CAMILLE BAUER

SINEAX G 536
Phase Angle or Power Factor Transducer

Carrying rail housing P13/70

*Fig. 1. Transducer SINEAX G 536 in housing **P13/70** clipped onto a top-hat rail.*

Application

The transducer **SINEAX G 536** (Fig. 1) measures the phase angle or power factor between current and voltage of a single or 3-phase balanced network having a sine wave form.

The output signal, in the form of a **load independent** DC current or voltage, is proportional to the phase angle resp. power factor between the 2 measured quantities current and voltage.

The transducer fulfils all the important requirements and regulations concerning electromagnetic compatibility **EMV** 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.

Features / Benefits

- **Measuring input: Sine, rectangular or distorted wave forms of input quantities with dominant fundamental wave**

Measured variables	Nominal input current	Nominal input voltage	Measuring range limits
Phase angle or power factor	0.5 to 6 A	10 to 690 V	Min. span 20 °el Max. span 360 °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**

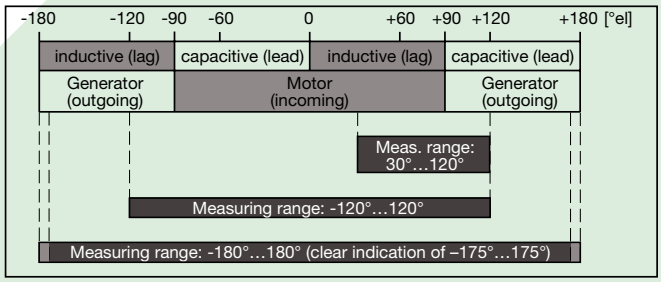
Technical data

General

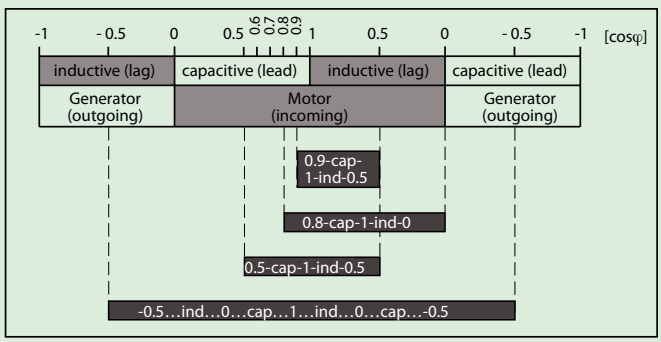
Measured quantity:	Phase angle or power factor between current and voltage
Measuring principle:	Measurement of the zero crossing interval

Measuring input

Examples of measuring ranges with φ-linear output



Examples of measuring ranges with cosφ-linear output



Nominal frequency f_N: 16 2/3 … 400 Hz

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Nominal input voltage U_N: 10 … 690 V
(max. 230 V with power supply from voltage measuring input)

Response sensitivity: 10 … 120% U_N

Nominal input current I_N: ≥ 0.5 to 6.0 A

Response sensitivity: < 1% I_N

Own consumption: < 0.1 VA per current path
U_N · 1.5 mA per voltage path

Overload capacity:

Input variables I_N .U_N	Number of applications	Duration of one application	Interval between two successive applications
1.2 x I_N	——	continuously	——
20 x I_N	10	1 s	100 s
1.2 x U_N [1]	——	continuously	——
2 x U_N [1]	10	1 s	10 s

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

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

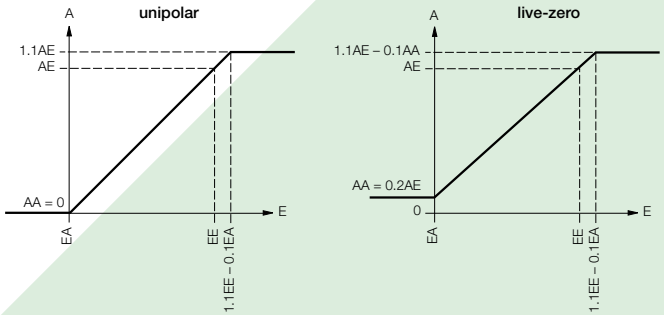
Current limit under overload: Approx. 30 mA

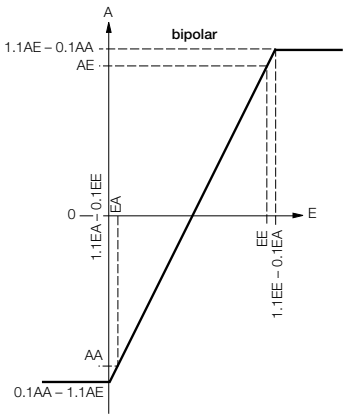
Residual ripple in output current: < 0.5% p.p.

