TNM 3440

- True RMS measurement.
- 3 Line 4 Digits ultra bright LED Display .
- On site Programmable CT/PT Ratios.
- User selectable CT Secondary 1A/5A.
- User selectable 3ph3wire / 3ph4wire .
- Storage of MIN / MAX values.
- Measurement and Display of RPM, Run hours, On hours, No. of interruption.
- Optional: MODBUS (RS485) Communication / Pulse output / Analogue output

TNM3440 measures important electrical parameters and replaces the multiple analog panel meters. It measures electrical parameters like AC current, Voltage, frequency, active energy import and active energy export, Current Demand, kW Demand, kVA Demand and Max Current Demand, Max kW Demand and Max kVA Demand. The instrument has optional output as one pulse output or two pulse output for energy measurement.

Product Features

On site programmable PT/CT ratios:

It is possible to program primary of external potential Transformer (PT), primary of external Current Transformer (CT) on site locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485)

User selectable CT Secondary 5A/1A

The secondary of external Current Transformer (CT) can be programmed on site to either 5A or 1A locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485)

User selectable PT Secondary

The secondary of external potential Transformer (PT) can be programmed on locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485)

User selectable 3 phase 3W or 4W

User can program on site the network connection as either 3 Phase 3 Wire or 4 Wire locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485).

Low back depth

The instrument has very low back depth (behind the panel) of less than 80 mm in spite of optional features like pulse output

Onsite selection of Auto scroll / Fixed Screen

User can set the display in auto scrolling mode or fixed screen mode locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485).

Phase reversal indication

The instrument can detect wrong phase sequence or failure of one of the input voltages and displays “phase” error message.

Energy measurement (Import and Export):

Active energy (kWh), Reactive energy (kVArh), Apparent energy (kVAh) and Ampere Hour (kAh). Any of the parameters can be freely assigned to 2 optional pulse outputs.

True RMS measurement

The instrument measures distorted waveform up to 15th Harmonic.

High brightness 3 line 4 digits LED display

Simultaneous display of 3 Parameters

User selectable Low Current suppression (below 30 mA)

User can suppress the readings below 30 mA in the current measurement by onsite programming if required.

Min Max storage of parameters possible

The instrument stores minimum and maximum values for System Voltage and System Current. Every 40 sec minimum and maximum readings are updated.

Number of parameters measured: more than 46

The instrument measures more than 46 electrical parameters of 3 Phase network.

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www.celsamessgerate-spain.com
info@celsaspain.com / +34 96 130 93 78

Parameter Screen recall

In case of power failure, the instrument memorizes the last displayed screen. The displayed screen will get memorized only if user keeps this screen for minimum 40 sec duration before power failure for fixed screen mode.

Total Harmonic Distortion (THD)

The instrument can measures per phase THD of voltage and THD of current.

Energy Count storage

In case of power failure, the instrument memorizes the last energy count.

Programmable Energy format and Energy rollover count

Customer can assign the format for energy display on MODBUS (RS485) in terms of W, kW or MW. Additional to this, customer can also set a rollover count from 7 to 14 digits (for W), 7 to 12 digits (for kW) and 7 to 9 digits (for MW), after which the energy will roll back to zero. The above settings are applicable for all types of energy.

Hour Run, ON Hour, Number of Interruptions

Hour run records the number of hours load is connected. ON Hour is the period for which the auxiliary supply is ON. Number of Interruptions indicates the number of times the Auxiliary Supply was interrupted.

Optional MODBUS (RS485) Output

The optional ModBus output enables the instrument to transmit all the measured parameters over standard MODBUS (RS485).

User Assignable Registers for MODBUS

Customer can assign MODBUS register address as per his need for faster response time.

Optional: Pulse output

The optional pulse output is a potential free, very fast acting relay contact which can be used to drive an external mechanical counter for energy measurement.

Configuration of the Instrument via MODBUS

The instrument settings can be configured locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485).

Optional Analog Outputs (2 Outputs)

2 Analog outputs can be programmed from a list of input parameters.

Ethernet Interface (Modbus TCP/IP Protocol)

The optional Ethernet Interface output transmit all the measured parameters on Modbus TCP/IP. Also user can configure their instrument via Ethernet Interface.

