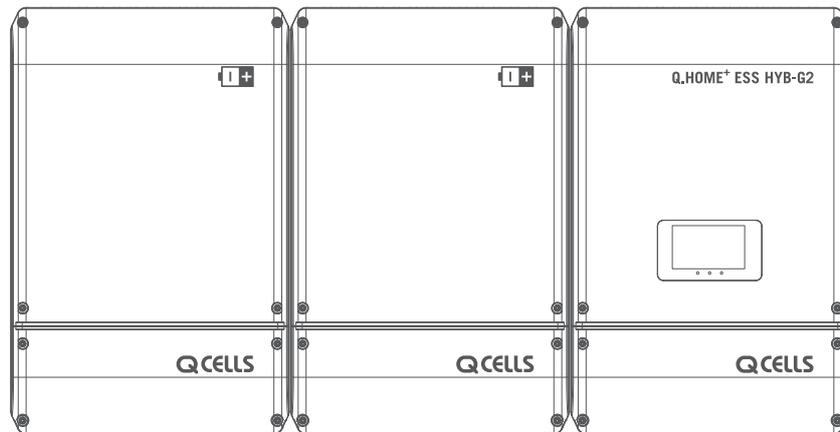


INSTALLATION MANUAL

Model : Q.HOME+ESS HYB-G2



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 installer.
- The Specifications of the product may be modified without prior notice to improve product quality.

TABLE OF CONTENTS

Table of Contents	i
Table of Tables	iv
Table of Figures	v
1. Information in this manual	1
1.1 About this Manual	1
1.2 Target Group	1
1.3 Manual Storage	1
1.4 Symbols Used	1
2. Safety	4
2.1 Intended Use	4
2.2 Safety Precautions	5
2.3 Product Overview	6
2.3.1 INVERTER Product Overview	6
2.3.2 Battery Product Overview	7
2.3.3 Basic Specifications	8
2.3.4 Grounding the PV INVERTER	9
3. Package Removal and Inspection	10
3.1 Package Removal	10
3.1.1 Removing the INVERTER Enclosure Package	10
3.1.2 Removing the Battery Enclosure Package	11
3.1.3 Checking Components on the Packing List	12
3.2 Checking for Damage in Delivery	14
3.3 Identifying Q.HOME+ESS HYB-G2	14
4. Installation	16
4.1 Selection of Installation Location	16
4.1.1 Dimensions	17
4.1.2 Ambient Conditions and Temperatures	17
4.1.3 Environmental Checks	17
4.1.4 Position (Location Selection)	18
4.2 Mounting Instructions	19
5. Electrical Connections	22
5.1 The Overview of Electrical Connection	22
5.1.1 Electrical System Connection	23
5.1.2 Power Line Specification	23
5.1.3 Overall Drawing of the Q.HOME+ESS HYB-G2	24
5.2 Opening the Front Case Cover	26
5.3 Battery Connections	27
5.4 Closing the Front Case Cover	30
5.5 Method of Locking the Distribution Box (Board)	31
5.5.1 AC Circuit Breaker and DC Disconnect Switch	32
5.5.2 RCD (residual current device) Leakage Circuit Breaker	32

5.6	An Installation Method of Energy Meter Electrical Connection	33
5.7	A Connecting Method of the DC Line from the PV	33
5.8	Connection Method between Grid and Load	35
5.8.1	Grid Connection Method	35
5.8.2	Load Connection Method	35
5.8.3	Battery Connection Method	36
5.8.4	Feature and Size of Cable	36
6.	Communication Connection	38
6.1	Internet Connection	38
6.1.1	Components	38
6.1.2	Connection Block Diagram	38
6.1.3	Connection Method	38
6.2	The Communication Terminal	39
6.3	Energy Meter Connection	40
6.3.1	RS-485 Interface	40
6.3.2	Connection Energy Meter	40
6.4	Recommended Energy Meter List	41
6.5	Homepage	42
6.5.1	Service Terms	42
6.5.2	Membership	42
6.5.3	Membership Withdrawal	42
6.5.4	Log-In	42
6.5.5	Password Initialization	43
6.5.6	Types of Service Offered	43
6.5.7	Mobile Service	46
7.	Entering Initial Installation Information	47
7.1	Information Input Administrator	47
7.2	System Information Input Stage	47
7.3	PC Direct Connection and Local Setting Value	47
7.3.1	PC Direct Connection Flow	47
7.3.2	LAN Cable Connection between PC and System	47
7.3.3	SIM (System Install Manager) Connection	47
7.3.4	Entering Setting Value	50
7.4	Web Page Connection	51
7.4.1	Web Page Connection	51
8.	Operating Test	56
8.1	LED Indications	56
8.2	Starting the System	56
8.2.1	Loading Screen & Update Screen	56
8.2.2	Home Screen Configuration Information	57
8.3	Turning off the System	59
8.4	Descriptions of Operation Mode	59
8.4.1	Status Description	59
8.4.2	Standby Mode	59

8.4.3	PV-Auto Mode	60
8.4.4	PV-Only Mode	61
8.4.5	Battery-Discharge Mode	62
8.4.6	Stand-Alone Mode	62
8.4.7	Event Check Mode	62
8.5	Information Display	63
8.5.1	PV Information Display	63
8.5.2	Grid Information Display	64
8.5.3	Load Information Display	65
8.5.4	Battery Information Display	66
8.5.5	System Information Display	67
8.5.6	Error Information Display	68
9.	Problem Confirmation	69
9.1	General Events	69
9.1.1	INVERTER General Events (Protection)	69
9.1.2	Battery General Events (Protection)	80
9.1.3	System General Events (Protection)	87
10.	Maintenance	88
10.1	Cleaning the Cover	88
10.2	Checking and Exchanging Various Components	88
10.2.1	Fuse Check	88
10.2.2	Input / Output Terminal Check	88
10.2.3	DC Link Check	88
10.3	Battery Maintenance	89
10.3.1	Checking Battery Problem	89
10.3.2	Battery Exchange Procedure	89
10.4	The List of Replaceable Parts	90
10.4.1	Li-Ion Battery Pack	90
10.4.2	PV Connector	90
11.	Technical Specifications	92
12.	Disassembly	94
12.1	Disassembly	94
12.1.1	Removing Electric Connection	94
12.1.2	Disassembling the Main Body of Q.HOME+ESS HYB-G2	94
12.2	Packaging	95
12.3	Storage	95
12.4	Disposal	95
13.	Contact	96

TABLE OF TABLES

[Table 1-1 : Symbol Description 1]	2
[Table 1-2 : Symbol Description 2]	3
[Table 1-2 : Symbol Description (Battery)]	3
[Table 2-1 : Part Description of INVERTER]	6
[Table 2-2 : Part Description of Battery Pack]	7
[Table 2-3 : Basic Specifications]	8
[Table 3-1 : Component Description of INVERTER]	12
[Table 3-2 : Component Description of Battery Pack]	13
[Table 4-1 : Screw Specification]	19
[Table 5-1 : Power Line Specification]	23
[Table 5-2 : Component Description of INVERTER]	24
[Table 5-3 : Component Description of Battery Pack]	25
[Table 5-4 : Front Case Open Process]	26
[Table 5-5 : Circuit breaker and DC Disconnection Switch]	32
[Table 5-6 : RCD Leakage circuit breaker description]	32
[Table 5-7 : Insulation Strip Lengths]	36
[Table 6-1 : Description of Short Bar Location]	39
[Table 6-2 : Recommended Meter List]	40
[Table 6-3 : Recommended Meter List]	41
[Table 8-1 : LED Indications]	56
[Table 8-2 : Screen Configuration Information]	57
[Table 8-3 : Status Description]	59
[Table 8-4 : PV Information Display Description]	63
[Table 8-5 : Grid Information Display Description]	64
[Table 8-6 : Load Information Display Description]	54
[Table 8-7 : Battery Information Display Description]	66
[Table 8-8 : System Information Display Description]	67
[Table 8-9 : Error Information Display Description]	68
[Table 9-1 : INVERTER General Events Warning List]	79
[Table 9-2 : Battery Operation General Events List]	86
[Table 9-3 : System General Events Protection List]	87
[Table 10-1 : Replaceable Parts List]	90
[Table 11-1 : Technical Specifications]	92

TABLE OF FIGURES

[Figure 2-1 : TN-S Network System Connection Diagram]	4
[Figure 2-2 : Part View of INVERTER]	6
[Figure 2-3 : Part View of Battery Pack]	7
[Figure 2-4 : Work on the Ring Terminal]	9
[Figure 2-5 : Ring Terminal (10R6-4)]	9
[Figure 2-6 : Double Grounding Point of Q.HOME+ESS HYB-G2]	9
[Figure 3-1 : Process for the INVERTER Enclosure Package Removal]	10
[Figure 3-2 : Process for the Battery Enclosure Package Removal]	11
[Figure 3-3 : Packing List of INVERTER]	12
[Figure 3-4 : Packing List of Battery Pack]	13
[Figure 4-1 : Dimension of Q.HOME+ESS HYB-G2]	17
[Figure 4-2 : Minimum Clearance for Q.HOME+ESS HYB-G2]	18
[Figure 4-3 : Restriction for the Surface Gradient]	18
[Figure 4-4 : Bracket on the Wall in Step 1, 2]	19
[Figure 4-5 : Bracket on the Wall in Step 3]	20
[Figure 4-6 : Bracket on the Wall in Step 4]	20
[Figure 4-7 : Bracket on the Wall in Step 5]	21
[Figure 4-8 : Bracket on the Wall in Step 6]	21
[Figure 5-1 : PV Connections]	23
[Figure 5-2 : INVERTER Bottom View]	24
[Figure 5-3 : INVERTER Front inside View]	24
[Figure 5-4 : Battery Bottom View]	25
[Figure 5-5 : Battery Front inside View]	25
[Figure 5-6 : Outside of Q.HOME+ESS HYB-G2]	27
[Figure 5-7 : Inside of Q.HOME+ESS HYB-G2]	28
[Figure 5-8 : Battery Pack and INVERTER Connection]	28
[Figure 5-9 : Cable Gland of Q.HOME+ESS HYB-G2]	28
[Figure 5-10 : BMS Communication Wire Connection]	29
[Figure 5-11 : Battery Pack Switch]	29
[Figure 5-12 : Outside of INVERTER and Battery Case]	30
[Figure 5-13 : Front Cover Assembly Process 1]	30
[Figure 5-14 : Front Cover Assembly Process 2]	30
[Figure 5-15 : Distribution Box Connection Diagram]	31
[Figure 5-16 : Electric Cable Connection for Energy Meter Installation]	33
[Figure 5-17 : PV Connector (Female) and PV Line (Male)]	33
[Figure 5-18 : PV Connector Connection (MC4 Type Connector Connection)]	34
[Figure 5-19 : Wire Connection and Disconnection]	34
[Figure 5-20 : Power Cable Connection to the AC Connector]	35
[Figure 5-21 : Power Cable Connection to the Load Connector]	35
[Figure 5-22 : Power Cable Connection to the Load Connector]	36
[Figure 5-23 : AC Cable Gland]	37
[Figure 5-24 : Ground Location of Grid and Load]	37
[Figure 6-1 : Internet Connection]	38
[Figure 6-2 : RJ45 Cable]	38
[Figure 6-3 : RJ45 External Connector Assembly]	38
[Figure 6-4 : Communication Terminal]	39
[Figure 6-5 : Out Connector Board Wire Connection Method]	40
[Figure 6-6 : Energy Meter Connection Method]	41

[Figure 6-7 : Energy Meter Connection Method]	41
[Figure 6-8 : Log-in Page]	42
[Figure 6-9 : Password Initialization Page]	43
[Figure 6-10 : Monitoring Page]	43
[Figure 6-11 : Backup Mode Monitoring Page]	44
[Figure 6-12 : Consumption Report Page]	44
[Figure 6-13 : Forecast Page]	45
[Figure 6-14 : Setting Page]	45
[Figure 6-15 : Mobile Service Page]	46
[Figure 7-1 : Setting Laptop IP]	48
[Figure 7-2 : Connecting Short Bar]	48
[Figure 7-3 : Initial Setup Page]	49
[Figure 7-4 : Main Page]	51
[Figure 7-5 : Installer in Page]	52
[Figure 7-6 : Product Information Entry Screen in Step 1]	53
[Figure 7-7 : Address Entry in Step 2]	53
[Figure 7-8 : Product Setup Information Details Entry in Step 3]	54
[Figure 7-9 : Energy Rate Information Entry in Step 4]	54
[Figure 7-10 : Installation Completion Screen]	54
[Figure 8-1 : LCD Location]	56
[Figure 8-2 : Initial Indication Screen on Power On]	56
[Figure 8-3 : Update Screen]	56
[Figure 8-4 : Standby State Indication Screen before the EMS Command]	57
[Figure 8-5 : Home Menu Structure]	58
[Figure 8-6 : Diagram of PV-Auto Weak Mode]	60
[Figure 8-7 : Diagram of PV-Auto Strong Mode]	60
[Figure 8-8 : Diagram of PV-Auto Strong Both Mode]	61
[Figure 8-9 : Diagram of PV-Only Mode]	61
[Figure 8-10 : Diagram of Battery-Discharge Mode]	62
[Figure 8-11 : Diagram of Stand-Alone mode]	62
[Figure 8-12 : PV Information Display]	63
[Figure 8-13 : Grid Information Display]	64
[Figure 8-14 : Load Information Display]	65
[Figure 8-15 : Battery Information Display]	66
[Figure 8-16 : System Information Display]	67
[Figure 8-17 : Error Information Display]	68
[Figure 10-1 : PV Connector (MC4 Type)]	90
[Figure 11-1 : Derating Curve]	93

This page is intentionally left blank.

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

This installation manual applies only to the Q.HOME+ESS HYB-G2.

1.3 Manual Storage

The user manual and installation manual can be downloaded from the product download section at "<https://www.q-cells.de/service-support/downloadbereich.html>".

The specifications of the product can be changed for improvement without notice.

Also, the software can be updated automatically without notice over the Internet.

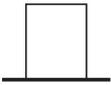
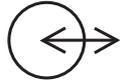
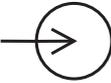
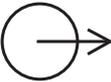
1.4 Symbols Used

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 before connecting supply

Symbols	Description
	Beware dangerous voltage. The INVERTER operates at high voltage. All works related to the INVERTER 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 the 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.

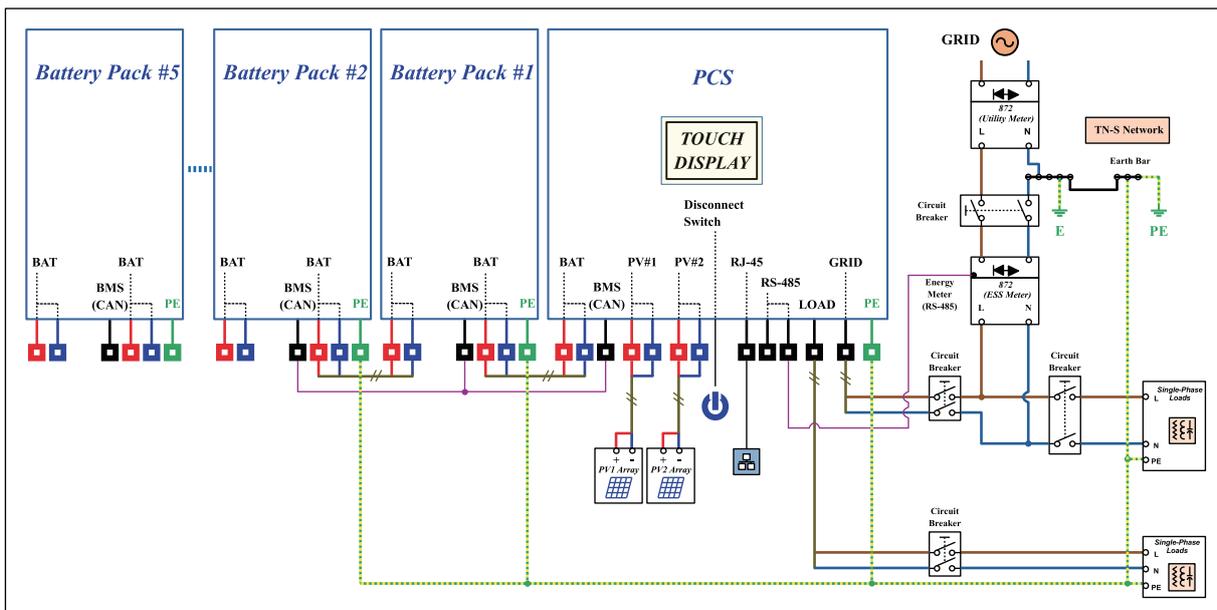
The Q.HOME+ESS HYB-G2 uses solar energy power connected to the input/output terminal installed on the side of the device in order to :

- 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.

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 Hansol Technics will nullify the product's guarantee.

For example, Hansol 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 Hansol Technics Service-Hotline.

TN-S Network System(Single-Phase)



[Figure 2-1 : TN-S Network System TOUCH Connection Diagram]

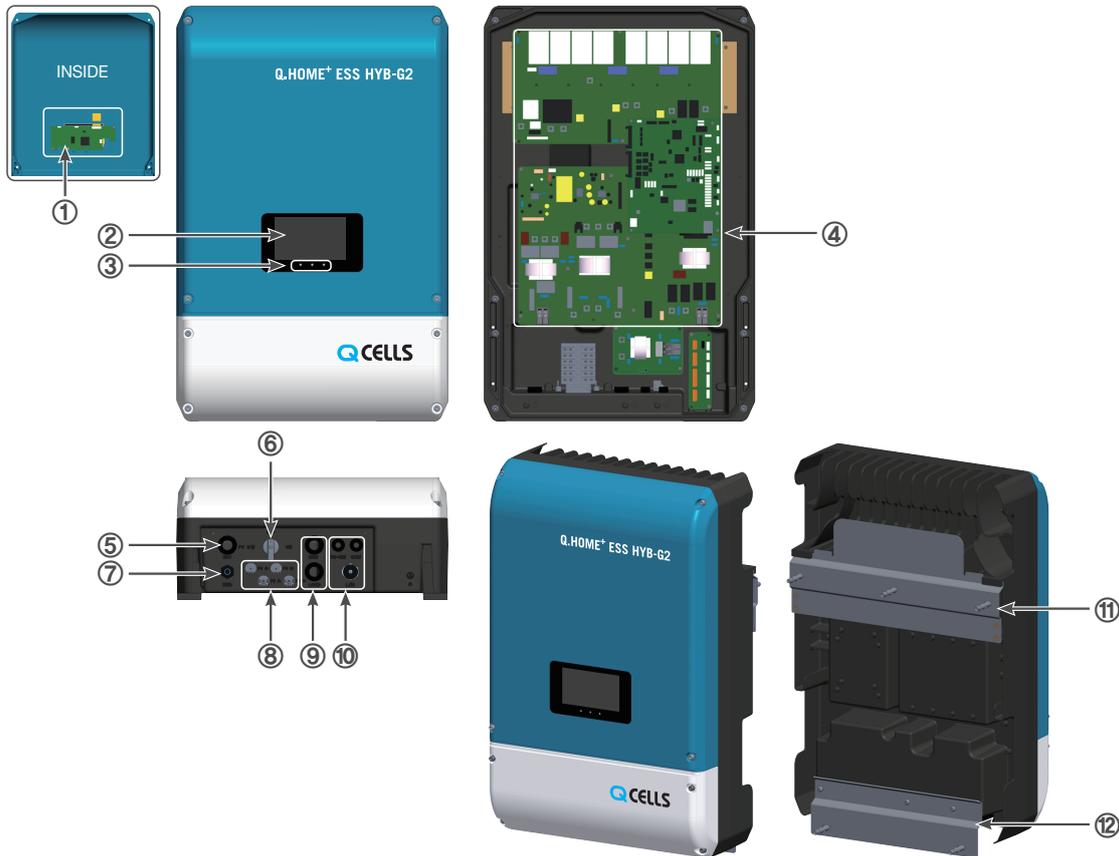
2.2 Safety Precautions

	<p>CAUTION</p> <p>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.</p>
	<p>CAUTION</p> <p>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.</p>
	<p>CAUTION</p> <p>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 equipment may be impaired.</p>
	<p>CAUTION</p> <p>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.</p>
	<p>CAUTION</p> <p>After disconnecting the INVERTER from Battery or PV, Wait 5minutes to discharge the INVERTER.</p>

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-Along 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

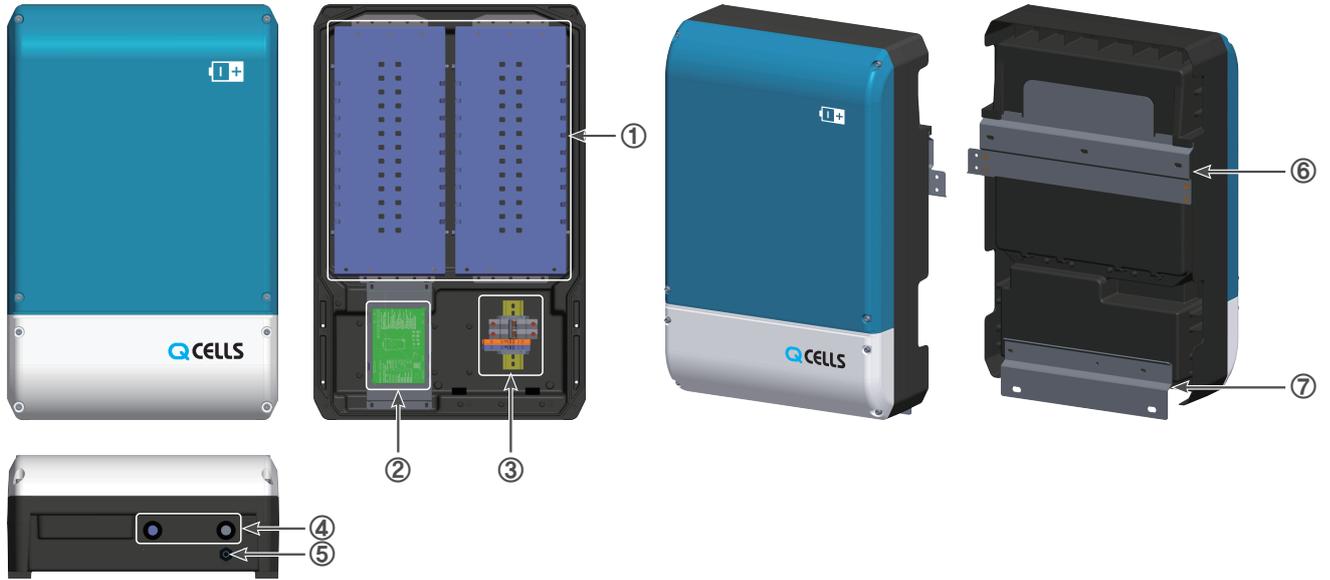


[Figure 2-2 : Part View of INVERTER]

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 Isolator)
⑦	Battery Communication
⑧	PV Input Connector (MC4 type 2set)
⑨	AC Connector and Load Connector
⑩	PCS Communication
⑪,⑫	Bracket Connected Part

[Table 2-1 : Part Description of INVERTER]

2.3.2 Battery Product Overview



[Figure 2-3 : Part View of Battery Pack]

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

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

2.3.3 Basic Specifications

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
Battery nominal capacity / usable 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
Battery DC/DC converter data		
Max. charge power	2 kWh	3 kWh
Max. discharge power	3.0 kWh	
Technology	Non-Isolated	
Grid Connection Data (AC)		
Rated power (at 230V, 50Hz)	4.6 kW	
Max. apparent AC power	4.6 kVA	
Max. current	20 A	
Nominal AC voltage / range	230 V / 184 Vac ~ 264 Vac	
Rated power frequency / range	50 Hz / 47.5 Hz ~ 51.5 Hz	

[Table 2-3 : Basic Specifications]

2.3.4 Grounding the PV INVERTER

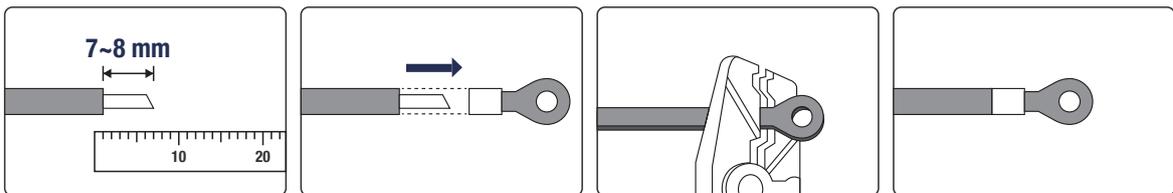
	DANGER
	High touch current, earth connection essential before connecting supply

The PV INVERTER complies with the local requirements for grounding the PV INVERTER. Hansol Technics 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.

