Prometer 100

High-precision meter
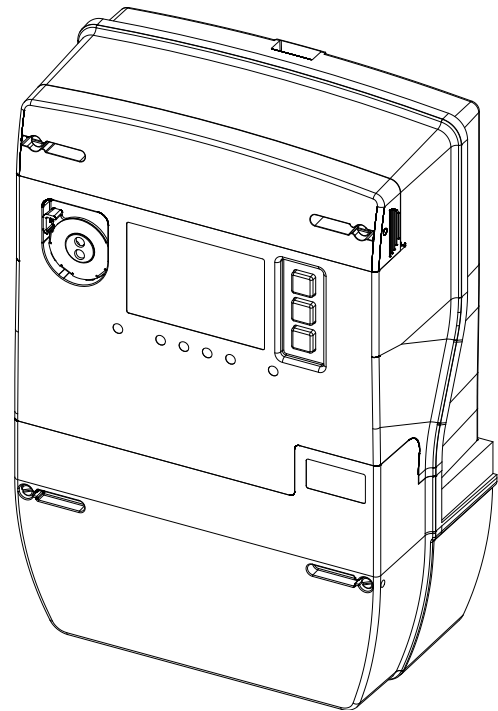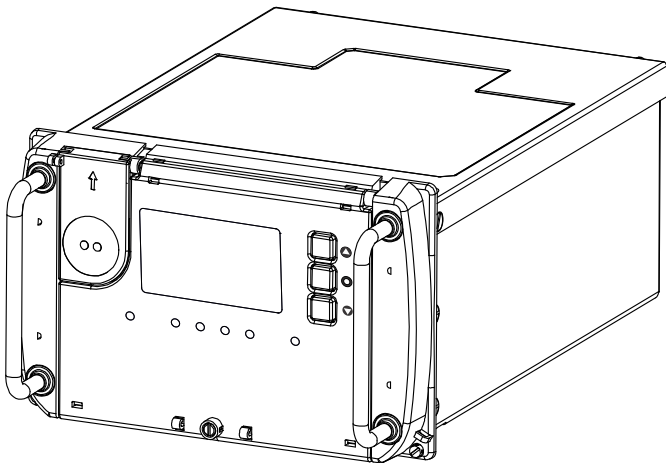
User Manual

BGX501-943-R01

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1   Important Safety Information

Installation, wiring, testing and service must be performed in accordance with all local and national electrical codes.

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this device and the equipment in which it is installed before working on the device or equipment.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Do not perform Dielectric (Hi-Pot) or Megger testing on this device.
- Connect protective ground (earth) before turning on any power supplying this device.

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.

2   Disclaimer

This user manual covers all types of the Prometer 100 energy meter. Depending on the product offering based on business proposal, some features or functionalities may or may not be available in the supplied version. It is therefore recommended to refer the features or functionalities according to the business offered.

The details of complete software's features are out of the scope for this document, please contact concern sales representative for its details if required. Note that due to variations between computers and improvements in software, the screen shots shown in this manual may vary slightly from the appearance of the software on your system.

3   Introduction

This manual discusses the Prometer 100 meter features and provides the information needed to configure and use the meter. The manual covers all versions of Prometer 100-R (rack-mount) and Prometer 100-W (wall-mount) meters.

By the time you are ready to use this guide, your meter should be installed, most basic setup should have been performed, and communications/basic operation should have been verified. If the unit is not yet installed and operational, refer to the Installation Guide shipped with the meter.

This section provides an overview of Prometer 100 meters and summarizes many of their key features.

3.1   Prometer 100 meters

Prometer 100 meters provide revenue-accurate, true RMS measurements of voltage, current, power and energy, and are complemented by extensive I/O capabilities, comprehensive logging, and advanced power quality measurement and compliance verification functions. The meters come with an extensive selection of pre-configured data screens and measurements, so you can use the meters as they are shipped from the factory or customize them to fit your unique requirements.

You can integrate the meters with software such as M-Cubed or with other energy management, SCADA, automation and billing systems, using multiple industry-standard communication channels and protocols.

Common meter applications

- Transmission and distribution metering
- Revenue and tariff metering
- Total harmonic distortion monitoring

- Load management

- System stability monitoring

- Energy pulsing and totalization

- CT/VT error compensation

- Transformer loss compensation

3.1.1 The Prometer 100 meter in an energy management system

You can use Prometer 100 meters as standalone devices, but their extensive capabilities are fully realized when used with software as part of an energy management system (EMS). EMS gives energy suppliers, service providers, and large industrial and commercial energy consumers the tools to meet all the challenges and opportunities of the new energy environment. EMS uses real-time information and control to directly address a broad range of requirements throughout the power delivery chain. This system offers an integrated solution to managing new billing structures, distributed generation, energy purchasing, energy cost control, operational efficiency, power quality and reliability.

Applications that include the meter typically require additional equipment. Display and analysis software tools are almost always used to manage, interpret and distribute the data measured or logged by a meter. There are usually a variety of tools used, and often these tools are connected using different communications standards and protocols. In many cases, a meter must also provide control capabilities and device-level data sharing.

The meter can adapt to many situations. Advanced communications allow data to be shared simultaneously across multiple networks, built-in I/O provides monitoring and control capabilities, and a variety of display and analysis tools to help you get the most from your power system.
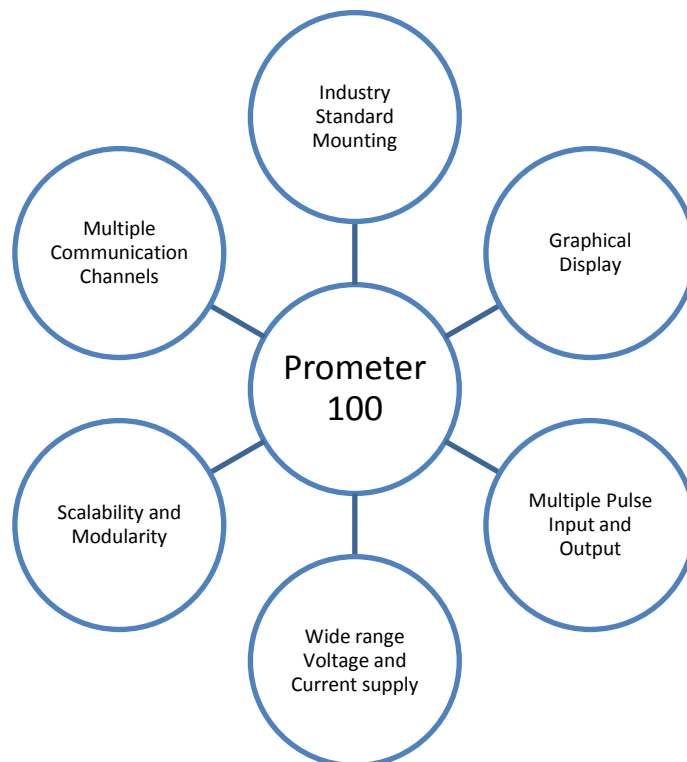
Figure 1: An Overview

4   Physical Features

Prometer 100 is configurable for HV 3-phase 3-wire, HV 3-phase 4-wire or LV 3-phase 4-wire and is suitable for mounting in a panel or on a wall. Prometer 100 has self-powered and auxiliary-powered variants. The auxiliary-powered variant also comes with dual auxiliary support so that you can put AC or DC voltage for main and backup supply for powering up the meter. The auxiliary circuit is not intended to be connected to the secondary of measurement VT. For example, the VT secondary supply of 63.5 V AC (phase to neutral voltage) or 110 V AC (phase-to-phase voltage) needs to be supplied as a voltage input to the product. Similarly three CTs, namely R/L1, Y/L2 and B/L3, need (as applicable) to be given as a current input to the product of 1A/ 5A from secondary side.

Note:

- Only Prometer 100-W variants can be configured as LV 3-phase 4-wire.

4.1   Power Supply, Auxiliary and Other Details

Details for the power supply and measurement options are shown below:
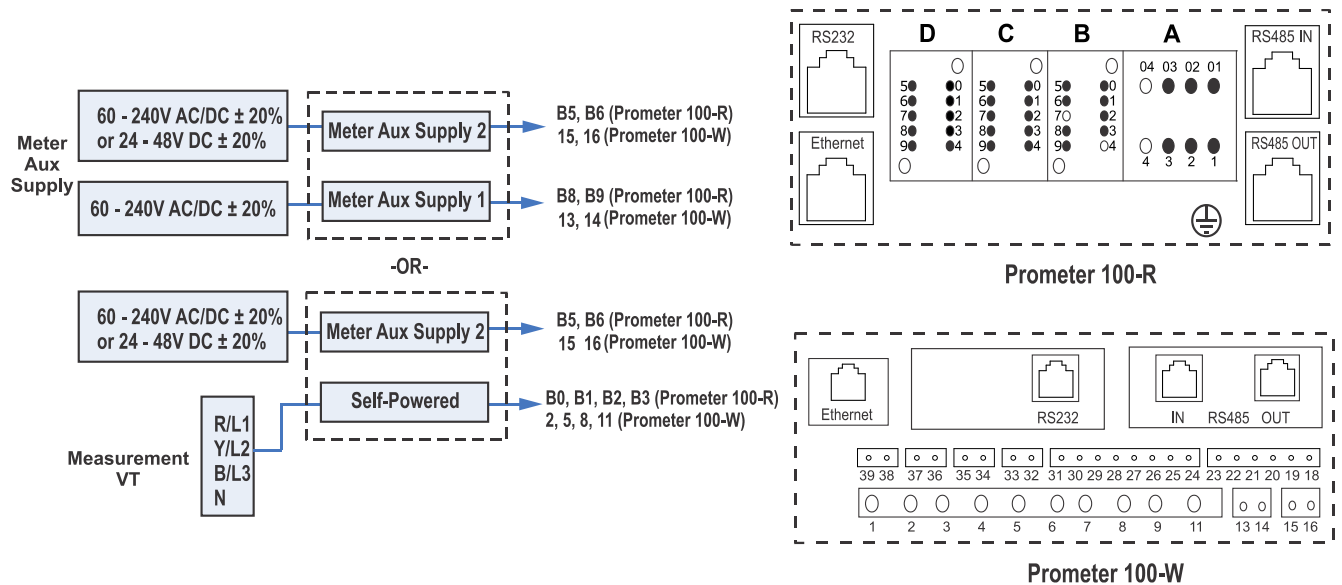
Figure 2: Power Supply Options

Variants	Main supply	Backup supply	No. of Aux power supply inputs supported	Range of Aux supply	Field Replaceable Battery (for meter reading and viewing display)
Self+Aux power supply	Aux. supply input (Aux 2)	Measurement voltage terminals (VT supply)	One (Aux 2)	60-240 V AC/DC ± 20% or 24-48 V DC ± 20%	Optional
Self power supply	Measurement voltage terminals (VT supply)	Not available	Not available	Not applicable	Optional
Auxiliary power supply	Aux. supply input (Aux 2)	Aux 1 (optional)	Two (dual) (Aux. 1 & Aux. 2)	Both as 60-240 V AC/DC ± 20% or one as 24-48 V DC ± 20%	Optional

Table 1: Different Power Supply and other Variants available in Prometer 100

- In case of auxiliary-powered and self-powered variants, meter will draw power from Aux 2 supply input. In its absence it will shift to Aux 1 supply (in case of auxiliary-powered variant) and VT supply (in case of self-powered variant).

- Do not connect voltage transformer (VT) to any of the Aux supply input terminal as a general practice. If it is necessary to connect VT secondary to Aux input then make sure to connect it to the Aux1 supply only in presence of Aux 2 so that burden on measurement VT secondary can be minimal.

- Connect your reliable auxiliary supply source like DC bank/AC lighting load/ Aux power transformer etc to Aux 2 terminal only so that meter burden will be handled by it; or take your best judgment to connect auxiliary supply source considering the rating and suitable operation of meter and best installation practices followed.

- The field replaceable battery can be configured to support meter reading in absence of mains power supply depending on the requirement. It only supplies sufficient power to the meter reading and display circuitry and will not fully power-up the meter. Contact the concern sales representative or technical team regarding this useful feature. The battery can be replaced in the field. Take care while inserting the battery; make sure that the polarity and fitment are correct.

- Ensure that the correct auxiliary voltage rating is used with the meter. The wrong voltage rating could cause damage to the meter. Therefore it is recommended to verify and crosscheck the rating-plate on the actual product in use at the site.
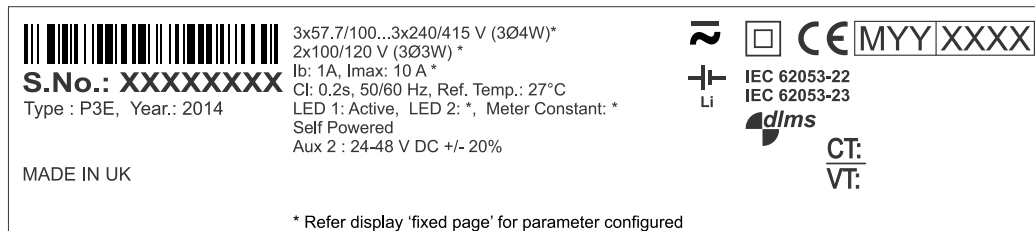
Figure 3: Rating Plate of Prometer 100-W <mark>(To be verified with realistic information and updated as per latest changes)</mark>
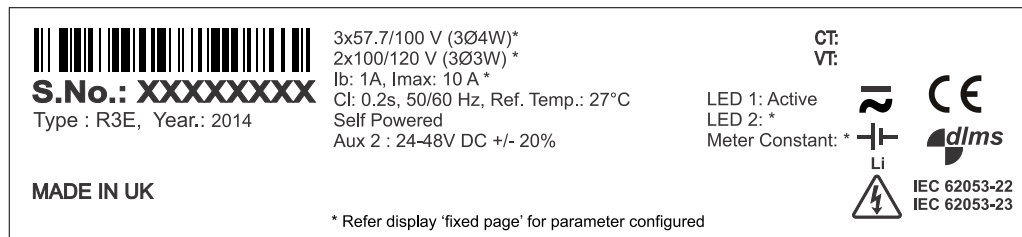
Figure 4: Rating Plate of Prometer 100-R <mark>(To be verified with realistic information and can show one of the rating plates with Aux 1 supply, 'MADE in UK' & S. No. here shown in bold and in Wall-mount not bold so we should use same font style in order to maintain consistency, and updated as per latest changes)</mark>

4.2 Front Panel of Prometer 100-R
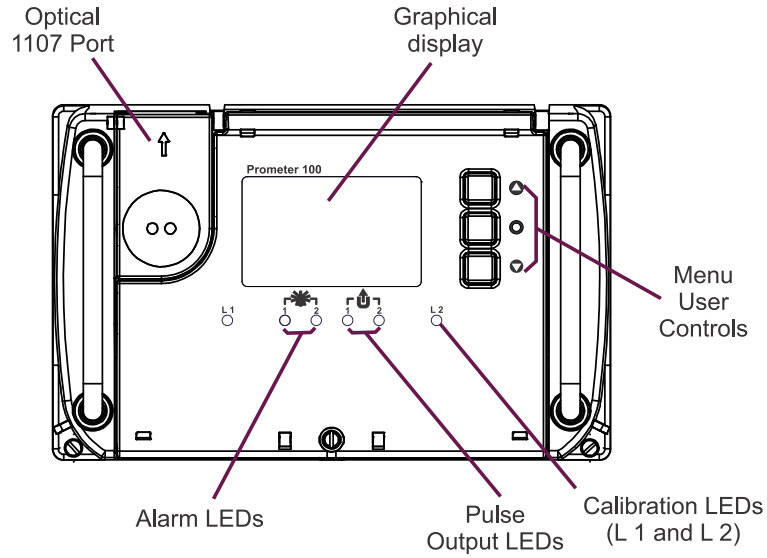
Figure 5: Front View

The front cover is made of translucent plastic with a transparent window to view the display. The cover has two top hinges which allow the front cover to swing-up, allowing access to the sealed button and field replaceable battery. The cover is secured in position by a retaining screw and also has provision to seal it.
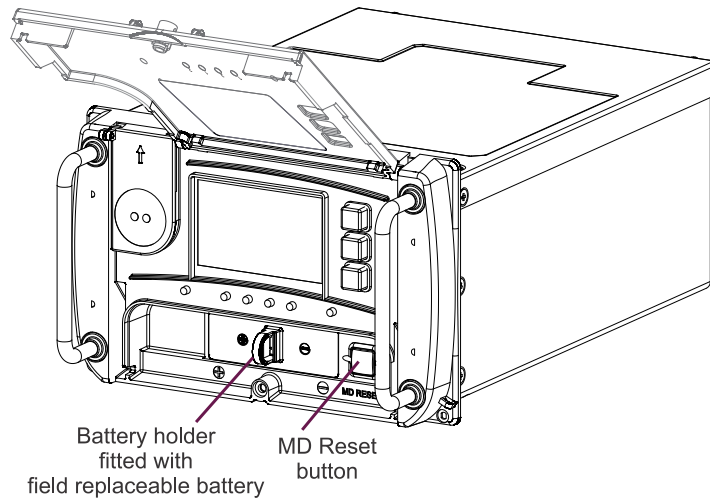
Figure 6: Front Cover Opened

4.3   Front Panel of Prometer 100-W
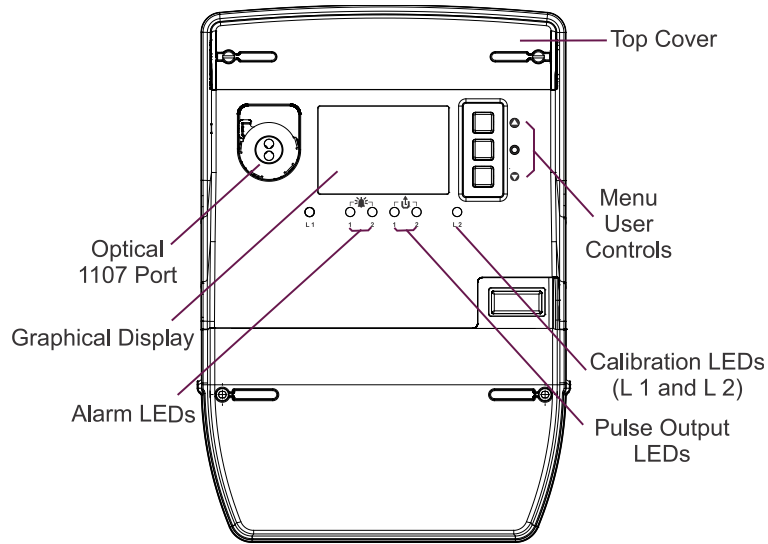
Figure 7: Front View

The front cover is made of translucent plastic with a transparent window to view the display. The top cover is used to seal the MD (Maximum Demand) reset button and field replaceable battery. The extended terminal block cover is secured in position by retaining screws and also has provision to seal it.
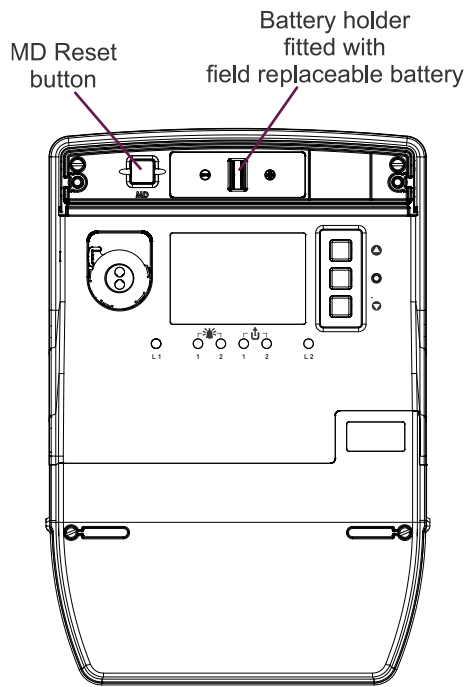
Figure 8: Top Cover Removed

4.4 Connections to the Prometer 100-R

The diagram shows the rear connector with its pin diagrams for the meter. There are different options that may be provided as per the specification agreed with the customer at the time of order.

