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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TRINITY

Warranty statement

Trinity warrants to the original retail purchaser of the Trinity product enclosed with this limited warranty statement that the product, if purchased new and used in the India conforms to the manufacturer's specifications and will be free from defects in workmanship and materials for a period of one year from the date of original purchase, unless expressly stated otherwise by Trinity, in a written format.

Should your Trinity product prove defective during the warranty period, please bring the product securely packaged in its original container or an equivalent, along with proof of the date of original purchase, to our Trinity Dealer or Factory. You are responsible for all costs (shipping, insurance, travel time) in getting the product to the service location. Trinity will, at its option, repair or replace on an exchange basis the defective unit, without charge for parts or labor. When warranty service involves the exchange of the product or of a part, the item replaced becomes Trinity property. The replacement unit may be new or refurbished to the Trinity standard of quality, and at Trinity's option, the replacement may be another model of like kind and quality. Trinity's liability for replacement of the covered product will not exceed the original retail selling price of the covered product. Exchange or replacement products or parts assume the remaining warranty period of the product covered by this limited warranty.

What This Warranty Does Not Cover:

This warranty does not apply to refurbished or reconditioned products. This warranty covers only normal use in India. This warranty does not cover damage to the Trinity product caused by parts or supplies not manufactured, distributed or certified by Trinity. This warranty is not transferable. This warranty does not cover third party parts, components or peripheral devices added to the Trinity product after its shipment from Trinity. Trinity is not responsible for warranty service should the Trinity label or logo or the rating label or serial number be removed or should the product fail to be properly maintained or fail to function properly as a result of misuse, abuse, improper installation, neglect, improper shipping, damage caused by disasters such as fire, flood, and lightning, improper electrical current, interaction with non-Trinity products, or service other than by an Trinity Authorized Service.

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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 16 x 1 or 16 x 2 LC display having additional 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 80 mm enclosure

Microcontroller based

Backlit 16 x 1 or 16 X 2 LC Display

Dual source measurement (EB & DG) with ON TIME optional available

Whole current models for 30A and 60A available

RS-485 Communication port with MODBUS-RTU protocol

Infinity 16X1 LCD

Technical Specifications

Parameter		
Type	**Name**	**Statistics**
INPUT	Supply	Three Phases and Neutral of a 3P4W system / Three Phases of 3P3W system.
	Voltage	Direct Voltage Input : Up to 300V L-N or 500V L-L Burden : 0.5VA
	Current	Secondary Current Input : 5A or 1A (optional) CT Primary : Site Selectable Range of Reading : 0 – 5000A Burden : < 1.0VA Overload (Through CT) : 5A CT = 6A RMS Continuous 1A CT = 1.2A RMS Continuous (Whole Current) : 120% of Imax continuous.
	Power Supply	Wide operating Voltage SMPS : 80VAC - 480 VAC, 50-60 Hz.
COMMUNICATION	RS485 Port	Supporting MODBUS-RTU protocol.
MEASUREMENT Energy	Total Active Energy (KWh)	Range of Reading : 0 to 99999999.9 KWh Accuracy : 1.0S as per IS13779.
MISCELLANEOUS Dimensions	Bezel	96 X 96 mm
	Panel Cutout	92 X 92 mm
	Depth of installation	80 mm
	Operating temp	10°C to 50°C
	Weight	0.340 Kgs
	Min. Operating Current	0.4% of CT primary.
	Dual Source Sensing	By presence or absence of 230VAC across two terminals. Can be looped.

Ordering Options

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

| INFINITY Energy Meter (KWh) Range : 0-99999999.9 KWh	
Technical Specification	**Options**
Installation	☐ 3P4W installation ☐ 3P3W installation
For H.T application (only if meter is to be used for HT line)	PT-Primary…………...…KV. PT-secondary…….……..V.
CT secondary **(Current)**	☐ 5A ☐ 1A ☐ Whole current 30 A ☐ Whole current 60 A
Communication	☐ RS485 port with Modbus-RTU protocol. ☐ None
Dual Source	☐ Dual (EB & DG) KWh ☐ None

Installation and commissioning

The Infinity supports two installation modes – 3P4W and 3P3W. Proceed the following steps to install / commission the unit.