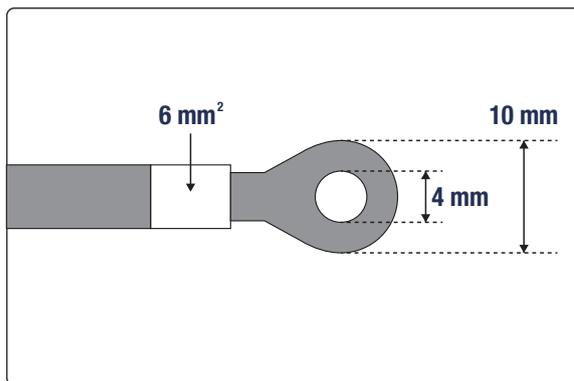
* Double Grounding Point

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

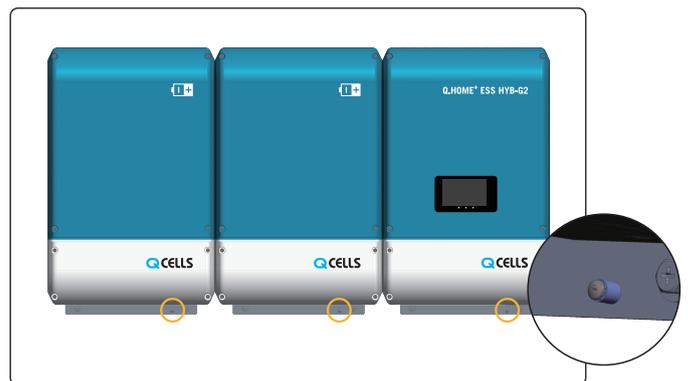
- Bolts : SJ60-00126A
- SCREW-MACHINE : PH, +, WSP, M4, L12, NTR, SUS304
- Torque for fastening bolts : 1.2 ~ 1.8 Nm



[Figure 2-4 : Work on the ring terminal]



[Figure 2-5 : Ring terminal (10R6-4)]



[Figure 2-6 : Double Grounding Point of Q.HOME+ESS HYB-G2]

3. Package Removal and Inspection



CAUTION

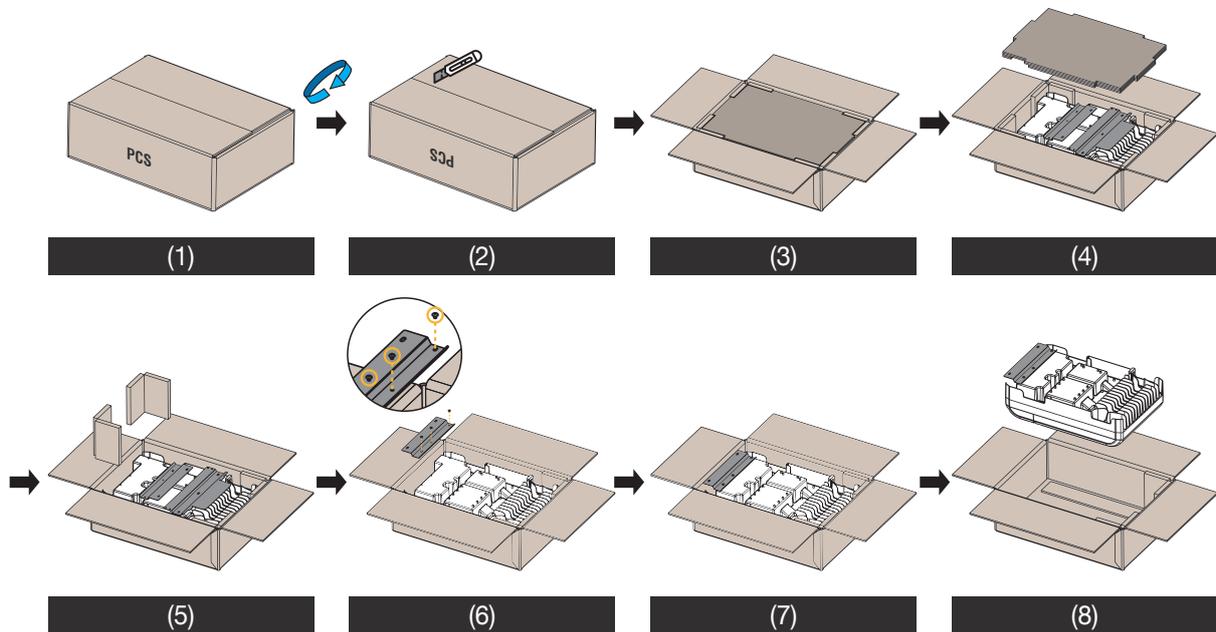
Included in this box are a Battery and printed circuit board. Therefore, special care must be taken in handling. Make sure to have at least two persons deliver and remove the package.

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.

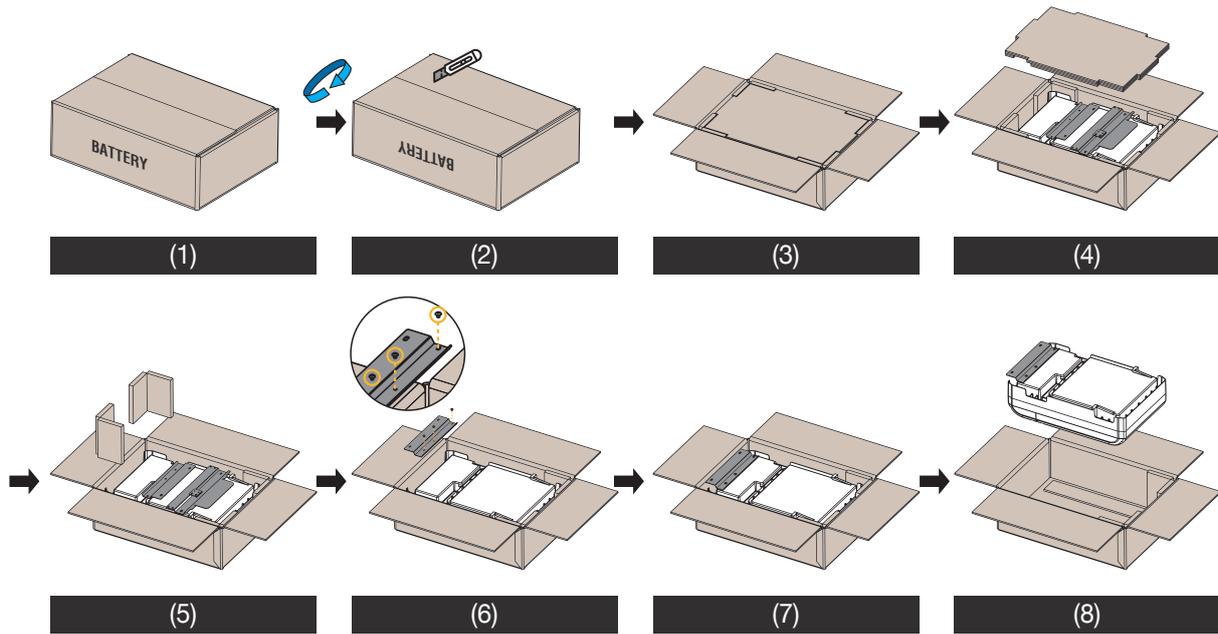


[Figure 3-1 : Process for the INVERTER Enclosure Package Removal]

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.

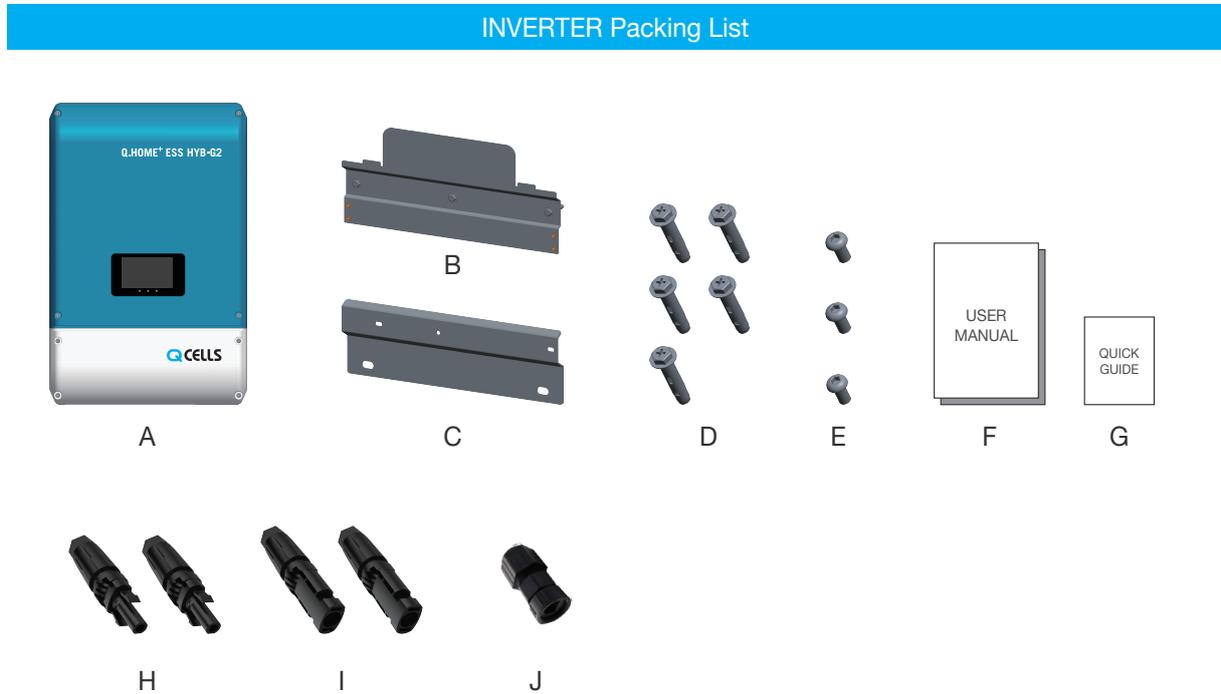
1. Place the system on the installation location.
2. Turn the box upside down.
3. Open the box.
4. Remove the cover on the back of the product.
5. Remove the protective cover on the side of the product.
6. Prepare the lower bracket for the INVERTER. (3 Down Bracket Screws, 1 Down Bracket)
7. Assemble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



[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], [Table 3-1] and [Table 3-2], check the entire components included in the package and the correct number of the quantity listed in the table.

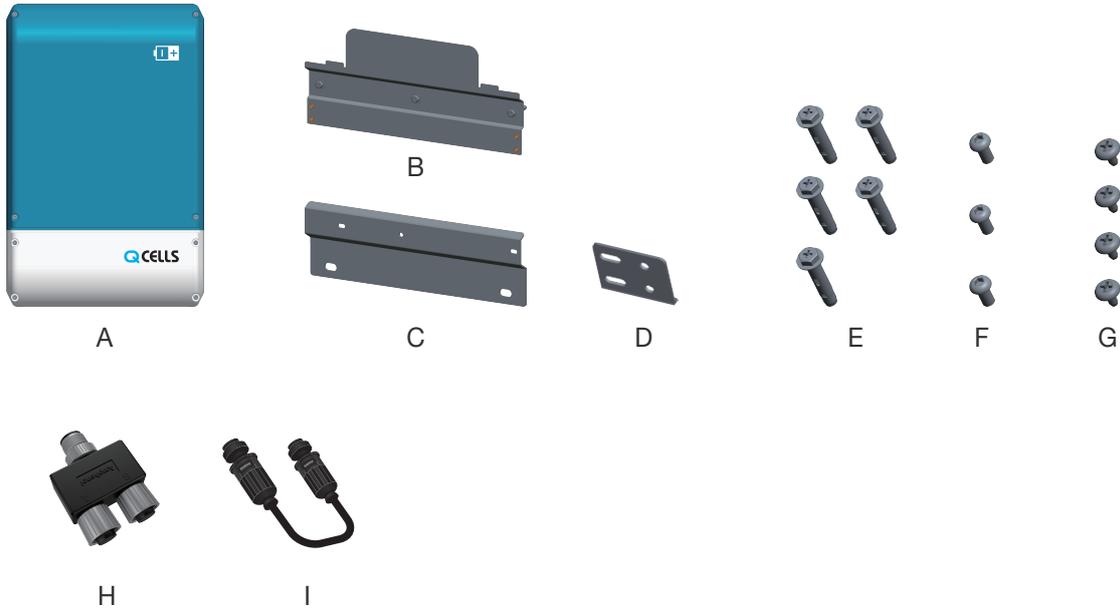


[Figure 3-3 : Packing List of INVERTER]

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	Adaptor	4635150029WD	1
I	BMS Communication Cable	4635150030WD	1

* H : 2 Batteries → 1ea / 3 Batteries → 2ea / 4 Batteries → 3ea / 5 Batteries → 4ea

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

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 your local dealer 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

- HSES-4001
 - HS : Hansol
 - ES : Energy System
 - 400 : Battery capacity (x0.01kwh)
(If Battery capacity is more than 10kwh, third number is K. For example, Battery capacity is 12kwh, model No. is HSES-12K1.)
 - 1 : First version

INVERTER (Power Conditioning System)

- HSHP-4601
 - HSHP : Hansol Hybrid PCS
 - 460 : Power of INVERTER (x0.01kwh)
(If Power of INVERTER is more than 10kwh, third number is K.)
 - 1 : First version

BATTERY

- HSBE-4001
 - HSBE : Hansol Battery
 - 400 : Battery capacity (x0.01kwh)
 - 1 : First version

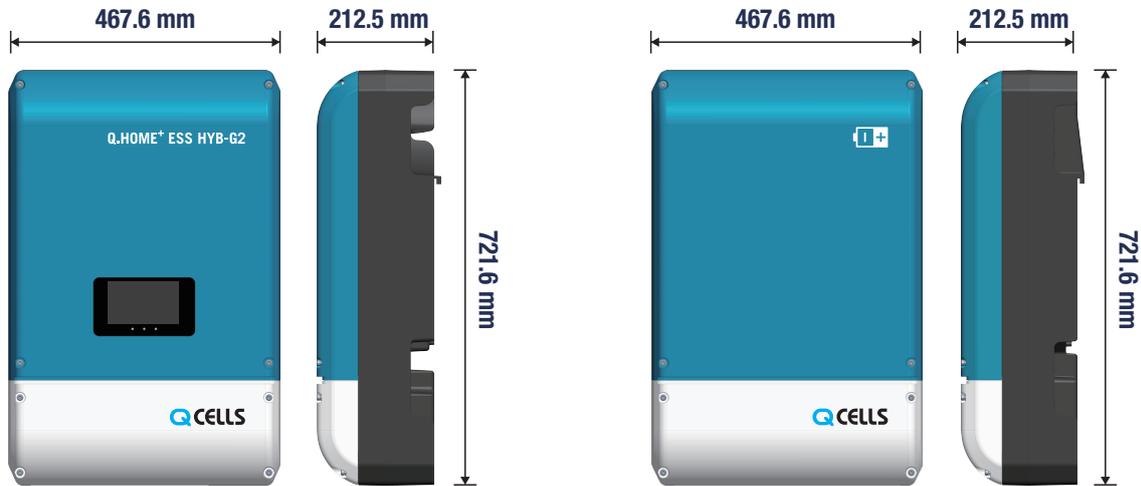
4. Installation

4.1 Selection of Installation Location

	<p>CAUTION</p> <p>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!</p>
	<p>CAUTION</p> <p>Li-Ion Battery energy storage is mounted outside Q.HOME+ESS HYB-G2. 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.</p> <p>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.</p>
	<p>CAUTION</p> <p>All work on the ESS and electrical connections must be carried out by qualified personnel only.</p>

4.1.1 Dimensions

Once the Q.HOME+ESS HYB-G2 has been assembled, its dimension is 467.6 x 721.6 x 212.5mm. 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

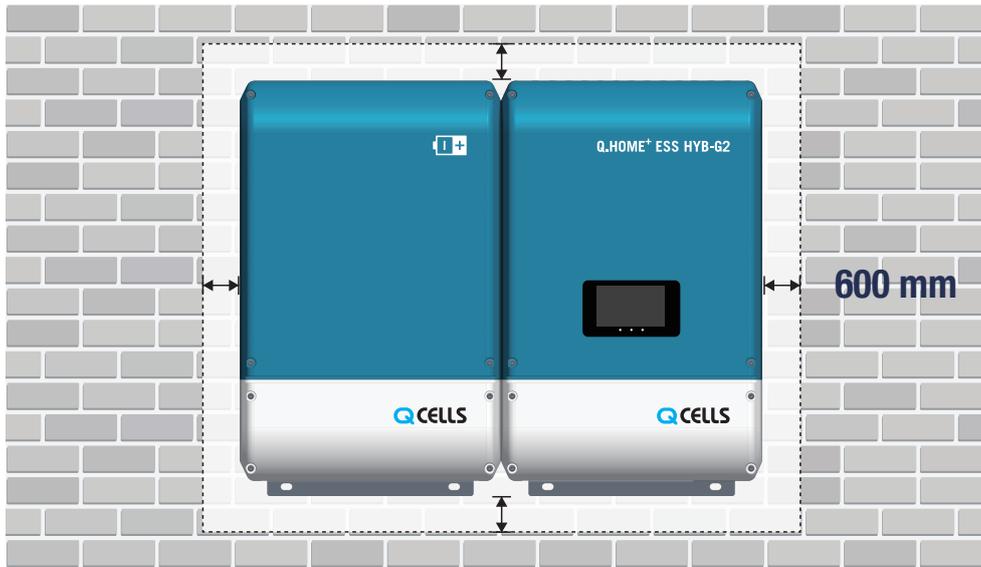
Check a proper installation location to install and remove the device easily at any time.

This device must be located within reach distance. The ambient temperature of the installation location will range from -20°C to +60°C.

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.

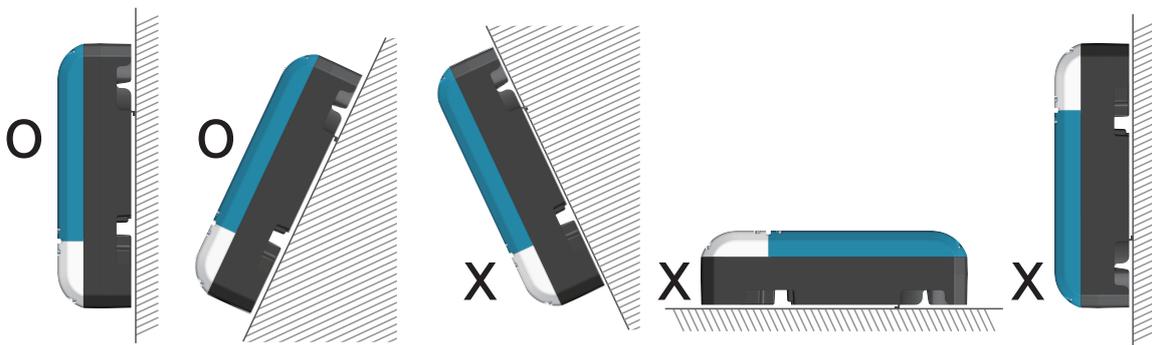


[Figure 4-2 : Minimum Clearance for Q.HOME+ESS HYB-G2]

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.) which must be at least 60cm 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
	<p>There is risk of injury if the INVERTER 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 INVERTER carefully.</p> <p>It is important to ensure the drilling locations are not located on any electrical wiring within the wall.</p>

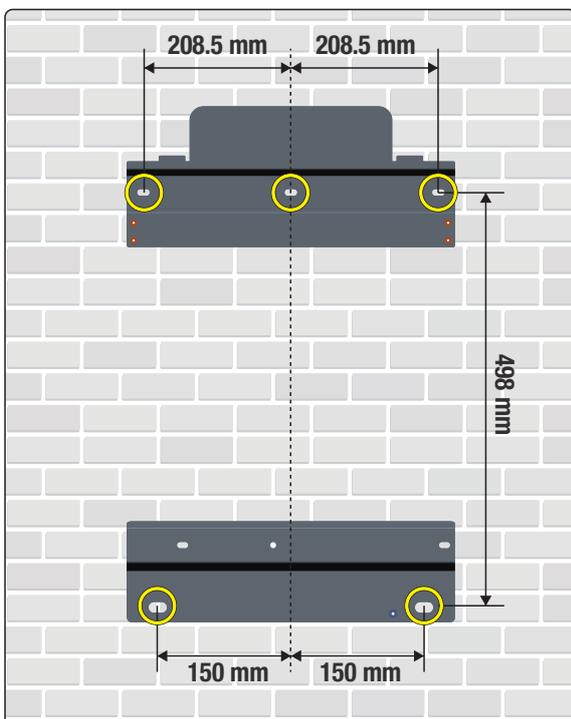
This product must be installed on the wall considering appropriate environments described in previous pages. Follow the mounting instruction described below exactly and securely.

