



eCactus WH-SPA3.68H/WH-SPA5.0H USER MANUAL

AC-COUPLED BATTERY STORAGE RETROFIT

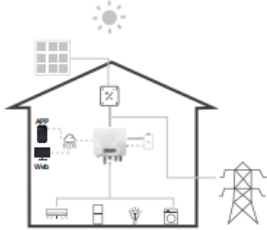
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1.INTRODUCTION

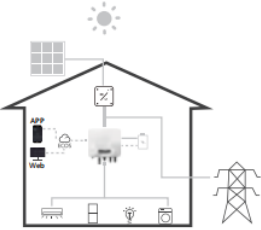
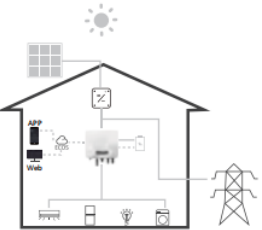
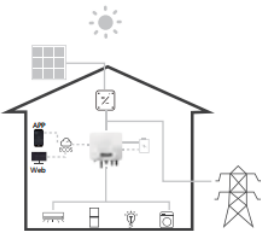
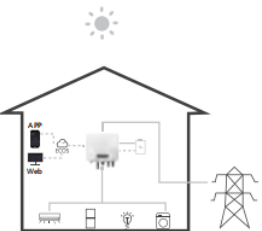
WH SPA series AC couple inverter is designed for both indoor and outdoor use, which could be used with or without existing grid-tied inverter systems to store energy with batteries.

Energy produced from grid-tied inverters shall be used to optimize self-consumption, then charge battery, exceed power from grid-tied system could export to grid. Loads will be supported in priority by grid-tied system, then battery power, exceed consumption power will be drained from grid.

 <p>The diagram illustrates a house's energy system. On the roof, there are solar panels connected to an inverter. The inverter is connected to a battery storage unit and also to the main electrical panel of the house. The house contains various loads represented by icons: a smartphone, a laptop, a light bulb, and a refrigerator. A power line with a transformer tower connects the house to the external grid.</p>	<p>Note: the introduction describes a general behavior of SPA system. The operation mode can be adjusted on eCactus APP/WEB depends on the system layout. Below are the general operation modes for SPA system:</p>
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1.1 OPERATION MODES INTRODUCTION












eCactus WH-SPA system normally has the following operation modes based on your configuration and layout conditions.

 <p>Mode 1A</p>	 <p>Mode 1B</p>
<p>Self-powered (1A) :Energy from grid-tied inverters optimize loads, then charge battery, exceed power export to grid.</p>	<p>Self-powered (1B): When energy from grid-tied inverters is weak, battery discharge to support loads in priority, together with grid.</p>
 <p>Mode 2</p>	 <p>Mode 3</p>
<p>Back up: When grid power fails, battery will discharge to support Back-Up Loads.</p>	<p>Load shifting: Battery behavior is controlled based on the price or time. Battery is charged by grid when electricity price is low, and discharged to loads when electricity price is high. It can be set on eCactus APP/WEB.</p>

1.2 SAFETY & WARNINGS

The eCactus series inverters of Jiangsu WH Power Supply Technology Co., Ltd. (hereinafter called as WH) strictly comply with related safety rules for product design and testing. Please read and follow all the instructions and cautions on the inverter or user manual during installation, operation or maintenance, as any improper operation might cause personal or property damage.

• SYMBOLS EXPLANATION

	Caution! Failing to observe a warning indicated in this manual may result in injury.
	Danger of high voltage and electric shock!
	Danger of hot surface!
	Components of the product can be recycled.
	This side up! The package must always be transported, handled and stored in such a way that the arrows always point upwards.
	No more than six (6) identical packages being stacked on each other.
	Product should not be disposed as household waste.
	The package/product should be handled carefully and never be tipped over or slung.
	Refer to the operating instructions.
	Keep dry! The package/product must be protected from excessive humidity and must be stored under cover.
	Inverter will be touchable or operable after minimum 5 minutes of being turned off or

- SAFETY WARNING

Any installation and operation on inverter must be performed by qualified electricians, in compliance with standards, wiring rules or requirements of local grid authorities or companies (like AS 4777 and AS/NZS 3000 in Australia).

Before any wiring connection or electrical operation on inverter, all battery and AC power must be disconnected from inverter for at least 5 minutes to make sure inverter is totally isolated to avoid electric.

The temperature of inverter surface might exceed 60°C during working, so please make sure it is cooled down before touching it, and make sure the inverter is untouchable for children.

Usage and operation of the inverter must follow instructions in this user manual, otherwise the protection design might be useless and warranty for the inverter will be invalid.

Do not open inverter cover or change any components without authorization, otherwise the warranty commitment for the inverter will be invalid.

Appropriate methods must be adopted to protect inverter from static damage. Any damage caused by static is not warranted by eCactus.

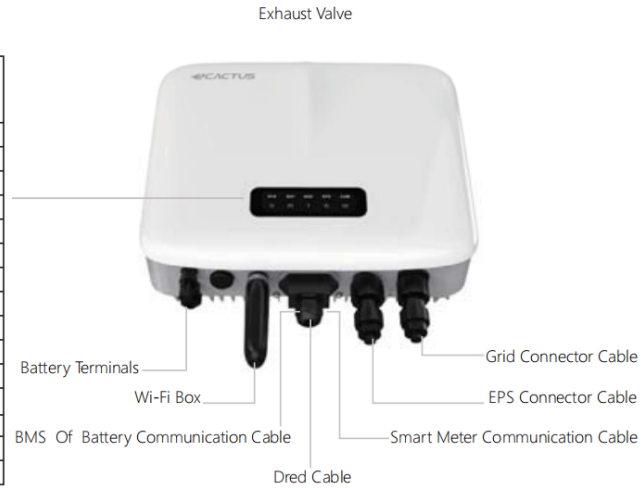
The inverter, with built-in RCMU, will exclude possibility of DC residual current to 6mA, thus in the system an external RCD (type A) can be used($\geq 30\text{mA}$).

In Australia, output of backup side in switch box should be labeled 'Main switch UPS supply', the output of normal load side in switch box should be labeled 'main switch inverter supply'.

