SolarEdge TerraMax™ Inverter communication options

Installation Guide

Version 1.0

Revision History

- Version 1.0, June 2024 – Initial release

Contents

Introduction

This document describes various communication scenarios and the specific equipment required for each scenario. Once the physical connection is done, the configuration sequence for each scenario is provided.

For a detailed description of how to install and set up communications between the SolarEdge inverter and the SolarEdge monitoring server, refer to the specific SolarEdge installation manual.

Communication types and functionality

The various types of communication options supported by the SolarEdge TerraMax Inverter are:

- Ethernet (built-in): Used for a LAN connection. Enables communication to the SolarEdge monitoring server.
- CAN bus (built-in): used for connecting TerraMax inverters on the same bus in a leader/follower configuration.
- RS485-1: this port supports the following functionality:
    - Connecting to a third-party logger using the SunSpec protocol.
    - Connecting to a SolarEdge electricity meter.
- Wi-Fi (optional): enables wireless connection of one or several inverters for wireless communication to the SolarEdge monitoring server.
- Cellular Connectivity (optional): enables cellular connection of one or several devices for wireless communication to the SolarEdge monitoring server.

Communication connectors

The inverter has two communication glands that are used to connect various communication options. Each gland has three openings. The table below describes the functionality of each opening. Unused openings should remain sealed.

Gland#	Opening	Functionality	Cable size (diameter)
1 (PG16)	One small	External antenna cable	2-4 mm
	Two large	Ethernet connection (CAT5/6), Cellular, or Wi-Fi	4.5-7 mm
2 (PG13.5)	All three	RS485, power reduction	2.5-5 mm

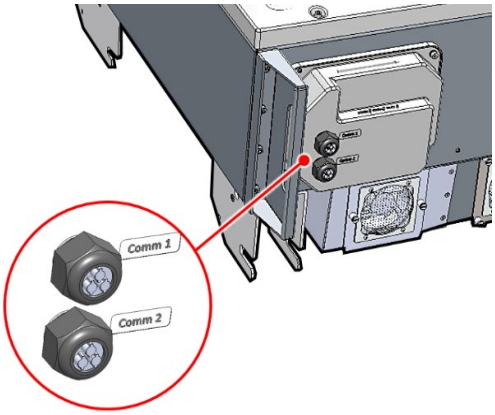

Figure 1: TerraMax Inverter communication glands

The TerraMax inverter has a standard RJ45 terminal block for Ethernet connection, a 6-pin terminal block with three left pins for RS485-1 connections, and three right pins for CAN connections, and a connector for WiFi antenna. The positions of these connectors on the inverter communication board are shown below.

