

AC Module System Installation Manual



LGXXA1X-XX, LGXXM1X-XX

Important! Please read AC Module System Installation Manual before installing, wiring, or using this product in any way. Failure to comply with these instructions will invalidate Warranty.
※ Excluding LGXXA1W-V5 (only for Korea)



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Revisions Table

Date	Version	Description of change	Remark
2019.08.30	1.0	First Release	Installation Manual
2019.12.04	1.1	Add model (LGXXXA1K-V5)	Installation Manual
2020.05.18.	1.2	Add model (LGXXXM1C-N5, LGXXXM1K-L5)	Installation Manual
2020.09.29	1.4	Surge protection of AC module system is recommended	Installation Manual
2020.12.01	1.5	Add Model (LGXXXA1C-A6, LGXXXM1X-A6)	Installation Manual



1 Safety

Note and comply with the safety guidelines of this manual while handling AC modules. Failure to comply may result in severe damage to the equipment and/or fatal injuries.

1-1 Safety Symbol

Safety symbols are used to prevent property losses and human life damages during the operation of this equipment.

Safety Symbol	Description
	Failure to comply with the instructions may cause a severe injury or immediate death.
	Failure to comply with the instructions may cause death or severe injury.
	Failure to comply with the instructions may cause injury or property damage.
	Failure to comply with the instructions may cause a severe injury or immediate death caused by electricity.
	Failure to comply with the instructions may cause injury or property damage caused by fire.

1-2 Circuit Symbol

Circuit symbols are used to describe the AC module circuit in this manual

Circuit symbol	Description
	DC current supply. Generated from PV module.
	AC current supply. Generated from utility and micro inverter. Used in electric appliances.
	Symbol representing the phase of AC current. Mark the number in front of this symbol to represent the number of phases.
	Equipment Grounding Conductor (EGC). Conductor connecting normally non-current carrying metal parts of equipment together.
	Grounding Electrode Conductor (GEC). Conductor connecting EGC and neutral conductor to the ground for grounding.



1-3 Important Safety Instructions

DANGER

- To prevent the risk of electric shock, do not touch any terminals in operation and wait for a few minutes after turning a circuit breaker off. It may be energized in the open position.
- To prevent the risk of arcing, do not disconnect the cable connector in operation.
- Do not contact electrically active parts of the panel, such as terminals, without appropriate safety gear. Contact may result in lethal spark or electric shock.
- To prevent the risk of electric shock, do not touch the glass surface or frame of the solar module after installation.
- Do not use or install AC modules if the module is broken or torn. Failure to comply may result in electric shock.

WARNING

- To prevent the risk of burns, do not touch AC modules during operation.
- For safety, only qualified personnel should service modules.
- To prevent the risk of electric shock, stay away from any damaged modules. Do not operate the module if you find broken glass or torn back sheets in any module.
- Damaged modules must be handled with proper PPE (Personal Protective Equipment).
- Micro inverter warranty is void if cover removed. No serviceable parts inside. Refer to qualified personnel for service.
- For proper operation, make sure to use AC cables, connectors and accessories provided by LG Electronics. Parts that are not listed may cause critical danger.
- For proper operation, the AC module shall be connected only to a dedicated branch circuit.
- To prevent the risk of fire, do not connect any device between the AC module and circuit breaker. Circuit breaker may not work properly.
- Before installation, make sure to check that the area of location meets the required environment.
- Perform all work in dry conditions and use only dry tools. Do not handle wet panels without appropriate protection equipment.
- Do not approach to the damaged or broken module unless you are an authorized or qualified expert.
- Waste, electrical parts, bolts, nuts, conductors or any other debris must be cleared after installation.
- Do not bend AC cables. While under stress, it may occur module damage. Cable bending radius should be more than 5 times the cable diameter, at least.



CAUTION

- Use proper equipment, connectors, wires and buttresses for the installation of the module.
- To reduce the risk of accidents, install the AC modules during mild weather. For raining or snowy days, electric shock hazard exists. For windy days, there is a difficulty to move the AC modules.
- To prevent the risk of injury, do not apply pressure on the module (ex. placing heavy objects or stepping on the module).
- To prevent the risk of injury, do not drop the module. Modules must be gently handled and placed down with care.
- For proper operation, do not scratch the coating surface of the frame. It may increase the corrosion of the frame.
- For proper operation, do not artificially concentrate sunlight on the module surface.
- Addition of holes in the frame or glass of the module may decrease the strength and integrity of the frame or glass.
- Do not remove warning labels. Do not apply a shock to micro inverter of the module or pull the AC cable. Do not remove the labels attached on the module except the detachable label for installation map .
- Store the module in its original package until installation.
- Do not use any kind of oil or lubricant on the module's any parts, It can damage the AC Module.



- AC modules shall be mounted with racking and mounting products certified and listed for system fire class rating in accordance with UL1703 edition 2014 and UL2703 edition 2014.
- The System Fire Class Rating of the module or panel in a mounting system in combination with a roof covering must meet the requirements to achieve the specified System Fire Class Rating for a non-BIPV module or panel.
- To make better air circulation along the backside of the AC module, it is recommended to install the PV rack with a gap of at least 4 inches (100mm) between the back of the module and roof surface. It might affect UL listing and fire class if it is less than 4 inches (100mm).
- Please check voltage range for use before installation of AC modules and EnerBox2. Refer to **9 Product Specifications**.
- When installed on a roof, the PV module must be mounted over a fire-resistant roof. The fire resistance of the PV module is class C according to ANSI/UL790.
- It is recommended to check with local authorities for fire safety guidelines and requirements for any buildings or structures on to which the panels will be installed.



- Both AC and DC voltage sources are terminated inside this equipment.
- Each circuit must be individually disconnected before servicing.
- When the photovoltaic array is exposed to light, it supplies a DC voltage to this equipment.
- AC module arrays need to be connected only to a dedicated branch circuit.



1-4 FCC Guideline

For Micro inverter & Communication Gateway (EnerBox2)

You are cautioned that changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user’s authority to operate this equipment.

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 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 instruction, may cause harmful interference to radio communication. 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, the user is 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 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.

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

For Communication Gateway (EnerBox2)

FCC RF Radiation Exposure Statement :

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment should be installed and operated with minimum distance 20 cm (7.8 inches) between the antenna and your body. Users must follow the specific operating instructions for satisfying RF exposure compliance.

FCC Radio Frequency Interference Requirements :

High power radars are allocated as primary users of the 5.25 to 5.35 GHz and 5.65 to 5.85 GHz bands. These radar stations can cause interference with and/or damage this device. This device cannot be co-located with any other transmitter.

Responsible Party :

LG Electronics USA, Inc.
 111 Sylvan Avenue, North Building
 Englewood Cliffs, NJ 07632
 E-Mail : lg.environmental@lge.com

Supplier’s Declaration of Conformity	
Trade Name	LG
Responsible Party	LG Electronics USA, Inc.
Address	111 Sylvan Avenue, North Building, Englewood Cliffs, NJ 07632
E-mail	lg.environmental@lge.com



2 Introduction

LG AC module consists of a DC module and a micro inverter. Without any additional equipment, it converts the solar energy to AC power which can be consumed by electric appliances in a home or can be supplied to the utility.

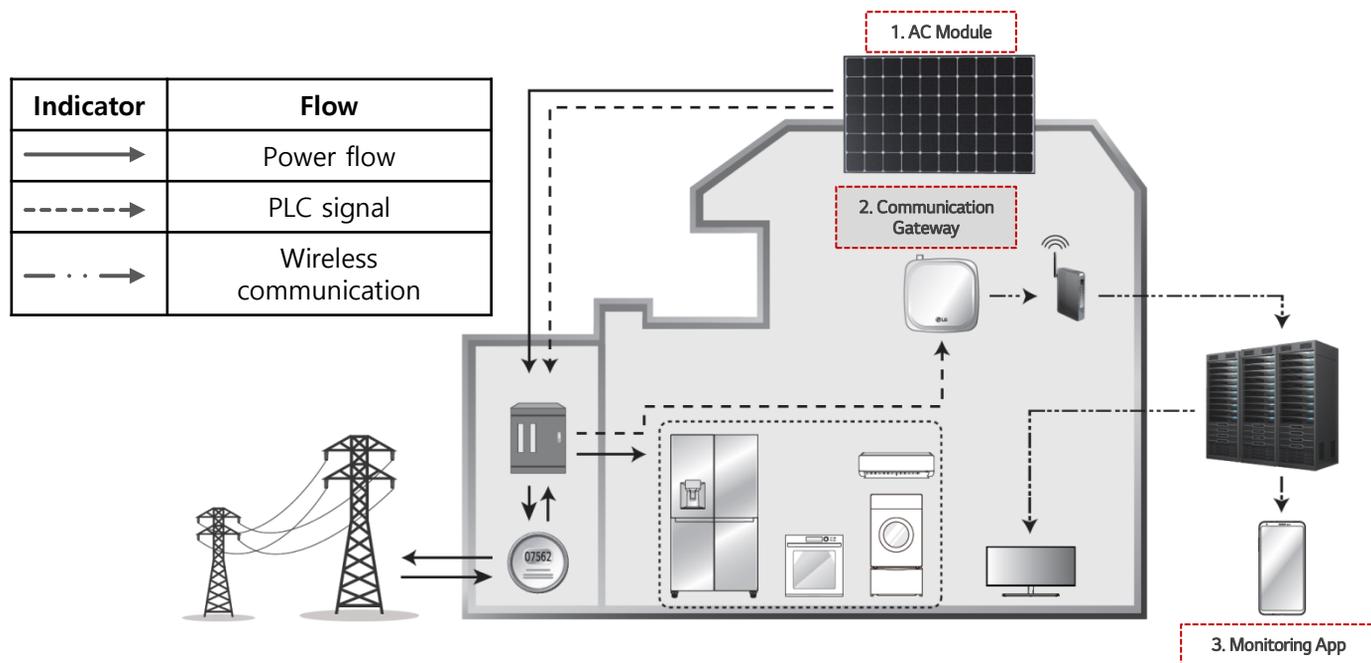
The Advantage of AC Module System

The AC module produced by LG Electronics is delivered after completing the connection between DC module and a micro inverter, which eliminates installation steps connecting a micro inverter to a DC module. Thus, steps for the connection of DC module and a micro inverter can be excluded.

Also, the AC module provides better flexibility for building PV arrays. The AC module is equipped with two separate AC cable connectors (male and female). Thus the two AC cable connectors enable landscape or portrait orientation without requirement of any trunk cables. Even though there are roof vents on the target site, there is no worry because AC cable connection is possible for the AC module array circumventing the vent area.

The mentioned advantages will reduce total installation and labor costs. Also, total installation time will be shortened.

AC Module System



In this diagram, AC modules will produce power during daytime. The produced energy can be consumed by home appliances like a fridge, TVs, and etc. Or if the power generation is more than total power consumption in the house, the power will flow to the grid. Power flow is described as \longrightarrow .

The EnerBox2 utilizes power line communication (PLC) method to collect data from each AC modules. The PLC matters to communication between micro inverters and a EnerBox2. The PLC signal is depicted as $\text{---}\longrightarrow$.

The EnerBox2 sends data to the web server through a home router. Internet connection of the EnerBox2 is possible with Wi-Fi or a LAN cable. Wireless communication is described as $\text{---}\cdots\longrightarrow$.



3 Installation

3-1 Instruction before Installation

- LG AC module is “Grid Support Utility Interactive Inverter”, which requires approval from the corresponding authority prior to connection with utility grid. Contact the applicable local government agencies and/or utility company.
- Installation, maintenance, and supervision may only be carried out by an approved qualified and authorized installer for the safety of workers and systems.
- Read and follow the installation guidelines specified in this manual. Installation with unapproved methods may result in injuries including fatal injuries and/or damage to the equipment.
- Consult with LG Electronics for the approval of installation methods which are not specified in the installation manual, but are going to be applied. Failure to comply will void the warranty and the module certificate.
- After arrival of AC modules, check for possible damages during transportation. Damaged modules should not be installed. Request an exchange by contacting LG Electronics.
- If previously used modules (or parts) are replaced, check that the modified module works properly. The modified module shall retain its model number.
- Secure all necessary permits and licenses to install the solar modules.
- Store the AC modules in its original packing before installation.
- Keep the AC modules in clear and secured area. Any particles or moisture may cause malfunction of AC cable’s contactors.
- Consider the weight of AC module before installation.
- Do not work alone. Install AC modules with a team unit including at least 2 persons for safe installation.
- To prevent the risk of accidents, use proper PPE (Personnel Protective Equipment) including helmets and gloves at all times.
- If installation location is high above ground, make sure to use Fall Protection System during the installation.
- Plan the installation work in moderate weather. There is a risk of electric shock when it is raining or snowing.
- Partial shadowing may substantially reduce energy production.
- Check whether all parts used for the installation are certified for outdoor usage.
- Keep the solar module and system away from children at all times.
- During the AC module installation, do not let children play near the module and the system.
- Care must be taken to avoid low tilt angles which may cause dirt to buildup on the glass. It can be a cause of performance degradation.
- Dirt build-up on the surface of the panel may cause active solar cells to be shaded and electrical performance to be impaired.
- Carry out the installation according to the local electric code.



3-2 Checking the Installation Site

- Check whether the target site of installation meets the following requirements.
- Do not install AC modules near highly combustible structures or materials.
- Do not install AC modules where the maximum ambient temperature exceeds 65°C (149°F).
- Do not install AC modules at a place under direct exposure to salt water or ammonia.
- Do not install AC modules at a place easily accessible to people.
- Do not install AC modules indoors or on a moving vehicle.
- In an environment having frequent lightning storms, an auxiliary grounding may need to be established by installer, which is connected directly from the AC module system to the ground.
- If the target installation structure lies on an uneven surface, do not forcefully modify the module to fit in the structure. Make sure that the installation structure has been set up to provide a flat surface. Unreliable structures may cause damage to the product during and/or after installation.



3-3 Inspecting Components of an AC Module

After receiving products, inspect all parts for possible deformity or malfunction.



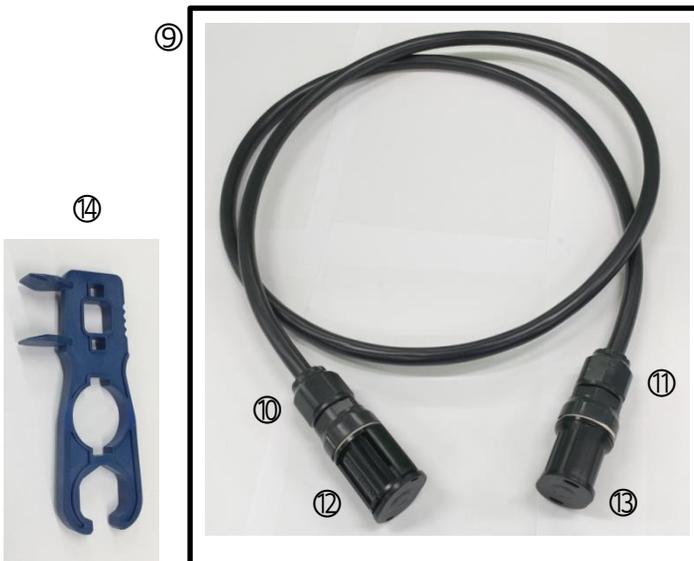
AC Module

1. **DC module**
converts the solar energy to DC power.
2. **Micro Inverter**
converts DC power generated by each PV module to AC power.
3. **AC module frame**
is a structural system to protect and support a DC module and a micro Inverter.
4. **AC Cable Male Connector**
can be connected with an AC cable female connector or a female end cap.
5. **AC Cable Female Connector**
can be connected with an AC cable male connector or a male end cap.
6. **Product Label**
indicates product specification and MAC ID number.
7. **Detachable MAC ID**
is for a customer to place it on a map for record.
8. **Model number**
represents its model number.

Accessory

(Contact distributor for order)

9. **Extension Cable (serviceable as a transition cable)**
has both of female/male connectors paired with male/female end cap.
10. **Male Connector**
can be used for connection with a female connector or a female end cap.
11. **Female Connector**
can be used for connection with a male connector or a male end cap.
12. **Female End Cap**
is for sealing a male connector.
13. **Male End Cap**
is for sealing a female connector.
14. **Unlocking Tool**
for handling male and female connectors.





3-4 Inspecting Components of EnerBox2

After completing the installation of AC module on the rooftop or other site, next step is to install the communication gateway(EnerBox2) which enables home owners and installers to monitor power production of individual AC module or the entire array on a daily, monthly or an annual basis. The communication system is simple to connect the gateway with each micro inverter and an internet router. Power Line Communication (PLC) method facilitates communication between the gateway and each micro inverter. Then the gateway collecting energy and performance data from the AC modules in real time transmits the accumulated log data to a web server through an internet router.



EnerBox2

EnerBox2 (Gateway) (Contact distributor to order)

1. **EnerBox2**
is to collect energy harvest volume data from installed AC modules.
2. **Wi-Fi antenna**
is attached on the body of EnerBox2 for wireless connection of an EnerBox2 to a router(It needs to be already installed at home owner's site). A router is not provided by LG Electronics.
3. **EnerBox2 left-side**
provides many functions including reset, buttons, LEDs, and etc.
4. **EnerBox2 bottom-side**
provides slots for power cable, LAN cable and USBs.
5. **EnerBox2 power cable**
is used to provide power to EnerBox2 for operation.
6. **LAN Cable**
is accessible for a case that wireless service is not provided by a router.
7. **Wall mount bracket**
can be used for the EnerBox2 to be installed on a wall.
8. **Wall mount bracket screws**
hold the wall mount bracket on a wall.



③ EnerBox2 left-side



④ EnerBox2 bottom-side



⑤ EnerBox2 power cable



⑥ LAN cable



⑦ Wall mount bracket

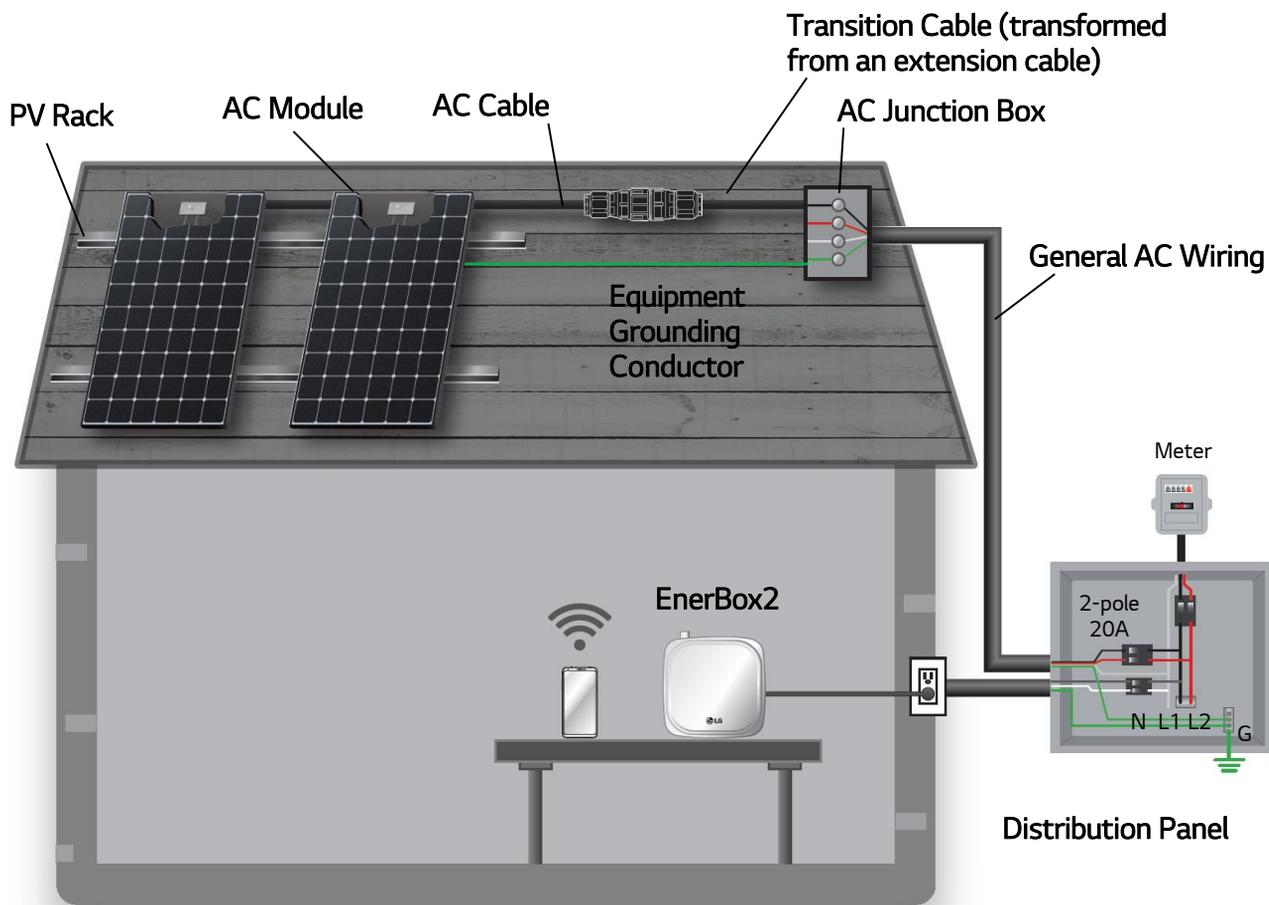


⑧ Wall mount bracket screws



3-5 Wiring Diagram of AC Module System

Below is a sample diagram of the AC module system.



1. AC module

- Consists of a DC module and a micro inverter.
- Performs power conversion from solar power to AC power and maximizes power generation by performing MPPT (Maximum Power Point Tracking).

2. EnerBox2 (Communication Gateway)

- Collects data from the installed AC module system via AC cable.
- Uses wireless connection to transmit data to a server.

3. Monitoring App

- Monitors how much power is produced by the AC module system.
- Transmits the condition of the system to the service center in case of a problem.



- PV rack: Structure used to attach AC modules on surfaces like roofs, empty plots etc
- AC junction box: Container for electrical connections of AC wiring.
- Distribution panel : Component of an electricity supply system which divides an electrical power feed into subsidiary circuits, while providing a protective fuse or circuit breaker for each circuit, in a common enclosure



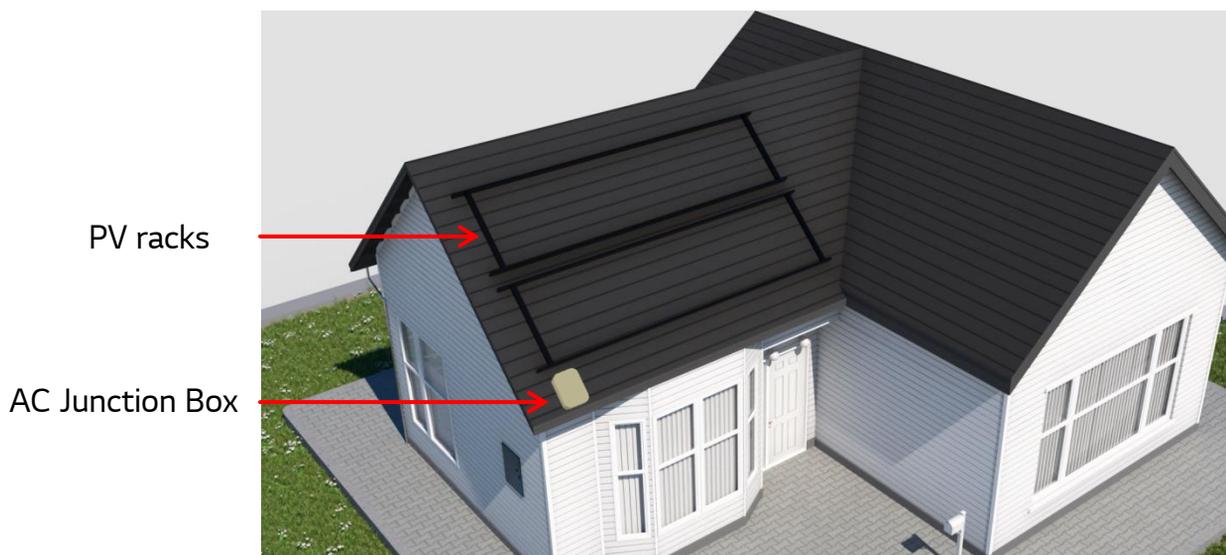
3-6 Installing the AC Junction Box and PV Rack

Before Installing the AC junction box and PV rack, be aware of the following requirements:

- Determine appropriate solar panel angle maximizing the amount of sunlight. It depends on geographical conditions.
- To make better air circulation along the backside of the AC module, it is recommended to install the PV rack with a gap of at least 4 inches (100mm) between the back of the module and roof surface. It might affect UL listing and fire class if it is less than 4 inches (100mm).
- Install AC junction box near the AC module.
- Install using the parts approved in the installation region.

Construct the overall frame of the solar system in the following order:

- Install the PV rack according to the number of modules per array and the dimensions of the AC module. (refer to **Chapter 9. Product Specification**)
- Inspect the installation site and design possible combination of arrays that fits into the installation site. If there are any vents or obstacles that make array build difficult, go to **3-9 Building an array of AC modules** to get ideas to design an array.
- Install the AC junction box near the PV rack. Select the size and type of AC junction box suitable for connection type according to the output voltage. (refer to **3-12 Connecting Array of AC Modules-to-Distribution Panel**)
- Make sure that the AC junction box is under protection of weather proof function.
- Please use appropriate conduit or ducts for wires.



All of procedures should be carried out by qualified installers. LG Electronics does not provide warranty for PV racks and the AC junction box.



PV module specification (conditions of 1000W/m² irradiance and 25°C (77°F) solar cell temperature)

Operating Ambient Temperature

Maximum operation temperature: 65°C (149°F).

Minimum operation temperature: -40°C (-40°F).

Design strength

Refer to **Appendix 2 – Module Installation & Load Guide**

Notes

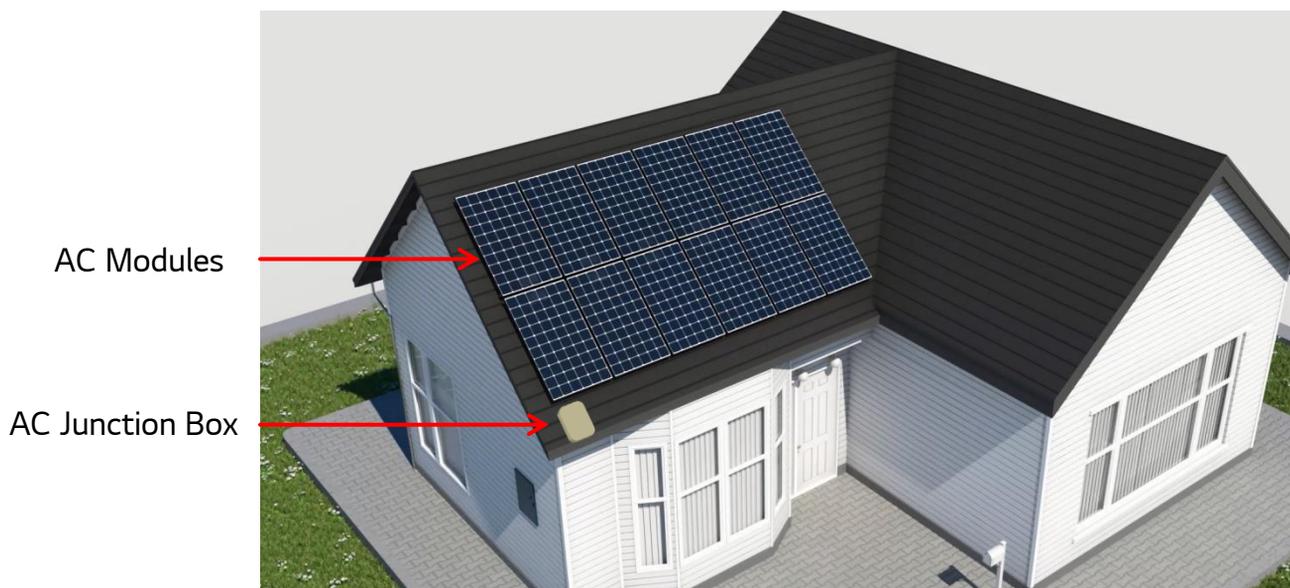
- LG AC module should not be operated in locations where direct contact to salt water or ammonia exists.



3-7 Mounting the AC module

Before mounting AC module in the PV rack, be aware of the following requirements:

- Check that all parts of the product are intact and operational.
- Check that the cable connectors are not damaged.
- Do not install the AC modules horizontally. It will make it difficult for dust to be washed off by rain naturally. Accumulation of dust, dirt or soil may be a cause of performance degradation.
- When installed on a roof, the PV module must be mounted over a fire-resistant roof. The fire resistance of the PV module is class C according to ANSI/UL790.
- For proper operation, do not remove AC module frame or replace with another frame.
- Do not make extra holes on the AC module frame. Additional holes on the frame may weaken the strength of the frame and cause damage finally.
- To avoid the tensile strain from the thermal expansion, it is recommended to leave a space more than 6mm (0.236 inches) between AC modules frames.
- Mount LG AC module to PV rack with 4~5N•m torque.
- For reliable connection, make sure that the AC module frame and a PV rack are surely fastened enough to prevent the AC modules from getting loose.
- When installing modules in areas of heavy snow, special care should be taken to install the modules in a manner that provides sufficient strength for meeting local code requirements.



Guides for mounting AC modules on the PV racks are explained from next page.



- When an AC module is exposed to light, it supplies a dc voltage to a micro inverter. Therefore, the LED on the micro inverter will illuminate in red with a condition that it is not connected to the grid.

⚠ WARNING



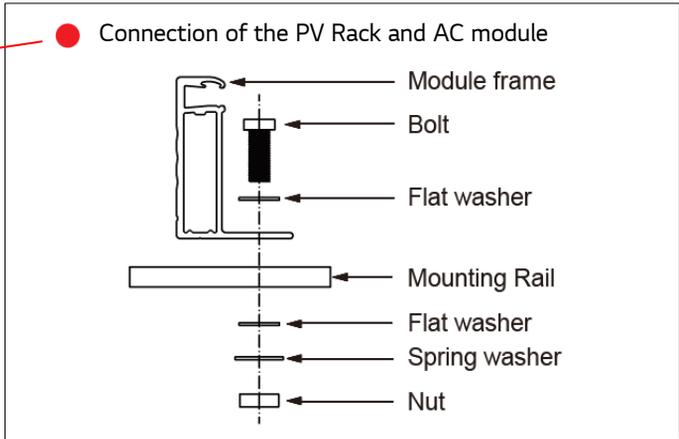
- To prevent the danger of the electric shock, do not touch metal parts inside the AC cable connectors.



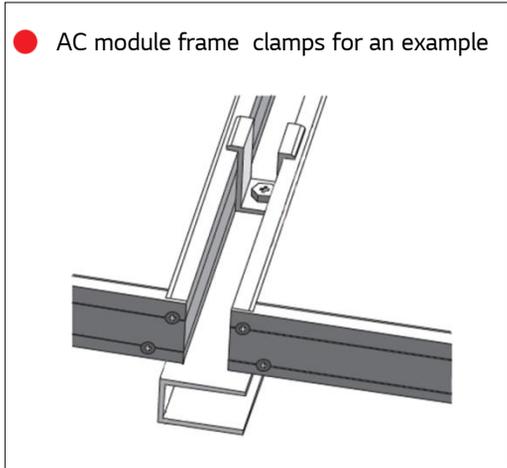
Mount AC module to the PV rack in the following order:

- Bolting type uses manufactured holes on the AC module frames to attach the AC modules on PV rack or support structure. Use at least 4 mounting holes (2 on right and 2 on left frame) to securely hold the AC modules on the structure. This mounting type is evaluated by UL.
- The AC module can be mounted by using clamps or fixing plates. Steps and procedures need to be carried out based on a manual provided by the clamp or fixing plate manufacturers. The type is evaluated by LG internal test, not evaluated by UL.
- Bolts, clamps or fixing plates must be installed according to the manufacturer’s specific instructions.
- Do not apply too much pressure on the AC module frame to a degree that the frame deforms.
- Please follow instructions and manuals specified by bolt, clamp or fixing plate manufacturers.
- Make sure that any clamps or fixing plates do not contact the front glass and do not deform the frame. Also, be sure to avoid shadowing effects caused by the clamps or fixing plates.
- It is recommended to check with local authorities for fire safety guidelines and requirements for any buildings or structures on to which the panels will be installed.

Bolting type



Clamp or fixing plate type



- Bolting Type is evaluated by UL. Refer to Appendix 2.
- Clamp or fixing plate type is not evaluated by UL. The type is evaluated by LG internal test.

⚠ WARNING

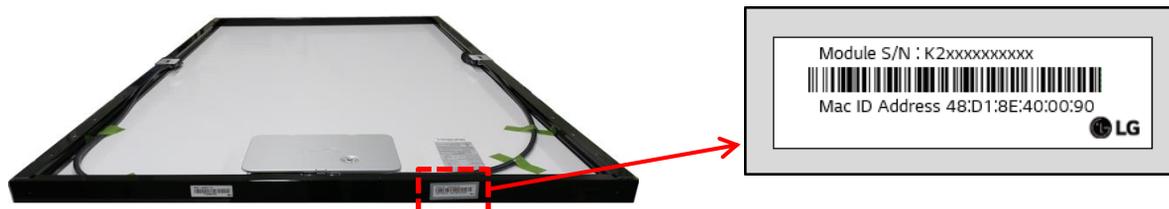


- To prevent the danger of the electric shock, do not attach or connect AC modules to the grid before the installation.
- The actual grid connection should be done after all of installation procedures are completed.



Mount AC module to the PV rack in the following order:

- Place AC modules on the PV rack with a minimum gap of 6mm (0.236 inches) between each module. To prevent the risk of slipping during installation, mount AC modules one by one.
- Peel the adhesive label attached on the side of AC module frame and attach the identification label on LG AC module Installation map. The map makes it easy for customers to identify the physical location of a particular AC module. Each AC module has two MAC ID label. One is placed under the product specification label. And the other is the detachable MAC ID label.



- The layout of the array will be utilized for building a monitoring system allowing a customer to check the amount of energy harvest.
- The AC modules can be mounted in landscape or portrait orientation, as illustrated below.
- When the AC module is mounted on a PV rack rail, ensure that the rail is inside the range specified in Appendix 2 – Module Installation & Load Guide. The range is varied depending on mounting methods.
- Appendix 2 guides you how to place PV rack rails and clamps in connection with AC modules.

Design Strength(Basic Load)

- 60Cell Modules : 75lb/ft²
- Detail of mounting distance is below.

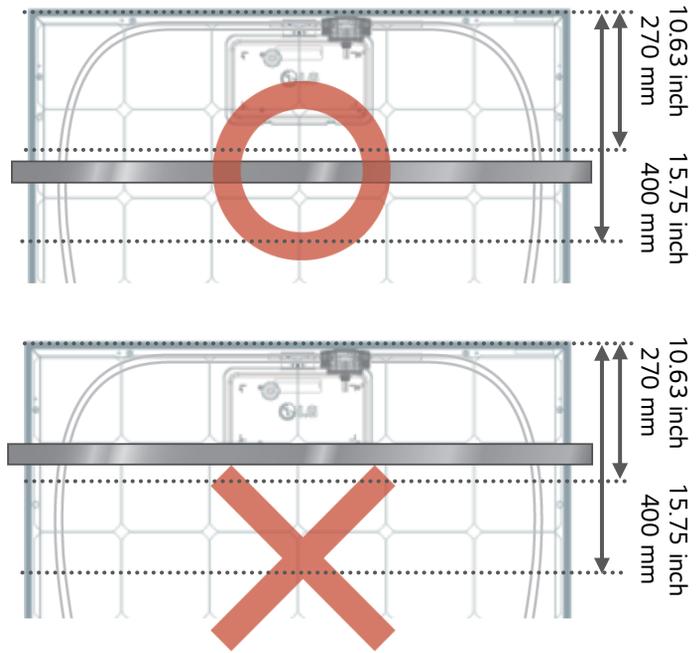
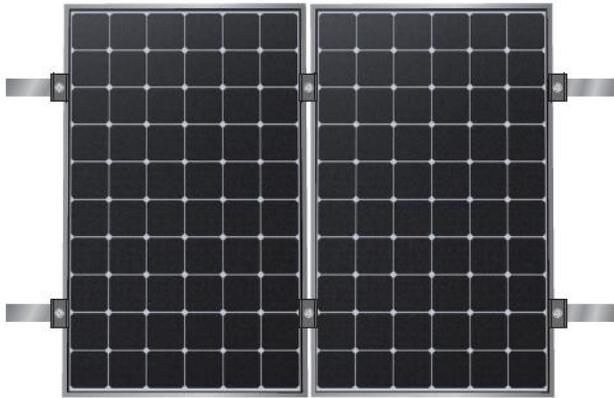
	<p>60 cell</p>	<p>① : 7.9 in (200mm) ② : 11.8 in (300mm)</p>
<p>※ This mounting method is by using frame bolt holes. ※ Please refer to Appendix 2 – Module Installation & Load Guide.</p>		

⚠ WARNING

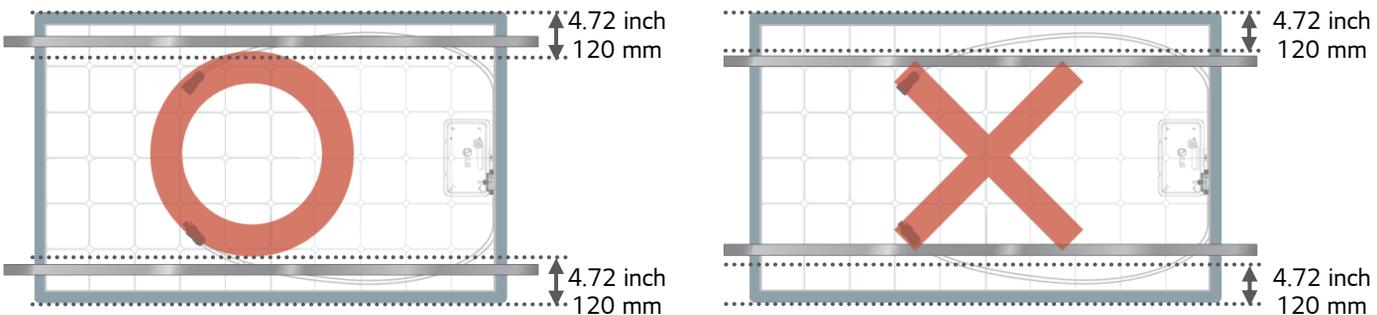
- To prevent the risk of accidents, use proper PPE (Personnel Protective Equipment) including helmets and gloves at all times.
- If installation location is high above ground, make sure to use Fall Protection System during the installation.



