solar**edge**

Application Note - Connecting an Electricity Meter to SolarEdge Devices (Europe and APAC)

This document describes how to connect a Modbus meter to a SolarEdge device (inverters, Safety & Monitoring Interfaces (SMIs) or Control & Communication Gateways) and how to configure the connection.

Single or three phase meters 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 platform.

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

Contents

Supported Electricity Meters

SolarEdge supports the following electricity meters:

Inepro® Metering PRO Smart and Standard Series

This meter type can be used for production, consumption, import and export monitoring, and for export limitation, from Inepro V1.18 and above. This meter cannot be used in combination with StorEdge or with Device Control systems.

Models:

- **PRO1 MODBUS** – MID approved single phase electricity meter. For detailed information refer to http://ineprometering.com/images/pdf/manuals/new//PRO1-user-manual.pdf
- **PRO380 MODBUS** – MID approved three phase electricity meter. For detailed information refer to http://ineprometering.com/images/pdf/manuals/new//PRO380-user-manual.pdf

WattNode® Revenue Modbus®

This meter is a bidirectional meter (measures both forward and backward power) that can be used for production, consumption, import and export monitoring, and for export limitation. It can be used for Smart Energy Management: export limitation, Device Control and StorEdge.

Model: **SE-WNC-3Y-400-MB-K1**

For detailed information, refer to http://www.solaredge.com/files/pdfs/products/se_electricity_meter.pdf and to http://www.ccontrolsys.com/w/WattNode_Modbus_-_Downloads.

SolarEdge Device Firmware Version

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

- With Inepro meters: 3.2016 or higher
- With WattNode meters:
  - Version 2.0700 or higher, if the CPU version is 2.0xxx
  - Version 3.0700 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.

```
I D :   # # # # # # # #   # #
D S P 1 / 2 : 1 . 0 2 1 0 / 1 . 0 0 3 4
C P U : 0 0 0 3 . 1 9 x x
C o u n t r y : E S P
```

3. SolarEdge devices with earlier firmware versions can be upgraded locally. Contact the SolarEdge Support team to obtain the upgrade files and instructions.

Electricity Meter Connection

Power Connection

► To connect the electricity meter to the AC power:

For detailed information on how to connect the meter's AC side, refer to the installation guide provided with the meter.

> **NOTE**
>
> When the meter is located at the grid connection point or the load consumption point, make sure that the CTs (Current Transformers) are installed with its arrow pointing towards the grid. If the meters are intended for inverter production reading only, the CTs should be installed with the arrow pointing towards the inverter.

RS485 Communication Connection

RS485 wiring specifications:

- Cable type: Min. 3-wire shielded twisted pair (a shielded Ethernet cable (Cat5/5E STP) may be used))
- Wire cross-section area: 0.2- 1 mm²/ 24-18 AWG (a CAT5 cable may be used)
- Maximum nodes: 32
- Maximum distance between first and last devices: 1 km /3300 ft.

> **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: http://www.solaredge.com/files/pdfs/lightning_surge_protection.pdf.

▶ **To connect a communication cable to the electricity meter – Inepro:**
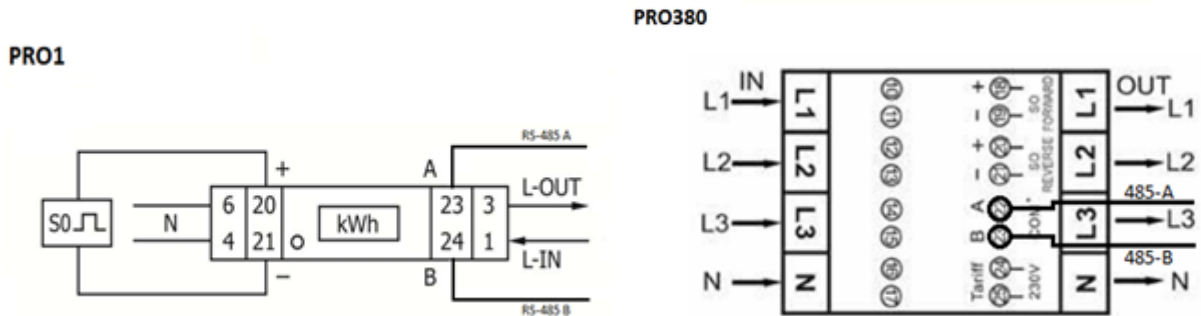
1. Loosen the screws of pins 485A and 485B shown below:

Figure 1: PRO1 and PRO380 pin connection

2. Insert the wire ends into the 485A and 485B pins.
3. Tighten the terminal screws.
4. Connect the other end of the cable to the SolarEdge device as detailed in *Connection to a SolarEdge Device* on page 4.
5. For each meter - perform commissioning separately when only one meter is connected on the RS485 bus. Refer to *perform first-time commissioning for the SolarEdge device using InePRO meters:* on page 7.

▶ **To connect a communication cable to the electricity meter – SolarEdge (WattNode):**

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.

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

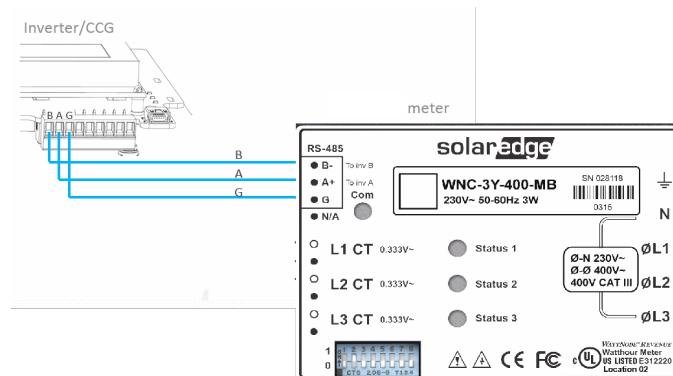

Figure 2: WattNode Modbus communication terminal block connection

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 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.

Connection to a SolarEdge Device

### ► To connect an electricity meter to an inverter or an SMI:

NOTE

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

1. Shut down the SolarEdge device by turning OFF the device ON/OFF switch.
2. Turn OFF the Safety Switch (if applicable) and the AC switch of the main circuit board.
3. Open the inverter/SMI cover.
4. Remove the seal from one of the openings in communication gland #2 at the bottom of the inverter/SMI and insert the wire through the opening.
5. Pull out the 9-pin RS485 terminal block connector located on the device's communication board, as shown below:

RS485 connector
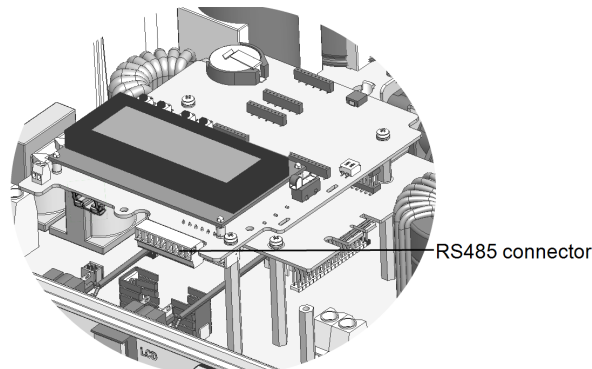
Figure 3: The RS485 terminal block

6. Loosen the screws of pins A and B of the RS485 port, as shown below:
   - Inverter: use the RS485-1 port
   - SMI: use the RS485-2 port

RS485-1 (Data-) B
(Data+) A
G

(Data-) B
RS485-2 (Data+) A
G
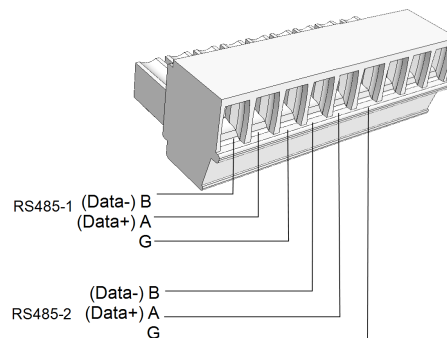
Figure 4: RS485 terminal block

7. Insert the wire ends from the meter into the pins shown above:
   - For Inepro meter:
     - Connect the wire from RS485 A in the meter to pin A.
     - Connect the wire from RS485 B in the meter to pin B.
   - For WattNode meter:
     - Connect the wire from RS485 B+ in the meter to pin A.
     - Connect the wire from RS485 A- in the meter to pin B.
     - Connect the wire from RS485 C in the 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/SMI by switching a termination DIP-switch inside the inverter to ON. The switch is located on the communication board and is marked SW7.

