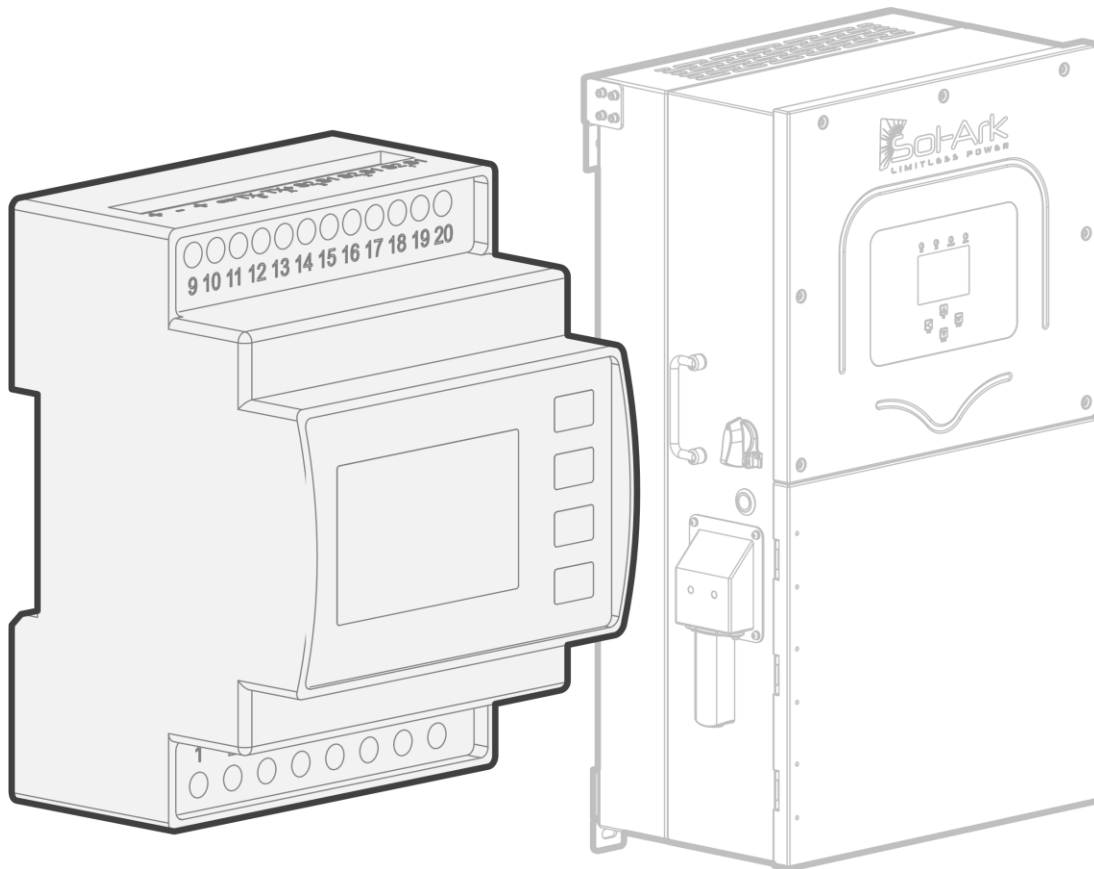SDM630MCT

# REVENUE GRADE METER | USER MANUAL

# IMPORTANT SAFETY INSTRUCTIONS
# SYMBOLS IN THIS DOCUMENT

**CAUTION:** Symbol indicates a hazardous situation which, if not avoided, could result in damage to the equipment.
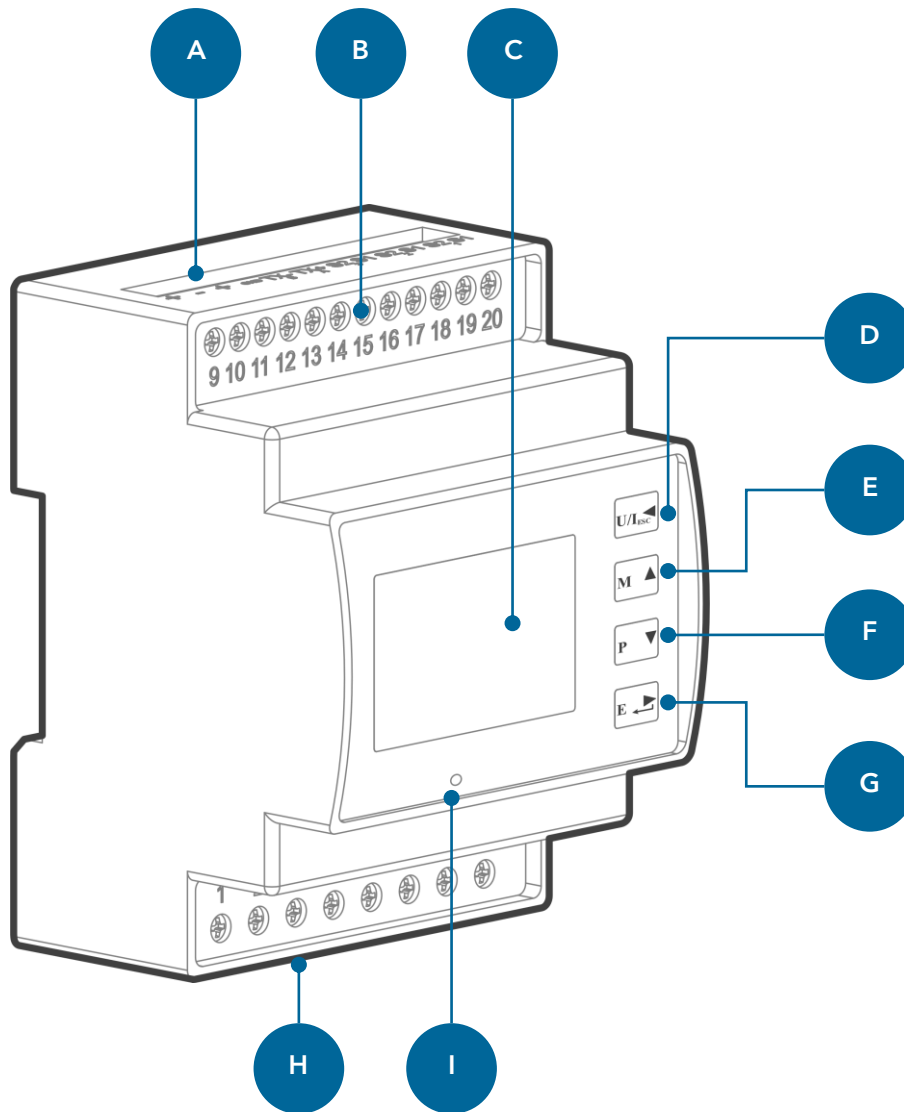
**NOTE:** Symbol indicated an important step or tip that leads to best results.

# Contents

# 1.  Product Overview



| Component | Name / Function |
|---|---|
| A | Sensing and reporting |
| B | Wire clamping screws |
| C | LCD Screen |
| D | Left / Back button. Voltage and Current display screens |
| E | Up button. Frequency and Power Factor display screens |
| F | Down button. Select Power display screens |
| G | Entre / Right button. Select Energy display screens |
| H | Voltage sensing and Power supply terminals |
| I | LED Indicator |
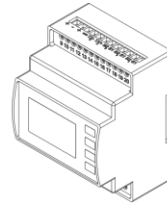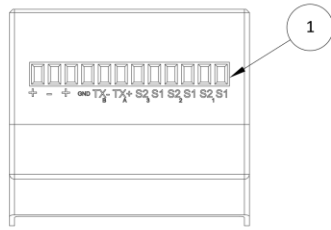
ISOMETRIC VIEW
REFERENCE ONLY
