RS485 Communications Troubleshooting Guide - NAM

Revision History

- Version 2.0, December 2023: Content update

Contents

WARNING

The following troubleshooting steps require you to work inside the inverter. Never install any wiring or any hardware while the AC power is connected to the inverter. Failure to disconnect AC power can result in injury or death. Never open the inverter if it is raining, or expose the inverter to moisture. Always follow your company's safety protocols when working inside the inverter.

Safety Precautions

For safety purposes, perform the following steps before removing any covers:

1. Turn off the inverter by moving the P/1/0 switch to the **0** (**OFF**) position and wait for V_{DC} on the inverter to drop below 50V.

   To verify that V_{DC} has dropped below 50V:

   - **Inverters via SetApp**: Connect to SetApp>Inverter's **Status** page>DC voltage field

   - **Inverters with an LCD screen**: A message is displayed letting you know that V_{DC} is lowering and not to disconnect. Once V_{DC} drops below 50V the message no longer appears.

NOTE

(NAM only): If the DC does not reach a safe level, turn off the DC Disconnect (DCD) switch and measure the voltage with a voltmeter.

2. (NAM only): Turn the DCD switch to the **OFF** position.

3. Turn off the AC circuit breaker.

CAUTION

If the Inverter's AC circuit breaker trips on-site, do not power on the AC circuit breaker before investigating the inverter for any internal damage, such as debris or thermal damage. If any damage is found, take photos and contact SolarEdge Technical Support.

Overview

RS485 is a communication method that allows SolarEdge devices to communicate with each other with a three-twisted pair wire (+/-/G) connection. This allows for one device to handle the communications to the SolarEdge Monitoring Server, for up to a total of 32 devices with a maximum round trip wiring run of 1000 meters.

The SolarEdge device that handles the connection to the SolarEdge Monitoring Server is considered the leader, while the inverter wires connected to it are considered followers. The followers are connected in daisy chain using RS485 to the leader. The leader can be connected using RS485 to a gateway. Additionally, RS485 is used for common communication with other devices, such as power meters, and can be used during power outages, export limitations, and more.
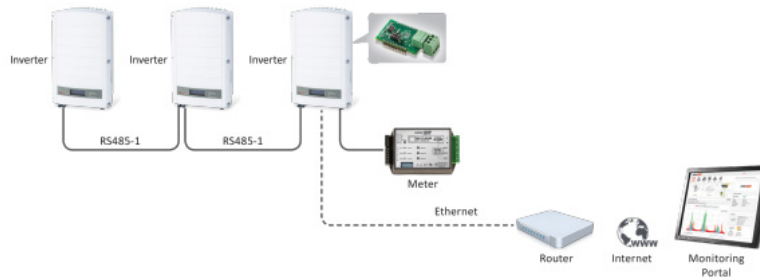
> **NOTE**
> This communications type is only supported for SolarEdge devices such as inverters, the communications gateway, and SolarEdge EV chargers. For batteries, backup interface, and other Modbus-enabled devices, see the device's respective installation manual.

> **NOTE**
> Older CPU firmware versions may use outdated terminology. On older CPU firmware versions, **Master = Leader**, and **Slave = Follower**. This guide uses the updated terms of leader and follower.

Installation

1. Power down the devices you are working on before opening any covers or working with any wiring.
   - **Inverter:** See [Safety Precautions](#).
   - **Battery:** Once the inverter has been powered down, turn off any battery toggle switches and breakers
   - **Other Devices (Meter/EV Charger/etc.):** Power off the device's AC circuit breaker or remove the AC power plug depending on the type of device.
2. Using three twisted pair wires, connect one wire to each of **B (+)**, **A (-)**, and **G** on the lead device
   - **Recommendation:** Take note of the color of the sleeves of the wires connected to B, A, and G.
     This will help determine the order of wires on the opposite end of the wires.

> **NOTE**
> Depending on the SolarEdge device, the RS485 connector may be in a location beside the communication board. Please refer to the device's installation manual to verify the correct place to install the wiring.