Inverter

Use the left switch in the inverter and the right switch in SMI
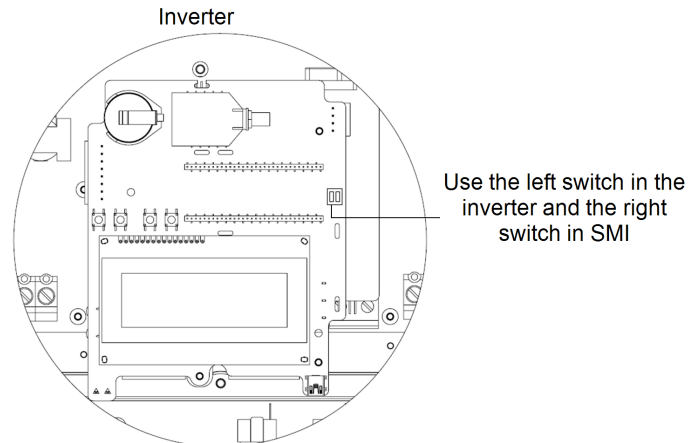
Figure 5: RS485 termination switch

▶ To connect an electricity meter to a Control and Communication Gateway:

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

RS485-2 connector   RS485-1 connector
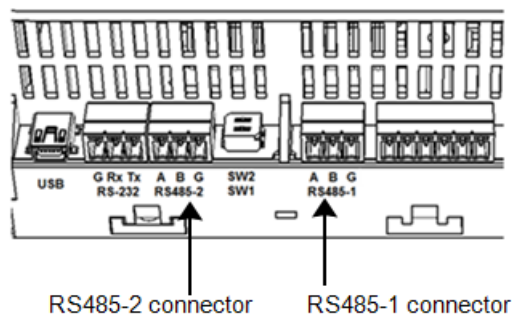
Figure 6: Gateway RS485 connections

2. Loosen the screws of terminals A, B and G.

3. Insert the wire ends from the meter into the A and B pins shown above:

    - For Inepro meter:
        - Connect the wire from RS485 A in the meter to pin A.
        - Connect the wire from RS485 B in the meter to pin B.
    - For WattNode meter:
        - Connect the wire from RS485 B+ in the meter to pin A.
        - Connect the wire from RS485 A- in the meter to pin B.
        - Connect the wire from RS485 C in the meter to pin G.

4. Tighten the terminal block screws.

5. Push the RS485 terminal block firmly all the way into its port.

Figure 7: Gateway termination switches

6. Terminate the gateway by switching the SW2 termination DIP-switch to ON.

SolarEdge Device Configuration

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

- Export Limitation - http://www.solaredge.com/files/pdfs/products/feed-in_limitation_application_note.pdf
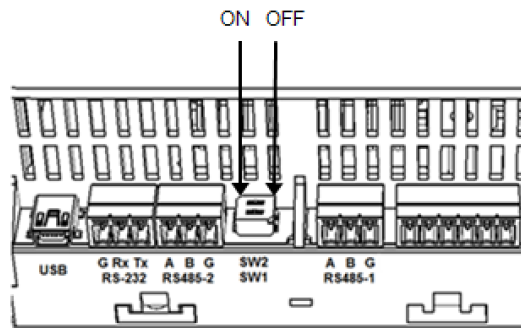- Consumption and Production Monitoring - http://www.solaredge.com/files/pdfs/products/consumption_ production_monitoring_application_note.pdf
- StorEdge Smart Energy Management on-grid applications - http://www.solaredge.com/files/pdfs/storedge_ interface_installation_guide.pdf

For configuring two connected meters refer to .

