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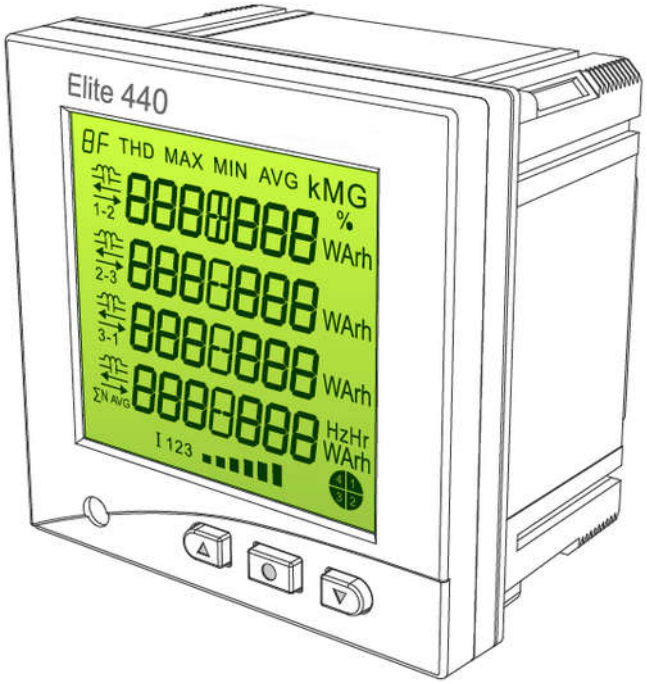
Elite 440

Multi-line Digital Display Panel Meter



Technical Reference Manual

BGX501-729-R15

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As part of Secure Meter's continuous endeavour to improve, product design and specifications mentioned are liable to change. System functionality information, illustrations and product aesthetics published in the document may vary from those of your product.

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1 Introduction

This manual is intended for understanding the various functions of Elite 440 series of microcontroller based meters and how to use its available features.

The manual covers the various application and features of Elite 440 series of meters, the configuration process both from the meter's Setup Mode (push buttons) and using the ConfigView Suite, the various displays and their meanings, installation process and the list of supporting parameters corresponding to each Elite 440 variant.

1.1 Reference Documents

For configuring certain parameters in the meter with the help of configuration tool, the user may find the **ConfigView User Manual** useful in addition to this manual.

2 Precautions and Safety Practices

- This product must be installed and serviced only by trained personnel. We strongly recommend reading the "Elite 440 Quick Start Guide" thoroughly before installing the product.
- Do not exceed the specified voltage and current ratings.
- Check the auxiliary supply voltage and / or polarity before making connection.
- Make sure that all connectors are correctly seated and firmly in place. Prior to any work with the product, isolate the voltage inputs and auxiliary power supply and short-circuit the secondary winding of all current transformers.
- Under no circumstances, the CT connections to the meter should be disconnected while current is flowing in the primary circuit of the external CT. The CT connector is provided with retaining screws to reduce the possibility of accidental disconnection.
- Make sure that there are no loose connections, stray wires or exposed conductors.
- Shielded cable should be used for RS-485 connections. Connect the shield to signal ground (SG) at meter-end only.
- Do not use solvents or abrasive materials to clean the unit, use only a slightly damp cloth and isolate the unit from the supply before cleaning it.
- An easily reachable switch and circuit breaker must be provided while installing Auxiliary supply. Make sure to mark it as "Disconnecting Device for the equipment".
- To avoid accidents disconnect the auxiliary power supply before fixing or removing external plug-in Modules from the rear of the meter.
- Care must be exercised during the installation of Elite 440 meter due to presence of mains voltages. Various points at the rear side operate at hazardous voltages.



The organization is committed to continuous improvement in our products and upgrading the feature set. While we will endeavour to integrate new features seamlessly, there could be instances when the enhancement is not backward compatible. Please check with the company representative for compatibility check before upgrade on an existing product.

Damage Preventing Measures:

Before installation, carryout the following checks and note the maximum voltage and current across the input terminals (Please refer the decal pasted on the product):

- The voltage of the auxiliary power should be in the range of 80-300 V AC/DC or 24-60 V DC.
- The frequency of the distribution system should be 50/60 Hz ± 5%;
- The maximum voltage across the voltage-input terminals (V1, V2, V3 and VN) is 300 V AC phase-to-neutral.
- A maximum current i.e I_{max} on the current-input terminals (I1, I2 and I3) is 10 A

Failure to comply with the above safety measures could cause serious injuries.If the meter is used in a manner not specified by the manufacturer, the protection provided by connections may be impaired. The manufacturer shall not be held responsible for failure to comply with the instructions in this manual.

3 Overview

Elite 440 series are multi-function panel meters with multi-line digital displays.

These are panel mounted (96*96) meters capable of measuring and monitoring various electrical quantities as well as detecting fault conditions in LV/HV networks. These meters are an ideal replacement for analogue ammeter/voltmeter combinations and are suitable for sub-metering of distribution system in Industrial and Commercial applications. A single Elite 440 meter can replace several single-function panel meters thereby saving the time and cost of installation.

Elite 440 meters are configurable for HV 3-phase 3-wire, HV 3-phase 4-wire or LV 3-phase 4-wire and have accuracy class of 1.0, 0.5s and 0.2s.

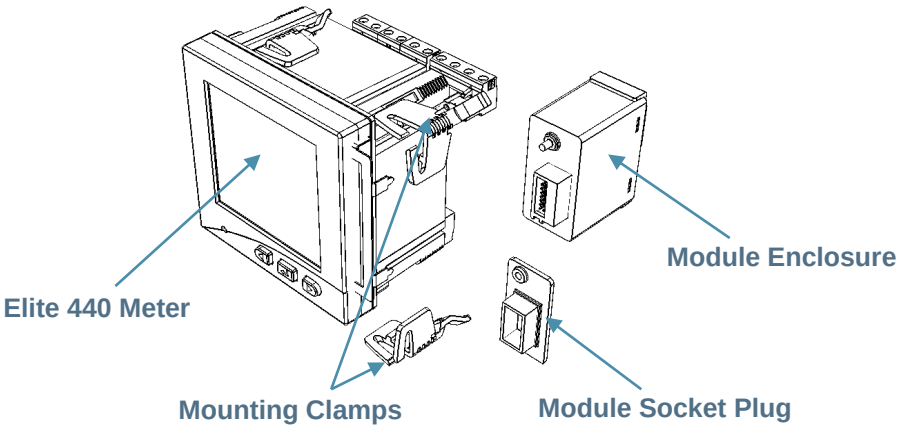


Figure 1: Elite 440 Meter Parts

These meters support external attachment of Modules to enhance their existing functionality or add extra features in to the meter. The Modules are replaceable and configurable at installation site and gives Elite 440 variants the flexibility to meet a broad range of applications. These Modules are optional and can be procured separately.

The meter's front panel has a large green backlit LCD (Liquid Crystal Display). When powered, the LCD is capable of displaying a group of related electrical parameter values together on a single page. For example, 3-phase voltage and average voltage can be displayed simultaneously on a single display page.

The push buttons provided on the front panel can be used to navigate through various displays, switching to a different display mode or to perform specific actions at the meter-end such as MD reset.

Elite 440 series of meters are pre-configured at the factory-end. Certain configurations can be modified at the installation site with the help of ConfigView Suite and/or the meter push buttons. Configurations done using ConfigView are saved in a configuration file with '.zip' extension that can be downloaded in the meter locally via the RS-485 connector port. For this, it is important to know the Modbus ID and baud rate configured in the meter so that a communication link can be established between the computer and the meter.

The meter has external detachable parts at the rear as shown in the above figure. These are described in the 'Rear Panel' section.

4 Features and Applications

4.1 Operational Features

Elite 440 meters have the following operational features:

- Measures and monitors instantaneous electrical parameters
- Displays energy and instantaneous electrical parameter values
- Configurable Favourite display sequence from ConfigView
- Programmable CT-VT ratio
- Connection check and self diagnostic facilities
- Optional Modules to add extra features
- MODBUS communication capability
- Backlit LCD
- Configurable calibration LED
- Panel mounted (96*96)

These meters are useful for the following applications:

- HV, MV and LV switch gear panels
- Control and relay panels
- Power Control Centre panels
- Motor Control Centre panels
- Energy management for buildings and industry
- Sub-metering

4.2 Physical and Functional Features

4.2.1 Front Panel

The front face of Elite 440 has a large digital liquid crystal display (LCD), three push buttons and an LED at the front as shown in the following figure and described below:

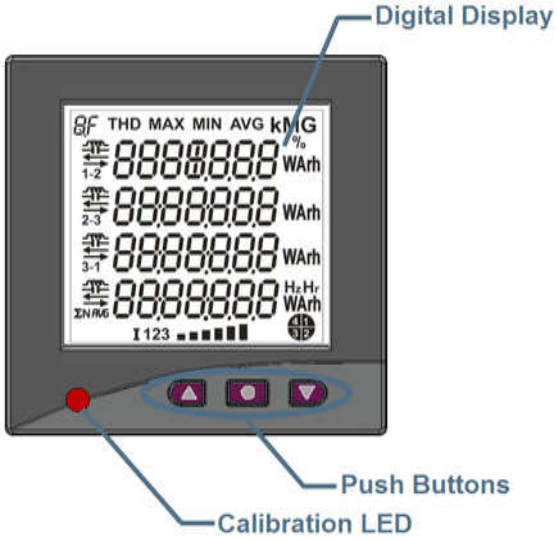


Figure 2: Elite 440 Front View

1. **Digital Display (LCD):** The LCD is a 7-segment 7-digit four line display with the 4th position from left on the 1st line being a 9-segment display (see the figure below). The LCD is green backlit with a large viewing area of 65 x 60 mm which when powered can display various measured basic electrical parameters such as voltage, current, frequency, power factor, phase angle, load and configured energy values. In addition, inside borders are reserved to display measuring units, display identifier, indicators, energy quadrant and percentage current bar graph as shown in the following figure.

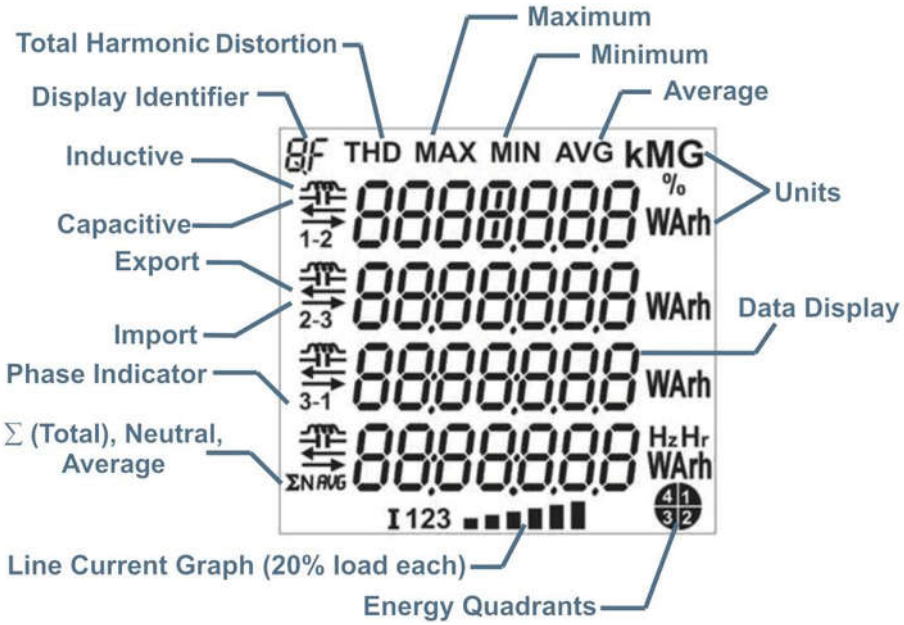


Figure 3: Elite 440 Display Details

The display identifier at the top left-hand corner shows the parameter being displayed on the LCD at any point of time. The display identifiers signify the following:

Display Identifiers	Parameter
U	Voltage (V)
L	Line Current (A)
I	Active/Reactive Current (A)
PF	Power Factor
P	Active Power (kW)
Q	Reactive Power (kVAr)
S	Apparent Power (kVA)
E	Energy
d	Demand

Table 1: Elite 440 Display Identifiers

2. **Push Button Functions**: The meter has three push buttons on the front, aligned in a row below the LCD. Each button has the following specific use in various operating modes:

	In Auto-Display Mode	In Manual or Favourite Display Mode	In Setup Mode	During Configuration Process
	Press twice for switching to manual display mode.	Navigate to next page	Move selection arrow to next line	Move cursor to next digit or value

	In Auto-Display Mode	In Manual or Favourite Display Mode	In Setup Mode	During Configuration Process
	Press and hold for 5 seconds (long push) to freeze a display page i.e to stop the display from scrolling. Press the same button again for 5 seconds to unlock scrolling.			
	Press twice for switching to manual display mode.	Navigate to previous page	Move selection arrow to previous line	Enter digits or values
	Press and hold for 5 seconds (long push) to continuously lit the LCD backlight. Press the same button again for 5 seconds to light the LCD backlight with a timeout. *If the LCD backlight remains lit constantly in auto-display mode, then press the 'up' or 'down' button once for switching to manual display mode.*			
	Access Setup Mode	Access Setup Mode	Select current option	Confirm or save the entered digit or value

Table 2: Push Button Functions

3. **Calibration LED**: Also referred to as Metrological LED, is the accuracy indicator on the meter front panel that can be configured to flash in proportion to the assigned energy. A single energy can be assigned to this LED.

4.2.2 Rear Panel

On the rear panel, these meters have voltage terminals, current terminals, an auxiliary power supply socket and an RS-485 communication socket as shown in the following figure. In addition, there are three separate sockets for fitting external Modules.

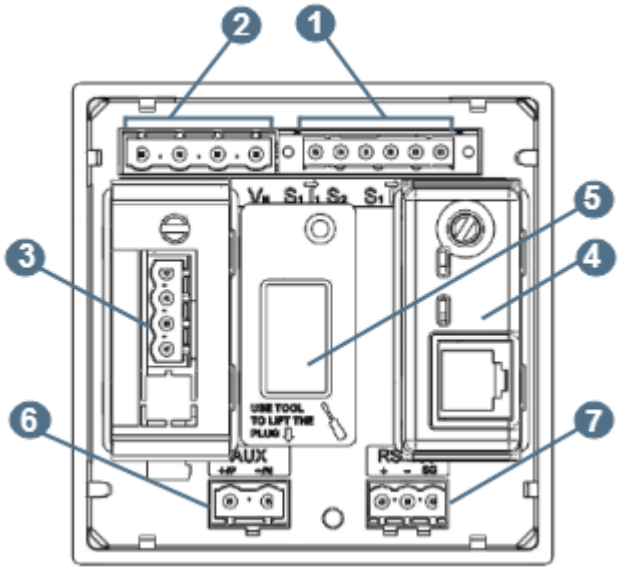


Figure 4: Elite 440 Rear View

1. 6-pin Current Input Connector Socket

Primary current range: Maximum 15000 A

Secondary current range: 1 A to 5 A in steps of 1

The above current range is applicable for both HV and LV meters.

2. 4-pin Voltage Input Connector Socket

$V_{nominal}$ for HV meters: 57.7 V phase to neutral and 100 V phase to phase

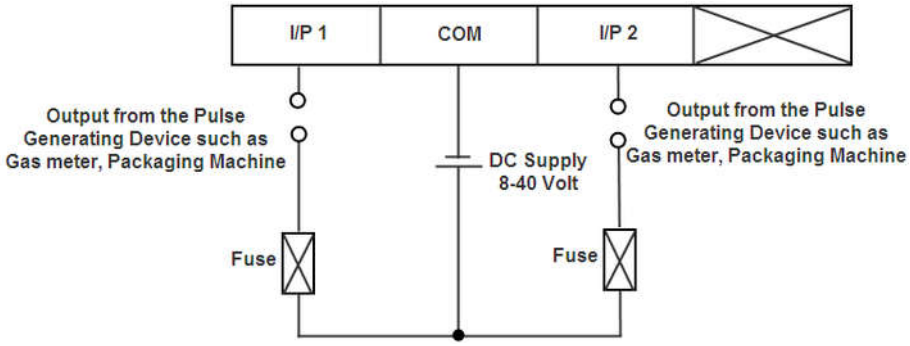
$V_{nominal}$ for LV meters: 240 V phase to neutral

3. I/O Module connected to Input-Output Module Socket

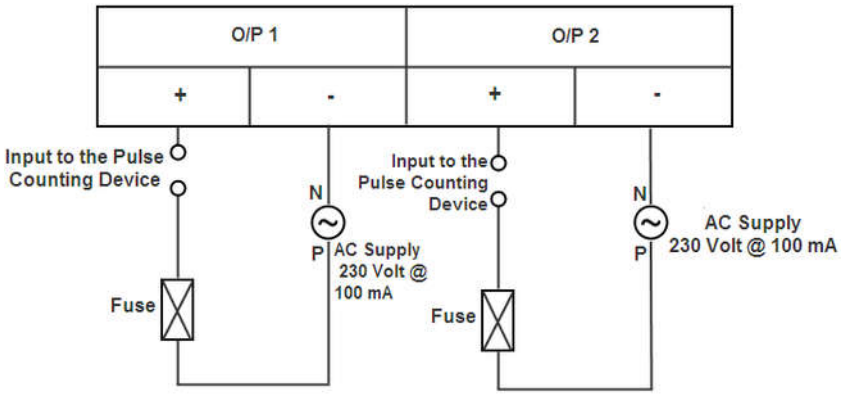
The 14-pin female socket (which is the leftmost socket located below the voltage terminals) at the rear is provided for attaching external I/O Modules. These Modules are optional and can be used to enhance the meter functionality. There are two I/O modules available each having different functions:

- Two digital pulse outputs and two digital pulse inputs
- Four 4-20 mA analogue outputs

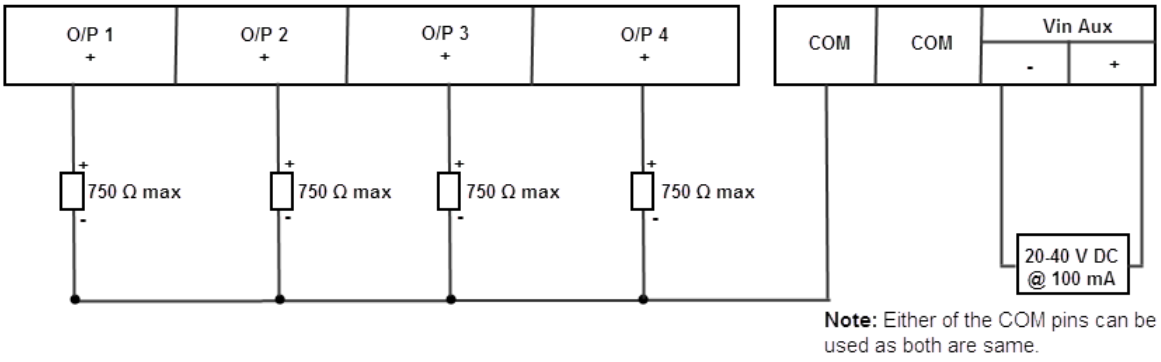
Pin Layout and connection details for two digital pulse inputs are shown below.



Pin Layout and connection details for two digital pulse outputs are shown below.



Pin Layout and connection details for four analogue outputs are shown below.



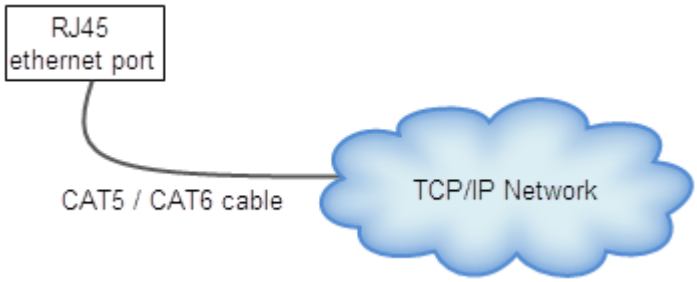
Note: Either of the COM pins can be used as both are same.

Attaching or detaching these modules should be done only after disconnecting the auxiliary power supply. The replaced Module should be reconfigured for the meter to automatically detect the new module at the next power up. A knurled head screw provided with each module holds it with the meter base.

4. **Ethernet Module connected to Ethernet Module Socket**

The 14-pin female socket (which is the rightmost socket located below the current terminals) at the rear is provided for attaching Ethernet Module. This module is optional and can be used to enhance the meter functionality.

Connection layout for Ethernet Module is shown below.



Attaching or detaching this module should be done only after disconnecting the auxiliary power supply. A knurled head screw provided with the module holds it with the meter base.

5. **Module Socket Plug**

The socket plugs made of polycarbonate plastic are used to seal module sockets when not in use. Before attaching a module, remove these plugs with the help of a screw-driver. Please refer the instruction to remove the plug as embossed on the plug.

6. **Auxiliary Power Supply Socket**

This 2-pin auxiliary power supply socket integrated at the rear panel is used for powering up the meter. There are two separate variants of Elite 440, each supporting different power supply voltage range:

Voltage range: 80-300 V AC/DC or 24-60 V DC

Frequency range for AC supply: 50/60 Hz ± 5%

7. **Meter Communication Socket**

This is an RS-485 connector port used for communication with the meter over MODBUS protocol. Its baud rate is set to 9600 bps as the default speed of communication, for data transfer and configuration download, and can be configured up to 38400 bps from the meter's Setup Mode (push buttons).

8. **Mounting Clamps**

Four numbers mounting clamps on four corners are provided to hold the meter with the panel. These clamps slide in and out of the channels easily (see Figure 1 on page 6).

4.3 Functional Specifications

Elite 440 series of meters are pre-configured at the factory-end. Certain configurations can be modified using the ConfigView Suite and/or with the help of meter push buttons. See Annexure-II on page 79 for configurable features.

4.3.1 Main Energy Registers

Elite 440 variants measures, records and displays metered energy values for each configured main energy. The meter maintains current and historical energy registers separately for each assigned energy type. The following energy types are supported by these meters from which a combination of maximum 12 or 14 energy types can be assigned to the meter using ConfigView:

Active Total Import Active Total Export Active Fundamental Import Active Fundamental Export Apparent Import Apparent Export Active Forwarded Apparent Forwarded Reactive Lag Forwarded Reactive Lead Forwarded	**and**	Reactive Import when Active Import Reactive Export when Active Import Reactive Import when Active Export Reactive Export when Active Export **Or** Reactive Import Reactive Export

Table 3: Main Energy List

Changing any of the main energy registers triggers a billing activity i.e. a snapshot of metered energy value for each of the configured energies will be stored in their respective historical registers.

Configuration of main energy registers is not possible from the push buttons.

Configuration of main energies using ConfigView

In ConfigView window, select the meter name and then in Configuration sub-folder click **Energy Definition**. The list of configurable energies that the meter supports will appear as shown below:

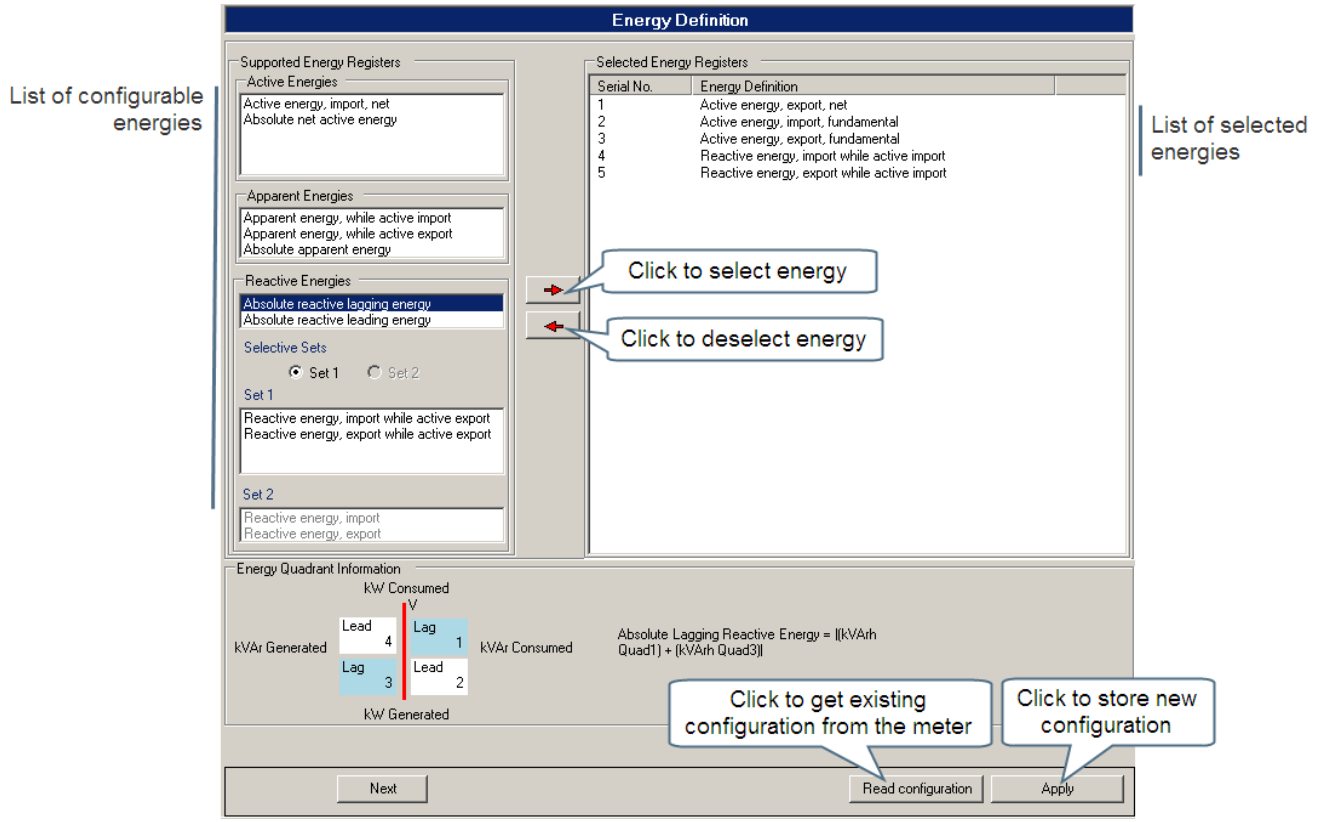


Figure 5: Configuring Energies with ConfigView

4.3.2 Maximum Demand Registers

Elite 440 variants can maintain MD (Maximum Demand) registers for supported energy channels. Energy demands are monitored periodically at each configured DIP (Demand Integration Period) to record the maximum demand value of each energy type. DIP can be set to 15, 30 or 60 minutes. It supports fixed-window and sliding-window type demand computation. The meter maintains current and historical registers separately for each MD energy type, changing the MD energy registers triggers the meter to store the current MD value in historical MD register.

Configuration of MD energy registers as well as selection of supporting parameters can be done using ConfigView. The meter's Setup Mode can only be used to select MD parameters.

The meter maintains two types of MD registers for each energy type:

- Cumulative MD registers – stores historical information which is the summation of all MD values recorded up to previous billing. The meter maintains separate cumulative MD registers for each MD energy type.
- Universal MD registers – stores the maximum of daily (0-24 hrs) demand values recorded at each DIP. The meter maintains separate universal MD registers for each MD energy type.

Configuration of MD energies using ConfigView

In ConfigView window, select the meter name and then in Configuration sub-folder click **Maximum Demand.** You can select MD energy registers from the main energy list populated as shown below:

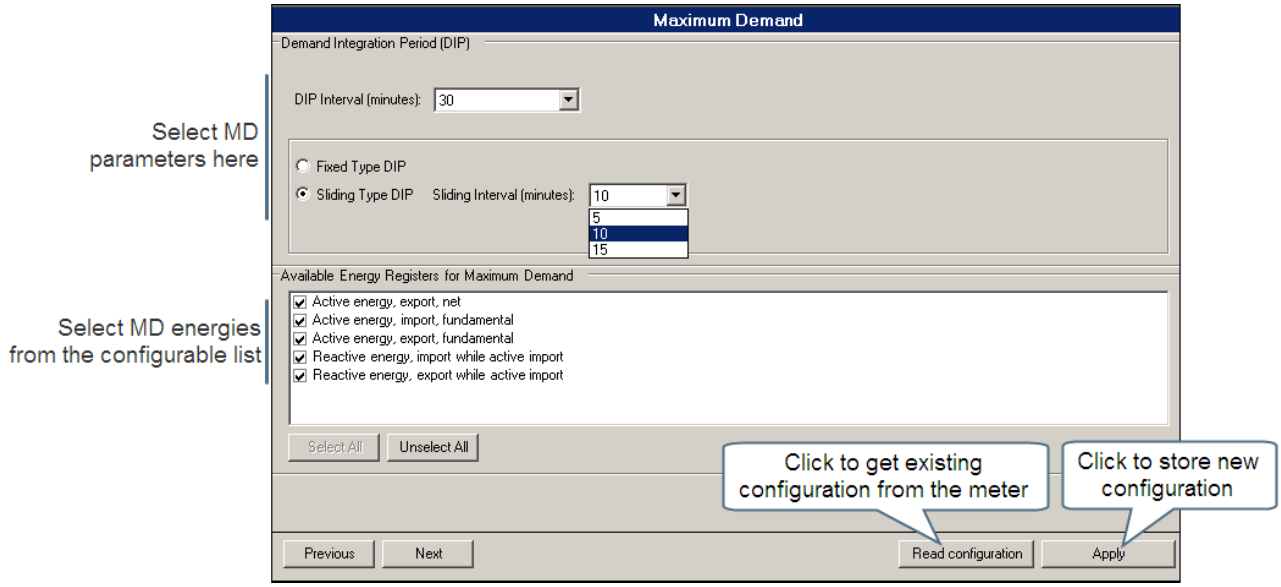


Figure 6: Maximum Demand Configuration with ConfigView

4.3.3 Energy Snapshots

Elite 440 records daily cumulative energy values at a predefined time as configured in the meter. Each energy type configured for daily energy snapshot will have separate cumulative registers that will hold data only from the previous day.

With the help of ConfigView Suite, these energies can be selected from the configured main energies. In addition, you can select the time when the meter will take the energy snapshot. This feature is not configurable from the push buttons.

