



## User manual

### Energy storage integrated inverter

Product Model: HYD 3K~6K-ES



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## **Notice**

This manual contains important safety instructions that must be followed during installation and maintenance of the equipment.

### **Save these instructions!**

This manual must be considered as an integral part of the equipment. The manual must always accompany the equipment, even when it is transferred to another user or field.

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The current Version updated at 20210303.

# Preface

**Note**

If you have any question or problem when you read the following information, please contact Shenzhen SOFARSOLAR Co., Ltd.

**Outline**

Please read the product manual carefully before installation, operation or maintenance. This manual contains important safety instructions and installation instructions that must be followed during installation and maintenance of the equipment.

**Scope**

This product manual describes the installation, electrical connections, commissioning, maintenance and troubleshooting of HYD 3K-6K-ES inverters:

|             |             |             |
|-------------|-------------|-------------|
| HYD 3000-ES | HYD 3600-ES | HYD 4000-ES |
| HYD 4600-ES | HYD 5000-ES | HYD 6000-ES |

Keep this manual where it will be accessible at all times.

**Target Group**

This manual is intended for qualified electrical technical personnel who are responsible for inverter installation and commissioning in the PV power system and PV plant operator.

**Symbols Used**

This manual provides safety operation information and uses the symbol in order to ensure personal and property security and use inverter efficiently when operating the inverter. You must understand these emphasized information to avoid the personal injury and property loss. Please read the following symbols used in this manual carefully.

|                                                                                                       |                                                                                                                   |
|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| <br><b>Danger</b>    | <p>Danger indicates a hazardous situation which, if not avoided, will result in death or serious injury.</p>      |
| <br><b>Warning</b>   | <p>Warning indicates a hazardous situation which, if not avoided, could result in death or serious injury.</p>    |
| <br><b>Caution</b>   | <p>Caution indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.</p>   |
| <br><b>Attention</b> | <p>Attention indicates potential risks which, if not avoided, may lead to equipment fault or property damage.</p> |
| <br><b>Note</b>      | <p>Note provides tips that are valuable for the optimal operation of the product.</p>                             |

# ***1. HYD-ES inverter Introduction***

The HYD-ES hybrid inverter is used in PV system with battery storage.

Energy produced by the PV system will be optimized for maximum self-consumption.

The HYD-ES inverter can work in auto or time-of-use (TOU) mode, charge / discharge the battery when needed. In auto mode, the HYD-ES inverter will charge surplus PV energy into the battery & discharge battery to supply power to local load when PV energy is not enough.

In case of blackout, HYD-ES inverter can work in Emergency Power Supply (EPS) mode. HYD-ES inverter will utilize power from PV panels & energy stored in the battery to supply power to critical load.

Fig.1-1 HYD-ES inverter schematic diagram



## ***2. Safety Notes***

Before installation, please make sure you read & understand this manual. The HYD-ES inverter strictly comply with safety rules of design and testing. During the installation, operation and maintenance, operators should abide by local safety regulations. Improper operation may cause an electric shock or damage the equipment and properties.

### **2.1. Safety Notes**

- ✧ Electrical installation and maintenance must be carried out by competent electricians according to local regulations.
- ✧ HYD-ES inverter can only be installed by qualified electrician, and only those who have appropriate accreditation, as required by local authority.
- ✧ Do NOT put explosives or flammable materials, e.g. gasoline, kerosene, diesel, oil, wood slab, cotton, or rag close to batteries or HYD-ES inverter.
- ✧ Disconnect AC connection first, then disconnect battery & PV(PV1&PV2), then wait at least 5 minutes (discharge capacitors) before maintenance to prevent electric shock.
- ✧ HYD-ES inverter shall be disconnected completely (BAT, PV & AC) while being maintained.
- ✧ HYD-ES inverter can be very hot during working. Switch off HYD-ES inverter & wait HYD-ES inverter to cool down before maintenance.
- ✧ Keep children away from batteries & HYD-ES inverter.
- ✧ It's NOT allowed to open the front cover of HYD-ES inverter. This will void the product warranty.
- ✧ HYD-ES inverter damaged by improper installation/operation is NOT covered by the product warranty.

### **2.2. Installation and Maintenance Notes**

- ✧ The battery has been charged more than 60% before being delivered and shall be prevented from short circuit during transportation and installation.
- ✧ HYD-ES inverter/batteries shall be placed in a well-ventilated place. Do not

put the HYD-ES inverter/batteries in an airtight or badly ventilated place or cabinet. This can be very harmful to system performance & service life.

- ✧ Keep HYD-ES inverter/batteries away from direct sunshine. Don't put HYD-ES inverter/batteries close to a furnace or fire. This can lead battery to leak even explode.
- ✧ The current capacity of DC power cables (from battery to inverter) should be at least 90A. Use short DC power cables to avoid high voltage drop & power loss.
- ✧ Use a multimeter to check the battery voltage & polarity before switching ON batteries. Make sure connections are correct according to this manual.
- ✧ Use a multimeter to check the PV voltage & polarity before switching ON PV isolator. Make sure connections are correct according to this manual.
- ✧ If you want to store the batteries without using them, they should be disconnected from HYD-ES inverter, and be kept in a cool, dry, and ventilated environment.
- ✧ Battery maintenance operators shall have the knowledge and technical skill for battery maintenance;
- ✧ All batteries connected in parallel should be of the same model and have same firmware version. This is a design issue needs to be considered by designer/installer, particularly when replacing batteries or modifying an existing energy storage system.
- ✧ HYD-ES inverter is transformer-less, therefore the positive pole and negative pole of the PV array are NOT grounded. Otherwise it will cause inverter failure. In the PV system, all non-current carrying metal parts (such as: PV module frame, PV rack, combiner box enclosure, inverter enclosure) should be connected to earth.
- ✧ Warning: Do not disassemble or break the battery. Its electrolyte can be toxic and damage your skin and eyes.
- ✧ Warning: follow the following rules during battery installation/maintenance.
  - a. Take off your watch, ring, and other metal objects.
  - b. Only use tools with insulated handles.
  - c. Wear rubber gloves and shoes.
  - d. Do not put tools or metals above the battery.
  - e. Switch off HYD-ES inverter & batteries before connecting / disconnecting battery terminals.



- f. Battery positive/negative poles should be isolated from ground.

## 2.3. Signs on the inverter

There are some symbols which are related to security on the inverter. Please read and understand the content of the symbols before system installation.

|                                                                                     |                                                                                                                                  |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
|    | This symbol indicates a hazardous situation which could result in injuries, if not avoided.                                      |
|    | Risk of Electric Shock and wait at least 5 mins after switching OFF HYD-ES inverter.                                             |
|    | Be careful of high voltage and electric shock.                                                                                   |
|    | Be careful of hot surface.                                                                                                       |
|    | Comply with the Conformity Europeanness (CE) certification.                                                                      |
|    | Earth terminal.                                                                                                                  |
|    | Please read this manual before installing HYD-ES inverter.                                                                       |
|   | This indicates the degree of protection of the equipment according to IEC standard 70-1 (EN 60529 June 1997).                    |
|  | Positive pole and negative pole of the DC voltage (PV & Battery).                                                                |
|  | This side up, HYD-ES inverter must always be transported, handled and stored in such a way that the arrows always point upwards. |
|  | RCM (Regulatory Compliance Mark)<br>The product complies with the requirements of the applicable Australian standards.           |

## 3. Installation

### 3.1. Product Overview

HYD-ES inverter is 100% strictly inspected before package and delivery. It is forbidden to put the HYD-ES inverter upside down during delivery.

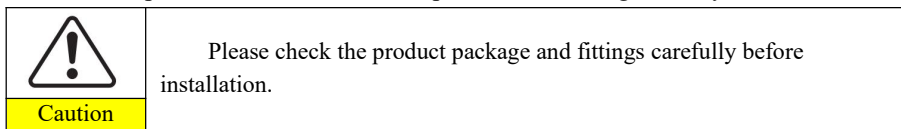
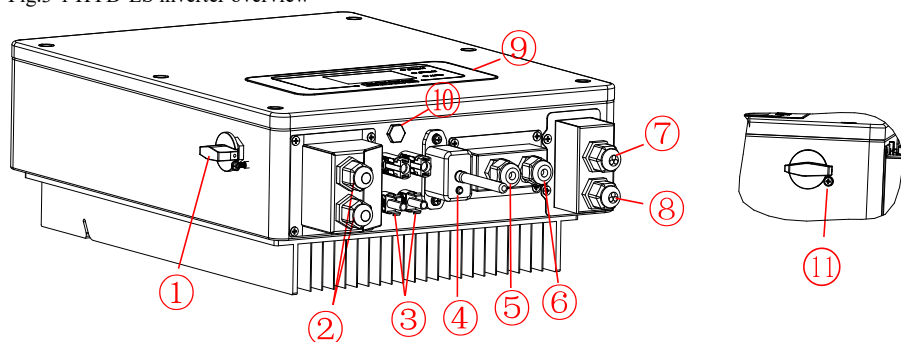


Fig.3-1 HYD-ES inverter overview



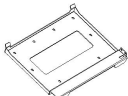
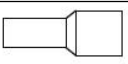
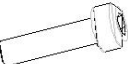
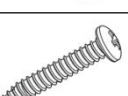
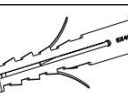
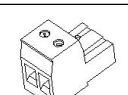
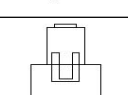
|   |                          |      |                                        |
|---|--------------------------|------|----------------------------------------|
| 1 | DC switch                | 7    | Load connection port                   |
| 2 | Battery input terminals  | 8    | Grid connection port                   |
| 3 | PV input terminals       | 9    | LCD                                    |
| 4 | Wi-Fi/GPRS stick         | 10   | Breather valve                         |
| 5 | BMS communication port   | 11 * | DC switch lock (For Australian models) |
| 6 | Current transformer port |      |                                        |

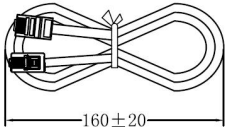
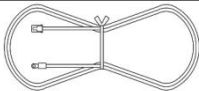
\*Note: Lock the screw to limit the torque of the DC switch, making it impossible to twist the DC switch from OFF to ON, or ON to OFF. Remove the screw before turning the DC switch from OFF to ON or ON to OFF.

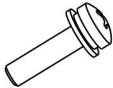
### 3.2. Packing List

Inspect the package and fittings carefully before installation. You should have the following fittings:

Table3-1 Components and mechanical parts that should be delivered

| NO. | Picture                                                                             | Description        | Quantity |
|-----|-------------------------------------------------------------------------------------|--------------------|----------|
| 1   |    | Inverter           | 1pcs     |
| 2   |    | Mounting Bracket   | 1pcs     |
| 3   |    | AC terminal        | 6pcs     |
| 4   |    | M5 screw           | 2pcs     |
| 5   |    | Battery terminal   | 2pcs     |
| 6   |    | M6 flat washer     | 10pcs    |
| 7   |    | Self-tapping screw | 8pcs     |
| 8   |    | Expansion bolts    | 8pcs     |
| 8   |   | Terminal cap       | 2pcs     |
| 9   |  | CT terminal        | 3pcs     |
| 10  |  | CT                 | 1pcs     |

|    |                                                                                     |                                                   |      |
|----|-------------------------------------------------------------------------------------|---------------------------------------------------|------|
| 11 |    | Communication cable                               | 1pcs |
| 12 |    | NTC×1 (Long-3M)                                   | 1pcs |
| 13 |    | PV+ input terminal                                | 2pcs |
| 14 |    | PV- input terminal                                | 2pcs |
| 15 |    | Metal terminals secured to PV+ input power cables | 2pcs |
| 16 |    | Metal terminals secured to PV- input power cables | 2pcs |
| 17 |   | User Manual                                       | 2pcs |
| 18 |  | Warranty card                                     | 1pcs |
| 19 |  | Quality Certificate                               | 1pcs |

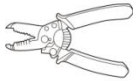
|    |                                                                                   |                                                                   |      |
|----|-----------------------------------------------------------------------------------|-------------------------------------------------------------------|------|
| 20 |  | Outgoing inspection report                                        | 1pcs |
| 18 |  | M4X14 Cross round head triple set screw (Only for DC switch lock) | 1pcs |

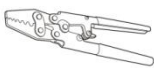
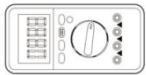
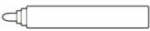
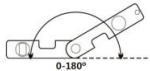
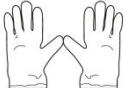
### 3.3. Installation Environment

- ✧ Choose a dry, clean, and tidy place, convenient for installation
- ✧ Ambient temperature range: -25°C ~ 60°C
- ✧ Relative humidity: 0 ~ 100% (non-condensed)
- ✧ HYD-ES inverter shall be installed in a well-ventilated place
- ✧ No flammable or explosive materials close to HYD-ES inverter
- ✧ The AC overvoltage category of HYD-ES inverter is category III
- ✧ Maximum altitude: 2000m

### 3.4. Installation Tools

The following tools shall be prepared before installation:

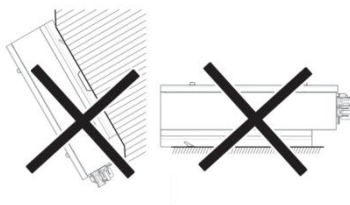
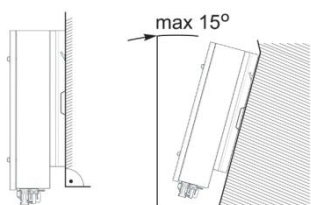
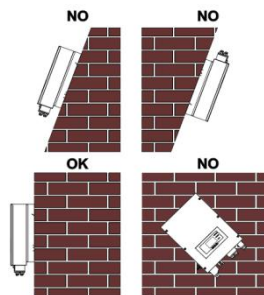
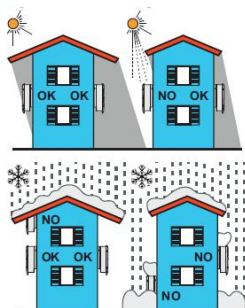
| No. | Tool                                                                                | Model                                   | Function                                           |
|-----|-------------------------------------------------------------------------------------|-----------------------------------------|----------------------------------------------------|
| 1   |   | Hammer drill<br>Recommend drill dia.6mm | Used to drill holes on the wall                    |
| 2   |  | Screwdriver                             | wiring                                             |
| 3   |  | Wire stripper                           | Strip wire                                         |
| 4   |  | 4mm Allen Key                           | Turn the screw to connect rear panel with inverter |

|    |                                                                                   |                      |                                                          |
|----|-----------------------------------------------------------------------------------|----------------------|----------------------------------------------------------|
| 5  |  | Crimping tools       | Used to crimp power cables                               |
| 6  |  | Multi-meter          | Used to check grounding                                  |
| 7  |  | Marker pen           | Used to mark signs                                       |
| 8  |  | Measuring tape       | Used to measure distances                                |
| 9  |  | Level                | Used to ensure that the rear panel is properly installed |
| 10 |  | ESD gloves           | Operators wear                                           |
| 11 |  | Safety goggles       | Operators wear                                           |
| 12 |  | Anti-dust respirator | Operators wear                                           |

## 3.5. Installation Position

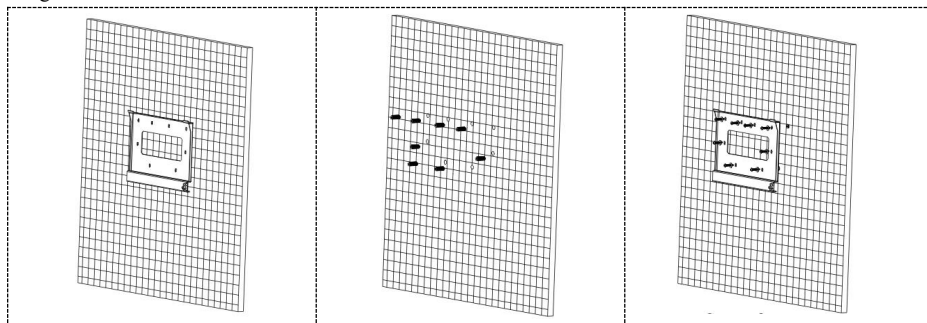
HYD-ES inverter should be vertically mounted (to ensure fast heat dissipation), please choose a position without direct sunlight / snow accumulation to install HYD-ES inverter. Please the installation position is well-ventilated.

