User manual

Q.VOLT HYB-G3 1P/1P-D Inverter

3.7kw / 5.0kw / 6.0kw

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1 Note on this Manual

1.1 Scope of Validity

This manual is an integral part of Q.VOLT HYB-G3 1P/1P-D, it describes the assembly, installation, commissioning, maintenance and troubleshooting for the product. Read it carefully before operating.

Q.VOLT HYB-G3 3.7kW 1P	Q.VOLT HYB-G3 5.0kW 1P	Q.VOLT HYB-G3 6.0kW 1P
Q.VOLT HYB-G3 3.7kW 1P-D	Q.VOLT HYB-G3 5.0kW 1P-D	Q.VOLT HYB-G3 6.0kW 1P-D

Note: "Q.VOLT HYB-G3 1P/1P-D" Series refers to the energy storage inverter that supports photovoltaic grid-tied.

"Q.VOLT HYB-G3 5.0kW 1P" means "5.0kW" inverter with externally installed Q.SAVE MATEBOX-G3 1P for full load EPS (Off-grid) operation.

"Q.VOLT HYB-G3 5.0kW 1P-D" means "5.0kW" inverter with DC Switch.

Keep this manual available at any time.

1.2 Target Group

This manual is for qualified electricians. The tasks described in this manual only can be performed by qualified electricians.

1.3 Symbols Used

The following types of safety instructions and general information appear in this document as described below:

Danger!

- "Danger" refers to a dangerous situation that, if not avoided, will result in a high level of risk such as serious injury or even death.

Warning!

- "Warning" indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Caution!

- "Caution" indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Note!

- "Note" provides tips that are valuable for the optimal operation of our product.

1.3.1 Important Safety Instructions

Danger!
Danger to life due to high voltages in the inverter!
- The personnel responsible for the installation, electrical connection, debugging, maintenance and fault handling operation of this product need to be trained, master the correct operation method, have the corresponding electrician qualification and safety operation knowledge.

Caution!
- When the inverter is working, it is strictly forbidden to touch the shell. The temperature of the shell can be high and there is a risk of scalding.

Caution!
- Radiation may be harmful to health!
Do not stay for a long time and keep at least 20 cm away from the inverter.

Attention!
Ground PV system.
- Perform PV modules and photovoltaic system grounding in accordance with local requirements to achieve optimal protection of systems and personnel.

Warning!
Ensure that the input DC voltage is below the inverter limit.
- Excessive DC voltage and current may cause permanent damage or other losses to the inverter, which is not covered by the warranty.

Warning!
- Authorized service personnel must disconnect the AC and DC power supply of the inverter before performing any maintenance, cleaning or operation of any circuit connected to the inverter.

Warning!
- The inverter can not be operated when it is running.

Warning!
- Risk of electric shock!

Strictly follow relevant safety specifications for product installation and testing. During installation, operation or maintenance, read carefully and follow the instructions and precautions on the inverter or user manual. If the operation is incorrect, it may cause personal and property losses. Keep the user manual properly after use.

This inverter can only use the accessories sold and recommended by Qcells, otherwise it may cause fire, electric shock or casualties.
Without the authorization of our company, you may not open the inverter cover or replace the inverter parts, otherwise the warranty promise of the inverter will be invalid.

The use and operation of the inverter must be carried out in accordance with the instructions in this manual, otherwise this protection will fail and the warranty of the inverter will also fail.
During working, the inverter surface temperature may exceed 60°C, make sure the inverter cools down before touching, and make sure children can not touch.

When exposed to sunlight, photovoltaic arrays generate dangerous high DC voltages. Follow our instructions, otherwise it will be life-threatening.

All DC and AC power sources must be disconnected from the inverter for at least 5 minutes before any wiring or electrical operation is performed on the inverter to ensure complete isolation of the inverter and avoid electric shock.

A photovoltaic module used on the inverter must have a IEC61730A rating, and the total open circuit voltage of the photovoltaic string / array is lower than the maximum rated DC input voltage of the inverter. Any damage caused by photovoltaic over voltage is not covered by warranty.

Installation position should be away from wet environment and corrosive substances.

After the inverter and power grid cut off the PV power supply, there will be a certain amount of residual current in a short time, be cautious or it may lead to serious personal injury and even high risk of death. Use a multimeter (impedance at least 1 MΩ) to measure the voltage between the UDC and the UDC- to ensure that the inverter port is discharged below the safe voltage before starting operation (35 VDC).

➢ Surge protection devices (SPDs) for PV installation

Warning!

- The grid connected inverter is fitted with SPDs in both PV input side and MAINS side.
- External over-voltage protection with surge arresters should be anyway provided when the PV power system is installed, according to local regulations.

Direct or indirect lightning strikes can cause failures. Surge is the main cause of lightning damage to most devices. Surge voltage may occur at photovoltaic input or AC output, especially in remote mountain areas where long distance cable is supplied.

Consult professionals before installing SPDs.

The external lightning protection device can reduce the influence of direct lightning strike, and the lightning protection device can release surge current to the earth.

If the building installed with external light protection device is far away from the inverter location, in order to protect the inverter from electrical and mechanical damage, the inverter should also install an external lightning protection equipment.

In order to protect DC system, two-stage surge protection equipment is needed between DC cable of inverter and photovoltaic equipment module.

In order to protect the AC system, the level 2 surge protection equipment should be installed at the AC output, located between the inverter and the grid. Installation requirements must comply with IEC61643-21 standard.

All DC cables shall be installed in a distance as short as possible, and the positive and negative cables of the same input need to be bundled together to avoid causing loops in the system. Minimum distance installation and binding requirements also apply to auxiliary grounding and shielding grounding conductors.

➢ Anti-islanding Effect

The islanding effect means that when the power grid is cut off, the grid-connected power generation system fails to detect the power outage and still supplies power to the power grid. This is very dangerous for the maintenance personnel and the power grid on the transmission line.

Q.VOLT HYB-G3 1P/1P-D series inverters use active frequency offset method to prevent islanding effect.

PE Connection and Leakage Current

• All inverter incorporate a certified internal Residual Current Device (RCM) in order to protect against possible electrocution and fire hazard in case of a malfunction in the PV array, cables or inverter. There are 2 trip thresholds for the RCM as required for certification (IEC 62109-2:2011). The default value for electrocution protection is 30mA, and for slow rising current is 300mA.
• The inverter, with built-in RCM, will exclude possibility of DC residual current up to 6mA.
• Check which type of RCD is required for the relevant grid code in your region. Qcells strongly recommends to use an RCD Type B on the line connecting to the house loads.

Warning!
High leakage current!
Earth connection essential before connecting supply.

• A faulty ground connection can result in equipment failure, personal and death injuries, and electromagnetic interference.
• Ensure correct grounding according to IEC62109 and conductor diameter according to STANDARD specification.
• Do not connect the grounding end of the equipment in series to prevent multi-point grounding.
• Electrical appliances must be installed in accordance with the wiring rules of each country.

For United Kingdom
• The installation that connects the equipment to the supply terminals shall comply with the requirements of BS 7671.
• Electrical installation of PV system shall comply with requirements of BS 7671 and IEC 60364-7-712.
• All protective devices cannot be changed.
• User shall ensure that equipment is so installed, designed and operated to maintain at all times compliance with the requirements of ESQCR22(1)(a).

Battery Safety Instructions

Qcells Q.VOLT HYB-G3 1P/1P-D Series inverter should pair with high voltage battery, for the specific parameters such as battery type, nominal voltage and nominal capacity etc., refer to section 3.3.

Refer to the matching battery specification for details.

1.3.2 Explanation of Symbols

This section gives an explanation of all the symbols shown on the inverter and on the type label.

- Symbols on the Inverter

Symbol	Explanation
	Operating Display
	Battery status
	An error has occurred, inform your installer immediately.

- Symbols on the Type Label

Symbols	Explanation
CE	CE mark. The inverter complies with the requirements of the applicable CE guidelines.
UK CA	UKCA mark. The inverter complies with the requirements of the applicable UKCA guidelines.
UK NI	UKNI mark. The inverter complies with the requirements of the applicable UKNI guidelines.
	TUV certified.
	Beware of hot surface. The inverter can become hot during operation. Avoid contact during operation.

	Danger of high voltages. Danger to life due to high voltages in the inverter!
	Danger. Risk of electric shock!
	Observe enclosed documentation.
	The inverter can not be disposed together with the household waste. Disposal information can be found in the enclosed documentation.
	Do not operate this inverter until it is isolated from battery, mains and on-site PV generation suppliers.
	Danger to life due to high voltage. There is residual voltage existing in the inverter after powering off, which needs 5 min to discharge. Wait 5 min before you open the upper lid or the DC lid.

1.3.3 CE Directives

This chapter describes the requirements of the European low voltage regulations, including safety instructions and system licensing conditions, the user must comply with these regulations when installing, operating, and maintaining the inverter, otherwise it will cause personal injury or death, and the inverter will cause damage.

Read the manual carefully when operating the inverter. If you do not understand "danger", "warning", "caution" and the description in the manual, contact the manufacturer or service agent before installing and operating the inverter.

Grid-connected inverter comply with low voltage directive (LVD) 2014/35/EU and Electromagnetic compatibility directive (EMC) 2014/30/EU. Testing of components is based on:
EN 62109-1:2010;
EN 62109-2:2011;
IEC 62109-1(ed.1);
IEC62109-2(ed.1);
EN 61000-6-3:2007+A:2011;
EN 61000-6-1:2007;
EN 61000-6-2:2005;

For installation in photovoltaic module system, it is necessary to make sure that the whole system complies with the requirements of EC(2014/35/EU, 2014/30/EU, etc.) before starting the module (i.e. to start the operation). The assembly shall be installed in accordance with the statutory wiring rules. Install and configure the system in accordance with safety rules, including the use of specified wiring methods. The installation of the system can only be done by professional installers who are familiar with safety requirements and EMC. The installer shall ensure that the system complies with the relevant local norms.

The individual subassembly of the system shall be interconnected by means of the wiring methods outlined in national/international norms such as the national electric code (NFPA) No.70 or VDE regulation 0107.

2 Introduction

2.1 Basic Features

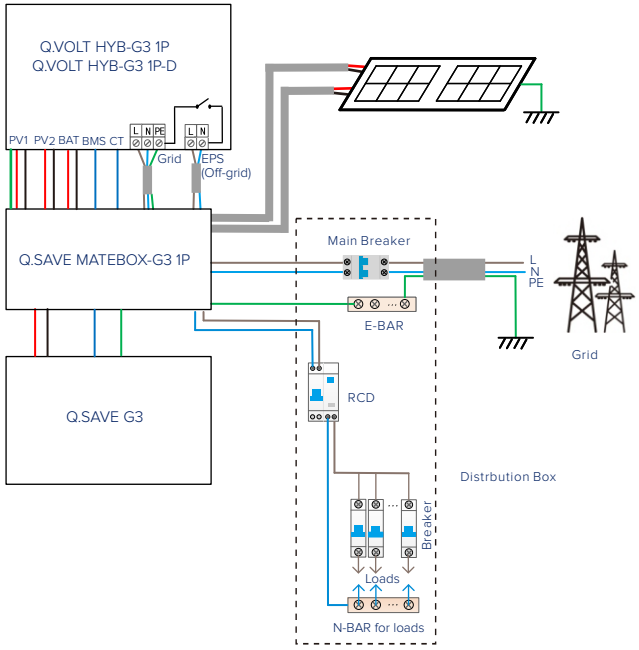
Q.VOLT HYB-G3 1P/1P-D series is a high-quality inverter that can convert solar energy into alternating current and store energy into batteries.

The inverter can be used to optimize self-consumption, stored in batteries for future use or feed into the public grid. The system can also provide emergency power (EPS) during power outages. The most suitable operating mode can be set from the end user.

2.2 System Diagram

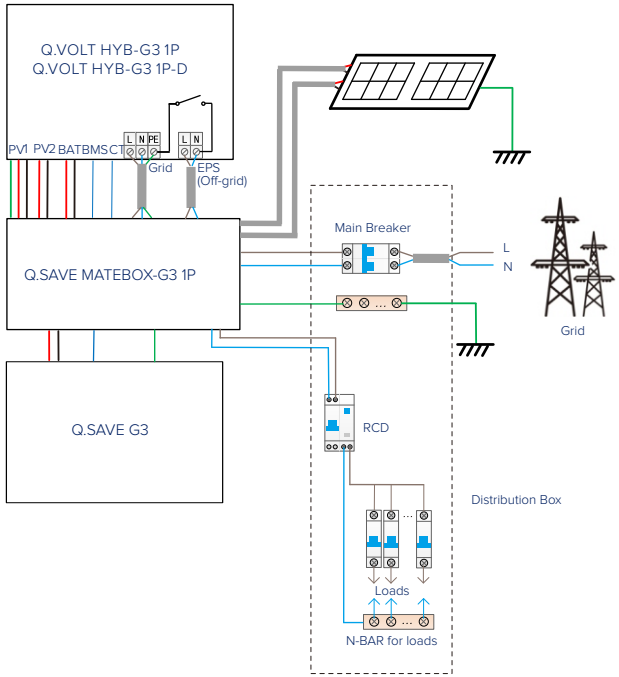
There are different ways of wiring in different countries. Refer to the diagrams below and select the appropriate wiring method according to local wiring rules and standards.

Diagram A: Neutral line and PE line are separated from each other, all loads connect to the "Load" port of the Q.SAVE MATEBOX-G3 1P;



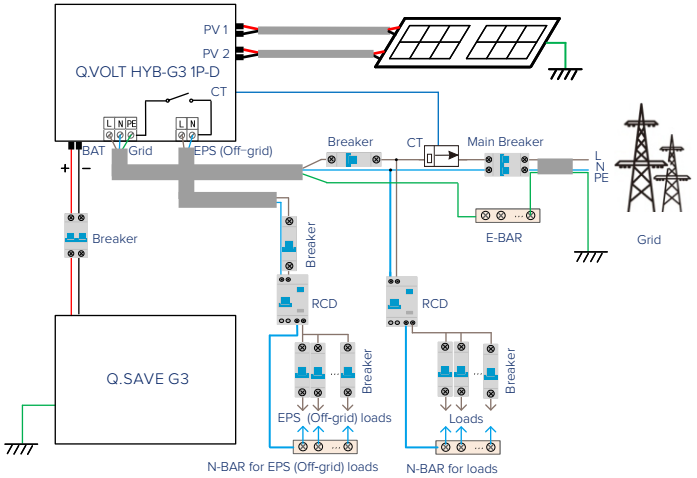
TN-S System Diagram

Diagram B: Neutral line and PE line are separated from each other, the protective grounding should be independent, all loads connect to the "Load" port of the Q.SAVE MATEBOX-G3 1P.



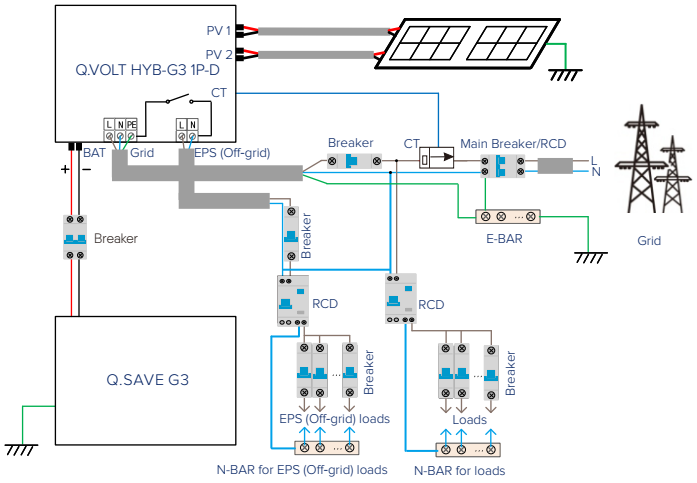
TT System Diagram

Diagram C: Neutral line and PE line are separated from each other, the backup loads connect to the EPS (Off-grid) port;



TN-S System Diagram

Diagram D: Neutral line and PE line are separated from each other, the protective grounding should be independent, the backup loads connect to the EPS (Off-grid) port.



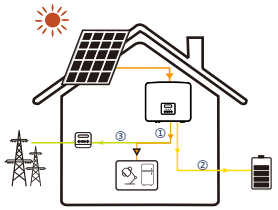
TT System Diagram

Note!

- In case of a sudden power outage, the inverter connects the N line of EPS (Off-grid) load with the ground through relay, providing a fixed zero potential for EPS (Off-grid) load and ensuring the safety of electricity use by users.
- Control the inverter load and make sure its "output value" is "within" EPS (Off-grid) output power, otherwise the inverter will stop and the alarm "overload fault" will be shown.
- Check with the grid operator whether there are special regulations for grid connection.

2.3 Work Mode

Q.VOLT HYB-G3 1P/1P-D series, can be based on different needs, there are a variety of models.



Self Use

The self-use mode is suitable for areas with low feed-in subsidies and high electricity prices.

① When the power of PV is sufficient

Active Charge or Discharge time period: PV will power the loads firstly, and surplus power will charge to the battery.
If the battery is fully charged, then sell the surplus power to the grid; (The inverter will limit the output if Feed-in limit or zero feed-in is needed)

(PV > Load, PV →Load→Battery → Grid)

② When the power of PV is insufficient

Active Charge time period: PV will power the loads firstly, the remaining power will be taken from the grid, the battery will not discharge at thifrom the grid.

(PV < Load, PV + Battery + Grid → Load)

③ Without PV power

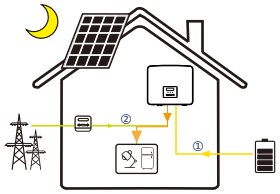
Active Charge time period: The grid supplies the loads and also can charge the battery;

(PV=0, Grid → Load → Battery)

Active Discharge time period: The battery will power the home loads firstly. If the battery power is not enough, the remaining power will be taken from the grid. The inverter will enter into the standby state.

(PV=0, Battery+Grid → Load)

Battery min SOC can be set: 10%-100%
Charge battery to min SOC can be set:10%-100%



Feed-in priority

The Feed-in priority mode is suitable for areas with high feed-in subsidies, but has feed-in power limitation.

①When the power of PV is sufficient

Active Charging time period: First, PV supply power to the load, then charge the battery to the set capacity, and then sell the power to the grid. If the local grid company limits the grid-connected power of the inverter, the excess energy continues to charge the battery.

(PV＞Load, PV → Load → Battery → Grid → Battery)

Active Discharge time period: PV will power the loads firstly, and surplus power will feed-in to the grid.

(PV＞Load, PV → Load → Grid)

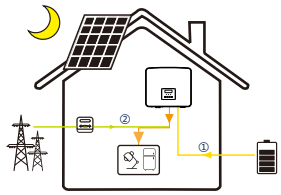
② When the power of PV is insufficient

Active Charging time period: PV will power the loads firstly, the remaining power will be taken from the grid. The battery will not discharge.

(PV＜Load, PV + Grid → Load)

Discharge time period: PV+BAT will power the loads together. If the power is still not enough, the remaining power will be taken from the grid.

(PV＜Load, PV + Battery + Grid → Load)



③ Without PV power

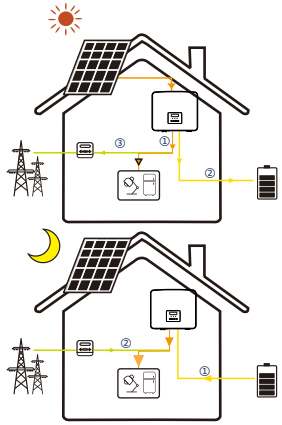
Active Charge time period: The grid will power the home loads and also charge the battery;

(PV=0, Grid → Load + Battery)

Active Discharge time period: The battery will power the home loads firstly. If the battery power is not enough, the remaining power will be taken from the grid. The inverter will enter into the standby state.

(PV=0, Battery + Grid → Load)

Battery min SOC can be set: 10%-100%
Charge battery to min SOC can be set:10%-100%

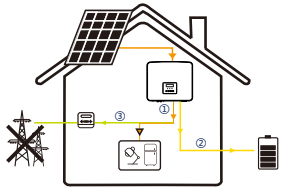


Backup mode

The back-up mode is suitable for areas with frequent power outages.

Same working logic with “Self-use” mode. This mode will maintain the battery capacity at a relatively high level (users setting) to ensure that the emergency loads can be used when the grid is off.

Battery min SOC can be set: 30%-100%
Charge battery to min SOC can be set: 30%-100%.



EPS (Off-grid)

IIn case of power failure, the system will power EPS loads through PV and battery.
(Battery must be installed, and EPS loads shall not exceed battery’s max. output power.)

①When the power of PV is sufficient

PV will power the loads firstly, and surplus power will charge the battery.

(PV＞Load, PV → Load → Battery)

② When the power of PV is insufficient

The remaining power will be taken from the battery.

(PV＜Load, PV → Load)

③ Without PV power

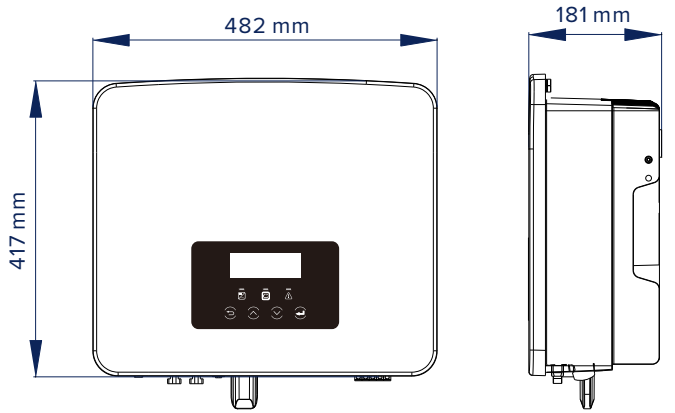
The battery will power the emergency loads until the battery reaches the min SOC, then the inverter will enter into the idle mode.

(PV=0, Battery → Load)

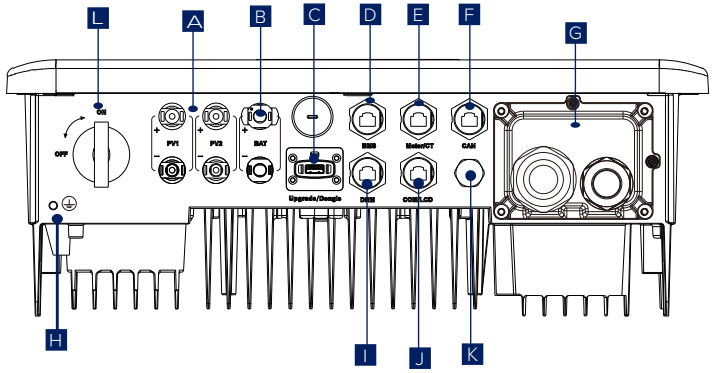
EPS (Off-grid) SOC-min condition is adjustable within the range of 1 0%-25%

Note: In the case of grid connection, all working modes work normally when the battery SOC >5%. When the battery SOC is below 5%, the PV or Grid will first charge the battery SOC to 11% and then return to the working mode selected by the user.