3. On the follower device, connect the opposite end of the twisted pair wires on the RS485 terminals in the same order as they are on the lead device.
4. If more devices are part of the RS485 daisy chain, continue wiring the rest of the devices in the same way, combining the RS485 wires between each two devices in the chain. Repeat this until all the necessary devices are wired together.
   - **Example:** Inverter 1 is the lead inverter, while inverters 2 and 3 are followers. RS485 is wired to B, A, and G on inverter 1 to inverter 2 in the same order.
     Then three new wires connected in the same B, A, and G ports on inverter 2, with the other end of the same three wires going to inverter 3.
5. Verify the orientation of the RS485 termination DIP switches found on the communications boards.
   - **First Device in Daisy Chain**: 1 up, 2 down
   - **Last Device in Daisy Chain**: 1 up, 2 down
   - Devices in Between 1 and 2 down
6. Once wiring has been done, reinstall any covers that were removed during troubleshooting and turn on AC to power on the devices, then configure the devices within the daisy chain.

Configuration

SetApp Enabled Devices

Follower

It is recommended to verify the configuration on the follower devices first, as the final step will be running a follower detection on the lead device.

1. Using SetApp, connect to the lead device.
2. Navigate to **Site Communications.**
3. Navigate to the RS485 bus to check which port the wiring is connected to (RS485-1 or RS485-2).
4. Set the Device Type to **SolarEdge** and set the Protocol to **SolarEdge Follower.**

Leader

The leader handles the connectivity to the SolarEdge Monitoring server and is the device with the supported communications installed.

1. Using SetApp, connect to the lead device.
2. Navigate to **Site Communications**.
3. Navigate to the RS485 bus to check which port the wiring is connected to (RS485-1 or RS485-2).
4. Set the Device Type to **SolarEdge** and set the Protocol to **SolarEdge Leader**.
5. After followers and leaders are configured, follow the steps outlined in the [Follower Detect](#) section of this guide.

LCD Enabled Devices Connected

Follower

It is recommended to verify the configuration on the follower devices first, as the final step will be running a follower detection on the lead device.

1. Use the navigation buttons on the device to enter the menus.
   - **Home Wave Inverter:** Set the P/1/0 switch in the **0** (**OFF**) position. Press and hold the **Enter** button to the far right until you see a 5-second countdown to pair. Release the button before this countdown finishes. You will be prompted for a password.
   - **A Series Inverter:** Set the 0/1 switch in the **0** (**OFF**) position and remove the top cover. Press and hold the **3/Enter** button found above the LCD for a few seconds until you see a 5-second countdown to pair. Release the button before this countdown finishes. You will be prompted for a password.
     i. The **green push button** can also be used to enter the menus, but the number of options is limited.
   - **Data Logger/CCG:** Using the four push buttons on the device, press and hold the **3/Enter** button until you are prompted for a password.
2. If prompted for a password, enter **12312312.**
   - Each of the four buttons on the device represents a function and number.
     From left to right: **Escape**, **Up/1**, **Down/2**, **Enter/3**.
     These buttons are used to enter the password as well as to navigate the menus.
3. Using the buttons, navigate to the Server.
4. Navigate to the RS485 bus to check which port the RS485 wiring is connected to (**RS485-1/RS485-2**).
   - On LCD-enabled devices, RS485-2 is only available on SolarEdge data loggers, as well as some StorEdge and EV Ready inverters. If the RS485-2 options are missing from the menus, the device does not support wiring to the RS485-2 terminals.
5. Set the device type to **SolarEdge (SE)**
6. Set the protocol to **Follower.**

Leader

The leader handles the connectivity to the SolarEdge Monitoring server and is the device with supported communications installed.

