USER'S MANUAL

TINYPRO6
POWER METER

This document contains the latest technical information about TINYPRO6 which is a micro-controller based Power meter. The product TINYPRO6 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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Contents

Introduction

TRINITY has a host of low cost, easy to use individual and multifunctional meter that offers for all the basic measurement capabilities required to monitor electricity over and above basic metering. These meters also have an RS485 port supporting MODBUS-RTU protocol for integration with SCADA/EMS. The entire range is very rugged and cost-effective. All these products are field proven and more than 100,000 units are active in service.

The Main Features Available in This Model

- Multiparameter Monitoring with LED indicators
- Displays with 0.4" Red Seven Segment
- Three phases (RYB) voltage and current
- Measurement of Active Power (KW) and Active Energy (KWh)
- Frequency and system PF with lead (-) and lag side
- Modbus-RTU on RS485 port with SCADA/EMS
- Measurement of all important Electrical Parameters
- All parameters with default accuracy class 1.0S.

**Front View of the Unit**

Technical Specifications

SR. NO	PARAMETERS & OPTIONS	STATASTICS	
1	Volts R-N	Direct Voltage Input : Up to 300V L-N Burden : 0.5VA Secondary Voltage Input : 63.5V*	
2	Volts Y-N		
3	Volts B-N		
4	Volts RY	Direct Voltage Input : Up to 500V L-L Burden : 0.5VA Secondary Voltage Input : 110V*	
5	Volts YB		
6	Volts BR		
7	Current R	Secondary Current Input : 5A or 1A (To be specified at the time of Ordering) CT Primary : Site Selectable Range of Reading : 0 – 4000A Burden : < 1.0VA Overload(Through CT) : 5A CT = 6A RMS Continuous 1A CT = 1.2A RMS Continuous (Whole Current) : 120% of Imax continuous.	
8	Current Y		
9	Current B		
10	Frequency	45 to 55 Hz, Accuracy : 0.3% of Reading	
11	KWh	Range of Reading : 0 to 99999999.9 kWh Accuracy : 1.0S as per IS13779.	
14	System PF	Accuracy : 1% of Reading (IPF|$\geq$0.5) Range of Reading : 0.05 to 1.00 Lag/Lead	
16	System KW	Accuracy : 1.0% of Reading (Between 0.5 Lag to 0.8 Lead)	
18	DISPLAY	0.4" Red Seven Seg.	
19	RS485	For Integration with EMS/SCADA	
20	Bezel	96x96 mm	DIN enclosure
21	Depth	55 mm	

Installation and Commissioning

The unit can be used only for either 3P4W or 3P3W according to your ordering option and requirement in your electrical installation.

To install and commission for 3P4W, proceed the following instructions:

