RISHABH

Data Sheet

RISH Ducer E13

Transducer - AC Current / AC Voltage

RoHS CE

Measure Control Record Analyze Optimize

Application

The Transducer *RISH* DuceE13 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.

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 Ranges
AC Currents AC Voltages	0 ... 0.01 to 0 ... 10 A 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

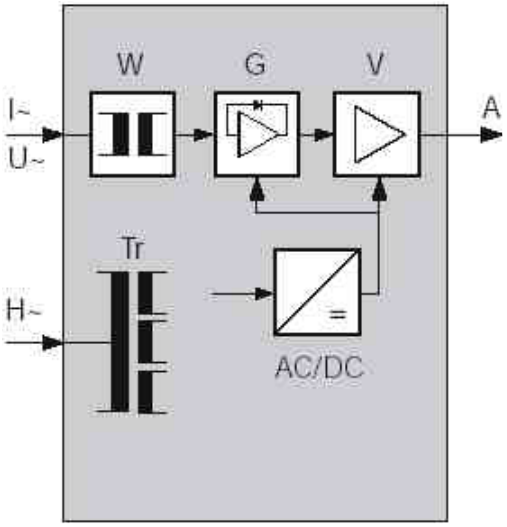

Fig : Block diagram for a function unit

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
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 value

Overload capacity :

Measured quantity I_N U_N	Number of appli-cations	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

Output Variable	load-independent DC voltage U_A OR Load-independent DC current I_A
Nominal Values of I_A (6) (7)	0…1, 0…5, 0…10, 0…20 or 4…20 mA Burden voltage 15 V $R_{ext}\,\text{max.}\,[k\Omega] \le \frac{15\ V}{I_A\ [mA]}$ I_{AN} = End output current value
Nominal Values of U_A (4) (5)	0...10 / 1...5 V Load capacity 20 mA External resistance $R_{ext}\ [k\Omega] \ge \frac{U_A[V]}{20\ mA}$

(1) to (7) see "Table 2: Special features"

Voltage limit

under $R_{ext} = \infty$	Approx. 40 V
Voltage 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

Output characteristic

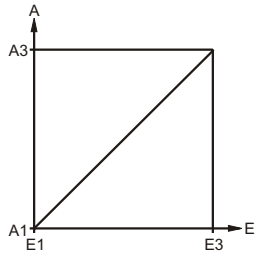

Fig. 4. Characteristic A "Standard".

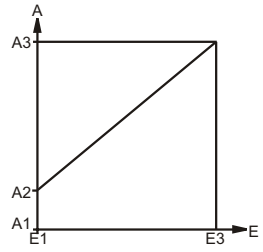

Fig. 5. Characteristic B Standard and live-zero" Condition: A2 = 0.2 A3

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

Reference value:	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} ± 15% (AC)
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 influence f_N ± 5%	± 0.05%
Dependence on external resistance (Δ R_{ext} max.)	± 0.05%
Power supply influence U_{HN} ±10%	± 0.05%

Additional errors

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

Power supply

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

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	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 brackerts
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

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
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 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

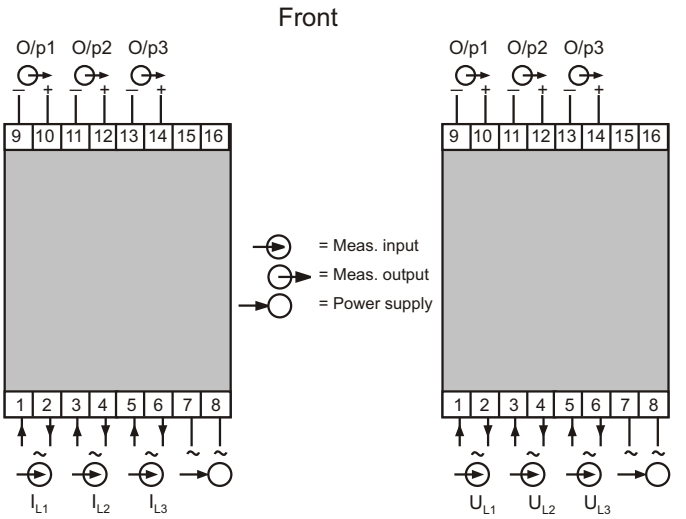

Fig. 6. *RISH* DuceE13 for AC current measurement.

Fig. 7. RISH DuceE13 for AC voltage measurement.

Dimensional Drawings

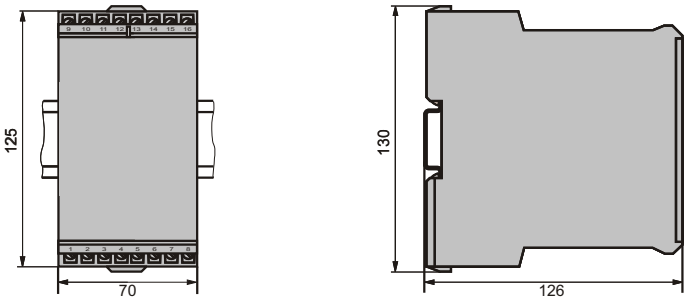

Fig. 9. *RISH* DuceE13 in housing E16 clipped onto a top hat rail (35 x 15 mm or 35 x 7.5 mm) acc. to EN 50022

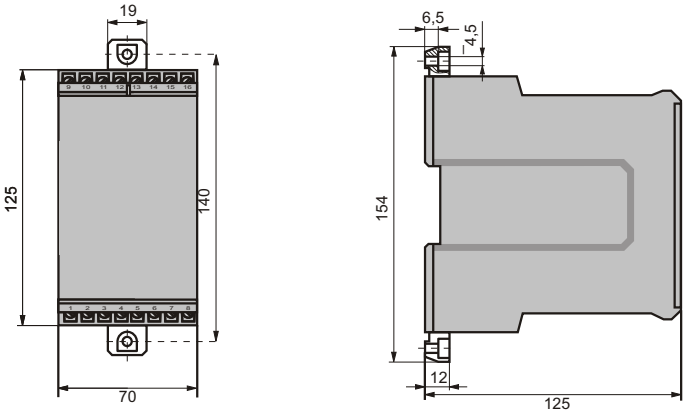

Fig.10. *RISH* DuceE13 in housing E16 with the screw hole brackets pulled out for wall mounting.

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] > 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 . . . . .
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	. . . . . 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/$\sqrt{3}$ V	B	A	. . . . . A . . . .
B) 0...110/$\sqrt{3}$ V	B	A	. . . . . B . . . .
C) 0…120/$\sqrt{3}$ 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 . . .
7. Output signal 2 (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 . .
8. Output signal 3 (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 .

(2) to (7) see “Table 2: Special features”

Order Code E-13 —			
Features, Selection	***SCODE**	**no-go**	
C) 0…10 mA, $R_{ext} \leq 1.5$ kΩ			C
D) 0…20 mA, $R_{ext} \leq 750$ Ω			D
E) 4…20 mA, $R_{ext} \leq 750$ 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
3) 24...60 V AC/DC			3
4) 85...230 V AC/DC			4

④ to ⑦ see “Table 1: Special features”

RISHABH

All specifications are subject to change without notice

Measure Control Record Analyze Optimize

RISHABH INSTRUMENTS LIMITED

Domestic (India): +91 253 2202099 | marketing@rishabh.co.in

International: +91 253 2202004/06/08/99 | global@rishabh.co.in

www.rishabh.co.in