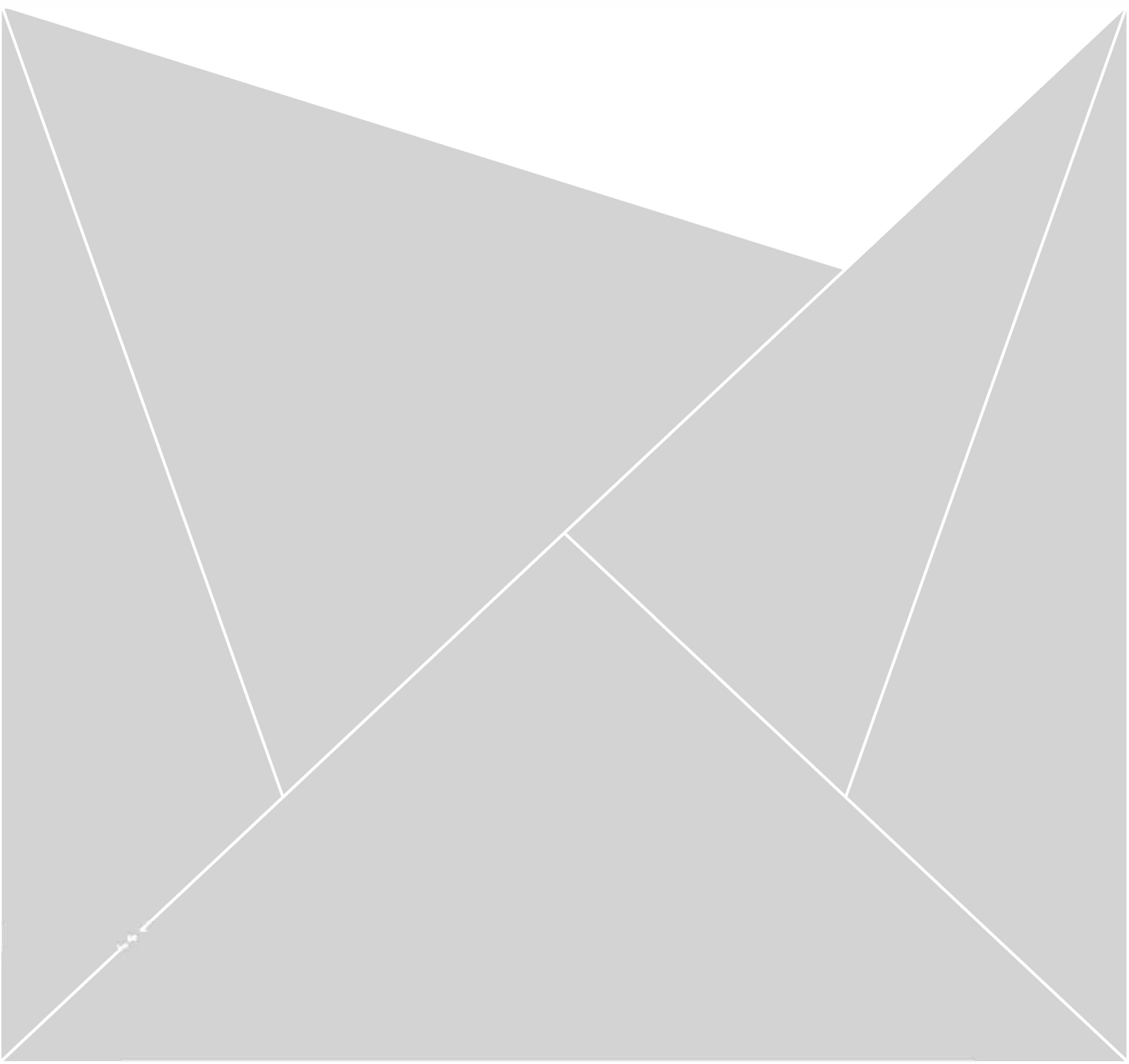


Qoltec®



INSTRUCTION MANUAL

OFF-GRID SOLAR HYBRID INVERTER

53862

EN

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. Please read this manual carefully before installing and operating the unit. Keep the manual for future reference.

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

ABOUT THE PRODUCT

This is a multifunctional inverter, combining the functions of an inverter, solar charger and battery charger, offering uninterrupted power support in one 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.

Features

- Pure sine wave inverter
- Inverter operation without the need to connect a battery
- Built-in MPPT solar controller
- Configurable input voltage range for home appliances and PCs (settings via LCD)
- Configurable battery charging current depending on application (settings via LCD)

- Configurable charging priority from AC mains or solar panels (settings via LCD)
- Compatible with mains or generator voltage
- Automatic restart when mains power is restored
- Protection against overload, overheating and short circuit
- Intelligent charger design for optimum battery performance

- Cold start function

Inverter design

Figure 1

1. LCD display
2. Status display
3. Charging indicator
4. Error indicator
5. Function button
6. On/off
7. Output hole for negative/positive battery terminal
8. RS232 port (RJ45)
9. RS485 port (RJ45)
10. RS232 port (DB9)
11. Voltage-free PRO contact
12. PV input 1
13. PV input 2
14. AC input
15. AC output
16. Grounding

NOTE :

Basic System Architecture

The following illustration shows the basic application of this inverter/charger. It also includes the following devices, necessary for a complete system:

Illustration 2

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, instruction manual, PV connector x 4, fuse x 1

Before connecting all the wires, remove the bottom cover by unscrewing the two screws as shown.

Illustration 3

II. Installation of the Unit

Illustration 3

Consider the following points before selecting an installation location:

- 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 optimal operation.
- The recommended mounting position is against the wall vertically.
- Ensure that other objects and surfaces are positioned as shown in the diagram to the right to ensure adequate heat dissipation and to have sufficient space for the removal of cables.

NOTE : SUITABLE FOR MOUNTING 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.

Illustration 5

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 the safety of the system and efficient operation that the correct cable is used to connect the battery.

Figure 6

Model	Maximum amperage	Battery Capacity	Cable size	Cable mm²	L(mm)	W(mm)	D(mm)	Torque rating
8.5KW	180A	400AH	4AWG*2	25	37	22	8.4	10~12 Nm
11KW	220A	600AH	2AWG*2	38	37	22	8.4	10~12 Nm

Steps to connect the battery:

Please follow the steps below to connect the battery:

1. Make the positive and negative leads according to the recommended lug size.
2. Connect all battery packs according to the requirements of the unit. It is recommended to use the recommended battery capacity.
3. Insert the battery cable flat into the battery connector on the inverter and ensure that the screws are tightened to a torque of 10-12 Nm. Ensure that the polarity on both the battery and inverter/charger side is correct and that the battery cables are tightened securely to the connector.

Illustration 7

WARNING: Electrical shock hazard

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

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

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

NOTE: Make sure the positive (+) pole is connected to the positive (+) pole and the negative (-) pole to the negative (-) pole before making the final DC connection or closing the DC switch/switch.

IV. Connecting the AC Input/Output

NOTE: Before connecting to the AC power source, install a separate AC switch between the inverter and the AC power source. This will ensure that the inverter can be safely disconnected during maintenance and that the AC input is fully protected from over current. The recommended specification for the AC breaker is 63A.

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
All	6AWG	1.2~ 1.4Nm

Steps for connecting AC input/output:

a) Make sure the DC switch is open before making the AC input/output connection.

b) Remove 10mm insulation for 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 that you first connect the PE protective conductor 

 -> GROUND (yellow-green)

L→ LINE (brown)


N→ NEUTRAL (blue).

Illustration 8

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 .

Illustration 9

 -> GROUND (yellow-green)

L→ LINE (brown)

N→ NEUTRAL (blue).

e) Ensure that the wires are connected correctly.

NOTE: Units 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 in 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: Before connecting to the PV modules, a DC circuit breaker must be installed separately between the inverter and the PV 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 that the correct cable is used 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
All models	18A*2	10 AWG	1.4~1.6 Nm

PV module selection:

When selecting suitable PV modules, the following parameters should be taken into account:

1. the open circuit voltage (Voc) of the PV 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	8.5KW	11KW
Max. PV Array Open Circuit Voltage	500DC	
PV Array MPPT Voltage Range	60VDC~500VDC	
Max. PV INPUT CURRENT	18A*2	

Let's take 450 Wp and 550 Wp photovoltaic modules as an example. After considering the two parameters above, the recommended module configurations are shown in the table below.