Configuration of energy snapshots using ConfigView

In ConfigView window, select the meter name and then in Configuration sub-folder click **Energy Snapshots**. You can select energy channels for snapshots from the main energy list populated as shown below:

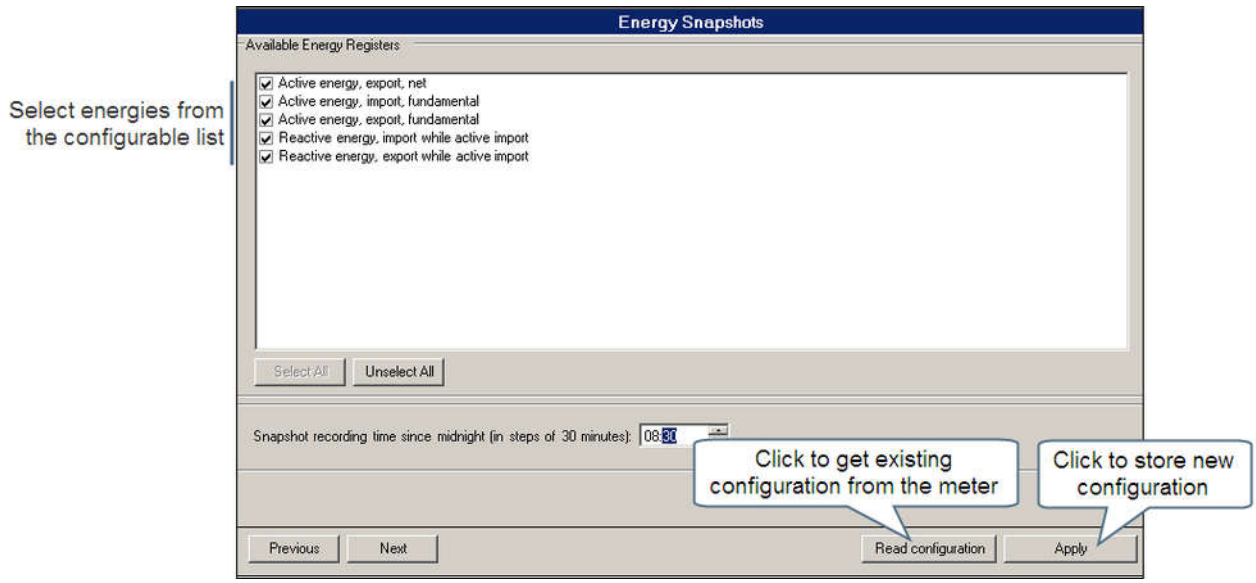


Figure 7: Energy Snapshot Configuration with ConfigView

4.3.4 Load Profile

Load profile data comprises load consumption and instantaneous parameter values recorded by the meter at fixed intervals for predefined number of days. The number of days of load profile data that the meter can record depends on the SIP (Survey Integration Period) as well as the number of energies and instantaneous parameters configured in the meter. For example, Elite 440 meters can be configured to store 40 days of load profile data at 30 minutes SIP for a maximum of 6 parameters. The table below shows the number of days of load profile data that the meter can record for the various combination of logging interval and number of parameters.

Number of logging channels

Logging interval (min)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**.....**	**28**
15	120	60	40	30	24	20	17	15	13	12		4
30	240	120	80	60	48	40	34	30	27	24		9
60	480	240	160	120	96	80	69	60	53	48		17

Load profile data stored for each instantaneous parameter is the average over a SIP. Load profile data logging energies, instantaneous parameters and SIP as desired by customers can be configured using ConfigView. It supports fixed-window and sliding-window type load profile. The meter's Setup Mode (push buttons) can only be used to select load profile parameters such as survey window type and SIP.

Load profile data logging energies can be selected from the main energies configured in the meter. In addition, the following instantaneous parameters can be selected for fixed load survey logging:

- Phase-wise and average voltage
- Phase-wise and average current
- Phase-wise power factor
- Frequency

Additionally, two pulse count inputs can be assigned for load profile.

In case of HV 3-phase 3-wire, phase 2 related instantaneous parameters will not be available for load profile logging.

Configuration of load survey parameters using ConfigView

In ConfigView window, select the meter name and then in the **Configuration** sub-folder click **Load Profile**. You can select energy channels for load profile from the main energy list populated as shown below:

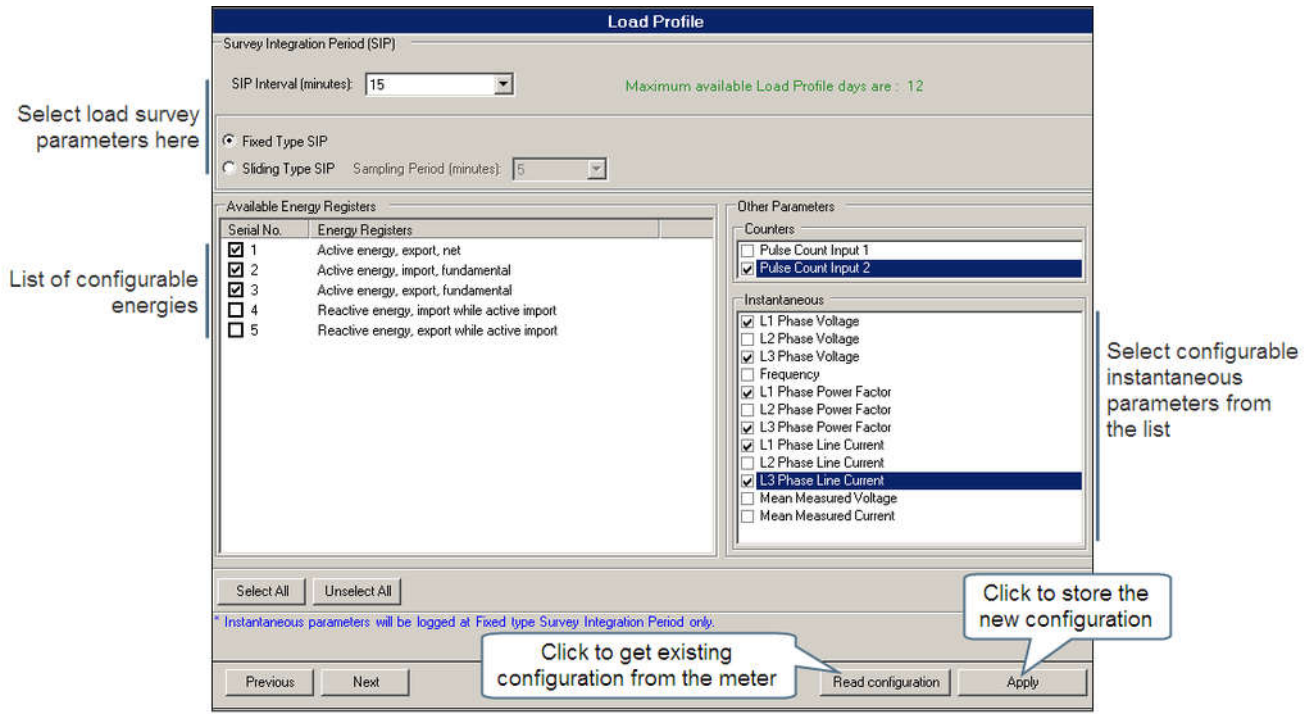


Figure 8: Load Profile Configuration with ConfigView

4.3.5 Billing Dates

Elite 440 records snapshot of the measured energies on predefined billing dates. You can select a maximum of 12 billing dates. These dates are defined using ConfigView which can be loaded either at the factory-end or at the installation site through configuration file but cannot be downloaded into the meter over Modbus protocol. Snapshot of each energy type will have a separate billing register. Billing dates are not configurable from the meter's Setup Mode (push buttons).

Configuration of billing dates using ConfigView

In ConfigView window, select the meter name and then in the **Configuration** sub-folder click **Billing Dates**.

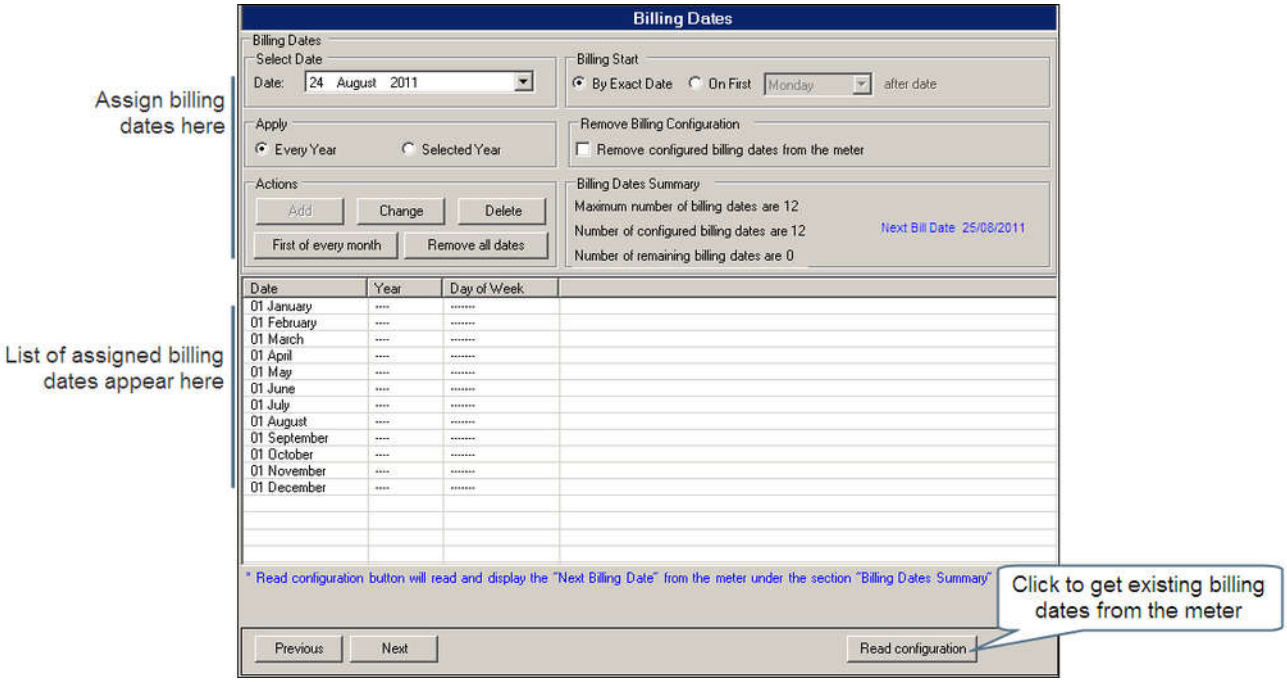


Figure 9: Bill Dates Configuration with ConfigView

4.3.6 Daylight Saving Time (DST) Definition

Internal clock in Elite 440 meter variants are configured to display standard base time (GMT). These meters have DST feature that can be used to move the meter clock forward or backward by half-an hour or more to adjust the meter time where applicable. The date and time of change along with the offset time can be defined using ConfigView. You can set a maximum of 30 DSTs in the meter, 15 forward and 15 backward out of which only the 1st two can be sent to the meter over Modbus protocol. DSTs are not configurable from the meter's Setup Mode (push buttons) but are configurable from ConfigView.

Configuration of DST definitions using ConfigView

In ConfigView window, select the meter name and then in the **Configuration** sub-folder click **DST Definitions**.

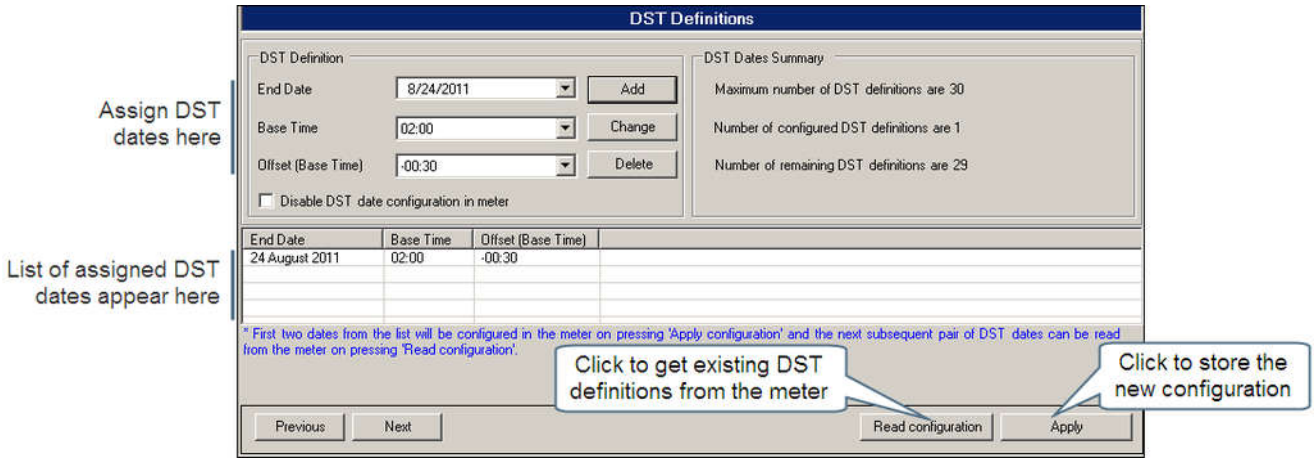


Figure 10: DST Configuration with ConfigView

4.3.7 Maxima and Minima

Elite 440 meter variants measure the following instantaneous parameters every second and record the maximum and minimum value for each.

- Phase-wise voltage
- Phase-wise current
- Phase-wise absolute active power (kW)
- Phase-wise absolute reactive power (kVAr)
- Phase-wise absolute apparent power (kVA)
- Frequency
- Minimum power factor (Lead and Lag)

All the above recorded values are configured to display on the meter LCD. The meter resets these recorded values daily.

4.3.8 Metrological LED

Elite 440 variants have got one Metrological LED that can be set to flash at a rate proportion to the rate of consumption of the assigned energy. The energy can be assigned using ConfigView Suite or from the meter's Setup Mode (Push buttons). You can assign a single energy by using the either method. The number of flashes over a period corresponds to the amount of energy registered by the meter.

Configuration of Metrological LED using ConfigView

In ConfigView window, select the meter name and then in the **Configuration** sub-folder click **Metrological LED**.

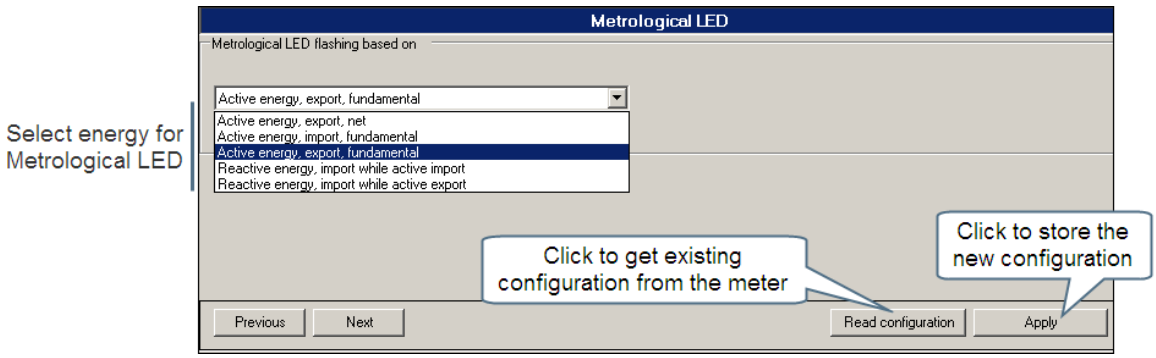
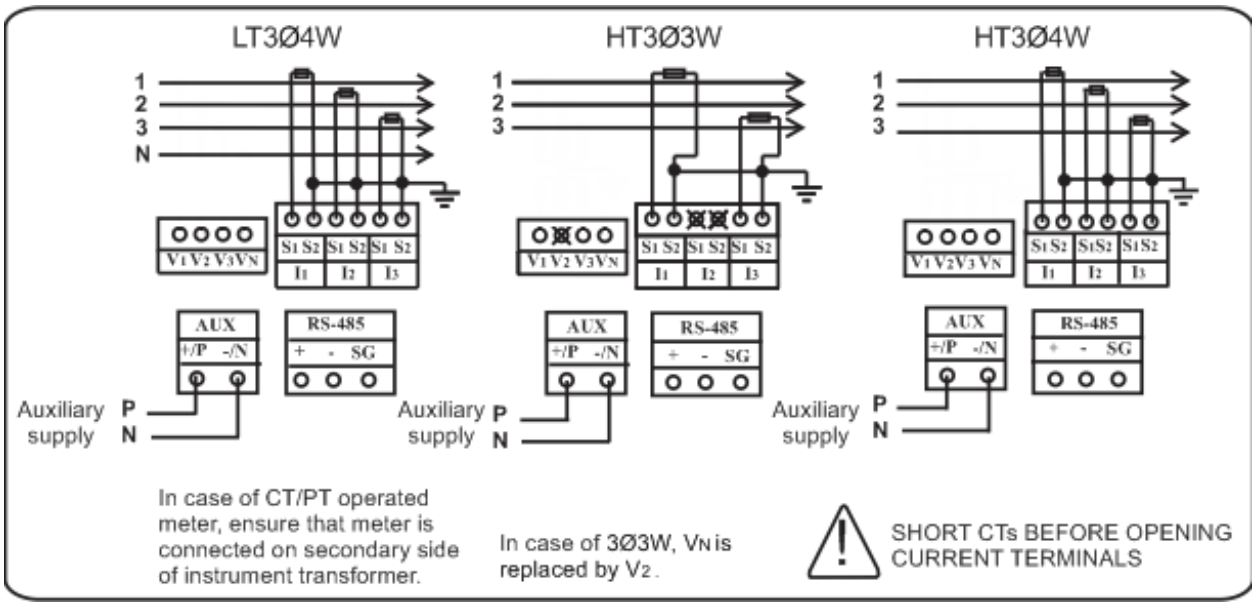


Figure 11: Metrological LED Configuration with ConfigView

Note: Energy must be defined before configuring Maximum Demand, Energy Snapshots, Load Survey and Metrological-LED.

4.3.9 Ammeter Functionality

Elite 440 works as an ammeter when no line voltage is applied. In this case, meter measures only line current and value of other parameters will be shown as zero.



4.4 Optional Plug-in Modules

4.4.1 Input-Output Modules

Elite 440 meter variants have an Input-Output Module socket (which is the leftmost socket located below the voltage terminals) at the rear to which you can attach I/O Modules. Currently the following two I/O Modules are available for selected variants (Elite 440-443 to Elite 440-448) of which any one can be used at a time depending on the requirement:

- Two digital pulse inputs and two digital pulse outputs
- Four 4-20 mA analogue outputs

Any authorised personnel can remove or replace these Modules at the installation site. Replacing a Module should be done only after disconnecting the auxiliary power supply. After attaching the Module when the power supply is switched on, the meter will automatically detect the attached Module. A replaced Module should be configured which can be done using ConfigView or from the meter's Setup Mode. The Setup Mode may not support configuration of all the parameters of some of the Modules in which case these can be done using ConfigView.

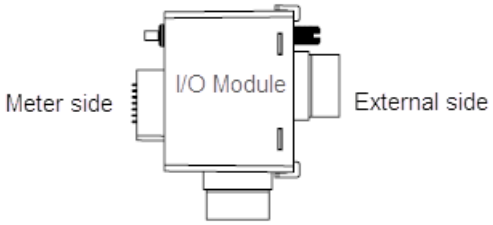


Figure 12: I/O Module

1. Two digital Pulse Inputs and Two digital Pulse Outputs

Pulse inputs supports voltage range between 8-40 V DC. Minimum pulse input duration is 5 ms for I/P 1 and 40 ms for I/P 2.

Pulse outputs are normally open type, have voltage rating of 230 V AC or 48 V DC and current rating of 100 mA. Pulse output width is 80 ms or 240 ms.

Configuration of 2 Pulse Inputs and 2 Pulse Outputs Module using ConfigView

In ConfigView window, select the meter name and then in the **Configuration** sub-folder click **Modules**.

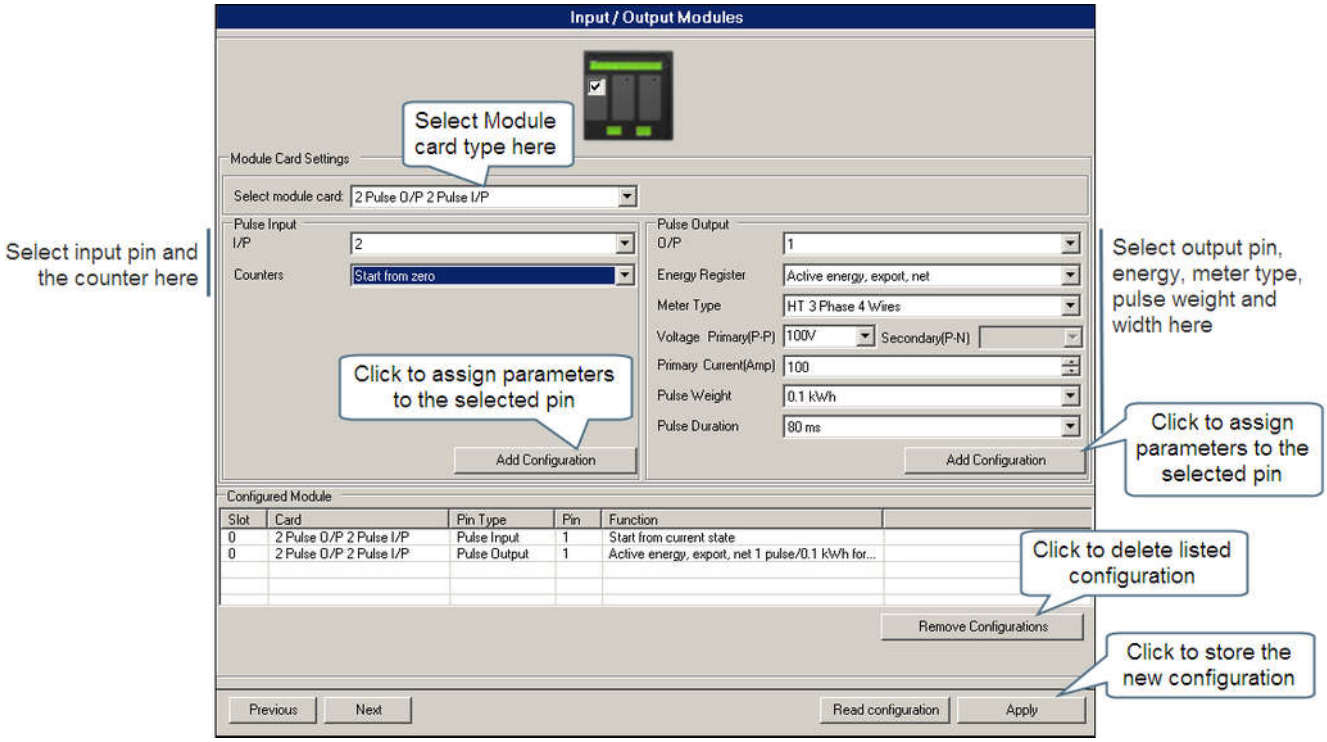


Figure 13: 2 Pulse Input and 2 Pulse Output Module Configuration with ConfigView

Note:

- Energy must be defined before configuring pulse outputs.
- When a module is replaced in a meter variant, it may be necessary to reconfigure certain parameters which can be done from the meter's Setup Mode (push buttons) by an authorised user.

2. Four 4-20 mA Analogue Outputs

This module is used as transducer where voltage, current and other instantaneous electrical parameters will be converted to industry standard of 4-20 mA. The module has 4 ports and a connector for external power supply that supports voltage rating of 20-40 V DC @ 100 mA. Maximum loop impedance is 750 ohms. The accuracy of the analogue output module is within ±1.0% of the full scale range specified for class 0.2s meters and within ±1.5% of the full scale range specified for class 1 and 0.5s meters.

The outputs are configurable using the ConfigView configuration tool and also from the meter's Setup Mode. However, the percentage limits are configurable only using ConfigView. The following table elaborates the various parameters along with the supported range for each output:

Instantaneous Parameters	Supported Range

Phase-wise Voltage	70 to 130% of $V_{nominal}$
Phase-wise Line Current	0 to 200% of I_{basic}
Powers (active, reactive and apparent)	0 to 250% of $P_{nominal}$ (where, $P_{nominal}$ = sqrt(3) x $V_{nominal}$ x I_{basic} $V_{nominal}$ = Primary Line Voltage I_{basic} = Primary Line Current (CT primary current))
Frequency	90 to 110% of 50 Hz / 60 Hz
Power Factor	0.0 Lag - Unity - 0.0 Lead
Average Voltage	70 to 130% of $V_{nominal}$
Average Line Current	0 to 200% of I_{basic}

Table 4: Range for Output Parameters

If the output parameter is configured using meter's Setup Mode (push button) then the percentage limits will be set to default values. The following table elaborates the various parameters along with the default upper and lower limits for each output:

Instantaneous Parameters	4 mA Output	20 mA Output
Phase-wise Voltage	90% of $V_{nominal}$	110% of $V_{nominal}$
Phase-wise Line Current	50% of I_{basic}	100% of I_{basic}
Powers (active, reactive and apparent)	50% of $P_{nominal}$ (where, $P_{nominal}$ = sqrt(3) x $V_{nominal}$ x I_{basic} $V_{nominal}$ = Primary Line Voltage I_{basic} = Primary Line Current (CT primary current))	110% of $P_{nominal}$
Frequency	90% of 50 Hz / 60 Hz	110% of 50 Hz / 60 Hz
Power Factor	0.5 Lag	0.5 Lead
Average Voltage	90% of $V_{nominal}$	110% of $V_{nominal}$
Average Line Current	50% of I_{basic}	100% of I_{basic}

Table 5: Default Upper and Lower Limits for Output Parameters

Configuration of Four Analogue Outputs Module using ConfigView

In ConfigView window, select the meter name and then in the **Configuration** sub-folder click **Modules**.

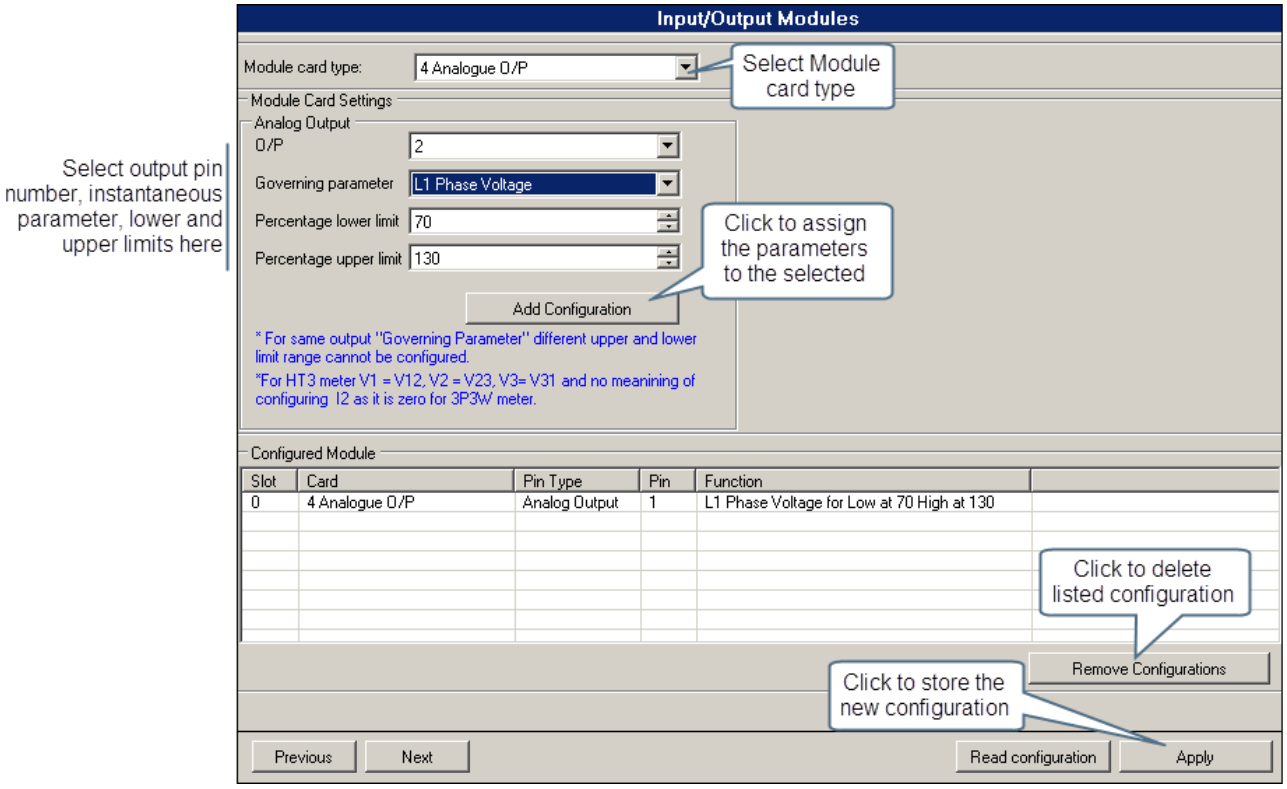


Figure 14: Analogue Output Module Configuration with ConfigView

Note: When a module is replaced in a meter variant, it may be necessary to reconfigure certain parameters which can be done from the meter's Setup Mode (push buttons) by an authorised user.

4.4.2 Ethernet Module

Elite 440 meter variants have an Ethernet Module socket (which is the rightmost socket located below the current terminals) at the rear to which you can attach Ethernet Module. The following two Ethernet Module variants are available of which any one can be used for TCP/IP communication at a time depending on the requirement:

- Ethernet: This is used to communicate with single meter. The Ethernet module is attached to each meter.
- Ethernet Gateway: This is used to communicate with multiple meters. Multiple meters are connected in a RS485 network with any one meter having Ethernet Gateway module attached to it. The Ethernet Gateway module sends/receives data to/from all the meters connected in a RS485 network and transmits over TCP/IP network.

This module is field replaceable only after disconnecting the power supply to the meter. A replaced or newly connected module should be configured using ConfigView Suite or from the meter's Setup Mode (push buttons). With the help of ConfigView Suite, *IP Address*, *Subnet Mask* and *Default Gateway* can be configured by configuring the IP address of PC such that it belongs to the same class as that of the meter's IP address (refer ConfigView help for details).

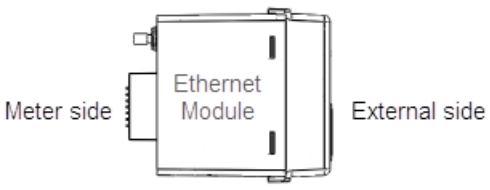


Figure 15: Ethernet Module

Note:

- The Ethernet module can be used with the Input-Output module.
- At a time, only one client (using serial or TCP/IP communication) can perform reading operation for historical values (of parameters such as energy, demand) or load profile values.

5 Meter Operation

Operating the meter is necessary for the following purpose:

a. Changing the meter display mode and navigating through the display pages in Manual and Favourite display mode.

b. Updating configuration or changing password from the Setup Mode (push buttons).

c. Resetting Maximum Demand.

d. Activating the Manual or Favourite display scroll-lock feature.

5.1 Changing the Meter Display Mode

By default, the meter display is configured to cycle through a sequence of preset Auto-cycle display pages at predefined intervals (5 seconds to 2 minutes as configured in the meter using ConfigView). This default mode can be switched to the Manual display mode in which you can navigate through the pages by using the ‘up or ‘down’ push buttons.

The Manual display mode is the alternative active mode which you can replace with Favourite display mode by selecting ‘Fav On’ from the Setup Mode.

