LESSO

1kW / 2kW Residential Off-grid Solar Energy System User Manual

Document Revision: V1.0

Contents

Overview

This document is prepared for a residential off-grid solar energy system in 1kW/3kWh and 2kW/5kWh configuration, and covers product introduction, component introduction, installation, debugging, and system maintenance. In case of any discrepancy in the product description, please refer to the actual product.

The images in this document are for reference only. Please refer to the actual product structure.

Intended Readers

This document is primarily intended for the following engineers:

- Sales engineers
- Technical support engineers
- Maintenance engineers

Symbol Descriptions

The following symbols may appear in this document, representing the following:

Symbol	Description
	**Danger:** An imminent dangerous situation may occur which, if not avoided, will result in death or serious injury. **Warning:** A potential dangerous situation may occur which, if not avoided, may result in death or serious injury. **Caution:** A potential dangerous situation may occur which, if not avoided, may result in moderate or minor personal injury.
	**Note:** A warning on equipment or environmental safety, if not avoided, may result in equipment damage, data loss, device performance degradation, environmental pollution, or other unanticipated results. A "Note" involves no risk of personal injury.
	It is used to convey equipment or environmental safety warning information. If not avoided, the situation may result in equipment damage, data loss, device performance degradation, environmental pollution, or other unanticipated results. A "**Notice**" involves no risk of personal injury.
INSTRUCTIONS	**Instructions:** Provide supplementary information related to the main text.

Warning: When using this product, the PV module bracket and the ground bar of the PV DC distribution box must be connected to the grounding pole or lightning protection grounding pole of the building. It is recommended that the grounding cable be no less than 10mm^2. A lightning protection grounding device shall be installed by a local engineering company holding the relevant construction certification.

Warning: When this product is connected to the battery, some circuits will still be working after the PV input power has been disconnected.

The lines of the PV system contain HVDC and 220V AC voltage, and users need to arrange for qualified electricians to carry out installation, wiring and commissioning.

1. Introduction

1.1 Introduction to Off-grid System

This product consists of PV modules, MPPT solar controller, AC inverter, lithium battery packs, PV and Battery DC distribution box, PV module bracket, and the connecting cables of each component, auxiliary installation materials and other materials. The product features a split structure and is installed in the user's indoor waterproof and moisture-proof space.

1.2 Features

- The 1kW system is configured with a set of 3kWh lithium batteries as standard, while the 2kW system is configured with a set of 5kWh lithium batteries as standard. Users can expand the number of batteries to increase the backup time based on power backup requirements.
- Standard system accessories include different connecting cables between equipment, for easier field wiring.

2. Product Composition and Appearance

2.1 Typical Product Configuration Table for 1kW/3kWh Systems

Name	Model	Parameters	Specification	Quantity
40A MPPT solar controller	LSSM40A-DMD01	MPPT voltage range (Vdc)	36-150	1
		Maximum PV input power (Wp)	1100	
		Rated battery voltage (Vdc)	25.6	
		Maximum charging / Discharging current of the battery (A)	40	
1kW AC Inverter	LSOT1K-DMD01	Rated battery voltage (Vdc)	25.6	1
		Inverter output voltage (Vac)	220	
		Inverter output frequency (Hz)	50	
		Inverter output power (W)	1000	
3kWh Battery pack	LSMO25.6V 120AH-ZY	Battery type	Lithium	1
		Rated voltage (Vdc)	25.6	
		Capacity (Ah/kWh)	120/3	
		Maximum charging / Discharging current (A)	100	

415W PV module	415D(BPM) 54(182)	Open-circuit voltage (Vdc)	37.57	2
		Short-circuit current (A)	14.03	
		Maximum power voltage (Vdc)	31.55	
		Maximum power current (A)	13.16	
		Dimensions (mm)	1722x1134x35 (H x W x D)	
		Weight (kg)	21.7	
PV and battery DC distribution box	LSDB-PDC20-LY01	Configuration	PV input circuit breaker: 16A/2P×1, SPD Imax=40KA×1 Battery circuit breaker: 63A/2P×1	1
		Dimensions (mm)	330x230x100 (W x H x D)	
		Weight (kg)	3.6	
		Installation method	Indoor wall-mounted, IP30, top and bottom cable entry	

2.2 Typical Product Configuration Table for 2kW/5kWh Systems

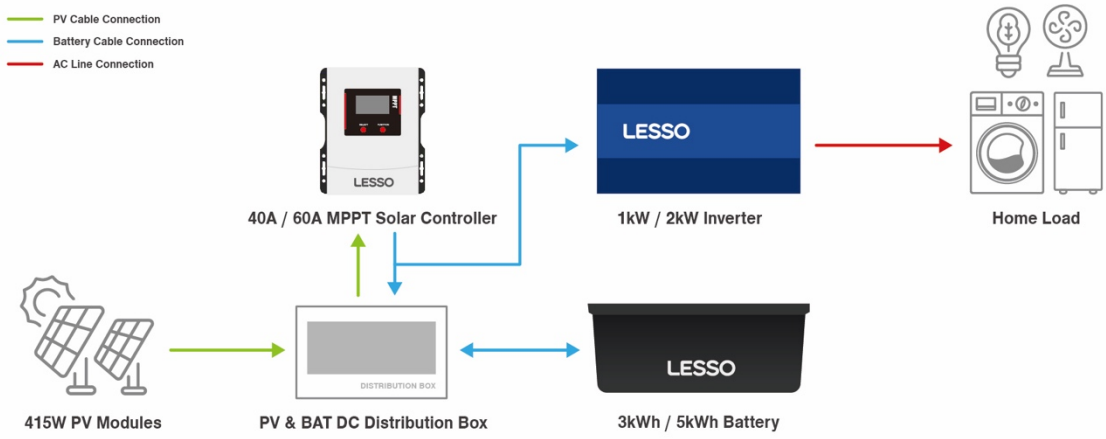
Name	Model	Parameters	Specification	Quantity
60A MPPT solar controller	LSSM60A-DMD01	MPPT voltage range (Vdc)	36-150	1
		Maximum PV input power (Wp)	1600	
		Rated battery voltage (Vdc)	25.6	
		Maximum charging / Discharging current of the battery (A)	60	
2kW Inverter	LSOT2K-DMD01	Rated battery voltage (Vdc)	25.6	1
		Inverter output voltage (Vac)	220	
		Inverter output frequency (Hz)	50	
		Inverter output power (W)	2000	
5kWh Battery pack	LSMO25.6V 200AH-A01	Battery type	Lithium	1
		Rated voltage (Vdc)	25.6	
		Capacity (Ah/kWh)	200/5	
		Maximum charging / Discharging current (A)	100	

415W PV module	415D(BPM) 54(182)	Open-circuit voltage (Vdc)	37.57	4
		Short-circuit current (A)	14.03	
		Maximum power voltage (Vdc)	31.55	
		Maximum power current (A)	13.16	
		Dimensions (mm)	1722x1134x35 (H x W x D)	
		Weight (kg)	21.7	
PV and battery DC distribution box	LSDB-PDC20-LY02	Configuration	PV input circuit breaker: 16A/2P×1, SPD Imax=40KA×1 Battery circuit breaker:125A/2P×1	1
		Dimensions (mm)	330x230x100 (W x H x D)	
		Weight (kg)	3.6	
		Installation method	Indoor wall-mounted, IP30, top and bottom cable entry	

INSTRUCTIONS The manufacturer will configure the shipped products according to the order requirements. The configuration in this Manual only matches products of the same packaging.

2.3 Product Wiring Schematic Description

2.3.1 1kW/3kWh System and 2kW/5kWh System Wiring Diagram



INSTRUCTIONS Please refer to the actual product for the structure of the power distribution unit.

