



Installation Guide

**Three Phase System with  
SetApp Configuration  
with SetApp Configuration**

For Europe and APAC

Version 1.4

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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.

# Revision History

## Version 1.4 (June 2020)

- Activating, Commissioning and Configuring updated.

## Version 1.3 (May 2020)

- Modified the procedure for disconnecting the DC power and deleted the introduction in the Safe DC Appendix.
- The inverter can be connected in parallel with a generator.
- Modified Power Optimizer Guidelines section: Length of home - run cables maximum values , Extension cables rules, Power optimizer clearance.
- Modified RS485 terminology - Master is now Leader and Slave is Follower, respectively.
- Updated SetApp menu options.

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# HANDLING AND SAFETY INSTRUCTIONS

During installation, testing and inspection, adherence to all the handling and safety instructions is mandatory. **Failure to do so may result in injury or loss of life and damage to the equipment.**

## Safety Symbols Information

The following safety symbols are used in this document. Familiarize yourself with the symbols and their meaning before installing or operating the system.

### WARNING!



Denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in **injury or loss of life**. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.

### CAUTION!



Denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in **damage or destruction of the product**. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

### NOTE



Denotes additional information about the current subject.

### IMPORTANT SAFETY FEATURE



Denotes information about safety issues.

Disposal requirements under the Waste Electrical and Electronic Equipment (WEEE) regulations:

### NOTE



Discard this product according to local regulations or send it back to SolarEdge.

## IMPORTANT SAFETY INSTRUCTIONS

### SAVE THESE INSTRUCTIONS

#### WARNING!



The inverter cover must be opened only after switching the inverter ON/OFF/P switch located at the bottom of the inverter to OFF. This disables the DC voltage inside the inverter. Wait five minutes before opening the cover. Otherwise, there is a risk of electric shock from energy stored in the capacitors.



P = Program/Pair  
1 = ON  
0 = OFF

#### WARNING!



Before operating the inverter, ensure that the inverter AC power cable and wall outlet are grounded properly. This product must be connected to a grounded, metal, permanent wiring system, or an equipment-grounding conductor must be run with the circuit conductors and connected to the equipment grounding terminal or lead on the product.

#### WARNING!



Opening the inverter and repairing or testing under power must be performed only by qualified service personnel familiar with this inverter.

#### WARNING!



Do not touch the PV panels or any rail system connected when the inverter switch is ON, unless grounded.

#### WARNING!



SafeDC complies with IEC60947-3 when installing the system with a worst case SafeDC voltage (under fault conditions) < 120V.

The worst case voltage is defined as:  $V_{oc,max} + (\text{String Length} - 1) * 1V$ , where:

- $V_{oc,max}$  = Maximum Voc (at lowest temperature) of the PV modules in the string (for a string with multiple modules, use the max value)
- String Length = number of power optimizers in the string

#### CAUTION!



This unit must be operated according to the technical specification datasheet provided with the unit.

#### CAUTION!



**HEAVY OBJECT.** To avoid muscle strain or back injury, use proper lifting techniques, and if required - a lifting aid.




**NOTE**

The inverter is IP65 rated . Unused conduit openings and glands should be sealed with appropriate seals.

**NOTE**

Use PV modules rated according to IEC 61730 class A.

**NOTE**

The symbol  appears at grounding points on the SolarEdge equipment. This symbol is also used in this manual.

**NOTE**

A SolarEdge inverter may be installed in a site with a generator. SolarEdge requires installing a physical or electronic interlock, which will signal to the inverter when the grid has been disconnected. Interlock procurement, installation, maintenance and support are the responsibility of the installer.



Damage to the inverter due to incorrect interlock installation or use of an interlock that is incompatible with the SolarEdge system will render the SolarEdge warranty invalid.

For more information, refer to

<https://www.solaredge.com/sites/default/files/se-inverter-support-of-voltage-sources.pdf>.

**NOTE**

The following warning symbols appear on the inverter warning label:



Risk of electric shock



Risk of electric shock from energy stored in the capacitor. Do not remove cover until 5 minutes after disconnecting all sources of supply.



Hot surface – To reduce the risk of burns, do not touch.

# Chapter 1: Introducing the SolarEdge Power Harvesting System

The SolarEdge power harvesting solution maximizes the power output from any type of solar photovoltaic (PV) installation while reducing the average cost per watt. The following sections describe each of the system's components.

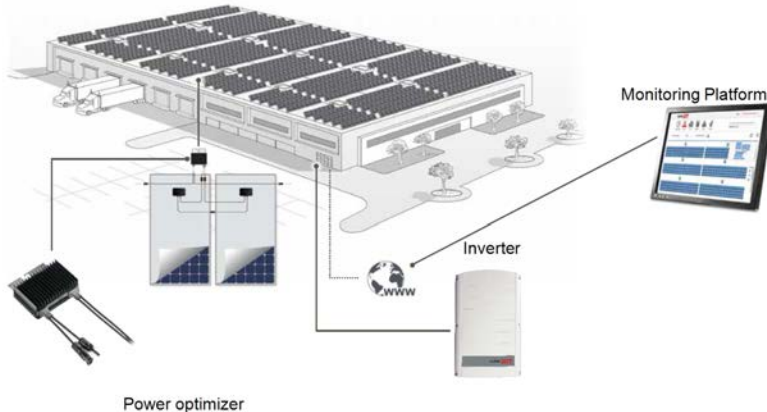


Figure 1: The SolarEdge power harvesting system components

## Power Optimizer

The power optimizers are DC-DC converters connected to PV modules in order to maximize power harvesting by performing independent Maximum Power Point Tracking (MPPT) at the module level.

The power optimizers regulate the string voltage at a constant level, regardless of string length and environmental conditions.

The power optimizers include a safety voltage function that automatically reduces the output of each power optimizer to 1 Vdc in the following cases:

- During fault conditions
- The power optimizers are disconnected from the inverter
- The inverter ON/OFF/P switch is turned OFF
- The inverter AC breaker is turned OFF

Each power optimizer also transmits module performance data over the DC power line to the inverter.

Two types of power optimizers are available:

- Panel Module Add-on power optimizer – connected to one or more modules
- Smart modules - the power optimizer is embedded into a module

## Inverter

The inverter efficiently converts DC power from the modules into AC power that can be fed into the main AC service of the site and from there to the grid. The inverter also receives the monitoring data from each power optimizer and transmits it to a central server (the monitoring platform; requires Internet connection).

Some inverters are available with an optional DC Safety Unit. The DC Safety Unit has a manually operated switch for disconnecting the DC power of a SolarEdge system.

The DC Safety Unit is located below the inverter and is connected to the inverter with AC and DC wires.

## Monitoring Platform

The monitoring platform enables monitoring the technical and financial performance of one or more SolarEdge sites. It provides past and present information on the system performance both at the system and module levels.

## Installation Procedure

The following is the procedure for installing and setting up a new SolarEdge site. Many of these also apply to modification of an existing site.

1. [Connecting Power Optimizers in Strings](#), page 17
2. [Recording power optimizer serial numbers \(optional\)](#), page 39
3. [Mounting the inverter](#), Page 25
4. [Connecting the AC and the Strings to the Inverter](#), page 31, or [Connecting the AC and the String to the DC Safety Unit](#), page 57
5. [Commissioning and activating the installation](#), page 35
6. [Connecting the inverter to the monitoring platform](#), page 40

## Installation Equipment List

Standard tools can be used during the installation of the SolarEdge system. The following is a recommendation of the equipment needed for installation:

- Allen screwdriver for 5mm screw type for the inverter enclosure screws

- Allen screwdriver for M5/M6/M8 screw types
- Standard flat-head screwdrivers set
- Non-contact voltage detector
- Cordless drill (with a torque clutch) or screwdriver and bits suitable for the surface on which the inverter and optimizers will be installed. Use of an impact driver is *not* allowed.
- Mounting hardware (stainless bolts, nuts, and washers) for attaching:
  - the mounting brackets to the mounting surface
  - the power optimizer to the racking
- MC4 crimper
- Wire cutters
- Wire strippers
- Voltmeter

For installing the communication options, you may also need the following:

- For Ethernet:
  - CAT5/6 twisted pair Ethernet cable with RJ45 connector
  - If using a CAT5/6 cable spool: RJ45 plug and RJ45 crimper
- For RS485:
  - Four- or six-wire shielded twisted pair cable
  - Watchmaker precision screwdriver set

## Inverter Transport and Storage

Transport the inverter in its original packaging, facing up and without exposing it to unnecessary shocks. If the original package is no longer available, use a similar box that can withstand the weight of the inverter (refer to the inverter weight in the specification datasheet provided with the unit), has a handle system and can be closed fully.

Store the inverter in a dry place where ambient temperatures are -25°C to +65°C / -13°F to 149°F.

# Chapter 2: Installing the Power Optimizer

## Safety

The following notes and warnings apply when installing the power optimizers. Some of the following may not be applicable to smart modules:

**WARNING!**



When modifying an existing installation, turn OFF the inverter ON/OFF/P switch, the Connection Unit (if applicable) and the AC circuit breaker on the main AC distribution panel.

**CAUTION!**



Power optimizers are IP68/NEMA6P rated. Choose a mounting location where optimizers will not be submerged in water.

**CAUTION!**



This unit must be operated according to the operating specifications provided with the unit.

**CAUTION!**



Cutting the power optimizer input or output cable connector is prohibited and will void the warranty.

**CAUTION!**



All PV modules must be connected to a power optimizer.

**CAUTION!**



If you intend to mount the optimizers directly to the module or module frame, first consult the module manufacturer for guidance regarding the mounting location and the impact, if any, on module warranty. Drilling holes in the module frame should be done according to the module manufacturer instructions.

**CAUTION!**

Installing a SolarEdge system without ensuring compatibility of the module connectors with the optimizer connectors may be unsafe and could cause functionality problems such as ground faults, resulting in inverter shut down. To ensure mechanical compatibility of the power optimizers' connectors with the PV module' connectors to which they are connected:

- Use identical connectors from the same manufacturer and of the same type on both the power optimizers and on the modules; or

- Verify that the connectors are compatible in the following way:



- The module connector manufacturer should explicitly verify compatibility with the SolarEdge optimizer connector; and

- A third-party test report by one of the listed external labs (TUV, VDE, Bureau Veritas UL, CSA, InterTek) should be obtained, verifying the compatibility of the connectors.

For more information, refer to

<https://www.solaredge.com/sites/default/files/optimizer-input-connector-compatibility.pdf>

**IMPORTANT SAFETY FEATURE**

Modules with SolarEdge power optimizers are safe. They carry only a low safety voltage before the inverter is turned ON. As long as the power optimizers are not connected to the inverter or the inverter is turned OFF, each power optimizer will output a safe voltage of 1V.


## Installation Guidelines

- For the minimum and maximum number of power optimizers in a string (string length), see the power optimizer datasheets. Refer to the Designer for string length verification. The Designer is available on the SolarEdge website at:

[https://www.solaredge.com/products/installer-tools/designer#/.](https://www.solaredge.com/products/installer-tools/designer#/)

- The length of home-run cables from the first and last power optimizer to the inverter (total cable length) may not exceed the following values:

| Single Phase Inverters | Three Phase Inverters  |
|------------------------|--|
| All - 1000 ft. /300 m  | SE17K and below - 1000 ft. /300 m<br>Above SE17K - 2300 ft. /700 m |

- Do not use extension cables between a module and a power optimizer, between two modules connected to the same power optimizer, or between two power optimizers other than in the following cases:
  - Power optimizers with the 4-type suffix in their part number (Pxxx-4xxxxxx) - extension cables of up to 16 m can be installed per optimizer (8 m for DC+ and 8 m for DC-).
  - Power optimizers manufactured starting from working week 42, 2019, as indicated in the serial number (Example: S/N SJ5019A-xxxxxxx - working week 50, 2019) - extension cables of up to 16 m can be installed per power optimizer (8 m for DC+ and 8 m for DC-).
  - Extension cables can be installed between power optimizers only from row to row, around obstacles or pathways within a row, and from the end of the string to the inverter, as long as the total cable length is not exceeded.
- For connecting power optimizers to the inverter, use cables with a minimum cross-section of 11 AWG/ 4 mm<sup>2</sup> DC cables.
- Frame-mounted power optimizers are mounted directly on the module frame, regardless of racking system (rail-less or with rails). For installation of frame-mounted power optimizers, refer to [http://www.solaredge.com/sites/default/files/installing\\_frame\\_mounted\\_power\\_optimizers.pdf](http://www.solaredge.com/sites/default/files/installing_frame_mounted_power_optimizers.pdf).
 
- The steps in this chapter refer to module add-on power optimizers. For smart modules, start from *Step 3: Connecting Power Optimizers in Strings* on page 17. Also refer to the documentation supplied with the smart modules.
- The power optimizer can be placed in any orientation.
- If connecting more modules than power optimizer inputs in parallel, use a branch cable. Some commercial power optimizer models have a dual input.
- Position the power optimizer close enough to its module so that their cables can be connected.

- Make sure to use power optimizers that have the required output conductor length.
- Completely shaded modules may cause their power optimizers to temporarily shut down. This will not affect the performance of the other power optimizers in the string, as long as the minimum number of unshaded power optimizers connected in a string of modules is met. If under typical conditions fewer than the minimum power optimizers are connected to unshaded modules, add more power optimizers to the string.
- To allow for heat dissipation, maintain clearance as specified below.

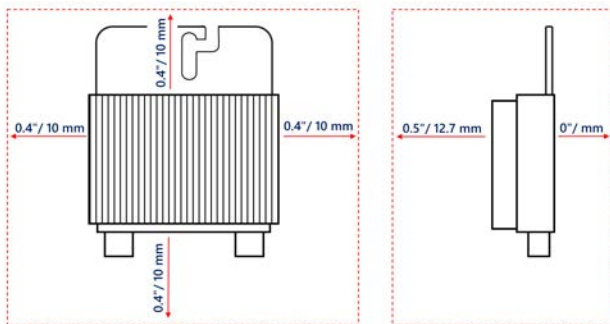


Figure 2: Power optimizer clearance

- When installing modules in a confined space, for example, if installing Building-integrated photovoltaic (BIPV) modules, ventilation measures may be needed to ensure the power optimizers are not be exposed to temperatures outside their specifications.



## Step 1: Mounting the Power Optimizers

For each of the power optimizers<sup>(1)</sup>:

1. Determine the power optimizer mounting location and use the power optimizer mounting brackets to attach the power optimizer to the support structure. It is recommended to mount the power optimizer in a location protected from direct sunlight. For frame-mounted power optimizers follow the instructions supplied with the optimizers, or refer to [https://www.solaredge.com/sites/default/files/installing\\_frame\\_mounted\\_power\\_optimizers.pdf](https://www.solaredge.com/sites/default/files/installing_frame_mounted_power_optimizers.pdf).
2. If required, mark the mounting hole locations and drill the hole.



### CAUTION!



Drilling vibrations may damage the power optimizer and will void the warranty. Use a torque wrench or an electric drill with adjustable clutch that meets the mounting torque requirements. *Do not* use impact drivers for mounting the power optimizer.

*Do not* drill through the power optimizer or through the mounting holes.

