

LIVOLTEK®

USER MANUAL



iPower AES1-3K/3.6K/4.6K/5KEG1

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1. About This Manual

Thank you for choosing our AC Couple Series inverter. This manual will assist you in becoming familiar with this product. Please keep this manual available at any time. And read the manual and other related documents before performing any operation on the inverter and consider the connection requirements by your local grid utility.

All descriptions in the manual are for guidance only.

1.1 Scope of Validity

This manual describes the installation process, maintenance, technical data, and safety instructions for the following models:

AES1-3KG1, AES1-3K6G1, AES1-4K6G1, AES1-5KG1, AES1-3KEG1, AES1-3K6EG1, AES1-4K6EG1, AES1-5KEG1.

“AES” means AC Couple Series inverter; “1” means single-phase;

“3K” means the rated power is 3000W; “E” means EPS port included;

“G” means product model-general-purpose model; “1” means first generation.

1.2 Target Group

This manual is intended for qualified persons and inverter owners. All activities described in the document may only be carried out by specially trained personnel in compliance with standards, wiring rules and the requirements of local grid authorities or companies. Moreover, they must also understand basic safety precautions and with the knowledge of how to deal with the dangers and risks associated with installing, repairing, and using electrical devices and batteries.

1.3 Symbol Definition

Safety instructions will be highlighted with the following symbols.

Symbol	Description
 DANGER	Indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.
 WARNING	Indicates a hazard with a medium level of risk that, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a hazard with a low level of risk that, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a situation that, if not avoided, could result in equipment or property damage.

Note: This user manual is subject to change (specific please in kind prevail) without prior notice. For more product details and latest documents, visit <https://livoitek.com>.

2. Safety Precaution

- The inverter has been designed and tested strictly in accordance with international safety regulations. As with all electronic equipment, there are residual risks despite careful construction.
- Read all safety instructions carefully prior to any work and always observe them when working on or with the inverter to prevent personal injury and property damage and to ensure long-term operation of the inverter.
- Ensure that the equipment is used in environments that meet its design specifications. Otherwise, the equipment may become faulty, and the resulting equipment malfunction, component damage, personal injuries, or property damage are not covered under the warranty.
- Follow local laws and regulations when installing, operating, or maintaining the equipment. The safety instructions in this document are only supplements to local laws and regulations.

2.1 Personnel Requirements

- The inverter must be installed, electrically connected, operated and maintained by specially trained and qualified electrician.
- The qualified persons who plan to install or maintain LIVOLTEK equipment must receive thorough training, understand all necessary safety precautions, and be able to correctly perform all operations.

2.2 Inverter Safety

 DANGER
Danger to life due to electric shock when live components are touched on opening the product. • High voltages are present in the live parts and cables inside the product during operation. Touching live parts and cables results in death or lethal injuries due to electric shock. • Do not open the inverter cover or change any components without manufacturer's authorization. Otherwise, the warranty for the inverter will be invalid.



WARNING

Danger to life due to fire or explosion.

- In rare cases, an explosive gas mixture can be generated inside the product under fault conditions. In this state, switching operations can cause a fire inside the product or explosion. Death or lethal injuries due to hot or flying debris can result.
- In the event of a fault, do not perform any direct actions on the product.
- Ensure that unauthorized persons have no access to the product.
- Only perform work on the product when wearing personal protective equipment for handling of hazardous substances.
- Wait at least 10 minutes for the internal capacitors to discharge after the battery is powered off.
- Ensure that there is no voltage or current before installing or disconnecting any connectors.
- All safety instructions, warning labels, and nameplate on the inverter should not be removed or covered.



CAUTION

Risk of burns due to hot components! Avoid any unnecessary touching!

- Do not touch any hot parts (such as the heat sink) during operation.

2.3 Battery Safety



DANGER

Danger to life from electric shock due to live DC cables at the battery.

The DC cables connected to a battery may be live. Touching the DC conductors or the live components leads to lethal electric shocks.

- Do not touch non-insulated cable ends.
- Do not touch any live components.
- Observe all safety information of the battery manufacturer.
- Prior to performing any work on the inverter or the battery, disconnect the inverter from all voltage sources as described in this document.
- If an error occurs, have it rectified by qualified persons only.



WARNING

Risk of burns due to electric arcs.

- Short-circuit currents in the battery can cause heat build-up and electric arcs.
- Disconnect the battery from all voltages sources prior to performing any work on the battery.

2.4 Installation Safety

NOTICE	
• As soon as receiving the inverter please check if it is damaged during its transportation. If yes, please contact your dealer immediately. • Adequate ventilation must be provided for inverter installation location. • Mount the inverter in vertical direction, and ensure that no objects block the heat dissipation. • The safety instructions in this manual cannot cover all the precautions that should be followed. Perform operations considering actual onsite conditions. • LIVOLTEK shall not be held liable for any damage caused by violation of the safety instructions in this manual.	

2.5 Electrical Safety

 DANGER	
• Before installing the inverter check all electrical ports to ensure no damage and no short circuit, otherwise personal casualty and or fire will occur. • Before touching the DC cables, operator must use a measuring device to ensure that the cable is voltage-free. • All electrical connections must be in accordance with local and national standards. Only with the permission of the local utility grid company, the inverter can be connected to the utility grid.	

2.6 Maintenance and Replacement

DANGER

- High voltage generated by the equipment during operation may cause an electric shock, which could result in death, serious injury, or serious property damage. Prior to maintenance, power off the equipment and strictly comply with the safety precautions in this document and relevant documents.
- Maintain the equipment with sufficient knowledge of this document and using proper tools and testing equipment.
- Before maintaining the equipment, power it off and follow the instructions on the delayed discharge label to ensure that the equipment is powered off.
- Turn off the AC switches of the inverter when maintaining the electric equipment or power distribution equipment connected to the inverter.
- For personal safety maintenance personnel must wear appropriate personal protective equipment (like insulation gloves and protective shoes) for the inverter maintenance.
- Place temporary warning signs or erect fences to prevent unauthorized access to the maintenance site.
- Follow the procedures of maintenance stipulated in the manual strictly.
- Check the relevant safety and performance of the inverter rectify any faults that may compromise the inverter security performance before restarting the inverter.
- To avoid any other unforeseeable risk, contact immediately your dealer, if there is any issue found during operation.
- The equipment can be powered on only after all faults are rectified. Failing to do so may escalate faults or damage the equipment.

2.7 PE Connection and Leakage Current

- All inverter is incorporate a certified internal Residual Current Monitoring (RCM) in order to protect against possible electrocution and fire hazard in case of a malfunction in the cables or inverter.
- There are 2 trip thresholds for the REMA as required for certification (IEC 62477). The default value for electrocution protection is 30mA, and for slow rising current is 300mA.
- The inverter, with built-in RCM, will exclude possibility of DC residual current to 6mA, thus in the system an external RCD (type A) can be used ($\geq 30\text{mA}$).

WARNING

- High leakage Current!
- Earth connection essential before connecting supply.
- A faulty ground connection can result in equipment failure, personal and death injuries, and electromagnetic interference.
- Ensure correct according to grounding to IEC62109 and conductor diameter according to STANDARD specification.
- Do not connect the grounding end of the equipment in series to prevent multi-point grounding.
- Electrical appliances must be installed in accordance with the wiring rules of each country.

For United Kingdom

- The installation that connects the equipment to the supply terminals shall comply with the requirements of BS 7671.
- All protective devices cannot be changed.
- User shall ensure that equipment is so installed, designed, and operated to always maintain compliance with the requirements of ESQCR22(1)(a).

2.8 EU Declaration of Conformity

Hangzhou Livoltek Power Co., Ltd. hereby declares that the inverter with wireless communication module sold in the European market meets the requirements of the following directives:

- Radio Equipment Directive 2014/53/EU (RED)
- Restrictions of Hazardous Substances Directive 2011/65/EU and (EU) 2015/863 (RoHS).
- Waste Electrical and Electronic Equipment 2012/19/EU
- Registration, Evaluation, Authorization and Restriction of Chemicals (EC) No 1907/2006 (REACH).
- You can download the EU Declaration of Conformity on <https://livoltek.com>.

3. Product Introduction

3.1 Product Description

The inverter is a single-phase AC Couple inverter applicable to both on-grid and off-grid solar system with participation of battery, loads and grid system for energy management.

The AC Couple inverter converts the DC power from the battery to the AC power, in conformity with the grid requirements. It also controls and optimizes the power of PV systems, e.g., by transmitting the DC power from the PV system to the battery or supporting the loads. With the bidirectional converter integrated inside, the inverter can charge or discharge the battery.

Several protective functions are integrated in the inverter, including short circuit protection, grounding insulation resistance surveillance, residual current protection, anti-islanding protection, overvoltage, and over-current protection, etc.

3.2 Application Scenarios

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

Please avoid the following installations which will damage the system or the Inverter. Any damage caused will not be covered by the warranty policy.

- ① Parallel connection is not supported.
- ② PV strings cannot be connected to inverters.
- ③ One battery bank cannot be connected to multiple inverters.
- ④ The EPS (backup) side cannot be connected to the grid.
- ⑤ The inverter cannot be connected to any AC generator directly.
- ⑥ The inverter cannot be connected to any incompatible batteries.

3.3 Power Derating

Power derating is a way to protect the inverter from overload or potential faults. For a safe operation, the inverter will automatically reduce the output power when the operating environment is not ideal. The following are the factors that may occur power derating. Please try to avoid them during usage.

- ✧ Unfavorable environmental conditions, e.g., direct sunlight, high temperature, etc.
- ✧ Over-temperature (including ambient temperature and module temperature).
- ✧ Power factor (when values out of the rated values)
- ✧ Over-frequency derating.
- ✧ Higher input voltage value.
- ✧ Higher input current value.

3.4 Declaration for Back-Up Function

The BACK-UP function can provide to the normal household load when the grid is disconnected. To ensure the stability of switching time and load power supply, avoid using loads with higher starting current, such as air conditioner, high-power pump, vacuum cleaner, and hair drier.

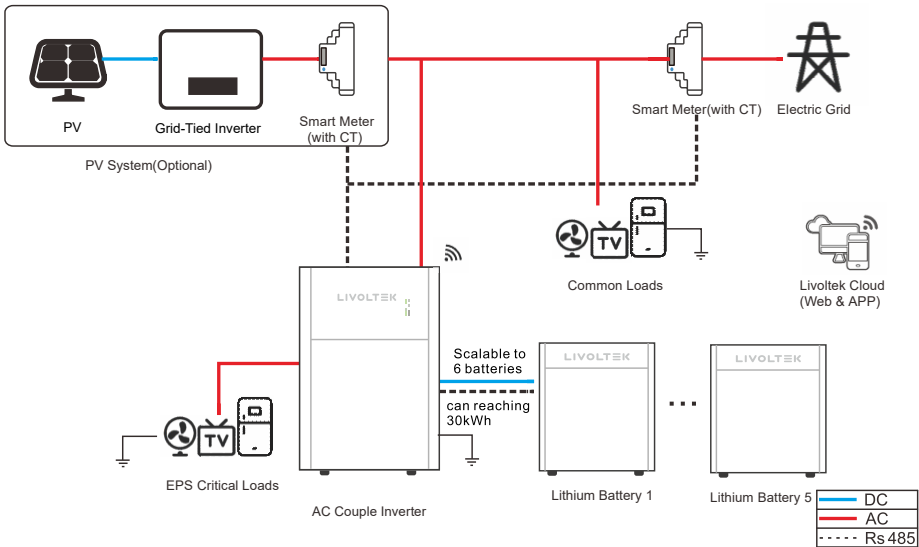
The inverter has the overload protection capability. When single overload protection occurs, the inverter can restart automatically; however, the restarting time will be extended if it happens several times. For a faster restarting, try to turn off the large loads and ensure the load power is within maximum limitation or remove the loads which may cause very high start-up current surges.

NOTICE
• 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's 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.

3.5 System Architecture

The following figure shows inverter application in an AC Couple system.

B System Connection Diagram



Description	Note
AC Couple Inverter	AC Couple Inverter Battery All-in-One System
EPS Critical Load	Protected house loads, connected to inverter EPS (backup) port, which need uninterrupted power supply.
Common load	Normal household loads, which will be lack of power when grid is blackout.
Smart meter	Smart meters are used in conjunction with inverters to monitor the current system feed-in and the amount of power being generated by the grid-connected machine.
Grid	Utility grid, supported Grid Types: TT, TN-C, TN-S, TN-C-S. For the grid structure with N cable, the effective value of the voltage between the neutral wire and the ground wire must be less than 10V. When the inverter is used in TT and IT systems, it is required that the inverter casing must be grounded, and the default ground fault detection function can be turned off through the APP.

3.6 Appearance and Dimension

The following figure shows the dimensions of the inverter. The image shown here is for reference only. The actual product received may differ.

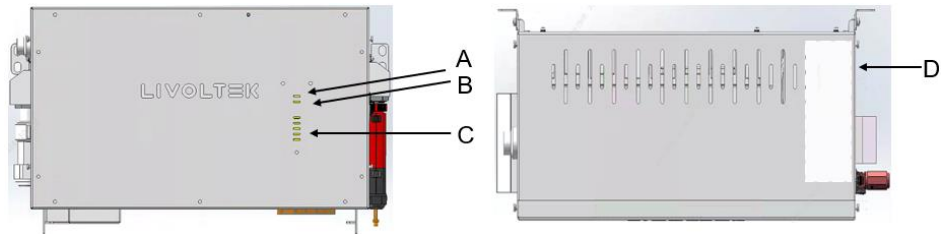


Figure 1. Appearance

Position	Designation
A	SYS indicator: Displays the current working state of the inverter.
B	COM indicator: Indicates Current working status of the communication terminal
C	Battery SOC indicator: Indicates the SOC of the connected battery.
D	Nameplate Label: To clearly identify the product, including device model, S/N (series number), technical data, certifications, etc.