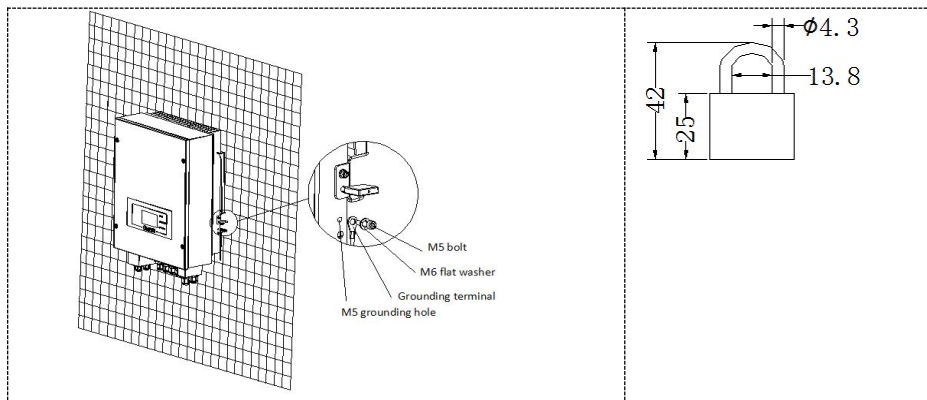
Fig. 3-2 Installation Position of HYD-ES inverter



## 3.6. Mount HYD-ES inverter

Fig. 3-3 Mount HYD-ES inverter





Step 1: Put the mounting bracket properly on the wall, mark these 8 drill holes using a marker pen. Drill 8 holes (drill bit 6mm) on the wall.

Step 2: Insert the expansion screw vertically into the hole, note the insertion depth. (not too shallow or too deep)

Step 3: Fix the mounting bracket on the wall using bolts & flat washers.

Step 4: Put HYD-ES inverter on the mounting bracket.

Step 5: Earth HYD-ES inverter using the grounding hole on the heat sink.

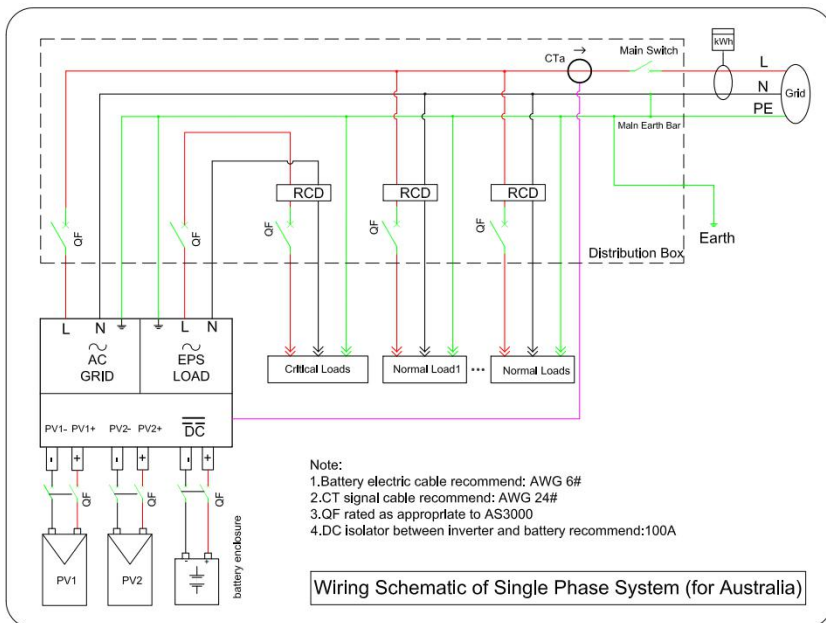
Step 6: OPTIONAL: you can lock HYD-ES inverter to the mounting bracket.



## 4. Electrical Connection

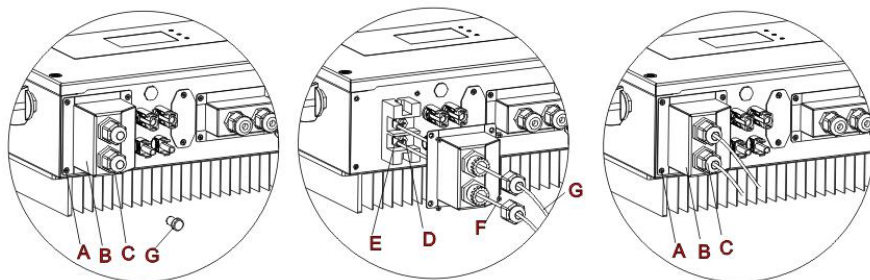
|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>High voltages in power conversion circuits. Lethal hazard of electric shock or serious burns.</p> <p>All work on the PV modules, inverters, and battery systems must be carried out by qualified personnel only.</p> <p>Wear rubber gloves and protective clothing (protective glasses and boots) when working on high voltage/high current systems such as INVERTER and battery systems.</p> |
| <b>Caution</b>                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                  |
|  | <p>HYD-ES inverter is intended to be used in PV system with battery storage. If not used as intended, the protection provided by the equipment may be impaired.</p>                                                                                                                                                                                                                              |
| <b>Caution</b>                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                  |

Fig. 4-1 Electrical connections



### 4.1. Battery Connection

Fig. 4-2 Battery connection (Measure battery wires polarity/voltage before connection)



Step 1: Loosen 4 screws (A) using a screwdriver (Fig. 4-2);

Step 2: Remove the waterproof cover (B), loosen the cable gland (C), and then remove the stopper (G);

Step 3: Route the battery wires (F) through the cable gland, then connect battery wires using OT terminal (E);

Step 4: Fasten the waterproof cover using 4 screws.

## 4.2. PV Connection

Table4-1 Recommended DC input cable specifications

| Cross-Sectional Area (mm <sup>2</sup> ) |                   | External Cable Diameter(mm <sup>2</sup> ) |
|-----------------------------------------|-------------------|-------------------------------------------|
| Range                                   | Recommended Value |                                           |
| 4.0~6.0                                 | 4.0               | 4.5~7.8                                   |

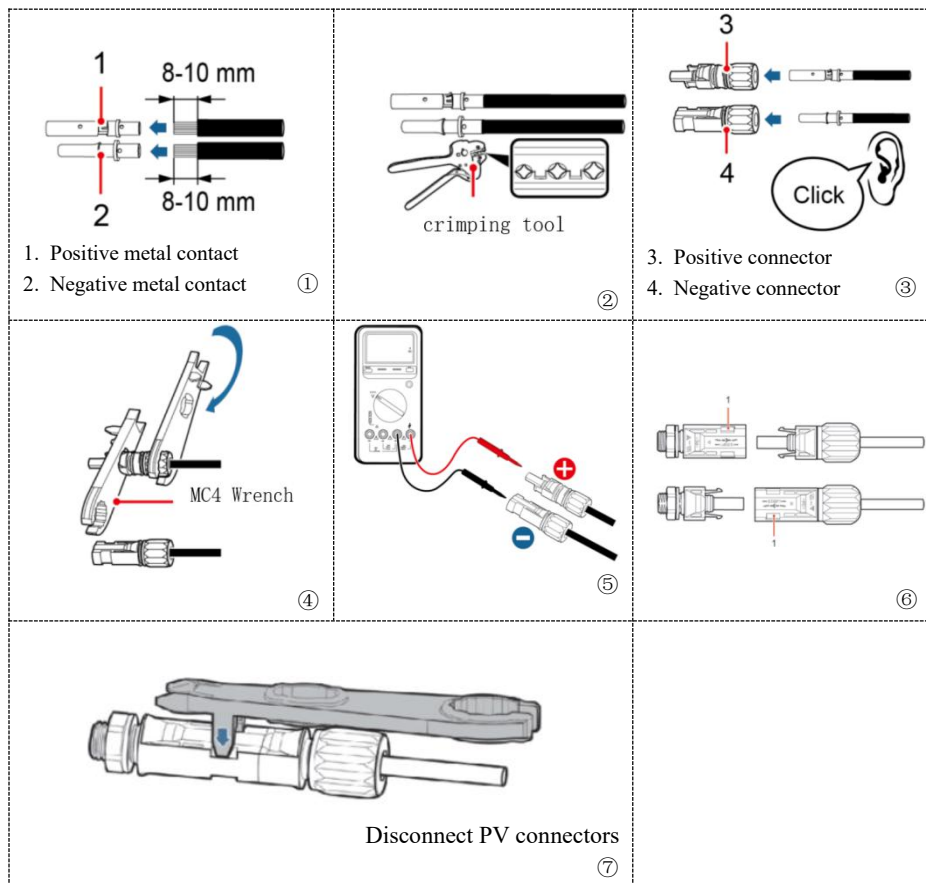
### Procedure:

**Step 1** Prepare PV positive and negative power cables.

**Step 2** Insert crimped PV positive and negative power cables into corresponding PV connectors.

**Step 3** Make sure the DC voltage of each PV string is less than 600V DC and polarities of PV power cables are correct. Insert the positive and negative connectors into HYD-ES inverter until you hear a "click" sound, as shown in Fig.4-3③.

Fig.4-3 Connect Battery&PV connectors



Caution

Before removing the PV positive and negative connectors, ensure that the DC SWITCH is OFF.

### 4.3. Inverter logic interface connection

**Step 1:** Loosen 4 screws (A) using a screwdriver (fig. 4-4①);

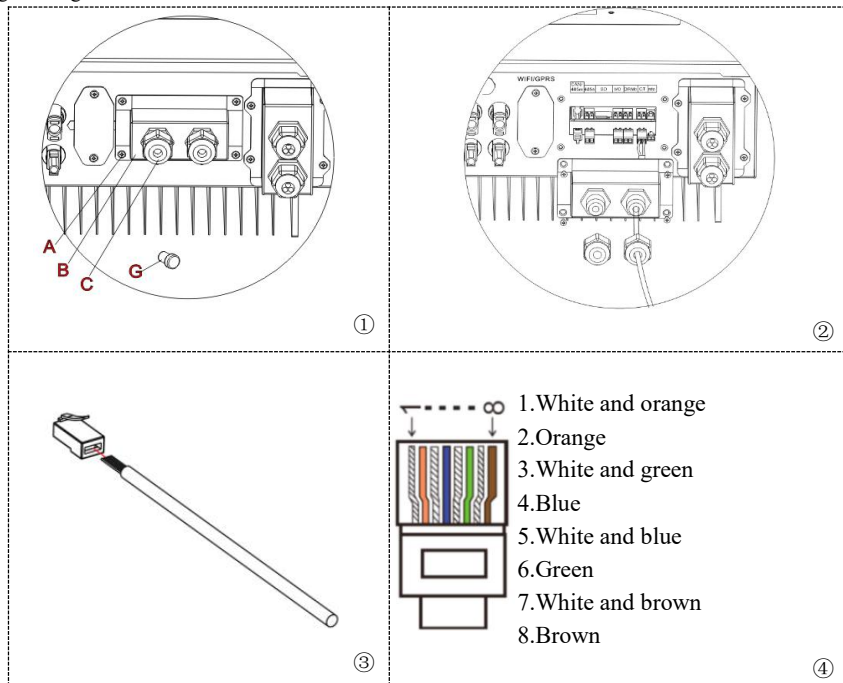
**Step 2:** Remove the waterproof cover (B), Loosen the cable gland (C), and then remove the stopper (G);

**Step 3:** Press the wire terminals in color sequence;

**Step 4:** Route Cable terminal through the cable gland, Insert the communication cable into the RJ45 connector;

**Step 5:** Fasten the waterproof cover using 4 screws.

Fig.4-4 Logic interface



The logic interface pin definitions and circuit connections are as follows:

Logic interface pin are defined according to different standard requirements

(a) Logic interface for AS/NZS 4777.2:2015, also known as inverter demand response modes (DRMs).

The inverter will detect and initiate a response to all supported demand response commands within 2 s. The inverter will continue to respond while the mode remains asserted.

Table 4-2 Function description of the DRMs terminal

| Pin NO. | Color            | Function |
|---------|------------------|----------|
| 1       | White and orange | DRM1/5   |
| 2       | Orange           | DRM2/6   |
| 3       | White and green  | DRM3/7   |
| 4       | Blue             | DRM4/8   |

|   |                 |                          |
|---|-----------------|--------------------------|
| 5 | White and blue  | DRM0                     |
| 6 | Green           | RefGen                   |
| 7 | White and brown | Pin7&Pin8 short internal |
| 8 | Brown           |                          |

(b) Logic interface for VDE-AR-N 4105:2018-11, is in order to control and/or limit the inverter' s output power.

