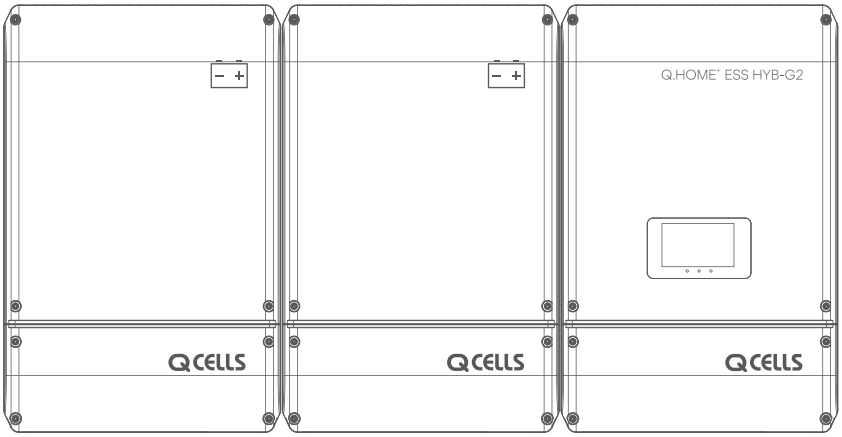
INSTALLATION MANUAL

MODEL	EUROPE	AUSTRALIA
SYSTEM	Q.HOME+ ESS HYB-G2	
INVERTER	Q.VOLT-G2 HYB-4.6kW.1.1	Q.VOLT-G2 HYB-5kW.1.1
BATTERY	Q.SAVE-G2 4kWh B1.1.1	
	Q.SAVE-G2 6.3kWh B1.1.1	



NOTICE

- Do not operate with other components not approved by the ESS systems.
  (Connecting other products in parallel to Q.HOME+ ESS HYB-G2 may result in abnormal operation.)
- The internet connection is required to use all functions of the ESS system.
- If you have a problem, please contact the Q CELLS After Sales Service.
- The Specifications of the product may be modified without prior notice to improve product quality.

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1. Information in this Manual

1.1 About this Manual

This is the installation manual for the Q.HOME+ ESS HYB-G2. Please read this installation and user manual carefully before installing and operating the Q.HOME+ ESS HYB-G2. It contains important safety instructions. The warranty will be void if you fail to follow the instructions in this manual.

1.2 Target Group

Electricians and qualified technicians who are allowed to install and to connect electrical systems.

1.3 Additional Information

The user manual and installation manual can be downloaded from the product download section at "https://www.q-cells.com".
The specifications of the product can be changed for improvement without notice.
Also, the software can be updated automatically without notice over the Internet.

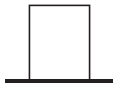
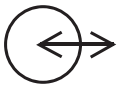
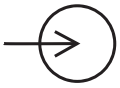
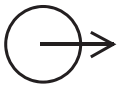
1.4 Symbols Used

Symbols	Description
	CAUTION This symbol indicates a hazardous situation which could result in a light injury, if not avoided.
	NOTICE This symbol indicates a hazardous situation which could result in damage to the property, if not avoided.
	INFORMATION This symbol indicates valuable tips for optimum installation and operation of the product.
	DANGER High touch current, earth connection essential befoer connecting supply

Symbols	Description
	Beware dangerous voltage. The ESS operates at high voltage. All works related to the ESS can only be performed by an electrical technician.
	Beware of hot surface. The INVERTER can become hot during operation. Avoid contact during operation.
	Follow the guidelines in all relevant documents enclosed along with the INVERTER.
	Do not dispose of the INVERTER with household wastes. For further information on disposal, refer to this installation manual provided.
	The CE Indication : The relevant equipment complies with the requirements in the EC guidelines.

[Table 1-1 : Symbol Description 1]

Symbols	Description	Symbols	Description
	Direct current		Refer to the operating instructions
	Alternating current		On (supply)
	Both direct and alternating current		Off (supply)
	Three-phase alternating current		Equipment protected throughout by double insulation or reinforced insulation
	Three-phase alternating current with neutral conductor		Caution : Risk of Electric Shock
	Earth terminal		Caution : Hot Surface
	Protective conductor terminal		Caution : Risk of Danger
	Frame or chassis terminal		In position of a bi-stable push control

Symbols	Description	Symbols	Description
	Out position of a bi-stable push control		Bidirectional terminal rating
	Input terminal or rating		Caution : Risk of Electric Shock and Energy Storage Timed Discharge
	Output terminal or rating		Caution : Risk of Hearing Damage and Wear Hearing Protection Wear hearing protection

[Table 1-2 : Symbol Description 2]

Symbols	Description
	Energy Storage Device To help avoid burns of electric shock : - Service by qualified personnel only - Disconnect main power before maintenance - Turn off the Battery System before maintenance
	Electric shock hazard Do not remove cover or disassemble.
	Explosive gas Do not expose to flame, incinerate, puncture, or impact
	Shield eyes Wear safety goggles at ALL times (Installation, maintenance, etc.)
	Electrolyte hazard Do not contact eyes, skin or clothing. If it happens, Flush with water and seek medical aid immediately.
	Do not dispose in trash Transport legally. Follow manufacturer's instructions for disposal. Please recycle Lithium ion Battery. Do not discard.
	Qualified technicians use this manual for service and replacement.

[Table 1-3 : Symbol Description (Battery)]

2. Safety

2.1 Intended Use

NOTICE

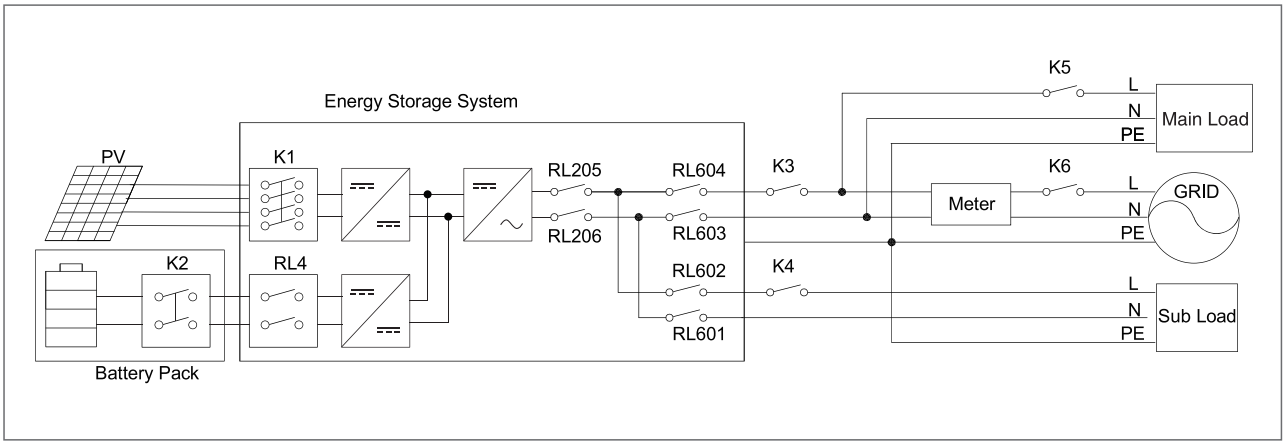
- The Q.HOME+ ESS HYB-G2 is intended for residential use only.
- The Q.HOME+ ESS HYB-G2 should not be used for commercial or building.

The Q.HOME+ ESS HYB-G2 is designed for residential use. It is a single-phase, Grid-connected system of solar energy sources and Li-Ion Battery energy storage.

The Q.HOME+ ESS HYB-G2 uses solar energy power connected to the input/output terminal installed on the side of the device in order to :
1) charge the Li-Ion Battery energy storage,
2) provide a supply to the household load, and
3) convert direct current (DC) electricity of the Battery to alternating current (AC) to discharge as household single-phase load or electric system.

Inverters should not be installed in multiple phase combinations. This device should not be used for any purpose other than the purpose described in this installation manual. Any substitute use of this device, random change in any of its parts, and use of components other than sold or recommended by Q CELLS will nullify the product's guarantee. For example, Q CELLS Li-Ion Battery energy storage should not be replaced by other manufacturer's Battery storages. For further information on proper use of this device, contact the Q CELLS Service-Hotline.

2.1.1 MEN Link (Only for Australia)

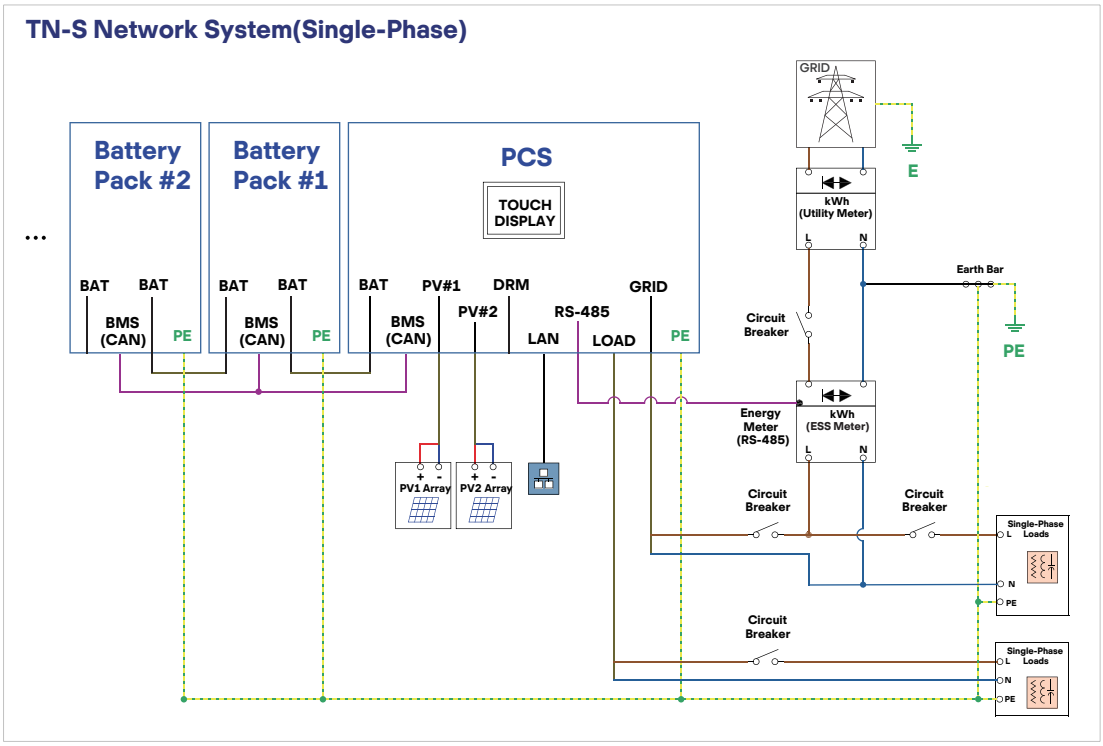


[Figure 2-1 : MEN Link]

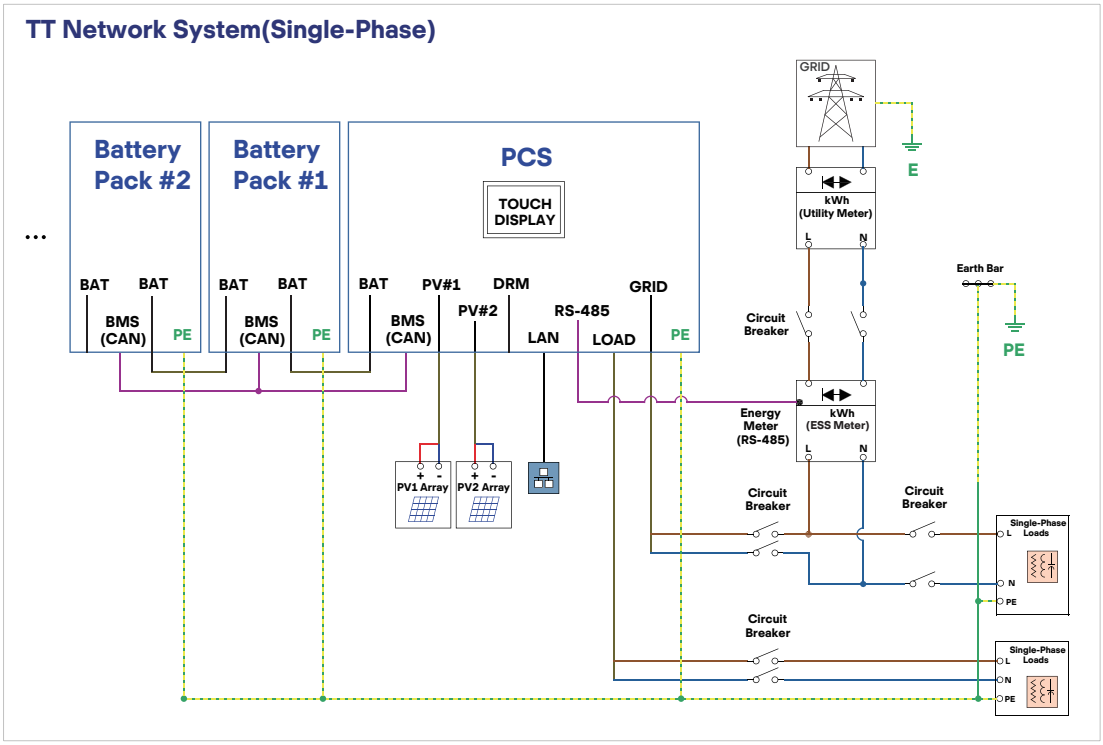
1. K1 is PV input DC disconnection switch. K2 is battery DC disconnection switch, K3 is grid breaker, k5 is main load breaker. K6 is total grid breaker. K4 is sub_load breaker.
2. MEN Link : The INVERTER maintains connection for the internal relay(RL206, RL603, RL601) on neutral wire when entering the off-gird mode.

2.1.2 Network System Connection Diagram

2.1.2.1 Single Phase

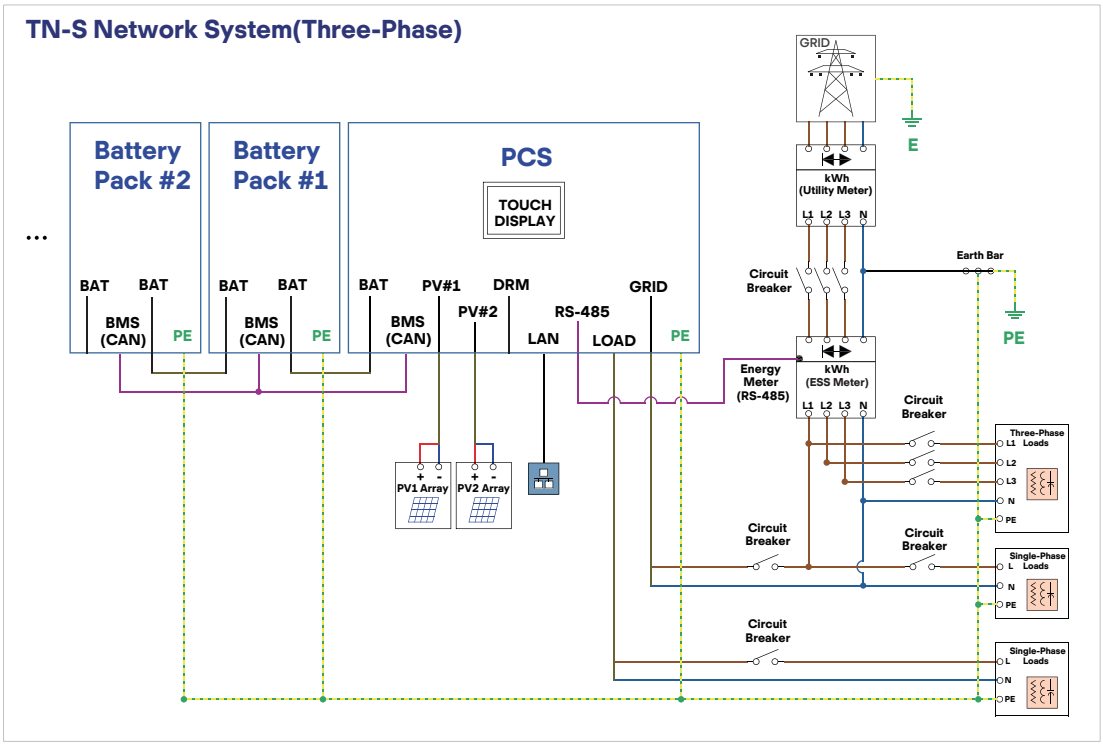


[Figure 2-2 : TN-S Network System Connection Diagram (Single-Phase)]

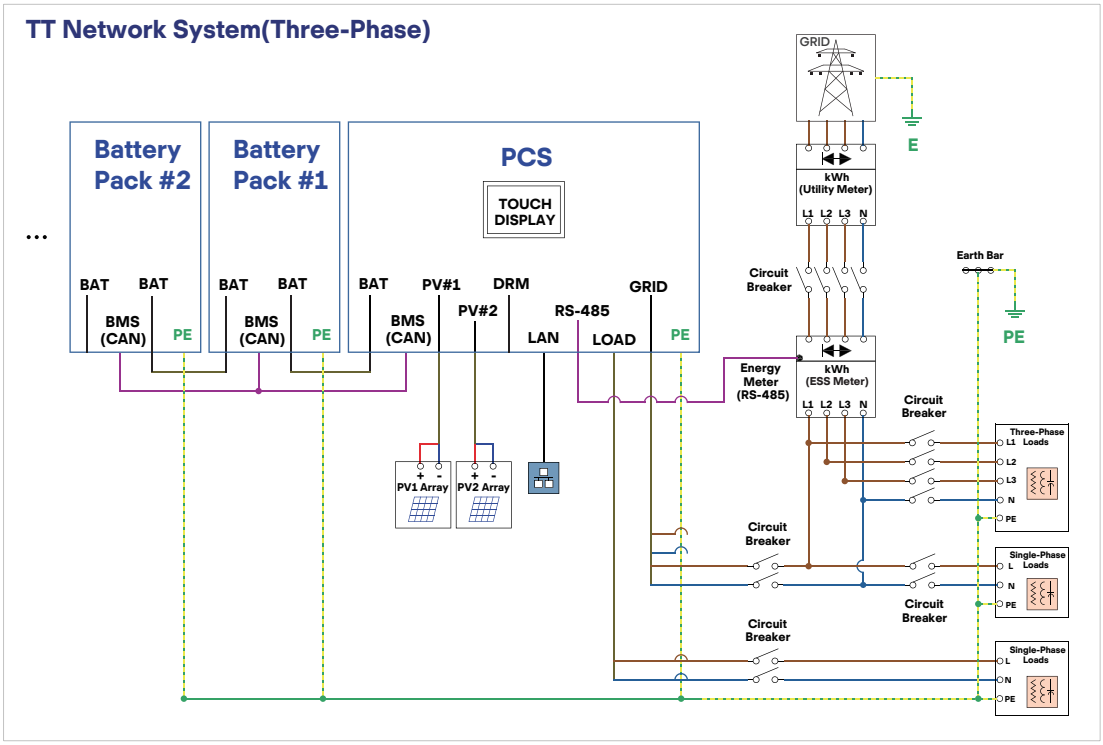


[Figure 2-3 : TT Network System Connection Diagram (Single-Phase)]

2.1.2.2 Three Phase



[Figure 2-4 : TN-S Network System Connection Diagram (Three-Phase)]



[Figure 2-5 : TT Network System Connection Diagram (Three-Phase)]

2.2 Safety Precautions

CAUTION

High voltages in power conditioning circuits. Lethal hazard of electric shock or serious burns. All work on the PV modules, INVERTER, converters, and Battery systems must be carried out by qualified personnel only. Wear rubber gloves and protective clothing (protective glasses and boots) when working on high voltage/high current systems such as INVERTER and Battery systems.

CAUTION

Li-Ion Battery energy storage system (ESS) outside. When assembling the system, do not intentionally short the positive (+) and negative (-) terminals with metallic object.
All work on the ESS and electrical connections must be carried out by qualified personnel only. Q.HOME+ ESS HYB-G2 provides a safe source of electrical energy when operated as intended and as designed. A potentially hazardous circumstance such as excessive heat or electrolyte mist may occur due to improper operating conditions, damage, misuse and/or abuse. The following safety precautions and the warning messages described in this section must be observed. If any of the following precautions are not fully understood, or if you have any questions, contact Customer Support for guidance (see chapter 13).
The safety section may not include all regulations for your locale; personnel working with Q.HOME+ ESS HYB-G2 must review applicable federal, state and local regulations as well as the industry standards regarding this product.

CAUTION

This product is intended to be used for PV source inputs and residential home Grids (AC 230V). If not used as intended, the protection provided by the equip -ment may be impaired.

CAUTION

This device is designed appropriate for two-PV string structure. Therefore, the PV string 1 and PV string 2 must be connected to PV input 1 and PV input 2, respectively. Do not split one PV string output for connecting it into the PV input terminal 1 and input terminal 2.

CAUTION

After disconnecting the INVERTER from Battery or PV, Wait 5minutes to discharge the INVERTER.

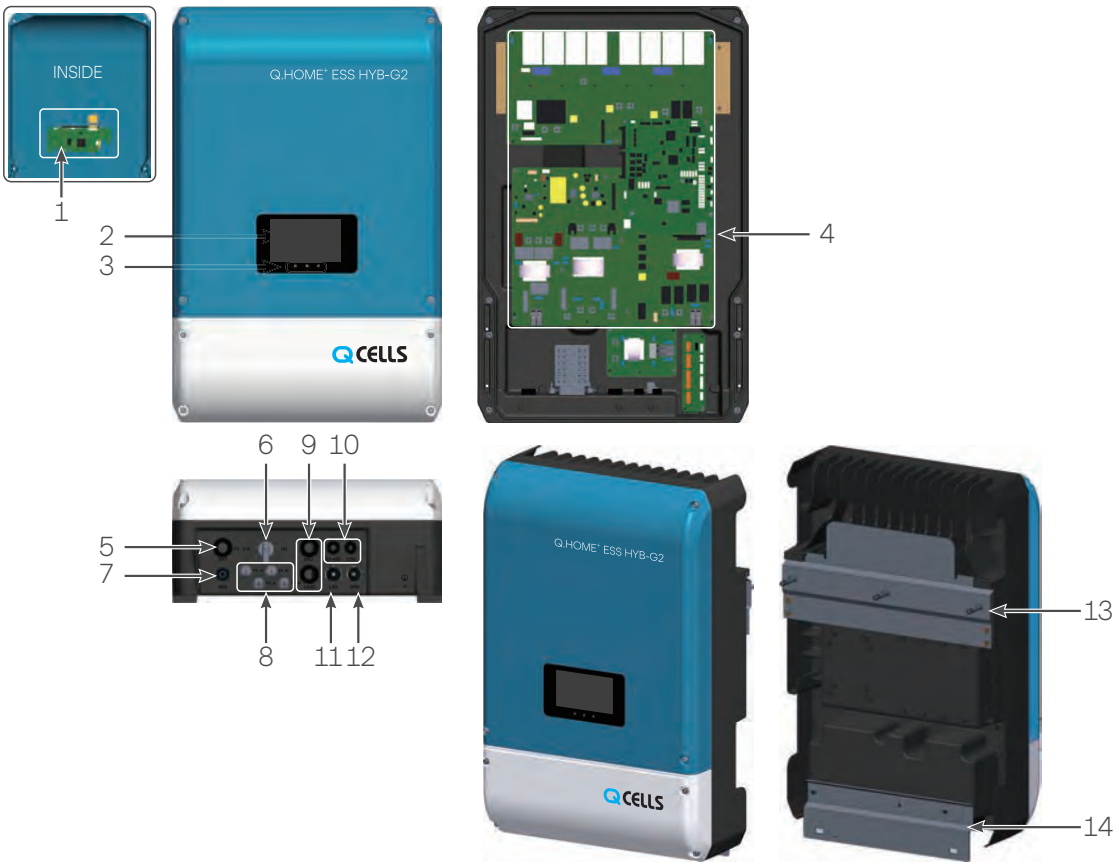
CAUTION

When the photovoltaic array is exposed to light, it supplies DC voltage to the Q.HOME+ ESS HYB-G2.
Do not touch the PV cable when it PV cable is connected to the PV arrays.

2.3 Product Overview

The Q.HOME+ ESS HYB-G2 includes the PV INVERTER, Battery charger/discharger, Li-Ion Battery, and EMS. The basic operating modes consist of Stand-Alone (Back-up) mode, PV generation mode, PV generation + charge/discharge mode. The operation mode of this product is automatically determined by the EMS algorithm.

2.3.1 INVERTER Product Overview

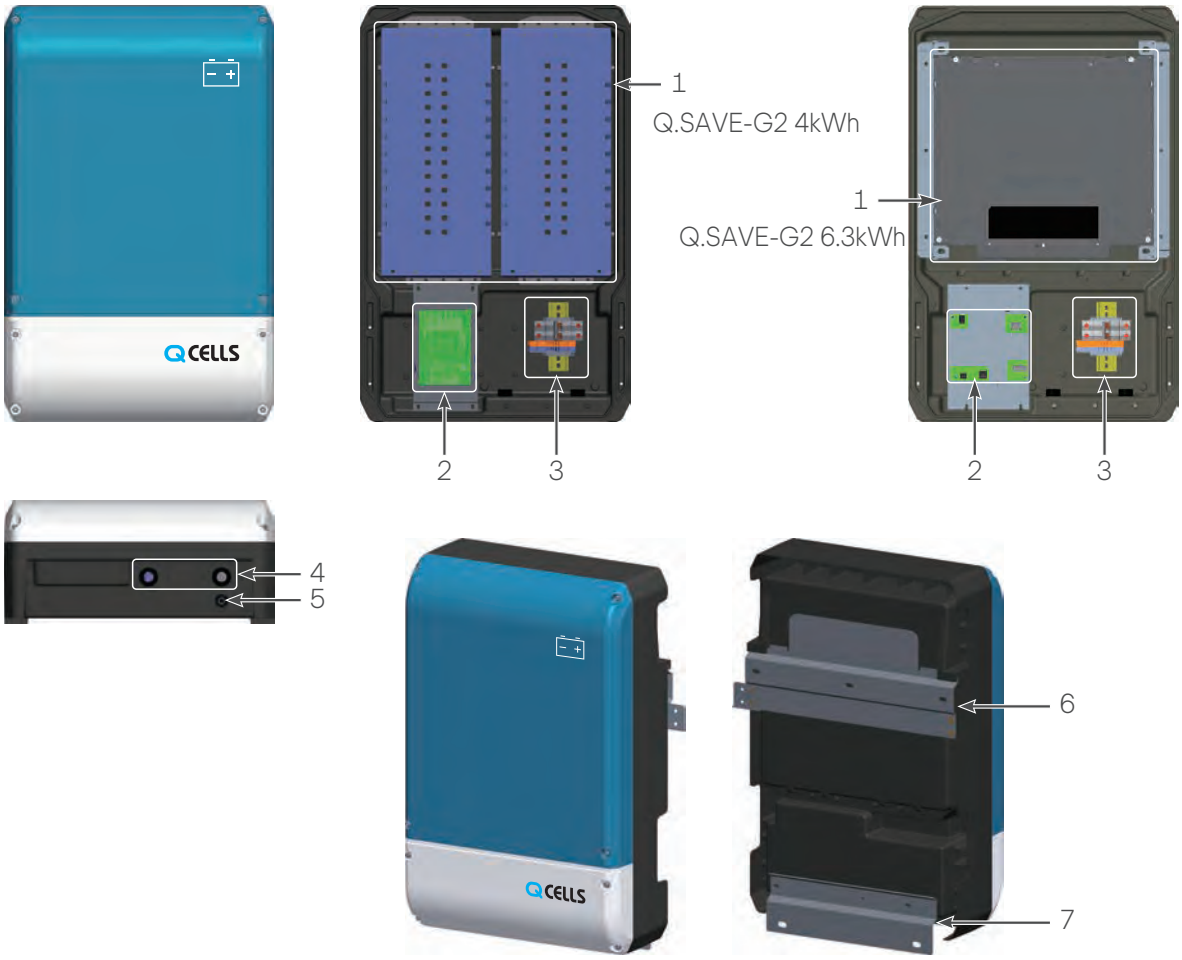


[Figure 2-6 : Part View of INVERTER]

No.	Description
1	LCD Board
2	LCD Panel
3	LED Indications
4	INVERTER (PV Inverter and Battery charger / discharger)
5	Cable Gland for Battery
6	DC Disconnection Switch (PV & Battery Isolator)
7	Battery Communication
8	PV Input Connector (MC4 type 2set)
9	AC Connector and Load Connector
10	PCS Communication
11	Ethernet Communication
12	Demand Response Mode / See ‘page 40’ for more information.
13,14	Bracket Connected Part

[Table 2-1 : Part Description of INVERTER]

2.3.2 Battery Product Overview



[Figure 2-7 : Part View of Battery Pack]

No.	Description
1	Battery (Made by Samsung SDI)
2	BMS Board (Made by Samsung SDI)
3	Terminal and Circuit Breaker
4	Cable Gland for power cables
5	BMS Communication Connector
6,7	Bracket Connected Part

[Table 2-2 : Part Description of Battery Pack]

2.3.3 Basic Specifications (Europe)

<table>
<tr><th colspan="5">PV Generator Data (DC)</th></tr>
<tr><td colspan="3">Max. input total power</td><td colspan="2">6.6 kWp</td></tr>
<tr><td colspan="3">Max. input power per string</td><td colspan="2">3.3 kWp</td></tr>
<tr><td colspan="3">Max. input voltage</td><td colspan="2">550 V</td></tr>
<tr><td colspan="3">Min. input voltage / Initial input voltage</td><td colspan="2">125 V / 150 V per string</td></tr>
<tr><td colspan="3">MPPT voltage range</td><td colspan="2">125 V - 500 V</td></tr>
<tr><td colspan="3">Max. input current per string</td><td colspan="2">15 A per string</td></tr>
<tr><td colspan="3">Number of independent MPPT trackers</td><td colspan="2">2</td></tr>
<tr><th colspan="5">Battery Data (DC)</th></tr>
<tr><td></td><td colspan="2"></td><td>1 Battery Pack</td><td>2 or more Battery Pack</td></tr>
<tr><td rowspan="4">Q.SAVE G2 4kWh</td><td colspan="2">Battery nominal capacity</td><td>4.0 kWh</td><td>4.0 kWh x Pack</td></tr>
<tr><td colspan="2">DOD (Depth of Discharge) Range</td><td colspan="2">90 %</td></tr>
<tr><td colspan="2">Battery voltage range / nominal voltage</td><td colspan="2">176.4 Vdc - 225.12 Vdc / 203.84 Vdc</td></tr>
<tr><td colspan="2">Max. discharge current</td><td colspan="2">17 A</td></tr>
<tr><td rowspan="4">Q.SAVE G2 6.3kWh</td><td colspan="2">Max. charge current</td><td>9.8 A</td><td>17 A</td></tr>
<tr><td colspan="2">Battery nominal capacity</td><td>6.3 kWh</td><td>6.3 kWh x Pack</td></tr>
<tr><td colspan="2">DOD (Depth of Discharge) Range</td><td colspan="2">90 %</td></tr>
<tr><td colspan="2">Battery voltage range / nominal voltage</td><td colspan="2">173.6 Vdc - 228.2 Vdc / 202.7 Vdc</td></tr>
<tr><td colspan="2">Max. discharge current</td><td>15.6 A</td><td>17 A</td></tr>
<tr><td colspan="2">Max. charge current</td><td>15.6 A</td><td>17 A</td></tr>
<tr><td colspan="3">Battery DC/DC converter data</td><td colspan="2"></td></tr>
<tr><td rowspan="2">Max. charge power</td><td>Q.SAVE-G2 4kWh</td><td>2.0 kW</td><td>3.0 kW</td></tr>
<tr><td>Q.SAVE-G2 6.3kWh</td><td colspan="2">3.0 kW</td></tr>
<tr><td colspan="3">Max. discharge power</td><td colspan="2">3.0 kW</td></tr>
<tr><td colspan="3">Technology</td><td colspan="2">Non-Isolated</td></tr>
<tr><th colspan="5">Grid Connection Data (AC)</th></tr>
<tr><td colspan="3">Rated power (at 230V, 50Hz)</td><td colspan="2">4.6 kW</td></tr>
<tr><td colspan="3">Max. output apparent AC power</td><td colspan="2">4.6 kVA</td></tr>
<tr><td colspan="3">Max. current</td><td colspan="2">25 A</td></tr>
<tr><td colspan="3">Nominal AC voltage / range</td><td colspan="2">230 V / 184 V_{AC} - 264 V_{AC}</td></tr>
<tr><td colspan="3">Rated power frequency / range</td><td colspan="2">50 Hz / 47.5 Hz - 51.5 Hz</td></tr>
</table>

[Table 2-3 : Basic Specifications (Europe)]

2.3.4 Basic Specifications (Australia & New Zealand)

PV Generator Data (DC)			
Max. input total power		6.6 kWp	
Max. input power per string		3.3 kWp	
Max. input voltage		550 V	
Min. input voltage / Initial input voltage		125 V / 150 V per string	
MPPT voltage range		125 V - 500 V	
Max. input current per string		15 A per string	
Number of independent MPPT trackers		2	
Battery Data (DC)			
		1 Battery Pack	2 or more Battery Pack
Q.SAVE G2 4kWh	Battery nominal capacity	4.0 kWh	4.0 kWh x Pack
	DOD (Depth of Discharge) Range	90 %	
	Battery voltage range / nominal voltage	176.4 Vdc - 225.12 Vdc / 203.84 Vdc	
	Max. discharge current	17 A	
	Max. charge current	9.8 A	17 A
	Max. charge power (Rated power)	2.0 kW (0.8 kW)	3.0 kW (0.8 kW x Pack)
	Short circuit current	771.25 A (701 μs)	
Q.SAVE G2 6.3kWh	Battery nominal capacity	6.3 kWh	6.3 kWh x Pack
	DOD (Depth of Discharge) Range	90 %	
	Battery voltage range / nominal voltage	173.6 Vdc - 228.2 Vdc / 202.7 Vdc	
	Max. discharge current	15.6 A	17 A
	Max. charge current	15.6 A	17 A
	Max. charge power (Rated power)	3.0 kW (1.25 kW x Pack)	
	Short circuit current	1070.5 A (0.4 ms)	
Max. discharge power		3.0 kW	
Battery technology		Rechargeable Li-Ion	
DC/DC converter technology		Non-Isolated	
Over voltage Category		II	
Grid Connection Data (AC)			
		Australia	New Zealand
Rated power (at 230V, 50Hz)		5.0 kW	
Max. output apparent AC power		5.0 kVA	
Max. current		25 A	
Nominal AC voltage / range		230 V / 181 V_{AC} - 259 V_{AC}	
Rated power frequency / range		47 - 52 HZ	45 - 52 HZ

[Table 2-4 : Basic Specifications (Australia & New Zealand)]

2.3.5 Grounding the PV INVERTER

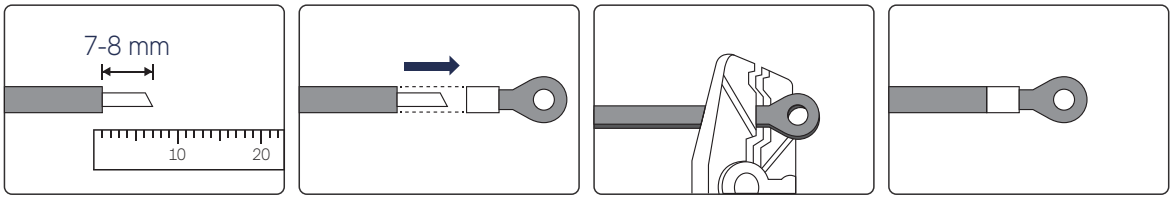
	DANGER
	High touch current, earth connection essential before connecting supply

The PV INVERTER complies with the local requirements for grounding the PV INVERTER.
Q CELLS recommends connecting and grounding the PV INVERTER's frame and other electricity conducting surfaces in such a way that there is continuous conduction in order to achieve maximum protection for systems and persons. And the PV INVERTER's DC (+) pole and DC (-) pole are not permitted to be grounded.

