



Installation Guide

Three Phase Inverters with Synergy Technology

PN: SExxK-xxxxlxxxx

For Europe and APAC

Version 1.5

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.

Revision History

Version 1.5 (Mar. 2024)

Added appendix for Safe DC shutdown.

Version 1.4, June 2023: A new configuration of DC boards was added inside the Synergy Manager.

Version 1.3, May 2022: Change in connection method to the DC terminals of the Synergy Manager. Updated links to circuit breaker rating documents.

Version 1.2, September 2021: Change in connection method to the DC terminals of the Synergy Manager

Version 1.1, September 2021: Added Synergy Unit connectors drawing

Version 1.0, April 2021: Initial release

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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.

CAUTION!



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



NOTE

Denotes additional information about the current subject.



IMPORTANT SAFETY FEATURE

Denotes information about safety issues.

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



NOTE

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



WARNING!

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



WARNING!

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

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.



P = Program/Pair
1 = ON
0 = OFF

WARNING!

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

WARNING!

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

WARNING!

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.

WARNING!

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

WARNING!

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

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



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

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

CAUTION!

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

CAUTION!


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

NOTE

Use PV modules rated according to IEC 61730 class A.

NOTE



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

NOTE

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>.

NOTE

The following warning symbols appear on the inverter warning label:



Risk of electric shock



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



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



Caution, risk of danger

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.

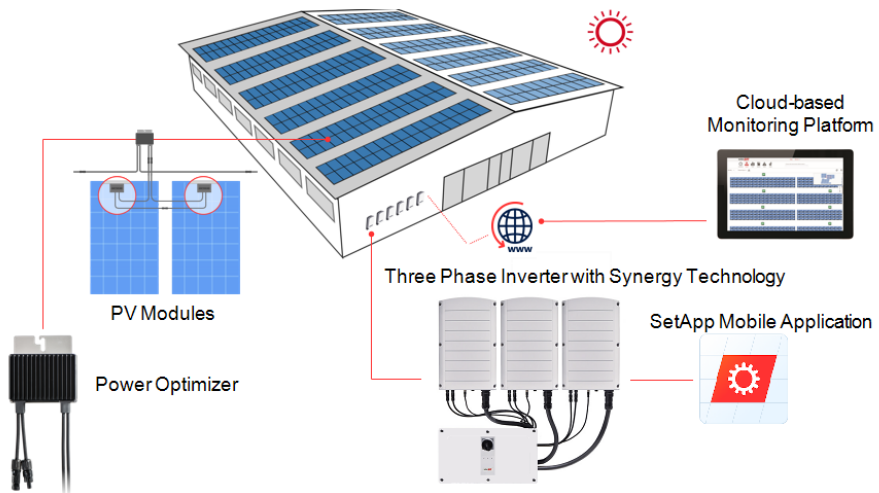


Figure 1: The SolarEdge power harvesting system components

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.

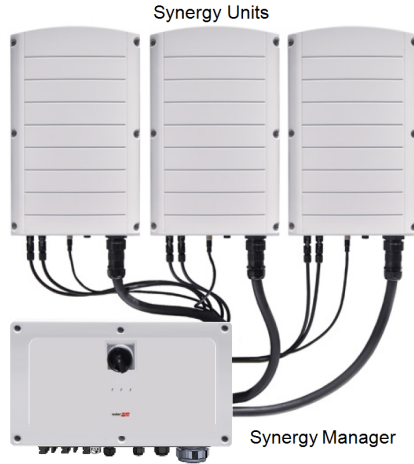


Figure 2: Synergy Manager with three Synergy Units

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.

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.

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.

Supported AC Grids

This section details the AC grids supported by SolarEdge inverters (model dependent). Ground connection is required for all grids, as described in "Connecting Ground and AC Wires to the Synergy Manager" on page 44.

For overview of common AC grids and the compatibility of SolarEdge inverters, refer to [Grids Supported by SolarEdge Inverters](#).

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
- Allen screwdriver for M5/M6/M8 screw types
- Standard flat-head screwdrivers set
- Non-contact Voltage detector
- Cordless drill (with a torque clutch) or screwdriver and bits suitable for the surface on which the inverter and Power Optimizers will be installed. Use of an impact driver is not allowed.
- MC4 crimping tool
- 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 :
 - Four- or six-wire shielded twisted pair cable
 - Watchmaker precision screwdriver set

For secondary grounding:

- Ring/lug terminal crimper tool for the Ground wire
- Ring/lug terminal
- Serrated washer
- Grounding screw
- Two washers

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 PV Modules and AC to the Synergy Manager" on page 35
- [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!



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

CAUTION!



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

CAUTION!



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

CAUTION!



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

CAUTION!



All PV modules must be connected to a Power Optimizer.

CAUTION!



If you intend to mount the 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.

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 Power Optimizers' 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.

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/products/installer-tools/designer#/>.
- *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 1.8 m are allowed for all Power Optimizers (0.9 m for DC+, and 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 Mxxxx-Series - extension cables of up to 16 m can be installed per Power Optimizer (8 m for DC+, and 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.

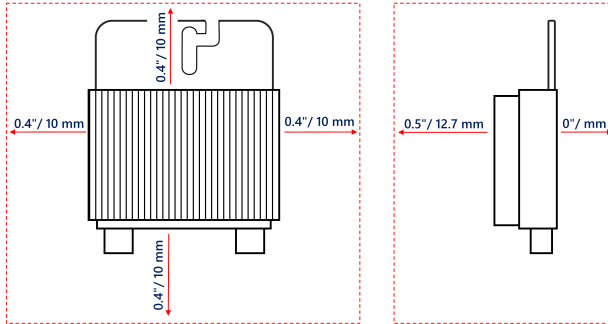
For planning considerations when connecting multiple PV modules to an Power Optimizer, refer to:

<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.
- 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

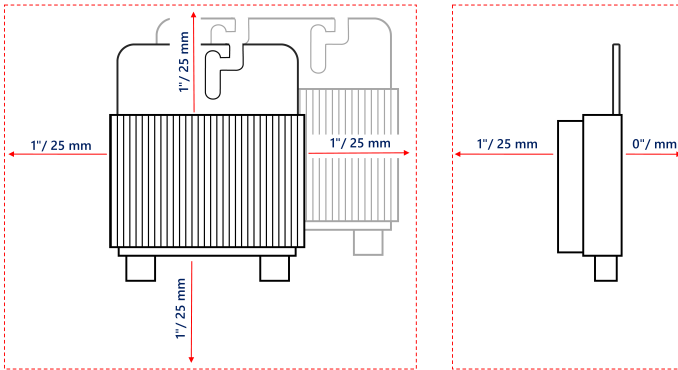


Figure 3: Clearance for heat dissipation around the Power Optimizer

- When installing PV modules in a confined space such as Building-integrated photovoltaic (BIPV) modules, ventilation measures may be required to ensure that the Power Optimizers are not exceeding the maximum temperatures stated in their specifications.

Step 1: Mounting the Power Optimizers

For each of the Power Optimizers⁽¹⁾:

1. Determine the Power Optimizer mounting location and use the Power Optimizer mounting brackets to attach the Power Optimizer to the support structure . It is recommended to mount the Power Optimizer in a location protected from direct sunlight.
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.

3. Attach each Power Optimizer to the rack using M6 or M8 stainless steel bolts, nuts and washers or other mounting hardware. Apply torque of 9-10 N*m.
4. Verify that each Power Optimizer is securely attached to the module support structure.
5. Record Power Optimizer serial numbers and locations, as described in *Reporting and Monitoring Installation Data* on page 70.

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).

⁽¹⁾Not applicable to smart modules.

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.

