LIVOLTEK

User Manual
Off-Grid Inverter

GF1- 24-SSV1-2401

Table Of Contents

ABOUT THIS MANUAL

Purpose

This manual describes the assembly, installation, operation and troubleshooting of this unit. Please read this manual carefully before installations and operations. Keep this manual for future reference.

Scope

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

SAFETY INSTRUCTIONS

WARNING: This chapter contains important safety and operating instructions. Read and keep this manual for future reference.

1. Before using the unit, read all instructions and cautionary markings on the unit, the batteries and all appropriate sections of this manual.
2. **CAUTION** --To reduce risk of injury, charge only deep-cycle lead acid type rechargeable batteries. Other types of batteries may burst, causing personal injury and damage.
3. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
4. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
5. **CAUTION** – Only qualified personnel can install this device with battery.
6. **NEVER** charge a frozen battery.
7. For optimum operation of this inverter/charger, please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter/charger.
8. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
9. Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to INSTALLATION section of this manual for the details.
10. Fuse is provided as over-current protection for the battery supply.
11. GROUNDING INSTRUCTIONS -This inverter/charger should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
12. NEVER cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.
13. **Warning!!** Only qualified service persons are able to service this device. If errors still persist after following troubleshooting table, please send this inverter/charger back to local dealer or service center for maintenance.

INTRODUCTION

This is a multi-function inverter/charger, combining functions of inverter, MPPT solar charger and battery charger to offer uninterruptible power support with portable size. Its comprehensive LCD display offers user-configurable and easy-accessible button operation such as battery charging current, AC/solar charger priority, and acceptable input voltage based on different applications.

Features

- Pure sine wave inverter
- Inverter running without battery
- Built-in MPPT solar controller
- Configurable input voltage range for home appliances and personal computers via LCD setting
- Configurable battery charging current based on applications via LCD setting
- Configurable AC/Solar Charger priority via LCD setting
- Compatible to mains voltage or generator power
- Auto restart while AC is recovering
- Overload/ Over temperature/ short circuit protection
- Smart battery charger design for optimized battery performance
- Cold start function

Basic System Architecture

The following illustration shows basic application for this inverter/charger. It also includes following devices to have a complete running system:

- Generator or Utility.
- PV modules (option)

Consult with your system integrator for other possible system architectures depending on your requirements.

This inverter can power all kinds of appliances in home or office environment, including motor-type appliances such as tube light, fan, refrigerator and air conditioner.

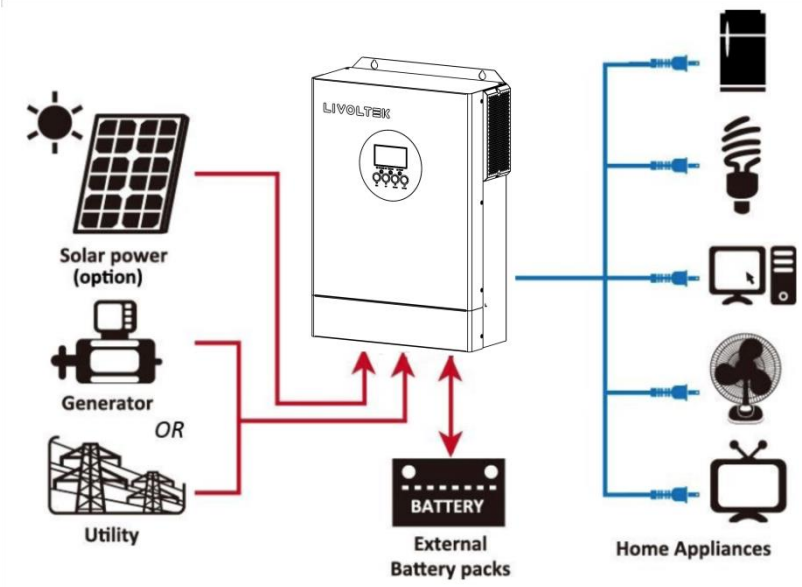
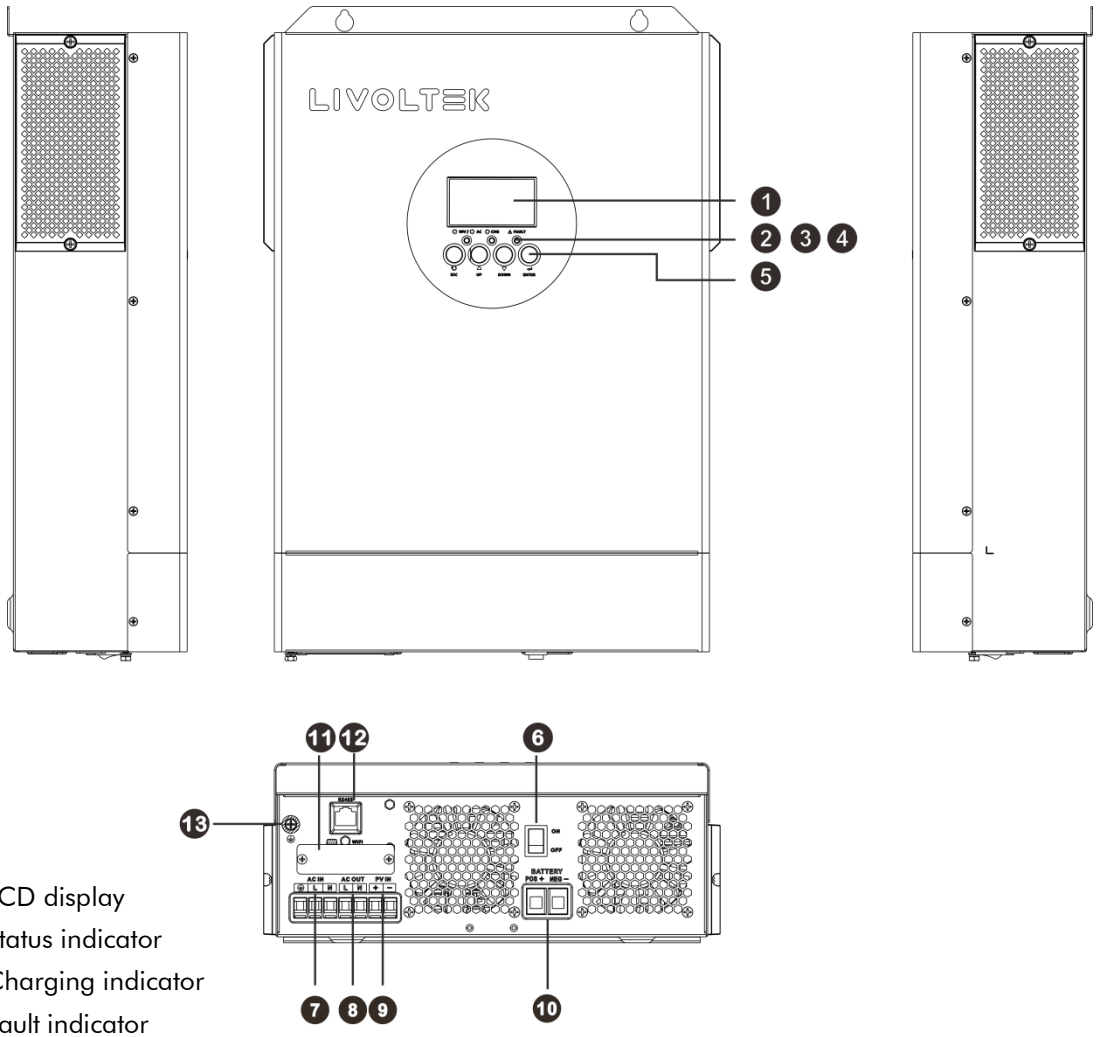


Figure 1 Hybrid Power System

PRODUCT OVERVIEW



1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function buttons
6. Power on/off switch
7. AC input
8. AC output
9. PV input
10. Battery input
11. RS232 communication port
12. RS485 communication port
13. Grounding

INSTALLATION

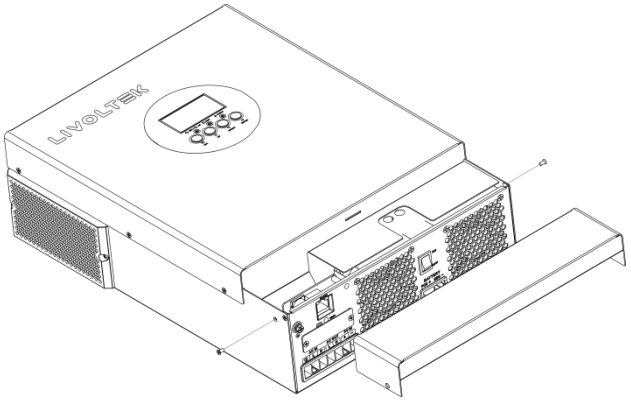
Unpacking and Inspection

Before installation, please inspect the unit. Be sure that nothing inside the package is damaged. You should have received the following items inside of package:

1. The unit x 1
2. User manual x 1

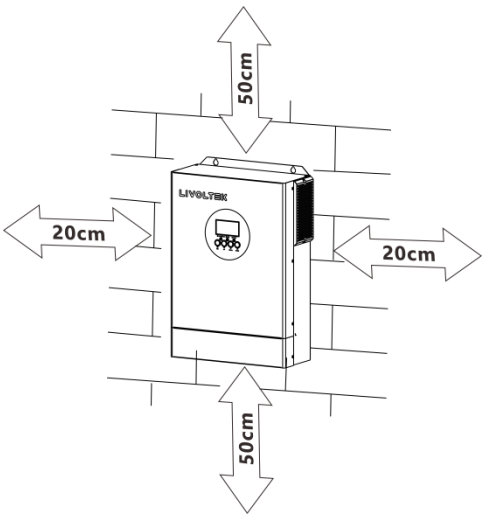
Preparation

Before connecting all wirings, please take off bottom cover by removing two screws as shown below.



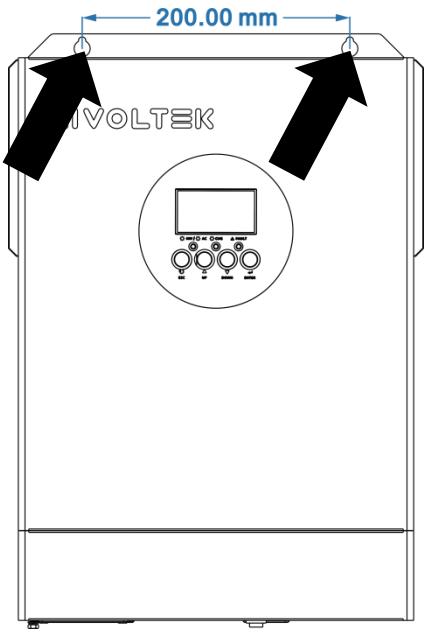
Mounting the Unit

Consider the following points before selecting where to install:
1. Do not mount the inverter on flammable construction materials.
2. Mount on a solid surface
3. Install this inverter at eye level in order to allow the LCD display to be read at all times.
4. The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
5. The recommended installation position is to be adhered to the wall vertically.
6. Be sure to keep other objects and surfaces as shown in the right diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.



⚠ SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.

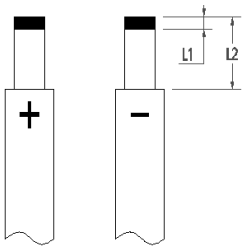
Install the unit by screwing three screws. It's recommended to use M4 or M5 screws.



Battery Connection

CAUTION: For safety operation and regulation compliance, it's requested to install a separate DC over-current protector or disconnect device between battery and inverter. It may not be requested to have a disconnect device in some applications, however, it's still requested to have over-current protection installed. Please refer to typical amperage in below table as required fuse or breaker size.

Stripping Length:



WARNING! All wiring must be performed by a qualified personnel.

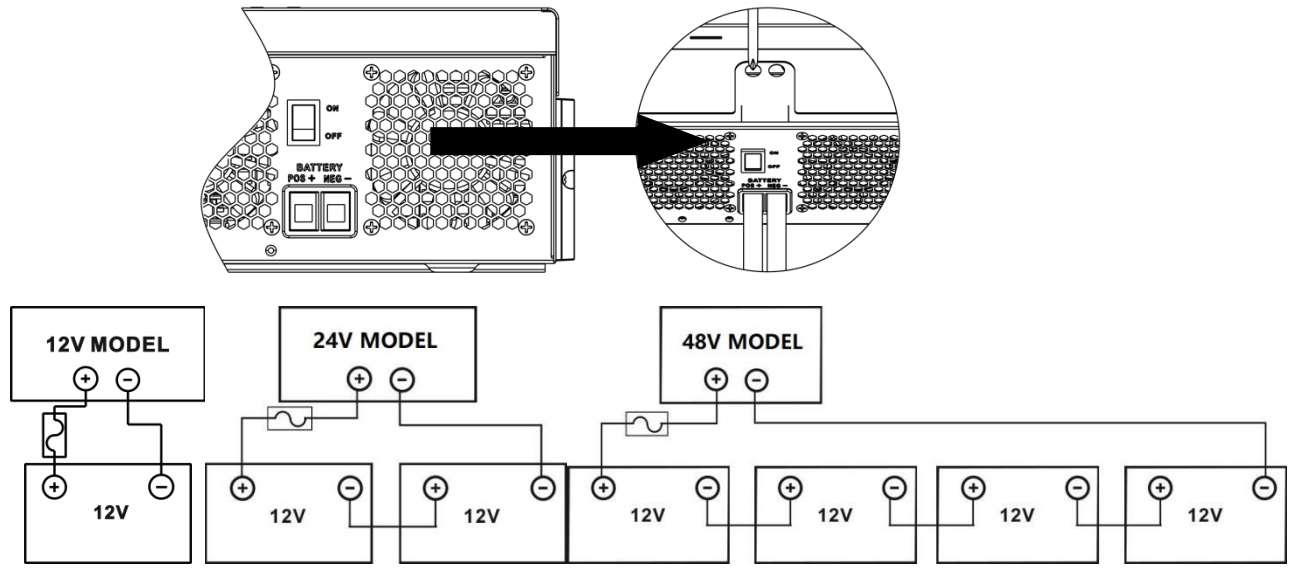
WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable 、 stripping length(L2) and tinning length(L1) as below.

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

Model	Maximum Amperage	Battery capacity	Wire Size	Cable mm^2	L1 (mm)	L 2 (mm)	Torque value
All Models	137A	100AH	2AWG	38	3	18	2~ 3 Nm

Please follow below steps to implement battery connection:

1. Remove insulation sleeve 18 mm for positive and negative cables based on recommended stripping length.
2. Connect all battery packs as units requires. It's suggested to use recommended battery capacity.
3. Insert battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2-3 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and battery cables are tightly screwed to the battery connector.



⚠	**WARNING: Shock Hazard** Installation must be performed with care due to 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 anti-oxidant substance on the terminals before terminals are connected tightly. **CAUTION!!** Before making the final DC connection or closing DC breaker/disconnector, be sure positive (+) must be connected to positive (+) and negative (-) must be connected to negative (-).

AC Input/Output Connection

CAUTION!! Before connecting to AC input power source, please install a **separate** AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 50A. **CAUTION!!** There are two terminal blocks with "IN" and "OUT" markings. Please do NOT mis-connect input and output connectors.

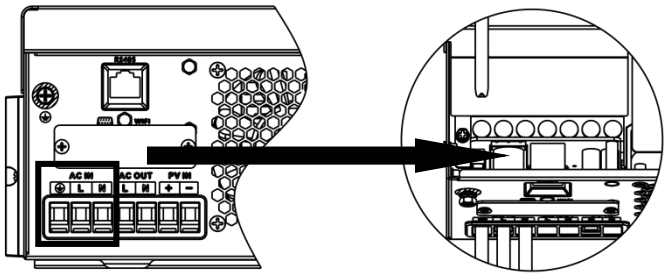
WARNING! All wiring must be performed by a qualified personnel.
WARNING! It's very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable size as below.
Suggested cable requirement for AC wires

Model	Gauge	Torque Value
3.5KVA	10AWG	1.4~ 1.6Nm
6.2KVA	8 AWG	1.4~ 1.6Nm

Please follow below steps to implement AC input/output connection:

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⏚) first.