3. Equipment Installation

3.1 Safety Requirements

1. Only qualified technicians can carry out installation and maintenance.
2. Provide proper grounding for the equipment.
3. Keep the equipment environment clean and dry.
4. Avoid contact with exposed parts of the circuit.

3.2 Preparation for Installation

1. After the goods arrive at site, check whether the materials are complete according to the packing list.
2. Ensure a safe and clean installation site.
3. Get the required tools for equipment installation ready. Tools should be insulated before use.
4. Get the auxiliary materials required for installation and construction ready, including cable ties, insulation tape, expansion bolts, and cables.

3.3 Inverter Installation

1. Unpack the carton and take out the inverter.
2. Check whether all accessories inside the carton are complete.
3. Install the inverter according to the Inverter Manual.

*** Refer to the Inverter Manual or the demonstration video for detailed installation steps.**

3.4 Battery Pack Installation

1. Unpack the carton and take out the battery pack.
2. Check whether all accessories inside the carton are complete.
3. Refer to the instructions in the Battery Pack Manual for installation.

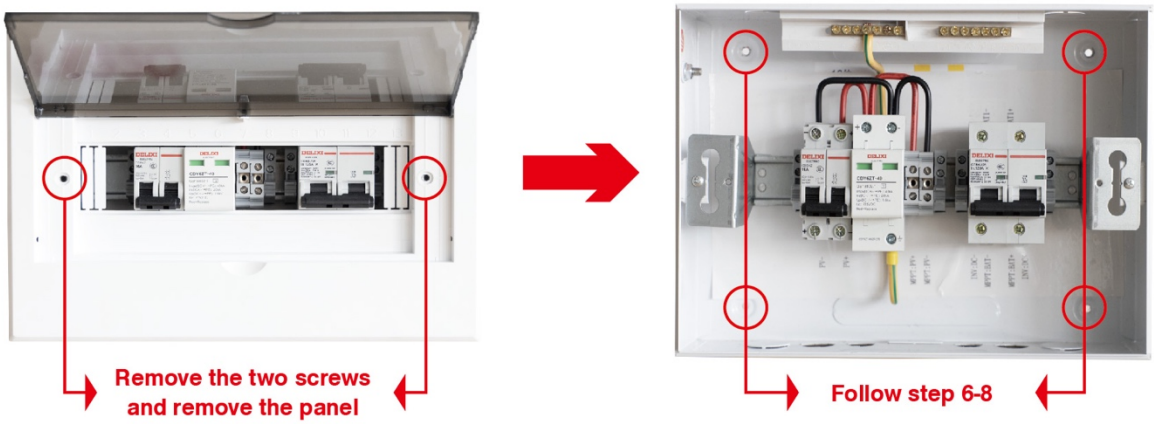
***Refer to the Battery Pack Manual or the demonstration video for detailed installation steps.**

Warning: The weight of the battery pack exceeds 25kg. Please handle it carefully to avoid injury.

3.5 Distribution Box Installation

1. Unpack the protective foam packaging and take out the distribution box.
2. Check whether all installation accessories for the distribution box are complete.
3. Perform installation according to the following steps.
4. Open the panel on the distribution box.
5. Remove the two screws on the right and left of the distribution box panel and remove the panel.
6. Place the distribution box against the wall at an appropriate position and mark the four mounting holes in the box.

7. Use the plastic expansion tubes provided with the distribution box to drill holes in the marked positions on the wall.
8. Install the distribution box on the four plastic expansion tubes using the tapping screws provided with the distribution box.



*** Refer to the demonstration video for detailed installation steps.**

3.6 415W PV Module and Bracket Installation

1. Disassemble the bracket wooden case and take out the 415W PV module bracket.
2. Check whether all accessories inside the carton are complete.
3. For details about how to install the L-shaped angle iron bracket, see the Appendix 2 - *Installation Guide for 415W PV Module Bracket*.

*** Refer to the demonstration video for detailed installation steps.**

4. Equipment Wiring Notes

⚠ Before performing the following operations, ensure that the inverter and battery pack are powered off, and that all circuit breakers in the distribution box are off.

4.1 Connection between PV Modules

1. Take out the 415W PV modules from the wooden case. The 1kW system requires two pcs of 415W PV modules, while the 2kW system requires four pcs of 415W PV modules.
2. After installing the modules on the bracket, connect the MC4 connector.
3. For details on how to connect cables, see the Appendix 3 – *PV Module Rear Wiring Connection.*

⚠ After the PV modules have been connected in series, the positive and negative terminals will be at a high DC voltage. Users need to arrange for a qualified electrician to connect and install the PV modules.

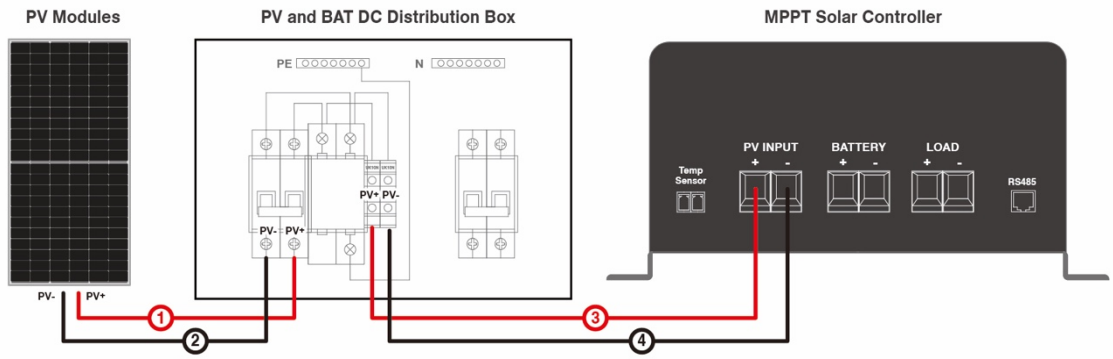
*** Refer to the demonstration video for detailed installation steps.**

4.2 PV Cable Connection

Connection Sequence: PV modules - PV circuit breakers on the distribution box - MPPT solar controller PV ports.

1. Use the PV cable with serial number ①, connect the MC4 female plug end of the cable to the positive MC4 male plug end of the PV array, and connect the pin end of the cable to the PV+ end of the PV circuit breaker in the PV and battery DC distribution box.
2. Use the PV cable with serial number ②, connect the MC4 male plug end of the cable to the negative MC4 female plug end of the PV array, and connect the pin end of the cable to the PV - end of the PV circuit breaker in the PV and battery DC distribution box.
3. Use cable with serial number ③, connect one end of the cable to the PV+ terminal of the distribution box, and connect the other end of the cable to the PV+ port of the MPPT solar controller.
4. Use cable with serial number ④, connect one end of the cable to the PV terminal of the distribution box, and connect the other end of the cable to the PV port of the MPPT solar controller.

See the figure below or the demonstration video for detailed installation steps.