Voltage & Aux Supply Connector

CT Connector

Earth Terminal
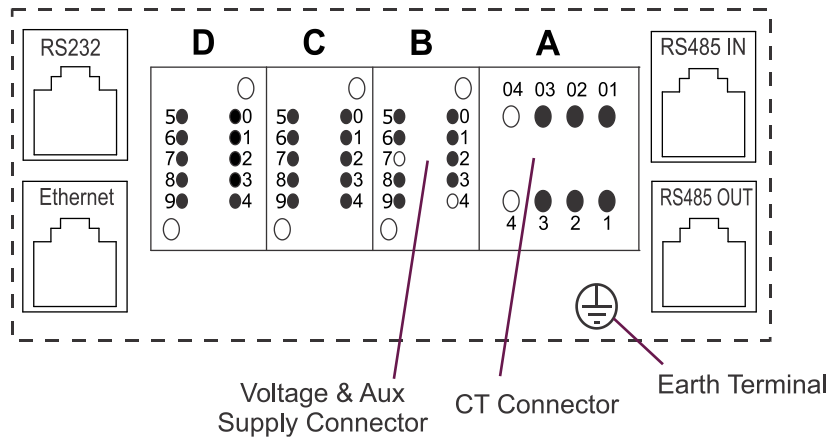
Connect	R/L1	Y/L2	B/L3	N
CT IN	A01	A02	A03	NC
CT OUT	A1	A2	A3	NC
VT	B1	B2	B3	B0

Dual AUX Supply	P/+ Terminal	N/- Terminal
AUX1	B8	B9
AUX2	B5	B6

Digital Input/Output			
8 Outputs and 4 configurable Inputs/Output			
O/P 1	C0, C1	I/O 1	D3, D2
O/P 2	C1, C2	I/O 2	D9, D4
O/P 3	C4, C3	I/O 3	D7, D8
O/P 4	C4, C9	I/O 4	D5, D6
O/P 5	C7, C8		
O/P 6	C7, C6		
O/P 7	D0, D5		
O/P 8	D0, D1		

Figure 9: Rear Connector with Pin Details

Figure A — 3 Phase, 3 Wire; Figure B — 3 Phase, 4 Wire connection diagram with Configurable Pulse I/O, Pulse Output, RS232, Ethernet, RS485 IN/OUT, and terminal designations.

CONNECT	R/L1	Y/L2	B/L3	N
CT IN	A01	A02	A03	NC
CT OUT	A1	A2	A3	NC
VT	B1	B2	B3	B0

Aux.1 (P/+)(N/-) 60 - 240V AC/DC +/- 20% or Self powered (Internal)

Aux.2 (P/+)(N/-) 60 - 240V AC/DC +/- 20% or 24-48V DC +/- 20%
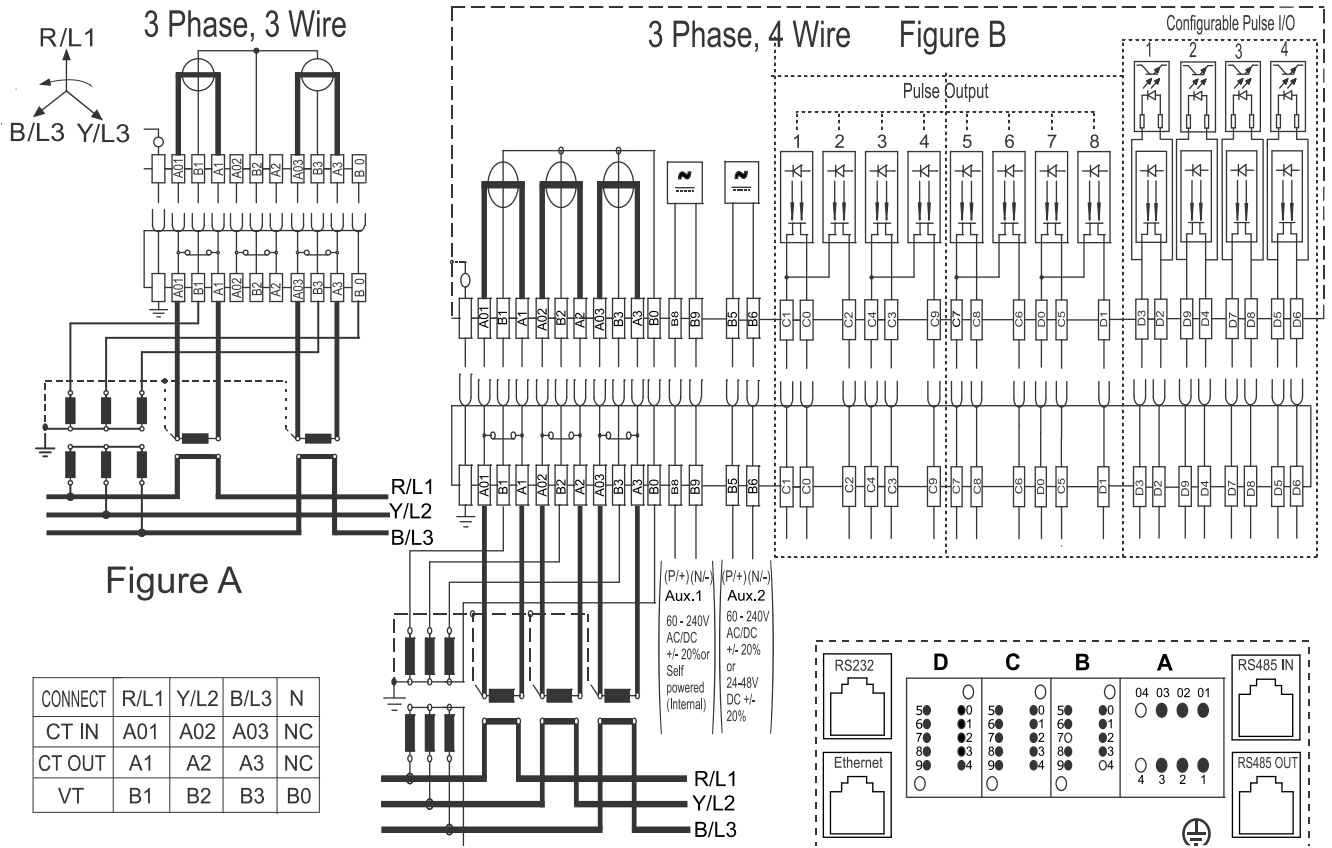
Note: For 3-phase 3-wire CT/VT operated refer to figure A
For 3-phase 4-wire CT/VT operated refer to figure B
For 3-phase 3-wire and 3-phase 4-wire connections from B5 to D9 are the same.
For self-powered variant Aux.1 (B8 and B9) supply is not available.

Figure 10: Connection Diagram

Note: One side of the CT secondary wiring should be earthed according to local practice.

The recommended size of the CT, VT and Aux power supply cable is 2.5 sq mm with lugs type as ring (M3 type) for CT and H type for Aux and VT terminals.

In case of Prometer 100-R the internal earthing cable between the meter and the rack should also be connected, and for this an M4 size screw is used in the meter and in the rack. The same ring type connector as used in the CT connection can also be used.

The internal earthing cable should be about 5-10 cm in length to allow for ease of fitting and access and not fouling with sharp edges of rack etc. Finally a proper earthing cable from rack to earth should be put up by installer. Other accessories or shipway kit is supplied based on the requirement like seals, communication cords etc.

4.5 Connections to the Prometer 100-W

Connections to the Prometer 100-W are made on the meter terminal under the terminal cover.
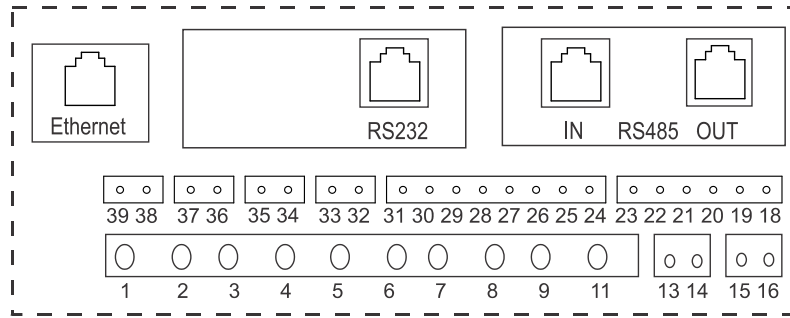
Connect	R/L1	Y/L2	B/L3	N
CT IN	1	4	7	NC
CT OUT	3	6	9	NC
VT	2	5	8	11

Dual AUX Supply	P/+ Terminal	N/- Terminal
AUX 1	13	14
AUX 2	15	16

Digital Input/Output			
8 Outputs and 4 configurable Inputs/Output			
O/P 1	18, 19	I/O 1	32, 33
O/P 2	20, 21	I/O 2	34, 35
O/P 3	22, 23	I/O 3	36, 37
O/P 4	24, 25	I/O 4	38, 39
O/P 5	26, 27		
O/P 6	28, 29		
O/P 7	30, 31		

Figure 11: Rear Connector with Pin Details
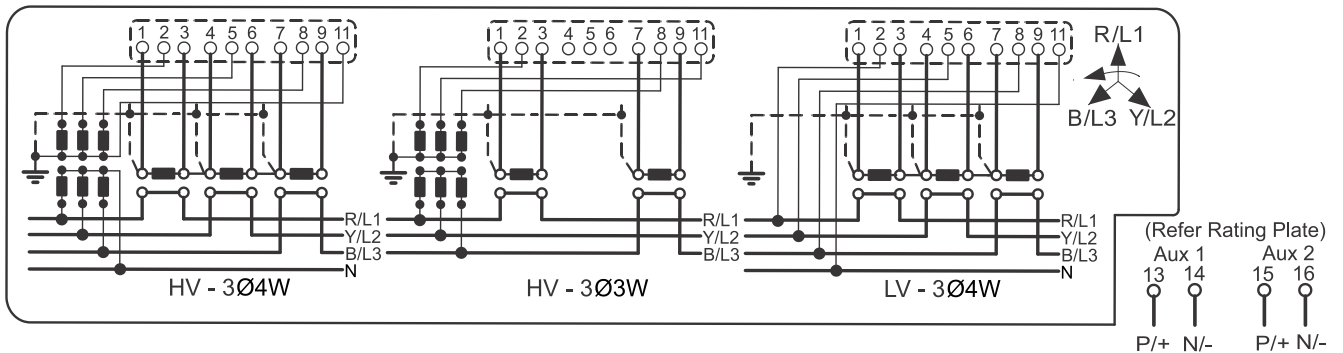
Current, Voltage and Auxiliary supply connections
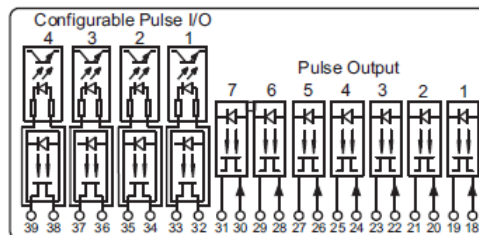
Pulse Input/ Output connections

Figure 12: Connection Diagram

4.6 Sealing Arrangement in Prometer 100 - R

4.6.1 Front Cover Sealing
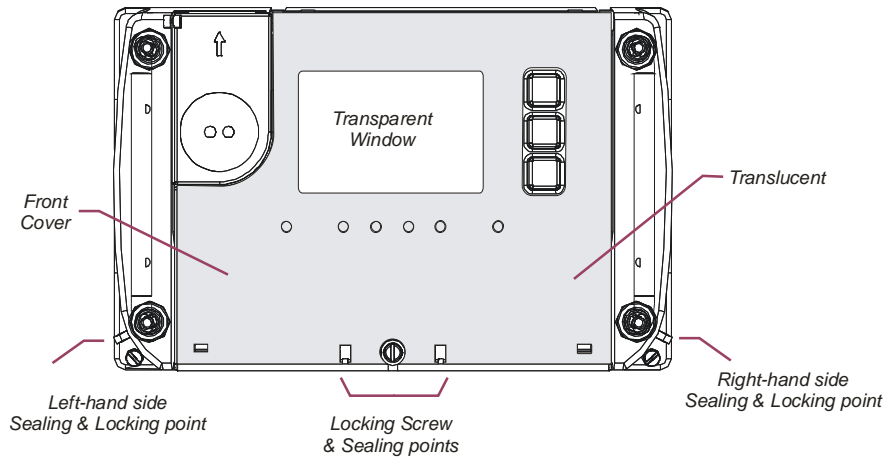
Figure 13: Front Cover Sealing Arrangement

The front cover can be sealed in the closed position. This will stop the front cover from being opened and restrict unauthorised access to the MD Reset pushbutton and internal areas. There are also sealing points on either side of the meter for securing it to a rack or frame. The sealing bore diameter is 2.0 mm and is suitable for seals.

4.6.2 Rear Sealing Arrangement

When the meter is fitted into the rack, a cover can be fitted which conceals all the rear connectors. The figure below show the sealing points for the rear cover. The figure shows the single rack example with an enlarged detailed view of the sealing points.
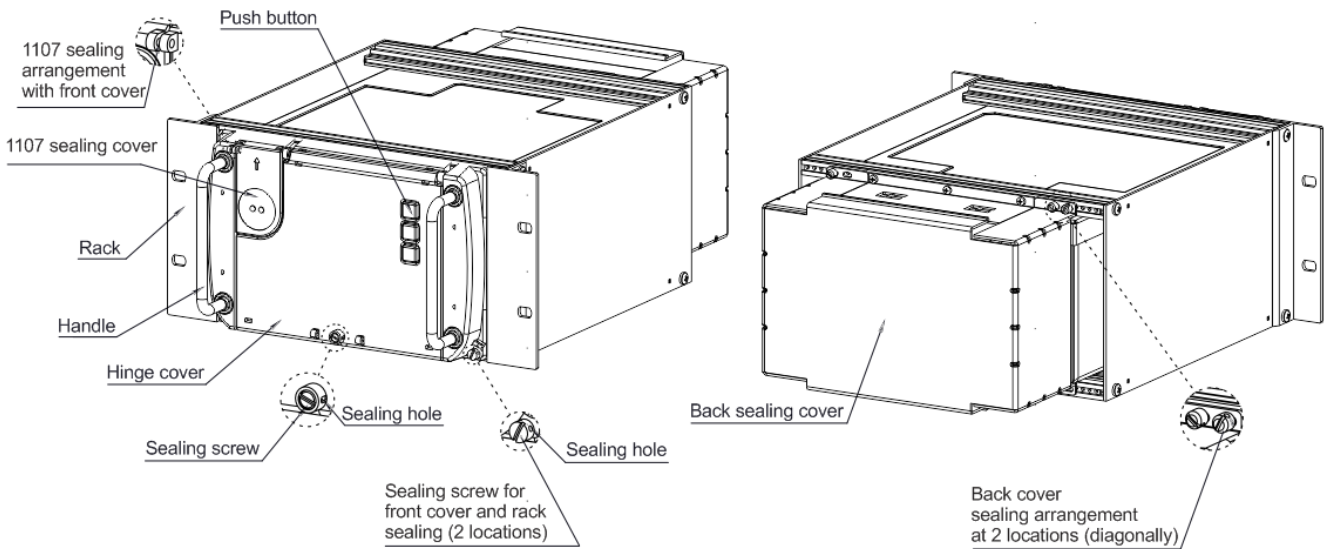
Figure 14: Front and Rear Sealing Points – 11" Rack Installation

4.7   Sealing Arrangement in Prometer 100 – W

The meter incorporates sealing bars and screws with through-holes, through which traditional lead/wire seals can be inserted. When utilized, these lead/wire seals can help prevent unauthorized personnel from gaining access to meter internals or to button under the cover. The sealing provision in Prometer 100-W is as follows:

- The front cover can be sealed through the two sealing points under the terminal cover.

- The secondary terminal cover can be sealed through a sealing point.

- The extended terminal cover can be sealed through the two sealing points.

- The top cover can be sealed through the two sealing points.

- The 1107 optical communication port can be sealed using rotational seal.
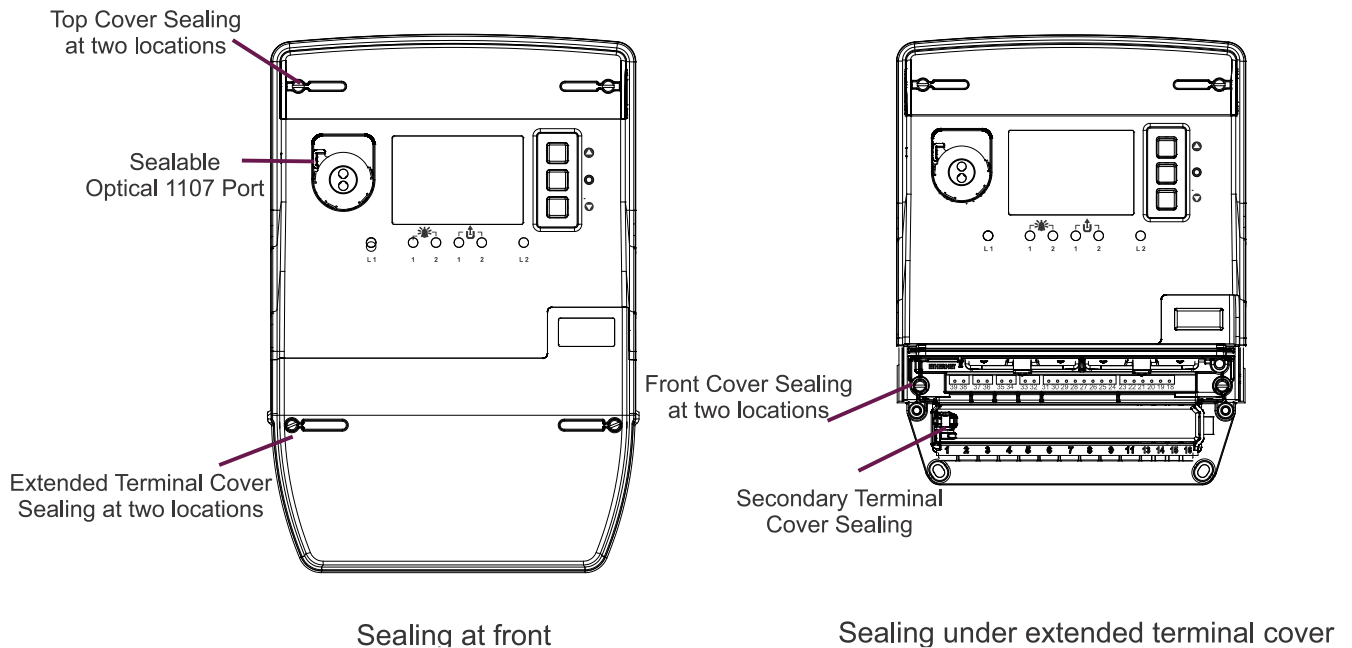
Figure 15: Sealing Points

4.8   Pulse Inputs and Outputs

The product support multiple pulse inputs and outputs. A maximum of eight pulse outputs (for Prometer 100-R) and seven pulse outputs (for Prometer 100-W); and four configurable pulse input/ output can be provided as per the specification agreed at the time of order.

