User Manual

SAJ Single-phase Hybrid Solar Inverter

H1 Series

www.saj-electric.com

Content

Chapter 1 Safety Precautions

1.1 Scope of Application

This User Manual describes instructions and detailed procedures for installing, operating, maintaining, and troubleshooting of the following SAJ hybrid solar inverters:

H1-3K-S2-15, H1-3.6K-S2-15, H1-4K-S2-15, H1-4.6K-S2-15, H1-5K-S2-15, H1-6K-S2-15-IE, H1-6K-S2-15

Please read the user manual carefully before any installation, operation and maintenance and follow the instruction during installation and operation. Please keep this manual all time available in case of emergency.

1.2 Safety Instructions

DANGER
· DANGER indicates a hazardous situation, which, if not avoided, will result in death or serious injury.

WARNING
· WARNING indicates a hazardous situation, which, if not avoided, can result in death or serious injury or moderate injury.

CAUTION
· CAUTION indicates a hazardous condition, which, if not avoided, can result in minor or moderate injury.

NOTICE
· NOTICE indicates a situation that can result in potential damage, if not avoided.

1.3 Target Group

Only qualified electricians who have read and fully understood all safety regulations contained in this manual can install, maintain and repair the inverter. Operators must be aware of the high-voltage device.

Chapter 2 Preparation

2.1 Intended Use

The product is not suitable for supplying power to life-support medical equipment.

Loads connected to the product must have a CE identification label.

The maximum DC input voltage of the product must not be exceeded. Turn off DC switch before any installation and operation.

2.2 Safety Instructions

DANGER
· There is possibility of dying due to electrical shock and high voltage. · Do not touch the operating component of the inverter; it might result in burning or death. · To prevent risk of electric shock during installation and maintenance, please make sure that all AC and DC terminals are plugged out. · Do not touch the surface of the inverter while the housing is wet, otherwise, it might cause electrical shock. · Do not stay close to the inverter while there are severe weather conditions including storm, lighting, etc. · Before opening the housing, the SAJ inverter must be disconnected from the grid and PV generator; you must wait for at least five minutes to let the energy storage capacitors completely discharged after disconnecting from power source.

WARNING

·The installation, service, recycling and disposal of the inverters must be performed by qualified personnel only in compliance with national and local standards and regulations.
·Any unauthorized actions including modification of product functionality of any form may cause lethal hazard to the operator, third parties, the units or their property. SAJ is not responsible for the loss and these warranty claims.
·The SAJ inverter must only be operated with PV generator. Do not connect any other source of energy to the SAJ inverter.
·Be sure that the PV generator and inverter are well grounded in order to protect properties and persons.

CAUTION

·The inverter will become hot during operation. Please do not touch the heat sink or peripheral surface during or shortly after operation.
·Risk of damage due to improper modifications.

NOTICE

·Public utility only.
·The inverter is designed to feed AC power directly to the public utility power grid; do not connect AC output of the inverter to any private AC equipment.

2.3 Explanations of Symbols

Symbol	Description
	**Dangerous electrical voltage** This device is directly connected to public grid, thus all work to the inverter shall only be carried out by qualified personnel.
	**Danger to life due to high electrical voltage!** There might be residual currents in inverter because of large capacitors. Wait 5 MINUTES before you remove the front lid.
	**Notice, danger!** This is directly connected with electricity generators and public grid.
	**Danger of hot surface** The components inside the inverter will release a lot of heat during operation. Do not touch metal plate housing during operating.
	**An error has occurred** Please go to Chapter 9 “Troubleshooting” to remedy the error.
	**This device SHALL NOT be disposed of in residential waste** Please go to Chapter 8 “Recycling and Disposal” for proper treatments.
	**CE Mark** With CE mark & the inverter fulfills the basic requirements of the Guideline Governing Low-Voltage and Electro-magnetic Compatibility.
	**RCM Mark** Equipment meets safety and other requirements as required by electrical safety laws/regulations in Australian and New Zealand.

Chapter 3 Product Information

3.1 Application Scope of Products

H1 series products are hybrid solar inverters without transformers, and the inverters are important components of energy storage systems.

The H1 inverters converts the DC generated by solar panels into AC which is in accordance with the requirements of public grid and send the AC into the grid, reduce the load pressure of the grid.

When the grid failure, provide AC source to supply important loads, achieve uninterrupted power supply function.

3.2 Overview and Dimensions of Products

The dimensions of H1 series products are shown in Figure 3.1.

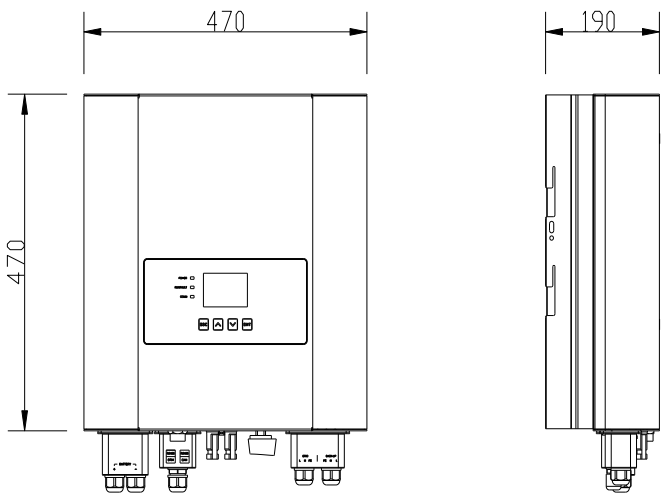


Figure 3.1 Dimensions of H1 series Product

3.3 Datasheet

MODEL	H1-3K-S2-15	H1-3.6K-S2-15	H1-4K-S2-15	H1-4.6K-S2-15
Input(DC)				
Max.PV Array Power[Wp]@STC	4500	5400	6000	6900
Max. DC Voltage [V]	600			
MPPT Voltage Range [V]	90～550			
Nominal DC Voltage[V]	360			
Start Voltage [V]	120			
Min. DC Voltage [V]	80			
Max. DC Input Current[A]	15 /15			
Max. DC Short Circuit Current[A]	18 / 18			
Number of MPPT	2			
DC Switch	Integrated			
Battery Data				
Battery Type	Lithium battery			
Battery Input Voltage /Range of Voltage [V]	51.2 / 42～58.4			
Max./Rated Charge Current [A]	60/60			100 / 100
Charging Mode Control	3-stages			
Grid Data [On grid Mode]				
Rated Output Power[W]	3000	3680	4000	4600
Max. Output Power [VA]	3000	3680	4000	4600
Rated Output Current [A]	13.1	16.0	17.4	20.0
Max. Output Current [A]	13.6	16.7	18.2	20.9
Rated Grid voltage /Range [V]	220V, 230V, 240V / 180V～280V			
Rated Grid Frequency / Range [Hz]	50 / 60 ± 5			
Power Factor [cos φ]	0.9 leading~0.9 lagging			
Total Harmonic Distortion [THDi]	<3%			
Feed-in	L+N+PE			
AC Output Data [Back-up Mode]				

Max. Output Power [VA]	3000	4600
Output Voltage [V]	220/230/240	
Output Frequency [Hz]	50/60	
Total Harmonic Distortion of Voltage	<3%	
Peak Output Apparent Power [VA]	3600, 10sec	5500, 10sec
Efficiency		
Max. Efficiency	97.6%	
Euro Efficiency	97.0%	
Max. Battery to Load Efficiency	94.6%	
Protection		
AC Short Circuit Protection	Integrated	
Overload Protection	Integrated	
DC Overvoltage/ Undervoltage	Integrated	
AC Overvoltage/ Undervoltage	Integrated	
AC Overfrequency/ Underfrequency	Integrated	
Over Thermal Protection	Integrated	
Anti-islanding protection	Integrated	
Peak-to-trough Period Setting	Integrated	
Interface		
PV Connection Type	MC4	
Battery Connection Type	Terminal Block	
AC Connection Type	Terminal Block	
Display	LCD	
Communication port	RS485*2& RS232&DRM*2（Integrated）	
Communication Mode	Wi-Fi/GPRS/Ethernet(Optional)	
General Data		
Topology	Transformerless	
Ingress Protection	IP65	
Operating Temperature	-25～+60℃ [45～60℃ with derating]	