Portrait Orientation



Landscape Orientation



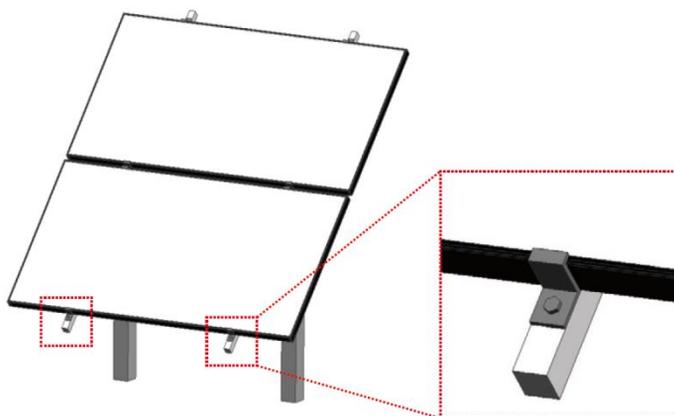
⚠ WARNING



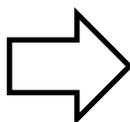
- After checking whether pairing male and female connectors between modules (except end cap and junction box connection) are surely finished, proceed to install next row of modules.
- All of AC cable connectors must be installed underneath the module, out of rain and sun. Do not leave AC cable connectors in an environment of long-term exposure to direct sunlight or rain.



- If the installation is likely to be affected by heavy(extreme) snow, further suitable panel support is recommended on the lower row of panels.



LED indicator



Flashing red light => No red light

- Solar panel is getting solar energy but it is not providing power to utility grid. (Left figure)
- Solar panel is getting solar energy and it is providing power to utility grid. (Right figure)
- Connection time is set with 1min. After you turn the circuit breaker on for the actual utility connection, the micro inverter will be in operation to provide power to the grid.
- Reconnection time is set with 5 min. Reconnection time is applied if the micro inverter is tripped with grid voltage and frequency abnormality. For example, if the circuit breaker is turned off during operation, the reconnection time 5 min. will be applied. Once it starts power production, connection time 1 min. will be applied.
- After connection time or reconnection time, the micro inverter will transform DC power to AC power for utility grid.



1. At night, the LED has no light because there is no energy to make the LED illuminate.
2. At daytime, the LED will light in flashing red when the PV panel is getting solar energy as well as the micro inverter is not providing power to grid. However, it will turn in no red light if it generates AC power to a utility grid.

WARNING



- Ensure that the micro inverters are not interfered by the PV racks, ventilation structures. Do not allow any structure to pressure on micro inverters. Continuous stress or force might be a cause of malfunction.



3-8 Coupling AC cable Connectors

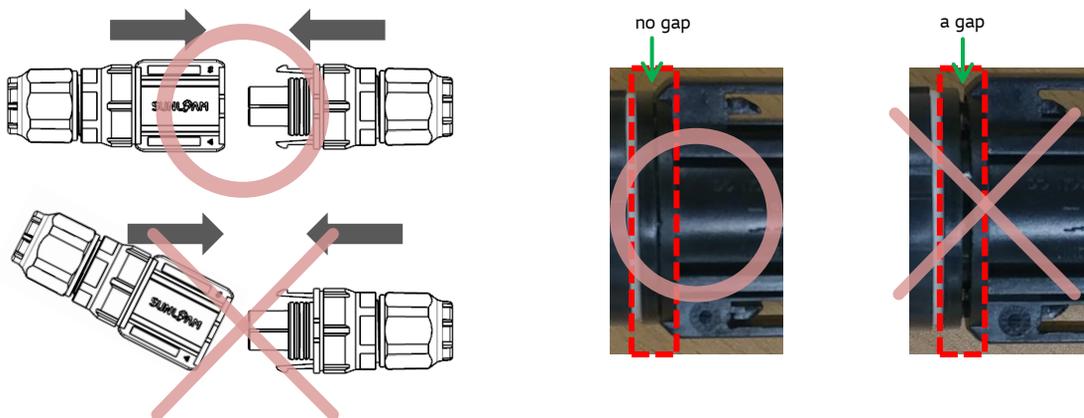
Before pairing AC cable connectors, familiarize yourself with the following descriptions specifically explaining how to handle AC cable connectors and accessories.

AC cable connector insertion

- AC cable connectors have 'Fool-proof system' to pair connectors in a right direction.
- Before pairing two AC cable connectors, identify the locations of 'Fool-proof system' on each AC cable connectors.
- Inserting the AC cable female connector into the AC cable male connector is only possible when 'Fool-proof System' is properly matched.
- Use fool-proof system 1 or 2 in your convenience.



- Insert the AC cable female connector into the AC cable male connector in horizontal direction. If you insert at wrong angle, the connector can be damaged.
- Insert a connector fully into the end of the connector until you hear two clicks.
- When mating the connectors, ensure that coupling connectors is done by pushing the connectors together until a clear audible click is heard.
- When the connectors are correctly connected, there should be no space between the end of a male connector and the end of a female connector.



- Do not let cable be pulled too tight or hang too loose. Internal conductor may break.
- Do not allow any liquid inside to prevent danger of electric shock.
- Do not use damaged cables.
- Do not cut or transform AC cables for use.
- Frequent disassembly or connection may damage connectors.
- The size of dedicated cables are decided by NEC2014. (For the size, refer to Chapter 9. Product Specification)
- For information about accessory, refer to Chapter 8. Accessory.

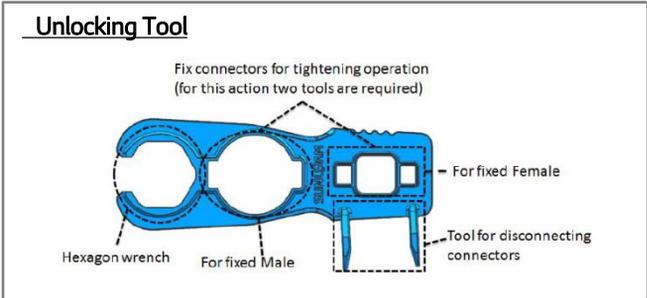
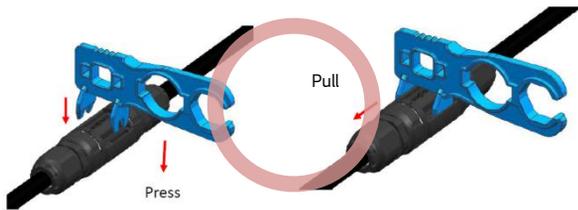


- AC cable information can be found in **8 AC Module Accessories**.
- When temperature is warm and you are about to engage two connectors, you might not hear two clicks. So in that case, engage connectors until there is no space (no gap) between connectors.



- Do not bend the cable too many times. It may result in mechanical and/or electrical problems.
- Do not disconnect AC cable connectors under load.
- Use the dedicated unlocking tool to remove the connector. Do not use any other tools.
- The following unlocking tool is available for disconnecting the combined AC cable connectors.
- The male and female connectors will be opened by fully depressing the unlocking tool into the latches.
- After the unlocking tool insertion is complete, pull the connectors apart.

AC Cable Connector removal



- Avoid all external interference to the connector.
- Do not impose force on the side direction of the connector.
- Do not apply too much force on AC cables away from connectors or a micro inverter.



- The cable must not be bent, crushed or pinched on the direct exit of the cable screw joint.
- The cable must be routed in a way that the tensile stress on the conductor or connections is prevented.
- A minimum bending radius $R \geq 55\text{mm}$ ($5 \times$ Cable diameter) must be maintained.



- Do not attempt to assemble connectors in wet, soiled, or dusty environment.
- Keep connectors dry and clean, and ensure that connectors have no damage or deforms.
- Avoid connectors resting on the ground or roof surface. AC cables should be kept away from the ground or roof surface. Use proper tools like cable clips for securely attaching AC cables on structures like PV racks.
- Avoid sunlight exposure and water immersion of the connectors.
- Incomplete connections can result in arcs and electrical shock.
- Check that all AC cables are securely fastened to structures.
- Ensure that all locking connectors are fully engaged and locked.
- Do not leave unconnected (unprotected) connectors exposed to the environment. Use appropriate end caps for the unconnected AC cable connectors.

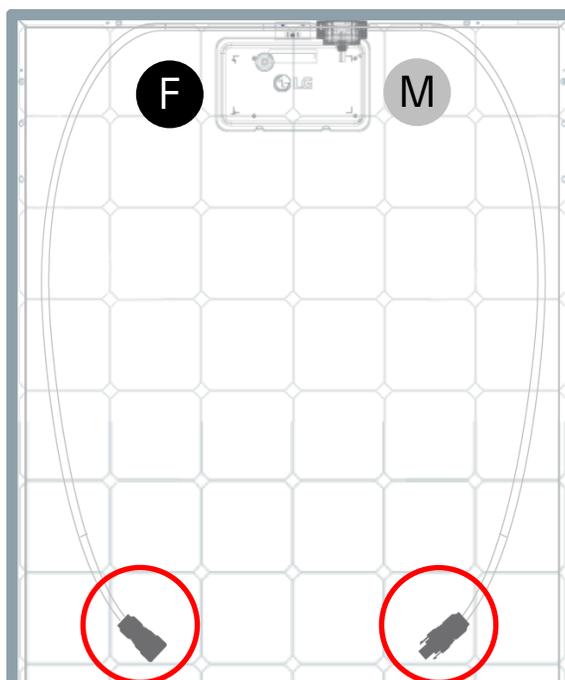
⚠ DANGER

- To prevent the danger of the electric shock, make sure to turn off the circuit breaker before the installation.
- Do not disconnect AC cable connectors under load.



3-9 Building an array of AC modules

- Take the AC cable male and female connectors out of the cable holder.
- Each AC module has an AC cable male connector and an AC cable female connector.
- AC cable female connector is located on the left at rear side, on the right at front side.
- AC cable male connector is placed on the right at rear side, on left at front side.
- For easy recognition of the position, the **F** represents the location of the female connector and the **M** stands for the location of the male connector.
- Because male connector is designed to be connected with a female connector or female end cap, there is a need to keep track of the positions of male and female connectors when you build an array.
- The AC module produced by LG Electronics is delivered after completing the electrical connection between DC module and a micro inverter.
- Therefore, it eliminates installation steps for pairing DC module outputs and micro inverter inputs.
- Also, the two AC cables coming out of the micro inverter have enough cable length which enables easy cable links throughout an array you have designed.
- Landscape, portrait or mixture of the two type orientation is possible with the AC cable connectors.
- Even though there are roof vents on the target site, AC cable connection is feasible for the AC module array to circumvent the vent area.



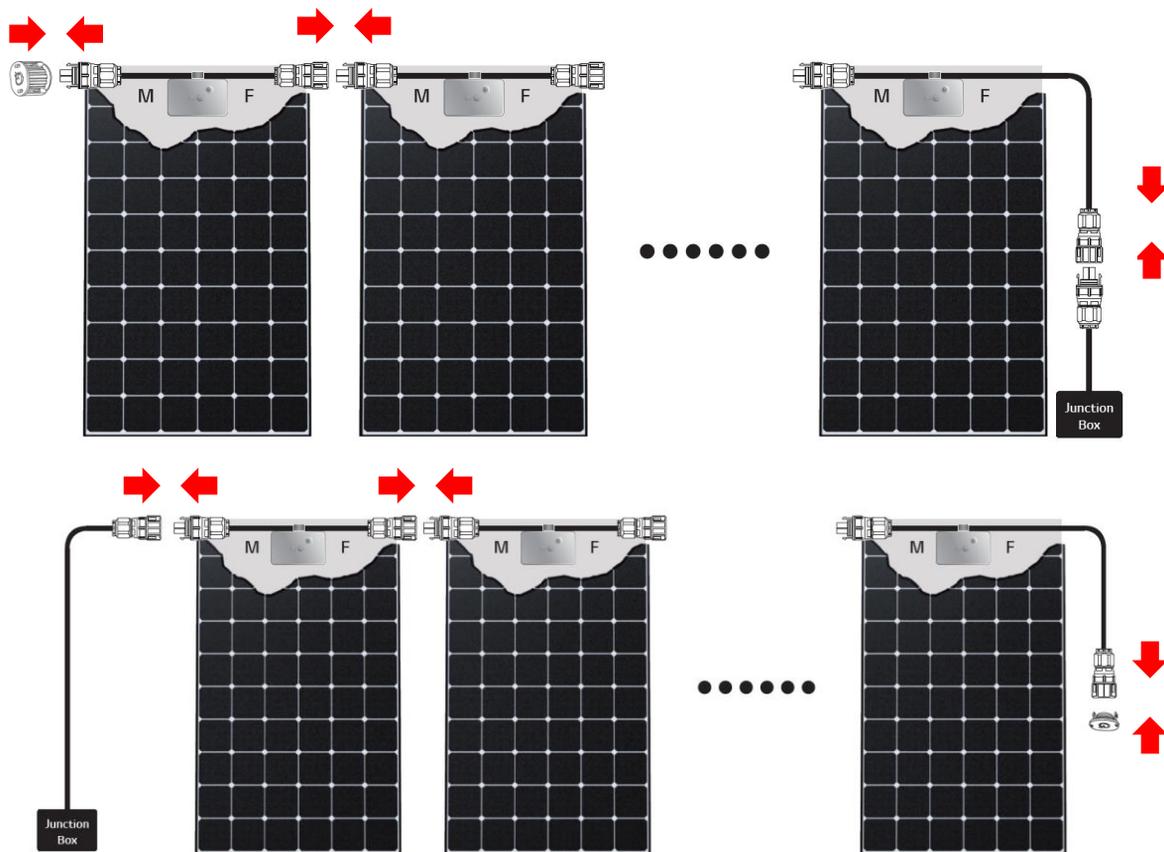
Male End Cap	AC Cable Female Connector
F	Position of the female connector

AC Cable Male Connector	Female End Cap
M	Position of the male connector

※ The end caps are not attached on the above AC cable connectors. Male or female end caps are provided with extension cables. This diagram is for showing that each end cap has its pair.



- Do not expose the cable connections to directed, pressurized liquid (water jets, etc.).
- Do not expose the cable connections to continuous immersion.
- Do not expose the AC cable connector to continuous tension.
- Use only the connectors and cables provided by LG Electronics.
- Do not allow contamination or debris inside the connectors.
- Use cables and connectors only when all parts are present and intact.
- All of AC cable connectors must be installed underneath the module, out of rain and sun. Do not leave AC cable connectors in an environment of long-term exposure to direct sunlight or rain.
- Ensure that the micro inverters are not interfered by the PV racks, ventilation structures. Do not allow any structure to pressure on micro inverters. Continuous stress or force might be a cause of malfunction.
- Attach the AC Cable to the PV racks using the cable clips. Keep the AC cables away from the ground surface or the roof.
- After checking whether pairing male and female connectors between modules (except end cap and junction box connection) are surely finished, proceed to install next row of modules.
- Seal the last AC cable connector with an appropriate end cap to add the waterproof function. Insert the end cap into the male or female connector in the arrow direction until you hear a click sound or find no gap at the edge. (Refer to the **3-8 Coupling AC cable connectors**). End caps are attached on each extension cable that you have ordered.



-AC cable connector and end cap include waterproof functions.

WARNING



- Make sure to use AC cables, extension cables and end caps provided by LG. If other cables other than genuine are used, waterproofing may not be guaranteed and the permissible current of the cable may be lower than the output current of the micro inverter.
- To prevent the danger of the electric shock, firmly connect all connectors and end caps.



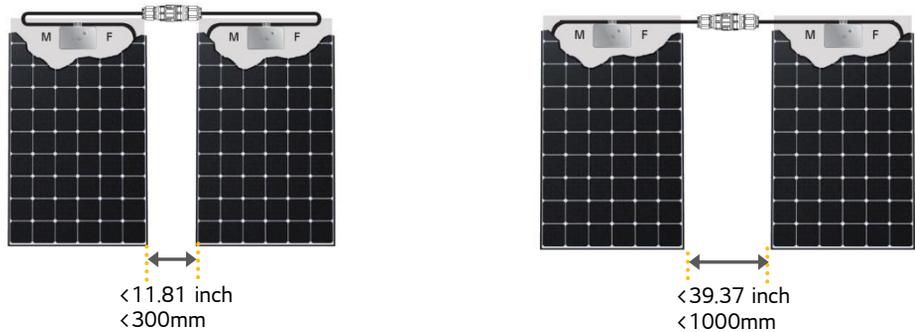
3-10 Building blocks of an array

6 building blocks

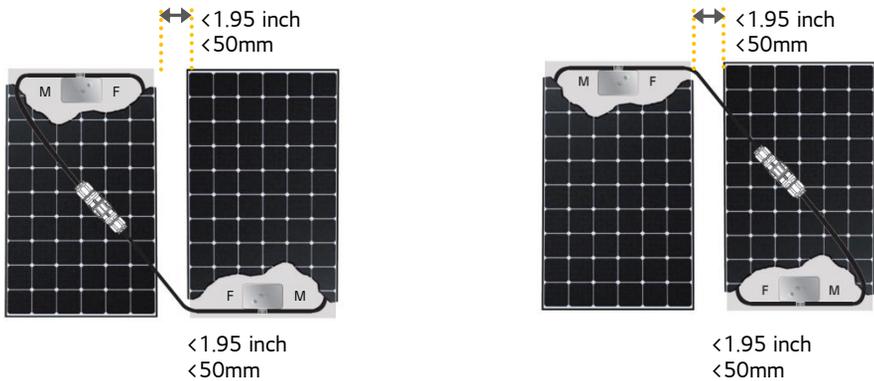
- M Male connector
- F Female connector

- There are 6 building blocks of AC modules which can be used in building an array. Using the 6 building blocks helps installers sketch array configuration and plan the AC cable connection. The designer needs to keep in mind that the location of female and male connector will affect array design.
- Each building block has a limitation on the space between two AC modules because of cable length. Therefore, the space gap between two AC module frames must be kept under the value specified in each building block.
- Also, to avoid the tensile strain from the thermal expansion, it is recommended to leave a space more than 6 mm (0.236 inches) between AC module frames.
- This manual provides gap limitation between AC module frames for each building blocks. After male and female connection of two AC modules, use cable clips in order to fasten the AC cables on frames or PV racks.
- Keep the AC cables off from roof surface or ground.
- In brief, simple diagrams indicate different types of building blocks describing location of male and female connectors and gap limitation between AC module frames. So do not interpret the simple diagrams as the AC cables must make path only to the top direction from an AC module.
- In cases of portrait in reverse and landscape in common, AC cables run below the micro inverter to meet another AC cable. Keep in mind to fasten the AC cables on frames or PV racks in order to make them off from the roof surface.

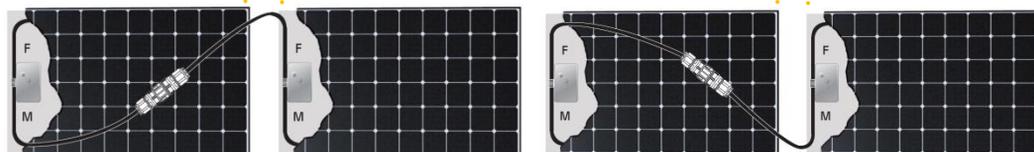
Portrait in common



Portrait in reverse



Landscape in common



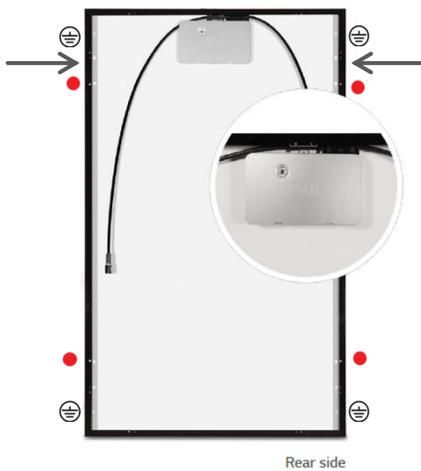


Fastening AC cables on PV racks or AC module frame

- Use cable clip or cable tie in order to fasten the AC cables on AC module frames or PV racks.
- Keep the AC cables off from roof surface or ground.
- For cases of portrait in reverse or landscape in common, steps are described to recommend to fasten AC cables on AC module frames and PV racks.

For portrait in reverse or landscape in common,

- Get the AC cable paired.
- Use a mounting hole with a cable clip for fastening the AC cable on the AC module frame. Mounting holes are placed in red dots as displayed in the rear side of an AC module. Also
- Attach another AC cable on near PV racks.

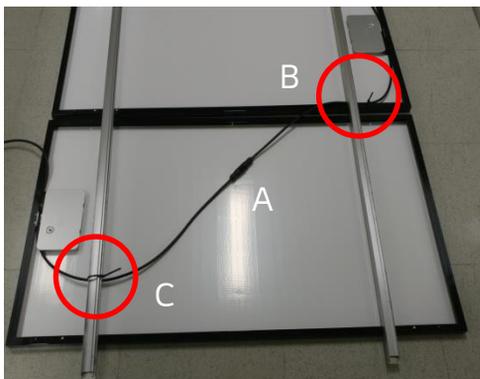


● Location of mounting hole

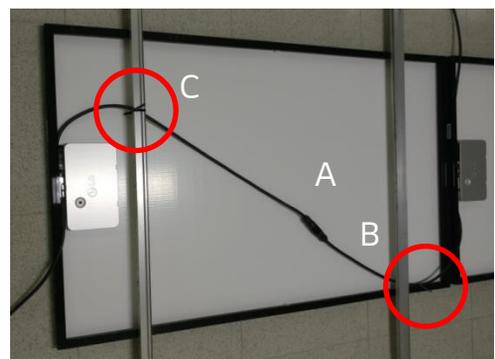
⊕ Location of grounding hole

→ Mounting holes can be used for cable clip

Cable management clip or Cable tie



Portrait in reverse



Landscape in common

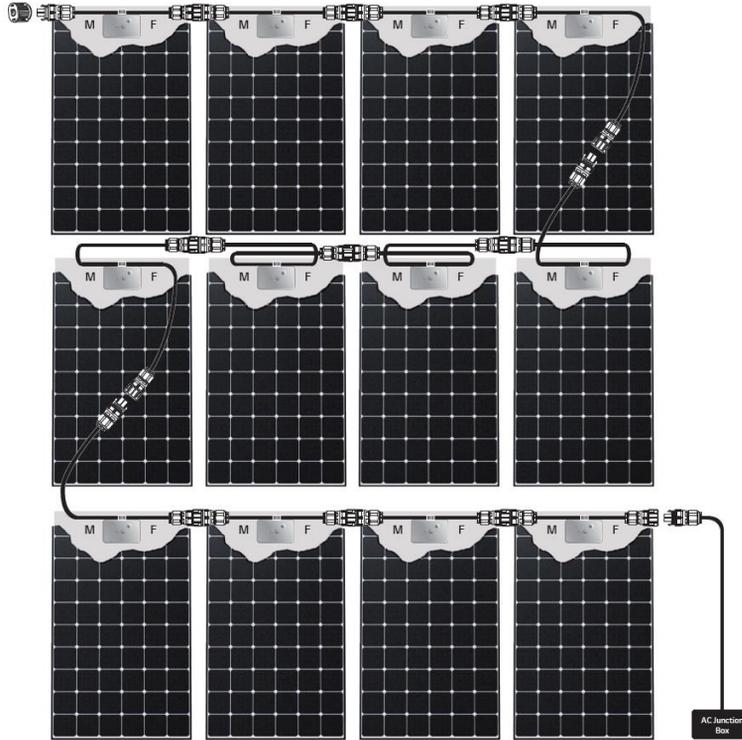


Possible combination of AC modules for array design

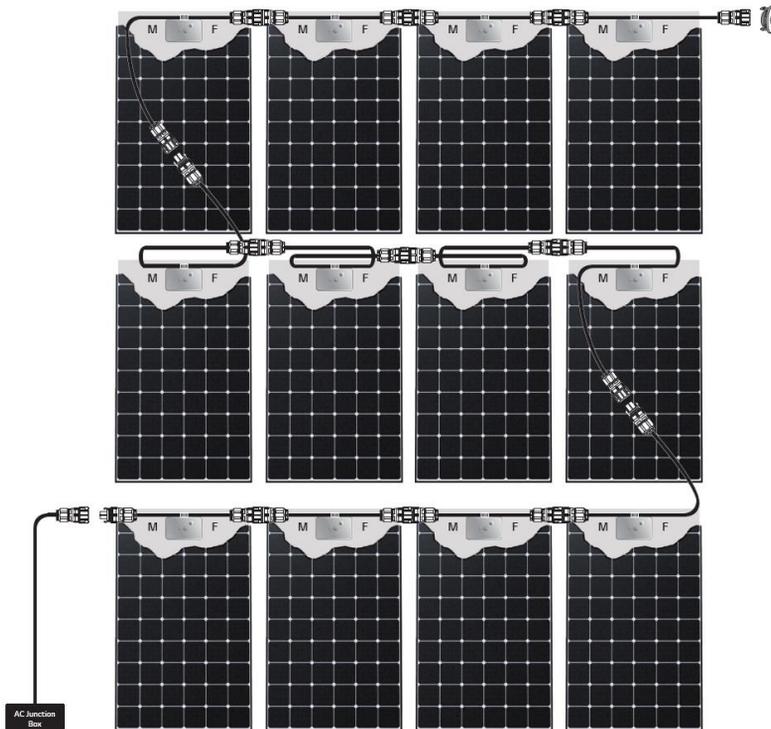
- M Male connector
- F Female connector

If AC junction box is on the right side of a 3-by-4 PV array in portrait orientation,

Use a proper transition cable for connecting the array with the AC junction box. (Refer to 3-12 Connecting Array of AC Modules-to-Distribution Panel guiding installers to make a transition cable from an extension cable) Seal the AC cable male or female connector of the last AC module using an appropriate end cap. End caps can be found in an extension cable.



If AC junction box is on the left of a 3-by-4 PV array in portrait orientation,



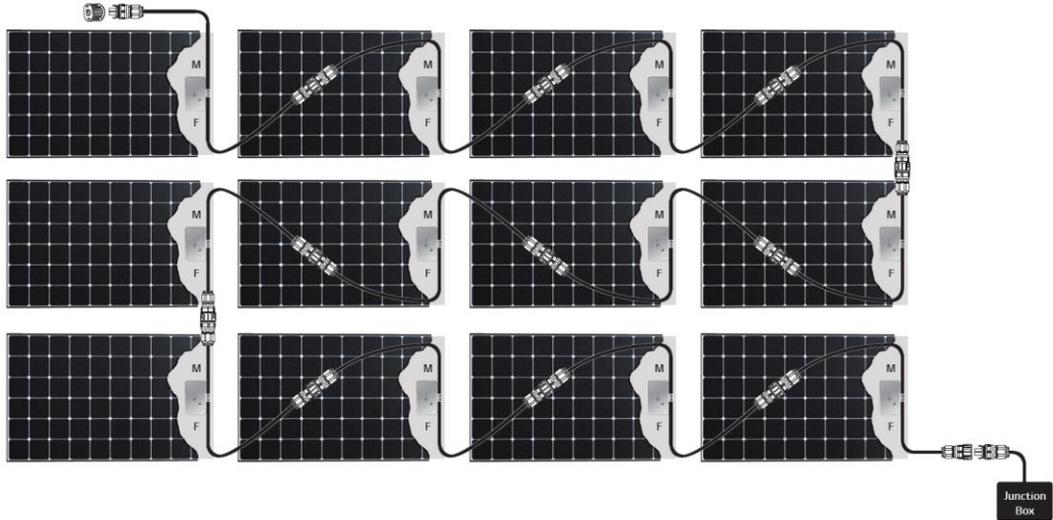


Possible combination of AC modules for array design

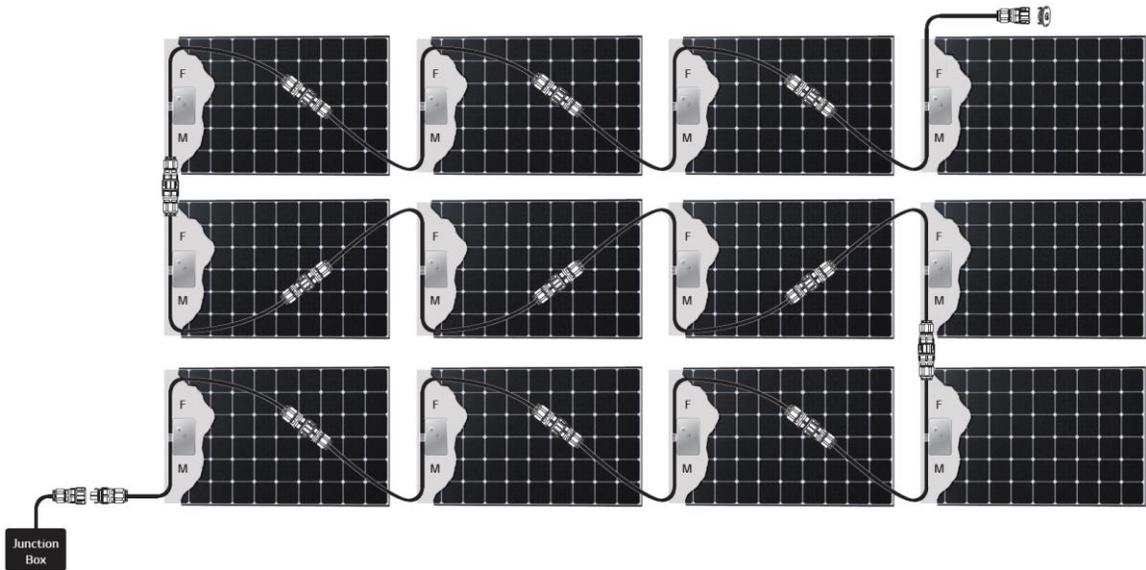
- M Male connector
- F Female connector

If AC junction box is on the right side of a 3-by-4 PV array in landscape orientation,

Use a proper transition cable for connecting the array with the AC junction box. (Refer to 3-12 Connecting Array of AC Modules-to-Distribution Panel guiding installers to make a transition cable from an extension cable) Seal the AC cable male or female connector of the last AC module using an appropriate end cap. End caps can be found in an extension cable.

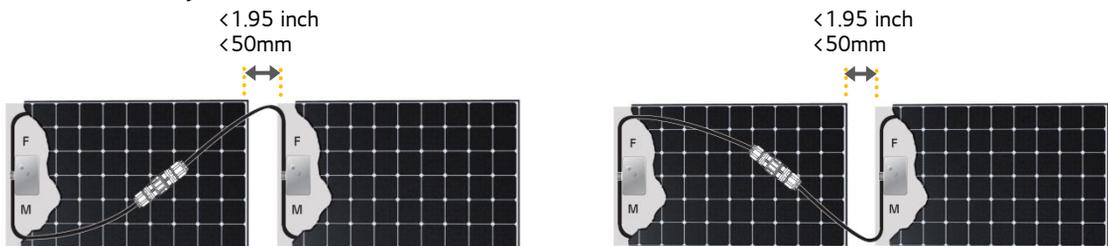


If AC junction box is on the left side of a 3-by-4 PV array in landscape orientation,



Requirement for the landscape formation.

Unlike a connection in a portrait orientation, two AC modules in a landscape orientation requires to be placed with a gap ranging from 0.24 inch (6mm) to 5.9 inch(150mm). Otherwise, the length of the AC cables is not enough for male and female connectors to be fully connected.



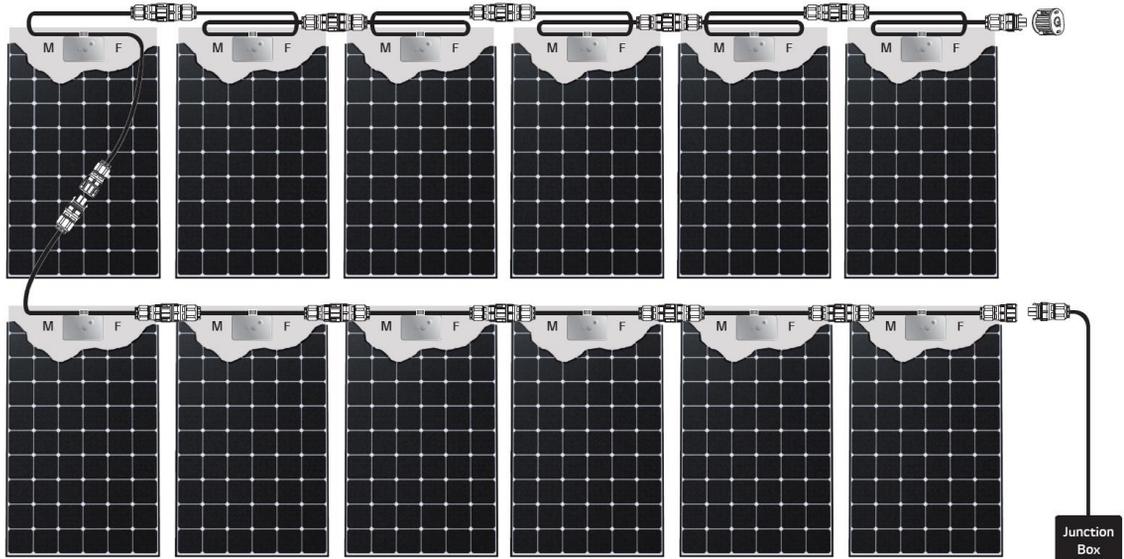


Possible combination of AC modules for array design

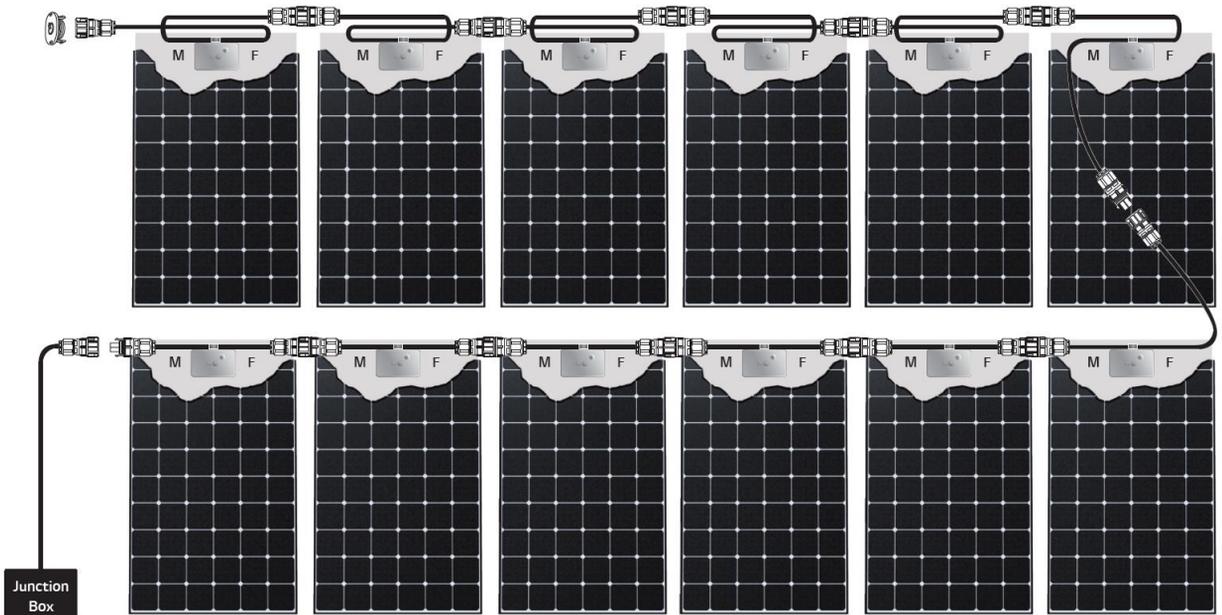
- M Male connector
- F Female connector

If AC junction box is on the right side of a 2-by-6 PV array in portrait orientation,

Use a proper transition cable for connecting the array with the AC junction box. (Refer to 3-12 Connecting Array of AC Modules-to-Distribution Panel guiding installers to make a transition cable from an extension cable) Seal the AC cable male or female connector of the last AC module using an appropriate end cap. End caps can be found in an extension cable.



If AC junction box is on the left of a 2-by-6 PV array in portrait orientation,





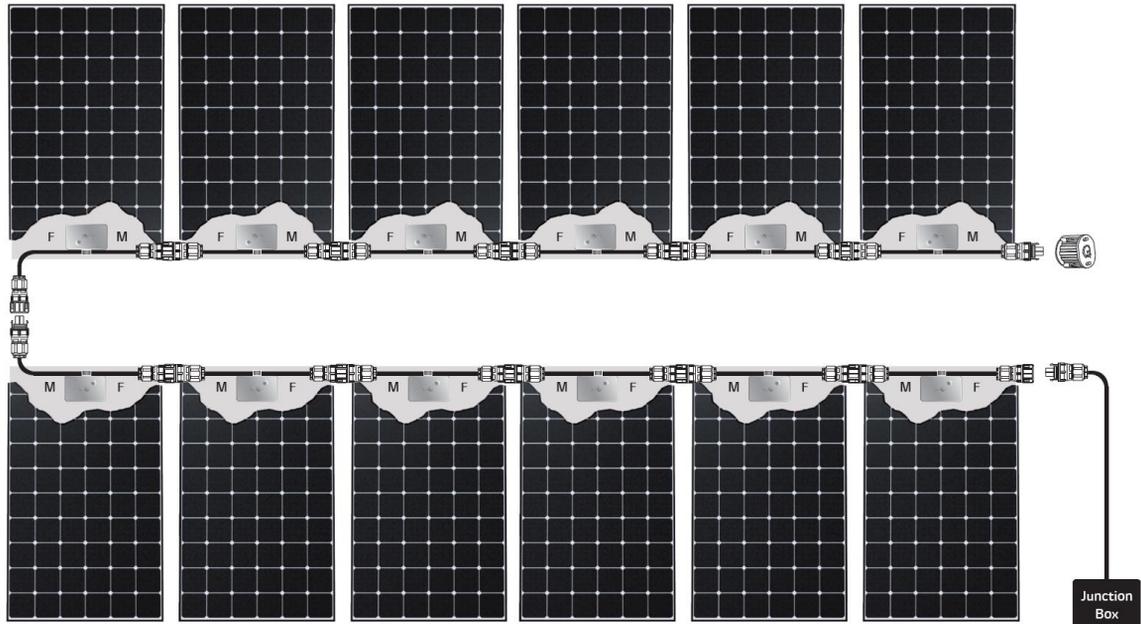
Possible combination of AC modules for array design

M Male connector

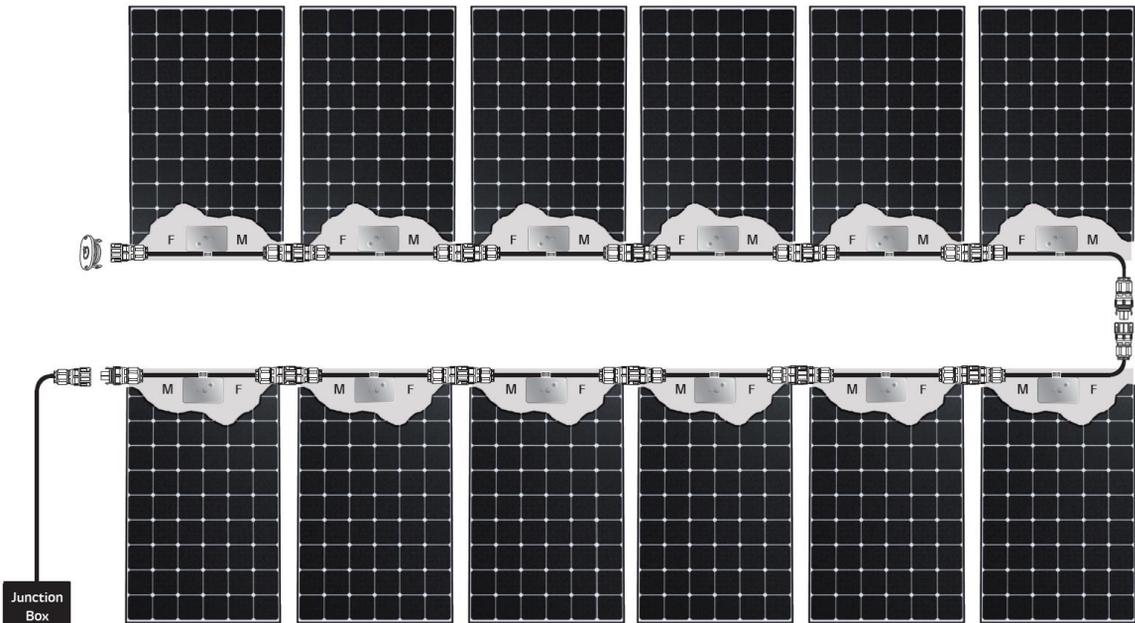
F Female connector

If AC junction box is on the right side of a 2-by-6 PV array in portrait orientation,

Use a proper transition cable for connecting the array with the AC junction box. (Refer to 3-12 Connecting Array of AC Modules-to-Distribution Panel guiding installers to make a transition cable from an extension cable) Seal the AC cable male or female connector of the last AC module using an appropriate end cap. End caps can be found in an extension cable.



