RISH *Ducer* E13 3 channel transducer for AC current and voltage

The **RISH** *Ducer* E13 (Fig. 1) converts 3 sine wave AC current or AC voltage into 3 output signals that can serve several receiving instruments such as indicators, recorders, alarm units etc.

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**

Measured variables	Measuring range limits
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 and 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 and reliable**
- **Screw terminals suitable for multistoried or thick solid wires.**
- **Electric isolation between input / output and power supply (3.7 kV) / personnel protection assured**
- **Electric isolation between channels is 500V**

Fig.1*. RISH Ducer E 13 transducer screw hole mountion brackets pulled out.*

Layout and mode of operation

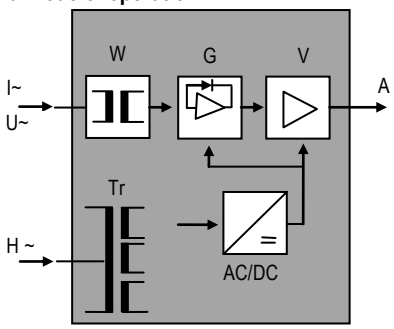

Fig. 3*. Block diagram for a function unit.*

The measured variable I/U AC is isolated from the electronics by the transformer W, and is rectified and smoothed in thev 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

Measured quantity: AC current or AC voltage sinusoidal
Arithmetical mean measured, calibration to rms with sine wave form

Measuring principle: Active rectifier

Measuring input E ⊖→

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/ 3, 110/ 3 / 120/ 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 end value

Overload capacity:

Measured Variable 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.
40 x I_N[1]	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 ⊖→

Output variable : Load-independent DC current I_A
or
Nominal values of I_A ⑥⑦ : load-independent DC voltage U_A
0…1, 0…5, 0…10, 0…20 or 4…20 mA
Burden voltage 15 V
R_{ext} max. [kΩ] = 15 V / I_{AN} [mA]
I_{AN} = End output curr

Nominal value of U_A ④⑤
0…10 or 1…5 V
Load capacity 20 mA
External resistance
R_{ext} max. [kΩ] = U_A / 20 mA

Voltage limit under $R_{ext.} = \infty$: Approx. 40V
Current limit under overload: Approx. 1.3 x I_{AN} at current output
Approx. 30 mA at voltage output
Output current ripple: ≤ 1% p.p.
Response time: < 300 ms

① to ⑦ see "Table 2: special features"

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

Reference value:	Output span
Basic accuracy:	Class 0.5

Reference conditions

Ambient temperature	23 °C, ± 5 K
Pre-conditioning:	30 min. acc. to EN 60 688 Section 4.3, Table 2
input	0…100%
Frequency	f_N ±2%
Distortion factor	< 0.2%
Power supply	U_{HN} ±1%
External resistance :	0 – R_{ext} max. for current output R_{ext} min. ….∞ for voltage output
Output voltage :	0...15 V
Output current :	0...20 mA

Influence effects (maxima)
(included in basic error)

Linearity error	± 0.2%
Frequency f_N ± 5 %	± 0.05%
Dependence on external resistance Δ R_{ext} max.	± 0.2%
Power supply influence U_H ± 10 %	

Additional errors

Temperature influence (– 25…+ 55 °C)	± 0.5% / 10 K
Frequency influence 45 – 65 Hz	± 0.5%
Stray field influence 0,5 mT Influence of common mode	± 0.5%
voltage 220V, 50Hz or 10V,1Mz	± 0.5%

Output characteristic

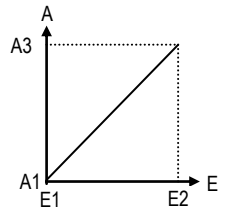


Fig.4. *Characteristic A "Standard"*

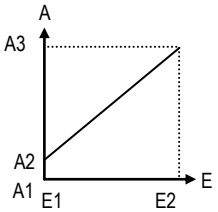


Fig.5. *Characteristic B "Standard and live-zero"*
Condition: A2 = 0.2 A3

Power supply →◯
AC voltage :
110 or 230 V
± 10%, 50 / 60 Hz
Power input approx. 8 VA

