RISH Ducer Series of Transducers for AC Current / AC Voltage

Electrical Transducers Rish Ducer

RISH Ducer series of Electrical Transducers are made in technical collaboration with Gossen Metrawatt Camille Bauer, Germany / Switzerland.

RISH Ducer products are thus the result of well proven technology and state of the art manufacturing facilities & expertise of Rishabh Instruments, a 100% Export Oriented Unit.

RISH Ducers are extremely reliable data sourcing elements for SCADA, PLC's, Energy Management System, and Building Management System (BMS) etc.

RISH Ducers are also useful for remote indications of electrical parameters, input to recorders, for feedback in control systems etc.

Current & Voltage Transducers series Rish Ducer IXX / VXX

Very wide range of product to meet the needs of varied applications.

Rish** Ducer **IXX / VXX Series in E8 Housing

Current :
I11 - Average type, Self Powered. (Class 0.5)
I12 - Average type, Self Powered with dual range input (Class 0.5)
I21 - True RMS. (Class 0.5)
I22 - True RMS, (Class 0.2)

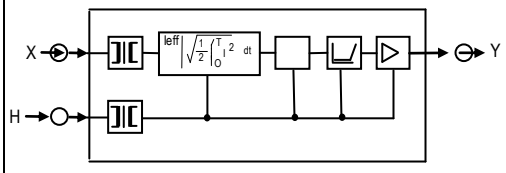
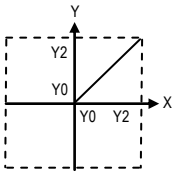
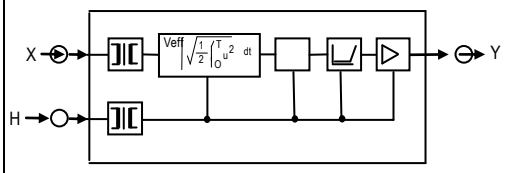
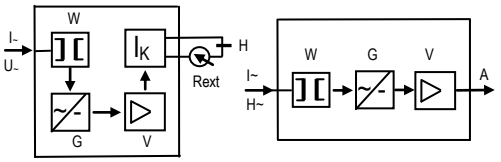
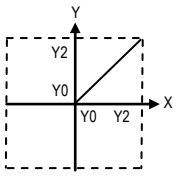
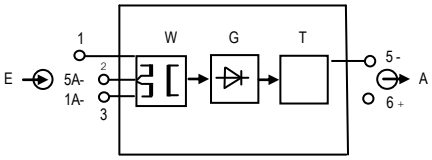
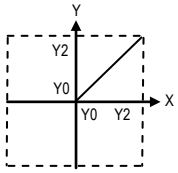
Voltage :
V11 - Average type, Self Powered. (Class 0.5)
V21 - True RMS. (Class 0.5)
V22 - True RMS, (Class 0.2)

Unique Features :-

- State of the art products with SMT: Compact & reliable.
- Well proven technology from Gosse Microwatt Camille Bauer, Germany / Switzerland.
- Meets requirements of International Standard IEC688 for accuracy
- Insulation level of 3.7kV/4kV.
- Impulse withstands voltage 5 kV.
- Higher load capacity: 750 Ohms at 20 mA.
- True RMS models (I21/V21).
- Self Powered models (I1X/V1X)
- Mounting: DIN rail or Panel mounting. Easy "onsite" conversion.
- Response time < 300 mS standard, < 50mS optional.
- Mounting position : Any
- Electrical isolation between all transducer connections.
- Terminal connection: Electricians delight. Even suitable for multistoried or solid wire Connection. Large space for lopping of wires.
- Housing: Polycarbonate, Flammability class V-0 acc to UL94, conforming to V0 grade of UL 94. (Self extinguishing, non drip)
- Accuracy class 0.5 as per IEC 688, (I22 & V22 class 0.2.)
- Output short circuit & open circuit proof.
- Option of SMPS supply for wide range of ac/dc supply available.
- Option of bent transformation characteristic.
- Operating temperature - 10 to +55º C.
- Storage temperature - 40 to +70º C.