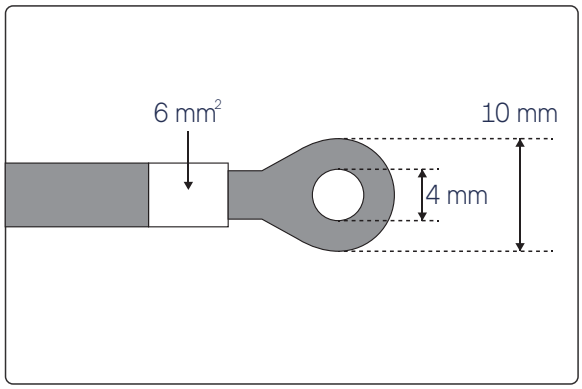
* Double Grounding Point

Q.HOME+ ESS HYB-G2 must be connected to an additional ground on the enclosure.
The grounding method on the enclosure is as follows :

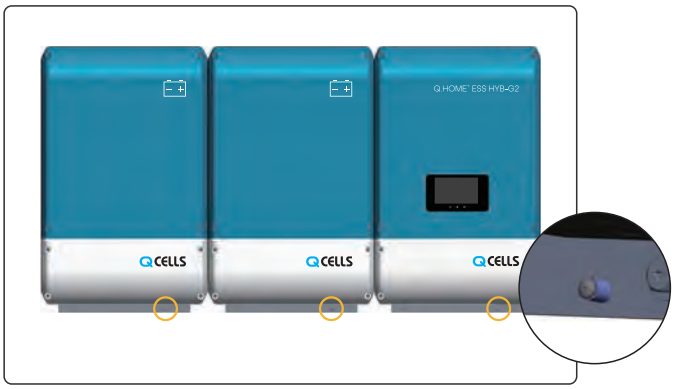
- Bolts : SJ60-00126A
- SCREW-MACHINE : PH, +, WSP, M4, L12, NTR, SUS304
- Torque for fastening bolts : 1.2 - 1.8 Nm



[Figure 2-8 : Work on the ring terminal]



[Figure 2-9 : Ring terminal (10R6-4)]



[Figure 2-10 : Double Grounding Point of Q.HOME+ ESS HYB-G2]

2.4 Earth Fault Alarm

When an earth fault occurs, the inverter stops operation and notifies earth fault code to the installer and administrator.
Note: This feature is only supported on models released in Australia.

3. Package Removal and Inspection

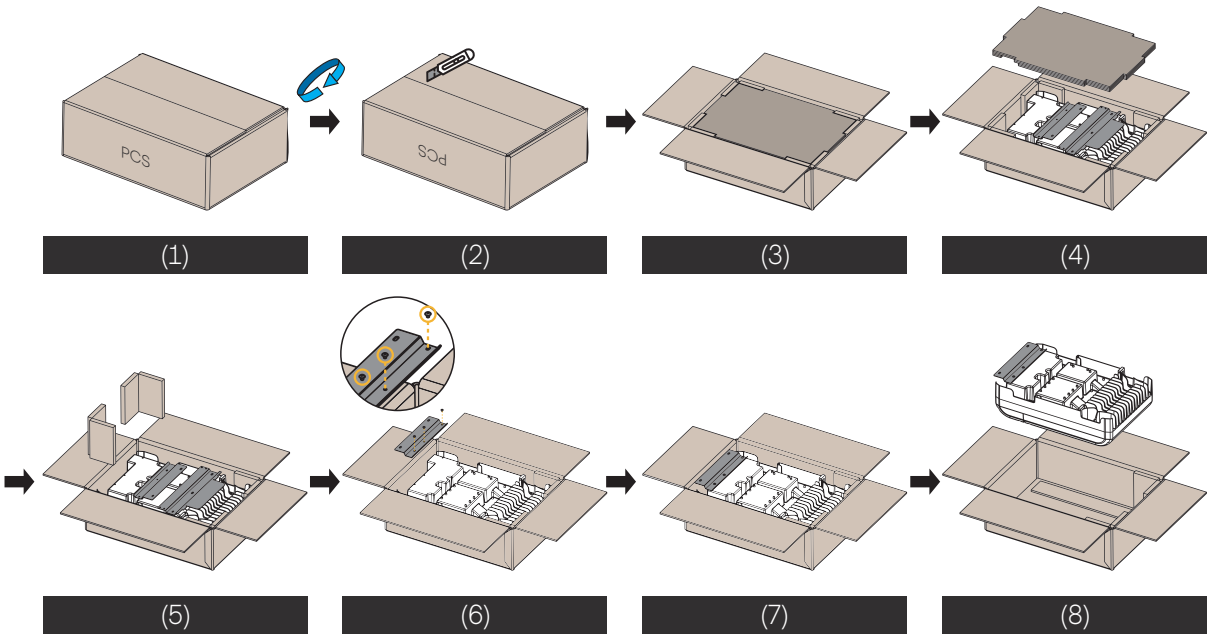
	CAUTION
	Included in this box are a Battery and printed circuit board. Therefore, special care must be taken in handling. Make sure to have at least two persons deliver and remove the package.

3.1 Package Removal

3.1.1 Removing the INVERTER Enclosure Package

As shown in the [Figure 3-1], remove the package components from the enclosure in the following order.

1. Place the system on the installation location.
2. Turn the box upside down.
3. Open the box.
4. Remove the cover on the back of the product.
5. Remove the protective cover on the side of the product.
6. Prepare the lower bracket for the INVERTER. (3 Down Bracket Screws, 1 Down Bracket)
7. Assemble the lower bracket to the INVERTER.
8. Lift the INVERTER.

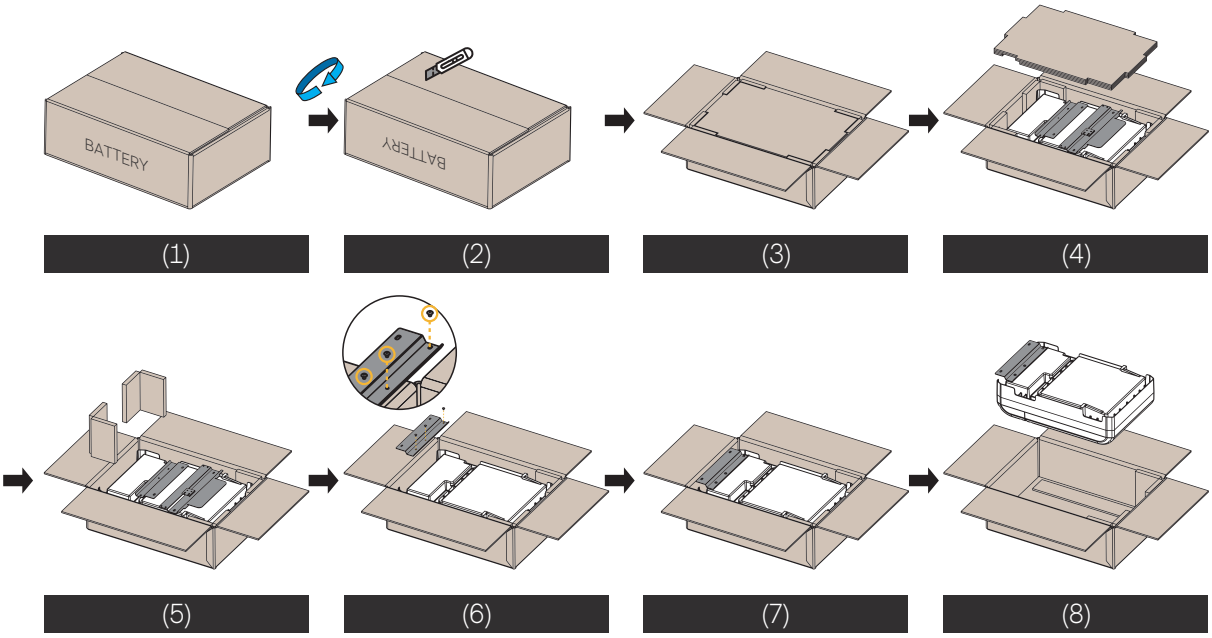


[Figure 3-1 : Process for the INVERTER Enclosure Package Removal]

3.1.2 Removing the Battery Enclosure Package

As shown in the [Figure 3-2], remove the package components from the enclosure in the following order.

1. Place the system on the installation location.
2. Turn the box upside down.
3. Open the box.
4. Remove the cover on the back of the product.
5. Remove the protective cover on the side of the product.
6. Prepare the lower bracket for the BATTERY. (3 Down Bracket Screws, 1 Down Bracket)
7. Assemble the lower bracket to the BATTERY.
8. Lift the BATTERY.

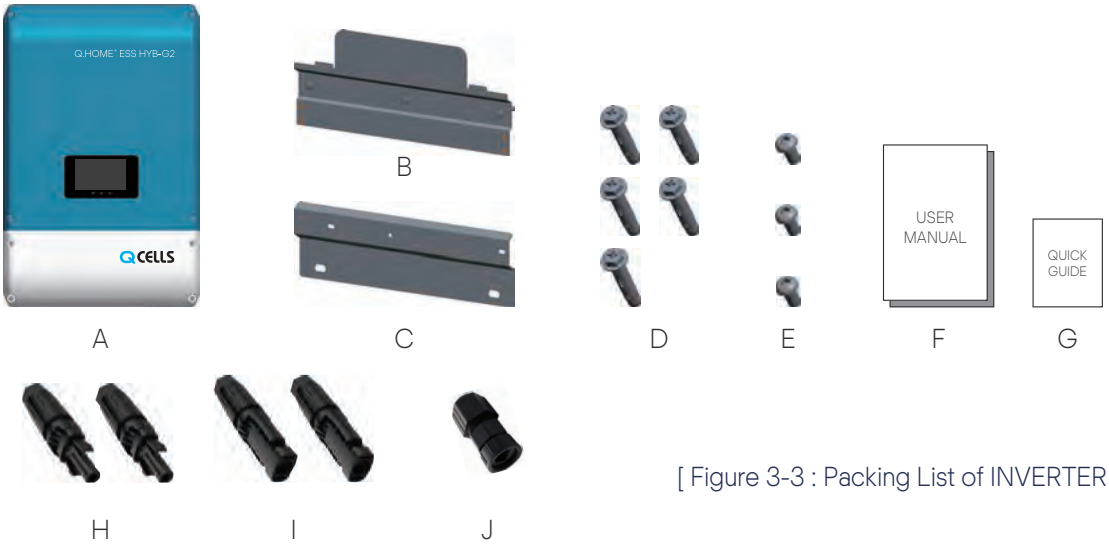


[Figure 3-2 : Process for the Battery Enclosure Package Removal]

3.1.3 Checking Components on the Packing List

Once the product has been delivered, refer to the [Figure 3-3], [Figure 3-4], [Figure 3-5], [Table 3-1], [Table 3-2], and [Table 3-3] check the entire components included in the package and the correct number of the quantity listed in the table.

INVERTER Packing List

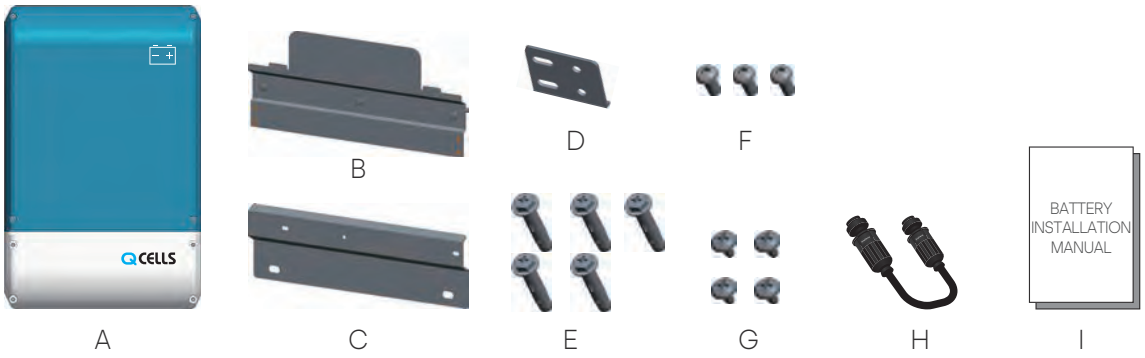


[Figure 3-3 : Packing List of INVERTER]

No.	Part Name	Code No.	Quantity
A	INVERTER ASSY	0147000122CA	1
B	Upper Wall Bracket	6447300054AD	1
C	Lower Wall Bracket	6447300055AD	1
D	Wall Mount Screw	67613074AAAD	5
E	Down Bracket Screw	67613075AAAD	3
F	User manual	6547310111AD	1
G	Quick Guide	6547310114AD	1
H	PV Stick(+)	4925310128KD	2
I	PV Stick(-)	4925310129KD	2
J	RJ45 Sleeve Housing	4635150094WD	1

[Table 3-1 : Component Description of INVERTER]

Battery Packing List



[Figure 3-4 : Packing List of Battery Pack]

No.	Part Name	Code No.	Quantity
A	Battery ASSY	0147000123CA	1
B	Upper Wall Bracket	6447300054AD	1
C	Lower Wall Bracket	6447300055AD	1
D	Bridge Bracket	74190024AAAD	1
E	Wall Mounting Screw	67613074AAAD	5
F	Down Bracket Screw	67613075AAAD	3
G	Bridge Screw	67613078AAAD	4
H	BMS Communication Cable	4635150030WD	1
I	Battery Installation Manual	MHBAA092770	1

[Table 3-2 : Component Description of Battery Pack]

Option List

[Figure 3-5 : Option List]

No.	Part Name	Code No.	Quantity
*A	T Distributor	752901202000000	*
B	BMS Communication Cable (1m or 2m)	752647202000000	1
*C	Cable Gland for power cables	752603202000000	*
D	Floor Mount (470 x 380 x 787 mm) for Europe	752904202000001	1
	Floor Mount (470 x 380 x 787 mm) for Australia	752904202000002	1

* A : Adaptor
- If using more than one battery, a separate adaptor is requried. (Adaptor is an accessory, requires separate purchase)
- 2 Batteries → 1ea / 3 Batteries → 2ea / 4 Batteries → 3ea / 5 Batteries → 4ea

* C : Cable Gland
- INVERTER → 3ea (Grid, Load, Battery) / Battery → 2ea

[Table 3-3 : Component Description of Option]

3.2 Checking for damage in Delivery

When opening the box that contains Q.HOME+ ESS HYB-G2 in it, check for any possible damage caused in transit and ensure the correct number of the components therein. If there is a scratch on the enclosure, contact the Q CELLS after sales service for inspection and service.

3.3 Identifying Q.HOME+ ESS HYB-G2

Attached on the enclosure of this product is the Type Label where the identity of this product is described. For safe usage, make sure that the following product information is indicated on the Type Label.

- Device Type (Model)
- Serial Number (Serial No.)
- Device-specific characteristics
- Certification Lists
- Warnings and Notification

Q.HOME+ ESS HYB-G2

- Q.HOME+ ESS HYB-G2
  - Q CELLS ESS For Home with Hybrid Inverter G2

INVERTER

- G2 for Europe : Q.VOLT-G2 HYB-4.6kW.1.1
  - HYB-4.6kW.1.1 : Hybrid Inverter rated power 4.6 kW single phase ver.1
- G2 for Australia : Q.VOLT-G2 HYB-5kW.1.1
  - HYB-5kW.1.1 : Hybrid Inverter rated power 5 kW single phase ver.1

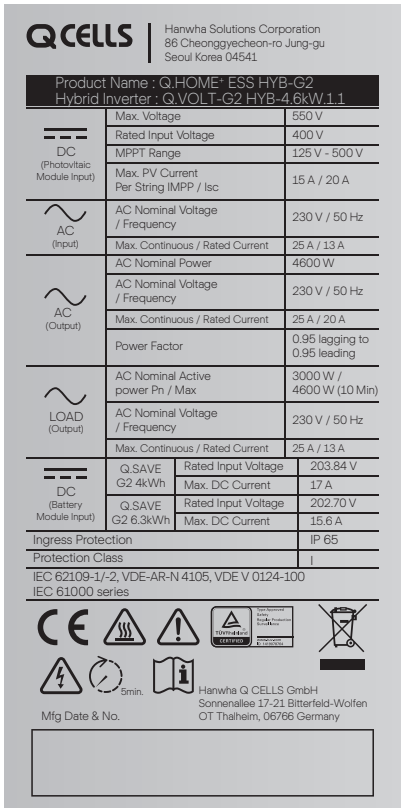
Q.VOLT-G2 HYB-4.6kW.1.1
: Model with DRM hole

Q.VOLT-G2 HYB-5kW.1.1
: Model with DRM hole

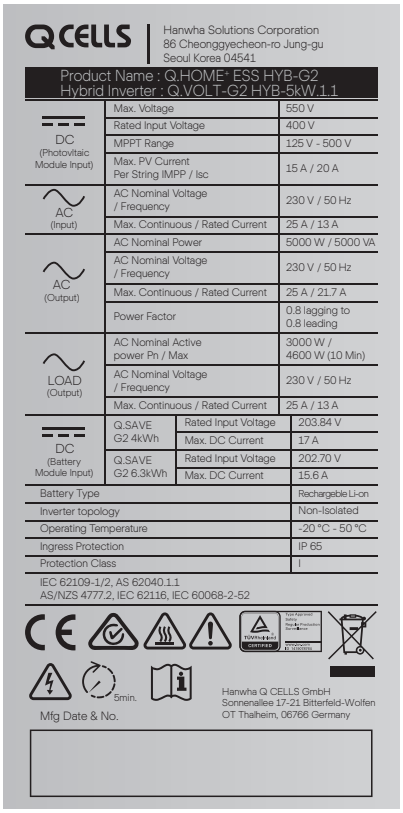
BATTERY

- G2 for Europe : Q.SAVE-G2 4kWh B1.1.1, Q.SAVE-G2 6.3kWh B1.1.1
- G2 for Australia : Q.SAVE-G2 4kWh B1.1.1, Q.SAVE-G2 6.3kWh B1.1.1
  - 4kWh B1.1.1 : nominal energy 4 kWh NMC cylinder battery ver.1
  - 6.3kWh B1.1.1 : nominal energy 6.3 kWh NMC cylinder battery ver.1

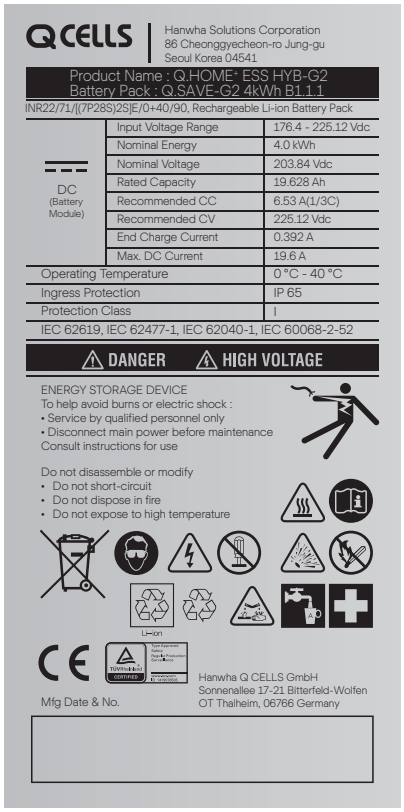
The Type Label is shown in the [Figure 3-6], [Figure 3-7], [Figure 3-8] and [Figure 3-9].



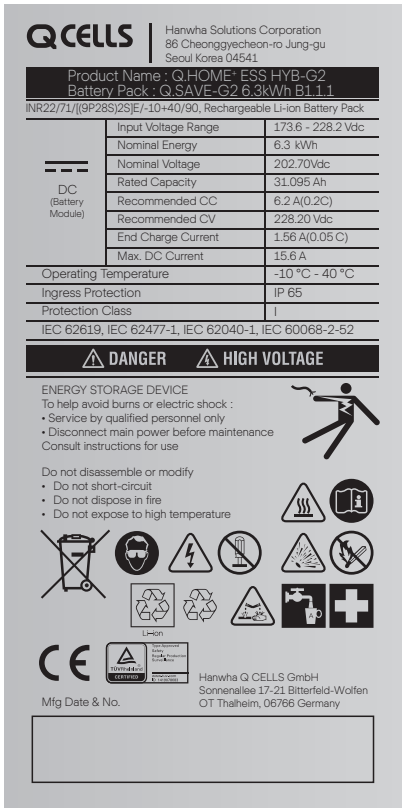
[Figure 3-6 : INVERTER Name Plate (Europe)]



[Figure 3-7 : INVERTER Name Plate (Australia & New Zealand)]

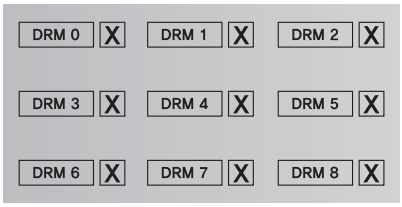


Q.SAVE-G2 4kWh



Q.SAVE-G2 6.3kWh

[Figure 3-8 : Battery Name Plate]



[Figure 3-9 : DRM Name Plate]

4. Installation

4.1 Selection of Installation Location

CAUTION

Danger to life due to fire or explosion!
Danger to life due to high voltages!
Despite careful construction, a fire can occur with electrical devices.
Do not install the Q.HOME+ ESS HYB-G2 on the following locations:
On flammable construction materials;
In potentially explosive areas; and
In areas where highly flammable materials are stored!

CAUTION

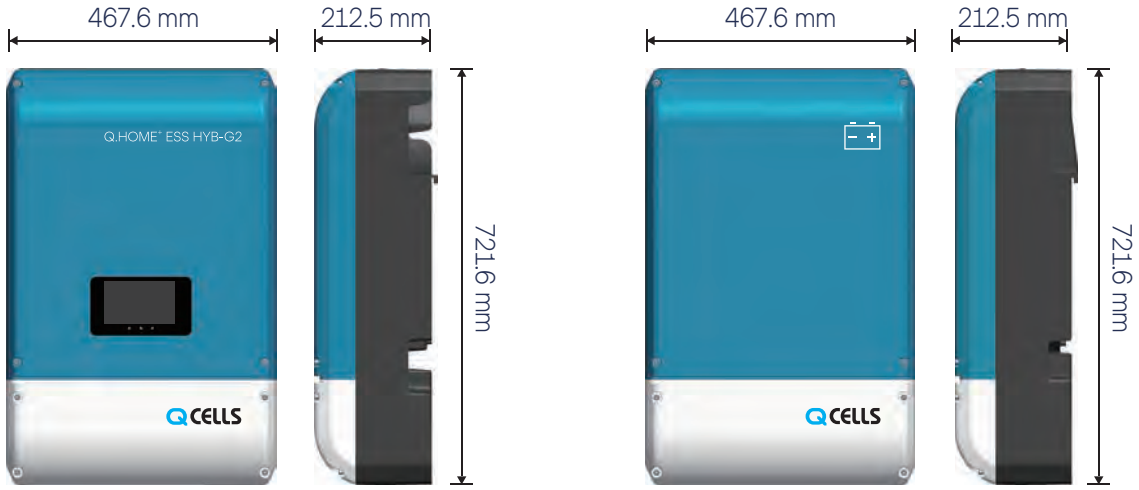
Q.HOME+ ESS HYB-G2 provides a safe source of electrical energy when operated as intended and as designed. A potentially hazardous circumstance such as excessive heat or electrolyte mist may occur due to improper operating conditions, damage, misuse and/or abuse. The following safety precautions and the warning messages described in this section must be observed.
If any of the following precautions are not fully understood, or if you have any questions, contact Customer Support for guidance. The Safety Section may not include all regulations for your locale; Personnel working with Q.HOME+ ESS HYB-G2 must review applicable federal, state and local regulations as well as the industry standards regarding this product.

CAUTION

All work on the ESS and electrical connections must be carried out by qualified personnel only.

4.1.1 Dimensions

Once the Q.HOME+ ESS HYB-G2 has been assembled, its dimension is 467.6 x 721.6 x 212.5 mm.
The [Figure 4-1] show the outer dimensions of the device after assembly, respectively.



[Figure 4-1 : Dimension of Q.HOME+ ESS HYB-G2]

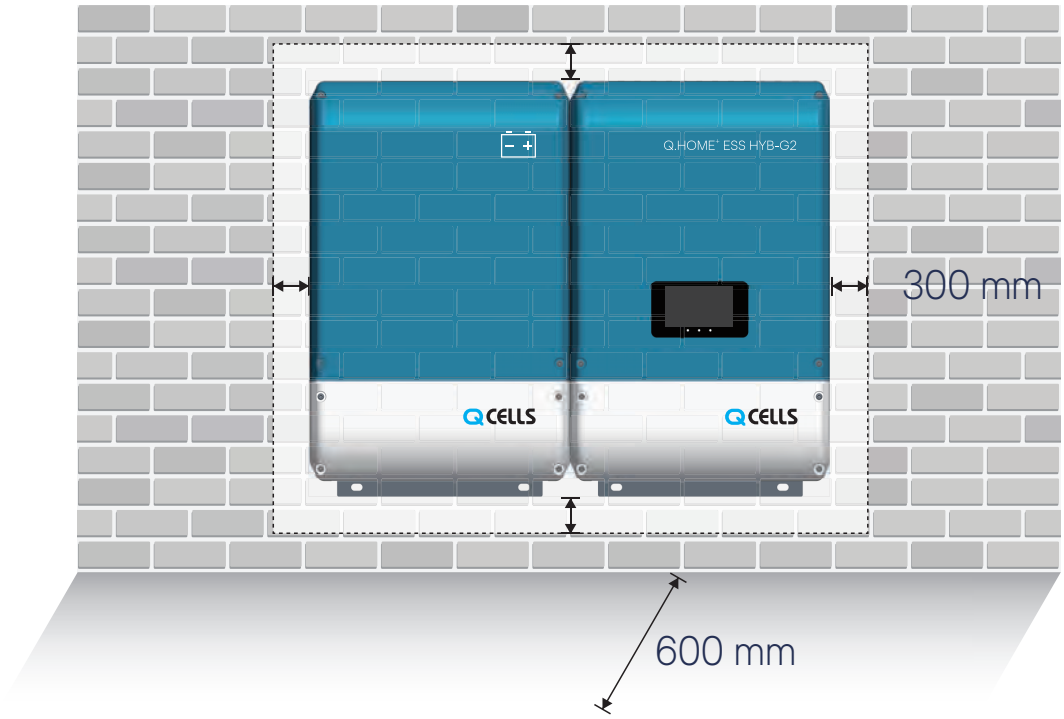
4.1.2 Ambient Conditions and Temperatures

Check a proper installation location to install and remove the device easily at any time.
This device must be located within reach distance. The ambient temperature of the installation location is -20 °C - 50 °C for the inverter, 0 °C - 40 °C (4 kWh) or -10 °C - 40 °C (6.3 kWh) for the battery.

4.1.3 Environmental checks

When choosing installation location, observe the following conditions :

- The installation location must be easily accessible.
- Prevent access to the installation location by children.
- Installation of the unit in a location exposed to solar rays must be avoided as it may cause :
  - power limitation phenomena in the INVERTER (with a resulting decreased energy production by the system)
  - premature wear of the electrical/electromechanical components
  - premature wear of the mechanical components (gaskets) and of the user interface (display)
  - reduction in performance, lifetime and possible damage of the Battery pack
- Always ensure that the flow of air around the INVERTER is not blocked so as to prevent overheating.
- Do not install in locations where flammable substances or gases may be present.
- You can install in locations with a constant presence of water and/or high humidity level, but not recommended.
- Do not install in rooms where people live or where the prolonged presence of people or animals is expected, because of the noise that the INVERTER produces during operation.

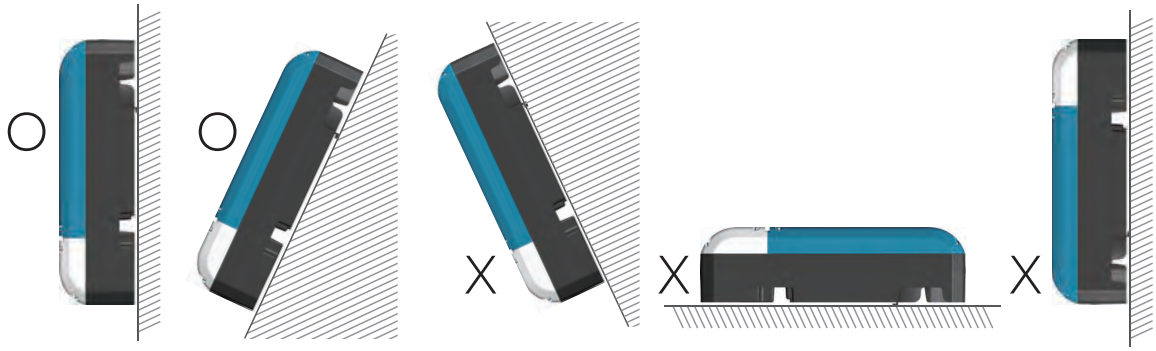


[Figure 4-2 : Minimum Clearance for Q.HOME+ ESS HYB-G2]

4.1.4 Position (Location Selection)

When choosing the place of installation, observe the following conditions:

- Install on a wall or strong structure capable of bearing the weight of the equipment.
- If possible, install at eye-level so that the display can be seen easily.
- Install at a height that considers the heaviness of the equipment. Failure to meet this condition could result in problems during servicing, unless suitable means are provided to carry out the operation.
- Install vertically with a maximum inclination of 5° (backward). If this condition cannot be met, the INVERTER could undergo derating due to high temperature because of poor heat dissipation.
- The installation must take account of any electrical devices (e.g. lamps, switches, etc.) and ventilations to any electrical devices which must be at least 60 cm from the equipment. These distances must be maintained also to facilitate the circulation of the air needed to cool the unit and to facilitate the operations to install/maintain hardware and software which is done by dismantling the covers placed on the front.



[Figure 4-3 : Restriction for the Surface Gradient]

4.2 Mounting Instructions

	CAUTION
⚠	There is risk of injury if the ESS is lifted incorrectly or dropped while being transported or when attaching it to or removing it from the wall mounting bracket. Transport and lift the ESS carefully. It is important to ensure the drilling locations are not located on any electrical wiring within the wall.

This product must be installed on the wall considering appropriate environments described in previous pages. Follow the mounting instruction described below exactly and securely.

* NOTE

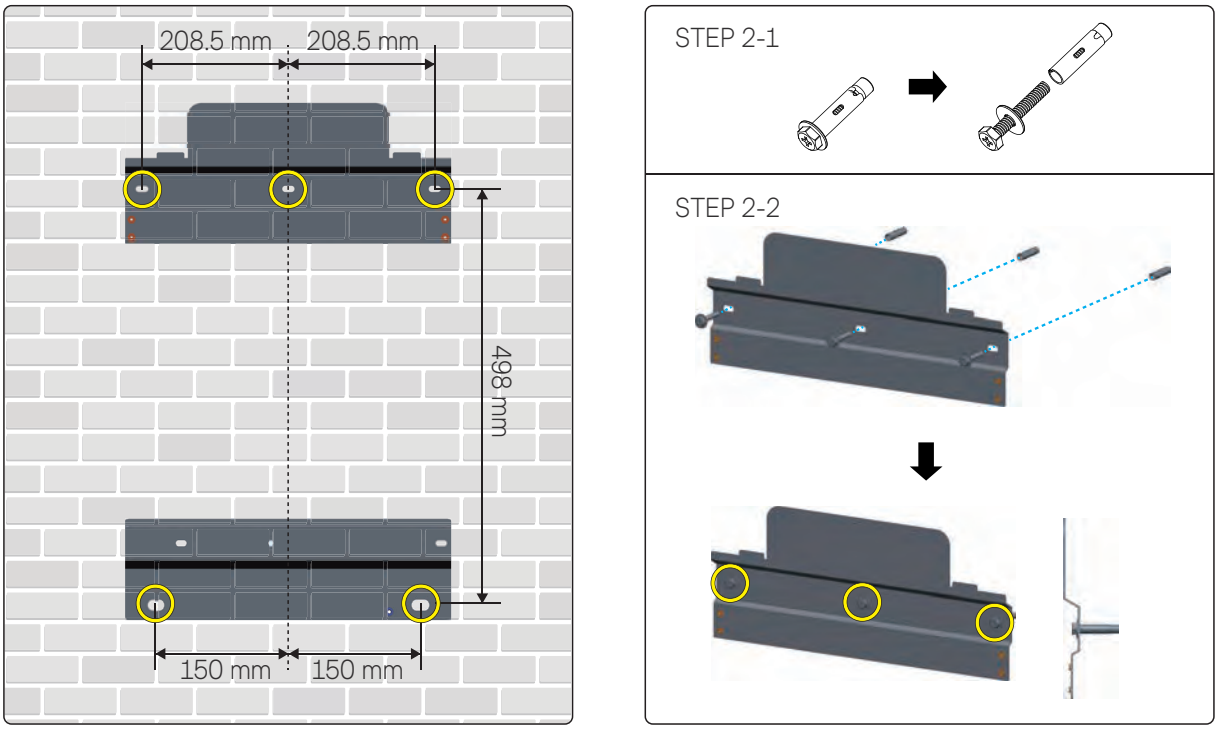
When attaching the wall bracket to a wall, adjust the horizontal level using inclinometer.

STEP 1

- Step 1 : Mark guideline on wall.
  - Drill hole : size = Ø10 / Length = 45-55 mm
  - Upper bracket : 3 EA
  - Lower bracket : 2 EA

STEP 2

- Step 2 : Get ready for the upper bracket.
  - Step 2-1 : Detach Anchor bolt.
  - Step 2-2 : Insert the Anchor bolt into the bracket.