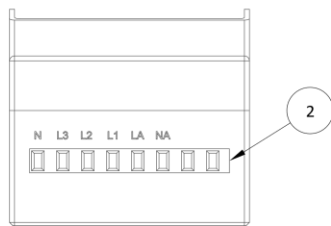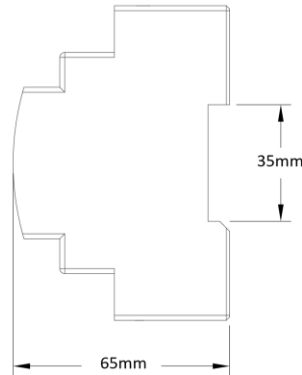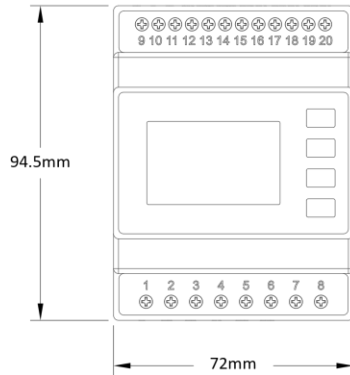
| Component | Name / Function |
|-----------|-----------------|
| 1 | Current sensing and reporting |
| 2 | Voltage sensing and supply terminals |

| Datasheet | SDM630MCT V2 |
|-----------|--------------|
| Parameter | Values |
| CT parameters | I:1/5A |
| CT max ratio | 9999 |
| CT secondary maximum Voltage | 500V |
| CT primary Maximum Current | 9.999/50 kA (Using 1/5 A CTs) |
| Accuracy/Class | 0.5%/0.5 |
| Supported grid modes | 1p2w, 3p3w, 3p4w |
| Communications and monitoring | Modbus RTI Pulse Output On screen display |
| RS-485 RTU | 3-digit number, 001 to 247 |
| Modbus Word order | Hi/Lo byte order |
| Certifications | UL 61010-1. 61010-2-30. CSA C10.1, ANSI C22.2. ANSI C12.1-2008, ANSI C12.20-2015. |
| WARNING HUMIDTY | Use in environments below 90% non-condensing |
| Mounting | Din Rail 35mm |
| Pulse outputs | Dual passive output |

