



**Single Phase Inverter  
with HD-Wave Technology  
Installation Guide**

For North America  
Version 1.1

## Disclaimers

### Important Notice

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### FCC Compliance

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This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate the equipment.

## Revision History

### Version 1.1 (July 2018)

- Update of product names
- Recommendation to mount the power optimizer in a location protected from direct sunlight
- DC Safety Unit bracket has 3 mounting holes
- Update regarding use of extension cables in power optimizer installation guidelines
- Addition of caution - installation in saline environment
- Recommendation to mount the power optimizer in a location protected from direct sunlight
- Addition of possibility to use compatible connectors from third-party manufacturers
- Power optimizer clearance - no clearance is required on the mounting bracket side
- Addition of reference to troubleshooting undetected devices application note
- Torque for grounding using the equipment grounding bus-bar: 3.4 N\*M / 30 lb-in
- Setup mode: To use the LCD buttons when the inverter cover is removed, touch the white dots on the LCD button frames.
- Removed Ferrite bead on AC wires
- Addition of link to the Designer web page
- Updated warning about sealing unused power optimizer input connectors
- Output safe voltage is 1V ( $\pm 0.1V$ )
- Addition of mounting bracket type 2
- Mechanical specifications: Addition of inverter models (10kW and 11.4kW)
- Updated the Safety section:
  - New warning: The Safety Switch meets all requirements for a code-compliant installation of this system. The DC Disconnect Switch disconnects both the positive and negative conductors.
  - New important safety feature information for inverters with automatic rapid shutdown(PVRSS)
- Overview section updated (system image , additional safety voltage initiator: Rapid Shutdown (PVRSS))
- In Supported AC Grids, added: Ground connection is required for all grids
- In Power Optimizer Installation chapter:
  - Added grounding method testing information
  - Added: circuit conductors must be sized according to NEC 690.9 when combining strings
  - Removed reference to racking models and their grounding methods
  - Removed mentioning of tracker
- In inverter Installation chapter:
  - In Inverter Interfaces - updated ON/OFF switch description, added warning regarding PVRSS
  - Added a caution about not altering the DC Safety Unit enclosure: SolarEdge does not permit opening or puncturing the Safety Switch in any location other than the pre-defined drill guide locations, or otherwise altering the construction of the enclosure, as this may compromise safety and will void the warranty.
- Connection to/from the Safety Switch:
  - AC grounding to bus-bar instead of terminal block - updated instructions and Safety Switch image
  - String fusing requirement note updated: Fuses needed for 4 strings or more (instead of 3).
  - Added conduit sealing requirement

- In Commissioning chapter:
  - Updated the activation sequence
  - Removed RS232 reference
- Rapid shutdown (PVRSS):
  - Added important safety information notes and warnings
  - For a compliant PV Rapid Shutdown installation, use no more than 30 optimizers per string.
  - Enabling PVRSS from the inverter menu is only required if the installed optimizers were manufactured before 2015, otherwise it is enabled by default.
  - Added testing PVRSS functionality after pairing
- In Configuration Menu Options:
  - Communication section:
    - Removed RS232 Conf
    - Added GSM Conf
  - Power Control section:
    - Removed Phase Balance link and info
    - Added a note about compliance with UL 1741 Supplement A.
    - Added link to P(Q) diagram application note
  - Maintenance section:
    - Added links to application notes (Upgrading the inverter using SD card; Isolation fault troubleshooting; Arc fault detection)
    - Removed Optimizer Conf
- Status Screens updates:
  - Meter status screen - added Power and Energy lines
  - Telemetry status screen - updated
  - GSM status screen - new
- Communication options - updated
- Inverter cover removal sequence - updated
- Added link to Arc Detection application note
- Troubleshooting:
  - Error codes moved to a separate document. A link was added to the manual.
  - Slave Detect and Slave List - updated
- Updated the technical specification document
- Removed Inverter Arc Detection and Interruption appendix

## Support and Contact Information

If you have technical problems concerning SolarEdge products, please contact us:

- USA and Canada: 1 510 498 3200
- Worldwide: +972 073 2403118
- Fax: +1 (530) 273-2769
- Email: [support@solaredge.us](mailto:support@solaredge.us).

Before contact, make sure to have the following information at hand:

- Model and serial number of the product in question.
- The error indicated on the LCD screen or on the monitoring platform or by the LED, if there is such an indication.
- System configuration information, including the type and number of modules connected and the number and length of strings.
- The communication method to the SolarEdge server, if the site is connected.
- The inverter software version as appears in the ID status screen.



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## HANDLING AND SAFETY INSTRUCTIONS

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

### Safety Symbols Information

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

**WARNING!**

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

**AVERTISSEMENT!**

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

**CAUTION!**

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

**ATTENTION**

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

**NOTE**

Denotes additional information about the current subject.

**IMPORTANT SAFETY FEATURE**

Denotes information about safety issues.



## IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

## CONSIGNES DE SÉCURITÉ IMPORTANTES

CONSERVEZ CES INSTRUCTIONS

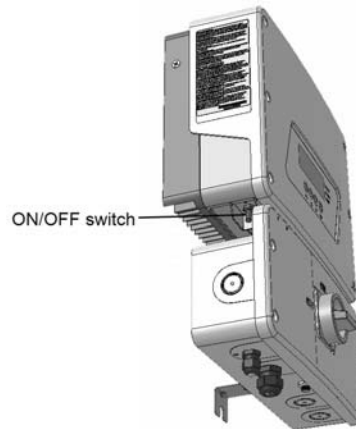


### WARNING!

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

### AVERTISSEMENT!

*Ne pas ouvrir le couvercle de l'onduleur avant d'avoir coupé l'interrupteur situé en dessous de l'onduleur. Cela supprime les tensions CC et CA de l'onduleur. Attendre que le LCD affiche une tension sécurisée (50V). Si l'affichage LCD n'est pas visible, attendre cinq minutes avant d'ouvrir le couvercle. Sinon, il y a un risque de choc électrique provenant de l'énergie stockée dans le condensateur.*



### WARNING!

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

### AVERTISSEMENT!

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



### WARNING!

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

### AVERTISSEMENT!

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



**WARNING!**

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

**AVERTISSEMENT!**

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

**WARNING!**



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

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

**AVERTISSEMENT!**

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

*La mise à la terre des équipements est la responsabilité de l'installateur et doit être faite en accord avec les toutes les règles locales et nationales applicables.*



**WARNING!**

The inverter must be connected to a dedicated AC branch circuit with a maximum Overcurrent Protection Device (OCPD) of 50A.

**AVERTISSEMENT!**

*Les onduleurs monophasé doivent être connectés à un branchement AC dédié avec un disjoncteur de 50A.*



**CAUTION!**

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

**ATTENTION!**

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



**CAUTION!**

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

**ATTENTION**

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



**NOTE**


Use only copper conductors rated for a minimum of 75°C/ 167°F.



**NOTE**

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

**NOTE**

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

**NOTE**

A SolarEdge inverter may be installed in a site with a generator, however must not operate at the same time as the generator. Operating an inverter and a generator simultaneously will void the warranty. SolarEdge requires installing a physical or electronic interlock, which will prevent the generator and inverter from operating simultaneously. 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.

**IMPORTANT SAFETY INFORMATION**

To perform Rapid Shutdown, shut down AC power to the inverter. This can be done by turning off the AC breaker in the main service panel, which is an approved AC disconnect as described in the NEC.

## Chapter 1: Introducing the SolarEdge Power Harvesting System

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

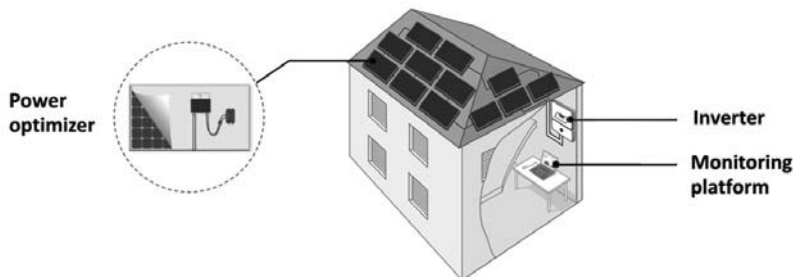


Figure 1: The SolarEdge power harvesting system components

### Power Optimizer

The power optimizers are DC-DC converters connected to PV modules in order to maximize power harvesting by performing independent Maximum Power Point Tracking (MPPT) at the module level. The power optimizers regulate the string voltage at a constant level, regardless of string length and environmental conditions.

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

- During fault conditions
- The power optimizers are disconnected from the inverter
- The inverter ON/OFF switch is turned OFF
- The safety switch on the DC Safety Unit is turned OFF
- The inverter AC breaker is turned OFF
- The Rapid Shutdown (PVRSS) is initiated by one of the following methods:
  - Inverter AC breaker is turned OFF, or AC to the inverter is disconnected by another method (intentionally or as result of a fault)
  - Inverter ON/OFF switch is turned OFF
  - The DC Safety Unit 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

### SolarEdge Inverter

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

## Monitoring Platform

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

## Supported AC Grids

The following figures illustrate grids that are supported by SolarEdge single phase inverters. Refer to *Country and Grid* on page 41).

Ground connection is required for all grids, as described in *Connecting the AC Grid to the Safety Switch* on page 29.

Note that in some cases L1 and L2 are not interchangeable. In these places, L1 and L2 locations appear in the drawing.

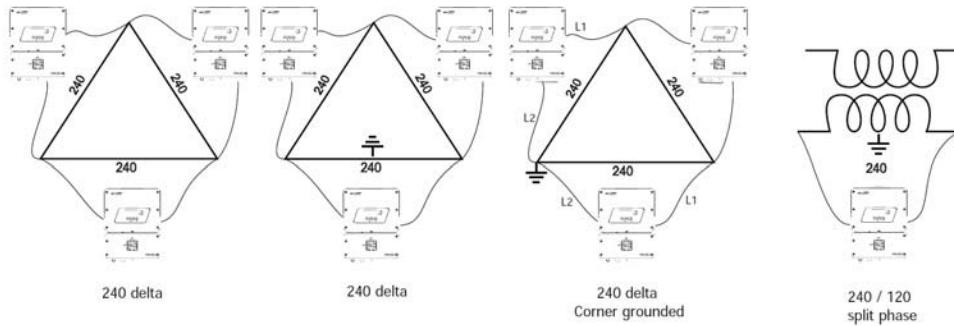


Figure 2: 240V AC grids supported by SolarEdge single phase inverter

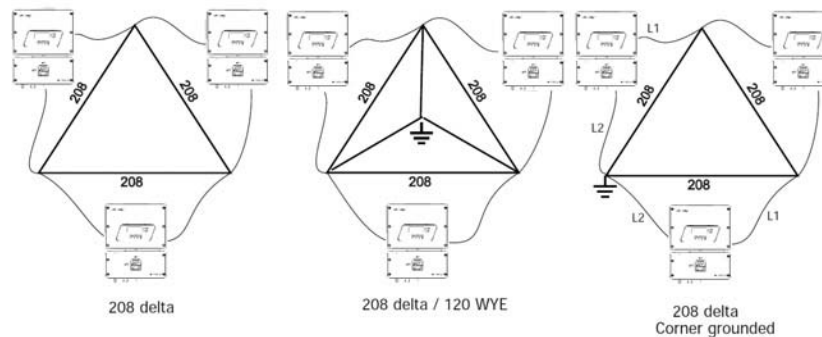


Figure 3: 208V AC grids supported by SolarEdge single phase inverter<sup>1</sup>

<sup>1</sup>208V AC grids are only supported by some inverter models. Refer to the specification supplied with the inverter.