The inverter can be connected to a RRCR (Radio Ripple Control Receiver) in order to dynamically limit the output power of all the inverters in the installation.

Fig.4-5 Inverter – RRCR Connection

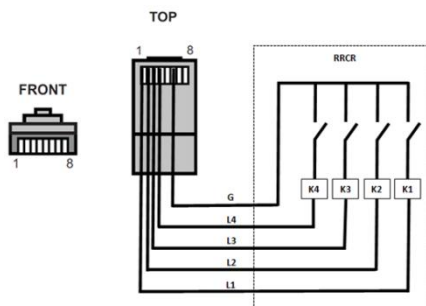


Table 4-3 Function description of the terminal

| Pin NO. | Pin name | Description           | Connected to (RRCR) |
|---------|----------|-----------------------|---------------------|
| 1       | L1       | Relay contact 1 input | K1 - Relay 1 output |
| 2       | L2       | Relay contact 2 input | K2 - Relay 2 output |
| 3       | L3       | Relay contact 3 input | K3 - Relay 3 output |
| 4       | L4       | Relay contact 4 input | K4 - Relay 4 output |
| 5       | NC       | Not Connected         | Not Connected       |
| 6       | G        | GND                   | Relays common node  |
| 7       | NC       | Not Connected         | Not Connected       |
| 8       | NC       | Not Connected         | Not Connected       |

Table 4-4 The inverter is preconfigured to the following RRCR power levels,close is 1, open is 0

| L1 | L2 | L3 | L4 | Active Power | Cos(φ) |
|----|----|----|----|--------------|--------|
| 1  | 0  | 0  | 0  | 0%           | 1      |
| 0  | 1  | 0  | 0  | 30%          | 1      |
| 0  | 0  | 1  | 0  | 60%          | 1      |
| 0  | 0  | 0  | 1  | 100%         | 1      |

(c) Logic interface for EN50549-1:2019, is in order to cease active power output within five seconds following an instruction being received at the input interface.

Fig.4-6 Inverter – RRCR Connection

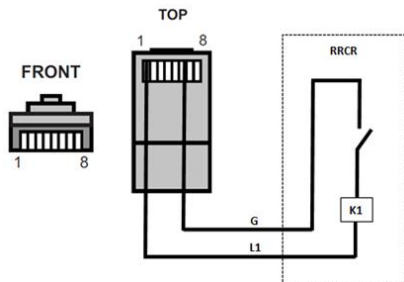


Table 4-5 Function description of the terminal

| Pin NO. | Pin name | Description           | Connected to (RRCR) |
|---------|----------|-----------------------|---------------------|
| 1       | L1       | Relay contact 1 input | K1 - Relay 1 output |
| 2       | NC       | Not Connected         | Not Connected       |
| 3       | NC       | Not Connected         | Not Connected       |
| 4       | NC       | Not Connected         | Not Connected       |
| 5       | NC       | Not Connected         | Not Connected       |
| 6       | G        | GND                   | K1 - Relay 1 output |
| 7       | NC       | Not Connected         | Not Connected       |
| 8       | NC       | Not Connected         | Not Connected       |

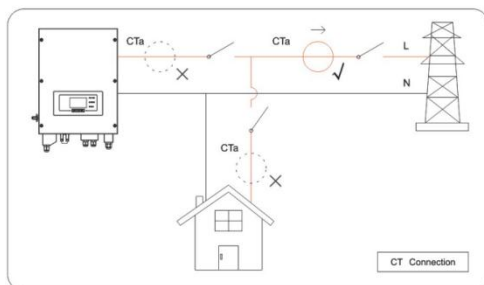
Table 4-6 The inverter is preconfigured to the following RRCR power levels,close is 1, open is 0

| L1 | Active Power | Power drop rate | Cos( $\varphi$ ) |
|----|--------------|-----------------|------------------|
| 1  | 0%           | <5 seconds      | 1                |
| 0  | 100%         | /               | 1                |

## 4.4. CT / CAN / RS485 / NTC connection

CT (Current transformer) can measure the value and direction of AC current. Refer to Fig.4-7 for the correct connection of CTa.

Fig. 4-7 CTa connection

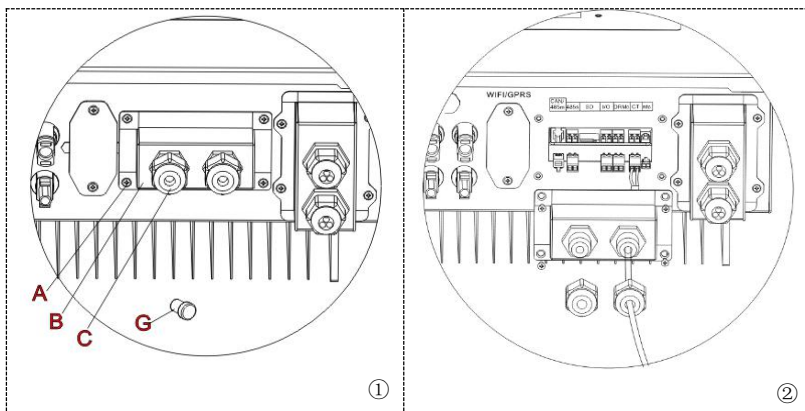


**Step 1:** Refer to Fig. 11 for correct position of CTa. Wrap the CT around L wire of incoming mains, make sure that the CT arrow direction is “home → grid”.

**Step 2:** You can use network cable & terminal caps to extend CT wires if necessary, the maximum CT cable length is 200m.

| CT wire | Extension cable (network cable)             | HYD-ES inverter |
|---------|---------------------------------------------|-----------------|
| Red     | Orange / white orange / brown / white brown | CT+             |
| Black   | Green / white green / blue / white blue     | CT-             |

Fig.4-8 CT / CAN / RS485 / NTC connection



**Step 3:** Loosen 4 screws (part A) using a screwdriver (Fig.4-8①)

**Step 4:** Remove the waterproof cover (part B), loosen the cable gland (part C), then remove the stopper (part G)

**Step 5:** Route CT cable through the cable gland, connect CT cable to CT terminal, then insert CT terminal into corresponding ports.

**Step 6:** One communication cable (between battery BMS & HYD-ES inverter) is provided in the HYD-ES inverter accessory bag. One inverter end, one BAT end.

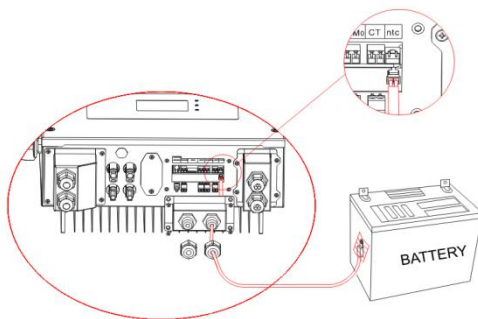
Route the communication cable (inverter end) through the cable gland, insert the 4P4C connector to HYD3000/4000/5000/6000-ES CAN port. Insert the 8P8C connector (BAT end) to PYLONTECH battery CAN port.

| Communication cable between battery & HYD-ES inverter                               |  | CAN communication |                            |
|-------------------------------------------------------------------------------------|--|-------------------|----------------------------|
|  |  | HYD-ES inverter   |                            |
|                                                                                     |  | CAN port          | CANH---pin1<br>CANL---pin2 |
|                                                                                     |  |                   | 485A---pin3<br>485B---pin4 |
|                                                                                     |  | RS485 port        |                            |

|                                                                                   |                                                             |                                            |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------|
|  | <b>PYLONTECH US2000 PLUS /<br/>US3000<br/>AMASS Battery</b> |                                            |
|                                                                                   | CAN Port                                                    | CANH---pin4<br>CANL---pin5                 |
|                                                                                   | RS485 port                                                  | 485A----pin2 & pin7<br>485B----pin1 & pin8 |

**Step 7:** Connect NTC for lead acid batteries only:

Fig. 4-9 NTC connection



**Step 8:** Fasten the waterproof cover using 4 screws.

## 4.5. Grid Connection

Sofarsolar has already integrated RCMU (residual current monitoring unit) inside inverter, If an external RCD is required, a type-A RCD with rated residual current of 100mA or higher is suggested.

**Step 1:** Loosen 4 screws (part A) using a screwdriver (fig. 4-10)

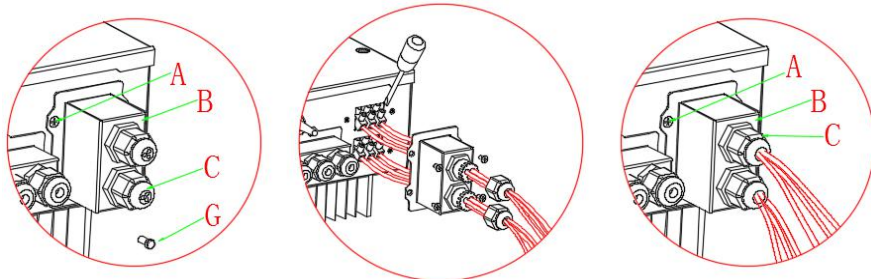
**Step 2:** Remove the waterproof cover (part B), loosen the cable gland (part C), then remove the stopper (part G)

**Step 3:** Route a 3-core cable through GRID cable gland, then connect 3 wires to corresponding terminal blocks. (BROWN – L, BLUE – N, YELLOW/GREEN – PE)

**Step 4:** Fasten the waterproof cover using 4 screws.

Fig.4-10 Grid & Load connection





### Context

All the AC output cables used for the inverters are outdoor three-core cables. To facilitate the installation, use flexible cables. The following table lists the recommended specifications for the Breaker.

| Model   | HYD 3000-ES | HYD 3600-ES | HYD 4000-ES | HYD 4600-ES | HYD 5000-ES | HYD 6000-ES |
|---------|-------------|-------------|-------------|-------------|-------------|-------------|
| Breaker | 25A         | 25A         | 32A         | 32A         | 32A         | 32A         |

## 4.6. Critical Load Connection (EPS function)

Critical load: in case of grid outage, if EPS function is enabled, HYD-ES inverter will work in EPS (Emergency Power Supply) mode, utilize the PV power & energy stored in the battery to supply power to critical load via LOAD connection port.

LOAD connection port is only for critical load connection. The power of critical loads must be less than 3000VA.

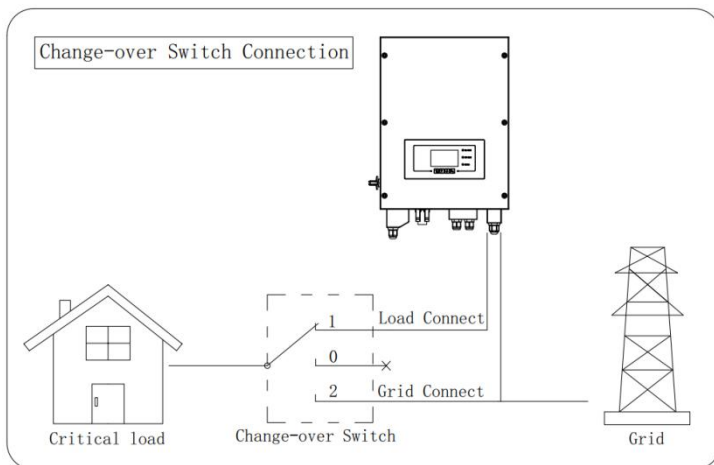
The connection procedure of LOAD port is the same as grid connection (Fig. 18).

### Change-over positions

|                                                                                     |                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>The changeover switch is necessary.</p> <p>While checking/repairing critical load, make sure change-over switch is at position 0.</p> <p>While checking/repairing HYD-ES inverter, make sure change-over switch is at position 0 &amp; HYD-ES inverter is disconnected from grid.</p> |
| <b>Caution</b>                                                                      |                                                                                                                                                                                                                                                                                          |

- ✧ Under normal conditions: change-over switch is at position 1. HYD-ES inverter can supply power to critical load in case of blackout.
- ✧ If the HYD-ES inverter is faulty, manually change the switch to position 2. Grid will supply power to critical load.

Fig. 4-11 Change-over Switch connections



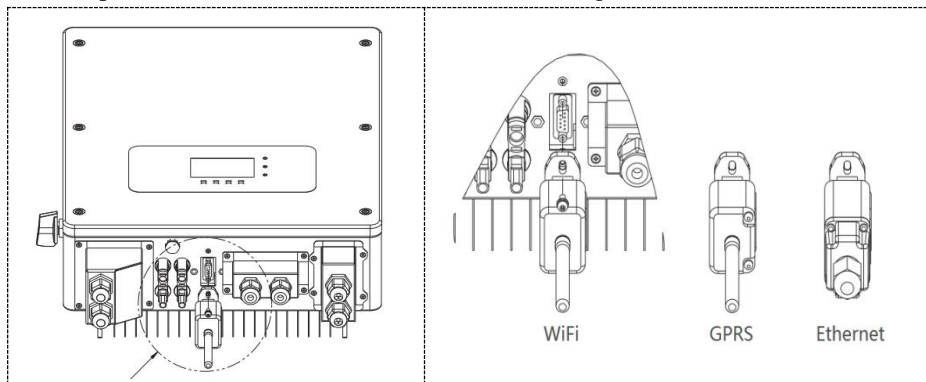
## 4.7. WiFi/GPRS/Ethernet module

**NOTE:**GPRS and Ethernet is optional and is not suitable for all countries .

**Step1:** Remove WiFi/GPRS/Ethernet waterproof cover using screw driver.

**Step2:** Install WiFi/GPRS/Ethernet module.

**Step3:** Fasten WiFi/GPRS/Ethernet module using screws.



The operation information (generated energy, alert, operation status) of the inverter can be transferred to PC or uploaded to the server via WiFi /GPRS/ Ethernet. You can register on the website.

