



Installation Guide

Smart Energy Hot Water

For Europe, APAC and South Africa

Version 2.1

Disclaimers

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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.

Contents

- Disclaimers** 1
- Important Notice 1
- Emission Compliance 2
- Overview** 5
- Installation** 9
- Connection** 11
- Configuration** 14
- Configuration with Inverters with LCD Screen 14
- Configuration with Inverters with SetApp 18
- Modifying the Device Operation Mode and Schedules 20
- Verifying the Connection 21
- Button Functionality 21
- LED Indications 23
- Troubleshooting 24
- Mechanical specifications** 27
- Specifications** 28
- Support Contact Information** 30

Revision History Immersion Heater

- August 2019 - Added SetApp section

Overview

The SolarEdge Smart Energy solutions allow increasing the self-consumption of a site. One method used for this purpose is controlling the usage (consumption) of loads using Smart Energy products.

The Smart Energy devices divert power to an appliance (load) according to pre-configured schedules, using the following modes:

- **Schedule** - The device turns on and off at times set by the user for the user's convenience, regardless of available PV power.
- **Smart Save** - The device (typically a boiler or water pump) is controlled automatically to maximize self-consumption. Grid power is used only if PV power is insufficient to meet the user's "Ready by" time. For example, to heat water for 2 hours and have hot water by 18:00, set the **Duration** to 2 hours and **Ready-by** to 18:00. The boiler may work before 16:00 if there is available PV power, but in any case you are guaranteed to have hot water by 18:00.

Refer to *Figure 2* for examples of the device modes of operation.

You can re-configure the schedules at any time and manually switch appliances on and off.

You can configure the Smart Energy products locally through the inverter, or remotely via the monitoring platform (or monitoring smartphone app).

The Smart Energy Hot Water (referred to as "the device" throughout) is a Smart Energy product that diverts excess energy produced by the PV system to a load, normally a hot water heater. The device saves energy and reduces utility bills by storing energy as hot water during the day when surplus energy is high, and providing free hot water later on in the day.

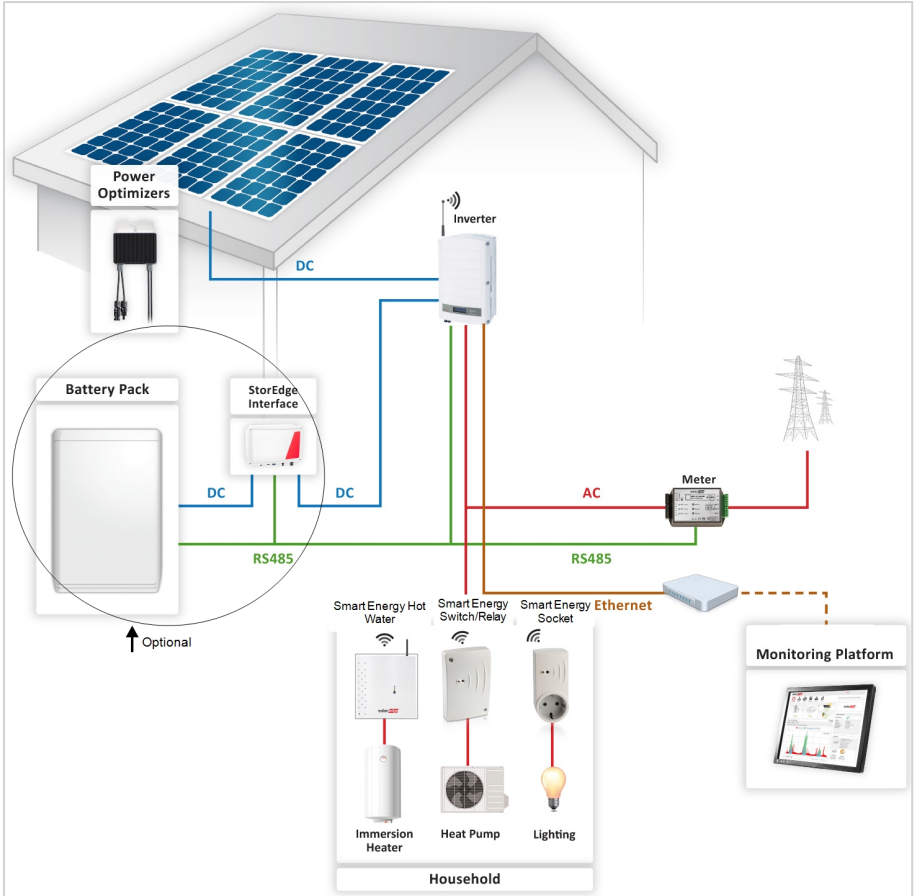


Figure 1: SolarEdge system with Smart Energy products

The following figure illustrates a typical example of device operation with Smart Save and Schedule modes. Note that in Smart Save mode, the consumption is reduced by taking advantage of excess PV earlier in the day.