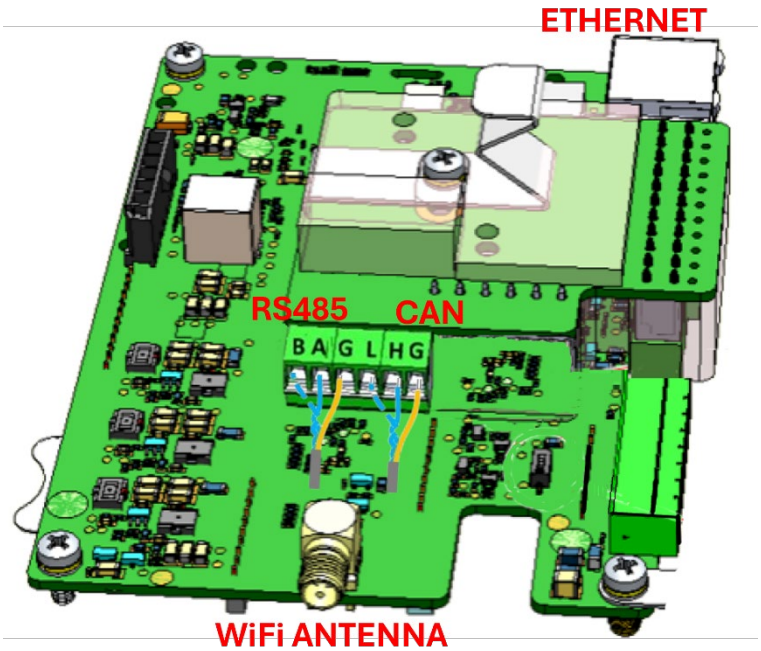

Figure 2: TerraMax inverter communication ports

Ethernet

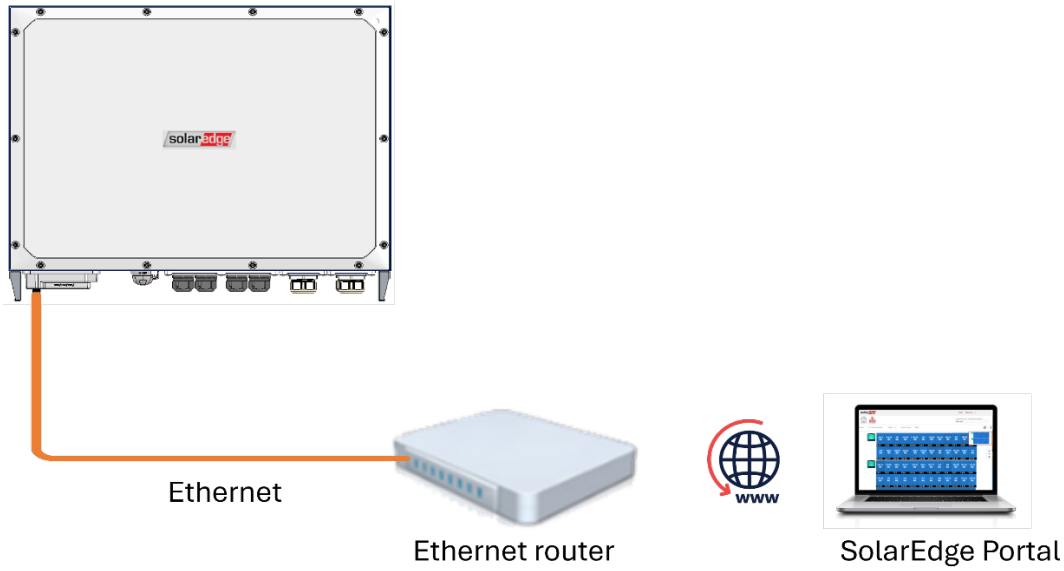

Figure 3: Single device Ethernet connection

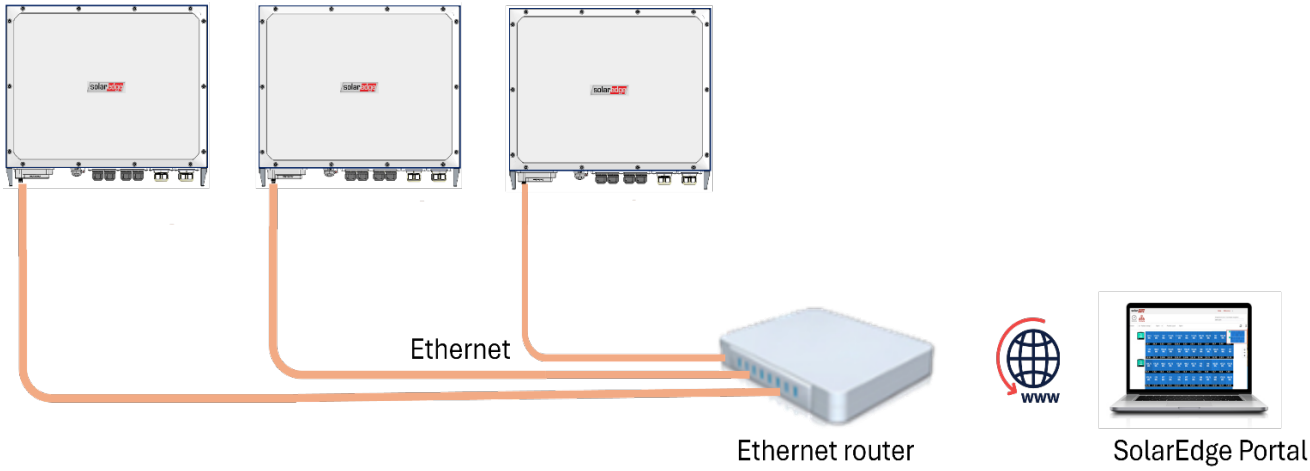

Figure 4: Multiple device Ethernet connection

Single inverter, wired Ethernet (LAN) connection

Description

In this configuration, Ethernet cables are used to connect the inverter to the SolarEdge monitoring server through an Ethernet router.

