LESSO GROUP
STOCK CODE: 2128.HK

LESSO

Hybrid Inverter User Manual

LEC-ABF Series (7-10kW)

*1. The pictures are for reference only, and the actual product shall prevail.
*2. Information is subject to update without prior notice.

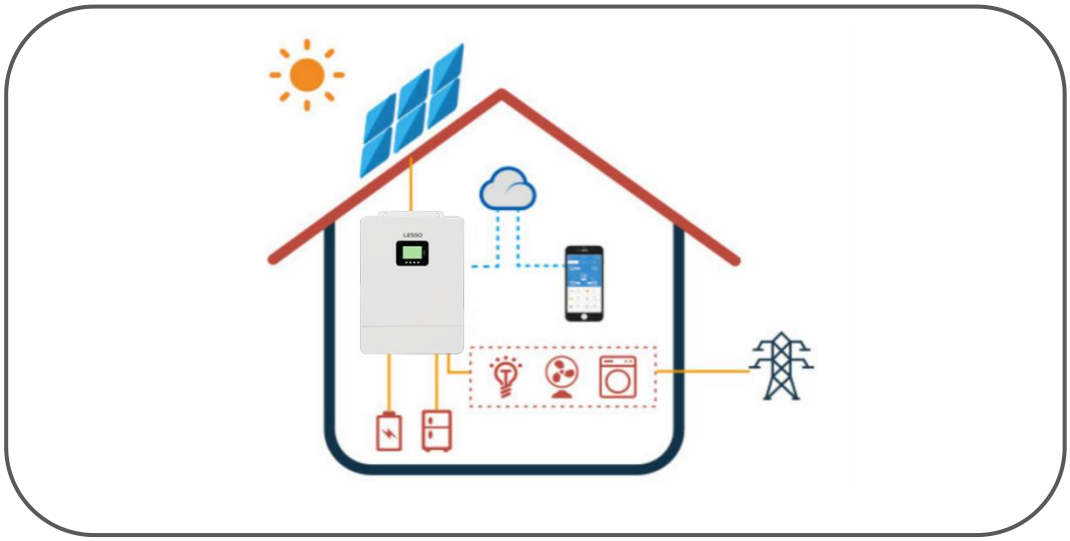
Contents

1. INTRODUCTION

This series of products, also known as hybrid or bidirectional energy storage inverter, is suitable for solar systems in which PV, batteries, loads and grid systems participate together to achieve energy management.

The electric energy generated by the PV power generation system is used for self-consumption, the excess electric energy is used for battery charging, and the remaining electric energy is exported to the power grid.

When the PV power does not meet its own consumption, the battery will discharge to support the load operation. If the battery power is insufficient, the system will obtain power from the grid to support the load operation PV energy storage system architecture.



1.1 Safety & warning

Please read and follow all the instructions and cautions on the inverter or user manual during installation, operation or maintenance, as any improper operation might cause personal or property damage.

- **SYMBOLS EXPLANATION**

	Caution! Failing to observe a warning indicated in this manual may result in injury.
	Danger of electric shock due to high voltage! Disconnect all incoming power and turn off the product before working on it.
	Danger on hot surfaces! High-temperature hazard. Do not touch the product under operation to avoid being burnt.
	This side up! The package must always be transported, handled and stored in such away that the arrows always point upwards.
	Product should not be disposed as household waste. Do not dispose of the inverter as household waste. Discard the product in compliance with local laws and regulations .or send it back to the manufacturer.

	Grounding mark.
	Read through the user manual before any operations.
	Keep dry! The package/product must be protected from excessive humidity and must be stored under cover.
	Inverter will be touchable or operable after minimum 5 minutes of being turned off or totally disconnected, in case of any electrical shock or injury.

- **SAFETY WARNING**

Any installation and operation on inverter must be performed by qualified electricians, in compliance with standards, wiring rules or requirements of local grid authorities or companies.

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

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

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

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

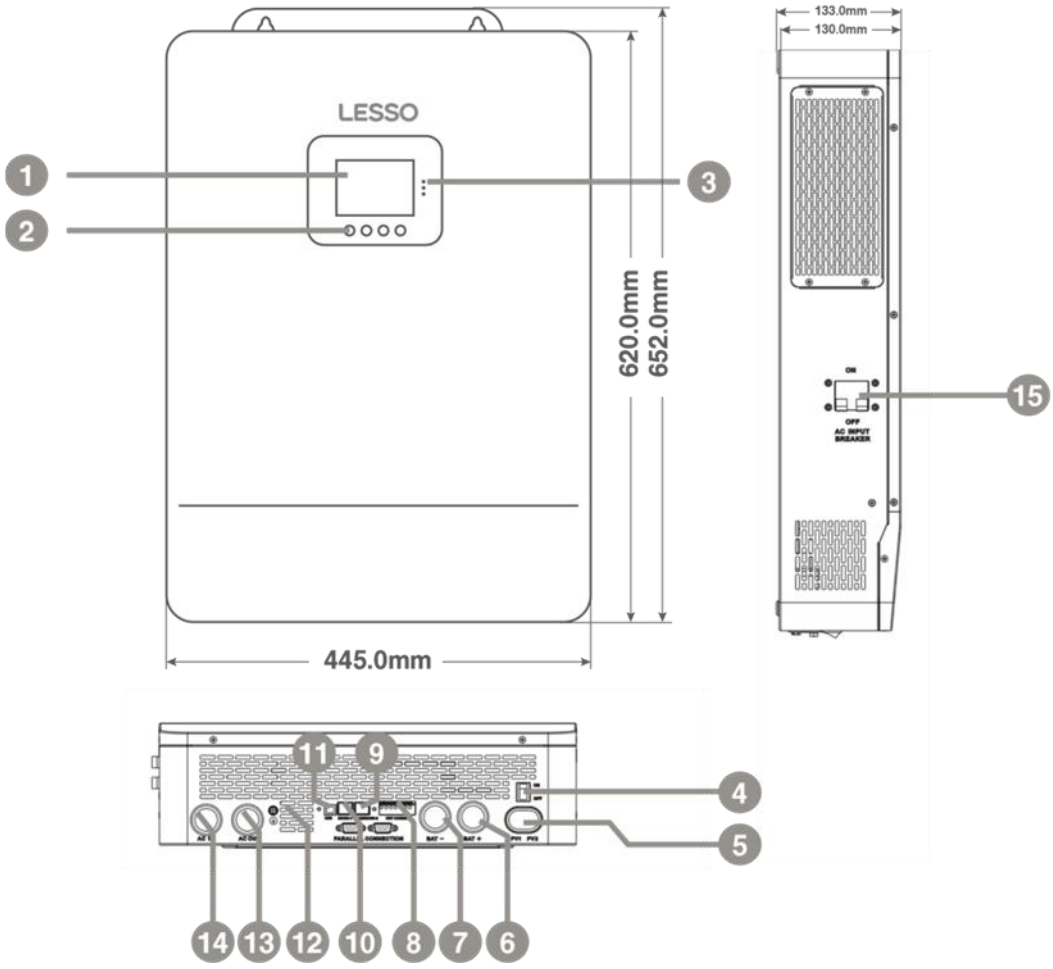
Appropriate methods must be adopted to protect inverter from static damage. Any damage caused by static is not warranted by manufacturer.

PV negative (PV-) on inverter side is not grounded as default design.

The total open-circuit voltage of PV string/array is lower than the maximum rated DC input voltage of the inverter. Any damage caused by PV over-voltage is beyond warranty.

When the inverter is working, it is prohibited to plug PV, battery, and AC connectors.

1.2 Product overview

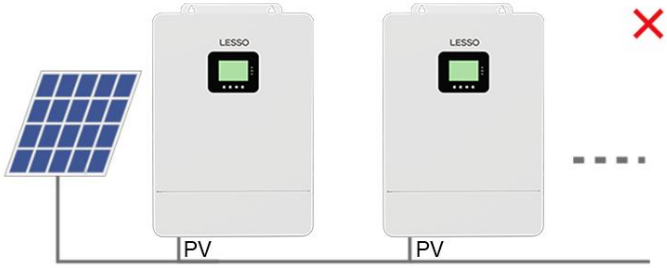


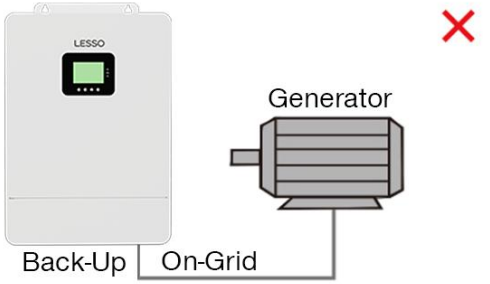
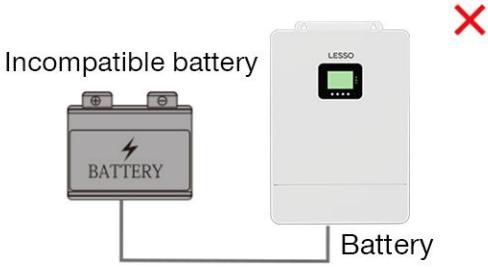
1	LCD screen	**2**	Touchable key	**3**	LED Indicators
4	ON/OFF Rocker Switch	**5**	PV INPUT	**6**	BAT INPUT (+)
7	BAT INPUT (-)	**8**	Dry contact	**9**	RS485/CAN port
10	WIFI port	**11**	USB-B port	**12**	Grounding Screw
13	AC OUT (L+N)	**14**	AC IN (L+N)	**15**	AC INPUT breaker

2. INSTALLATION INSTRUCTIONS

2.1 Unacceptable installations

Please do not use the following installation methods that may cause damage to the system or inverter:

	
BACK-UP SIDE CANNOT CONNECT TO GRID.	SINGLE PV STRING CANNOT CONNECT TO TWO OR MOREINVERTERS.

	
ON-GRID OR BACK-UP SIDE CANNOT CONNECT TO ANY AC GENERATOR.	CANNOT CONNECT TO INCOMPATIBLE BATTERIES.

2.2 Packing List

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

			
Inverter×1	Expansion screws tightening pipe×2	Smart meter&CT×1(option)	Data Collector×1
			
Hexagon flange nut M4&M8×2	Expansion anchor bolt×2	Cross-slot self-tapping screws M3*30×2	Battery terminal SC70-8×2

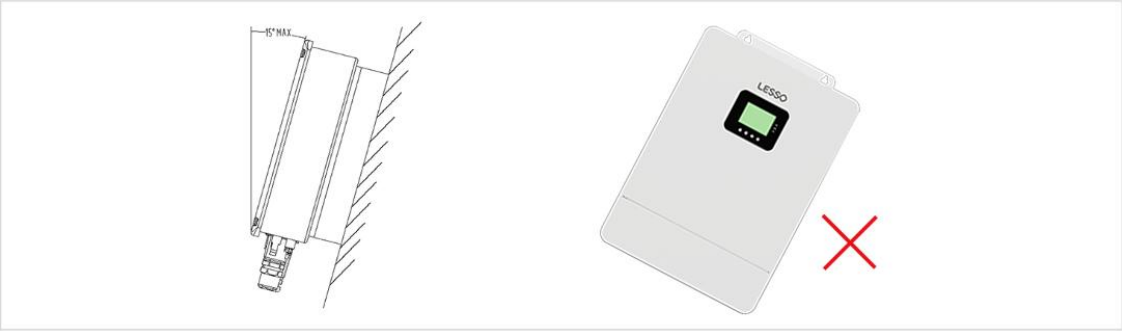
2.3 Installation

2.3.1 Installation location selection

In order to facilitate the protection and maintenance of the inverter, the installation location of the inverter must be carefully selected according to the following rules:

Rule1. The inverter should be installed on a solid surface that is suitable for the orientation of the inverter and capable of supporting the weight of the inverter.