	SOLAR INPUT	Number of panels	Total input power	Model
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Solar panel specification (reference) - 450Wp - Vmp: 34.67Vdc - Imp: 13.82A - Voc: 41.25Vdc - Isc: 12.98A	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 units in series	6	2,700 W	
	7 units in series	7	3,150 W	
	8 units in series	8	3,600 W	
	9 units in series	9	4,050 W	
	10 units in series	10	4,500 W	
	11 units in series	11	4,950 W	
	12 units in series	12	5,400 W	
Solar panel specification s. (reference) - 550Wp - Vmp: 42.48Vdc - Imp: 12.95A - Voc: 50.32Vdc - Isc: 13.70A	SOLAR INPUT	Number of panels	Total input power	Model
	3 units in series	3	1,650 W	All
	4 units in series	4	2,200 W	
	5 units in series	5	2,750 W	
	6 units in series	6	3,300 W	
	7 units in series	7	3,850 W	
	8 units in series	8	4,400 W	
	9 units in series	9	4,950 W	

Wiring connection of the photovoltaic module: *Illustration 10*

Follow the steps below to implement the PV module connection:

1. Remove the 10 mm insulation sleeve for the positive and negative cable
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.

Figure 11

3. Ensure that the wires are connected correctly.

VI. Final assembly

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

Figure 12

VII. Signal from voltage-free contact

There is one voltage-free contact (3A/250VAC) on the rear panel.

When programme 16 of group F0 is set to 'Model1', this contact can be used to transmit a signal to an external device when the battery voltage reaches a warning level.

When programme 16 of group F0 is set to "Model2" and the unit is operating in battery mode, this contact can be used to activate the earth box that connects the neutral wire to earth at the AC output.

Device status	Status/condition			No-voltage contact port: Figure 13	
				NC&C	NO&C
Off	The unit is switched off and does not supply any output.			closed	open
ON	The output is powered from the mains.			closed	open
	The output is powered from the	Program 1 / F1 set as SUB	The battery voltage or state of	open	closed

	<i>mains or PV.</i>		<i>charge (SoC) is lower than the low DC voltage warning threshold or the set SoC level.</i>		
			<i>The battery voltage or state of charge (SoC) is above the value set in programme 5 of group F2 or the battery charge has entered the hold phase.</i>	<i>closed</i>	<i>open</i>
		<i>Program 1 / F1 set as SBU</i>	<i>The battery voltage is lower than the value set in program 5 of group F2.</i>	<i>open</i>	<i>closed</i>
			<i>The battery voltage exceeds the value set in programme 6 of group F2 or the battery charge has entered the holding phase.</i>	<i>closed</i>	<i>open</i>

When programme 16 of group F0 is set to "Model2":

Device status	Status/condition	Voltage-free contact port: Figure 13	
		NC&C	NO&C
Off	The unit is switched off and does not supply any output.	closed	open
ON	The unit is in standby mode, mains mode or fault mode.	closed	open
	The unit is in battery mode or power saving mode.	open	closed

OPERATION

I. Switch on/off

Figure 14

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

II. Operation 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 supply information.

Figure 15

LED indicator			Message
AC/INV	Green	Stable	Output is supplied directly from the mains "Line Mode"
		Flashing	Output is powered by battery or

			PV in battery mode.
CHG	Green	Stable	Battery charged
		Flashing	Battery charging
FAULT	Red	Stable	An error has occurred in the inverter.
		Flashing	There is a warning in the inverter.

Key functions

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

III. LCD display

Figure 16

IV. LCD display settings

1. Hold down the ENTER button for 3 seconds - the unit will enter group setting mode.
2. Press the "UP" or "DOWN" button to select a setting group. There are 5 menu groups available: F0 / F1 / F2 / F3 / F4. Press ENTER to confirm the selection or ESC to exit.
 - F0: General parameter settings
 - F1: AC output parameter settings
 - F2: Battery parameter settings
 - F3: Time parameter settings
 - F4: System parameter settings
3. Press ENTER to confirm the group selection, or ESC to return to the group selection or exit the menu.

4. Program setting :

F0

Programme	Description	Selection option	
01	AC input voltage range	Devices (default) Figure 17	If this option is selected, the acceptable AC input voltage range will be 90-280VAC.
		UPS Figure 18	If this option is selected, the acceptable AC input voltage range will be 170-280VAC.
		Generator Figure 19	If this option is selected, the acceptable AC input voltage range will be 170-280VAC and will be generator compatible. Note: Due to the instability of generators, the inverter output may also be unstable.
02	Energy saving mode on/off	Energy saving mode off (default) Figure 20	If the mode is off, regardless of whether the connected load is small or large, the on/off status of the inverter output will not change.
		Energy saving mode on Figure 21	If the mode is on, the inverter output will be switched off when the connected load is very low or not detected.
03	Overload bypass mode: When enabled, the unit will switch to mains mode (line mode) in the event of an overload during battery operation.	Bypass mode off Figure 22	Bypass mode on (default) Figure 23
04	Automatic restart in case of overload	Restart disabled Figure 24	Restart on (default) Figure 25

05	Automatic restart in the event of overheating	Restart not available Figure 26	Restart enabled Figure 27
06	Auto bypass When "auto" is selected, if the mains supply is correct, the appliance will automatically switch to bypass mode, even if the switch is off.	manual Figure 28	auto Illustration 29
07	Automatic return to default display screen	Return to default display screen (default) Figure 30	If this option is selected, regardless of how the user switches the display screen, a return to the default display screen (input/output voltage) will automatically occur after 1 minute without pressing any button.
		It will remain on the last screen: Figure 31	If this option is selected, the display screen will remain on the last screen that was set by the user.
08	Backlight control	Figure 32 Backlight on	Backlight off Picture 33
09	Buzzer mode	Mode1 Figure 34	Mute buzzer
		Mode 2 Figure 35	Mode 2: The buzzer sounds when the power source changes or when a specific warning or error occurs
		Mode 3 Figure 36	Mode 3: The buzzer will sound only in the event of a specific warning or fault
		Mode 4 Figure 37	Mode 4 (default): Buzzer activates only in the event of a fault
10	Modbus ID configuration	Figure 38 Modbus ID setting range: 001 (default) ~ 247	

16	Voltage-free contact mode Please check the function in the section on "Voltage-free contact signal".	<p>Model1 (default): Can be used to transmit a signal to an external device when the battery voltage reaches a warning level.</p> <p>Model2: Allows the neutral and earth wire to be connected to the AC output. This function is only available if the inverter works with an external earthing box. The connection of the neutral and earth is only made in battery operation mode when the inverter triggers the earth box to connect the two conductors. The neutral wire and the AC output earth are connected.</p>
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F1

Programme	Description	Selectable option	
01	Priority of the output source	SUB priority Figure 39	Solar -> Network -> Battery Solar energy is first used to charge and then to power the loads. If the solar energy is not sufficient to power all connected loads, the grid energy will power the loads simultaneously.
		SBU priority Figure 40	Solar -> Battery -> Grid Solar energy supplies the loads as first order priority.

			<p>If solar energy is not sufficient to power all connected loads, battery energy will power the loads simultaneously. Grid energy supplies the loads only when the voltage of the battery drops to the warning level (low voltage) or to the value set in program 05 group F2.</p>
		SUF priority Figure 41	<p>Solar -> Mains -> Battery</p> <p>If the solar energy is sufficient to power all connected loads and charge the batteries, the excess solar energy can be fed back into the grid (sale of energy to the grid).</p> <p>If the solar energy is not sufficient to power all connected loads, energy from the grid will simultaneously power the loads.</p>
03	Output voltage	220V	230V

		Figure 42	Illustration 43
		240V Illustration 44	
04	Output frequency	Illustration 45	Illustration 46
06	Slave output power source priority This priority will be active when the operating period is set. During this period, the device will switch from the main priority to the slave priority (salve).	Disabled Figure 47	Disable power source priority slave output
		SUB Illustration 48	The function is the same as in programme 01 of group F1.
		SBU Figure 49	
07	Setting the start timer for the slave output - Setting the hours	Fig. 50	The setting range is from 00 to 23 for each day.
08	Setting the start timer for the slave output - Minute setting		The setting range is 00 to 59 for each hour.
09	Setting the start timer for the slave output - Hour setting		The setting range is 00 to 23 for each day.
10	Setting the start timer for the slave output - Minute setting		The setting range is 00 to 59 for each hour.