1.3 PRODUCT OVERVIEW

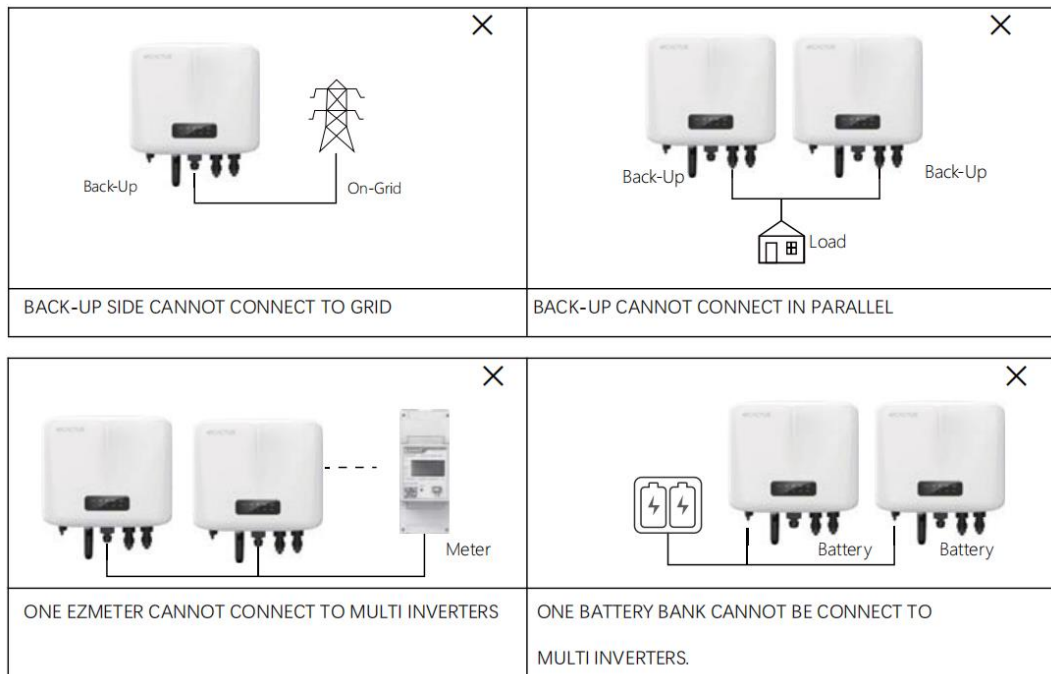
LED INDICATORS

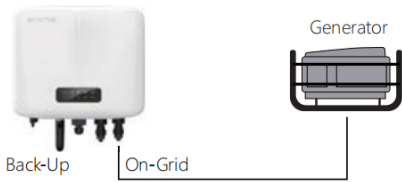
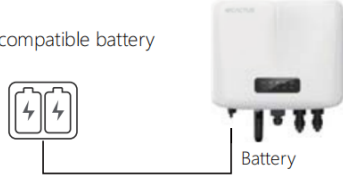
	SYS ☐	BAT ☐	GRID ☐	EPS ☐	COM ☐
System ☐	☐☐☐☐☐				
	☐☐☐☐☐				
	☐☐☐☐☐				
Battery ☐		☐☐☐☐☐			
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Grid ☐			☐☐☐☐☐		
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Com ☐					☐☐☐☐☐
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2. INSTALLATION INSTRUCTIONS

2.1 UNACCEPTABLE INSTALLATIONS



	
ONE EZMETER CANNOT CONNECT TO MULTI INVERTERS	ONE BATTERY BANK CANNOT BE CONNECT TO MULTI INVERTERS.

2.2 PACKING LIST

On receiving the inverter, please check to make sure all the components as below are not missing or broken.

				
AC couple*1	Positive terminal combination*1	Negative terminal combination*1	EPS terminal*1	Grid EPS terminal*1
				
M4x10L*3	OT terminal 5-4/PE*1	Heat shrinkable number tube*1	Expansion tube and self-tapping screw combination*3	Quick installation*1
				
Back plate*1	PV meter*1	Grid meter*1	Com. cable*1	

2.3 MOUNTING

2.3.1 SELECT MOUNTING LOCATION

For inverter's protection and convenient maintenance, mounting location for inverter

should be selected carefully based on the following rules:

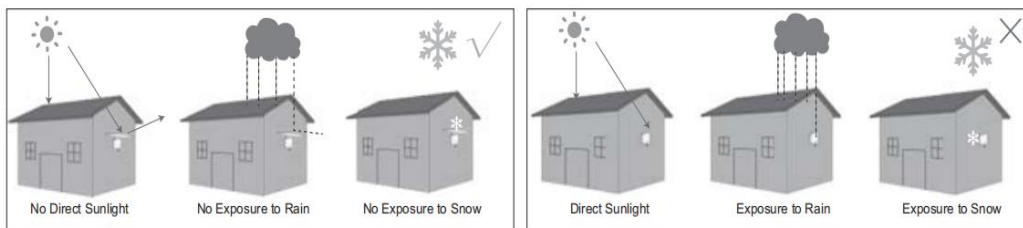
Rule 1. Inverter should be installed on a solid surface, where is suitable for inverter's dimensions and weight.



Rule 2. Inverter installation should stand vertically or lie on a slop by max15° (Pic 1).

Rule 3. Ambient temperature should be lower than 40°C.

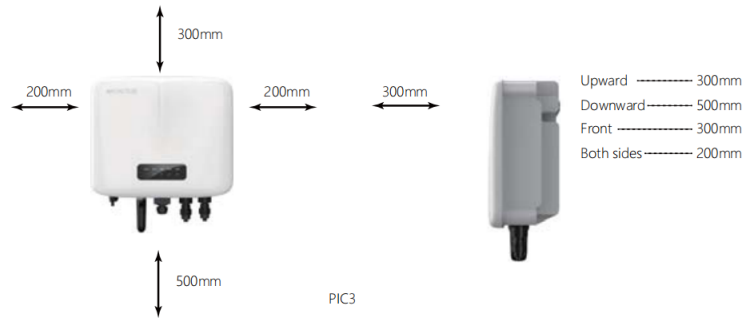
Rule 4. The installation of inverter should be protected under shelter from direct sunlight or bad weather like snow, rain, lightning etc. (Pic 2)



Rule 5. Inverter should be installed at eye level for convenient maintenance.


Rule 6. Product label on inverter should be clearly visible after installation.

Rule 7. Leave enough space around inverter following the values on pic 3.



 Inverter cannot be installed near flammable, explosive or strong electromagnetic equipment.[1]

2.3.2 MOUNTING

 Remember that this inverter is heavy! Please be careful when lifting out from the package.[2]

The inverter is suitable for mounting on concrete or other non-combustible surface Only.

<p>STEP1</p> <ul style="list-style-type: none"> •Please use the mounting bracket as a template to drill 3 holes on right positions (Pic 4) •Use expansion bolts in accessory box and fix the mounting bracket onto the wall tightly. <p>NOTE: Bearing capacity of the wall must be higher than 19KG, otherwise may not be able to keep inverter from dropping.</p>	
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<p>STEP2</p> <p>Carry the inverter by holding the heating sink on two sides and Place the inverter on the mounting bracket.</p> <p>NOTE: Make sure the heat sink on inverter is rightly joint with mounting bracket.</p>	
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<p>STEP3</p> <p>Ground cable shall be connected to ground plate on grid side.</p>	
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<p>STEP4</p> <p>A lock could be used for anti-theft if it is necessary for individual requirement.</p>	
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2.4 ELECTRICAL WIRING CONNECTION

2.4.1 BATTERY CONNECTION


- For lithium battery (pack) the capacity should be 25Ah or larger. Lead acid batteries are not allowed to use with inverters without authority. Battery cable requirement as below. (Pic 8).