If AC junction box is on the left of a 2-by-6 PV array in portrait orientation,





Possible combination of AC modules for array design

M Male connector

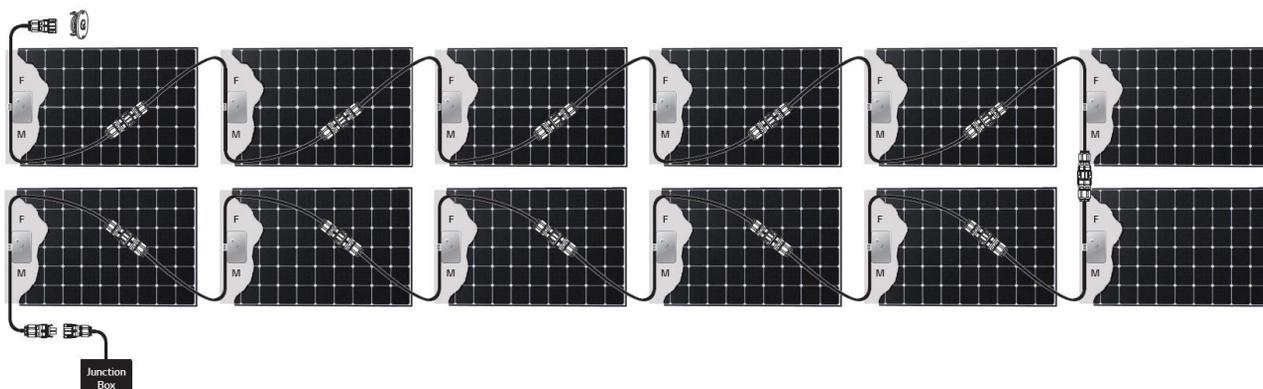
F Female connector

If AC junction box is on the right side of a 2-by-6 PV array in landscape orientation,

Use a proper transition cable for connecting the array with the AC junction box. (Refer to 3-12 Connecting Array of AC Modules-to-Distribution Panel guiding installers to make a transition cable from an extension cable) Seal the AC cable male or female connector of the last AC module using an appropriate end cap. End caps can be found in an extension cable.

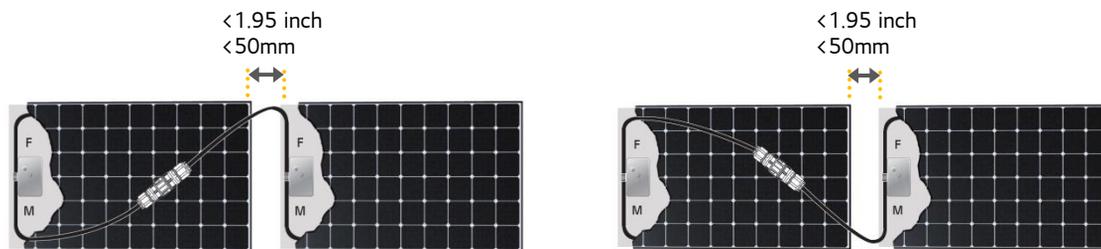


If AC junction box is on the left side of a 2-by-6 PV array in landscape orientation,



Requirement for the landscape formation.

Unlike a connection in a portrait orientation, two AC modules in a landscape orientation requires to be placed with a gap ranging from 0.24 inch (6mm) to 5.9 inch (150mm). Otherwise, the length of the AC cables is not enough for male and female connectors to be fully connected.



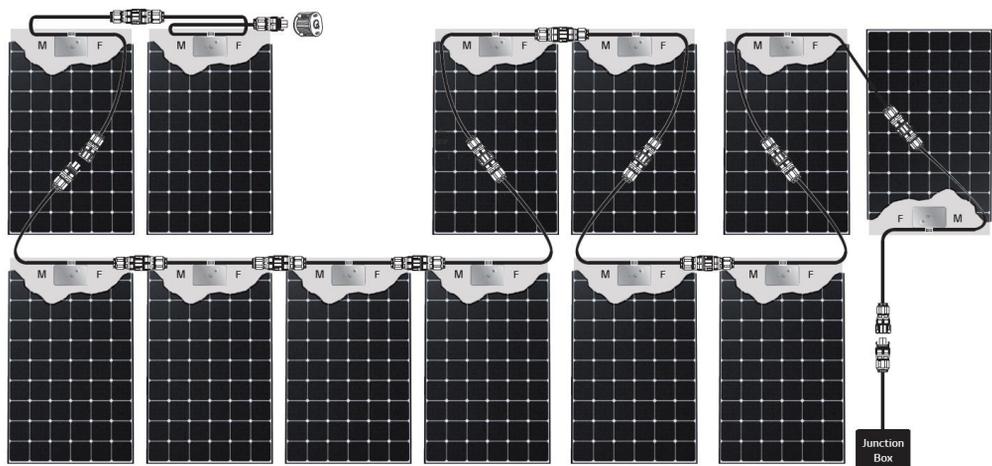


Possible combination of AC modules for array design

- M Male connector
- F Female connector

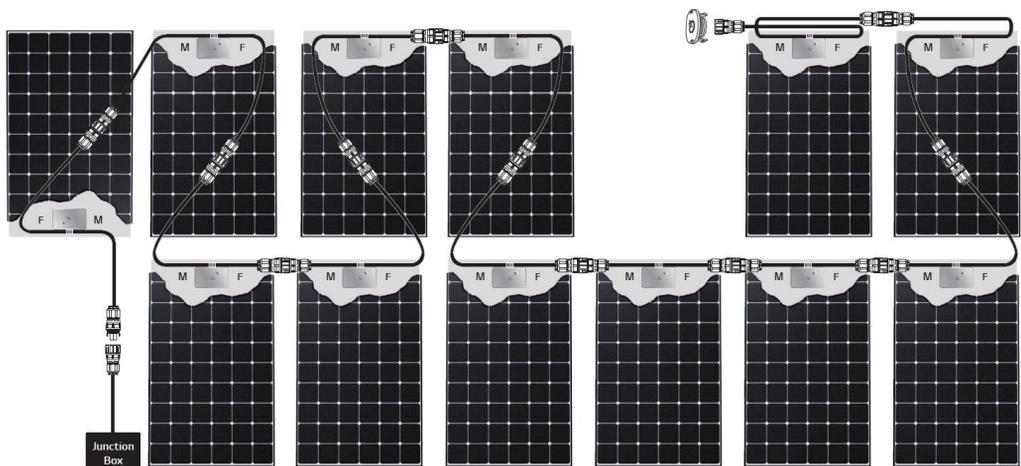
If AC junction box is on the right side of a 2-by-6 PV array in portrait orientation.

An example is described below for a case where a modification of the array design is inevitable because of a roof vent or other obstacles. The benefit of the AC module comes from a case where a connection of AC modules in reverse position can be achieved.



If AC junction box is on the left of a 2-by-6 PV array in portrait orientation.

Use a proper transition cable for connecting the array with the AC junction box. (Refer to 3-12 Connecting Array of AC Modules-to-Distribution Panel guiding installers to make a transition cable from an extension cable) Seal the AC cable male or female connector of the last AC module using an appropriate end cap. End caps can be found in an extension cable.



Requirement for the connection of AC modules in reverse position.

Unlike a general connection of AC modules in a portrait orientation, AC modules in a reverse position requires to be placed with a gap ranging from 0.24 inch (6mm) to 1.95 inch (50mm). Otherwise, the length of the AC cables is not enough for male and female connectors to be fully connected.





Possible combination of AC modules for array design

- M Male connector
- F Female connector

If AC junction box is on the right side of a 2-by-6 PV array in portrait orientation,

An example is described below for a case where a modification of the array design is inevitable because of a roof vent or other obstacles. The problem can be solved by using extension cables which are 63 inch (1600 mm) long. The extension cable connectors are provided with end caps. So apply unlocking tool to remove end caps from connectors.

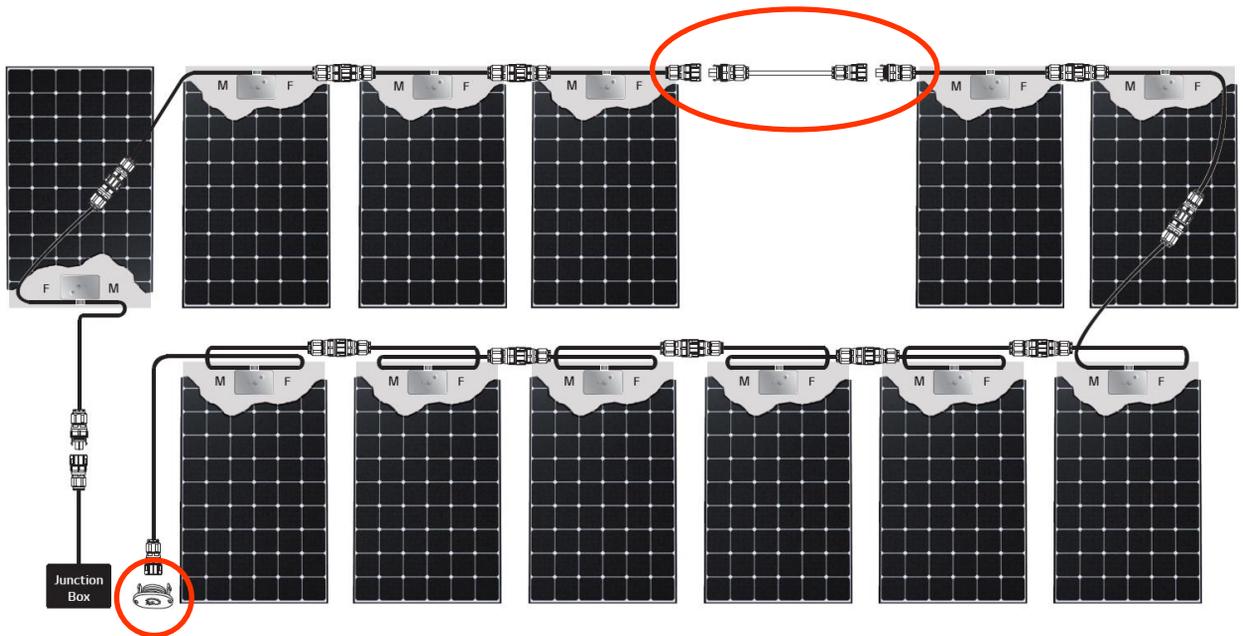


Extension Cable



Unlocking Tool

If AC junction box is on the left of a 2-by-6 PV array in portrait orientation,





3-11 Grounding

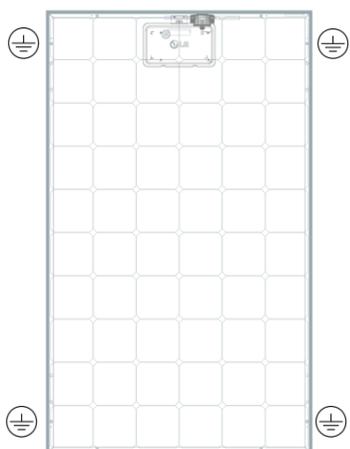
Check your information below before grounding.

Notice

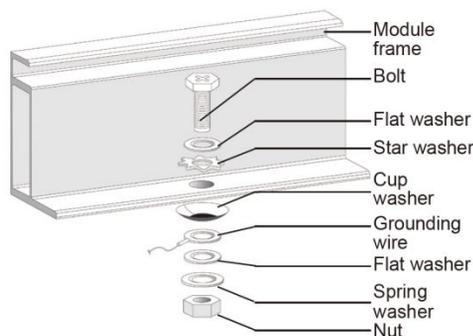
- Grounding is largely classified into equipment grounding and neutral grounding. The purpose of the equipment grounding is to prevent electric shock from contact with metal parts. Equipment grounding allows the abnormal current to flow from the equipment to the earth.
- The equipment grounding conductor and the neutral conductor are separated.
- Depending on the local code, connection between the equipment grounding conductor and the neutral conductor may be required in the distribution panel.
- In a place where lightning storms are frequent, an auxiliary grounding may need to be installed by installer. The path comes directly from the AC module system and goes to the ground.
- To form an effective equipment grounding path, do not make any unnecessary paths.
- Practice according to the local electricity code.
- A module with exposed conductive parts is considered to be in compliance with UL 1703 only when is electrically grounded in accordance with the instructions presented below and the requirements of the National Electrical Code.

Form the equipment grounding path from AC module to the grounded distribution panel with one connection in the following order:

- To form the effective grounding path, connect the one of points marked ⊕ of a AC module frame to the PV rack.
- To electrically connect, it recommends that you use one M4 stainless steel bolt, one nut, one spring washer, two flat washers, one cup washer and, one star washer. (Minimum torque : 4~5 N·m)



● Electric connection of the PV Rack and PV Module



- Connect an equipment grounding conductor from AC module arrays to AC junction box, to form one equipment grounding system. (For grounding method, refer to next page's **Samples for Grounding**)

※ The installation instructions shall include:

1. Wiring must be compliant with NEC Article 705.
2. Grounding methods must be compliant with NEC Article 250. Module array must be compliant with NEC Article 250 and the grounding method uses AC module frame.
3. CNL model instruction manuals shall also include a statement that installation shall be in accordance with CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, Part1.

WARNING



- Do not use bare-copper grounding lugs for grounding. The lugs can corrode which could result in a faulty ground circuit thereby, posing risk for electric shock, electrocution or fire hazard.

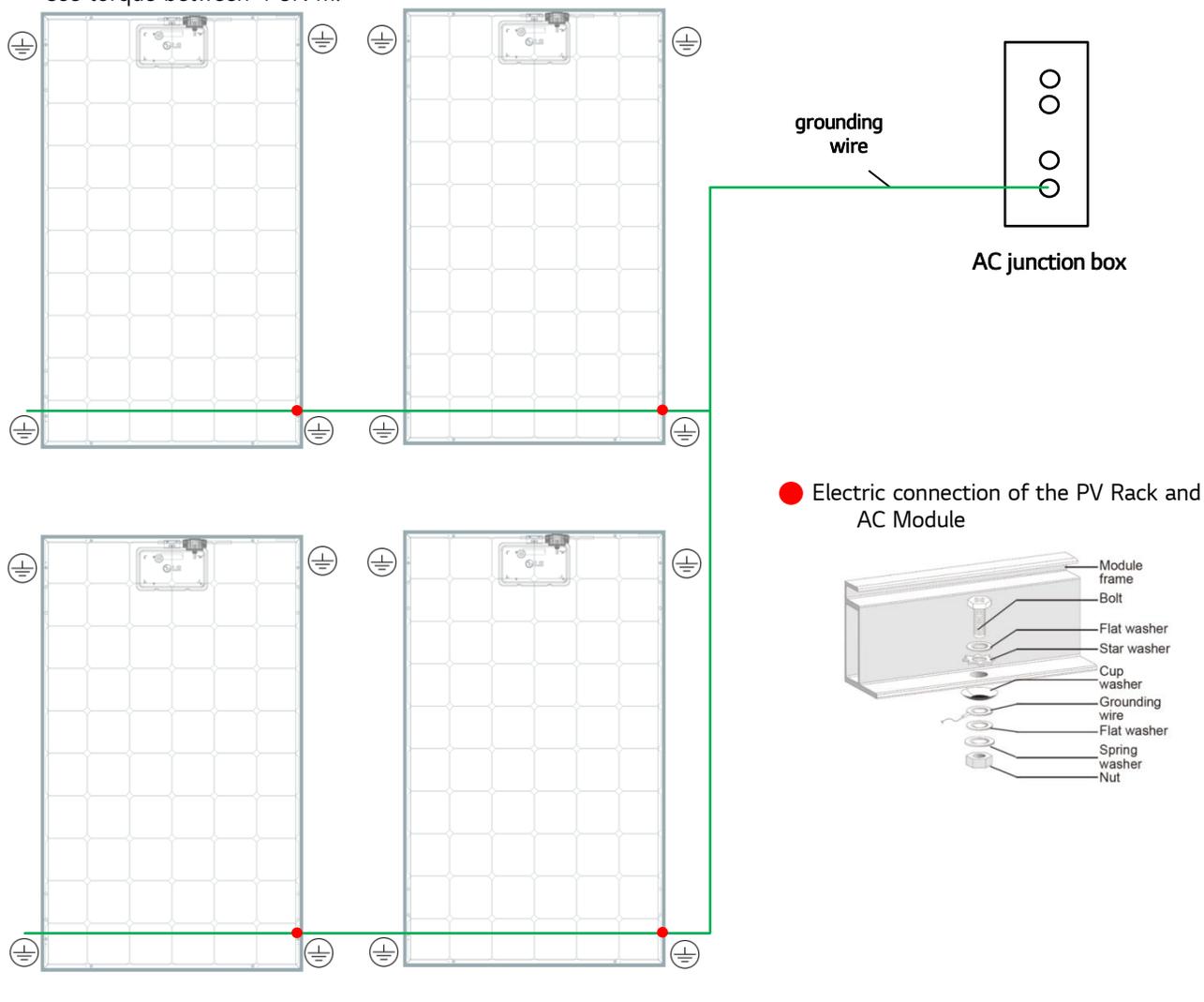


Samples for grounding

There is a sample for grounding method as described below.

Using ground holes on PV frames

- Determine the size of an external ground wire according to Article 690.45, NEC2014. (Grounding conductors smaller than 6 AWG shall be protected from physical damages.)
- All dead metal parts should be grounded through the connection of the PV module frame.
- Each grounding point on each PV frame is identified with ground symbol. The ground symbols are found on PV frame. This marking is etched directly into the aluminum frame.
- The combination of 2 flat washers, star washer, cup washer, spring washer and M4 size nut and bolt made of stainless steel is required in order to provide a reliable grounding connection to the module frame.
- Use torque between 4-5N•m.



- LG AC module includes DC cables in the module's internal wiring, so no grounding is required for DC input.
- LG AC Modules need to be grounded by using an external grounding equipment conductor. LG does not provide a grounding conductor.
- **The grounding method using ground holes on PV frame is tested and qualified by UL.**

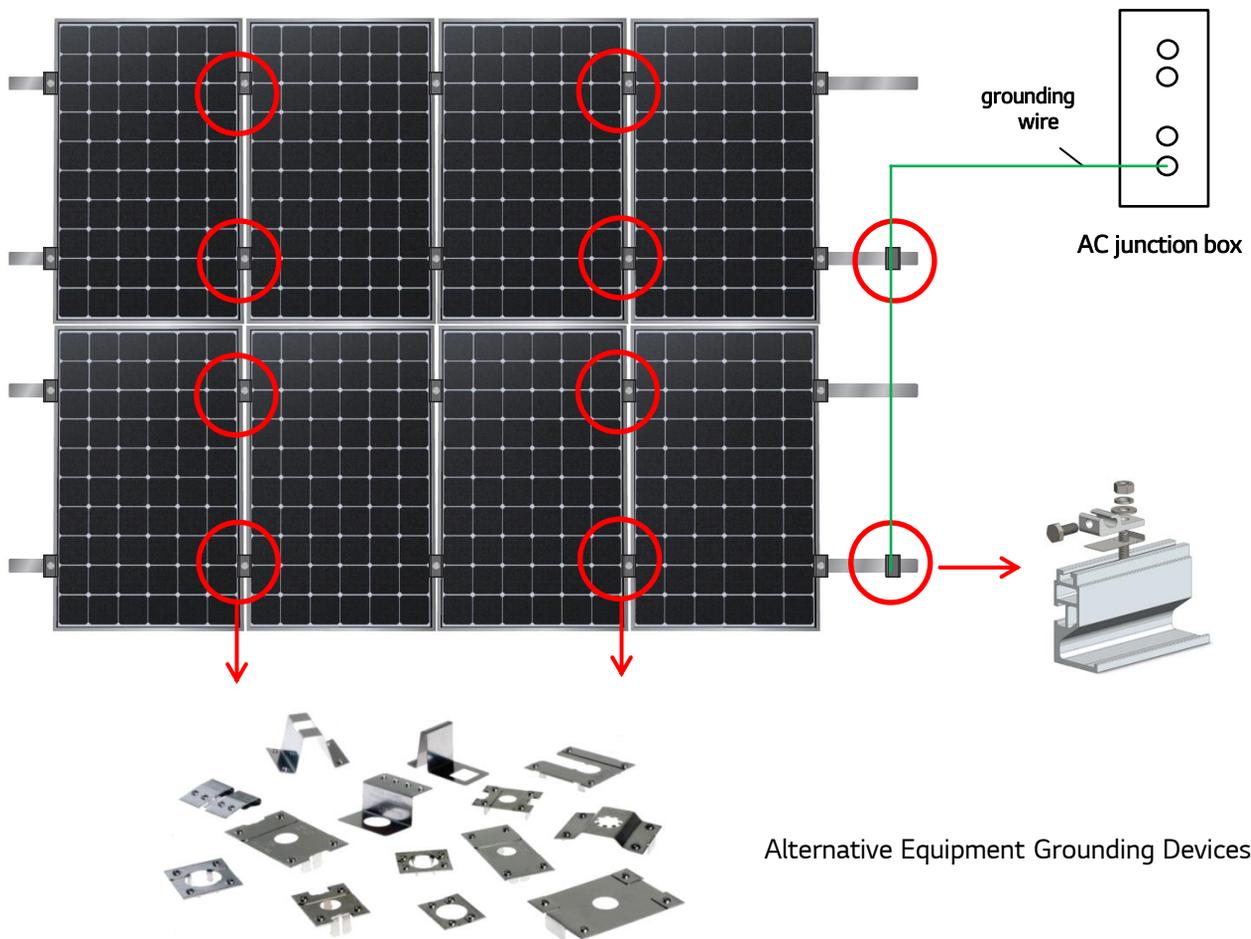


Samples for grounding

There is a sample for grounding method as described below.

Using alternative equipment grounding devices.

- Determine the size of an external ground wire according to Article 690.45, NEC2014.
- All dead metal parts should be grounded through the connection of the PV module frame.
- Alternative Equipment Grounding Devices are classified on a table at **Appendix 3 - Alternative Equipment Grounding Devices**.
- **Those methods and devices are not evaluated by UL.**
- These alternative grounding devices indicated on the appendix has been evaluated and approved by LG, not by UL.
- Please follow installation manual for the grounding devices provided by its manufacturer.



- ※ The NEC section 690.43 states that "Exposed non-current carrying metal parts of module frames, equipment, and conductor enclosures shall be grounded in accordance with 250.134 or 250.136(A) regardless of voltage."
- ※ The devices are intended for single use only. Functionality will not be guaranteed if reused.



- These alternative grounding devices indicated on the appendix has been evaluated and approved by LG, not by UL.
- Please refer to **Appendix 3 - Alternative Equipment Grounding Devices** for alternative equipment grounding devices.



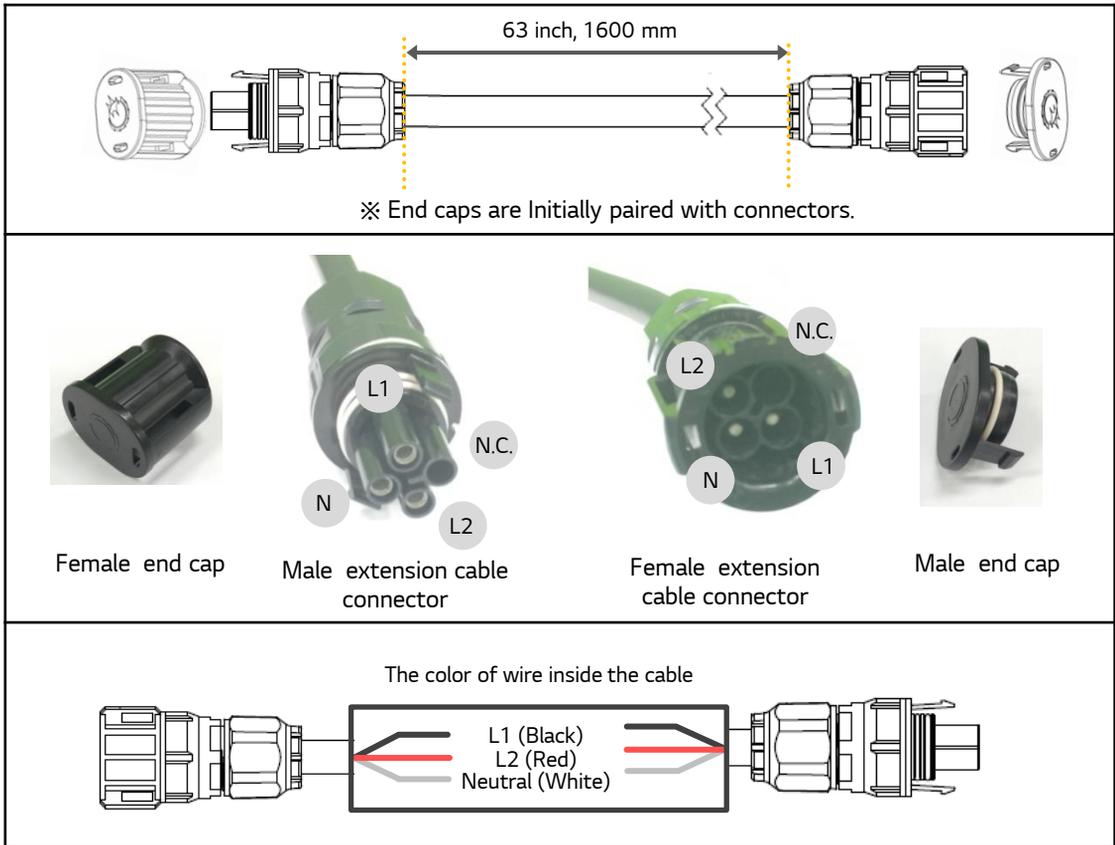
3-12 Connecting Array of AC Modules to Distribution Panel

Before connecting general AC cable from the AC junction box to distribution panel, adhere to the following items:

Notice

- To prevent the danger of electric shock, check again if the circuit breaker is surely turned off.
- LG does not provide separate general AC wiring coming from the distribution panel to an AC junction box.
- Undertake the Installation works using certified parts and tools.
- Do not put any liquid or metal into connectors, cables, or end caps. There is a danger of electric shock.
- Do not use any damaged cables.
- Do not use general AC conductors smaller than size of AC cables provided by LG.

Extension cable (serviceable as a transition cable)



Each conductor can be identified by the color of wire.
N.C. means 'No Connection'.

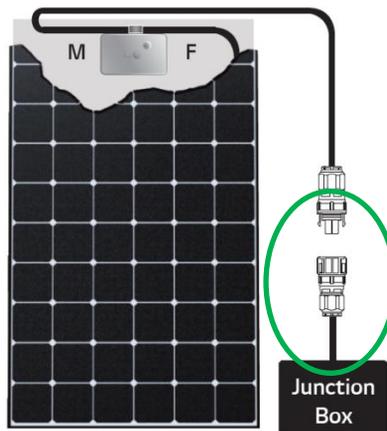
WARNING



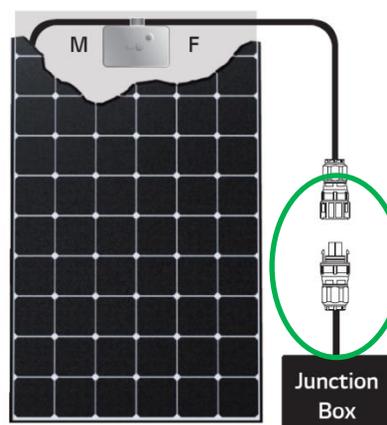
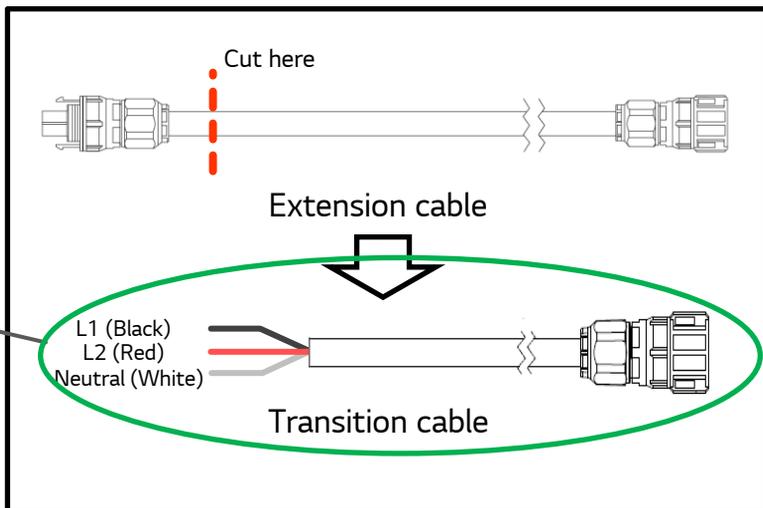
- To prevent property damage or danger to human life by fire or explosion, do not connect any consumable device between AC module and the circuit breaker.
- To prevent the danger of the electric shock, make sure to turn off the circuit breaker.



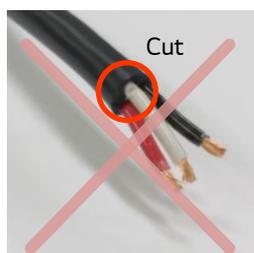
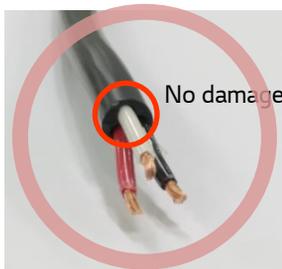
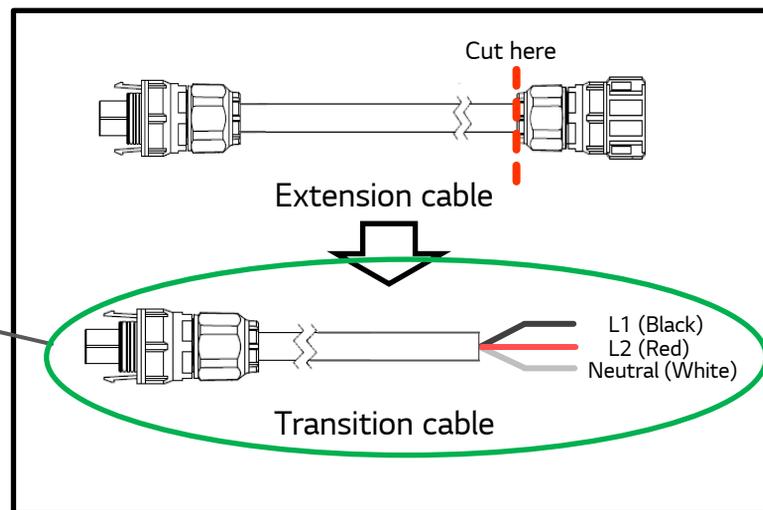
Adjust an extension cable for junction box configuration



※ Use a proper transition cable for the first AC module connector.



※ Use a proper transition cable for the first AC module connector.



※ Use appropriate tools for stripping the outer insulation of the extension cable and the inner three wire's insulation.

WARNING



- When you cut the extension cable, please be careful about the L1, L2, Neutral wire's insulation from getting cut. Damages on the cable can be a cause of electrical short leading to a fire.
- To prevent the danger of the electric shock, make sure to turn off the circuit breaker.
- Attach the AC Cable to the PV racks using the cable clips. Keep the AC cables away from the ground surface or the roof.



- All of AC cable connectors must be installed underneath the module, out of rain and sun. Do not leave AC cable connectors in an environment of long-term exposure to direct sunlight or rain.
- AC wiring from the junction box to the distribution panel should be protected by a conduit.

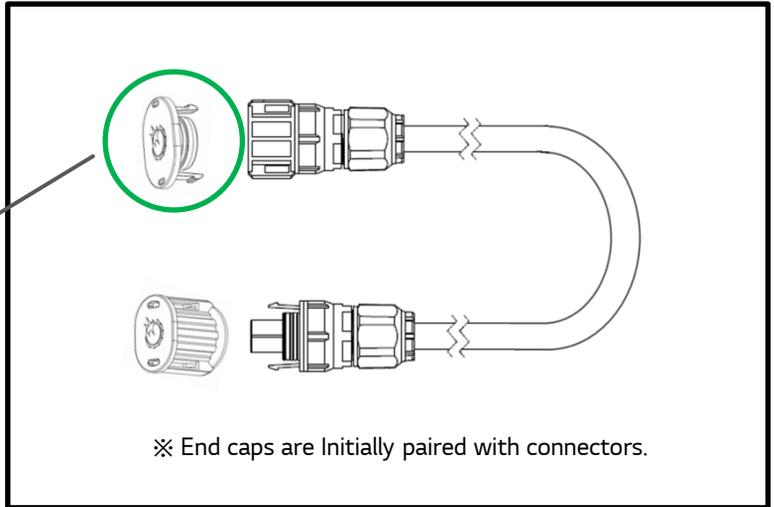


Sealing the last AC module connector

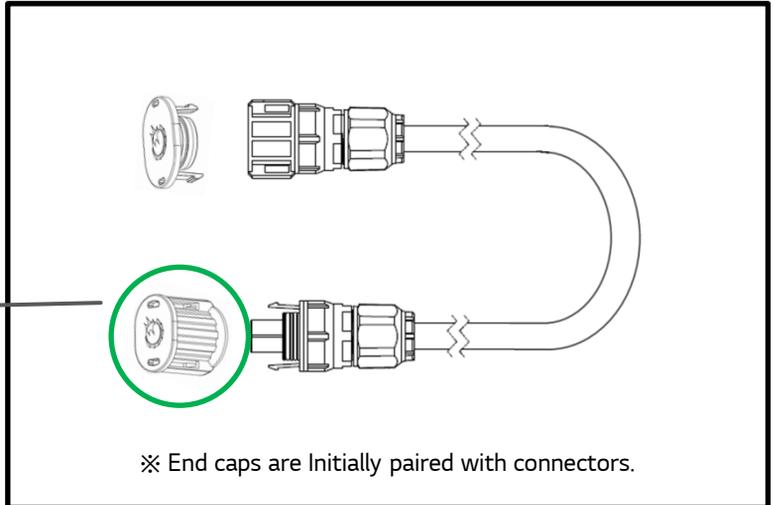
The AC cable connector of the last AC module should be sealed for weather proof function. End caps are initially paired with connectors. Installers can use suitable end cap for different type of connector at the last AC module.



※ Use a proper end cap for the last AC module connector.



※ Use a proper end cap for the last AC module connector.



※ Use unlocking tool for getting an end cap from a connector. Refer to **3-8 Coupling AC cable Connectors**.

WARNING



- To prevent property damage or danger to human life by fire or explosion, do not connect any consumable device between AC module and the circuit breaker.

- To prevent the danger of the electric shock, make sure to turn off the circuit breaker.

- Attach the AC Cable to the PV racks using the cable clips. Keep the AC cables away from the ground surface or the roof.



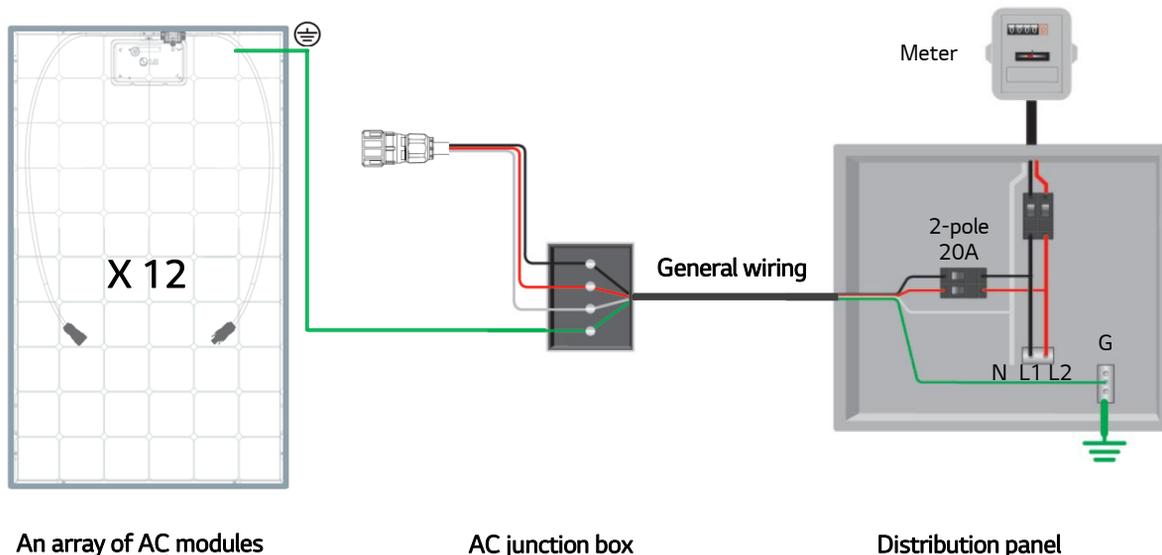
- All of AC cable connectors must be installed underneath the module, out of rain and sun. Do not leave AC cable connectors in an environment of long-term exposure to direct sunlight or rain.
- AC cables from the junction box to the distribution panel should be protected by a conduit.