Rule 2. The inverter should be installed vertically or at an angle not exceeding 15°.

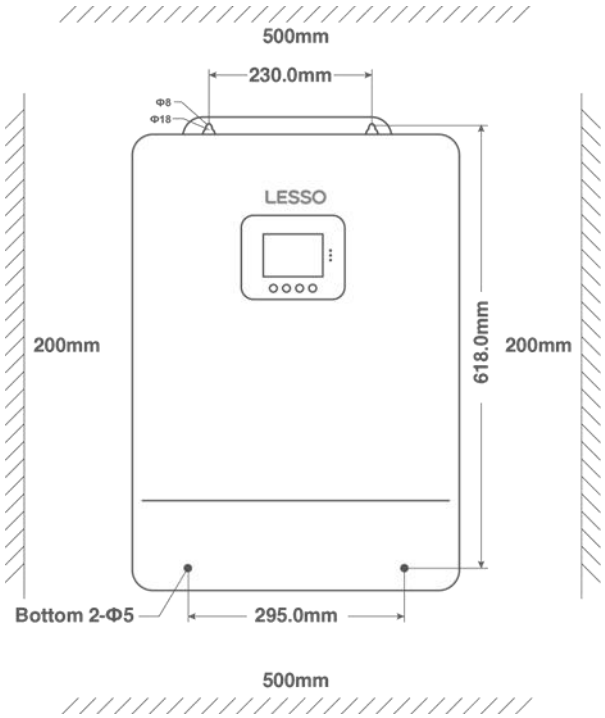


Rule 3. Ambient temperature should be lower than 60°C.

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

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

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



DANGE

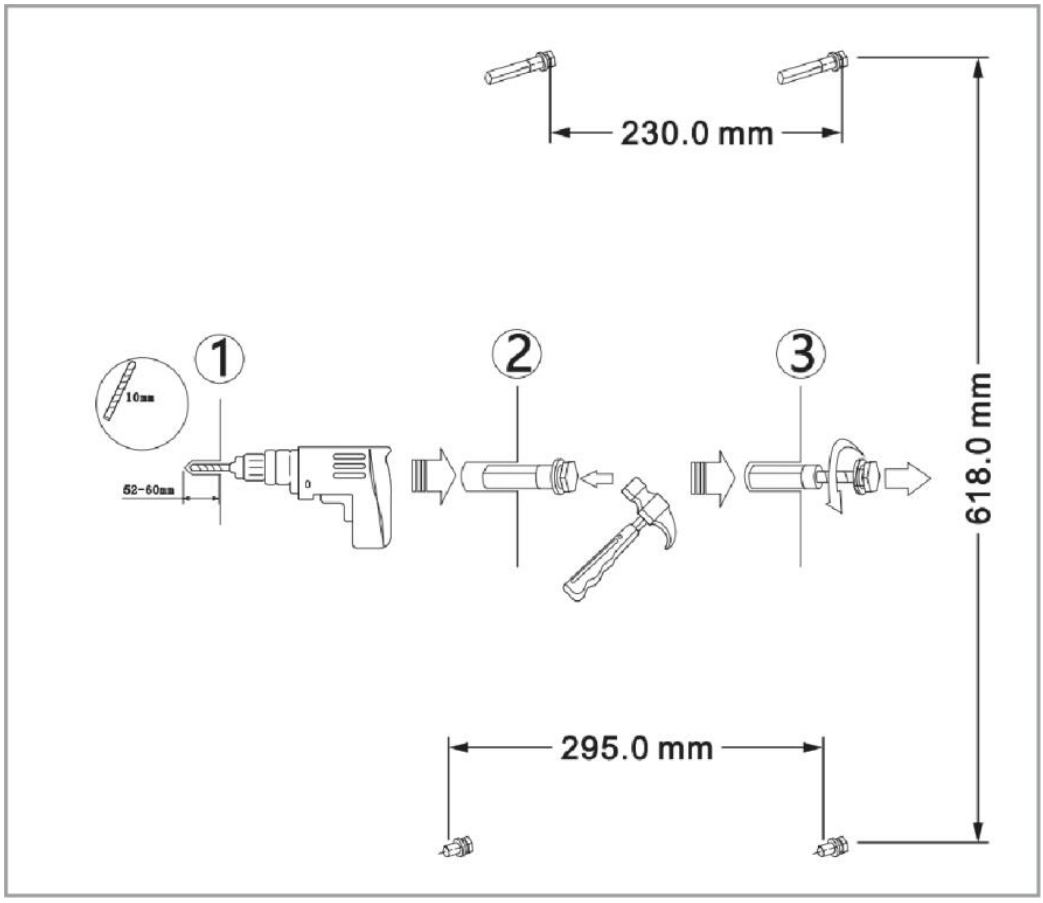
- Do not install the inverter where highly flammable materials are near by.
- Do not install the inverter in potential explosive areas.
- Do not install the inverter with lead-acid batteries in a confined space.

CAUTIO

- Do not install the inverter in direct sunlight.
- Do not install or use the inverter in a humid environment.

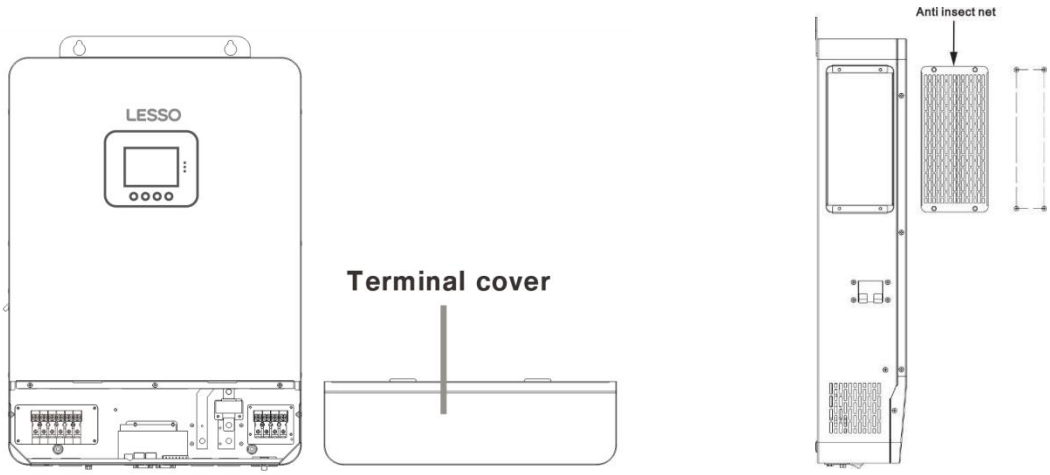
2.3.2 Mount the inverter

Make 4 mounting holes in the wall with a drill according to the specified dimensions, insert two expansion screws above and two M5 size screws below for fixing the inverter.



2.3.3 Remove the terminal cover

Using screwdriver, remove the terminal protection cover.

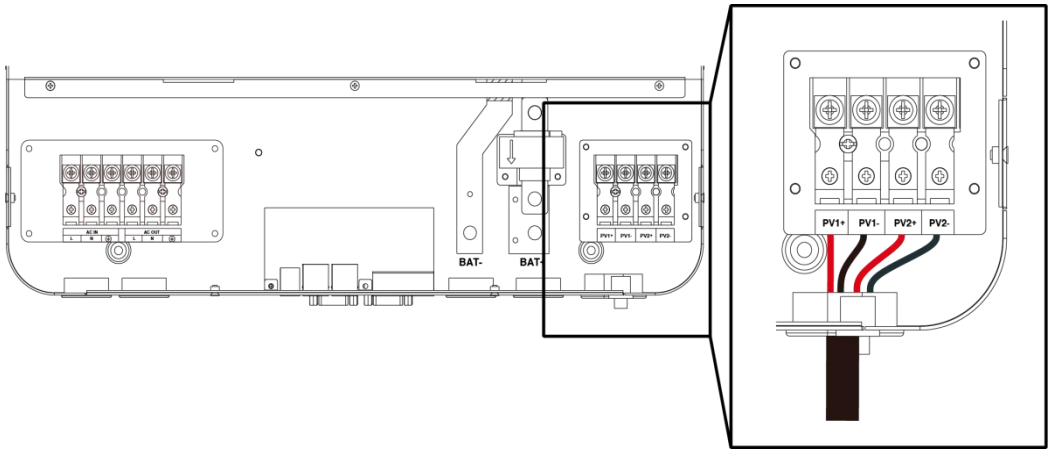


> ***NOTICE***
>
> • When using the device in areas with poor air quality, the dust screen is easily blocked by airborne particles. Please dismantle and clean the dust screen regularly to avoid affecting the internal air flow rate of the inverter, which may trigger an over-temperature protection fault (19/20 fault) affecting the use of the power supply and the service life of the inverter.

2.4 Electrical wiring connection

2.4.1 PV Connection

Connect the positive and negative wires of the two strings of PV according to the diagram below.

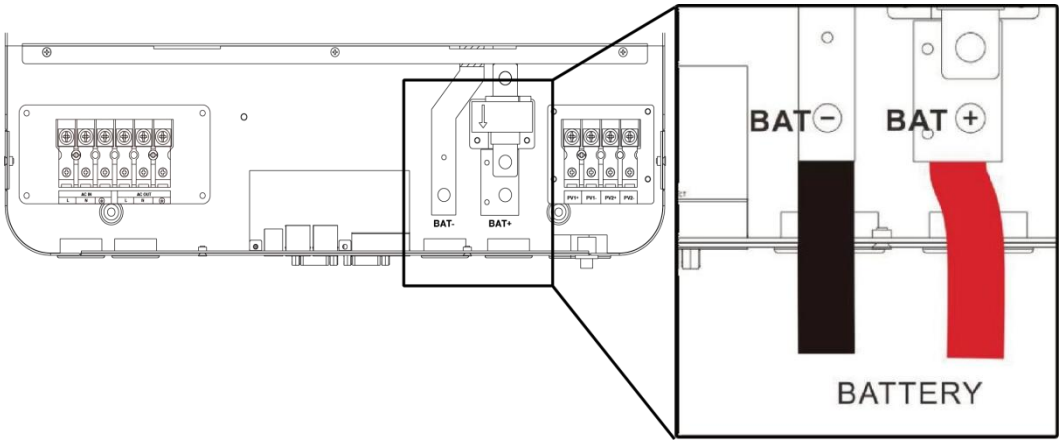


DANGER

- Before connecting PV, the circuit breaker must be opened to avoid the risk of electric shock and must not be operated with electricity.
- Please make sure that the open circuit voltage of the PV modules in series does not exceed the ***Max. Open Circuit Voltage*** of the inverter (In the LEC-ABF Series, this value is 500V), otherwise the inverter may be damaged.