3. Attach each power optimizer to the rack using M6 (1/4") stainless steel bolts, nuts and washers or other mounting hardware. Apply torque of 9-10 N\*m / 6.5-7 lb\*ft.
4. Verify that each power optimizer is securely attached to the module support structure.
5. Record power optimizer serial numbers and locations, as described in *Reporting and Monitoring Installation Data* on page 38.

## Step 2: Connecting a PV module to a Power Optimizer



### NOTE

Images are for illustration purposes only. Refer to the label on the product to identify the plus and minus input and output connectors.

For each of the power optimizers:

- Connect the Plus (+) output connector of the module to the Plus (+) input connector of the power optimizer.

<sup>(1)</sup>Not applicable to smart modules.

- Connect the Minus (-) output connector of the module to the Minus (-) input connector of the power optimizer.

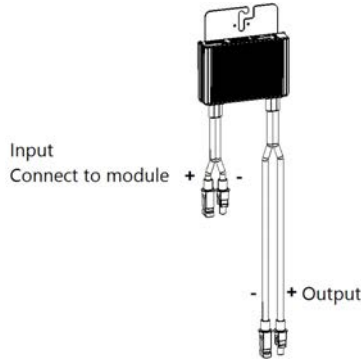


Figure 3: Power optimizer connectors

### Step 3: Connecting Power Optimizers in Strings

You can construct parallel strings of unequal length, that is, the number of power optimizers in each string does not have to be the same. The minimum and maximum string lengths are specified in the power optimizer datasheets. Refer to the [Designer](#) for string length verification.

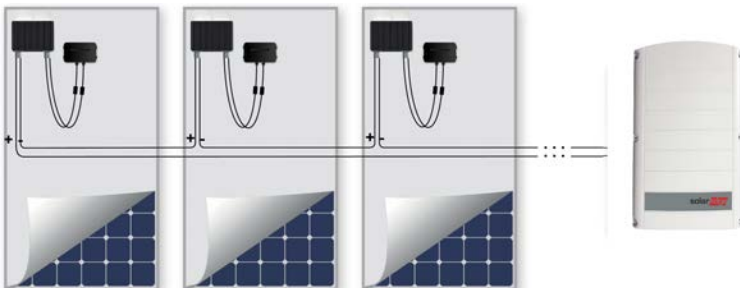


1. Connect the Minus (-) output connector of the string's first power optimizer to the Plus (+) output connector of the string's second power optimizer.
2. Connect the rest of the power optimizers in the string in the same manner.

**WARNING!**



If using a dual-input power optimizer and some inputs are not used, seal the unused input connectors with the supplied pair of seals.



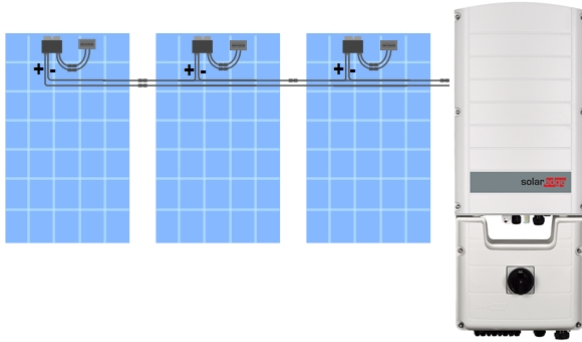


Figure 4: Power optimizers connected in series

3. If you intend to monitor the installation, using the monitoring platform, record the physical location of each power optimizer, as described in *Creating Logical and Physical Layout using Installation Information* on page 39.

## Step 4: Verifying Proper Power Optimizer Connection

When a module is connected to a power optimizer, the power optimizer outputs a safe voltage of 1V ( $\pm 0.1V$ ). Therefore, the total string voltage should equal 1V times the number of power optimizers connected in series in the string. For example, if 10 power optimizers are connected in a string, then 10V should be produced.

Make sure the PV modules are exposed to sunlight during this process. The power optimizer will only turn ON if the PV module provides at least 2W.

In SolarEdge systems, due to the introduction of power optimizers between the PV modules and the inverter, the short circuit current  $I_{SC}$  and the open circuit voltage  $V_{OC}$  hold different meanings from those in traditional systems.

For more information about the SolarEdge system's string voltage and current, refer to the  $V_{OC}$  and  $I_{SC}$  in *SolarEdge Systems Technical Note*, available on the SolarEdge website at:

[https://www.solaredge.com/sites/default/files/isc\\_and\\_voc\\_in\\_solaredge\\_systems\\_technical\\_note.pdf](https://www.solaredge.com/sites/default/files/isc_and_voc_in_solaredge_systems_technical_note.pdf)



→ To verify proper power optimizer connection:

- Measure the voltage of each string individually before connecting it to the other strings or to the inverter. Verify correct polarity by measuring the string polarity with a voltmeter. Use a voltmeter with at least 0.1V measurement accuracy.



## NOTE

Since the inverter is not yet operating, you may measure the string voltage and verify correct polarity on the DC wires inside the DC Safety Unit.

For troubleshooting power optimizer operation problems, refer to *Power Optimizer Troubleshooting* on page 54.

## Chapter 3: Installing the Inverter

Install the inverter either before or after the modules and power optimizers have been installed.

### CAUTION!



Do not rest the connectors at the bottom of the inverter on the ground, as it may damage them. To rest the inverter on the ground, lay it on its back, front or side.

### NOTE



- Use only copper conductors rated for a minimum of 90°C/ 194°F.
- For the SE10KUS, SE20KUS, SE33.3KUS three phase inverters where opposite polarity DC conductors are routed in the same conduit, 1000V rated cables must be used.

## Inverter Package Contents

- One inverter with DC Safety Unit (if applicable)
- One mounting bracket
- Two Allen screws for fastening the inverter to the mounting bracket
- DC Safety Unit sealing cover (if applicable, for use in case of inverter replacement)
- Quick Installation guide

## Identifying the Inverter

Refer to the sticker on the inverter that specifies its **Serial Number** and its **Electrical Ratings**. Provide the serial number when contacting SolarEdge support. The serial number is also required when opening a new site in the monitoring platform.

## Inverter Interfaces

The following figure shows the inverter connectors and components, located at the bottom of the inverter.

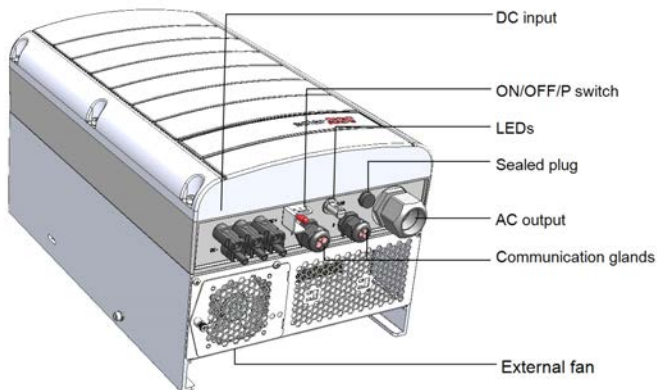


Figure 5: Inverter Interfaces

- **AC output:** AC output gland, AC cable external gauge, M32 (15-21mm diameter) for connection to the grid
- **DC input:** MC4 connector, for connection of the PV installation.
- **AC and DC conduit entries:** Connection points of the Connection Unit.
- **Two communication glands:** for connection of inverter communication options. Each gland has three openings.
- **ON/OFF/P switch:**



P = Program/Pair  
 1 = ON  
 0 = OFF

Figure 6: ON/OFF/P switch

- **ON (1)** - Turning this switch ON (after power optimizer pairing) starts the operation of the power optimizers, enables power production and allows the inverter to begin exporting power to the utility grid.
- **OFF (0)** - Turning this switch OFF reduces the power optimizer voltage to a low safety voltage and inhibits exportation of power. When this switch is OFF, the control circuitry remains powered up.
- **P** - Moving and releasing the switch allows viewing system information via the LEDs, and performing the following functions:

| P Position<br>Duration  | Function   | Comments  |
|---|--|---|
| Switch moved to P for <b>2 seconds</b> , then released.           | <ul style="list-style-type: none"> <li>• Displays (via LEDs) production information for 5 seconds, or error type indications (if exist) for 5 seconds.</li> <li>• Activates the Wi-Fi access point for connecting to the SetApp</li> </ul> | <p>While the switch is in P, all LEDs are ON.</p> <p>When the switch is released all LEDs turn OFF for 0.5 sec and then display the production or error indication.</p> |
| Switch moved to P for <b>more than 5 seconds</b> , then released. | Starts pairing   | Pairing is indicated by all 3 LEDs blinking simultaneously.   |

- **LEDs:** three LEDs indicate, by color and state (on/ off/ blinking<sup>(1)</sup>/ flickering<sup>(2)</sup>/alternating<sup>(3)</sup>), different system information, such as errors or performance indications.

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(1)Blinking = Turns ON and OFF for the same duration

(2)Flickering = Turns ON for 100 mS and turns OFF for 5 seconds

(3)Alternating = alternate LED flashes

For more information, refer to <https://www.solaredge.com/leds>.

The main LED indications are:

- Blue ON - the inverter is communicating with the monitoring platform
- Green ON - the system is producing
- Green blinking - AC is connected but the system is not producing
- Red ON - system error

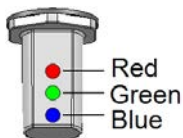


Figure 7: LEDs

The following table describes system performance information by LED color and ON/OFF/P switch position.

| Indication                  | ON/ OFF/ P<br>Switch<br>Position | LED Color |            |  | Comment   |
|-----------------------------|----------------------------------|-----------|------------|--|---|
|                             |                                  | Red       | Green      | Blue   |   |
| Power optimizers not paired | ON (1)                           | OFF       | Blinking   | <ul style="list-style-type: none"> <li>• S_OK: ON</li> <li>• No S_OK: OFF</li> </ul> | S_OK: ON communication with the monitoring platform is established. |
| Pairing                     |                                  | Blinking  | Blinking   | Blinking   |   |
| Wake-up/ Grid Monitoring    |                                  | OFF       | Blinking   | Blinking   |   |
| System Producing            |                                  | OFF       | ON         | <ul style="list-style-type: none"> <li>• S_OK: ON</li> <li>• No S_OK: OFF</li> </ul> |   |
| Night mode (no production)  |                                  | OFF       | Flickering | <ul style="list-style-type: none"> <li>• S_OK: ON</li> <li>• No S_OK: OFF</li> </ul> |   |



| Indication                             | ON/ OFF/ P<br>Switch<br>Position | LED Color   |                                     |  | Comment  |
|--|----------------------------------|-------------|-------------------------------------|--|--|
|  |                                  | Red         | Green                               | Blue   |  |
| Inverter is OFF<br>(Safe DC)           | OFF (0)                          | OFF         | Blinking                            | <ul style="list-style-type: none"> <li>• S_OK: ON</li> <li>• No S_OK: OFF</li> </ul> |  |
| Inverter is OFF<br>(DC not safe)       |                                  | Blinking    | Blinking                            | <ul style="list-style-type: none"> <li>• S_OK: ON</li> <li>• No S_OK: OFF</li> </ul> |  |
| Inverter<br>configuration<br>or reboot | ON / P                           | ON          | ON                                  | ON   |  |
| Inverter<br>firmware<br>upgrade        | ON / P                           | Alternating | Alternating                         | Alternating  | The upgrade<br>process can take<br>up to 5 minutes               |
| Error                                  | Any                              | ON          | ON/ OFF/<br>Blinking/<br>Flickering | ON/ OFF /<br>Blinking  | Refer to <i>Errors<br/>and<br/>Troubleshooting</i><br>on page 52 |

The following table describes production percentage of AC information by LED color and ON/OFF/P switch position.

| Indication                                    | ON/<br>OFF/ P<br>Switch<br>Position | LED Color |       |      | Comment  |
|---|-------------------------------------|-----------|-------|------|--|
|   |                                     | Red       | Green | Blue |  |
| Percentage of AC<br>Production:<br>0 %        | ON (1)                              | OFF       | OFF   | OFF  | This indicates<br>power<br>production as<br>percentage of<br>rated peak AC<br>output power |
| Percentage of AC<br>Production:<br>0 - 33 %   |                                     | OFF       | ON    | OFF  |  |
| Percentage of AC<br>Production:<br>33 - 66 %  |                                     | OFF       | OFF   | ON   |  |
| Percentage of AC<br>Production:<br>66 - 100 % |                                     | OFF       | ON    | ON   |  |

- **DC Safety Unit** (if applicable), including:
  - **ON/OFF switch:** connects and disconnects the DC power of the system
  - **AC output:** Cable gland for connection to the grid
  - **DC input:** Cable glands or MC4 connectors for connection of the PV installation
  - **Secondary grounding** (optional): Cable gland for grounding

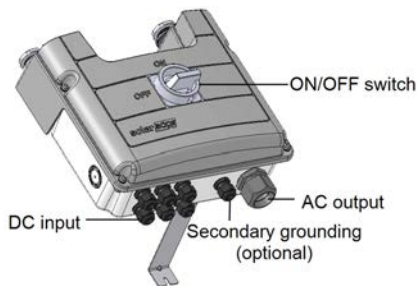


Figure 8: DC Safety Unit

**NOTE**

When the DC Safety Unit is OFF (for example during maintenance) it may be locked to prevent a safety hazard:



1. Move the switch to the Lock position.
2. Insert the lock through the knob opening and lock.



Lock here

## Mounting the Inverter

The inverter is typically mounted vertically, and the instructions in this section are applicable for vertical installation. Some three phase inverter models can be installed horizontally (above 10° tilt) as well as vertically, and at any tilt over 10° up to 90°. For information and instructions for horizontal mounting refer to



[http://www.solaredge.com/sites/default/files/application\\_note\\_horizontal\\_mounting\\_of\\_three\\_phase\\_inverters.pdf](http://www.solaredge.com/sites/default/files/application_note_horizontal_mounting_of_three_phase_inverters.pdf).

The inverter is supplied with a mounting bracket.

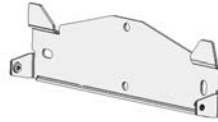


Figure 9: Mounting bracket

**NOTE**

Make sure the mounting surface or structure can support the weight of the inverter and bracket, and make sure that it spans the width of the bracket.

**CAUTION!**

**HEAVY OBJECT.** To avoid muscle strain or back injury, use proper lifting techniques, and if required - a lifting aid.

**CAUTION!**

SolarEdge inverters and power optimizers can be installed at a minimum distance of 50 m/ 164 ft from the shoreline of an ocean or other saline environment, as long as there are no direct salt water splashes on the inverter or power optimizer.

1. Determine the inverter mounting location, on a wall, stud framing or pole. It is recommended to mount the inverter in a location protected from direct sunlight.
2. To allow proper heat dissipation, maintain the following minimum clearance areas between the inverter and other objects:
  - If installing a single inverter:
    - At least 20 cm (8") from the top and bottom of the inverter; if installing an inverter with a DC Safety Unit, make sure to leave sufficient clearance for cable entry.
    - 10 cm (4") from the right and left of the inverter. For easy access to the fans , a larger clearance is recommended.

