



Installation Guide

Energy Meter with Modbus Connection

Version 1.6

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Emission Compliance

This equipment has been tested and found to comply with the limits applied by the local regulations.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate the equipment.

Version History

- Version 1.6 (September 2019)
 - Added LED information to troubleshooting appendix
- Version 1.5 (July 2019)
 - SetApp configuration support
- Version 1.4 (April 2019)
 - Configuration updates
- Version 1.3 (Nov. 2018)
 - Configuration steps update
- Version 1.2 (July 2018)
 - Firmware version support update
- Version 1.1 (May 2018)
 - Product name update
 - Model SE-WND-3Y400-MB-K2
 - Accuracy: 1% of Rated CT Current
 - Supports UK Engineering Recommendation G100 Issue 1 Amendment 1 2017
- Version 1.0 (February 2016) - Initial release

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HANDLING AND SAFETY INSTRUCTIONS

During installation, testing and inspection, adherence to all the handling and safety instructions is mandatory. **Failure to do so may result in injury or loss of life and damage to the equipment.**

Safety Symbols Information

The following safety symbols are used in this document. Familiarize yourself with the symbols and their meaning before installing or operating the system.

WARNING!



Denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in **injury or loss of life**. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.

CAUTION!



Denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in **damage or destruction of the product**. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.



NOTE

Denotes additional information about the current subject.



IMPORTANT SAFETY FEATURE

Denotes information about safety issues.

Disposal requirements under the Waste Electrical and Electronic Equipment (WEEE) regulations:



NOTE

Discard this product according to local regulations or send it back to SolarEdge.

Chapter 1: Introduction

Terminology

The following terms are used in this document:

- **Export:** The power injected to the grid.
- **Import:** The power purchased from the grid.
- **Export/Import meter:** A meter that is installed at the grid connection point and measures the energy/power exported/imported to/from the grid.
- **Consumption:** The power consumed at the site. Consumption power is calculated as the sum of self-consumption power and import power.
- **Consumption meter:** A meter that is installed at the load consumption point and measures the energy/power consumed by the site.
- **Self-consumption:** The PV power consumed by the site and not fed into the grid.
- **Production:** The power produced by the PV system.
- **Production meter:** A meter that is installed at the inverter output or site AC connection, and measures the energy/power produced by the PV system or site.

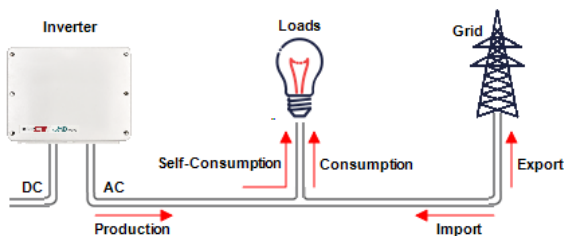


Figure 1: Terminology Illustration

The meter is used by the inverter for export/import metering in the following applications:

- Export/import monitoring
- Export limitation
- Smart Energy on-grid applications

The SolarEdge inverter or the Commercial Gateway reads export/import data from the meter, typically using one of the scenarios illustrated in the figures below:

- Exported/imported power from a meter installed at the grid connection point
- Power consumption from a meter installed at the load consumption point

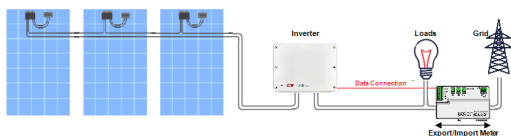


Figure 2: Typical installation with export/import meter

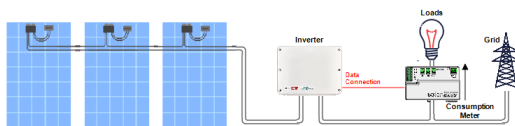


Figure 3: Typical installation with consumption meter

Meter Connection Options

In a *single* inverter system, the meter is connected directly to an RS485 port of the inverter.

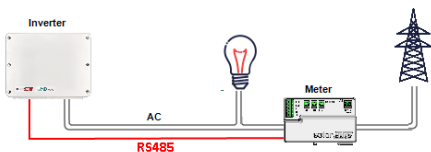


Figure 4: Single-inverter connection

In a *multiple* inverter system, two options are available:

- The meter is connected to an RS485 port of one of the inverters.
 - If the inverter has a second RS485 port, use this port to connect between the inverters.
 - If the inverter has only one RS485 port, use an RS485 Plug-In (available from SolarEdge) or ZigBee communication between the inverters.
- The meter is connected to one of the RS485 ports of a Commercial Gateway. The Commercial Gateway's second RS485 port can be used to create an RS485 bus for communication between the inverters. This option is illustrated in *Figure 5*.

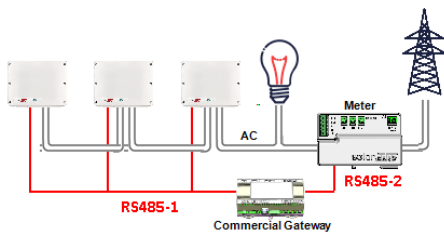


Figure 5: Multi-inverter connection with Commercial Gateway and meter

Chapter 2: Meter Installation

NOTE



Before installing the meter, make sure that you are installing the model SE-WND-3Y400-MB-K2 meter from SolarEdge that has a *yellow barcode sticker* on one of the side panels of the meter.

Installation Guidelines

AC wire specifications: 1.3 to 2.0 mm diameter / 16 to 12 AWG stranded wire, 600 V, type THHN, MTW, or THWN.

RS485 wiring specifications:

- Cable type: Min. 3-wire shielded twisted pair (a 4-wire cable may be used)
- Wire cross-section area: 0.2- 1 mm²/ 24-18 AWG (a CAT5 cable may be used)

NOTE



If using a cable longer than 10 m/33 ft in areas where there is a risk of induced voltage surges by lightning, it is recommend to use external surge protection devices. For details refer to *External Lightning Protection* on page 78. If grounded metal conduits are used for routing the communication wires, there is no need for a lightning protection device.

- The meter is considered “permanently connected equipment” and requires a disconnect means (circuit breaker, switch, or disconnect) and overcurrent protection (fuse or circuit breaker).
- The meter draws 10-30mA, therefore the rating of any switches, disconnects, fuses, and/ or circuit breakers is determined by the wire gauge, the mains voltage, and the current interrupting rating required.
- The switch, disconnect, or circuit breaker must be located near the meter and be easily operated .
- Use circuit breakers or fuses rated for 20A or less.
- Use grouped circuit breakers when monitoring more than one line.
- The circuit breakers or fuses must protect the mains terminals labeled L1, L2, and L3. In the rare case in which neutral has overcurrent protection, the overcurrent protection device must interrupt both neutral and the ungrounded conductors simultaneously.
- The circuit protection / disconnect system must meet IEC 60947-1 and IEC 60947-3, as well as all national and local electrical codes.

