

Qoltec[®]

Model: 53868, 53869, 53870, 53871

USER MANUAL

Off-Grid Hybrid Solar Inverter

100A 2.5kVA, 3.5kVA, 5.5kVA

120A 6,2kVA

Table of Contents

Introduction

Information about this manual

About the product

Installation

- I. Preparation
- II. Installation of the Unit
- III. Connecting the Battery
- IV. Connection of AC inputs/outputs
- V. PV connection
- VI. Final assembly

Operation

- I. Switching on/off
- II. Operating and Display Panel
- III. LCD settings
- IV. Balancing the Battery
- V. Settings for Lithium Batteries

Error codes

Warning indicator

Specifications

Problem solving

INTRODUCTION

Thank you for your trust and for choosing our solar inverter. We are confident that the product will meet your expectations. This manual will help you to familiarise yourself with the device and facilitate the configuration process, as well as help you with any problems that may arise during the operation of the device. In case of any problems, please read this manual before contacting customer service.

INFORMATION ABOUT THIS MANUAL

This manual describes the assembly, installation, operation and troubleshooting of this appliance. Read this manual carefully before installing and operating the appliance. Keep the manual for future reference.

This manual contains safety and installation guidelines, as well as information on tools and wiring.

ABOUT THE PRODUCT

It is a multifunctional inverter, combining the functions of inverter, solar charger and battery charger, offering uninterrupted power support in a single package. The versatile LCD display offers user-configurable and easy-to-access push-button operations such as battery charging current, AC or solar charging priority and allowable input voltage for different applications.

Illustration 1

1. LCD display
2. Status indicator
3. Charging indicator
4. Error indicator
5. Function button
6. Power switch
7. AC input
8. AC output

9. PV input
10. Battery input
11. RS232 communication port
12. RS485 communication port
13. Cable outlet
14. Grounding

INSTALLATION

I. Preparation

Inspect the unit before installation. Make sure that nothing inside the packaging is damaged. You should receive the following items inside the packaging: Solar inverter, User manual

Before connecting all the cables, remove the lower cover by unscrewing the two screws as shown below.

Illustration 2

II. Installation of the Unit

Illustration 3

Consider the following points before selecting an installation site:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface.
- Install this inverter at eye level so that the LCD display is always visible.
- The ambient temperature should be between 0°C and 55°C for optimum performance.
- Recommended mounting position is against the wall vertically.
- Make sure other objects and surfaces are positioned as shown in the right diagram to ensure adequate heat dissipation and to have sufficient space for cable removal.

NOTE : SUITABLE FOR INSTALLATION ONLY ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE.

Mount the unit by tightening the three screws. It is recommended to use M4 or M5 screws.

Figure 4

III. Connecting the Battery

NOTE: The installation of a separate DC current protection or disconnecting device between the battery and the inverter is required for safe operation and regulatory compliance. It may not be required to have a disconnecting device in some applications, but current protection is still required. Please refer to the typical amperage in the table below as the required fuse or breaker size.

Isolation length:

WARNING: All wiring work must be carried out by qualified personnel.

WARNING: It is very important for system safety and efficient operation to use the correct cable for the battery connection. To reduce the risk of injury, use the recommended cable, stripping length (L2) and tinning length (L1) as below.

Recommended battery cable stripping length (L2) and tinning length (L1):

Illustration 5

Model	Maximum intensity	Battery Capacity	Cable size	Cable mm²	L1 (mm)	L2 (mm)	Torque value
1500W-24	70A	100AH	6AWG	13.3	3	18	2~3 Nm
2500W-24	100A	100AH	4AWG	21.15	3	18	2~3 Nm
Other Models	137A	100AH	2AWG	38	3	18	2~3 Nm

Steps to connect the batteries:

1. Remove 18 mm of insulation for positive and negative wires, according to the recommended stripping length.
2. Connect all battery packs as required by the unit. It is recommended to use the recommended battery capacity.
3. Slide the battery cable flat into the inverter battery connector and ensure that the screws are tightened to a torque of 2-3 Nm. Ensure that the polarity on both the battery and the inverter/charger is correctly connected and that the battery cables are screwed firmly into the battery connector.

Figure 6

WARNING: Electrical shock hazard

Installation must be carried out carefully due to the high battery voltage in the series.

CAUTION: Do not place anything between the flat part of the inverter terminal, otherwise overheating may occur.

NOTE: Do not apply antioxidant to the terminals before they are thoroughly connected.

NOTE: Before making the final DC connection or closing the DC switch/switch, ensure that the positive (+) pole is connected to the positive (+) pole and the negative (-) pole to the negative (-) pole.

IV. Connection of AC inputs/outputs

NOTE: A separate AC breaker must be installed between the inverter and the AC power source before connecting to the AC power source. This will ensure that the inverter can be safely disconnected during maintenance and is fully protected from over current AC input. The recommended specification for the AC breaker is 50A.

NOTE: There are two terminal blocks marked "IN" and "OUT". Please do NOT confuse input and output.


WARNING: All wiring work must be carried out by qualified personnel.


WARNING: It is very important for system safety and efficient operation to use the correct cable to connect the AC input. To reduce the risk of injury, use the recommended cable size as below.

Recommended cable requirements for AC cables:

Model	Cross-section	Torque value
1.5KVA	12AWG	1.4~ 1.6Nm
2.5KVA/3.5KVA	10AWG	1.4~ 1.6Nm
5.5KVA/6.2KVA	8 AWG	1.4~ 1.6Nm

Steps to connect AC input/output:

- a) Make sure the DC switch is open before making the AC input/output connection.
- b) Remove 10 mm of insulation for the six wires. And shorten the L phase wire and N neutral wire by 3 mm.
- c) Insert the AC input wires according to the polarity indicated on the terminal block and tighten the terminal screws. Make sure to connect the PE protective conductor first 

 -> GROUND (yellow-green)

L→LINE (brown)


N→NEUTRAL (blue).

Figure 7

Warning : Ensure that the AC power source is disconnected before attempting to connect it to the unit.

- d) Then connect the AC output wires according to the polarity indicated on the terminal block and tighten the terminal screws. Connect the PE protective conductor first .

Figure 8

 -> GROUND (yellow-green)

L→*LINE* (brown)

N→*NEUTRAL* (blue).

e) Ensure that the cables are connected correctly.

NOTE: Appliances such as the air conditioner require at least 2~3 minutes to restart, as this is required to have enough time to balance the refrigerant gas inside the circuits. If there is a power shortage and it is restored within a short time, this will damage the connected appliances. To prevent this type of damage, check with the air conditioner manufacturer before installation whether the air conditioner is equipped with a time delay function. Otherwise, this inverter/charger will trigger an overload fault and cut off the output to protect the unit, but sometimes still cause internal damage to the air conditioner.

V. PV connection

NOTE: A DC circuit breaker must be installed separately between the inverter and the photovoltaic modules before connection to the photovoltaic modules.

WARNING! All wiring must be carried out by qualified personnel.

WARNING! It is very important for the safety of the system and efficient operation to use the correct cable to connect the photovoltaic module.

To reduce the risk of injury, use the correct recommended cable size, as below.

Model	Typical Amperage	Cable Size	Torque
1.5KVA	15A	12 AWG	1.4~1.6 Nm
2.5KVA	15A	12 AWG	1.4~1.6 Nm
3.5KVA	15A	12 AWG	1.4~1.6 Nm
5.5KVA	18A	12 AWG	1.4~1.6 Nm
6.2KVA	27A	12 AWG	1.4~1.6 Nm

PV module selection:

When choosing the right photovoltaic modules, the following parameters should be taken into account:

1.The open circuit voltage (Voc) of the photovoltaic modules does not exceed the maximum open circuit voltage of the inverter.

2.The open circuit voltage (Voc) of the photovoltaic modules should be higher than the minimum battery voltage.

Solar Charging Mode					
INVERTER MODEL	1.5KVA	2.5KVA	3.5KVA	5.5KVA	6.2KVA
Max. PV Array Open Circuit Voltage	500DC				
PV Array MPPT Voltage Range	60VDC~500VDC				
Max. PV INPUT CURRENT	15A	15A	15A	18A	27A

Ensure that the open circuit voltage (Voc) of the PV panel is less than 450 VDC in the coldest conditions. The open circuit voltage (Voc) of the PV should be greater than 120V.

Connect the positive (+) and negative (-) poles to the corresponding terminal on the inverter.

WARNING: Ensure that the positive (+) pole is connected to the positive (+) and the negative (-) pole to the negative (-).