2.4.2 Battery Connection

Connect the positive and negative cable of the battery according to the diagram below.



DANGER

- Before connecting battery, the circuit breaker must be opened to avoid the risk of electric shock and must not be operated with electricity.
- Make sure that the positive and negative terminals of the battery are connected correctly and not reversed, otherwise the inverter may be damaged.
- Please check that the cable used is sufficient for the requirements, too thin, poor quality cables are a serious safety hazard.

- FOR LEAD-ACID BATTERIES

Lead-Acid and other similar older-technology battery types require experienced and precise design, installation and maintenance to work effectively.

For lead-acid battery bank, the inconformity between battery cells might lead to battery cell over-charge or discharge, and further might damage battery cells and shorten battery bank life.

For this series inverters there is no temperature compensation, thus customers need do battery settings based on the real working temperature of battery.

For lead-acid battery settings on App, please honestly refer to battery specifications and the actually battery work condition like work temperature and battery age. Unsuitable settings will lead to higher SOC deviation, weaker battery lifespan and further battery damage.

For lead-acid batteries, battery SOC calculation might not be so accurate result from like battery inconformity between cells, battery aging or other specifications of lead-acid battery etc.

We will keep the right for explanation on all the settings suggested and all the problems happened on lead-acid batteries or the whole system. And we are not responsible for any damage caused by unsuitable settings, battery beyond warranty or battery quality etc.

- BATTERY PROTECTION DESCRIPTION

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

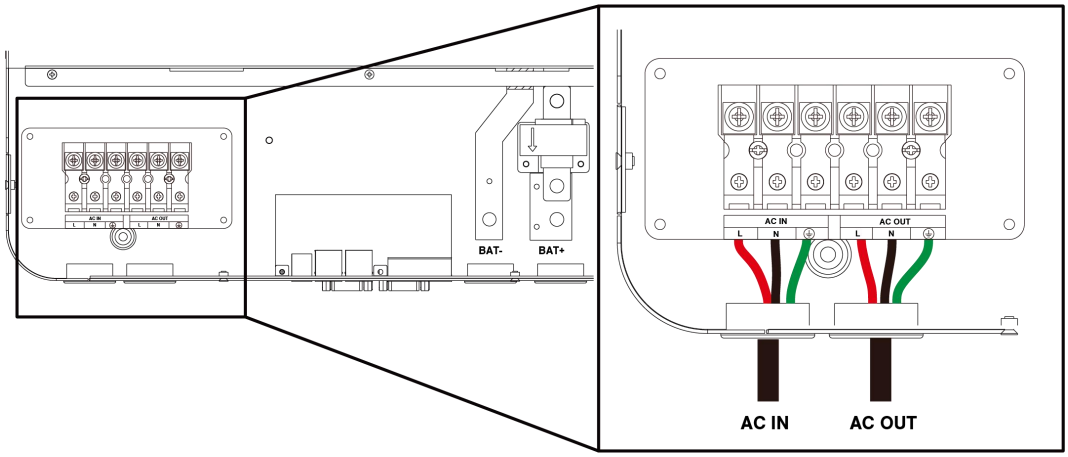
- Battery SOC is lower than SOC Protection
- Battery voltage lower than discharge Cut-off Voltage
- Battery over temperature protection
- BMS limitation for lithium battery

When charge/discharge current limitation protection happens:

- Under on-grid mode, battery charge/discharge operation could be abnormal
- Under off-grid mode, Back-Up supply will shut down

2.4.3 AC input & output connection

Connect the live,neutral and ground wires according to the cables' position and order shown in the diagram below.

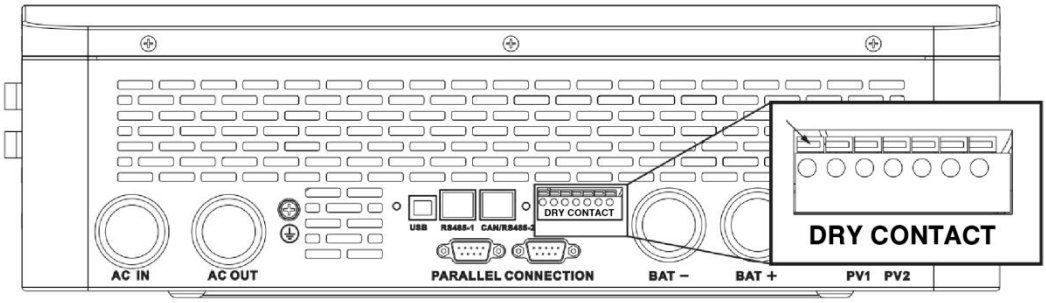


DANGER

- Before connecting AC inputs and outputs, the circuit breaker must be opened to avoid the risk of electric shock and must not be operated with electricity.
- Please check that the cable used is sufficient for the requirements, too thin, poor quality cables are a serious safety hazard.

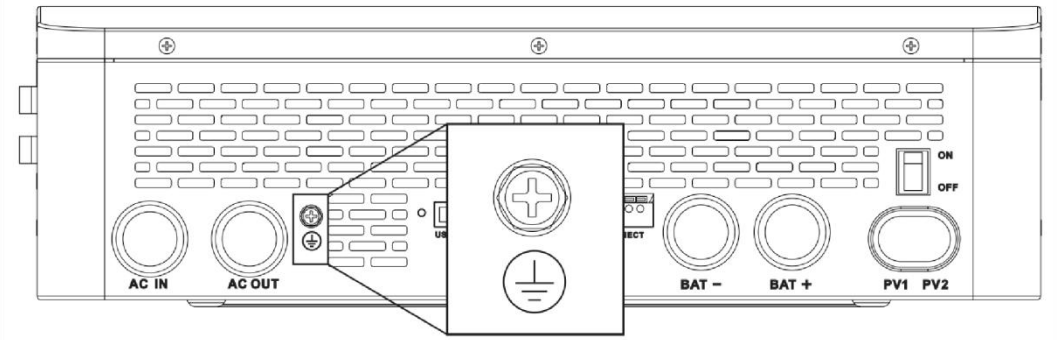
2.4.4 Dry contact connection

Use a small screwdriver to push back the direction indicated by the arrow, then insert the communication cable into the Dry Junction port. (Communication cable diameter 0.2~1.5mm²)



2.4.5 Grounding connection

Please make sure the grounding terminal connect to the Grounding Bar.



> ⚠ *NOTICE*
>
> • The grounding cable should have a diameter of not less than 4 mm² and be as close as possible to the grounding point.

2.4.6 Final assembly

After ensuring that the wiring is reliable and the wire sequence is correct, install the terminal protection cover in place.

2.4.7 Start up the inverter

Step 1: Close the circuit breaker of the battery.

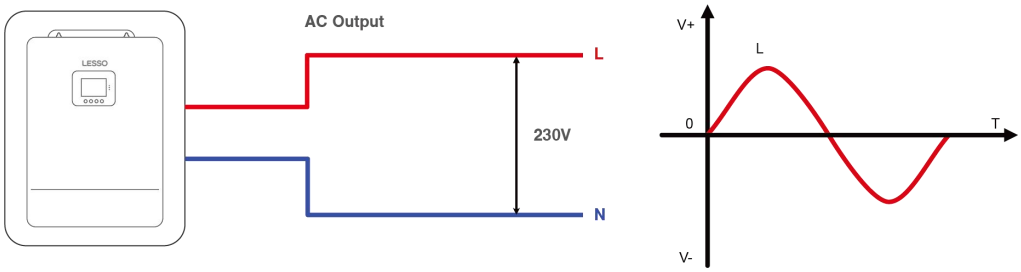
Step 2: Press the rocker switch on the bottom of inverter, the screen and indicators light up to indicate that the inverter has been activated.

Step 3: Sequential close of the circuit breakers for PV, AC input and AC output.

Step 4: Start the loads one by one in order of power from small to large.

3. Connection

3.1 Single-phase output

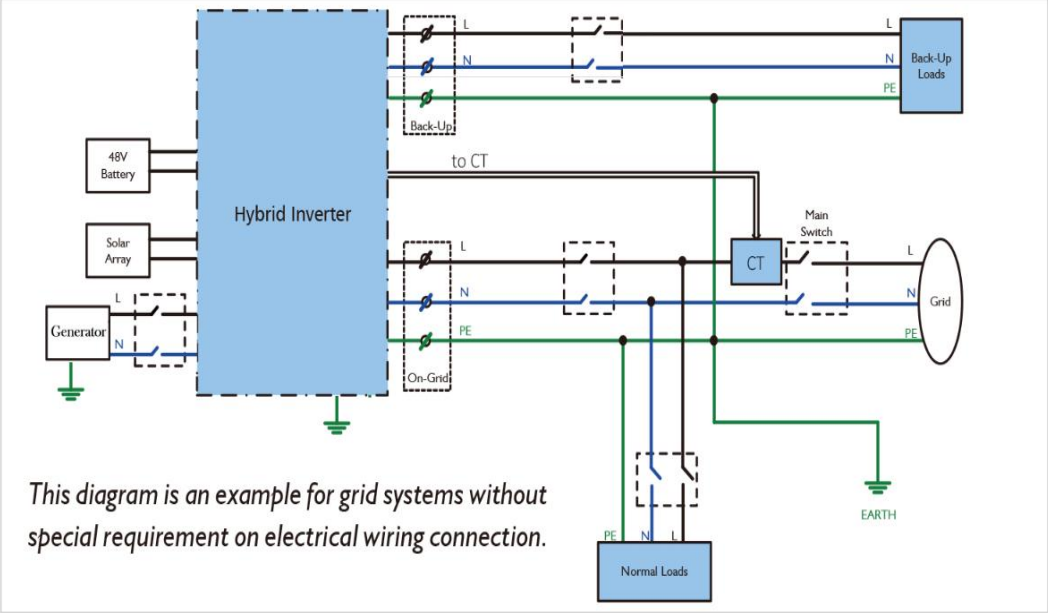


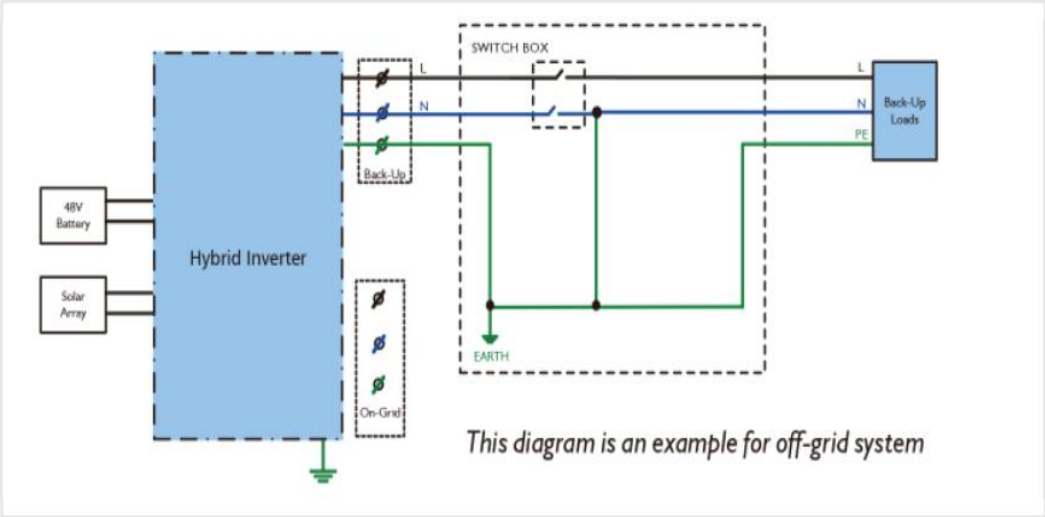
Items	Description
Applicable Model	LEC Series ABF model
Output Voltage Range (L-N)	200~240Vac, 230Vac default

NOTICE

- Users can change the output voltage by setup menu. Please read the chapter 5.2 Setting.
- Output voltage corresponds parameter 38 , the output voltage can be set from 200V to 240Vervice life of the inverter.