⏚→Ground (yellow-green) L→LINE (brown or black) N→Neutral (blue)



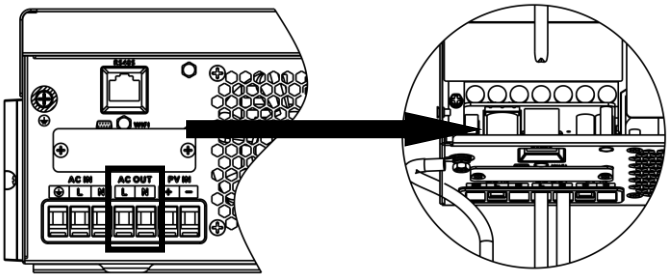
⚠	**WARNING:** Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

4. Then, insert AC output wires according to polarities indicated on terminal block and tighten terminal screws. Be sure to connect PE protective conductor (⏚) first.

⏚ → **Ground (yellow-green)**

L → **LINE (brown or black)**

N → **Neutral (blue)**



5. Make sure the wires are securely connected.

Declarations for the AC OUTPUT Function:

The ***AC OUTPUT*** of GF1 inverters have over load ability.

For details, please refer to the technical parameters of GF1 series inverter section.

And the inverter has self-protection derating at high ambient temperature.

The below statement lays out general policies governing the off grid inverters of the series GF1.

1. For off grid inverters (Series GF1), the standard PV installation typically consists of the connection of the inverter with both panels and batteries. In the case where the system is not connected to the batteries, the back-up function is strongly not advised for use.
2. Manufacturer shall not cover the standard warranty and be liable for any consequences arising from users not following this instruction.
3. Under normal circumstances, the back-up switching time is less than 10ms (the minimal condition to be considered as the UPS level). However, some external factors may cause the system failing on back-up mode. As such, we recommend the users to be aware of conditions and follow the instructions as below:

- Do not connect loads when they are dependent on a stable energy supply for a reliable operation.
- Do not connect the loads which may in total exceed the maximum back-up capacity.
- Try to avoid those loads which may create very high start-up current surges such as inverter air-conditioner, high-power pump etc.

- Due to the condition of the battery itself, battery current might be limited by some factors including but not limited to the temperature, weather etc.

Acceptable Loads Are as Below:

GF1 series inverter is able to supply a continuous rated output or maintain a double rated output for less than 10 seconds on back-up side to support loads. The inverter also has self-protection against derating at high ambient temperature.

*** ***Inductive loads and capacitive loads*** can be briefly referred to as ***shock loads.***

*** ***Shock loads*** may experience shock currents or surges during startup, which can cause voltage fluctuations, current inrushes, motor vibrations, and voltage surges. These anomalies may exceed the load-bearing capacity of the inverter, resulting in damage or even failure. Therefore, it is necessary to control the total amount of inductive and capacitive loads connected to the inverter to ensure safe and stable operation.

- When selecting an inverter, the loading capacity should be taken into consideration to ensure that the total amount of connected inductive and capacitive loads fall within its rated capacity.
- When connecting **Shock loads** to the off-grid inverter, it is necessary to limit the total load capacity according to the following table to ensure safe and reliable operation of the inverter. Please refer to the table for the allowed load capacities for each load type.

	Continuous output	Max output (<10S)	Maximum individual Shock load power Maximum total load power
3K524V @230Vac	3500VA	7000VA	≤1.1KVA (**Individual Shock load**) ≤2.3KVA(Total Loads **include** Shock load) ≤2.4KVA(Total Load **without** Shock load)
6K248V @230Vac	6200VA	12400VA	≤2KVA (**Individual Shock load**) ≤3.8KVA (Total Load **include** Shock load) ≤4.2KVA(Total Load **without** Shock load)

WARNING:

- Earth connection essential before connecting supply.
- Be sure that AC power source is disconnected before attempting to hardwire it to the unit.
- Be sure to connect AC wires with correct polarity. If L and N wires are connected reversely, it may cause utility short-circuited when these inverters are worked in parallel operation.

NOTICE:

- It is important to make sure that the combined power required for all devices connected to this EPS output does not exceed the power rating of the inverter.
- Appliances such as air conditioner are required at least 2~3 minutes to restart because it's required to have enough time to balance refrigerant gas inside of circuits. If a power shortage occurs and recovers in a short time, it will cause damage to your connected appliances.
- To prevent this kind of damage, please check manufacturer of air conditioner if it is equipped with time-delay function before installation. Otherwise, this inverter will trig overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

PV Connection

CAUTION: Before connecting to PV modules, please install **separately** a DC circuit breaker between inverter and PV modules.
WARNING! All wiring must be performed by a qualified personnel.
WARNING! It" very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

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

PV Module Selection:
When selecting proper PV modules, please be sure to consider below parameters:

1. Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.
2. Open circuit Voltage (Voc) of PV modules should be higher than min. battery voltage.

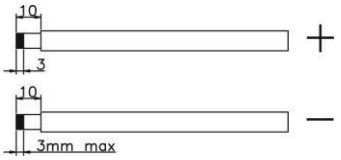
INVERTER MODEL	3.5KVA	6.2KVA
Max. PV Array Open Circuit Voltage	500DC	
PV Array MPPT Voltage Range	60VDC~500VDC	
Max. PV INPUT CURRENT	15A	27A

Take the 450Wp and 550Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed in the table below.

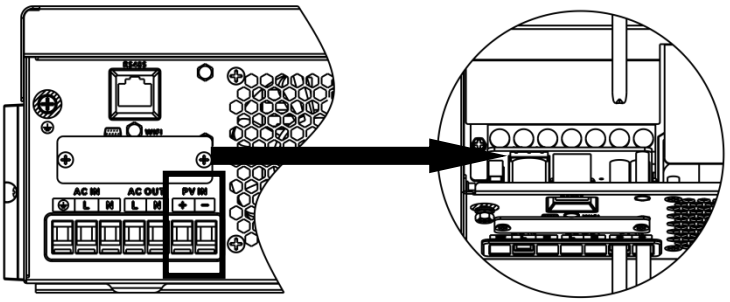
	SOLAR INPUT	Q'ty of panels	Total input power	Inverter Model
Solar Panel Spec. (reference) - 450Wp - Vmp: 34.67Vdc - Imp: 13.82A - Voc: 41.25Vdc - Isc: 12.98A	3 pcs in serial	3 pcs	1,350 W	3.5KVA/6.2KVA
	4 pcs in serial	4 pcs	1,800 W	
	5 pcs in serial	5 pcs	2,250 W	
	6 pcs in serial	6 pcs	2,700 W	
	7 pcs in serial	7 pcs	3,150 W	
	8 pcs in serial	8 pcs	3,600 W	
	9 pcs in serial	9 pcs	4,050 W	
	10 pcs in serial	10 pcs	4,500 W	6.2KVA
	11 pcs in serial	11 pcs	4,950 W	
	12 pcs in serial	12 pcs	5,400 W	
	6 pieces in serial and 2 sets in parallel	12 pcs	5,400 W	6.2KVA
	7 pieces in serial and 2 sets in parallel	14 pcs	6,300 W	
Solar Panel Spec. (reference) - 550Wp - Vmp: 42.48Vdc - Imp: 12.95A - Voc: 50.32Vdc - Isc: 13.70A	SOLAR INPUT	Q'ty of panels	Total input power	Inverter Model
	3 pcs in serial	3 pcs	1,650 W	3.5KVA/6.2KVA
	4 pcs in serial	4 pcs	2,200 W	
	5 pcs in serial	5 pcs	2,750 W	
	6 pcs in serial	6 pcs	3,300 W	
	7 pcs in serial	7 pcs	3,850 W	
	8 pcs in serial	8 pcs	4,400 W	6.2KVA
	9 pcs in serial	9 pcs	4,950 W	
	4 pieces in serial and 2 sets in parallel	8 pcs	4,400 W	6.2KVA
	5 pieces in serial and 2 sets in parallel	10 pcs	5,500 W	
	6 pieces in serial and 2 sets in parallel	12 pcs	6,600 W	

PV Module Wire Connection:

Please follow below steps to implement PV module connection:



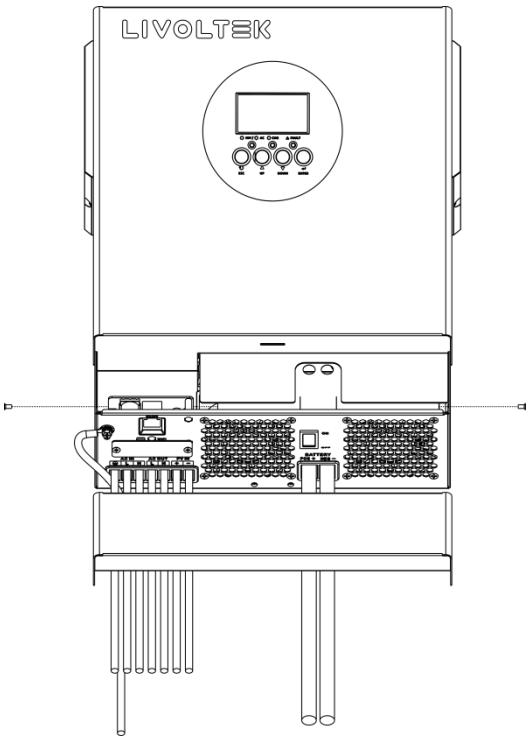
1. Remove insulation sleeve 10 mm for positive and negative conductors.
2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV input connector.



3. Make sure the wires are securely connected.

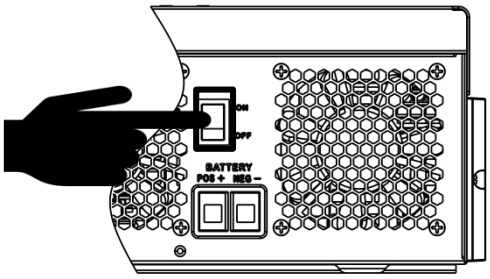
Final Assembly

After connecting all wirings, please put bottom cover back by screwing two screws as shown below.



OPERATION

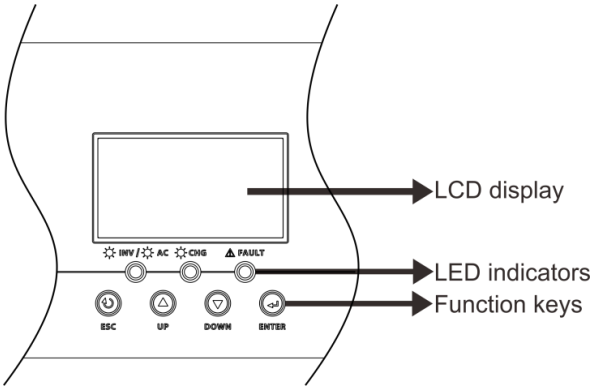
Power ON/OFF



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

Operation and Display Panel

The operation and display panel, shown in below chart, is on the front panel of the inverter. It includes three indicators, four function keys and a LCD display, indicating the operating status and input/output power information.



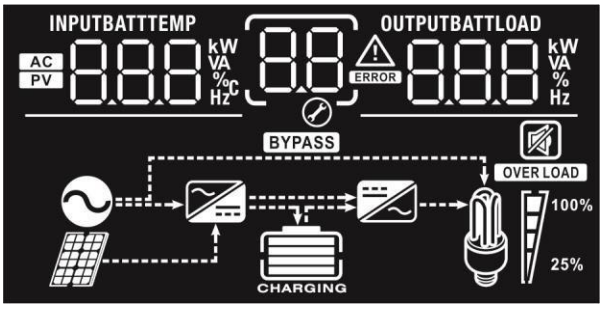
LED Indicator

LED Indicator			Messages
☀ AC / ◐ INV	Green	Solid On	Output is powered by utility in Line mode.
		Flashing	Output is powered by battery or PV in battery mode.
☀ CHG	Green	Solid On	Battery is fully charged.
		Flashing	Battery is charging.
⚠ FAULT	Red	Solid On	Fault occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.

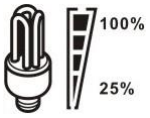
Function Keys

Function Key	Description
ESC	To exit setting mode
UP	To go to previous selection
DOWN	To go to next selection
ENTER	To confirm the selection in setting mode or enter setting mode

LCD Display Icons



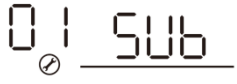
Icon	Function description
Input Source Information	
AC	Indicates the AC input.
PV	Indicates the PV input
INPUTBATT kW VA % Hz	Indicate input voltage, input frequency, PV voltage, battery voltage and charger current.
Configuration Program and Fault Information	
	Indicates the setting programs.
ERROR	Indicates the warning and fault codes. Warning: flashing with warning code. Fault: ERROR lighting with fault code
Output Information	
OUTPUTBATTLOAD kW VA % Hz	Indicate output voltage, output frequency, load percent, load in VA, load in Watt and discharging current.
Battery Information	
CHARGING	Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.

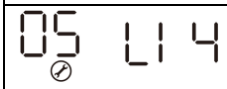
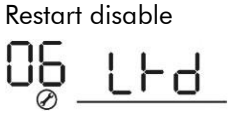
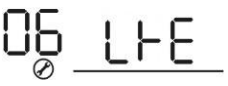
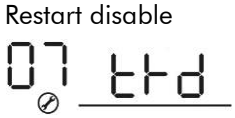
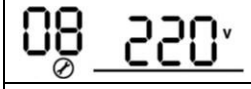
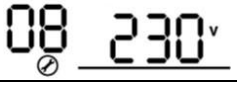
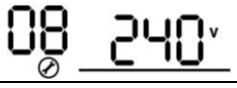
Load Information				
OVER LOAD	Indicates overload.			
	Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%.			
	0%~24%	25%~49%	50%~74%	75%~100%
				
Mode Operation Information				
	Indicates unit connects to the mains.			
	Indicates unit connects to the PV panel.			
BYPASS	Indicates load is supplied by utility power.			
	Indicates the utility charger circuit is working.			
	Indicates the DC/AC inverter circuit is working.			
Mute Operation				
	Indicates unit alarm is disabled.			

LCD Setting

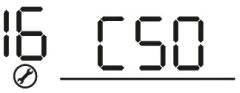
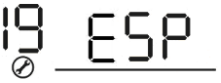
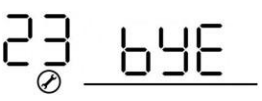
After pressing and holding ENTER button for 3 seconds, the unit will enter setting mode. Press "UP" or "DOWN" button to select setting programs. And then, press "ENTER" button to confirm the selection or ESC button to exit.

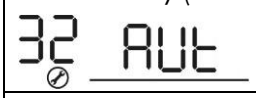
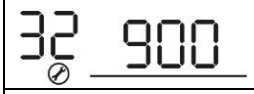
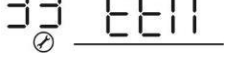
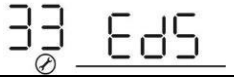
Setting Programs:

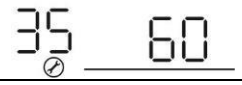
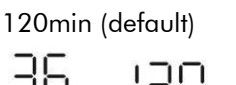
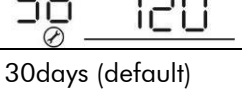
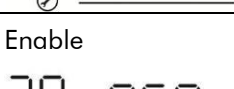
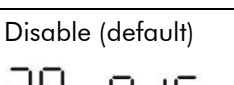
Program	Description	Selectable option	
01	Output source priority: To configure load power source priority	Solar first 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power the loads at the same time. Utility provides power to the loads only when any one condition happens: - Solar energy is not available - Battery voltage drops to either low-level warning voltage or the setting point in program 12.
		Utility first (default) 	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		SBU priority 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.
		SUB priority 	Solar energy is charged first and then power to the loads. If solar energy is not sufficient to power all connected loads, Utility energy will supply power to the loads at the same time. Note：SUB priority is just for PVmax=500Vdc model.