Nominal value of response time: 4 periods of the nominal frequency

Other ranges: 2, 8 or 16 periods of the nominal frequency

Output characteristic





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

Accuracy (acc. to EN 60 688)

Reference value: $\Delta\varphi = 90°$ resp. $\Delta\cos\varphi = 0.5$

Basic accuracy: Class 0.5

Reference conditions

Ambient temperature: 15 … 30 °C

Input current: 0.8 … 1.2 I_N

Input voltage: 0.8 … 1.2 U_N

Frequency: f_N ± 10%

Wave forms: Sine wave

Power supply: At nominal range

Output burden: Δ R_{ext} max.

Additional errors (maxima):

Voltage influence between 0.5 and 1.5 U_N: ± 0.3%

Current influence
between 0.4 and 1.5 I_N: ± 0.3%
between 0.1 and 1.5 I_N: ± 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 (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

Test voltage (continuation):
3250 V, input circuits 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. 0.24 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 x 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
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

Table 2: Specification and ordering information

Description	*Blocking code	no-go with blocking code	Article No./ Feature
SINEAX G 536 **Order Code 536 - xxxx xxxx xx**			536 –
Features, Selection			
1. Mechanical design			
Housing P13/70 for rail mounting			4
2. Measuring mode			
For phase angle (φ-linear)	A		1
For power factor (cosφ-linear)	B		2

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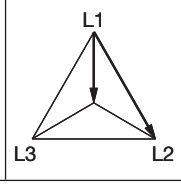
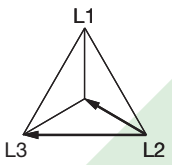
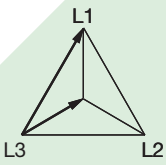
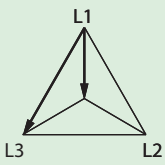
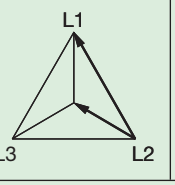
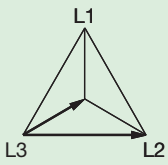
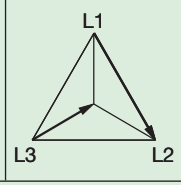
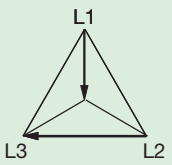
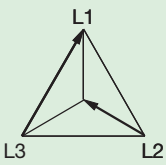
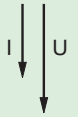
Description			*Blocking code	no-go with blocking code	Article No./ Feature
SINEAX G 536		**Order Code 536 - xxxx xxxx xx**			536 –
Features, Selection					
3. Application					
Single-phase AC					1
U: L1 & L2	I: L1	3 or 4-wire 3-phase balanced load			2
U: L2 & L3	I: L2	3 or 4-wire 3-phase balanced load			3
U: L3 & L1	I: L3	3 or 4-wire 3-phase balanced load			4
U: L1 & L3	I: L1	3 or 4-wire 3-phase balanced load			5
U: L2 & L1	I: L2	3 or 4-wire 3-phase balanced load			6
U: L3 & L2	I: L3	3 or 4-wire 3-phase balanced load			7
U: L1 & L2	I: L3	3 or 4-wire 3-phase balanced load			A
U: L2 & L3	I: L1	3 or 4-wire 3-phase balanced load			B
U: L3 & L1	I: L2	3 or 4-wire 3-phase balanced load			C
4. Nominal input frequency					
50 Hz					1
60 Hz					2
Non-standard [Hz] ≥ 10 to 400 Hz With power supply from measuring input min. 40 Hz					9
5. Nominal input voltage					
U_N = 100 V			C		1
U_N = 230 V			C		2
U_N = 400 V			D		3
Non-standard [V] ≥ 10 to 690 V With power supply from measuring input min. 24 V, max. 230 V, see feature 9, lines 3 and 4					9
3-phase system: Input voltage = phase to phase voltage					
6. Nominal input current					
1 A					1
5 A					2
Non-standard [A] ≥ 0.5 to 6.0 A					9
7. Measuring range					
Phase angle – 60 … 0 … + 60 °el				B	1
cosφ 0.5 … cap … 1 … ind … 0.5				A	2
Non-standard [°el] or [cosφ] Measuring range within – 180 … 0 … + 180 °el or – 1 … ind … 0 … cap … 1 … ind … 0 … cap … – 1, but clear indication only to – 175 … 0 … + 175 °el Measuring span ≥ 20 °el					9
8. 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)					Z
AA = Output start value, AE = Output end value					

