LM-56

User Manual

LT Intelligent
Three-Phase Energy Meter
& Data Logger
For Energy Management

TAS PowerTek
Version 1.0
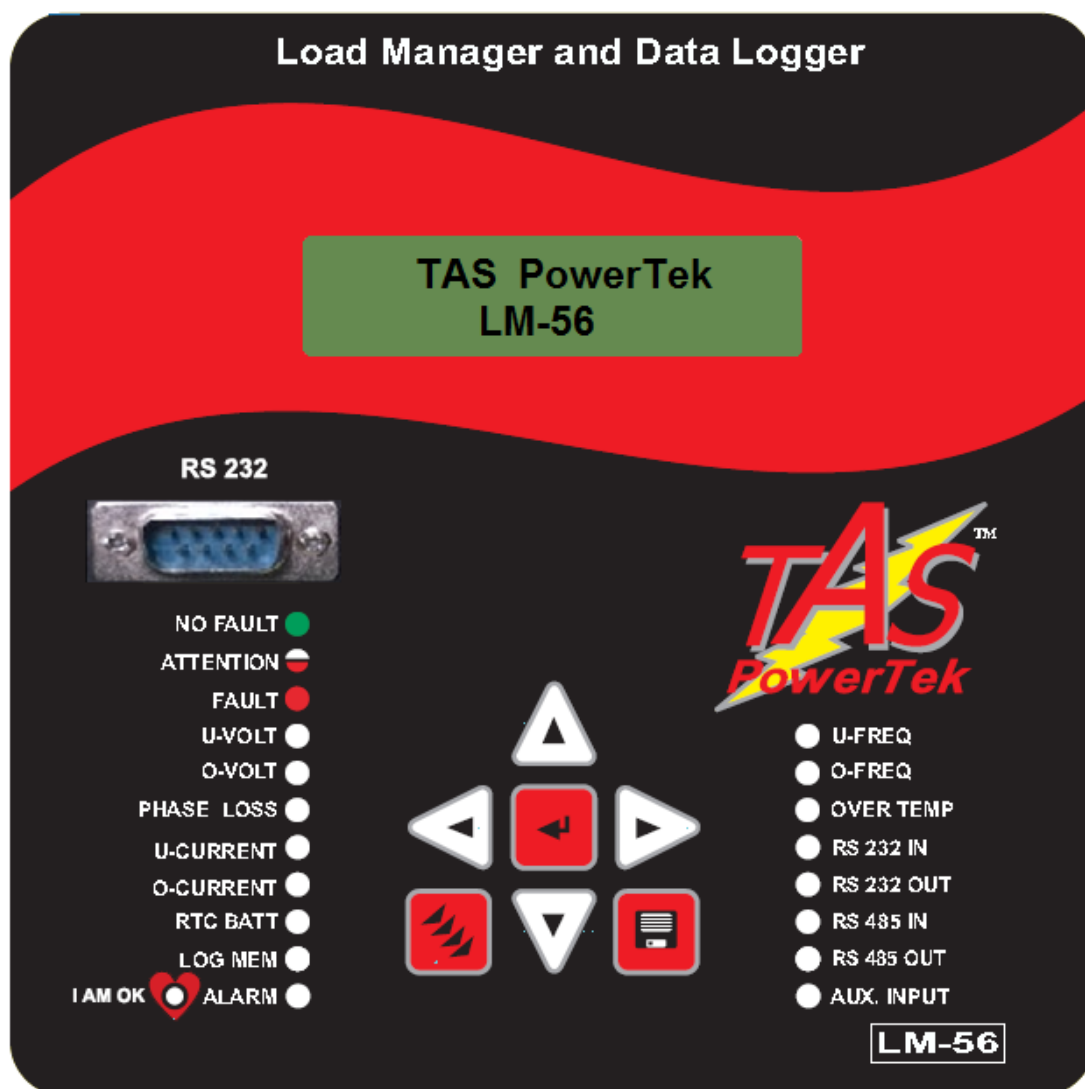
NOTE

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchasers purposes, the matter should be referred to our office.

The contents of this instruction Manual shall not become part of or modify any prior or existing agreement or relationship. Any statements contained herein do not create new warranties or modify the existing warranty.

CAUTIONS:

1. There can be High Voltages at the Rear Terminals of this Unit.

2. LM-56 may only be used indoor!

3. This User Manual is applicable to LM-56 Energy Meter Unit with Firmware Version 1.1.2 as on 11th Dec. 2015.

Because of continuous improvements efforts by TAS PowerTek in their Product's Features and Specifications, the Product as well as the Content of the User Manual is likely to get updated.

Therefore, please always refer to the User Manual supplied to the customer along with the Product, at the time of product dispatch.

Index

<u>Ordering Information</u>

Product Specific Information Number (PSIN)

LM-56

Please confirm from TAS PowerTek, Nasik, before ordering the
Unit, the desired ranges of:
1] AC or DC Input Operating Supply Voltage,
2] AC Voltage Measurement,
3] AC Load Current Measurement
4] AC Line Frequency as 50 Hz or 60 Hz, etc.

Features:

- Micro-Controller based logic for measurements, monitoring, analysis, logging.

- Protection and Functionality to take care of Supply System abnormalities and various faults.

- Communication port RS-232 for logged data downloading and for other convenience functionalities.

- Completely Fire Retardant ABS grade plastic material body with sufficient ventilation for cooling on back side.

- Externally replaceable RTCC Battery slot for maintenance convenience. Battery is used primarily for RTCC – "Real Time Clock-Calendar" to work during supply power down condition.

- Alpha-Numeric, Dot-Matrix LCD Display, 16 Char. x 2 Lines, Yellow-Green Backlight and Black Characters, for Display of various parameters, symbols & functionalities requirement.

- Auto Shut-off Timer based LED Back-light for the LCD Display.

- Keypads with soft touch 7 Nos. of keys for Scrolling between various displays and various functionalities / settings.

- Power supply and measurement range is wide-ranging and highly reliable operation under various supply system PQ issues like supply voltage dips / swells, transients, ac mains cycle loss etc.

- Internal, High-Efficiency, Switched-Mode, PWM, Power Supply, capable of working on AC Input within the specified AC Voltage range, or even on a DC Power Supply Input of 150 V DC to 450 V DC.

Features (Continued)**:**

- Measurement and Display of Various Electrical values:
    - ✓ 3-phase Voltages (Line-to-Neutral Values)
    - ✓ 3-phase Voltages (Line-to-Line Values)
    - ✓ 3-phase Currents and Neutral Current.
    - ✓ Individual Phase Active, Reactive, and Apparent Power values.
    - ✓ AC Mains Supply Line frequency.
    - ✓ Overall Values: Average Voltage & Current, Total Active Power, Total Reactive Power, Total Apparent Power.
    - ✓ Energy Values: Active Energy Consumed, Reactive Energy Inductive, Reactive Energy Capacitive, Apparent Energy.
    - ✓ Harmonics: Per Phase V-THD-F% and I-THD-F% values, up to 15th odd harmonics.
    - ✓ Inside Temperature of the LM-56 Unit.
    - ✓ Battery Voltage for RTCC / NV-RAM Battery.

- Data Logging: Unit has sufficient Non-Volatile Memory to log hourly, 30 Min.,15 Min.,10 Min. Interval Readings and also to log last (latest) 1024 events. The Parameters are logged and can be down-loaded in TAS Data Mobilizer Unit and transferred to a computer for viewing and report generation purpose.
  The Logged values for viewing and report generation are:
    - ✓ Unit ID, Sr. No., Date / Time stamp.
    - ✓ 3-phase Voltages (Line-to-Neutral Values)
    - ✓ 3-phase Currents.
    - ✓ Supply frequency.
    - ✓ Overall Power Values: Total values of Active, Reactive, Apparent
    - ✓ Energy Values: Active Energy Consumed, Reactive Energy Inductive, Reactive Energy Capacitive, Apparent Energy.
    - ✓ Harmonics: Maximum value of Phase V-THD-F% and I-THD-F% values.
    - ✓ Inside Temperature of the LM-56 Energy Meter.
    - ✓ Battery Voltage for RTCC / NV-RAM Battery.

Features (Continued)**:**

- **Data Mobilizer** – In future, we will add a Hand-Held-Unit (HHU-02) as a separate unit, that can be ordered and procured separately, for transfer of data from remote site(s) located LM-56 Unit(s) that can be further up-loaded to PC thru' PC Side Software from TAS. Such Unit even have added facilities like fixed set parameter uploading (5 pre-programmed sets of Parameters to be programmed in LM-56).
- GSM (Global System for Mobile) :
    Enabling GSM to send SMS about various parameter:
    - ✓ 3-phase Voltages (Line-to-Neutral Values)
    - ✓ 3-phase Currents and Neutral Current.
    - ✓ Fault(s).
- RS-485 Communication :
    There are two basic transmission modes found in serial MOD-BUS connections, ASCII and RTU. These transmission modes determine the way in which the MOD-BUS messages are coded.
    One of the main differences between MOD-BUS/ ASCII and MOD-BUS RTU is that ASCII allows gaps between the bytes of a message with a maximum length of 1 second. With MOD-BUS RTU, continuous streams of messages must be sent. Enabling Mod-bus ASCII or RTU gives values:
    - ✓ 3-phase Voltages (Line-to-Neutral Values)
    - ✓ 3-phase Voltages (Line-to-Line Values)
    - ✓ 3-phase Currents and Neutral Current.
    - ✓ Individual Phase Active Power, Reactive Power, Apparent Power values.
    - ✓ AC Mains Supply Line frequency.
    - ✓ Overall Values: Average Voltage & Current, Total Active Power, Total Reactive Power, Total Apparent Power.
    - ✓ Energy Values: Active Energy Consumed, Reactive Energy Inductive , Reactive Energy Capacitive, Apparent Energy.
    - ✓ Harmonics: Per Phase V-THD-F% and I-THD-F% values.
    - ✓ Inside Temperature of the LM-56 Unit.