Required equipment

- CAT5 or CAT6 Ethernet cable with RJ45 connectors. Maximum distance: 100m (330ft) per device connection.
- Ethernet router

LAN configuration

SolarEdge inverters are pre-configured to use the LAN port by default, thus obtaining the IP settings automatically from a DHCP server. If a static IP is required, do the following in the SetApp Commissioning screen:

1. In the **Commissioning** screen, tap **Site Communication** > **Ethernet** > **Yes**
2. In the **IP Configuration** screen, tap **Edit** > **Static IP**
3. Set the IP address, Subnet Mask, Default Gateway, and DNS.
4. Tap **Save**

You can verify that communication with the server (S_OK) is correctly set up in one of the following three ways:

- In the **Commissioning** screen, tap **Monitoring Communication** and verify that S_OK appears in the status field.
- In the **Commissioning** screen, tap **Status** and verify that S_OK appears in the **Server Comm** field.
- If the blue LED is lit, communication with the server is verified.

Multiple inverters, CAN bus, wired Ethernet (LAN) connection

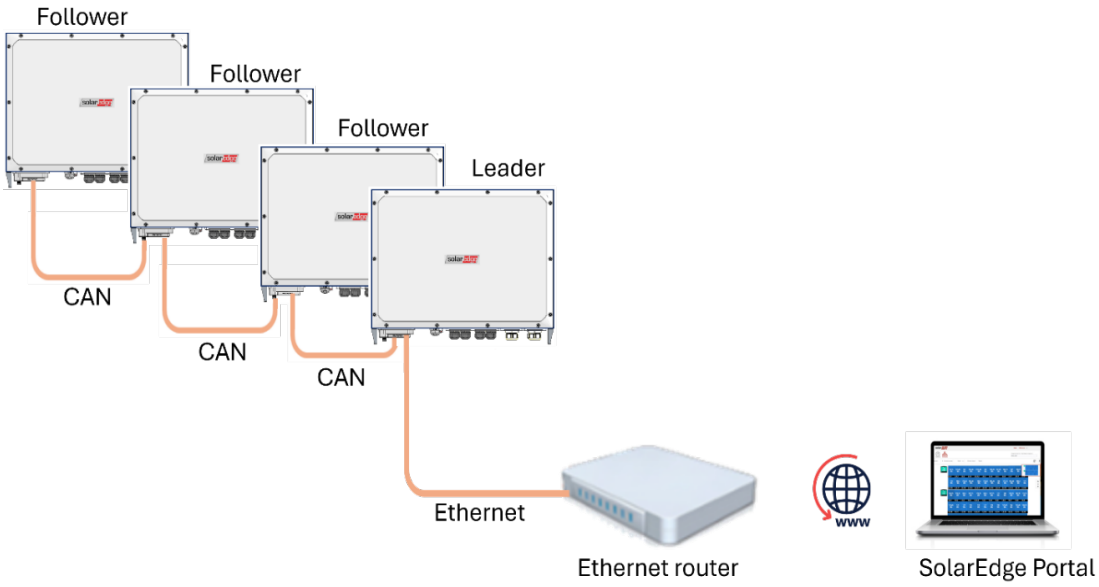

Figure 5: Multiple inverters, CAN bus, wired Ethernet connection.

Description

In this configuration multiple devices connect through the same CAN bus in a leader/follower configuration. Only the leader is physically connected to the internet through the Ethernet port.

Required equipment

- CAT5 or CAT6 Ethernet cable with RJ45 connectors. Maximum distance 100m (330ft) from leader device to router
- Ethernet router
- CAN: 3-conductor cable. Maximum distance 750m (2460ft) from the first to the last inverter. The leader does not have to be the first or the last inverter.

CAN-bus configuration

In SetApp, do the following:

1. For the follower devices, in the SetApp **Commissioning** screen, tap **Site Communication**.
2. Tap **CAN** > **Protocol** > **SolarEdge follower**
3. For the leader device, in the SetApp **Commissioning** screen, go to **Site Communication**, > **CAN** > **Protocol** > **SolarEdge leader**

LAN configuration (leader device)

SolarEdge inverters are pre-configured to use the LAN port by default. They obtain the IP settings automatically from a DHCP server. If a static IP is needed, do the following:

In the SetApp **Commissioning** screen:

1. Tap **Site Communication** > **Ethernet** > **Yes**
2. In the **IP Configuration** screen, tap **Edit** > **Static IP**
3. Set the IP address, Subnet mask, Default gateway, and DNS.
4. Tap **Save**.

The leader should report the correct number of followers. If it does not, verify the connections and terminations.
You can verify that communication with the server (S_OK) is correctly set up in one of the following three ways:

- In the **Commissioning** screen, tap **Monitoring Communication** and verify that S_OK appears in the status field.
- In the **Commissioning** screen, tap **Status** and verify that S_OK appears in the **Server Comm** field.
- If the blue LED is lit, communication with the server is verified.