▶ **To configure the SolarEdge device:**

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 inverter 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 CCG). The following screen is displayed:

```
Device Type <SE>
Protocol <M>
Device ID <1>
Slave Detect <#>
Slave List <#>
```

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

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

7. Select **Revenue Meter**, the following screen is displayed:

```
Device Type <MTR>
Protocol <WN>
Device ID <1>
CT Rating <0>
Meter Func. <None>
```

8. Configure the meter parameters as follows:

   - Select **Protocol → WattNode**.
   - Select **Device ID: 2**
   - 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
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.
   - **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>.

9. 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 http://www.solaredge.com/files/pdfs/products/feed-in_limitation_application_note.pdf).

▶ **To perform first-time commissioning for the SolarEdge device using InePRO meters:**

NOTE

Perform this one-time procedure when only one InePRO meter is connected in the RS485 bus. Each meter should be commissioned separately.

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/OK** (3): Used to select an option

1. Verify that the InePRO meter firmware is V1.18 and above by checking the meter LCD screen.
2. Verify that the SolarEdge device ON/OFF switch is OFF.

WARNING!

ELECTRICAL SHOCK HAZARD. Do not touch uninsulated wires when the inverter 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 CCG). The following screen is displayed:

```
Device Type <SE>
Protocol <M>
Device ID <1>
Slave Detect <#>
Slave List <#>
```

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

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

7. Select **Multi Devices**. The following is displayed:

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

8. Select **Meter 1 ➜ Device Type ➜ Revenue Meter**.The following is displayed:

```
Device Type <MTR>
Protocol <PR1>
Device ID <1>
Meter Func. <None>
Meter Commission
```

9. Select **Protocol ➜ PRO1/PRO380-MOD**

10. Select **Meter Commission**. The following is displayed:

```
Set Serial Conf
Set Meter ID
```

11. Select **Set Serial Conf** to set the meter parity to none

12. Select **Set Meter ID** and set the meter ID address (1 or 2) in case of installing two meters.

▶ **To configure the SolarEdge device for using InePRO meters:**

1. Enter Setup mode.

2. Select:

    - **Communication ➜ RS485-X Conf**
    - **Device Type ➜ Multi Devices**
    - **Meter #** (1/2/3) **➜ Device Type ➜ Revenue Meter**
    - Protocol **➜ PRO1/PRO380-MOD**

3. Configure the meter parameters as follows:

    - **Device ID**: Has to be the same as the meter device ID set in the commissioning (see above). The default is 1. If changing - perform commissioning as described above.

    - **Meter Func.** :Select one of the functionality options, according to the installed meter specifications and location.

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

      ○ **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.

○ **Production**: The meter is installed at the inverter output and reads the energy produced by the inverter.

○ **Ext. Production**: Used for export limitation with 3rd party generator and for AC coupling with non-SolarEdge inverters.

○ **None**: No reading

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

► **To verify meter connection:**

1. Press the Enter button or the LCD external button 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 configured to this port. **MTR** indicates a meter.

Prot: the communication protocol

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

3. Press the Enter button or the LCD external button until reaching the meter status screen showing the total energy [Wh]. 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 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 10.

Total [Wh]: Displays the accumulated lifetime energy of the meter.

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

► **To display the meter serial number:**

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

```
Versions
Error Log
Warning log
Hardware IDs
```

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

```
ID 5000FFFF4E
RGM:12345678
```

Appendix A: Troubleshooting Meter Connection

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

For troubleshooting dual-meter connection, refer to *Installing Two Meters* on page 12.