F2

Program	Description	Selectable option	
01	Battery type	Figure 51	AGM (default)
		Figure 52	Flooded
		Illustration 53	User settings (User-Defined): If "User-Defined" is selected, the battery charging voltage and the

			low DC disconnection voltage can be configured in programs 03 / 04 / 08 of group F2.
		Figure 54	Supports PYLON US2000 protocol (version 3.5)
		Figure 55	Standard communication protocol 2 from the inverter supplier.
		Figure 56	If "LIB" is selected, the default battery values are adapted to a lithium battery without communication. The battery charging voltage and the disconnection voltage at low DC voltage can be set in programs 03 / 04 / 08 of group F2.
02	Charge source priority: Used to configure the order of the power sources used to charge the battery.	If this inverter/charger is operating in mains (Line), standby (Standby) or fault (Fault) mode, the charging source can be programmed as follows:	
		Solar priority Figure 57	Solar power will charge the battery first. Mains power will only charge the battery when solar power is not available.
		Solar and mains Figure 58	Solar energy and mains power will charge the battery simultaneously.
		Solar only Figure 59	Solar energy will be the only source of charging, regardless of whether mains power is available or not.
		Residual solar energy Figure 60	Solar energy will primarily power all connected consumers and the remaining energy will be

			used to charge the battery.
03	Charging voltage in main mode (C.V voltage)	56.4V(default) Figure 61	
		If "Self-defined" or "LIB" is selected in program 01 of group F2, this program can be configured. The setting range is from the value set in program 04 of group F2 to 62.0 V.	
04	Holding charge voltage (floating)	Figure 62	
		If "Self-defined" or "LIB" is selected in program 01 of group F2, this program can be configured. The setting range is from 48.0 V to the value set in programme 03 of group F2.	
05	Setting of the voltage or SoC (state of charge) point at which the mains supply is returned when the "SBU priority" option is selected.	Lithium battery without communication: Default value: 46 V	The setting range is 44.0 V to 57.2 V, but: the maximum value must be lower than the value set in program 06 group F2, the minimum value must be higher than the value set in program 08 of group F2.
		Lithium battery with communication: Default value: 50% (SoC - state of charge)	Lithium battery with communication: Default value: 50% Setting range: 5% to 50%, but the minimum value must be greater than the value of programme 08 group F2 plus 2%.
06	The setting range is 44.0 V to 57.2 V, but: the maximum value must be lower than the value set in	Battery charged	If this option is selected, the acceptable voltage range will be from 48 V to the value set in program 03 of group F2, but the minimum value must be greater than the

	program 06 of group F2, the minimum value must be higher than the value set in program 08 of group F2.		value set in programme 05 of group F2. Default value: 95%
		Default value: 95%	Setting range: 60% to 100%
08	Disconnection voltage at low DC voltage or SoC (state of charge) level	If "Self-defined" or "LIB" is selected in program 01 of group F2, the default value is 42.0 V and the setting range is 40.0 V to 54.0 V. The maximum value must be lower than the value set in program 05 of group F2. If "LIX" is selected in program 01 of group F2 and communication between the inverter and the battery is successful, the default value is 20% and the setting range is 3% to 30%, whereby the value must be lower than the value set in program 05 of group F2.	
09	Maximum charge current: Used to configure the total charging current from the solar and mains charger. (Maximum charging current = mains charging current + solar charging current).	80A (default)	8.5 kW model: If this option is selected, the acceptable range of charging current will be between 10A and 140A, but should not be lower than the AC mains charging current (set in programme 10 group F2). 11.0 kW model: If this option is selected, the acceptable charging current range will be between 10 A and 160 A, but should not be lower than the charging current from the AC mains (set in programme 10 of group F2).
10	Maximum mains charging current (utility)	60A (default)	If this option is selected, the acceptable range of charging current will be between 5A and 120A,

	Used to set the highest permissible current at which the battery can be charged from the mains (AC).		but the maximum set value must not exceed the value set in program 09 group F2.
11	Charge source priority for slave output (Slave) This priority is activated when the operating period is set - at this time the unit will switch from main priority to slave priority.	OFF(default) Illustration	Switch off the priority of the charging source for the slave output
		Solar priority	The function is the same as in program 02 group F2.
		Solar and grid (default)	
		Solar only	
		Residual solar energy	
12	Setting the start timer for the slave output - Setting the hours	Fig. 70	The setting range is from 00 to 23 for each day.
13	Setting the start timer for the slave output - Minute setting		The setting range is 00 to 59 for each hour.
14	Setting the start timer for the slave output - Hour setting		The setting range is 00 to 23 for each day.
15	Setting the start timer for the slave output		The setting range is 00 to 59 for each hour.

	- Minute setting		
16	Charging time in basic mode (C.V. stage)	Illustration 71	If this option is selected, the inverter will automatically evaluate the charging time.
		Illustration 72	The setting range is from 5 minutes to 900 minutes. The increment of each click is 5 minutes.
		Illustration 73	
		If 'USE' is selected in programme 01 of group F2, this programme can be configured.	
17	Battery alignment	Battery alignment Figure 74	Disabled battery alignment (default) Figure 75
		If "Flooded" or "User-Defined" is selected in program 01 of group F2, this program can be configured	
18	Battery equalisation voltage	Figure 76	The setting range is from 48 V ~ 62 V. The increase of each click is 0.1 V (the minimum value should be greater than the floating charge value).
19	Battery equalisation time	Figure 77	The setting range is from 0 min to 900 min. Each click increases the value by 5 minutes.
20	Battery equalisation time limit	Figure 78	The setting range is from 0 min to 900 min. Each click increases the value by 5 minutes.
21	Equalisation interval	Figure 79	The setting range is 1 to 90 days. Each click increases the value by 1 day.

22	Immediate activation of alignment	Enabled Figure 80	Disabled Figure 81
		<p>If the equalisation function (equalization) is enabled in programme 17 of group F2, this programme can be configured.</p> <p>If "Enable" is selected in this programme, battery equalisation is immediately activated and the symbol "E9 " appears on the main page of the LCD display.</p> <p>If "Disable" is selected, the equalisation function will be cancelled until the next automatic activation according to the setting in programme 21 of group F2.</p> <p>In this case, the symbol "E9 " will not be displayed on the LCD screen.</p>	
23	Manual activation of the lithium battery setting	Figure 82	Default: activation deactivated
		Picture 83	When "LIX" (lithium battery) is selected as the battery type in program 01 of group F2 and the battery is not detected, if you want to activate the lithium battery immediately, you can select this option.
24	Automatic activation of	Figure 84	Default: activation deactivated
		Figure 85	<p>When 'LIX' (lithium battery) is selected as the battery type in program 01 of group F2 and the battery is not detected, the appliance or PV installation will automatically attempt to activate the lithium battery.</p> <p>For automatic activation to take place, the unit must be restarted (restart the inverter).</p>
25	Setting the	Figure 86	When the battery

	maximum battery discharge current	Figure 87	discharge current exceeds the set value, the unit will stop discharging the battery and enter bypass or standby mode. The setting range is 50 to 500.
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F3

Program me	Description	Selection of options	
01	Time setting - year	Fig. 88	For the year setting, the range is 00 to 99.
02	Setting the time - month	Picture 89	For the month setting, the range is from 1 to 12.
03	Setting the time - day	Picture 90	For the day setting, the range is from 1 to 31.
04	Time setting - hour	Picture 91	For the time setting, the range is 00 to 23.
05	Setting the time - minute	Picture 92	For the minute setting, the range is 00 to 59.
06	Setting the time - second	Picture 93	For the year setting, the range is 00 to 59.

F4

Program	Description	Selection of options	
01	Reset all stored data on the generated energy from PV and the energy consumed by loads.	Keep data (default setting) Figure 94	Reset the generated energy data. Figure 95

Description of the LCD display functions

The information on the LCD display will be switched sequentially when the "UP" or "DOWN" button is pressed. All information can be displayed in the 1/2/3 area of the LCD display.

Figure 96

NO .	Data from area 1:	Data from area 3:	Example
1	Input voltage	Output voltage	Input voltage=220V Output voltage=220V (Default display screen) Illustration 97
2	Input frequency	Output frequency	Input frequency=50Hz Output frequency=50Hz Illustration 98
3	Active output power	Apparent output power	Active power = 3.02 kW Apparent power = 4.0 kVA Illustration 99
4	Active power input	PV feedback power	Active power = 800 W PV feedback power = 0W Illustration 100
5	Battery voltage	Percentage load	Battery voltage = 50 V Load percentage = 80% Illustration 101
6	Charging power	Charging current	Total charging power = 1.8 kW Charging current = 36 A

			The AC and PV icons are highlighted - this means that the mains (AC) and photovoltaic (PV) panels are charging the battery simultaneously. Illustration 102
7	Total PV power	Discharge current	PV power = 8.6 kW Battery discharge current = 0 A Illustration 103
8	PV1 power	PV2 power	PV1=4.5KW PV2=4.3KW Illustration 104
9	Voltage PV1	Current PV1	PV voltage = 360V Current PV= 12A Illustration 105
10	VoltagePV2	PV2 current	PV voltage= 320V Current PV= 13A Illustration 106
9	DAY	Energy generated / day	Power generated/day=10K Wh Figure 107
10	MON	Energy generated / month	Energy generated / month=310KWh Figure 108
11	YEA	generated energy/year	generated energy/year=3.6mWh Figure 109
12	TTL	Total generated energy	Total generated energy=13.6mWh Figure 110
13	Year	Month/day	Figure 111
14	Hour	Seconds/minutes	Figure 112
If the communication between the inverter and the battery is successful, the communication icon "LI" will flash and the LCD display will show the corresponding information.			
No	Data from area	Data from area 3:	Example

.	1:			
15	Maximum charge voltage of lithium battery	Maximum charge current of the lithium battery	Illustration 113	
16		xx1: Indicates that charging the lithium battery is prohibited; x1x: Indicates that the lithium battery is prohibited (not allowed); 1xx: Indicates that the lithium battery requires forced charging.	Illustration 114	
17		Lithium battery SOC(%)	Figure 115	
Other information on the LCD display Please hold down the "Down" button for a long time on the main menu page to see the following information.				
No.	Data from area 1:	Area 2 data:	Area 2 data:	Example
18	Software version part1	Software version part2	Software version part3	Figure 116
19	Model code version part1	Model code version part2	Model code version part3	Figure 117
20	CPU type	HD	Hardware version	Figure 118

Error reference code

There are seven groups of error codes. The error code consists of a group code and a number - the group code is at the beginning and the number at the end, for example: C0.