Enclosure Protection for dust and water

conforms to IP 54 (front face) as per IEC60529

Compliance to International Safety standards

Compliance to International Safety standard IEC 61010-1- 2001

EMC Compatibility

Compliance to International standard IEC 61326

Technical Specifications

Input Voltage		
Nominal input voltage (AC RMS)		Phase –Neutral 57.7 - 346 VL-N / Line-Line 100 - 600 VL-L
System PT primary values		100VLL to 692kVLL programmable on site.
System PT secondary values		100VLL to 600VLL programmable on site.
Max continuous input voltage		120% of rated value
Input Current		
Nominal input current		1A / 5A AC RMS.
System CT secondary values		1A and 5A programmable on site.
System CT primary values		From 1A up to 9999A (for 1 or 5 Amp)
Max continuous input current		120% of rated value
Auxiliary supply		
Auxiliary Supply		60 - 300 V AC DC
	or	65 - 300 V AC DC for Ethernet Option
	or	12 - 60 V AC DC
AC Auxiliary supply frequency range		45 to 66 Hz
VA Burden		
Nominal input voltage burden		< 0.35 VA approx. per phase
Nominal input current burden		< 0.3 VA approx. per phase
Auxiliary Supply burden		< 5 VA approx
	or	< 7 VA approx with 4-20mA analog output or Ethernet Option
Overload withstand		
Voltage		2 x rated value for 1 second, repeated 10 times at 10 second intervals
Current		20x for 1 second, repeated 5 times at 5 min
Operating measuring ranges		
Voltage		10... 120% of rated value
Current		5 ... 120% of rated value
Frequency		40...70 Hz
Power Factor		0.5 Lag ... 1... 0.8 Lead
Reference conditions for accuracy		
Reference temperature		23°C +/- 2°C
Input waveform		Sinusoidal (distortion factor 0.005)
Input frequency		50 or 60 Hz ±2%
Auxiliary supply voltage		Rated Value ±1%
Auxiliary supply frequency		Rated Value ±1%
Voltage Range		50... 100% of Nominal Value. 60... 100% of Nominal Value for THD.
Current Range		10... 100% of Nominal Value. 20... 100% of Nominal Value for THD.
Power		Cos phi / sin phi = 1 for Active / Reactive Power and Energy. 10... 100% of Nominal Current and 50... 100% of Nominal Voltage.
Power Factor / Phase Angle		40... 100% of Nominal Current and 50... 100% of Nominal Voltage.
Accuracy		
		Class 0.2S
Voltage		± 0.2% of Nominal value
Current		± 0.2% of Nominal value
Frequency		± 0.15% of mid frequency
Active Power		± 0.2% of Nominal value
Re-Active Power		± 0.4% of Nominal value
Apparent Power		± 0.2% of Nominal value
Active energy (kWh)		± 0.2% of Nominal value
Re Active energy (kVArh)		± 0.5% of Nominal value
Apparent energy (kVAh)		± 0.2% of Nominal value
Accuracy of Analog Output		1 % of Output end value
Power Factor		±1.0% of Unity
Angle		±1% of range
Total Harmonic Distortion		±1%

Note:- Measurement error is normally much less than the error specified above. Variation due to influence quantity is less than twice the error allowed forreference condition

Influence of variations	
Temperature coefficient : (for rated value range of use (0...50°C))	0.025%/°C for Voltage (50... 120% of rated value) and 0.05%/°C for Current (10... 120% of rated value)
Display update rate	
Response time to step input	1 sec approx.