* NOTE

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

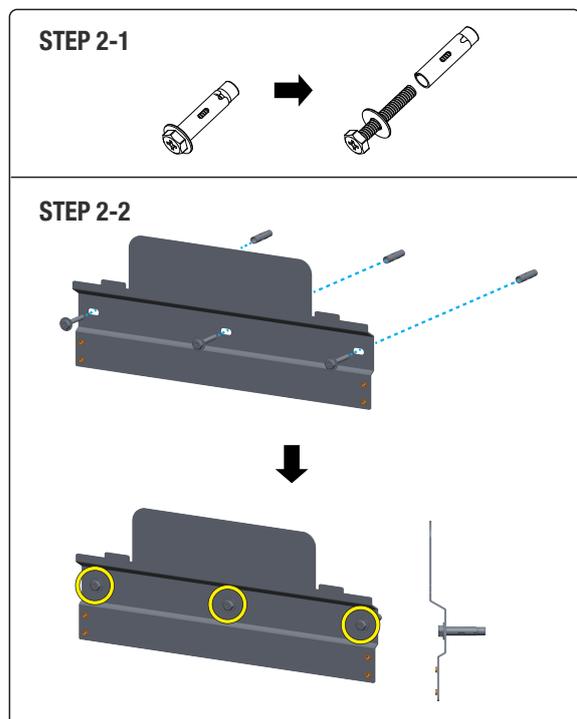
STEP 1

- Step 1 : Mark guideline on wall.
 - Drill hole : size = $\text{Ø}10$ / Length = 45~55mm
 - 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.



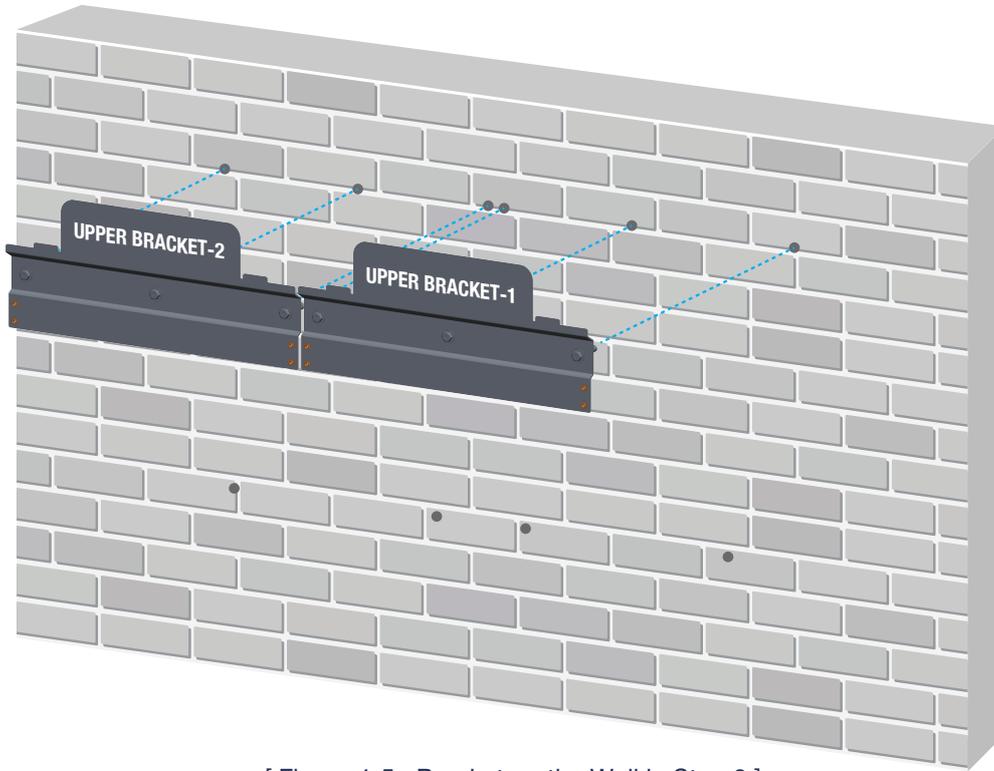
[Figure 4-4 : Bracket on the Wall in Step 1, 2]

	SCREW		CAP	
Diameter : 5/16"	L : 70mm	Torque : 2.0Nm	Diameter : 10mm	L : 45mm

[Table 4-1 : Screw Specification]

STEP 3

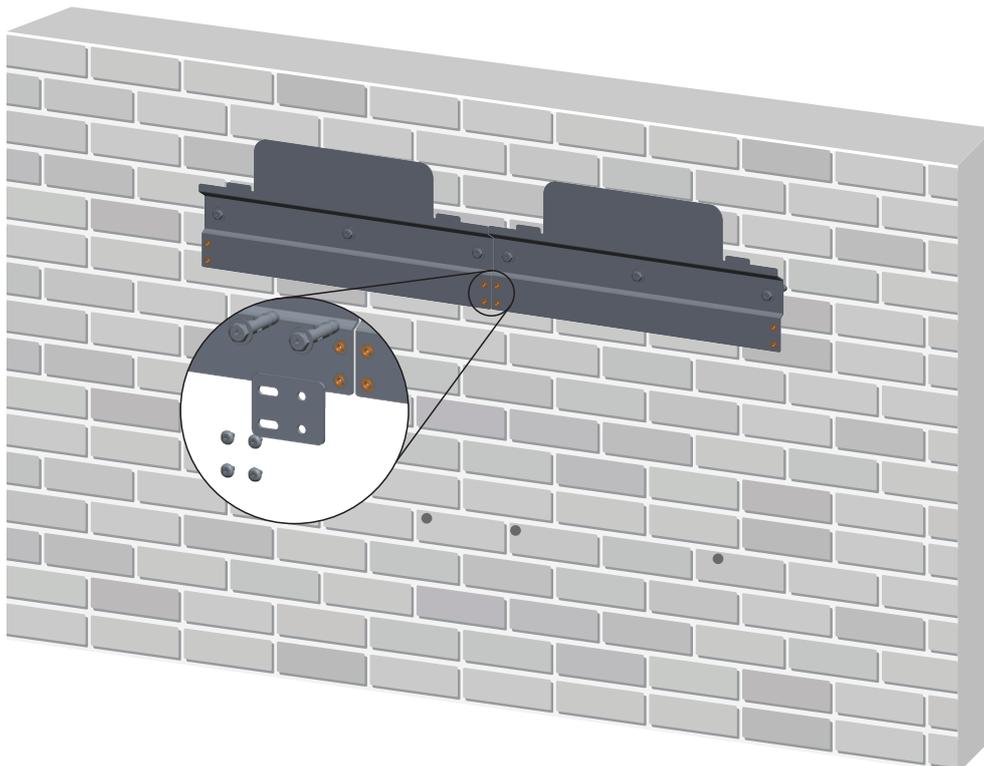
- Step 3 : Secure the upper bracket.



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

STEP 4

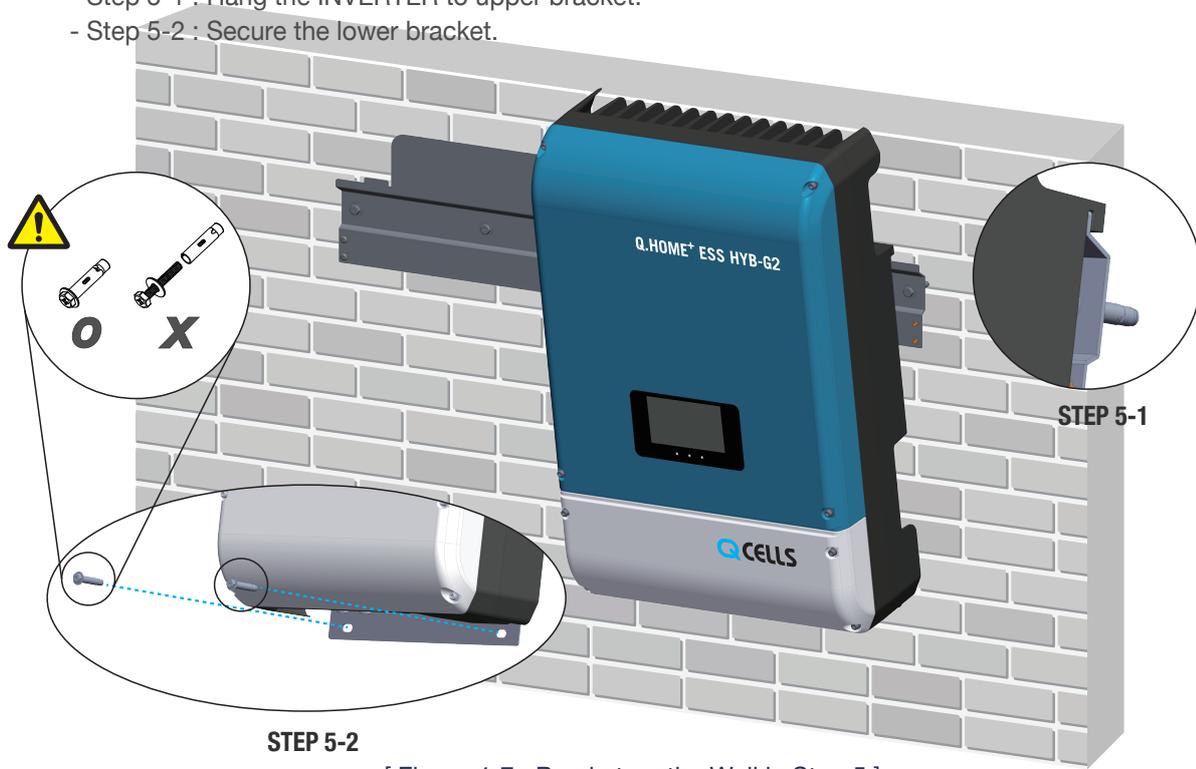
- Step 4 : If you secure the upper bracket, Use the bridge bracket.



[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]

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

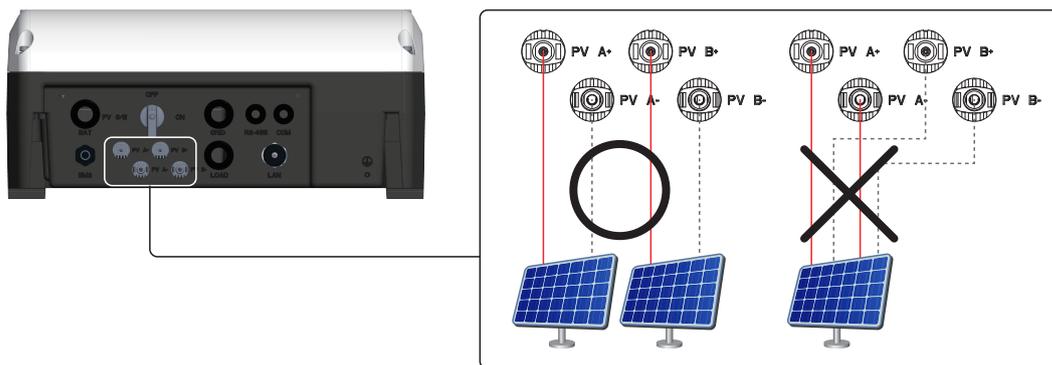
5.1.1 Electrical System Connection

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.

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

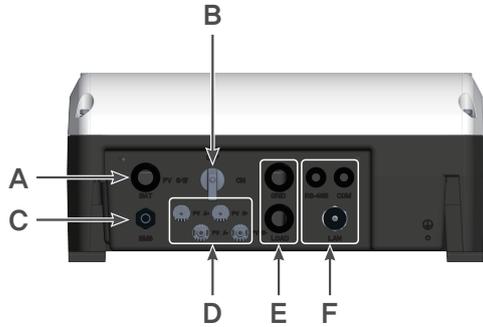
	Area	Insulation
Grid (L,N)	6mm ²	600V or more
Load(L,N)	6mm ²	600V or more
PE	6mm ²	600V or more
PV (+), (-)	6mm ²	700V or more
Battery (+), (-)	6mm ²	600V or more

[Table 5-1 : Power Line Specification]

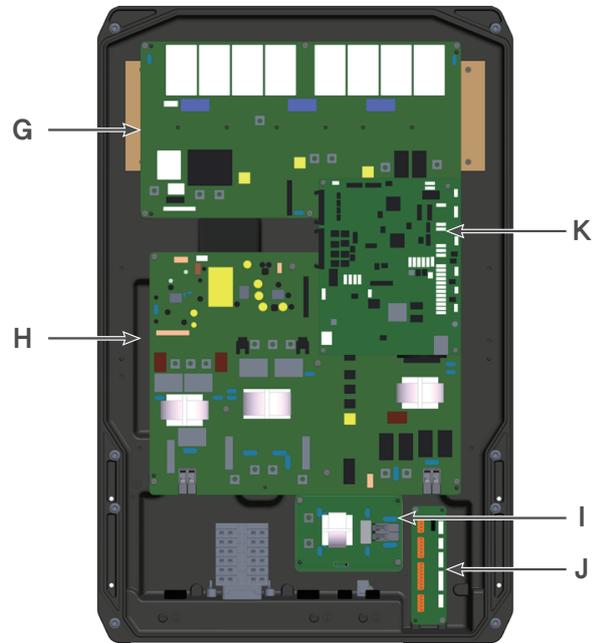
5.1.3 Overall Drawing of the Q.HOME+ESS HYB-G2

5.1.3.1 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]



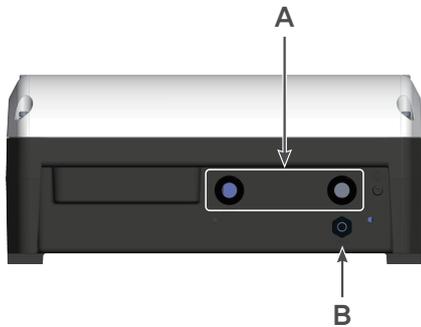
[Figure 5-3 : INVERTER Front inside View 1]

No.	Part List	
A	Battery Connector	Bottom of the INVERTER
B	PV Disconnection Switch	
C	Battery Communication	
D	PV Connector	
E	Grid & Load Connector	
F	Communication Part	
G	Switching Board	Inner of the INVERTER
H	Filter Board	
I	Sub Filter Board	
J	Out Connector Board	
K	Control Board	

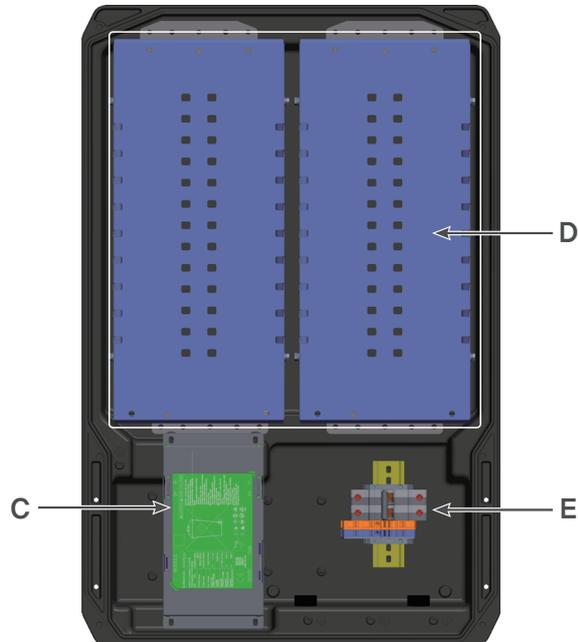
[Table 5-2 : Component Description of INVERTER]

5.1.3.2 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	Inner of the Battery
D	Battery (Made by Samsung SDI)	
E	Terminal and Circuit Breaker	

[Table 5-3 : Component Description of Battery Pack]

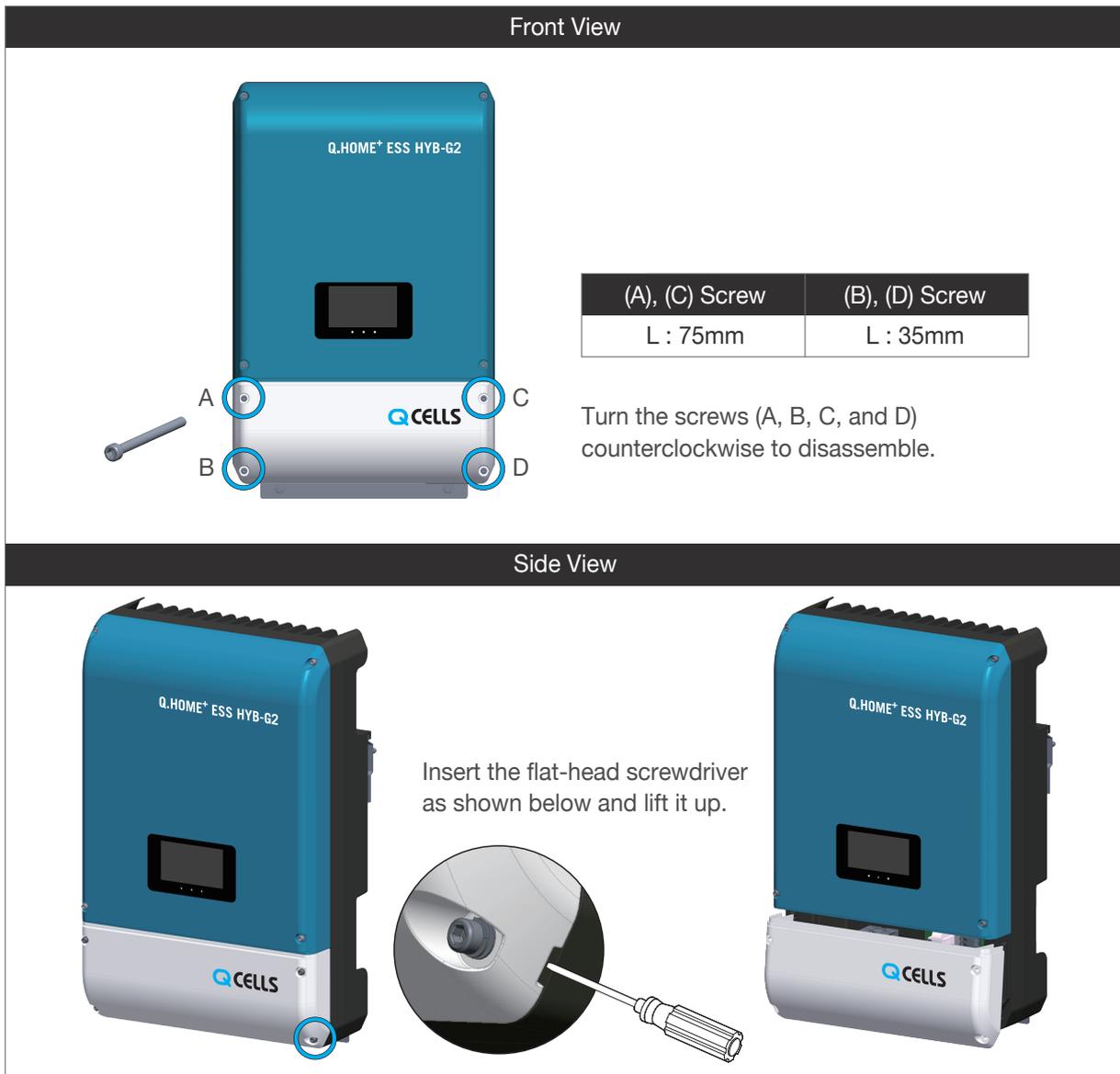
5.2 Opening the Front Case Cover



NOTICE

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 5-4], 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.



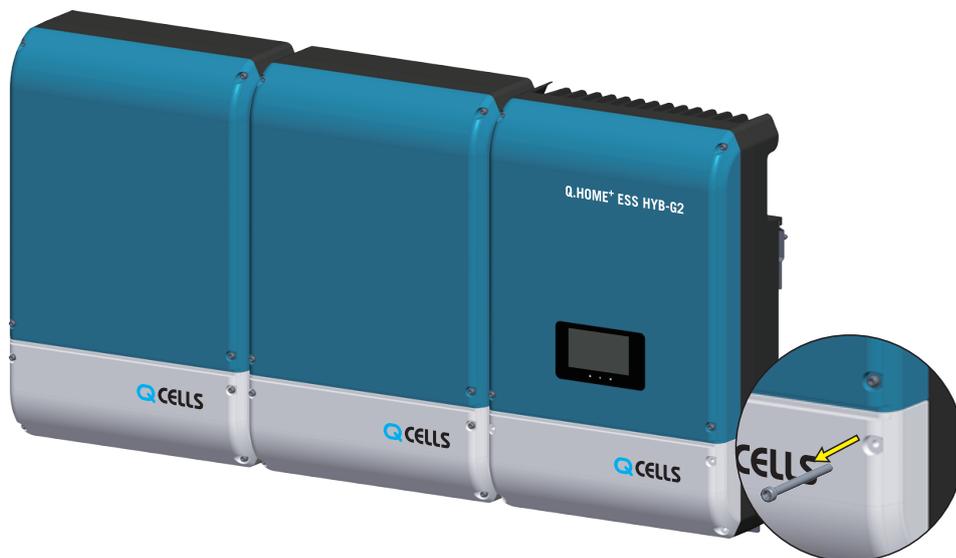
[Table 5-4 : Front Case Open Process]

5.3 Battery Connections

	CAUTION
	<ul style="list-style-type: none">• 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.

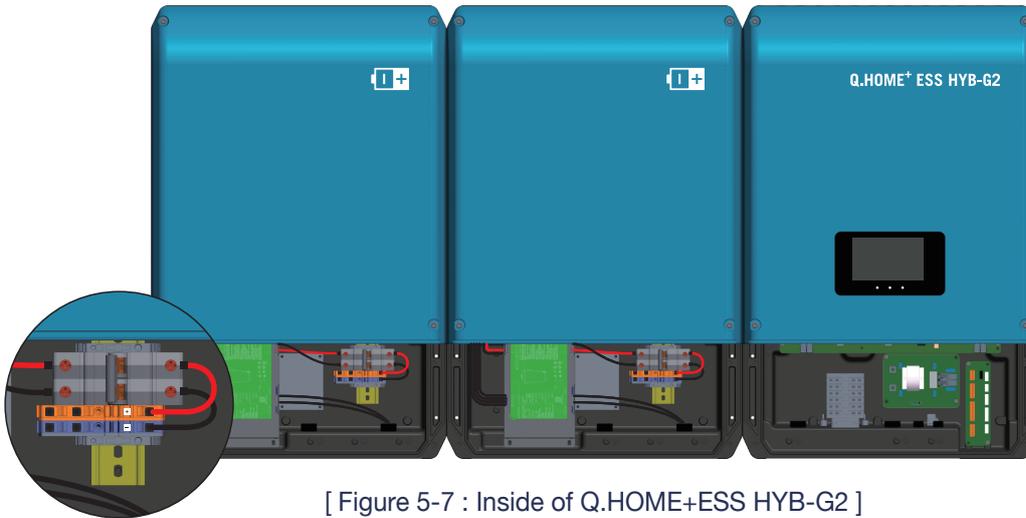
You can connect a Battery to this product. The electricity generated from the connected PV array will be stored in the Battery. Before connecting the Battery to this product, install the Battery on the place where the Battery cables are easily accessible to this product. Refer to the installation manual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

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.