Error code groups:

A: Inverter group error codes

B: Battery group error codes

C: Error codes for PV group (photovoltaic panels)

D: Output group fault codes

E: Parallel operation group fault codes

F: Other fault codes

G: Mains group fault codes

Warning indicator

There are seven groups of warning codes. The warning code consists of a number and a group code - the number is at the beginning and the group code at the end, for example: 0C.

Warning code groups:

A: Inverter group warning codes

B: Battery group warning codes

C: PV (photovoltaic panel) group warning codes

D: Output group warning codes

E: Parallel operation group warning codes

F: Other warning codes

G: Grid group warning codes

ERROR CODES

Fault code	Description	Icon
Inverter		
A0	Short circuit on output	Icon with error code number
A1	Output voltage too high	
A2	Overcurrent	
A3	DC output voltage too high	
A4	Inverter current offset too high	
A5	Output voltage too low	
A6	Inverter power negative	
Battery		
B0	Battery voltage too high	Icon with error code number
B1	DC/DC current overload	
B2	DC/DC current offset too high	
PV panels		
C0	PV current overload	Icon with error code number

C1	PV voltage too high	
C2	PV1 Current offset too high	
C3	PV1 current offset too large	
Output		
D0	Overload time exceeded	
D1	Output current offset too large	
Other		
F0	Inverter module overheating	
F1	PV module overheating	
F2	DC/DC module overheating	
F3	Bus voltage too high	
F4	Bus soft-start failed	
F5	Bus voltage too low	

WARNING INDICATOR

Warning codes consist of a number and a letter (e.g. 0C), where the letter denotes a group and the number a specific code.

Warning code groups:

A: Inverter

B: Battery pack

C: PV panels

D: Output

E: Parallel operation

F: Other

G: Power grid

Code	Warning event	Audible alarm	Flashing icon
0B	Low battery voltage	Single tone every second	Code number icon
1B	No battery connected	No	
2B	Battery balancing	None	

3B	Battery voltage low, not reaching the value set in program 06 group F2	Double signal every 3 seconds	
4B	Lithium battery communication fault	Signal every 0.5 seconds	
5B	Battery discharge current exceeded	No	
1C	PV energy too weak	Double signal every 3 seconds	
0D	Overload	Signal every 0.5 seconds	
1D	Output reduction	Double signal every 3 seconds	
0F	Temperature too high	Triple signal every second	

Battery balancing

A balancing function has been added to the charge controller. It helps to eliminate negative chemical effects such as stratification, a condition where the acid concentration is greater at the bottom of the battery than at the top. Balancing also helps to remove sulphate crystals that can settle 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 software 33.

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

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

When to equalize

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

Figure 119

Equalisation charge 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. Fixed-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 120

However, in the equalisation stage, when the battery equalisation time has elapsed and the battery voltage has not reached the equalisation voltage level, the charge controller will extend the equalisation time until the battery voltage reaches the required level. If, despite this, the battery voltage is still lower than the equalisation voltage after the set time limit has been exceeded, the charge controller will terminate the equalisation process and proceed to the float stage.

Figure 121

Settings for the lithium battery

Lithium-ion battery connection

If you select a lithium-ion battery for the inverter, you can only use the lithium-ion battery that we have configured. The lithium-ion battery has two connectors: the RS485 BMS port and the power cable. Please follow the steps below to connect the lithium-ion battery:

1. Assemble the battery terminal according to the recommended battery cable and terminal size (as with lead-acid batteries, please refer to the section "Connecting a lead-acid battery" for details on how to connect a lead-acid battery).
2. Connect the RS485 port end of the battery pack to the BMS (RS485) communication port of the inverter.

Figure 122

Communication and setting of the lithium-ion battery

If you choose a lithium-ion 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-ion battery and the inverter. Details of the information transmitted are shown below:

1. Reconfiguring the charging voltage, charging current and battery discharge cut-off voltage according to the parameters of the lithium-ion battery.
2. Enabling or disabling charging of the inverter depending on the status of the lithium-ion battery.

RS485 port connection:

Connect the RS485 port end of the battery pack to the RS485 communication port of the inverter. Ensure that the RS485 port of the lithium-ion battery is connected to the RS485 port of the inverter according to the pins (Pin to Pin). The communication cable is included in the kit and the pin assignment of the RS485 port of the inverter is shown below:

Figure 123

PIN	RS485 port
1	RS485-B
2	RS485-A
3	RS485-A
4	RS485-B

Settings for lithium battery PYLON US2000

1) Settings for the PYLONTECH US2000 lithium battery:

DIP switches: there are 4 DIP switches for setting the different baud rates and address of the battery group.

If the switch is set to the "OFF" position, this means "0".

If the switch is set to "ON", this means "1".

Dip 1 set to "ON" indicates a baud rate of 9600.

Dip 2, 3 and 4 are reserved for setting the battery group address.

DIP switches 2, 3 and 4 on the master battery (first in order) are used to configure or change the group address.

NOTE: "1" is the upper position and "0" is the lower position.

Illustration 124

2) Installation process

Step 1. use the RS485 cable to connect the inverter to the lithium battery (as shown in figure).

Step 2. Switch on the lithium battery.

Illustration 125

Step 3. Press and hold the button for more than three seconds to activate the lithium battery - the power output will be ready.

Figure 126

Step 4 Turn on the inverter.

Step 5. Ensure that the battery type is selected as 'Li2' in program 5 on the LCD display.

If the communication between the inverter and the battery is successful, the battery icon will light up on the LCD display.

SPECIFICATIONS

Table 1 Linear mode specifications

Inverter model	8.5KW	11KW
Input voltage waveform	Sinusoidal (mains or generator)	
Nominal input voltage	230V AC	
Low loss voltage	170V AC $\pm 7V$ (UPS) 90V AC $\pm 7V$ (Appliances)	
Voltage at low loss	180V AC $\pm 7V$ (UPS) 100V AC $\pm 7V$ (Devices)	
Voltage at high loss	280V AC $\pm 7V$	
Return voltage at high loss	270V AC $\pm 7V$	
Maximum AC input voltage	300V AC	
Nominal input frequency	50Hz / 60Hz (auto detection)	
Frequency at low loss	40 ± 1 Hz	
Return frequency at low loss	42 ± 1 Hz	
Frequency at high loss	65 ± 1 Hz	
Return frequency at high loss	63 ± 1 Hz	
Output short-circuit protection	Battery mode: Electronic circuits	

Efficiency (linear mode)	>95% (at nominal load R, battery fully charged)
Switching time	10 ms typical (UPS) 20 ms typical (appliances)
Output power limitation: When the AC input voltage drops to 95V or 170V, depending on the model, the output power will be limited.	Figure 127
Output power reduction: When the battery voltage drops to 50.5V (for the 8.5K model) or 55.0V (for the 11K model), the output power will be reduced.	Figure 128 Output power reduction - 8.5 kW Figure 129 Output power reduction - 11 kW

Table 2 Specification - Inverter mode

Inverter model	8.5KW	11KW
Nominal output power	8.5KVA	11KVA
Output voltage waveform:	Sinus	
Output voltage regulation:	230Vac±5%	
Output frequency:	50Hz or 60Hz	
Maximum efficiency:	94%	
Overload protection	5.5s@≥ 140% load; 10.5s@100%~140% load	
Peak capacity:	2* rated power for 5 seconds	
Nominal DC input voltage:	48Vdc	
Cold start voltage:	46.0Vdc	
DC low level warning voltage (Only for AGM and Flooded)	40.4Vdc 42.8Vdc 44.0Vdc	

@ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	
Return voltage after low DC warning (Only for AGM and Flooded) @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	42.4Vdc 44.8Vdc 46.0Vdc
Low DC cut-off voltage (Only for AGM and Flooded) @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	42.0Vdc 40.8Vdc 38.4Vdc

Table 3 Specifications - charging mode

Utility charging mode		
Model	8.5KW	11KW
Maximum charging current (PV+AC) (@ VI/P=230Vac).	140Amp	160Amp
Maximum charge current (AC) (@ VI/P=230Vac).	120Amp	
Charging voltage in Bulk mode	Flooded battery	58.4VDC
	AGM/GEL	56.4VDC
Sustaining charge voltage	54VDC	
Overcharge protection	63VDC	
Charging algorithm	3-stage	