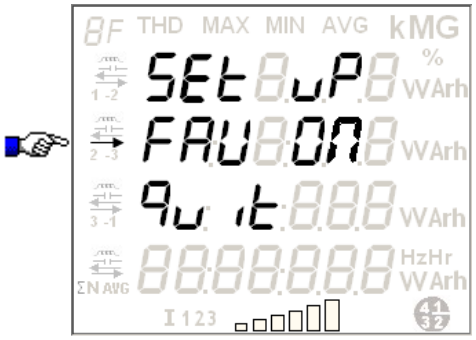
5.2 Favourite Display Mode

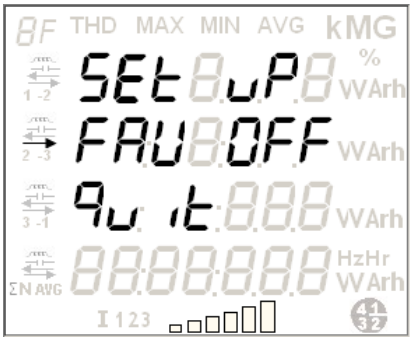
Favourite mode is a special display mode in which the desired display pages are selected and grouped together for quick viewing. In this mode you can select a maximum of 20 display pages and configure their display sequence using ConfigView, which can be sent to the meter either through configuration file or over Modbus protocol. The favourite mode display sequence will be maintained only if it downloaded into the meter through configuration file. Displays in Favourite mode can be customised in ConfigView but the same cannot be done using the meter push buttons. The meter push buttons can be used only to switch between the Favourite display ‘On’ or ‘Off’ mode. When Favourite display is turned off, the Manual display becomes the alternative active display mode. As in Manual mode you can also navigate through the various Favourite mode displays by using the ‘up or ‘down’ push buttons.

Display from the Auto-cycle mode can be switched to the Manual or Favourite (whichever is active) mode by pressing either the ‘up or ‘down’ push buttons twice.

5.2.1 Setting Favourite Display On or Off

From the default display mode press  to access the Setup Mode, then use  button to move to ‘Fav On’ or ‘Fav Off’. When selection bar ‘→’ is on ‘Fav On’ or ‘Fav Off’ menu as shown in the figure press  to select it. This will trigger the favourite display mode to either On or Off depending upon the current display in operation. If favourite display is Off then select ‘Fav On’ to set it On and if it is On then select ‘Fav Off’ to set it Off, this is a toggle option.





5.3 Using the Setup Mode

The Setup Mode can be used to configure the following parameters with the help of push buttons:

- MD Reset
- Setting the meter type as 3-phase 3-wire or 3-phase 4-wire
- CT-VT commissioning
- Input-Output Modules
- MODBUS ID and MODBUS baud rate
- Maximum Demand
- Load Profile
- Number of Poles on motor for RPM measurement
- Metrological LED
- Ethernet
- Changing the password to access the Setup mode
- Changing the unit of energy and power

All the above configurations are also possible using ConfigView Suite. The Setup Mode is password protected which can be accessed only by users authorized to change the above configurations.

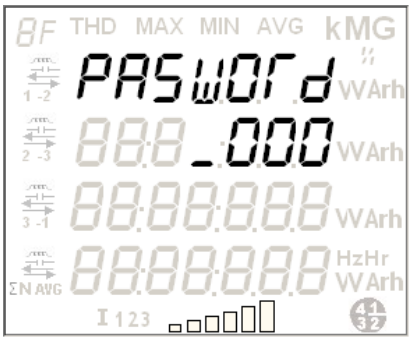
5.3.1 Password Entry

The following steps will guide you to access the Setup Menu:

1. From the default display mode, simply press button once to access the following Setup Mode page.



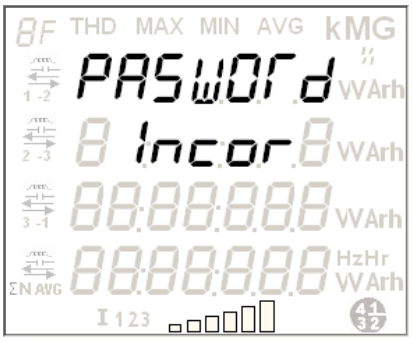
2. In the above display page, when the selection bar '→' is on the 'Set Up' option, press button to confirm the selection of Setup Menu. This will give access to the following password entry prompt screen:



3. At the password prompt enter the 4-digit password (default password is '1234') using ▼ and ▲ buttons. After completing the entry, press ● button to confirm. Correct password gives access to the 1st page of configuration mode, see figure (i). An incorrect password will display 'Incorrect' message as shown in figure (ii).



(i) Display after correct password entry



(ii) Display after incorrect password entry

In case you have entered incorrect password, the display will automatically return to the Setup Mode page (as shown in step 1) in 5 seconds or alternatively, press ● button to return to Setup Mode immediately.

Note: After seven unsuccessful attempts, you won't be able to try again until the next day. If you forget the password, contact concerned sales person or technical team for resetting the password.

5.3.2 Page Navigation within the Setup Mode

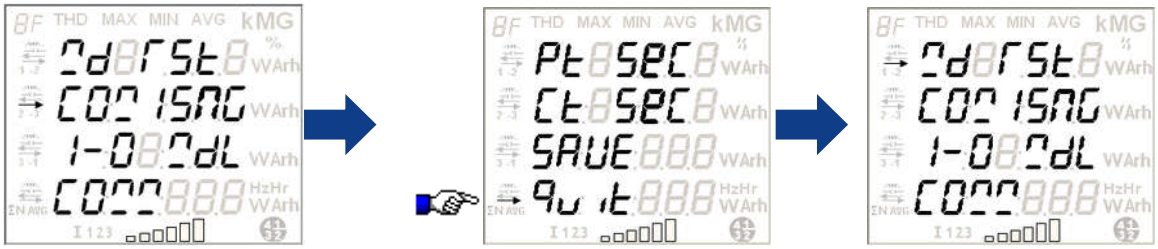
The Setup Mode has the following sequence of configurable menus through which you can navigate using the push buttons:

Glossary - Setup Mode Configuration Headers	
Cd rSt	MD Reset
COMISNG	Commissioning
I-O CdL	I/O Module
COMM	Communication
dEMAnd	Demand
ProF iLE	Load Profile
POLES	Poles
C - LEd	Metrological LED
EthrNEt	Ethernet
ChnGPAS	Change Password
Qu it	Quit Setup Mode Menu

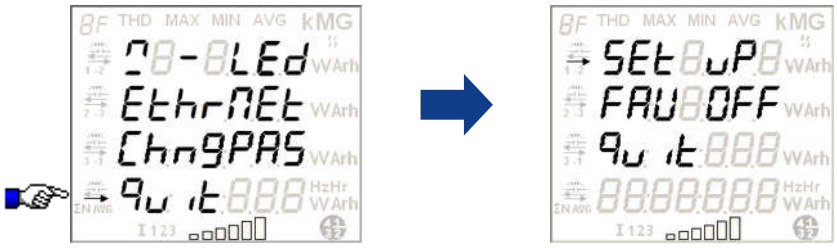
Table 6: Meter Setup Mode Menu

Use ▼ button for navigation through the above display sequence and ● button to select a configuration menu, a selection bar '⟶' will appear on the selected configuration menu.

When you select ‘Quit’ from any of the configuration page, the display returns to its immediate parent page. For example, when you select ‘Quit’ from the ‘Commissioning’ configuration page, the display returns to the 1st page of Setup Menu as shown below:



When you select ‘Quit’ from the Setup Menu, the display returns to the main Setup Mode as shown below:



5.4 Configurations from the Meter’s Setup Menu

Note: No footer displays (shown in any of the displays) will appear during the configuration process.

To configure available parameters from the Setup Menu, use the three push buttons as specified below:

- To move the selection arrow to next line or move the cursor to the right while entering a digit or value.
- To move the selection bar to previous line or to enter a digit or value at the cursor position.
- To select the option at the cursor position or confirm and save the entered value.

No push button activity within 120 seconds (2 minutes) during the configuration process will exit the Setup Mode to resume the default auto-cycle display mode.

During configuration from Setup menu the following confirmation messages will appear for 5 seconds before returning to their parent menu:

Save done

No action

No change

Favourite On success

Favourite Off success

MD Reset done

5.4.1 MD Reset

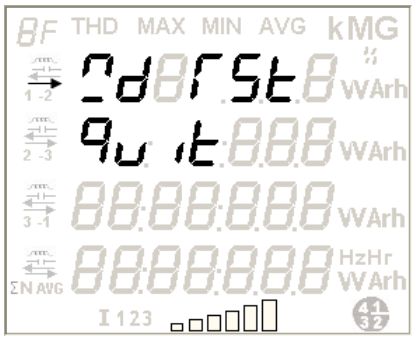
Maximum demand resets automatically on changing certain configurations or on preset billing dates. It can also be reset manually by authorised users either from the Meter Setup Mode (push buttons) or through Modbus commands such as raising a billing request. MD resets automatically due to one of the following reasons:

- on predefined billing dates
- on changing certain configurations in the meter such as energy or MD registers, DIP, demand window type, commissioning.
- on tariff download
- on meter type change

The following changes takes place with each MD reset:

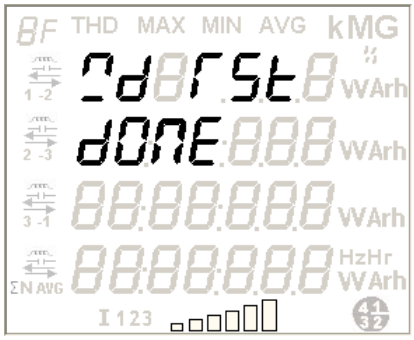
- The universal MD register that records each day's maximum demand, is added to cumulative MD register
- Historical data is generated – current values of each assigned energy registers and MD registers are copied in the meter's historical register and thereafter the current value of MD register is added to the cumulative MD register before the MD value resets. The meter maintains a record of 6 recent historical data for each energy register and supports up to 12 billing dates.

Manual resetting of MD from the Meter's Setup Mode



This is the 1st option on the 1st page of Setup Menu. To select it, press . When the selection bar is on 'MD Reset', press to reset the MD.

To return back to the first page of Setup Menu, move the selection bar on 'Quit' and press .



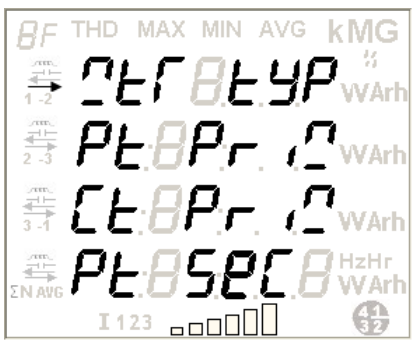
The 'MD Reset done' message confirms that all maximum demand register values are successfully reset to zero. Press or wait for 5 seconds to return to the previous display.

5.4.2 Meter Type and CT-VT Commissioning

This is the 2nd option on the 1st page of Setup Menu. The commissioning option can be used to configure the following parameter values:

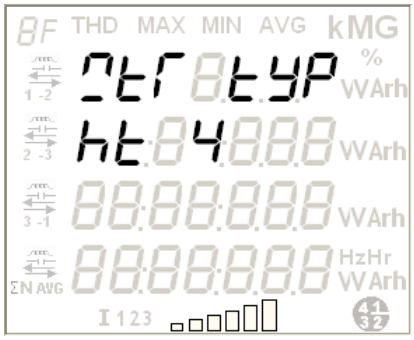
a. Meter type selection - HV3, HV4, LV4
b. Primary Voltage and Current rating
c. Secondary Voltage and Current rating

To select this option, move selection bar on 'Commissioning' option and then press . The following display will appear:

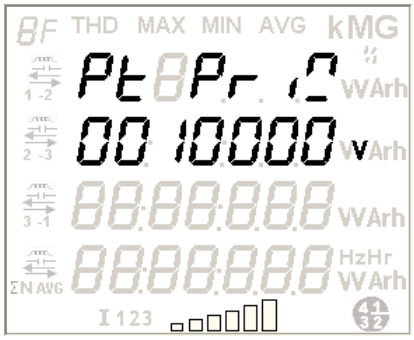


Meter Type Configuration – HV3, HV4, LV4

This is the 1st option on 'Commissioning' page. To select it, press . The following display page will appear:



With the help of left/right button select the meter type and then press to confirm the selection.



Primary Voltage Configuration

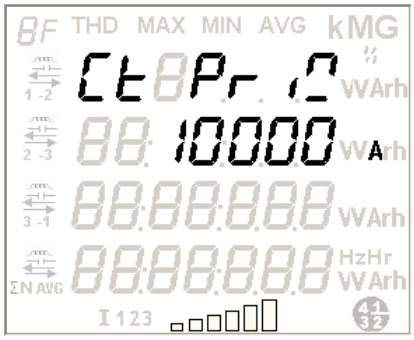
This is the 2nd option on 'Commissioning' page. To select it, move the selection bar on 'Pt Primary' option and then press . The display page shown on the left appears. Enter the desired value from the following permissible range and then press to confirm and save the selection.

Applicable range : 100 V to 1000 kV (not applicable for LV meters)

Note:

From 100 V to 99999 V in steps of 1 volt

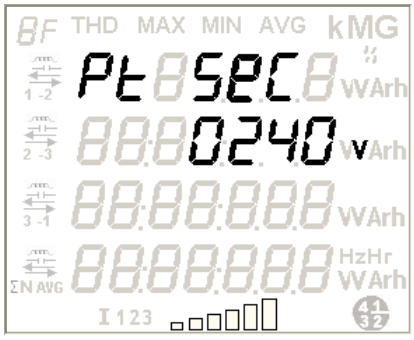
From 100 kV to 1000 kV in steps of 10 volt



Primary Current Configuration

This is the 3rd option on 'Commissioning' page. To select it, move the selection bar on 'Ct Primary' option and then press . The display page shown on the left appears. Enter the desired value from the following permissible range and then press to confirm and save the selection.

Applicable range : 1 A to 15000 A

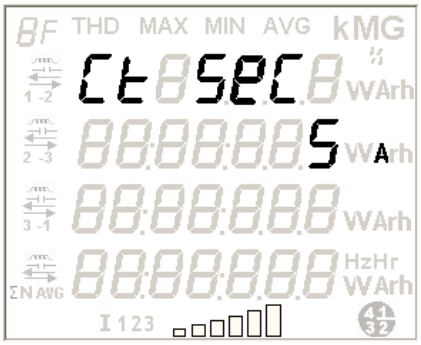


Secondary Voltage Configuration

This is the 4th option on 'Commissioning' page. To select it, move the selection bar on 'Pt Secondary' option and then press . The display page shown on the left appears. Enter the desired value from the following permissible range and then press to confirm and save the selection.

Applicable range for HV meters: 100 V to 130 V (Phase to Phase)

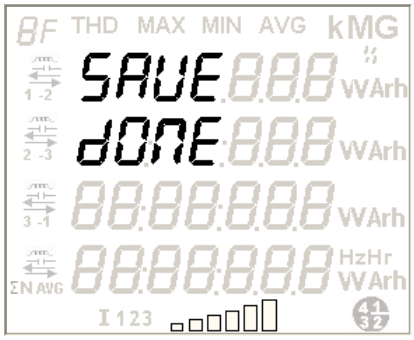
Applicable range for LV meters: 210 V to 250 V (Phase to Neutral)



Secondary Current Configuration

This is the 5th option on 'Commissioning' page. To select it, move the selection bar on 'Ct Secondary' option and then press . The display page shown on the left appears. Enter the desired value from the following permissible range and then press to confirm and save the selection.

Applicable range: 1 A to 5 A in steps of 1



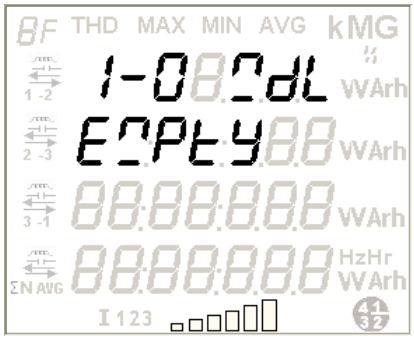
Once all necessary configurations are updated, select the ‘Save’ option and press . This activates the new configuration in the meter. The ‘Save done’ message indicates that the activation is successful. However, ‘No Change’ message will appear if the changes are not implemented in the meter. To return to the ‘Commissioning’ page, press again or wait for 5 seconds.



To exit the Commissioning page and return to the Setup menu, move the selection bar over ‘Quit’ as shown on the left and then press button.

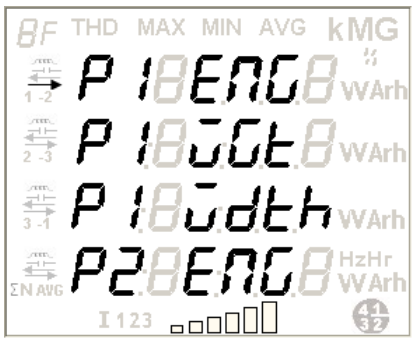
5.4.3 Input-Output Module configuration

This is the 3rd option on the 1st page of Setup Menu. The ‘I-O Module’ option can be used to configure parameter values of the I/O Module attached to the meter. To select it, move selection bar to ‘I-O Module’ option and then press . The following display will appear:



No I/O Module connected

If no I/O module is attached to I/O module socket of the meter then the display shown on the left will appear which indicates ‘Input-Output Module’ socket is empty.



2 Pulse Output and 2 Pulse Input Module Configuration

The page shown on the left displays the configurable parameters for two digital pulse outputs and two digital pulse inputs module. Move the selection bar to the parameter to be configured and press button. The display headers implies the following:

“P1 Energy”: Assign ‘Energy’ for pulse output 1

“P1 Weight”: Assign ‘Weight’ for pulse output 1

“P1 Width”: Assign ‘Pulse Width’ for pulse output 1

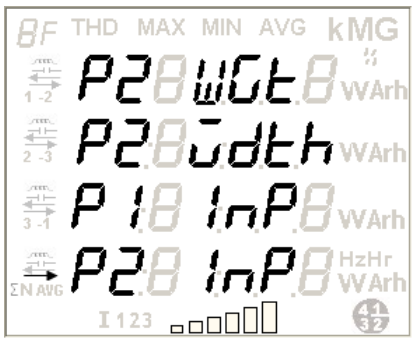
“P2 Energy”: Assign ‘Energy’ for pulse output 2

“P2 Weight”: Assign ‘Weight’ for pulse output 2

“P2 Width”: Assign ‘Pulse Width’ for pulse output 2

“P1 Input”: Assign ‘Pulse Input 1’ start type

“P2 Input”: Assign ‘Pulse Input 2’ start type



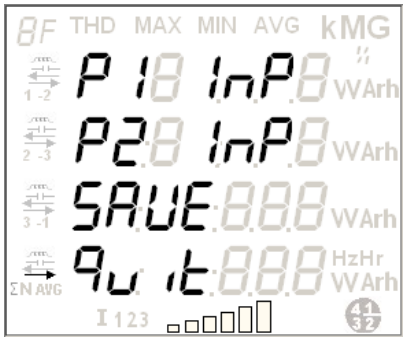
Energy for pulse outputs P1 and P2 can be configured from the range of energies supported by the meter; See Glossary of Energy Types for display representation of all the energy types

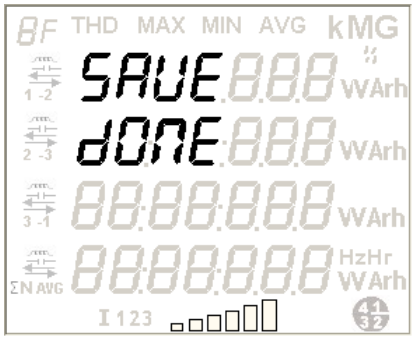
Configuration range for pulse outputs P1 and P2 Weight depends on the CT-PT ratio commissioned in the meter;

Configuration range for pulse outputs P1 and P2 Width is 80 ms or 240 ms

Pulse inputs P1 and P2 start type can be configured as either ‘Start from zero’ or ‘Start from current state’.

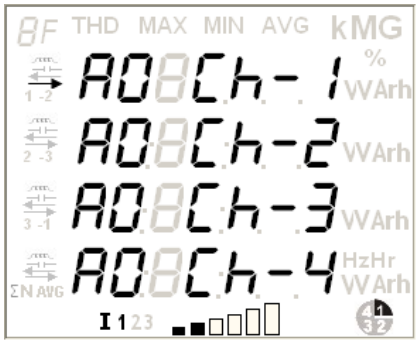
To exit the ‘I-O Module’ page and return to the Setup menu, move the selection bar over the ‘Quit’ option as shown in the figure on the left and then press button.





At the end of configuration updates, select the ‘Save’ option to activate the above new configurations in the meter.

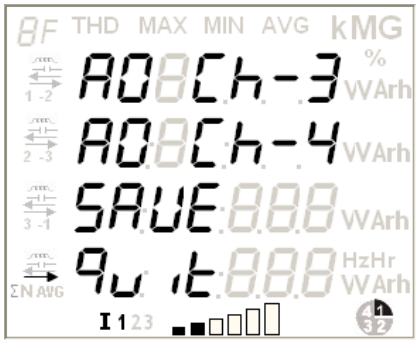
To return to the ‘I-O Module’ page, press or wait for 5 seconds.



Four 4-20 mA Analogue Output Module

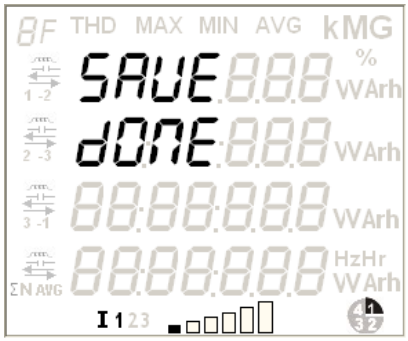
The page shown on the left displays the four configurable Analogue Output channels. Each channel can be assigned with any of the following parameters:

- Phase-wise voltage
- Phase-wise Line current
- Powers (active, reactive and apparent)
- Frequency
- Power Factor
- Average Voltage
- Average Line Current



To assign a parameter to a channel, move the selection bar on the channel and then press button.

To exit the ‘I-O Module’ page and return to the Setup menu, move the selection bar over the ‘Quit’ option as shown in the figure on the left and then press button.

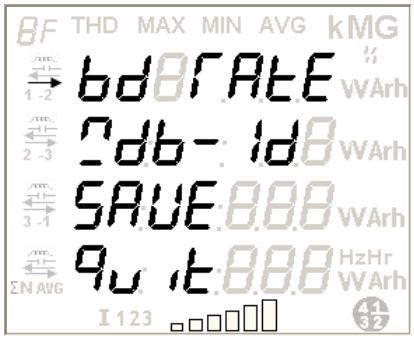


At the end of configuration updates, select the ‘Save’ option to activate the above new configurations in the meter.

To return to the ‘I-O Module’ page, press ● or wait for 5 seconds.

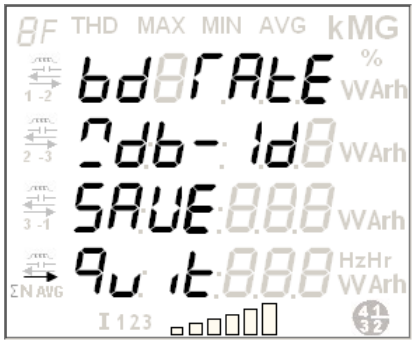
5.4.4 MODBUS Communication Configuration

This is the 4th option on the 1st page of Setup Menu. The ‘Communication’ option can be used to configure the baud rate and the MODBUS identification number. To select it, move selection bar to ‘COMM’ option and then press ●. The page shown in the following figure will appear:

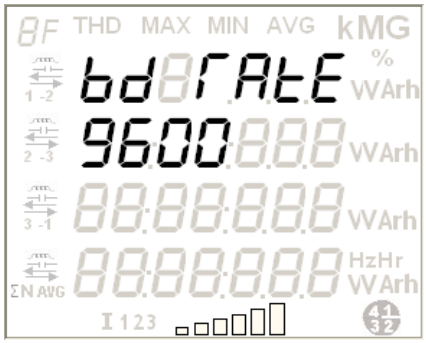


Baud Rate

This is the 1st option on ‘Communication’ page. When the selection arrow is on ‘BD RATE’, press ● to access the next page for entering the baud rate.



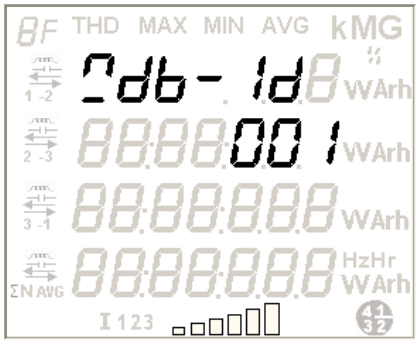
To exit the ‘COMM’ page and return to the Setup menu, move the selection bar over the ‘Quit’ option and then press ● button.



With the help of left/right button select the baud rate from the below specified range and then press ● to confirm the selection.

Configurable baud rates:

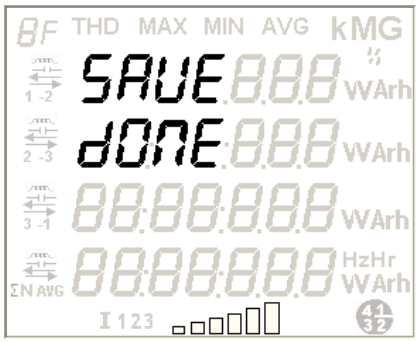
1200, 2400, 4800, 9600, 19200, 38400 bps



MODBUS ID

This is the 2nd option on 'Communication' page. To select it, move the selection arrow on 'MODBUS ID' option and then press . The display page shown on the left appears. Enter the desired ID from the following permissible range and then press to confirm and save the selection.

Configurable MODBUS ID range is 1 to 247.



At the end of configuration updates, select the 'Save' option to activate the above new configurations in the meter.

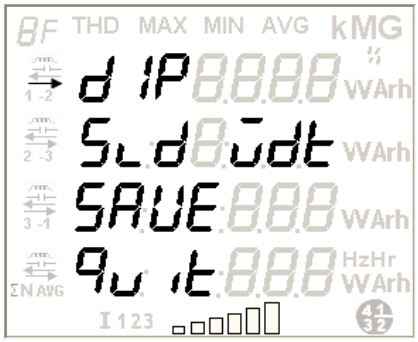
To return to the previous page, press or wait for 5 seconds.

5.4.5 Maximum Demand Configuration

This can be configured using the 'demand' option which is the 1st option on the 2nd page of Setup Menu. The 'demand' option can be used to configure the following parameters:

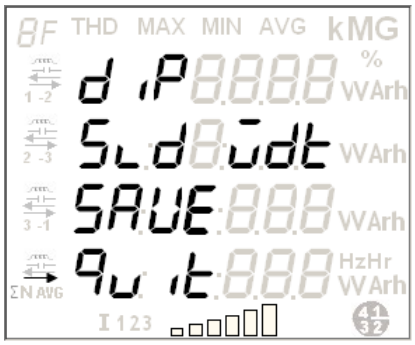
a. Demand Integration Period
b. Demand window type
c. Demand width

To select the 'demand' option, move selection bar to 'demand' option and then press . The page shown in the following figure will appear:

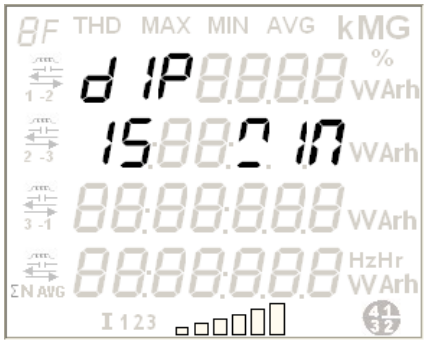


DIP (Demand Integration Period)

This is the 1st option on 'demand' page. When the selection arrow is on 'DIP', press to access the next page for entering the DIP value.

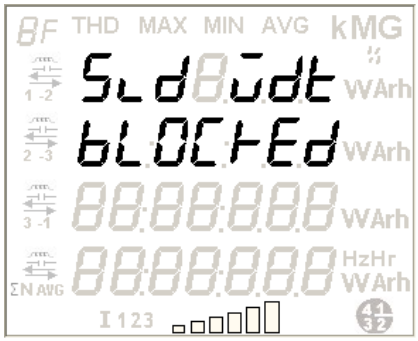


To exit the 'demand' page and return to the Setup menu, move the selection arrow over the 'Quit' option and then press button.



With the help of left/right button select a demand integration period from the below specified range and then press ● to confirm the selection.

Configurable DIP range: 15, 30, 60 minutes



Demand Window Type – Fixed or Sliding

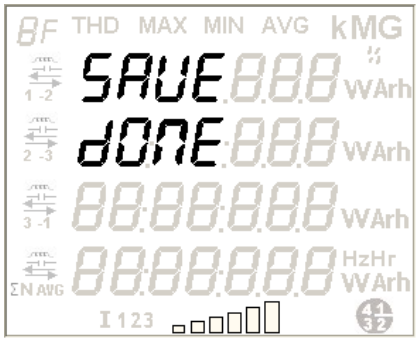
This is the 2nd option on 'demand' page. To select it, move the selection arrow on 'Sliding Width' option and then press ●. The display page shown on the left appears with two window type options – 'Sliding' and 'blocked'.

For Sliding window type, enter the Sliding width from the following permissible range and then press ● to confirm and save the selection.

Sliding width for DIP value 15 is 5

Sliding width range for DIP value 30 = 05, 10, 15

Sliding width range for DIP value 60 = 05, 10, 15, 20, 30



At the end of configuration updates, select the 'Save' option to activate the above new configurations in the meter.

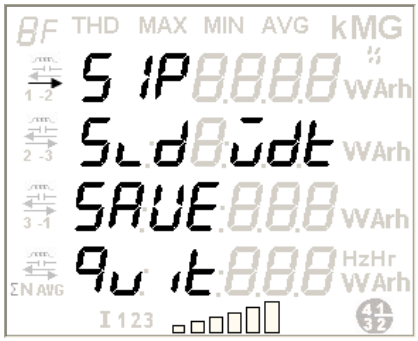
To return to the previous page, press ● or wait for 5 seconds.

5.4.6 Load Profile Configuration

This can be configured using the 'Profile' option which is the 2nd option on the 2nd page of Setup Menu. The 'Profile' option can be used to configure the following parameters:

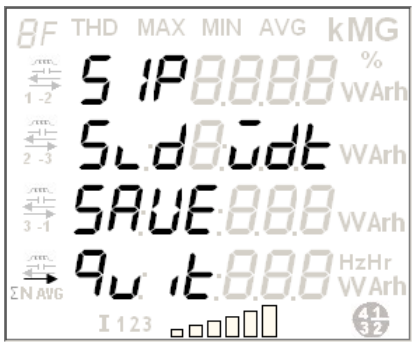
a. Survey Integration Period
b. Survey window type
c. Survey width

To select the 'Profile' option, move selection bar to 'Profile' option and then press ●. The page shown in the following figure will appear:

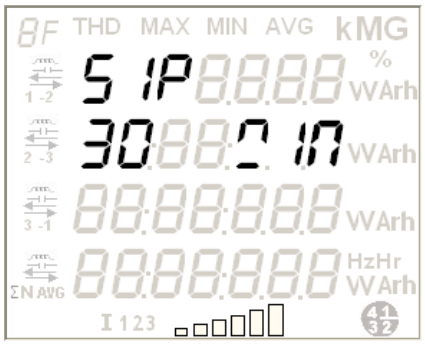


SIP (Survey Integration Period)

This is the 1st option on 'Profile' page. When the selection arrow is on 'SIP', press ● to access the next page for entering SIP value.