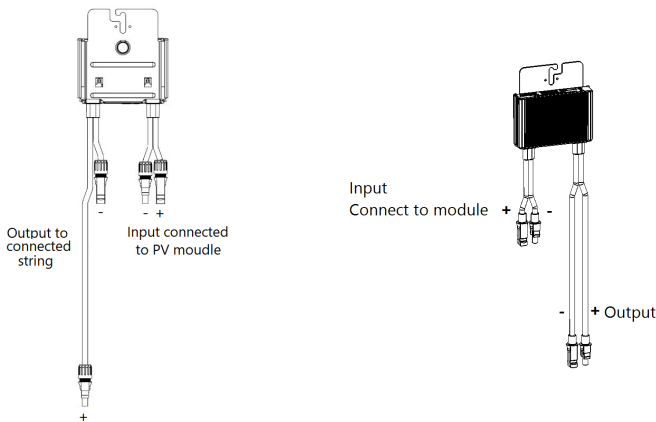


Figure 4: S-Series (left) and P-Series (right) Power Optimizer connectors

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.

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.

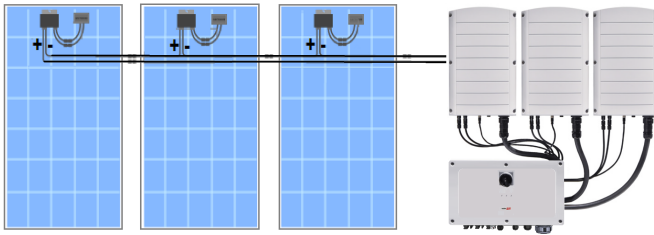


Figure 5: Power Optimizers connected in series

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 71.

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

→ 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. inside the Synergy Manager.

For troubleshooting Power Optimizer operation problems, refer to *Power Optimizer Troubleshooting* on page 74.

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 Unit 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.

CAUTION!



To avoid damage to the Synergy Manager or Synergy Unit, do not rest the units on their bottom side. Resting on the bottom side of the units may cause damage to the connectors. Rest the units only on the back side.

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

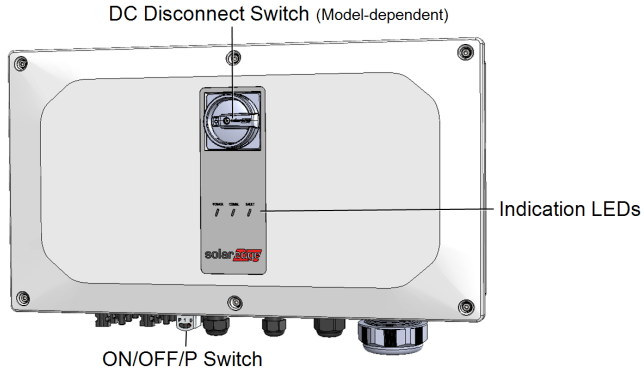


Figure 6: Synergy Manager Unit - Front interfaces



NOTE

Some models Synergy Manager do not include DC Disconnect Switch.

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 7 shows the ON/OFF/P switch of the Synergy Manager.

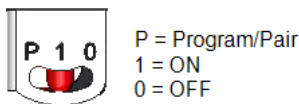


Figure 7: ON/OFF/P switch

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

Indication LEDs

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

Figure 8 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

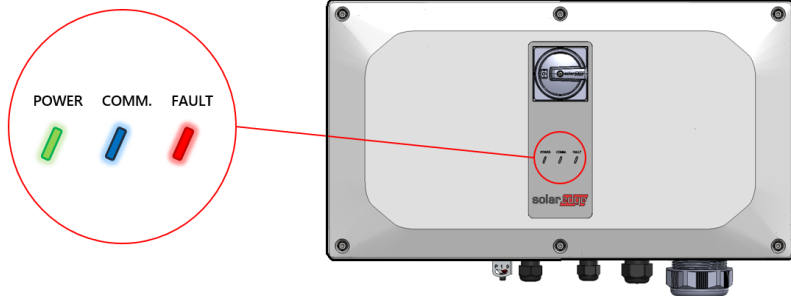


Figure 8: Indication LEDs

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

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

⁽³⁾Alternating = Alternate 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	OFF	
Inverter is OFF (DC not safe)		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 73

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 9 shows the interconnecting cables of the inverter.

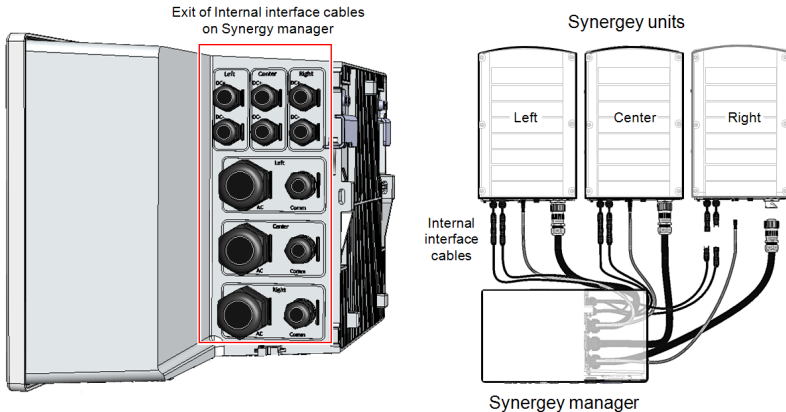


Figure 9: Inverter - interconnection cables

Synergy Manager External Cable Interface

The connectors and glands, 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.

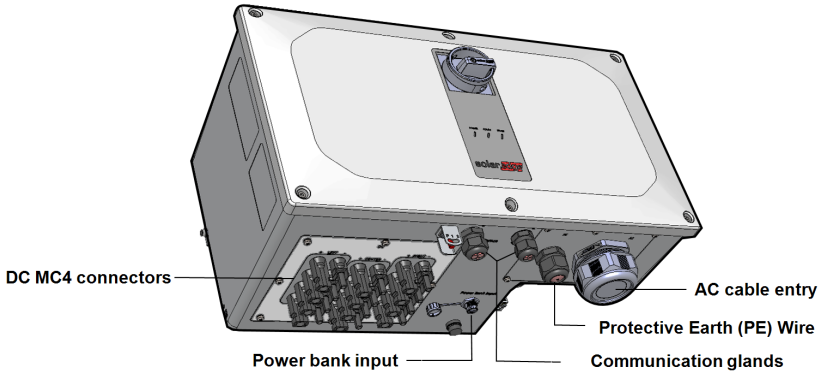


Figure 10: Synergy Manager with MC4 connectors - bottom view

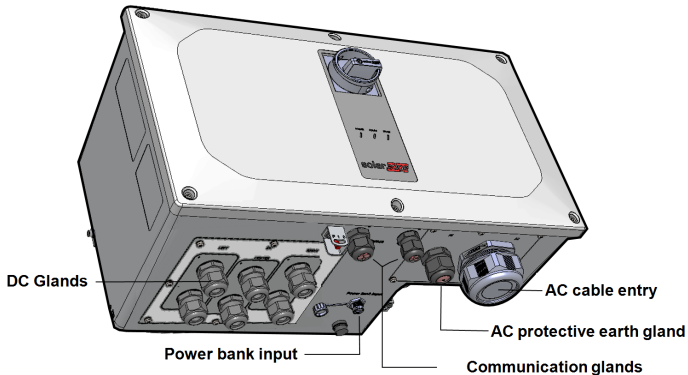


Figure 11: Synergy Manager with glands - bottom view

- **Protective Earth (PE) Wire Entry:** PE gland for connecting Protective Earth (PE) wire
- **AC Cable Entry:** AC cable gland for grid connection
- **DC Connectors:** MC4 cable connectors for connecting the PV strings
- **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

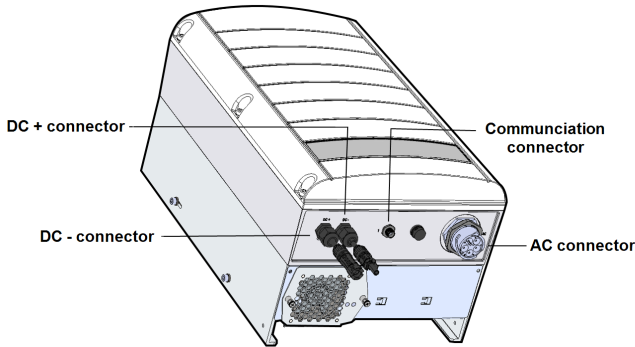


Figure 12: Synergy Unit Interface Connectors

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 116.8 cm x 100.8 cm.