Installing and Connecting the Meter

Mount the meter either directly on a flat surface, or on a DIN rail using the DIN-rail clips supplied with the meter.

→ To mount the meter directly on a surface:

1. Carefully remove the terminal blocks on both sides of the meter.
2. Use the two mounting holes on both sides of the meter to mark the hole positions.

NOTE



Do not use the meter as a drilling guide; the drill may damage the screw terminals and metal shavings may fall into the connectors.

3. Use the supplied screws to mount the meter. Do not over-tighten the screws, as long-term stress on the case can cause cracking.

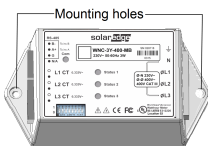


Figure 6: Meter mounting holes

→ To mount on a DIN rail using clips:

The supplied kit includes two DIN-rail mounting-clips and two screws.

1. Carefully remove the terminal blocks from both sides of the meter.
2. Attach the DIN rail clips to the meter and fasten them using the supplied screws (torque 0.7 N*m/ 0.5 lb*ft). Make sure that the clips are correctly oriented, as shown below.



Figure 7: Mounting the meter on a DIN-rail

→ To install the current transformers (CTs):



NOTE

If installing a high-accuracy/RGM meter, make sure that the CTs chosen are appropriate for use with the meter.

1. Turn off AC power before clamping on current transformers.
2. Install the CTs around the conductor to be measured. Split-core CTs can be opened for installation around a conductor. A nylon cable tie may be secured around the CT to prevent accidental opening.
3. Install the CTs with the arrows pointing to the grid for consumption or export measurement.

→ To wire the meter:

The meter communicates with the inverter/Commercial Gateway over an RS485 connection. Refer to the connection diagram below.

If you are connecting two meters, refer to *Installing Two Meters* on page 57.

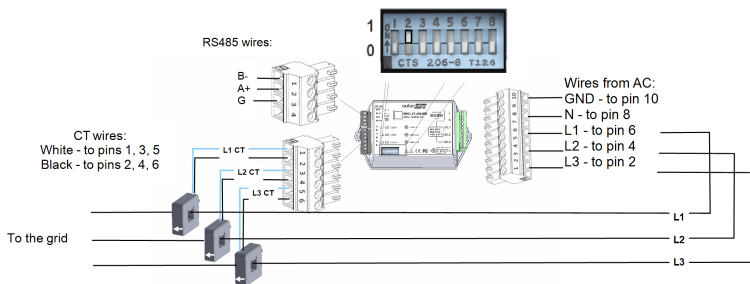


Figure 8: Meter connections

NOTE

- Clamp the CT connected to **L1 CT** around the wire connected to \emptyset **L1**.
- Clamp the CT connected to **L2 CT** around the wire connected to \emptyset **L2**.
- Clamp the CT connected to **L3 CT** around the wire connected to \emptyset **L3**.

1. Verify that power is OFF before making connections.
2. Connect the AC side wires (meter input) using the 10-pin terminal block:
 - a. Loosen the appropriate screws on the 10-pin terminal block.
 - b. Connect each AC wire to the appropriate screw terminal (pins 6, 4, 2). Verify that the lines match the symbols printed on the meter front label.
 - c. Connect ground to pin 10 and neutral to pin 8.
 - d. Tighten the screws making sure the wires are fully inserted and cannot be pulled out easily.
 - e. Insert the 10-pin terminal block into the socket on the meter making sure it is fully seated in the meter.
3. Connect the CT wires to the 6-pin terminal block:
 - a. Connect the black and white wires according to the dots printed on the label: White to L1/L2/L3 white (pins 1/3/5), and black to L1/L2/L3 black (pins 2/4/6).
 - b. Insert the 6-pin terminal block into the socket on the meter making sure it is fully seated in the meter
4. Connect the RS485 twisted pair cable to the 4-pin terminal block of the meter:

- a. Connect the wires to the A+ and B- terminals, and connect the shield to the G terminal.
 - b. Insert the 4-pin terminal block into the socket on the meter making sure it is fully seated in the meter.
5. Set the meter's DIP switches as follows:
- a. Switches 1-6 are used to set the meter address. To set the address to '2' (the default address) , set switch 2 to 1 (UP), and switches 1, 3, 4, 5, and 6 to 0 (DOWN).
 - b. Switch 7: Set to 1 (UP), if 120 ohm termination is required. Otherwise, set to 0 (DOWN).
 - c. Switch 8: Set to 0 (DOWN).

→ To connect the meter to the inverter or Commercial Gateway:

1. If connecting to an inverter, remove the seal from one of the openings in communication gland #2 at the bottom of the inverter and insert the RS485 wires from the meter through the opening.

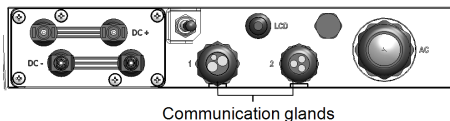


Figure 9: Communication glands

2. Prepare to connect to one of the available RS485 ports of

the device, as shown below:

- Inverter RS485-1 - pull out the RS485 connector located on the communication board.

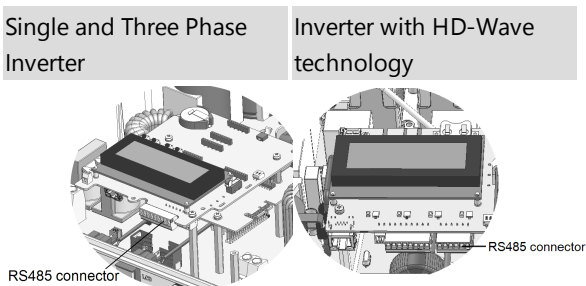


Figure 10: Inverter RS485 connectors

- Inverter RS485 Plug-in - pull out the 3-pin connector

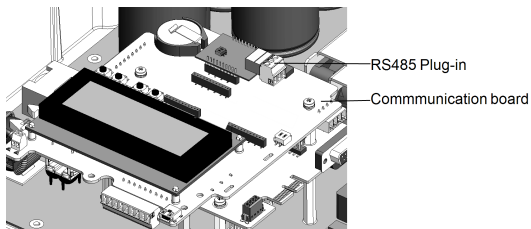


Figure 11: RS485 Plug-in on Single/Three Phase inverter

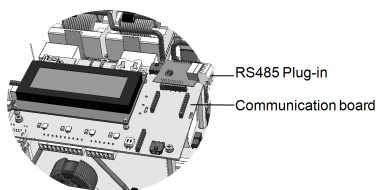


Figure 12: RS485 Expansion module on HD-Wave Inverter

- Commercial Gateway - use one of the 3-pin connectors supplied with the Commercial Gateway. Connect it to the RS485-2 connection on the Commercial Gateway.



