# Installation Guide

# Cellular Plug-In

## For Inverters with a Display

Version 1.1

# Disclaimers

## Important Notice



The material furnished in this document is believed to be accurate and reliable. However, SolarEdge assumes no responsibility for the use of this material. SolarEdge reserves the right to make changes to the material at any time and without notice. You may refer to the SolarEdge web site (www.solaredge.com) for the most updated version.

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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.

## Revision History

- Version 1.0, January 2020 - initial release
- Version 1.1, April 2020 - updated software compatibility requirements

# Contents

# About This Guide

This manual describes how to install and set up a Cellular Plug-in in a SolarEdge inverter.

SolarEdge offers the Cellular Plug-in for connection of the SolarEdge inverter to the SolarEdge monitoring server.

This guide assumes that the SolarEdge power harvesting system is already installed and commissioned. For additional information about how to install and commission the SolarEdge power harvesting system, refer to the relevant installation guide.

For further information, datasheets and the most up-to-date certifications for various products in different countries, please visit the SolarEdge website: www.solaredge.com.

# Chapter 1: Introduction to the Cellular Plug-In

The Cellular Plug-In and antenna attach to SolarEdge devices that will communicate with the SolarEdge monitoring platform. The plug-in attaches to the communications board, as shown in the figure below.

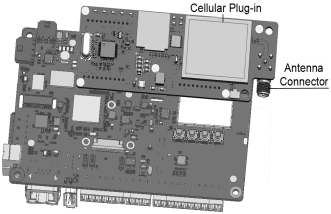


Figure 1: Communications Board with Cellular Plug-in

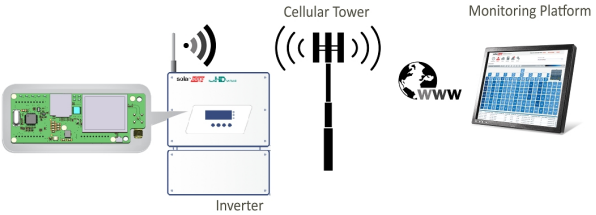


Figure 2: Connecting the Inverter to the Monitoring Platform

# Package Contents

- Cellular Plug-in
- Nano SIM card
- SD memory card with upgrade software
- Installation guide
- Antenna with mounting clip and antenna cable. The antenna and mounting clip are supplied as either separate units, or joined, as shown in the figures below.

Figure 3: Separate Antenna and Mounting Clip with Cable

Figure 4: Joined Antenna and Mounting Clip with Cable

# Chapter 2: System Compatibility

## Hardware Requirements

To use the cellular plug-in, the communication board must include a designated modem connector, as shown in the following figure. If the communication board does not support the modem connector, contact SolarEdge support.

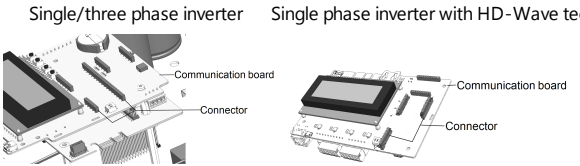


Figure 5: Communication board with Cellular connector

## Software Requirements

To use the cellular plug-in, the communication board firmware (CPU) version must be 3.2536 or higher.

→ To check the inverter CPU version using the inverter display:

1. Short-press the LCD light button (in HD-Wave press the up/down buttons) until the following screen is displayed.

```
ID: ######## ##
DSP1/2:x.xxxx/x.xxxx
CPU :0003.2400
Country:XXXXX
```

2. Check the CPU version number.
   - If the CPU version number is 3.2536 or higher, proceed with the configuration.
   - If the CPU version number is 3.0000 or higher, but lower than 3.2536, upgrade the inverter software as described below.

NOTE

Only inverters with version 3.xxxx can be upgraded.

→ To upgrade the inverter software:

1. Disconnect the AC power to the inverter and wait 5 minutes.
2. Open the inverter cover as described in its manual.
3. Insert the firmware upgrade card supplied with the kit into the card slot on the communication board.

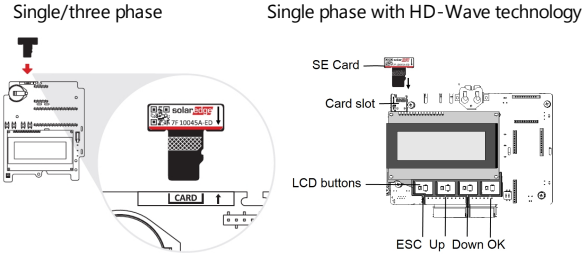


Figure 6: Communication board and activation card

4. Turn the AC ON.

**WARNING!**

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

5. If upgrade is required, it starts automatically. Wait for the message "Done" to be displayed on the LCD.
6. Verify the correct version.
7. Remove the card from the inverter.

