

# Application Note - Connecting a Revenue Grade Meter to SolarEdge Devices (North America)

This document describes how to connect a revenue grade meter (RGM) to a SolarEdge device (inverters or control & communication gateways), and how to configure the connection.

Single or three phase revenue grade meters<sup>1</sup> can be connected to the RS485 port of SolarEdge devices. The SolarEdge device reads the energy value from the energy meter and sends it to the SolarEdge monitoring portal.

To read the energy produced by multiple inverters, connect the RGM at the common AC connection point.

## Supported Revenue Grade Meters

The following models of WattNode<sup>®</sup> Revenue Modbus<sup>®</sup> RGMs are supported:

Model	Vac Line to Line	Supported Grids	Meter Neutral Required
RWNC-3Y-208-MB	208 / 240V	<ul style="list-style-type: none"> <li>Single Phase: 120/240V split phase</li> <li>Three Phase: 120/208V WYE</li> </ul>	Yes
RWNC-3Y-480-MB	480V	<ul style="list-style-type: none"> <li>Single Phase: 277V L-N</li> <li>Three Phase: 277/480V WYE</li> </ul>	Yes
RWNC-3D-240-MB	208 / 240V	<ul style="list-style-type: none"> <li>Single Phase: 208V L-L, 240V L-L, 120/240V split phase</li> <li>Three Phase: 208V Delta (delta grids are not supported by the SolarEdge three phase inverter), 120/208V WYE</li> </ul>	Configuration dependent. Refer to the meter manual.

For detailed information, refer to [http://www.ccontrols.com/w/WattNode\\_Modbus - Downloads](http://www.ccontrols.com/w/WattNode_Modbus - Downloads).



NOTE:

This meter requires compatible current transformers (CTs). The RGM is preconfigured to a specific CT rating that cannot be changed by the user.

## SolarEdge Device Firmware Version

To use the electricity meter connection, the inverter communication board firmware (CPU) must be:

- Version 2.055X or higher, if the CPU version is 2.0xxx
- Version 3.0600 or higher, if the CPU version is 3.0xxx

→ **To check the inverter CPU version:**

1. Verify that the inverter has been activated using the activation card supplied with the inverter.
2. Press the LCD light button short presses until the screen below is reached.

```
ID : # # # # # # # # # #
DSP 1 / 2 : x . x x x x / x . x x x x
CPU : 0 0 0 2 . 0 5 5 0
Country : X X X X X
```

3. SolarEdge devices with earlier firmware versions can be upgraded locally. Contact the SolarEdge support team to obtain the upgrade files and instructions. Refer to *Support and Contact Information* on page 7.

<sup>1</sup> The revenue grade meter is not supplied by SolarEdge and should be purchased separately.

Upgrading from CPU firmware versions earlier than 2.5xx requires setting of the SolarEdge device ID to 1, as follows:  
**Communication** → **RS485-X Conf** → **Device ID** → [Set to 1].

## Revenue Grade Meter Connection

→ **To connect the AC power to the revenue grade meter:**

For detailed information on how to connect the meter's AC side, refer to the meter installation manual:  
<http://www.ccontrols.com/ww/images/9/92/WNC-Modbus-Manual-V18.pdf>

→ **To connect a communication cable to the revenue grade meter:**

It is recommended to use a two-wire shielded twisted pair cable for this connection.

For outdoor distances longer than 35 ft/10m, always use a shielded twisted-pair cable to prevent interference. When using a shielded cable, connect the shield to earth ground at one end. It is also recommended to use an external lightning protection device on the RS485 communication cable. Refer to Appendix A for connection example and recommendation.

