



Installation Guide

Revenue Grade Energy Meter with Modbus Connection

For North America

Version 1.0

Disclaimers

Important Notice

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The images contained in this document are for illustrative purposes only and may vary depending on product models.

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules.

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 1.0 (July 2019) - Initial release

Support and Contact Information

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

USA and Canada: 1 510 498 3200

Worldwide: +972 073 2403118

Fax: +1 (530) 273-2769

Email: ussupport@solaredge.com.

Support Center:

<https://www.solaredge.com/us/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 Revenue Grade Energy Meter with Modbus Connection 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 Revenue Grade Energy Meter with Modbus Connection software version as appears in the ID status screen.

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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.



AVERTISSEMENT!

Dénote un risque: il attire l'attention sur une opération qui, si elle n'est pas faite ou suivi correctement, pourrait causer des blessures ou un danger de mort. Ne pas dépasser une telle note avant que les conditions requises soient totalement comprises et accomplies.

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.

**ATTENTION!**

Dénote un risque: il attire l'attention sur une opération qui, si elle n'est pas faite ou suivi correctement, pourrait causer un dommage ou destruction de l'équipement. Ne pas dépasser une telle note avant que les conditions requises soient totalement comprises et accomplies.

**NOTE**

Denotes additional information about the current subject.

**IMPORTANT SAFETY FEATURE**

Denotes information about safety issues.

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 by the site.
- **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, or in the inverter (a built-in revenue grade meter), and measures the energy/power produced by the PV system or site.

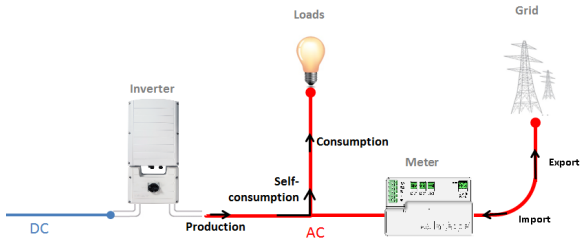


Figure 1: Terminology Illustration

Three-phase grid configuration types:

- **Wye:** In a Wye ("Y") configuration, all three phases are connected at a single neutral point. Wye systems utilize five wires - three hot, one neutral and one ground.
- **Delta:** In a Delta configuration, the three phases are connected in a triangle. Delta systems utilize four wires - three hot and one ground.

The SolarEdge Revenue Grade Energy Meter with Modbus Connection

The SolarEdge Revenue Grade Energy Meter with Modbus Connection (also referred to as “the meter”) enables measuring the power and energy of the photovoltaic (PV) system.

The following meter models are available:

SolarEdge Meter Model	Grid Type
SE-RGMTR-3D-208V-A	Delta
SE-RGMTR-3Y-208V-A	Wye
SE-RGMTR-3Y-480V-A	Wye

The meter is used by the inverter for the following applications:

- Production metering
- Consumption monitoring
- Export limitation
- Smart Energy on-grid applications

The meter requires *three Current Transformers (CTs)*. The CTs are available from SolarEdge.

The SolarEdge inverter or the Commercial Gateway (CCG) reads the exported/imported power from a meter installed at the grid connection point or reads the consumption from a meter installed at the load consumption point.

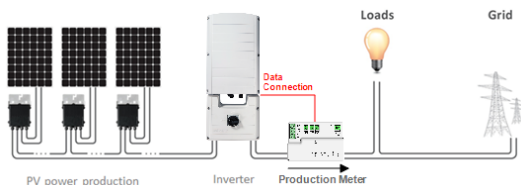


Figure 2: Typical installation with production meter

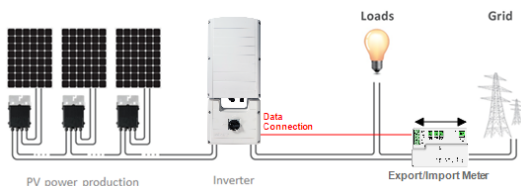


Figure 3: Typical installation with export/import meter

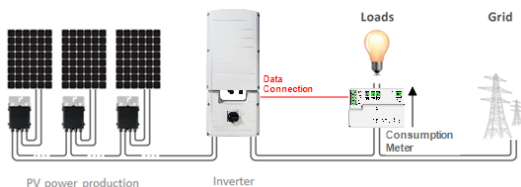


Figure 4: Typical installation with consumption meter

Meter Connection Options

In a *single* inverter system, the meter is connected directly to the inverter.

