

# RISH Ducer E15

## Transducer For Ac Current Or Ac Voltage With Different Characteristics



Fig. 1. RISH Ducer E 15 clipped onto a top - hat rail. Fig. 2. RISH Ducer E15 screw hole mounting brackets pulled out

### Application

The RISH Ducer E15 transducer (Fig.1 and 2) is used where a sine-wave AC current or voltage is to be converted into signal proportional to the measured value (load-independent current or voltage).

Depending on the version, part of the measuring range of interest may be amplified at the beginning or end (voltage magnifier), The section no or minor interest is suppressed.

A live zero output signal is possible with all versions.

### Table 1 : Electromagnetic compatibility

The basic standards EN 50 081-2 and EN 50 082-2 were taken in account.

Conducted interference from the instrument	EN 55 011	Group 1, Class A	Complies
HF radiation from complete instrument	EN 55 011	Group 1, Class A	Complies
Electrostatic discharge on instrument	IEC 801 - 2	± 4 kV contact ± 8 kV air	Without influence
HF field influence on instruments	IEC 801 - 3	27 ... 500 MHz : 3V/m, not modulated (ITU frequencies : 10 V/m)	influence < 2%
Electrical fast transient/burst influence power, supply lines	IEC 801 - 4	± 2 kV, 5/50 ns, 5 kHz, asymmetrical 2 min.	influence < 2%
Electrical fast transient/burst influence inputs and output lines	IEC 801 - 4	± 1 kV, 5/50 ns, 5 kHz, 2 min. capacitive coupled	Without influence < 2%
Surge Immunity Requirements coupled on the power supply lines	IEC 801 - 5	Symmetrical ±1 kV asymmetrical ± 2 kV	Without influence

The device fulfils the protection requirements of the EMC guidelines (89/339/EWG). The device bears the CE symbol of EMC.

### Features / Benefits

- Different characteristics / choice of the most suitable version according to application
- Narrow housing, 35 mm / saves space and therefore costs
- Provision for either snapping the transducer onto top - rails or securing it with screw to a wall or panel
- Manufactured in SMD technology / Compact and reliable
- The device fulfils the protection requirements of the EMS guidelines (89/336/EWG). The device bears the CE symbol for EMS
- Screw terminals suitable for multistrand or thick solid wires
- Electric isolation between input / output and power supply (4kV) / Personal protection assured



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### Nature of Special features

#### Nature of special features

##### Nominal frequency $f_N$

- ① Between  $\geq 16$  to 400 Hz, besides the standard ranges 50 / 60 Hz  
Restrictions :  
With  $f_N < 40$  Hz :  
Power supply derived from measuring input not possible  
Output current ripple  $< 0.5\%$  p.p. not possible  
Response time  $< 800$  ms

##### 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  $I_E \leq 10$ A

##### Nominal input voltage $U_N$

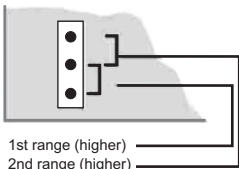
- ③ Between 0...10 and 0...750 V, besides the standard ranges 0...100/ $\sqrt{3}$  / 0...110 / $\sqrt{3}$  / 0...120 / $\sqrt{3}$  / 0...100 / 0...150 / 0...116.66 / 0...120 / 0...125 / 0...133.33 / 150 / 0...250 / 0...400 and 0...500 V  
Restrictions :  
With  $U_N < 500$  V :  
Overload capacity 2000 V, 2 s

##### Measuring range adjustable

- ② (Admissible alteration of full scale output, variable sensitivity adjustable with potentiometer )  
Adjusting range : 0.95...1.05  $I_N$  resp.  $U_N$  ( $\pm 5\%$ )  
0.9 ... 1.1  $I_N$  resp.  $U_N$  ( $\pm 10\%$ )  
Restrictions :  
Possible only with characteristic A, Figs. 4 and 6

##### Two measuring ranges ( for measuring inputs E )

- ⑤ Current between 0...0.01 to 0...10 A  
Voltage between 0...10 to 0.750 V  
I1 : I2 or U1 > 1.053 to 2  
Restriction :  
Possible only with characteristic A Figs. 3, 4, 5 or 6



In each case the selected range is achieved by the change of a jumper

#### Nature of special features

##### Output signal A ( measuring output A )

- ⑥ *Load - independent DC voltage unipolar*  
Ranges between 0...1 and 0...15 V, besides the standard range 0...10 V
- ⑦ *Live-Zero*  
Ranges between 0.2 ... 1 and 3...15 V, besides the standard ranges 1 ... 5 V
- ⑧ *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
- ⑨ *Live - Zero*  
Ranges between 1...5 and 4...20 mA, besides the standard ranges 4...20 mA