2.4 Dimensions



2.5 Terminals of Inverter



Object	Description
A	PV connection port
B	Battery connection port
C	USB port for upgrading/ External monitoring connection port
D	Battery communication
E	CT Port
F	Communication port for parallel operation
G	Grid/EPS (Off-grid) Output
H	Ground connection port
I	DRM Port
J	Communications/ LCD external screen ports
K	Waterproof valve
L	DC Switch

Warning!
Qualified electrician required for the installation.

3 Technical Data

3.1 DC Input

Model	Q.VOLT HYB-G3 3.7kW 1P Q.VOLT HYB-G3 3.7kW 1P-D	Q.VOLT HYB-G3 5.0kW 1P Q.VOLT HYB-G3 5.0kW 1P-D	Q.VOLT HYB-G3 6.0kW 1P Q.VOLT HYB-G3 6.0kW 1P-D
Max. recommended PV power [W]	5500	7500	9000
Max. DC voltage [V]	600	600	600
Nominal DC operating voltage [V]	360	360	360
MPPT voltage range [V]	70-550		
MPPT Full Power voltage range [V]	135-480	190-480	225-480
Max. input current [A]	16/ per MPPT	16/ per MPPT	16/ per MPPT
Max. short circuit current [A]	20/ per MPPT	20/ per MPPT	20/ per MPPT
Start output voltage [V]	90	90	90
No. of MPP trackers	2	2	2
Strings per MPP tracker	1	1	1

3.2 AC Output/Input

Model	Q.VOLT HYB-G3 3.7kW 1P Q.VOLT HYB-G3 3.7kW 1P-D	Q.VOLT HYB-G3 5.0kW 1P Q.VOLT HYB-G3 5.0kW 1P-D	Q.VOLT HYB-G3 6.0kW 1P Q.VOLT HYB-G3 6.0kW 1P-D
AC Output			
Nominal AC power [VA]	3680	5000	6000
Max. apparent AC power [VA]	3680	5500 (C10/11 5000)	6600
Rated AC voltage [V]	220/230/240 (180 to 270)		
Rated grid frequency [Hz]	50/60		
Max.AC current [A]	16	23.9 (C10/11 21.7)	28.6
Displacement power factor	0.8 leading...0.8 lagging		
Total harmonic distortion (THDi)	< 2%		
AC Input			
Max. apparent power [VA]	7360	9200	9200
Rated AC power [W]	3680	5000	6000
Rated grid voltage (range) [V]	220/230/240 (180 to 270)		
Rated grid frequency [Hz]	50/60		
Max. AC current [A]	32	40	40
Displacement power factor	0.8 leading...0.8 lagging		

3.3 Battery (Manufacturer certified battery)

Model	Q.VOLT HYB-G3 3.7kW 1P Q.VOLT HYB-G3 3.7kW 1P-D	Q.VOLT HYB-G3 5.0kW 1P Q.VOLT HYB-G3 5.0kW 1P-D	Q.VOLT HYB-G3 6.0kW 1P Q.VOLT HYB-G3 6.0kW 1P-D
Battery type	Lithium batteries		
Battery Full Voltage [V]	80-480		
Maximum charge/discharge flow [A]	30		
Communication interface	CAN/RS485		
Reverse connection protection	Yes		

3.4 Efficiency, Safety and Protection

Model	Q.VOLT HYB-G3 3.7kW 1P Q.VOLT HYB-G3 3.7kW 1P-D	Q.VOLT HYB-G3 5.0kW 1P Q.VOLT HYB-G3 5.0kW 1P-D	Q.VOLT HYB-G3 6.0kW 1P Q.VOLT HYB-G3 6.0kW 1P-D
MPPT efficiency	99.9%	99.9%	99.9%
European efficiency	97.0%	97.0%	97.0%
Maximum efficiency	97.6%	97.6%	97.6%
Max. battery charge efficiency (PV to BAT) (@ full load)	97.0%	97.0%	97.0%
Max. battery discharge efficiency (BAT to AC) (@ full load)	97.0%	97.0%	97.0%
Security & Protection			
DC SPD Protection	Integrated(Type III)		
AC SPD Protection	Integrated(Type III)		
Over/under voltage protection	YES		
Grid protection	YES		
DC injection monitoring	YES		
Back feed current monitoring	YES		
Residual current detection	YES		
Anti-islanding protection	YES		
Over load protection	YES		
Over heat protection	YES		
Array insulation resistance detection	YES		

3.5 EPS (Off-grid) Output

Model	Q.VOLT HYB-G3 3.7kW 1P Q.VOLT HYB-G3 3.7kW 1P-D	Q.VOLT HYB-G3 5.0kW 1P Q.VOLT HYB-G3 5.0kW 1P-D	Q.VOLT HYB-G3 6.0kW 1P Q.VOLT HYB-G3 6.0kW 1P-D
EPS (Off-grid) rated power [VA]	3680	5000	6000
EPS (Off-grid) rated voltage [V]	230VAC		
Frequency [Hz]	50/60		
EPS (Off-grid) rated current [A]	16	21.7	26.1
EPS (Off-grid) Peak Power [VA]	120%rated, 1h	120%rated, 1h	120%rated, 10min
Switching time(typical value) [ms]	internal switch<10, external switch＜100		
Total harmonic distortion (THDi)	<2%		

3.6 General Data

Model	Q.VOLT HYB-G3 3.7kW 1P Q.VOLT HYB-G3 3.7kW 1P-D	Q.VOLT HYB-G3 5.0kW 1P Q.VOLT HYB-G3 5.0kW 1P-D	Q.VOLT HYB-G3 6.0kW 1P Q.VOLT HYB-G3 6.0kW 1P-D
Dimensions (W/H/D) [mm]	482x417x181		
Dimensions of Packing (W/H/D) [mm]	590x530x315		
Net weight [kg]	24	24	24
Gross weight * [kg]	28	28	28
Heat dissipation treatment	Natural Cooling		
Noise emission(typical)[dB]	<30		
Storage temperature range	-40°C ~ 65°C		
Operating temperature range	-35°C ~ 60°C on derating at 45°C		
Humidity [%]	0%~100%		
Altitude	< 3000m		
Protection level	IP65		
Protection Class	I		
Cold standby consumption	<3W		
Over voltage category	III (MAINS), II (PV, Battery)		
Pollution Degree	III		
Installation mode	Wall mounted		
Inverter Topology	Non-isolated		
Communication interface	CT, E-Meter / WLAN, Ethernet (both with adapter) / USB (for local upgrade) / Dry Contact (with adapter) /RS485 / CAN 2.0		
Standard warranty	10 years		

* The specific gross weight is subject to the actual situation of the whole machine, which may be a little different due to the influence of the external environment.

4 Installation

4.1 Check for Transport Damage

Ensure that the inverter is in good condition after delivery. If there is any visible damage such as cracks, contact the installer immediately.

4.2 Packing List

Open the package and check the materials and accessories according to the following list.

Q.VOLT HYB-G3 1P series

Number	Quantity	Description
A	1	Q.VOLT HYB-G3 1P series inverter
B	1	Bracket
C	3	Expansion bolt, Gasket, Self-tapping bolt
D	1	M5 inner hexagon bolt
E	2	Waterproof connector with RJ45
F	1	Manual
G	1	Quick Installation Guide
H	1	Warranty Card
I	1	Q.VOLT HYB-G3 Wi-Fi

Q.VOLT HYB-G3 1P-D series

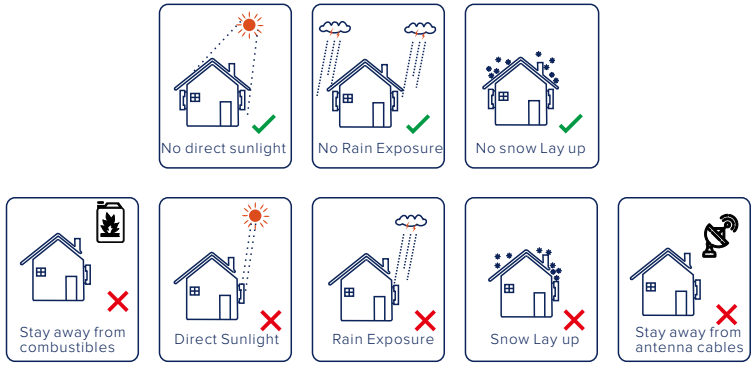
Number	Quantity	Description
A	1	Q.VOLT HYB-G3 1P-D series inverter
B	1	Bracket
C	3	Expansion bolt, Gasket, Self-tapping bolt
D	1	M5 inner hexagon bolt
E	3	Waterproof connector with RJ45
F	1	Manual
G	1	Quick Installation Guide
H	1	Warranty Card
I	1	Q.VOLT HYB-G3 Wi-Fi
J	4	PV terminal (2 x positive, 2 x negative)
K	1	Waterproof shield
L	3	8 mm^2 European terminal
M	2	6 mm^2 European terminal
N	2	Battery connection terminal (1 x positive, 1 x negative)
O	1	RJ45 terminal
P	1	OT terminal (inverter grounding)
Q	1	RJ45 terminal adapter
R	1	CT Sensor

4.3 Installation Precautions

The ingress protection level of Q.VOLT HYB-G3 1P/1P-D series inverters is IP 65, so that the inverter can be installed outdoors.
Check the installation environment and pay attention to the following conditions when installing:

- Do not expose to strong light.
- Do not install on flammable construction materials.
- Do not install in proximity of flammable and explosive gases or liquids (e.g. where chemicals are stored).
- Do not install in proximity of TV antennas or cables.
- Do not place in areas above 3000 meters above sea level.
- Do not install in areas directly exposed to precipitation or high humidity, which may cause corrosion or damage Internal devices.
- Keep the system out of reach of children.

If the inverter is installed in a narrow area, be sure to reserve appropriate space for heat dissipation.
The ambient temperature of the installation should be between -35°C ~ 60°C.
The maximum angle range of wall tilt should be ±5°.
Avoid exposing the products to direct sunlight, rain and snow.



4.4 Tool preparation

Tool equipment				
Type	Name	Image	Name	Image
Machine Installation Tools	Hammer drill	Bit 10 	Multimeter	DC Voltage Range ≥1100 V DC 
	Torque screwdriver	Crosshead M5 	Socket wrench set (Hexagon)	
	OT terminals press clamp	2mm²~6mm² 	Diagonal pliers	
	Utility knife		Multifunction terminal crimping tool (RJ45)	
	Diagonal pliers		Marker	
	Rubber hammer		Tape measure	
	Crimping Tool		Hexagon keys	
	Euro terminal crimping tool		Spirit level	
Individual Protection Tools	Dustproof Cover		Protective glasses	

Tool equipment				
Type	Name	Image	Name	Image
Individual Protection Tool	Safety gloves		Safety shoes	

Type	Name	Image	Requirement
Equipment Preparation	Breaker		Grid port and EPS (Off-grid) port wiring section (5.1) Note: In case of installation with Q.SAVE MATEBOX-G3 1P, the circuit breakers are already included and pre-installed.
Cable Preparation	PV end wire		Dedicated PV wire, line number # 4 mm^2 withstand voltage 1000V, temperature resistance 105℃ fire resistance grade VW-1
	EPS (Off-grid) end wire		Double Core Cables
	Grid end wire		Triple Core Cables
	Communi-cation lines		Twisted pair with shield
	Battery Cable		Conventional wire
	PE Cable		Conventional wire

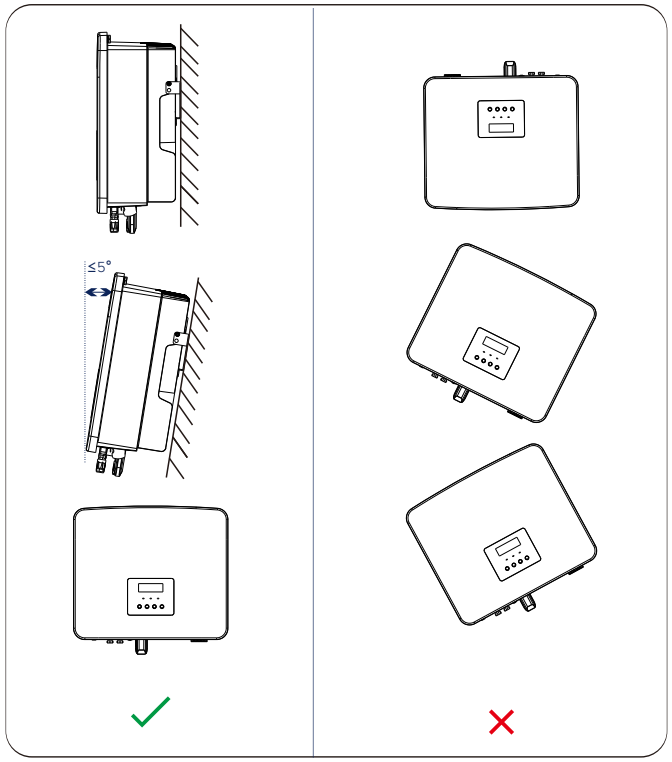
4.5 Installation Site Conditions

4.5.1 Installation Carrier Requirements

Do not install the inverter near flammable materials.
Install the inverter on a solid object that can withstand the weight requirements of the inverter and energy storage system.
Be careful not to install the inverter in the plasterboard wall or similar to the residential places with poor sound insulation, so as not to work with noise and interfere with the residents' life in the morning.

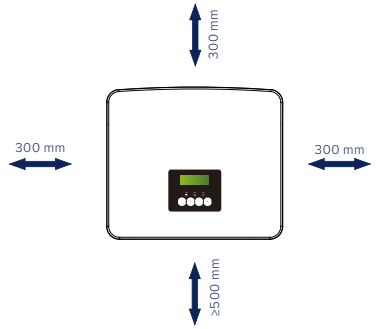
4.5.2 Installation Requirements

Install the inverter at a maximum back tilt of 5 degrees, the inverter can not be tilted forward, installed upside down, excessively back tilted or side tilted.



4.5.3 Installation Space Requirements

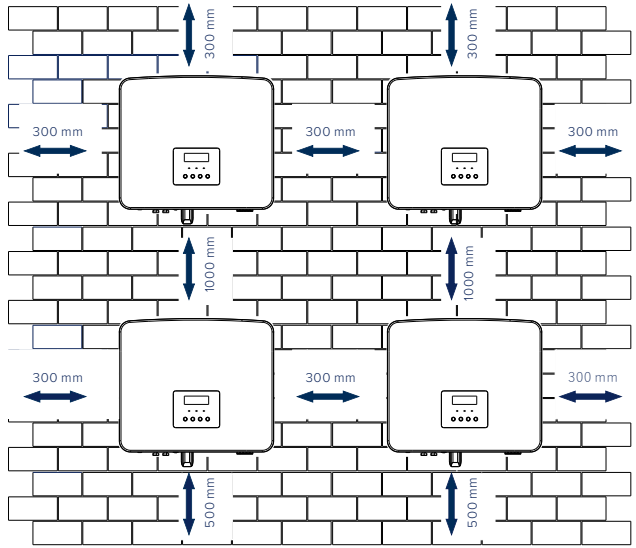
Reserve enough space when installing inverter (at least 300 mm) for heat dissipation.



Reserved space dimensions of installation

Position	Min Distance
Left	300 mm
Right	300 mm
Up	300 mm
Down	500 mm

For multi-inverter installation scenarios, the inline installation method is recommended; it is not recommended to install multiple inverters in stacks. If you choose stack installation, please refer to the installation separation distance below.



4.6 Mounting

Preparation

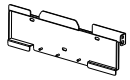
Prepare the following tools before installation.

Installation tools: screwdriver, wrench,Φ10 drill, hammer, socket wrench set, Hexagon keys and spirit level.

Step 1. Fix the wall bracket to the wall.

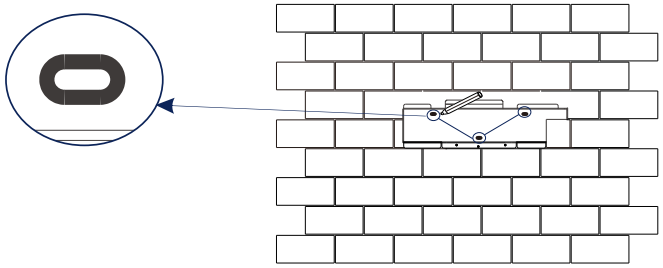
First find the expansion screw and the wall bracket in the accessory bag, as shown below:

Expansion bolts, Gasket,Tapping screws

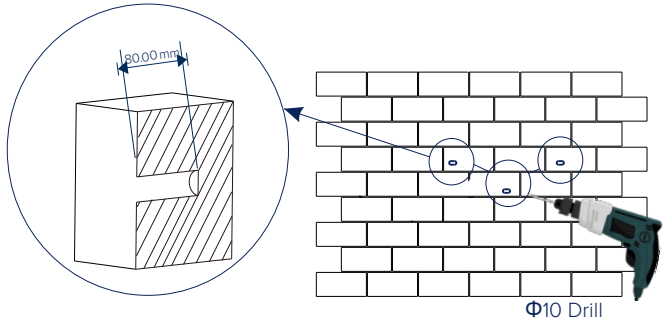


Bracket

a) Draw drilling holes as per the bracket's hole locations by a marker, and ensure that the two top holes lie on the same straight line by spirit level.
b) Drill holes at marked spots with depth of 80 mm.



a)

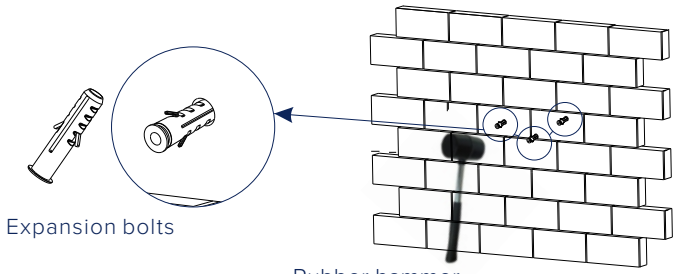


Φ10 Drill
Depth: 80 mm

b)

Step 2. hang the inverter on the bracket.

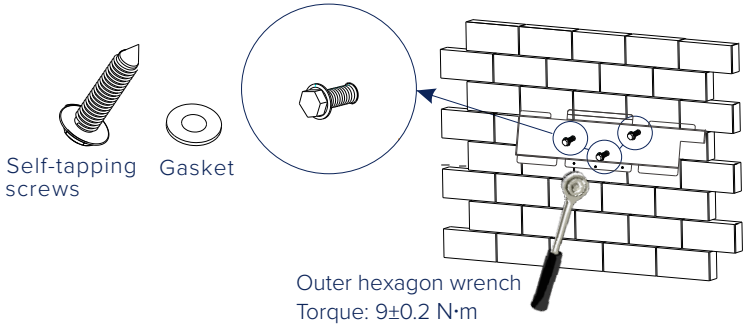
c) Insert expansion bolt into the hole, use rubber hammer to knock the expansion screw bolt into the wall;
d) The bracket is aligned with the screw uses the inner hexagonal wrench to screw the tapping screw until the expansion bolt "bang" is heard.



Expansion bolts

Rubber hammer

c)



Self-tapping screws

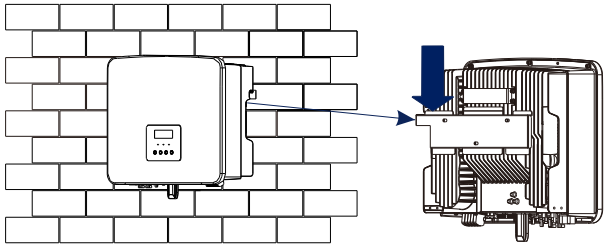
Gasket

Outer hexagon wrench
Torque: 9±0.2 N·m

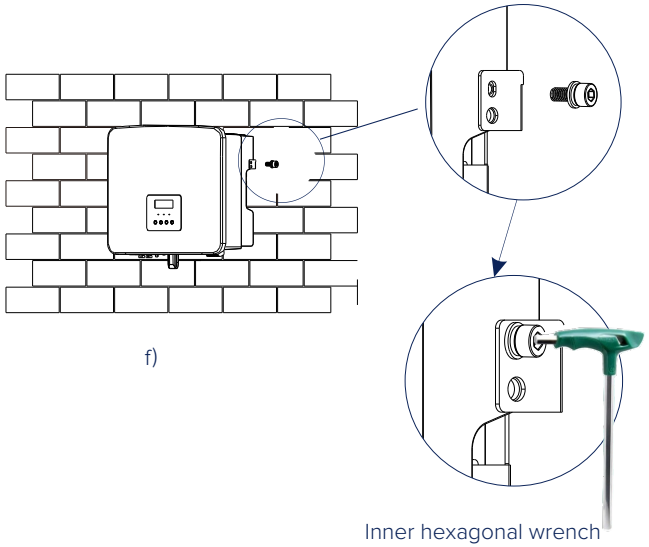
d)

➢ **Step 3. Tighten the inverter and bracket.**

e) Hang the buckle on the inverter to the corresponding position of the backplane;
f) Use the inner hexagonal wrench to tighten the inner hexagonal screw on the right side of the inverter.



e)



f)

Inner hexagonal wrench
(Torque: 1.2±0.1 N·m)

5 Electrical Connections

Most of the electrical connections of Q.VOLT HYB-G3 1P series inverters have been connected, refer to Q.SAVE MATEBOX-G3 1P installation guide. The Q.VOLT HYB-G3 1P-D series inverters need to be connected as described in corresponding part.

5.1 PV Connection

Q.VOLT HYB-G3 1P/1P-D series inverters have two PV inputs. Select photovoltaic modules with good performance and quality assurance. The open circuit voltage of the module array should be less than the maximum PV input voltage specified by the inverter, and the working voltage should be within the MPPT voltage range.

