



Installation Guide

# Three Phase Inverters with Synergy Technology

PN: SExxK-xxxxlxxxx

For North America

Version 1.7

# Disclaimers

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This manual describes the installation of the Three Phase Inverter with Synergy Technology. Read this manual before you attempt to install the product, and follow the instructions throughout the installation process. If you are uncertain about any of the requirements, recommendations, or safety procedures described in this manual, contact SolarEdge Support immediately for advice and clarification. The information included in this manual is accurate at the time of publication. However, the product specifications are subject to change without prior notice. In addition, the illustrations in this manual are meant to help explain system configuration concepts and installation instructions. The illustrated items may differ from the actual items at the installation location.

## FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference. 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:

- Increase the separation between the equipment and the receiver.
- Reorient or relocate the receiving antenna.
- 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 1.7, August 2024: Added DC Safety Switch model to Appendix G

Version 1.6, June 2024: Added Appendix G: PV Hazard Control Models

Version 1.5, April 2024: Updated Removing the Synergy Manager Cover procedure

Version 1.4, March 2024: Various updates

Version 1.3, April 2023: Added in the Maintenance appendix how to clean the fan

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# HANDLING AND SAFETY INSTRUCTIONS

## 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.

### AVERTISSEMENT!

Dénote un risque: il attire l'attention sur une opération qui, si elle n'est pas faite ou suivi correctement, pourrait causer des blessures ou un danger de mort. Ne pas dépasser une telle note avant que les conditions requises soient totalement comprises et accomplies.

### 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.

### ATTENTION!

Dénote un risque: il attire l'attention sur une opération qui, si elle n'est pas faite ou suivi correctement, pourrait causer un dommage ou destruction de l'équipement. Ne pas dépasser une telle note avant que les conditions requises soient totalement comprises et accomplies.

### NOTE



Denotes additional information about the current subject.

### IMPORTANT SAFETY FEATURE



Denotes information about safety issues.

# IMPORTANT SAFETY INSTRUCTIONS / CONSIGNES DE SÉCURITÉ IMPORTANTES

SAVE THESE INSTRUCTIONS / CONSERVEZ CES INSTRUCTIONS



**WARNING!**

To reduce the risk of injury, read all instructions in this document.

**AVERTISSEMENT!**

*Pour réduire le risque de blessure, lisez toutes les instructions de ce document.*

**WARNING!**



When servicing or replacing SolarEdge equipment, instructions in the SolarEdge Inverter Installation Guide must be followed to maintain the integrity of the PV hazard control system. SolarEdge Power Optimizers and/or inverters may only be replaced with SolarEdge Power Optimizers and/or inverters. Third party equipment is not compatible with SolarEdge equipment.

**AVERTISSEMENT!**

*Lors de l'entretien ou du remplacement de l'équipement SolarEdge, les instructions du guide d'installation de l'onduleur SolarEdge doivent être suivies pour maintenir l'intégrité du système de contrôle des risques photovoltaïques. Les optimiseurs de puissance SolarEdge et/ou les onduleurs ne peuvent être remplacés que par des optimiseurs de puissance SolarEdge et/ou des onduleurs. Les équipements tiers ne sont pas compatibles avec les équipements SolarEdge.*



**WARNING!**

Using this equipment in a manner not specified by SolarEdge in this document may impair the protection provided by this equipment.

**AVERTISSEMENT!**

*L'utilisation de cet équipement d'une manière non spécifiée par SolarEdge dans ce document peut nuire à la protection fournie par cet équipement.*

**WARNING!**



The inverter cover should be opened only after shutting off the inverter, by moving the ON/OFF/P switch to the OFF(0) position. This disables the DC voltage inside the inverter. Wait at least five minutes before opening the cover. Otherwise, there is a risk of electric shock from energy stored in the capacitors.

**AVERTISSEMENT!**

*Ne pas ouvrir le couvercle de l'onduleur avant d'avoir coupé l'interrupteur situé en dessous de l'onduleur. Cela supprime les tensions CC et CA de l'onduleur. Attendre cinq minutes avant d'ouvrir le couvercle. Sinon, il y a un risque de choc électrique provenant de l'énergie stockée dans le condensateur.*





P = Program/Pair  
1 = ON  
0 = OFF

**WARNING!**



Before operating the inverter, ensure that the inverter is 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.

**AVERTISSEMENT!**

*Avant d'utiliser l'onduleur monophasé, assurez-vous que l'onduleur est correctement mis à la terre. Ce produit doit être raccordé à un système de câblage fixe, métallique, l'équipement-le conducteur de mise à la terre doit être exécuté avec les conducteurs de circuit et raccordé à l'équipement borne de mise à la terre ou de plomb sur le produit.*

**WARNING!**



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

**AVERTISSEMENT!**

*L'unité ne doit être ouverte que par un technicien qualifié dans le cadre de l'installation et de la maintenance.*

**WARNING!**



High DC Voltage on PV strings at night when Potential Induced Degradation (PID) rectifier / Volt-Ampere Reactive (VAR) control function is active. DO NOT touch any component or perform any maintenance operation on the PV strings.

**AVERTISSEMENT!**

*Tension CC élevée sur les chaînes photovoltaïques la nuit lorsque le redresseur à dégradation induite potentielle (PID) / la fonction de contrôle Volt-Ampère Réactif (VAR) est active. NE touchez AUCUN composant et n'effectuez aucune opération de maintenance sur les chaînes photovoltaïques.*

**WARNING!**



The Safety Unit meets all requirements for a code-compliant installation of this system. The DC Disconnect Switch disconnects both the positive and negative conductors.

**AVERTISSEMENT!**

*Le sectionneur externe (inclus) répond aux exigences de conformité pour l'installation de ce système. Le coupeur CC ouvre les conducteurs positifs et négatifs.*

**WARNING!**



The inverter input and output circuits are isolated from the enclosure. This system does not include an isolation transformer and should be installed with an ungrounded PV array in accordance with the requirements of NEC Articles 690.35 and 690.43 National Electric Code, ANSI/NFPA 70, 2011 (and Canadian Electrical Code, Part I, for installations in Canada).

Equipment grounding is the responsibility of the installer and must be performed in accordance with all applicable Local and National Codes.

**AVERTISSEMENT!**

*Les circuits d'entrée et de sortie de l'onduleur sont isolés de l'enveloppe. Ce système n'inclut pas d'isolation galvanique (transformateur) et devra être installé sans mise à la terre du champ PV et en accord avec les articles 690.35 et 690.43 du National Electric Code (NEC), ANSI/NFPA 70, 2011 (et du Code Electrique Canadien, Partie 1, pour les installations faites au Canada). La mise à la terre des équipements est la responsabilité de l'installateur et doit être faite en accord avec toutes les règles locales et nationales applicables.*

**WARNING!**



SolarEdge inverters for the 480V L-L grid are rated above 750V. As such installers are required to mark " DANGER — HIGH VOLTAGE" adjacent to each DC wiring compartment.

**NOTE**



Utility interconnection may require approval from the authority having jurisdiction.

Approval from the authority having jurisdiction is required for making adjustments to utility interactive setpoints.

**NOTE**



SolarEdge inverters always opens a disconnecting means when the inverter ceases to deliver power because of abnormal Voltage or frequency conditions or in response to a detected unintentional island.

**NOTE**

The current unbalance shall be defined as the maximum deviation of line current on any phase, from the average line current of all phases, expressed as a percentage.

The measured maximum inverter current unbalance is as specified in the below table:



Model	% Current unbalance phase A	% Current unbalance phase B	% Current unbalance phase C
SE43.2K	2.0082	0.0171	1.9908
SE50K	1.7511	0.0978	1.8489
SE66.6K	1.3706	0.0966	1.274
SE80K	1.2938	0.0596	1.2342
SE100K	2.0559	0.1449	1.911
SE110K	1.9407	0.0894	1.8513
SE120K	1.9407	0.0894	1.8513

**WARNING!**

SolarEdge products can expose you to chemicals including antimony trioxide, which is known to the State of California to cause cancer. For more information, go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).



**AVERTISSEMENT!**

*Les produits SolarEdge peut vous exposer à des agents chimiques, y compris trioxyde d'antimoine, identifiés par l'État de Californie comme pouvant causer le cancer. Pour de plus amples informations, prière de consulter [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).*



**CAUTION!**

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

**ATTENTION!**

*Cette unité doit être utilisée selon les spécifications de fonctionnement, comme décrit dans la dernière fiche technique des spécifications.*

**CAUTION!**

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



**ATTENTION!**

*Objet lourd. Pour éviter la fatigue musculaire ou des blessures au dos, utilisez des techniques de levage appropriées et, si nécessaire - un auxiliaire de levage lors du retrait.*

NOTE



This inverter is provided with an IMI (Isolation Monitor Interrupter) for ground fault protection.

NOTE



The state of the ungrounded PV array may temporarily change during Isolation tests (resistor is connected between DC+ and DC- and GND points) and PID rectifier operation (small resistance is connected between DC- and GND points).

NOTE




The inverter is rated for:

- Overvoltage category: IV
- Pollution degree: 2

NOTE



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

NOTE



SolarEdge inverters can be installed in sites with an alternative power source such as 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 on connecting an alternative power source to SolarEdge inverter, refer to <https://www.solaredge.com/sites/default/files/se-inverter-support-of-voltage-sources.pdf>.

All SolarEdge inverters incorporate a certified, built-in Ground Fault Current Interrupter (GFCI). The GFCI protects against electrocution in case of a malfunction in the PV array, DC cables, or DC section of the inverter. The GFCI in the SolarEdge inverter can detect current leakage on the DC side. There are two trip thresholds for the GFCI. The lower threshold is used to protect against rapid changes in current leakage - typically due to direct contact by people. The higher threshold detects slowly rising leakage currents in the grounding conductors and limits the currents to ensure fire safety. The default current value for lower speed fire safety, per unit, is 300mA. The same detection is also used for measuring the resistance of the insulation of the PV array for verifying it is higher than a pre-configured value.

## Photovoltaic Rapid Shutdown System Requirements

This section is applicable to all Three Phase Inverters with Synergy Technology having Synergy Units marked with "R" in the part numbers: SESUK-USRxxxx.

### WARNING!



THIS PHOTOVOLTAIC RAPID SHUTDOWN SYSTEM (PVRSS) INCORPORATES ONE OR MORE PIECES OF EQUIPMENT THAT EXERCISE THE RAPID SHUTDOWN CONTROL OF PV SYSTEM CONDUCTORS REQUIRED BY SECTION 690.12 OF THE NEC (NFPA 70). OTHER EQUIPMENT INSTALLED IN OR ON THIS PV SYSTEM MAY ADVERSELY AFFECT THE OPERATION OF THIS PVRSS. IT IS THE RESPONSIBILITY OF THE INSTALLER TO ENSURE THAT THE COMPLETED PV SYSTEM MEETS THE APPLICABLE RAPID SHUT DOWN FUNCTIONAL REQUIREMENTS. THIS EQUIPMENT MUST BE INSTALLED ACCORDING TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.

- SolarEdge inverters and power optimizers installed together form a photovoltaic rapid shutdown system (PVRSS). All inputs and outputs of the inverter and power optimizers comply with photovoltaic rapid shutdown requirements for controlled conductors both inside and outside the PV array boundary. To form a PV rapid shutdown system, no more than 30 power optimizers should be installed in series. Each power optimizer will output around 1 Vdc when rapid shutdown is initiated. Rapid shutdown time limit is 30 Sec.
- This SolarEdge system is compatible with the **Grid support interactive compatible** functionality.
- All DC and AC conductors served by the power optimizers and inverters are controlled by the photovoltaic rapid shutdown system. The AC branch circuit conductors serving the inverter may remain energized until the AC service panel is de-energized. Installers must provide signage complying with Section 690.56(C) of the NEC (NFPA 70).
- Buildings with rapid shutdown PV systems, complying with NEC 690.56(C), shall have permanent labels as described in 690.56(C)(1) through (C)(2):
  - (1)(a) For PV systems that shut down the array and conductors leaving the array: The title "**SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN**" shall utilize capitalized characters with a minimum height of 3/8 in. in black on yellow background, and the remaining characters shall be capitalized with a minimum height of 3/16 in. in black on white background.

**SOLAR PV SYSTEM EQUIPED  
WITH RAPID SHUTDOWN**

TURN RAPID  
SHUTDOWN SWITCH  
TO THE "OFF"  
POSITION TO  
SHUTDOWN THE PV  
SYSTEM AND  
REDUCE SHOCK  
HAZARD IN ARRAY!

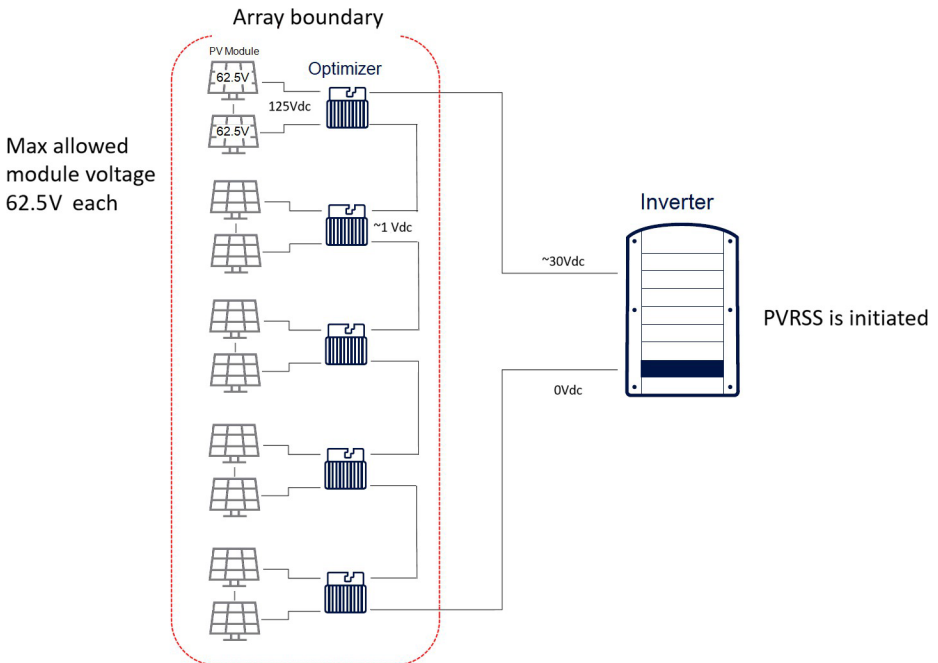


- (2) A rapid shutdown switch shall have a label located on or no more than 3 ft from the switch that includes this wording. The label shall be reflective, with all letters capitalized and having a minimum height of 3/8 in., in white on a red background.

**PV SYSTEM PV WITH  
RAPID SHUTDOWN**

## Photovoltaic Hazard Control System

SolarEdge commercial optimizers and inverters have been evaluated and listed to UL 3741 and may be used to form a PV hazard control system that utilizes SolarEdge PV rapid shutdown system to comply with NEC 690.12. Multiple modules may be connected in series to the optimizer input without exceeding the input voltage rating of the optimizer (125V dc). The diagram below depicts a typical PV hazard control system using multiple PV modules in series connected to optimizers. Installation instructions, warnings and cautions in this installation guide must be followed to comply with Local codes. The PVHCS shall be installed by qualified people in accordance with the installation instructions and all applicable installation codes and standards.



Power optimizer models with input Voltage up to 125Vdc, when used with SolarEdge three phase inverters and DC safety switches listed and marked with PVRSS, may be used to form a Listed Photovoltaic Hazard Control System.

### NOTE



Power optimizer models compliant with SolarEdge PV Hazard Control System: UL3741 listed models as noted on the power optimizer datasheet, and in Appendix G.

**WARNING!**



Upon servicing and/or replacing equipment, instructions in this installation guide must be followed to maintain the integrity of the PV hazard control system. SolarEdge commercial optimizers and three phase inverters should only be replaced with SolarEdge commercial optimizers and inverters. Third party equipment is not compatible.



# Chapter 1: Introducing the SolarEdge Power Harvesting System

## System Overview

The SolarEdge power harvesting solution is designed to maximize the power output from any type of solar Photovoltaic (PV) installation while reducing the average cost per Watt. *Figure 1* shows and the following sections describe the components of the SolarEdge power harvesting system.