# 2.   Product Features

The unit measures and displays the characteristics of single phase two wires (1p2w), three phase three wires(3p3w,) and three phase four wires(3p4w) supplies, including voltage, frequency, current, power, active and reactive energy, imported or exported. Energy is measured in terms of kWh, kVArh. Maximum demand current can be measured over preset periods of up to 60minutes. To measure energy, the unit requires voltage and current inputs in addition to the supply required to power the product. The requisite current input(s) are obtained via current transformers.

This meter is a <u>1A or 5A</u> CT operated unit and can be configured to work with a wide range of CTs, giving it a wide range of operation. You will need to set the correct CT rate of the current transformer. Built-in terminals provide pulse and RS485 Modbus RTU outputs for multi-purpose reporting.
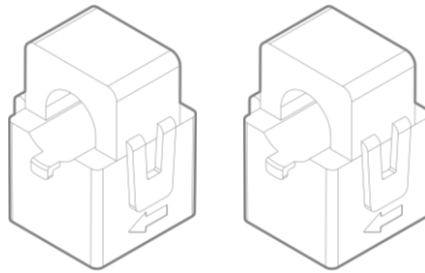
*Figure (2.1): Sol-Ark's included CTs*

When installing your product please make note of the label located at the front of your current transformers (CTs)

## Product Usage

The SDM630MCT is a digital, 3 Phase meter designed to be compatible with the Modbus protocol in the Sol-Ark inverters.

With the purpose of keeping the meter powered and always measuring, an external power source must be connected to the corresponding terminals. This is a requirement to keep your net metering and/or Solar Renewable Energy Credits properly accredited.

The separate auxiliary supply can be either an AC source (85Vac - 275Vac @ 50/60Hz) or DC source (120Vdc - 380Vdc). AC source is recommended; we suggest using a 3-prong plug wired in series with a 1A fuse either on the power supply or the neutral lines coming from the grid.
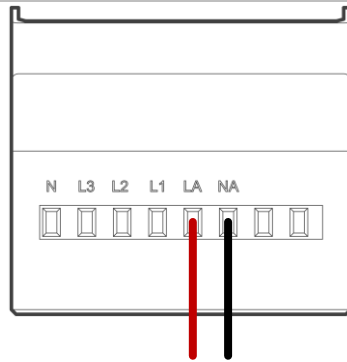
External Power Supply Wiring
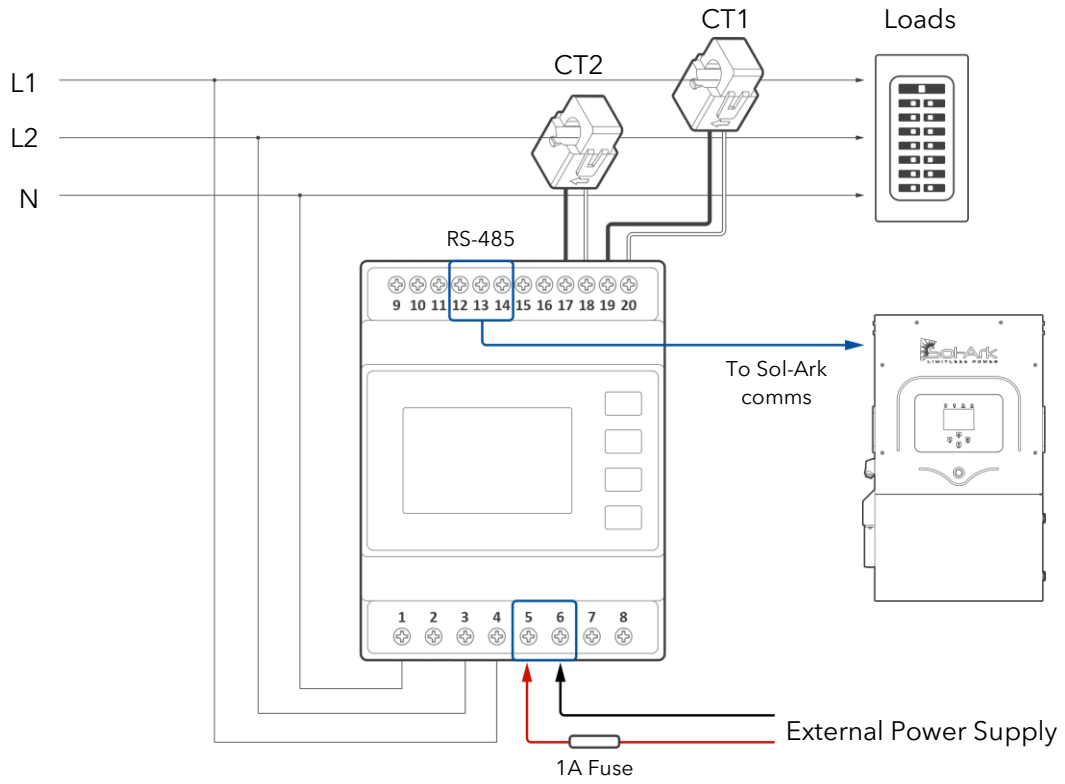
*Figure (2.2) Powering on the unit*