Table 1: Maximum input voltage limit

Model	Q.VOLT HYB-G3 3.7kW 1P Q.VOLT HYB-G3 3.7kW 1P-D	Q.VOLT HYB-G3 5.0kW 1P Q.VOLT HYB-G3 5.0kW 1P-D	Q.VOLT HYB-G3 6.0kW 1P Q.VOLT HYB-G3 6.0kW 1P-D
Max. DC input voltage	600V		

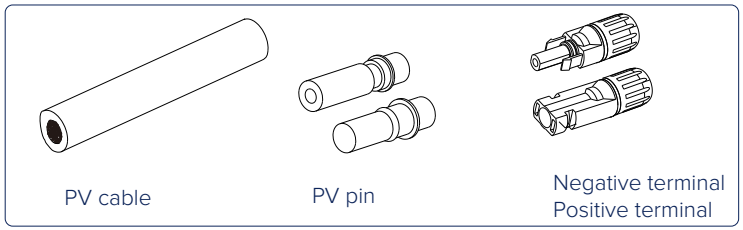
Warning!
The voltage of photovoltaic modules is very high, and is dangerous voltage. When wiring, follow the safe electricity regulations.

Note!
Do not ground the positive or negative pole of the photovoltaic module!

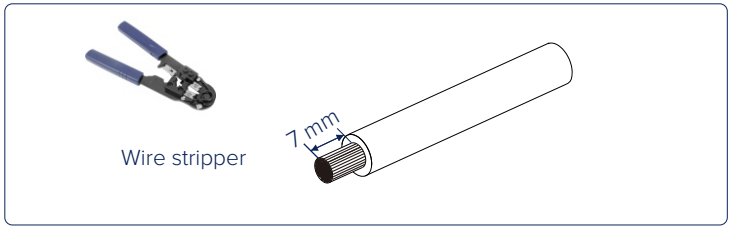
Note!
The following PV module requirements need to be applied to each input range:
1. Same model
2. Same quantity
3. The same queue
4. The same angle

➢ **Connection steps for Q.VOLT HYB-G3 1P-D series**

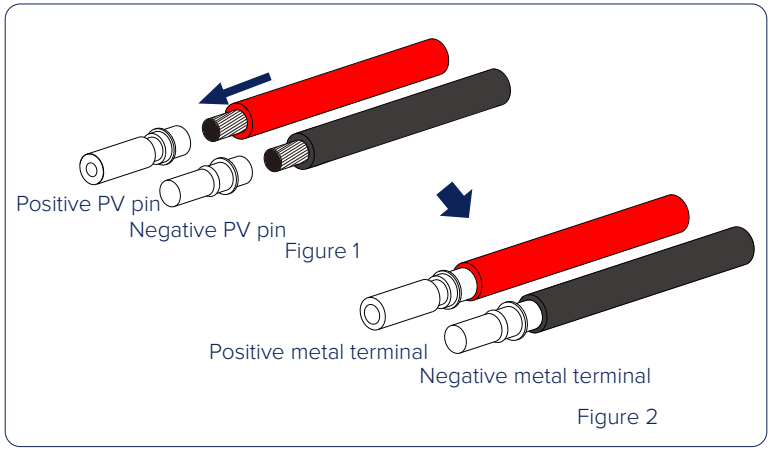
Step 1. Turn off the DC switch, connect the PV module, prepare a 4 mm² PV cable, and find the PV (+) terminal and PV (-) terminal in the package.



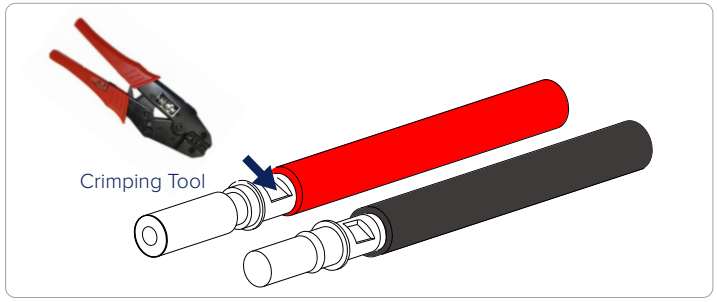
Step 2. Use a wire stripper to strip the 7 mm insulation layer of the wire end.



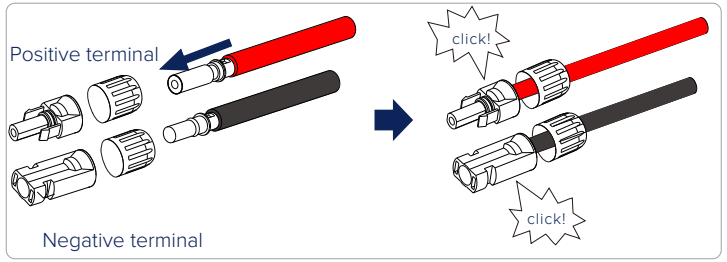
Step 3. Tighten the cable with the insulation layer stripped and insert it into the metal terminal (see Figure 1), make sure all wires are inserted into the metal terminal (see Figure 2).



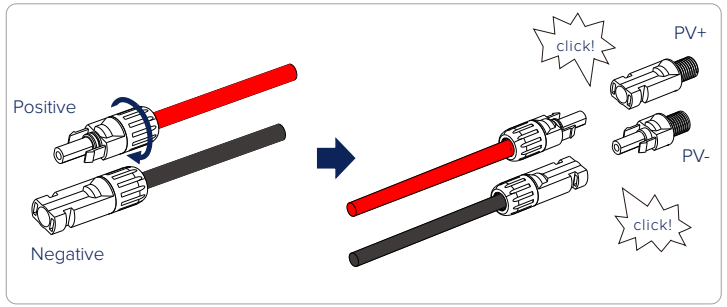
Step 4. Tighten the PV pin contact and the wiring harness to make the connection tight without looseness.



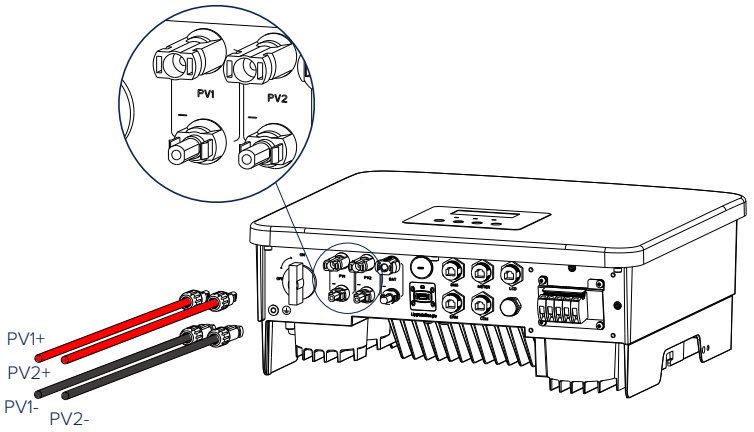
Step 5. The PV joint is divided into 2 parts - the plug and the fastening head. Insert the cable through the fastening head and the opposite plug.
Notice that the red and black lines correspond to different of plugs. Finally force the cable pair into the plug, will a "click" sound, which indicates that the connection is completed.



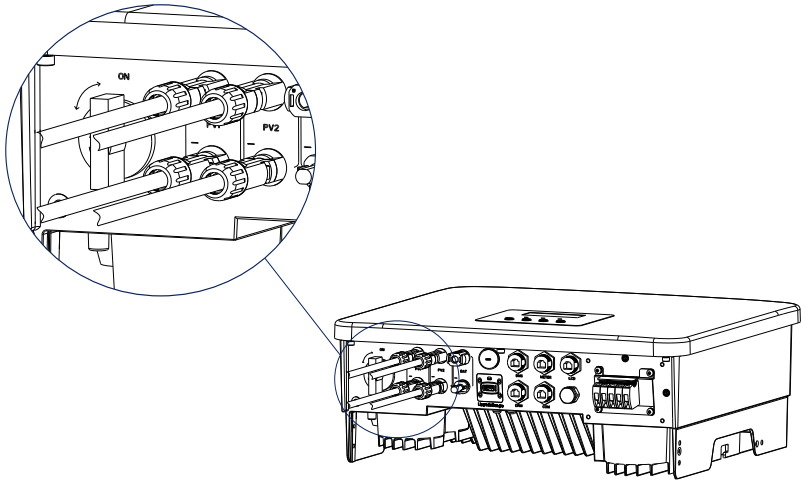
Step 6. Tighten the fastening head and insert into the corresponding positive and negative (PV-/PV+) ports of the inverter.



The following is the location of the inverter positive and negative (PV-/PV+) ports.



Schematic diagram of the inverter PV connected.



5.2 Grid Port and EPS (Off-grid) Output Connection

Q.VOLT HYB-G3 1P/1P-D series inverter are single-phase inverter. Suitable for rated voltage 220/230/240V, frequency 50/60Hz. For more technical requirments, consult the requirements of the local public grid.

➢ Grid port connection

Note: In case of installation with Q.SAVE MATEBOX-G3 1P please note that the circuit breakers are already pre-installed inside the Q.SAVE MATEBOX-G3 1P. The output cables from the Q.VOLT HYB-G3 only need to be connected on the Q.AVE MATEBOX-G3 1P according to the marked terminals.

Grid Cable and Micro-breaker recommended

Model	Q.VOLT HYB-G3 3.7kW 1P	Q.VOLT HYB-G3 5.0kW 1P	Q.VOLT HYB-G3 6.0kW 1P
Cable (copper)	3–4 mm^2	4–6 mm^2	4–6 mm^2
Micro-Breaker	25 A	32 A	32 A

Model	Q.VOLT HYB-G3 3.7kW 1P-D	Q.VOLT HYB-G3 5.0kW 1P-D	Q.VOLT HYB-G3 6.0kW 1P-D
Cable (copper)	6-8 mm^2	8-10 mm^2	8-10 mm^2
Micro-Breaker	40 A	50 A	50 A

EPS (Off-grid) Cable and Micro-breaker recommended

Model	Q.VOLT HYB-G3 3.7kW 1P Q.VOLT HYB-G3 3.7kW 1P-D	Q.VOLT HYB-G3 5.0kW 1P Q.VOLT HYB-G3 5.0kW 1P-D	Q.VOLT HYB-G3 6.0kW 1P Q.VOLT HYB-G3 6.0kW 1P-D
Cable (copper)	3–4 mm^2	4–6 mm^2	4–6 mm^2
Micro-Breaker	25 A	32 A	32 A

The circuit breaker should be installed between the inverter and the mains, and the load should not be directly connected to the inverter.

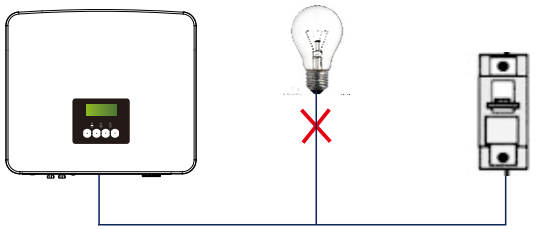


Figure: Wrong connection of load and inverter

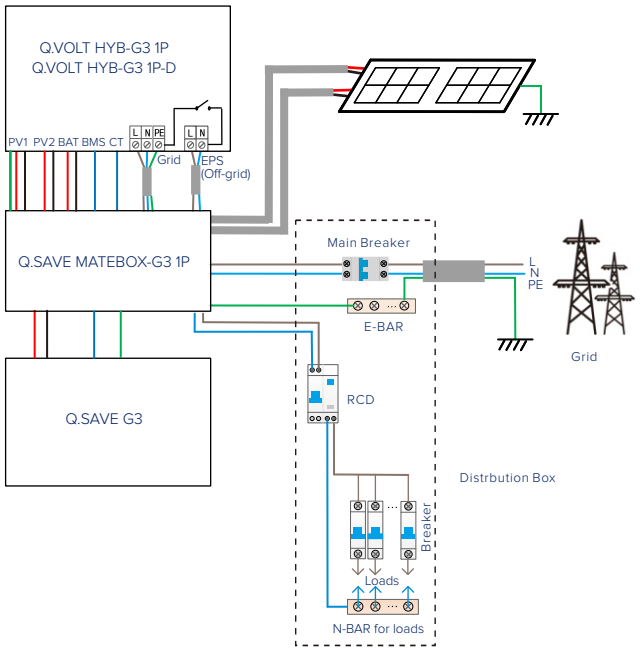
5.3 EPS (Off-grid) Block Diagram

Q.VOLT HYB-G3 1P/1P-D series inverters have an integrated EPS (Emergency Power Supply) function. When the grid is connected, the inverter outputs flows through the Grid port, and when the grid is disconnected, the inverter outputs flows through the EPS (Off-grid) port.
Refer to the following diagram for the wiring.

➢ **EPS (Off-grid) wiring diagram**

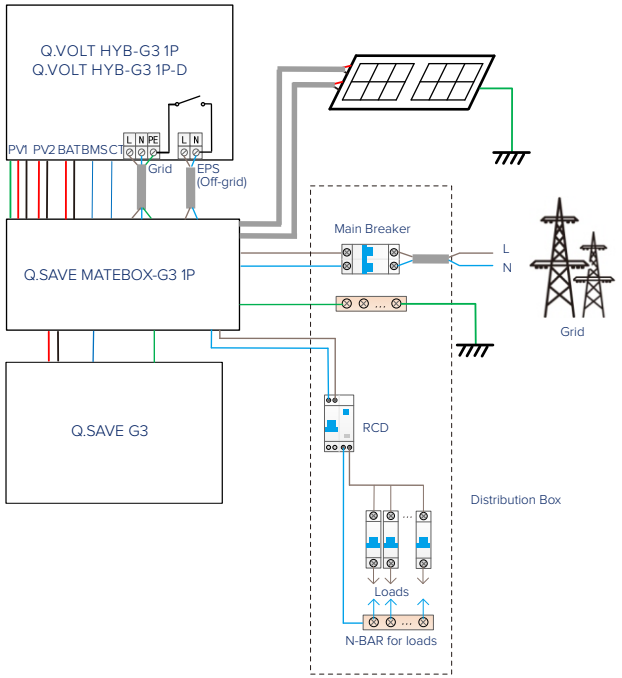
Refer to the diagrams below and select the appropriate wiring method according to local wiring rules.

Diagram A: Neutral line and PE line are separated from each other, all loads connect to the "Load" port of the Q.SAVE MATEBOX-G3 1P;



TN-S System Diagram

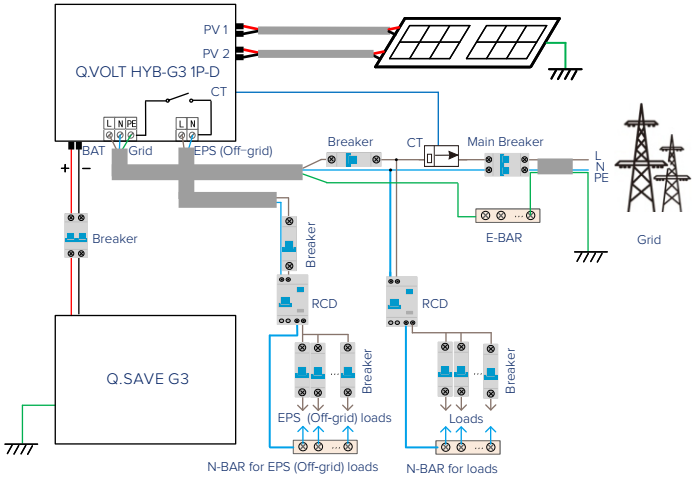
Diagram B: Neutral line and PE line are separated from each other, the protective grounding should be independent, all loads connect to the "Load" port of the Q.SAVE MATEBOX-G3 1P.



TT System Diagram

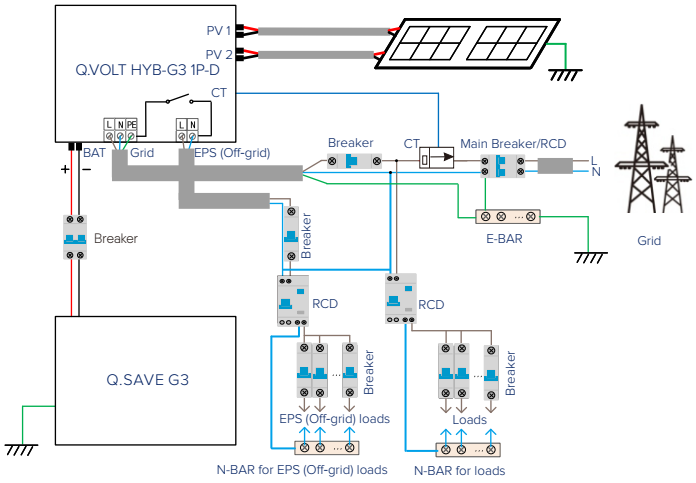
Q.SAVE MATEBOX-G3 1P is a convenient wiring accessory that can realize a full-load EPS (Off-grid). Refer to Q.SAVE MATEBOX-G3 1P for details.

Diagram C: Neutral line and PE line are separated from each other, the backup loads connect to the EPS (Off-grid) port;



TN-S System Diagram

Diagram D: Neutral line and PE line are separated from each other, the protective grounding should be independent, the backup loads connect to the EPS (Off-grid) port.



TT System Diagram

➢ **EPS (Off-grid) load requirements**

Warning!
Ensure that the EPS (Off-grid) load rated power is within the EPS (Off-grid) rated output power range, otherwise, the inverter will report an "overload" warning.

When “overload” occurs, adjust the load power to make sure it is within the EPS (Off-grid) rated output power range, and the inverter will automatically return to normal operation.

For non-linear loads, ensure that the inrush current power is within the EPS (Off-grid) rated output power range.

The following table shows some common loads for your reference.
Note: Check with the manufacturer for high-power inductive loads.

Content	Power		Common equipment	Instance		
	Start	Rated		Equipment	Start	Rated
Resistive load	X 1	X 1	Incandescent lamp	100W Incandescent lamp	100VA (W)	100VA (W)
Inductive load	X 3~5	X 2	Fan Fridge	150W Fridge	450 - 750VA (W)	300VA (W)

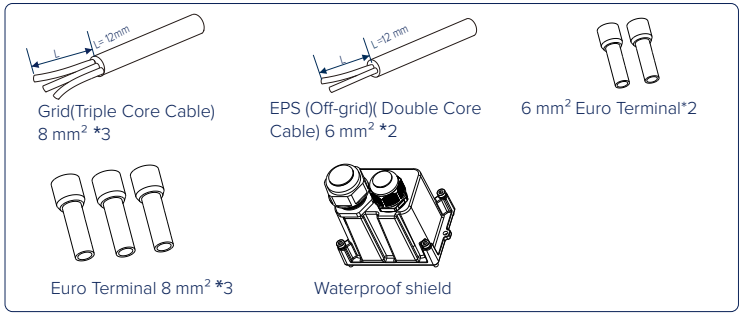
➢ Grid and EPS (Off-grid) connection steps

- Connection requirements

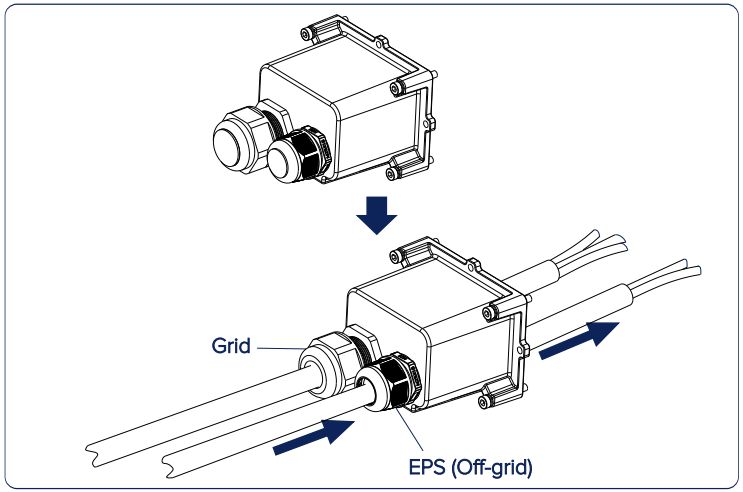
Note: Check the grid voltage and compare the voltage range (see technical data).
Disconnect the circuit board from all power sources to prevent electric shock. The Grid and EPS (Off-grid) ports of Q.VOLT HYB-G3 1P/1P-D series inverter must be connected. This connection of Q.VOLT HYB-G3 1P series has been completed and Q.VOLT HYB-G3 1P-D series needs to be wired according to the following steps.

- Connection steps for Q.VOLT HYB-G3 1P-D series

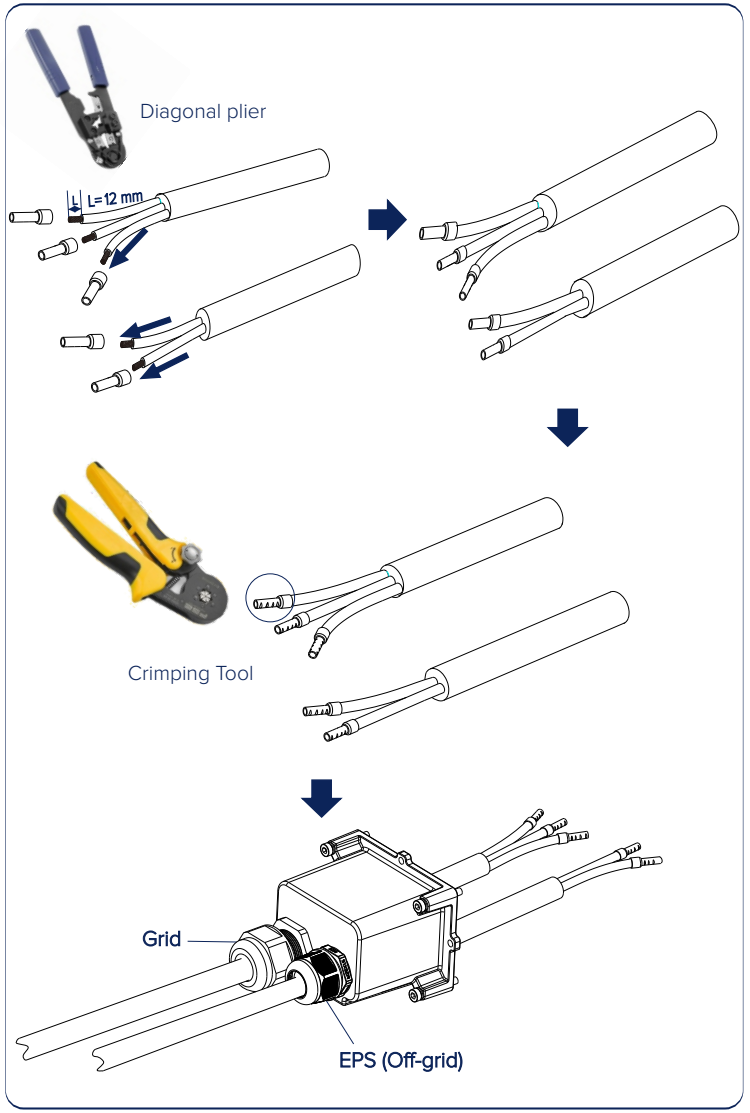
Step 1. Prepare a Grid cable (three-core wire) and an EPS (Off-grid) cable (two-core wire), and then find the European terminal and waterproof shield in the accessory bag.