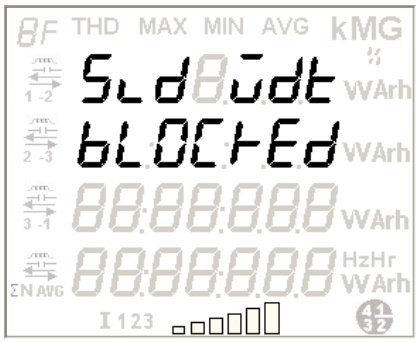


To exit the ‘Profile’ page and return to the Setup menu, move the selection arrow over the ‘Quit’ option and then press button.



With the help of left/right button select a survey integration period from the below specified range and then press to confirm the selection.

Configurable SIP range: 15, 30, 60 minutes



Survey Window Type – Fixed or Sliding

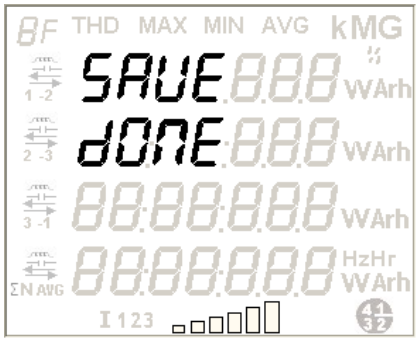
This is the 2nd option on ‘Profile’ page. To select it, move the selection arrow on ‘Sliding Width’ option and then press . The display page shown on the left appears with two window type options – ‘Sliding’ and ‘blocked’.

For Sliding window type, enter the Sliding width from the following permissible range and then press to confirm and save the selection.

Sliding width for DIP value 15 is 5;

Sliding width range for DIP value 30 = 05, 10, 15;

Sliding width range for DIP value 60 = 05, 10, 15, 20, 30.

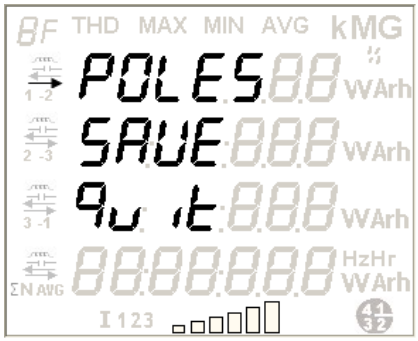


At the end of configuration updates, select the ‘Save’ option to activate the above new configurations in the meter.

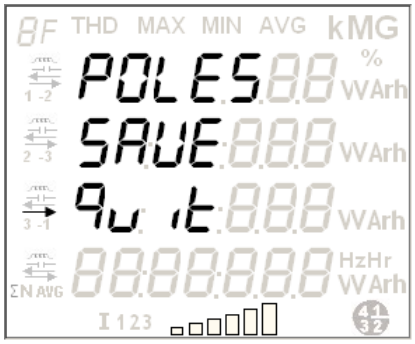
To return to the previous page, press or wait for 5 seconds.

5.4.7 Poles Configuration

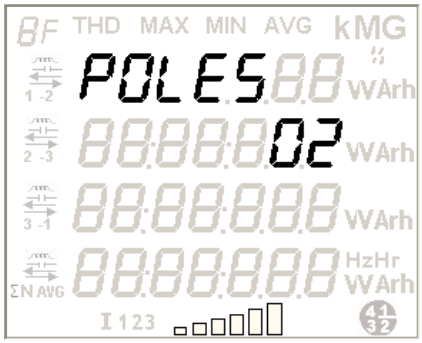
This is the 3rd option on the 2nd page of Setup Menu. The option ‘POLES’ can be used to configure the number of poles for measuring RPM of the motor. This depends on the frequency of the supply. To select it, move selection bar to ‘POLES’ option and then press . The page shown in the following figure will appear:



When the selection arrow is on ‘POLES’, press ● to access the next page for entering the pole number.

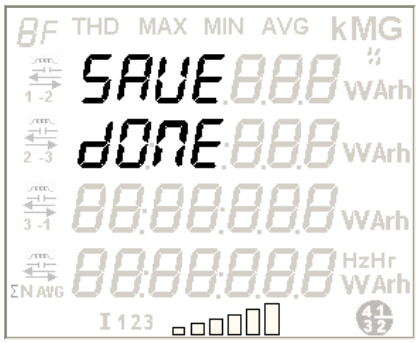


To return back to the first page of Setup Menu, move the selection arrow on ‘Quit’ and then press ●.



With the help of left and right buttons select a number from the following specified range and then press ● to confirm the selection. Use the left button to enter the digit at the cursor position, use the right button to move the cursor to the next position on the right. This number will be used to calculate the RPM of the motor.

Configurable number range: 2 to 48 (in steps of 2)

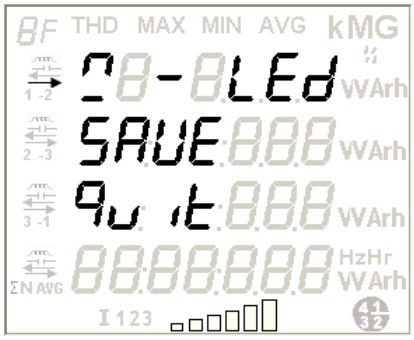


At the end of configuration updates, select the ‘Save’ option to activate the above new configurations in the meter.

To return to the previous page, press ● or wait for 5 seconds.

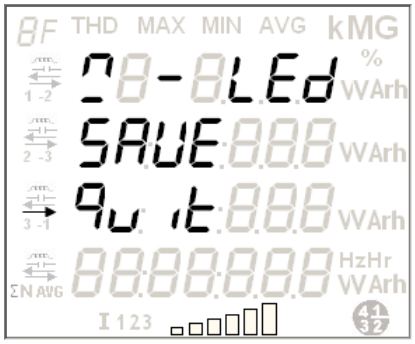
5.4.8 Metrological LED Configuration

This can be configured using the ‘M-LED’ option which is the 4th option on the 2nd page of Setup Menu or the 1st option on the 3rd page of Setup Menu (see page 24). The ‘M-LED’ option is used to assign a single energy for Metrological LED flashing, at a rate proportional to the rate of consumption. The number of flashes over a period corresponds to the amount of energy registered by the meter. To select it move selection bar to ‘M-LED’ option and then press ●. The page shown in the following figure will appear:

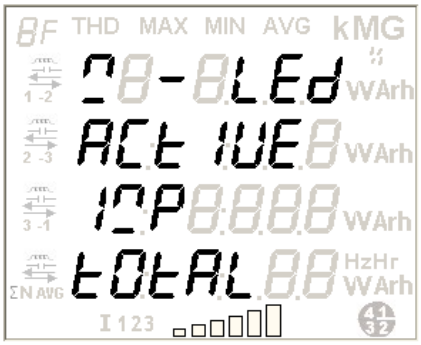


Metrological LED

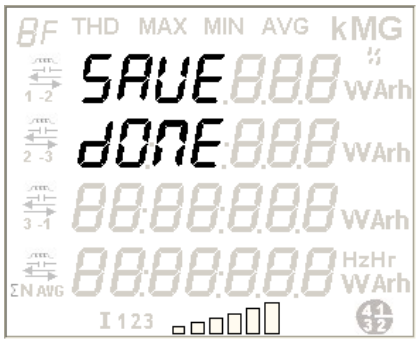
When the selection arrow is on ‘M-LED’, press ● to access the next page for assigning energy.



To return back to the first page of Setup Menu, move the selection arrow on ‘Quit’ and then press ●.



Use the left/right button to scroll through the main energies configured in the meter. Press ● to select the energy. See Glossary of Energy Types for display representation of all the energy types.

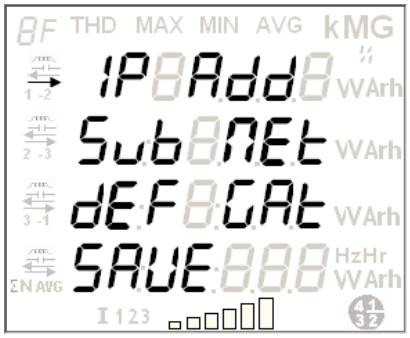


After assigning the energy select the ‘Save’ option to activate new configurations in the meter.

To return to the previous page, press ● or wait for 5 seconds.

5.4.9 Configuring Ethernet Module

This is the 2nd option on the 3rd page of Setup Menu. The ‘Ethernet Module’ option can be used to configure parameter values of the Ethernet Module attached to the meter. To select it, move selection bar to ‘Ethernet Module’ option and then press ●. The following display will appear:



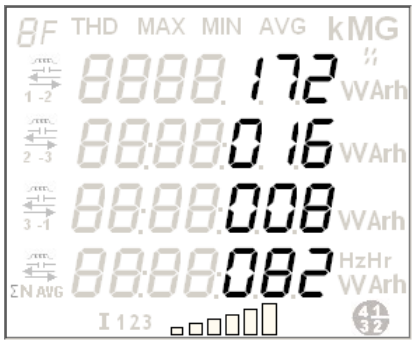
Ethernet Module Configuration

The page shown on the left displays the configurable parameters for Ethernet module. Move the selection bar to the parameter to be configured and press button. The display headers implies the following:

“IP Address”: Assign ‘IP Address’ for Ethernet Module

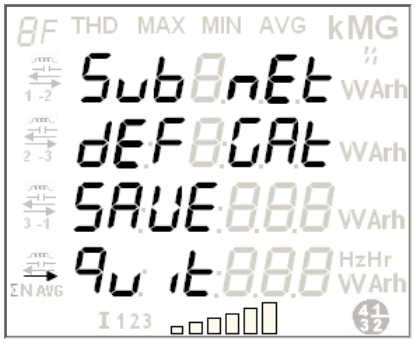
“Subnet Mask”: Assign ‘Subnet Mask’ for Ethernet Module

“Default Gateway”: Assign ‘Default Gateway’ for Ethernet Module

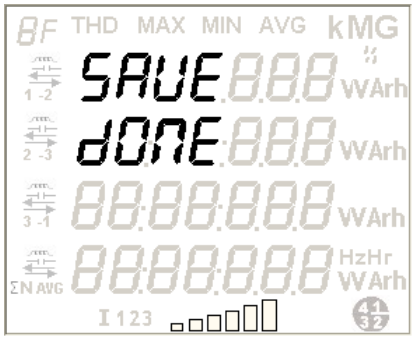


Use the left button to enter a digit at the cursor position, use the right button to move the cursor to the next position on the right. Repeat this until you have entered all the four numbers with each number in a line and then press to save the IP Address.

Similarly, assign the Subnet Mask and Default Gateway.



To exit the ‘Ethernet Module’ page and return to the Setup menu, move the selection bar over the ‘Quit’ option as shown in the figure on the left and then press button.

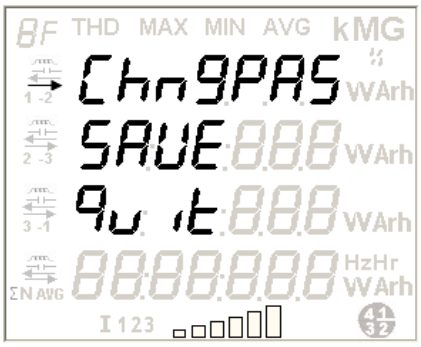


At the end of configuration updates, select the ‘Save’ option to activate the above new configurations in the module attached to the meter which will take around one minute of time.

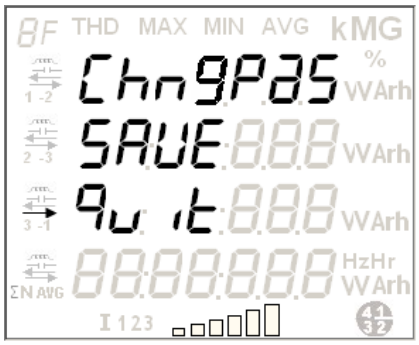
To return to the ‘Ethernet Module’ page, press or wait for 5 seconds.

5.4.10 Changing the Setup Mode Password

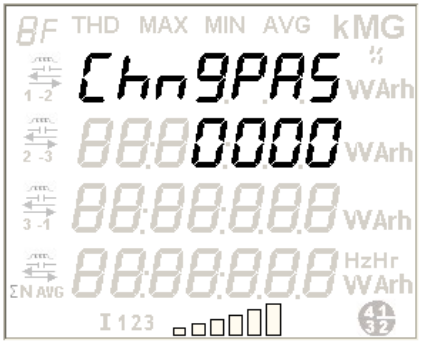
The Setup Mode password is a 4-digit integer ranging from 0000 to 9999. The default factory setting is ‘1234’ that can be reprogrammed from the setup mode using the meter push buttons. The password can be changed using the ‘CHNG PAS’ option which is the 3rd option on the 3rd page of Setup Menu (see page 24). To select it, move selection bar to ‘CHNG PAS’ option and then press . The following display page will appear:



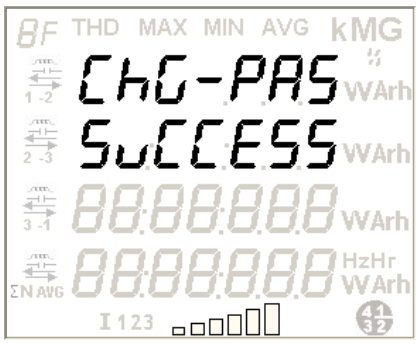
When the selection arrow is on ‘CHNG PAS’, press ● to access the next page for entering a new password.



To return back to the first page of Setup Menu, move the selection arrow on ‘Quit’ and then press ●.



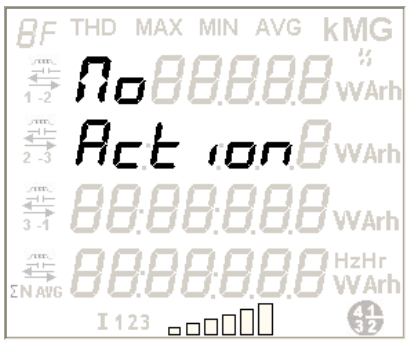
Use the left button to enter a digit at the cursor position, use the right button to move the cursor to the next position on the right. Repeat this until you have entered all the four digits and then press ● to save the new password.



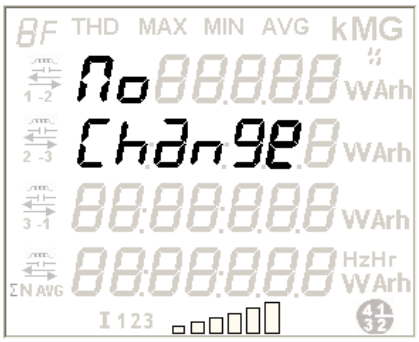
The message ‘CHG-PAS SUCCESS’ will appear if the password change is successful.

To return to the previous page, press ●.

Important: It is a good practice to note down the new password in a safe and secured place to access the set up mode next time as the default password becomes invalid after it has been reprogrammed.



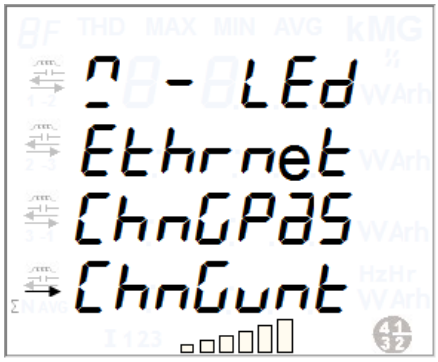
In configuration mode, the ‘No Action’ message on the display indicates that a parameter is not available for configuration.



In configuration mode, the ‘No Change’ message on the display indicates that the new configurations are not activated in the meter yet.

5.4.11 Changing unit for Energy and Power

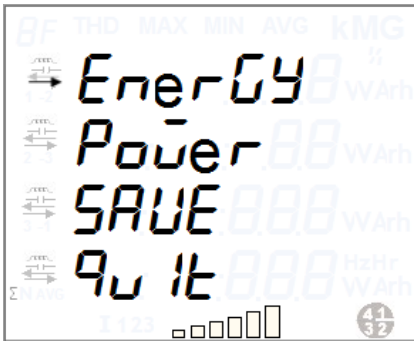
This is the 4th option on the 3rd page of Setup Menu. The ‘Change Unit’ option can be used to configure unit of energy and power. To select it, move selection bar to ‘Change Unit’ option and then press . The following display will appear:



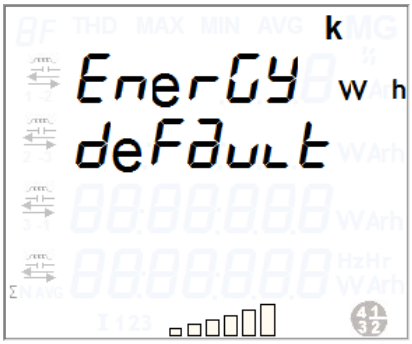
Move selection bar to ‘CHNG unt’, press to access the next page for configuring unit of energy and power.

5.4.11.1 Changing unit for Energy

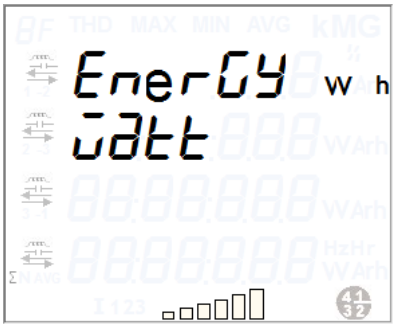
This is the 1st option on the 4th page of Setup Menu. The ‘Energy’ option can be used to configure unit of energy.



When the selection arrow is on ‘Energy’, press to access the next page for changing a unit of energy.



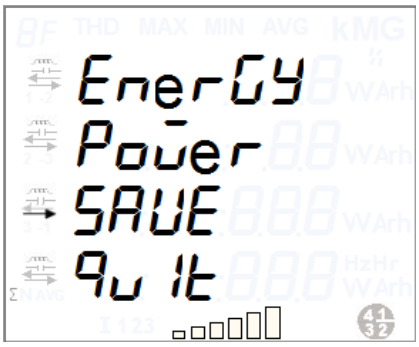
This display shows the factory default unit set for energy. The default unit is set according to CT-PT commissioning.



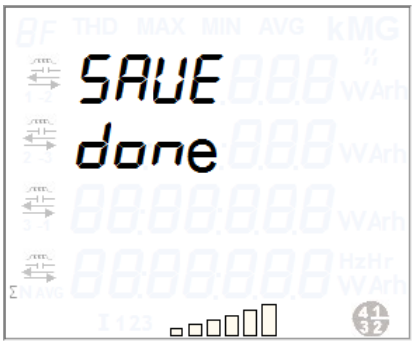
You can set energy unit through Configview or display. To navigate between available options, press up/ down keys. You can set the units to one higher unit or one lower unit. i.e.

If the default unit is ‘kWh’, the user can make it either ‘MWh’ or ‘Wh’, respectively. As MWh is one higher unit to kWh and Wh is one lower unit to kWh. For example, 719kW will be shown as either 719000W or 0.719MW.

Press ● to select desired unit.

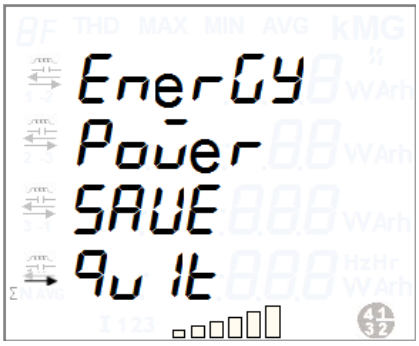


To save the changes, move the selection arrow on ‘SAVE’ and then press ●.



The message ‘SAVE done’ will appear for some seconds if the unit change is successful.

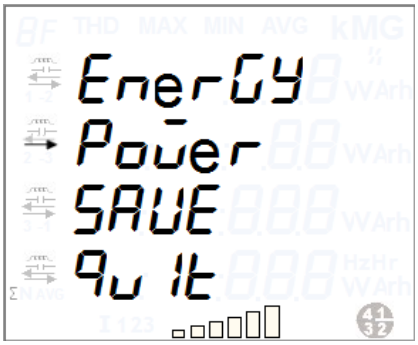
To return to the previous page, press ●.



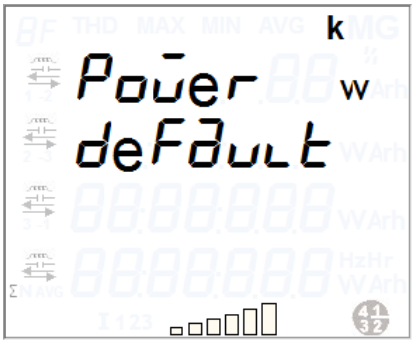
To return back to the first page of Setup Menu, move the selection arrow on ‘Quit’ and then press ●.

5.4.11.2 Changing unit for Power

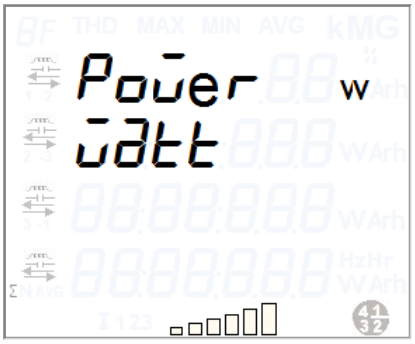
This is the 2nd option on the 4th page of Setup Menu. The ‘Power’ option can be used to configure unit of power.



When the selection arrow is on ‘Power’, press ● to access the next page for changing a unit of power.



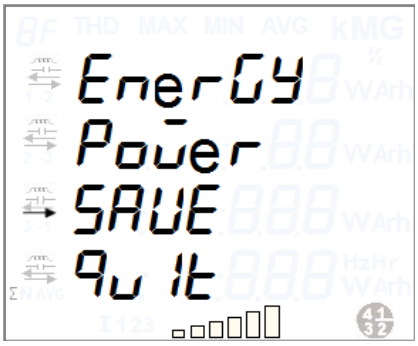
This display shows the factory default unit set for power. The default unit is set according to CT-PT commissioning.



You can set power unit through Configview or display. To navigate between available options, press up/ down keys. You can set the units to one higher unit or one lower unit. i.e.

If the default unit is ‘kW’, the user can make it either ‘MW’ or ‘W’, respectively. As MW is one higher unit to kW and W is one lower unit to kWh. For example, 719kW will be shown as either 719000W or 0.719MW.

Press ● to select desired unit.

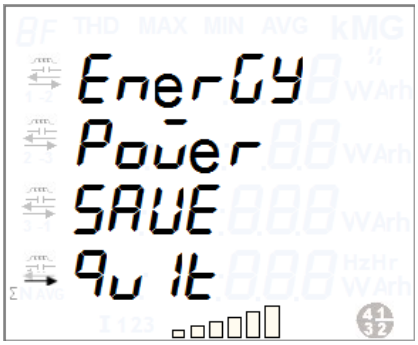


To save the changes, move the selection arrow on ‘SAVE’ and then press ●.



The message ‘SAVE done’ will appear for some seconds if the unit change is successful.

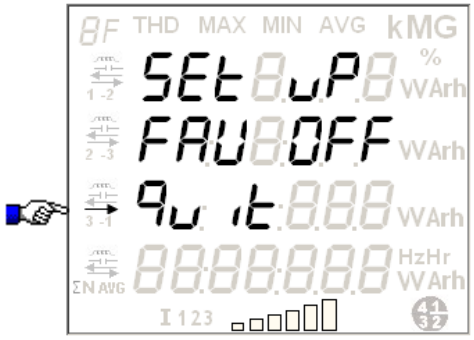
To return to the previous page, press ●.



To return back to the first page of Setup Menu, move the selection arrow on ‘Quit’ and then press .

5.4.12 Exit Setup Mode

The meter display will automatically exit the Setup mode and resume the default auto-cycle display mode if no buttons are pressed within 120 seconds (2 minutes). Alternatively, you can select ‘Quit’ from the Setup Mode as shown below:



6 Meter Displays

6.1 Normal Displays

A powered meter displays logically grouped multiple parameter information in four separate lines on its multi-line backlit LCD. In addition, the footer on display pages indicates the status of active energy quadrants, % current graph with respect to I_{max} and phase-wise line currents as shown below:

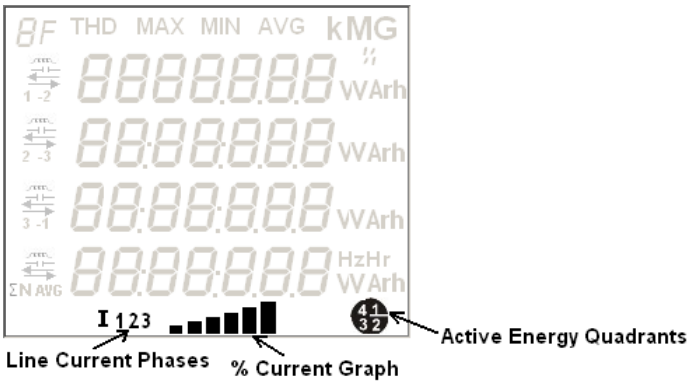


Figure 16: Elite 440 Footer Displays

The meter has three display modes - Auto, Manual, and Favourite.

By default, Auto-cycle and Manual display modes are active. Auto-cycle display pages advance sequentially to the next page in every 5 seconds to 2 minutes (as configured in the meter). After completing one full cycle through the sequence, there will be a delay of 5 seconds to 2 minutes (as configured in the meter) before the display resumes from the beginning. These timeout periods are configurable either at the factory-end or at the installation site through configuration file.

To switch to the Manual Mode, press the ‘up’ or ‘down’ button twice. In Manual display mode you can use the ‘up’ or ‘down’ push buttons to navigate through the pages. The Manual display mode can be replaced with Favourite display mode from the Setup mode (see section 5.2.1 on page 21 for setting Favourite display mode On). No push button activity for 5 seconds to 2 minutes (as configured in the meter) in Manual or Favourite display mode returns the display to Auto-cycle mode.

The footer displays shown in the figure above are mandatory information that will be available on every display page as per the load condition except in Setup Mode and fault condition displays when these footer displays will appear greyed out.

To continuously lit the LCD backlight, press and hold the left-hand (up) button for five seconds (long push), the LCD backlight will now remain lit constantly. To light the LCD backlight with a timeout, press the same button again for five seconds.

If the LCD backlight remains lit constantly in auto-cycle mode then press the ‘up’ or ‘down’ button once to switch to the Manual mode.

The manual display pages have the scroll lock feature that gives the flexibility to freeze a display page i.e. to stop the display from scrolling.

Display scroll-lock feature

This feature allows you to use the meter’s push button to stop the display from scrolling to the next display in the sequence. To activate the scroll-lock feature, press and hold the right-hand (down) button for five seconds (long push), the locked page will now appear constantly. To unlock scrolling, press the same button again for five seconds or until the first display of the sequence appears.

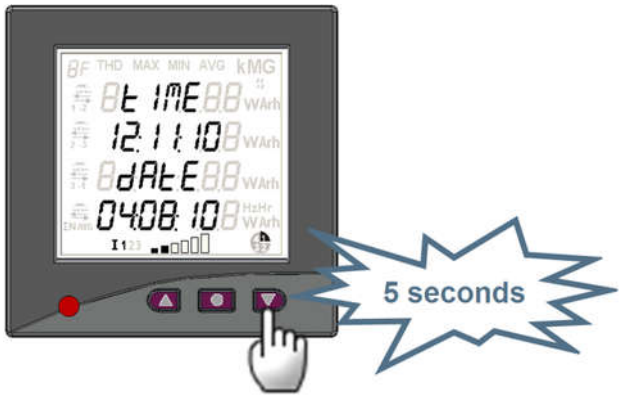


Figure 17: Elite 440 Display Scroll-lock

In display locked state, you can view the manual display pages with the help of meter push buttons. At the end of each display timeout period (the length for which a page appears), the page will return to its locked display page. If there is a power failure, the display goes off; on restoration of power, the display will return to its locked display page. Scroll lock will be disabled on enabling the Favourite display mode.

Display pages for all the three modes are configurable using ConfigView Suite but display configurations for only favourite mode can be sent to the meter over Modbus protocol.

Refer to Annexure-I on page 58 for list of supported displays that can be configured in the meter.

Configuration of LCD Displays using ConfigView

In ConfigView window, select the meter name and then in the **Configuration** sub-folder click **Display**.

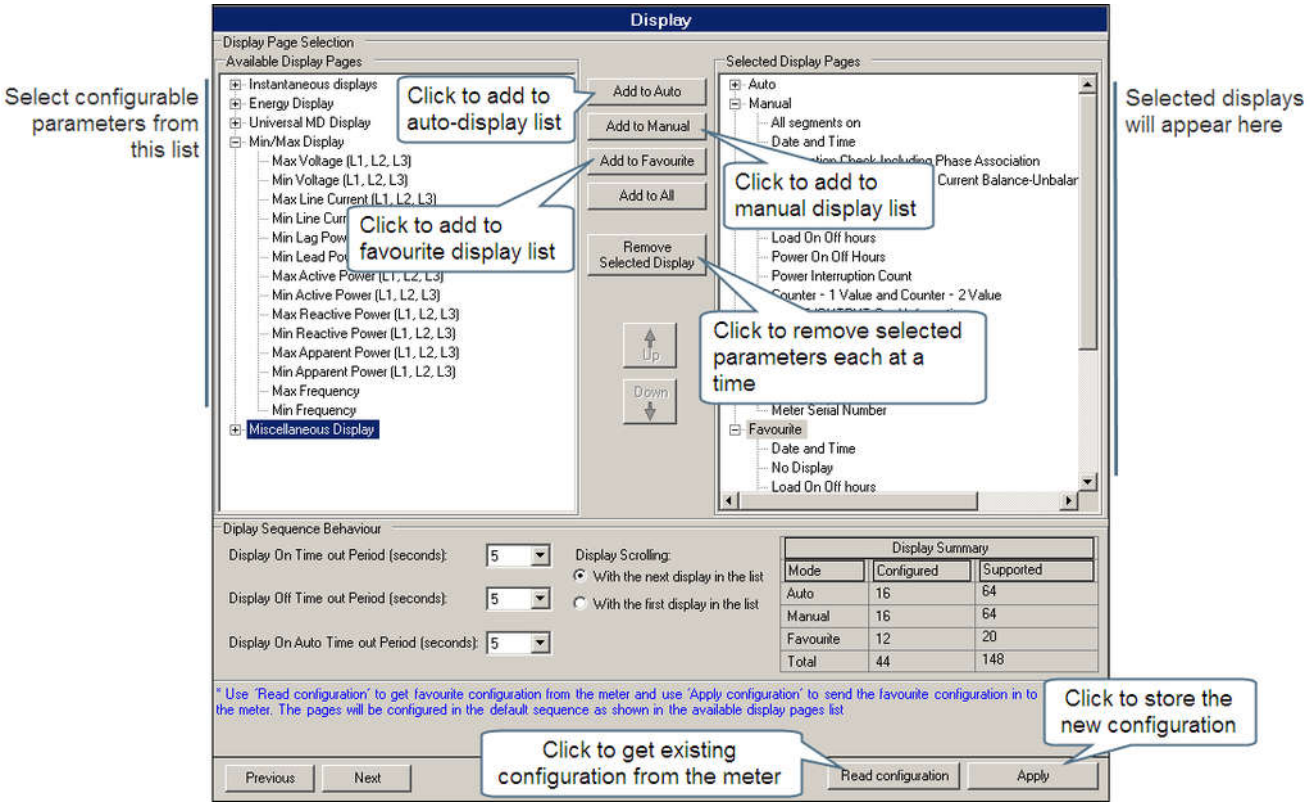


Figure 18: Meter Display Configuration with ConfigView

6.2 Fault Condition Displays

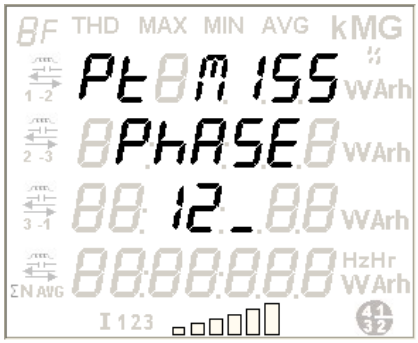
Elite 440 continuously monitor voltage, current and phase angle for each phase. When the meter is powered, a 'test pattern' will appear as the first display to verify that all display segments are working properly. It is then followed by the default auto-displays configured in the meter. Any faults detected during the meter's normal operation will appear instantly on its LCD. The fault message if not rectified or acknowledged (by using the meter push buttons) within 5 minutes will resume the display to its default auto-display cycle.

