



## Technical Data Sheet

# Theta Hz



File No. E471457



**Theta Hz** the transducer is used for frequency measurement. The output signal is proportional to measured frequency and is either load independent DC Current or load independent DC Voltage.

### Special Features

- Fully onsite programmable input range
- Available in Single or Dual output type
- Onsite selectable output type.(DC current / DC voltage)
- Accuracy class 0.2 ( IEC / EN 60688)
- Seven Segment LCD Display
- RS485(Modbus) Communication
- Output Response Time < 400 msec

## Application

*Theta Hz* the transducer is used for frequency measurement. The output signal is proportional to measured frequency and is either load independent DC Current or load independent DC Voltage.

## Product Features

<b>Measuring Input</b>	Sine wave or distorted wave form of nominal input voltage with fundamental wave.	<b>LED Indication</b>	LED indication for power on and output type. (Current output : Red LED, Voltage output : Green LED)
<b>Analog Output (Single or dual)</b>	Isolated analog output which can be set onsite to either voltage or current output.	<b>Display Module (Optional)</b>	Optional 7 segment LCD display with backlit & keypad. For displaying measured parameters & onsite configuration of Input/output
<b>Accuracy</b>	Output signal accuracy <b>Class 0.2</b> as per International Standard <b>IEC / EN 60688</b> .	<b>Rs485 Communication (Optional)</b>	Optional RS485 communication is available. For reading measured parameters & onsite configuration of input/output.
<b>Programmable Input/Output</b>	The Transducer can be programmed onsite using front key & display or through programming port (COM) or through RS 485.		

## Symbols and their meaning

<b>X</b>	Input Frequency
<b>X0</b>	Start value of input
<b>X1</b>	Elbow value of input
<b>X2</b>	End value of input
<b>Y</b>	Output DC Voltage / DC Current
<b>Y0</b>	Start value of output DC Voltage / DC Current
<b>Y1</b>	Elbow value of output DC Voltage / DC Current
<b>Y2</b>	End value of output DC Voltage / DC Current
<b>RN</b>	Rated value of output burden
<b>UN</b>	Nominal input voltage

## Technical Specifications

Reference conditions for Accuracy	
Ambient temperature	23°C +/- 1°C
Pre-conditioning	30 min acc. to IEC / EN 60688
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 60688

### 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)	
<b>Linear characteristics</b>	$C = \frac{1 - \frac{Y0}{Y2}}{1 - \frac{X0}{X2}} \text{ or } C=1$
<b>Bent characteristics</b>	For $X0 \leq X \leq X1$ : $C = \frac{Y1 - Y0}{X1 - X0} \cdot \frac{X2}{Y2}$ or $C=1$
	For $X1 \leq X \leq X2$ : $C = \frac{1 - \frac{Y1}{Y2}}{1 - \frac{X1}{X2}}$ or $C=1$

### Measuring Output Y ( Single or Optional Dual)

Output type	Load independent DC Voltage , DC Current onsite selectable through DIP switches.
Load independent DC output	0...20mA / 4...20mA / 0...1mA OR 0...10V
Output burden with DC current output Signal	$0 \leq R \leq 15V/Y2$
Output burden with DC voltage output Signal	$Y2/(2 \text{ mA}) \leq R \leq \infty$
Current limit under overload R=0	$\leq 1.25 * Y2$ with current output $\leq 100 \text{ mA}$ with Voltage output
Voltage limit under R=∞	$< 1.25 * Y2$ with voltage output $\leq 30 \text{ V}$ with current output
Residual Ripple in Output signal	$\leq 1\% \text{ pk-pk}$
Response Time	$< 400 \text{ msec}$

# Technical Specifications

## Auxiliary Power Supply

AC/DC Auxiliary Supply	60V... 300 VAC-DC $\pm$ 5% or 24V... 60VAC-DC $\pm$ 10%
AC Auxiliary supply frequency range	40 to 65 Hz
Auxiliary supply consumption	
60V...300 VAC-DC	$\leq$ 8VA for Single output $\leq$ 10VA for Dual output
24V...60 VAC-DC	$\leq$ 5 VA for Single output $\leq$ 6 VA for Dual output

## Environmental

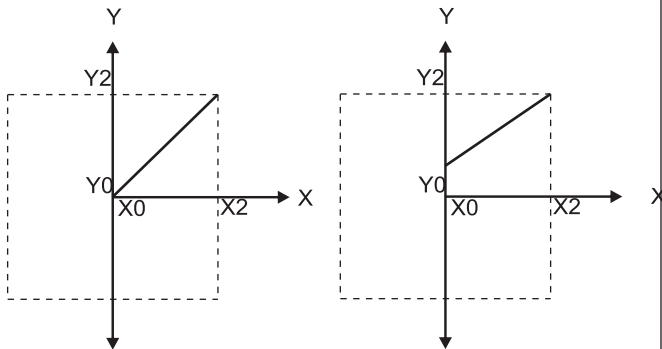
Nominal range of use	0 to 45 °C
Storage temperature	-40° C to 70° C
Relative humidity of annual mean	$\leq$ 75%
Altitude	2000m max