##### Output signal A ( measuring output A )

- ⑩  $\leq 0.5\%$  p.p. instead of  $\leq 1\%$  p.p.  
Restriction : Response time approx. 800 ms instead of  $< 300$  ms ( for nominal frequency  $f < 50$  Hz not possible )

##### Power supply

- ⑪ Without separate power supply connection  
Internal from voltage measuring input ( $24V \leq EN \leq 380$ , f)  
Restrictions : Possible only with characteristic B  
With  $U_N \geq 170$  V:  
Impulse withstand voltage acc. to IEC 255-4, Cl. II : 1kV, 1.2/50 ms, 0.5 Ws or overload capacity of the voltage input max. 680 V~, 2s  
The additional power taken from input voltage signal is approx. 5VA
- ⑫ With AC voltage  
any voltage between 24 and 380 V,  $\pm 15\%$ , 50/60 Hz, power consumption approx. 5VA  
besides the standard voltages : 324, 115, 120, 127, 230 or 240 V

##### Improved climatic rating

- ⑬ Climate class 3Z acc. to VDI/VDE 3540, but temperature continuously - 25 to +550 C.  
Relative humidity  $\leq 90\%$  annual mean (Application class HVR acc. to DIN 40 040)



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### 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 $\rightarrow$

Nominal frequency  $f_N$  ① 50 or 60 Hz

Nominal input current  $I_N$  1 / 1.2 / 5 or 6 A

(measuring range end  
value)

② ④ ⑥

Nominal output voltage  $U_N$  100/ $\sqrt{3}$  / 110 / $\sqrt{3}$  / 120 / $\sqrt{3}$  / 100 / 110  
(measuring range end  
value)  
116.66 / 120 / 125 / 133.33 / 150 /  
250 / 400 or 500 V

③ ④ ⑤

Own consumption < 0.2 VA at current transducer  
< 1 VA at voltage transducer

① to ⑤ see section "special features"

Response 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
$2 \times I_N$	contin.	—	—
$10 \times I_N$	5	15 s	5 min.
$40 \times I_N$	1	1 s	—
$1.5 \times U_N$	contin.	—	—
$2 \times U_N$	10	10 s	10 s
$4 \times U_N$	1	2 s	—

#### Measuring input A $\rightarrow$

Output Variable load-independent DC voltage  $U_A$   
OR  
Load-independent DC current  $I_A$

Standard ranges of  $U_A$  0...10 / 1...5 V

Load capacity 20 mA

External resistance

$$R_{\text{ext}} [k] > \frac{U_A [V]}{20 \text{ mA}}$$

⑥ ⑦

Standard ranges Of  $I_A$

⑧ ⑨

0...1/0...5/0...10/0...20/4...20 mA

Burden voltage 15 V

External resistance

$$R_{\text{ext max.}} [k] = \frac{15 \text{ V}}{I_{AN} [\text{mA}]}$$

$I_{AN}$  = Full output value

#### Voltage limit

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

#### Current limit under

overload

Approx.  $1.3 \times I_{AN}$  at current output

Approx. 30 mA at voltage output

Span adjustment

Approx.  $\pm 2\%$

#### Output current ripple ⑩

1% p. p.

Response time

< 300 ms

### Accuracy

Reference value:

Output span Exceptions :  
Characteristics B and C, Input end  
value

Basic accuracy:

Class 0.5

#### Reference conditions

Ambient temperature

23 C,  $\pm 5$  K

Frequency

$f_N \pm 2\%$

Distortion factor

< 0.2 %

Power supply

$U_{HN} \pm 15\%$  (AC)

$U_{HN} - 15 / +33$  (DC)

Output burden

0... $R_{\text{ext max.}}$  at current output

$R_{\text{ext min.}}$  ... at voltage output

Output Voltage

0...15 V

Output current

0...20 mA

Influence effects (maxima)

Included in basic error

Linearity error

$\pm 0.2\%$

frequency influence

$f_N \pm 5\%$

$\pm 0.05\%$

Dependence on

external resistance

( $R_{\text{ext max.}}$ )

$\pm 0.05\%$

Power supply

influence  $U_{HN} \pm 15\%$

$\pm 0.05\%$

① to ⑩ see section "Special features"