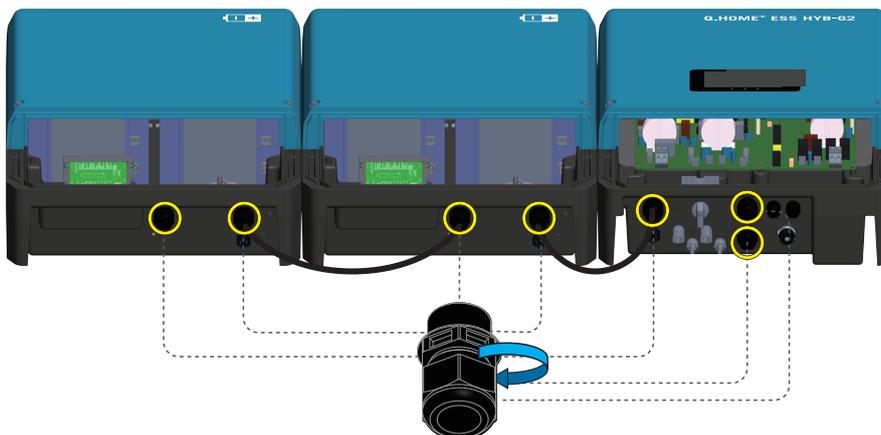
[Figure 5-7 : Inside of Q.HOME+ESS HYB-G2]

3. Connect the (+) and (-) wire (PCS) to the marked terminal (Battery). And then connect the ground terminal.(See Chapter 5.8.4)



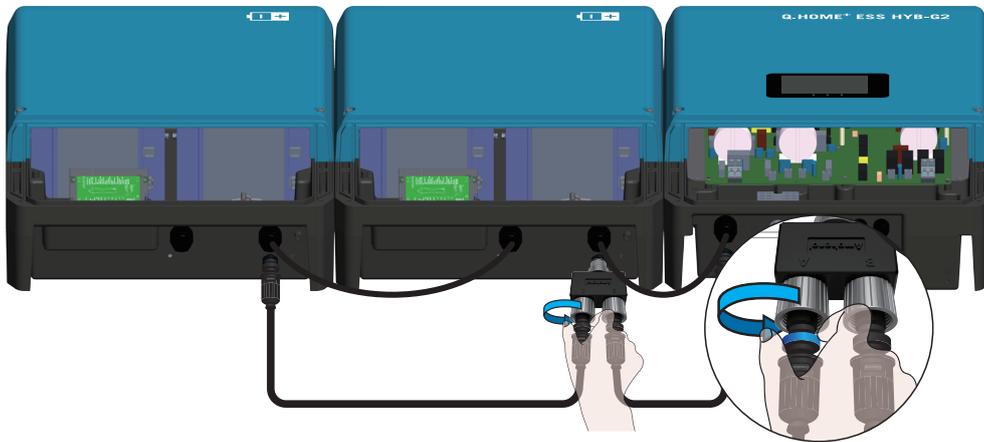
[Figure 5-8 : Battery Pack and INVERTER Connection]

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



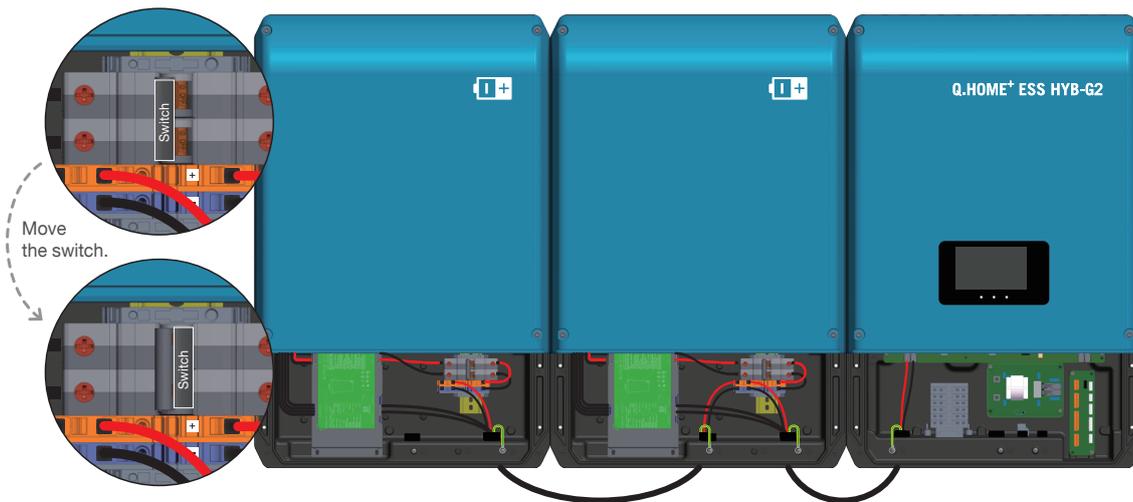
[Figure 5-9 : Cable Gland of Q.HOME+ESS HYB-G2]

5. As shown in the [Figure 5-10], connect Battery communication connector is composed of RJ45 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]

6. Change the switch on.



[Figure 5-11 : Battery Pack Switch]

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



[Figure 5-12 : Outside of INVERTER and Battery Case]

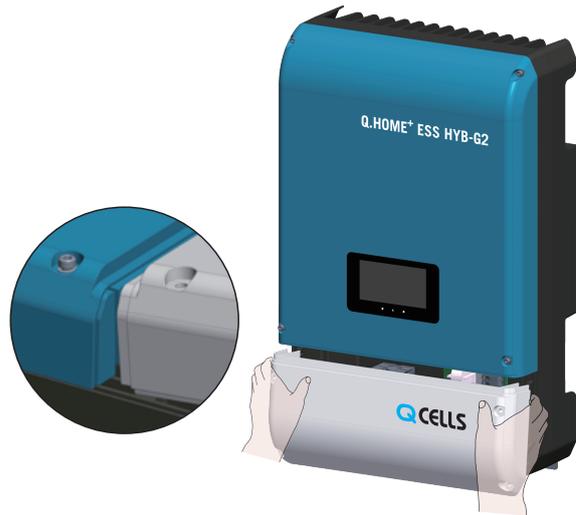
5.4 Closing the Front Case Cover



NOTICE

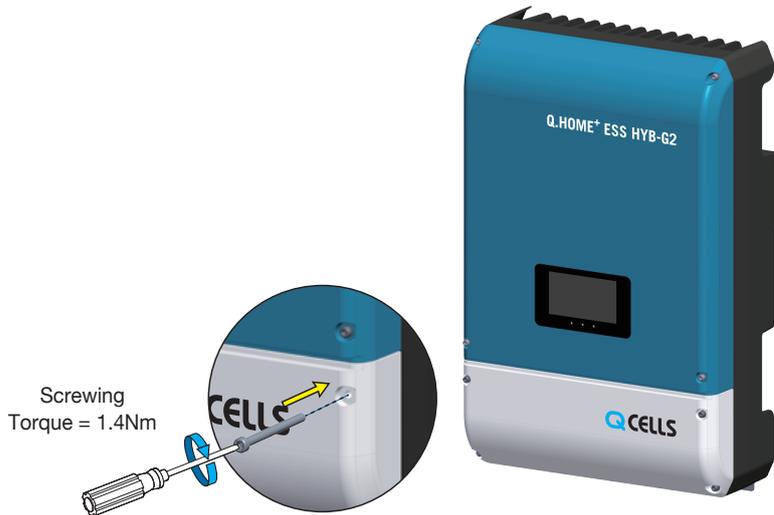
Make sure that connection between connector and ground match correctly, before reassembling front lower cover.

1. 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 5-13 : Front Cover Assembly Process 1]

2. As shown in the [Figure 5-14], Use a hexagon wrench (size : M4) to fasten the bolt clockwise.



[Figure 5-14 : Front Cover Assembly Process 2]

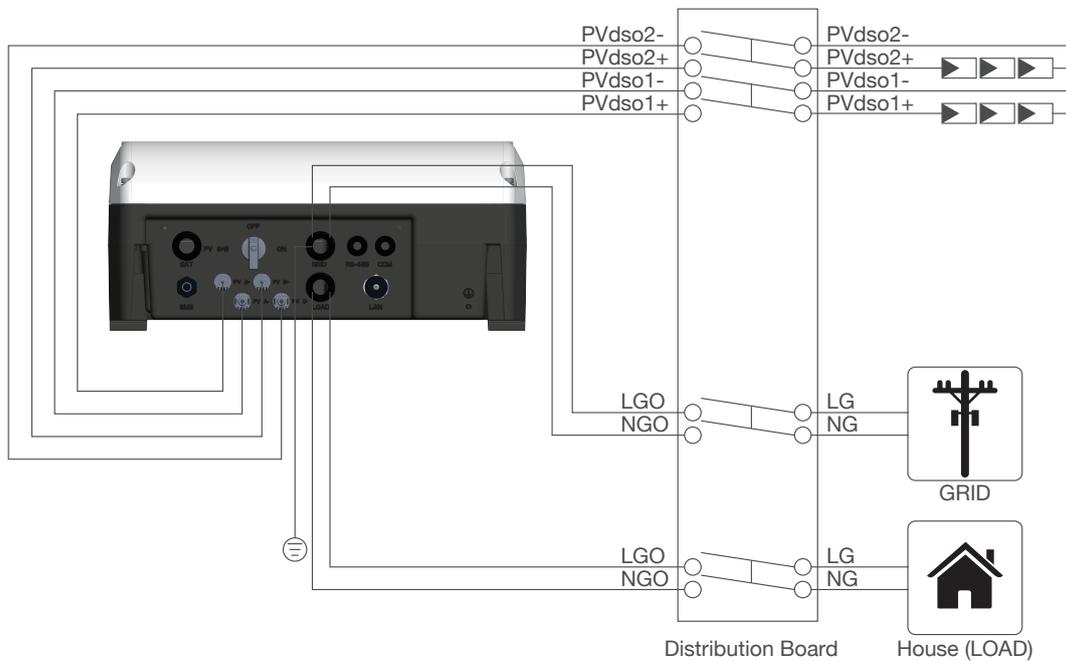
5.5 A Method of Locking the Distribution Box (Board)

The distribution board performs the following functions when it is connected to the INVERTER, the PV and the Grid.

- Grid block function (external) AC circuit breaker : 230Vac, 32A, 10kA (short circuit current rating)
- DC block function; DC disconnect switch must be fitted.
 - PV String1 block function (external) DC disconnect switch
 - PV String2 block function (external) DC disconnect switch
 - : 650Vdc or more / 15A or more
- Residual current device (RCD) : Leakage current measure and block

The [Figure 5-15] shows the connection diagram on the distribution board. The distribution box receives the DC input (the PV string 1 and the PV string 2) from the solar energy module.

The power system is connected to the INVERTER. Grid and House (Load) is connected to the INVERTER Load. The DC disconnection switches displayed in the box below are already mounted on the product so you don't need to install them.



[Figure 5-15 : Distribution Box Connection Diagram]

CAUTION	
	<p>The PV string 1 and the PV string 2 must be each connected to the distribution box terminals, as shown in the distribution board connection diagram. Make sure that the string numbers match correctly. For example, do not connect a PV string 1 to a PV string 2.</p>

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 and the PV. Refer to Chapter 5.1.2 for cable specification.

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

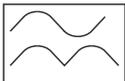
[Table 5-5 : Circuit breaker and DC Disconnection Switch]

As illustrated in the [Figure 5-15], the distribution box connection diagram, the connection between the Q.HOME+ESS HYB-G2 and the distribution box is made to the terminals of the solar energy (PVdso1+, PVdso1-, PVdso2+, and PVdso2-) of PV1+, PV1-, PV2+, and PV2-.

On one hand, the main body terminals (PV1 +, PV1 -, PV2+, PV2-) and the distribution box terminals are connected in proper order. On the other hand, for the lines coming from the Grid, L and N leads are connected to the distribution board (LG, NG). The lines coming out from the LGO, PGO of the distribution board are connected to the L and N terminals of the Q.HOME+ESS HYB-G2. The connection between Load and Grid is same.

5.5.2 RCD (residual current device) Leakage Circuit Breaker

This product can cause a DC current in the external protective earthing conductor. Where a residual current-operated protective (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, either an RCD or RCM of Type A or Type AC is only available on the supply side of this product.

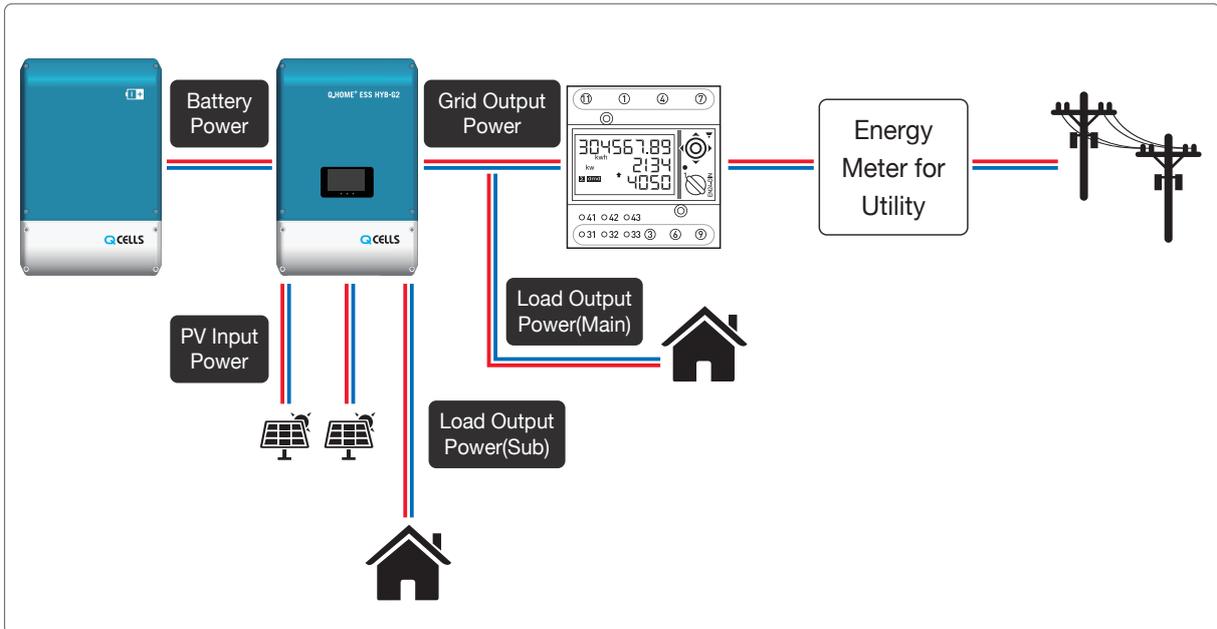
Item	Description
	Type AC AC current sensitive
	Type A AC current sensitive and pulse current sensitive

[Table 5-6 : RCD Leakage circuit breaker description]

5.6 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, as recommended by Hansol Technics in Chapter 6.4 on the following page.

The [Figure 5-16] shows the electrical cable connection and the communication lines of the digital energy meter. Refer to the [Figure 5-16] and the communication description in Chapter 6 to install the digital energy meter.



[Figure 5-16 : 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.

5.7 A Connecting Method of the DC Line from the PV

Refer to the [Figure 5-16] for the PV module connection. The lead wire coming from the PV module is connected to the distribution box. For the structure of the distribution box, refer to subsection 5.5. 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 HSHP-4601 in proper order. For the connectors (PV1+, PV1-, PV2+, and PV2-) between the distribution box and the HSHP-4601 input, the following types of connectors are used. Refer to Chapter 5.1.2 for cable specification.

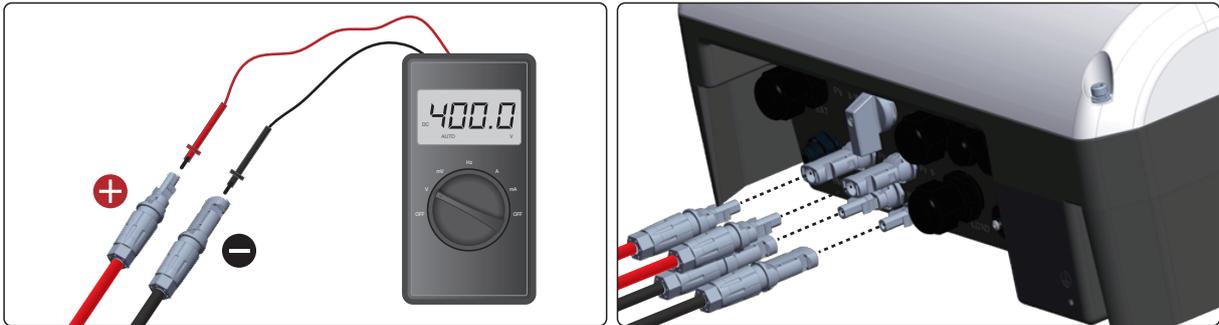


[Figure 5-17 : PV Connector (Female) and PV Line (Male)]

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.

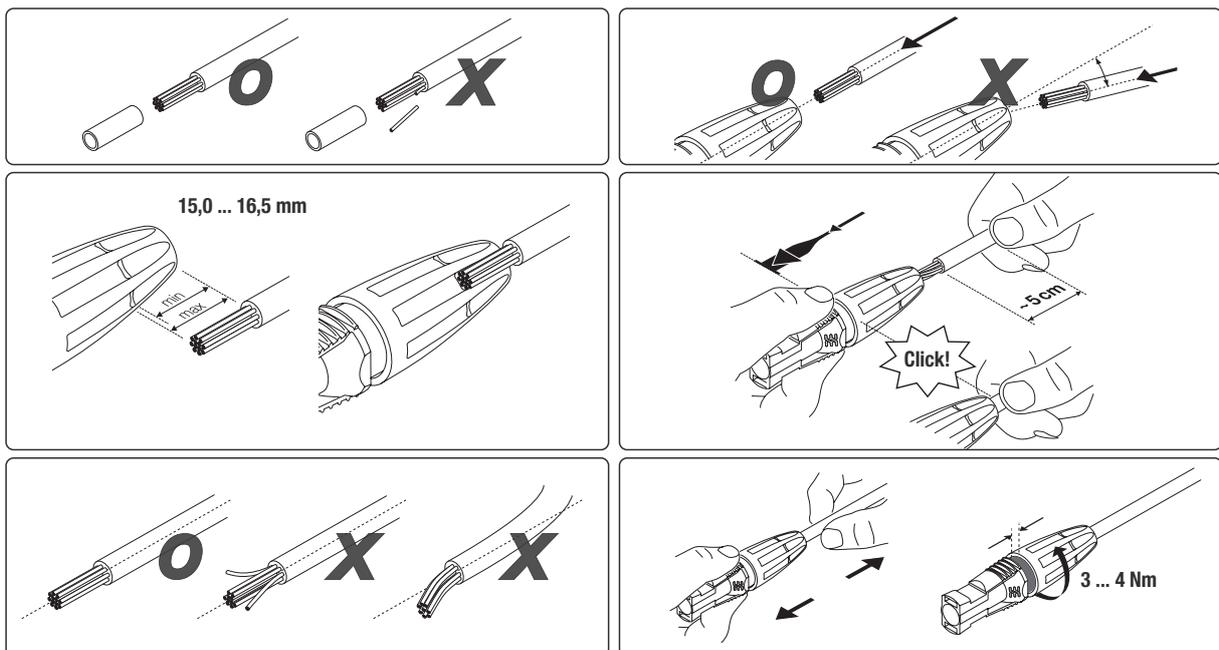


[Figure 5-18 : PV Connector Connection (MC4 Type Connector Connection)]

In the Q.HOME+ESS HYB-G2, the AC power input/output ports are plug type. Each cord shall be 6mm² and the diameter of the cable shall be approximately 18mm². The PE terminal is connected from the inside of the product to the frame ground of the enclosure.

* Wire connection

As shown in the [Figure 5-19], 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 5-19 : Wire Connection and Disconnection]

5.8 Connection Method between Grid and Load

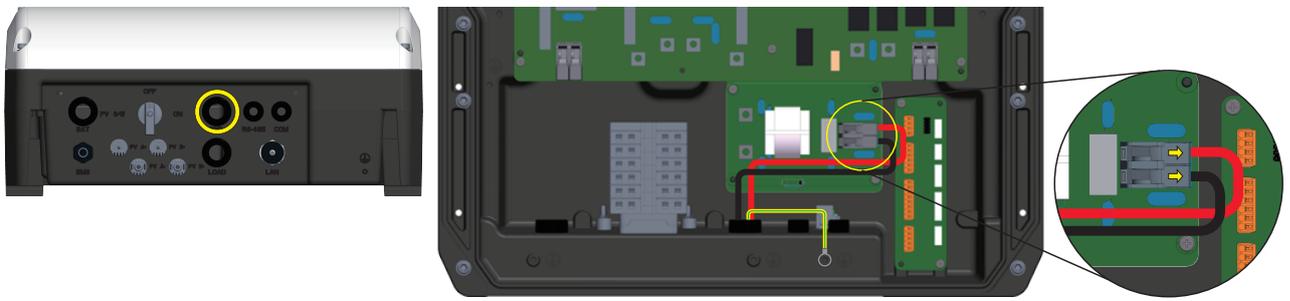


CAUTION

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

5.8.1 Grid Connection Method

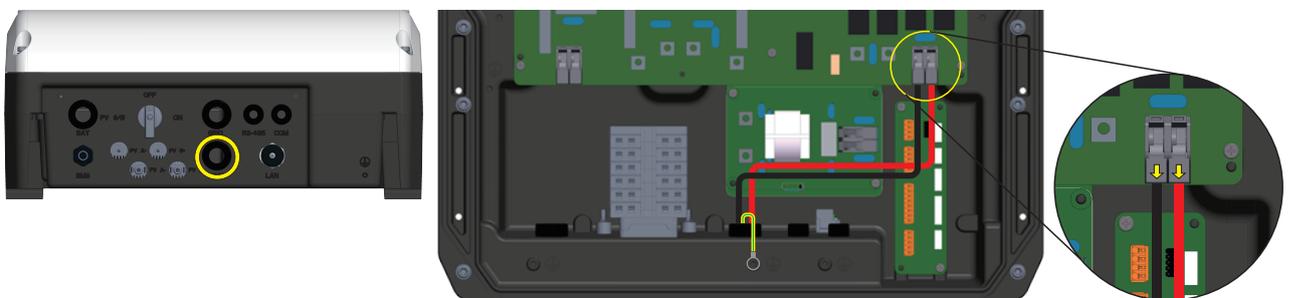
To connect the Grid of the INVERTER, you need 3 connections : Ground, Neutral and Phase. In any case, connection of the INVERTER to ground is mandatory. Insert the Grid cable into the INVERTER through the AC cable gland. Strip 9 mm of cable from the cable to connect to the Grid. Connect the Grid cable 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 free from flicker.



[Figure 5-20 : Power Cable Connection to the AC Connector]

5.8.2 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 free from flicker.