Cable List:

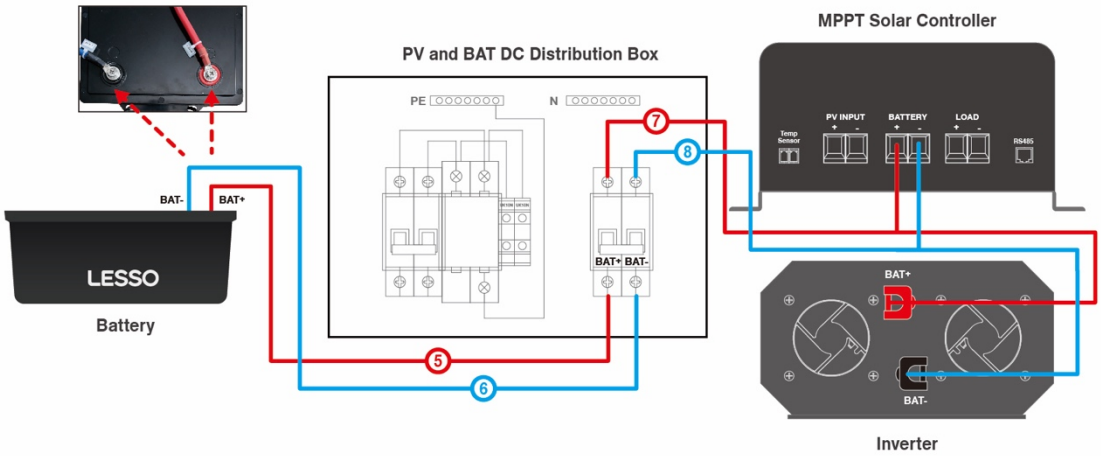
No.	Name & Specifications	Quantity	Applications
①	PV cable 6mm^2 red 20m	1	Connect the positive MC4 connector of the PV array to the positive terminal on the PV circuit breaker in the PV and battery DC distribution box
②	PV cable 6mm^2 black 20m	1	Connect the negative MC4 connector of the PV array to the negative terminal on the PV circuit breaker in the PV and battery DC distribution box
③	PV cable 2.5mm^2 red 2m	1	Connect the PV+ terminal on the PV and battery DC distribution box to the PV+ port on the MPPT solar controller
④	PV cable 2.5mm^2 black 2m	1	Connect the PV- terminal on the PV and battery DC distribution box to the PV- port on the MPPT solar controller

4.3 Battery Cable Connection

Connection Sequence: Positive and negative battery ports - distribution box battery circuit breakers - MPPT solar controller and inverter BAT ports.

1. Use battery cable with serial number ⑤, connect the round terminal of the cable to the BAT+ port, and connect the tubular terminal of the cable to the BAT+ end below the battery circuit breaker of the PV and battery DC distribution box.
2. Use battery cable with serial number ⑥, connect the round terminal of the cable to the BAT- port, and connect the tubular terminal of the cable to the BAT- end below the battery circuit breaker of the PV and battery DC distribution box.
3. Use cable with serial number ⑦, connect the double conduit terminal of the cable to the BAT+ terminal above the battery circuit breaker of the distribution box, connect the conduit terminal of the 6/10mm^2 cable to the BAT+ port of the controller, and connect the round terminal of the 10/25mm^2 cable to the BAT+ port of the inverter.
4. Use cable with serial number ⑧, connect the double conduit terminal of the cable to the BAT- terminal above the battery circuit breaker in the distribution box, connect the conduit terminal of the 6/10mm^2 cable to the BAT- port of the controller, and connect the ear end of the 10/25mm^2 cable to the BAT- port of the inverter.

See the figure below or the demonstration video for detailed installation steps.



Cable List of the 1kW System:

No.	Name & Specifications	Quantity	Applications
⑤	Battery cable 10mm^2 red 2m	1	Connect the positive terminal on the battery to the positive terminal on the battery circuit breaker in the PV and battery DC distribution box
⑥	Battery cable 10mm^2 blue 2m	1	Connect the negative terminal on the battery to the negative terminal on the battery circuit breaker in the PV and battery DC distribution box

⑦	Controller and inverter cables 6mm^2 +10mm^2 red 2m	1	Connect the BAT+ terminal in the PV and battery DC distribution box and battery to the BAT+ port on the controller and the BAT+ port on the inverter
⑧	Controller and inverter cables 6mm^2 +10mm^2 blue 2m	1	Connect the BAT- terminal in the PV and battery DC distribution box and battery to the BAT- port on the controller and the BAT- port on the inverter

Cable List of the 2kW System:

No.	Name & Specifications	Quantity	Applications
⑤	Battery cable 25mm^2 red 2m	1	Connect the positive terminal on the battery to the positive terminal on the battery circuit breaker in the PV and battery DC distribution box
⑥	Battery cable 25mm^2 blue 2m	1	Connect the negative terminal on the battery to the negative terminal on the battery circuit breaker in the PV and battery DC distribution box
⑦	Controller and inverter cables 10mm^2 + 25mm^2 red 2m	1	Connect the BAT+ terminal in the PV and battery DC distribution box and battery to the BAT+ port on the controller and the BAT+ port on the inverter
⑧	Controller and inverter cables 10mm^2 + 25mm^2 blue 2m	1	Connect the BAT- terminal in the PV and battery DC distribution box and battery to the BAT- port on the controller and the BAT- port on the inverter

4.4 AC Line Connection

Connection Sequence: Inverter AC output port.

Users can plug their appliances directly into the inverter output socket to obtain power. Users can also plug the power strip into the socket to obtain power.

*** Refer to the demonstration video for detailed installation steps.**

4.5 Grounding Connections in the System

1. The inverter is connected to the PE copper bar of the AC distribution box through the ground wire of the AC input / output cable.
2. The PE ground bar of the PV and battery DC distribution box and AC distribution box needs to be connected to the power grid ground wire at the user's home; the diameter of the copper core cable should be no less than 10mm^2.
3. The ground cable of the PV module bracket must be connected to the grounding pole of the building's ground network, while the wire diameter of the copper core cable or 40x4 flat steel should be no less than 10mm^2.

⚠ For the wiring work required on items 2 and 3, the user should arrange for a professionally qualified electrician or engineer to carry out the necessary work. The

cables and accessories used in items 2 and 3 shall be provided by the user or the construction company.

5. Post-installation Inspection

5.1 Hardware Installation Inspection

- Check whether all screws are tight (pay particular attention to electrical connections). Flat washers and spring washers must be complete and cannot be installed backwards.

5.2 Electrical Connection Inspection

- Check whether all circuit breakers are OFF.
- Check whether the positive and negative terminals are correctly connected to ensure no short circuits.
- Check whether the input and output power cables and protective ground cables are correctly connected. Ensure that the input and output power cables have no short circuits.

5.3 Cable Installation Inspection

- Check whether all cables have been securely connected.
- Check whether all cables are properly bound to the nearest cable tie and are not twisted or overly bent.
- Check whether the labels on the cables are correct. Ensure that they have not fallen off or been damaged, and that the labels face the same direction for easy viewing.

6. System Debugging

6.1 Wiring Inspection before Power-on

Step 1. Check that all cables to the MPPT solar controller, inverter, battery, PV module, and the distribution box are correctly connected.

Step 2. Use the voltage level on the multimeter to check whether there is no voltage on the PV, battery, AC input and AC output ports of the MPPT solar controller and inverter when the system is turned off.

Step 3. Check that the ground cables of the PV bracket, and distribution box have been securely connected. The recommended ground resistance is $\leqslant 1\Omega$.

6.2 Battery Power-on

Step 1. Ensure that the battery circuit breaker on the PV and battery DC distribution box is off.

Step 2. Turn on the battery switch on the PV and battery DC distribution box. The MPPT solar controller and inverter operation lights up green. The LCD screen on the inverter displays information about the battery voltage; no warning indicates that the battery is working properly.

6.3 Power on the MPPT Solar Controller and Inverter

Step 1. Ensure that the PV circuit breaker on the distribution box is disconnected.

Step 2. After the battery supplies power to the MPPT solar controller, the inverter will start and the LCD panel will display information.

Step 3. Press the inverter button. The inverter outputs a 230V AC voltage. The LCD panel displays the output parameters of the inverter.