[http://www.solarmanpv.com/portal/Register/Regi\\_Pub.aspx](http://www.solarmanpv.com/portal/Register/Regi_Pub.aspx)

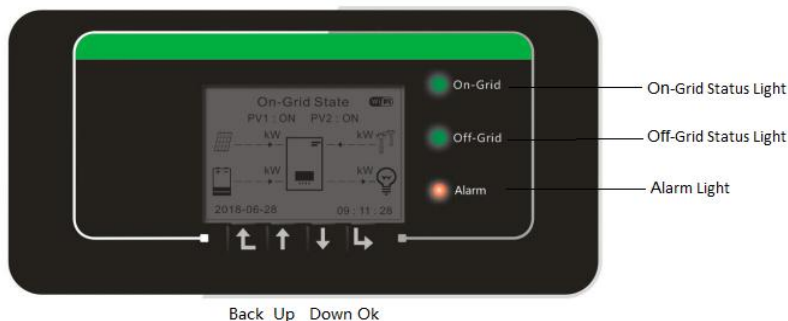
Using the WiFi/GPRS/Ethernet S/N number(NOTE3), then you can login the website: <http://www.solarmanpv.com/portal/LoginPage.aspx> to remote monitors the inverter.

**Note1:**S/N number of the WiFi/GPRS/Ethernet module is located on the side.

**Note2:**Specific use methods of WiFi/GPRS/Ethernet can refer to the operation manual of WiFi/GPRS/Ethernet.

## 5. Buttons and indicator lights

Fig 5-1. Buttons and indicator lights



### 5.1. Buttons

- ✧ Press “back” to the previous screen or enter the main interface.
- ✧ Press “up” to the upper menu option or value plus 1.
- ✧ Press “down” to the lower menu option or value minus 1.
- ✧ Press “ok” to select the current menu option or switch to the next digit.

### 5.2. Indicator lights and status

| Status of HYD inverter | On Grid<br>Green light | Off-Grid<br>Green light | Alarm<br>Red light |
|------------------------|------------------------|-------------------------|--------------------|
| On-grid                | ON                     |                         |                    |
| Standby (On-Grid)      | Flashing               |                         |                    |
| Off-Grid               |                        | ON                      |                    |
| Standby (Off-Grid)     |                        | Flashing                |                    |
| Alarm                  |                        |                         | ON                 |

## 6. Operation

### 6.1. Double Check

Please double check the following before operation.

1. HYD-ES inverter is firmly fastened to the mounting bracket on the wall;
2. PV+/PV- wires are firmly connected, polarity and voltage are correct;
3. BAT+/BAT- wires are firmly connected, polarity and voltage are correct;
4. DC isolator is correctly connected between battery & HYD-ES inverter, DC isolator: OFF;
5. GRID / LOAD cables are firmly / correctly connected;
6. AC circuit breaker is correctly connected between HYD-ES inverter GRID port & GRID, circuit breaker: OFF;
7. AC circuit breaker is correctly connected between HYD-ES inverter LOAD port & critical load, circuit breaker: OFF;
8. For lithium battery, please ensure that the communication cable has been correctly connected;
9. For the lead-acid battery, please ensure that the NTC wire has been correctly connected.

### 6.2. First Time Setup (IMPORTANT!)

IMPORTANT: PLEASE FOLLOW THE FOLLOWING PROCEDURE to switch ON HYD-ES inverter

1. Make sure there's no power generation in HYD-ES inverter's phase.
2. Turn ON DC switch.
3. Switch ON the battery. Turn ON DC isolator between battery & HYD-ES inverter.
4. Turn ON AC circuit breaker between the HYD-ES inverter GRID port & GRID.
5. Turn ON AC circuit breaker between the HYD-ES inverter LOAD port & critical load.
6. HYD-ES inverter should start to operate now.

You need to set the following parameters before HYD-ES inverter starts to

operate.

|                            |                                 |
|----------------------------|---------------------------------|
| 1)Set system time          | 8)*Set min discharge voltage    |
| 2)Set country              | 9)*Set max discharge current    |
| 3)Select battery type      | 10)*Set min protect voltage     |
| 4)*Set battery capacity    | 11)*Set discharge depth         |
| 5)*Set max charge voltage  | 12)*Set empty discharge voltage |
| 6)*Set max charge current  | 13)*Set full charge voltage     |
| 7)*Set max protect voltage |                                 |

Note: 4)\* to 13)\* settings are only for DEFAULT battery type.

1)Set system time

System time format is “20YY-MM-DD-HH-MM-SS” ,press “up” or “down” to change the 1<sup>st</sup> digit, press “ok” to switch to next digit, press “ok” to complete setting. When system time setting is complete, “Set country” will pop up.

2)Set country

Press “up” or “down” to select a country, press “ok” to complete the country setting. When country setting is complete, “Set battery type” will pop up.

| code | country              | code | country          | code | country       |
|------|----------------------|------|------------------|------|---------------|
| 00   | Germany VDE AR-N4105 | 21   | Sweden           | 42   | LV-Range-50HZ |
| 01   | CEI0-21 Internal     | 22   | Europe General   | 43   | EU EN50549    |
| 02   | Australia            | 23   | CEI0-21 External | 44   | South Africa  |
| 03   | Spain RD1699         | 24   | Cyprus           | 45   | AU-WA         |
| 04   | Tuekey               | 25   | India            | 46   | Dubai DEWG    |
| 05   | Denmark              | 26   | Philippines      | 47   | Dubai DEWG MV |
| 06   | Greece Continent     | 27   | New Zealand      | 48   | Taiwan        |
| 07   | Netherland           | 28   | Brazil           | 49   | AU-VIC        |
| 08   | Belgium              | 29   | Slovakia VSD     | 100  | AU- SA        |
| 09   | UK-G99t              | 30   | Slovakia SSE     | 101  | AU-QLD        |
| 10   | China                | 31   | Slovakia ZSD     | 102  | AU-VAR        |
| 11   | France               | 32   | CEI0-21 In Areti | 103  | AUSGRID       |
| 12   | Poland               | 33   | Ukraine          | 104  | Horizon       |
| 13   | Germany BDEW         | 34   | Brazil           |      |               |
| 14   | Germany VDE 0126     | 35   | Mexico           |      |               |
| 15   | Italy CEI0-16        | 36   | FAR Arrete23     |      |               |
| 16   | UK-G98               | 37   | Denmark Tr322    |      |               |
| 17   | Greece island        | 38   | Wide-Range-60    |      |               |

|    |             |    |               |  |  |
|----|-------------|----|---------------|--|--|
|    |             |    | HZ            |  |  |
| 18 | EU EN50438  | 39 | Ireland EN504 |  |  |
| 19 | IEC EN61727 | 40 | Thailand PEA  |  |  |
| 20 | Korea       | 41 | Thailand MEA  |  |  |



### Caution

It's very important to make sure that you have selected the correct country code according to requirements of local authority.

Please consult qualified electrical engineer or personnel from electrical safety authorities about this.

Shenzhen SOFARSOLAR Co., Ltd. is not responsible for any consequences arising out of incorrect country code selection.

### 3) Select battery type

Press “up” or “down” to select your battery type, then press “ok” to complete the battery type setting.

If you're using “1. PYLON”, “2. DARFON”, “4. General Lithium”, “5. Alpha. ESS” or “6. SOLTARO” battery types, congratulations, inverter's first-time setup is complete. Please press “ok” to enter the main interface.

But if you're using “3. DEFAULT” battery type. We need more information regarding your battery.

| MENU               | Compatible Batteries                                                                                                                                           |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.PYLON            | PYLONTECH US2000 PLUS / US2000B/US3000<br>Note: Please confirm with representative of PYLONTECH that your battery is compatible with HYD3000/4000/5000/6000-ES |
| 2. DARFON--NC      | DARFON 14S31P ESS--NC                                                                                                                                          |
| 3.DEFAULT          | LEAD ACID / LEAD CRYSTAL / AQUION battery                                                                                                                      |
| 4. General Lithium | All batteries that comply with SOFAR'S BMS CAN communication protocol.                                                                                         |
| 5. Alpha. ESS      | M48112-P / SMILE-BAT                                                                                                                                           |
| 6. SOLTARO         | SL-3KWH / SL-1KWH                                                                                                                                              |

### 4)\*Set battery capacity (only for DEFAULT battery type)

Press “up” or “down” to change the 1<sup>st</sup> digit, press “ok” to switch to next digit. After changing the battery capacity per your battery specification, press “ok”, then “Set max charge voltage” will pop up.

### 5)\*Set max charge voltage (only for DEFAULT battery type)

Press “up” or “down” to change the 1<sup>st</sup> digit, press “ok” to switch to next digit. After changing max charge voltage per your battery specification, press

“ok” , then “Set max charge current” will pop up.

6)\*Set max charge current (only for DEFAULT battery type)

Press “up” or “down” to change the 1<sup>st</sup> digit, press “ok” to switch to next digit. After changing the max charge current per your battery specification, press “ok” , then “Set max protect voltage” will pop up.

7)\*Set max protect voltage (only for DEFAULT battery type)

Press “up” or “down” to change the 1<sup>st</sup> digit, press “ok” to switch to next digit. After changing the max protect voltage per your battery specification, press “ok” , then “Set min discharge voltage” will pop up.

8)\*Set min discharge voltage (only for DEFAULT battery type)

Press “up” or “down” to change the 1<sup>st</sup> digit, press “ok” to switch to next digit. After changing the min discharge voltage per your battery specification, press “ok” , then “Set max discharge current” will pop up.

9)\*Set max discharge current (only for DEFAULT battery type)

Press “up” or “down” to change the 1<sup>st</sup> digit, press “ok” to switch to next digit. After changing the max discharge current per your battery specification, press “ok” , then “Set min protect voltage” will pop up.

10)\*Set min protect voltage (only for DEFAULT battery type)

Press “up” or “down” to change the 1<sup>st</sup> digit, press “ok” to switch to next digit. After changing the min protect voltage per your battery specification, press “ok” , then “Set discharge depth” will pop up.

11)\*Set discharge depth (only for DEFAULT battery type)

Press “up” or “down” to change the 1<sup>st</sup> digit, press “ok” to switch to next digit. After changing the discharge depth per your battery specification, press “ok” , then “Set empty discharge voltage” will pop up.

12)\*Set empty discharge voltage (only for DEFAULT battery type)

Press “up” or “down” to change the 1<sup>st</sup> digit, press “ok” to switch to next digit. After changing the empty discharge voltage per your battery specification, press “ok” , then “Set full charge voltage” will pop up.

13)\*Set full charge voltage (only for DEFAULT battery type)

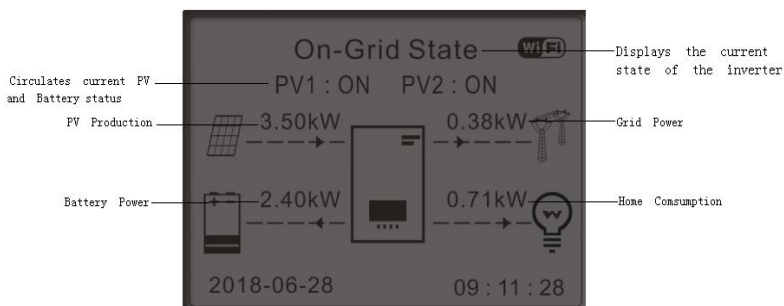
Press “up” or “down” to change the 1<sup>st</sup> digit, press “ok” to switch to next digit. After changing the full charge voltage per your battery specification, press “ok” .



Congratulations, HYD 3K~6K-ES' s first-time setup is complete. Please press “ok” to enter the main interface.

## 6.3. Commissioning

Fig 6-1. Main interface



If you didn' t change the work mode of HYD-ES inverter, which means HYD-ES inverter is working in “Auto Mode” :

While “PV Production” > “Home Consumption”

If the battery is not full. HYD-ES inverter will charge the battery.

While “PV Production” < “Home Consumption”

If the battery is not flat. HYD-ES inverter will discharge the battery.

## 6.4. Menu

In the main interface, press “down” button to enter grid/battery parameters page:

| Main Interface | Press “down”         |
|----------------|----------------------|
|                | 1.Grid(V)            |
|                | 2.AC Current(A)      |
|                | 3.Frequency          |
|                | 4.Batt(V)            |
|                | 5.Batt Chrg Curr.    |
|                | 6.Batt DisChrg Curr. |
|                | 7.State of Charge    |
|                | 8.Batt Cycles        |

### 9.Batt Temp.

In the main interface, press “up” button to enter PV parameters page:

#### Main Interface

Press “up”

1.PV1 Voltage

2.PV1 Current

3.PV1 Power

4.PV2 Voltage

5.PV2 Current

6.PV2 Power

7.Inverter Temp.

In the main interface, press “back” button to enter main menu. The main menu has the following five options:

#### Main Interface

Press “back”

1.Basic Settings

2.Advanced Settings

3.Event List

4.System Information

5.Energy Statistic

6.Software Update

## 6.4.1. Basic settings

#### 1.Basic Settings

Press “ok”

1.Language

2.Time

3.Energy Storage Mode

4.PV Input Mode

5.EPS Mode

6.Communication Addr.

7.Auto Test (Italian)

### 1. Set Language

Select “1. Language”, press “ok”. Press “up” or “down” to select the language and press “ok”.

Easier Way: press “back” & “ok” at the same time to change system

language.

## 2. Set Time

Select “2. Time”, press “ok” to enter time setting interface, system time format is 20YY-MM-DD HH:MM:SS

Press “up” or “down” to change the 1<sup>st</sup> digit, press “ok” to switch to next digit, after inputting the current time, press “ok” .

## 3. Energy Storage Mode

Select “3. Energy Storage Mode”, press “ok” to enter energy storage mode setting interface.

### 3. Energy Storage mode

1. Self-use Mode

2. Time-of-use Mode

3. Timing Mode

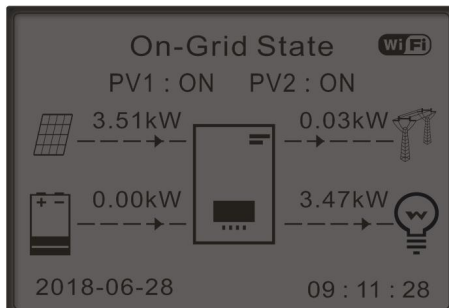
4. Passive Mode

### 1) Set Self-use Mode

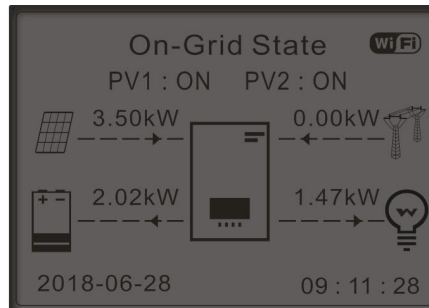
Select “1. Self-use Mode”, then press “ok” .

In Self-use mode, HYD-ES inverter will automatically charge & discharge the battery.