Range	
Ambient Humidity	0～100% No Condensing
Altitude	4000m(>3000m power derating)
Noise[dBA]	<29
Cooling method	Natural Convection
Dimensions[H*W*D][mm]	470*470*190
Weight[kg]	23
Standard Warranty[year]	5
Applicable Standard	IEC62109-1/2,IEC61000-6-1/2/3/4,EN50438,EN50549,C10/11,IEC62116,IEC61727,RD1699,UNE 206006,UNE 206007,CEI 0-21,AS4777.2, CQC NB/T 32004,VDE-AR-N 4105

MODEL	H1-5K-S2-15*	H1-6K-S2-15-IE	H1-6K-S2-15
Input(DC)			
Max.PV Array Power[Wp]@STC	7500	9000	9000
Max. DC Voltage [V]	600		
MPPT Voltage Range [V]	90～550		
Nominal DC Voltage[V]	360		
Start Voltage [V]	120		
Min. DC Voltage [V]	80		
Max. DC Input Current[A]	15 /15		
Max. DC Short Circuit Current[A]	18 / 18		
Number of MPPT	2		
DC Switch	Integrated		
Battery Data			
Battery Type	Lithium battery		
Battery Input Voltage /Range of Voltage [V]	51.2/ 42～58.4		
Max./Rated Charge Current [A]	100 / 100		
Charging Mode Control	3-stages		
Grid Data [On grid Mode]			
Rated Output Power[W]	5000	5500	6000
Max. Output Power [VA]	5000	5500	6000
Rated Output Current [A]	21.7	25	26.1
Max. Output Current [A]	22.7	25	27.3
Rated Grid voltage /Range [V]	220V, 230V, 240V / 180V～280V		
Rated Grid Frequency / Range [Hz]	50 / 60 ± 5		
Power Factor [cos φ]	0.9 leading~0.9 lagging		
Total Harmonic Distortion [THDi]	<3%		
Feed-in	L+N+PE		

AC Output Data [Back-up Mode]			
Max. Output Power [VA]	5000	5000	5000
Output Voltage [V]	220/230/240		
Output Frequency [Hz]	50/60		
Total Harmonic Distortion of Voltage	<3%		
Peak Output Apparent Power [VA]	6000, 10sec	6000, 10sec	6000, 10sec
Efficiency			
Max. Efficiency	97.6%		
Euro Efficiency	97.0%		
Max. Battery to Load Efficiency	94.6%		
Protection			
AC Short Circuit Protection	Integrated		
Overload Protection	Integrated		
DC Overvoltage/ Undervoltage	Integrated		
AC Overvoltage/ Undervoltage	Integrated		
AC Overfrequency/ Underfrequency	Integrated		
Over Thermal Protection	Integrated		
Anti-islanding protection	Integrated		
Peak-to-trough Period Setting	Integrated		
Interface			
PV Connection Type	MC4		
Battery Connection Type	Terminal Block		
AC Connection Type	Terminal Block		
Display	LCD		
Communication port	RS485*2& RS232&DRM*2（Integrated）		
Communication Mode	Wi-Fi/GPRS/Ethernet(Optional)		
General Data			
Topology	Transformerless		

Ingress Protection	IP65
Operating Temperature Range	-25～+60℃ [45～60℃ with derating]
Ambient Humidity	0～100% No Condensing
Altitude	4000m(>3000m power derating)
Noise[dBA]	<29
Cooling method	Natural Convection
Dimensions[H*W*D][mm]	470*470*190
Weight[kg]	23
Standard Warranty[year]	5
Applicable Standard	IEC62109-1/2,IEC61000-6-1/2/3/4,EN50438,EN50549,C10/11,IEC62116,IEC61727,RD1699,UNE 206006,UNE 206007,CEI 0-21,AS4777.2, CQC NB/T 32004,VDE-AR-N 4105

Note: * Power 4600W/4600VA for VDE-AR-N4105, 5000W/5000VA for other countries.
Current 20.9Aac for VDE-AR-N 4105, 22.7Aac for other countries.
20.9Aac/4600W/4600VA for VDE-AR-N4105 bypass mode.
22.7Aac/5000W/5000VA for other countries or VDE-AR-N4105 stand-alone mode.

Chapter 4 Instructions for Installation

4.1 Safety Instructions

DANGER
· Dangerous to life due to potential fire or electricity shock. · Do not install the inverter near any inflammable or explosive items. · This inverter will be directly connected with HIGH VOLTAGE power generation device; the installation must be performed by qualified personnel only in compliance with national and local standards and regulations.

NOTICE
· This equipment meets the pollution degree II. · Inappropriate or the harmonized installation environment may jeopardize the life span of the inverter. · Installation directly exposed under intensive sunlight is not recommended. · The installation site must be well ventilated.

4.2 Pre-installation Check

4.2.1 Check the Package

Although SAJ's inverters have surpassed stringent testing and are checked before they leave the factory, it is uncertain that the inverters may suffer damages during transportation. Please check the package for any obvious signs of damage, and if such evidence is present, do not open the package and contact your dealer as soon as possible

4.2.2 Check the Assembly Parts

Please refer to the Packing List inside the package container.

4.3 The Determination of the Installation Method and Position

4.3.1 Mounting Method

The equipment employs natural convection cooling, and it can be installed indoor or outdoor.

Do not expose the inverter to direct solar irradiation as this could cause power derating due to overheating.

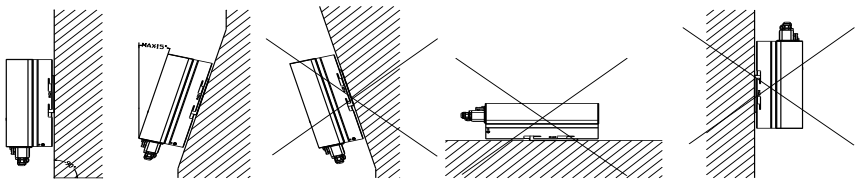


Figure 4.1 Mounting Method

(2) Mount vertically or tilted backwards by max. 15°. Never install the inverter tilted forwards, sideways, horizontally or upside down.

(3) Install the inverter at eye level for convenience when checking the LCD display and possible maintenance activities.

(4) When mounting the inverter, please consider the solidness of wall for inverter, including accessories. Please ensure the Rear Panel mount tightly.

To make sure the installation spot is suitably ventilated, if multiple SAJ hybrid solar inverters are installed same area.

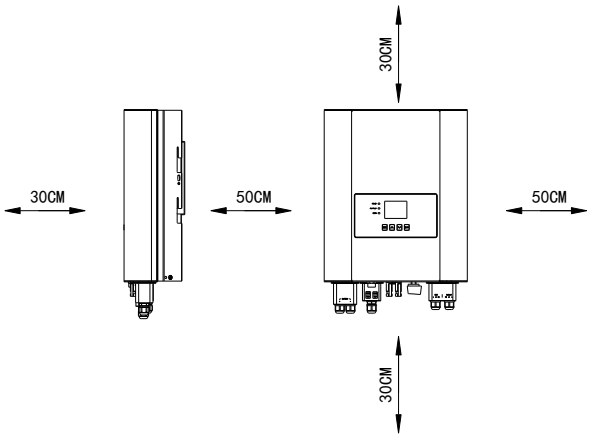


Figure 4.2 Minimum Clearance

4.4 Mounting Procedure

4.4.1 Mark the Positions of the Drill Holes of the Rear Panel

The mounting position should be marked as shown in Figure 4.3.