CAUTION!

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

CAUTION!

SolarEdge inverters and Power Optimizers can be installed at a minimum distance of 50 m 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 200 m 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.

→ **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 13*)

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 13*).

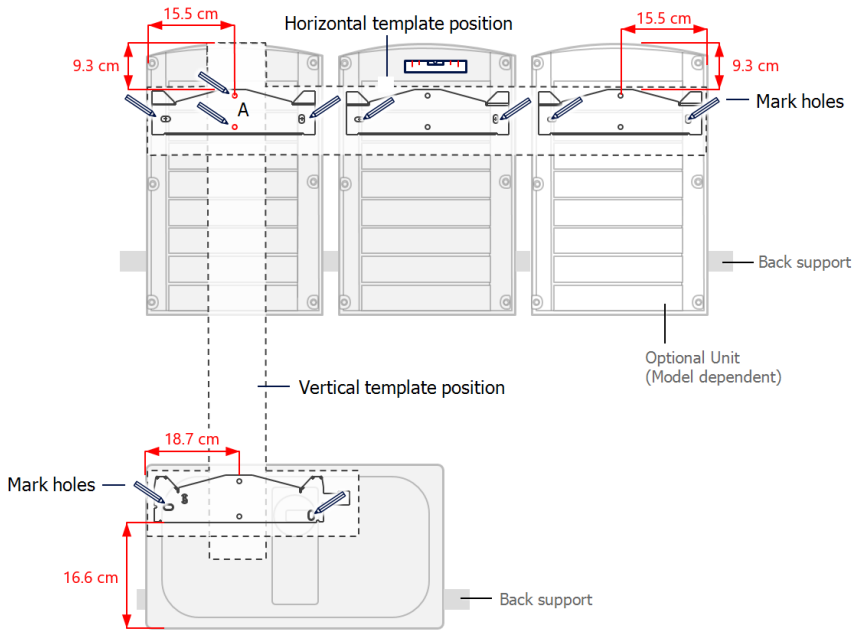


Figure 13: Marking the drilling holes locations

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.

NOTE



The grounding wire can be installed on either side of the Synergy Unit chassis. When installing three Synergy Units, connect the chassis grounding wire to the center Synergy Unit before hanging the left or right Synergy Units. Refer to: "Connecting Ground and AC Wires to the Synergy Manager" on page 44.

- 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 15*).
- 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 4.0 N*m (see *Figure 14*).

**NOTE**

For the center Synergy Unit, use both side screws.

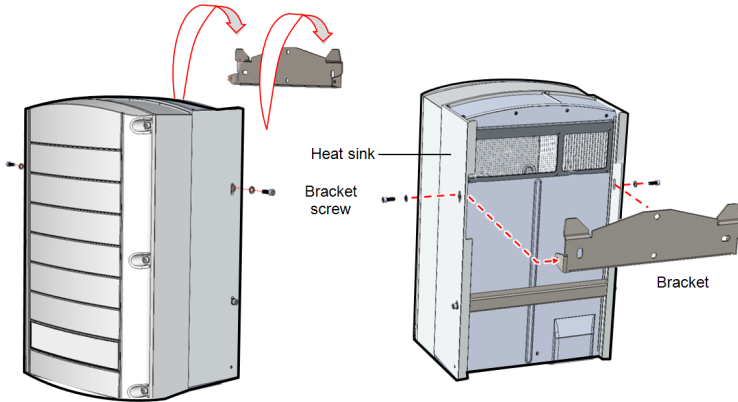


Figure 14: Hanging the Synergy Unit

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 15*).
 - c. Insert the supplied bracket screw through the right side of the heat sink and into the bracket.

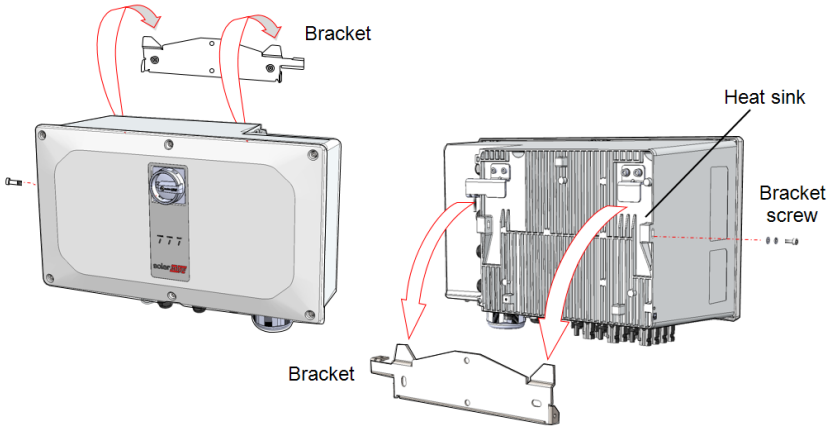


Figure 15: Hanging the Synergy Manager

Horizontal Mounting of the Inverter

The inverter can be installed horizontally, on a flat surface, at any tilt above 10° (see *Figure 16*). 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](#).

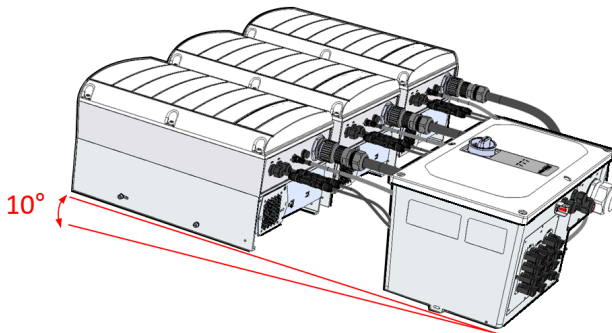


Figure 16: Horizontal mounting of the Inverter

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:

- Three Phase Inverters for 3-Wire Grids application note at https://www.solaredge.com/sites/default/files/se_three_phase_inverters_for_delta_grids.pdf
- Grids Supported by SolarEdge Inverters application note at https://www.solaredge.com/sites/default/files/grids_supported_by_se_inverters_europe_and_apac.pdf
- Countries Supported by the SolarEdge Inverters application note (to confirm compatibility) at: https://www.solaredge.com/sites/default/files/se_inverters_supported_countries.pdf. Installing without confirmation may void the inverter warranty.
- 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

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

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.

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>



In India, use only a circuit breaker device. For selecting a circuit breaker, refer to <https://www.solaredge.com/sites/default/files/se-determining-the-circuit-breaker-ratings-for-three-phase-inverters-India.pdf>

In Israel, use only a circuit breaker device. For selecting a circuit breaker, refer to <https://www.solaredge.com/sites/default/files/se-determining-the-circuit-breaker-ratings-for-three-phase-inverters-Israel.pdf>

For more wiring information, refer to the *SolarEdge Recommended AC Wiring Application Note*, available on the SolarEdge website at <http://www.solaredge.com/files/pdfs/application-note-recommended-wiring.pdf>.