02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	60A (default) 	If selected, acceptable charging current range will be from Max. AC charging current to Max. charging current of SPEC, but it shouldn't be less than the AC charging current (program 11)
03	AC input voltage range	Appliances (default) 	If selected, acceptable AC input voltage range will be within 90-280VAC.
		UPS 	If selected, acceptable AC input voltage range will be within 170-280VAC.
		Generator 	If selected, acceptable AC input voltage range will be within 170-280VAC and compatible with generators. Note: Because generators are unstable, maybe the output of inverter will be unstable too.
05	Battery type	AGM (default) 	Flooded 
		User-Defined 	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
			Support PYLON US2000 Protocol 3.5 Version
			Support for **Livoltek BLF-B51100** lithium battery
06	Auto restart when overload occurs	Restart disable 	Restart enable (default) 
07	Auto restart when over temperature occurs	Restart disable 	Restart enable (default) 
08	Output voltage	220V 	230V (default) 
		240V 	

09	Output frequency	50Hz (default) 	60Hz 
10	Auto bypass When selecting “auto”, if the mains power is normal, it will automatically bypass, even if the switch is off.	manual(default) 	auto 
11	Maximum utility charging current	30A (default)  If selected, acceptable charging current range will be within 2-Max. AC charging current of SPEC.	
12	Setting voltage point back to utility source when selecting “SBU priority” or “Solar first” in program 01.	**48V models:**46V (default) Setting range is from 44.0V to 57.2V for 48v model, but the max setting value must be less than the value of program13.	
		24V models:23V (default) Setting range is from 22.0V to 28.6V for 24v model, but The max setting value must be less than the value of program13.	
13	Setting voltage point back to battery mode when selecting “SBU priority” or “Solar first” in program 01.	Battery fully charged (default) 	**48V models:** Setting range is from 48V to full (the value of program26-0.4V), but the max setting value must be more than the value of program12. **24V models:** Setting range is from 24V to full (the value of program26-0.4V), but the max setting value must be more than the value of program12.

16	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Solar first 	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility (default) 	Solar energy and utility will charge battery at the same time.
		Only Solar 	Solar energy will be the only charger source no matter utility is available or not.
		If this inverter/charger is working in Battery mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.	
18	Buzzer mode	Mode1 	Buzzer mute
		Mode2 	The buzzer sounds when the input source changes or there is a specific warning or fault
		Mode3 	The buzzer sounds when there is a specific warning or fault
		Mode4(default) 	The buzzer sounds when there is a fault
19	Auto return to default display screen	Return to default display screen (default) 	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		Stay at latest screen 	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on (default) 	Backlight off 
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable 	Bypass enable(default) 

<table>
<tr><td>25</td><td>Modbus ID Setting</td><td colspan="2">Modbus ID Setting Range ： 001(default)~247
  </td></tr>
<tr><td>26</td><td>Bulk charging voltage (C.V voltage)</td><td colspan="2">If self-defined is selected in program 5, this program can be set up. But the setting value must be more than or equal the value of program27. Increment of each click is 0.1V.
24V models: Default 28.2V, setting range is from 24.0V to 30.0V ,
48V models: Default 56.4V, setting range is from 48.0V to 62.0V.</td></tr>
<tr><td>27</td><td>Floating charging voltage</td><td colspan="2">If self-defined is selected in program 5, this program can be set up.
24V models default setting: 27.0V
Setting range is from 24.0V to the value of program 26
48V models default setting: 54.0V
Setting range is from 48.0V to the value of program 26</td></tr>
<tr><td>29</td><td>Low DC cut-off voltage</td><td colspan="2">If self-defined is selected in program 5, this program can be set up.
The setting value must be less than the value of program12. Increment of each click is 0.1V.Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected.
24V models default setting: 21.0v
Setting range is from 20.0V to 27.0V
48V models default setting: 42.0V
Setting range is from 40.0V to 54.0V</td></tr>
<tr><td rowspan="4">32</td><td rowspan="4">Bulk charging time (C.V stage)</td><td>Automatically (Default):
  </td><td>If selected, inverter will judge this charging time automatically.</td></tr>
<tr><td>5 min
  </td><td rowspan="2">The setting range is from 5 min to 900 min. Increment of each click is 5 min.</td></tr>
<tr><td>900 min
  </td></tr>
<tr><td colspan="2">If “USE” is selected in program 05, this program can be set up.</td></tr>
<tr><td rowspan="2">33</td><td rowspan="2">Battery equalization</td><td>Battery equalization
  </td><td>Battery equalization disable (default)
  </td></tr>
<tr><td colspan="2">If “Flooded” or “User-Defined” is selected in program 05, this program can be set up.</td></tr>
</table>

34	Battery equalization voltage	24V models default setting is 29.2V. Setting range is from floating voltage ~ 31V. Increment of each click is 0.1V. 48V models default setting is 58.4V. Setting range is from floating voltage ~ 64V. Increment of each click is 0.1V.	
35	Battery equalized time	60min (default) 	Setting range is from 0 min to 900min.
36	Battery equalized timeout	120min (default) 	Setting range is from 0min to 900 min.
37	Equalization interval	30days (default) 	Setting range is from 1 to 90 days.
39	Equalization activated immediately	Enable 	Disable (default) 
		If equalization function is enabled in program 33, this program can be set up. If "Enable" is selected in this program, it's to activate battery equalization immediately and LCD main page will shows "  ". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 37 setting. At this time, "" will not be shown in LCD main page..	
41	Automatic activation for lithium battery		Disable automatic activation (default)
			When Program05 is selected "LIx" as lithium battery and when the battery is not detected, the unit will activate automatically the lithium battery at a time. If you want to activate automatically the lithium battery，you must restart the unit.
42	Manual activation for lithium battery		Default: disable activation
			When Program05 is selected "LIx" as lithium battery, when the battery is not detected, If you want to activate the lithium battery at a time, you could selected it.
43	Setting SOC point back to utility source when selecting "SBU priority" or "Solar first" in program 01		Default 50%, 5%~50% Settable,but the minimum setting value must be more than the value of program 45.
44	Setting SOC point back to battery mode when selecting "SBU priority" or "Solar first "in program 01		Default 95%, 60%~100% Settable

45	Low DC cut-off SOC		Default 20%, 3%~30% Settable,but the max setting value must be less than the value of program 43.
46	Maximum discharge current protection when selecting “single” in program 28		Default OFF Disable current discharge current protection function
			Only available in Single model. When utility is available, it turns to utility model and battery discharge stops after the battery discharge current exceeded the setting value. When utility is unavailable, warning occurs and battery discharge lasts after the battery discharge current exceeded the setting value.

BATTERY EQUALIZATION

Equalization function is added into charge controller. It reverses the buildup of negative chemical effects like stratification, a condition where acid concentration is greater at the bottom of the battery than at the top. Equalization also helps to remove sulfate crystals that might have built up on the plates. If left unchecked, this condition, called sulfation, will reduce the overall capacity of the battery. Therefore, it’s recommended to equalize battery periodically.

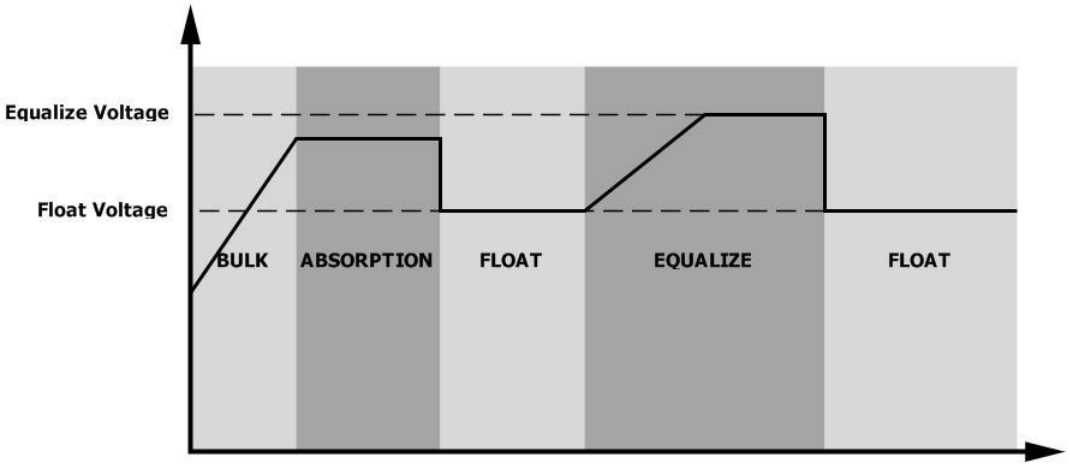
- How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting program 33 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 37.
2. Active equalization immediately in program 39.

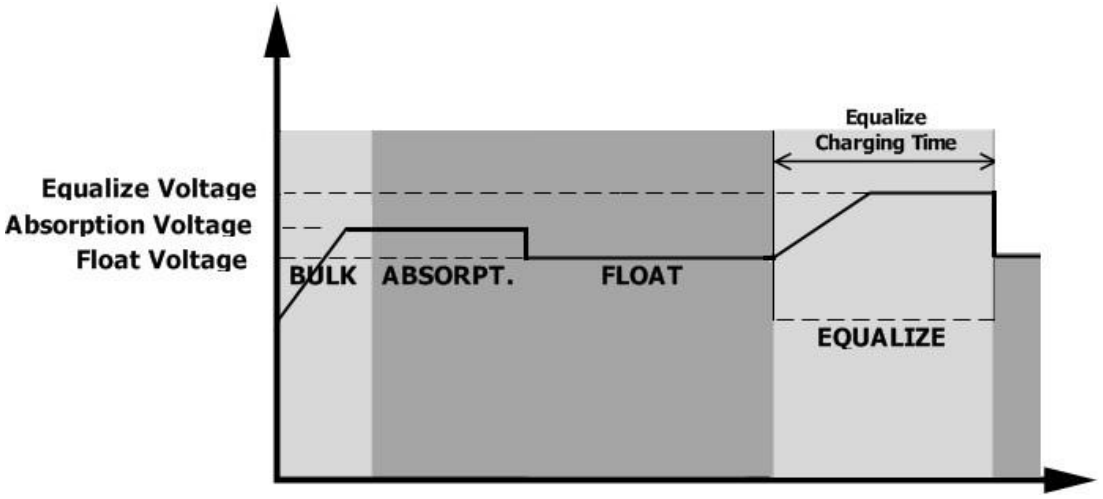
- When to Equalize

In float stage, when the setting equalization interval (battery equalization cycle) is arrived, or equalization is active immediately, the controller will start to enter Equalize stage.

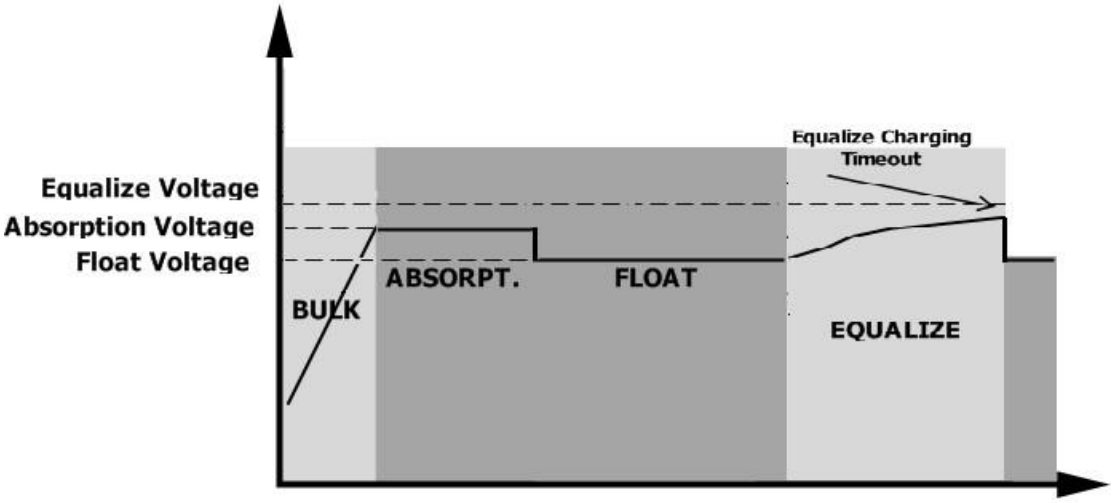


- Equalize charging time and timeout

In Equalize stage, the controller will supply power to charge battery as much as possible until battery voltage raises to battery equalization voltage. Then, constant-voltage regulation is applied to maintain battery voltage at the battery equalization voltage. The battery will remain in the Equalize stage until setting battery equalized time is arrived.



However, in Equalize stage, when battery equalized time is expired and battery voltage doesn't rise to battery equalization voltage point, the charge controller will extend the battery equalized time until battery voltage achieves battery equalization voltage. If battery voltage is still lower than battery equalization voltage when battery equalized timeout setting is over, the charge controller will stop equalization and return to float stage.



SETTING FOR LITHIUM BATTERY

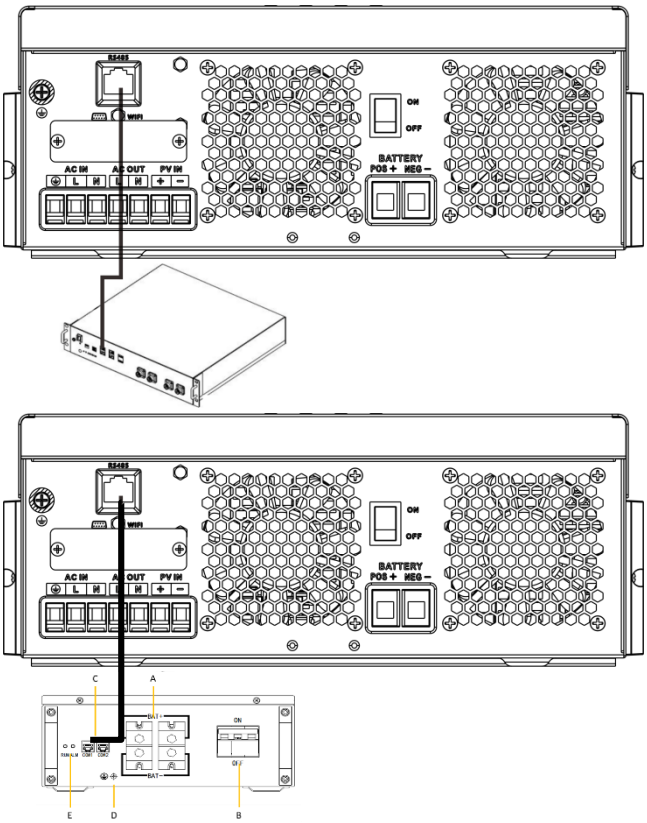
Lithium Battery Connection

If choosing lithium battery for the inverter, you are allowed to use the lithium battery only which we have configured. There're two connectors on the lithium battery, RS485 port of BMS and power cable.

Please follow below steps to implement lithium battery connection:

1). Assemble battery terminal based on recommended battery cable and terminal size (same as Lead acid, see section Lead-acid Battery connection for details).

2). Connect the end of RS485 port of battery to BMS(RS485) communication port of inverter.



Lithium battery communication and setting

if choosing lithium battery, make sure to connect the BMS communication cable between the battery and the inverter. This communication cable delivers information and signal between lithium battery and the inverter. This information is listed below:

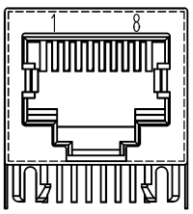
Re-configure charging voltage, charging current and battery discharge cut-off voltage according to the lithium battery parameters.

Have the inverter start or stop charging according to the status of lithium battery.

Connect the end of RS485 of battery to RS485 communication port of inverter

Make sure the lithium battery RS485 port connects to the inverter is Pin to Pin, the communication cable is inside of package and the inverter RS485 port pin assignment shown as below:

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



LCD setting

After connecting, you need to finish and confirm some settings as follow:

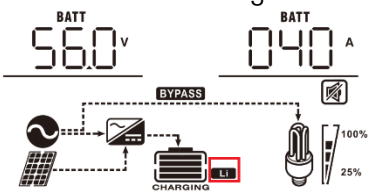
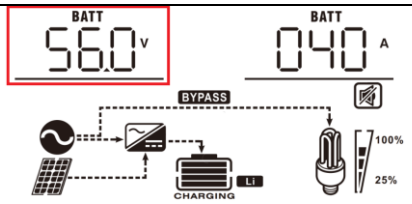
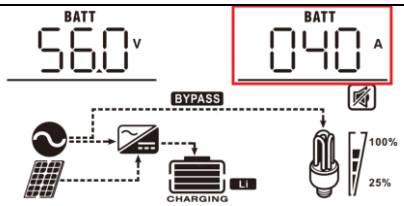
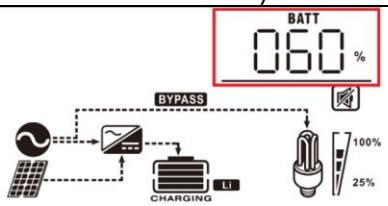
1) Select program 05 as lithium battery type.