Wi-Fi Connection

The Wi-Fi communication option enables wireless connection of a SolarEdge device to the SolarEdge monitoring server. You can connect devices together on the CAN-bus and connect the Leader via Wi-Fi to the server.

Multiple inverters, CAN bus, Wi-Fi server connection

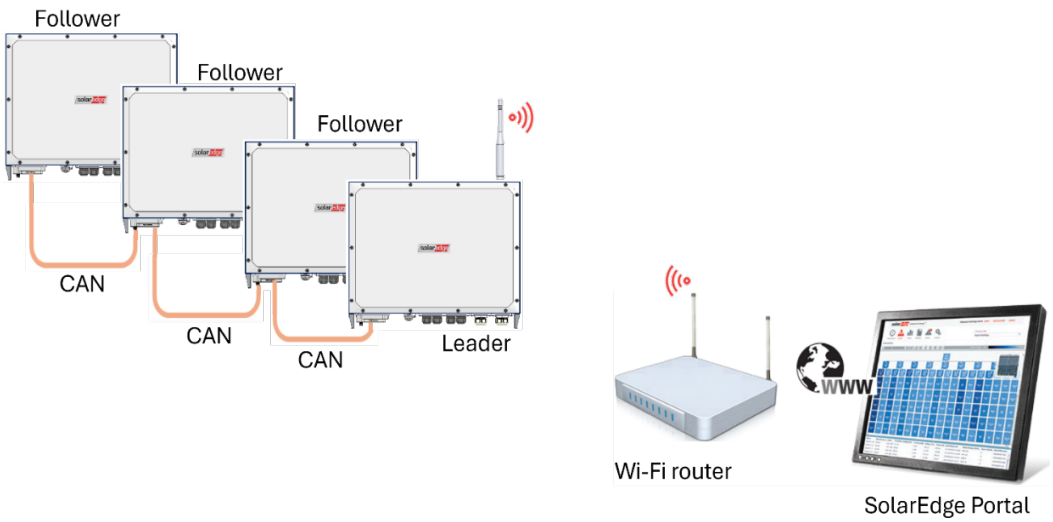

Figure 6: Multiple inverters, CAN bus, Wi-Fi server connection

Description

You can connect multiple devices on the same CAN bus in a leader/follower configuration. In this configuration, only the Leader device is connected wirelessly to a Wi-Fi router. Up to 12 devices can be connected as CAN followers.

Required Equipment

- Wi-Fi router: Wi-Fi maximum distance: outdoors (line-of-sight) 400m (1300ft); indoors 50m (160ft)
- SolarEdge – Wi-Fi kit for the Leader inverter, including:
  - Wi-Fi Plug-in
  - Antenna with mounting clip
  - RF cable
- CAN-bus: 3-conductor cable. Maximum distance: 750m (2460ft) from the first device to last device. The leader does not have to be the first or the last device.

CAN configuration

The follower inverters are pre-configured to use the CAN port by default.

To configure follower devices:

1. Go to the SetApp **Commissioning** screen.
2. Tap **Site Communication** > **CAN** > **Protocol** > **SolarEdge follower**

To configure the CAN Leader device:

1. Go to the SetApp **Commissioning** screen.
2. Tap **Site Communication** > **CAN** > **Protocol** > **SolarEdge leader**

You can verify that communication with the server (S_OK) is correctly set up in one of the following three ways:

- In the **Commissioning** screen, tap **Monitoring Communication** and verify that S_OK appears in the status field.
- In the **Commissioning** screen, tap **Status** and verify that S_OK appears in the **Server Comm** field.
- If the blue LED is lit, communication with the server is verified.

Wi-Fi configuration

To configure the leader device to communicate via Wi-Fi:

In the SetApp **Commissioning** screen, select **Site Communication** > **Wi-Fi**

Select one of the following:

If your router supports WPS mode, you can automatically connect without entering a password.

1. In the SetApp **Commissioning** screen, select **Site Communication** > **Wi-Fi** > **Connect with WPS**
2. Push the WPS button on your router and hold until the LED lights up (refer to your router manual).
3. Check that the message **Connected** is displayed at the top of the SetApp screen.

Alternatively, to connect to a specific network from a list:

1. Select **Wi-Fi**
2. Select the required network from the list of networks.
3. Enter the security key (up to 20 characters) if required.

The system starts the connection process. Connection time can take up to 30 seconds, after which the message **Connected** is displayed at the top of the SetApp screen.

Cellular connectivity

The cellular communication option enables a wireless connection between the inverter and the SolarEdge monitoring server using a cellular network. Depending on your SIM card and data plan provider, you can wirelessly connect multiple devices, each with its own cellular modem. You can also connect multiple devices via a CAN bus and then connect only the leader to the server using a cellular module.