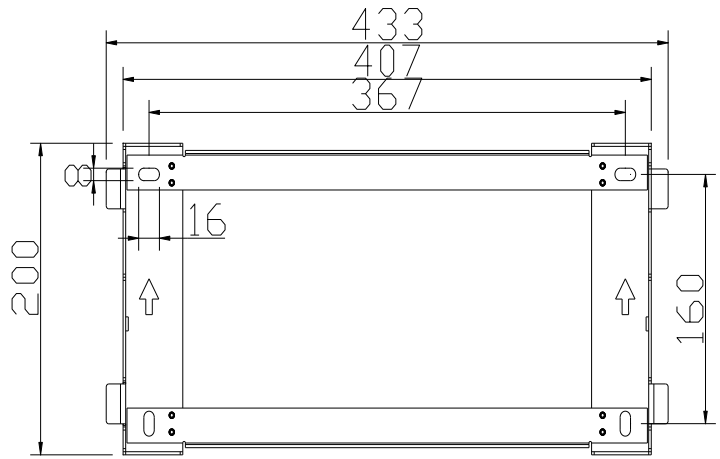


Figure 4.3 Dimensions of rear panel of H1 inverter

4.4.2 Drill Holes and Place the Expansion Tubes

Following the given guides, drill 4 holes in the wall (in conformity with position marked in Figure 4.4, and then place expansion tubes in the holes using a rubber mallet.

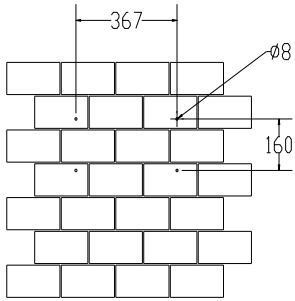


Figure 4.4 Drill holes dimensions of H1 inverter

4.4.3 Mount the Screws and the Rear Panel

The panels should be mounted in the mounting position by screws as shown in Figure 4.5.

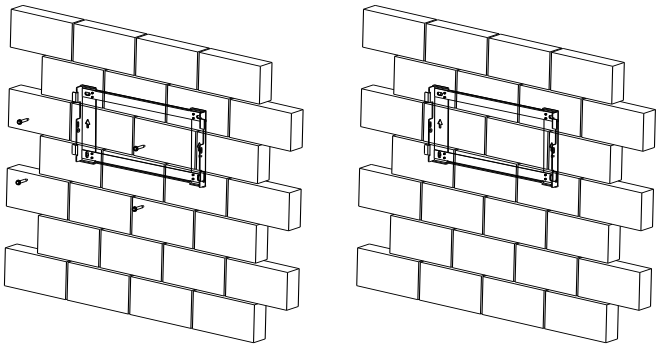


Figure 4.5 Mount the Rear Panel of H1 inverter

4.4.4 Mount the Inverter

Carefully mount the inverter to the rear panel as shown in Figure 4.6. Make sure that the rear part of the equipment is closely mounted to the rear panel.

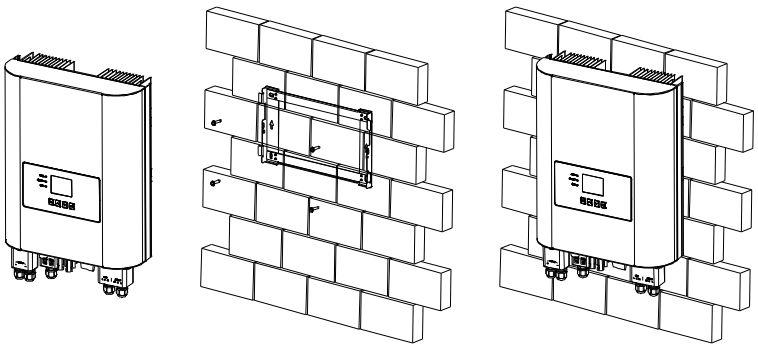


Figure 4.6 Mount H1 inverter

Chapter 5 Electrical Connection

5.1 Safety Instruction for Hot-line Job

Electrical connection must only be operated on by professional technicians. Please keep in mind that the inverter is a bi-power supply equipment. Before connection, necessary protective equipment must be employed by technicians including insulating gloves, insulating shoes and safety helmet.

DANGER
· Dangerous to life due to potential fire or electricity shock. · When power-on, the equipment should in conformity with national rules and regulations. · The direct connection between the inverter and high voltage power systems must be operated by qualified technicians in accordance with local and national power grid standards and regulations.

WARNING
· When the photovoltaic array is exposed to light, it supplies a DC voltage to the inverter.

NOTICE
·Electrical connection should in conformity with proper stipulations, such as stipulations for cross-sectional area of conductors, fuse and ground protection. ·The overvoltage category on DC input port is II,on AC output port is III.

5.2 Specifications for Electrical Interface

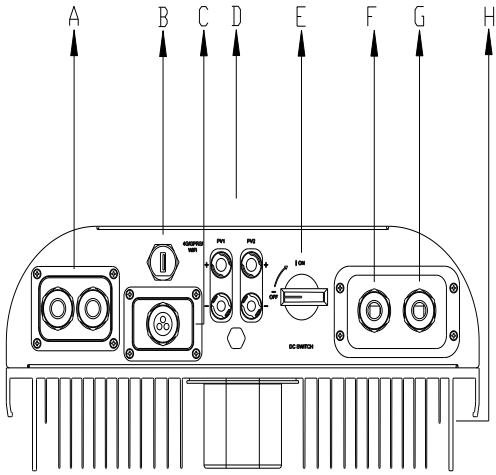


Figure 5.1 Electrical Interface of H1 inverter

Code	Name
A	Battery Input
B	RS232 /4G/GPRS/Wi-Fi Port
C	RS485 & DRM Port & CAN
D	DC Input
E	DC Switch
F	On-Grid Terminal
G	Backup Plug Terminal
H	Ground Connection

Table 5.1 Specifications for Interface

5.3 AC Grid Wire and Backup Output Connection

Caution：For safety operation and regulation compliance, it is requested to install a breaker (63A) between grid and inverter.

Cable Cross-sectional area（mm²）		External diameter（mm）	
Range	Recommend	Range	Recommend
2.5~6.0	4.0	8~14	14

Table 5.2 Recommended Specifications of AC Cables

If the grid-connection distance is too far, please amplify diameter selection of the AC cable as per the actual condition.

5.3.1 Open the waterproof cover, feed the AC cable through the AC waterproof hole.

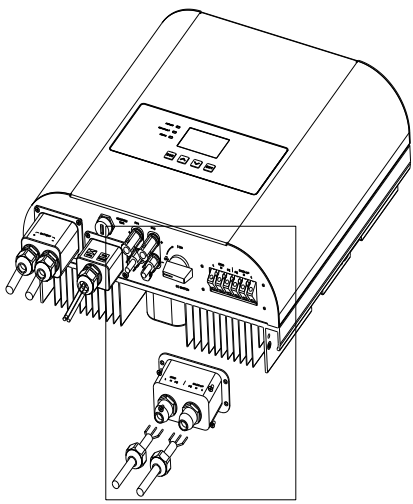


Figure 5.2 Thread the cables

5.3.2 Connect the cables according to connection marks of L, N and PE.

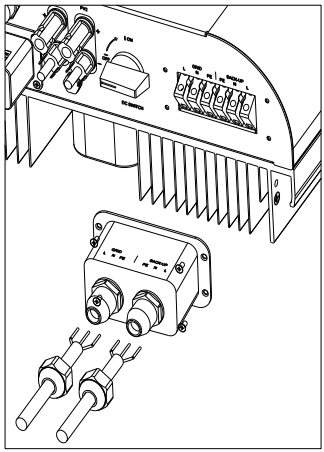


Figure 5.3 Connect the Cables

5.3.3 Secure all parts of the grid and backup connector tightly.

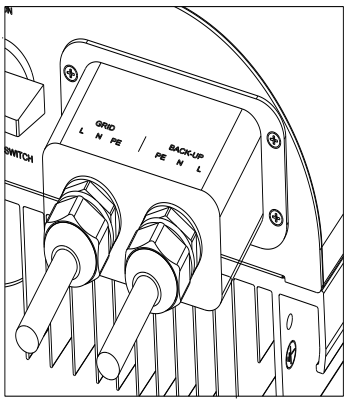


Figure 5.4 Screw the Connector

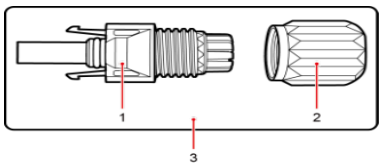
5.3.4 During off-network operation time, null line at the BACK-UP end will remain to be connected with the null line at the power grid end inside the machine. (Only applicable to market in Australia)