1) If PV generation = LOAD consumption ( $\Delta P < 100W$ ) HYD-ES won't charge or discharge the battery.

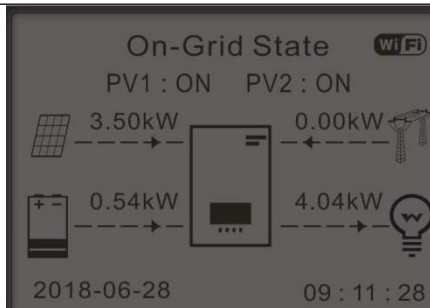
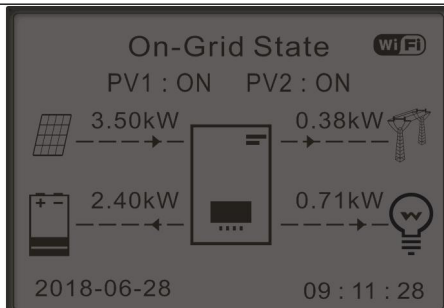


2) If PV generation > LOAD consumption, the surplus power will be stored in the battery.

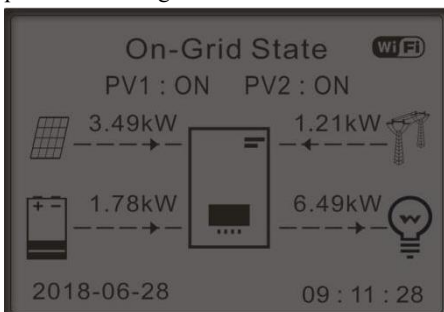


3) If the battery is full(or already at Max Charge Power), excess power will be exported to the grid.

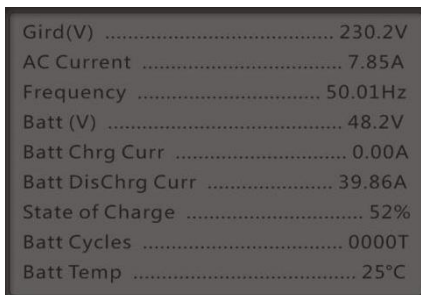
4) If PV generation < LOAD consumption, it will discharge the battery to supply power to load.



5) If PV generation + Battery < LOAD consumption, HYD-ES inverter will import power from the grid.



6) Press “down” button to view current grid/battery parameters, press “up” to get back to main interface.



## 2) Set Time-of-use Mode

Select “2. Time-of-use Mode”, and then press “ok” to enter Set Time-of-use mode interface.

|                      |          |      |      |      |        |      |
|----------------------|----------|------|------|------|--------|------|
| Set Time-of-use Mode |          |      |      |      |        |      |
| Rules. 0: Enabled    |          |      |      |      |        |      |
| From                 | To       |      | SOC  |      | Charge |      |
| 02h00m               | - 04h00m |      | 070% |      | 1000W  |      |
| Effective date       |          |      |      |      |        |      |
| Dec.                 | 22       | -    | Mar. | 21   |        |      |
| Weekday select       |          |      |      |      |        |      |
| Mon.                 | Tue.     | Wed. | Thu. | Fri. | Sat.   | Sun. |

If electricity is more expensive in high demand time (peak rate) & electricity is much cheaper in low demand time (off-peak rate).

You can select an off-peak period to charge your battery. Outside the off-peak charge period, HYD-ES inverter is working in Auto Mode.

If your family normally go to work/school on weekdays & stay at home on weekends, which means the home electricity consumption is much higher on weekends. Thus, you need to store some cheap electricity on weekends only. This is possible using our Time-of-use mode.

In summer, if your PV system can produce more electricity than your home electricity consumption. Then you don't need to set an off-peak charge period to charge your battery in summer at all. You can select an effective date (normally winter) for Time-of-use mode in this case. Outside the effective date, HYD-ES inverter is working in Auto Mode.

You can set multiple Time-of-use rules to meet your more complex requirement. Right now we support 4 rules maximum (rule 0/1/2/3).

### 3) Set Timing Mode

Select “3. Timing Mode”, and then press “ok” to enter Set Timing mode interface. The interface of Set Timing Mode is shown as below. You can select a charge time/power & discharge time/power in this mode.

|               |    |                           |
|---------------|----|---------------------------|
| 3.Timing Mode | ok | Timing Mode               |
|               |    | Rules: 0:Enabled/Disabled |
|               |    | Charge Start 22 h 00 m    |
|               |    | Charge End 05 h 00 m      |
|               |    | Charge Power 02000 W      |
|               |    | DisCharge Start 14 h 00m  |
|               |    | DisCharge End 16 h 00m    |
|               |    | DisCharge Power 02500 W   |

Note: normally this mode is used to test whether HYD-ES inverter can charge & discharge correctly or not. So basically, this mode is used for testing purposes only.

### 4) Set Passive Mode

Select “4. Passive Mode”, and then press “ok” .

For more detailed information, please ask representative of SOFAR to get a copy of passive mode communication protocol.

## 4. PV Input Mode

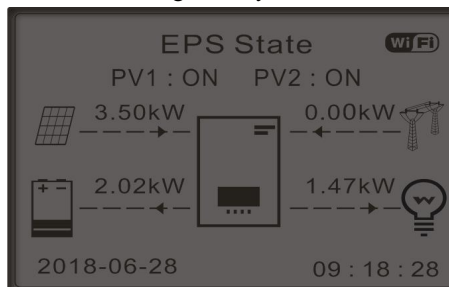
PV input mode selection: HYD-ES inverter has 2 MPPT channels. The 2 MPPT can operate independently, also can operate in parallel. If the PV strings are connected in parallel outside the inverter, you should choose the “in parallel

mode” , otherwise use the default setting (independent mode).

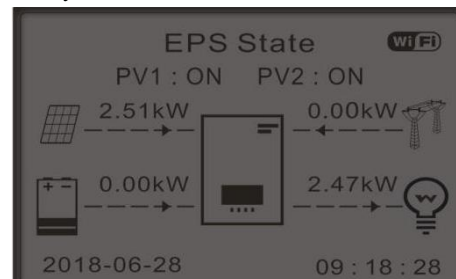
## 5. EPS Mode

|                 |                    |                    |
|-----------------|--------------------|--------------------|
| 5. Set EPS Mode | 1.EPS Mode Control | 1.Enable EPS Mode  |
|                 |                    | 2.Disable EPS Mode |

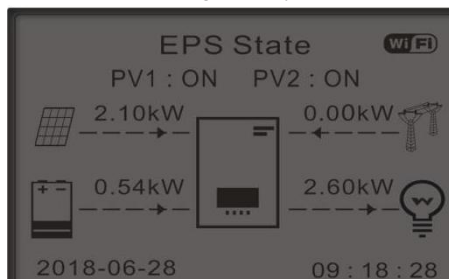
1) If PV generation > LOAD consumption ( $\Delta P > 100W$ ), HYD-ES inverter will charge battery.



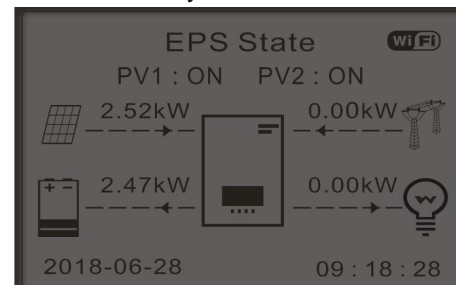
2) If PV generation = LOAD consumption, HYD-ES inverter won't charge or discharge battery.



3) If PV generation < LOAD consumption ( $\Delta P > 100W$ ), HYD-ES inverter will discharge battery.



4) If PV generation is normal, but LOAD consumption=0, the surplus power will be stored in the battery.



## 6. Communication Addr.

Select “6. Set Communication Addr.”, press “ok”. Press “up” or “down” to change the 1st digit, press “ok” to switch to next digit, after changing the 485-communication address (default :01), press “ok” .

## 7. Auto Test (ONLY for Italian Market)

Select “7. Auto Test” , press “ok” to enter autotest interface.

7.Auto Test

1.Autotest Fast

“Up” ↑

- 33 -

“Down”

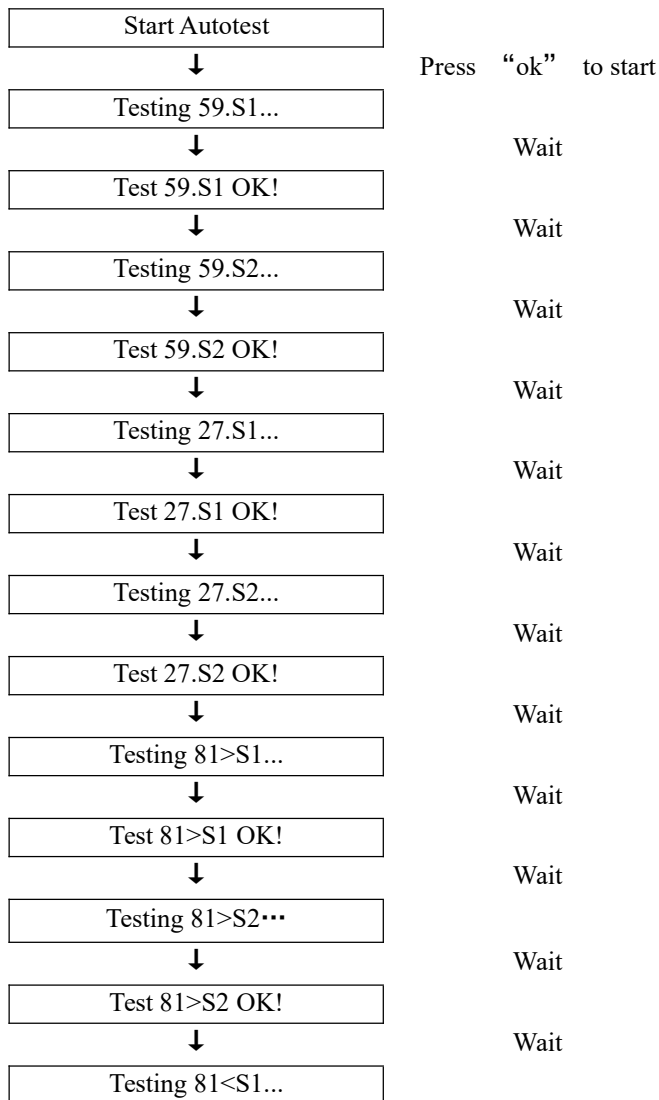
2.Autotest STD

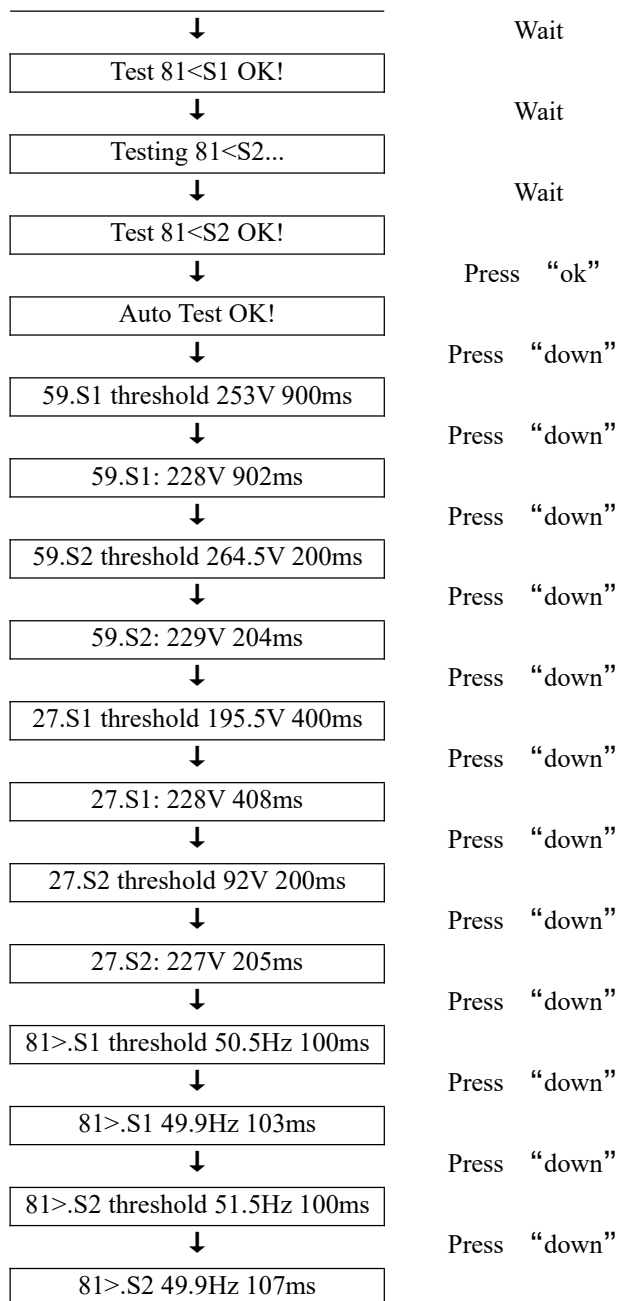
3.QF Time Setting

4.QV Time Setting

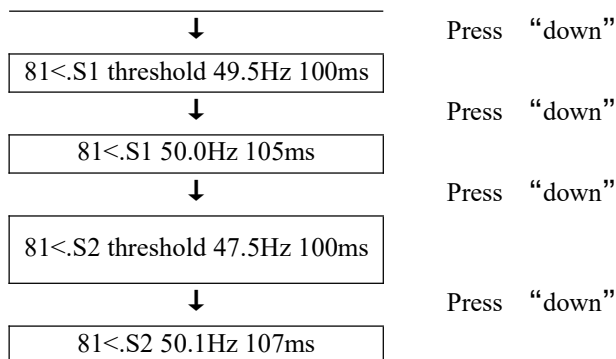
5.Control 81.S1

# 1) Autotest Fast









Select “1. Autotest Fast” , then press “ok” to start Auto test Fast.

## 2) Autotest STD

Select “2. Autotest STD” , then press “ok” to start Auto test STD.

The test procedure is same as Autotest Fast, but it’ s much more time consuming.

## 3) PF Time Setting

Select “3. PF Time Setting” , then press “ok” . The following will be shown on the display:

Set: \*. \*\*\* s

Press “up” or “down” to change the 1st digit, press “ok” to switch to next digit. After changing all digits, press “ok” .

