



Technical Data Sheet

Theta E13



Fig. 1. Theta E13 clipped onto a top - hat rail.



Fig. 2. Theta E13 screw hole mounting brackets pulled out

Theta E13 convert a 3 sine waves AC voltage (upto 750V) or Current (upto 10A) of sine waveform into proportional 3 analog output load dependent Vdc or independent Idc based on arithmetical mean value measuring, calibration to RMS with sine waveform, AC or DC Aux supply

Application

The Transducer Theta E13 is used to convert a 3 sine wave AC Voltage or AC Current (depending on types) into a (load independent DC current or load independent DC Voltage) 3 output signal. That can serve several receiving instruments such as indicators, recorders, alarm units etc.

Product Features/ Benefits

- Up to 3 measuring inputs: AC currents or AC voltages sine wave-form, arithmetical mean value measurement, calibration to rms with sine wave form

Measuring Variables	Measuring Variables
AC Currents	0 ... 0.01 to 0 ... 10 A
AC Voltages	0 ... 10 to 0 ... 750 V

- Three measuring outputs: DC current signal (load-independent) or DC voltage signal
- Low power consumption / Smaller CT's & VT's can be used
- Provision for either snapping the transducer onto top - hat rails or securing it with screws to a wall or panel
- Manufactured in SMD technology/compact & reliable
- Screw terminals suitable for multistrand or thick solid wires.
- Electric isolation between input / output and power supply (3.7 kV) /personnel protection assured
- Electric isolation between channels is 500V

Layout & Mode of Operation

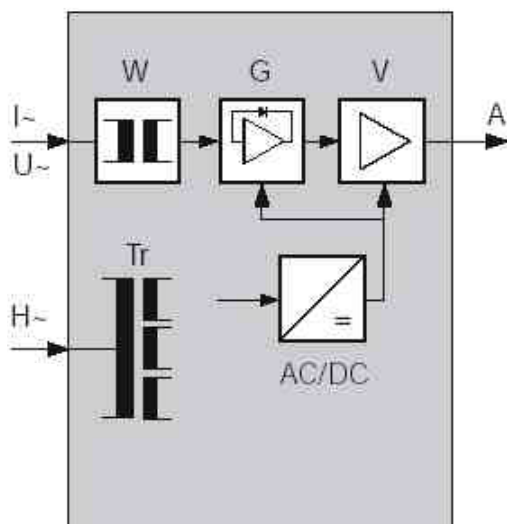


Fig : Block diagram for a function unit

The measured variable I/U AC is isolated from the electronics by the transformer W, and is rectified and smoothed in the rectifier unit G following. The output amplifier V amplifies this quantity and converts it into the load-independent DC output signal A. With AC power supply the supply is processed by a mains transformer with three isolated secondary windings.

Technical Data

General

Measuring Quantity	AC current or AC voltage sinusoidal Arithmetical mean measured, calibration to rms with sine wave form Active rectifier
Measuring principle	

Measuring input E \rightarrow

Nominal frequency f_N ①	50 or 60 Hz
Nominal input current I_N (full range end value) ②	1 / 1.2 / 5 or 6 A
Nominal input voltage U_N (full range end value) ③	100 $\sqrt{3}$ / 110 $\sqrt{3}$ / 120 $\sqrt{3}$ / 100 / 110 116.66 / 120 / 125 / 133.33 / 150 / 250 / 400 or 500 V
Consumption	< 0.2 VA per Current Circuit < 1 mA per Voltage Circuit
Sensitivity	< 0.05 % of full range value

Overload capacity :

Measured quantity I_N U_N	Number of applications	Duration of one application	Interval between two successive applications
2 x I_N	continuously	— — —	— — —
10 x I_N	5	15 s	5 min.
20 x I_N	5	1 s	5 min.
40 x I_N	1	1 s	— — —
1.5 x U_N	continuously	— — —	— — —
2 x U_N	10	10 s	10 s
4 x U_N	1	2 s	— — —

