



Installation Guide

ZigBee Gateway

Version 1.0

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Emission Compliance

This equipment has been tested and found to comply with the limits applied by the local regulations. 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.

SIMPLIFIED EU DECLARATION OF CONFORMITY

Hereby, SolarEdge Technologies Ltd., declares that the radio equipment type Wireless Communication ZigBee Kit is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at the following internet address:

https://www.solaredge.com/sites/default/files/se_wireless_communication_zigbee_kit_certificate_ce_conformity.pdf.

Contents

Disclaimers	1
Important Notice	1
Emission Compliance	2
SIMPLIFIED EU DECLARATION OF CONFORMITY	3
Support and Contact Information	6
About This Guide	8
Chapter 1: Overview	10
Package Contents	12
Installation Procedure	12
Safety	13
Chapter 2: ZigBee Gateway Interfaces	14
Connectors	15
Configuration Button	15
LEDs	16
DIP Switches	18
Chapter 3: Installing the ZigBee Gateway	19
Installation Guidelines	19
Connecting the ZigBee Gateway	21
Configuring the Inverter to ZigBee Communication	21
Device Discovery	23
Verifying the Connection	23
Appendix A: Troubleshooting	26
Troubleshooting Ethernet Connection	26
Troubleshooting ZigBee Wireless Connection	29

Appendix B: Technical Specifications	32
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Revision History

January 2019 - Initial release

Support and Contact Information

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DACH & Rest of Europe (+49)	089 454 59730	support@solaredge.de
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Worldwide (+972)	073 240 3118	

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 Inverter SetApp mobile application 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 inverter software version as appears in the status screen.

About This Guide

This guide is intended for Photovoltaic (PV) system owners, installers, technicians, maintainers, and integrators who use the SolarEdge power harvesting system.

This manual describes how to install and set up ZigBee™ communication between a SolarEdge device (inverters or Safety and Monitoring Interface (SMI)) and the SolarEdge ZigBee Gateway.

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.

This guide includes the following chapters:

- *Overview on page 10*, describes the ZigBee Gateway functionality and connection options.
- *ZigBee Gateway Interfaces on page 14*, details all the user interfaces of the ZigBee Gateway.
- *Installing the ZigBee Gateway on page 19* describes how to mount, connect and verify the connection of the ZigBee Gateway.

- *Troubleshooting* on page 26, provides information about connection problems and how to troubleshoot them.
- *Technical Specifications* on page 32 provides the electrical and mechanical specifications of the ZigBee Gateway.

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: Overview

ZigBee is a technology that enables wireless connection between several SolarEdge devices.

The SolarEdge ZigBee Gateway is used for wireless connectivity between one or more inverters at a site and a remote internet gateway point. Wireless connectivity allows simplifying the installations as no outdoor cabling is required. The ZigBee Gateway communicates using ZigBee, a standard for low-rate, high-reliability, and multi-device wireless protocol for telemetry communications.

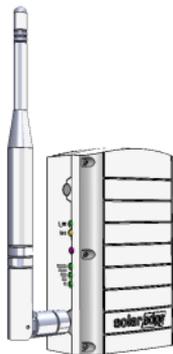


Figure 1: The ZigBee Gateway

Figure 2 shows an inverter as an example; however, this illustration is applicable to other SolarEdge devices, such as Safety and Monitoring Interface (SMI).

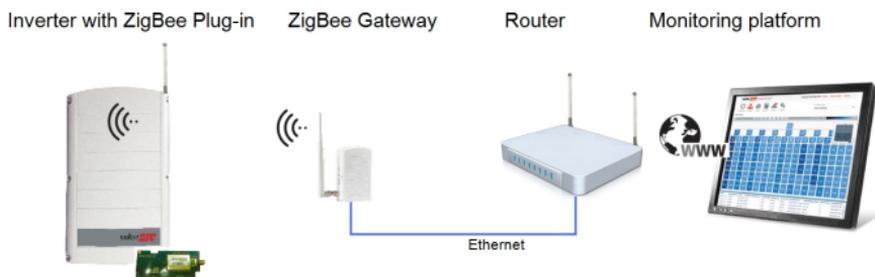


Figure 2: Connection to the inverter

The ZigBee Gateway is provided with one ZigBee Plug-in unit to be installed inside the inverter, and a ZigBee antenna to be installed on the inverter. Up to 15 inverters can be supported per one ZigBee wireless link. In order to enable more than one inverter, additional ZigBee Plug-in kits are required (sold separately).

