

## **USER'S MANUAL**

# **INFINITY**

## *Energy Meter*

This document contains the latest technical information about Infinity which is a micro-controller based energy meter. The product Infinity is sophisticated electronic equipment, and the user is advised to read this User's Manual carefully before attempting to install or operate the equipment.

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## **Infinity – Operational Manual**

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**TRINITY**

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## **Infinity – Operational Manual**

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## **Infinity – Operational Manual**

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Introduction.....	1
The Main Features Available In The Model.....	2
Technical Specifications .....	4
Installation And Commissioning .....	6
3P4W Mode Installation .....	6
Back View Of The Unit .....	10
RS485 Connection .....	11
Operational Details .....	12
Programming Mode.....	13
Setting CT-Primary.....	13
Setting Meter Id For RS485 Port.....	14
Setting Time To Run Hour And Load Run Hour .....	16
Setting Energy Parameter For Display.....	17
Run Mode.....	18
Communication.....	20
Modbus RTU On RS485 Port.....	20
Ordering Options .....	24

### Introduction

Infinity is a digital energy meter for use in three phase electrical systems as well as sub-metering applications. The design of this meter is based on proven microcontroller technology with front end ASICs, resulting in compact and accurate energy metering. The accuracy of the meters is maintained even under severely distorted waveform conditions which occur due to harmonics in the system.

Infinity is the advanced model with bright 16X1 LC display having optional features like RS485 port, dual source measurement and whole current measurement up to 60A.

### **The Main Features Available in the Model**

- Class 1.0S accuracy as per IS13779
- Class 0.5 accuracy also available
- Compact 96 x 96 x 55 mm enclosure
- Microcontroller based
- Backlit 16 X 1 LC Display Optional Dual Source
- Dual source measurement (EB & DG) along with Run Hour or Load Run Hour available.
- Energy Measurement Selectable Between KWh & KVAh
- Whole current models up to 60Aavailable
- RS-485 Communication port with MODBUS-RTU protocol



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*TRINITY*



### Technical Specifications

Parameters		
Type	Name	Statistics
INPUT	Supply	Three Phases and Neutral of a 3P4W system
	Voltage	Direct Voltage Input : Up to 300V L-N Burden : 0.5VA
	Current	Secondary Current: 5A or 1A ( optional ) Input CT Primary : Site Selectable Range of Reading : 5 -5000A Burden : < 1.0VA Overload : 5A CT = 6A RMS Continuous (Through CT) 1A CT = 1.2A RMS Continuous (Whole Current) : 120% of I <sub>max</sub> continuous.
	Power Supply	Wide operating Voltage SMPS : 80VAC - 300VAC, 50-60 H

## Infinity – Operational Manual

Parameters			
Type	Name	Statistics	
Communication	RS485 Port	Supporting MODBUS-RTU protocol.	
MEASUREMENT	Energy	Total Active Energy (KWh) Range of Reading : 0 to 9999999.9 KWh Accuracy : 1.0S as per IS13779.	
		Total Apparent Energy (KVAh) Range of Reading : 0 to 9999999.9 KVAh Accuracy : 1.0S as per IS13779. (Energy Measurement Selection In Programming Mode)	
MISCELLANEOUS	Dimensions	Bezel	96 X 96 mm
		Panel Cutout	92 X 92 mm
		Depth of installation	55 mm
		Operating temp	10°C to 50°C
		Weight	0.276 Kgs
		Min. Operating Current	0.4% of CT primary.
		Dual Source Sensing	By presence or absence of 230VAC across two terminals. Can be looped.
	Run Hour and Load Run Hour (Any One Parameter Available Through Programming Mode)		

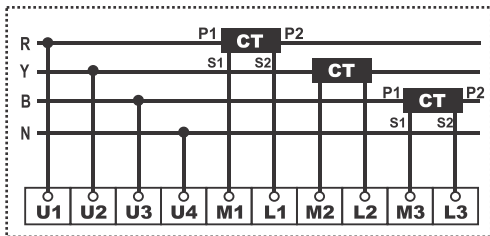
**TRINITY**

## Installation and commissioning

### 3P4W Mode Installation Only

Follow the steps outlined below to install / commission the unit.

1. Push the unit into the panel and mount using the clamps provided.
2. Connect the Auxiliary supply (80V AC to 270V AC) to the terminals marked P and N.