Connect the general AC cables in the following order:

AC output single phase 240VAC

There is a sample for AC output cables connection of single phase 240VAC below. The micro inverter is compatible with 240VAC/120VAC and 208VAC/120VAC. No additional setting is required.



An array of AC modules

AC junction box

Distribution panel

transition cable		
Conductor	Color	Description
L1	Black	Line to neutral voltage 120VAC
L2	Red	Line to neutral voltage 120VAC
Neutral	White	Neutral between L1 and L2
External Equipment Grounding Conductor (Array ↔ AC junction box)		
Ground	Green	Conductor to connect normally non-current carrying metal parts of equipment together
General wiring		
L1	Black	Line to neutral voltage 120VAC
L2	Red	Line to neutral voltage 120VAC
L1-L2	-	Line to line voltage 240VAC
Neutral	White	Neutral between L1 and L2
Ground	Green	Conductor to connect normally non-current carrying metal parts of equipment together

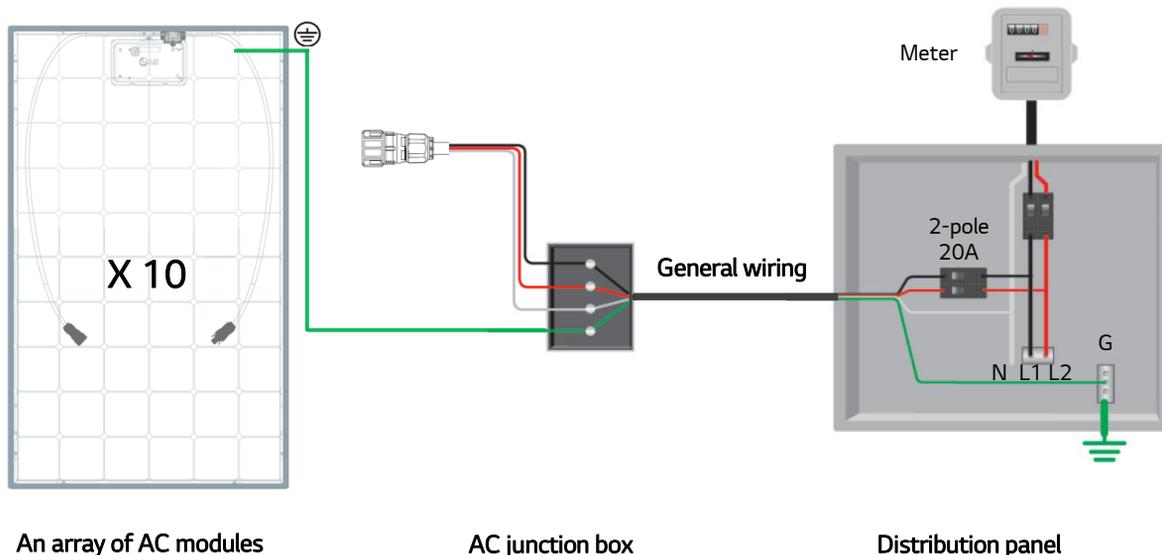
- Step 1. Check your distribution panel for figuring out what type of AC distribution system you have. Use a volt-meter to find out the phase and line-to-line voltage across L1, L2 and neutral. If the AC distribution system have 240VAC for L1-L2 and 120VAC for L1-N and L2-N, the AC modules should not be connected more than 12 AC modules per a 2-pole 20AMP circuit breaker as described above.
- Step 2. Install an AC junction box on an appropriate position for a transition cable to reach to the last AC module. If necessary, move the AC junction box close to the last AC module.
- Step 3. Check the extension/transition cables to verify they have not been pulled too tight or are hanging too loose. Attach cables on a structure like PV racks or rails using the cable clips. Also, place extension/transition cables or AC cables under a structure so that wires can avoid direct sunlight exposure and water immersion.
- Step 4. Connect the equipment grounding conductor from all of the AC modules to the AC junction box connecting to the distribution panel.
- Step 5. Make sure that a conduit or a small pipe protects wires from the AC junction box to the distribution panel from rain, snow or direct sunlight.



Connect the general AC cables in the following order:

AC output single phase 208VAC

There is a sample for AC output cables connection of single phase 208VAC below. The micro inverter is compatible with 240VAC/120VAC and 208VAC/120VAC. No additional setting is required.



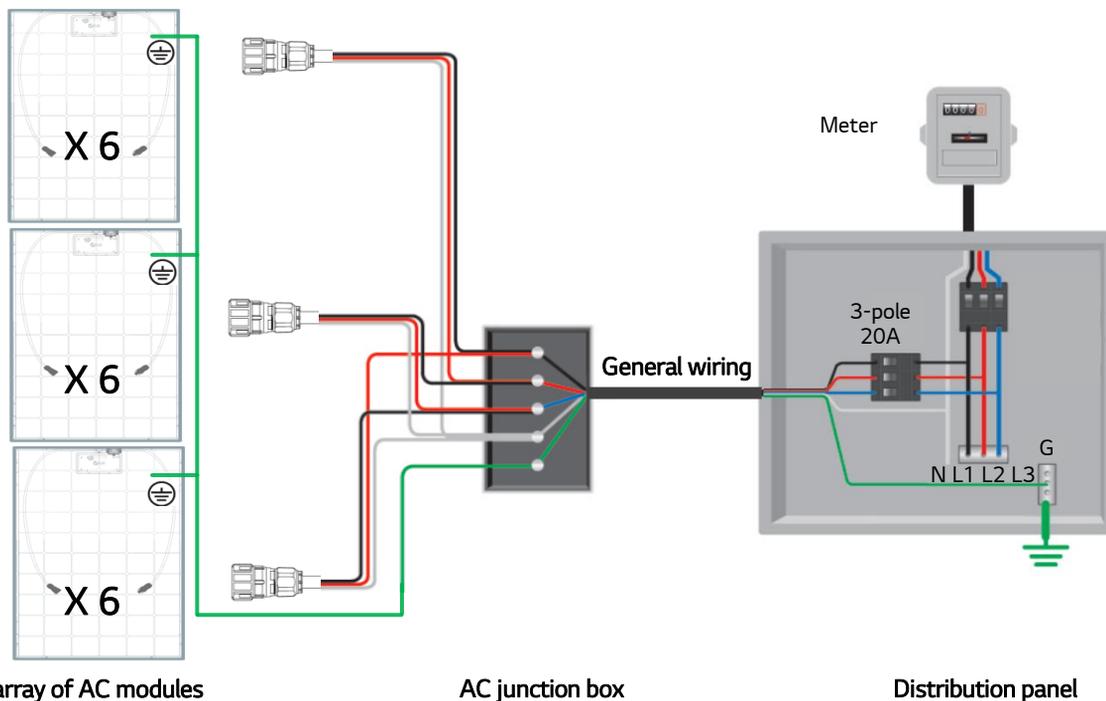
transition cable		
Conductor	Color	Description
L1	Black	Line to neutral voltage 120VAC
L2	Red	Line to neutral voltage 120VAC
Neutral	White	Neutral between L1 and L2
External Equipment Grounding Conductor (Array ↔ AC junction box)		
Ground	Green	Conductor to connect normally non-current carrying metal parts of equipment together
General wiring		
L1	Black	Line to neutral voltage 120VAC
L2	Red	Line to neutral voltage 120VAC
L1-L2	-	Line to line voltage 208VAC
Neutral	White	Neutral between L1 and L2
Ground	Green	Conductor to connect normally non-current carrying metal parts of equipment together

- Step 1. Check your distribution panel for figuring out what type of AC distribution system you have. Use a volt-meter to find out the phase and line-to-line voltage across L1, L2 and neutral. If the AC distribution system have 208VAC for L1-L2 and 120VAC for L1-N and L2-N, the AC modules should not be connected more than 10 AC modules per a 2-pole 20AMP circuit breaker as described above.
- Step 2. Install an AC junction box on an appropriate position for a transition cable to reach to the last AC module. If necessary, move the AC junction box close to the last AC module.
- Step 3. Check the extension/transition cables to verify they have not been pulled too tight or are hanging too loose. Attach cables on a structure like PV racks or rails using the cable clips. Also, place extension/transition cables or AC cables under a structure so that wires can avoid direct sunlight exposure and water immersion.
- Step 4. Connect the equipment grounding conductor from all of the AC modules to the AC junction box connecting to the distribution panel.
- Step 5. Make sure that a conduit or a small pipe protects wires from the AC junction box to the distribution panel from rain, snow or direct sunlight.



AC output three phase 208VAC -merge type

To form balanced three phases, it is recommended to use 3-array and equal to the number of AC modules in each array . Here is a sample for AC output cables connected to three phase 208VAC below.



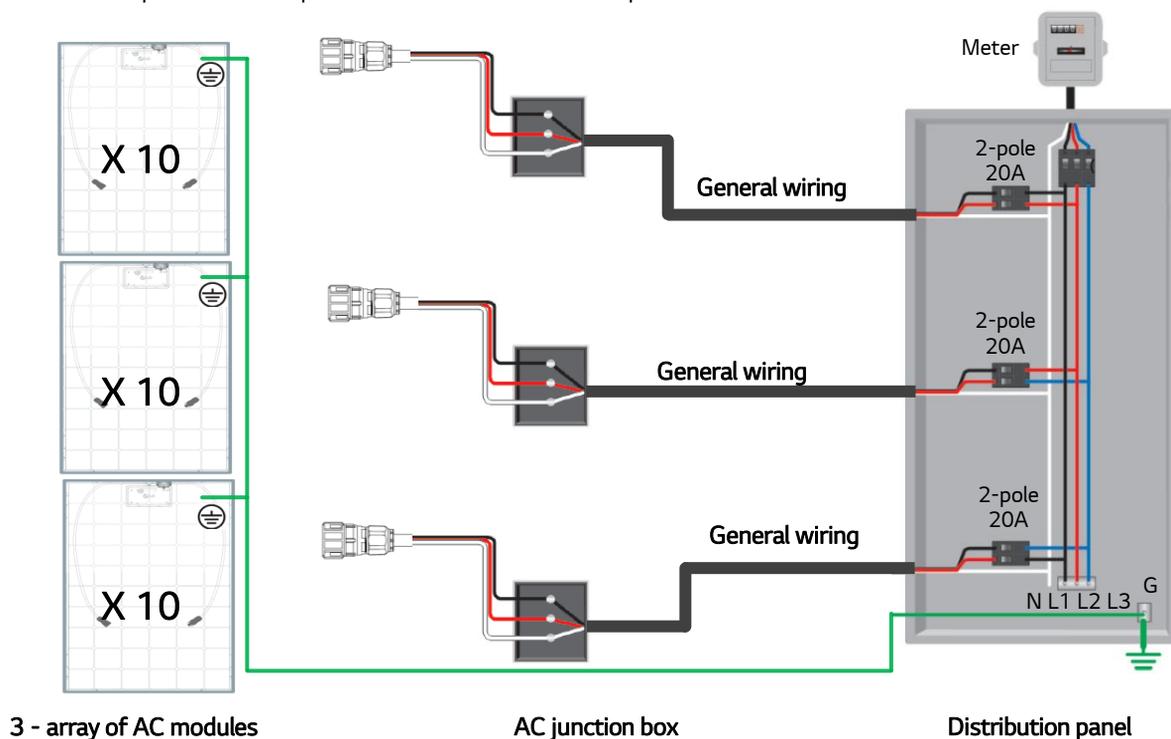
transition cable		
Conductor	Color	Description
L1	Black	Line to neutral voltage 120VAC
L2	Red	Line to neutral voltage 120VAC
Neutral	White	Neutral between L1 and L2
External Equipment Grounding Conductor (Array ↔ AC junction box)		
Ground	Green	Conductor to connect normally non-current carrying metal parts of equipment together
General wiring		
L1	Black	Line to neutral voltage 120VAC
L2	Red	Line to neutral voltage 120VAC
L3	Blue	Line to neutral voltage 120VAC
L1-L2	-	Line to line voltage 208VAC
L2-L3	-	Line to line voltage 208VAC
L3-L1	-	Line to line voltage 208VAC
Neutral	White	Neutral between L1 and L2
Ground	Green	Conductor to connect normally non-current carrying metal parts of equipment together

- Step 1. Check your distribution panel for figuring out what type of AC distribution system you have. Use a volt-meter to find out the phase and line-to-line voltage across L1, L2 and neutral. If the AC distribution system have 208VAC for L1-L2 and 120VAC for L1-N and L2-N, the AC modules should not be connected more than 18 AC modules for the three phase system having one 3-pole 20AMP circuit breaker at the distribution panel. And do not exceed 6 AC modules per phase.
- Step 2. Install an AC junction box on an appropriate position for a transition cable to reach to the last AC module. If necessary, move the AC junction box close to the last AC modules.
- Step 3. Check extension/transition cables to verify they have not been pulled too tight or are hanging too loose. Attach cables on a structure like PV racks or rails using the cable clips. Also, place extension/transition cables or AC cables under a structure so that wires can avoid direct sunlight exposure and water immersion.
- Step 4. Connect the equipment grounding conductor from all of the AC modules to the AC junction box ending to the distribution panel.
- Step 5. Make sure that a conduit or a small pipe protects wires from the AC junction box to the distribution panel from rain, snow or direct sunlight.



AC output three phase 208VAC –split type

To form balanced three phases, it is recommended to use 3-array and equal to the number of AC modules in each array . There is one of samples for AC output cables connection of three phase 208VAC below.



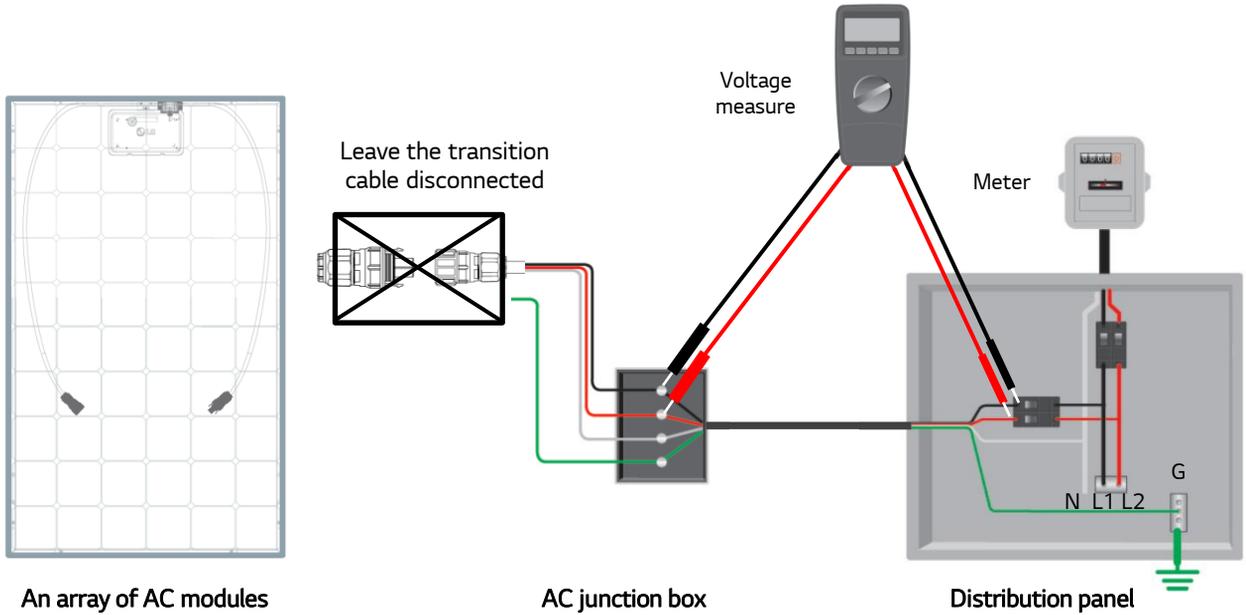
transition cable		
Conductor	Color	Description
L1	Black	Line to neutral voltage 120VAC
L2	Red	Line to neutral voltage 120VAC
Neutral	White	Neutral between L1 and L2
External Equipment Grounding Conductor (Array ↔ AC junction box)		
Ground	Green	Conductor to connect normally non-current carrying metal parts of equipment together
General wiring		
L1	Black	Line to neutral voltage 120VAC
L2	Red	Line to neutral voltage 120VAC
L3	Blue	Line to neutral voltage 120VAC
L1-L2	-	Line to line voltage 208VAC
L2-L3	-	Line to line voltage 208VAC
L3-L1	-	Line to line voltage 208VAC
Neutral	White	Neutral between L1 and L2
Ground	Green	Conductor to connect normally non-current carrying metal parts of equipment together

- Step 1. Check your distribution panel for figuring out what type of AC distribution system you have. Use a volt-meter to find out the phase and line-to-line voltage across L1, L2 and neutral. If the AC distribution system have 208VAC for L1-L2 and 120VAC for L1-N and L2-N, the AC modules should not be connected more than 10 AC modules for one 2-pole 20AMP circuit breaker at the distribution panel.
- Step 2. Install an AC junction box on an appropriate position for a transition cable to reach to the last AC module. If necessary, move the AC junction box close to the last AC modules.
- Step 3. Check extension/transition cables to verify they have not been pulled too tight or are hanging too loose. Attach cables on a structure like PV racks or rails using the cable clips. Also, place extension/transition cables or AC cables under a structure so that wires can avoid direct sunlight exposure and water immersion.
- Step 4. Connect the equipment grounding conductor from all of the AC modules to the AC junction box ending to the distribution panel.
- Step 5. Make sure that a conduit or a small pipe protects wires from the AC junction box to the distribution panel from rain, snow or direct sunlight.



3-13 Grid Voltage Measurement

Measure AC voltage of the utility at the distribution panel and AC junction box using a volt-meter. Fill out the below table. If the measured voltage is out of the range which is specified in each table, then ask to local electricity provider regarding voltage instability.



At distribution panel

Measure point	Single Phase 240V(RMS)			Single Phase 208V(RMS)			Three Phase 208V(RMS) Merge, Split Type		
	Expected	Range	Measured	Expected	Range	Measured	Expected	Range	Measured
L1 - N	120	106~132		120	106~132		120	106~132	
L2 - N	120	106~132		120	106~132		120	106~132	
L3 - N	-			-			120	106~132	
L1 - L2	240	211~264		208	183~229		208	183~229	
L2 - L3	-						208	183~229	
L3 - L1	-						208	183~229	

At AC junction box

Measure point	Single Phase 240V(RMS)			Single Phase 208V(RMS)			Three Phase 208V(RMS) Merge, Split Type		
	Expected	Range	Measured	Expected	Range	Measured	Expected	Range	Measured
L1 - N	120	106~132		120	106~132		120	106~132	
L2 - N	120	106~132		120	106~132		120	106~132	
L3 - N	-			-			120	106~132	
L1 - L2	240	211~264		208	183~229		208	183~229	
L2 - L3	-						208	183~229	
L3 - L1	-						208	183~229	

⚠ WARNING

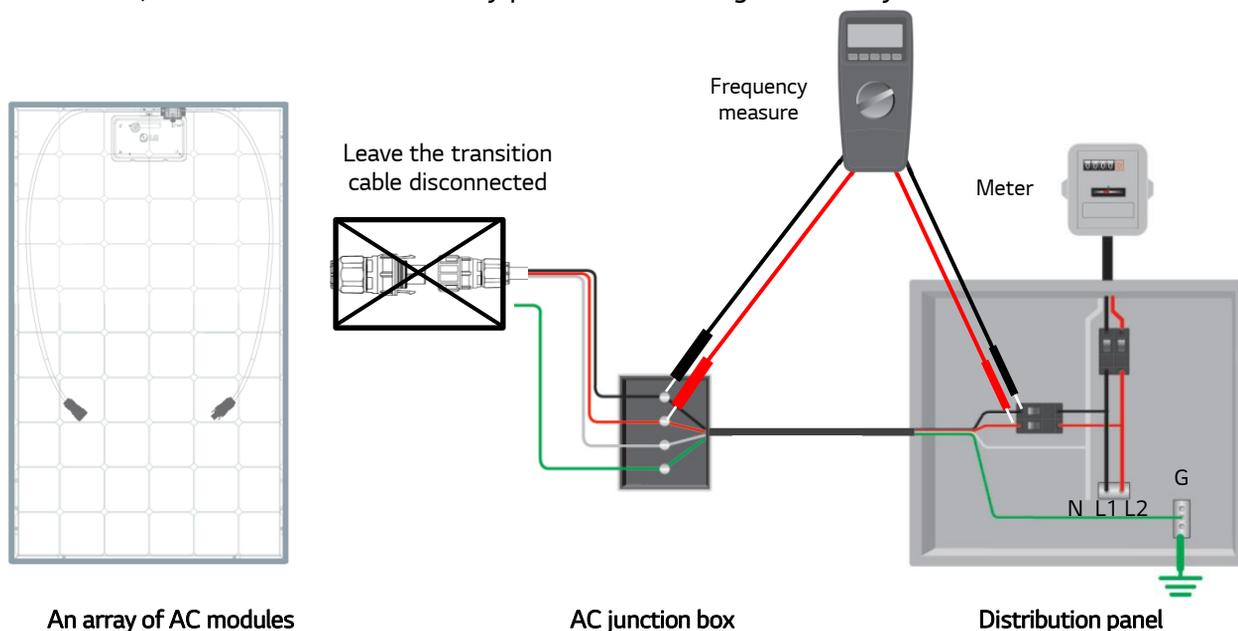


- Plan the installation work in moderate weather. There is a risk of electric shock when it is raining or snowing.
- To prevent the risk of accidents, use proper PPE (Personnel Protective Equipment) including helmets and gloves at all times.
- If installation location is high above ground, make sure to use Fall Protection System during the installation.
- For safety, only qualified personnel should service the work.



3-14 Grid Frequency Measurement

Measure grid frequency of the utility at the distribution panel and AC junction box using a volt-meter. Fill out the below table. If the measured voltage is out of the range which is specified in each table, then ask to local electricity provider for voltage instability.



At distribution panel

Measure point	Single Phase 240V(RMS)			Single Phase 208V(RMS)			Three Phase 208V(RMS) Merge, Split Type		
	Expected	Range	Measured	Expected	Range	Measured	Expected	Range	Measured
L1 - N	60Hz	59.4-60.4		60Hz	59.4-60.4		60Hz	59.4-60.4	
L2 - N	60Hz	59.4-60.4		60Hz	59.4-60.4		60Hz	59.4-60.4	
L3 - N	-			-			60Hz	59.4-60.4	
L1 - L2	60Hz	59.4-60.4		60Hz	59.4-60.4		60Hz	59.4-60.4	
L2 - L3	-						60Hz	59.4-60.4	
L3 - L1	-						60Hz	59.4-60.4	

At AC junction box

Measure point	Single Phase 240V(RMS)			Single Phase 208V(RMS)			Three Phase 208V(RMS) Merge, Split Type		
	Expected	Range	Measured	Expected	Range	Measured	Expected	Range	Measured
L1 - N	60Hz	59.4-60.4		60Hz	59.4-60.4		60Hz	59.4-60.4	
L2 - N	60Hz	59.4-60.4		60Hz	59.4-60.4		60Hz	59.4-60.4	
L3 - N	-			-			60Hz	59.4-60.4	
L1 - L2	60Hz	59.4-60.4		60Hz	59.4-60.4		60Hz	59.4-60.4	
L2 - L3	-						60Hz	59.4-60.4	
L3 - L1	-						60Hz	59.4-60.4	

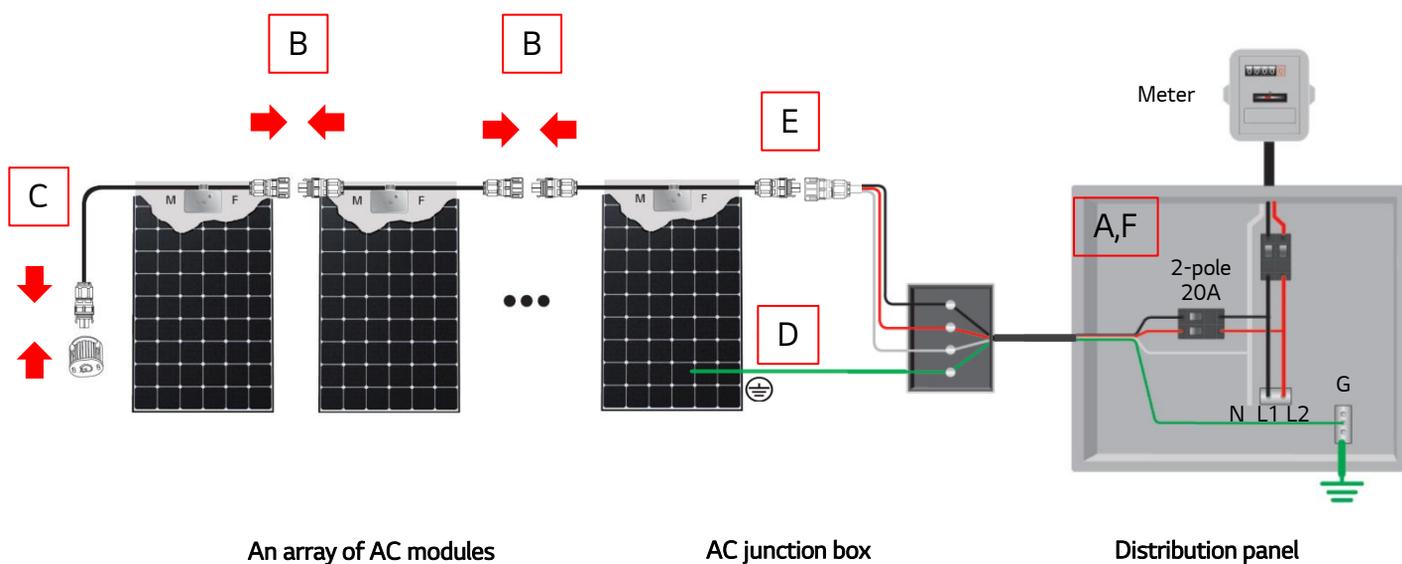
⚠ WARNING



- Plan the installation work in moderate weather. There is a risk of electric shock when it is raining or snowing.
- To prevent the risk of accidents, use proper PPE (Personnel Protective Equipment) including helmets and gloves at all times.
- If installation location is high above ground, make sure to use Fall Protection System during the installation.
- For safety, only qualified personnel should service the work.



3-15 Energize the installed AC module system



- A. Make sure that the branch circuit breaker is initially turned off.
- B. Check whether all of AC cable connectors are properly engaged. Refer to **3-8 Coupling AC cable connectors** and **3-9 Building an array of AC modules**.
- C. Confirm that the last AC module's cable connector is appropriately sealed with an end cap.
- D. Ensure grounding wire connects all of AC module running to grounded distribution panel. Refer to **3-11 Grounding**.
- E. Engage the AC cable connector of the last AC module with connector of the transition cable which can be manually made from an extension cable.
- F. Turn on the circuit breaker. After approximately 6 min., the AC module system will be producing power if sunlight is sufficient.

WARNING



- Plan the installation work in moderate weather. There is a risk of electric shock when it is raining or snowing.
- To prevent the risk of accidents, use proper PPE (Personnel Protective Equipment) including helmets and gloves at all times.
- If installation location is high above ground, make sure to use Fall Protection System during the installation.
- For safety, only qualified personnel should service the work.



3-16 Lightning and Surge Protection

Surge protection of AC module system is recommended

Surge is a harmful factor that occurs environmentally, such as lightning, motors, and electrical appliances. Protection from lightning and overvoltage surges may be required for various reasons.

Surge protection (SPD) is a must when installed in the location of some types of buildings or systems (e.g. hospitals, telecommunications equipment buildings, buildings with motors and electrical devices over tens of kW).

✓ Surge protection

The AC Module has a built-in surge protection circuit. However, the device may be damaged if an external surge occurs that exceeds the built-in protection function. The Micro-inverter's surge protection circuit is designed to work for a surge, and Fuse may blow if excess energy is introduced. So it is recommended to protect your system with surge protection circuit (SPD) from lightning or excess energy.

✓ Lightning protection

Lightning energy, one of the causes of surge, is very large and can damage the PV system. Therefore, you need an external protective device that redirects the lightning energy to the ground, and it is recommended to install it. External protection devices include lightning rods and grounding systems. Protection against lightning and resulting voltage surge must be in accordance with local standards.

What is SPD (Surge Protection Device) device ?

- ✓ SPD is a device designed to reduce very the voltage in the short time when excessive voltage is applied. This is to prevent the connected device by the surge.

SPD recommended specifications

- ✓ It is recommended to install SPD Type 2 Surge Protector or equivalent product for system protection. Install in accordance with SPD vendor instructions..



4 Communication

After completing the installation of AC modules on the rooftop or other site, next step is to install the communication gateway (EnerBox2). Before installing the gateway, adhere to the following notices:

- For reliable communication, it is recommended for the gateway (EnerBox2) to be directly installed to an outlet which is electrically connected to the distribution panel where the AC modules are attached also.
- To avoid damage and failure of the gateway, do not use at temperatures outside of 0 ~ 40°C (32 ~ 104°F).
- To avoid damage of the gateway, install the gateway in an environmentally protected location.
- To avoid malfunction of the gateway, be sure to use only the enclosed adapter and cables.
- To avoid risk of the electric shock, do not disassemble or expose to pressure.
- To avoid risk of the electric shock, do not bend or cut cables used to connect to the gateway.
- Do not expose to water.
- Only clean with a dry cloth.
- The gateway will not log energy production if the power of the gateway (EnerBox2) is off or AC cable and PLC (Power Line Communication) are disconnected. So, keep the gateway on always.

⚠ WARNING

- EnerBox2 warranty void if cover removed. No serviceable parts inside.
- To avoid communication interference, do not connect the product to surge protector or surge protector-embedded power strips.
- It is recommended the gateway is directly connected to a 120VAC outlet.
- There may be a difference between the value of displayed in the monitoring and Actual power generation. (It cannot be used for measurement purposes.)



⚠ WARNING : This product can expose you to chemicals including carbon black, which is known to the State of California to cause cancer, and DINP, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

⚠ WARNING : Cancer and Reproductive Harm - www.P65Warnings.ca.gov.



4-1 EnerBox2 Components

After completing the installation of AC modules on the rooftop or other site, next step is to install the communication gateway(EnerBox2) which enables home owners and installers to monitor power production of individual AC module or the entire array on a daily, monthly or an annual basis. The communication system is simple to connect the gateway with AC modules and an internet router. Power Line Communication (PLC) method facilitates communication between the gateway and AC modules. Then the gateway collecting energy and performance data from the AC modules in real time transmits the accumulated log data to a web server through an internet router.



1. EnerBox2 Front-side



2. EnerBox2 left-side



3. EnerBox2 bottom-side



4. EnerBox2 Power-cable



5. LAN cable

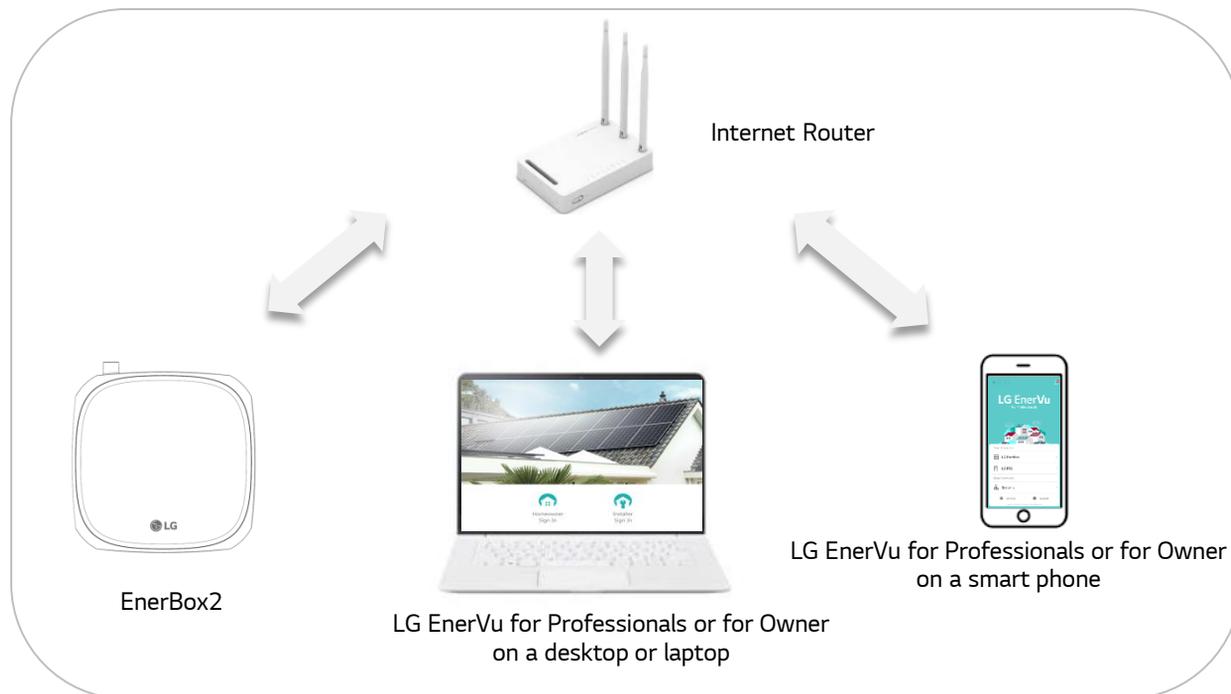


6. Wall mount bracket



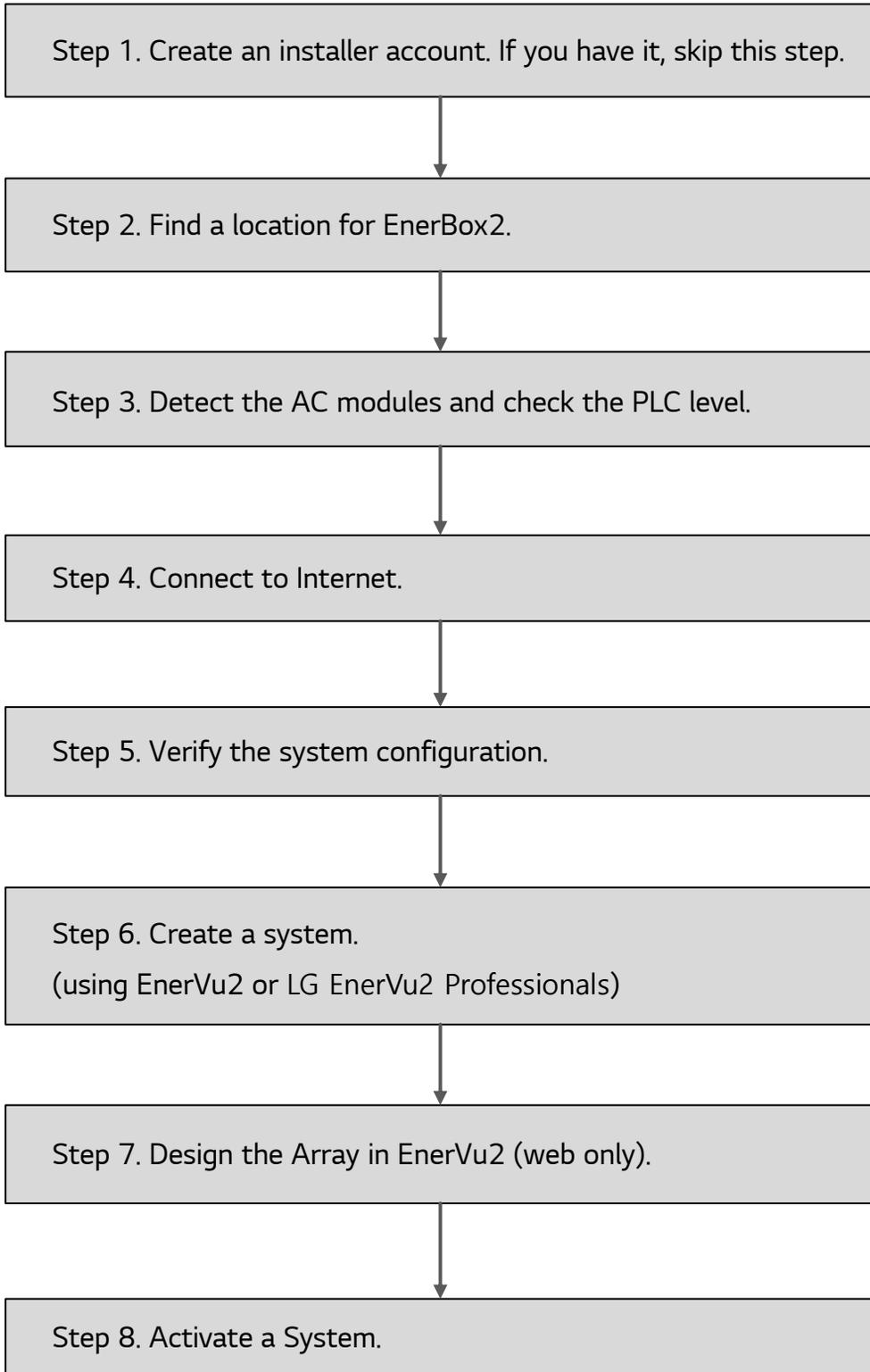
7. Wall mount bracket screws

4-2 Simple Diagram for Communication System Configuration





4-3 EnerBox2 installation procedure



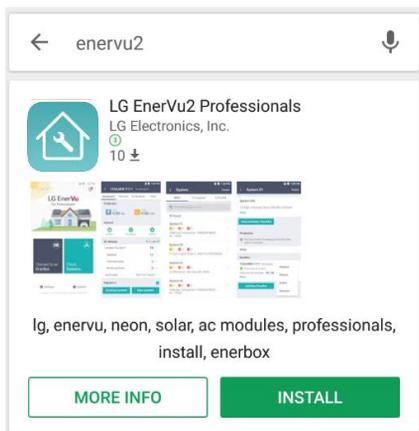
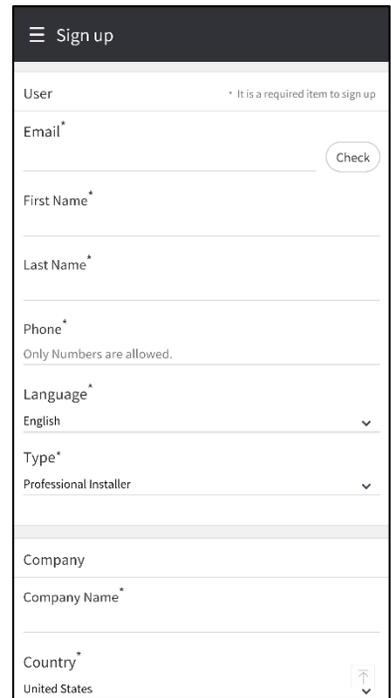
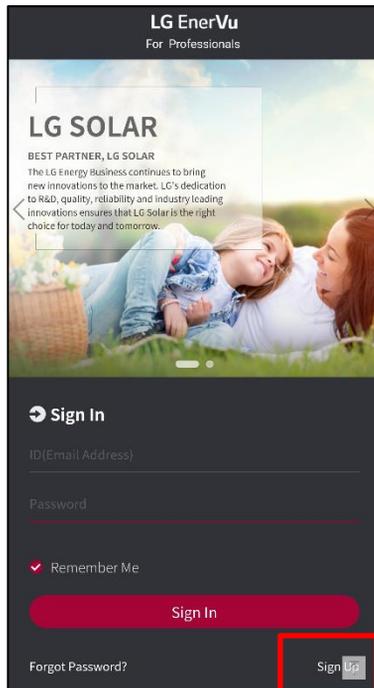
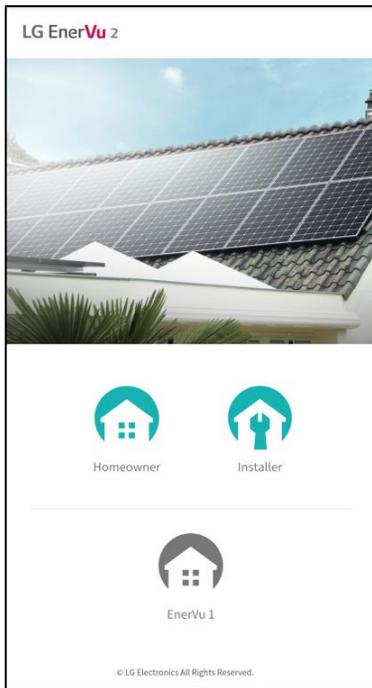
※ EnerVu2 indicates a website(<https://enervu.lg-solar.com>), while LG EnerVu2 Professionals mean a program of mobile application. Search for the LG EnerVu2 in App Store.