## Influence of Variations

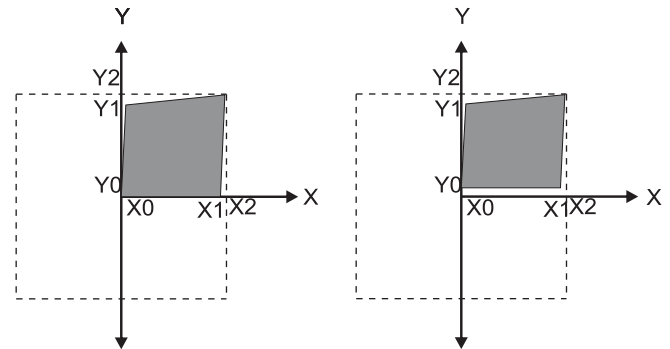
As per IEC / EN 60688 standard Output Stability	< 30 min
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## Output Characteristics

Example of setting with Linear Characteristics :



Example of setting with bent Characteristics :



X0 = Start value of input                      Y0 = Start value of output  
X1 = Elbow value of input                      Y1 = Elbow value of output  
X2 = End value of input                      Y2 = End value of output

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

## Safety

Protection Class	II (Protection Isolated, EN 61010)
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 61010-1) 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.

## 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

## Additional error

Temperature influence	$\pm$ 0.2% /10°C
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## Connection Terminal

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

## Ambient tests

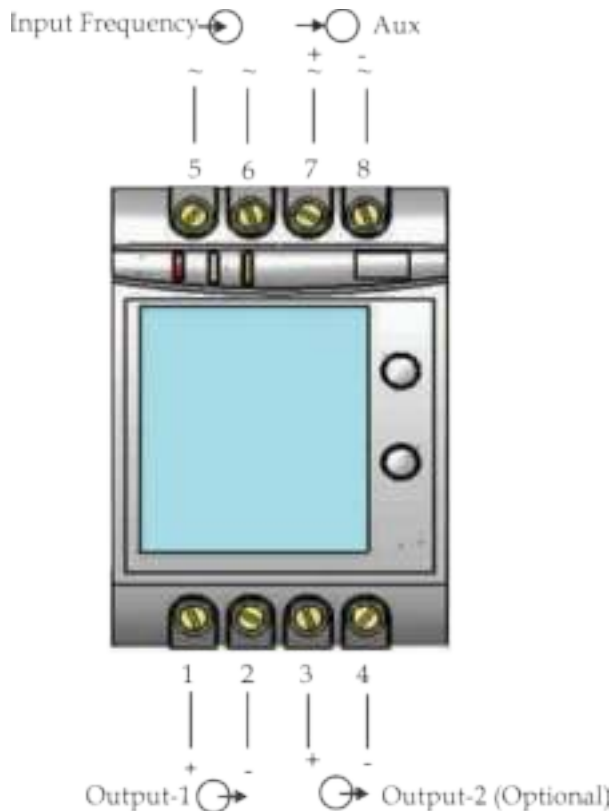
EN 60 068-2-6	Vibration
Acceleration	$\pm$ 2 g
Frequency range	10...150...10Hz, rate of frequency sweep: 1 octave/minute
Number of cycles	10, in each of the three axes
EN 60 068-2-7	Shock
Acceleration	3*50g 3 shocks in each direction
EN 60 068-2-1/-2/-3	Cold, Dry, Damp heat
IEC 61000-4-2/-3/-4/-5/-6 EN 55 011	Electromagnetic compatibility.

## Technical Specifications

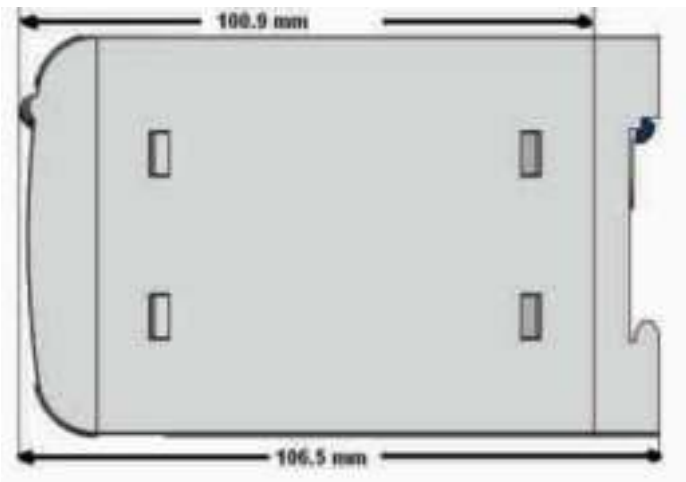
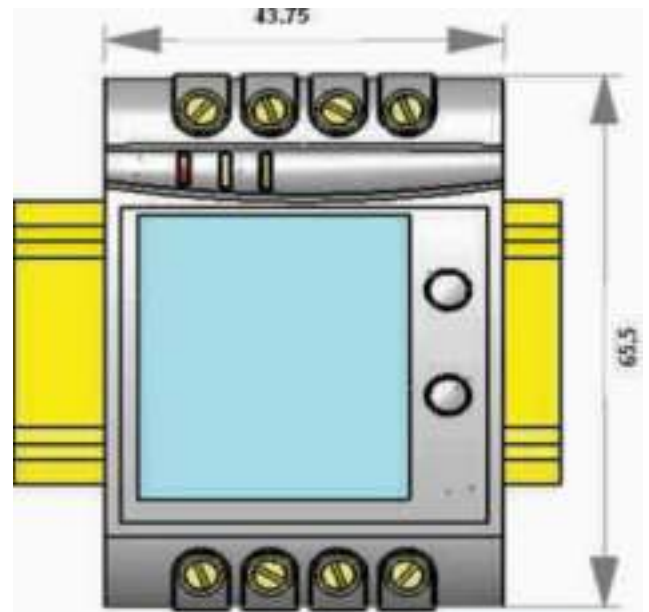
ON LED	Aux.supply healthy condition	Green LED continuous ON
O/P1 LED	Output1 voltage selection	Green LED continuous ON
	Output1 Current selection	Red LED continuous ON
O/P2 LED	Output2 voltage selection	Green LED continuous ON
	Output2 Current selection	Red LED continuous ON