2) Confirm program41/42/43/44/45 setting value.

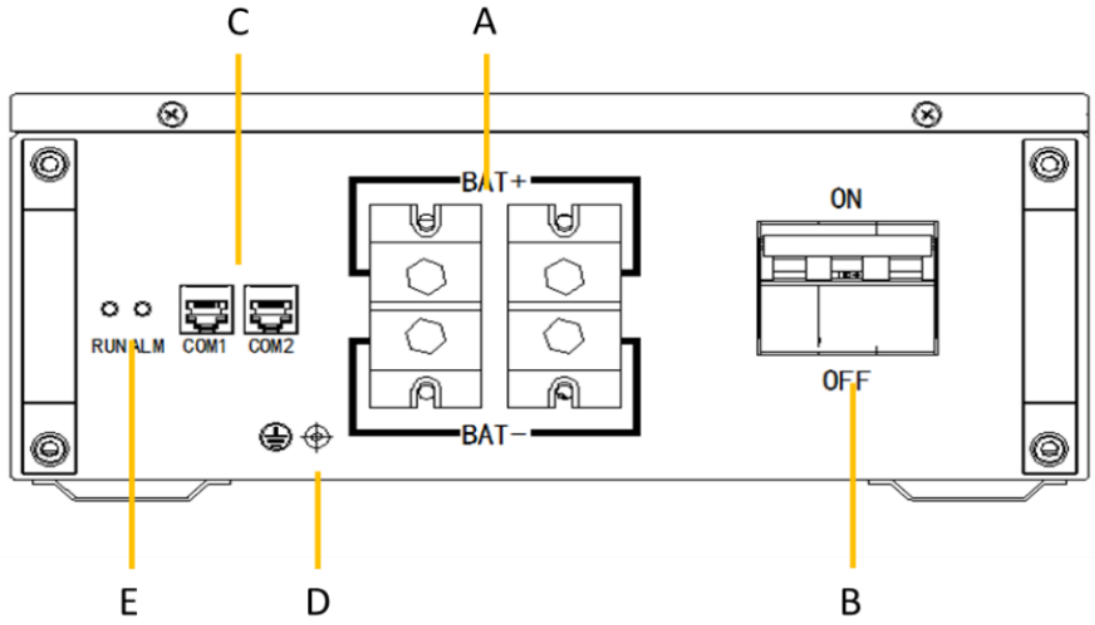
Note: Program 43/44/45 are only available with successful communication, they will replace the Program 12/13/29 function, at the same time, program 12/13/29 become unavailable.

LCD Display

If communication between the inverter and battery is successful, there is some information showing on the LCD as follow:

Item	Description	LCD display
1	Communication successful icon	Li will be flashing 
2	Max lithium battery charging voltage	 Max lithium battery charging voltage is 56.0V.
3	Max lithium battery charging current	 Max lithium battery charging current is 40A.
4	Lithium battery discharging is forbidden	Li will flash once every 1 second
5	Lithium battery charging is forbidden	Li will flash once every 2 second
6	Lithium battery SOC(%)	 Lithium battery SOC is 63AH and 60%

Setting for Livoltek BLF-B51100 lithium battery



Position	Definition
A	Battery Power Ports
B	DC Breaker
C	BMS Communication Ports
D	Ground Port
E	LED Indicator

1). Battery Power Connection

Procedure:

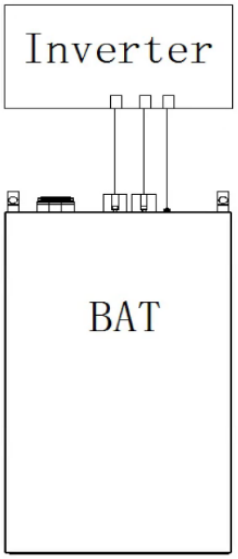
Before connecting the power cables, make sure the DC breaker of the battery is disconnected.

STEP 1:

Install the OT terminals ends of power cable to the battery.

STEP 2:

Plug the other ends of power cables into inverter.



Battery connection diagram

2). BMS Communication Connection

Please check whether the BMS communication cable in the accessory box is appropriate for the battery. If you are not sure for that, please confirm with your vendor.

Procedure:

STEP 1:

Please insert the RJ45 connector of the communication cable into the COM1 port of battery.

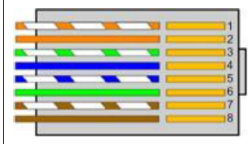
STEP 2:

Please insert the other end of the cable in the corresponding port of inverter.

STEP 3:

Plug the RJ45 CAN terminal resistor into the COM2 port of the battery.(No difference between COM1 and COM2)

BMS Connector Pin Definition:

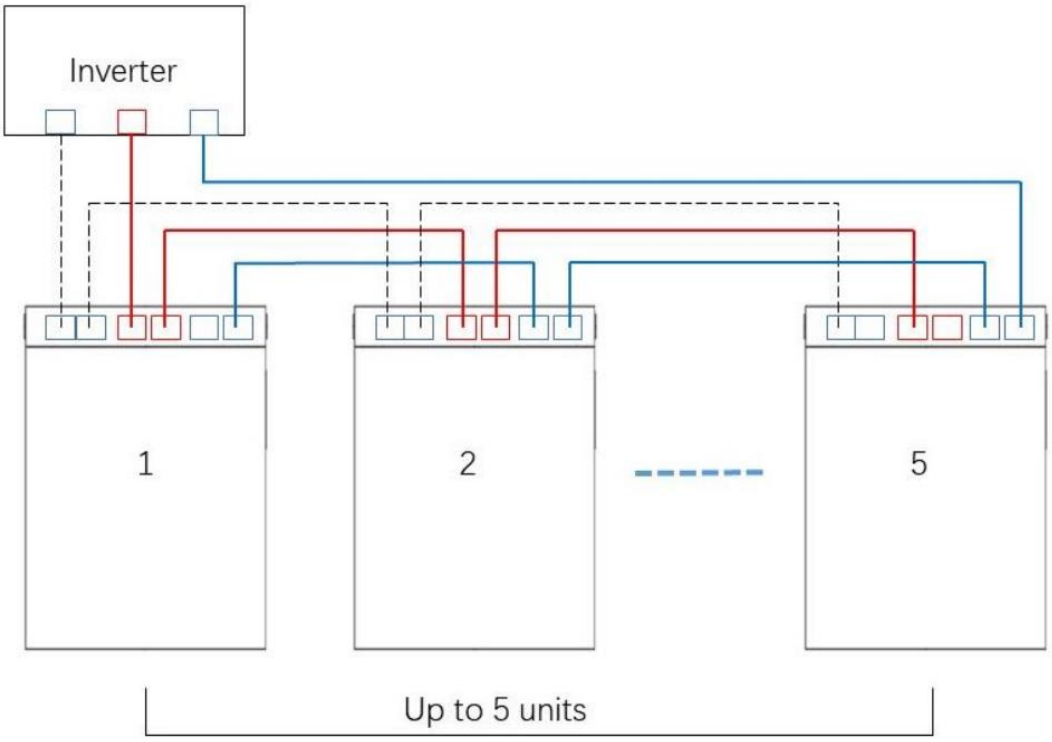


1	Orange/white	BMS_CAN_H
2	Orange	BMS_CAN_L
3	Green/white	BMS_485_A
4	Blue	GND
5	Blue/white	BMS_485_B
6	Green	NC
7	Brown/white	NC
8	Brown	NC

Parallel Connection of Multi-batteries (Livoltek BLF-B51100)

Expandability: Up to 5 units of BLF-B51100 batteries can be parallel connected in one system

Parallel Connection Diagram (Expansion Application)



Red /Blue solid line: Positive / Negative power cable

Black dotted line: Communication cable.

Procedure:

STEP 1:

a) Connect all the positive terminals (BAT+) of power ports of each battery by parallel power cable.

b) Connect all the negative terminals (BAT-) of power ports of each battery by parallel power cable.

c) Connect the positive terminal (BAT+) of the nearest battery from the inverter to the positive terminal (BAT+) of the inverter by power cable to inverter.

Two batteries system: Connect the negative terminal (BAT-) of the nearest battery from the inverter to the negative terminal (BAT-) of the inverter by power cable to inverter.

At least 3 batteries system :Connect the negative terminal (BAT-) of the farthest battery from the inverter to the negative terminal (BAT-) of the inverter by negative power cable to inverter(which must be harnessed on site).

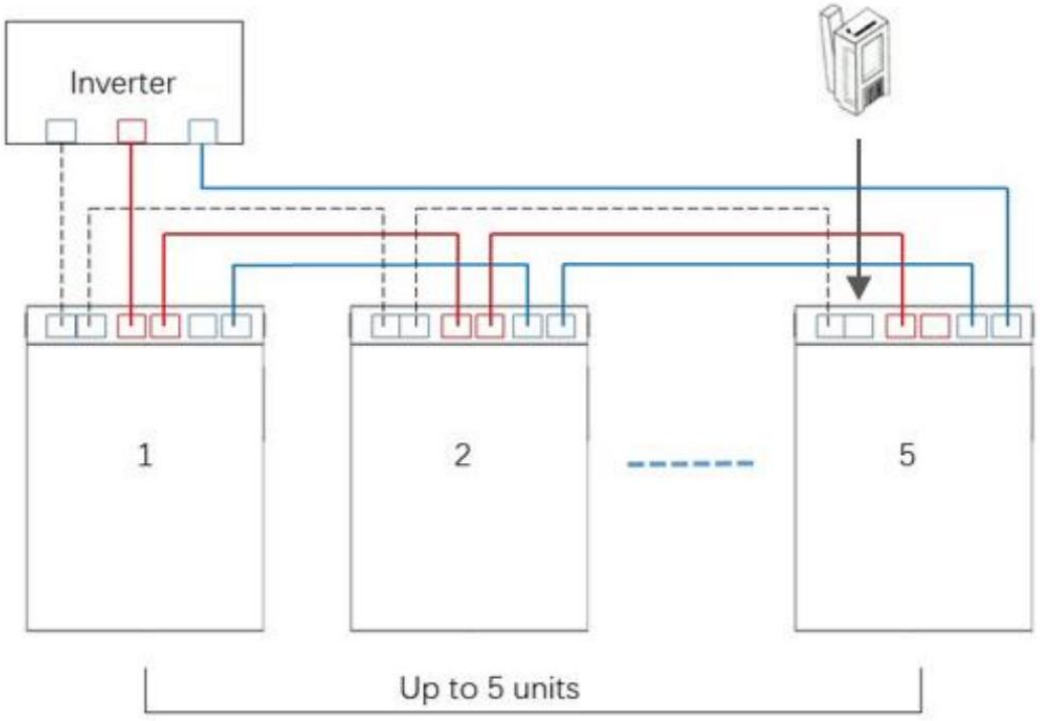
STEP 2:

Connect the BMS ports of each battery. The COM2 should be connected to the COM1.

Then connect the COM1 port of the nearest battery from the inverter to the corresponding port of inverter.

STEP 3:

Plug the RJ45 terminal resistor into the COM2 port of the farthest battery from the inverter.



Setting for PYLON US2000 lithium battery

1). PYLONTECH US2000 lithium battery setting:

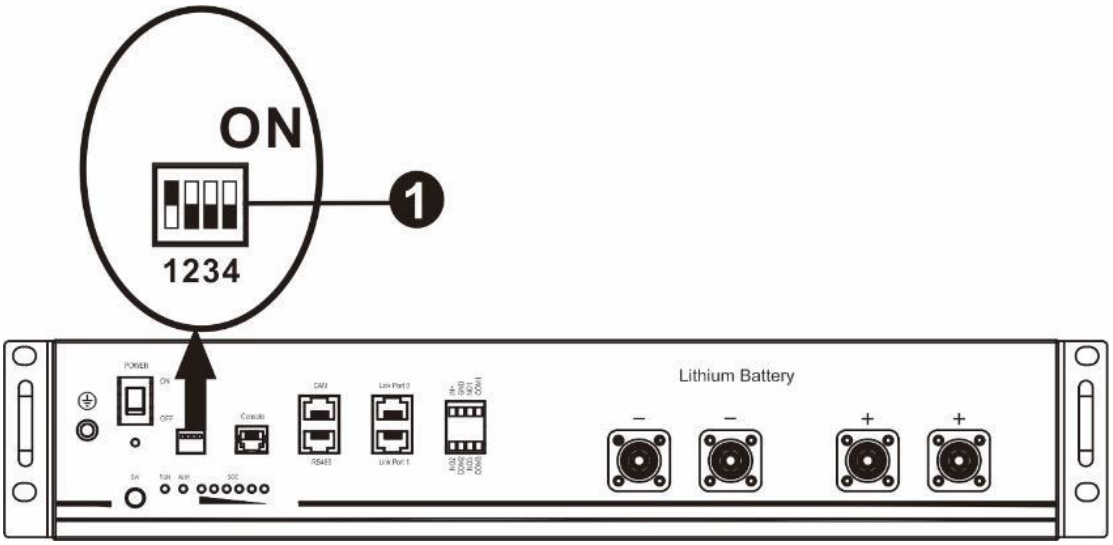
Dip Switch: There are 4 Dip Switches that sets different baud rate and battery group address. If switch position is turned to the "OFF" position, it means "0". If switch position is turned to the "ON" position, it means "1".

Dip 1 is "ON" to represent the baud rate 9600.

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

Dip switch 2, 3 and 4 on master battery (first battery) are to set up or change the group address.

NOTE: "1" is upper position and "0" is bottom position.



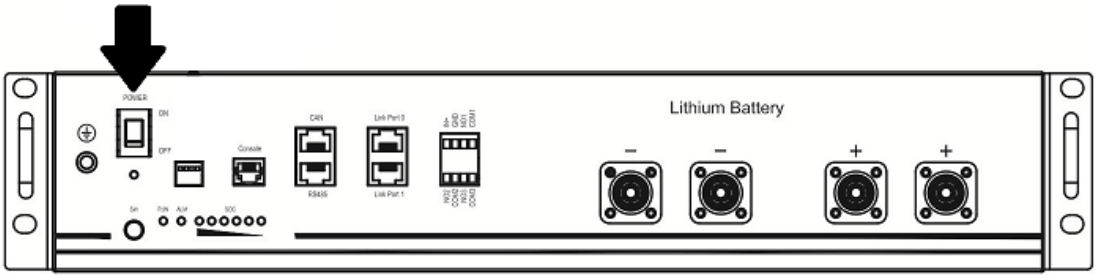
2). Process of install

Step 1.

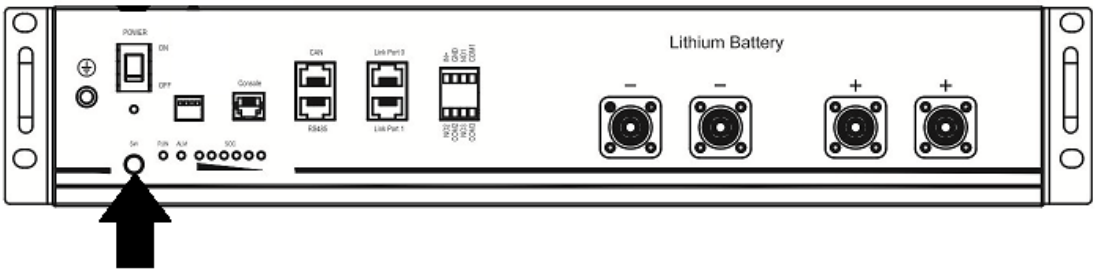
Use the RS485 cable to connect inverter and Lithium battery as Fig 1.

Step 2.

Switch on Lithium battery.



Step 3. Press more than three seconds to start Lithium battery, power output ready.



Step 4.

Turn on the inverter.

Step 5.

Be sure to select battery type as "Li2" in LCD program 5.