- If installing multiple inverters:
  - When installing inverters one above the other, leave at least 40 cm (16") between inverters. If installing an inverter with a DC Safety Unit, leave 20 cm (8") between the top of an inverter and the bottom of the DC Safety Unit).
  - When installing inverters side by side, follow these clearance specifications:

| Location  | Indoor Installation           | Outdoor Installation  |
|---|-------------------------------|---|
| Locations where the annual average high temperature <sup>(1)</sup> is below 25°C / 77°F | 20 cm / 8" between inverters  | 5 cm / 2" between inverters (if inverters are also installed one above the other, maintain the indoor installation clearance) |
| Locations where the annual average high temperature <sup>1</sup> is above 25°C / 77°F   | 40 cm / 16" between inverters |   |

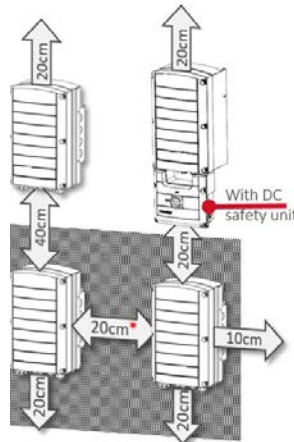


Figure 10: Clearance

(1)Annual average high temperature – the average of the 12 monthly average highs, for example:

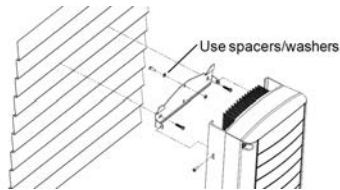
| Average High Temperature |        |      |      |      |      |      |      |     |      |      |      | Years on Record: 20 |     |
|--------------------------|--------|------|------|------|------|------|------|-----|------|------|------|---------------------|-----|
| C                        | ANNUAL | JAN  | FEB  | MAR  | APR  | MAY  | JUN  | JUL | AUG  | SEP  | OCT  | NOV                 | DEC |
|                          | 21.5   | 11.8 | 12.6 | 15.4 | 21.5 | 25.3 | 27.6 | 29  | 29.4 | 28.2 | 24.7 | 18.8                | 14  |

Refer to <http://www.weatherbase.com/> to find the value in your location.

3. Position the mounting bracket against the wall/pole and mark the drilling hole locations (refer to *Mechanical Specifications* on page 56 for inverter and mounting bracket dimensions):
  - Ensure that the flat edge of the bracket is at the bottom, as in *Figure 11*.
  - Use at least two bracket holes. Additional holes can be used to fix the bracket. Determine which and how many holes to use according to mounting surface type and material.
4. Drill the holes and mount the bracket. Verify that the bracket is firmly attached to the mounting surface.

#### NOTE

When mounting an inverter on an uneven surface, you may use spacers/washers behind the top mounting hole of the bracket. Depending on the angle, use the appropriate size and number of spacers so that the bracket is perpendicular to the ground. Recommended: a stainless steel 3/4" long screw, with a 1/4" socket button head, two jam nuts and three washers.



5. Hang the inverter on the bracket (see *Figure 17*): Lift the inverter from the sides, or hold it at the top and bottom of the inverter to lift the unit into place. Do not lift holding the Connection Unit/DC Safety Unit as it may be damaged.
6. Align the two indentations in the inverter enclosure with the two triangular mounting tabs of the bracket, and lower the inverter until it rests on the bracket evenly.

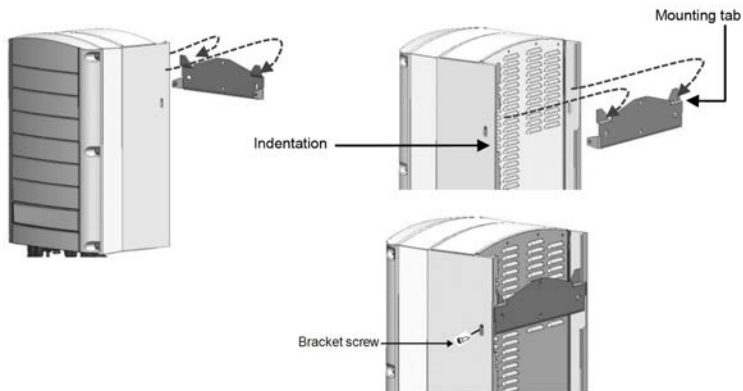


Figure 11: Hanging the inverter on the bracket

7. Secure the Connection Unit bracket to the wall:
8. For inverters with Connection Unit - secure the Connection Unit bracket to the wall:
  - Mark the location of the bracket screw for the DC Safety Unit and drill the hole.
  - Fasten the bracket using a standard bolt.
  - Verify that the bracket is firmly attached to the mounting surface.

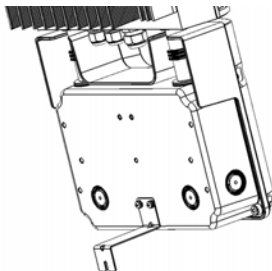


Figure 12: DC Safety Unit bracket

9. Insert the two supplied screws through the outer heat sink fin on both sides of the inverter and into the bracket (see *Figure 11*). Tighten the screws with a torque of 4.0 N\*m / 2.9 lb.\*ft.

# Chapter 4: Connecting the AC and the Strings to the Inverter

This chapter describes how to connect the inverter to the AC grid, and to the strings of modules with power optimizers.

If using an inverter with a DC Safety Unit, refer to the instructions in *Connecting the AC and DC Strings to the DC Safety Unit* on page 57.

## Grid Connection Guidelines

- In most countries, three phase inverters require neutral connection at all times. In some countries, the three phase inverters can be connected to delta grids; in other cases, multiple single phase inverters can be used.

Prior to system installation, refer to:

- Three Phase Inverters for Delta Grids application note at [https://www.solaredge.com/sites/default/files/se\\_three\\_phase\\_inverters\\_for\\_delta\\_grids.pdf](https://www.solaredge.com/sites/default/files/se_three_phase_inverters_for_delta_grids.pdf)



- Supported Countries application note to confirm compatibility at [http://www.solaredge.com/sites/default/files/se\\_inverters\\_supported\\_countries.pdf](http://www.solaredge.com/sites/default/files/se_inverters_supported_countries.pdf); installing without confirmation may void the inverter warranty.



- For more wiring information refer to the *SolarEdge Recommended AC Wiring Application Note*, available on the SolarEdge website at <http://www.solaredge.com/files/pdfs/application-note-recommended-wiring.pdf>.
- For recommended circuit breaker size per model refer to *Determining the Circuit Breaker Size* on page 69

## Connecting the AC Grid to the Inverter

Use a five-wire cable for three phase connection. The maximum wire size for the input terminal blocks is 16 mm<sup>2</sup>.

1. Turn OFF the AC circuit breaker.
2. Release the six Allen screws of the inverter cover and carefully move the cover horizontally before lowering it.

### CAUTION!



When removing the cover, make sure not to damage internal components. SolarEdge will not be held responsible for any components damaged as a result of incautious cover removal.

3. Strip 58 mm / 2.32" of the external cable insulation and strip 8 mm / 0.32" of the internal wire insulation.

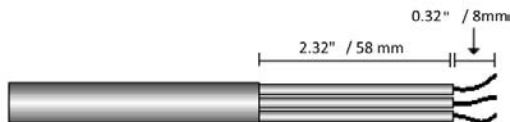


Figure 13: Insulation stripping – AC (3-wire cable)

4. Open the AC cable gland and insert the cable through the gland (see ).

### WARNING!



Turn OFF the AC before connecting wires to the AC terminals. If connecting equipment grounding wire, connect it before connecting the AC Line and Neutral wires.

5. For SE25K, SE27.6K, and SE33.3K three phase inverters, attach the supplied Ferrite bead to the AC wires:
  1. Insert the AC wires through the supplied bead.
  2. Connect the AC wires to the terminal blocks as described in the next steps.
  3. Tighten the wires to the bead using the supplied T-wrap.



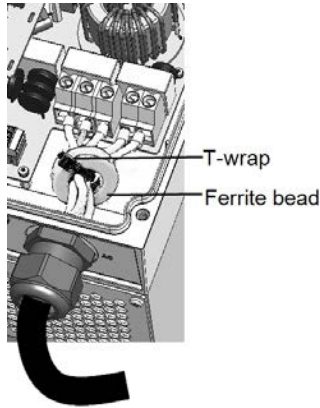



Figure 14: Attaching a Ferrite bead

6. Connect the AC, as follows. Connect the PE (grounding) wire first.

| Wire type      | Connect to terminal   |
|----------------|---|
| Line 1         | L1  |
| Line 2         | L2  |
| Line 3         | L3  |
| Neutral        | N   |
| PE (grounding) |  |

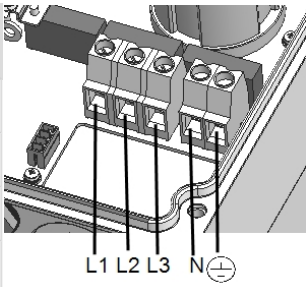


Figure 15: AC Terminals

**NOTE**

If power control is enabled, it is important to respect the order of grid lines connection to the inverter. A 120deg phase difference should be kept between L1 to L2 and between L2 to L3 (L1-L2-L3 and not, for example L1-L3-L2).

If the grid lines are not in this order, an error is displayed on the SetApp screen and the inverter will not produce power.

7. Connect the wires to the appropriate terminal block connectors in the inverter. Tighten the terminal block screws with a torque of 1.2-1.5 N\*m / 0.88-1.1 lb\*ft.
8. Check that the wires are fully inserted and cannot be pulled out easily.
9. Tighten the AC cable gland with a torque of 2.8-3.3 N\*m / 2.0-2.4 lb\*ft.
10. Verify that there are no unconnected wires to the inverter and that the unused terminal screws are tightened.

## Connecting the Strings to the Inverter

Connect the string to the DC input pairs. If required, connect additional strings in parallel using an external combiner box/branch cables before connecting to the inverter.

### NOTE



Functional electrical earthing of DC-side negative or positive poles is prohibited because the inverter has no transformer. Grounding (earth ground) of module frames and mounting equipment of the PV array modules is acceptable.

### NOTE



SolarEdge's fixed input voltage architecture enables the parallel strings to be of different lengths. Therefore, they do not need to have the same number of power optimizers, as long as the length of each string is within the permitted range.

Connect the DC connectors of each string to the DC+ and DC- connectors. See *Figure 5*.

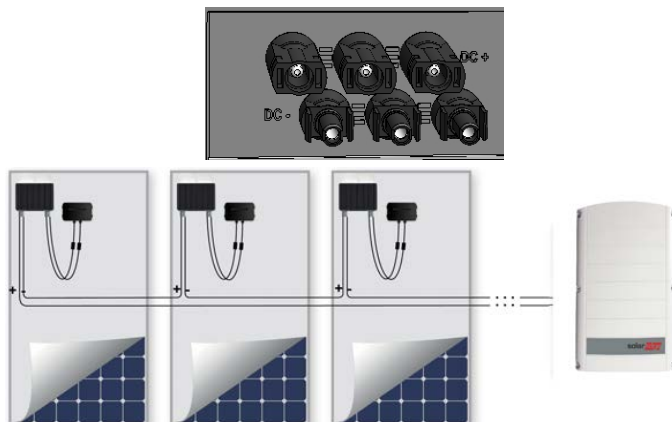


Figure 16: Inverter DC Connections

## Selecting a Residual Current Device (RCD)

### IMPORTANT SAFETY FEATURE

All SolarEdge inverters incorporate a certified internal Residual Current Device (RCD) in order to protect against possible electrocution and fire hazard in case of a malfunction in the PV array, cables or inverter. There are two trip thresholds for the RCD as required for certification (DIN VDE 0126-1-1). The default value for electrocution protection is 30 mA, and for slow rising current is 300 mA.



If an external RCD is required by local regulations, check which type of RCD is required for the relevant electric code. Install the residual-current device (RCD) in accordance with the applicable local standards and directives. SolarEdge recommends using a type-A RCD. The recommended RCD value is 100 mA or 300 mA unless a lower value is required by the specific local electric codes. When required by local regulations, the use of an RCD type B is permitted.

**NOTE**

For multiple inverters, an RCD per inverter is required.

In installations where the local electric code requires an RCD with a lower leakage setting, the discharge current might result in nuisance tripping of the external RCD. The following steps are recommended to avoid nuisance tripping of the external RCD:

- Select the appropriate RCD for correct operation of the installation: An RCD with a rating of 30 mA may actually trip at a leakage as low as 15 mA (according to IEC 61008). High quality RCDs will typically trip at a value closer to their rating.
- Configure the trip voltage of the inverter's internal RCD to a lower value than the trip current of the external RCD. The internal RCD will trip if the current is higher than the allowed current, but because the internal inverter RCD automatically resets when the residual currents are low it saves the manual reset.

For detailed information, refer to the *RCD Selection for SolarEdge Inverters Application Note*, available on the SolarEdge website at [http://www.solaredge.com/sites/default/files/application\\_note\\_ground\\_fault\\_rcd.pdf](http://www.solaredge.com/sites/default/files/application_note_ground_fault_rcd.pdf).



## Chapter 5: Activating, Commissioning and Configuring the System

You can connect communication options at this stage, as described in *Setting Up Communication to the Monitoring Platform* on page 41.

After completing all connections, activate and commission the system using the inverter SetApp mobile application. You can download the SetApp from the Apple App Store and Google Play before arriving at the site.



Internet connection is required for the download, one-time registration, and logging in, but not required for using the SetApp.

### Step 1: Activating the Installation

During system activation, a Wi-Fi connection is created between the mobile device and the inverter and the system firmware is upgraded.

#### Before activation

- Download, register (first time only) and log-in to SetApp on your mobile device. Verify that the application is updated with the latest version.
- If applicable, turn on all devices (battery, Energy Meter) connected to the inverter, so that the devices may be auto-detected.

#### → To activate the inverter:

1. Turn ON the AC circuit breaker on the main distribution panel.
2. Open SetApp and follow the on-screen instructions (scan the inverter bar-code; move the ON/OFF/P switch to P position for 2 seconds and release).

SetApp creates a Wi-Fi connection, upgrades the inverter firmware and activates the inverter.

3. When the activation is complete, do one of the following:
  - Select **Connect to Another Device** to continue activating additional inverters.
  - Select **Start Commissioning** for pairing and other system configuration.

## Step 2: Commissioning and Configuring the Installation

This section describes how to use the SetApp menus for commissioning and configuring the inverter settings.

Menus may vary in your application depending on your system type.

→ To access the **Commissioning** screen:

Do one of the following:

- During first time installation: Upon activation completion, in the SetApp, tap **Start Commissioning**.
- If the inverter has already been activated and commissioned:
  - If not already ON - turn ON AC to the inverter by turning ON the circuit breaker on the main distribution panel.
  - Open SetApp and follow the on-screen instructions (scan the inverter QR code, move the ON/OFF/P switch to P position for 2 seconds and release).  
The mobile device creates a Wi-Fi connection with the inverter and displays the main Commissioning screen.

In the main menus, tap the menu red arrows (➤) to perform the system commissioning or configuration task. Tap the **Back** arrow (◀) to return to the previous menu.

