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PRECISION INSTRUMENTATION

TRANSUCERS & ISOLATORS
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DATASHEET

Issue 1



Multifunction Meters
Transducers & Isolators
Temperature Controllers
Converters & Recorders
Digital Panel Meters
Current Transformers
kWh Energy Meters
Analogue Panel Meters
Shunts
Digital Bargraphs
Digital Multimeters
Protection Relays
Synchroscope Series
Rotary Switches
Power Supplies
Test & Measurement



THETA 20A-20V PROGRAMMABLE TRANSDUCER

SUBJECT TO CHANGE WITHOUT NOTICE

This datasheet superseded all previous versions – please keep for future reference

Product Features:

→ Measuring Input

AC Voltage/ Current input signal, sine wave or distorted wave form

→ Analog Output (Single or dual)

Isolated analog output which can be set onsite to either voltage or current output

→ Accuracy

Output signal accuracy class 0.2 as per International Standard IEC/EN 60 688

→ Programmable Input/Output

The Transducer can be programmed onsite using front key & display or through RS 485

→ LED Indication

LED indication for power on and output type. (Current output: Red LED, Voltage output: Green LED)

→ Display Module (Optional)

Optional 7 segment LCD display with backlit & keypad. For displaying measured parameters & onsite configuration of Input/output.

→ RS485 Communication (Optional)

Optional RS485 communication is available. For reading measured parameters & onsite configuration of input/output.

THETA 20A-20V Programmable Transducer



Fig. 1

Application

The Theta 20A-20V is used to measure and convert AC Voltage or Current input into a load independent DC current or voltage output signal. Output signal generated is proportional to the root mean square value of the input Current or Voltage.

Salient Features

- True RMS measurement
- Fully onsite programmable input voltage range (for Theta 20V) & Input current range (for Theta 20A)
- Available in Single or Dual output type
- Onsite selectable output type (DC current/ DC voltage)
- Accuracy class 0.2 (IEC/ EN 60 688)
- Seven Segment LCD Display (Optional)
- RS 485 (Modbus) Communication
- Wide Auxiliary power supply (Optional)
- Accept any input between 60-300VAC/DC or 24-60VAC/DC
- Output Response Time < 400 ms
- Fast and easy installation on DIN RAIL or onto a wall or in a panel using optional screw hole bracket
- Connection Terminal : Conventional Screw type

Symbols and their meaning

X	Input AC Voltage/ AC Current
XO	Start value of input
X1	Elbow value of input
X2	End value of input
y	Output DC Voltage / DC Current Start value of output DC Voltage / DC Current
YO	Elbow value of output DC Voltage / DC Current
Y1	End value of output DC Voltage / DC Current
R _N	Rated value of output burden
F _N	Nominal Frequency

Technical Specifications
Measuring Input X

Voltage Transducer (Theta 20V)	
Nominal input Voltage UN (AC RMS) (PT Secondary range)	$57V \leq UN \leq 500 V$
PT Primary range	57V to 400 kV
Nominal Frequency FN	45...66 Hz
Nominal input Voltage burden	< 0.6 VA at UN
Overload Capacity:	1.2 * UN continuously, 2 * UN for 1 second, repeated 10 times at 10 minute intervals (Maximum 300V with power supply powered from measuring input)

No need of external potentiometer. User can set full scale output for desired input with the help of programmable PT secondary.

Current Transducer (Theta 20A)	
Nominal input Current IN (AC RMS) (CT Secondary range)	$1 A \leq IN \leq 5 A$
CT Primary range	1 A to 9999A
Nominal Frequency FN	45...66 Hz
Nominal input Current burden	< 0.2 VA at IN
Overload Capacity	1.2 * IN continuously, 10 * IN for 3 second, repeated 5 times at 5 minute intervals. 50 * IN for 1 second, repeated 1 time at 1 hour interval(max 250 A).

No need of external potentiometer. User can set full scale output for desired input with the help of programmable CT secondary.

Measuring Output Y(Single or Optional Dual)

Output type	Load independent DC Voltage or DC Current (Onsite selectable through DIP switches & programming.)
Load independent DC output (Y)	0... 20mA / 4... 20mA OR 0...10V.
Output burden with DC current output Signal	$0 \leq R \leq 15V/Y2$
Output burden with DC voltage output Signal	$Y2/(2 mA) \leq R \leq \infty$
Current limit under overload R= ∞	$\leq 1.25 * Y2$ with current output $\leq 100 mA$ with voltage output
Voltage limit under R=00	$< 1.25 * Y2$ with voltage output $\leq 30 V$ with current output
Residual Ripple in Output signal	$\leq 1\% \text{ pk-pk}$
Response Time	< 400 ms.
Measurement TRMS	Up to the 15th harmonic