Two pulse outputs (3 and 4 in case of Prometer 100-R / 2 and 3 in case of Prometer 100-W, refer to Figure 10 and Figure 12 for details) are linked to two pulse output LEDs indication as available on front side of meter so that user can have a visualisation sort of feature by physically seeing the LEDs. The pulse output 3 (in case of Prometer 100-R) / 2 (in case of Prometer 100-W) is linked to pulse output LED 1 and the pulse output 4 (in case of Prometer 100-R) / 3 (in case of Prometer 100-W) is linked to pulse output LED 2. The Pulse Output LEDs can be configured through M-Cubed 100 either at factory or in field. One pulse input can be used for time synchronization application.

Configurable pulse input/output rating: 24 to 240 V AC/DC. Isolation will be available for each individual input/output.

Pulse output rating: 24 to 40 V DC or 48 to 240 V AC/DC @ 100 mA (Pulse outputs will have volt free contact). The only one rating will be applicable for entire block (each containing four outputs) and so isolation available will be for entire block. The outputs are of solid-state type and when the meter is turned off, they are open.

5 Prometer 100 and M-Cubed BCS

This section describes the various operations that can be performed using the M-Cubed BCS with Prometer 100 meter.

5.1 M-Cubed BCS

Communication Media

M-Cubed BCS
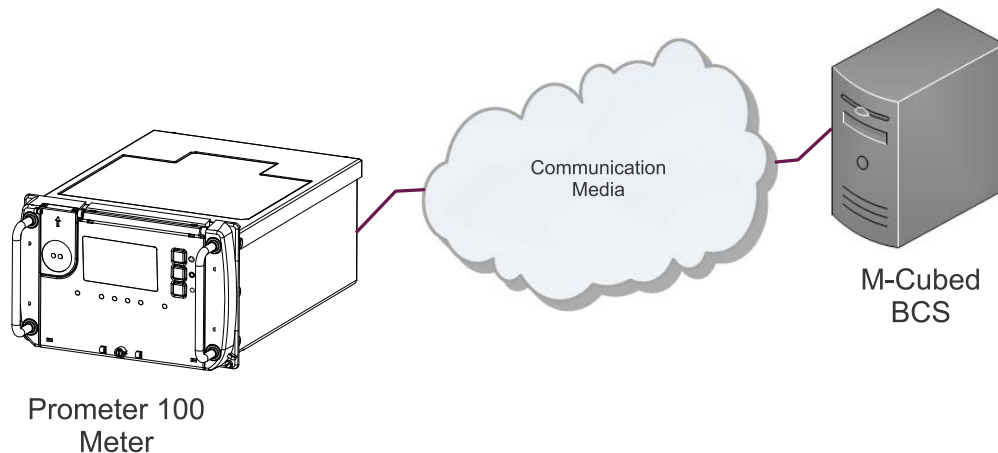
Prometer 100 Meter

Figure 16: Prometer100 and M-Cubed BCS

M-Cubed stands for Modular Meter Management and is the name of Secure's software suite for programming meters, reading data and reporting from energy meters. M-Cubed has separate modules that can be configured to suit particular applications and access rights required by individual users.

M-Cubed can be used for:

- Configuration
- Commissioning
- Meter Reading
- Data Viewing

The M-Cubed helpfile contains a detailed description of all these functions.

6 Using the Display

There are two types of display mode: Auto Scroll and Manual Mode. The two types of display modes and their associated settings and parameters are discussed in this section. All single parameters, e.g. voltage, will be displayed with their OBIS codes. A large selection of parameters (Auto + Manual) can be chosen for display.

6.1 Auto Scroll

Auto Scroll is the default mode. A large number of parameters can be chosen for this mode. The display time out time can be configured in the field using M-Cubed or by the display keys. Once the display button is pressed, the Auto Scroll mode will be interrupted and will switch to manual mode. If no button is pressed in manual mode, the display will time out and revert to auto mode. The display will resume from the last displayed parameter. The display LCD backlight is always on.

The Auto Display pages will look as shown below (details can be checked as agreed in purchase order):

L1 Line Current	L2 Line Current	L3 Line Current
100.15 A	**099.15 A**	**099.00 A**
OBIS 1.0.31.7.0.255	OBIS 1.0.51.7.0.255	OBIS 1.0.71.7.0.255

L1 Phase Voltage	L2 Phase Voltage	L3 Phase Voltage
006336 V	**006360 V**	**006312 V**
OBIS 1.0.32.7.0.255	OBIS 1.0.52.7.0.255	OBIS 1.0.72.7.0.255

L1 Power Factor	L2 Power Factor	L3 Power Factor
0.999 Lag	**0.919 Lag**	**0.929 Lag**
OBIS 1.0.33.7.0.255	OBIS 1.0.53.7.0.255	OBIS 1.0.73.7.0.255

3 Ph Power Factor	Frequency	Apparent Power
0.949 Lag	**49.949 Hz**	**01.954 MVA**
OBIS 1.0.13.7.0.255	OBIS 1.0.14.7.0.255	OBIS 1.0.9.7.0.255

Active (T) Power	Reactive Power	C, Main Energy, MWh Active energy Imp. (T)
01.874 MW	**00.612 MVAr**	**0000061.35**
OBIS 1.0.1.7.0.255	OBIS 1.0.3.7.0.255	OBIS 1.0.1.8.0.255

C, Main Energy, MWh Active energy Exp. (T)	C, Main Energy, MWh Active energy Imp. (F)	C, Main Energy, MWh Active energy Exp. (F)
0000088.00	**0000056.35**	**0000088.00**
OBIS 1.0.2.8.0.255	OBIS 1.0.129.8.0.255	OBIS 1.0.130.8.0.255

C, Main Energy, MVArh Reactive energy QI **0000143.38** OBIS 1.0.5.8.0.255	C, Main Energy, MVArh Reactive energy QII **0000143.38** OBIS 1.0.6.8.0.255	C, Main Energy, MVArh Reactive energy QIII **0000188.75** OBIS 1.0.7.8.0.255
C, Main Energy, MVArh Reactive energy QIV **0000188.75** OBIS 1.0.8.8.0.255	C, Main Energy, MVAh Apparent energy Imp. **0000056.45** OBIS 1.0.9.8.0.255	C, Main Energy, MVAh Apparent energy Exp. **0000188.75** OBIS 1.0.10.8.0.255
C, Total MD r, MW Active energy Imp. (T) **000.06456** **23 Dec' 14 10:03** OBIS 1.0.1.6.0.255	C, Total MD r, MW Active energy Exp. (T) **006.06456** **23 Dec' 14 10:03** OBIS 1.0.2.6.0.255	C, Total MD r, MW Active energy Imp. (F) **000.06456** **23 Dec' 14 10:03** OBIS 1.0.129.6.0.255
C, Total MD r, MW Active energy Exp. (F) **006.06456** **23 Dec' 14 10:03** OBIS 1.0.130.6.0.255	Note: 'T' stands for Total (Fundamental with harmonics) 'F' stands for Fundamental 'C' stands for Current 'MD' stands for Maximum Demand	

6.2 Manual

Display parameters are grouped in to a number of pages. Each page parameters can be individually selected. A considerable number of parameters can be assigned in manual mode.

Display Groups

The display is arranged into groups for easier navigation.

- Fixed Display Page: Fixed default displays (not configured by tariff)
- User Configurable Pages: User selected parameters. Page name can also be configured. Up to 7 pages can be configured.
- Favourite: These are selected from the user configurable pages and up to 20 parameters can be selected in the field.
- Configuration: Configuration page for Metrological LED, Display time out, Delete Favourite page displays, Reset Battery time, Meter Constant, MODBUS and language configuration.

6.3 Display Buttons

The meter has four user buttons. One button can be used for performing MD reset or for navigating through the sealed button display sequence depending on the requirement and is behind a sealable door. The other three buttons are used for navigating through the display and configuration menu options.
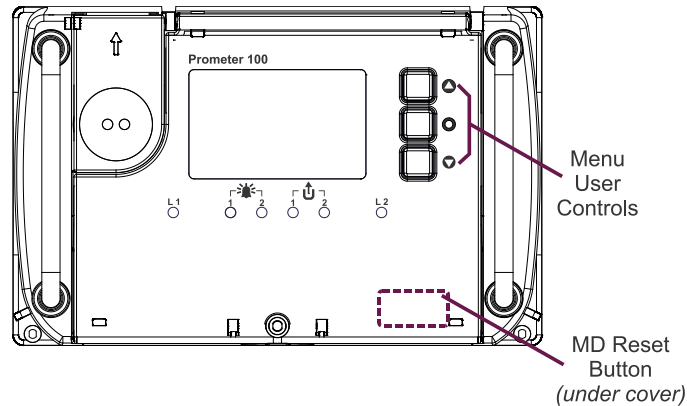
Figure 17: User Buttons

A page can be selected by pressing the enter button. A navigation screen will appear showing all the available pages. The Up and Down buttons can then be used to choose a page. Press the Enter button to select your choice.
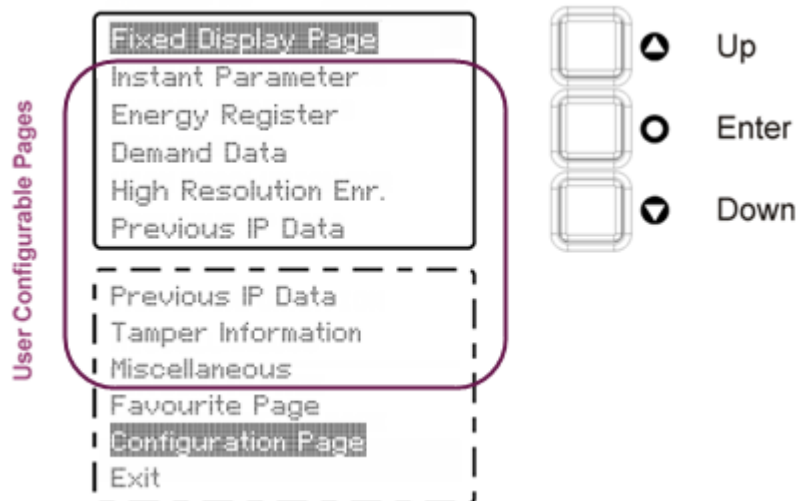
Figure 18: Selecting a Page (instead of the word 'Tamper', 'event' can be used in the display menu)

Once you have selected a target page, you can then use the Up/Down buttons to scroll through that selected page. Parameters are cyclically displayed in the selected page, i.e. after the last parameter in the list is displayed, the display will return to the first in the list, and so on.

Press the Enter button to return to the immediate parent page.

6.4 Menu Example Screens

Fixed Display Page

Select the Fixed Display Page from the top line menu. The following screen will be displayed.
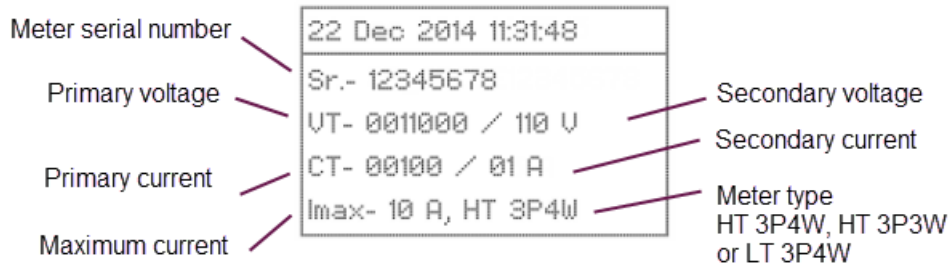
Figure 19: Fixed Display Page

The Fixed Display pages are shown below:

22 Dec 2014 17:31:54 Auxiliary supply 1 Healthy Auxiliary supply 2 Healthy	22 Dec 2014 17:30:38 IO Information: Type (07) No. of Output: 07 No. of Cfg. IO: 04 Cfg. IO State: Ip Op Ip Ip	22 Dec 2014 17:31:24 Pulse Weight: (0.050 M) / Multiplier Refer to tariff for Multiplier value
High Res. Energy, MWh Active energy Imp. (T) 000006.923369 Active energy Exp. (T) 000000.179987	High Res. Energy, MWh Active energy Imp. (F) 000006.934925 Active energy Exp. (F) 000000.018059	High Res. Energy, MVArh Reactive energy Imp. 000000.205218 Reactive energy Exp. 000000.179987
High Res. Energy, MVAh Apparent energy Imp. 000006.947864 Apparent energy Exp. 000000.018173	22 Dec 2014 17:30:16 MFW Version 31-00	22 Dec 2014 17:31:34 Module [L]: RS232 Module [R]: RS485

Note:

'I' stands for Import

'E' stands for Export

'T' stands for Total (Fundamental with harmonics)

'F' stands for Fundamental

'R' stands for Right

'L' stands for Left

'Cfg. IO' stands for Configurable Input/Output

User Configurable Pages

Up to seven user configurable pages can be defined complete with page title e.g. Instant Parameters, see Figure 20 below. The page title can have a maximum of 20 alphanumeric characters. The illustrations shown below are indications of how the pages and their respective displays will be displayed. The final pages and their corresponding displays are dependent on the specification of your purchase order.
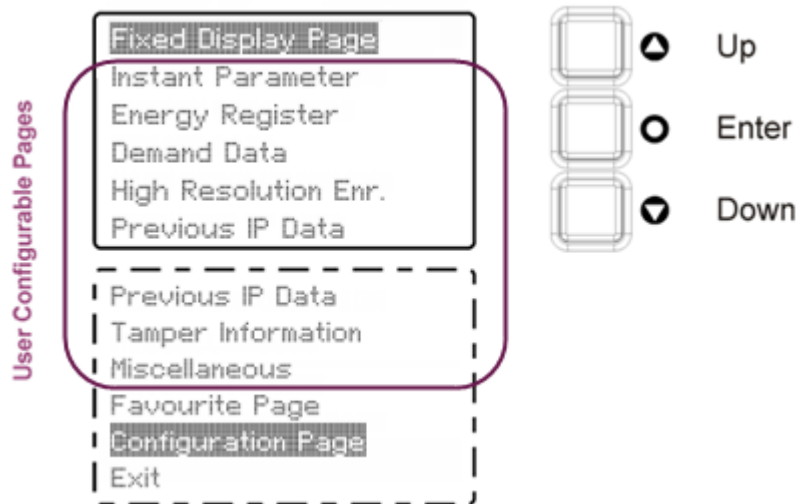
Figure 20: User Configurable Pages

Instantaneous Parameters

Fixed Display Page **INSTANT PARAMETER** ENERGY REGISTER DEMAND DATA HIGH RESOLUTION ENR. PREVIOUS IP DATA	Use the Up/Down buttons to scroll to the Instant Parameters page. The selection will be highlighted. Press the Enter button to open the page. Use the Up/Down buttons to scroll within the page and view the various screens.

L1 Line Current **0.0514 A** OBIS 1.0.31.7.0.255	L2 Line Current **0.0514 A** OBIS 1.0.51.7.0.255	L3 Line Current **0.0514 A** OBIS 1.0.71.7.0.255
L1 Active Current **0.0513 A** OBIS 1.0.161.7.0.255	L2 Active Current **−0.0514 A** OBIS 1.0.163.7.0.255	L3 Active Current **−0.0514 A** OBIS 1.0.165.7.0.255
L1 Reactive Current **0.0033 A** OBIS 1.0.162.7.0.255	L2 Reactive Current **−0.0015 A** OBIS 1.0.164.7.0.255	L3 Reactive Current **−0.0015 A** OBIS 1.0.166.7.0.255

L1 Phase Voltage	L2 Phase Voltage	L3 Phase Voltage
0240.00 V	0240.00 V	0240.00 V
OBIS 1.0.32.7.0.255	OBIS 1.0.52.7.0.255	OBIS 1.0.72.7.0.255

L1 Power Factor	L2 Power Factor	L3 Power Factor
0.997 Lag	0.999 Lag	0.999 Lag
OBIS 1.0.33.7.0.255	OBIS 1.0.53.7.0.255	OBIS 1.0.73.7.0.255

3 Ph Power Factor	Frequency	Apparent Power
0.999 Lead	50.000 Hz	0.0123 kVA
OBIS 1.0.13.7.0.255	OBIS 1.0.14.7.0.255	OBIS 1.0.9.7.0.255

Active (F) Power	Reactive Power	Rising Demand, kW Active energy Imp. (T)
−0.0123 kW	0.0000 kVAr	0.0000000 Time 00:00:47
OBIS 1.0.129.7.0.255	OBIS 1.0.3.7.0.255	OBIS 1.0.1.4.0.255

Rising Demand, kW Active energy Exp. (T)	Rising Demand, kW Active energy Imp. (F)	Rising Demand, kW Active energy Exp. (F)
0.0002376 Time 00:04:44	0.0000000 Time 00:04:04	0.0013056 Time 00:03:32
OBIS 1.0.2.4.0.255	OBIS 1.0.129.4.0.255	OBIS 1.0.130.4.0.255

Rising Demand, kVA Apparent energy Imp.	Rising Demand, kVA Apparent energy Exp.	Phase Sequence
0.0023448 Time 00:02:22	0.0000000 Time 00:01:45	123 Forward
OBIS 1.0.9.4.0.255	OBIS 1.0.10.4.0.255	OBIS 0.0.96.7.30.255

L1 V-I Angle(D:M) 003:41 OBIS 1.0.81.7.4.255	**L2 V-I Angle(D:M)** 181:41 OBIS 1.0.81.7.15.255	**L3 V-I Angle(D:M)** 181:41 OBIS 1.0.81.7.26.255
L12 Voltage Angle (D:M) 120:02 OBIS 1.0.81.7.1.255	**L23 Voltage Angle (D:M)** 120:02 OBIS 1.0.81.7.12.255	**L31 Voltage Angle (D:M)** 119:54 OBIS 1.0.81.7.20.255

Note:

'D' stands for degree

'M' stands for minutes

Energy Registers

In this example the user defined page has been configured to view the energy registers and an appropriate page title has been chosen for easy identification. Always choose a user friendly and self-explanatory name for your titles. We have used "Energy Register" for our title example.

Fixed Display Page INSTANT PARAMETER **ENERGY REGISTER** DEMAND DATA HIGH RESOLUTION ENR. PREVIOUS IP DATA	Use the Up/Down buttons to scroll to the Energy Registers page. The selection will be highlighted. Press the Enter button to open the page. Use the Up/Down buttons to scroll within the page and view the various screens.

C, Main Energy, kWh Active energy Imp. (T) 00561.4448 OBIS 1.0.1.8.0.255	C, Main Energy, kWh Active energy Exp. (T) 02188.7500 OBIS 1.0.2.8.0.255	C, Main Energy, kWh Active energy Imp. (F) 05614.4490 OBIS 1.0.129.8.0.255
C, Main Energy, kWh Active energy Exp. (F) 02188.7500 OBIS 1.0.130.8.0.255	C, Main Energy, kVArh Reactive energy QI 56143.3800 OBIS 1.0.5.8.0.255	C, Main Energy, kVArh Reactive energy QII 56143.3800 OBIS 1.0.6.8.0.255

C, Main Energy, kVArh Reactive energy QIII **02188.7500** OBIS 1.0.7.8.0.255	C, Main Energy, kVArh Reactive energy QIV **02188.7500** OBIS 1.0.8.8.0.255	C, Main Energy, kVAh Apparent energy Imp. **05614.4510** OBIS 1.0.9.8.0.255
C, Main Energy, kVAh Apparent energy Exp. **02188.7500** OBIS 1.0.10.8.0.255	C, Main Energy, kWh Active energy (I-E) **−00000.0225** OBIS 1.0.16.8.0.255	C, Main Energy, kVArh Reactive energy (I-E) **00000.0000** OBIS 1.0.140.8.0.255

Demand Data

This page has been set up to capture demand values.