5.4 PV Connection

Cable Cross-sectional area（mm²）		External diameter（mm）	
Range	Recommend	Range	Recommend
4.0~6.0	4.0	4.2~5.3	5.3

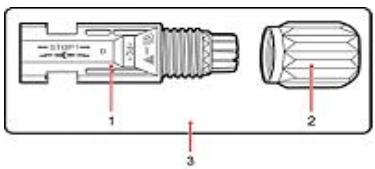
Table5.3 Recommended Specifications of DC Cables

DC connector is made up of the positive connector and the negative connector



1. Insulated Enclosure 2. Lock Screw 3. Positive Connector

Figure 5.5 Positive Connector



1. Insulated Enclosure 2. Lock Screw 3. Negative Connector

Figure 5.6 Negative Connector

NOTICE

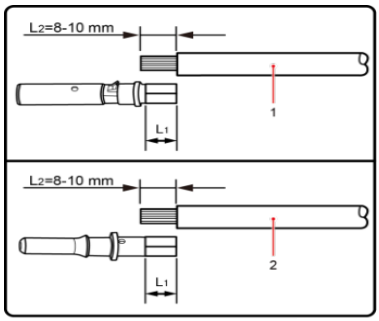
· Please place the connector separately after unpacking in order to avoid confusion for connection of cables.
· Please connect the positive connector to the positive side of the solar panels, and

connect the negative connector to the negative side of the solar side. Be sure to connect them in right position.

Connecting Procedures:

（1）Tighten the lock screws on positive and negative connector.

（2）Use specified strip tool to strip the insulated enclosure of the positive and negative cables with appropriate length.



1. Positive Cable 2. Negative Cable

Figure 5.7 Connecting Cables

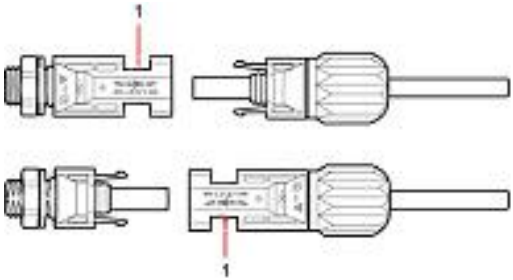
（3）Feed the positive and negative cables into corresponding lock screws.

（4）Put the metal positive and negative terminals into positive cable and negative cable whose insulated enclosure has been stripped off, and crimp them tightly with a wire crimper. Make sure that the withdrawal force of the pressed cable is larger than 400N.

（5）Plug in the pressed positive and negative cables into relevant insulated enclosure, a “click” should be heard or felt when the contact cable assembly is seated correctly.

（6）Fasten the lock screws on positive and negative connectors into corresponding insulated enclosure and make them tight.

（7）Connect the positive and negative connectors into positive and negative DC input terminals of the inverter, a “click” should be heard or felt when the contact cable assembly is seated correctly.



1. Connection Port

Figure 5.8 Connect the Inverter

NOTICE
· Before insert the connector into DC input terminal of the inverter, please make sure that the DC switch of the inverter is OFF. ·Please use the original H4 terminal to install.

5.5 Battery Connection

Approved compatible battery list

Brand	Model
Chint	HESS_6kWh
Dyness	B4850
Pylon	US2000/ US2000B
SAJ	B1-5.1-48/ B2-5.0-LV1/B2-5.0-LV2

Note: For Italy market, only Dyness, Pylon, SAJ batteries are applicable.

H1 series inverter is only compatible with the batteries listed above, any other unapproved battery connections will NOT be covered by SAJ limited warranty.

Caution：For safety operation and regulation compliance, it is requested to install a breaker (≥125A) between battery and inverter.

Note: 1* If lithium battery is connected, it is not required to install a breaker between battery and inverter.

Cable Cross-sectional area（mm²）		External diameter（mm）	
Range	Recommend	Range	Recommend
16~25	16	8~14	14

Table5.4 Recommended Specifications of DC Cables

Noted: For multiple batteries connection, please refer to B1-5.1-48 battery manual.

Open the waterproof cover, then feed the battery cable through the AC waterproof hole.

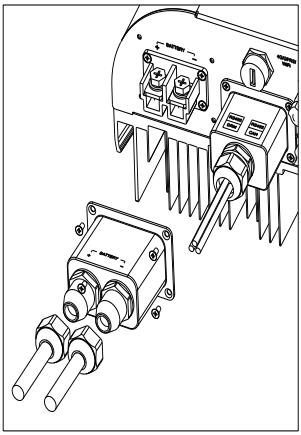


Figure5.9 Open the waterproof cover

Strip off the insulation skin of DC cable, the core is exposed to 10mm, and use a special tool to press the Battery Terminal.

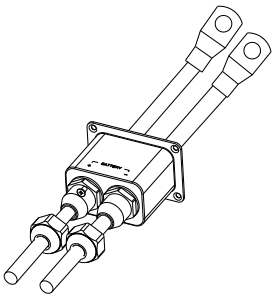


Figure 5.10 Battery Terminal

Fixing the battery cable on the battery copper terminal by positive and negative in order.

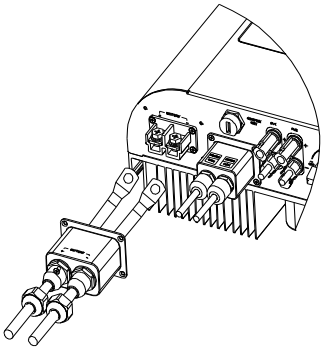


Figure 5.11 Connect the Battery Cable

5.6 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 second LED indicator will be lit up and error code <06 ISO Err> will be displayed on the screen of inverter until the error being solved and inverter functioning properly.

5.7 Communication Connection

5.7.1 Serial Port Definition

H1 series hybrid inverter has a RS232 communication port integrated.

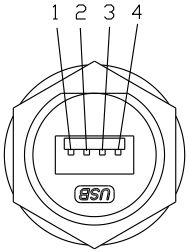


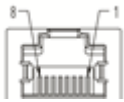
Figure 5.12 9-Pin serial port

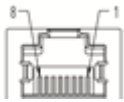
Pin Number	Description	Effect
1	+7V	Power supply
2	RS-232 TX	Send data
3	RS-232 RX	Receive data
4	GND	Ground wire

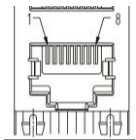
Table 5.5 9-Pin serial port introduction

USB interface with Wi-Fi module, please reference Wi-Fi user manual.

5.7.2 RJ45 Pin Port Definition.

Left		
1	NC	RS485 
2	NC	
3	NC	
4	NC	
5	NC	
6	NC	
7	RS485-A+	
8	RS485-B-	

Right		
RS485 	1	NC
	2	NC
	3	NC
	4	NC
	5	NC
	6	NC
	7	RS485-A+
	8	RS485-B-

Left		
1	DRM 1/5	 DRM
2	DRM 2/6	
3	DRM 3/7	
4	DRM 4/8	
5	RefGen	
6	Com/DRM 0	
7	V+	
8	V-	

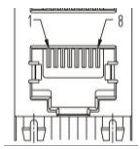
Right		
 CAN	1	NC
	2	NC
	3	NC
	4	CANH
	5	CANL
	6	NC
	7	NC
	8	NC

Table 5.6 RJ45 pin port definition

Figure 5.13 Interface definition

5.7.3 Open the waterproof cover, pass the prepared communication cable through each component, insert corresponding communication port, then tighten the screws.

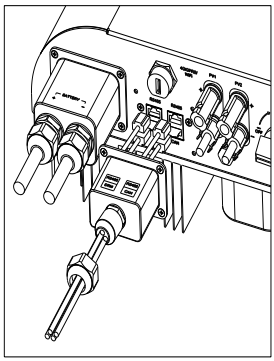


Figure 5.14 Connection of communication cable

5.7.4 Smart Meter Connection

Notice: The hybrid inverter is with export limitation function, which can be realized by connecting SAJ recommended smart meter to the hybrid energy storage system. If users have no intention to set the export limitation function, please ignore chapter 5.7.4.