SYSTEM CONNECTION DIAGRAMS





3.2 Cable & circuit breaker requirement

- PV INPUT

Model	Cable Diameter	Max.PV Input Current	Circuit Breaker Spec
LEC-702A1B1F	5mm² /10AWG	22A	2P-25A
LEC-852A1B1F	5mm² /10AWG	22A	2P-25A
LEC-103A1B1F	5mm² /10AWG	22A	2P-25A

- AC INPUT

Model	Output Mode	Max.Input Current	Cable diameter	Circuit Breaker Spec
LEC-702A1B1F	Single-phase	63A(L/N)	13mm² /6AWG	2P-63A
LEC-852A1B1F	Single-phase	63A(L/N)	13mm² /6AWG	2P-63A
LEC-103A1B1F	Single-phase	63A(L/N)	13mm² /6AWG	2P-63A

- BATTERY INPUT

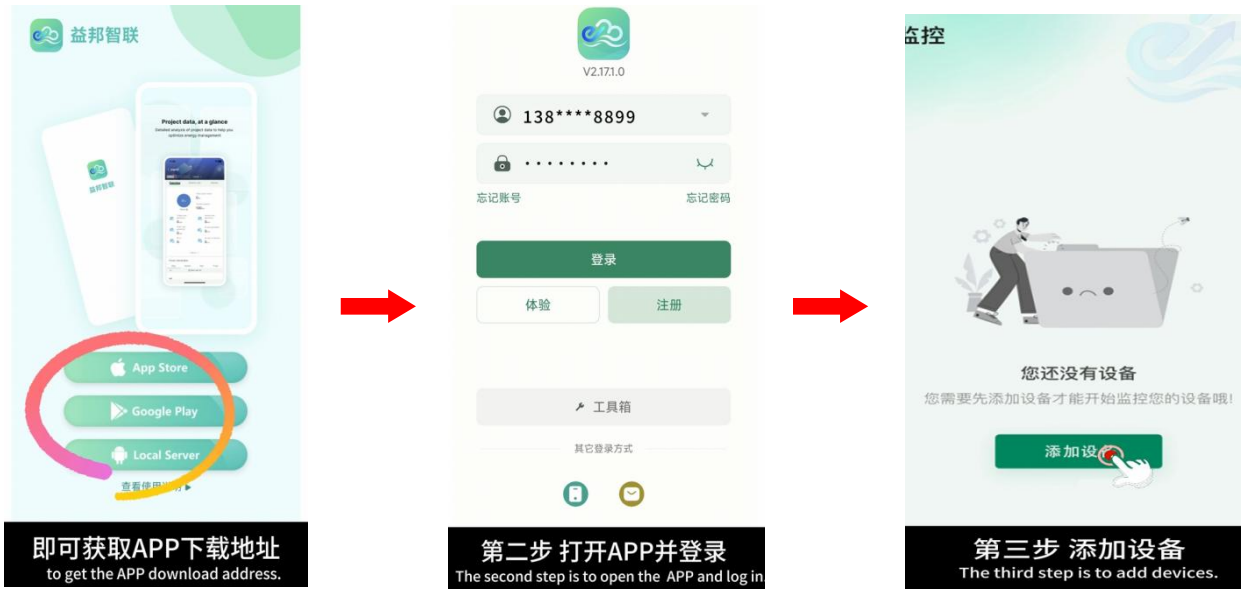
Model	Cable Diameter	Max.Battery Current	Circuit Breaker Spec
LEC-702A1B1F	26mm² /4AWG	160A	2P-180A
LEC-852A1B1F	34mm² /2AWG	180A	2P-200A
LEC-103A1B1F	42mm² /1AWG	220A	2P-250A

- AC OUPUT

Model	Output Mode	Max.Output Current	Cable diameter	Circuit Breaker Spec
LEC-702A1B1F	Single-phase	63A(L/N)	13mm² /6AWG	2P-63A
LEC-852A1B1F	Single-phase	63A(L/N)	13mm² /6AWG	2P-63A
LEC-103A1B1F	Single-phase	63A(L/N)	13mm² /6AWG	2P-63A

4. MANUAL OPERATION

4.1 Eybond smart APP operation




概览
项目
设备
设备
设备名称/SN/PN
所有类型
所有1
正常0
离线1
故障0
告警0
我的设备-01
通用设备
离线
SN K30150K224400003
PN I20000244876630501
先点击右上角加号
Click the plus sign in the upper right corner


蓝牙添加
扫码添加
添加设备
请将您的手机靠近设备
D80000210400158945
D80000210404191500
K20000240100288913
已被添加
K20000240400000251
T50000240300110435
E20240904000000002
VirtualDevice_4321
添加方法一：蓝牙添加
Add method one, Bluetooth addition.


Add method two, scan the code to add.

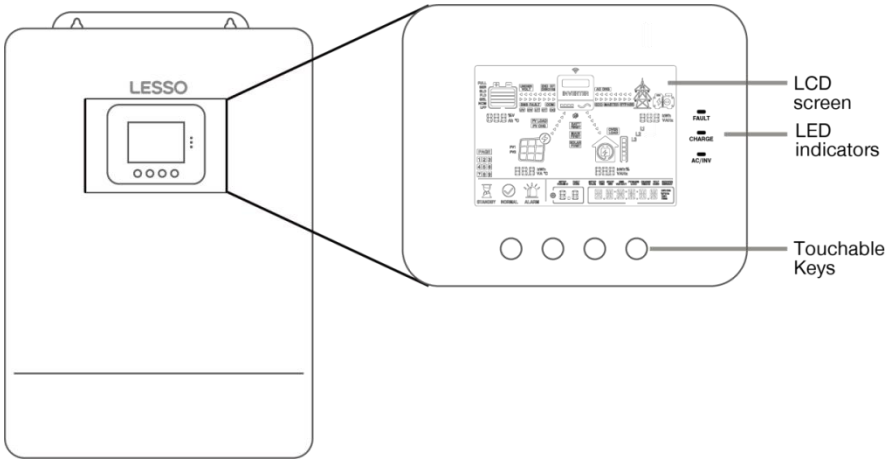

联网配置
Wi-Fi（暂不支持5G）
wifi_test
密码
记住当前联网配置
温馨提示:
设备无法联网？联网诊断
开始联网
WiFi产品需要配网
WiFi products need to be connected to the network.


联网成功
W123456789211
联网配置成功
设备
数采器
路由器
云端
确定
点击联网，联网成功配置完成
The first step is to connect the Datalogger to the device


Eybond
温馨提示
1 正常查看设备数据,完成
1. Normal viewing of device data
2 如果配置失败
2 If the configuration fails
3 查看诊断结果和修复建议
3 Viewing diagnostic results and repair recommendations
4问题排查处理后点击 重新配网
4 After troubleshooting and handling the issue, click on "Reconnect Network Distribution"

4.2 Operation and display panel

The operation and display panel below includes 1 LCD screen, 3 indicators, 4 touchable keys.



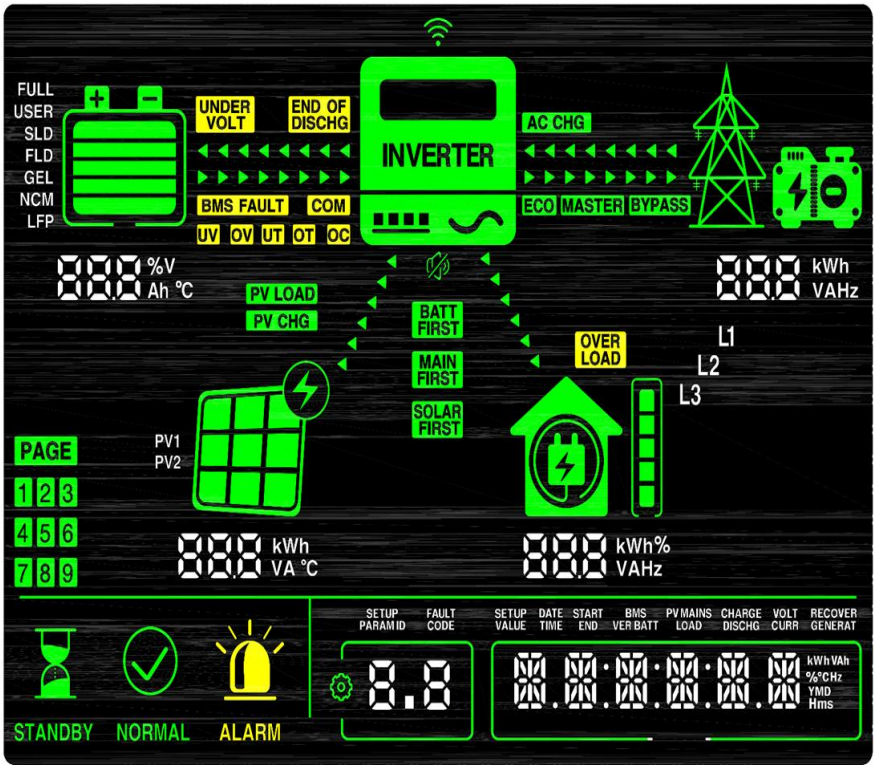
- Touchable Keys

Touchable Keys	Description
	To enter/exit the setting menu
	To next selection
	To last selection
	To confirm/enter the selection in setting menu

- LED Indicators

Indicators	Color	Description
FAULT	Red	Flash: error occur
CHARGE	Yellow	Continued: charging complete
		Flash: charging
AC/INV	Green	Continued: utility grid by-pass output
		Flash: inverter output