Step 4. After the inverter output begins operating normally, turn on the PV circuit breaker. The PV module will supply power to the MPPT solar controller, and the LCD panel will display the PV parameters and icons.

Step 5. After the PV input starts to operate normally, plug the electrical appliances or power strip into the inverter socket to supply power to the electrical appliances.

The inverter and controller have been configured before delivery.

6.4 Set the Parameters of the MPPT Solar Controller

Please read the MPPT solar controller manual carefully, or consult our customer service personnel for advice.

INSTRUCTIONS If the battery parameters of the MPPT solar controller have been incorrectly set, the batteries may age prematurely. Please set the parameters strictly in accordance to the actual situation.

7. Technical Indicators

7.1 Environmental Conditions

- Storage Temperature: -20℃ ~ +65℃
- Charging Temperature: -0 ~ +50℃
- Discharging Temperature: -10℃ ~ +60℃
- Relative Humidity for Storage and Transportation: 5 ~ 95% (40℃±2℃)
- Altitude: Below 4000m, above 2000m use at a reduced rate.

In countries or regions with a very low ambient temperature, the PV modules of the 2kW system need to be changed to 2-series 2-parallel connection mode, so as to avoid failure of the MPPT solar controller due to input over-voltage protection resulting from an excessively high array voltage.

8. Routine Maintenance

8.1 Routine Maintenance

Maintenance engineers need to specify a maintenance period based on local conditions. The recommended period is once every three months.

Routine Maintenance List

Maintenance Item	Inspection Item	Inspection Method	Issue	Solution
Electrical	Is the voltage normal?	Multimeter	DC input voltage beyond the normal range	Refer to the controller, inverter and battery manuals.
Fault inspection	Is the indicator light normal?	Visual inspection	Fault alarm	Refer to the controller and inverter manuals.
Grounding inspection	Is the power supply grounding point properly connected to the grounding bar?	Multimeter	Resistance between the power supply grounding point and the grounding bar is greater than 1Ω.	Retighten the grounding point or replace the grounding cable.

8.2 Alarm Troubleshooting

INSTRUCTIONS The content of the alarm signal needs to be viewed in the alarm message generated by the MPPT solar controller and inverter. Please refer to the MPPT solar controller and inverter manuals.

8.2.1 DC Over-voltage

Possible cause	The equalizing and floating charging voltage of the MPPT solar controller has been set too high.
Solution	Reset the equalizing and floating charging voltage of the MPPT solar controller.

8.2.2 DC Under-voltage

Possible cause	The floating charging voltage of the MPPT solar controller has been set too low.
Solution	Check whether the floating charge voltage has been set to a reasonable value. If not, adjust the value based on the actual situation.

8.2.3 Battery Circuit Disconnected

Possible cause	• The battery circuit breaker is off. • The battery circuit breaker cable is loose.
Solution	1. Check whether the battery circuit breaker is off. If yes, rectify the fault on the back-end circuit of the circuit breaker and close the switch. 2. Check whether the battery circuit breaker cable is loose. If yes, secure the cable again.

8.2.4 Battery BMS Output Off

Possible cause	• Battery over-discharge protection. • Ambient temperature is too high. • Battery BMS fault.
Solution	1. Charge the battery to full capacity. 2. Lower the temperature to ensure that the ambient temperature is within the operating range. 3. Apply for repair and request after-sales personnel to handle the problem.

8.2.5 Battery Fault

Possible cause	• The battery port is improperly connected. • The battery cell is damaged. • The battery BMS is abnormal. • Battery over-current protection.
Solution	1. Re-close the battery circuit breaker and restart the battery. 2. Rewire the positive and negative battery cables while ensuring good contact. 3. Apply for repair and request after-sales personnel to handle the problem.