Fixed Display Page INSTANT PARAMETER ENERGY REGISTER **DEMAND DATA** HIGH RESOLUTION ENR. PREVIOUS IP DATA	Use the Up/Down buttons to scroll to the Demand Data page. The selection will be highlighted. Press the Enter button to open the page. Use the Up/Down buttons to scroll within the page and view the various screens.

C, UMD Reg, kW Active energy Imp. (T) 0.0044520 **03 Dec' 14 16:45** OBIS 1.0.1.6.0.255	C, UMD Reg, kVA Apparent energy Imp. 0.0044532 **03 Dec' 14 16:50** OBIS 1.0.9.6.0.255	H1, UMD Reg, kW Active energy Imp. (T) 0.0054420 **03 Dec' 14 16:45** OBIS 1.0.1.6.0.101
H1, UMD Reg, kVA Apparent energy Imp. 0.0054420 **03 Dec' 14 16:45** OBIS 1.0.9.6.0.101	C, UMD Reg, kW Active energy Imp. (F) 0.0044520 **03 Dec' 14 16:45** OBIS 1.0.129.6.0.255	H1, UMD Reg, kW Active energy Imp. (F) 0.0054420 **03 Dec' 14 16:45** OBIS 1.0.129.6.0.101

H1, CMD Reg. 01, kW Active energy Imp. (F) **00561.4448** OBIS 1.0.129.2.1.101	H3, CMD Reg. 01, kW Active energy Exp. (F) **00001.4448** OBIS 1.0.130.2.1.103	H1, CMD Reg. 01, kW Active energy Exp. (T) **00561.4448** OBIS 1.0.2.2.1.101
H3, CMD Reg. 01, kW Active energy Imp. (T) **00061.4448** OBIS 1.0.1.2.1.103	C, UMD Reg, kVA Apparent energy Exp. **00061.4448** OBIS 1.0.10.6.0.255	

High Resolution Energy Register

This page has been set up to capture high resolution energy registers.

Fixed Display Page INSTANT PARAMETER ENERGY REGISTER DEMAND DATA **HIGH RESOLUTION ENR.** PREVIOUS IP DATA	Use the Up/Down buttons to scroll to the High Resolution Energy Registers page. The selection will be highlighted. Press the Enter button to open the page. Use the Up/Down buttons to scroll within the page and view the various screens.

High Res. Energy, kWh Active energy Imp. (T) **5615.19330000** OBIS 1.0.167.8.0.255	High Res. Energy, kWh Active energy Exp. (T) **0000.02813434** OBIS 1.0.168.8.0.255	High Res. Energy, kWh Active energy Imp. (F) **5615.19830000** OBIS 1.0.169.8.0.255
High Res. Energy, kWh Active energy Exp. (F) **0000.02819617** OBIS 1.0.170.8.0.255	High Res. Energy, kVArh Reactive energy QI **0218.75000000** OBIS 1.0.173.8.0.255	High Res. Energy, kVArh Reactive energy QII **0000.00000510** OBIS 1.0.175.8.0.255

High Res. Energy, kVArh	High Res. Energy, kVArh	High Res. Energy, kVAh
Reactive energy QIII	Reactive energy QIV	Apparent energy Imp.
0102.85640000	5614.36100000	0000.00103769
OBIS 1.0.176.8.0.255	OBIS 1.0.174.8.0.255	OBIS 1.0.178.8.0.255
High Res. Energy, kVAh	High Res. Energy, kVArh	High Res. Energy, kWh
Apparent energy Exp.	Reactive Hi. energy Imp.	Active energy (I-E)
0212.55780000	0000.00000651	−0000.00135802
OBIS 1.0.179.8.0.255	OBIS 1.0.187.8.192.255	OBIS 1.0.189.8.0.255

Previous IP data

This page has been set up to capture previous IP data.

INSTANT PARAMETER ENERGY REGISTER DEMAND DATA HIGH RESOLUTION ENR. PREVIOUS IP DATA TAMPER INFORMATION	Use the Up/Down buttons to scroll to the Previous IP Data registers page. The selection will be highlighted. Press the Enter button to open the page. Use the Up/Down buttons to scroll within the page and view the various screens.

Previous IP Demand, kW	Previous IP Demand, kW	Previous IP Demand, kW
Active energy Imp. (T)	Active energy Exp. (T)	Active energy Imp. (F)
1.4161570	0.4161570	1.4161570
OBIS 1.0.1.5.0.255	OBIS 1.0.2.5.0.255	OBIS 1.0.129.5.0.255
Previous IP Demand, kW	Previous IP Demand, kVA	Previous IP Demand, kVA
Active energy Exp. (F)	Apparent energy Imp.	Apparent energy Exp.
0.4161570	0.0029320	0.0022020
OBIS 1.0.130.5.0.255	OBIS 1.0.9.5.0.255	OBIS 1.0.10.5.0.255

Event Information

This page details tamper events and status. Events are discussed in section 6.5

ENERGY REGISTER DEMAND DATA HIGH RESOLUTION ENR. PREVIOUS IP DATA TAMPER INFORMATION MISCELLANEOUS	Use the Up/Down buttons to scroll to the Tamper Information page. The selection will be highlighted. Press the Enter button to open the page. Use the Up/Down buttons to scroll within the page and view the various screens.

CT Related Events Reverse: -23 OBIS 1.0.96.50.1.255	VT Related Events High OBIS 1.0.96.50.2.255	Other than CT-VT Events No Events OBIS 1.0.96.50.0.255
Tamper Count 00003 OBIS 0.0.94.91.0.255		

Miscellaneous

This page details miscellaneous displays.

DEMAND DATA HIGH RESOLUTION ENR. PREVIOUS IP DATA TAMPER INFORMATION MISCELLANEOUS Favourite Page	Use the Up/Down buttons to scroll to the Miscellaneous information page. The selection will be highlighted. Press the Enter button to open the page. Use the Up/Down buttons to scroll within the page and view the various screens.

Meter Serial Number SP_ABCDE12345678 OBIS 0.0.96.1.0.255	Battery Status Healthy OBIS 0.0.96.6.1.255	Remaining Battery Hours 05:59:00 OBIS 0.0.96.6.0.255

Power ON Minutes **00000027 Min** OBIS 1.0.0.1.136.255	Power OFF Minutes **00000015 Min** OBIS 0.0.94.91.8.255	H1, Bill Cause **Push Button** OBIS 0.0.0.1.12.101
H1, Billing Date/Time **28 May 2014** **19:01:95** OBIS 0.0.0.1.2.101		

Scroll Lock

Locking of individual parameter page in user configurable pages (manual pages) –

press and hold
the **Up** Key for
5 seconds
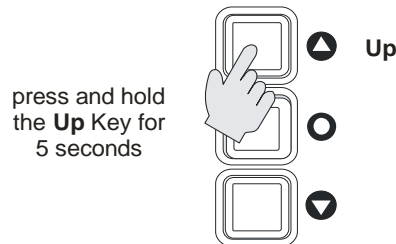
Figure 21: Locking the manual page parameter

The screen can be locked to show a desired parameter. To screen lock a parameter, select the parameter using the menu buttons (this is applicable under user configurable pages only). Press the Up key for 5 seconds. During this process the display will temporarily move to the next parameter, then after 5 seconds will display your selection.

To unlock the screen (i.e. revert to auto scroll mode) press the Up key for 5 seconds.

Favourite Page

This page is used for your selection of display parameters.

press and hold
the **Down** Key
for 5 seconds
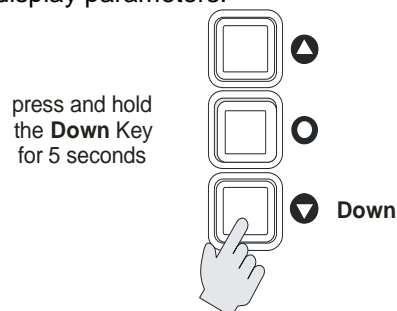
Figure 22: Adding parameter to favourite page

To add a parameter, go to the page containing the parameter that you require. Once the required page is selected press the down key for 5 seconds, the selected parameter will now be added to your favourite page.

When the favourite page is full, you will need to delete complete list in this page to make space for the new one, so be sure before selecting parameters as maximum 20 parameters can be selected in favourite display page.

To delete the complete list of Favourite parameters, go to the configuration page and select 'Del Fav Parameters'.

Configuration Page
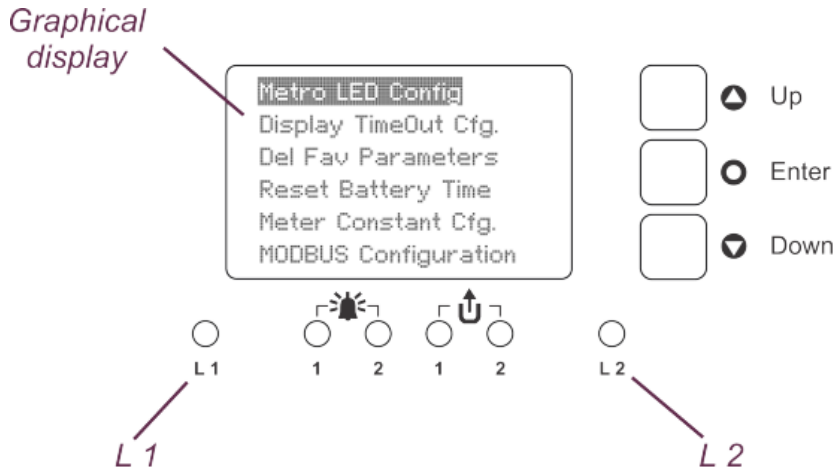
Figure 23: Front view showing metrological LEDs

The configuration pages are used to set-up and enable features such as the metrological LEDs, display timeout, meter constant, reset battery time, MODBUS configuration and language on display. They are also used to manage your favourite selections.

The configuration page is password protected which can be accessed only by users authorized to change the above configurations.

At the password prompt enter the 6-digit password (default password is '000000') using Up and Down buttons Use the Down key to enter a digit at the cursor position and use the Up key to move the cursor to the right while entering a digit. After completing the entry, press the Enter button to confirm. Correct password gives access to the first screen of configuration page. An incorrect password will display 'Incorrect Password' message.
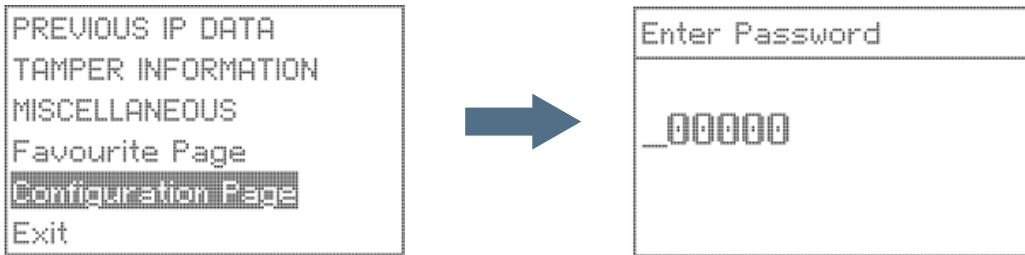
The Prometer 100 meter display can be set to different languages. The following languages are available:

- English
- Swedish
- German
- French
- Spanish
- Russian
- Arabic

The configuration page displays are shown below.

PREVIOUS IP DATA TAMPER INFORMATION MISCELLANEOUS Favourite Page Configuration Page Exit	Use the Up/Down buttons to scroll to the Configuration page. The selection will be highlighted. Press the Enter button and enter the correct password using Up and Down buttons to open the page. Use the Up/Down buttons to scroll within the page and view the various screens.

Metro LED Config Display TimeOut Cfg. Del Fav Parameters Reset Battery Time Meter Constant Cfg. MODBUS Configuration	**Metro LED 1** Metro LED 2 Exit	**Active Energy-Total** Active Energy-Fund Exit
Metro LED 1 **Metro LED 2** Exit	**Reactive Energy** Apparent Energy Exit	Metro LED Config **Display TimeOut Cfg.** Del Fav Parameters Reset Battery Time Meter Constant Cfg. MODBUS Configuration
Auto Disp TimeOut Manual Disp TimeOut Display Off TimeOut Exit	Display Configuration Auto Display Timeout **005 Sec** Current Timeout Value	Auto Disp TimeOut **Manual Disp TimeOut** Display Off TimeOut Exit
Display Configuration Manual Display Timeout **180 Sec** Current Timeout Value	Auto Disp TimeOut Manual Disp TimeOut **Display Off TimeOut** Exit	Display Configuration Display Off Timeout **000 Sec** Current Timeout Value
<mark>Display to be added</mark>	Delete Favourite Page All Parameters **Are You Sure?** Press Up-Yes, Down-No	Metro LED Config Display TimeOut Cfg. Del Fav Parameters **Reset Battery Time** Meter Constant Cfg. MODBUS Configuration
Reset Battery Timing New Battery Inserted? **Are You Sure ?** Press Up-Yes, Down-No	Metro LED Config Display TimeOut Cfg. Del Fav Parameters Reset Battery Time **Meter Constant Cfg.** MODBUS Configuration	Meter Constant Config. Number of pulses **256000 /k** Current Meter Constant
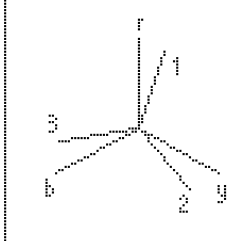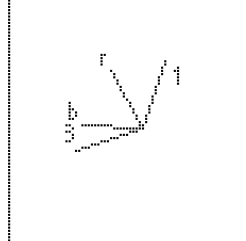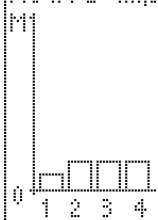
Reset Battery Time Meter Constant Cfg. **MODBUS Configuration** Language Exit	**MODBUS ID** MODBUS Baud Rate (R) Exit	MODBUS ID Configuration **001** Current MODBUS ID
MODBUS Baudrate Cfg.(R) **09600** Current Baudrate	Del Fav Parameters Reset Battery Time Meter Constant Cfg. MODBUS Configuration **Language** Exit	**English** Swedish German French Spanish Exit

(Russian and Arabic language options are missing in the above display)

The following displays are self-explanatory and occur at the time of events such as configuration, file download etc. and are included here for your reference only.

Successfully Configured	Configuration Failed	No Parameter
Action Not Allowed!	Billing in Process…	Delete Favourite Page All Parameters Are You Sure? Press Up-Yes, Down-No
Favourite Page Parameter List Full !	Favourite Page Parameter Added	Favourite Page Duplicate Parameter

User Selectable Display Examples (displays to be updated)

Description	HV (3-phase 4-wire) Display	HV (3-phase 3-wire) Display
Phasor Diagram	Ary= 120:02 Ayb= 120:02 Abr= 119:54 Ar1= 020:49 Ay2= 020:41 Ab3= 020:42 1,2,3=> Cur. r,y,b=> Vol.	Abr= 059:52 Ar1= 050:49 Ab3= 340:48 1,2,3=> Cur. r,y,b=> Vol.
Bar graph	Active Import (Total) M1 Unit= Wh C1= 0000028.3 C2= 0000048.7 C3= 0000048.7 C4= 0000048.7 13:00 - 14:00 0 1 2 3 4 SIP = 15 Min	Same for HV3 and HV4
MD Value	C, UMD Reg, kW Active energy Imp. (T) **0.0044520** **03 Dec' 14 16:45** OBIS 1.0.1.6.0.255	Same for HV3 and HV4
Battery Status Greater than equal to 30%	Battery Status Healthy OBIS 0.0.96.6.1.255	Same for HV3 and HV4
Battery Status Less than 30% & Greater than equal to 20%	General Battery Status Low OBIS - 0.0.96.6.1.255	Same for HV3 and HV4
Battery Status Less than 20%	General Battery Status Critical OBIS - 0.0.96.6.1.255	Same for HV3 and HV4

Battery Remaining Hours	Remaining Battery Hours 05:59:00 OBIS 0.0.96.6.0.255	Same for HV3 and HV4

6.5 Events

The Prometer 100 has a number of defined events that are stored in the meter's event log when they occur and restore. The events are arranged into different logical compartments with defined numbers of events logging. An event is displayed with a description and a time stamp in M-Cubed. All the events will be displayed in following categories in meter display as– voltage related, current related and events other than voltage & current related. The events do not enforce any electrical value changes inside the meter such as running the meter on I_{max} etc.

Events are logged if the condition for the detection of an event persists for a specified duration, known as the persistence time. Events can have a different persistence time for occurrence and restoration as applicable. The persistence time for an occurrence as well as for restoration is configurable at factory end for respective event as applicable. However some events like power on/off, magnet will not have any restoration time because of the nature and type of the event. Similarly some events can have the same condition of tamper detection as per the nature and type of the event in a given circumstances.

The general events supported are as follows –

1. Phase-wise missing potential
2. Voltage unbalance
3. Invalid Voltage
4. Over Voltage
5. Under Voltage
6. Phase wise current circuit reversal
7. CT Miss
8. Current unbalance
9. Feeder Supply Fail
10. Power on/off
11. Front cover and ETBC Open detection in power on/off condition (applicable for Prometer 100-W)

There are other customised events like Neutral Disturbance (ND), Magnet immunity, CT open/ Bypass and %THD for voltage and current are also supported in meter.

7 Functions

This section provides an overview of the functions available in Prometer 100. All functions in the meter can be both configured and read in M-Cubed. In many cases, M-Cubed can also export data to a file or print out data.

7.1 Meter clock

The Prometer 100 has an integrated real-time clock for time-dependent functions. Information about time adjustment and daylight saving time status is recorded with tags on the logged values (refer to the section Loggers on page 42). Time set is also noted as an event in the event log; *see the section* Display of events *(pg. 46).*

7.1.1 Time Set

The meter's date and time can be set to an absolute point in time. Instantaneous adjustment of the meter's time can influence logged values. For this reason, instantaneous adjustment of the meter clock is primarily intended for use at initial configuration of the meter.

7.1.2 Time Advance and Time Retard (Sliding adjustment)

When the Prometer 100 is not being used for on-line application, the meter's time can be advanced or retarded using time advance or time retard commands with M-Cubed BCS. The meter time can be retarded or advanced by t_{tc} seconds spanned over N_{tc} consecutive blocks of 15 minutes (t_{tc}/ N_{tc} seconds for each block). The meter automatically adjusts for any time correction during the load survey reading period. Once a meter gets and accepts a time advance/retard command, it is not possible to do time adjustment for the next 7 days.

7.1.3 Daylight saving time

Prometer 100 offers the alternative of letting the meter clock follow daylight savings time. At a specified date, the meter clock is adjusted forward, and at another, adjusted backward. Prometer 100 can store 15 years of DST configuration.

Example: On 28 March the clock is to be adjusted forward, from 02:00 to 03:00. The adjustment back to standard time is to occur on 31 October at 3:00 (daylight savings time) when the clock is to be set back to 02:00. The following is set in the meters: Begin March, 28, 02:00. End October, 31, 03:00 and the standard time is to be adjusted by 60 minutes.

7.1.4 External synchronisation

The meter time can be adjusted by a pulse on one of the meter's digital inputs. When a pulse is registered, the clock is adjusted to the closest multiple of a specified synchronisation interval. If the synchronisation interval is, for example, one minute and the time is 13:00:29, a pulse will adjust the clock to 13:00:00. If the time had instead been 13:00:31, the clock would have been adjusted to 13:01:00.

Available synchronisation intervals are:

1, 2, 5, 10, 15, 20, 30, 45 and 60 minutes
12 and 24 hours

A digital input must be configured for clock synchronisation (refer to the section Digital inputs and outputs on page 39).