	SOLAR INPUT	Number of panels	Total input power	Model
Solar panel specification. (reference) - 450Wp	2 units in series	2	900 W	1.5KVA-6.2KVA
	3 units in series	3	1,350 W	
	4 units in series	4	1,800 W	
	5 units in series	5	2,250 W	
	6 pieces in series	6	2,700 W	

- Vmp: 34.67Vdc - Imp: 13.82A - Voc: 41.25Vdc - Isc: 12.98A	7 pieces in series	7	3,150 W	5.5KVA-6.2KVA
	8 units in series	8	3,600 W	
	9 pcs in serial	9	4,050 W	
	10 pcs in serial	10	4,500 W	
	11 pcs in serial	11	4,950 W	6.2KVA
	12 pcs in serial	12	5,400 W	
	6 pieces in serial and 2 sets in parallel	12	5,400 W	
	7 pieces in serial and 2 sets in parallel	14	6,300 W	
Solar panel specification. (reference - 550Wp - Vmp: 42.48Vdc - Imp: 12.95A - Voc: 50.32Vdc - Isc: 13.70A	SOLAR INPUT	Number of panels	Total input power	Model
	2 units in series	2	900 W	1.5KVA-6.2KVA
	3 units in series	3	1,650 W	
	4 units in series	4	2,200 W	
	5 units in series	5	2,750 W	
	6 pieces in series	6	3,300 W	
	7 pieces in series	7	3,850 W	5.5KVA-6.2KVA
	8 units in series	8	4,400 W	
	9 pieces in series	9	4,950 W	
	4 series sets and 2 parallel sets	8	4,400 W	6.2KVA
	5 series sets and 2 parallel sets	10	5,500 W	

6 series sets and 2 parallel sets	12	6,600 W	
-----------------------------------	----	---------	--

Wiring connection of the photovoltaic module: *Figure 9*

Follow the steps below to implement the PV module connection:

1. Remove 10 mm insulation sleeve for positive and negative cable
Illustration 10
2. Check the correct polarity of the connection cable from the PV modules and PV input connectors. Then connect the positive (+) pole of the connection cable to the positive (+) pole of the PV input connector. Connect the negative (-) pole of the connection cable to the negative (-) pole of the PV input connector.
3. Make sure the cables are connected correctly.

VI. Final assembly

Once all wires are connected, replace the lower cover by tightening the two screws as shown below.

Illustration 11

WORKING WITH THE DEVICE

I. Switching on/off

Illustration 12

Once the unit is properly installed and the batteries are connected, simply press the On/Off switch (located on the case button) to switch the unit on.

II. Operating and display panel

The operation and display panel, shown in the diagram below, is located on the front panel of the inverter. It contains three indicators, four function buttons and an LCD display, indicating operating status, input/output power information and power information.

Illustration 13

LED indicator			Message
AC/INV	Green	Stable	The output is powered directly from the mains "Line Mode"
		Flashing	The output is powered by a battery or PV in battery mode.
CHG	Green	Stable	Battery charged
		Flashing	Battery on charge
FAULT	Red	Stable	An error has occurred in the inverter.
		Flashing	A warning appears in the inverter.

Key functions

Key	Description
ESC	To close the setting mode
UP	To go to the previous setting
DOWN	To move to the next option
ENTER	To confirm a selection in the setting mode or to enter the setting mode

III. Display settings

When the ENTER button is pressed and held for 3 seconds, the unit will enter the setting mode. Press the "UP" or "DOWN" button to select the setting programmes. Then press the "ENTER" button to confirm the selection or the ESC button to exit.

Programme settings

Programme	Description	Selection option	
01	Output source priority: To configure the priority of the load source	Network priority Illustration 14	In the first instance Electricity will be supplied to consumers in the first instance. Solar and battery power will only supply energy to consumers when mains power is unavailable.
		Illustration 15 Priority solar energy	Solar energy provides power to consumers in the first instance. If there is not enough solar energy to supply all connected consumers, battery energy will supply the consumers at the same time. The mains supply will only provide energy to the consumers if one of the conditions occurs: <ul style="list-style-type: none"> - Solar energy is not available - The battery voltage will drop to a low warning voltage or setting point in programme 12.
		SBU priority Illustration 16	Solar energy provides power to consumers in the first instance. If the solar energy is not sufficient to power all connected consumers, the battery energy will

			<p>power the consumers at the same time.</p> <p>The mains supply only delivers power to the consumers when the battery voltage drops to a low warning voltage level or a setting point in programme 12.</p>
		<p>Priority SUB Illustration 17</p>	<p>First the solar energy is charged and then the consumers are powered. If there is not enough solar energy to power all the connected consumers, grid energy supplies the consumers at the same time.</p>
		<p>SUF priority Illustration 18</p>	<p>If the solar energy is sufficient to power all connected consumers and charge the battery, the solar energy can be transferred to the grid. If there is not enough solar energy to power all the connected consumers, energy from the grid will be supplied to the consumers at the same time.</p>
02	<p>Maximum charging current: Used to configure the total charging current for solar and mains chargers.</p>	<p>60A (default) Illustration 19</p>	<p>If you select this option, the permissible charging current range will be from the maximum AC supply charging current to the maximum charging current specified.</p>

	(Maximum charging current = charging current from mains + charging current from solar panels).		However, the charging current must not be lower than the AC charging current set in programme 11.
03	AC input voltage range	Devices (default) Illustration 20	If selected, the permissible AC input voltage range will be 90 to 280 V AC.
		UPS Figure 21	If selected, the permissible AC input voltage range will be 170 to 280 V AC.
		Generator Figure 22	If selected, the permissible AC input voltage range will be 170 to 280 V AC and compatible with generators. Note: Due to the instability of the generators, the inverter output may also be unstable.
05	Battery type	AGM(default) Figure 23	Flooded Illustration 24
		User-defined Illustration 25	If the 'User defines' option is selected, the battery charging voltage and low DC cut-off voltage can be set in programmes 26, 27 and 29.

		Illustration 26	Support for the PYLON US2000 protocol version 3.5.
		Illustration 27	Standard communication protocol
		Lithium battery without communication Illustration 28	If 'LIB' is selected, the default battery value will be suitable for a lithium battery without communication. The battery charging voltage and low DC cut-off voltage can be set in programmes 26, 27 and 29.
06	Automatic restart after an overload occurs	Disabling automatic restart Figure 29	Automatic restart enabled (default) Illustration 30
07	Automatic restart when temperature is too high	Disabling automatic restart Illustration 31	Automatic restart enabled (default) Illustration 32
08	Output voltage	220V Illustration 33	230V (default) Illustration 34
		240V Illustration 35	
09	Output frequency	50Hz (default) Illustration 36	60Hz Illustration 37
10	Automatic bypass When 'auto' is selected, if the mains supply is correct, the system will automatically switch to bypass,	Manual (default) Illustration 38	Auto Illustration 39

	even if the switch is in the 'off' position.		
11	Maximum mains charging current	30A (default) Illustration 40 If selected, the allowable charging current range will be from 2 to the maximum AC charging current specified.	
12	Setting the voltage point to the mains source when "SBU priority" or "Solar first" is selected in programme 01.	48V models: 46V (default) The setting range is 44.0V to 57.2V for the 48V model, but the maximum setting must be less than the value in programme 13.	
		24V models: 23V (default) The setting range is 22.0V to 28.6V for the 24V model, but the maximum setting value must be less than the value in programme 13.	
13	Setting the voltage point to battery mode when "SBU priority" or "Solar first" is selected in programme 01.	Battery fully charged (default) Illustration 41	48V models: The setting range is from 48V to the full value (the value in programme 26 minus 0.4V), but the maximum setting value must be greater than the value in programme 12. 24V models: The setting range is from 24V to the full value (programme value 26 minus 0.4V), but the maximum setting value must be greater than the value in programme 12
16	Priority of charging source: Used to configure the priority of the charging source.	If this inverter/charger is operating in Line, Standby or Fault mode, the charging source can be programmed as follows:	
		Solar energy (default) Illustration 42	Solar energy will take precedence when charging the batteries.

			Mains power will only charge the battery when solar power is not available.
		Solar energy and the grid at the same time Illustration 43	Solar energy and mains power will charge the battery simultaneously.
		Solar energy only Illustration 44	Solar energy will be the sole source of charging, regardless of the availability of mains power.
		If this inverter/charger is operating in battery mode, the only source of battery charging will be solar energy. The battery will only be charged when solar energy is available and sufficient.	
18	Audible signalling mode	Mode 1 Illustration 45	Deactivation of acoustic signalling
		Mode 2 Illustration 46	The audible alarm sounds when the power source changes or a specific warning or fault occurs.
		Mode 3 Illustration 47	The audible signal is activated when a specific warning or fault occurs.
		Mode 4 (default) Illustration 48	The audible signal is activated when a fault occurs.
19	Automatic return to default display screen	Return to default display screen (default) Illustration 49	If this option is selected, regardless of which screen the user is on, the screen will automatically return to the default display screen (input/output voltage) after 1 minute without pressing any button.

		Stay on the last screen Illustration 50	If this option is selected, the display screen will remain at the last screen the user selected.
20	Backlighting control	Backlight on (default) Illustration 51	Backlight off Illustration 52
23	Overload workaround: When enabled, the unit will switch to mains power mode if there is an overload in battery mode.	Bypass disabled Illustration 53	Workaround enabled (default) Illustration 54
25	Modbus id setting	Modbus identifier setting range: 001 (default) ~ 247 Illustration 55	
26	Buffer charging voltage (C.V.)	If "User-defined" is selected in programme 5, this programme can be set. However, the setting value must be equal to or greater than the value in program 27. An increase of 0.1V is possible with each click. 24V models: default 28.2V, setting range is 24.0V to 30.0V. 48V models: default 56.4V, setting range is 48.0V to 62.0V.	
27	Sustaining charge voltage	If 'User-defined' is selected in programme 5, this programme can be set. 24V models: 27.0V by default, the setting range is from 24.0V to the value in programme 26. 48V models: default 54.0V, the setting range is from 48.0V to the value in programme 26.	
29	Low DC cut-off voltage	If "User-defined" is selected in program 5, this program can be set. The setting value must be less than the value in program 12. An increase of 0.1V is possible with each click. The low DC cut-off voltage will be fixed at the selected value, regardless of the connected load.	