The next sections provide more information about configuration options (in addition to **Country and Language** and **Pairing**, described in *Step 2: Commissioning and Configuring the Installation* on page 36).

### Setting Country, Grid and Language

The inverter must be configured to the proper settings in order to ensure that it complies with the country grid code and functions.

1. From the **Commissioning** screen select **Country & Grid**.
2. From the **Country & Grid** drop-down list, select the required option and tap **Set Country & Grid**.
3. From the **Language** drop-down list, select your language and tap **Set Language**.

## Pairing

1. From the **Commissioning** menu, select **Pairing**.
2. Tap **Start Pairing**.
3. When **Pairing Complete** is displayed, the system startup process begins:  
Since the inverter is ON, the power optimizers start producing power and the inverter starts converting AC.



### WARNING!

When you turn ON the inverter ON/OFF/P switch, the DC cables carry a high voltage and the power optimizers no longer output a safe output.

When the inverter starts converting power after the initial connection to the AC, the inverter enters Wakeup mode until its working voltage is reached. This mode is indicated by the flickering green inverter LED.

When working voltage is reached, the inverter enters Production mode and produces power. The steadily lit green inverter LED indicates this mode.

4. Tap **OK** to return to the **Commissioning** menu.

## Communication

Communication settings can be configured only after communication connections are complete. Refer to *Setting Up Communication to the Monitoring Platform* on page 41.

- Select **Monitoring Communication** to configure communication with the monitoring platform.
- Select **Site Communication** to configure communication between multiple SolarEdge devices or external non-SolarEdge devices, such as batteries or loggers.

## Power Control

Power control options are detailed in the *Power Control Application Note*, available on the SolarEdge website at [https://www.solaredge.com/sites/default/files/application\\_note\\_power\\_control\\_configuration.pdf](https://www.solaredge.com/sites/default/files/application_note_power_control_configuration.pdf).



The Grid Control option may be disabled. Enabling it opens additional options in the menu.

The Energy Manager option is used for setting power export limitation, as described in the *Export Limitation Application Note*, available on the SolarEdge website at [https://www.solaredge.com/sites/default/files/feed-in\\_limitation\\_application\\_note.pdf](https://www.solaredge.com/sites/default/files/feed-in_limitation_application_note.pdf).



## Step 3: Verifying Proper Activation and Commissioning

1. Select **Information** and verify that the correct firmware versions are installed on each inverter.
2. Select **Status** and verify that inverter is operating and producing power.
3. Verify that additional configurations were properly set by viewing the relevant Status screens.
4. Verify that the green inverter LED is steadily lit.

Your SolarEdge power harvesting system is now operational.

## Reporting and Monitoring Installation Data

Monitoring the site requires connecting the inverter to the monitoring platform, using any of the wired or wireless options available from SolarEdge. Refer to *Setting Up Communication to the Monitoring Platform* on page 41.

## The Monitoring Platform

The monitoring platform provides enhanced PV performance monitoring and yield assurance through immediate fault detection and alerts at the module, string and system level.

Using the platform, you can:

- View the latest performance of specific components.
- Find under-performing components, such as modules, by comparing their performance to that of other components of the same type.
- Pinpoint the location of alerted components using the physical layout.

The monitoring platform enables accessing site information, including up-to-date information viewed in a physical or logical view:

- **Logical Layout:** Shows a schematic tree-layout of the components in the system, such as: inverters, strings, modules, meters and sensors, as well as their electrical connectivity. This view enables you to see which modules are connected in each string, which strings are connected to each inverter, and so on.
- **Physical Layout:** Provides a bird's eye view of the actual placement of modules in the site, and allows pinpoint issues to the exact location of each module on a virtual site map.

If you do not report the mapping of the installed power optimizers, the monitoring platform will show the logical layout indicating which power optimizers are connected to which inverter, but will not show strings or the physical location of power optimizers.

The monitoring platform includes a built-in help system, that guides you through the monitoring functionality.

For more information, refer to <https://www.solaredge.com/products/pv-monitoring#/>.



## Creating Logical and Physical Layout using Installation Information

To display a logical layout, insert the inverter serial number in the new site created in the monitoring platform. When the communication between the inverter and the monitoring server is established, the logical layout is displayed.

To display a physical layout, you need to map the locations of the installed power optimizers. To map the locations, use one of the methods described in the next sections.

### Designer

Designer recommends inverter and power optimizer selection per site size and enables report generation. You can create a project in Designer and export the site design with the string layout to the monitoring platform.



For more information, refer to

<https://www.solaredge.com/products/installer-tools/designer#/>.



## Mapper Application

Use the Mapper smart phone application to scan the power optimizer and inverter 2D bar-codes and create a virtual map of a PV site for enhanced monitoring and easier maintenance.

The Mapper application is integrated with the monitoring platform and enables:

- Simple on-site registration of new systems.
- Creating, editing and verifying system physical layout.
- Scanning and assigning the power optimizer serial number to the correct module in the system physical layout.

For detailed information, refer to the *Mapper* demo movies:

- [Creating new sites using the Mapper mobile application](#)
- [Mapping existing sites using the Mapper mobile application](#)



## Physical Layout Editor

1. If you are a registered installer, access the monitoring platform site creation page at <https://monitoring.solaredge.com/solaredge-web/p/home#createSites>. If you have not yet signed up, go to <https://monitoring.solaredge.com/solaredge-web/p/createSelfNewInstaller>.
2. Fill out all required information in the screen, which includes information about your installation, as well as details about its logical and physical mapping.



## Using a Paper Template

Fill out the Physical Layout Template (downloadable from the SolarEdge website <http://www.solaredge.com/files/pdfs/physical-layout-template.pdf>) using the detachable 2D barcode stickers on each power optimizer. Once the form is completed, use the Mapper to scan the 2D codes and create the map in the monitoring platform. Optionally, you can send the sticker sheet to SolarEdge Support for physical layout creation.



## Chapter 6: Setting Up Communication to the Monitoring Platform

The inverter sends the following information to the monitoring platform:

- Power optimizer information received via the DC power lines (the PV output circuit)
- Inverter information
- Information of any other connected devices

This chapter describes how to set up communication between:

- The inverter and the monitoring platform through the Internet (wired/ wireless)
- Multiple inverters for a leader-follower configuration

Communication setup is not required for power harvesting, however it is needed for using the monitoring platform .

When connecting the communication cables, make sure that the ON/OFF/P switch at the bottom of the inverter (and the switch of the DC Safety Unit if applicable) is turned OFF, and the AC is turned OFF.

When configuring the communication parameters *while the inverter cover is removed*, make sure that the ON/OFF/P switch (and the switch of the DC Safety Unit if applicable) is OFF, and the AC is turned ON.

---

### Communication Options

The following types of communication can be used to transfer the monitored information from the inverter to the monitoring platform.

Only communication products offered by SolarEdge are supported.

Always connect the communication options when the relevant devices are powered down - Commercial Gateway, inverter, etc.

#### Ethernet

Ethernet is used for a LAN connection.

#### RS485

RS485 is used for the connection of multiple SolarEdge devices on the same bus in a leader-follower configuration. RS485 can also be used as an interface to external devices, such as meters and third party data loggers.

## Wi-Fi

This communication option enables using a Wi-Fi connection for connecting to the monitoring platform.

The Wi-Fi access point is built into the inverter. An antenna is required and available from SolarEdge for connection to the monitoring platform.

## Wireless Gateway, Wireless Repeater(s)

The Wireless Gateway collects inverter data using a dedicated Wi-Fi connection and connects to the monitoring platform with the help of a home router. Wireless Repeater(s) extend the Wi-Fi signal range between the Wireless Gateway and inverter. Wireless Gateway and Wireless Repeaters can be purchased separately from SolarEdge. For more information, refer to <https://www.solaredge.com/sites/default/files/se-wireless-gateway-wireless-repeater-installation-guide.pdf>.



## Cellular

This wireless communication option enables using a cellular connection to connect one or several devices (depending on the data plan used) to the monitoring platform.

The Cellular Plug-in is provided with a user manual, which should be reviewed prior to connection. Refer to <https://www.solaredge.com/sites/default/files/se-cellular-plug-in-for-inverters-with-setapp-installation-guide.pdf>



## ZigBee

This option enables wireless connection to one or several Smart Energy products, which automatically divert PV energy to home appliances.

The Smart Energy ZigBee connections require a ZigBee plug-in and an external antenna, available from SolarEdge.

The ZigBee Plug-in for Smart Energy is provided with an installation guide, which should be reviewed prior to connection. Refer to <https://www.solaredge.com/sites/default/files/se-zigbee-plug-in-for-setapp-installation-guide.pdf>

The Smart Energy products are provided with an installation guide, which should be reviewed prior to connection. Refer to [https://www.solaredge.com/products/device-control#](https://www.solaredge.com/products/device-control#/).



## Communication Connectors

Two communication glands are used for connection of the 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, ZigBee, or Wi-Fi | 4.5-7 mm              |
| 2 (PG13.5) | All three | RS485, power reduction                                   | 2.5-5 mm              |

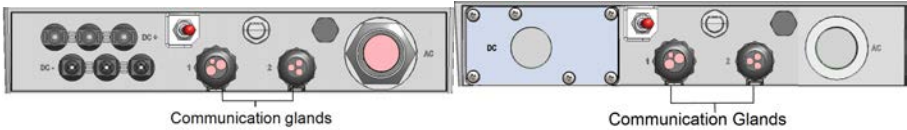


Figure 17: Communication Glands

The communication board has a standard RJ45 terminal block for Ethernet connection, and a 6-pin terminal block for RS485 connection, as shown below:



Figure 18: Internal connectors

## Removing the Inverter Cover

1. Switch the inverter ON/OFF/P switch to OFF. Wait 5 minutes for the capacitors to discharge.
2. Turn the Connection Unit (if applicable) to OFF.
3. Disconnect the AC to the inverter by turning OFF the circuit breakers on the distribution panel.
4. Open the Allen screws of the inverter cover and carefully pull the cover horizontally before lowering it.

### CAUTION!



When removing the inverter cover, make sure not to damage the internal components. SolarEdge will not be held responsible for any components damaged as a result of incautious cover removal.

## Removing the DC Safety Unit Cover

1. Turn OFF the AC breaker of the distribution panel and the safety switch (if applicable).
2. Open the DC Safety Unit cover: Release the four Allen screws and remove the cover.

### CAUTION!



When removing the DC Safety Unit cover, make sure not to damage the internal components. SolarEdge will not be held responsible for any components damaged as a result of incautious cover removal.

## Creating an Ethernet (LAN) Connection

This communication option enables using an Ethernet connection to connect the inverter to the monitoring platform through a LAN.

Ethernet cable specifications:

- Cable type – a shielded Ethernet cable (Cat5/5E STP) may be used
- Maximum distance between the inverter and the router – 100 m/ 330 ft.

**NOTE**



If using a cable longer than 10 m / 33 ft 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:

[http://www.solaredge.com/files/pdfs/lightning\\_surge\\_protection.pdf](http://www.solaredge.com/files/pdfs/lightning_surge_protection.pdf).

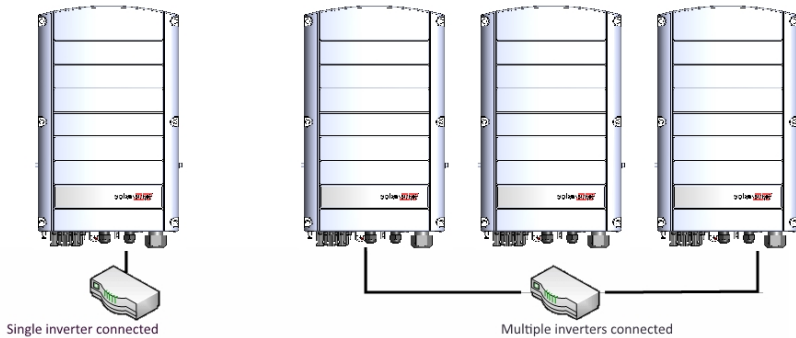


Figure 19: Example of Ethernet connection

→ **To connect the Ethernet cable:**

1. Remove the inverter cover .
2. Open the communication gland #1.

**CAUTION!**



The gland includes a rubber waterproof fitting, which should be used to ensure proper sealing.

3. Remove the plastic seal from one of the large opening .
4. Remove the rubber fitting from the gland and insert the CAT5/6 cable through the gland and through the gland opening in the inverter
5. Push the cable into the cut opening of the rubber fitting.

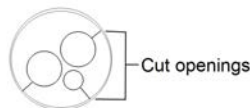


Figure 20: Rubber fitting

CAT5/6 standard cables have eight wires (four twisted pairs), as shown in the diagram below. Wire colors may differ from one cable to another. You can use either wiring standard, as long as both sides of the cable have the same pin-out and color-coding.

| RJ45 Pin # | Wire Color <sup>(1)</sup> |              | 10Base-T Signal<br>100Base-TX Signal |
|------------|---------------------------|--------------|--------------------------------------|
|            | T568B                     | T568A        |                                      |
| 1          | White/Orange              | White/Green  | Transmit+                            |
| 2          | Orange                    | Green        | Transmit-                            |
| 3          | White/Green               | White/Orange | Receive+                             |
| 4          | Blue                      | Blue         | Reserved                             |
| 5          | White/Blue                | White/Blue   | Reserved                             |
| 6          | Green                     | Orange       | Received-                            |
| 7          | White/Brown               | White/Brown  | Reserved                             |
| 8          | Brown                     | Brown        | Reserved                             |

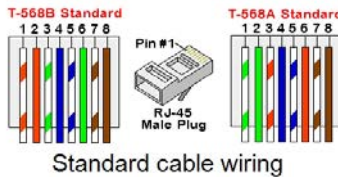


Figure 21: Standard cable wiring

6. Use a pre-terminated cable to connect via gland #1 to the RJ45 plug on the inverter's communication board or, if using a spool of cable, connect as follows:
  - a. Insert the cable through gland #1.
  - b. Remove the cable's external insulation using a crimping tool or cable cutter and expose eight wires.
  - c. Insert the eight wires into an RJ45 connector, as described in *Figure 21*.
  - d. Use a crimping tool to crimp the connector.
  - e. Connect the Ethernet connector to the RJ45 port on the communication board.

<sup>(1)</sup>The inverter connection does not support RX/TX polarity change. Supporting crossover Ethernet cables depends on the switch capabilities.

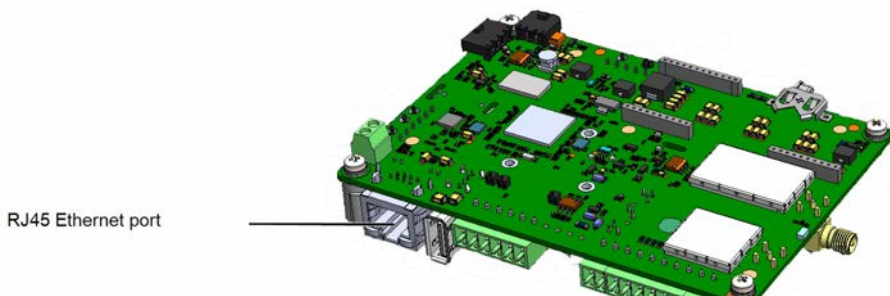


Figure 22: The RJ45 Ethernet connection

7. For the switch/router side, use a pre-terminated cable or use a crimper to prepare an RJ45 communication connector: Insert the eight wires into the RJ45 connector in the same order as above (*Figure 21*).
8. Connect the cable RJ45 connector to the RJ45 port of the Ethernet switch or router. You can connect more than one inverter to the same switch/router or to different switches/routers, as needed. Each inverter sends its monitored data independently to the monitoring platform.
9. The inverter is configured by default to LAN. If reconfiguration is required:
  - a. Make sure the ON/OFF/P switch is OFF.
  - b. Turn ON the AC to the inverter by turning ON the circuit breaker on the main distribution panel.
  - c. Configure the connection as described in *Communication* on page 37.

