CAMILLE BAUER

Преобразователь разницы частоты
SINEAX F535

SINEAX F535
Transducer for measuring frequency difference

Carrying rail housing P13/70

CE (GL) (CSA)

*Fig. 1. Transducer SINEAX F535 in housing **P13/70** clipped onto a top-hat rail.*

Application

The transducer **SINEAX F535** (Fig. 1) converts the frequency 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.

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
Frequency difference	10 to 690 V	$\Delta = \pm\, 1\%\, f_S$ to $\pm\, 80\%\, f_S$ $10\,Hz \leq f_G \leq 1000\,Hz$, $16\,Hz \leq f_S \leq 800\,Hz$

● Measuring output: Unipolar, bipolar or live zero output variables
● Measuring principle: Digital period measurement
● AC/DC power supply / Universal
● Standard as marine version per Lloyd's Register of Shipping

Technical data

General

Measured quantity: Frequency difference Δf

Measuring principle: Digital period measurement

Measuring inputs $\rightarrow\!\!\ominus$

Measuring range (f_S = bus bar f_G = generator): See Section "Specification and ordering information»

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

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]	——	continuously	——
$2 \times U_N$ [1]	10	1 s	10 s

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

Wave form: Any; fundamental wave only taken into account

Measuring output $\ominus\!\!\rightarrow$

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

Load capacity: Max. 4 mA

Voltage limit under $R_{ext} = \infty$: $\leq$ 25 V

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Current limit under
overload: Approx. 1.3 x 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

Behaviour of output current in different operating states:

Operating state[1]		Output	Display
Generator frequency	Bus frequency		
$f_G > f_S$		unipolar	$> I_{AN} / 2$
		bipolar	positive
missing[2]	nominal value	unipolar	approx. 0
		bipolar	approx. − 110% I_{AN}
nominal value	missing[2]	unipolar	approx. + 110% I_{AN}
		bipolar	
missing[2]	missing[2]	unipolar	approx. $I_{AN} / 2$
		bipolar	approx. 0

[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 0.2

Reference conditions
Ambient temperature 15 … 30 °C
Input voltage U_{min} to U_{max}
Distortion factor No influence
Power supply At nominal range
Output burden ΔR_{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, input
230 V, power supply
40 V, output

Test voltage: 50 Hz, 1 min. acc. to EN 61 010-1
3700 resp. 5550 V, input versus
all other circuits as well as outer
surface
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 ± 15%

or power supply from
voltage measuring input: 24 … 60 V AC or 85 … 230 V AC,
Note: 40 Hz ≤ f ≤ 400 Hz

Option: Connect to the low tension to ter-
minals 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: ≤ 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: ≤ 75%, no dew
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

Output characteristic

Legend:
E = Input
EA = Input start value
EE = Input end value
A = Output
AA = Output start value
AE = Output end value
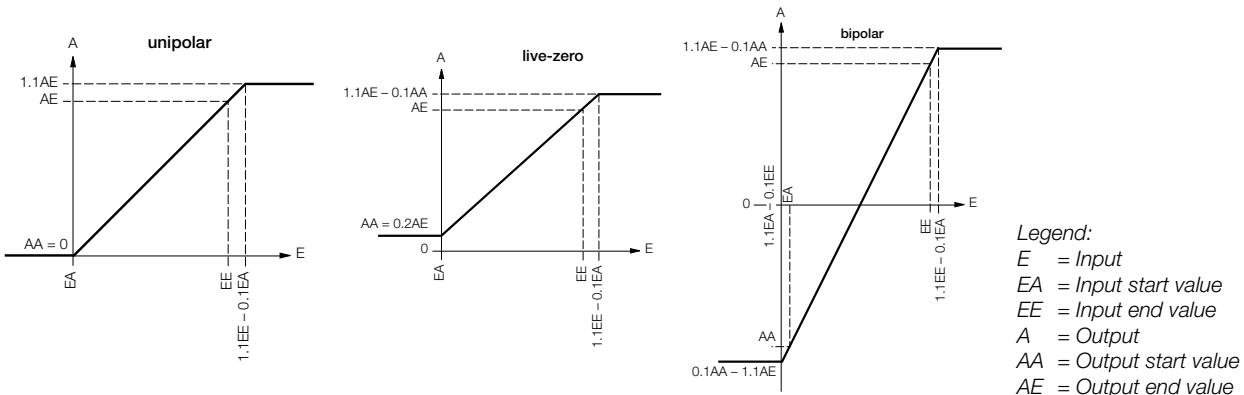
Table 2: Specification and ordering information

| Description		*Blocking code	no-go with blocking code	Article No./ Feature
SINEAX F535	**Order code 535 - xxxx xx**			535 –
Features, Selection				
1. Mechanical design				
Housing P13/70 for rail mounting				4
2. Nominal input voltage Generator and bus bar:				
U_N: 10 … 230 V				1
U_N: > 230 … 690 V Not possible with power supply from measuring input		A		2
3 phase system: Input voltage = phase to phase voltage				
3. Measuring range Frequency: Bus bar = f_S / Generator = f_G				
f_S = 50 Hz / f_G = 49.5 … 50 … 50.5 Hz				1
f_S = 50 Hz / f_G = 47.5 … 50 … 52.5 Hz				2
f_S = 50 Hz / f_G = 45 … 50 … 55 Hz				3
f_S = 50 Hz / f_G = 40 … 50 … 60 Hz				4
f_S = 60 Hz / f_G = 57.5 … 60 … 62.5 Hz				5
Non-standard limit values [Hz] $\Delta f \pm 1\% f_S$ to $\pm 80\% f_S$ $10\,Hz \le f_G \le 1000\,Hz$, $16\,Hz \le f_S \le 800\,Hz$ With power supply from measuring input: $40\,Hz \le f_S \le 400\,Hz$, see feature 5, lines 3 and 4				9
4. 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				