Figure 13: Commercial Gateway RS485 connector

3. Connect the wires as shown below:

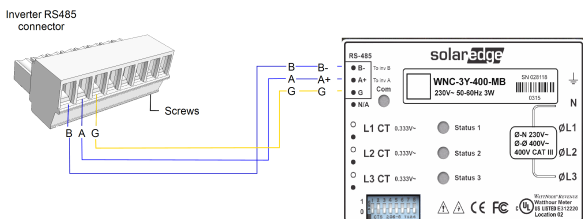


Figure 14: Meter RS485 connections

- If the SolarEdge device is at the end of the RS485 bus, terminate as follows:
 - Inverter** - Terminate by switching a termination DIP-switch inside the inverter to ON (top position). The switch is located on the communication board and is marked SW7.
 - Commercial Gateway** - Terminate by switching the SW2 termination DIP-switch to ON.

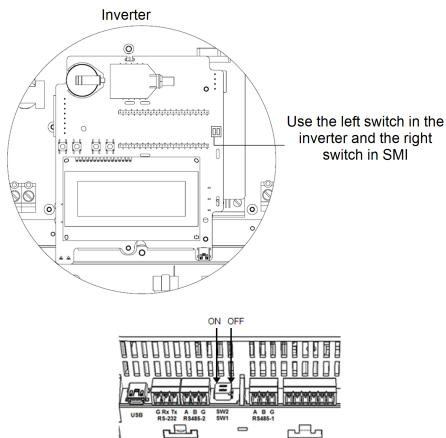


Figure 15: RS485 termination switch

Chapter 3: Configuration

SolarEdge Device Firmware Version

To ensure proper communication with the meter, make sure that the inverter communication board firmware (CPU) version is:

- For inverters using SetApp: Version 4.2.xx or later
- For inverters using a display: Version 3.2222 or later

→ To check the inverter CPU version using SetApp:

1. Select **Commissioning** → **Information** to view the CPU Version.

| Information | |
|---------------|-------------|
| CPU Version | 4.2000.0000 |
| DSP1 Version | 1.0210.1066 |
| DSP2 Version | 2.0052.0410 |
| Serial Number | 7F129A09-33 |
| Hardware IDs | > |
| Error Log | > |
| Warning Log | > |

→ To check the inverter CPU version using the device display:

1. Verify that the inverter has been activated using the activation card supplied with the inverter.
2. Short press the LCD light button on the inverter until the screen below is displayed.

```
C P U :   0 0 0 3 . 1 9 x x
C o u n t r y :   E S P
```

3. To upgrade inverters with earlier firmware versions, refer to https://www.solaredge.com/sites/default/files/upgrading_an_inverter_using_micro_sd_card.pdf.



Device Configuration

This section describes basic configuration of SolarEdge devices (inverter/Commercial Gateway) for use of a meter. In addition, a configuration that is specific to the application being used is required in some cases. Refer to the following documents:

- Export Limitation -
https://www.solaredge.com/sites/default/files/feed-in_limitation_application_note.pdf
- StorEdge Smart Energy Management on-grid applications
- https://www.solaredge.com/sites/default/files/se_storedge_interface_installation_guide_for_hd_wave_setapp_and_lg.pdf

NOTE

Calculated meter readings, such as self-consumption, are calculated using the data measured by the meter and the inverters. Calculated meter readings are only sent when Energy Manager is enabled (for details refer to



https://www.solaredge.com/sites/default/files/feed-in_limitation_application_note.pdf).

Device Configuration using SetApp



NOTE

Meter functionality is supported in inverters with CPU versions 4.2.xxx and above.

→ To configure the SolarEdge meter using SetApp:

1. From the SetApp main menu, select **Communication**, and select the port to which the meter is connected - **RS485-1** or **RS485-2**.
2. Select **Protocol** → **Modbus (Multi-Device)**
3. Return to the RS485-x Menu and select **Add Modbus Device** → **Meter**. A meter identified as "Meter n" (where n = 1, 2, 3...) is created. The RS485-x Menu reappears.
4. Select **Meter n** (where n is the meter number). The Meter Configuration Menu appears as shown in the figure below.

RS485-1 Meter 1

| | | |
|---------------------|---------------------|---|
| Meter Function | Export+Import (E+I) | > |
| Meter Protocol | WattNode | > |
| Device ID | 2 | > |
| CT phase-loss | Disabled | > |
| CT Rating | 100 | > |
| CT Rating Secondary | | > |
| Grid Topology | WYE | > |
| PT Scaling | 1 | > |

Figure 16: Meter Configuration

5. Select **Meter Function**, and choose one of the following options:
 - **Inverter Production:** The meter is installed at the inverter output and reads the energy produced by the inverter.
 - **Export+Import:** The meter is installed at the grid connection point and reads pulses from both directions - export and import energy.
 - **Consumption:** The meter is installed at the load consumption point and reads the energy consumed by the site.
 - **Site Production:** The meter is installed at the inverter output and reads the energy produced by inverters at the site.
 - **Ext. Production:** The meter is used for export limitation with 3rd party generators and for AC coupling with non-SolarEdge inverters.
6. Select **Meter Protocol**, and select **WattNode**.
7. Select **Device ID** and enter the value 2.
8. Select **CT phase-loss**. The CT phase-loss page appears. Using the toggle switch buttons, toggle to **Enable** for each CT and phase used by the meter, or use the **All** toggle to enable for all CTs and phases. Tap on **Done** to complete the

setting. On the RS485-x Meter n Menu, **CT phase-loss** is set automatically to **Enabled**.

CT phase-loss

| | |
|-----|-------------------------------------|
| All | <input checked="" type="checkbox"/> |
| CT1 | <input checked="" type="checkbox"/> |
| CT2 | <input checked="" type="checkbox"/> |
| CT3 | <input checked="" type="checkbox"/> |
| L1 | <input checked="" type="checkbox"/> |
| L2 | <input checked="" type="checkbox"/> |
| L3 | <input checked="" type="checkbox"/> |

Figure 17: CT Phase-Loss Menu

9. Select **CT Rating** and enter the current transformer's rating in amperes.

10. Select **Grid Topology** and select **WYE**.
11. If relevant, select **PT Scaling** and set the potential transformer ratio. The default value is 1.

Device Configuration using the Device Display

→ To configure the SolarEdge device using the device display:

Use the four user buttons to control the LCD panel menus:

- **Esc**: Goes to the beginning of the currently entered parameter or to the previous menu.
- **Up** (1) and **Down** (2): Moves the cursor (>) to the relevant menu option.
- **Enter** (3): Used to select an option

1. Verify that the device ON/OFF switch is OFF.
2. Turn ON the AC switch of the main circuit board.



WARNING!

ELECTRICAL SHOCK HAZARD. Do not touch uninsulated wires when the cover is removed.