Measuring output A \rightarrow

Output Variable	load-independent DC voltage U_A OR Load-independent DC current I_A
Nominal Values of I_A ⑥⑦	0...1, 0...5, 0...10, 0...20 or 4...20 mA Burden voltage 15 V $R_{ext} \max. [kW] \leq \frac{15 V}{I_A [mA]}$ I_{AN} = End output current value
Nominal Values of U_A ④⑤	0...10 / 1...5 V Load capacity 20 mA External resistance $R_{ext} [k\Omega] \geq \frac{U_A [V]}{20 \text{ mA}}$
① to ⑦ see "Table 2: Special features"	
Voltage limit under $R_{ext} = \infty$ Voltage limit under overload Output current ripple Response time	Approx. 40 V Approx. 1.3 x I_{AN} at current output Approx. 30 mA at voltage output $\leq 1\%$ p.p. < 300 ms

Output characteristic

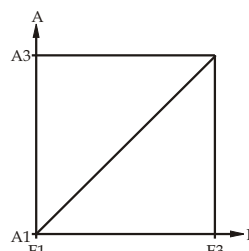


Fig. 4. Characteristic A "Standard".

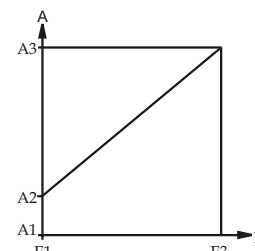


Fig. 5. Characteristic B "Standard and live-zero"
Condition: $A2 = 0.2 A3$

Accuracy (acc. to DIN/IEC 688-1)

Reference value: Basic accuracy:	Output span Class 0.5
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Reference conditions

Ambient temperature Pre-conditioning:	23 C, ± 5 K 30 min. acc. to EN 60 688 Section 4.3, Table 2
Input Frequency Distortion factor Power supply External resistance :	0...100% $f_N \pm 2\%$ < 0.2 % $U_{HN} \pm 15\%$ (AC) 0 - $R_{ext} \max.$ for current output $R_{ext} \min. \dots \infty$ for voltage output
Output Voltage Output current	0...15 V 0...20 mA

Influence effects (maxima)

Linearity error	$\pm 0.2\%$
frequency influence $f_N \pm 5\%$	$\pm 0.05\%$
Dependence on external resistance ($\Delta R_{ext} \max.$)	$\pm 0.05\%$
Power supply influence $U_{HN} \pm 10\%$	$\pm 0.05\%$

Additional errors

Temperature influence - 25...+ 55 °C)	$\pm 0.5\%$ / 10 K
Frequency influence 45 - 65 Hz	$\pm 0.5\%$
Frequency influence Stray field influence 0,5 mT	$\pm 0.5\%$
Influence of common mode voltage 220V, 50Hz or 10V, 1MHz	$\pm 0.5\%$

Power supply

AC voltage	110 or 230 V $\pm 10\%$, 50/ 60Hz Power input approx. 8 VA 85...230V AC/DC AUX 24...60V AC/DC AUX For DC AUX : -15% / +33% For AC AUX : $\pm 15\%$
Input VA Burden :	9VA (DC) 10VA (AC)

Environmental conditions

Climate rating	Climate class 3Z acc. to VDI / VDE 3540, but temperature continuously -25 to +55°C Relative humidity < 75% annual mean (application class HVC acc. to DIN 40 040)
Storage temperature	-40 to +70°C

Table 1 : Electromagnetic compatibility

DIN / IEC 688- Part 1	Transducer for converting AC electrical quantities into DC electrical quantity. Transducer for general applications
DIN 57410	Electrical Standards
DIN 57110 b	Insulation Group: A (instrument), C (terminals)
EN 50022	For snapping into top hat rail.

Electromagnetic Compatibility Standards Acc. to EN 50081-2 And EN 50082-2

EN 55011	Conducted interference from the instrument	Group 1, Class A	Complies
EN 55011	HF radiation from the complete instrument	Group 1, Class A	Complies
IEC 801-2	Electrostatic Discharge on instruments	± 4 KV contact ± 8 KV air	Without Influence
IEC 801-3 HF	field influence on instruments	27...500MHz : 3 V/m, not modulated(ITU frequencies: 10 V/m)	Influence < 2%
IEC 801-4	Electrical Fast Transients/burst influence power, supply lines	± 2KV, 5/50 ns, 5KHz, asymmetrical, 2 min	Influence < 2%
IEC 801-4	Electrical Fast Transients/burst influence power, input and output lines	± 1KV, 5/50 ns, 5KHz, 2 min. Capacitive coupled.	Without Influence
IEC 801-5	Surge immunity requirements coupled under power supply lines	symmetrical ± 1KV asymmetrical ± 2KV	Without Influence