*Figure (2.3): 120/240V split phase wiring.*
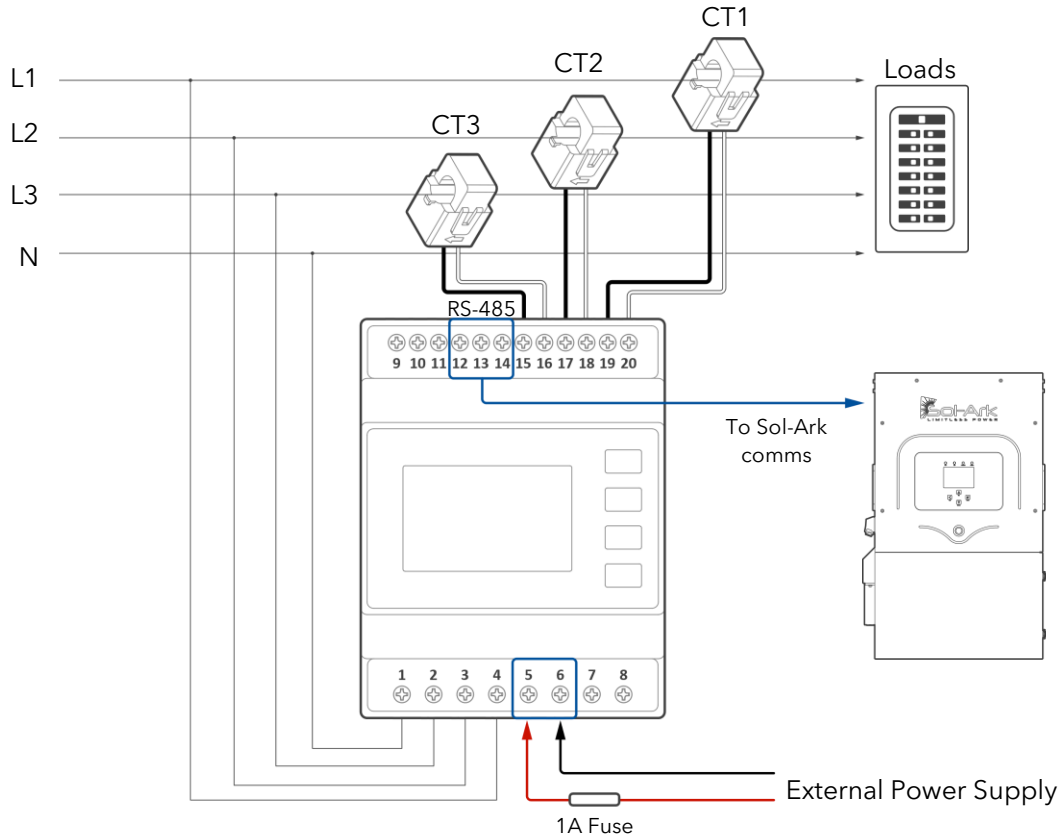
*Figure (2.4): 120/208V three phase wiring.*

| Meter Pins | Connection / Function |
|:---:|:---:|
| 1 | Grid Neutral |
| 2 | Grid L1 |
| 3 | Grid L2 |
| 4 | Grid L3 |
| 5 | L1 fused to power chord |
| 6 | N to power chord |
| 7,8 | Not in use |
| 9 | Pulse output + |
| 10 | Pulse output - |
| 11 | Pulse output + |
| 12 | GND Ethernet |
| 13 | RS 485 B – |
| 14 | RS 485 A+ |
| 15 | CT3 Black |
| 16 | CT White |
| 17 | CT2 Black |
| 18 | CT2 White |
| 19 | CT1 Black |
| 20 | CT1 White |