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

Setting for lithium battery without communication

This suggestion is used for lithium battery application and avoid lithium battery BMS protection without communication, please finish the setting as follow:

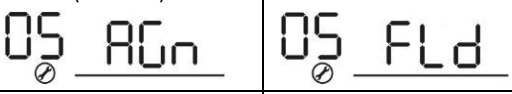
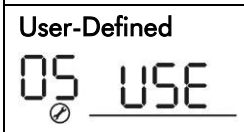
1.Before starting setting，you must get the battery BMS specification：

A. Max charging voltage

B. Max charging current

C. Discharging protection voltage

2.Set battery type as"USE"（user-defined)

05	Battery type	AGM (default) 	Flooded 
		User-Defined 	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
			Support for **Livoltek BLF-B51100** lithium battery

3. Set C.V voltage as Max charging voltage of BMS-0.5V.

26	Bulk charging voltage (C.V voltage)	If self-defined is selected in program 5, this program can be set up. But the setting value must be more than or equal the value of program27. Increment of each click is 0.1V. 24V models: Default 28.2V, setting range is from 24.0V to 30.0V , 48V models: Default 56.4V, setting range is from 48.0V to 62.0V.

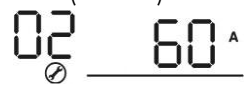
4. Set floating charging voltage as C.V voltage.

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

5. Set Low DC cut-off voltage ≥discharging protection voltage of BMS+2V.

29	Low DC cut-off voltage	If self-defined is selected in program 5, this program can be set up. The setting value must be less than the value of program12. Increment of each click is 0.1V.Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected. 24V models default setting: 21.0v Setting range is from 20.0V to 27.0V 48V models default setting: 42.0V Setting range is from 40.0V to 54.0V

6. Set Max charging current which must be less than the Max charging current of BMS.

02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	60A (default) 	If selected, acceptable charging current range will be within 1- Max. charging current of SPEC, but it shouldn't be less than the AC charging current (program 11)

7. Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.The setting value must be ≥Low DC cut-off voltage+1V, or else the inverter will have a warning as battery voltage low.

12	Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.	**48V models:**46V (default) Setting range is from 44.0V to 57.2V for 48v model, but the max setting value must be less than the value of program13.
		24V models:23V (default) Setting range is from 22.0V to 28.6V for 24v model, but The max setting value must be less than the value of program13.

Remark:

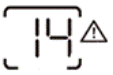
1.you'd better to finish setting without turn on the inverter(just let the LCD show, no output);

2.when you finish setting, please restart the inverter.

Fault Reference Code

Fault Code	Fault Event	Icon on
01	Over temperature of inverter module	
02	Over temperature of DCDC module	
03	Battery voltage is too high	
04	Over temperature of PV module	
05	Output short circuited.	
06	Output voltage is too high.	
07	Overload time out	
08	Bus voltage is too high	
09	Bus soft start failed	
10	PV over current	
11	PV over voltage	
12	DCDC over current	
13	Over current or surge	
14	Bus voltage is too low	
15	Inverter failed (Self-checking)	
18	Op current offset is too high	
19	Inverter current offset is too high	
20	DC/DC current offset is too high	
21	PV current offset is too high	
22	Output voltage is too low	
23	Inverter negative power	

Warning Indicator

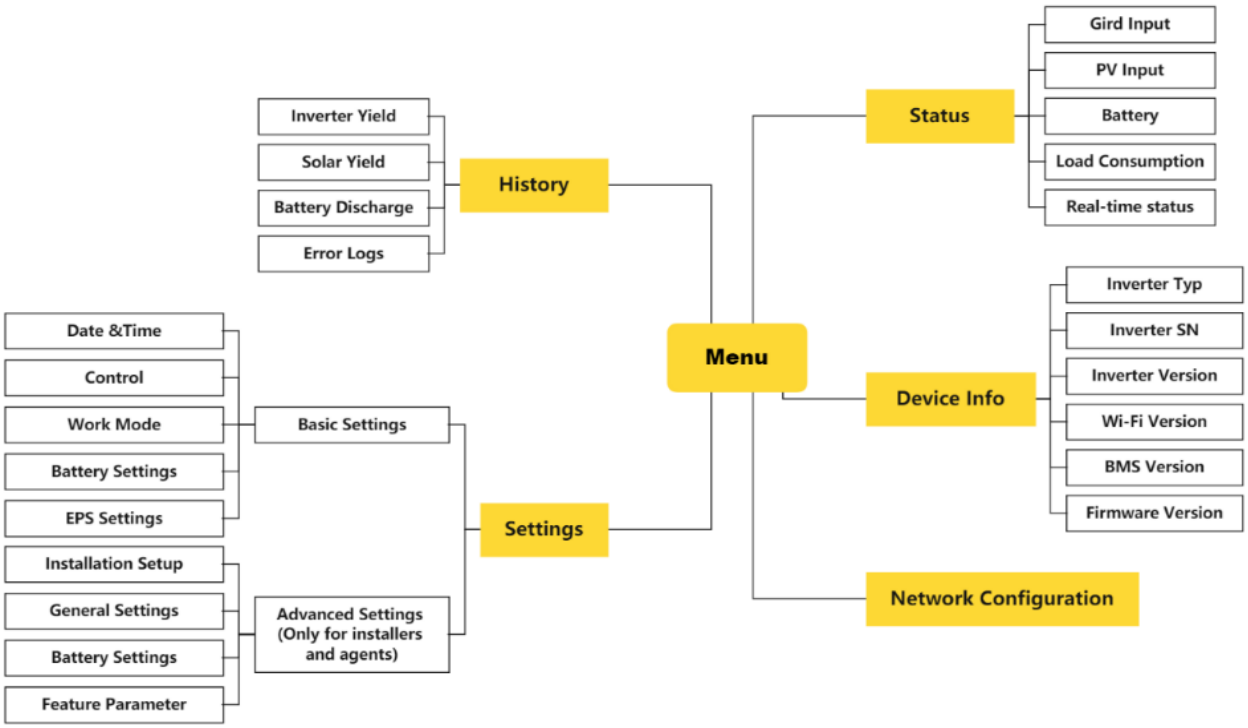
Warning Code	Warning Event	Audible Alarm	Icon flashing
02	Temperature is too High	Beep three times every second	
04	Low battery	Beep once every second	
07	Overload	Beep once every 0.5 second	
10	Output power derating	Beep twice every 3 seconds	
14	Fan blocked	None	
15	PV energy is low	Beep twice every 3 seconds	
19	Lithium Battery communication is failed	Beep once every 0.5 second	
21	Lithium Battery over current	None	
E9	Battery equalization	None	
bP	Battery is not connected	None	

APP Operation

"My Livoltek" APP is a platform to communicate with your device via Wi-Fi or Bluetooth, you can login on LIVOLTEK web portal(link as below) on your computer, also you can scan the QR code (as below) to download the APP on your phone to achieve real-time display and remote control.

Web link2: https://evs.livoltek-portal.com (For Asia, Latin American, Australia and others.)
Web link1: https://www.livoltek-portal.com (For Europe, Middle East Regions, Africa.)
APP: Search **"My Livoltek"** on Apple App Store, Google Play and you can scan the QR code to download the latest installation package.

User interface on the APP



Notes:

The advanced setting and Maintenance settings can only be checked and set via local mode on the APP or the web platform of installers and distributors" accounts.

WIFI Configuration

Preparation

Power on inverter

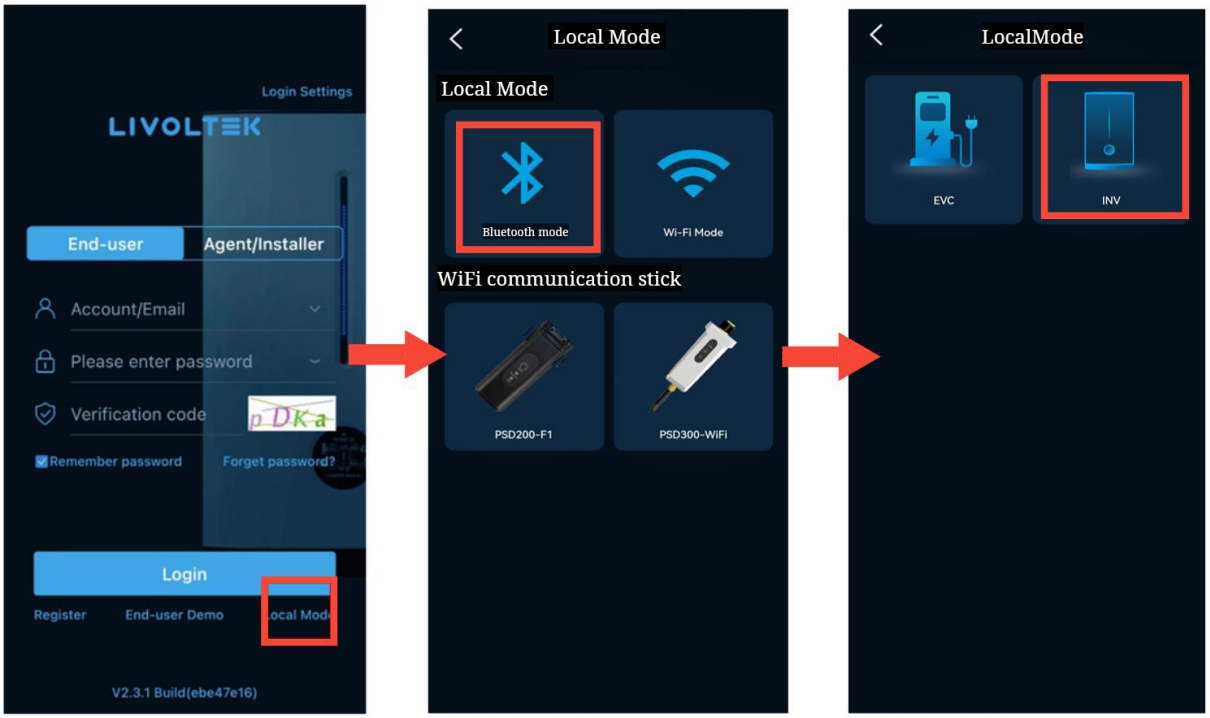
Power on router and check the wireless networks that your mobile phone joined

Open the "**My Livoltek**" APP

❶ Click on "**Local Mode**".

❷ Click on "**Bluetooth Mode**".

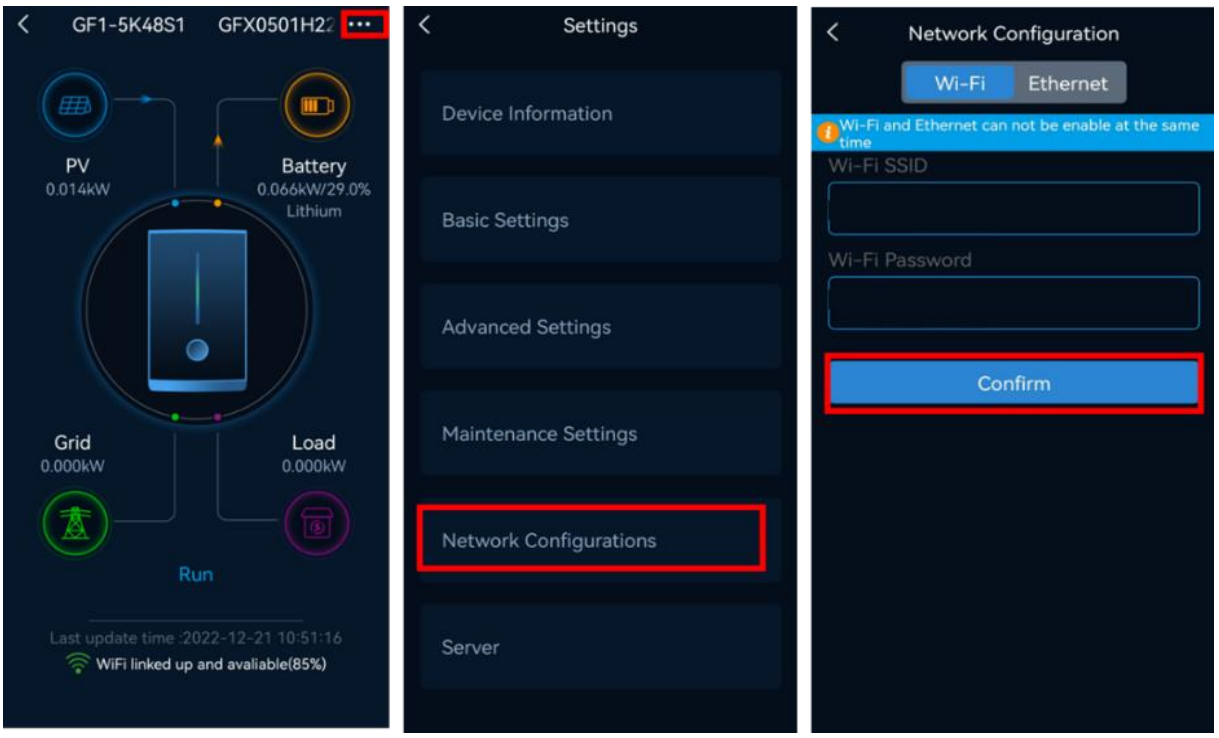
❸ Click on "**INV**".



❹Find your inverter according to

Device's **SN number ("BLF-GF- xxxx* "),** which is the few tail numbers of SN on the label.

❺ Click on " ••• " to click on setting.
❻ Click on "**Network Configurations**".
❼ Choose "**Wi-Fi**"*.
❽ Enter wireless network name & password
❾ Click on "**Confirm**" and wait 10s, "**Success**" will display on the APP if connection is successful.

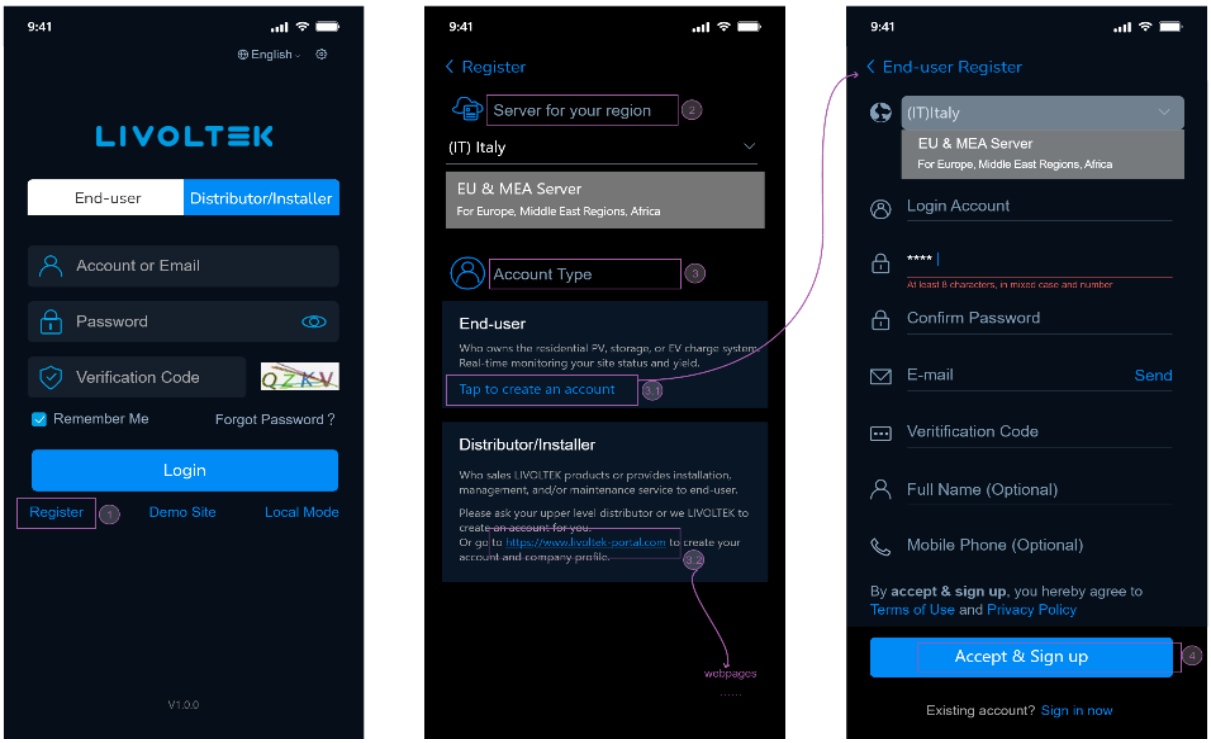


Notice: Local real-time monitoring via Bluetooth.

* Local real-time monitoring via Bluetooth.
* Refers to the last four digits of inverter's SN.
* If it's not possible to connect to the wireless network, or you do not want to do so, select the "Ethernet" to connect by LAN connection.