#### NOTE



If your network has a firewall, you may need to configure it to enable the connection to the following address:

- Destination Address: prod2.solaredge.com
- TCP Port: 22222, 22221, or 80 (for incoming and outgoing data)

10. Verify the connection, as described in *.Verifying the Connection* on page 51.



## Creating an RS485 Bus Connection

The RS485 option enables creating a bus of connected inverters, consisting of up to 31 follower inverters and 1 leader inverter. Using this option, inverters are connected to each other in a bus (chain), via their RS485 connectors. The first and last inverters in the chain must be terminated as described on page 50.

RS485 wiring specifications:

- Cable type: Min. 3-wire shielded twisted pair (a shielded Ethernet cable (Cat5/5E STP) may be used)
- Wire cross-section area: 0.2- 1 mm<sup>2</sup>/ 24-18 AWG (a CAT5 cable may be used)
- Maximum nodes: 32
- Maximum distance between first and last devices: 1 km /3300 ft.

### NOTE

If using a cable longer than 10 m/33 ft 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](https://www.solaredge.com/sites/default/files/lightning_surge_protection.pdf).



If grounded metal conduits are 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 RS485 chain; ensure it is not in contact with other wires. For inverters with a DC Safety Unit, connect the grounding wire to the grounding bus-bar in the DC Safety Unit.

The following sections describe how to physically connect the RS485 bus and how to configure the bus.

→ **To connect the RS485 communication bus:**

1. Remove the inverter cover as described in *Removing the Inverter Cover* on page 44.
2. Remove the seal from one of the openings in communication gland #2 and insert the wire through the opening.
3. Pull out the 6-pin RS485 terminal block connector, as shown below.

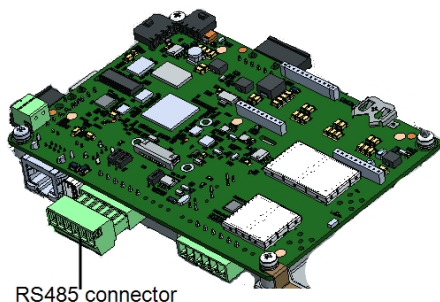


Figure 23: RS485 terminal block on the communication board

- Loosen the screws of pins A(+), B(-), and G on the left of the RS485 terminal block (RS485-1 or RS485-2).

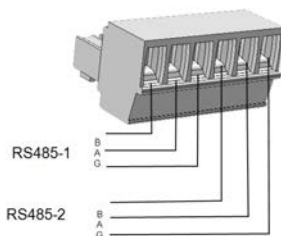
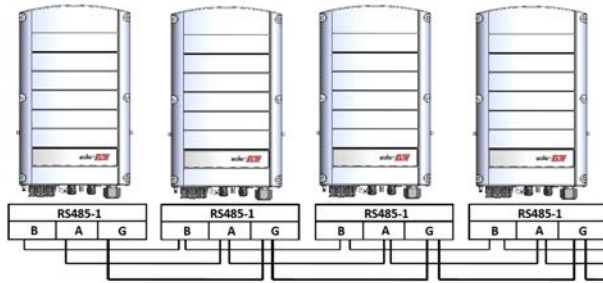


Figure 24: RS485 terminal block

- Insert the wire ends into the **G**, **A** and **B** pins shown above. Use Four- or six-wire twisted pair cable for this connection.  
You can use any color wire for each of the **A**, **B** and **G** connections, as long as:
  - The same color wire is used for all A pins the same color for all B pins and the same color for all G pins
  - The wire for G is not from the same twisted pair as A or B.
- For creating an RS485 bus - connect all B, A and G pins in all inverters.

**NOTE**

Do not cross-connect B, A and G wires.

7. Tighten the terminal block screws.
8. Check that the wires are fully inserted and cannot be pulled out easily.
9. Push the RS485 terminal block firmly all the way into the connector on the right side of the communication board.
10. Terminate the first and last SolarEdge device in the chain by switching a termination DIP-switch inside the inverter to ON (move the left switch up). The switch is located on the communication board and is marked SW7SW1.

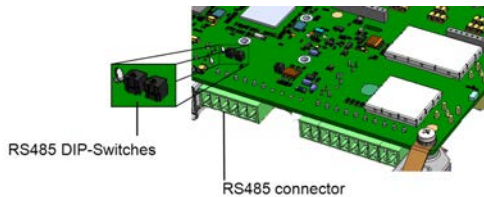


Figure 25: RS485 termination switch

**NOTE**

Only the first and last SolarEdge devices in the chain should be terminated. The other inverters in the chain should have the termination switch OFF (down position).

11. If not using surge protection, connect the grounding wire to the first inverter in the RS485 chain; make sure the grounding wire is not in contact with other wires. For inverters with a DC Safety Unit, connect the grounding wire to the grounding busbar in the DC Safety Unit.

→ To connect to the monitoring platform:

1. Designate a single inverter as the connection point between the RS485 bus and the monitoring platform. This inverter will serve as the leader inverter.
2. Connect the leader to the monitoring platform via the LAN option (refer to ) or any of the other options.

→ To configure the RS485 bus:

All inverters are configured by default as followers. To configure the leader:

1. Verify the ON/OFF/P switch is OFF.
2. Verify that AC is on.
3. Use SetApp to access the **Commissioning** menu screen as described in *Communication* on page 37.
4. From the **Commissioning** menu tap **Communication**. The Communication screen is displayed.
5. Select the following to configure the connection:
  - Server → LAN, Cellular or Wi-Fi
  - RS485-1 → Protocol → SolarEdge → **SolarEdge Leader**
  - RS485-1 → **Follower Detect**

The system starts automatic detection of the follower inverters connected to the leader inverter. The inverter should report the correct number of followers. If it does not, verify the connections and terminations.

6. To check the follower IDs and last communication time, select **RS4851** → **Follower List**.
7. Verify the connection of the leader to the monitoring platform, as described in the next section.

## Verifying the Connection

After connecting and configuring a communication option, perform the following steps to check that the connection to the monitoring server has been successfully established.

1. Go to **Commissioning > Status**.
2. In the **Summary** section, under **Server Comm.**, make sure **S\_OK** is displayed together with the selected communication option.
3. Scroll down to the **Communication** section and check that the communication options are as required.

# Appendix A: Errors and Troubleshooting

This chapter describes general system problems, and how to troubleshoot them. For further assistance, contact SolarEdge Support.

## Identifying Errors

Errors may be indicated in various system interfaces: On the inverter bottom panel, a red LED indicates an error. In the monitoring platform and SetApp, errors are displayed with codes.

For more information on the codes displayed for error and warning messages, refer to <http://www.solaredge.com/sites/default/files/se-inverter-installation-guide-error-codes.pdf>. This document describes errors that appear in SetApp, monitoring platform, and LCD (for inverters with LCD). To identify the error types, use the methods described below.



→ To identify the error type using the inverter LEDs:

1. Move the ON/OFF/P switch to **P** position for **2 seconds** and release it.
2. Observe the LED lights and use the following table to identify the error type. For more information, refer to <https://www.solaredge.com/leds>.



| Error type               | LED color and state |          |          |
|--------------------------|---------------------|----------|----------|
|                          | Red                 | Green    | Blue     |
| Arc detected             | ON                  | OFF      | OFF      |
| Isolation or RCD problem | Blinking            | OFF      | OFF      |
| Grid error               | OFF                 | ON       | OFF      |
| High temperature         | OFF                 | Blinking | OFF      |
| Pairing failed           | OFF                 | OFF      | ON       |
| Other issue              | OFF                 | OFF      | Blinking |

→ To identify the error type using the monitoring platform:

1. Open the site dashboard and click the **Layout** icon.
2. Right-click the inverter and select **Info** from the menu. The inverter details window is displayed.
3. Click the **Errors** tab. The list is displayed.

## Troubleshooting Communication

### Troubleshooting Ethernet (LAN) Communication

The possible errors and their troubleshooting are detailed in the following table:

| Error Message                      | Possible Cause and Troubleshooting   |
|------------------------------------|--|
| LAN cable disconnected             | Physical connection fault. Check the cable pin-out assignment and cable connection.  |
| No DHCP                            | IP settings issue. Check the router and inverter configuration. Consult your network IT.   |
| Configure Static IP or set to DHCP |  |
| Gateway not responding             | Ping to router failed. Check the physical connection to the switch/ router. Check that the link LED at the router /switch is lit (indicating phy-link). If OK - contact your network IT, otherwise replace the cable or change it from cross to straight connection.             |
| No Internet connection             | Ping to google.com failed. Connect a laptop and check for internet connection. If internet access is unavailable, contact your IT admin or your internet provider.<br>For Wi-Fi networks, ensure that user-name and password are as defined in the internet provider AP/ router. |

### Troubleshooting RS485 Communication


- If the message **RS485 Leader Not Found** appears in the Status screen, check the connections to the leader device and fix if required.
- If after follower detection the number of followers displayed for the leader under **RS485-2 Conf → Follower Detect** is lower than the actual number of followers, refer to the following application note to identify missing followers and troubleshoot connectivity problems:  
[https://www.solaredge.com/sites/default/files/troubleshooting\\_undetected\\_RS485\\_devices.pdf](https://www.solaredge.com/sites/default/files/troubleshooting_undetected_RS485_devices.pdf)

## Additional Troubleshooting

1. Check that the modem or hub/router is functioning properly.
2. Check that the connection to the internal connector on the communication board is properly done.
3. Check that the selected communication option is properly configured.
4. Use a method independent of the SolarEdge device to check whether the network and modem are operating properly. For example, connect a laptop to the Ethernet router and connect to the Internet.
5. Check whether a firewall or another type of network filter is blocking communication.

## Power Optimizer Troubleshooting

| Malfunction   | Possible Cause and Corrective Action   |
|---|--|
| Pairing failed  | Power optimizers are shaded.<br>If you connected the inverter to the monitoring platform, retry pairing remotely (during sunlight). Make sure to leave the inverter ON/OFF/P switch ON and that S_OK appears in the status screen. |
| String voltage is 0V                                      | Power optimizer (s) output is disconnected.<br>Connect all power optimizer outputs.  |
| String voltage not 0V but lower than number of optimizers | Power optimizer(s) not connected in the string.<br>Connect all power optimizers.   |
|   | Panel(s) not connected properly to power optimizer inputs (not applicable to smart modules).<br>Connect the modules to the optimizer inputs.   |
|   | String reverse polarity.<br>Check string polarity using a voltmeter and correct if needed.   |

| Malfunction   | Possible Cause and Corrective Action  |
|---|---|
| <p>String voltage is higher than number of optimizers</p> <p><b>WARNING!</b><br/>If the measured voltage is too high, the installation may not have a safe low voltage. <b>PROCEED WITH CARE!</b> A deviation of <math>\pm 1\%</math> per string is reasonable.</p>  | <p>Extra power optimizer(s) connected in the string (not applicable to smart modules).<br/>Check if an extra power optimizer is connected in the string. If not – proceed to next solution.</p> <p>A module is connected directly to the string, without a power optimizer (not applicable to smart modules).<br/>Verify that only power optimizers are connected in the string and that no module outputs are connected without a power optimizer. If the problem persists, proceed to the next step.</p> <p>Power optimizer(s) malfunction.</p> <ol style="list-style-type: none"> <li>1. Disconnect the wires connecting the power optimizers in the string.</li> <li>2. Measure the output voltage of each power optimizer to locate the power optimizer that does not output 1V safety voltage. If a malfunctioning power optimizer is located, check its connections, polarity, module, and voltage.</li> <li>3. Contact SolarEdge Support. Do not continue before finding the problem and replacing the malfunctioning power optimizer. If a malfunction cannot be bypassed or resolved, skip the malfunctioning power optimizer, thus connecting a shorter string.</li> </ol> |



# Appendix B: Mechanical Specifications

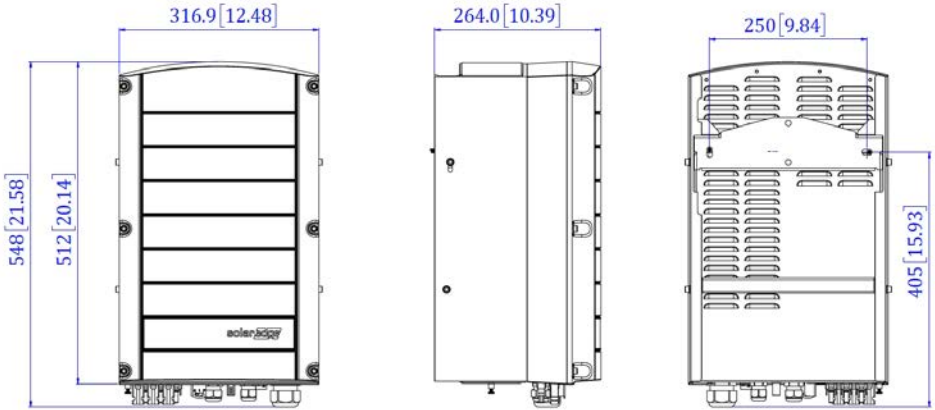


Figure 26: Inverter with bracket - front, side and rear views

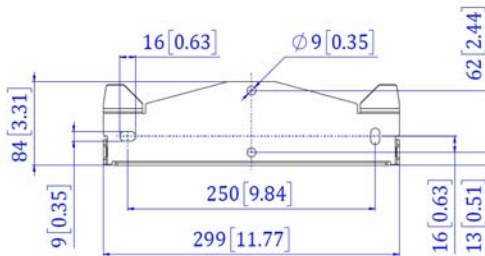


Figure 27: Inverter mounting bracket

## Appendix C: Connecting the AC and DC Strings to the DC Safety Unit

Some inverter models are supplied with an integrated DC Safety Unit. This appendix describes how to connect the AC grid and DC strings to the DC Safety Unit.

The DC Safety Unit includes:

- Mechanical DC switch (2-pole disconnection)
- DC surge protection (SPD, Type II)
- DC fuses (plus & minus; optional)

This appendix describes connections to DC Safety Unit with or without fuses. The following figure illustrates the DC Safety Unit supplied with fuses.