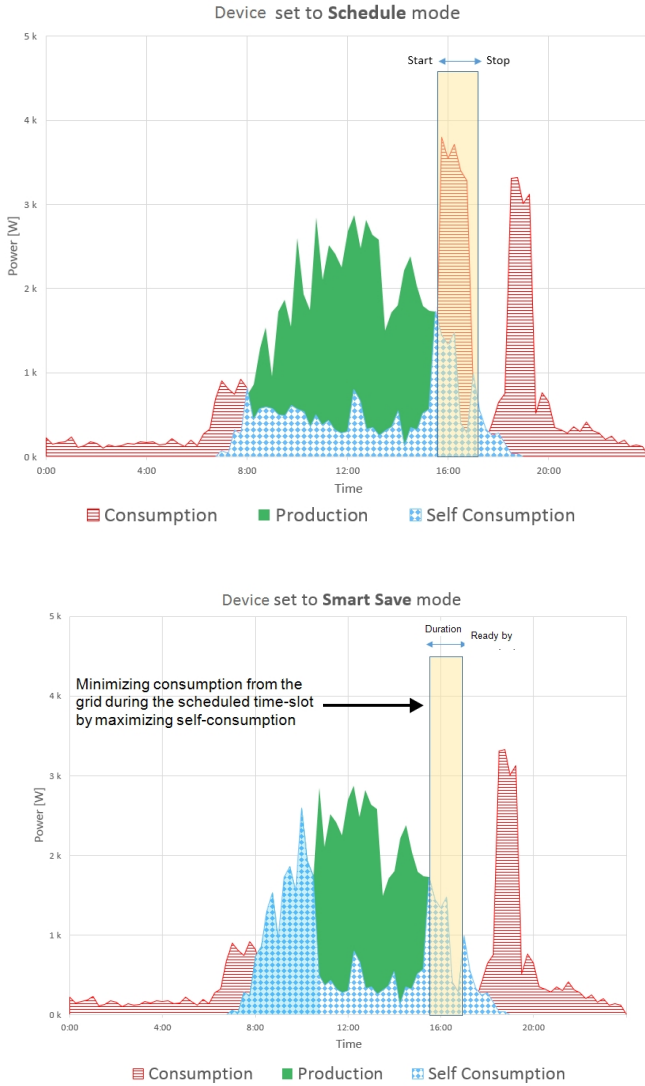


Figure 2: Examples of device operation

To enable the Smart Energy Hot Water functionality, the following supporting devices must be installed:

■ Energy Meter:

- Energy Meter with Modbus Connection. Refer to:

<http://www.solaredge.com/files/pdfs/solaredge-meter-installation-guide.pdf>

or

<http://www.solaredge.com/files/pdfs/solaredge-meter-installation-guide-na.pdf>

- Energy Meter with Cellular Connection. Refer to

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

■ ZigBee Plug-in for Smart Energy. Refer to:

<https://www.solaredge.com/sites/default/files/se-device-control-zigbee-module-installation-guide.pdf>

<https://www.solaredge.com/sites/default/files/se-zigbee-plug-in-for-setapp-installation-guide.pdf>

Installation

**CAUTION!**

To avoid damage to electrical equipment, connect only purely resistive loads/appliances to the Smart Energy Hot Water.

CAUTION!

- This product must be operated under the specified operating specifications, as described in the latest technical specification datasheet.
- This product must be used with immersion heaters that include a thermostat that shuts off the power when reaching the required temperature.
- Configure the product so that the load connected is not switched on or off more frequently than specified by the load manufacturer.



- Do not connect loads that require a continuous current supply (e.g. fridge, freezer).
- Do not use the product if it is damaged or malfunctioning.
- Never connect loads that can cause injuries or fire if they are switched on unintentionally (e.g. an iron).
- Do not let the product come into contact with water or other liquids.
- The enclosed documentation is an integral part of this product. Keep the documentation in a convenient place for future reference and observe all instructions contained therein.