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

- AC cable with L1, L2, L3, PE wires
- AC cable with L1, L2, L3, N, PE wires
- AC cable with L1, L2, L3 wires and an external PE (Protective Earth) wire
- AC cable with L1, L2, L3, N wires and an external PE wire

WARNING!

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

- Use AC line wires with a maximum of 120 mm² cross section conductor (For inverter models SE50K, SE55K, SE66.6K, SE80K use up to 95 mm²)
- Use PE wire with a maximum of 70 mm² cross section conductor (For inverter models SE50K, SE55K, SE66.6K, SE80K use up to 95 mm²)
- For inverter model SE120, use a PE wire with an outer diameter of 12 to 20 mm. For inverter models SE50K SE55K, SE66.6K, SE80K use 9 to 16 mm
- 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.
- The AC gland supports a cable of 30 - 50 mm in diameter

**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 17* and *Figure 18*)

Figure 17 shows the connection of PV strings and *Figure 18* shows the connection of PV arrays to the Synergy Manager.

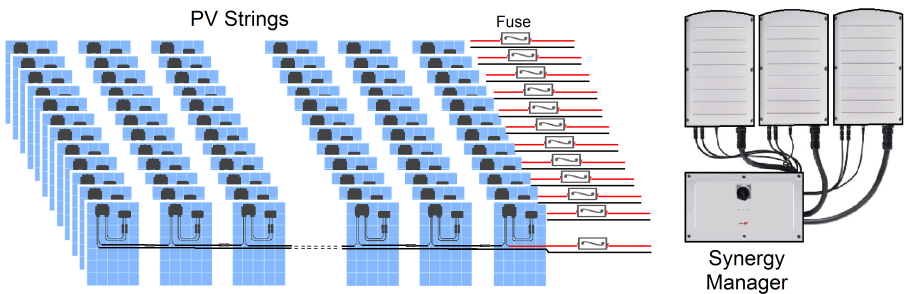


Figure 17: Connection of PV strings to the Synergy Manager

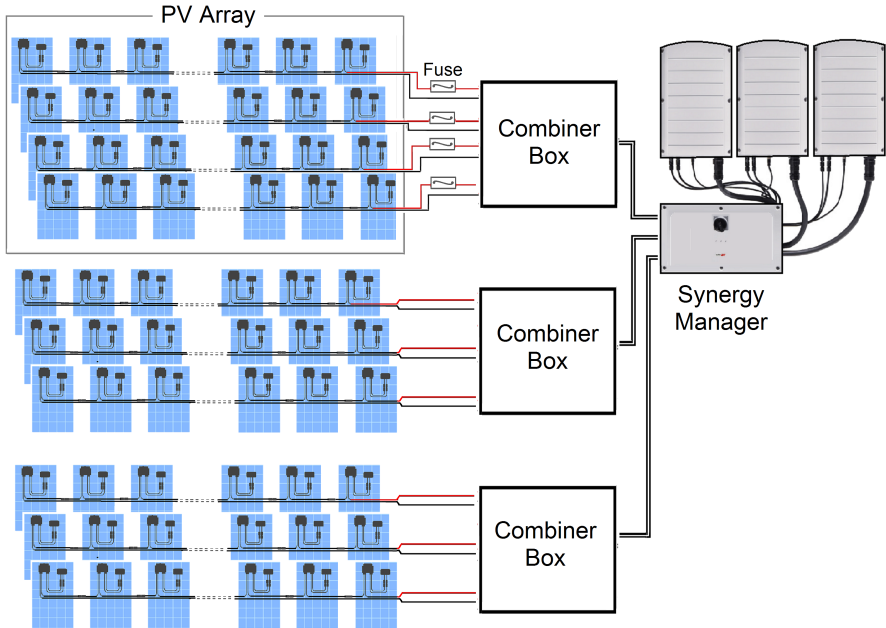


Figure 18: Connection of PV arrays to the Synergy Manager

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:

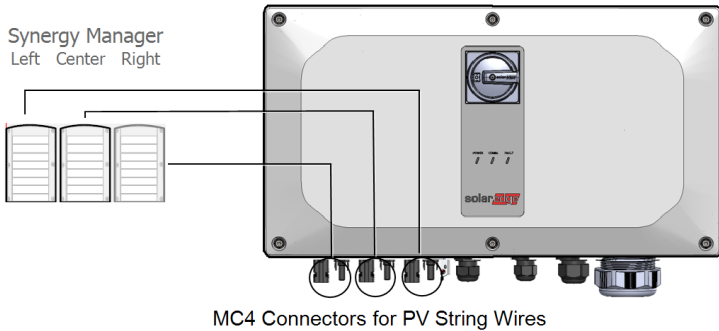
- MC4 input connectors for 12 PV strings located at the bottom of the Synergy Manager enclosure.
- DC input terminals for three PV arrays inside the Synergy Manager

Figure 19 shows the various methods of connection of DC from the PV strings to Synergy Manager.



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

Synergy Manager with 12 PV Strings Connected



Synergy Manager with Three PV Arrays

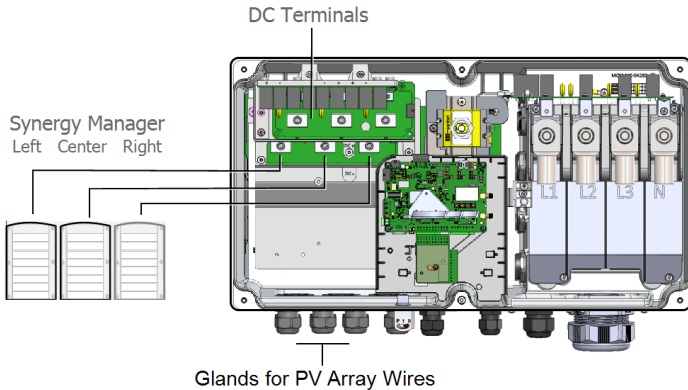


Figure 19: Connecting methods of PV Strings and PV arrays to Synergy Manager



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

NOTE

SolarEdge 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.

WARNING!

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

Connecting PV Strings to the Synergy Manager

→ To connect the PV strings to the Synergy Manager with MC4 connectors:

1. Connect the MC4 connectors of each PV string to the corresponding DC+ and DC- connectors as shown at the bottom of the Synergy Manager. To ensure proper seal of the connectors, verify that a lock click heard.
2. Seal the unused MC4 connectors with caps.

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.

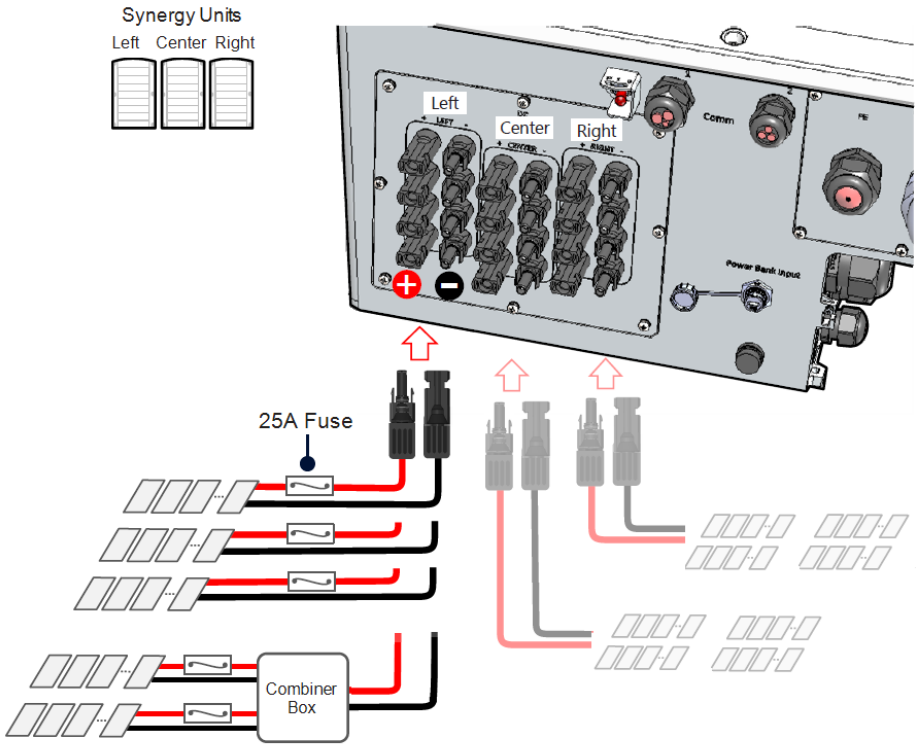


Figure 20: Connecting PV strings to a Synergy Manager with MC4 Connectors

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 glands.