    Contact TAS PowerTek, Nashik, for Energy Management System (EMS) SCADA Software for PC on Windows Platform, compatible to TAS LM-56 Units on MOD-Bus (ASCII Mode).

Specifications of LM-56:

1.   Rated supply voltage values:
        3-Phase, 4-Wire AC Supply System.
        Line-to-Line rated Voltage Nominal 440V_{AC} sinusoidal.
        Rated Nominal frequency: 50 Hz +/- 3 Hz OR 60 Hz +/-3 Hz.

2. Auxiliary Supply:
- Line-to-Line sinusoidal AC Voltage range 100V_{AC} - 500V_{AC}.
- The LM-56 can also be operated on a DC Supply of 150 to 450 V DC.
- Supply frequency range 47 Hz to 53 Hz; OR 57 Hz to 63 Hz.
- Supply VA burden – 10 VA maximum. (typical 8 VA)
- Protected by externally replaceable 500 mA / 500V_{AC} slow-blow ceramic cartridge type standard fuse.

3. Metering (measurement) Input:
   Voltage Inputs:
- Voltage 3-Phase, 4-Wire with Phase-to-Neutral values range of measurements as 60 V_{AC} to 300V_{AC}.
- Voltage Measurement burden < 1VA per phase.
   Current Inputs:
- Current measurement through secondary current of 3 No.s of Current Transformers (CTs) with secondary rated current as either Nominal 1 Amp or Nominal 5 Amp AC.
- Current measurement range: 1.5%I_N to 130%I_N.
  For 1 Amp terminals: 15 mA to 1.3 Amp.
  For 5 Amp terminals: 75 mA to 6.5 Amp.
- Maximum current withstanding capacity: 4xI_N for 1 Second.
- Maximum VA burden on EACH CT: < 1VA.

   Measurement Values and Accuracy:
- Per Phase Voltage, Per Phase & Neutral Current,
  Overall Power and Overall Energy values with accuracy class
  1.0 as defined in IS-14697 with all Amendments till date.
  This is for Active & Reactive Power / Energy.

Specifications (continued)**:**

4. Connection Terminals (rear side):

➢ All the connectors are on rear side and suitable for connecting fork type copper lugs with 1.5mm^2 or 2.5mm^2 wires.

➢ Maximum applicable torque on Screws of Terminal while tightening is 0.5 Newton-meter. Recommended torque calibrated screw driver adjustment is 0.35 N-met.

➢ Voltage rating across 2 adjacent terminals – 380V$_{AC}$.

➢ Continuous Current rating (RMS value) – 8 Amp max.

5. Battery for RTCC (Real Time Clock-Calendar) & NV RAM:

➢ Battery type to be used : CR2032. (Maxell make preferred)

➢ Battery Voltage (New) : 3.3V$_{DC}$ to 3.1V$_{DC}$.

➢ Low Battery Alarm : 2.6V$_{DC}$. (Range 2.65V$_{DC}$ to 2.55V$_{DC}$)

➢ Battery Fault Indication : < 1.8V$_{DC}$.

➢ Expected Battery Life: @ 2½ Years to 3 Years.

➢ Time-frame for Battery replacement after Low Battery Alarm is Maximum 6 months. Recommended period < 3 Months.

6. Data Log Non-Volatile Memory:

➢ LM-56 Programmed Parameters storage, 1 Hour, 30 Min.,15 Min.,10 Min. interval Data log, latest 1024 "Events" data log and Power-down values storage with "Early-Warning-Power-Failed (EWPF)" sequence.

➢ Critical storage even with RTCC Battery Fail or Replacement for ensuring no data loss or maintain Energy values.

Specifications (continued)**:**

7. Mechanical Dimensions:

146 mm

146 mm

95 mm

37mm

70mm

107 mm

All Dimensions are in mm.

Mounting
Clamps
All 4 sides.
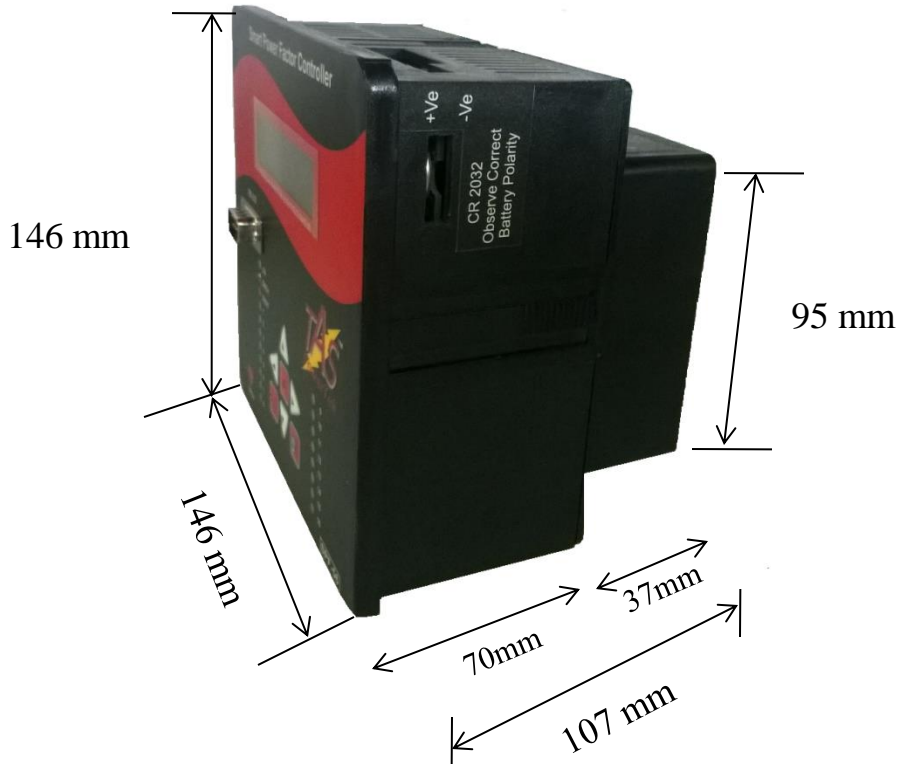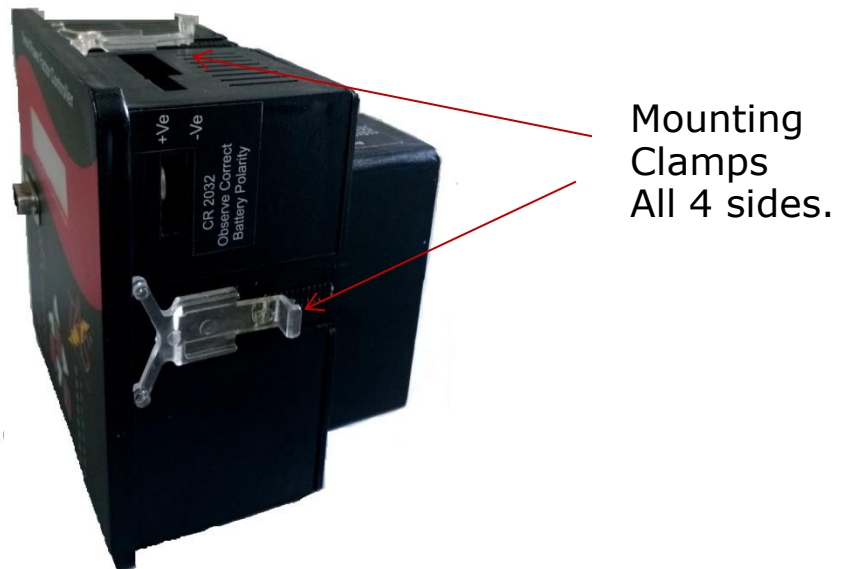
• Un-packed net weight of the Unit: Approx. 940 grams.

Front fascia

Keyboard, LCD display and communication port

LCD Display
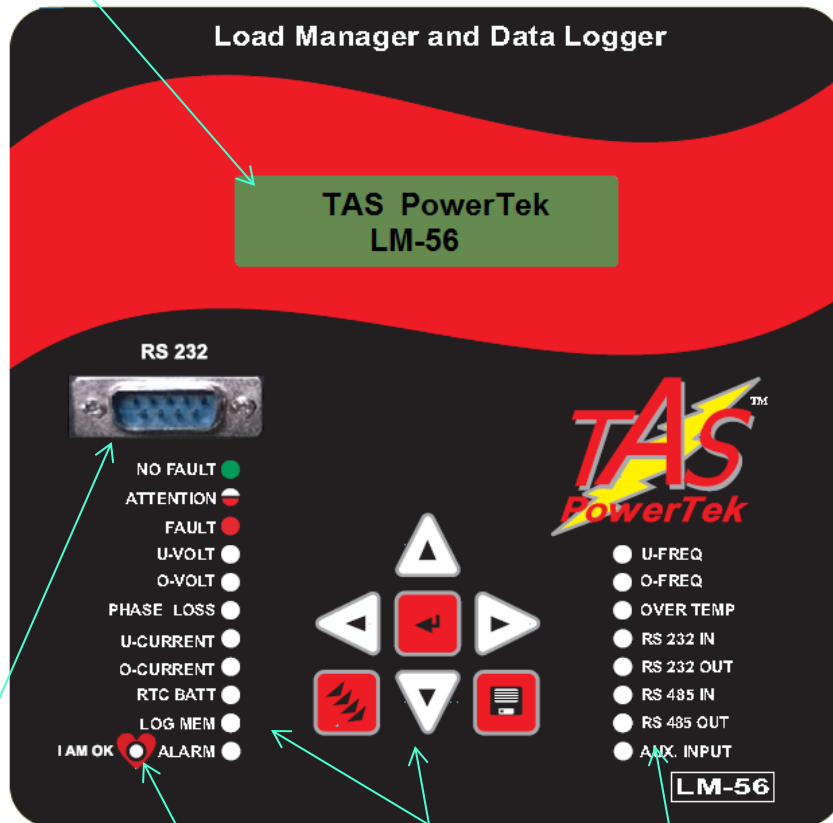
RS-232 port with
dedicated protocol.