Regulations

Electrical standards	Acc. to DIN 57 410
Housing protection	IP 40 acc. to IEC 529
Insulation group acc. to DIN 57 110 b	A (Instrument) C (Terminals)
Test voltage	3.7 kV / 50 Hz / 1min. between electrically insulated circuits. 0.5 kV, 50Hz, 1 min. between any two channels
Test voltage	3.7 kV / 50 Hz / 1min. between electrically insulated circuits. 0.5 kV, 50Hz, 1 min. between any two channels

Installation Data

Mechanical Drawing	Carrying rail housing type E16 Dimensions see section "Dimensional drawing"
Material of Housing	Lexan 940 (polycarbonate), Flammability Class V-0 according to UL 94, self-extinguishing, non-dripping, free of halogen
Mounting	Mounting For snapping onto top - hat rail (35 x 15 mm or 35 x 7.5 mm) acc. to EN 50 022 OR Directly onto a wall or panel using the pull-out screw hole brackets
Mounting Position	Any
Electrical connections	Screw - type terminals with indirect wire presire, for max. 2 x 2.5 mm ² or 1 x 6 mm
Weight	Approx. 0.9 kg.

Table : 1 : Special features

Nominal frequency f_N

① between ≥ 16 to 400 Hz, besides the standard ranges 50 / 60 Hz

Nominal input current I_N

② Between 0...0.01 to 0...10 A, besides the standard ranges 0...1 / 0...1.2 / 0...5 and 0...6 A

Restrictions :

With $I_N > 5$ A : N

Own consumption < 0.3 VA

Overload capacity : 15 A continuously

100 A for 10 s, max. 5 times at 5 minute intervals

250 A for 1 s, once only

Nominal frequency $f_N \geq 40$ Hz

With $I_N > 8.3$ A : N

Reference conditions $I_E \leq 10$ A

Nominal input voltage U_N

③ Between 0...10 and 0...750 V, besides the standard ranges 0...100 / $\sqrt{3}$ / 0...110 / $\sqrt{3}$ / 0...120 / $\sqrt{3}$ / 0...100 / 0...110 / 0...116.66 / 0...120 / 0...125 / 0...133.33 / 0...150 / 0...250 / 0...400 and 0...500 V

Restrictions :

With $U_N > 500$ V :

Overload capacity 2000 V, 2 s

Output signal A (measuring output A)

④ Load-independent DC voltage unipolar
Ranges between 0...1 and 0...15 V, besides the standard range 0...10 V

⑤ Live-zero
Ranges between 0.2...1 and 3...15 V, besides the standard range 1...5 V

Output signal A (measuring output A)

⑥ Load-independent DC voltage unipolar
Ranges between 0...1 and 0...20 mA, besides the standard ranges 0...1/0...5/0...10 and 0...20 mA

⑦ Live-zero
Ranges between 1.5 and 4...20 mA, besides the standard range 4...20 mA

Electrical connections

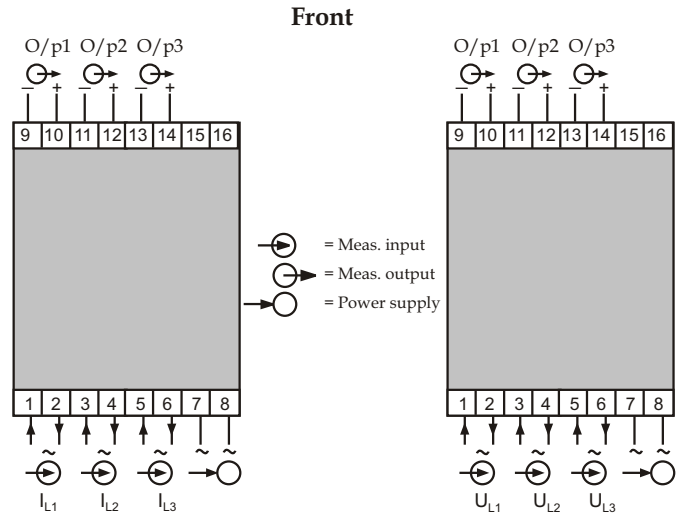


Fig. 6. Ducer E13 for AC current measurement.

Fig. 7. Ducer E13 for AC voltage measurement.