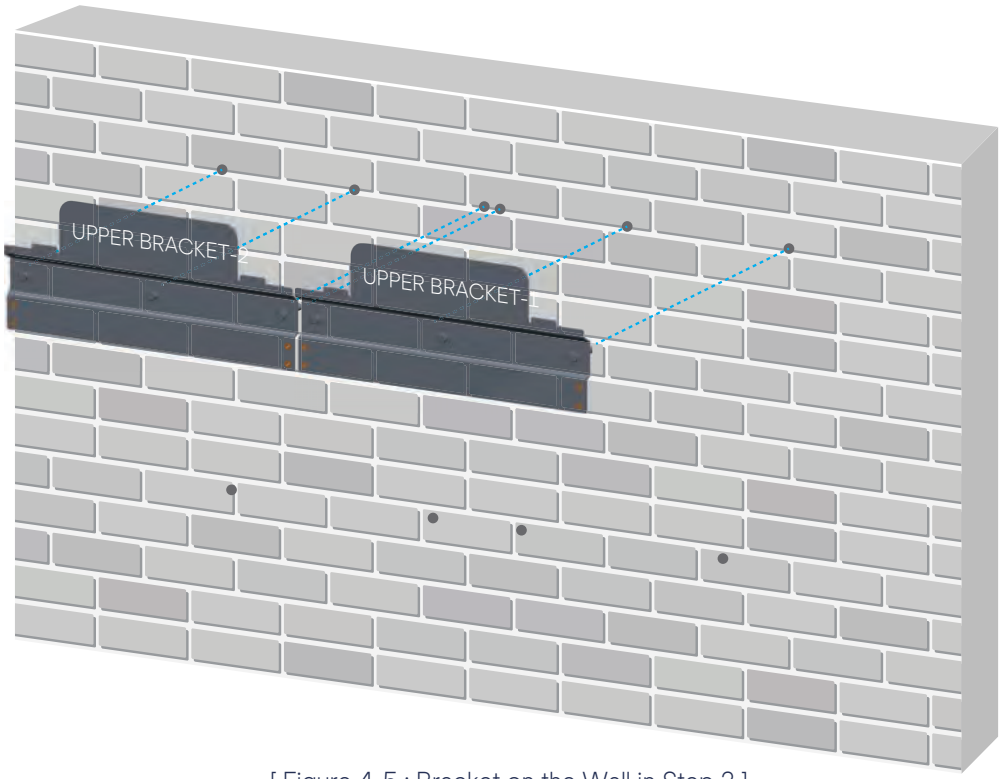
[Figure 4-4 : Bracket on the Wall in Step 1, 2]

	Diameter	L	Touque
Wall Mount Screw	M8	45 mm	20 kgf
GND Screw	M4	8 mm	10 kgf

[Table 4-1 : Screw Specification]

STEP 3

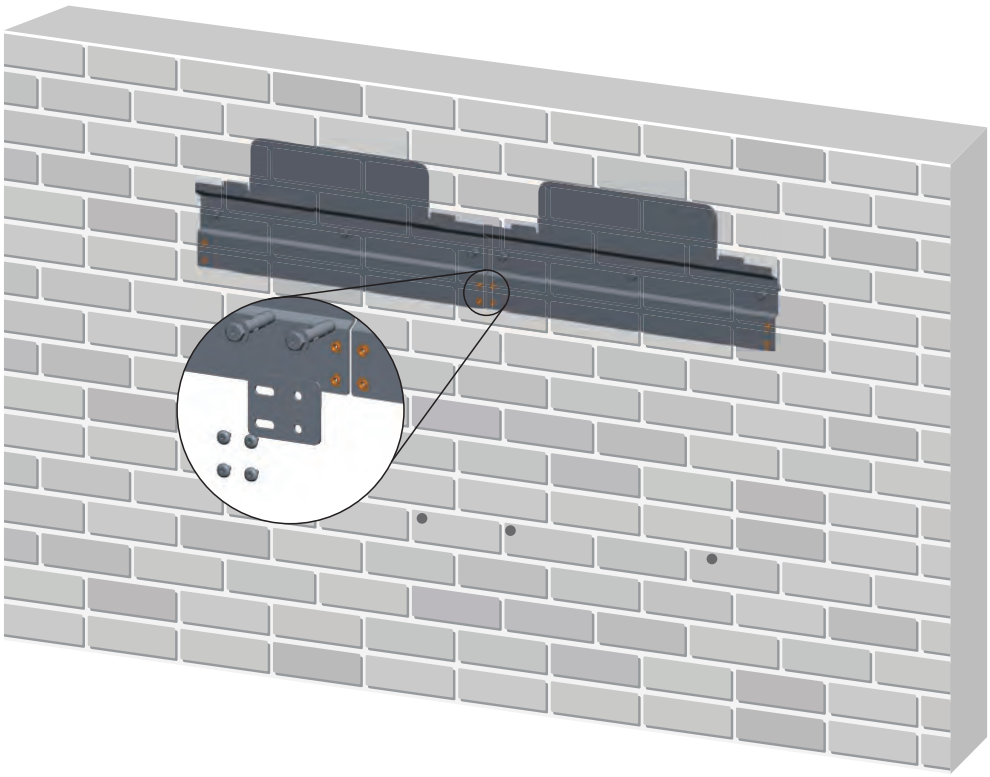
• Step 3 : Secure the upper bracket.



[Figure 4-5 : Bracket on the Wall in Step 3]

STEP 4

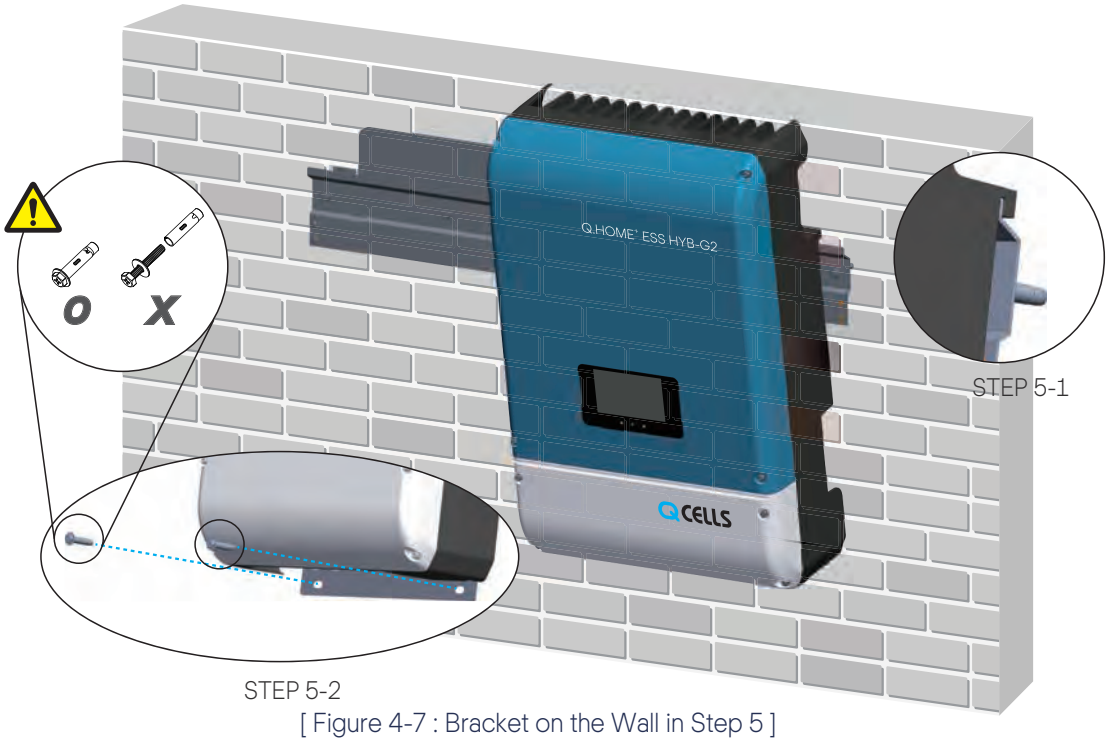
• Step 4 : If you secure the upper bracket, Use the bridge bracket.



[Figure 4-6 : Bracket on the Wall in Step 4]

STEP 5

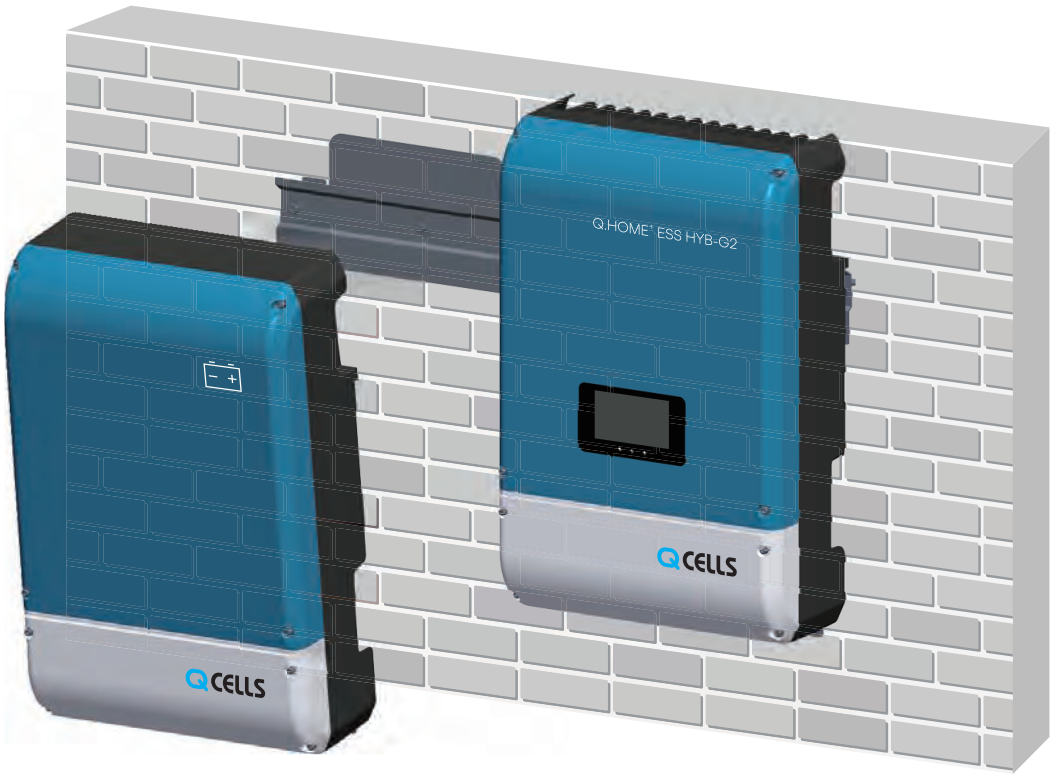
• Step 5 : Lift the INVERTER and secure it to the upper bracket.
  - Step 5-1 : Hang the INVERTER to upper bracket.
  - Step 5-2 : Secure the lower bracket.



[Figure 4-7 : Bracket on the Wall in Step 5]

STEP 6

• Step 6 : The method of mounting the Battery is the same as that of the INVERTER.

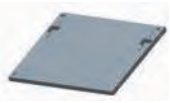


[Figure 4-8 : Bracket on the Wall in Step 6]

4.3 Floor Mount - Mounting Instructions

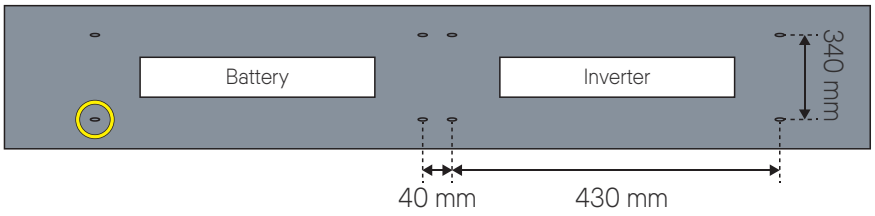
NOTICE

- The Floor Mount must use the frame provided by the manufacturer, All four directions should be fastened with bolts to the bottom.

						
Mount Plate (1ea)	Stand Column (2ea)	D-Bracket (2ea)	L-Bracket (4ea)	Screw M8x16 (8ea)	Screw M6x8 (4ea)	Nut M8 (2ea)

[Figure 4-9 : Floor Mount Part List]

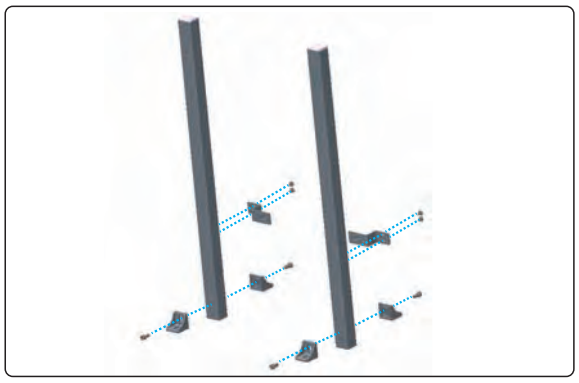
STEP 1



- Step 1 : Mark guideline on floor.
  - Bolt : M12-16 x L30 mm (Min)

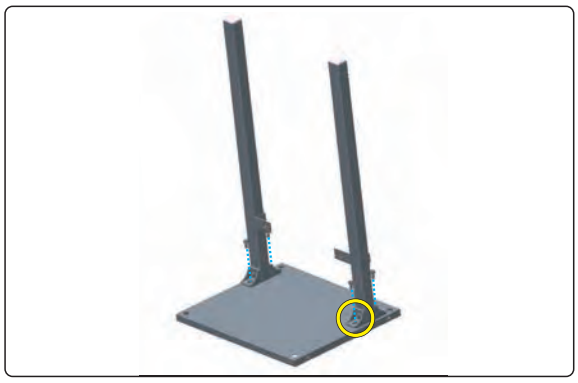
STEP 2

- Step 2 : L-Bracket (Screw M8x16, 4point)
  D-Bracket (Screw M6x8, 4point)



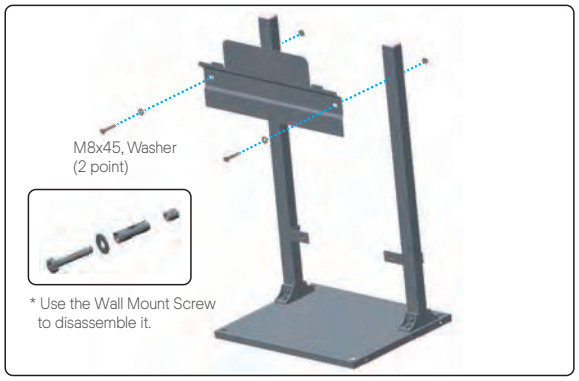
STEP 3

- Step 3 : After assembling Stand Column on Mount plate, tighten Screw(M8x16, 4point).



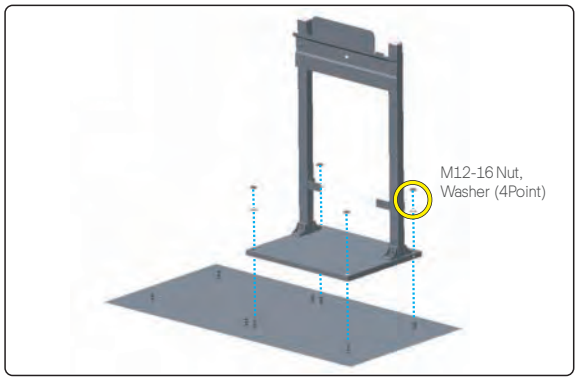
STEP 4

- Step 4 : After tightening the Upper Wall Bracket, tighten the nut (M8, 2point).



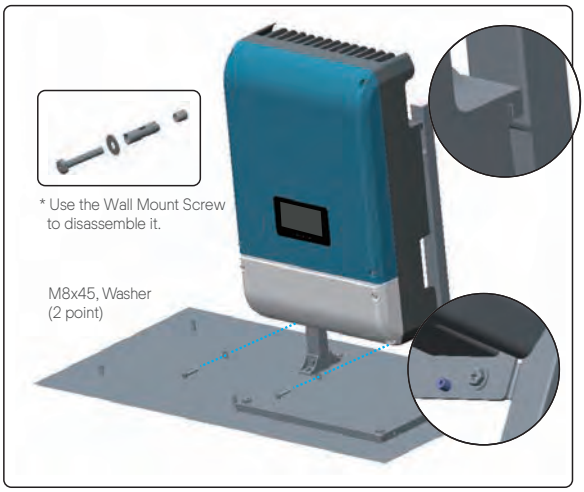
STEP 5

- Step 5 : Secure the Mount plate to the floor.



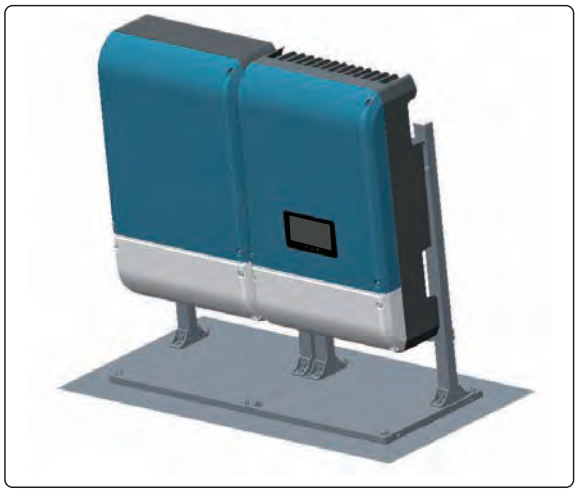
STEP 6

• Step 6 : After assembling INVERTER A'SSY and Floor Mount Option, tighten SCREW.



STEP 7

• Step 7 : Assemble the battery in the same way.



[Figure 4-10 : Floor Mount assembly Step 1-7]

5. Electrical Connections

NOTICE

The Q.HOME+ ESS HYB-G2 system can be damaged by static discharge.
Before you touch a component inside the Q.HOME+ ESS HYB-G2, ground yourself by touching PE or a grounded object.

CAUTION

When handling with the Li-Ion Battery for the Q.HOME+ ESS HYB-G2, you must wear the following personal protective equipment : High voltage rated rubber gloves Safety goggles or other protective eye equipment 40-minute standby period of time to complete discharging in the system before testing electrical parts inside the system!
Follow the guidelines below when handling the Li-Ion Battery.
Do not intentionally short circuit the positive (+) and negative (-) terminals with a metallic object.
Do not remove the cap on the terminals. If the cap is removed, avoid contact between the metals and the Battery terminals. Do not damage the screw thread.
Do not use seriously scarred or deformed Battery. Dispose immediately according to proper regulations.
Do not damage sheath of cable and connectors.

5.1 The Overview of Electrical Connection

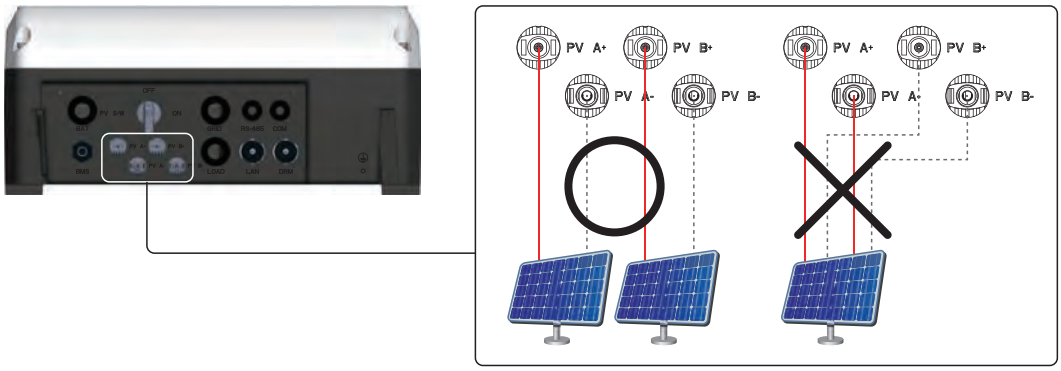
5.1.1 Electrical System Connection

The Q.HOME+ ESS HYB-G2 has two solar energy inputs (PV1, PV2). 3.3kW (per string) is the maximum output for each PV input. The AC output of Q.HOME+ ESS HYB-G2 is connected to the Home Load and the Grid. Between the Grid and PCS, the Digital Energy Meter is placed for power metering. The Home Load is directly connected to PCS. PCS is installed between the AC circuit breaker and DC Disconnect for safety reasons. Refer to Chapter 2.1 for detail system diagram.

The Q.HOME+ ESS HYB-G2 uses the two independent channels of the PV Input ({PV1+, PV1-}, {PV2+, PV2-}). They are used independently for running the maximum power from the sources of PV1 and PV2. Two channels are recommended for independent use for the two PV Inputs. Make sure not to connect one PV string in parallel with the two independent PV inputs (PV1, PV2).

A PV string must not be commonly connected to the two input terminals of the Q.HOME+ ESS HYB-G2. That is, make sure not to connect the split wiring from one PV string output with the two independent PV inputs (PV1+, PV1- and PV2+, PV2-). (Refer to the PV String connection method in the [Figure 5-1]).

* PV modules shall have an IEC61730 Application Class A rating or equivalent.



[Figure 5-1 : PV Connections]

5.1.2 Power Line Specification

As shown in the [Table 5-1], the input / output power cables correspond to the AC / DC input / output specifications for this system. Battery Power Cable is not provided. Please prepare it seperately.

Recommended cables for the Q.HOME+ ESS HYB-G2.

	Area	Insulation	(Europe) Color	(Australia) Color
Grid (L,N)	6 mm^2	600 V or more	L (Black), N (Blue)	L (Brown or Red), N (Blue & Black)
Load(L,N)	6 mm^2	600 V or more	-	-
PE	6 mm^2	600 V or more	Green / Yellow	Green / Yellow, Green
PV (+), (-)	4-6 mm^2	600 V or more	-	-
Battery (+), (-)	6 mm^2	400 V or more	-	-

[Table 5-1 : Power Line Specification]

5.1.3 Cable Gland Specification

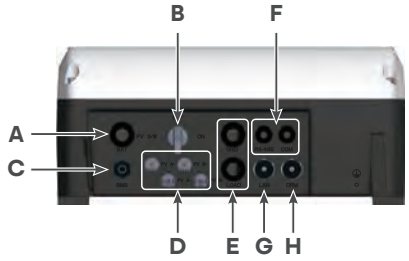
Grid, Load, Battery Cable Gland (M25)	External cable diameter	10 mm - 17 mm
	IP	IP66
Communication Cable Gland (M16)	External cable diameter	4.5 mm - 9 mm
	IP	IP66

[Table 5-2 : Cable Gland Specification]

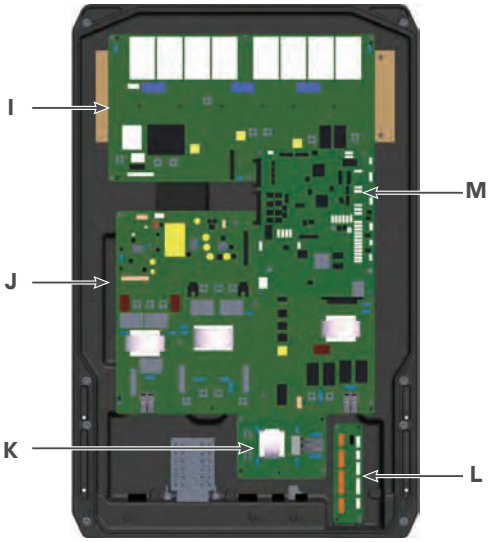
5.1.4 Overall Drawing of the Q.HOME+ ESS HYB-G2

5.1.4.1 Overall Drawing of the INVERTER

The [Figure 5-2] and [Figure 5-3] shows the overall drawing of the INVERTER.
Please refer to the figure of the drawing for installation and maintenance.



[Figure 5-2 : INVERTER Bottom View]



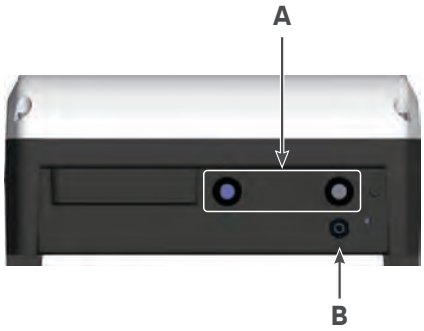
[Figure 5-3 : INVERTER Front inside View]

No.	Part List	
A	Battery Connector	Bottom of the INVERTER
B	DC Disconnection Switch (PV & Battery Isolator)	
C	Battery Communication	
D	PV Connector	
E	Grid & Load Connector	
F	Communication Part	
G	Ethernet Communication	
H	Demand Response Mode (Used in Australia)	
I	Switching Board	Inner of the INVERTER
J	Filter Board	
K	Sub Filter Board	
L	Out Connector Board	
M	Control Board	

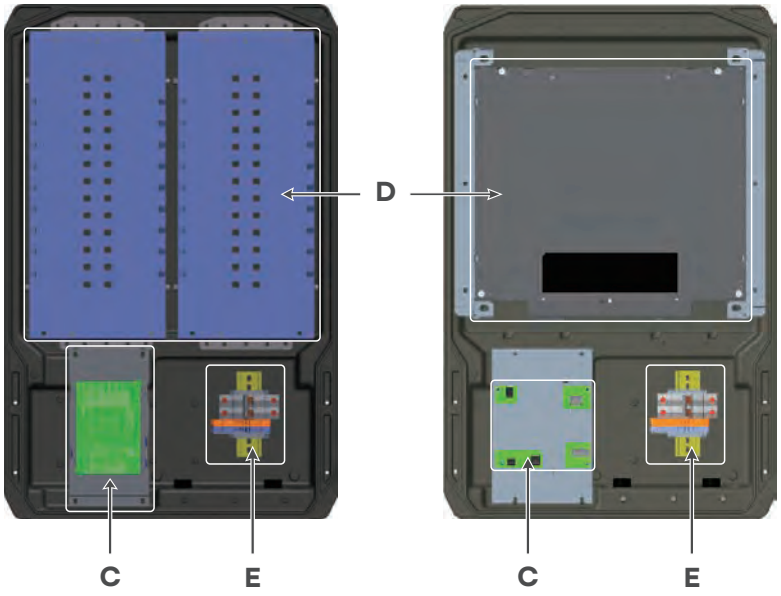
[Table 5-3 : Component Description of INVERTER]

5.1.4.2 Overall Drawing of the Battery

The [Figure 5-4] and [Figure 5-5] shows the overall drawing of the Battery pack.
Please refer to the figure of the drawing for installation and maintenance.



[Figure 5-4 : Battery Bottom View]



[Figure 5-5 : Battery Front inside View]

No.	Part List	
A	Cable Gland	Bottom of the Battery
B	BMS Communication Connector	
C	BMS Board (Made by Samsung SDI)	Inner of the Battery
D	Battery (Made by Samsung SDI)	
E	Terminal and Circuit Breaker	

[Table 5-4 : Component Description of Battery Pack]

5.2 Opening the Front Case Cover

NOTICE

Do not remove the top cover except for special events(A / S).
For normal installation it is not necessary and not allowed to open the upper cover.
Only Q CELLS After Sales is allowed to open or to instruct installer to open in case of necessary service.
The LCD connector and ground are connected to center of top cover.
Be careful when you detach the front cover.
Make sure to connect the connector and ground before reassembling the front cover.

As shown in the [Table 5-5], The Q.HOME+ ESS HYB-G2 front cover consists of a top cover with LCD and LED, and a bottom cover for electrical connection. Do not remove the top cover except for special events (A / S). The Battery pack also has the same method of opening the bottom cover.

Front View

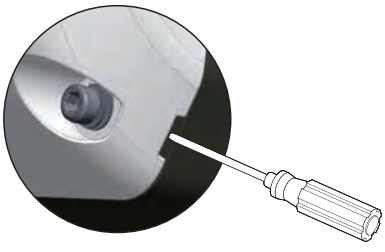
(A), (C) Screw	(B), (D) Screw
L : 75 mm	L : 35 mm

Turn the screws (A ~ F : 6 EA) counterclockwise to disassemble.

Side View

Insert the flat-head screwdriver as shown below and lift it up.

If bottom cover cannot be removed even after removing all screws, the four screws of the top cover needs to be loosen a bit



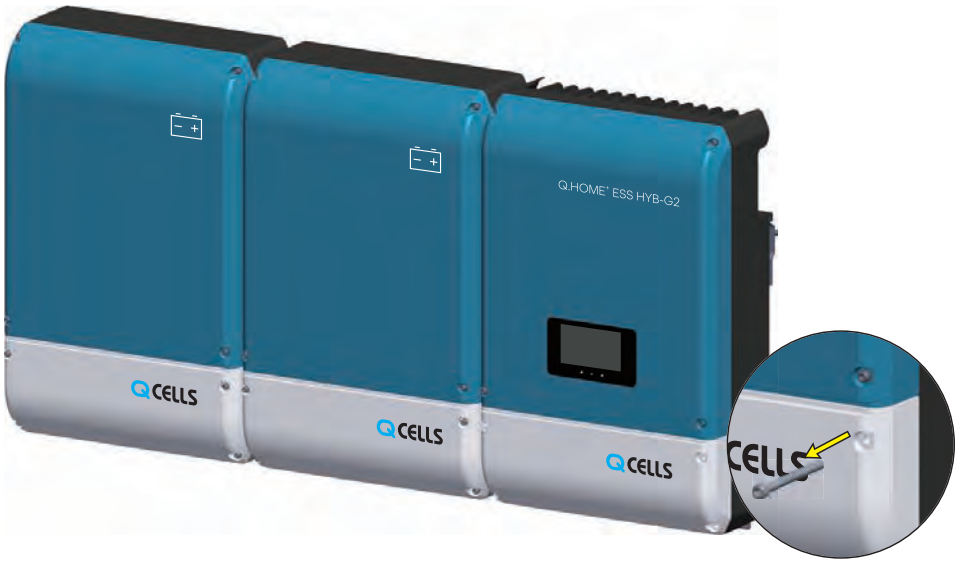
[Table 5-5 : Front Case Open Process]

5.3 Battery Connections

	CAUTION
⚠	• Make sure the AC circuit breaker, PV switch and DC circuit breaker of the Battery are disconnected before starting electrical cable connections. • Battery replacement can only be carried out by qualified personnel. If the Battery needs to be changed, it should be placed with a product which meets the manufacturer's specifications. • Do not mismatch the connection of the electric poles (+) to (-) and (-) to (+) when installing. It may cause electric shock or the product may permanently be damaged. • Incorrect Battery polarity connection will damage the product seriously. This damage is not covered by the warranty. • All other connections should be done before Battery assembly and the Battery interrupter must be off.

You can connect a Battery to this product. The electricity generated from the connected PV array will be stored in the Battery. Before connecting the Battery to this product, install the Battery on the place where the Battery cables are easily accessible to this product.

1. Open the bottom cover of INVERTER and Battery case.



[Figure 5-6 : Outside of Q.HOME+ ESS HYB-G2]

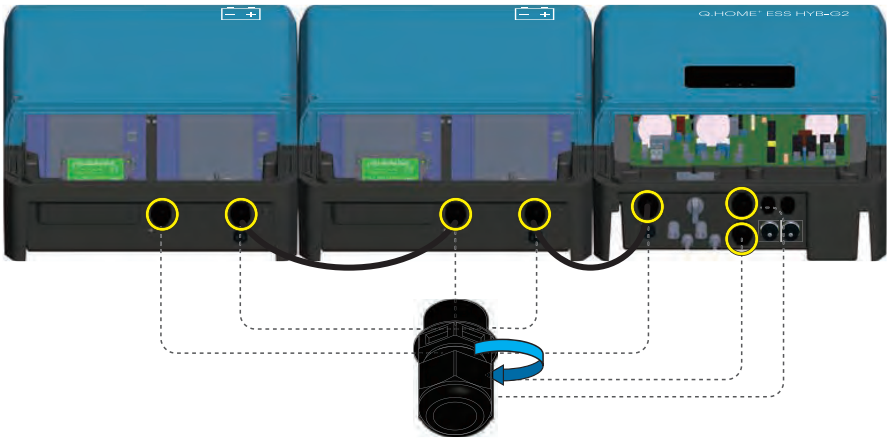
2. Check inner circuit breaker and terminal in Battery case.

[Figure 5-7 : Inside of Q.HOME+ ESS HYB-G2]

3. Connect the (+) and (-) wire (PCS) to the marked terminal (Battery). And then connect the ground terminal.(See Chapter 5.6.1)

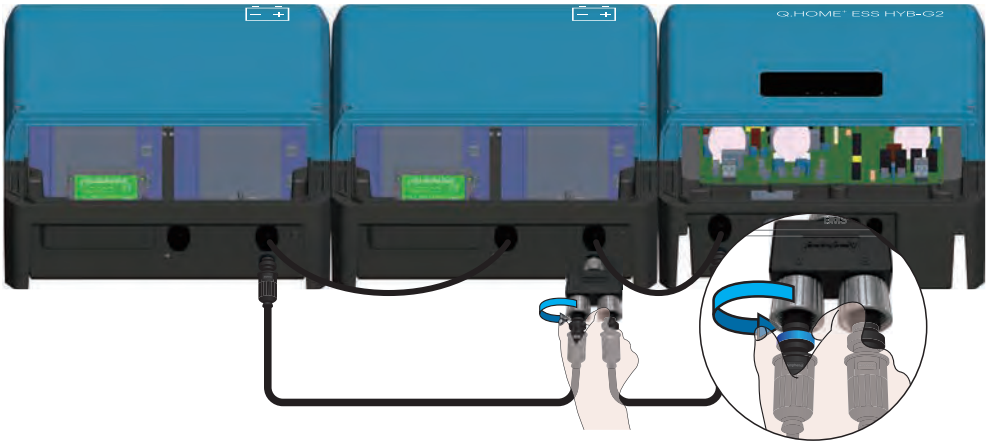
[Figure 5-8 : Battery Pack and INVERTER Connection]

4. Turn the cable gland clockwise to check the tightness.



[Figure 5-9 : Cable Gland of Q.HOME+ ESS HYB-G2]

5. As shown in the [Figure 5-10], connect Battery communication connector is composed of BMS Communication Adaptor and connect from outside. If you use more than one Battery (8kwh or more), use the adaptor (Amphenol) for Battery communication. (EX. If you use 3 Battery, you need 2 adaptor for BMS communication.) When using the adaptor, hold the communication cable and fasten the silver color of the adaptor to anticlockwise.



[Figure 5-10 : BMS Communication Wire Connection]

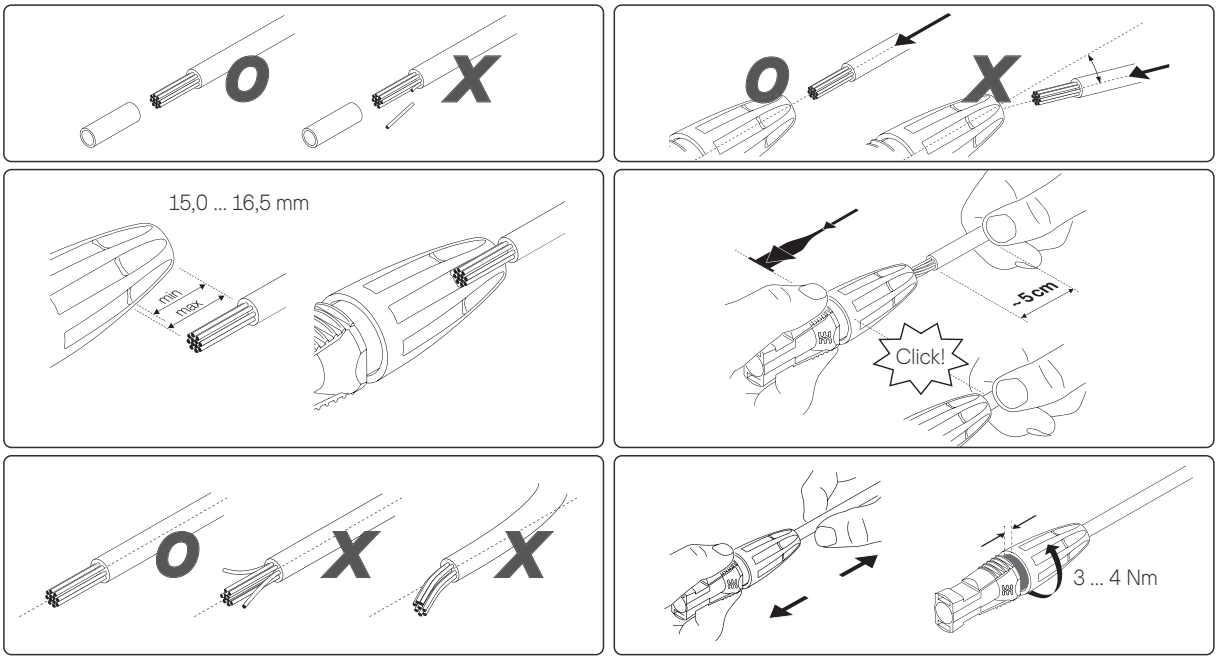
5.4 A Connecting Method of the DC Line from the PV

Refer to the [Figure 5-1] for the PV module connection. The lead wires, coming from the PV modules, are directly connected to the HYB-G2. For the connection to the distribution box, connect each to the terminals of the solar energy of PV1+, PV1-, PV2+, and PV2-. On the other hand, connect the distribution box terminals with the main body terminals (PV1+, PV1-, PV2+, and PV2-) of the Q.HOME+ ESS HYB-G2 in proper order. For the connectors (PV1+, PV1-, PV2+, and PV2-) between the distribution box and the Q.HOME+ ESS HYB-G2 input, the following types of connectors are used. Refer to Chapter 5.1.2 for cable specification.