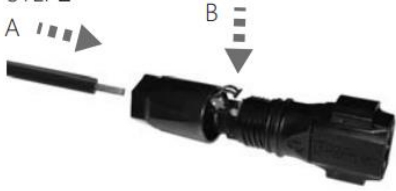
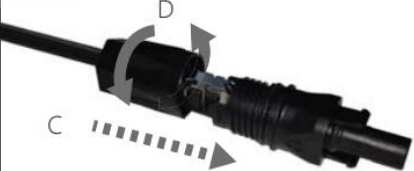



Grade	Description	Value
A	Out side Diameter	5.5-8.0mm
B	Conduct Wire Length	7mm
C	Conduct Core Section	4-6mm ²

- Please be careful against any electric shock or chemical hazard.
- Make sure there is an external DC switch ($\geq 50A$) connected for battery without attached DC switch.

Battery wiring connection steps as below:

	<p>Make sure battery switch is off and battery nominal voltage meet SPA specification before connecting battery to inverter. Make sure inverter is totally isolated from AC power.[3]</p>
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<p>STEP1</p>  <p>Open the spring using a screwdriver</p>	<p>STEP2</p>  <p>Carefully insert the stripped wire with twisted litz wires all the way in(A) .The litz wire ends have to be visible in the spring. Close the spring.Make sure that the spring is snapped in(B) .</p>
<p>STEP3</p>  <p>Push the insert into the sleeve(C) Tighten the cable gland to 2 Nm(D) Use a suitable and calibrated torque wrench size 15. Use an open-iaw wrench, size 16, to hold the connector in place</p>	<p>STEP4</p>  <p>Fit the two connectors together until the connection audibly locks into place. Check to make sure the connection is securely locked.</p>

* For the compatible lithium batteries connection, please refer to battery connection part in **eCactus-SPA series QUICK INSTALLATION INSTRUCTIONS.**

•BATTERY PROTECTION DESCRIPTION

Battery will act a protective charge/discharge current limitation under any condition as below:

- Battery SOC is lower than 1-DOD.
- Battery voltage lower than discharge voltage.
- Battery over temperature protection.
- Battery communication abnormal for lithium battery.
- BMS limitation for lithium battery When charge/discharge current limitation protection.
- Under on-grid mode, battery charge/discharge operation could be abnormal Under off-grid mode, Back-Up supply will shut down.

•NOTE:

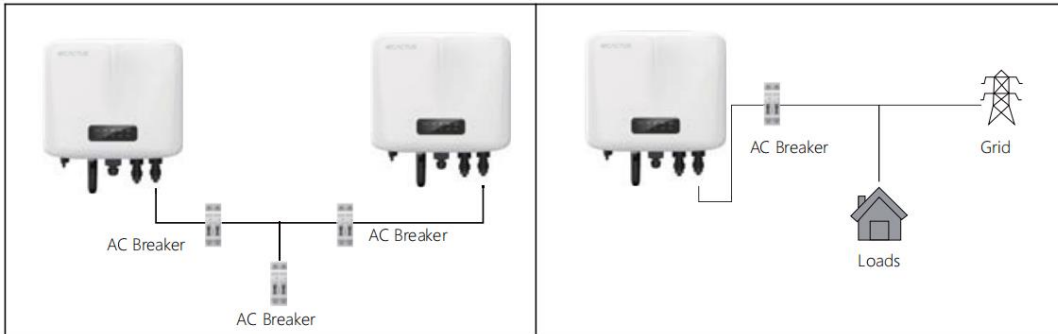
- Under on-grid mode, battery is protected from over discharge by DOD and discharge voltage, under off-grid mode, it is protected by only discharge voltage and DOD.
- The DOD setting of a battery prevents the inverter from discharging battery reserve power. As soon as the DOD is reached the load of building will only be supported by either PV power or from the grid. If there are continuous days when little or no battery charging occurs, the battery may continue to self-consume energy to support communications with the inverter. This behavior is different between battery manufactures products, however, if the SOC of the battery reaches a certain level the inverter will boost the SOC back up. This protection mechanism safeguards the battery to falling to 0 SOC.

2.4.2ON-GRID & BACK-UP CONNECTION

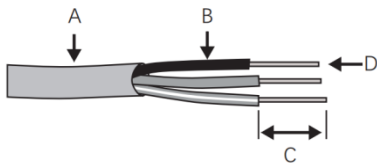
An external AC switch ($\geq 40A$ for SPA 3.68H, $\geq 50A$ for SPA5.0H) is needed for On-Grid and Back-Up connection to isolate from grid when necessary. Below are the requirements on AC switch use.

Note: The absence of AC breaker on Back-Up side will lead to inverter damage if only electrical short-circuit happened on Back-Up side.

- | | |
|--|---|
| 1. Use a separate AC switch for individual inverter (Pic 12) | 2. On AC side, the individual switch should be connected before loads (between inverter and loads) (Pic 13) |
|--|---|



- Requirement on AC cable connected on On-Grid and Back-Up side:




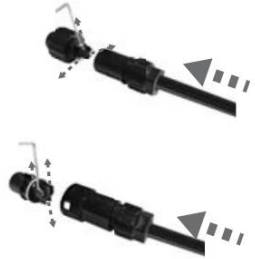
Grade	Description	Value
A	Out side Diameter	13-22mm
B	Separated Wire Length	10-15mm
C	Conduct Wire Length	12-14mm ²
D	Conduct Core Section	8-10mm ²

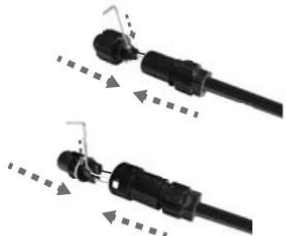
NOTE:


1. Neutral conductor shall be blue, line conductor black or brown (preferred) and protective earth bonding line yellow-green.
2. For AC cables, PE cable shall be longer than N & L cables, so that if in any case AC cable slips or taken out, the protecting earth conductor will be the last to take the strain.