Before setting the export limitation function, users shall connect the meter to the system with procedures below:

(1) Power cable connection: Connect Live to terminal 3 and Neutral to terminal 4. The CT blue wire is connected to terminal 6, and the white wire is connected to terminal 5.

(2) Connect meter to Hybrid Inverter: Wire "RS485-A+" of inverter to terminal 24 of the Meter, then wire "RS485-B-" of inverter to terminal 25 of the Meter.

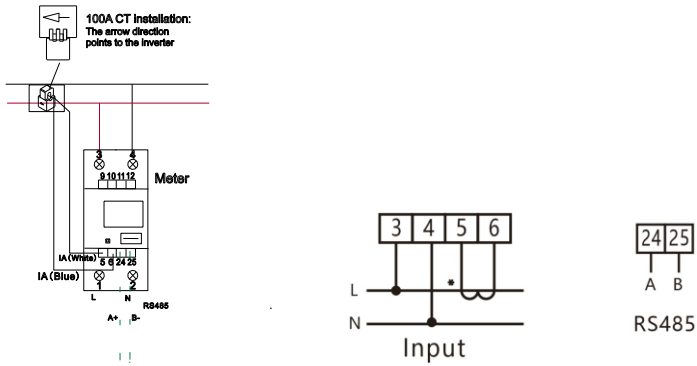


Figure 5.15 Meter wiring diagram

(3) Fixing Meter (DIN 35mm mounting)

There are buckles at the bottom of the meter. Buckle it on the grooves matched in size and fix it stably.

(4) Power on the meter and check if the meter is running.

(5) Confirm communication address of meter and hybrid inverter:

For both meter and hybrid inverter, the default communication address is 1. If the communication addresses are different, users can set the communication address value of hybrid inverter to the same value as meter.

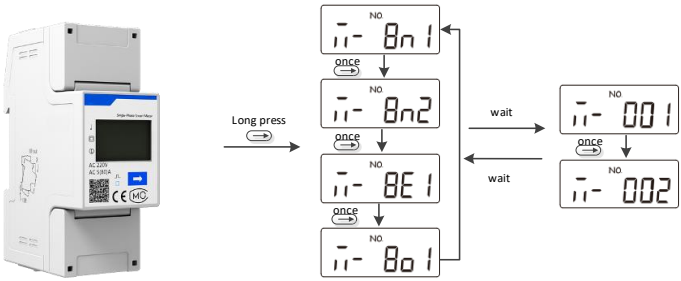


Figure 5.16 Communication address of meter

(6) After settings, users can move to set the Export Limitation Setup on

the hybrid inverter.

Select the “Setting” in menu, press ENT to the second menu, then select “Mode Setting”, press ENT to enter the interface of choosing Export Limitation Setup, as shown below

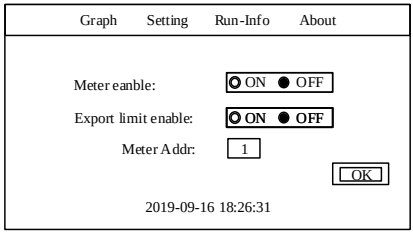


Figure 5.17 Mode Setting

Note: Meter is not waterproof or dust-proof, it is recommended to install it in the distribution box. If the current value showed in the meter is a negative value, the export limitation is working.

5.8 Connection Diagram

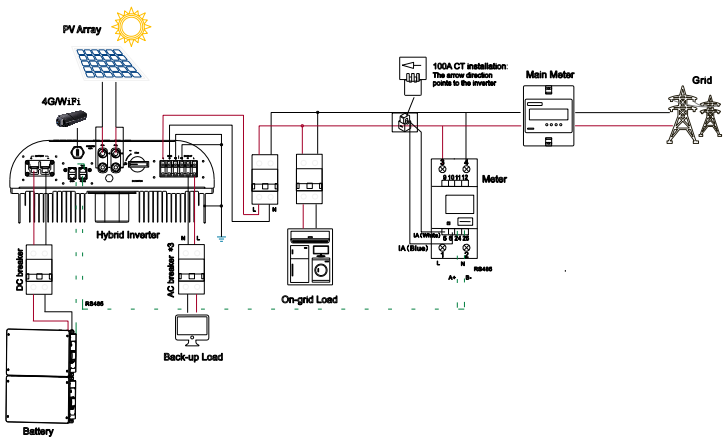


Figure 5.18 H1 Connection diagram

The system connection for grid system without special requirements is as below.

Note：The backup PE line and earthing bar must be grounded properly. Otherwise, backup function may be inactive during blackout.

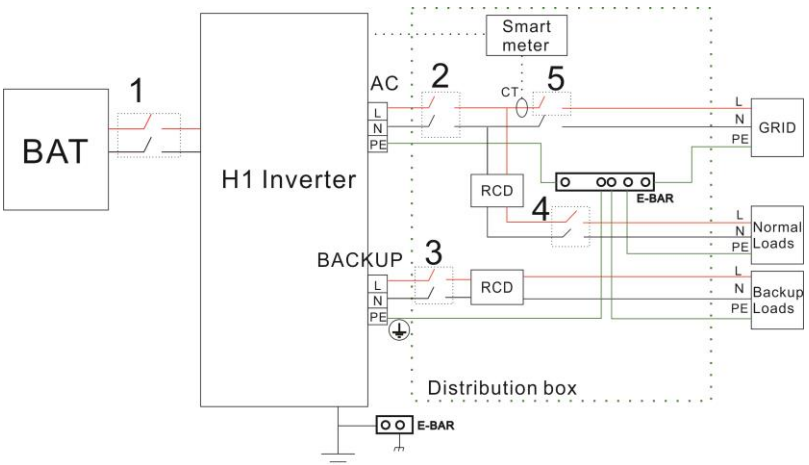


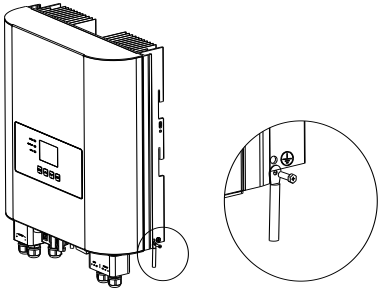
Figure 5.19 System wiring diagram

Position	Recommended breaker size
1	125A
2	40A
3	40A
4	Depends on loads
5	Depends on household loads and inverter capacity

Table 5.7 Recommended circuit breaker size

5.9 Ground Connection

After penetrating the external hex head screw through OT terminal of the grounding line, screw in the grounding port of enclosure of the inverter in clockwise direction and make sure it is screwed up tightly.



5.19 Inverter ground protection

5.10 External AC Circuit Breaker and Residual Current Device

Please install a circuit breaker to ensure the inverter is able to disconnect from grid safely. The inverter is integrated with a RCMU, however, an external RCD is needed to protect the system from tripping, either type A or type B RCD are compatible with the inverter.

The integrated leakage current detector of inverter is able to detect the real time external current leakage. When a leakage current detected exceeds the limitation, the inverter will be disconnected from grid quickly, if an external residual current device is connected, the action current should be 30mA or higher.