3P4W Mode Installation

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.
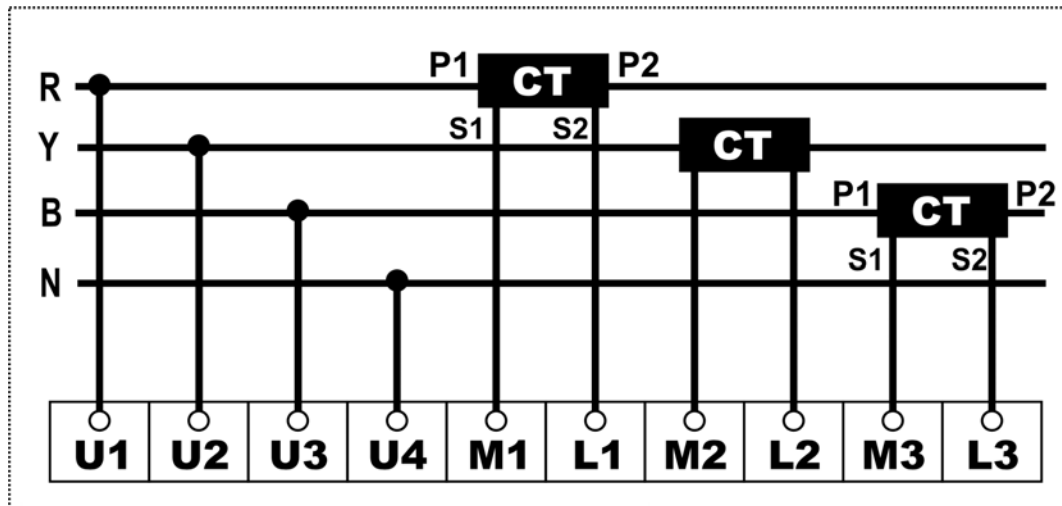
3. Connect the three phases with the phase sequence being R-Y-B to the corresponding terminals marked U1, U2 and U3 on the unit. Make sure that the three phases coming to the unit come through control fuses of 1.0 Amp rating. This will protect the electronics inside from damage due to severe over voltages 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 V AC 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 'TRINITY ' for about one second.

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.

3P3W Mode Installation

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.
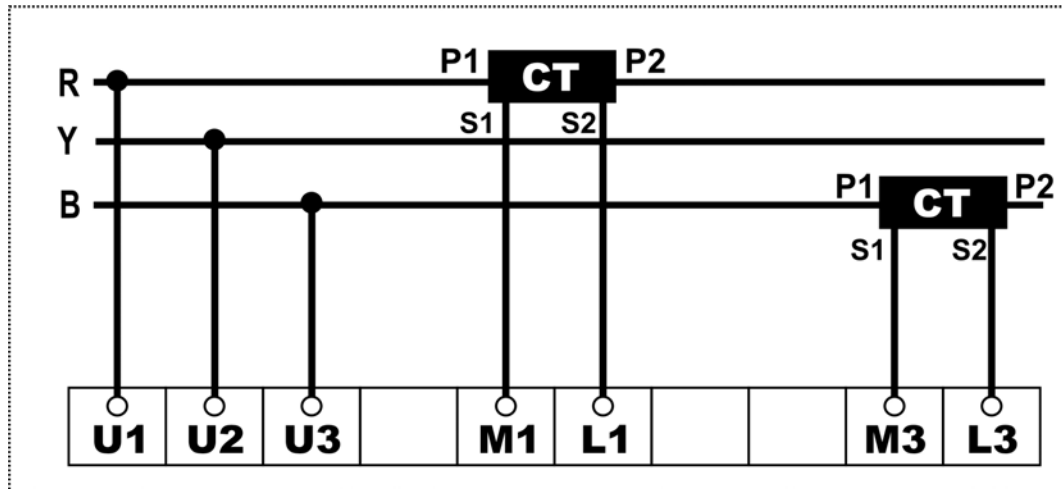
3. Connect the three phases with the phase sequence being R-Y-B to the corresponding terminals marked U1, U2 and U3 on the unit. Make sure that the three phases coming to the unit come through control fuses of 1.0 Amp rating. This will protect the electronics inside from damage due to severe over voltages or phase faults in the system.