		<p>24V models: default 21.0V, setting range is 20.0V to 27.0V.</p> <p>48V models: default 42.0V, setting range is 40.0V to 54.0V.</p>	
32	Buffer charging time (C.V. stage)	Automatic (default) Illustration 56	If this option is selected, the inverter will automatically assess the charging time.
		5 min Illustration 57	The setting range is from 5 minutes to 900 minutes. Increasing the value by 5 minutes is possible with each click.
		900min Illustration 58	
		If 'USE' is selected in programme 05, this programme can be set.	
33	Balancing the battery	Balancing the battery Illustration 59	Battery balancing off (default) Illustration 60
		If 'Flooded' or 'User-defined' is selected in programme 05, this programme can be set.	
34	Battery voltage balancing	<p>24V models: default 29.2V. The setting range is from holding voltage to 30V. Increases of 0.1V are possible with each click.</p> <p>48V models: 58.4V by default. The setting range is from holding voltage to 64V. Increases of 0.1V are possible with each click.</p>	
35	Battery balancing time	60 min (default) Illustration 61	The setting range is from 0 minutes to 900 minutes.
36	Battery balancing time	120min (default) Illustration 62	The setting range is from 0 minutes to 900 minutes.
37	Balancing interval	30 days (default) Illustration 63	The setting range is from 1 to 90 days.
39	Immediately activated balancing	Enabled Illustration 64	Off (default) Illustration 65
		If the balancing function is enabled in programme 33, this programme can be set. If "Enable" is selected in this	

		programme, the battery balancing function will be activated immediately and "E9" will be displayed on the main LCD screen. If "Disable" is selected, the balancing function will be cancelled until the next scheduled balancing arrives according to the setting in programme 37. "E9 " will then not be displayed on the main LCD screen.	
41	Automatic activation for lithium batteries	Illustration 66	Deactivation of automatic activation (default)
		Illustration 67	When "Llx" is selected as the lithium battery in Program 05 and when the battery is not detected, the unit automatically activates the lithium battery at the specified time. If you want to automatically activate the lithium battery, you must restart the unit.
42	Manual activation for lithium batteries	Illustration 68	Default: deactivation of activation
		Illustration 69	When 'Llx' is selected as the lithium battery in Programme 05 and the battery is not detected, you can select this option if you want to manually activate the lithium battery at a particular time.
43	Setting the SOC point to the mains power source when "SBU priority" or	Illustration 70	Default 50%. The setting range is from 5% to 50%, but the minimum setting must

	"Solar first" is selected in programme 01.		be greater than the value in programme 45.
44	Setting the SOC (State of Charge) point to battery mode when "SBU priority" or "Solar first" is selected in program 01	Illustration 71	Default is 95%, the setting range is 60% to 100%.
45	Low SOC (state of charge) DC cut-off	Illustration 72	Default 20%, the setting range is 3% to 30%, but the maximum setting value must be less than the value in programme 43.
46	Protection against maximum discharge current	Illustration 73	Default OFF Deactivates maximum discharge current protection function
		Illustration 74	Only available in the unit model. When mains power is available, the unit switches to mains power mode and battery discharge stops when the set battery discharge current is exceeded. When mains power is unavailable, a warning appears and battery discharge continues, despite the battery discharge current exceeding the set value.

IV. Alignment of the battery

A balancing function has been added to the charge controller. It helps to eliminate negative chemical effects such as stratification, a condition in which the acid concentration is greater at the bottom of the battery than at the top. Balancing also helps to remove sulphate crystals that can deposit on the plates. If this condition, known as sulphation, is not controlled, it can reduce the overall capacity of the battery. Therefore, periodic balancing of the battery is recommended.

How to apply the balancing function:

Enable the battery balancing function in the LCD monitor settings in programme 33.

You can then apply this function to your device in one of the following ways:

1. Set the balancing interval in programme 37.
2. Activate balancing immediately in programme 39.

When to align

In the holding mode, when the set time for levelling is reached (battery levelling cycle) or when levelling is immediately activated, the controller will enter levelling mode.

Illustration 75

Equalisation charging time and time limit

In the equalisation stage, the controller provides maximum power to charge the battery until the battery voltage reaches the set equalisation voltage. Constant-voltage charging is then applied to maintain the battery voltage at the equalisation voltage. The battery will remain in the equalisation stage until the set equalisation time is reached.

Illustration 76

However, in the equalisation stage, when the set equalisation time has elapsed and the battery voltage has not reached the set equalisation voltage, the charge controller will extend the equalisation time until the battery voltage reaches the required level. If, after the extended equalisation time, the battery voltage is still lower than the set equalisation voltage, the charge controller will terminate the equalisation process and return to the holding mode.

Illustration 77

V. Settings for the lithium battery

Lithium battery connection

If you choose a lithium battery for the inverter, you can only use the lithium battery that we have configured. There are two connectors on the lithium battery: an RS485 port for communication with the BMS and a power cable.

To connect the lithium battery, follow the steps below:

1. Assemble the battery terminal using the recommended cables and terminal sizes (same as for lead acid batteries)
2. Connect the RS485 port on the battery to the BMS communication port (RS485) on the inverter.

Illustration 78

Lithium battery communication and settings

If you choose a lithium battery, make sure that the BMS communication cable is connected between the battery and the inverter. This communication cable transmits information and signals between the lithium battery and the inverter. This information includes:

1. Reconfiguration of charging voltage, charging current and discharge cut-off voltage according to the parameters of the lithium battery.
2. Starting or stopping charging by the inverter depending on the state of the lithium battery.

Connect the RS485 port on the battery to the RS485 communication port on the inverter.

Ensure that the RS485 port of the battery is connected pin to pin with the inverter. The communication cable is included in the kit and the pin assignment of the inverter's RS485 port is shown below:

Pin	RS485 Port
PIN1	RS485-B
PIN2	RS485-A
PIN7	RS485-A
PIN8	RS485-B

Illustration 79

LCD SETTINGS

Once connected, you must perform and confirm the following settings:

1. Select programme 05 as the lithium battery type.
2. Confirm the setting values for programmes 41/42/43/44/45.

Note: Programmes 43/44/45 are only available with successful communication, they will replace the functions of programmes 12/13/29, which will become unavailable at the same time.

LCD display

If the communication between the inverter and the battery is successful, the following information will appear on the LCD display:

Number	Description	LCD display
1	Successful communication icon	Illustration 80
2	Maximum charging voltage of the lithium battery	For most lithium batteries, the typical maximum charging voltage is 56V Illustration 81
3	Maximum charging current of the lithium battery	Illustration 81
4	Discharging the lithium battery is prohibited	"Li" Will flash every 1 second
5	Charging the lithium battery is prohibited	"Li" Will flash every 2 seconds
6	Lithium battery SOC(%)	Illustration 83 The state of charge of the lithium battery is 63 Ah and 60% of the

Settings for the PYLON US2000 lithium battery

DIP switch:

The accumulator is equipped with 4 DIP switches which are used to set the different baud rates and addresses of the accumulator groups. If the switch position is set to "OFF", this means "0". If the switch position is set to "ON", this means "1".

Dip 1: Set to "ON" represents a transmission rate of 9600 baud.

Dip 2, 3 and 4: These are used to set or change the address of the battery group. DIP switches 2, 3 and 4 on the main battery (first battery) are used to set or change the address of the group.

NOTE: '1' is the top position and '0' is the bottom position.

Illustration 84

Installation process:

Connect the inverter and the lithium-ion battery:

- Use the RS485 cable to connect the inverter to the lithium-ion battery, as shown in Fig.
- Switch on the lithium-ion battery to start the process.

Illustration 85

- Press the button for more than three seconds to activate the lithium-ion battery. The power supply will then be ready for use.

Illustration 86

- Switch on the inverter
- Make sure you select the battery type as 'Li2' in LCD 5.
- If the communication between the inverter and the battery is successful, the battery icon "Li" on the LCD display will light up.

Settings for lithium-ion battery without communication

This suggestion is for the use of lithium-ion batteries and prevents the BMS protection of a lithium-ion battery without communication. Please follow the following steps:

1. Before setting up, you must obtain the battery's BMS specification:
 - Maximum charging voltage
 - Maximum charging intensity
 - Discharge protection voltage
2. Set the battery type to "LIB".

05	Battery type	AGM (default) Illustration 87	Flooded Illustration 88
----	--------------	----------------------------------	----------------------------

		User-defined Illustration 89	If 'User-Defined' is selected, the battery charging voltage and low DC cut-off voltage can be set in programmes 26, 27 and 29.
		Lithium-ion battery without communication Illustration 90	If 'LIB' is selected, the default battery values are suitable for a lithium-ion battery without communication. The battery charging voltage and low DC cut-off voltage can be set in programmes 26, 27 and 29.