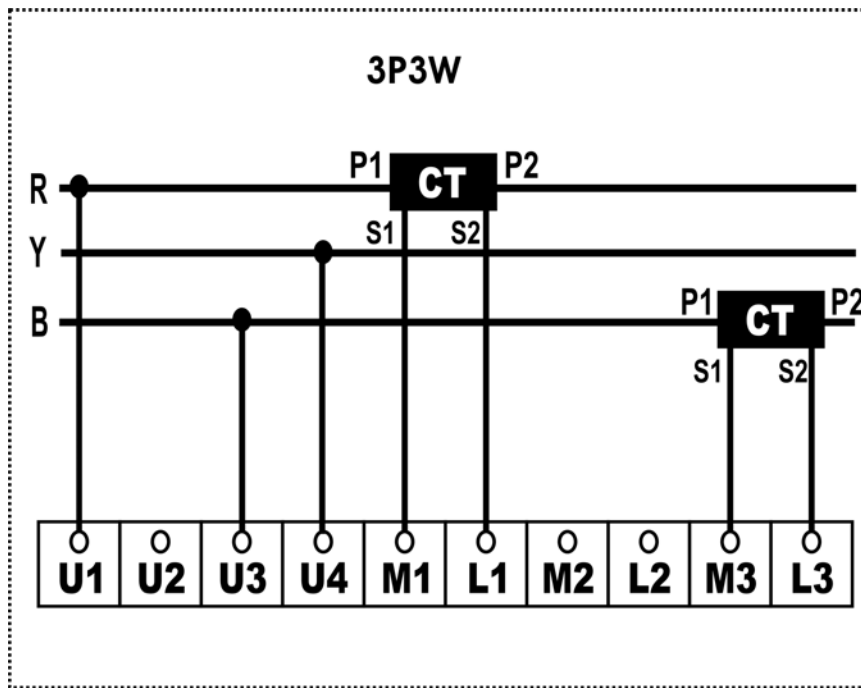1. Push the unit into the panel and mount using the claim provided on it.
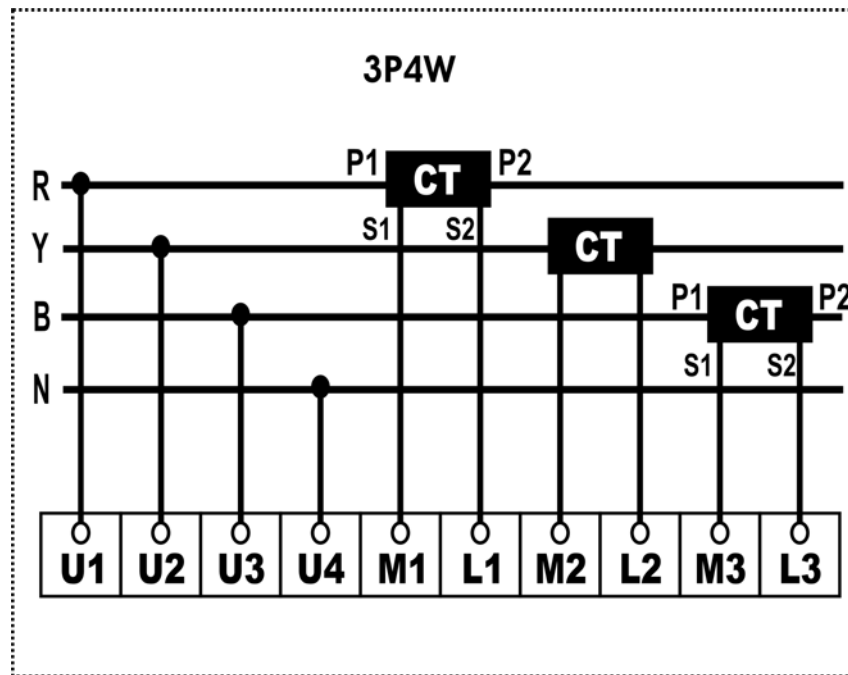
2. Connect the auxiliary supply (80V AC to 270V AC) to the terminals marked P and N.

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

4. Connect the neutral wire to the terminal marked U4.

5. Connect the two wires from the R-phase CT to the terminal marked M1 and L1 such that S1 from CT goes to M1.

6. Connect the two wires from the Y-phase CT to the terminals marked M2 and L2 such that S1 from the CT goes to M2.

7. Connect the two wires from the B-phase CT to the terminals marked M3 and L3 such that S1 from the CT goes to terminal marked M3.

8. Switch on the auxiliary supply as well as three phase supply and then, the unit will come alive in order to display such as TRINITY ESPL, CT ratio, Unit Address and Run Mode respectively.

9. Firstly, user should program the settable parameters, CT-primary and unit address for RS485 communication port. (*Refer Operational Details in the next section*).

10. Now the unit is ready for operation.

To install and commission for 3P3W, proceed the following instructions:

1. Push the unit into the panel and mount using the claim provided on it.

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 terminals marked U1, U4 and U3 respectively. Make sure that the phases coming to the unit come through control fuses of 1.0A rating. This will protect the electronic inside from damage due to severe over voltage or phase faults in the system.

4. Connect the two wires from the R-phase CT to the terminals marked M1 and L1 such that S1 from CT goes to M1.

5. Connect the two wires from the B-phase CT to the terminals marked M3 and L3 such that S1 from the CT goes to the terminal marked M3.

6. Switch on the auxiliary supply as well as three phases supply and then, the unit will come alive in order to display such as TRINITY ESPL, CT ratio, unit Address and Run Mode respectively.

7. Firstly, user should program the settable parameters, CT-primary and unit address for RS485 communication port as required. (*Refer Operational Details in the next section*).

