V-TAC
Meaningful Innovation.

isuna

WEEE Number: 80133970

INSTRUCTION MANUAL

SINGLE PHASE LOW-VOLTAGE HYBRID INVERTER

10 YEAR WARRANTY*

INTRODUCTION

Thank you for selecting and buying V-TAC product. V-TAC will serve you the best. Please read these instructions carefully before starting the installation and keep this manual handy for future reference. If you have any another query, please contact our dealer or local vendor from whom you have purchased the product. They are trained and ready to serve you at the best. The warranty does not apply to damage caused by incorrect installation or abnormal wear and tear. The company gives no warranty against damage to any surface due to incorrect removal and installation of the product. This product is warranted for manufacturing defects only.

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Contents

1 Overview

This Manual mainly introduces the product information, installation, electrical connection, configuration commissioning, troubleshooting and maintenance, and technical parameters of Residential energy storage single-phase hybrid inverter. Before installing and using this product, please read this Manual carefully to understand the safety information and be familiar with the functions and features of the product. The Manual is subject to update. Please obtain the latest version from the official website to get more product information.

1.1 Scope of Application

This document applies to the inverters of the following models:

Model	Rated output power	Rated output voltage
Isuna 3000S	3000W	220/230V/240V，L/N/PE
Isuna 3600S	3600W	
Isuna 4000S	4000W	
Isuna 4600S	4600W	
Isuna 5000S	5000W	
Isuna 6000S	6000W	

1.2 Intended Users

This Manual is only suitable for professional technicians who are familiar with local regulations, standards and electrical systems, have received professional training, and are familiar with the relevant knowledge of this product.

1.3 Symbols Used in This Manual

In order to ensure the user's personal and property safety when using the PV grid-connected inverter, and to use the product efficiently, relevant safety operation information is provided in this Manual and highlighted with corresponding symbols. Please fully understand and strictly abide by below emphasized information to avoid personal injury and property damage. The symbols used in this manual are listed below.

	It indicates a highly potential hazard which, if not avoided, will result in death or serious injury.
	It indicates a hazard with a medium level of potential which, if not avoided, could result in death or serious injury.
	It indicates a hazard with a low level of potential which, if not avoided, could result in moderate or minor injury.
	It indicates a potential hazard which, if not avoided, could result in the equipment malfunction or property damage.
	It indicates the emphasis and supplementary instructions on the content, and may also provide tips for optimizing the product use, which can help you solve a certain problem or save your time.

2 Safety Precautions

The safety precautions information contained in this document must always be followed when operating the equipment.

	➢ The inverter has been designed and tested in strict accordance with safety regulations. However, as an electrical device, relevant safety instructions must be followed before any operation. Improper operation may cause serious injury or property loss.

2.1Operation Safety

	➢ Please read this manual carefully to fully understand the product and precautions before installing the equipment. ➢ All operations of the equipment must be carried out by professional electrical technicians, and the technicians need to be familiar with the relevant standards and safety regulations of the project location. ➢ When operating the inverter, use insulated tools and wear personal protective equipment to ensure personal safety. When touching electronic devices, wear ESD gloves, ESD wrist straps, and ESD clothing to prevent the inverter from being damaged by static electricity and causing losses. ➢ Machine damage or personal injury caused by installation, use, and configuration not in accordance with the requirements of this Manual is not within the scope of the equipment manufacturer's responsibility.

2.2 PV String Safety

	➢ Please use the DC terminals provided with the box to connect the DC cables of the inverter. If other types of DC terminals are used, serious consequences may result, and the manufacturer isn’ t responsible for equipment damage therefrom.
	➢ Please ensure that the frame of the module and the bracket system are properly grounded.

	➢ After the DC cable is connected, please ensure that the cable connection is tight and firm. ➢ Use a multimeter to measure whether the positive and negative poles of the DC terminal of the battery are connected correctly and the voltage is within the allowable range. ➢ Do not connect the same PV string to multiple inverters, or the inverters will be damaged.

2.3 Battery Safety

	➢ Please carefully read the content about battery safety introduced in the Manual before installing the equipment, and operate in strict accordance with the requirements in the Manual. ➢ If the battery has been fully discharged, please charge the battery strictly according to the corresponding type of battery in the Manual. ➢ The battery current may be affected by the external environment, such as temperature and humidity, which may cause the battery current limit and affect the battery load performance. ➢ If the battery fails to start, please contact the after-sales service center as soon as possible. Otherwise, the battery may be permanently damaged. ➢ Use a multimeter to measure whether the positive and negative poles of the DC terminal of the battery are normal and the voltage is within the allowable range. ➢ Do not connect the same battery pack to multiple inverters, or the inverter will be damaged.

2.4 Inverter Safety

	➢ Please ensure that the voltage and frequency of the grid connection meet the specifications of the inverter. ➢ It is recommended to add protection devices such as circuit breakers or fuses on the AC side of the inverter. The specification of the protection device must be greater than 1.25 times the maximum AC output current of the inverter. ➢ The protective grounding wire of the inverter must be firmly connected. When multiple inverters are paralleled, ensure that the protective grounding points of all inverter chassis shells are equipotentially connected. ➢ If no battery is configured in the PV system, it is not recommended to use the BACK-UP off-grid function, and the resulting system power consumption risk will not be covered by the equipment manufacturer's warranty.