1. Loosen the screws of pins **RS485 A-**, **RS485 B+** and **RS485 C**, shown below.

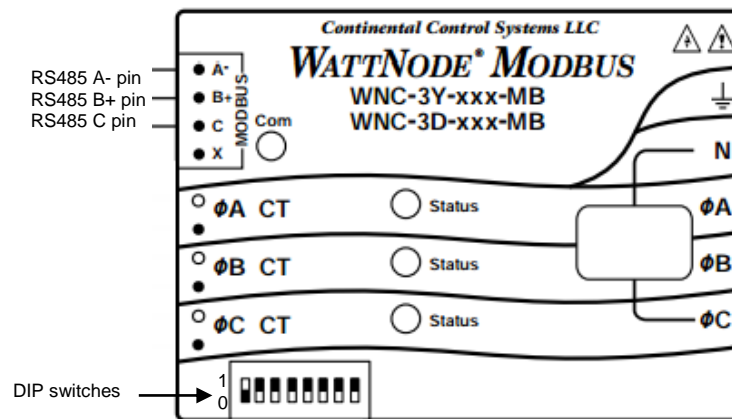


Figure 1: WattNode Modbus communication terminal block connection

2. Connect the twisted pair to the **A-** and **B+** terminals, and connect the shield to the **C** (common) terminal. The **X** terminal is usually not used.
3. Tighten the terminal screws.
4. Check that the WattNode RGM Modbus address is set to 1 and the Baud Rate is set to 9600bps: DIP switch 1 (left switch) is set to 1 and all other DIP switches are set to 0 – as shown above.
5. Connect the other end of the cable to the SolarEdge device as detailed below.

→ **To connect a revenue grade meter to an inverter:**



**NOTE:**

When connecting a revenue grade meter to an inverter's RS485 port, an RS485 master-slave inverter configuration is not possible.

1. Shut down the inverter by turning OFF the inverter ON/OFF switch.
2. Turn OFF the Safety Switch and the AC switch of the main circuit board.
3. Open the inverter cover.
4. Remove the seal from one of the openings in communication gland #2 at the bottom of the inverter and insert the wire through the opening.

5. Pull out the 9-pin RS485/RS232 terminal block connector located on the inverter communication board, as shown below:

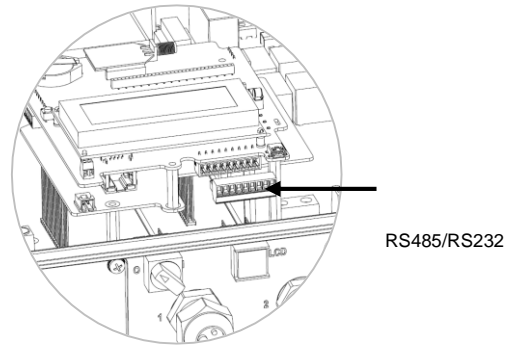


Figure 2: The RS485/RS232 terminal block

6. Loosen the screws of pins **B**, **A** and **G** of the RS485-1 port, as shown in Figure 3 below:

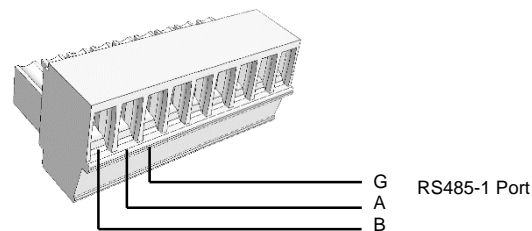


Figure 3: RS485/RS232 terminal block

7. Insert the wire ends from the meter into the **A**, **B** and **G** pins shown above:
- Connect the wire from **RS485 B+** in the revenue grade meter to pin **A**.
  - Connect the wire from **RS485 A-** in the revenue grade meter to pin **B**.
  - Connect the wire from **RS485 C** in the revenue grade meter to pin **G**.
8. Tighten the terminal block screws.
9. Push the RS485 terminal block firmly all the way into the communication board.
10. Terminate the inverter by switching a termination DIP-switch inside the inverter to ON. The switch is located on the communication board and is marked **SW7**.