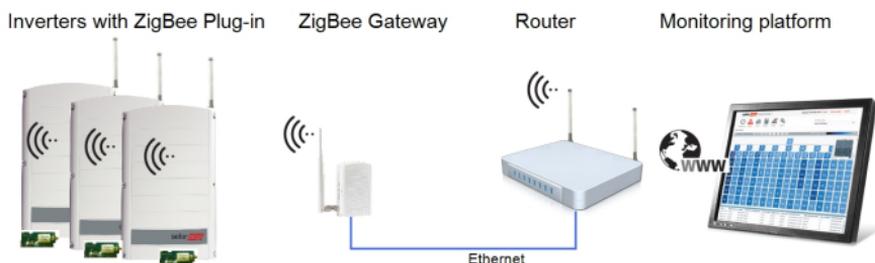


Figure 3: Connection to a multiple inverter wireless bus

Package Contents

The package contains the following items:

- ZigBee Gateway with antenna
- Power supply
- CAT 5E Ethernet cable
- ZigBee Plug-in kit, including:
 - ZigBee Plug-in module
 - Antenna with RF cable
 - Installation guide
- This installation guide

Installation Procedure

The following steps are required for the ZigBee Gateway installation:

1. Install a ZigBee Plug-in in all inverters - Refer to the [ZigBee Plug-in kit Installation Guide](#).
2. [Connect the ZigBee Gateway](#), page 21.
3. [Device Discovery](#), page 23.



Safety

WARNING!

Do not use the AC power supply if it is broken.



Do not use the AC power supply if the cable is damaged.

The ZigBee Gateway and ZigBee repeater kit and the AC power supply are for indoor use only and cannot be used in wet locations.

Chapter 2: ZigBee Gateway Interfaces

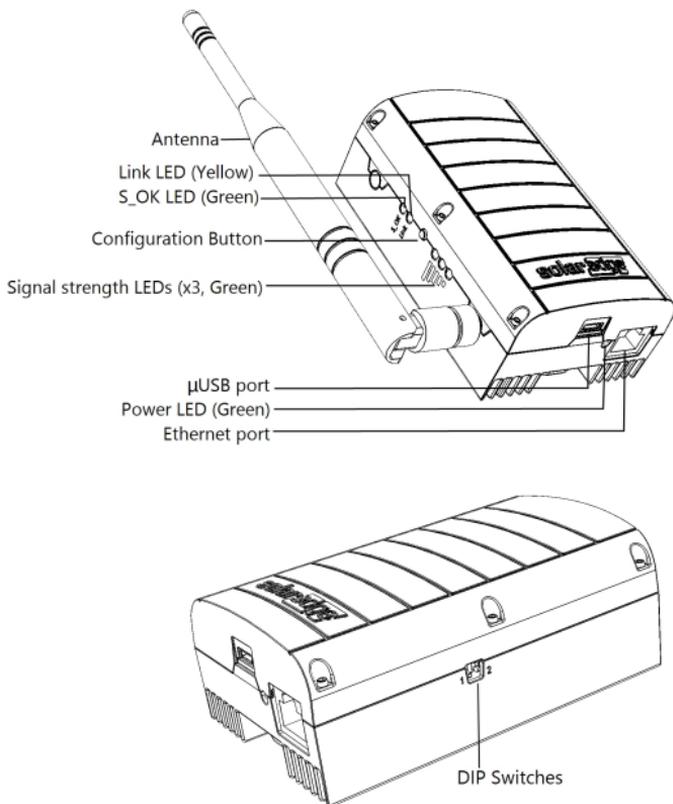


Figure 4: ZigBee Gateway interfaces

Connectors

- **μUSB:** Connection to the power supply. This port can also be used for connecting to a computer for advanced configuration or SW upgrade.
- **Ethernet:** Connecting the ZigBee Gateway to the monitoring platform through an Ethernet switch/router. The Ethernet switch/router should be connected to the Internet.