NOTE

It is recommended to install a 2-pole magneto-thermal switch breaker between the AC cables coming from the mains and the AC cables going to the immersion heater.

Package Contents

- Smart Energy Hot Water device, including antenna
- This installation guide

Installation Procedure

1. Remove the device cover: Release the four screws attaching the cover to the enclosure.

2. Remove the antenna taped inside the enclosure and install it at the top of the device.
3. Determine the device mounting location on the wall, as follows:
 - To allow proper heat dissipation, maintain a minimum clearance of 7 cm to the top and bottom of the device.
 - Maximum distance from the inverter⁽¹⁾ (or closest Smart Energy Device (with ZigBee in the network): 50 m when the device is installed indoors.
4. Position the device against the wall and mark the drilling hole locations. Do not use the device as a drilling template as it may damage the enclosure.
5. Drill the holes and mount the device using screws and nuts. Fasten the unit to the wall. Do not install the device cover at this stage.

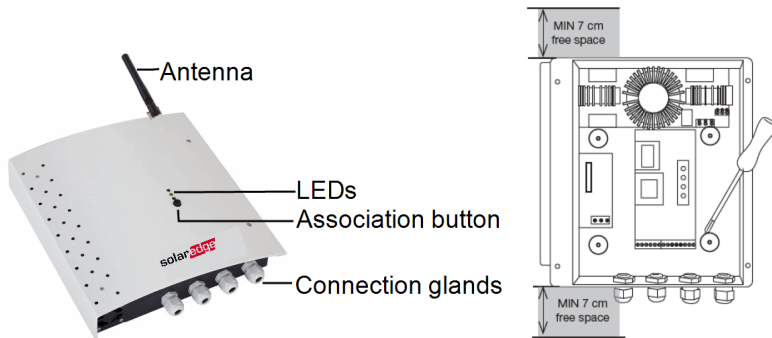


Figure 3: Smart Energy Hot Water installation

⁽¹⁾Approximate values. May differ depending on specific installation conditions.

Connection

Guidelines

- Make sure that power is disconnected from the main distribution panel.
- Connect the device through a 2-pole magneto-thermal switch breaker in the AC distribution panel.
- Use a 3-core cable with a minimum wire cross section of 2.5 mm².
- Use the connection gland suitable for the cable diameter (6 - 12 mm or 4 - 8mm).
- Use the following cable types for power supply:
 - Rubber sheathed, H05RR-F of type HD 22.4
 - PVC sheathed, H05W-F of type HD 21.5
- Refer to *Figure 4*.

Connecting the Device

CAUTION!



Do not connect the device *output* (labeled A & B) to the grid, as this will damage the product. Connect the AC grid to the designated *input* only (see *Figure 4*).

1. Turn OFF the AC circuit breaker of the main distribution panel.
2. Insert the AC cable coming from the mains through the right-most gland.
3. Insert the wire coming from the mains and going to L (line) through the current transformer (CT). Make sure the arrow inside the CT is pointing towards the mains.
4. Connect the wires to the terminal blocks according to the labels.
5. Insert the cable from the immersion heater through the left gland and connect the wires according to labels on the terminal block .