If multiple faults occur simultaneously or within 5 minutes of another fault then the latest fault event message will be displayed. The default auto-display cycle can be resumed by acknowledging only the currently displayed message.

The meter can detect the following types of fault:

- phase-wise missing voltage
- phase-wise reverse current
- invalid, low or over voltage
- low power factor
- over or under load
- voltage unbalance
- current imbalance
- configured module card unplugged
- invalid phase association

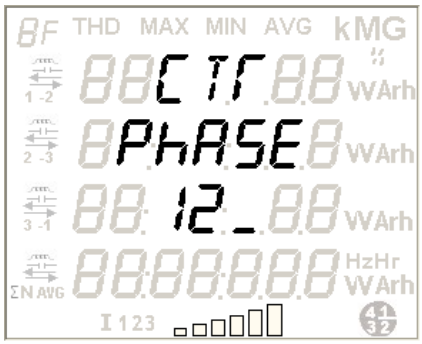
The various fault condition messages are described below as they appear on the meter LCD in the event of such faults.



Missing potential is detected if phase voltage is below the threshold percentage of nominal voltage where the respective line current is above the threshold percentage of I_{basic}.

Potential missing in phase 1 and 2.

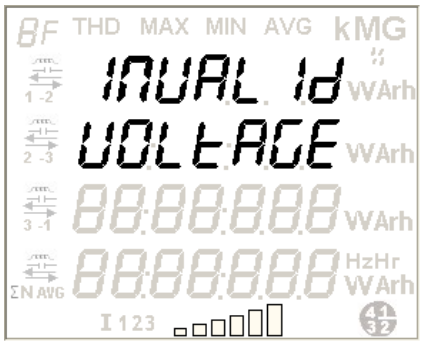
This message indicates that the voltage in phase 1 and 2 are lower than their threshold limit.



Reverse current is detected if CT is connected with incorrect polarity (current direction) in any of the 3 phases. This test is not performed if the current is below 5% of the rated value.

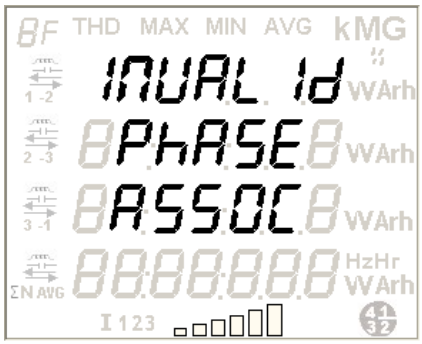
In case of import-export meter (variants from 445 to 448), CT reversal will not be logged if all the CTs are reversed. If a CT reversal already exists in the meter then it will be restored if all the CTs are reversed. But in case of import only meter (variants from 442 to 444), CT reversal will be logged if all the CTs are reversed.

The display message indicates that the CT in phase 1 and 2 is connected with incorrect polarity.



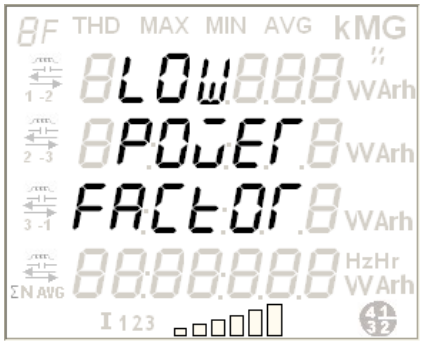
Invalid voltage order is detected if the phase angle between any two connected phases is outside $\pm 10^0$ limits or phase angle incorrect if all phase voltages are more than 60% of nominal values.

The display message indicates *invalid voltage order.*



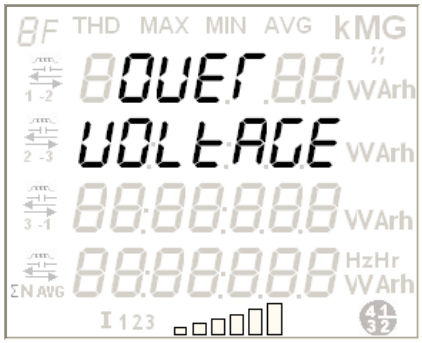
Invalid phase association is detected if the phase sequence of current and voltage is not the same.

The display message indicates *invalid phase association*.



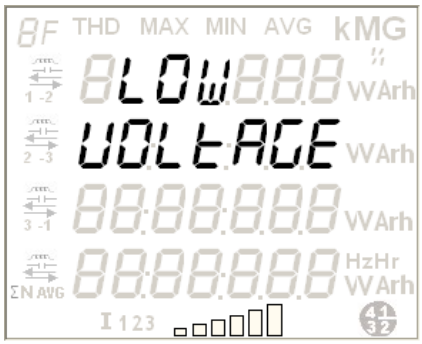
Low power factor is detected if the average power factor is less than 0.5.

The display message indicates *low power factor*.



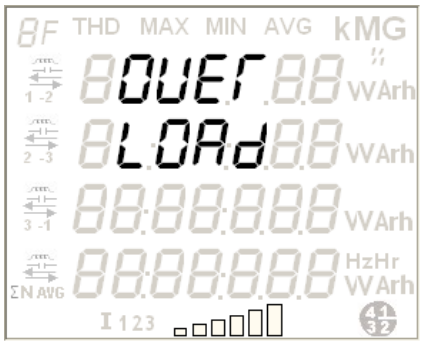
Over voltage is detected if any of the connected voltages exceeds 110% of the nominal value ($V_{nominal}$).

The display message indicates *over voltage*.



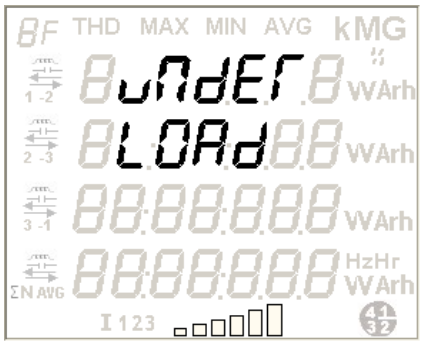
Low voltage is detected if any of the connected voltages is less than 70% of the nominal value ($V_{nominal}$).

The display message indicates *low voltage*.



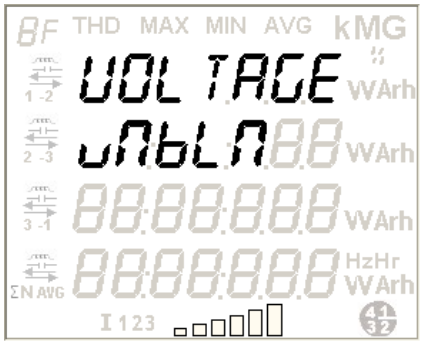
Over load is detected if power (kVA) consumption exceeds the configured power (kVA) rating.

The display message indicates *over load*.



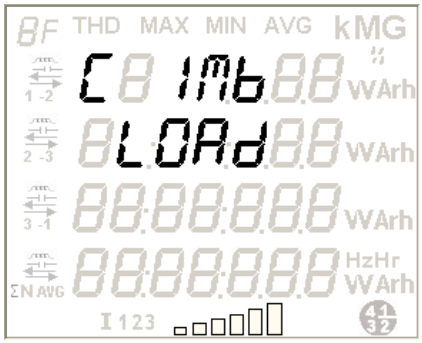
Under load is detected if power (kVA) consumption is less than the configured power (kVA) rating.

The display message indicates *under load*.



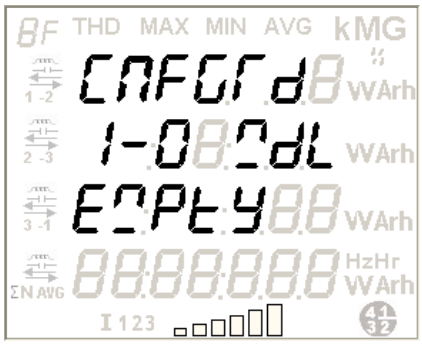
Voltage unbalance is detected if the difference between any phase voltage and three phase average voltage is above a specified threshold percentage of average voltage.

The display message indicates *voltage unbalance*.



Current unbalance is detected if the difference between any phase line current and maximum line current out of all three phases is above a specified threshold percentage of I_{basic}.

The display message indicates *current imbalance*.



An event is logged during next power up either when a configured module card is unplugged from the meter or when a configured module card is not attached to the meter.

The display message indicates the configured module card is unplugged from the meter.

7 Communication

Elite 440 meter variants can be interrogated over Modbus protocol for collecting energy and instantaneous electrical parameter values via ConfigView. In addition, certain configurations can be updated in the meter using ConfigView. For this purpose an RS-485 port is provided on the rear panel of these meters which can be used to communicate with the computer COM port and ConfigView via any RS-232 to RS-485 converter. Up to 32 meters can be connected in a RS485 network. The default communication speed is 9600 bps which can be set to 38400 bps for faster communication. Each Elite 440 meter will have a separate Modbus ID which is used by the software for communication and identification. The communication port can be used for performing the following tasks:

a. Reading and updating meter Configuration
b. Reading meter information
c. Reading basic electrical parameters
d. Reading current and historical energy values
e. Changing CT-VT ratio in the meter
f. Adjusting meter time
g. Resetting MD (Maximum Demand)

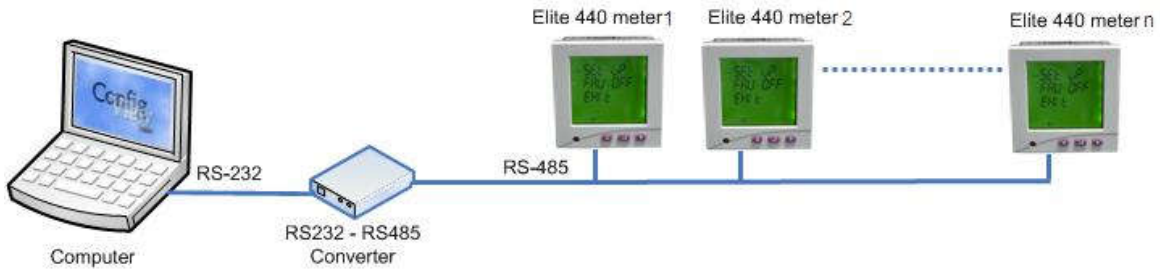


Figure 19: Meter Communication via RS232-RS485 Converter

To setup the communication link from ConfigView, use the 'Communication Settings' button as shown below:

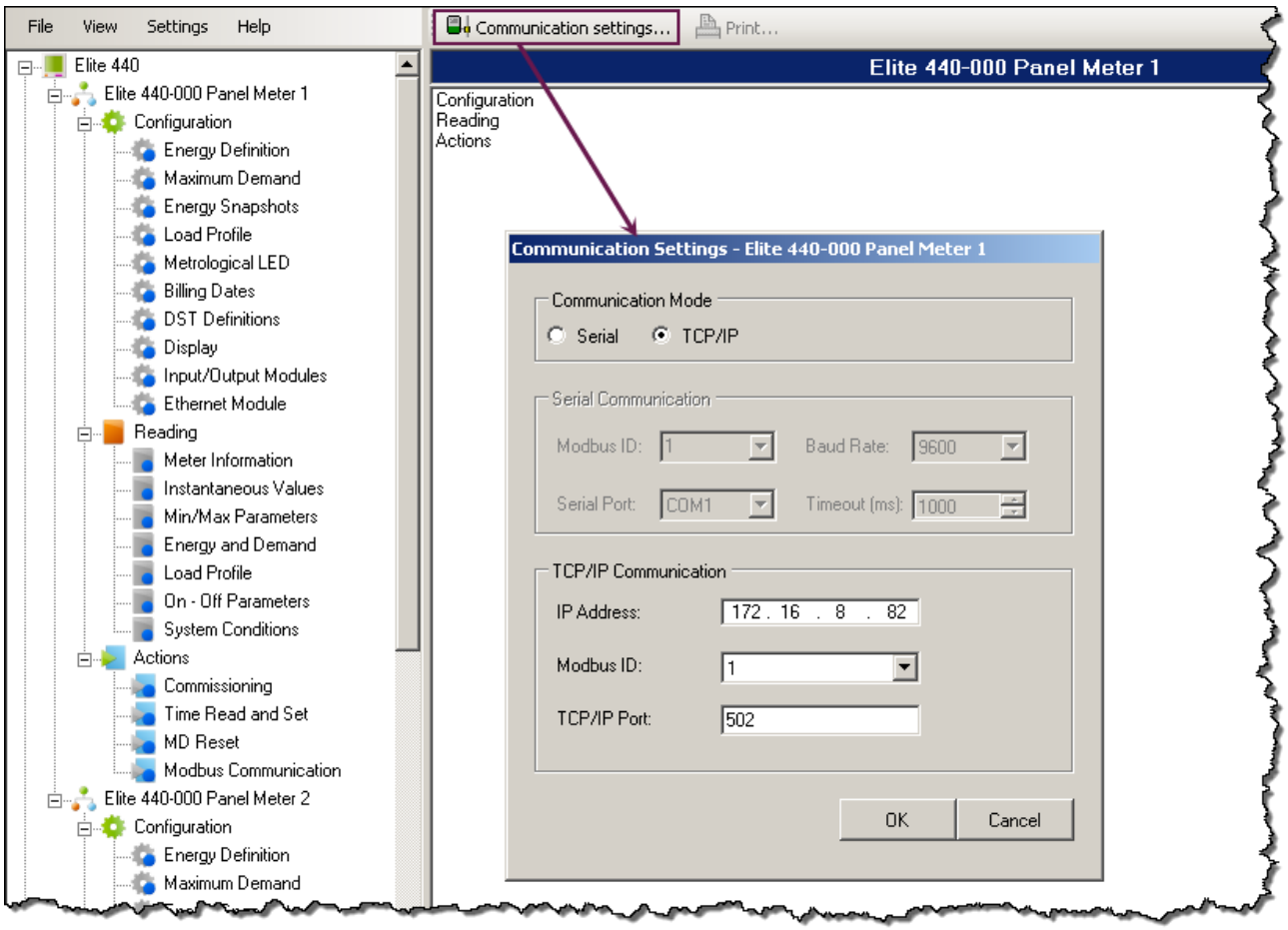


Figure 20: Meter Connection Setting Window in ConfigView

For establishing connection with the meter using ConfigView, it is important to know the Modbus ID and baud rate of the meter you are connecting to. The meter Modbus ID is also configurable using ConfigView.

ConfigView for Configuring Meter Modbus Id

In ConfigView window, select the meter name and then in the **Actions** sub-folder click **Modbus Communication**.

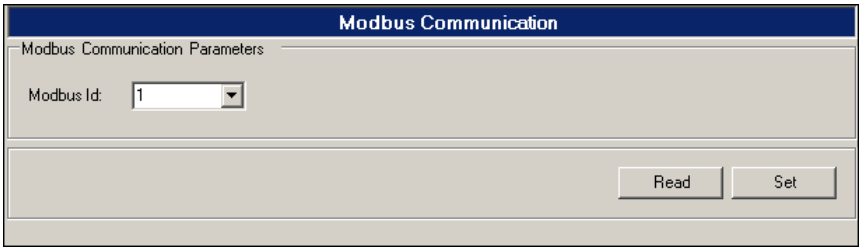


Figure 21: Modbus Communication Configuration with ConfigView

After establishing link with the meter, the following information and parameter values can be read from the meter:

- Meter type
- Program name
- Meter Sr. No.
- Meter time and date
- Phase-to-phase, phase-to-neutral and average voltages
- Phase-wise and neutral line currents
- Phase-wise active currents
- Phase-wise reactive currents
- Phase-wise and average power factors
- Phase-wise and total active powers
- Phase-wise and total reactive powers
- Phase-wise and total apparent powers
- Frequency
- Phase Angles (Phase-to-Phase)

- Cumulative MD historical values
- All supported energy values
- All supported historical energy values
- Historical values (billing) generation dates
- MD values with date and time stamp for all supported energies
- MD historical values with date and time stamp for all supported energies
- Cumulative power on-off time
- Cumulative load on-off time
- Cumulative power on-off time histories
- Cumulative load on-off time histories
- Previous day's energy snapshot for all selected energies
- Load profile
- Current and last occurred events
- Maximum and Minimum parameter values
- Metrological LED pulse rate
- Percentage total harmonic distortion in each phase (up to 31st harmonics)

8 Technical Specification

Electrical				
Wiring configuration	Common product for 3-phase 3-wire and 3-phase 4-wire application			
Voltage range				
*Measurement voltage range**	57.7 V (100 V) - 240 V (415 V) AC 3-phase 4-wire (3-phase 3-wire) Tolerance: -30% to +20% of $V_{nominal}$			
Aux power supply range	80-300 V AC/DC or 24-60 V DC			
Maximum primary voltage	1000 kV			
Current range				
Basic current (I_{basic})	1 to 5 A in steps of 1			
Maximum current (I_{max})	200% of I_{basic}			
Maximum primary current	15000 A			
Short Time Over Current	20 times of I_{max} for 1 sec 10 times of I_{max} for 3 sec 7 times of I_{max} for 10 sec			
Maximum Power	17.3 GW			
Frequency	50/60 Hz ± 5%			
Accuracy				
*Class***	0.2s, 0.5s, 1			
Meter parameter accuracy	**Parameter**	**Accuracy Class 0.2s (%)**	**Accuracy Class 0.5s (%)**	**Accuracy Class 1 (%)**
	kWh	0.2	0.5	1.0
	kVArh	0.2	0.5	1.0
Burden				
*Auxiliary power supply***	1.5 W and 3.5 VA (without module) Max 4 W and 8 VA (with module)			
Current circuit	1 VA			
Voltage circuit	0.5 W and 1 VA			

Approvals		
Standard	IEC61010-1, IEC62052-11, IEC62053-22, IEC62053-23, IEC62053-31 (for Two digital Pulse Inputs Two digital Pulse Outputs module)	
Mechanical		
Dimension (W x H x D)	96 x 96 x 70 mm (without module) 96 x 96 x 122 mm (with module) Cut-out size 92 x 92 mm + 0.5 mm	
LCD size	65 x 60 mm	
Weight (without module)	0.4 kg ± 0.1 kg	
I/O Module Weight	0.05 kg	
Ethernet Module Weight	0.04 kg	
Enclosure	Fire Retardant Polycarbonate (FRPC)	
Module attachment	Using knurled screws by applying torque of 1.2 Nm	
Terminals	Combicon connector	
Conductor size	2 to 2.5 mm^2	
Environmental		
Ingress protection	IP54 (front fascia); IP20 (at terminals)	
Insulation	4 kV RMS 50 Hz	
Impulse withstand	4 kV	
Temperature	-20 ^{0}C to + 60 ^{0}C (operating) -25 ^{0}C to + 80 ^{0}C (storage)	
Humidity	95% non-condensing	
Communication		
Communication Port	RS485, 3 wires, half duplex	
Communication link	Modbus RTU, data response time 1 sec	
Baud rate	1200 bps to 38400 bps	
Data pattern	Word length 8, Parity None, Stop bits 1	
Optional External Plug-in Module		
Two digital Pulse Inputs Two digital Pulse Outputs	Input voltage range	8-40 V DC with 5 ms pulse duration for input 1
		8-40 V DC with 40 ms pulse duration for input 2
	Voltage rating	230 V AC @ 100 mA
		48 V DC @ 100 mA
	Pulse width	80 ms or 240 ms
	Note: Two digital Pulse Inputs Two digital Pulse Outputs module tested as per IEC62053-31 standard.	
Four 4-20 mA Analogue Output	Voltage rating 20-40 V DC Current rating 100 mA @ 20-40 V DC Maximum loop impedance 750 ohms	

Ethernet	10/100 base-T for Modbus over TCP/IP communication
*With respect to reference voltage $V_{nominal}$ **According to variant	

9 List of Configurable Features and Parameters

Elite 440 meters offer the flexibility to change certain configuration in the meter at client's end to suit their requirement. Although the meter comes with all pre-set default parameter values, it may be necessary to change certain configurable parameters to match the installation type and meet customer's requirements. Configuration of various features or parameters supported in Elite 440 meters can be modified using the following three methods:

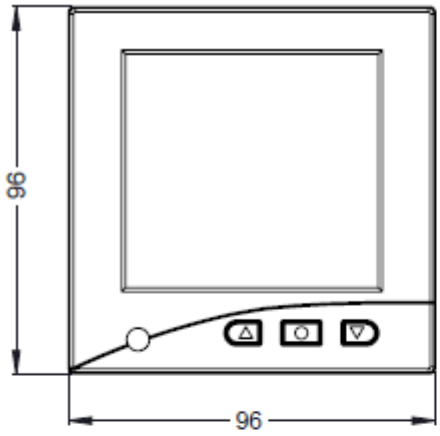
- With meter push buttons from the Setup mode (refer to section 5.4 on page 24)
- Modbus commands
- Using the ConfigView Suite

The following table gives a list of configurable features and parameters along with the possible options that can be used to change a configuration:

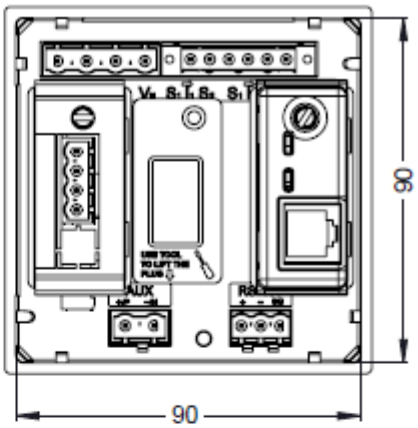
Configurable Features and Parameters	Factory Configuration	Meter Push Buttons	Modbus Command (ConfigView Suite)	Configuration file (ConfigView Suite)
MD Reset	Yes	Yes	Yes	Yes (if related parameter is changed)
3-phase 3-wire or 3-phase 4-wire selection	Yes	Yes	Yes	Yes
CT-VT Commissioning	Yes	Yes	Yes	Yes
Modbus ID	No	Yes	Yes	No
Modbus baud rate	No	Yes	No	No
MD register	Yes	No	Yes	Yes
Demand Integration Period	Yes	Yes	Yes	Yes
Sliding or Blocked window selection for demand logging	Yes	Yes	Yes	Yes
Pulse output parameter selection	Yes	Yes	Yes	Yes
Pulse input selection	Yes	Yes	Yes	Yes
Pulse output width and weight selection	Yes	Yes	Yes	Yes
4-20 mA analogue output parameter selection	Yes	Yes	Yes	Yes
4-20 mA analogue output parameter limit selection	Yes	No	Yes	Yes
IP Address	No	Yes	Yes	No
Subnet Mask	No	Yes	Yes	No
Default Gateway	No	Yes	Yes	No
Load profile parameter selection	Yes	No	Yes	Yes
Load profile integration period selection	Yes	Yes	Yes	Yes

Configurable Features and Parameters	Factory Configuration	Meter Push Buttons	Modbus Command (ConfigView Suite)	Configuration file (ConfigView Suite)
Billing Dates selection	Yes	No	No	Yes
Display pages selection	Yes	No	Yes (only favourite pages)	Yes
Metrological LED Energy configuration	Yes	Yes	Yes	Yes
Selection of Main energy registers	Yes	No	Yes (limited as per factory configuration)	Yes (limited as per factory configuration)
Selecting parameters for daily energy snapshots	Yes	No	Yes	Yes
Daily energy snapshot time	Yes	No	Yes	Yes
Daylight Saving Time	Yes	No	Yes (only two DST dates)	Yes

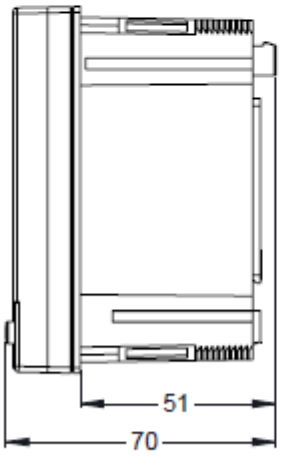
10 Meter Dimensions



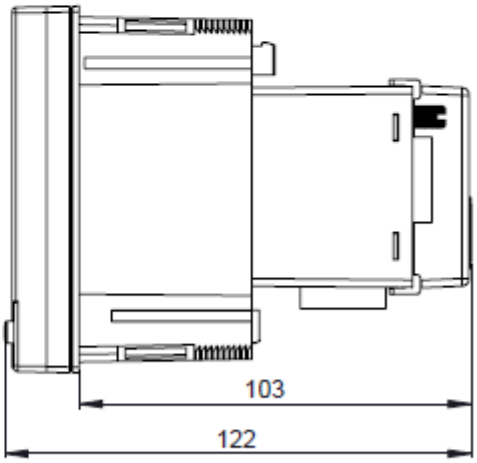
Front View



Rear View



Side View (without module)



Side View (with module)

Note:
1. All dimensions are in mm
2. General tolerance ±1.0 mm

11 Installation and Commissioning

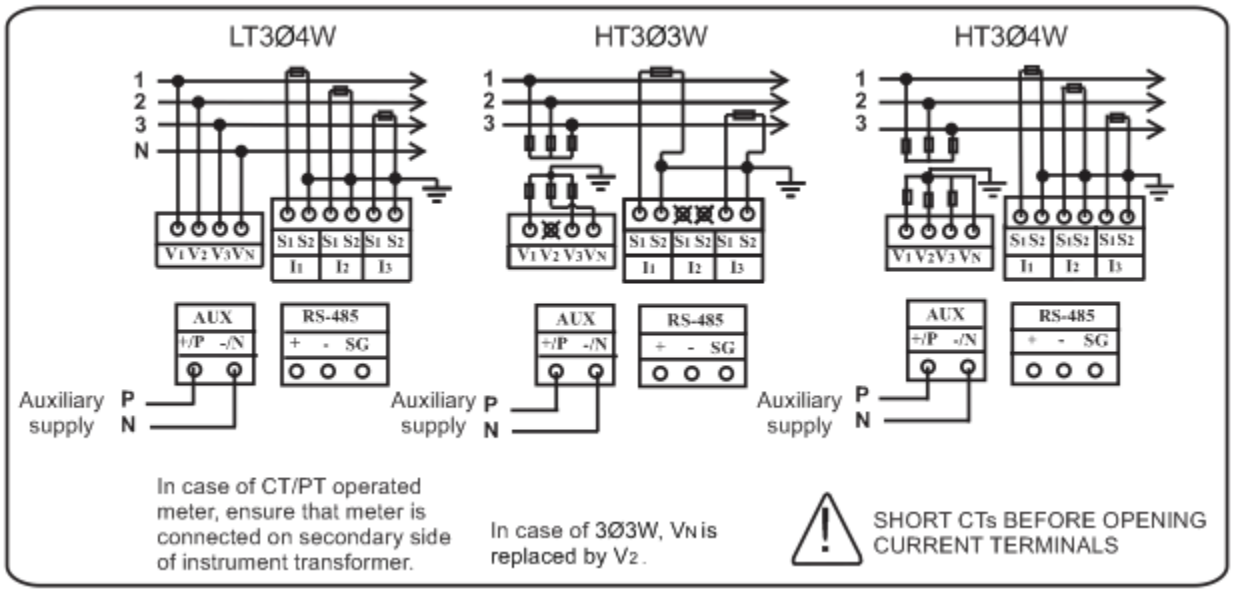
The meter should be installed by trained personnel. In addition to the safety precautions recommended in this manual, local best practice and regulatory stipulations should be always followed during the installation and commissioning process.

11.1 Connection Diagram

By default, Elite 440 meter is configured as a 3-phase 4-wire application, it can also be configured as a 3-phase 3-wire application.

Things to check for, when Elite 440 meter is used as a 3-phase 3-wire application:

1. Connection for 3-phase 3-wire should be done as directed on the decal pasted on the top of the meter or Quick Start Guide.
2. Select appropriate Meter Type from meter's Setup Mode.

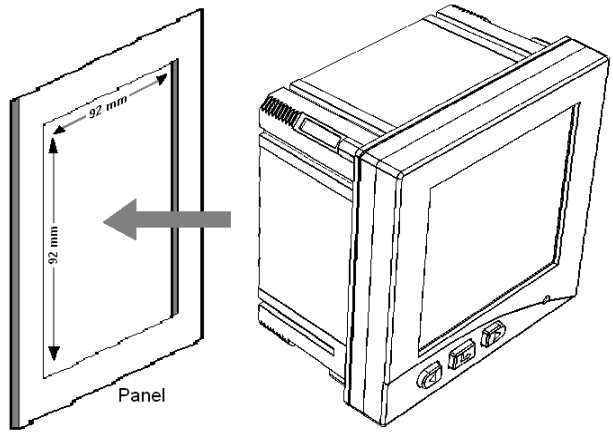


Note: One side of the CT secondary wiring should be earthed. The diagram shows 'S2' side earthed, but it is permissible to ground the 'S1' side instead, according to local practice.

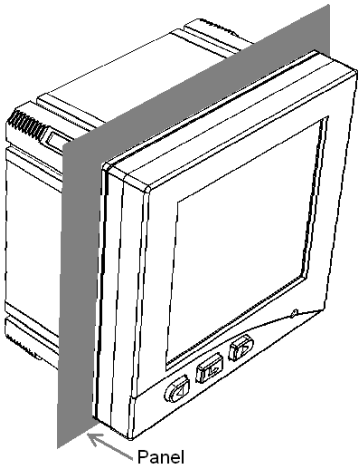
11.2 Mounting the Meter on the Panel

Prepare Panel, remove four clamps from the rear of the meter and then insert the meter in the panel.