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Applicable standards			
EMC		IEC 61326	
Immunity		IEC 61000-4-3. 10V/m min – Level 3 industrial low level	
Safety		IEC 61010-1-2001 , Permanently connected use	
IP for water and dust		IEC60529	
Pollution degree		2	
Installation category		III	
High Voltage Test		2.2 kV AC, 50Hz for 1 minute between all electrical circuits	
Environmental			
Operating temperature		-10 to +55°C	
Storage temperature		-20 to +65°C	
Relative humidity		0... 90% non condensing	
Warm up time		Minimum 3 minute	
Shock		15g in 3 planes	
Vibration		10... 55 Hz, 0.15mm amplitude	
Energy (can be programmed for different energy parameters simultaneously)			
Relay contact		1 NO + 1 NC	
Switching Voltage and Current for Relay		240 VDC ,5 A	
Other Pulse rate divisors (applicable only when Energy on RS485 is in W)			
10	1 per 10 Wh (up to 3600W),	1 per 10kWh (up to 3600kW),	1 per 10MWh (above 3600 kW)
100	1 per 100Wh (up to 3600W),	1 per 100kWh (up to 3600kW),	1 per 100MWh (above 3600 kW)
1000	1 per 1000Wh (up to 3600W),	1 per 1000kWh (up to 3600kW),	1 per 1000MWh (above 3600 kW)
Pulse duration		60 ms, 100 ms or 200 ms	
Above options are also applicable to Apparent and reactive Energy.			
Ampere hour			
Default pulse rate divisoe		CT secondary = 1A Max pulse rate 3600 pulses/Ah *	
		CT secondary = 5A Max pulse rate 720 pulses/Ah	
Other Pulse rate divisors (applicable only when Energy on RS485 is in W):			
	10	CT secondary = 1A Max pulse rate 3600 pulses/10Ah *	
		CT secondary = 5A Max pulse rate 720 pulses/10Ah	
	100	CT secondary = 1A Max pulse rate 3600 pulses/100Ah *	
		CT secondary = 5A Max pulse rate 720 pulses/100Ah	
	1000	CT secondary = 1A Max pulse rate 3600 pulses/1000Ah *	
		CT secondary = 5A Max pulse rate 720 pulses/1000Ah	
Pulse duration		60 ms, 100 ms or 200 ms	

*No. of Pulses = $\frac{\text{Maximum Pulses}}{\text{CT Ratio}}$

Where, CT Ratio = (CT primary/ CT Secondary)

UNIVERSAL MEASURING INSTRUMENTS

No.	Parameter	3 Phase 4 Wire	3 Phase 3 Wire
1.	System Voltage	●	●
2.	System Current	●	●
3.	Voltage L1 - N	●	-
4.	Voltage L2 - N	●	-
5.	Voltage L3 - N	●	-
6.	Voltage L1 - L2	●	●
7.	Voltage L2 - L3	●	●
8.	Voltage L3 - L1	●	●
9.	Current L1	●	●
10.	Current L2	●	●
11.	Current L3	●	●
12.	Neutral current	●	-
13.	Frequency	●	●
14.	System Active Power (kW)	●	●
15.	Active Power L1(kW)	●	-
16.	Active Power L2 (kW)	●	-
17.	Active Power L3 (kW)	●	-
18.	System Re-active Power (kVar)	●	●
19.	Re-active Power L1(kVar)	●	-
20.	Re-active Power L2 (kVar)	●	-
21.	Re-active Power L3 (kVar)	●	-
22.	System Apparent Power (kVA)	●	●
23.	Apparent Power L1(kVA)	●	-
24.	Apparent Power L2 (kVA)	●	-
25.	Apparent Power L3 (kVA)	●	-
26.	System Power Factor	●	●
27.	Power Factor L1	●	-
28.	Power Factor L2	●	-
29.	Power Factor L3	●	-
30.	Phase Angle L1	●	-
31.	Phase Angle L2	●	-
32.	Phase Angle L3	●	-
33.	Import kWh (8 digit resolution)	●	●
34.	Export kWh (8 digit resolution)	●	●
35.	Import kVArh (8 digit resolution)	●	●
36.	Export kVArh (8 digit resolution)	●	●
37.	KVAh (8 digit resolution)	●	●
38.	KAh (8 digit resolution)	●	●
39.	Current demand	●	●
40.	KVA demand	●	●
41.	KW Import demand	●	●
42.	KW Export demand	●	●
43.	Max Current demand	●	●
44.	Max KVA demand	●	●
45.	Max KW Import demand	●	●
46.	Max KW Export demand	●	●
47.	Run Hour	●	●
48.	On Hour	●	●
49.	Number of interruptions	●	●
50.	Phase reversal indication	●	●
51.	THD Volts L1-N	●	-
52.	THD Volts L2-N	●	-
53.	THD Volts L3-N	●	-
54.	THD Volts L1-L2	-	●
55.	THD Volts L2-L3	-	●
56.	THD Volts L3-L1	-	●
57.	THD Current L1	●	●
58.	THD Current L2	●	●
59.	THD Current L3	●	●
60.	THD Voltage mean	●	●
61.	THD Current mean	●	●