## 4) QV Time Setting

Select “4. QV Time Setting” , then press “ok” . The following will be shown on the display:

Set: \*\* s

Press “up” or “down” to change the 1st digit, press “ok” to switch to next digit. After changing all digits, press “ok” .

## 5) Control 81.S1

Select “5. Control 81.S1” , press “ok” . Press “up” or “down” to select “Enable 81.S1” or “Disable 81.S1” , press “ok” .

# 6.4.2. Advanced setting

## 2.Advanced Setting

**Input Password 0715**

|                          |
|--------------------------|
| 1.Battery Parameter      |
| 2.Clear Energy Data      |
| 3.Clear Events           |
| 4.Country Settings       |
| 5.Anti Reflux            |
| 6.IV Curve Scan          |
| 7.Battery Active         |
| 8.Logic interface        |
| 9.CT Direction           |
| 10.Set Bat Uninterrupted |
| 11.CT Calibration        |
| 12.CT Error Detection    |

Select “2. Advanced Setting” and press “ok”, “input password” is shown. Input the password ” 0715” , press “up” or “down” to change the 1st digit, press “ok” to switch to next digit, when “0715” is shown on the screen, press “ok” to enter “2. Advanced Setting” interface.

If “Incorrect, Try Again!” is shown on the screen, press “back” and input the password again.

## 1. Battery Parameter

|                     |                        |                          |
|---------------------|------------------------|--------------------------|
| 1.Battery Parameter |                        |                          |
|                     | 1)Battery Type         | 7)Max Discharge (A)      |
|                     | 2)*Battery Capacity    | 8)*Low (V) Protection    |
|                     | 3)Discharge Depth      | 9)*Min Discharge (V)     |
|                     | 4)Max Charge (A)       | 10)*Empty Discharged (V) |
|                     | 5)*Over (V) Protection | 11)*Full Charged (V)     |
|                     | 6)*Max Charge (V)      | 12)Save                  |

Note: 2)\*, 5)\*, 6)\*, 8)\*, 9)\*, 10)\* and 11)\* settings are only for DEFAULT battery type.

### 1) Battery Type

Select “1. Battery Type” and press “ok” . Press “up” or “down” to select the battery type. Press “ok” .

### 2) \*Battery Capacity (only for DEFAULT battery type)

Select “2. Battery Capacity” and press “ok”. Press “up” or “down” to change

the 1st digit, press “ok” to switch to next digit. Input the value of battery capacity. Press “ok”.

### 3) Discharge Depth

Select “3. Discharge Depth” and press “ok” to enter discharge depth interface.

|                     |     |
|---------------------|-----|
| Discharge Depth     |     |
|                     | 50% |
| EPS Discharge Depth |     |
|                     | 80% |
| EPS Restore Depth   |     |
|                     | 20% |

Press “up” or “down” to change the 1st digit, press “ok” to switch to next digit. Input the value of Discharge Depth & EPS Discharge Depth per battery specification. Press “ok” .

For example: if Discharge Depth = 50% & EPS Discharge Depth = 80%.

While grid is connected: HYD-ES inverter won’t discharge the battery when its SOC is less than 50%.

In case of blackout: HYD-ES inverter will work in EPS mode (if EPS mode is enabled) & keep discharging the battery till battery SOC is less than 20%.

### 4) Max. Charge (A)

Select “4. Max. Charge (A)” and press “ok” . Press “up” or “down” to change the 1st digit, press “ok” to switch to next digit. Input the value of Max. Charge (A) per battery specification. Press “ok” .

### 5) \*Over (V) Protection (only for DEFAULT battery type)

Select “5. Over (V) Protection” and press “ok. Press “up” or “down” to change the 1st digit, press “ok” to switch to next digit. Input the value of Over (V) Protection per battery specification. Press “ok” .

### 6) \*Max. Charge (V) (only for DEFAULT battery type)

Select “6. Max. Charge (V)” and press “ok” . Press “up” or “down” to change the 1st digit, press “ok” to switch to next digit. Input the value of Max. Charge (V) per battery specification. Press “ok” .

### 7) Max. Discharge (A)

Select “7. Max. Discharge (A)” and press “ok” . Press “up” or “down” to change the 1st digit, press “ok” to switch to next digit. Input the value of Max.

Discharge (A) per battery specification. Press “ok” .

8) \*Low (V) Protection (only for DEFAULT battery type)

Select “8. Low (V) Protection” and press “ok” . Press “up” or “down” to change the 1st digit, press “ok” to switch to next digit. Input the value of Low (V) Protection per battery specification. Press “ok” .

9) \*Min. Discharge (V) (only for DEFAULT battery type)

Select “9. Min. Discharge (V)” and press “ok” . Press “up” or “down” to change the 1st digit, press “ok” to switch to next digit. Input the value of Min. Discharge (V) per battery specification. Press “ok” .

10) \* Empty Discharged (V) (only for DEFAULT battery type)

Select “10. Empty Discharged (V)” and press “ok” . Press “up” or “down” to change the 1st digit, press “ok” to switch to next digit. Input the value of Empty Discharged Voltage per battery specification. Press “ok” .

11) \* Full Charged (V) (only for DEFAULT battery type)

Select “11. Full Charged (V)” and press “ok” . Press “up” or “down” to change the 1st digit, press “ok” to switch to next digit. Input the value of Full Charged Voltage per battery specification. Press “ok” .

12) Save

Select “12. Save” and press “ok” to complete setting battery parameters.

## 2. Clear Energy Data

Select “2. Clear Energy” and press “ok” , “input password” is shown. Input the password “0001” , press “up” or “down” to change the 1st digit, press “ok” to switch to next digit, when “0001” is shown on the screen, press “ok” . If “Incorrect, Try Again!” is shown on the screen, press “back” and input the password again.

## 3. Clear Events

Select “3. Clear Events” , press “ok” button twice to clear all the events.

## 4. Country (refer to Set country)

Select “4. Country” , press “ok” , current country setting is shown, input new country code & press “ok”

## 5. Anti Reflux

### 5.Anti Reflux Control

|                       |         |
|-----------------------|---------|
| 1.Anti Reflux Control |         |
|                       | Enable  |
|                       | Disable |
| 2.Reflux Power        |         |
|                       | ***KW   |

The user can enable “Anti Reflux Control” to limit the max export power to grid.

Select “2. Reflux Power” to input desired max export power to grid.

## 6. IV Curve Scan

|                 |         |
|-----------------|---------|
| 6.IV Curve Scan |         |
| 1.Scan Control  |         |
|                 | Enable  |
|                 | Disable |
| 2.Scan Period   |         |
|                 | ***min  |
| 3.Force Scan    |         |

The user can enable “IV Curve Scan” (MPPT scan) to make HYD-ES inverter to find the global max power point periodically to deliver max power from a partially shaded PV array.

The user can input scan period or make HYD-ES inverter to perform a scan right away.

## 7. Battery Active

|                       |         |
|-----------------------|---------|
| 7.Battery Active      |         |
| 1.Auto Active Control | Enable  |
|                       | Disable |
| 2.Force Active        |         |

HYD-ES inverter can activate flat batteries when needed.

The user can enable “Auto Active Control” to allow HYD-ES inverter to activate flat batteries automatically. Or make HYD-ES inverter to activate the battery right away.

## 8. Logic interface control

Select “8. Logic interface Control”, press “ok”, press “up” or “down” to select “Enable Logic interface” or “Disable Logic interface”, press “ok”.

## 9. CT Direction

Select “9.CT Direction”,press“ok” input the interface.

In this interface,press“up”or“down”to select FREEZE or UNFREEZE.If you select FREEZE,CT directiong will be freezed.When you restart the inverter,CT direction will stay the same.If you select UNFREEZE,CT directiong won’t be freezed.When you restart the inverter,CT direction will to be recalibrated again.

## 10. Set Bat Uninterrupted

It is used for and off - grid quick switching situation, keeps the load power supply uninterrupted in EPS mode. The use condition is in the spontaneous and self-use mode, enabling EPS mode, connecting the battery and load, unloading the load after grid connection, waiting for one minute or longer time, immediately cut off the power grid when the load is connected, can maintain the load power supply uninterrupted.

## 11. CT Calibration

Its function is to calibrate grid-connected power.

Select“11.CT Calibrate”,press“ok” input the actual power minus the difference of LCD display grid-connected power.

## 12. CT Error Detection

Select“12.CT Error Detection”,press“ok” input the “CT Error Detection” enable interface.You can choose to enable or disable the feature.Default to disable.

After enabling the detection function, the machine will report an error after disconnecting CT for about 1 second. When the machine is connected to the network (where the CT is) and the PCC power is close to 0kW, no false positives can be generated. When this function is disabled, no error can be reported even if the CT is disconnected.

## 6.4.3. Event List

|              |                      |
|--------------|----------------------|
| 3.Event List |                      |
|              | 1.Current Event List |
|              | 2.History Event List |

Event list of HYD-ES inverter, including current event list and history event list.

### 1) Current Event List

Select “1. Current Event List”, press “ok” to check the current events.

### 2) History Event List

Select “2. History Event List”, press “ok” to check the historical events. Press

“up” or “down” to check all historical events if there’re more than 1 page of events.

## 6.4.4. System information interface

|                      |  |                   |                       |
|----------------------|--|-------------------|-----------------------|
| 4.System Information |  |                   |                       |
| 1.Inverter Info      |  |                   |                       |
|                      |  | Inverter Info (1) | Product SN            |
|                      |  |                   | Software Version      |
|                      |  |                   | Hardware Version      |
|                      |  |                   | Power Level           |
|                      |  | Inverter Info(2)  | Country               |
|                      |  |                   | PV Input Mode         |
|                      |  |                   | Energy Storage Mode   |
|                      |  | Inverter Info (3) | RS485 Address         |
|                      |  |                   | EPS Mode              |
|                      |  |                   | IV Curve Scan         |
|                      |  |                   | Anti Reflux           |
|                      |  | Inverter Info (4) | Logic interface       |
|                      |  |                   | PF Time Setting       |
|                      |  |                   | QV Time Setting       |
|                      |  |                   | Power Factor          |
|                      |  | Inverter Info (5) | Battery Active        |
|                      |  |                   | CT Direction          |
|                      |  |                   | Insulation resistance |
| 2.Battery Info       |  |                   |                       |
|                      |  | Battery info (1)  | Battery Type          |
|                      |  |                   | Battery Capacity      |
|                      |  |                   | Discharge Depth       |
|                      |  |                   | Max Charge (A)        |
|                      |  | Battery Info (2)  | Over (V) Protection   |
|                      |  |                   | Max Charge (V)        |
|                      |  |                   | Max Discharge (A)     |
|                      |  |                   | Min Discharge (V)     |

|                 |                  |                   |
|-----------------|------------------|-------------------|
|                 | Battery Info (3) | EPS Safety Buffer |
| 3.Safety Param. |                  |                   |
|                 | Safety Param.(1) | OVP 1             |
|                 |                  | OVP 2             |
|                 |                  | UVP 1             |
|                 |                  | UVP 2             |
|                 | Safety Param.(2) | OFP 1             |
|                 |                  | OFP 2             |
|                 |                  | UFP 1             |
|                 |                  | UFP 2             |
|                 | Safety Param.(3) | OVP 10mins        |

## 6.4.5. Energy Statistic

### 5.Energy Statistic

| Today     |        |
|-----------|--------|
| PV        | ***KWH |
| Load      | ***KWH |
| Export    | ***KWH |
| Import    | ***KWH |
| Charge    | ***KWH |
| Discharge | ***KWH |
| Week      |        |
| PV        | ***KWH |
| Load      | ***KWH |
| Export    | ***KWH |
| Import    | ***KWH |
| Charge    | ***KWH |
| Discharge | ***KWH |
| Month     |        |
| PV        | ***KWH |
| Load      | ***KWH |
| Export    | ***KWH |
| Import    | ***KWH |



|           |        |
|-----------|--------|
| Charge    | ***KWH |
| Discharge | ***KWH |
| Year      |        |
| PV        | ***KWH |
| Load      | ***KWH |
| Export    | ***KWH |
| Import    | ***KWH |
| Charge    | ***KWH |
| Discharge | ***KWH |
| Lifetime  |        |
| PV        | ***KWH |
| Load      | ***KWH |
| Export    | ***KWH |
| Import    | ***KWH |
| Charge    | ***KWH |
| Discharge | ***KWH |

Select “5. Energy Statistic”, press “ok” to enter Energy Statistic interface, it shows the energy generation and consumption within a certain range of time. Press “up” or “down” to check the daily / weekly / monthly / yearly / lifetime energy statistics.

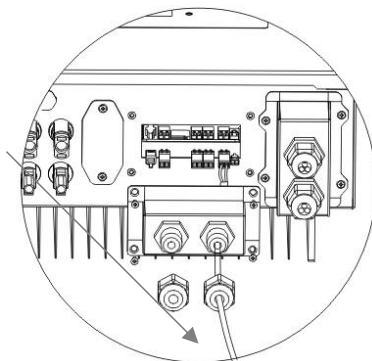
## 6.4.6. Software upgrade

Copy the firmware folder to the root directory of SD card.

Select “6. Software Update”, press “ok”, “input password” is shown. Input the password (“0715”), press “up” or “down” to change the 1st digit, press “ok” to switch to next digit, when “0715” is shown on the screen, press “ok”. HYD-ES inverter will start to upgrade the software automatically.

### Detailed Firmware Upgrade Procedure:

**Step 1** Turn OFF AC circuit breaker (grid & load), then turn OFF DC isolator (battery) and PV switch, then remove communication waterproof cover. If communication cables (CAN/RS485/NTC/CT) have been connected, loosen their cable glands before removing cover.



SD card

**Step 2** Press the SD card and take it out. Insert the SD card into a micro-SD card reader, then insert micro-SD card reader into a PC; (NOTE: micro-SD card reader & PC are not provided by SOFARSOLAR).

**Step 3** Format the SD card. Copy the “firmware” folder to the SD card.

**Step 4** Insert the SD card back to the SD card slot.

**Step 5** Turn ON AC circuit breaker (grid), press “back” to enter main menu. Press “down” to select “6. Software Update”, then press “ok”.

**Step 6** “Input password” is shown. Input the password (“0715”), press “up” or “down” to change the 1<sup>st</sup> digit, press “ok” to switch to next digit, when “0715” is shown on the screen, press “ok” to start firmware update.