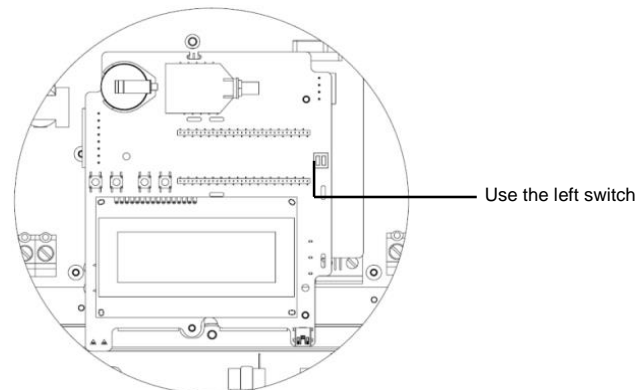


Figure 4: RS485 Termination switch

→ To connect a revenue grade meter to a Control and Communication Gateway:

1. Pull out the 3-pin RS485-2 terminal block connector.

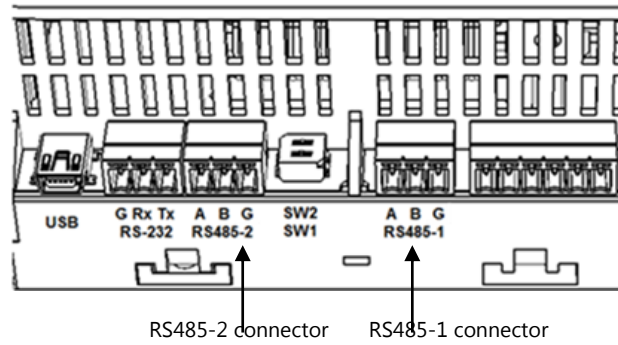


Figure 5: Gateway RS485 connections

2. Loosen the screws of terminals **A**, **B** and **G**.
3. Insert the wire ends from the meter into the **A**, **B** and **G** pins shown above.
  - Connect the wire from **RS485 B+** in the revenue grade meter to pin **A**.
  - Connect the wire from **RS485 A-** in the revenue grade meter to pin **B**.
  - Connect the wire from **RS485 C** in the revenue grade meter to pin **G**.
4. Tighten the terminal block screws.
5. Push the RS485 terminal block firmly all the way into its port.
6. Terminate the gateway by switching the SW2 termination DIP-switch to ON.

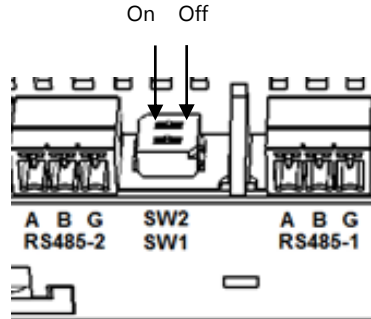


Figure 6: Gateway termination switches

## SolarEdge Device Configuration

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

These buttons can also be used to type in a number.

1. Verify that the inverter ON/OFF switch is OFF.
2. Turn ON the Safety Switch and the AC switch of the main circuit board.



**WARNING!**

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

*RISQUE D'ÉLECTROCUTION, ne touchez pas les fils non isolés lorsque le couvercle de l'onduleur est retiré*

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**.

6. Set the following (X represents the actual RS485 port to which the revenue grade meter is connected: 1 or 2):

```

Device type < MTR >
Device Protocol < W N >
CT Rating < X X X X A >
Meter Func. < none >
Device ID < 1 >
    
```

- Select **Device Type** → *Revenue Meter*.
- Select **Protocol** → *WattNode*
- Select Meter Func. → [Select Feed-in + Purchased , Consumption or Production according to meter location]
- In the RS485 Conf menu, verify that the **Device ID** Is set to 1 and exit Setup mode.