To use the cellular communication option, the communication board must include a designated modem connector and its SolarEdge device CPU version must be 3.1600 or higher. To use a SolarEdge data plan, the SolarEdge device CPU version must be 3.1800 or higher.

Cellular communication enables continuous connection to the server. The data is sampled every 5 minutes. In a multiple inverter system, up to thirteen devices can be connected together via a CAN bus, and a cellular modem with sim card needs only to be installed in the Leader inverter. Alternatively, a cellular modem and a sim card are required for each of the devices (up to thirteen). The modem can be purchased with a sim card and a 5 year data plan. Alternatively, the modem can be purchased alone while the sim card plus data plan can be purchased from a third party carrier.

For more information about data plans and other related information refer to the relevant cellular modem datasheet:

Cellular Plug-in with Data Plan for the US and Canada for SetApp Inverters

Cellular Plug-In for the EU and ROW

Cellular connection – multiple inverters

The sim card and data plan can be purchased together with the modem or from a third party carrier.

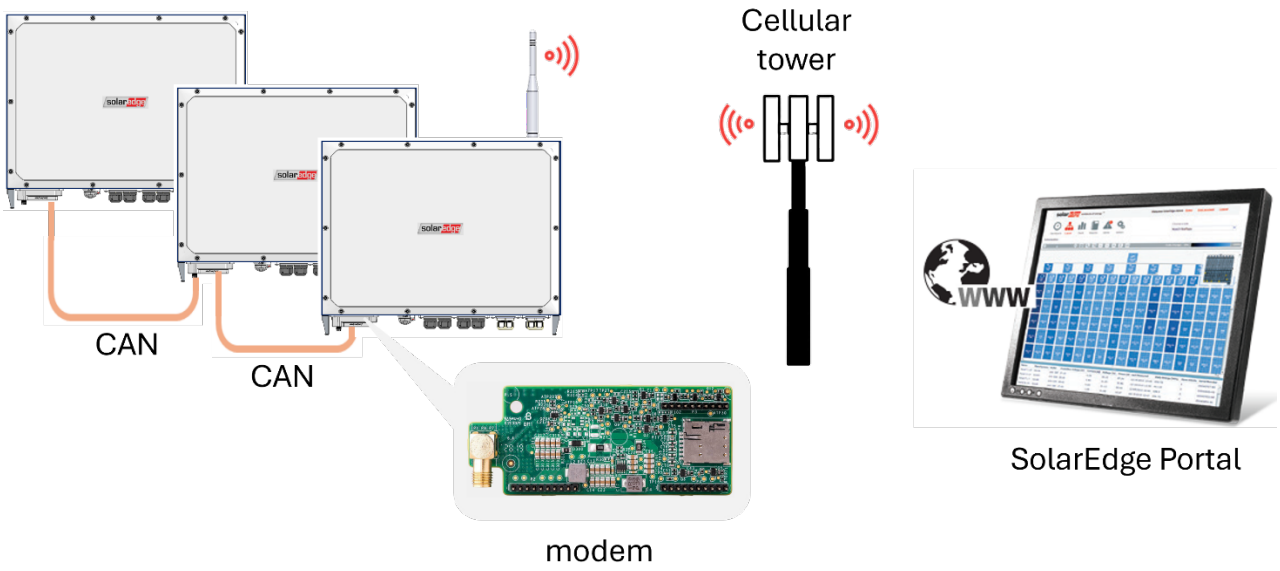

Figure 7: Cellular connection, multiple inverterss, CAN bus

Description

In this configuration you can connect multiple devices on the same CAN bus in a leader/follower configuration. Only the leader device is connected to the cellular network. Up to thirteen devices may be connected, but only up to twelve CAN followers may be connected. An LTE kit is only required for the leader device.

NOTE

For detailed information about Installation Guidelines, System Compatibility Check and Upgrade, LTE Modem and Antenna Installation, LTE Communication Configuration and Technical Specifications, see the Cellular Plug-in Installation Guide.

Cellular communication configuration

In the SetApp **Commissioning** screen:

1. Tap **Monitoring Communication** > **Change Connection Type** > **Yes** > **Cellular.**
2. Tap **Done.**
3. Tap **Configure Cellular > Configurations > Edit.**
4. Set the Access Point Name (APN), User Name, and Password.

When completed, the cellular modem connects to the server and "**Connected**" appears in SetApp.

For detailed communication configuration instructions see the Cellular Plug-in Installation Guide.
For troubleshooting communication issues see the Cellular Plug-in Troubleshooting Guide.