## Installation Procedure

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

1. [Connecting Power Optimizers in Strings](#), page 21.
2. [Recording power optimizer serial numbers \(optional\)](#), page 36.
3. [Mounting the inverter](#), Page 25.
4. [Connecting the AC and the String to the DC Safety Unit](#), page 29.
5. [Commissioning and activating the installation](#), page 32.
6. [Connecting the inverter to the monitoring platform](#), page 37.
7. [Configuring the inverter](#), page 38.

## Installation Equipment List

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

- Allen screwdriver for 3mm screw type for the inverter cover, side screws, and Safety Switch cover.
- Standard flat-head screwdrivers set
- Non-contact voltage detector
- Cordless drill or screwdriver and bits suitable for the surface on which the inverter will be installed and for opening the Safety Switch drill guides
- Appropriate mounting hardware (for example: stainless bolts, nuts, and washers) for attaching:
  - the inverter mounting bracket to the mounting surface
  - the power optimizer to the racking (not required for smart modules)
- Wire cutters
- Wire strippers
- Voltmeter

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

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

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## **Inverter Transport and Storage**

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

Store the inverter in a dry place where ambient temperatures are -13°F - 140°F / -25°C - +60°C.



## Chapter 2: Installing the Power Optimizers

### Safety

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


**WARNING!**

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

**AVERTISSEMENT!**

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


**WARNING!**

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

**AVERTISSEMENT!**

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


**CAUTION!**

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

**ATTENTION!**

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


**CAUTION!**

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

**ATTENTION!**

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


**CAUTION!**

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

**ATTENTION!**

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


**CAUTION!**

All PV modules must be connected to a power optimizer.

**ATTENTION!**

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


**CAUTION!**

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

**ATTENTION!**

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

**CAUTION!**

Installing a SolarEdge system without ensuring compatibility of the module connectors with the optimizer connectors may be unsafe and could cause functionality problems such as ground faults, resulting in inverter shut down. To ensure mechanical compatibility of the power optimizers' connectors with the PV 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 optimizer connector; and
  - A third-party test report by one of the listed external labs (TUV, VDE, Bureau Veritas UL, CSA, InterTek) should be obtained, verifying the compatibility of the connectors.

**ATTENTION!**

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

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

**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.

## Package Contents

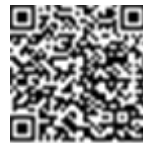
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- Power optimizers
- Stainless steel grounding lock washers

## Installation Guidelines

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- Frame-mounted power optimizers are mounted directly on the module frame, regardless of racking system (rail-less or with rails). For installation of frame-mounted power optimizers, refer to [http://www.solaredge.com/sites/default/files/installing\\_frame\\_mounted\\_power\\_optimizers.pdf](http://www.solaredge.com/sites/default/files/installing_frame_mounted_power_optimizers.pdf).
- The steps in this chapter refer to module add-on power optimizers. For smart modules, start from *Step 3: Connecting Power Optimizers in Strings* on page 21. Also refer to the documentation supplied with the smart modules.
- The power optimizer can be placed in any orientation.



- If connecting more modules than optimizer inputs in parallel, use a branch cable. Some commercial power optimizer models have a dual input.
- Position the power optimizer close enough to its module so that their cables can be connected.
- Make sure to use power optimizers that have the required output conductor length:
  - Minimize the use of extensions between power optimizers.
  - You can use extension cables between rows and from the end of string to the inverter.
  - *Do not* use extension cables between the modules and the power optimizers, or between two power optimizers within a string.
- The minimum and maximum string length guidelines are stated in the power optimizer datasheets. Refer to the Designer for string length verification. The Designer is available on the SolarEdge website at <http://www.solaredge.us/products/installer-tools/site-designer#/>.
- Completely shaded modules may cause their power optimizers to temporarily shut down. This will not affect the performance of the other power optimizers in the string, as long as the minimum number of unshaded power optimizers connected in a string of modules is met. If under typical conditions fewer than the minimum optimizers are connected to unshaded modules, add more optimizers to the string.
- Equipment grounding tightening torques: 4-6 AWG: 45 lb-in, 8 AWG: 40 lb-in, 10-14 AWG: 35 lb-in.
- To allow for heat dissipation, maintain a 2.5 cm / 1" clearance distance between the power optimizer and other surfaces, on all sides except the mounting bracket side.

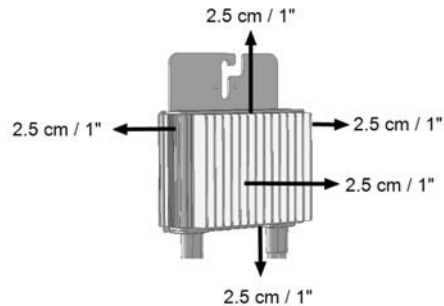


Figure 4: Power optimizer clearance

**NOTE**

The images contained herein are for illustrative purposes only and may vary depending on product models.