- **On-Grid wiring** connection process is as below:

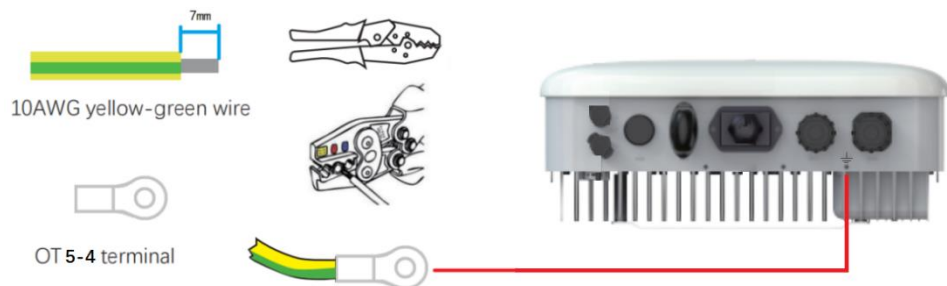
 Make sure inverter is totally isolated from any DC or AC power before connection AC cable^[4]

<p>STEP1</p> <p>1.Prepare the terminals and AC cables</p> <p>2. Put AC cable through terminal cover follow the sequence as on the left</p> <p>Note: Please use the terminals in WH components box.</p>	
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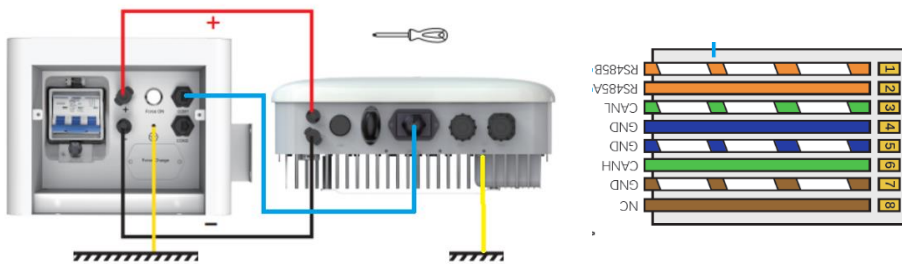
<p>STEP2</p> <p>Press the six connectors on cable conductor core tightly</p> <p>Note: Make sure cable jacket is not locked within the connector.</p>	
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<p>STEP3</p> <p>1.Connect the assembled AC terminals onto inverter.</p> <p>2. Lock the cover and screw the cap on .</p> <p>Note: 1. Make sure it is not connected to a wrong side</p> <p>2. Tightening torque 2-2.5N.m</p>	
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- **PE wiring** connection process is as below:



- Connect **the inverter and the battery box** :



Declaration For Back-Up Loads:

SPA inverter is able to supply a continuous 5000VA output (max 6000VA within 60s) on Back-Up side. And inverter will shut down under full loading with high ambient temperature if grid is absent.

- For complicated application, please contact WH after-sales service.


Declaration For Back-Up Overload Protection

Inverter will restart itself as overload protection happens. The preparation time for restarting will be longer and longer (max one hour) if overload protection incessantly repeats. Take following steps to restart inverter immediately:

- Decrease Back-Up load power within max limitation.

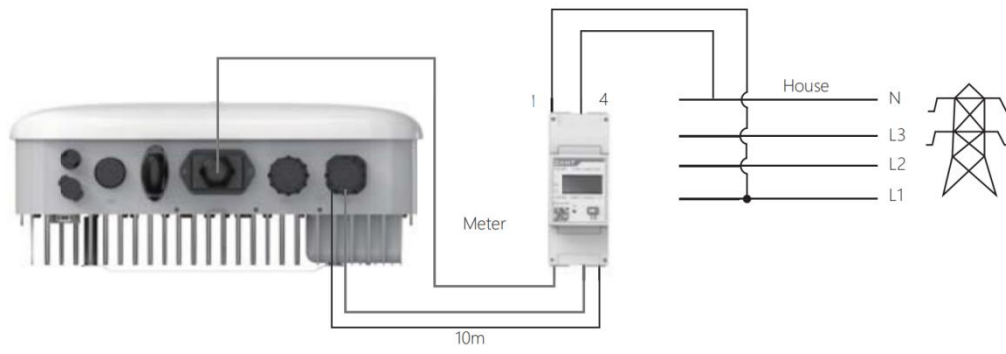
2.4.3 METER CONNECTION

The single-phase meter in eCactus product box is compulsory for eCactus system installation, used to detect grid voltage and current direction and magnitude, further to instruct the operation condition of eCactus inverter via RS485 communication.



Make sure SPA and grid-tied inverters are totally isolated from AC and DC power before connecting

- Single-Phase Wiring (Pic 20)



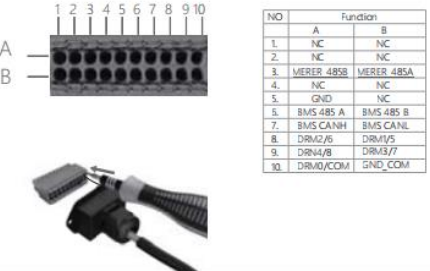



Pic 20

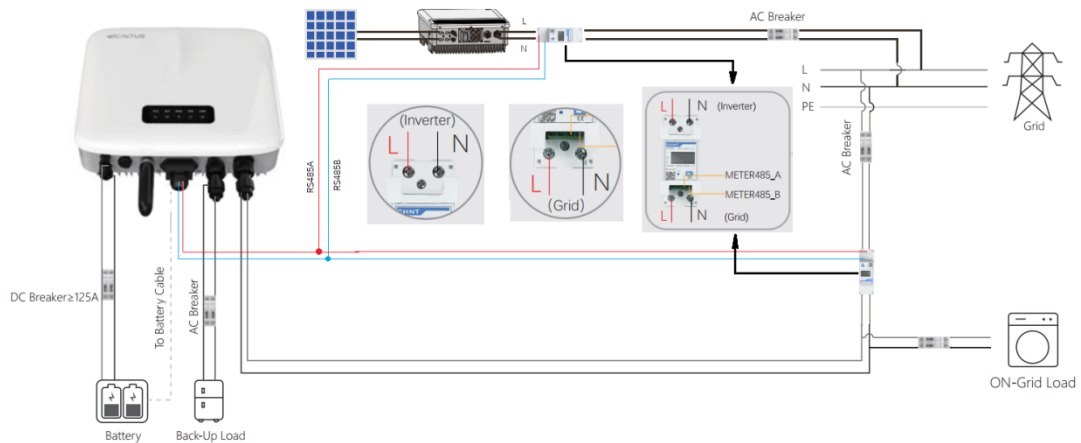
2.5 DRED CONNECTION

DRED is only for Australian and New Zealand installations, in compliance with Australian and New Zealand safety requirements. And DRED device is not provided by WH.