8. Now, the unit is ready for operation.
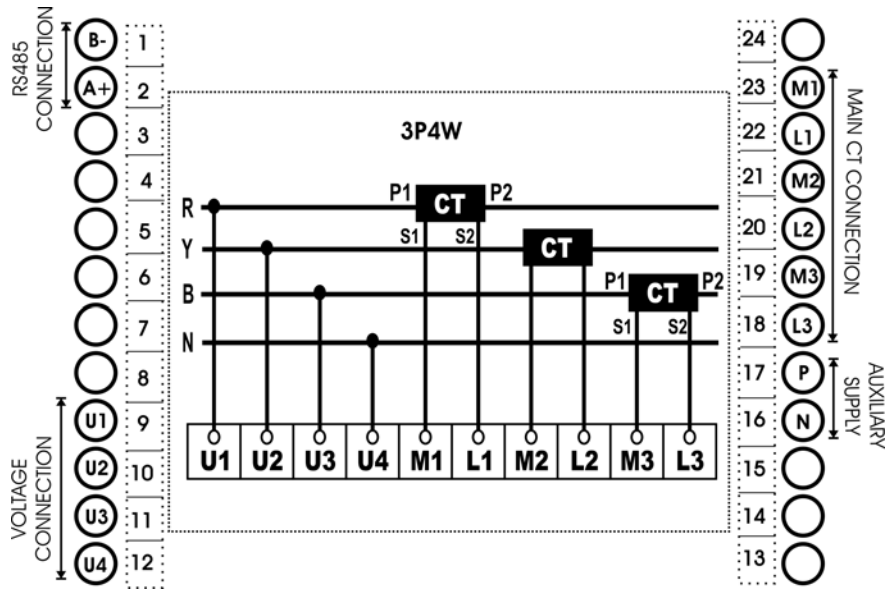
Connection Scheme
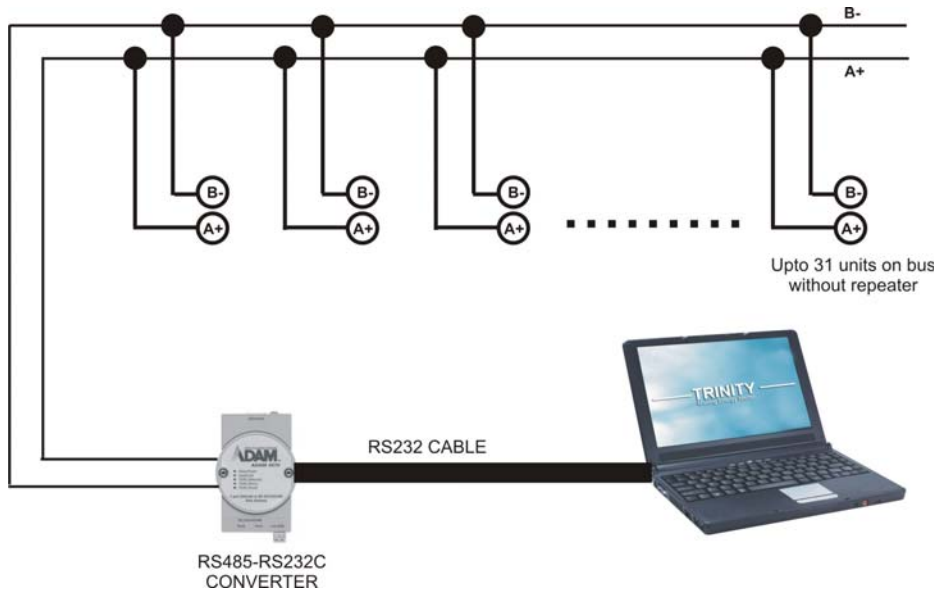
RS485 Connection

Operational Details

The Power Meter, TINYPRO6 is a versatile meter, with all the features needed to implement for a robust electrical load management system. It can be configured to monitor most electrical parameters and communication needs and, is also achieved by making field programmable parameters, as possible.

There are basically two modes of operation in TINYPRO6:

1. Programming Mode
2. Run Mode

After supplying power (80 VAC - 270 VAC), the unit displays immediately power receiving information, TRINITY ESPL on Seven Segment screen and by default, the display comes into Run Mode such as shown below.
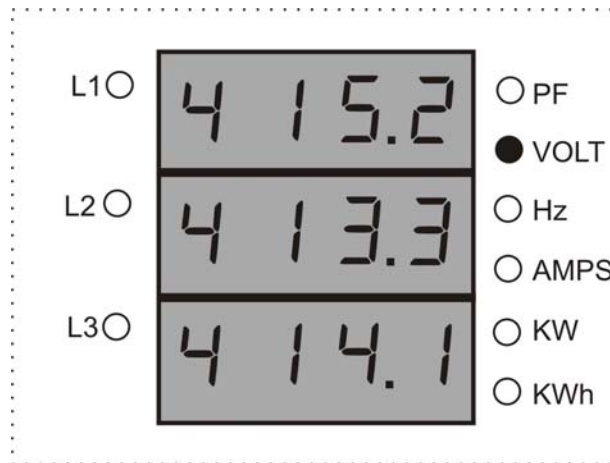
Now, the unit can be operated by using the following keypad provided for both the Programming Mode and Run Mode such as shown below.