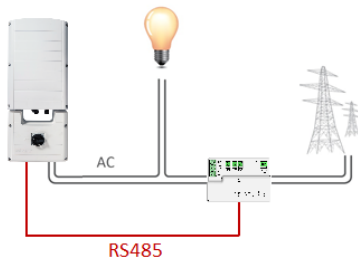


Figure 5: Single-inverter connection

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 CCG. The CCG's second RS485 port can be used to create an RS485 bus for communication between the inverters. This option is illustrated in *Figure 6*.

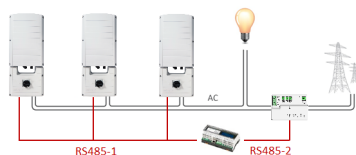


Figure 6: Multi-inverter connection with CCG and meter

Meter Interfaces

This section describes the SolarEdge meter's interfaces.

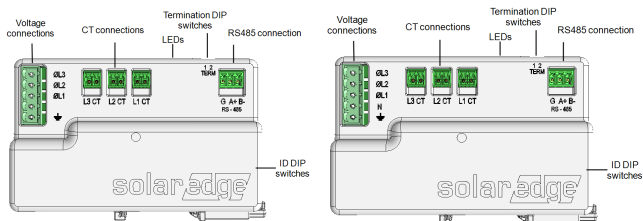


Figure 7: Delta (left) and Wye (right) Meter Interfaces

- **Voltage connections:** for connection to the grid
 - Delta: L1, L2, L3, Ground
 - Wye: L1, L2, L3, N, Ground
- **CT connections (L1 CT, L2 CT, L3 CT):** for connection to current transformers
- **RS485:** for connection to the inverter/gateway

- **LEDs:** used to monitor meter status.
- **ID DIP switches (ID 1, 2, 3):** used to set the Modbus address.
- **Termination DIP switches (TERM 1, 2):** used to set RS485 termination.

LEDs

The meter utilizes the LEDs at the top of the unit in order to indicate current status.

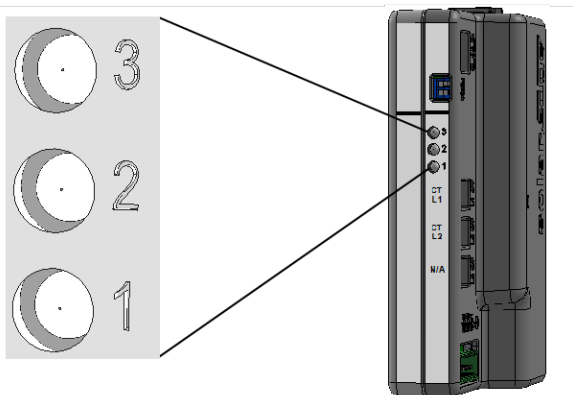


Figure 8: Meter LED

LED #	LED	Function	Indication
1	Bottom - green	Operational status	Flashing ON/OFF - normal operation
2	Middle - yellow	RS485 Modbus communication	Flashing ON/OFF - communication OK
3	Top - yellow	Energy management	Turns ON when the meter reads an energy change of ~1 kWh. Then turns OFF.

DIP Switches

ID DIP Switches

The ID DIP switches are used to set the Modbus address of the meter. The addressing options are listed in the table below. See the figure *ID and Termination DIP Switches* on page 18 for switch direction guidelines.

Modbus Address	ID 1	ID 2	ID 3
0	Down	Down	Down
1	Up	Down	Down
2	Down	Up	Down
3	Up	Up	Down
4	Down	Down	Up
5	Up	Down	Up
6	Down	Up	Up
7	Up	Up	Up

Termination DIP Switches

The Termination DIP switches are used to configure RS485 wiring termination. The termination options are listed in the table below. See the figure *ID and Termination DIP Switches* on page 18 for switch direction guidelines.