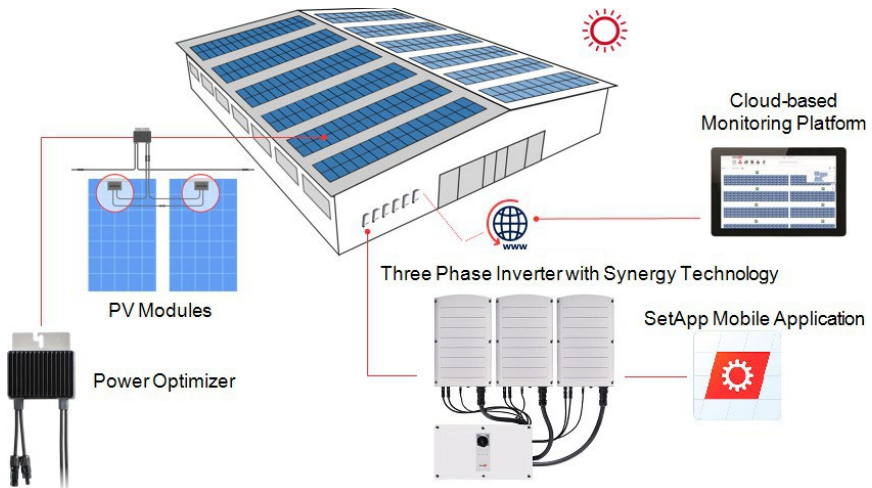


Figure 1: The SolarEdge power harvesting system components

## Power Optimizer

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

The Power Optimizers regulate the PV string Voltage at a constant level, regardless of PV string length and environmental conditions.

The Power Optimizers include a safety Voltage mechanism 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:

- Module add-on Power Optimizer – connected to one or more modules
- Smart modules - the Power Optimizer is embedded into a module

## Three Phase Inverter with Synergy Technology

The Three Phase Inverter with Synergy Technology (referred to as 'inverter' in this manual) efficiently converts DC power from the PV 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 the SolarEdge Monitoring platform (requires a LAN or cellular connection to the Internet).

The inverter is comprised of two or three Synergy unit inverters (depending on the model) accompanied by an external Synergy Manager unit. The Inverter may include two or three Synergy Units, depending on the inverter's model.

The Synergy Units are connected to the Synergy Manager via AC, DC and communication cables.

Each Synergy Unit operates independently and continues to work in case others stopped operating.

A chain of up to 31 inverters can be set to operate together via Modbus on RS485 line. When setting a chain of inverters, the inverter that manages communication interface to the internet is called Leader and the rest are Followers.



Figure 2: Synergy Manager with three Synergy Units

## Designer

SolarEdge Designer is a powerful tool and a user-friendly web application that simplifies solar energy system design. It offers an intuitive interface and advanced optimization features to help professionals create efficient PV designs. With accurate simulation algorithms and integration with SolarEdge products, it maximizes system performance. The application also enables financial analysis and supports collaboration.

## Monitoring Platform

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

## SetApp

SolarEdge SetApp is a mobile application designed to simplify the process of commissioning and configuring SolarEdge inverters and power optimizers by providing an intuitive and efficient interface for installers.

With SetApp, installers can easily access and configure SolarEdge inverters and power optimizers through their smartphone or tablet. The user-friendly app guides installers step-by-step through the entire commissioning process, ensuring that each component is properly connected and configured for optimal performance. This eliminates the need for complex manual setup procedures and significantly reduces the time and effort required for system installation.

## Installation Tools and Material List

Standard tools can be used during the installation of the SolarEdge system.

The following recommend tools is required for installation:

- Allen screwdriver for 5mm screw type for the inverter cover, Synergy Manager cover, and inverter side screws
- 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 Power Optimizers are installed and for opening the Safety Unit drill guides. Use of an impact driver is *not* allowed
- Ring terminals crimping tool
- Wire cutters
- Wire strippers
- Voltmeter

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

- For Ethernet:
  - CAT6 twisted pair Ethernet cable with RJ45 connector
  - If using a CAT6 cable spool: RJ45 plug and RJ45 crimper
- For RS485 / CAN Bus :
  - Four- or six-wire shielded twisted pair cable
  - Watchmaker precision screwdriver set

## Installation Procedure

The following procedures, are required for installing and setting up a new SolarEdge site. Some of these procedures also apply to modification of an existing site.

- [Installing the Power Optimizers](#)
- [Installing the Synergy Manager and Synergy Units](#)
- [Connecting AC and PV Strings to the Synergy Manager](#)
- [Activating, Commissioning and Configuring the System](#)
- [Setting Up Communication with the Monitoring Platform](#)

## Chapter 2: Installing the Power Optimizers

### Safety

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

#### WARNING!



The metallic enclosure of the Power Optimizer must be grounded in accordance with the product's listing and local and national codes.

#### AVERTISSEMENT!

*L'enceinte métallique de l'optimiseur de puissance doit être mise à la terre en accord avec les réglementations locales et nationales.*

#### WARNING!



When modifying an existing installation, turn OFF the inverter ON/OFF/P switch, the DC Disconnect Switch and the AC circuit breaker on the main AC distribution panel.

#### AVERTISSEMENT!

*Avant de faire ces étapes, éteignez l'onduleur monophasé en mettant sur OFF l'interrupteur ON/OFF situé au bas de l'onduleur.*

#### CAUTION!



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

#### ATTENTION!

*Les optimiseurs de puissances sont compatibles à la norme IP68/NEMA6P. Choisissez le lieu de montage tel que l'optimiseur ne puisse pas être submergé par l'eau.*

#### CAUTION!



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

#### ATTENTION!

*Cette unité doit être opérée suivant les instructions trouvées dans le manuel fourni avec le produit.*

#### CAUTION!



Cutting the Power Optimizer input or output cable connector is prohibited and will void the warranty.

#### ATTENTION!

*Sectionner les câbles d'entrées ou de sortie de l'optimiseur est interdit et annule sa garantie.*

**CAUTION!**

All PV modules must be connected to a Power Optimizer.

**ATTENTION!**

*Tous les modules doivent être connectés à un optimiseur de puissance.*

**CAUTION!**

If you intend to mount the Power 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.

**ATTENTION!**

Pour installation à même le module ou la monture du module, consultez d'abord le fabricant du module sur la position et son impact sur la garantie du module. Le perçage de trous dans le cadre du module devra se faire suivant les instructions du fabricant.

**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.

**CAUTION!**

Installing a SolarEdge system without ensuring compatibility of the module connectors with the Power 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 SolarEdge PowerOptimizers' connectors with the PV modules' 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 Power Optimizer connector; and the Inverter DC input connectors.
- 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.

**ATTENTION!**

*Les connecteurs du module doivent être mécaniquement compatibles avec les optimiseurs de puissance. Sinon, le système SolarEdge installé peut être dangereux ou causer des problèmes fonctionnels, tels que les défauts de terre, qui peuvent provoquer un arrêt de l'onduleur. Afin d'assurer la compatibilité mécanique entre les optimiseurs de puissance SolarEdge et les modules auxquels ils sont connectés:*

- *Utiliser des connecteurs identiques du même fabricant et du même type aussi bien pour les optimiseurs de puissance que pour les modules.*
- *Vérifiez que les connecteurs sont compatibles de la manière suivante:*
- *Le fabricant du connecteur doit explicitement vérifier la compatibilité avec le connecteur SolarEdge.*
- *Un rapport de test de tierce partie doit être effectué par l'un des laboratoires externes indiqués ci-dessous:(TUV, VDE, Bureau Veritas UL, CSA,Intertek), qui vérifiera la compatibilité des connecteurs.*

## Package Contents

- Power Optimizers
- Stainless steel grounding lock washers

## Installation Guidelines

- For the minimum and maximum number of Power Optimizers in a PV string (PV string length), see the Power Optimizer datasheets. Refer to the Designer for PV string length verification. The Designer is available on the SolarEdge website at: <https://www.solaredge.com/us/products/installer-tools/designer#/>.

Single Phase Inverters	Three Phase Inverters
All - 1000 ft / 300 m	SE10KUS and SE30KUS below - 300m / 1000ft SE9KUS, SE20KUS - 700m /2300ft SE14.4KUS, SE17.3KUS, SE33.3KUS, SE40KUS -700m / 2300ft

\*The same rules apply for Synergy units of equivalent power ratings, that are part of the modular Synergy technology inverter. For more information on how to use

<https://knowledge-center.solaredge.com/sites/kc/files/se-extension-cables-with-power-optimizer-application-note.pdf>

- *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:

**Between a Power Optimizer and a module:**

- Extension cables of up to 6 ft / 1.8 m are allowed for all Power Optimizers (3 ft / 0.9 m for DC+, and 3 ft / 0.9 m for DC -).
- SolarEdge Sense Connect technology monitors the S-Series Power Optimizer cable connectors and the direct connection created between them and another connector.
- P-Series Power Optimizers with the 4-type suffix in their part number (Pxxx-4xxxxxx) and the Mxxx-Series - extension cables of up to 52 ft / 16 m can be installed per Power Optimizer (26 ft / 8 m for DC+, and 26 ft / 8 m for DC-).

**Between two PV modules connected in series to a Power Optimizer**

When connecting two PV modules in series to supported Power Optimizers – an extension cable may be installed between the two modules, if the following conditions are met:

- The total round-trip cable length between the (+) and the (-) input terminals of the power optimizer (including the extension cable between the modules and the module output cables) does not exceed 16m/52.5ft.
- Supported Commercial Power Optimizers with the following part numbers are used:
  - Pxxx-4xxxxxx (P Series with 4-type in part number suffix)
  - Sxxx-1xxxxxx (S Series with 1-type in part number suffix)
- The connectors on each end of the extension cable must be identical to PV module's output connectors.



**NOTE**

The extension cable between two modules is considered as auxiliary equipment and is not covered by the SolarEdge warranty.



**NOTE**

When using a serial input optimizer for up to two modules connected in series, and PV modules installed in landscape orientation, it is recommended to use PV modules with long output cables to avoid the use of an extension (jumper cable) between two modules.

"Modules with long output cables" refers to modules with longer cables intended for landscape installation. The output cables length is usually specified in the Mechanical Characteristics section of the PV Module Datasheet.

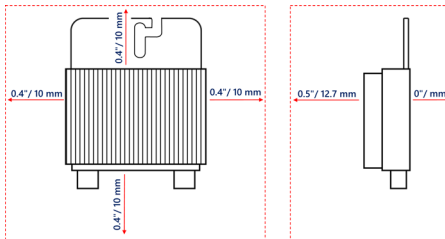
For planning considerations when connecting multiple PV modules to an Power Optimizer, refer to:

<https://www.solaredge.com/sites/default/files/application-note-connecting-solaredge-power-optimizers-to-multiple-pv-modules.pdf>

**Between two Power Optimizers or between a Power Optimizer and the inverter:**

- 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 PV string to the inverter. For more information on how to use extension and adapter cables with power optimizers, refer to <https://knowledge-center.solaredge.com/sites/kc/files/se-extension-cables-with-power-optimizer-application-note.pdf>
- 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 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 and input 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 PV string, as long as the minimum number of unshaded Power Optimizers connected in a PV 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 PV string.
- To allow for heat dissipation, maintain the following clearance:  
For All Power Optimizers, except for the P860, P960 and M1600



#### For P860, P960 and M1600 Power Optimizer

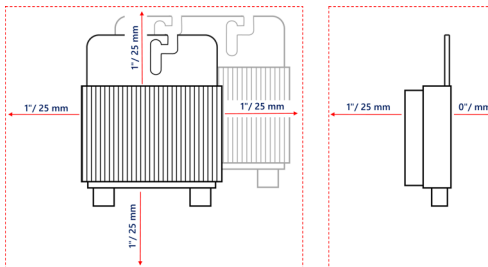


Figure 3: Clearance for heat dissipation around the Power Optimizer

- Equipment grounding tightening torques: 4-6 AWG: 45 lb-in, 8 AWG: 40 lb-in, 10-14 AWG: 35 lb-in.
- When installing PV modules in a confined space like Building-integrated photovoltaic (BIPV) modules, ventilation may be necessary to prevent Power Optimizers from exceeding their specified maximum temperatures.

## Step 1: Mounting and Grounding 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 (See *Figure 4*). It is recommended to mount the Power Optimizer in a location protected from direct sunlight.
2. If required, mark the mounting hole locations and drill holes.

### 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.

### ATTENTION!

*Les vibrations résultant du perçage peuvent endommager l'optimiseur de puissance et annulera la garantie. Utilisez une clé dynamométrique ou une perceuse électrique avec embrayage adaptable compatible avec les moments indiqués. Ne pas utiliser des tournevis à percussion pour fixer l'optimiseur. Ne pas percer à travers l'optimiseur de puissance ou ses trous de fixation.*

3. Attach each Power Optimizer to the rack using M6 (1/4") or M8 stainless steel bolts, nuts and washers or other mounting hardware. Apply torque of 6.5-7 lbf·ft/9-10 N·m.
4. Use the following methods to ground the Power Optimizer:

### WARNING!



The metallic enclosure of the Power Optimizer must be grounded in accordance with the requirements of the local and national codes.

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

**AVERTISSEMENT!**

*L'enceinte métallique de l'optimiseur de puissance doit être mise à la terre en accord avec les réglementations locales et nationales.*

- **For mounting on a grounded metal rail:** Use SolarEdge approved 5/16" stainless steel grounding star washer between the railing and the flat side of the mounting bracket.

**NOTE!**

Star washers for the S-series optimizer are not included and may be purchased in bulk (SolarEdge part number OPT-Washer-100 or OPT-Washer-500).

The star washer (used for grounding) should break through the anodize coating of the railing to ensure low resistive connection. Apply a torque of 9.5 N\*m / 7 lb\*ft.

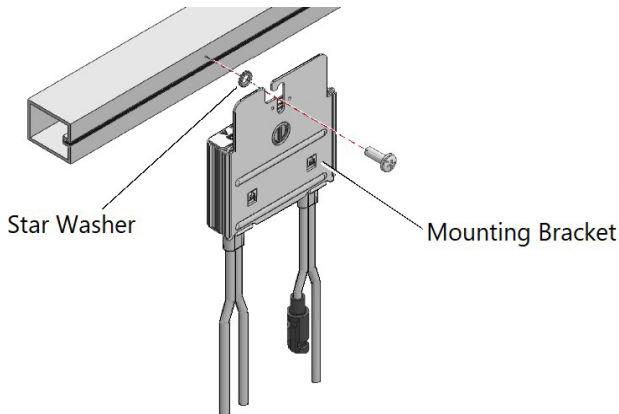


Figure 4: Power Optimizer installation and grounding using a star washer

- For mounting on rails with sliding nut fasteners:** If the star washer cannot be used, use the SolarEdge grounding plate (purchased separately - Part Number: SE-GNDPLATE-100) between the railing and the flat side of the mounting bracket. Use mounting specific hardware as needed. Apply a torque of 9.5 N\*m / 7 lb\*ft.

See *Figure 5*.

**NOTE!**



For more detailed information on Grounding SolarEdge Power Optimizer refer to:

[https://knowledge-center.solaredge.com/sites/kc/files/grounding\\_se\\_power\\_optimizers.pdf](https://knowledge-center.solaredge.com/sites/kc/files/grounding_se_power_optimizers.pdf)

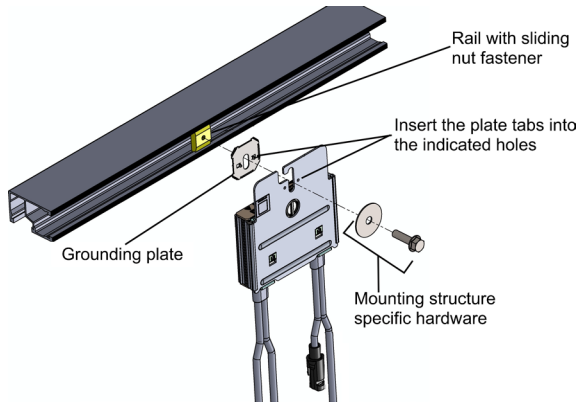


Figure 5: Power Optimizer installation and grounding using a grounding plate

- **For mounting on un-grounded structures** (such as a wooden structure): If the star washer or the plate cannot be used, use the SolarEdge grounding lug (purchased separately) with an equipment-grounding conductor according to the supplied instructions. The grounding terminal accepts wire sizes of 6-14 AWG and must be sized for equipment grounding per NEC 250.122 requirements. Tighten the screws connecting the Power Optimizer to the frame and the grounding terminal screw. Apply a torque of 9.5 N\*m / 7 lb\*ft.

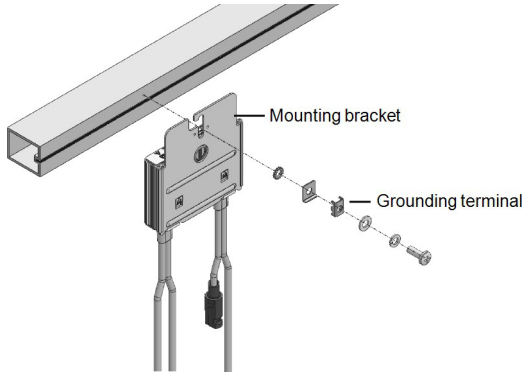


Figure 6: Power optimizer grounding terminal

- Verify that each Power Optimizer is securely attached to the module support structure.
- Record Power Optimizer serial numbers and locations, as described in *Reporting and Monitoring Installation Data* on page 81.