3. Press the Enter (3) button for at least five seconds. The following message is displayed:

```
Please enter  
Password  
*****
```

4. Use the three right most buttons (Up-1, Down-2 and Enter-3) to type in the following default password: **12312312**.
5. Scroll to the **Communication** menu and select **RS485-X Conf** (X represents the actual RS485 port to which the electricity meter is connected: 1 or E for the inverter; 1 or 2 or E for the Commercial Gateway). A screen similar to the following is displayed (the example here appears in master/slave installations):

```
Device Type <SE>  
Protocol <M>  
Device ID <1>  
Slave Detect <#>  
Long SLV Detect <#>  
Slave List <#>  
Multi-Inv. Set
```

6. Select **Device Type**. the following screen is displayed:

```
SolarEdge <M>  
Non-SE Logger <S>  
Multi Devices <M>  
None
```

7. Select **Multi Devices**, a screen similar to the following is displayed:

```

Device Type <MLT>
Meter 1 <--->
Meter 2 <WN><2>
Meter 3 <--->

```

8. Select **Meter 2** → **Device Type** → **Revenue Meter**. A screen similar to the following is displayed:

```

Device Type <MTR>
Protocol <WN>
Device ID <2>
CT/Phase Loss <Dis>
CT Rating <0>
Meter Func. <None>
Topology <Wye>
PT Scaling <1>

```

9. Configure the meter parameters as follows:
- Select **Protocol: WN**
 - Select **Device ID: 2**
 - Set **CT/Phase Loss** to <En> (enabled). In the sub-menu, for each CT and phase used by the meter, set the corresponding entry to <En> enabled.

```

CT1 <En>
CT2 <Dis>
CT3 <Dis>
L1 <En>
L2 <Dis>
L3 <Dis>
Disable

```

- Set the CT rating to the value that appears on the CT: **CT Rating** → <xxxxA>. The default is 5 Amperes. If the displayed rating is 0 or you cannot change the value, there is no communication with the meter. Check that the AC power to the meter is on.
- Select **Meter Func.** and select one of the functionality options, according to the installed meter specifications and location.

```
Export+Import  
Export  
Consumption  
Production  
Ext. Production  
Import  
None
```

- **Export+Import:** The meter is installed at the grid connection point and reads pulses from both directions - export and import energy.
- **Export:** The meter is installed at the grid connection point and reads the export energy.
- **Consumption:** The meter is installed at the load consumption point and reads the energy consumed by the site.

- **Production:** The meter is installed at the inverter output and reads the energy produced by the inverter.
- **Ext. Production:** The meter is used for export limitation with 3rd party generators and for AC coupling with non-SolarEdge inverters.
- **Import:** The meter is installed at the grid connection point and reads the import energy.
- **None:** No reading

The selected option is displayed in the RS485 Conf screen as <E+I>, <E>, <Cons>, <Prod>, <I>, <None>.

- **Select Topology: Wye**
- If relevant, select **PT Scaling** and set the potential transformer ratio. The default value is 1.

10. Exit Setup mode.

Verifying the Meter Connection

Verifying the Meter Connection using SetApp

→ To verify the meter connection using SetApp:

1. From the SetApp main menu, select **Status**.
2. On the Status page, scroll down to the **Communication** status section. Check that one or more meters is connected to the RS485-1 or RS485-2 bus.

| Communication | | |
|-------------------------|------------------------------------|------------------------------------|
| LAN Connected | RS485-1 Modbus 2 of 2 | RS485-2 SE Slave None |
| Cellular N/A | Wi-Fi NC | ZigBee NC |

3. Continue scrolling to the **Meters** section. If there is more than one meter/function, there is a status sub-section for each one. An example appears below. The following information is displayed:

- **Type and function:** Displays the meter functionality (Production, Export, Import, Export+Import)
- **Status:**
 - Displays 'OK' if the meter is communicating with the inverter.
 - <Error message>: If an internal meter error occurs, it will be displayed here. Refer to *Troubleshooting Meter Connection* on page 41.
- **Power:** The exported or imported power
- **Energy:** The total energy read by the meter

| Meters | |
|-------------------------|----------|
| Production Meter | |
| SN: XXXXXXXX | |
| RS485-2 | Status |
| Modbus ID #2 | OK |
| Power | Energy |
| 7.60 kW | 13.68MWh |

4. From the SetApp main menu, select **Status**.

Verifying the Meter Connection using the Device Display

→ To verify the meter connection in devices with a display:

1. Short-press the LCD light button (on the inverter) or the **Enter** button (inside the inverter) until the Communication status screen is displayed as shown below. This screen shows the number of external devices that communicate on each port, the device type, and the protocol to which each port was configured.
2. Verify that the setting of the relevant RS485 port is correct and that the port is communicating with the meter. For example, if the meter is connected to the RS485-1 port, the Communication status screen should display the following:

| | Dev | Prot | ## |
|---------|-------|-------|-------|
| RS485-1 | <MTR> | <WN> | <1> |
| RS485-2 | <---> | <---> | <---> |
| ZigBee | <---> | <---> | <---> |

Dev: the type of device connected to this port. **MTR** indicates a meter.

Prot: the communication protocol

= 1: Indicates that the connection to the meter is successful.

3. Continue pressing the Enter button or the LIGHT button

using short presses until reaching the meter status screen showing the **Energy [Wh]** total. If there is more than one meter/ function, there is a status screen for each one. The following is an example of an Export meter:

```
Export Meter
Status:      <OK / Error# >
Power [W] :   xxxxx.x
Energy [Wh] :  xxxxx.x
```

Status: Displays the state of communications between the meter and the inverter.

- Displays 'OK' if the meter is communicating with the inverter.
- **<Error message>**: If an internal meter error occurs, it will be displayed here. Refer to *Troubleshooting Meter Connection* on page 41.

Power [W]: Displays the exported or imported power.

Energy [Wh]: Displays the total energy read by the meter.

Appendix A: Troubleshooting Meter Connection

This section describes how to troubleshoot meter-related installation and performance errors.

For troubleshooting dual-meter connections, refer to *Installing Two Meters* on page 57.

Troubleshooting the Meter using SetApp

Communications Failure

The following are indications of a connectivity failure between the inverter and the meter:

- If **NC** (not connected) appears for a meter in the RS485-1 or RS485-2 sub sections of the Communication page.

| Communication | | |
|-------------------------|------------------------------------|------------------------------------|
| LAN Connected | RS485-1 Modbus 2 of 2 | RS485-2 SE Slave None |
| Cellular N/A | Wi-Fi NC | ZigBee NC |

- If the following error message appears in the bottom left-hand corner of the Inverters section of the Status page:
"Error 3x6E: Meter Comm. Error"
- If the status in the Meters section of the Status page is
"Comm. Error"

| Meters | |
|--------------------------------|------------------------------|
| Export Meter | |
| RS485-1 Modbus ID #2 | Status Comm. Error |
| Power 7.60 kW | Energy 8.42 MWh |

If a connectivity failure occurs, check the following:

- Check the following as specified in *To wire the meter*: on page 19
 - The RS485 wiring between the meter and the inverter/Commercial Gateway.
 - The meter's DIP switch settings.
- Check that the meter is configured as required in the chapter "Configuration" on page 25
- Check for water damage or sealing problems:
 - Inspect the entire conduit run for possible points of water penetration, and fix leaks.
 - Ensure that proper outdoor rated components are used.
- Use a Voltmeter to measure the voltage on the meter's AC wiring. The L1 – L2 – L3 line to line voltage should be 208-240 Vac.