3. Set the C.V (charging voltage) to the maximum charging voltage of the BMS minus 0.5 V.

26	Set the charging voltage in bulk mode (C.V voltage) to the maximum BMS charging voltage minus 0.5 V.	If "self-defined" is selected in program 5, this program can be configured. The value of the setting must be equal to or higher than the value in program 27. The stroke of the change at each click is 0.1 V. 24V models: the default value is 28.2 V, the setting range is from 24.0 V to 30.0 V. 48V models: the default value is 56.4 V, the setting range is 48.0 V to 62.0 V.
----	--	---

4. Set the floating charging voltage to the same as the C.V. voltage.

27	Floating charging voltage	If 'self-defined' is selected in programme 5, this programme can be configured. 24V models: the default setting is 27.0 V. The setting range is from 24.0 V up to the value in programme 26. 48V models: the default setting is 54.0 V. The setting range is from 48.0 V to the value in programme 26.
----	---------------------------	--

- Set the low DC cut-off voltage to at least the BMS discharge protection voltage plus 2 V.

29	Low DC cut-off voltage	<p>If 'self-defined' is selected in programme 5, this programme can be configured.</p> <p>The setting value must be less than the value in programme 12.</p> <p>The change stroke at each click is 0.1 V.</p> <p>The low DC cut-off voltage will be set to the set value, irrespective of the connected load.</p> <p>Default settings and ranges:</p> <p>24V models: the default setting is 21.0 V. The setting range is from 20.0 V to 27.0 V.</p> <p>48V models: the default setting is 42.0 V. The setting range is from 40.0 V to 54.0 V.</p>
----	------------------------	---

- Set the maximum charging rate, which must be less than the maximum charging rate specified by the BMS.

02	<p>Maximum charging intensity: The total charging intensity for solar and mains chargers must be configured.</p> <p>Maximum charging rate = charging rate from the grid + charging rate from solar panels.</p> <p>Ensure that the total charging rate does not exceed the maximum charging rate specified by the BMS.</p>	<p>60A (default)</p> <p>Illustration 91</p>	<p>If this option is selected, the permissible charging intensity range will be from 1 to the maximum SPEC charging intensity, but should not be less than the AC charging intensity (programme 11).</p>
----	---	---	--

- Set the voltage point for the return to the power source when selecting "SBU priority" or "Solar first" in program 01. The setting value must be greater than or equal to the low DC cut-off voltage plus 1 V. Otherwise, the inverter will display a low battery voltage warning.

12	<p>Setting of the voltage point for the return to the power source when "SBU priority" or "Solar first" is selected in programme 01.</p> <p>The setting value must be greater than or equal to the low DC cut-off voltage plus 1 V.</p> <p>Otherwise, the inverter will display a low battery voltage warning.</p>	48V models: the default setting is 46 V. The setting range is 44.0 V to 57.2 V for the 48V model, but the maximum setting must be less than the value in programme 13.
		24V models: the default setting is 23 V. The setting range is from 22.0 V to 28.6 V for the 24V model, but the maximum setting must be less than the value in programme 13.

Notes:

It is best to complete the settings without switching on the inverter (let the LCD only display information, without generating output).

After completing the settings, please restart the inverter.

ERROR CODES

Error code	Description	Icon
01	Inverter module overheating	Error number icon
02	DCDC module overheating	
03	Battery voltage is too high	
04	Overheating of the PV module	
05	Short output circuit	
06	Output voltage is too high	
07	Overload - cut-off time	
08	Bus voltage is too high	
09	Failure of the soft-start bus	
10	PV current overload	
11	PV surge	

12	DCDC current overload	
13	Current overload or overvoltage	
14	Bus voltage is too low	
15	Inverter error	
18	OP offset current is too high	
19	Inverter offset current is too high	
20	DC/DC offset current is too high	
21	PV offset current is too high	
22	Output voltage is too low	
23	Negative inverter power	

WARNING INDICATOR

Code	Communication	Alarm	Icon on the display
02	Temperature too high	Three beeps every second	Illustration 92
04	Low battery	One beep every second	Illustration 93
07	Overload	Audible signal every 0.5 seconds	Illustration 94
10	Reduction in output power	Two beeps every 3 seconds	Illustration 95
14	Fan blocked	No	Illustration 96
15	Low energy PV	Two beeps every 3 seconds	Illustration 97
19	Communication with the lithium battery failed	Audible signal every 0.5 seconds	Illustration 98
21	Lithium battery output current is too high	No	Illustration 99
E9	Balancing the battery	No	Illustration 100
bP	Battery not connected	No	Illustration 101

SPECIFICATIONS

Table 1 Line mode specifications

Inverter model	1.5KVA	2.5KVA	3.5KVA	5.5KVA	6.2KVA
Input voltage waveform	Sinusoidal (mains or generator)				
Nominal input voltage	230V AC				
Low loss voltage	170V AC \pm 7V (UPS) 90V AC \pm 7V (Devices)				
Low loss voltage	180V AC \pm 7V (UPS) 100V AC \pm 7V (Devices)				
Voltage at high losses	280V AC \pm 7V				
Return voltage at high losses	270V AC \pm 7V				
Maximum AC input voltage	300V AC				
Nominal input frequency	50Hz / 60Hz (auto detection)				
Frequency at low loss	40 \pm 1Hz				
Return frequency at low losses	42 \pm 1Hz				
Frequency at high losses	65 \pm 1Hz				
Return frequency at high losses	63 \pm 1Hz				
Output short-circuit protection	Battery mode: Electronic circuits				
Efficiency (linear mode)	>95% (at nominal R load, battery fully charged)				
Switching time	10 ms typical (UPS) 20 ms typical (Devices)				
Output power limitation: When the AC input voltage drops to 95V or 170V, depending on the model, the output will be limited.	Illustration 102				

Table 2 Specification - Inverter mode

Inverter model	1.5KVA	2.5KVA	3.5KVA	5.5KVA	6.2KVA
Rated output power	1.5KVA/1.5KW	2.5KVA/2.5KW	3.5KVA/3.5KW	5.5KVA/5.5KW	6.2KVA/6.2KW
Wave form of the output voltage:	Sinus				

Output voltage adjustment:	230Vac±5%	
Output frequency:	50Hz or 60Hz	
Maximum efficiency:	94%	
Peak capacity:	2* rated power for 5 seconds	
Nominal DC input voltage:	24Vdc	48Vdc
Cold start voltage:	23.0Vdc	46.0Vdc
DC low level warning voltage	22.0Vdc 21.4Vdc 20.2Vdc	40.4Vdc 42.8Vdc 44.0Vdc
Return voltage after low DC warning	23.0Vdc 22.4Vdc 21.2Vdc	42.4Vdc 44.8Vdc 46.0Vdc
Low DC cut-off voltage (Only for AGM and Flooded) @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	21.0Vdc 20.4Vdc 19.2Vdc	42.0Vdc 40.8Vdc 38.4Vdc

Table 3 Specifications - charging mode

Utility charging mode					
Model	1.5KVA	2.5KVA	3.5KVA	5.5KVA	6.2KVA

Maximum charging current (PV+AC) (@ VI/P=230Vac).		60Amp	100Amp	100Amp	100Amp	120Amp
Maximum charging current (AC) (@ VI/P=230Vac).		60Amp	80Amp			
Charging voltage in Bulk mode	Flooded battery	29.2VDC			58.4VDC	
	AGM/GEL	28.2VDC			56.4VDC	
Sustaining charge voltage		27VDC			54VDC	
Protection against overcharging		32VDC			63VDC	
Charging algorithm		3-stage				
Charging curve		Illustration 103				
Solar input						
Model	1.5KVA	2.5KVA	3.5KVA	5.5KVA	6.2KVA	
Rated power	2000W	3000W	4000W	5500W	6500W	
Maximum open circuit voltage of the PV array		500Vdc				
MPPT voltage range of the PV set		60Vdc~500Vdc				
Maximum input current	15A	15A	15A	18A	27A	
Maximum charging current (PV)	60A	100A	100A	100A	120A	

Table 4

Model	1.5KVA	2.5KVA	3.5KVA	5.5KVA	6.2KVA
Operating temperature range	-10°C to 55°C				
Storage temperature	-15°C~ 60°C				
Moisture	5% to 95% (non-condensing)				

PROBLEM SOLVING

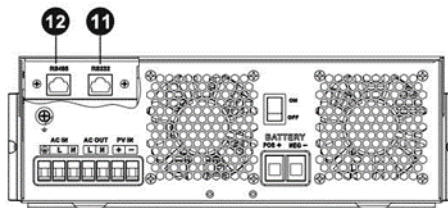
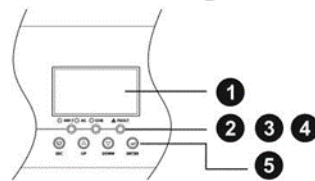
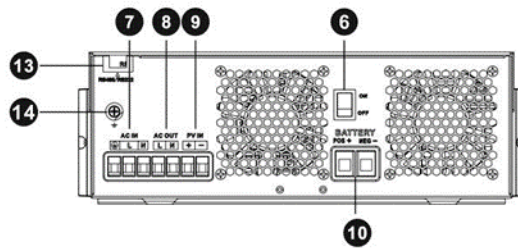
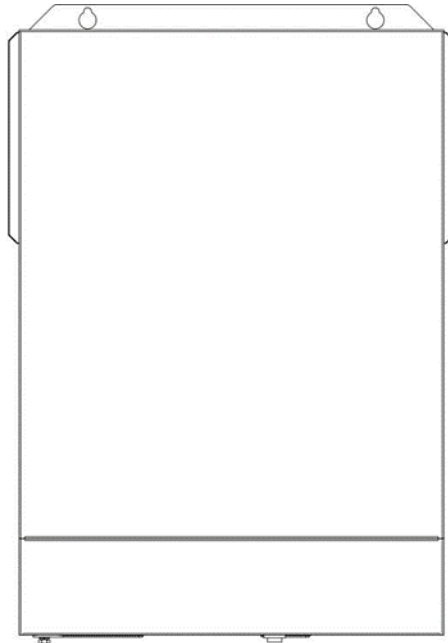
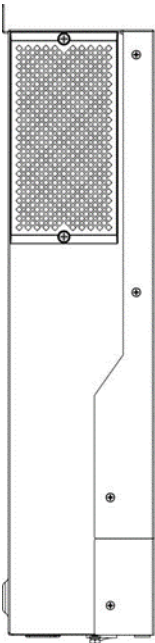
Problem	LCD/LED/Sound	Possible cause	Solution
----------------	----------------------	-----------------------	-----------------