**NOTE**

When installing the Power Optimizers before the PV Modules, protect the connectors from rain and dust by using the provided seals. A seals kit can also be purchased separately (Part ID: OPT-SEAL-100).

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

### NOTE



Improper wiring may cause electrical faults in a PV system. To avoid electrical faults, verify proper locking of connectors and avoid cable tension and friction. Proper planning, materials and installation reduce the risk of electric arcs, short-circuits and ground faults in the PV system.

### 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.
- Connect the Minus (-) output connector of the module to the Minus (-) input connector of the Power Optimizer.

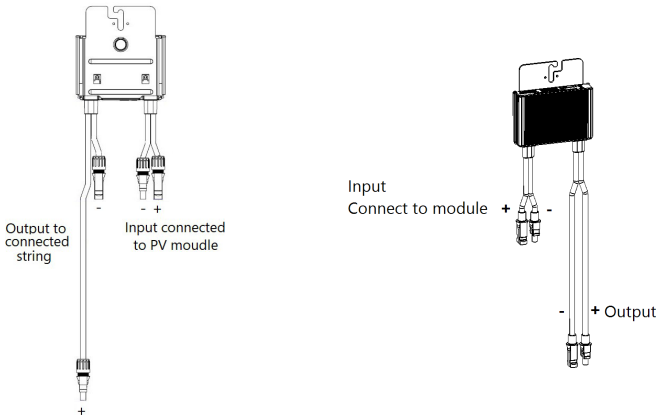


Figure 7: S-Series (left) and P-Series (right) Power Optimizer connectors

## Step 3: Connecting Power Optimizers in PV Strings

You can construct parallel PV strings of unequal length, that is, the number of Power Optimizers in each PV string does not have to be the same. The minimum and maximum PV string lengths are specified in the power data-sheets. Refer to the SolarEdge Site Designer for PV string length verification.

### IMPORTANT SAFETY FEATURE



- For a compliant PV Rapid Shutdown (PVRSS) installation, use no more than 30 Power Optimizers per PV string.
- Enabling PVRSS from the inverter menu is only required if the installed Power Optimizers were manufactured before 2015, otherwise it is enabled by default.

### NOTE



The DC bus of each unit is separate and not shared for all units. Therefore, in addition to following the inverter design rules, each unit should follow the unit design rules as detailed in the Technical Specifications.

1. Connect the Minus (-) output connector of the PV string's first Power Optimizer to the Plus (+) output connector of the PV string's second Power Optimizer.
2. To minimize electromagnetic interference (EMI), make sure to minimize the distance between the positive and negative DC cables.

For detailed instructions, see:

<https://www.solaredge.com/sites/default/files/se-emi-performance-application-note.pdf>.



3. Connect the rest of the Power Optimizers in the PV string in the same manner.

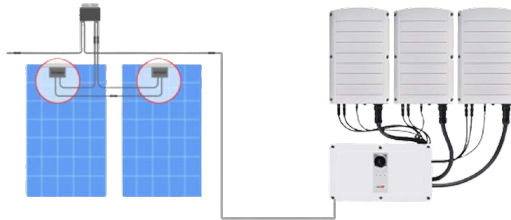


Figure 8: Power Optimizers connected in series

4. If you intend to monitor the installation, using the SolarEdge Monitoring platform, record the physical location of each Power Optimizer, as described in *Creating Logical and Physical Layout using Installation Information* on page 82.



## 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 PV string voltage should equal 1V times the number of Power Optimizers connected in series in the PV string. For example, if 10 Power Optimizers are connected in a PV 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 PV 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 PV string individually before connecting it to the other PV strings or to the inverter. Verify correct polarity by measuring the PV 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 PV string Voltage and verify correct polarity on the DC wires.

For troubleshooting Power Optimizer operation problems, refer to *Power Optimizer Troubleshooting* on page 85.

Proper Power Optimizer connection can also be verified in the Designer application.

For more information, refer to [https://www.solaredge.com/products/installer-tools/designer#./](https://www.solaredge.com/products/installer-tools/designer#/)

## Chapter 3: Installing the Synergy Manager and Synergy Units

This section, describes how to install the inverter. Install the Synergy Manager and Synergy units either before or after the PV modules and Power Optimizers have been installed.

The inverter is provided with a mounting template that ensures correct installation location of the Synergy Manager and all Synergy Unit mounting brackets. The template ensures that all the Synergy Unit inter-connecting cables can reach the Synergy Units and correct distance between the units ensures proper heat dissipation.

First, mount the Synergy Units and then the Synergy Manager. The Synergy Units can be installed in any order.

### Synergy Manager Package Contents

- Synergy Manager
- Installation template
- Mounting bracket kit
- Two Allen screws for fastening the unit to the mounting bracket
- Cable lock(s)
- Quick Installation guide

### Synergy Unit Package Contents

- Synergy Unit
- Mounting bracket kit
- Two Allen screws for fastening the unit to the mounting bracket

### Identifying the Units

Stickers on the Synergy Manager and Synergy Units show Serial Numbers.

When creating a site in the SolarEdge Monitoring platform or contacting SolarEdge support, provide the inverter's serial number.

## Front Interface of Synergy Manager

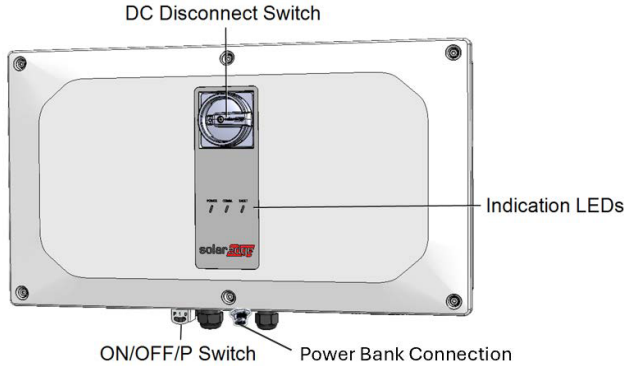


Figure 9: Synergy Manager Unit - Front interfaces

### DC Disconnect Switch

The DC Disconnect Switch is a manually operated safety switch for disconnecting the DC power of the SolarEdge system.

**NOTE**

When the Synergy Manager 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.



### ON/OFF/P Switch

Figure 10 shows the ON/OFF/P switch of the Synergy Manager.

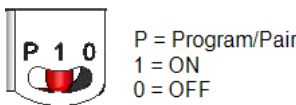


Figure 10: ON/OFF/P switch

- 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 Synergy Manager and Synergy Units control circuitry remains powered up.
- **P** - Holding the switch pressed in P position allows performing the following functions:

P Position duration	Function	Comments
Switch moved to P for <b>less than 5 seconds</b> , then released.	<ul style="list-style-type: none"> <li>• Displays production information for 5 seconds on the SetApp screen.</li> <li>• Displays error type indications (if exist) for 5 seconds.</li> <li>• Activates the Wi-Fi access point for connecting to the SolarEdge Inverter SetApp</li> </ul>	While the switch is in P, all LEDs are ON
Switch moved to P for <b>more than 5 seconds</b> , then released.	Starts pairing	

**WARNING!**

For inverters with manual Rapid Shutdown (PVRSS) functionality - Upon PVRSS, the internal circuitry remains up, therefore the inverter cover must be opened only after shutting off the inverter ON/OFF/P switch. This disables the DC Voltage inside the inverter (Synergy Manager). Wait five minutes before opening the cover. Otherwise, there is a risk of electric shock from energy stored in the capacitors.

**AVERTISSEMENT!**

*A la Coupure Rapide (PVRSS) les circuits internes restent actifs, il est donc impératif de n'ouvrir le couvercle qu'après avoir arrêté l'onduleur à l'aide de l'interrupteur ON/OFF/P. Ceci coupe la tension DC à l'intérieur de l'onduleur. Attendez cinq minutes avant d'ouvrir le couvercle. Sinon, il y a risque d'électrocution du à l'énergie stockée dans les condensateurs.*

## Indication LEDs

LEDs indication consists of color and state (on/ off/ blinking<sup>(1)</sup>/ flickering<sup>(2)</sup>/alternating<sup>(3)</sup>). The LEDs indicate different system information, such as errors or performance.

Figure 11 shows the Indication LEDs of the Synergy Manager.

Generally, the main LED indications are:

- COMM. ON - the inverter is communicating with the monitoring platform
- POWER ON - the system is producing
- POWER blinking - AC is connected but the system is not producing power
- FAULT ON - system error

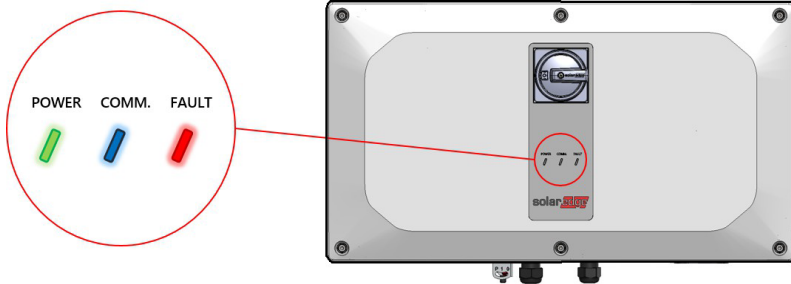


Figure 11: Indication LEDs

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<sup>(1)</sup>Blinking = Turns ON and OFF for the same duration

<sup>(2)</sup>Flickering = Turns ON for 100 mS and turns OFF for 5 seconds

<sup>(3)</sup>Alternating = Alternate LEDs flash

Indication	ON/ OFF/ P SWITCH position	LED			Comment
		FAULT	POWER	COMM.	
Power Optimizers not paired	ON (1)	OFF	Blinking	• = S_OK: ON No S_OK: OFF	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	• = S_OK: ON No S_OK: OFF	
Night mode (no production)		OFF	Flickering	• = S_OK: ON No S_OK: OFF	
Inverter is OFF (Safe DC)		OFF (0)	OFF	Blinking	• = S_OK: ON No S_OK: OFF
Inverter is OFF (DC not safe)	OFF (0)	Blinking	Blinking	• = S_OK: ON No S_OK: OFF	
Inverter configuration or reboot	ON / P	ON	ON	ON	
Inverter firmware upgrade	ON / P	Alternating	Alternating	Alternating	The upgrade process can take up to 20 minutes
Error	Any	ON	ON/ OFF/ Blinking/ Flickering	ON/ OFF / Blinking/ Flickering	Refer to <i>Errors and Troubleshooting</i> on page 84

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

Indication	ON/ OFF/ P switch position	LED color			Comment
		Red	Green	Blue	
Percentage of AC Production: 0 - 33 %	ON (1)	OFF	ON	OFF	This indicates power production as percentage of rated peak AC output power
Percentage of AC Production: 33 - 66 %		OFF	OFF	ON	
Percentage of AC Production: 66 - 100 %		OFF	ON	ON	

## Inverter Interconnection Cable Interfaces

The cables on the right hand side of the Synergy Manager, interfaces the Synergy Manager to the Synergy Unit of the inverter.

**NOTE**



Models of the Three Phase Inverters with Synergy Technology are provided with either two or three Synergy Units. The following connection description refers to inverter models with three Synergy Units. In inverter models with two Synergy Units, the Manager Unit connects to the left and center Synergy Units.

To connect cables, follow the writing shown next to each cable on the panel.

Figure 12 shows the interconnecting cables of the inverter.

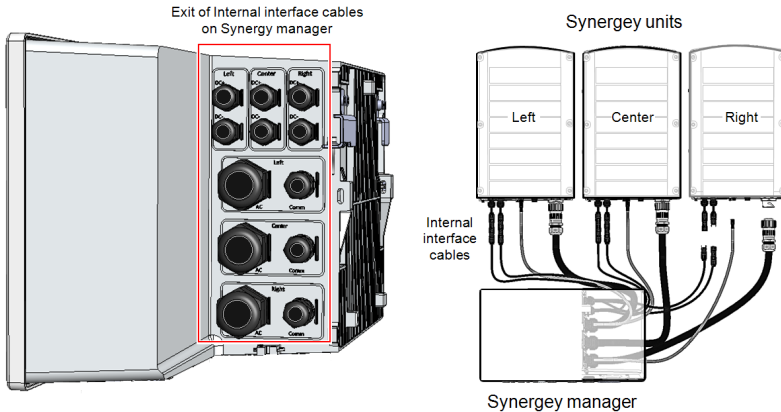


Figure 12: Inverter - interconnection cables

## Synergy Manager External Cable Interface

The conduit entries, at the bottom side of the Synergy Manager, interfaces the inverter to the grid and PV arrays. The communication glands, support communication cables connecting the inverter to the SolarEdge Monitoring platform and external power bank used for setting up the inverter in sites with no available grid power.

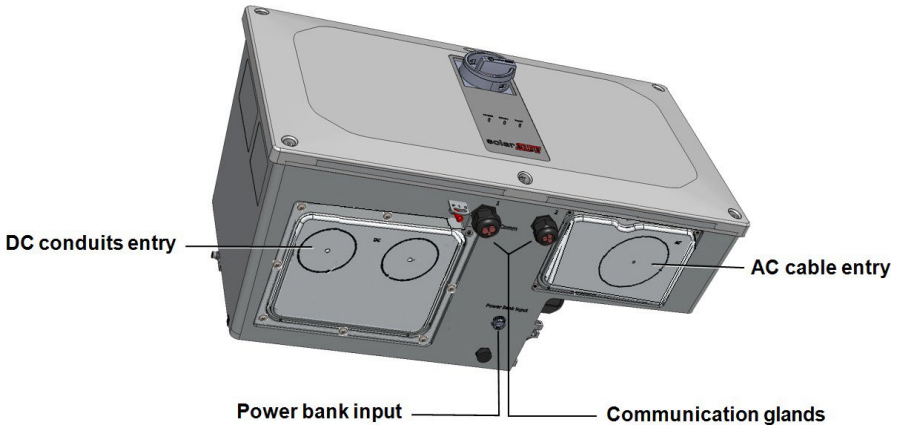


Figure 13: Synergy Manager - bottom view

- **AC Conduits Entry:** drill guides for conduits running AC cable from the grid
- **DC Conduits Entries:** drill guides for conduits running DC cables from the PV arrays
- **Power Bank Input:** power bank connection enables inverter pre-commissioning when AC power is not connected
- **Communication Glands:** two communication glands for connecting communication and antenna cables.

## Synergy Unit Interface Connectors

The Synergy Unit connectors are used to interface the Synergy Unit to the Synergy Manager:



### NOTE

Connect cables according to labels shown on the Synergy Manager.

- **DC connectors** for DC input from the Synergy Manager
- **Communication connector:** for communication with the Synergy Manager



- **AC connector:** for supply of AC power to the Synergy Manager

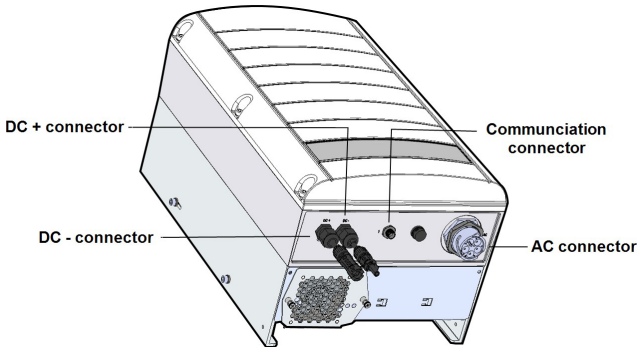


Figure 14: Synergy Unit Interface Connectors

## Drilling Conduit Holes

This section describes how to drill AC and DC openings at the bottom of the Synergy Manager for connecting the AC and DC conduits.

This procedure must be performed before mounting the Synergy Manager.

→ **To open conduit drill guides:**

1. Ensure that the Safety Switch is set to OFF (0) and ON/OFF/P switch of the Synergy Manager is in OFF position.
2. Remove the screws securing the DC and AC panels and remove the panels from the bottom of the Synergy Manager enclosure.



### CAUTION!

To avoid damage to the internal part of the Synergy Manager, always remove the panels from unit before drilling holes.



### NOTE

Unused conduit openings should always be sealed.