Chapter 6 Debugging Instructions

6.1 Introduction of Human-computer Interface

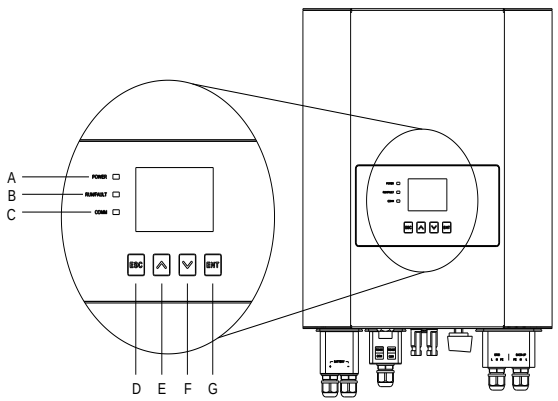


Figure 6.1 Human-computer Interface

LED indicator	Function	
A	Power status	On: Green LED on Off: LED off
B	Run/ fault status	Inverter running properly : Yellow LED on Inverter running faultily: Red LED on

C	Communication status	When a Wi-Fi/ 4G module is connected or inverter is upgrading: Yellow and blue light flashing alternatively

Table 6.1 Instructions of the Interface

Button	Function	
E ▲	A step up / left or increasing the setting value	
F ▼	A step down / right or decreasing the setting value	
D (ESC)	Press time shorter than 2 seconds	Return to main menu or canceling the setting
	Press time longer than 2 seconds	Cut off output to load
G (ENT)	Press time shorter than 2 seconds	Enter the sub-menu or confirming a selection
	Press time longer than 2 seconds	Turn on output to load

Table 6.2 Instructions for buttons

6.2 First Run Setup

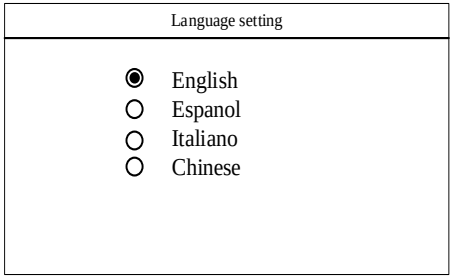
6.2.1 Start Up Inverter

The H1 inverter can be start up by the following procedure:

1. Turn on the external AC switch (grid side)
2. Turn on the DC switch on the inverter
3. Turn on the battery switch between inverter and battery

6.2.2 System Language Setting

Select the language



6.2.3 System Time Setting

When the inverter begins to run for the first time, please configure the time of system, and the inverter LCD will display as below:

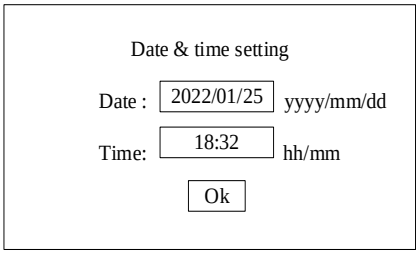


Figure 6.2 System time setting

Move the cursor to the editable box, press ENT to edit, set the target value by pressing ▼ or ▲. If pressing time longer than 2 seconds, the value will decrease or increase quickly. Complete setting and switching to next parameter setting by pressing ENT. Drop out of edit by pressing ESC.

6.2.4 Battery Data Setting

Select the battery protocol based on your battery connected. Discharge Depth(DOD) is the minimum energy stored up in the battery, i.e. if you are setting the discharge depth value to 80%, you can use up to 80% of

the battery energy.

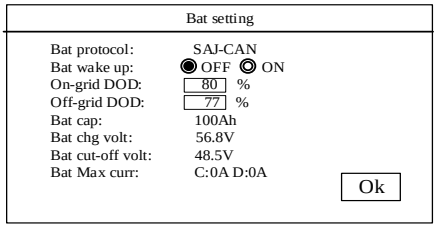


Figure 6.3 Battery setting

6.2.5 Set the Country

When the inverter begins to run for the first time, please configure the country of usage, each country is integrated with corresponding local grid protective parameters. If a country contains multiple compliances, they will appear next to this country, as shown below：

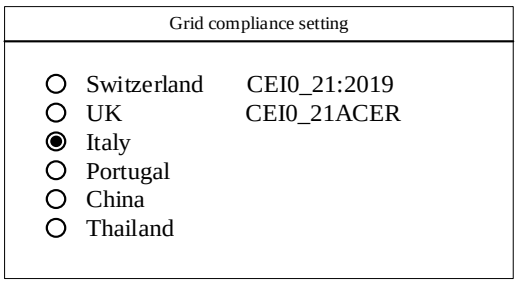


Figure 6.4 Country setting

Noted: If users cannot find out the corresponding country, please stop the setting and contact the after sales for confirmation.

6.3 LCD Operation

6.3.1 LCD Display Overview

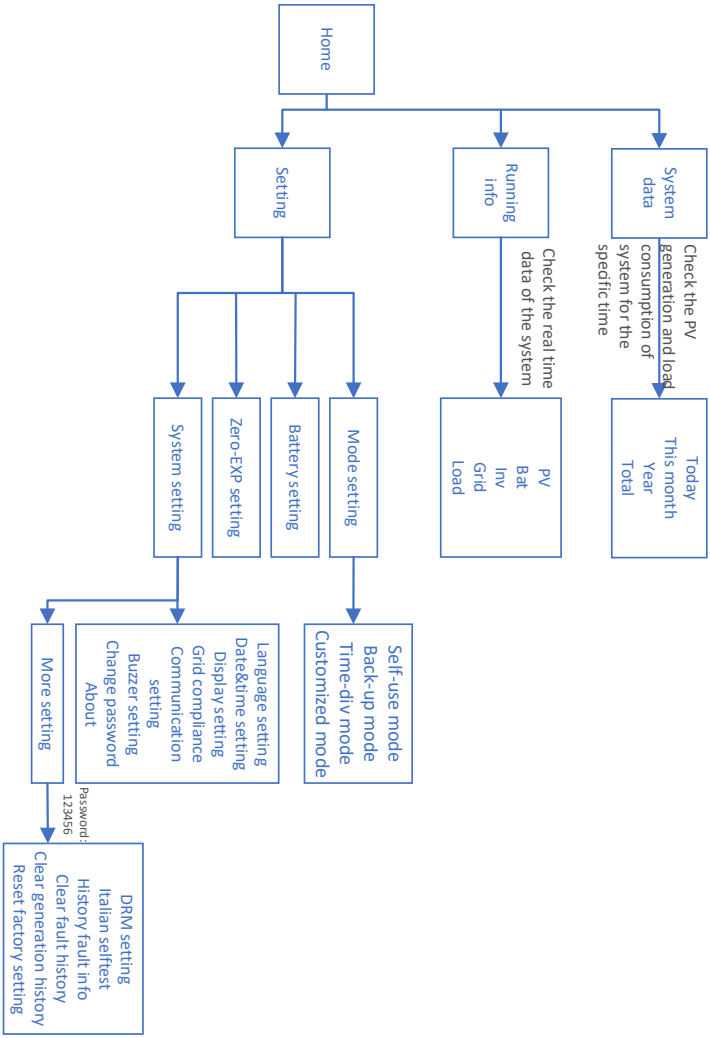


Figure 6.5 LCD operation overview

6.3.2 Home Display

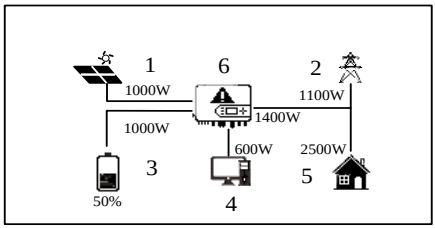
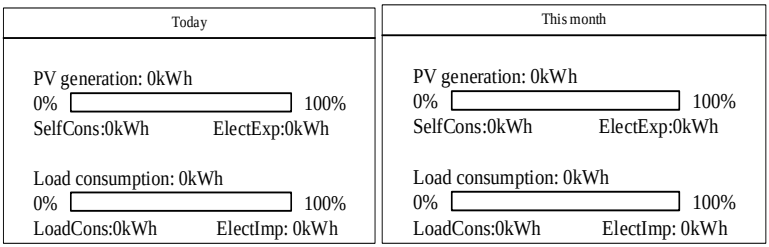


Figure 6.6 Home display

Position	Description
1	Current PV input power
2	Current power import from or export to grid
3	Battery charging or discharging power
4	Back up load consumption
5	Normal load consumption
6	If there is a triangle alarm icon blinking, it indicates there is an error occurs.

Table 6.3 Home display description

6.3.2 System Data



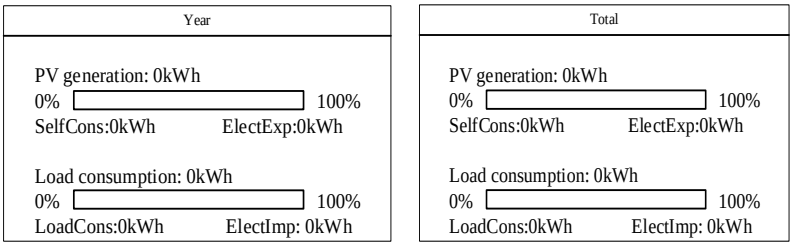


Figure 6.7 System data display

The running info showing the PV generation and load consumption on a daily, monthly, yearly basis.