Installation data

Mechanical design:	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, nondripping, free of halogen
Mounting:	For snapping onto top-hat rail (35 x 15 mm or 35 x 7.5 mm) acc. to EN 50022 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 pressure, for max. 2 x 2.5 mm^2 or 1 x 6 mm^2
Weight:	Approx. 0.9 kg

Regulations

Electrical standards:	Acc. to DIN 57 410
Housing protection:	IP 40 acc. to IEC 529
Test voltage:	3.7 kV, 50 Hz, 1 min. between electrically insulated circuits. 0.5 kV, 50Hz, 1 min. between any two channels.

Environmental conditions

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

RISH *Ducer* E13 3 channel transducer for AC current and voltage

Table 1: Specification and ordering information

Order Code E13 –										
Features, Selection	***SCODE**	**no-go**	↑	↑	↑	↑	↑			
1.Mechanical design										
3) Housing E16			3	.	.	.	.	.	.	.
2. Nominal frequency										
1) 50 / 60 Hz			.	.	1	.	.	.	.	.
2) non-standard [Hz] ≥16 to 400 [1]			.	.	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	.	.	.

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

Order Code E13 –			
Features, Selection	***SCODE**	**no-go**	
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
5. Input E3 (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 [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 [3]	B	A	Z
6. Output signal 1 (measuring output)			
1) 0...10 V, $R_{ext} \geq 500\ \Omega$			1
2) 1… 5 V, $R_{ext} \geq 250\ \Omega$			2
9) Non-standard 0 …1.00 to 0…15 [4] [V] 0.2…1 to 3…15 [5]			9
A) 0… 1 mA, $R_{ext} \leq 15\ k\Omega$			A
B) 0… 5 mA, $R_{ext} \leq 3\ k\Omega$			B
C) 0…10 mA, $R_{ext} \leq 1.5\ k\Omega$			C
D) 0…20 mA, $R_{ext} \leq 750\ \Omega$			D
E) 4…20 mA, $R_{ext} \leq 750\ \Omega$			E
Z) Non-standard 0…>1.00 to 0.< 20 [6] [mA] 1…5 to < (4 …20) [7]			Z

Order Code E13 –			
Features, Selection	***SCODE**	**no-go**	
7. Output signal 2 (measuring output)			
1) 0...10 V, R_{ext} ≥ 500 Ω			1
2) 1...5 V, R_{ext} ≥ 250 Ω			2
9) Non-standard 0 …1.00 to 0…15 [4] [V] 0.2…1 to 3…15 [5]			9
A) 0… 1 mA, $R_{ext.}$ ≤ 15 kW			A
B) 0… 5 mA, $R_{ext.}$ ≤ 3 kΩ			B
C) 0…10 mA, $R_{ext.}$ ≤ 1.5 kΩ			C
D) 0…20 mA, $R_{ext.}$ ≤ 750 Ω			D
E) 4…20 mA, $R_{ext.}$ ≤ 750 Ω			E
Z) Non-standard 0…> 1.00 to 0…< 20 [6] [mA] 1…5 to < (4…20) [7]			Z
8. Output signal 3 (measuring output)			
1) 0...10 V, R_{ext} ≥ 500 Ω			1
2) 1...5 V, R_{ext} ≥ 250 Ω			2
9) Non-standard 0 …1.00 to 0…15 [4] [V] 0.2…1 to 3…15 [5]			9
A) 0… 1 mA, $R_{ext.}$ ≤ 15 kΩ			A
B) 0… 5 mA, $R_{ext.}$ ≤ 3 kΩ			B
C) 0…10 mA, $R_{ext.}$ ≤ 1.5 kΩ			C
D) 0…20 mA, $R_{ext.}$ ≤ 750 Ω			D
E) 4…20 mA, $R_{ext.}$ ≤ 750 Ω			E
Z) Non-standard 0…> 1.00 to 0…< 20 [6] [mA] 1…5 to < (4…20) [7]			Z
9. Power supply			
1) 110 V, 50/60 Hz			1
2) 230 V,50/60 Hz			2