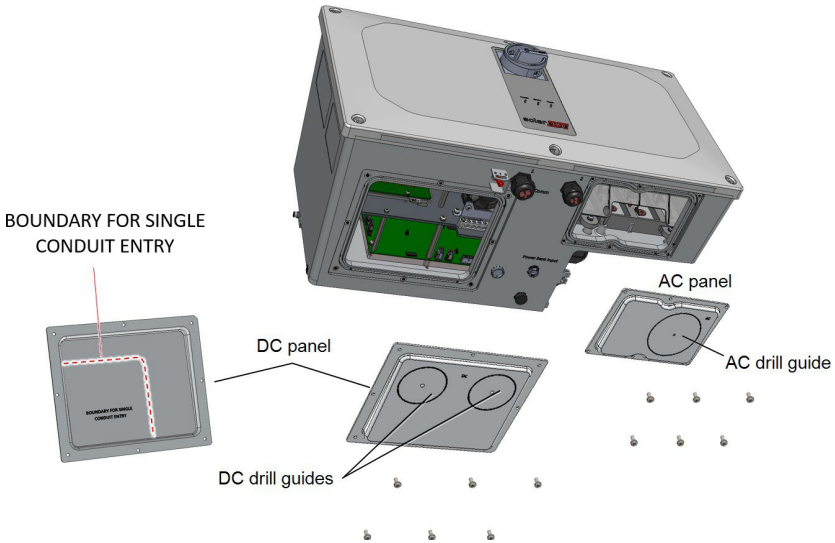


Figure 15: AC and DC panels with drill guides at the bottom of the Synergy Manager

3. Locate the drill guides for conduits on the DC and AC panels. Drill entry hole(s) for up to 2" conduit on the DC panel and 2.5" on the AC panel or drill entry hole for a single conduit, within the boundary marked on the inner side of the DC panel (see *Figure 15*).



#### NOTE

In some models, the DC panel has three drill entry hole(s) for up to 3" conduits.

4. Position the DC and AC panels back at the bottom of the Synergy Manager and torque the screws to 1.9 lb.\*ft.

## Mounting and Connecting the Synergy Manager and Synergy Units

This section provides instructions for vertical installation of the inverter and horizontal Inverter installed horizontally on a flat surface.

#### NOTE



Make sure the mounting surface or structure can support the weight of 82 kg (for inverter with two Synergy Units) or 114 kg (for inverter with three Synergy Units) of the inverter and brackets. Make sure that the mounting surface is at least 100.8 cm / 39.68" x 114.5 cm / 45".

**CAUTION!**

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

**ATTENTION**

*Objet lourd. Pour éviter la fatigue musculaire ou des blessures au dos, utilisez des techniques de levage appropriées et, si nécessaire - un auxiliaire de levage lors du retrait.*

**CAUTION!**

SolarEdge inverters and Power Optimizers can be installed at a minimum distance of 164 ft from the shoreline of an ocean or other saline environment, if there are no direct saltwater splashes on the inverter or Power Optimizer.



For SolarEdge inverters installed at 655 ft or closer to the shoreline, special brackets must be purchased separately from SolarEdge and SS304 stainless screws are required. For details, please contact your local sales representative.

**ATTENTION!**

Les onduleurs SolarEdge peuvent être installés à une distance minimum de 50m de la ligne d'eau de l'océan ou autre environnement salin, tant qu'il n'y a pas d'éclaboussements d'eau salée directs sur l'onduleur.

Pour les onduleurs SolarEdge installés à une distance de 200 m ou moins du rivage, des supports spéciaux achetés séparément auprès de SolarEdge et des vis inox SS304 sont nécessaires. Pour les détails, veuillez contacter le commercial de votre région.

→ **To mount the inverter:**

1. Determine the inverter mounting location on a wall or stud framing. It is recommended to mount the inverter in a location protected from direct sunlight.

**NOTE**

When installing the inverter on a stud framing or a rail, avoid wobbly installation by adding back support at the lower back side of the Synergy Manager and Synergy Units (See *Figure 16*)

2. Allow for proper heat dissipation, follow the guidelines specified in [Application Note - Clearance Guidelines](#).

**NOTE**

Some Inverter models are provided with only two Synergy Units.

3. Level the mounting template horizontally against the wall and mark the drilling hole locations for the bracket of the Synergy Units (see pencil icons in *Figure 16*).

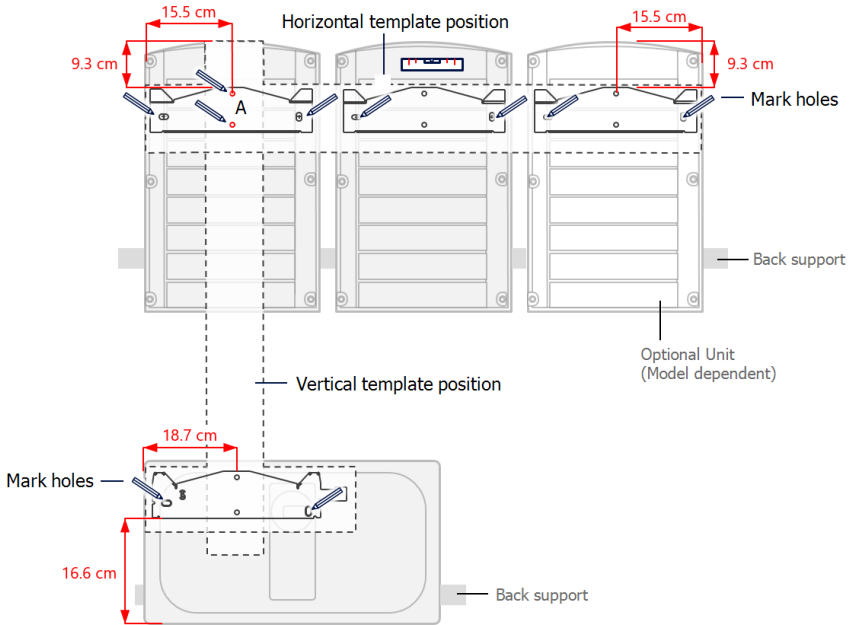


Figure 16: Marking the drilling holes locations

4. Place the mounting templates vertically against the wall and mark the drilling hole locations for the bracket of the Synergy Manager. Make sure that the template aligns with the two drilling holes marked A.
5. Drill two holes for each bracket and mount the brackets.
6. Position and secure the mounting brackets to the wall using at least two screws per bracket. Tighten the screws all the way and verify that the brackets are firmly attached to the mounting surface.
7. Mount the Synergy Units:

**NOTE**

When installing the Synergy Units, always install the center Synergy Unit first.

- Lift the Synergy Unit from the sides, or hold it at the top and bottom of the unit to lift into place.
- Align the two indentations in the enclosure with the two triangular mounting tabs of the bracket, and lower the unit until it rests on the bracket evenly (see *Figure 18*).

- For the right or left Synergy Units, insert only one screw through the outer (exposed) side of the unit and into the bracket. Tighten the screws to a torque of 2.9 lb.\*ft (see *Figure 17*).

**NOTE**

For the center Synergy Unit, use both side screws.

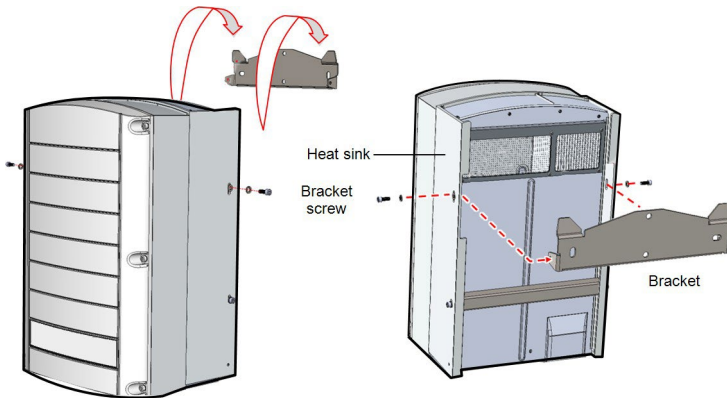


Figure 17: Hanging the Synergy Unit

8. Hang the Synergy Manager:
  - a. Lift the Synergy Manager from its sides.
  - b. Align the two indentations in the enclosure with the two triangular mounting tabs of the bracket, and lower the unit until it rests on the bracket evenly (see *Figure 18*).
  - c. Insert the supplied bracket screw through the right side of the heat sink and into the bracket.

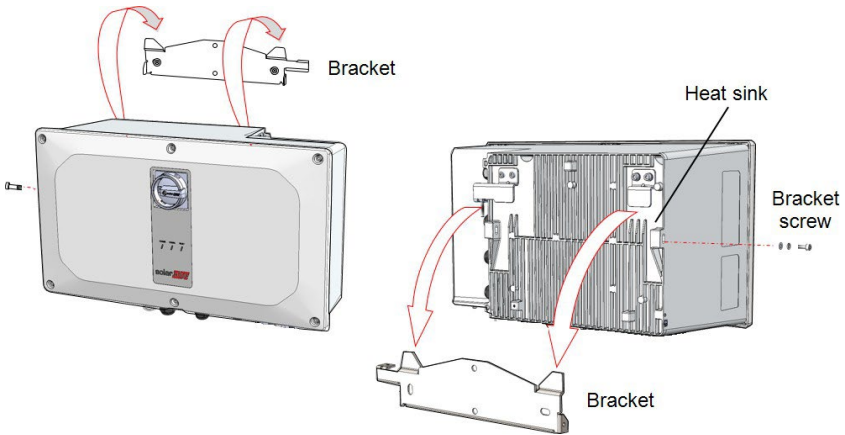


Figure 18: Hanging the Synergy Manager

## Horizontal Mounting of the Inverter

The inverter can be installed horizontally, on a flat surface, at any tilt above  $10^\circ$  (see *Figure 19*). The inverter can be installed under or near the PV modules, thus saving roof space and using the PV modules for shading the inverter.

For more information on horizontal mounting, refer to [Horizontal Mounting of Three Phase Inverters](#).

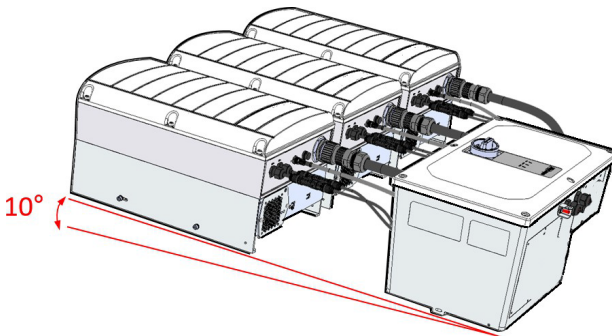


Figure 19: Horizontal mounting of the Inverter

# Chapter 4: Connecting PV Modules and AC to the Synergy Manager

This section describes how to connect the inverter to the PV modules and to the AC.

## Grid Connection Guidelines

In most countries, three phase inverters require neutral connection. In some countries, three phase inverters can be connected to delta grids along with multiple single phase inverters.

### NOTE



If local regulations permit, the connection of Neutral is optional in a 4-wire system of three phase inverters.

If local regulations permit, the connection of Neutral is optional in a 4-wire system of three phase inverters.

Prior to system installation, refer to the following documentation:

- The conduits, hubs and fittings must be suited for field wiring systems.
- The hubs and other fittings must comply with UL514B.
- Use the conduit and wiring appropriate for the installation location per the NEC. Outdoor installations must use components that are rated NEMA 3R or higher.
- For short-circuit currents in SolarEdge Three Phase Inverters refer to North America Short-Circuit Current Levels in SolarEdge Three Phase Inverters application note at [www.solaredge.com/sites/default/files/se-UL1741-short-circuit-currents-three-phase-inverters-tech-note.pdf](http://www.solaredge.com/sites/default/files/se-UL1741-short-circuit-currents-three-phase-inverters-tech-note.pdf)

### NOTE



For more wiring information refer to the SolarEdge Recommended AC Wiring Application Note, available on the SolarEdge website at [www.solaredge.com/sites/default/files/application-note-recommended-wiring.pdf](http://www.solaredge.com/sites/default/files/application-note-recommended-wiring.pdf)

**WARNING!**

The inverter must be protected by an over-current protection device (a circuit breaker or a fuse) with a maximum rating of 250 A.



Over Current Protection Device (OCPD) for the AC output is to be provided at the time of installation. Coordination of conductor sizes with overcurrent protection shall be in accordance with the Canadian Electrical Code, Part I.

For the exact rating of an over-current protection device, per model, refer to Application Note: <https://www.solaredge.com/sites/default/files/determining-the-circuit-breaker-size-for-three-phase-inverters.pdf>

The following wire configurations can be used to connect the Synergy Manager:

- L1, L2, L3, PE wires
- L1, L2, L3, N, PE wires

**WARNING!**

To avoid shock hazard conditions, the PE wire must be connected to the inverter before connecting the AC wires.

**AVERTISSEMENT!**

*Pour éviter les risques d'électrocution, le fil de terre doit être connecté à l'onduleur avant de connecter les fils CA.*

- Use AC line wires with a maximum of 4/0 AWG cross section conductor
- Use PE wire with a maximum of 1/0 AWG cross section conductor
- Use a PE wire with an outer diameter to a torque of 0.4 to 0.43"
- Use copper aluminum wires with insulation rated for at least 90°C. Make sure to consider the maximum termination temperature at both ends of the conductor and to base the ampacity on the lower value.

**CAUTION!**

Over-current protection for the AC output must be provided by the installer.

## Connecting PV Modules to the Synergy Manager

The Synergy Manager is designed to directly connect up to 12 PV strings or up to three PV arrays via an external combiner box.

**CAUTION!**

When installing a system with more than 3 PV strings per a single Synergy Unit (whether connected directly or via a combiner box), fuses are required. In SolarEdge system, 25A fuses must be used (See *Figure 20* and *Figure 21*)



Figure 20 shows the connection of PV strings and Figure 21 shows the connection of PV arrays to the Synergy Manager.

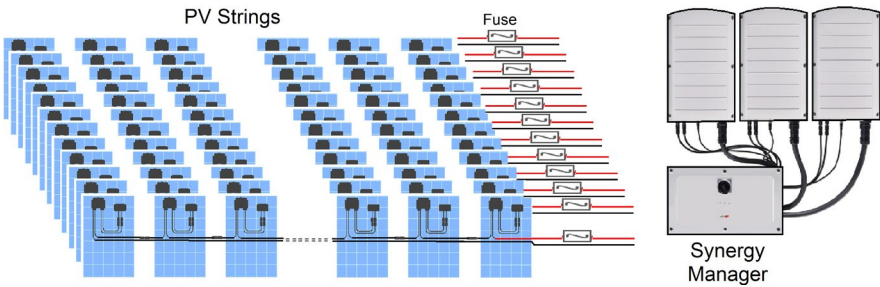


Figure 20: Connection of PV strings to the Synergy Manager

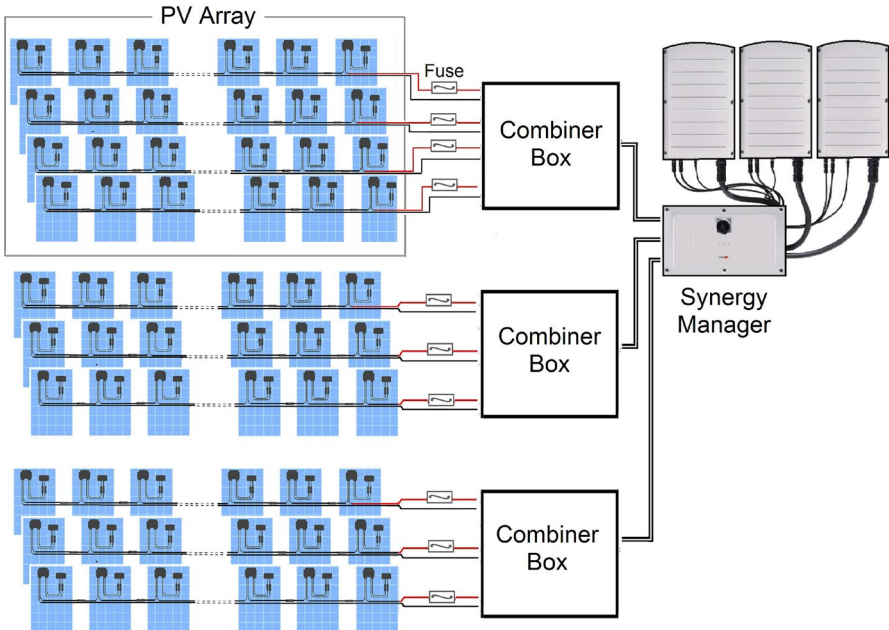


Figure 21: Connection of PV arrays to the Synergy Manager

Connection of PV arrays to the Synergy Manager is performed via a combiner box.

A combiner box is an electrical distribution box that may also host DC circuit breakers. The main purpose of the box is to combine multiple parallel strings of PV modules in the system into a single DC output. This DC output is then connected to a single input in the Synergy Manager of the inverter.