9. List of System Components

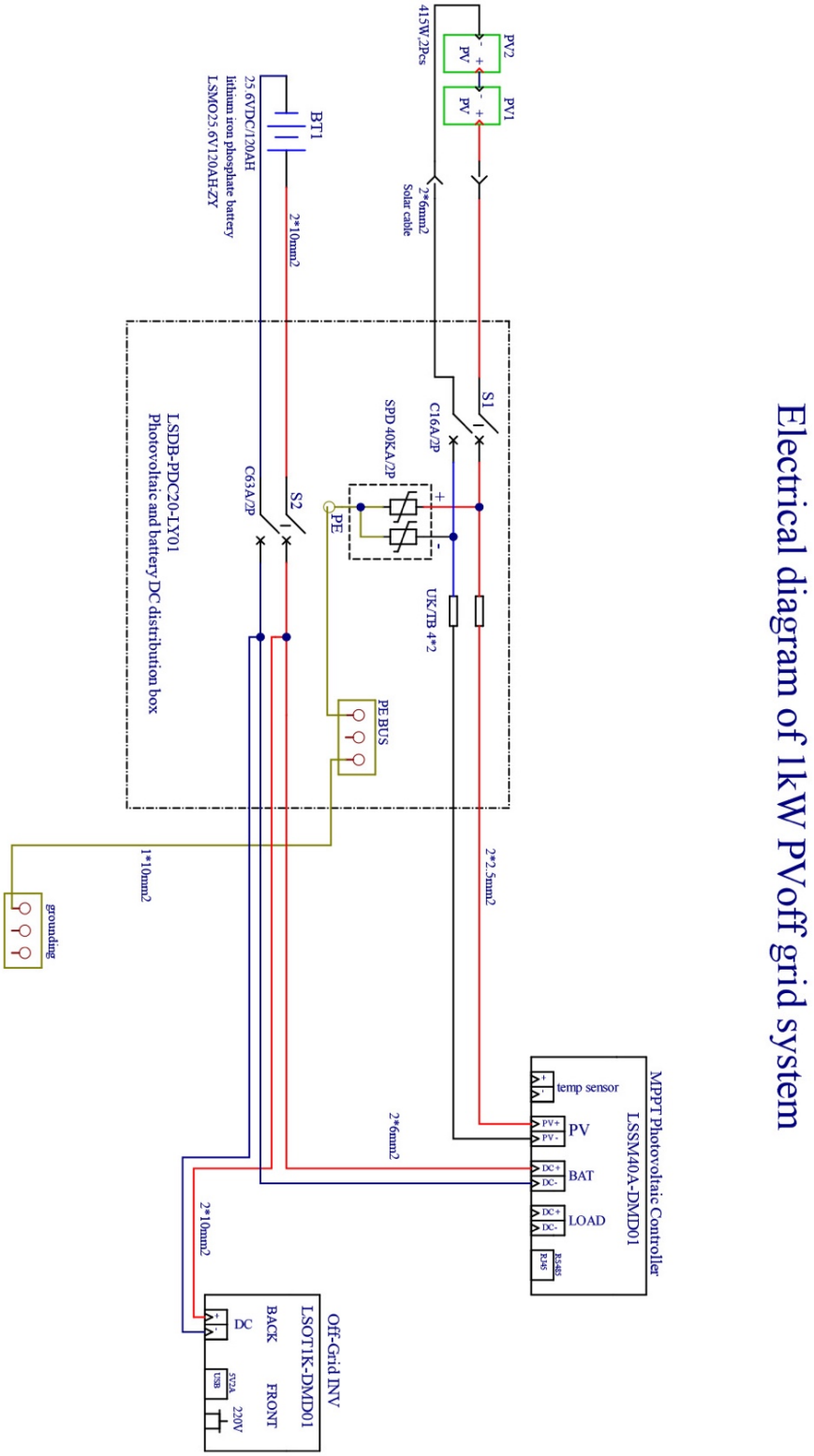
1kW/3kWh System

No.	Name	Model / Use	Quantity	Remarks
1	1kW inverter	LSOT1K-DMD01	1 unit	Packed in wooden 1kW inverter case
2	40A MPPT solar controller	LSSM40A-DMD01	1 unit	Packed in wooden 1kW inverter case
3	120Ah/3kWh lithium battery	LSMO25.6V120AH-ZY	1 unit	Individually packed
4	PV and battery DC distribution box	LSDB-PDC20-LY01	1 unit	Packed in wooden 1kW inverter case
5	415W PV module	415D(BPM)54(182)	2 pcs	Individually packed
6	L-shaped angle iron PV module mounting bracket		2 sets	Packed in wooden bracket case
7	Aluminum alloy solar PV cable	PV and battery DC distribution box photovoltaic circuit breaker and module connection cable	2 pcs	①+② packed in wooden 1kW inverter case
8	2.5mm^2 cable	Cable connecting the PV circuit breaker of the PV and battery DC distribution box to the controller	2 pcs	③+④ packed in wooden 1kW inverter case
9	10mm^2 cable	Cable connecting the battery circuit breaker of the PV and battery DC distribution box to the battery	2 pcs	⑤+⑥ packed in wooden 1kW inverter case
10	6mm^2 + 10mm^2 cable	Cable connecting the battery circuit breaker of the PV and battery DC distribution box to the controller and inverter	2 pcs	⑦+⑧ packed in wooden 1kW inverter case
11	MC4 PV connector copper-aluminum transition male and female		1 pair	Backup, packed in wooden 1kW inverter case
12	Copper and aluminum pin		2 pcs	Backup, packed in wooden 1kW inverter case
13	Electrical tape		1 roll	Packed in wooden 1kW inverter case
14	Ties		100 pcs	Packed in wooden 1kW inverter case
15	Plastic cable tray		1 pcs	Packed in wooden bracket case
16	Expansion pipe		20 pcs	Packed in wooden bracket case
17	Self-tapping screw		20 pcs	Packed in wooden bracket case

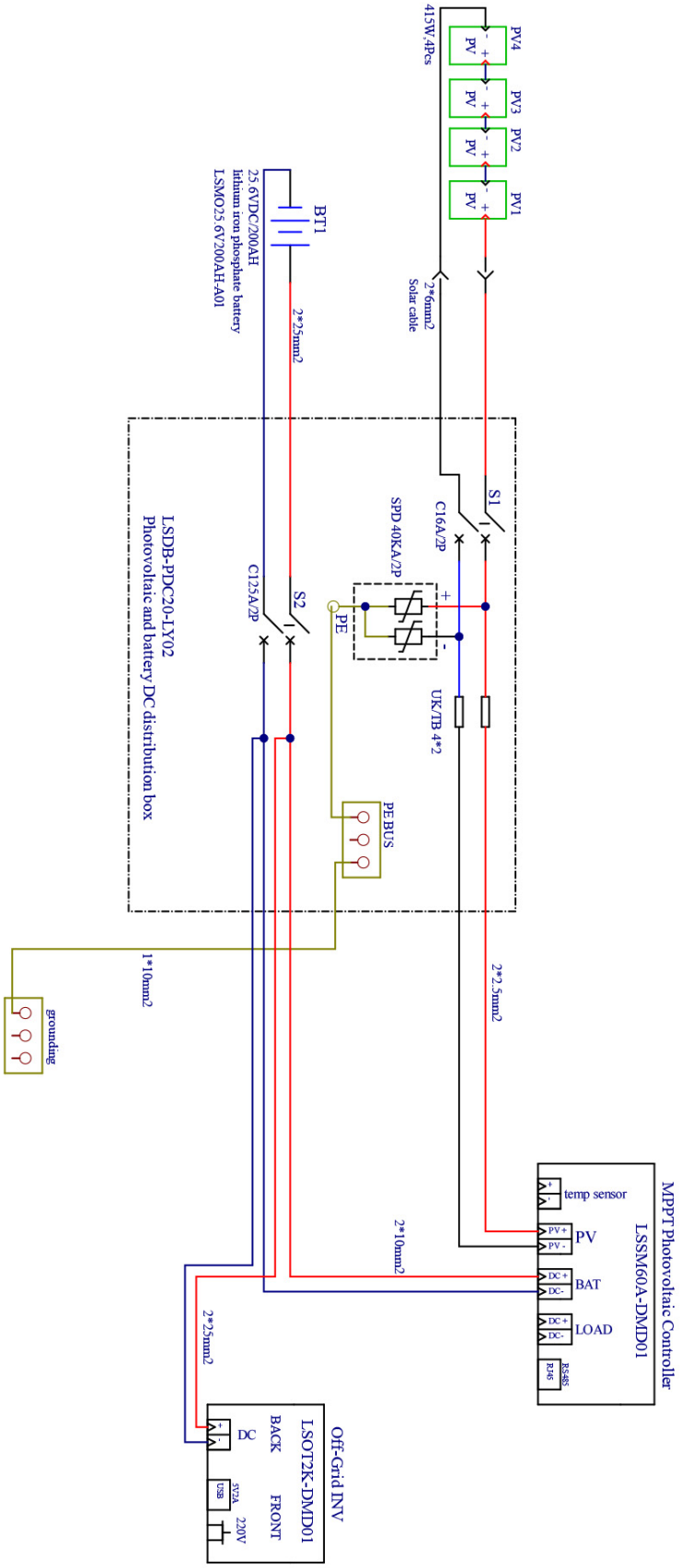
2kW/5kWh System

No.	Name	Model/Use	Quantity	Remarks
1	2kW inverter	LSOT2K-DMD01	1 unit	Packed in wooden 2kW inverter case
2	60A MPPT solar controller	LSSM60A-DMD01	1 unit	Packed in wooden 2kW inverter case
3	200Ah/5kWh lithium battery	LSMO25.6V200AH-A01	1 unit	Individually packed
4	PV and battery DC distribution box	LSDB-PDC20-LY02	1 unit	Packed in wooden 2kW inverter case
5	415W PV module	415D(BPM)54(182)	4 pcs	Individually packed
6	L-shaped angle iron PV module mounting bracket		4 sets	Packed in wooden bracket case
7	Aluminum alloy solar PV cable	PV and battery DC distribution box photovoltaic circuit breaker and module connection cable	2 pcs	①+② packed in wooden 2kW inverter case
8	2.5mm^2 cable	Cable connecting the PV circuit breaker of the PV and battery DC distribution box to the controller	2 pcs	③+④ packed in wooden 2kW inverter case
9	25mm^2 cable	Cable connecting the battery circuit breaker of the PV and battery DC distribution box to the battery	2 pcs	⑤+⑥ packed in wooden 2kW inverter case
10	10mm^2 + 25mm^2 cable	Cable connecting the battery circuit breaker of the PV and battery DC distribution box to the controller and inverter	2 pcs	⑦+⑧ packed in wooden 2kW inverter case
11	MC4 PV connector copper-aluminum transition male and female		1 pair	Backup, packed in wooden 2kW inverter case
12	Copper and aluminum pin		2 pcs	Backup, packed in wooden 2kW inverter case
13	Electrical tape		1 roll	Packed in wooden 2kW inverter case
14	Ties		100 pcs	Packed in wooden 2kW inverter case
15	Plastic cable tray		1 pcs	Packed in wooden bracket case
16	Expansion pipe		20 pcs	Packed in wooden bracket case
17	Self-tapping screw		20 pcs	Packed in wooden bracket case