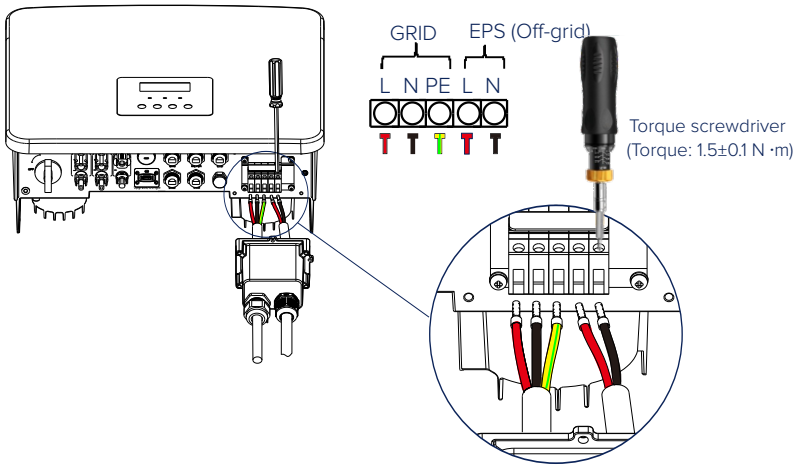
Step 2. The Grid and EPS (Off-grid) cables go through the corresponding Grid and EPS (Off-grid) ports of the waterproof shield.



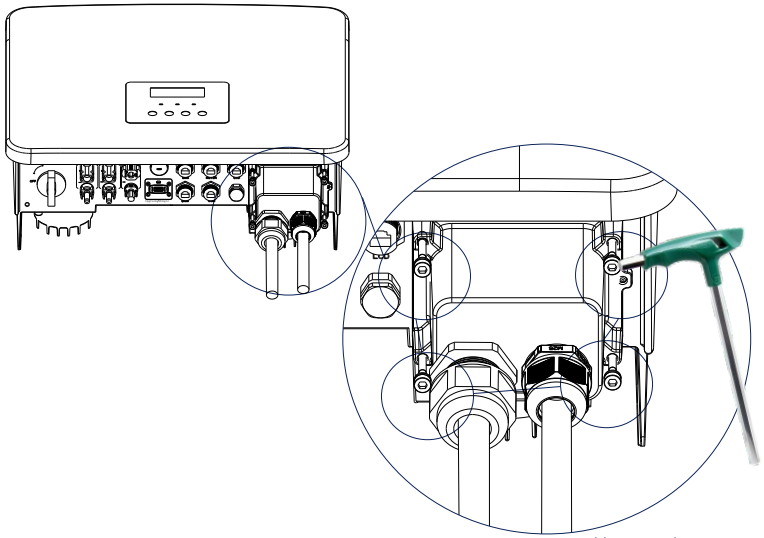
Step 3. Remove the 12 mm insulation layer at the end of the wire. Insert the European-style terminals respectively, and make sure that the stripped ends are inserted into the European-style terminal, and finally use crimping pliers to press tightly.



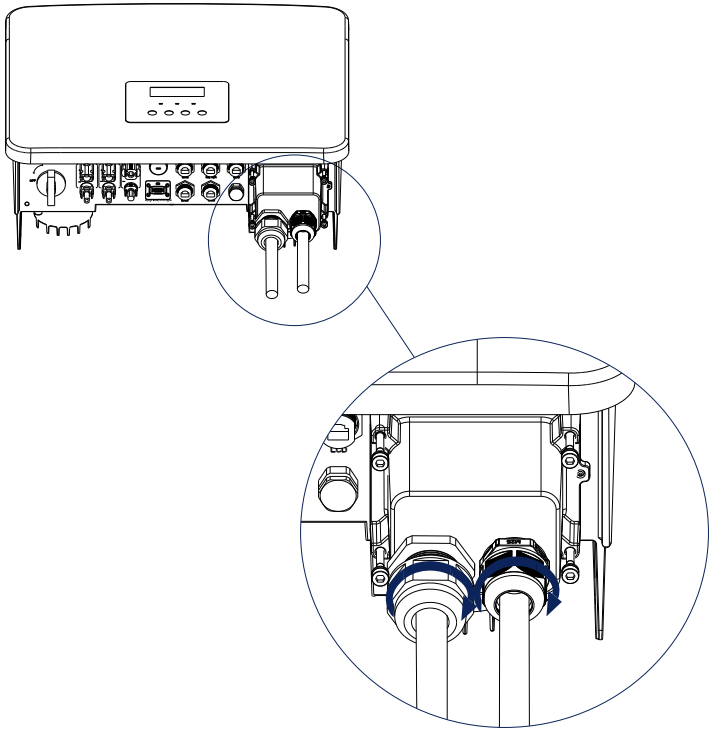
Step 4. Find the location of the AC interface on the inverter, insert the crimped terminals into the UW10 terminals L, N, and P according to the wire sequence, and use a flat-blade screwdriver to tighten the screws. (Torque: 0.2±0.1 N ·m)



Step 5. Install the AC waterproof shield and tighten the screws on the four sides of the waterproof shield with an Allen wrench.



Step 6. Tighten the waterproof fastening head.



5.4 Battery Connection

➢ Connection requirements

Q.VOLT HYB-G3 1P/1P-D series inverter charge and discharge system can be equipped with high voltage lithium battery of the series Q.SAVE-G3.

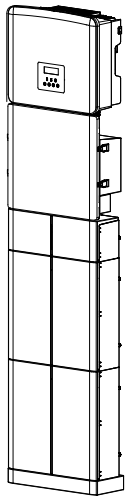
➢ Battery Breaker

Before connecting the battery, a non-polar DC MCB must be installed to ensure safety.
Before maintenance, the inverter need to be safely disconnected.

Model	Q.VOLT HYB-G3 3.7kW 1P Q.VOLT HYB-G3 3.7kW 1P-D	Q.VOLT HYB-G3 5.0kW 1P Q.VOLT HYB-G3 5.0kW 1P-D	Q.VOLT HYB-G3 6.0kW 1P Q.VOLT HYB-G3 6.0kW 1P-D
Voltage	Nominal voltage of DC breaker should be larger than maximum voltage of battery.		
Current[A]	32 A		

➢ Battery connection diagram

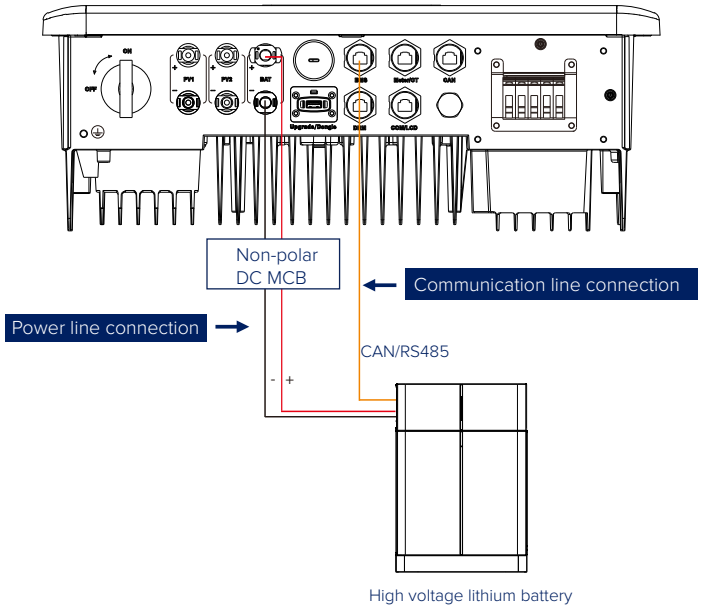
• Q.VOLT HYB-G3 1P series:



High voltage lithium battery

Battery port connection line of the Q.VOLT HYB-G3 1P series inverter is on the Q.SAVE MATE BOX-G3 1P, just connect it.

• Q.VOLT HYB-G3 1P-D series:



High voltage lithium battery

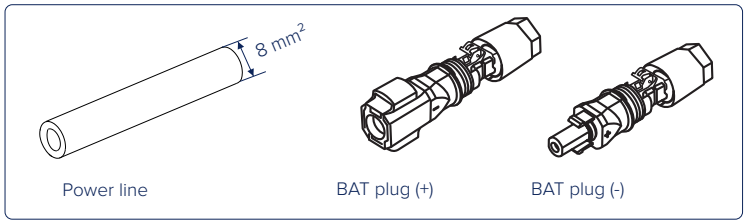
When using Qcells batteries of the series Q.SAVE-G3, the recommended number of battery modules is 1-4 units, and one battery controller unit. Refer to Q.SAVE-G3 installation guide for specific wiring.

➢ Battery connection steps

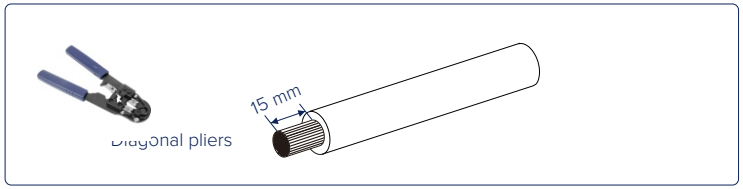
Battery port connection line of Q.VOLT HYB-G3 1P series has been completed.

- Connection steps for Q.VOLT HYB-G3 1P-D series

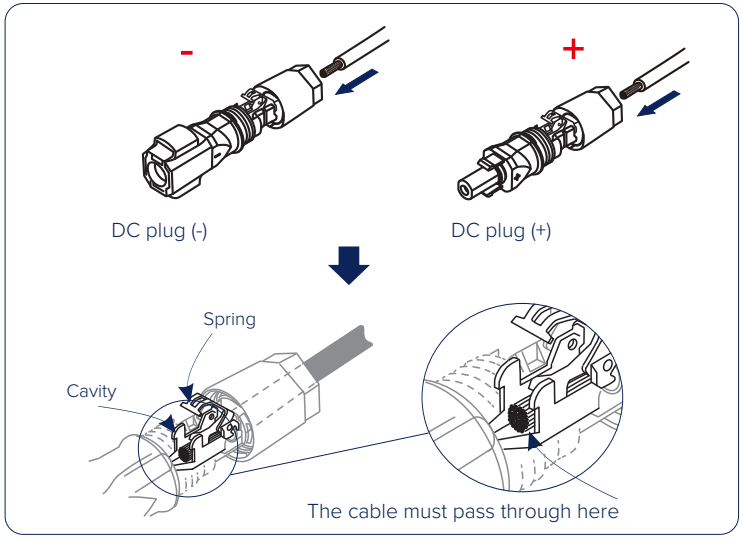
Step 1. Prepare 8 mm^2 battery power line, find the DC plug (+), DC plug (-) in the accessory bag.



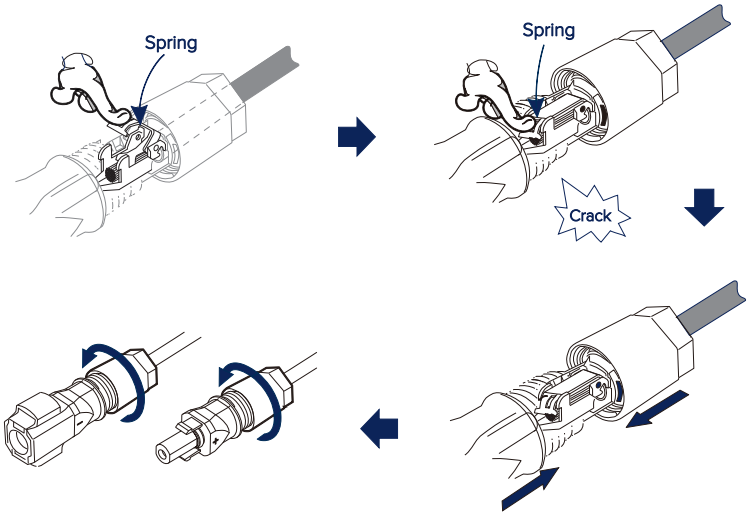
Step 2. Strip the insulation layer (length:15 mm) at one end of the power line.



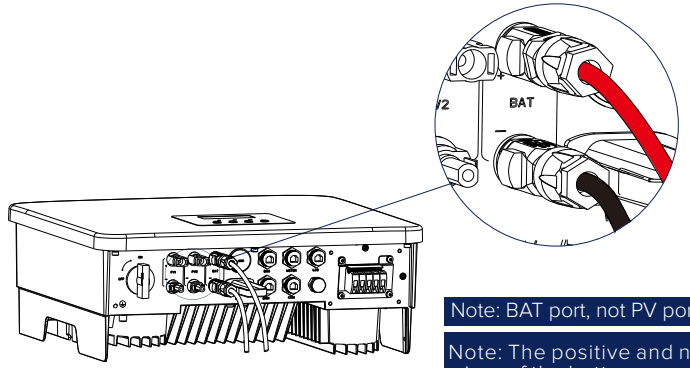
Step 3. Insert the stripped cables into the DC plug (-) and DC Plug (+) respectively.



Step 4. Press down on the spring by hand, you can hear a click sound, then push the ends together, and tighten the screw joints.



Step 5. Insert the battery power lines into the corresponding BAT port (+), (-) of the inverter.



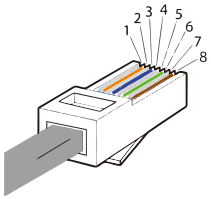
Note: BAT port, not PV port!

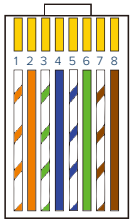
Note: The positive and negative wires of the battery are not allowed to be reversed!

➢ **Communication connection**

BMS port definition

The communication interface between the inverter and the battery uses the waterproof connector with RJ45.





1) White with orange stripes
2) Orange
3) White with green stripes
4) Blue
5) White with blue stripes
6) Green
7) White with brown stripes
8) Brown

PIN	1	2	3	4	5	6	7	8
Definition	BAT_TEMP	GND	GND	BMS_CANH	BMS_CANL	X	BMS_485A	BMS_485B

Note!
After the BMS communication between the battery and the inverter is finished, the battery will work normally.

5.5 Communication Connection

5.5.1 Introduction to meter/CT Communication

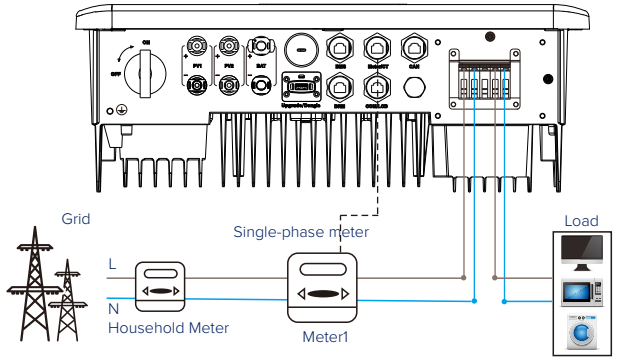
Q.VOLT HYB-G3 1P/1P-D inverter should work with an electric meter or current sensor (CT for short) to monitor household electricity usage.
The electricity meter or CT can transmit the relevant electricity data to the inverter or platform, which is convenient for users to read at anytime.

Note: the CT sensor is already included and wired in the Q.SAVE MATEBOX-G3 1P.

Note!
The meter or CT must be connected to the inverter, otherwise the inverter will shut down and the alarm "meter fault" will appear on the display.
Energy meters must be approved by Qcells, otherwise they may be incompatible with the inverter.

Qcells will not be responsible for the impact caused by the use of unauthorized appliances.

➢ **Energy meter connection diagram**

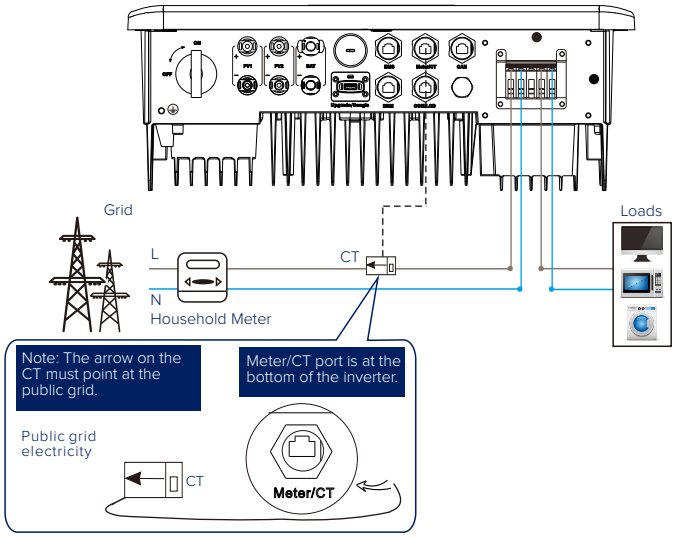


➢ **CT Connection**

The current sensor measures the current on the live wire between the inverter and the public grid.

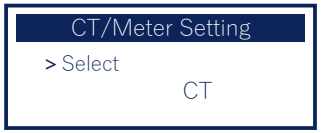
Note: In case of installation with Q.SAVE MATEBOX-G3 1P, the CT sensor is already included in the Q.SAVE MATEBOX-G3 1P.

- CT connection diagram



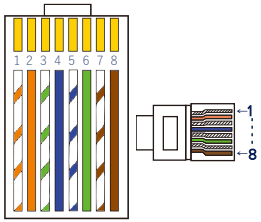
- LCD settings

  To select CT, you need to enter User setting, then enter CT/Meter Setting.



- Note for CT connection:

Note!
- Do not place the CT on the N wire or ground wire.
- Do not put CT on the N line and L line at the same time.
- Do not place the CT on the side where the arrow points to the inverter.
- Do not place the CT on non-insulated wires.
- The cable length between CT and inverter should not exceed 100 meters.
- After CT is connected, prevent the CT clip from falling off. It is recommended to wrap the CT clip with insulating tape.

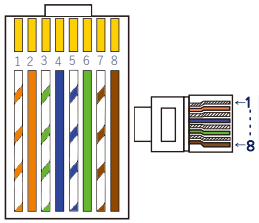


1	2	3	4	5	6	7	8
CT1-1	X	CT2-1	485A	485B	CT2-2	X	CT1-2

Note!
Only one of the Meter and CT connections can be selected. Meter cable goes to pin terminal 4 and 5; CT cable goes to pin terminal 1 and 8; reserved CT cable goes to pin terminal 3 and 6. These pins are reserved for the use of a second CT, in case of installation of a second generation unit.

➢ **BMS communication cable.**

The BMS pin is defined as follows:



1	2	3	4	5	6	7	8
BAT_TEMP	GND	GND	BMS_CANH	BMS_CANL	X	BMS_485A	BMS_485B

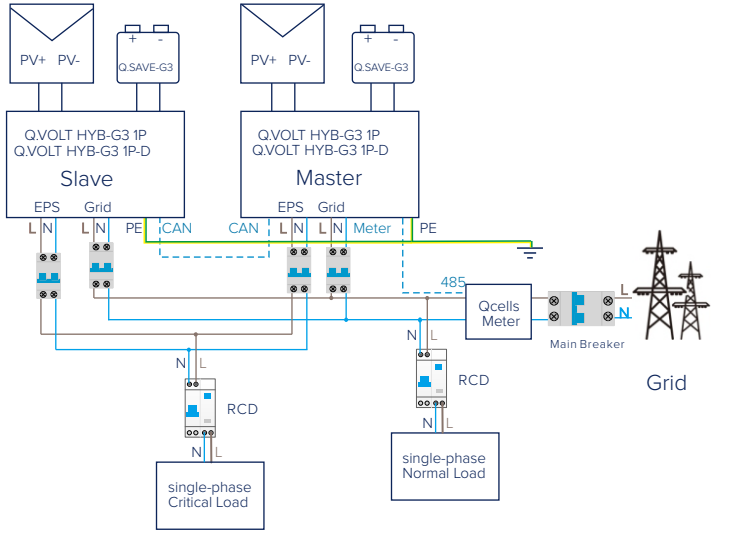
Note!
The BMS port on the inverter is the communication port for connecting the battery. The communication port on the battery management system (BMS) must be consistent with the definition of pins 4, 5, 7, and 8 above.

5.5.2 Parallel Connection

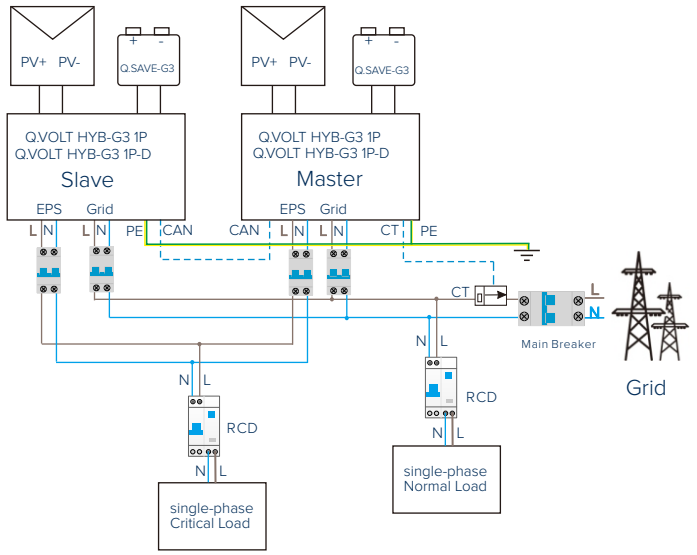
Q.VOLT HYB-G3 1P/1P-D series inverters are able to be installed in parallel configuration, and up to 2 inverters can be connected in a system.
In this configuration, one inverter is set as the "master inverter", and the other inverter is switched to the "slave inverter" state, and the inverters will communicate through the CAN line. The "master inverter" controls the "slave inverter".

➢ **System Diagram**

System diagram applicable with use of energy meter:



System diagram applicable with use of current sensor (CT):



➢ Work Modes in parallel system

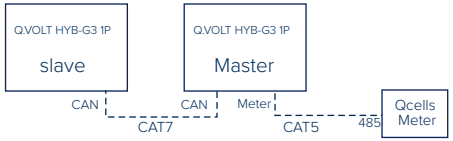
There are three work modes in parallel system.