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Description		*Blocking code	no-go with blocking code	Article No./ Feature
SINEAX F535	**Order code 535 - xxxx xx**			535 –
Features, Selection				
5. 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)			A	4
Connect to the low tension 24 V AC / 24 … 60 V DC				5
6. 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 "Blocking code».

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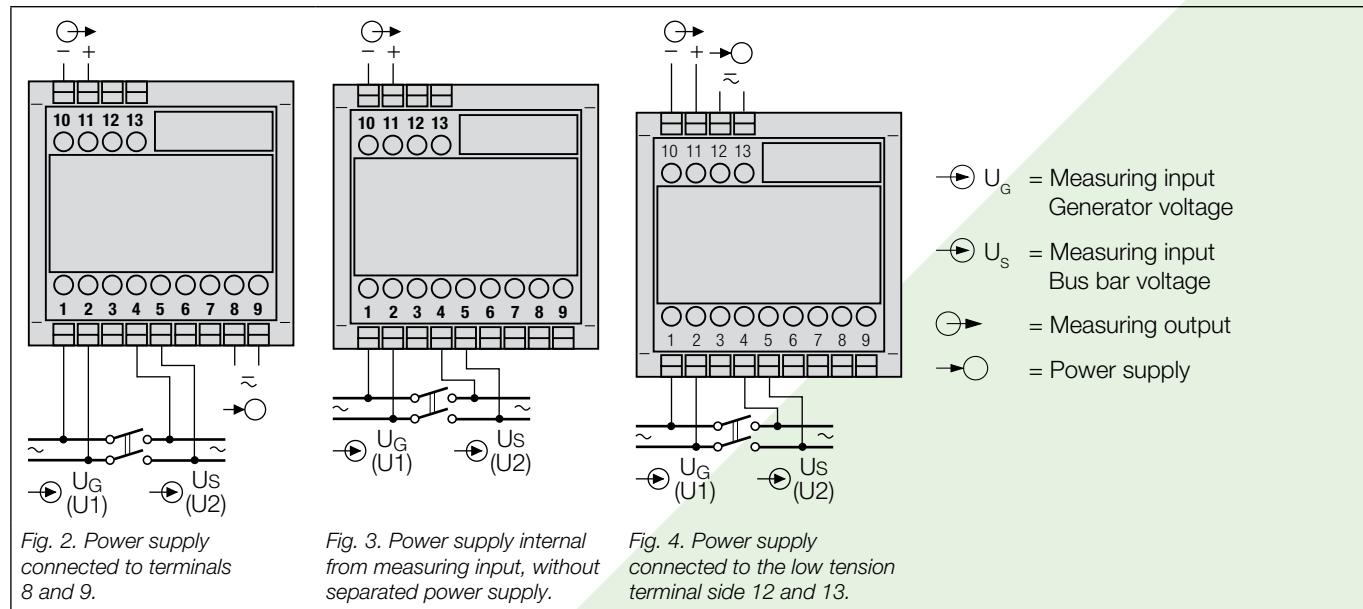
Dimensional drawing
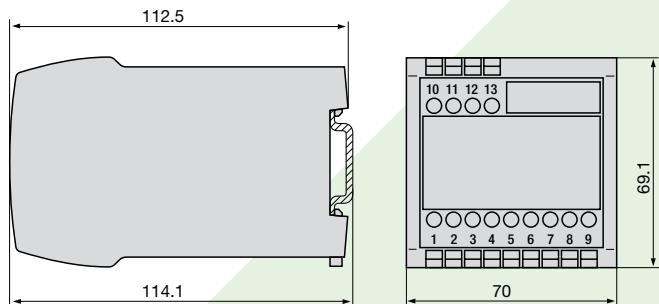
*Fig. 5. Housing **P13/70** clipped onto a top-hat rail (35 x 15 mm or 35 x 7.5 mm, acc. to EN 50 022).*

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Rely on us.

Standard accessories

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

PROCESS CONTROL ENGINEERING

TEMPERATURE

SIGNAL CONVERSION

PROCESS MANAGEMENT

ANGULAR POSITION ENGINEERING

ANGLE

POSITION

INCLINATION
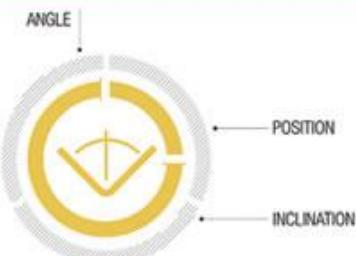
HEAVY CURRENT ENGINEERING

STATUS

ENERGY CONSUMPTION

QUALITY

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