The following figure shows the dimensions of the inverter.

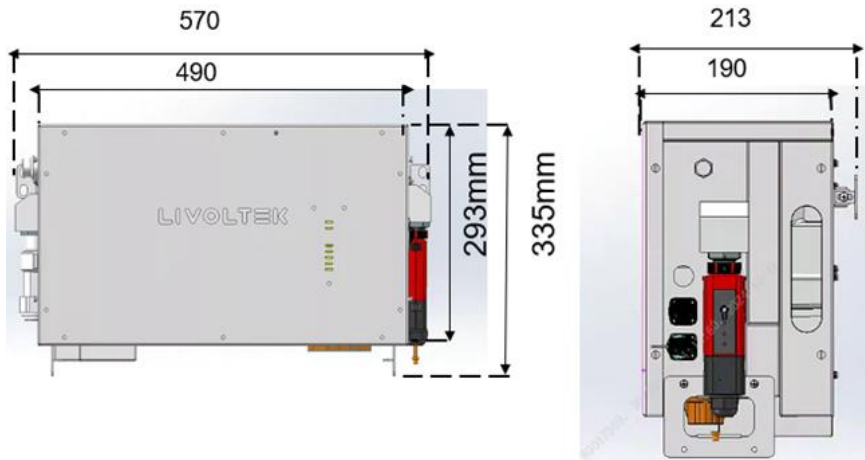


Figure 2. Dimensions

3.7 Terminal Description

The following diagram shows the wiring ports of the inverter.

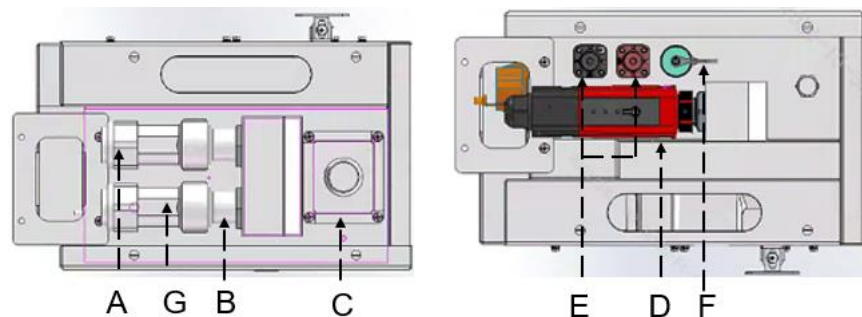


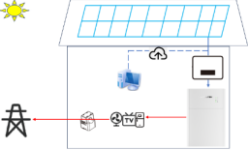
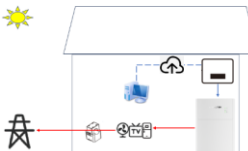
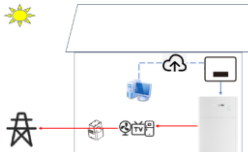
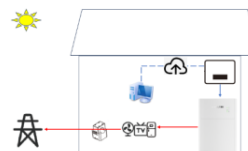
Figure 3. Terminals on the inverter

Position	Description
A	Grid Terminal for connection to the utility grid
B	AC Terminal for backup loads
C	16Pin Multi COM(Communication) Terminal
D	Communication Port for Wi-Fi Stick
E	Battery Input Terminal (BAT+/BAT-)
F	BMS Communication Port for communication between the inverter and the Li-Ion battery.
G	Additional grounding terminal

Note: The image shown here is for reference only. The actual product received may differ.

3.8 Work Modes

The AC Couple inverter offers four operating modes (Self-use, Self-define, backup and off-grid) based on different requirements. Which can be configured via LIVOLTEK APP for you to determine which mode will be best for you.

Work Modes	Description
Self-Use 	The self-use mode is suitable for areas with the low import rate and high electricity price. The purpose of this mode is to maximize the optimization of the remaining energy after the photovoltaic system supplies the load and reduce the power input from the grid. - When the power produced from the solar system is sufficient, the power will be used to supply the loads first, the excess energy is used to recharge the batteries, any remaining excess is then exported to the grid (if allowed) . - When the power produced by the solar system is insufficient or without power, the battery bank will discharge to support critical loads. And when the battery is insufficient, the grid will power the loads.
Self-Define 	The self-define mode is suitable for areas with time of use tariffs which means prices vary between peak and valley. - The purpose of this mode is to help the customer using the solar energy at times that best suit them to reduce influence of power price hikes and reduce energy costs. - During the set time period, it will charge or discharge the battery using timed schedules. And during the non-set time period, it will work in self-use mode.
Backup Mode 	The Backup mode is suitable for areas with unstable grid to prolong the autonomy in the event of grid outage. Or reducing the frequency charging and discharging of battery to extend battery life. - This work mode will ensure the battery reserves a minimum capacity fully charged (can be set via APP) for when there is a grid outage. - The battery will never discharge when the capacity is lower than the set value when the grid is on.
Off-grid Mode 	The Off-grid mode is suitable for non-grid areas, and the inverter will automatic activation this mode in the event of grid failure. - When the grid fails, the system will automatically switch to this mode. The critical loads will be powered by solar system and Battery. - Battery is necessary in this mode, and EPS loads shall not exceed the max. output power of batteries.)

Note: Contact us for additional or more complex application requirements.

3.8.1 On-Grid Self-Use Mode

The on grid self-use operating mode is recommended for when the AC Couple system is installed in an area with a stable grid. The purpose is to rationally utilize the remaining energy after the solar system supplies the load and save electricity costs. When Inverter is set to work in this mode:

- **During daytime and there is sufficient PV Power,**
 - ✧ The PV energy is used to supply local loads as priority and then charge the battery, any excess energy will be fed into grid ^{*1}.
 - ✧ When battery is fully charged, PV energy is supplied to the local loads and fed into grid ^{*1}.
- **During nighttime or there is not sufficient PV Power,**
 - ✧ Battery is discharged to supply local loads until reaches its power limit ^{*2}, if extra power is required, it will be imported from grid.
 - ✧ The battery will stop to discharge when the value is lower than the discharge cut-off value, which is available for setting, the local loads will be supplied from the grid.
 - ✧ The switch from battery power, PV power and grid power are automatic and seamless.
- **When grid fails,**

In the event of a grid failure or there's no mains, the AC Couple inverter automatically switches to

Off-grid operation mode. The off-grid mode ensures that the system forms a battery-backup grid that utilize power from PV production and battery to supply power to critical loads.

NOTICE
*1: The inverter can be set not to feed power into the grid. But a small amount of energy will still inevitably be fed into grid due to unpredictable PV power changes and load fluctuations. *2: The battery power supply can be restored when the battery is charged to the “set value +10%” by solar.

3.8.2 On-Grid Self-Define Mode

When operating in this mode, the charging and discharging time can be set flexibly as required. This mode is ideal for those who want to store the power in the battery when the electricity price is at an off-peak rate and use the power during peak rate time or save the energy for grid outages.

- ✧ During charge time, solar energy and grid will charge the battery bank as priority at the same time, any excess solar energy will supply local loads and then be fed into the grid ^{*1}.
- ✧ During discharge time, solar power will supply local loads first, then excess solar power and battery power will be fed into grid ^{*1}.
- ✧ The inverter will automatically work in Self-Use mode outside the set time of Charge or Discharge.

NOTICE

*1: The inverter can be set not to feed power into the grid. But a small amount of energy will still inevitably be fed into grid due to unpredictable PV power changes and load fluctuations.

*2: The battery power supply can be restored when the battery is charged to the “set value +10%” by solar system.

3.8.3 On-Grid Backup Mode

Keep the battery at a high level (default 50%, which is available for setting) for areas with unstable grid that need a large amount of battery to support the emergency use in the event of grid outage. Or reducing the frequency charging & discharging of battery to extend battery life.

- ✧ When there is grid connected, the battery is only allowed to discharge when its capacity is above the set value.
- ✧ When the capacity of the battery power is less than the set value, the solar energy and grid will charge battery to the set value as priority. If the PV energy is sufficient, it will fully charge the battery and the excess power will be fed to the grid*1.
- ✧ The loads will be supplied by the surplus solar production supplemented, if necessary, by the public electricity grid.

NOTICE

*1: The inverter can be set not to feed power into the grid. But a small amount of energy will still inevitably be fed into grid due to unpredictable PV power changes and load fluctuations.

*2: The battery power supply can be restored when the battery is charged to the “set value +10%” by solar.

3.8.4 Off-Grid Mode

When operating in this mode, residual energy from photovoltaic systems and battery constitutes a pure off-grid system, the critical loads (EPS Loads) will be powered by PV production and if the PV production is insufficient, battery will discharge to power the loads at the same time. (Battery is necessary in this mode.)

NOTICE

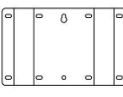
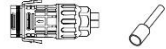
- When battery is discharged to the discharge cut-off value (@EPS), the inverter will stop working and wait for the grid to recover or until there is sufficient power from PV panels to charge the battery.
- If grid failure is a common occurrence in your area, it is recommended to adjust the discharge cut-off value (@Grid) higher to ensure there is more battery power available.

4. Unpacking and Storage

The inverter is thoroughly tested and strictly inspected before delivery. Damage may still occur during shipping. Please check the outer packing for damage and the inner contents for any visible damage. Contact your distributor immediately in case of any damaged or missing components.

4.1 Packing List

Check if all the accessories are in the package, the standard accessories are listed as below:

 Inverter+Battery*1	 Connecting Piece*2 Fixed Piece*2	 Bracket*1	 Expansion Bolts *2
 Inverter Decorative Panels*2 Battery Decorative Panels*2	 AC Terminal Rubber Core Removal Tools *1 L-type Hexagon Wrench *1 AC Plug for Grid *1	 AC Plug for EPS *1	 CT*1 (Current Transformer)
 MULTI Connector (16 pin) *1 16pin Terminals *16	 Phillips Screws *10 PE Cable Terminal *1 M5*12 screw*1	 Wi-Fi Dongle *1	 Meter(with CT)*1(Optional)
 Quick Installation Guide *1 Certification *1 User Manual *1			

Note: If anything is missing, please contact your local distributor.

4.2 Identification Label

4.2.1 Nameplate

After moving the AC Couple inverter from package, identify it by reading its nameplate labeled on the side of the inverter. The nameplate contains important product information: the model information, technical specifications, and compliance symbols. Below is an example of the nameplate for the AES1-3K6G1 model.

LIVOLTEK

AC Couple Inverter

Model Name: AES1-3K6G1

Product type and model

Safety and certification symbols

AC Input/Output@Grid	
Rated AC Output Power	3680W
Max. Apparent Power	3680VA
Max. Apparent Power From Grid	3680VA
Rated Output Voltage	L/N/PE,220/230V
Rated Grid Frequency	50/60Hz
Max. AC Current Output	16.7A
Max. AC Current From Grid	16.7A
Output Power Factor	-0.8~+0.8

Technical parameters

Battery Input Data	
Battery Type	LFP
Battery Voltage Range	40-60V
Max Charge/Discharge Power	3680W
Max Charge/Discharge Current	80A

Others	
AC Overvoltage-Category	III
Protection	IP 65
Protective Class	Class I

Serial number and contact information

Hangzhou Livoltek Power Co., Ltd.

ADD: 1418-35 Moganshan Road, Industrial Zone, Hangzhou, Zhejiang Province, China

web: www.livoltek.com

MADE IN CHINA

AES1-3K6G1_Livoltek1.0_01

Note: The nameplate shown here is for reference only. The actual product received may differ.

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4.2.2 Compliance and Safety Symbols

Symbol	Explanation
	CE marking The product complies with the requirements of the applicable EU directives.
	UKCA marking The inverter complies with the requirements of the applicable UKCA guidelines.
	UKNI marking The inverter complies with the requirements of the applicable UKNI guidelines.
	Caution! Beware of a danger zone! Failure to observe any warnings contained in this manual may result in injury.
	Danger! Beware of hot surface! The inverter can become hot during operation.
	Danger! Beware of high voltage and electric shock! Beware of electrical voltage, the product operates at high voltages.
	Observe the documentation. Observe all documentation supplied with the product.
	WEEE designation. Do not dispose of the product together with the household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site.
	RCM marking Regulatory compliance mark.
	Danger to life due to high voltage and electric shock! There are residual voltages in the inverter after powering off, you should wait at least 5mins after disconnecting the inverter from the utility grid before touching any inner live parts.

Note: The table shown here is for reference only. The actual product received may differ.

4.3 Storage of Inverter

The following requirements should be met if the inverter will not be deployed immediately:

- Do not unpack the inverter (put desiccant in the original box if the inverter is unpacked).
- Store the inverter at a temperature range of -30° C to +70° C, and with the relative humidity of 0% to 100% (no condensing).
- In case of stacking storage, the number of stacking layers should never exceed the limit marked on the outer side of the packing case.
- The inverter should be stored in a clean and dry place and be protected from dust and water vapor corrosion.
- Do not store the inverter in places susceptible to direct sunlight, rain, and strong electric field.
- Do not store the inverter in places with corrosive substances or susceptible to rodents and insects.
- Carry out periodic inspections. Inspection shall be conducted at least once every six months.
- If any insect or rodent bites are found, replace the packaging materials in time.
- If the inverter has been stored for more than a year, inspection and testing by professionals are required before it can be put into operation.
- If the inverter needs to be transported again, pack it strictly before transporting it.