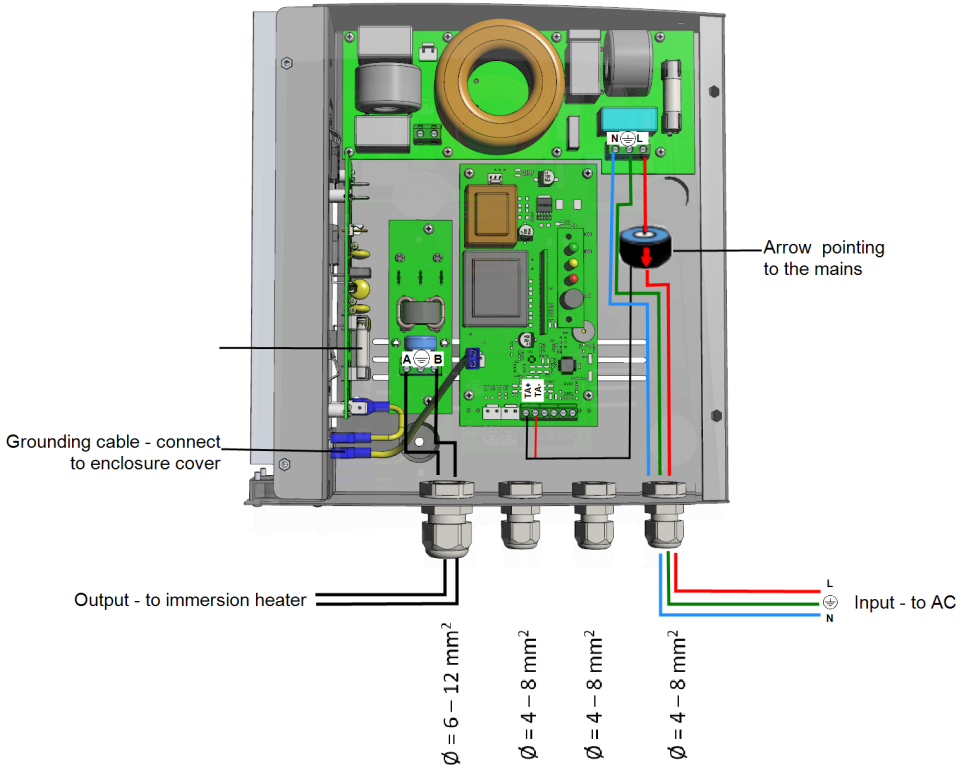


Figure 4: Smart Energy Hot Water connections

6. Install the device cover and connect to ground:
 1. Connect the grounding cable from the device to the connector on the cover .
 2. Close the device cover: Use the supplied screws to attach the cover to the device.

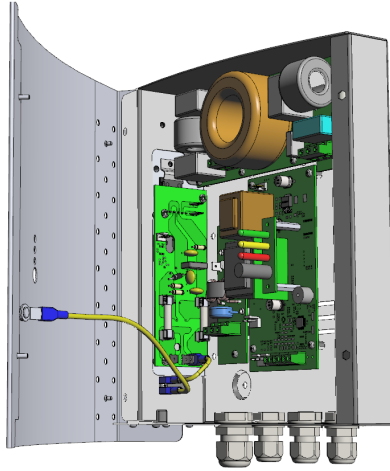


Figure 5: Grounding cable connected to the cover

7. Turn ON the AC circuit breaker of the main distribution panel.

Configuration

Smart Energy is configured in the inverter, as described herein.

Smart Energy is supported for the following:

- Inverters with LCD screen - from firmware version 3.24xx. Refer to *Configuration with Inverters with LCD Screen* on page 14.
- Inverters with SetApp configuration - from firmware version 4.5.xx. Refer to *Configuration with Inverters with LCD Screen* on page 14.

For detailed information about various use cases, refer to https://www.solaredge.com/sites/default/files/home_energy_management_immersion_heater_controller_use_cases_app_note.pdf.



NOTE



Verify that the inverter has a ZigBee Plug-in installed and is connected to the monitoring platform (refer to the *Inverter Installation Guide* for details on setting up communication).

Configuration with Inverters with LCD Screen

Required inverter Firmware CPU version : v3.24xx and later.

→ To associate the device with the inverter using the inverter LCD user buttons:

1. Enter the inverter Setup mode as described in the *Inverter Installation Guide*.
2. Select **Communication** → **ZigBee Conf.**
3. Select:
 - **Device Type** → **HA** (Home Automation)
 - **Protocol** → **HAM** (Home Automation)

When HA Device Type is selected, a **Device Manager** menu item will appear in the main configuration menu:

```
Country <Italy>
Language <Eng>
Communication
Power Control
Display
Maintenance
Information
```

4. From the main menu select **Device Manager**. The Device Manager screen is displayed:

```
Add Devices < 0 >
```

5. Select **Add Devices** to start the device association with the inverter.
6. Hold the ON/OFF/P switch of the Smart Energy Hot Water device to the left for more than 5 seconds.

The Device Manager LCD screen should display a new line for each discovered device, including the 3 last digits of its serial number, operating mode and operating state. Discovery time may take up to 3 minutes. You can press the inverter LCD light button or the internal ESC button to exit the discovery process when all devices are discovered.

```
Add Devices < 3 >
SE-REG xxx < Auto, OFF >
SE-REG-36xx < Auto, OFF >
SE-SW xxx < Man, OFF >
SE-S-PLGxxx < Man OFF >
Remove All
```

Device types:

- SE-SW - Smart Energy Relay
- SE-S-PLG - Smart Energy Socket
- SE-S-SW - Smart Energy Switch

7. Select the device. The device configuration screen is displayed:

```
Mode < Manual >
State < OFF >
Device Info
Remove Device
```

For the following device configuration steps, you can use either the inverter LCD buttons or the monitoring platform/ app. The steps herein show configuration using the inverter LCD.