[Figure 5-11 : PV Connector (Female) and PV Line (Male)]

* Wire connection

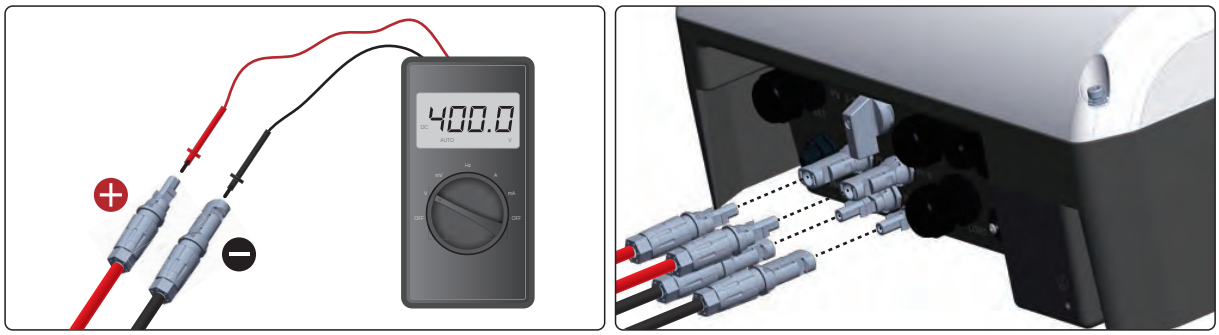
As shown in the [Figure 5-12], Remove the sheathed wire to conform to the connector specification, and then roll the wire in one direction. Be careful not to bend or tangle the wires at this time.
Push the wire in until the connector "Click!" Sounds. When pulling the wire back and forth, the wire should not be disconnected.



[Figure 5-12 : Wire Connection and Disconnection]

Check the cable connection of PV strings for the correct polarity and that the open circuit voltage does not exceed the INVERTER input limit 550 V. If open circuit voltage is higher than 550 V, status of INVERTER is fault.

The Male product is connected to the lead wire coming from the distribution box in the PV side, and the Female part is attached to the Q.HOME+ ESS HYB-G2. The two products are properly docked when connected together.
When inserting or pulling out the PV connector (MC4 Type), be sure to turn off the DC disconnection switch.



[Figure 5-13 : PV Connector Connection (MC4 Type Connector Connection)]

In the Q.HOME+ ESS HYB-G2, the AC power input/output ports are plug type. Each cord shall be in 4.0mm² (12AWG) ~ 6.0mm² (10AWG) range, and the outer diameter of the cable shall be in 5.5mm ~ 7.5mm range. The PE terminal is connected from the inside of the product to the frame ground of the enclosure.

5.5 Circuit Breaker

5.5.1 AC Circuit Breaker and DC Disconnect Switch

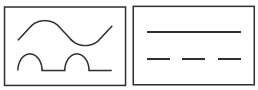
The circuit breaker populated on the distribution board varies depending on the installer.
Follow the installation standards to install a circuit breaker satisfying the voltage, the current specification of the Grid, PV and the Battery. Refer to Chapter 5.1.2 for cable specification.

	Standard	Short circuit current rating
AC circuit breaker	230 Vac / 32 A	10 kA minimum
DC disconnect switch	650 Vdc / 27 A or more	-

[Table 5-6 : Circuit breaker and DC Disconnection Switch]

5.5.2 RCD (residual current device) Leakage Circuit Breaker

This product can cause a DC current in the external protective earthling conductor. Where a residual current-operated protective (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, RCD should be type B. Type A or type AC RCD would only be acceptable if the RCMU were set to trip at DC 6mA or less.
The RCD must have a maximum sensitivity of 30 mA

Item		Description
	Type B	Detecting AC residual currents and pulsating DC residual currents of mains frequency, as well as smooth DC residual currents and AC residual currents ≠ mains frequency

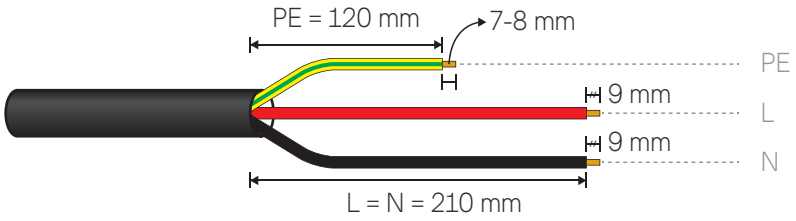
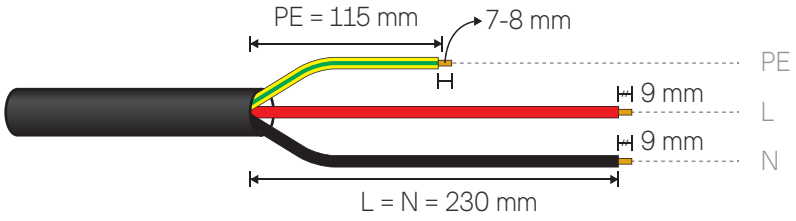
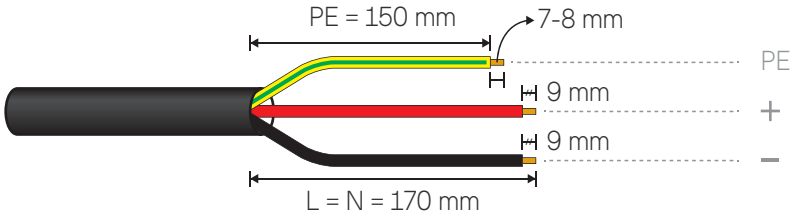
[Table 5-7 : RCD Leakage circuit breaker description]

5.6 Connection Method between Grid and Load

	CAUTION
⚠	Any failure of the INVERTER when it is not connected to ground through the appropriate terminal is not covered by the warranty.

5.6.1 Feature and Size of Cable

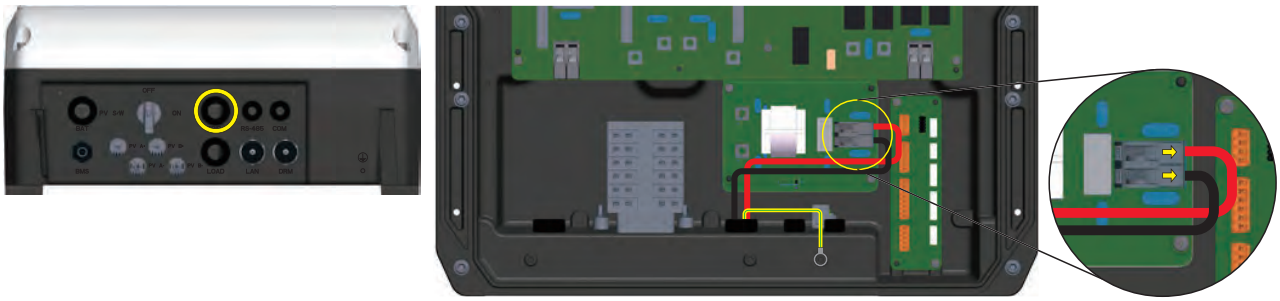
The following lists the insulation strip length details for each conductor cross section.
Refer to Chapter 5.1.2 for cable specification. The ground wire should be grounded by crimping the ring terminal. Refer to Chapter 2.4.5 for work on ring terminal.

Type	Strip Length
Grid	
Load	
Battery	

[Table 5-8 : Insulation Strip Lengths]

5.6.2 Grid Connection Method

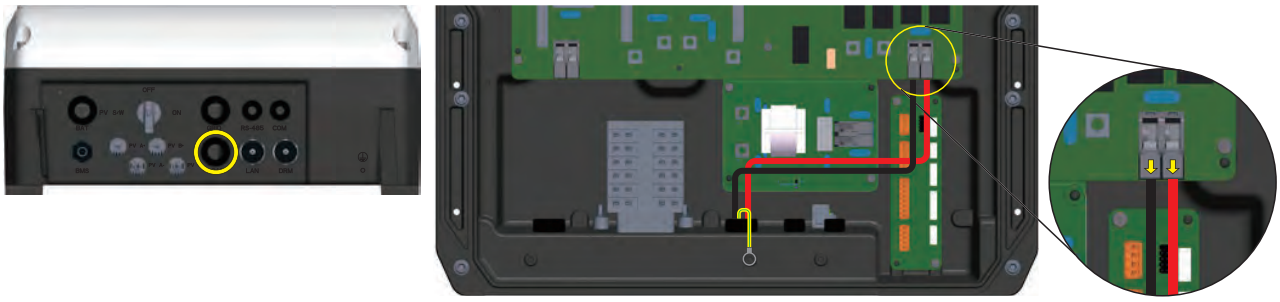
To connect the Grid of the INVERTER, you need 3 connections :
Ground, Neutral and Phase. In any case, connection of the INVERTER to ground is mandatory.
Insert the Grid cable into the INVERTER through the AC cable gland. Strip 9 mm of cable from the cable to connect to the Grid. Connect the Grid cable to the Sub Filter Board CN1. And then raise the handle of the connector, insert the cable, and then lower the handle of the connector to secure the Grid cable.
Be sure to use the correct size cable and be cables are not loose.



[Figure 5-14 : Power Cable Connection to the AC Connector]

5.6.3 Load Connection Method

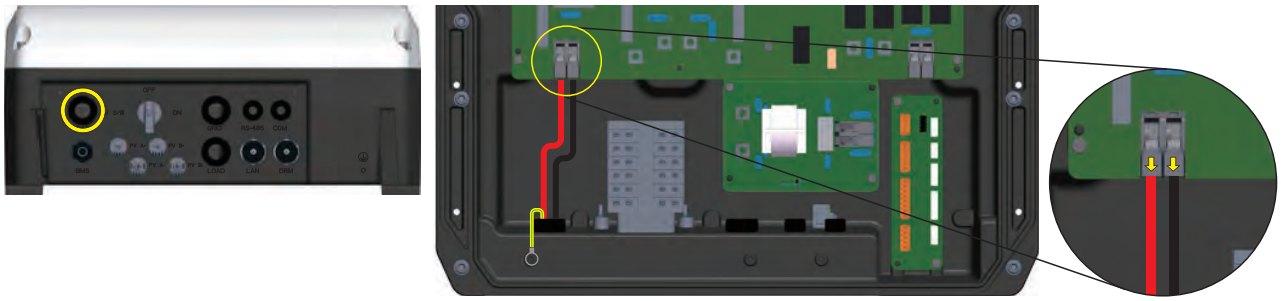
To connect the Load of the INVERTER, you need 3 connections :
Ground, Neutral and Phase. In any case, connection of the INVERTER to ground is mandatory.
To connect the Load output, insert the cable into the INVERTER through the Load cable gland.
Strip 9 mm of cable from the cable to connect to Load. Connect the Load cable to the Filter Board CN603.
After lifting the handle of connector, insert the cable and lower the handle of the connector to secure the Load cable. Be sure to use the correct size cable and be cables are not loose.



[Figure 5-15 : Power Cable Connection to the Load Connector]

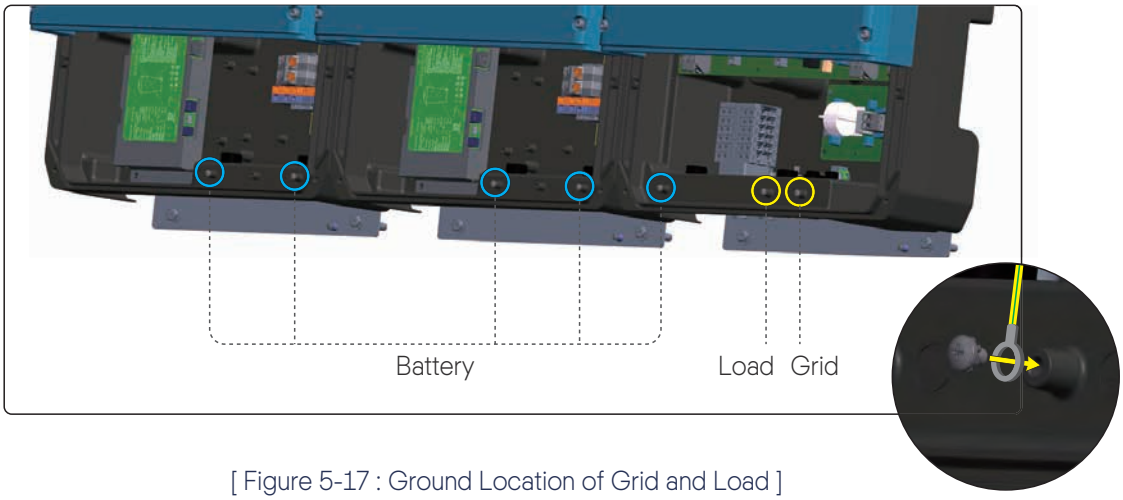
5.6.4 Battery Connection Method

To connect the Battery, you need 3 connections :
Ground, (+) and (-). In any case, connection of the INVERTER to ground is mandatory.
To connect the Battery, insert the cable into the INVERTER through the Battery cable gland.
Strip 9 mm of cable from the cable to connect to Load. Connect the Battery cable to the Filter Board CN401.
After lifting the handle of connector, insert the cable and lower the handle of the connector to secure the Battery cable. Be sure to use the correct size cable and be cables are not loose.



[Figure 5-16 : Power Cable Connection to the Load Connector]

As shown in [Figure 5-17], use the ring terminal to connect the ground wire to the correct location.



[Figure 5-17 : Ground Location of Grid and Load]

6. Change the switch on.

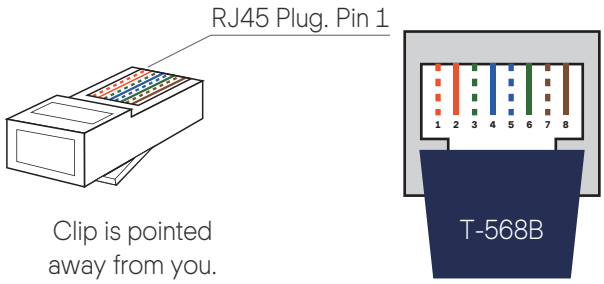
[Figure 5-18 : Battery Pack Switch]

5.7 A Connecting Method of DRM connection (Only for Australia)

The INVERTER supports the DRM (Demand Response Mode) function as specified in AS/NZS 4777.2:2020. The terminal block inside the INVERTER is used for connecting to a demand response enabling device (DRED). The DRED asserts DRMs. The INVERTER detects and initiates a response to all supported demand response commands within 2 s. The following table lists the DRMs supported by the INVERTER.
(DRM 3 and DRM7 will supply or sink reactive power.)

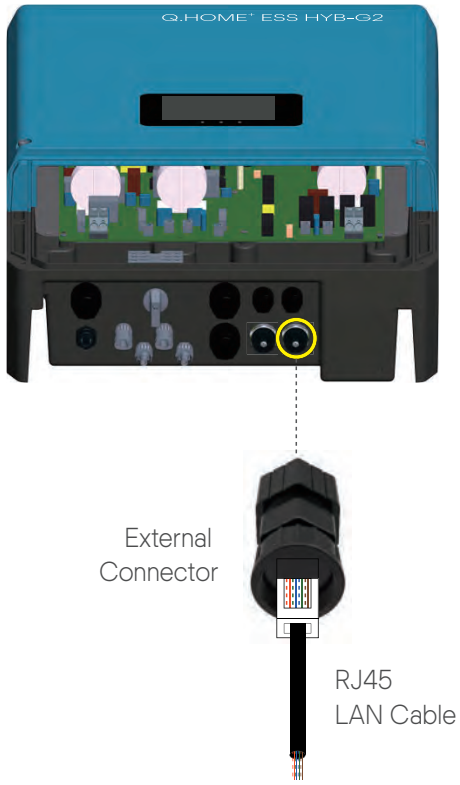
Mode	Explanation
DRM 0	The INVERTER is in the state of “Key-stop.”
DRM 1	The import power from the grid is 0.
DRM 2	The import power from the grid is no more than 50 % of the rated power.
DRM 3	The import power from the grid is no more than 75 % of the rated power.
DRM 4	The import power from the grid is no more than 100 % of the rated power, but subject to the constrains from other active DRMs.
DRM 5	The export power from the grid is 0.
DRM 6	The export power from the grid is no more than 50 % of the rated power.
DRM 7	The export power from the grid is no more than 75 % of the rated power.
DRM 8	The export power from the grid is no more than 100 % of the rated power, but subject to the constrains from other active DRMs.

[Table 5-9 : DRMs Supported by the INVERTER]



Corresponding Relationship Between Cables and Pins (568B)	
Pin. 1 : White-orange	: DRM 1/5
Pin. 2 : Orange	: DRM 2/6
Pin. 3 : White-green	: DRM 3/7
Pin. 4 : Blue	: DRM 4/8
Pin. 5 : White-blue	: RefGen
Pin. 6 : Green	: Com.DRM 0
Pin. 7 : White-brown	: -
Pin. 8 : Brown	: -

* The cable for connecting to the DRM is not included in the delivery.
* The cable for DRM connecting must be made as described in chapter 6.

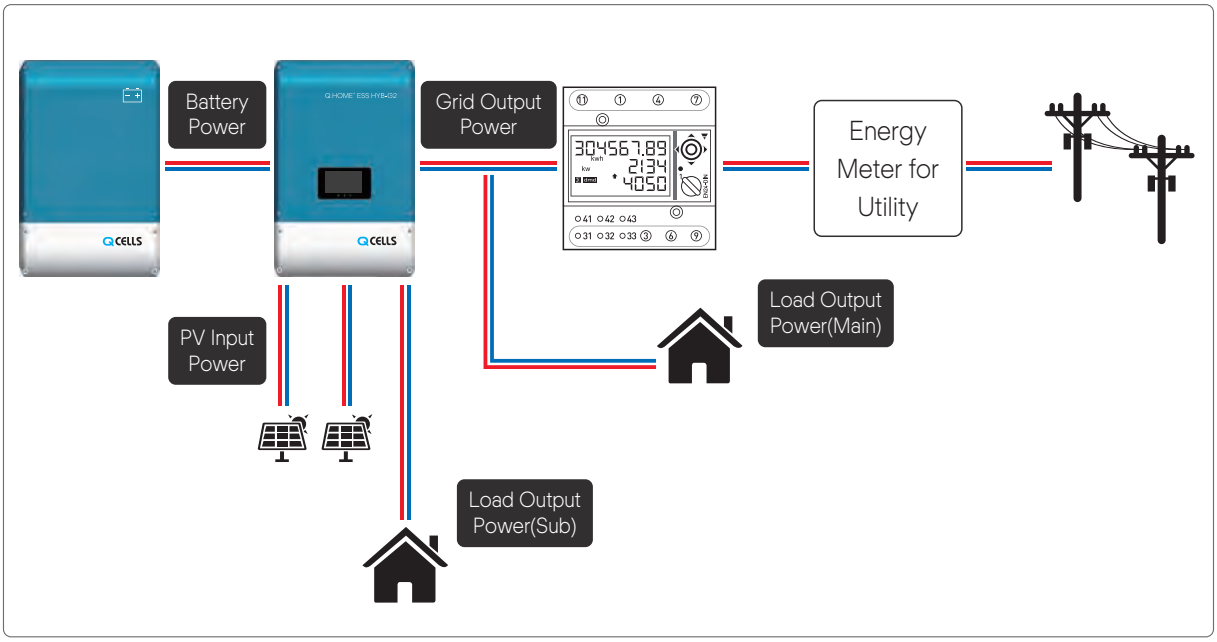


[Figure 5-19 : DRM Connection Method]

5.8 An Installation Method of Energy Meter Electrical Connection

The electrical installation method of the digital energy meter (energy meter) must comply with installation method provided by the digital energy meter manufacturer. However, the digital energy meter must be selected.

The [Figure 5-15] shows the electrical cable connection and the communication lines of the digital energy meter. Refer to the [Figure 5-20] and the communication description in Chapter 6 to install the digital energy meter.



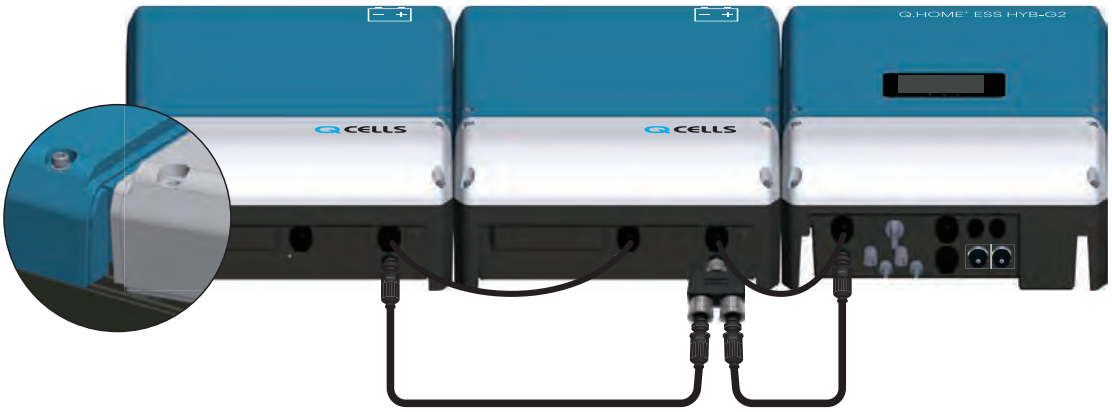
[Figure 5-20 : Electric Cable Connection for Energy Meter Installation]

The end system of the used lead wiring may be different with the energy meter chosen. Therefore, refer to the energy meter manual.

5.9 Closing the Front Case Cover

	NOTICE
⚠	Make sure that connection between connector and ground match correctly, before reassembling front lower cover.

1. Close the bottom cover of INVERTER and Battery case.

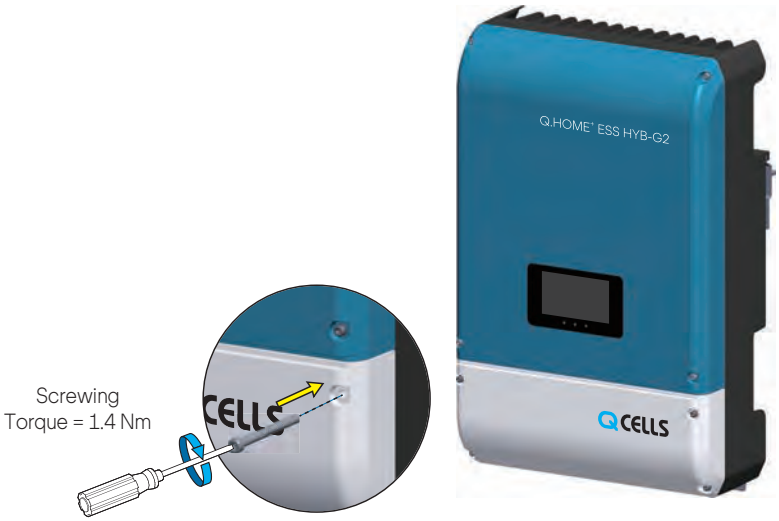


[Figure 5-21 : Outside of INVERTER and Battery Case]

2. Hold the front lower cover with both hands. As shown in the [Figure 5-13], slide the bottom cover at an angle and connect it to the top cover.

[Figure 5-22 : Front Cover Assembly Process 1]

3. As shown in the [Figure 5-23], Use a hexagon wrench (size: M4) to fasten the bolt clockwise.



[Figure 5-23 : Front Cover Assembly Process 2]

6. Communication Connection

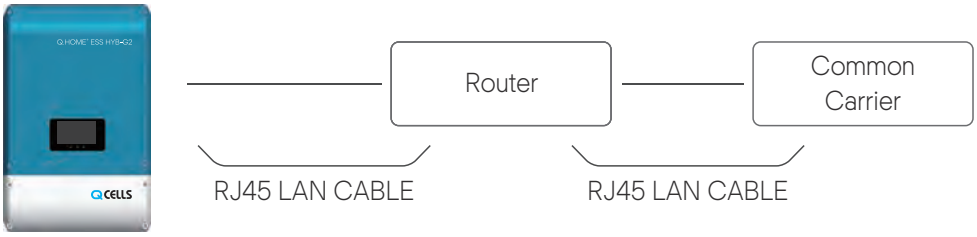
6.1 Internet Connection

6.1.1 Components

- Wired Router (not provided in the product package)
- RJ45 general LAN Cable (not provided in the product package, the length of the cable must be less than 10 m.)

6.1.2 Connection Block Diagram

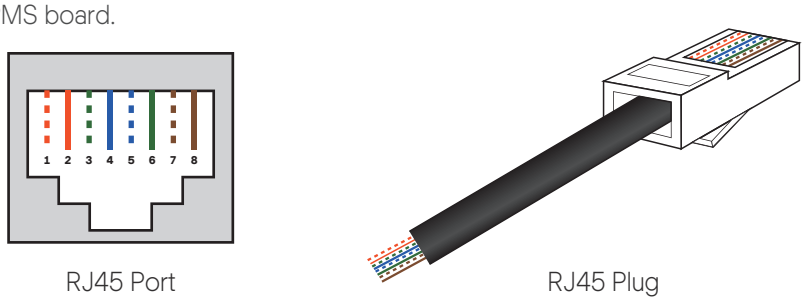
- LAN (Common carrier → Router) → ESS



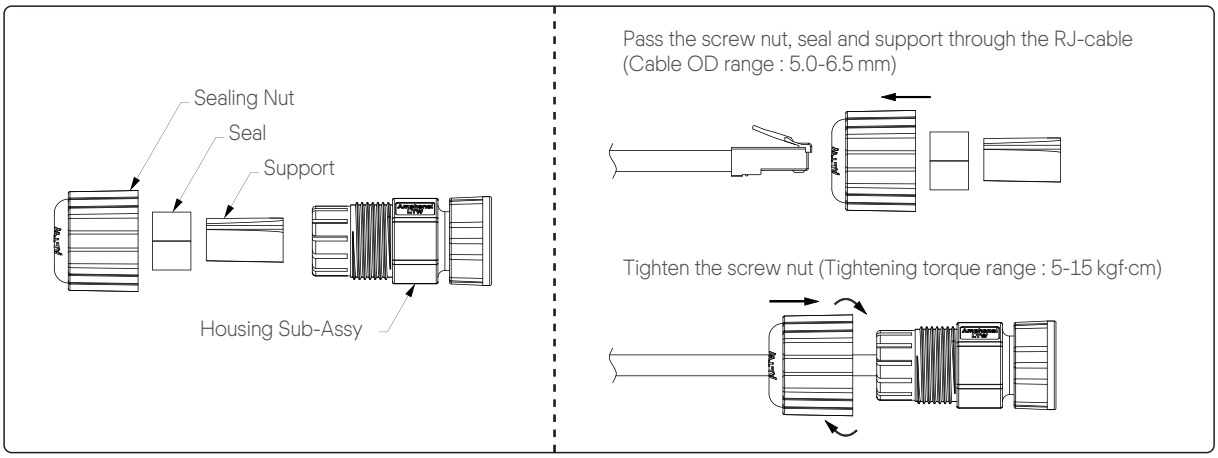
[Figure 6-1 : Internet Connection]

6.1.3 Connection Method

Plug the RJ45 LAN Cable between the LAN terminal and the Router. Use the Ethernet crimper to crimp the cable and connect the cable to RJ45 plug. The RJ45 cable is responsible for communication between the web and the PMS board.



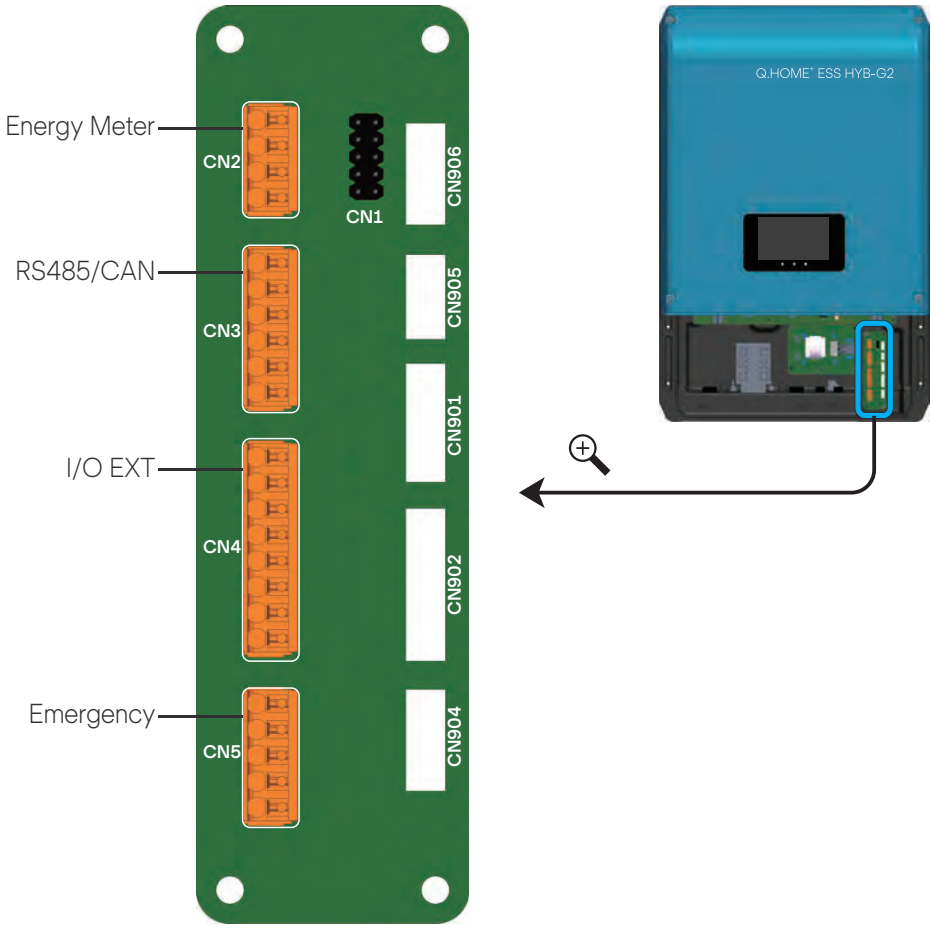
[Figure 6-2 : RJ45 Cable]



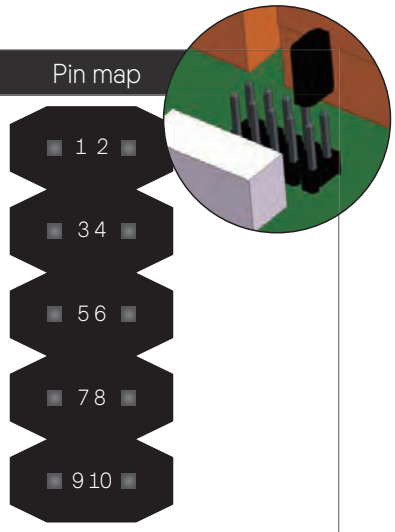
[Figure 6-3 : RJ45 External Connector Assembly]

6.2 The Communication Terminal

- Energy meter : Connect to RS-485 Energy Meter, Out Connector Board CN2.
- Short bar is connected to CN1. Refer to Chapter 7.3.



[Figure 6-4 : Communication Terminal]

Short bar location	Description	Pin map
1, 2	You can connect to the System Install Manager (SIM) and set IP.	
3, 4	Using this pins is permitted only to the qualified personnel.	
5, 6	Using this pins is permitted only to the qualified personnel.	
7, 8	Using this pins is permitted only to the qualified personnel.	
9, 10	Default	

[Table 6-1 : Description of Short Bar Location]

6.3 Energy Meter Connection

6.3.1 RS-485 Interface

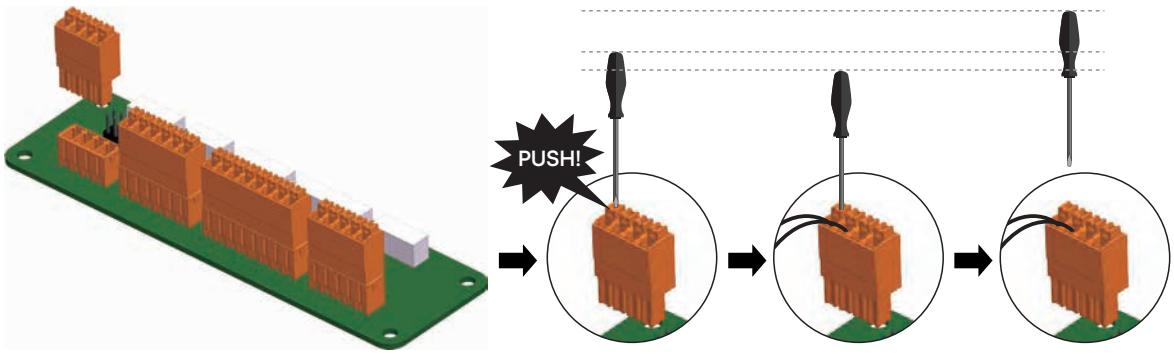
6.3.1.1 Components

- RS-485 Meter
  - The Energy Meter uses RS-485 Interface for communication.

- Connection line (Not provided in the product package)
  - It should be applied to a twisted-pair type.

- Cable length limit
  - The RS-485 meter communication cable must be used within 100 m.

6.3.1.2 Connection terminal



[Figure 6-5 : Out Connector Board Wire Connection Method]

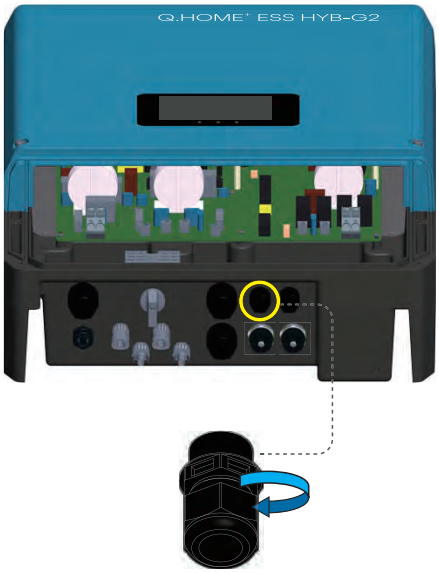
Make sure that the housing and connector are connected. As shown in the [Figure 6-5], separate housing from connector. And press the lock with a flat-head screwdriver to connect the communication cable. The RS-485 meter communication cable must be used within 100m.