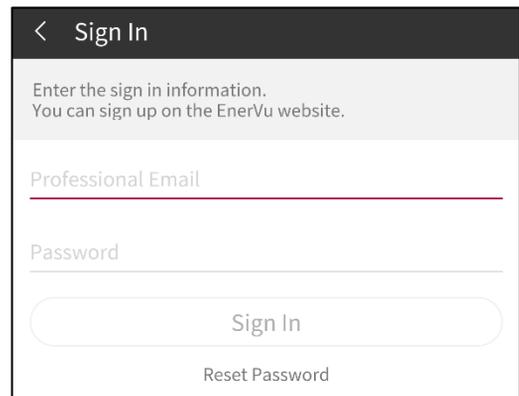
Step 1. Create an installer account. If you have it, skip this step.

Create an installer account using a mobile phone.

- A. Access and sign up into the EnerVu2 URL : <https://enervu.lg-solar.com/>.
If you have signed up before, please go for Step 2 directly.
- B. If you generate a password through a link sent to your email, your subscription is complete.
➤ You can create an account by using your laptop or desktop web browser.
- C. Search for 'enervu2' at the App Store and download the app.



Type 'enervu2' at 'Google Play Store'.
Then install the app.



After installing the app, sign in on the app
with the account you have created.

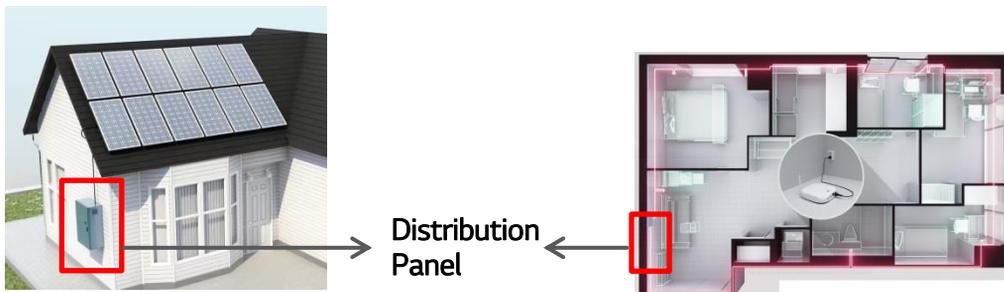


※ The mobile application is supported by Android 5.0 (Lollipop) and above versions, iOS 9 and above versions.

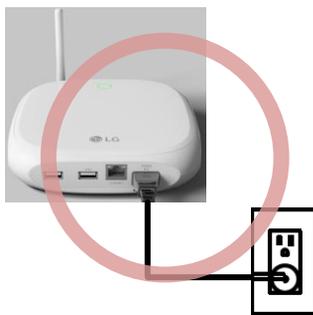


Step 2. Find a location for EnerBox2

- A. In a house, find out an outlet that is electrically connected to the distribution panel where all of AC modules are attached.



- B. Do not share the outlet with other home appliances like TVs, washing machines, or electronic gadgets, etc. It will create interference in communication of an EnerBox2 with AC modules.
- C. Allow the EnerBox2 to occupy the outlet exclusively.



- D. Before connecting the EnerBox2 with the power source, make sure that the gateway / repeater toggle button is positioned to the G (gateway).



EnerBox2 left-side LEDs and buttons

- E. Locate the EnerBox2 close to the AC mains and plug in the EnerBox2. When the EnerBox2 starts to operate, the LED on upper position of the EnerBox2 will be flashing light. Then it will be turned off after the boot procedure is completed. Please do not press buttons nor pull the power cord out of an outlet during the boot procedure.



- ※ When initiate the installed AC module system by turning the circuit breaker on inside the distribution panel, dummy fault alerts might be found on the web browser or mobile application. After the AC module system is on operation, the alerts will disappear.

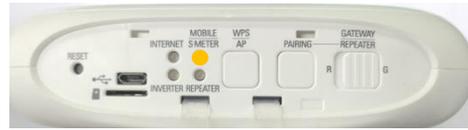


Step 3. Detect the AC modules and check the PLC level

- A. Briefly press the AP button on EnerBox2 to activate the Soft AP mode. The 'MOBILE / S-METER' LED is displayed in amber. (if you push the AP button again, Soft AP mode will be deactivated).

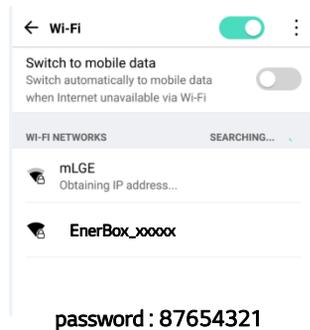


Briefly press the AP button

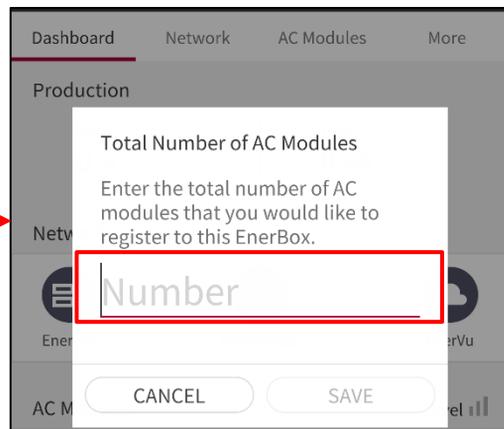
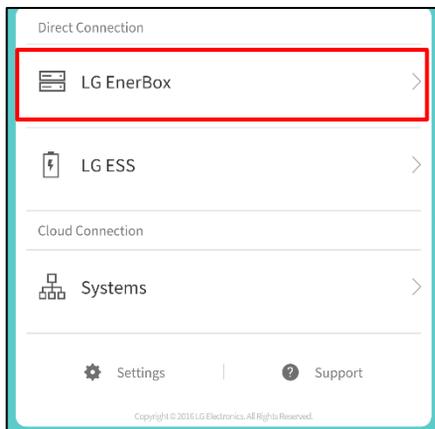


Amber color on the LED

- B. Turn Wi-Fi on in your mobile phone. Search for the SSID of **EnerBox_XXXXX** (XXXXX : Five digits after EnerBox2 serial number). The password is **87654321**.

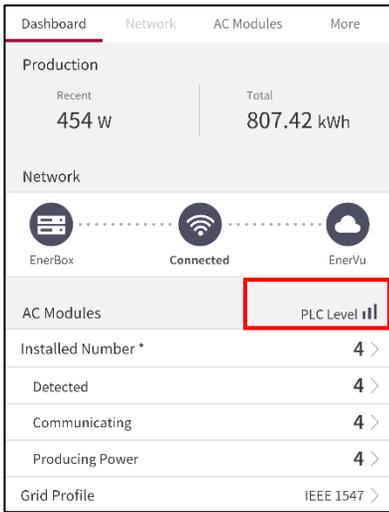


- C. On your mobile phone, open the LG EnerVu2 Professionals app. Tap 'LG EnerBox'. It will guide you directly to the 'Dashboard'.
- D. Then, put the total number of AC modules in the blank then touch the save button.





- E. You can check the PLC level in dashboard. It is recommended for the PLC level to have two or three bars. If the PLC level is zero or one, Relocate the EnerBox2 to a location where few home appliances are installed.



PLC level Recommendations

- : Inappropriate PLC level for communication → Relocate the EnerBox2 to another place.
- : Intermittent communication failure is imminent → Relocate the EnerBox2 to another place.
- : Decent PLC level → Go on to next step
- : Excellent PLC level → Go on to next step

- F. When the stable PLC level is confirmed, briefly press the AP button on EnerBox2 to deactivate the Soft AP mode. The 'MOBILE / S-METER' LED is off.



Briefly press the AP button



The LED is off



Step 4. Connect to Internet

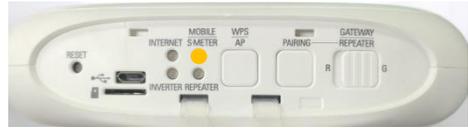
Method A : Wi-Fi setting with soft AP mode

- Using Soft AP mode

A. Briefly press the AP button on EnerBox2 to activate the Soft AP mode. The 'MOBILE / S-METER' LED is displayed in amber. (if you push the AP button again, Soft AP mode will be deactivated).

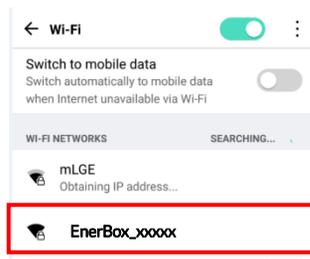


Briefly press the AP button



Amber color on the LED

B. Turn Wi-Fi on in your mobile phone. Search for the SSID of **EnerBox_XXXX**.



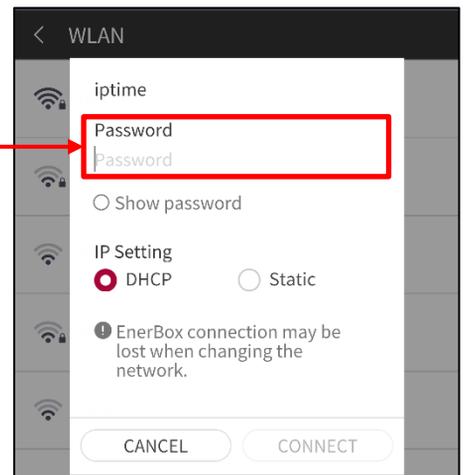
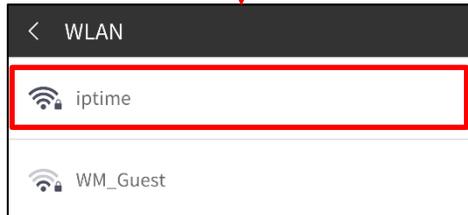
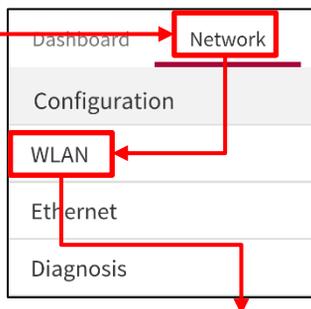
password : 87654321

C. Then go for [LG EnerBox -> Network -> WLAN].

D. Select your **home router's SSID** then put the **password** on the blank.



Home router SSID



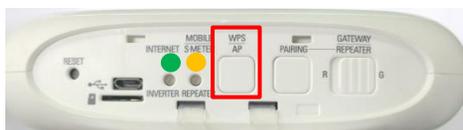
E. Find solid green on INTERNET LED. If it is not, try method B or C.



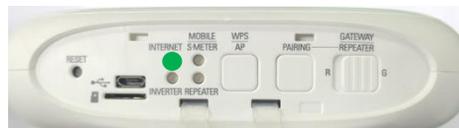
Green on INTERNET LED



- F. If it is done, briefly press the AP button on EnerBox2 to deactivate the Soft AP mode. The 'MOBILE / S-METER' LED is off.



Briefly press the AP button



The MOBILE LED is off

- G. Get your Wi-Fi setting back to normal.
- H. Go to Step 5.

If internet connection by using the AP mode does not work, try methods described below.

Method B : WPS mode

- Using WPS (Wi-Fi Protected Setup) mode

- A. Find WPS button on your home router. If it does not have it, try Method B.



WPS button of a router.

- B. Press and hold the WPS button on the EnerBox2 for 3 seconds. When the WPS mode is activated, the INTERNET LED is displayed as flashing green.



Press and hold the WPS button for 3 sec.

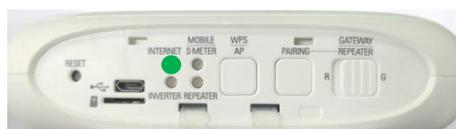


Find flashing green on INTERNET LED

- C. Press the router's WPS button to connect to EnerBox2. After the internet connection is completed, the INTERNET LED will turn green. At this time, WPS button of the router needs to be pressed within a couple of minutes.



Press WPS button of a router.



Find solid green on INTERNET LED

- D. Go to Step 5.



If internet connection by using the A / B does not work, try methods described below.

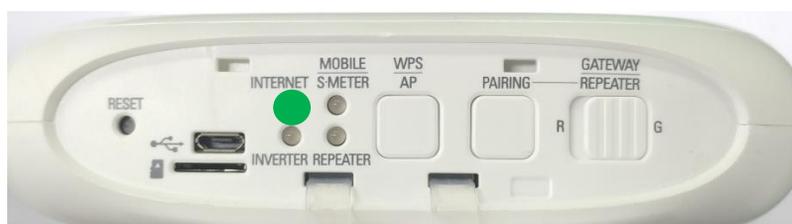
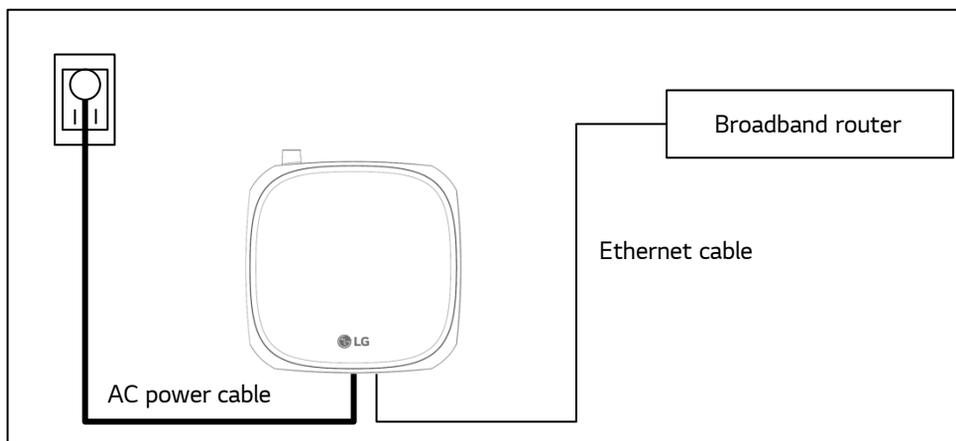
Method C : Ethernet

- A. a. Plug the Ethernet cable into the Ethernet(RJ45) port on the EnerBox2 and broadband router.
- B. If the Ethernet cable is fully functional, LED on 'INTERNET' of EnerBox2 is supposed to be turned on solid green.

If not, change the Ethernet cable.

And make sure that you are using a Broadband router. In most cases of 'Switch / Hub', DHCP is not in service. If DHCP service is not available, EnerVu Web server will not be accessible because IP address cannot be assigned.

- C. If you need static IP settings, it is easiest to connect and configure the LG EnerVu2 Professionals application. (You can set it by selecting Ethernet instead of WLAN after entering the Network tab, referring to Method A.)



Find solid green on INTERNET LED



EnerBox2 is connected to internet.
(Gateway Dashboard in application)



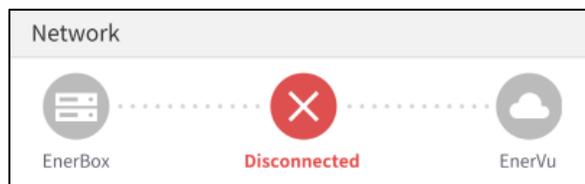
Step 5. Verify the system configuration

After getting connected to the EnerBox2 through Soft AP mode, check the dashboard for the following. You can also connect to EnerBox2 through the site's routers.

A. Confirm that internet connection is secured.

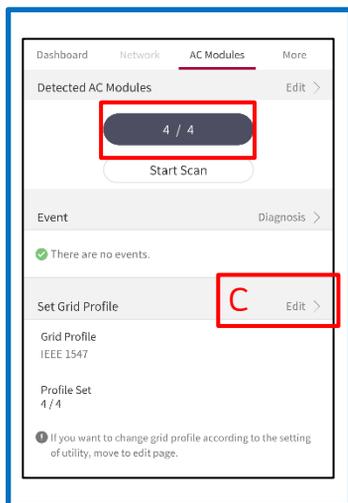


EnerBox2 is connected to internet.

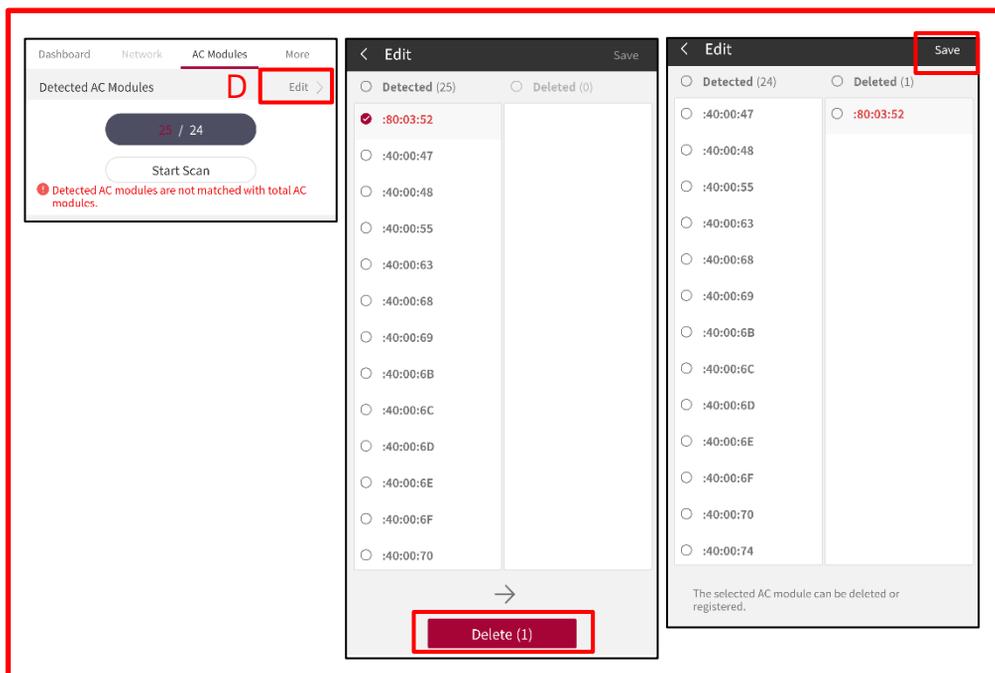


EnerBox2 is not connected to internet.

- B. Compare 'Installed Number' of AC modules with 'Detected, Communicating or Producing Power' of AC modules. This number is refreshed in 15 min.
- C. In areas like California, Hawaii or Molokai where Factory-installed grid profile(IEEE1547) is not applied, users can edit grid profile by going [AC Modules - Set Grid Profile]. It takes 15 min for updating changes.
- D. When the number of communicating AC modules is smaller than the Installed Number, do 'Start Scan'. If the number is matched, go on to next steps. If the number is more than input number, delete MAC addresses that you cannot find from 'Installation Map'.



The number is matched. Go on to next steps.



The number is more than the input number. Delete MAC addresses that you cannot find from 'Installation Map'.



- ※ Make sure that the circuit breakers for branches where all of installed AC modules are attached are surely turned on.
- ※ Power production data will be refreshed in 30 min at maximum.

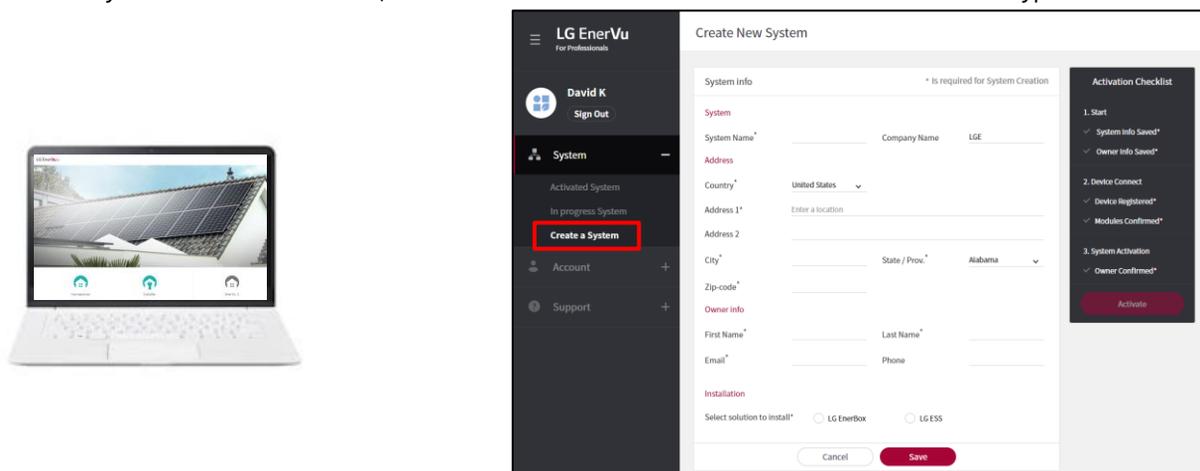


Step 6. Create a system

Creating a system and registering the EnerBox2 is possible by using EnerVu2 (web browser) or LG EnerVu2 Professionals (mobile application).

- Using a laptop or a desktop

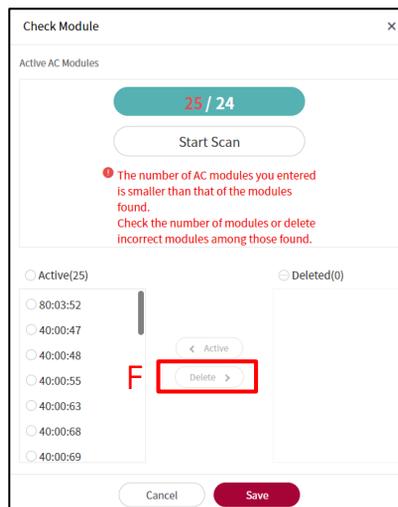
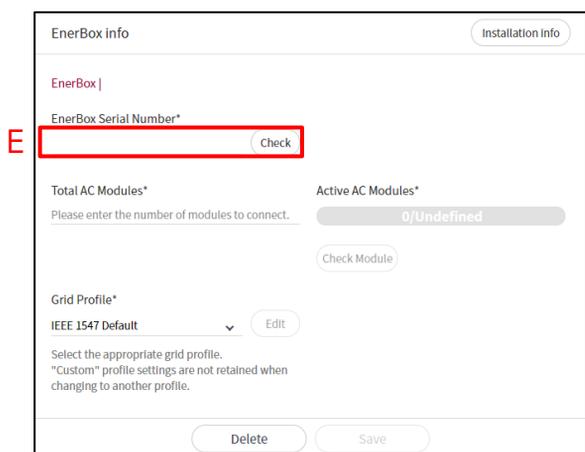
- Access and sign in to EnerVu2. URL : <https://enervu.lg-solar.com>
- To register the EnerBox2 that you have just installed on the site, press the " Create a System" button in left global navigation bar.
- Following the Activation Checklist, fill in the System & Owner information.
- If you click the 'Save' button, an invitation e-mail will be sent to the home owner's email typed in Owner Info.



- Fill in the EnerBox2 serial number and press check button. The serial number is attached on the EnerBox2. - If the server says "This EnerBox is not verified on EnerVu. Please proceed after installation is completed", check the internet connection of the EnerBox2.
- Make sure that the inserted serial number is correct. If it is not, edit the number. If the number of 'Detected AC modules' and the number of 'Total AC modules' are not equal, modify the number of Total AC modules or click Check Module to edit.

If the number of Detected AC modules is smaller than the number of Total AC modules, 'Start Scan' needs to be performed.

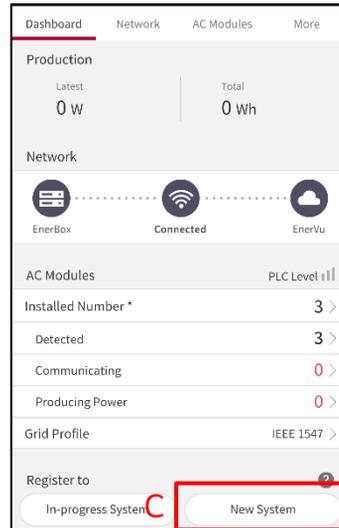
If the number of Detected AC modules is larger than the number of Total AC modules, delete AC modules not in your MAC ID list. After checking the Grid profile, go to 'Design the Array'.





Using a mobile phone

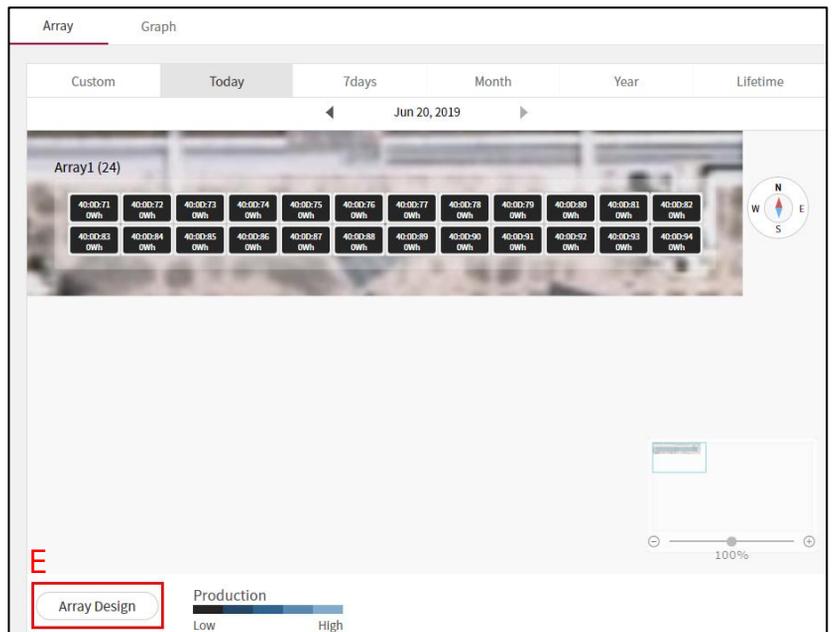
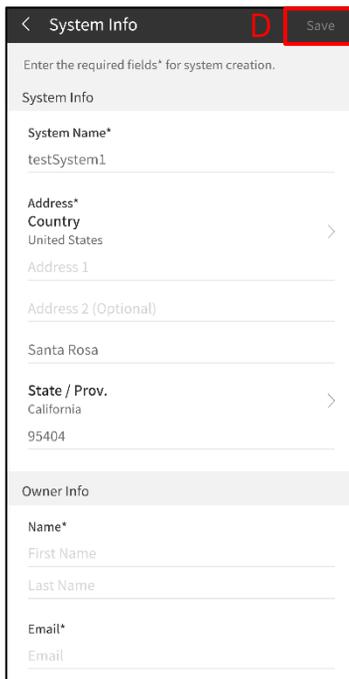
- A. Turn Wi-Fi on in your mobile phone. Search for the SSID of the network connected with EnerBox2.
- B. Use your mobile phone to open the LG EnerVu2 Professionals app. Tap 'LG EnerBox' and select the EnerBox2 serial number.
- C. To register the EnerBox2 that you have just installed on the site, press the "New System" button in bottom side of the dashboard.



- D. Fill in the System & Owner information. If you click the 'Save' button, an invitation e-mail will be sent to the home owner's email typed in Owner Info.
- E. Design arrays via EnerVu2 (web application). It is possible to edit arrays although the system is activated.



Once 'Activate' button is pushed, the system will be locked in 'Activation Ready' so that it is impossible to edit information. However, after homeowner signs in to LG account, the system will be in completion of activation automatically. Then, monitoring and revision is possible.



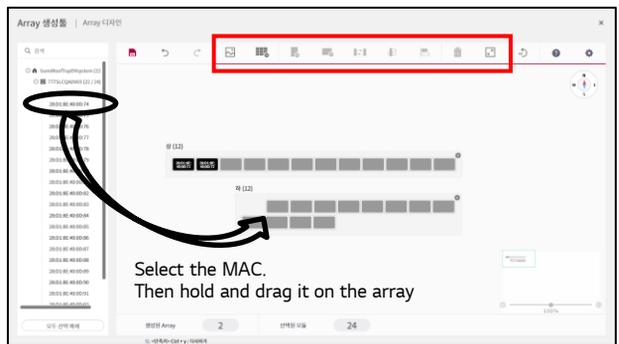


Step 7. Design the Array in EnerVu2 using a laptop or a desktop (It is not available on the mobile application)

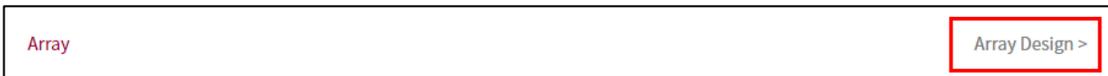
A. Click 'Go to Design'.



D



- B. Choose a background image in order to decorate the array builder. For an example, you can use a picture of rooftop having a great view for a pleasing view of the array in the website. You can adjust the opacity, scale, and rotation of the selected image. If you don't want to put it on the background of 'Array Builder', you can skip it.
- C. Edit the modules by using shortcut keys and edit tools to describe the AC module system. After rotating an array, please adjust the position of the array then save the changes. It might be possible that the array after rotation is overlaid on another array.
- D. You can design arrays that will be presented in the system of dashboard. After creating an array for AC modules, drag the MAC on the array for mapping. The maximum allowable number of AC modules is 600. If you want to register more than 600 AC modules, please create multiple systems on the website.
- E. Confirm whether all of MAC addresses and AC modules are properly placed with a reference of 'AC module Installation map'.
- F. Save and terminate the Array builder.
- G. You can change the Array design again after system activation.



- 'Activated System' > Choose System Name > Array tab : Click 'Array Design'. See E on the previous page.



- ※ At Step 7, recommended display resolution of your laptop or desktop is 1680 × 1050 and higher than the resolution. If it is lower than 1680 × 1050, it might be uncomfortable to build an array because you have to scroll the window to right or left.
- ※ After rotating an array, please adjust the position of the array then save the changes. It might be possible that the array after rotation is overlaid on another array.
- ※ Array build step is only available on the website. Mobile application does not provide the tool for editing arrays.



Step 8. Activate a System

- A. Finally, press 'Activate' on right-side button at Activation Checklist. After homeowner signs in to LG account with an invitation email, the system will be in completion of activation automatically.
- B. Then, the installer and home owner can monitor the installed system to check out energy harvest.



System info * Is required for System Activation

System

System Name* TESTSystem Company Name LGE

Address

Country* United States

Address 1* 1300

Address 2 RM 101

City* Los Angeles State / Prov.* California

Zip-code* 90027

Owner info

First Name* David Last Name* K

Email* The email address is already registered to LG EMP.

Phone

Save

Activation Checklist

1. Start

- ✓ System Info Saved* Jun 20, 2019 7:42 PM
- ✓ Owner Info Saved* Jun 20, 2019 7:42 PM

2. Device Connect

- ✓ EnerBox Registered* Jun 20, 2019 7:46 PM
- ✓ Modules Registered* Jun 20, 2019 7:46 PM
- ✓ AC Modules Confirmed* Jun 20, 2019 7:46 PM
- Array Built

3. System Activation

- ✓ Owner Confirmed* Jun 20, 2019 7:42 PM

Activate

- C. Go for the site for homeowners and sign up.
- D. A window for creating an account will be popped up.
- E. Agree with the terms and conditions then go for 'Create Account'.
- F. The email account the home owner has created here should be same with the email address that the installer put on the installed system information.



LG ACCOUNT

SIGN IN CREATE ACCOUNT SWITCH USER FINDING / RESET PASSWORD ACCOUNT MANAGEMENT CUSTOMER SUPPORT

CREATE ACCOUNT

Accept Terms & Conditions Create Account E-mail confirmation Confirm LG Account

CREATE LG ACCOUNT

User ID lgaccount@example.com CHECK AVAILABILITY

Password Password confirm

Birthday Month Day Year

Country USA

E-mail opt-in Sign up to receive the latest news and special offers from LG. You will be notified of important changes to the service Terms & Conditions and Privacy Policy regardless of your opt-in setting.

CONFIRM CANCEL

The email address should be identical with installed system information.



※ Once 'Activate' button is pushed, the system will be locked in 'Activation Ready' so that it is impossible to edit information. However, after homeowner signs in to LG account, the system will be in completion of activation automatically. Then, monitoring and revision is possible.



Note 1. Visual notification of power production status.

- A. During daytime, users can be easily informed about the power generation information by simply looking at the EnerBox2.
- B. Different colors are used to express brief power production level as described below.
- C. If red LED light or no LED light is shown during daytime and it persists continuously, please refer to 'Trouble Shooting Guide' in Installation manual.



Average power is above 60W.



Average power is below 60W.



At least one Micro Inverter does not produce power over 72 hours



After sunset, no power production .



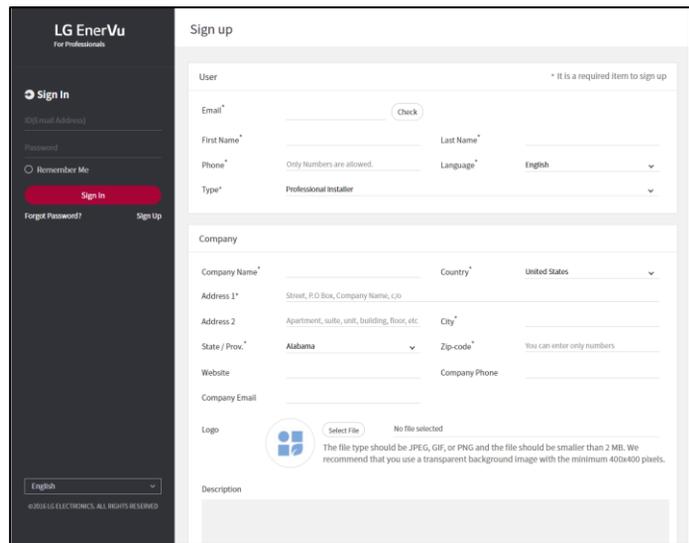
- The Power production LED will be refreshed at every 15 min.



4-4 EnerVu2 Monitoring system (Installer account)

Note 1. Creating an installer account using a laptop. (LG EnerVu for Professionals)

- A. Access and sign up into the EnerVu2 URL : <https://enervu.lg-solar.com/>. If you have signed up before, please skip this step. Creating an account by using a mobile is described in 4-3 EnerBox2 Installation procedure.
- B. Press the Sign Up button to go to the subscription page and enter basic information (User, Company Info).
- C. If you choose to submit the agreement after confirming the terms and conditions, an email will be sent from the solar server so that you can set the password with the email you have entered.
- D. If you generate a password through a link sent to your email, your subscription is complete.
- E. Access and sign in to LG EnerVu for Professionals URL : <https://enervu.lg-solar.com/>





Note 2. Dashboard

- A. Log in with 'LG EnerVu for Professionals' account.
 LG EnerVu for Professionals URL : <https://enervu.lg-solar.com/>

The screenshot displays the LG EnerVu dashboard interface. At the top, it says "Thank you for your green effort!". Below this is the "System Map" section, which includes a map of the United States with markers for system locations and filters for "Alert (3)", "Activated (4)", and "In progress (3)". A red box labeled 'B' highlights this map area. Below the map are sections for "Find System" (with a search bar) and "Send Email" (with a "Send" button). The "Alert System" section, highlighted with a red box labeled 'C', shows counts for Notice (2), Error (1), and Fault (0), with a list of alerts including "allSanityTest2" and "essSanityTest1". The "In progress System" section, also highlighted with a red box labeled 'C', contains a table of systems in progress:

System Name	Status	Last Update
testSystem	Register EnerBox	1 week ago
Steve Kyong	Register ESS	4 months ago
test	Register ESS	5 months ago

At the bottom, the "Total System" section, highlighted with a red box labeled 'D', shows a summary of 4 systems, 32 LG AC Modules, and 2 LG ESS units. To the right, the "Weather" section displays the current temperature as 22.4°C and a 5-day forecast.

- B. System map depicts a world map where a user easily finds each AC module system installed and registered by the user account. You can zoom the map in or out by holding a Ctrl key and scrolling a mouse wheel.
- C. Alerts and systems in progress are displayed here so that users can find current conditions of overall AC module system. If you click 'Notice', 'Error' or 'Fault', relevant systems will be listed. Clickable system name will guide you to a system monitoring page.
- D. Total number of registered system and AC modules can be found here. And weather forecast is provided here from 'AccuWeather'. If you put your location in the 'User Office Location', daily weather forecast can be identified. Or you can set it at 'Account' => 'Company Info'.



Note 3. Activated System List

- A. Select 'Activated System'. A list of installed systems are on display with simple data.
- B. Click a system name that you want to monitor in detail.
- C. The list can be easily fetched by just clicking the excel icon. An excel file will be automatically generated for helping user stack data or report a list. Also, 'Setting-Table Data' is provided to freely select columns you want to demonstrate in the excel file or on the display window.