Configuration Button

The configuration button is used for the following:

Use	Method
Discovery of ZigBee Plug-in(s) in inverters and associating them with the ZigBee Gateway	Short press the configuration button for 5-10 seconds and release. The device discovery process starts.
Diagnosis of communication problems	Long press the configuration button for more than 10 seconds and release. The ZigBee Gateway enters diagnostics mode (refer to <i>Troubleshooting</i> on page 26.

LEDs

The ZigBee Gateway has LED indicators, as described in the figure and table below.

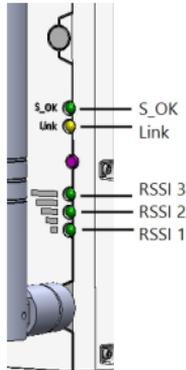


Figure 5: ZigBee Gateway LEDs

Label and Color	Indication	Functionality ⁽¹⁾
S_OK (green)	Connection with the SolarEdge monitoring platform	<p>ON - Connection with SolarEdge monitoring platform is OK</p> <p>OFF - Communication with the SolarEdge monitoring platform failed</p>
Link (yellow)	Communication with associated ZigBee Plug-in(s)	<p>Blinking - There has been ZigBee communication in the last 15 minutes. The LED blinks according to the number of slaves as follows: for each slave 0.5 sec. ON and 0.5 sec. OFF. This is repeated following a 5 sec. pause.</p>

(1) Functionality during normal operation. During device discovery and diagnostic mode, the LEDs indicate different functionality (see *Troubleshooting* on page 26).

Label and Color	Indication	Functionality ⁽¹⁾
		OFF - No communication with any slave in the last 15 minutes.
3x Signal strength (RSSI) (green)	Received Signal Strength Indication: Low/Medium/High	All 3 LEDs ON - High Two LEDs ON - Medium One LED ON - Low
Power (green)	Power	Power supply connected to the ZigBee Gateway

DIP Switches

Two DIP switches are located at the side of the gateway. They are used for internal configuration; therefore, their position should not be changed.

⁽¹⁾Functionality during normal operation. During device discovery and diagnostic mode, the LEDs indicate different functionality (see *Troubleshooting* on page 26).

Chapter 3: Installing the ZigBee Gateway

Installation Guidelines

The following requirements apply when locating and mounting the ZigBee Gateway:

- The ZigBee Gateway is suitable for mounting indoors only. For outdoor installation, use an external plastic outdoor enclosure (not provided by SolarEdge)
- The ZigBee Gateway must always remain in an ambient temperature of -20°C (-4°F) to $+60^{\circ}\text{C}$ (140°F).
- Protect the ZigBee Gateway from dust, wet conditions, corrosive substances, and vapors.
- Install the ZigBee Gateway on a wall or place it on the desk.

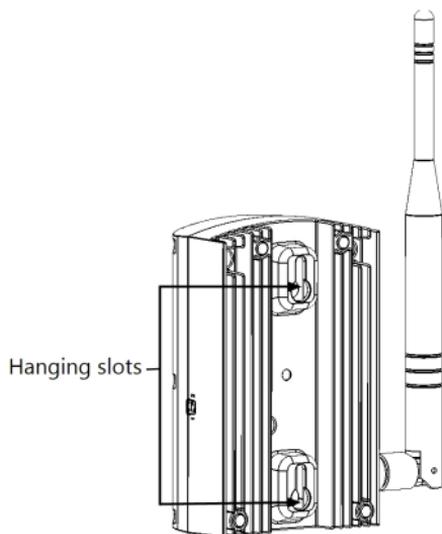


Figure 6: Wall Mount Option

- Ensure that the antenna is always vertically oriented.

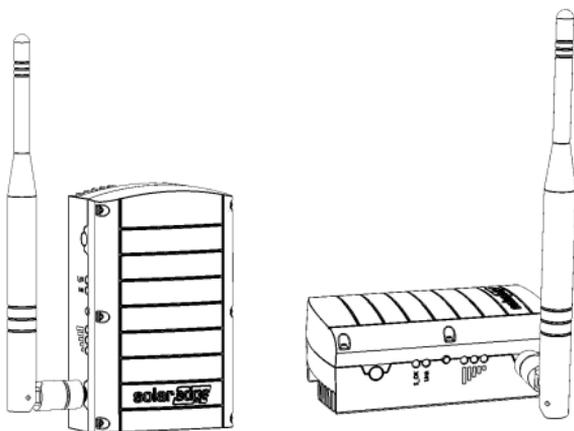


Figure 7: Antenna Orientation

Connecting the ZigBee Gateway

1. Install the supplied ZigBee Plug-in in the inverter as described in the *ZigBee Plug-in Installation Guide*. To connect multiple inverters, purchase additional ZigBee Plug-in kits for each inverter (sold separately).
2. Connect the power supply to the μ USB connector and connect to an AC source. The power LED is lit to indicate power connection.
3. Connect the Ethernet cable between the gateway connector and the router or switch used to connect to the Internet.