The Energy value is not advancing

Check the Energy value in the Meters section of the Status page, as shown in the figure below:

| Meters | |
|----------------|---------------|
| Export Meter | |
| RS485-1 | Status |
| Modbus ID #2 | Comm. Error |
| Power | Energy |
| 7.60 kW | 8.42 MWh |

If the Energy [in MWh] value displays a steady value even though the the site is consuming power, check the following:

- There are no loose connections at the inverter connectors and at the meter, specifically the AC wiring on the meter's AC wiring connector.
- The CT black and white cables are correctly connected to the CT connectors on the meter:
- The L1/L2/L3 cable passes through the CT in the correct direction, according to the arrow on the inside of the CT.

- Check for water damage or sealing problems:
 - Inspect the entire conduit run for possible points of water penetration, and fix leaks.
 - Ensure that proper outdoor rated components are used.

Troubleshooting the Meter using the Device Display

Communication Status Screen Troubleshooting

The communication status screen should display the following:

| Dev | Prot | # | # |
|---------|-------|-------|-------|
| RS485-1 | <MTR> | <SE> | < 1 > |
| RS485-2 | <---> | <---> | <---> |
| ZigBee | <---> | <---> | <---> |

Device Type or Protocol are configured incorrectly

If MTR (meter) is not displayed as the device type (DEV), or WN (WattNode) is not displayed as the Prot (protocol), configure the meter as follows.:

1. Select **Communication** → **RS485-x Conf** → **Device Type** → **Revenue Meter**.

2. Select **Communication** → **RS485-x Conf** → **Protocol** → **WattNode**.
3. Check that the Device ID under **Communication** → **RS485-x Conf** → **Device ID** is set to 2.
4. Select **Revenue Meter** → **Meter Func.** → **Export+Import / Export / Import / Consumption / Site Production / Inv. Production**.

Number of devices is not displayed

If <--> is displayed under the ## column in the Communication status screen, the meter is not communicating with the inverter. Check the following:

- Check the meter's DIP switch settings. The switches should be set as follows:
 - Check that switches 1-6 correctly specify the meter address. To set the address to '2' (the default address) , set switch 2 to 1 (UP), and switches 1, 3, 4, 5, and 6 to 0 (DOWN).
 - Switch 7: Set to 1 (UP), if 120 ohm termination is required. Otherwise, set to 0 (DOWN)
 - Switch 8: Set to 0 (DOWN)
- The meter configuration is as described in the previous section.

- There are no loose connections at the inverter connectors and at the meter, specifically the RS485 wiring.
- The wiring between the meter and the RS485 terminal block on the communication board is correct.
- Use a Voltmeter to measure the voltage on the meter 10-pin's terminal block . The L1 - L2 - L3 line to line voltage should be 400 Vac \pm 20% for three-phase; 240 Vac from L to N \pm 20% for single-phase.

Meter Status Screen Troubleshooting

```
Export Meter
Status:      <OK / Error# >
Power [ W ] :      xxxxx.x
Energy [ Wh ] :    xxxxx.x
```

<OK> is not displayed

If <OK> is not displayed in the Status line of the status screen shown above, the meter is not communicating with the inverter. Check the following:

- There are no loose connections at the inverter communication board and at the meter.
- The wiring between the black 4-pin terminal block on the meter and the RS485 terminal block on the communication board is correct.

An error message is displayed

- If **Comm. Error** is displayed in the meter status screen, verify proper connection of:
 - The RS485 cables and connectors
 - The AC connection of the meter
- If **Error 185 Meter Comm. Error** message is displayed, contact SolarEdge support.

Total [Wh] value is not advancing

If the Total [Wh] value displays a steady value although the the site is consuming power, check the following:

- There are no loose connections at the inverter connectors and at the meter, specifically the AC wiring on the meter 10-pin connector.
- The CT black and white cables are correctly connected to the 6-pin connector on the meter:
 - White CT wire is connected to the L1/L2/L3 white dot.
 - Black CT wire is connected to the L1/L2/L3 black dot.

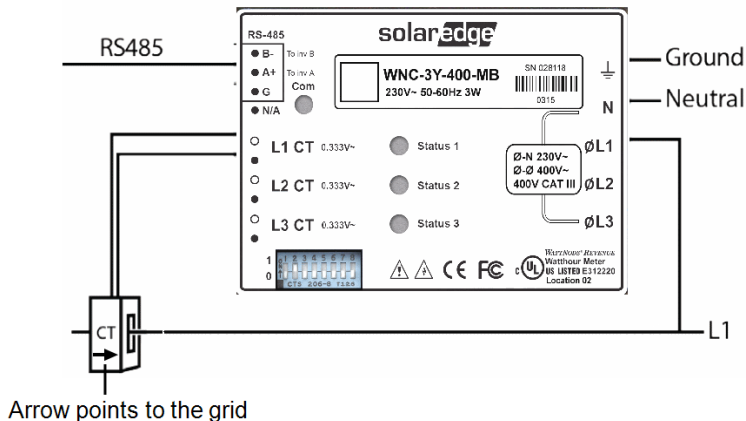


Figure 18: Meter Connection Diagram

NOTE

The above meter setup is for single phase applications. The meter supports three phase applications as well.

Meter Status LEDs

Power Status LEDs

The three status LEDs on the front of the meter can help indicate correct measurements and operation.

- Normal operation indications:
 - At normal startup - when power is first applied, all the LEDs light up sequentially for 1 sec.
 - The following table describes LED indications during normal operation:

| LED color | Function | Indication |
|-----------|-----------------|--|
| Red | Flashing ON/OFF | Appears only when the meter is connected at the grid connection point (CT directed towards the grid). Indicates export power measurement. |
| Yellow | Flashing | Communication OK |

| LED color | Function | Indication |
|-----------|-----------------|---|
| Green | Flashing ON/OFF | <ul style="list-style-type: none">• When the meter is connected at the grid connection point it indicates import power measurement (CT directed towards the grid).• When the meter is connected at the load connection point it indicates consumption power measurement (CT directed towards the grid).• When the meter is used for production it indicates production power measurement (CT directed toward the inverter). |
| | ON for >3 sec | No current flow (zero current) |

- Abnormal operation indications:
 - If all LEDs are off – the meter is not operating. Perform all troubleshooting steps starting with checking the physical connections.
 - The following table describes additional LED indications that require troubleshooting and repair.