Note: Meter will not sync the time if the time difference is more than the time adjustment limit configured in the meter. By default, the time adjustment limit is set as 25 seconds. The time adjustment limit can be configured as any value between 0 to 30 seconds.

7.2 Support for Different Types of Energy

Prometer 100 meter is used for feeder based applications where energy may flow in both the directions. Prometer 100 is an Import Export type meter; its metering unit is capable of logging energy in both directions.
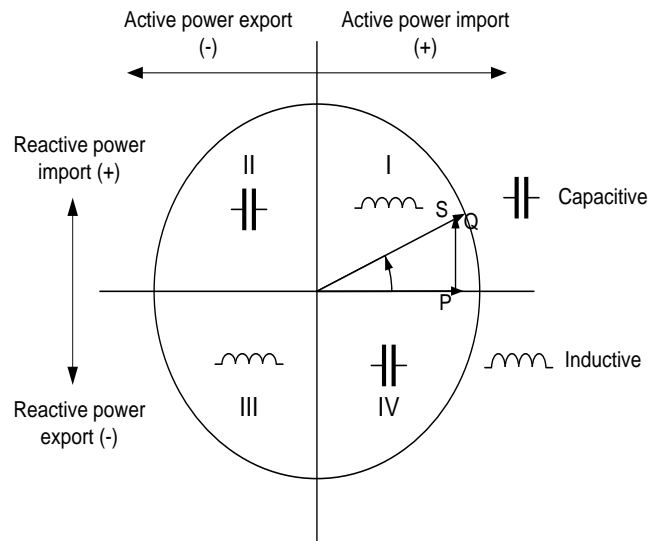
Quadrants	Phase angle	Current relative to voltage
I	0 to 90°	Lagging
II	90 to 180°	Leading
III	-180 to -90°	Lagging
IV	-90 to 0°	Leading

Prometer 100 supports different tariff structures and number of Energy types (refer to Table 2). Any combination of energy types can be provided as per the specification agreed at the time of order.

The Energy Channel Registers are shown below:

Sr. No.	Parameters	Instantaneous	Billing	TOD MD / UMD	TOD Rate	Daily Energy	Logger 1	Logger 2
1	Active Import Total (Q1+Q4)	Y	Y	Y	Y	Y	Y	Y
2	Active Export Total (Q2+Q3)	Y	Y	Y	Y	Y	Y	Y
3	Active Import Fundamental (Q1+Q4)	Y	Y	Y	Y	Y	Y	Y
4	Active Export Fundamental (Q2+Q3)	Y	Y	Y	Y	Y	Y	Y
5	Reactive Import while Active Import – Q1	Y	Y	Y	Y	Y	Y	Y
6	Reactive Import while Active Export – Q2	Y	Y	Y	Y	Y	Y	Y
7	Reactive Export while Active Export – Q3	Y	Y	Y	Y	Y	Y	Y
8	Reactive Export while Active Import – Q4	Y	Y	Y	Y	Y	Y	Y
9	Apparent – While Active Import (See Note 2)	Y	Y	Y	Y	Y	Y	Y
10	Apparent – While Active Export (See Note 2)	Y	Y	Y	Y	Y	Y	Y
11	Reactive Import (Q1+Q2)	Y	Y	Y	Y	Y	Y	Y
12	Reactive Export (Q3+Q4)	Y	Y	Y	Y	Y	Y	Y

#	Description							
13	Reactive Inductive (Q1+Q3)	Y	Y	Y	Y	Y	Y	Y
14	Reactive Capacitive (Q2+Q4)	Y	Y	Y	Y	Y	Y	Y
15	Net Active (Imp – Exp) *	Y	Y	N	N	Y	Y	Y
16	Net Reactive (Q1+Q2-Q3-Q4) *	Y	Y	N	N	Y	Y	Y
17	Active Import Total (Q1+Q4) - Phase 1	Y	Y	N	N	Y	Y	Y
18	Active Import Total (Q1+Q4) - Phase 2	Y	Y	N	N	Y	Y	Y
19	Active Import Total (Q1+Q4) - Phase 3	Y	Y	N	N	Y	Y	Y
20	Active Export Total (Q2+Q3) - Phase 1	Y	Y	N	N	Y	Y	Y
21	Active Export Total (Q2+Q3) - Phase 2	Y	Y	N	N	Y	Y	Y
22	Active Export Total (Q2+Q3) - Phase 3	Y	Y	N	N	Y	Y	Y

Table 2: Energy Channel Registers

The pre-defined energy channels can be configured for display, billing, TOD, MD, Load Survey and Daily Energy in line with purchase order requirements at the time of order.

Notes:

1) All the bi-directional energy registers (* marked) will have sign indication ('-'sign will be available for negative value and no sign for positive value).

2) In 'Apparent' and 'Net Active' energy calculation, 'Active' energy can be either 'fundamental' or 'total'. This can be configured through the tariff tool. Both energies need to be of same type.

3) Single phase measurements (17-22) are supported by the 4 wire configuration.

For energy types 1-16:

These registers are continuously increased depending on the selected energy.
Example: Main Energy Register kWh (I) will show the total imported active energy logged till date.

Recording of all supported energy types is possible but only those energy types are logged into the memory which is specified by the tariff file. An individual register is provided for all selected energy types. These register are called Main Energy Registers. Whenever an individual energy type is generated / consumed, its value is updated in the corresponding main energy register. These registers cannot be reset.

7.3 Instant values

Besides energy, the Prometer 100 can also measure instant values. Instant values are constantly changing values such as current, voltage, power and harmonics. The instant values are updated every second. The formulas and definitions used to calculate the values are presented in Appendix E: Calculation Principles on page 61.

7.3.1 Overview

This table provides an overview of the instant values that can be read on the meter. Readings can be viewed with M-Cubed, on the display and with other software that has implemented Prometer 100's communication protocol. Most instant values can be logged; for more information, see section Loggers on page 42.

Instant value	Available on 3-element meter	Available on 2-element meter
Real Time Clock – Date and Time	Yes	Yes
Phase Voltage	Yes (L1, L2, L3, Average)	No
Line Voltage (L12, L23, L31, Average)	Yes	Yes
Line Current	Yes (L1, L2, L3, Average)	Yes (L1, L3, Average)
Active Current	Yes (L1, L2, L3, Average)	Yes (L1, L3, Average)
Reactive Current	Yes (L1, L2, L3, Average)	Yes (L1, L3, Average)
Voltage Phase angle (L12, L23, L31)	Yes	Yes

Current Phase angle	Yes (L1, L2, L3)	Yes (L1, L3)
Active power total	Yes	Yes
Active power per phase	Yes	No
Active power fundamental	Yes	Yes
Active power fundamental per phase	Yes	No
Reactive power total	Yes	Yes
Reactive power per phase	Yes	No
Apparent power total	Yes	Yes
Apparent power per phase	Yes	No
Power factor total	Yes	Yes
Power factor per phase	Yes	No
Frequency	Yes	Yes
Average THD voltage	Yes	Yes
THD voltage per phase	Yes	No
Average THD current	Yes	Yes
THD current per phase	Yes	No
Average THD power	Yes	Yes
THD power per phase	Yes	No

7.3.2   Prefix for units in the display

The presentation for units and the number of decimals depends on the magnitude of the value.

7.3.3   Harmonics measurement

Harmonics numbers 2 to 31 are measured for all currents and voltages. At a fundamental frequency of 50 Hz, the second harmonic is 100 Hz, the third harmonic is 150 Hz, etc. Both the harmonics' amplitude and phase angle are measured and included in the calculation of power and energy, and their magnitude can be read via the meter's communication protocols. In M-Cubed, harmonic magnitude is presented with a diagram.

Voltage harmonics profile

Parameter	Available on 3-element meter	Available on 2-element meter
Real Time Clock – Date and Time	Yes	Yes
Voltage harmonics (2 to 31) – L1	Yes	Yes
Voltage harmonics (2 to 31) – L2	Yes	No
Voltage harmonics (2 to 31) – L3	Yes	Yes

Current harmonics profile

Parameter	Available on 3-element meter	Available on 2-element meter
Real Time Clock – Date and Time	Yes	Yes
Current harmonics (2 to 31) – L1	Yes	Yes
Current harmonics (2 to 31) – L2	Yes	No
Current harmonics (2 to 31) – L3	Yes	Yes

7.3.4   THD

THD stands for Total Harmonics Distortion and is a measurement of the amount of harmonics present in a signal. Voltages and currents' THD can be read via M-Cubed and on the display.

7.4   Daily Energy Snapshot

Energy Snapshot feature saves the value of a particular energy register at a particular time. Prometer 100 stores a snapshot of different energy registers (can be up to 28 energies) on a daily basis at predefined time as selected from tariff configuration (generally it is set at midnight). Snap shots are generally stored for 45 days and can be stored for a maximum of 100 days as configured at factory. The updating of Energy Snap shot records is done in a rollover fashion, i.e. each day a new energy snapshot is stored in the memory and the earliest record is deleted. So at any time a meter will have energy snapshot records for the last 45 days.

7.5 Digital inputs and outputs

The Prometer 100 has several inputs and outputs that can be configured to perform various tasks. Both inputs and outputs are protected against overvoltages by varistors. They also have an isolated interface between the electronics and the surroundings to ensure personal safety. For electrical data on the meter's inputs and outputs, see Appendix F: Connection and General Details (page 66).

7.5.1 Inputs

The inputs can be configured as follows:

- **Not used**
  The input is not used.

- **Finish historical period (To be verified that only 'Finish Hist Period' Input can be set to inverted as in ConfigView S/W it allows none of the inputs to be set as inverted)**
  An incoming pulse will result in the present period ending and registers being copied to historical registers. The meter registers pulses on positive or negative flanks, depending on if the input is set to inverted or not. By setting limits for maximum and minimum pulse lengths, the meter can be limited as to what it detects as a valid pulse. Pulses with lengths beyond the established limits are ignored. For a pulse to finish historical period, it is also necessary that the Data communication be configured to allow this. For more information, see the section Historical registers (pg.48).
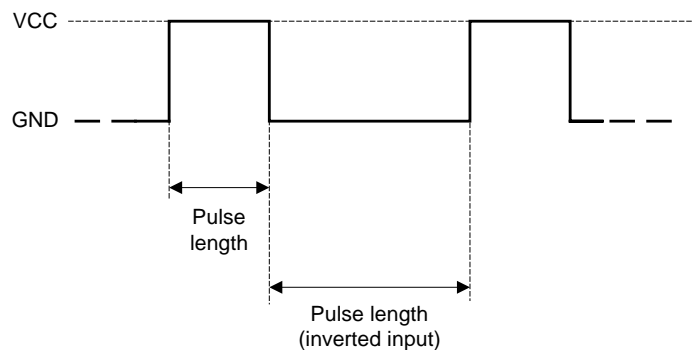
The figure shows pulse lengths when an input is inverted or non-inverted, respectively.

- **Pulse input**
  To register pulses from pulse-producing units such as energy meters, pulse inputs are used. Incoming pulses are accumulated in registers called external registers. There is an external register connected to each input on the meter. For external registers, a factor is configured by which the number of incoming pulses is multiplied. Prefixes and the number of decimals can also be configured for the registers. Moreover, the registers can be configured with descriptive texts.

- **Time synchronisation**
  When incoming pulses are received, the meter's clock is synchronised at a specific interval For available synchronisation intervals and more detailed information on time synchronisation, see the section Meter clock (pg. 35).

- **Rate input**
  Up to three digital inputs can be configured to control the active rate. Each input will correspond to a bit and the significance is also defined for the digital input. A high level on the input will signify that the bit is "1" while a low level will signify "0". How the digital input levels are mapped to rates is defined in the Time of use panel (pg.48).

7.5.1.1   Registration of pulses

A pulse must be at least 20 ms (for 50 Hz) and 16 ms (for 60 Hz) long to be guaranteed of being detected by the meter. The maximum pulse width that the meter can handle is 300 ms.

7.5.2 Outputs

The outputs can be configured as follows:

- **Not used**
  The output is not used.

- **Energy Pulse output**
  The output is used to pulse an energy type that the meter is measuring. A multiplier is specified for the output as pulses/unit and the pulse length is specified for all pulse outputs. The shortest possible pulse length is 20 ms.
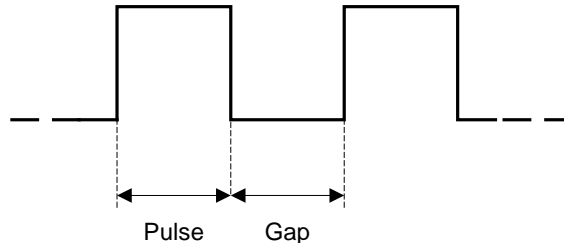
<div align="center">Pulse   Gap</div>

Maximum pulse frequency at outputs is limited so that the gap is at least as long as the pulse length.

- **Long Pulse output**
  The output is used to generate long pulse whose length is between 2 to 15 seconds. By default, the pulse length is set as 10 seconds. The long pulse output is used for the following functions:

  - MD Register Change

    On switching the MD registers, the output generates a long pulse.

  - Rate Register Change

    On switching the Rate registers, the output generates a long pulse.

  - Billing Action

    On performing billing action, the output generates a long pulse.

  - DIP Start

    At the start of a set demand integration period, the output will go active for the configured pulse length before returning to the inactive state. See the section Maximum demand (pg. 47).

- **Remote control**
  With this function, the output can be made active or inactive by sending commands to the meter via the DLMS/PACT protocol. This function can be used to control anything that can be controlled with a digital relay output. For this, it is also necessary that the Data communication be configured to enable remote control.

- **State Output**

  - MD Register

    With this function, the output remains active or inactive for the time zones during which the selected MD registers are activated.

  - Rate Register

    With this function, the output remains active or inactive for the time zones during which the selected Rate registers are activated.

  - Alarm output
    When an output is set to function as an alarm output, one of the user-defined alarms can be chosen to indicate at the output. When an alarm occurs, the output switches to active, and when the alarm state ceases, the output returns to inactive. In the section Alarms (pg. 45), user-defined alarms are described and how they can be configured.

Note that the outputs are inverted via firmware. If the meter loses its auxiliary power, the relay will open, regardless of it is inverted or not.

7.5.2.1   Output states

An active output means a closed relay when the output is not inverted. When the output is inverted, the active relay is open. The Prometer 100 outputs are of the solid-state type and **when the meter is turned off, they are open.**

7.5.2.2   Meter variants

Inputs/Outputs	Prometer 100-R	Prometer 100-W
4 configurable input/output	●	●
8 outputs and 4 configurable input/output	●	
7 outputs and 4 configurable input/output		●

7.6   Communications and Security

Prometer 100 meters have optical port, RS232, RS485 and Ethernet ports for communication.

Note:

The Prometer 100-W supports attachment of field replaceable communication modules for RS232 and RS485. These modules are optional and can be procured separately.

Communication channel	Default / Max supported Baud rate	Supported protocol	Usage
Optical port- IEC1107	300 / 19200 bps	DLMS	Local Meter Reading
RS485 (RJ-45 in & out)	9600 / 57600 bps	DLMS, Modbus RTU	Meter reading, online monitoring, third party interface
RS232	9600 / 57600 bps	DLMS	Remote meter reading through external modem
Ethernet port	10 / 100 Mbps	Modbus TCP (port no.: 502) DLMS TCP (port no.: 4059)	Meter reading, online monitoring, third party interface
Note: For more information on protocol support, see the document 'Prometer 100 meter reading'.			

7.6.1   Communication speed

The meter's optical port always starts with a baud rate of 300 bps, regardless of what is configured, before shifting over to the specified communication speed. This means that software (for example, M-Cubed) that communicates with the meter via the optical port does not need to know the speed that the meter's optical port is set to. RS232 and RS485 communication ports differ in this respect. They start at the specified baud rate from the beginning, which means that connected software must be aware of the speed to be able to communicate. RS232 communication port can be set at a speed of between 9600 bps and 57600 bps, and RS485 communication port can be set at a speed of between 9600 bps and 57600 bps. The optical port can be set at a speed of between 300 and 19200 bps.

7.6.2   Security

The meter has five authorisation levels that can limit access to the meter during communication via any of the meter's communication ports. Authorisation levels are password-protected.

Authorisation levels

1   Provides access to reading.

2   Provides access to everything in level 1 plus access to set the clock and finish historical periods (also resets maximum demand values).

| 3 | Provides access to everything in level 2 plus access to configure the meter. |

| 4 | Provides access to everything in level 3 plus access to transfer new firmware to the meter. |

| 5 | Provides access to everything in level 4 plus access to calibrate the meter, reset registers and change certain security setting. |

7.6.2.1 Limitation of total access attempts

The meter limits the total number of access attempts to six when incorrect passwords are entered. At the seventh attempt, the meter blocks access whether the password is correct or not. The block is in effect until the next hour shift. After that, new password attempts may be made.

7.6.2.2 Passwords

A password consists of up to 12 case insensitive alpha-numerical characters. The authorisation check may be deactivated for a level by deleting the password. When connecting to the meter, access is granted to the highest level that is lacking password regardless of the password given by the user.

If the setting 'Require COP password compliance (min length 6)' is activated, a new password is required to be at least 6 characters. The setting can only be changed at access level 5.

7.6.2.3 Security settings

The following security settings modify what can be configured at what access level. The settings are of the type active/not active, and can only be changed at access level 5.

- Permit measuring configuration only at level 5 — If this setting is active, settings in the measurement form can only be changed at access level 5.
- Block configuration of transformer compensation — If this setting is active, transformer compensation cannot be changed at all.
- Block configuration of display sequence 4 — If this setting is active, it is not possible to change the content of display sequence 4, or change its name or activation.

7.6.2.4 Access restriction for measurement configuration

Generally the meter allows to be reconfigured at access level 3. This function requires level 5 for measuring configuration.

7.7 Loggers

The Prometer 100 has two identical, parallel and individually configurable loggers. That which is described in this section applies both to logger 1 and logger 2.

7.7.1 Overview

A logger in a Prometer 100 can log values for instant quantities, energy registers and external registers. Some quantities can be logged both by phase and as total values for all three phases, others only as total values. The table provides an overview of quantities that can be logged. Certain instant values in the table are not available in 2-element meters and thus cannot be logged; see the section Instant values (pg. 37). Logger Parameters can be read as profile data and SIP wise.