Non-SolarEdge monitoring connection options

This communication option is used for monitoring SolarEdge inverters using a non-SolarEdge (non-SE) logger. The configuration enables connecting to a non-SolarEdge logger or a third-party device (eg supported meters) using the SunSpec protocol via an RS485 connection.

Multiple inverters, CAN bus, RS485-1, wired Ethernet (LAN), non-SE logger

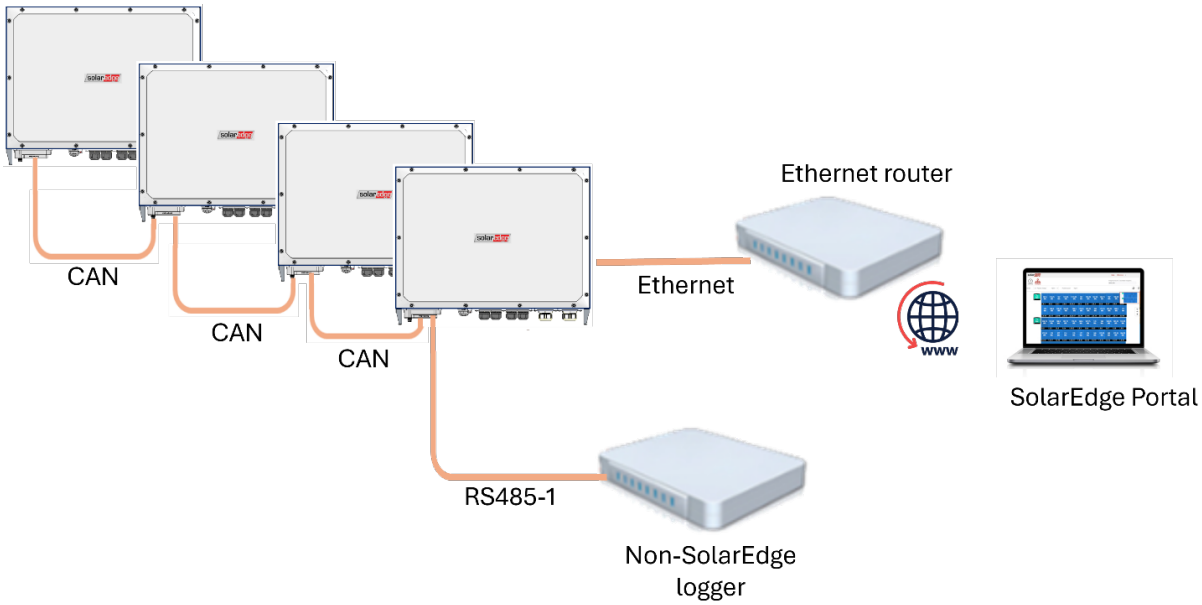

Figure 8: Multiple inverters, CAN bus, RS485-1, wired Ethernet (LAN), non-SE logger

Description

In this configuration you can connect multiple inverters on the same CAN bus in a leader/follower configuration. An Ethernet cable is used to connect the leader inverter to the SolarEdge monitoring server through an Ethernet router. The non-SolarEdge logger is connected to the RS485-1 port of the leader inverter.

Inverter and Power Optimizer monitoring data is sent to the SolarEdge monitoring server via the LAN port using the SolarEdge protocol, and inverter monitoring data is sent to the non-SolarEdge logger via the RS485-1 port using the SunSpec protocol.

Required Equipment

- CAT5 or CAT6 Ethernet cable with RJ45 connectors. Maximum distance 100m (330ft) per inverter connection.
- Non-SE SunSpec logger
- Ethernet router
- 3-conductor RS-485 cable (logger end of the cable should have a connector to match the logger). Maximum distance: 1000m (3300ft).
- 3-conductor CAN cable. Maximum distance: 750m (2460ft).

NOTE

- If using a cable longer than 10m (33ft) in areas where there is a risk of induced voltage surges by lightning, it is recommended to use external surge protection devices. For details refer to: https://www.solaredge.com/sites/default/files/lightning_surge_protection.pdf.
- If a grounded metal conduit is used for routing the communication wires, a lightning protection device is not required.
- If not using surge protection, connect the grounding wire to the first inverter in the CAN chain making sure the grounding wire is not in contact with other wires. Connect the grounding wire to the grounding bus-bar in the DC Disconnect Unit.
- A CAN/RS485 surge protection plug-in is integrated into the CAN/RS485-1 terminal block.