Activated System

System Map

Alert (3)

Activated (4)

Results: 1-4 of 4

Favorite	System Name	Alert	Status	Owner	Zip-code
All	SN Library	No Issue	Normal	David K	22222

Setting-Table data

Please pick you want to show

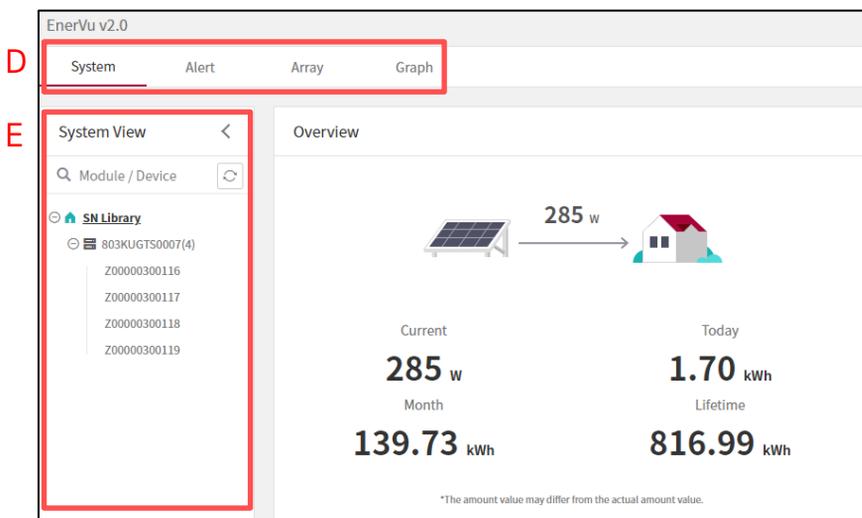
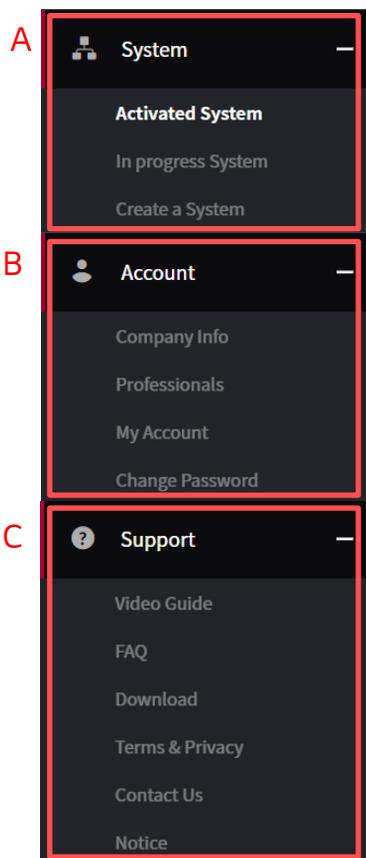
- System Name
- Alert
- Status
- System ID
- AC modules
- Company Name
- Owner
- Zip-code
- City
- State, Prov.
- Installed On
- Last Report
- Production (Recent)
- Consumption (Recent)
- Production (Today)
- Consumption (Today)
- Production (7days)
- Consumption (7days)
- Production (This Month)
- Consumption (This Month)
- Battery SOH
- Battery Cycle
- ESS Serial Number
- Grid Profile

OK



Note 4. GNB(Global Navigation Bar) and Monitoring menu

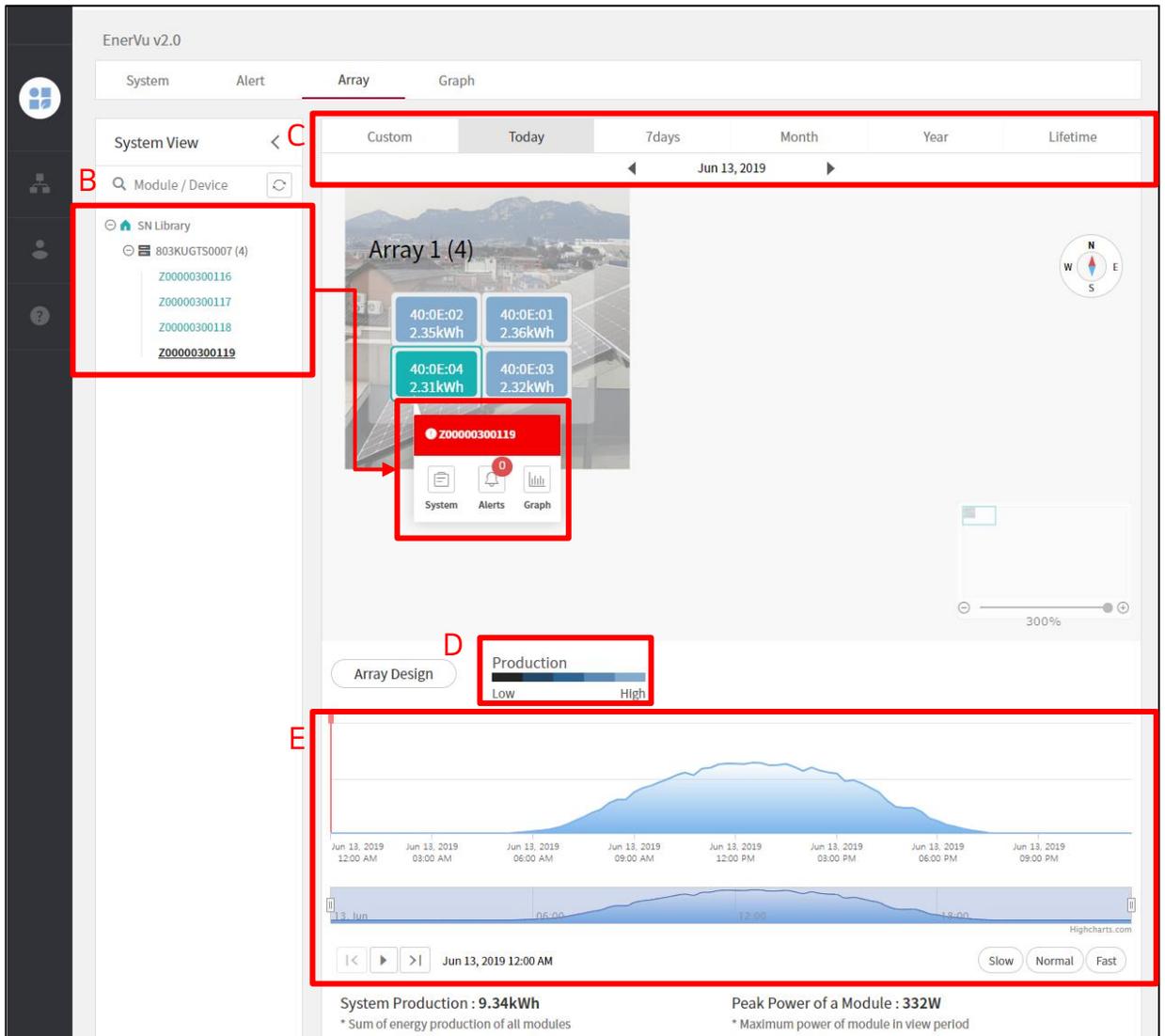
- A. Systems – Menu to view or create systems
 - Activated system – Energy harvest data can be monitored on daily, weekly, monthly or annual basis. It is only possible after installation of AC modules and a monitoring system is finished.
 - In progress System – It shows systems on development.
 - Create a System – It is for registering a new AC module system.
- B. Account – Account and Company information
 - Company Info – Information about a main office and branch offices can be generated and modified.
 - Professionals – You can register personnel working for the company. The menu will be useful for sharing basic information of staffs.
 - My Account – Account information is managed in this menu and notification preference can be set. Also, the International System of Unit (SI) can be changed between Fahrenheit scale(°F) and Celsius scale (°C).
 - Change Password – You can change Password
- C. Support – Video Guide, frequently asked questions(FAQ), System manuals / catalogues, terms and privacy etc can be found in the menu.
- D. Monitoring menu
 - System – You can check the system overview, system information, system owner, device information, and issue a report.
 - Alert – You can check the alarm information of the system.
 - Array – This allows you to monitor the power generation in the designed Array configuration.
 - Graph –It is possible to check the power generation amount by energy and power, and it can be set by period.
- E. System view - It shows EnerBox, micro inverter ID list in tree form. If you select each, you can check the current details of the device.





Note 5. Array

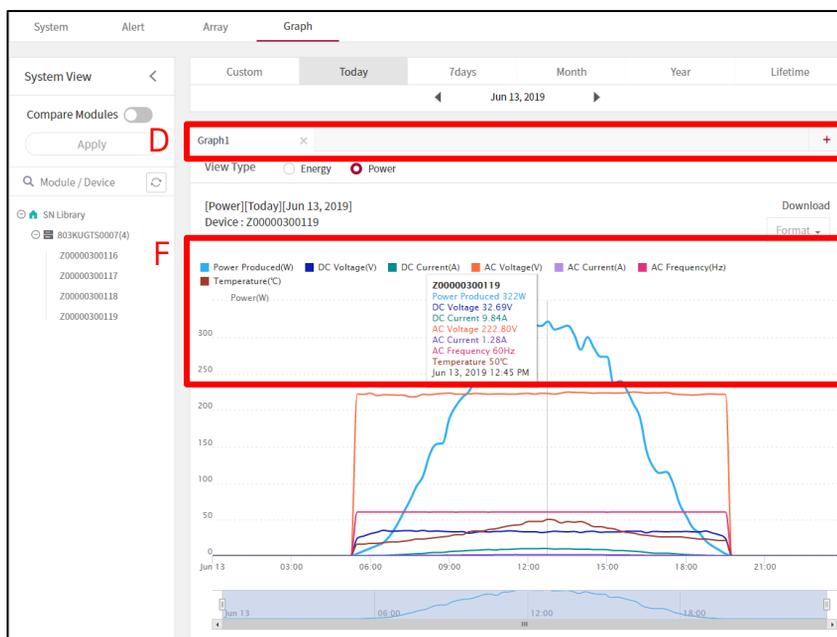
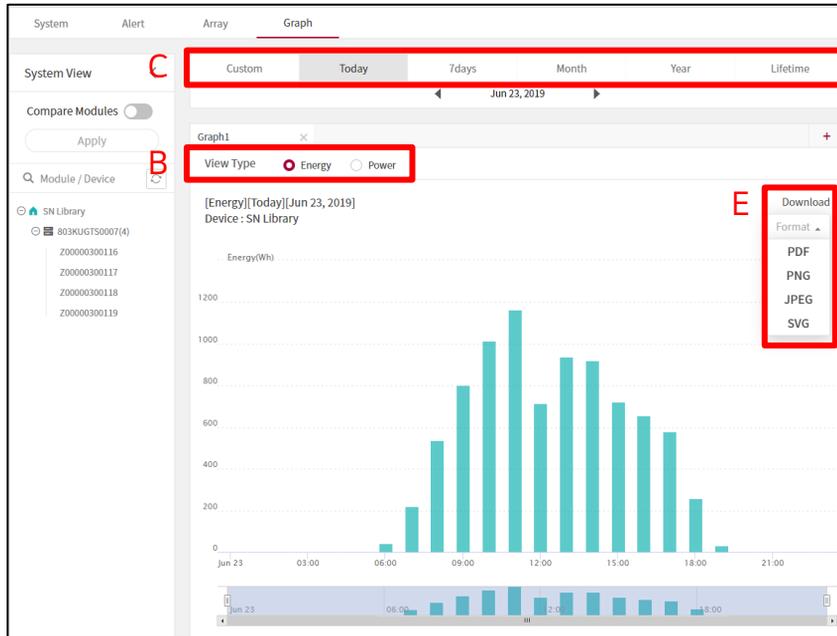
- A. Select 'Array'
- B. When you select the micro inverter ID in the system tree, the position on the array is displayed and you can see the menu that can be moved to system, alerts and graph. The same pop-up menu appears when you select a module above the array design.
- C. Set a period with which total amount of energy will be specified on the virtual array.
- D. Blue color saturation is used to describe the intensity of energy production on each AC module in order to give visual difference on power production level.
- E. Power Production graphs showing power from the AC module system at a specific time. The power generated from the AC module system depends on weather conditions, shadows caused by clouds, structures and etc. You can hover your mouse pointer near a line of the graph so that a mini-popup will indicate how much power is produced at a certain time. This function is available with Today / 7 days setting only. Set left and right time frames for widening or reducing the time frame. Overall time frame can be changed by setting a period depicted in C. Animation speed level can be chose with Slow, Normal or Fast. Then click start button located on the left side of the graph. A moving bar will be in motion from the far-left location of the graph to the end. As it moves, color intensity of each AC bar module in the array shows power production level visually.





Note 6. Graph

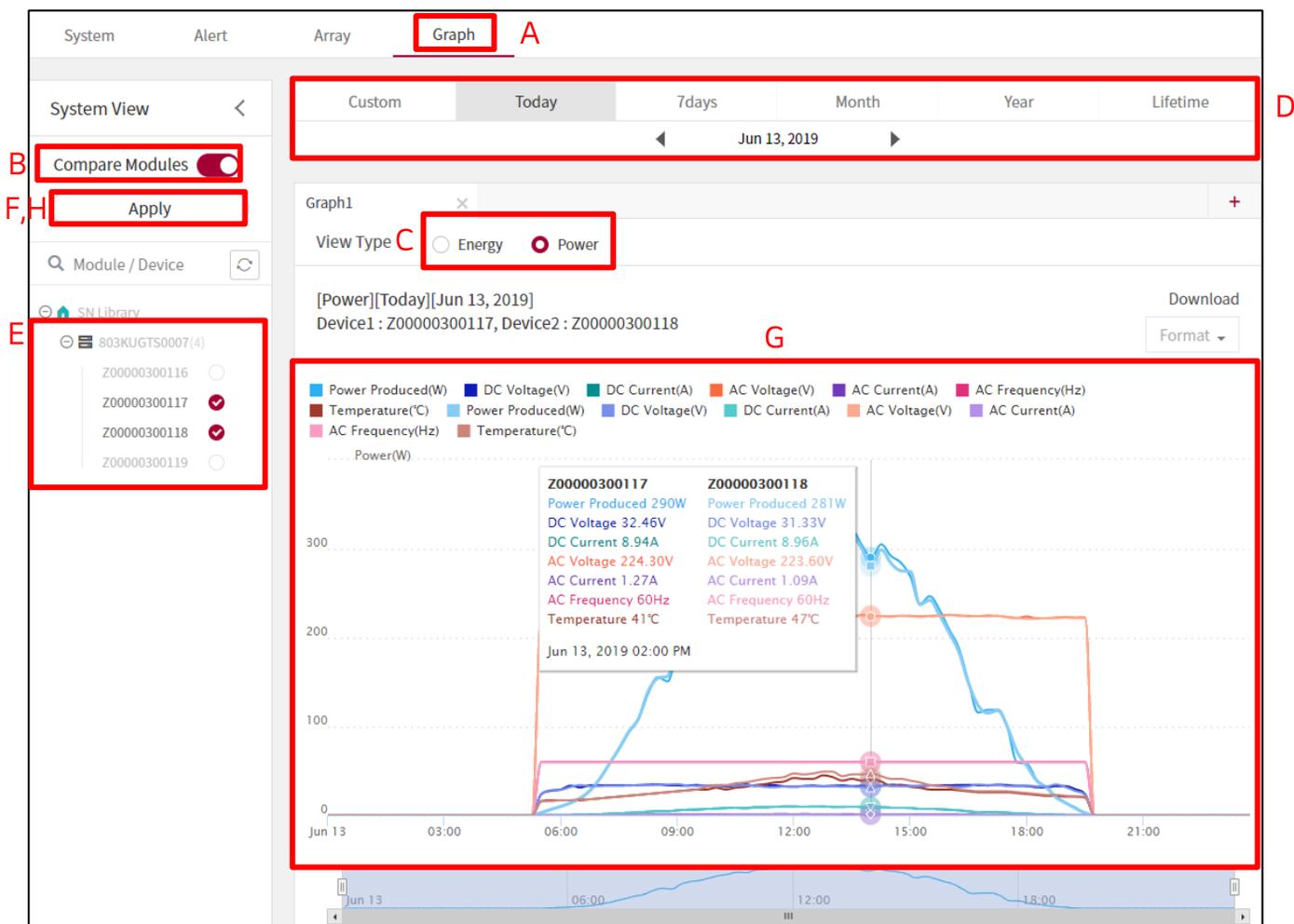
- A. Select 'Graph'.
- B. Click 'Energy' to see energy production (Wh) trend. Or select 'Power' to see power (W) that is generated at a specific time instance.
- C. Set an appropriate time frame. Select the system or an AC module to check energy and power production.
- D. Multiple graphs can be created in taps. For a new tap, it shows data with previous setting. So change settings for graphs that you want to check.
- E. The graphs can be fetched in a format that you have selected.
- F. For 'Power' setting, users can find more parameters that individual micro inverter has collected (only for ONE AC module). If you selected the system consisting of all AC modules, total power production trend can be viewed.





Note 7. Comparison of an AC module with another AC module

- A. Select 'Graph'.
- B. Put the slider of 'Compare Modules' on right position.
- C. Click 'Energy' to see energy production (Wh) trend. Or go for 'Power' to see power (W) that is generated at a specific time instance.
- D. Set an appropriate time frame.
- E. Please check out two modules you want to compare.
- F. After selecting two modules, press the 'Apply' button.
- G. Then you can compare two AC modules for power, DC voltage/current, and etc. Also, if you hover your mouse pointer on the graphs, actual values are displayed with a popup. Detailed information can be found only at 'Power'.
- H. Once you have changed setting, please click onto 'Apply' button again. Changes will be applied once you click 'Apply' button.

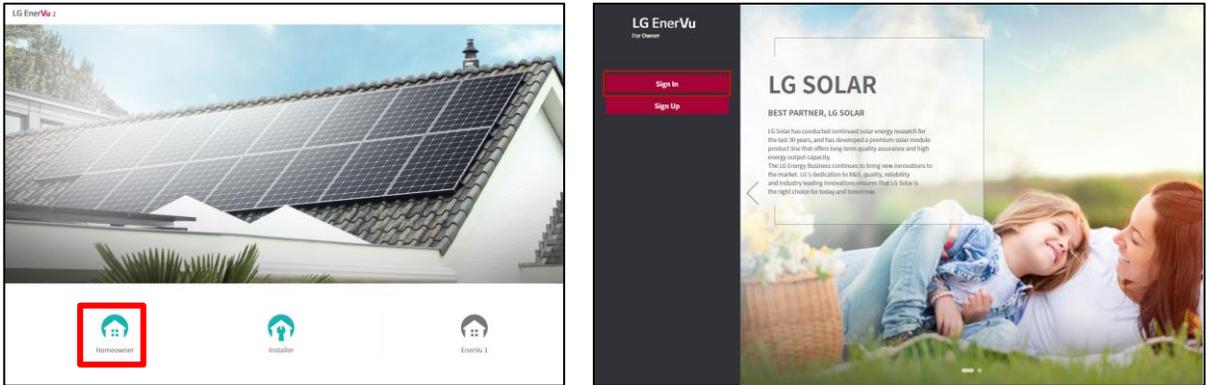




4-5 EnerVu2 Monitoring system (Homeowner account)

Note 1. LG EnerVu for Owner

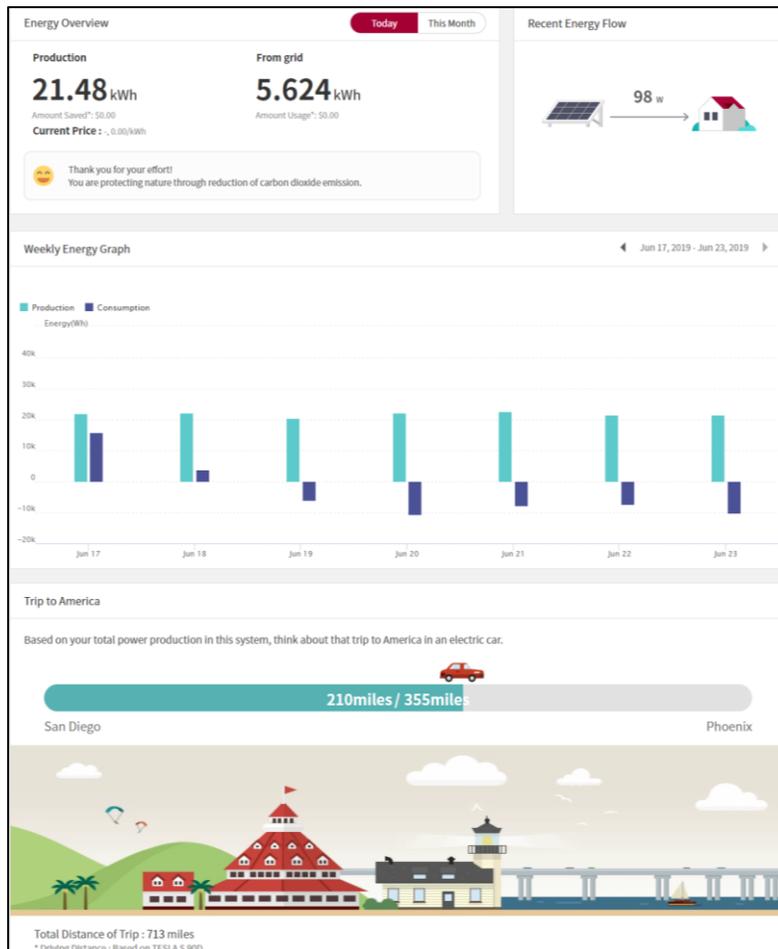
A. Log in with 'LG EnerVu for Owner' account. LG EnerVu for owner URL : <https://enervu.lg-solar.com>



B. Once you're signed in, you can see your dashboard. In the dashboard, you can check Energy Overview, Recent Energy Flow, weekly energy graph, and Trip to America.

Weekly Energy Graph allows a home owner to observe general energy production trend quickly.

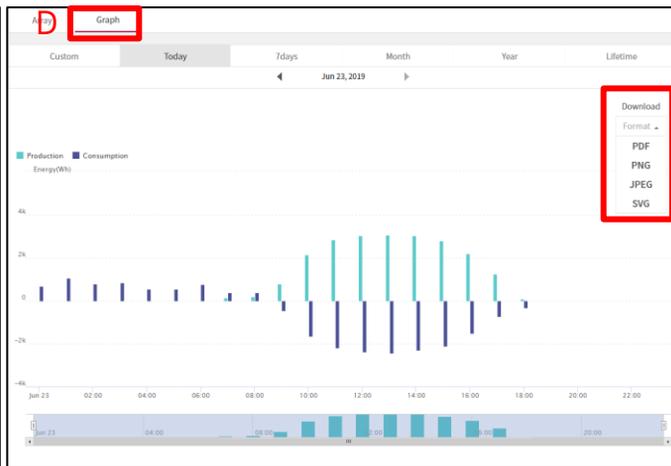
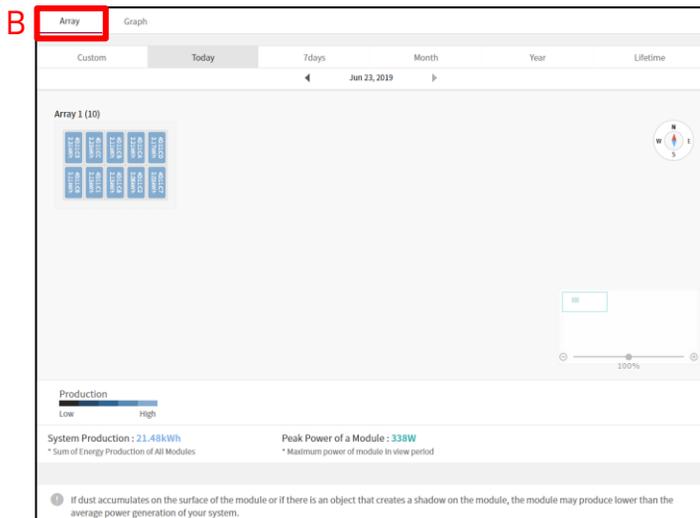
Trip to America simply demonstrate an electric car on a road in order to simply show how the solar energy contributes to alleviate air pollution.



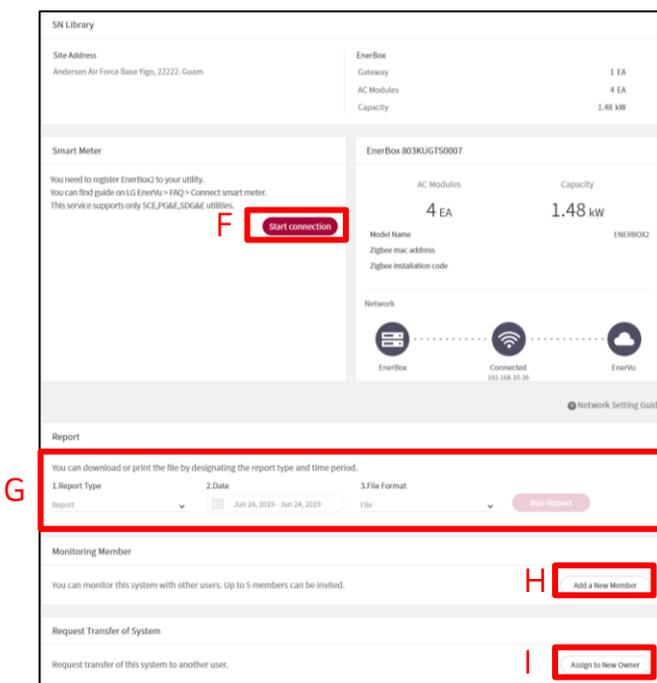


Note 2. Monitoring and System Info

- A. Select 'Monitoring' menu displayed on the left.
- B. Click 'Array' to see the virtual array that the installer has already set.
- C. The AC module system shows total energy production on each AC module depending on how you set the time period
- D. Click 'Graph' to see energy production and consumption trend during a period you have set. It can be also saved in various formats



- E. Go for 'System Info' if system information setting is needed to check.
- F. It shows brief system information and depicts current status of the installed AC modules and communication network. You can set the connection with the utility smart meter by pressing the 'Start Connection' button.
- G. A report can be selected among 1) Energy Production(Daily), 2) Power Production(Recent), 3) System Report. After setting the date and file format, a report can be created if you click 'Run Report'.
- H. You can monitor this system with other users. Up to 5 members can be invited.
- I. You can transfer it to a new user through the 'Request Transfer of System' menu.

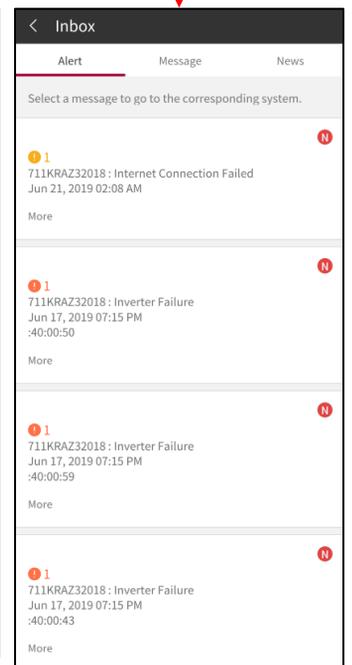
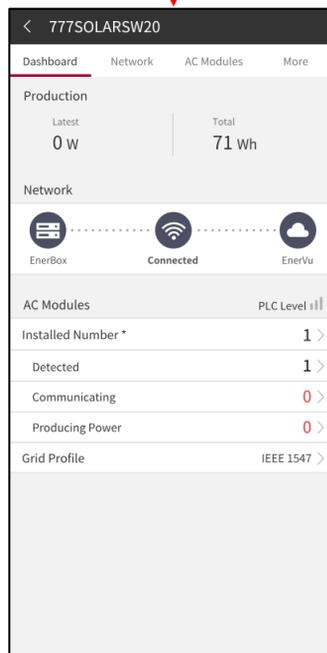
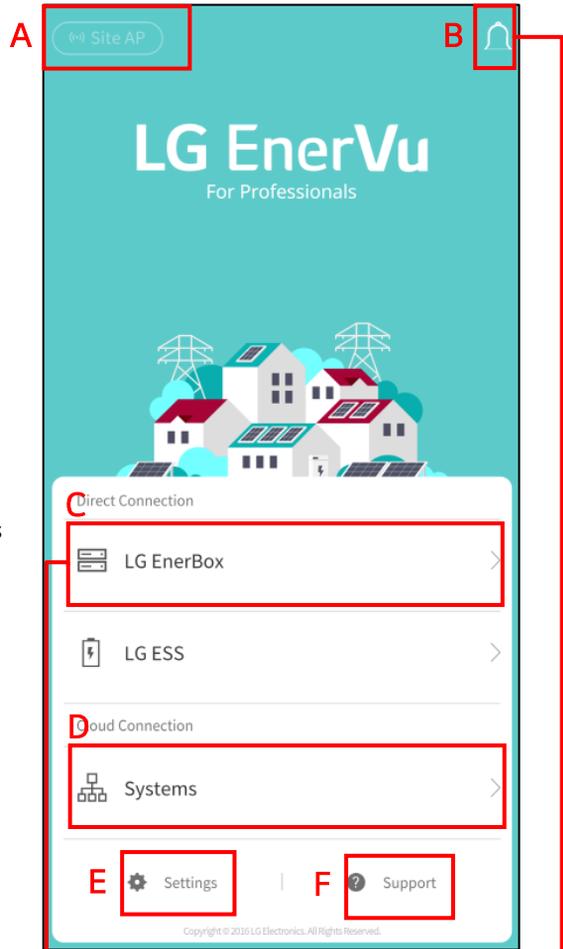




4-6 EnerVu2 Mobile Monitoring Application(Installer account)

Note 1. LG EnerVu mobile application main page (LG EnerVu for Professionals)

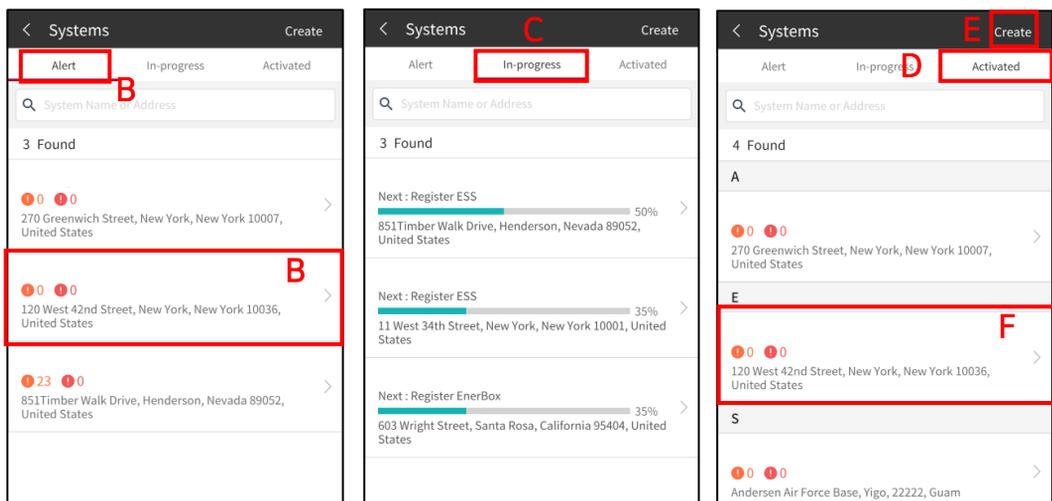
- A. Connection method for EnerBox2
 - Site AP : connection through the router
 - 3G/LTE : connection using 3G/LTE
 - EnerBox AP : connection using Soft AP mode
- B. Notices ("🔔" when it has new notices)
 - Alert : notice for system alert
 - Message : listing a system of activation or transfer
 - News : Notice or Announcement
- C. LG EnerBox – Direct Connection(Gateway Soft AP Mode)
 - Dashboard : offering power generation and system status
 - Network : where internet setting for EnerVu can be changed
 - AC modules : for giving individual AC Module conditions
 - More : helping users find EnerBox2 F/W version and EnerBox2 Event
- D. Systems – Cloud Connection(Web monitoring system)
 - Alert : showing systems having any alerts
 - In-progress : listing systems in process of activation
 - Activated : representing systems ready to view energy production
- E. Settings
 - Firmware download
 - Language selection
 - Firebase Analytics
 - Sign Out
- F. Support
 - Quick Install Guide
 - ESS Event Guide
 - Terms of Use
 - Privacy Policy
 - Video Guide
 - FAQ
 - Open Source
 - Application Info



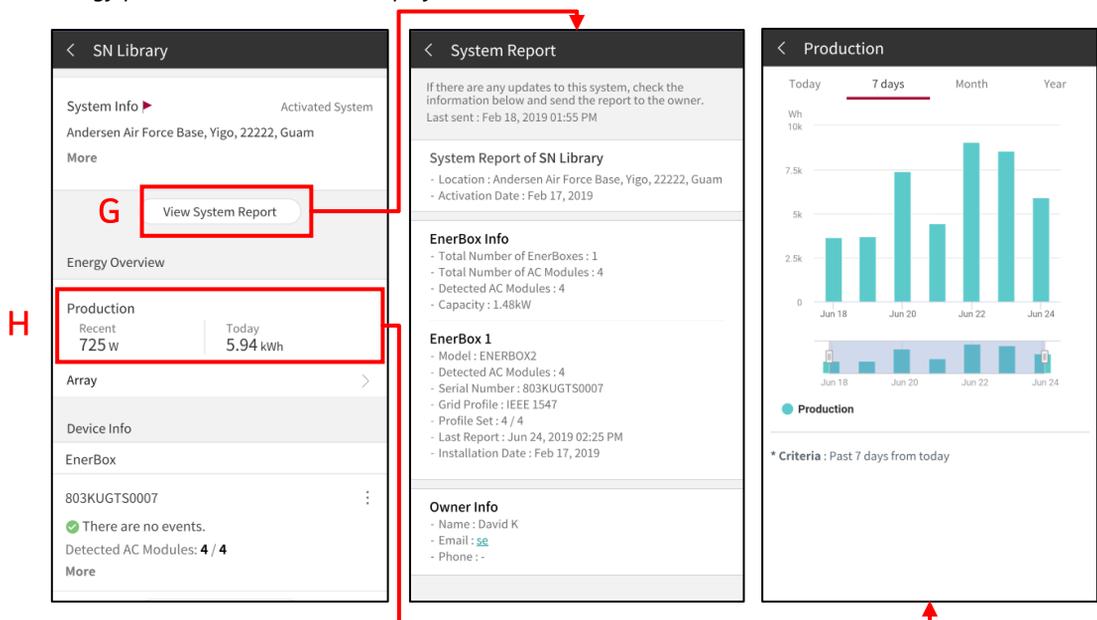


Note 2. LG EnerVu mobile system monitoring

- A. Touch 'Systems' (Cloud Connection)
- B. The 'Alert' tab allows installers to discover any system having alerts. The reported alerts can be used for troubleshooting. Specific information can be found if you touch a particular system that you want to investigate.
- C. The 'In-progress' tap lists systems which are in a process of registration. If a system is fully done for the web-monitoring, the system will be located in the 'Activated' tab.
- D. All of registered systems are settled in the 'Activated' tab. From this tab, mobile web-monitoring activity can be achieved.
- E. You may create a new system if you touch 'Create' on right-top screen. However, it is recommended to create a system based on the web site because it will be more convenient to put information in blanks.



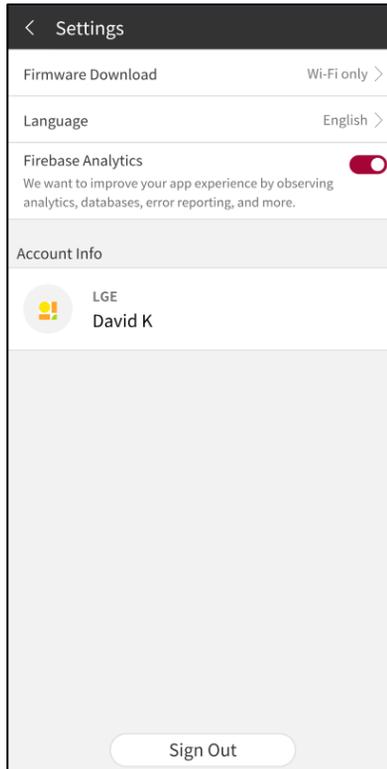
- F. You can check the detailed system information by selecting system name.
- G. If there are any updates on the system, send the system report to the owner for letting him/her be aware of the changes.
- H. Energy production trend is on display with a time frame.



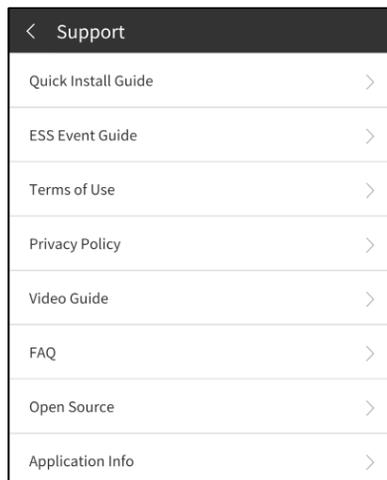


Note 3. Settings and Support

- A. Touch 'Settings'
- B. You can check and download the latest firmware version update from your mobile.
- C. There is an option to choose a language that you want to set.
- D. Firebase Analytics provides an option for users to allow/disallow sending logs to a web-server. So, if you want to disable 'Firebase Analytics', turn it off.



- E. Touch 'Support'
- In 'Support', you can see the following menus.





4-7 EnerVu2 Mobile Monitoring Application(Homeowner account)

Note 1. LG EnerVu mobile application main page (LG EnerVu for Owner)

- A. Sign in with a user ID and a password.
If you have not signed up, click the 'Sign up' button to proceed with the registration first.
A user can create an account with a mobile phone.
- B. After touching 'Guest', an example of screen layout will be depicted. The 'Energy Production Graph' is based on random values which will be automatically generated.
- C. If you scroll the mobile screen down, more buttons are ready to be used. FAQ helps a user find out useful resources to solve potential problems.