Configuring the Inverter to ZigBee Communication

1. Access SetApp as described in the inverter installation guide.
2. Select **Commissioning** → **Communication** → **ZigBee** → **Protocol** → **Multi-Point Slave**.

ZigBee		
Protocol	Multi-Point Slave	>
External PAN ID	5001A005	>
PAN-ID	F758	
Scan Channel	12	
Coordinate MAC	1	
Load ZigBee Default		>

3. Select **Status** and check that in the ZigBee section in the Communication section displays **MP Slave**. At this stage the screen also displays **M(Master) not found**.

Communication		
LAN Connected	RS485-1 SE Slave NC	RS485-2 Modbus 2 of 2
Cellular N/A	Wi-Fi NC	ZigBee MP Slave M not Found

Device Discovery

Press the configuration button on the ZigBee Gateway for 5-10 seconds and release after all LEDs have turned on. The ZigBee Gateway starts discovering the inverter(s). The device discovery may take 2-3 minutes, during which all the LEDs blink. The signal strength LEDs also light up (refer to *LEDs* on page 16).

Verifying the Connection

1. In SetApp select **Communication** and check that the **Server** menu is defined as **ZigBee Slave**.
2. Select **Status** and check that in the ZigBee section in the Communication section displays **MP Slave Connected**.

3. Verify that the S_OK LED is ON, which indicates the communication with the monitoring platform is established. This may take up to five minutes. If the LED does not light up, refer to *Troubleshooting* on page 26.
4. After device discovery, verify that the yellow (Link) LED blinks and indicates the correct amount of slaves, as described in the following illustration.

One inverter



Two inverters

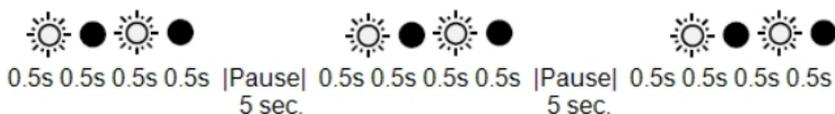


Figure 8: Example of LED blinks for one or two inverters

5. Verify signal strength: Check that at least two RSSI LEDs are ON, which indicates medium signal strength. If only one LED is ON, the signal strength is Low. Consider relocating the ZigBee Gateway closer to the inverter to improve reception. If all RSSI LEDs are OFF, place a ZigBee repeater (sold separately) between the ZigBee Gateway and the inverter. Refer also to *Troubleshooting Ethernet Connection* on page 26.

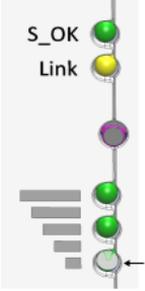
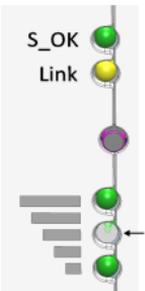
Appendix A: Troubleshooting

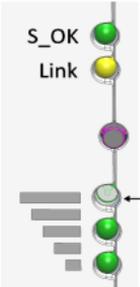
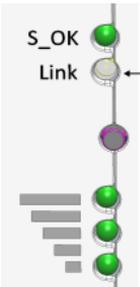
Troubleshooting Ethernet Connection

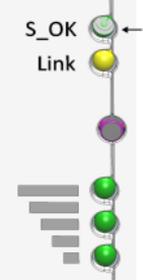
If the S_OK LED on the ZigBee Gateway is not ON, use the diagnostics mode to identify the error:

Press the ZigBee Gateway configuration button for more than 10 seconds and release it (after all LED turn on and then off while pressing). The ZigBee Gateway is now in diagnostics mode.

- If all LEDs light up – no error has occurred.
- If one of the LEDs is OFF, refer to the following table to diagnose the problem. If more than one problem is identified, diagnose the top one first.