Symbols & Their Meaning

Symbols	Meaning
X	Measuring input / Input variable
X0	Start value of input voltage / current
X1	Elbow of input voltage
X2	Final value of input voltage / current
Y	Measuring output / Output variable
Y0	Start value of output variable
Y1	Elbow of output variable
Y2	Final value of output variable
H	Power supply
Hn	Rated value of power supply
T	Setting Time
Tn	Rated value of setting time
R_{ext} max	Max. output burden
Rn	Rated value of output burden

Layout and Mode of Operation		Block Digram	Standard Transformation Characteristics
I21 **I22**	Input signal X is galvanic ally separated from the mains network using a transformer. The following mathematical expression is then formed using a RMS value Computer $I_{eff} \left\| \sqrt{\frac{1}{2}\int_0^T I^2 \, dt} \right\|$ Following filtration by means of an active filter, the transformation properties of the measuring transducer are determined in the characteristics circuit. The o/p amplifier transforms the measuring signal into an impressed o/p signal Y. The electronic components are supplied with voltage H from the mains supply unit.	 ***Fig. 1.Block diagram***	 ***Fig. 6*** Linear curve, characteristics (X0 = 0; Y0 = 0)
V21 **V22**	Input signal X is galvanic ally separated from the mains network using a voltage transformer. The following mathematical expression is then formed using a RMS value computer $I_{eff} \left\| \sqrt{\frac{1}{2}\int_0^T u^2 \, dt} \right\|$ Following filtration by means of an active filter, the transformation properties of the measuring transducer are determined in the characteristics circuit. The o/p amplifier transforms the measuring signal into an impressed o/p signal Y. The electronic components are supplied with voltage H from the mains supply unit.	 ***Fig. 2.Block diagram***	
I11 **&** **V11**	The Transducer comprises a transformer W, a rectifier unit G and the amplifier V The measured variable I/U AC is isolated from the electronics by the transformer W, and is rectified and a smoothed in the rectifier unit G. The o/p amplifier V amplifies the resultant signal and converts it into the load-independent DC o/p signal A. The version with live-zero o/p has a 4mA constant current source to provide the zero setting. In the case of 2-wire connection the o/p increases from the zero setting of 4mA with an increase in measured value. The constant current source needs a supply voltage H between 12 and 30 V DC, which may be supply typically from the main installation, the receiving equipments or a separate power pack.	 ***Fig. 3.*** Block diagram for transducer with live-zero output & 2-wire connection ***Fig. 3.*** Block diagram for transducer with unipolar output.	 ***Fig. 7*** Linear curve, characteristics (X0 = 0; Y0 = 0.2 Y2)
I12	The Transducer comprises a transformer W, a rectifier unit G and a low-pass filter T The measured variable is isolated from the electronics by the transformer W, and is rectified and a smoothed in the rectifier unit G.	 ***Fig. 5* Block diagram**	 ***Fig. 8*** Linear curve, characteristics (X0 = 0; Y0 = 0)

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General and Measuring Input (other specification available on request)

Parameters		RISH*Ducer* I21	RISH*Ducer* I22	RISH*Ducer* V21	RISH*Ducer* V22	RISH*Ducer* I12	RISH*Ducer* I11 & V11
General		AC current Sine or distorted waveforms True RMS value measurement		AC voltage Sine or distorted waveforms True RMS value measurement		AC current or AC voltage sinusoidal arithmetical mean measured, calibration to rms with sine wave form (Average value)	
1	Measured Quantit						
2	Measuring Principle	Logarithmic				Rectifier method	
Measuring Input		Current		Voltage		Current	Current and Voltage
1	Nominal Frequency F_N	50,60 or 400 Hz	50 or 60 Hz	50,60 or 400 Hz	50 or 60 Hz	50 or 60 Hz	
2	Nominal input*	Current X2 : 1A ≤ X2 ≤ 7.5 A		Voltage X2 : 100 V ≤ X2 ≤ 500 V		Current : 1A & 5A site configurable	Current I_N 1A or 5A Voltage V_N : 110 / √3 / 110 / 110 / 150/ 240/ 415/ 440 V
3	Recalibration of X2	Final value permanently set or final value can be adjusted in range 0.5.X2 ≤ X2		--		--	Range adjustable 0.9...1.1. I_N resp. U_N(± 10%) Admissible alteration of full scale output, variable sensitivity, adjustable with potentiometer)
4	Own Consumption	< 1 VA at X2				≤ 1VA	At nominal freq. 50 Hz :