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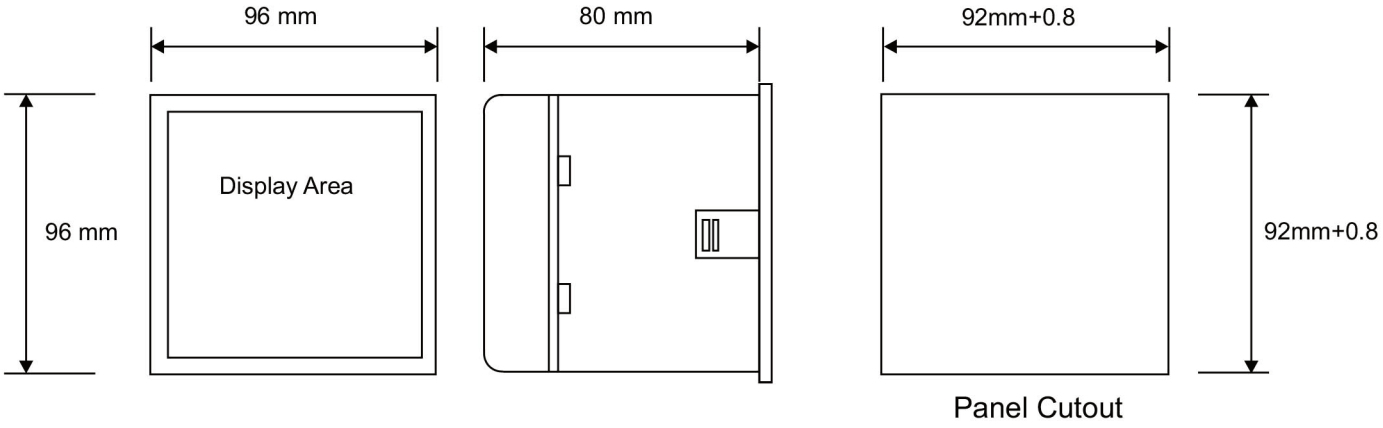
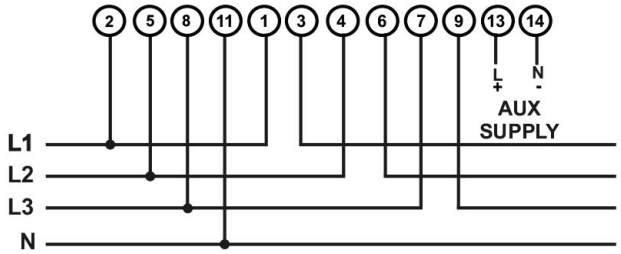
Dimensions:

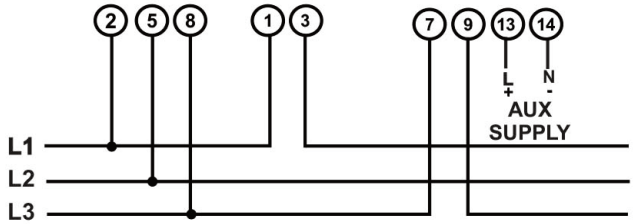


Electrical connections:

For 3 Phase 4 Wire Unbalanced Load



For 3 Phase 3 Wire Unbalanced Load



It is recommended that the wires used for connections to the instrument should have lugs soldered at the end. That is, the connectionsshould be made with Lugged wires for secure connections. The Maximum diameter of the lug should be 7.0 mm and maximum thickness 3.5 mm.
Permissible cross section of the connection wires: <= 4.0 mm2 single wire or 2 × 2.5 mm2 fine wire.

Ordering Information

Model: TNM3440
Accuracy class 0.2S
Auxiliary supply
60 - 300V AC DC
or 12 - 60V AC DC
Optional
RS485 + 2 Pulse output
or RS485 + 1 Pulse output + 2 Analog output
or Ethernet
or Option not used

Order Example:

TNM3440, Accuracy 0.2S, 60 - 300V AC DC Auxiliary supply, with MODBUS (RS485) and with 2 pulse output.