For configuring using the monitoring platform, refer to

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



8. Select **Mode**. The mode configuration screen is displayed:

```
Manual
Auto
```


- **Manual** - turns the device to ON or OFF, as described below
- **Auto** - allows setting two types of schedules for Home Energy Management, as described in the next sections:
 - **Smart Save** - set the device operation requirements (ReadyBy and Duration values). This mode is useful for maximizing self-consumption using excess PV power: the device operates autonomously based on configured settings.
 - **Schedule** - set the device start and stop times regardless of available excess PV power.

→ To set **Manual mode**:

1. Select **Mode** → **Manual**
2. Select **ON** or **OFF** to turn the device on or off.

→ To set **Auto mode**:

1. Select **Auto**. The following screen is displayed, showing options for setting the device parameters:

```
Mode <Auto>
Use Excess PV <Y>
Add Schedule
Device Properties
Device Info
Remove Device
```

2. Select **Device Properties** and set the following properties:

```
Load Rating <x.xKW>
Min On Time <xxx>
```

- **Load Rating** - the rated power (in kW) of the appliance (immersion heater)
- **Min ON Time** - (optional); the minimum duration (in minutes) the appliance should remain ON once switched on, even when no excess PV power is available. The default value is 5 minutes.

3. Select **Use Excess PV**. The following screen is displayed:

```
Set <Yes>
Week Days <1234567>
```

- **Set <Yes/ No>** - automatically divert the excess PV to the device (default: Yes).
- **Week Days <optional>** - days to repeat the settings (default: every day).

4. Select **Add Schedule**. The following screen is displayed, showing schedule setting options. You can configure up to four different schedules.

```
Smart Save  
Schedule  
Disable  
Remove Schedule
```

Use **Disable** to deactivate a schedule or **Remove Schedule** to delete it.

5. Select and set one of the scheduling options:

■ **Smart Save:**

```
Set <Smart >  
Ready by <00:00 >  
Duration <00 >
```

- **Ready by** - requested energy must be diverted to the load by this time (default: 00:00; format: hours:minutes).
- **Duration** - minimum accumulated time the load must remain on (in minutes; default: 00).



NOTE

The actual accumulated time the load remains on may be longer due to diversion of excess PV energy.

■ **Schedule:**

```
Set <Schedule >  
Start Time <00:00 >  
End Time <00:00 >  
Week Days <1234567 >
```

- **Start/End Time** - the time of day by which the Smart Energy Hot Water must start/ complete its task of delivering energy to the load (default: 00:00; format: hours:minutes). If these values are not set, only the excess PV power is used.
- **Week Days** (optional) - days to repeat the settings (default: every day).

NOTE



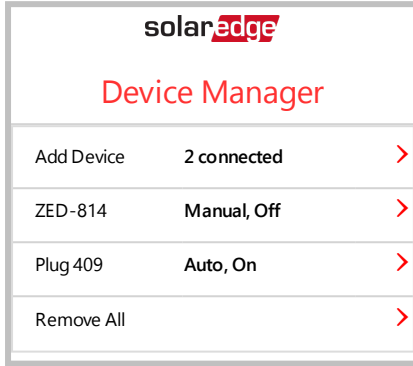
In Auto mode, if you configure overlapping time-frames between Schedule and Smart Save options, Schedule mode takes precedence over the Smart Save mode.

Configuration with Inverters with SetApp

Required inverter Firmware CPU version : v4.5xx and later.