The combiner box should be installed and connected before connecting to the Synergy Manager. This simplifies the commissioning of the inverter by allowing testing and servicing the inverter.

## Connection Methods

The Synergy Manager connects to the solar panels by the following interface methods:

- DC input terminals (spring-clamps) for 12 PV strings inside the Synergy Manager
- DC input terminals for three PV arrays inside the Synergy Manager

The DC Disconnect Switch of the Synergy Manager disconnects all ungrounded DC conductors in compliance with the National Electric Code (NEC; Specifically NEC690.35, which addresses ungrounded PV arrays). The Synergy Manager is rated to the maximum operating conditions of the inverter.

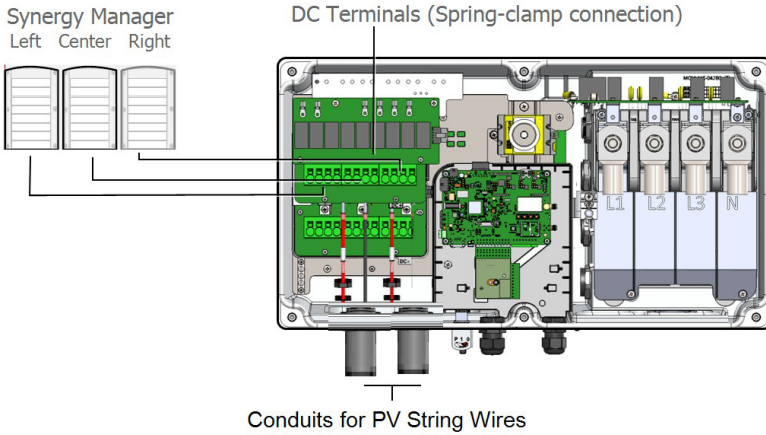
*Figure 22* shows the various methods of connection of DC from the PV strings and PV arrays to Synergy Manager.



### NOTE

In some Synergy Managers, the DC Surge Protection Device Board is mounted horizontally.

## Synergy Manager with 12 PV Strings



## Synergy Manager with Three PV Arrays

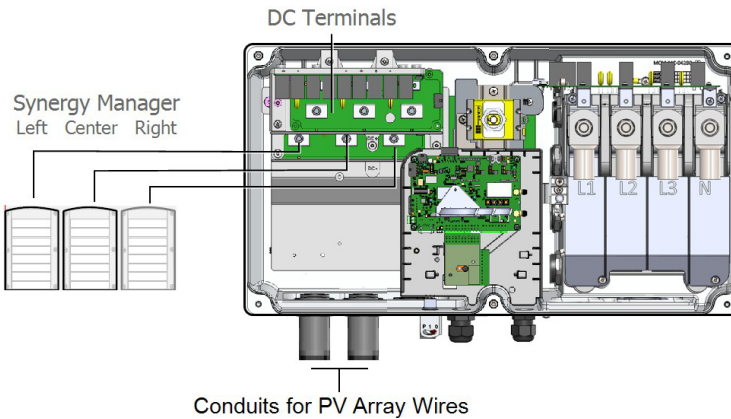


Figure 22: Connecting methods of PV Strings and PV arrays to Synergy Manager

### NOTE



SolarEdge fixed input Voltage architecture enables parallel PV 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 PV string is within the permitted range.

## Connecting PV Strings to the Synergy Manager

### CAUTION!



The PV inputs of the inverter are not intended for connection to a battery or any other type of DC source except a PV array.

### CAUTION!



When installing a system with more than three strings per a single Synergy Unit (Whether connected directly or via a combiner box), fuses are required. In SolarEdge system, 25A fuses shall be used.

→ To connect the DC wires to a Synergy Manager with spring-clamp DC terminals:

### NOTE



Use copper aluminum wires with insulation rated for at least 90°C. Make sure to consider the maximum termination temperature at both ends of the conductor and to base the ampacity on the lower value.

1. Thread a 6 to 12 AWG wire through the AC conduit.
2. Strip 0.7" (18 mm) of wire insulation from the end of the wire.



### NOTE

When using a stranded wire, use of ferrule is at the installer discretion

3. Insert the DC conduit into the DC-side opening at the bottom left-side of the Synergy Manager and fasten the conduit nut.

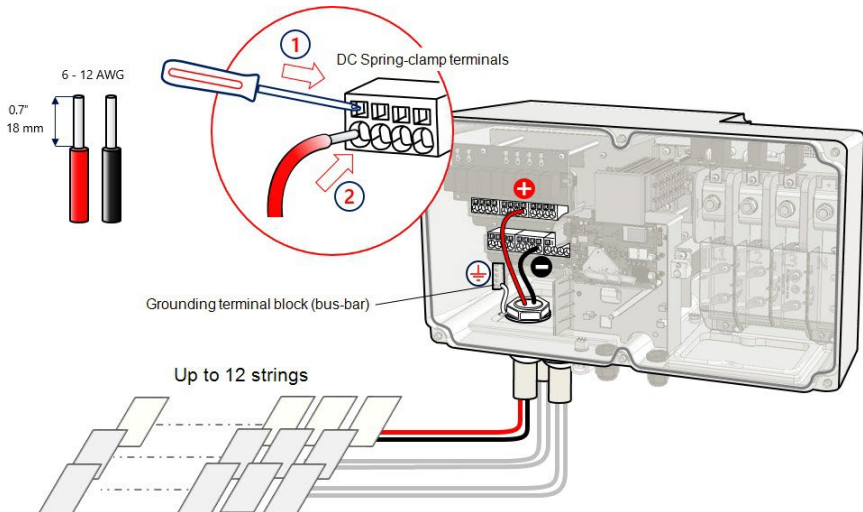


Figure 23: Connecting PV strings to a Synergy Manager with spring-clamp DC terminals

4. Connect the 4-14 AWG ground wire of the conduit nut to the grounding terminal block (bus-bar) in the Synergy Manager. Fasten the screw bus-bar to a torque of 2.2 lb.\*ft.
5. Connect the DC wires to the DC+ and DC- terminal blocks, according to the labels on the terminals:
  - a. 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.
  - b. Insert the screwdriver and firmly tilt it to press the release mechanism and open the clamp.
  - c. Insert the wire into the top opening (see *Figure 23*).
  - d. Remove the screwdriver – the wire is automatically clamped.

**CAUTION!**

Ensure that the Plus (+) wire is connected to the + terminal and that the Minus (-) wire is connected to the Minus (-) terminal connector.

**ATTENTION!**

Veillez à ce que le câble Plus (+) soit connecté au terminal + et que le câble - soit connecté au connecteur terminal.

6. Close the Synergy Manager cover and secure it by tightening the six screws to a torque of 2.6 ft.\*lb.
7. Ensure proper conduit sealing; inspect the entire conduit run and use standard conduit sealants to avoid water penetration.

## Connecting PV Arrays to the Synergy Manager

→ To connect the PV arrays to a Synergy Manager with DC wire terminals:

When connecting cables between the combiner boxes and the inverter, ensure that each pair of cables coming from the combiner box is marked with DC+ and DC- labels.

### NOTE



Use copper or aluminum wires with insulation rated for at least 90°C. Make sure to consider the maximum termination temperature at both ends of the conductor and to base the ampacity on the lower value.

1. Route the DC wires through the DC conduit.



### NOTE

Use wires with a cross-section conductor of 4 to 2 AWG.

2. Fasten the conduit nut and connect the 4-14 AWG ground wire of the conduit nut to the Grounding terminal block (bus bar) in the Synergy Manager. Fasten the screw of the bus bar to a torque of 2.2 lb.\*ft.

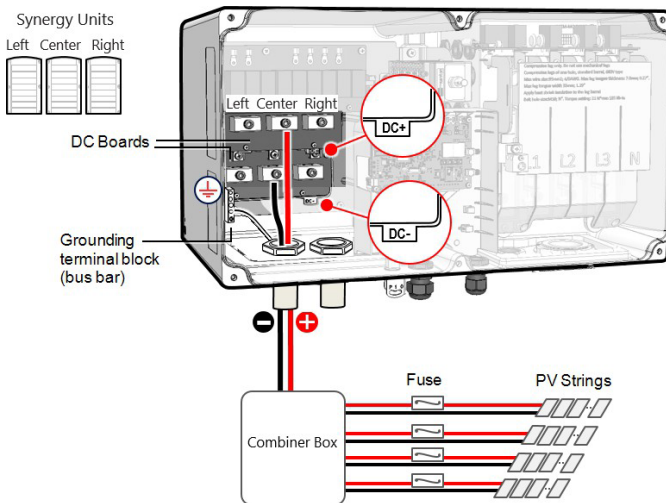


Figure 24: Connecting PV Arrays to the Synergy Manager

3. Loosen the Allen screws of the DC terminals.
4. Strip 0.79" 20mm of insulation from the DC wires.

**NOTE**

Before connecting aluminum wires to the terminals:



- a. Remove oxide from the exposed wires with emery paper or a steel wire brush
- b. Clean dust with a cloth and Isopropyl alcohol (IPA)
- c. Coat wires with a designated antioxidant aluminum wire grease immediately after cleaning

**CAUTION!**

Connection of oxidize aluminum wires may result in resistance and high temperatures at contact points.

5. Route the DC wires to the DC+ and DC- terminals on the DC+ and DC- boards of the Synergy Manager (see DC+ and DC- indications on the DC boards).

**CAUTION!**

The DC boards have three pairs of DC terminals. Each pair is connected to a single Synergy Unit (Left, Center and Right).

When installing a system with more than three PV strings per a single Synergy Unit (whether connected directly or via a combiner box), fuses are required. In SolarEdge system, 25A fuses must be used (see *Figure 24*).

**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 string modules is acceptable.

6. Insert the DC wires into the DC terminals and fasten the 5 mm Allen screw to a torque of 3.7 ft.\*lb for 4 AWG wires or 5.9 ft.\*lb for 3 to 2 AWG wires.

**CAUTION!**

DO NOT use an impact driver or any electrical tool to fasten the terminal screws.

**CAUTION!**

Ensure that each Plus (+) wire is connected in corresponds to its Plus (+)terminal.

**ATTENTION!**

Veillez à ce que le câble Plus (+) soit connecté au terminal (+) et que le câble - soit connecté au connecteur terminal.

## NOTE



For systems with four PV strings per unit or more, fuses may need to be installed in both the positive and negative conductors as required by NEC Article 690.9. For more information, refer to the “String Fusing Requirements in SolarEdge Systems” technical note at [http://www.solaredge.com/files/pdfs/string\\_fusing\\_requirements.pdf](http://www.solaredge.com/files/pdfs/string_fusing_requirements.pdf).



7. Close the Synergy Manager cover and secure it by tightening the six screws to a torque of 2.6 ft.\*lb.
8. Ensure proper conduit sealing; inspect the entire conduit run and use standard conduit sealants to avoid water penetration.

## Connecting Ground and AC Wires to the Synergy Manager

This section describes how to connect AC and Ground (also referred to Protective Earth - PE) to the Synergy Manager.

### Connecting Protective Earth (PE)

## WARNING!



Turn OFF the AC before connecting the AC terminals. When connecting equipment Grounding wire, connect it before connecting the AC Line and Neutral wires.

## AVERTISSEMENT!

*Éteignez l'alimentation CA avant de connecter les bornes CA. Si vous souhaitez relier le fil de mise à la terre de l'équipement, faites-le avant de connecter la ligne CA et les fils du neutre.*

→ To connect Protective Earth (PE) to the Synergy Manager:

1. Turn OFF and secure the main AC circuit breaker in OFF position at the circuit breakers panel.
2. Release the six Allen screws and carefully remove the cover of the Synergy Manager.

## 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.

## ATTENTION!



*Lors du retrait du couvercle, assurez-vous de ne pas endommager les composants internes. SolarEdge ne peut être tenue pour responsable des composants endommagés à la suite d'une imprudence dans le retrait du couvercle.*

3. Insert the conduit with the AC lines and PE wire through AC opening at the bottom of the Synergy Manager.



**CAUTION!**

Ground the conduit nut if required by regulation.

*Mettez à la terre l'écrou du conduit si la réglementation l'exige.*



**NOTE**

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

*Veillez à relier le conducteur de PE (la terre) avant de connecter les fils CA au bornier CA.*

4. Strip 0.4 to 0.43" / 10 to 11 mm of insulation from the PE wire.
5. Connect the PE wire to the PE terminal and fasten the Allen screw to a torque of 3.7 lb.\*ft for wires of 10 to 4 AWG or 5.9 lb.\*ft for wires of 3 to 1/0 AWG.

**NOTE**

Before connecting lugs to aluminum wires:



- a. Remove oxide from the exposed wires with emery paper or a steel-wire brush
- b. Clean dust with a cloth and Isopropyl alcohol (IPA)
- c. Coat wires with a designated antioxidant aluminum wire grease immediately after cleaning



**NOTE**

Use ferrule when connecting a fine stranded wire.

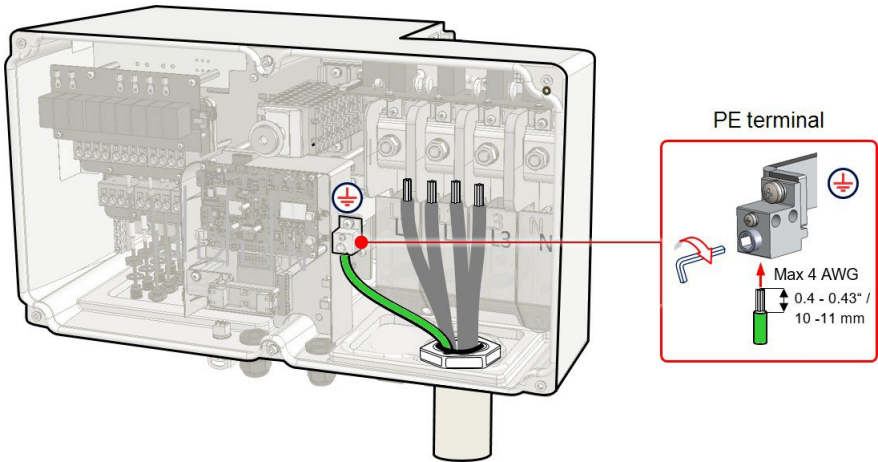


Figure 25: Connecting the Protective Earth (PE) wire

**NOTE**

Ground the conduit nut if required by regulation.

→ To connect AC wires to the Synergy Manager:

1. Verify that the main AC circuit breaker is in OFF position at the circuit breakers panel.
2. Remove the upper cover of the AC terminal block.

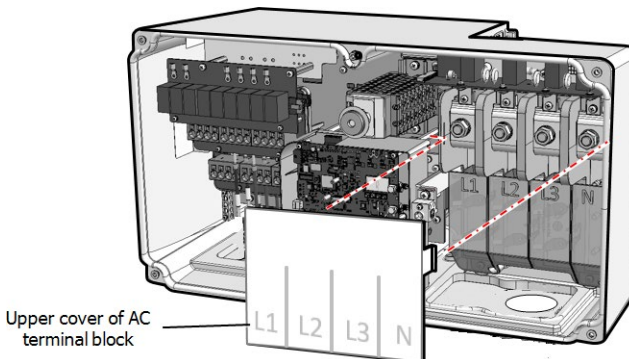


Figure 26: Upper cover of AC terminal block

3. Route the AC wires through the AC conduit.
4. Fasten the conduit nut inside the Synergy Manager.



**NOTE**

Ground the conduit nut if required by regulation.

5. Strip the required length of insulation from the AC cable and AC wires.

**NOTE**

Before crimping lugs to aluminum wires:



- a. Remove oxide from the exposed wires with emery paper or a steel wire brush
- b. Clean dust with a cloth and Isopropyl alcohol (IPA)
- c. Coat wires with a designated antioxidant aluminum wire grease immediately after cleaning

6. Crimp lugs on the AC wires.

**CAUTION!**



For aluminum wires, USE ONLY aluminum lugs.  
 For copper wires, USE ONLY copper tin-plated lugs.

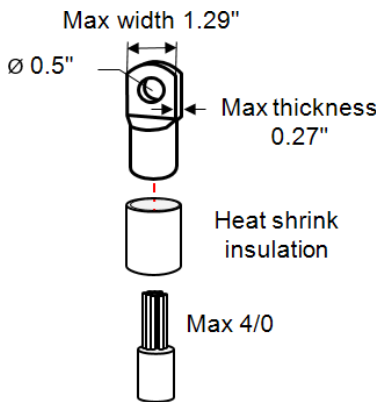


Figure 27: Crimping a lug on an AC wire

Lug parameters:

- Bolt hole diameter size: 0.5"
  - Compression lugs of the one-hole, standard barrel, 600V type.
  - Maximum wire size: 4/0 AWG 120 mm<sup>2</sup>
  - Maximum lug tongue thickness: 0.27 "
  - Maximum lug tongue width: 1.29 "
7. Use heat shrink to isolate the lug barrels.
  8. Remove the nut of the AC terminals.
  9. Connect the lug of the AC wires according to the labels on AC terminal block. Fasten the nut of the AC terminals to a torque of 15.4 lb.\*ft.