The unit switches off automatically during the start-up process.	The LCD/LED display and beeper will be active for 3 seconds and then switch off completely.	Battery voltage is too low	Charge the battery. Replace the battery.
No response when the power is switched on.	No	Battery voltage is too low. The battery polarity is reversed.	Check that the batteries and cabling are correctly connected. Charge the battery. Replace the battery.
Power is available, but the unit is operating in battery mode.	The input voltage is displayed as 0 on the LCD and the green LED flashes.	Protection against overcurrent or overvoltage at the input has been activated	Check that the AC switch has been turned off and that the AC wiring is properly connected.
	The green LED flashes.	Low quality AC supply (from mains or generator)	Check whether the AC cables are too thin and/or too long. Check that the generator (if used) is operating correctly or that the input voltage range settings are correct. (UPS → Appliance)
	The green LED flashes.	Set "Solar First" as output source priority	Change the priority of the output source to "Utility first".
When the unit is switched on, the internal relay switches on and off repetitively.	The LCD display and LEDs flash.	The battery is disconnected	Check that the battery cables are properly connected.

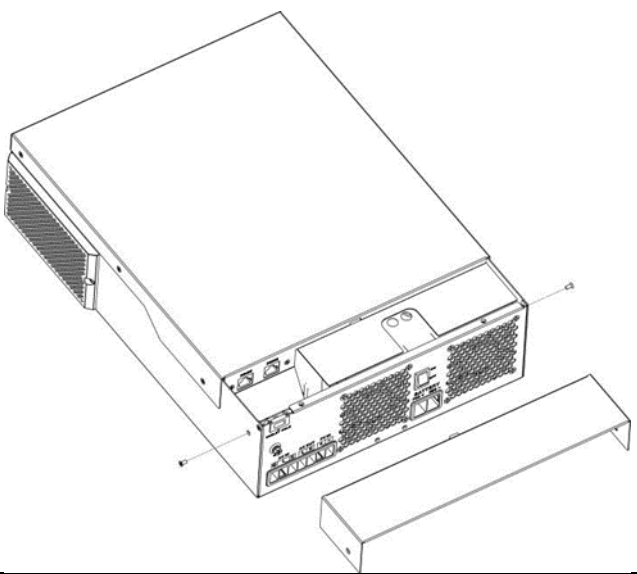
The beeper beeps continuously and the red LED is on.	Error code 07	Overload error. The inverter is overloaded by 110% and the time has expired.	Reduce the load by switching off some devices.
	Error code 05	Short-circuit at the output.	Check that the wiring is correctly connected and remove any abnormal load.
	Error code 02	The internal temperature of the inverter components exceeds 100°C.	Check if the airflow in the unit is blocked or if the ambient temperature is too high.
	Error code 03	The battery is overcharged	Contact the service centre.
		Battery voltage is too high.	Check that the specification and number of batteries meet the requirements.
	Error code 06/22	Incorrect output (Inverter voltage below 190Vac or above 260Vac).	Reduce the load. Contact the service centre.
	Error code 08/09/15	Internal components have failed.	Contact the service centre.
	Error code 13	Overcurrent or overvoltage.	Restart the unit. If the error reappears, please contact the service centre.
	Error code 14	The bus voltage is too low.	
Other error code		If the cables are connected correctly, please contact the service centre.	