Charging curve	Illustration 130	
Solar input		
Model	8.5KW	11KW
Rated power	5000W*2	5500W*2
Maximum open circuit voltage of the PV array	500Vdc	
MPPT voltage range of PV set	60Vdc~500Vdc	
Maximum input current	140A	160A
Maximum charging current (PV)	18A*2	18A*2

Table 4

Model	8.5KW	11KW
Certificate	CE	
Operating temperature range	-10°C to 55°C	
Storage temperature	-15°C~ 60°C	
Humidity	5% to 95% (non-condensing)	

TROUBLESHOOTING

Problem	LCD/LED/Sound	Possible cause	Solution
The unit shuts down automatically during the start-up process.	The LCD/LED display and sounder will be active for 3 seconds and then switch off completely.	Battery voltage is too low	Charge the battery. Replace the battery.
No response after power up.	No	Battery voltage is too low. Battery polarity is reversed.	Check that batteries and wiring are correctly connected. Charge the battery. Replace the battery.
Power is available but the unit is	Input voltage is displayed as 0 on	Overcurrent or input voltage	Check that the AC switch has been turned

operating in battery mode.	the LCD and the green LED is flashing.	protection has been activated	off and that the AC wiring is correctly connected.
	Green LED is flashing.	Poor AC power quality (from mains or generator)	Check if the AC wiring is too thin and/or too long. Check that the generator (if used) is working properly or that the input voltage range settings are correct. (UPS→ Device)
	Green LED is flashing.	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 D0	Overload error. The inverter is overloaded by 110% and the time has expired.	Reduce the load by switching off some devices.
	Error code A2	Short circuit at the output.	Check that the wiring is correctly connected and remove the abnormal load.
	Error code F2	Internal temperature of inverter components exceeds 100°C.	Check if the airflow in the unit is blocked or if the ambient temperature is too high.
	Error code B0	Battery is overcharged	Contact the service centre.
		Battery voltage is too high.	Check that the battery specification and quantity meet the requirements.
	Error code A1/A5	Invalid output (Inverter voltage	Reduce the load. Contact the service

		below 190Vac or above 260Vac).	centre.
	Error code F3/F4	Internal components have failed.	Contact the service centre.
	Fault code A2	Overcurrent or overvoltage.	Restart the unit. If the error reappears, please contact the service centre.
	Error code F5	Bus voltage is too low.	
	Error code A3	Output voltage unbalanced	
	Other error code		If the cables are connected correctly, please contact the service centre.

MAINTENANCE

1. Keep the Waveform clean by using a soft, dry cloth to remove dust and dirt. Do not use chemicals.
2. Regularly check the power cords and connectors for damage such as abrasions, cracks or loose connections.
3. Make sure vents are clean and not blocked to ensure adequate cooling.
4. Avoid contact with water or other liquids to prevent electrical damage.

DISPOSAL

This product is subject to the regulations for the disposal of electrical and electronic equipment (WEEE). Return it to an electro-waste collection point that provides safe recycling in accordance with GPSR standards. Check where the nearest electro-waste collection points are located. If you have any questions about disposal, contact the manufacturer or an authorised service centre.

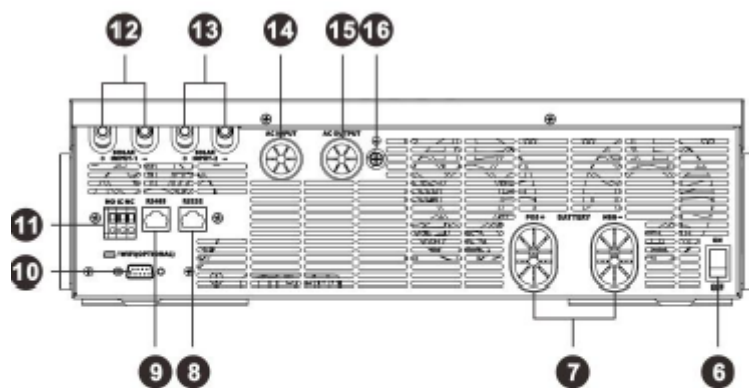
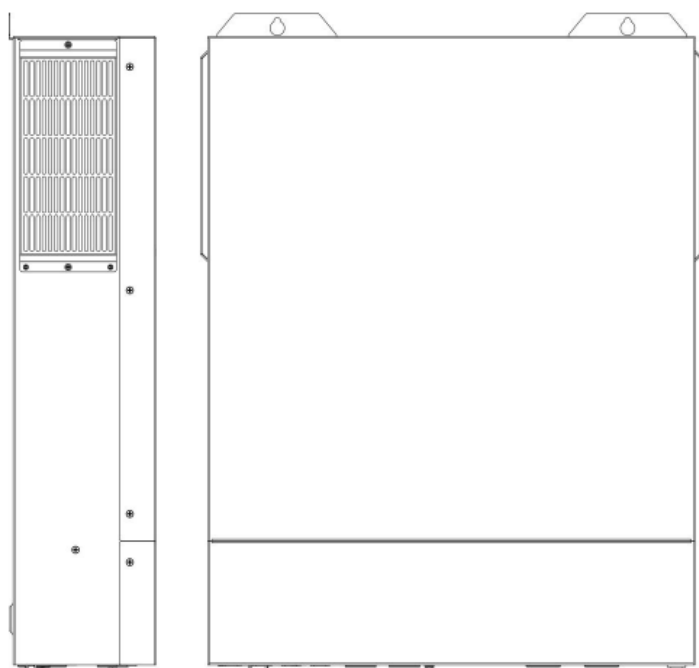
WARRANTY AND SERVICE INFORMATION

The product is covered by a 24-month manufacturer's warranty from the date of purchase. The warranty covers any defects in materials and workmanship. Please contact our service department in case of any problems with the device to ensure a fast and professional service. The warranty does not cover damage

resulting from misuse, falls, mechanical damage, unauthorised repairs or disassembly attempts.

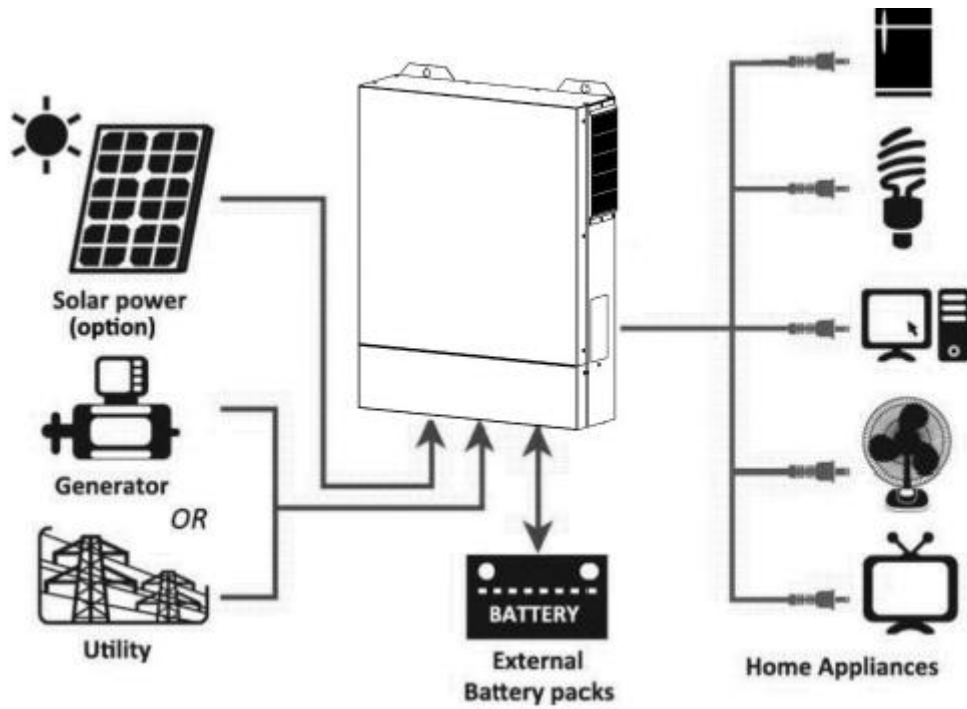
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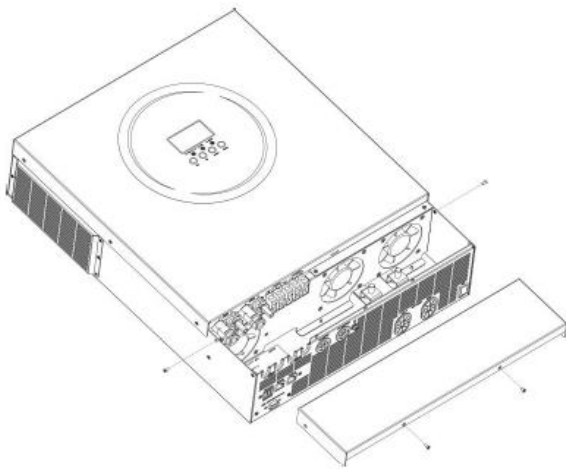