# Chapter 3: Guidelines for Installing a SIM Card

Activating and using the Cellular Plug-in requires a Nano SIM card, which is inserted into a designated slot on the Cellular Plug-in. A SIM card is required in each Cellular Plug-in.

If there is no SIM card installed in the Cellular Plug-in, insert one into the slot on the Cellular Plug-in, as shown in the figure below.

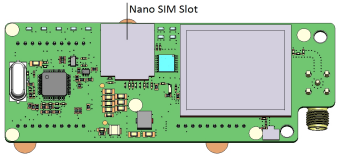


Figure 7: Nano SIM card slot on Cellular Plug-in

When using multiple SolarEdge inverters in the same site, a Cellular Plug-in must be installed as follows:

- Residential installations - in each inverter
- Commercial installations - in one device (one leader inverter for up to 31 follower inverters)

NOTE

In commercial installations, make sure to choose a data plan that is suitable for the AC system size.

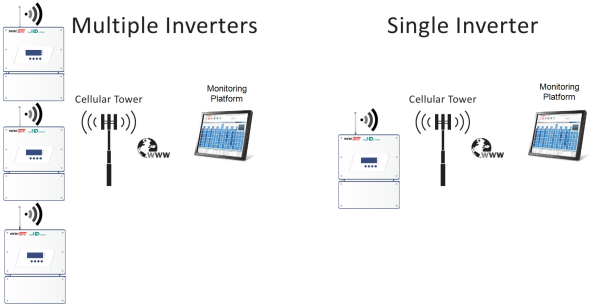


Figure 8: Cellular Plug-in Connection Diagram - Residential Installation

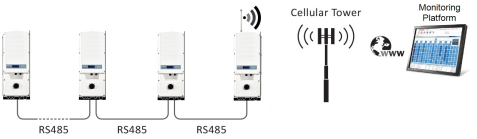


Figure 9: Cellular Plug-in Connection Diagram - Commercial Installation

# Chapter 4: Antenna and Plug-in Installation

This chapter describes how to install a cellular plug-in and antenna in SolarEdge devices that will communicate with the SolarEdge monitoring platform.

## Clipping the Antenna to the Inverter

1. Power down the inverter:
   a. Switch the inverter ON/OFF switch to OFF. Wait 5 minutes for the capacitors to discharge.
   b. Turn the DC Safety Unit (if applicable) to OFF.
   c. Cut off AC power to the inverter by turning off the circuit breakers on the distribution panel.
2. Insert the clip from the bottom of the inverter between the bracket and the inverter rear side.
3. Route the antenna cable upwards along the inner fins or the inverter side, by threading the clip and RF cable from the bottom of the inverter between the bracket and the inverter's rear side.

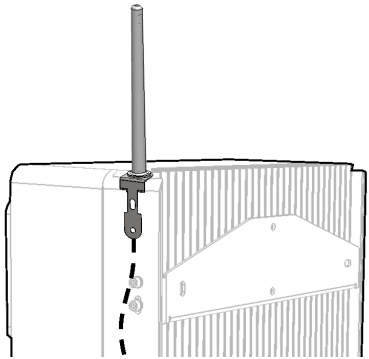

Figure 10: Routing the antenna cable

4. Clip the antenna vertically to the heatsink fins or the inverter side.

NOTE

The antenna should point upward for maximum range.

5. Pass the antenna cable between the mounting bracket and the rear side of the inverter or along the heatsink fins.
6. Open the antenna cable gland (see the figure below) at the bottom of the inverter.

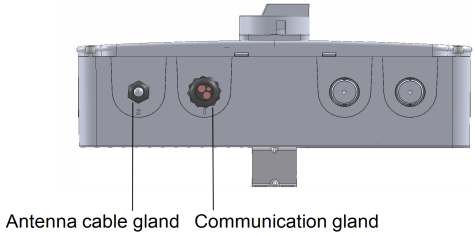


Figure 11: Connection via antenna cable gland

7. Remove the rubber seal from the gland and insert the cable through the gland body.
8. Insert the rubber seal with the cable into the gland body and reconnect the gland to the inverter. Tighten the sealing gland.
9. Pull the excess cable into the inverter so that the cable can be attached to the inverter communication board (see *Figure 16*). The cable connects to the cellular Plug-in as described in the follwing section.