Attachment 1

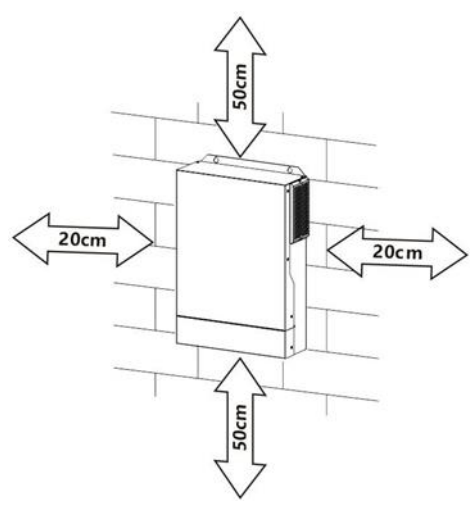
1



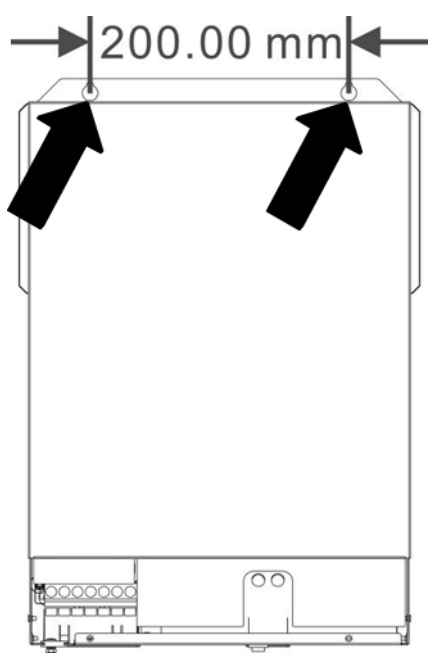
2



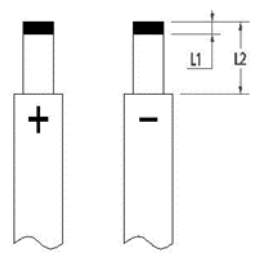
3



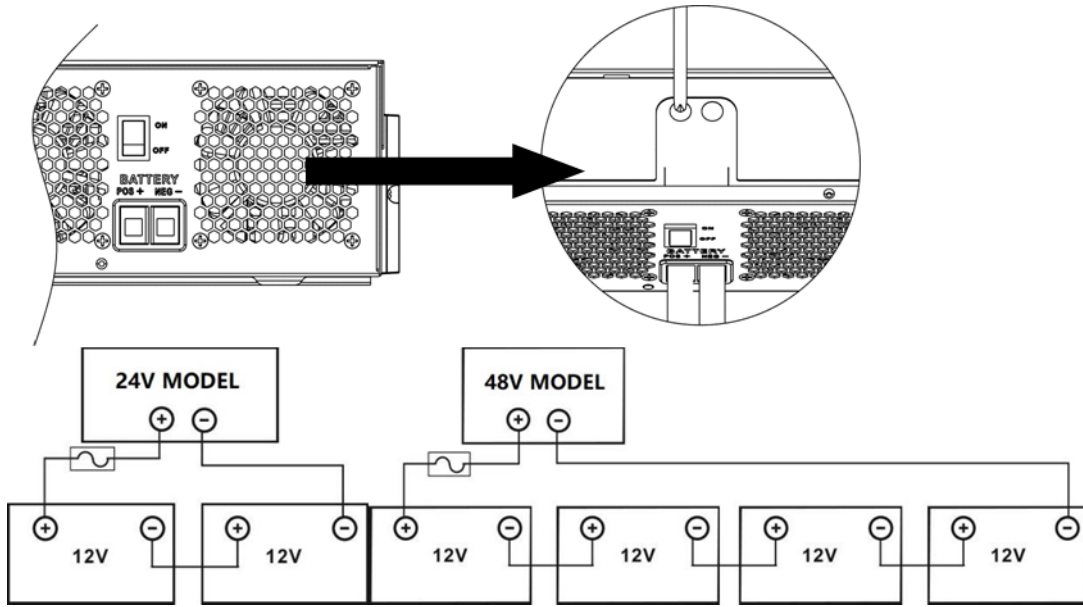
4



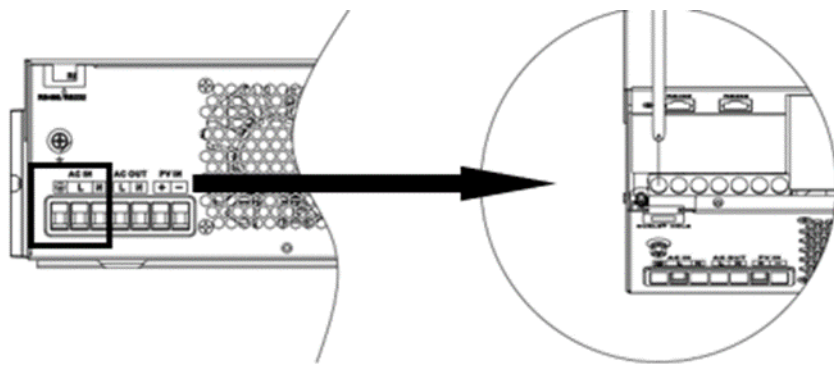
5



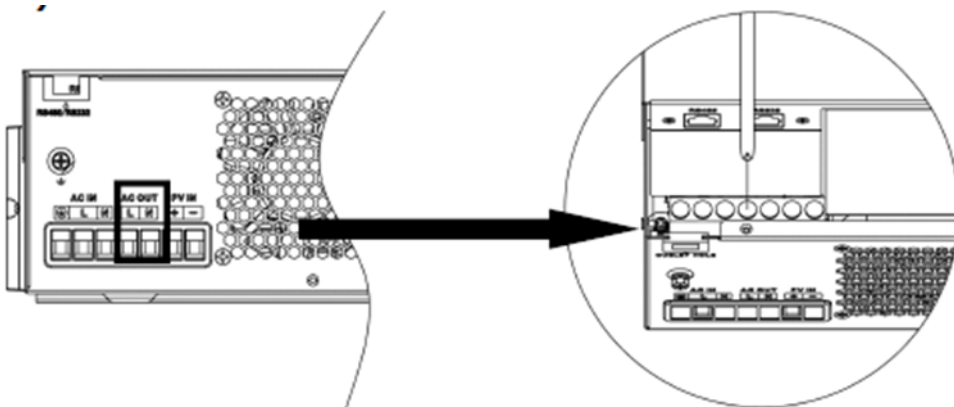
6



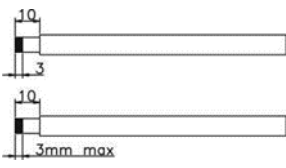
7



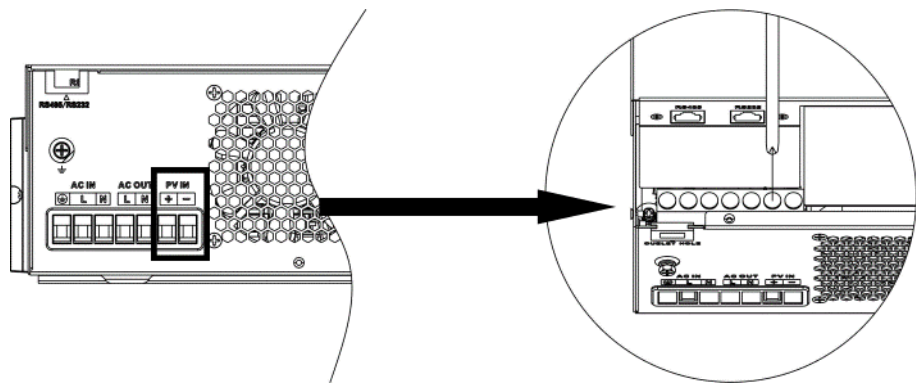
8



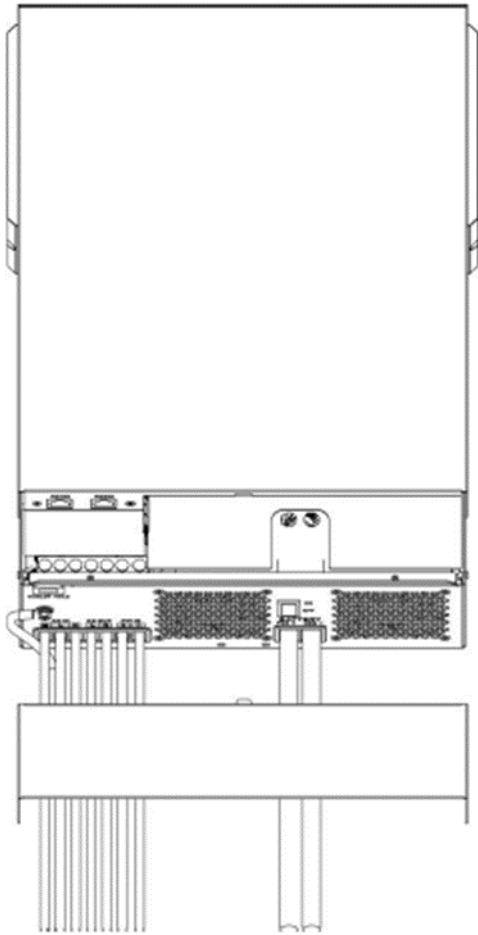
9



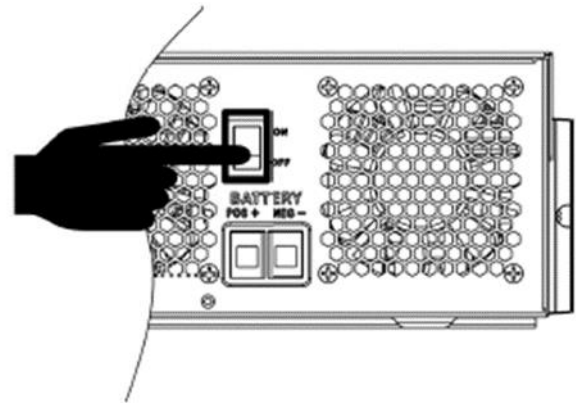
10



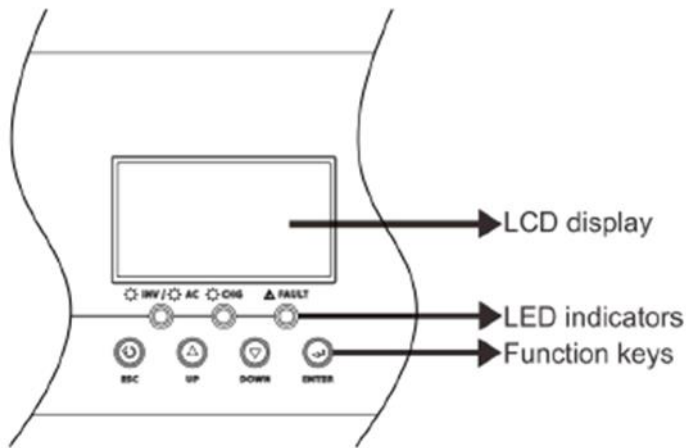
11



12



13

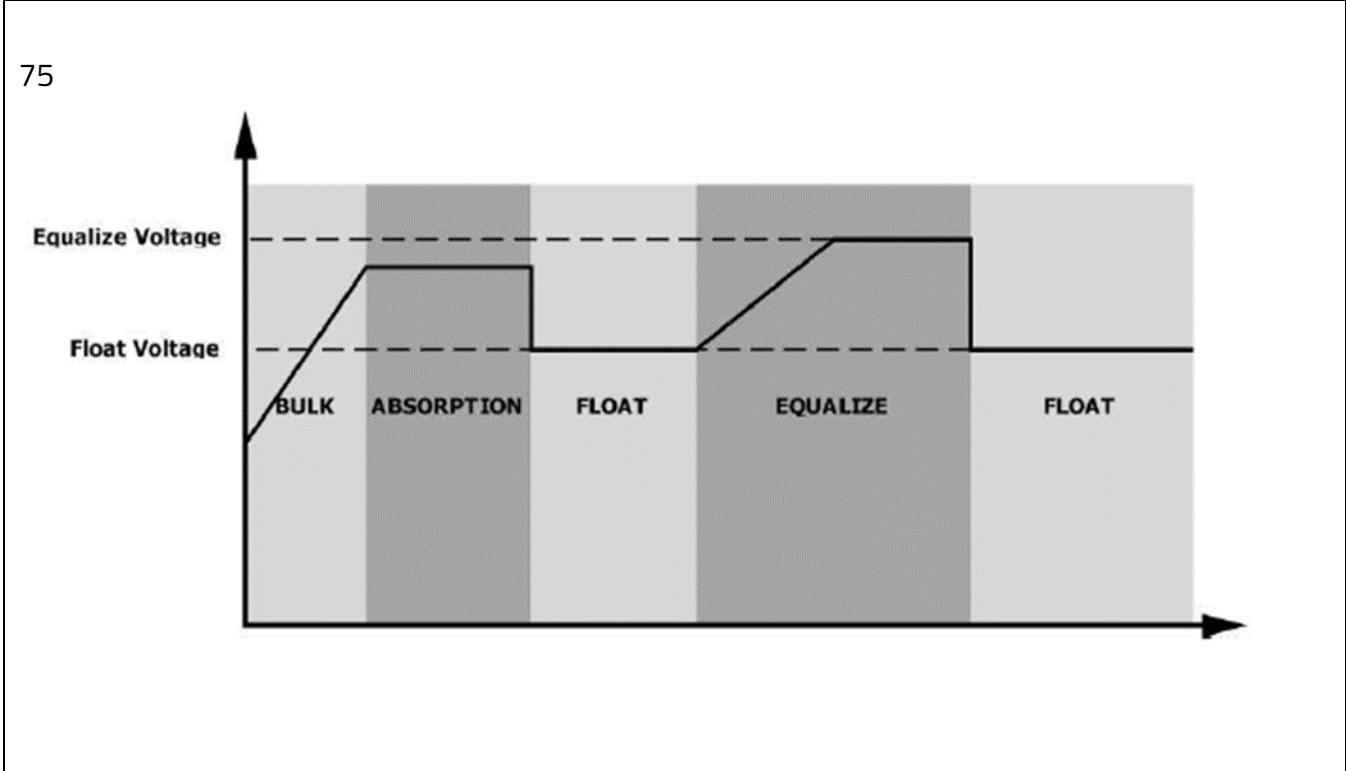


14 01 UTI	15 01 SOL	16 01 SBU
17 01 SUB	18 01 SUF	19 02 60^
20 03 APL	21 03 UPS	22 03 CNT
23 05 AGn	24 05 FLd	25 05 USE
26 05 LI2	27 05 LI4	28 05 LI6
29 06 LId	30 06 LIE	31 07 LId
32 07 LIE	33 08 220 ^v	34 08 230 ^v