6.3.2 Connection Energy Meter

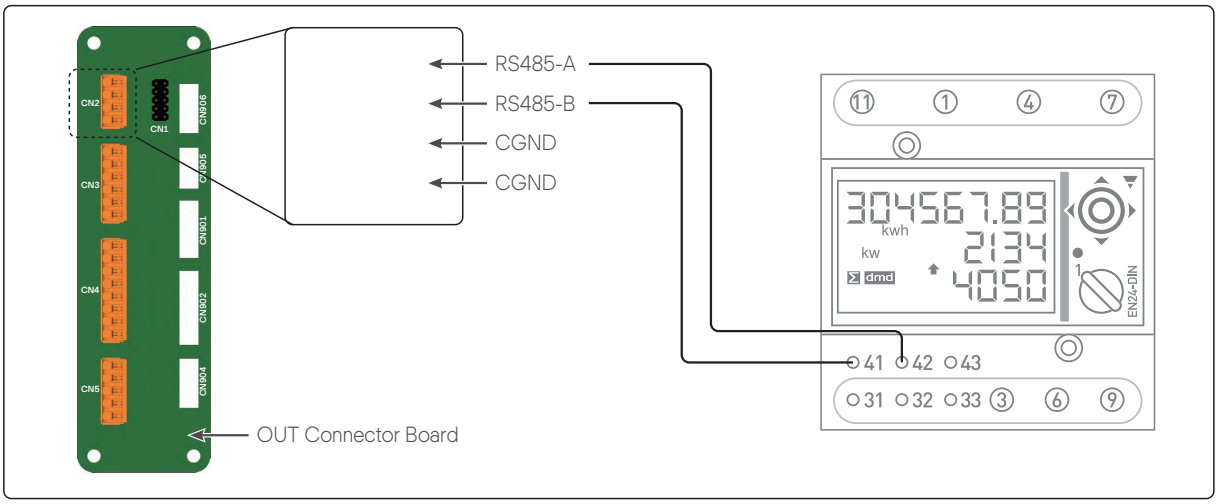
Pass the communication cable through the cable gland and tighten the cable gland. Connect the energy meter to the INVERTER as shown in the [Table 6-2].

INVERTER	Energy Meter
RS485-A	42
RS485-B	41

[Table 6-2 : Recommended Meter List]



[Figure 6-6 : Energy Meter Connection Method]



[Figure 6-7 : Energy Meter Connection Method]

6.4 Recommended Energy Meter List

No.	Company	Model	Interface	Direction
1	CARLO GAVAZZI	EM24-DIN.AV9.3.X.IS.X	RS-485	Bi-direction
2	CARLO GAVAZZI	EM112-DIN.AV0.X.S1.X	RS-485	Bi-direction
3	Q CELLS	Q.HOME Manager	RS-485	Bi-direction

[Table 6-3 : Recommended Meter List]

7. Entering Initial Installation Information

You can use the following procedure to enter the initial installation information and to monitor the operational information of this system appropriately on server.

7.1 Preparations for installer

- A laptop or a smart phone is required.

7.2 Overview of initial information input stages

- Connect PC to ESS → Input local settings → Connect to web page → Input webpage settings

7.3 PC Connection and Local Settings

7.3.1 Overview of PC connection stages

7.3.1.1 Direct connection

This describes how to establish direct connection from installer's laptop ("laptop") to Q.HOME+ ESS HYB-G2 ("ESS").

- Turn off system → Insert short bar on Out connector board ("board"), now board has static IP address → Connect LAN cable from laptop to board → Turn on system → Connect laptop to board via internet browser → Input settings → Turn off system → Remove short bar from pin → Turn on system.

7.3.1.2 Network connection

This describes how to establish connection from laptop to ESS using existing network.

- Check IP address from LDC screen on ESS, ESS has DHCP IP address in default → Connect LAN cable from laptop to network switch or hub → Connect laptop to board via internet browser → Input settings

7.3.2 TCP/IP connection

7.3.2.1 LAN Cable Specification

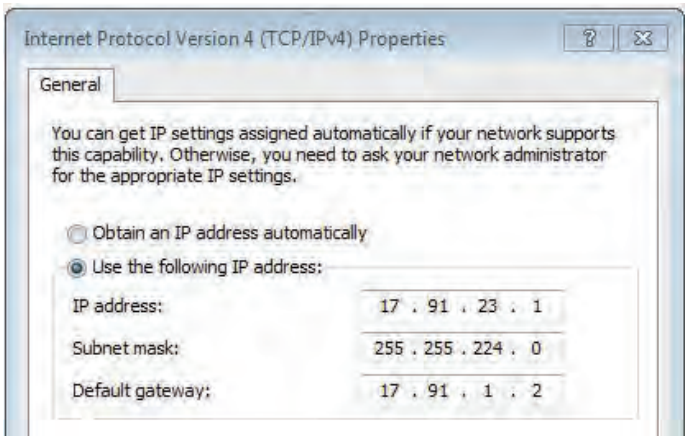
- Ethernet cable: UTP CAT.5E
- RJ45 Termination: Direct T568B-T568B

7.3.2.2 IP settings

In order to establish connection between laptop and ESS, change TCP/IP settings on the laptop as shown below :

- Laptop → [Control panel → Network and Sharing Center → Change adapter settings → Local Area Connector → Properties → Internet Protocol Version 4 (TCP/Ipv4)]

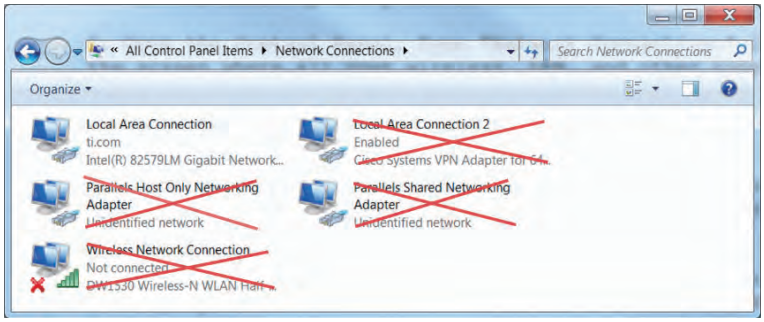
IP address: 17.91.23.1
Subnet mask: 255.255.224.0
Default gateway: 17.91.1.2



[Figure 7-1 : Setting Laptop IP]

CAUTION

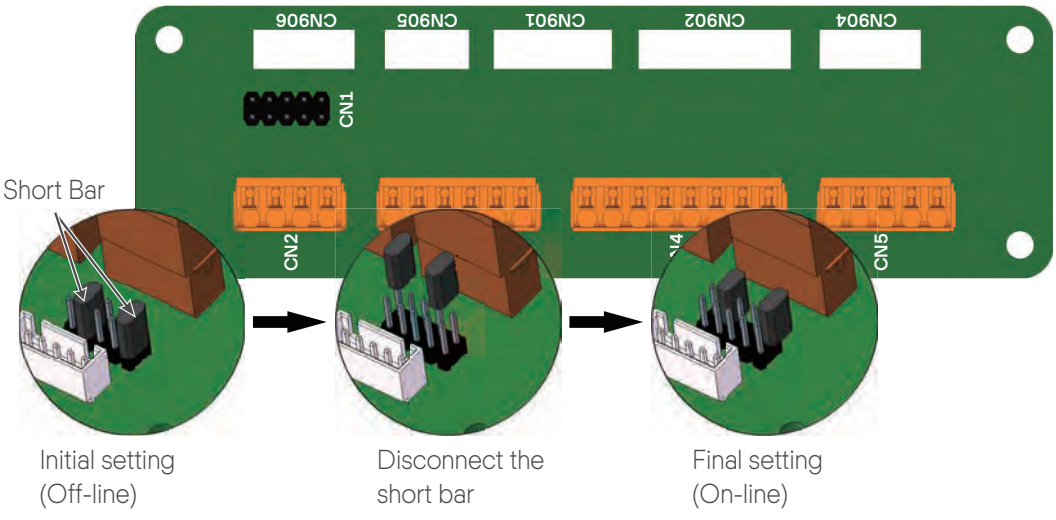
- Turn off Wifi.
- Only turn on Local Area Connection.



7.3.3 SIM (System Install Manager) connection

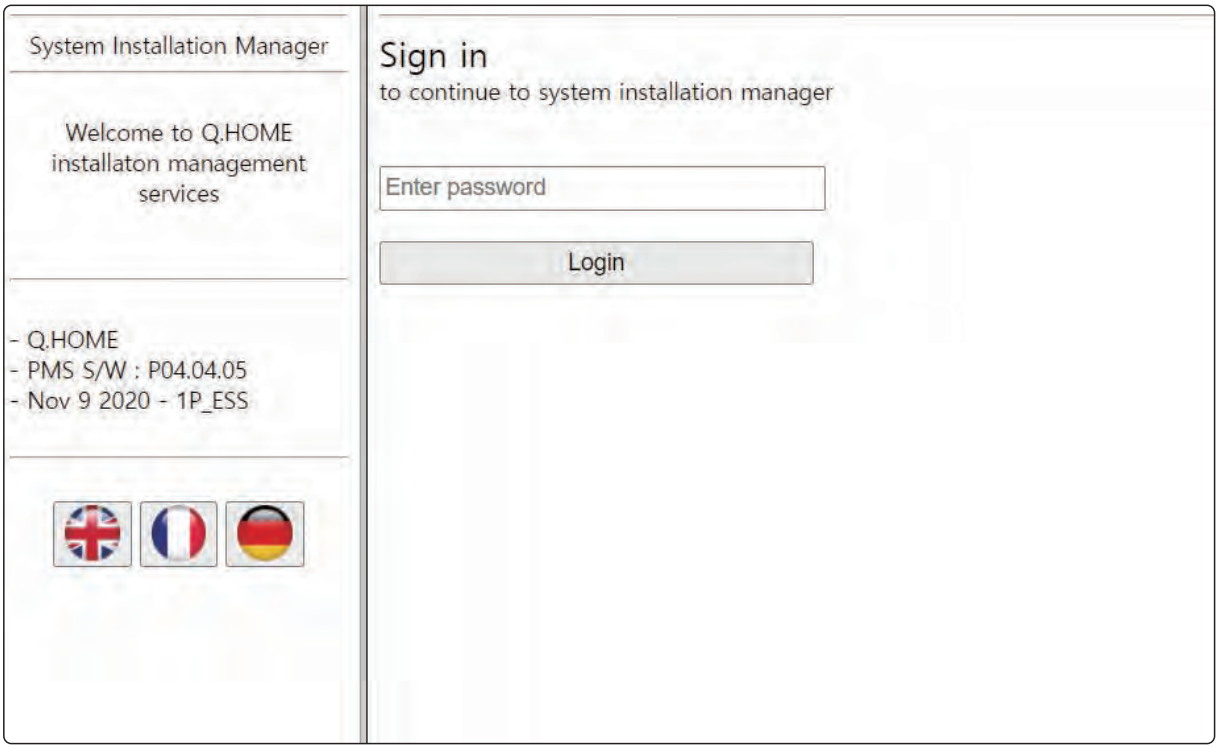
7.3.3.1 Direct connection

1. Confirm that power is off.
2. Connect two short bars to pin 1-2 and 7-8 on Out Connector Board as shown in the [Figure 7-2].
   It makes Control Board to have static IP address so that you can access to System Install Manager (SIM) Page.



[Figure 7-2 : Connecting Short Bar]

3. Connect a LAN cable to laptop and ESS.
4. Turn on AC circuit breaker at grid side, turn PV switch to ON position.
5. On the laptop, open an internet browser, enter http://17.91.23.196:8000 in address bar to access SIM page. If you do not know the password, please contact your supplier.
   Refer to Chapter 13 for contact information.



[Figure 7-3 : Initial Setup Page]

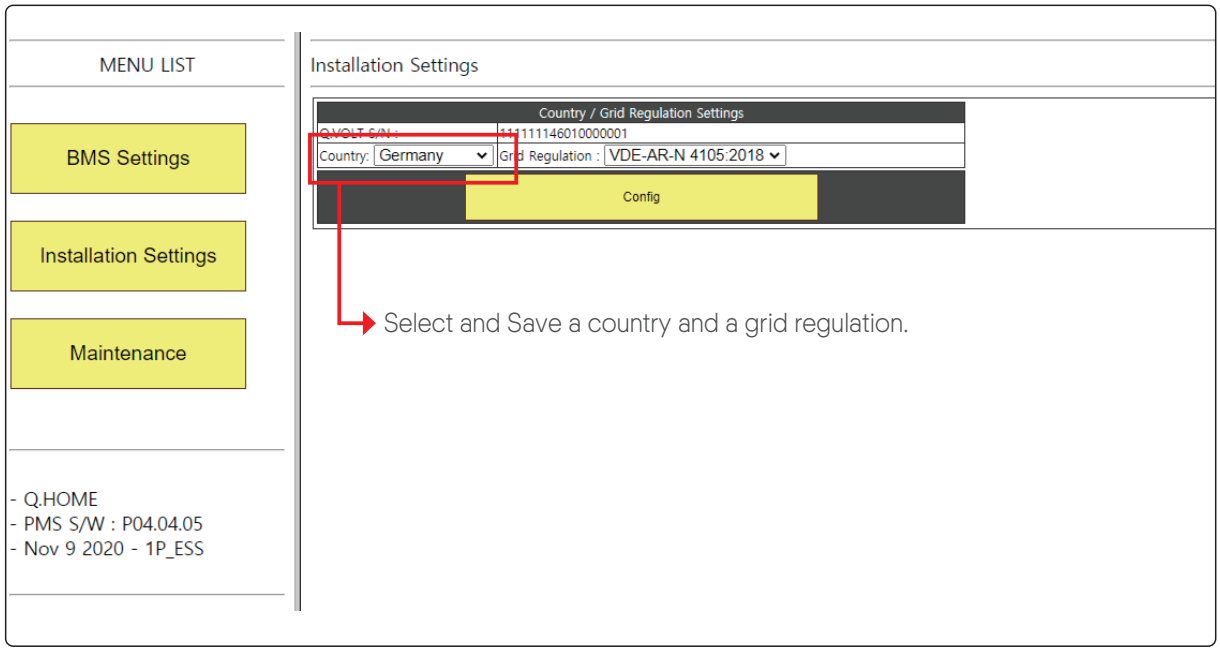
6. Input settings following steps after 7.3
7. Turn PV switch to OFF position, Turn off AC circuit breaker at grid side.
8. Remove short bars from board.
9. Disconnect LAN cable from laptop, connect to internet.
10. Turn on AC circuit breaker at grid side, turn PV switch to ON positon

7.3.3.2 Network connection

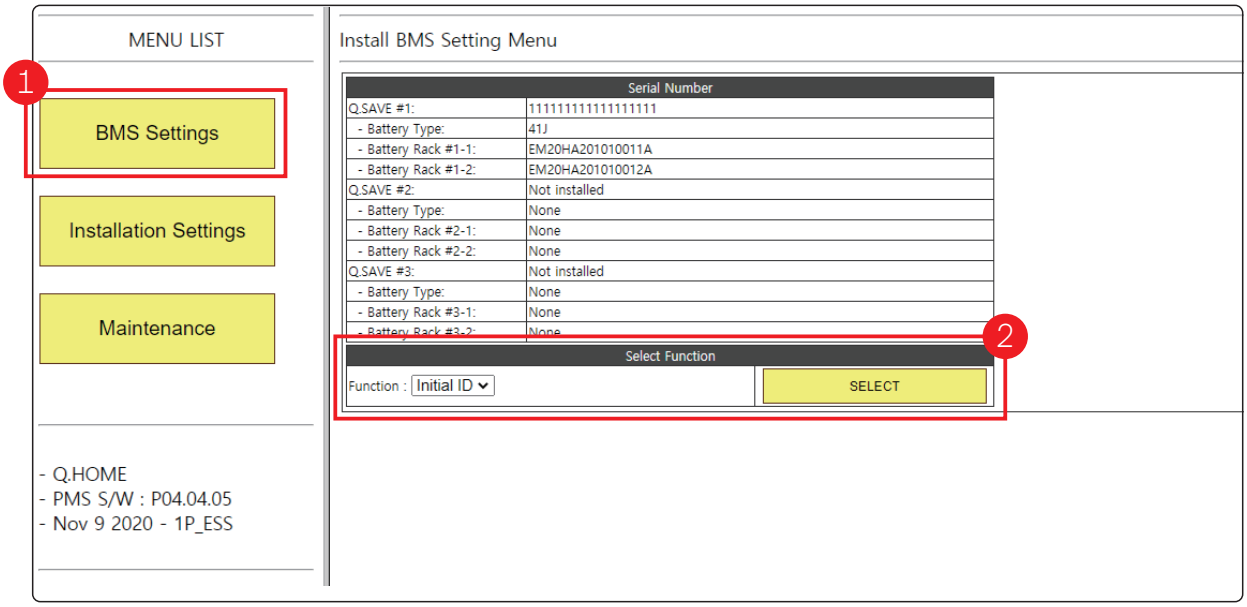
1. Turn on AC circuit breaker at grid side, turn PV switch to ON position
2. Connect LAN cable to ESS and existing internet network (”network”).
3. On the ESS LCD screen, check IP address.
4. On the laptop, open an internet browser, enter http://IP_Address:8000 in address bar to access SIM page (For instance, if IP address is 192.168.12.34, than enter http://192.168.12.34:8000).
   If you do not know the password, please contact your supplier. Refer to Chapter 13 for contact information.
5. Input settings following steps after 7.3.

7.3.4 SIM(System Install Manager) Battery Installing

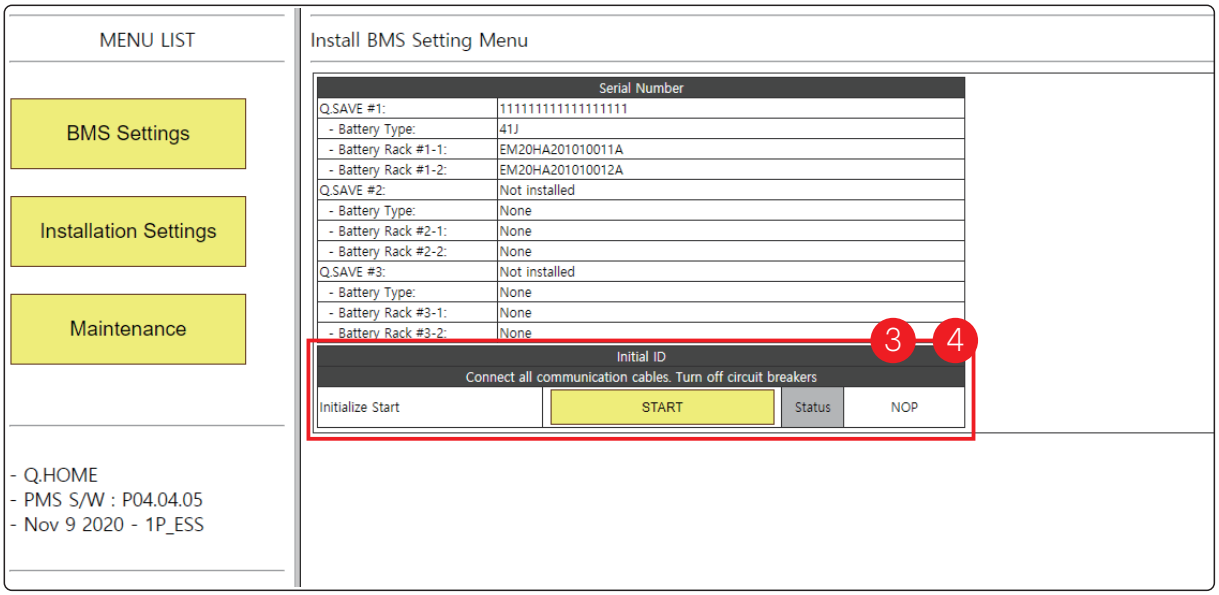
7.3.4.1 Main Page



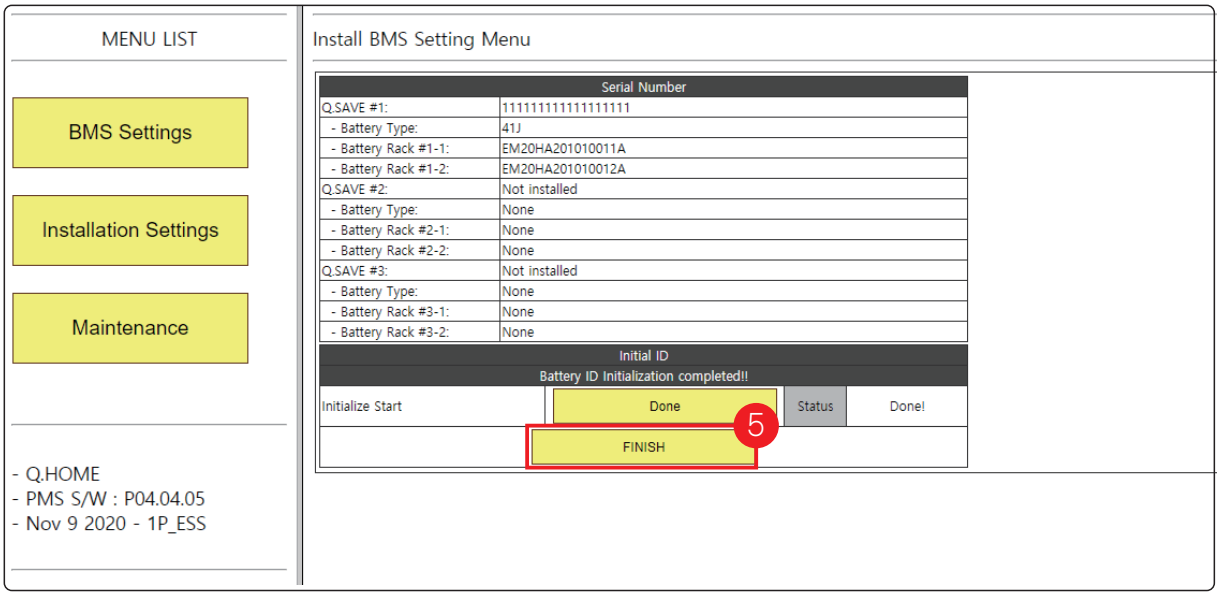
7.3.4.2 Battery Install - Initialize



Step 1) Click here.
Step 2) Select Initial ID function and click SELECT button.

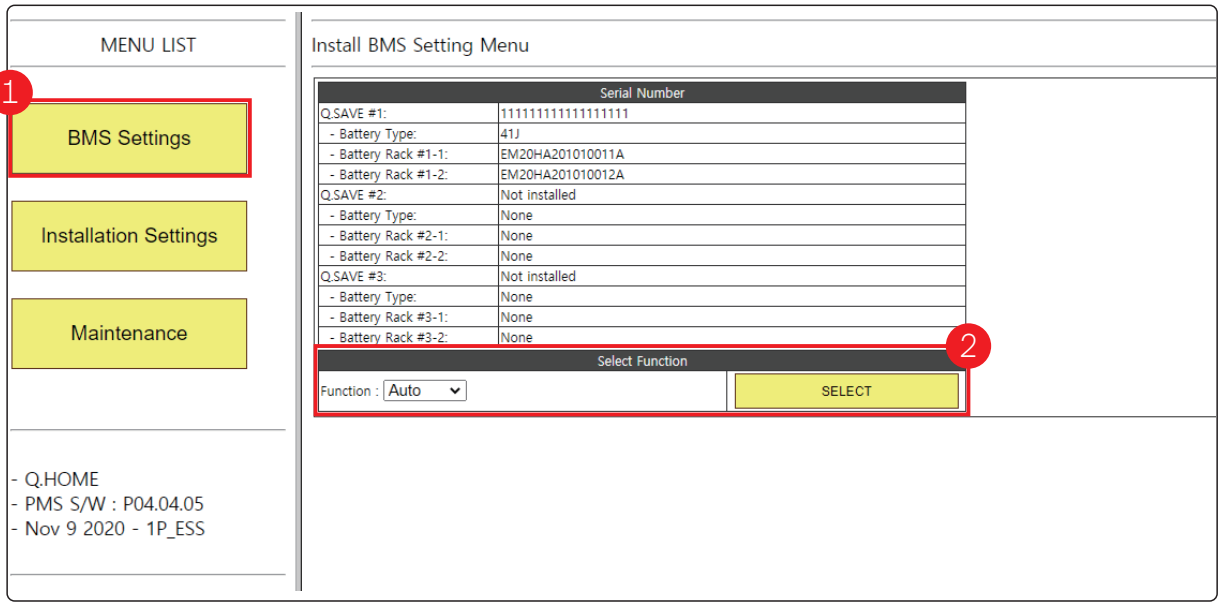


Step 3) Connect the Communication Cable of all the Batteries you want to install.
Step 4) Then click the START button.

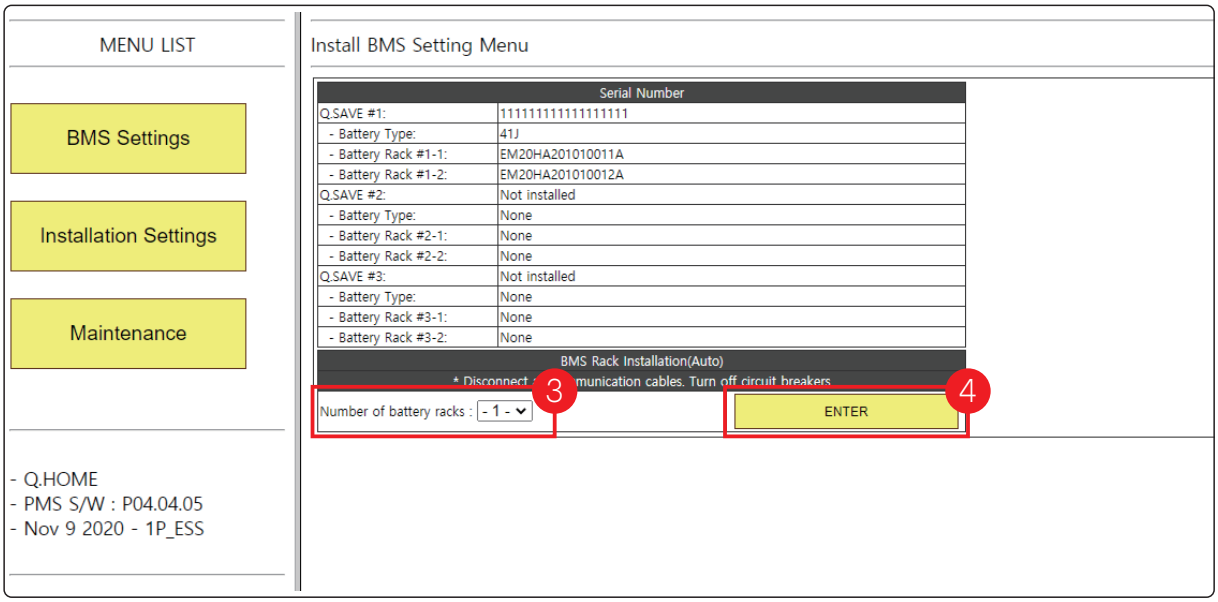


Step 5) If it completes normally, the same screen appears. If there is a problem return to “Step 1”.
Then click the FINISH button to complete Initialize.

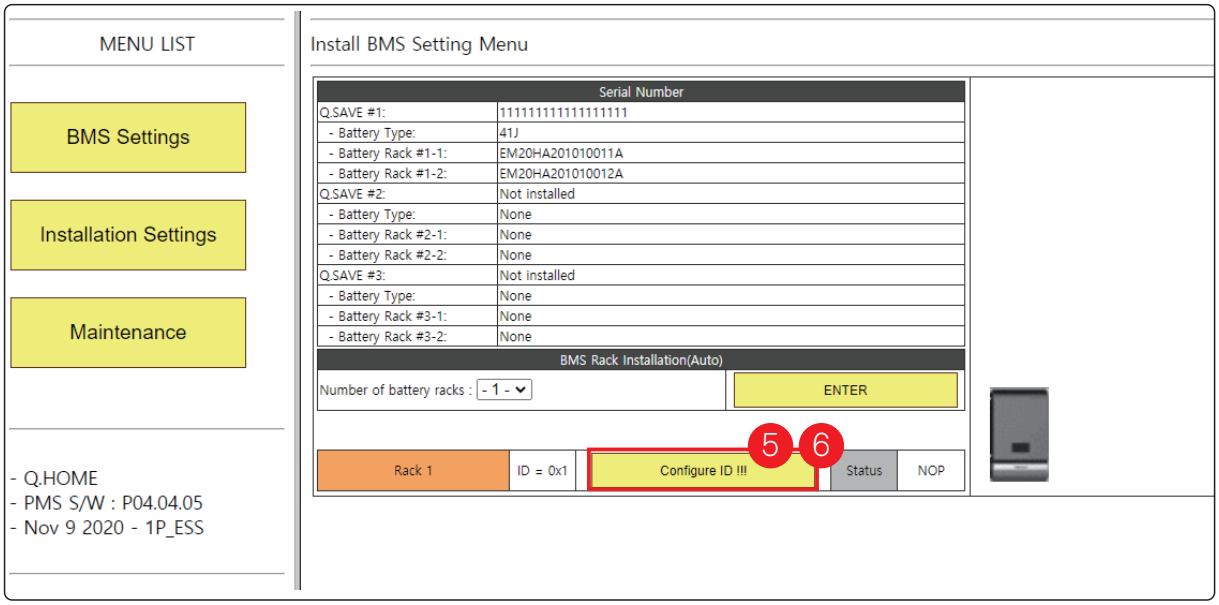
7.3.4.3 Battery installation process.



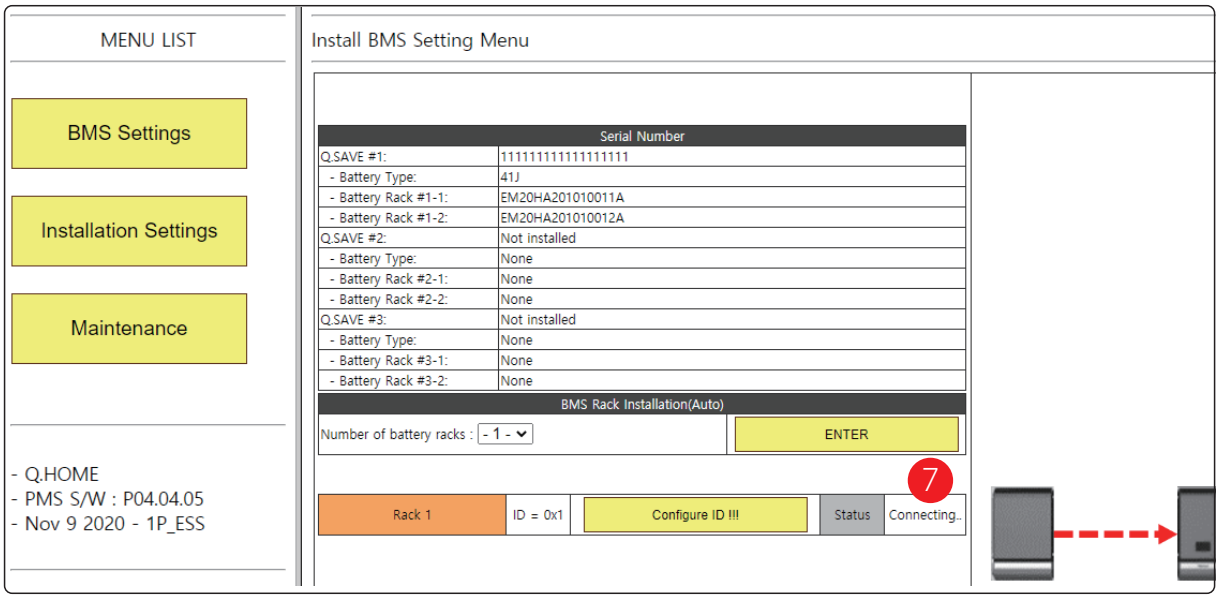
Step 1) Click here.
Step 2) Select Auto function and click SELECT button.



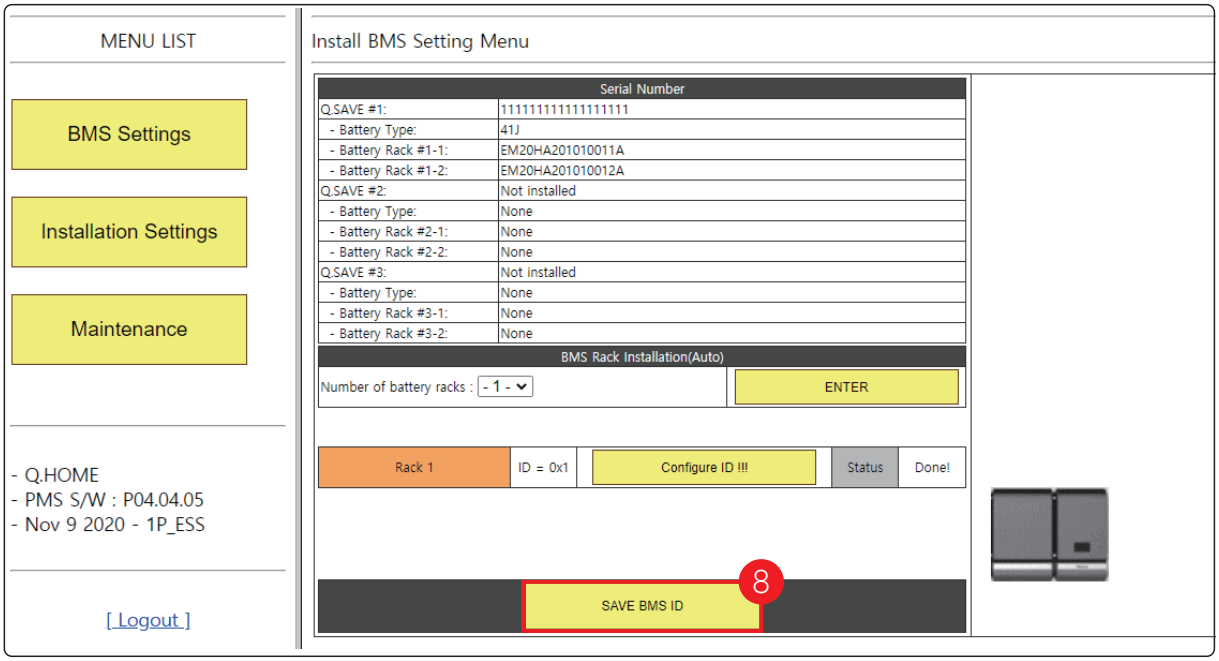
Step 3) Select the number of batteries you want to install.
Step 4) Click the ENTER button.



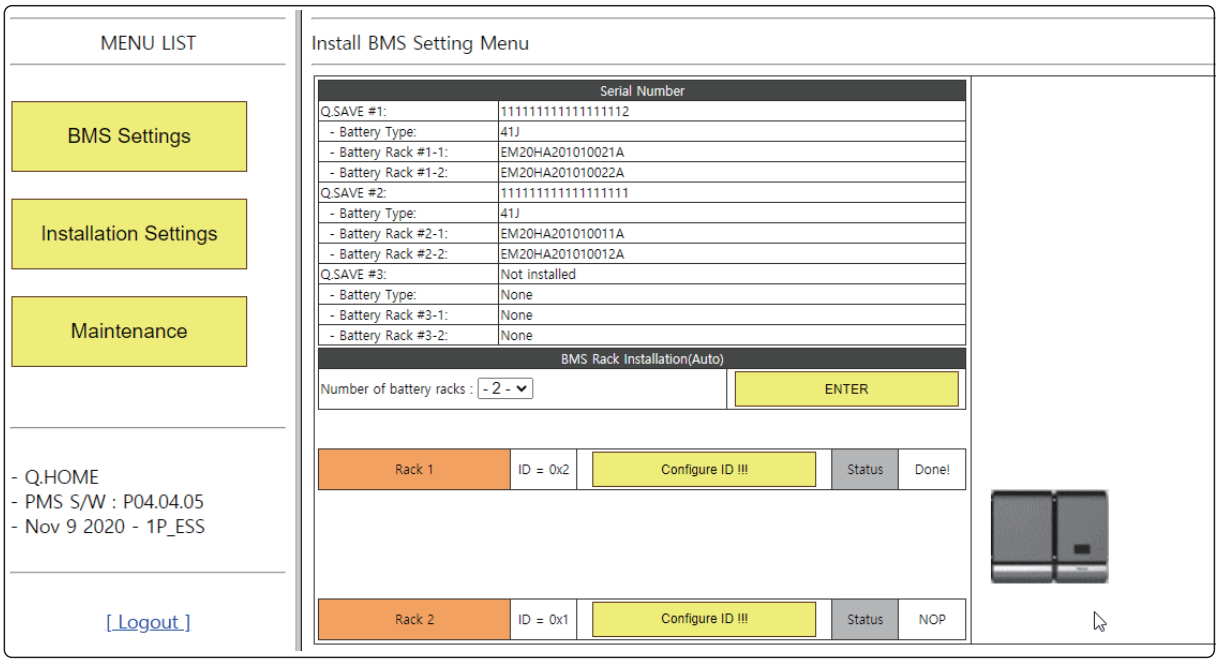
Step 5) Connect the Communication Cable of the first Battery you want to install.
Step 6) Then click the 'Configure ID !!!' button.