NOTE

Use wires in a diameter 12 to 20 mm with a cross-section conductor of 25 to 70 mm².

Crimp ferrules when using a stranded class 5/6 copper or aluminum wire.

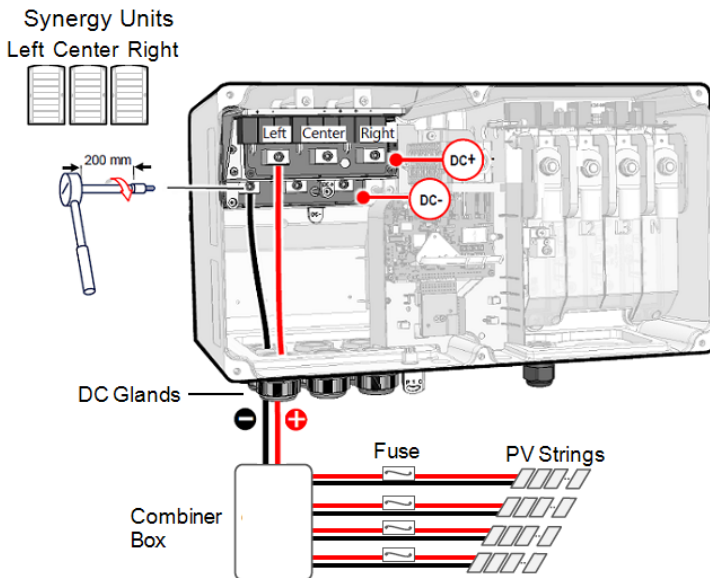


Figure 21: Connecting PV Arrays to the Synergy Manager

2. Loosen the Allen screws of the DC terminals.
3. Strip 25 mm 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.

4. 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 21*).

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.

5. Insert the DC wires into the DC terminals and fasten the 5 mm Allen screw to a torque of 7 N*m.

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.

6. Fasten the gland nuts to a torque of 12 N*m.

7. Close the Synergy Manager cover and secure it by tightening the six screws to a torque of 3.5 N*m.

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.

Chassis Grounding

If required, ground the Synergy Manager and Synergy units as shown in *Figure 22*. Use a grounding cable, a grounding screw, two washers, a ring terminal and a serrated washer. Connect the grounding cable to the grounding point on the left or right side of the unit.

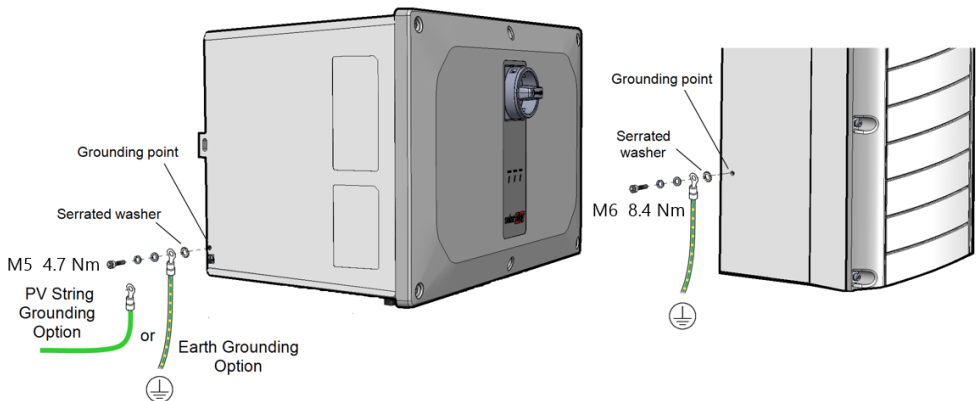


Figure 22: Chassis grounding of the Synergy Manager and Synergy Units

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.

→ 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.

- 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.

- Open the gland of the AC cable and insert the AC cable through the gland.
- Strip 10 to 11 mm of insulation from the PE wire.
- Connect the PE wire to the PE terminal and fasten the Allen screw to a torque of 5 N*m for wires of 16 mm² to 25 mm² or 8 N*m for wires of 35 mm² to 70 mm².

NOTE

Before connecting lugs to aluminum wires:



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



NOTE

Use ferrule when connecting a fine stranded wire of up to 50 mm².

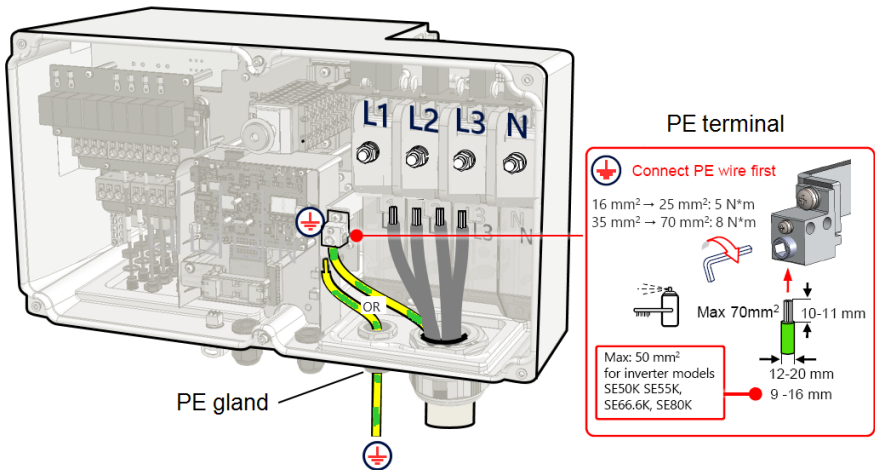


Figure 23: Connecting the Protective Earth (PE) wire

-or-

Route a separate PE wire through the PE gland. Connect the wire to the PE terminal and fasten the Allen screw to a torque of 5 N*m for wires of 16 mm² to 25 mm² or 8 N*m for wires of 35 mm² to 70 mm². Secure the PE gland with a torque of 12 N*m.



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.

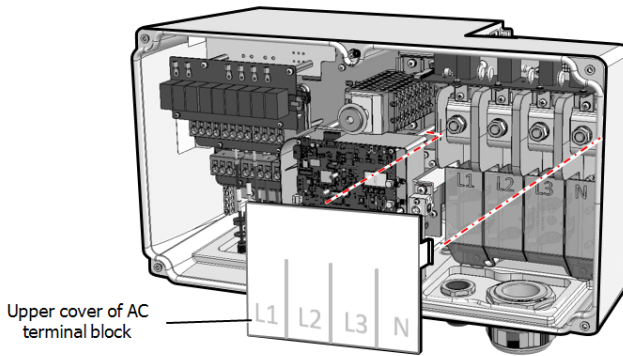


Figure 24: Upper cover of AC terminal block

3. Route the AC wires through the AC gland.
4. 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

5. Crimp lugs on the AC wires.

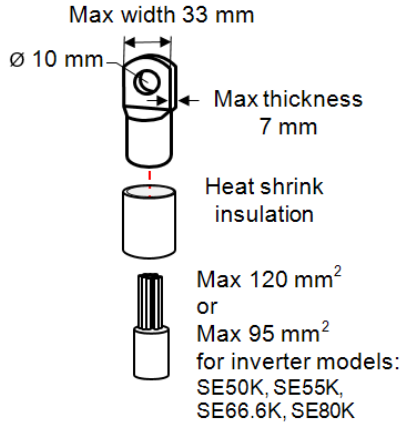


Figure 25: Crimping a lug on an AC wire

Lug parameters:

- Bolt hole diameter size: 10mm
 - Compression lugs of the one-hole, standard barrel, 600V type.
 - Maximum wire size: 120 mm² (For inverter models SE50K, SE55K, SE66.6K, SE80K use up to 95 mm²)
 - Maximum lug tongue thickness: 7 mm
 - Maximum lug tongue width: ≤33 mm
6. Use heat shrink to isolate the lug barrels.
 7. Remove the nut of the AC terminals.
 8. 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 21 N*m.