RS485 Termination	TERM 1	TERM 2
Terminated	Down	Down
Not Terminated (factory default)	Up	Up

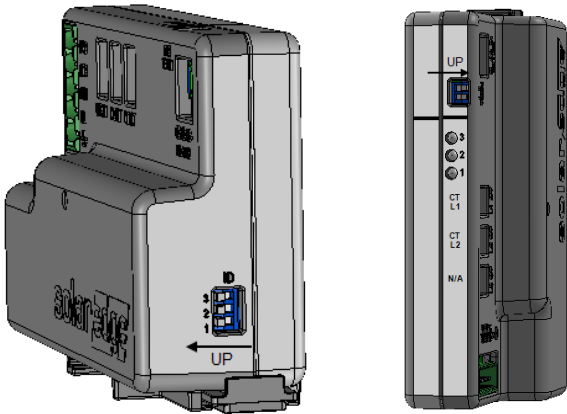


Figure 9: ID and Termination DIP Switches

Chapter 2: Meter Installation

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 68. If grounded metal conduit 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 all national and local electrical codes.

Installing and Connecting the Meter

Mount the slotted part of the meter on a DIN rail and secure it with the meter's fastening clip.

→ 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.

22 Installing and Connecting the Meter

→ To wire the meter:

The meter communicates with the inverter/Commercial Gateway over an RS485 connection. Wire the meter in accordance with the three-phase connection diagrams below.

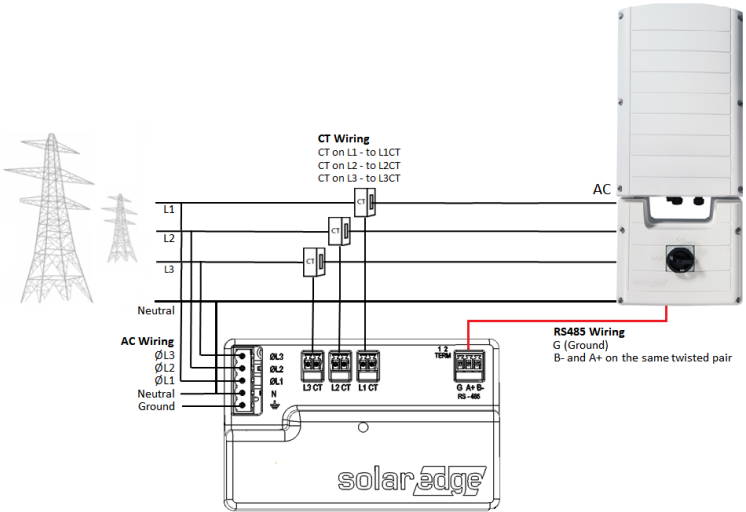


Figure 10: Three Phase Grid (Wye) - Production Meter Connections

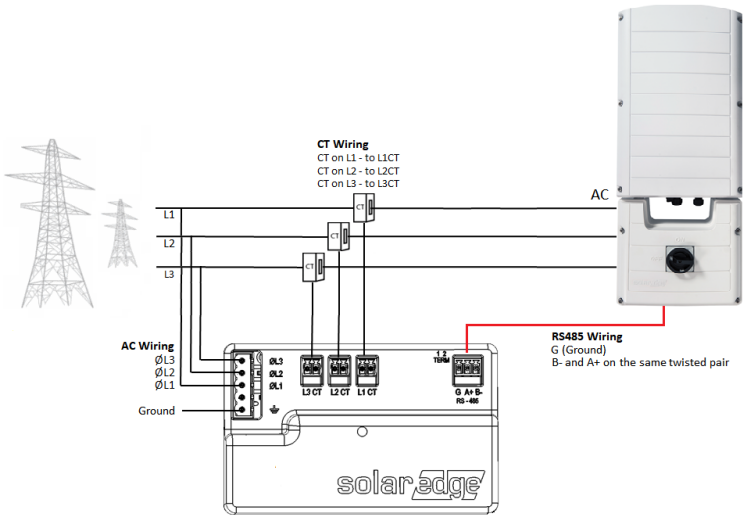


Figure 11: Three Phase Grid (Delta) - Production Meter Connections

NOTE

- Clamp the CT connected to **L1 CT** around the wire connected to **ØL1**.
- Clamp the CT connected to **L2 CT** around the wire connected to **ØL2**.
- Clamp the CT connected to **L3 CT** around the wire connected to **ØL3**.



1. Verify that power is OFF before making connections.
2. Connect the AC side wires (meter input) to the grid connectors on the meter.
3. Connect the CT wires to the three 2-pin terminals on the meter.
4. Connect the RS485 twisted pair cable to the 3-pin terminal on the meter:
 - a. Connect the wires to the A+ and B- terminals, and connect the shield to the G terminal.
5. Set the meter's DIP switches as follows. For general DIP switch guidelines, see "DIP Switches" on page 17
 - a. Set the termination DIP switches for **Termination**. Both switch 1 and switch 2 should be in the DOWN position.
 - b. Set the address DIP switches for **Modbus Address 1**:
Set switch 1 to UP, and set switches 2 and 3 to DOWN.