**NOTE**

For easy installation of the AC wires, start connecting the wires from left to right: L1 → L2 → L3 → N (See *Figure 28*).

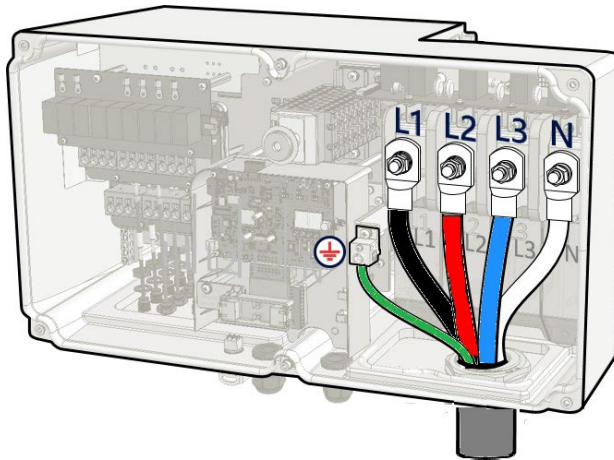


Figure 28: Connecting AC wires to the AC terminals

10. Place the upper cover of the AC terminal block and push until a lock click is heard. Close the Synergy Manager cover and secure it by tightening the six screws to a torque of 2.6 lbf-ft.

# Chapter 5: Setting Up Communication with 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.

## CAUTION!



Before connecting the communication cables, make sure that the ON/OFF/P switch at the bottom of the is turned off, DC Safety Unit is turned OFF and the AC is turned OFF.

When configuring the communication parameters, make sure that the ON/OFF/P switch on the is OFF, and the AC is turned ON.

## ATTENTION!

*Lors de la connexion des câbles de communication, assurez-vous que l'interrupteur MARCHE/ARRÊT à la base de l'onduleur soit en position ARRÊT, le sectionneur DC est éteint et le CA est en position ARRÊT. Lors de la configuration des paramètres de communication, assurez-vous que l'interrupteur MARCHE/ARRÊT soit en position ARRÊT, et le CA est en position MARCHE.*

## Communication Options

The following types of communication can be used to transfer site data through the inverter to the monitoring platform.

### NOTE



This guide refers to 3rd party communication products, such as internet switches and routers that are not supported by SolarEdge. For detailed information on how to install and use the products, refer to the respective publication provided with each product.

## External Communication Options

### Ethernet

Ethernet is used for a LAN connection. For connection instructions refer to "Creating an Ethernet (LAN) Connection" on page 1.

### Wi-Fi

The Wireless Gateway collects inverter data using a dedicated Wi-Fi. The inverter connects to the Monitoring platform with via 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-wirelessgateway-wireless-repeater-installation-guide.pdf>.

### Cellular

Cellular Plug-in (purchased separately) provides cellular communication to connect one or several inverters to the Monitoring platform. Cellular communication depends on the purchased data plan.

## Internal Communication Options

### 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.

- RS485-1: Enables the connection of multiple devices (inverters/Commercial Gateway) over the same bus, such that connecting only one device to the internet is sufficient to provide communication services for all the devices on the bus.
- RS485-2: Enables connection of multiple SolarEdge devices and of non-SolarEdge devices over the same bus.

For connection instructions refer to *Creating an RS485 Bus Connection* on page 69.

## Communication Connectors

The Synergy Manager has communication glands for connecting communication cables to support the various communication options of the inverter. Unused openings should remain sealed.

The Synergy Manager is equipped with two glands designated for routing communication cables.

Figure 29 shows the communication glands of the Synergy Manager and Table 1 describes the glands.

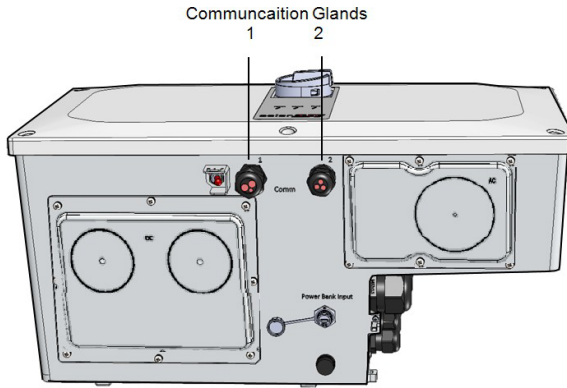


Figure 29: Synergy Manager - Communication Glands

The table below describes the openings of the communication glands of the Synergy Manager.

**Table 1: Synergy Manager - Communication Glands**

Gland#	Opening	Functionality
1	Three large openings 2.5-5 mm	Ethernet cable (CAT6), Power reduction cable
	Two large openings 4.5-7 mm	External antenna cable, RS485-1 and RS485 -2 cables (CAT6)
2	One small opening 2-4 mm	External antenna cable

## Communication Board

The communication board is located, inside the Synergy Manager and serves as the communication hub of the inverter.

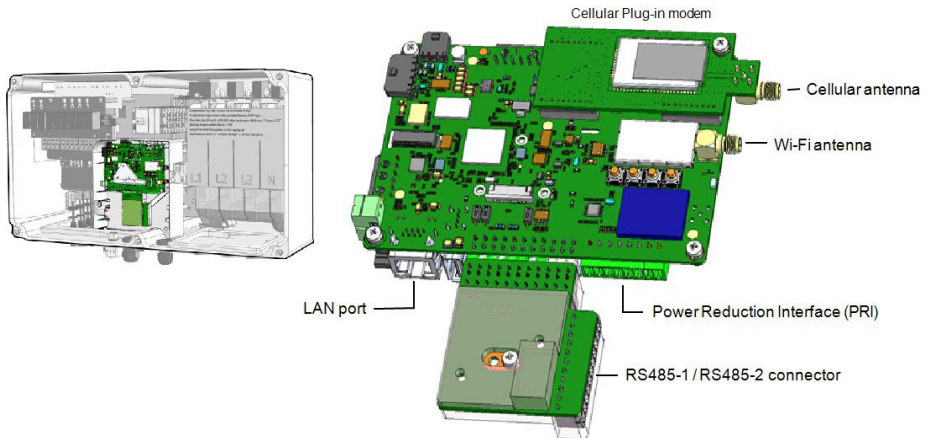


Figure 30: Synergy Manager - communication board

The Communication Board includes the following interface connectors:

- Cellular antenna - Antenna port for a Cellular Plug-in modem connecting the inverter to the internet.
- Wi-Fi Antenna - Wireless LAN antenna port for connecting the inverter to an internet modem
- Power Reduction Interface (PRI) - Connecting the Inverter to a power reduction device, such as a generator.  
For more information, refer to: [Power Control Configuration - Application Note](#)
- RS485-1 / RS485-2 connector - Two Modbus ports for connecting multiple connectors in a daisy chain.
- LAN port - Ethernet cable port for connecting the inverter to an internet modem

## Removing the Synergy Manager Cover

To access the communication board, remove the Synergy Manager cover.

→ To remove the Synergy Manager cover:

1. Turn OFF the ON/OFF/P switch of the Synergy Manager .





Figure 31: Synergy Manager  
ON/OFF/P and DC disconnect switches

2. Wait for at least five minutes for the DC voltage inside the inverter to drop to a safe level.



#### NOTE

Before doing any maintenance work on the inverter, test for safe AC and DC voltages.

3. Turn OFF the DC Disconnect switch of the Synergy Manager .
4. Disconnect the AC to the inverter by turning OFF the circuit breakers on the distribution panel.
5. Release the six Allen screws of the cover and remove the Synergy Manager cover.

#### 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.



#### ATTENTION!

*Lors du retrait du couvercle, assurez-vous de ne pas endommager les composants internes. SolarEdge ne peut être tenue pour responsable des composants endommagés à la suite d'une imprudence dans le retrait du couvercle.*

## Creating a Local Area Network (LAN) Connection

This communication option enables connection to the SolarEdge monitoring platform via Ethernet.

Ethernet cable specifications:

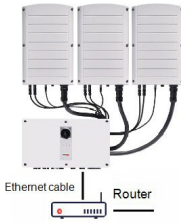
- Cable type – a shielded Ethernet cable (CAT6) should be used
- Maximum distance between the inverter and the router – 100 m/ 330 ft.

**NOTE**

If using an Ethernet cable longer than 10 m / 33 ft in areas where there is a risk of induced Voltage surges by lightning, it is recommend to use external surge protection devices:

[https://knowledge-center.solaredge.com/sites/kc/files/lightning\\_surge\\_protection.pdf](https://knowledge-center.solaredge.com/sites/kc/files/lightning_surge_protection.pdf)

Single Inverter Connection



Multiple Inverter Connection

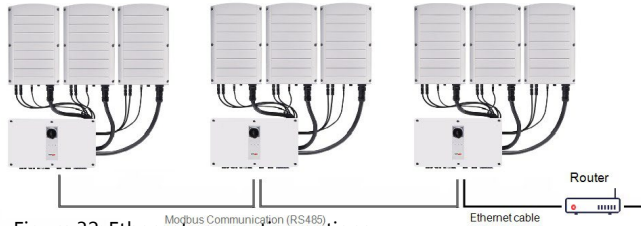


Figure 32: Ethernet connection options

→ To connect the Ethernet cable:

1. Remove the nut of the COMM1 gland.

**CAUTION!**

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



**ATTENTION!**

*Le cote interne du gland contient une rondelle qui doit être utilisée pour une bonne étanchéité.*

2. Insert the CAT6 Ethernet cable through the gland nut.
3. Remove the rubber fitting.
4. Remove the plastic seal from the rubber fitting.
5. Route the LAN cable through the gland opening in the Synergy Manager.
6. Insert the CAT6 Cable through the cut in the rubber fitting.

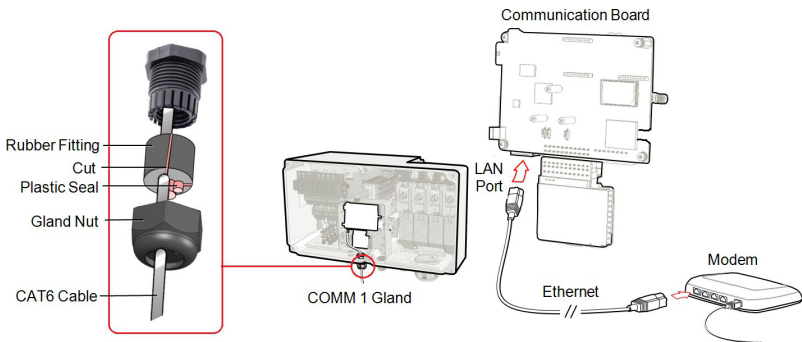


Figure 33: Inserting the Ethernet (CAT6) cable

7. Route the Ethernet cable to the communication board and plug to the LAN port.
8. Crimp an RJ45 plug on the Ethernet cable.
9. Tighten the gland nut to 4 lbf-ft.

## Ethernet (CAT6) Cables

CAT6 cables have eight wires (four twisted pairs), as shown in the pin layout of the Ethernet connector in Figure 33. 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-coded.

RJ45 Pin #	Wire Color <sup>(1)</sup>		10Base-T Signal
	T568B	T568A	100Base-TX Signal
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

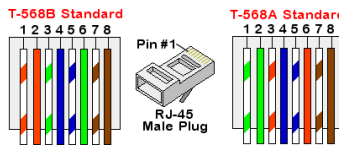


Figure 34: Ethernet connector - pin layout

- Use a non-crimped cable to connect via the gland to the RJ45 port on the inverter's communication board or, if using a spool of cable, connect as follows:
  - Insert the cable through the gland.
  - Remove the cable's external insulation using a crimping tool or cable cutter and expose eight wires.
  - Insert the eight wires into an RJ45 connector, as shown in *Figure 33*.
  - Use a crimping tool to crimp the connector.
  - Connect the Ethernet connector to the RJ45 port on the communication board as shown in *Figure 32*.
- For the switch/router side, use a pre-crimped cable or use a crimper to prepare an RJ45 communication connector.
- Connect the cable RJ45 connector to the RJ45 port of the Ethernet router or switch.
- 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 SolarEdge Monitoring platform.

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

**NOTE**

There are no LED indicators on the Ethernet connector, if the inverter is not communicating with the Monitoring platform through a LAN refer to "Troubleshooting Communication" on page 86

## LAN Configuration

1. The inverter is configured by default to LAN. If reconfiguration is required:
  - a. Verify the ON/OFF/P switch is OFF.
  - b. Verify the AC is on.
  - c. Close the cover and turn ON the DC Disconnect Switch of the Synergy Manager.

**WARNING!**

**ELECTRICAL SHOCK HAZARD.** Do not touch uninsulated wires when the Synergy Manager cover is removed.

**AVERTISSEMENT!**

*RISQUE D'ÉLECTROCUTION, ne touchez pas les fils non isolés lorsque le couvercle de l'onduleur est retiré.*

- d. Use the SolarEdge SetApp to access the **Commissioning** main menu screen as described in "Activating, Commissioning and Configuring the System" on page 74.
  - e. From the **Commissioning** screen, tap **Communication**.
  - f. Select **Configure Ethernet**, to configure the connection.
2. Verify the connection, as described in "RS485 Bus Configuration" on page 72

**NOTE**

The system automatically establishes communication with the monitoring platform as it is configured to LAN by default.

**NOTE**

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

.

.

.

.

Destination Address: **prodssl.solaredge.com**

Modbus TCP Port: **443** (for incoming and outgoing data)

## 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 71.

RS485 wiring specifications:

- Cable type: CAT6
- Maximum nodes: 32
- Maximum distance between first and last devices: 1 km /3300 ft

### NOTE



If grounded metal conduits are used for routing the communication wires, a lightning protection device is not required.

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

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

1. Release the six Allen screws and carefully remove the Synergy Manager cover
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 in *Figure 34*.

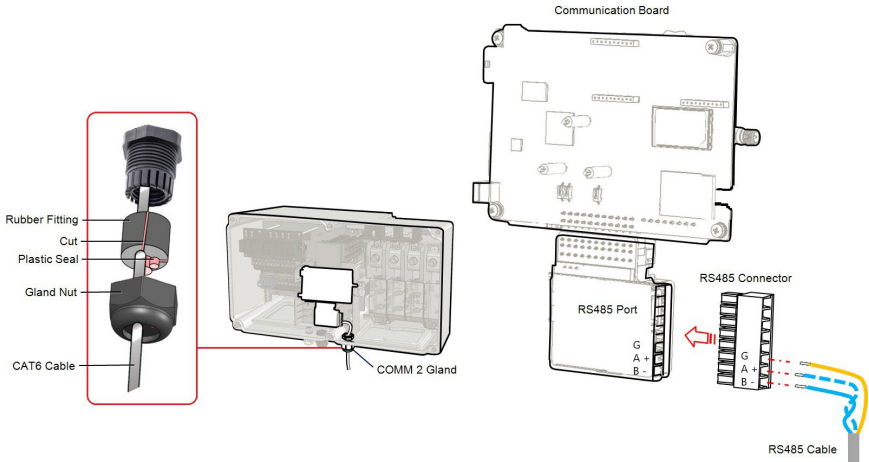


Figure 35: RS485 terminal block on the communication board

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

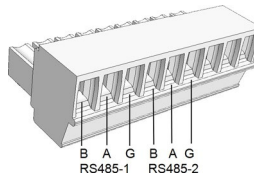


Figure 36: RS485 terminal block

- 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. The following figure shows this connection schema:

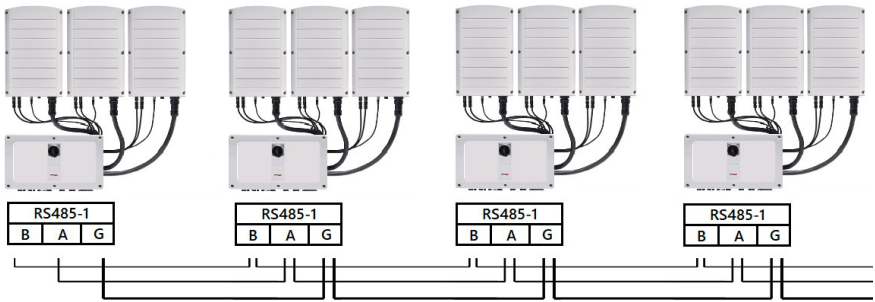


Figure 37: Connecting the inverters in chain

**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 DIP-switch is located on the communication board and is marked SW1.