NOTICE
• Please store the inverter according to the storage requirements. Product damage caused by failure to meet the storage requirements is not covered by the warranty.

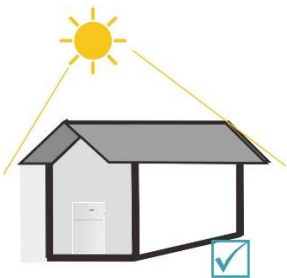
5. Installation

5.1 Installation Requirements

NOTICE	
• Make sure there is no electrical connection before installation. • In order to avoid electric shock or other injury, make sure that holes will not be drilled over any electricity or plumbing installations. • Always follow the instructions when moving or positioning the inverter. • Improper operation may cause injuries or serious wounds. In the case of poor ventilation, the system performance may compromise.	

5.1.1 Location Requirements

Select an optimal mounting location for safe operation, long service life and expected performance.



No direct sunlight



No rain exposure



No snow lay up

Note:

- **AVOIDE** direct sunlight, rain exposure, snow laying up during installation and operation.
- **DO NOT** install the inverter in a place where personnel are likely to encounter its enclosure and heat sinks because these parts are extremely hot during operation.

5.1.2 Environment Requirements

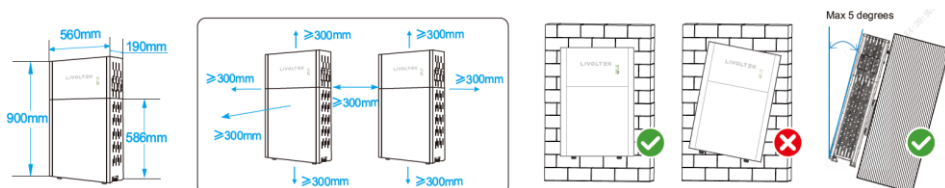
The inverter must be installed in a ventilated environment to ensure good heat dissipation. Make sure the installation meets the following conditions:

- Not in areas where highly flammable materials are stored.
- Not in potential explosive areas.
- Not in the cool air directly.
- Not near the television antenna or antenna cable.
- Not higher than altitude of about 2000m above sea level.
- Not in environment of precipitation or humidity ($>95\%$).
- The slope of the wall should be within $\pm 5^\circ$.
- The wall must be solid enough to bear the weight of the inverter.
- Do not install the inverter on a wall made of gypsum boards or similar materials with weak sound insulation to avoid noise disturbance in a residential area.

5.1.3 Angle and Space Requirements

NOTICE

- Never install the inverter horizontally, or with a forward tilt or with a backward tilt or even with upside down. The horizontal installation can result in damage to the inverter.
- Install the inverter upright or at a maximum back tilt of 15 degrees to facilitate heat dissipation.



5.1.4 Tools Preparation

Installation tools recommended but not limited to the following ones. If necessary, use other auxiliary tools on site.

 Bit Φ 10 Hammer drill	 Hammer	 Tape ruler	 Phillips scwdriver Straight scwdriver
 Protective glasses	 Hydraulic tensioner	 OT terminals press clamp	 Wire stripper
 DC Voltage (Range $\geq$ 1100V DC) Multimeter	 Euro terminal crimping tool	 Diagonal pliers	 Spirit level Marker

5.2 Mounting Instruction

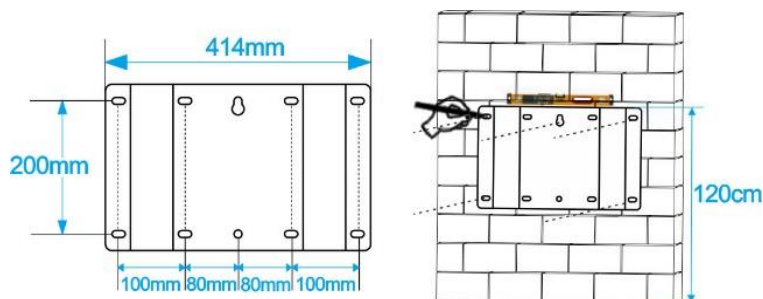
Installation methods:

- AC Couple inverters connected to batteries are fixedly mounted in a wall or corner called “All-in-one Application”.
- For All-in-one Application, the inverter must be connected with the Li-Ion battery of LIVOLTEK brand. And there are three independent packages (inverter, battery, and Inverter Decorative Panels) for the installation. Please check and contact your distributor immediately in case of any damaged or missing components.

5.2.1 Mounting the All-in-one System

Step1: Confirm the position of the battery bracket

- Use a tape ruler to mark the wall 120cm perpendicular to the ground.
- Align the top edge of the battery bracket with the marker on the wall.
- Put a spirit level on the bracket to ensure it is level.
- Mark five positions on the wall as below.

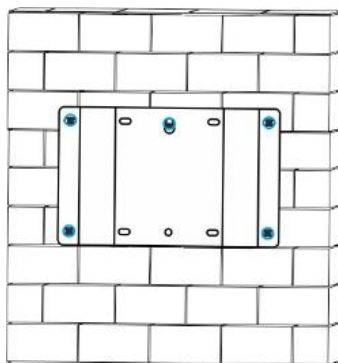


NOTICE

- The inverter must not be installed near flammable or explosive materials or near the equipment with strong electromagnetism.
- The inverter is suitable for mounting on concrete or other non-combustible surfaces only.
- The bearing capacity of the wall must be greater than 35kg. Otherwise, the wall may not be able to prevent the inverter from dropping.

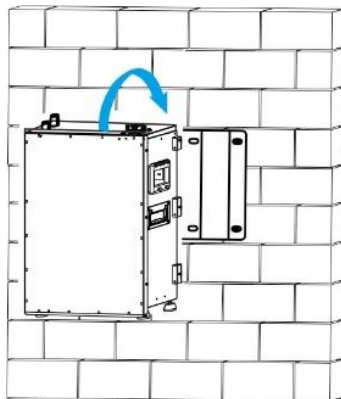
Step 2: Fixing the battery bracket

- Drill holes at the marked locations.
- Insert expansion bolts through the battery bracket into the holes on the wall.
- Hammer the bolts and use a torque wrench to secure the bolts.



Step 3: Install the battery

Lift and hang the battery on the battery bracket and ensure that the four mounting ears perfectly engage with the battery bracket.



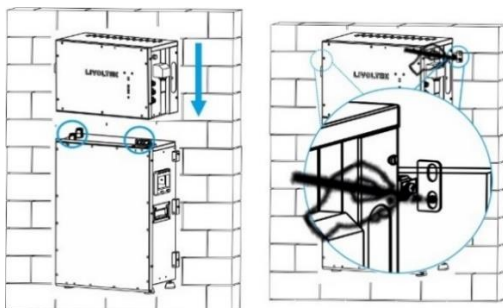
Step 4: Confirm the position of inverter bracket

Remove the dustproof cover on the top of the battery.

Install the inverter on the battery.

Secure the two fixed pieces on the inverter with Phillips screws on both sides of the inverter.

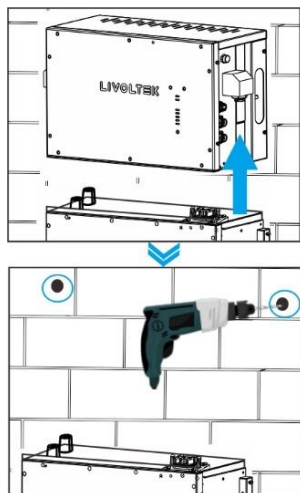
Mark the position of the fixed pieces on the wall.



Step 5: Drill holes for inverter bracket

Put the inverter down on the ground.

Drill holes on the wall.

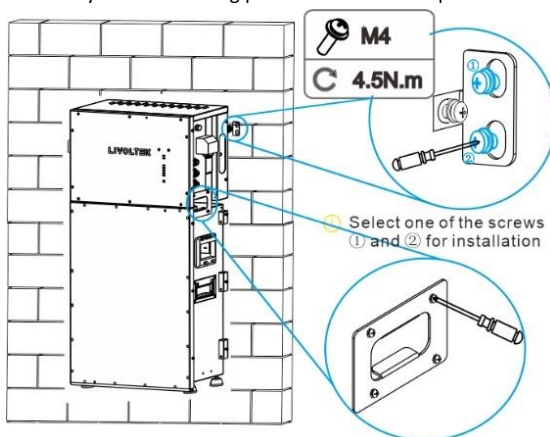


Step 6: Complete the installation of the battery and the inverter

Install the inverter on the battery again.

Fix the inverter on the wall: thread the expansion bolts through the fixed pieces on both side of the inverter into the wall. Hammer the bolts and secure them with a torque wrench.

Fix the inverter and the battery with connecting pieces and secure the pieces with Phillips screws.

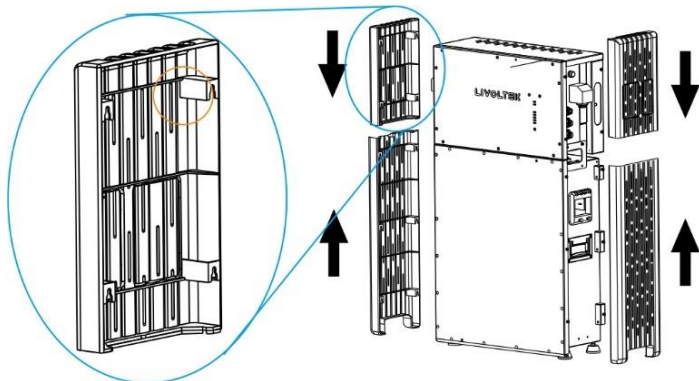


Step 7: Electrical Connection

Please refer to the Electrical Connection instructions in the next chapter.

Step 8: Installing the cover on both sides

- Align the buckles on the cover with the screws on the inverter and secure the cover.



Note:

- The direction of removing the cover is opposite to the direction of fixing. The cover can be removed by pushing by hand.

6. Electrical Connection

Prior to any electrical connections, keep in mind that the inverter has dual power supplies. It is mandatory for the qualified personnel to wear personal protective equipment (PPE) during the electrical work.

 DANGER
Danger to life due to a high voltage inside the inverter! • All operations, cables and parts specification during the electrical connection shall follow local laws and regulations. • Disconnect the AC output switch of the inverter to power off the inverter before any electrical connections. Do not work with power on. Otherwise, an electric shock may occur.
 WARNING
• Any improper operations during cable connection can cause device damage or personal injury. • Wear personal protective equipment like safety shoes, safety gloves, and insulating gloves during electrical connections. • Only qualified personnel can perform cable connection. • All cables must be firmly attached, undamaged, properly insulated and adequately dimensioned.
NOTICE
• Comply with the safety instructions related to the regulations related to the utility grid. • All electrical connections must be in accordance with local and national standards. • Only with the permission of the utility grid, the inverter can be connected to the utility grid. • When the inverter is powered on, the EPS(BACK-UP) port is charged. Power off the inverter first if maintenance is required for the loads connected with EPS port. Otherwise, it may cause electric shock.

Note:

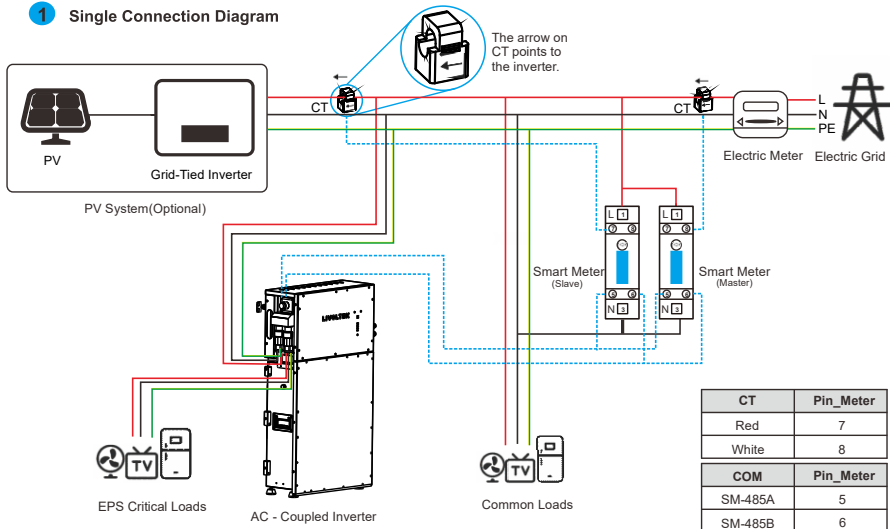
The cable colors shown in the electrical connection diagrams provided in this chapter are for reference only. Select cables in accordance with local cable specifications (green and yellow cables are only used for PE).