Press (PROG/ENTR) key on Run Mode for about five seconds continuously, the unit will therefore enter into Programming Mode, CT PRIMARY with default value.

Programming Mode

In order to operate for all the field programmable parameters, it is easy for user interface by pressing the keys such as, (PROG ENTR), (▲) and (▼) keys. Once the unit displays is in CT-PRIMARY, press (▲) key to move into the next programmable parameter, UNIT ADDRESS for RS485 communication.

Setting CT- primary

The CT-primary is settable from 5 to 5000 and, should be set so as to give actual current values in an electrical installation.

To set the CT-primary, proceed the following instruction:

1. Press (PROG ENTR) key for about 4 to 5 seconds on Run Mode display.

2. The unit will alter into Programming Mode display with settable parameter, CT-primary such as shown below.
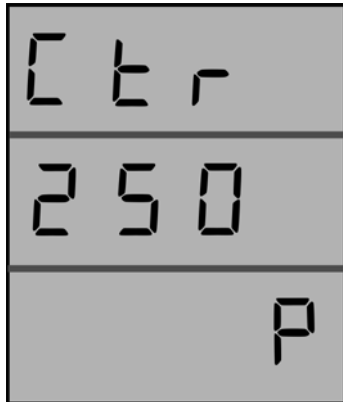
3. Press (PROG ENTR) key. Immediately, P starts blinking with an interval of one second which shows that the parameter is now settable. Set the CT-primary by using (▲) and (▼) keys until the desired value is received and then press (PROG ENTR) key to confirm the set value.

4. Now, the unit will reset and return into Run Mode.

Setting a unit address for RS485 port

The unit has the provision to specify a meter address at site for RS485 port. This address can be set starting from 1 to 255 with a fixed baud rate of 9600.

To set the CT-primary, proceed the following instruction:

1. Press (PROG ENTR) key for about 4 to 5 seconds on Run Mode display.

2. The unit will alter into Programming Mode display with the settable parameter, unit ADDRESS such as shown below.

```
Addr
255
```

3. Press (PROG ENTR) key. Immediately, P starts blinking with an interval of one second which shows that the parameter is now settable. Set the ADDRESS by using ▲ and ▼ keys until the desired value is received and then, press (PROG ENTR) key to confirm the set value.

4. Now, the unit will reset and return into Run Mode.

Run Mode

In the run mode, the various parameters calculated by the TINYPRO6 are displayed on different pages on a three lines of 0.4" Red Seven Segment. There are ten parameters which displays in different pages with the system values. Now the displays can be altered and analyzed one by one.
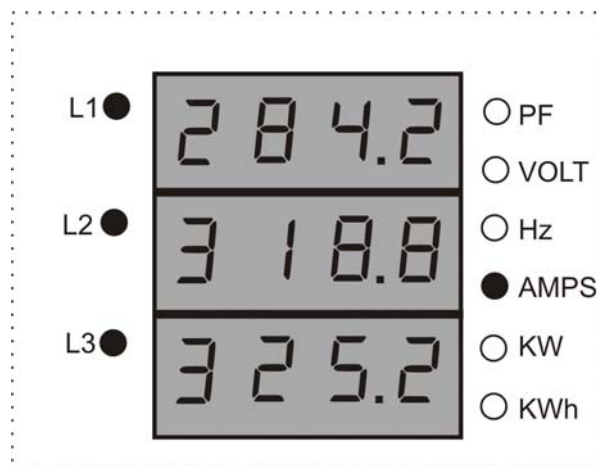
Run Mode Displays

