Technical Data Sheet

Theta 20A / 20V

c UL us LISTED

File No. E471457

Theta 20A / 20V is used to measure and convert AC Voltage or Current input into a load independent DC current or voltage output signal.

Special Features

- **True RMS** measurement
- 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
- RS-485(Modbus) Communication
- Output Response Time < 400 msec

Application

Theta 20A/20V The 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.

Product Features

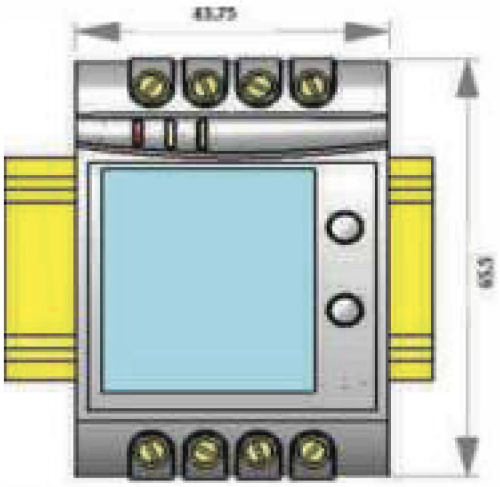
Measuring Input	AC Voltage/ Current input signal , sine wave or distorted wave form.
Analog Output (Single or dual)	Isolated analog output which can be set onsite to either voltage or current output.
Accuracy	Output signal accuracy **class 0.2** as per International Standard **IEC/EN 60 688**.
Programmable Input / Output	The Transducer can be programmed onsite using front key & display or through programming port (COM) or through RS-485.

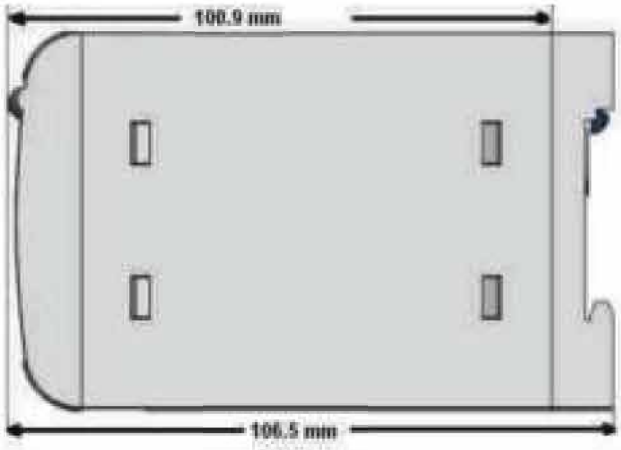
LED Indication	LED indication for power on and output type. (Current output : Red LED, Voltage output : Green LED)
Display Module	Optional 7 segment LCD display with backlit & keypad. For displaying measured parameters & onsite configuration of Input/output.
RS485 Communication (Optional)	Optional RS485 communication is available. For reading measured parameters & onsite configuration of input/output.

Symbols and their meanings

X	Input AC Voltage / AC Current
X0	Start value of input
X1	Elbow value of input
X2	End value of input
Y	Output DC Voltage / DC Current
Y0	Start value of output DC Voltage / DC Current
Y1	Elbow value of output DC Voltage / DC Current
Y2	End value of output DC Voltage / DC Current
RN	Rated value of output burden
FN	Nominal Frequency

Dimensions





Technical Specifications

Reference conditions for Accuracy	
Pre-conditioning	30 min acc. to IEC / EN 60 688
Input Variable	Rated Voltage / Rated Current
Input waveform	Sinusoidal, Form Factor 1.1107
Input signal frequency	50 or 60Hz
Auxiliary supply voltage	At nominal range
Output Load	Rn = 7.5 V / Y2 ±1% With DC current output signal Rn = Y2 / 1 mA ± 1% With DC voltage output signal
Miscellaneous	Acc. to IEC / EN 60 688

Technical Specifications

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

$$C=\frac{1-\frac{Y0}{Y2}}{1-\frac{X0}{X2}} \text{ or } C=1$$

Bent characteristics

For $X0 \leq X \leq X1$ $\quad C=\frac{Y1-Y0}{X1-X0}\cdot\frac{X2}{Y2}$ or $C=1$

For $X1 \leq X \leq X2$ $\quad C=\frac{1-\frac{Y1}{Y2}}{1-\frac{X1}{X2}}$ or $C=1$