# Connecting the Antenna to a Vertical Surface using a Bracket

For connecting the antenna to a vertical surface, use a bracket with the following recommended dimensions (not supplied by SolarEdge):

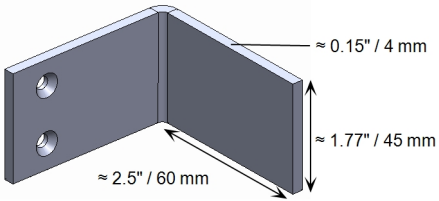


Figure 12: Example of an antenna bracket

1. Drill two holes in the surface and attach the bracket to it with two screws.
2. Clip the antenna onto the bracket. Make sure the antenna is vertical.

# Installing the Plug-in in the Inverter

NOTE

If you intend to use the RS485 communication, and termination is required, adjust the termination DIP switches on the inverter communication board before installing the plug-in, as the DIP switches are inaccessible when the plug-in is installed.

NOTE

Make sure that the inverter CPU version is 3.2534 or higher before installing the plug-in, otherwise the cellular communication may be inoperative and the inverter will not start up.If applicable, upgrade the inverter firmware using the supplied upgrade card.

→ To Install/replace the plug-in in single/three phase inverters (non-HD Wave):

1. Power down the inverter and DC Safety Unit (if installed).
2. Remove the inverter cover as described in its manual.
3. If replacing an existing plug-in:
   - Detach the existing antenna.
   - Remove the existing plug-in.
4. Loosen the upper-right screw attaching the communication board to the standoff.

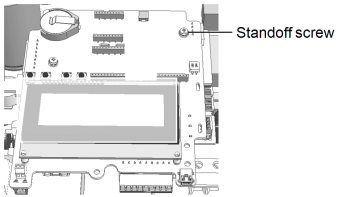


Figure 13: The communication board

5. Attach the supplied holder to the communication board and use the removed screw to fasten the holder to the board.

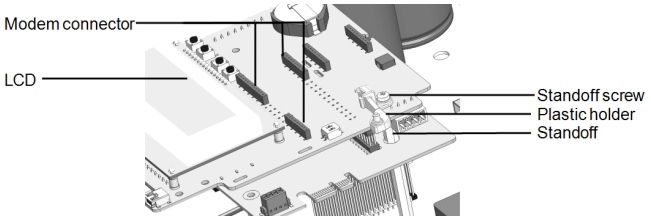


Figure 14: The holder installed on the communication board

6. Insert the supplied plug-in in its place on the communication board, as shown in *Figure 15*. Follow these guidelines:
   - Use the supplied holder to position the plug-in with the correct orientation and stabilize it.
   - Connect the plug-in making sure that all pins are correctly positioned in the plug-in connector, and no pins are left out of the connector.
   - Make sure that the plug-in is firmly in place.

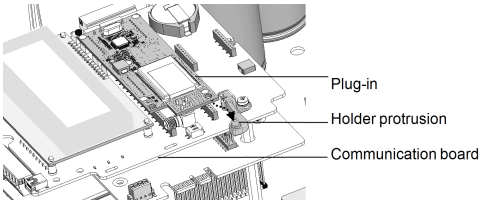


Figure 15: Installing the cellular plug-in on the holder

7. Connect the antenna cable to the plug-in and tighten manually (see *Figure 16*).
8. Install the cable holder at the side of the communication board.

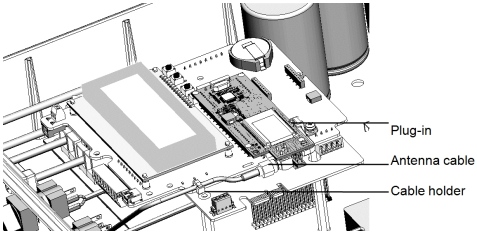


Figure 16: Installed plug-in and antenna cable

9. Power on the inverter and the DC Safety Unit (if installed).

WARNING!

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

10. Check that all the cellular plug-in LEDs are lit. If not, refer to *Troubleshooting* on page 27.

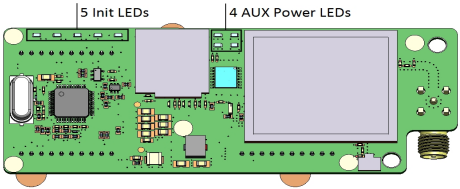


Figure 17: Cellular plug-in LEDs

→ To Install/replace the plug-in in inverters with HD-Wave technology:

1. Power down the inverter and the DC Safety Unit (if installed).
2. Remove the inverter cover as described in its manual.
3. If replacing an existing plug-in:
   - Detach the existing antenna.
   - Remove the existing plug-in.
4. Insert the supplied plug-in in its place on the communication board. Make sure that the plug-in is firmly in place (see *Figure 18*).
5. Connect the antenna cable to the plug-in and tighten manually.
6. Use the tie-wrap to fasten the plug-in to the communication board.