## Step 1: Mounting and Grounding the Power Optimizers

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

1. Determine the power optimizer mounting location and use the power optimizer mounting brackets to attach the power optimizer to the support structure (See *Figure 5*). It is recommended to mount the power optimizer in a location protected from direct sunlight. For frame-mounted power optimizers follow the instructions supplied with the optimizers, or refer to [https://www.solaredge.com/sites/default/files/installing\\_frame\\_mounted\\_power\\_optimizers.pdf](https://www.solaredge.com/sites/default/files/installing_frame_mounted_power_optimizers.pdf).



2. If required, mark the mounting hole locations and drill the hole.



### CAUTION!

Do not drill through the power optimizer or through the mounting holes. The drilling vibrations can damage the power optimizer and will void the warranty.

### ATTENTION!

*Ne pas percer à travers l'optimiseur de puissance ou ses trous de fixation. Les vibrations qui en résulteraient peuvent endommager l'optimiseur de puissance.*

3. Attach each power optimizer to the rack using M6 (1/4") stainless steel bolts, nuts and washers or other appropriate mounting hardware. Apply torque of 9.5 N\*m / 7 lb\*ft.  
For 3NA series power optimizers, SolarEdge recommends mounting the power optimizer on a rail with the smooth side facing out, so that the power optimizer body will prevent its rotation.
4. Use the following methods<sup>2</sup> to ground the power optimizer:



### WARNING!

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

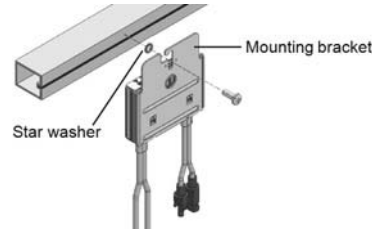
### AVERTISSEMENT!

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

- **For mounting on a grounded metal rail:** Use the provided 5/16" stainless steel grounding star washer between the railing and the flat side of the mounting bracket. The grounding washer should break through the anodize coating of the railing to ensure low resistive connection. Apply torque of 9.5 N\*m / 7 lb\*ft. See *Figure 5*.

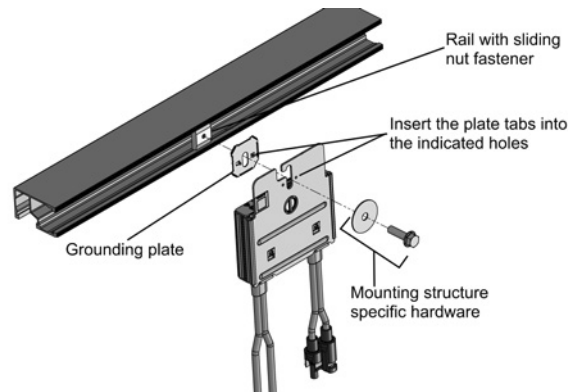
<sup>1</sup>Not applicable to smart modules.

<sup>2</sup>These methods have been evaluated by a nationally recognized testing laboratory as part of the optimizer evaluation. The SolarEdge-supplied grounding lug kit has been evaluated only for use with SolarEdge power optimizers. It is not intended or listed to be used as a general purpose grounding lug with other electrical equipment.



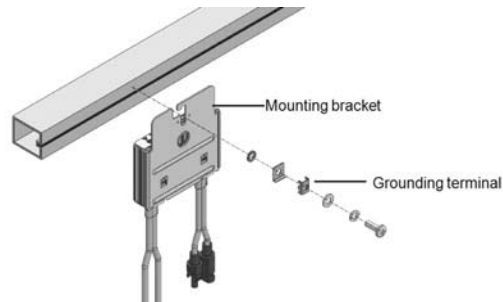
**Figure 5: Power optimizer installation and grounding using a star washer**

- **For mounting on rails with sliding nut fasteners:** If the star washer cannot be used, use the SolarEdge grounding plate (purchased separately) between the railing and the flat side of the mounting bracket. Use mounting specific hardware as needed. Apply torque of 9.5 N\*m / 7 lb\*ft. See Figure 6



**Figure 6: Power optimizer installation and grounding using a grounding plate**

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



**Figure 7: Power optimizer grounding terminal**

5. Verify that each power optimizer is securely attached to the module support structure.

- Record power optimizer serial numbers and locations, as described in *Reporting and Monitoring Installation Data* on page 35.

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



### NOTE

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

For each of the power optimizers:

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

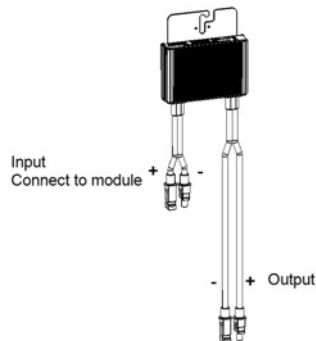


Figure 8: Power optimizer connectors

## Step 3: Connecting Power Optimizers in Strings

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



### NOTE

- Use at least 11 AWG/ 4 mm<sup>2</sup> DC cables.
- The total cable length of the string (excluding power optimizers' cables) should not exceed 1000ft./300 m from DC+ to DC- of the inverter.

- Connect the Minus (-) output connector of the string's first power optimizer to the Plus (+) output connector of the string's second power optimizer.