Communication Status Screen Troubleshooting

The communication status screen should display the following:

```
          Dev  Prot  ##
RS485-1<MTR><WN><  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**.

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 physical RS485 Modbus address and baud rate DIP switch setting: The second DIP-switch from the left is in 1 position; the rest are in 0 position.
- The meter configuration is as described above.
- 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 terminal block . The L1 – L2 line to line voltage should be 400 Vac ± 20% for three-phase; 230V from L to N +/- 20% for single-phase.

Meter Status Screen Troubleshooting

```
Production  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 white dot.
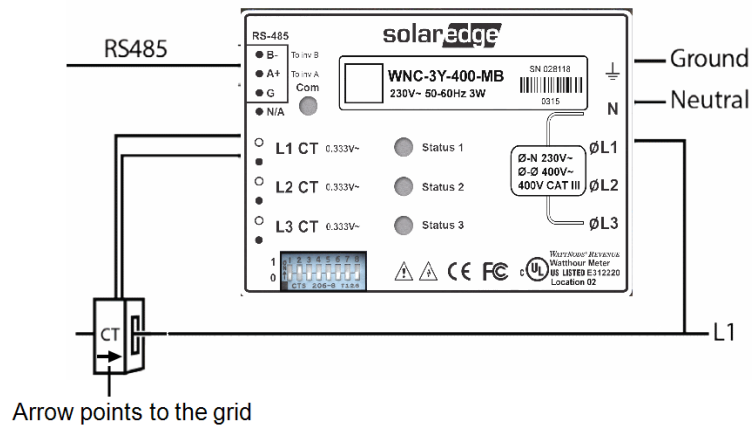 - Black CT wire is connected to the L1/L2 black dot.

Figure 8: Meter Connection diagram

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:
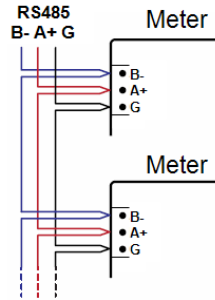

Figure 9: RS485 chain of meters

Connecting Two Meters

1. Connect the twisted pair of wires to the meters as shown in *Figure 10*.
2. Connect the meters to the inverter or CCG RS485 connector as illustrated below.
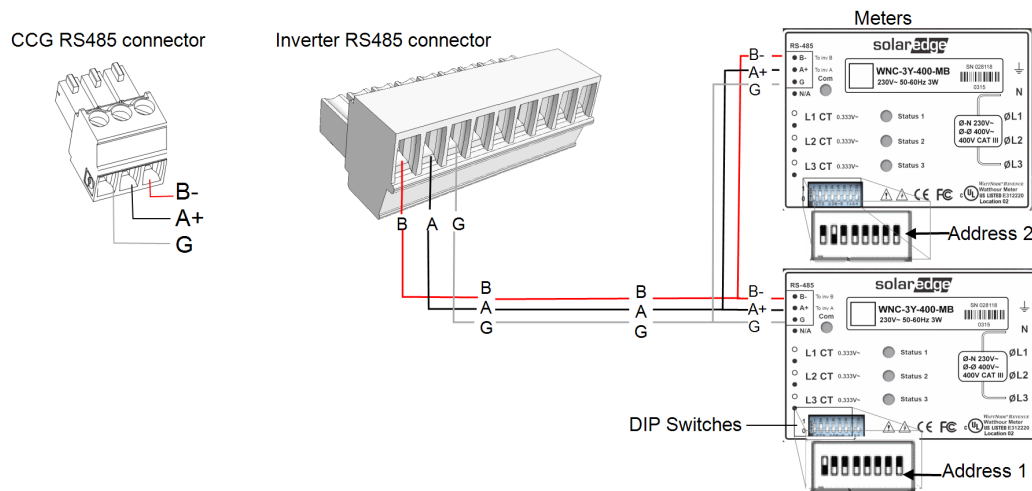
Figure 10: Meters connection to the inverter or CCG RS485 connector

3. Set one of the meter's DIP switches as follows:
   a. Switch 2: Set to 1 (UP)
   b. Switch 7: Set to 1 (UP), if 120 ohm termination is required. Otherwise, set to 0 (DOWN)
   c. Set all other switches to 0 (DOWN)
4. Set the other meter's DIP switches as follows:
   a. Switch 1: Set to 1 (UP)
   b. Switch 7: Set to 1 (UP), if 120 ohm termination is required. Otherwise, set to 0 (DOWN)
   c. Set all other switches to 0 (DOWN)
5. Set the baud rate of the meters to 9600 bps.
6. Terminate the SolarEdge device as described in *Electricity Meter Connection* on page 2.