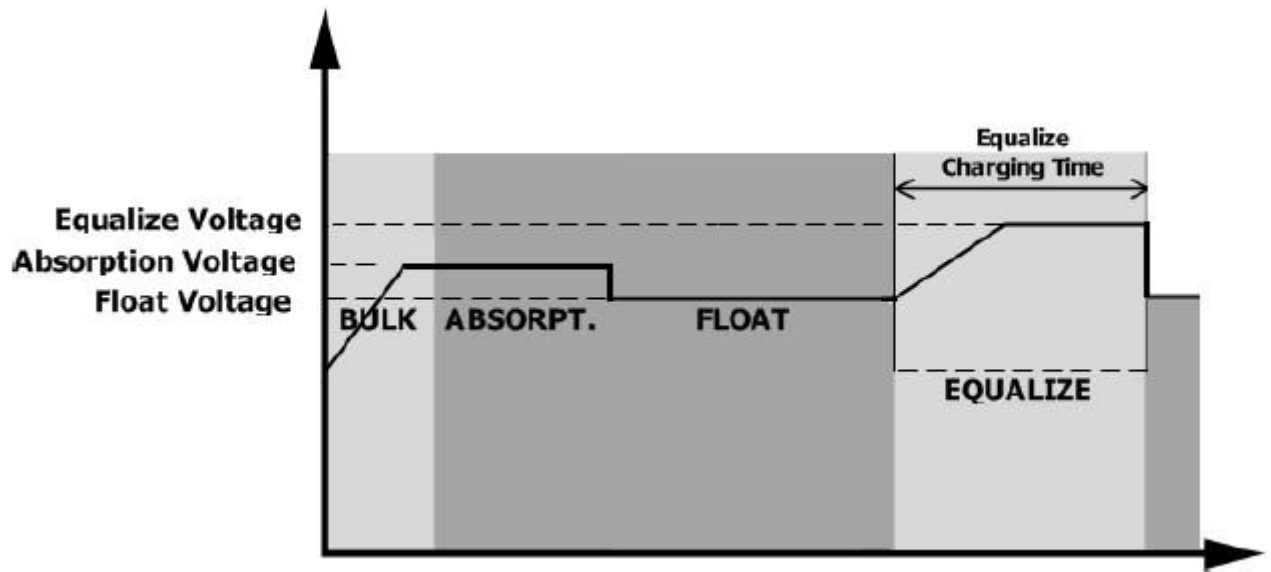
35 08 240 ^v	36 09 50 ^{Hz}	37 09 60 ^{Hz}
38 10 nNL	39 10 AtO	40 11 30A
13 ^{BATT} FUL	16 C50	16 5NU
41	42	43
44 16 050	45 bU2 18 n	46 bU2 18 nd2
47 bU2 18	48 bU2 18 n	49 19 ESP
50 19 BEP	51 20 LON	52 20 LOF
53 23 byd	54 23 byE	55 nOd 25 001
56 32 AUT	57 32 5	58 32 900
59 33 EEN	60 33 EdS	61 35 60
62 36 120	63 37 30d	64 39 AEN

65 39 AdS	66 AAAt 41 nni	67 AAAt 41 AtO
68 nAt 42 nO	69 nAt 42 Act	70 43 BAT 050%
71 44 BAT 095%	72 45 BAT 020%	73 ndC 46 OFF