Quantity	Computation Method
Real Time Clock – Date and Time	Instant
Active Import Total (Q1+Q4)	Consumption
Active Export Total (Q2+Q3)	Consumption
Active Import Fundamental (Q1+Q4)	Consumption
Active Export Fundamental (Q2+Q3)	Consumption
Reactive Import while Active Import – Q1	Consumption
Reactive Import while Active Export – Q2	Consumption

Reactive Export while Active Export – Q3	Consumption
Reactive Export while Active Import – Q4	Consumption
Apparent – While Active Import	Consumption
Apparent – While Active Export	Consumption
Reactive Import (Q1+Q2)	Consumption
Reactive Export (Q3+Q4)	Consumption
Reactive Inductive (Q1+Q3)	Consumption
Reactive Capacitive (Q2+Q4)	Consumption
Net Active (Imp – Exp)*	Consumption
Net Reactive (Q1+Q2-Q3-Q4)*	Consumption
Active Import Total (Q1+Q4) - Phase 1	Consumption
Active Import Total (Q1+Q4) - Phase 2	Consumption
Active Import Total (Q1+Q4) - Phase 3	Consumption
Active Export Total (Q2+Q3) - Phase 1	Consumption
Active Export Total (Q2+Q3) - Phase 2	Consumption
Active Export Total (Q2+Q3) - Phase 3	Consumption
Phase Voltage - Phase wise, Average 3 phase	Min / Max / Avg / Instant
Line Voltage - Phase wise, Average 3 phase	Min / Max / Avg / Instant
Line Current - Phase wise, Average 3 phase	Min / Max / Avg / Instant
Active Power - Phase wise, Average 3 phase	Min / Max / Avg / Instant
Reactive Power - Phase wise, Average 3 phase	Min / Max / Avg / Instant
Apparent Power - Phase wise, Average 3 phase	Min / Max / Avg / Instant
Power Factor - Phase wise, Average 3 phase	Min / Max / Avg / Instant
THD Voltage (%) - Phase wise, Average 3 phase	Min / Max / Avg / Instant
THD Current (%) - Phase wise, Average 3 phase	Min / Max / Avg / Instant
THD Power (%) - Phase wise, Average 3 phase	Min / Max / Avg / Instant
Frequency	Min / Max / Avg / Instant
Voltage Angles	Min / Max / Avg / Instant
Voltage Current Angles	Min / Max / Avg / Instant
Voltage Harmonics - Phase wise, Average 3 phase (3rd, 5th, 7th, 9th, 11th, 13th and 15th)	Min / Max / Avg / Instant
Current Harmonics - Phase wise, Average 3 phase (3rd, 5th, 7th, 9th, 11th, 13th and 15th)	Min / Max / Avg / Instant
Pulse Input Counter (1 to 4)	Instant
Status Flag (Time adjusted, Time disturbed, Alarm, Parameter Changed, DST, Low / Missing Voltage, Battery and Power Loss)	Instant

Energy is logged as consumption. Instantaneous values can be logged as average, maximum, minimum and instant value during the logging interval or as the instantaneous value at the end of the logging interval. Maximums and minimums are detected based on 1 sec. interval snapshots, and average is calculated based on 1 sec. interval snapshots.

Notes:

- Maximum 50 parameters can be selected for each logger.

- Pulse input must be configured through ConfigView.

7.7.2 Logging interval and total channels

A logger can store data in 1 to 50 channels. The logging interval is common for all channels in a logger and it can be configured from one minute up to one hour. A logger's capacity is dependent on number of channels and logging interval. For example, Prometer 100 meters can be configured to store 960 days of load profile data at 30 minutes SIP for 10 parameters. When the logger is full, the oldest values will be written over. The table shows the capacity in number of days before the oldest value is written over.

Capacity in days

Logging interval (min)	Number of logging channels						
	1	**5**	**10**	**20**	**30**	**40**	**50**
1	320	64	32	16	10	8	6
2	640	128	64	32	21	16	12
3	960	192	96	48	32	24	19
4	1000	256	128	64	42	32	25
5	1000	320	160	80	53	40	32
10	1000	640	320	160	106	80	64
15	1000	960	480	240	160	120	96
20	1000	1000	640	320	213	160	128
30	1000	1000	960	480	320	240	192
60	1000	1000	1000	960	640	480	384

Notes:

- Survey Integration Period (SIP) for Instantaneous parameters can be configured as 1, 2, 3, 4, 5, 10, 15, 20, 30 or 60 minutes.

- Survey Integration Period (SIP) for Energy parameters can be configured as 5, 10, 15, 20, 30 or 60 minutes.

- Maximum 1000 days can be configured

7.7.3 Storage of logged values

Logged values are saved with time stamps and flags that indicate events that have occurred during the logging interval.

- The time stamp indicates the end-time. If the logging interval is configured to one hour, a value with the time stamp 15:00 refers to the period 14:00 to 15:00.

- To indicate events or states during an interval, a logged value can be stored with one or more flags.

Event or state	Name of flag	Explanation
Time adjusted	T	During the past interval, the meter clock has been adjusted either instantaneous or a sliding adjustment is in progress.
Time Disturbed	D	The past interval is incomplete. For example, an interval shortened by the meter being without auxiliary power or if the logging memory has been reset. The first value after the logging memory having been configured will thus always be indicated with "Faulty value" (the logging memory is reset in conjunction with reconfiguration).
Alarm	A	In conjunction with user-defined alarms being configured, it may be specified that an alarm will also be indicated with logged values. When a user-defined alarm has triggered during the past interval, this is indicated with the flag "Alarm".
Parameter changed	P	The Prometer 100's configuration, calibration or initiation has changed. Which of these three the flag refers to can be seen in the event log.
Daylight savings time	S	Daylight saving time has been in effect during the past interval.
Voltage loss/missing	V	During the past interval all measuring voltages have been lost or missing.
Field Replaceable Battery (for meter reading/ RTC backup)	B	Estimated battery lifetime is up.
Power loss	O	During the past interval, the meter has been without auxiliary power.

For several of the flags, additional information can be viewed in the event log. A more exact time for events is specified in the log.

Note: When power is calculated from logged energy values, the resulting values will be somewhat more precise than when power is logged directly. This is because power is logged as an average value of instant values. The instant values are read twice per second, while energy is accumulated continuously.

7.8   Alarms

The Prometer 100 is equipped with alarms to be able to indicate when measured quantities are over or under a factory configured limit value. The meter enters the alarm state when the limit value is reached. An alarm is generated only after the alarm state has continued for a configurable time (persistence time). Alarms are configurable by the user and are therefore called user-defined alarms. The persistence time can be configured to a maximum of 60 minutes.

Note: There are alarms and events that cannot be configured, but instead, are always active. Examples of such alarms are indication that the clock has been changed or that an auxiliary power loss has occurred. For more information, see the section Display of events (pg. 46).

7.8.1   Overview

For most user-defined alarms, the limit value is specified as a percentage of the nominal value, which is the configured, nominal primary value (current, voltage or power). For 3-element meters, the limit value corresponds to phase voltage, and for 2-element meters, phase to phase voltage. The following table provides an overview of available alarms.

Alarm	Description
Low voltage	Alarm can be configured for low voltage event. Occurred condition is treated as alarm condition.
High voltage	Alarm can be configured for high voltage event. Occurred condition is treated as alarm condition.
Voltage unbalance	Alarm can be configured for voltage unbalance event. Occurred condition is treated as alarm condition.
Current unbalance	Alarm can be configured for current unbalance event. Occurred condition is treated as alarm condition.
High THD voltage	Alarm can be configured for voltage THD event. Occurred condition is treated as alarm condition.
High THD current	Alarm can be configured for current THD event. Occurred condition is treated as alarm condition.
High THD power	Average value of THD for all power phases exceeds the limit value.
Any phase voltage missing	Alarm can be configured for PT miss event (any phase). Occurred condition (any phase) is treated as alarm condition.
Frequency healthy	Frequency is (< 49 Hz or >= 51 Hz) or (<59 Hz or >= 61 Hz)
Auxiliary power supply fail	Any auxiliary supply fails
Low power factor	System power factor is below limit value.
Low active power	System active power is below limit value.
High active power	System active power is above limit value.
Single harmonic high voltage	Any phase voltage individual harmonics value (2nd to 31st) is above limit value. Every 5 second meter will scan 2nd to 31st harmonic values for one phase and in next 5 sec meter will scan for next phase. Hence resolution of checking for each phase is 15 second.

Single harmonic high current	Any phase current individual harmonics value (2nd to 31st) is above limit value. Every 5 second meter will scan 2nd to 31st harmonic values for one phase and in next 5 sec meter will scan for next phase. Hence resolution of checking for each phase is 15 second.
Internal error / Health Status	In case of internal failure like RTC fail (as per event logged), Memory fail (as per event logged), Battery fail or System status.
Internal RTC battery fail	In case of internal RTC battery fail (Simulated battery failure alarm shall be provided)
Phase wise low voltage	Phase voltages is beneath the nominal voltage - limit value
Phase wise high voltage	Phase voltages is above the nominal voltage - limit value
Phase wise low power factor	Phase wise power factor is below limit value.
Reverse energy direction	Alarm can be configured for CT reverse event (any phase). Occurred condition (any phase) is treated as alarm condition.

Note:

- Two LEDs are available for alarm information.
- Multiple alarms can be selected on single LED.
- Events selected only for alarm, shall not log event. For logging purpose event has to be selected in event log section.

7.8.2   Indication

Alarms can be configured to indicate in one or more of the following ways:

- Alarm LED on meter front
- Changed digital output level
- Indication of a logged value with a flag

The alarm LED stops flashing and the digital output returns to inactive low after the alarm state passes.

7.8.3   Display of events

The events status can be viewed on the meter's display if the tamper information displays are configured to be included in one of the meter's display sequences. A more detailed description of the meter's events can be viewed in M-Cubed. Via M-Cubed, the event log can also be printed out or saved to a file.

Sr.No	Fixed Compartment	Events	Maximum number of events per compartment	Snapshot
1	1	Phase wise PT Miss	100	Y
2		Over Voltage		
3		Under Voltage		
4		Voltage Unbalance		
5	2	Phase wise CT Reversal	100	Y
6		Phase wise CT Open (HT Meter Only)		
7		CT Bypass (HT Open Only)		
8		Current Unbalance		
9	3	Power Fail / Power On-Off	100	N

10		Time Set Transactions		
11	4	Profile Capture Period Transaction for logger 1	100	Y
12		Profile Capture Period Transaction for logger2		
13	5	Neutral Disturbance	100	Y
14		Magnet Interference		
15	6	Cover Open (In case of cover open during power fail duration, time stamp and snapshot will be logged at power up time)	100	Y
16	7	Device ID Change	100	N
17		Password Change		
18		AES Key Change		
19		Immediate Tariff Download		
20		Feeder Supply Fail		
21		Tamper Reset		
22		Scaling Tariff Download		
22		Remote control IO switch transaction		
23		Energy register reset transaction		
23		MD reset transaction		
24	8	CT Miss	100	Y
25		Invalid Phase Association		
26		Invalid Voltage		
27	9	RTC Fail	100	N
28		Memory Fail		
29	10	Phase wise Voltage THD (%)	100	Y
30	11	Phase wise Current THD (%)	100	Y

For snapshot refer to Appendix G

7.9 Maximum demand

Maximum Demand (MD) plays a crucial role in current scenario of electricity conditions. According to maximum demand conditions it is easy to monitor variation in the load condition and trend of load according to the time zone.

The Prometer 100 meter has the capability of logging Maximum Demand for all the selected energy types (except Net Active and Net Reactive). The Maximum Demand is computed for a fixed block of time which is called Demand Integration Period (DIP). DIP can be set to 5, 10, 15, 20, 30 or 60 minutes.

Maximum Demand registers are provided for each individual energy type. A separate register is available to record the Maximum Demand during the entire day (i.e. 00-24 hours). This is known as the Universal Demand Register. This is not configurable through the tariff.

The rules for logging Maximum Demand in these individual register may be set on the following basis:

As per Time Zone: In this case the individual MD registers are assigned to a specific time zone of a day. A particular MD is active in the assigned Time Zone only. In such case the MD register are called **TOD MD register**.

MD reset button: User can trigger the Maximum Demand by use of MD reset button provided under the front cover of the meter.

Please note that the Maximum Demand in any MD register is for the current billing period and is always reset to zero whenever a billing cycle is finished.

7.10 Historical registers

Historical registers are used by the Prometer 100 to store current register values at defined points so as to be able to read them later. Stored in historical registers are all maximum demand values, TOU registers and energy registers, with the exception of energy registers by phase. The historical registers are time stamped to indicate when storage occurred. The Prometer 100 can store up to 15 historical registers.

```
Date and time

  ┌────────────────────┐    ┌────────────────────┐
  │ Energy registers   │    │ Maximum demand     │
  │                    │    │ values             │
  └────────────────────┘    └────────────────────┘

  ┌────────────────────┐
  │ Time of use registers │
  └────────────────────┘
```
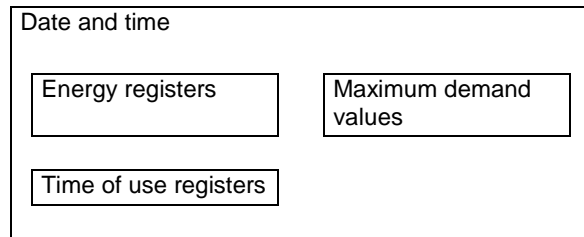
7.10.1.1 Finish historical period

By finishing a historical period, the current registers values are stored in historical registers and the maximum demand values are reset. When a period is finished, an event is stored in the meter's event log. Periods can be finished in various ways:

- Via meter push button

  The period is finished when the meter's MD Reset button is pressed.
  This requires that the historical registers are configured to permit finish via the meter button.

- Via M-Cubed

  The period is finished when a command is given from M-Cubed or third-party software.

- At any configured billing date

  The period is finished when the meter clock reaches the configured billing date

- Via digital input

  The period ends when a pulse is received at a digital input on the meter.

  This requires both that the historical registers are configured to permit ending via a digital input and that an input is configured for this purpose.

7.10.1.2 Lock out time for finish historical period

The Lock out time prevents the user to create a new historical period within a configured time. It can be configured from 1 hour to 40 days.

7.11 Time of use

Time of use is a function that enables energy to be divided up into various registers depending on the rate that applied when the energy was measured. In the Prometer 100, tariff structure can be stored that switch rates at predetermined times according to a configurable pattern. A tariff structure consists of seasons, day types and holiday dates. The maximum number of rates is eight.

- Day types specify how rates change during a 24-hour day.

- Seasons specify the day types that apply during the days of the week, Monday to Sunday.

- Holiday dates specify the day type that applies on a certain date.

- Rate input can be used to control active rate depending on the state of digital input signals.

7.11.1 Day type

Prometer 100 supports up to 16 day types. A day type specifies which rate, from a maximum of eight, should apply when during the day. A day can have up to 16 changing points. A day type can be connected to a day of the week in a season or to a holiday date.

7.11.2 Season

A season refers to a period. During this period, the season defines the day types that will apply during the days of the week. Prometer 100 supports up to 16 separate seasons. The seasons are arranged in a sequence where one season replaces the previous at a predetermined date.

7.11.3 Holiday dates

Days that change rates according to a pattern that is not covered by linking day types to seasons are called holiday dates. A holiday date specifies the day type that applies on a certain date. Holiday dates can be configured to apply every year on the same date or for a single year. In the Prometer 100, up to 30 holiday dates can be configured.

7.11.4 TOU registers

An energy register that is chosen to be divided into the rates is a TOU register. There are 14 TOU registers and each TOU register has separate registers for eight rates.

7.12   Billing Cycle Support

The concept of energy metering essentially consists of billing cycles. Prometer 100 has an inbuilt support for billing cycle.

7.12.1 Billing Cycle

The Prometer 100 provides following ways to perform a billing action. Performing a billing action finish current billing cycle and starts a new billing cycle.

- According to billing dates specified in Tariff file. A billing action from a billing date is done at the start of the day on the nominated date file

- At the time of Tariff activation i.e. whenever a new tariff is activated.(Downloading of new tariff having change in energy channels, scaling and TOU)

- By pressing MD Reset button

- Authenticated command for MD Reset from M-Cubed.

    Note: The lock out time prevents the user to perform a billing action within a configured time.

7.12.2 History of Energy, Rate and MD Register

Following values are stored in the meter memory each time a billing cycle completes i.e. a billing action is performed.

1. Values of all main Energy Registers at the time of a billing action. This is maintained in a rollover fashion which may have a maximum of 15 histories .i.e. all last 15 historical values will be available to you.

2. Values of all Rate Registers. This is maintained in a rollover fashion which may have a maximum 15 histories .i.e. all last 15 historical values will be available to you.

3. Values for all MD Registers along with Date & Time of MD occurrence. This is also maintained in a rollover fashion which may have a maximum 15 histories .i.e. all last 15 historical values will be available to you.

7.12.3 History for the Cause of Billing Register

The cause of billing is available on display in the meter for last 15 billing actions along with date & time of billing.

7.12.4 Cumulative Maximum Demand Registers

A special register is also provided for energy type selected for maximum demand which stores cumulative Maximum Demand for all MD register whenever a billing action takes place. Each time Billing Action takes place, the cumulative register shall increase by the value of their source register.

The purpose of this register is to limit the scope of tampering with Maximum Demand by performing a billing action repeatedly.

7.13   Meter Reading

The Prometer 100 uses DLMS for meter reading. In DLMS protocol the BCS is considered the client and the meter is the server. On request by the BCS, the meter will send all its supported OBIS codes and expected queries. All DLMS meters will communicate data only after 'getting associated' with the BCS client. Meter reading is divided in to the following sessions:

Single parameter sessions

Profile sessions

1.   Instantaneous profile reading

2.   Midnight energy profile reading

3.   Load survey profile reading

4.   Log wise events profile reading

7.14   Scaling Tariff

The Prometer 100 Scaling Tariff supports CT / VT ratio adjustment, and CT-VT error compensation in the field.

The M-Cubed is used for preparing the scaling tariff. The existing meter configuration must first be opened and read. The configuration can then be modified using the M-Cubed. The Prometer 100 does not require to be switched off during the configuration mode and will only implement the new configuration when all the blocks have been received and authenticated.

The Scaling Tariff contains the following sections:

1. Commissioning
2. Error Compensation

In a single scaling tariff, commissioning change and error compensation is treated & logged as three separate transactions.

It is also possible to download a scaling tariff in meter using a suitable tool. Complete meter data will be washed out by applying scaling tariff in meter.

7.15 Transformer compensation

Transformer compensation is a function for compensating for measurement errors in instrument transformers and for losses in power transformers. The function enables the Prometer 100 to present measurement values for which errors and losses have been compensated. The formulas used in the meter are presented in Appendix E: Calculation Principles (pg. 61).

Changing the transformer compensation can be blocked by the security setting 'Block configuration of transformer compensation'. This setting can only be changed at access level 5.

7.15.1 Overview

The tables present an overview of the transformer compensations in Prometer 100.

Instrument transformer compensations

Name	Value to be entered
Voltage error L1, L2, L3	Amplitude error as percent
	Phase angle in minutes
Current error L1, L2, L3	Amplitude error as percent
	Phase angle in minutes

Power transformer compensations

Name	Value to be entered
Copper losses, Total values	Active loss as percent of nominal power
	Reactive loss as percent of nominal power
Iron losses, Total values	Active loss as percent of nominal power
	Reactive loss as percent of nominal power

7.15.2 Instrument transformer compensations

To compensate for errors in instrument transformers, their amplitude error in percent and phase angle error in minutes are configured in the meter. One minute is equal to the angle 1°/60. The errors can be specified separately for all voltages and currents. When instrument transformer compensations are used, current and voltage are affected, as well as all quantities that arise from these: power, energy, etc.

7.15.2.1 2-element meter

When voltage errors are compensated on a 2-element meter, this is done on phase to phase voltages L12, L23 and L31 instead of on phase voltages. Only L12 and L23 are included in the calculation of power and energy. Compensation of L31 has no significance in this respect. In compensation of current errors for 2-element meters, only L1 and L3 can be compensated for because they are the only currents measured.

7.15.3 Power transformer losses

Power transformer losses consist of copper and iron losses. They are expressed as percentages of nominal power. One value is specified for active loss and one for reactive. When compensation of losses is configured, power, energy, power factor, etc. are affected but not current and voltage.

When copper losses are added per phase, the resulting copper loss is the average of the value.

Calculating loss values

Based on the nominal total power and the measured loss value in watts, a loss value can be calculated as a percentage of nominal power. It is the loss value that is configured in the meter. Nominal power is calculated with configured nominal current and voltage.

Nominal power: $Power_{nom} = Current_{nom} \cdot Line\,voltage_{nom} \cdot \sqrt{3}$

Loss value: $Loss\,value = Loss\,/\,Power_{nom} \cdot 100$

7.16 Quality of Supply

Power quality encompasses voltage monitoring and harmonics measurement. Harmonics measurement is described in the section Instant values (pg. 37).