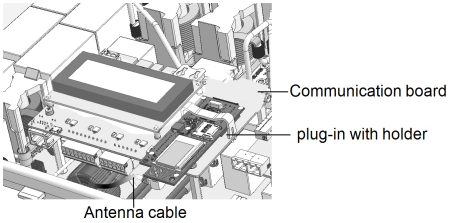


Figure 18: Installed plug-in

7. Power on the inverter and the DC Safety Unit (if installed).

   WARNING!

   

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

8. Check that all the cellular plug-in LEDs are lit (see *Figure 17*). If not, refer to *Troubleshooting* on page 27.

# Chapter 5: Configuring Cellular Communication

This chapter describes how to configure the inverter to use cellular communication, verify the connection and troubleshoot problems.

1. Verify that the inverter ON/OFF switch is OFF.
2. Enter the inverter Setup mode:
   - Single/ three inverters - Press the **Enter** button for 5-10 seconds and release. Enter the password **12312312**.
   - Single phase inverter with HD-Wave technology - Press the **OK** button for 5-10 seconds and release. Enter the password **12312312** (Up=1, Down=2, OK=3: **Up ➔ Down ➔ OK ➔ Up ➔ Down ➔ OK ➔ Up ➔ Down**).
3. Scroll down to the **Communication** sub-menu and press Enter to select it. The Communication menu is displayed (Some of the menu items may vary depending on configuration).

```
Server<LAN>
LAN Conf
RS485-1 Conf<S>
ZigBee Conf<S>
Wi-Fi Conf<N/A>
GPIO Conf <MTR>
RS232 Conf
Cellular Conf
Exit
```

4. Select **Server ➔ Cellular**.

```
LAN
RS485
Zigbee
Wi-Fi
Cellular
None
```

5. Exit the Setup mode by selecting the **Exit** option in each submenu screen, or wait for the inverter to automatically exit Setup mode if no buttons are pressed for more than two minutes.

# Verifying the Connection

The plug-in communicates with the SolarEdge monitoring platform every 5 minutes, and sends all monitoring data accumulated since the previous communication.

1. Check the server communication status screen:


- **Server**: The method of communication to the SolarEdge monitoring platform. Should display **Cell**.
- **Status**: Displays OK if the inverter established a successful physical connection to the cellular plug-in.
- **S_OK**: The last communication to the SolarEdge monitoring platform was successful. If S_OK is not displayed, refer to *Troubleshooting* on page 27.
- **MNO**: The mobile network operator name
- **Sig**: The signal strength, received from the cellular plug-in. A value between 0-5, (0 = no signal, 5 = excellent signal).
- **Error message** per communication connection status failure (Refer to *Troubleshooting* on page 27).

2. Close the inverter cover as described in its manual. Verify proper cover fastening to ensure sealing.

# Troubleshooting

## The Inverter is not Starting Up

If the inverter is not starting up, the plug-in may have been installed in an inverter with an incompatible CPU software version.

Check if the plug-in is installed, remove it and upgrade the inverter as described in *System Compatibility* on page 9.

## LCD Error Messages

| Error message | Description | Troubleshooting |
|---|---|---|
| No modem detected | The internal plug-in is not communicating with the communication board. | Check that the cellular plug-in is installed properly: All the pins are inserted in the correct location and not shifted. |
| Not activated | The cellular plug-in is not activated for use. | Contact SolarEdge support. |

| Error message | Description | Troubleshooting |
|---|---|---|
| Not registered | The cellular plug-in is not registered to a network provider. | • Check antenna connection or change antenna location.<br>• Contact SolarEdge support. |
| No signal | No cellular signal is received. | • Check that the cable is connected properly to both plug-in and antenna.<br>• Check for any damage to the cable or connectors.<br>• Try relocating the antenna.<br>• Check that there is cellular coverage in your area. |

| Error message | Description | Troubleshooting |
|---|---|---|
| DNS Failure | The DNS request that was forwarded to the cellular network provider has failed, or there is a problem in the DNS registration on the SolarEdge server. | Contact SolarEdge support. |
| TCP Failure | Connection to the SolarEdge server has failed. | Contact SolarEdge support. |
| S_OK is not displayed | Communication with the SolarEdge monitoring server is not established. | Verify that none of the above errors appear. To force communication with the server, scroll to the **Communication** menu and re-select **Cellular**. |