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*TRINITY*

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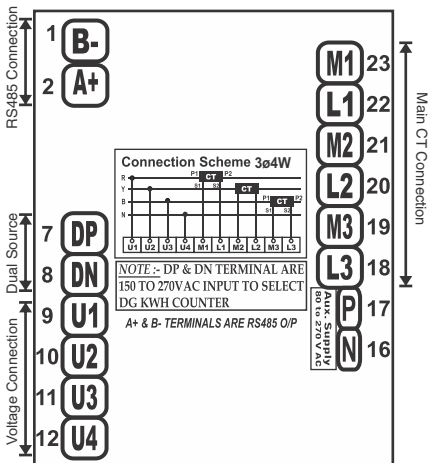
3. Connect the three phases with the phase sequence being R-Y-B to the corresponding terminals marked U1, U2 and U3 on the unit. Make sure that the three phases coming to the unit come through control fuses of 1.0 Amp rating. This will protect the electronics inside from damage due to severe over voltages or phase faults in the system.
4. Connect the neutral to the terminal marked U4.
5. For CT operated meter, connect the two wires from the R-phase CT to terminals marked M1 & L1 such that S1 from CT goes to M1 on the unit. For whole current meter, pass the R-Phase current cable through the meter CT hole in such a way that current flows in from side marked "R-Phase Source" and passes out through side "R-Phase Load". NOTE: The current carrying capacity of the whole current meter is limited by the maximum cable size which can be passed through the CT hole, which is 4sq.mm.
6. For CT operated meter, connect the two wires from the Y-phase CT to terminals marked M2 & L2 such that S1 from CT goes to M2 on the unit. For whole current meter, pass

the Y-Phase current cable through the meter CT hole in such a way that current flows in from "Y-Phase Source" and passes out through "Y- Phase Load". NOTE: The current carrying capacity of the whole current meter is limited by the maximum cable size which can be passed through the CT hole, which is 4sq.mm.

7. For CT operated meter, connect the two wires from the B-phase CT to terminals marked M3 & L3 such that S1 from CT goes to M3 on the unit. For whole current meter, pass the B-Phase current cable through the meter CT hole in such a way that current flows in from "B-Phase Source" and passes out through "B-Phase Load". NOTE: The current carrying capacity of the whole current meter is limited by the maximum cable size which can be passed through the CT hole, which is 4sq.mm.
8. For meters supplied with Dual Source facility, make the connections in such a way that there is no voltage between DP and DN terminals when the power is drawn from the EB source, and a clean 150-270 VAC appears

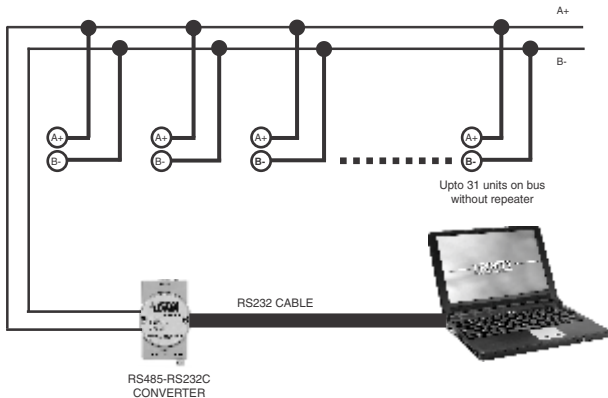
between the DP and DN terminals when the power is drawn from the DG source.

9. Switch on the three phase supply. The unit will come alive and display Factory information such as '—TRINITY-- ' and then enter into Run Mode.
10. Set the correct CT-Ratio on the unit for CT operated meters. In case of units with RS-485 communication port, set the correct meter address. For this refer to the OPERATIONAL DETAILS chapter.
11. The unit is ready for operation.



**Back view of the Unit**

## RS485 connection





### Operational Details

The Infinity is a versatile meter, with the features needed to implement an accurate electrical energy measurement system.

The configurable parameters of the meter can be programmed in Programming Mode. Run Mode is the normal mode where measured values are displayed.

The unit can be operated by pressing the following Keys:



After supplying power, the unit displays immediately power receiving information such as "--TRINITY--", CT Ratio and Unit ID on LCD screen for some time and then, by default, is in the Run Mode such as shown below.

In Normal INFINITY meter,



KWh=112.10

OR



KVAh = 120.12

(Display parameter as per the selected parameter in the programming mode).