Step 7) Wait until the battery connected the communication Cable is installed.



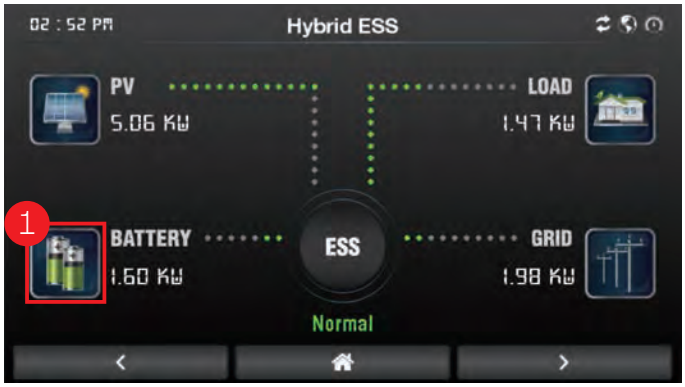
Step 8) When the installation is completed for the desired Number of batteries, 'SAVE BMS ID' button will Appear as below.
Then click the 'SAVE BMS ID' button to complete The installation.



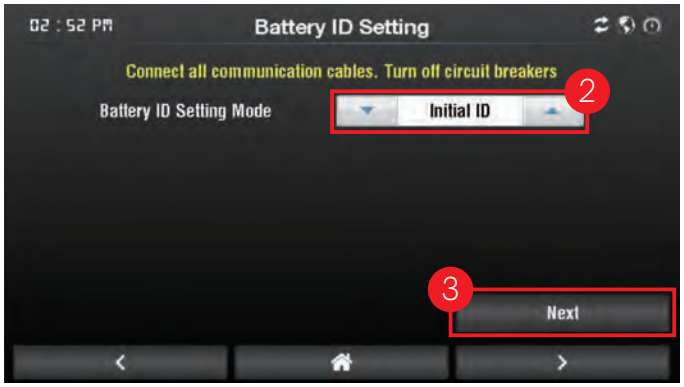
Step 9) If there are still batteries left to install, the following Screen appears. Repeat the previous step.

7.3.5 Battery Installation Process with HMI

Please check the LCD screen on top cover of PCS. Follow the instruction below for battery communication.

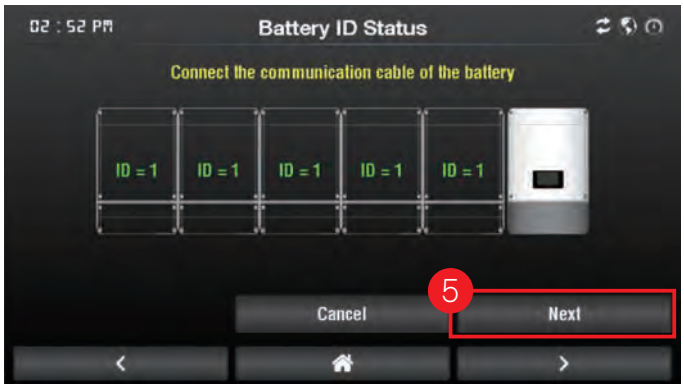


Step 1)
Touch Battery Icon 10 times.



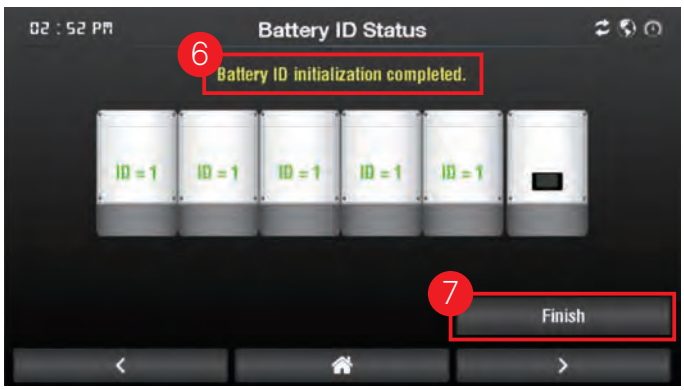
Step 2)
Select. [Initial ID]

Step 3)
Click Next Button.



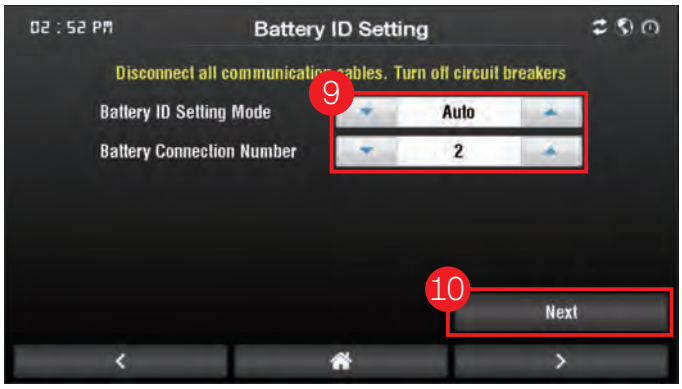
Step 4)
- All Battery Pack Communication Cables are Connected. Open circuit breakers.

Step 5)
Click Next Button.



Step 6)
Check Initialization Success Message.
- If there is Failure Message, Click Stop Button and Check Communication Line. Go to Step 2. [Initial ID]

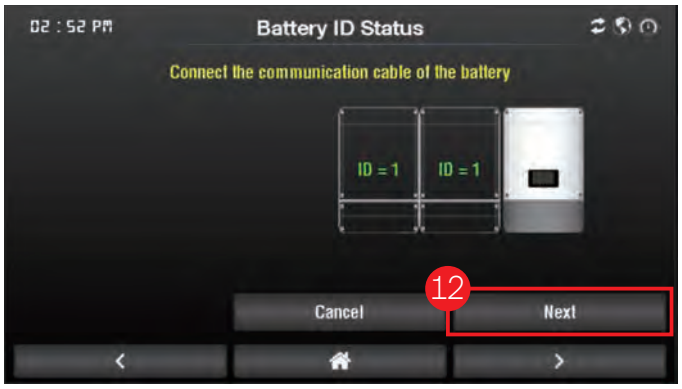
Step 7)
Click Finish Button when Initialization is successful.



Step 8)
- Disconnect all communication cable.
  Open Circuit Breakers.

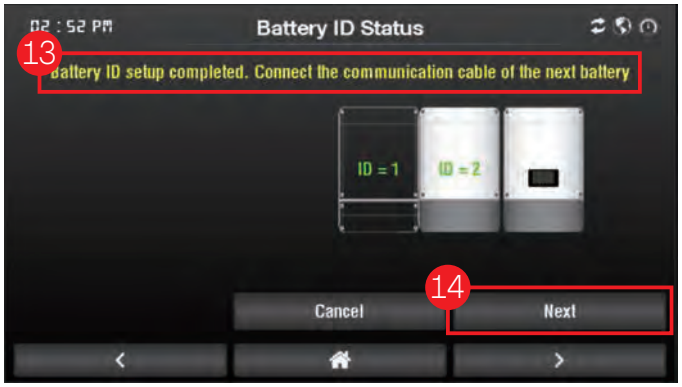
Step 9)
Select [Auto] and set the amount of the battery to install.
- Example) Amount of batteries to install : 2

Step 10)
Click Next Button.



Step 11)
- Connect the communication cable of the First battery.
  (The communication cable of the 2nd battery is not connected.)

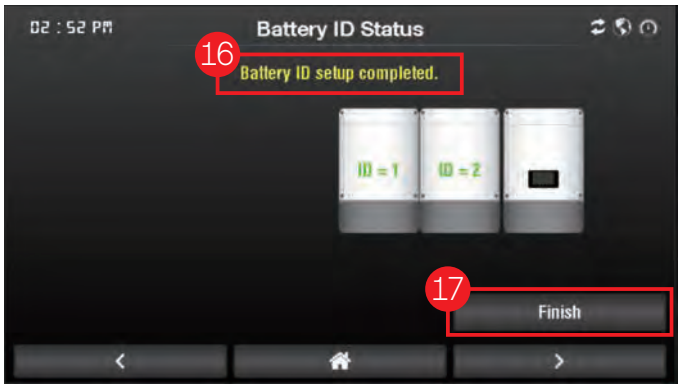
Step 12)
Click Next Button.



Step 13)
Check Initialization Success Message.
- If there is Failure Message, Click Stop Button and Check Communication Line.
  Go to Step 2. [Initial ID]

Step 14)
Click Next Button.

Step 15)
- Connect the communication cable of the 2nd battery.



Step 16)
If there is Failure Message, Click Stop Button and Check Communication Line.
Go to Step 2. [Initial ID]

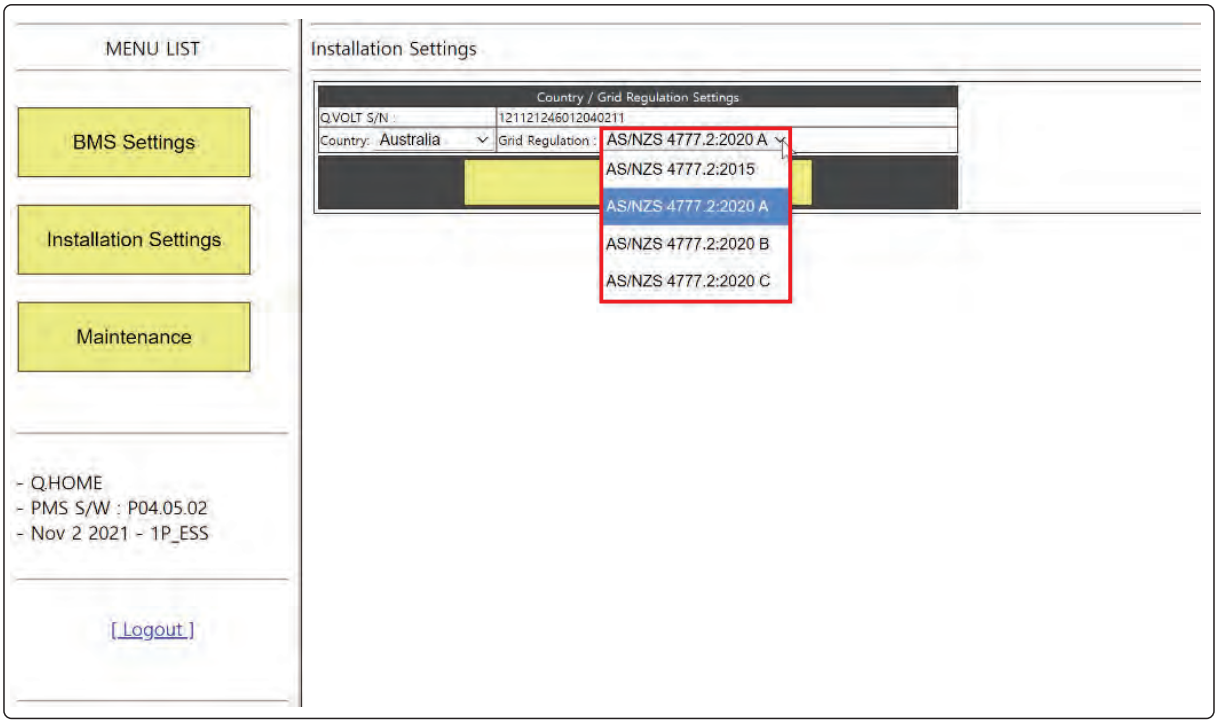
Step 17)
Click Finish Button.

Step 18)
- When installing more batteries, Follow and Repeat this procedure above.
- Both jumper need to be removed. One can be left on the last (non-assigned slot), in case the jumper needs to be used again one day.
- After completed setup, please check that connection of every cables of all batteries and turn on all the battery switches.
- The bottom covers can now be closed.

7.3.6 Installation Settings

7.3.6.1 Country / Grid Regulation Settings

- Select a country and the grid regulation.



Note
For compliance to AS/NZS 4777.2:2020, please select from region A/B/C.
Please contact your local grid operator for which region is required.

7.3.6.2 Product Setting

- Enter installation capacity of each PV string.
- Enter the grid feed in limit value; the default value is set by each country's grid regulation.
- Select an operation mode.
  - The dynamic optimizer provides an advanced control mode.
- Select number of batteries.
- Select PMS external mode if the 3rd party gateway is connected.

7.3.6.3 Date / Time Settings

- Enter the current date and time

7.3.6.4 Smart Meter Settings

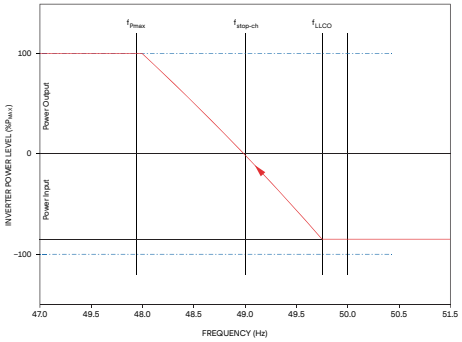
- Select a meter type.
- Select the baud rate of the communication interface.
- Select a meter model.

7.3.6.5 Advanced Settings

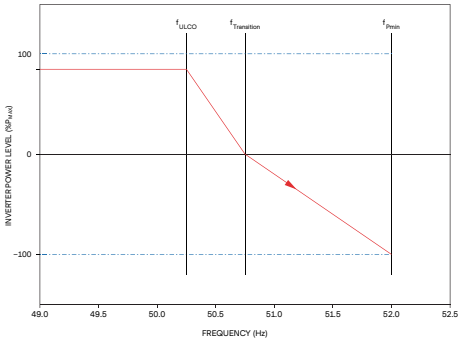
- Adjust grid protection setpoints
  (Configurable grid protection setpoints depend on the selected grid regulation.)
- [AU] 10 Min Voltage
  If the average system voltage for 10 minutes exceeds the detection level, the inverter is blocked from the system within 3 seconds.

Parameter	Default Values				Range
	Australia A	Australia B	Australia C	New Zealand	
Detection Level	258 V	258 V	258 V	249 V	244 V to 258 V

- [AU] Active Power Frequency
  - **When frequency decreases**: When frequency decreases below f_{LLCO} during ESS charging operation, the inverter responds in 2 levels depending on frequency.
    - **Level 1**: It decreases charging active power of ESS until frequency reaches f_{Stop_CH}.
    - **Level 2**: If frequency decreases more than f_{Stop_CH}, it increases active power output until it reaches f_{Pmax}.



  - **When frequency increases**: When frequency decreases below f_{LLCO} during ESS charging operation, the inverter responds in 2 levels depending on frequency.
    - **Level 1**: If frequency exceeds f_{ULCO}, ESS linearly decreases electric power output until it reaches $f_{Transition}$.
    - **Level 2**: If frequency exceeds $F_{Transition}$, it increases charging active power according to the increase in frequency until it reaches f_{Pmin}.

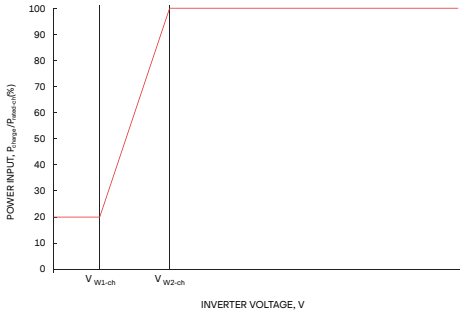


Parameter	Default Values of Frequency Response Limits				Range
	Australia A	Australia B	Australia C	New Zealand	
f_{Pmax} [Hz]	48	48	47	48	47 to 49
f_{Stop_CH} [Hz]	49	49	48.25	49	48 to 49.5
f_{LLCO} [Hz]	49.75	49.85	49.5	49.8	49.5 to 49.9
f_{ULCO} [Hz]	50.25	50.15	50.5	50.2	50.1 to 50.5
$f_{Transition}$ [Hz]	50.75	50.75	51.75	51	50.5 to 52
f_{Pmin} [Hz]	52	52	53	52	51 to 53

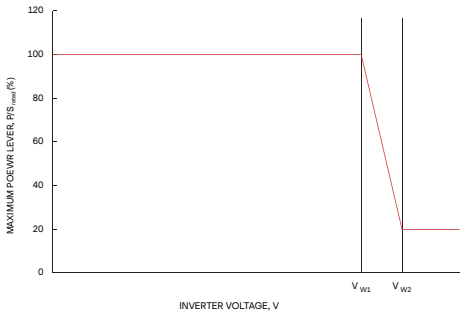
- **f_{Pmax} [Hz]**: Frequency where power output level is maximum
- **f_{Stop_CH} [Hz]**: Frequency where power output level is zero
- **f_{LLCO} [Hz]**: Lower limit of continuous operation range
- **f_{ULCO} [Hz]**: Upper limit of the continuous operation range
- **$f_{Transition}$ [Hz]**: Frequency where power output level is zero
- **f_{Pmin} [Hz]**: Frequency where power input level is minimum

• [AU] Active Power Voltage
The inverter changes the maximum input·output active power depending on system voltage. The inverter responds in two ways depending on charging or discharging operation.

• **During charging operation**: If frequency decreases below V_{W2_CH}, it decreases input active power, and it does not exceed the designated active power input constraint W1 below V_{W1_CH}.



• **Discharging mode**: It decreases input active power from the frequency of V_{W1}, and it does not exceed the designated active power output constraint W4 above V_{W2}.



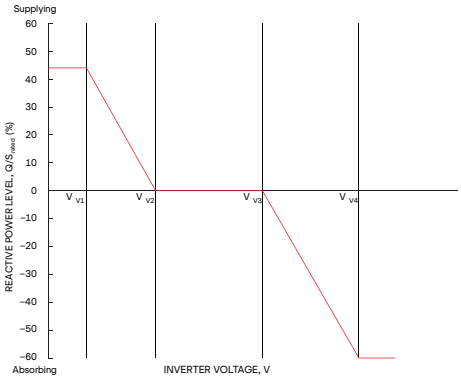
Parameter	Default Values of Volt-Watt Response				Range
	Australia A	Australia B	Australia C	New Zealand	
W1 [%]	20	0	20	20	0 to 20
V_{W1_CH} [V]	207	195	207	216	180 to 230
V_{W2_CH} [V]	215	215	215	224	180 to 230
V_{W1} [V]	253	250	253	242	235 to 255
V_{W2} [V]	260	260	260	250	240 to 265
W4 [V]	20	20	20	20	0 to 20

- **W1 [%]**: Inverter maximum active power Input level below VW1_CH
- **V_{W1_CH} [V]**: Voltage where power input level is W1
- **V_{W2_CH} [V]**: Lower limit of continuous operation range
- **V_{W1} [V]**: Upper limit of the continuous operation range
- **V_{W2} [V]**: Voltage where power output level is W4
- **W4 [V]**: Inverter maximum active power output level above VW2

• [AU] Reactive Power SetPoint
The setting range for the fixed power factor mode is 0.8 to 1.0 and supplying and absorbing can be set for reactive power. The default power factor is set to 1.0.

• [AU] Reactive Power Q(SetPoint)
The reactive power mode outputs reactive power in the fixed rate for apparent power. The minimum setting range for the reactive power (vars) rate for apparent power is 60 % or higher from 60 % absorption to 60 % supply, and the default reactive power is set to 0 %.

• [AU] Reactive Power Q(U)
A volt-var response mode changes reactive power absorbed or supplied by an inverter depending on system voltage. The response curve needed for the volt-var response is operated according to the four default values of volt response and the corresponding reactive power standard.



Parameter	Default Values of Volt-Var Response				Range
	Australia A	Australia B	Australia C	New Zealand	
V_{V1} [V]	207	205	215	207	180 to 230
V_{V2} [V]	220	220	230	220	180 to 230
V_{V3} [V]	240	235	240	235	230 to 265
V_{V4} [V]	258	255	255	244	230 to 265

• [AU] Gradient Control
Power speed limit (WGra) is the lamp speed of active power output, and is defined as a percentage of the rated power per minute. Nominal lamp time (Tn) is the nominal time for 100 % change of the power output.

• [AU] Limit Control

CAUTION

If at least one limit control function is enabled when an energy meter is not connected, an error occurs and an inverter is not operated.

- **Export Hard Limit**: If the inverter output active power exceeds the Export Hard Limit for 15 seconds, the inverter is blocked from the Export Hard Limit Time system.
- **Export Soft Limit**: If the inverter output active power exceeds the Export Soft Limit, the inverter decreases the output apparent power below the Export Soft Limit Level.
- **Generation Hard Limit**: If the inverter output active power exceeds the Generation Hard Limit for 15 seconds, the inverter is blocked from the Generation Hard Limit Time system.
- **Generation Soft Limit**: If the inverter output apparent power exceeds the Generation Soft Limit, the inverter decreases the output apparent power below the Generation Soft Limit Level within the Generation Soft Limit Level.

Parameter	Default Values	Range
Export Hard Limit Level [%]	100	0 to 100
Export Hard Limit Time [s]	5	0 to 100
Export Soft Limit Level [%]	100	0 to 100
Export Soft Limit Time [s]	15	0 to 100
Generation Hard Limit Level [%]	100	0 to 100
Generation Hard Limit Time [s]	5	0 to 100
Generation Soft Limit Level [%]	100	0 to 100
Generation Soft Limit Time [s]	15	0 to 100

• [DE] Active Power SetPoint
It limits the inverter output power below fixed power with Active Power SetPoint Gradient (= Pmax per s)

Parameter	Default Values	Range
SetPoint Value [%]	100	0 to 100
Active Power SetPoint Gradient [%]	0.5	0.33 to 0.66

• [DE] Active Power Frequency
The inverter changes the inverter output active power according to the system frequency in order to support the system. Ramp rate of power and start frequency can be set as in the table below

Parameter	Default Values	Range
Ramp rate [%]	1	2 to 12
Start frequency [Hz]	50.2	50.2 to 50.5

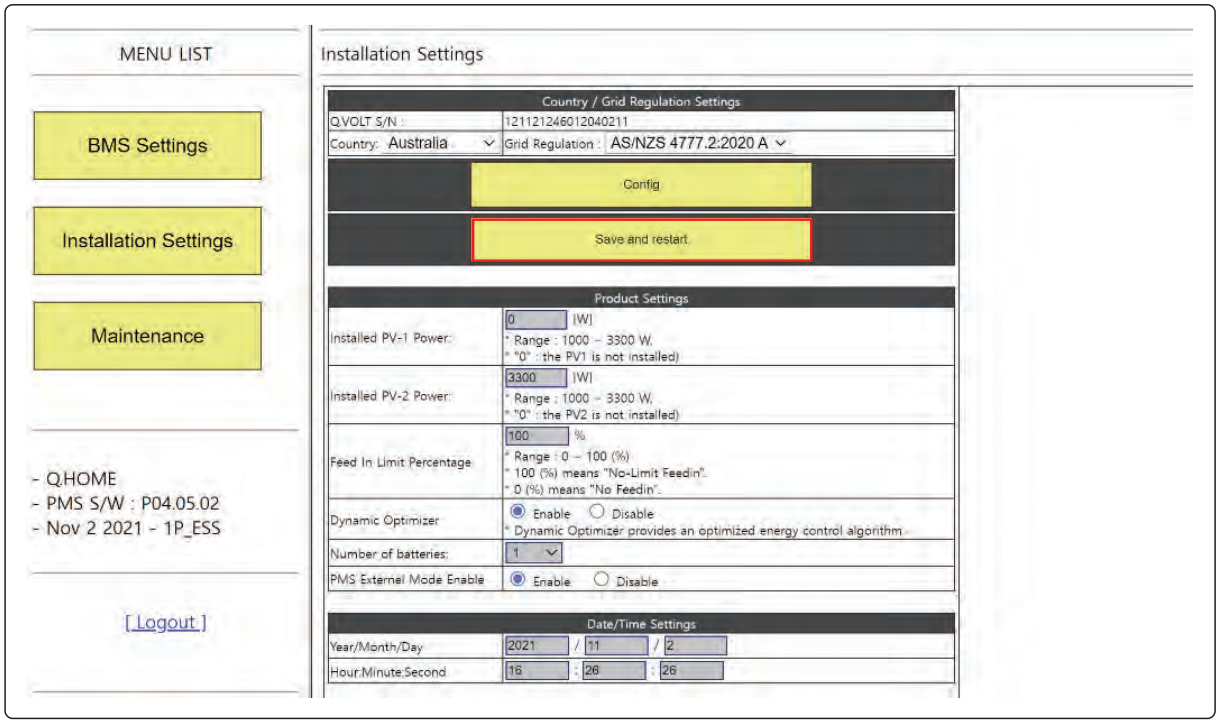
• [DE] Reactive Power SetPoint
You can set the inverter output power factor as well as leading (over) and lagging (under) of reactive power.

Parameter	Default Values	Range
Cos Φ Value	1	0.95 to 100
Response time [ms]	10000	6000 to 60000

• [DE] Reactive Power Cospi(P)
If inverter output power is generated more than 50 %, it outputs lagging reactive power and is operated in the power factor of 0.95 in the maximum output. At this time, the response time can be set and the default time is 6000 ms

7.3.6.6 Save and Restart

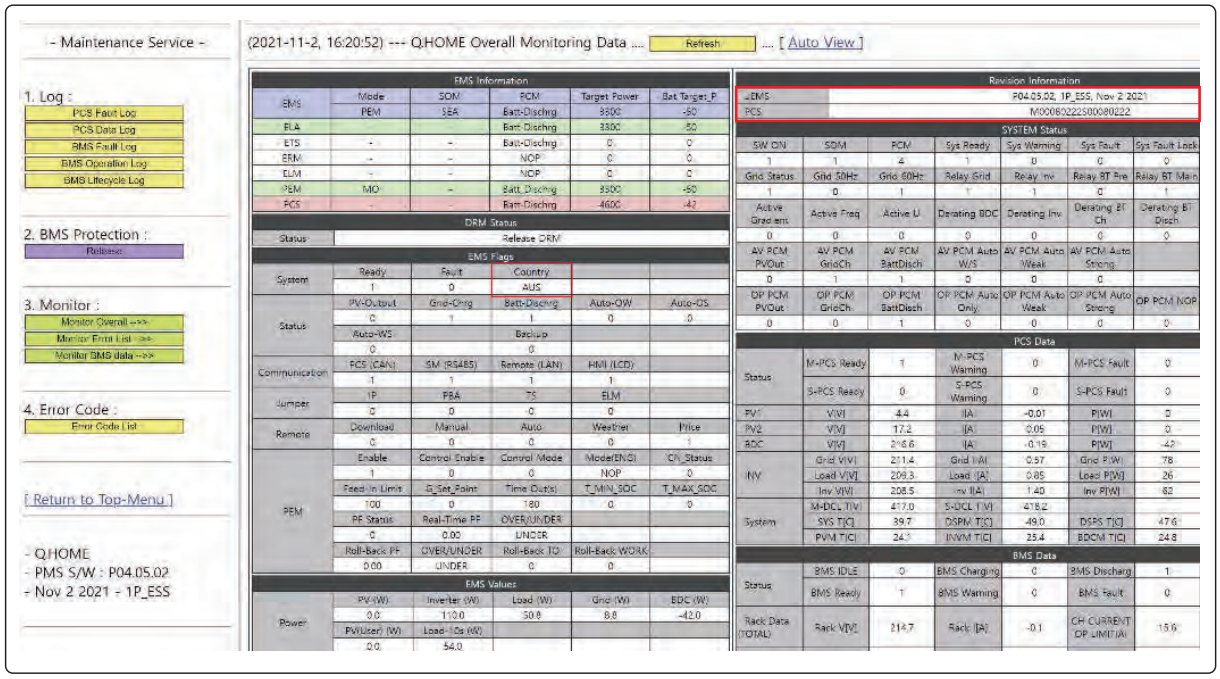
• Save onto the system after all the procedures above are completed.



7.3.7 Checking the settings information

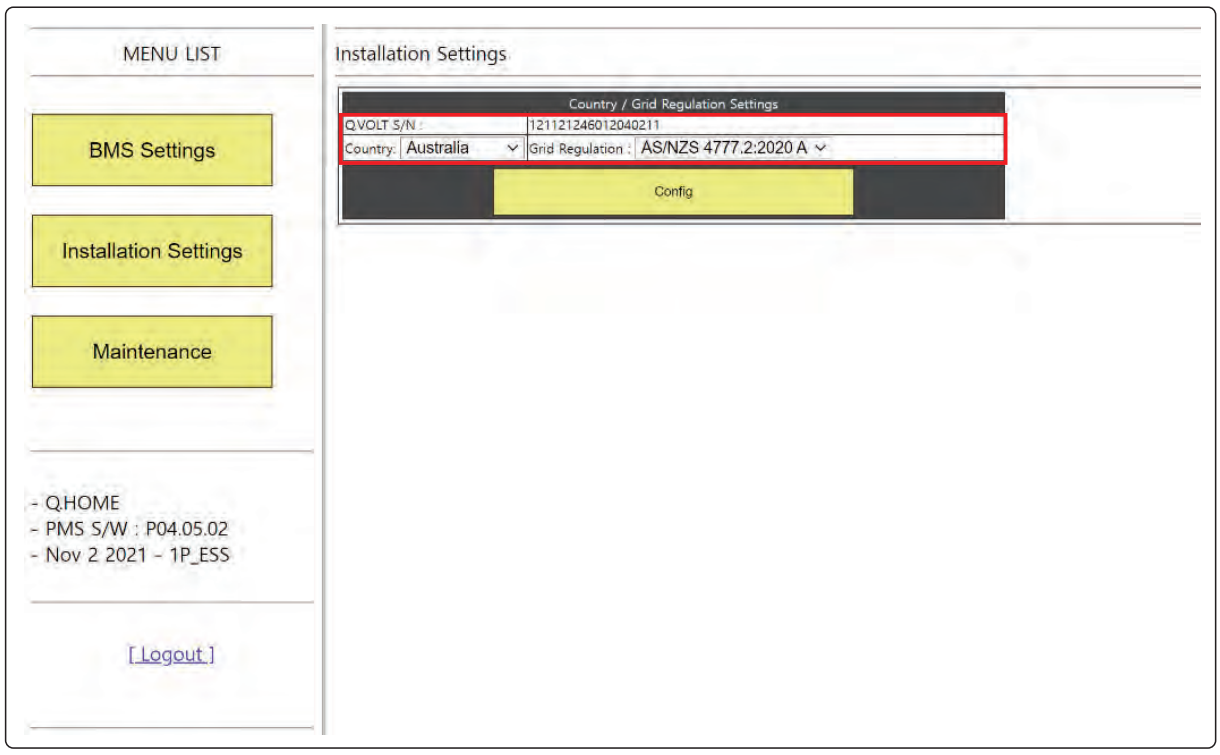
7.3.7.1 Firmware version

- Select a maintenance menu
- Check the firmware version and country



7.3.7.2 Region / Grid regulation

- Select a installation settings menu
- Check the country and grid regulation



7.4 Web Page Connection

7.4.1 Web Page Connection

Open an Internet browser of your laptop or smart phone, then enter the designated address.
Then the system information input page pops up.

- Input URL: www.qcells-qonnect.com
- Concurrent support of PC and Mobile

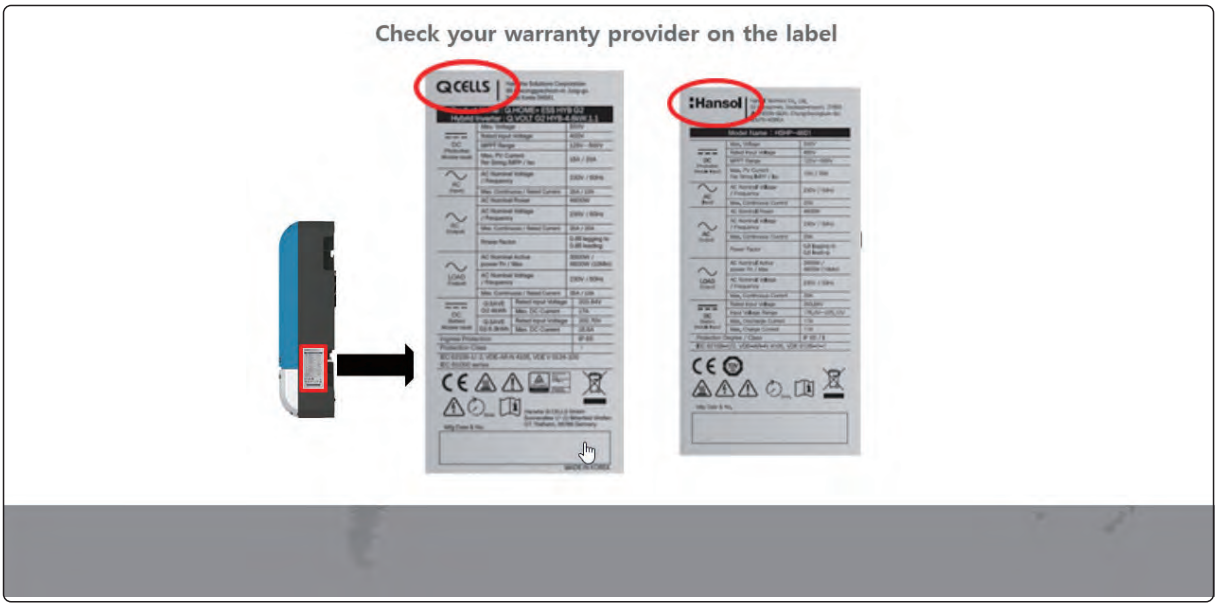
1. By typing “www.qcells-qonnect.com,”access the corresponding website.
   Then select your product.
2. Click the picture of your product

[Figure 7-4 : Select product]

NOTICE

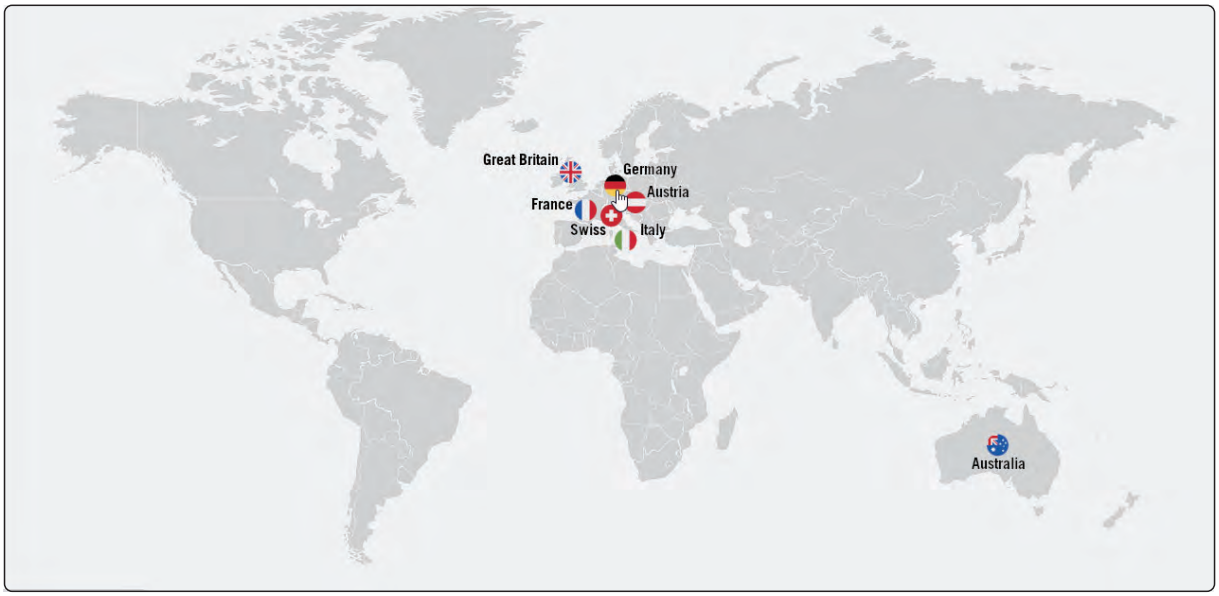
- In case your computer, tablet, or smartphone does not support HTML5, it may not operate normally.
- Some older smart devices may not operate normally, if its browser version is lower.