Free mode	Only when none of the inverters is set to "Master", both inverters are in free mode in the system and will operate independently with respect to each other.
Master mode	When one inverter is set as “Master”, this inverter enters master mode and will control the overall system configuration settings. Master mode can be changed back to free mode.
Slave mode	Once one inverter is set as “Master”, another inverter will enter slave mode automatically. Slave mode cannot be manually changed from other modes by LCD setting.

➢ Wiring Operation and LCD Setting

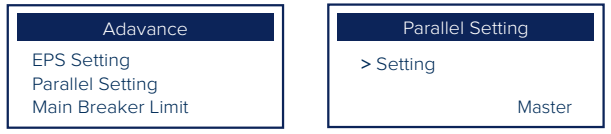
Note: Before operation, please make sure that the inverter meets the following three conditions,
1. The software version of all inverters is the same;
2. The power range of all inverter models is the same;
3. The type and quantity of batteries connected to all inverters are the same;
Otherwise, this function cannot be used.

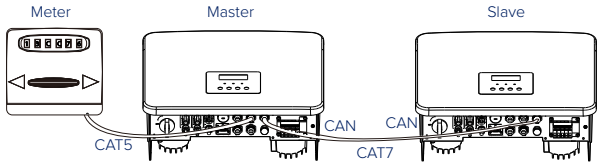
Step1: Connect all communication ports of the inverters together by connecting CAT7 network cables between CAN ports.
- Insert one side of CAT7 cable into the master inverter’s CAN port and the other side into the slave inverter’s CAN port.
– Insert one side of CAT5 cable from the Meter, and the other side into the “CT/Meter” port the master inverter.



➢ CAN PIN Definition

Step 2: Turn on the power of the entire system, find the inverter connected to the meter, enter the setting page of the inverter LCD screen, click on the parallel settings, and select "master control".





Step 3: Disable "settings - Advanced settings-External ATS" on both master inverter and slave inverter.

➢ How to Remove parallel system

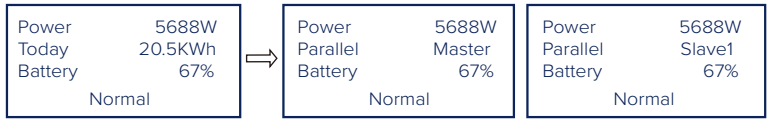
If one inverter wants to exit from this parallel system, please follow the steps as below:

- step1: Disconnect all the network cables on the CAN ports.
- step2: Enter the settings page and select parallel setting, then choose “Free”.

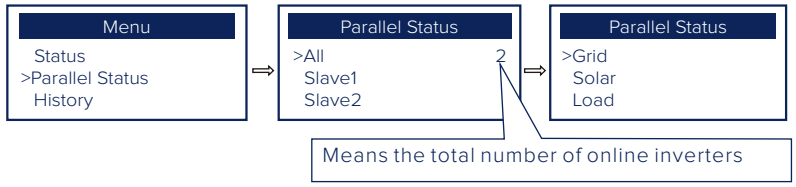
Note!
- If a slave inverter is set to “Free” mode but not disconnect the network cable, this inverter will return to “slave”mode automatically.
- If a slave inverter is disconnected from another inverter but is not set to “Free” mode, this inverter will stop working and remain in “waiting” status.

➢ LCD display

Main display:
Once an inverter enters parallel system mode, the “today yield” will be replaced by “Inverter Class”, and parallel relevant fault has a higher priority than other faults and will be showed firstly on main display.



Status display:
User can obtain all the status data from the master inverter. System power and individual slave inverter power can be obtained from the status display of the master inverter.



➢ Parallel Control Function

The master inverter has an absolute priority in the parallel system to control slave inverter’s energy management and dispatch control. In case master inverter has some errors and stops working, the slave inverter will stop as well. On the contrary, the master inverter is independent with respect to the slave inverter operating status and will not be affected in case of a slave inverter’s fault.

When two inverters are paralleled, the overall system and slave inverter will execute according to the parameters set in the master inverter. Meanwhile, the parameters previously set in the slave inverter will not be overwritten. Once a slave inverter exits from a parallel system and will be running as an independent unit, all its settings will be restored.

Off mode setting:
Off mode can only be set by master inverter
(long press ESC button on LCD).

Safety setting:
System safety protection is overwritten by the master inverter. The slave inverter protection settings will only be triggered by the master inverter’s instructions.

Self-use setting:
If the system is running as self-use mode, please note that the Feedin Power Limit setting of the master inverter is for the overall system and the corresponding setting of the slave inverter is no more valid.

Power Factor setting:
All settings related to the power factor for the master inverter are valid for the overall system and the corresponding settings of the slave inverter are no more valid.

Remote control setting:
The remote demand instructions received by the master inverter will be interpreted as demand instructions for the overall system.

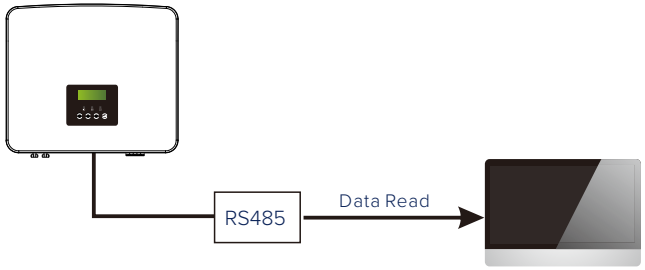
5.5.3 COM Communication

The COM communication interface is mainly provided for customization and advanced use. The inverter supports the control of external equipment or external equipment control through Modbus RTU communication.

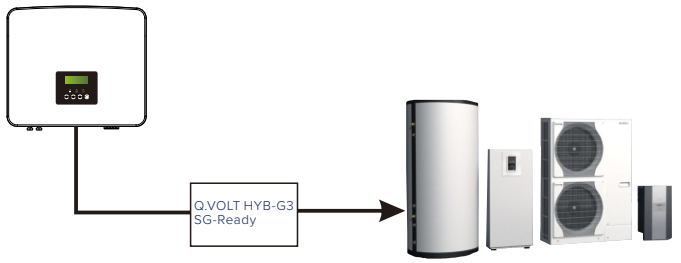
➢ Application occasion

The COM port has a standard communication interface, through which the monitoring data of the inverter can be directly obtained. Also, external communication devices can be connected to carry out advanced development and customizations. For example, the Q.VOLT HYB-G3 SG-Ready adapter can be connected.

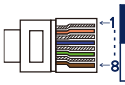
●External communication



●Inverter communication to control external equipment



➢ COM PIN Definition

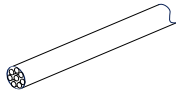


1	2	3	4	5	6	7	8
Drycontact_A(in)	Drycontact_B(in)	+13V	485A	485B	GND	Drycontact_A(out)	Drycontact_B(out)

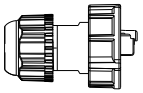
Note!
The communication port on the COM must be consistent with the definition of pins 4, 5 above; The inverter terminal communication lines are carried out in strict accordance with the color sequence of the above lines. If you use it with Q.VOLT HYB-G3 1P/1P-D series inverters, please pay attention to the communication control of pins 3, 6, 7 and 8;

5.5.4 Communication Connection Steps

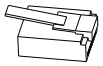
Step 1. Prepare a communication cable, and then find the communication adapter in the accessory bag.



Communication cable

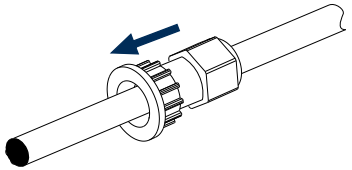


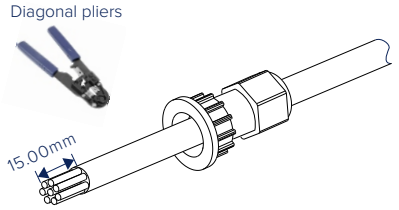
Waterproof connector with RJ45



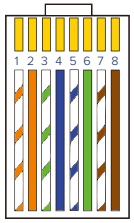
RJ45 terminal

Step 2. Insert the communication cable through the communication adapter, and peel off the outer insulation layer of 15 mm.



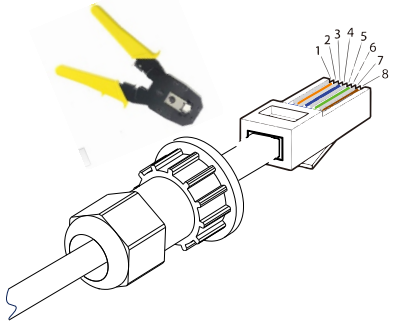


Step 3. Insert the prepared communication cables into the RJ45 terminals in sequence, and then use network cable crimping pliers to press them tightly.



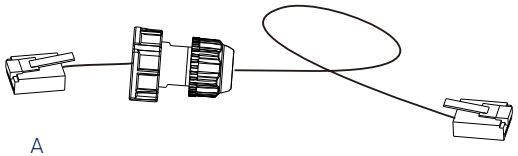
1) White with orange stripes
2) Orange
3) White with green stripes
4) Blue
5) White with blue stripes
6) Green
7) White with brown stripes
8) Brown

Multifunction terminal crimping tool (RJ45)



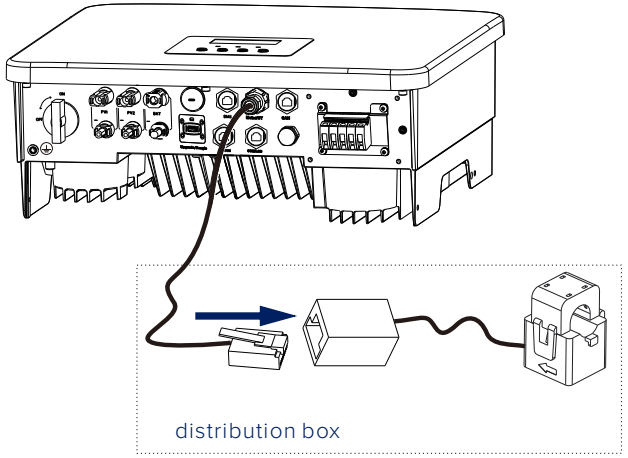
➢ METER/CT communication cable

1) Users can customize the length of the CT communication cable. The accessory package provides 1xRJ45 and 1xwaterproof connector with RJ45 terminals.
When the CT cable is completed, connect the A terminal to the "CT/METER" port of the inverter and tighten the waterproof screw, and connect the B terminal to the RJ45 coupler.



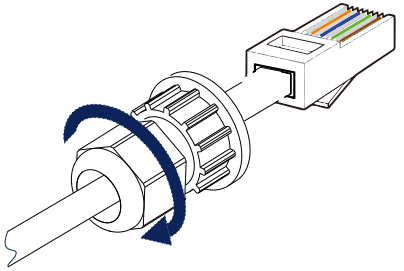
A B

2) One side of the finished cable, Waterproof connector with RJ45 is inserted into the inverter, and one side of the RJ45 terminal is inserted into the CT connection.

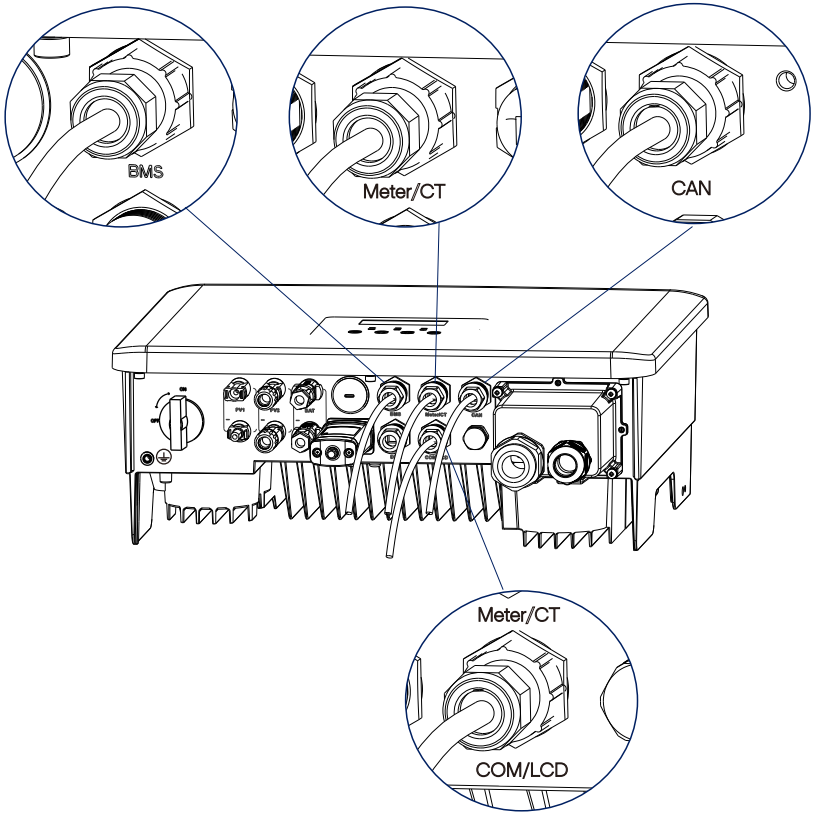


Note!
When installing, pay attention to water resistance. All the connected parts of CT must be placed into the distribution cabinet.

Step 4. Tighten the completed Meter/CT/BMS/CAN communication line and tighten the waterproof plug.



Step 5. Finally, find the corresponding COM/LCD (should be consistent with the picture below and what is printed on the bottom of the inverter), Meter/CT, CAN ports on the inverter and insert the communication cable into the corresponding ports.



5.6 Grounding Connection (mandatory)

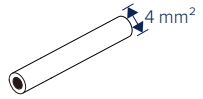
Make sure that the ground wire port of Q.VOLT HYB-G3 1P/1P-D series inverter has been connected.

Notice: If the PV end of the inverter is not connected with earth, the inverter will turn on a red light Inspect and report ISO Fault. This inverter complies with IEC 62109-2 clause 13.9 for earth fault alarm monitoring.

The user must perform two grounding connections: one shell grounding, and one equipotential grounding. This prevents electric shock.

➢ **Ground connection steps for Q.VOLT HYB-G3 1P-D series**

Step 1. Prepare a one-core cable (4 mm^2), and then find the ground terminal in the accessories.



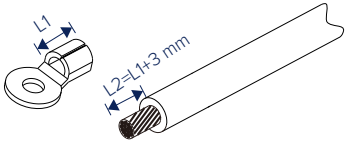
One-core cable (4 mm^2)

OT terminal

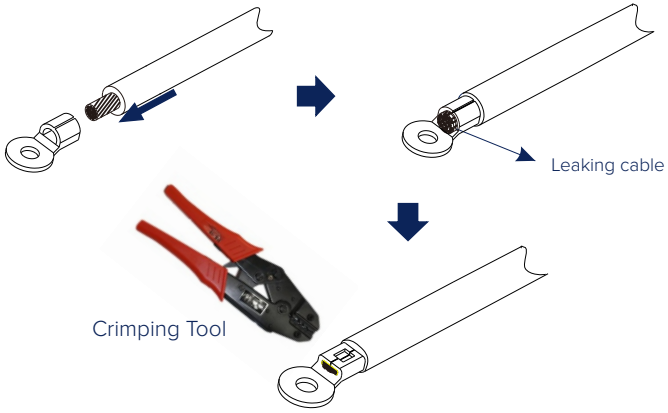
Hexagon socket screws

Step 2. Strip the grounding cable insulation(length"L2"), insert the stripped cable into the ring terminal, and then clamp it.

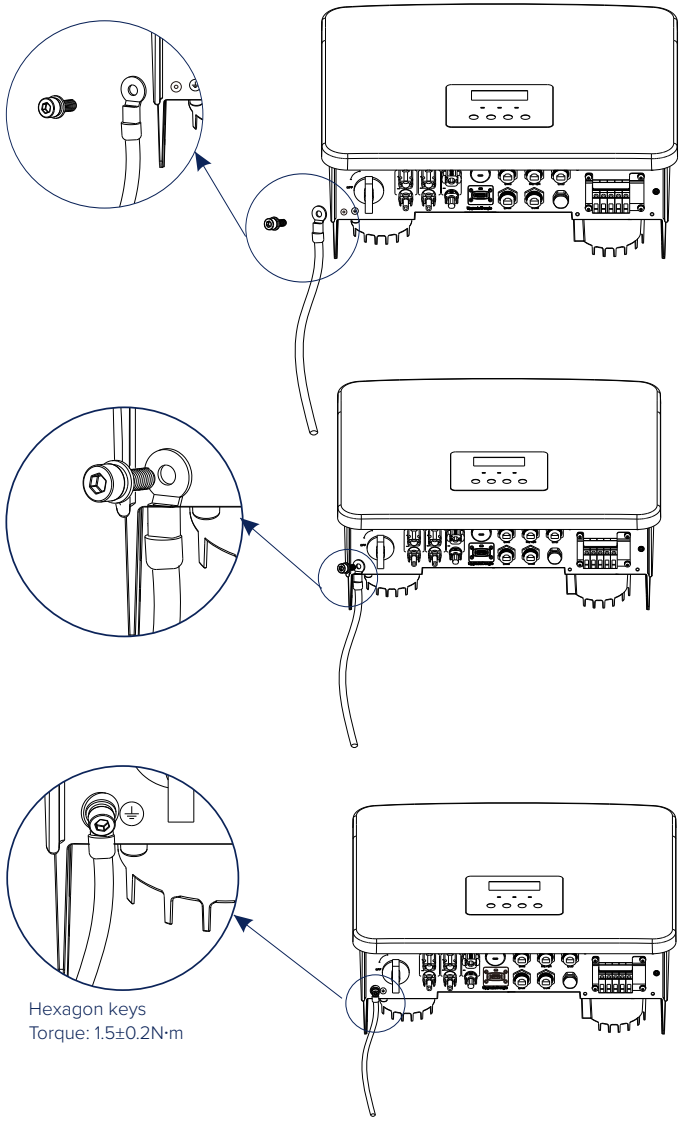
Diagonal pliers



Step 3. Insert the stripped cable into OT terminal and tighten the terminal with a terminal crimping tool.



Step 4. Find the ground connection port on the inverter, and screw the ground wire on the inverter with an M5 Hexagon keys.



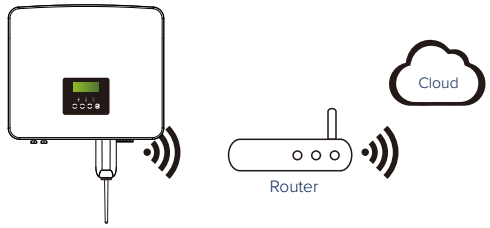
Hexagon keys
Torque: 1.5±0.2N·m

5.7 Monitoring Connection (Accessories)

The inverter provides a DONGLE port, which allow the data transmission of the inverter to the monitoring website via additional communication adapter.

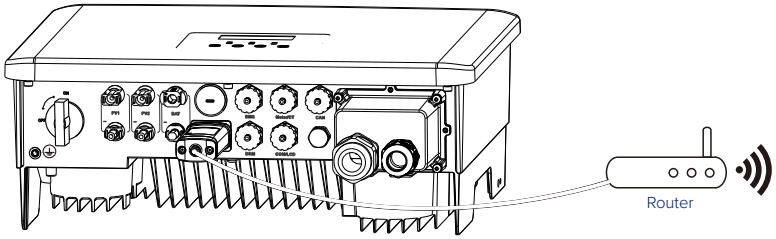
➢ **Connection diagram**

- With Q.VOLT HYB-G3 Wi-Fi



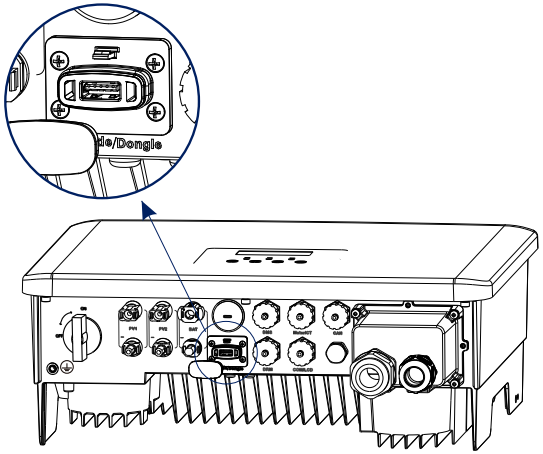
*For details on the configuration please refer to the Q.VOLT HYB-G3 Wi-Fi installation manual.

- With Q.VOLT HYB-G3 LAN

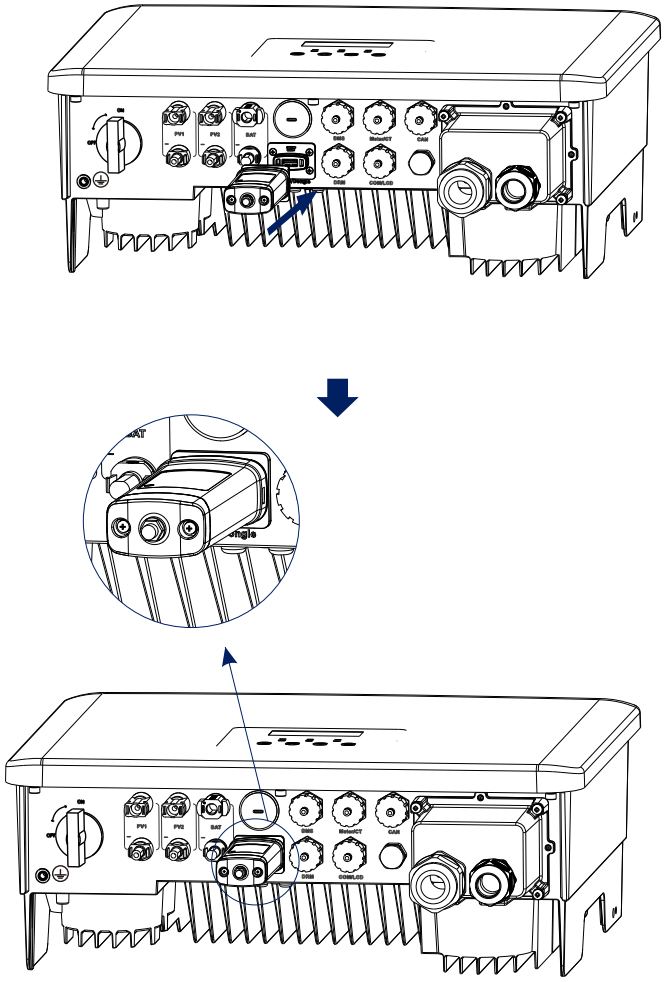


➢ **Communication adapter connection steps:**

Step 1. First find the DONGLE port of the inverter.