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### Additional errors

Temperature influence (-25...+55°C)	± 0.5% / 10K
Frequency influence (45 — 65 Hz)	± 0.5%
Stray field influence (0.5 mT)	± 0.5%
Power supply influence $U_{HN} \pm 20\%$	± 0.2%
Influence of common mode voltage 220 V, 50 Hz or 10 V, 1 MHz	± 0.5%

### Power supply

AC voltage (11) (12)	24, 115, 120, 127, 230 or 240V, ± 15%, 50 / 60 Hz Power input approx. 5 VA
DC voltage	24, 48, 60 or 110 V, - 15% / + 33 %, Power input approx. 5 W

### Installation Data

Mechanical Drawing	Carrying rail housing type E8 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 brackets
Mounting Position	Any
Electrical connections	Screw - type terminals with indirect wire presire, for max. 2 x 2.5 mm <sup>2</sup> or 1 x 6 mm
Weight	Approx. 0.45 kg.

(11) to (12) see section "Special features"

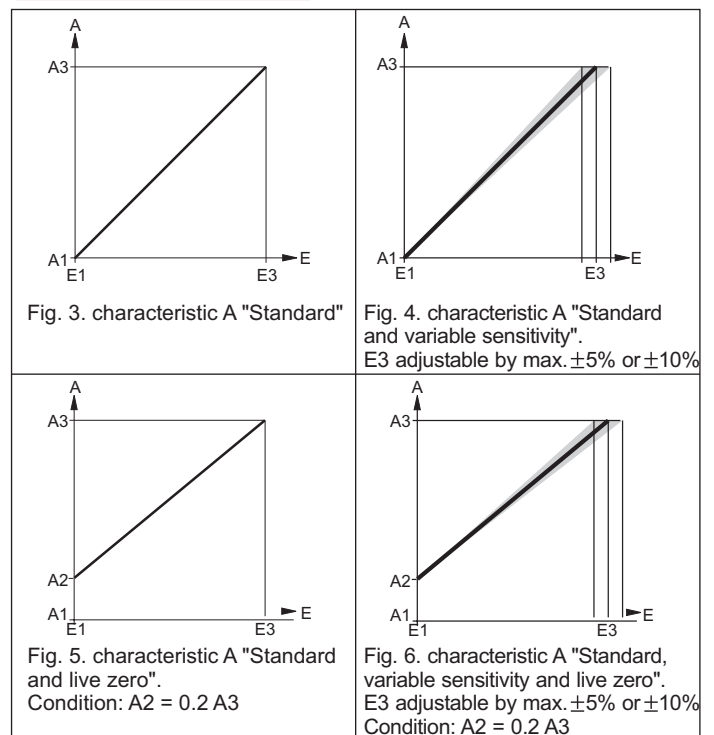
### Regulations

Impulse withstand voltage acc. to IEC 255-4, Cl.III	5 kV, 1.2 / 50 s, 0.5 Ws Common-mode and differential - mode between any terminals
Electrical standards	Acc. to DIN 57 410
Housing protection	IP 40 acc. to IEC 529
Insulation group acc. to DIN 57 110 b	Terminals IP 20 A ( Instrument ) C ( Terminals )
Test voltage	4 kV / 50 Hz / 1min. between electrically isolated circuits and versus housing

### Environmental conditions

Climate rating (13)	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

### Output characteristic



Continuation "Output characteristic" see next page!



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### Output characteristic

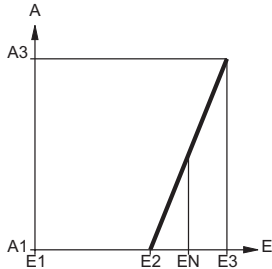


Fig. 7. characteristic B "Current resp. magnifier in end range".

E1...E2 suppressed completely, E2...E3 (main measuring range) magnified.

Conditions:

$$\frac{E3}{E2} = 1.22...1.66$$

or, if power supply derived from voltage measuring input:

$$\frac{E3}{E2} = 1.22...1.35$$

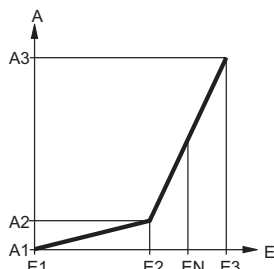


Fig. 8. characteristic C "Main value magnification in end range".

E1...E2 (secondary measuring range) suppressed, E2...E3 (main measuring range) magnified.