**Step 7** After finishing firmware upgrade, turn OFF AC circuit breaker (grid), lock the communication waterproof cover with four screws, then turn ON AC circuit breaker (grid), turn ON DC isolator (battery), turn on PV switch, HYD-ES inverter will start to operate automatically.

NOTE: If “DSP communicate fail”, “Update DSP1 Fail” or “Update DSP2 Fail” is shown on the screen, which means the firmware upgrade is unsuccessful, please turn OFF AC circuit breaker (grid), wait 5 minutes, then start again from “Step 5”

## 7. Troubleshooting

This section contains information and procedures for solving possible problems with the inverter.

➤ This section help users to identify the inverter fault. Please read the following procedures carefully:

✧ Check the warning, fault messages or fault codes shown on the inverter screen, record all the fault information.

✧ If there is no fault information shown on the screen, check whether the following requirements are met:

- Is the inverter mounted in a clean, dry place with good ventilation?
- Is the DC switch turned ON?
- Are the cables adequately sized and short enough?
- Are the input and output connections and wiring in good condition?
- Are the configuration settings correct for the particular installation?
- Are the display panel and the communication cables properly connected and undamaged?

➤ Follow the steps below to view recorded problems: Press "back" to enter the main menu in the normal interface. In the interface screen select "Event List", then press "ok" to enter events.

➤ Earth Fault Alarm

This inverter complies with IEC 62109-2 clause 13.9 for earth fault alarm monitoring.

If an Earth Fault Alarm occurs, the fault will be displayed on the LCD screen, the red light will be on, and the fault can be found in the history of the fault. For the machine installed with WiFi/GPRS, the alarm information can be seen on the corresponding monitoring website, and can also be received by the APP on the mobile phone.

➤ EventList information

Table 7-1 Eventlist

| Code | Name    | Description                    | Solution                                                                                                                                                     |
|------|---------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID01 | GridOVP | The grid voltage is too high   | If the alarm occurs occasionally, the possible cause is that the electric grid is abnormal occasionally. HYD-ES inverter will automatically return to normal |
| ID02 | GridUVP | The grid voltage is too low    |                                                                                                                                                              |
| ID03 | GridOFP | The grid frequency is too high |                                                                                                                                                              |
| ID04 | GridUFP | The grid frequency is too low  |                                                                                                                                                              |

|      |                 |                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------|-----------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |                 |                                                                     | <p>operating status when the electric grid's back to normal.</p> <p>If the alarm occurs frequently, check whether the grid voltage/frequency is within the acceptable range. If yes, please check the AC circuit breaker and AC wiring of the HYD-ES inverter.</p> <p>If the grid voltage/frequency is NOT within the acceptable range and AC wiring is correct, but the alarm occurs repeatedly, contact SOFAR technical support to change the grid over-voltage, under-voltage, over-frequency, under-frequency protection points after obtaining approval from the local electrical grid operator.</p> |
| ID05 | BatOVP          | The battery voltage is too high                                     | <p>If the alarm occurs occasionally, wait a while to see if the problem is solved.</p> <p>If the alarm occurs frequently, check whether the battery overvoltage setting is inconsistent with the battery specification.</p>                                                                                                                                                                                                                                                                                                                                                                               |
| ID06 | OVRT fault      | OVRT function is faulty                                             | Check whether the grid voltage fluctuates greatly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| ID07 | LVRT fault      | LVRT function is faulty                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| ID08 | PVOVP           | The PV voltage is too high                                          | Check whether too many PV modules are series connected in a PV string, thus the PV string voltage (Voc) is higher than the maximum input voltage of HYD-ES inverter. If yes, adjust the number of series connected PV modules to decrease the PV string voltage to fit the input voltage range of HYD-ES inverter. HYD-ES inverter will automatically return to normal status after correcting adjustments                                                                                                                                                                                                |
| ID09 | HW_LLCC Bus_OVP | LLC Bus voltage is too high and has triggered hardware protection   | <p>ID09- ID12 are internal faults of HYD-ES inverter, switch OFF HYD-ES inverter, wait for 5 minutes, then switch ON HYD-ES inverter. Check whether the problem is solved.</p> <p>If no, please contact SOFAR technical support.</p>                                                                                                                                                                                                                                                                                                                                                                      |
| ID10 | HW_Boost_OVP    | Boost voltage is too high and has triggered hardware protection     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| ID11 | HwBuckBoostOCP  | BuckBoost current is too high and has triggered hardware protection |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| ID12 | HwBatOC         | The battery current is too high                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

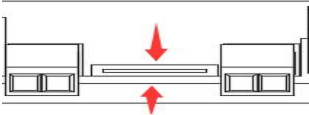
|      |                                 |                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------|---------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | P                               | and has triggered hardware protection                                          |                                                                                                                                                                                                                                                                                                                                                                                                                     |
| ID13 | GFCI OCP                        | The GFCI sampling value between the master DSP and slave DSP is not consistent | If the fault occurs occasionally, the possible cause is that the external circuits are abnormal occasionally. HYD-ES inverter automatically returns to normal operating status after the fault is rectified.<br>If the fault occurs frequently and lasts a long time, check whether the insulation resistance between the PV array and earth(ground) is too low, also check the insulation conditions of PV cables. |
| ID14 | HWPVOC P                        | The PV current is too high and has triggered hardware protection               | ID14-ID15 are internal faults of HYD-ES inverter, switch OFF HYD-ES inverter, wait for 5 minutes, then switch ON HYD-ES inverter. Check whether the problem is solved.<br>If no, please contact SOFAR technical support.                                                                                                                                                                                            |
| ID15 | HwAcOCP                         | The grid current is too high and has triggered hardware protection             |                                                                                                                                                                                                                                                                                                                                                                                                                     |
| ID16 | IpvUnbalance                    | Input current is not balanced                                                  | Check the <a href="#">PV input mode</a> (parallel mode/ independent mode) setting of HYD-ES inverter. If it's incorrect, change the <a href="#">PV input mode</a> .                                                                                                                                                                                                                                                 |
| ID17 | HwADFaultGrid                   | The grid current sampling error                                                | ID17-ID26 are internal faults of HYD-ES inverter, switch OFF HYD-ES inverter, wait for 5 minutes, then switch ON HYD-ES inverter. Check whether the problem is solved.<br>If no, please contact SOFAR technical support.                                                                                                                                                                                            |
| ID18 | HwADFaultDCI                    | The DCI sampling error                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                     |
| ID19 | HwADFaultVGrid                  | The grid voltage sampling error                                                |                                                                                                                                                                                                                                                                                                                                                                                                                     |
| ID20 | GFCI Device Fault               | The GFCI sampling error                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                     |
| ID21 | MChip_Fault                     | The master chip fault                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                     |
| ID22 | HwAuxPowerFault                 | The auxiliary voltage error                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                     |
| ID25 | LLC Bus Over Voltage Protection | LLC Bus voltage is too high                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                     |
| ID26 | Sw Bus Over Voltage Protection  | Bus voltage is too high and has triggered software protection                  |                                                                                                                                                                                                                                                                                                                                                                                                                     |
| ID27 | BatOCP                          | Battery current is too high                                                    | If the fault occurs frequently, please contact SOFAR technical support.                                                                                                                                                                                                                                                                                                                                             |
| ID28 | DciOCP                          | The DCI is too high                                                            | ID28-ID31 are internal faults of HYD-ES                                                                                                                                                                                                                                                                                                                                                                             |

|      |                        |                                                                                          |                                                                                                                                                                                                                                                                                                                                                           |
|------|------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID29 | SwOCPIstant            | The grid current is too high                                                             | inverter, switch OFF HYD-ES inverter, wait for 5 minutes, then switch ON HYD-ES inverter. Check whether the problem is solved.<br>If no, please contact SOFAR technical support.                                                                                                                                                                          |
| ID30 | BuckOCP                | Buck current is too high                                                                 |                                                                                                                                                                                                                                                                                                                                                           |
| ID31 | AcRmsOCP               | The output current is too high                                                           |                                                                                                                                                                                                                                                                                                                                                           |
| ID32 | SwBOCPInstant          | The input current is too high                                                            | Check whether the input current is higher than the maximum input current of HYD-ES inverter, then check the input wiring, if both are correct, please contact technical support.                                                                                                                                                                          |
| ID33 | PvConfigSetWrong       | Incorrect input mode                                                                     | Check the <a href="#">PV input mode</a> (parallel mode/independent mode) setting of HYD-ES inverter. If it's incorrect, change the <a href="#">PV input mode</a> .                                                                                                                                                                                        |
| ID34 | Overload               | The load is overloaded                                                                   | Check if the load power is out of range, and if so, adjust the power to the correct range.                                                                                                                                                                                                                                                                |
| ID35 | CT Fault               | The CT is fault                                                                          | Check whether the CT connection is firm and the installation direction is correct.                                                                                                                                                                                                                                                                        |
| ID48 | Consistent Fault       | The GFCI sampling value between the master DSP and slave DSP is not consistent           | ID48-ID51 are internal faults of HYD-ES inverter, switch OFF HYD-ES inverter, wait for 5 minutes, then switch ON HYD-ES inverter. Check whether the problem is solved.<br>If no, please contact SOFAR technical support.                                                                                                                                  |
| ID49 | Consistent Fault_Vgrid | The grid voltage sampling value between the master DSP and slave DSP is not consistent   |                                                                                                                                                                                                                                                                                                                                                           |
| ID50 | Consistent Fault_Fgrid | The grid frequency sampling value between the master DSP and slave DSP is not consistent |                                                                                                                                                                                                                                                                                                                                                           |
| ID51 | Consistent Fault_DCI   | The DCI sampling value between the master DSP and slave DSP is not consistent            |                                                                                                                                                                                                                                                                                                                                                           |
| ID52 | BatCommunication Flag  | HYD-ES inverter can't communicate with Lithium battery BMS correctly.                    | Make sure the battery you're using is compatible with HYD-ES inverter. Make sure you've selected the correct battery type. Check the communication cable between battery & HYD-ES inverter. It's recommended to use CAN communication.<br>For PYLONTECH US2000 PLUS battery, and you're using RS485 communication, the ADD DIP switch should be all down. |
| ID53 | SpiComm                | SPI communication is fault                                                               | ID53-ID55 are internal faults of HYD-ES                                                                                                                                                                                                                                                                                                                   |

|      |                            |                                                                         |                                                                                                                                                                                                                                                                                                               |
|------|----------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | Lose                       |                                                                         | inverter, switch OFF HYD-ES inverter, wait for 5 minutes, then switch ON HYD-ES inverter. Check whether the problem is solved.<br>If no, please contact SOFAR technical support.                                                                                                                              |
| ID54 | SciComm Lose               | SCI communication is fault                                              |                                                                                                                                                                                                                                                                                                               |
| ID55 | RecoverRelayFail           | The relays fault                                                        |                                                                                                                                                                                                                                                                                                               |
| ID56 | PvIsoFault                 | The insulation resistance is too low                                    | Check the insulation resistance between the PV array and earth(ground), if a short circuit occurs, rectify the fault.                                                                                                                                                                                         |
| ID57 | OverTemp Fault_BAT         | The battery temp is too high                                            | Please make sure HYD-ES inverter is installed in a place without direct sunlight.<br>Please make sure HYD-ES inverter is installed in a cool / well-ventilated place.<br>Make sure the inverter is vertically installed & the ambient temperature is less than the temperature upper limit of HYD-ES inverter |
| ID58 | OverTemp Fault_HeatSink    | The temperature of heat sink is too high                                |                                                                                                                                                                                                                                                                                                               |
| ID59 | OverTemp Fault_Env         | The environment temperature is too high                                 |                                                                                                                                                                                                                                                                                                               |
| ID60 | PE connectFault            | Grounding not correct                                                   | Check the grounding of AC output PE wire.                                                                                                                                                                                                                                                                     |
| ID65 | unrecoverHwAcOCP           | The grid current is too high and has cause unrecoverable hardware fault | ID65-ID67 are internal faults of HYD-ES inverter, switch OFF HYD-ES inverter, wait for 5 minutes, then switch ON HYD-ES inverter. Check whether the problem is solved.<br>If no, please contact SOFAR technical support.                                                                                      |
| ID66 | unrecoverBusOVP            | The bus voltage is too high and has cause unrecoverable fault           |                                                                                                                                                                                                                                                                                                               |
| ID67 | BitEPSunrecoverBatOcP      | Unrecoverable fault of battery overcurrent in EPS mode                  |                                                                                                                                                                                                                                                                                                               |
| ID68 | UnrecoverIppvUnbalance     | The input current is unbalance, and has triggered unrecoverable fault   | Check the <a href="#">PV input mode</a> (parallel mode/ independent mode) setting of HYD-ES inverter. If it's incorrect, change the <a href="#">PV input mode</a> .                                                                                                                                           |
| ID70 | UnrecoverOCPIstant         | The grid current is too high, and has cause unrecoverable fault         | Internal faults of HYD-ES inverter, switch OFF HYD-ES inverter, wait for 5 minutes, then switch ON HYD-ES inverter. Check whether the problem is solved.<br>If no, please contact SOFAR technical support.                                                                                                    |
| ID73 | UnrecoverIPVConfigSetWrong | Input mode is incorrectly set                                           | Check the <a href="#">PV input mode</a> (parallel mode/ independent mode) setting of HYD-ES inverter. If it's incorrect, change the <a href="#">PV input mode</a> .                                                                                                                                           |
| ID74 | Unrecover                  | Input current is too high this                                          | Internal faults of HYD-ES inverter, switch                                                                                                                                                                                                                                                                    |

