . .
3) 8 periods of the input frequency			. 3 . . . . .
4) 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”.*

Electrical connections

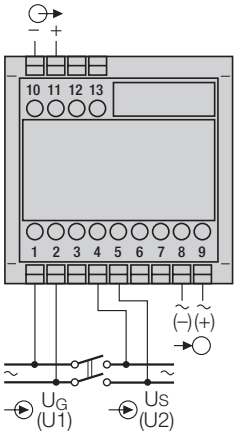

Fig. 2. Power supply connected to terminals 8 and 9.

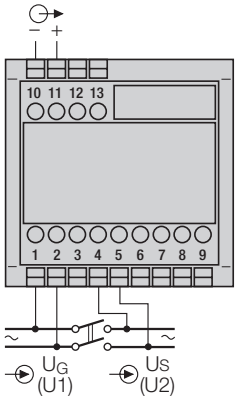

Fig. 3. Power supply internal from measuring input, without separated power supply.

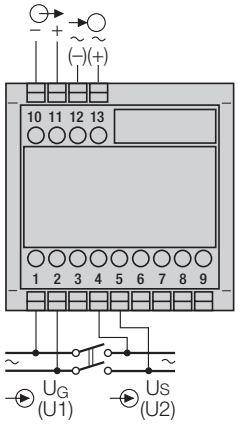

Fig. 4. Power supply connected to the low tension terminal side 12 and 13.

U_G = Measuring input Generator voltage

U_S = Measuring input Bus bar voltage

= Measuring output

= Power supply

Dimensional drawing

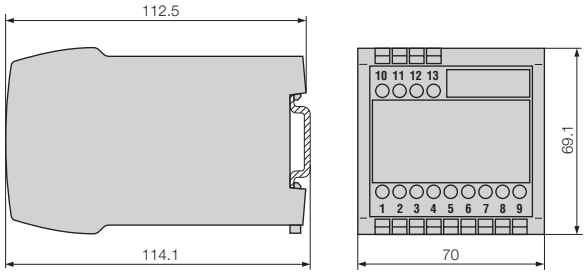

*Fig. 5. Housing **P13/70** clipped onto a top-hat rail (35 × 15 mm or 35 × 7.5 mm, acc. to EN 50 022).*

Standard accessories

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

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