Dimensional Drawings

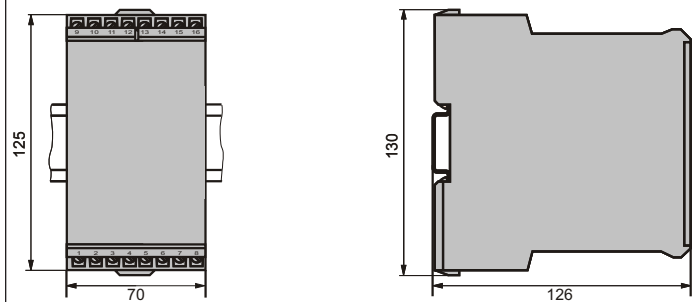


Fig. 9. Ducer E13 in housing E16 clipped onto a top hat rail (35 x 15 mm or 35 x 7.5 mm) acc. to EN 50022

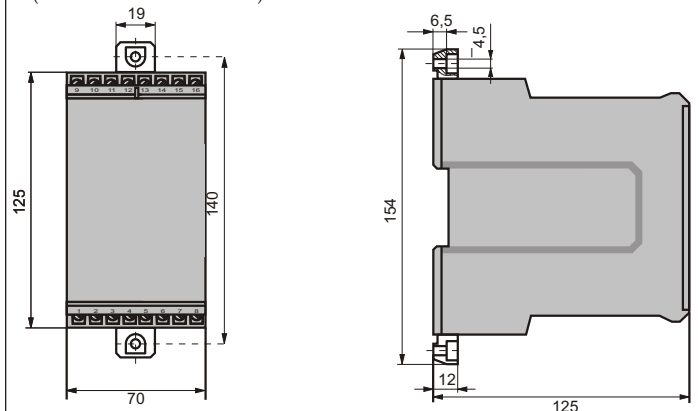


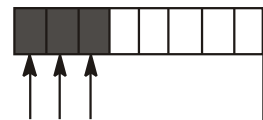
Fig.10. Ducer E13 in housing E16 with the screw hole brackets pulled out for wall mounting.

Specification and Ordering Information

Order Code E-13 –						
Features, Selection	*SCODE	no-go				
1. Mechanical design 3) Housing E16						↑ ↑ ↑ ↑ ↑ 3
2. Nominal frequency 1) 50 / 60 Hz						. . . 1
2) non-standard [Hz] █						. . . 9
3. Input E1 (measuring input E) 1) 0 ... 1 A	A	B				. . . 1
2) 0 ... 1.2 A	A	B				. . . 2
3) 0 ... 5 A	A	B				. . . 3
4) 0 ... 6 A	A	B				. . . 4
9) Non-standard [A] █ 0...0.01 to 0...10 A ②	A	B				. . . 9
A) 0...100 / √3 V	B	A				. . . A
B) 0...110 / √3 V	B	A				. . . B
C) 0...120 / √3 V	B	A				. . . C
D) 0...100 V	B	A				. . . D
E) 0...110 V	B	A				. . . E
F) 0...116.66 V	B	A				. . . F
G) 0...120 V	B	A				. . . G
H) 0...125 V	B	A				. . . H
J) 0...133.33 V	B	A				. . . J
K) 0...150 V	B	A				. . . K
L) 0...250 V	B	A				. . . L
M) 0... 400 V	B	A				. . . M
N) 0... 500 V	B	A				. . . N
Z) Not-standard [V] █ 0...10.00 to 0...750 V ③	B	A				. . . Z
4. Input E2 (measuring input E) 1) 0...1 A	A	B				. . . 1
2) 0...1.2 A	A	B				. . . 2
3) 0...5 A	A	B				. . . 3
4) 0...6 A	A	B				. . . 4
9) Non-standard ② [A] █ 0...0.01 to 0...10 A	A	B				. . . 9
A) 0...100 / 3 V	B	A				. . . A
B) 0...110 / 3 V	B	A				. . . B
C) 0...120 / 3 V	B	A				. . . C
D) 0...100 V	B	A				. . . D
E) 0...110 V	B	A				. . . E
F) 0...116.66 V	B	A				. . . F
G) 0...120 V	B	A				. . . G
H) 0...125 V	B	A				. . . H
J) 0...133.33 V	B	A				. . . J
K) 0...150 V	B	A				. . . K
L) 0...250 V	B	A				. . . L
M) 0...400 V	B	A				. . . M
N) 0...500 V	B	A				. . . N
Z) Non-standard [A] █ 0...10.00 to 0...750 V ③	B	A				. . . Z