Full o/p value [mA]	I11 [VA]	V11 [VA]
1	0.8	0.8
5	1.8	1.2
10	2.2	1.5
20	2.5	1.8

5	Overload Capacity	Measured Qty	No of App	Duration of 1 Apple	Interval between 2 successive apple.	Measured Qty	No of App.	Duration of 1 Apply	Interval between 2 successive apple.	1.2 x I_N continuously	Measured Qty	No. of Appl.	Duration of 1 Apply	Interval between 2 successive apple
		2 ·X 2	--	Conti..	--	1.2· X 2	--	Conti ..	--		1.5 x I_N	Conti ..	--	--
		10 ·X2	5	3s	5 min	1.5 ·X 2	10	10s	10 min.		2 x I_N	10	10s	10s
		50·X2⊛	1	1s	1 h						10 x I_N	5	3s	5min
											40 x I_N	1	1s	--
		⊙ X2=Final value, but ⊛ max.250 A									1.5 x V_N	Conti ..	--	--
											2 x V_N	10	10s	10s
											4 x V_N	1	2s	--

* Other input available on request

Sr No.	Parameter	I21	I22	V21	V22	I12	I11&V11
1	Output variable Y	Load-independent DC current or DC voltage				DC depends on load	Load - independent DC current I_A or DC voltage o/p V_A (not Superimposed)
2	Load independent DC current Output range	1 mA ≤ Y2 ≤ 20 mA				0...5 mA 0...10 mA 0...20mA	0...1/0...5/0...10 or 0...20 mA (4...20mA refer cl. for 2 wire output)
3	O/p burden with DC current o/p signal	0 ≤ R ≤ 15V/Y2				R_{ext} max. [k ext] = 15V/ I_{AN}[mA] I_{AN} = full o/p value	R_{ext}max.[K ohm] = 15 V/I_{AN} [mA] I_{AN} = full o/p value
4	DC voltage o/p range	1V ≤ Y2 ≤ 10 V				10 V	O/p V_A not superimposed : std range of V_A : 0...10V
5	O/p burden with DC voltage o/ signal	Y2/2mA ≤ R < ∞				≥100 KΩ	Ext resistance ≥ 200 kΩ /v
6	Current limit under overload	≤ 1.7 Y2 with current o/p Approx. 20 mA with voltage o/p				≤ 3 x I_{AN}	≤1.5 x I_{AN} for current o/p Approx. 30 mA for voltage
7	Voltage limit under R_{ext} =∞	≤ 40 V with Current o/p ≤ 1.7.Y2 with voltage o/p				< 20 V	<24 V
8	Residual ripple in o/p signal	≤ 5% p.p at setting time 50 ms ≤ 0.5 % p.p at setting time 300 ms		≤ 5% p.p at setting time 50 ms and C < 1 ≤ 5 % p.p + C 0.5 % at setting time 50 ms and C > 1 ≤ 5 % p.p at setting time 300 ms and C < 1 ≤ 2 % p.p at setting time 300 ms and C > 1		≤ 1% p.p at 750Ω /20 mA	Current ripple ≤1% p.p.
9	Response time	≤ 300 ms standard, ≤ 50 ms optional				< 2s	<300 ms
10	Output Standard Ranges *	Current : 0-1mA/5mA/10mA/20mA/4-20mA Voltage : 0-10V				Current : 0...5 / 0...10 / 0...20 mA Voltage : 0-10V	Current : 0...1/0...5/0...10 or 0...20 mA Voltage : 0-10 V

* *Other ranges available request.*

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Accuracy (IEC 688-1/ IS12784)

Parameters	I21	I22	V21	V22	I12	I11	V11
Reference Value	Output end value Y2				Input end value X2		
Basic Accuracy (for std ranges)	Class 0.5	Class 0.2	Class 0.5	Class 0.2	Class 0.5	Class 0.5	

Reference Conditions

Parameters	I21	I22	V21	V22	I12	I11	V11
Ambient Temp	23 °C, ± 5 k				23°C, ± 1°C	23° C, ± 5 k	
Input Variable	Rated operating range					0 to 100% for current measurement 20 to 100 % for voltage measurement	
Frequency	Fn ± 2%						
Distortion Factor	--				< 0.5%		
External Resistance Current o/p Voltage o/p	Rn = 7.5 V/Y2 ± 1% Rn = Y2/1 mA ± 1%				Rext. Max -1% Rext. Min + 1%	O - R ext Max. R ext Max to ∞	
Curve shape	Sine - wave						
Shape Factor	1.1107						
Power Supply	Hn ± 1%				--	± 1 % for 24 V dc with 4-20 mA output	
Warm-up Time	≤ 5 min.						