- Display panel



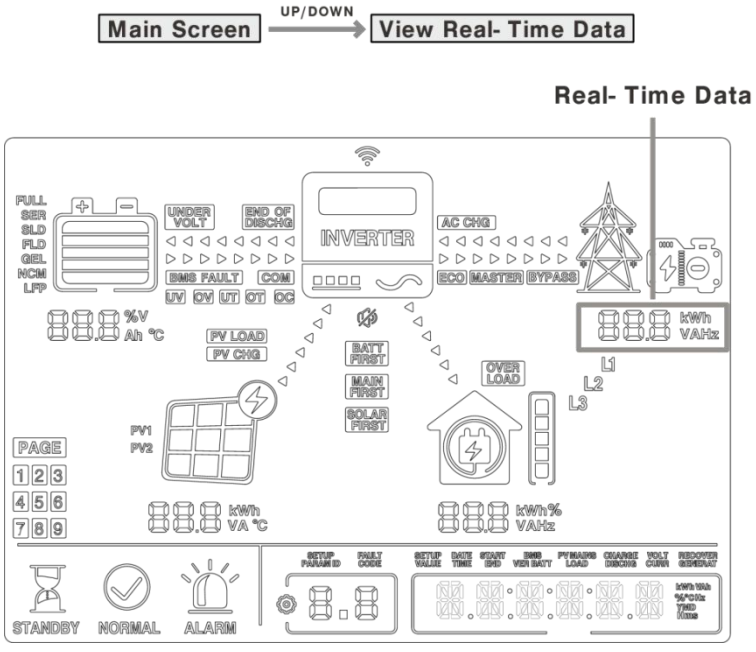
Icon	Description	Icon	Description
	Indicates the PV panel		Indicates the utility grid
	Indicates the battery		Indicates the generator
	Indicates the inverter is working		Indicates the home load
	Indicates the inverter is communicating with data collector		Indicates the buzzer muted
	Indicates the direction of energy flow		
	Indicates the inverter is standby		Indicates the inverter is working normally
	Indicates error occur		Indicates setting
	Indicates load power 80%~100%		Indicates battery SOC 80%~100%
	Indicates load power 60%~79%		Indicates battery SOC 60%~79%
	Indicates load power 40%~59%		Indicates battery SOC 40%~59%
	Indicates load power 20%~39%		Indicates battery SOC 20%~39%
	Indicates load power 5%~19%		Indicates battery SOC 5%~19%
UNDER VOLT	Indicates battery under-voltage	END OF DISCHG	Indicates battery discharge
OVER LOAD	Indicates over-load	BMS FAULT	Indicates BMS fault

COM	Indicates system communication error	UV	Indicates system under-voltage
OV	Indicates system over-voltage	UT	Indicates system under-temperature
OT	Indicates system over-temperature	OC	Indicates system over-current
FULL	Indicates battery is full	FLD	Indicates flooded lead-acid battery
SLD	Indicates sealed lead-acid battery	NCM	Indicates ternary li-ion battery
GEL	Indicates gel lead-acid battery	ECO	Indicates energy-saving mode
LFP	Indicates LFP li-ion battery	PV CHG	Indicates PV energy is charging the battery
PV LOAD	Indicates PV energy is carrying the load	MAIN FIRST	Indicates the inverter output mode is mains power first
AC CHG	Indicates AC IN energy is charging the battery	SOLAR FIRST	Indicates the inverter output mode is solar first
BYPASS	Indicates the inverter output mode is bypass	BATT FIRST	Indicates the inverter output mode is battery first

- View real-time data

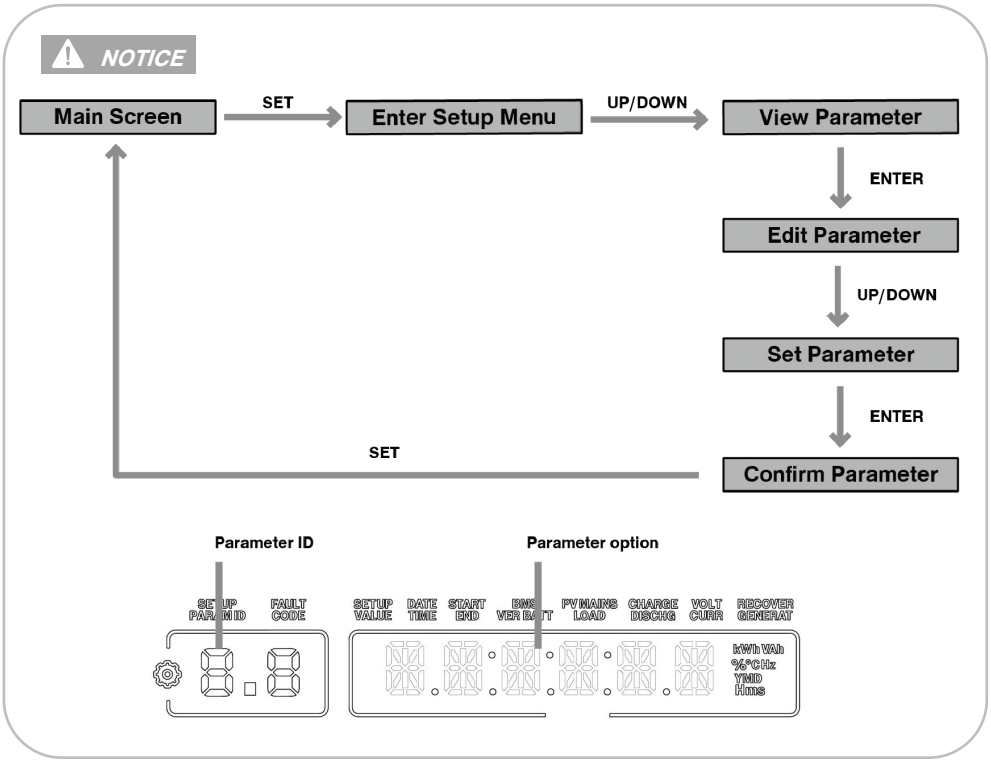
In the main screen, press the UP / DOWN keys to view the real-time data of the inverter during operation.

NOTICE



Page	PV side	BAT side	AC IN side	LOAD side	General
1	PV voltage	Batt Voltage	AC in voltage	Single phase voltage	Current Time
2	PV current	Batt Current	AC in current	Single phase Current	Current Date
3	PV power	Batt Voltage	Total AC charging power	Single phase active power	PV Total kWh
4	PV today kWh	Batt Current	Today AC charging kWh	Single phase apparent power	Load Total kWh
5	PV side heat sink temperature	INV Heat Sink Temperature	AC frequency	AC output frequency	RS485 Address
6	PV rated voltage	Batt Rated Voltage	Busbar voltage	AC output rated power	Software Version
7	Max. PV charging current	Max.Batt charging current	Max. AC charging Current	Total AC output active power	/
8			/	Total AC output apparent power	/

4.3 Setting



ID	Parameter Meaning	Options	Description
00	Exit	UTi default	Exit the setup menu.
01	AC output mode	SbU	Photovoltaic energy priority with the load, photovoltaic is not enough, the grid power and photovoltaic mixed load, photovoltaic energy is enough with the load, the excess energy to charge the battery, the grid power only starts charging when the battery is too discharged (06 Settings as" OSO(only PV)) ", the grid power will not charge), the battery is only discharged when off the grid
		SOL	Solar power and battery at first priority,Utility will provide power to load when solar power is not available and the battery voltage below parameter [04] value.
		SUB	Solar power at first priority, Utility will provide power to load when solar power is not available and the battery voltage below parameter [04] value .
		UTi default	Solar energy priority charging, insufficient solar energy, grid energy and solar energy hybrid charging (if 06 Settings as" OSO(only PV)", the grid energy will not charge) and grid with load, when solar energy is enough to charge, excess energy not enough to load, excess solar energy and grid will hybrid load, the battery is discharged only when off the grid
02	AC output frequency	50.0	AC output frequency will adaptive utility frequency in bypass mode.Otherwise the output will follow the preset value.
		60.0 default	
03	AC input voltage range	UPS default	When output range is 220/230V, input voltage range 170~280V
		APL	When output range is 220/230V, input voltage range 90~280V
04	Voltage point of battery switch to utility	43.6	When parameter 01 = SbU/SOL, output source will switch to utility from battery when the battery voltage below the preset value. Setting range:40~52V
05	Voltage point of utility switch to battery	57.6	When parameter 01 = SbU/SOL, output source will switch to battery from utility when the battery voltage above the preset value. Range:48~60V
06	Battery charge mode	SNU default	When both PV power and mains are used to charge the battery at one time, the PV charge first and when the PV power is insufficient, the mains tags in. Only in bypass mode can both PV power and mains be used to charge the battery at one time, and only the PV charge mode can be enabled during inverter operation.
		OSO	
07	Battery charging current	60	LEC-852A1B1F current setting range:0~180A
			LEC-103A1B1F current setting range:0~200A.
08	Battery type	USER	User-defined, user can set all battery parameter.
		SLd	Sealed lead-acid battery.
		FLd	Flooded lead-acid battery.
		GEL default	Gel lead-acid battery.
		L14/L15/L16	LFP li-ion battery, 14\15\16 corresponds battery cells number in series.
		N13/N14	Ternary li-ion battery.

ID	Parameter Meaning	Options	Description
09	Battery bulk charging voltage	57.6	Setting range:48V~58.4V, increment of each click is 0.4V, parameter can be set only when battery type is USER and L14/15/16,N13/14
10	Battery bulk charging delay time	120	indicates the duration when battery voltage reached parameter 09 value in bulk charging procession,Setting range: 5min~ɔnly when battery type is USER and L14/15/16, N13/14
11	Battery float charging voltage	55.2	Setting range: 48V~58.4V, parameters cannot be set only after successful BMS communication.
12	Battery overdischarge voltage (delay off)	42	When the battery voltage falls below this voltage point and parameter 13 value is reached, the inverter output will be switched off.Setting range: 40V~48V, increment of each click is 0.4V, parameter can be set only when battery type is USER and L14/15/16,N13/14
13	Battery overdischarge voltage delay time	5	Indicates the duration when battery voltage reached parameter 12 value in over-voltage procession. Setting range: 5s~50s, increment of each click is 5s, parameter can be set only when battery type is USER and LFP14/15/16,NCM13/14
14	Battery undervoltage alarm	44	When the battery voltage falls below this voltage point, alarm will be displayed on the screen and indicator. Setting range: 40V~52V, increment of each click is 0.4V, parameter can be set only when battery type is USER and L14/15/16, N13/14
15	Battery undervoltage limit voltage	40	When the battery voltage falls below this voltage point, the inverter output is switched off immediately. Setting range is 40V~52V, increment of each click is 0.4V, parameter can be set only when battery type is USER and L14/15/16, N13/14
16	Battery equalization charging	diS	Disable equalization charging.
		ENA default	
17	Battery equalization charging voltage	58	Setting range: 48V~58V, increment of each click is 0.4V, parameter can be set only when battery type is FLd\SLd\USER
18	Battery equalization charging duration	120	Setting range: 5min~900min, increment of each click is 5min, parameter can be set only when battery type is FLd\SLd\USER
19	Battery equalization charging delay time	120	Setting range: 5min~900min, increment of each click is 5min, parameter can be set only when battery type is FLd\SLd\USER
20	Battery equalization charging interval	30	Setting range: 0~30 days, increment of each click is 1 day, parameter can be set only when battery type is FLd\SLd\USER
21	Battery equalization charging stopstart	diS default	Stop equalization charging immediately.
		ENA	Start equalization charging immediately.
22	Power saving mode	diS default	Disable power saving mode.
		ENA	Enable power saving mode, When the load power below50W, the inverter output will switch off after a 5min delay. When the load is more than 50W, the inverter automatic restart.
23	Over-load restart	diS	When overload occurs and the output is switched off，the machine will not restart.
		ENA default	When overload occurs and the output is switched off, the machine will restart after a delay of 3 minutes. After it reaches 5 cumulative time, the machine will not restart automatically.
24	Overtemperature restart	diS	When over temperature occurs and the output is switched off，the machine will not restart.
		ENA default	When overload occurs and the output is switched off，the machine will restart when the temperature drops.
25	Buzzer alarm	diS	Disable buzzer alarm.
		ENA default	Enable buzzer alarm.