[Figure 5-21 : Power Cable Connection to the Load Connector]

5.8.3 Battery Connection Method

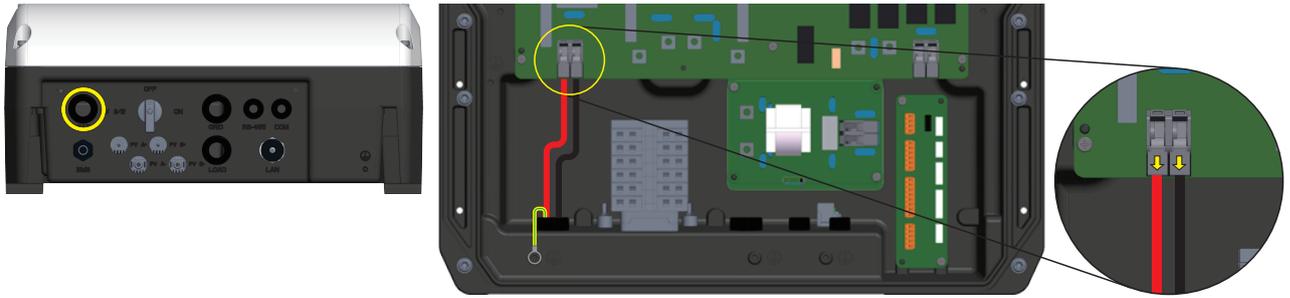
To connect the Battery, you need 3 connections :

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 free from flicker.



[Figure 5-22 : Power Cable Connection to the Load Connector]

5.8.4 Feature and Size of Cable

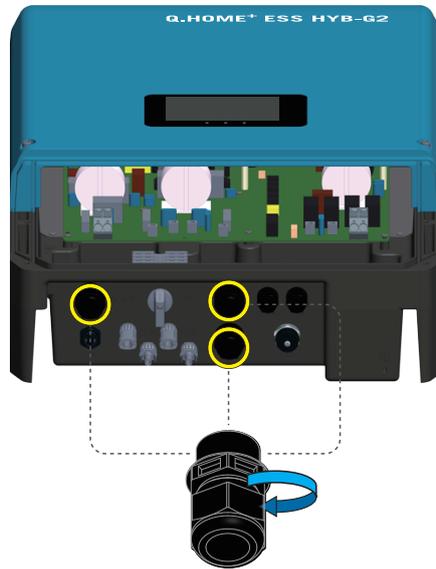
The following lists the insulation strip length details for each conductor cross section.

Refer to Chapter 5.1.2 for cable specification. The ground wire should be grounded by crimping the ring terminal. Refer to Chapter 2.3.4 for work on ring terminal.

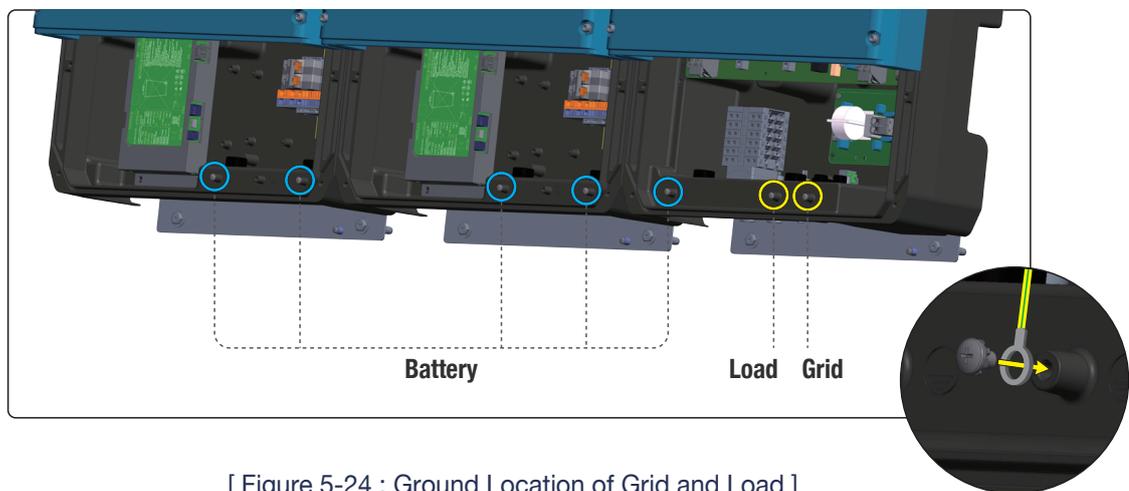
Type	Strip Length
Grid	<p>PE = 120 mm</p> <p>7-8 mm</p> <p>H</p> <p>9 mm</p> <p>9 mm</p> <p>L</p> <p>N</p> <p>L = N = 210 mm</p>
Load	<p>PE = 115 mm</p> <p>7-8 mm</p> <p>H</p> <p>9 mm</p> <p>9 mm</p> <p>L</p> <p>N</p> <p>L = N = 230 mm</p>
Battery	<p>PE = 150 mm</p> <p>7-8 mm</p> <p>H</p> <p>9 mm</p> <p>9 mm</p> <p>L</p> <p>N</p> <p>L = N = 170 mm</p> <p>+</p> <p>-</p>

[Table 5-7 : Insulation Strip Lengths]

As shown in [Figure 5-24], use the ring terminal to connect the ground wire to the correct location. When the Grid cable is connected, tighten the cable gland clockwise as shown in [Figure 5-23] and check the tightness.



[Figure 5-23 : AC Cable Gland]



[Figure 5-24 : Ground Location of Grid and Load]

6. Communication Connection

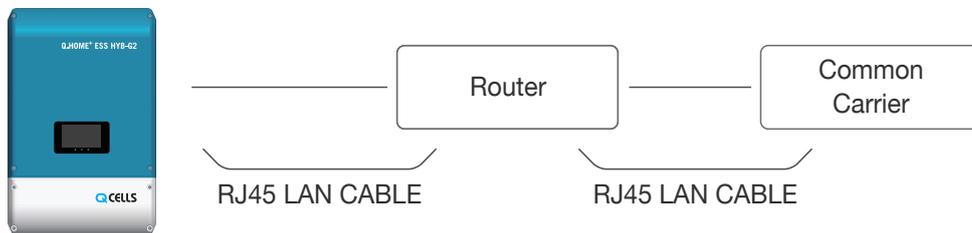
6.1 Internet Connection

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 10m.)

6.1.2 Connection Block Diagram

- LAN (Common carrier → Router) → ESS



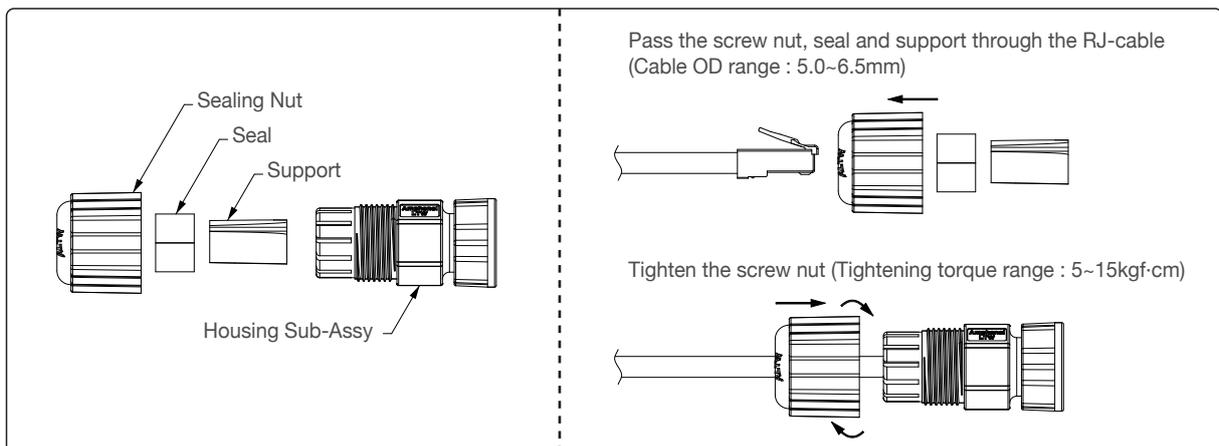
[Figure 6-1 : Internet Connection]

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.



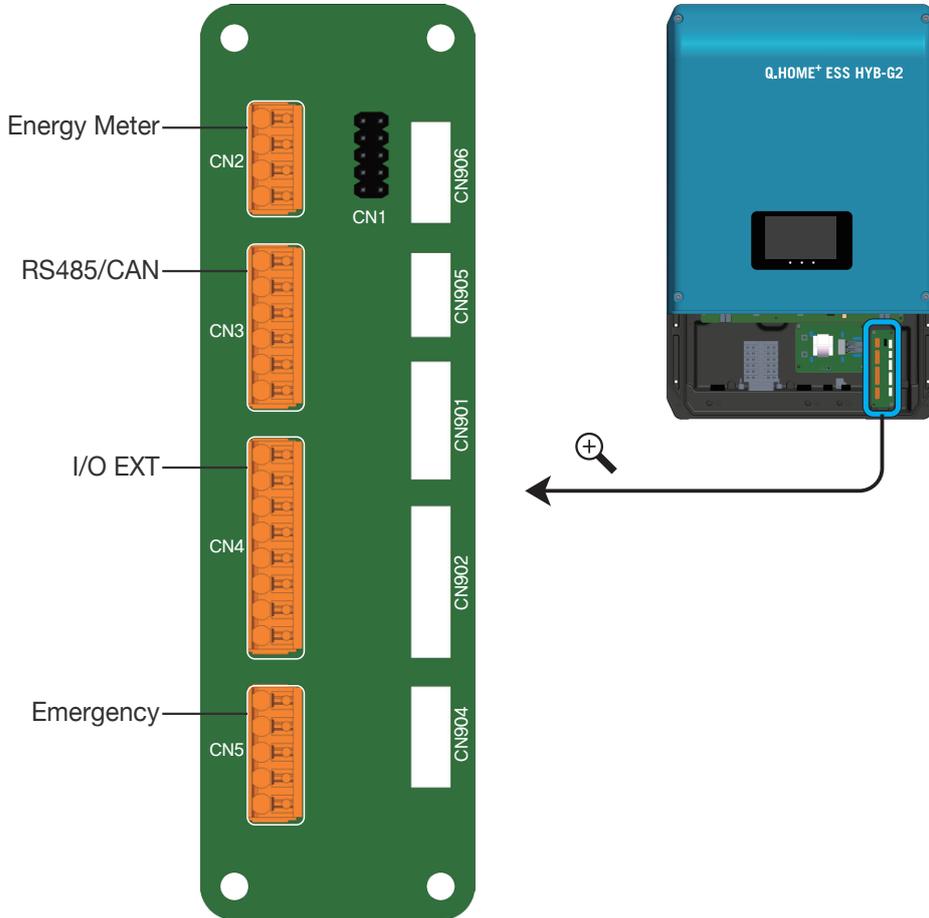
[Figure 6-2 : RJ45 Cable]



[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 7.2.



[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]

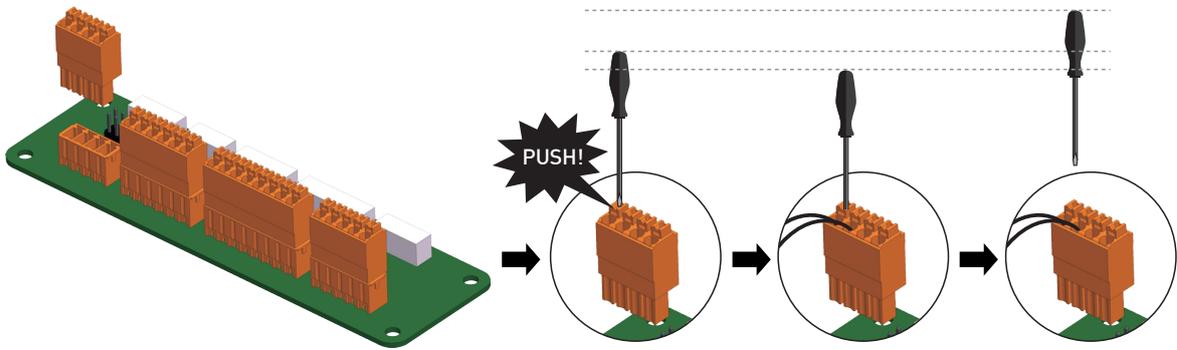
6.3 Energy Meter Connection

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]

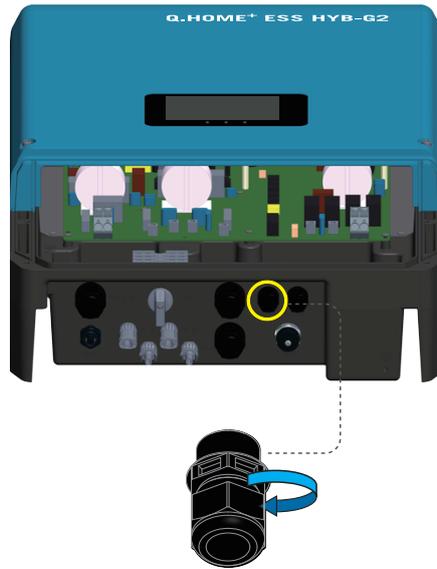
Make sure that the housing and connector are connected. As shown in the [Figure 6-5], separate housing from connector. And press the lock with a flat-head screwdriver to connect the communication cable. The RS-485 meter communication cable must be used within 100m.

6.3.2 Connection Energy Meter

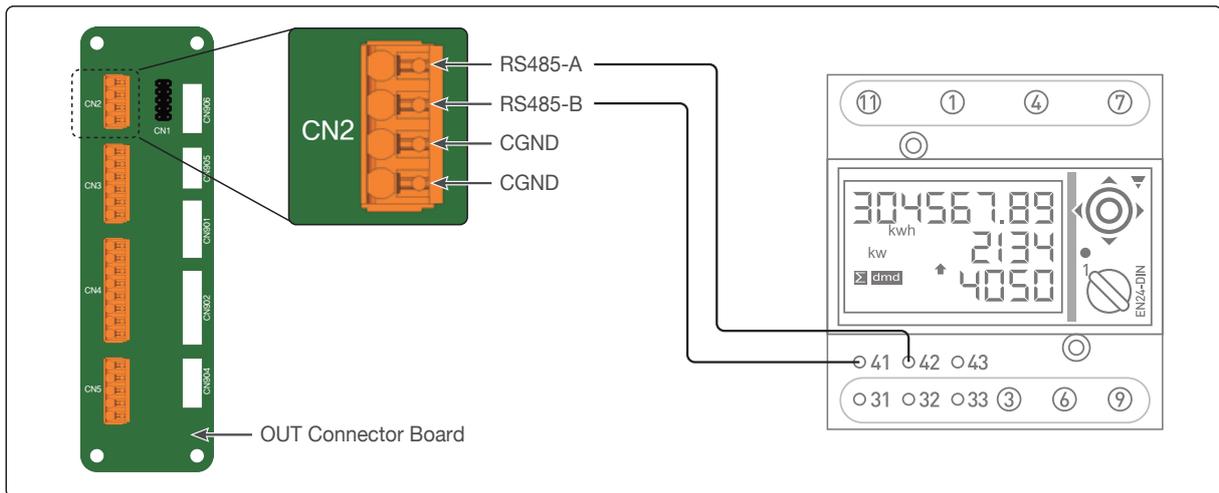
Pass the communication cable through the cable gland and tighten the cable gland. Connect the energy meter to the INVERTER as shown in the [Table 6-2].

INVERTER	Energy Meter
RS458-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(*)

(*) :You can use it but not recommended.

(**) : It is strongly recommended to use the meter in 8.

[Table 6-3 : Recommended Meter List]

6.5 Homepage

Any customer who has purchased this device can use a web browser (<https://myess.hansoltechnics.com>) or a smart phone to check its current operation status and receive various statistical information on operation in the house or remotely.

6.5.1 Service Terms

This service is provided only when the device is connected to the Internet, and specific services may require additional information only after approval from the customer.

6.5.2 Membership

To use this service, you must register for membership through our homepage.

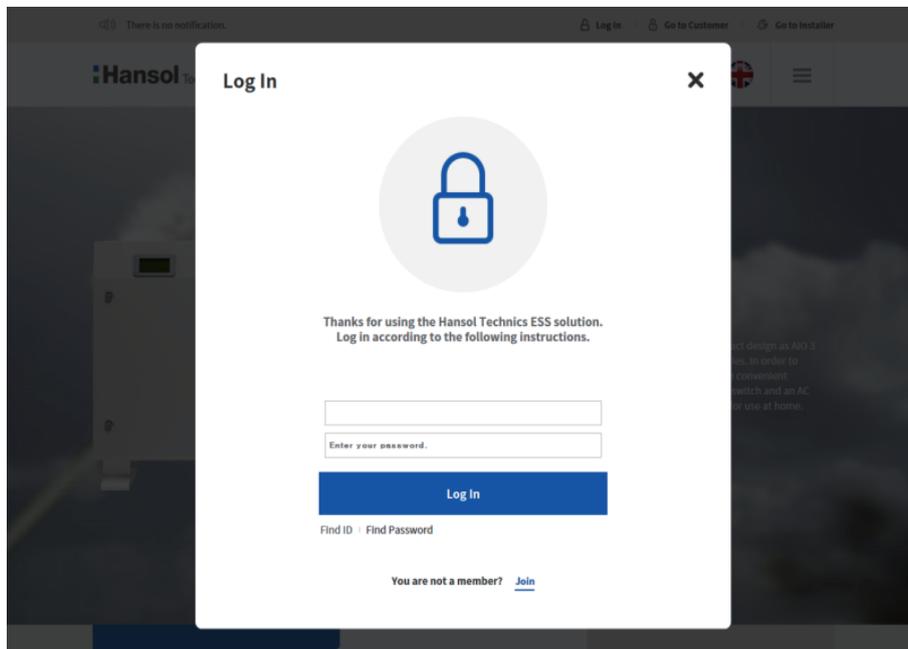
During membership registration, the member's information such as ID, password, name and the address are collected, and additional data may also be collected to provide statistical information upon customer's approval.

6.5.3 Membership Withdrawal

For a customer who does not want to use this service, membership withdrawal is available through the personal information modification menu on the homepage.

6.5.4 Log-In

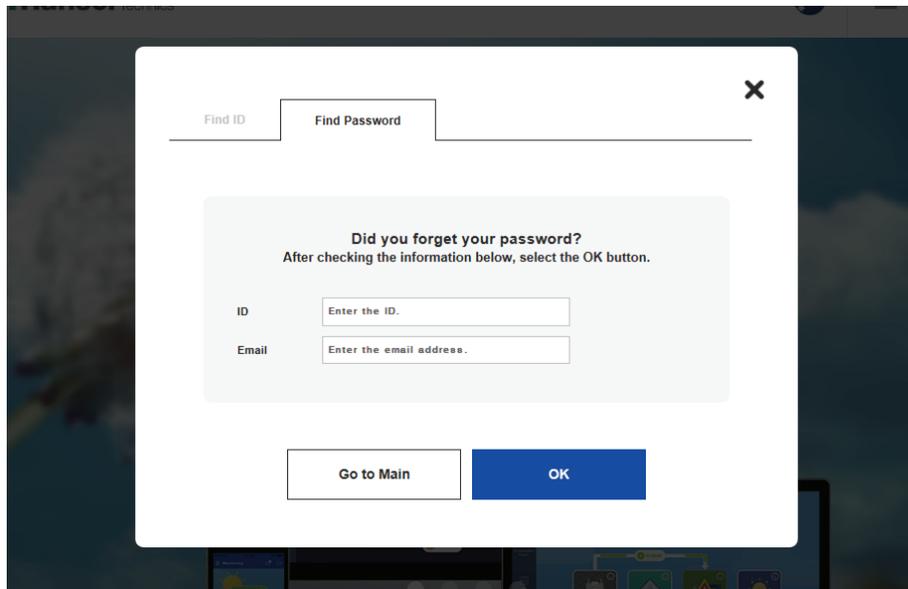
Log in to the homepage through the ID and the password generated through membership registration. You can monitor the product online only when you are logged in. Also, if a log-in ID error or a password error occurs five consecutive times, access is blocked for 10 minutes for security reasons, and access is permitted after this waiting period of time.



[Figure 6-8 : Log-in Page]

6.5.5 Password Initialization

A customer who forgets the password during use can initialize the password by using the password initialization menu on the homepage. On the log-in page, select the “Forgot your id or password?” menu, and when the customer confirms the ID and the e-mail address created during membership registration, the initialized password is sent to the registered e-mail address.



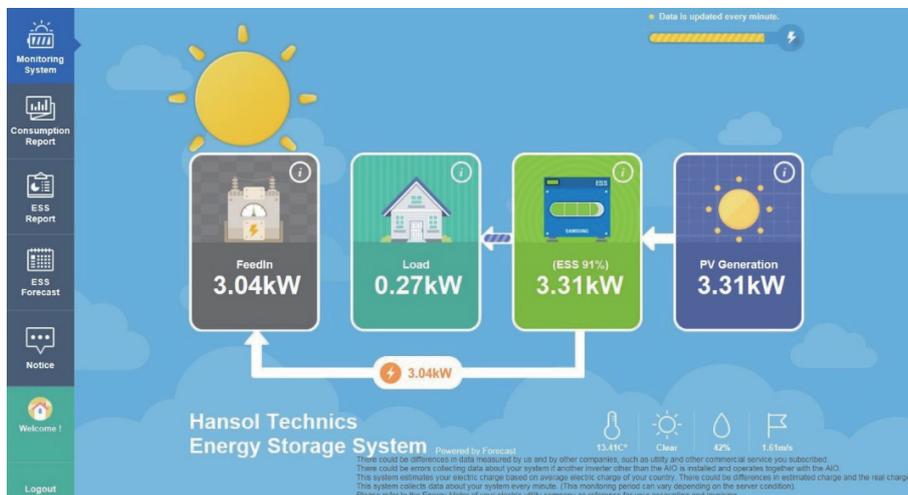
[Figure 6-9 : Password Initialization Page]

6.5.6 Types of Service Offered

After completing log-in, normal service is available. This service currently provides such menu items as monitoring, consumption reports, ESS reports, ESS forecasts, and notices.

6.5.6.1 Monitoring

The operational status of the product is indicated. You can check the current status of operation, the customer's power consumption information, and power generation amount information in real-time. You can also check event codes generated during run time on the monitoring page. You can check the details of the event codes by clicking the exclamation marks which appear on the ESS icon. If the Internet is not available, the event codes cannot be checked.