In Dual Source Meter instead of “KWh” it shows “EBKWh” for Electricity Board Active Energy or “EBKVAh” for Electricity Board Apparent Energy.


### Programming Mode

The Programming Mode is possible for user interface with settable parameters such as CT-Primary and Meter Address for RS485 port and display energy parameter. .

### Setting CT-Primary





The CT-Primary is settable from 5 to 5000. The CT-Primary should be set to give the actual value of KWh.

To set the CT-Primary, follow the instructions below:

1. In Run Mode, press  key for about four seconds. The unit enters into Programming Mode such as shown below.





CT\_PRI=1550

2. Press  key again. Immediately, P starts blinking which indicates that the parameter can now be changed. Set the parameter value by pressing  and  keys until the desired value is received.
3. Press  key to confirm the parameter value. Hence, the unit will restart and return into Run Mode.

### Setting Meter ID for RS485 port

The Unit has the provision to specify a meter ID at site for RS485 port. The address can be set starting from 1 to 255 with a fixed baud rate of 9600. (This Baud rate can also be specified for 19200 at the time of ordering according to user's requirement).

To set the Meter ID, follow the instructions below:





1. In Run Mode, press  key for about four seconds. The unit enters into Programming Mode and press  key till Device ID is prompting such as shown below.



DEVICE ID=2

## Infinity – Operational Manual



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2. Press  key again. Immediately, P starts blinking which indicates that the parameter can now be changed. Set the parameter value by pressing  and  keys until the desired value is received.
3. Press  key to confirm the parameter value. Hence, the unit will restart and return into Run Mode.





### Setting Time to Run Hour and Load Run Hour (Available Only In Dual Source Meter)

The unit has user's programmable two types of times: (i) Run Hour (ii) Load Run Hour. Run Hour is the time to be counted since the unit receives power. Load Run Hour is the time to be counted since the Load receives energy.

To set this time, follow the instructions below:

1. Press  key for about four seconds. The unit enters into Programming Mode and press  key till the TIME is prompting such as shown below.



TIME=LoadRunHr

2. Press  key again. Immediately, P starts blinking which indicates that the parameter can now be changed. Set TIME to LOAD RUN HOUR or RUN HOUR by pressing  and  keys according to user's requirement.
3. Press  key to confirm the parameter value. Hence, the unit will restart and return into Run Mode.

### Setting Energy Parameter for Display:





The unit has user's programmable two types of Energy parameter for display. (i) KWh (ii) KVAh

To set the energy parameter, follow the instructions below:

1. In Run Mode, press  key for about four seconds. The unit enters into Programming Mode and press  key till ENERGY is prompting such as shown below.







ENERGY=KWh

2. Press  key again. Immediately, P starts blinking which indicates that the parameter now can be changed. Set the parameter to either "KWh" or "KVAh" by pressing  and  keys.
3. Press  key to confirm the parameter value. Hence, the unit will restart and return into Run Mode.

### Run Mode

The parameters calculated by the meter will be displayed on 16 X 1 backlit LC Display. The parameter shows the energy consumed and the time taken for EB and DG for dual source.

In case of dual source, the Run Mode pages can also be frozen and unfrozen by pressing  key. However, the pages are unfrozen by default. To freeze the pages, press  key and press  and  keys so as to alter each page..

### For normal infinity display

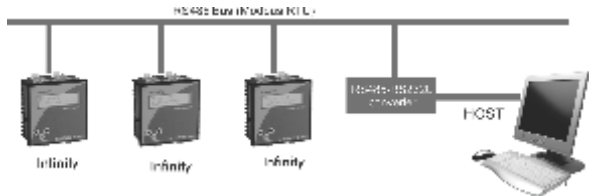
Run Mode	Descriptions
KWh=115.18 Or KVAh=210.20	The display shows either active or apparent energy as per the selection done in the programming mode

### For dual source display

Run Mode	Descriptions
EBKWH=150.05 OR EBKVAh=210.07	The first display shows active / apparent energy for Electricity Board Supply Source.
TEB=000000:40:01	The second display shows the time taken for energy Consumption of EBKWh/EBKVAh if "LoadRunHr" is selected in programming mode. If "RunHr" is selected then it shows meter powered on time.
DGKWH=105.10 OR DGKVAh=210.07	The third display shows active / apparent energy for Diesel Generator.
TDG=000000:60:01	The Fourth display shows the time taken for energy Consumption of DGKWh/DGKVAh if "LoadRunHr" is selected in programming mode. If "RunHr" is selected then it shows meter powered on time.
TOT=255.15	The fifth display show total energy consumption of both EB and DG.