Detailed connection of DRED device is shown below:

<p>STEP1</p> <p>1, Lossen the screws. 2, Screw this plate off from inverter</p>																																		
<p>STEP2</p> <p>1, Put DRED cable through the plate as shown in pic 2, Make DRED cable as shown in pic</p>																																		
<p>STEP3</p> <p>1. Connect cable on function of each connection position as shown in pic</p>	 <table border="1" data-bbox="1166 1173 1337 1346"> <thead> <tr> <th>NO</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>NC</td> <td>NC</td> </tr> <tr> <td>2.</td> <td>NC</td> <td>NC</td> </tr> <tr> <td>3.</td> <td>MERER_485B</td> <td>MERER_485A</td> </tr> <tr> <td>4.</td> <td>NC</td> <td>NC</td> </tr> <tr> <td>5.</td> <td>GND</td> <td>NC</td> </tr> <tr> <td>5.</td> <td>BMS_485_A</td> <td>BMS_485_B</td> </tr> <tr> <td>7.</td> <td>BMS_CANH</td> <td>BMS_CANL</td> </tr> <tr> <td>8.</td> <td>DRM42/S</td> <td>DRM42/S</td> </tr> <tr> <td>9.</td> <td>DRM4/B</td> <td>DRM4/B</td> </tr> <tr> <td>10.</td> <td>DRM0/COM</td> <td>GND_COM</td> </tr> </tbody> </table>	NO	A	B	1.	NC	NC	2.	NC	NC	3.	MERER_485B	MERER_485A	4.	NC	NC	5.	GND	NC	5.	BMS_485_A	BMS_485_B	7.	BMS_CANH	BMS_CANL	8.	DRM42/S	DRM42/S	9.	DRM4/B	DRM4/B	10.	DRM0/COM	GND_COM
NO	A	B																																
1.	NC	NC																																
2.	NC	NC																																
3.	MERER_485B	MERER_485A																																
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5.	GND	NC																																
5.	BMS_485_A	BMS_485_B																																
7.	BMS_CANH	BMS_CANL																																
8.	DRM42/S	DRM42/S																																
9.	DRM4/B	DRM4/B																																
10.	DRM0/COM	GND_COM																																
<p>STEP4</p> <p>1, Locking the srews. 2, Screw this plate in to inverter</p>																																		

•SYSTEM CONNECTION DIAGRAMS



* The neutral continuity is maintained already internally when changing from on-grid to standalone mode, no need external wiring.

*This inverter includes an integrated residual current device (RCD) .If an external residual current device (RCD) is used, a device of type A should be used, with a tripping current of 30 mA or higher.

• **shut down and startup procedure**

shut down procedure	startup procedure
Step 1: turn off AC Breaker of EPS	Step 1: turn on DC Breaker of Battery
Step 2: turn off AC Breaker of Grid	Step 2: turn on AC Breaker of Grid
Step 3: turn off DC Breaker of Battery	Step 2: turn on AC Breaker of EPS

3.eCactus ECOS User Manual

3.1 ECOS APP WIFI CONFIGURATION

This document briefs the eCactus ECOS smart monitoring system.


This document is for the end user or customer. If there is any question, you are always welcomed to contact us.

Web: ecactus.wifopro.com

Email: ecossystem@wifo-china.com

Telephone:+86 0511 85159106 (CN)

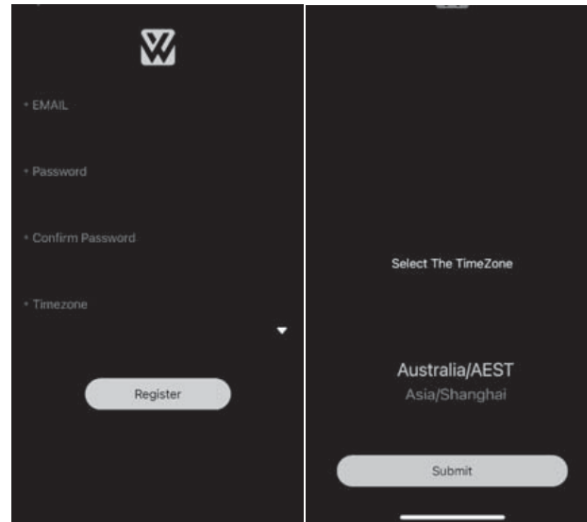
ECOS APP is the only way to connect and activate your device.

1.Download Information	
<p>ECOS is available on apple store and google play.</p>	 The image shows the ECOS app logo. It consists of a rounded square icon with a light gray background. The word "eCACTUS" is written in a stylized, white, sans-serif font across the middle. Below this, there is a dark gray curved shape that resembles a cap or a shadow, and the word "ECOS" is written in a bold, white, sans-serif font on a black background within this shape.

2. Sign Up

a.

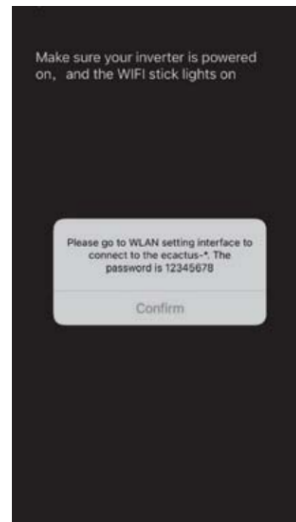
Click the sign up button for the first time using ECOS APP. You are required to provide necessary information to move to the next step. Note: Please choose the TIMEZONE as "Australia/AEST".

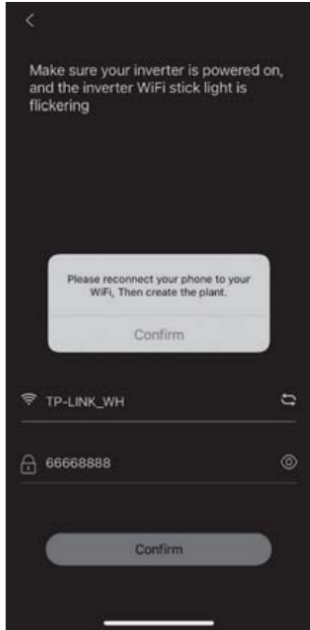


b.

Please make sure your inverter is powered on and the WIFI stick lights on. Click the confirm button, and go to the WLAN setting on your mobile phone to connect to the ecactus-*, the password is 12345678.

Note: When you fail to connect to the ecactus-*, ECOS APP will be forced to stay in the same page until the connection is successful.