The Run mode displays will autoscroll by default and stay for each page with an interval of 7 to 8 seconds.
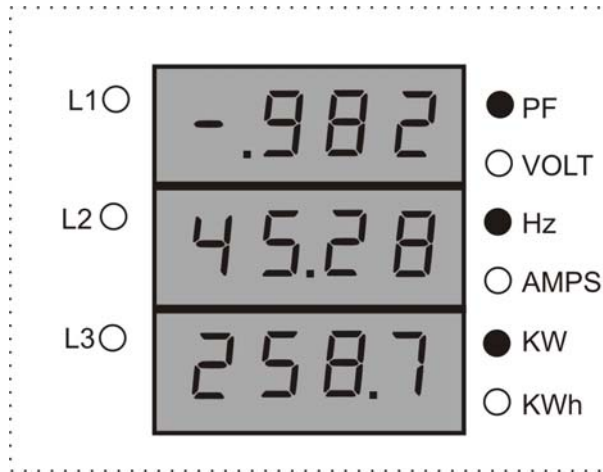
Page 1
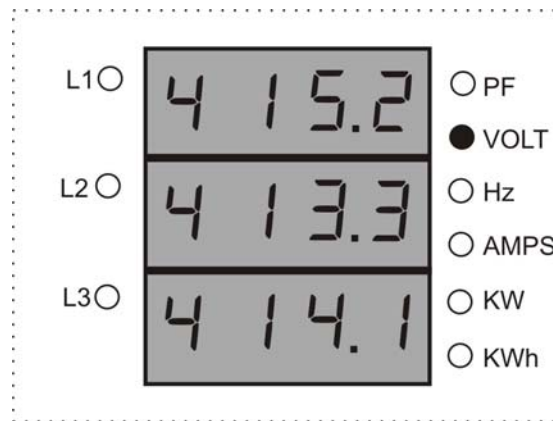
The LED indicator glows on VOLT which shows individual phase to phase voltage of R-Y-B on first row, second row and third row display respectively.

Page 2

The LED indicator glows on AMPS with respect to L1, L2 and L3 which shows individual phase current values of R-Y-B on first row, second row and third row display respectively.

Page 3

The LED indicators glow on system PF, Hz and active power (KW) which shows their values on first row, second row and third row displays respectively.

Page 4

The LED indicator glows on Total Active Energy (KWh) which shows its system value on display.
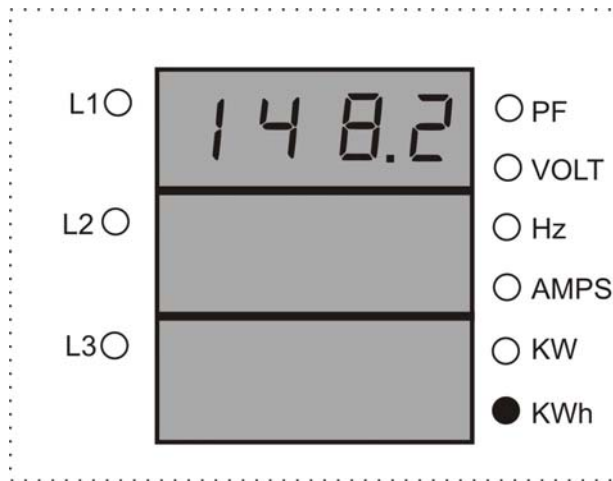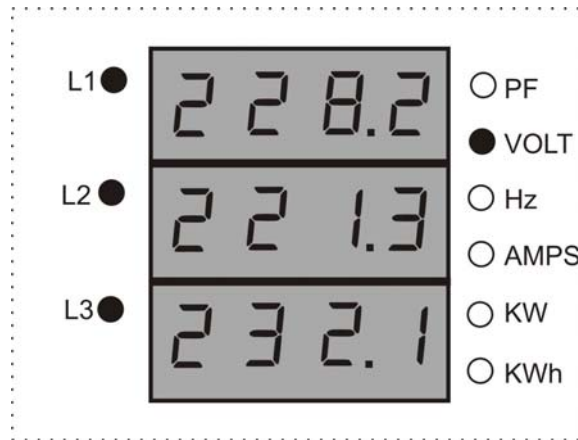
Page 5

The LED indicator glows on VOLT with respect to L1, L2 and L3 which shows individual phase to neutral voltage of R-Y-B on first row, second row and third row display respectively.