Term	Description
PV generation	The amount of electricity generated by PV
SelfCons	Self-consumption: The amount of electricity consumed by loads/battery
ElectExp	Electricity export: The amount of electricity exported to grid
The percentage bar on top	The percentage of self-consumption
Load consumption	The total amount of electricity consumed by loads
LoadCons	Load consumption: The amount of load consumption provided by PV and battery
ElectImp	Electricity import: The amount of load consumption provided by the electricity imported from grid
The percentage bar on bottom	The percentage of load consumption

Table 6.4 System data description

6.3.3 Setting

6.3.3.1 Mode Setting

Self-use Mode: When the solar is sufficient, electricity generated by photovoltaic system will be supplied to load first, the surplus energy will be stored in battery, then the excess electricity will be exported to the grid. When the solar is insufficient, the battery will release electricity to supply load.

Backup Mode: Reserved Backup SOC setting value can be adjusted, when battery SOC is less than reserved SOC value, battery can only be charged, until SOC reaches reserved value, the battery will be stopped charging; when SOC is larger than SOC setting value, battery will behave as Self-use mode.

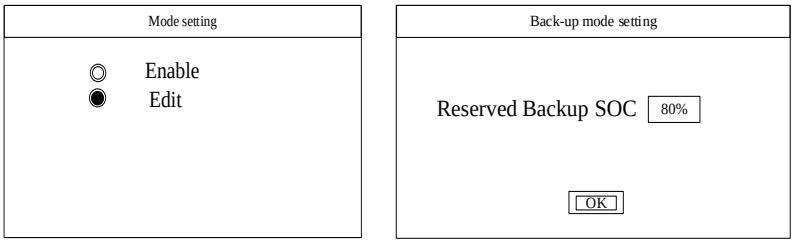


Figure 6.8 Back up mode setting

Time-Div Mode: Battery charging period and discharging period can be set, during charging period, battery can only be charged, while in discharging period, battery can only be discharged, the rest of the period, battery will behave as Self-use mode.

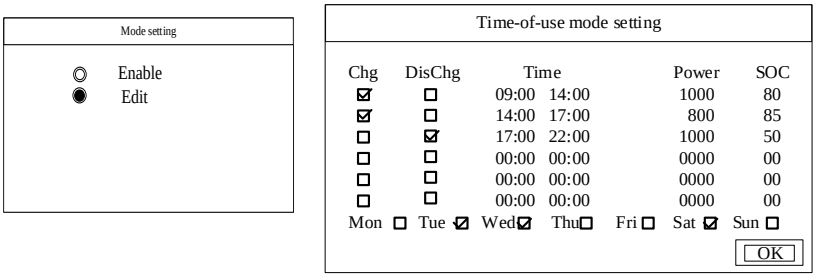


Figure 6.9 Time-div mode setting

6.3.3.2 Battery Setting

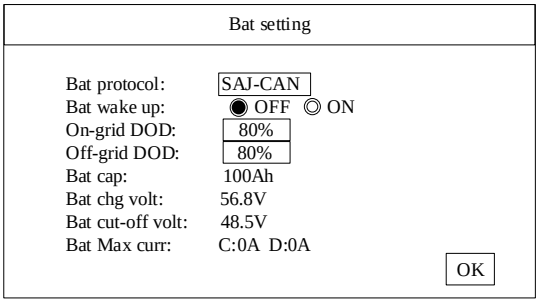


Figure 6.10 Battery setting

Term	Description
Bat protocol	Battery protocol: Select the bat protocol according to your battery brand and model
Bat wake up	Battery wake up: Activate this function when there is not enough charge in the battery to induce the charger. Activate this function to force charging the battery.
On-Grid DOD	The DOD value under on-grid mode
Off-grid DOD	The DOD value under off-grid mode
Bat cap	Battery capacity
Bat chg volt	Battery charging voltage
Bat cut-off volt	Battery cut-off voltage
Bat Max curr	Battery maximum charging/discharging current

Table 6.5 Battery setting description

6.3.3.3 Zero-EXP Setting

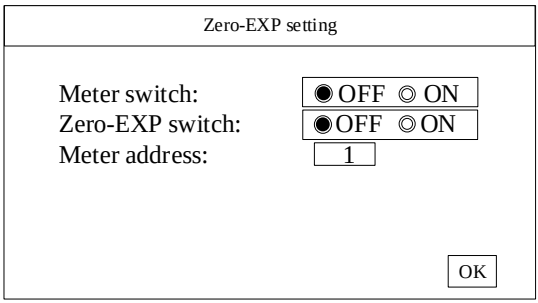


Figure 6.11 Zero export setting

Term	Description
Zero-EXP setting	Zero export limit setting
Meter switch	OFF: Turn it off if no meter is connected ON: Turn it on if there is meter connected
Zero-EXP switch	OFF: Turn it off if no zero export limit requirement ON: Turn it on if there is zero export limit requirement
Meter address	Set to 1 if there is only one meter is connected

Table 6.6 Zero-EXP setting description

6.3.3.4 System Setting

Grid compliance

If a country contains multiple compliances, they will appear next to this country, as shown below, please contact your local grid operator for which region to select"

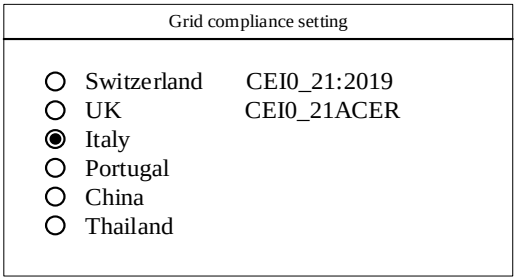


Figure 6.12 Grid compliance setting

Communication setting

The inverter can detect RS485 information of meter automatically, these information are unable to adjust.

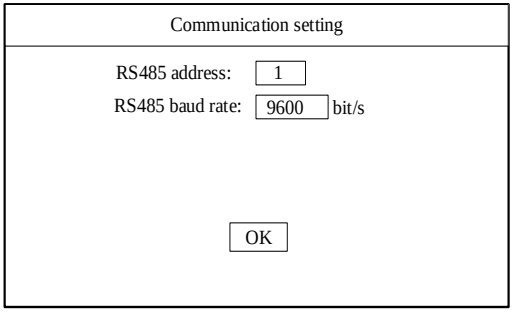


Figure 6.13 Communication setting

6.3.3.4.1 More Setting

Enter password: 123456 to enter the interface.

DRM setting

The DRM function to the demand response enabling device (DRED) is disabled by default, turn it on if this function is required.

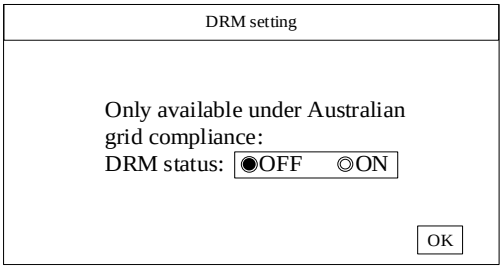


Figure 6.14 DRM setting

Italian self test

This function is required for all the inverters installed in Italy. During the self testing, the inverter will test the protection reaction times and values for overvoltage, undervoltage, overfrequency and underfrequency. The test results will be displayed after the test.

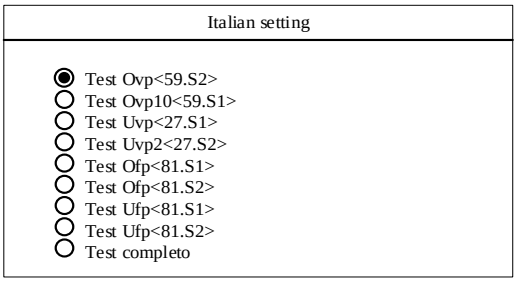


Figure 6.15 Italy self test setting

History fault info

Viewing the history fault info by pressing the ▼or▲button to turn the page and view all the history fault info. Error code details can be referred to Chapter 7.