Conditions:

$$\frac{E3}{E2} = 1.22...1.66$$

$$A2 = (0.1 \text{ to } 0.25) A3$$

$$\frac{A2 - A1}{A3 - A1} = 0.95 \frac{E2}{E3}$$

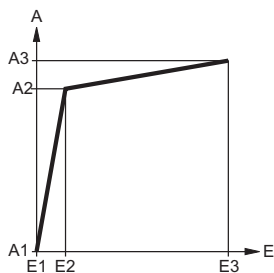


Fig. 9. Characteristic D "Main value magnification in initial range".

E1...E2 (main measuring range) magnified.

E2...E3 (secondary measuring range) suppressed,

Conditions:

$$\frac{E2}{E3} = 0.025^* \text{ to } 0.5 \text{ and } \frac{A2 - A1}{A3 - A1} \geq 1.05 \frac{E2}{E3}$$

$$A2 = (0.4 \text{ to } 0.8) A3$$

\* between 0.025 and 0.05 reduced accuracy

### Electrical connections

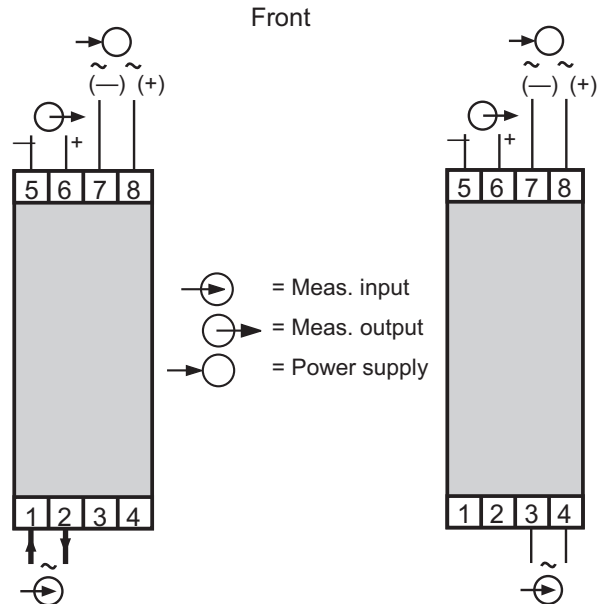


Fig.10 . RISH Ducer E15 one output for AC current measurement.

Fig.11 . RISH Ducer E15 one output for AC voltage measurement.

### Dimensional Drawings

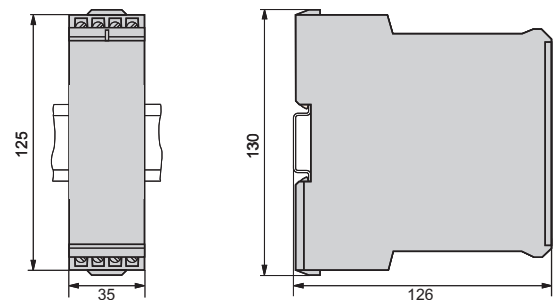


Fig. 12 Transducer clipped onto a top hat rail (35 X 15mm or 35 X 7.5 mm) acc. to EN 50 022.

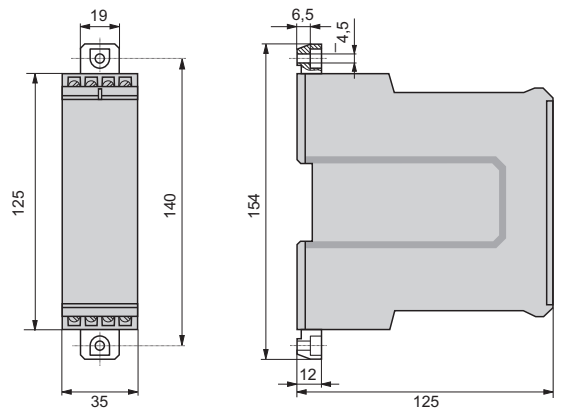


Fig. 13 Transducer with the screw hole brackets pulled out for wall mounting.



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**Table 2 : Stock versions**

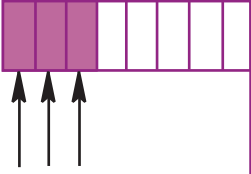
The following 2 transducer versions are available ex stock. It is only necessary to quote the Order No:

Oder Code *)	Housing	Nom. frequency	Meas. range	Output signal	Power supply	Order No.
508 - 3A 11 E70	Carrying rail housing <b>E8</b>	50 / 60 Hz	0...1 A	4...20 mA	230 V, 50 / 60 Hz	993 635
508 - 3A 13 E70			0...5 A	4...20 mA		993 643

\*) See section "Specification and ordering information"

The complete order Code .... .. and / or a description according to the section " Specification and ordering information " should be started for other versions.