Freezing and unfreezing the displays

The Run Mode Displays enable to freeze and unfreeze by pressing (PROG/ENTR) key and the LED indicator will start blinking which shows that the display is frozen. By pressing ▲ and ▼ keys, the pages can also be changed and analyzed each parameter. To unfreeze the Run Mode, press (PROG/ENTR) key again which will stop blinking the indicator and change the pages automatically in an interval of seven to eight seconds.

Communication
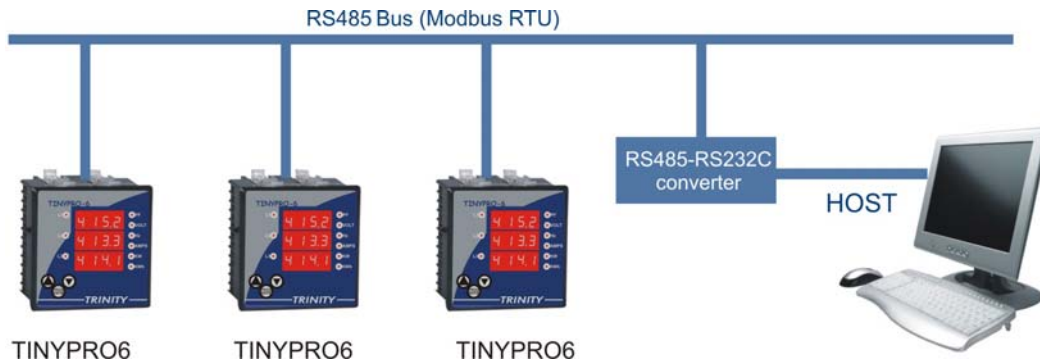
UNIT CONNECTED TO RS485 PORT

The industrial standard RS-485 communication port option is also available in TINYPRO6. This option makes it possible for a user to select TINYPRO6 to provide power and energy information into a variety of existing or new control systems and communication networks.

Modbus RTU on RS485 Port

In order to download live data for the various system parameters, user can use RS485 connecting to a SCADA or EMS software. TINYPRO6 supports an RS485 port with MODBUS-RTU support. The station id for every meter is site selectable, and so is the baud rate. The data which can be read using MODBUS query # 3 (Read Holding Registers) is provided in an address map, with the applicable multiplication factors, vide ***Appendix.***

Communication line parameters: 9600/8/N/1.

The register map is described in Appendix. All addresses are in decimal whose parameters are unsigned long. If illegal address is sent in query or host, try to read more than 32 bytes of data in one query except message is generated. The parameters name, address and multiplication factor are also mentioned.

Reserved values are for future uses which are transmitted as zeroes. Please refer to the address map for the various parameters in Appendix.

Appendix

3 phase 3000-3019	R phase 3030-3049	Y phase 3060-3079	B phase 3090-3109	MF
Reserved	3030-KWh	Reserved	Reserved	X100
3002-KW	Reserved	Reserved	Reserved	X100
Reserved	Reserved	Reserved	Reserved	X100
3006-PF	3036-**Hz**	Reserved	Reserved	X1000
3008-Avg.VLL	3038-Vry	3068-Vyb	3098-Vbr	X100
3010-Avg. VLN	3040-Vr	3070-Vy	3100- Vb	X100
3012-Avg. Amps.	3042-Ir	3072-Iy	3102-Ib	X100

DEFINING MULTIPLICATION FACTOR

- **Hz** has a multiplication factor of 100 & not 1000. e.g. If Hz is 48.33, and then it is sent as 4833.
- For providing resolution, all parameters except PT are multiplied with 100 before transmitting. Thus if the KVA value is 278.99, it is sent out as 27899. PF has MF of 1000, instead of 100. Thus, a PF value of 0.987 is sent as 987.
- If an attempt is made to read some address other than the valid addresses, the exception response is sent.

EXPEPTION CODE

In the event that 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

Exception Code can have only one value, 02: if the address is not a valid, start address or host has requested more than 32 bytes of data, this code is returned.

Ordering Options

TINYPRO6 can be ordered with the following options according to your requirements.

TINYPRO6 Power Meter	
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
Communication	☐ RS485 port with Modbus-RTU protocol. ☐ None

P.O No.   : ……………………………………………………………………………

Customer   : ……………………………………………………………………………

Sr. No.   : ……………………………………………………………………………

Result of Test : ……………………………………………………………………………

Remarks   : ……………………………………………………………………………

Test engineer : ……………………………………………………………………………

Date   : ……………………………………………………………………………