→ To associate the device with the inverter using SetApp:

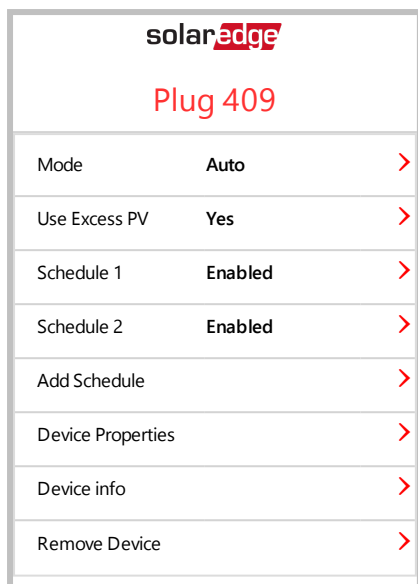
1. Access SetApp as described in the *Inverter Installation Guide*.
2. Select **Commissioning** → **Communication** → **Device Manager**. The Smart Energy Manager screen is displayed:



3. Select **Add Devices** to start the device association with the inverter.
4. Hold the ON/OFF/P switch of the Smart Energy Hot Water device pressed to the left for more than 5 seconds.

The Smart Energy Manager screen should display a new line for each discovered device, including the 3 last digits of its serial number, operating mode and operating state. Discovery time may take up to 3 minutes. You can tap the **Stop** button to exit the discovery process when all devices are discovered.

5. Select the device from the list. The device configuration screen is displayed (menus vary depending on the device type):



6. Select **Mode**. The mode configuration screen is displayed. Select one of the following:
 - **Manual** - turns the device to ON or OFF
 - **Auto** - allows setting two types of schedules for Home Energy Management, as described in the next sections:
 - **Smart Save** - set the device operation requirements (ReadyBy and Duration values). This mode is useful for maximizing self-consumption using excess PV power: the device operates autonomously based on configured settings.
 - **Schedule** - set the device start and stop times regardless of available excess PV power.
7. Select **Use Excess PV**. Set the following:
 - Select <Yes/ No> - automatically divert the excess PV to the device (default: Yes).
 - **Week Days** <optional> - days to repeat the settings (default: every day).
8. If you selected the Auto option, select **Schedule 1** and edits the schedule settings as necessary. Use **Disable** to deactivate a schedule or **Remove Schedule** to delete it. You can configure up to four different schedules.
9. Select and set one of the scheduling options:

Smart Save:

- **Ready by** - requested energy must be diverted to the load by this time (default: 00:00; format: hours:minutes).
- **Duration** - minimum accumulated time the load must remain on (in minutes; default: 00).



NOTE

The actual accumulated time the load remains on may be longer due to diversion of excess PV energy.

Schedule:

- **Start/End Time** - the time of day by which the Smart Energy Hot Water must start/ complete its task of delivering energy to the load (default: 00:00; format: hours:minutes). If these values are not set, only the excess PV power is used.
- **Week Days** (optional) - days to repeat the settings (default: every day).

10. To use multiple schedules select **Add Schedule** and edit the settings.

11. Select **Device Properties** and set the following properties:

- **Load Rating** - the rated power (in kW) of the appliance (immersion heater)
- **Min ON Time** - (optional); the minimum duration (in minutes) the appliance should remain ON once switched on, even when no excess PV power is available. The default value is 5 minutes.

Modifying the Device Operation Mode and Schedules

You can re-configure the device operation mode and schedules at any time:

To	Do this
Manually turn the load on or off	Select the device from the Device Manager screen. Select Mode → Manual and set the device to either ON or OFF .
Modify the schedule configuration	Select the device from the Device Manager screen. Select Mode → Auto and set the parameters of any menu: Smart Save/Schedule .
Disable or delete a schedule	Select Disable or Remove Schedule from the Schedule screen.
Disconnect the device(s) from the network	Select Remove Device or Remove All from the device screen.

Verifying the Connection

1. Check the status screens:

- HA devices status, showing the device name and state: ON, OFF, or an asterisk (*), which indicates no communication with the device:

```
HA Devices Status:
REG 011 <ON >
```

- Communication status, showing the number of communicating HA devices (under Prot) and the number of detected devices (under ##):

```
Dev Prot ##
RS485-1 <--> <--> <->
ZigBee <HA> < 1> <1>
```

2. To check the device details, from the device configuration screen, select **Device Info**. The following screen is displayed:

```
MAC: xxxxxxxxxxxxxx
Last seen: <DD:HH>
MFG: SolarEdge
Power [W]: 0
```

- MAC:** the full MAC address of the device
- Last seen:** The date and time when the device communicated with the inverter
- MFG:** The device manufacturer
- Model:** The device model type
- Power [W]:** The energy delivered to the load

Button Functionality

The following table describes the device button functions depending on the network association state:

Network state	Pressing duration	Result
No ZigBee association with the inverter	Any	Attempting to associate with the network
ZigBee associated with the inverter	Up to 3 seconds (short press)	Switching the device to " <i>Boost mode</i> ", in which the device delivers the maximum power to the load (according to the rate power of the heater), overriding any programmed mode like Schedule or Smart Save. The device returns to its previous operating mode after an hour, or if the button is short-pressed again within an hour. During this mode the red LED is on.
	More than 3 seconds (long press)	Disconnecting from the network, however not removing the device from the list of devices. An asterisk (*) next to the device name in the device manager indicates it is not communicating. The green LED turns off. Re-associating the device will load the previous configuration so re-configure is not required.