7.16.1 Voltage monitoring

Voltage monitoring monitors the following states: swells (overvoltage), sags (under voltage), unbalance and interrupts. Monitoring is enabled by checking the check box and configuring limit values for the events. The occurrence and restoration limits are expressed as percentages of configured nominal voltage.

Example: For an occurrence limit of 110% and a restoration limit of 90%, and the configured nominal primary voltage of 10 kV, the limits attained are 9 kV and 11 kV.

These events are monitored phase wise every second. For 3-element meters, the average value for phase voltage is monitored, and for 2-element meters, the average value for phase to phase voltage is monitored.

The states shorter than three seconds are registered by accumulating registers. If the states last longer than three seconds, they are instead registered in the event log with time stamp and duration. The accumulating counters and the event log can be read in M-Cubed.

State	Duration	Registered in	Duration presented as
Sags / Swells / Interrupt / Unbalance	1 s – 3 s	Accumulating counter	Duration not specified
	3 s – 60 s	Event log	Duration of state
	> 60 s	Event log as Low voltage (for Sag) High voltage (for Swell) Feeder fail (for Interrupt) Voltage unbalance (for unbalance)	Duration of state

Note: If voltage interrupt condition persists, then voltage sag and voltage unbalance conditions are not monitored.

Appendix A: Abbreviations

The following are commonly occurring abbreviations used throughout this manual.

APS: Auxiliary Power Supply

BCS: Base Computer Software

DLMS: Device Language Message Specification

SCADA: Supervisory Control and Data Acquisition

MD: Maximum Demand

UMD: Universal Maximum Demand (0 to 24 hours)

Appendix B: Material Declaration

The material declaration for the Prometer 100-R is shown below:

Enclosure Rack	Mild steel with Aluminium
Meter Enclosure	Mild steel
Meter back plate	Mild steel
Meter current and voltage terminals	Brass with gold and silver plating
Handle	Mild steel
Screws	M3 for sealing meter with rack and M4 elsewhere
Front Cover	PC (Polycarbonate)
Front hinged plate	PC (Polycarbonate)

*Rack carries the female part of Essailec connector and meter carries the male part of Essailec connector with all the back side communication ports in the form of RJ45 connector.

The material declaration for Prometer 100-W is shown below:

Enclosure	PC FR (Polycarbonate Fire retardant)
Meter current and voltage terminals	Brass with nickel plating
Sealing screws	Brass with nickel plating

Appendix C: Communication Ports

The Prometer 100 can come as fitted with the following ports (see the variant supplied as per order):

1. Optical 1107 port
2. RS232/RS485 – Left Module
3. RS232/RS485 – Right Module
4. Ethernet

Optical Communication Port

In Prometer 100-R, the optical 1107 port is protected by a sliding cover. The 1107 optical port cover can be slid upwards in the arrow direction to the open position. The cover has a captive design and cannot be removed and lost. There is an optional sealing point. While in Prometer 100-W, the optical 1107 port is protected by a rotational seal.
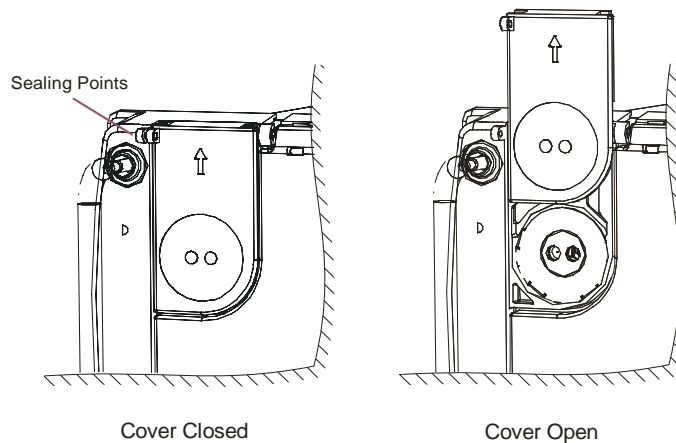

Cover Closed   Cover Open

Figure 24: Optical 1107 Port in Prometer 100-R

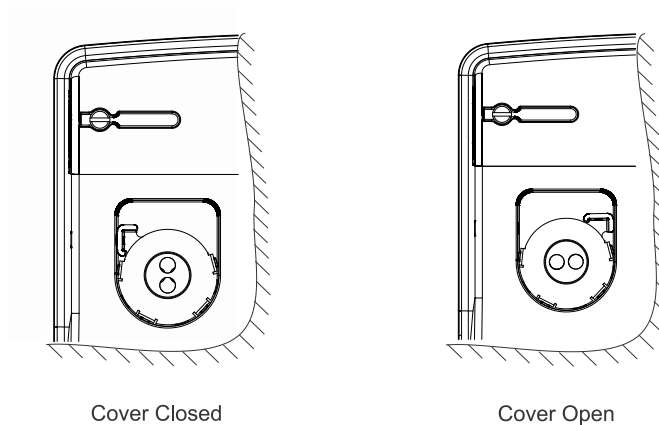

Cover Closed   Cover Open

Figure 25: Optical 1107 Port in Prometer 100-W

Communication through the 1107 infrared optical communications port is performed through PC with suitable communication cable. Care has to be taken to align the opto head so the IR transmitters and receivers are in the best position to exchange signals. Usually this means attaching the opto head with the connecting wire hanging straight down. Ambient visible light (daylight, incandescent or in particular fluorescent light) may disturb the exchange of IR signals if strong enough and cause the communication to fail. To ensure reliable communications, avoid strong ambient light positions when installing the Prometer 100.

RS232 Serial Communication Port

The RS232 communication port is used for connecting to communication equipment such as computers and modems through a serial cable. The meter side connector is an RJ-45 type. The user should ensure that the other side is fitted with a suitable connector before connecting an external device with the meter. See Figure 26 for pin description.

RS485 Serial Communication Port

The RS485 serial half duplex communication ports are intended to be used to connect the Prometer 100 to a network for multi-drop communications. The RS485 network is looped through the input connector to the output connector. See Figure 4 for pin description. If for example three meters needed to be "*daisy chained*", then simply connect the "RS485 Out" on the first meter to the "RS485 In" on the next meter and so on. The pin connection for both ports is identical, so the same type of cable can be used through-out and is not polarity conscious.

Ethernet Port

The Ethernet serial communication port is used for connecting directly to an internal Ethernet network. Each meter needs to be provided with an IP addressed static to internal LAN for communicating the data over TCP/IP network. See Figure 26 for pin description.
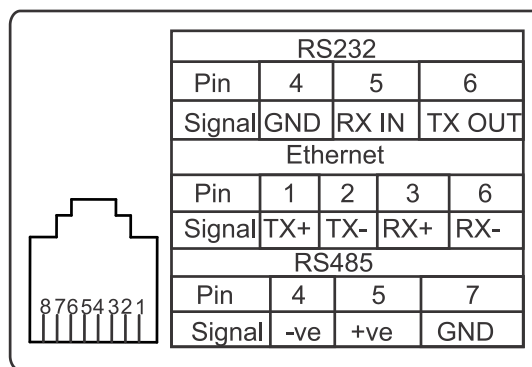
RS232			
Pin	4	5	6
Signal	GND	RX IN	TX OUT
Ethernet			
Pin	1	2	3	6
Signal	TX+	TX-	RX+	RX-
RS485			
Pin	4	5	7
Signal	-ve	+ve	GND

87654321

Figure 26: Pin Description for RJ-45 Ports

Note- Recommended cable to use with all the above mentioned ports (RJ-45) is CAT6 type and shall be crimped with standard tools used in LAN connection to PC/ Laptop. The other end of the cable should be as desired by customer for its intended application like connecting to Modem or PC or LAN switch etc. In general, all the communication ports in meter are optically isolated with each other and can be configured by M-Cubed for data settings, TCP/IP settings etc. as desired by user. The Ethernet cable is normally connected between the meter and the main switch, although local IP installations may differ.

The Ethernet port has a 1-minute inactivity time-out period. If no activity is detected the Ethernet port will disconnect after 1 minute.

Appendix D: How to Read Meters through Ethernet Port

This section discusses the reading a Prometer 100 meter through Ethernet port (TCP/IP connection).
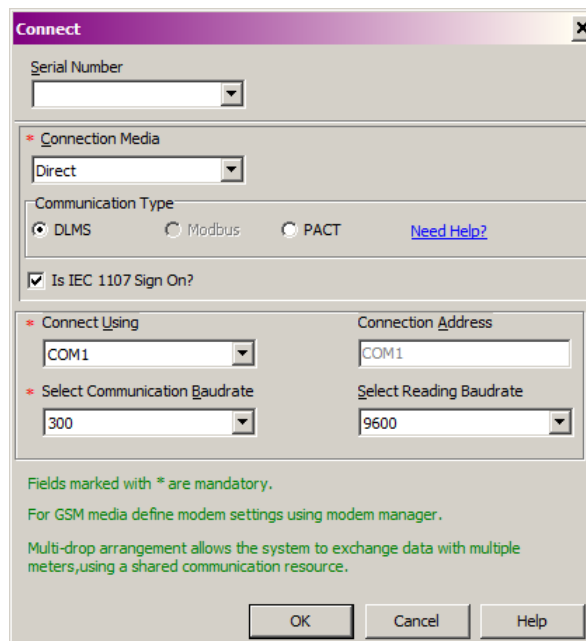
Prerequisites:

- Take static IP address, Subnet Mask and Gateway from network
- M-Cubed (6.0.0.6)
- Install the M-cubed on PC
- Connect meter with PC using optical port or RS232 port

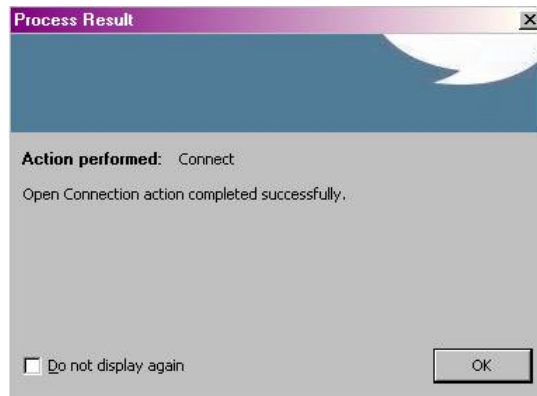**Configuring the static IP address, Subnet Mask and Gateway**

Connect Prometer 100 meter with PC on optical port
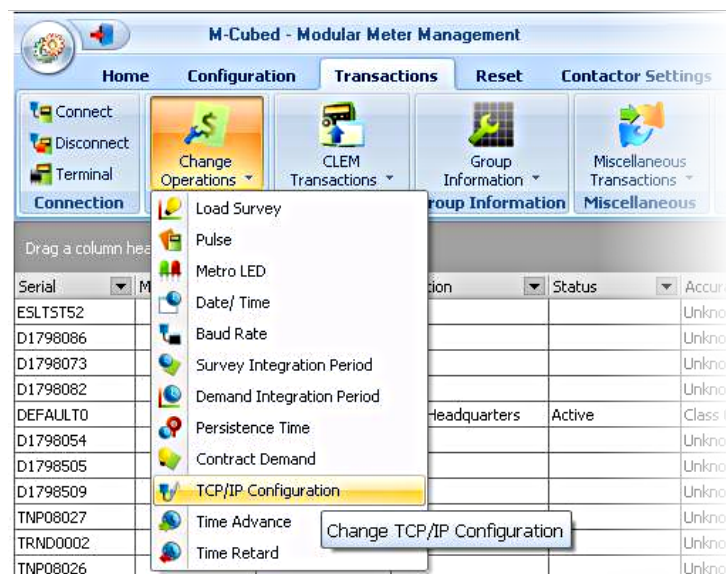

Select connection media, protocol, comport and baud rate. Click **OK**.
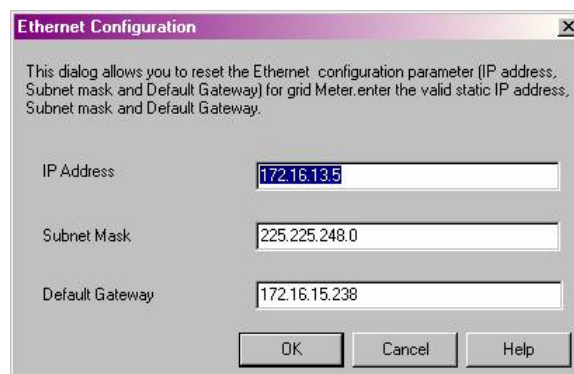
Check successfully connected

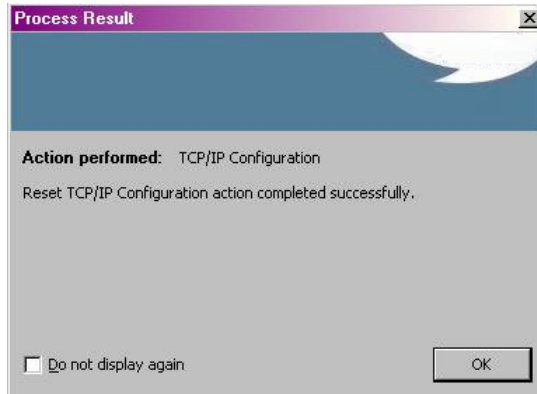Click **Transaction** and then click **TCP/IP Configuration**

Enter the IP address, Subnet Mask and Gateway information to be configured in meter.
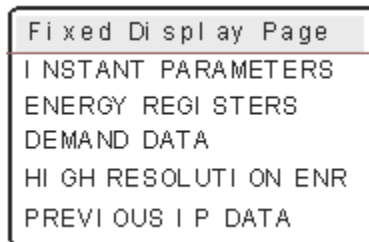
Click **OK**

IP configured successfully.

Process Result

Action performed: TCP/IP Configuration

Reset TCP/IP Configuration action completed successfully.

☐ Do not display again   OK

You can verify on the meter display.

Go to the **Fixed Display Page**

Fixed Display Page
INSTANT PARAMETERS
ENERGY REGISTERS
DEMAND DATA
HIGH RESOLUTION ENR
PREVIOUS IP DATA

Scroll down to view the Ethernet configuration information

04 Dec 2014 14:50:57
IP Addr: 172.16.13.5
Subnet: 225.225.248.0
Gateway: 172.16.15.238
MAC ID: 00:13:E1:0F:00:3C
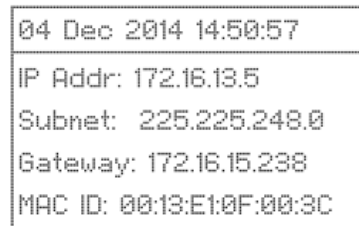
Reading the Prometer 100 Meter on the Ethernet port

Connect the meter with the LAN network using the LAN cable.

Confirm that the LAN cable is firmly connected to both the meter and PC Ethernet ports.
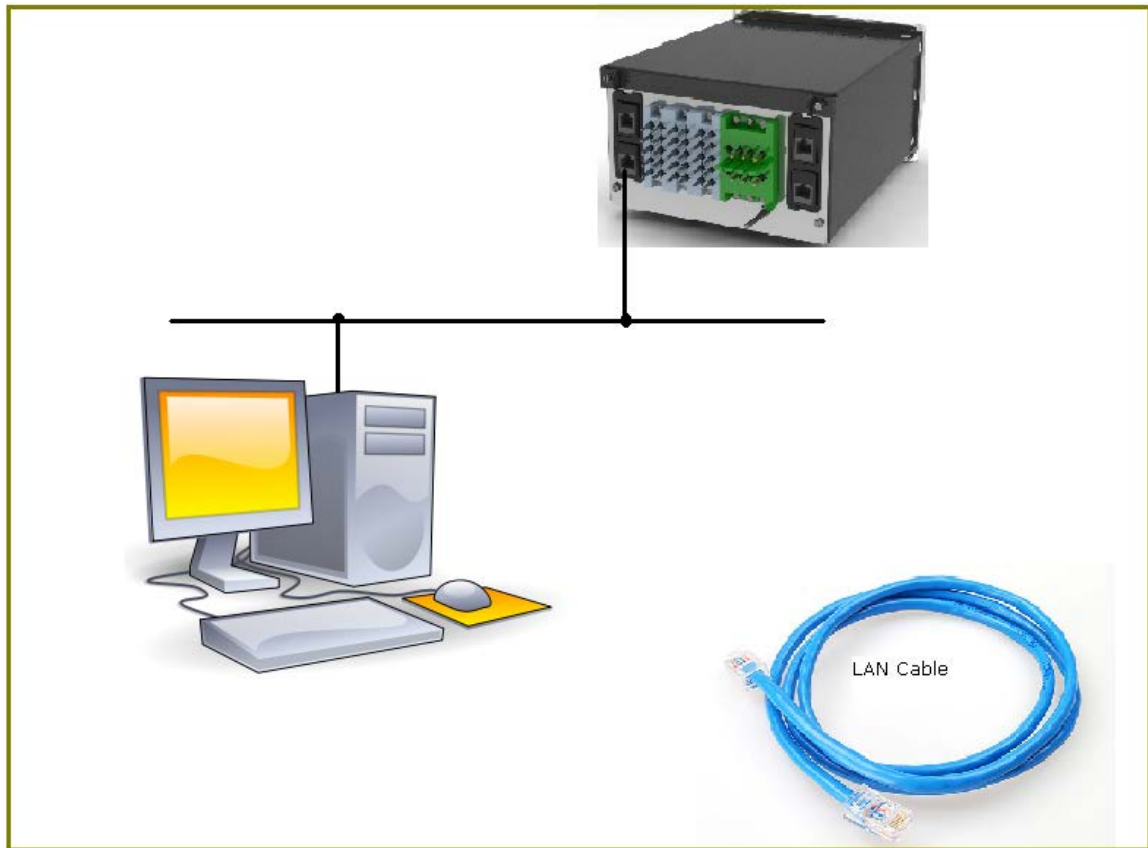
Click **Connect** and then select connection media as TCP/IP, communication type as DLMS. Select the checkbox "Use TCP profile over Ethernet port."

Enter the meter static IP information in Connection Address

Click **OK**.