Influence Effects (maxima) : Included In Basic Error

Sr No.	Parameters	I21	V21	I22	V22	I12	I11 & V11
1	Linearity Error	< ±0.1%				< ±0.3 %	
2	Frequency	----		----		----	± 0.3 % (Fn ± 2%)
3	Dependences on External resistance ∆ R ext max.	±0.1%		±0.1%		± 0.5 %*	±0.1 %

Additional Errors *

1.	Ambient Temp	Rated Operating range	Permitted effect factor of precision class	Rated Operating range	Permitted effect factor of precision class	-25° C...+55 °C ± 0.5% 10K	
		+ 10°c...**23°c**...40°c	1	Usage group II 0...**23°c**...45°c	1		
		+ 0°c...**23°c**...55°c	2	-10°c...**23°c**...55°c	2		
2.	Curve Shape of Input	Rectangle 1:1 Cut-in sine wave 90 O (for V21)	1 2	Rectangle 1:1	1	Sine Waveform only	
3.	Frequency of input Variable	40...400 Hz	1	45..65 Hz	1	45...55Hz ± 0.3%	45...200Hz ± 0.5%
		> 400...1000 Hz	2	--	--		

**not included in basic error*

Power Supply

Parameters	I21	I22	V21	V22	I12	I11	V11
Version with AC Power packs standard voltage :-		Rated Value Hn: AC 24 V, AC 110 V, AC 230 V, AC 400 V Rated Operating Voltage: 22...26 V, 99...121 V, 207...253 V, 360...440V			--	--	
Rated operating range of frequency :	45...**50**...**60**...65 Hz						
Power consumption	AC ≤ 4 VA at H=Hn DC ≤ 4 w	AC ≤ 3 VA at H=Hn DC ≤ 3w	AC ≤ 4 VA at H=Hn DC ≤ 4 w	AC ≤ 3 VA at H=Hn DC ≤ 3w			
Version with AC / DC Power Packs (Dc & 45 -- 400 Hz) Power consumption		Rated Value Un: 24...60 V DC/AC; 85...230 V DC/AC Permissible Variation: DC - 15...+33%, AC ± 15% ≤ 1.4 W resp. ≤ 2.7 VA			--	--	
DC Voltage Supply	--		--		--	12-30 V (only for 2-wire connection with output 4 ...20 mA)	

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Installation Data

Sr No.	Parameters	I21	I22	V21	V22	I12	I11	V11
1	Mechanical Design	Housing 35 mm width (E8)						
2	Material of Housing	Glass filled polycarbonate, flammability Class V-0 acc. to UL 94, self extinguishing, non-dripping.						
3	Mounting	DIN rail mounting (35 x 15 mm or 35 x 7.5 mm) acc. To EN 50 022 or Directly onto a wall or panel using to pull-out screw hole brackets (on site conversion possible)						
4	Mounting Position	Any						
5	Electrical Connection	Screw-type terminals with indirect wire pressure, for max.2 x 2.5 mm2 or 1 x 6 mm^2						
6	Weight	Approx. 0.5 Kg					Approx. 0.4 Kg	

Environmental Conditions

Sr No.	Parameters	I21	I22	V21	V22	I12	I11	V11
1	Climatic Rating	Climate Class 3Z acc. To VDI/VDE 3540						
2	Operating Temperature	-25 to +55 degree C			-10 to +55 degree C		-25 to +55 degree C	
3	Storage Temperature	-40 to +70 degree C						
4	Relative Humidity of Annual Mean	≤ 75%					≤ 75% Standard Climatic Rating ≤ 90% Enhanced Climatic Rating	
5	Permissible Vibration	2 g acc. To EN 60 068-2-6						
6	Shock	3 x 50 g 3 shocks each in 6 directions						