## Electrical Connections

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



## Dimensions



# Programming

<b>Programming of transducer can be done in three ways</b>	<p>1) Programming Via Front LCD &amp; two keys.</p> <p>2) Programming Via optional RS485(MODBUS) communication port ( Device address, Password,communication parameter, Output Type &amp; simulation mode can be programmed).</p> <p>3) Programming Via Programming port available at front of Theta Hz Transducers using (optional) PRKAB601 Adapter.</p>
<b>Programming Via Programming port (COM)</b>	A PC with RS 232 C interface along with the programming cable PRKAB601 and the configuration software are required to program the transducer.

**The connections between** PC ↔ PRKAB 601 ↔ Theta 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 insulation between the PC and Theta Transducers.

**Configuring Transducer**

To configure Theta Transducer Input / output one of the three programming methods can be adapted along with mechanical switch setting (DIP switch setting on PCB for output).

**DIP Switch Setting for OUTPUT**

Type of output (current or voltage signal) has to be set by DIP switch (see Fig.5).

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. 5 for DIP switch setting. The four pole DIP switch is located on the PCB in the Theta Transducer

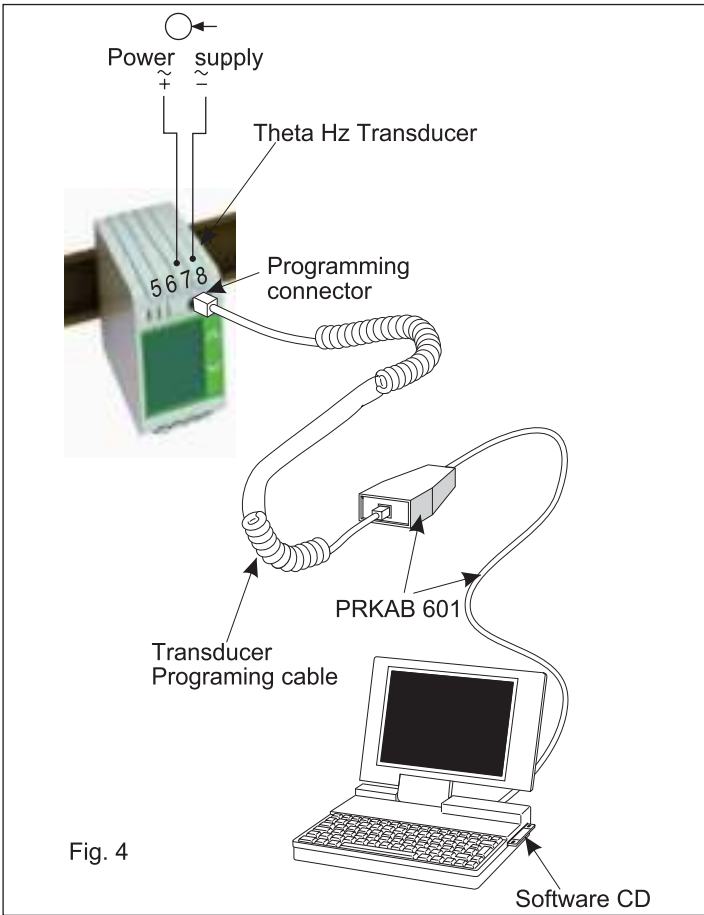


Fig. 4

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

Fig. 5

## Ordering Information

Product Code	TT25-	X	XX	X	X	X	X	X	00000
Input Range	45-55Hz	6							
	55-65Hz	B							
	45-65Hz	7							
	48-52Hz	A							
Input Range	100-500V	8F							
Power Supply	60-300U			H					
	24-60U			F					
Output	1 O/P 10				1				
	2 O/P 20				2				
Display Module	With Display					D			
	Without Display WD					Z			
RS485 Module	With RS-485 485						R		
	Without RS-485						Z		
Prog. Cable	With PRKAB 601 PRK							C	
	PRKAB 601							Z	