7. If your device is connected to the SolarEdge server, you can show the meter’s readings in the monitoring portal. Verify that that the meter type is set to **Production** in the **Admin** page > **Logical Layout** > **Meter details**:

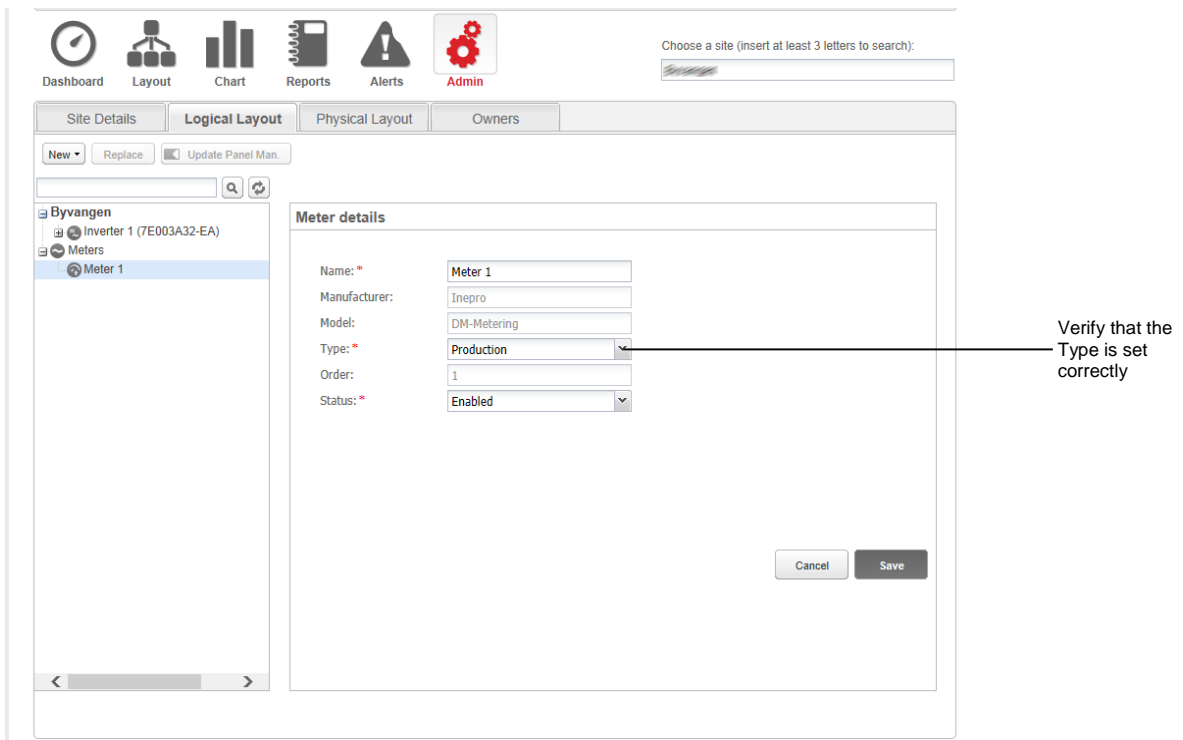


Figure 7: Setting the Meter details in the monitoring portal

## Verifying the Connection

1. Press the **Enter** button or the LCD external button until the Communication Ports 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 external revenue grade meter.

For example, if the revenue grade meter is connected to the RS485-1 port, a message similar to the following should appear in the Communication status screen on the LCD panel:

```

      D e v   P r o t   # #
R S 4 8 5 - 1 < M T R > < W N > < 1 >
R S 4 8 5 - 2 < - - - > < - - - > < - - - >
Z i g B e e   < - - - > < - - - > < - - - >

```

**Dev** : the type of device configured to a specific port. **MTR** indicates a revenue grade meter.

**Prot**: the communication protocol. **WN** indicates the meter was selected (WattNode).

**##** = 1: Indicates that the connection to the revenue grade meter is successful.

3. Check the Energy status screen, showing the Total (Wh) energy reading:

```

R e v e n u e   G r a d e   M e t e r
S t a t u s :   < O K >
< E r r o r   M e s s a g e >
T o t a l [ W h ] : X X X X X X X

```

**Status**: Displays OK if the meter is communicating with the communication board and the meter readings are valid, that is, the meter energy count is aligned with the internal energy count of the inverter.