Description	*Blocking code	no-go with blocking code	Article No./ Feature
SINEAX G 536 Order Code 536 - xxxx xxxx xx			536 –
Features, Selection			
9. Power supply			
85 … 230 V DC, AC			1
24 … 60 V DC, AC			2
Internal from measuring input (24 … 60 V AC)		C	3
Internal from measuring input (85 … 230 V AC)		CD	4
Connect to the low tension 24 V AC / 24 … 60 V DC			5
10. 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".*

Application notes

Current connection in phase	L1	L2	L3	L1	L2	L3
Voltage connection between	L1 & L2	L2 & L3	L3 & L1	L1 & L3	L2 & L1	L3 & L2
Vector diagrams						

Current connection in phase	L3	L1	L2	L
Voltage connection between	L1 & L2	L2 & L3	L3 & L1	L & N
Vector diagrams				

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Electrical connections

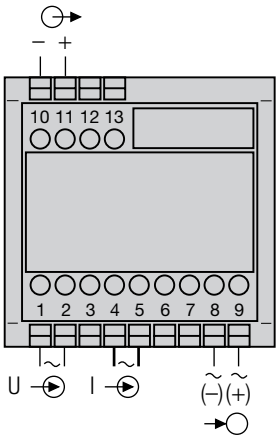


Fig. 2. Power supply connected to terminals 8 and 9.

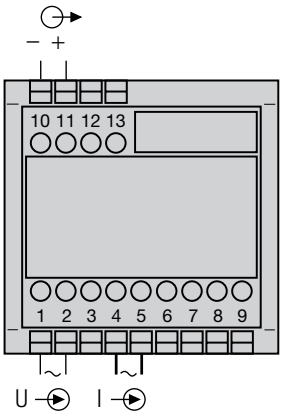


Fig. 3. Power supply internal from measuring input, without separated power supply.