Regulations

Sr No.	Parameters	I21	I22	V21	V22	I12	I11&V11
1	Safety Standards	Acc. To IEC 1010					
2	Housing Protection	IP 40 acc. To EN 60 529 Terminals IP 20					
3	Rated Insulation Voltage	Measuring input AC 300 V, Power supply AC 300 V, DC 230V Measuring output DC 40 V				--	--
4	Contamination Level	2				--	--
5	Over voltage Category	III				--	--
6	Protection Class	II				--	--
7	Safe Isolation	Acc. To IEC 1010 and DIN/VDE 106, part 101				--	--
8	Impulse withstand Voltage Acc to IEC 255-4 Cl,III:	5 KV 1.2/50 sec, 0.5 Ws Common-mode and differential mode between any terminals				--	5 KV 1.2/50 sec, 0.5 Ws Common-mode and differential mode between any terminals
9	Test Voltage	3.7 KV 50 Hz/1 min. between electrically isolated circuits. Measuring output versus housing 0.5 kV/50 Hz/1 min.				Measuring input versus Measuring output 3.7 kV, 50Hz, 1 min. Measuring input versus housing 3.7 kV,50Hz,1 min measuring output versus housing 740V, 50 Hz, 1 min	4 kV/50 Hz/1 min
10	Product Performance	IEC 688,IS 12784					

Special Features (Optional) :

Current & Voltage Transducer

1) 2 Wire output with 4-20 mA, for I11 & V11 with 12...30V DC AUX :

With 2 wire connection

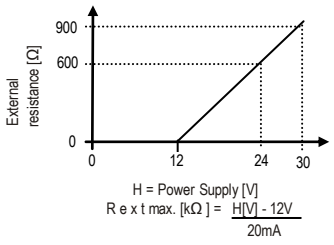

Fig . 9
Standard ranges of I_A= 4...20 mA
External resistance R_{ext} -- dependent on power supply H (12...30 V DC)

2) Response Time 50 ms for I21/I22/V21/V22

3) Special Transformation Characteristics:

A) Bent Characteristics.

Factor c (V21)

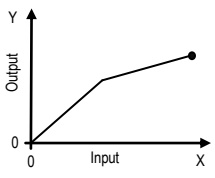

Fig.10
Linear Curve = 1
BENT Curve
c = 1 / 1 - x1/x2 or c = x2/x1
(the larger value applies)

B) Suppressed Initial Range:

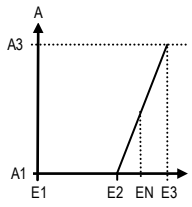

Fig. 11
Characteristic B
"Voltage magnifier in end range".
E1…E2 suppressed completely,
E1…E3 main measuring range magnified

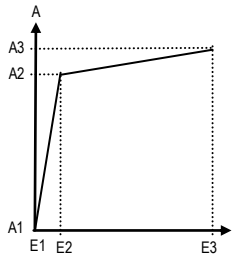

Fig. 12
Characteristic D "Main value magnification in initial range".
E1...E2 (main measuring range) magnified,
E2...E3 (secondary measuring range) suppressed
Input Magnification Of Initial range.

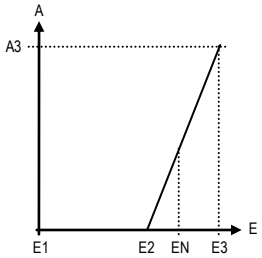

Fig. 13
End Value Magnified.
Characteristic B "Current resp. Voltage magnifier in end range".
E1...E2 suppressed completely,
E2...E3 (main measuring range) magnified.
End Value Magnified

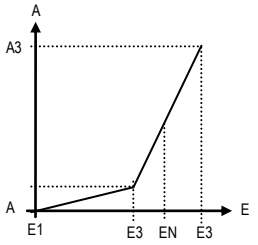

Fig. 13
End Value Magnified.
Characteristic C "Main value magnification in end range".
E1...E2 (secondary measuring range) suppressed,
E3...E3 (main measuring range) magnified.
End Value Magnified

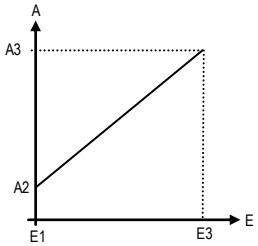

Fig. 15
Characteristic A "Standard and live zero. "

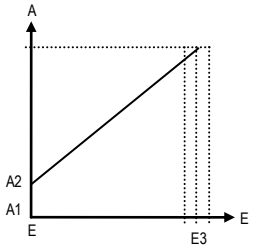

Fig. 16
Characteristic A "Standard"
Variable sensitivity and live zero.