**<Error message>**: If an internal RGM error occurs, it will be displayed here.

**Total (Wh)**: The energy production as read by the RGM. If the SolarEdge device is connected to the SolarEdge server this value will also be displayed in the monitoring portal.

## Troubleshooting

- If **##**  $\neq$  1 in the Communication status screen shown above:
  - Check the RGM physical RS485 Modbus address and baud rate DIP switch setting.
  - Check the cable connection between the inverter and RGM.
  - Check that the RS485 termination resistor on the SolarEdge is turned ON.
  - Check that the Device ID under **Communication** → **RS485-X Conf** → **Device ID** is set to **1**.
- If an internal RGM error occurs, it will be displayed in the Energy status screen shown above. In this case, contact SolarEdge support.

## Appendix A – External Lightning Protection Connection

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 3.5ft/1m, 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 8/20µs and **I<sub>max</sub>**: 20kA 8/20µs is recommended.

Various lightning protection devices are available for RS485 communication lines.

The diagram below shows a connection example using the ISKRA ZAŠČITE **VM-RS 485** data protocol protection device. A detailed datasheet can be found at: <http://www.iskrazascite.si/en/data-signal-systems/data-protocols/item/56-vm-rs>.

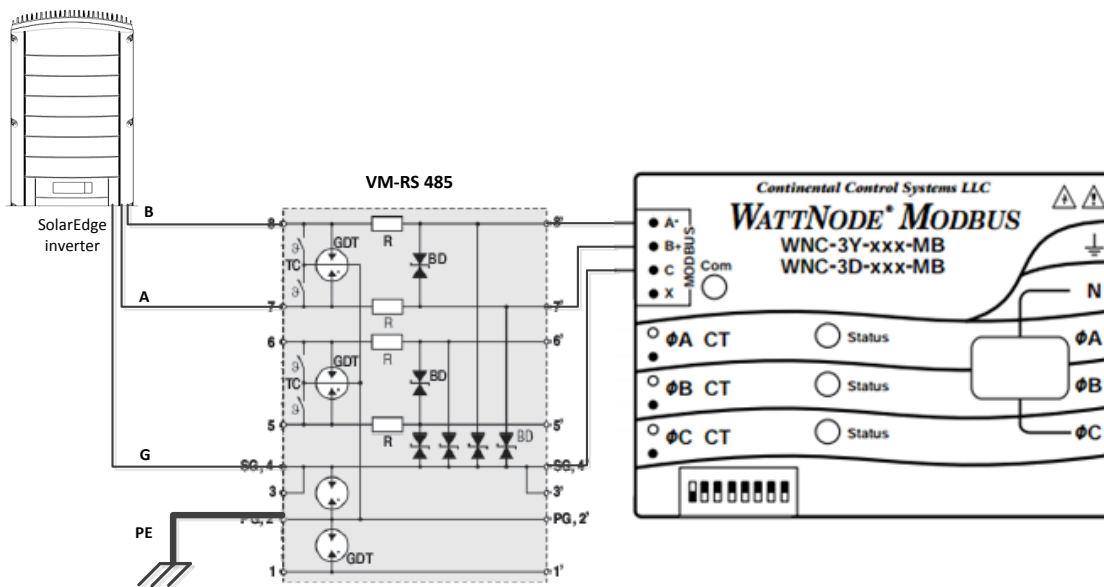


Figure 8: Protection connection

## Support and Contact Information

If you have technical queries concerning our products, please contact us:

US & Canada	1 877 360 5292	<a href="mailto:ussupport@solaredge.com">ussupport@solaredge.com</a>
Worldwide	+972 73 240-3118	<a href="mailto:support@solaredge.com">support@solaredge.com</a>
Fax	+972 73 240-3117	