4. 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.*

5. 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.

6. 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 V AC appears between the DP and DN terminals when the power is drawn from the DG source.

7. Switch on the three phase supply. The unit will come alive and display 'TRINITY ' for about one second.

8. Set the correct CT ratio on the unit for CT operated meters. In case of units with RS485 communication port, set the correct meter address. For this refer to the *OPERATIONAL DETAILS* chapter.

9. The unit is ready for operation.
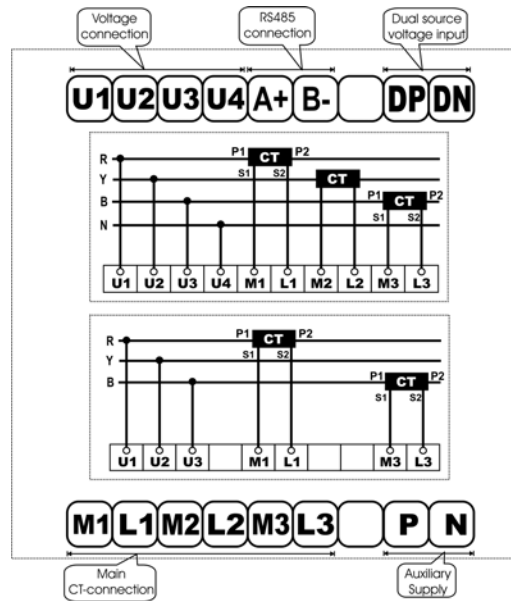
Back view of the Unit
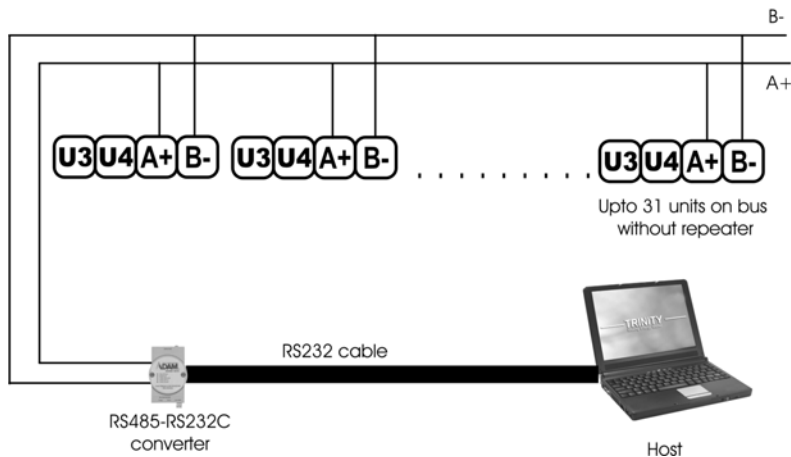
RS485 connection

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 on information such as "--TRINITY--"on LCD screen for some time and by default, is in the Run mode as shown below.

```
EBKWh=0.00

TEB=000000000:01
```

Programming Mode

The programming Mode is possible for user interface with settable parameters such as CT-primary and Meter address for RS485 port.

Setting CT-Primary

The CT Primary is settable from 0005 to 5000. The CT-primary should be set directly to give the actual value of KWh.

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

1. Press **PROG** key for four seconds to enter into programming mode such as shown below.

```
PROG-MODE-PRESS
```

2. The right side of the display will show a blinking arrow. Press ▲ (up) key to move into the programmable mode such as shown below.

CT_PRI:1550

3. Press **PROG** key. 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.

4. Press **PROG** key to confirm the parameter value. If the setting is completed, press **PROG** key for 4 seconds to exit the Programming Mode and return to the Run Mode.