Appendix 1 – Electrical Schematic Diagram



Electrical diagram of 2kW PVoff grid system

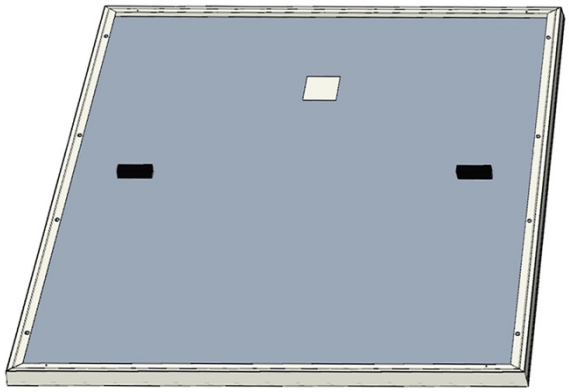


Appendix 2 – Installation Guide for 415W PV Module Bracket

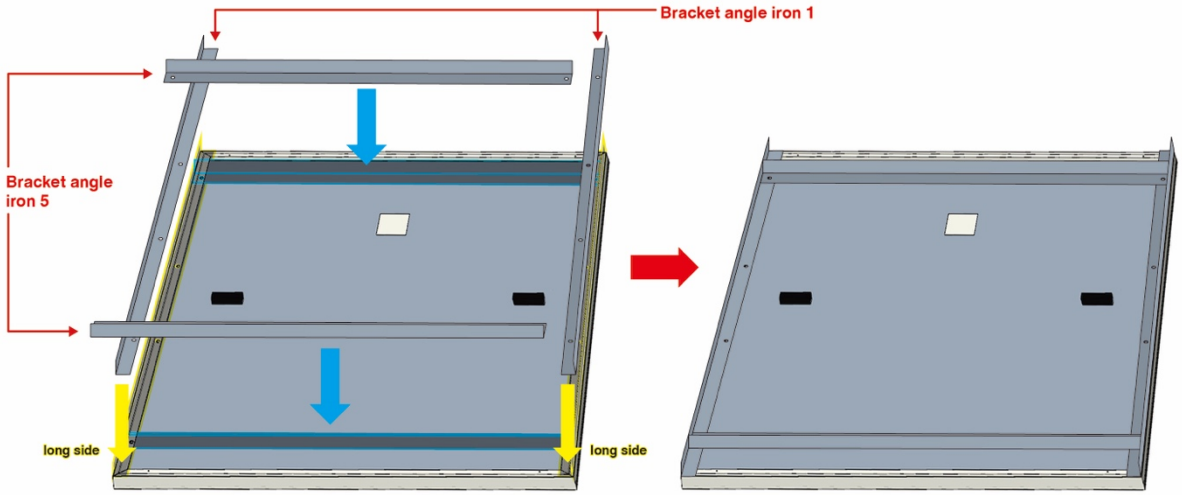
Follow these steps to set up and install the module on the bracket.

Step 1. Lay a mat on the ground that is slightly larger than the PV module to prevent the surface of the module from being scratched.

Step 2. Place the module on the mat with the rear up and the nameplate text facing the installation personnel, as shown below:

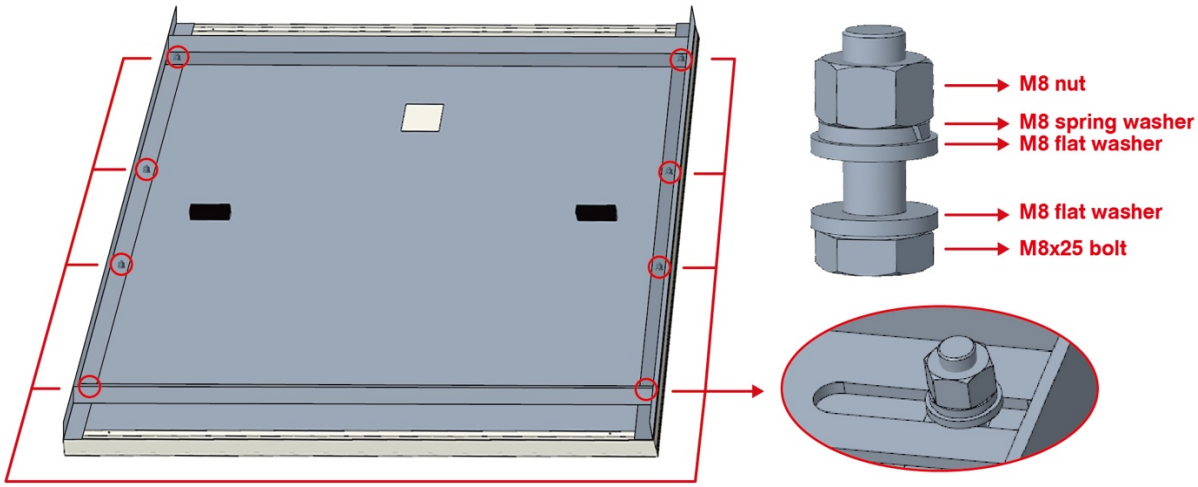


Step 3. Place the bracket angle iron 1 (2 pcs) and bracket angle iron 5 (2 pcs) on the rear of the PV module as shown in the figure; make sure that the mounting holes of the bracket angle iron 1 overlap with the mounting holes of the PV module, and that the bracket angle iron 5 is stacked on top of the bracket angle iron 1 as shown in the figure below:

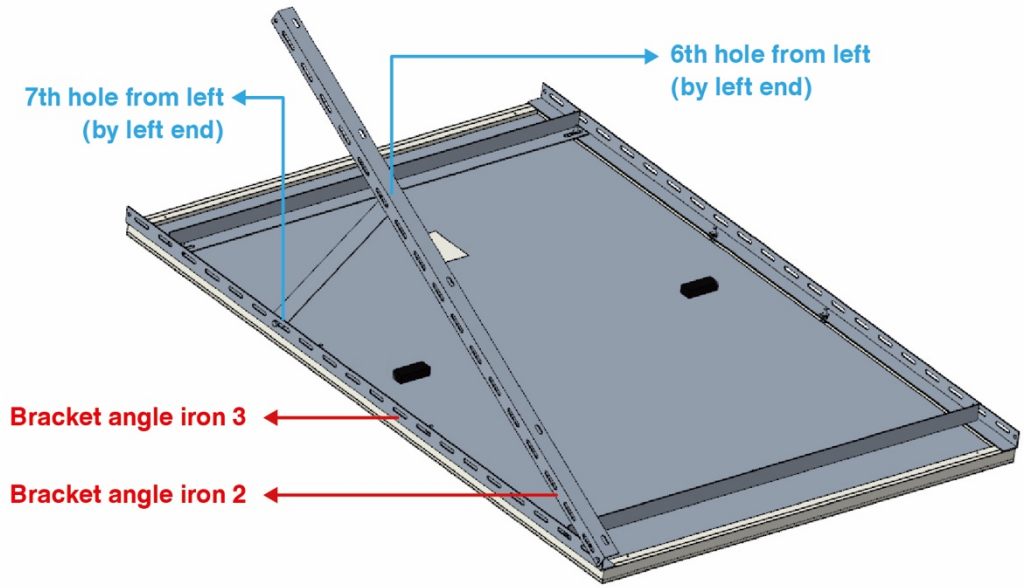


Step 4. Tighten the bracket angle iron 1, bracket angle iron 5 and PV module through the mounting holes on the bracket angle iron 1 and PV module using the M8 outer hexagon bolt and nut kit (8 pcs), as shown below:

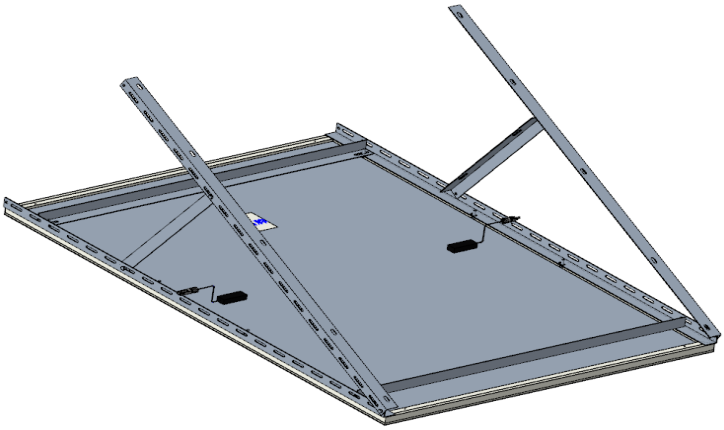
***Note: the nuts on the bolts should face upwards when installing.**



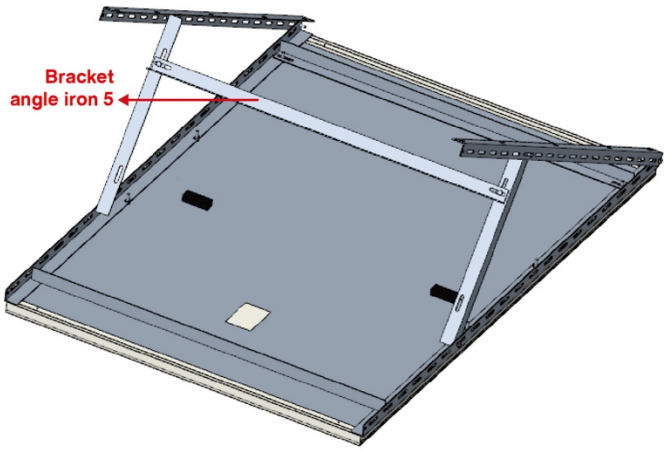
Step 5. Install the supporting edge of one side with bracket angle iron 2 and bracket angle iron 3, as shown in the figure. Note that the tilt angle of the bracket is determined by the fixed position of the two ends of the bracket angle iron 3. The angle in the figure below is 29°. The tilt angle of the bracket angle iron 3 can be adjusted by moving the installation position of the bracket angle iron 3 back and forth (please refer to the local latitude for adjustment). Use the bolts and nuts to lock the bracket angle iron 2 and 3, and keep the nuts facing outward, as shown below:



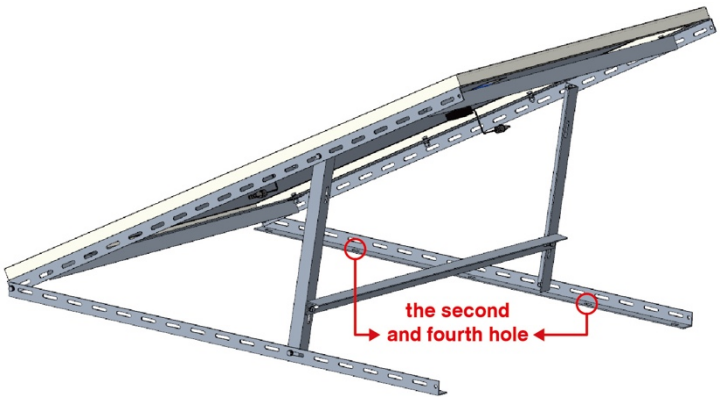
Step 6. Install the bracket angle iron 2 and bracket angle iron 3 on the other side using the same method. The angle of the bracket on both sides must be the same. The installation is completed as shown below:



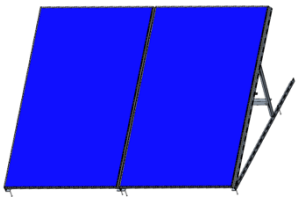
Step 7. Install the last bracket angle iron 5 as shown in the figure. The completed installation is then as shown below:



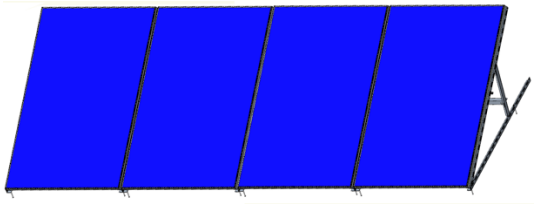
Step 8. Turn over the PV module and keep the mirror side up. Drill holes in the second and the fourth hole positions of the bracket angle iron 2 fitted to the ground, and fix them using M8x100 expansion bolts, as shown in the following figure:



Step 9. A single 415W PV module bracket is thus assembled. After installation, the 1kW and 2kW off-grid systems will be as shown below:



1kW System

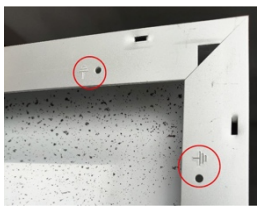


2kW System

Step 10. Grounding installation of PV module bracket.

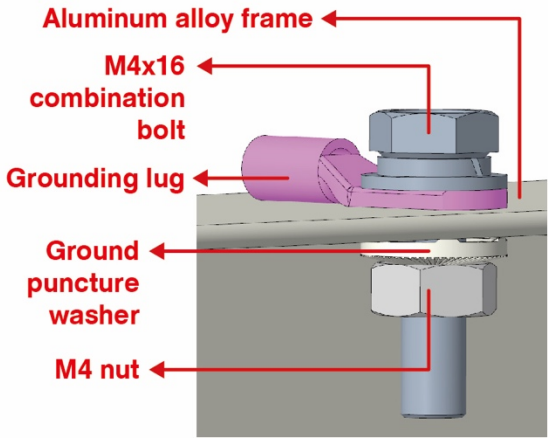
The PV module mount has two groundings:

10.1 The aluminum alloy frame of the PV module is grounded. The grounding holes and grounding symbols of the aluminum module frame are shown below:



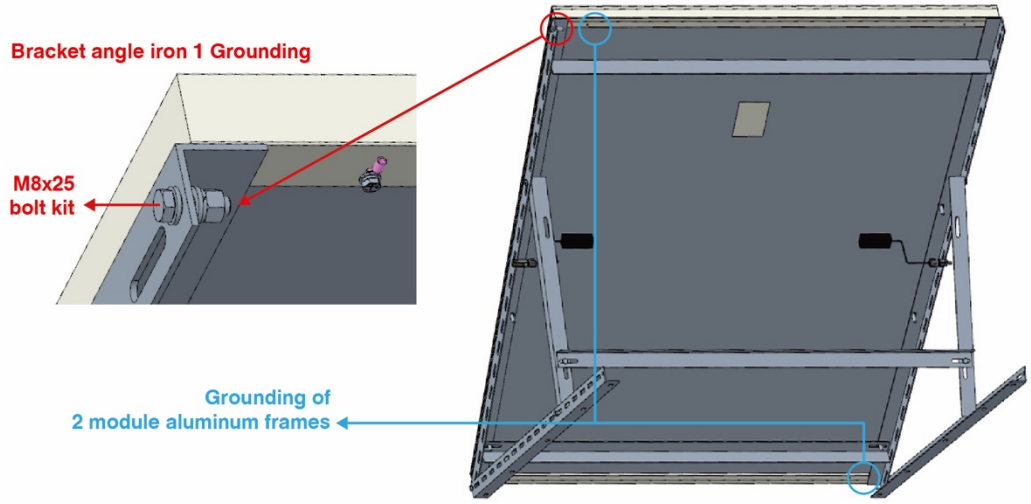
The module bracket is used with 2 sets of aluminum alloy frame grounding bolts.

10.2 As shown in the figure below, install the matching grounding combination bolt in the grounding hole of the aluminum alloy frame (the ring terminal of the external grounding wire should be prepared by the construction personnel).