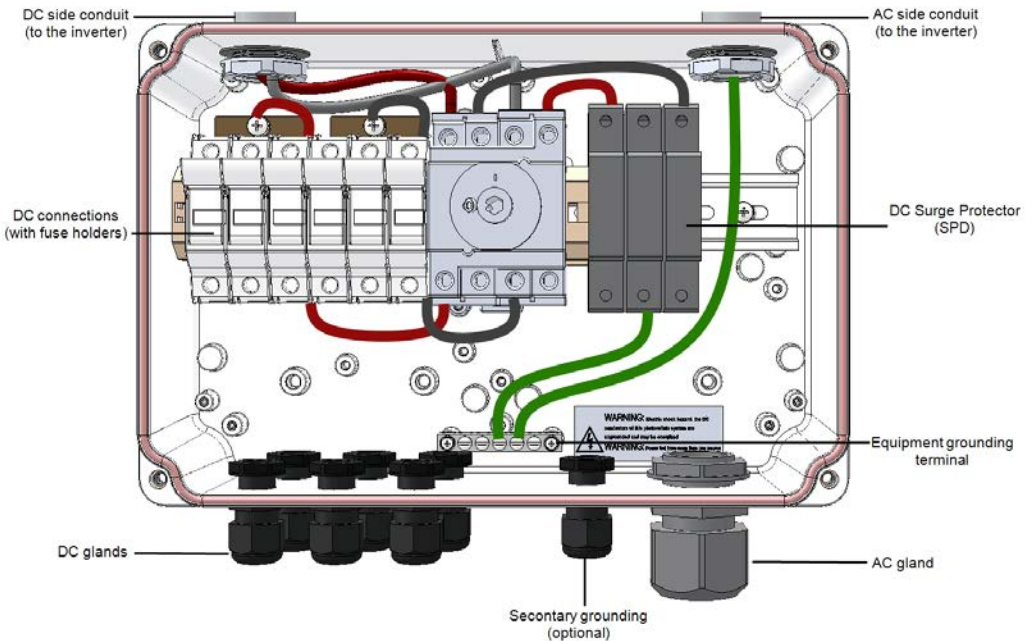


Figure 28: Inside the DC Safety Unit with fuses

## Connecting the AC Grid to the Inverter

Use a five-wire cable for this connection. The maximum wire size for the input terminal blocks is 16 mm<sup>2</sup>.

→ To connect the AC grid to the inverter via the DC Safety Unit:

1. Turn OFF the following:
  - The inverter ON/OFF switch
  - The AC circuit breaker
  - The DC Safety Unit
2. Open the inverter cover: Release the Allen screws and carefully move the cover horizontally before lowering it.

### CAUTION!



When removing the cover, make sure not to damage internal components. SolarEdge will not be held responsible for any components damaged as a result of incautious cover removal.

3. Loosen the screws on the front cover of the DC Safety Unit, as shown below:

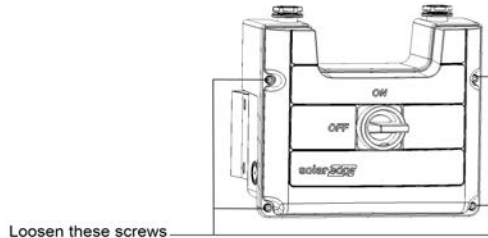


Figure 29: Opening the DC Safety Unit cover

4. Remove the DC Safety Unit cover.
5. Strip 35 cm of the external cable insulation and strip 8 mm of the internal wire insulation.

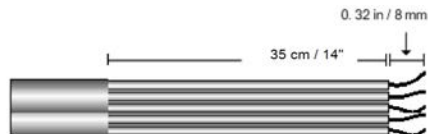


Figure 30: Insulation stripping – AC

6. Open the AC cable gland and insert the cable through the gland (see *Figure 28*).

7. Connect the grounding wire to the equipment grounding terminal in the DC Safety Unit.

**NOTE**

Connect the equipment grounding before connecting the AC wires to the AC terminal block.

8. Insert the remaining four wires through the AC conduit to the inverter, and connect them to the appropriate terminal blocks in the inverter according to the labels on the terminal blocks (N, L1, L2 and L3).

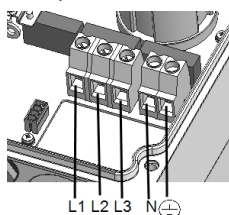


Figure 31: AC Terminals

9. Tighten the screws of each terminal with a torque of 1.2-1.5 N\*m / 0.88-1.1 lb\*ft.
10. Check that the wires are fully inserted and cannot be pulled out easily.
11. Tighten the AC cable gland with a torque of 5.0 N\*m / 44 lb\*in.
12. Verify that there are no unconnected wires.
13. Make sure the SPDs are tightly attached to the DIN rail.

**NOTE**

If power control is enabled, it is important to respect the order of grid lines connection to the inverter. A 120deg phase difference should be kept between L1 to L2 and between L2 to L3 (L1-L2-L3 and not, for example L1-L3-L2). If the grid lines are not in this order, an error is displayed on the SetApp screen and the inverter will not produce power.

## Connecting the Strings to the DC Safety Unit

Up to three strings may be connected in parallel to the DC input pairs of the switch. The terminals are suitable for connection of copper conductors only.

→ To connect the strings to the DC Safety Unit:

1. Strip 8 mm of the DC wire insulation.
2. Insert the wires into the DC input glands of the DC Safety Unit .
3. Connect the DC wires according to the DC+ and DC- labels:

- For DC terminals *without fuses*: Use a standard flat-blade screwdriver to connect the wires to the spring-clamp terminals.
  - The screwdriver blade should fit freely in the terminal opening. Too large a blade can crack the plastic housing.
  - Insert the screwdriver and press the release mechanism and open the clamp.
  - Insert the conductor into the round opening and remove the screwdriver – the wire is automatically clamped.

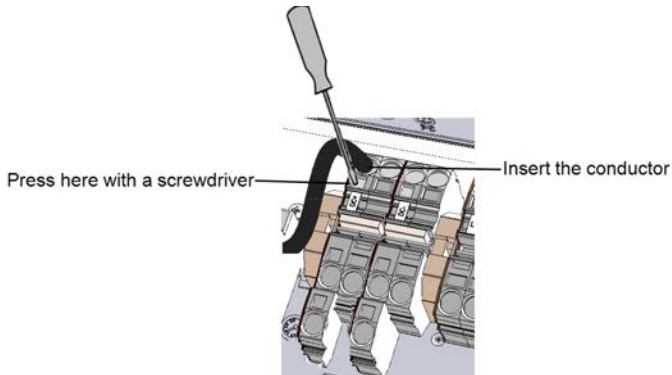


Figure 32: Spring-clamp terminals

- For DC terminals *with fuses*:
  - Insert the wires into the side openings.
  - Fasten the screws at the top of the fuses. Apply torque of 3.4 N\*M / 30 lb\*in.

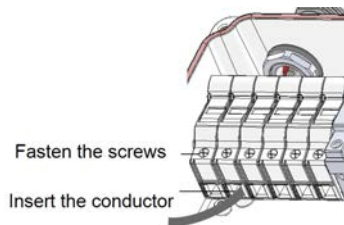


Figure 33: DC connection with fuses

4. Verify that there are no unconnected wires.
5. Close the DC Safety Unit cover: Attach the cover and secure it by tightening the four screws with a torque of 1.2 N\*m / 0.9 ft.\*lb.
6. Ensure proper cable entry sealing: inspect the entire cable run and use standard sealants to avoid water penetration.

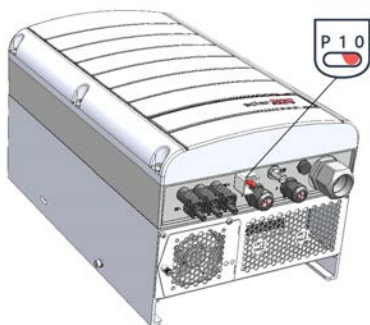
## Appendix D: SafeDC™

The SolarEdge inverters are certified for compliance with the following standards as disconnection devices for PV generators, meaning that they can replace a DC disconnect:

- IEC 60947-3:1999 + Corrigendum: 1999 + A1:2001 + Corrigendum 1:2001 + A2:2005;
- DIN EN 60947-3
- VDE 0660-107:2006-03
- IEC 60364-7-712:2002-05
- DIN VDE 0100-712:2006-06.

In compliance with these standards, follow the instructions below to disconnect DC power:

1. Move the inverter P/ON/OFF switch to OFF (0).



2. Disconnect the AC to the inverter by turning OFF the circuit breakers on the distribution panel.

### WARNING!

SafeDC complies with IEC60947-3 when installing the system with a worst case SafeDC voltage (under fault conditions)  $< 120V$ .



The worst case voltage is defined as:  $V_{oc,max} + (\text{String Length} - 1) * 1V$ , where:

- $V_{oc,max}$  = Maximum  $V_{oc}$  (at lowest temperature) of the PV module in the string (for a string with multiple module models, use the max value)
- String Length = number of power optimizers in the string

## Appendix E: External Fan Maintenance and Replacement

The inverter has two fans: one is internal and the other is accessible from the outside of the inverter.

A fan replacement kit is available from SolarEdge.

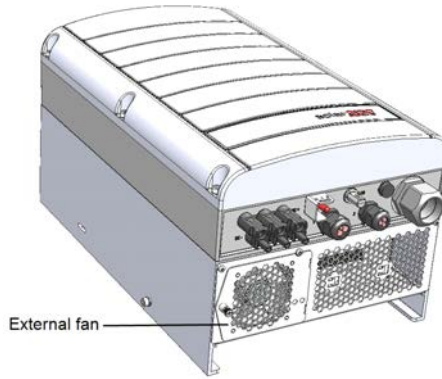


Figure 34: Inverter external fan

### Fan Maintenance

At least once a year, open the fan screen and clean the accumulated dust using a brush. If the SetApp Status screen displays the status **Not Working** for the fan (refer to *Main Inverter Status* on page 1), replace the fan as described in the next section.

### External Fan Replacement

1. Turn OFF the inverter ON/OFF/P switch, and wait until the green LED is blinking, indicating that the DC voltage is safe (<50V), or wait five minutes before continuing to the next step.
2. Turn OFF the DC Safety Unit(if applicable).
3. Disconnect the AC to the inverter by turning OFF the circuit breakers on the distribution panel.
4. Use a standard screwdriver to unfasten the single screw of the fan cover and open the fan door.

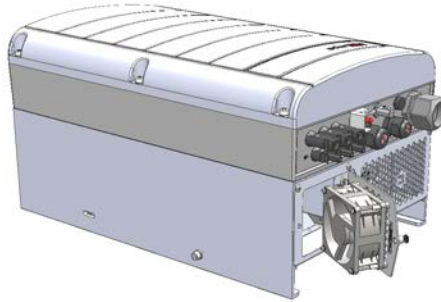


Figure 35: Fan door open

5. Disconnect the fan connector and remove the fan.

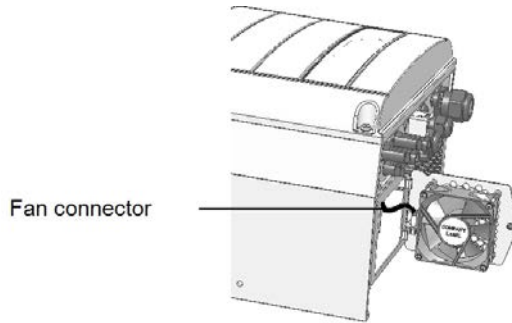
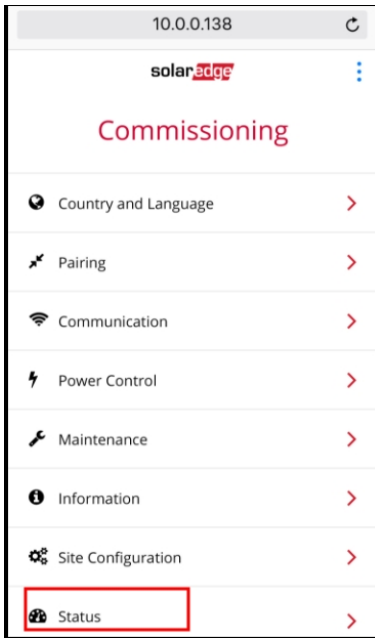


Figure 36: Fan connector

6. Connect the fan connector to the new fan.
7. Close the fan door and fasten the cover screws.



1. After powering up the inverter, check the fan status on SetApp: Select **Commissioning** → **Status**.



| Status  |                           |                                       |
|---|---------------------------|---------------------------------------|
| <b>Inverter</b><br>SN 07318000C               |                           |                                       |
| <b>Power</b><br>7.60 kW                       | <b>Voltage</b><br>240 Vac | <b>Frequency</b><br>60.9 Hz           |
| <b>P_OK: 30 of 30</b><br>Optimizers Connected |                           | <b>S_OK</b><br>Server Connected (LAN) |
| <b>Status</b><br>Production                   |                           | <b>Switch</b><br>ON                   |
| <b>Cos Phi</b><br>1.00                        | <b>Limit</b><br>No Limit  | <b>Country</b><br>USA2                |
| <b>Voltage</b><br>380 Vdc                     | <b>Temp.</b><br>156 F     | <b>Fan</b><br>OK                      |

## Appendix F: Replacing and Adding System Components

This appendix includes replacement procedures for the SolarEdge system components. For inverter or DC Safety Unit replacement, typically only the part to be replaced is supplied (not both inverter and DC Safety Unit). In this case, the DC Safety Unit should be disconnected from the inverter as described herein.

### NOTE

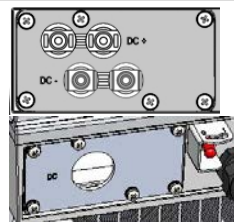


If you are permanently disassembling the installation or part of it, make sure to use the disposal methods dictated by local regulations.

### CAUTION!



Do not remove the six screws on the DC metal panel as it may harm the inverter sealing and void the warranty.



## Replacing an Inverter

1. Turn OFF the inverter ON/OFF/P switch, and wait until the green LED is blinking, indicating that the DC voltage is safe (<50V), or wait five minutes before continuing to the next step.
2. Disconnect the AC to the inverter by turning OFF the circuit breakers on the distribution panel.
3. Turn OFF the DC Safety Unit (if applicable).
4. Open the inverter cover as described in *Removing the Inverter Cover* on page 44.
5. Disconnect the DC plugs and AC wires from the inverter.
6. For inverters with a DC Safety Unit, unscrew the two conduit nuts in the inverter securing the DC Safety Unit to the inverter.

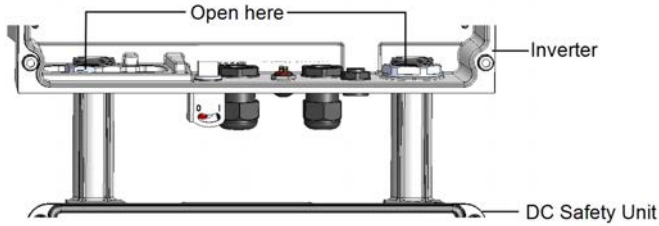


Figure 37: Conduit nuts

7. Remove the screws securing the inverter to the mounting bracket and remove the inverter from the mounting bracket.

**NOTE**

If you remove the old inverter and do not immediately install a new one, use insulation tape to isolate each of the AC and DC wires

8. Place the new inverter on the mounting bracket; insert the screws securing the inverter to the mounting bracket.
9. For inverters with a Connection Unit, screw the two conduit nuts in the inverter securing the DC Safety Unit to the inverter.
10. Connect all the wires to the inverter: Follow the instructions of *Installing the Inverter* on page 20 and *Activating, Commissioning and Configuring the System* on page 35.
11. Close the DC Safety Unit cover (if applicable) and the inverter cover.