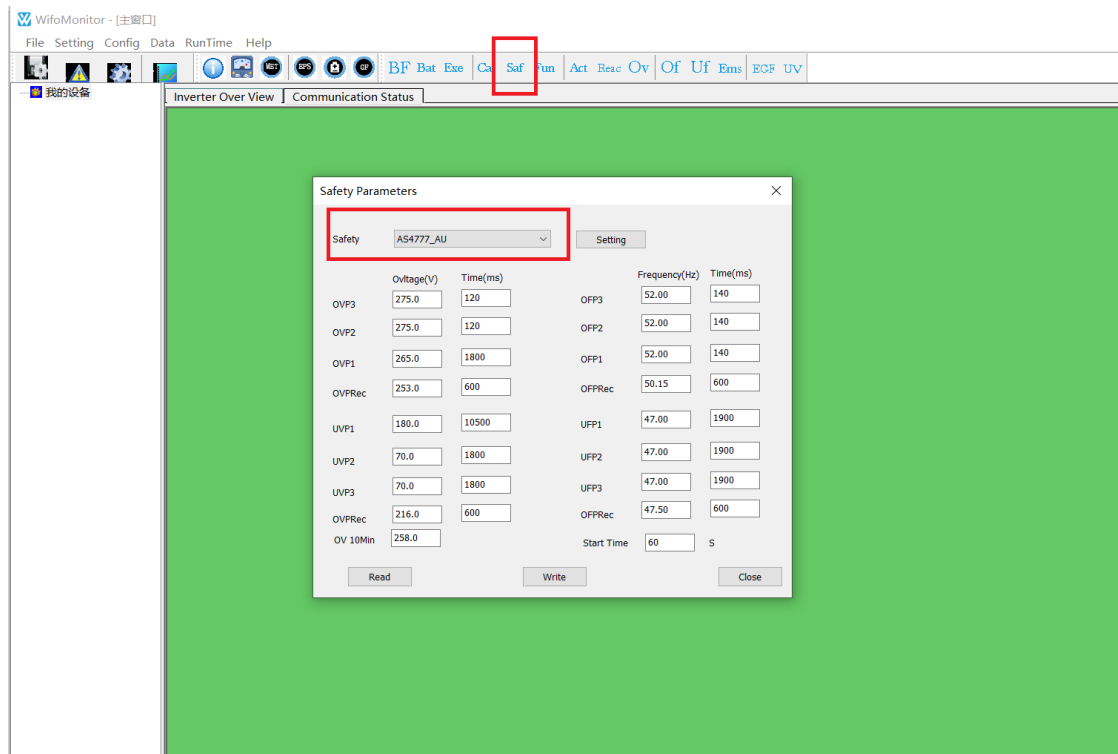


<p>C.</p> <p>After connected to the ecactus-*, you are required to choose your home WLAN signal and fill in the right password in the ECOS APP as below. After that, click the confirm button.</p> <p>Note: You should make sure your inverter is powered on and the inverter WiFi stick light is flickering. You should choose the stable and safe WLAN signal.</p>	
<p>d.</p> <p>You have successfully activate your inverter. Please enter your information as below so we can provide you with fast and good service. Note: The QR is on the WiFi stick.</p>	

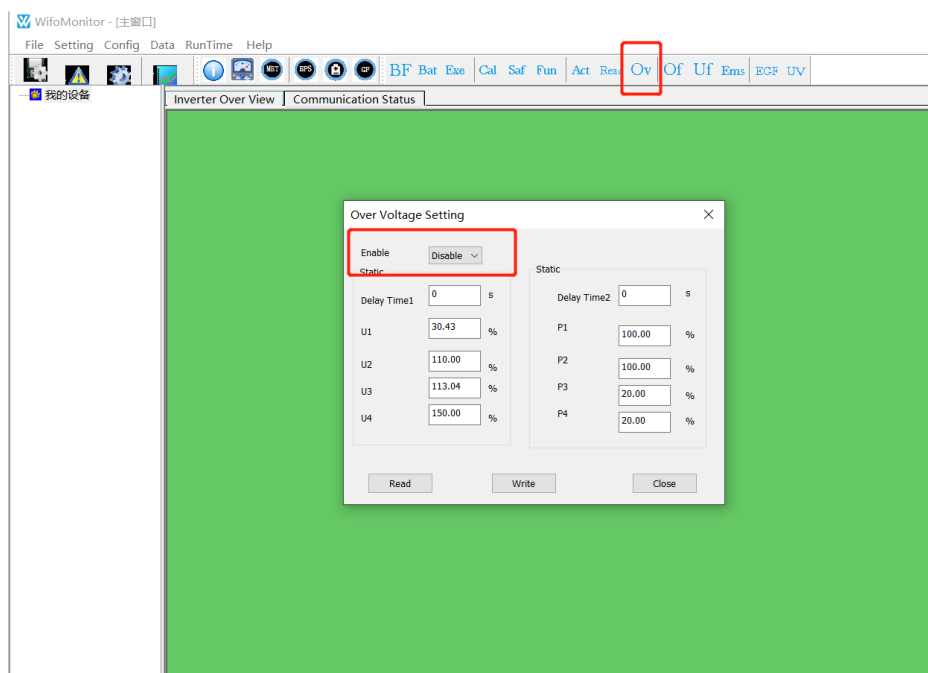
3.2 Wifo Monitor CONFIGURATION

We can change and check the country code and power quality response modes via our configuration software "Wifo Monitor". Please contact our technical support for more information.

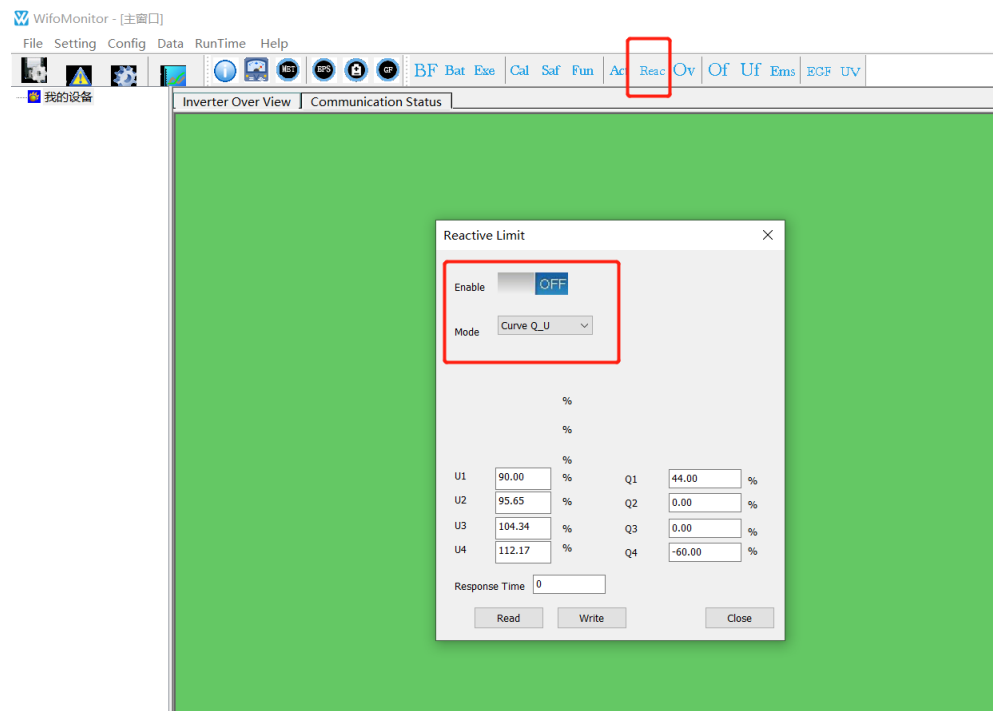
For example: open the Wifo Monitor, click the "Saf" button and open the setting page to change the country code.