5. Otherwise, press ▲ key to proceed for the next programmable parameter, Meter Address.

Setting Meter Address for RS485 port

The Unit has the provision to specify a meter address 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 Address, follow the below instructions:

1. Press **PROG** key for four seconds to enter into Programming Mode such as shown below.

PROG-MODE-PRESS

2. At right side of the display, it will show a blinking arrow. Press ▲ (up) key two times to move into the programmable mode, Meter Address such as shown below.
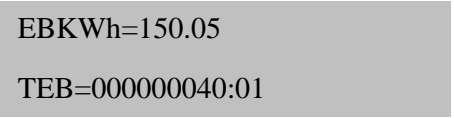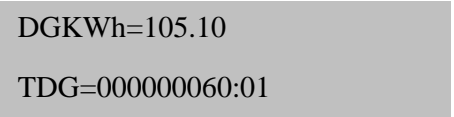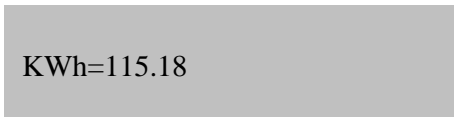
M_ADD :001

3. Press **PROG** key. 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.

4. Press **PROG** key to confirm the parameter. If the setting is completed, press **PROG** key for 4 seconds to exit the Programming Mode and return to Run Mode.

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Run Mode

The parameters calculated by the meter will be displayed on either 16 X 1 or 16X2 backlit LC Display. There are three parameter displays with which show the energy consumed and the time taken for EB and DG respectively in 3P4W and 3P3W.

The Run Mode displays can be received by pressing ▲ and ▼ keys as shown below for both 3P4W and 3P3W:

Run Mode on 16x2 LC display	Description
EBKWh=150.05 TEB=000000040:01	The first display shows active energy with the time taken for energy consumption of EB.
DGKWh=105.10 TDG=000000060:01	The second display shows active energy with the time taken for energy consumption of DG.
TOT=255.15	The third display shows the total energy consumption of both EB and DG.

Run Mode on 16x1 LC display	Description
KWh=115.18	The display shows active energy.

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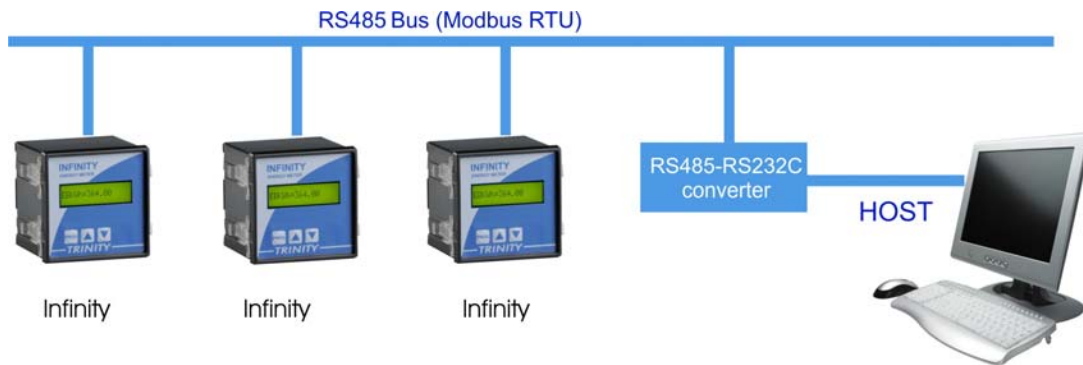
The industry standard RS485 communication port option is available in Infinity. This option makes it possible for a user to select Infinity to provide energy information into a control system.

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 query or the host, tries to read more than 4 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 16X2 LCD 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	

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The table below will be used for the parameter address of 16X1 LCD meter

Address	Parameters	MF
3030	KWh	X100

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

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	LRC	CRC

Exception code can have only one value such as:

If the address is not a valid address or host has requested more than 4 bytes data, this code is returned.