Key pad

Fault / Status LEDs

"I AM OK" LED
(Controller
"Health" status
LED)

Back-side terminals

Note:

Use appropriately rated and type, while replacing the fuse(s) in the field

Measurement Voltage Feedback
(Line-to-Neutral 300VAC max)

Load Current CTs
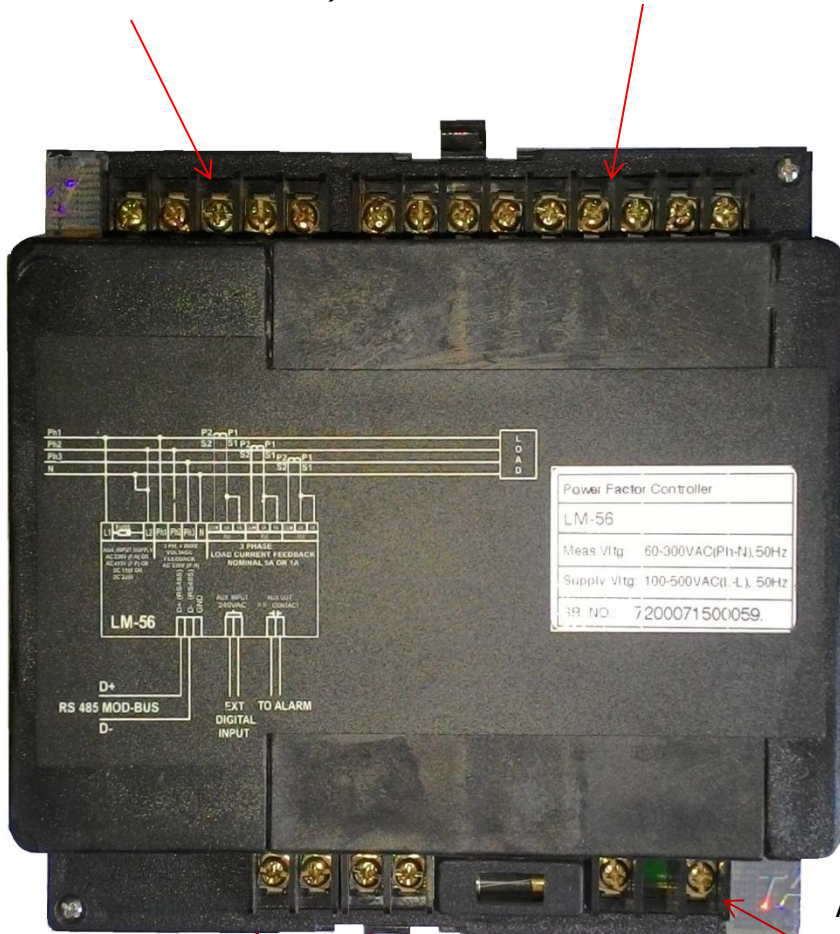
Auxiliary Supply Voltage
(100V to 500V AC)

AUX Digital Input 240 V AC

AUX Digital Output N.O. Relay Contact

F1: Fuse for Auxiliary Supply (0.8A , 500VAC slow-blow, Glass).

Other Arrangements:

RTC Battery insertion slot.
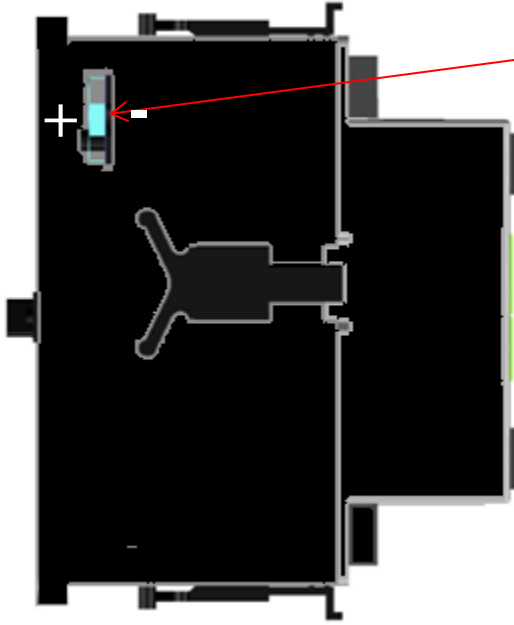
Battery Slot for replacement
Of CR2032, 3 V dc Li.-Ion Battery.

(Remove black sticker over the slot
 to see the battery inside)

Recommended to change the Battery
With Auxiliary Supply to Unit in ON
condition. RTCC would not be disturbed.

Ensure new battery replacement with
Correct polarity. Use tips insulated, thin
& long nose plier to remove old battery
& insert the new battery.

In case the Aux. Supply was OFF and then
this RTCC Battery is replaced, user will
have to set RTCC once again to correct
date & time.

Side view of LM-56 for seeing Battery insertion slot.

The unit after mounting in panel is compatible for
enclosure protection class as per DIN 40 050:

Front side: IP-54.
Back side: IP-10.

8. Environmental Requirements:
- Operating temperature range: 0°C to +55°C.
- Storage temperature range: 0°C to +65°C.
- Altitude: up to 3500 Meters, above mean sea level.
- Relative Humidity range: 10% to 95% RH (Non-condensing).

9. Standards Compatibility:
Unit is designed to comply with following standards compliance.
Safety Standards: IEC61010-1:2001
EMI Standards: CISPR 11
EMC Standards: IEC61000-4-2:8kV
                    IEC61000-4-4:4kV
                    IEC61000-4-11:Class A.
Accuracy Standards: IS14697: Class 1.0

10. Jumper Selection for RS-485 and GSM communication

3
2
1

DI (RS-485)

TX 1

TXD1 (RS-232)

JP1

3
2
1

RO (RS485)

RX 1

RXD1 (RS-232)

JP2
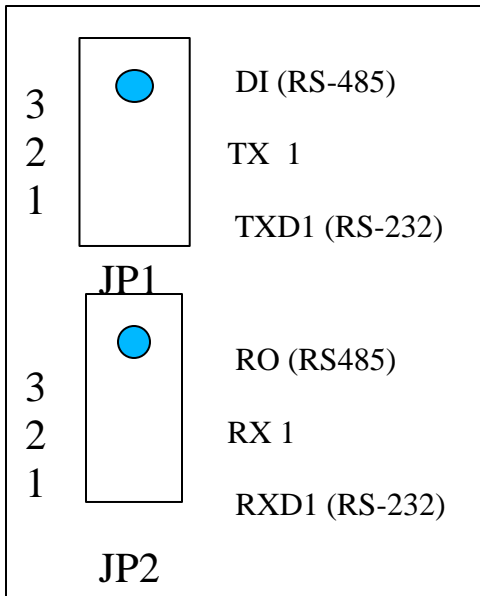
Selecting positions 1 & 2 in both JP1 and JP2 enables RS-232 communication for external GSM Modem.

Selecting positions 2 & 3 in both JP1 and JP2 enables RS-485 for MOD-Bus ASCII or MOD-Bus RTU protocol.

Contact TAS for RS-232-to-RS-485 converter Module for RS-485 communication between ENERGY METER and PC / PLC's RS-232 Port, with Auto-Data-Direction Control.

Fig: Berg Jumpers selection for RS-232 or RS-485 Interface.

D+ (RS485)

D- (RS485)

GND

TXD-GSM(RS232)

RXD-GSM(RS232)

Figure shows connector for RS-232 and RS-485 Communication. RX and TX for RS-232 communication and D- and D+ for RS-485 communication. Note that the Signal Ground Terminal is common for RS-232 or RS-485.

Contact us for Separate Documents for MOD-Bus and GSM Functionality Implementations.

Fig: Connector for RS-232 and RS-485

Note:
Please remove the 5-way mating connector of RS-232/RS-485 while installing the Unit in the DIN Standard Cut-out on the Panel Door, and replace it after the installation is done.