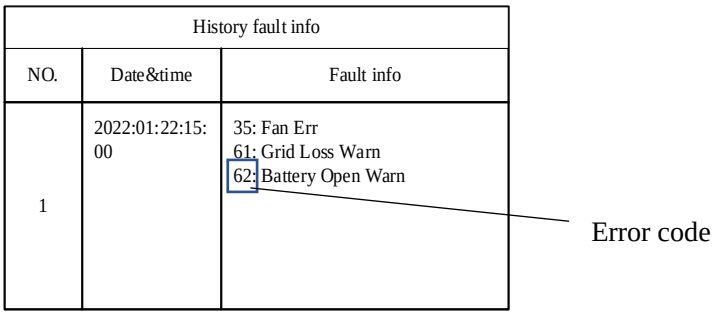


Figure 6.16 History fault info

6.4 Shut Down Inverter

The H1 inverter can be shut down by the following procedure:

1. Turn off the external AC switch (grid side)
2. Turn off the DC switch on the inverter
3. Turn off the battery switch between inverter and battery

6.5 Monitoring Operation and Battery manage system

The equipment is equipped with a RS232 interface, RS232 can connect with Wi-Fi module, which can be used in monitoring of the operation status.

By connecting the internet through a Wi-Fi module and uploading the data of the inverter to server, users can monitor the operational information of the inverter via web portal or APP remotely (please download the mobile APP from APP store or Google play).

The equipment is equipped with a RS485 interface, RS485 can be

connected to battery manage system (BMS) to maximize the battery life.

Chapter 7 Fault Code and Troubleshooting

Code	Fault Information	Explanation	Fault type
Master Device Error			
01	Relay Err	Relay Error	Error
02	GFCI Device Err	GFCI Devices Error	Error
03	Fan Err	Fan Error	Error
04	Eeprom Err	Storer Error	Error
05	Lost Com.M<->S Err	Interior Communication	Error
06	ISO Err	Insulation Error	Error
07	Temp.High Err	High Temperature	Error
08	Temp.Low Err	Low Temperature	Error
09	Bus Volt.High Err	Over Bus Voltage	Error
10	Bus Volt.Low Err	Under Bus Voltage	Error
11	GFCI Err	GFCI Error	Error
12	DCI Err	DCI Devices Error	Error
13	HWBus Volt.High Err	Bus Hardware Over-voltage	Error
14	HWPV1 Curr.High Err	PV1 Hardware Over-current	Error
15	HWPV2 Curr.High Err	PV2 Hardware Over-current	Error
16	HWInv Curr.High Err	Inverter Hardware Over-current	Error
17	Inv Short Err	Inverter short circuit error	Error
18	Over Load Err	Output overload error	Error
19	PV1 Volt.High Err	PV1 Over-voltage	Error
20	PV2 Volt.High Err	PV2 Over-voltage	Error
21	PV1 Curr.High Err	PV1 Over-current	Error
22	PV2 Curr.High Err	PV2 Over-current	Error
23	Inv Curr.High Err	Inverter Over-current	Error
25	Grid Volt.High Warn	Voltage of Grid High	Alarm
26	Grid Volt.Low Warn	Voltage of Grid Low	Alarm
27	Grid Freq.High Warn	Frequency of Grid High	Alarm

28	Grid Freq.Low Warn	Frequency of Grid Low	Alarm
29	Grid Loss Warn	Grid Lost	Alarm
30	Grid Volt.10min Warn	Average voltage of 10 minutes	Alarm
31	Over Load Warn	Over-load	Alarm
32	Out Volt. Low Warn	Output under-voltage	Alarm
Slave Device Error			
33	Bat Input Short Err	Battery input short circuit	Error
34	Bat Volt.High Err	Battery over-voltage	Error
35	Fan Err	Fan erroe	Error
36	Bus SoftTimeOut Err	Bus soft start time out	Error
37	Lost Com.M<->S Err	Lost interior communication	Error
39	Bus Volt.High Err	Over Bus Voltage	Error
41	Bus Volt.Consis Err	Data Consistency of Bus Voltage Error	Error
42	Out Insert Err	Output Connection error	Error
43	Inv Wave Err	Inverter voltage wave error	Error
44	GFCI Consis Err	Data Consistency of GFCI Error	Error
46	DVI Consis Err	Data Consistency of DVI	Error
47	CHG1 Curr Err	Charging bridge 1 current error	Error
48	CHG2 Curr Err	Charging bridge 2 current error	Error
49	Grid Volt.Consis Warn	Data Consistency of Grid Voltage Error	Alarm
50	Grid Freq.Consis Warn	Data Consistency of Grid Frequency	Alarm
51	Bms Com Lost Warn	BMS Communication Lost	Alarm
52	GND loss Warn	Ground lost	Alarm
53	LN Wrong Warn	L and N Wires Connected Reversely	Alarm
54	ForbidCharge Warn	Battery Forbidden Charge	Alarm
55	forbidDisCharge Warn	Battery Forbidden Discharge	Alarm
56	ForceCharge Warn	Battery Forced Charge	Alarm
57	Grid Volt.High Warn	Voltage of Grid High	Alarm
58	Grid Volt.Low Warn	Voltage of Grid Low	Alarm

59	Grid Freq.High Warn	Frequency of Grid High	Alarm
60	Grid Freq.Low Warn	Frequency of Grid Low	Alarm
61	Grid Loss Warn	Grid Loss	Alarm
62	Battery Open Warn	Battery open circuit	Alarm
63	Battery Dod Warn	Battery Discharge End	Alarm
64	Battery Low Warn	Battery under-voltage	Alarm
Display Board Error			
65	Lost Com.H<->M Err	Display board communication lost	Error
66	HMI Eeprom Err	Eeprom Error	Error
67	HMI RTC Err	RTC error	Error
68	BMS Device Err	BMS Device Error	Error
81	BMS Cell Volt.H Warn	BMS cell voltage high warning	Alarm
82	BMS Cell Volt.L Warn	BMS cell voltage low warning	Alarm
83	BMS CHG Curr.H Warn	BMS charging current high warning	Alarm
85	BMS DCHG Curr.H Warn	BMS discharging current high warning	Alarm
86	BMS DCHG TempH Warn	BMS discharging temperature high warning	Alarm
87	BMS CHG TempH Warn	BMS charging temperature high warning	Alarm
88	BMS Voltage Low Warn	BMS voltage low warning	Alarm
89	BMS Lost.Conn Warn	BMS communication lost warning	Alarm
91	Meter Lost Com Warn	Meter Lost Communication Warning	Alarm
92	DRM0 Warn	DRM0 Warn	Alarm

Chapter 8 Recycling and Disposal

This device should not be disposed as residential waste. An Inverter that has reached the end of its life and is not required to be returned to your dealer, it must be disposed carefully by an approved collection and recycling facility in your area.

Chapter 9 Contact SAJ

Guangzhou Sanjing Electric Co., Ltd.

SAJ Innovation Park, No.9, Lizhishan Road, Guangzhou Science City, Guangdong, P.R.China.

Postcode: 510663

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Technical Support & Service

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Fax: +86 20 6660 8589

E-mail: service@saj-electric.com

International Sales

Tel: 86-20-66608618/66608619/66608588/66600086

Fax: 020-66608589

E-mail: info@saj-electric.com

Domestic Sales

Tel: 020-66600058/66608588

Fax: 020-66608589

Warranty Card

The installer should fill in the second form while installing the inverter. For warranty claim, please complete the below forms and send this page to SAJ attached with the Customer's invoice.

For Customer to fill in

Name:		
City:	Country:	Zip:
Tel:	Fax:	E-mail:

Information on Device

Device type:	Serial No.(S/N):
Invoice No:	Commissioning date:
Fault time:	
Error message (Display reading):	
Brief fault description & photo:	
Signature:_____ Date:_____	

For Installer to fill in

Modules Used:		
Modules Per String:	No. of String:	
Installation Company:	Contractor License Number:	
Company:		
City:	Country:	Zip:
Tel:	Fax:	E-mail:
Signature:_____	Date:_____	

Guangzhou Sanjing Electric Co., Ltd.

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