## Replacing the DC Safety Unit

### Removing the DC Safety Unit

1. Turn OFF the inverter ON/OFF/P switch, and wait until the green LED is blinking, indicating that the DC voltage is safe (<50V), or wait five minutes before continuing to the next step.
2. Turn OFF the DC Safety Unit and the AC breaker of the distribution panel.
3. Open the inverter cover.
4. Disconnect the DC and AC wires from the inverter. If there are ferrite beads on the DC and AC wires in the inverter, open them and set aside.
5. Disconnect the RS485 connector from the inverter communication board.
6. Unscrew the two conduit nuts in the inverter securing the DC Safety Unit to the

inverter, as shown below:

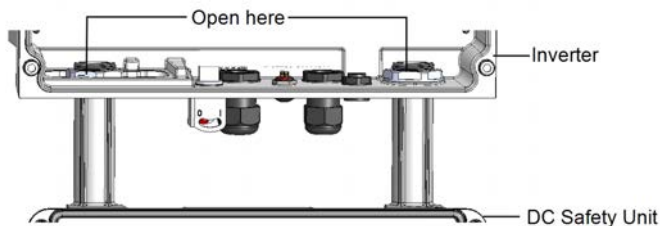


Figure 38: Disconnecting the conduits

7. Open the DC Safety Unit cover and disconnect the DC and AC wires. Unscrew the two conduit nuts securing the DC Safety Unit to the external conduits.
8. If the DC Safety Unit bracket is screwed to the wall, release it.
9. Carefully remove the DC Safety Unit with its mounting bracket from the wall.

## Installing a New DC Safety Unit

1. Open the conduit drill guides of the new DC Safety Unit .
2. Position the new DC Safety Unit below the inverter and from the inside of the inverter grab the AC and DC wires extending from the switch conduits.
3. Attach the DC Safety Unit with its bracket to the wall and slightly close the screws. Do not over tighten.
4. Securely screw the two conduit nuts onto the conduit ends in the inverter. Verify proper conduit sealing.

## Connecting the DC Safety Unit to the Inverter

1. If ferrite beads were removed from the DC and AC wires, place them on the wires and close them. Make sure the DC labeled ferrite bead is placed on the DC wires and the AC labeled ferrite bead is placed on the AC wires.
2. Connect the DC, as follows:
  - Connect the red wire to any of the DC+ terminals in the inverter.
  - Connect the black wire to any of the DC- terminals in the inverter.

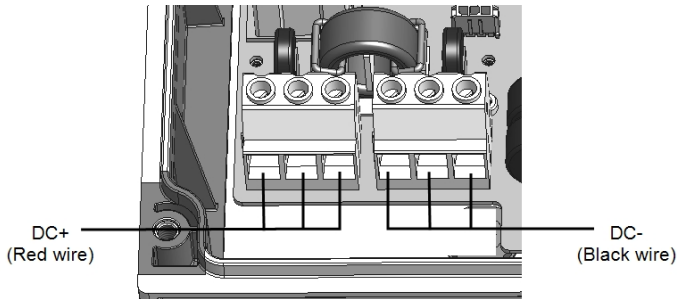



Figure 39: DC terminals

3. Connect the AC wires according to the labels on the AC terminal blocks, as follows:

| Wire type      | Connect to terminal   |
|----------------|---|
| Line 1         | L1  |
| Line 2         | L2  |
| Line 3         | L3  |
| PE (grounding) |  |
| Neutral        | N   |

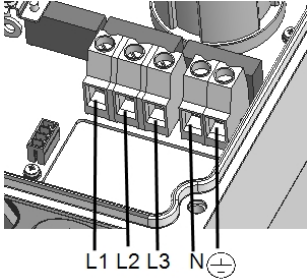


Figure 40: AC terminals

4. Tighten the screws of each terminal with a torque of 1.2-1.5 N\*m / 0.88-1.1 lb.\*ft.
5. Verify that there are no unconnected wires at the output of the DC Safety Unit and that any unused terminal screws are tightened.
6. Connect the DC and AC wires to the DC Safety Unit. Refer to *Connecting the AC and the Strings to the Inverter* on page 30.
7. Ensure proper cable entry sealing; inspect the entire cable run and use standard sealants to avoid water penetration.

## Adding, Removing, or Replacing Power Optimizers

1. Turn OFF the inverter ON/OFF/P switch, and wait until the green LED is blinking , indicating that the DC voltage is safe (<50V), or wait five minutes before continuing to the next step.
2. Disconnect the AC to the inverter by turning OFF the circuit breakers on the distribution panel.
3. Turn OFF the DC Safety Unit (if applicable).
4. Disconnect and connect the necessary power optimizers.
5. Perform pairing and other procedures described in *Activating, Commissioning and Configuring the System* on page 35 on all inverters to which power optimizers were added or from which power optimizers were removed.
6. In the monitoring platform, use the **Replace** button in the **logical layout** tab (in site Admin). Replace the serial number of the removed power optimizer with the serial number of the newly installed power optimizer. Refer to <https://www.solaredge.com/sites/default/files/se-monitoring-portal-site-admin.pdf>



## Determining the Circuit Breaker Size

Inverters should be protected by circuit breakers. This document describes how to determine which circuit breaker to use in three phase commercial installations.

## Using Transformers in Commercial Three Phase Inverter Installations

Using transformers in a commercial installation is optional. In most cases a transformer is used to connect the installation to the medium voltage power grid. The following figure illustrates a typical transformer and commercial three phase inverter installation topology.

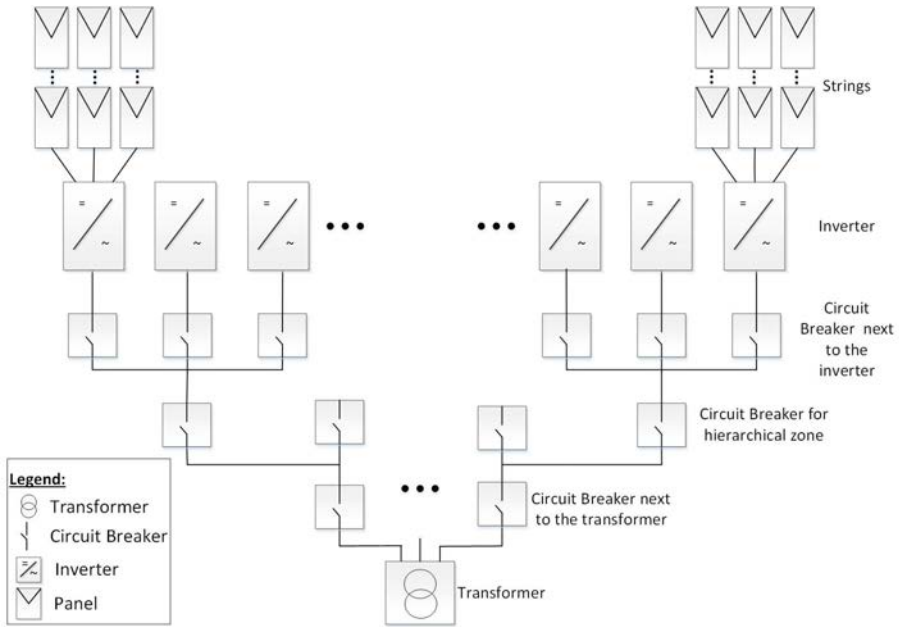


Figure 41: Typical transformer and commercial three phase inverter installation topology

There are many considerations for selecting the suitable transformer and its associated current limiting devices such as circuit breakers and fuses. The considerations must include at least the following:

- The transformer should be designed for a typical PV system production profile: high daytime loads with no loads at night.
- The current limiting devices should protect the electrical circuits and the inverters from the excess current created by an overload, or a short circuit. If a short circuit or other overcurrent occurs, the current limiting devices should block the current flow to the circuit, thus preventing damage to the electrical circuits and the inverters.

The circuit breakers and the fuses should comply with the transformer manufacturer recommendations and with the relevant sections in standards such as IEC 60909, IEC 60364, UL 508A and NEC 2017.

Some manufacturers provide detailed information about the transformer short circuit calculation procedure, and its effect on the selection of circuit breakers and fuses at the different hierarchical levels of the installation topology (see *Figure 41*).

For an example of a calculation, refer to:

- [Guidelines on the Short Circuit Current Rating for Industrial Control Panels](#)
- [Short-circuit current rating \(SCCR\) of industrial control panels](#)
- To ensure that the circuit breaker and fuses trip as expected, follow their manufacturers' recommendations, especially with respect to the various de-rating considerations.

**NOTE**

Transformer procurement, installation, maintenance and support are the responsibility of the installer. Damage to the inverter due to incorrect transformer installation, or use of a transformer that is incompatible with the SolarEdge system will render the SolarEdge warranty invalid.

## Determining the Size of an Inverter Circuit Breaker

This section explains how to determine the rate of a circuit breaker next to an inverter. For an example of an inverter with a circuit breaker next to it see *Figure 41*.

Ensure you have the following parameters before determining the circuit breaker size:

- The inverter's maximum continuous output current as appears in the datasheet.
- Factor for the installation's country. This factor is dictated by regulation, applicable standards or common practice and is usually 1.25.

→ To determine the size of an inverter circuit breaker:

1. Multiply the inverter's maximum continuous output current by the factor.  
For example,  $40A \times 1.25 = 50A$
2. Round up the rated size, as calculated in step 1, to the closest standard circuit breaker size. See Circuit Breaker Criteria table below for standard sizes suitable for SolarEdge three phase inverters.

**NOTE**

If the result has a decimal fraction smaller than 0.5 round it down.

3. To ensure that the selected circuit breaker trips as expected, at minimum consider the following:
  - The circuit breaker rated voltage.
  - Temperature de-rating due to both close proximity of other circuit breakers and the effect of ambient temperature on the distribution board.
  - De-rating due to permanent load.



If the de-rated current of the selected circuit breaker is lower than the maximum output current of the inverter, consider selecting a circuit breaker that is designed for a higher rated current, or reducing the temperature de-rating effect by increasing the distance between adjacent circuit breakers.

**NOTE**

- Make sure to select cables that are suitable for the environmental conditions, the operating voltage and the selected circuit breaker.
- Three or four pole circuit breakers are required. It is recommended to use a four pole circuit breaker when applicable.
- It is recommended to use a circuit breaker with tripping characteristic B or C.

**Table 1: Circuit Breaker Criteria**

| Inverter  | Max. Continuous Output Current (per Phase) | Recommended Circuit Breaker |
|-----------|--|-----------------------------|
| SE12.5K   | 20A  | 25A                         |
| SE14.4KUS | 40A  | 50A                         |
| SE15K     | 23A  | 32A                         |
| SE16K     | 25.5A                                      | 32A                         |
| SE17K     | 26A  | 32A                         |
| SE25K     | 38A  | 50A                         |
| SE27.6K   | 40A  | 50A                         |
| SE30K     | 36.5A                                      | 50A                         |
| SE33.3K   | 40A  | 50A                         |
| SE43.2KUS | 120A                                       | 150A                        |
| SE50K     | 76A  | 100A                        |
| SE55K     | 80A  | 100A                        |
| SE66.6K   | 80A  | 100A                        |
| SE66.6KUS | 80A  | 100A                        |
| SE75K     | 120A                                       | 150A                        |
| SE82.8K   | 120A                                       | 150A                        |
| SE100K    | 120A                                       | 150A                        |
| SE100KUS  | 120A                                       | 150A                        |

# Technical Specifications - Three Phase Inverters (Europe & APAC)

## SE4K - SE12.5K

|  | SE3K                                      | SE4K        | SE5K | SE6K        | SE7K | SE8K | SE9K | SE10K | SE12.5K | Unit           |
|--|---|-------------|------|-------------|------|------|------|-------|---------|----------------|
| <b>Output</b>  |   |             |      |             |      |      |      |       |         |                |
| Rated AC power output  | 3000<br>(1)                               | 4000<br>(1) | 5000 | 6000<br>(1) | 7000 | 8000 | 9000 | 10000 | 12500   | VA             |
| Maximum AC power output                                      | 3000                                      | 4000        | 5000 | 6000        | 7000 | 8000 | 9000 | 10000 | 12500   | VA             |
| AC Output Line Connections                                   | 3 phase, 4-wire / PE (L1-L2-L3-N), TN, TT |             |      |             |      |      |      |       |         |                |
| AC output voltage – line to line / line to neutral (nominal) | 380/ 220; 400/ 230                        |             |      |             |      |      |      |       |         | Vac            |
| AC output voltage range                                      | 184 – 264.5                               |             |      |             |      |      |      |       |         | Vac            |
| AC frequency   | 50/60 ± 5                                 |             |      |             |      |      |      |       |         | Hz             |
| Maximum continuous output current (per phase)                | 5   | 6.5         | 8    | 10          | 11.5 | 13   | 14.5 | 16    | 20      | A              |
| Maximum continuous overcurrent protection                    | 5   | 6.5         | 8    | 10          | 11.5 | 13   | 14.5 | 16    | 20      | A              |
| Residual current detector / Residual Current step detector   | 300 / 30                                  |             |      |             |      |      |      |       |         | mA             |
| Grid supported – three phase                                 | 3 / N / PE (WYE with Neutral)             |             |      |             |      |      |      |       |         |                |
| Inrush current AC (Peak/Duration)                            | 3/ 20                                     |             |      |             |      |      |      |       |         | Aac (rms) / ms |