Functional Description:

Functional Block Diagram
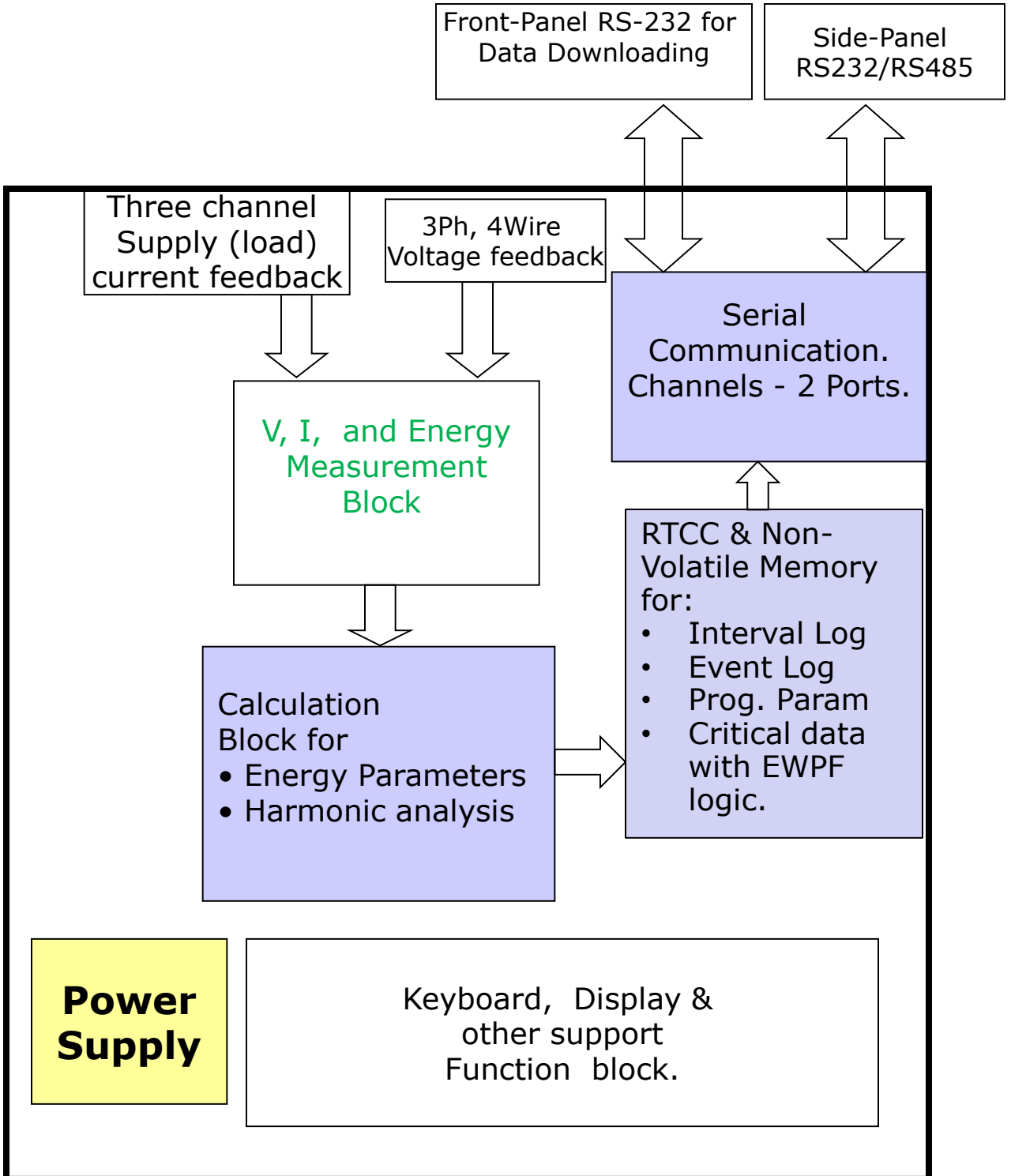
Typical wiring diagram:

Please follow the standard procedure applicable for doing the RS-485 MOD-Bus Wiring and the requirements of the appropriate Terminating Load Resistors at the extreme ends of the Communication Network.

User twisted-pair and shielded, BELDEN Cable for the RS-485 Wiring.
The Multi-Drop, Half-Duplex, Master-Slave Operation is explained in the Communications text books.

Each LM-56 Unit, as a "Slave Unit", connected to the RS-485 Network MUST have a Unit Identification Number so that there is no conflict of the Data on the MOD-Bus.

Information is available on the Internet explaining the similarities and the differences between MOD-Bus ASCII Mode and the MOD-Bus RTU Mode.

Contact TAS PowerTek for the simplified version and / or advanced versions of the MOB-Bus Data Viewing Software for LM-56, at appropriate additional costs.
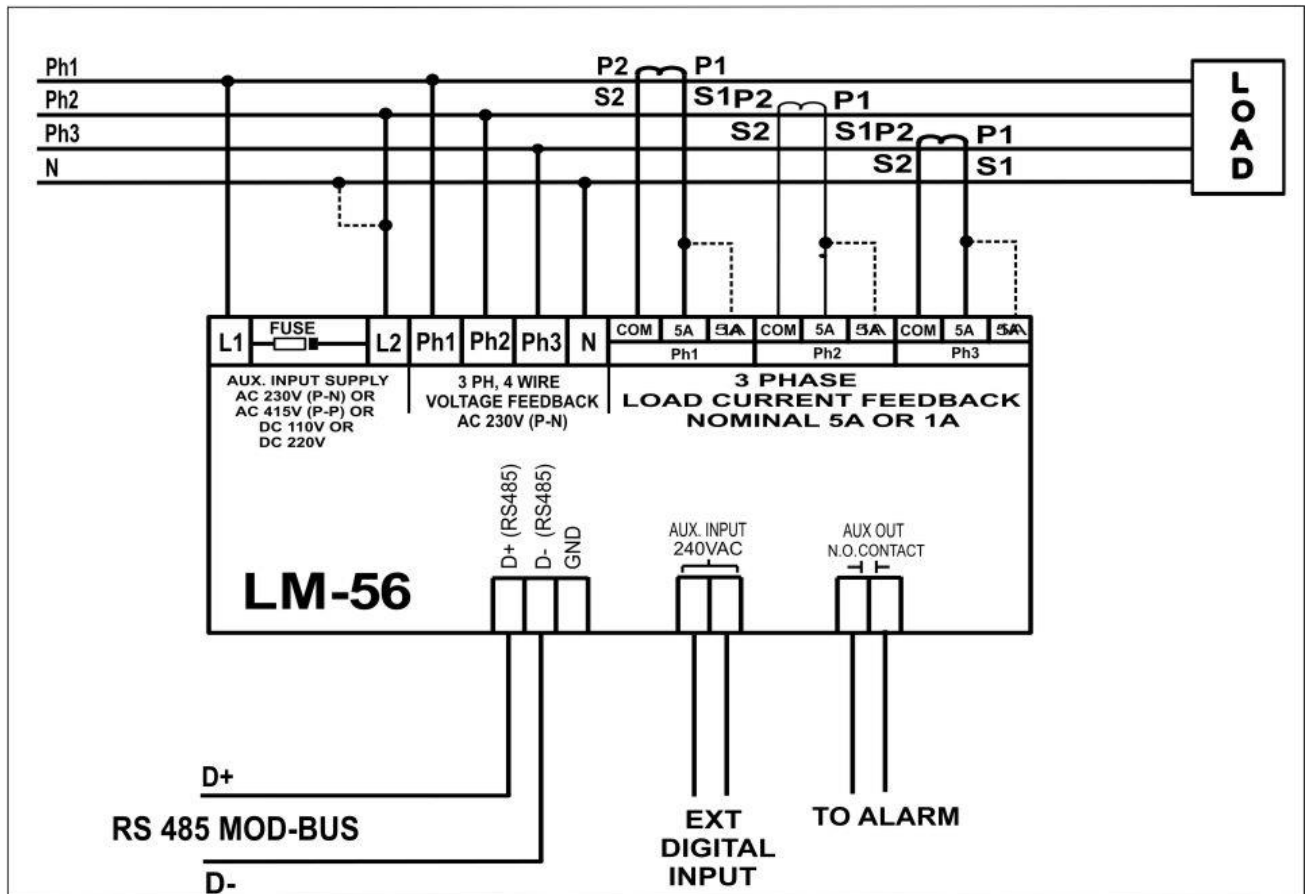
Front -fascia:
LCD Screen

```
KW=+000025.9  ↑   OK
```
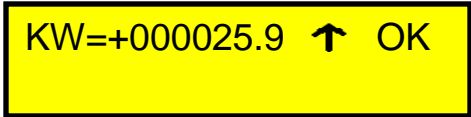
First line of display indicates the KW value, import / Export KW, mode of operation and fault / OK status:

"KW = 000025.9" indicates the overall KW of the system.

"+" or "-" indicates if this KW Import or Export respectively.

"↑" or "↓' indicates the Mains and Generator mode of operation respectively.

"OK" (blinking) indicates status of the system, healthy or faulty.

Last two characters represent one of the following status:

OK	Controller status is OK		OT	Over Temperature
ZV	Zero voltage		UF	Under Frequency
OV	Over voltage		OF	Over Frequency
UV	Under voltage		UL	Under Load
VH	Voltage over-harmonics THD%		BL	Low Battery Warning
IH	Current over-harmonics THD%		OC	System Over Current Warning
ZC	Zero current in any one phase		BF	Battery Fail for Battery or RTC faulty

For all LEDs, the Name of the LED indicates the Function of the respective LED as follows.