6.1 Wiring Diagram

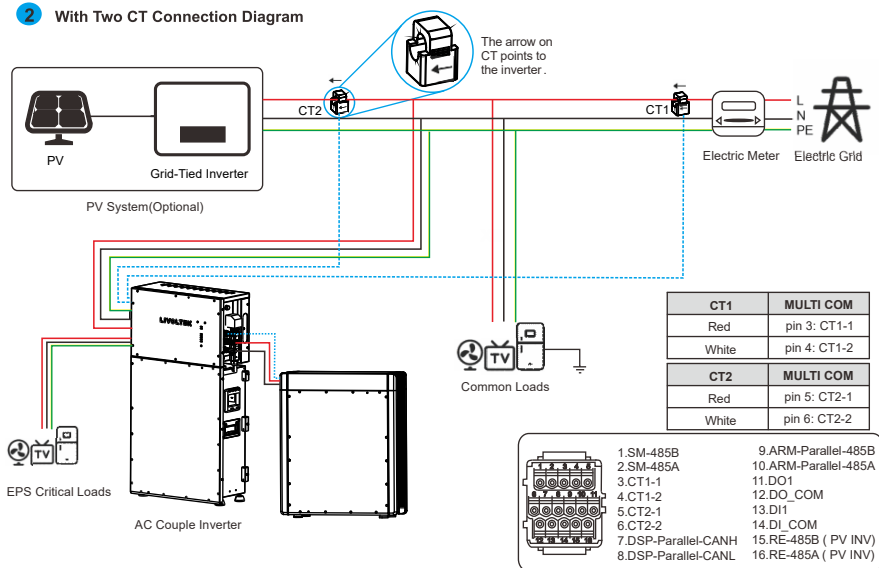
- Refer to the AC Couple All-in-One System Electrical Connection Schematic and System Connection Schematic for wiring connections.
- The PV system is an optional configuration and must be paired with a PV grid- tied inverter. Depending on the size of the load, the AC Couple can be connected to a single battery or to multiple batteries in parallel.
- The AC Couple All-in-One System ensures power continuity to critical loads by supplying power to the critical loads through the EPS ports.

- The system current is monitored online by current transformer CT and the power consumption is monitored by smart meter.

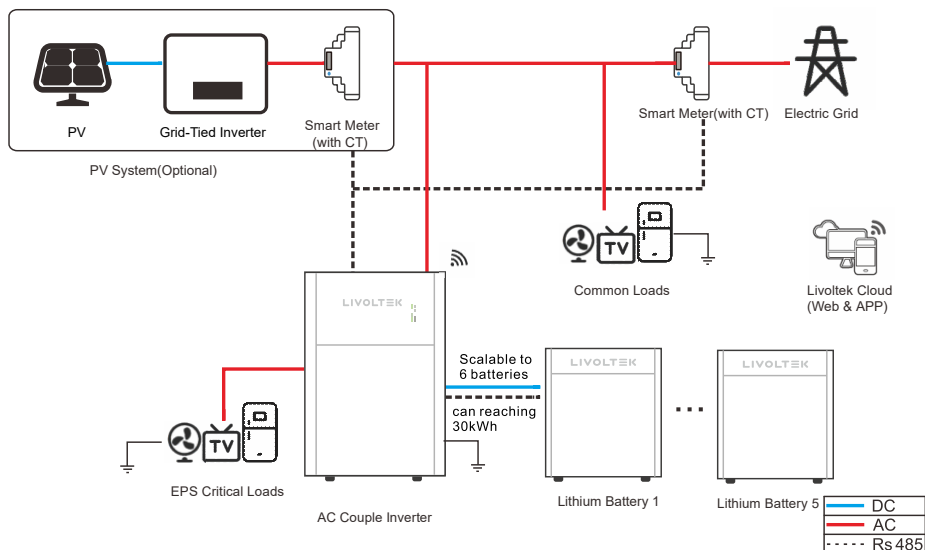
1 Single Connection Diagram



2 With Two CT Connection Diagram



B System Connection Diagram



WARNING

- N and PE wiring via ON-GRID and BACK-UP ports of the inverter are different based on the regulation requirements of different regions. Refer to the specific requirements of local regulations.
- For Australia, New Zealand and South Africa, the neutral cable of GRID side and BACK-UP side must be connected, otherwise EPS(BACK-UP) function will not work.
- In Australia and New Zealand, electrical installation and maintenance shall be conducted by a licensed electrician and shall comply with Australia/New Zealand National Wiring Rules. Because the inverter does not maintain neutral integrity, an external neutral connection must be used in Australia and New Zealand. 30mA Type "A" RCD can be used where required by AS/NZ_3000, but cannot be used if there are backup loads on the inverter as per AS4777.
- If the battery is integrated with a readily accessible internal DC breaker, no additional DC breaker is required.

6.2 External Grounding (PE Cable) Connection

6.2.1 External Grounding Requirements

Good grounding for the inverter helps resist the impact of surge voltage and improve the EMI performance. Connect the PGND cable before connecting the AC power cables, and communication cables.



WARNING

- Ensure that the PE cable is securely connected. Otherwise, electric shocks may occur.
- Do not connect the neutral wire to the enclosure as a PE cable. Otherwise, electric shocks may occur.

NOTICE

- The PE point at the AC output port is used only as a PE equipotential point, and cannot substitute for the PE point on the enclosure. Make sure the two terminals are both grounded reliably.
- It is recommended that silica gel or paint be used around the ground terminal after the PE cable is connected.

6.2.2 Wiring Connection Procedure

The PE cable should be prepared by customers. Recommended specifications:

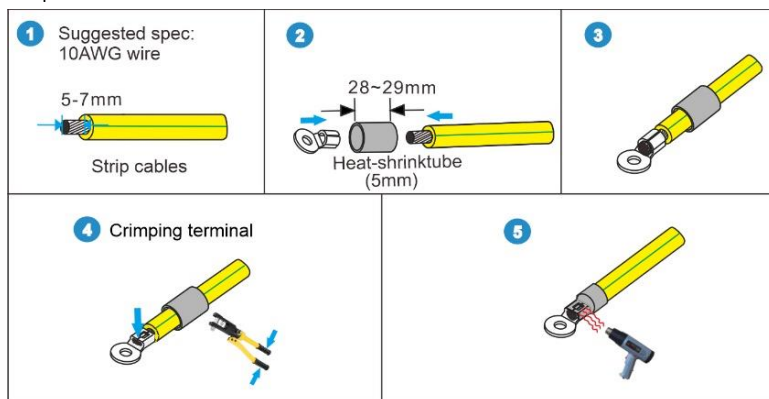
No.	Cable	Cross Section	Cable diameter
1	PE Cables	4~6mm ²	12~10 AWG
2	AC Cables	4~6mm ²	12~10 AWG
3	Battery Power Cables	25mm ²	4 AWG
4	Network cable(recommend)	/	2-core

NOTICE

- Do not work with power on. All operations, cables and parts specification during the electrical connection shall follow local laws and regulations.
- Disconnect the DC switch of the inverter to power off the inverter before any electrical connections.

Step1: Crimping OT terminals

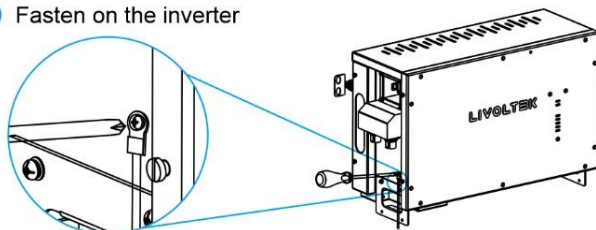
- Prepare the cable and remove an appropriate length of the insulation layer from it.
- Insert the exposed core wires into the crimping areas of the OT terminal and crimp them using hydraulic pliers.



Step2: Connecting the PE Cable

- Remove the screw on the grounding terminal on the side of the inverter and fasten the cable with a screwdriver.
- Apply paint to the grounding terminal to ensure corrosion resistance.

6 Fasten on the inverter



6.3 Grid Port Connection

The AC Couple inverter has two AC output terminals, one is grid output for connecting grid and the other is EPS (emergency power supply) output for connecting critical (backup) Loads.



WARNING

- Make sure inverter is totally isolated from any DC or AC power before connecting AC cable.
- Only with the permission of the local grid department, the inverter can be connected to the grid.
- Before commencing AC wiring, please ensure all AC circuit breakers are switched off.
- **DO NOT** connect the AC grid terminal and AC Backup (EPS) terminal together.
- **DO NOT** connect the AC Backup (EPS) terminal to grid.
- When you want to use both on grid power and backup power, please connect both with Grid output and EPS output. When you want to use on grid only, please connect with Grid output and float EPS output.
- Determine whether an AC circuit breaker with greater overcurrent capacity is required based on actual conditions.
- The grid voltage and frequency must be in the permissible range.
- Never connect a load between the inverter and the circuit breaker.

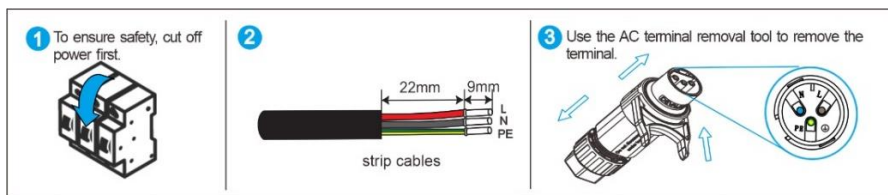
6.3.1 Wiring Connection Procedure

The AC cable should be prepared by customers. And an external AC circuit breaker should be installed on the output side of the inverter and the grid side (between inverter and loads) to ensure safe disconnection from the grid. The recommended specifications are as follows.

Model	Wire Size	Cable	Breaker
3KVA	10-12AWG	4-6mm ²	230/25A
3.6KVA	10-12AWG	4-6mm ²	230/32A
4.6KVA	10-12AWG	4-6mm ²	230/32A
5KVA	10-12AWG	4-6mm ²	230/32A

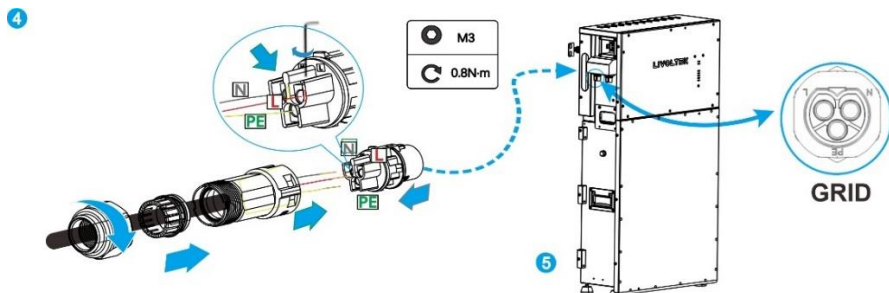
Step1: Assembling the Grid Connector

- Take out the AC terminal from the package box and uninstall it as below chart.
- Put the AC cables through the terminal cap, threaded sleeve in sequence.
- Remove the cable jackets and strip the wire insulation by 5~7 mm then insert cables into connection terminals according to polarities indicates on it and tighten the screws.
- Push threaded sleeve onto the connection terminal until both are locked tightly.
- Screw up the terminal cap.



Step 2: Connecting the Grid terminal into the Grid Port on the inverter

- Unscrew the cap on the Grid port.
- Insert the Grid connector into the Grid port on the bottom of the inverter.
- Check all the wires are firmly installed.



6.3.2 Residual Current Monitoring Device

With an integrated universal current-sensitive residual current monitoring unit included, the inverter will disconnect immediately from the mains power once a fault current with a value exceeding the limit is detected. However, if an external residual current device (RCD) (type A is recommended) is mandatory, the switch must be triggered at a residual current of 300 mA (recommended). RCD of other specifications can also be used according to local standard.

6.4 EPS Output Connection

If you want to use the energy storage system to power the house (as a standalone system or during Grid failure), the EPS connector should be used and the EPS function should be enabled during setup. Otherwise, you could leave the EPS port disconnected.

The EPS output port is only for critical loads connection.

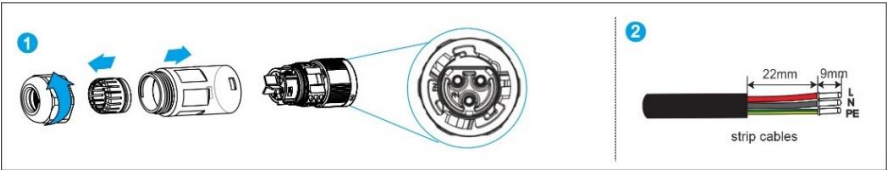


WARNING

- The grid voltage and frequency must be in the permissible range.
- Risk of inverter damage due to incorrect cable connection. Do not connect the grid power wires to EPS port.
- An independent circuit breaker must be installed on the EPS side to cut off the inverter from EPS loads when necessary.
- Decide which household appliances should be included in the EPS circuit and carry out any required re-wiring.

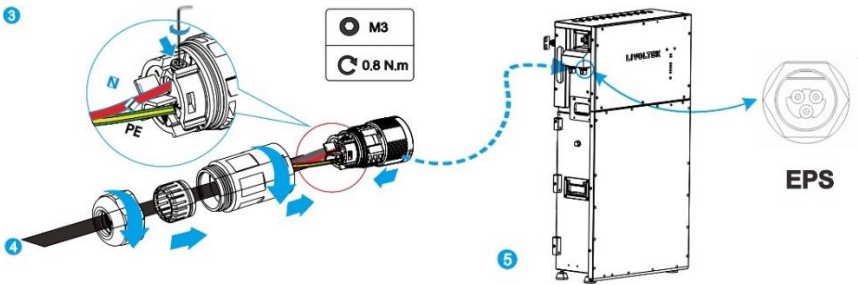
Wiring Connection Procedure:

Step 1: Assembling the EPS Connector (reference to Grid connector). Make sure Live/Neutral/PE wires are correct.



Step 2: Connecting the EPS cable to the inverter

- Unscrew the cap on the EPS port.
- Insert the EPS cable into the EPS port on the inverter until there is a “Click” sound.
- Check all the wires are firmly installed.