①, ② and ③ see "Table 1: Special features"

Order Code E-13 –			
Features, Selection	*SCODE	no-go	
5. Input E3 (Measuring input E)			
1) 0...1 A	A	B	
2) 0...1.2 A	A	B	
3) 0...5 A	A	B	
4) 0...6 A	A	B	
9) Non-standard 0...0.01 to 0...10 ② [A] █	A	B	
A) 0...100/√3 V	B	A	
B) 0...110/√3 V	B	A	
C) 0...120/√3 V	B	A	
D) 0...100 V	B	A	
E) 0...110 V	B	A	
F) 0...116.66 V	B	A	
G) 0...120 V	B	A	
H) 0...125 V	B	A	
J) 0...133.33 V	B	A	
K) 0...150 V	B	A	
L) 0...250 V	B	A	
M) 0...400 V	B	A	
N) 0...500 V	B	A	
Z) Not-standard 0...10.00 to 0...750 ③ [V] █	B	A	
6. Output signal 1 (measuring output)			
1) 0...10 V, R _{ext} ≥ 500 Ω			
2) 1... 5 V, R _{ext} ≥ 250 Ω			
9) Non-standard 0 ...1.00 to 0...15 ④ [V] █ 0.2...1 to 3...15 ⑤			
A) 0... 1 mA, R _{ext} ≤ 15 kΩ			
B) 0... 5 mA, R _{ext} ≤ 3 kΩ			
C) 0...10 mA, R _{ext} ≤ 1.5 kΩ			
D) 0...20 mA, R _{ext} ≤ 750 Ω			
E) 4...20 mA, R _{ext} ≤ 750 Ω			
Z) Non-standard 0... > 1.00 to 0... < 20 ⑥ [mA] █ 1...5 to < (4...20) ⑦			
7. Output signal 2 (measuring output)			
1) 0...10 V, R _{ext} ≥ 500 Ω			
2) 1... 5 V, R _{ext} ≥ 250 Ω			
9) Non-standard 0 ...1.00 to 0...15 ④ [V] █ 0.2...1 to 3...15 ⑤			
A) 0... 1 mA, R _{ext} ≤ 15 kΩ			
B) 0... 5 mA, R _{ext} ≤ 3 kΩ			
C) 0...10 mA, R _{ext} ≤ 1.5 kΩ			
D) 0...20 mA, R _{ext} ≤ 750 Ω			
E) 4...20 mA, R _{ext} ≤ 750 Ω			
Z) Non-standard 0... > 1.00 to 0... < 20 ⑥ [mA] █ 1...5 to < (4...20) ⑦			
8. Output signal 3 (measuring output)			
1) 0...10 V, R _{ext} ≥ 500 Ω			
2) 1... 5 V, R _{ext} ≥ 250 Ω			
9) Non-standard 0 ...1.00 to 0...15 ④ [V] █ 0.2...1 to 3...15 ⑤			
A) 0... 1 mA, R _{ext} ≤ 15 kΩ			
B) 0... 5 mA, R _{ext} ≤ 3 kΩ			





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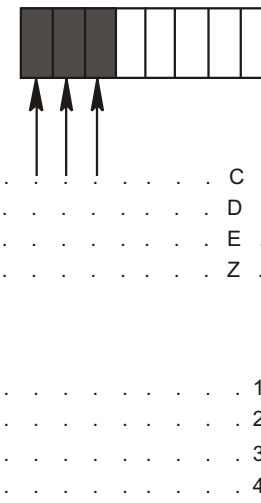
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② to ⑦ see "Table 2: Special features"

Order Code E-13 – 		
Features, Selection	*SCODE	no-go
C) 0...10 mA, $R_{ext} \leq 1.5 \text{ kW}$		
D) 0...20 mA, $R_{ext} \leq 750 \text{ W}$		
E) 4...20 mA, $R_{ext} \leq 750 \text{ W}$		
Z) Non-standard 0...> 1.00 to 0...< 20 $\text{\textcircled{6}}$ [mA]  1...5 to < (4...20) $\text{\textcircled{7}}$		
9. Power supply		
1) 110 V, 50/60 Hz		
2) 230 V, 50/60 Hz		
3) 24...60 V AC/DC		
4) 85...230 V AC/DC		



$\text{\textcircled{4}}$ to $\text{\textcircled{7}}$ see "Table 1: Special features"



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