Step 2. Plug the communication dongle into the DONGLE port.



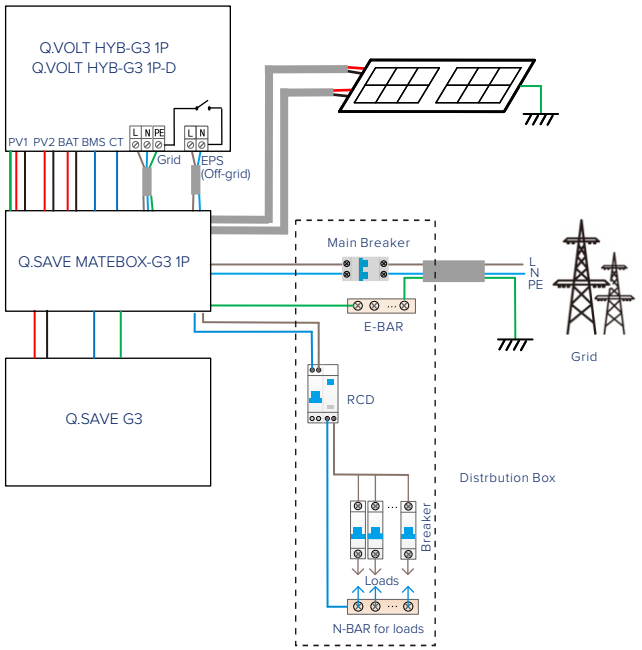
5.8 Check All Below Steps Before Starting The Inverter

➢ **After checking the inverter, please carry out the following steps:**

With Q.SAVE MATEBOX-G3 1P:

- Make sure that the inverter is fixed on the wall.
- Ensure that all ground wires are grounded.
- Ensure that all DC lines and AC lines are connected.
- Make sure the battery is well connected.
- Ensure that the external EPS (Off-grid) contactor is well connected. (If applicable)
- Turn on the Load switch and EPS (Off-grid) switch.
- Turn on the battery switch.

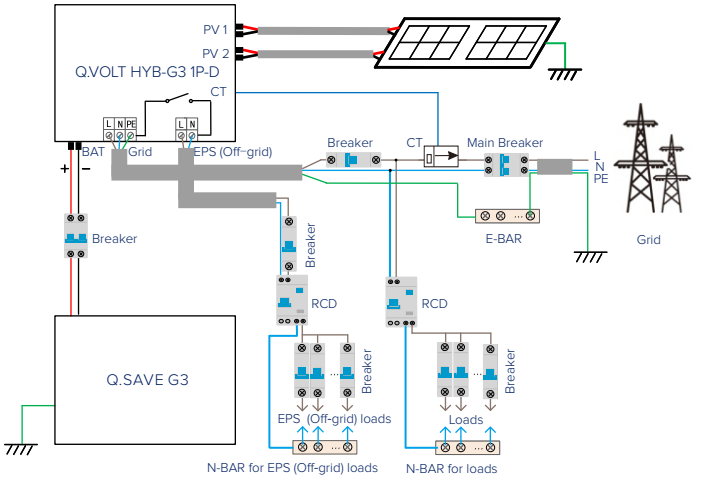
Long press the “Enter” key for 5 seconds to exit the Off mode. (In case the factory mode defaults to Off Mode)



Without Q.SAVE MATEBOX-G3 1P:

- Make sure that the inverter is fixed on the wall.
- Ensure that all ground wires are grounded.
- Confirm that all DC lines and AC lines are connected.
- Make sure the CT is connected.
- Make sure the battery is well connected.
- Turn on the Load switch and EPS (Off-grid) switch.
- Turn on the battery switch.

Long press the “Enter” key for 5 seconds to exit the Off mode. (The mode is factory defaulted as Off Mode)



5.9 Inverter Operation

➢ **Before operation, check the inverter according to the following steps**

a) Check that the inverter is well fixed on the wall.
b) Ensure that all ground wires are well tightened.
c) Ensure that all DC and AC circuit breakers are disconnected.
d) Ensure that all ground wires are well tightened.
e) The AC output terminal is correctly connected to the mains.
f) Ensure that all photovoltaic panels and inverters are properly connected.
Unused DC connectors should be blocked with caps.

➢ **Start the inverter**

- Steps to start the inverter
  - Turn on the AC switch between the Q.VOLT HYB-G3 1P/1P-D and the power grid.
  - (Optional) Remove the locking screw from the DC switch.
  - Turn on the DC switch between the PV string and the Q.VOLT HYB-G3 1P/1P-D (in case of installation with Q.SAVE MATEBOX-G3 1P the DC switch is present on the
- Q.SAVE MATEBOX G3 1P).
  If the photovoltaic panel generates enough power, the inverter will start automatically.
- Check the status of the LED and LCD screen, the LED is green, and the LCD screen displays the main interface.
  If the LED is not green, please check the following:
  -All connections are correct.
  -All external disconnect switches are closed.
  -The DC switch of the PV strings is set to the "ON" position.

After successfully starting, 3 different states of inverter operation are shown as follows:
Waiting: When the DC output voltage of the photovoltaic panel is higher than 70V (lowest starting voltage) and lower than 90V (lowest working voltage), the inverter waits for checking.
Checking: The inverter will automatically detect the DC input. When the DC input voltage of the photovoltaic panel is higher than 90V and the photovoltaic panel has enough energy to start the inverter, the inverter will enter the checking state.
Normal: When the inverter is working normally, the green light is always on. At the same time, the LCD displays the output power.

For the first installation of the system, please enter the settings interface and complete the commissioning (initial settings may vary according to the specific country and system configuration).

Warning!
The input terminal of the inverter can be opened only when all the installation work of the inverter has been completed. All electrical connections must be performed by professionals in accordance with local regulations.

6 Firmware Upgrade

➢ **Upgrade notes**

Read the following precautions before upgrading.

Note!
The software updates can be done over-the-air by the Qcells customer support by request.

Warning!
-In order to upgrade the firmware successfully, if the DSP and ARM firmware need to be upgraded, note that the ARM firmware must be upgraded first, then the DSP firmware!
-Make sure that the category format is correct, do not modify the firmware file name, otherwise the inverter may not work!

Warning!
-For Q.VOLT HYB-G3 1P/1P-D, ensure that the PV input voltage is greater than 100V (upgrade on sunny days). Ensure that the battery SOC is greater than 20% or the battery input voltage is greater than 90V. otherwise it may cause serious failure during the upgrade process!

Caution!
-If the ARM firmware upgrade fails or stops, do not unplug the U disk. Power off the inverter and restart it. Then repeat the upgrade steps.

Caution!
-If the DSP firmware upgrade fails or stops, check whether the power is off. If it is normal, plug in the U disk again and repeat the upgrade.

➢ Upgrade preparation

1) Check the inverter version and prepare a U disk (USB 2.0/3.0) and personal computer before upgrading.

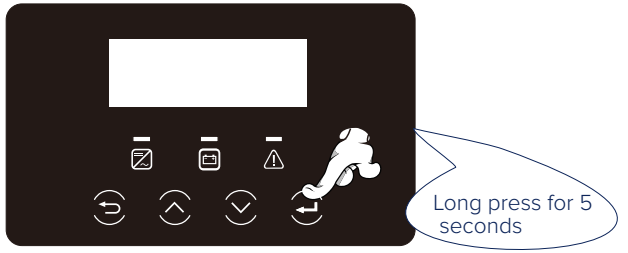
Caution!
-Make sure that the size of the U disk is smaller than 32GB, and the format is FAT16 or FAT32.

2) Contact our service support through service support.components@q-cells.com to obtain the firmware, and store the firmware in the U disk according to the following path.

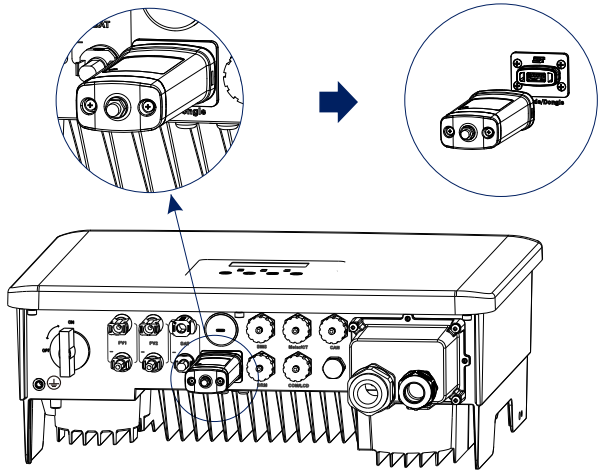
Update:
For ARM file: "update \ARM\xxx.xxxxx.xx_HYB_1P_ARM_Vx.xx.xxxx.usb";
For DSP file: "update\DSP\xxx.xxxxx.xx_HYB_1P_DSP_Vx.xx.xxxx.usb";

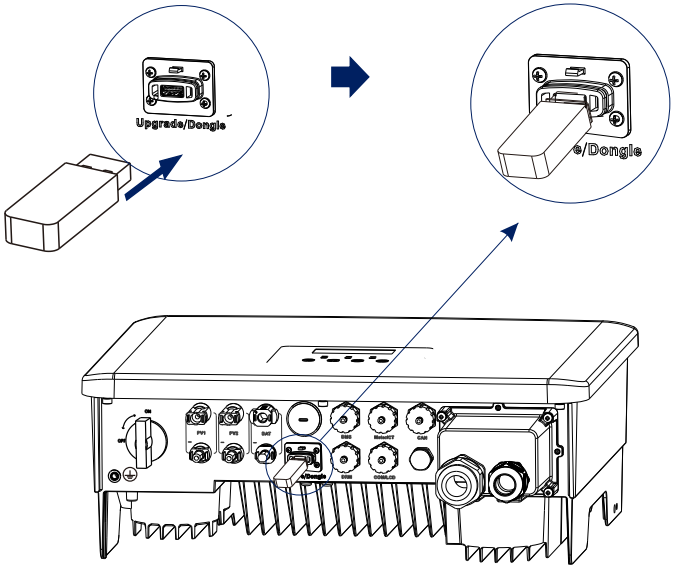
➢ **Upgrade steps**

Step 1. Save the "Upgrade" firmware in your U disk first, and press the "Enter" button on the inverter screen for 5 seconds to enter the OFF mode.



Step 2. Find the "Update" port of the inverter, unplug the monitoring module by hand, and insert the USB flash drive.





Step 3. LCD operation, enter the upgrade interface, as shown below(a): Press the up and down keys to select ARM, then press down to set "OK", press the enter key to enter the software version interface;

Update Selection
>ARM
DSP

(a)

Update ARM
Cancel
>OK

(b)

Step 4. Confirm the new firmware version again and select the firmware to upgrade. The upgrade takes about 20 seconds.
(d) When it is completed, the LCD screen returns to the "Update" page.

Update (ARM)
>xxx.xxxxx.xx_HYB_1P
_ARM_Vx.xxxxxx.usb

(c)

Update (ARM)
Upgrading---------25%

(d)

Update
>ARM
DSP

(e)

Step 5. For DSP: wait 10 seconds. When the "Update" page shown as below, press down to select "DSP" and then press Enter. Confirm the firmware version again and press Enter to upgrade. The upgrade takes about 2 minutes.

Update
ARM
>DSP

(f)

Update (DSP)
>xxx.xxxxx.xx_HYB_1P
_DSP_Vx.xx_xxxx.usb

(g)

Update (DSP)
Connect

(h)

Update (DSP)
DEP Erasing---------

(i)

Update (DSP)
Upgrading---------25%

(j)

Step 6. After the upgrade is completed, the LCD screen displays "Upgrade Successful".

Update (DSP)
Upgrade Successful

(k)

Step 7. Pulg off the U disk, press "Esc" to return to the main interface, and long press the enter key to exit the mode.

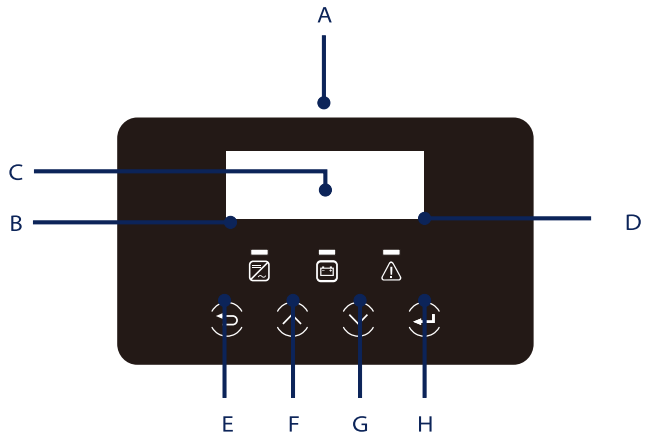
Caution!

-Strictly follow each step from step 1-6, don't skip any.
-Confirm the ARM/DSP firmware version on the USB flash drive.

Tip: If the display screen is stuck on "Q.VOLT HYB-G3 1P/1P-D" after the upgrade, turn off the photovoltaic power supply and restart, and the inverter will restart and return to normal. If not, contact our service support.components@q-cells.com for help.

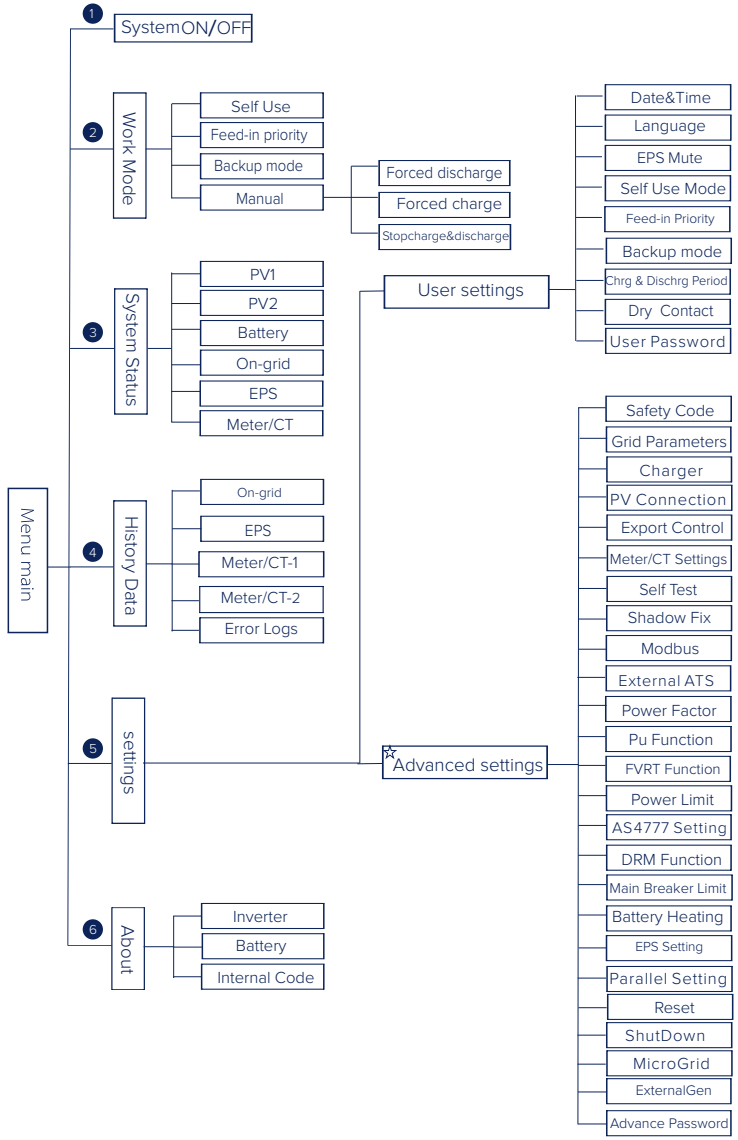
7 Setting

7.1 Control Panel



Object	Name	Description
A	LCD Screen	Display inverter information on the LCD display.
B	LED Indicator light	Blue light: The inverter is in normal state or EPS (Off-grid) mode. Blue flashing: The inverter is in waiting, checking state or the system switch is off. Off: The inverter is in a fault state.
C		Green: The battery communication is normal and working normally. Green flashing: The battery communication is normal and in an idle state. Off: The battery does not communicate with the inverter.
D		Red light on: The inverter is in a fault state. Off: The inverter has no error.
E	Key Function	ESC button: Return from the current interface or function.
F		Up button: Move the cursor to the upper part or increase the value.
G		Down button: Move the cursor down or decrease the value.
H		Enter button: Confirm selection.

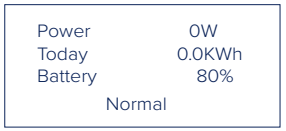
7.2 Screen Menu Structure



Note:"☆"This part of the content cannot be set by the end user. Contact the installer or Qcells if necessary.

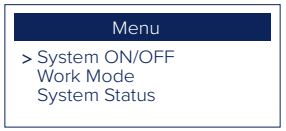
7.3 LCD Operation

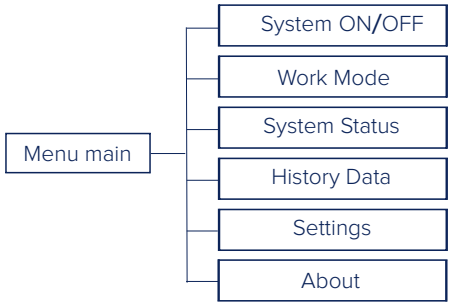
The main interface is the default interface, the inverter will automatically return to this interface when the system started up successfully or not operated for a period of time.
The information of the interface is as below. "Power" means the instantaneous AC-Output power of the inverter. "Today" means the energy generated within the day. "Battery" indicates the battery state of charge (SOC).



➢ Menu interface

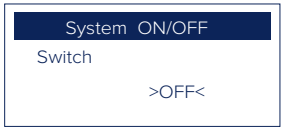
The menu interface is another interface for users to change settings or obtain information.
-When the LCD displays the main interface, click "OK" to enter this interface.
-The user can select up and down the menu, and press the "OK" key to confirm.



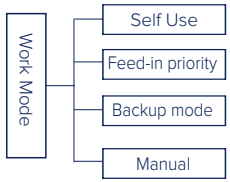


➢ System ON/OFF

"ON" indicates that the inverter is in working state, which is generally the default state.
"OFF" means that the inverter stops running and only the LCD screen is turned on.



➢ Work Mode



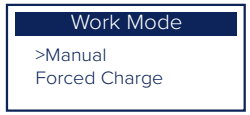
Mode selection, there are 4 working modes to choose from.

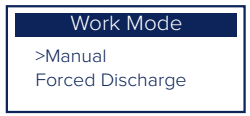
Name	Description
Self Use	The self-use mode is suitable for areas with low feed-in subsidies and high electricity prices. **① When the power of PV is sufficient** Active Charging or Discharge time period: PV will power the loads firstly, and surplus power will charge to the battery. If the battery is fully charged, then sell the surplus power to the grid; (The inverter will limit the output if Feed-in limit or zero feed-in is needed) (PV > Load, PV →Load→Battery → Grid) **② When the power of PV is insufficient** Active Charging time period: PV will power the loads firstly, the remaining power will be taken from the grid, the battery will not discharge at this time. (PV < Load, PV + Grid → Load) Active Discharge time period: PV+BAT will power the loads together. If the power is still not enough, the remaining power will be taken from the grid. (PV < Load, PV + Battery + Grid → Load) **③ Without PV power** Active Charging time period: The grid supplies the loads and also can charge the battery; (PV=0, Grid → Load → Battery) Active Discharge time period: The battery will power the home loads firstly. If the battery power is not enough, the remaining power will be taken from the grid. The inverter will enter into the standby state. (PV=0, Battery+Grid → Load) Battery min SOC can be set: 10%-100% Charge battery to min SOC can be set:10%-100%.
Feed-in priority	The Feed-in priority mode is suitable for areas with high feed-in subsidies, but has feed-in power limitation. **①When the power of PV is sufficient** Active Charging time period: First, PV supply power to the load, then charge the battery to the set capacity, and then sell the power to the grid. If the local grid company limits the grid-connected power of the inverter, the excess energy continues to charge the battery. (PV>Load, PV → Load → Battery → Grid → Battery) Active Discharge time period: PV will power the loads firstly,and surplus power will feed-in to the grid. (PV<Load, PV → Load → Grid)

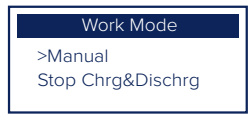
Feed-in Priority	**② When the power of PV is insufficient** Active Charging time period: PV will power the loads firstly, the remaining power will be taken from the grid. The battery will not discharge. (PV<Load, PV + Grid → Load) Discharge time period: PV+BAT will power the loads together. If the power is still not enough, the remaining power will be taken from the grid. (PV<Load, PV + Battery + Grid → Load) **③Without PV power** Active Charging time period: The grid will power the home loads and also charge the battery; (PV=0, Grid → Load + Battery) Active Discharge time period: The battery will power the home loads firstly. If the battery power is not enough, the remaining power will be taken from the grid. The inverter will enter into the standby state. (PV=0, Battery+Grid → Load) Battery min SOC can be set: 10%-100%. Charge battery to min SOC can be set:10%-100%.
Backup mode	The back-up mode is suitable for areas with frequent power outages. Same working logic with "Self-use" mode. This mode will maintain the battery capacity at a relatively high level (Users setting) to ensure that the emergency loads can be used when the grid is off. Battery min SOC can be set: 30%-100%. Charge battery to min SOC can be set: 30%-100%.
EPS (Off-grid)	In case of power failure, the system will power EPS (Off-grid) loads through PV and battery. (Battery must be installed, and EPS (Off-grid) loads shall not exceed battery's max. output power.) **① When the power of PV is sufficient** PV will power the loads firstly, and surplus power will charge to the battery. (PV>Load, PV→Load→Battery) **② When the power of PV is insufficient** The remaining power will be taken from the battery. (PV<Load, PV+Battery→Load) **③Without PV power** The battery will power the emergency loads until the battery reaches the min SOC, then the inverter will enter into the idle mode. (PV=0, Battery → Load) EPS (Off-grid) SOC-min condition is adjustable within the range of 10%-25%.

Note: in the case of grid connection, all working modes work normally when the battery SOC>5%.When the battery SOC is below 5%, the PV or Grid will first charge the battery SOC to 11% and then return to the working mode selected by the user.