[Figure 6-10 : Monitoring Page]

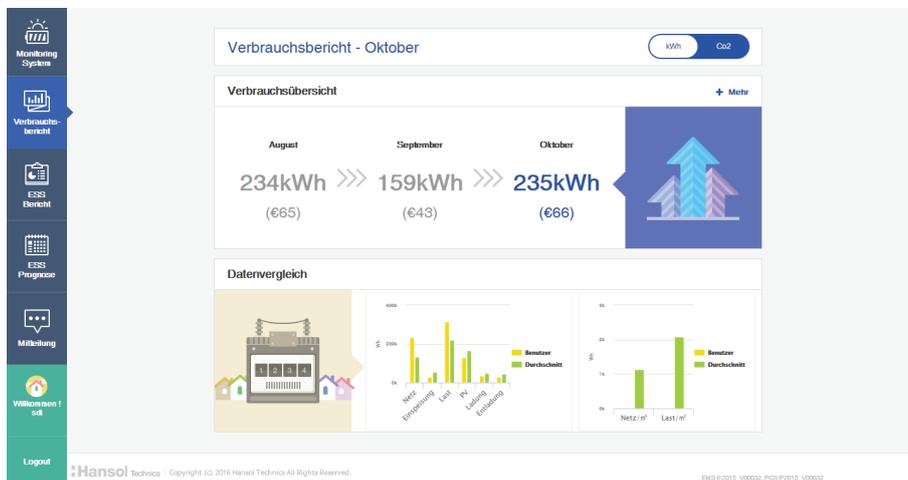
The [Figure 6-11] shows the backup mode screen. This mode can be specified by the user. Since the Grid does not consume power separately in the backup mode, it shows only the ESS. In the figure below, warning on ESS is an error that power does not come on the Grid.



[Figure 6-11 : Backup Mode Monitoring Page]

6.5.6.2 Consumption Report

The household power consumption information collected during energy meter linkage is provided. In particular, such information on as the household type, the size, and the number of family residents is collected according to the customer's approval. You can use these data to identify various types of statistics and comparative analysis data.



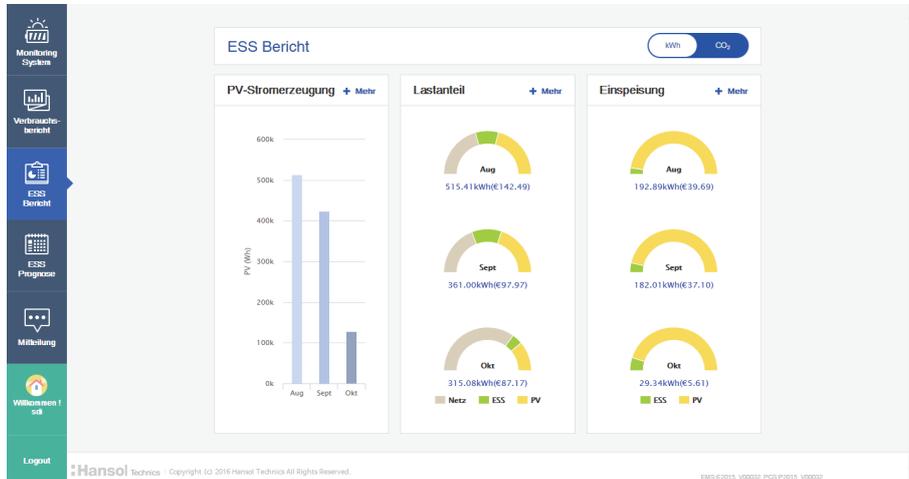
[Figure 6-12 : Consumption Report Page]

6.5.6.3 ESS Report

On the ESS Report page, you can check various types of data generated through ESS operation. You can also use the ESS Report to check the amount of energy charged or discharged and other data comparisons with the solar energy production amount or the power sales amount.

6.5.6.4 ESS Forecast

In the ESS Forecast menu, the generation amount forecast information and the guide for optimized operation can be checked through the algorithm mounted on the product.



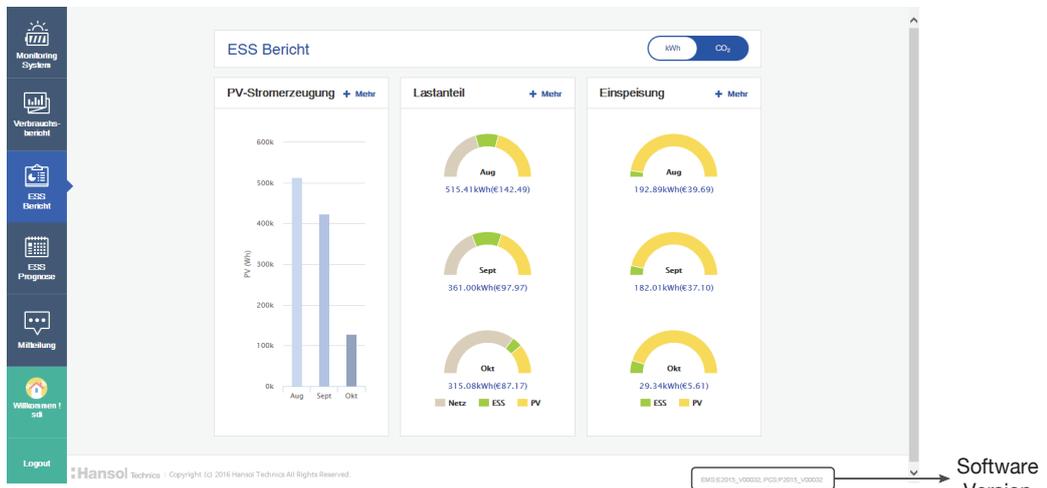
[Figure 6-13 : Forecast Page]

6.5.6.5 Notices

You can check the notice message whenever there is an update or any other change in the service.

6.5.6.6 Software Versions

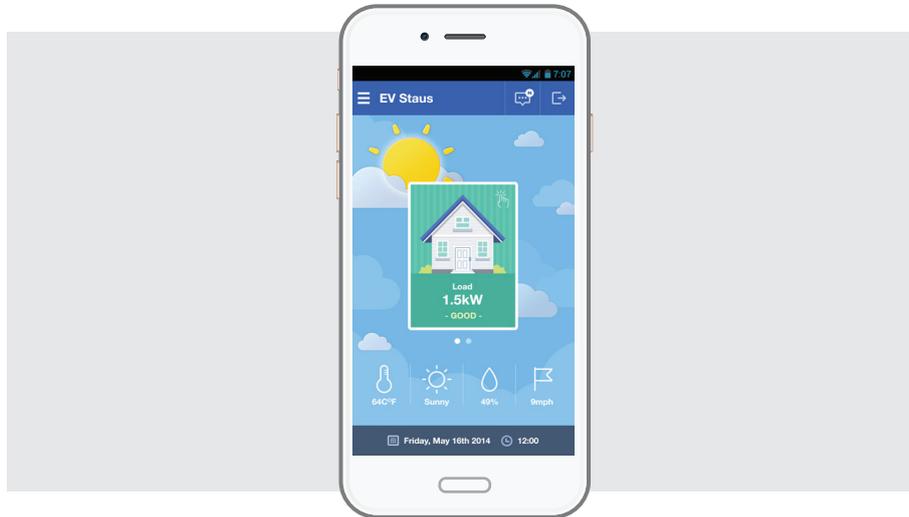
You can check the software version of the product on the monitoring page.



[Figure 6-14 : Setting Page]

6.5.7 Mobile Service

Customers who use Android or I-Phone can use a smart phone to easily check the product status anytime, anywhere. To use the mobile service, the customer must first register the membership through the webpage and use the ID and the password to log-in.



[Figure 6-15 : Mobile Service Page]

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 Information Input Administrator

You have to use a laptop or a smart phone to enter the installation information.

7.2 System Information Input Stage

- 1st Step : Direct Connection to PC → Input Local Setting Value
- 2nd Step : Connection to Web Page → Input Webpage Setting Value

7.3 PC Direct Connection and Local Setting Value

7.3.1 PC Direct Connection Flow

- System Off Status → Insert Jumper Wire, Connect PC LAN cable → System AC on → PC Direct Connection → Input Setting Value → System off → Remove Jumper Wire → Connect Internet LAN Cable

7.3.2 LAN Cable Connection between PC and System

7.3.2.1 LAN Cable Type

- UTP cable/category 5E
- 1:1 direct cable

7.3.3 SIM (System Install Manager) Connection

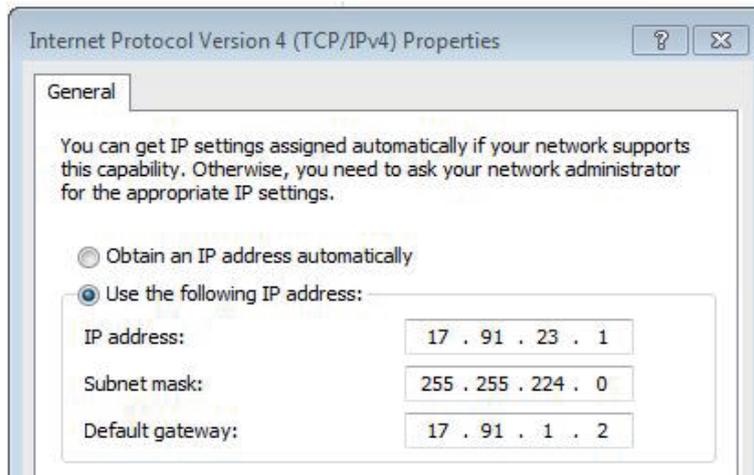
7.3.3.1 Connection

- To enable direct communication between the computer and the Q.HOME+ESS HYB-G2, change the TCP/IP settings on the computer as shown below :

1. Set on your laptop

[Control Panel → Network and Sharing Center → Change adapter settings → Local Area Connector → Properties → Internet Protocol Version 4 (TCP/IPv4)]

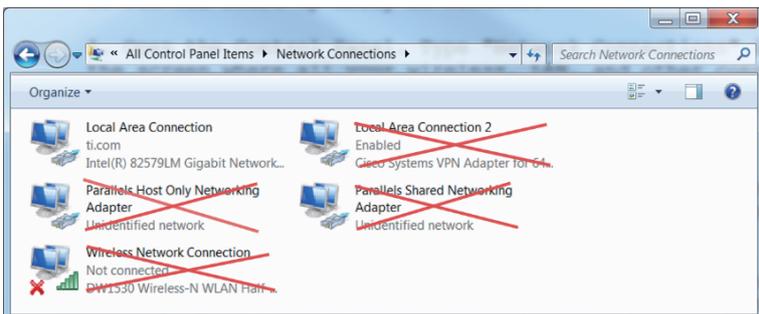
IP address: 17.91.23.1 Subnet mask: 255.255.224.0 Default gateway: 17.91.1.2
--



[Figure 7-1 : Setting Laptop IP]

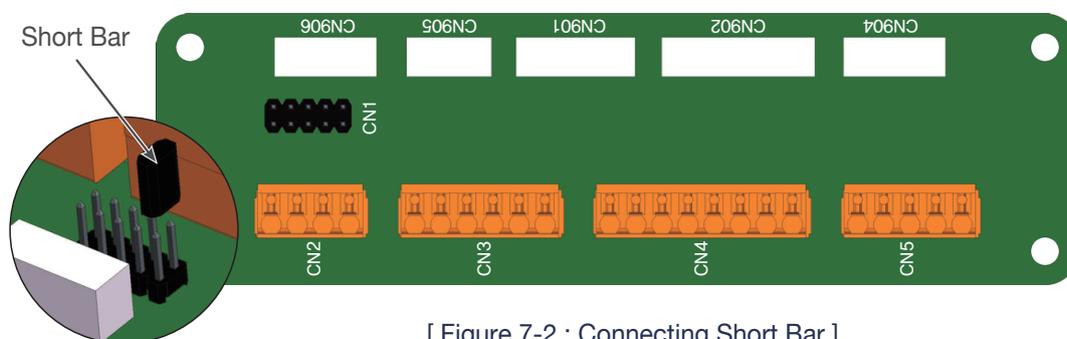
CAUTION

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

2. Connect the short bar to the connector.

(*If you want to connect System Install Manager (SIM) page, connect the short bar to pin 1 & 2 as shown in the [Figure 7-2].)



[Figure 7-2 : Connecting Short Bar]

3. Connect the LAN cable between Q.HOME+ESS HYB-G2 and Laptop.
4. Turn the power On (Grid On) and PV S/W On.
5. Access to SIM (System Install Manager) <http://17.91.23.196:8000>
6. Install the settings (As shown in the [Figure 7-3]).
7. Turn the power Off (Grid Off) and PV S/W Off. → Remove Jumper Wire.
8. Connect Internet LAN Cable.
9. Turn the power On (Grid On) and PV S/W On.

7.3.3.2 Connection URL

- <http://17.91.23.196:8000>

7.3.3.3 Connection Screen

MENU LIST	
Install Setting	
Operating Test	
- HSHP-4601 8.0kWh - EMS S/W : V04.01 Jan 29 2018 - 1P_DEU	

Install Setting Menu	
Country / Region Information	
S/N:	XXXXXXXXXXXXXXXXXXXX
Country:	Germany
Region:	Bremen
Country / Region Config	
Product Information	
installed PV-1 Power:	0 [W] * Range : 1000 ~ 3600 W, * "0" : the PV1 is not installed)
installed PV-2 Power:	0 [W] * Range : 1000 ~ 3600 W, * "0" : the PV2 is not installed)
Feed In Limit percentage	100 % * Range : 0 ~ 100 (%) * 100 (%) means "No-Limit Feedin".
Automatic Operation type	<input checked="" type="radio"/> Smart Mode <input type="radio"/> Basic Mode (* The "Smart" type is more advanced Algorithm.)
Sleep-Mode	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Server's IP-address and port	IP: 14.34.15.211 I Port: 80
Smart Meter Selection	
Meter Type : RS485	
D0 - Meter Model Selection	
D0-Bi/Feed-In	5.EM24-DIN.AV9.3.X.IS.X(Gavazzi)
Date/Time Setting	
Year/Month/Day	2018 / 3 / 13
Hour:Minute:Second	10 : 47 : 30
SAVE and ReSTART	

[Figure 7-3: Initial Setup Page]

7.3.4 Entering Setting Value

7.3.4.1 S/N

- Enter shipment value from the factory (a subsequent modification is not available.)

7.3.4.2 Region

- Select a city and enter the city name for installation on the menu.

7.3.4.3 Country / Region Configure

- Save the selected Country / Region and proceed to the next step.

7.3.4.4 PV Install Value

- Enter installation capacity of each PV string.
- Enter by typing by hand.

7.3.4.5 Sever IP & Port

- Enter as basic value.
- Perform any modification for relevant issues only.

7.3.4.6 Energy Meter Selection

- Meter Type
 - RS-485
- RS-485 Meter model selection
 - Energy Meter recommends using EM24.
Refer to the Quick Guide for Energy Meter self-configuration and installation.

7.3.4.7 Date/Time setting

- Enter the current date and time.

7.3.4.8 Save and Restart

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

7.3.4.9 Grid Feed in Limit Regulation Setting

- For some countries that have a regulation for the Grid feed in limit, the device allows the installer to set up a limit value. You can select the required limit value in the [Feed in Limit Percentage] on the set up screen. The selectable values is 0%,10%,20%,30%,40%,50%,60%,70%,80%,90%, and unlimited. The term unlimited means that is that there is no Grid feed-in limit.

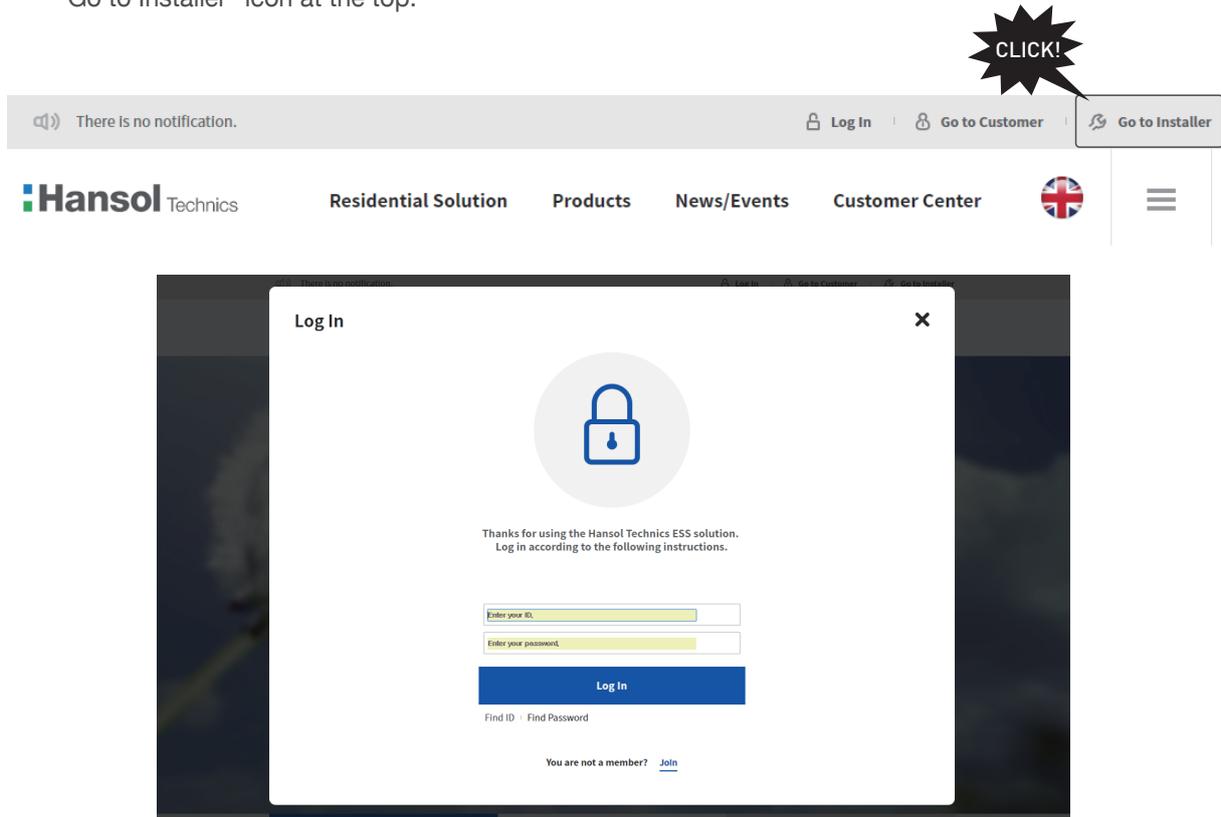
7.4 Web Page Connection

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 : <https://myess.hansoltechnics.com>
- Concurrent support of PC and Mobile

1. By typing “<https://myess.hansoltechnics.com>,” access the corresponding website. Then click the “Go to Installer” icon at the top.



[Figure 7-4 : Main Page]

NOTICE	
	<ul style="list-style-type: none">• Note that the URL starts with "http://".• 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.

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

	NOTICE
	<ul style="list-style-type: none">• 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.

3. Click the “Join Membership” link.

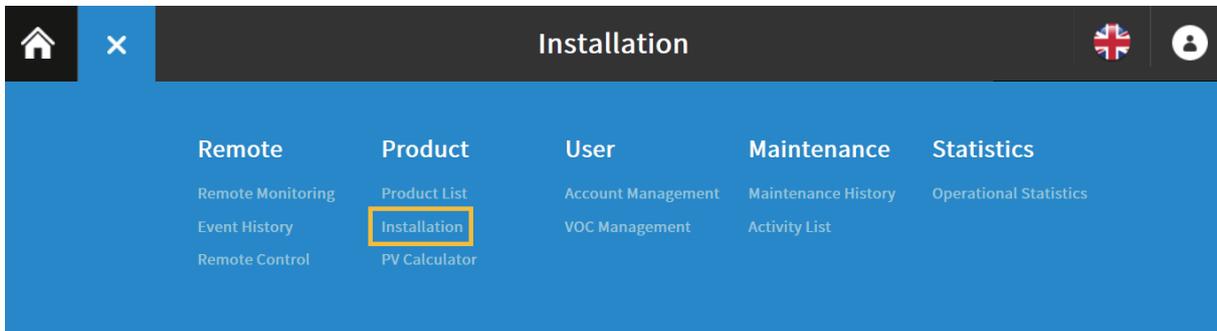
4. In order to join as a member, you must consent to the terms for personal privacy protection. The terms have been prepared in accordance with applicable local laws. If you do not agree to the terms, you cannot join as a member.

5. Enter the required information for registration.

	NOTICE
	<ul style="list-style-type: none">• 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.

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

7. After login, the main installer page appears. After selecting the menu button at the upper left corner, select Product → Installation.



[Figure 7-5 : Installer in Page]

8. The installation wizard runs automatically. Explain the terms for personal privacy protection to your customer and obtain the consent to the terms with a signature.

	NOTICE
	<ul style="list-style-type: none">• The data collected during the installation process is used only for installation purpose.• The consent and signature acquisition process proceeds according to the local laws. We at Hansol Technics are making the utmost effort to protect personal information in accordance with the laws.

- Enter the product information and customer information in Step 1. The product serial number and user telephone number are required. The product serial number is on the upper area of the cover. Please also enter your country and BATT.

[Figure 7-6 : Product Information Entry Screen in Step 1]

NOTICE

- If you enter the product serial number (21 characters), the rest of the information is automatically filled in.
- The user telephone number is used for after-sales service purpose.

- Enter the information of the installation site in Step 2. In the address input field, enter the address or select the installation site on the map. After the installation site entry is finished, click the "Next" button.

[Figure 7-7 : Address Entry in Step 2]

NOTICE

- In the address input box, enter the country and city. It is recommended to move the focus on the map and select the installation site.
- If the location is incorrect, the smart operation algorithm may not operate normally.

- Enter the product Setup Information details in Step 3. Enter values for installed capacities for each PV string, feed-in limit (e.g. 60% in Germany), maximum INVERTER power, whether or not to use the basic mode, energy meter type, and its model. Hansol supports stable country default settings. (Countries that do not have their current default settings will be supported in the future.)

The screenshot shows the 'Installation' app interface at Step 3: Setup Info. The top navigation bar includes a home icon, a menu icon, the title 'Installation', a UK flag, and a user profile icon. Below the navigation bar, there are four tabs: '01. Product Info.', '02. Installation Info.', '03. Setup Info.' (which is active), and '04. Rates Info.'. The main content area contains several configuration sections:

- PV1 Capacity (W):** A slider set to 5000, with a text input field for '5000' and a label 'Enter the maximum capacity of PV String 1.'
- PV2 Capacity (W):** A slider set to 5000, with a text input field for '5000' and a label 'Enter the maximum capacity of PV String 2.'
- Feed-In Limit (%):** A slider set to 60, with a text input field for '60' and a label 'Set the maximum feed-in limitation rate. (0% - 100%, 100% the feed-in limit)'
- Feed In Relay:** Radio buttons for 'disable' (selected) and 'enable'.
- Relay1 Attach Level:** A slider set to 1000, with a text input field for '1000' and a label '360 (0 - 4000)'.
- Relay1 Detach Level:** A slider set to 1800, with a text input field for '1800' and a label '360 (0 - 4000)'.
- Relay2 Attach Level:** A slider set to 2000, with a text input field for '2000' and a label '360 (0 - 4000)'.
- Relay2 Detach Level:** A slider set to 2800, with a text input field for '2800' and a label '360 (0 - 4000)'.
- Relay3 Attach Level:** A slider set to 3000, with a text input field for '3000' and a label '360 (0 - 4000)'.
- Relay3 Detach Level:** A slider set to 3800, with a text input field for '3800' and a label '360 (0 - 4000)'.
- Relay4 Attach Level:** A slider set to 4000, with a text input field for '4000' and a label '360 (0 - 4000)'.
- Relay4 Detach Level:** A slider set to 4800, with a text input field for '4800' and a label '360 (0 - 4000)'.
- Fault Lock:** Radio buttons for 'disable' (selected) and 'enable'. Below it are 'Value' (input: 60, label: 0-100) and 'Time Level' (input: 600, label: 0-1000).
- Backup Mode:** Radio buttons for 'disable' (selected) and 'enable'.
- Islanding Flag:** Radio buttons for 'disable' (selected) and 'enable'.
- 3rd Party Control:** Radio buttons for 'disable' (selected) and 'enable'.
- Smart Meter Type:** Radio buttons for 'None' and 'RS485'.
- meter000:** Radio buttons for 'EM24'.