Enable/disable the Volt-Watt mode



Enable/disable the Volt-var mode



4. OTHERS

4.1 ERROR MESSAGE AND TROUBLESHOOTING

- **ERROR MESSAGE**

The error messages below will be displayed on PV Master App or report by E-mail if the error really happend.

ERROR MESSAGE	EVENT CODE (DEC)	EXPLANATION	REASON
Utility Loss	10	Not available of public grid power (power loss or on-grid connection fails)	Inverter does not detect the connection of grid
VAC Failure	11	Grid voltage is not within permissible range	Inverter detects that AC voltage is beyond the normal range required by the safety country
FAC Failure	13	Grid frequency is not within permissible range	Inverter detects that Grid frequency is beyond the normal range required by the safety country
Over Temperature	14	Temperature inside of the inverter is too high	Inverter working environment leads to a high temperature condition
Grid-Tied Relay Fault	48	Self-checking of grid-tied relay fails	Neutral & ground cable are not connected well on AC side or just occasional failure
Back-Up Relay Fault	49	Self-checking of Back-Up relay fails	Neutral & ground cable are not connected well on Back-Up load side or just occasional failure
Bypass Relay Fault	50	Self-checking of bypass relay fails	Neutral & ground cable are not connected well between AC side and Back-Up load side or just occasional failure
DC Injection High	15	/	Inverter detects a higher DC component in AC output
Storage IC R/W Failure	51	/	Caused by a strong external magnetic field etc.
Communication Failure	52	Internal communication fails	Caused by a strong external magnetic field etc.
DC Bus High	9	BUS voltage is over-high	/
Back-Up Over Load	39	Back-up side is over loaded	Total Back-Up load power is higher than the nominal backup output power
Inconsistent software version	55	/	The software version of the main and slave CPU is inconsistent

Note: All the errors about battery happen only on Lithium battery with BMS communication.

• TROUBLESHOOTINGS

Checking Before Starting

- ★ Battery Connection: Confirm the connection between S-BP and battery : polarities (+/-) not reversed, refer to Pic 27;
- ★ On-Grid & Back-Up Connection: Confirm ON-GRID connected to power grid and Back-Up to loads : polarity (+/-) not reversed, refer to Pic 28



★ Meter Connection: Confirm the cable connected to the meter is strictly by the label as below.

Checking After Turn On AC Power And Battery Power

★ Battery Connection: BAT led on inverter should be green.

★ On-Grid & Back-Up Connection: Grid led and EPS led on inverter should be green.

★ Meter Connection: After turn on AC power, the GRID led on inverter should be green.

★ Communication:

1. if connection between inverter and wifi stick is OK.

Note: 5 minutes After turn on AC power, the COM led on inverter should be green. You can see your SPA in eCactus APP/Web.

Note: Note: If any led on inverter is red, then please refer to the SPA QUICK INSTALLATION INSTRUCTIONS.

Possible Problems During Operation SPA not Start Up With ONLY Battery

Solution:

1. Make sure the voltage of battery is higher than 85V, otherwise battery cannot start SPA up.

No Discharge or Output From SPA to Support Loads.

Possible Reasons:

1. There is grid-tied inverter connected in the system, and the output power is higher than load power.

2. Battery is not on the condition of discharging, such as low SOC, battery communication fail for lithium batteries etc.

Solutions:

1. Communication between SPA and Meter is OK or not

2. Make sure SOC is higher than 1-DOD. Or if battery discharged to below 1-DOD, then battery will only discharge again when SOC charged to 20%+ (1-DOD) / 2 and SOC > 105% -DOD (if need battery discharge immediately, battery should be restarted)
4. Check on APP if already set charge time, as during charge time, battery will not discharge (battery will charge in priority during coincident time of charge/discharge)

NOTE: In S-BP system, there is usually a grid-tied inverter connected. As system cannot detect power from grid-tied inverter or other power source, thus sometimes when you see the system does not discharge when load power is high, which actually is because of grid-tied production is supporting load.

Battery Does Not Charge

Possible Reason:

1. Battery in S-BP system does not charge automatically unless on conditions as below:
 - a. Battery is under compulsive charging condition (different condition for different battery brands, like some battery will compulsively get charge when SOC is lower than 5%)
 - b. On App, under Economic Mode, here is option to set a charge time, during which battery will get charge compulsively from Grid
 - c. When connecting with a grid-tied inverter or other power source, when load power is lower, the exceed power from grid-tied inverter or sources will charge battery, unless battery is fully charged already.

Questions & Answers (Q & A)

About Wi-Fi Configuration

Q: Why cannot search Solar-WiFi* signal on smart phone?

A: Normally Solar-WiFi* signal can be searched after inverter powered up.

Please check if Wi-Fi module is connected well, and make sure inverter is powered up normally.

NOTE: If Wi-Fi led on inverter is single-blinking (0.5s on & off), then it means Wi-Fi module is not connected or not connected well.

Q: Why cannot connect Solar-WiFi* signal on my mobile device?

A: It is the character of the Wi-Fi module that it can connect to only one device at a time. So please make sure the signal is not connected on other device.

NOTE: Please make sure the password of the Wi-Fi signal (12345678) is not wrong.

About Battery Operation

Q: Why battery does not discharge when grid is not available, while it discharge normally when grid is available?

A: On APP, Back-up function should be turned on to make battery discharge under off-grid mode.

Q: Why there is output on Back-Up side?

A: For Back-Up supply, the “Back-Up” on eCactus App/Web must be turned on.

Q: Why battery switch always trip when starts it up (Lithium battery)?

1.BMS communication fails

2.Battery SOC is too low, battery trips to protect itself

3.An electrical short-cut happened on battery connection side. Or other reasons please contact eCactus for details.

Q: Which battery should I use for SPA?

A: For SPA inverters, it could connect lithium batteries, with nominal voltage 300V, max charge voltage 450V

Compatible lithium batteries for now: Pylon H48050(2~7packs). WH-BX (2~6packs).

About eCactus Operation and Monitoring

Q: Why Cannot save settings on eCactus App?