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

Auxiliary Power Supply

AC/DC Auxiliary Supply	60V… 300 VAC-DC ± 5% or 24... 60 VAC-DC ± 10%	
AC Auxiliary supply frequency range	40 to 65 Hz	
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

Current Transducer (Theta 20A)

Nominal input Current I_N (AC RMS) (CT Secondary range)	1 A ≤ IN ≤ 5 A
CT Primary range	1 A to 9999 A
Nominal Frequency FN	45.....66 Hz
Nominal input Current burden	< 0.2 VA at IN
Overload Capacity	1.2 * I_N continuously, 10* I_N for 3 second, repeated 5 times at 5 minute intervals. 50* I_N 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.	

Additional Error

Temperature influence	± 0.2% /10°C

Measuring Input X

Voltage Transducer (Theta 20V)	
Nominal input Voltage UN (AC RMS) (PT Secondary range)	57V ≤ UN ≤ 500 V
PT Primary range	57V to 400 kV
Nominal Frequency F_N	45.....66 Hz
Nominal input Voltage burden	< 0.6 VA at UN
Overload Capacity	1.2 * U_N continuously, 2* U_N 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.	

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 / 0…1mA OR 0…10V
Output burden with DC current output Signal	0 ≤ R ≤ 15V/Y2
Output burden with DC voltage output Signal	Y2/(2 mA) ≤ R ≤ ∞
Current limit under overload R=0	≤ 1.25 * Y2 with current output ≤ 100 mA with voltage output
Voltage limit under R=∞	< 1.25 * Y2 with voltage output ≤ 30 V with current output
Residual Ripple in Output signal	≤ 1% pk-pk
Response Time	400 msec

Ambient tests

EN 60 068-2-6	Vibration
Acceleration	± 2 g
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
EN 60 068-2-1/-2/-3	Cold, Dry, Damp heat
IEC 61000-4-2/-3/-4/-5/-6 EN 55 011	Electromagnetic compatibility.

Technical Specifications

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	1min. (EN 61 010-1) 7700VDC, Input versus outer surface 5200VDC, Input versus all other circuits 5200VDC, Auxiliary supply versus outer surface and output 690VDC, Output versus output versus each other versus outer surface.

Connection Terminal

Connection Element	Conventional Screw type terminal with indirect wire pressure
Permissible cross section of the connection lead	≤ 4.0 mm² single wire or 2 x 2.5 mm² fine wire

Influence of Variations

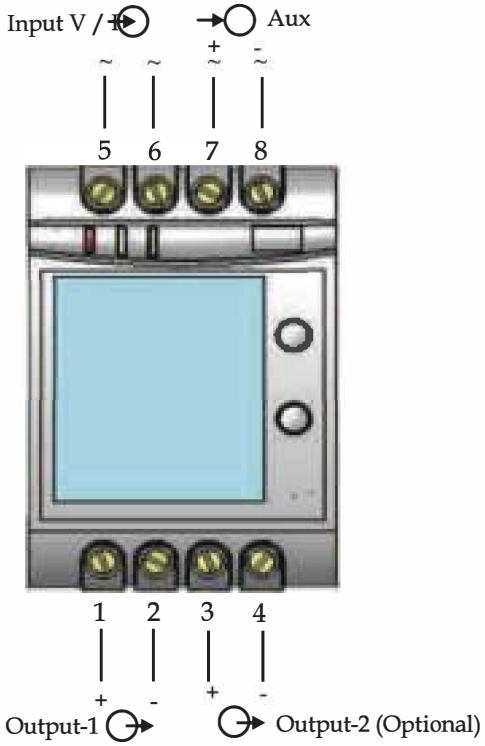
As per IEC / EN 60688 standard. Output stability	< 30min