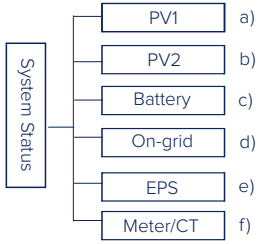
- Manual mode (manual mode), there are three options to choose from: forced charging, forced discharge, stop charging and discharging (grid-connected 0 power).





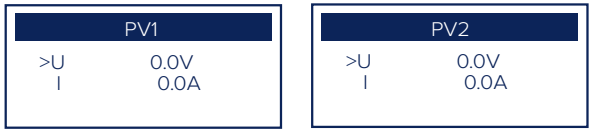


➢ **System Status**

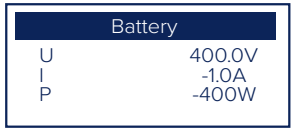


System status contains six items: PV1/PV2/Battery/On-grid (energy feed into or withdrawn from the grid), EPS and Meter/CT.
Press up and down to select, press "Enter" to confirm the selection, and press "ESC" to return to the menu.

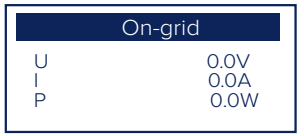
a/b) PV1, PV2
Here you can see the voltage, current and power of the PV1 and PV2. photovoltaic strings respectively;



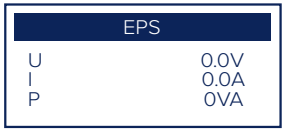
c) Battery
This shows the battery status, including the battery voltage, current, power, state of charge (SOC), temperature, BMS connection. The meaning of the sign of battery current and power is as follows: "+" means charging; "-" means discharging.



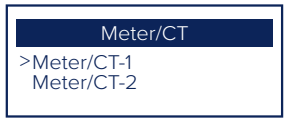
d) On-grid
Here you can see the voltage, current, frequency, and power of the grid.



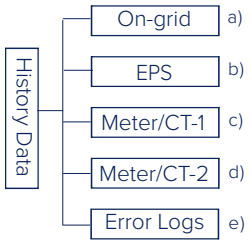
e) EPS
Here you can see the voltage, current, frequency and power of the inverter when it is disconnected from the grid.



f) Meter/CT
Here you can see the data showing the meter or the CT.



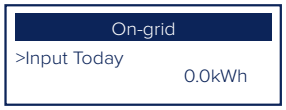
➢ **History Data**



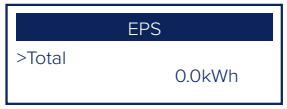
The history data contains five pieces of information: on-grid power of the inverter, EPS power generation, power of the meter/CT and error logs.

Press up and down to select, press Enter to confirm selection, and press ESC to return to the menu.

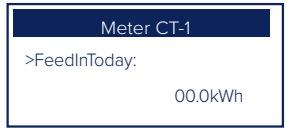
a) On-grid
Here is a record of the energy of the inverter connected to the grid during the current day and the total.
“Input” indicates that the total energy are taken from the grid.



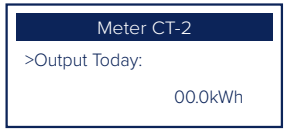
b) EPS
Here you can see the EPS output of the inverter on the current day and the total output.



c) Meter /CT-1
Here you can see the inverter's energy exported to the grid for the current day and in total and the energy withdrawn from the grid for the current day and in total.

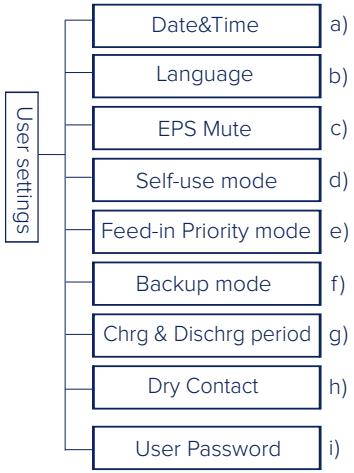


d) Meter /CT-2
Here you can see the total energy output of the inverter for the current day.

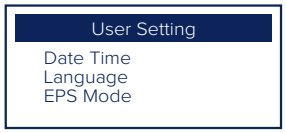


e) Error Logs
Here you can see the most recent six error messages.

➢ **Settings**



Here you can set the inverter time, language, working mode, charging and discharging time period and user password.

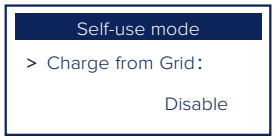


a) Date&time
This interface is for users to set the system date and time.

b) Language
This inverter is available in multiple languages.

c) EPS Mute
Here you can choose whether the buzzer is turned on when the inverter is running in EPS mode. By selecting Yes, the buzzer mutes, selecting NO, in EPS mode, the buzzer will emit a beeping sound once every 4s when the battery is fully charged, the closer the battery is to the empty state, the higher the buzzer will sound, to remind users to adapt their household consumption according to the battery residual capacity.

d) Self-use mode
In this mode, you can set the minimum energy reserve percentage of the battery, set whether power can be taken from the grid to charge the battery, and set the upper limit to charge the battery.
For example: set the reserved minimum SOC of the battery capacity to "10%", will mean that when the battery has been discharged to 10% of the battery capacity, it is not allowed to continue to discharge;
When Charge from grid is set to "Enable", the power from the grid will be used to charge the battery; when set to “Disable”, the power from the grid will not be used to charge the battery;
Charge battery to is set to 90%, indicating that battery will be charged using power withdrawn from the grid, to reach the upper limit of 90%.

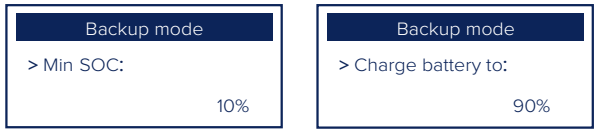


e) Feed-in Priority mode
In this mode, you can set the minimum energy reserve percentage of the battery, set whether power can be taken from the grid to charge the battery, and set the upper limit to charge the battery.
For example: set the reserved minimum SOC of the battery capacity to "10%", which means that when the battery has been discharged to 10% of the battery capacity, the battery will not continue to discharge;

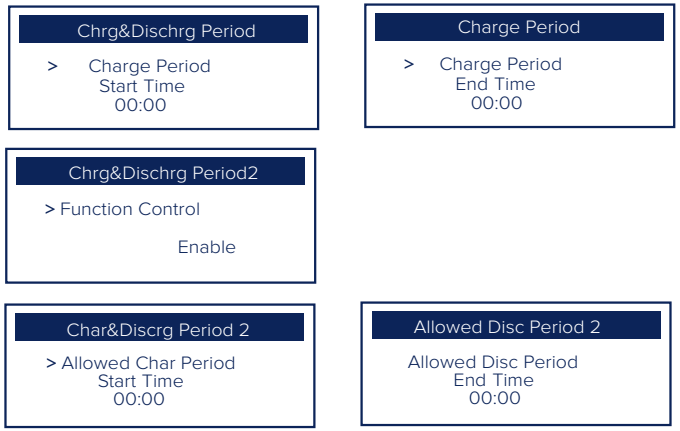
Charge battery to is set to 90%, indicating that the grid will charge the battery up to 90%.

f) Backup mode
In this mode, you can set the minimum energy reserve percentage of the battery, set whether the power can be taken from the grid to charge the battery, and set the upper limit to charge the battery.
For example: set the reserved minimum SOC of the battery capacity to "10%", which means that when the battery has been discharged to 10% of the battery capacity, the battery will not continue to discharge;

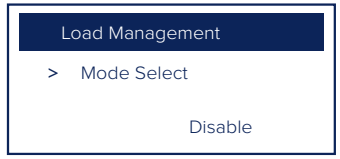
Charge battery to is set to 90%, indicating that the grid will charge the battery up to 90%.



g) Charge and discharge time
Here you can set the charge and discharge time period.
If two charging and discharging periods are needed, turn on the charging and discharging period 2 and set the period.

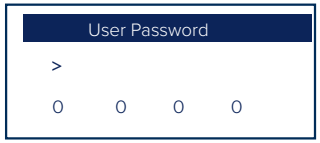


h) Dry Contact
This section is related to the settings parameters programmable in combination with the accessory Q.VOLT HYB-G3 SG-Ready adapter. Please refer to the Q.VOLT HYB-G3 SG-Ready quick installation manual to set the parameters here.

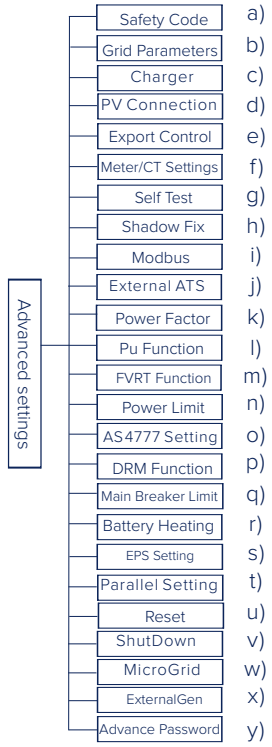


i) User Password

The default password for the end user is "0000", here you can choose a new password by pressing the up/down key to increase or decrease the values. Press "Enter" to confirm the value and move to the next digit. When all digits have been entered and confirmed, a new password has been successfully set after pressing "OK".



➢ **Advance settings**



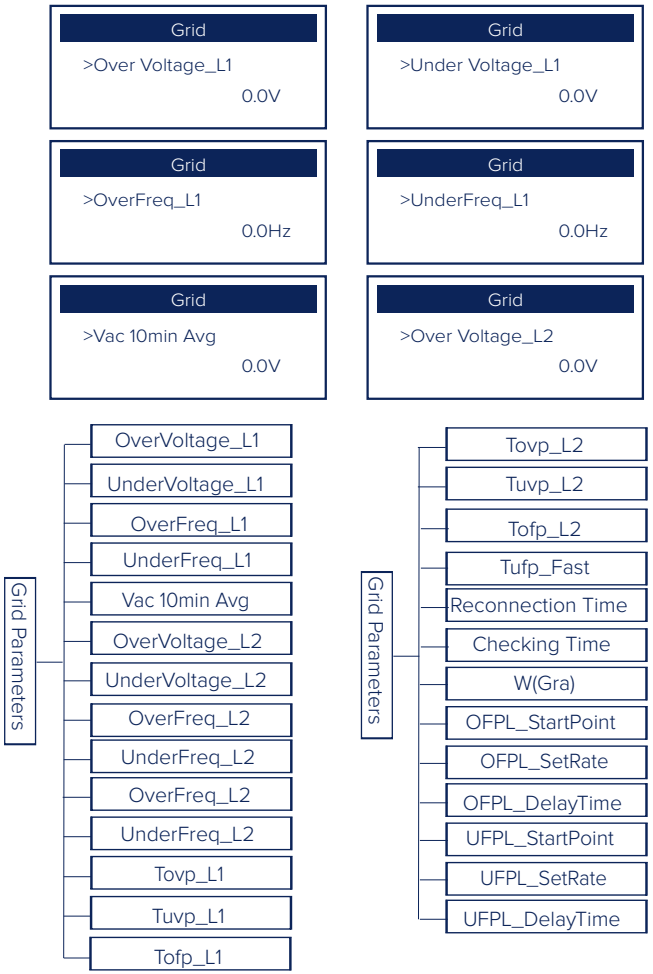
All advanced settings can be set here.

"Advanced" setting is generally used for advanced customization and resetting of the system.

Contact and check with your installer if there is any change on these settings needed to be performed.

a) Safety Code
Users can set the safety standard according to different countries and grid connection parameters.
The selectable standards are available in the settings list. The list is under continuous updated and may vary depending on the firmware version of the inverter.

b) Grid Parameters
Here users can set the protection value of grid voltage and frequency. The default values are the ones specified under the selected safety regulation ("Safety Code").

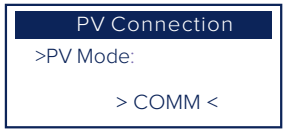


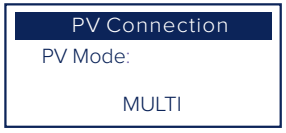
Item	Description
OverVoltage_L1	Primary overvoltage value
UnderVoltage_L1	Primary undervoltage value
OverFreq_L1	Primary overfrequency value
UnderFreq_L1	primary undervoltage value
Vac 10min Avg	10-minute overvoltage value
OverVoltage_L2	Secondary overvoltage value
UnderVoltage_L2	Secondary undervoltage value
OverFreq_L2	Secondary overfrequency value
UnderFreq_L2	Secondary underfrequency value
Tovp_L1	Duration of primary overvoltage value
Tuvp_L1	Duration of primary undervoltafe value
Tofp_L1	Duration of primary overfrequency value
Tovp_L2	Duration of secondary overvoltage value
Tuvp_L2	Duration of secondary undervoltage value
Tofp_L2	Duration of secondary overfrequency value
Tufp_Fast	Duration of underfrequency
Reconnection Time	Required time for reconnection
Checking Time	Required time for checking
W (Gra)	Rise speed of active power after starting
OFPL_StartPoint	Output power occurs if frequency exceeds the limit
OFPL_SetRate	The inverter will increase the output power linearly with a decrease of frequency until f stopis reached
OFPL_DelayTime	A delay time before the inverter starts to reduce the power output linearly with an increase of frequency
UFPL_StartPoint	Output power occurs if frequency falls the limit
UFPL_SetRate	The inverter will reduce the output power linearly with an increase of frequency until f stopis reached
UFPL_DelayTime	A delay time before the inverter starts to increase the power output linearly with a decrease of frequency

c) Charger
Here the user can set the parameters for the maximum charge/discharge current of the battery.

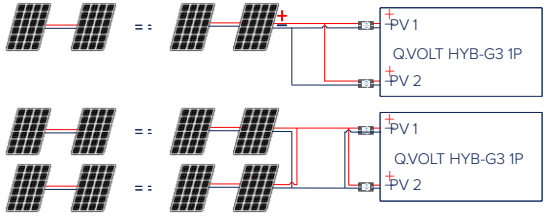
d) PV Connection

PV connection is divided into Comm Mode and Multi Mode. Comm Mode refers to connect a string of PV Modules to the two MPPT's in an inverter. Multi Mode refers to the inverter's two MPPT are independent of each other.

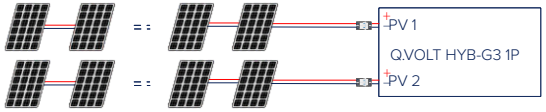




Comm Mode



Multi Mode



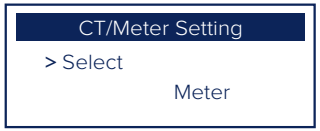
e) Export Control

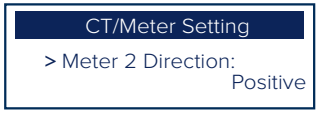
This feature allows the inverter to control the amount of power being fed in to the grid.

The factory value is the default and can be changed by the user. The user value set must be less than the maximum default value. If the user does not want to supply power to the grid, this value must be to 0.

f) Meter/CT Settings

The user needs to select CT or energy meter according to what is connected to the inverter. Select the address of the meter. For the CT, no address must be selected.





g) Self Test (only for Italy/CEI 0-21)

The self test function allows users to test the following items. "Full test", "Ovp(59.S2) test", "Uvp (27.S1) test", "Uvp (27. S2) test", "Ofp (81>.S1) test", "Ufp (81 <.S1) test", "Ofp (81>.S2) test", "Ufp (81 <.S2) test", "Ovp10 (59. s1) test".

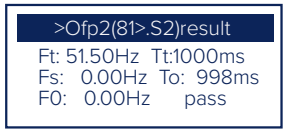
In the self-test interface, the user can select "all tests" or a single test item for testing.

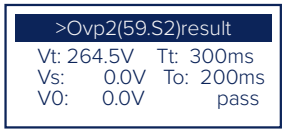
Before testing, make sure that the inverter is connected to the grid.

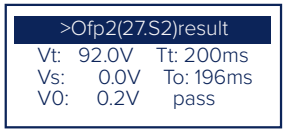
All tests take about 6 minutes. And it will be displayed "Success" and then "Delivery".

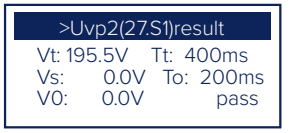
For each single test item, it may take about a few seconds or minutes.

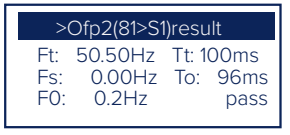
Click "Test Report" to view the test results of all items.

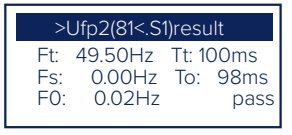


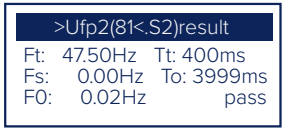


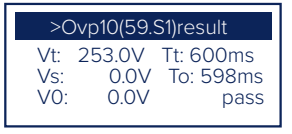




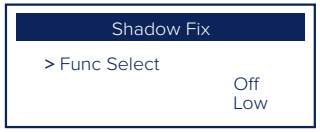




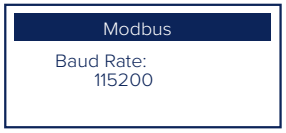


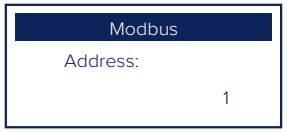


h) Shadow Fix
If the user's PV module is shaded by a fixed object, you can turn on the shadow tracking setting as low, middle, or high here. If there is no shading issue, please turn off this function.
The shadow tracking function, mainly using MPPT tracking technology, can successfully adapt to the rapidly changing weather conditions, such as cloudy, and can continuously and effectively maintain power output. After this function is started, there are totaling 4 scanning modes, namely “No Shadow (scanning is not required for no shading)”, “Low (scanning every 4 hrs for small amount of shading)”, “Middle (scanning every 3 hrs for medium amount of shading)”, or “High (scanning every 1 hr for large amount of shading)”.

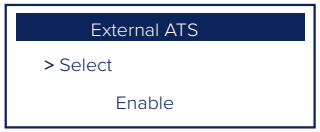


i) Modbus
Here you select the baud rate of the external communication protocol, the default location of 19200 and 485 addresses.

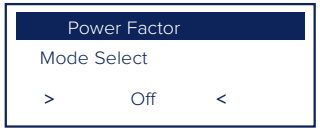


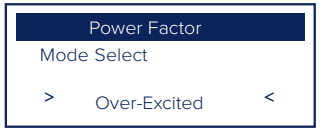


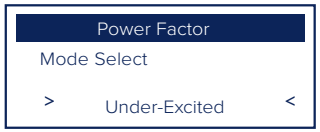
j) External ATS
If an external ATS interface is installed (Q.SAVE MATEBOX-G3 1P), you need to enable this feature here.

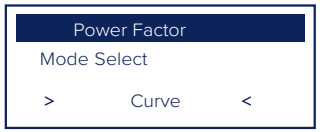


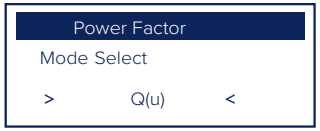
k) Power Factor (applicable to specific countries, refer to local grid requirements.)
There are 5 modes to select from: Off, Under-Excited, Over-Excited, Curve, Q(u).
Navigate by pressing the up and down key to select, press enter key to confirm.











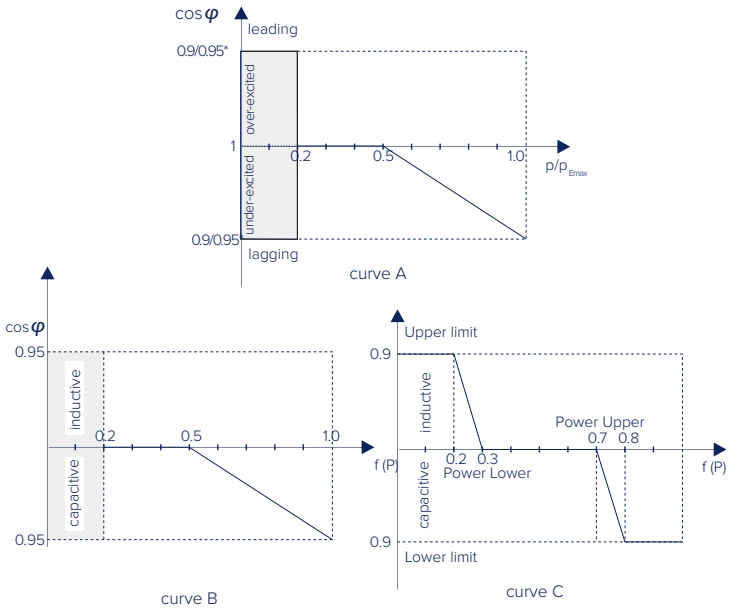
Mode	Comment
Off	–
Over-Excited	PF value
Under-Excited	PF value
Curve	Upper limit
	Lower limit
	Power Upper
	Power Lower
	PFLockInPoint (CEI 0-21 only)
	PFLockOutPoint (CEI 0-21 only)
Q(u)	VoltRATIO 1 (AS4777.2 only)
	VoltRATIO 4 (AS4777.2 only)
	QURESPONSEV2 (AS4777.2 only)
	QURESPONSEV3 (AS4777.2 only)
	QURESPONSEV4 (AS4777.2 only)
	K Value (CEI 0-21 only)
Fixed Q Power	Q Power

- Reactive power control, reactive power standard curve
  cosφ = f(P)

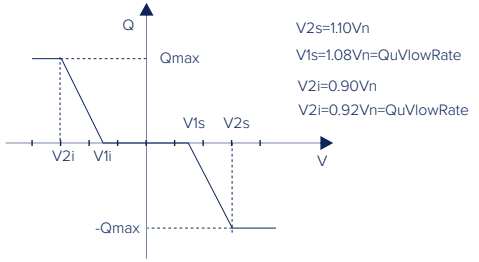
For VDE ARN 4105, the curve cosφ = f(P) should refer to curve B. The set default value is shown in curve B.

For e8001, the curve cosφ = f(P) should be curve A. The set default value is shown in curve A.

For CEI 0-21, the default value of PFLockInPoint is 1.05. When Vac> 1.05Vn, Pac> 0.2 Pn, curve cosφ = f(P) corresponds to curve B.