NOTE

For easy installation of the AC wires, start connecting the wires from left to right: L1 → L2 → L3 → N (See *Figure 26*).

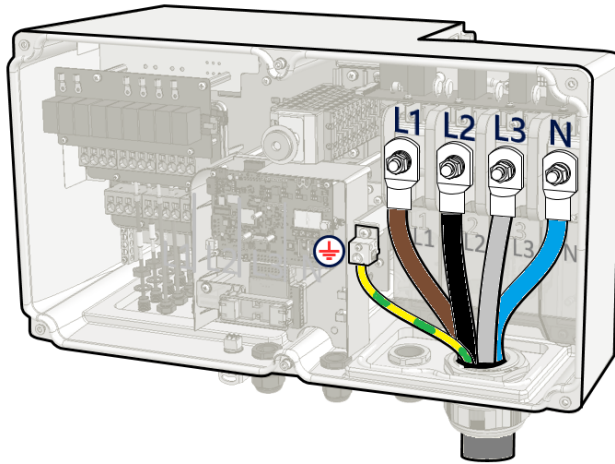


Figure 26: Connecting AC wires to the AC terminals

9. 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 3.5 N*m.

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!

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.

Cellular

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 58.

Wi-Fi

This built-in communication option enables using a Wi-Fi for connecting to the Monitoring platform. It requires an external antenna, available from SolarEdge, that can be purchased separately and assembled during system installation.

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 27 shows the communication glands of the Synergy Manager and *Table 1* describes the glands.

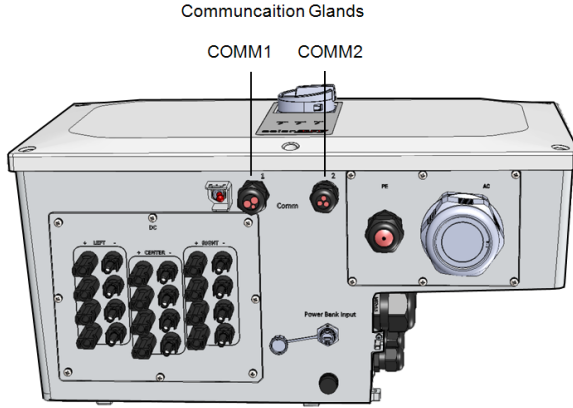


Figure 27: Synergy Manager - Communication Glands

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.

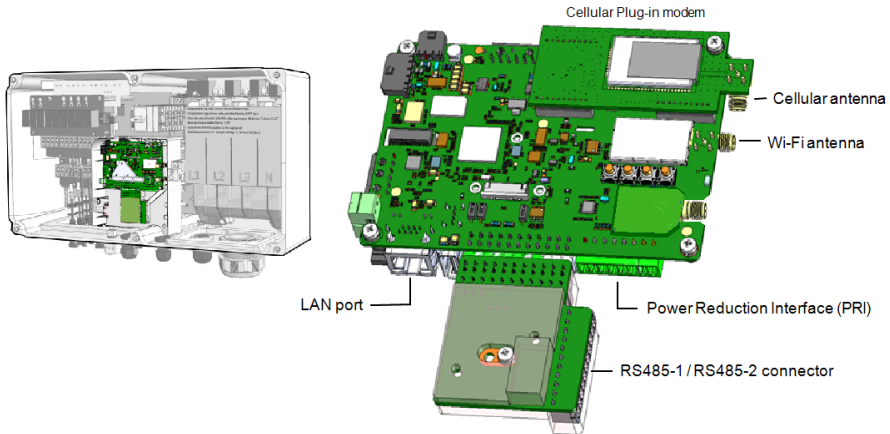


Figure 28: Synergy Manager - communication board

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 inverters to each other. The ports are also used for connecting peripheral devices such as meters, a batteries and a third party data logger.
- 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 and wait five minutes before continuing to the next step.



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 (model dependent).
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.

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.

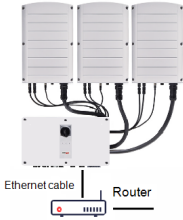
NOTE



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. For details refer to:

http://www.solaredge.com/files/pdfs/lightning_surge_protection.pdf

Single Inverter Connection



Multiple Inverter Connection

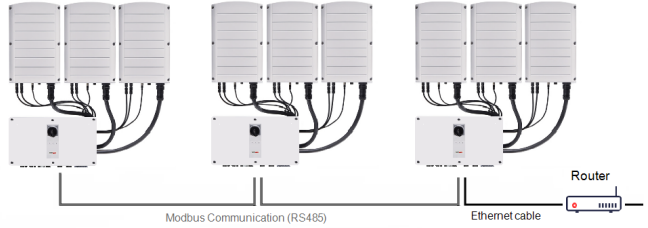


Figure 29: Ethernet connection options

→ 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.

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.

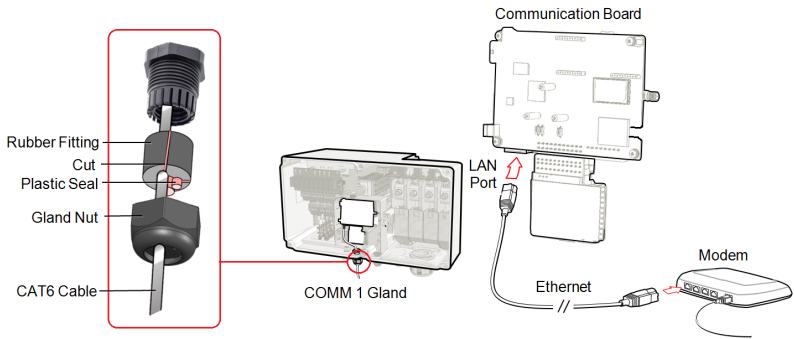


Figure 30: Inserting the Ethernet (CAT6) cable

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 5.5 N*m.

Ethernet (CAT6) Cables

CAT6 cables have eight wires (four twisted pairs), as shown in the pin layout of the Ethernet connector in *Figure 31*. Wire colors may differ from one cable to another. You can use either wiring standard, as long as both sides of the cable have the same pin-out

and color-coding.

RJ45 Pin #	Wire Color ⁽¹⁾		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

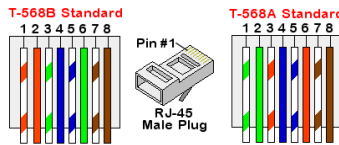


Figure 31: Ethernet connector - pin layout

- 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 31*.
 - Use a crimping tool to crimp the connector.
 - Connect the Ethernet connector to the RJ45 port on the communication board as shown in *Figure 30*.
- 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.

⁽¹⁾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 75

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.

- d. From the **Commissioning** screen, tap **Communication**.
 - e. Select **Configure Ethernet**, to configure the connection.
2. Verify the connection, as described in "RS485 Bus Configuration" on page 61

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 60.