| LED color | Function | Indication | Troubleshooting |
|-----------|-------------------------|------------------------------------|--|
| Red | ON for >3 sec. | Internal error | Contact SolarEdge Support. |
| | Flashing ON/OFF | Negative power for the phase | If the meter is connected at the load connection point or if the meter is used for production metering, check for reversed CTs, swapped CT wires, or CTs not matched with the lines. |
| | Flashing with green LED | Voltage is too high for this model | Disconnect power immediately! Check the line voltages and the meter ratings. |

| LED color | Function | Indication | Troubleshooting |
|-----------|--------------------------|---|--|
| | Flashing with yellow LED | The line voltage is out of range (Vac \pm 20%). Specifically, the voltage is too low for the meter to operate correctly and the meter reboots repeatedly. | Verify that the voltage on the Vac screw terminals is within the range of \pm 20% of the nominal operating voltages printed in the white rectangle on the front label. |
| Yellow | ON for >3sec. | Power line frequency is below 45 Hz or above 70 Hz. | Check for the presence of high noise, for example, the meter is too close to an unfiltered variable frequency drive. |
| | Flashing with red LED | Voltage is too high for this model | Disconnect power immediately! Check the line voltages and the meter ratings. |

Modbus Communication LEDs

The communication LED is located at the upper left corner. The following are indications of the LED light:

| LED color | Function | Indication | Troubleshooting |
|-----------|--------------------------|---|--|
| Red | Flashing | An invalid packet: bad baud rate, bad CRC, noise, bad parity, etc. | Check that the communication wires are connected correctly. |
| | ON | The address is set to zero: an invalid choice | Check that the Device ID is set to 2 in the RS485 Conf screen. |
| | Flashing with yellow LED | A possible address conflict (two devices with the same DIP switch address). | Check that the DIP-switches are set correctly. Check that the Device ID is set to 2 in the RS485 Conf screen. |

| LED color | Function | Indication | Troubleshooting |
|-----------|----------|---|-----------------|
| Yellow | Flashing | Valid packets addressed to different devices. | N/A |
| Green | Flashing | A valid packet addressed to this device | N/A |

Appendix B: Installing Two Meters

You can connect up to two meters on the same bus.

To connect two meters, install two wires into each screw terminal by twisting the wires together, inserting them into terminal, and securely tightening. RS485 wiring is daisy-chained between meters, as described in the following figure:

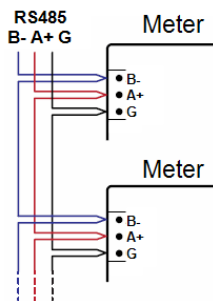


Figure 19: RS485 chain of meters

Connecting Two Meters

1. Connect the twisted pair wiring to the meters as shown in *Figure 20*.
2. Connect the meters to the inverter or Commercial Gateway RS485 connector as illustrated below.

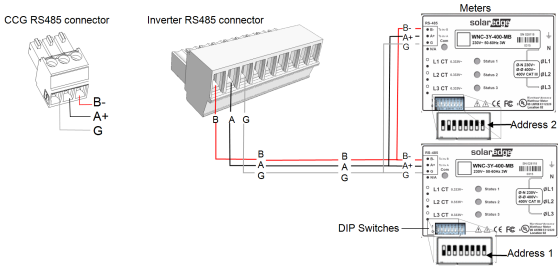


Figure 20: Connecting the meters to the inverter or Commercial Gateway RS485 connector

3. Set one of the meter's DIP switches to address '2':
 - a. Set switch 2 to 1 (UP), and switches 1, 3, 4, 5, and 6 to 0 (DOWN).
 - b. Switch 7: Set to 1 (UP), if 120 ohm termination is required. Otherwise, set to 0 (DOWN)
 - c. Switch 8: Set to 0 (DOWN)
4. Set the other meter's DIP switches to address '1':
 - a. Set switch 1 to 1 (UP), and switches 2, 3, 4, 5, and 6 to 0 (DOWN).
 - b. Switch 7: Set to 1 (UP), if 120 ohm termination is required. Otherwise, set to 0 (DOWN)
 - c. Switch 8: Set to 0 (DOWN)

5. Terminate the SolarEdge device as described in *Installing and Connecting the Meter* on page 16.

Configuring the Dual-Meter Connection

- To configure the Dual-Meter connection using SetApp, refer to *Configuring Dual-Meter Connection Using SetApp* on page 60.
- To configure the Dual-Meter connection using the device display, refer to *Configuring Dual-Meter Connection using the Device Display* on page 62.

Configuring Dual-Meter Connection Using SetApp

In the sample configuration described below, a production meter is set to address 1 and an export/import meter is set to address 2. The meters use the WattNode protocol.

→ To configure the SolarEdge device using SetApp:

1. From the SetApp main menu, select **Communication** → **RS485-x** → **Meter 1**
2. Verify the value of the following parameters:
 - **Meter Function** → **Inverter Production**
 - **Protocol** → **WattNode**
 - **Device ID** → **1**

3. Select **Meter 2** to configure the export/import meter in the following steps:
4. Select **Meter Function**, and choose one of the following options:
 - **Export+Import:** The meter is installed at the grid connection point and reads pulses from both directions - export and import energy.
 - **Consumption:** The meter is installed at the load consumption point and reads the energy consumed by the site.
 - **Site Production:** The meter is installed at the inverter output and reads the energy produced by the inverters at the site.
 - **Ext. Production:** The meter is used for export limitation with 3rd party generators and for AC coupling with non-SolarEdge inverters.
5. Select **Meter Protocol**, and select **WattNode**.
6. Set **Device ID** to 2.
7. Select **CT Rating** to set the CT rating to the value that appears on the CT. If the displayed rating is 0 or you cannot change the value, there is no communication with the meter. Check that the AC power to the meter is on.
8. Select **Grid Topology** and select **WYE**.

9. Select **PT Scaling** and set the potential transformer ratio.
The default value is 1.

Configuring Dual-Meter Connection using the Device Display

→ To configure the SolarEdge device using the device display:

1. Enter Setup mode, scroll to the **Communication** menu and select **Communication** → **RS485-x Conf.**

The following screen is displayed:

```
Device Type <SE>
Protocol <M>
Device ID <1>
Slave Detect <#>
Long SLV Detect <#>
Slave List <#>
Multi-Inv. Set
```

2. Select **Device Type**. the following screen is displayed:

```
SolarEdge <M>
Non-SE Logger <S>
Multi Devices <M>
None
```

3. Select **Multi Devices**. The following screen is displayed:

```
Device Type <MLT>
Meter 1 <--->
Meter 2 <WN><2>
Meter 3 <--->
```

4. Configure the parameters of the two meters as follows. Make sure that the meter addresses (set in the previous section) correspond with the device IDs and meter functions in the setting below.

The settings provided herein are an example of a Consumption meter set to address 1 and an Export+Import meter set to address 2.