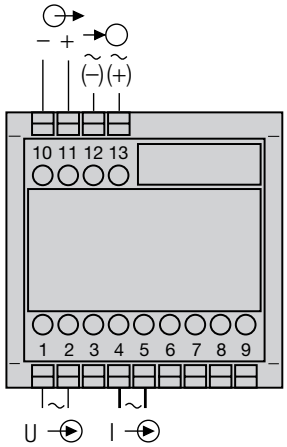
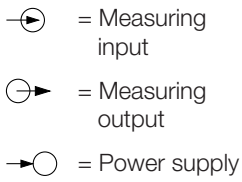
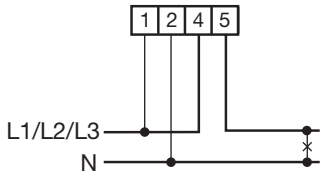
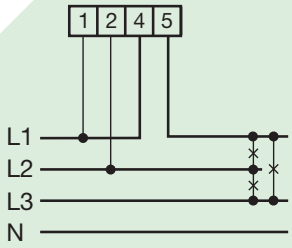
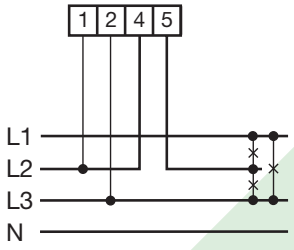
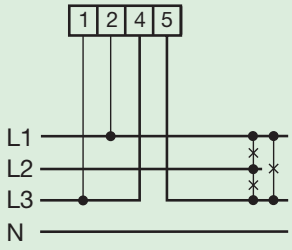
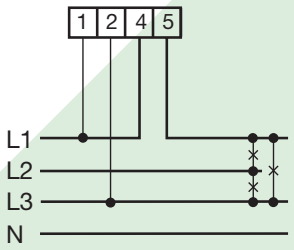
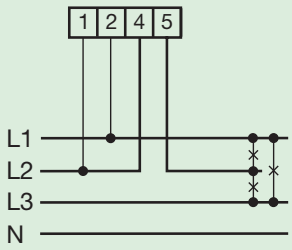
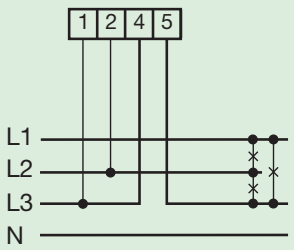
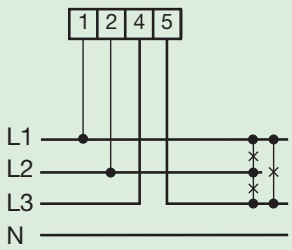


Fig. 4. Power supply connected to the low tension terminal side 12 and 13.



Measuring inputs			
Application	**Terminal allocation**	**Application**	**Terminal allocation**
Phase angle or power factor measurement in single-phase AC network		Phase angle or power factor measurement in 3 or 4-wire 3-phase network U: L1 & L2 I: L1	
Phase angle or power factor measurement in 3 or 4-wire 3-phase network U: L2 & L3 I: L2		Phase angle or power factor measurement in 3 or 4-wire 3-phase network U: L3 & L1 I: L3	
Phase angle or power factor measurement in 3 or 4-wire 3-phase network U: L1 & L3 I: L1		Phase angle or power factor measurement in 3 or 4-wire 3-phase network U: L2 & L1 I: L2	
Phase angle or power factor measurement in 3 or 4-wire 3-phase network U: L3 & L2 I: L3		Phase angle or power factor measurement in 3 or 4-wire 3-phase network U: L1 & L2 I: L3	

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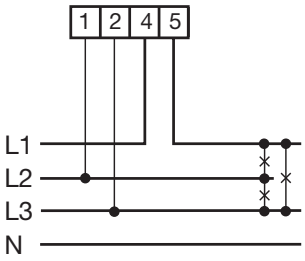
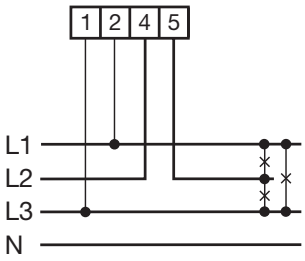
Measuring inputs			
Application	**Terminal allocation**	**Application**	**Terminal allocation**
Phase angle or power factor measurement in 3 or 4-wire 3-phase network U: L2 & L3 I: L1		Phase angle or power factor measurement in 3 or 4-wire 3-phase network U: L3 & L1 I: L2	

Dimensional drawing

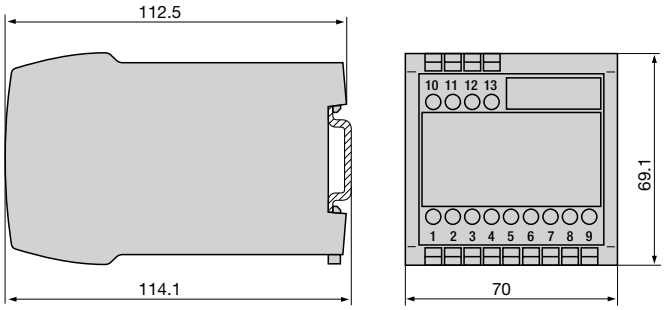


*Fig. 5. Housing **P13/70** clipped onto a top-hat rail (35 x 15 or 35 x 7.5 mm, acc. to EN 50 022).*

Standard accessories

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

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