→ To connect the meter to the inverter or CCG:

1. 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.

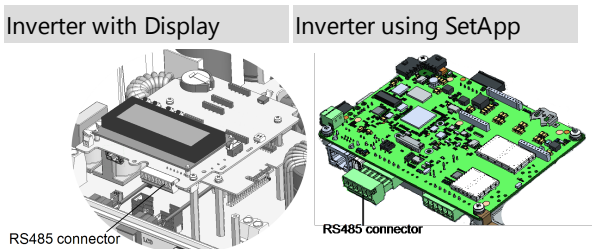


Figure 12: Inverter RS485 connectors

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

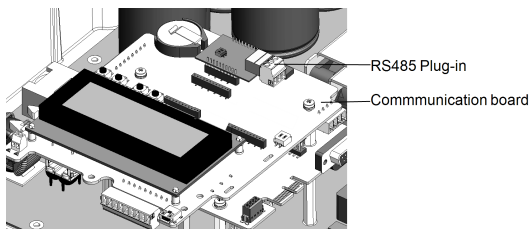


Figure 13: RS485 Plug-in on Single/Three Phase inverter

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

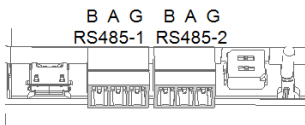


Figure 14: CCG RS485 connector

2. Connect the meter's RS485 G, A+, and B- connectors to the G, A, and B connectors in the inverter.
3. 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.
 - CCG - Terminate by switching the SW2 termination DIP-switch to ON.

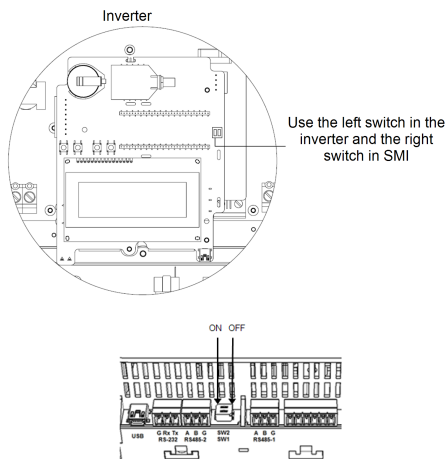


Figure 15: RS485 termination switch

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 4.2.xxx or later.

→ To check the inverter CPU version:

1. Verify that the inverter has been activated using the activation card supplied with the inverter.
2. To check the CPU firmware version, do one of the following:

- Devices using the SolarEdge SetApp mobile application: Select **Commissioning** → **Information**.

Information	
CPU Version	4.0000.0000
DSP1 Version	1.0210.1066
DSP2 Version	2.0052.0410
Serial Number	7F129A09-33
Hardware IDs	>
Error Log	>
Warning Log	>

- Devices with a display: Short press the LCD light button on the inverter until the screen below is displayed.
- 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/export_limitation_application_note_NA.pdf
- StorEdge Smart Energy Management off-grid applications - https://www.solaredge.com/files/pdfs/storedge_backup_installation_guide_NA.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/export_limitation_application_note_NA.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**. The RS485-x Meter n Menu appears.
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 **SolarEdge**.
 7. Select **Device ID** and enter the Modbus address corresponding to the ID DIP switch settings on the meter.
 8. Select **CT Rating** and enter the current transformer's rating in amperes.
 9. Select **Grid Topology** and select **WYE** or **Delta**, in accordance with grid and meter type requirements.
 10. If relevant, select **PT Scaling** and set the potential transformer ratio. The default value is 1.
- 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 section and view the current connection state.

Meters	
Export Meter	
RS485-2	Status
Modbus ID #1	OK
Power	Energy
7.60 kW	13.68 MWh

→ To configure the SolarEdge meter using the device display:

1. 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). 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** → **Multi Devices**. A screen similar to the following is displayed:

```
Device Type <MLT>
Meter 1 <SE, 1>
Meter 2 <--->
Meter 3 <--->
```

3. Select **Meter 1** → **Device Type** → **Revenue Meter**. A screen similar to the following is displayed:

```
Device Type <MTR>
Protocol <SE>
Device ID <1>
CT Rating <200>
Meter Func. <E+I>
Topology <Wye>
PT Scaling <1>
```

4. Configure the meter parameters as follows:

- Select **Protocol** → **SE**.
- Select **Device ID** and enter the Modbus address corresponding to the ID DIP switch settings on the meter.
- Select **CT Rating** and set the rating to the value that appears on the CT. If the displayed rating is 0 or you cannot change the value, it means that 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>.