Inverter CAN Configuration

For all follower inverters, in the SetApp **Commissioning** screen select:
Site Communication > **CAN** > **Protocol** > **SolarEdge Follower**

For the Leader inverter, in the SetApp **Commissioning** screen select:
Site Communication > **CAN** > **Protocol** > **SolarEdge Leader**

The leader must report the correct number of followers. If it does not, verify the connections and terminations.

You can verify that communication with the server (S_OK) is correctly set up in one of the following three ways:

- In the **Commissioning** screen, tap **Monitoring Communication** and verify that S_OK appears in the status field.
- In the **Commissioning** screen, tap **Status** and verify that S_OK appears in the **Server Comm** field.
- If the blue LED is lit, communication with the server is verified.

SolarEdge device RS485 configuration

For the leader inverter, in the SetApp **Commissioning** screen, select the following:

1. **Site Communication** > **RS485-1** > **Protocol** > **sunspec (non-se-logger)**
2. Set **Device ID** [unique value 1...247]

Multiple inverters, wired Ethernet (LAN), non-SE logger (Modbus over TCP)

Direct connection - Each inverter connects to the Ethernet router via Ethernet cables.

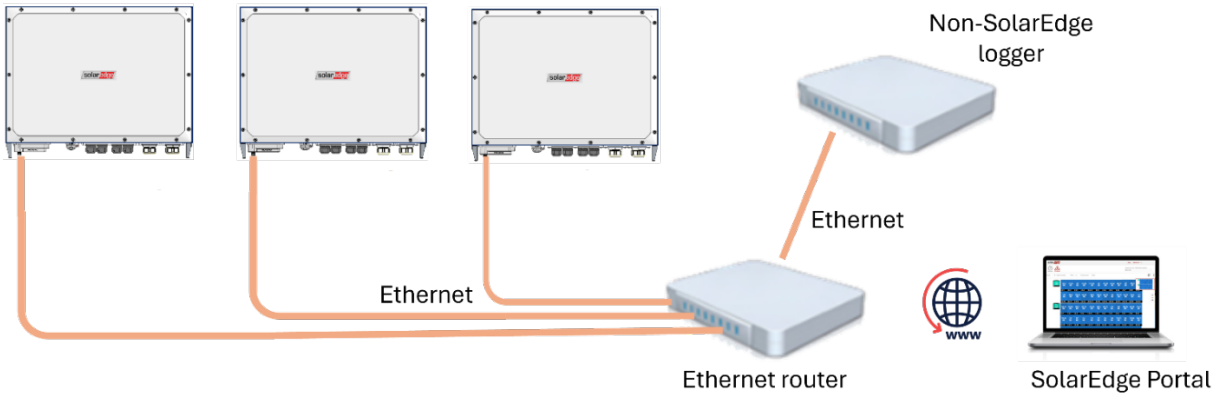

Figure 9: Multiple inverters, wired Ethernet, non-SE logger.

Description

In this configuration you can connect each inverter directly to the Ethernet router with LAN cables, and the non-SolarEdge logger to the router also with a LAN cable.

LAN cables are used to connect the inverters to the SolarEdge monitoring platform via an Ethernet router. Inverter and Power Optimizer monitoring data is sent to the SolarEdge monitoring server via the LAN port using the SolarEdge protocol, and inverter monitoring data is sent to the non-SolarEdge logger via the LAN port using the SunSpec protocol.

Required Equipment

- CAT5 or CAT6 Ethernet cable with RJ45 connectors. Maximum distance: 100m (330ft) per inverter connection.
- Ethernet router
- Non-SE SunSpec logger

Inverter LAN configuration

The SolarEdge devices are preconfigured to use the LAN port by default, thus obtaining the IP settings automatically from a DHCP server. If a static IP is required, select the following in the **SetApp Commissioning** screen:

1. **Site Communication** > **Ethernet** > **Yes**
2. In the **IP Configuration** screen, tap **Edit** > **Static IP**
3. Set the IP Address, Subnet Mask, Default Gateway, and DNS
4. Tap **Save**

You can verify that communication with the server (S_OK) is correctly set up in one of the following three ways:

- In the **Commissioning** screen, tap **Monitoring Communication** and verify that S_OK appears in the status field.
- In the **Commissioning** screen, tap **Status** and verify that S_OK appears in the **Server Comm** field.
- If the blue LED is lit, communication with the server is verified.