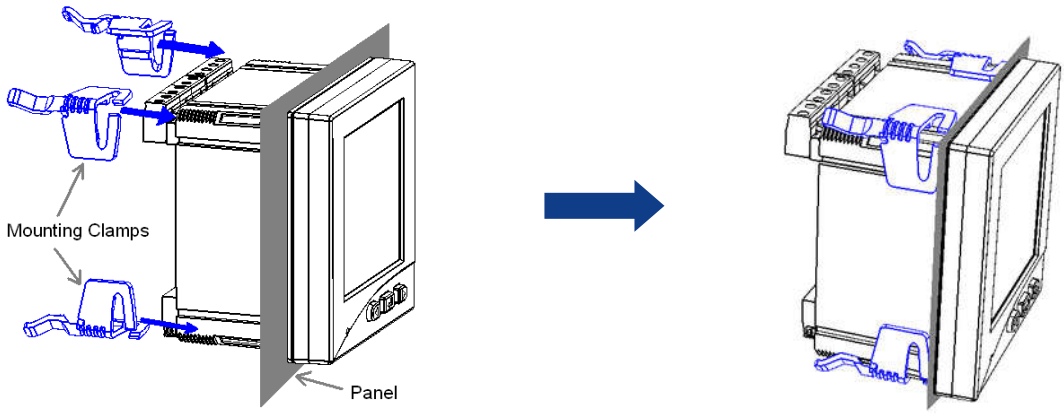
Step 1: Cut out 92 x 92 mm in the panel



Step 2: Fix the meter in the panel



Step 3: Slide in the mounting clamps

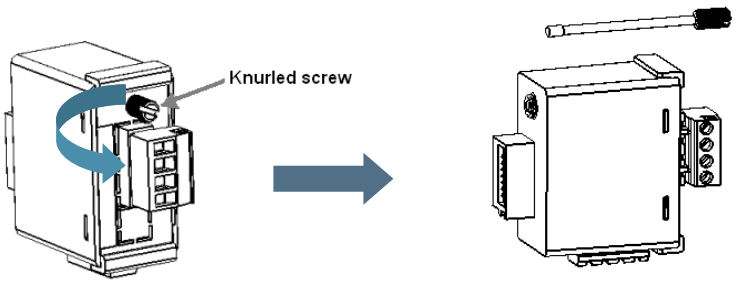


11.3 Attaching External Module

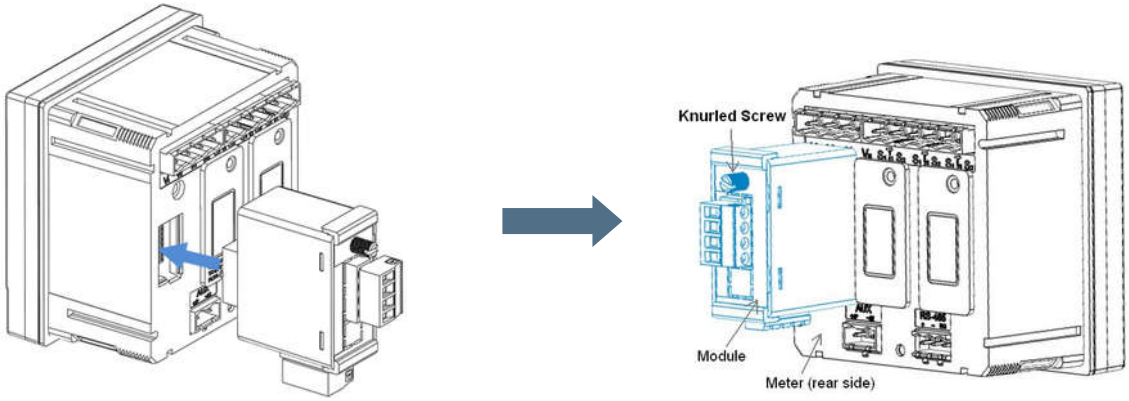
External Module can be easily fitted in the module socket present at the rear of the meter. Simply plug-in a module in the socket and turn the knurled screw provided with the module to hold it with the meter. Before attaching or detaching a module ensure to switch off auxiliary power supply to the meter.

Attaching I/O Module

Step 1: Each Module comes with a knurled screw that is used to secure the module with the meter. To attach a module, remove the screw from the module by turning it anti-clockwise and then pull it out as shown in the following figure.



Step 2: Insert the I/O module in the Input-Output Module socket (which is the leftmost socket located below the voltage terminals) present at the rear of the meter as shown in the figure below. After inserting the module, slide-in the screw in the slot provided in the module as shown in the figure. Tighten the screw by turning it clockwise so that the module is fixed in place with the meter.



Attaching Ethernet Module

Similarly, external Ethernet Module can be easily fitted in the Ethernet Module socket (which is the rightmost socket located below the current terminals) present at the rear of the meter.

11.4 Detaching Modules

Important: Before detaching a module ensure to disconnect the auxiliary power supply.

Once the auxiliary power supply is disconnected, remove the screw from the attached module and simply pull the module out of the socket.

12 Frequently Asked Questions (FAQs)

Q **Meter does not power up after supplying power to the measurement circuit.**

Answer: Auxiliary supply is mandatory to power up the meter. Please refer the decal pasted on the meter for auxiliary supply type and range.

Q **How to stop the display from scrolling?**

Answer: First, navigate to the display page you want to lock. Second, press and hold the right-hand (down) button for five seconds (long push), the locked page will now appear constantly.

Q **How to light the LCD backlight continuously?**

Answer: To continuously light the LCD backlight, press and hold the left-hand (up) button for five seconds (long push), the LCD backlight will now remain lit constantly.

Q **Meter is not showing correct values of instantaneous parameters?**

Answer: The following things should be verified:-

- Verify that the correct CT/VT commissioning values are selected in set up mode of the meter.
- Verify that the connection is done as directed on the decal pasted on the top of the meter.

Q **Meter is not communicating with the PC using serial communication?**

Answer: The following things should be verified:-

- Verify the communication settings (i.e. Baud rate and Modbus ID) in the setup mode of meter.
- Verify the connection between PC and the meter is done using standard RS485 communication cable and RS232/485 converter (i.e. all wires are connected properly D+, D- and SG).
- Proper communication settings at the software end.

Q **How to access the Favourite mode display in the meter?**

Answer: Press  to access the Setup Mode, then use  button to move to ‘Fav On’. When selection bar ‘→’ is on ‘Fav On’ menu, press  to select it.

Q **Some parameters in the Setup mode cannot be configured and shows “No Action” message.**

Answer: In configuration mode, the ‘No Action’ message on the display indicates that a parameter is not available for configuration. The parameter you are trying to configure may not be supported for that particular variant.

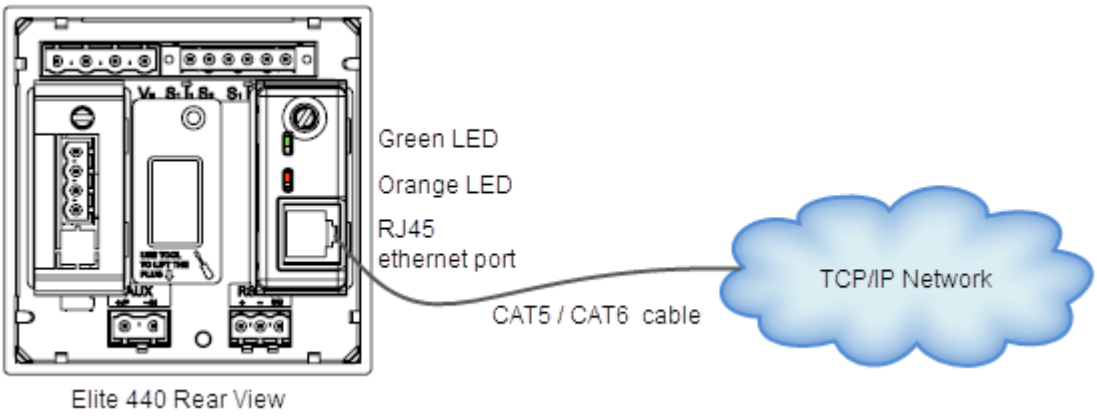
Q **Why the instantaneous parameter values are not shown on Modbus/ConfigView?**

Answer: The parameters may not be supported for that particular variant.

Q **How to verify that the Ethernet Module is connected to the meter?**

Answer: If the Ethernet Module (properly attached to the Ethernet Module socket of the meter) is connected to the TCP/IP network through the LAN cable (as shown in below figure), then the two LEDs (green and orange) present at the rear of the Ethernet module will indicate the following:

- The green coloured LED will continuously glow indicating that it is connected to the TCP/IP network
- The orange coloured LED will blink indicating the data flow.

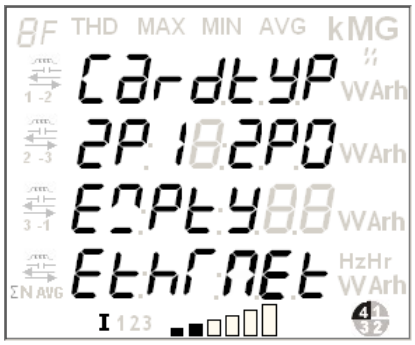


Elite 440 Rear View

Q **How to verify the types of cards connected to the meter?**

Answer: The Card Type information display shows the type of cards connected to the meter.

For example, the following display indicates '2 pulse input and 2 pulse output' and 'Ethernet' cards are connected.



Q **Can serial communication and TCP/IP communication through Ethernet Gateway be established simultaneously?**

Answer: While communicating through Ethernet Gateway module, serial communication cannot be established.

Q **Where the IP setting for Ethernet module is stored?**

Answer: The IP setting for Ethernet module is stored in the meter.

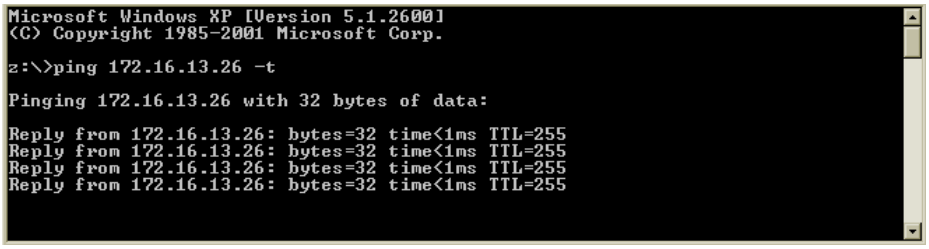
Q **What is the time to establish TCP/IP communication after meter power off-on?**

Answer: It will take 40 seconds to establish TCP/IP communication after power off-on. The same applies to similar actions such as after IP re-configure, module re-insert and LAN re-connect.

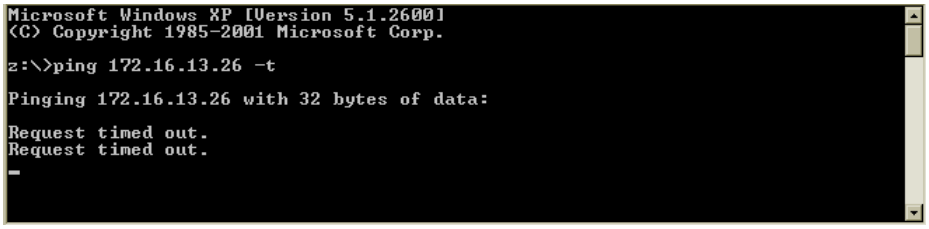
Q **Unable to communicate with the meter using TCP/IP communication.**

Answer: To resolve this problem, try one of the following methods in sequential order.

1. Check IP address status using ping command in command prompt.



Successful TCP/IP Communication



TCP/IP Communication Failure

2. Re-connect the LAN cable and try to communicate.
3. Ensure the following:
   - ✓ *IP address configured in the meter should be static and must be unique in the LAN network.*
   - ✓ *Proper opening and closing mechanism for TCP/IP socket connection is maintained at application software end as only two TCP/IP socket connections can be established for two different clients.*
   - ✓ *TCP/IP socket connection timeout has not occurred*

Q **How many TCP/IP socket connections can be established?**

Answer: You can establish two TCP/IP socket connections for an IP for two different clients.

Q **Unable to get response for a query even after opening a TCP/IP socket.**

Answer: After opening TCP/IP socket if no query is sent until one minute, the TCP/IP socket will automatically get closed and user needs to re-open it.

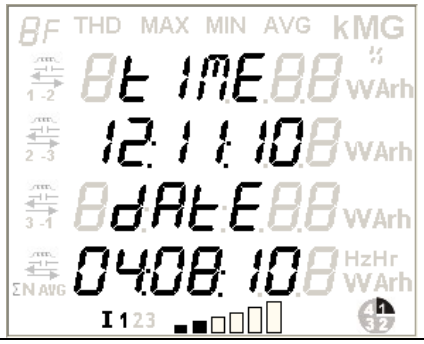
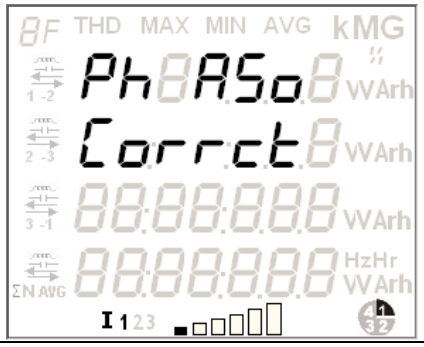
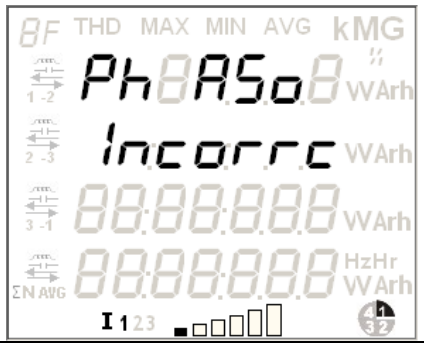
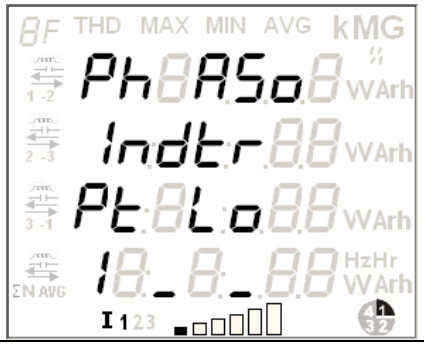
Q **Unable to connect to a new TCP/IP socket.**

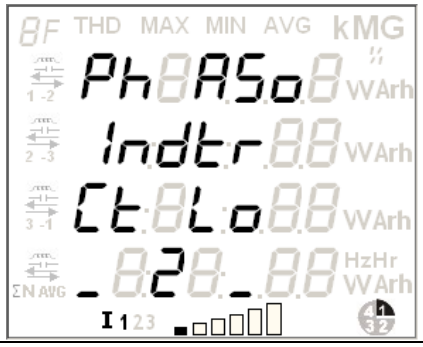
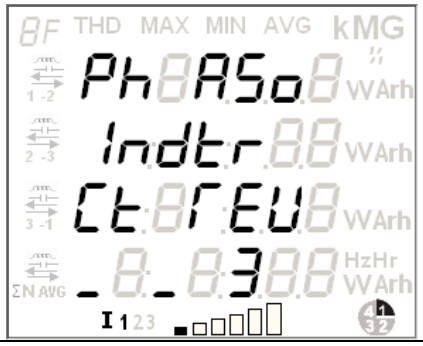
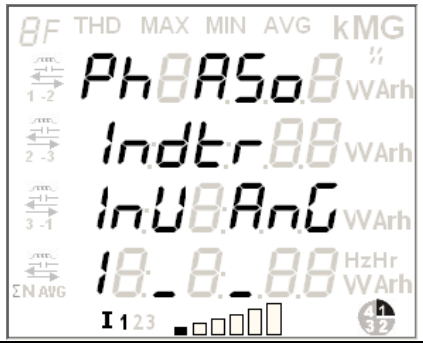
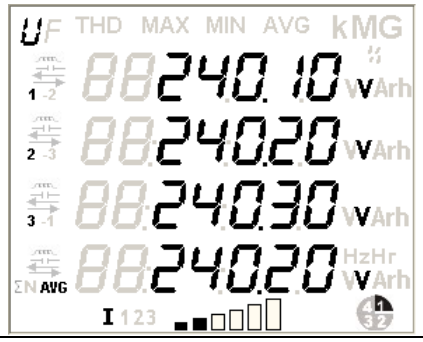
Answer: Ensure proper opening and closing mechanism for TCP/IP socket connection is maintained at application software end. For example, an energy management system application opens and closes a TCP/IP socket connection but the socket is not closed. This may create problem while establishing the TCP/IP socket connection if both the sockets are opened.

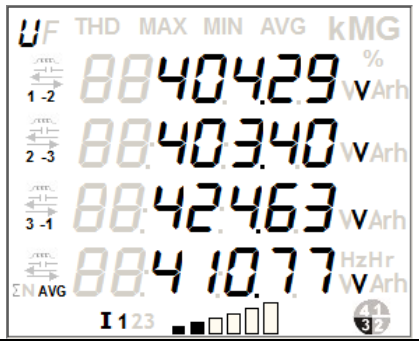
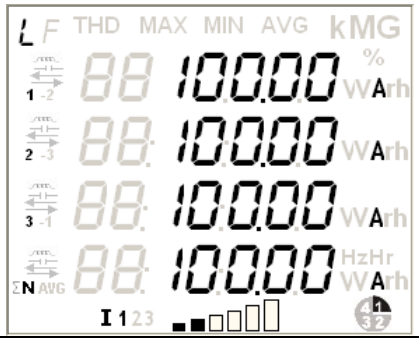
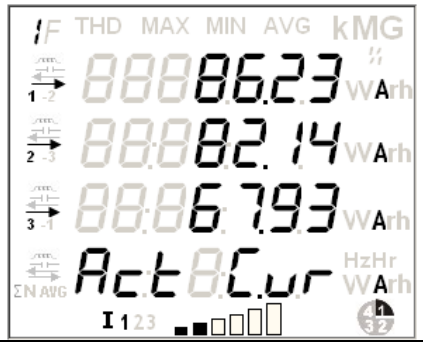
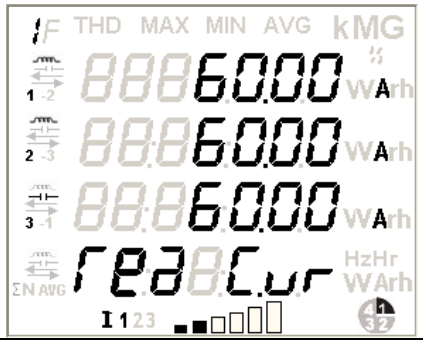
Q **Can meter reading be performed through multiple clients (using serial or TCP/IP communication) simultaneously?**

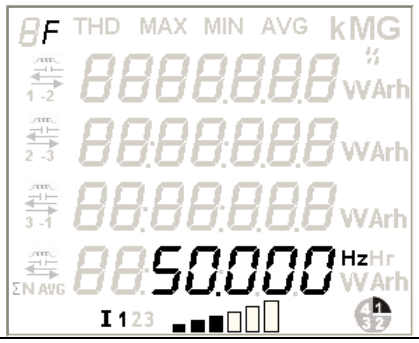
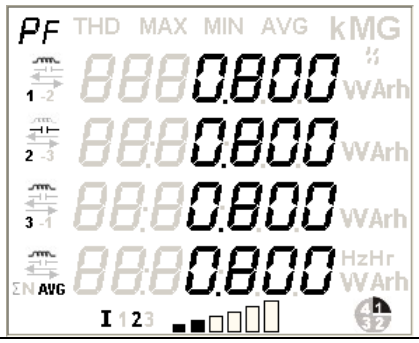
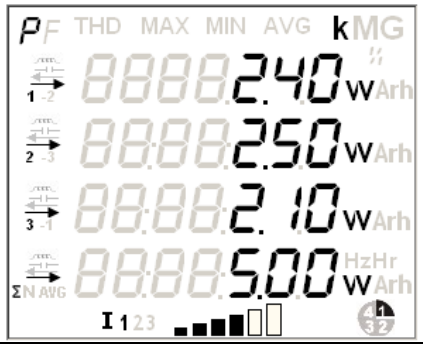
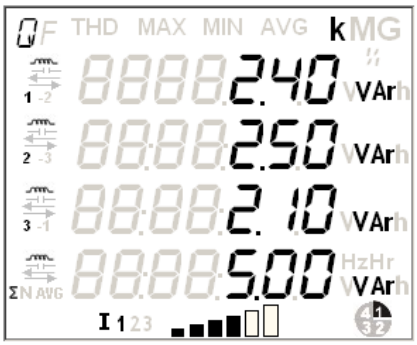
Answer: Load Profile and billing registers cannot be read through multiple clients at the same time.

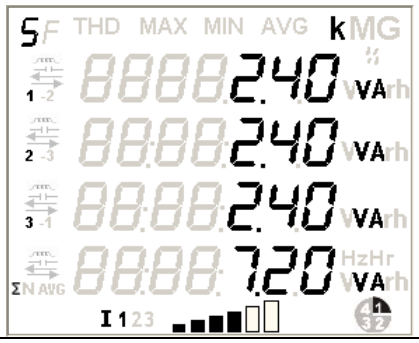
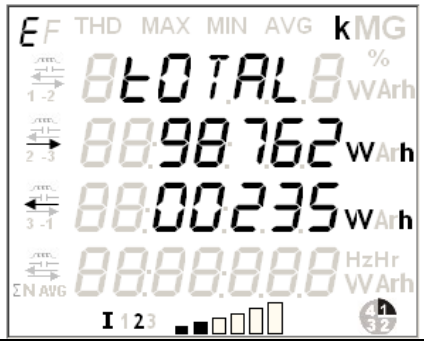
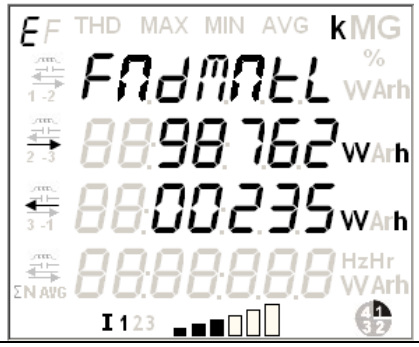
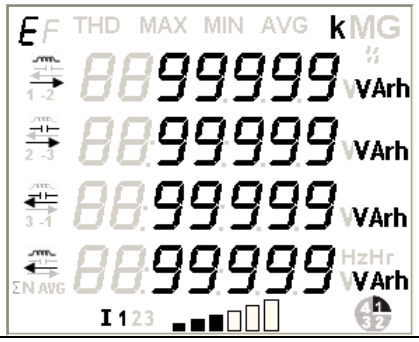
Annexure I: Meter Displays

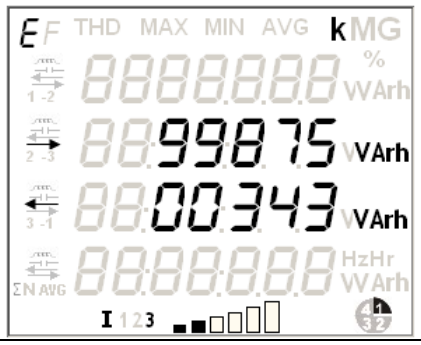
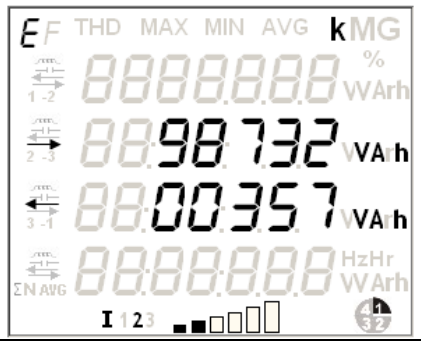
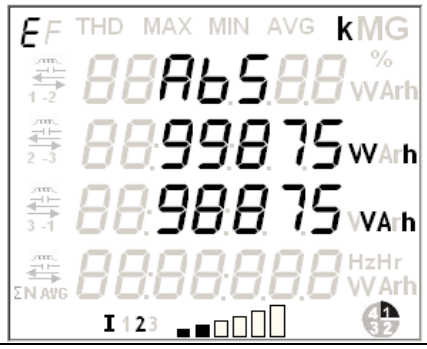
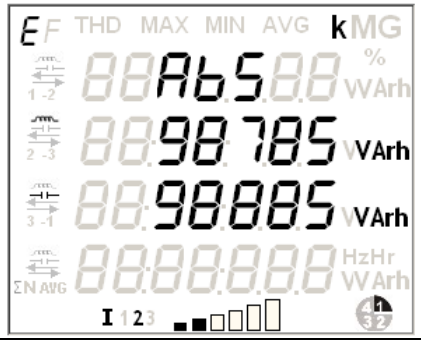
Display Messages	Meaning
Date and Time	
	The display indicates current ‘TIME 12:11:10’ in HH:MM:SS format and Today’s ‘DATE 04:08:10’ in DD:MM:YY format.
Invalid Phase Association and Condition Checks	
	If the connection is correct the message ‘Phase Association Correct’ will appear.
	If the connection is incorrect the message ‘Phase Association Incorrect’ will appear. This message will be followed by one of the below messages:
	The message indicates ‘Phase Association Indeterminate’ due to ‘low voltage in Phase 1’.

Display Messages	Meaning
	The message indicates ‘Phase Association Indeterminate’ due to ‘low current in Phase 2’.
	The message indicates ‘Phase Association Indeterminate’ due to ‘reverse current flow in Phase 3’.
	The message indicates ‘Phase Association Indeterminate’ due to ‘Invalid phase angle in phase 1’.
Phase-to-Neutral and average voltages (V) [applicable for 3-phase 4-wire connections only]	
	The meter measures instantaneous voltage. Page identifier at the top left indicates ’U’ for voltage being displayed currently on the page. The display indicates the following phase-wise and average voltages: Phase 1-to-Neutral = 240.10 V ; Phase 2-to-Neutral = 240.20 V ; Phase 3-to-Neutral = 240.30 V ; Average Phase-to-Neutral = 240.20 V.

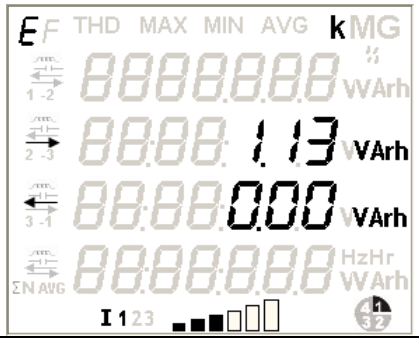
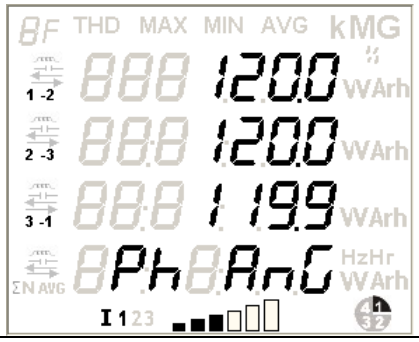
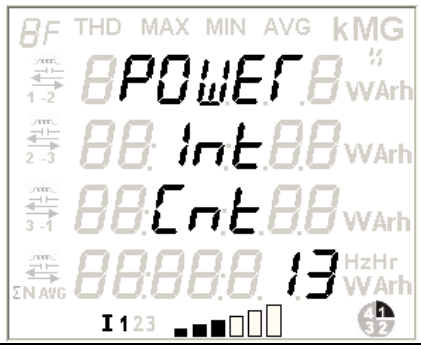
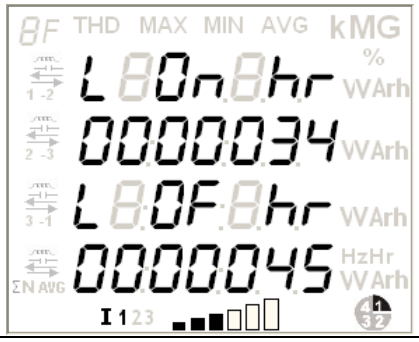
Display Messages	Meaning
Phase-to-Phase and average voltages (V)	
	The meter measures instantaneous voltage. The display indicates the following phase-wise and average voltages: Phase 1-to-Phase 2 = 404.29 V ; Phase 2-to-Phase 3 = 403.40 V ; Phase 3-to-Phase 1 = 424.63 V ; Average Phase-to-Phase = 410.77 V.
Three-phase line currents (A)	
	The meter measures instantaneous line current. Page identifier at the top left indicates 'L' for line current being displayed currently on the page. The 1st three display lines indicate line current in each phase and the 4th line indicates neutral current. Line current in Phase 1 = 100 A ; Line current in Phase 2 = 100 A ; Line current in Phase 3 = 100 A ; Neutral current 'N' = 100 A
Three-phase active currents (A)	
	The meter measures instantaneous active current. Page identifier at the top left indicates 'I' for current being displayed currently on the page. The display indicates the following 'Active Current' in each phase. Active current in Phase 1 = 86.23 A; Active current in Phase 2 = 82.14 A; Active current in Phase 3 = 67.93 A In addition, the display on the left indicates import '→'in phase 1, 2 and 3.
Three-phase reactive currents (A)	
	The meter measures instantaneous reactive current. The display indicates the following 'Reactive Current' in each phase. Reactive current in Phase 1 = 60 A; Reactive current in Phase 2 = 60 A; Reactive current in Phase 3 = 60 A In addition, the display on the left indicates load is inductive/lag '⏦' in phase 1 and 2 but capacitive '⊣⊢' in phase 3,

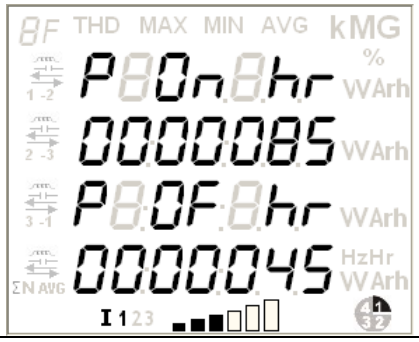
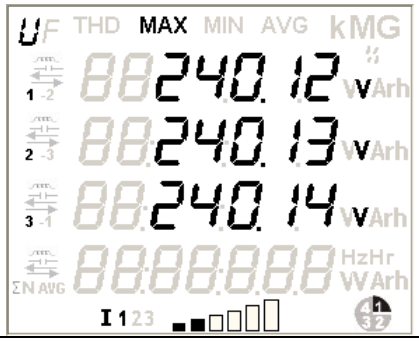
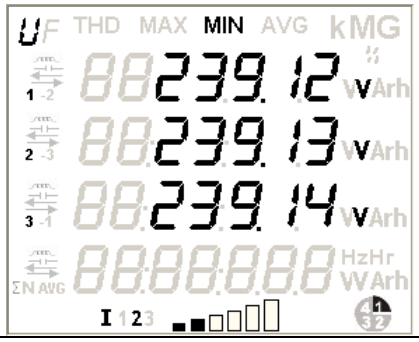
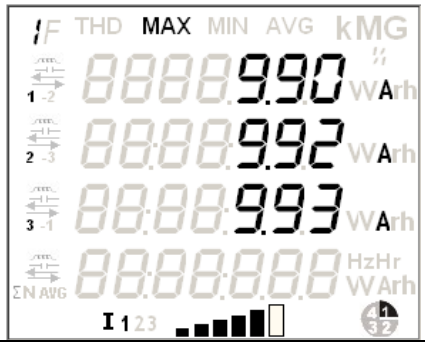
Display Messages	Meaning
Frequency (Hz)	
	The meter measures the frequency. Page identifier at the top left indicates 'F' for frequency being displayed currently on the page. The display indicates frequency = 50.000 Hz.
Three phase and average power factor	
	The meter measures the power factor. Page identifier at the top left indicates 'PF' for power factor being displayed currently on the page. The display indicates the following power factor in each phase and the average power factor: PF in phase 1 = 0.800; PF in phase 2 = 0.800; PF in phase 3 = 0.800; PF_{AVG} = 0.800 In addition, the display on the left indicates load is inductive/lag '⎓' in phase 1 and 3 but capacitive '⊣⊢' in phase 2.
Three phase and total active power (kW)	
	The meter measures active power. Page identifier at the top left indicates 'P' for active power being displayed currently on the page and 'k' at the top right indicates the values are in kilo. The display indicates the following active power in each phase and the total active power: Active Power in phase 1 = 2.40 kW ; Active Power in phase 2 = 2.50 kW ; Active Power in phase 3 = 2.10 kW ; Total Active Power = 5.00 kW In addition, the display on the left indicates import '⟶'in all three phases and total.
Three phase and total reactive power (kVAr)	
	The meter measures reactive power. Page identifier at the top left indicates 'Q' for reactive power being displayed currently on the page and 'k' at the top right indicates the values are in kilo. The display indicates the following reactive power in each phase and the total reactive power: Reactive Power in phase 1 = 2.40 kVAr ; Reactive Power in phase 2 = 2.50 kVAr ; Reactive Power in phase 3 = 2.10 kVAr ; Total Reactive Power = 5.00 kVAr In addition, the display on the left indicates reactive power is inductive/lag '⎓' in all three phases and total.