Environmental

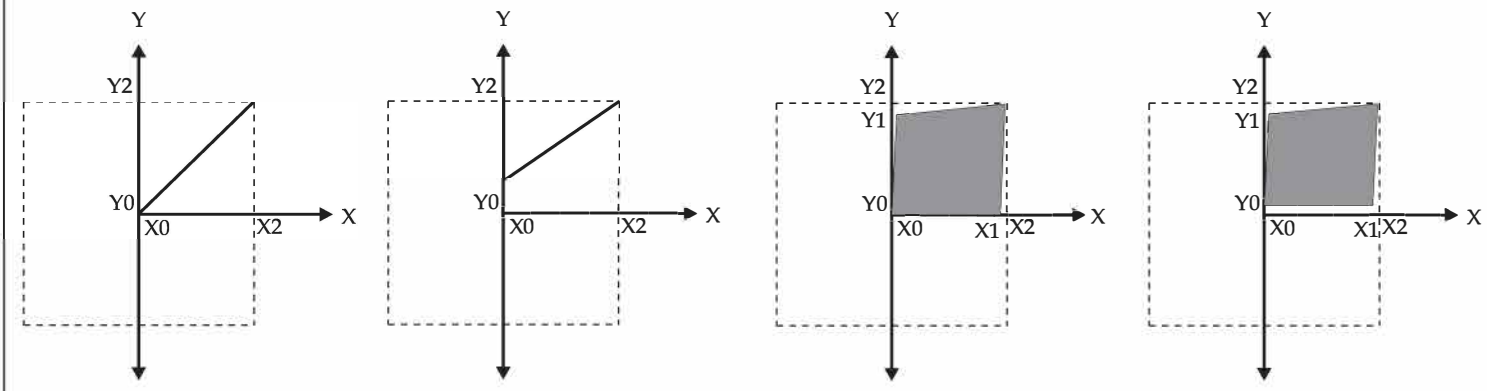
Nominal range of use	0 to 45°C
Storage temperature	-40 to 70 °C
Relative humidity of annual mean	≤ 75%
Altitude	2000m max

Electrical Connections

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



Output 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

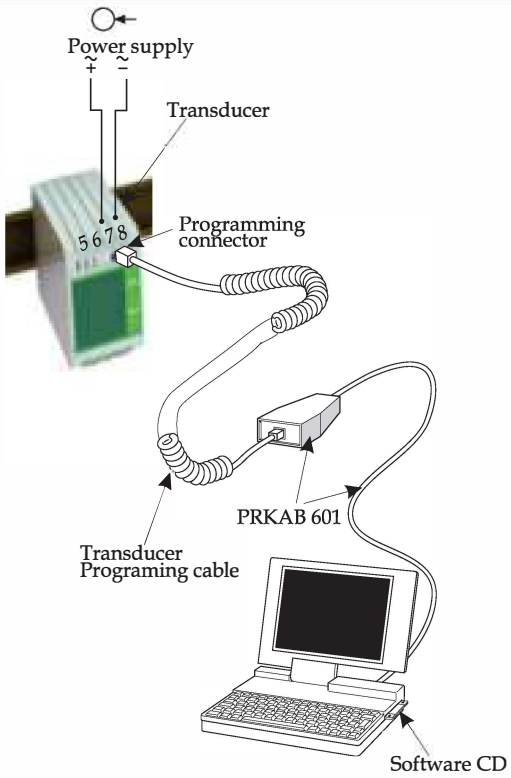
Note: End value(Y2) of output cannot be changed onsite.

Technical Specifications

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

Programming

Programming of transducer can be done in three ways	1) Programming Via Front LCD & two keys. 2) Programming Via optional RS-485(MODBUS) communication port. (Device address, PT Ratio,CT Ratio,Password,communication parameter,Output Type & simulation mode can be programmed). 3) Programming Via Programming port available at front of Transducers using optional PRKAB601 Adapter.
Programming Via Programming port (COM)	A PC with RS 232 C interface along with the programming cable PRKAB 601 and the configuration software are required to Program the transducer.



The connections between	"PC←→PRKAB ←→ Transducer. The power supply must be applied to Transducer before it can be programmed. The Configuration software is supplied on a CD. The programming cable PRKAB601 adjusts the signal level and provides the electrical insulati on between the Transducers
Configuring Rish Con Transducer	To Configure the transducer Input / output one of the three 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 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.

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

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

Ordering Information Standard Version

Product Code	TT20-	X	XX	X	X	X	X	X	00000
Product Type	THETA 20A	I							
	THETA 20V	V							
Input Range	Prog. 1…5A 1-5A		74						
	Prog. 57…500V 57-500V		8E						
Power Supply	60-300U			H					
	24-60U			F					
Output	1 O/P 1O				1				
	2 O/P 2O				2				
Display Module	With Display					D			
	Without Display WD					Z			
RS485 Module	With RS-485						R		
	Without RS-485						Z		
Prog. Cable	With PRKAB 601 PRK							C	
	Without PRKAB 601							Z	