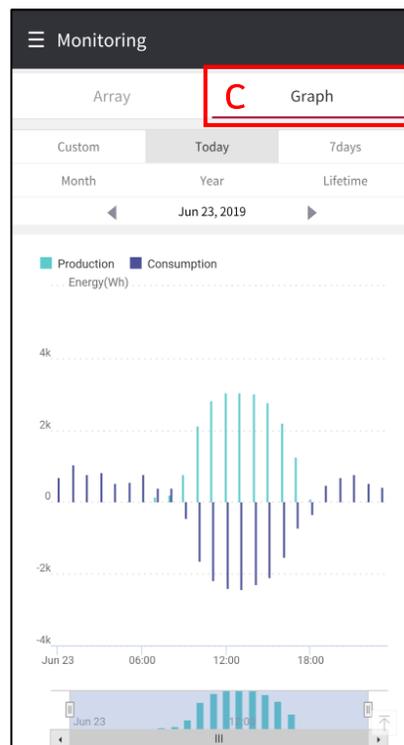
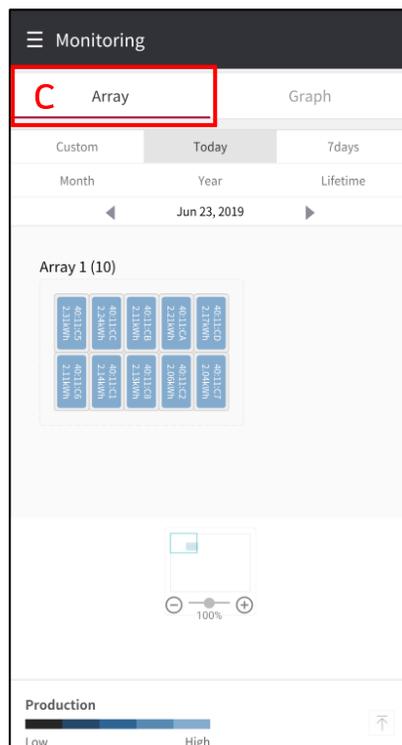
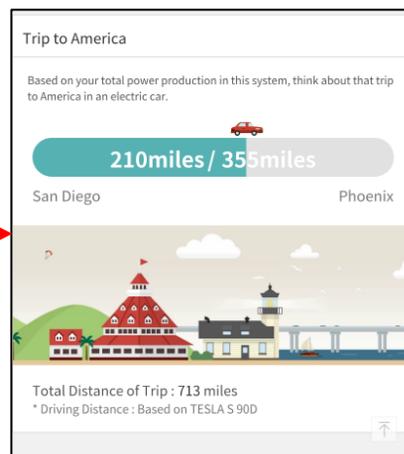
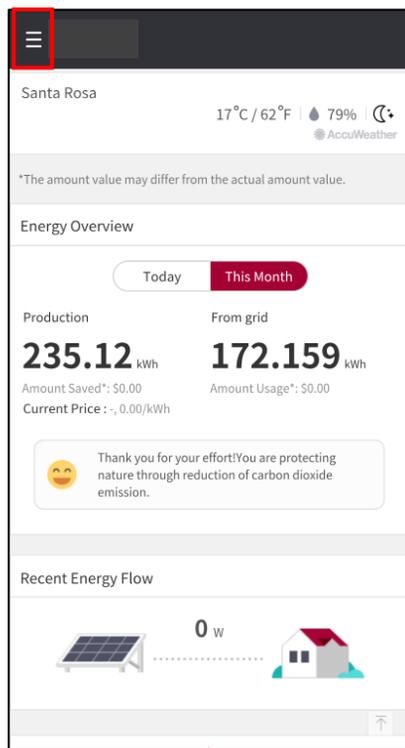
From left, you will be connected to 'Open Source', 'FAQ', 'Download Android App' and 'Download iOS App'.



Note 2. Dashboard / Monitoring

- A. After signing in with an ID and a password.
- B. Dashboard provides brief description about solar energy generation produced by the installed AC module system. Also, a graph representing solar energy generation within a specific time is on display. Particularly, simple comparison of the produced solar energy with electricity consumption by an electric car is illustrated for showing how the installed AC module systems contribute to clean the world.
- C. Mobile monitoring is available on the left side. The built AC module array is on the screen. Set a period with which total amount of energy will be specified on the virtual array. Blue color saturation is used to describe the intensity of energy production on each AC module in order to give visual difference on power production level. Also, graphs can be utilized to know how much solar energy is produced within a time period.

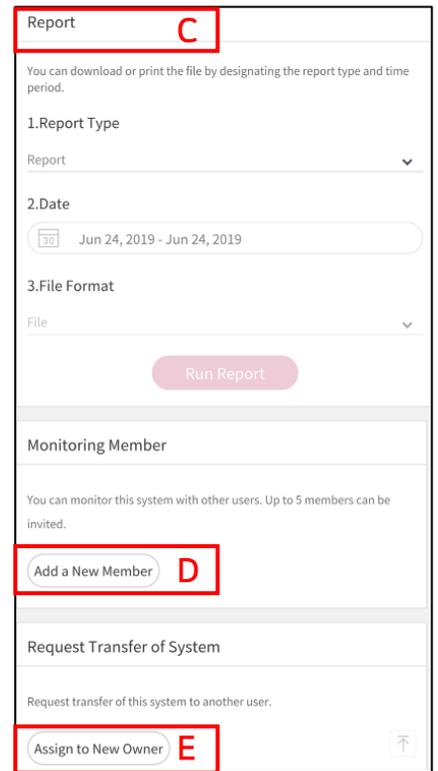
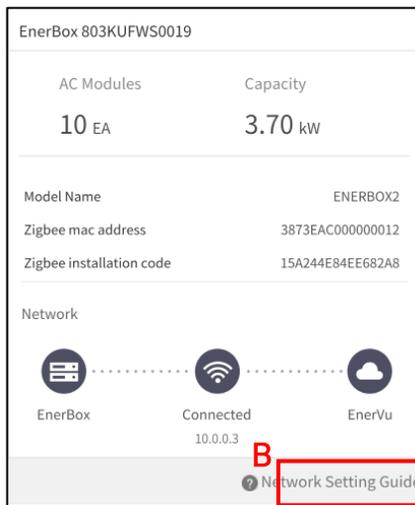
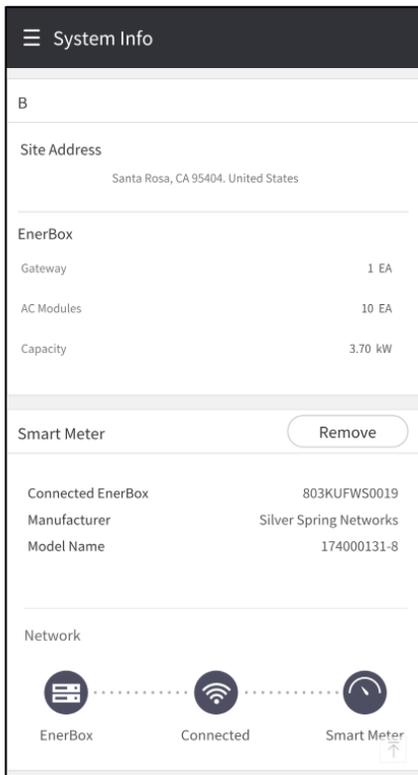
Menu button





Note 3. System Info

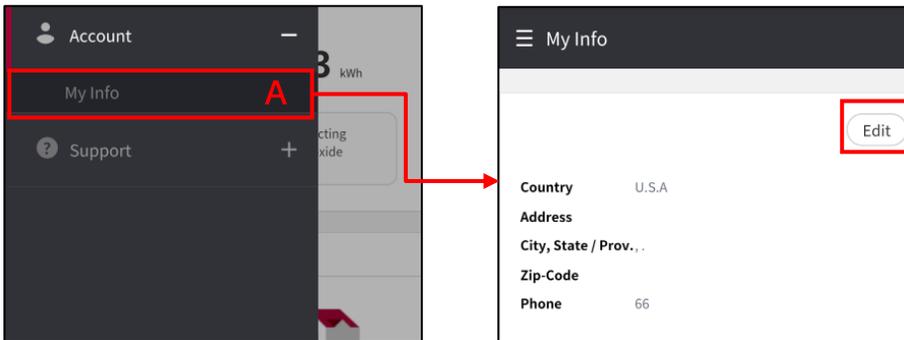
- A. Touch 'System Info'. Variable tasks are available including changing system information, getting system data, adding a new member or requesting account transfer.
- B. If connection between EnerBox2 and EnerVu is not guaranteed, get 'Network Setting Guide' for trouble shooting.
- C. If data of energy production or system report is needed in a form of files, go for 'Run Report' after setting 'Report Type', 'Date' and 'File Format'.
- D. Other users can be invited to monitor the system. The invited user will have access to view the system information and data, but will not be authorized to add or transfer the account.
- E. To transfer your account, enter a new owner's email and press 'Check'. Once the new owner's account has been verified, you can proceed with the transfer process. Please take these steps carefully. Once the transfer is completed, the existing owner's information will be completely erased.



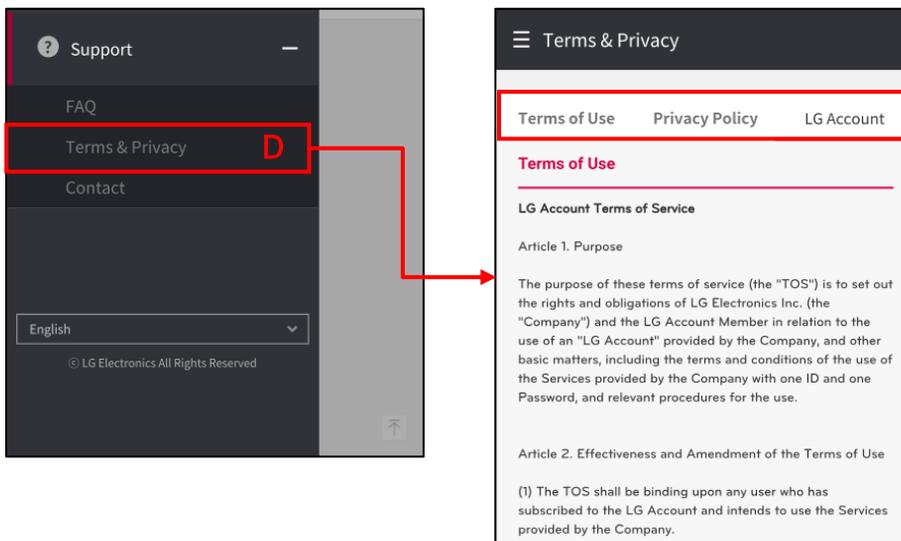


Note 4. Account / Support

- A. Select 'Account' > 'My Info' if it is necessary to edit homeowner information. Press the 'Edit' button to connect to the LG enterprise management system.



- B. From the Support menu, you can see the FAQ, Terms and Privacy, and Contact
- C. In 'FAQ', you'll find instructions for common user questions.
- D. 'Terms & Privacy' can be used to check rights and obligation. There are 3 taps consisting of 'Terms of Use', 'Privacy Policy' and 'LG Account'.
- E. In 'Contact', you can see instructions for contacting us in the event of a problem.
 System Inquiry - Please contact the installer for inquiries about system and error occurrence.
 Homepage Inquiry - For inquiries about using the website, please contact LG Electronics..



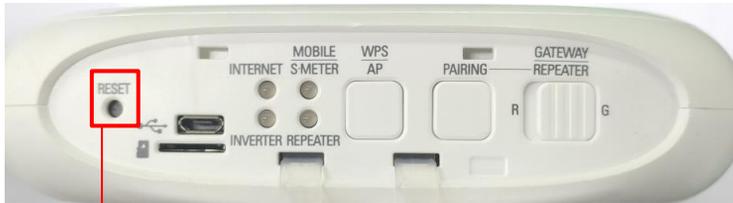


5 Troubleshooting Guide

5-1 EnerBox2 Inspection

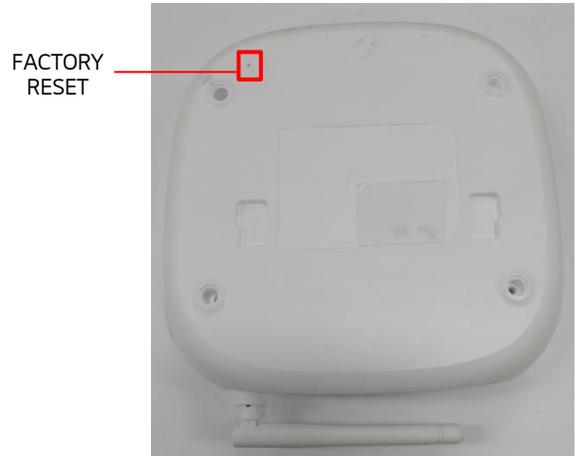
If EnerBox2 doesn't work as guided in the manual, please follow these steps at first measure before troubleshooting.

- A. Make sure that the power cord is fully engaged into the power outlet and into the EnerBox2 body. If everything is normal, the LED on upper position of the EnerBox2 will be flashing light then turned off after the boot procedure is in completion.
- B. Check the EnerBox2 operation mode. Enerbox2 usually used as the GATEWAY mode.
- C. Reboot the EnerBox2 by pressing the 'RESET' pin. If everything is normal, the The LEDs will be flashing light then turned off after the boot procedure is in completion.
- D. For another solution, push the 'FACTORY RESET' for 3 seconds. The button is placed on the bottom of the EnerBox2. Four LEDs will be flashing in amber. When it is done, they will be flashing in green. Then, press the 'RESET' button for reboot.
- E. Please follow other steps described in this manual. If problems persists, contact LG for technical support.



RESET

EnerBox2 left-side



FACTORY RESET

EnerBox2 bottom-side

※ If the current location is not the installation site, you can reboot the EnerBox2 remotely to check the operation.

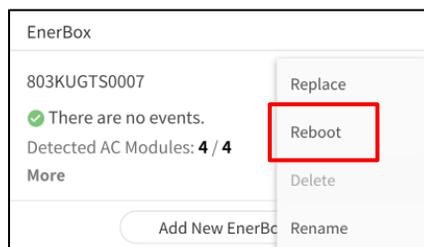
- Web : [System > Activated System > Choose System name]

Click 'EnerBox2 S/N' in the left system view or 'View Detail' in Device info and then press 'Reboot'



- App : [System (Cloud Connection) > Activated > Choose System name > EnerBox]

Click '...' and then press 'Reboot'





5-2 Replacing an EnerBox2

First, physically install the new Enerbox2 using the following procedure.

1. Unplug the power cord of the old EnerBox2
2. Place the new EnerBox2 at the same location. Connect the power cord to the new EnerBox2 and a power outlet (same outlet used by the old EnerBox2).
3. Enable the installed EnerBox2 access to internet in reference of AC Module System Installation Manual where 4-3 installing EnerBox2 describes Step 4.

※ Since you are transferring the information from the Web server to the new EnerBox2, you need to connect to the Internet to use the 'Replace' function.

- Using EnerVu2 website

Go for [System -> Activated System -> Select the system name -> Device Info -> View Detail].

As before, you can find the 'Replace' button by pressing EnerBox2 S/N in the left System View or by clicking 'View Detail' in the Device Info.

The image shows a laptop displaying the EnerVu2 website interface. On the right side of the screen, there is a panel for 'EnerBox 1' with a 'Replace' button highlighted in a red box. Below this panel, a 'Replace EnerBox' popup window is shown. The popup contains the following fields and buttons:

- EnerBox Serial Number***: 803KUGTS0007
- Total Number of AC Modules**: 4
- New EnerBox Serial Number**: An empty text input field with a 'Check' button to its right, both highlighted in a red box.
- At the bottom of the popup, there are 'Cancel' and 'Replace' buttons, with the 'Replace' button highlighted in a red box.

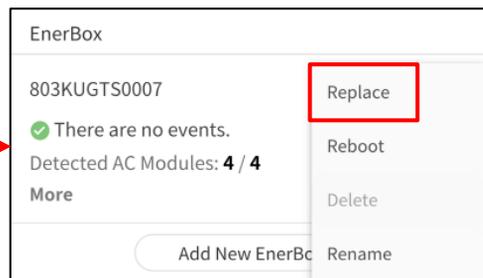
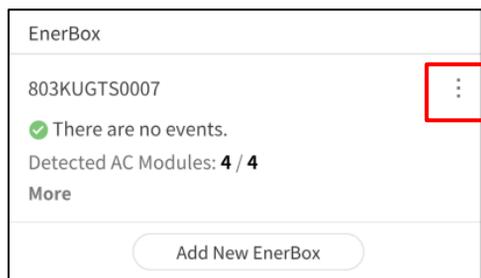
When you press the 'Replace' button, the above popup window will appear. Enter the newly installed EnerBox2 S/N. Verify it with the 'Check' button, and click 'Replace' at the bottom right in order to perform communication between EnerBox2 and the Web server.

※ Replace function should be performed after physical installation in steps 1 ~ 3 above. If the newly installed EnerBox2 does not connect to the Internet, the Replace function cannot be executed because the EnerBox2 S/N verification has not been made.



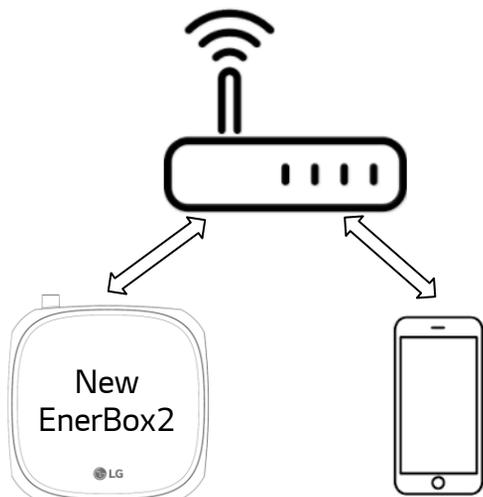
▪ Using LG EnerVu2 Professionals

You can find 'Reboot' button by going for [Systems -> Activated -> Choose a system name -> EnerBox]. The button is placed on the right.

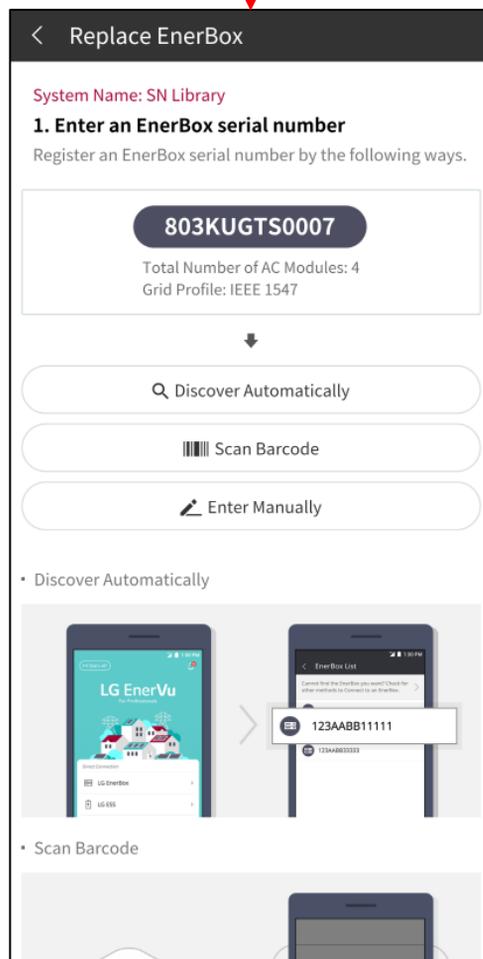


When you press the 'Replace' button, you will see three ways to enter the new EnerBox2 S/N as shown below.

- Discover Automatically
If the home router is connected together as shown below, discover the EnerBox2 automatically.



- Scan Barcode
Scan Barcode for EnerBox2 registration. Utilize your mobile phone camera to scan barcode placed on the bottom of the EnerBox2.
- Enter Manually
Enter S/N manually.





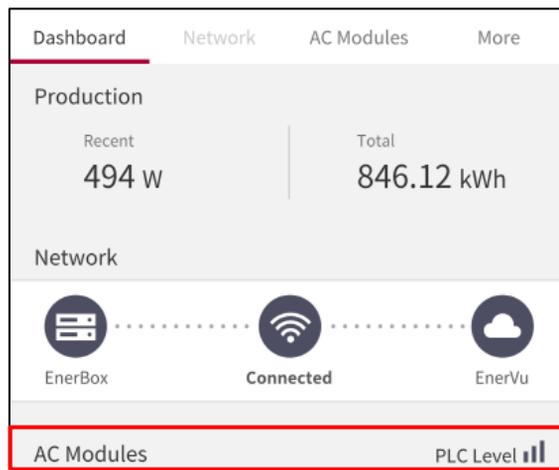
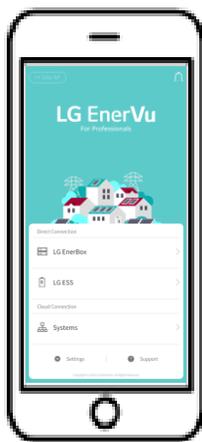
5-3 Check the PLC Level

It is recommended for the PLC level to have two or three bars. It will be the best if the outlet has shortest electrical path from the distribution panel where all of AC modules are attached. If the PLC level is zero or one, relocate the EnerBox2 to a location where few home appliances are installed. Refer to '5-4 Micro Inverter Detection Issues' when relocation of EnerBox2 cannot solve problem.

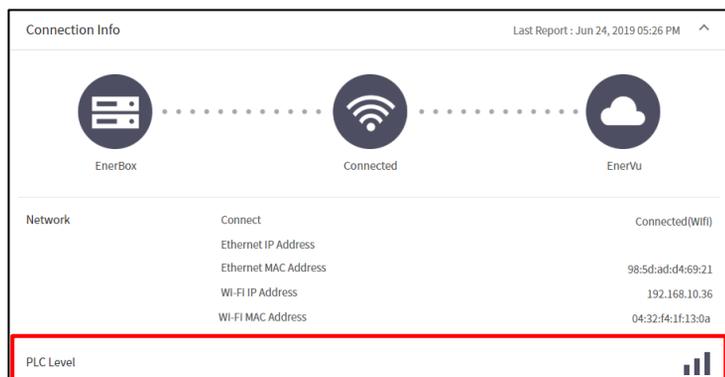
PLC level indicator

- : Inappropriate PLC level for communication
- : Intermittent communication failure is imminent
- : Decent PLC level
- : Excellent PLC level

In App : Tap on the 'Dashboard' for checking 'PLC Level'. Then check out the PLC level.



In website : It is also possible to check PLC level via website if the system is in completion of activation. Go for [System -> Device info -> View detail].





5-4 Micro Inverter Detection Issues

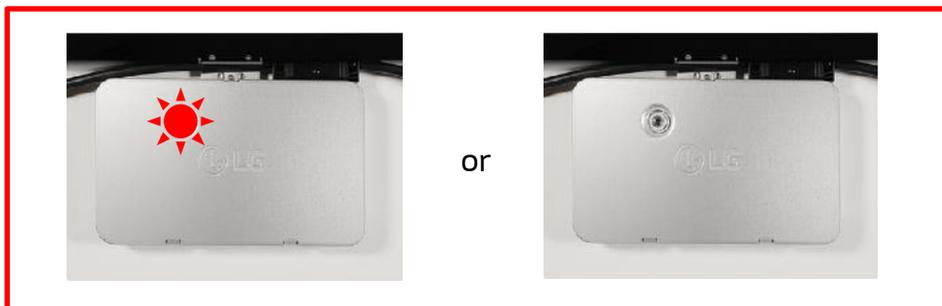
Troubleshoot power line communication issues as follows

Issue : When the number of detected AC modules is not matched with the number of installed AC modules.

- 'Detected AC modules' is smaller than 'Installed Number'.

Follow below check list..

- ✓ Rescan AC modules using the app and let the EnerBox2 find all of installed AC modules.
- ✓ Check LED status.



Check LED status

Grid connectivity	Grid connection (5 min. after grid connection)	Grid disconnection	Case
LED Status	LED off	LED off	abnormal A
	Red Blinking LED	LED off	abnormal B
	Red Blinking LED	Red Blinking LED	abnormal C
	LED off	Red Blinking LED	normal

Abnormality case A,B

- A. Check that the solar panel is actually getting sunlight. If it persists continuously, contact LG Electronics to replace the product.

Abnormality case C

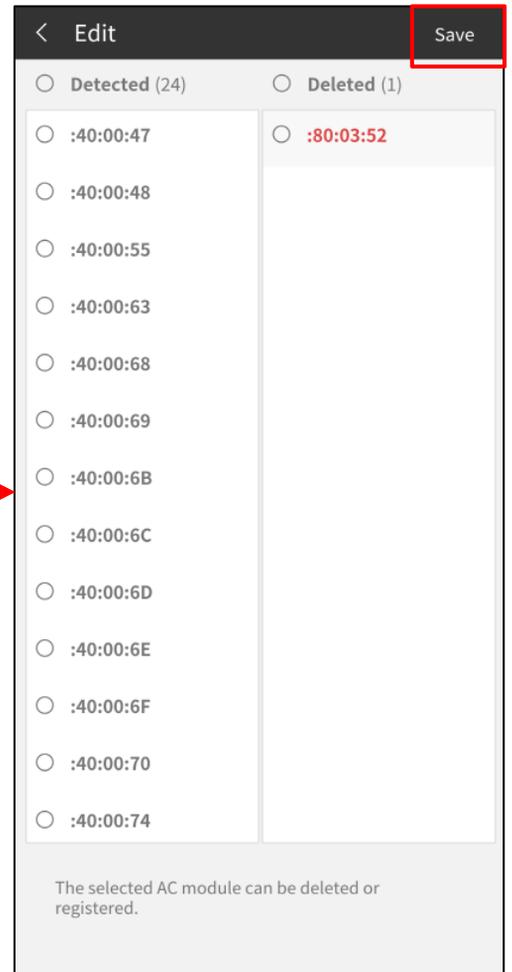
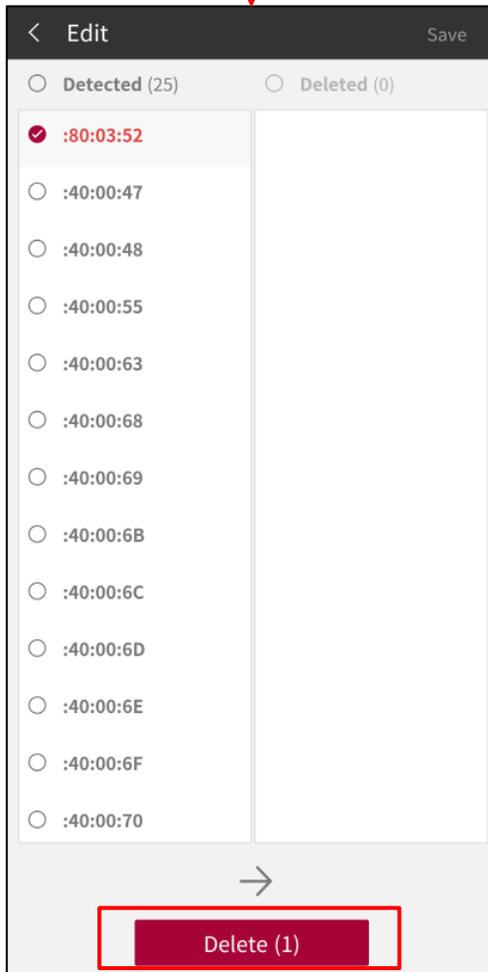
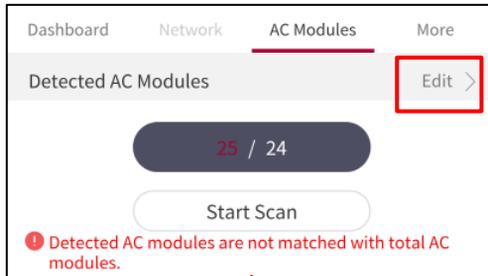
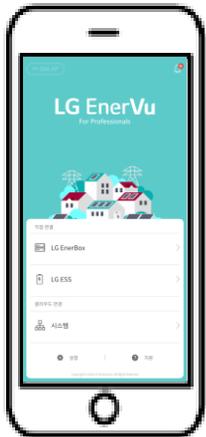
- A. Measure voltages.
- B. Measure frequencies.
- C. Measure ambient temperature and check if it is in the range of -40 to 65 °C (-40 to 145 °F).
- D. Please check that all of AC cable connectors are properly connected.

If problems persists despite of the above measure, follow steps below.

- Relocate the EnerBox2 to a location where few home appliances are installed. Or allow the EnerBox2 to occupy an outlet exclusively.
- Install another EnerBox2 inside a sub-panel or a distribution panel.



- 'Detected AC modules' is larger than 'Installed Number'.
- Follow below check list.
 - ✓ Make sure that the number of installed AC modules is accurate in the activated system.
 - ✓ Go for [Detected AC Modules–Edit]. Then bring the installation map where all of MAC address is attached. Compare it with the list in the app. Find and delete one which is not in the installation map. Then save it for update.





5-5 Internet Connection Issues

Issue: Internet LED is Solid Amber or Off



While LG Electronics provides technical support on EnerBox2, LG Electronics has no responsibility for a router which is made by other manufacturer. If connection failure between the EnerBox2 and a router occurs, check whether your laptop or mobile phone has no problem to use internet access at first. Take a quick measure by doing the steps below.

- A. Turn off a modem, a router and the EnerBox2.
- B. Turn on the modem at first. Wait for a few minutes.
- C. Turn on the router. Wait for a few minutes. It needs time for the network to get IP address.
- D. Then turn on EnerBox2.

If your router is providing internet service with no problem, then follow the steps described below. EnerBox2 can play a host in a network with particular settings like a laptop or mobile phone.

To troubleshoot this issue :

- When the internet LED is solid amber, check setting of site owner’s broadband router. This is a case that EnerBox2 can only access to local network but Internet / EnerVu Web server. It might be solved if the router has been set with firewall setting, MAC filtering, or inactive DHCP service. Refer to a manual provided by a manufacturer of the router.

Check the router’s setting

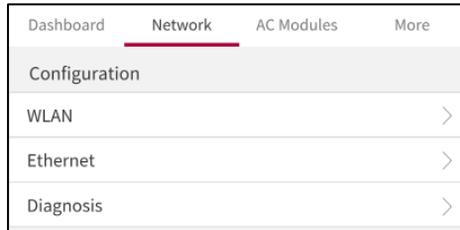
- Firewall
EnerBox2 uses TCP Protocol/443 port to communicate with a server. If outbound firewall rules are applied on the home router, you must configure a static IP address for the EnerBox2 and add new rules that allow outbound access for the home router.
- MAC filtering
If MAC filtering is set on the home router, disable the MAC filtering. Refer to a manual provided by a manufacturer of the router.



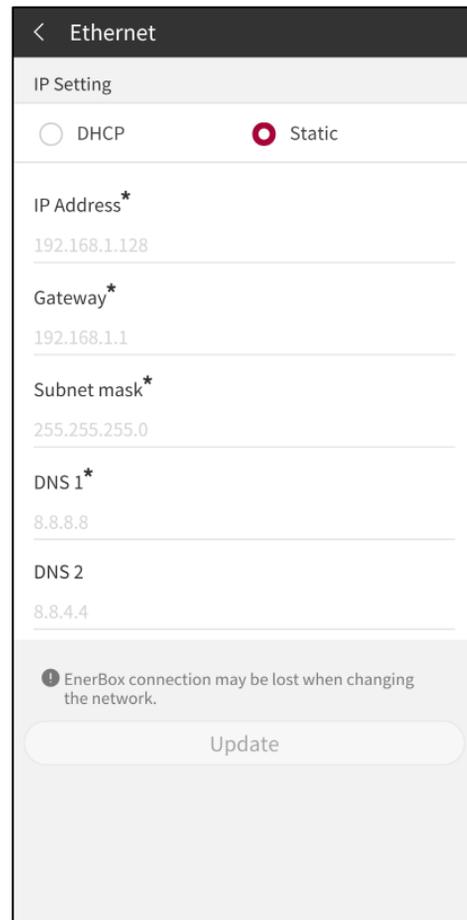
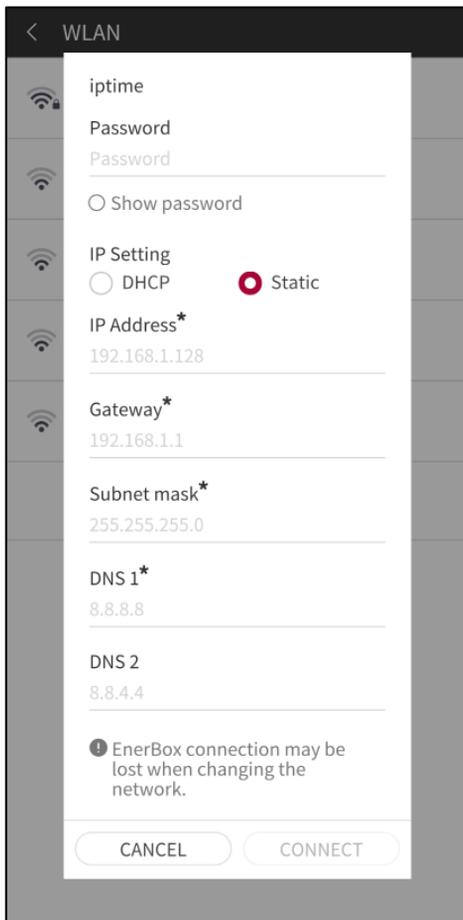
Issue: How to set the static IP address.

When an EnerBox2 tries to access to internet, it will automatically receive IP address from the router’s DHCP(Dynamic Host Configuration Protocol) server. However, based on circumstances, an EnerBox2 can manually set static IP address.

1. Push AP button for Soft AP mode. Please refer to Method B in Step 4 of 4-3 EnerBox2 installation procedure.
2. Go for [Dashboard -> Network]. Then select WLAN or Ethernet.



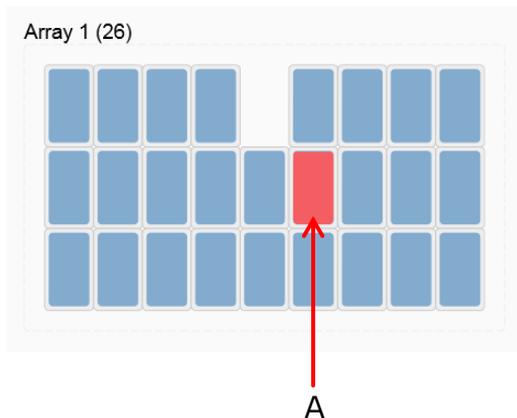
3. For WLAN, select SSID of the target router and put the password on the blank first.
4. In IP setting, select Static and put the appropriate information on each space.



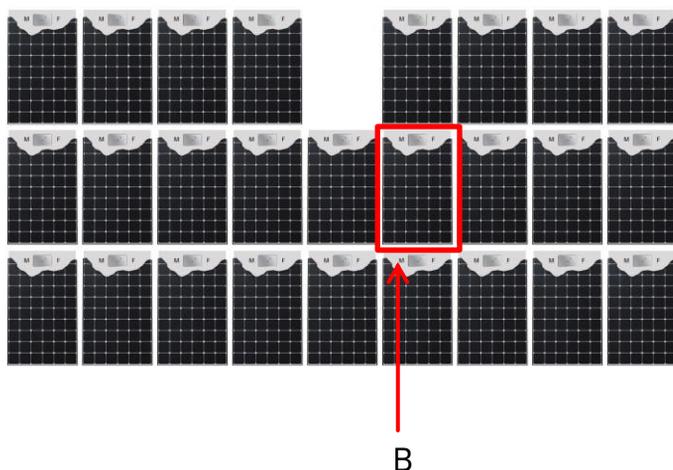
※ When WLAN is already connected and you want to set static IP, terminate WLAN connection then proceed the steps from the start.



5-6 Micro inverter Operation Issues



Web Monitoring system



Installed AC module system



C : Check LED status

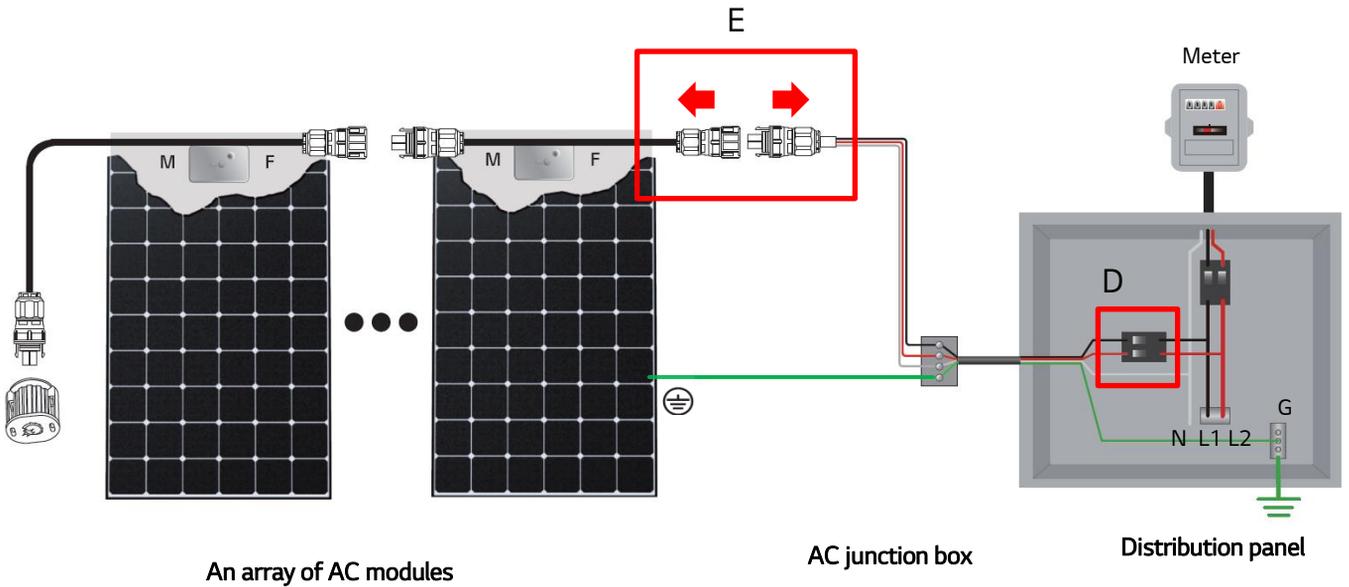
- A. If the web monitoring system notify you that particular AC modules are not communicating with the EnerBox2, then write down the location of the AC module and MAC address.
- B. Find out the physical location of the target AC modules. Please make sure that you are equipped with proper PPE (Personal Protective Equipment) that can protect you.
- C. During a daytime, check whether the LED blinks red or shows no lights. And keep the LED status in mind or write it down on your notes.

Grid connectivity	Grid connection (5 min. after grid connection)	Grid disconnection	Case
LED Status	LED off	LED off	abnormal A
	Red Blinking LED	LED off	abnormal B
	Red Blinking LED	Red Blinking LED	abnormal C
	LED off	Red Blinking LED	normal

⚠ WARNING



- Plan the installation work in moderate weather. There is a risk of electric shock when it is raining or snowing.
- To prevent the risk of accidents, use proper PPE (Personnel Protective Equipment) including helmets and gloves at all times.
- If installation location is high above ground, make sure to use Fall Protection System during the installation.



An array of AC modules

AC junction box

Distribution panel



F : Check LED status

- D. Investigate the distribution panel and find out the circuit breaker that works only for the branch where all of AC modules are attached. Then turn the circuit breaker off.
- E. Disengage the AC connectors for the last module which is connected with the AC junction box. For this step, make sure that the circuit breaker is properly turned off. Do not disconnect the AC cable connectors under load.
- F. During a daytime, check whether the LED blinks red or shows no lights. And keep the LED status in mind or write it down on your notes.