Configuring Dual-meter Connection

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

   The following screen is displayed:

   ```
   D e v i c e   T y p e   < S E >
   P r o t o c o l   < M >
   D e v i c e   I D   < 1 >
   S l a v e   D e t e c t   < # >
   S l a v e   L i s t   < # >
   ```

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

   ```
   S o l a r E d g e   < M >
   N o n - S E   L o g g e r   < S >
   M u l t i   D e v i c e s   < M >
   N o n e
   ```

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

   ```
   D e v i c e   T y p e   < M L T >
   M e t e r   1   < W N , 1 >
   M e t e r   2   < - - - >
   M e t e r   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:

     ```
     D e v i c e   T y p e   < M T R >
     P r o t o c o l   < W N >
     D e v i c e   I D   < 2 >
     C T   R a t i n g   < 0 >
     M e t e r   F u n c .   < N o n e >
     ```

     ○ Select **Device Type ➔ Revenue Meter**.
     ○ Select **Protocol ➔ WattNode**.
     ○ Set **Device ID➔ 1**.
     ○ 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.➔ Consumption**.

   - Select **Meter 2** and configure its settings:

     ○ Select **Device Type ➔ Revenue Meter**
     ○ Select **Protocol ➔ WattNode**
     ○ Verify that **Device ID: 2**
     ○ Set **CT Rating➔ <xxxxA>**
     ○ Select **Meter Func.➔ Export+Import**

Verifying Meter Connection

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:

   ```
             D e v   P r o t   # #
   R S 4 8 5 - 1 < M L T > < 0 2 > < 0 2 >
   R S 4 8 5 - 2 < - - - > < - - > < - - >
     Z i g B e e   < - - - > < - - > < - - >
   ```

   Dev: The type of device configured to this port. **MLT** indicates multiple meters.

   Prot: The number of configured meters.

: 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]:XXXXXX
```

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 10.

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

Communication Status Screen Troubleshooting

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

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

Device Type or Protocol are configured incorrectly

If **MLT** (Multi) is not displayed as the device type (DEV), or **2** is not displayed as the number of meters under Prot (protocol), 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. ➔ 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 and baud rate DIP switch settings: For meter with address 1 - its first DIP-switch from the left is in 1 position; the rest are in 0 position; for the meter with address 2 - its second from the left DIP-switch is in 2 position and the rest are 0.
- 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 10.

Appendix C: 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 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 8/20μs and **Imax**: 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://iskrazascite.si/uploads/datasheet/1396000869.pdf.
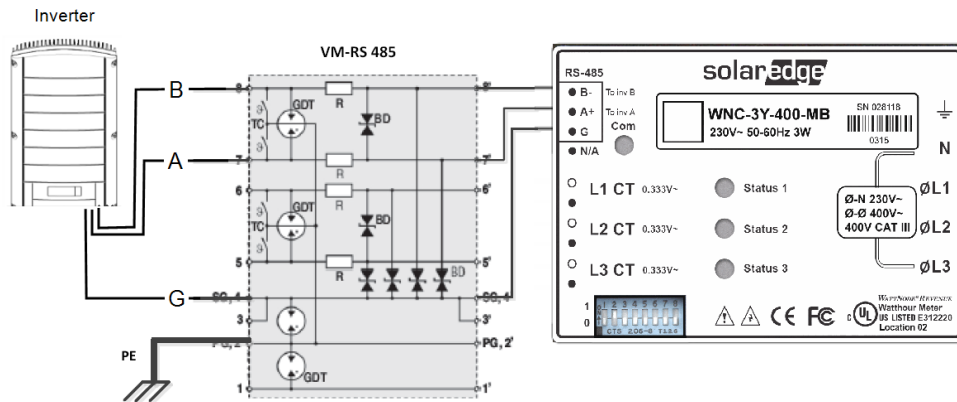

Figure 11: Protection connection