ID	Parameter Meaning	Options	Description
26	Power source switching reminder	diS	Disable reminder when the status of the input power source changes.
		ENA default	Enable reminder when the status of the input power source changes.
27	inverter overload switch to bypass	diS	Disable switch to the bypass when the inverter is overload.
		ENA default	Enable switch to the bypass when the inverter is overload.
28	Max. utility charging current	60	LEC-852A1B1F, setting range: 0~100A.
			LEC-103A1B1F, setting range: 0~120A.
30	RS485 address	id: 1	RS485 address setting range: 1~254.
32	RS485 communication	SLA default	Enabling PC and remote monitoring protocols
		485	Enabling BMS communication based on RS485
		CAN	Enabling BMS communication based on CAN
33	BMS communication	When item 32 is set to 485 or CAN, the corresponding communication protocol must be selected in item 33	
		PAC=PACE, RDA=Ritar, AOG=ALLGRAND BATTERY, OLT=OLiTER，HWD=SUNWODA, DAQ=DAKiNG, WOW=SRNE, PYL=PYLONTECH UOL=WEiLAN	
34	Feed back & hybrid output function	diS default	Disable this function.
		ON GRd	On-grid function When parameter 01 =UTI ,solar energy will feed back into the grid when battery is full or disconnected.
35	Battery under voltage recover point	52	Battery recover discharge from under voltage protection when voltage above this value. Setting range: 44V~54V.
37	Battery full recharge voltage point	52	inverter stops charging when the battery is full. inverter resumes charging when the battery voltage below this value. Setting range: 44V~54V.
38	AC output voltage	230	Setting range: 200/208/220/230/240Vac
39	Charge current limitine method (when BMS is enabled)	LC SET	Max. battery charging current not greater than the value ol setting [07]
		LC BMS default	Max. battery charging current not greater than the limit value of BMS
		LC iNV	Max. battery charging current not greater than the logic judgements value of the inverter
40	1st slot start charging	00:00:00	Setting range: 00:00:00-23:59:00
41	1st slot end charging	00:00:00	Setting range: 00:00:00-23:59:00
42	2nd slot start charging	00:00:00	Setting range: 00:00:00-23:59:00
43	2nd slot end charging	00:00:00	Setting range: 00:00:00-23:59:00
44	3rd slot start charging	00:00:00	Setting range: 00:00:00-23:59:00
45	3rd slot end charging	00:00:00	Setting range: 00:00:00-23:59:00
46	Time slot charging function	diS default	Disable this function.
		ENA	Enable this function, AC output source mode will switch to SbU, utility charging the battery and carry load only in charging time slot which user set or the battery is under voltage.

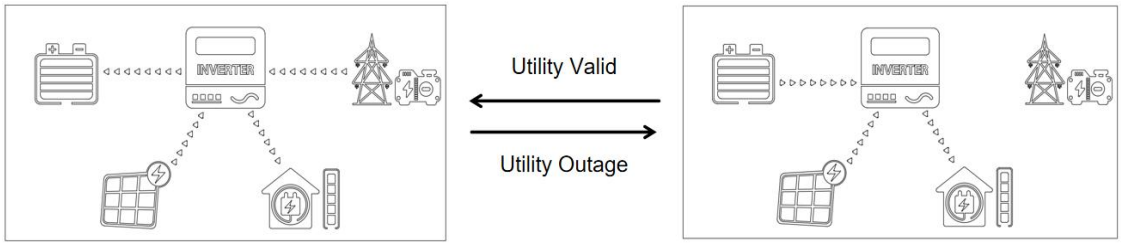
ID	Parameter Meaning	Options	Description
47	1st slot start discharging	00:00:00	Setting range: 00:00:00-23:59:00
48	1st slot end discharging	00:00:00	Setting range: 00:00:00-23:59:00
49	2nd slot start discharging	00:00:00	Setting range: 00:00:00-23:59:00
50	2nd slot end discharging	00:00:00	Setting range: 00:00:00-23:59:00
51	3rd slot start discharging	00:00:00	Setting range: 00:00:00-23:59:00
52	3rd slot end discharging	00:00:00	Setting range: 00:00:00-23:59:00
53	Time slot discharging function	diS default	Disable this function.
		ENA	Enable this function, AC output source mode will switch to UTi , battery discharging only in discharging time slot which user set or utility is not available.
54	Local date	00:00:00	YY/MM/DD. Setting range: 00:01:01-99:12:31
55	Local time	00:00:00	Setting range: 00:00:00-23:59:59
57	Stop charging current	3	Charging stops when the charging current is less than the set value (unit:amp)
58	Discharging alarm SOC	15	Triggers an alarm when the battery SOC is less than the set value (unit:%)
59	Discharging cutoff SOC	5	Stops discharging when the battery SOC is less than the set value (unit:%)
60	Charging cutoff SOC	100	Stops charging when the battery SOC is touch the set value (unit:%)
61	Switching to utility SOC	10	Switch to utility power when the battery SOC is less than this setting (unit:%)
62	Switching to inverter SOC	100	Switches to inverter output mode when SOC is greater than this setting (unit:%)
63	N-PE bonding automatic switching function	diS default	Allow automatic switching of N-PE bonding
		ENA	

4.4 AC output mode

The AC output mode corresponds to parameter setting item 01 and 34, which allows the user to set the AC output power source manually.

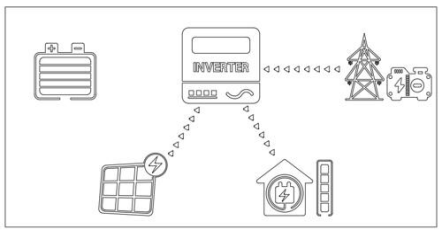
- Utility Priority Output 01 UTI (default)

Utility at first priority, utility and solar provide power to load at the same time when solar is available, battery will provide power to load only when utility power is not available.(Priority:utility>solar>battery)

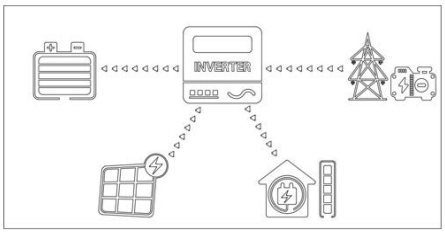


- Solar and Utility Hybrid Output

In UTI mode, when not connected to the battery or when the battery is full, the solar and the utility supply power to the load at the same time.(Priority: solar>utility>battery)



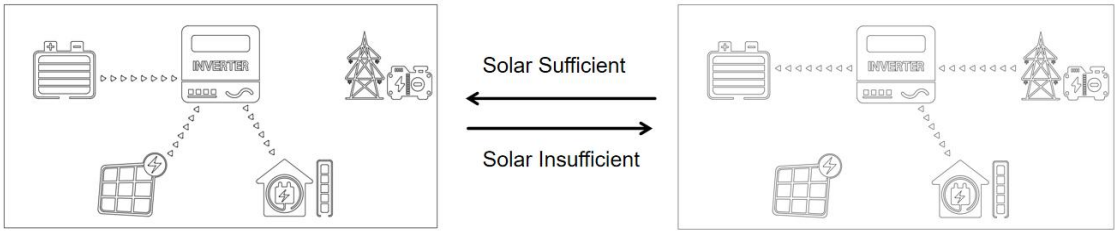
Battery Dsiconnected



Battery Full

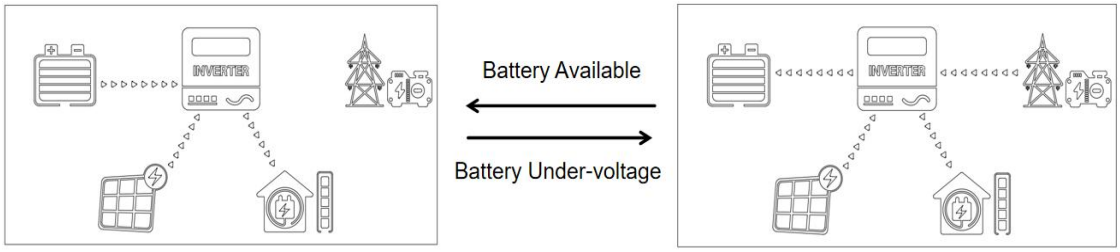
- Solar Priority Output 01 SOL

Solar provides power to the loads as first priority.If solar is not available, the utility grid will provide power to the loads. This mode maximise solar energy while maintaining battery power and is suitable for areas with relatively stable power grids.(Priority: solar>utility>battery)



Inverter Priority Output 01 SBU

Solar provides power to the loads as first priority.If solar is not sufficient or not available, the battery will be used as a supplement to provide power to the loads. When the battery voltage reaches the value of parameter 04 (Voltage point of battery switch to utility) will switch to utility to provide power to the load,This model makes maximum use of DC energy and is used in areas where the grid is stable. (Priority: solar>battery>utility)

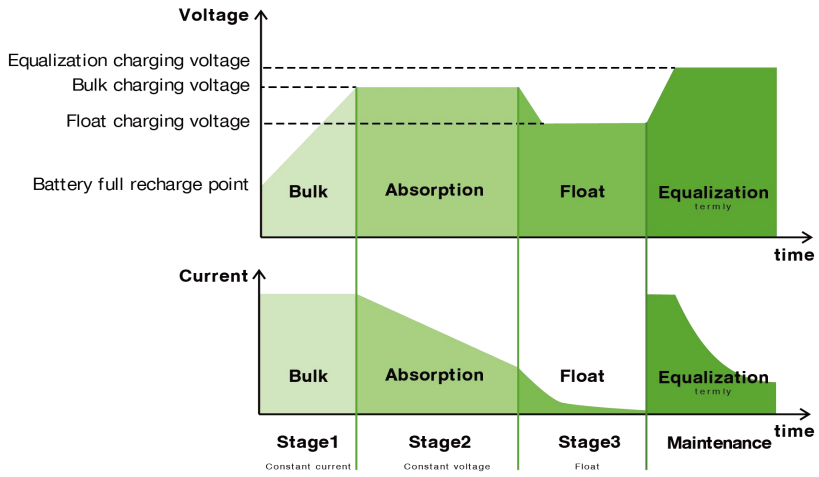


4.5 Battery parameter

- Lead-acid battery

Parameter/BatterY 1ype	Sealed	Gel	Flooded	User-defined
	SLd	GEL	FLd	USER
Parameter/Battery 1ype	60V	60V	60V	60V
Over-voltage cut-off voltage	58V	56.8V	58V	40~60V settable
Equalization charging voltage	57.7V	56.8V	57.6V	40~60V settable
Bulk charging voltage	55.2V	55.2V	55.2V	40~60V settable
Float charging voltage	44V	44V	44V	40~60V settable
Under-voltage alarm voltage	42V	42V	42V	40~60V settable
Under-voltage cut-off voltage	40V	40V	40V	40~60V settable
Discharging limit voltage	5s	5s	5s	1~30s settable
Over-discharge delay time	120min	-	120min	0~600min settable
Equalization charging duration	30d	-	30d	0~250d settable
Equalization charging interval	120min	120min	120min	10~600m settable