- Select **Meter 1**. The following is displayed:

```
Device Type <MTR>
Protocol <WN>
Device ID <2>
CT Rating <0>
Secondary CT <5>
VT Rating <11000>
Secondary VT <110>
Meter Func. <None>
Meter Commission
Topology <Wye>
PT Scaling <1>
```


- Select **Device Type** → **Revenue Meter**.
- Select **Protocol** → **WattNode**.
- Set **Device ID**: 1.
- Set the CT Rating to the value that appears on the CT. If the displayed rating is 0 or you cannot change the value, there is no communication with the meter. Check that the AC power to the meter is on.
- Select **Meter Func.** → **Inverter Production**.
- Set **Topology** to **Wye**.
- Select **Meter 2** and configure its settings:
 - Select **Device Type** → **Revenue Meter**
 - Select **Protocol** → **WattNode**.
 - Set **Device ID**: 2
 - Set the CT Rating to the value that appears on the CT. If the displayed rating is 0 or you cannot change the value, there is no communication with the meter. Check that the AC power to the meter is on.
 - Select **Meter Func.** → **Export+Import**
 - Set **Topology** to **Wye**.

Verifying Meter Connection

Verifying the Meter Connections using SetApp

To verify the connectivity of two meters using SetApp, refer to "Verifying the Meter Connection using SetApp" on page 37

Verifying the Meter Connections using the Device Display

→ To verify the meter connections in devices with a display:

1. Press the Enter button or the LCD external button until the Communication status screen is displayed as shown below. When two meters are connected, a screen similar to the following should appear:

```
Port  Dev  Prot  ##  
RS 485 - 1 <MLT> <02> <02>  
RS 485 - 2 <---> <---> <--->  
ZigBee <---> <---> <--->
```

Dev: The type of device configured to this port.

MLT indicates multiple meters.

Prot: The number of configured meters. For dual meters it should display 2.

: The number of communicating meters. For dual meters

it should display 2. If not, refer to *Troubleshooting* below.

2. Press the Enter button or the LCD external button until reaching the Meter status screen showing the total energy [Wh]. There is a status screen for each meter function. For example, for an export+import meter and a production meter, there will be three status screens: for export, import and production. The following is an example of an export meter:

```
Export Meter
Status: <OK>
<Error Message>
Total [Wh] : XXXXXXXX
```

Status: Displays OK if the meter is communicating with the communication board.

<Error message:> If an internal meter error occurs, it will be displayed here. Refer to *Troubleshooting Meter Connection* on page 41.

Total [Wh]: The amount of Watts per hour of the designated meter.

If the SolarEdge device is connected to the SolarEdge server, this value will also be displayed in the monitoring platform.

Troubleshooting Dual-Meter Connection

Troubleshooting Dual-Meter Connections using SetApp

To verify the connectivity of two meters using SetApp, refer to "Troubleshooting the Meter using SetApp" on page 41

Troubleshooting Dual-Meter Connections using the Device Display

When two meters are connected on the same RS485 bus, the following should appear in the Communication status screen:

```
Device ID  Dev  Prot  # #  
RS485-1 <MLT> <02> <02>  
RS485-2 <---> <---> <--->  
ZigBee <---> <---> <--->
```

Device Type or Protocol are configured incorrectly

If <MLT> (multiple meters) is not displayed in the **Dev** field as the device type, or <02> is not displayed in the **Prot** field as the number of meters, configure the meters as follows:

1. Select **Communication** → **RS485-x Conf** → **Device Type** → **Multi Devices**. Select **Device 1** or **Device 2**.

2. Select **Communication** → **RS485-x Conf** → **Protocol** → **WattNode**.
3. Select **Revenue Meter** → **Meter Func.** → **Inv. Production, Site Production, Consumption, Export, Import, or Export+Import**.
4. Check that the Device ID under **Communication** → **RS485-x Conf** → **Device ID** is set to 1 or 2.

Number of devices is lower than configured or not displayed

If <--> or <01> is displayed under the ## column in the Communication status screen shown above, at least one of the meters is not communicating with the inverter. Check the following:

- Check the RS485 Modbus address DIP switch settings, as specified in "Connecting Two Meters" on page 57.
- The meter configuration is as described above.
- There are no loose connections at the inverter connectors and at the meters, specifically the RS485 wiring.

Meter Status Screen Troubleshooting

Refer to *Meter Status Screen Troubleshooting* on page 47.

Appendix C: Monitoring Platform - Meter Data

If your device is connected to the SolarEdge server, you can view the meter's readings in the monitoring platform. Verify that the meter type is set correctly in the Admin page > Logical Layout > Meter details:

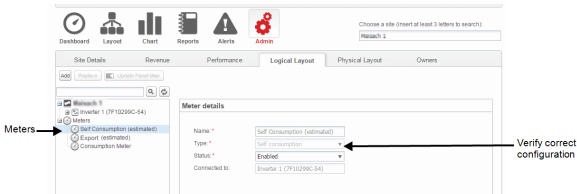


Figure 21: Setting the Meter details in the monitoring platform

Calculated meter readings (also referred to as "virtual meters"), such as self-consumption, are calculated using the data measured by the meter and the inverters.

The data from the inverters and from installed meters is displayed in the Dashboard and Charts tabs of the monitoring platform. The displayed data depends on the meter(s) location: grid connection point (export), or load consumption point (consumption). The following tables detail the displayed information per meter location.

No meter installed:

| Data | Displayed in Monitoring Dashboard | Displayed in Monitoring Charts |
|----------------------------|-----------------------------------|--------------------------------|
| Production (inverter/site) | ✓ | ✓ |
| Consumption | X | X |
| Self-consumption | X | X |
| Export | X | X |
| Import | X | X |

Export meter:

| Data | RS485 Meter | | S0 Meter ⁽¹⁾⁽²⁾ | |
|----------------------------|-----------------------------------|--------------------------------|-----------------------------------|--------------------------------|
| | Displayed in Monitoring Dashboard | Displayed in Monitoring Charts | Displayed in Monitoring Dashboard | Displayed in Monitoring Charts |
| Production (inverter/site) | ✓ | | ✓ | ✓ |
| Consumption | ✓ (calculated) (2) | ✓ (calculated) (3) | X | X |
| Self-consumption | ✓ (calculated) | ✓ (calculated) | ✓ (calculated) | ✓ (calculated) |
| Export | X | ✓ | X | ✓ |
| Import | X | ✓ | X | X |

(1) S0 meters are supported only by inverters with a display.

(2) When installing an S0 meter at the grid connection point, make sure that it counts the total positive energy, that is, the energy fed into the grid.