|      |                                      |                                                                        |                                                                                                                                                                                                                                                                                                                |
|------|--------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | PvInatant                            | caused unrecoverable hardware fault                                    | OFF HYD-ES inverter, wait for 5 minutes, then switch ON HYD-ES inverter. Check whether the problem is solved.<br>If no, please contact SOFAR technical support.                                                                                                                                                |
| ID75 | Unrecover WRITE EEPROM               | Unrecoverable EEPROM write                                             | ID75-ID77 are internal faults of HYD-ES inverter, switch OFF HYD-ES inverter, wait for 5 minutes, then switch ON HYD-ES inverter. Check whether the problem is solved.<br>If no, please contact SOFAR technical support.                                                                                       |
| ID76 | Unrecover REDEEPROM                  | Unrecoverable EEPROM read                                              |                                                                                                                                                                                                                                                                                                                |
| ID77 | Unrecover RelayFail                  | Relay has triggered permanent fault                                    |                                                                                                                                                                                                                                                                                                                |
| ID81 | Over TempDerating                    | Internal temperature is too high.                                      | Please make sure HYD-ES inverter is installed in a place without direct sunlight. Please make sure HYD-ES inverter is installed in a cool / well-ventilated place. Make sure the inverter is vertically installed & the ambient temperature is less than the temperature upper limit of HYD-ES inverter.       |
| ID82 | Over FreqDerating                    | AC frequency is too high                                               | Please make sure the grid frequency is within the acceptable range.                                                                                                                                                                                                                                            |
| ID83 | RemoteDerating                       | Remote power derate                                                    | HYD-ES inverter receives a remote signal to decrease its power.                                                                                                                                                                                                                                                |
| ID84 | Remote Off                           | Switch OFF HYD series inverter remotely                                | HYD-ES inverter receives a remote signal to switch OFF.                                                                                                                                                                                                                                                        |
| ID85 | SOC <= 1-DOD or Battery undervoltage | Battery voltage below SOC                                              | For example, if you set DOD to 30%, when SOC is less than 70%, you will see ID85 in the event list. HYD-ES inverter won't discharge the battery when ID85 is present. Or this is an indication of low battery voltage. HYD-ES inverter won't discharge battery in this case to ensure long battery cycle life. |
| ID86 | Force charge failure                 | Force charge failure                                                   | Check whether PV and grid conditions meet charging conditions.                                                                                                                                                                                                                                                 |
| ID94 | Software version is not consistent   | Software version between control board and com board is not consistent | Contact SOFAR technical support to upgrade software.                                                                                                                                                                                                                                                           |



|       |                                  |                                                    |                                                                                                                                                                                                                                                                                   |
|-------|----------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID95  | Communication board EEPROM Fault | The Communication board EEPROM is faulty           | ID95-ID96 are internal faults of HYD-ES inverter, switch OFF HYD-ES inverter, wait for 5 minutes, then switch ON HYD-ES inverter. Check whether the problem is solved.<br>If no, please contact SOFAR technical support.                                                          |
| ID96  | RTC clock chip anomaly           | RTC clock chip is faulty                           |                                                                                                                                                                                                                                                                                   |
| ID98  | SDfault                          | The SD card is faulty                              | <p>Normally ID98 is caused by loose SD card holder. Click &amp; take out SD card, press SD card holder then insert SD card back can normally solve this problem.</p> <p><b>485s SD DRMO</b></p>  |
| ID99  | Wifi fault                       | The Wifi is error                                  | Just for alarm in factory.                                                                                                                                                                                                                                                        |
| ID100 | BatOCD                           | Battery over current discharging protect           | ID100-ID103 is battery fault. If this fault occurs occasionally, wait a few minutes to see whether the problem is solved.<br>If this fault occurs frequently, please contact SOFAR technical support.                                                                             |
| ID101 | BatSCD                           | Discharging short circuit protect                  |                                                                                                                                                                                                                                                                                   |
| ID102 | BatOVP                           | Battery Overvoltage protect                        |                                                                                                                                                                                                                                                                                   |
| ID103 | BatUV                            | Battery low voltage protect                        |                                                                                                                                                                                                                                                                                   |
| ID104 | BatOTD                           | Battery high temperature protect while discharging | Make sure battery is in a well-ventilated place.                                                                                                                                                                                                                                  |
| ID105 | BatOTC                           | Battery high temperature protect while charging    | Try to decrease the max discharge (A) or/and max charge (A) to see if the problem is solved.                                                                                                                                                                                      |
| ID106 | BatUTD                           | Battery low temperature protect while discharging  | Try to increase the ambient temperature of the battery.                                                                                                                                                                                                                           |
| ID107 | BatUTC                           | Battery low temperature protect while charging     |                                                                                                                                                                                                                                                                                   |

## Maintenance

Inverters generally do not need any daily or routine maintenance. Heat sink should not be blocked by dust, dirt or any other items. Before the cleaning, make sure that the DC SWITCH is turned OFF and the circuit breaker between inverter and electrical grid is turned OFF. Wait at least for 5 minutes before the Cleaning.

### ✧ Inverter cleaning

Please clean the inverter with an air blower, a dry & soft cloth or a soft bristle brush. Do NOT clean the inverter with water, corrosive chemicals, detergent, etc.

### ✧ **Heat sink cleaning**

For the long-term proper operation of inverters, ensure there is enough space around the heat sink for ventilation, check the heat sink for blockage (dust, snow, etc.) and clean them if they exist. Please clean the heat sink with an air blower, a dry & soft cloth or a soft bristle brush. Do NOT clean the heat sink with water, corrosive chemicals, detergent, etc.

## 8. Technical Data

| Model                          | HYD<br>3000-ES                                                                  | HYD<br>3600-ES      | HYD<br>4000-ES      | *HYD<br>4600-ES     | HYD<br>5000-ES      | HYD<br>6000-ES      |
|--------------------------------|---------------------------------------------------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Battery Parameters             |                                                                                 |                     |                     |                     |                     |                     |
| Battery Type                   | Lead-acid, Lithium-ion                                                          |                     |                     |                     |                     |                     |
| Nominal battery voltage        | 48V                                                                             |                     |                     |                     |                     |                     |
| Battery voltage range          | 42 - 58V                                                                        |                     |                     |                     |                     |                     |
| Min discharge voltage          | Lithium:(according to BMS), General                                             |                     |                     |                     |                     | 46.0V               |
|                                | Lead acid: 44.0V                                                                |                     |                     |                     |                     |                     |
| Max charge voltage             | Lithium-ion:(according to BMS), Max                                             |                     |                     |                     |                     | 58V                 |
|                                | Lead acid: 58V                                                                  |                     |                     |                     |                     |                     |
| Battery capacity               | 50-2000Ah                                                                       |                     |                     |                     |                     |                     |
| Recommended storage capacity   | 9.6 kWh                                                                         |                     |                     |                     |                     |                     |
| Max charge current             | 65A                                                                             |                     |                     |                     |                     |                     |
| Charge current range           | 0 - 65A programmable                                                            |                     |                     |                     |                     |                     |
| Charge curve                   | 3 - stage adaptive with maintenance                                             |                     |                     |                     |                     |                     |
| Max discharge current          | 70A programmable                                                                |                     |                     |                     |                     |                     |
| Battery protection             | Over voltage protection / Over current protection / Over temperature protection |                     |                     |                     |                     |                     |
| Depth of discharge             | Lithium: 0 - 90% DOD adjustable                                                 |                     |                     |                     |                     |                     |
|                                | Lead acid: 0 - 50% DOD adjustable                                               |                     |                     |                     |                     |                     |
| PV parameters                  |                                                                                 |                     |                     |                     |                     |                     |
| Recommended Max.PV input power | 3990Wp                                                                          | 4790Wp              | 5320Wp              | 6120Wp              | 6650Wp              | 7980Wp              |
| Max DC input power             | 3500W                                                                           | 4000W               | 4400W               | 5000W               | 5500W               | 6600W               |
| Max DC power for single MPPT   | 2000W<br>(160-520V)                                                             | 2400W<br>(180-520V) | 2600W<br>(200-520V) | 2800W<br>(230-520V) | 3000W<br>(250-520V) | 3500W<br>(300-520V) |
| The max DC input voltage       | 600V                                                                            |                     |                     |                     |                     |                     |
| Start-up DC voltage            | 120V                                                                            |                     |                     |                     |                     |                     |

|                                  |                                                                                                                                                                                                                                                                                                                |          |          |          |          |          |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|----------|----------|
| Nominal DC Voltage               | 360V                                                                                                                                                                                                                                                                                                           |          |          |          |          |          |
| MPPT operating voltage range     | 90-580V                                                                                                                                                                                                                                                                                                        |          |          |          |          |          |
| Full load DC voltage range       | 160-520V                                                                                                                                                                                                                                                                                                       | 180-520V | 200-520V | 230-520V | 250-520V | 300-520V |
| MPPT number                      | 2                                                                                                                                                                                                                                                                                                              |          |          |          |          |          |
| The max DC input current         | 12A/12A                                                                                                                                                                                                                                                                                                        |          |          |          |          |          |
| The max DC input short current   | 15A/15A                                                                                                                                                                                                                                                                                                        |          |          |          |          |          |
| AC parameters                    |                                                                                                                                                                                                                                                                                                                |          |          |          |          |          |
| Max output power                 | 3000W                                                                                                                                                                                                                                                                                                          | 3680W    | 4000W    | 4600W    | 5000W    | 6000W    |
| Max output current               | 13.7A                                                                                                                                                                                                                                                                                                          | 16A      | 18.2A    | 21.0A    | 22.8A    | 27.3A    |
| Nominal grid voltage & frequency | 220V, 230V, 240V,<br>44 - 55Hz or 54 - 66Hz                                                                                                                                                                                                                                                                    |          |          |          |          |          |
| AC voltage range                 | 180 - 276V (according to local authority requirements)                                                                                                                                                                                                                                                         |          |          |          |          |          |
| THD                              | <3%                                                                                                                                                                                                                                                                                                            |          |          |          |          |          |
| Power factor                     | 1default (+ / - 0.8 adjustable)                                                                                                                                                                                                                                                                                |          |          |          |          |          |
| Inrush current                   | 0.8A / 1us                                                                                                                                                                                                                                                                                                     |          |          |          |          |          |
| Max output fault current         | 100A / 1us                                                                                                                                                                                                                                                                                                     |          |          |          |          |          |
| System parameters                |                                                                                                                                                                                                                                                                                                                |          |          |          |          |          |
| Max efficiency                   | Charge: 94.6% / discharge 94.6%                                                                                                                                                                                                                                                                                |          |          |          |          |          |
| Standby losses                   | < 10W (PV SPS)                                                                                                                                                                                                                                                                                                 |          |          |          |          |          |
| Topology                         | High frequency isolation(for bat)                                                                                                                                                                                                                                                                              |          |          |          |          |          |
| Ingress protection ratings       | IP 65                                                                                                                                                                                                                                                                                                          |          |          |          |          |          |
| Safety protection                | Anti-islanding, RCMU, ground fault monitoring                                                                                                                                                                                                                                                                  |          |          |          |          |          |
| Communication                    | Wi-Fi/GPRS/Ethernet(optional), RS485, SD,CAN2.0                                                                                                                                                                                                                                                                |          |          |          |          |          |
| Certification                    | EN 61000-6-2, EN 61000-6-3, EN 61000-3-2, EN 61000-3-3, EN 61000-3-11, EN 61000-3-12<br>IEC62109-1/2, IEC62040-1, IEC62116, IEC61727, IEC-61683,<br>IEC60068(1,2,14,30)<br>AS/NZS 4777, VDE V 0124-100, V 0126-1-1, VDE-AR-N 4105, CEI 0-21,<br>EN50438/EN50549, G83/G59/G98/G99, UTE C15-712-1, UNE 206 007-1 |          |          |          |          |          |

| Environmental data                |                                      |
|-----------------------------------|--------------------------------------|
| Ambient temperature range         | -25°C to +60°C(Derating above +45°C) |
| Relative humidity range           | 0% - 100% (no condensing)            |
| Protective class                  | Class I                              |
| Max operating altitude            | 2000m                                |
| Current transformer connection    | Hard wired                           |
| General data                      |                                      |
| Noise                             | <25dB                                |
| Weight                            | 20.5kg                               |
| Cooling                           | Natural convection                   |
| Dimensions (W*H*D)                | 566 x 394 x 173 mm                   |
| Display                           | LCD display                          |
| Warranty                          | 5 years or more                      |
| EPS (Emergency Power Supply) data |                                      |
| EPS rated power                   | 3000VA                               |
| EPS nominal voltage/frequency     | 230V, 50/60Hz                        |
| EPS rated current                 | 13.2A                                |
| THD                               | <3%                                  |
| Switch time                       | 10mS default                         |

**The models marked with “\*” should be available only for some designated countries.**

## 9. *Quality Assurance*

### **Standard warranty period**

The standard warranty period of inverter is 60 months (5 years). There are two calculation methods for the warranty period:

1. Purchase invoice provided by the customer: the first flight provides a standard warranty period of 60 months (5 years) from the invoice date;
2. The customer fails to provide the invoice: from the production date (according to the SN number of the machine), Our company provides a warranty period of 63 months (5.25 years).
3. In case of any special warranty agreement, the purchase agreement shall prevail.

### **Extended warranty period**

Within 12 months of the purchase of the inverter (based on the purchase invoice) or within 24 months of the production of the inverter(SN number of machine, based on the first date of arrival),Customers can apply to buy extended warranty products from the company's sales team by providing the product serial number, Our company may refuse to do not conform to the time limit extended warranty purchase application. Customers can buy an extended warranty of 5, 10, 15 years.

If the customer wants to apply for the extended warranty service, please contact the sales team of our company. to purchase the products that are beyond the purchase period of extended warranty but have not yet passed the standard quality warranty period. Customers shall bear different extended premium.

During the extended warranty period, pv components GPRS, WIFI and lightning protection devices are not included in the extended warranty period. If they fail during the extended warranty period, customers need to purchase and replace them from our company.

Once the extended warranty service is purchased, our company will issue the extended warranty card to the customer to confirm the extended warranty period.

### **Invalid warranty clause**

Equipment failure caused by the following reasons is not covered by the warranty:

- 1) The "warranty card" has not been sent to the distributor or our company;

- 2) Without the consent of our company to change equipment or replace parts;
- 3) Use unqualified materials to support our company's products, resulting in product failure;
- 4) Technicians of non-company modify or attempt to repair and erase the product serial number or silk screen;
- 5) Incorrect installation, debugging and use methods;
- 6) Failure to comply with safety regulations (certification standards, etc.);
- 7) Damage caused by improper storage by dealers or end users;
- 8) Transportation damage (including scratches caused by internal packaging during transportation). Please claim directly from the transportation company or insurance company as soon as possible and obtain damage identification such as container/package unloading;
- 9) Failure to follow the product user manual, installation manual and maintenance guidelines;
- 10) Improper use or misuse of the device;
- 11) Poor ventilation of the device;
- 12) The product maintenance process does not follow relevant standards;
- 13) Failure or damage caused by natural disasters or other force majeure (such as earthquake, lightning strike, aware fire, etc.)

### **Statement**

If you have purchased this product in Australia, you should be aware that this warranty is provided in addition to other rights and remedies held by a consumer at law.

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.



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