6.5 Battery Connection

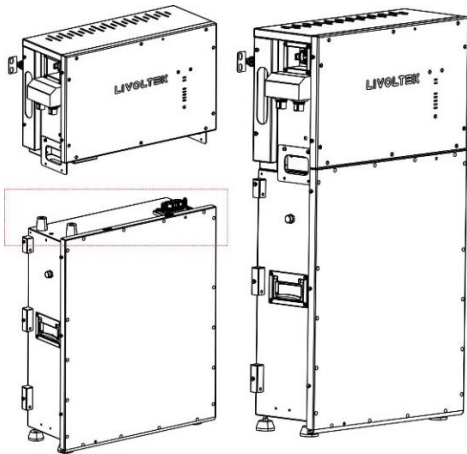
This section mainly describes the cable connections on the inverter side. Refer to the instructions supplied by the battery manufacturer for the connections on the battery side and configuration.

 DANGER
• Be careful against any electric shock or chemical hazard. • A short circuit in the battery may cause personal injury. The instantaneous high current caused by a short circuit can release a large amount of energy and may cause a fire. • Ensure that the open circuit voltage of the battery is within the permissible range of the inverter. • Only use properly insulated tools to prevent accidental electric shock or short circuits. If insulated tools are not available, use electrical tape to cover the entire exposed metal surfaces of the available tools except their tips. • Before connecting the battery cable, ensure the switches of inverter and the battery are all disconnected. • Connect battery cables with correct polarity. If battery cables are reversely connected, the solar inverter may be damaged. • It is forbidden to connect and disconnect the battery cables when the inverter is running, otherwise it may cause electric shock. • Do not connect one battery pack to more than one inverter at the same time. Otherwise, it may cause damage to the inverter. • It is forbidden to connect loads between the inverter and batteries. • All wiring must be performed by a professional person.
NOTICE
• The inverter is not connected to a battery and does not support off-grid operation functions.

6.5.1 Battery inverter connection

Battery inverter connection diagram

The AC Couple All-in-One system is equipped with quick release terminals at the inverter and battery connections, which are further secured with connecting tabs.



6.5.2 Battery Wiring Connection

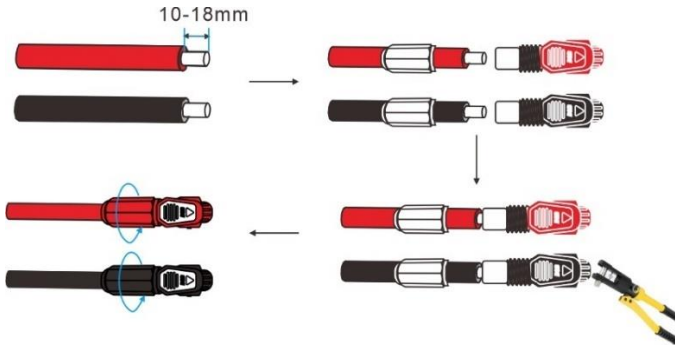
Referring to the schematic, use a tool to strip the battery power cable to the desired size.

NOTICE	
• If choosing Li-Ion battery, make sure to connect the BMS communication cable between the battery and the inverter. • The CAN cable enables the communication between the inverter and the Li-Ion Battery. • Communication interface between inverter and battery is CAN with a RJ45 connector. • The battery communication can only work when the battery BMS is compatible with the inverter.	

Wiring Connection Procedure:

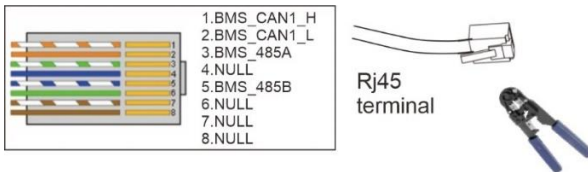
Step1: Battery power cables Connection

- Referring to the schematic, use a tool to strip the battery power cable to the desired size.



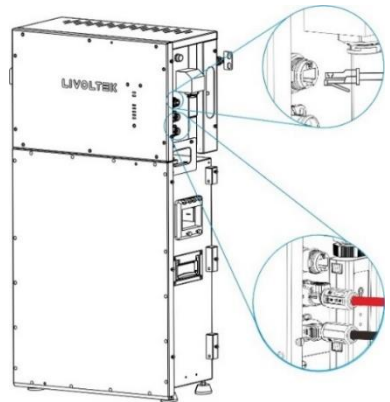
Setp2: COM cables connection

Communicate the parallel Li-ion batteries via CAN protocol. Insert the communication cables into the RJ45 plug in the correct order and crimp them.



Step3: Connect the BMS cable to the inverter

- Insert the BMS cable connector into BMS port on the inverter and screw it tightly.
- Then insert other side of communication cable into CAN port on the battery.
- Make sure the Li-Ion battery BMS port connects to the inverter is Pin to Pin.



6.6 WIFI Connection

The inverter provides a communication port, which can collect data and transmit data of the inverter to the monitoring website via Wi-Fi stick.

WIFI Dongle (Wi-Fi & Bluetooth 2in1 function) implements communication with Cloud server through wireless network to monitor the inverter's data status. For more details, refer to WIFI Application Manual.

Wiring Connection Procedure:

Step 1: Remove the waterproof lid from the Wi-Fi/4G terminal.

Step 2: Insert the Wi-Fi stick into the communication port. Slightly shake it by hand to determine whether it is installed firmly.

Step 3: Build the connection between the inverter and router. Please refer to the Pocket Wi-Fi user manual to configure the WLAN.



Note:

- Refer the APP guide manual delivered with the product or find it at our APP homepage 'guide' (please install 'My Livoltek' APP on your phone firstly). You can also find it at our official website:

www.livoltek.com > service > guide.

- 'My Livoltek' is a platform to communicate with your device via Wi-Fi or bluetooth, you can login on our web (link as below) on your computer, also you can scan the QR code to download the APP on your phone.
- APP: Search for 'My Livoltek' on Apple App Store, Google Play.
- Web Link1: <https://www.livoltek-portal.com/> For Asia, Latin American, Australia and others.
- Web Link2: <https://evs.livoltek-portal.com/> For Europe, Middle East Regions, Africa.



My Livoltek



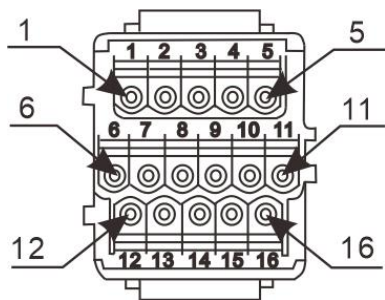
Download

6.7 Multi COM Terminal Connection

The inverter provides 16pin terminals to facilitate you to install CT or Smart meter, parallel function or EV charger.

NOTICE

- Follow the pin definition below to connect the Multi com communication cables.
- Do not remove the resistor or short circuit wire unless you are going to use the corresponding PINs.



Signal definitions

Pin	Definition	Description	Pin	Definition	Description
1	Meter-485B	485 contact interfaces for Smart meter	9	Paral-485B	N/A
2	Meter-485A		10	Paral-485A	
3	CT1-1+ (Red)	CT contact interface	11	DO	
4	CT1-2- (White)		12	DO-COM	
5	CT2-1+ (Red)		13	DI	
6	CT2-2 (White)		14	DI-COM	
7	Paral-CANH	CAN contact interface	15	485-B	Reserve
8	Paral-CANL		16	485-A	

6.7.1 Wiring Connection Procedure:

Step 1: Prepare the communication cable and strip the cable insulation for 6–8mm.

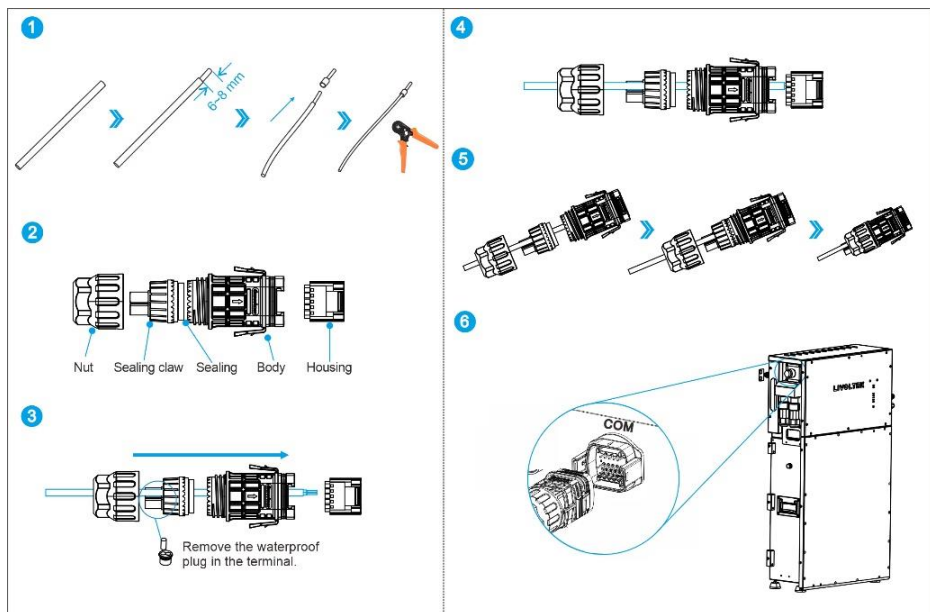
Step 2: COM terminal structure introduction.

Step 3: Pass the cable through “nut-sealing claw-sealing-body-housing” in sequence.

Step 4: Insert cable into the corresponding pin ports, and complete the terminal assembly.

Step 5: Complete the terminal assembly

Step 6: Insert the terminal into the inverter.



Notes:

Assemble the communication module and plug it into the communication terminal directly if you are not going to use the communication functions.

6.7.2 CT Connection

The AC Couple All-in-One System is equipped with the feed-in power limit function, to meet the requirements of some national standards or grid standards for the output power at the grid connection point. For the setting of feed-in power limit, refer to the section “Feed-in Limitation”.

The CT (Current transformer) in the package of inverter is compulsory for this hybrid system installation. Which measures the value and direction of AC current. Thanks to its built-in metering chip, the hybrid inverter enables the export power to the grid does not exceed a preconfigured limit.

NOTICE

- No meter or CT to the inverter will cause fault.
- The smart meter must be authorized by LIVOLTEK, any third party or non-authorized meter may not match with the inverter.
- LIVOLTEK will not take the responsibility if the meter is unavailable.
- The color of the wire is not fixed to a red & black combination, it could also be red & white or blue & white, etc. Please pay close attention to the corresponding interfaces when wiring.

NOTICE

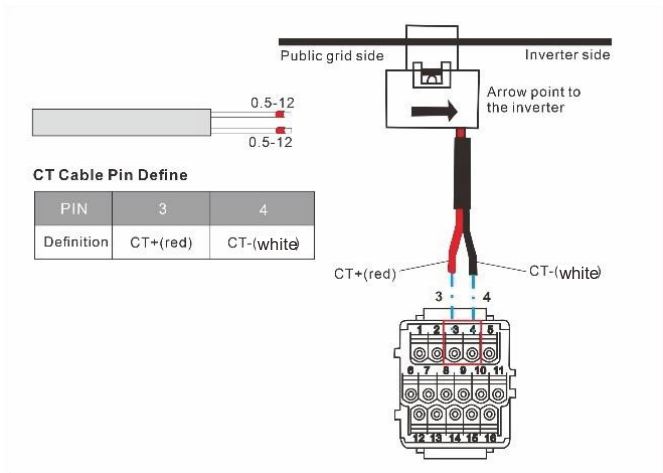
Do not place the CT on the N Wire or the earth wire.

Do not place the CT on the N and L wire simultaneously.

Do not place the CT with the arrow pointing to the inverter side. Do not place the CT on the non-insulated wires.

Important: The arrows direction on the CT must point to the inverter side.

CT Pin Definition



Note: Wiring harness color in the picture is subject to actual.

6.7.3 Smart Meter Connection

When customer needs to use meter to monitor the energy flow, the meter terminal connection steps are as follows:

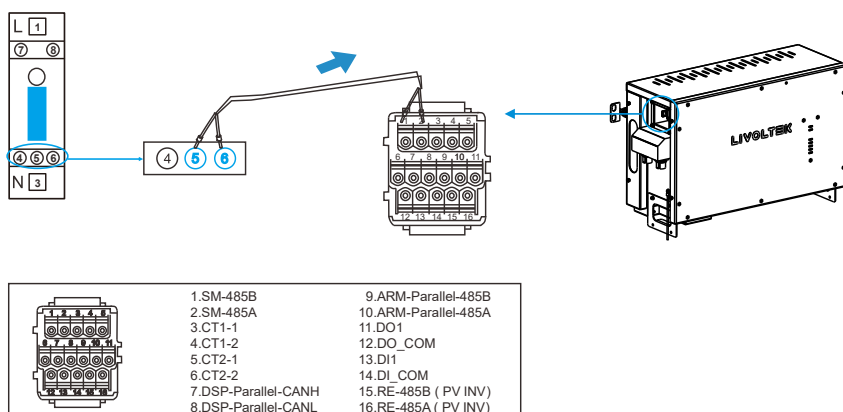
NOTICE

Make sure AC cable is totally isolated from AC power before connecting Smart Meter. Two smart meters are required in AC Couple system, the master meter and the “PV” meter. The Master meter ID is 20 and the “PV” meter ID is 01. Please refer to the wiring diagram in Section 6.1 Normally the smart meter should be placed in or near the grid distribution box right after the billing meter. Please use the smart meter cable in the accessory box for communication.