Register an account

Open the "My Livoltek" APP or LIVOLTEK Web Platform (the link shown above at "8.APP operation") and login with the username & password. Register it first if you don't have an account, which provides access to the remote monitoring and management.



Steps:

❶ Click the "**Register**" button.

❷ Choose your "**Server**" according to your country and region.

❸ Choose "**Account Type**". For end-users, please tap to create an account, if you are distributors/installers, go to browse livoltek-portal web platform to create an account.

❹ Fill in your personal details in the registration form (end-user).

You will receive an email in your inbox to confirm your account (If you do not have the email in your inbox, please check the spam folder).

Notice:

Meanwhile, for end-user can also ask the installer to create an account for him/her. The login account and initial password will be sent to the end-use's register email after created. Please note that the initial password needs to be changed at the first time your login.

NOTICE
• There are two different accounts for end users and business (agents/installers), with different account authorizations. • Business accounts can only be registered through web. • Only end user accounts can be registered through the APP. • The agent/installer can create a sub-account for the end user after the power site (PV plant) is created. The login account and initial password will be sent to the end-use's register email after created.

Create a site and add the inverter to the site

You can edit the site (PV Plant) information, add the new inverter to the site, delete the site, expand the list of added inverters of the site and set time-of-use tariff of your site.

Add the first Site and device

For the first login, there is the guidance to create the first site.

If have a LIVOTEK device, please touch “CREATE A SITE NOW” to start your journey. Filling up the site Basic info, PV capacity and tariff of your site, then add your device.

- Choose your site installer and complete yoursite name, time zone, and location your address.

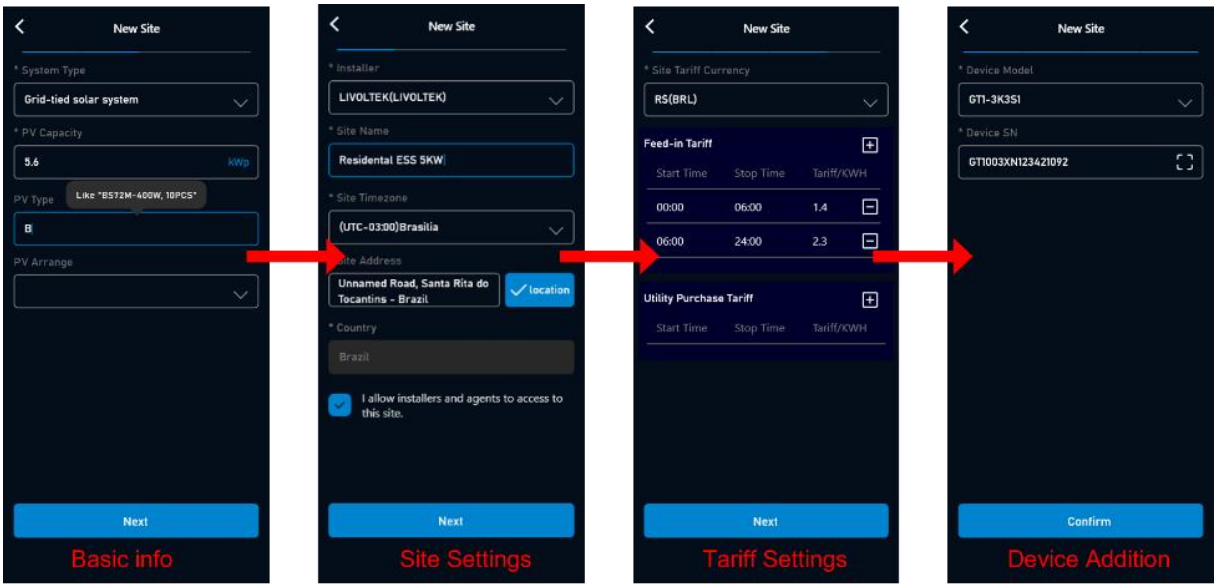
*Note: if forget to check the access allows,the end-users’ installer may not be able toserve.

- Configure your system type and PV info including PV capacity, PV type (optional, fill like “BS72M-400W, 10PCS”), PV arrange(optional, please select the electrical arrange of PV array).
- Set time-of-use tariff of your site.

Note: The time of use tariff must meet the requirements of 24 hours for both feed-in and self-use (or purchase) tariffs.

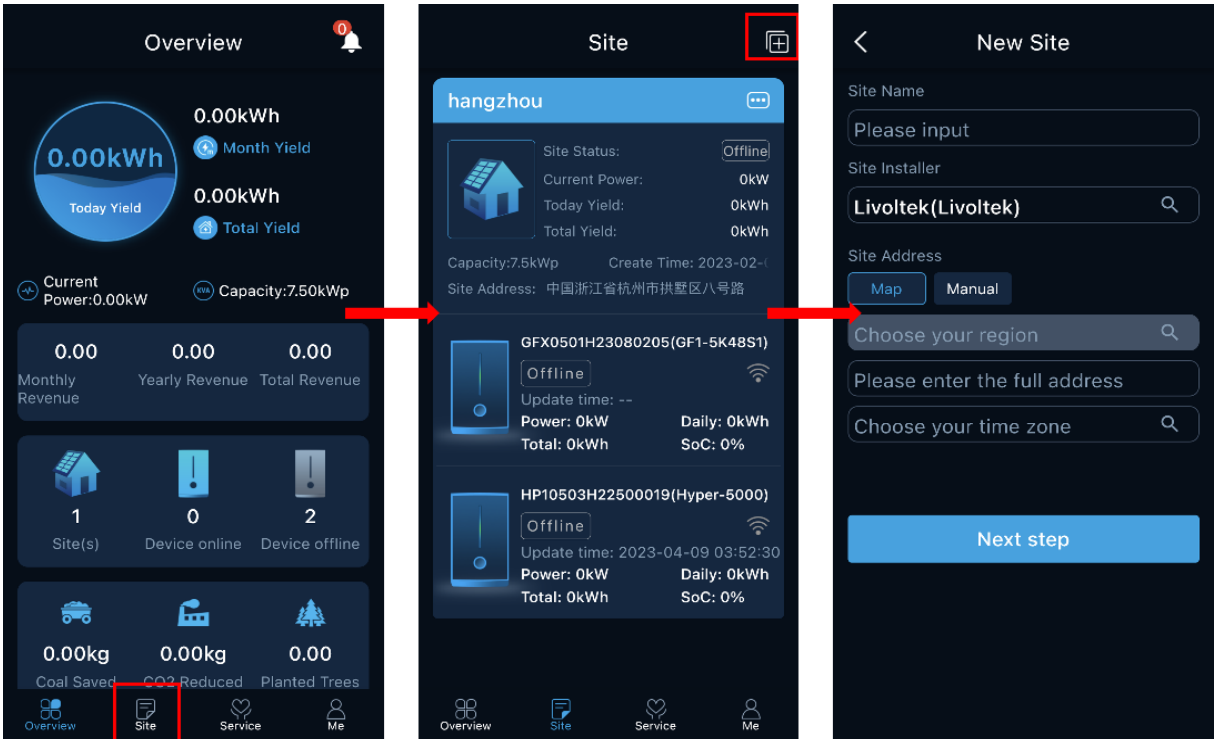
- Add device by filling device model and its serial number.

Support scan QR Code/Bar Code to add device.

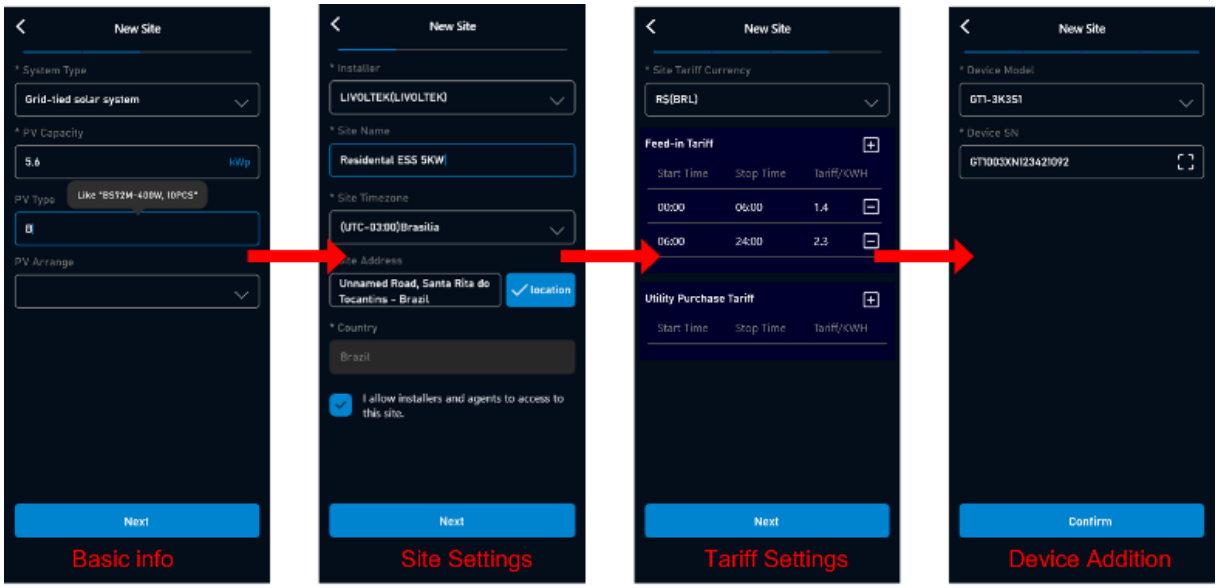


Add Another Site

- Open the app and login with the username & password.
- Enter the "Site" Page, touch "Add" button [⊞] at the top right of the page.
- Choose the Installer, enter the Plant Name, Time Zone, location and other basic information.
- For the location, click the "Map", system will automatically fill in the details according to what you enter.



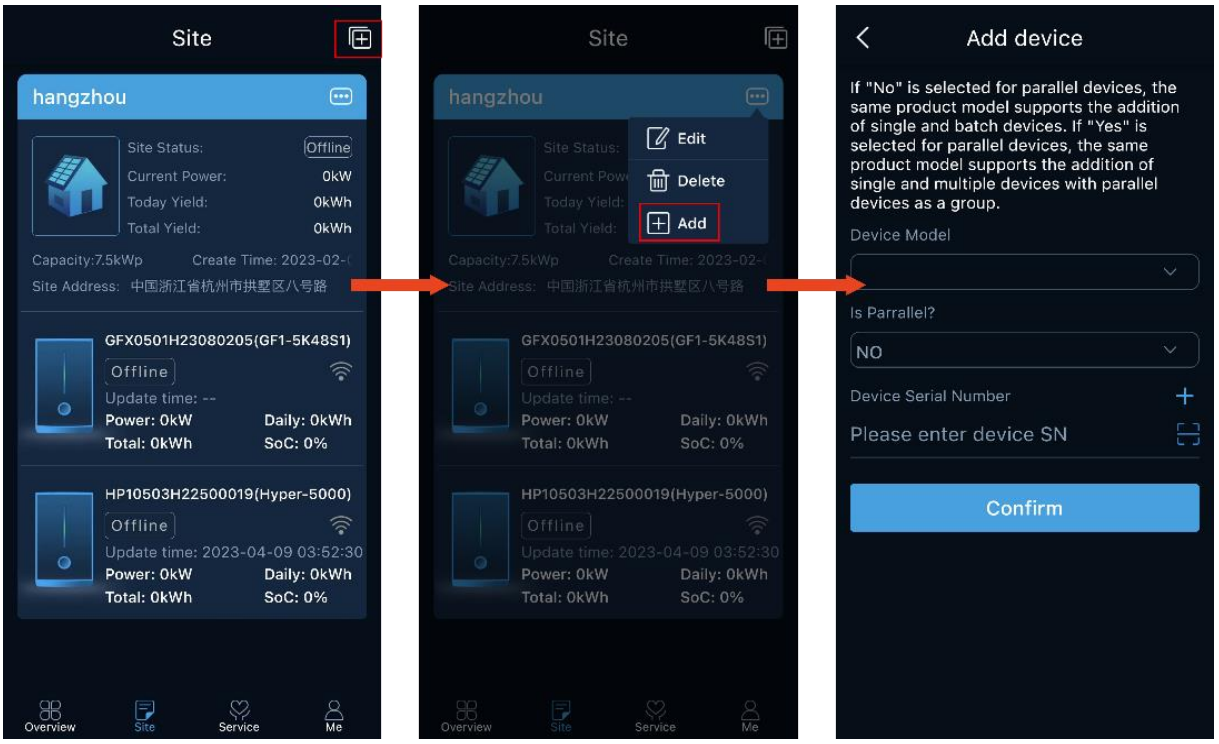
Notes: Tick "I agree installers to access to this site ", then your installer can assist you to set the inverter remotely. The subsequent steps are the same as the previous: **"8.4.1Add the first Site and device".**



Notes: The time frame must be 24-hour electricity tariffs.

Add Device

- Touch "Add" button [ ] at the top right of the PV site page to add a device.
- Choose your product model and enter SN number, then touch [confirm].



- The SN number can be found on the label of inverter and click the [ ] which supports scanning QR Code/ Bar Code to add device.

Settings on the APP

Home Page Overview

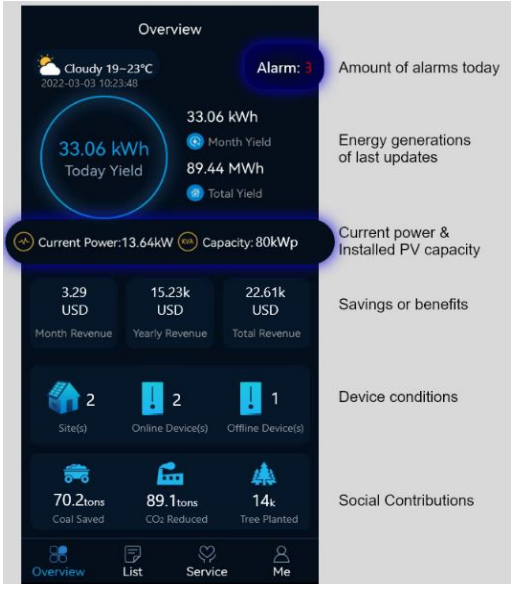
You can check Parameters of System. The status and data on this page might be a few minutes delay from the real-time inverter data

By touch the icons on the diagram, it will show the historical data of each part.

This screen is the homepage after user logging in.

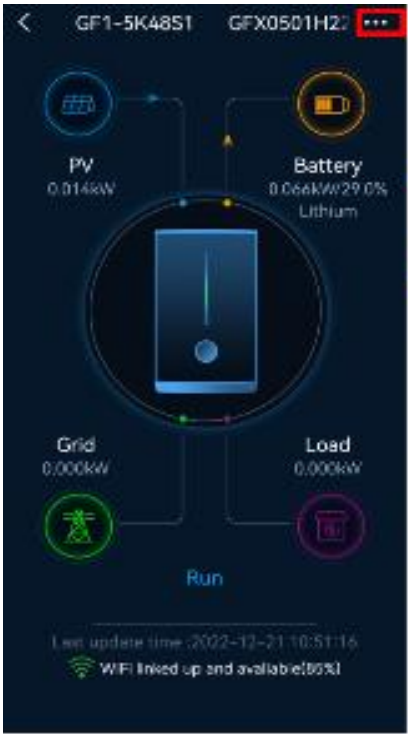
You can touch Overview tab to get into this screen as well.

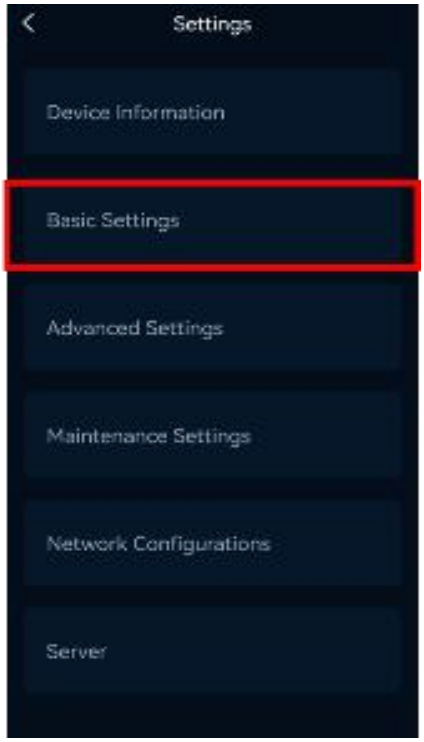
In this screen, you have full insight with site status, including generations, revenues and social contributions.