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 32*.

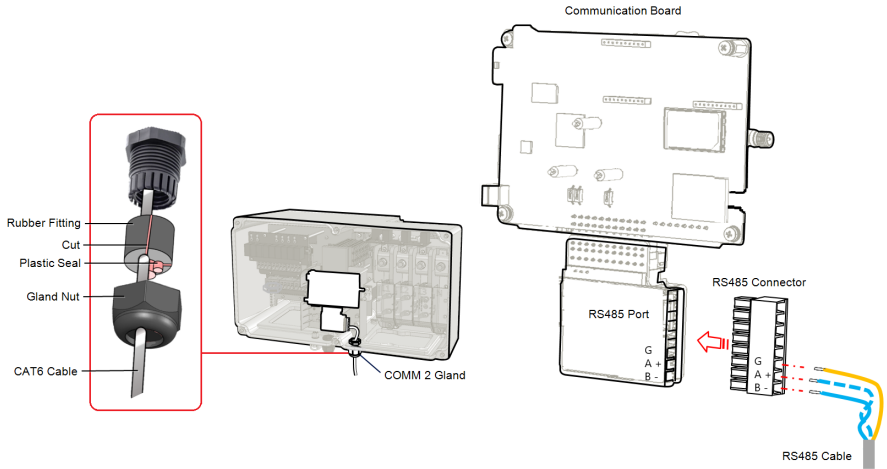


Figure 32: RS485 terminal block on the communication board

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

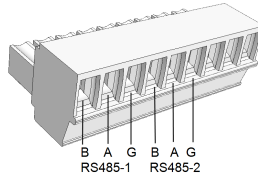


Figure 33: RS485 terminal block

- 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:

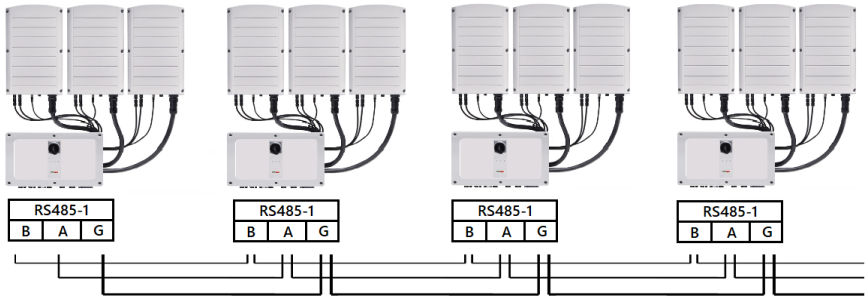


Figure 34: Connecting the inverters in chain

**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.

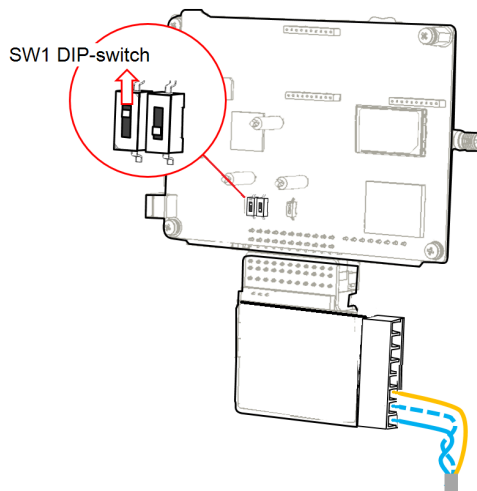


Figure 35: RS485 termination DIP-switch (SW1)

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 of 4 N*m.

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 67.
4. From the **Commissioning** screen, select **Site Communication** > **RS485-** > **Protocol** > **SolarEdge** > **SolarEdge Leader**.
5. Return to the **RS485-** 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-** > **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 . 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 63.
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) 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.

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

Power Control

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.

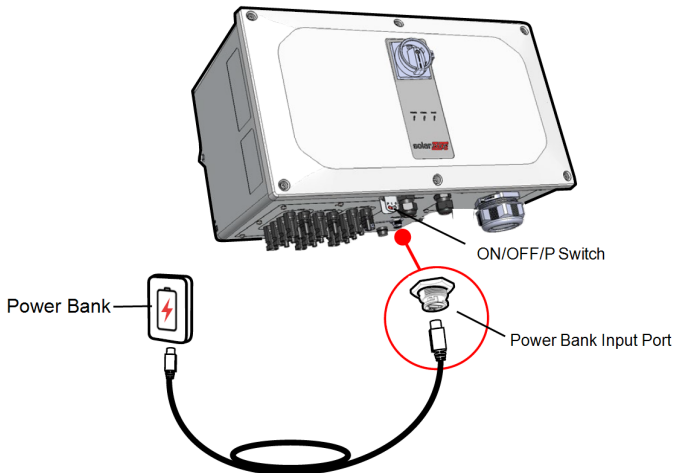


Figure 36: Pre-commissioning the inverter

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#/>.

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 37, shows an Example of Alternative Power Source System.

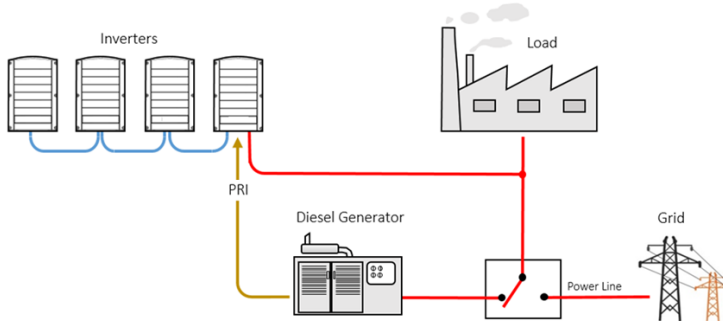


Figure 37: Example of Alternative Power Source System

The Power reduction Interface (PRI) terminal block on the communication board (See Figure 38) is used signaling the inverter to switch to Alternative Power Source mode.

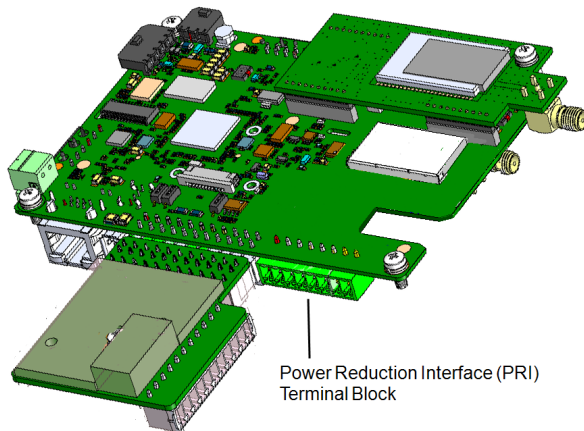


Figure 38: PRI Terminal Block Location on the Communication Board of the Inverter

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 <http://www.solaredge.com/sites/default/files/se-inverter-installation-guide-error-codes.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/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. For Wi-Fi networks, ensure that user-name and password are as defined in the internet provider AP/ router.