2. Connect the rest of the power optimizers in the string in the same manner.

**WARNING!**

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

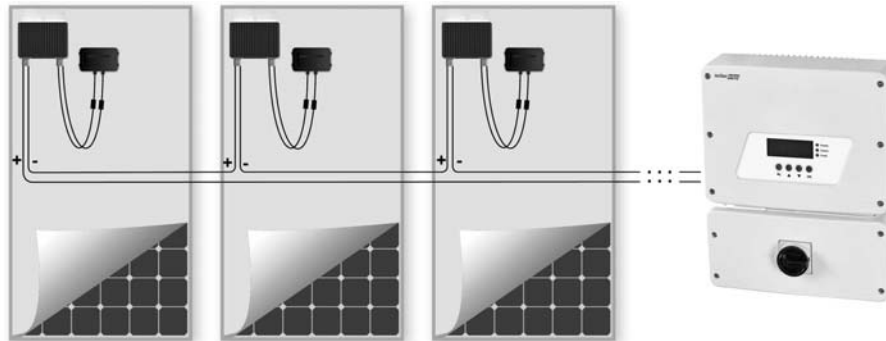


Figure 9: Power optimizers connected in series

3. If you intend to monitor the installation, using the monitoring platform, record the physical location of each power optimizer, as described in *Providing Installation Information* on page 36.

## Step 4: Verifying Proper Power Optimizer Connection

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

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

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

For more information about the SolarEdge system's string voltage and current, refer to the  $V_{OC}$  and  $I_{SC}$  in *SolarEdge Systems Technical Note*, available on the SolarEdge website at: [http://www.solaredge.us/files/pdfs/isc\\_and\\_voc\\_in\\_solaredge\\_systems\\_technical\\_note.pdf](http://www.solaredge.us/files/pdfs/isc_and_voc_in_solaredge_systems_technical_note.pdf).



► **To verify proper power optimizer connection:**

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

**NOTE**

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

For troubleshooting power optimizer operation problems, refer to *Power Optimizer Troubleshooting* on page 68.

## Chapter 3: Installing the Inverter

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



### NOTE

Use only copper conductors rated for a minimum of 75°C/ 167°F.

## Inverter Package Contents

- One inverter
- Mounting bracket kit
- DC Safety Unit sealing cover
- Installation guide (with activation card and instructions)
- For built-in wireless communication, antenna and mounting bracket

## Identifying the Inverter

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

## Inverter Interfaces

The following figure shows the inverter connectors and interfaces.

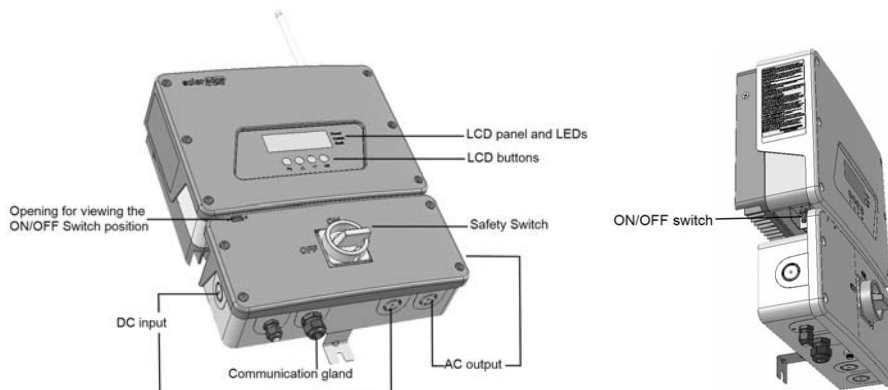


Figure 10: Inverter Interfaces

- **AC output:** For connection of the AC grid
- **DC input:** For connection of the PV installation
- **ON/OFF switch:** Turning this switch ON starts the operation of the power optimizers, enables power production and allows the inverter to begin exporting power to the utility grid. Turning it OFF reduces the power optimizer voltage to a low safety voltage and inhibits exportation of power. When this switch is OFF, the inverter control circuitry remains powered up.
- **LCD buttons:** Used for accessing configuration menu options and displaying status screens, as described in *Configuring the Inverter* on page 38. Pressing these buttons produces beeping sounds and lights up the LCD for 30 seconds.



- **Communication gland:** For connection of inverter communication options. Refer to *Setting Up Communication* on page 52 for more information.
- **Drain valve:** Drains any moisture that may be accumulated in the unit.
- **LCD panel:** Displays inverter information and configuration parameters
- **LCD LEDs:** Three LEDs located to the right of the LCD indicate the following inverter statuses:

Color	Description	Functionality
Green	Power production	<p><b>On</b> - The inverter is producing power.</p> <p><b>Blinking</b> - Standby mode. The inverter is in Standby mode until its working voltage is reached. The inverter then enters Production mode and produces power.</p> <p><b>Off</b> - The inverter is not producing power. This may be during Night mode, when the inverter ON/OFF switch is OFF or when an error occurs.</p>
Yellow	Communication and inverter shutdown	<p><b>Blinking:</b></p> <ul style="list-style-type: none"> <li>○ Monitoring information is being received from a power optimizer.</li> <li>○ The inverter is being shut down.</li> </ul>
Red	Fault	<p><b>On</b> - There is an error. Refer to <i>Errors and Troubleshooting</i> on page 62 for more information.</p> <p><b>Blinking</b> - The inverter is being shut down.</p>

All LEDs turn on while the inverter is being configured.

## Opening Conduit Drill Guides

This step may be performed before or after mounting the inverter.

► **To open conduit drill guides:**

1. Move the DC Safety Unit and the inverter ON/OFF switch to OFF.

**NOTE**

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

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



Lock here

- Loosen the screws on the front cover of the Safety Switch , as shown below:

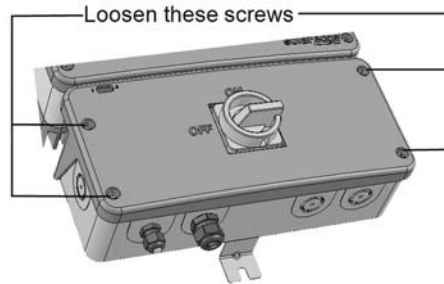


Figure 11: Opening the Safety Switch cover

- Remove the Safety Switch cover.
- Open the required AC and DC conduit drill guides according to the conduits used in the installation: The drill guides are located at the bottom and sides of the enclosure, each with two sizes: 3/4" and 1". Open the required drill guides, taking care not to interfere with any of the internal components. It is recommended to use a Unibit drill.