O-VOLT	OVER VOLTAGE		U-FREQ	UNDER FREQUENCY
U-VOLT	UNDER VOLTAGE		O-FREQ	OVER FREQUENCY
PHASE LOSS	VOLTAGE ABCENT IN ANY PHASE		OVER TEMP	OVER TINTERNAL EMPERATURE IN LM-56
U-CURRENT	UNDER KILLO WATT LOAD		RS 232 IN	DATA TRAFFIC ON RS232 RECEIVING LINE
O-CURRENT	OVER CURRENT		RS 232 OUT	DATA TRAFFIC ON RS232 TRANSMITTING LINE
RTC BATT	BATTERY FAIL		RS 485 IN	DATA TRAFFIC ON RS485 RECEIVING LINE
LOG MEM	INTERVAL LOG MEMORY FAIL		RS 485 OUT	DATA TRAFFIC ON RS485 TRANSMITTING LINE
ALARM	MD ALARM (AUX. DIG. OUTPUT)		AUX INPUT	AUXILLARY INPUT STATUS
I AM OK	Blinking Green color LED to indicate the healthy state of Controller			

Front side RS232 communication port connection

This port is used for downloading of data logged in the APFC Controller or LM-56 Unit. The interface is a Standard, 3-wire, RS232. For further description about the data logging, please refer the corresponding Page of this User Manual. These Connections are standardized by TAS for their APFC Units and the LM-56 Load Manager. Following gives the pin configuration and the cable connections:
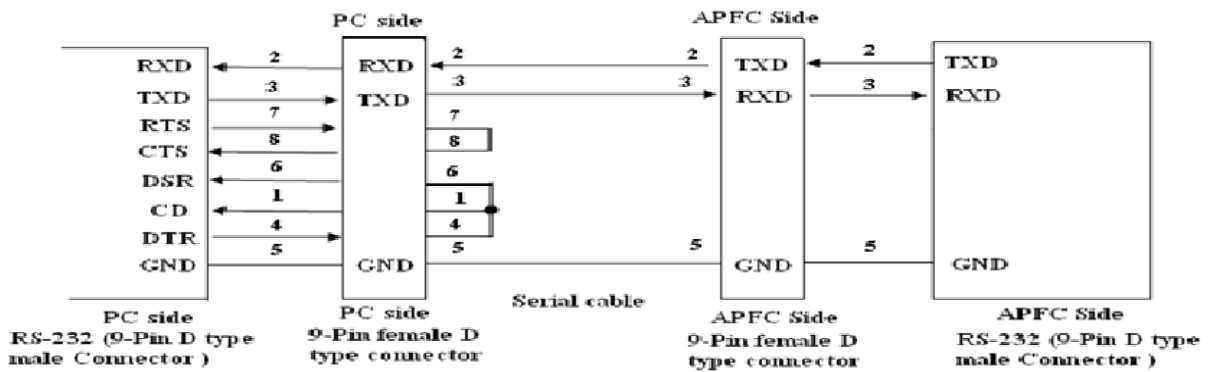
Front fascia –   Keypad
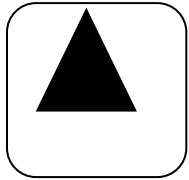
UP key. Used to scroll up the menu screen; increment values when entering numbers. Also used for changing the status of banks.

DOWN key. Used to scroll down the menu screen; decrement values when entering numbers. Also use to change status of bank.

RIGHT key. Used to shift the cursor to right; also used to increase the contrast of LCD in default display screen mode.
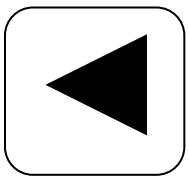
LEFT key. Used to shift the cursor to left; also used to decrease the contrast of LCD in default display screen mode.

ENTER key. Used for entering a submenu or for setting up values.

MODE key. Used for selecting modes of operation and editing of parameters.

SAVE key. Used to save all the changes made in the Program mode menu.

LCD Display Contrast & Back-light.

The LCD display Contrast is adjustable by front keyboard.
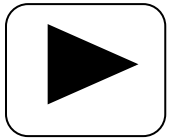
▶ Repetitive strikes of "Right" key would increase the contrast
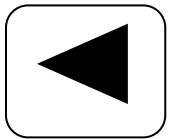
◀ Repetitive strikes of "Left" key would reduce the contrast of
   LCD display.

LCD – Background visibility light (LED Back-light) is turned on during
Power Up of LM-56.

Any key on the Keypad pressed once, will turn on the LED Back-light of
LCD Display.

Any non-activity on the keyboard for more than 1 Minute would turn off
the LED Back-light of LCD Display.

Display of various parameters

Values of various parameters can be viewed by using UP / DN keys & then pressing ENT key. To exit a sub-menu press PROGRAM.

KW=+000000.0 ↑ OK ----------------------	This is factory set default display screen giving information of Overall KW.
DISPLAY OVERALL VALUES	Overall values gives the average values of system parameters – V, I, kW, kVAr, kVA, C-kVAr, frequency.
DISPLAY MAXIMUM VALUES	Max values gives the maximum values of V, I, kW, kVAr and kVA, detected after the last reset. This also has the facility of resetting the maximum values manually which would be the actual instantaneous values and not zero.
DISPLAY PER-PHASE RMS	Per phase RMS gives the per phase values of voltage, current, and neutral current.
DISPLAY POWER	Displays overall power parameters for per phase like PF, kW, kVAr, kVA.
DISPLAY ENERGY	Displays overall energy parameters like kWH, Inductive & Capacitive kVArH, kVAH.
DISPLAY HARMONICS	Displays THD in terms of "%" for per phase voltage and current up to 15th odd harmonics.
BATTERY VOLTAGE 3.15 VOLT	Displays the Battery voltage of the Lithium Coin Battery inserted in the Battery Holder.
INT-Temperature 29 Deg C	Displays the internal (cabinet) temperature of the LM-56 Unit.
TIME: 15:10:14 DATE:25/02/14	Displays current time & date that is from the internal Real Time Clock-Calendar. Time is in HH/MM/SS (24 Hour) & date is in DD/MM/YY format.
TAS POWERTEK LM-56 VER. 1.0.2	Displays Name & the version of software.
UNIT SR.NO 7200071500001	Display Sr. No. of LM-56. It is used for Data downloading.

UP

DN

Sub-menu for display of parameters

Overall Values	Max. Values	Per Phase RMS	Display Power	Display Energy	Display Harmonics
Average Voltage 00000.0 (L-N)	Maximum Voltage 00000.0 V	R-Phase Voltage 00000.0 (L-N)	R-Phase PF 1.000 IND	R-KWH 000000000.0	Vr-THD -F 000.0 %
Average Current 0000.5 A	Max. Current 0000.0 A	Y-Phase Voltage 00000.0 (L-N)	Y-Phase PF 1.000 IND	Y-KWH 000000000.0	Vy-THD-F 000.0 %
Active Power 00000.0 KW	Max_KW 00000.0 KW	B-Phase Voltage 00000.0 (L-N)	B-Phase PF 1.000 IND	B-KWH 000000000.0	Vb-THD -F 000.0 %
Reactive Power 00000.0 KVAr	Max_KVAR 00000.0 KVAR	R-Phase Current 00000.0 A	R-Phase KW 00000.0 KW	TOT KWH 000000000.0	Ir-THD -F 000.0 %
Apparent Power 00000.0 KVA	Max_KVA 00000.0 KVA	Y-Phase Current 00000.0A	Y-Phase KW 00000.0 KW	IND R-KVARH 000000000.0	Iy-THD -F 000.0 %
Frequency 00.0 Hz	RESET MAXIMUM VALUES NO:0	B-Phase Current 00000.0A	B-Phase KW 00000.0 KW	IND Y-KVARH 000000000.0	Ib-THD -F 000.0 %
		Neutral Current 00000.0A	R-Phase KVAR 00000.0KVAr	IND B-KVARH 000000000.0	In-THD -F 000.0 %
			Y-Phase KVAR 00000.0KVAr	IND KVARH 000000000.0	
			B-Phase KVAR 00000.0KVAr		
			R-Phase KVA 00000.0 KVA		
			Y-Phase KVA 00000.0 KVA		
			B-Phase KVA 00000.0 KVA		

continued..

Harmonic data of various current & voltage parameters can be viewed by pressing ENT on the respective parameter screen of the Harmonics menu. Following are the sub-menus giving the harmonic data of voltage, current for each phase.

V Harmonics

Vr Harmonics 3rd:00.0%	Vy Harmonics 3rd:00.0%	Vb Harmonics 3rd:00.0%
Vr Harmonics 5th:00.0%	Vy Harmonics 5th:00.0%	Vb Harmonics 5th:00.0%
Vr Harmonics 7th:00.0%	Vy Harmonics 7th:00.0%	Vb Harmonics 7th:00.0%
Vr Harmonics 9th:00.0%	Vy Harmonics 9th:00.0%	Vb Harmonics 9th:00.0%
Vr Harmonics 11th:00.0%	Vy Harmonics 11th:00.0%	Vb Harmonics 11th:00.0%
Vr Harmonics 13th:00.0%	Vy Harmonics 13th:00.0%	Vb Harmonics 13th:00.0%
Vr Harmonics 15th:00.0%	Vy Harmonics 15th:00.0%	Vb Harmonics 15th:00.0%

I Harmonics

Ir Harmonics 3rd:00.0%	Iy Harmonics 3rd:00.0%	Ib Harmonics 3rd:00.0%	In Harmonics 3rd:00.0%
Ir Harmonics 5th:00.0%	Iy Harmonics 5th:00.0%	Ib Harmonics 5th:00.0%	In Harmonics 5th:00.0%
Ir Harmonics 7th:00.0%	Iy Harmonics 7th:00.0%	Ib Harmonics 7th:00.0%	In Harmonics 7th:00.0%
Ir Harmonics 9th:00.0%	Iy Harmonics 9th:00.0%	Ib Harmonics 9th:00.0%	In Harmonics 9th:00.0%
Ir Harmonics 11th:00.0%	Iy Harmonics 11th:00.0%	Ib Harmonics 11th:00.0%	In Harmonics 11th:00.0%
Ir Harmonics 13th:00.0%	Iy Harmonics 13th:00.0%	Ib Harmonics 13th:00.0%	In Harmonics 13th:00.0%
Ir Harmonics 15th:00.0%	Iy Harmonics 15th:00.0%	Ib Harmonics 15th:00.0%	In Harmonics 15th:00.0%

Method for keyboard / display usage

Flowchart for entering into different modes:

PRESS

Enable / If Password Option is Enable/Disable. / Disable

KW=+000025.9 ↑ OK

Default Display mode

Enter Password:
****

PRESS

Enter the 4 digit Password by using ◀ ▶ ▲ & ▼ keys.