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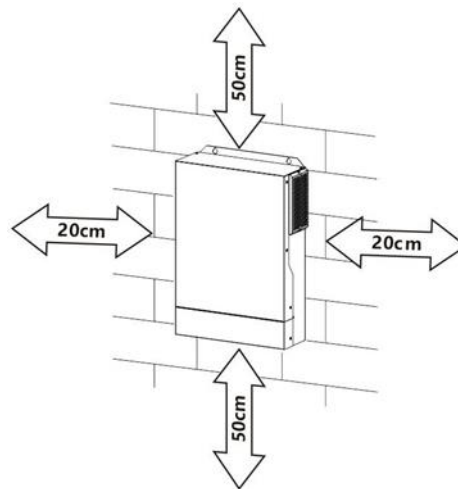
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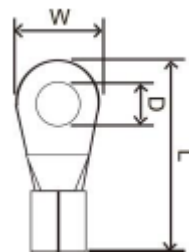


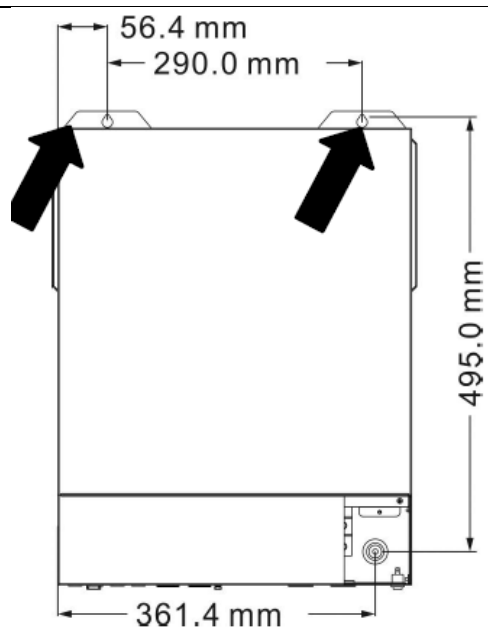
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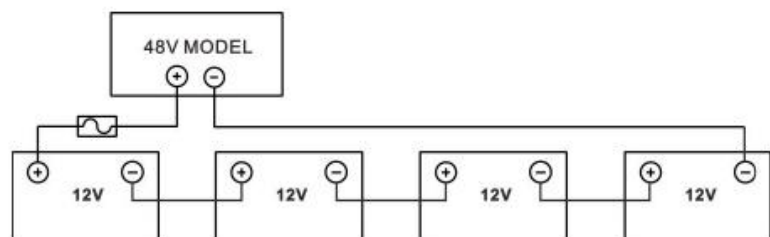
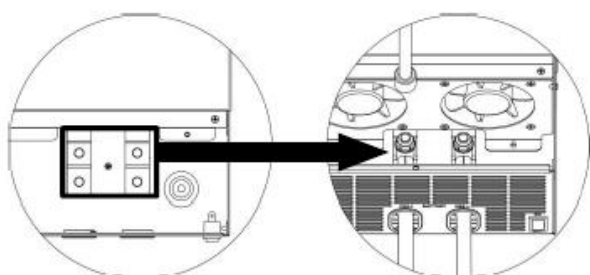
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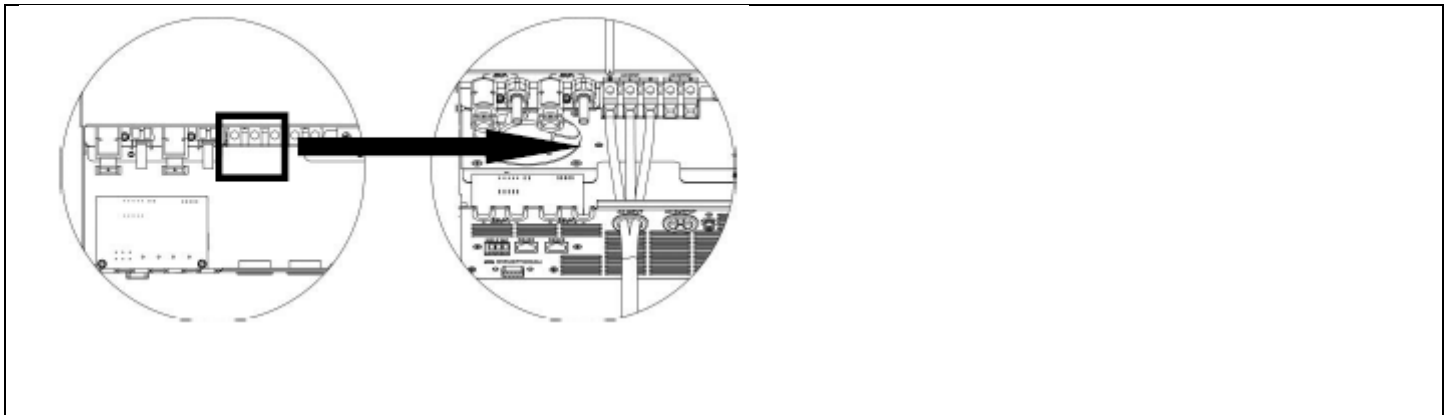