# Communication



The industry standard RS485 communication port option is available in Infinity. This option makes it possible for a user to select Infinity to provide energy information into a control system.

### Modbus RTU on RS485 Port

Protocol details for RS485 MODBUS communication of Trinity meter model Infinity with PC based DAS package.

Communication line parameters: 9600/8/N/1

The register map is described below. All address is in decimal. All parameters are unsigned long. If illegal address is sent in the

**TRINITY**

## Infinity – Operational Manual

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query or the host, tries to read more than 32 bytes of data in one query, exception message is generated.

The parameters names and multiplication are also mentioned. Reserved values are for future use. They are transmitted as zeroes.

The table below will be used for the parameter address of dualsource meter.

Address	Parameters	MF
3030	EB KWh	X100
3032	DG KWh	X100
3034	EB TIME Hours	
3036	EB TIME Minutes	
3038	DG TIME Hours	
3040	DG TIME Minutes	

## Infinity – Operational Manual

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Address	Parameters	MF
3060	EB KVAh	X100
3062	DG KVAh	X100
3064	EB Time Hour	
3066	EB Time Minute	
3068	DG Time Hour	
3070	DG Time Minute	

The table below will be used for the parameter address of normal infinity meter

Address	Parameters	MF
3030	KWh	X100
3060	KVAh	X100

## Infinity – Operational Manual

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For providing resolution, KWh is multiplied with 100 before transmitting. Thus if the KWh value is 278.99, it is sent out as 27899.

Based on selected display energy, only single type of energy data will be available over RS485.

If an attempt is made to read from some address other than the valid address, the exception response is sent.

### **EXCEPTION CODE:**

In the event of the query from the HOST has no communication error, but there is some error in specifying the address of registers to be read, the meter returns an exception message. The format of the exception message will be as under:

Unit address	0X83	Exception code	CRC	CRC
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### **Exception code can have only one value 02 :**

If the address is not a valid address or host has requested more than 32 bytes data, this code is returned.

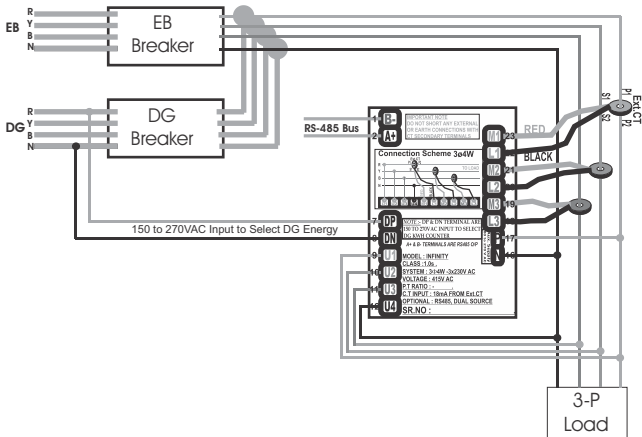
## Ordering Options

Infinity can be ordered from the following options according to your requirements.

INFINITY ENERGY METER (KWH) Range 0-9999999.9 KWh	
Technical Specification Installation	Options
	<ul style="list-style-type: none"><li>• 3P4W Installation</li></ul>
For H.T. application (only if meter is to be used for HT line)	PT-Primary.....KV
CT secondary (Current)	PT-secondary.....V.
	<ul style="list-style-type: none"><li>• 5A</li><li>• 1A</li><li>• Whole current upto 60A</li></ul>

# Infinity – Operational Manual

## INFINITY Dual Source & Rs485 Whole Current KWh Meter Connection



TRINITY

## Infinity – Operational Manual

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Customer : .....

Sr. No. : .....

P.O No. : .....

Routine and function tests conducted to relevant standards and our Specifications/Literature/O & M Manual.

Traceability: tested against "MTE" Standard Model PRS400.3 having basic accuracy of 0.02% traceable upto International Standards derived using appropriate ratio techniques.

Result of Test : .....

Remarks : .....

Test engineer : .....

Date : .....

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