Wiring Connection Procedure:

Step 1: Connect the signal cable to the signal cable connector. **Step 2:** Connect the signal cable connector to the Multi COM port. **Step 3:** Secure the signal cable connector

Meter Connection



6.7.4 Installation Verification

Check the following items after the inverter is installed.

- No other objects put on the inverter.
- All screws especially the screws used for electrical connections are tightened.
- The inverter is installed correctly and securely.
- Ground, AC and Communications cables are connected tightly correctly and securely.
- Check there is no open circuit or short circuits at AC terminals using multi-meter.
- Idle terminals are sealed.
- All safety warning symbols are intact and complete on the inverter.

7. System Operation

7.1 LED Display

The inverter operation status can be obtained from observing LED indicator status.



Mark	Color	Indicator status	Note
SYS	Red / Green	Green light always on: system normal Green light flashes slowly: system standby/startup Red light flashes slowly: system alarm Red light always on: system fault	Slow flash: 1s interval
COM	Red / Green	Green light constantly on: communication is normal Red light flashes slowly: meter disconnected Red light flashing fast: WIFI disconnection Red light constantly on: all communication disconnected	Fast flash: 250ms interval
SOC 1	Green	Green light constantly on: SOC is higher than 80% Green light flashes slowly: SOC above 80% during charging	
SOC 2	Green	Green light constantly on: SOC higher than 60% Green light blinks slowly: charging, SOC above 60%	
SOC 3	Green	Green light constantly on: SOC higher than 40% Green light blinks slowly: charging, SOC above 40%	
SOC 4	Green	Green light constantly on: SOC is higher than 20% Green light blinks slowly: charging, SOC above 20%	
SOC 5	Red / Green	Green light constantly on: SOC higher than 10% Green light flashes slowly: charging, SOC above 10% Red light blinks slowly: Battery level below 10%. Red light constantly on: Battery failure	

You can monitor & set data of the inverter through the LIVOLTEK APP. For details about operation, refer to APP User Manual. APP User Manual is available for free from website.

7.2 Start-up Procedures

Check the following items before starting the inverter:

- The country marked on the packing box is in accordance with the installation site.
- The inverter is correctly and firmly fastened to the mounting bracket on the wall.
- All cables are connected according to chapter 6;
- All unused terminals are properly sealed.
- AC circuit breaker is correctly connected between inverter GRID port & GRID, circuit breaker is disconnected.
- AC circuit breaker is correctly connected between inverter EPS port & critical loads, circuit breaker is disconnected.
- For Li-Ion battery, ensure that the BMS cable has been correctly connected.
- For the lead-acid battery, ensure that the NTC cable has been correctly connected.

If all the items mentioned above meet the requirements, proceed as follows to start up the inverter for the first time.

Step 1: Power on the Grid

- Connect the AC circuit breaker.

Step 2: Power on the Battery

- Connect the external DC circuit breaker between the inverter and the battery, then power on the battery manually if a battery is equipped.

Step 3: Switch on the loads

- The load parameters should show.

Step 4: Configure the Wi-Fi stick

- Establish communication connection between the mobile phone and Wi-Fi stick, then set initial protection parameters. Refer to LIVOLTEK APP Operation Instructions for details.

Step 5: Self-test in accordance with CEI 0-21 (Italy Only)

- The self-test is only required for inverters to be commissioned in Italy. During the self-test, the inverter will consecutively check the reaction times for: overvoltage, under-voltage, maximum frequency and minimum frequency.
- Please use the LIVOLTEK APP to initiate the self-test procedure and get the test results. Refer to "Settings on the APP" for details.

Step 6: Observe the LED indicator

- Observe the LED indicator to ensure that the inverter operates normally.

7.3 Shut down Procedures

For maintenance or other service work, the inverter must be switched off. Proceed as follows to disconnect the inverter from the AC power sources.

Notes: Please strictly follow the following procedure. Otherwise, it will cause lethal voltages or unrecoverable damage to the inverter.

Step 1: Turn off the loads;

Step 2: Turn off battery;

Step 3: Turn off the main grid switch;

Step 4: Wait for at least 5 minutes after the LED and graphical display black out for the internal circuits to discharge energy;

Step 5: Disconnect all the power cables;

Step 6: Disconnect all the communication cables, Remove the Wi-Fi stick;

Step 7: Remove the inverter from the wall, also remove the bracket if necessary;

Step 8: Pack the inverter with the original carton, and store it.

8. APP Operation

The AC Couple inverter can be configuration via WIFI Stick (Wi-Fi & Bluetooth 2in1 function), which is the easiest way to ensure a simple, highly reliable communication connection.

LIVOLTEK portal is a platform that the inverter connects through WIFI Stick, and upload the data to it every 5 minutes. You can log in account at any time through a computer, IOS or Android to achieve real-time display and remote control.

Web-1: <https://www.livoltek-portal.com/> (For Asia, Latin, American, Australia and others).

Web-2: <https://evs.livoltek-portal.com/> (For Europe, Middle East Regions, Africa).

APP: Search for Mylivoltek on Apple App Store, Google Play and download the latest installation package.

8.1 Wi-Fi Configuration

Preparation

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

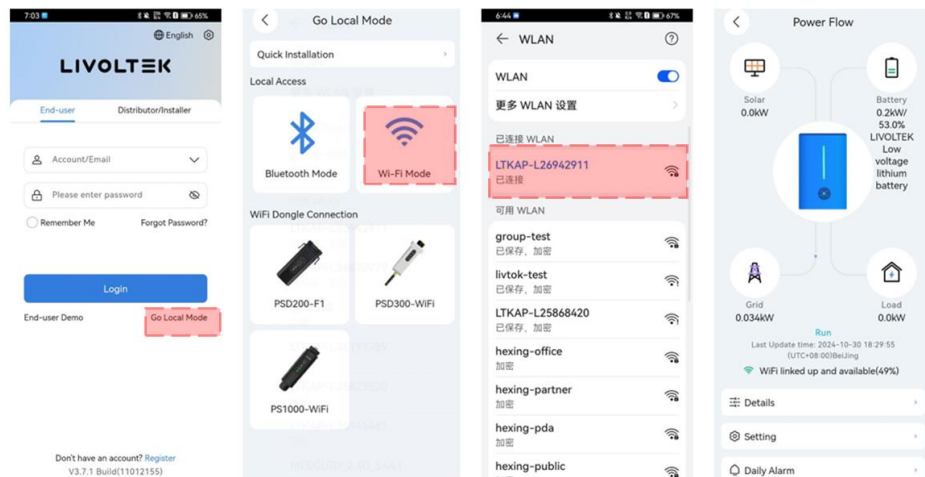
Step 1: Install LIVOLTEK APP

APP is available from Apple App Store, Google Play, and Android APK. Scan the QR Code below to download the APP on your smartphone.



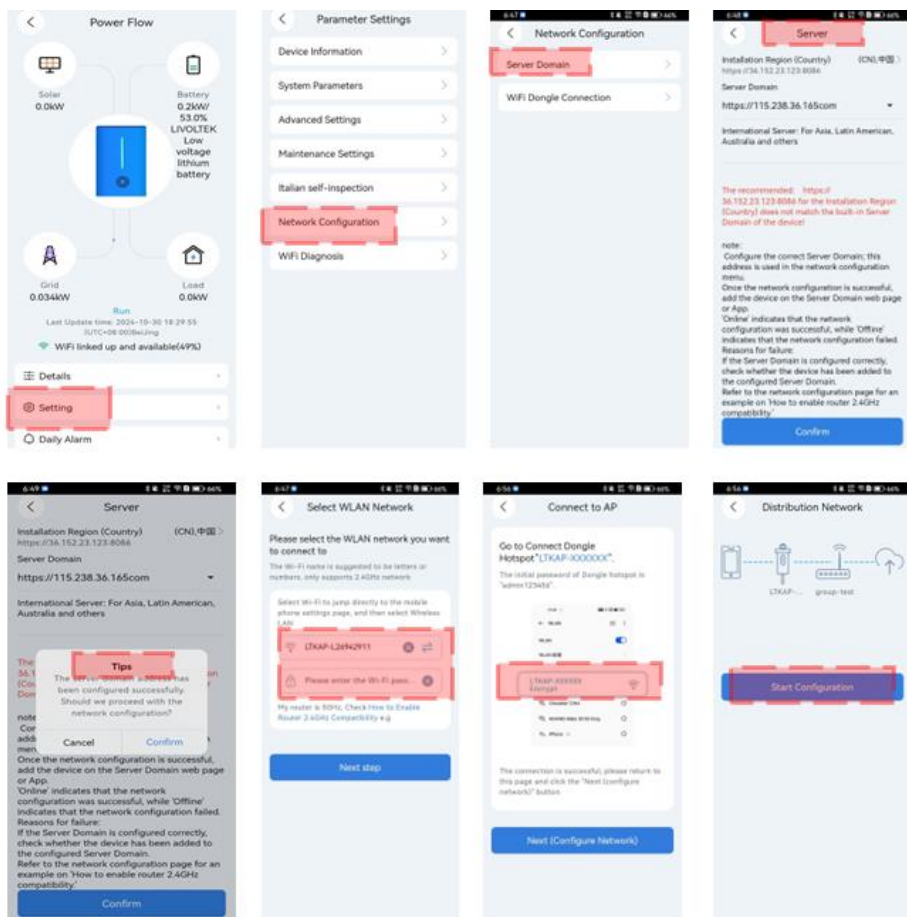
Step 2: Connect the Inverter

- Open the main screen of the app and select local mode.
- Click “Wi-Fi Mode” to select the inverter's Wi-Fi name and enter the password to connect.
- Successful connection into the energy flow screen.



Step 3: Wi-Fi Configuration

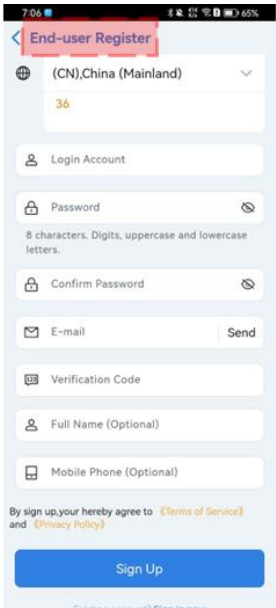
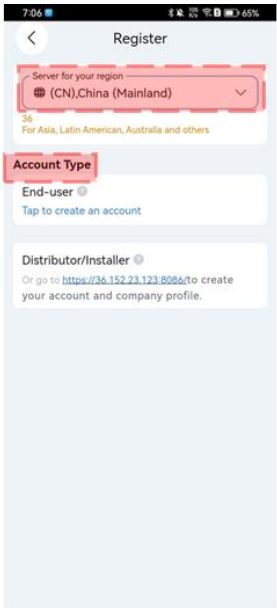
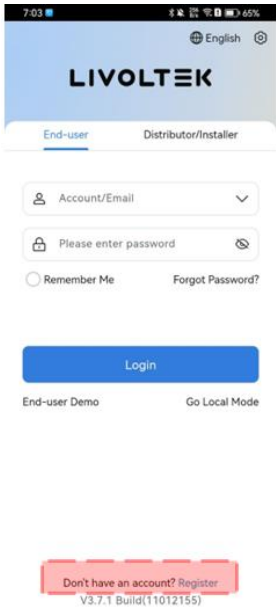
- After connecting the inverter successfully, enter the energy flow interface, click “Setting”.
- Click Network Configuration in the Parameter Settings screen.
- Select Server Domain in Network Configuration interface.
- Fill in the relevant information according to the instructions in the Server interface and click Confirm.
- After the prompt pops up, jump to the network configuration interface, fill in the user's own wifi name and password.
- After connecting to Wi-Fi, click NEXT to jump to Distribution Network, you can check the Wi-Fi configuration status.



8.2 Register an account

Open the app or web 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:

- Create an account in the initial screen of the app by clicking on “Don't have an account? Register”.
- In the registration screen, after filling in the region, select the type of account you want to apply for, which is categorized as “End-user or Distributor/Installer”.
- Take the “End-user” account type as an example, fill in the required information and click “Sign up”.



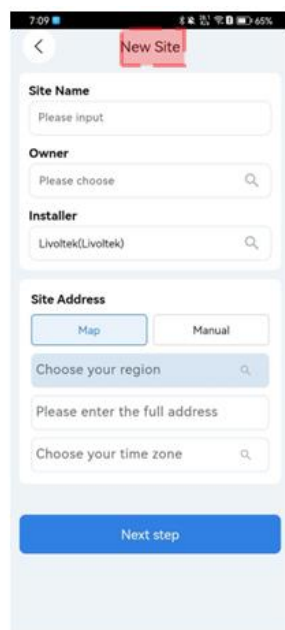
NOTICE	
• There are two different accounts for end users and business (agents/installers), with different account authorizations. • Business accounts can only be registered through web. • Only end user accounts can be registered through the APP. • The agent/installer can create a sub-account for the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

8.3 Create a site and add the inverter to the site

You can edit the site information, add the new inverter to the site, delete the site, expand the list of added inverters of the site and set the electricity price.