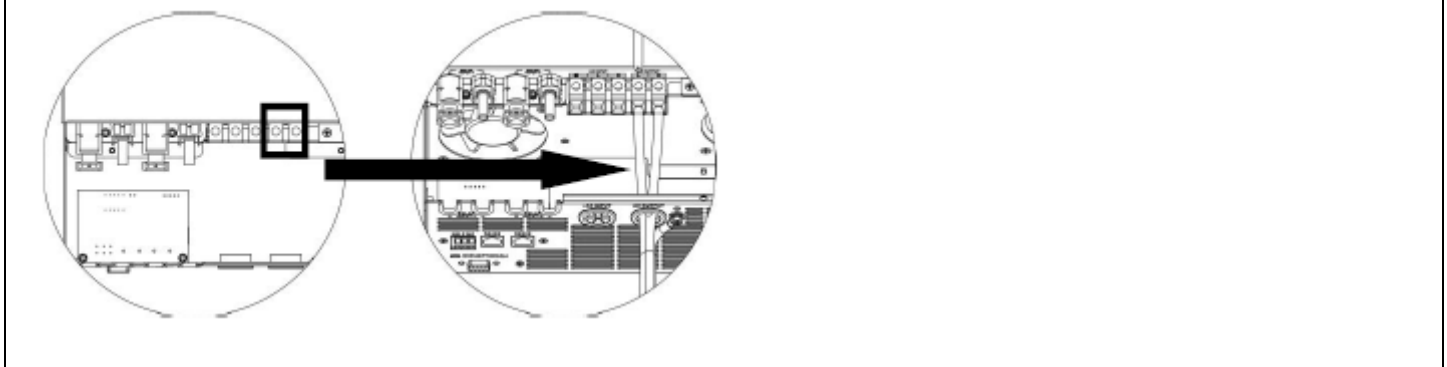
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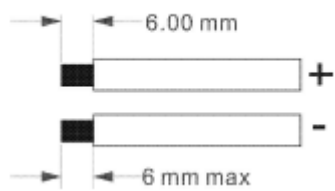
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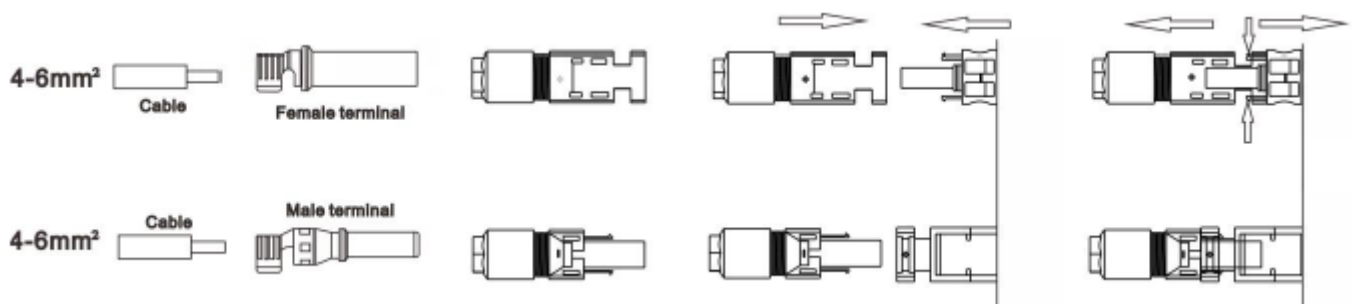
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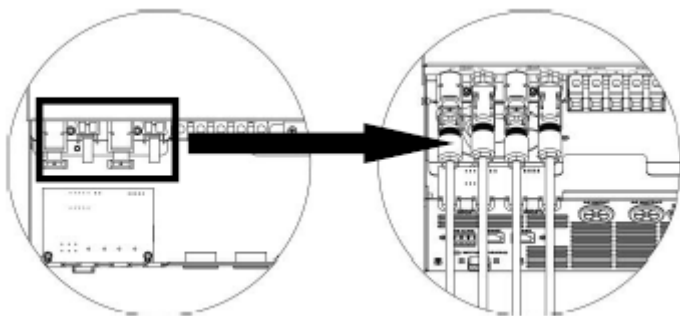
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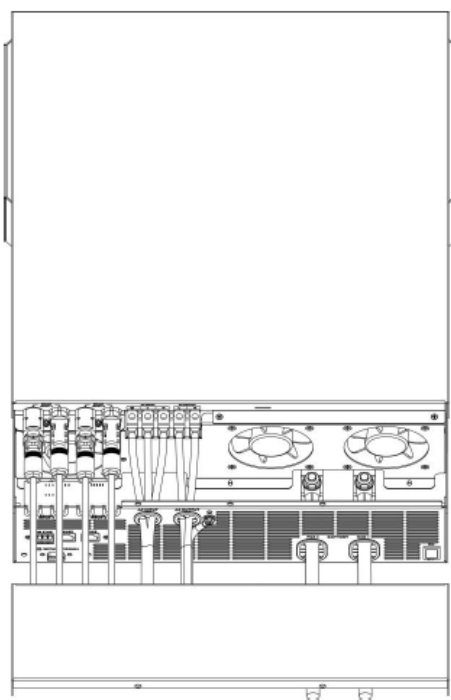
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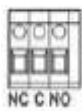
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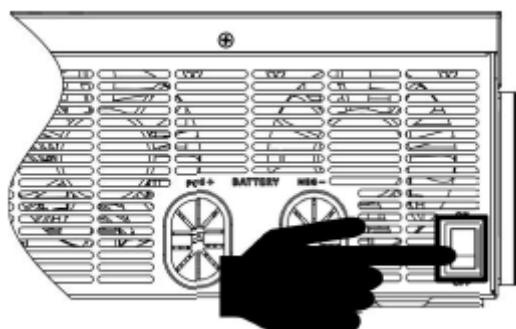
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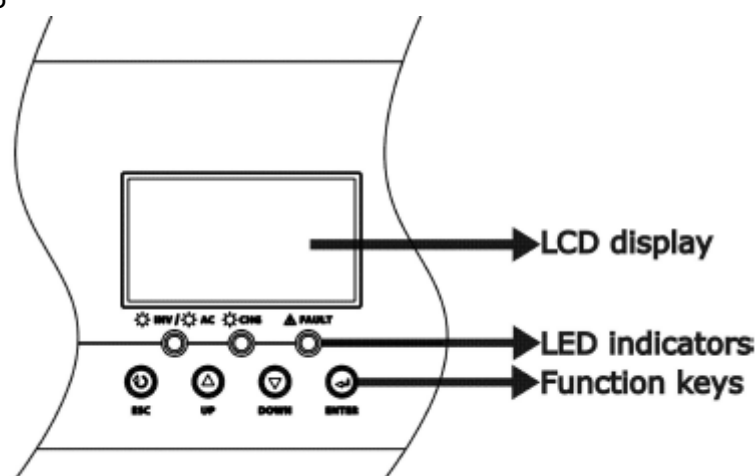
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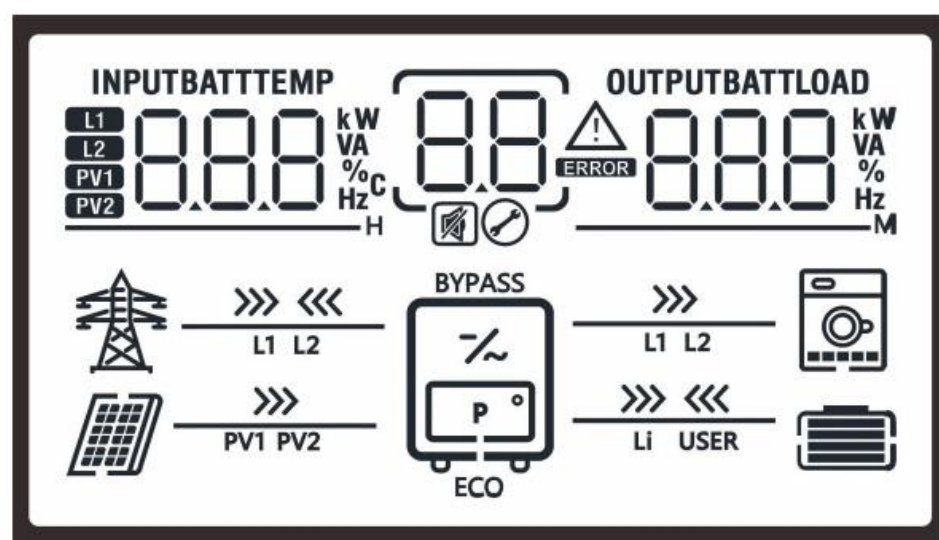
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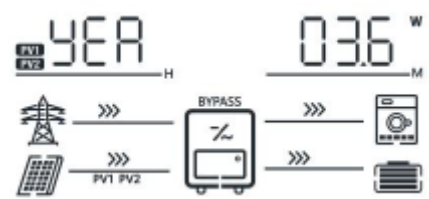
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32 LoN	33 LoF	34 nd l
35 nd2	36 nd3	37 nd4
38 00 1.002.003	39 SUB	40 SUB
41 SUB	42 220 ^v	43 230 ^v
44 240 ^v	45 050 _{Hz}	46 060 _{Hz}
47 OFF	48 SUB	49 SUB
50 00	51 ACn	52 FLd
53	54	55

USE	L 2	L 4
56 L b	57 5of	58 5nu
59 o5o	60 5ot	61 56.4 ^v
62 54.0 ^v	63 FUL	64 06 095 [%]
65 off	66 5of	67 5nu
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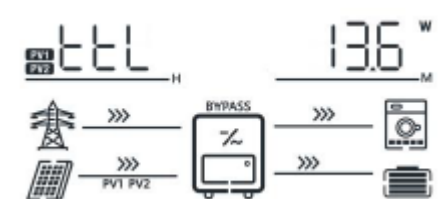
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<p>97</p> <p>INPUT 220^W OUTPUT 220^V</p>	<p>98</p> <p>INPUT 500^{Hz} OUTPUT 500^{Hz}</p>	<p>99</p> <p>302^{kW} 400^{kVA}</p> <p>LOAD</p>
<p>100</p> <p>INPUT 800^W 000^W</p>	<p>101</p> <p>BATT 500^V LOAD 080[%]</p>	<p>102</p> <p>INPUTBATT 180^{kW} BATT 036^A</p>
<p>103</p> <p>INPUT 860^{kW} OUTPUTBATT 000^A</p>	<p>104</p> <p>INPUT 450^{kW} 430^{kW}</p>	<p>105</p> <p>INPUT 360^V 012^A</p>
<p>106</p> <p>PV voltage=320V PV current=13A</p> <p>INPUT 320^V 013^A</p>	<p>107</p> <p>day 010^{kW}</p>	<p>108</p> <p>noon 310^{kW}</p>