NOTICE

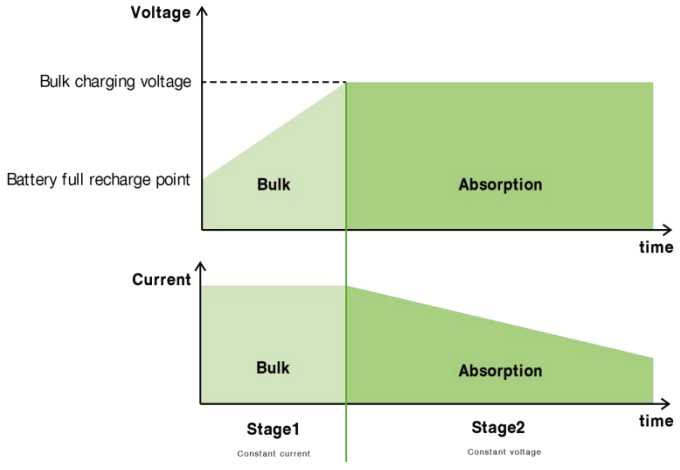


- Li-ion battery

Parameter/Battery type	Ternary		LFP			User- defined
	N13	N14	L16	L15	L14	USER
Over-voltage cut-off voltage	60V	60V	60V	60V	60V	60V
Equalization charging voltage	-	-	-	-	-	40~60V settable
Bulk charging voltage	53.2V	57.6V	56.8V	53.2V	49.2V	40~60V settable
Float charging voltage	53.2V	57.6V	56.8V	53.2V	49.2V	40~60V settable
Under-voltage alarm voltage	43.6V	46.8V	49.6V	46.4V	43.2V	40~60V settable
Under-voltage cut-off voltage	38.8V	42V	48.8V	45.6V	42V	40~60V settable
Discharging limit voltage	36.4V	39.2V	46.4V	43.6V	40.8V	40~60V settable
Over-discharge delay time	30s	30s	30s	30s	30s	1~30s settable
Equalization charging duration	-	-	-	-	-	0~600min settable
Equalization charging interval	-	-	-	-	-	0~250d settable
Bulk charging duration	120min settable	120min settable	120min settable	120min settable	120min settable	10~600min settable

NOTIC

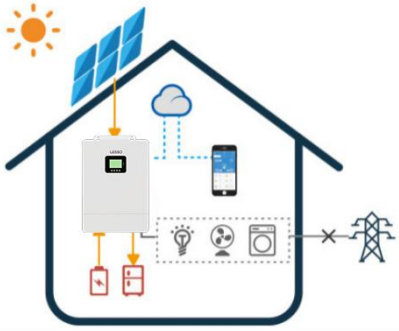
If no BMS is connected, the inverter will charge according to the battery voltage with a preset charging curve. When the inverter communicates with the BMS, it will follow the BMS instructions to perform a more complex stage charging process.

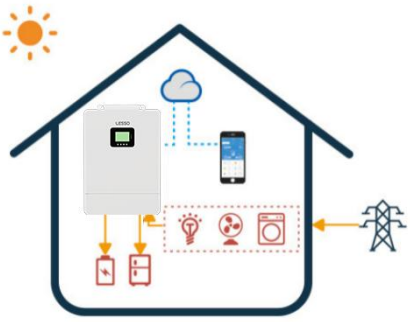


Hybrid inverter system normally has the following work modes based on your configuration and layout conditions

General mode

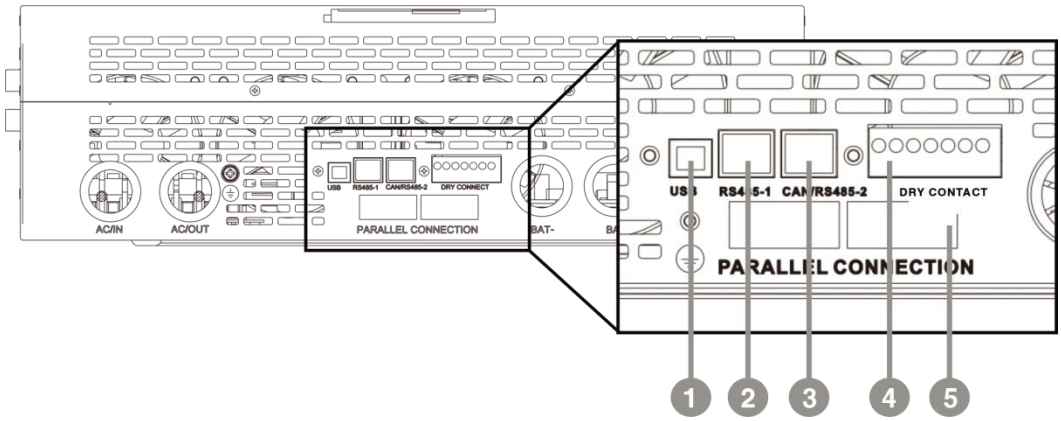
In this mode, the load supply priority is PV> Grid mains > Battery. 1. When PV power is available, PV power will provide power to the load first. If it’s sufficient, PV power will charge the battery, if it’s more sufficient, PV power will feed-in to the grid. 2. When PV power is not available or not sufficient, the grid mains will provide power to the load. 3. When PV power and the grid mains is not available, the battery will provide power to the load.
NOTE
In this mode, only the PV power can charge the battery, and the battery can only provide power to the load and can’t provide power to feed-in the grid.

Off-grid mode	
	In this mode, the load supply priority is PV > Battery. In this mode, the inverter will provide 230V pure sine waveform to ensure the load can use pure electricity. 1. When PV power is available, provide 230V pure sine waveform to ensure the load. 2. When PV power is not available or not sufficient, the battery will provide power to the load.
NOTE	
In this mode, only the PV power can charge the battery. to ensure the load can use pure electricity, the grid mains is not available.	

Economical mode	
	In this mode, you can set a set of battery charging and discharging time.
(1) During the battery charging period: 1. When PV power is available, PV power will provide power to the load first. If it’s sufficient, PV power will charge the battery, if it’s more sufficient, PV power will feed-in to the grid. 2. When PV power is not available or not sufficient, the grid mains will provide power to the load and charge the battery at the meanwhile. **NOTE:** In this mode, the grid mains can charge the battery. So we suggest that the charging period is setting in the electricity valley time.	
(2) During the battery discharging period: 1. When PV power is available, PV power will provide power to the load first. If it’s sufficient, PV power will feed-in to the grid directly. 2. When PV power is not available or not sufficient, the battery will provide power to the load. 3. When the battery voltage is under the cut-off voltage, the grid mains will provide power to the load. **NOTE:** In this mode, if the battery discharge power set value is more the load power , the excess power will be connected to the grid, and opening the anti-reverse flow can prevent the battery energy from flowing to the grid.	

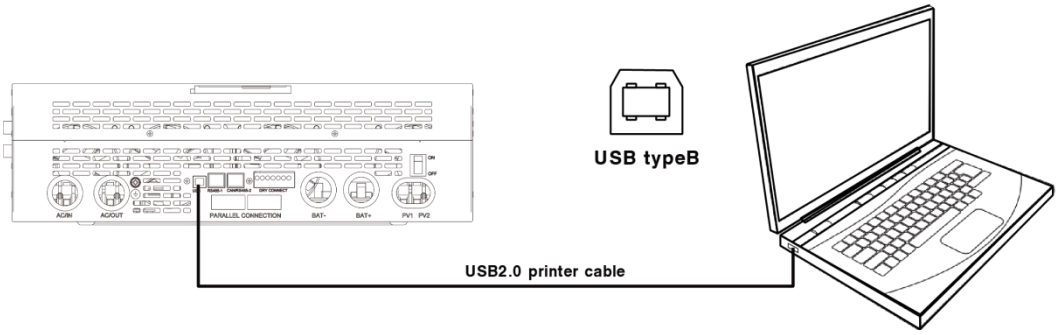
5. Communication

5.1 Overview



1	USB-B port	**2**	RS485-1 port	**3**	RS485-2 port
4	Dry contact port	**5**	Parallel connection port (reserved port, this model does not support parallel connection)		

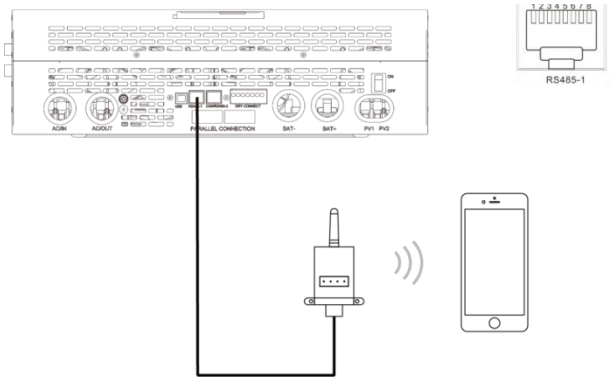
5.2 USB-B port



The user can read and modify device parameters through this port by using the host software. Please contact us for the host software installation package if you require one.

5.3 RS485-1 port

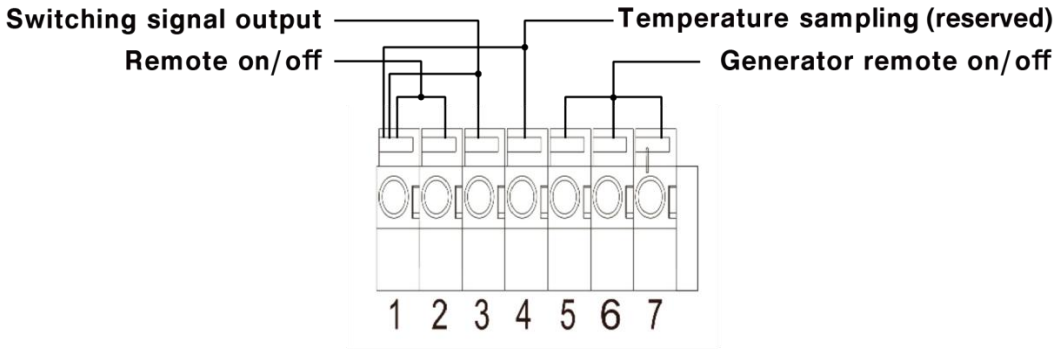
The RS485-1 port is used to connect to the Wi-Fi/GPRS data acquisition module, which allows the user to view the operating status and parameters of the inverter via the mobile phone APP.