Auxiliary Power Supply		
AC/DC Auxiliary Supply	60V... 300 VAC-DC ± 5% or 24... 60 VAC-DC ± 10%	
AC Auxiliary supply frequency	40 to 65 Hz	
range Auxiliary supply consumption	60V...300 VAC-DC	≤ 8VA for Single output
		≤ 10VA for Dual output
	24V...60 VAC-DC	≤ 5 VA for Single output
		≤ 6 VA for Dual output
Accuracy (Acc. to IEC / EN 60688)		
Reference Value	Output end Value Y2 (Voltage or Current)	
Basic Accuracy	0.2 * C	
Factor C (The highest value applies if calculated C is less than 1, then C=1 applies)		

Linear characteristics

$$C = \frac{1 - \frac{Y_0}{Y_2}}{1 - \frac{X_0}{X_2}} \text{ or } C=1$$

Bent characteristics

For $X_0 \leq X \leq X_1$

$$C = \frac{Y_1 - Y_0}{X_1 - X_0} \cdot \frac{X_2}{Y_2} \text{ or } C=1$$

For $X_1 \leq X \leq X_2$

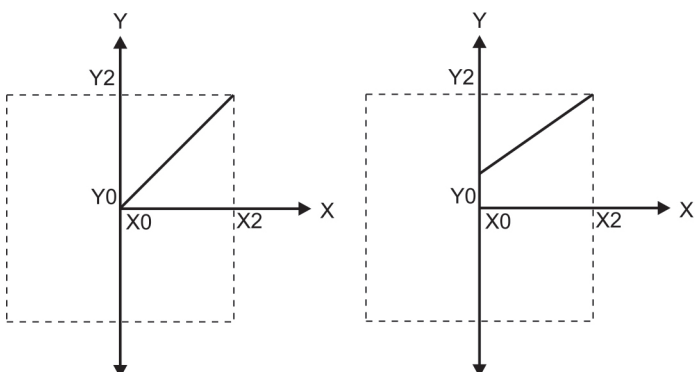
$$C = \frac{1 - \frac{Y_1}{Y_2}}{1 - \frac{X_1}{X_2}} \text{ or } C=1$$

Reference conditions for Accuracy

Ambient temperature	23°C ±1- 1°C
Pre-conditioning	30 min acc. to IEC I EN 60 688
Input Variable	Rated Voltage I Rated Current
Input waveform	Sinusoidal, Form Factor 1.1107
Input signal frequency	50 or 60Hz
Auxiliary supply voltage	At nominal range
Output Load	Rn=7.5VIY2 ±1% With DC current output signal Rn = Y2 I 1 mA ± 1% With DC voltage output signal Acc. to IEC I EN 60 688
Miscellaneous	Acc. to IEC I EN 60 688
Additional Error	
Temperature influence	± 0.2% 110°C
Influence of Variations	
As per IEC I EN 60688 standard. Output stability	< 30min

Output Characteristics

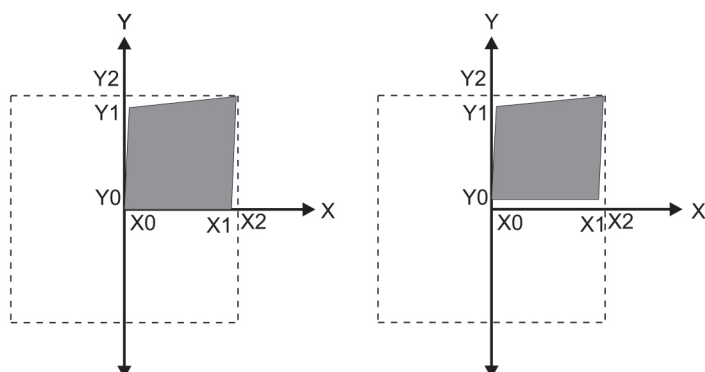
Example of setting with Linear Characteristics :



X0 = Start value of input
X1 = Elbow value of input
X2 = End value of input

Y0 = Start value of output
Y1 = Elbow value of output
Y2 = End value of output

Example of setting with bent Characteristics :



Note: End value(Y2) of output cannot be changed onsite.

Safety	
Protection Class	II (Protection Isolated, EN 61 010)
Protection	IP 40, housing according to EN 60 529 IP 20, terminal according to EN 60 529
Pollution degree	2
Installation Category	III
Insulation Voltage	50Hz, 1min. (EN 61 010-1) 5500V, Input versus outer surface 3700V, Input versus all other circuits 3700V, Auxiliary supply versus outer surface and output 490V, Output versus output versus each other versus outer surface
Installation Data	
Mechanical Housing	Lexan 940 (polycarbonate) Flammability Class V-0 acc. To UL 94, self extinguishing, non dripping, free of halogen
Mounting position	Rail mounting / wall mounting
Weight	Approx. 0.4kg
Connection Terminal	
Connection Element	Conventional Screw type terminal with indirect wire pressure
Permissible cross section of the connection lead	≤ 4.0 mm ² single wire or 2 x 2.5 mm ² fine wire
Environmental	
Nominal range of use	0 °C...23 °C... 45 °C (usage Group II)
Storage temperature	-40 °C to 70 °C
Relative humidity of annual mean	≤ 75%
Altitude	2000m max
Ambient tests	
EN 60 068-2-6	Vibration
Acceleration	±2g
Frequency range	10....150...10Hz, rate of frequency sweep: 1 octave/minute
Number of cycles	10, in each of the three axes
EN 60 068-2-7	Shock
Acceleration	3 X 50g 3 shocks in each direction
IEC 61000-4-2/-3/-4/-5/-6 EN 55 011	Electromagnetic compatibility

Proramming (Fig4)

Programming of transducer can be done in two ways

- Programming Via Front LCD & two keys for with display model.
- Programming Via optional RS485(MODBUS) communication port.