PRESS

NO / IF PASSWORD Correct? / YES

Select
1. Edit Parameter

#

# #

Select
1. Edit Parameter

Edit Parameters
General and IO → General parameters

Edit Parameters
System → LM-56 system related parameters

Edit Parameters
Fault → Fault trip settings

Edit Parameters
Communication → Communication related parameters

Keyboard / Display operations

Mode Selection:

Press the PROGRAM key. Enter password (if enabled) by using ◂ ▸ ▴ ▾ keys. Press ENTER Now using ▴ ▾ keys, select the Mode of operation. Then press ENTER to enter the specific mode.

·Edit Parameters:
This mode is used to carry out system settings. In this mode, various system settings can be carried out. To do the same, use the ▴ ▾ keys and select the type of parameters to be edited. The types of parameters that can be edited are:

General & I/O   : For general settings.
System   : For Energy Meter system related settings.
Fault   : Fault settings.
Communication : Communication parameters.

After selecting the type, press ENTER to enter the sub-menu of that specific type.
The details of these sub-menus for every type is given further.
You can edit all these sub-menu settings by using the ENTER, ▴ , ▾ , ◂ , and ▸ keys
To come out of the sub-menu press PROGRAM key once.
To store the edited parameters permanently, press MEMORY when you are either in the Edit Parameters or any sub-menu area.
To come out of Edit Parameters without saving the changes, press PROGRAM key again.

General & I/O

Password Disable   :
Change Password : 0000
Load Default No   :
THD To Display F-THD   :
Reset energy Cnt No   :
AUX OP1 FUNCTION None   :
AUX IP1 FUNCTION None   :

<u>Password:</u> Enable or disable password

<u>Change Password:</u> Set new value of password (4 digit). Factory default password is "0000"

<u>Load Default:</u> Loads factory set default parameters. Yes and No.

<u>THD to Display:</u> Type of THD to be displayed for V and I. R-THD (RMS) and F-THD (fundamental).

<u>Reset Energy Counter:</u> Reset all energy counters to zero.

<u>AUX OP1 FUNCTION</u> :Program the auxiliary output to become NC due to MD Alarm.

<u>AUX IP1 FUNCTION</u> : Set an action through auxiliary input None , Mains/Generator. When LM-56 is on 'Mains' then on main screen shows   (↑row). And if controller is on 'Generator' then on main screen show↓ (arrow).

System

Rated Supply Vtg (L-N) : 0254.0 V
EXT-PT Ratio 0001.0 : 1
CUR CT Primary : 1000
DT Ratio 0001.0 : 1
KVA Method : M1   :
KVAh Method : M1   :
MDKVA WINDOW SIZ: 10 MIN   :

<u>Rated Supply voltage</u> :user can set rated supply voltage of panel.

<u>Ext-PT ratio:</u> In case the external PT is used, this ratio can be set.

<u>Cur CT Primary:</u> Rated Feedback Load current for mains. NOTE: PT ratio and CT Ratio are adjusted such that Panel VA Rating Should not Exceed 50 MVA.

<u>DT Ratio:</u> Set the distribution transformer ratio.

<u>kVA Method:</u> User can select the right method to calculate kVA. (check next page for different method formula)

<u>kVAh Method:</u> User can select the right method to calculate kVAh. (check next page for different method formula)

<u>MD kVA Window SIZE:</u> It is scrolling window size in minutes to calculate the average kVA consumption. User can set this from 10,15,30 Minutes .

KVA Calculation:

Method 1:-

KVA-r   = sqrt ((KWr * KWr) + (KVAr * KVAr))

KVA-y   = sqrt ((KWy * KWy) + (KVAy * KVAy))

KVA-b   = sqrt ((KWb * KWb) + (KVAb * KVAb))

TOT KVA = KVA_r + KVA_y + KVA_b

Method 2 :-

 TOT KVA = sqrt ((TOT KW * TOT KW) + (TOT KVAR * TOT KVAR))

KVAh Calculation :

Method 1:

KVAh   =   (KVA/CYCLE) * No. of Cycles

Method 2:

KVAh   =   sqrt ((KWh * KWh) + (KVARh * KVARh))

KVARh   =   KVARH (Ind)
                        or
              =   KVARh (Ind) - KVARh (Cap)
                        or
              =   KVARh (Ind) + KVARh (Cap)

Faults:

Over voltage Limit (%) : 113
Over voltage Resume (%) : 110
Under voltage Limit (%) : 068
Under voltage Resume (%) : 071
Under load Limit (%) : 02
Under load Resume (%) : 03
Over Current Limit (%) : 130
Over Current Resume (%) :095
Temperature U. limit : 70
Temperature L. limit : 60

#

For over-voltage and under-voltage fault, the option available is as here under:

For all the faults, normally two limits are defined. One is Detection Limit and another Resume Limit. Detection Limit if exceeded (above/below) by the parameter would mean the action as defined by parameter in type of fault (as given here-above). Resume Limit defines the parameter value above/below which the fault is de-activated.

• Over-Voltage: As name suggests, its for Over-Voltage conditions persisting in any one phase for 3 Seconds.

• Under-Voltage: For Under-Voltage conditions in any one phase persisting for 3 Seconds.

• Under Load fault: The values here are set as % of Maximum rated KW. Value for this Under-Load KW can be calculated as shown in this manual.

•Over current: The LM-56 detects if the supply system is overloaded, then it is for warning indication.

•Temperature fault: As the name suggests, it displays the over temperature fault if the internal temperature of LM-56 Unit exceeds the set limits. There are two parameters related to it, i.e. the temperature upper limit and lower limit.

#

↓

| V-Thd Threshold Limit(%) : 05 |
| I-Thd Threshold Limit(%) : 025 |
| Har Flt Auto-Rst Enable : |
| Harmonic Lmt Ext Loading(%) : 20 |
| Low Rng Mul Fact For VTHD:3.0 |
| Low Rng Mul Fact For ITHD:4.0 |

•V-THD Threshold limit (%): If percentage of voltage THD is above the set limit, then voltage harmonics fault (VH) will be displayed on the default screen. Average THD in any one phase over 3 Minute period if exceeded, then this fault is activated.
The values can be set through this screen.
•I-THD Threshold limit (%): If percentage of current THD is above the set limit, then current harmonics fault (IH) will be displayed on the default screen. Average THD in any one phase over 3 Minute period if exceeded, then this fault is activated.
The values can be set through this screen.
•Harmonic Flt Auto-Rst: This has two options, namely Enable and Disable. If it is enable and Harmonics exceeds from set limits then controller stop all of its functioning until harmonics come down within set limits, after harmonics comes in to the set limits controller start its functioning on average time of 3 Minute and if disable controller shows error until you reset the error manually.
Harmonic Lmt Ext Loading: User can set the actual load limit in percentage of rated load here for which harmonic fault can be detected.
•Low Rng Mul Fact For VTHD: By setting this factor user can extend the VTHD fault limit.
•Low Rng Mul Fact For ITHD: By setting this factor user can extend the ITHD fault limit.

Communication

| Panel ID 00000001 |
| ErasData 4 NewID No   : |
| Baud Rate - COM1 57600   : |

•Panel ID: Value: Defines the 8 digit Panel ID, used for serial communication on RS-232 Dedicated protocol, and for further analysis of down-loaded data. The panel ID can be changed and a new Panel ID can be saved only if all the logged data is Erased from the EPROM. This is to prevent false data.
• Erase Data for New ID: Yes Or No.
It erases all the logged data in the EEPROM. The panel ID can be changed and a new Panel ID can be saved only if all the logged data is Erased from the EEPROM.
• Baud Rate: selectable options only for front RS-232 Port: 4800 bps, 9600 bps, 19200 bps, 57600 bps. The Baud rate should match on both sides, Energy meter & PC/HHU for communication.