# Plug-in LED Indications

| Function | LED Functionality | Description | Troubleshooting |
|---|---|---|---|
| Green AUX Power LEDs | All LEDs are OFF | The Plug-in is not connected properly. | Check that the Plug-in is installed properly: All the pins are inserted in the correct location and not shifted. |
| | 1 or more LEDs are OFF | The Plug-in is damaged. | Contact SolarEdge support. |
| Init LEDs | Red LED is blinking slowly | Communication between Plug-in and main board is established. | Indication only |
| | Orange LED | * ON: The Plug-in is registered to a cellular network, or performing a network search, or transmitting data.<br>* OFF: The Plug-in isn't registered to a cellular network. | Indication only |
| | Blue LED is ON | The Plug-in is powered on. | Indication only |

# Appendix A: Technical Specifications

| GENERAL | |
|---|---|
| Compatible Inverters | SExxxx-USxxxNxx2, SExxxx-USxxxNxx4, SExxxx-USxxxSxx2, SExxxx-USxxxSxx4, SExxxx-USxxxVxx2, SExxxx-USxxxVxx4, SExxxx-USxxxXxx2, SExxxx-USxxxXxx4, SExxxx-USxxxLxx2, SExxxx-USxxxLxx4 |
| Monitoring | Continuous connection. Data is sampled every 5 minutes and sent to SolarEdge server. |
| Number of monitored inverters with a single cellular plug-in | Commercial: Up to 32, limited by system AC size<br>Residential: 1 inverter |

| RF PERFORMANCE | | | | |
|---|---|---|---|---|
| LTE Cat M1 - operating frequency range | Band | Modem Tx | Modem Rx | Unit |
| | 2100 (B1) FDD | 1920-1980 | 2110-2170 | MHz |
| | 1900 (B2) FDD | 1850-1910 | 1930-1990 | MHz |
| | 1800 (B3) FDD | 1710-1785 | 1805-1880 | MHz |
| | 1700 (B4) FDD | 1710-1755 | 2110-2155 | MHz |
| | 850 (B5) FDD | 824-849 | 869-894 | MHz |
| | 900 (B8) FDD | 880-915 | 925-960 | MHz |
| | 700 (B12) FDD | 699-716 | 729-746 | MHz |
| | 700 (B13) FDD | 777-787 | 746-756 | MHz |
| | 850 (B18) FDD | 815-830 | 860-875 | MHz |
| | 850 (B19) FDD | 830-845 | 875-890 | MHz |
| | 800 (B20) FDD | 832-862 | 791-821 | MHz |
| | 1900 (B25) FDD | 1850-1915 | 1930-1995 | MHz |
| | 850 (B26) FDD | 814-849 | 859-894 | MHz |
| | 700 (B28) FDD | 703-748 | 758-803 | MHz |
| | 1900 (B39) TDD | 1880 | 1920 | MHz |
| Maximum output power | 23 | | | dBm |
| Receiver input sensitivity | -107 (@ 1.4 MHz Bandwidth, CE Mode A) | | | dBm |
| LTE Cat-M1 bandwidth | 1.4 | | | MHz |
| LTE Cat-M1 modulation | Downlink: OFDMA, 16 QAM<br>Uplink: SC-FDMA, 16 QAM | | | |

| | | |
|---|---|---|
| **ANTENNA** | | |
| Antenna | Included: outdoor dual-band antenna: 824-960/1710-2170 | MHz |
| Antenna Connector | RP-SMA or N Plug(1) | |
| VSWR | ≤4.0 | |
| Gain | 2 | dBi |
| Polarization | Vertical | |
| Material | PC Lexan 503R-WH5151L or WH8G952 Sabic | |
| Dimensions | 7.87 x 0.78 / 200 x 20 | in/mm |
| **STANDARDS COMPLIANCE** | | |
| EMC and Radio | FCC class B, Parts 15, 22, 24; Industry Canada (IC): ICES-003, RSS-102 | |
| Safety | cUL, UL60950 | |
| RoHS | Yes | |
| **INSTALLATION SPECIFICATIONS** | | |
| Plug-in dimensions (L x W x H) | 3.56 x 1.35 x 0.55 / 90.54 x 34.5 x 14.2 | in/mm |
| Operating temperature | -40 to +185 / -40 to +85 | °F/°C |
| Power consumption | 1000 (@ 23 dBm output power) | mW |

(1) Depending on type of antenna supplied.

# Support Contact Information

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

https://www.solaredge.com/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 product 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 product's software version as it appears in the ID status screen.


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