Configuring Rish Con Transducer

To configure Theta 20A-20V Transducer Input/ output one of the two programming methods can be adapted along with mechanical switch setting (DIP switch setting on PCB)

DIP Switch Setting for OUTPUT

Type of output (current or voltage signal) has to be set by DIP switch (see Fig.4).

For programming of DIP switch the user needs to open the transducer housing & set the DIP switch located on PCB to the desired output type Voltage or Current. Output range changing is not possible with DIP switch setting.

Refer below Fig.4 for DIP switch setting.

The four pole DIP switch is located on the PCB in the RISH CON Transducer

DIP Switch Setting	Type of Output Signal
ON 	load-independent current
ON 	load-independent voltage

Fig.4

LED Indication

ON LED	Aux.supply healthy condition	Green LED continuous ON
O/P1 LED	Output1 voltage selection	Green LED continuous ON
	Output1 Current selection	Red LED continuous ON
O/P2 LED	Output2 voltage selection	Green LED continuous ON
	Output2 Current selection	Red LED continuous ON

Dimensions

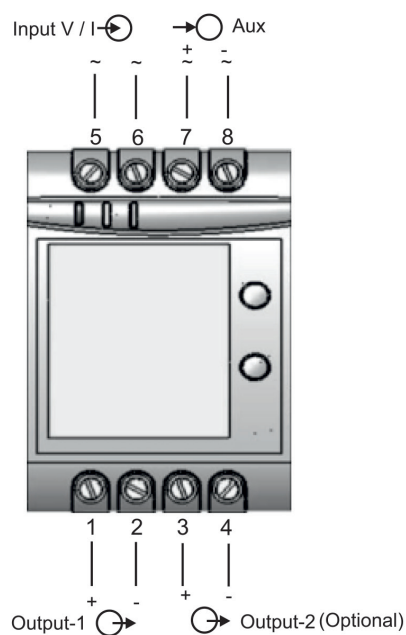


Fig. 2

Electrical Connections

Connection	Terminal details	
Measuring input	~ ~	5 6
Auxiliary power supply	~ , + ~ , -	7 8
Measuring output - 1	+ -	1 2
Measuring output 2 2	+ -	3 4

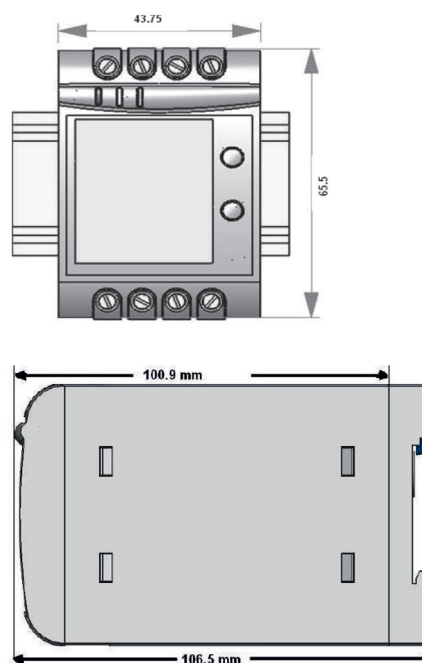


Fig. 3

Ordering Information

Product Code	CM41-	X	XX	X	X	X	X	Z	00000
Product Type	Theta 20A	I	74 8E	H F	1 2				
	Theta 20V	V							
Input Range	Programmable 1...5A								
	Programmable 57...500V								
Power Supply	60-300 VAC/DC								
	24-60 VAC/DC								
Output	1 O/P								
	1 O/P								
Module options	With Display, without RS-485								
	Without Display, wit RS-485					D	Z		
	With Display, with RS-485					Z	R		
						D	R		

Ordering Example: CM41-I74H1ZRZ00000 - Theta 20A, Programmable 1...5A, Aux 60-300 VAC/DC, without display, 1 Output, With RS485.

Analogue DC output options as below, to be specified while ordering only

Current Output	Voltage Output	DIP Option
Standard Ranges		
0/4...20 mA	0.....10V	Yes
Optional factory set ranges		
0...10 mA	0...5 V	No
0...5 mA	0...2.5 V	No
0...2.5 mA	0...1 V	No
0...1 mA		

Note: End value of output cannot be changed onsite.

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