4 to 7 see "Table 2: special features"

Table 2: Special features

Nature of 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: 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 40 Hz With I_N > 8.3 A: Reference conditions I_E ≤ 10 A

Nature of special features		
Nominal input voltage U_N		
3	between 0...10 and 0...750 V, besides the standard ranges 0...100/ 3 / 0...110/ 3 /0...120/ 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 Restriction: 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	

Nature of special features	
Output signal A (measuring output A)	
6	Load-independent DC current 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

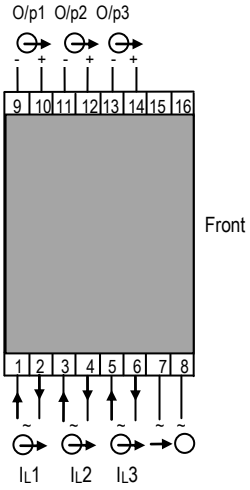


Fig. 6. RISH *Ducer* E13
for AC current measurement

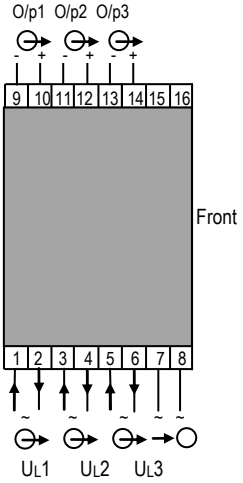
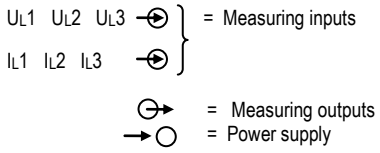


Fig. 7. RISH *Ducer* E 13
for AC voltage measurement



Dimensional drawings

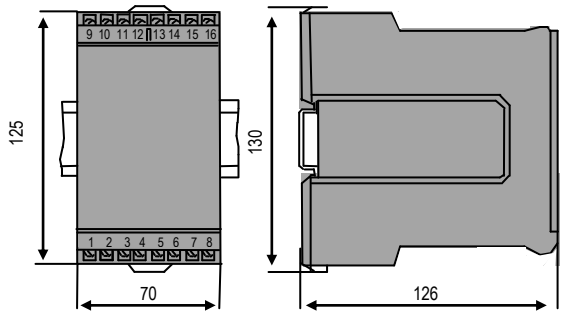


Fig. 8. RISH *Ducer* E13 in housing E16 clipped onto a top hat rail (35 x 15 mm or 35 x 7.5 mm) acc. to EN 50022

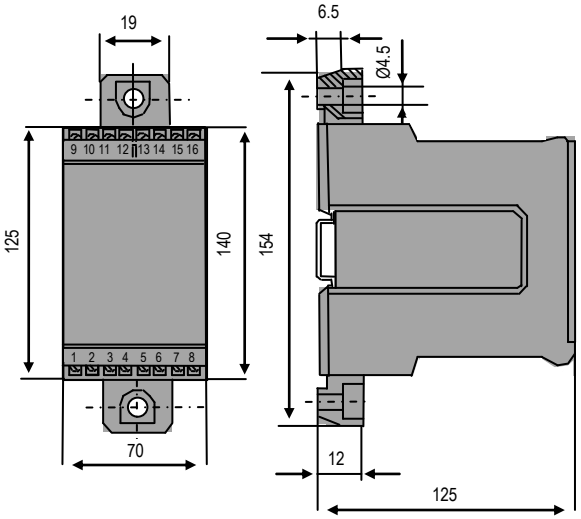


***Fig.* 9.** RISH *Ducer* E13 in housing E16 with the screw hole brackets pulled out for wall mounting.