Multiple Inverters, CAN-bus, wired Ethernet (LAN), non-SE logger

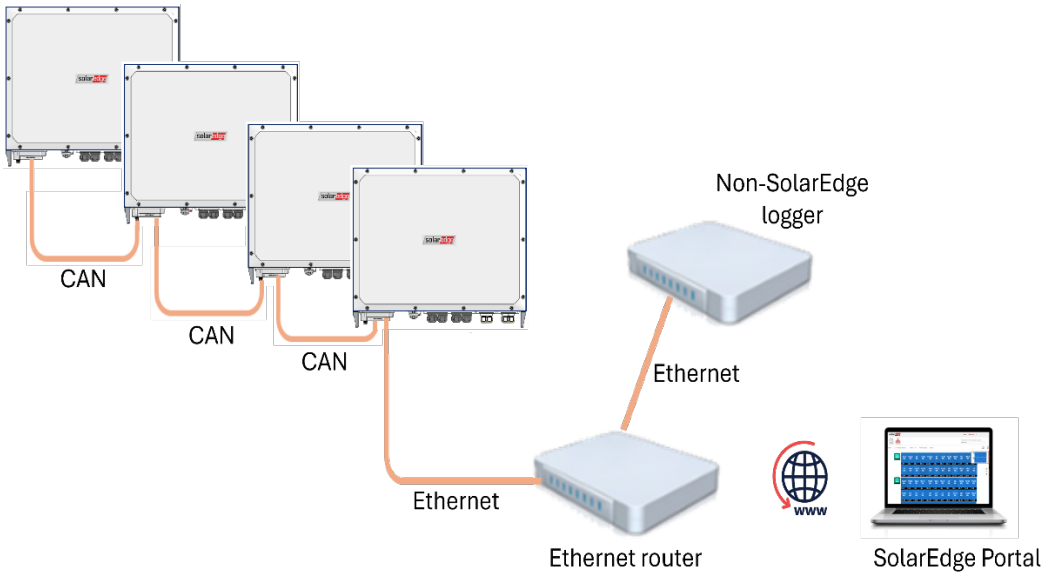

Figure 10: Multiple Inverters, CAN Bus, wired Ethernet (LAN), non-SE logger

Description

This configuration enables connecting multiple inverters on the same CAN bus in a leader/follower configuration to a non-SolarEdge logger via an Ethernet cable. Inverter monitoring data is sent to the non-SE logger using the SunSpec protocol.

Required Equipment

- non-SE SunSpec logger
- CAT5 or CAT6 Ethernet cable with RJ45 connectors. Maximum distance 100m (330ft).
- 3-conductor CAN cable. Maximum distance 750m (2460ft).

NOTE

- If using a cable longer than 10m (33ft) in areas where there is a risk of induced voltage surges by lightning, it is recommended to use external surge protection devices. For details refer to: https://www.solaredge.com/sites/default/files/lightning_surge_protection.pdf.
- If a grounded metal conduit is used for routing the communication wires, a lightning protection device is not required.
- If not using surge protection, connect the grounding wire to the first inverter in the CAN chain making sure the grounding wire is not in contact with other wires. Connect the grounding wire to the grounding bus-bar in the DC Disconnect Unit.
- A CAN surge protection plug-in is integrated into the CAN terminal block.

Inverter CAN configuration

For all follower inverters, in the SetApp **Commissioning** screen select:
Site Communication > **CAN** > **Protocol** > **SolarEdge Follower**

For the Leader inverter, in the SetApp **Commissioning** screen select:
Site Communication > **CAN** > **Protocol** > **SolarEdge Leader**

The leader must report the correct number of followers. If it does not, verify the connections and terminations.

You can verify that communication with the server (S_OK) is correctly set up in one of the following three ways:

- In the **Commissioning** screen, tap **Monitoring Communication** and verify that S_OK appears in the status field.
- In the **Commissioning** screen, tap **Status** and verify that S_OK appears in the **Server Comm** field.
- If the blue LED is lit, communication with the server is verified.

Inverter LAN configuration

The SolarEdge devices are preconfigured to use the LAN port by default, thus obtaining the IP settings automatically from a DHCP server. If a static IP is required, select the following in the **SetApp Commissioning** screen:

5. **Site Communication** > **Ethernet** > **Yes**
6. In the **IP Configuration** screen, tap **Edit** > **Static IP**
7. Set the IP Address, Subnet Mask, Default Gateway, and DNS
8. Tap **Save**

You can verify that communication with the server (S_OK) is correctly set up in one of the following three ways:

- In the **Commissioning** screen, tap **Monitoring Communication** and verify that S_OK appears in the status field.
- In the **Commissioning** screen, tap **Status** and verify that S_OK appears in the **Server Comm** field.
- If the blue LED is lit, communication with the server is verified.

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Japan (+81)	03 6262 1223
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