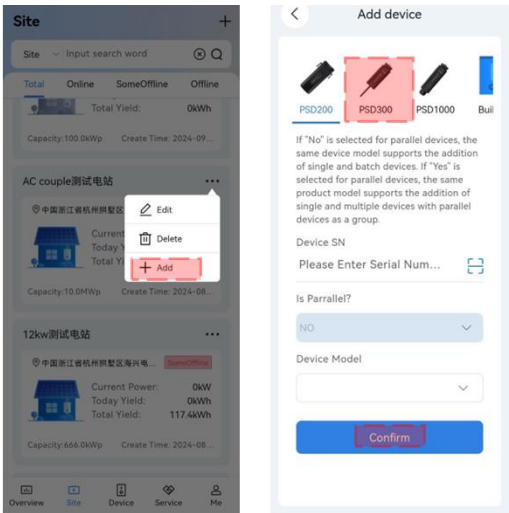
8.3.1 Add Site

- Open the app and login with the username & password.
- Enter the "Site" Page, touch "Add" button [] at the top right of the page.
- Enter the Plant Name, choose the Installer, Time Zone, location and other basic information.
- For the location, click the "Map" to enter the map page, system will automatically locate your location.
- Select the tariffs for selling and buying electricity in your area.



8.4.3 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].

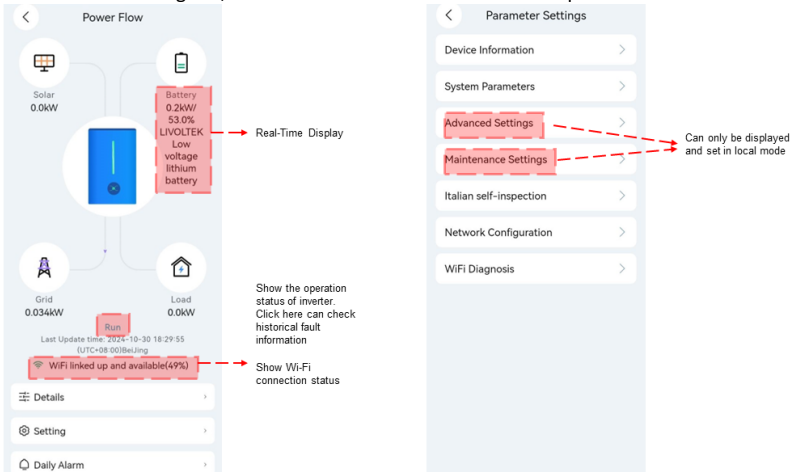


8.4 Setting on the APP

8.4.1 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.



8.4.2 Basic Settings

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

8.4.2.1 Select Work Modes

Work Modes decides the operation logic of the hybrid system. Make sure what you select is exactly what you want. The detailed description about the working modes, please refer to the chapter 3.4 Work Modes.

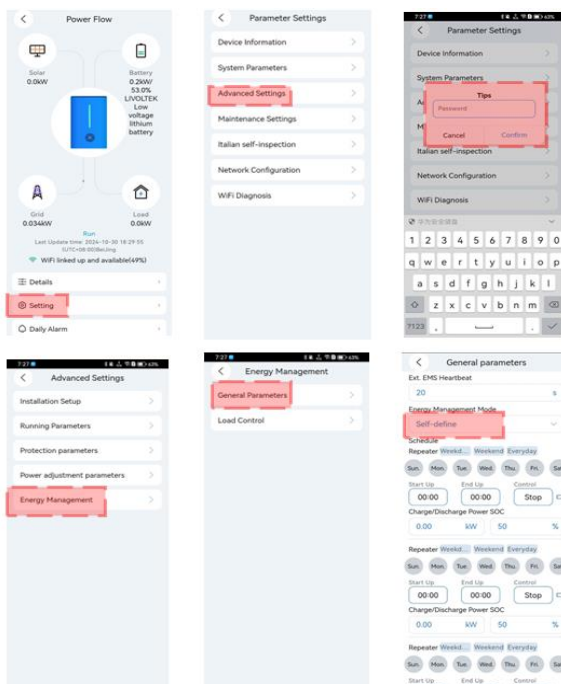
Self-Use Mode: The default mode for self- consumption.

Back-Up Mode: You can set the reserve percentage of the minimum battery state (Discharge End-up SOC @ Grid), for urgent use to support backup loads.

Self-Define Mode: You can set two charge time ranges as your need.

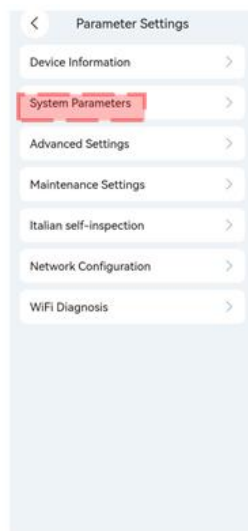
Step:

- Click on Set Mode in the Energy Flow screen.
- In the Parameter Settings screen select Advanced Settings. Enter the password and enter the Advanced Parameter Settings interface.
- Select Energy Management and click on General Parameters, then select Customize Mode.



8.4.2.2 Battery Setting

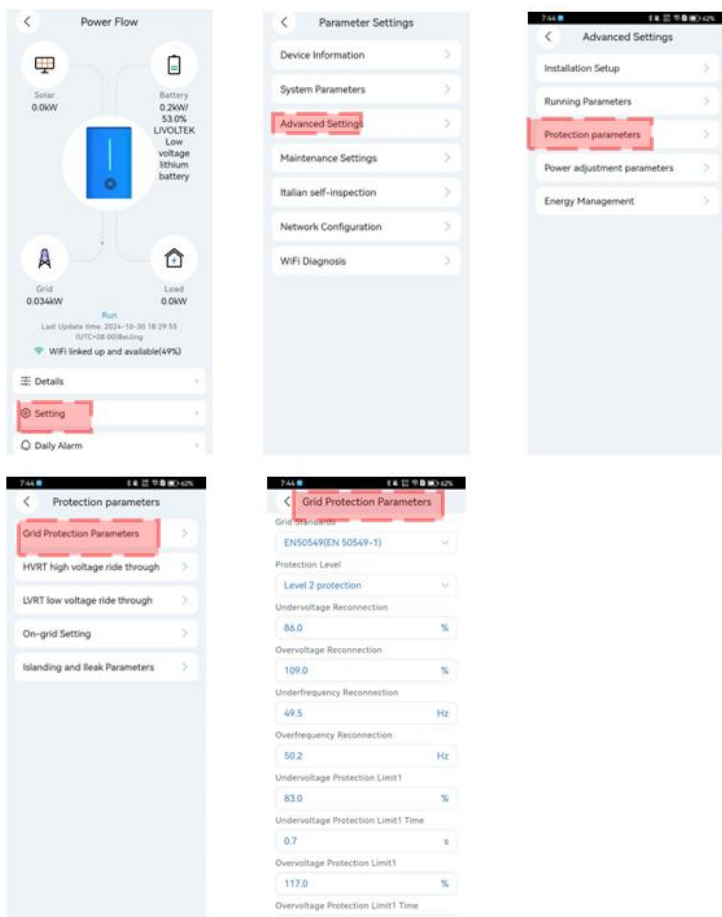
- After clicking Setting in the Energy Flow screen, select the system parameters in the Parameter Settings screen.
- Fill in the battery type, maximum/minimum SOC of the battery and other parameters in the system parameter setting interface.



8.4.2.3 Discharge End-up SOC @ Grid

It refers to the discharge cut-off SOC of the Li-Ion battery when the utility grid is available. The battery is not allowed to discharge if the capacity is lower than it.

- Click “Setting” in the interface of energy flow
- Select advanced setting in the interface of parameter setting.
- Click Protection Parameter in the Advanced Setting to enter the Protection Parameter interface.
- Select the grid protection parameter and fill in the relevant information according to the prompts.



Notes:

All the settings must be 100% honest to the battery specifications first. Both the two discharge End-up SOC set range is 10~100%.

9. Troubleshooting and Maintenance



WARNING

Before maintaining and commissioning inverter and its peripheral distribution unit switch off all the charged terminals of the inverter, and wait at least 10 minutes after the inverter is powered off.

9.1 Troubleshooting

When the inverter has an exception, its basic common warning and exception handling methods are shown in the table below.

Alarm Name	Possible causes	Suggestion
Grid Overvoltage	The grid voltage is higher than the set voltage protection value or the duration of the high voltage exceeds the high voltage ride-through setting.	Normally, the inverter will re-connect to the grid after the grid returns to normal. If the fault occurs repeatedly: 1. measure the actual grid voltage, if the grid voltage is higher than the set value, please contact the local power company to seek a solution; 2. Check the protection parameter settings through APP or WEB, and modify the over-voltage protection value with the consent of the local power operator; 3. If you confirm that the fault is not caused by the above reasons and still exists, please contact LIVOTEK's customer service center.
Grid Undervolt	Grid voltage below the set voltage protection value	Normally, the inverter will re-connect to the grid after the grid returns to normal. If the fault occurs repeatedly: 1. Measure the actual grid voltage, if the grid voltage is lower than the set value, please contact the local power company to seek a solution; 2. Check whether the protection parameter setting meets the requirement through APP or WEB; 3. Check whether the AC wiring is tight; 4. If you are sure that the fault is not caused by the above reasons, and the fault still exists, please contact LIVORD customer service center.

Alarm Name	Possible causes	Suggestion
Grid Overfrequency	The grid frequency is higher than the set frequency protection value	Normally, the inverter will re-connect to the grid after the grid returns to normal. If the fault occurs repeatedly: 1. measure the actual grid frequency, if the grid frequency is really out of the setting range, please contact the local power company to seek a solution; 2. check whether the protection parameter setting meets the requirement through APP or WEB terminal; 3. If you confirm that the fault is not caused by the above reasons and still exists, please contact LIVERTECH Customer Service Center.
Grid Underfrequency	Grid frequency below the set frequency protection value	Normally, the inverter will re-connect to the grid after the grid returns to normal. If the fault occurs repeatedly: 1. measure the actual grid frequency, if the grid frequency is really out of the setting range, please contact the local power company for solution; 2. check whether the protection parameter setting meets the requirement through APP or WEB; 3. Confirm that it is not the above reasons and the fault still exists, please contact LIVERD customer service center.
Grid Power Loss	1. There is no power supply from the grid; 2. AC line or AC switch disconnected.	Normally, the inverter will re-connect to the grid after the grid returns to normal. If the fault recurs: 1. check whether the grid is reliably supplied; 2. Check whether the AC wiring is tight; 3. check whether the AC cable is connected to the correct terminal (whether the fire wire is reversed with the N wire); 4. Check whether the AC circuit breaker is closed; 5. Confirm that it is not the above reasons, and the fault still exists, please contact LIVORD customer service center.
Leakage Current Exceeds Standard	Leakage current exceeding the standard requirement value during inverter operation	1. humid environment of PV panels will cause this fault, normally the inverter will be re-connected to the grid after the environment is improved; 2. If the environment is normal, check whether the insulation of DC and AC cables is normal; 3. If you confirm that the fault is not caused by the above reasons, and the fault still exists, please contact LIVOTROP customer service center.

Alarm Name	Possible causes	Suggestion
Grid Abnormal	Inverter self-test before grid connection, triggered if the grid is abnormal	Normally, the inverter will re-connect to the grid after the grid returns to normal. If the fault occurs repeatedly: 1. Measure the actual power grid, if the grid parameters are really out of the set range, please contact the local power company for a solution; 2. Confirm that it is not the above reason and the fault still exists, please contact LIVOTEK Customer Service Center.
Grid Overvoltage	The grid voltage is higher than the set voltage protection value or the duration of the high voltage exceeds the high voltage ride-through setting.	Normally, the inverter will re-connect to the grid after the grid returns to normal. If the fault occurs repeatedly: 1. measure the actual grid voltage, if the grid voltage is really higher than the set value, please contact the local power company to seek a solution; 2. Check the protection parameter setting through APP or WEB, and modify the over-voltage protection value with the consent of local power operator; 3. If you confirm that the fault is not caused by the above reasons and still exists, please contact LIVOTEK's customer service center.
Grid Volt Imbalance	The inverter detects a voltage imbalance between the phases of the grid	Normally, the inverter will re-connect to the grid after the grid returns to normal. If the fault occurs repeatedly: 1. Measure the actual grid voltage, if the phase voltage difference of each phase of the grid is large, please contact the current power company for solution; 2. if the phase voltage difference of each phase is within the allowed range of the local power company, modify the grid voltage imbalance parameter through APP or WEB; 3. If you confirm that it is not due to the above reasons and the fault still exists, please contact LIVOTEK Customer Service Center.
PE Abnormal	1. Poor contact of inverter ground wire 2. Inverter ground wire access is abnormal	1. Check whether the ground wire is connected properly; 2. Check whether the insulation between the ground wire and the fire wire is normal; 3. Confirm that it is not the above reasons and the fault still exists, please contact LIVOTEK customer service center.