Set Time HH:MM:SS
Set Date DD:MM:YY
Initialize RTC No   :
Clr Battery Flt No   :
Select LOG Time 60 MIN :
EraseData4LOG Time No :
OvrWrt INTER LOG No   :
OvrWrt EVENT LOG Yes   :
COM 2 Function : Modbus RTU   :
Baud Rate – COM 2 9600   :

• Real Time Calendar Clock: Defines the Real Time Clock / Calendar setting.
• Time: Defines Hours (24 Hours Clock), Minutes and Seconds (HH:MM:SS) format.
• Date: Defines the date, month & year setting. (DD:MM:YY) format.
• The above applicable only after saying "Yes" to initialize RTCC, by pressing Up key.
• Initialize RTCC: Yes Or No. Defining "Yes" initializes RTCC (real time calendar clock) to the above specified values.
• Clear Battery fault: Yes or No. Defining "Yes" clears Battery fault and / or NV RAM fault in LM-56.
• Select LOG Time : Interval of 60 Min. , 30 Min. ,15 Min. ,10 Min., By pressing up key it Define log data at 60 /30/15/10 Minutes Interval period.Default value is 60 Minute.
• EraseData4LOGTime : Yes or No.
 Defining " Yes " erase all previously logged data from the EEPROM. Select LOG Time can be changed and new Select LOG Time can be saved only if all logged data is erased from the EEPROM. This is to maintain time synchronization of data.
• OvrWrt INTER LOG:User can enable this option to allow the interval logged data to be overwrite after log data memory is full. If the option is disable data logging will get stop after memory is full.
• OvrWrt EVENT LOG: User can enable this option to allow the Event logged data to be overwrite after log data memory is full. If the option is disable data logging will get stop after memory is full.
• COM 2 Function : None, Mod-bus ASCII , Mod-bus RTU, GSM. Option Mod-bus ASCII & Mod-bus RTU for RS-485 communication and GSM for RS-232 communication for an external GSM / GPRS MODEM.
• Baud Rate: Selectable, only for the Rear-Connector. 4800 bps, 9600 bps. The Baud rate should match on both sides, Load Manager and RS-485 for communication or for the GSM / GPRS MODEM.

Notes on Battery :

(1) Battery Low : If the internal Lithium coin Battery Voltage of nominal 3 V drops **below 2.6 V** then the controller will flash **"Battery Low!!!"** message on the Default screen display (in a blinking state with certain delay) until the battery is replaced by a new healthy battery. Please note that even when the **"Battery Low!!!"** message is being flashed on the LCD display the user can still operate the keypad.

It is essential to have the battery operational to maintain the Real Time Clock and Calendar information. If the Battery Voltage falls below certain limit, the RTCC will stop functioning. All Data Logging operations are prohibited if the RTCC is Stopped.

(2)Battery Replacement: The RTCC Battery is Maxell Make, CR2032 type. This can be replaced without opening the Controller through the Slot provided on the Top Left-Hand side of the Controller.

The Old Battery should be removed using insulated tip plier and a new Battery is to be placed using the same insulated tip plier.

Please observe the correct positive and negative polarity of the Battery while replacing.

The positive of the Battery should be towards the viewer (LCD Side) and the negative towards the PCB. It is always recommended to replace this battery with Auxiliary supply to the Unit in ON condition. This would prevent re-setting up of RTCC date. Still if one wishes, it can be safely done with unit in Power down condition too without fear of loosing data.

Note: Unit is equipped with EWPF logic. With Battery Faulty condition or Battery Low condition, Battery Replacement can be safely done without data download and without a fear of loosing any logged data. Such battery replacement can be even safely be done with unit in powered down condition.

LM-56 Load Manager fault indications and fault actions

Sr.No.	Status Indications on LCD Display	Status / Fault Description	Fault description	Action taken by Energy Meter	Status appearing in Data Logging
					Yes / No
1	OK	Controller status is OK		Indicative	Yes
2	ZV	Zero Voltage	If voltage absent in any one of the three phases	Indicative	Yes
3	OV	Over voltage	If voltage exceeds than defined limit in any one of the 3 P-N values	Indicative	Yes
4	UV	Under Voltage	If voltage reduces than defined limit in any one of the 3 P-N values	Indicative	Yes
5	VH	Voltage over-harmonics THD%	If V-THD exceeds than defined limit , in any one of the 3 P-N values	Indicative	Yes
6	IH	Current over-harmonics THD%	If I-THD exceeds than defined limit, in any one of the 3 P-N values	Indicative	Yes
7	BF	Battery for RTC faulty	Battery checked as un-usable	Stops data logging	Yes
8	ZC	Zero current	Load Current less than 1.5% in any one of the three phases	Indicative	Yes
9	OB	Out of Banks	Insufficient bank kvar	Indicative	Yes
10	OT	Over temperature	Indicates temperature inside the micro-controller	Indicative	Yes
11	UF	Under frequency	If reduces below 47Hz (limit)	Indicative	Yes
12	OF	Over frequency	If exceeds 53Hz (limit)	Indicative	Yes
13	UL	Under Load	If KW reduces than defined limit, in any one of the 3 P-N values	Indicative	Yes
14	OC	Over current	Load Current exceeds than defined limit, in any one of the 3 P-N values	Indicative	Yes
15	Battery Low!!!	Low battery	Battery Voltage drops below 2.6 V	Indicative	Yes
16	NF	Neutral Fault	Shifting of neutral voltage away from balanced condition	Indicative	Yes

"Events" and "Interval" based data-logging facilities:

▪ The Energy meter has non-volatile memory where internal operational status is monitored and change of state, called as an "Event", is internally recorded in the non-volatile memory, with RTCC date & time stamping for the event data.

▪ Up to 1024 latest events are held in the memory which can be off-loaded from the controller to a PC or to a hand-held unit (HHU) for further analysis.

▪ This information is useful to the user because the user comes to know when a particular fault occurred and when the controller resumed from the faulty condition.

▪ The "**Data View**" Application Software for PC, is provided to the users of Energy meter Unit to download and process the data directly from the Energy meter using a laptop/PC or download from Hand Held Unit(HHU), if the HHU already has the data from Energy meter. A separate User Manual is available for the "Data View" Software.

▪ "Data View" is for not only for data downloading from the Energy meter Units, but also for presenting the captured information in a User-Friendly manner.

▪ Energy meter Unit is capable of internally logging various important Electrical Parameters as well as the Capacitor Bank Status, on a fixed Time Interval Basis.

▪ The most common Time Interval provided is that of 1 Hour, therefore the data-logging is on an Hourly basis as a Factory-Default Setting.
Thus, the Hourly logged records in the Energy Meter Unit are first downloaded by "Data View", and then, analysed and presented to the User in various ways.

▪ "Data View" is capable of generating the reports in visual forms as well as in print form for hard-copy storage.

▪ The "Event" is considered as a Change-of-Status of a Fault or a specific "Event" happening. The List of "Events" for the LM-56 Unit:
Over-Voltage, Under-Voltage, Under-Load (kW), Over-Current, Over-Freq., Under-Freq., Over-Temperature, Voltage Harmonics, Current Harmonics, Manual/Auto Mode , RTCC Battery fail, Zero-Voltage, Power-Down, Power-Up, Zero Load Current, RTCC Battery Low, Editing Mode.

▪ "Data View" has the ability to show the date of downloading and expected date of next download. Time span between date of downloading and next date of downloading is 90 days.
This facility allows about One Month margin to get the data from the field. This is important so that one actually does not miss any field data.
If the logged-data is not off-loaded from the Controller in time, the old data will be over-written by the Controller to always present the latest data.

▪The Non-Volatile Memory of the LM-56 Unit is capable of logging the Hourly Data for a maximum duration of 124 days. The "Data View" downloads all logged data of 124 days. Selecting shorter time interval period for logging will correspondingly reduce the number of days for the logged data because the amount (size) of memory for data-logging, is internally fixed in the design.

▪ For the maintenance purpose, it is possible to generate "faults" related information for a   particular date and time.

Please refer page for the connection diagram between PC and the LM-56 Energy meter Unit.

Aux. Input AC Power "Early Warning Power-failed" monitoring (EWPF):

The Energy meter has the ability to detect the "power-failing" condition by way of an internal "Early-Warning" of impending AC Input Aux. Power Failure, and takes preventive measures for the following:

▪ In case of "power-failing" Early-Warning condition, the LM-56 saves all the dynamic parameters in its non-volatile memory (EEPROM) along with RTCC current date and time. So, the "Power-Down" event is precisely known.
Similar Record is created at the time of AC Aux. Input Power-Up. This enables the PC Side Data-View / Data View Software to find the interval for which the Energy meter did not receive Power Supply.

▪ After "saving" in to non-volatile memory operation, the LCD back-light which was off at the detection of "Power-Failing", it flashes on once which indicates that the memory saving operation has been successfully carried-out by the Energy meter Unit.

▪ "Early warning Power Failed" additionally has one critical functionality for taking care of critical value storage in EEPROM. This prevents any data loss in Interval or Events records or Energy Counters values to be lost in case of Battery Fault or Replacement of Battery even with Power Down condition.

Commissioning Instructions

Before LM-56 based Panel is powered-up for the first time

1. Panel Wiring Check

Ensure that all connections in the panel are tightened properly and there are no loose connections. Also ensure that the wiring is done as per the wiring diagram. Keep wires of high-voltages and low-voltages, such as CT feedbacks, separate from each others, to avoid cross-coupling or induced signals. **The Unit should be firmly mounted in the panel using the 4 mounting clips at the back.**

2. Power Wiring Check

Ensure that the power cables are connected properly from the Panel I/C to the feeder I/C or the transformer bushings. The connection has to be after the Load Feed back CT, looking from the Transformer side.

Ensure that the Bus Bars and/or Lugs are clean and free of Dust, Corrosion or Oxidation on the contact sides so that good electrical connection is maintained. The surface area should be flat so as to get maximum contact area.

If required, Clean the Bus Bars and/ or Lugs by rubbing it with Polish Paper to remove the oxidation layer. Provide contact paste in between the contacts surfaces.

3. Load Current Feedback CTs connections

Ensure that the load current feedback CTs connections are done properly. Confirm that correct phase CT is connected with the correct phase input terminals. Please make sure that the CT Connections Polarity is consistent with the kW parameter displayed, +kW is for Power Import and –kW is for Power Export, in a 4-Quadrant Mode of Operation. If not proper, the CT Connection Polarity can be reversed to get the correct sign for the kW Parameter Display on LM-56.