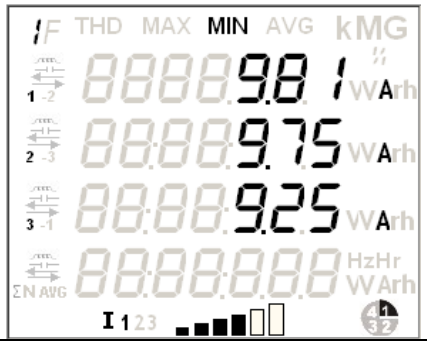
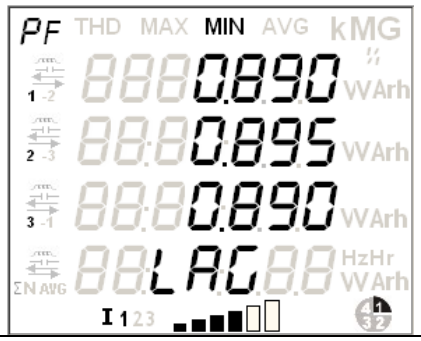
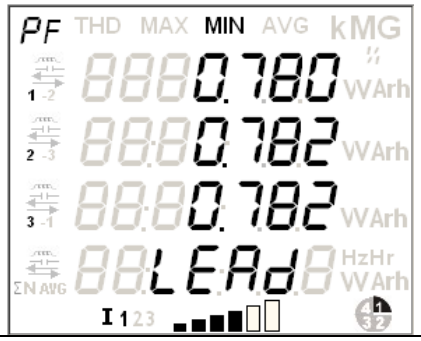
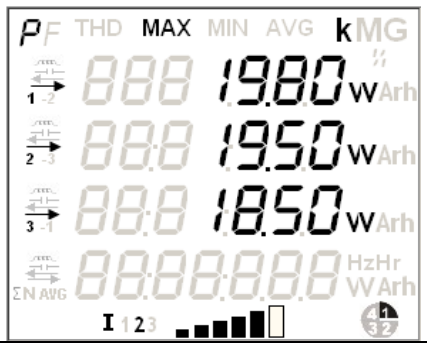
Display Messages	Meaning
Three phase and total apparent power (kVA)	
	The meter measures apparent power. Page identifier at the top left indicates 'S' for apparent power being displayed currently on the page and 'k' at the top right indicates the values are in kilo. The display indicates the following apparent power in each phase and the total apparent power: Apparent Power in phase 1 = 2.40 kVA ; Apparent Power in phase 2 = 2.40 kVA ; Apparent Power in phase 3 = 2.40 kVA ; Total Apparent Power = 7.20 kVA
Active total import and export energies (kWh)	
	The meter measures import and export of energy. Page identifier at the top left indicates 'E' for energy being displayed currently on the page and 'k' at the top right indicates the values are in kilo. The display indicates the following active total import '→' and export '←' energies: Active Total import = 98762 kWh Active Total export = 235 kWh
Active fundamental import and export energies (kWh)	
	The display indicates the following active fundamental import '→' and export '←' energies: Active Fundamental import = 98762 kWh Active Fundamental export = 235 kWh
Reactive import/export when active import/export energies (kVArh)	
	The display indicates the following: Reactive import energy when active import = 99999 kVArh; Reactive export energy when active import = 99999 kVArh; Reactive import energy when active export = 99999 kVArh; Reactive export energy when active export = 99999 kVArh.

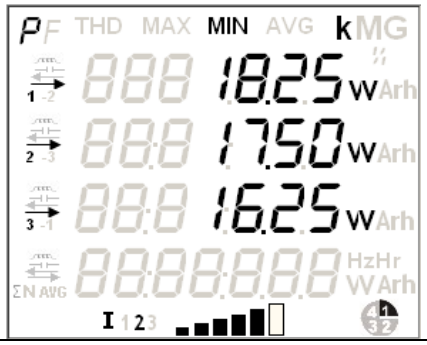
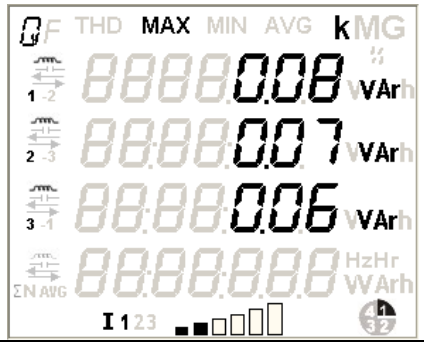
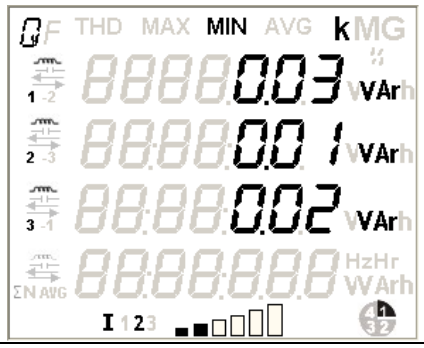
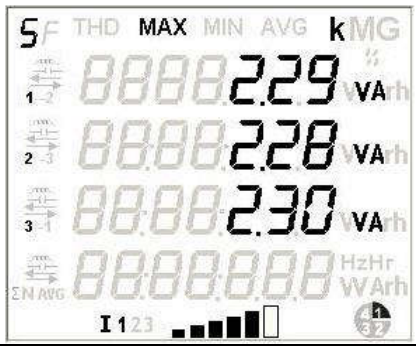
Display Messages	Meaning
Reactive import and export energies (kVArh)	
	The display indicates the following reactive import '⟶' and export '⟵' energy values: Reactive import = 99875 kVArh Reactive export = 343 kVArh
Apparent import and export energies (kVAh) – current values	
	The display indicates the following apparent import '⟶' and export '⟵' energy values: Apparent import = 98732 kVAh Apparent export = 357 kVAh
Active (kWh) and apparent (kVAh) forwarded energies	
	The display indicates the following active and apparent forwarded energy values: Active forwarded = 99875 kWh Apparent forwarded = 98875 kVAh
Reactive lag and lead forwarded energies (kVArh)	
	The display indicates reactive forwarded energy value as 98785 kVArh when the load is inductive/lag '⎍' and 98885 kVArh when the load is capacitive/lead '⊣⊢'.

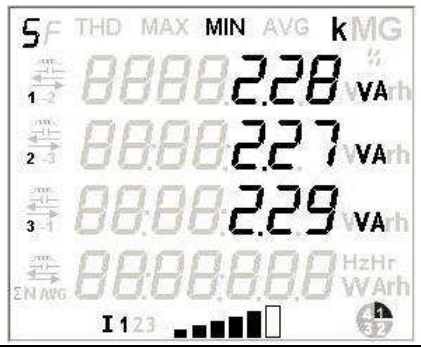
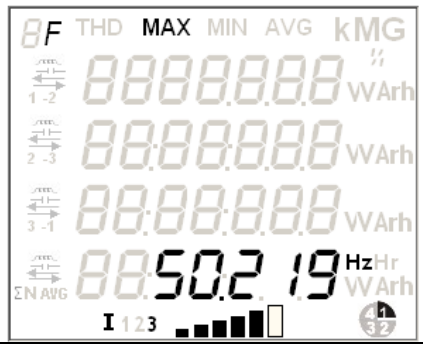
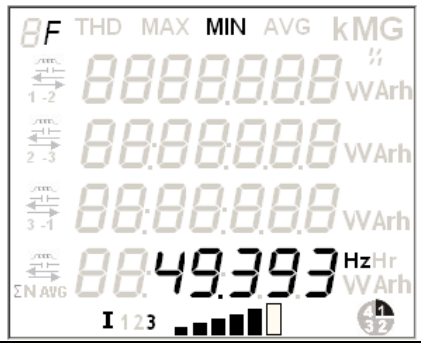
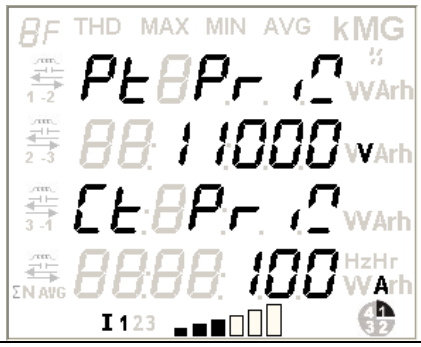
Reactive Import and Export energies (kVArh)

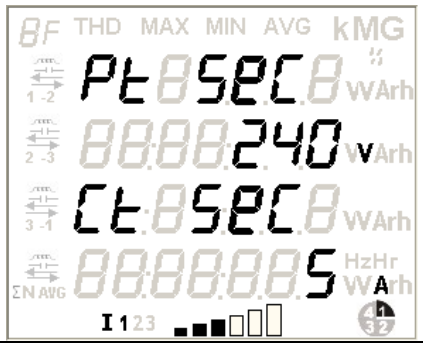
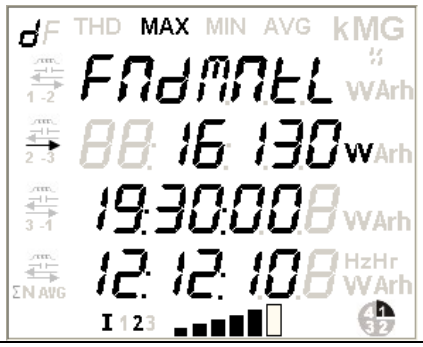
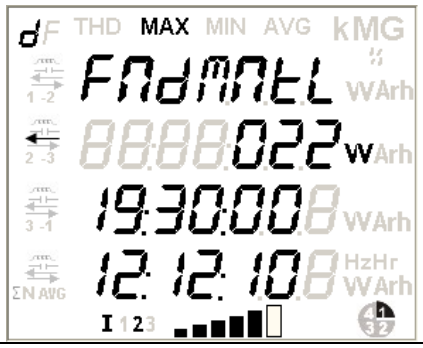
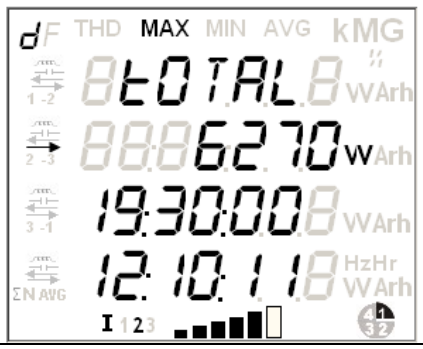
Display Messages	Meaning
	The display indicates reactive import '⟶' energy value as 1.13 kVArh and reactive export '⟵' energy value as 0.00 kVArh
Phase angles	
	The display indicates the following phase angle in each phase: Phase 1-to-Phase 2 = 120.0 degree Phase 2-to-Phase 3 = 120.0 degree Phase 3-to-Phase 1 = 119.9 degree
Power Interruption Count	
	The display 'Power Interruption Count' indicates that power interruption has occurred 13 times from the date of manufacturing.
Load On-Off hours	
	The display indicates the number of hours for which load was on and off. The message displays 'Load On hours' as 34 and 'Load Off hours' as 45.
Power On-Off hours	

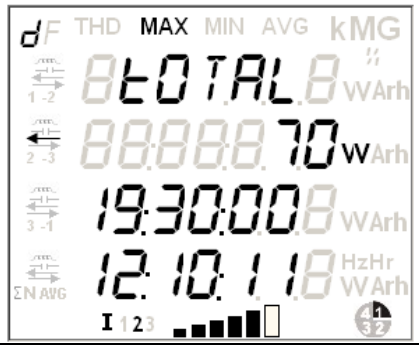
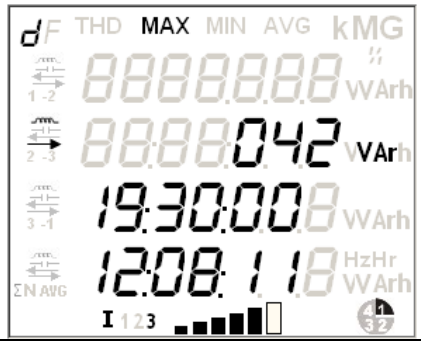
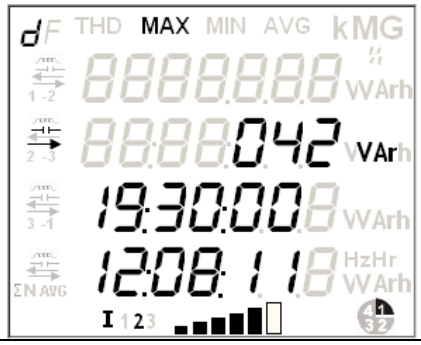
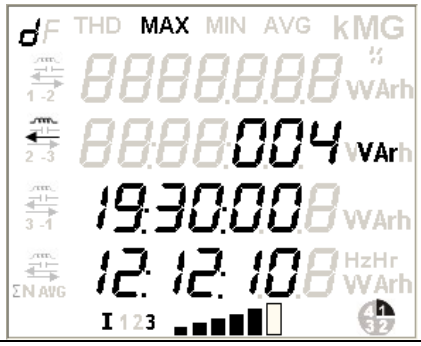
Display Messages	Meaning
	The display indicates the number of hours for which power was on and off from the date of manufacturing. The message displays ‘Power On hours’ as 85 and ‘Power Off hours’ as 45.
Phase-wise maximum instantaneous voltage (V)	
	The display indicates the following maximum ‘Max’ instantaneous voltage recorded in each phase: Phase 1 = 240.12 V ; Phase 2 = 240.13 V ; Phase 3 = 240.14 V
Phase-wise minimum instantaneous voltage (V)	
	The display indicates the following minimum ‘Min’ instantaneous voltage recorded in each phase: Phase 1 = 239.12 V ; Phase 2 = 239.13 V ; Phase 3 = 239.14 V
Phase-wise maximum instantaneous current (A)	
	The display indicates the following maximum ‘Max’ instantaneous current recorded in each phase: Phase 1 = 9.90 A ; Phase 2 = 9.92 A ; Phase 3 = 9.93 A

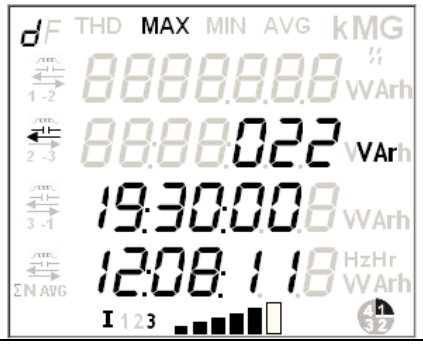
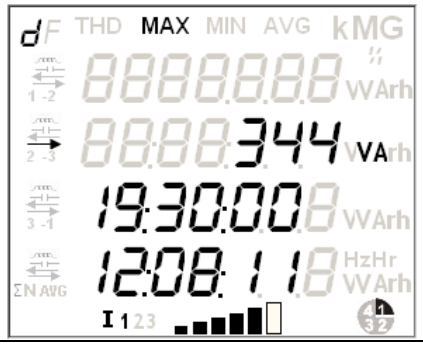
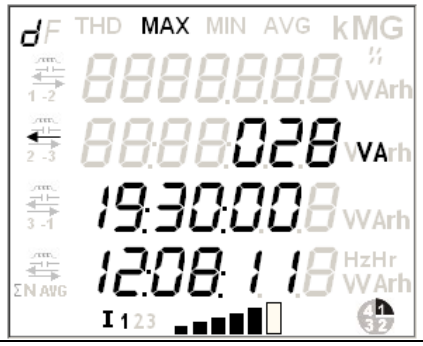
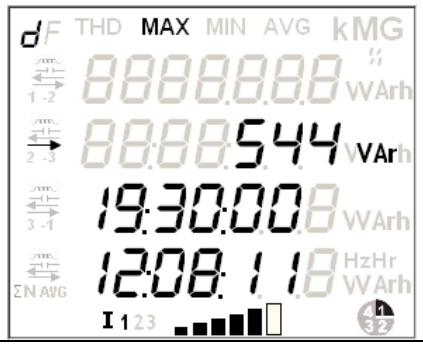
Display Messages	Meaning
Phase-wise minimum instantaneous current (A)	
	The display indicates the following minimum 'Min' instantaneous current recorded in each phase: Phase 1 = 9.81 A ; Phase 2 = 9.75 A ; Phase 3 = 9.25 A
Phase-wise minimum power factor lag	
	The display indicates the following minimum 'Min' instantaneous power factor lag recorded in each phase: Phase 1 = 0.890 ; Phase 2 = 0.895 ; Phase 3 = 0.890
Phase-wise minimum power factor lead	
	The display indicates the following minimum 'Min' instantaneous power factor lead recorded in each phase: Phase 1 = 0.780 ; Phase 2 = 0.782 ; Phase 3 = 0.782
Phase-wise maximum active power (W)	
	The display indicates the following maximum 'Max' active power recorded in each phase: Phase 1 = 19.80 kW ; Phase 2 = 19.50 kW ; Phase 3 = 18.50 kW In addition, the display on the left indicates import '→' in all three phases.

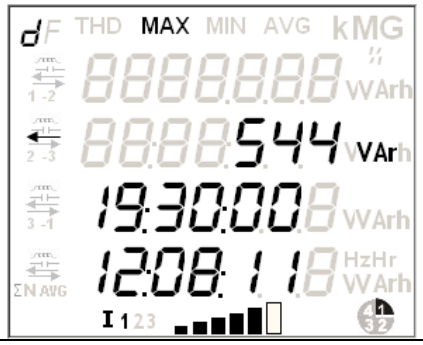
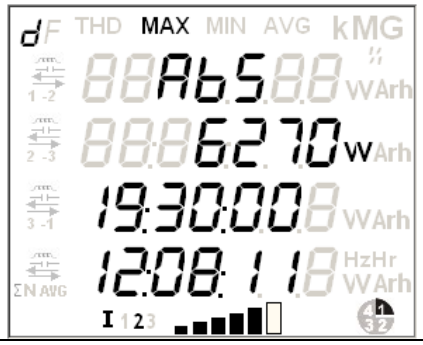
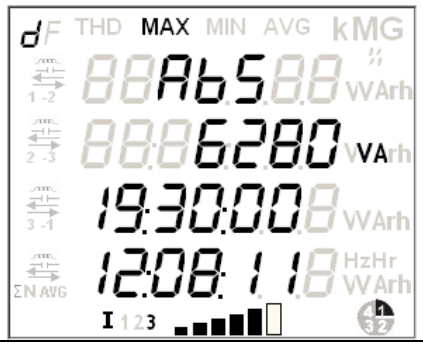
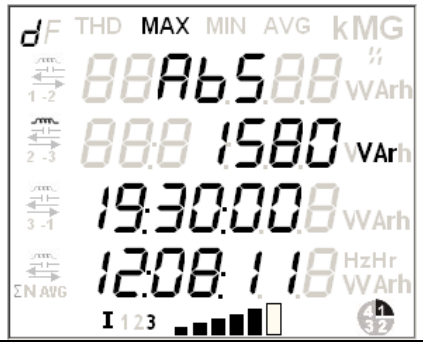
Display Messages	Meaning
Phase-wise minimum active power (W)	
	The display indicates the following minimum 'Min' active power recorded in each phase: Phase 1 = 18.25 kW ; Phase 2 = 17.50 kW ; Phase 3 = 16.25 kW In addition, the display on the left indicates import '→' in all three phases.
Phase-wise maximum reactive power (VAr)	
	The display indicates the following maximum 'Max' reactive power recorded in each phase: Phase 1 = 0.08 kVAr ; Phase 2 = 0.07 kVAr ; Phase 3 = 0.06 kVAr In addition, the display on the left indicates reactive power is inductive/lag '⌐¬' in all three phases
Phase-wise minimum reactive power (VAr)	
	The display indicates the following minimum 'Min' reactive power recorded in each phase: Phase 1 = 0.03 kVAr ; Phase 2 = 0.01 kVAr ; Phase 3 = 0.02 kVAr In addition, the display on the left indicates reactive power is inductive/lag '⌐¬' in all three phases.
Phase-wise maximum apparent power (VA)	
	The display indicates the following maximum 'Max' apparent power recorded in each phase: Phase 1 = 2.29 kVA ; Phase 2 = 2.28 kVA ; Phase 3 = 2.30 kVA

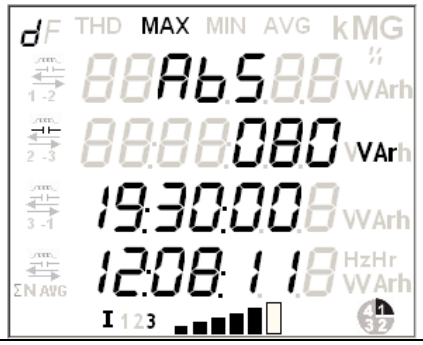
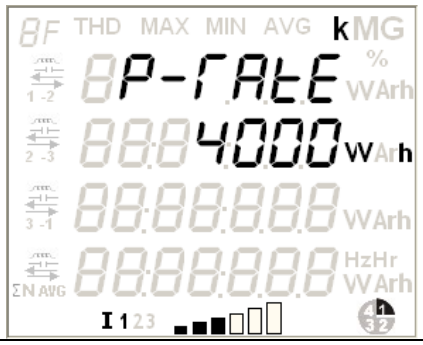
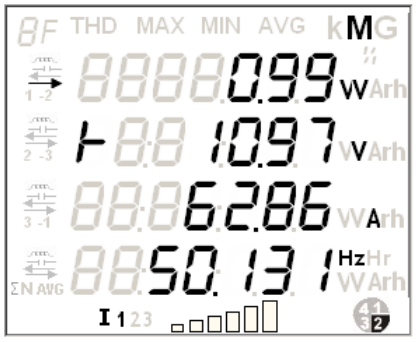
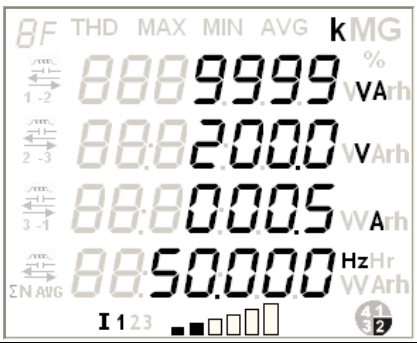
Display Messages	Meaning
Phase-wise minimum apparent power (VA)	
	The display indicates the following minimum ‘Min’ apparent power recorded in each phase: Phase 1 = 2.28 kVA ; Phase 2 = 2.27 kVA ; Phase 3 = 2.29 kVA
Maximum frequency (Hz)	
	The display indicates the maximum ‘Max’ frequency recorded by the meter is 50.219 Hz
Minimum frequency (Hz)	
	The display indicates the minimum ‘Min’ frequency recorded by the meter is 49.393 Hz
Primary voltage (V) and current (A) ratings - Primary VT-CT ratio	
	The display indicates the following primary voltage ‘Pt Primary’ and current ‘Ct Primary’ ratings configured in the meter: Primary voltage = 11000 V Primary current = 100 A

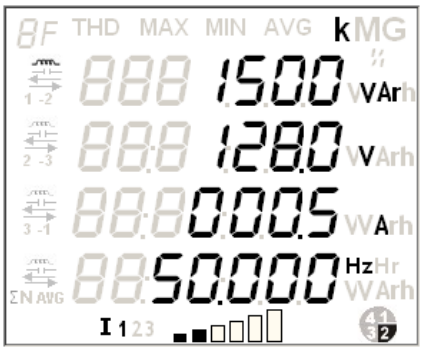
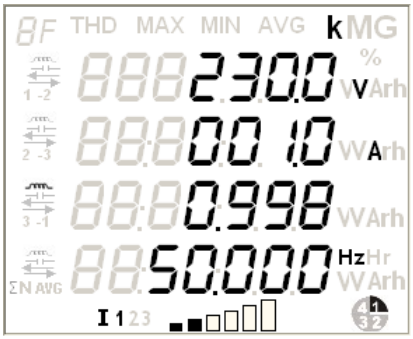
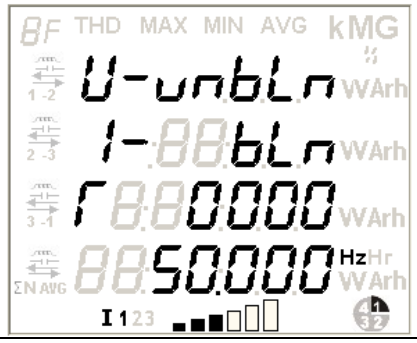
Display Messages	Meaning
Secondary voltage (V) and current (A) ratings - Secondary VT-CT ratio	
	The display indicates the following secondary voltage 'Pt Secondary' and current 'Ct Secondary' ratings configured in the meter: Secondary voltage = 240 V Secondary current = 5 A
Maximum demand of active fundamental import energy (W)	
	Page identifier at the top left indicates 'd' for demand being displayed currently on the page. The display indicates the following maximum 'Max' demand value of active fundamental import '→' energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 16130 W; Time = 19:30:00; Date = 12:12:10 Note: The display can be configured for all supported MD energy types
Maximum demand of active fundamental export energy (W)	
	The display indicates the following maximum 'Max' demand value of active fundamental export '←' energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 22 W; Time = 19:30:00; Date = 12:12:10
Maximum demand of active total import energy (W)	
	The display indicates the following maximum 'Max' demand value of active total import '→' energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 6270 W; Time = 19:30:00; Date = 12:10:11

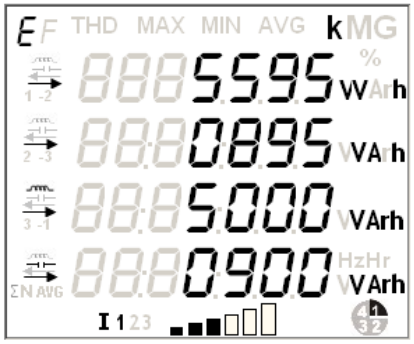
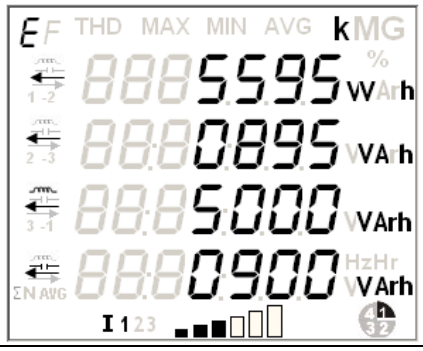
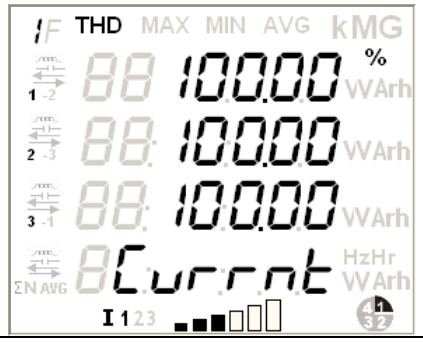
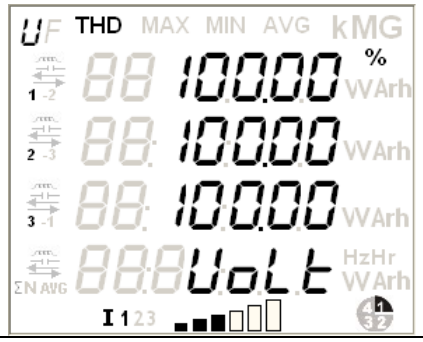
Display Messages	Meaning
Maximum demand of active total export energy (W)	
	The display indicates the following maximum 'Max' demand value of active total export '←' energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 70 W; Time = 19:30:00; Date = 12:10:11
Maximum demand of reactive lag '⎓' while active import energy (VAr)	
	The display indicates the following maximum 'Max' demand value of reactive lag '⎓' while active import '→' energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 42 VAr; Time = 19:30:00; Date = 12:08:11
Maximum demand of reactive lead '⊣⊢' while active import energy (VAr)	
	The display indicates the following maximum 'Max' demand value of reactive lead '⊣⊢' while active import '→' energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 42 VAr; Time = 19:30:00; Date = 12:08:11
Maximum demand of reactive lag '⎓' while active export energy (VAr)	
	The display indicates the following maximum 'Max' demand value of reactive lag '⎓' while active export '←' energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 4 VAr; Time = 19:30:00; Date = 12:12:10

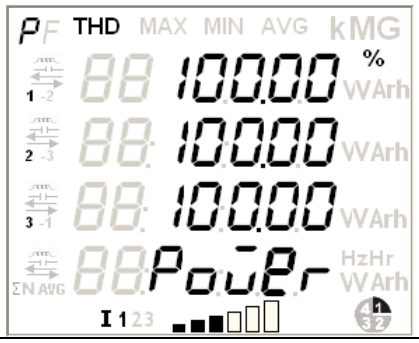
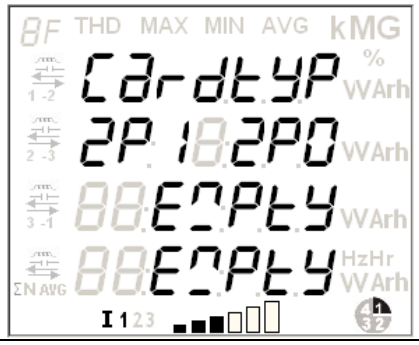
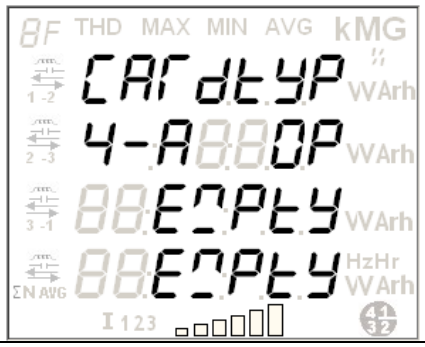
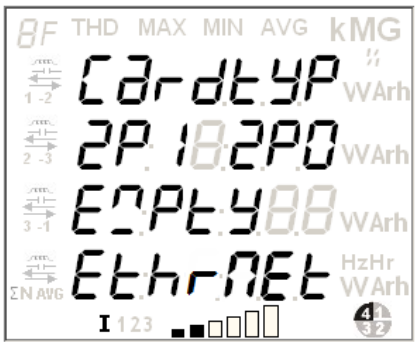
Display Messages	Meaning
Maximum demand of reactive lead '⊣⊢' while active export energy (VAr)	
	The display indicates the following maximum 'Max' demand value of reactive lead '⊣⊢' while active export '⟵' energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 22 VAr; Time = 19:30:00; Date = 12:08:11
Maximum demand of apparent import energy (VA)	
	The display indicates the following maximum 'Max' demand value of apparent import '⟶' energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 344 VA; Time = 19:30:00; Date = 12:08:11
Maximum demand of apparent export energy (VA)	
	The display indicates the following maximum 'Max' demand value of apparent export '⟵' energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 28 VA Time = 19:30:00; Date = 12:08:11
Maximum demand of reactive import energy (VAr)	
	The display indicates the following maximum 'Max' demand value of reactive import '⟶' energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 544 VAr; Time = 19:30:00; Date = 12:08:11