3. Check your warranty provider and click yours.



[Figure 7-5 : Select warranty]

4. Select your country.



[Figure 7-6 : Select country]

7.4.2 Product Registration

Detailed manual for product registration and advanced settings is provided as a separate file.
The manual download procedure is as follows.

	NOTICE
⚠	• To install the product, you must obtain an installer membership instead of a general membership. • To join as an installer member, a special number is required. First check the special number from the local dealer or service center.

1. Enter your ID and password in the login window. If you have no account, please join as a Member

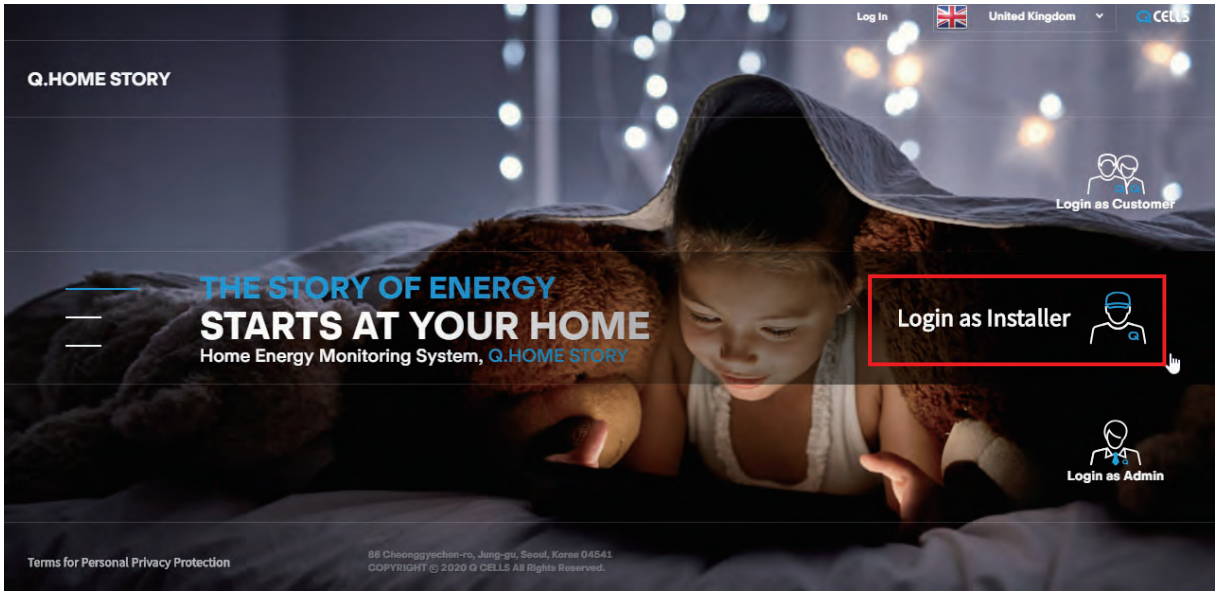
2. Click the “Join Membership” link.

3. In order to join as a member, you must consent to the terms for personal privacy protection.
   The terms have been prepared in accordance with applicable local laws.
   If you do not agree to the terms, you cannot join as a member.

4. Enter the required information for registration.

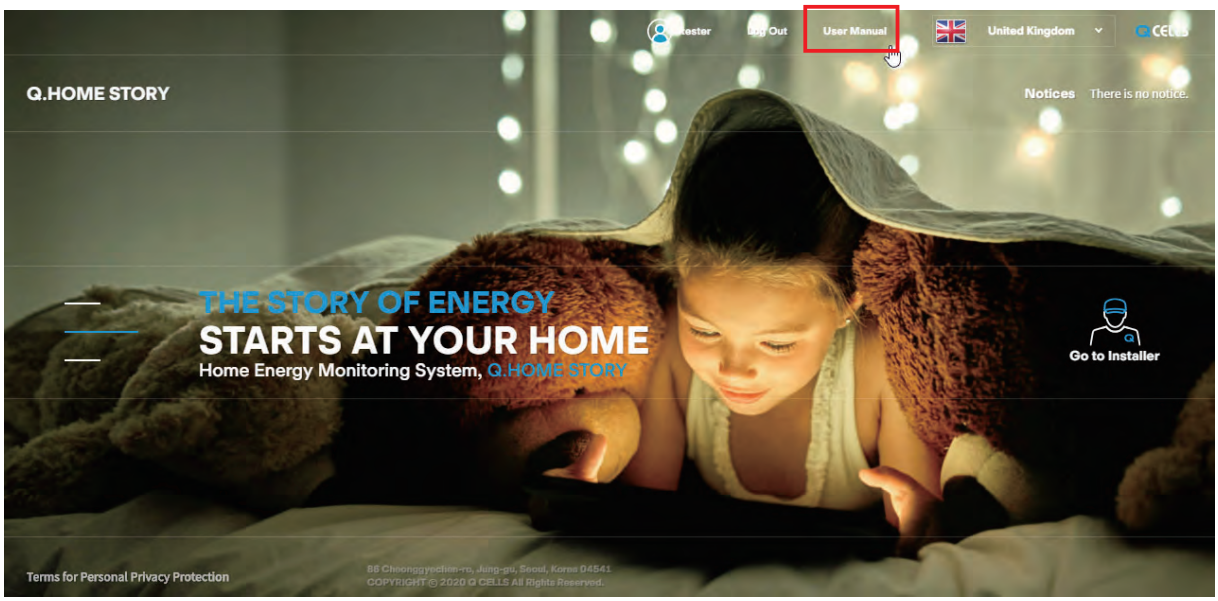
	NOTICE
⚠	• The optional items for company name and email address are necessary for quick contact and response from the service center. • Enter the number identified through a pre-contact in Special Number.

5. After obtaining a membership, a completion message appears. Click the "Log In" button.



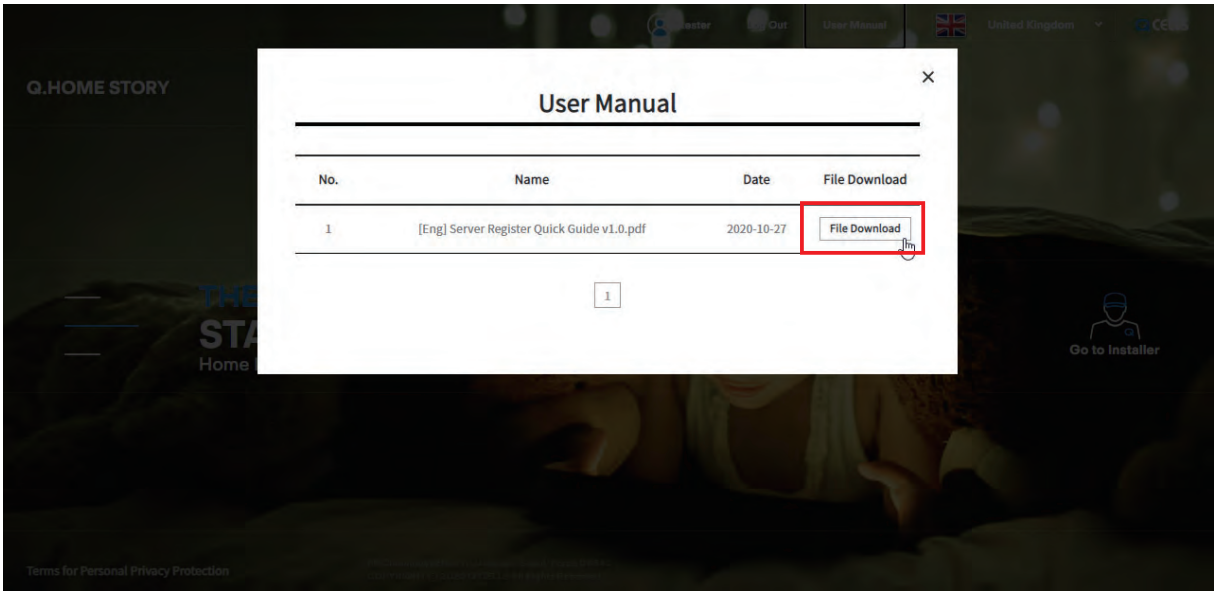
[Figure 7-7 : Main page - Login]

6. After login, click “User Manual” Button.



[Figure 7-8 : Main page - User Manual]

7. In the pop-up window of the user manual, find the registration manual, i.e., Server Register Quick Guide, and click the file download button

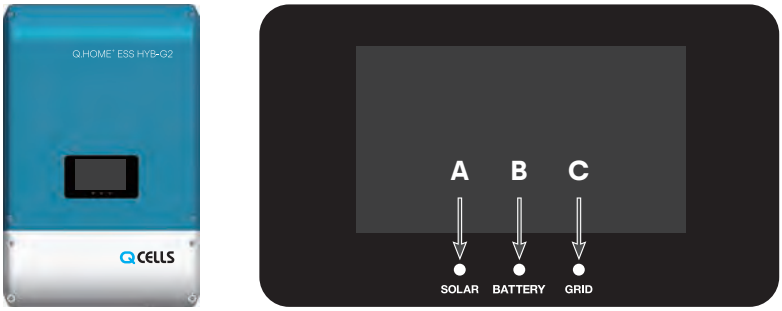


[Figure 7-9 : Main page - User Manual Download]

8. Operating Test

8.1 LED Indications

As shown in the [Figure 8-1], the LED of Q.HOME+ ESS HYB-G2 is located at bottom of LCD.
The color of LED depend on current status of INVERTER and LED display information can be checked in [Table 8-1].



[Figure 8-1 : LCD Location]

	Solar (A)	Battery (B)	Grid (C)
OFF	Energy is not being generated.	Battery is not connected.	Grid is not connected.
Green	Energy is being generated.	Battery is connected.	Grid is connected.
Red	Fault	Fault	Fault

[Table 8-1 : LED Indications]

8.2 Starting the System

After completing the installation, turn on the AC circuit breaker installed in the distribution box and then turn on the DC disconnect switch on the product.
Check the system check message on the front LCD screen.

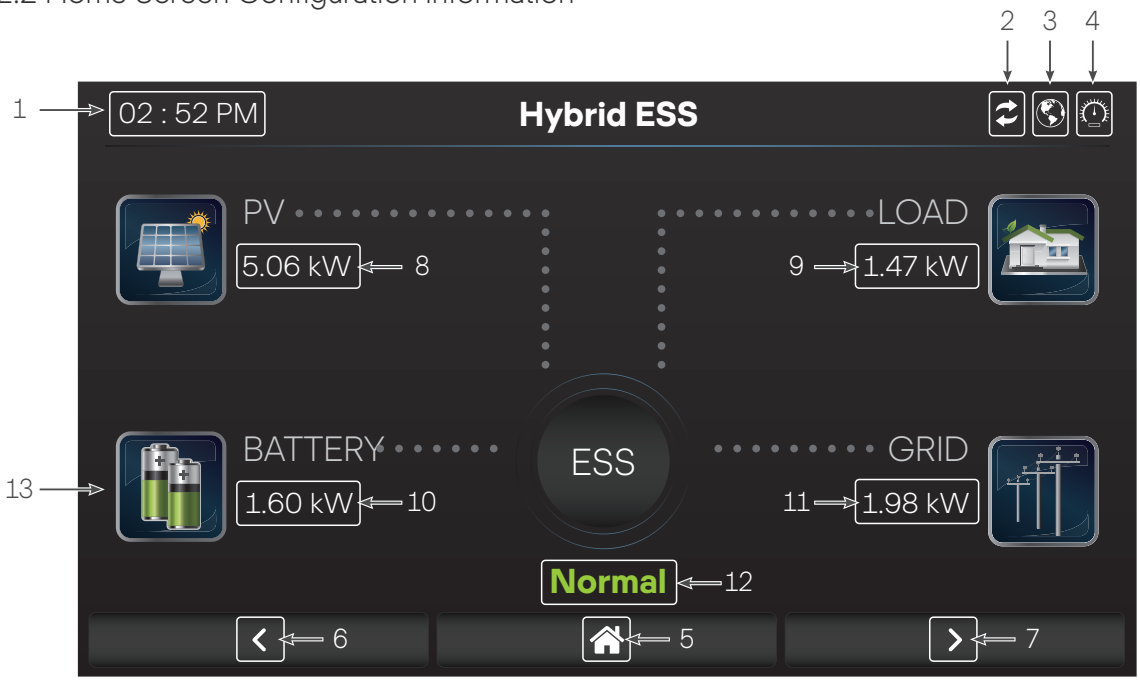
8.2.1 Loading Screen & Update Screen

The [Figure 8-2] is displayed at the time of initial boot, and the home screen is displayed when internal communication is normal. The time setting is automatically renewed when connected to the network. The [Figure 8-3] is a screen display when ESS Software (PMS & PCS) is updated.

[Figure 8-2 : Initial Indication Screen on Power On]

[Figure 8-3 : Update Screen]

8.2.2 Home Screen Configuration Information



[Figure 8-4 : Standby State Indication Screen before the EMS Command]

No.	Screen Information	Description
1	Time Information	Display time information
2	Operation Status	Internal communication connection status (PV, Battery, Indication during independent operation)
3	Network Connection Status	Display status when connecting to Ethernet network
4	Meter Connection Status	Display status when connecting to meter
5	Home Button	Go to home display
6	Previous Button	Go to previous screen
7	Next Button	Go to next screen
8	PV Power	Display current PV power
9	Load Power	Display current Load power
10	Battery Power	Display current Battery power
11	Grid Power	Display current Grid power
12	ESS Status Information	Display ESS normal operation (Standby/Normal/Fault/Fault Lock/Error Comm)
13	Battery SOC	Battery SOC status

[Table 8-2 : Screen Configuration Information]

You will receive the command from the EMS to convert to operation mode.
For individual operation mode screen, refer to 8.4.

8.2.2.1 Home menu structure

If you touch next or previous button, the screen is displayed as shown in the [Figure 8-5].
The description of each screen refer to Chapter 8.5

[Figure 8-5 : Home Menu Structure]

8.3 Turning off the System

	CAUTION
⚠	When turning off the system, make sure to turn off the battery circuit breaker. it is very important to prevent battery deep discharge.

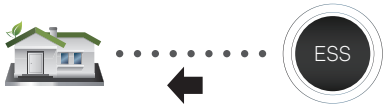
1. Turn PV Switch on INVERTER unit to OFF position.
2. Make sure that ESS has stopped.
3. Turn off AC circuit breaker in control cabinet at grid side.
4. Open bottom covers of battery cases.
5. Turn off Battery circuit breaker.

Note: After turning off the system, if you want to use ESS hybrid inverter for PV only, turn the PV switch to ON position and turn on the AC circuit breaker in the control cabinet.

8.4 Descriptions of Operation Mode

This system is composed of six modes: PV Auto, PV Only, Battery discharge, Standby, Maintenance (forced charge), and Stand-Alone (Back-up). The event check status should not be considered as any specific mode.

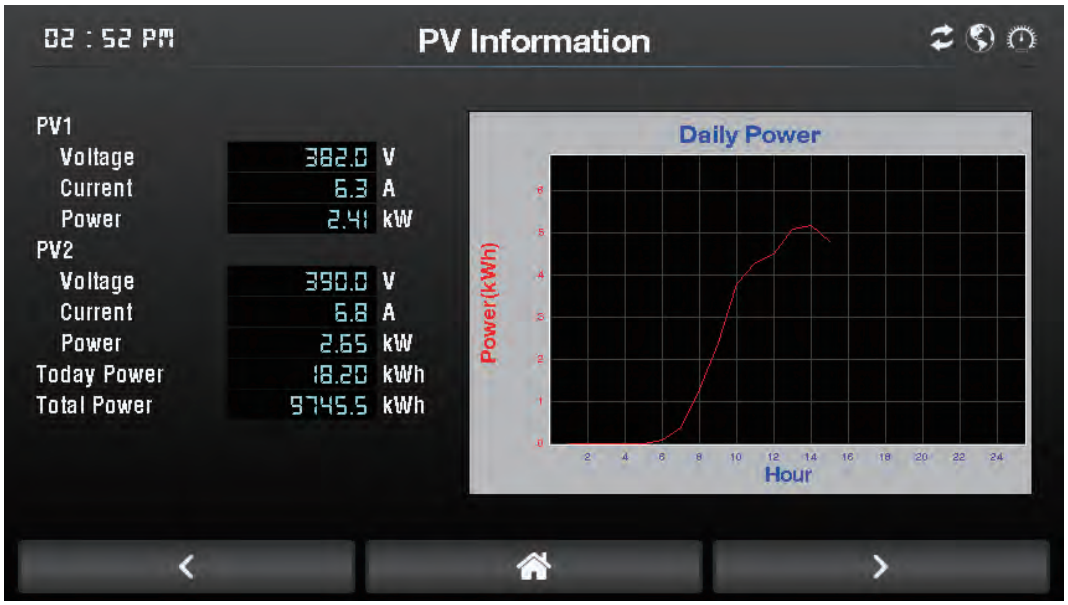
8.4.1 Status Description

Mode	Screen Information	Description
PV Generation		The electrical power is generated by PV.
Battery Charge		The Battery is charging.
Battery Discharge		The Battery is discharging.
Grid Input		Supply the electrical power of Grid to INVERTER.
Grid Output		The power generated from the PV is fed into the Grid.
Load Input		The power generated by INVERTER is supplied to Load.

[Table 8-3 : Status Description]

8.5 Information Display

8.5.1 PV Information display

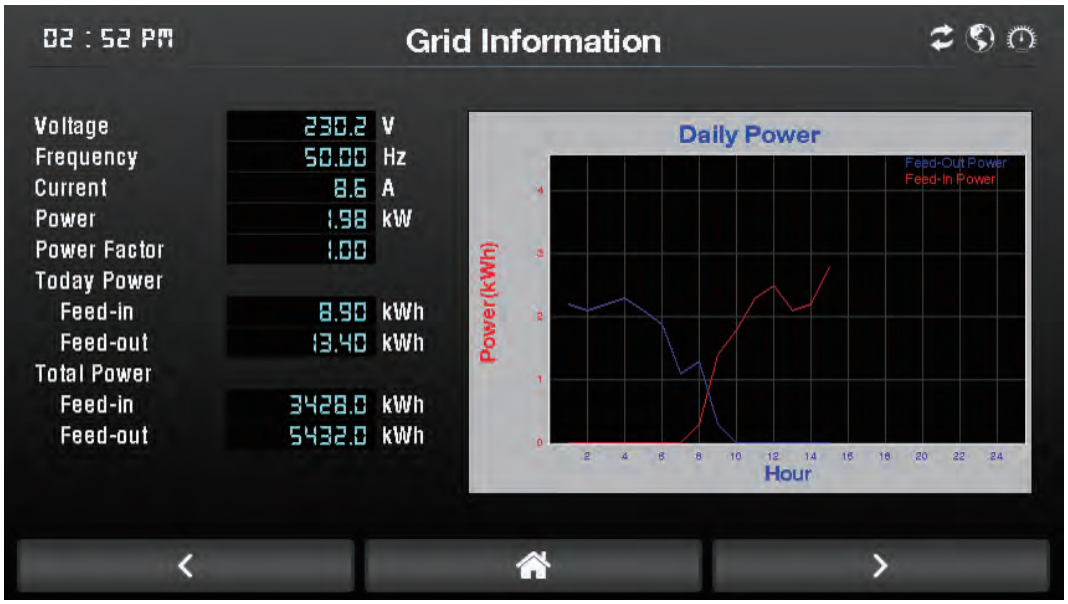


[Figure 8-6 : PV Information Display]

Display	Description
PV1 Voltage	Display current PV1 voltage
PV1 Current	Display current PV1 current
PV1 Power	Display current PV1 power
PV2 Voltage	Display current PV2 voltage
PV2 Current	Display current PV2 current
PV2 Power	Display current PV2 power
Today Power	Display today's PV power
Total Power	Display the mount of PV power
Graph	Display PV power graph (Daily/Weekly/Monthly/Yearly) (If you want to see the next graph, touch graph screen.)

[Table 8-4 : PV Information Display Description]

8.5.2 Grid Information display

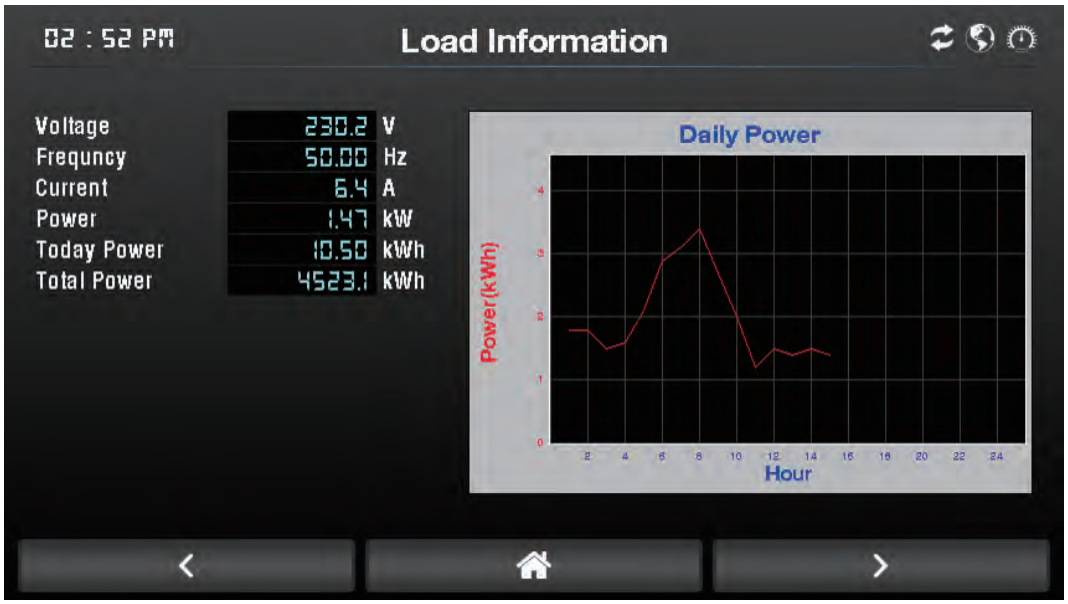


[Figure 8-7 : Grid Information Display]

Display	Description
Voltage	Display Grid voltage
Frequency	Display Grid frequency
Current	Display Grid current
Power	Display Grid active power
Power Factor	Display Grid power factor
Today Feed-in Power	Display today's power received from the Grid
Today Feed-out Power	Display today's electricity sent to the Grid
Total Feed-in Power	Display the amount of electricity received from the Grid
Total Feed-out Power	Display the amount of electricity sent to the Grid
Graph	Display Grid power graph (Daily/Weekly/Monthly/Yearly) (If you want to see the next graph, touch graph screen.)

[Table 8-5 : Grid Information Display Description]

8.5.3 Load Information display

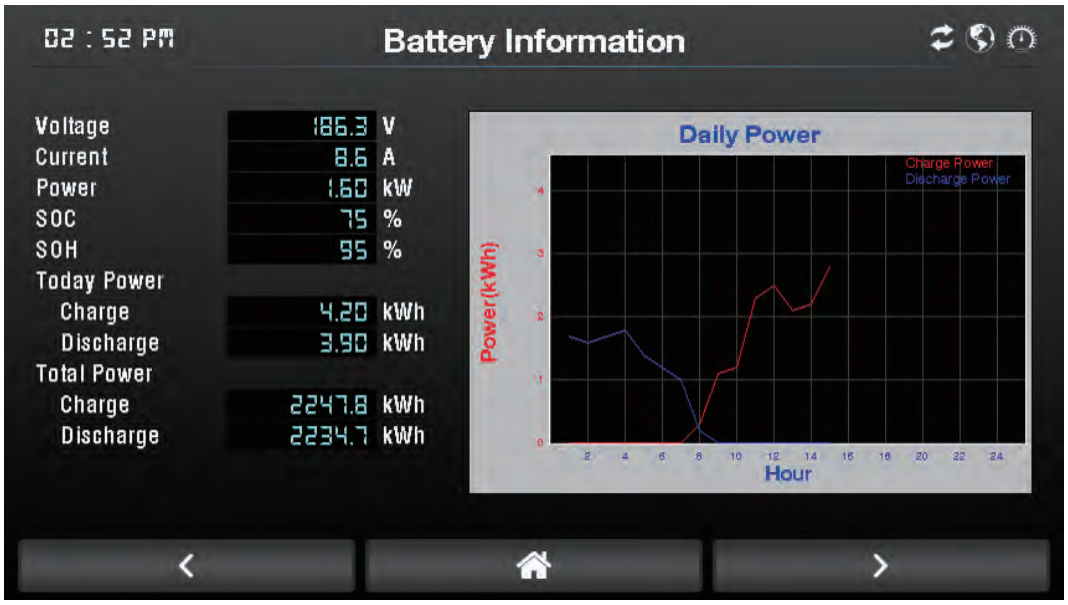


[Figure 8-8 : Load Information Display]

Display	Description
Voltage	Display Load voltage
Current	Display Load current
Frequency	Display Load frequency
Power	Display Load active power
Today Power	Display today's Load power
Total in Power	Display the amount of power used in today's Load
Graph	Display Load power graph (Daily/Weekly/Monthly/Yearly) (If you want to see the next graph, touch graph screen.)

[Table 8-6 : Load Information Display Description]

8.5.4 Battery Information display

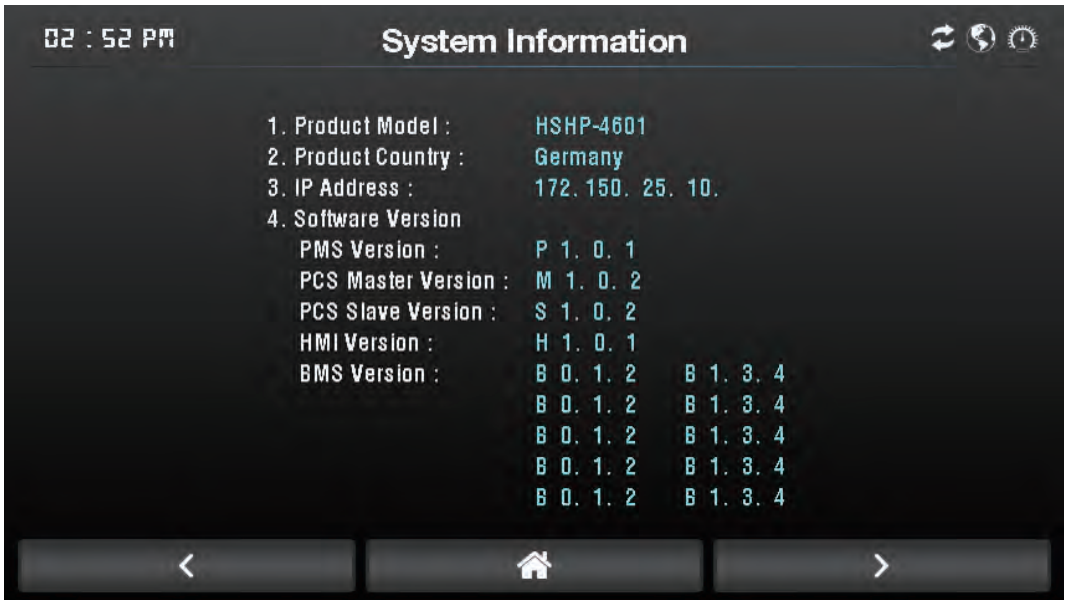


[Figure 8-9 : Battery Information Display]

Display	Description
Voltage	Display Battery voltage
Current	Display Battery current
Power	Display Battery charging / discharging power
SOC	State of charge
SOH	State of health
Today Charge Power	Display today's Battery charge power
Today Discharge Power	Display Battery power factor
Total Power Charge	Display the amount of Battery charge power
Total Power Discharge	Display the amount of Battery discharge power
Graph	Display Battery power graph (Daily/Weekly/Monthly/Yearly) (If you want to see the next graph, touch graph screen.)

[Table 8-7 : Battery Information Display Description]

8.5.5 System Information display

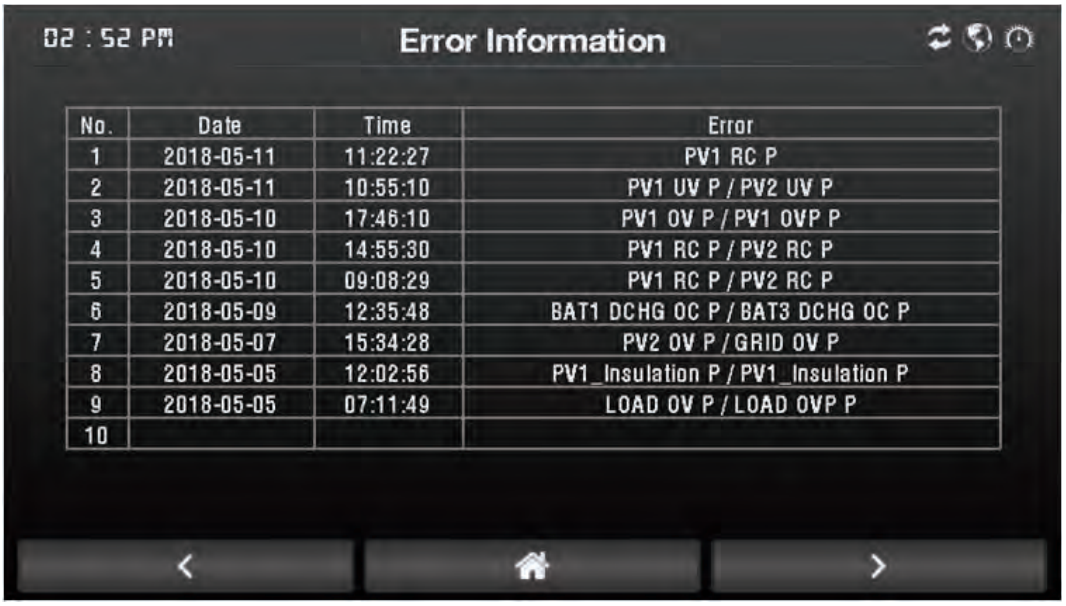


[Figure 8-10 : System Information Display]

Display	Description
Product Model	Name of this product
Product Country	Country using this product
IP Address	IP Address
Software Version	Software version of this product
PMS Version	Software version of PMS
PCS Master Version	Software version of PCS master
PCS Slave Version	Software version of PCS slave
HMI Version	Software version of HMI
BMS Version	Software version of BMS (up to 5 types)

[Table 8-8 : System Information Display Description]

8.5.6 Error Information display



No.	Date	Time	Error
1	2018-05-11	11:22:27	PV1 RC P
2	2018-05-11	10:55:10	PV1 UV P / PV2 UV P
3	2018-05-10	17:46:10	PV1 OV P / PV1 OVP P
4	2018-05-10	14:55:30	PV1 RC P / PV2 RC P
5	2018-05-10	09:08:29	PV1 RC P / PV2 RC P
6	2018-05-09	12:35:48	BAT1 DCHG OC P / BAT3 DCHG OC P
7	2018-05-07	15:34:28	PV2 OV P / GRID OV P
8	2018-05-05	12:02:56	PV1_Insulation P / PV1_Insulation P
9	2018-05-05	07:11:49	LOAD OV P / LOAD OVP P
10			

[Figure 8-11 : Error Information Display]

Display	Description
Date	The date the fault occurred.
Time	The time the fault occurred.
Error	Type of fault (See Chapter 9.1) If there are more than 10 errors, the first error is cleared.

[Table 8-9 : Error Information Display Description]

9. Problem Confirmation

Checking event codes is available on the website (www.q-cells.com).
If the Internet is not available, the event codes cannot be checked.

9.1 General Events

The general events contain warnings and protection.
The warning level events does not stop the generating process. A displayed warning message automatically disappears as soon as the issue is resolved.
When protection level events occur, the product stop the generating process. The process may automatically resume as long as the issue is resolved.

9.1.1 INVERTER General Events (Protection)

Type : PROTECTION			
WEB Display	HMI Display	Description	Measures
D01P	BDC I TZM P	BDC Current Trip Zone Master Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
D02P	BDC I TZS P	BDC Current Trip Zone Slave Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
D03P	BDC1 COC P	BDC1 Charge RMS Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
D04P	BDC1 COCP P	BDC1 Charge Over Current Peak Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.

WEB Display	HMI Display	Description	Measures
D05P	BDC1 DOC P	BDC1 Discharge RMS Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
D06P	BDC1 DOCP P	BDC1 Discharge Over Current Peak Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
D13P	BDC2 COC P	BDC2 Charge RMS Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
D14P	BDC2 COCP P	BDC2 Charge Over Current Peak Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
D15P	BDC2 DOC P	BDC2 Discharge RMS Over Current Protection	The product stops the generating process because a significant protection event has occurred. nbWait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
D16P	BDC2 DOCP P	BDC2 Discharge Over Current Peak Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.

WEB Display	HMI Display	Description	Measures
D21P	BDC UV P	BDC RMS Under Voltage Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
D22P	BDC OV P	BDC RMS Over Voltage Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
D23P	BDC OVP P	BDC Over Voltage Peak Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
D24P	BDC OW P	BDC RMS Over Watt Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
D25P	BDCM OT P	BDC Module Over Temp Protection	When the switch temperature is high. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
D26P	BDCM UT P	BDC Module Under Temp Protection	When the switch temperature is low. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.

WEB Display	HMI Display	Description	Measures
G01P	INV I TZM P	INV Current Trip Zone Master Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
G02P	INV I TZS P	INV Current Trip Zone Slave Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
G03P	INV OW P	INV Over Watt Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
G04P	INV OC P	INV RMS Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
G05P	INV OCP P	INV Over Current Peak Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
G06P	INV OT P	INV Module Temp Over Temp Protection	When the switch temperature is high. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.