■ **Topology:** Select **Wye** or **Delta**, in accordance with grid and meter type requirements.

■ If relevant, select **PT Scaling** and set the potential transformer ratio. The default value is 1.

5. Exit Setup mode.

NOTE

Calculated meter readings, such as self-consumption, are calculated using the data measured by the meter and the inverters.



Calculated meters are only sent when Energy Manager is enabled (for details refer to

https://www.solaredge.com/sites/default/files/export_limitation_application_note_NA.pdf).

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		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 the Meter* on page 45.
- **Power:** The exported or imported power
- **Energy:** The total energy read by the meter

Meters	
Production Meter	
SN: XXXXXXXX	
RS485-2	Status
Modbus ID #1	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 the Meter* on page 45.

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

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

Accessing the Meter Serial Number

Accessing the Meter Serial number using SetApp

→ To display the meter serial number using SetApp:

1. From the SetApp main menu, select **Information**.
2. On the Information page, select **Hardware IDs**. The meter serial number is found in the **RGM** field.

HW IDs	
This inverter	7F129A09-33
RGM 1	161901057
Battery 1	T16F0009749

Accessing the Meter Serial number using the Device Display

→ To display the meter serial number using the device display:

1. Enter Setup mode and select **Information**. The following screen is displayed:

```
V e r s i o n s  
E r r o r   L o g  
W a r n i n g   l o g  
H a r d w a r e   I D s
```

2. Select **Hardware IDs**. The following is displayed showing the ID of the inverter and any meter connected to it:

```
I D   5 0 0 0 F F F F 4 E  
R G M : 1 2 3 4 5 6 7 8
```

Appendix A: Troubleshooting the Meter

This appendix describes how to troubleshoot meter-related installation and performance issues.

- To troubleshoot the meter using SetApp, refer to *Troubleshooting the Meter using SetApp* on page 45.
- To troubleshoot the meter using the device display, refer to *Troubleshooting the Meter using the Device Display* on page 50.

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, the meter is not communicating with the inverter.

Communication		
LAN Connected	RS485-1 Modbus 2 of 2	RS485-2 SE Slave None
Cellular N/A	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

Check the following:

- The meter's RS485 address DIP switch settings. Refer to "DIP Switches" on page 17.
- The meter's Termination DIP switch settings. Refer to "Termination DIP Switches" on page 18.
- That the meter is configured as required in the chapter "Configuration" on page 28
- The RS485 wiring between the meter and the inverter/Commercial Gateway as specified in *To connect the meter to the inverter or CCG*: on page 24
- There are no loose connections at the inverter connectors and at the meter, specifically the RS485 wiring.
- 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 line to line voltage should be according to the meter's specifications.

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 inverter is producing 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 AC power cables pass through the CTs 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

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 SE (SolarEdge) 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** → **SolarEdge**.
3. Check that the meter's Modbus address specified in **Communication** → **RS485-x Conf** → **Device ID** corresponds to the meters' DIP switch settings. Refer to "DIP Switches" on page 17.

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:

- The meter's ID DIP switch settings. Refer to "DIP Switches" on page 17.
- The meter's Termination DIP switch settings. Refer to "Termination DIP Switches" on page 18.
- That the meter is configured as required in the chapter "Configuration" on page 28
- The RS485 wiring between the meter and the inverter/Commercial Gateway as specified in *To connect the meter to the inverter or CCG*: on page 24
- There are no loose connections at the inverter connectors and at the meter, specifically the RS485 wiring.

- 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 line to line voltage should be according to the meter's specifications.

<OK> is not displayed

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

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 RS485 wiring between the meter and the inverter/Commercial Gateway as specified in *To connect the meter to the inverter or CCG*: on page 24

- 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.

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 inverter is producing 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 AC power cables pass through the CTs 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.