Basic Settings

You can set the inverter time, Restart the inverter, choosing work modes, battery type and buzzer in Basic settings.

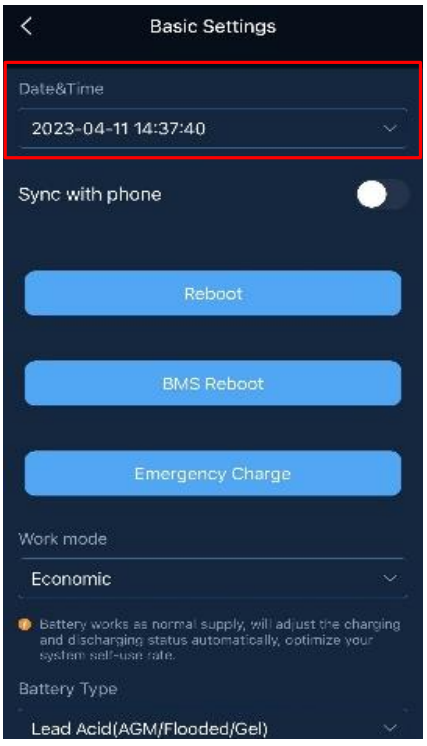


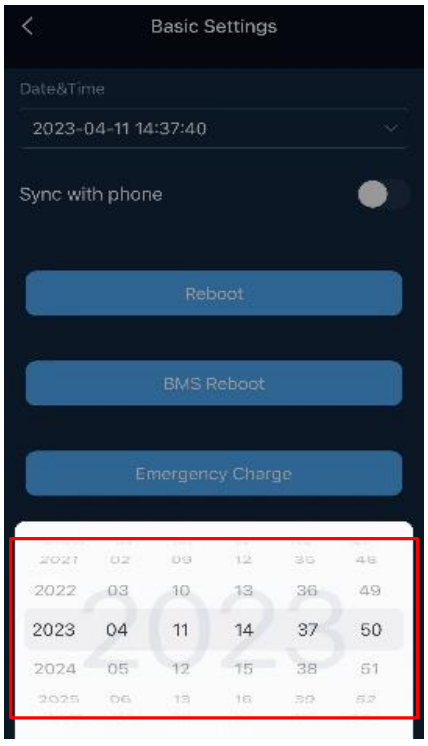


Date&Time

(Basic Settings＞Date&Time)

The date and time of device is synchronized with phone by default.It can also be set by yourself.

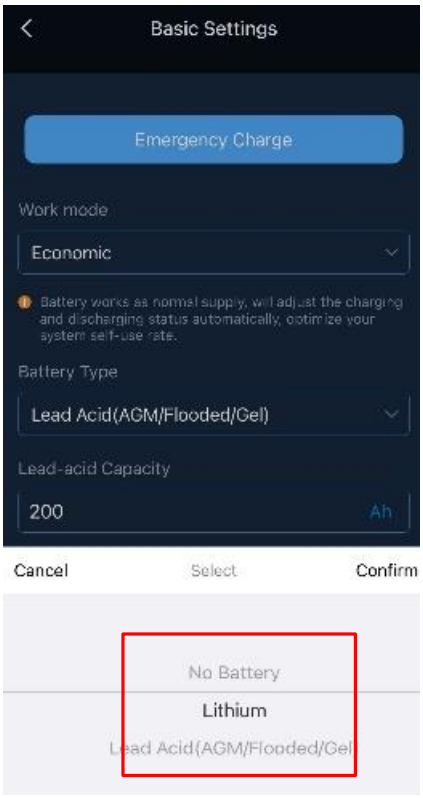




Battery Type

(Basic Settings＞Battery Type)

You would select battery Type here, and the lithium brand must have been compatible with Livoltek.

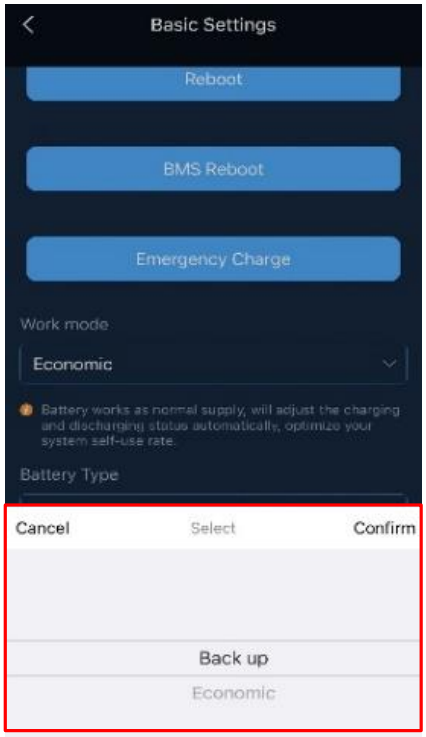


Work mode

(Basic Settings＞ Work mode)

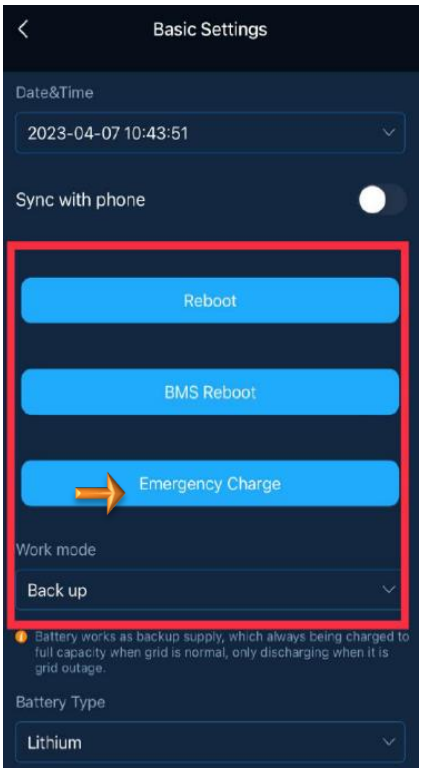
There are two modes provided for you to choose: Back up, Economic.

When the grid failure appears, it will switch into Off-grid mode automatically.



Emergency Charge

- Emergency Charge is design to avoid the damage caused by long time excessive discharge .
- It is recommended to manually click this button to charge the battery after installing the battery for the first time.
- The inverter cannot respond to the discharge command during emergency charge.
- In this mode, the battery will be charged to 54V, and it will exit this mode after 2 hours. But you can exit this mode by clicking "Restart" during this process.



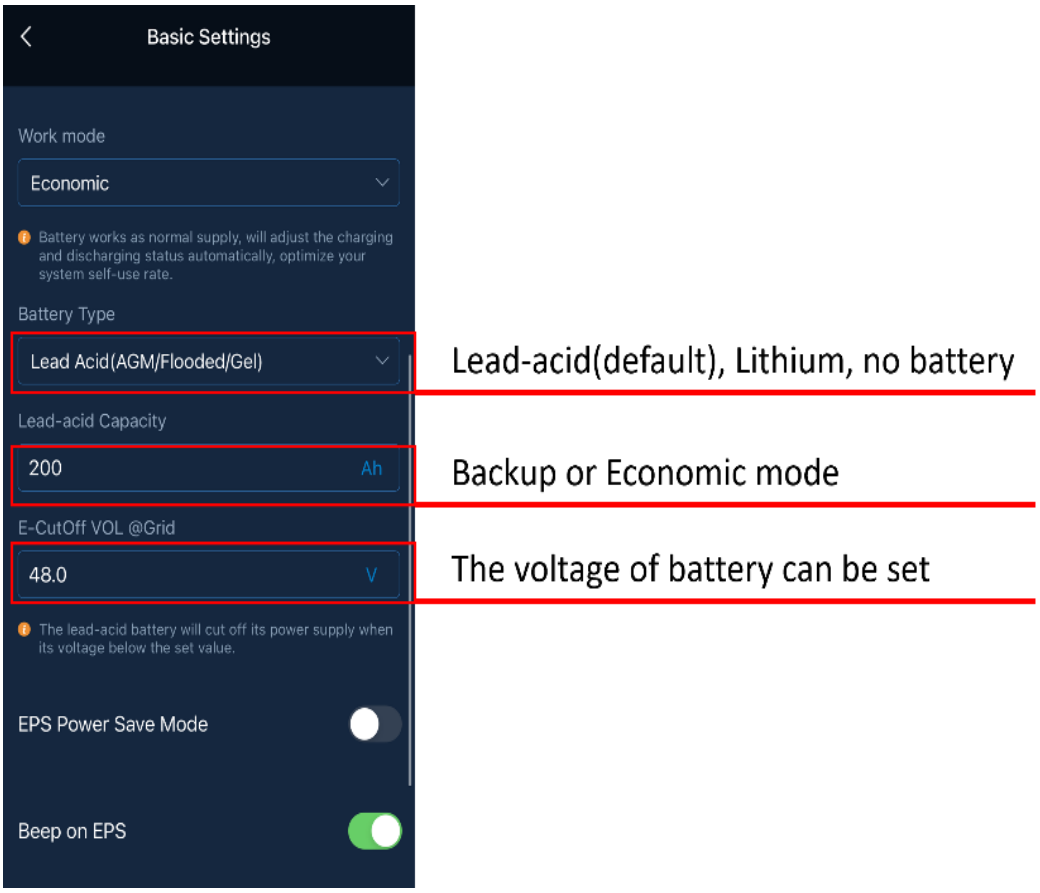
Select Battery type and Work Modes

In the battery type, you can choose proper capacity lead acid battery with a nominal voltage at 48V. And you need to choose battery type as “Lead-acid”.

If you choose lithium battery, you are allowed to use the lithium battery only which we have configured. Also, you need to choose battery type as “Li-ion”.

If you have no battery now, you can also float BAT terminal, and this inverter will only work like a PV inverter.

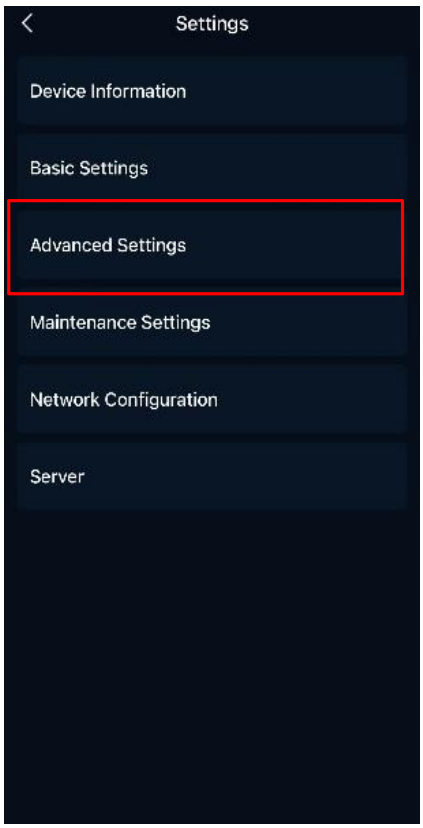
Work Modes decides the operation logic of the hybrid system. So make sure what you select is exactly what you want. The detailed description about the working modes, please refer to the Working Modes.

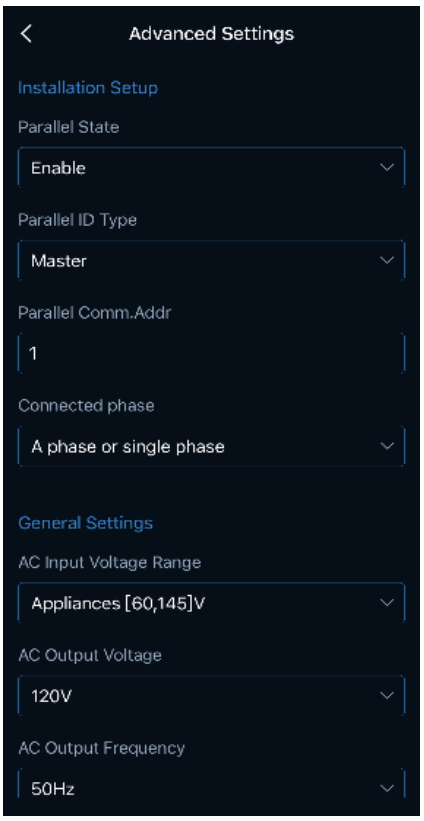


Advanced Settings

Advanced settings are generally customization for lead-acid battery and protection value of grid. All the settings must be 100% honest to the battery specifications first.

Note: *This function interface is only exposed to the installers and distributors" accounts. Please contact your installer or factory if needed.