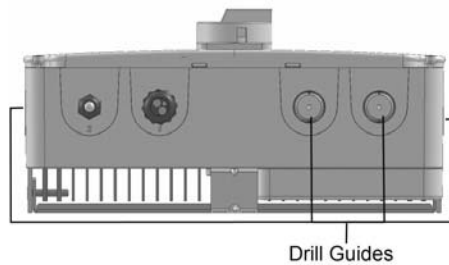


Figure 12: Safety Switch drill guides



**NOTE**

Unused conduit openings and glands should be sealed with appropriate seals.

## Mounting the Inverter

The mounting brackets kit includes the following parts:

- Two brackets for mounting on a wall/ pole (screws not included)
- Two screws with washers for fastening the inverter brackets to the wall brackets.

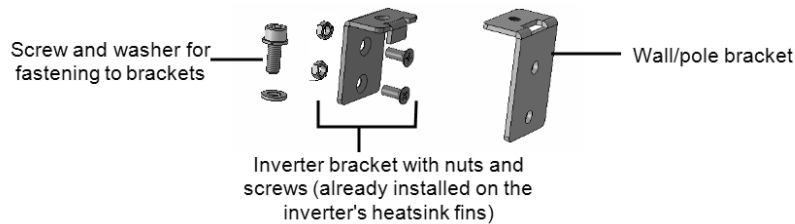


Figure 13: Mounting brackets and screws

**NOTE**

Make sure the mounting surface or structure can support the weight of the inverter.

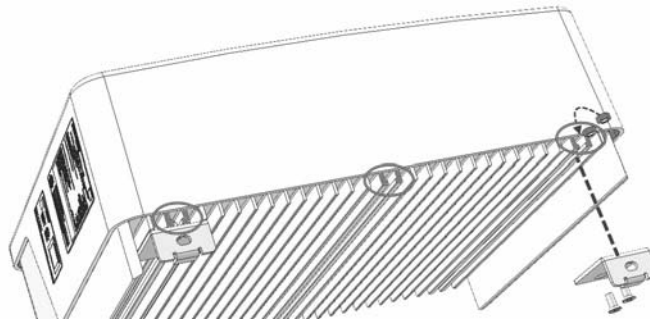
**CAUTION!**

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

**AVERTISSEMENT!**

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

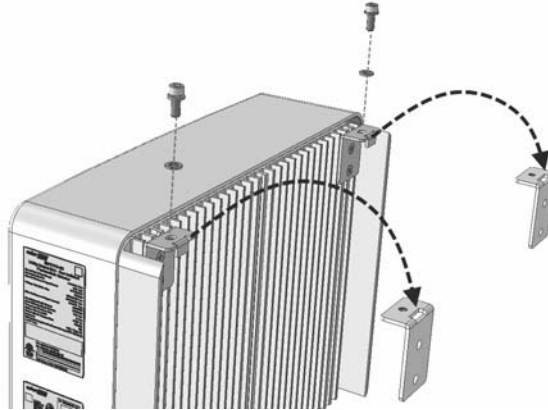
1. Determine the inverter mounting location, on a wall, stud framing or pole. It is recommended to mount the inverter in a location protected from direct sunlight.
2. To allow proper heat dissipation, maintain the following minimum clearance areas between the inverter and other objects:
  - If installing a single inverter:
    - 8" (20 cm) from the top of the inverter.
    - At least 4" (10 cm) from the bottom of the inverter; if conduit entry to the Safety Switch will be from the bottom, leave sufficient clearance for the conduits as well.
    - 4" (10 cm) from the right and left of the inverter.
  - If installing multiple inverters:
    - When installing inverters one above of the other, leave at least 12" (30 cm) between inverters.
3. The inverter brackets are attached to the designated heatsink fins ready for wall mounting. For installation on a pole, remove the two brackets and attach them to the central heatsink fin one below the other (do not over tighten so the bracket height can be adjusted).



**Figure 14: Mounting the inverter brackets**

4. Position the wall mounting brackets against the wall/ pole and mark the drilling hole locations (refer to *Mechanical Specifications* on page 70 for inverter and mounting bracket dimensions).
5. Drill the holes and mount the brackets. Verify that the brackets are firmly attached to the mounting surface.

6. Hang the inverter on the bracket: Lift the inverter from the sides, or hold it at the top and bottom of the inverter to lift the unit into place. Do not lift holding the Safety Switch as it may be damaged. Lower the inverter so that the notches on the inverter brackets are inserted in the holes of the wall brackets, as shown below.



**Figure 15: Hanging the inverter on the bracket**

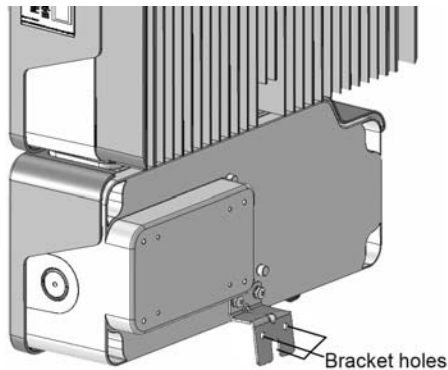
7. Optionally, secure the DC Safety Unit bracket to the wall/pole, using 1-3 screws:



**NOTE**

In case of inverter replacement with the DC Safety Unit still mounted, it is recommended to use all 3 holes.