CT connections MUST be done carefully, so as to ensure that the wire do not get opened and there is no loose contacts or loose connections.

Loose connection or open CT secondary will result in very high voltages getting developed at the CT Connection Terminals which will damage the CT and also damage the Energy meter Unit as well.

4. MOV or Free-Wheeling Diode across contactor coil, if the Auxiliary Digital Output Relay Contact is used for Driving an External Alarm Hooter.

It is **essential** to install 320V AC (+/- 5% Tolerance) rated MOV of 20 mm diameter, directly across the 230V AC rated coil of contactor.

If a suitable MOV is not available, then, at least a suitably rated R-C Snubber must be placed across the 230 V AC Rated Contactor Coil.

The recommended values for the Series Connected Resistor & Capacitor (R & C) Components are:

R =330 Ohm, +/- 5% Tolerance, 1 Watt, CFR Type.
C = 0.1 micro-farad / 1000 V DC, El-Ci-Ar Make, axial, cylindrical.

The above are the right values for a 230 / 240V AC rated Contactor Coil.

In case of Contactor Coil is 12 or 24 V DC rated, then, use a Free-Wheeling Diode such as 1N4007 across the Coil, with proper free-wheeling diode Anode-Cathode polarity.

After panel is powered-up:

Observe panel performance for about 2 Hours after commissioning.

Troubleshooting procedure

Nature of Fault	Probable Reason	Action to be taken
Unit does not turn ON.	•Input auxiliary supply not coming. •Input side fuse blown.	•Check the input supply & restore. •Check fuse in the unit is OK & of Proper rating.
Unit does turn 'ON' but 'I AM OK' LED is steady ON or steady OFF	Processor may be hanged.	Switch OFF the Energy meter Unit and again Switch it ON.
LCD Display is not properly visible.	The contrast of the LCD may not be Set properly. It may be either very low or high.	Adjust contrast of LCD using Left and Right keys of the Keypad. Left key reduces the contrast whereas right key increases the contrast.
"BATTERY LOW!!!" message on Display *OR* BF Fault on Display OR Corruption of date & time.	In all these three conditions, the battery needs to be checked. • Internal Lithium 3.0 Vdc battery CR2032 used for RTCC, must have been drained.	• Replace this battery with a brand new one of original manufacturer. •Battery Part Number is CR2032 (Maxell Make) • Observe correct positive & negative polarity while replacing.
1] Serial Communication is not working with Hand Held Unit(HHU). 2] Serial Communication Not working with Laptop (PC).	• Baud rate and other communication parameters selection is not proper. • Serial communication cable connections are not proper. • Energy meter may be in MANUAL Mode or EDIT Mode. In such a case, Serial Communication would not work.	• Select proper baud rate and other communication parameters. • Check the serial cable continuity as per the connections given earlier in this manual. • Try using Lower Baud Rate setting. • Try using shorter length cable.

Factory Default Settings

PARAMETER	MIN	MAX	PARAMETER EDITING STEP SIZE	FACTORY DEFAULT
GENERAL I/O				
Password (Enable:/ Disable)	Disable	Enable	-	Disable
Change password	0000	9999	1	0000
Load default (Yes/ No)	No	Yes	-	No
THD to display (F–THD/ R-THD)	R-THD	F-THD	-	F-THD
Reset energy counter (Yes/No)	No	YES	-	No
Aux OP1 FUNCTION (None/ MD Alarm)	None	MD Alarm	-	None
Aux IP1 FUNCTION (None / Mains-Gen)	None	Mains-Gen	-	None

PARAMETER	MIN	MAX	STEP SIZE	FACTORY DEFAULT
SYSTEM				
Rated Supply Voltage. (L-N)	110	399.9	1	254.0
EXT-PT Ratio	1	299.9	1	1
Current CT Primary (Amp) (only in user editable steps option)	1	8000	1	1000
NOTE: PT ratio and CT Ratio are adjusted such that Panel VA Rating Should not Exceed 50 MVA.				
DT Ratio	1	299.9	1	1

Factory Default Settings

PARAMETER	MIN	MAX	STEP SIZE	FACTORY SETTINGS
Faults				
Over Voltage limit (%)	(resume % set) +1	119	1	113
Over Voltage resume (%)	101	(Limit % Set)-1	1	110
Under Voltage limit (%)	60	(resume % set) -1	1	68
Under Voltage resume (%)	(Limit % Set)+1	99	1	71
Under Ld. kW Fault Disable, Enable	Disable	Enable	-	Disable
Under load limit (%)	1	(resume % set) -1	1	02
Under load resume(%)	(Limit % Set)+1	60	1	03
Over Current Limit (%)	Over current resume	150	1	100
Over Current Resume (%)	50	Over current limit	1	095
Internal Temperature Fault (Enable/ Disable)	Disable	Enable	1	Enable
Internal Temp. upper limit	(lower limit 1 set)+1	70	1	70
Internal Temp. lower limit	0	(Upper limit 2 set) -1	1	60
Harmonic Overload (Disable/Enable)	Disable	Enable	-	Enable
V- THD Threshold limit (%)	1	20	1	05
I THD Threshold limit (%)	3	150	1	25
Harmonic fault auto Reset (Enable/Disable)	Disable	Enable	-	Enable
Harmonic Limit Ext loading(%)	2	50	1	20
Low Rng. Mul. Fact For V- THD	1.1	5.0	0.1	3.0
Low Rng. Mul. Fact For I- THD	1.1	5.0	0.1	4.0

Factory Default Settings

PARAMETER	MIN	MAX	STEP SIZE	FACTORY Settings
Communication				
1] Panel ID	00000000	99999999	1	00000001
2] Erase Data 4 New ID (Yes/ No)	Yes	No	-	No
3] Baud Rate – COM1 4800 9600 19200 57600	4800	57600	1	57600
4] Set Time (HH/MM/SS) 24 Hrs clock	–	–	–	Current Time
5] Set Date (DD/MM/YY)	–	–	–	Current Date
6] Initialize RTCC (Yes/No)	–	–	–	No
7] Clear Battery fault (Yes/ No)	–	–	–	No

8] Select Log Time: 60 MIN
             30 MIN
             15 MIN
             10 MIN
	0	3	1	60 MIN

9] Erase data 4LOGTIME(Yes/No)	No	Yes	-	Yes
10] Ovr Wrt INTER LOG (Yes/No)	No	Yes	-	No
11] Ovr Wrt EVENT LOG (Yes/No)	No	Yes	-	Yes
12] COM 2 Function :None Modbus ASCII (Easy to use) Modbus RTU (It is time critical) RS-232 GSM (For SMS Mode)	None	GSM	-	Mod-bus RTU But, use matching with Project.
13] Baud Rate – COM	4800	9600	1	9600
14] Service Provider	000000000	9999999999	1	0000000000
15] SMS Receiver No	0000000000	9999999999	1	0000000000

Maintenance Copy: To be filled-in by the User's Maintenance Engineer at Site.

PARAMETER	As on date	As on date	As on date
GENERAL I/O			
Password (Enable:/ Disable)			
Change password			
Load default (Yes/ No)			
THD to display (F–THD/ R-THD)			
Reset energy counter (Yes/No)			
Aux OP1 FUNCTION (None / MD alarm).			
Aux IP1 FUNCTION (None / Mains-Gen).			

PARAMETER	As on date	As on date	As on date
SYSTEM			
Rated Supply Voltage.(L-N)			
EXT-PT Ratio			
Current CT Primary (Amp) (only in user editable steps option)			
NOTE: PT ratio and CT Ratio are adjusted such that Panel VA Rating Should not Exceed 50 MVA.			
DT Ratio			

PARAMETER	As on date	As on date	As on date
Faults			
Over Voltage limit (%)			
Over Voltage resume (%)			
Under Voltage limit (%)			
Under Voltage resume (%)			
Under Ld. kW Fault Disable, Enable			
Under load limit (%)			
Under load resume(%)			
Over Current Limit (%)			
Over Current Resume (%)			
Temperature Fault (Fast off/ Disable)			
Temp upper limit			
Temp lower limit			
Out of Banks Fault (Enable/Disable)			
Harmonic Overload (Disable/Fast Off)			
V- THD Threshold limit (%)			
I THD Threshold limit (%)			
Harmonic fault auto Reset (Enable/Disable)			
Harmonic fault reset (Minutes)			
Harmonic Limit Ext loading(%)			
Low Rng. Mul. Fact For V- THD			
Low Rng. Mul. Fact For I- THD			

PARAMETER	As on date	As on date	As on date
Communication			
1] Panel ID			
2] ErasData 4 New ID (Yes: 1/ No: 0)			
3] Baud Rate – COM1 0: 4800 1: 9600 2: 19200 3: 57600			
4] Set Time (HH/MM/SS) 24Hrs clock			
5] Set Date (DD/MM/YY)			
6] Initialize RTC (Yes: 1/No: 0)			
7] Clear Battery fault (Yes: 1/ No: 0)			
8] Select Log Time:60 MIN 30 MIN 15 MIN 10MIN			
9] Erase data 4LOGTIME (Yes/ No)			
10] Ovr Wrt INTER LOG (Yes/ No)			
11] Ovr Wrt EVENT LOG (Yes/ No)			
12] COM 2 Function :None/ Modbus ASCII/ Modbus RTU/ GSM/			
13] Baud Rate – COM 2 4800 9600			
14] Service Provider			
15] SMS Receiver No			

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