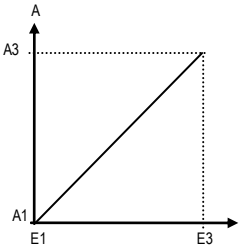

Fig. 17
Characteristic A "Standard"

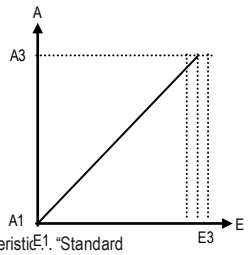

Fig. 18
Characteristic A "Standard and variable sensitivity." E3 adjustable by max. ± 5% or ± 10%

4) Transformation Characteristics (V21) :
5) Any other input / output / power supply
6) Dual Chanel current Transducer
7) Dual output current Transducer.
8) Input Frequency (if other than 50 Hz)

Possible range of elbow X1/Y1

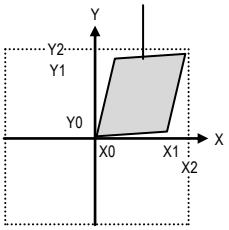

Fig. 19
Bent curve,
characteristic
(X0 = 0 0.05 X2 ≤ X1 ≤ 0.9 X2
Y0 = 0 Y0 ≤ Y1 ≤ 0.9 Y2).

Possible range of elbow X1/Y1

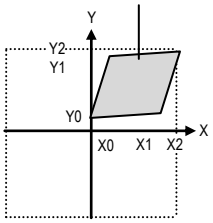

Fig. 20
Bent curve,
characteristic
(X0 = 0 0.05 X2 ≤ X1 ≤ 0.9 X2
Y0 = 0.2 Y2 Y0 ≤ Y1 ≤ 0.9 Y2).

Electrical Connection :

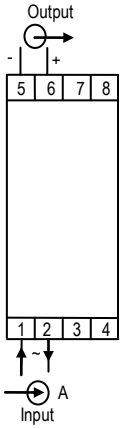

Fig 21 : RISH*Ducer* I11
for measuring AC Current

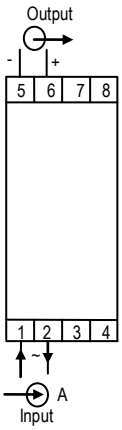

Fig 22. : V11
for measuring AC Voltage
RISH*Ducer*

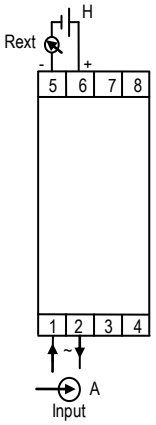

Fig 23. : RISH*Ducer* I11
as 2-wire converter
with 4.. 20 mA output.

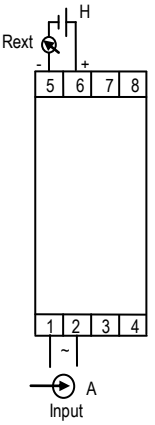

Fig 24 : RISH*Ducer* V11,
as 2-wire converter
with 4.. 20 mA output.

Connection		**Connecting terminals**
Measuring input E	1A~	1 and 3
Measuring input E	5A~	1 and 2
Measuring output	A	5 - and 6 +

RISH Ducer Series of Transducers for AC Current / AC Voltage

Connection	Terminals	
Measuring input	~	1
	~	3
Measuring Output	+	13
	-	14
Power supply	~ ,+	21
	~,-	22

Connection	Terminals	
Measuring input	~	1
	~	3
Measuring Output	+	13
	-	14
Power supply	~ ,+	21
	~,-	22

Dimensional Drawing:

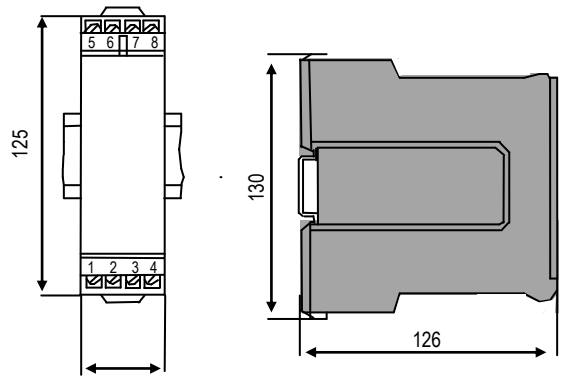

Fig 25. : *Transducer in housing E8 clipped onto a top-hat rail (35 x 15 mm or 35 x 7.5 mm acc. to EN 50 022).*