ⓘ *NOTE: reversing CT polarity will require adjustment on the programming.*

The first screen is a boot up screen that lights up all display segments, software, and calibration checks. This can be used as a display check. Shortly after, the screen will display active energy measurements.
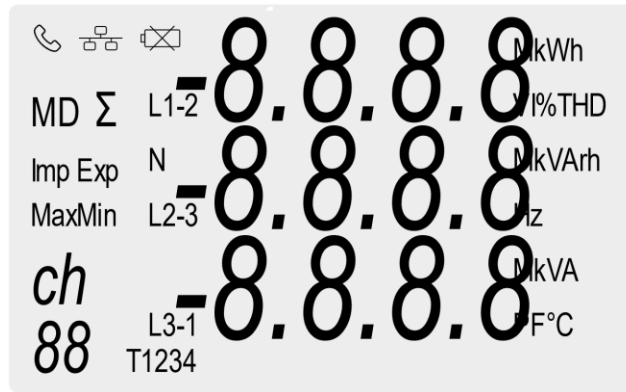


# 3.  Setup Screens

**Password:** When setting up the unit, some screens require the entering of a number. On entry to the setting up section, a password must be entered. Digits are set individually, from left to right.



**The DIT Demand Integration Time** This sets the period in minutes over which the current and power readings are integrated for maximum demand measurement. The options are: off, 5, 8, 10, 15, 20, 30, 60 minutes.
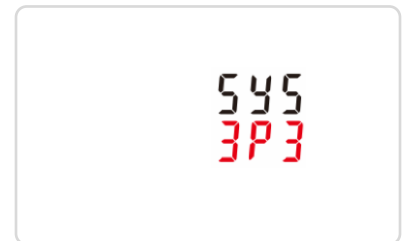


**The Backlit** Set-up provides the function to set the blue backlit lasting time.



**Supply System:** Use this section to set the type of power supply being monitored. Select the required system option:

1P2(W),3P3(W),3P4(W)



**CT:** The CT option sets the secondary current (CT2 1A or 5A) of the current transformer (CT) that wires to the meter.

Set **CT Ratio value:** The range is from 0001 to 9999. Example: If the ratio is set to be 100, it means the primary current equals secondary currentx100

```
Ct
rAtE
0001
```

**PT:** The PT option sets the secondary voltage (PT2 100to 500V) of the Voltage transformer (PT) that wires to the meter. The range is from 100 to 500V.

```
SEt
Pt2
400
```

Set **PT ratios value:** The range is from 0001 to 9999. For example, if the ratio is set to be 100, it means the primary voltage equals secondary voltagex100.

```
Pt
rAtE
0001
```

**Pulse Output:** This option allows you to configure the pulse output. The output can be set to provide a pulse for a defined amount of energy active or reactive. Use this section to set up the pulse output1-Units: Total kWh, Total kVArh.

```
SEt          kWh
rLY
```

**Pulse rate:** Use this to set the energy represented by each pulse. Rate can be set to 1 pulse per 0.01kWh / 0.1kWh / 1kWh / 10kWh / 100 / 1000kWh. Example: the following figure shows 1 impulse = 10kWh/kVArh.

```
SEt
rAtE
10
```

**Pulse Duration:** The energy monitored can be active or reactive and the pulse width can be 200, 100 or 60ms. Example: the following figure shows a pulse width of 200ms.

```
SEt
PULS
200
```
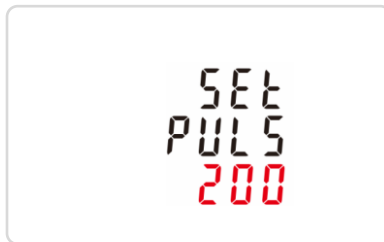
**RS-485 Address:** There is an RS485 port that can be used for communication using Modbus RTU protocol. For Modbus RTU, parameters are selected from the Front panel. The range goes from 001 to 247.

```
SEt
Addr
001
```

**Baud Rate:** choose Baud rate 2.4k. 4.8k, 9.6k, 19.2k, 38.4k

```
SEt
bAUd
9.6    k
```

**Parity:** choose Parity (EVEN / ODD/ NONE)

Default is NONE.

```
SEt
PAri
EUEN
```

**Stop Bits:** Choos stop bit (2 or 1).

Default is 1, and only when the parity is NONE, the stop bit can be changed to 2.

```
SEt
StoP
2
```

CLR: The meter provides a function to reset the maximum demand value of current and power.