WEB Display	HMI Display	Description	Measures
G07P	INV UT P	INV Module Temp Under Temp Protection	When the switch temperature is low. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
G11P	GRID OW P	Grid Over Watt Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
G12P	GRID UV P	Grid RMS Under Voltage Protection	Check the connection of Grid Voltage cable.
G13P	GRID OV P	Grid RMS Over Voltage Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
G14P	GRID OVP P	Grid Over Voltage Peak Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
G15P	GRID OF P	Grid Over Frequency Protection	The operation mode is terminated when a power system event occurs. Restart 1 minute after the electric power system event is settled
G16P	GRID UF P	Grid Under Frequency Protection	The operation mode is terminated when a power system event occurs. Restart 1 minute after the electric power system event is settled

WEB Display	HMI Display	Description	Measures
G21P	DC Injection P	DC Injection Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
G22P	RCMU N P	Residual Current Monitoring Unit Normal Protection	Turn off system power when the leakage current level is above standard level. Check the leakage current level, then restart or turn off to get back to the below standard level.
G23P	RCMU SD P	Residual Current Monitoring Unit Sudden Protection	Turn off system power when the leakage current level is above standard level. Check the leakage current level, then restart or turn off to get back to the below standard level.
G24P	GRID OV 10Min P	Grid 10 Minute Average Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
G25P	ANTI ISLANDING P	Anti-Islanding Protection	If the electric power system blacks out, it automatically detects the state and turns off the Q.HOME+ ESS HYB-G2. (shifting the frequency of the inverter away from nominal conditions in the absence of a reference frequency. (frequency shift))
G31P	GRID AD P	Grid V AD Measurement Protection	The error of Master & slave AD value is more than 2 %. A/S is required.
G32P	Relay L1 P	Relay L1 Abnormal Operation Protection	Relay L1 is burned out. A / S is required.
G33P	Relay L2 P	Relay L2 Abnormal Operation Protection	Relay L2 is burned out. A / S is required.

WEB Display	HMI Display	Description	Measures
G34P	Relay L3 P	Relay L3 Abnormal Operation Protection	Relay L3 is burned out. A / S is required.
G35P	Relay L4 P	Relay L4 Abnormal Operation Protection	Relay L4 is burned out. A / S is required.
L01P	Load OC P	Load RMS Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
L02P	Load OCP P	Load Over Current Peak Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
L03P	Load UV P	Load RMS Under Voltage Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
L04P	Load OV P	Load RMS Over Voltage Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
L05P	Load OVP P	Load Over Voltage Peak Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.

WEB Display	HMI Display	Description	Measures
L06P	Load OF P	Load Over Frequency Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
L07P	Load UF P	Load Under Frequency Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
L08P	Load OW P	Load Over Watt Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
S01P	PV1 RC P	PV1 String Reverse Connection Protection	Please check PV1 (+) and (-) wiring. If the connection is successful, wait until the event message disappears. When the event message is removed, it automatically returns to the normal state. If it is not removed until the time limit is reached, it is converted to a significant event.
S04P	PV1 OV P	PV1 RMS Over Voltage Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
S05P	PV1 OVP P	PV1 Over Voltage Peak Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.

WEB Display	HMI Display	Description	Measures
S06P	PV1 OC P	PV1 RMS Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
S07P	PV1 OCP P	PV1 Over Current Peak Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
S08P	PV1 OW P	PV1 RMS Over Watt Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
S11P	PV2 RC P	PV2 String Reverse Connection Protection	Please check PV2 (+) and (-) wiring. If the connection is successful, wait until the event message disappears. When the event message is removed, it automatically returns to the normal state. If it is not removed until the time limit is reached, it is converted to a significant event.
S14P	PV2 OV P	PV2 RMS Over Voltage Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
S15P	PV2 OVP P	PV2 Over Voltage Peak Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.

WEB Display	HMI Display	Description	Measures
S16P	PV2 OC P	PV2 RMS Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
S17P	PV2 OCP P	PV2 Over Current Peak Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
S18P	PV2 OW P	PV2 RMS Over Watt Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
S21P	PVM OT P	PV Module Over Temp Protection	When the switch temperature is high. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
S22P	PVM UT P	PV Module Under Temp Protection	When the switch temperature is low. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
S23P	PV1 INSULATION P	PV1 Insulation Protection	Turn off system power if PV1 insulation resistance is at the standard level.
S24P	PV2 INSULATION P	PV2 Insulation Protection	Turn off system power if PV2 insulation resistance is at the standard level.

WEB Display	HMI Display	Description	Measures
S31P	DCLINK V TZM P	DCLINK Voltage Trip Zone Master Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
S32P	DCLINK UV P	DCLINK RMS Under Voltage Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
S33P	DCLINK OV P	DCLINK RMS Over Voltage Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
S34P	DCLINK OVP P	DCLINK Over Voltage Peak Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.

[Table 9-1 : INVERTER General Events Warning List]

9.1.2 Battery General Events (Protection)

Type : PROTECTION			
WEB Display	HMI Display	Description	Measures
B01P	BAT1 CHG OC P	BAT1 Charge Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
B02P	BAT1 DCHG OC P	BAT1 Discharge Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
B03P	BAT1 CEL V HOLD P	BAT1 Cell Voltage Sensing Data Hold Protection	Power reset of the system is required. If the symptom still occurs after reset, repair of BMS or PCS Control Board is necessary.
B04P	BAT1 CEL OV P	BAT1 Cell or Rack Over Voltage Protection	When the maximum cell or rack voltage is above protection level, thus terminating the system. Automatically returns to normal when the maximum cell or rack voltage goes below the limit value.
B05P	BAT1 CEL UV P	BAT1 Cell or Rack Under Voltage Protection	When the minimum cell or rack voltage is below protection level, thus terminating the system. Automatically returns to normal when the minimum cell or rack voltage goes above the limit value.
B06P	BAT1 CEL OT P	BAT1 Cell Over Temp Protection	When the maximum cell temperature is above protection level, thus terminating the system. Automatically returns to normal when the maximum cell temperature goes below the limit value.

WEB Display	HMI Display	Description	Measures
B07P	BAT1 COM P	BAT1 Communication Protection	Power reset of the system is required. If the symptom persists after reset, replace the cable connecting the Battery pack and the INVERTER. After replacement, repair of BMS or PCS Control Board is necessary.
B08P	BAT1 ADD P	BAT1 Additional Protection	Power reset of the system is required. If the symptom still occurs after reset, repair of BMS or PCS Control Board is necessary.
B11P	BAT2 CHG OC P	BAT2 Charge Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
B12P	BAT2 DCHG OC P	BAT2 Discharge Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
B13P	BAT2 CEL V HOLD P	BAT2 Cell Voltage Sensing Data Hold Protection	Power reset of the system is required. If the symptom still occurs after reset, repair of BMS or PCS Control Board is necessary.
B14P	BAT2 CEL OV P	BAT2 Cell or Rack Over Voltage Protection	When the maximum cell or rack voltage is above protection level, thus terminating the system. Automatically returns to normal when the maximum cell or rack voltage goes below the limit value.

WEB Display	HMI Display	Description	Measures
B15P	BAT2 CEL UV P	BAT2 Cell or Rack Under Voltage Protection	When the minimum cell or rack voltage is below protection level, thus terminating the system. Automatically returns to normal when the minimum cell or rack voltage goes above the limit value.
B16P	BAT2 CEL OT P	BAT2 Cell Over Temp Protection	When the maximum cell temperature is above protection level, thus terminating the system. Automatically returns to normal when the maximum cell temperature goes below the limit value.
B17P	BAT2 COM P	BAT2 Communication Protection	Power reset of the system is required. If the symptom persists after reset, replace the cable connecting the Battery pack and the INVERTER. After replacement, repair of BMS or PCS Control Board is necessary.
B18P	BAT2 ADD P	BAT2 Additional Protection	Power reset of the system is required. If the symptom still occurs after reset, repair of BMS or PCS Control Board is necessary.
B21P	BAT3 CHG OC P	BAT3 Charge Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
B22P	BAT3 DCHG OC P	BAT3 Discharge Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.

WEB Display	HMI Display	Description	Measures
B23P	BAT3 CEL V HOLD P	BAT3 Cell Voltage Sensing Data Hold Protection	Power reset of the system is required. If the symptom still occurs after reset, repair of BMS or PCS Control Board is necessary.
B24P	BAT3 CEL OV P	BAT3 Cell or Rack Over Voltage Protection	When the maximum cell or rack voltage is above protection level, thus terminating the system. Automatically returns to normal when the maximum cell or rack voltage goes below the limit value.
B25P	BAT3 CEL UV P	BAT3 Cell or Rack Under Voltage Protection	When the minimum cell or rack voltage is below protection level, thus terminating the system. Automatically returns to normal when the minimum cell or rack voltage goes above the limit value.
B26P	BAT3 CEL OT P	BAT3 Cell Over Temp Protection	When the maximum cell temperature is above protection level, thus terminating the system. Automatically returns to normal when the maximum cell temperature goes below the limit value
B27P	BAT3 COM P	BAT3 Communication Protection	Power reset of the system is required. If the symptom persists after reset, replace the cable connecting the Battery pack and the INVERTER. After replacement, repair of BMS or PCS Control Board is necessary.
B28P	BAT3 ADD P	BAT3 Additional Protection	Power reset of the system is required. If the symptom still occurs after reset, repair of BMS or PCS Control Board is necessary.

WEB Display	HMI Display	Description	Measures
B31P	BAT4 CHG OC P	BAT4 Charge Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
B32P	BAT4 DCHG OC P	BAT4 Discharge Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
B33P	BAT4 CEL V HOLD P	BAT4 Cell Voltage Sensing Data Hold Protection	Power reset of the system is required. If the symptom still occurs after reset, repair of BMS or PCS Control Board is necessary.
B34P	BAT4 CEL OV P	BAT4 Cell or Rack Over Voltage Protection	When the maximum cell or rack voltage is above protection level, thus terminating the system. Automatically returns to normal when the maximum cell or rack voltage goes below the limit value.
B35P	BAT4 CEL UV P	BAT4 Cell or Rack Under Voltage Protection	When the minimum cell or rack voltage is below protection level, thus terminating the system. Automatically returns to normal when the minimum cell or rack voltage goes above the limit value.
B36P	BAT4 CEL OT P	BAT4 Cell Over Temp Protection	When the maximum cell temperature is above protection level, thus terminating the system. Automatically returns to normal when the maximum cell temperature goes below the limit value

WEB Display	HMI Display	Description	Measures
B37P	BAT4 COM P	BAT4 Communication Protection	Power reset of the system is required. If the symptom persists after reset, replace the cable connecting the Battery pack and the INVERTER. After replacement, repair of BMS or PCS Control Board is necessary.
B38P	BAT4 ADD P	BAT4 Additional Protection	Power reset of the system is required. If the symptom still occurs after reset, repair of BMS or PCS Control Board is necessary.
B41P	BAT5 CHG OC P	BAT5 Charge Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
B42P	BAT5 DCHG OC P	BAT5 Discharge Over Current Protection	The product stops the generating process because a significant protection event has occurred. Wait until the event message disappears. After the event message is removed, it automatically returns to normal. If it is not removed until the time limit is reached, it is converted to a significant event.
B43P	BAT5 CEL V HOLD P	BAT5 Cell Voltage Sensing Data Hold Protection	Power reset of the system is required. If the symptom still occurs after reset, repair of BMS or PCS Control Board is necessary
B44P	BAT5 CEL OV P	BAT5 Cell or Rack Over Voltage Protection	When the maximum cell or rack voltage is above protection level, thus terminating the system. Automatically returns to normal when the maximum cell or rack voltage goes below the limit value.

WEB Display	HMI Display	Description	Measures
B45P	BAT5 CEL UV P	BAT5 Cell or Rack Under Voltage Protection	When the minimum cell or rack voltage is below protection level, thus terminating the system. Automatically returns to normal when the minimum cell or rack voltage goes above the limit value.
B46P	BAT5 CEL OT P	BAT5 Cell Over Temp Protection	When the maximum cell temperature is above protection level, thus terminating the system. Automatically returns to normal when the maximum cell temperature goes below the limit value.
B47P	BAT5 COM P	BAT5 Communication Protection	Power reset of the system is required. If the symptom persists after reset, replace the cable connecting the Battery pack and the INVERTER. After replacement, repair of BMS or PCS Control Board is necessary.
B48P	BAT5 ADD P	BAT5 Additional Protection	Power reset of the system is required. If the symptom still occurs after reset, repair of BMS or PCS Control Board is necessary.

[Table 9-2 : Battery Operation General Events List]

9.1.3 System General Events (Protection)

Type : PROTECTION			
WEB Display	HMI Display	Description	Measures
P01P	Unknown	Unregistered Failure	It is an unregistered fault. Turn off and restart the system. Please contact the Q CELLS Service –Hotline, if an error occurs continuously.
P03P	DSP-EMG TRIP P	DSP-Emergency Trip Protection	Please check emergency switch.
P11P	ADC P	ADC Measure Error Protection	Please turn off and restart the system. If an error occurs repeatedly, it is necessary to replace the Control Board.
P12P	DSPM UPDATE P	DSP Master Remote Update Fail Protection	Please update DSP Master software again.
P13P	DSPS UPDATE P	DSP Slave Remote Update Fail Protection	Please update DSP Slave software again.
P14P	PMS UPDATE P	PMS Remote Update Fail Protection	Please update PMS software again.
P15P	DSP VER P	DSP Firmware Version Error Protection	DSP and PMS versions are different. Please re-install the DSP software.
P16P	PMS VER P	PMS Firmware Version Error Protection	Please update DSP Slave software again.
P21P	DSPM FRAM P	DSP Master FRAM Communication Error Protection	Please turn off and restart the system. If an error occurs repeatedly, it is necessary to replace the Control Board.
P22P	DSPS FRAM P	DSP Slave FRAM Communication Error Protection	Please turn off and restart the system. If an error occurs repeatedly, it is necessary to replace the Control Board.
P23P	DSP COM P	DSPM-DSPS Communication Error Protection	It is an unregistered fault. Turn off and restart the system. Please contact the Q CELLS Service –Hotline, if an error occurs continuously.

[Table 9-3 : System General Events Protection List]

10. Maintenance

10.1 Cleaning the Cover

NOTICE

Qualified Person Only!
Damage to the ESS due to the use of cleaning agents. If the ESS is dirty, clean the enclosure, the enclosure lid, the type label and the LEDs using only clean water and a cloth.

Ensure that the ESS is free of dust, foliage and other dirty.

10.2 Checking and Exchanging Various Components

NOTICE

Qualified Person Only !

10.2.1 Fuse Check

- Check the fuse when the device fails to work with significant error.
- Do not perform Fuse Check when the device is working.
- Check the fuse after turning off the DC disconnect switch and the AC circuit breaker.
- Measure both ends of the Filter PBA F101, F102, and F401 check the resistance value.
- If the resistance value is open state (Mega ohms or Infinite value), perform PBA exchange.
- Voltage rating : 600 Vac/Vdc
- Current rating : 30 A

10.2.2 Input / Output Terminal Check

- Check the input / output terminal when the device fails to work with significant errors.
- Check the input / output terminal after turning off the AC circuit breaker and DC disconnect switch.
- Do not perform the check when the device is working.
- Measure the input / output terminal with a multi-meter.
  - PV1 input : CN104, CN105
  - PV2 input : CN107, CN106
  - Battery input : CN401
  - Load output : CN603
  - AC output : CN1 (Sub Filter Board)
- If the resistance value is in a short state (close to 0), perform PBA exchange.

10.2.3 DC Link Check

- Check the DC Link when the device fails to work.
- Check the DC Link after turning off the AC circuit breaker and DC disconnect switch.
- If the resistance value is in a short state, perform PBA exchange.

10.3 Battery Maintenance

CAUTION

All work or service on the ESS and electrical connections must be supervised by personnel knowledgeable about batteries and the required precautions. When replacing Battery packs, replace old ones with the same type and number of batteries (Check the type label or serial numbers/model numbers on Battery packs). 40-minute standby period of time to complete discharging in the system before testing electrical parts inside the system!
Do not dispose of batteries in a fire. The batteries may explode.
Do not open or damage batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.
A Battery can present a risk of electrical shock and high short-circuit current.
The following precautions should be observed when handling batteries.
Remove watches, rings, or other metallic objects.
Use tools with insulated handles.
Wear rubber gloves, eye protection glasses and boots when working with the Battery systems.
Do not lay tools or metal parts on top of batteries.
Disconnect charging source prior to connecting or disconnecting Battery terminals.
Determine if the Battery is inadvertently grounded. If that is the case, separate Battery from ground Contact with any part of a grounded Battery can result in electrical shock.
The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote Battery supplies not having a grounded supply circuit).

10.3.1 Checking Battery Problem

When you check the event message (as noted in Chapter 9), check whether it is a significant event that informs the Battery system.

If it is a significant event, contact the installer or the maintenance personnel.

If it is a significant event message related to the failure, exchange the Battery. However, Battery exchange is permitted only to the qualified personnel.

10.3.2 Battery Exchange Procedure

1. Disconnect the BMS communication cable.
2. Open the bottom cover of the Battery you want to replace.
3. Remove the ground, (+) and (-) wire.
4. Close the Battery bottom cover and move the Battery pack to a suitable location.
5. Prepare the Battery pack to be installed and proceed as described in section 5.3.

10.4 The List of Replaceable Parts

The [Table 10-1] shows the list of parts replaceable for maintenance of this system.
For the parts other than presented here, please refer to the application notes linked on the website, or contact the installer or the service center.

No.	Part Name	Manufacturer	Code No.
1	Li-Ion Battery module	SAMSUNG SDI	
2	PV Connector (+)	Weidmuller	752601202000000
3	PV Connector (-)	Weidmuller	752602202000000

[Table 10-1 : Replaceable Parts List]

10.4.1 Li-Ion Battery module

The Li-Ion Battery module can be replaced if it fails to work properly. The Q.HOME+ ESS HYB-G2 uses a Battery module manufactured by SAMSUNG SDI. When you have to replace the Battery module, please contact Q CELLS and provide the item's name and the serial number of the Q.HOME+ ESS HYB-G2.

10.4.2 PV Connector

The PV connector can be replaced when it is damaged. The PV connector used in the Q.HOME+ ESS HYB-G2 consists of a PV stick with male/female parts manufactured by Weidmuller.

PV Connector (+) PV Connector (-)

[Figure 10-1 : PV Connector (MC4 Type)]

11. Technical Specifications

Europe			
PV Data (DC)			
Max. input total power		6.6 kWp	
Max. input power per string		3.3 kWp	
Max. input voltage		550 V	
Min. input voltage / Initial input voltage		125 V / 150 V per string	
MPPT voltage range		125 V - 500 V	
Max. inverter backfeed current		0 A	
Max. input current per string		15 A	
Max. input short circuit current for each MPPT		20 A	
Max. PV port input short-circuit fault current (A)		62 A, 53.34 ms	
Number of independent MPPT trackers		2	
Number of DC inputs pairs for each MPPT		2	
Connection type		MC4 Type	
Over voltage Category		II	
Battery Data (DC)			
		1 Battery Pack	2 or more Battery Pack
Q.SAVE G2 4kWh	Battery nominal capacity	4.0 kWh	4.0 kWh x Pack
	Battery voltage range / nominal voltage	176.4Vdc - 225.12Vdc / 203.84Vdc	
	Max. discharge current	17 A	
	Max. charge current	9.8 A	17 A
	Max. charge power	2.0 kW	3.0 kW
	Short circuit current	771.25 A (701 µs)	
Q.SAVE G2 6.3kWh	Battery nominal capacity	6.3 kWh	6.3 kWh x Pack
	Battery voltage range / nominal voltage	173.6Vdc - 228.2Vdc / 202.7Vdc	
	Max. discharge current	15.6 A	17 A
	Max. charge current	15.6 A	17 A
	Max. charge power	3.0 kW	
	Short circuit current	1070.5 A (0.4 ms)	
Max. discharge power		3.0 kW	
Battery technology		Rechageable Li-Ion	
DC/DC converter technology		Non-Isolated	
Over voltage Category		II	
Grid Output			
Grid inrush current (A)		210.4 A, 19.598ms	
Rated power (at 230V, 50 Hz)		4.6 kW	
Max. output apparent AC power		4.6 kVA	
Nominal voltage / range		230 V / 184 V_{AC} - 264 V_{AC}	
Rated power frequency / range		50 Hz / 47.5 Hz - 51.5 Hz	
Max. current		25 A	
Max. Rated / Max. output current		20 A / 25 A	
Max. over-current protectionnt		32 A	
Max. grid port output short-circuit fault current (A)		210.4 A, 19.598 ms	
Adjustable power factor range		0.8 lagging to 0.8 leading	
Feed-in phases / connection phases		1 / 1	
Total Harmonic Distortion. (Total harmonic factor of the output current with total harmonic factor of the AC voltage < 2 %, and AC power > 50 % of the rated power)		5 %	
Over voltage Category		III	

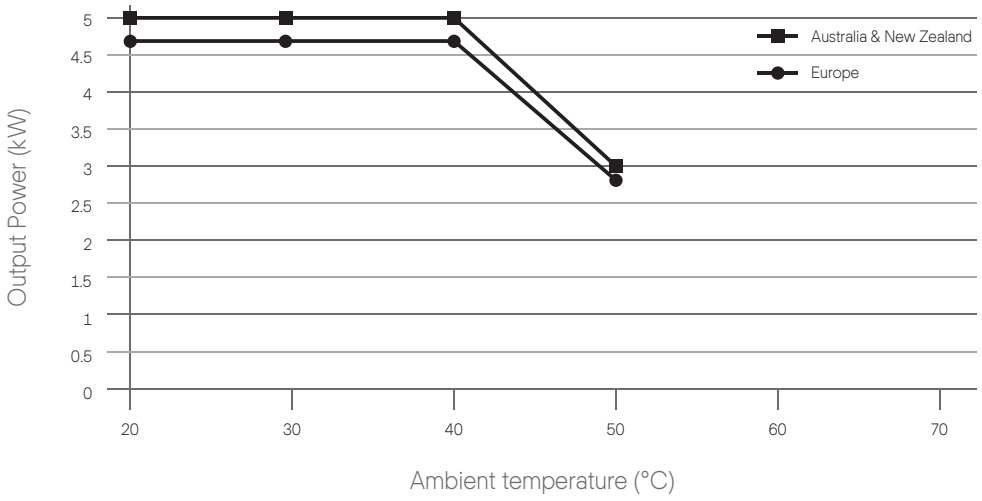
Grid Input		
Rated / Maximum input apparent power		3000 / 4000 VA
Rated / Maximum input active power		3000 / 4600 W
Rated input voltage		230 Va.c.
Rated / Maximum continuous input current		13/25 Aa.c.
Rated input frequency		50 Hz
Max. grid port input short-circuit fault current (A)		56.5 A (191.048 ms)
Back-up Output		
AC connection type		Single phase
Nominal apparent power		3000 VA
Nominal AC voltage		230 VAC
Nominal frequency		50 Hz
AC Nominal Active Power / Max		3000 W / 4600 W (10 min)
Max. back-up port output short-circuit fault current (A)		125 A, 4.384 ms
Efficiency (PV to Grid)		
European efficiency		95.5 %
Max. efficiency		96.2 %
Protective Device		
DC disconnection device for PV		Yes
Ground-fault monitoring / grid monitoring		Yes / Yes
General Data		
Dimensions (W x H x D, mm)		467.6 x 721.6 x 212.5 (INVERTER)
		467.6 x 721.6 x 212.5 (Battery)
Weight		31.28 kg (INVERTER)
		52.26 kg (4kWh) / 59.36 kg (6.3kWh)
Protective class (I, II, III)		Class I
Degree of protection		IP 65 (Both)
Max. permissible value for relative humidity		4 % to 100 % (Condensing)
Operating temperature	INVERTER (Derates > 40°C)	-20 - +50 °C
	Battery (Derates outside these temperatures)	+0 - +40 °C (4 kWh) / -10 - +40 °C (6.3 kWh)
Suggested operating temperature		+0 - +40 °C
Storage temperature		-20 - +60 °C (Both)
INVERTER topology		Non-Isolated
Noise emission		≤ 40 dB(A) @ 1m
Intend to use		Outdoor
Wet condition		Yes
Pollution degree		3
Maximum altitude rating		< 2000 m
Features		
Display		Touch TFT LCD “4.95” inch
Communication		LAN (Modbus TCP / IP), RS485, CAN
Energy management system		Integrated
Certificates and approvals	IEC 62109-1/2, VDE-AR-N 4105:2018, VDE V 0124-100, VFR 2019, IEC 61000 series, G99, UTE C 15-712-1:2013, EDT Version 1, DIN VDE 0126-1-1A1:2012, SEI REF 04 Version 7 (INVERTER)	
	IEC 62619, IEC 62477-1, IEC 62040-1, IEC 60068-2-52, EN 61000-6-2/3 (Battery)	
Island protection	Shifting the frequency of the INVERTER away from nominal conditions in the absence of a reference frequency. (Frequency shift)	

[Table 11-1 : Technical Specifications (Europe)]

Australia & New Zealand			
PV Data (DC)			
Max. input total power		6.6 kWp	
Max. input power per string		3.3 kWp	
Max. input voltage		550 V	
Min. input voltage / Initial input voltage		125 V / 150 V per string	
MPPT voltage range		125 V - 500 V	
Max. inverter backfeed current		0 A	
Max. input current per string		15 A	
Max. input short circuit current for each MPPT		20 A	
Max. PV port input short-circuit fault current (A)		62 A, 53.34 ms	
Number of independent MPPT trackers		2	
Number of DC inputs pairs for each MPPT		2	
Connection type		MC4 Type	
Over voltage Category		II	
Battery Data (DC)			
		1 Battery Pack	2 or more Battery Pack
Q.SAVE G2 4kWh	Battery nominal capacity	4.0 kWh	4.0 kWh x Pack
	Battery voltage range / nominal voltage	176.4 Vdc - 225.12 Vdc / 203.84 Vdc	
	Max. discharge current	17 A	
	Max. charge current	9.8 A	17 A
	Max. charge power (Rated power)	2.0 kW (0.8 kW)	3.0 kW (0.8 kW x Pack)
	Short circuit current	771.25 A (701 µs)	
Q.SAVE G2 6.3kWh	Battery nominal capacity	6.3 kWh	6.3 kWh x Pack
	Battery voltage range / nominal voltage	173.6 Vdc - 228.2 Vdc / 202.7 Vdc	
	Max. discharge current	15.6 A	17 A
	Max. charge current	15.6 A	17 A
	Max. charge power (Rated power)	3.0 kW (1.25 kW x Pack)	
	Short circuit current	1070.5 A (0.4 ms)	
Max. discharge power		3.0 kW	
Battery technology		Rechageable Li-Ion	
DC/DC converter technology		Non-Isolated	
Over voltage Category		II	
Grid Output			
Grid inrush current (A)		210.4 A, 19.598 ms	
Rated power (at 230V, 50 Hz)		5.0 kW	
Max. output apparent AC power		5.0 kVA	
Nominal voltage / range		230 V / 184 V_{AC} - 264 V_{AC}	
Rated power frequency / range		50 Hz / 47.5 Hz - 51.5 Hz	
Max. current		25 A	
Max. Rated / Max. output current		20 A / 25 A	
Max. over-current protectionnt		32 A	
Max. grid port output short-circuit fault current (A)		210.4 A, 19.598 ms	
Adjustable power factor range		0.8 lagging to 0.8 leading	
Feed-in phases / connection phases		1 / 1	
Total Harmonic Distortion. (Total harmonic factor of the output current with total harmonic factor of the AC voltage < 2 %, and AC power > 50 % of the rated power)		5 %	
Over voltage Category		III	

Grid Input		
Rated / Maximum input apparent power		3000 / 4000 VA
Rated / Maximum input active power		3000 / 4600 W
Rated input voltage		230 Va.c.
Rated / Maximum continuous input current		13/25 Aa.c.
Rated input frequency		50 Hz
Max. grid port input short-circuit fault current (A)		56.5 A (191.048 ms)
Back-up Output		
AC connection type		Single phase
Nominal apparent power		3000 VA
Nominal AC voltage		230 VAC
Nominal frequency		50 Hz
AC Nominal Active Power / Max		3000 W / 4600 W (10 min)
Max. back-up port output short-circuit fault current (A)		125 A, 4.384 ms
Efficiency (PV to Grid)		
European efficiency		95.5 %
Max. efficiency		96.2 %
Protective Device		
DC disconnection device for PV		Yes
Ground-fault monitoring / grid monitoring		Yes / Yes
General Data		
Dimensions (W x H x D, mm)		467.6 x 721.6 x 212.5 (INVERTER)
		467.6 x 721.6 x 212.5 (Battery)
Weight		31.28 kg (INVERTER)
		52.26 kg (4 kWh) / 59.36 kg (6.3 kWh)
Protective class (I, II, III)		Class I
Degree of protection		IP 65 (Both)
Max. permissible value for relative humidity		4 % to 100 % (Condensing)
Operating temperature	INVERTER (Derates > 40°C)	-20 - +50 °C
	Battery (Derates outside these temperatures)	+0 - +40 °C (4kWh) / -10 - +40 °C (6.3 kWh)
Suggested operating temperature		+0 - +40 °C
Storage temperature		-20 - +60 °C (Both)
INVERTER topology		Non-Isolated
Noise emission		≤ 40 dB(A) @ 1m
Intend to use		Outdoor
Wet condition		Yes
Pollution degree		3
Maximum altitude rating		< 2000 m
Features		
Display		Touch TFT LCD “4.95” inch
Communication		LAN (Modbus TCP / IP), RS485, CAN
Energy management system		Integrated
Certificates and approvals		IEC 62109-1/2, AS 62040.1.1, AS/NZS 4777.2, IEC 62116, IEC 60068-2-52 (INVERTER)
		IEC 62619, IEC 62477-1, IEC 62040-1, IEC 60068-2-52, EN 61000-6-2/3 (Battery)
Island protection		Shifting the frequency of the INVERTER away from nominal conditions in the absence of a reference frequency. (Frequency shift)

[Table 11-2 : Technical Specifications (Australia & New Zealand)]



[Figure 11-1 : Derating Curve]

Item		Cell body / module temperature		Specification
Maximum Charge Current(*)	Q.SAVE-G2 4 kWh	T < 0 °C		0 A
		0 °C ≤ T < 10 °C		3.5 A
		10 °C ≤ T < 25 °C		7 A
		25 °C ≤ T < 40 °C		9.8 A
		40 °C ≤ T < 50 °C		3.5 A
		50 °C ≤ T		2.1 A
	Q.SAVE-G2 6.3 kWh	Cell body temperature	Max Cell V	Specification
		T < -10 °C	-	0 A
		-10 °C ≤ T < 0 °C	Max Cell V < 3.8	7.5 A
			3.8 ≤ Max Cell V < 3.9	3 A
			3.9 ≤ Max Cell V	0 A
		0 °C ≤ T < 10 °C	Max Cell V < 3.8	7.5 A
			3.8 ≤ Max Cell V < 4.0	3 A
			4.0 ≤ Max Cell V	0 A
		10 °C ≤ T < 20 °C	Max Cell V < 3.8	15.6 A
			3.8 ≤ Max Cell V	10 A
		20 °C ≤ T < 45 °C	-	15.6 A
		45 °C ≤ T < 55 °C	-	10 A
		55 °C ≤ T	-	3 A

(*) : Maximum Charge Current

- If the battery is discharged at the maximum discharge current / power, the battery should be cooled its ambient temperature before discharging again.

[Table 11-3 : Maximum Charge Current Limit]

Item		Cell body / module temperature	Specification
Maximum Discharge Current(*)	Q.SAVE-G2 4 kWh	T < -20 °C	0 A
		-20 °C ≤ T < -10 °C	7 A
		-10 °C ≤ T < 0 °C	10.5 A
		0 °C ≤ T < 40 °C	19.6 A
		40 °C ≤ T < 50 °C	10.5 A
		50 °C ≤ T	7 A
	Q.SAVE-G2 6.3 kWh	Cell body temperature	Specification
		T < -10 °C	0 A
		-10 °C ≤ T < 50 °C	15.6 A
		50 °C ≤ T < 55 °C	10 A
		55 °C ≤ T	3 A

[Table 11-4 : Maximum Discharge Current Limit]

12. Disassembly

12.1 Disassembly

	CAUTION Risk of injury due to the heavy weight of the Q.HOME+ ESS HYB-G2! Make sure to have at least two persons move this system.
	CAUTION Lethal hazards may be caused by high voltages in the Q.HOME+ ESS HYB-G2!
	CAUTION Lethal hazards may be caused by voltage spikes if the positive and negative terminal of the Battery are shorted by conductive metals. Stand by for 40 minutes to complete discharging in the system.
	CAUTION When transporting the Q.HOME+ ESS HYB-G2, work with at least two persons (Overweight).

12.1.1 Removing Electric Connection

- Push down the DC disconnect switch in the distribution box.
- Push down the AC circuit breaker in the distribution box.
- Stand by for 40 minutes to complete discharging in the system.
- Remove the AC connection terminal in the main body of the Q.HOME+ ESS HYB-G2.
- Remove the PV connection terminal in the main body of the Q.HOME+ ESS HYB-G2.
- Remove the communication cable from the Q.HOME+ ESS HYB-G2.
- Remove the energy meter.

12.1.2 Disassembling the Main Body of Q.HOME+ ESS HYB-G2

- Check to make sure that the communication connection line and the external electrical cable are removed from the Battery and product.
- Open the bottom cover of this product.
- Disconnect AC, Load and Battery connections from the INVERTER.
- Remove all communication lines from the INVERTER.
- Remove the BMS communication cable from the Battery.
- Close the INVERTER and the bottom cover of the Battery.
- Place the INVERTER and Battery in the packing box upside down. Work with at least two persons (Overweight).
- Remove the bottom bracket. This process is the reverse order of the installation process.

12.2 Packaging

Make sure to pack the Q.HOME+ ESS HYB-G2 in the original box.
If you have to pack in the box other than provided by Q CELLS, consider the minimum weight.
The main body must go into the box completely.

12.3 Storage

Store Q.HOME+ ESS HYB-G2 at a temperature ranging from -20 to 60 °C.

12.4 Disposal

If the Battery or the product life has expired, the regulations for the disposal of electronic products in that region must be followed, and if it is not possible, send them to Q CELLS. The address is indicated in the contact information (See Chapter 13).

12.5 Transportation

When installing or moving the product, be sure to bring two or more workers together.

13. Contact

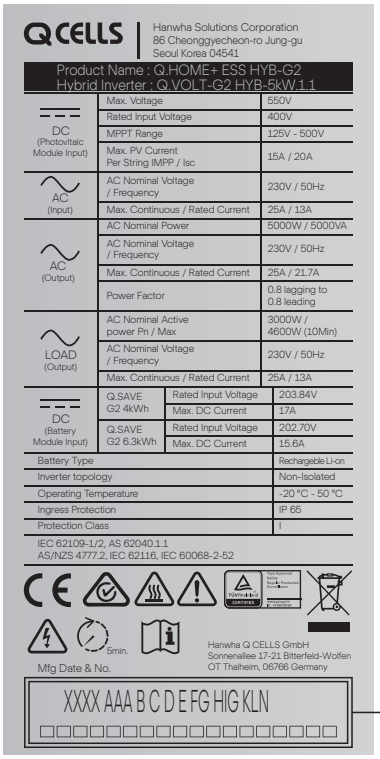
• Hanwha Solutions Corp.
Q CELLS 86 Cheonggyecheon-ro Jung-gu Seoul Korea 04541(+82(0)2-729-3163)

• Q.HOME+ ESS Service for Europe, Germany
E-Service Haberkorn GmbH Augustenhöhe 7 06493 Harzgerode
(Technical Support, +49(0)39484-9763-85, q.home@e-service48.com)

• Hanwha Q CELLS Australia Pty Ltd
Suite 1, Level 1, 15 Blue Street North Sydney, NSW 2060 Australia
(+61 (0)2 9016 3033, qhome.au@q-cells.com)

• For technical problems or inquiries for use, please contact the installation company.
To receive customer support, the following information is required.
1. Product type : Q.VOLT-G2 HYB-4.6kW.1.1 (Europe), Q.VOLT-G2 HYB-5.0kW.1.1 (Australia)
2. Serial Number : ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
3. PV module type and configuration
4. Option equipment : Energy Meter Model Name

Serial Number



☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ : Serial number (18 digit)

Manufacturer & Warranty Provider:
Hanwha Solutions Corporation
86 Cheonggyecheon-ro, Jung-gu,
Seoul Korea 04541