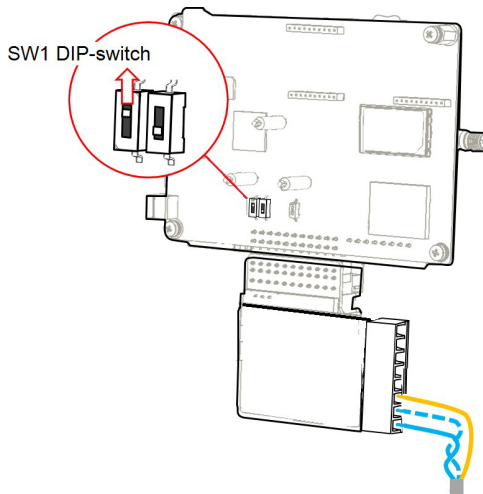


Figure 38: RS485 termination DIP-switch (SW1)



## 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. Tighten the nut of the COMM2 gland to a torque to 3 lbf-ft.

## RS485 Bus Configuration

→ 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 using Ethernet (refer to *Creating an Ethernet (LAN) Connection* above).

→ To configure the RS485 bus:

All inverters are configured by default as followers. The *leader* is the inverter connected to the Home network and the one that the meter **MUST** be connected to. To configure the leader:

1. Make sure the inverter's ON/OFF/P switch is off.
2. Make sure that the AC circuit breaker on the main distribution panel is on.
3. Access SetApp, as described in *Communication* on page 78.
4. From the **Commissioning** screen, select **Site Communication > RS485-1 > Protocol > SolarEdge > SolarEdge Leader**.
5. Return to the **RS485-1** screen and select **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 in all inverters in the chain.
6. To check the follower IDs and last communication time, select **RS485-1 > Follower List**.
7. Verify the connection of the leader to the monitoring platform, as described below.

## Verifying the Connection

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

1. If the Synergy Manager cover is not closed, close it: Attach the cover and secure it by tightening the screws of 2.6 lb.\*ft. For proper sealing, first tighten the corner screws and then the two central screws.
2. Commission the inverter as describe in "**Activating, Commissioning and Configuring the System**" on page 74.
3. Access SetApp and select **Status** from the **Configuring** screen.
4. In the **Summary** section, under **Server Comm.**, make sure **S\_OK** is displayed together with the selected communication option.
5. Scroll down to the **Communication** section and check that the communication options are as required.

## Chapter 6: Activating, Commissioning and Configuring the System

After the solar system is installed, it is important to activate and commission the solar system. Activation and commission of the system is performed using the inverter SetApp mobile application.

The solar system can be activated and commissioned in the following stages of system stage:

- On-grid: The inverter is connected to a utility grid
- Pre-commissioning (Off-grid): The inverter is not connected to a grid to enable:
  - Early validation and fault detection of system components, such as inverters, Power Optimizer, PV modules before activation
  - Ensure system integrity before connecting to the grid

During the activation and commissioning, the inverter discovers and communicates with all connected components in the solar system, such as: optimizers, peripheral communication devices and other linked inverters. When commissioning is performed, the user is required to set the grid parameters and backup Voltage information (if used).

Before starting the activation and commissioning, verify all the communication hardware is properly connected.

Before arriving at the site, download SolarEdge SetApp application to your mobile device from Apple App Store or Google Play .



For downloading SetApp, Internet connection, one-time registration and logging are required. No registration is required for using the SetApp.

**IMPORTANT NOTE!**

It is possible to perform DC commissioning on the inverters before completing the AC connection to the electrical grid. DC commissioning, also referred to as "commissioning from the sun", is performed in daylight using SolarEdge SetApp mobile application.

## 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 login to SetApp on your mobile device. Verify that the application is updated with the latest version.
- If applicable, turn on all devices (Energy Meter, Backup Interface) 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. Turn on the DC Disconnect Switch (if applicable).
3. Open SetApp and follow the on-screen instructions (scan the inverter barcode; 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.
4. 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.

**IMPORTANT NOTE!**

When commissioning a Leader inverter, from the **Commissioning** screen select **Central Commissioning** for fast and simple commissioning powered by a wizard.

## 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, the commissioning process will continue automatically. follow SetApp instructions
- 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.

## 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. Unless these settings are selected, the inverter will not start production.

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. If relevant, from the **Language** drop-down list, select your language and tap **Set Language**.
4. To save the information to a read-only file, tap the **PDF** icon (iOS) or the **JPEG** icon (Android) at the bottom of the screen.

## Pairing

Once all connections are made, all the Power Optimizers must be paired with the inverter. This section describes how to assign the Power Optimizers to the inverter. The pairing process takes place during the first activation of the inverter. The pairing process is automatically triggered after the commissioning process.

In some cases, where Power Optimizers are replaced, proactive pairing process is required.

→ To activate the proactive pairing process:

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 ON/OFF/P switch, the DC cables carry a high Voltage and the Power Optimizers no longer output a safe output.

**AVERTISSEMENT!**

*Après avoir mis l'interrupteur ON/OFF/P de l'onduleur monophasé sur ON, les câbles DC portent une haute tension et les optimiseurs de puissance ne génèrent plus la tension de sécurité.*

When the inverter starts converting power after the initial connection to the AC, the inverter enters Wake up 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.

- From the Commissioning menu, select **Monitoring Communication** > **Auto Select**. SetApp will automatically detect your connection method. Follow the on-screen instructions to complete the configuration and establish communication with the monitoring platform.
- From the Commissioning menu, Select **Site Communication** to configure communication between multiple SolarEdge devices or external non SolarEdge devices, such as batteries or data loggers.

For more information on the Monitoring Platform, refer to the C&I One User Guide available on the SolarEdge website at: [https://utility.solaredge.com/hub/ci\\_one\\_user\\_guide.pdf](https://utility.solaredge.com/hub/ci_one_user_guide.pdf)

## Power Control

For P\_Q diagram, see:

[https://knowledge-center.solaredge.com/sites/kc/files/application\\_note\\_power\\_control\\_configuration.pdf](https://knowledge-center.solaredge.com/sites/kc/files/application_note_power_control_configuration.pdf)

For details about power control options and the P\_Q diagram, see [Application Note - SolarEdge Inverters, Power Control Options](#).

### NOTE



SolarEdge inverters with “Grid Support” functionality (as marked on the inverter certification label), are compliant with UL 1741 Supplement B. The functionality is built into the inverter and no additional external device is required.

## 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.
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.

## Pre-commissioning (Off-Grid)

The following items are required for Pre-commissioning:

- Mobile device with SolarEdge SetApp application
- Power bank: 60W output port, USB-C Power Delivery (PD): 20V 3A (not provided)
- USB cable: 3.3 ft (1 meter), USB-C to USB-C (not provided)



### IMPORTANT NOTE

Commissioning should be performed in full daylight.



### NOTE

When pre-commissioning multiple inverters, each inverter needs to be commission individually.

→ To pre-commission the inverter:

1. Turn OFF and secure the AC circuit breaker in OFF position in the circuit breakers panel.
2. Verify that SolarEdge SetApp is installed on your mobile device.
3. Turn the DC Disconnect Switch on the Synergy Manager to ON position (if applicable).
4. Remove the cover from the Power Bank input port at the bottom of the Synergy Manager. Connect the USB cable between the Power Bank and the input port - Upon connection, all LEDs light steady for one minute, and then alternate blue / green.



### NOTE

Alternating red / blue LEDs indicate a problem with the power bank.



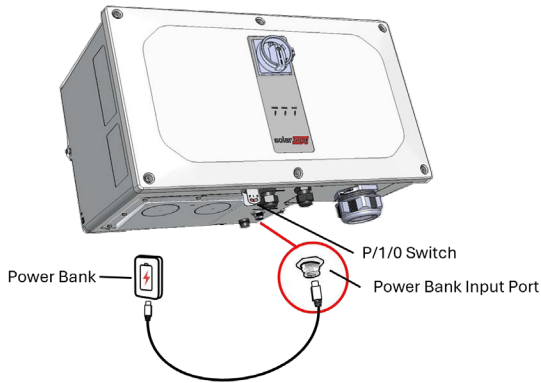


Figure 39: Pre-commissioning the inverter

5. Start SetApp on your mobile device and follow the on-screen instructions.
6. When instructed, hold the ON/OFF/P Switch in P position and release within two seconds and continue to follow the on-screen instructions.
7. Disconnect the power bank and cover the power bank input port.
8. Turn-off the DC Disconnect Switch and the ON/OFF/P Switch.
9. Wait until the inverter turns-off (all LEDs turn-off).

## 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.

### The Monitoring Platform

The monitoring platform provides enhanced PV performance monitoring and inverter yield assurance through immediate fault detection and alerts at the module, PV array 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, Power Optimizers, PV arrays, modules, meters, and sensors, as well as their electrical connectivity. This view enables you to see which modules are connected in each PV array, which PV arrays 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 PV 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#/.](https://www.solaredge.com/products/pv-monitoring#/)

## Creating Logical and Physical Layout using Installation Information

To display a logical layout, insert the inverter 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 PV array layout to the monitoring platform.

For more information, refer to <https://www.solaredge.com/products/installer-tools/designer#/>.

### 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 the required information in the screen, which includes information about your installation, as well as details about its logical and physical mapping.

## Signaling Options

### Alternative Power Source

Energy-generation systems (such as PV inverters) connected to the grid may consist of different types of energy generating sources.

In some cases, when grid power is disconnected, PV inverters operate in parallel with other voltage sources, such as generators.

When inverters operate concurrently with generators, they may be subjected to voltage and frequency fluctuations that exceed trips, which are preset according to regional grid connection requirements. To support simultaneous operation of the inverter and a generator, the inverter extends its Voltage and frequency operating range once it receives a Power Reduction Interface (PRI) signal indicating that grid power is

unavailable (alternative Power Source mode"). When the grid power is restored, the inverter automatically reverts to its default country setting, which includes the original Voltage and frequency operating range.

Figure 39, shows an Example of Alternative Power Source System.

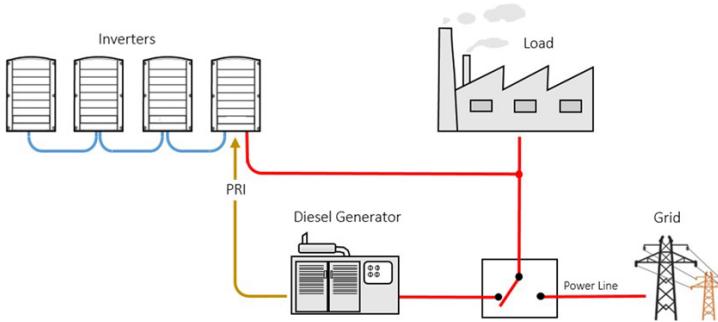


Figure 40: Example of Alternative Power Source System

The Power reduction Interface (PRI) terminal block on the communication board (See Figure 40) is used signaling the inverter to switch to Alternative Power Source mode.

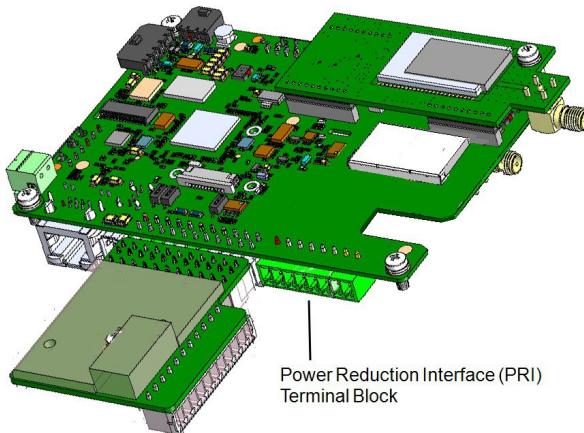


Figure 41: PRI Terminal Block Location on the Communication Board of the Inverter

For detailed connection and configuration of the inverter in alternative power source mode, refer to: <https://www.solaredge.com/sites/default/files/se-inverter-support-of-voltage-sources.pdf>

# Appendix A: Errors and Troubleshooting

This chapter describes how to troubleshoot general system problems. 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 [https://www.solaredge.com/sites/default/files/troubleshooting\\_for\\_se\\_inverter\\_insallation\\_guide\\_addendum\\_na.pdf](https://www.solaredge.com/sites/default/files/troubleshooting_for_se_inverter_insallation_guide_addendum_na.pdf). This document describes the errors and alerts that appear in SetApp, and the Monitoring Platform and the way of troubleshooting them. 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/us/leds>.

Error Type	Inverter 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.

## Power Optimizer Troubleshooting

For details about Power Optimizer troubleshooting, see [SolarEdge Isolation Fault Troubleshooting](#).

## 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 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.

### 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> Follower** is lower than the actual number of followers, refer to the following application note to identify missing followers and troubleshoot connectivity problems: <https://knowledge-center.solaredge.com/sites/kc/files/se-troubleshooting-undetected-can-bus-follower-devices-application-note.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.

## Isolation Fault

In photovoltaic systems with a transformer-less inverter, the DC is isolated from ground. PV modules with defective isolation, unshielded wires, defective power optimizers, or a faulty inverter, can cause a leakage of DC current to the ground (PE - protective earth). Such a fault is also called an isolation fault or ground fault.

To identify and locate an isolation fault in a PV system, refer to:

[https://knowledge-center.solaredge.com/sites/kc/files/application\\_note\\_isolation\\_fault\\_troubleshooting.pdf](https://knowledge-center.solaredge.com/sites/kc/files/application_note_isolation_fault_troubleshooting.pdf)



## Appendix B: Maintenance

This appendix describes how to perform preventive maintenance to the inverter. By performing these preventive maintenance tasks, you can help keep the inverter functioning properly and avoid potential problems.

### Routine Maintenance of the Inverter

Perform a yearly mechanical inspection of the mounted solar inverter to ensure its proper and efficient functioning, and prolonging its lifespan.

#### Visual Inspections

By performing these inspection steps, you can help ensure that your inverter is installed safely:

1. Check the mounting of the inverter: Check that the mounting brackets of all units are secured to the wall and not showing signs of wear or damage or corrosion. Make sure that the units are firmly installed.
2. Inspect the physical condition: Inspect the physical condition of the inverter enclosures. Check for cracks, dents, and other physical damage. Ensure that all screws securing the front panel are in place.
3. Check the ventilation: Check that the cooling fan, at the bottom of the Synergy Units, operate and that air can freely flow around the inverter.
4. Check the conduit connections: Inspect the physical condition of the conduits. Ensure that conduits are secured properly to the inverter, and to the wall.
5. Check the wiring glands: Check that the unused openings in the communication glands, at the bottom of the Synergy Manager, are sealed. Check that the port of the battery bank input is covered.
6. Check the wiring connections: Check the cables between the Synergy Manager and the Synergy Units. Make sure that the plugs are connected properly and secured. Check that the cables are not damaged. If cables are disconnected, immediately power-off the inverter.
7. Checking Ground Connections: Check that all Ground (PE) wires are tightly connected to all enclosures of the inverter.

#### Ground Connection

The following process should only be done by a qualified electrician or someone with the proper training and equipment to avoid electrical hazards.

To check a proper connection of a ground wire to the inverter, perform the following steps:

1. Ensure that the Ground (PE) wire is connected to the designated location on the enclosure of the Synergy Manager and the Synergy units.
2. Use a continuity tester to check the continuity between the ground wire, inverter's enclosure, metal conduits, and the earth. The tester should indicate a continuous circuit.

## Fan Maintenance

Each Synergy Unit has a cooling fan at can be accessed from the bottom panel of the enclosure. Keep the fan clean and free of dust. When needed, and at least once a year, open the fan screen and clean the accumulated dust using a brush.

Check the fan to make sure it is functioning properly and is free of dust and debris. A dirty fan can cause the inverter to overheat, reducing its efficiency.

To clean the internal fan filter:

1. Turn ON/OFF/P Switch of the Synergy Manager to **OFF** (0).

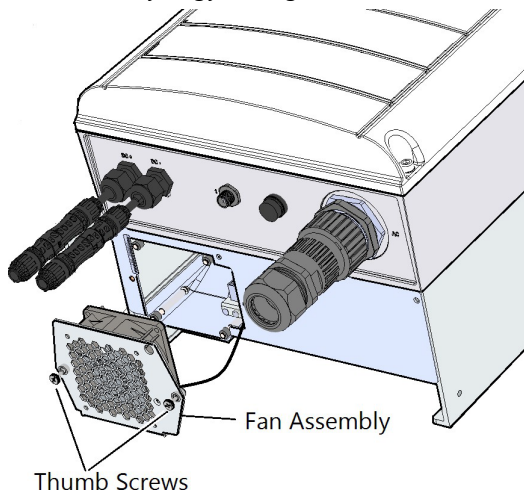


Figure 42: Removing the Fan Assembly

2. Turn **OFF** the DC Disconnect Switch on the front cover of the Synergy Manager (see "Front Interface of Synergy Manager " on page 34) and the AC breaker on the distribution panel.