- a. Mark the location of the bracket screw for the Safety Switch, and optionally the two additional bracket holes.



**Figure 16: Safety Switch bracket**

- b. Remove the inverter from the wall/ pole.
- c. Drill the hole for the Safety Switch bracket.
- d. Hang the inverter on the mounted brackets.
- e. Fasten the Safety Switch bracket using a standard bolt.

8. Insert the screws at the top of the inverter brackets and fasten the brackets together.
9. Verify that all the brackets are firmly attached to the mounting surface.

## Chapter 4: Connecting the AC and the Strings to the Safety Switch

The Safety Switch disconnects all ungrounded DC conductors of the circuit to which it is connected in compliance with the National Electric Code, and specifically NEC690.35, which addresses ungrounded PV arrays. The Safety Switch is rated to the maximum operating conditions of the inverter.

The following figure illustrates the Safety Switch.

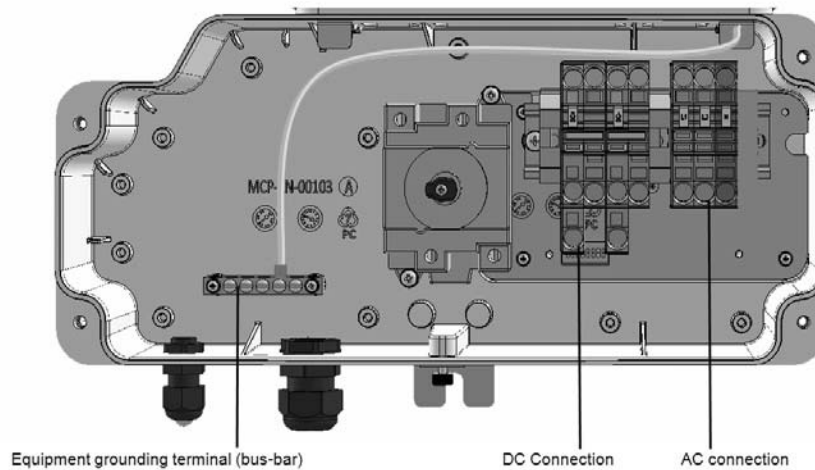


Figure 17: Inside the Safety Switch

### Grid Connection Guidelines

- In single phase inverters connected to corner grounded grids, connect the L2 terminal to the grounded conductor. When connecting to other grids, L1 and L2 are interchangeable.
- The conduits, hubs and fittings must be suited for field wiring systems.
- The hubs and other fittings must comply with UL514B.
- Use the conduit and wiring appropriate for the installation location per the NEC. Outdoor installations must use components that are rated NEMA 3R or higher.

#### NOTE



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



### Connecting the AC Grid to the Safety Switch

1. Remove the spring-clamp terminal instructions from inside the switch.
2. Strip 05/16" (8mm) of the AC wire insulation.
3. Insert the AC conduit into the AC-side drill guide that was opened.

**NOTE**

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

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

4. Connect the wires to the appropriate terminal blocks according to the labels on the terminal blocks (N,  $\oplus$ , L1 and L2).
5. Use a standard flat-blade screwdriver to connect the wires to the spring-clamp terminals:
  - The screwdriver blade should fit freely in the terminal opening. Too large a blade can crack the plastic housing.
  - Insert the screwdriver and press the release mechanism and open the clamp.
  - Insert the wire into the round opening and remove the screwdriver – the wire is automatically clamped.

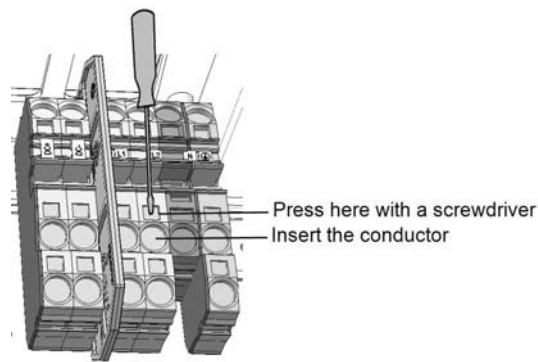


Figure 18: AC Connection

6. Verify that there are no unconnected wires.

## Connecting the Strings to the DC Safety Unit

You can connect systems with multiple DC strings in parallel to the DC input terminals of the DC Safety Unit. Inverters may have a different number of pairs of DC input terminals, depending on the inverter power rating. If more strings are required, they can be connected in parallel using an external combiner box before connecting to the DC Safety Unit. When connecting multiple strings, it is recommended to run separate circuits to the DC Safety Unit or to position the combiner box near the DC Safety Unit. This simplifies commissioning by allowing testing and servicing near the inverter.

**NOTE**

Use 16-6AWG, 75-90°C copper wires only.

**► To connect the strings to the DC Safety Unit:**

1. Equipment grounding: Connect the DC equipment ground conductor to the equipment grounding terminal block in the DC Safety Unit.

**NOTE**

Functional Electrical Earthing of DC-side negative or positive is prohibited because the inverter has no transformer. Equipment grounding of exposed conductive surfaces in the array is required per the NEC.

2. Insert the DC conduit into the DC-side opening on the DC Safety Unit (left side at the bottom of the DC Safety Unit).
3. Connect the DC wires to the DC+ and DC- terminal blocks, according to the labels on the terminals, connect two wires (DC+ and DC-) per string:
  - a. Use a standard flat-blade screwdriver to connect the wires to the spring-clamp terminals. The screwdriver blade should fit freely in the terminal opening. Too large a blade can crack the plastic housing.
  - b. Insert the screwdriver and firmly tilt it to press the release mechanism and open the clamp.
  - c. Insert the wire into the top opening.
  - d. Remove the screwdriver – the wire is automatically clamped.