(3) Available from CPU version 2.10xx/3.14xx

Consumption meter:

| Data | RS485 Meter | | S0 Meter ⁽¹⁾ | |
|----------------------------|-----------------------------------|--------------------------------|-----------------------------------|--------------------------------|
| | Displayed in Monitoring Dashboard | Displayed in Monitoring Charts | Displayed in Monitoring Dashboard | Displayed in Monitoring Charts |
| Production (inverter/site) | ✓ | ✓ | ✓ | ✓ |
| Consumption | ✓ | ✓ | ✓ | ✓ |
| Self-consumption | ✓ (calculated) | ✓ (calculated) | ✓ (calculated) | ✓ (calculated) |
| Export | X | ✓ (calculated) | X | ✓ (calculated) |
| Import | X | ✓ (calculated) | X | X |

⁽¹⁾S0 meters are supported only by inverters with a display.

Appendix D: Meter Technical Specifications

| SE-WND-3Y400-MB-K2 | | |
|---|---|-----|
| ELECTRICAL SERVICE | | |
| Operating Voltage Range - Line to Neutral / Line to Line | Nominal: 230/400 184-264.5 / 320-460 | Vac |
| AC Frequency | 50/60 | Hz |
| Grids Supported - Single Phase ; Three Phase ⁽¹⁾ | Single Phase: L / N / PE Three Phase: L1 / L 2 / L3 / N / PE | |
| Power Consumption (typ.) | 1.8 | W |
| COMMUNICATION | | |
| Supported Communication Interfaces | Modbus/ RS485 | |
| Response time | $\leq 1^{(2)}$ | sec |
| Default Device ID (Modbus) | 2 | |

(1) PE (Protective Earth) connection is not required for meter operation

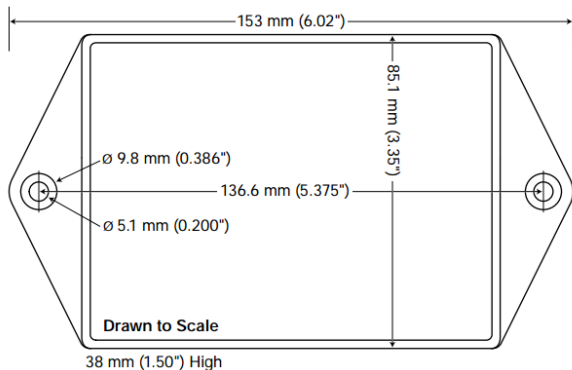
(2) When the meter is connected at the grid connection point, and when RS485 is used for multiple inverters

| ACCURACY (@ 25°C, PF:0.7- 1) ⁽¹⁾ | | |
|---|----------------------|---|
| 1% - 100% of Rated CT Current | ±1.0 | % |
| Hi-Accuracy / Revenue Generation | ANSI C12.20 Class .5 | |

⁽¹⁾Using ACT-0750 CT models

| STANDARD COMPLIANCE | | |
|------------------------------------|---|----|
| Safety | IEC 61010-1 | |
| Immunity | EN 61326, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-11 | |
| Emissions | EN 55022 Class B | |
| Export Limitation Schemes | Engineering Recommendation G100 Issue 1 Amendment 1 2017 by ENA London UK | |
| INSTALLATION SPECIFICATIONS | | |
| Dimensions (HxWxD) | 85 x 153 x 38 | mm |
| Weight | 310 | gm |
| Enclosure type | High impact, ABS and/or ABS/PC plastic UL 94V-0, IEC FV-0 | |
| Operating Temperature Range | -30 to + 55 | °C |
| Relative Humidity (noncondensing) | 5 - 90 | % |
| Protection Rating | Indoor (Outdoor when installed in an outdoor enclosure) | |
| Mounting Type | DIN rail / Surface mount | |
| Pollution degree | >2 (normally non-conductive; temporary conductivity due to condensation) | |

Mechanical specifications:

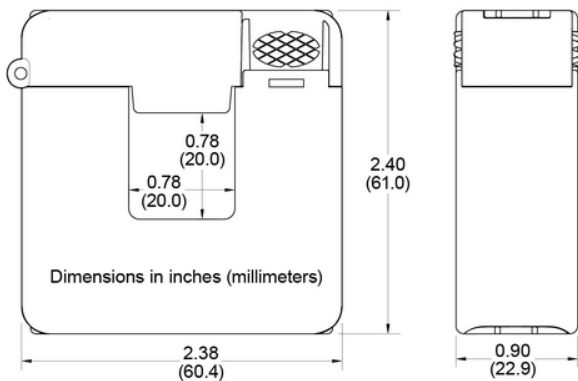


Current Transformers:

| CURRENT TRANSFORMER MODEL ⁽¹⁾ | RATED RMS CURRENT (A) | DIMENSIONS (INTERNAL/ EXTERNAL) (mm) |
|--|-----------------------|--------------------------------------|
| SE-ACT-0750-50 | 50 | 20 x 20 / 61 x 60.4 |
| SE-ACT-0750-100 | 100 | |
| SE-ACT-0750-250 | 250 | |
| SE-CTS-2000-1000 | 1000 | 50.8 x 50.8 / 121 x 127 |

Mechanical specifications:

(1) One current transformer per phase; for other ratings contact SolarEdge.



Appendix E: External Lightning Protection

Protection devices are most often installed from each data line to the local earth ground, and should be selected to begin conducting current at a voltage as close to the system's normal communication level as possible, but never lower. For RS485 communication lines, the selected voltage rating is typically 6-8 V. Transient suppressors should be installed as close as possible to the port that is being protected, and the user must provide an extremely low impedance connection to the local earth ground of the SolarEdge device. This ground connection is crucial for proper suppression device operation. The ground connection should be made using a heavy gauge wire and kept as short as possible. If the cable between the SolarEdge device and the protection device must be longer than 1m/3.3 ft., a copper strap or a braided cable intended for grounding purposes must be used for the protection device to be effective. In addition to the high frequency nature of transients, extremely high current may flow.

A protective device with surge discharge ratings of **In**: 10kA 8/20 μ s and **I_{max}**: 20kA 8/20 μ s is recommended.

For further information, see the *Overtoltage Surge Protection Technical Note*:

https://www.solaredge.com/sites/default/files/lightning_surge_protection.pdf

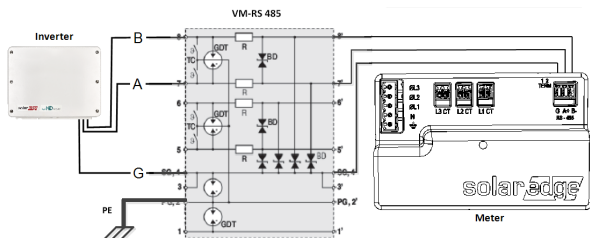


Figure 22: Protection connection

Support Contact Information

If you have technical problems concerning SolarEdge products, please contact us:



<https://www.solaredge.com/service/support>

Before contact, make sure to have the following information at hand:

- Model and serial number of the product in question.
- The error indicated on the product SetApp mobile application LCD screen or on the monitoring platform or by the LEDs, if there is such an indication.
- System configuration information, including the type and number of modules connected and the number and length of strings.
- The communication method to the SolarEdge server, if the site is connected.
- The product's software version as it appears in the ID status screen.

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