---

## Voltage and Current

Each successive pressing of the [U/I ESC] button selects a new range, including:

  A. Line to Neutral voltages
  B. Phase to Neutral voltages
  C. Current on each phase
  D. Line to Neutral voltage THD%
  E. Phase to Neutral voltage THD%
  F. Current THD% for each phase
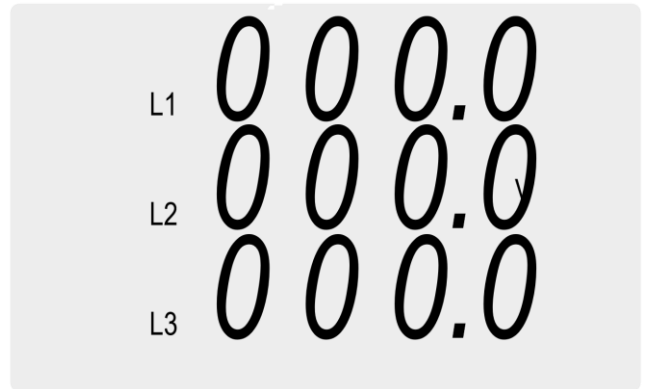


*Figure (2.5) Voltage – Current screens*

## Frequency, Power Factor and Demand

Each successive pressing of the [M ▲] button selects a new range, including:

  A. Frequency and Power Factor (total)
  B. Power Factor of each phase
  C. Maximum Power Demand (MD)
  D. Maximum Current Demand (MD)



*Figure (2.6) Frequency, PF, and demand screens*

## Power

Each successive pressing of the [P ▼] button selects a new range, including:

---

A.  Instantaneous Active Power in kW
B.  Instantaneous Reactive Power in kVAr
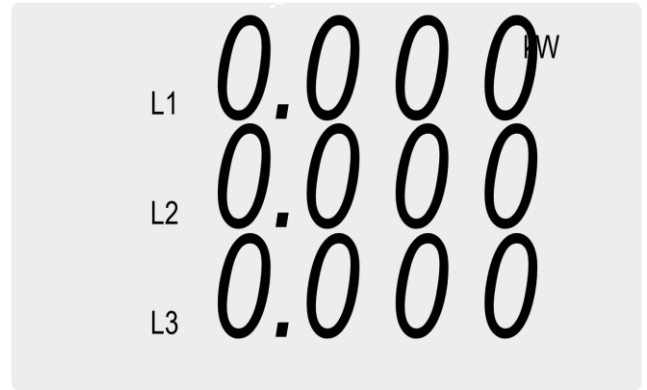C.  Instantaneous Volt-Amps in kVA
D.  Total kW, kVArh, kVA ($\sum$)



*Figure (2.7) Power screens*

## Energy Measurements

Each successive pressing of the [E] button selects a new range, including:

A.  Exported active energy in kWh
B.  Imported reactive energy in kVArh
C.  Exported reactive energy in kVArh
D.  Total active energy in kWh ($\sum$)
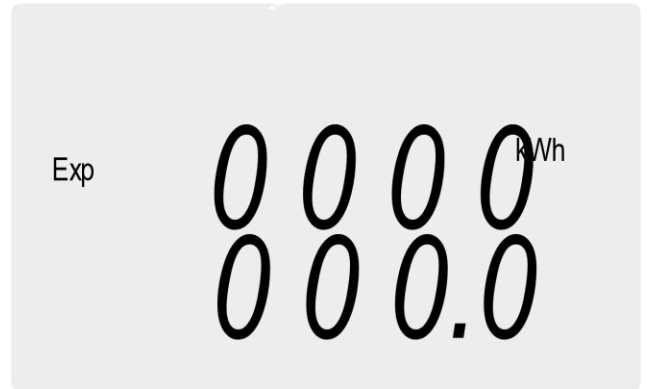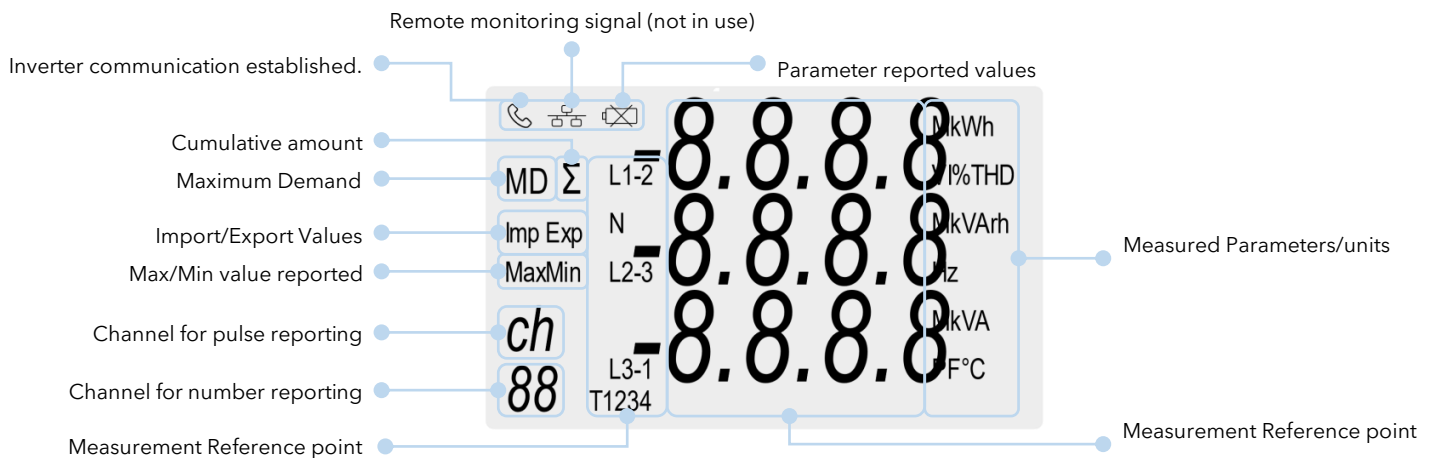E.  Total reactive energy in kVArh ($\sum$)