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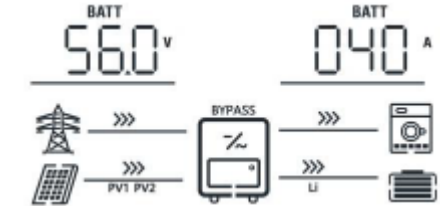
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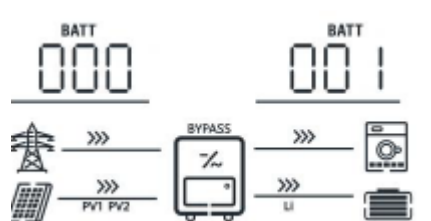
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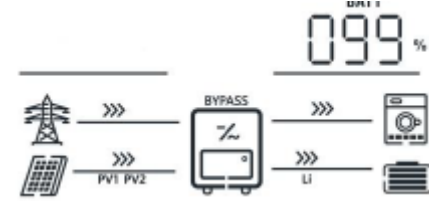
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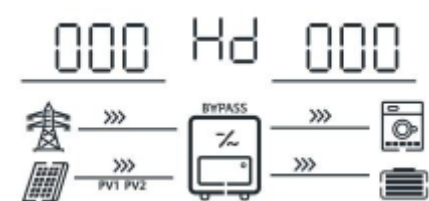
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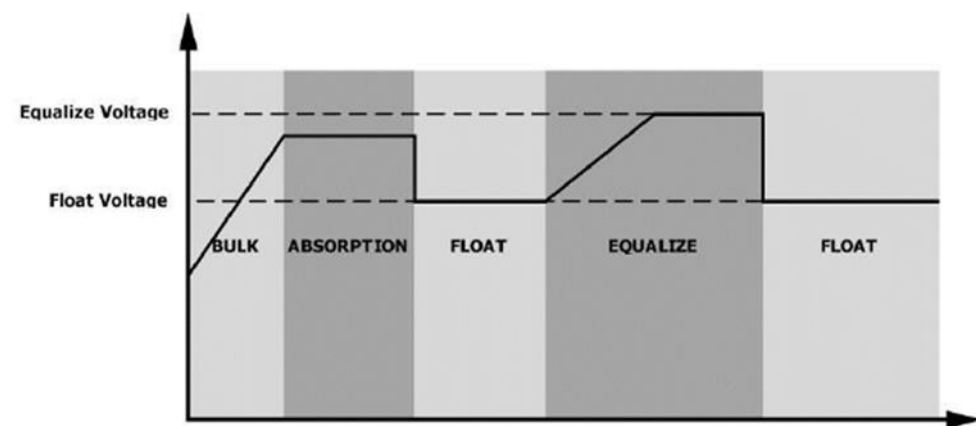
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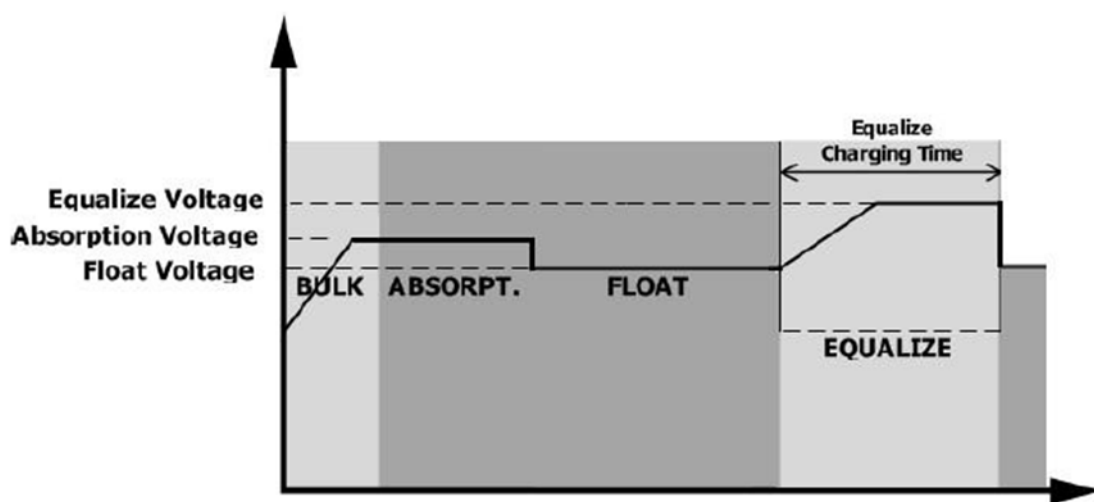
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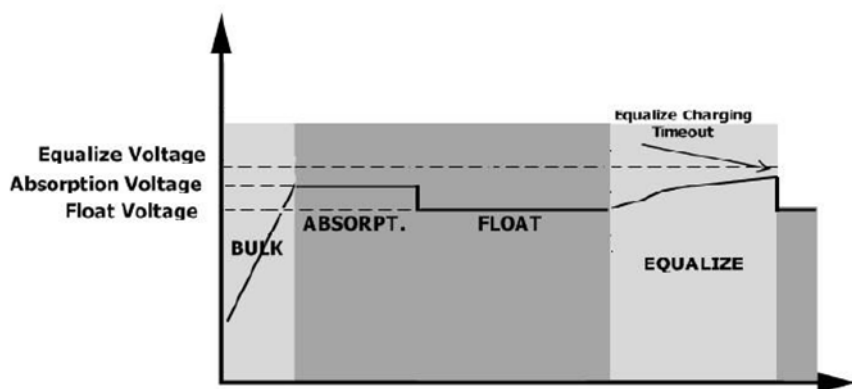
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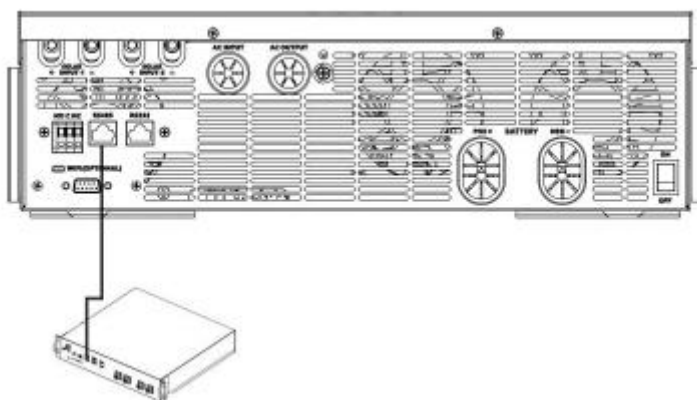
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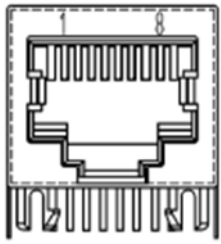
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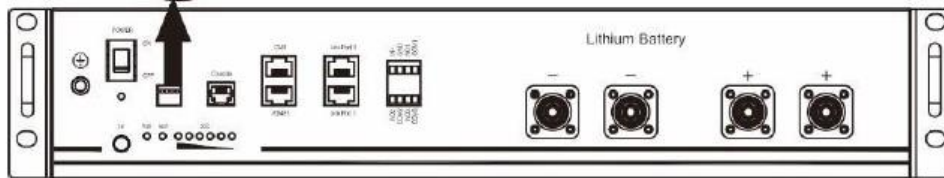
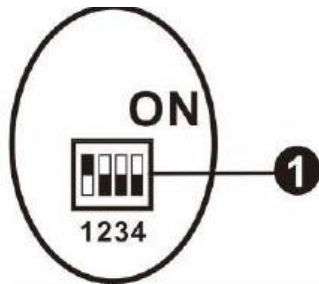
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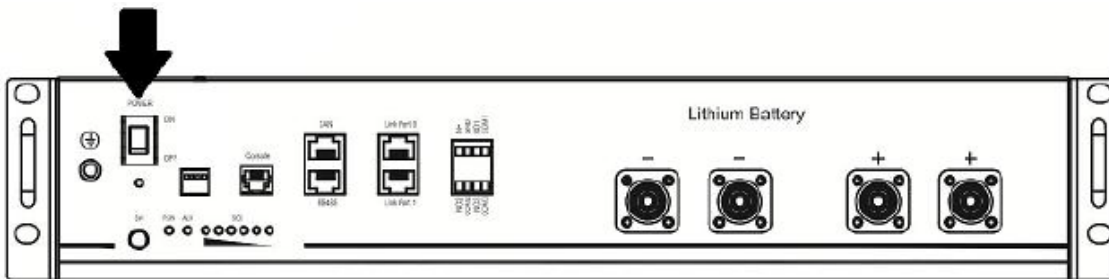
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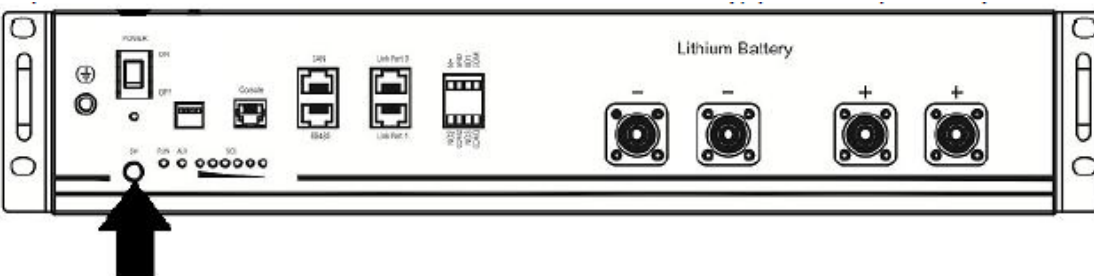
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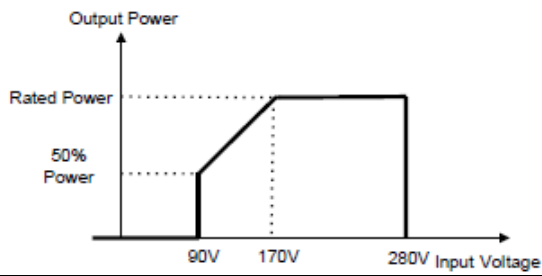
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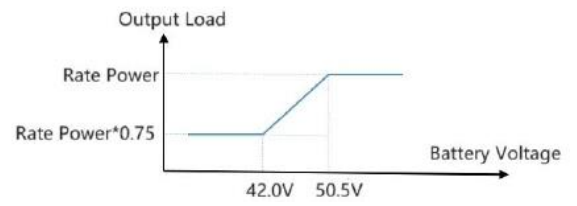
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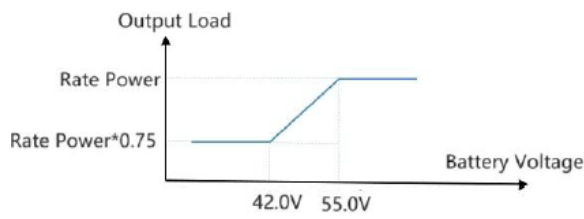
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