**CAUTION!**

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

**ATTENTION!**

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

**NOTE**

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

**NOTE**

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

5. Close the DC Safety Unit cover: Attach the switch cover and secure it by tightening the four screws with a torque of 1.20.9 ft.\*lb.
6. Ensure proper conduit sealing; inspect the entire conduit run and use standard conduit sealants to avoid water penetration.





MAN-01-00308-1.3

## Technical Specifications - Single Phase Inverters with HD-Wave Technology (North America)

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	Unit
<b>OUTPUT</b>								
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400	VA
Max AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400	VA
AC Output Voltage	-	✓	-	✓	-	-	-	Vac
Min.-Nom.-Max. (183 - 208 - 229)	✓	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage	✓	✓	✓	✓	✓	✓	✓	Vac
Min.-Nom.-Max. (211 - 240 - 264)								
AC Frequency (Nominal)	59.3 - 60 - 60.51							
Maximum Continuous Output Current 208V	-	16	-	25	-	-	-	A
Maximum Continuous Output Current 240V	12.5	16	21	25	32	42	47.5	A
Max. output fault current and duration @208V	-	17.5 / 20	-	27.5 / 20	-	-	-	A / ms
Max. output fault current and duration @240V	14 / 20	17.5 / 20	23 / 20	27.5 / 20	40 / 20	56.6 / 20	56.6 / 20	A / ms
Inrush current AC (Peak/ Duration)	2.8 / 20							
Max. output overcurrent protection	35		48		55	80	80	A

<sup>1</sup>For other regional settings please contact SolarEdge support

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	Unit	
Power factor range	1 (adjustable from -0.85 to +0.85)								
Total harmonic distortion	< 3%								
GFDI Threshold	1								
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes								
<b>INPUT</b>									
Maximum DC Power @208V	-	5100	-	7750	-	-	-	W	
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17670	W	
Transformer-less, Ungrounded	Yes								
Maximum Input Voltage	480								
Nominal DC Input Voltage	380								
Maximum Input Current 208V	-	9	-	13.5	-	-	-	Adc	
Maximum Input Current 240V	8.5	10.5	13.5	16.5	20	27	30.5	Adc	
Max. Input Short Circuit Current	45								
Reverse-Polarity Protection	Yes								
Ground-Fault Isolation Detection	600 kΩ Sensitivity								
Maximum Inverter Efficiency	99	99.2							%
CEC Weighted Efficiency	99								
Nighttime Power Consumption	< 2.5								
<b>ADDITIONAL FEATURES</b>									
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (Optional)								

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	Unit
Revenue Grade Data, ANSI C12.20	Optional <sup>1</sup>							
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect							
<b>STANDARD COMPLIANCE</b>								
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07							
Grid Connection Standards	IEEE1547, Rule 21, Rule14 (HI)							
Emissions	FCC part15 class B							
RoHS	Yes							
<b>INSTALLATION SPECIFICATIONS</b>								
AC output conduit size / AWG range	3/4" minimum / 14 - 6 AWG				3/4" minimum / 14-4 AWG			
DC input conduit size / # of strings / AWG range	3/4" minimum / 1-2 strings / 14-6 AWG				3/4" minimum / 1-3 strings / 14-6 AWG			
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174				21.3 x 14.6 x 7.3 / 540 x 370 x 185			
Weight with Safety Switch	22 / 10	25.1 / 11.4	26.2 / 11.9	38.8 / 17.6				
Noise	< 25				< 50			
Cooling	Natural Convection				Natural convection and internal fan (user replaceable)			
Operating Temperature Range	-13 to +140 / -25 to +60 <sup>2</sup> (-40°F / -40°C option) <sup>3</sup>							
Protection Rating	IP65/ NEMA 3R (Inverter with Safety Switch)							

<sup>1</sup>Revenue grade inverter P/N: SExxxxH-US000NNC2

<sup>2</sup>For power de-rating information refer to: <https://www.solarEdge.com/sites/default/files/se-temperature-derating-note-na.pdf>

<sup>3</sup>3-40 version P/N: SExxxxH-US000NNU4

Recommended OCPD size per grid:

Inverter	Maximum Output Current (A)	Minimum Fuse Rating (A)		Maximum Fuse Rating (A)	
		208 VAC	240 VAC	208 VAC	240 VAC
SE3000H-US	12.5	20	---	---	50
SE3800H-US	16	20	---	50	50
SE5000H-US	21	30	---	50	50
SE6000H-US	25	35	---	---	50
SE7600H-US	32	40	---	---	50
SE10000H-US	42	60	---	---	80
SE11400H-US	47.5	60	---	---	80

## Default Trip Limits and Times According to IEEE1547



### NOTE

The inverters are equipped with adjustable utility protective function set-points, and can be aggregated above 30kW on a single Point of Common Connection. The default settings are in compliance with IEEE1547. Utility authorization is required to change these set-points.

Voltage Range (% of Base Voltage)	Max. Clearing Time (Sec)
V < 50%	0.16
50 % < V < 88%	2.00
110% < V < 120%	1.00
V > 120 %	0.16
Frequency Range (Hz)	Max. Clearing Time (Sec)
> 60.5	0.16
< 59.3 (Hawaii – 57)	0.16

If you have technical queries concerning our products, please contact our support through SolarEdge service portal:

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