2.5 Personnel Requirements

	When the inverter is running, some components may be electrified or hot. Improper use, incorrect installation or operation may result in serious personal or property injury. Transport, installation, disassembly, start-up and maintenance operations must be performed by qualified electrical engineers.

2.6 Description of Symbols on the Inverter

There are some safety-related labels on the residential energy storage single-phase hybrid inverter. Please carefully read and fully understand the content of these labels before installing the product.

Symbol	Description	Meaning
	Residual voltage in the inverter	After the inverter is powered off for a period of time, the internal capacitor is still charged. Please wait for more than 5 minutes until the capacitor is completely

		discharged.
	High voltage	There is high voltage during the operation of the inverter. If you need to operate the inverter, please ensure that the inverter is powered off.
	Be careful of hot surface	The casing of the inverter is very hot when it is running. Do not touch it, or it may cause burns.
	Ground terminal	Connect the inverter to the ground to achieve the purpose of ground protection.
	Read the Manual	Before installing the inverter, please carefully read and understand this Manual.

3 Equipment Inspection and Storage

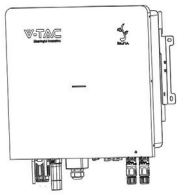
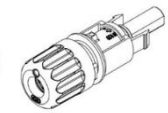
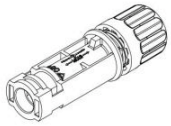
3.1 Inspection before Signing

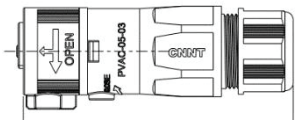
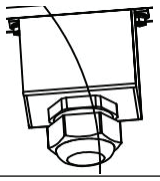
Before signing for the product, please check the following in detail:

- Check whether the outer package is damaged, such as holes, deformation, cracks or other signs that may cause damage to the equipment in the box. If there is any damage, do not open the package and contact your dealer.
- Check whether the inverter model is correct; if not, do not open the package and contact your dealer.
- Check whether the type and quantity of deliverables are correct, and whether the appearance is damaged. In case of damage, please contact your dealer.

3.2 List of Deliverables

After unpacking the inverter, check whether the deliverables are complete. If any components are missing or incomplete, please contact the dealer in time.

No.	Picture	Description	Quantity
1		Inverter	1PCS
2		Wall mounted back panel	1PCS
3		PV+ wire input terminal molded case	2PCS
4		PV- wire input terminal molded case	2PCS
5		PV+ input terminal metal core	2PCS
6		PV- input terminal metal core	2PCS
7		Battery terminal box	1PCS

8		AC terminal block	2PCS
9		Single-phase electric meter (optional)	1PCS
10		Signal interface waterproof cover	1PCS
11		WIFI module (optional)	1PCS
12		Parallel communication line	1PCS
13		BMS communication line	1PCS
14		RJ45 terminal	2PCS
15		M8*80 expansion bolt	4PCS
16		M6 inner hexagon screw	4PCS

17		User Manual	1PCS
18		Warranty Card	1PCS
19		Desiccant	1PCS

3.3 Equipment Storage

If the inverter will not be put into use immediately, please store it according to the following requirements:

- Make sure that the outer packing box is not removed, and the desiccant in the box is not lost.
- Make sure the storage environment is clean and the temperature and humidity range is appropriate.
- Make sure that the stacking height and direction of the inverter comply with the instructions on the label on the packing box.
- Make sure that there is no risk of tipping over after the inverters are stacked.
- After the inverter has been stored for a long time, it must be checked and confirmed by professionals before it can continue to be used.

4 Product Introduction

4.1 Overview

Residential energy storage single-phase hybrid inverter integrates PV grid-connected inverter and battery energy storage, and has built-in multiple working modes to meet the diverse needs of users. In the period of rising energy costs such as oil and coal, the declining energy subsidies of PV grid-connected systems, mountainous areas without grids or base stations with uninterrupted power supply and emergency power supply needs, Residential energy storage single-phase hybrid inverter can provide a complete solution.

4.2 Application Scenarios

	➢ PV system is not suitable for connecting devices that depend on stable power supply, such as life-sustaining medical equipment, etc. Please ensure that no personal injury will be caused when the system is powered off. ➢ In the PV system, please try to avoid using loads with high starting current, or the off-grid output may fail due to excessive instantaneous power. ➢ When the overload protection of the inverter occurs once, the inverter can automatically restart; if it occurs multiple times, the inverter will stop, and it can be restarted through the APP after the fault is eliminated. ➢ When the grid is powered off, if the load capacity exceeds the rated power of the inverter, the off-grid function of the inverter will be automatically turned off; if it needs to be started, the large load must be turned off to ensure that the load power is less than the rated power of the inverter. ➢ When the inverter is in off-grid mode, it can be used by ordinary household loads. ➢ Inductive load: It supports up to 1.5P non-inverter air conditioners. Connecting two or more non-inverter air conditioners may lead to unstable standby mode.

