Plug-In Socket with Meter Installation Guide

Overview

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

The SolarEdge Device Control units divert power to an appliance (load) according to pre-configured schedules, using the following modes:

- **Schedule** - The product diverts power to the load during the configured time-slots, using excess PV power or, if none is available, using grid power.
- **Smart Save** - The product begins diverting power to the device once there is excess PV power, even prior to the configured time-slots, to maximize self-consumption and minimize consumption from the grid during the scheduled time-slot.

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 Device Control products locally through the SolarEdge inverter or remotely, via the SolarEdge monitoring portal.

The SolarEdge Plug-In Socket (referred to as "the device") is a ZigBee wireless AC switch with a built-in energy and power-consumption meter that provides power measurements up to 2.5kW. Based on these measurements and on the system configuration it switches the loads on and off.
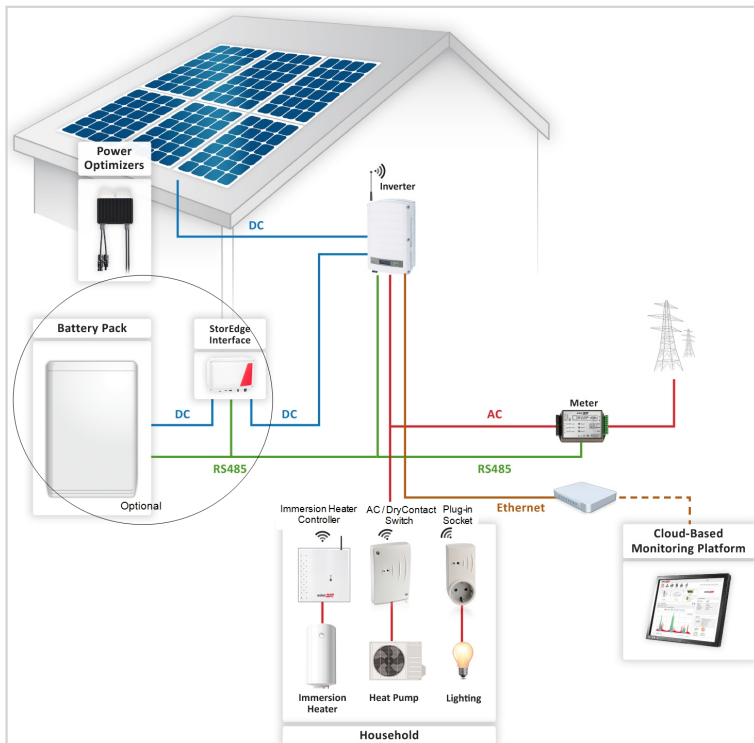

Figure 1: SolarEdge system with Device Control products

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.
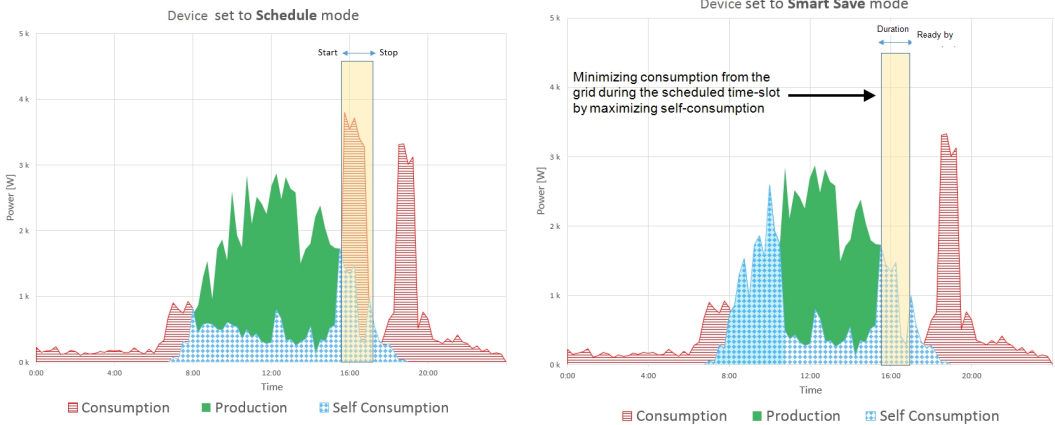

Figure 2: Examples of device operation

To enable the Plug-in socket functionality, the following supporting devices must be installed:

- Device Control ZigBee Module, installed inside the inverter. For physical installation refer to http://www.solaredge.com/sites/default/files/se-device-control-zigbee-module-installation-guide.pdf.
- SolarEdge Modbus Meter. Refer to http://www.solaredge.com/files/pdfs/solaredge-meter-installation-guide.pdf
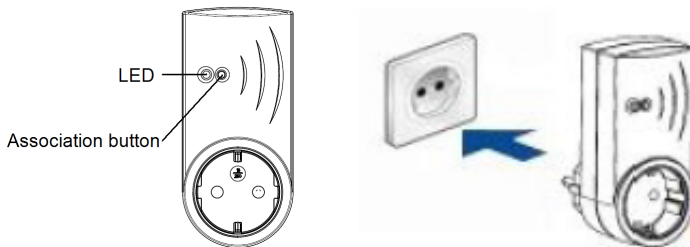
Installation

Figure 3: The Plug-in Socket

CAUTION!

- This product must be operated under the specified operating specifications, as described in the latest technical specification datasheet.
- 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.

Plug the device into a wall socket , at a maximum distance of 50 m from the inverter.

Configuration

NOTE

Verify that the inverter is connected to the monitoring portal (refer to the *Inverter Installation Guide* for details on setting up communication).