Alarm Name	Possible causes	Suggestion
Environmental Temp Too High	1.The temperature inside the chassis is too high; 2.Excessive temperature of the operating environment.	Generally, the machine will run again after the internal temperature or module temperature returns to normal, if the fault occurs repeatedly: 1. Check whether the ambient temperature of the machine is too high 2. Check whether the machine is easy to ventilate the place 3. Check whether the machine is in direct light, if so, please appropriate shade 4. Check whether the fan is running normally, if not normal, please replace the fan 5. If you are sure that the problem is not caused by the above reasons, and the problem still exists, please contact LIVOTEK Customer Service Center.
Environmental Temp Too Low	Ambient temperature below the protection value is detected.	Shut down and disconnect the inverter and wait for the ambient temperature to rise to within the inverter operating temperature range before restarting the inverter.
Battery Fault	The malfunction is reported due to abnormalities in the battery wiring, caused by the battery itself, the usage environment, or the operation of the battery.	1. Please check whether there is any abnormality in the wiring of the battery power cable (reverse connection, loose, etc.), if so, connect the battery power cable correctly. 2. If you confirm that it is not due to the above reasons and the fault still exists, please contact LIVOTRUST Customer Service Center.
Battery Communication Abnormal	Communication wire disconnected between battery and inverter; poor contact at battery or inverter communication terminals.	1. Check whether there is any abnormality in the communication cable and its terminals, if so, make sure it is reliably connected. 2. Reinstall the battery communication cable 3. If you are sure that it is not due to the above reasons and the fault still exists, please contact LIVOTRUST customer service center.
Battery Connection Abnormal	1. Battery polarity reversed; 2. Battery has communication, but battery power cable is not connected; 3. Low battery voltage; 4. Inverter battery charge/discharge circuit relay failure	1. Check whether the polarity of the battery is reversed or not connected, if so, access the battery power cable correctly; 2. Confirm that it is not the above reasons and the fault still exists, please contact LIVOTRUST Customer Service Center.

Alarm Name	Possible causes	Suggestion
AFCI Fault	AFCI fault on DC side of inverter	1、 Disconnect the DC power, check whether there are broken cables, loose connection terminals or fuses and poor contact on the DC side, or burn marks on the parts; if there are, replace the broken cables, tighten the loose connection terminals or fuses, and replace the parts with burn marks; 2、 After completing step 1 DC side inspection and rectification and repair, reconnect the DC power and clear the AFCI fault through APP or WEB, the inverter will operate normally again; 3、 Confirm that it is not the above reasons and the fault still exists, please contact LIVOTEK customer service center.
Smart Meter Connection Abnormal	Communication wire disconnected between meter and inverter; poor contact at meter or inverter communication terminals; no power from grid.	1. Check that the power grid is supplied; 2. check whether there is any abnormality in the communication line and its terminals, and if so, ensure that they are reliably connected 3. Reinstall the meter communication wire. 4. Confirm that it is not due to the above reasons, and the fault still exists, please contact LIVOTROP customer service center.
Fan Alarm	1. Abnormalities in the internal modules of the system 2. Abnormalities in system wiring or terminals 3. foreign object blocking	1, the machine can continue to run; 2、 Check whether there is any abnormality in the wiring and terminals related to the alarm, check the environment for foreign objects and other abnormalities, and repair accordingly; 3. Confirm that it is not the above reasons, and the alarm still exists, please contact please contact LIVOTEK customer service center.
Battery Connection Abnormal	1. Battery polarity reversed; 2. Battery has communication, but battery power cable is not connected; 3. Low battery voltage; 4. Inverter battery charge/discharge circuit relay failure	1. Check whether the polarity of the battery is reversed or not connected, if so, access the battery power cable correctly; 2. Confirm that it is not the above reasons and the fault still exists, please contact LIVOTRUST Customer Service Center.
AFCI Fault	AFCI fault on DC side of inverter	1、 Disconnect the DC power, check whether there are broken cables, loose connection terminals or fuses and poor contact on the DC side, or burn marks on the parts; if there are, replace the broken cables, tighten the loose connection terminals or fuses, and replace the parts with burn marks; 2、 After completing step 1 DC side inspection and rectification and repair, reconnect the DC power and clear the AFCI fault through APP or WEB, the inverter will operate normally again; 3、 Confirm that it is not the above reasons and the fault still exists, please contact LIVOTEK customer service center.

Alarm Name	Possible causes	Suggestion
Smart Meter Connection Abnormal	Communication wire disconnected between meter and inverter; poor contact at meter or inverter communication terminals; no power from grid.	1. Check that the power grid is supplied; 2. check whether there is any abnormality in the communication line and its terminals, and if so, ensure that they are reliably connected 3. Reinstall the meter communication wire. 4. Confirm that it is not due to the above reasons, and the fault still exists, please contact LIVOTROP customer service center.
Smart Meter Communication Abnormal	Reverse meter direction	1. Check whether the wiring of the meter is reversed, if so, reconnect the power line with the meter after reversing it. 2. If you are sure that it isn't due to the above reasons and fault still exists, please contact LIVOTROP customer service center.
Battery Alarm	Alarms are generated when there is a slight abnormality in the battery itself, in the operating environment, or in the operation of the battery.	Normally, the battery can automatically return to normal. If the alarm appears for a long time: 1. If over-temperature and low temperature alarms are reported, alarms related to the ambient temperature, take measures to improve heat dissipation and other measures to reduce the temperature; 2. Confirm that it is not the above reasons, and the alarm still exists, please contact the battery manufacturer.
Battery Fault	Alarms are generated when there is a slight abnormality in the battery itself, in the operating environment, or in the operation of the battery.	1. For battery voltage failure, please check whether there is any abnormality in the battery power cable wiring (reverse connection, loose, etc.), if so, connect the battery power cable correctly. 2. Make sure the battery power cable is connected correctly, please check whether there is any abnormality in the real-time battery voltage, if yes, contact the battery manufacturer. If yes, contact the battery manufacturer. If no, please contact LIVORD customer service center. 3. For battery temperature failure, take measures to reduce the temperature by improving heat dissipation conditions; 4. Confirm that it is not the above reasons and the fault still exists, please contact the battery manufacturer.

9.2 Routine Maintenance

To ensure that the inverter can operate properly for a long term, you are advised to perform routine maintenance on it as described in this chapter.



CAUTION

Risk of inverter damage or personal injury due to incorrect service!

- Always keep in mind that the inverter is powered by dual sources: PV strings and utility grid.
- Before maintaining and commissioning inverter and its peripheral distribution unit switch off all the charged terminals of the inverter, and wait at least 10 minutes after the inverter is powered off.

Routine Maintenance

Check Item	Method	Period
System clean	Check the temperature and dust of the inverter. Clean the inverter enclosure if necessary.	Once every 6 to 12 months
System running status	Check whether the inverter is not damaged or deformed or can be operated with no abnormal sound.	
Cable entry	Check whether the cable entry is insufficiently sealed, or the gap is excessively large, and reseal the entry when necessary.	
Electrical connection	Check whether all cables are firmly in place. Check whether a cable is damaged, especially the part contacting the metal enclosure.	

9.3 Decommissioning

Perform the following procedures to remove the inverter:

Step 1: Disconnect all cables from the inverter including communications cables, AC output power cables, and PGND cables.

Step 2: Remove the inverter from the bracket.

Step 3: Remove the bracket.

9.4 Disposal of the Inverter

The inverter and its packing case are made from environment-friendly materials. If the inverter service life has expired, do NOT discard it with household garbage; dispose the inverter in accordance with local environmental laws and regulations.

10. Technical Data

Model Name	AES1-3KG1/ RT1-3KS1	AES1-3K6G1/ RT1-3K6S1	AES1-4K6G1/ RT1-4K6S1	AES1-5KG1/ RT1-5KS1	AES1-3KL1/ RT1-3KL1
AC Output Data @Grid					
Rated AC Output Power (W/VA)	3000	3680	4600	5000	3000
Max. Apparent Power (VA)	3000	3680	4600	5000	3000
Max. Apparent Power from Grid (VA)	3000	3680	4600	5000	3000
Rated Output Voltage (V)	L/N/PE, 220 / 230				L/N/PE, 110 / 120 / 127
AC Voltage Range (V)	176 - 276				85-156
Rated Grid Frequency (Hz)	50 / 60				
Grid Frequency Range (Hz)	45-55 / 55-65				
Rated Output Current (A) @230V	13	16	20	21.7	25
Max. AC Current Output (A)	13.6	16.7	20.9	22.7	25
Max. AC Current from Grid (A)	13.6	16.7	20.9	22.7	25
Output Power Factor	~1 (Adjustable from 0.8 Leading to 0.8 Lagging)				
THDi @Rated Power (%)	< 3%				
AC Output Data@EPS					
Rated Output Power (W/VA)	3000	3680	4600	5000	3000
Peak Output Power (W/VA)	3000	3680	4600	5000	3000
Rated Output Voltage (V)	L/N/PE, 230				L/N/PE, 110 / 120 / 130
Rated Output Frequency (Hz)	50 / 60				
Rated Output Current (A) @230V	13	16	20	21.7	25
Max. AC Current Output (A)	13.6	16.7	20.9	22.7	25
THDv @Linear Power(%)	< 3%				

Model Name	AES1-3KG1/ RT1-3KS1	AES1-3K6G1/ RT1-3K6S1	AES1-4K6G1/ RT1-4K6S1	AES1-5KG1/ RT1-5KS1	AES1-3KL1/ RT1-3KL1
AC Output Data@EPS					
Automatic Switch Time (ms)	<10ms				
Efficiency					
Max. Efficiency (%)	94%	94%	94%	94%	94%
Euro Efficiency (%)	93.50%	93.50%	93.50%	93.50%	93.50%
Protection					
Anti-islanding Protection	Integrated				
Residual Current Monitoring Unit	Integrated				
AC Surge Protection	Type II				
AC Overcurrent Protection	Integrated				
AC Short Circuit Protection	Integrated				
AC Overvoltage Protection	Integrated				
Ground Fault Monitoring	Integrated				
Battery Reverse Protection	Integrated				
Remote Shutdown	Integrated				
Battery Input Data					
Battery Type	LFP				
Battery Voltage Range (V)	40-60				
Max. Charge/ Discharge Current (A)	65	80	100	100	65
Communication with BMS	CAN				
Inverter General Data					
Inverter Dimension (W × H × D mm)	564*305*190				
Inverter Weight (kg)	15				18.5
Cooling Method	Natural Convection				
Mounting Method	wall or floor mounting				

Model Name	AES1-3KG1/ RT1-3KS1	AES1-3K6G1/ RT1-3K6S1	AES1-4K6G1/ RT1-4K6S1	AES1-5KG1/ RT1-5KS1	AES1-3KL1/ RT1-3KL1
Inverter General Data					
Operating Temperature Range (°C)	-10 to 60				
Storage environments (°C)	-20 to 65				
Operating Humidity (%)	0-95%				
Typical Noise Emission(dB)	< 35				
Display	LED				
Communication interface	RS485 CAN				
Max. Parallel Connection of Inverter (pcs)	1				
Standard Warranty(years)	5 years				

Model Name	AES1- 3KEG1/RT1- 3KS1E	AES1- 3K6EG1/RT 1-3K6S1E	AES1- 4K6EG1/RT 1-4K6S1E	AES1- 5KEG1/RT1- 5KS1E	AES1- 3KEL1/RT 1-3KL1E
AC Output Data @Grid					
Rated AC Output Power (W/VA)	3000	3680	4600	5000	3000
Max. Apparent Power (VA)	3000	3680	4600	5000	3000
Max. Apparent Power from Grid (VA)	3000	3680	4600	5000	3000
Rated Output Voltage (V)	L/N/PE, 220 / 230				L/N/PE, 110 / 120 / 127
AC Voltage Range (V)	176 - 276				85-156
Rated Grid Frequency (Hz)	50 / 60				
Grid Frequency Range (Hz)	45-55 / 55-65				
Rated Output Current (A) @230V	13	16	20	21.7	25
Max. AC Current Output (A)	13.6	16.7	20.9	22.7	25
Max. AC Current from Grid (A)	13.6	16.7	20.9	22.7	25
Output Power Factor	~1 (Adjustable from 0.8 Leading to 0.8 Lagging)				
THDi @Rated Power (%)	< 3%				
Efficiency					
Max. Efficiency (%)	94%	94%	94%	94%	94%
Euro Efficiency (%)	93.50%	93.50%	93.50%	93.50%	93.50%
Protection					
Anti-islanding Protection	Integrated				

Model Name	AES1- 3KEG1/RT1- 3KS1E	AES1- 3K6EG1/RT 1-3K6S1E	AES1- 4K6EG1/RT 1-4K6S1E	AES1- 5KEG1/RT1- 5KS1E	AES1- 3KEL1/RT 1-3KL1E
Protection					
Residual Current Monitoring Unit	Integrated				
AC Surge Protection	Type II				
AC Overcurrent Protection	Integrated				
AC Short Circuit Protection	Integrated				
AC Overvoltage Protection	Integrated				
Ground Fault Monitoring	Integrated				
Battery Reverse Protection	Integrated				
Remote Shutdown	Integrated				
Battery Input Data					
Battery Type	LFP				
Battery Voltage Range (V)	40-60				
Max. Charge/ Discharge Current (A)	65	80	100	100	65
Communicati on with BMS	CAN				
Inverter General Data					
Inverter Dimension (W × H × D mm)	564*305*190				
Inverter Weight (kg)	15				18.5
Cooling Method	Natural Convection				
Mounting Method	wall or floor mounting				
Operating Temperature Range (°C)	-10 to 60				

Model Name	AES1- 3KEG1/RT1- 3KS1E	AES1- 3K6EG1/RT 1-3K6S1E	AES1- 4K6EG1/RT 1-4K6S1E	AES1- 5KEG1/RT1- 5KS1E	AES1- 3KEL1/RT 1-3KL1E
Inverter General Data					
Storage environment s (°C)	-20 to 65				
Operating Humidity (%)	0-95%				
Typical Noise Emission(dB)	< 35				
Display	LED				
Communication interface	RS485 CAN				
Max. Parallel Connection of Inverter (pcs)	1				
Standard Warranty(years)	5 years				

Notes:

- (1) Backup output power depends on the battery.
- (2) Specifications are subject to change without further notice.

11. Disclaimer

The AC Couple 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, war and 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 36 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.



Contacts

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