*Figure (2.8) Energy Measurements screens*

# 4.  Setup and configuration



Remote monitoring signal (not in use)

Inverter communication established.

Parameter reported values

Cumulative amount

Maximum Demand

Import/Export Values

Max/Min value reported

Measured Parameters/units

Channel for pulse reporting

Channel for number reporting

Measurement Reference point

Measurement Reference point

To enter the set-up mode, press and hold the [E] button for 3 seconds until the password screen appears. Password must be entered to access the set-up mode. If an incorrect password is entered, the display will show an error message.

To exit the set-up mode, press [U/I ESC] until the measurement screen is restored.

Some menu items, such as password and CT, require a four-digit number entry while others, such as supply system, require selection from several menu options.

For the former, please press [M ▲] and [P ▼] to change the value displayed and the [U/I ESC] and [E ↵] buttons to change the decimal place being modified. When done, press ESC for 3 seconds to go back to the previous screen.

For all Sol-Ark inverters, the Eastron 3P Meter must be specified and configured in the inverter's programming. On the Sol-Ark, go to **Basic Setup → Advanced**, set inverter to **Master** with **Modbus SN 01** and check the option **[√] Meter > Grid** with the **Eastron 3P meter** selected. This will establish communications between the Meter and the Sol-Ark.
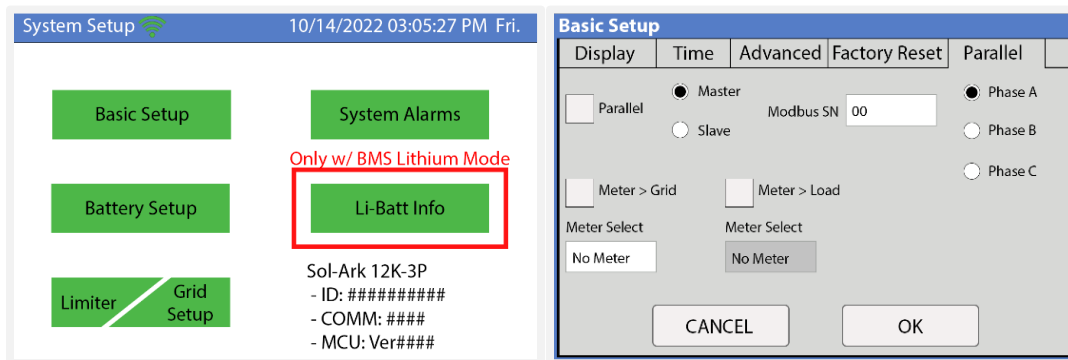


*The meters can supply up to 30 values per transaction, the sol-ark can handle ~25.*

| Parameters suggested for Sol-Ark 12/15K configuration | |
| --- | --- |
| Parameter | Value |
| Recommended power supply size | 26 AWG (No fuse) /10 (with fuse) |
| CT ratio 2 (OUTPUT) | 1 (Check CTs provided with your meter) |
| CT ratio 1 (INPUT) | 150 (Check CTs provided with your meter) |
| Secondary voltage 1 (PT1) | 240 (or 208V depending on usage |
| Secondary voltage 2 (PT2) | 240 (or 208V depending on usage) |
| Address (Addr) | 001(Grid Meter)/ 002 (Load meter) |
| Secondary Address | N/A, do not use for this model |
| Baud rate (baud) | 9.6 K |
| Parity (Par1) | NONE |
| Bit stop (Stop) | 1 |
| Summary of Reported parameters | |
| Reported parameter | Units |
| Line-Neutral Voltage | V |
| Line frequency | Hz |
| Line-Line Voltage | V |
| Line Current | A |
| Neutral Current | A |
| V/I THD | % |
| Power | kW |
| Reactive Power | kVAr |