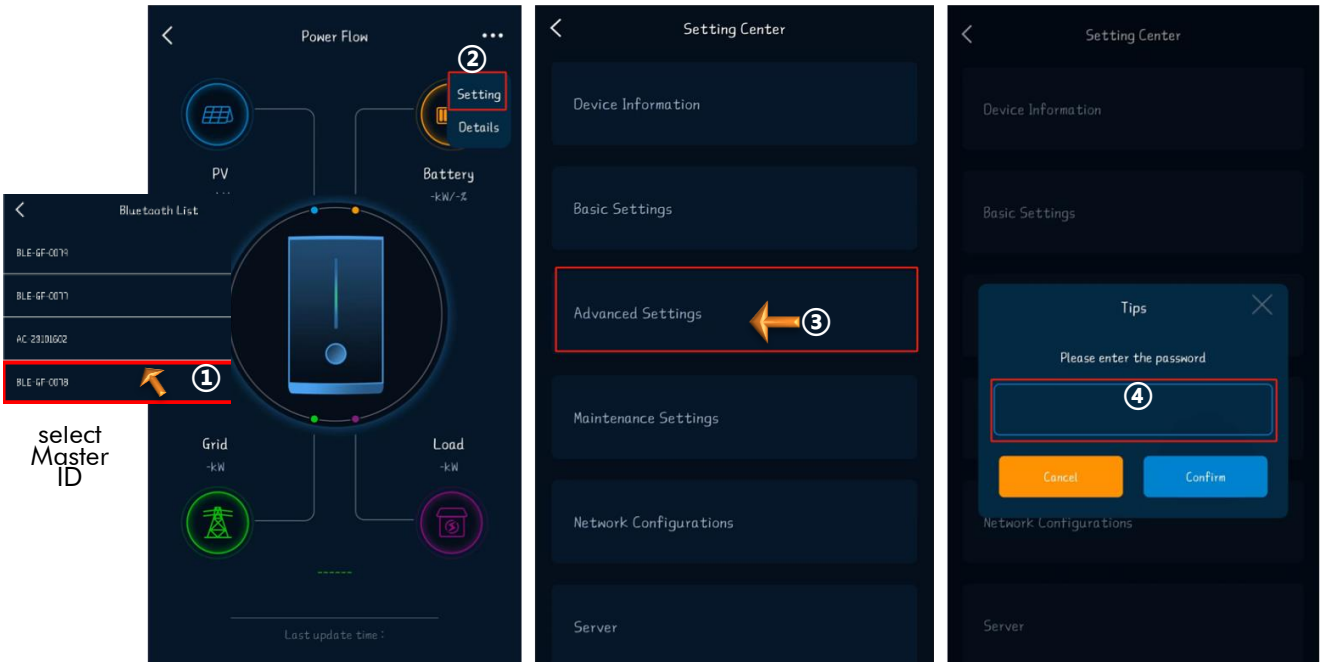




Parallel Settings

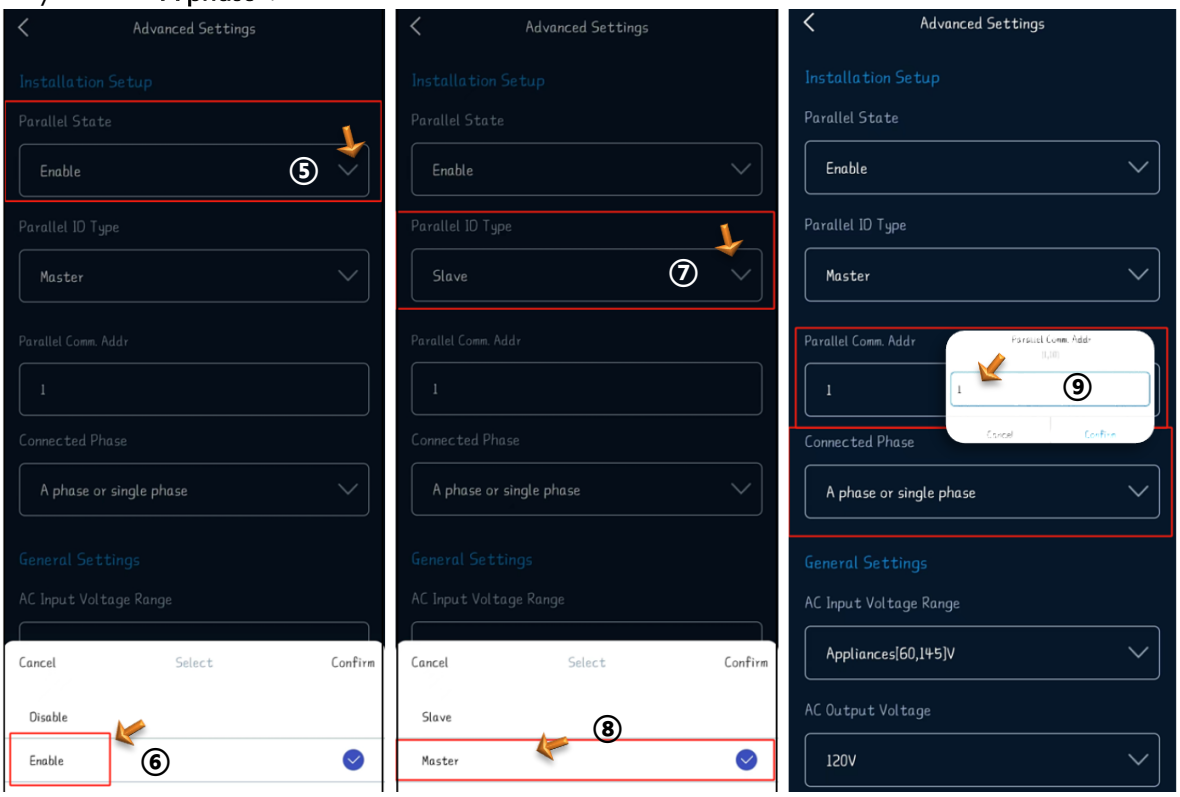
Set the Master in parallel

Open the app, follow the prompts shown in the image below, First select the ID of the Master and enter the Master APP interface, click "**Settings**", select "**Advanced Settings**", and enter the settings interface. The default password is ***hx123456***



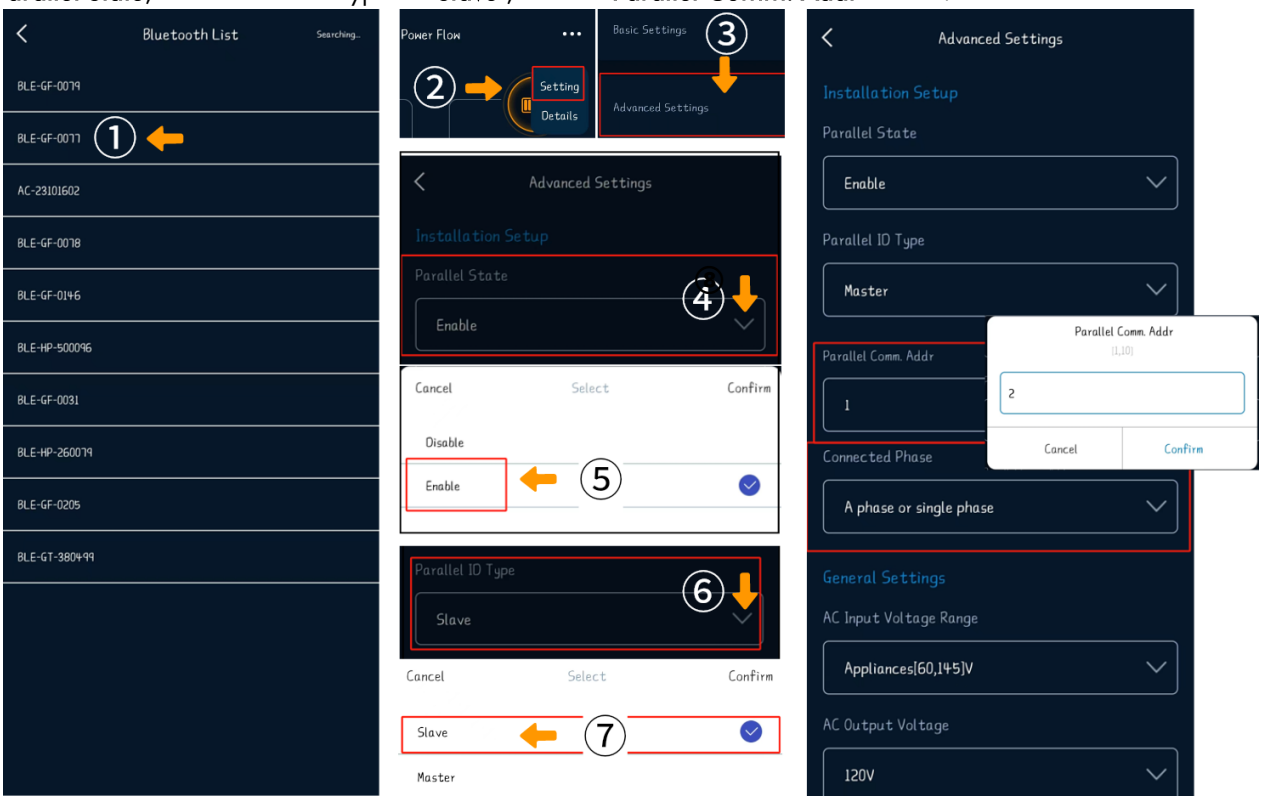
In the advanced settings, set the **"Parallel State"** to **"Enable"**, and then set the **"Parallel ID Type"** to **"Master"**, and set the **"Parallel Comm. Addr"** to "1".

Note: The phase (Connect Phase) of the off-grid inverter is set the **"Connected Phase"** to **"A phase"** by default. If not, manually set it to **"A phase"**.



Set the Slave in parallel

First select the ID of the slave and enter the slave APP interface, click **"Settings"**, select **"Advanced Settings"**, **"Enable"** the **Parallel State**, set the Parallel Type to **"Slave"**, set the **"Parallel Comm. Addr"** to "2".

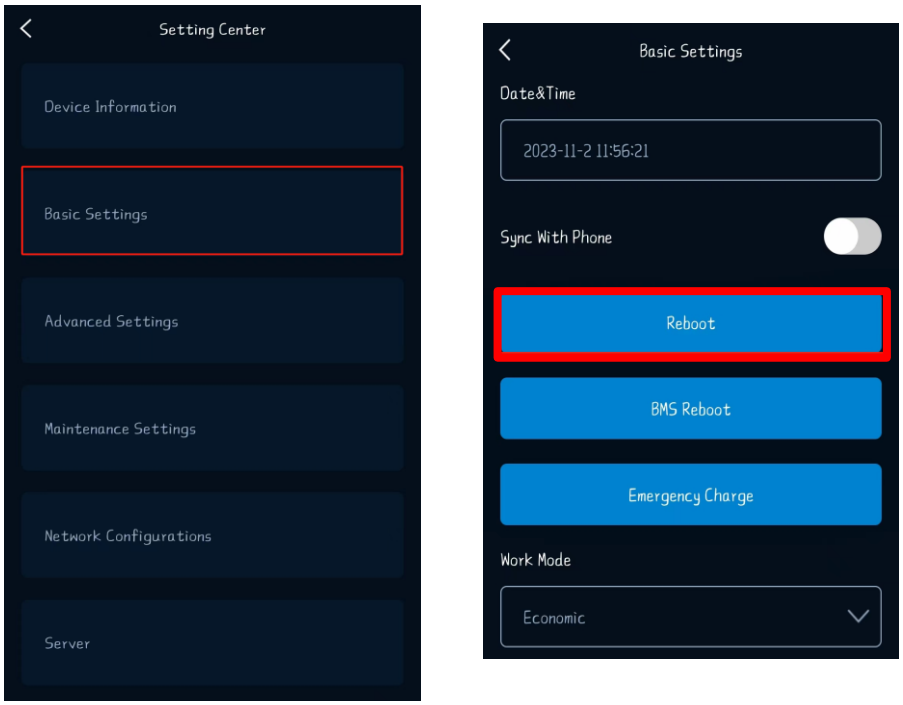


Restart the inverter

After completing the settings for the **Master** and **Slave**, you need to restart the inverter.

Select **"Basic Settings"**in the settings and

click **"Reboot"** to restart the inverter.



SPECIFICATIONS

Table 1 Line Mode Specifications

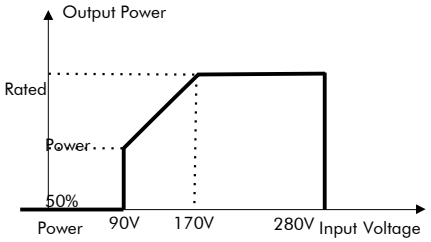
INVERTER MODEL	3.5KVA	6.2KVA
Input Voltage Waveform	Sinusoidal (utility or generator)	
Nominal Input Voltage	230Vac	
Low Loss Voltage	170Vac±7V (UPS) 90Vac±7V (Appliances)	
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)	
High Loss Voltage	280Vac±7V	
High Loss Return Voltage	270Vac±7V	
Max AC Input Voltage	300Vac	
Nominal Input Frequency	50Hz / 60Hz (Auto detection)	
Low Loss Frequency	40±1Hz	
Low Loss Return Frequency	42±1Hz	
High Loss Frequency	65±1Hz	
High Loss Return Frequency	63±1Hz	
Output Short Circuit Protection	Battery mode: Electronic Circuits	
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)	
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)	
Output power derating: When AC input voltage drops to 95V or 170V depending on models, the output power will be derated.		

Table 2 Inverter Mode Specifications

INVERTER MODEL	3.5KVA	6.2KVA
Rated Output Power	3.5KVA/3.5KW	6.2KVA/6.2KW
Output Voltage Waveform	Pure Sine Wave	
Output Voltage Regulation	230Vac±5%	
Output Frequency	50Hz or 60Hz	
Peak Efficiency	94%	
Surge Capacity	2* rated power for 5 seconds	
Nominal DC Input Voltage	24Vdc	48Vdc
Cold Start Voltage	23.0Vdc	46.0Vdc
Low DC Warning Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 22.0Vdc 21.4Vdc 20.2Vdc	 44.0Vdc 42.8Vdc 40.4Vdc
Low DC Warning Return Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 23.0Vdc 22.4Vdc 21.2Vdc	 46.0Vdc 44.8Vdc 42.4Vdc
Low DC Cut-off Voltage Just 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 Charge Mode Specifications

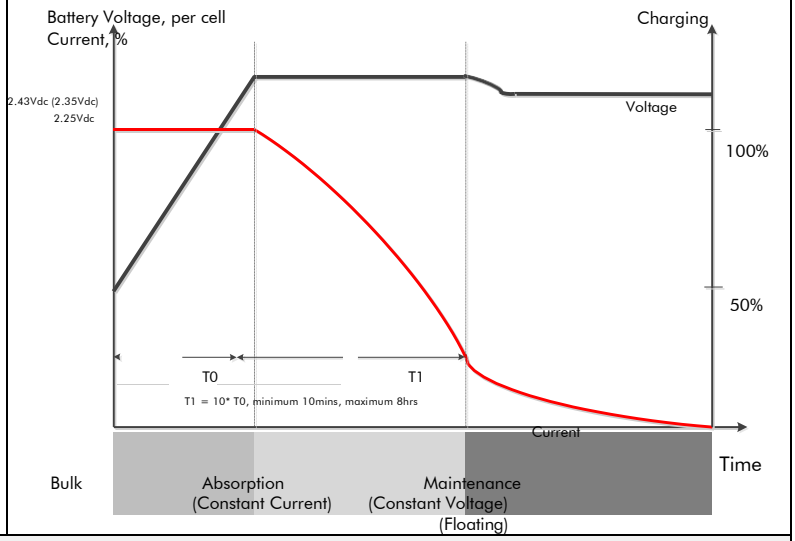
Utility Charging Mode			
INVERTER MODEL		3.5KVA	6.2KVA
Max Charging Current (PV+AC) (@ VI/P=230Vac)		100Amp	120Amp
Max Charging Current(AC) (@ VI/P=230Vac)		80Amp	
Bulk Charging Voltage	Flooded Battery	29.2Vdc	58.4Vdc
	AGM / Gel Battery	28.2Vdc	56.4Vdc
Floating Charging Voltage		27Vdc	54Vdc
Overcharge Protection		33Vdc	63Vdc
Charging Algorithm		3-Step	
Charging Curve			
Solar Input			
INVERTER MODEL		3.5KVA	6.2KVA
Rated Power		4000W	6500W
Max. PV Array Open Circuit Voltage		500Vdc	
PV Array MPPT Voltage Range		60Vdc~500Vdc	
Max. Input Current		15A	27A
Max. Charging Current(PV)		100A	120A

Table 4 General Specifications

INVERTER MODEL	3.5KVA	6.2KVA
Operating Temperature Range	-10°C to 55°C	
Storage temperature	-15°C~ 60°C	
Humidity	5% to 95% Relative Humidity (Non-condensing)	
Dimension(D*W*H), mm	358x295x105	438x295x105
Net Weight, kg	6.2	8.7

TROUBLE SHOOTING

Problem	LCD/LED/Buzzer	Explanation / Possible cause	What to do
Unit shuts down automatically during startup process.	LCD/LEDs and buzzer will be active for 3 seconds and then complete off.	The battery voltage is too low	1. Re-charge battery. 2. Replace battery.
No response after power on.	No indication.	1. The battery voltage is far too low. 2. Battery polarity is connected reversed.	1. Check if batteries and the wiring are connected well. 2. Re-charge battery. 3. Replace battery.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS Appliance)
	Green LED is flashing.	Set "Solar First" as the priority of output source.	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code 07	Overload error. The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
	Fault code 02	Internal temperature of inverter component is over 100°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 03	Battery is over-charged.	Return to repair center.
		The battery voltage is too high.	Check if spec and quantity of batteries are meet requirements.
	Fault code 06/22	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	1. Reduce the connected load. 2. Return to repair center
	Fault code 08/09/15	Internal components failed.	Return to repair center.
	Fault code 13	Over current or surge.	Restart the unit, if the error happens again, please return to repair center.
	Fault code 14	Bus voltage is too low.	
	Another fault code		If the wires is connected well, please return to repair center.

Disclaimer

The GF1 series inverters are transported, used and operated under limited condition, such as environmental, electrical etc. Livoltek shall not be liable to provide the service, technical support or compensation under conditions listed below, including but not limited to:

- Inverter is damaged or broken by force majeure (such as earthquake, flooding, thunderstorm, lighting, fire hazard, volcanic eruption etc.).
- Inverter's warranty is expired and doesn't buy extended warranty.
- Can't provide the inverter's SN, warranty card or invoice.
- Inverter is damaged by man-made cause.
- Inverter is used or operated against any items in local policy.
- Inverter's installation, configuration, commissioning doesn't follow the requirements mentioned in this manual.
- Inverter is installed, refitted or operated in improper ways mentioned
- in this manual without authority from Livoltek.
- Inverter is installed, operated under improper environment or electrical condition mentioned in this manual without authority from Livoltek.
- Inverter is changed, updated or disassembled on hardware or software without authority from Livoltek.
- Obtain the communication protocol from other illegal channels.
- Build monitoring, control system without authority from Livoltek.
- Livoltek will keep right to explain all the contents in this user manual.

Warranty Card Registration

Dear customer, thank you for choosing LIVOLTEK product.
For registering product warranty, please prepare everything ready and register on **https://www.livoltek.com/registration.html.**

Product Information	
Product Type	
Product S/N	
Installation date	
Installation Company	
Personal Information	
Your name	
Your contact number	
Your Email address	
Your home address	

*Warranties should be registered within 6 months of installation, however it is recommended that they are registered no more than 6 weeks following the successful installation and commissioning of the Product where possible, thanks for your cooperation.

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371-00084-01