► To associate the device with the ZigBee network:

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)

```
Device Type<HA>
Protocol<HAM>
PAN ID
Scan Channel
Load ZB Defaults
```

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. Press the association button on the Plug-in socket (see *Figure 1*).

The Device 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 press the inverter LCD light button or the internal ESC button to exit the discovery process when all devices are discovered.

```
Add Devices <3>
Reg xxx <Auto, OFF>
SE-SW xxx <Man,OFF>
SE-S-PLG xxx <Man,OFF>
Remove All
```

Device types:

- **REG** - Immersion heater controller
- **SE-SW** - Dry contact switch
- **SE-S-PLG** - Plug-in socket
- **SE-S-SW** - AC switch with meter

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 portal. The steps herein show configuration using the inverter LCD.

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 device control, as described in the next sections:
  - ○ **Smart Save** - set the device operation requirements (ready-by 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>
Add Schedule
Device Properties
Device Info
Remove Device
```

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

```
Load Rating <x.xKW>
Export TH <xxxxW>
Import TH <xxxxW>
Min On Time <xxx>
```

- **Load Rating** - the appliance rated power (in kW)
- **Export TH** (threshold) - optional; the minimum power (in W) above which the excess PV power will be diverted to the appliance. This value can be lower than the load rating. The default value is 5% above the Load Rating.
- **Import TH** (threshold) - optional; the maximum power (in W) purchased from the grid and diverted to the appliance. The default value is 5% of the Load Rating.

NOTE

If changing the Export TH and Import TH default values, make sure they sum up to a value that equals or greater than the appliance Load Rating value. Otherwise, the device will turn off when there is insufficient power to divert to the appliance.

- **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 1 minute.

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

```
Smart Save
Schedule
Disable
Delete
```

Use **Disable** to deactivate a schedule or **Delete** to remove it.

4. Select and set one of the scheduling options:

- **Smart Save**:

```
Set<Smart>
Ready by <00:00>
Duration <00>
Max Duration <00>
Week Days<1234567>
```

- ○ **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).
- ○ **Max Duration** - maximum accumulated time the load can be on throughout the day (in minutes; default: 00).

  If the value of *Max Duration* is longer than the value of *Duration,* the device will use up only excess PV energy in the difference time. For example, if Max Duration = T1 and Duration = T2, during (T1-T2) only excess PV power will be used.
- ○ **Week Days** (optional) - days to repeat the settings (default: every day).

- **Schedule**:

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

- ○ **Start/Stop Time** - the time of day by which the Plug-in socket 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.

Once the installation process is complete you can re-configure the device operation mode and schedules.

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 **Delete** 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  State:
   SE-S-PLG 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: xxxxxxxxxx
   Last seen:<DD:HH>
   MFG: SolarEdge
   Model: SE-S-PLG
   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

LED Indications

The device has a bi-color LED (red/ green) that provides information about its operation status:

LED function	Indication
Solid green (2 seconds), flashing green (2 seconds)	Reset
Flashing red	No ZigBee association with the inverter
Flashing green	ZigBee association in process
Solid green	ZigBee association completed and the relay is closed
Solid red	ZigBee association completed and the relay is open

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	Attempt to associate with the network
ZigBee associated with the inverter	Up to 3 seconds (short press)	Manually toggle ON/OFF state (manual mode). To return to Auto/Scheduled states, configure the device using the mobile application or monitoring portal.
	More than 10 seconds (long press)	Disconnect from the network (the LED turns red and the device resets).
	3 - 10 seconds	Start a discovery search for nearby devices. The discovery may take up to 3 minutes during which the device is not functional. Not required for normal operation.

Troubleshooting

Symptom / Error	Possible cause	Troubleshooting
○ 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	Try to solve using these options. If problem is not solved, proceed with the next option: ○ 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 *not* 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 module.	○ Turn OFF the AC to the inverter. ○ Check that the ZigBee module is inserted correctly inside the inverter. ○ Turn ON the AC to the inverter.
	Network problems	Try to solve using these options. If problem is not solved, proceed with the next option: ○ Check the ZigBee status screen: Verify that PAN has been established and Channel is not 0:

Symptom / Error	Possible cause	Troubleshooting
| | | ```
PAN:XXXXX
CH:XX/XXXXRSSI:<L>
MID:XXXX  XX
```<br><br>○ Turn the inverter OFF and ON (power cycle).<br>○ Reset all the devices using the association button and begin the discovery process again for all devices.<br>○ From the Device Manager screen select **Remove All** and repeat the discovery process for all the devices.<br>○ 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 managemnt network. | Remove an unused device from the device list before attempting to add another device. |

Specifications

ELECTRICAL SERVICE	SEHAZB-SCKT-MTR-XX[1]	
Operating Voltage Range - Line to Neutral	90 - 250	Vac
AC Frequency	50/60	Hz
Maximum Active Power Measurement	2.5	kW
Maximum Load Current	13	A
COMMUNICATION		
Supported Communication Protocol	ZigBee Home Automation	
Nominal Transmit Power	3	dBm
Operating Frequency Range	2.4 - 2.5	GHz
Outdoor (LOS) Range	100	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 60335-1, EN 60335-2-30, EN 50371	
Immunity	EN 55014-2	
Emissions	EN 55014-1, EN 61000-3-2, EN 61000-3-3	
INSTALLATION SPECIFICATIONS		
Operating Temperature Range	0 to +50	°C
Protection Rating	IP30	
Dimensions (H x W x D)	110 x 50 x 40	mm

[1]Multiple plug types for various sockets: XX = GB, DE, FR, IT
[2]Approximate values. May differ depending on specific installation conditions.