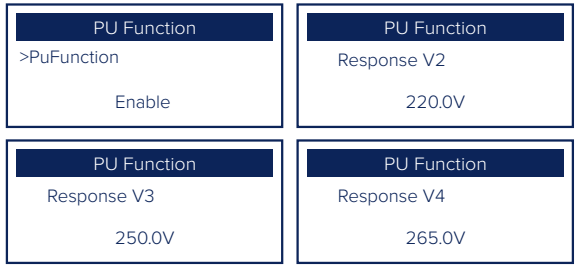


- Reactive power control, reactive power standard curve Q= f(V)

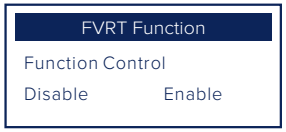


l) PU Function (applicable to specific countries, refer to local grid requirements)

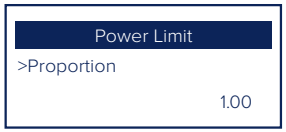
The PU function is a volt-watt response mode required by certain national standards such as AS4777.2. This function can control the active power of the inverter according to the grid voltage.
Selecting "Enable" means that this function is turned on and is the default value.
Select "Disable" to deactivate the function.



m) FVRT Function(apply to50549)
Here you can set the high and low enable or disable.



n) Power limit
Power limit function, the maximum power of the AC output of the inverter can be set by percentage.



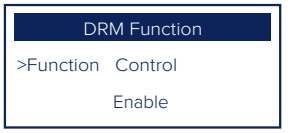
o) AS4777 Setting

It is the same as the function of Export Control, but it's only applicable to Australia and New Zealand.

p) DRM function (applied to NZS4777.2)

The DRM function is a demand response method required by the NZS4777.2 standard and is only applicable to NZS4777.2.

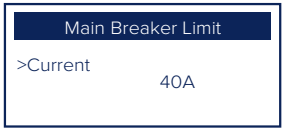
The default value is "enable". Select "Disable" to disable this function.



q) Main Breaker Limit

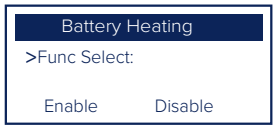
For power limit of smart meter or CT, the current must be set according to the utility's contract requirements. In case of failure to set, it may cause a circuit breaker fault of main switchboard, adversely affecting the charging or discharging of battery.

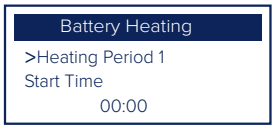
Click Main Breaker Limit to enter the setting interface, and then choose the corresponding amperage according to the utility's requirements.

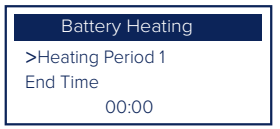


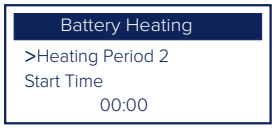
r) Battery Heating

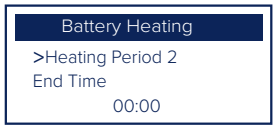
If the user needs the battery heating function, you can turn it on here and





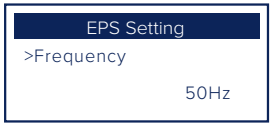


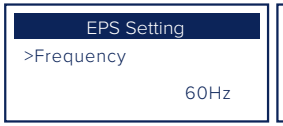




s) EPS Setting

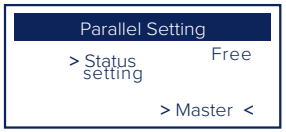
User can set the frequency selection in the EPS mode here, and set the minimum capacity reserved for battery discharge.

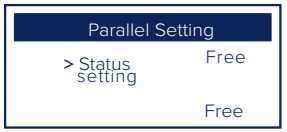




t) Parallel Setting (a function for parallel operation)

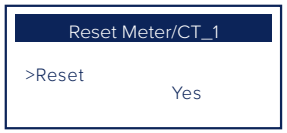
If a parallel operation is required, the user may set it with Parallel Setting.





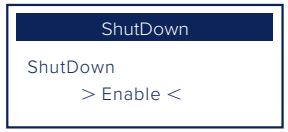
u) Reset

Users can reset the reset error log, meter power, inverter power, and restore factory settings here.



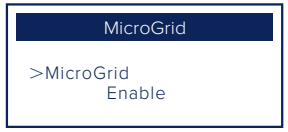
v) ShutDown

ShutDown is an Enable Switch. If the user want to use ShutDown, the Enable mode can be set. When COM PIN 1 and 2 (refer to COM PIN definition in 5.5.3) are short-circuited, the inverter will shutdown automatically after this function is enabled.



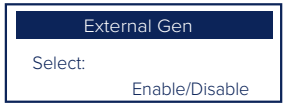
w) MicroGrid

If the user would like to use MicroGrid, the Enable mode can be set. After it starting, in off-grid circumstances, the EPS of Q.VOLT HYB-G3 1P/1P-D will supply the grid voltage the grid-connected photovoltaic inverter requires to enable it to operate normally.



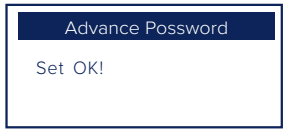
x) ExternalGen

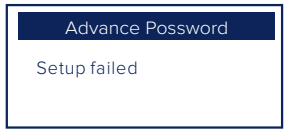
If the user would like to use an external generator, select Enable to enable this function. Then set the value of Max Charge, which will be the maximum charging power of the battery when the generator is operating.
The set value of power must meet the following two conditions when the maximum charging power of batteries is to be set.
1) The value of Max Charge Power is less than that of rated power of the generator minus total load power.
2) The value of Max Charge Power is less than or equals that of rated power of the inverter.



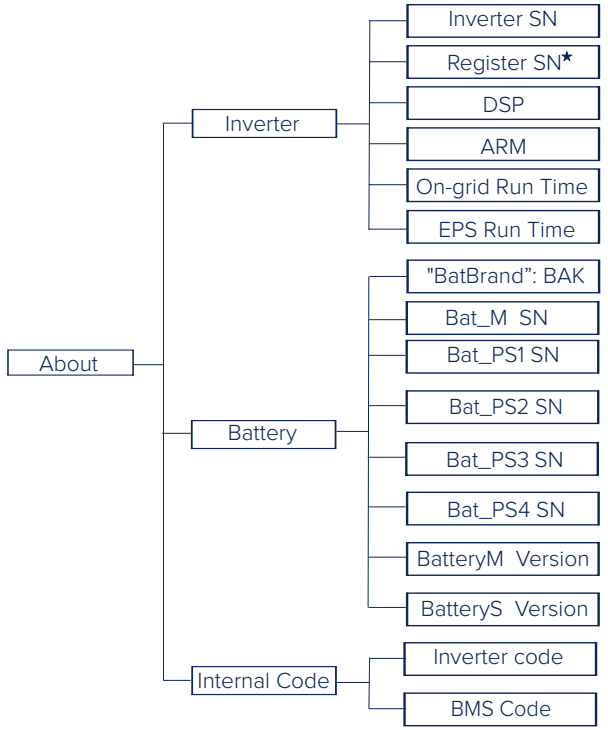
y) Advance Password

Here you can reset the advanced password. "Set OK!" is displayed on success, and “Setup Failed!” will displayed in case the reset has failed.





➢ **About**

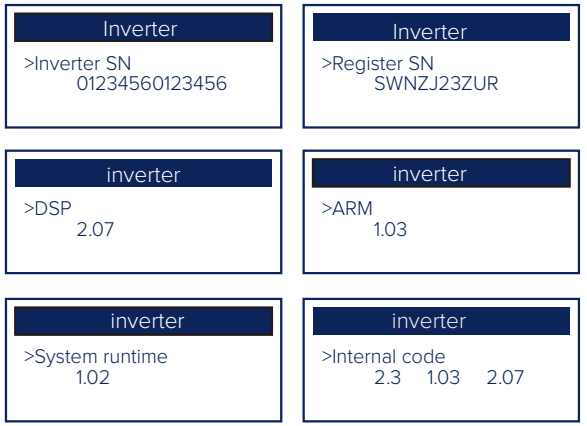


Register1 SN: Represents the serial number of external monitoring equipment, such as Q.VOLT HYB-G3 Wi-Fi.

a) About

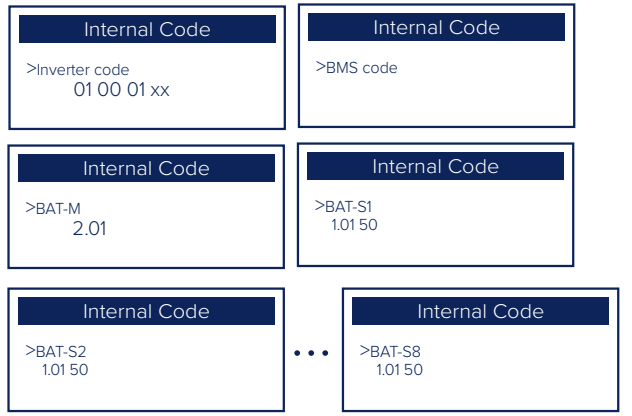
Here you can see some basic information of the inverter and battery, as the inverter and battery model, S/N number, firmware version, and system run time.

Inverter



Battery

Internal Code



8 Troubleshooting

8.1 Troubleshooting

This section contains information and procedures for resolving possible problems with Q.VOLT HYB-G3 1P/1P-D, and provides you with troubleshooting tips to identify and solve most problems that may occur during the operation of the Q.VOLT HYB-G3 1P/1P-D. This section will help you narrow down the source of any problems you may encounter. Read the troubleshooting steps below carefully.
Check the warning or fault information on the system control panel or the fault code on the inverter information panel. If a message is displayed, document it before undertaking any further action.
Then perform the suggested actions indicated in the table below.

Number	Faults	Diagnosis and solution
IE 001	TZ Protect Fault	Overcurrent fault. • Wait for a while to check if you're back to normal. • Disconnect PV+ PV- and batteries, reconnect. • Or ask for help from the installer if it can not return to normal.
IE 002	Grid Lost Fult	• Check battery input voltage if it's within normal range. • Or ask the installer for help
IE 003	Grid Volt Fault	Power grid voltage overrun • Wait a moment, if the utility returns to normal, the system will reconnect. • Check if the grid voltage is within normal range. • Or ask the installer for help.
IE 004	Grid Freq Fault	Electricity frequency beyond range • If the utility returns to normal, the system reconnects. • Or ask the installer for help.
IE 005	PV Volt Fault	PV voltage out of range • Check the output voltage of the PV panel. • Or ask the installer for help.
IE 006	Bus Volt Fault	• Press the "ESC" key to restart the inverter. • Check that the PV input open circuit voltage is in the normal range. • Or ask the installer for help.
IE 007	Bat Volt Fault	Battery voltage fault • Check battery input voltage if it's within normal range. • Or ask the installer for help.
IE 008	AC10M Volt Fault	• The grid voltage was out of range in the last 10 minutes. • The system will return to normal if the grid returns to normal. • Or ask the installer for help.

Number	Faults	Diagnosis and solution
IE 009	DCI OCP Fault	DCI overcurrent protection fault. • Wait for a while to check if it's back to normal. • Or ask the installer for help.
IE 010	DCV OVP Fault	DCV EPS (Off-grid) overvoltage protection failure. • Wait for a while to check if it's back to normal. • Or ask the installer for help.
IE 011	SW OCP Fault	Software Detection of Overcurrent Fault • Wait for a while to check if it's back to normal. • Shut down photovoltaic, battery and grid connections. • Or ask the installer for help.
IE 012	RC OCP Fault	Overcurrent protection fault. • Check the impedance of DC input and AC output. • Wait for a while to check if it's back to normal. • Or ask the installer for help.
IE 013	Isolation Fault	Insulation Fault • Check the wire insulation for damage. • Wait for a while to check if it's back to normal. • Or ask the installer for help.
IE 014	Temp Over Fault	Temperature beyond limit • Check if ambient temperature exceeds the limit. • Or ask the installer for help.
IE 015	Bat Con Dir Fault	EPS (Off-grid) mode current is too strong. • Ensure that the load power is within the EPS (Off-grid) power range. • Check for any non-linear load connections on the EPS (Off-grid). • Move this load to check for recovery. • Or ask for help from the installer if it can not return to normal.
IE 016	EPS Overload Fault	EPS (Off-grid) over load fault. • Shutdown the high-power device and press the "ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal.
IE 017	OverLoad Fault	On-grid mode over load • Shutdown the high-power device and press the "ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal.
IE 018	BatPowerLow	• Close the high-power device and press the "ESC" key to restart the inverter. • Charge the battery to a level higher than the protection capacity or protection voltage.
IE 019	BMS Lost	Battery communication loss • Check that the communication lines between the battery and the inverter are properly connected. • Or ask for help from the installer if it can not return to normal.
IE 020	Fan Fault	Fan Fault • Check for any foreign matter that may have caused the fan not to function properly. • Or ask for help from the installer if it can not return to normal.
IE 021	Low Temp	Low temperature fault. • Check if the ambient temperature is too low. • Or ask for help from the installer if it can not return to normal.

Number	Faults	Diagnosis and solution
IE 022	ARM Unmatched	ARM software version mismatch Fault • update the software and press the "ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal.
IE 023	Other Device Fault	Other device Fault • update the software and press the "ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal.
IE 025	InterComms Error	Mgr InterCom Fault • Shut down photovoltaic, battery and grid, reconnect. • Or ask for help from the installer if it can not return to normal.
IE 025	InterComms Error	• Internal communication errors • Shut down photovoltaic, battery and grid connections. • Or ask for help from the installer if it can not return to normal.
IE 026	Inv EEPROM Fault	Inverter EEPROM Fault • Shut down photovoltaic, battery and grid, reconnect. • Or ask for help from the installer if it can not return to normal.
IE 027	RCD Fault	Fault of Residual Current Device • Check the impedance of DC input and AC output. • Disconnect PV + PV - and batteries, reconnect. • Or ask for help from the installer if it can not return to normal.
IE 028	Grid Relay Fault	Electrical relay failure • Disconnect PV+ PV- grid and batteries and reconnect. • Or ask for help from the installer if it can not return to normal.
IE 029	EPS Relay Fault	EPS (Off-grid) relay failure • Disconnect PV+, PV-, grid and batteries and reconnect. • Or ask for help from the installer if it can not return to normal.
IE 030	PV ConnDirFault	PV direction fault • Check if the PV input lines are connected in the opposite direction. • Or ask for help from the installer if it can not return to normal.
IE 031	ChargerRelayFault	Charge relay fault • Press the "ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal.
IE 032	EarthRaleyFault	EPS (Off-grid) earth relay fault • Press the "ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal.
IE 101	PowerTypeFault	Power type fault • Upgrade the software and press the "ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal.
IE 102	Port OC Warning	EPS (Off-grid) port over current fault • Check that the EPS (Off-grid) load does not exceed the system requirements, and press the "ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal.

Number	Faults	Diagnosis and solution
IE 103	Mgr EEPROM Fault	Manager EEEPROM Fault. • Shut down photovoltaic, battery and grid, reconnect. • Or seek help from the installer if it can not return to normal.
IE 104	DSPunmatched	DSP version error • Check that the DSPI version matches. • Or ask for help from the installer, if it can not return to normal.
IE 105	NTC Sample Invalid	NTC invalid • Make sure the NTC is properly connected and the NTC is in good condition. • Confirm that the installation environment is normal. • Or ask for help from the installer, if it can not return to normal.
IE 106	Bat Temp Low	Battery temp low • Check the battery installation environment to ensure good heat dissipation. • Or ask for help from the installer, if it can not return to normal.
IE 107	Bat Temp High	Battery temp high • Check the battery installation environment to ensure good heat dissipation. • Or ask for help from the installer, if it can not return to normal.
IE 109	Meter Fault	Meter error • Check that the instrument is working properly. • Or seek help from the installer if it can not return to normal.
IE 110	BypassRaleyFault	Bypass relay fault • Press the "ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal.
BE 001	BMS_External_Err	Battery Error - External Communication Fault • Contact the battery supplier.
BE 002	BMS_Internal_Err	Battery Error - Internal Communication Fault • Contact the battery supplier.
BE 003	BMS_OverVoltage	Over voltage in battery system • Contact the battery supplier.
BE 004	BMS_LowerVoltage	Low voltage in battery system • Contact the battery supplier.
BE 005	BMS_ChargeOCP	Battery fault - over charge fault • Contact the battery supplier.
BE 006	BMS_DischargeOCP	Battery fault-discharge over current fault • Contact the battery supplier.
BE 007	BMS_TemHigh	Over temperature in battery system • Contact the battery supplier.
BE 008	BMS_TempSensor Fault	Battery temperature sensor malfunction • Contact the battery supplier.

Number	Faults	Diagnosis and solution
BE 009	BMS_CellImblance	Battery Unbalanced Failure • Contact the battery supplier.
BE 010	BMS_Hardware Protect	Battery hardware protection failure • Contact the battery supplier.
BE 011	BMS_Circuit_Fault	Battery circuit failure • Restart the battery. • Contact the battery supplier.
BE 012	BMS_ISO_Fault	Battery insulation failure • Check that the battery is properly grounded and restart the battery. • Contact the battery supplier.
BE 013	BMS_VolSen_Fault	Battery voltage sensor fault • Contact the battery supplier.
BE 014	BMS_TemppSen_Fault	Temperature sensor failure • Restart the battery. • Contact the battery supplier.
BE 015	BMS_CurSensor Fault	Battery current sensor fault • Contact the battery supplier.
BE 016	BMS_Relay Fault	Battery relay failure • Contact the battery supplier.
BE 017	BMS_Type_Unmatch	Battery type failure • Upgrade the battery BMS software. • Contact the battery supplier.
BE 018	BMS_Ver_ Unmatch	Battery version mismatch failure • Upgrade the battery BMS software. • Contact the battery supplier.
BE 019	BMS_MFR_ Unmatch	Battery manufacturer did not match the fault • Upgrade the battery BMS software. • Contact the battery supplier.
BE 020	BMS_SW_ Unmatch	Battery hardware and software mismatch failure • Upgrade the battery BMS software. • Contact the battery supplier.
BE 021	BMS_M&S_ Unmatch	Battery master slave control mismatches • Upgrade the battery BMS software. • Contact the battery supplier.
BE 022	BMS_CR_ NORespond	Battery charging request does not respond to a fault • Upgrade the battery BMS software. • Contact the battery supplier.
BE 023	BMS_SW_ Protect	Battery slave software protection failure • Upgrade the battery BMS software. • Contact the battery supplier.
BE 024	BMS_536_Fault	Battery fault-discharge over current fault • Contact the battery supplier.
BE 025	BMS_SelfcheckErr	Over temperature in battery system • Contact the battery supplier.

Number	Faults	Diagnosis and solution
BE 026	BMS_TempdiffErr	Battery temperature sensor malfunction • Contact the battery supplier.
BE 027	BMS_BreakFault	Battery Unbalanced Failure • Contact the battery supplier.
BE 028	BMS_Flash_Fault	Battery hardware protection failure • Contact the battery supplier.
BE 029	BMS_Precharge_Fault	Battery precharge failure • Contact the battery supplier.
BE 030	BMS_AirSwitch_Fault	Battery air switch failure • Check that the battery breaker is off. • Contact the battery supplier.

● If the information panel of your inverter does not show the fault light, check the following list to ensure the current installation status, correct operation.
------Is the inverter located in a clean, dry and well-ventilated place?
------Is the DC input circuit breaker open?
------Is the specification and length of the cable adequate?
------Are the input and output connections and wiring in good condition?
------Is the configuration set correct for your particular installation?

Contact Qcells customer service for further assistance. Be prepared to describe the details of your system installation and provide the inverter serial number and the registration number.

8.2 Routine Maintenance

Inverters do not require any maintenance or correction in most cases, but if the inverter often loses power due to overheating, this can be attributed to the following reason:

- Heat sink behind the inverter is covered with dirt.

If necessary, clean the cooling heat sink with a soft dry cloth or brush. Only trained and authorized professionals familiar with safety requirements can perform maintenance and maintenance work.

➢ **Safety inspections**

Safety checks should be conducted at least every 12 months, Contact the manufacturer to arrange for appropriate training, expertise, and practical experience in performing these tests.

(Note that this action is not covered by warranty).

These data should be recorded in the device log. If the equipment is not running properly or any test fails, the equipment must be repaired for details of safety inspections, refer to section 2 of this manual for safety instructions and europe commission instructions.

➢ **Regular maintenance**

Only qualified people can do the following work.

In the process of using frequency converter, the manager should check and maintain the machine regularly. The specific operation is as follows.

1.Check whether the heat sink is covered with dirt, clean the inverter and absorb dust if necessary. This work should be performed from time to time.

2.Check whether the frequency converter indicator is normal, check whether the frequency converter button is normal, check whether the frequency converter display is normal.
This inspection should be conducted at least every 6 months.

3.Check the input and output lines for damage or aging. This inspection should be conducted at least every 6 months.

4.Cleaning and safety inspection of PV modules should be carried out at least once every 6 months.

9 Decommissioning

9.1 Dismantling the inverter

- Remove DC input line and AC output line of inverter.
- Wait for at least 5 minutes to power off.
- Remove all cable connections from the inverter.
- Remove inverter from finger support the bracket.
- Remove the bracket if necessary.

9.2 Packaging

Load the inverter into the original package if possible.

- If the original package can not be found, you can also use the following requirements of the carton packaging:
  Bearing capacity of more than 30kg.
  Easy to carry.
  Can completely seal the cover.

9.3 Storage and Transportation

Store the inverter in a dry, temperature -40°C ~ 65°C environment.
Pay attention to less than four inverter on each stack board during storage and transportation.

9.4 Waste Disposal

If it is necessary to scrap the inverter or other related parts, be sure to send the waste inverter and packaging materials to the designated location for recycling by the relevant department.

10 Disclaimer

The Q.VOLT HYB-G3 1P/1P-D series hybrid inverters are transported, used and operated under limited condition, such as environmental, electrical etc. Qcells shall not be liable to provide the service, technical support or compensation under conditions listed below, including but not limited to:

- Inverter is damaged or broken by force majeure (such as earthquake, flooding, thunderstorm, lighting, fire hazard, volcanic eruption etc).
- Inverter's warranty is expired and not extended.
- Can't provide the inverter's S/N, warranty card or invoice.
- Inverter is damaged by man-made cause. Inverter is used or operated against any items in local policy.
- Inverter's installation, configuration, commissioning doesn't follow the requirements mentioned in this manual.
- Inverter is installed, refitted or operated in improper ways mentioned in this manual without authority from Qcells.
- Inverter is installed, operated under improper environment or electrical condition mentioned in this manual without authority from Qcells.
- Inverter is changed, updated or disassembled on hardware or software without authority from Qcells.
- Obtain the communication protocol from other illegal channels.
- Build monitoring, control system without authority from Qcells.
- Connect to other brands batteries without explicit authorization from Qcells.