| Apparent power | kVA |
|---|---|
| Maximum Power | kWh |
| Power Factor | n/a |
| Exported/Imported Power | kW |
| Exported/Imported Reactive Power | kVA |
| Maximum Demand MD | Will appear on the screen |
| Cumulative ∑ | Total production |
| Imported Energy (Total) | kWh |
| Exported Energy (Total) | kWh |
| Imported Reactive Energy (Total) | kVArh |
| Exported Reactive Energy (Total) | kVArh |
| Total Lifetime Active energy | kWh |
| Total Lifetime Reactive Energy | kVArh |

# Pulse Output

These terminals will output a clock signal reporting the values for Active and Reactive energy. This can be a requirement by utility companies to report to their own equipment.

Pulse output 1 will always report at a rate of 3.2 Kimp/kWh. Whereas Pulse Output 2 will be programmable via the setup screen.

The LED indicator located at the bottom of the display will flash RED whenever an impulse is meant to be sent via the communication terminals(See product overview)

# 5.   Wiring and Pinouts for Sol-Ark inverters

The Meter uses an RS-485 serial port with Modbus RTU protocol to provide a means of remotely monitoring and controlling the Unit. Set-up screens are provided for setting up the RS485 port. The Modbus configuration (Baud rate etc.) and the pulse output assignments (kW/kVArh) are configured through the Set-up screens.
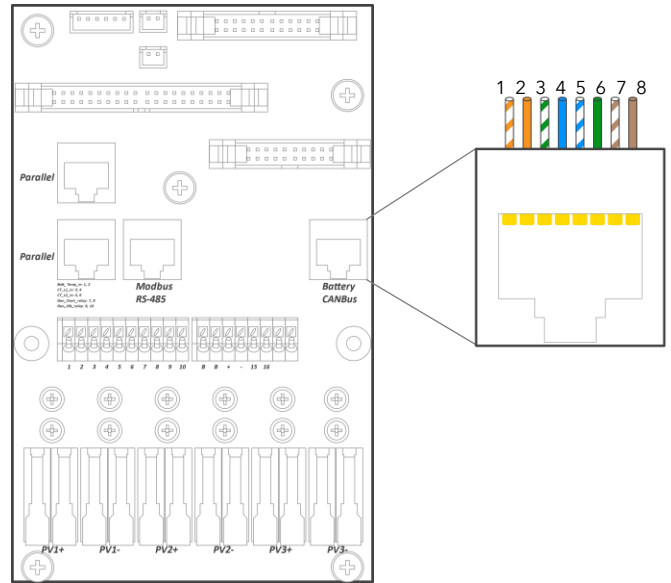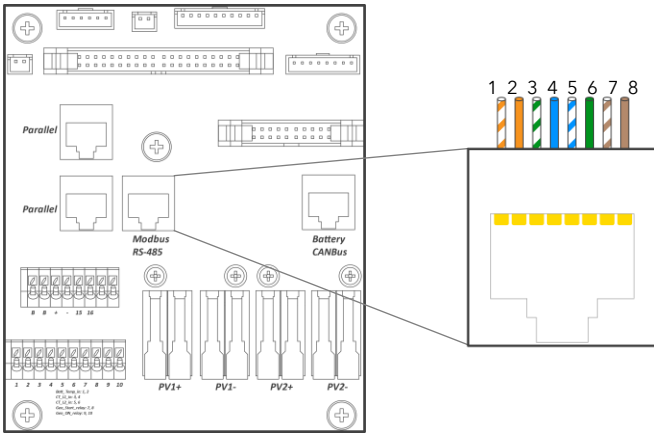
The 15K Outdoor will require a different pins configuration from the common communication wiring. For the 15K, these some pins must be inverted. Please refer to the communication pinout figures and table for more information.

**Requirement:** 1A fuse on the power lines and on the ground line.

| RS-485 pins | Meter input pins (Sol-Ark 12K) | Meter input pins (Sol-Ark 15K/30K/60K) |
|---|---|---|
| 1 | TX A+ (Pick either Orange or Brown) | TX B- (Pick either Orange or Brown) |
| 2 | TX B- | TX A+ |
| 3 | GND (Pick 3 or 6) | GND (Pick 3 or 6) |
| 4 | Not used | Not used |
| 5 | Not used | Not used |
| 6 | GND | GND |
| 7 | TX B- | TX A+ |
| 8 | TX A+ | TX B- |

## 12K Outdoor Comm Board



## 15K Outdoor Comm Board



## 30K / 60K Comm Board



*30K / 60K Comm board front view*

*30K / 60K Comm board bottom view*

16