**Table 3 : Specification and information** (see also table 3 : "Stock version")

Order Code E-15 —				
Features, Selection	*SCODE	no-go		
<b>1. Mechanical Design</b> 3) Carrying rail housing E8			3 . . . . .	
<b>2. Output characteristic</b> A) Characteristic A "Standard" see Fig.3 "Standard and variable sensitivity", see Fig. 4 Note feature 9 "Measuring range adjustable" line A or B "Standard and live - zero", see Fig. 5 Note feature 5 5 "Output signal" line 2, 9, E or Z "Standard, variable sensitivity and live - zero", see Fig. 6 Note feature 9 "Measuring range adjustable" line A or B and "Output signal" line 2, 9, E, or Z	G		. A . . . . .	
B) Characteristic B "Current resp. voltage magnifier in end range" see Fig.7	A		. B . . . . .	
C) Characteristic C "Main value magnification in end range" see Fig.8	AB		. C . . . . .	
D) Characteristic D "Main value magnification in end range" see Fig.8	AB		. D . . . . .	
The selection feature 2 "Output characteristic" and feature 4 "measuring range" as well as feature 5 "Output signal" to be determined together. In the section "Output characteristic" conditions laid down in Figs. 3 to 9 should be noted				
<b>3. Nominal frequency</b> 1) 50 / 60 Hz			. . . 1 . . . . .	
9) Non - standard ≥ 16 to 400 ①	[Hz]		. . . 9 . . . . .	

① see section "special features"



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Order Code E-15 —										
Features, Selection					*SCODE	no-go				
<b>4. Measuring range (measuring input E)</b>										
1)	0...1 A				C					A
2)	0...1.2 A				C					A
3)	0...5 A				C					A
4)	0...6 A				C					
9)	Non - standard 0...0.01 to 0...10 ②	[A]								
A)	0...100 / 3 V				D					A
B)	0...110 / 3 V				D					A
C)	0...120 / 3 V				D					A
D)	0...100 / V				D					A
E)	0...110 / V				D					A
F)	0...166.66 V				D					A
G)	0...120 V				D					A
H)	0...125 V				D					A
J)	0...133.33 V				D					A
K)	0...150 V				D					A
L)	0...250 V				D					A
M)	0...400 V				D					A
N)	0...500 V				D					A
Z)	Non - standard 0...10.00 to 0...750 ③	[V]			D					A
Lines 1 to 9 and A to Z : Measuring range for characteristics A, Figs.3, 4, 5 and 6 lines Lines 9 and Z : Measuring range for characteristics B, C and D, Figs.7, 8, and 9 Specify range (E1 ... E2 ... E3) e.g. with characteristic B 90 ... 110 V e.g. with characteristic C 0... 90 ... 120 V e.g. with characteristic D 0... 10 ... 100 V										
<b>5. Output signal ( measuring output A )</b>										
1)	0... 10 V, R <sub>ext</sub> ≥ 500									B
2)	1... 5 V, R <sub>ext</sub> ≥ 250				E					B
9)	Non - standard 0...1.00 to 0...15 ⑥ 0.2...1 to 3 ... 15 ⑦	[V]			E					B
Lines 1 and 9 : Output signal for characteristics A, Figs.3, 4, and characteristic B, Fig. 7 Lines 2 and 9 : Output signal for characteristics A, Figs.5, and 6 Lines 9 : Output signal for characteristics C and D, Figs.8 and 9 Specify range (A1 ... A2 ... A3) e.g. with characteristic C 0... 2 ... 20 V e.g. with characteristic D 0... 16 ... 20 V										

Insert code figure in the 1st field of the next page!									
1	.	.	.	.	.	.	.	.	.
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B	.	.	.	.	.	.	.	.	.
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D	.	.	.	.	.	.	.	.	.
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.	9	.	.	.	.	.	.	.	.

②, ③, ⑥ and ⑦ see section "special features"

Continuation "5. Output signal" see next page!