1.Make sure you connected SPA-WiFi* (make sure no other devices connected) or router (if connected SPA-WiFi* to router) and on APP home page shows connection well.

2.Make sure SPA under waiting mode (on APP) before you change any settings on eCactus APP/Web ---disconnect grid/load, only leave battery connected and then restart SPA till see work mode as “wait” on APP.

Q: On the App, why data on the homepage and Param page are different, like charge/discharge, load or grid value?

A: As the data on APP is from inverter and on home page and Param page, the data refresh frequency is different, so there will be a data inconformity between different pages on APP as well as between that on portal and APP.

Q: On App, some columns show blank, why is that?

A: Blank means App does not receive data from inverter or server, normally it is because communication problem, such as battery communication, and communication between inverter and the APP.

4.2 DISCLAIMER

The SPA series inverters are transported, used and operated under environmental and electrical conditions. WH has the right not providing after-sales services or assistance under following conditions:

- Inverter is damaged during transferring
- Inverter is out of warranty year and extended warranty is not bought
- Inverter is installed, refitted or operated in improper ways without authority from WH
- Inverter is installed or used under improper environment or technical condition mentioned in this user manual, without authority from WH
- Installation or configuration of the inverter does not follow requirements mentioned in this user manual
- The inverter is installed or operated against the requirements or warnings that are mentioned in this user manual
- Inverter is broken or damaged by any force majeure like lightning, earthquake, fire hazard, storm and volcanic eruption etc.
- Inverter is disassembled, changed or updated on software or hardware without authority from WH
- Inverter is installed, used or operated against any related items in international or local policies or regulations
- Any non-compatible batteries, loads or other devices connected to SPA system

Note: WH will keep right to explain all the contents in this user manual.

* Maintenance

The inverter requires periodically maintenance, details as below:

NOTE: Make sure inverter is totally isolated from all DC and AC power for at least 5 mins before maintenance

Heat sink: please use clean towel to clean up heat sink once a year

Torque: please use torque wrench to tighten AC and battery wiring connection once a year

4.3 WARNING QUICK CHECK LIST

[1] Inverter cannot be installed near flammable, explosive or strong electro-magnetic equipment, page 06

[2] Remember that this inverter is heavy! Please be careful when lifting out from the package, page 07

[3] Make sure battery switch is off and battery nominal voltage meet SPA specification before connecting battery to inverter make sure inverter is totally isolated from AC power, page 08

[4] Make sure inverter is totally isolated from any DC or AC power before connection AC cable, page 10

[5] Make sure SPA and grid-tied inverters are totally isolated from AC and DC power before connecting Meter page 12

4.4 TECHNICAL PARAMETERS AND CERTIFICATES

- TECHNICAL PARAMETERS OF SPA INVERTERS

Copia Technical Specs

江苏为恒智能科技有限公司
 JIANGSU WEIHENG INTELLIGENT TECHNOLOGY CO.,LTD.

	WH-SPA3.68H	WH-SPA5.0H
Battery		
Type		Li-Ion
Battery Voltage Range[V]		85-450
Start-up Voltage		90
Max. charge / discharge current[A]	25	25
AC Output/Input Data(On-grid)		
Nominal AC power[W]	3680	5000
Max.Apparent power output to Utility Grid[VA]	3680	5000
Max.Apparent power output from Utility Grid[VA]	7200	10000
Rated grid voltage[V]		230
Rated frequency[Hz]		50/60
Rated AC current to Utility Grid[A]	16	21.7
Max AC current From Utility Grid[A]	32	43.4
Displacement power factor		~1(-0.8~0.8)
Thdi(@Rate power)		<3%
EPS output(with battery)		
EPS rated power [VA]	3680	5000
Apparent power@Peak value[VA]	4320.60SEC	6000.60SEC
Rated/MAX.Output Current(A)	16/18	21.7/24
Switch time between on grid and off grid [ms]		<10
Rated voltage[V]		230(+/-2%)
Rated frequency[Hz]		50/60(+/-0.2%)
Thdv(Linear load)		<3%
Efficiency		
Max. efficiency	96.8%	96.8%
Protect		
Over voltage or low voltage of battery		Integrated
Output short circuit		Integrated
Anti-island		Integrated
Insulation Resistor detection		Integrated
Residual Current detection		Integrated
Output over voltage		Integrated
Output over current		Integrated
Certification		
Safety	IEC62109-1, IEC62040-1, EC62477-1	
EMC	EN61000-6-1/2/3/4	
Normal parameter		
Dimensions (W*H*D)[mm]	370*317*146	
Weight[Kg]	11	
Installation mode	Wall Bracket	
Operating temperature range(°C)	-35~60	
Humidity	0~95%	
Altitude[m]	4000	
Protection class	IP65	
Topology	Transformerless	
Standby consumption[W]	<10W	
Cooling concept	Natural Convection	
Noise emission(typical)[dB]	<25	
Display	LED&APP	
BMS communication BMS	CAN&RS485	
Ammeter communication	RS485	
Network communication	R485, Wi-Fi	

Smax=Rated for AS/NZS 4777.2

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Find more: eactus.wifopro.com

• **CERTIFICATES OF SPA SERIES**



AS62040.1:2019 EN IEC 62040-1:2019
 IEC62477-1:2012 AS/NZS 4777.2:2015
 EN 61000-6-2/3 IEC 61000-3-11/12
 IEC61000-6-2 IEC61000-4-2/3/4/5/6/8

• **OTHER TEST**

For Australian requirements, in the THDi test, there should add Zref between inverter and mains.

RA , XA for Line conductor RN, XN for Neutral conductor

Zref:

RA=0,24 XA=j0,15 at 50Hz RN=0,16 XN=j0,10 at 50Hz.

Appendix: Protection Category Definition

Over voltage Category Definition

Moisture Parameters	Level		
	3K3	4K2	4K4H
Temperature Range	0~+40°C	-33~+40°C	-20~+55°C
Humidity Range	5%~85%	15%~100%	4%~100%

Environment Category Definition

Environment Condition	Ambient Temperature	Relative Humidity	Applied to
Outdoor	-20 ~ 50°C	4%~100%	PD3
Indoor Unconditioned	-20 ~ 50°C	5%~95%	PD3
Indoor Conditioned	0 ~ 40°C	5%~85%	PD2

Pollution Degree Definition

Pollution Degree I	No pollution or only dry, non-conductive pollution occurs. The pollution has no influence
Pollution Degree II	Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.
Pollution Degree III	Conductive pollution occurs, or dry, non-conductive pollution occurs, which becomes conductive due to condensation, which is expected.
Pollution Degree IV	Persistent conductive pollution occurs, for example, the pollution caused by conductive dust, rain and snow.