LED Indications

The device has three LEDs that provide information about the device operation status:


LED color	Indication
Green	<p>ON -The device is associated with the inverter</p> <p>Flashing slow - Reset</p> <p>Flashing fast - Association in process</p> <p>OFF - The device is not associated</p>
Yellow	<p>ON - The device is delivering the maximum power to the load</p> <p>OFF - The device is not delivering any power to the load</p> <p>Flashing - The device is delivering intermediate power</p>
Red	<p>ON - The device is in controlled locally. "Boost" mode is active, delivering the maximum power to the load for 1 hour</p> <p>OFF - The device is controlled remotely. "Boost" mode is inactive.</p>

When the device is initially switched on all its LEDs remain ON for two seconds, then they flash quickly for two seconds.

Troubleshooting

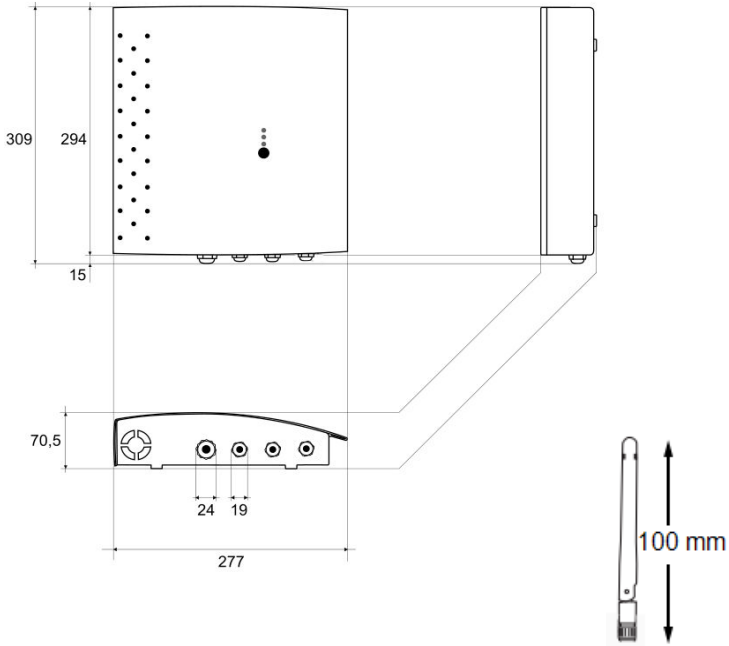
Symptom / Error	Possible cause	Troubleshooting
<ul style="list-style-type: none"> An asterisk (*) is displayed next to the Device type in the device manager screen indicating that the device is not communicating. In the Communication status screen, the number of detected devices does not match the number of communicating devices. The device is powered on but the green LED is OFF 	The device is not associated with the inverter	<p>Try to solve using these options. If problem is not solved, proceed with the next option:</p> <ul style="list-style-type: none"> Turn the device OFF and ON. Recheck communication. Reset the device by pressing the button for more than 10 seconds and then repeat the association process. Reconfiguration is <i>not</i> required. From the Device Manager screen select Remove Device and repeat the discovery process. Reconfiguration is required in this case. Contact SolarEdge support.
The device is powered on and the green LED is ON	The device is Associated with the inverter but is not communicating.	
All the devices are not communicating	No ZigBee error is displayed on the inverter LCD - The inverter has not detected the installed ZigBee Plug-in.	<ul style="list-style-type: none"> Turn OFF the AC to the inverter Check that the ZigBee Plug-in is inserted correctly inside the inverter. Turn ON the AC to the inverter