**WARNING!**

Wait five minutes for the input capacitors of the inverter to discharge.

**AVERTISSEMENT!**

*Attendez cinq minutes pour que les condensateurs d'entrée de l'onduleur soient déchargés.*

3. Unscrew and remove the two Thumb Screws securing the Fan Assembly to the Synergy Unit (see *Figure 41*).
4. Pull out the Fan Assembly from within the inverter.
5. Clean the accumulated dust on the fan and screen using a brush. install the Fan assembly and secure the Thumb Screws.
6. Turn ON the AC breaker on the distribution panel
7. Turn ON the DC Disconnect Switch on the front cover of the Synergy Manager (see "Front Interface of Synergy Manager " on page 34) .
8. Turn ON(I) the ON/OFF/P Switch of the Synergy Manager.
9. Use the SetApp mobile application to connect to the inverter and follow the on-screen instructions. From the Commissioning screen, tap Status and check that Fan OK is displayed in the Status screen.

To clean the external fan filter:

1. Turn the P/1/0 switch of the to OFF (0). Wait for five minutes for the DC Voltage inside the inverter to drop to a safe level before preceding to the next step.
2. Remove dust from the filter with a brush.
3. Turn the P/1/0 switch of the to ON(I).

## Wire connections

Follow this procedure for maintaining the wire connections of the inverter:

1. Turn ON/OFF/P Switch of the Synergy Manager to OFF (0) and wait for five minutes for the DC Voltage, inside the inverter, to drop to a safe value before preceding to the next step.

**WARNING!**

Wait five minutes for the input capacitors of the inverter to discharge.

**AVERTISSEMENT!**

*Attendez cinq minutes pour que les condensateurs d'entrée de l'onduleur soient déchargés.*

2. Turn OFF the DC Disconnect Switch on the on the front cover of the Synergy Manager and the AC breaker on the distribution panel.
3. Remove the front cover of the Synergy Manager.
4. Inspect the wire connections: Visually inspect all wire connections, looking for signs of damage, wear and tear, loose connections or overheating. If you find any signs of damage, it's important to address them promptly to prevent further issues.
5. Ensuring tight DC connections: If your inverter is equipped with spring-clamped terminals, gently hold each wire and try to pull it out. Verify that all wires are locked inside the terminals. If your inverter is equipped with DC screw terminals, fasten the screw of the terminals to a torque of 3.7 ft.\*lb for 4 AWG wires or 5.9 ft.\*lb for 3 to 2 AWG wires (see "Connecting PV Strings to the Synergy Manager" on page 51).

**WARNING!**

Wait five minutes for the input capacitors of the inverter to discharge.

**AVERTISSEMENT!**

*Attendez cinq minutes pour que les condensateurs d'entrée de l'onduleur soient déchargés.*

6. Ensuring tight AC connections: Fasten the nuts of the AC terminals to a torque of 15.4 lb.\*ft (see "Connecting Ground and AC Wires to the Synergy Manager" on page 55).
7. Check the wire insulation: Inspect the insulation on all wires for any signs of damage, such as cracks, overheating or abrasions. If you find any issues, repair or replace the wire as necessary.
8. Reconnect and turn on the inverter: Once you've completed the maintenance, reconnect the inverter to the electrical source and turn it on. Monitor the inverter's performance to ensure it's operating as expected.

## General Cleaning

Clean the inverter: Dirt and debris can accumulate on the inverter over time, which can reduce its performance. Clean the inverter regularly with a soft brush, a soft cloth, and mild detergent to keep it functioning efficiently.

## Monitoring the Solar System Performance

The SolarEdge monitoring platform enables to monitor PV strings connected to the inverter. It provides accurate information about the present and past performance of

each PV module individually and the system as a whole. The platform enables to detect, pinpoint and troubleshoot faults, efficiently manage maintenance operations, and analyze site profitability.

Smart algorithms continuously track the power, Voltage, and current of all PV modules and inverters, as well as a range of statistical indicators to detect performance events that require intervention or maintenance.

If you are experiencing alerts from the SolarEdge monitoring system, it may indicate an issue with the PV modules, inverter, or the monitoring system itself. Some common alerts include:

1. **Panel mismatch:** This alert occurs when the performance of one or more panels in the solar array is not matching the expected performance. This could be due to shading, soiling, a malfunction, or other factors that are affecting the performance of the panel.

To learn more on generating a PV module mismatch report, refer to [https://knowledge-center.solaredge.com/sites/kc/files/monitoring\\_platform\\_mismatch\\_analysis\\_report.pdf](https://knowledge-center.solaredge.com/sites/kc/files/monitoring_platform_mismatch_analysis_report.pdf)

2. **Inverter failure:** This alert occurs when the inverter, which is responsible for converting the DC power generated by the PV modules into AC power has failed.

To learn more on viewing alerts in the monitoring platform, refer to <https://knowledge-center.solaredge.com/sites/kc/files/se-alerts-in-monitoring-application-note.pdf>

3. **Communication failure:** This alert occurs when the monitoring system is unable to communicate with the SolarEdge inverter. This could be due to a problem with the inverter itself, or with the communication network that connects the monitoring system to the inverter.

It's important to address these alerts promptly to ensure the proper functioning of the system. If you're unsure how to address a specific alert, it may be helpful to contact SolarEdge support for assistance.

## Appendix C: Adding Optional Components

This appendix describes the optional components available for the inverter. Before ordering component, verify that your inverter model supports the component and that the component is not already provided with the inverter.

Ordered Installation and replacement kits for components include procedures for removal and installation of the components.

### NOTE



Replaced component or part may require being disposed according local regulations. If you wish to discard components or parts, contact your local authorities and ask for the correct method of disposal.

### AC Surge Protection Device (SPD)

The AC SPD is a device designed to protect the inverter from Voltage spikes and surge attempts forming on the AC grid lines. The SPD limits the Voltage supplied to the inverter by either blocking or shorting to ground Voltages above a safe threshold. The SPD is installed inside the inverter and communicates with the SolarEdge Monitoring platform for reporting surge protection events and faults.

For installation and configuration of the AC SPD, refer to:

<https://www.solaredge.com/sites/default/files/se-synergy-manager-ac-spd-installation-guide.pdf>

### DC Surge Protection Device (SPD)

The DC SPD is a device designed to protect the inverter from Voltage spikes and surge attempts, forming on the PV DC lines, mainly induces by lightning. The SPD limits the Voltage supplied to the inverter by either blocking or shorting to ground Voltages above a safe threshold. The SPD is installed inside the inverter and communicates with the SolarEdge Monitoring platform for reporting surge protection events and faults.

For installation and configuration of the DC SPD, refer to:

<https://www.solaredge.com/sites/default/files/se-synergy-manager-dc-spd-installation-guide.pdf>

### Cellular Plug-in

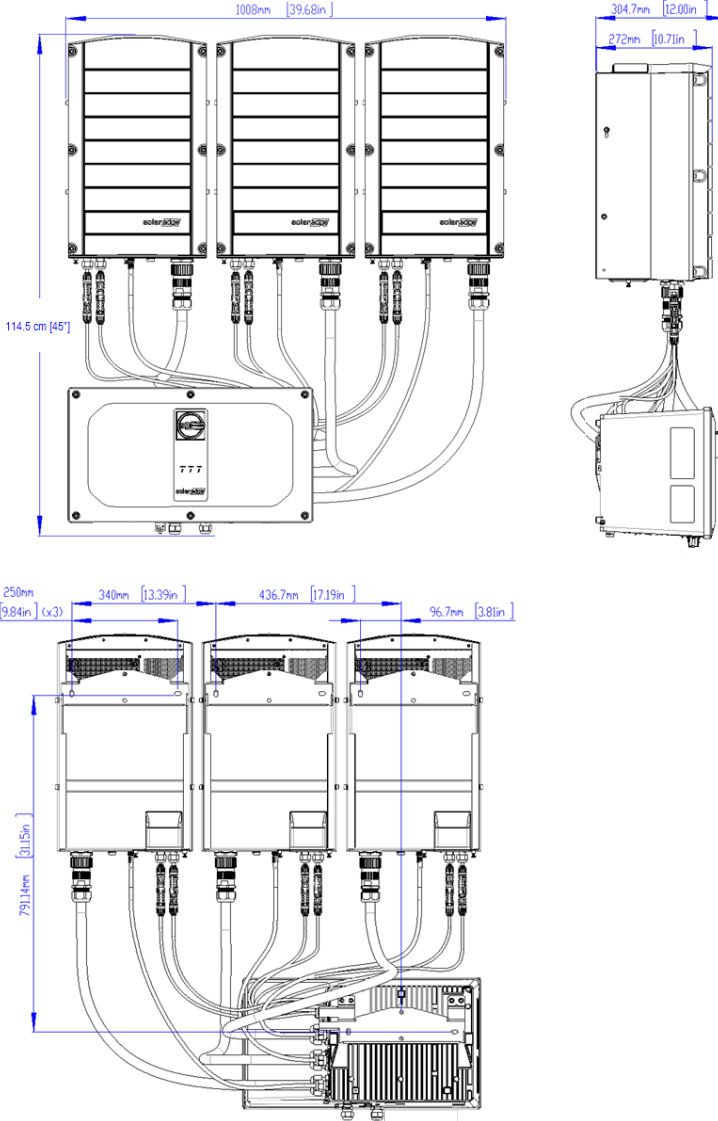
The cellular plug-in provides wireless communication between the inverter and the SolarEdge monitoring platform. The Cellular Plug-in kit is provided with an antenna and user manual. For more information on the Cellular Plug-in, refer to:

[https://www.solaredge.com/sites/default/files/cellular\\_gsm\\_installation\\_guide\\_for\\_inverters\\_with\\_setapp.pdf](https://www.solaredge.com/sites/default/files/cellular_gsm_installation_guide_for_inverters_with_setapp.pdf)

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

# Appendix D: Mechanical Specifications

The following figure shows the dimensions of the Three Phase Inverter with Synergy Technology.







## Appendix E: Interconnection Standards

The information in this appendix complies with the IEEE 1547-2018 standard. The IEEE 1547-2018 standard, establishes criteria and requirements for interconnection of distributed energy resources (DER) with electric power systems (EPS) and associated interfaces.

### Performance Categories and Interconnection Standards

Description	Category / Standard
Normal Operating Performance Category	A <sup>(1)</sup> , B
Abnormal Operating Performance Category	3
Additional Abnormal Categories	1 <sup>(1)</sup> , 2 <sup>(1)</sup>
Interconnection Standards	UL 1741 Ed. 3 (SA), UL 1741 Ed. 3 (SB), IEEE 1547-2018, IEEE 1547.1-2020, IEEE 1547a-2020, IEEE 1547.1-2020 SRD 2.0 (HECO), CA Rule 21 2017, CSA 22.3 No 9

### Response to Abnormal Voltages and Frequencies

Voltage (p.u.)	Default setting		Adjustable range	
	Maximum Clearing Time (sec)		voltage (p.u.)	Clearing Times
1.20	0.16		1.2	0.16
1.10	13.0		1.10 - 1.20	1.0-13.0
0.88	21.0		0.0-0.88	21.0-50.0
0.50	2.00		0.0-0.50	2.0-21.0
Frequency (Hz)	Maximum Clearing Time (sec)		Frequency (Hz)	Clearing Times (sec)
62.00	0.16		61.8-66.0	0.16-1000
61.2	300		61.0-66.0	180-1000
58.5	300		50.0-59.0	180-1000
56.5	0.16		50.0-57.0	0.16-1000

<sup>(1)</sup>Units meet the highest performance category B, 3 and may be configured to operate at lower categories if required by the EPS.

Utility authorization is required to change abnormal voltage and frequency set-points. Response to abnormal conditions and unintentional islanding results in a disconnect of the equipment from the area EPS.

## Enter Service Settings

Function	IEEE 1547 Default Settings <sup>(1)</sup>	Range
Enter Service Delay	300 <sup>(2)</sup>	0-1000 seconds
Enter Service Ramp Period	100	1-1000 seconds
Minimum voltage	0.917	0.88-0.95 p.u.
Maximum voltage	1.05	1.05 -1.05 p.u.
Minimum frequency	59.5	59.0-59.9 Hz
Maximum Frequency	60.1	60.1-61.0 Hz

## Grid Support Functions

Function	IEEE 1547 Default Settings <sup>(1)</sup>	Range
Constant Power Factor mode	1	0-1
Constant Reactive power mode	Disabled	+/- 1 nameplate Var p.u.
Voltage-Reactive power mode	Disabled	
V2	0.98	0.92 -1.05 V p.u.
Q2	0	+/- 1 nameplate Var p.u.
V3	1.02	0.95 -1.08 V p.u.
Q3	0	+/- 1 nameplate Var p.u.
V1	0.92	0.77-1.03 V p.u.
Q1	0.44	0-1 nameplate Var p.u.
V4	1.08	0.97-1.23 V p.u.

<sup>(1)</sup> Settings will be specified by the regional EPS (electric power system) operator.

<sup>(2)</sup> Changes to this setting should not be made without approval from the area EPS operator

Function	IEEE 1547 Default Settings (1)	Range
Q4	-0.44	(-1)-0 nameplate Var p.u.
OLRT	5	1-90 seconds
Active Power-Reactive power mode <sup>(1)</sup>	Disabled	
P3	1	0.5-1 nameplate power p.u.
P2	0.5	0.4-0.8 nameplate power p.u.
P1	0.2	0-0.7 nameplate power p.u.
P'1	-0.2	-0.7-0 nameplate load p.u.
P'2	-0.5	-0.4-(-0.8) nameplate load p.u.
P'3	-1	-1-(-0.5) nameplate load p.u.
Q3	-0.44	+/- 1 nameplate Var p.u.
Q2	0	+/- 1 nameplate Var p.u.
Q1	0	+/- 1 nameplate Var p.u.
Q'1	0	+/- 1 nameplate Var p.u.
Q'2	0	+/- 1 nameplate Var p.u.
Q'3	0.44	+/- 1 nameplate Var p.u.
Voltage Active power mode <sup>(1)</sup>	Disabled	
V1	1.06	1.05-1.09 V p.u.
P1	1	nameplate power p.u.
V2	1.1	1.06-1.10 V p.u.
P2	0	0-1 nameplate power p.u.
P'2	0	-1-0 nameplate load p.u.
OLRT	10	0.5-60 seconds
Frequency-droop mode	Disabled	
DBOF	0.036	0-1 Hz
DBUF	0.036	0-1 Hz
KOF	0.05	0.02-0.07

<sup>(1)</sup>Load parameters P' and Q' apply to single phase energy storage inverters only.

Function	IEEE 1547 Default Settings (1)	Range
KUF	0.05	0.02-0.07
OLRT	5	0.2- 10 seconds
Normal Ramp Rate <sup>(1)</sup>	100	1-100%/ seconds

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<sup>(1)</sup>California rule 21 function.

## Appendix F: Immunity Standards

The information in this appendix complies with the IEEE 1547-2018 standard. The IEEE 1547-2018 standard, establishes criteria and requirements for interconnection of distributed energy resources (DER) with electric power systems (EPS) and associated interfaces.

Test type	Test method	Test Level
Radiated Immunity	IEEE C37.90.2	20 V/m
EFT	IEEE C37.90.1, C62.45, C62.41.2	+3 kV
		+4 kV
Surge	IEEE C62.45, C62.41.2, UL 1741	+3 kV
		+6 kV
Oscillatory Test	IEEE C37.90.1	2.5 kV

## Appendix G: PV Hazard Control Models

### Optimizers

P730  
P750  
P801  
P850  
S850  
P950  
P1101  
S1201  
S1401  
R800  
R1100

### Inverters

SE9kUS  
SE10kUS  
SE14.4kUS  
SE16.7kUS  
SE17.3kUS  
SE20kUS  
SE24kUS  
SE30kUS  
SE33.3kUS  
SE40kUS  
SE43.2kUS  
SE66.6kUS  
SE80kUS  
SE85kUS  
SE100kUS  
SE110kUS  
SE120kUS

### DC Safety Switches

DCD-3PH-US-S3-A  
DCD-3PH-US-S3-B  
DCD-3PH-US-S5-A-1  
DCD-3PH-US-S5-A-3  
DCD-3PH-US-S5-A-1P  
DCD-3PH-US-S7  
DCD-3PH-US-S8  
DCD-3PH-US-S9-DB  
DCD-3PH-US-S9-DB-F  
DCD-3PH-US-S9-DB-E  
DCD-3PH-US-S9-DB-NF3



Power Optimizer models compliant with SolarEdge PV Hazard Control System: UL3741 are listed models as noted on the Power Optimizer datasheet.

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