1. Use the navigation buttons on the device to enter the menus.
   - **Home Wave Inverter:** Set the P/1/0 switch in the **0 (OFF)** position.
     Press and hold the **Enter** button to the far right until you see a 5-second countdown to pair.
     Release the button before this countdown finishes. You will be prompted for a password.
   - **A Series Inverter:** Set the 0/1 switch in the **0 (OFF)** position and remove the top cover.
     Press and hold the **3/Enter** button found above the LCD for a few seconds until you see a 5-second countdown to pair.
     Release the button before this countdown finishes. You will be prompted for a password.
   - The green push button can also be used to enter the menus, but the number of options is limited.
   - **Data Logger/CCG:** Using the four push buttons on the device, press and hold the 3/Enter button until you are prompted for a password.
2. If prompted for a password, enter **12312312**.
   - Each of the four buttons on the device represents a function and number.
     From left to right: **Escape, Up/1**, **Down/2**, **Enter/3**.
     These buttons are used to enter the password as well as to navigate the menus.
3. Navigate to Server.
4. Navigate to the **RS485 bus** to check which port the RS485 wiring is connected to (**RS485-1/RS485-2**).
   - On the LCD-enabled devices, **RS485-2** is only available on SolarEdge data loggers, as well as some StorEdge and EV Ready inverters.
     If the **RS485-2** options are missing, the device does not support wiring to the **RS485-2** terminals.
5. Set the device type to SolarEdge (SE)
6. Set the protocol to the Leader.
7. Once followers and leaders are configured, follow the steps outlined in the [Follower Detect](#) section of this guide.

Follower Detect

Once the device configuration has been confirmed, a follower detect will need to be run on the leader.

1. Once the lead device has been configured as a leader, the follower detect function will be found in the menus RS485 configuration menus. Select this option to run a follower detect process.
   - The device will run a follower detection for approximately 60 seconds
   - For large sites with 10 or more follower devices, a long follower detect may be recommended, which runs a follower detect for 60 minutes, or until the process is canceled.

Troubleshooting

Follower not Detected

If one or more of the followers are not detected, perform the following troubleshooting steps:

1. Verify the follower(s) that were not detected are set to the following:
   - **RS485 Device Type**: SolarEdge (SE)
   - **RS485 Protocol:** SolarEdge Follower
2. Investigate the wiring between the undetected SolarEdge device and the next device(s) in the daisy chain for any damage or breaks and verify the correct type of wiring was used.
3. Verify proper DIP switch orientation as outlined in the [Installation](#) section of this guide.
4. Perform communication board resistance testing on the communication board as outlined in the [Resistance Testing](#) section of this guide.

Resistance Testing

If no faults were found with the wiring or configuration between devices, the issue could be with the communication board.

1. Power down the devices being worked with before opening any covers or working with any wiring.
   - **Inverter:** Set the P/1/0 switch to the **0** (OFF) position, wait for V_{DC} to drain below 50V, then turn off the DC and AC disconnect switches
   - **Battery:** Once the inverter has been powered down, turn off any battery toggle switches and breakers
   - **Other Devices (Meter/EV Charger/etc.):** Power off the AC disconnect for the device or remove the AC power plug depending on the type of device.
2. Remove the RS485 Phoenix connector from the communication board.
3. With the connector removed, set a voltmeter to resistance and measure between the following points on the pins where the connector once was on the board:
   - B-A – Value should be 120-310 Kiloohms
   - B-G – Value should be > 1 Megaohm
   - A-G – Value should be > 1 Megaohm
4. If the resistance values are lower than what is listed above, contact SolarEdge Technical Support
   - **Important Note on Resistance Testing and Multimeters:** Some multimeters are unable to measure resistance up to the > 1 Megaohm range. In these cases, meters will often show OL. Please confirm the resistance range capable on your multimeter before contacting support for a potentially "bad" communication board.

Follower Detected but is not Getting S_OK

1. Verify the leader has a daisy chain-supported communications device installed and configured.
2. Investigate the wiring between the follower without S_OK and the next device(s) in the daisy chain for any damage or breaks.
3. If the issue persists, contact SolarEdge Technical Support for further assistance.