Symptom / Error	Possible cause	Troubleshooting
<p>No hot water.</p>	<p>Network problems</p>	<p>Try to solve using these options. If problem is not solved, proceed with the next option:</p> <ul style="list-style-type: none"> • Check the ZigBee status screen: Verify that PAN has been established and Channel is not 0 <div data-bbox="636 376 972 497" style="border: 1px solid #ccc; padding: 5px; margin: 10px 0;"> <pre>PAN : X X X X X CH : X X / X X X X R S S I : < L > MID : X X X X X X</pre> </div> <ul style="list-style-type: none"> • Turn the inverter OFF and ON (power cycle). • Reset all the devices using the association button and begin the discovery process again for all devices. • From the Device Manager screen select Remove All and repeat the discovery process for all the devices. • Contact SolarEdge support.
	<p>The device is associated with the inverter (green LED is on) but not delivering power to the load.</p>	<p>Try to solve using these options. If problem is not solved, proceed with the next option:</p> <ul style="list-style-type: none"> • Check that the circuit breaker is ON and if there is an ON/OFF manual switch in series with the Smart Energy Hot Water it should be turned ON. • Check the configured schedules to verify device should in fact deliver power. • Check that the load is connected properly. • Turn the device OFF and ON. recheck communication. • Reset the device by pressing the button for more than 10 seconds and then repeat the discovery process. Reconfiguration is <i>not</i> required.

Symptom / Error	Possible cause	Troubleshooting
		<ul style="list-style-type: none"> From the Device Manager screen select Remove Device and repeat the discovery process. Reconfiguration is required in this case. Contact SolarEdge support.
Error message Device limit reached. Remove devices from the device list is displayed in the LCD.	You are attempting to associate more than 10 devices to the load management network.	Remove an unused device from the device list before attempting to add another device.
The device is not functioning	One of the fuses is blown	<ol style="list-style-type: none"> Turn the inverter ON/OFF switch to OFF. Wait 5 minutes for the capacitors to discharge. Disconnect the AC to the system by turning OFF the main circuit breakers on the distribution panel. <p>WARNING!</p> <p> ELECTRICAL SHOCK HAZARD. Do not touch uninsulated wires when the device cover is removed.</p> <ol style="list-style-type: none"> Open the device screws and remove the cover. Check the fuses using a multimeter. If blown, replace the fuse. Check that all the wires are correctly and firmly connected before returning the cover. Return the cover and fasten the screws. For further assistance, contact SolarEdge Support.

Mechanical specifications

Mechanical specifications (mm):



Specifications

ELECTRICAL SERVICE		
Operating Voltage Range	207 - 253 EU 207 - 264 AUS	Vac
AC Frequency	50	Hz
Supported Grids	L/ N/ PE	
Maximum Supported Load Size	3 EU 3.6 AUS	kW
Maximum Load Current Rating	13 EU 16 AUS	A
Minimum Output Power	2% of load rating	
Load Type	Resistive	
Efficiency	> 97	%
COMMUNICATION		
Supported Communication Protocol	ZigBee Home Automation	
Device Configuration	Via the monitoring app; Ethernet connection is required ⁽¹⁾	
Nominal Transmit Power	10	dBm
Operating Frequency Range	2.4 - 2.5	GHz
LOS Range	400	m
Indoor Range ⁽²⁾	50	m
STANDARD COMPLIANCE		
Radio	ETSI EN 300 328 V 1.8.1, ETSI EN 301 489-1, ETSI EN 301 489-17	
Safety	EN 60730-2-11:2006	
Immunity	EN 61000-6-3, EN 55014-1, EN 55014-2	
Emissions	EN 61000-6-2, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1	

⁽¹⁾Cellular connection may be used; requires a SIM card with a 1GB data plan that should be purchased from a cellular provider

⁽²⁾Approximate values. May differ depending on specific installation conditions.

INSTALLATION SPECIFICATIONS		
Dimensions (H x W x D)	277 X 309 X 70.5	mm
Weight	3.9	kg
Operating Temperature Range	-5 to +40	°C
Cable Gland Diameters ⁽¹⁾	2 glands 6-12, 2 glands 4-8 1 gland 6-12, 3 glands 4-8	mm
Terminal Block Minimum Wire Cross Section	2.5	mm ²
Protection Rating	IP20	
Mounting Type	Wall mount	

(1) Cable in the PG13.5 - nominal cable diameter from 6 to 12mm, torque 0,1N*m; Cable in the PG 9 - nominal cable diameter from 4 to 8mm, torque 0,1N*m.

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 SetApp mobile application 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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