Grid connectivity	Grid connection (5 min. after grid connection)	Grid disconnection	Case
LED Status	LED off	LED off	abnormal A
	Red Blinking LED	LED off	abnormal B
	Red Blinking LED	Red Blinking LED	abnormal C
	LED off	Red Blinking LED	normal



Grid connectivity	Grid connection (5 min. after grid connection)	Grid disconnection	Case
LED Status	LED off	LED off	abnormal A
	Red Blinking LED	LED off	abnormal B
	Red Blinking LED	Red Blinking LED	abnormal C
	LED off	Red Blinking LED	normal

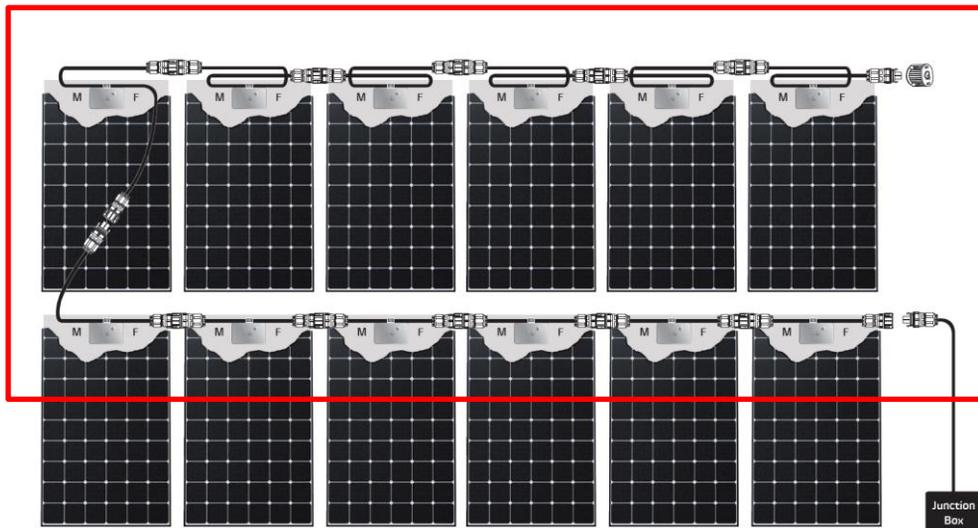
Abnormality case A,B

A. Check that the solar panel is actually getting sunlight. If it persists continuously, contact LG Electronics to replace the product.

Abnormality case C

- A. Measure voltages described in **5-7 Grid Voltage Measurement**.
- B. Measure frequencies described in **5-8 Grid Frequency Measurement**.
- C. Measure ambient temperature and check if it is in the range of -40 to 65 °C (-40 to 145 °F).
- D. Please check that all of AC cable connectors are properly connected with the reference described in **AC Module System Installation Manual**. Then try to follow steps of **5-6 Micro inverter Operation Issues** again.
- E. If the problem persists continuously, contact LG Electronics to replace the product.

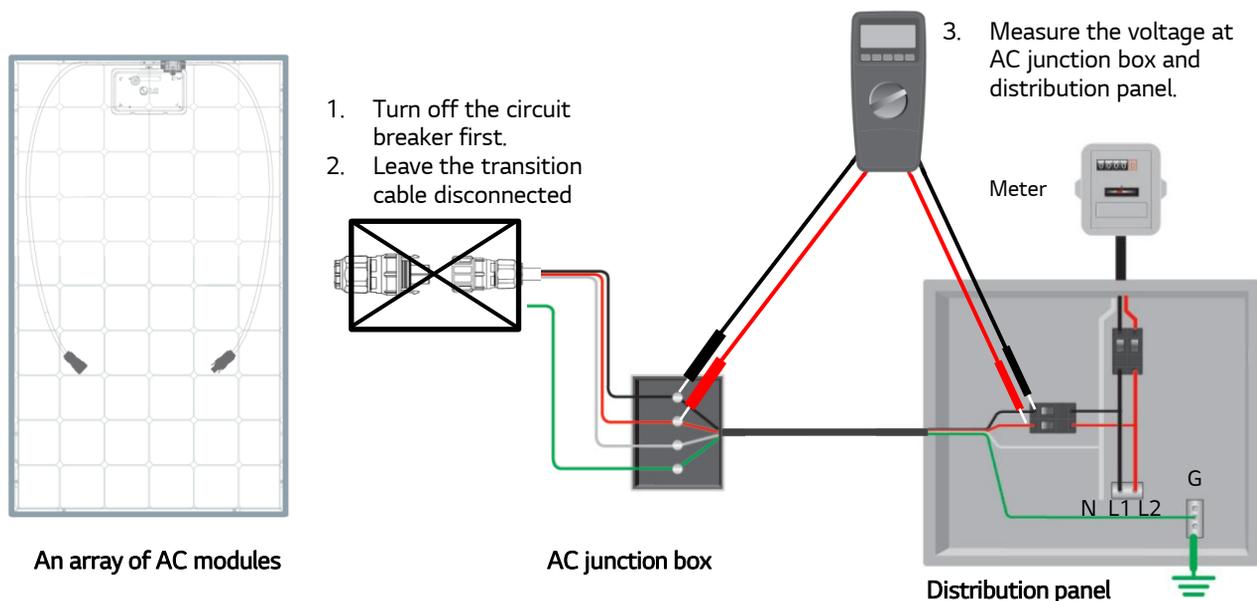
D





5-7 Grid Voltage Measurement

Measure AC voltage of the utility at the distribution panel and AC junction box using a volt-meter. Fill out the below table. If the measured voltage is out of the range which is specified in each table, then ask the local electricity provider about voltage instability. After the work, please follow 3-15 Energize the installed AC module system to restart the system.



At distribution panel

Measure point	Single Phase 240V(RMS)			Single Phase 208V(RMS)			Three Phase 208V(RMS) Merge, Split Type		
	Expected	Range	Measured	Expected	Range	Measured	Expected	Range	Measured
L1 - N	120	106~132		120	106~132		120	106~132	
L2 - N	120	106~132		120	106~132		120	106~132	
L3 - N	-			-			120	106~132	
L1 - L2	240	211~264		208	183~229		208	183~229	
L2 - L3	-						208	183~229	
L3 - L1	-						208	183~229	

At AC junction box

Measure point	Single Phase 240V(RMS)			Single Phase 208V(RMS)			Three Phase 208V(RMS) Merge, Split Type		
	Expected	Range	Measured	Expected	Range	Measured	Expected	Range	Measured
L1 - N	120	106~132		120	106~132		120	106~132	
L2 - N	120	106~132		120	106~132		120	106~132	
L3 - N	-			-			120	106~132	
L1 - L2	240	211~264		208	183~229		208	183~229	
L2 - L3	-						208	183~229	
L3 - L1	-						208	183~229	

⚠ WARNING

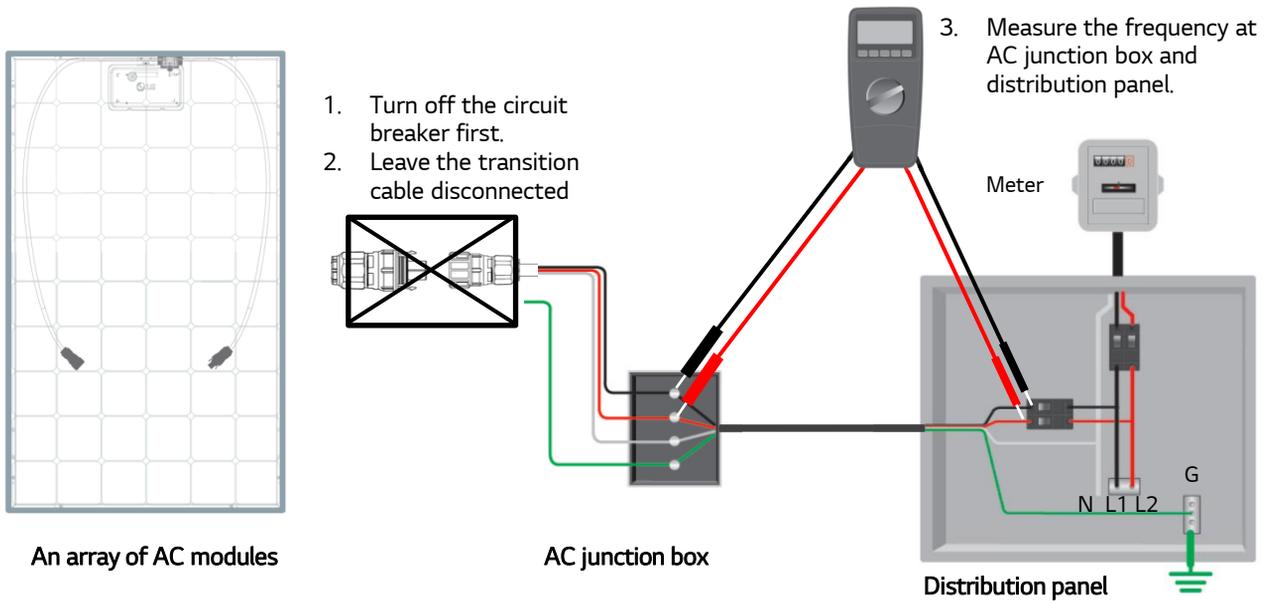


- Plan the installation work in moderate weather. There is a risk of electric shock when it is raining or snowing.
- To prevent the risk of accidents, use proper PPE (Personnel Protective Equipment) including helmets and gloves at all times.
- If installation location is high above ground, make sure to use Fall Protection System during the installation.
- For safety, only qualified personnel should undertake the work.



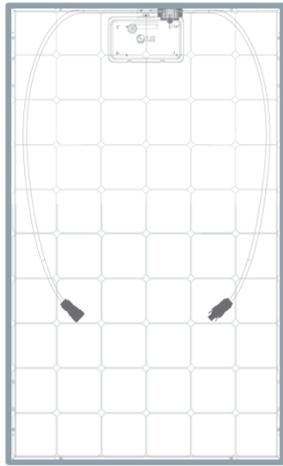
5-8 Grid Frequency Measurement

Measure grid frequency of the utility at the distribution panel and AC junction box using a volt-meter. Fill out the below table. If the measured frequency is out of the range which is specified in each table, then ask the local electricity provider about frequency instability. After the work, please follow 3-15 Energize the installed AC module system to restart the system.

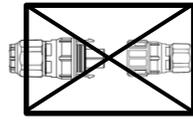


1. Turn off the circuit breaker first.
2. Leave the transition cable disconnected

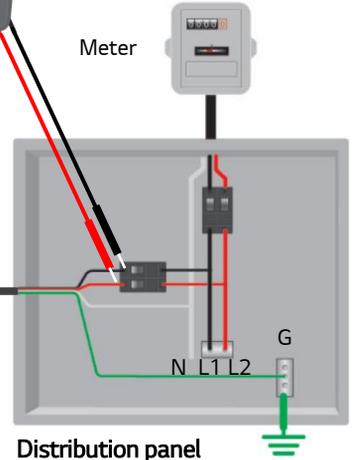
3. Measure the frequency at AC junction box and distribution panel.



An array of AC modules



AC junction box



Distribution panel

At distribution panel

Measure point	Single Phase 240V(RMS)			Single Phase 208V(RMS)			Three Phase 208V(RMS) Merge, Split Type		
	Expected	Range	Measured	Expected	Range	Measured	Expected	Range	Measured
L1 - N	60Hz	59.3-60.5		60Hz	59.3-60.5		60Hz	59.3-60.5	
L2 - N	60Hz	59.3-60.5		60Hz	59.3-60.5		60Hz	59.3-60.5	
L3 - N	-			-			60Hz	59.3-60.5	
L1 - L2	60Hz	59.3-60.5		60Hz	59.3-60.5		60Hz	59.3-60.5	
L2 - L3	-						60Hz	59.3-60.5	
L3 - L1	-						60Hz	59.3-60.5	

At AC junction box

Measure point	Single Phase 240V(RMS)			Single Phase 208V(RMS)			Three Phase 208V(RMS) Merge, Split Type		
	Expected	Range	Measured	Expected	Range	Measured	Expected	Range	Measured
L1 - N	60Hz	59.3-60.5		60Hz	59.3-60.5		60Hz	59.3-60.5	
L2 - N	60Hz	59.3-60.5		60Hz	59.3-60.5		60Hz	59.3-60.5	
L3 - N	-			-			60Hz	59.3-60.5	
L1 - L2	60Hz	59.3-60.5		60Hz	59.3-60.5		60Hz	59.3-60.5	
L2 - L3	-						60Hz	59.3-60.5	
L3 - L1	-						60Hz	59.3-60.5	

⚠ WARNING



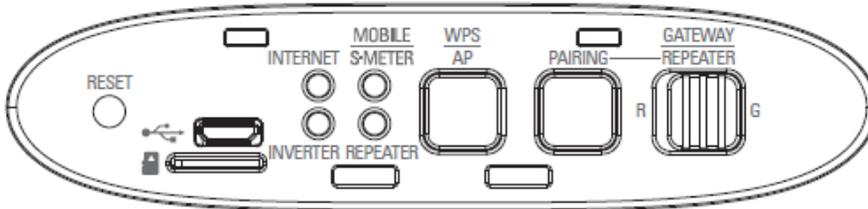
- Plan the installation work in moderate weather. There is a risk of electric shock when it is raining or snowing.
- To prevent the risk of accidents, use proper PPE (Personnel Protective Equipment) including helmets and gloves at all times.
- If installation location is high above ground, make sure to use Fall Protection System during the installation.
- For safety, only qualified personnel should undertake the work.



6 Event List and Description

6-1 EnerBox2 Displays and Controls

The LEDs on the EnerBox2 are solid green when a function is enabled or performing as expected, flashing when an operation is in progress, or solid amber when troubleshooting is required (except Soft AP operation).



No.	Button and Switch	Description	Remarks
1	WPS/AP	WPS/AP mode enable button - short press : AP mode (AP starts and stops with toggle) - long press(for 3 seconds) : WPS mode (No switch to WPS disable and auto disable after 2 minutes.)	
3	PAIRING	Repeater pairing button - short press : Enter pairing mode (Pairing starts and stops with toggle) - long press(for 3 seconds) : Delete the registered Gateway and Repeater.	To pair, press the Repeater and GW pairing button each other
2	GATEWAY REPEATER	Mode Select Switch(Gateway or Repeater)	Reboot is required if mode is changed while power is on
4	RESET	EnerBox2 rebooting button	It takes about 30 seconds
5	Factory Reset (rear)	Factory-installed reset button long press(for 3 seconds) : Initializing to factory default state.	



6-2 EnerBox2 LED

No.	LED	State	Description
1	All	Flashing Green	Software upgrade in progress Factory reset in progress (factory reset button pushed)
		Flashing Amber	After software upgrade and factory reset
2	INTERNET	Green	Communicating with EnerVu2
		Flashing Green	WPS mode enable
		Amber	Local network only (Connected with Home AP but not internet)
		Off	No network connection
3	MOBILE/ S-METER	Green	Zigbee paired
		Flashing Green	Zigbee pairing progress
		Amber	AP mode enable
		Flashing Amber	Zigbee connection issued
		Off	AP mode & Zigbee disconnected
4	INVERTER	Green	All Microinverters are communicating
		Flashing Green	While one or more is communicating with gateway, scan is in operation
		Amber	At least one Micro inverter is not communicating
		Flashing Amber	While it is not communicating with any micro inverter, scan is in operation
		Off	Microinverters are not communicating (include low light or night time)
5	REPEATER	Green	Repeater and gateway are paired
		Flashing Green	Repeater and gateway scan in progress
		Flashing Amber	Initialize the repeater and gateway list
		Off	Non-paired
6	Power production (Front)	Flashing Green	Average power is above 60W
		Flashing Yellow	Average power is below 60W
		Red	At least one Micro Inverter does not produce power over 72 hours
		Off	No power production



6-2 Web-monitoring System Event List

Cause Device	Event Code	Impact	Event Name (App / Web)	Event Class	Description	Remarks
MI	MI_ANG_ERR	Notice	AC Frequency changing too fast	Angle Status	NOTICE. Angle Status - 1 : Angle Error (Notice #3 - AC Frequency Changing Too Fast)	AC Frequency is the frequency at which voltage varies on the utility grid. This value is changing more rapidly than allowed. And this events are usually transient and reconverted by the utility.
	MI_IAC_OVR	Error	AC Current High	Iac Status	ERROR. Iac Status - 1 : Iac Over (Error #3 - AC Current Too High)	AC Output current from the AC Module is too high than allowed.
	MI_IPV_OVR	Error	DC Current High	Ipv Status	ERROR. Ipv Status - 1 : Ipv Over (1 : Error #2 - DC Current Too High)	DC Input current from the AC Module is too high than allowed.
	MI_NOT_RPT	Notice	AC Module Not Reported	MI Comm. Status	NOTICE. Cannot communicate with AC Module	Communication is temporarily unstable. This condition should correct itself.
	MI_THM_OPEN	Error	Inverter Failure	Thermistor Status	ERROR. Thermistor Status - 10 : Thermistor Open (10 : Error #6 - Thermistor Open)	AC Module has been in failure mode.
	MI_THM_SHT	Error	Inverter Failure	Thermistor Status	ERROR. Thermistor Status - 11 : Thermistor Short (11 : Error #8 - Thermistor Short)	AC Module has been in failure mode.
	MI_TMP_PRT	Error	Temperature Protection	Temperature Protection	ERROR. Temperature Protection - 1 : Temp. Protection (Error #5 - Temperature Protection)	Temperature from the AC Module Inverter is too hot than allowed And AC Module locks itself to protect the micro inverter from heat. This condition usually clears with out intervention.
	MI_VAC_OVR	Notice	AC Voltage High	Vac Status	NOTICE. Vac Status 10 : Vac Over (Notice #1 - AC Voltage High)	AC Voltage coming from the utility has been too high than allowed. This condition should correct itself.
	MI_VAC_UND	Notice	AC Voltage Low	Vac Status	NOTICE. Vac Status 11 : Vac Under (Notice #2 - AC Voltage Low)	AC Voltage coming from the utility has been too low than allowed. This condition should correct itself.



Cause Device	Event Code	Impact	Event Name (App / Web)	Event Class	Description	Remarks
MI	MI_VDC_OVR	Error	Inverter Failure Error	Vdc Status	ERROR. Iac Status - 1 : Vdc Over (Error #4 - DC Link Voltage High)	AC Module has been in failure mode.
	MI_VFR_OVR	Notice	AC Frequency High	Vfreq Status	NOTICE. Vfreq Status 10 : Vfreq Over	AC Frequency is the frequency at which voltage varies on the utility grid. AC Frequency coming from the utility is too high than allowed. These events are usually transient and recovered by the utility. No action is required unless the condition persists.
	MI_VFR_UND	Notice	AC Frequency Low	Vfreq Status	NOTICE. Vfreq Status 11 : Vfreq Under	AC Frequency is the frequency at which voltage varies on the utility grid. AC Frequency coming from the utility is too low than allowed. These events are usually transient and recovered by the utility. No action is required unless the condition persists.
	MI_VPV_OVR	Error	DC Voltage High	Vpv Status	ERROR. Vpv Status - 10 : Vpv Over (Error #1 - DC Voltage Too High)	DC Input voltage from the AC Module is too high than allowed.
	MI_VPV_UND	Notice	DC Voltage Low	Vpv Status	NOTICE. Vpv Status - 11 : Vpv Under (Error #7 - DC Voltage Too Low)	DC Input voltage from the AC Module is too low. This is usually normal condition during hours of low light and at dawn and dusk. If this condition does happen during hours of full daylight, the AC Module may be heavily shaded or covered by snow.



7 Maintenance

- Ensure that AC cable connectors are tightly connected and the wiring properly works.
- Conduct periodic inspection of the AC modules for any damages on front glass, back sheet, frame, AC junction box, micro inverters, circuit breakers, conduits, Earth Grounding path, or external electrical connections.
- No aggressive and abrasive cleansers or chemicals such as alkali chemicals including ammonia based solution should ever be used on the treated front glass.
- Always wear rubber gloves for electrical insulation while maintaining, washing or cleaning panels.
- Deposits of foreign material on the frame surface can be cleaned using a wet sponge or cloth and dried in air or by using a clean chamois.
- All works related to repair shall be carried out by the approved installer for the safety of workers and systems.
- Do not use any kind of oil or lubricant on any of the module's parts, It can damage the AC Module.

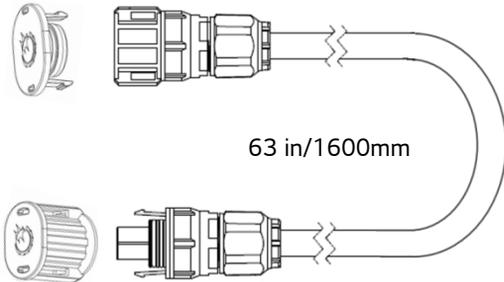
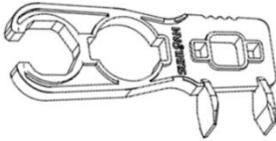
WARNING



- To prevent a risk of burn, do not touch the metal part of the AC module in operation with bare hands.
- To prevent the risk of arcing, do not disconnect the cable connector in operation.



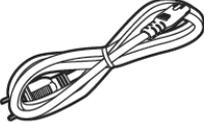
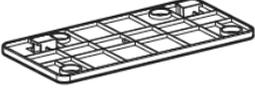
8 Accessories

Item	Model No.	Diagram	Details
Extension Cable	LEE16-FM3.AU1	 <p>63 in/1600mm</p>	<ul style="list-style-type: none"> -Used to connect two AC modules. - Usable as an extension cable or a transition cable. - End caps are initially paired with connectors. - The length 1600 mm/63 in. includes only cable length. (excluded connector length)
Unlocking Tool	LAC-UNLOCK2.AU1		<ul style="list-style-type: none"> - Used in the disassembly of the connector



- Accessories are not included in AC module. Contact the distributor for purchase.
- Use unlocking tool to remove end caps from the extension cable.



Item	Diagram		Details
EnerBox2 Components			- Used for communication with AC modules.
			- Used for providing power to the EnerBox2.
			- Used in a case of wired LAN.
		- Used for mounting the EnerBox2 on wall.	



• Accessories are not included in AC module. Contact the distributor for purchase.



9 Product Specifications

9-1 AC module

- Back Contact : LGXXA1X-XX

DC Input						
Parameter	Section	LG370A1C-V5	LG375A1C-V5	LG380A1C-V5	LG360A1K-V5	LG365A1K-V5
Power	Max.	370W	375W	380W	360W	365W
	Tolerance	0% ~ 3%				
Voltage	Voc	42.8V	42.8V	42.9V	43.3V	43.5V
	Vmpp	37.0V	37.2V	37.4V	36.7V	36.9V
	Tolerance	-5% ~ +5%				
Current	Isc	10.82A	10.83A	10.84A	10.5A	10.55A
	Impp	10.01A	10.09A	10.17A	9.82A	9.90A
	Tolerance	-5% ~ +5%				
Parameter	Section	LG395A1C-A6	LG400A1C-A6	LG405A1C-A6		
Power	Max.	395W	400W	405W		
	Tolerance	0% ~ 3%				
Voltage	Voc	43.6V	43.8V	43.9V		
	Vmpp	37.0V	37.2V	37.5V		
	Tolerance	-5% ~ +5%				
Current	Isc	11.29A	11.32A	11.35A		
	Impp	10.69A	10.76A	10.82A		
	Tolerance	-5% ~ +5%				
Note PV module was measured at STC (Standard Test Condition: Irradiation 1,000W/m ² , Cell temp. 25°C(77°F),1.5AM)						



- NeON 2 : LGXXXM1X-XX

DC Input					
Parameter	Section	LG355M1C-N5	LG360M1C-N5	LG365M1C-N5	LG370M1C-N5
Power	Max.	355W	360W	365W	370W
	Tolerance	0% ~ 3%			
Voltage	Voc	41.5V	41.6V	41.7V	41.8V
	Vmpp	34.7V	35.1V	35.5V	35.8V
	Tolerance	-5% ~ +5%			
Current	Isc	10.80A	10.84A	10.88A	10.92A
	I _{mpp}	10.25A	10.28A	10.30A	10.34A
	Tolerance	-5% ~ +5%			
Parameter	Section	LG340M1K-L5	LG345M1K-L5	LG350M1K-L5	
Power	Max.	340W	345W	350W	
	Tolerance	0% ~ 3%			
Voltage	Voc	40.9V	41.0V	41.1V	
	Vmpp	33.6V	34.0V	34.4V	
	Tolerance	-5% ~ +5%			
Current	Isc	10.60A	10.64A	10.68A	
	I _{mpp}	10.12A	10.15A	10.18A	
	Tolerance	-5% ~ +5%			
Parameter	Section	LG375M1C-A6	LG380M1C-A6	LG385M1C-A6	
Power	Max.	375W	380W	385W	
	Tolerance	0% ~ 3%			
Voltage	Voc	41.8V	41.9V	42.0V	
	Vmpp	35.3V	35.7V	36.1V	
	Tolerance	-5% ~ +5%			
Current	Isc	11.35A	11.39A	11.43A	
	I _{mpp}	10.63A	10.65A	10.67A	
	Tolerance	-5% ~ +5%			
Parameter	Section	LG355M1K-A6	LG360M1K-A6	LG365M1K-A6	LG370M1K-A6
Power	Max.	355W	360W	365W	370W
	Tolerance	0% ~ 3%			
Voltage	Voc	41.6V	41.7V	41.8V	41.9V
	Vmpp	34.3V	34.7V	35.1V	35.5V
	Tolerance	-5% ~ +5%			
Current	Isc	10.84A	10.88A	10.92A	10.96A
	I _{mpp}	10.37A	10.39A	10.41A	10.43A
	Tolerance	-5% ~ +5%			

 Note PV module was measured at STC (Standard Test Condition: Irradiation 1,000W/m², Cell temp. 25°C(77°F),1.5AM)

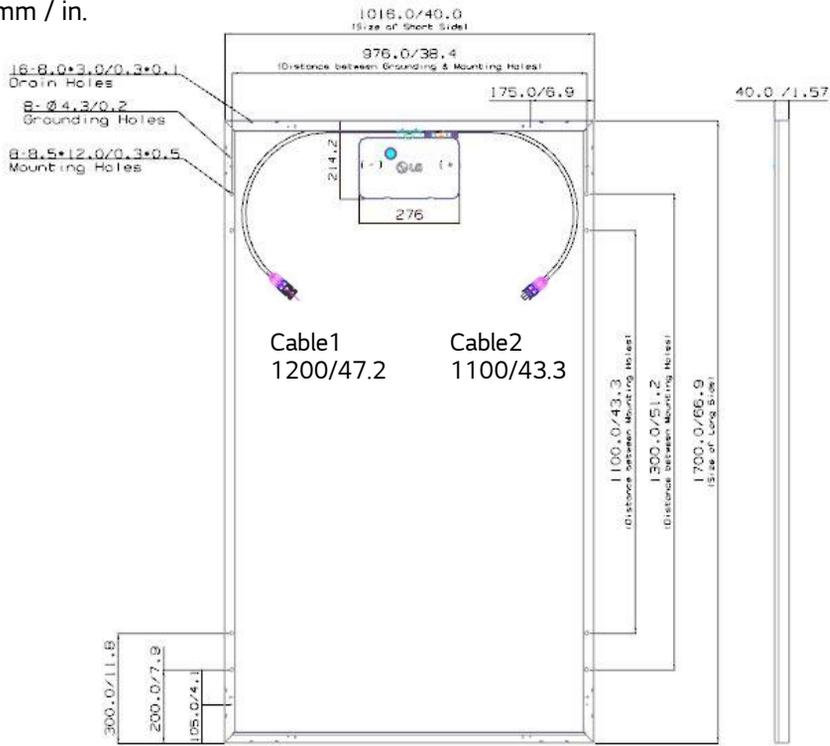


AC Output				
Parameter	Section	240VAC	208VAC	
Power	Inverter Rated Continuous	320W	320W	
Voltage	Nominal(Range)	240V (211V ~ 264V)	208V (183V ~ 229V)	
Current	Nominal Output	1.33A	1.54A	
Frequency	Nominal(Range)	60Hz (59.3Hz ~ 60.5Hz)		
Power Factor(adjustable)		1/0.8 leading...0.8 lagging		
CEC Weighted Efficiency (California Energy Commission)		0.97	0.965	
Max. Number of AC Modules ¹⁾		12 EA	10 EA	
1) Refer to 3-12 Connecting Array of AC Modules to Distribution Panel regarding Maximum number of AC Modules.				
Certification				
DC module	UL1703, IEC61215, IEC 61730, Safety Class II			
AC module	UL1741, IEEE1547, UL1741SA, FCC Part 15 Class B			
IEEE 1547 (Default)				
Parameter	Range	Clearing Time (s)		
Phase Voltage	$V < 50\%$	0.16		
	$50\% \leq V < 88\%$	2.00		
	$110\% \leq V < 120\%$	1.00		
	$V \geq 120\%$	0.16		
Frequency	$> 60.5 \text{ Hz}$	0.16		
	$< 59.3 \text{ Hz}$	0.16		
<ul style="list-style-type: none"> After the micro inverter got tripped by voltage or frequency abnormality, it takes about 5 min for the AC module to operate. If it got tripped by other reasons or it is connected with the utility after sunrise, it takes about 1 min for the AC module to operate. 				
Module Fire Performance	Back Contact		Neon 2	
	LGXXXA1C-XX (White Backsheet)	LGXXXA1K-XX (Black Backsheet)	LGXXXM1C-XX (White Backsheet)	LGXXXM1K-XX (Black Backsheet)
	Type 1	Type 2	Type 1	Type 2
Environmental Rating	NEMA 6 (IP67)			
Mechanical Data				
Micro Inverter	Micro Inverter Model	LM320UE-A2		
	(Grid Support Utility Interactive)			
	Operating ambient temperature	-40 to 65 °C (-40 to 149 °F)		
	Storage temperature	-40 to 90 °C (-40 to 194 °F)		
AC Module	Length	66.9 inch (1700mm)		
	Width	40.0 inch (1016mm)		
	Height	1.5 inch (40mm)		
	Weight	19.0kg		
	Cable length (male)	43.3 inch (1100mm)		
	Cable length (female)	47.2 inch (1200mm)		



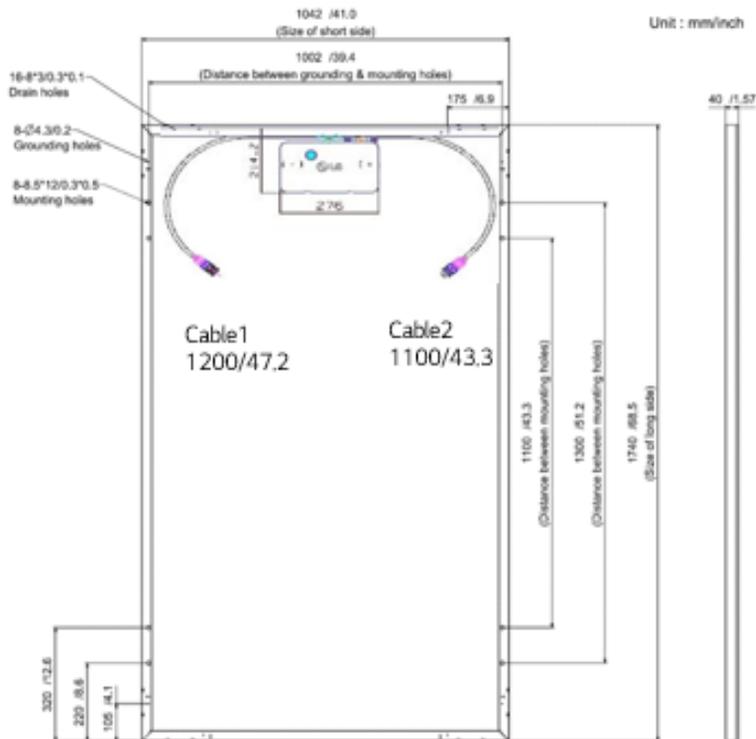
Dimensions (LGXXXA1X-XX / LGXXXM1C-N5 / LGXXXM1K-L5)

Unit: mm / in.



Dimensions (LGXXXA1X-A6 / LGXXXM1X-A6)

Unit : mm/inch





9-2 AC Cables

- AC Cable Ass'y (attached on a micro inverter) and Extension Cable (Accessory)

Technical Data	
Standard	UL9703
Rated Voltage	600V AC
Temperature Range	-40 to 85 °C (-40 to 185 °F)
Rated Current	20A
Protection Degree	IP68
Wire Size Range	3C 12AWG
Diameter range of cable	ø 11 mm



9-3 Communication Gateway

- EnerBox2 : HGQQMSD10

Internal Communication with AC module			
Type	Broadband Power Line Communication (IEEE1901)		
Sample Rate	15 minutes		
Bandwidth	2MHz ~ 28MHz		
Maximum Node	600		
Internal Communication with Smart-meter			
Wireless Communication	IEEE802.15.4 ZigBee		
External Communication			
Wired Communication	IEEE802.3 10BASE-T/100BASE-TX Ethernet		
Wireless Communication	IEEE802.11b,g,n		
Power Requirement			
	Min.	Typ.	Max.
Input Voltage	90 V _{rms}	100~264 V _{rms}	277 V _{rms}
Input Current	0.45 A _{rms}	0.24 A _{rms}	0.21 A _{rms}
Frequency	47 Hz	50/60 Hz	63 Hz
Phase	Single		
Lightening Surge	3kV IEC61547		
Mechanical Properties			
Dimension (W x H x D)	6.1 x 6.8 x 1.5 inch (155.8 x 173.4 x 38.2 mm)		
Weight	0.4 kg		
Operating Temperature	0 to 60 °C (32 to 140 °F)		
Enclosure Rating	IP30		
Certifications and Warranty			
Certifications	FCC Part 15 Class B ETL (Conforms to UL Std. 60950-1)		
Limited Warranty	5 years		



10 Disclaimer of Liability / Disposal

Disclaimer of Liability

- By beginning to installation process, the installer has to read and completely understand this Installation Manual.
- If installer had any questions regarding this installation manual, the installer would have contacted LG with any questions or concerns.
- By installing an LG Solar module, I discharge, and covenant not to sue LG, its affiliated companies, successors, or assigns, its administrators, directors, agents, officers, volunteer and employees, other participants in any activity connected to installation, operation, or service of LG Solar Modules, and if applicable, from all liabilities, claims, demands, losses, or damages on my account caused or alleged to be caused in whole or in part by the negligence of the LG, its affiliated companies, successors, or assigns, its administrators, directors, agents, officers, volunteer and employees.

Disposal

- Please contact us, if you have any inquiries related to the disposal or recycling of solar modules from LG Electronics.

11 Transportation and Storage

- Keep AC modules tight in position during transportation on a truck, a ship and etc.
In case of loose banding, module will be shaken, which may cause damage like glass breaking.
- Do not stack on more than one pallet. Maximum height is two pallets. Severe stacking can give stress to the AC modules
- Keep the module in its original packing prior to installation.

12 Contact

LG Electronics USA, Inc.
111 Sylvan Avenue, North Building
Englewood Cliffs, NJ 07632
E-Mail : lg.environmental@lge.com

<https://www.lg.com/us/solar>

Link to Sheet -----

Project Title: Total AC modules : Total Arrays (AC junction box) : Sheet _____ of _____	Customer Information :	Installer Information :	N S E W (Mark one) 
1	2	3	4
A			
B			
C			
D			
E			
F	EnerBox2 serial number:	AC module Installation Map	 LG Life's Good

Link to Sheet -----

Link to Sheet -----

Link to Sheet -----



Appendix 2 – Module Installation & Load Guide

Mechanical Installation

Fig. 1 Bolting Type		Fig. 2 Clamping Type	
① : 7.9 in(200mm) ② : 11.8 in(300mm)	Front : 5400Pa(113psf) Rear : 4000Pa(84psf)	A : 7.9 in(200mm) B : 15.7 in(400mm)	Front : 5400Pa(113psf) Rear : 4000Pa(84psf)
		A : 0.0 in(0mm) B : 25.6 in(650mm)	Front : 2400Pa(50psf) Rear : 2400Pa(50psf)
Fig. 3 Clamping Type		Fig. 4 Clamping Type	
A : 7.9 in(200mm) B : 15.7 in(400mm)	Front : 4000Pa(84psf) Rear : 4000Pa(84psf)	A : 4.7 in(120mm)	Front : 1800Pa(38psf) Rear : 1800Pa(38psf)
		B : 7.9 in(200mm)	Front : 2400Pa(50psf) Rear : 2400Pa(50psf)
Fig. 5 Clamping Type		Fig. 6 Clamping Type	
A : 7.9 in(200mm) B : 15.7 in(400mm)	Front : 5400Pa(113psf) Rear : 4000Pa(84psf)	A : 4.7 in (120mm)	*4point(①)
C : 4.7 in(120mm)	Front : 5400Pa(113psf) Rear : 1800Pa(38psf)	A : 120mm B : 33.2±3.9 in (843±100mm)	6point (①+②)
			Front : 1800Pa(38psf) Rear : 1800Pa(38psf)
			Front : 5400Pa(113psf) Rear : 4000Pa(84psf)

Note) All mechanical installation method(Fig. 1 to Fig. 6) in this appendix were not evaluated by UL. (UL 1703, ULC 1703) It is evaluated by LG internal test.



Appendix 3 – Alternative Equipment Grounding Devices

This appendix defines alternative grounding methods for LG AC modules and applies to the LG Module Install manual and listed manufacturer’s installation guide. These alternative grounding devices indicated on this page have been evaluated and approved by LG, not by UL. If such devices are to be used to meet the requirement in UL 1703, some adequate tests shall be conducted in accordance with UL1703 additionally.

Products		Remark
Manufacture	Ground Devices	
Everest	Everest Solar Universal Bonding Clamp	
IronRidge	IronRidge IG (Integrated Grounding) Clamp / UFO Mid Clamp	
Unirac	Unirac Bonding Mid Clamp / SunFrame Micro Rail / Wire Bonding Clip w/ 8 AWG	
Panel Claw	Standard Claw / Long Claw / PolaBear III Claw	
Quickmount PV	Quick Rack Panel Clamp	
SnapNrack	SnapNrack Bonding Mid Clamp / SnapLink for RL system	
Ecolibrium	EcoX Clamp and Coupling assembly / EcoFoot Clamp	
Pegasus	Pegasus LightSpeed Corners	
Schletter	Rapid Grounding Module Clamps	
Dynorax	DynoBond	
Roof Tech	Roof Tech Bonding Plate	
ILSCO	ILSCO SGB-4 Solar Grounding Lug	
TYCO	TYCO 2058729 / 2106831 SolarLock Grounding Assy	
Wiley Burndy	WEEB LUG / WEEB KMC in combination with Everest clamp / WEEB DMC in combination with IronRidge clamp / Wiley WEEB UMC or UGC-1 in combination with Unirac clamp / WEEB PMC in combination with Pro Solar clamp / WEEB DPW in combination with DPW Solar clamp	

Important Notes

1. The NEC section 690.43 states, “Exposed non-current carrying metal parts of module frame, equipment and conductor enclosures shall be grounded in accordance with 250.134 or 250.136(A) regardless of voltage.”
2. Functionality will not be guaranteed if reused.



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