(1)Available in some countries; refer to the Certifications category in

<http://www.solaredge.com/groups/support/downloads>

|  | SE3K                             | SE4K | SE5K | SE6K | SE7K | SE8K  | SE9K  | SE10K | SE12.5K | Unit |
|--|----------------------------------|------|------|------|------|-------|-------|-------|---------|------|
| Maximum output fault current   |                                  | 26   | 26   |      | 51   | 51    | 51    | 51    | 61      | A    |
| Power factor range   | 1 (adjustable from -0.9 to +0.9) |      |      |      |      |       |       |       |         |      |
| Total harmonic distortion  | < 3%                             |      |      |      |      |       |       |       |         |      |
| Protective class   | Class I                          |      |      |      |      |       |       |       |         |      |
| Utility monitoring, islanding protection, configurable Power Factor, country configurable thresholds | Yes                              |      |      |      |      |       |       |       |         |      |
| Overvoltage category   | III                              |      |      |      |      |       |       |       |         |      |
| <b>Input</b>   |                                  |      |      |      |      |       |       |       |         |      |
| Maximum DC power (Module STC)  | 4050                             | 5400 | 6750 | 8100 | 9450 | 10800 | 12150 | 13500 | 16850   | W    |
| Transformer-less, ungrounded   | Yes                              |      |      |      |      |       |       |       |         |      |
| Maximum input voltage  | 900                              |      |      |      |      |       |       |       |         | Vdc  |
| Nominal DC input voltage   | 750                              |      |      |      |      |       |       |       |         | Vdc  |
| Maximum input current  | 5                                | 7    | 8.5  | 10   | 12   | 13.5  | 15    | 16.5  | 21      | Adc  |
| Maximum back-feed current  | 0                                |      |      |      |      |       |       |       |         | Adc  |
| Reverse-polarity protection  | Yes                              |      |      |      |      |       |       |       |         |      |
| Ground-fault isolation detection   | 700kΩ Sensitivity                |      |      |      |      |       |       |       |         |      |
| Overvoltage category   | II                               |      |      |      |      |       |       |       |         |      |
| Maximum inverter efficiency  | 98                               |      |      |      |      |       |       |       |         | %    |

|                              | SE3K  | SE4K | SE5K | SE6K | SE7K | SE8K | SE9K | SE10K | SE12.5K | Unit |
|------------------------------|-------|------|------|------|------|------|------|-------|---------|------|
| European weighted efficiency | 96.7  | 97.3 | 97.3 | 97.3 | 97.4 | 97.6 | 97.5 | 97.6  | 97.7    | %    |
| Night-time power consumption | < 2.5 |      |      |      |      |      |      |       |         | W    |

|   | SE3K  | SE4K | SE5K | SE6K | SE7K | SE8K | SE9K | SE10K | SE12.5K | Unit |
|---|---|------|------|------|------|------|------|-------|---------|------|
| <b>Additional Features</b>                        |   |      |      |      |      |      |      |       |         |      |
| Supported Communication Interfaces <sup>(1)</sup> | RS485, Ethernet, Wi-Fi (requires antenna <sup>(2)</sup> ), ZigBee (optional), Cellular (Optional) |      |      |      |      |      |      |       |         |      |
| Smart Energy Management                           | Export Limitation, Home Energy Management (Device Control)  |      |      |      |      |      |      |       |         |      |
| Inverter Commissioning                            | With the SetApp mobile application using built-in Wi-Fi access point for local connection         |      |      |      |      |      |      |       |         |      |
| Arc Fault Protection                              | Integrated, user configurable (according to UL1699B)  |      |      |      |      |      |      |       |         |      |
| RS485 Surge Protection                            | Optional <sup>(3)</sup>   |      |      |      |      |      |      |       |         |      |
| <b>Standard Compliance</b>                        |   |      |      |      |      |      |      |       |         |      |
| Safety  | IEC-62103 (EN50178), IEC-62109  |      |      |      |      |      |      |       |         |      |
| Grid connection standards <sup>(4)</sup>          | VDE 0126-1-1, VDE-AR-N-4105, AS-4777, G83 / G59   |      |      |      |      |      |      |       |         |      |
| Emissions   | IEC61000-6-2, IEC61000-6-3, IEC61000-3-11, IEC61000-3-12, FCC part15 class B                      |      |      |      |      |      |      |       |         |      |
| WEEE, RoHS  | Yes   |      |      |      |      |      |      |       |         |      |
| <b>Installation Specifications</b>                |   |      |      |      |      |      |      |       |         |      |
| AC output / Gland Diameter / Wire Cross Section   | 15-21 mm / Solid wire 2.5-16 mm <sup>2</sup> , Stranded wire 2.5 - 10 mm <sup>2</sup>             |      |      |      |      |      |      |       |         |      |
| DC input  | 2 MC4 pairs <sup>(5)</sup>  |      |      |      |      |      |      |       |         |      |

(1)For specifications of communication options, refer to Datasheets > Communications category in the Downloads page: <http://www.solaredge.com/groups/support/downloads>

(2)Wi-Fi connectivity requires an external antenna. For more information refer to: <https://www.solaredge.com/sites/default/files/se-wif-zigbee-antenna-datasheet.pdf>.

(3)Provided with the inverter in India only. For other countries an SPD plug-in can be purchased. Refer to: [https://www.solaredge.com/sites/default/files/se\\_spd\\_plug\\_in\\_for\\_rs485\\_3ph\\_setapp\\_ds.pdf](https://www.solaredge.com/sites/default/files/se_spd_plug_in_for_rs485_3ph_setapp_ds.pdf)

(4)For all standards refer to the Certifications category in <http://www.solaredge.com/groups/support/downloads>.

(5)You can connect strings in parallel to a single input as long as the cumulative current does not exceed 45A.

|  | SE3K                      | SE4K | SE5K | SE6K | SE7K | SE8K | SE9K | SE10K | SE12.5K | Unit |
|--|---------------------------|------|------|------|------|------|------|-------|---------|------|
| Dimensions (WxLxH)                               | 540 x 315 x 260           |      |      |      |      |      |      |       |         | mm   |
| Weight   | 33.2                      |      |      |      |      |      |      |       |         | kg   |
| Operating temperature range (1)                  | -40 - +60                 |      |      |      |      |      |      |       |         | °C   |
| Operating humidity – non condensing              | < 95                      |      |      |      |      |      |      |       |         | %    |
| Cooling  | Fan (user replaceable)    |      |      |      |      |      |      |       |         |      |
| Noise (typical)                                  | < 50 <sup>(2)</sup>       |      |      |      |      |      |      |       |         | dBA  |
| Protection rating/<br>Environmental category     | IP65 - Outdoor and indoor |      |      |      |      |      |      |       |         |      |
| Maximum altitude                                 | 2000                      |      |      |      |      |      |      |       |         | m    |
| Pollution degree classification (inside/outside) | 2/3                       |      |      |      |      |      |      |       |         |      |
| Bracket mounted (bracket provided)               |                           |      |      |      |      |      |      |       |         |      |

### SE15K - SE33.3K<sup>(3)</sup>

|                         | SE15K | SE16K | SE17K | SE25K                | SE27.6K | SE33.3K | Unit |
|-------------------------|-------|-------|-------|----------------------|---------|---------|------|
| <b>Output</b>           |       |       |       |                      |         |         |      |
| Rated AC power output   | 15000 | 16000 | 17000 | 25000 <sup>(4)</sup> | 27600   | 33300   | VA   |
| Maximum AC power output | 15000 | 16000 | 17000 | 25000 <sup>6</sup>   | 27600   | 33300   | VA   |

(1) For inverter power de-rating refer to the application note at the following link:

<http://www.solaredge.com/files/pdfs/se-temperature-derating-note.pdf>

(2) For inverters with a noise level suitable for residential environments refer to:

<http://www.solaredge.com/files/pdfs/products/inverters/se-three-phase-indoor-inverter-datasheet.pdf>

(3) The SE33.3K model requires a medium voltage transformer.

(4) 24.99kVA in the UK

|  | SE15K                                     | SE16K | SE17K | SE25K   | SE27.6K | SE33.3K  | Unit           |
|--|---|-------|-------|---|---------|----------|----------------|
| AC Output Line Connections   | 3 phase, 4-wire / PE (L1-L2-L3-N), TN, TT |       |       |   |         |          |                |
| AC output voltage – line to line / line to neutral (nominal)   | 380/ 220; 400/ 230                        |       |       |   |         | 480/277  | Vac            |
| AC output voltage range  | 184 – 264.5                               |       |       |   |         | 244-305  | Vac            |
| AC frequency   | 50/60 ± 5                                 |       |       |   |         |          | Hz             |
| Maximum continuous output current (per phase)  | 23  | 25.5  | 26    | 38  | 40      | 40 @277V | A              |
| Maximum continuous overcurrent protection  | 23  | 25.5  | 26    | 38  | 40      | 40       | A              |
| Residual current detector / Residual Current step detector   | 300 / 30                                  |       |       |   |         |          | mA             |
| Grid supported – three phase   | 3 / N / PE (WYE with Neutral)             |       |       |   |         |          | V              |
| Inrush current AC (Peak/ Duration)   | 3/ 20                                     |       |       |   | 3.1/ 20 | 4.2/ 20  | Aac (rms) / ms |
| Maximum output fault current   | 65  | 72    | 68    | 88  | 92      | 92       | A              |
| Power factor range   | 1 (adjustable from -0.9 to +0.9)          |       |       | 1 (adjustable from -0.8 to +0.8) <sup>(1)</sup> |         |          |                |
| Total harmonic distortion  | < 3%                                      |       |       |   |         |          |                |
| Protective class   | Class I                                   |       |       |   |         |          |                |
| Utility monitoring, islanding protection, configurable Power Factor, country configurable thresholds | Yes                                       |       |       |   |         |          |                |
| Overvoltage category   | III                                       |       |       |   |         |          |                |

(1)For SE27.6K - when set to Germany Power Factor is limited to 0.9.



|                                    | SE15K   | SE16K | SE17K | SE25K                                     | SE27.6K | SE33.3K | Unit |
|------------------------------------|---|-------|-------|---|---------|---------|------|
| <b>Input</b>                       |   |       |       |   |         |         |      |
| Maximum DC power (Module STC)      | 20250   | 21600 | 22950 | 33750                                     | 37250   | 45000   | W    |
| Transformer-less, ungrounded       | Yes   |       |       |   |         |         |      |
| Maximum input voltage              | 900   |       |       |   |         | 1000    | Vdc  |
| Nominal DC input voltage           | 750   |       |       |   |         | 840     | Vdc  |
| Maximum input current              | 22  | 23    | 23    | 37  | 40      | 40      | Adc  |
| Maximum back-feed current          | 0   |       |       |   |         |         | Adc  |
| Reverse-polarity protection        | Yes   |       |       |   |         |         |      |
| Ground-fault isolation detection   | 700 k $\Omega$ Sensitivity  |       |       | 350 k $\Omega$ Sensitivity <sup>(1)</sup> |         |         |      |
| Overvoltage category               | III   |       |       |   |         |         |      |
| Maximum inverter efficiency        | 98  |       |       | 98.3                                      |         | 98.1    | %    |
| European weighted efficiency       | 97.6  | 97.7  |       | 98  |         |         | %    |
| Night-time power consumption       | < 2.5   |       |       | < 4                                       |         |         | W    |
| <b>Additional Features</b>         |   |       |       |   |         |         |      |
| Supported communication interfaces | RS485, Ethernet, Cellular (Optional)  |       |       |   |         |         |      |
| Inverter commissioning             | With the SetApp mobile application using built-in Wi-Fi access point for local connection |       |       |   |         |         |      |
| RS485 Surge Protection             | Supplied with the inverter  |       |       |   |         |         |      |
| Smart Energy Management            | Export Limitation   |       |       |   |         |         |      |
| Arc Fault Protection               | Integrated, user configurable (according to UL1699B)                                      |       |       |   |         |         |      |

(1)Where permitted by local regulations

|   | SE15K  | SE16K | SE17K   | SE25K | SE27.6K         | SE33.3K | Unit |
|---|--|-------|---|-------|-----------------|---------|------|
| Rapid Shutdown                                  | Optional <sup>(1)</sup> (Automatic upon AC grid disconnect)                                    |       |   |       |                 |         |      |
| RS485 Surge Protection                          | Optional <sup>(2)</sup>  |       |   |       |                 |         |      |
| <b>DC Safety Unit (optional)</b>                |  |       |   |       |                 |         |      |
| 2-pole Disconnection                            | N/A  |       | 1000V / 40A   |       |                 |         |      |
| DC Surge Protection                             | N/A  |       | Type II, field replaceable  |       |                 |         |      |
| DC Fuses on Plus & Minus                        | N/A  |       | Optional, 20A   |       |                 |         |      |
| Compliance                                      | N/A  |       | UTE-C15-712-1   |       |                 |         |      |
| <b>Standard Compliance</b>                      |  |       |   |       |                 |         |      |
| Safety  | IEC-62103 (EN50178), IEC-62109, AS3100   |       |   |       |                 |         |      |
| Grid connection standards <sup>(3)</sup>        | VDE-AR-N-4105, G59/3, AS-4777, EN 50438, VDE 0126-1-1, CEI-021, BDEW, CEI-016 <sup>(4)</sup> ; |       |   |       |                 |         |      |
| Emissions                                       | IEC61000-6-2, IEC61000-6-3, IEC61000-3-11, IEC61000-3-12                                       |       |   |       |                 |         |      |
| WEEE, RoHS                                      | Yes  |       |   |       |                 |         |      |
| <b>Installation Specifications</b>              |  |       |   |       |                 |         |      |
| AC output / Gland Diameter / Wire Cross Section | 15-21 mm / Solid wire 2.5-16 mm <sup>2</sup> ,<br>Stranded wire 2.5 - 10 mm <sup>2</sup>       |       | 18-25mm / Solid wire 2.5-16 mm <sup>2</sup> ,<br>Stranded wire 2.5-10 mm <sup>2</sup> |       |                 |         |      |
| DC input <sup>(5)</sup>                         | 2 MC4 pairs  |       | 3 MC4 pairs   |       |                 |         |      |
| DC input with DC Safety Unit                    | N/A  |       | Gland diameter 5-10 mm  |       | mm              |         |      |
|   |  |       | Wire cross section 0.5 - 13.5   |       | mm <sup>2</sup> |         |      |
| Dimensions (HxWxD)                              | 540 x 315 x 260  |       |   |       |                 |         | mm   |

(1) Inverter with rapid shutdown part number: SExxK-RWROOBNN2; available for SE25K and SE27.6K

(2) Provided with the inverter in India only. For other countries an SPD plug-in can be purchased. Refer to: [https://www.solaredge.com/sites/default/files/se\\_spd\\_plug\\_in\\_for\\_rs485\\_3ph\\_setapp\\_ds.pdf](https://www.solaredge.com/sites/default/files/se_spd_plug_in_for_rs485_3ph_setapp_ds.pdf)

(3) For all standards refer to the Certifications category in <http://www.solaredge.com/groups/support/downloads>.

(4) Models SE25K, SE27.6K and SE33.3K only

(5) Connection of additional strings in parallel to a single input is allowed as long as the cumulative current does not exceed 45A.

|  | SE15K                   | SE16K | SE17K           | SE25K | SE27.6K | SE33.3K | Unit |
|--|-------------------------|-------|-----------------|-------|---------|---------|------|
| Dimensions with Safety Unit (HxWxD)                  | N/A                     |       | 775 x 315 x 260 |       |         |         | mm   |
| Weight   | 33.2                    |       | 45              |       |         |         | kg   |
| Weight with Safety Unit                              | N/A                     |       | 48              |       |         |         | kg   |
| Operating temperature range <sup>(1)</sup>           | -40 - +60               |       |                 |       |         |         | °C   |
| Operating humidity – non condensing                  | < 95                    |       |                 |       |         |         | %    |
| Cooling  | Fan (user replaceable)  |       |                 |       |         |         |      |
| Noise (typical)                                      | < 50                    |       | < 55            |       |         |         | dBA  |
| Protection rating/<br>Environmental category         | IP65 Outdoor and indoor |       |                 |       |         |         |      |
| Maximum altitude                                     | 2000                    |       |                 |       |         |         | m    |
| Pollution degree classification (inside/<br>outside) | 2/3                     |       |                 |       |         |         |      |
| Bracket mounted (bracket provided)                   |                         |       |                 |       |         |         |      |

(1)For inverter power de-rating information, refer to the application note at the following link:

<http://www.solaredge.com/files/pdfs/se-temperature-derating-note.pdf>

## 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 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 status screen.

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