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Order Code E-15 —	*SCODE	no-go
<b>5. Output signal (measuring output A) (continuation)</b>		
A) 0 ... 1 mA, R <sub>ext</sub> 15 k		B
B) 0 ... 5 mA, R <sub>ext</sub> 3 k		B
C) 0 ... 10 mA, R <sub>ext</sub> 1.5 k		B
D) 0 ... 20 mA, R <sub>ext</sub> 750		B
E) 4 ... 20 mA, R <sub>ext</sub> 750	E	B
Z) Non - standard [mA] <input type="text"/>		
0 ... > 1.00 to 0... < 20 <sup>⑧</sup>		
1 ... 5 to < (4...20) <sup>⑨</sup>		
Lines A to D and Z : Output signals for characteristics A, Figs.3, 4, and characteristic B, Fig. 7 Lines E and Z : Output signals for characteristics A, Figs. A, Fig. 5 and 6 Lines Z : Output signals for characteristics C and D, Figs. 8 and 9 Specify range (A1 ... A2 ... A3) e.g. with characteristic C 0... 2 ... 20 V e.g. with characteristic D 0... 16 ... 20 V		
<b>6. Power supply</b>		
0) Internal from voltage measuring input <sup>⑪</sup>		BCEFG
1) 24 V, 50 / 60 Hz		
3) 115 V, 50 / 60 Hz		
4) 120 V, 50 / 60 Hz		
5) 127 V, 50 / 60 Hz		
7) 230 V, 50 / 60 Hz		
8) 240 V, 50 / 60 Hz		
9) Non - standard 50 / 60 Hz [V] <input type="text"/>		
> 24 to 380 <sup>⑫</sup>		
A) 24 V DC, -15 ... +33%		
B) 48 V DC, -15 ... +33%		
C) 60 V DC, -15 ... +33%		
D) 110 V DC, -15 ... +33%		
Line 0 : For AC > 40 Hz and characteristic B only, Fig. 7		
<b>7. Special features</b>		
0) Without	Y	BCEFG
1) With		
Without special features (line 0) : Order code complete With special features (line 1): The features to be omitted must be marked hereafter with / (slant line) in the order code until reaching the required feature		
<b>8. Smaller residual ripple in measuring output <sup>⑩</sup></b>		
A) ≥ 0.5% p.p. instead of ≤ 1% p.p. Response time approx. 800 ms (for current signals only)		

Order Code E-15 —
A . . . . .
B . . . . .
C . . . . .
D . . . . .
E . . . . .
Z . . . . .
. 0 . . . . .
. 1 . . . . .
. 3 . . . . .
. 4 . . . . .
. 5 . . . . .
. 7 . . . . .
. 8 . . . . .
. 9 . . . . .
. A . . . . .
. B . . . . .
. C . . . . .
. D . . . . .
. . . . . 0 . . . . .
. . . . . 1 . . . . .
. . . . . A . . . . .

8 to 12 see section "Special features"



**RISHABH INSTRUMENTS**  
Measure, Control & Record with a Difference

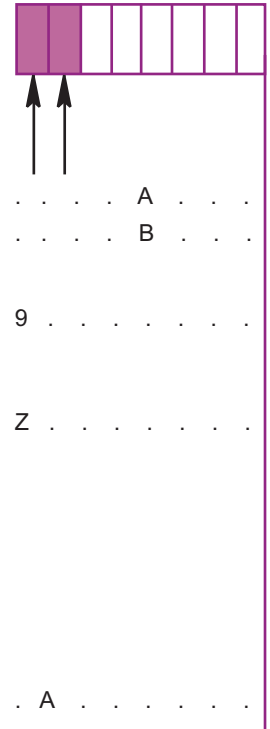
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# RISH Ducer E15

## Transducer For Ac Current Or Ac Voltage With Different Characteristics

Order Code E-15 —			
Features, Selection	*SCODE	no-go	
<b>9. Measuring range adjustable</b> ④			
A) E3 by max. 5%, characteristic A, Figs. 4 and 6			AY
B) E3 by max. 10%, characteristic A, Figs. 4 and 6			AY
<b>10. Two measuring ranges (for measuring input E)</b> ⑤			
9) Second measuring range for AC current [A] <input type="text"/> 0 ... 0.01 to 0 ... 10			ADY
Z) Second measuring range for AC voltage [A] <input type="text"/> 0 ... 10.00 to 0 ... 750			ACY
Lines 9 and Z : Possible only with characteristic A, Figs. 3, 4, 5 or 6 Condition: $\frac{\text{First meas. range}}{\text{Second meas. range}} > 1.053 \text{ to } \leq 2$			
<b>11. Improved climate rating (DIN 40 040)</b> ⑬			
A) Application class HVR instead of HVE (standard)			Y



\* Lines with letter(s) under "no-go" cannot be combined with preceding lines having the same letter under "SCODE"

④, ⑤ and ⑬ see section "Special features"



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