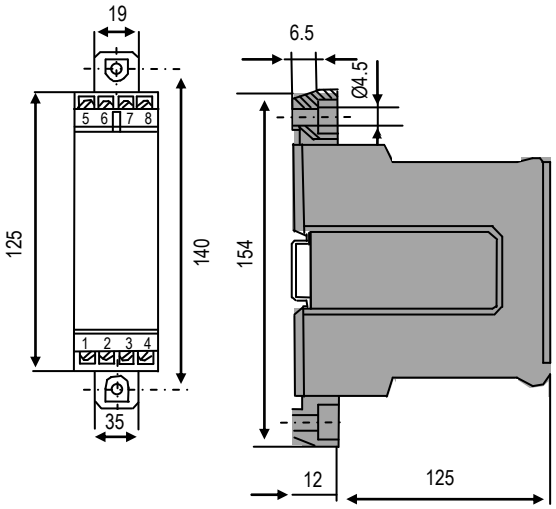

Fig 26. : *Transducer in housing E8 with the screw hole brackets pulled out for wall mounting.*

Specification & Ordering Information for TRMS Model

Sr.No.	Features Selection		Current Transducer	Voltage Transducer
1	Measuring Transducer for AC current/Voltage (RMS value measurement) Accuracy Class 0.5, 0.2		I21 ☐ I22 ☐	V21 ☐ V22 ☐
2	Frequency of Input Current Fn = 50 Hz Fn = 60 Hz Fn = 400 Hz		☐ ☐ ☐	
3	Final Value of Input Current 0...1A ... 7.5 A		☐ Specify range	Not applicable
4	Final value of input voltage ** 0...110/√3... 500 V * * >300 V; phase-to-phase connection to a 3-phase supply only.		Not applicable	☐ Specify range
5	Final value of output signal ** 0...1mA, 5mA, 10mA, 20mA, 4...20mA 0...10V		☐ ☐	Specify range
6	Linear Characteristics Bent (if applicable) X0 = 0 Y0 = 0 X0 = 0 Y0 = 0.2.Y2	0.05.X2 ≤ X1 ≤ 0.9 •X2 Y0 ≤ Y1 ≤ 0.9 •Y2 0.05.X2 ≤ X1 < 0.9• X2 Y0 ≤ Y1 ≤ 0.9 •Y2	Not applicable Not applicable	☐ Specify value of X1 & Y1 ☐ Specify value of X1 & Y1
7	Re-calibration of X2 Final value permanently set Final value can be adjusted in range 0.5 •X2 ≤ X2		☐ ☐ Specify value	Not applicable
8	Response time	50ms 0.3s (standard)	☐ ☐	
9	Power Supply	AC 22 V...26V AC 99V...121V AC 108V...132V AC 207V...253V AC 360V...440V * DC/AC 24V...60V DC/AC 85V...230V	☐ ☐ ☐ ☐ ☐ ☐ ☐	
	* > 300V; Phase -to-phase connection to a 3-phase supply only.			

Specification & Ordering Information for V_{11} / I_{11} model

Sr.No.	Features Selection	Current Transducer	Voltage Transducer
1)	Measuring Transducer for AC current/Voltage Accuracy class 0.5	I_{11} ☐	V_{11} ☐
2)	Measuring Range (Measuring Input Current) ** 0...1A, 0... 5A	☐ Specify range	Not applicable
	0... 110 /√3 V, 0...500V Measuring Range (Measuring Input Voltage) **	Not applicable	☐ Specify range
3)	Output Signal (measuring Output A)** O...1mA,R_{ext} ≤ 15 kΩ 0...5 mA, R_{ext} ≤ 3 kΩ 0..10mA, R_{ext} ≤ 1.5 kΩ 0...20mA, R_{ext} ≤ 750 Ω 4...20mA, 2 wire connection, R_{ext} dependant on power supply (12..30VDC) 0...10V, R_{ext} ≥1.5 kΩ	☐ ☐ ☐ ☐ ☐ ☐	Specify Aux. supply volt DC
4)	Special Feature Without With (Specify separately)	☐ ☐	