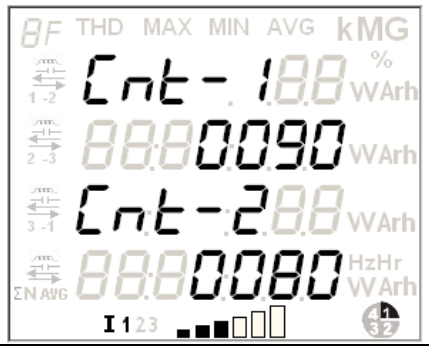
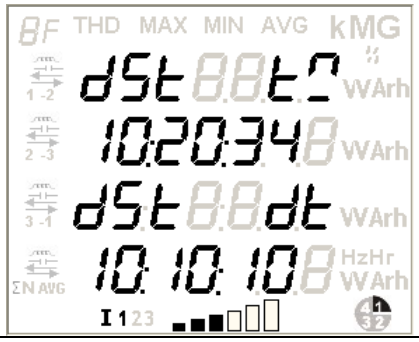
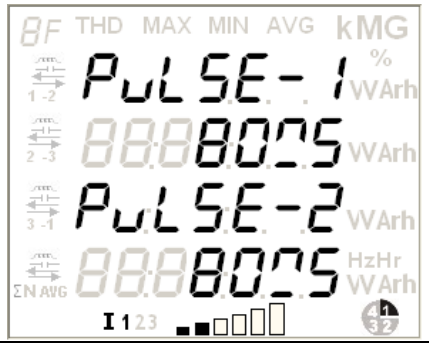
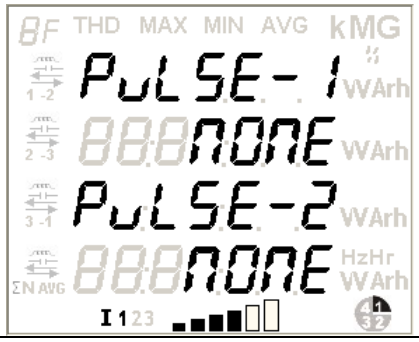
Display Messages	Meaning
Maximum demand of reactive export energy (VAr)	
	The display indicates the following maximum 'Max' demand value of reactive export '←' energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 544 VAr; Time = 19:30:00; Date = 12:08:11
Maximum demand of absolute active energy (W)	
	The display indicates the following maximum 'Max' demand value of absolute active energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 6270 W; Time = 19:30:00; Date = 12:08:11
Maximum demand of absolute apparent energy (VA)	
	The display indicates the following maximum 'Max' demand value of absolute apparent energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 6280 VA; Time = 19:30:00; Date = 12:08:11
Maximum demand of absolute reactive lag energy (VAr)	
	The display indicates the following maximum 'Max' demand value of absolute reactive lag '⌇' energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 1580 VAr; Time = 19:30:00; Date = 12:08:11

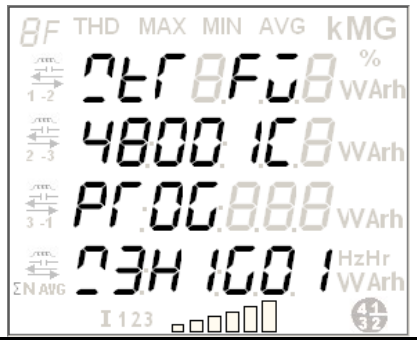
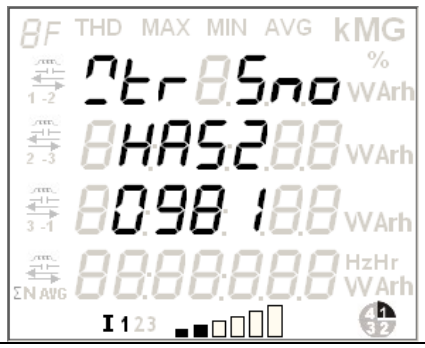
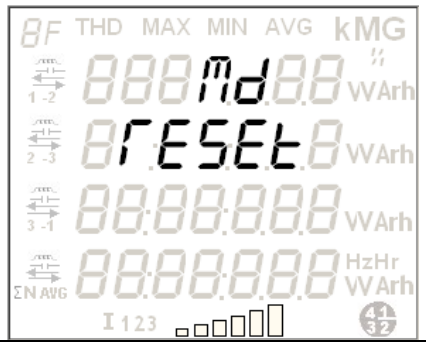
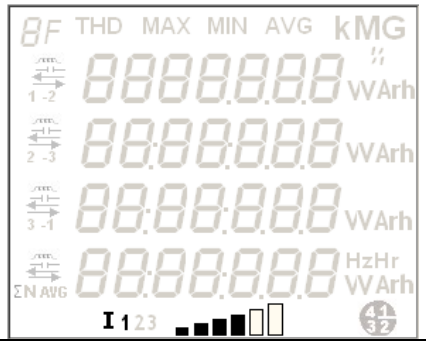
Display Messages	Meaning
Maximum demand of absolute reactive lead energy (VAr)	
	The display indicates the following maximum 'Max' demand value of absolute reactive lead '⊣⊢' energy with the recorded time (in hh:mm:ss) and date (in dd:mm:yy): MD for a billing cycle = 080 VAr; Time = 19:30:00; Date = 12:08:11
Pulse rate	
	The display indicates the 'PULSE RATE' of metrological LED, configured in the meter is 4000 impulses/kWh. Note : 'k' indicates pulse rate per kWh; 'M' indicates pulse rate per MWh; 'G' indicates pulse rate per GWh;
Active total power, average voltage, average line current, frequency	
	In this message, the above said instantaneous parameter values are displayed together. In this case, the unit symbol ('k' for kilo, 'M' for mega or 'G' for giga) at the top right corner of the screen will be applicable only for the first line. Display in each line indicates the following measured values: 1st line: active total power is 0.99 MW; 2nd line: average voltage (which is the average of instantaneous voltages for all the phases) is 10.97 kV; k symbol represents k for kilo. 3rd line: average line current (which is the average of instantaneous line currents for all the phases) is 62.86 A; 4th line: frequency is 50.131 Hz. Note: Voltage measured for HV (3-phase 3-wire) is L-L; L-L and L-N for HV (3-phase 4-wire) or LV (3-phase 4-wire) in different displays.
Apparent power, average voltage, average line current, frequency	
	In this message, the above said instantaneous parameter values are displayed together. In this case, the unit symbol ('k' for kilo, 'M' for mega or 'G' for giga) at the top right corner of the screen will be applicable only for the first line. Display in each line indicates the following measured values: 1st line: apparent power is 9999 kVA; 2nd line: average voltage is 200 V; 3rd line: average line current is 0.5 A; 4th line: frequency is 50 Hz. Note: Voltage measured for HV (3-phase 3-wire) is L-L; L-L and L-N for HV (3-phase 4-wire) or LV (3-phase 4-wire) in different displays.

Display Messages	Meaning
Reactive power, average voltage, average line current, frequency	
	In this message, the above said instantaneous parameter values are displayed together. In this case, the unit symbol ('k' for kilo, 'M' for mega or 'G' for giga) at the top right corner of the screen will be applicable only for the first line. Display in each line indicates the following measured values: 1st line: reactive power is 1500 kVAr; 2nd line: average voltage is 128 V; 3rd line: average line current is 0.5 A; 4th line: frequency is 50 Hz. Note: Voltage measured for HV (3-phase 3-wire) is L-L; L-L and L-N for HV (3-phase 4-wire) or LV (3-phase 4-wire) in different displays.
Average voltage, average line current, average power factor, frequency	
	In this message, the above said instantaneous parameter values are displayed together. In this case, the unit symbol ('k' for kilo, 'M' for mega or 'G' for giga) at the top right corner of the screen will be applicable only for the first line. Display in each line indicates the following measured values: 1st line: average voltage is 230 kV; 2nd line: average line current is 1 A; 3rd line: average power factor is 0.998; 4th line: frequency is 50 Hz. Note: Voltage measured for HV (3-phase 3-wire) is L-L; L-L and L-N for HV (3-phase 4-wire) or LV (3-phase 4-wire) in different displays.
Voltage unbalance, current balance, RPM (of the motor), frequency	
	The message in each line indicates the following: 1st line: voltage is unbalance; 2nd line: current is balance; 3rd line: RPM of the motor is 0; 4th line: frequency is 50 Hz.

Display Messages	Meaning
All import energies	
	Page identifier at the top left indicates 'E' for energies being displayed currently on the page. In this case, the unit symbol ('k' for kilo, 'M' for mega or 'G' for giga) at the top right corner of the screen will be applicable for all the lines. The message in each line indicates the following: 1st line: active total import '⟶' energy is 5595 kWh; 2nd line: apparent import '⟶' energy is 895 kVAh; 3rd line: reactive import '⟶' energy (inductive '⌇') is 5000 kVArh; 4th line: reactive import '⟶' energy (capacitive '⊣⊢') is 900 kVArh.
All export energies	
	Page identifier at the top left indicates 'E' for energies being displayed currently on the page. In this case, the unit symbol ('k' for kilo, 'M' for mega or 'G' for giga) at the top right corner of the screen will be applicable for all the lines. The message in each line indicates the following: 1st line: active total export '⟵' energy is 5595 KWh; 2nd line: apparent export '⟵' energy is 895 kVAh; 3rd line: reactive export '⟵' energy (inductive '⌇') is 5000 kVArh; 4th line: reactive export '⟵' energy (capacitive '⊣⊢') is 900 kVArh.
Total Harmonic Distortion (THD) – Current	
	Page identifier at the top left indicates 'I' for current being displayed currently on the page. The message indicates the total harmonic distortion percentage of 'Current' in all the three phases is 100%.
Total Harmonic Distortion (THD) – Voltage	
	Page identifier at the top left indicates 'U' for voltage being displayed currently on the page. The message indicates the total harmonic distortion percentage of 'Voltage' in all the three phases is 100%.

Display Messages	Meaning
Total Harmonic Distortion (THD) – Power	
	Page identifier at the top left indicates ‘P’ for power being displayed currently on the page. The message indicates the total harmonic distortion percentage of ‘Power’ in all the three phases is 100%.
Card type connected	
	The message indicates the card type connected in I/O slot is ‘2 pulse input and 2 pulse output’ and no cards are connected in the other two slots.
	The message indicates the card type attached in I/O slot is ‘4 analogue output’ and no cards are connected in the other two slots.
	The message indicates ‘2 pulse input and 2 pulse output’ and ‘Ethernet’ cards are connected.

Display Messages	Meaning
	The meter records pulse counter values for 2 pulse input pins. In this message the display indicates the value of ‘pulse counter 1’ is currently ‘90’ and that of ‘pulse counter 2’ is ‘80’.
DST time and date	
	In this message the display indicates the current daylight saving time (DST) time is 10:20:34 (in hh:mm:ss) and current DST date is 10:10:10(in dd:mm:yy).
Pulse Width (in milliseconds) for pulse output pins	
	In this message the display indicates the following pulse width is selected for 2 pulse output pin: Pulse width for ‘pulse output pin 1’ is ’80 ms’ and for ‘pulse output pin 2’ is ’80 ms’.
Pulse Width not selected	
	In this message the display ‘none’ indicates no pulse width is selected for the output pins.

Display Messages	Meaning
Meter firmware and Program name	
	In this message the first two lines indicates that the ‘Meter Firmware’ loaded in the meter is ’48001C’ and the last two lines indicates the ‘Program Name’ is ‘M3X1G01’.
Meter Serial Number	
	This message indicates the meter serial number is ‘XA520981’.
MD reset acknowledgement	
	This ‘MD Reset’ message is an acknowledgement from the meter that the MD has been reset recently.
Percentage bar for phase-wise line current	
	The footer display indicates phase-wise instantaneous line current percentage graph. The % graph for phase 1 line current shows 80% of I_{max}. The percentage graph will always appear in the footer along with other displays and will cycle between phase 1 line current, phase 2 line current and phase 3 line current. The bar stands for 20%, 40%, 60%, 80%, 100% and 120% of I_{max}.

Annexure II: Supported Features and Parameters in Elite Variants

	Elite 440-	441	442	443	444	445	446	447	448
Features	**Available Parameters**								
Main Energy		✔	✔	✔	✔	✔	✔	✔	✔
	Active energy, import, net					✔	✔	✔	✔
	Active energy, export, net					✔	✔	✔	✔
	Active energy, import, fundamental								
	Active energy, export, fundamental								
	Apparent energy, while active import					✔	✔	✔	✔
	Apparent energy, while active export					✔	✔	✔	✔
	Absolute net active energy	✔	✔	✔	✔				
	Absolute apparent energy	✔	✔	✔	✔				
	Absolute reactive lagging energy			✔	✔				
	Absolute reactive leading energy			✔	✔				
	Reactive energy, import while active import					✔		✔	
	Reactive energy, import while active export					✔		✔	
	Reactive energy, export while active import					✔		✔	
	Reactive energy, export while active export					✔		✔	
	Reactive energy, import						✔		✔
	Reactive energy, export						✔		✔
Maximum Demand					✔	✔	✔	✔	✔
	Energy								
	Active energy, import, net					✔	✔	✔	✔
	Active energy, export, net					✔	✔	✔	✔
	Active energy, import, fundamental								
	Active energy, export, fundamental								
	Apparent energy, while active import					✔	✔	✔	✔
	Apparent energy, while active export					✔	✔	✔	✔
	Absolute net active energy				✔				
	Absolute apparent energy				✔				
	Absolute reactive lagging energy				✔				
	Absolute reactive leading energy				✔				
	Reactive energy, import while active import					✔		✔	
	Reactive energy, import while active export					✔		✔	
	Reactive energy, export while active import					✔		✔	
	Reactive energy, export while active export					✔		✔	
	Reactive energy, import						✔		✔
	Reactive energy, export						✔		✔
	DIP (15, 30, 60 min.)				✔	✔	✔	✔	✔
	DIP WIDTH (5, 10, 15, 20, 30)				✔	✔	✔	✔	✔
Energy Snapshots		✔	✔	✔	✔	✔	✔	✔	✔
	Energy								
	Active energy, import, net					✔	✔	✔	✔
	Active energy, export, net					✔	✔	✔	✔
	Active energy, import, fundamental								
	Active energy, export, fundamental								
	Apparent energy, while active import					✔	✔	✔	✔
	Apparent energy, while active export					✔	✔	✔	✔
	Absolute net active energy	✔	✔	✔	✔				

Elite 440-		441	442	443	444	445	446	447	448
Features	**Available Parameters**								
	Absolute apparent energy	✔	✔	✔	✔				
	Absolute reactive lagging energy			✔	✔				
	Absolute reactive leading energy			✔	✔				
	Reactive energy, import while active import					✔		✔	
	Reactive energy, import while active export					✔		✔	
	Reactive energy, export while active import					✔		✔	
	Reactive energy, export while active export					✔		✔	
	Reactive energy, import						✔		✔
	Reactive energy, export						✔		✔
	Snapshot Time (in Steps of 30 min.)		✔	✔	✔	✔	✔	✔	✔
Load Profile		✔	✔	✔	✔	✔	✔	✔	✔
	Energy								
	Active energy, import, net					✔	✔	✔	✔
	Active energy, export, net					✔	✔	✔	✔
	Active energy, import, fundamental								
	Active energy, export, fundamental								
	Apparent energy, while active import					✔	✔	✔	✔
	Apparent energy, while active export					✔	✔	✔	✔
	Absolute net active energy	✔	✔	✔	✔				
	Absolute apparent energy	✔	✔	✔	✔				
	Absolute reactive lagging energy			✔	✔				
	Absolute reactive leading energy			✔	✔				
	Reactive energy, import while active import					✔		✔	
	Reactive energy, import while active export					✔		✔	
	Reactive energy, export while active import					✔		✔	
	Reactive energy, export while active export					✔		✔	
	Reactive energy, import						✔		✔
	Reactive energy, export						✔		✔
	Inst Parameters	✔	✔	✔	✔	✔	✔	✔	✔
	L1 Phase Voltage	✔	✔	✔	✔	✔	✔	✔	✔
	L2 Phase Voltage	✔	✔	✔	✔	✔	✔	✔	✔
	L3 Phase Voltage	✔	✔	✔	✔	✔	✔	✔	✔
	Frequency	✔	✔	✔	✔	✔	✔	✔	✔
	L1 Phase Power Factor		✔	✔	✔	✔	✔	✔	✔
	L2 Phase Power Factor		✔	✔	✔	✔	✔	✔	✔
	L3 Phase Power Factor		✔	✔	✔	✔	✔	✔	✔
	L1 Phase Line Current	✔	✔	✔	✔	✔	✔	✔	✔
	L2 Phase Line Current	✔	✔	✔	✔	✔	✔	✔	✔
	L3 Phase Line Current	✔	✔	✔	✔	✔	✔	✔	✔
	Mean Measured Voltage	✔	✔	✔	✔	✔	✔	✔	✔
	Mean Measured Current	✔	✔	✔	✔	✔	✔	✔	✔
	Pulse Counters								
	Counter Input 1			✔	✔	✔	✔	✔	✔
	Counter Input 2			✔	✔	✔	✔	✔	✔
	SIP (15, 30, 60 min)	✔	✔	✔	✔	✔	✔	✔	✔
	SIP WIDTH (5, 10, 15, 20, 30)	✔	✔	✔	✔	✔	✔	✔	✔
Billing Dates	Max 12 Billing Dates		✔	✔	✔	✔	✔	✔	✔
DST Dates	Max 30 DST Dates	✔	✔	✔	✔	✔	✔	✔	✔
Metro LED		✔	✔	✔	✔	✔	✔	✔	✔
	Active energy, import, net					✔	✔	✔	✔
	Active energy, export, net					✔	✔	✔	✔
	Active energy, import, fundamental								

Elite 440-		441	442	443	444	445	446	447	448
Features	**Available Parameters**								
	Active energy, export, fundamental								
	Apparent energy, while active import					✔	✔	✔	✔
	Apparent energy, while active export					✔	✔	✔	✔
	Absolute net active energy	✔	✔	✔	✔				
	Absolute apparent energy	✔	✔	✔	✔				
	Absolute reactive lagging energy			✔	✔				
	Absolute reactive leading energy			✔	✔				
	Reactive energy, import while active import					✔		✔	
	Reactive energy, import while active export					✔		✔	
	Reactive energy, export while active import					✔		✔	
	Reactive energy, export while active export					✔		✔	
	Reactive energy, import						✔		✔
	Reactive energy, export						✔		✔
	Active energy, import and export, net					✔	✔	✔	✔
	Active energy, import and export, fundamental								
	Reactive energy, import and export						✔		✔
Displays									
	Instantaneous Displays	✔	✔	✔	✔	✔	✔	✔	✔
	Voltage Phase to Phase (L1-L2, L2-L3, L3-L1, Average)	✔	✔	✔	✔	✔	✔	✔	✔
	Voltage Phase to Neutral (L1, L2, L3, Average)	✔	✔	✔	✔	✔	✔	✔	✔
	Phase wise Line Current (L1, L2, L3, N)	✔	✔	✔	✔	✔	✔	✔	✔
	Phase wise Active Current (L1, L2, L3)	✔	✔	✔	✔	✔	✔	✔	✔
	Phase wise Reactive Current (L1, L2, L3)	✔	✔	✔	✔	✔	✔	✔	✔
	Phase wise Power Factor (L1, L2, L3, Average)		✔	✔	✔	✔	✔	✔	✔
	Phase wise Apparent Power (L1, L2, L3, Total)			✔	✔	✔	✔	✔	✔
	Phase wise Active Power (L1, L2, L3, Total)		✔	✔	✔	✔	✔	✔	✔
	Phase wise Reactive Power (L1, L2, L3, Total)			✔	✔	✔	✔	✔	✔
	System Frequency	✔	✔	✔	✔	✔	✔	✔	✔
	Phase Angle (L1-L2, L2-L3, L3-L1)			✔	✔	✔	✔	✔	✔
	Avg Voltage(L-L), Avg Current, Power Factor, Frequency(HV-3, HV-4)		✔	✔	✔	✔	✔	✔	✔
	Avg Voltage(L-N), Avg Current,Power Factor, Frequency (LV-4)		✔	✔	✔	✔	✔	✔	✔
	P(Active Total) ,Avg Voltage(L-L), Avg Current, Frequency(HV-3, HV-4)		✔	✔	✔	✔	✔	✔	✔
	P(Active Total), Avg Voltage(L-N), Avg Current, Frequency(LV-4)		✔	✔	✔	✔	✔	✔	✔
	P(Reactive Total), Avg Voltage(L-L), Avg Current, Frequency (HV-3, HV-4)			✔	✔	✔	✔	✔	✔
	P(Reactive Total), Avg Voltage(L-N),Avg Current, Frequency(LV-4)			✔	✔	✔	✔	✔	✔
	P(App Total), Avg Voltage(L-L),Avg Current, Frequency(HV-3, HV-4)			✔	✔	✔	✔	✔	✔
	P(Apparent Total), Avg Voltage(L-N), Avg Current, Frequency (LV-4)			✔	✔	✔	✔	✔	✔
	Total Harmonic Distortion (THD%) Voltage (L1, L2, L3)	✔	✔	✔	✔	✔	✔	✔	✔
	Total Harmonic Distortion (THD%) Current (L1, L2, L3)	✔	✔	✔	✔	✔	✔	✔	✔
	Total Harmonic Distortion (THD%) Power (L1, L2, L3)		✔	✔	✔	✔	✔	✔	✔
	Energy Display	✔	✔	✔	✔	✔	✔	✔	✔
	Active Import Total, Active Export Total					✔	✔	✔	✔
	Active Import Fundamental, Active Export Fundamental								
	Reactive Q1, Reactive Q2, Reactive Q3, Reactive Q4					✔		✔	
	Reactive Import, Reactive Export						✔		✔

Elite 440-		441	442	443	444	445	446	447	448
Features	**Available Parameters**								
	Apparent while Active Import, Apparent while Active Export					✔	✔	✔	✔
	Active Absolute, Apparent Absolute	✔	✔	✔	✔				
	Reactive Lag Absolute, Reactive Lead Absolute			✔	✔				
	Active total Import,Apparent Import,Reactive Import-inductive, Reactive Import-Capacitive					✔		✔	
	Active total Export,Apparent Export ,Reactive Export-inductive, Reactive Export-Capacitive					✔		✔	
	Universal MD Display (with Date and Time Stamp)				✔	✔	✔	✔	✔
	Active Import Total					✔	✔	✔	✔
	Active Export Total					✔	✔	✔	✔
	Active Import Fundamental								
	Active Export Fundamental								
	Reactive Import while Active Import					✔		✔	
	Reactive Export while Active Import					✔		✔	
	Reactive Import while Active Export					✔		✔	
	Reactive Export while Active Export					✔		✔	
	Apparent while Active Import					✔	✔	✔	✔
	Apparent while Active Export					✔	✔	✔	✔
	Reactive Import						✔		✔
	Reactive Export						✔		✔
	Active Absolute				✔				
	Apparent Absolute				✔				
	Reactive Lag Absolute				✔				
	Reactive Lead Absolute				✔				
	Max Favourite Display Supported								
	Min/Max Display								
	Max Voltage (L1, L2, L3)							✔	✔
	Min Voltage (L1, L2, L3)							✔	✔
	Max Line Current (L1, L2, L3)							✔	✔
	Min Line Current (L1, L2, L3)							✔	✔
	Min Lag Power Factor (L1, L2, L3)							✔	✔
	Min Lead Power Factor (L1, L2, L3)							✔	✔
	Max Active Power (L1, L2, L3)							✔	✔
	Min Active Power (L1, L2, L3)							✔	✔
	Max Reactive Power (L1, L2, L3)							✔	✔
	Min Reactive Power (L1, L2, L3)							✔	✔
	Max Apparent Power (L1, L2, L3)							✔	✔
	Min Apparent Power (L1, L2, L3)							✔	✔
	Max Frequency							✔	✔
	Min Frequency							✔	✔
	Miscellaneous Display	✔	✔	✔	✔	✔	✔	✔	✔
	All segments on	✔	✔	✔	✔	✔	✔	✔	✔
	No Display	✔	✔	✔	✔	✔	✔	✔	✔
	Date and Time	✔	✔	✔	✔	✔	✔	✔	✔
	Load On-Off hours		✔	✔	✔	✔	✔	✔	✔
	Power On-Off hours			✔	✔	✔	✔	✔	✔
	Power Interruption Count			✔	✔	✔	✔	✔	✔
	Connection Check including Phase Association	✔	✔	✔	✔	✔	✔	✔	✔
	Voltage balance-unbalance, Current balance-unbalance, Rpm, Frequency	✔	✔	✔	✔	✔	✔	✔	✔
	Counter-1 Value and Counter-2 Value			✔	✔	✔	✔	✔	✔
	Input / Output Card information			✔	✔	✔	✔	✔	✔
	VT Primary and CT Primary Ratio	✔	✔	✔	✔	✔	✔	✔	✔
	VT Secondary and CT Secondary Ratio	✔	✔	✔	✔	✔	✔	✔	✔
	Meter Serial number	✔	✔	✔	✔	✔	✔	✔	✔

Elite 440-		441	442	443	444	445	446	447	448
Features	**Available Parameters**								
	Mask Version number, CLEM Version number	✔	✔	✔	✔	✔	✔	✔	✔
	Seasonal Date and Time (DST)	✔	✔	✔	✔	✔	✔	✔	✔
	Meter constant	✔	✔	✔	✔	✔	✔	✔	✔
Modbus Communication	Modbus baud rate (1200, 2400, 4800, 9600, 38400)	✔	✔	✔	✔	✔	✔	✔	✔
Modules		✔	✔	✔	✔	✔	✔	✔	✔
	No Card								
	2 Pulse Inputs 2 Pulse Outputs			✔	✔	✔	✔	✔	✔
	4 Analogue Outputs			✔	✔	✔	✔	✔	✔
	L1 Phase Voltage			✔	✔	✔	✔	✔	✔
	L2 Phase Voltage			✔	✔	✔	✔	✔	✔
	L3 Phase Voltage			✔	✔	✔	✔	✔	✔
	L1 Phase Line Current			✔	✔	✔	✔	✔	✔
	L2 Phase Line Current			✔	✔	✔	✔	✔	✔
	L3 Phase Line Current			✔	✔	✔	✔	✔	✔
	Active Power Total			✔	✔	✔	✔	✔	✔
	Reactive Power Total			✔	✔	✔	✔	✔	✔
	Apparent Power Total			✔	✔	✔	✔	✔	✔
	Frequency			✔	✔	✔	✔	✔	✔
	Power Factor			✔	✔	✔	✔	✔	✔
	Average Voltage			✔	✔	✔	✔	✔	✔
	Average Line Current			✔	✔	✔	✔	✔	✔
	Ethernet	✔	✔	✔	✔	✔	✔	✔	✔
Commissioning		✔	✔	✔	✔	✔	✔	✔	✔
	Meter Type	✔	✔	✔	✔	✔	✔	✔	✔
	HV 3 Phase 4 Wires	✔	✔	✔	✔	✔	✔	✔	✔
	HV 3 Phase 3 Wires	✔	✔	✔	✔	✔	✔	✔	✔
	LV 3 Phase 4 Wires	✔	✔	✔	✔	✔	✔	✔	✔
MD Reset					✔	✔	✔	✔	✔
Time Set		✔	✔	✔	✔	✔	✔	✔	✔
Reading									
	Meter Information	✔	✔	✔	✔	✔	✔	✔	✔
	Instantaneous Values	✔	✔	✔	✔	✔	✔	✔	✔
	Min-Max Parameters								
	Per Phase Current Maximum							✔	✔
	Per Phase Current Minimum							✔	✔
	Per Phase Voltage Maximum							✔	✔
	Per Phase Voltage Minimum							✔	✔
	Per Phase Active Power Maximum							✔	✔
	Per Phase Active Power Minimum							✔	✔
	Per Phase Reactive Power Maximum							✔	✔
	Per Phase Reactive Power Minimum							✔	✔
	Per Phase Apparent Power Maximum							✔	✔
	Per Phase Apparent Power Minimum							✔	✔
	Per Phase Power Factor Lag Minimum							✔	✔
	Per Phase Power Factor Lead Minimum							✔	✔
	Frequency Maximum							✔	✔
	Frequency Minimum							✔	✔
	Energy of Supported Parameter (Recent and Hist 1 to 6)	✔	✔	✔	✔	✔	✔	✔	✔

Elite 440-		441	442	443	444	445	446	447	448
Features	**Available Parameters**								
	MD of Supported Parameter (Recent and Hist 1 to 6)				✔	✔	✔	✔	✔
	CMD of Supported Parameter (Hist 1 to 6)				✔	✔	✔	✔	✔
	Daily Energy Snapshots of Supported Parameter (Last)	✔	✔	✔	✔	✔	✔	✔	✔
	Load Profile of Supported Parameter	✔	✔	✔	✔	✔	✔	✔	✔
	On-Off Parameters (Power On-Off & Load On-Off) Recent and Hist 1 to 6		✔	✔	✔	✔	✔	✔	✔

Glossary of Energy Types

ACt IUE IMP tOtAL	Active Total Import Energy	Consumed (imported) kWh, including harmonics, metered in quadrants 1 and 4.
ACt IUE EHP tOtAL	Active Total Export Energy	Generated (exported) kWh, including harmonics, metered in quadrants 2 and 3.
ACt IUE IMP FundMEL	Active Fundamental Import Energy	Consumed (imported) kWh, excluding harmonics, metered in quadrants 1 and 4. The meter tracks the fundamental frequency and disregards all other harmonic components.
ACt IUE EHP FundMEL	Active Fundamental Export Energy	Generated (exported) kWh, excluding harmonics, metered in quadrants 2 and 3. The meter tracks the fundamental frequency and disregards all other harmonic components.
APP IMP	Apparent Import Energy	Consumed (imported) KVAh, including harmonics, metered in quadrants 1 and 4.
APP EHP	Apparent Export Energy	Generated (exported) KVAh, including harmonics, metered in quadrants 2 and 3.
rACt IUE IMP	Reactive Import Energy	Consumed (imported) kVArh, including harmonics, metered in quadrants 1 and 2.
rACt IUE EHP	Reactive Export Energy	Generated (exported) kVArh, including harmonics, metered in quadrants 3 and 4.
rACt IUE 91	Reactive Import when Active Import	Consumed (imported) kVArh, when consumed (imported) kWh, metered in quadrants 1.
rACt IUE 94	Reactive Export when Active Import	Generated (exported) kVArh, when consumed (imported) kWh, metered in quadrants 4.
rACt IUE 92	Reactive Import when Active Export	Consumed (imported) kVArh, when generated (exported) kWh, metered in quadrants 2.
rACt IUE 93	Reactive Export when Active Export	Generated (exported) kVArh, when generated (exported) kWh, metered in quadrants 3.

	Forwarded energy	Energy increment in forward direction irrespective of any CT reversal. It is the absolute sum of the three-phase energy.
ACt IUE Fud	*Active Forwarded Energy*	
APP Fud	*Apparent Forwarded Energy*	
rACt IUE LAG Fud	*Reactive Lag Forwarded Energy*	
rACt IUE LEAd Fud	*Reactive Lead Forwarded Energy*	

Note: Energy Quadrant as per relevant IEC standard.

13 Notes



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