Static IP is 172.16.13.5

Service port is 4059. It is fixed for DLMS
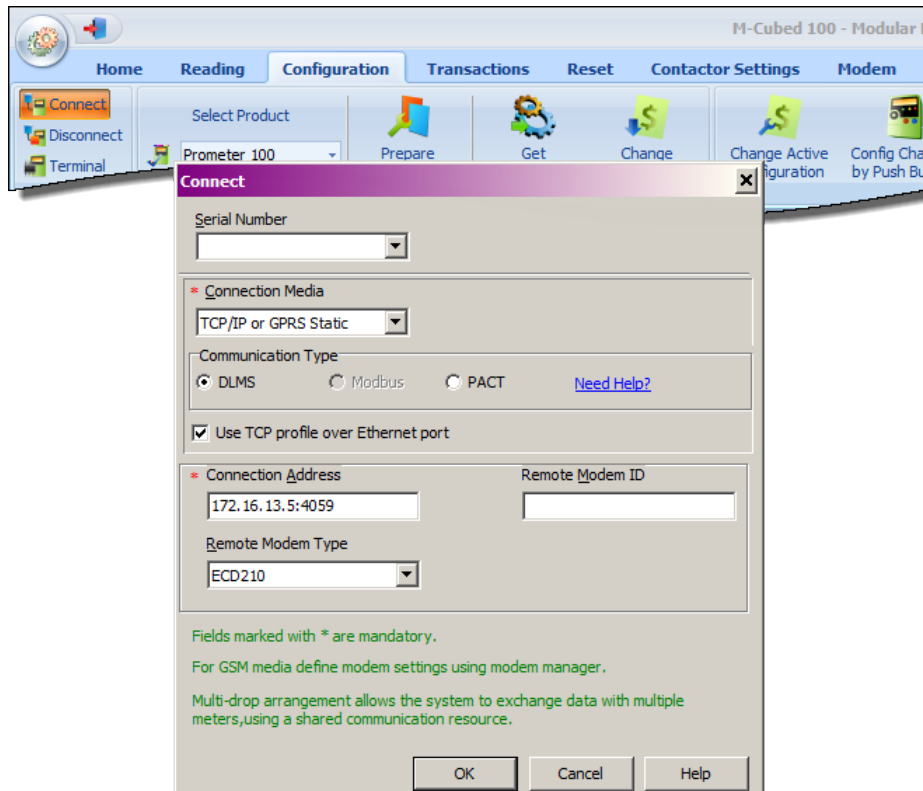
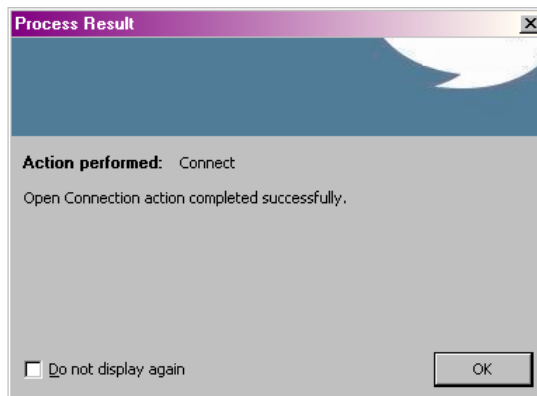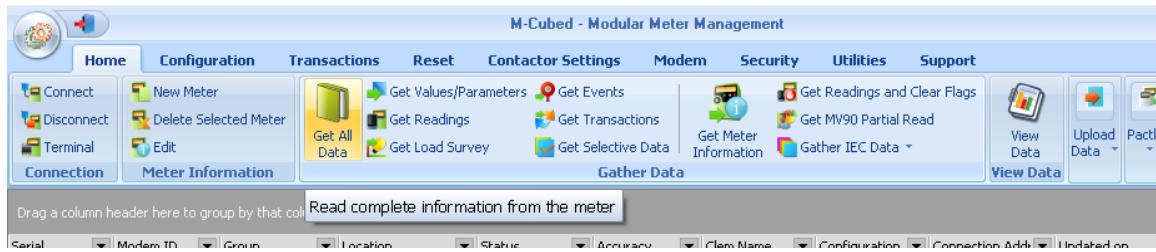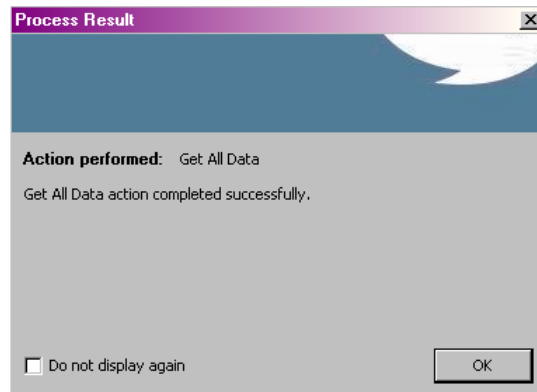Meter connected successfully with the M-Cubed.

To read data, click **Get All Data**

Action completed successfully will be displayed.

Appendix E: Calculation Principles

Current and Voltage

Current and voltage are first harmonic component (fundamental).

Calculated phase to phase voltage

Phase to phase voltage is calculated from the phase voltages' fundamental vectors. This calculation is only made in the 3-element meter; in the 2-element meter, the phase to phase voltage is measured.

$$U12_1 = \sqrt{(U1_1^2 + U2_1^2 - 2 \cdot U1_1 \cdot U2_1 \cdot \cos(U1_1 p - U2_1 p)}$$

Calculated I2

In the 2-element meter, I2 is not measured but is calculated for monitoring purposes. It is calculated from the current's fundamental vectors.

$I2_1$ Current I2's fundamental harmonic.

$$I2_1 = \sqrt{(I1_1 + I3_1 \cdot \cos(I1_1 p - I3_1 p))^2 + (I3 \cdot \sin(I1_1 p - I3_1 p))^2}$$

Voltage unbalance

Class A

The basic measurement of voltage harmonics, for class A, is defined in IEC 61000-4-7 class I. That standard shall be used to determine a 10/12-cycle gapless harmonic subgroup measurement, denoted $U_{isg,h}$ in IEC 61000-4-7.

Power

Harmonic component power

The calculations below are for active power, the calculations for reactive are identical except for that cos-functions are replaced with sin-functions.

$P1_n$ Active power in L1 is calculated for harmonic component n.

P_n Total active power is calculated for harmonic component n.

φ_n Phase angle between harmonic component $U1_n$ and $I1_n$

3-element meter:

$$P1_n = U1_n \cdot I1_n \cdot \cos(\varphi_n)$$

2-element meter:

For 2-element meters, only the total power is calculated in each harmonic component.

$\varphi1_n$ Phase angle between harmonic component $U12_n$ and $I1_n$

$\varphi2_n$ Phase angle between harmonic component $U32_n$ and $I3_n$

$$P_n = U12_n \cdot I1_n \cdot \cos(\varphi1_n) + U32_n \cdot I3_n \cos(\varphi2_n)$$

Active and reactive power

Active and reactive power is calculated as the sum of harmonic component power up to 31st harmonic. The calculation is made with plus and minus signs, where negative power represents export direction and positive represents import direction.

P Total active power

$P1$ Active power in L1

Q Total reactive power

$Q1$ Reactive power in L1

$$P = P1 + P2 + P3$$

$$Q = Q1 + Q2 + Q3$$

For 2-element meters, two elements are added instead of three.

Apparent power

S Total apparent power

$S1$ Apparent power in L1

$$S = \sqrt{P^2 + Q^2}$$

$$S1 = \sqrt{P1^2 + Q1^2}$$

Energy

Energy is calculated by integrating power (P, Q and S) over time.

Definition of quadrants

The term phase angle is described under its own heading below.

Quadrant I: phase angle 1–90°

Quadrant II: phase angle 90–180°

Quadrant III: phase angle -180–(-90)°

Quadrant IV: phase angle (-90)–0°

Active energy

Active energy is calculated for import and export. The direction is controlled by the sign for active power (+ import, – export).

Active energy import: quadrant I and IV

Active energy export: quadrant II and III

Reactive energy

Reactive energy is calculated for four quadrants. The quadrant is controlled by the sign for active and reactive power (e.g., active power >= 0 and reactive power >= 0 corresponding to quadrant I).

Reactive energy import: quadrant I and II

Active energy export: quadrant III and IV

Reactive energy inductive: quadrant I and III

Reactive energy capacitive: quadrant II and IV

Apparent energy

Apparent energy is calculated for import and export. The direction is controlled by the sign for active power; apparent energy is registered for the direction that the active energy has during the same period.

Apparent energy import: quadrant I and IV

Apparent energy export: quadrant II and III

Power Factor

$$pf(L1) = \left| \; P1/S1 \; \right|$$

$$pf(Tot) = \left| \; P/S \; \right|$$

The power factor is calculated without signs and is thus always positive.

Phase angle

$$\varphi(L1) = U1p - I1p$$

Phase angle for an element is calculated from the fundamental phase angles.

$$\varphi(Tot) = \arctan(P1_{fund} / Q1_{fund})$$

Total phase angle is calculated from fundamental power.

Phase angle values specified between –180 ° and 180°.

THD

Total harmonic distortion

$$THD_{eur} = \frac{\sqrt{I_2^2 + I_3^2 + ...I_n^2}}{\sqrt{I_1^2 + I_2^2 + ...I_{n-1}^2}} \cdot 100\%$$

Where $I_1 ... I_n$ are the current's harmonic components. The calculation is made in the same ways for current and voltage.

Transformer Compensations

Instrument transformer compensations

Instrument transformer compensations are specified as error in percent for amplitude, and as error in minutes (one-sixtieth of a degree) for phase angle. These errors can be specified separately for all voltages and currents.

$AmpErr$ Amplitude error as percent

$PhaseErr$ Phase angle error in minutes

u_{meas} Measured voltage

u Compensated voltage

Amplitude compensation

$$u = u_{meas} / (1 + AmpErr)$$

Phase angle compensation

$$up = up_{meas} - PhaseErr$$

In 3-element meters, phase voltages are compensated and in 2-element meters, phase to phase voltages. The same calculation is used for all currents and voltages.

Power transformer losses

Power transformer losses consist of copper and iron losses. They are expressed as percentages of nominal power. One value is specified for active loss and one for reactive.

Iron loss

$FeLoss$ Active iron loss as percent of nominal power.

$P1_{meas}$ Measured power.

$P1$ Compensated power.

Nom Nominal power per phase

$$P1 = P1_{meas} + FeLoss \cdot Nom$$

Copper loss

$CuLoss$ Active copper loss as percent of nominal power.

i Phase current.

i_{nom} Nominal current.

$$P1 = P1_{meas} + (i / i_{nom})^2 \cdot CuLoss \cdot Nom$$

Corresponding calculations made for active and reactive power.

Definition of phase order

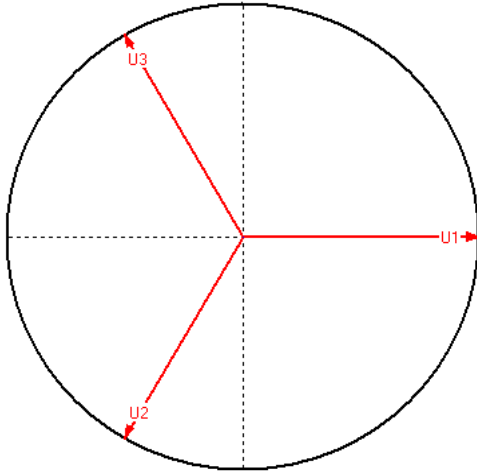Correct phase order (123) corresponds to phase position:

$U1p$ Phase position for U1

$U1p = 0°$

$U2p = -120°$

$U3p = 120°$

The same system is represented graphically below. The vectors rotate in an anti-clockwise direction.

Appendix F: Connection and General Details

Electrical	
Connection type	Common product for HV3/HV4/LV4 applications
Wiring configuration	3-phase 3-wire, 3-phase 4-wire
Voltage range (L-N/L-L)	57.7/100 V to 69.3/120 V (configurable) for HV3 & HV4 240/415 V for LV4 (applicable for Prometer 100-W only)
Current range	I_b: 1-5 A (configurable) I_{max}: maximum 10 A (configurable)
Accuracy	Class 0.2s and 0.5s
Mains frequency	50/60 Hz ± 5%
Burden	If power drawn from Aux supply – <0.1 VA /phase (for voltage and current circuit) <10 VA (burden on Aux supply) If power drawn from VT (i.e. self powered) – <0.1 VA /phase (for voltage and current circuit) <6 VA /phase (burden on VT supply)
STOC	10 times I_{max} for 1 second

Compliance	
Standards	IEC62052-11, IEC62053-22, IEC62053-23, IEC62056-52, IEC61010-1, IEC61010-2-030, CE, MID (EN50470-1, EN50470-3)

Mechanical	
Prometer 100-R	
Dimensions (L X W X D)	428 x 133 x 260 mm approx. (meter with 19" rack) 299 x 133 x 260 mm approx. (meter with 11" rack)
Enclosure	Translucent polycarbonate cover (with clear transparent window for display) and overall mild steel body
Sealing	Sealable screws on the front and back fascia of meter, sealing provision for optical port and MD reset button
Weight	Meter – 3.8 kg approx. (± 1 kg) 11" rack – 2.1 kg (± 0.1 kg) 19" rack – 3.3 kg (± 0.1 kg)
Ingress Protection (IP)	IP53 on front fascia and IP20 on back side
Prometer 100-W	
Dimensions (L X W X D)	300 x 200 x 100 mm (± 5 mm)
Enclosure	Plastic material (type Polycarbonate)
Sealing	Sealable base and cover
Weight	2.5 kg approx. (± 0.5 kg)
Ingress Protection (IP)	IP53 and IP54 with panel mounting kit over the front fascia

Environmental	
Temperature	-10 ^{0}C to + 60 ^{0}C (operating)
	-25 ^{0}C to + 70 ^{0}C (limit range of operation)
	-40 ^{0}C to + 80 ^{0}C (storage)
	-20 ^{0}C to + 70 ^{0}C (display operating range)
Humidity	95% non-condensing
Pollution degree	Type 2
Over voltage category	III

Appendix G: List of DLMS Parameters

List of Profile Parameters (DLMS)		
Section : Event Log 1 to 9 Snapshot Profile		
Sr.No	**Profile**	**Parameter**
1	Instantaneous	Real Time Clock – Date and Time
2	Instantaneous	Cumulative Energy – Active Import
3	Instantaneous	Cumulative Energy – Active Export
4	Instantaneous	Voltage – VRN for 3Φ4W / VRY for 3Φ3W
5	Instantaneous	Voltage – VYN for 3Φ4W
6	Instantaneous	Voltage – VBN for 3Φ4W / VBY for 3Φ3W
7	Instantaneous	Line Current – IR
8	Instantaneous	Line Current – IY
9	Instantaneous	Line Current – IB
10	Instantaneous	Active Current – IR
11	Instantaneous	Active Current – IY
12	Instantaneous	Active Current – IB
13	Instantaneous	Power Factor – R phase
14	Instantaneous	Power Factor – Y phase
15	Instantaneous	Power Factor – B phase
16	Instantaneous	Voltage angle – Angle between R and Y phase
17	Instantaneous	Voltage angle – Angle between Y and B phase
18	Instantaneous	Voltage angle – Angle between B and R phase

List of Profile Parameters (DLMS)		
Section : Event Log 10 Snapshot Profile		
Sr.No	**Profile**	**Parameter**
1	Instantaneous	Real Time Clock – Date and Time
2	Instantaneous	Cumulative Energy – Active Import
3	Instantaneous	Cumulative Energy – Active Export
4	Instantaneous	Voltage THD % - Phase 1
5	Instantaneous	3rd Harmonic Voltage - Phase 1
6	Instantaneous	5th Harmonic Voltage - Phase 1
7	Instantaneous	7th Harmonic Voltage - Phase 1
8	Instantaneous	9th Harmonic Voltage - Phase 1
9	Instantaneous	Voltage THD % - Phase 2
10	Instantaneous	3rd Harmonic Voltage - Phase 2
11	Instantaneous	5th Harmonic Voltage - Phase 2
12	Instantaneous	7th Harmonic Voltage - Phase 2
13	Instantaneous	9th Harmonic Voltage - Phase 2
14	Instantaneous	Voltage THD % - Phase 3
15	Instantaneous	3rd Harmonic Voltage - Phase 3
16	Instantaneous	5th Harmonic Voltage - Phase 3
17	Instantaneous	7th Harmonic Voltage - Phase 3
18	Instantaneous	9th Harmonic Voltage - Phase 3

List of Profile Parameters (DLMS)		
Section : Event Log 11 Snapshot Profile		
Sr.No	**Profile**	**Parameter**
1	Instantaneous	Real Time Clock – Date and Time
2	Instantaneous	Cumulative Energy – Active Import
3	Instantaneous	Cumulative Energy – Active Export
4	Instantaneous	Current THD % - Phase 1
5	Instantaneous	3rd Harmonic Current - Phase 1
6	Instantaneous	5th Harmonic Current - Phase 1
7	Instantaneous	7th Harmonic Current - Phase 1
8	Instantaneous	9th Harmonic Current - Phase 1
9	Instantaneous	Current THD % - Phase 2
10	Instantaneous	3rd Harmonic Current - Phase 2
11	Instantaneous	5th Harmonic Current - Phase 2
12	Instantaneous	7th Harmonic Current - Phase 2
13	Instantaneous	9th Harmonic Current - Phase 2
14	Instantaneous	Current THD % - Phase 3
15	Instantaneous	3rd Harmonic Current - Phase 3
16	Instantaneous	5th Harmonic Current - Phase 3
17	Instantaneous	7th Harmonic Current - Phase 3
18	Instantaneous	9th Harmonic Current - Phase 3

Frequently Asked Questions (FAQs)

The message 'Not configured' is shown on the Prometer 100 display.

The message 'Not configured' is displayed when the parameters are not configured in the meter.

For e.g, Bar Graph of Energy parameter for the logger will be available on meter display if user configures logger energy in meter. Similarly Rate Registers and Demand Registers will be available if user configures TOU energy in meter.

Is it possible to have different IDs for the two RS485 communication modules attached to the meter?

For DLMS, different IDs can be used for both the RS485 communication modules. While for Modbus, same IDs will be used for both the RS485 communication modules.

Are the harmonics data up to 31st order available on meter display?

The voltage and current harmonics data up to 31st order is not available on meter display and can be accessed using M-Cubed 100 and via the communication protocol.

Which information is not available on the Prometer 100's display for 3-phase 3-wire?

On configuring Phase 2 displays for 3-phase 3-wire, the Phase 2 parameters such as energy, voltage, current, Power, P.F, harmonics, L1-L2 voltage phase angle, L2-L3 voltage phase angle and current symmetry data will be displayed as "……..".

Which events are not applicable for 3-phase 3-wire?

Phase 2 current reversal, Phase 2 current miss, CT open, CT bypass, neutral disturbance and invalid phase association are not applicable for 3-phase 3-wire.

Will the existing meter data reset on changing configuration?

The existing meter data will be reset on configuring/changing existing energy channels, logger parameters or scaling information in meter.

What happens if a new successive adjustment is made when one is already underway?

The current adjustment will be stopped and the new begun.

When summer time starts, the clock jumps one hour. What happens if the user sets the meter to a DST time within that hour?

The meter will ignore the new time because that hour "does not exist".

Is logger's data affected by daylight saving time change? What data is affected by daylight saving time change?

No, the logger's data will not be affected by the daylight saving time change as the loggers, events and daily energy snapshot are logged as per base time. The daylight saving time is applicable only for TOU rate registers, TOU demand data and billing data.

Can user set meter clock via Modbus communication protocol?

Time set transaction as per base time or DST time will be provided via DLMS communication protocol.

Only time synchronization as per base time or DST time will be provided via Modbus communication protocol. Meter will reject the time sync request if it is above time adjustment limit.

What is the maximum time adjustment limit and how it works?

Time synchronization as per base time or DST time will be provided via Modbus communication protocol only.

Meter will not sync the time if the time difference is more than the time adjustment limit configured in the meter. By default, the time adjustment limit is set as 25 seconds. The time adjustment limit can be configured as any value between 0 to 30 seconds using ConfigView.

So, if user wants to change the meter time out of time adjustment limit then time set transaction has to be performed via DLMS communication protocol.

How the logged values affected by the daylight saving time change?

Logged values during daylight saving time are labelled with the flag "Yes". "Yes" means that the DST offset is applied in the meter.

What are the possible consequences of adjusting forward the meter clock?

If the clock is adjusted forward over one or more interval limits, there will be empty spaces filled by zero value in the logging memory.

What are the possible consequences of adjusting backward the meter clock?

It the clock is adjusted backward over one or more interval limits, one or more values will exist with the duplicate day and same time stamps. Empty spaces will be filled by zero value in duplicate day. In the worst event, this can result in data read from the meter not matching the expected period. Previous integration period and rising demand data will be reset.

What are the possible consequences of adjusting backward or forward the meter clock within time adjustment limit?

Integration period will be compressed for forward time sync and stretched for backward time sync. Data will be logged as per integration period.

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