RJ45	Definition
Pin 1	5V
Pin 2	GND
Pin 3	/
Pin 4	/
Pin 5	/
Pin 6	/
Pin 7	RS485-A
Pin 8	RS485-B

Dry contact port with 4 functions:

1. Remote switch on/off; 2. Switching signal output; 3. Battery temperature sampling; 4. Generator remote start/stop



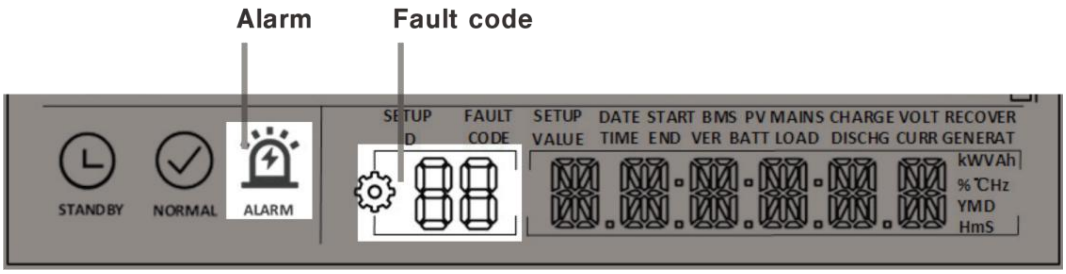
Function	Description
Remote switch on/off	When pin 1 is connected with pin 2, the inverter will switched off the AC output. When pin1 is disconnected from pin2, the inverter outputs normally.
Switching signal output	When the voltage of battery reaches the under-voltage limit voltage(parameter 15)，pin 3 to pin 1 voltage is 0V, When the battery charging/discharging normally pin 3 to pin 1 voltage is 5V.
Temperature sampling(reserved)	Pin 1 & Pin 4 can be used for battery temperature sampling compensation.
Generator remote start/stop	When the voltage of battery reaches the under-voltage alarm voltage (parameter 14) or voltage point of utility switch to battery (parameter 04), pin 6 to pin 5 normal open, pin 7 to pin 5 normal close.

NOTICE

If you need to use the remote start/stop function of the generator with dry contact, ensure that the generator has ATS and supports remote start/stop.

6. TROUBLE-SHOOTINGS

6.1 Warning list



Fault Code	Meaning	Does it Affect the outputs	Instructions
01	BatVoltLow	Yes	Battery under-voltage alarm
02	BatOverCurrSw	Yes	Battery discharge over-current, software protection
03	BatOpen	Yes	Battery disconnected alarm
04	BatLowEod	Yes	Battery under-voltage stop discharging alarm
05	BatOverCurrHw	Yes	Battery over-current hardware protection
06	BatOverVolt	Yes	Battery over-voltage protection
07	BusOverVoltHw	Yes	Busbar over-voltage hardware protection
08	BusOverVoltSw	Yes	Busbar over-voltage software protection
09	PvVoltHigh	Yes	PV input over-voltage protection
10	PvBoostOCSw	No	Boost circuit over-current software protection
11	PvBoostOCHw	No	Boost circuit over-current hardware protection
12	SpiCommErr	Yes	Master-slave chip SPI communication failure
13	OverloadBypass	Yes	Bypass overload protection
14	OverloadInverter	Yes	Inverter overload protection
15	AcOverCurrHw	Yes	Inverter over-current hardware protection
16	AuxDSpReqOffPWM	Yes	Slave chip request switch off failure
17	InvShort	Yes	Inverter short-circuit protection
18	Bussoftfailed	Yes	Inverter busbar soft start failed
19	OverTemperMppt	No	MPPT heat sink over-temperature protection
20	OverTemperInv	Yes	Inverter heat sink over-temperature protection
21	FanFail	Yes	Fan failure
22	EEPROM	Yes	Reservoir failure

6.2 Troubleshooting

Fault Code	Meaning	Causality	Remedy
/	Screen no display	No power input, or in sleep mode.	Closing the circuit breaker. Ensure the rocker switch is ON. Push any button on the panel to exit sleep mode.
01	Battery under-voltage	The battery voltage is lower than the value set in parameter [14].	Charge the battery and wait until the battery voltage is higher than the value set in the parameter item [14].
03	Battery not connected	The battery is not connected, or the BMS in discharge protection	Check whether the battery is reliably connected; check whether the circuit breaker of the battery is not closed; ensure that the BMS of the Li-ion battery can communicate properly.
04	Battery over-discharge	The battery voltage is lower than the value set in the parameter [12].	Manual reset: Power off and restart. Automatic reset: charge the battery so that the battery voltage is higher than the value set in the parameter item [35].
06	Battery over-voltage when charging	Battery is in over-voltage condition.	Manually power off and restart. Check to see if the battery voltage exceeds the limit. If it exceeds, the battery needs to be discharged until the voltage is below the battery's over-voltage recovery point.
13	Bypass over-load (software detection)	Bypass output power or output current overload for a certain period of time.	Reduce the load power and restart the device. Please refer to item 11 of the protection features for more details.
14	Inverter over-load(software detection)	Inverter output power or output current overload for a certain period of time.	
19	Heat sink of PV input over-temperature (software detection)	Heat sink of PV input temperature exceeds 90℃ for 3s.	Resume normal charge and discharge when the temperature of the heat sink has cooled to below the over-temperature recovery temperature.
20	Heat sink of inversion over-temperature (software detection)	Heat sink of inversion temperature exceeds 90℃ for 3s.	
21	Fan failure	Fan failure detects by hardware for 3s.	Manually toggle the fan after switching off to check for blockage by foreign objects.
26	AC Input relay shortcircuit	Relay for AC input sticking	Manually power off and restart; if the fault reappears after restarting,You need to contact the after-sales service to repair the machine.
28	Utility input phase fault	AC input phase does not coincide with AC output phase	Ensure that the phase of the AC input is the same as the phase of the AC output, e.g. if the output is in split-phase mode, the input must also be in split-phase.

NOTICE

If you encounter a fault with the product that cannot be solved by the methods in the table above, please contact our after-sales service for technical support and do not disassemble the equipment yourself.

7. Protection and Maintenace

7.1 Protection features

No	Protection Feature	Instruction
1	PV input current/power limiting protection	When the charging current or power of the PV array configured exceeds the PV input rated value, the inverter will limit the input power and charge at the rated.
2	PV input over-voltage	If the PV voltage exceeds the maximum value allowed by the hardware, the machine will report a fault and stop the PV boost to output a sinusoidal AC wave.
3	PV night reverse current protection	At night, the battery is prevented from discharging through the PV module because the battery voltage is greater than the voltage of PV module.
4	AC input over-voltage protection	When the AC input voltage of each phase exceeds 280V, the mains charging will be stopped and switched to the inverter mode.
5	AC input under-voltage protection	When the AC input voltage of each phase below 170V, the utility charging will be stopped and switched to the inverter mode.
6	Battery over-voltage protection	When the battery voltage reaches the over-voltage cut-off point, the PV and the utility will automatically stop charging to prevent the battery from being overcharged and damaged.
7	Battery under-voltage protection	When the battery voltage reaches the under-voltage cut-off point, the inverter will automatically stop the battery discharge to prevent damage from over-discharging the battery.
8	Battery over-current protection	After a period when the battery current exceeds that allowed by the hardware, the machine will switch off the output and stop discharging the battery.
9	AC output short-circuit protection	When a short-circuit fault occurs at the load output terminal, the AC output is immediately turned off and turned on after 1 second.If the output load terminal is still short-circuited after 3 attempts, the inverter must be manually restarted after first removing the shortcircuit fault from the load before the normal output can be restored.
10	Heat sink over-temperature protection	When the internal temperature of the inverter is too high, the inverter will stop charging and discharging; when the temperature returns to normal, the inverter will resume charging and discharging.
11	Inverter over-load protection	After triggering the overload protection the inverter will resume output after 3 minutes, 5 consecutive overloads will switch off the output until the inverter is restarted.
11	Inverter over-load protection	(102%<load<110%) ±10%: error and output shutdown after 5min; (110% < load < 125%) ±10%: error and output shutdown after 10s. Load > 125% ± 10%: error reported and output switched off after 5s.
12	AC output reverse	Prevents AC back flow from the battery inverter to the bypass AC input.
13	Bypass over-current protection	Built-in AC input over-current protection circuit breaker.
14	Bypass phase inconsistency protection	When the phase of the bypass input and the phase of the inverter split do not match, the inverter disables switching to the bypass output to prevent the load from dropping out or short-circuiting when switching to the bypass.

7.2 Maintenance

To maintain optimum and long-lasting working performance, we recommend that the following items are checked twice a year.

1. Ensure that the airflow around the inverter is not blocked and remove any dirt or debris from the radiator.

2. Check that all exposed conductors are not damaged by sunlight, friction with other surrounding objects, dry rot, insect or rodent damage, etc. The conductors need to be repaired or replaced if necessary.

3. Verify that the indications and displays are consistent with the operation of the equipment, note any faults or incorrect displays and take corrective action if necessary.

4. Check all terminals for signs of corrosion, insulation damage, high temperatures or burning/discolouration and tighten terminal screws.

5. Check for dirt, nesting insects and corrosion, clean anti insects net as required.

6. If the lightning arrester has failed, replace the failed arrester in time to prevent lightning damage to the inverter or other equipment of the user.

> ***DANGE***
>
> Make sure that the inverter is disconnected from all power sources and that the capacitors are fully discharged before carrying out any checks or operations to avoid the risk of electric shock.

The Company shall not be liable for damage caused by :

1. Damage caused by improper use or use in a wrong location.
2. Photovoltaic modules with an open circuit voltage exceeding the maximum permissible voltage.
3. Damage caused by the operating temperature exceeding the restricted operating temperature range
4. Dismantling and repair of the inverter by unauthorised persons.
5. Damage caused by force majeure: damage during transport or handling of the inverte

8. TECHNICAL PARAMETERS

Product Model	LEC-702A1B1F	LEC-852A1B1F	LEC-103A1B1F
PV Input			
Max input voltage (V)	500		
Isc PV (A)	25/25	27.5/27.5	28.75/28.75
Max input current (A)	20/20	22/22	23/23
Number of MPPT channels	2		
MPPT range (Vdc)	125-435		
Vdc range @ full power (Vdc)	240-425		
Max input PV power (VA)	14000	15200	16000
Battery (charge/discharge)			
Battery type	Li-ion / Lead-acid / User-defined		
Rated norma voltage (Range) (Vdc)	48V(40-60V)		
Rated battery voltage (V)	48		
Max charge/discharge current (A)	170	180	200
Max charge/discharge power (W)	7000	8500	10000
AC Grid (input and output)			
Rated AC voltage (Vac)	230(Single phase)		
AC input voltage (Range) (Vac)	90-275		
Rated frequency (Hz)	50/60		
Bypass over current (A)	60		
AC Load Output (stand alone)			
Rated voltage (VAC)	230(Single phase)		
Rated frequency (Hz)	50/60		
Rated current (A)	32	38	45
Rated output power (W)	7000	8500	10000
P-P output power (W)	11000	12000	15000
Load capacity of motors	4HP	5HP	6HP
Overload capablility (off grid)	After triggering the overload protection the inverter will resume output after 3 minutes, 5 consecutive overloads will switch off the output until the inverter is restarted. (102%<load< load < 125%): error and output shutdown after 10s. Load > 125%: error reported and output switched off after 5s.		
Output power factor (off grid)	0.8 leading to 0.8 lagging		
Others			
Ingress protection (IP)	IP20, indoor only		
Temperature (°C)	-10~55°C, >45°C derated (14~131°F，>113°F derated)		
Inverter isolation	Non-isolated PV-AC, High frequency isolated(Battery side)		
Dimensions D*W*H (mm)	620*445*130		
Weight (kg)	27		
Altitude (m)	2000		
Cooling method	Built-in fan		
Commication			
Embedded interfaces	RS485/CAN/USB/Dry contact		
External modules (optional)	WiFi/GPRS		