Troubleshooting RS485 Communication

- If the message **RS485 Leader Not Found** appears in the Status screen, check the connections to the leader device and fix if required.
- If after follower detection the number of followers displayed for the leader under **RS485> 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

Appendix B: 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>

Wi-Fi Antenna

The Wi-Fi Antenna is provided with a user manual. For more information, refer to:

<https://www.solaredge.com/sites/default/files/se-wifi-zigbee-antenna-installation-guide.pdf>

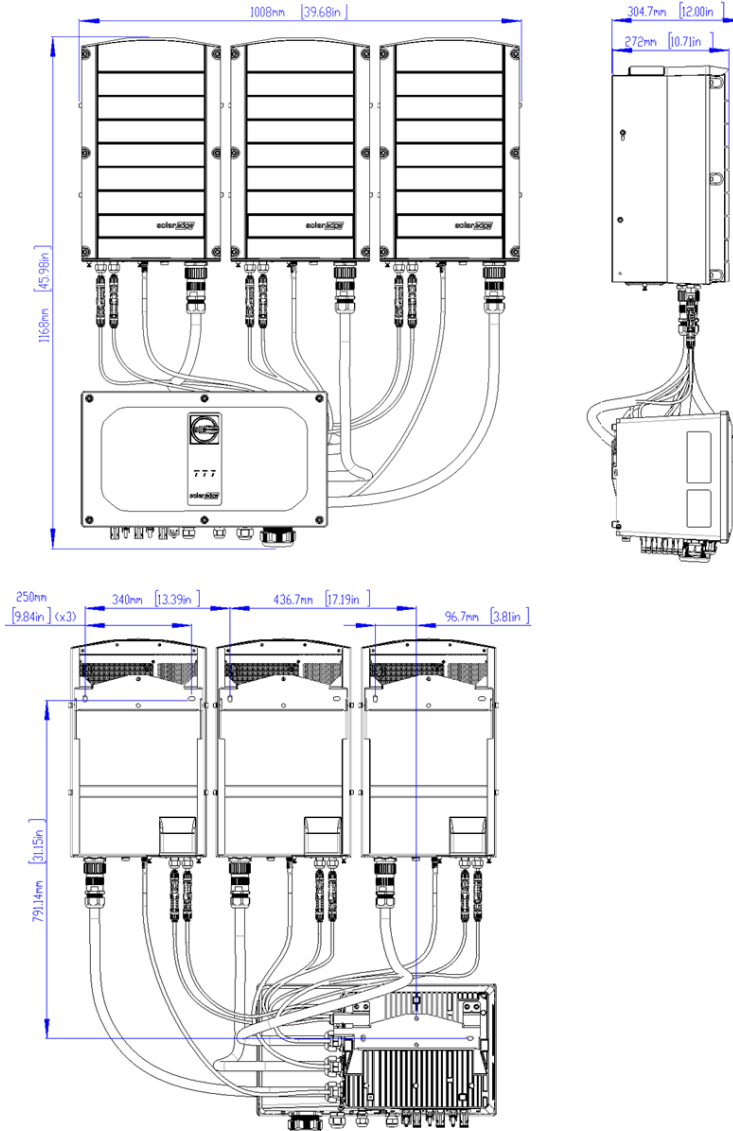
Cellular Plug-in

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:

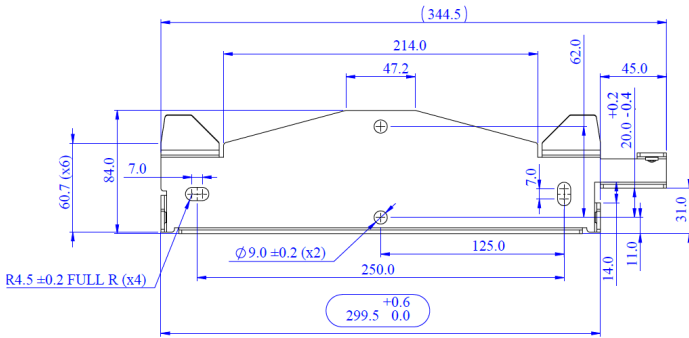
https://www.solaredge.com/sites/default/files/cellular_gsm_installation_guide_for_inverters_with_setapp.pdf

Appendix C: Mechanical Specifications

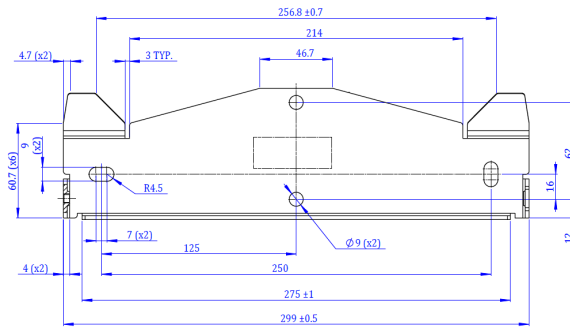
The following figure shows the dimensions of the Three Phase Inverter with Synergy Technology.



Synergy Manager mounting bracket



Synergy Unit mounting bracket



Appendix D: DC Wire Connections for Synergy Manager PN: SExxK-TWxxlxxK4 for Taiwan

This section is only applicable for Synergy Manager for Taiwan with part number structured as: SExxK-TWxxlxxK4.

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.

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

1. Route the DC wires through the DC glands.

NOTE

- Use 12 to 15 mm diameter wires with 25 or 35 mm² cross section conductor. Use only fine stranded copper wires with a minimum bending radius of 4 x cable diameter. Crimp ferrules on wires.

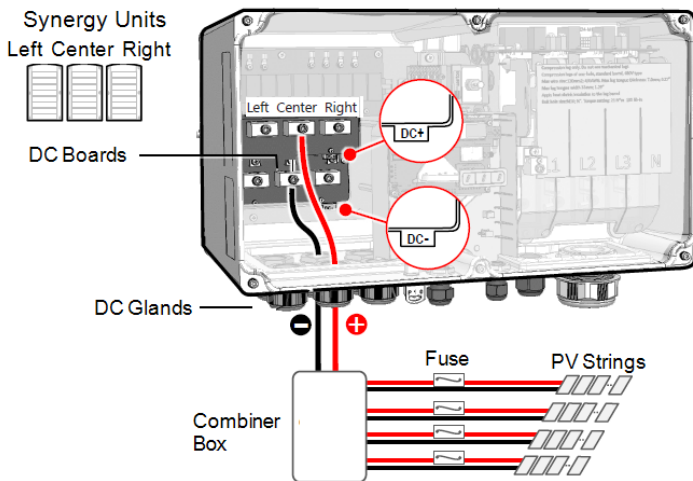


Figure 39: Connecting PV Arrays to the Synergy Manager

2. Loosen the Allen screws of the DC terminals.
3. Strip 250 mm 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.

4. 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 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 39*).

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.

5. Insert the DC wires into the DC terminals and fasten the 5 mm Allen screw to a torque of 5 N*m for 25 mm² wires or 8 N*m for 35mm² wires.

CAUTION!



Ensure that plus (+) and ,minus (-) wires correspond to plus (+) minus (-) terminal wires.

CAUTION!



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

6. Fasten the gland nuts to a torque of 12 N*m.

7. Close the Synergy Manager cover and secure it by tightening the six screws to a torque of 3.5 N*m.

Appendix E: SafeDC™

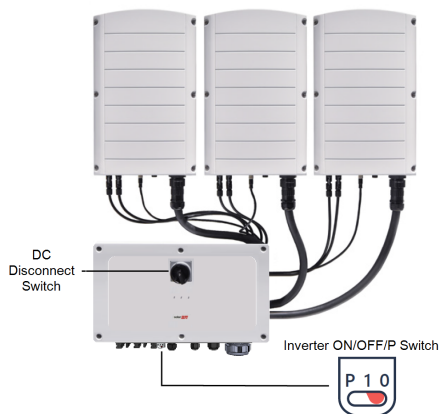
When AC supply to the inverter is shut off (by shutting off the AC breaker at the site), or when the inverter ON/OFF/P switch is turned to OFF, the DC Voltage drops to a safe Voltage of 1V per Power Optimizer.

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

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

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

1. Move the inverter ON/OFF/P switch to the OFF (0) position. Wait for five minutes for the DC Voltage inside the inverter to drop to a safe level before proceeding to the next step. See *Appendix E*.
2. Move the DC Disconnect Switch (if applicable) to the OFF (0) position. For reference, see the following image.



3. Turn OFF the circuit breakers on the distribution panel to disconnect the AC from the inverter.

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