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:

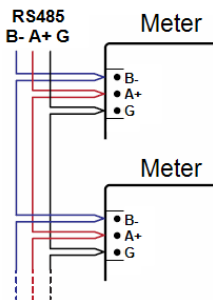


Figure 16: RS485 chain of meters

Connecting Two Meters

1. Connect the twisted pair wiring to the meters as shown in *Appendix B*.
2. Wire the RS485 connections between the meters and the inverter or Commercial Gateway.
3. Set the meters' 120 ohm termination DIP switches as

follows. For general DIP switch guidelines, see "DIP Switches" on page 17.

- a. For the meter closest to the inverter, the meter should be set for **No Termination**. Both switch 1 and switch 2 should be in the UP position.
 - b. For the meter furthest from the inverter, the meter should be set for **Termination**. Both switch 1 and switch 2 should be in DOWN position.
4. Set the meters' address DIP switches as follows. For general DIP switch guidelines, see "DIP Switches" on page 17.
- a. For one meter, set the address DIP switches for **Modbus Address 1**: Set switch 1 to UP, and set switches 2 and 3 to DOWN.
 - b. For the other meter, set the address DIP switches for **Modbus Address 2**: Set switch 1 to DOWN, set switch 2 to UP, and set switch 3 to DOWN.

Configuring the Dual-Meter Connection

- To configure the Dual-Meter connection using SetApp, refer to *Configuring Dual-Meter Connection Using SetApp* on page 57.
- To configure the Dual-Meter connection using the device display, refer to *Configuring Dual-Meter Connection using the Device Display* on page 59.

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.

- To configure the SolarEdge device using SetApp:
1. Verify that the meter at address 1 is configured as a production meter. From the SetApp main menu, select **Communication** → **RS485-x** → **Meter 1**
 2. Verify the value of the following parameters:

- **Meter Function** → **Inverter Production**
 - **Protocol** → **SolarEdge**
 - **Device ID** → **1**
3. Select **Meter 2** to configure the export/import meter in the following steps:
 4. Select **Meter Function**, and choose **Export+Import** from 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 **SolarEdge**.
 6. Set **Device ID** to the address 2 (the address should correspond to the DIP switch settings).

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 **Delta** or **WYE**, in accordance with grid and meter type requirements.
9. Select **PT Scaling** and set the potential transformer ratio.

Configuring Dual-Meter Connection using the Device Display

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

→ 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 <SE, 1>
Meter 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**. Verify that the meter at address 1 is configured as a production meter.
 - Select **Device Type** → **Revenue Meter**
 - Select **Protocol** → **SolarEdge**
 - Select **Device ID** → **1**
 - Set the CT rating to the value that appears on the CT: **CT Rating** → **<xxxxA>**. 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 or Delta**, in accordance with the grid and meter type requirements.
- Select **Meter 2** and configure its settings:
 - Select **Device Type** → **Revenue Meter**
 - Select **Protocol** → **SolarEdge**
 - Set **Device ID** → **2**
 - Set the CT rating to the value that appears on the CT: **CT Rating** → **<xxxxA>**. 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 or Delta**, in accordance with the grid and meter type requirements.

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 39

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:

```

wwwwww 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 .

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 45

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:

```

wwwvvv 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** → **SolarEdge**.
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 55.
- 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 *Troubleshooting the Meter* on page 45.

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:

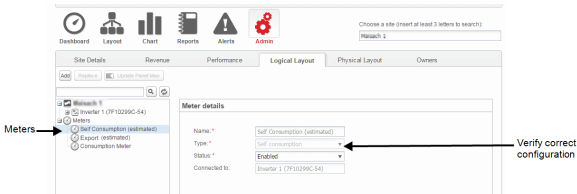


Figure 17: Setting the Meter details in the monitoring platform

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.

Export meter:

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

Consumption meter:

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

Appendix D: 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 *Overvoltage Surge Protection Technical Note*:

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

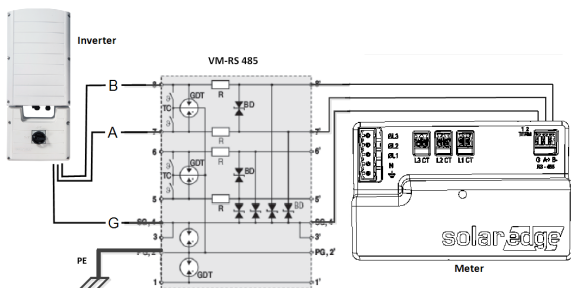


Figure 18: Protection connection

If you have technical queries concerning our products, please contact our support through the SolarEdge service portal:

www.solaredge.com/service/support

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