At the bottom, there are three buttons: '< Previous', 'Refresh', and 'Next >'.

[Figure 7-8 : Product Setup Information Details Entry in Step 3]

CAUTION

If configuration in this page has errors, it may cause product failure. Accordingly, first check specific installation conditions of the house for accuracy.

- Enter the energy rate Information of the house in Step 4. If a house uses a variable tariff , the charge and discharge operations may differ depending on the input price. Enter the time-based electricity tariff correctly. If a house uses a fixed payment tariff, the charge and discharge operations are not affected depending on the input price. The entry of energy price is used only for reference to calculate energy costs and it may not be the same as the actual electricity rate.

The screenshot shows the 'Installation' app interface at Step 4: Rates Info. The top navigation bar is the same as in Step 3. The tabs are '01. Product Info.', '02. Installation Info.', '03. Setup Info.', and '04. Rates Info.' (which is active). The main content area is titled 'Demand Rate (€)' and 'Feed-in Rate (€)'. It features three columns for different tariff types: 'Weekdays', 'Weekend', and 'Weekdays & Weekend'. Each column has a table with time ranges and a price value.

Demand Rate (€)			Feed-in Rate (€)					
Weekdays			Weekend			Weekdays & Weekend		
00:00	23:59	0	00:00	23:59	0	00:00	23:59	0

At the bottom, there are three buttons: '< Previous', 'Refresh', and 'Finish'.

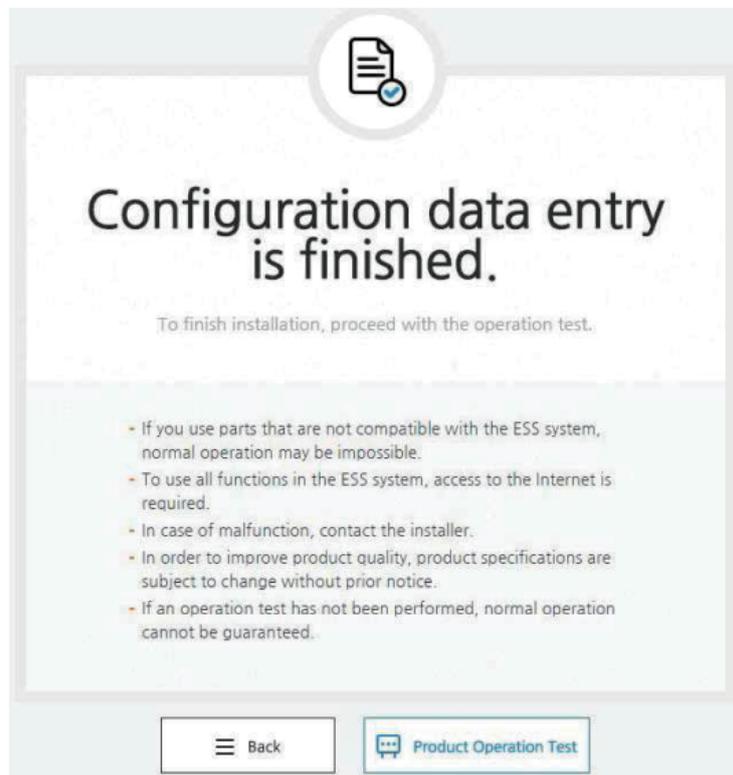
[Figure 7-9 : Energy Rate Information Entry in Step 4]



NOTICE

The entry of energy price is used only for reference to calculate energy costs and it may not be the same as the actual electricity rate. Hansol Technics will not assume responsibility for incorrect estimated rates.

13. End the installation. If you click the "Done" button, the product monitoring details page appears. Check whether the login is finished within 2 to 3 minutes. Some products immediately run "Automatic Update."

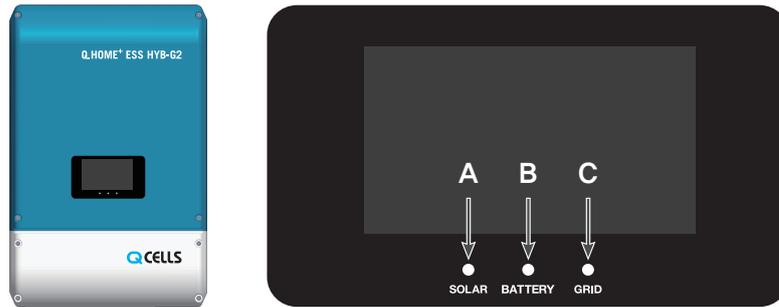


[Figure 7-10 : Installation Completion Screen]

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 in stop mode.	Grid is not connected.
Green	Energy is being generated.	Battery is in charging or in discharging.	Grid is connected.
Red	Fault	Fault	Fault

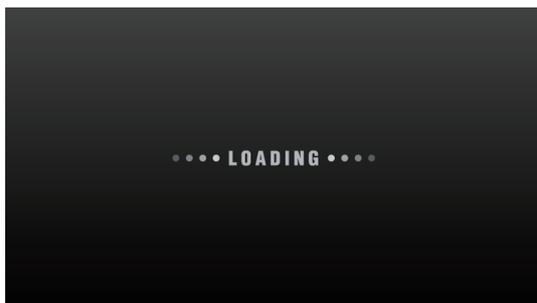
[Table 8-1 : LED Indications]

8.2 Starting the System

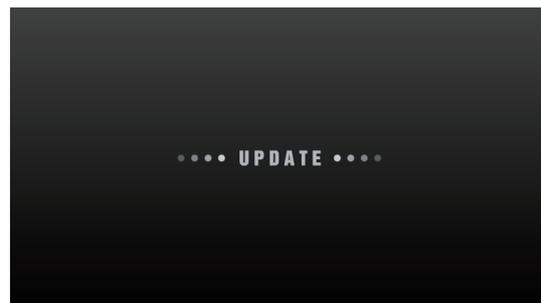
After completing the installation, turn on the AC circuit breaker installed in the distribution box and then turn on the DC disconnect switch on the product. Check the system check message on the front LCD screen.

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.

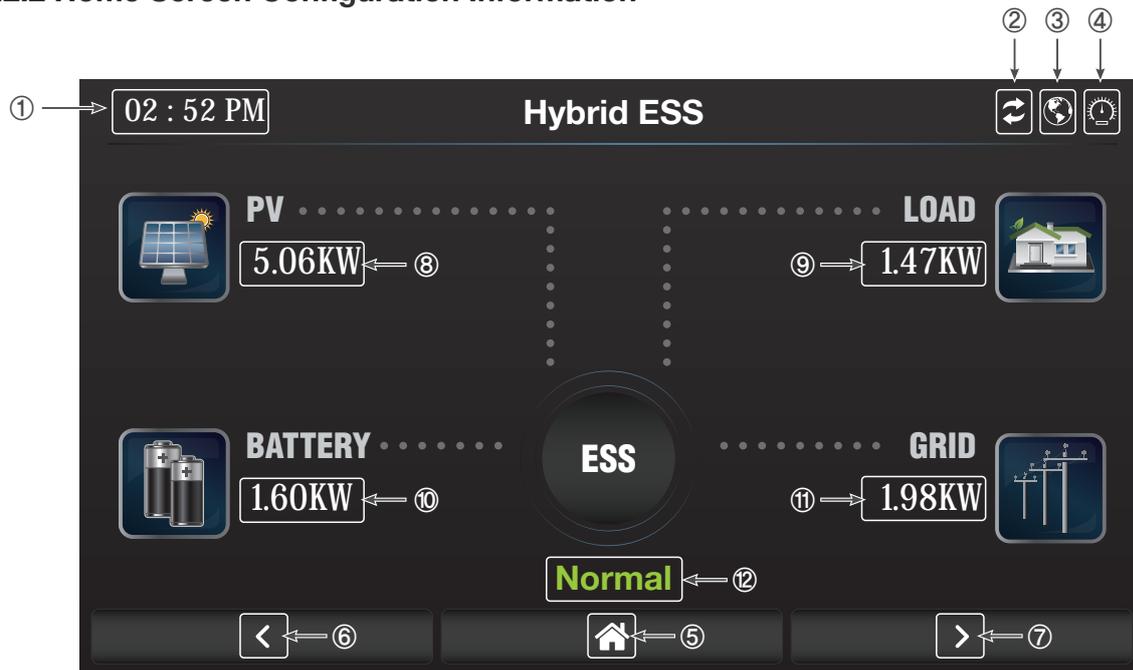


[Figure 8-2 : Initial Indication Screen on Power On]



[Figure 8-3 : Update Screen]

8.2.2 Home Screen Configuration Information



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

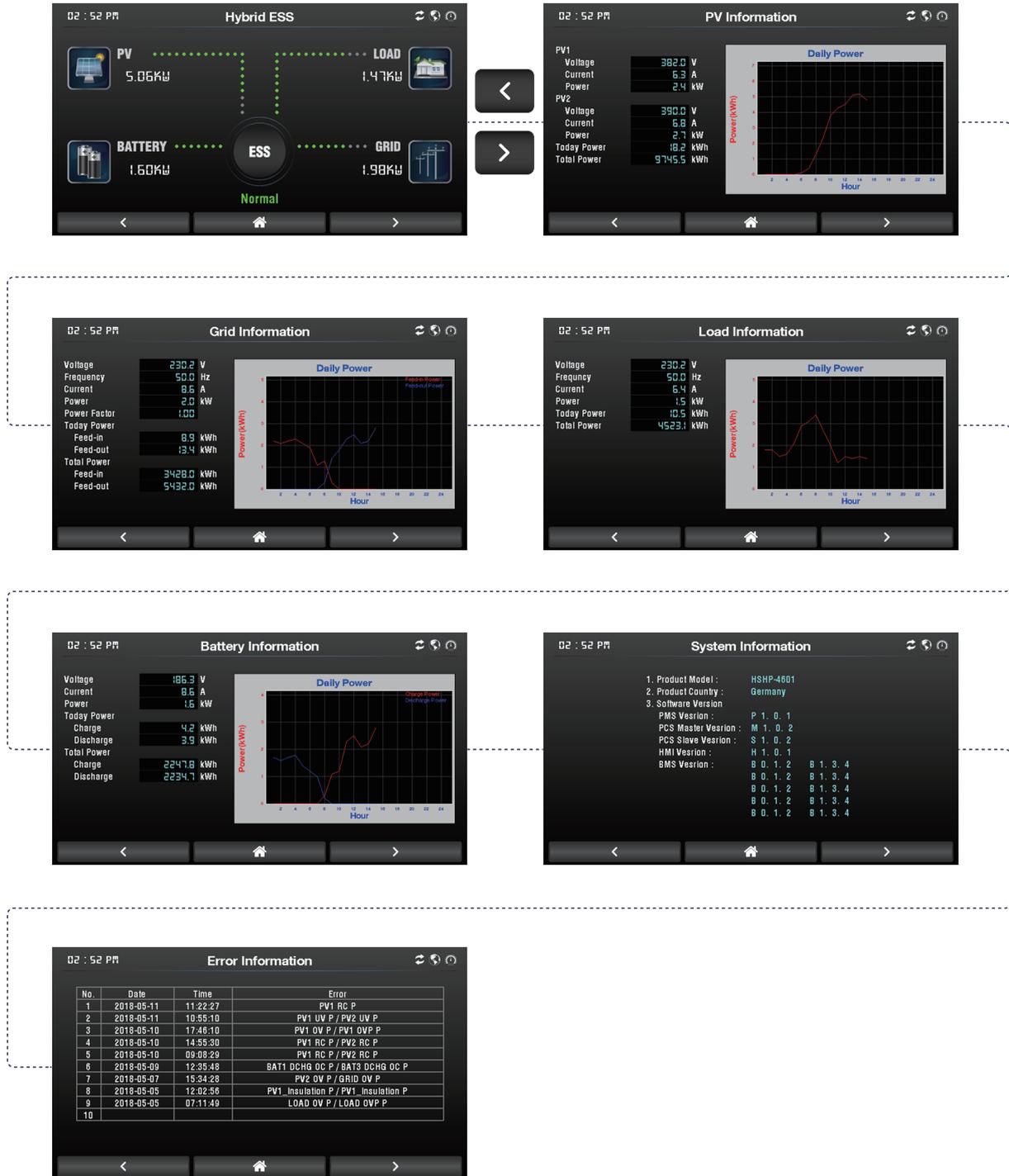
No.	Screen Information	Description
①	Time Information	Display time information
②	Operation Status	Internal communication connection status (PV, Battery, Indication during independent operation)
③	Network Connection Status	Display status when connecting to Ethernet network
④	Meter Connection Status	Display 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)

[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

To turn-off the system, turn off the DC disconnection switch and then push down the manual AC circuit breaker in the distribution board.

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. 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]

8.4.2 Standby Mode

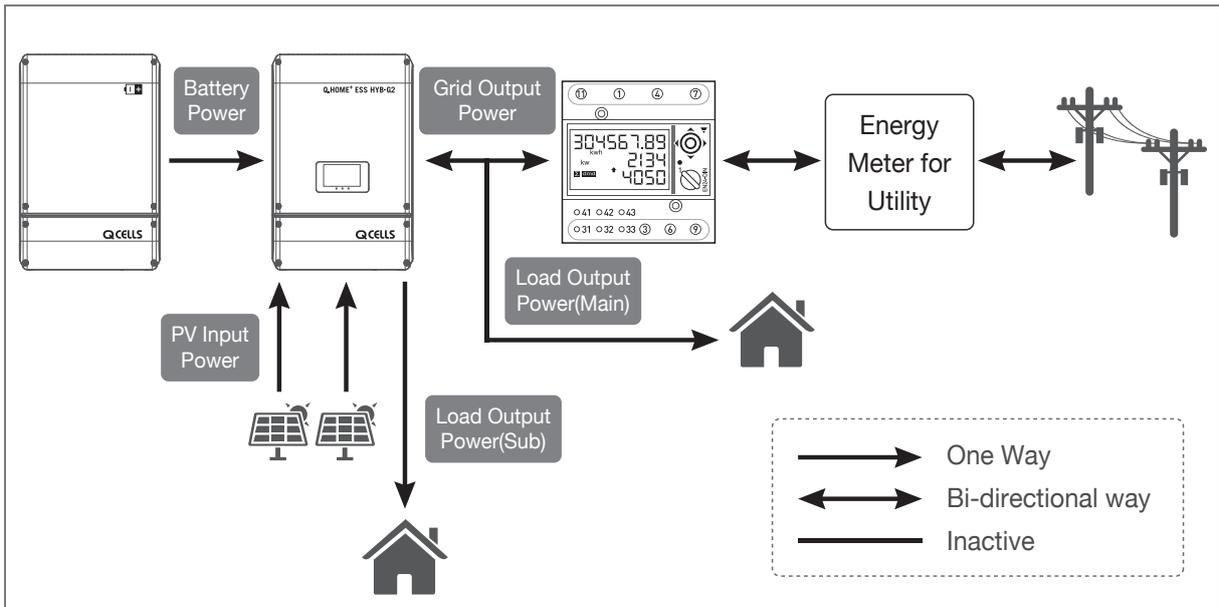
This is the standby mode before converting to operation mode (PV Auto, PV Only, Battery discharge mode). Conversion to the operation mode (PV Auto, PV Only, Battery discharge mode) is made by the EMS decision.

8.4.3 PV-Auto Mode

This mode is divided into three types depending on the state of the Battery power.

8.4.3.1 Weak

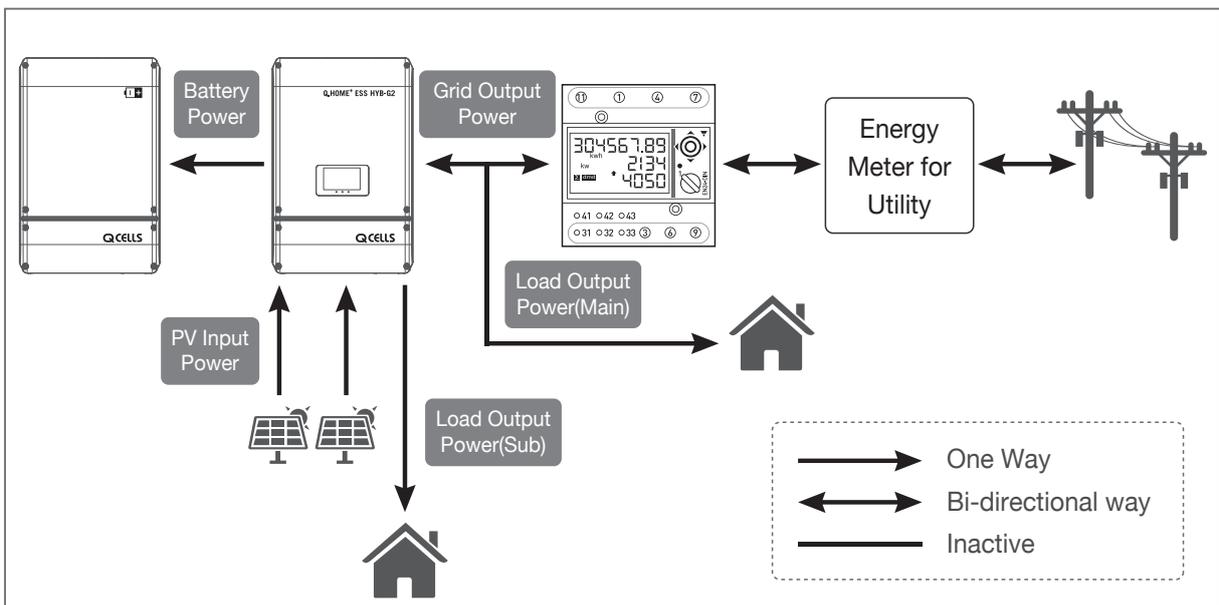
Solar energy generation and Battery discharging are available. The solar-generated power is charged or discharged to the Battery based on the EMS decision. A maximum of 4.6kW or less can be sent to Grid. When Load Output Power (Sub) is higher than power generation of PV and Battery, Grid power is supplied to the Sub.



[Figure 8-6 : Diagram of PV-Auto Weak Mode]

8.4.3.2 Strong

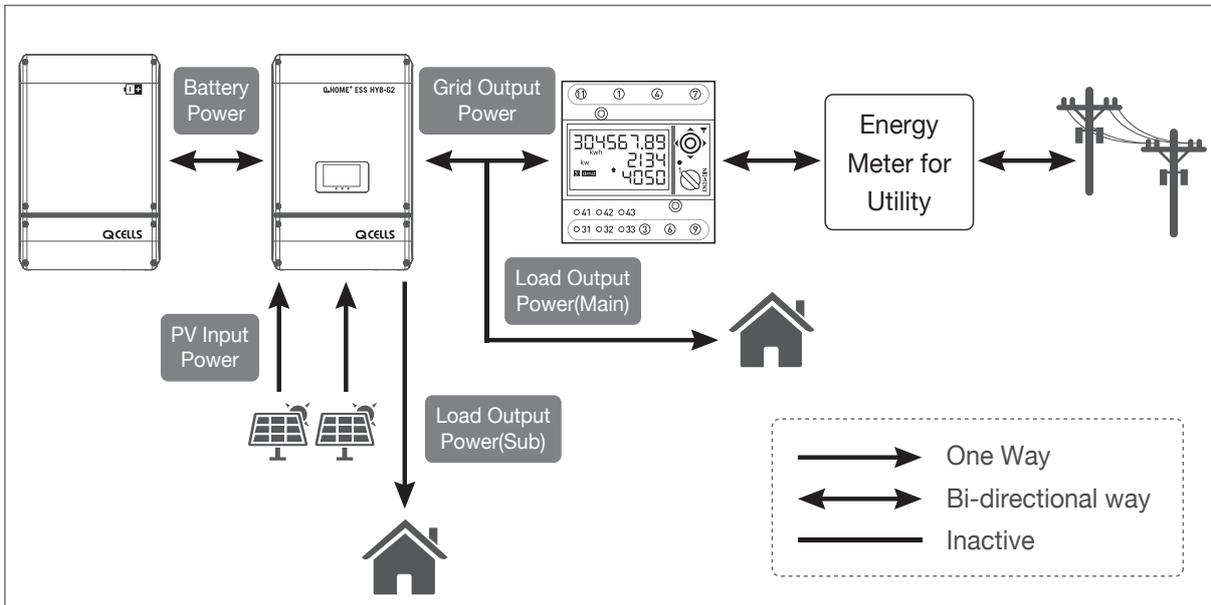
Solar energy generation and Battery charging are available. The solar-generated power is charged or discharged to the Battery based on the EMS decision. A maximum of 4.6kW or less can be sent to Grid.



[Figure 8-7 : Diagram of PV-Auto Strong Mode]

8.4.3.3 Both

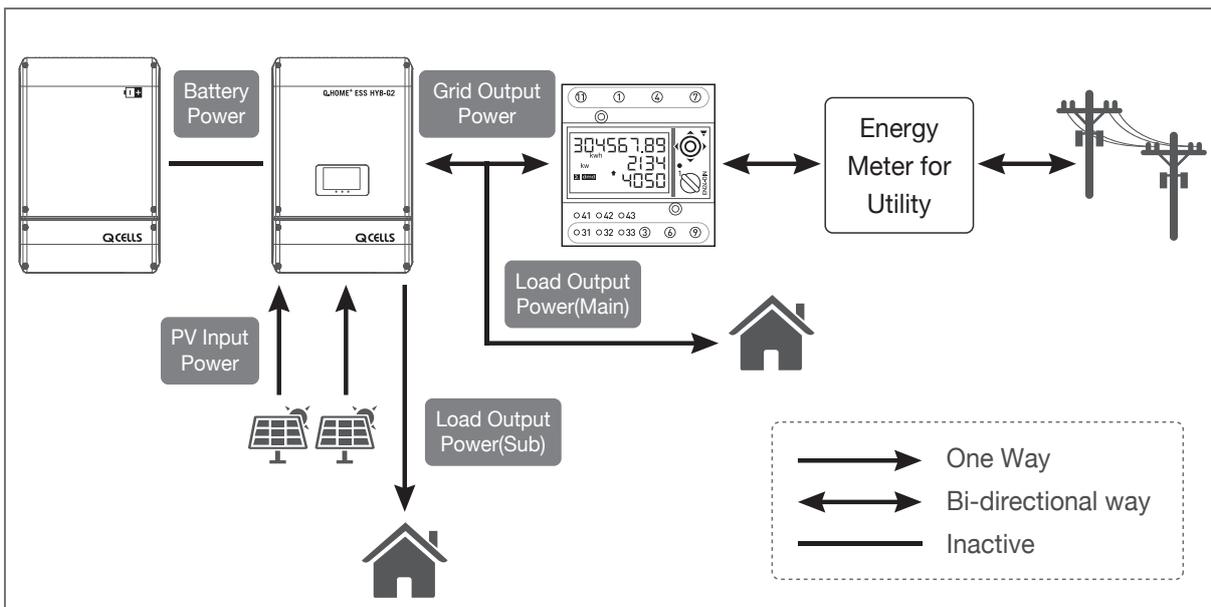
Both solar energy generation and Battery charge-discharge are available. The solar-generated power is charged or discharged to the Battery based on the EMS decision. A maximum of 4.6kW or less can be sent to Grid.