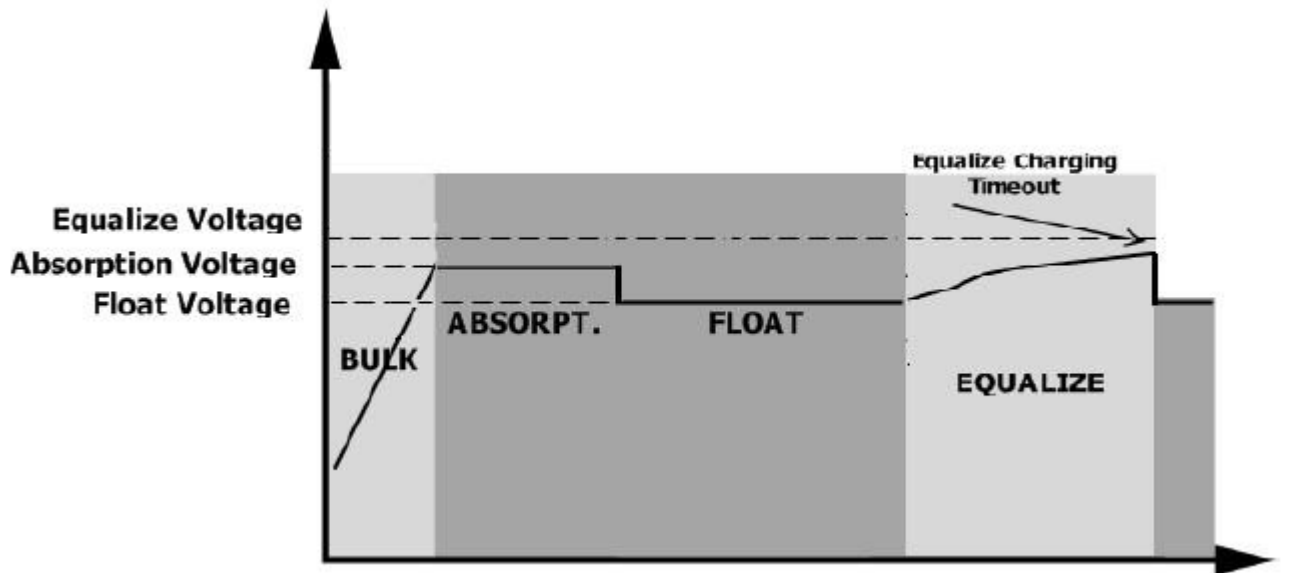
74
ndC 46 500^



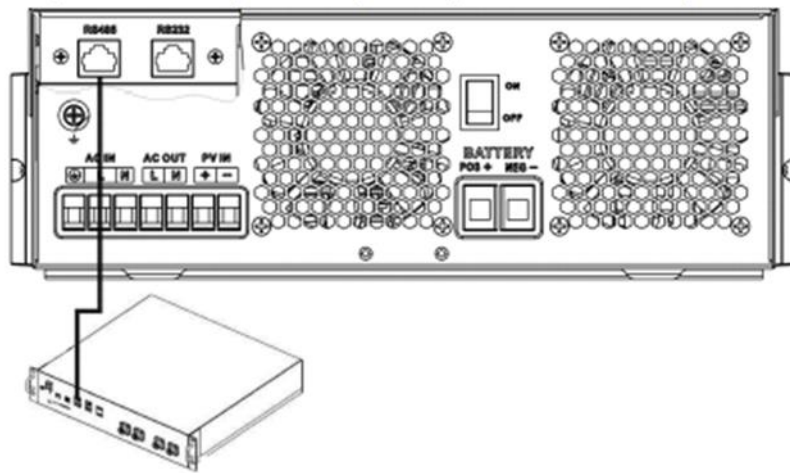
76



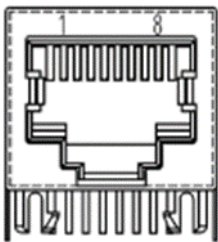
77



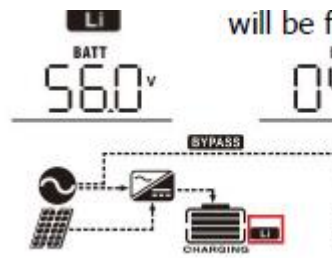
78



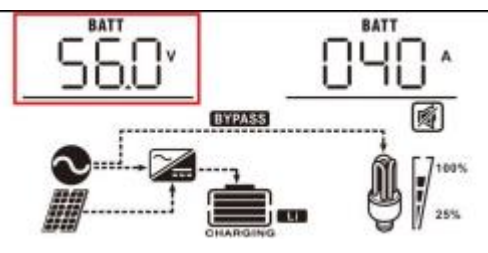
79



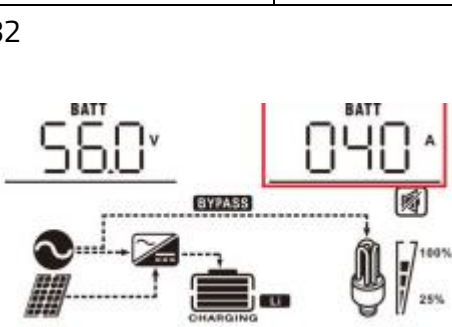
80



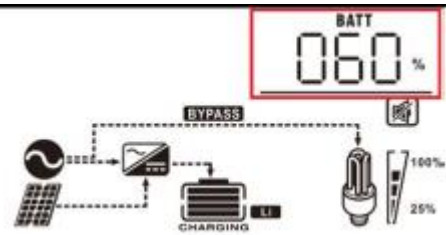
81



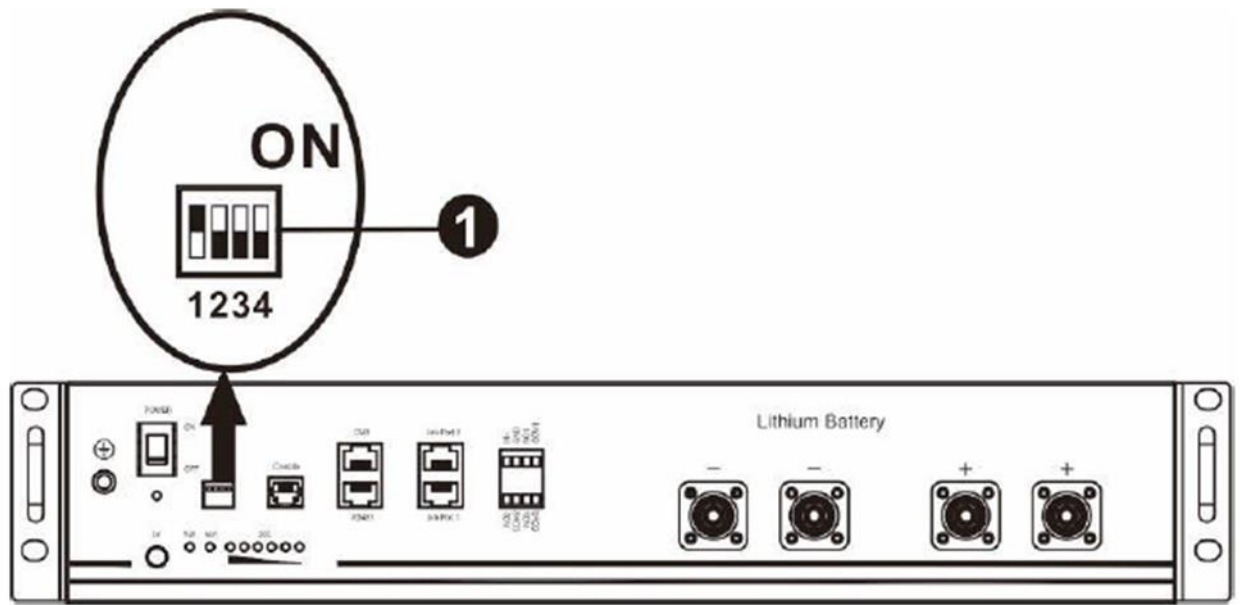
82



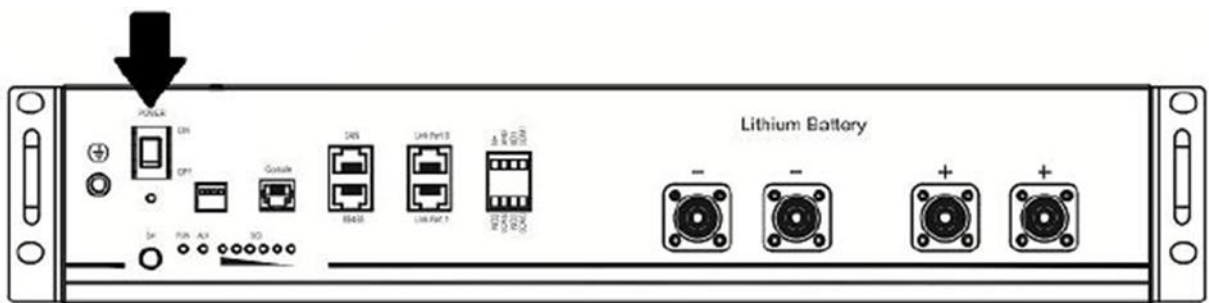
83



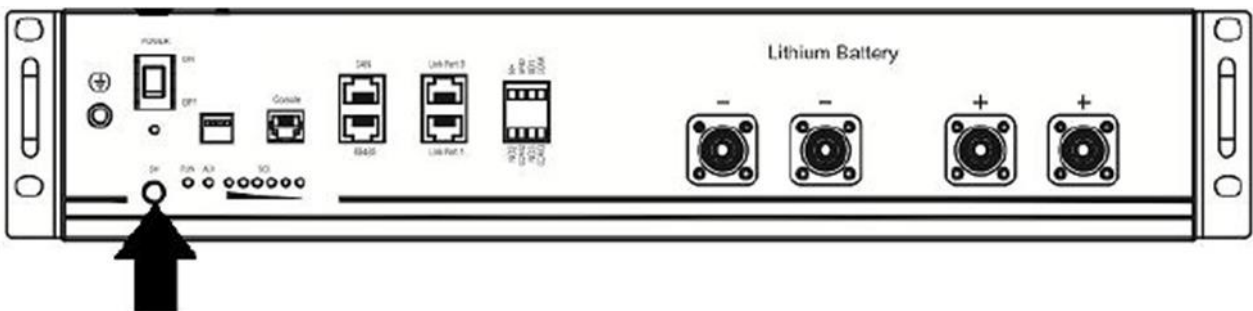
84





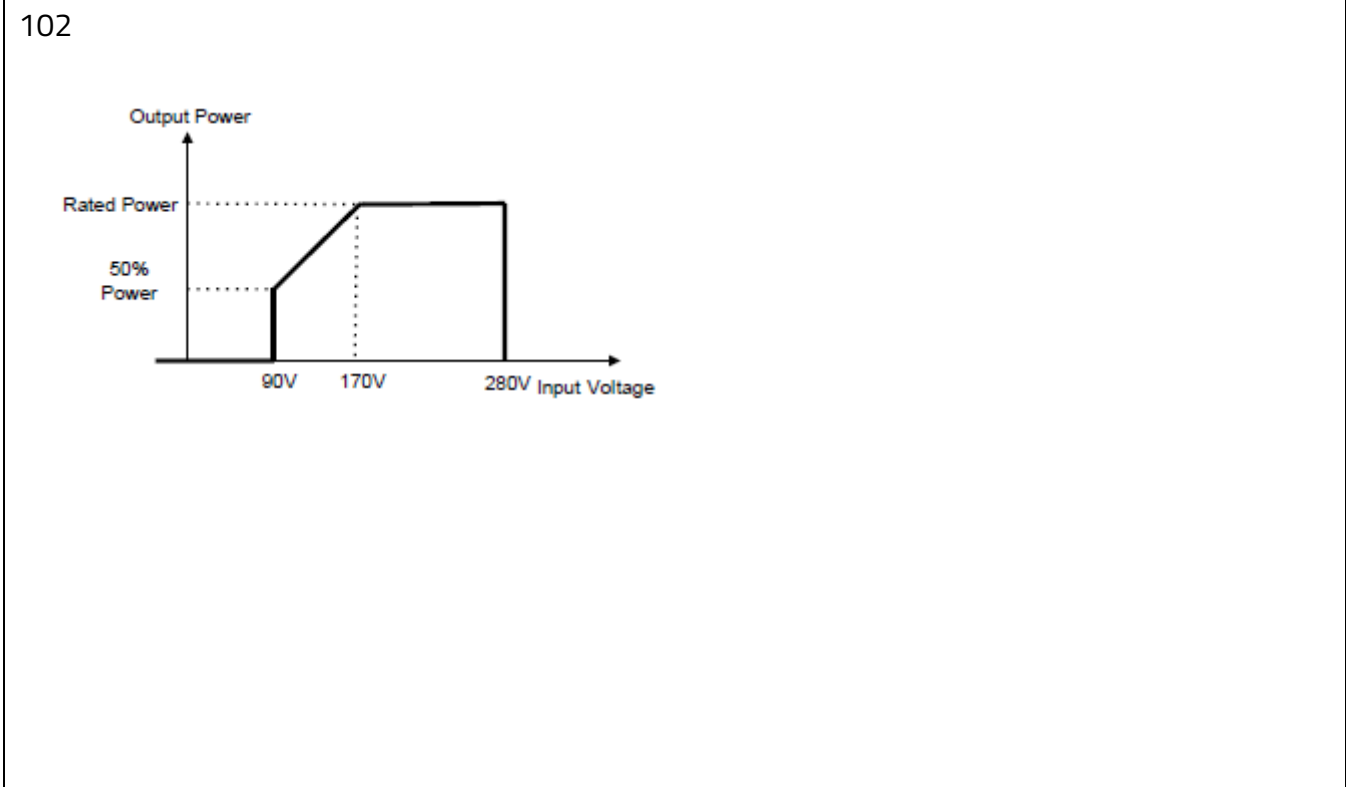
85



86



87 05 <u>AGn</u>	88 05 <u>FLd</u>	89 05 <u>USE</u>
90 05 <u>Li b</u>	91 02 <u>60</u> ^A	92 02 ^Δ
93 04 ^Δ	94 07 ^Δ  OVER LOAD	95 10 ^Δ
96 14 ^Δ	97 15 ^Δ	98 19 ^Δ
99 21 ^Δ	100 E9 ^Δ	101 6P ^Δ 



103