LED is OFF (Label and Color)		Indication when OFF During diagnostic mode	Troubleshooting
RSSI 1 (Low, green)		An Ethernet physical cable connection fault: The Ethernet link or physical Ethernet cable are not connected properly	Check the cable pin-out assignment and cable connection
RSSI 2 (Medium, green)		The ZigBee Gateway failed to get a valid IP address from the DHCP server, or The DHCP/ static IP settings in the gateway are not the same as those of the router.	Use SetApp to disable the DHCP and configure the IP settings.

LED is OFF (Label and Color)		Indication when OFF During diagnostic mode	Troubleshooting
RSSI 3 (High, green)		The connection to the router is not available: Ping to the first local switch/router failed (LAN error)	Check the physical connection to the switch/ router. contact your network IT, otherwise replace the cable or change it from cross to straight connection.
Link (yellow)		The connection to the Internet is not available: Ping to google.com failed	Connect a laptop and use the configuration tool to check for internet connection. If internet access is unavailable, contact your IT admin or your internet provider.

LED is OFF (Label and Color)		Indication when OFF During diagnostic mode	Troubleshooting
S_OK (green)		The connection to the SolarEdge platform was not established: Communication with the server failed	Check the SolarEdge server address

Troubleshooting ZigBee Wireless Connection

Yellow LED (Link) does not blink after device discovery

If the yellow LED (Link) does not blink after device discovery, a connection error may have occurred. Try the following troubleshooting actions:

- Relocate the ZigBee Gateway closer to the inverter to improve signal strength.

- Disconnect the inverter from the AC source and check that the ZigBee Plug-in inside the inverter is in the correct orientation and that all its pins are inserted into their correct locations in the communication board, and no pins are left out of their socket.
- Place a ZigBee repeater (sold separately) between the ZigBee Gateway and the inverter. Refer to the *ZigBee Repeater Installation Guide*.

Yellow LED (Link) does not blink according to number of inverters

If the yellow LED does blink, however not the correct number of times (according to number of inverters), try the following troubleshooting actions:

1. Check the inverters as follows in order to identify a disconnected inverter:
 - a. Access SetApp and select **Communication** → **ZigBee** → **ZigBee slave**. A blue check mark appears in the ZigBee slave row indicating that a connection has been established.
 - b. In SetApp select **Status**. Check that S_OK appears in the Server field to indicate a functioning connection to the SolarEdge monitoring portal, which was validated

during the last two minutes. Check that the <OK> appears in the Status field.

If S_OK is not displayed, or **Gateway Not Found / Master Not Found** appear, then the inverter not detected. Do the following:

- Check that the ZigBee Plug-in inside the inverter is in the correct orientation and that all its pins are inserted into their correct locations in the communication board, and no pins are left out of their socket.
- Reload ZigBee defaults as described in the *ZigBee Plug-in Kit Installation Guide*.

2. Check the following:

- **MID:** check that an MID (Master ID) value appears, to indicate the identification number of the ZigBee Gateway. If ZigBee Ready appears, the inverter is not associated with the ZigBee Gateway. Perform device discovery.
- **RSSI:** check that H (High) or M (Medium) appears which indicates the signal strength. If L (Low) or no values appear, relocate the ZigBee Gateway for better signal reception, or use a repeater.

Appendix B: Technical Specifications

Compatible Inverters	Inverters with SetApp configuration		
Number of devices that can be monitored	1-15		
Performance	North America	Worldwide	Unit
Transmit power	22.8	11.8	dBm
Receiver sensitivity	-102		dBm
EIRP with antenna	27.8	16.8	dBm
Outdoor (LOS) range ⁽¹⁾	400/ 1300		m/ft
Indoor range ¹	50/ 160		m/ft
Operating frequency range	2.4 - 2.5		GHz
Bandwidth	2		MHz
Modulation	O-QPSK with DSSS coding		
Maximum emitted power	≤ 30	≤ 20	dBm
Antenna gain	5		dBi

⁽¹⁾Approximate values, may differ depending on specific installation conditions

Environmental		
Operating temperature	-20 to +60 / -4 to 140	°C/°F
Storage temperature	-20 to +60 / -4 to 140	°C/°F
Relative humidity (non condensing)	0 to 80	%
Ingress protection	IP20	
Power Supply Requirements		
Voltage	5	V
Current	1	A

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