[Figure 8-8 : Diagram of PV-Auto Strong Both Mode]

8.4.4 PV-Only Mode

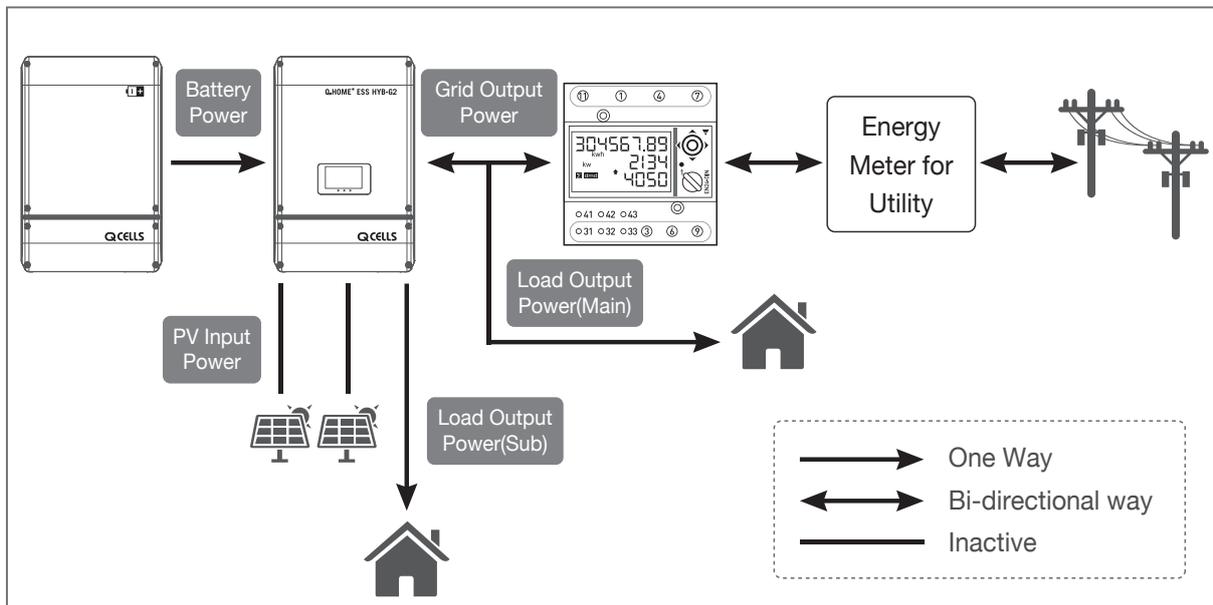
This mode enables the solar energy to be generated. However, the Battery charge-discharge does not operate. A maximum of 4.6kW or less of solar energy generation power can be sent to Grid based on the EMS decision.



[Figure 8-9 : Diagram of PV-Only Mode]

8.4.5 Battery-Discharge Mode

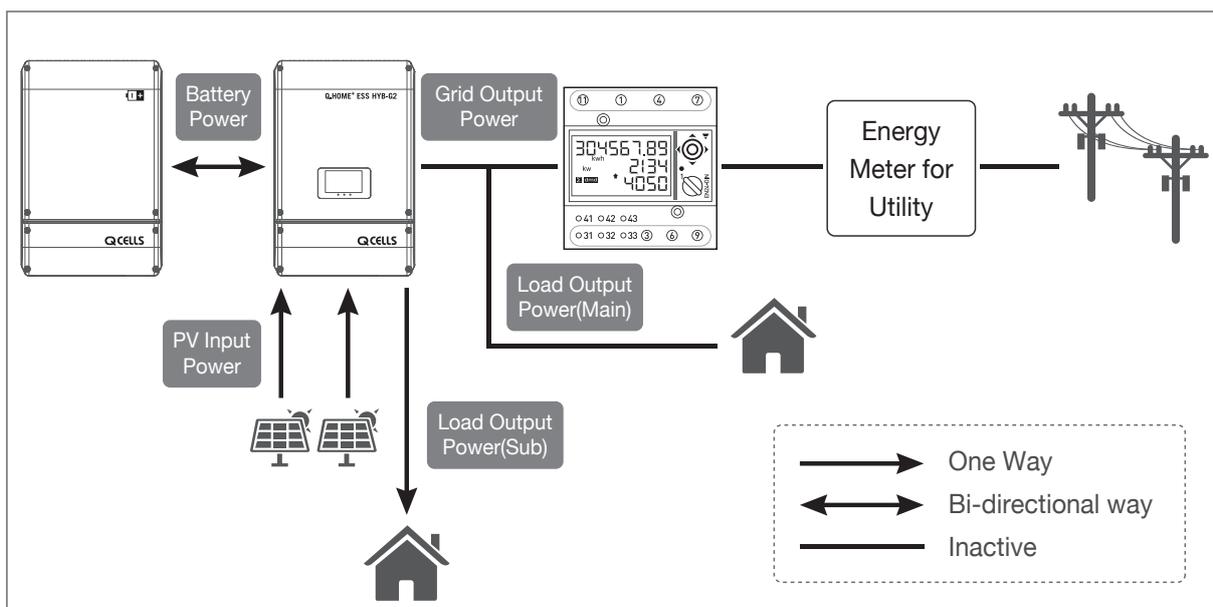
This mode permits of no solar energy generation. Battery discharge is only available on this mode. Based on the EMS decision, the Battery discharge power can be sent maximum 3kW or less only to the Load.



[Figure 8-10 : Diagram of Battery-Discharge Mode]

8.4.6 Stand-Alone Mode

When Q.HOME+ESS HYB-G2 is disconnected from the energy meter, or the power conversion system is disconnected from the energy management system (EMS), the Q.HOME+ESS HYB-G2 enters into the Stand-Alone Mode. The system operates in a PV- only mode.



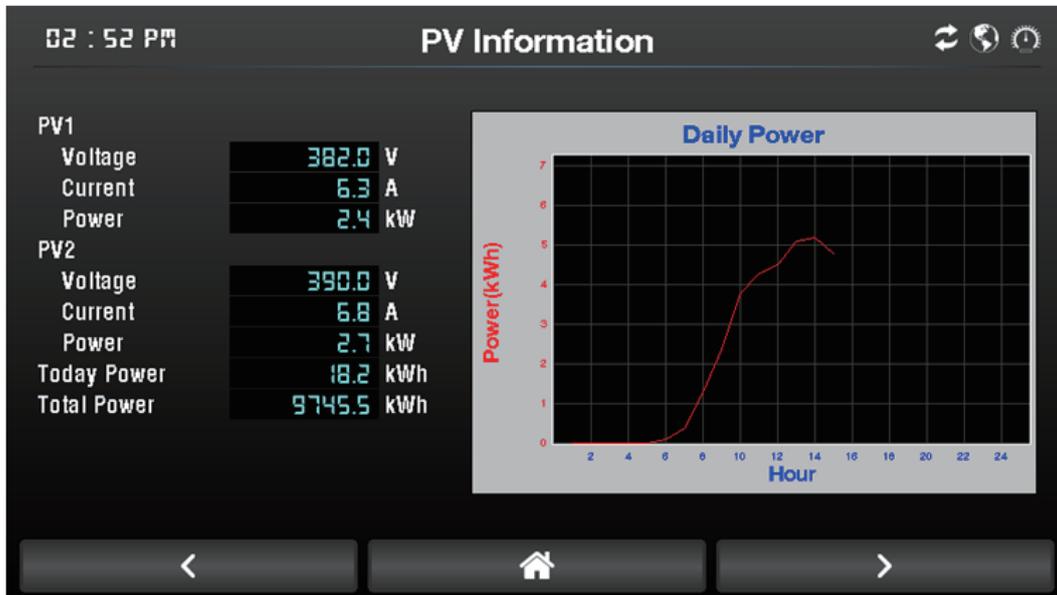
[Figure 8-11 : Diagram of Stand-Alone mode]

8.4.7 Event Check Mode

This mode stops solar energy generation and put it in standby mode as an event occurs.

8.5 Information Display

8.5.1 PV Information display

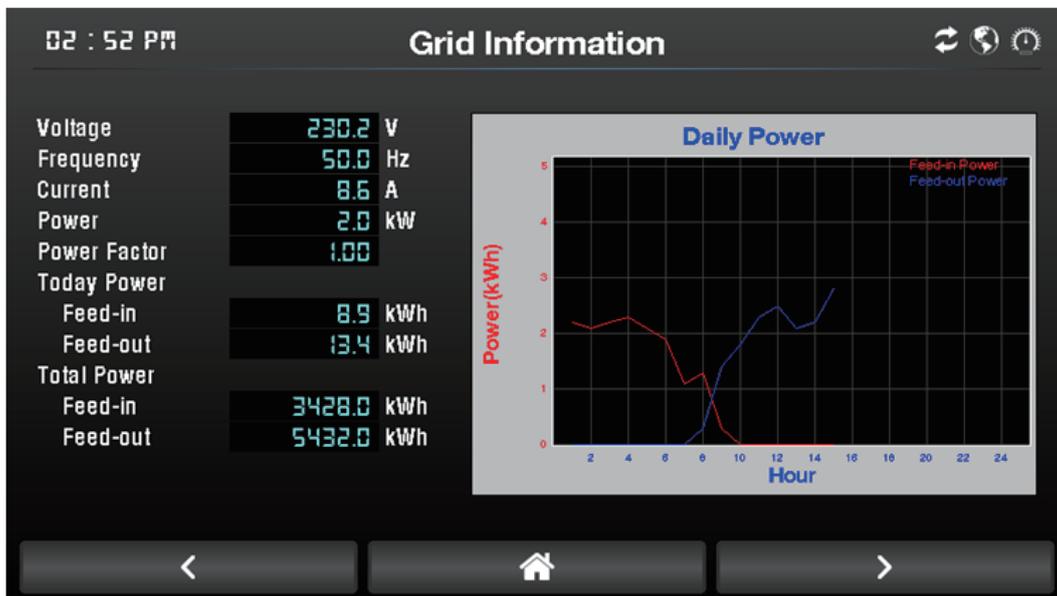


[Figure 8-12 : PV Information Display]

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

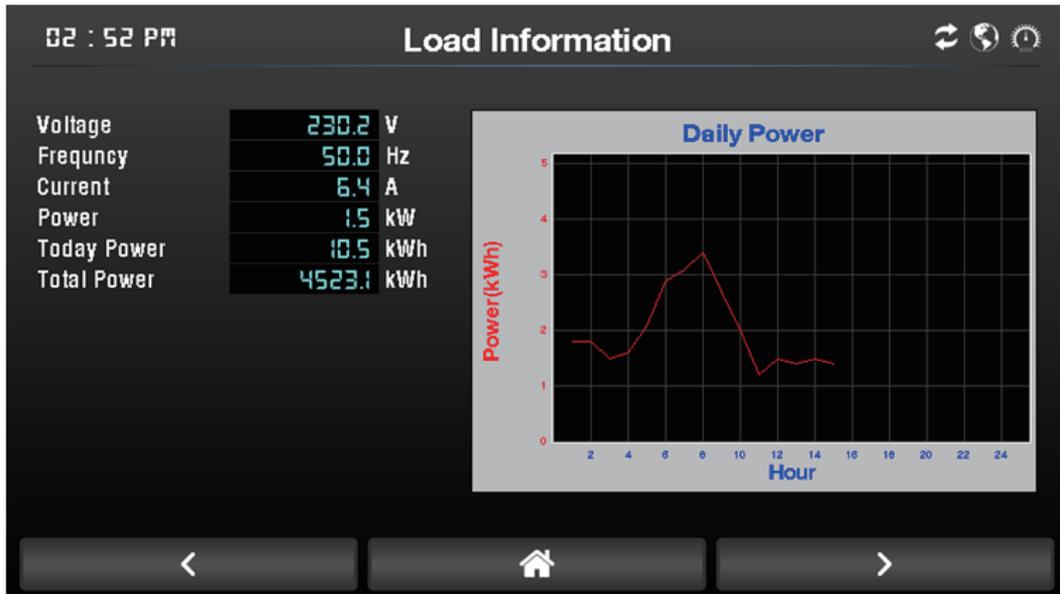


[Figure 8-13 : Grid Information Display]

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

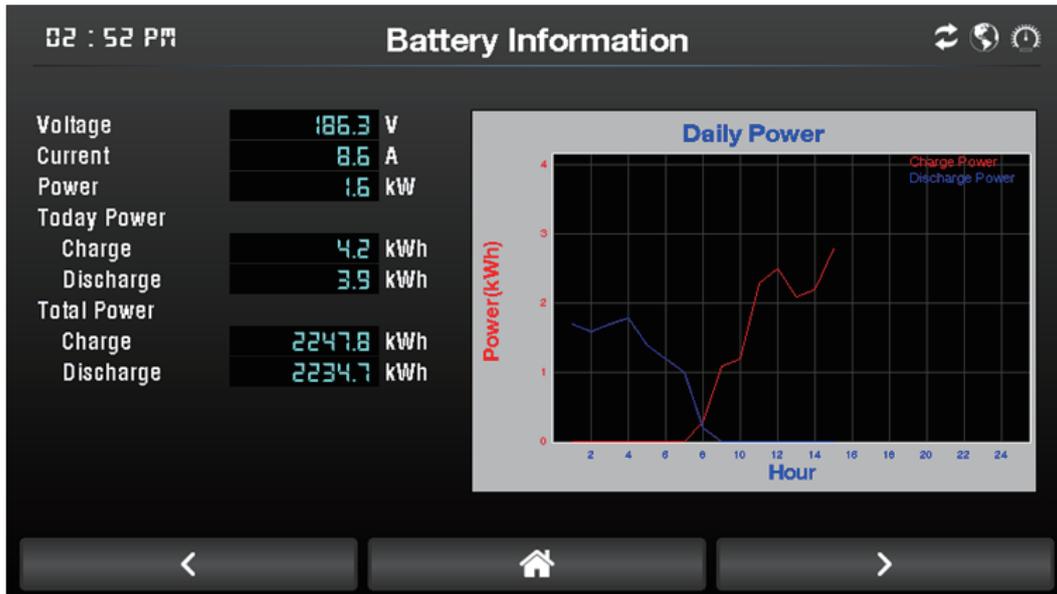


[Figure 8-14 : Load Information Display]

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

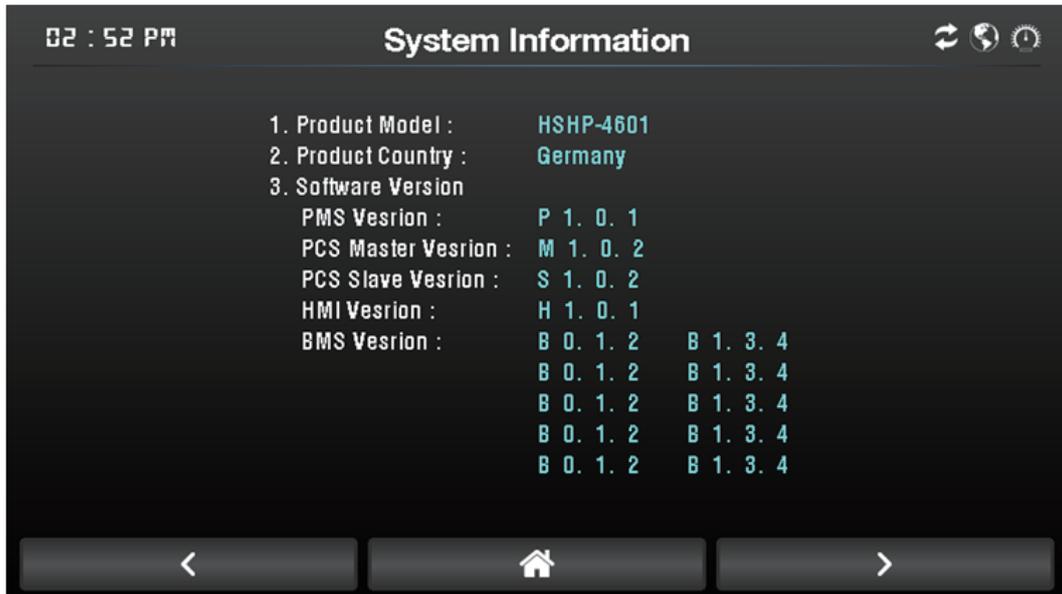


[Figure 8-15 : Battery Information Display]

Display	Description
Voltage	Display Battery voltage
Current	Display Battery current
Power	Display Battery charging/discharging power
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 8-16 : System Information Display]

Display	Description
Product Model	Name of this product+
Product Country	Country using this product
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 8-17 : 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 (<https://myess.hansoltechnics.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 HSHP-4601.
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	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 Hansol Technics 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 Hansol Technics 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 INVERTER due to the use of cleaning agents. If the INVERTER is dirty, clean the enclosure, the enclosure lid, the type label and the LEDs using only clean water and a cloth.

Ensure that the INVERTER is free of dust, foliage and other dirt.

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.

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	
	<p>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!</p> <p>Do not dispose of batteries in a fire. The batteries may explode.</p> <p>Do not open or damage batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.</p> <p>A Battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when handling batteries.</p> <p>Remove watches, rings, or other metallic objects.</p> <p>Use tools with insulated handles.</p> <p>Wear rubber gloves, eye protection glasses and boots when working with the Battery systems.</p> <p>Do not lay tools or metal parts on top of batteries.</p> <p>Disconnect charging source prior to connecting or disconnecting Battery terminals.</p> <p>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).</p>

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 Hansol Technics website, or contact the installer or the service center.

No.	Part Name	Manufacturer	Part number
1	Li-Ion Battery pack	SAMSUNG SDI	-
2	PV connector	Weidmuller	PV STICK

[Table 10-1 : Replaceable Parts List]

10.4.1 Li-Ion Battery Pack

The Li-Ion Battery module can be replaced if it fails to work properly. The Q.HOME+ESS HYB-G2 uses a Battery pack manufactured by SAMSUNG SDI. When you have to replace the Battery module, please contact Hansol Technics 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.



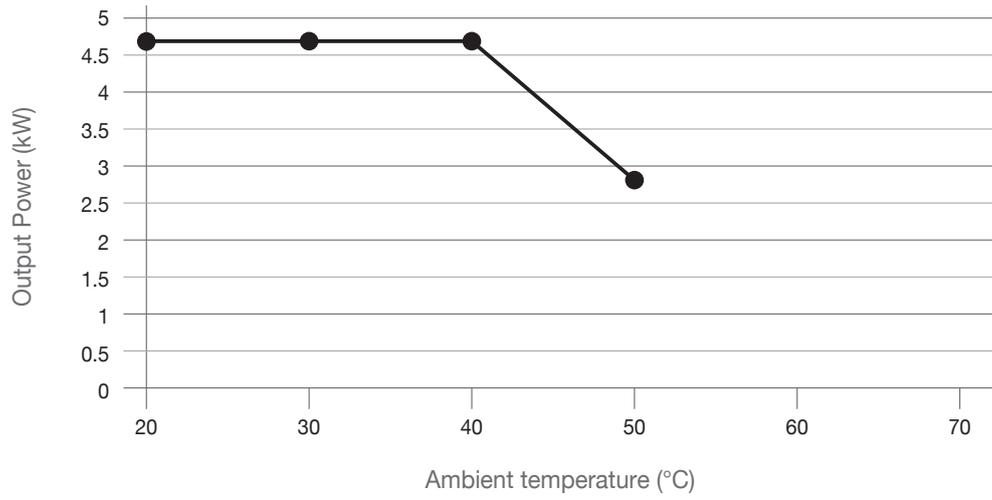
[Figure 10-1 : PV Connector (MC4 Type)]

11. Technical Specifications

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. input current per string	15 A	
Max. input short circuit current for each MPPT	20 A	
Max. INVERTER back feed current to the array	316 A (0.153 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
Battery nominal capacity	4.0 kWh	4.0 kWh x Pack
Battery short circuit current	30 A	
Battery usable capacity	3.6 kWh	3.6 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 kWh	3 kWh
Max. discharge power	3 kWh	
Max. input / output short circuit current	227 A / 278 A (1.003 ms / 1.222 ms)	
Battery technology	Li-Ion	
DC/DC converter technology	Non-Isolated	
Over voltage Category	II	
Grid Data (AC)		
Rated power (at 230V, 50 Hz)	4.6 kW	
Max. apparent AC power	4.6 kVA	
Nominal voltage / range	230 V / 184 V ~ 264 V	
Rated power frequency / range	50 Hz / 47.5 Hz ~ 51.5 Hz	
Max. current	20 A	
Max. over-current protectionnt	32 A	
Max. output fault current	84.5 A (peak), 0.956 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	

Back-up Output	
AC connection type	Single phase
Nominal apparent power	3000 VA
Nominal AC voltage	230 VAC
Nominal frequency	50Hz
AC Nominal Active Power / Max	3000 W / 4600 W (10 min)
Output short-circuit current	290 A (0.985 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 (Battery)
Protective class (I, II, III)	Class I
Degree of protection	IP 65 (Both)
Max. permissible value for relative humidity	4% to 100% (Both)
Operating temperature	-20 ~ +50°C (INVERTER)
	-10 ~ +40°C (Battery)
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, VDE 0126-1-1, EN 61000-6-2 and EN 61000-6-3 (INVERTER)
	IEC 62619, IEC 62477-1, EN 61000-6-2 and EN 61000-6-3 (Battery)

[Table 11-1 : Technical Specifications]



[Figure 11-1 : Derating Curve]

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 Hansol Technics, 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 Hansol Technics. The address is indicated in the contact information (See Chapter 13).

13. Contact

■ **Address** : 5FL.B-FINE AVENUE Bldg 100, Eulji-ro, Jung-gu, Seoul, Republic of Korea

■ **E-Mail** : ess.service@hansol.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 : HSHP-4601
2. Serial Number : HSHP4601Z1XXXXXXXX
3. PV module type and configuration
4. Option equipment : Energy Meter Model Name

Authorized Distributor :
HANWHA Q CELLS GMBH
Sonnenallee 17-21
06766 Bitterfeld-Wolfen
Germany

Manufacturer and Warranty Provider :
Hansol Technics Co., Ltd.
55 Hansam-ro, Deoksan-myeon,
27850 JINCHEON-GUN, Chungcheongbuk-do
SOUTH KOREA