10.3 As shown in the figure below, install 1 set of M8x25 bolt and nut flat spring washer in the grounding hole of the angle iron 1 near the module grounding hole as the bracket's external grounding wire bolt.

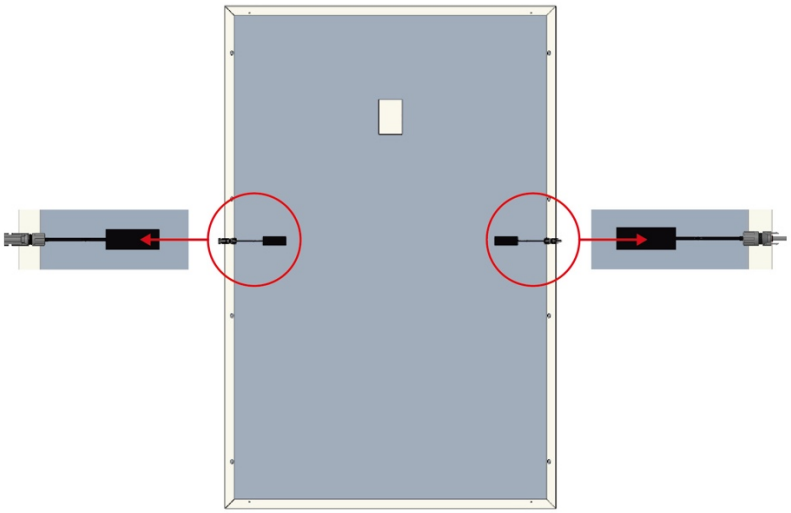
After completion, it will look as shown below.



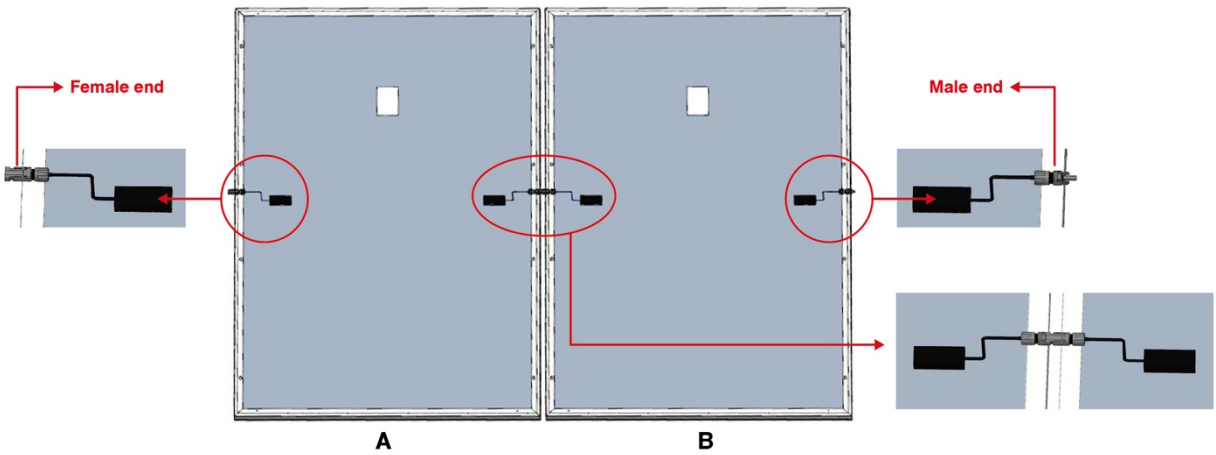
10.4 The ground cables between the PV module brackets can be connected by a copper cable of no less than 10mm^2 through the frame ground bolt or bracket ground bolt and connected by a copper cable of no less than 10mm^2 through one frame bolt or bracket bolt to the ground bus bar of the user's ground to ensure lightning protection and grounding of the module bracket. The required connecting cables and lugs will be configured by the construction personnel.

Appendix 3 – PV Module Rear Wiring Connection

The rear of the PV module has positive and negative wires containing MC4 connectors. Use an MC4 male connector for the positive terminal and an MC4 female connector for the negative terminal. See the figure below:



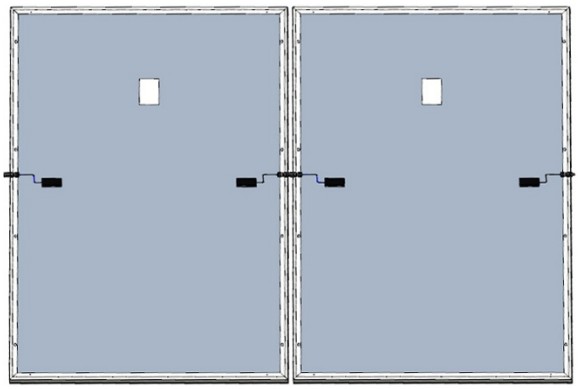
1. Connecting two PV modules. Two PV modules are connected together in series by means of the self-contained MC4 plug. As shown in the figure below:



Wiring is as above, connecting the male and female end plugs of both modules creates a series connection. When connected, the male end of Module A is positive and the female end of Module B is negative.

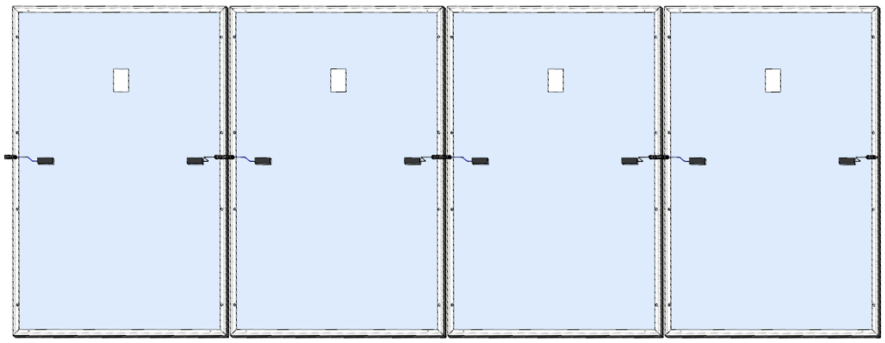
2. The 1kW system is equipped with 2 pcs 415W PV modules, as shown in the following figure, after connection.

High Voltage Hazard: The open circuit voltage after connection in series is 75.14V.

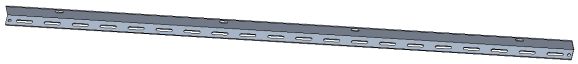
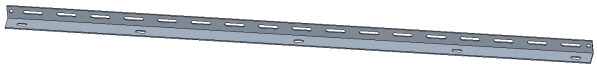
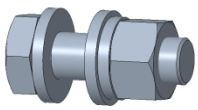
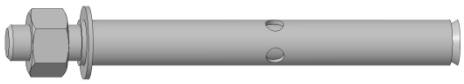
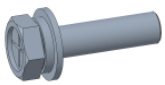


3. The 2kW system is equipped with 4 pcs 415W PV modules, as shown in the following figure, after connection.

High Voltage Hazard: The open circuit voltage after connection in series is 150.28V.



Appendix 4 – Bracket Accessory List and Illustrations

No.	Name	Quantity		Picture
		1kW	2kW	
01	Bracket angle iron 1	4	8	
02	Bracket angle iron 2	4	8	
03	Bracket angle iron 3	4	8	
04	Bracket angle iron 5	6	12	
05	M8 outer hexagon bolt	38	76	
06	M8x100 expansion bolt	12	24	
07	M4x16 combination bolt	4	8	
08	M4 stainless steel nut	4	8	
09	M4 ground puncture washer	4	8	

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