	➢ Capacitive load: total power ≤ 0.66 × rated output power of inverter.

4.3 Working Mode

Note: The anti-reverse function is disabled by default.

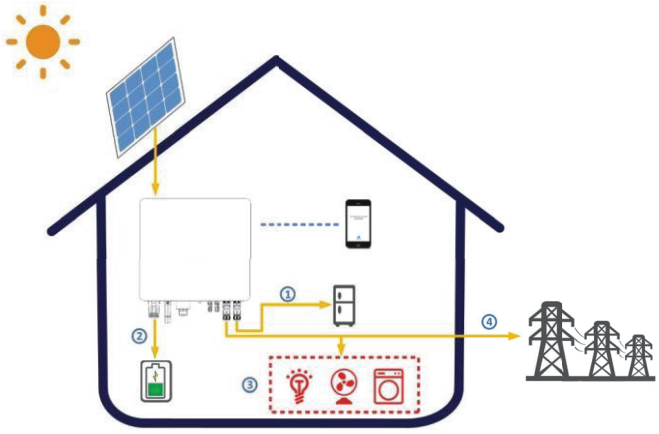
4.3.1 Self-use Mode (Default)

Function:

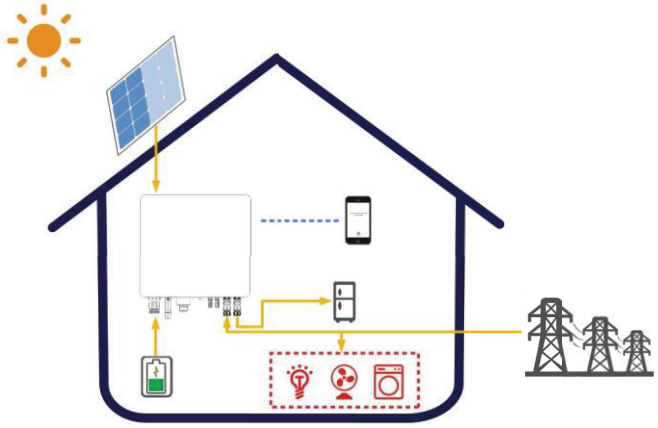
Prioritize the use of PV and battery energy, and try not to use the energy of the grid.

Specific working method:

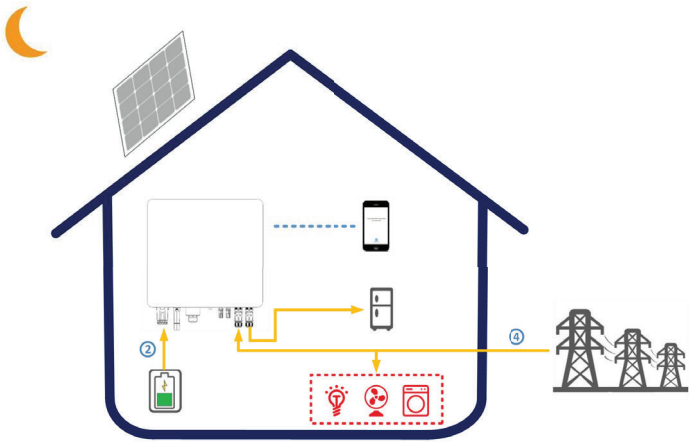
- When the PV is sufficient, the PV will give priority to powering the AC load ① and general load ③, then charge the battery ②, and the remaining energy can be connected to the grid ④.



- When the PV is insufficient, the PV, the battery, and the grid jointly supply power to the load.



- When the PV is not working, the battery ② and the grid ④ jointly supply power to the load together (priority to the battery ②).



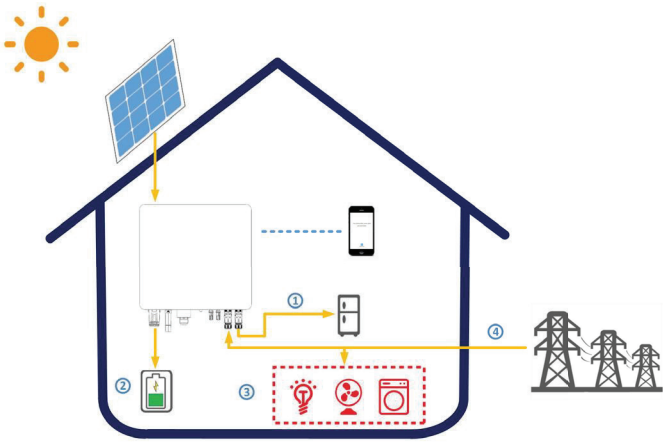
4.3.2 Time-of-use Mode

Function:

According to the electricity prices at different times, during the valley period: the grid and PV give priority to supplying power to the AC load, and the remaining energy is used to charge the battery; in other periods, it is in self-use mode.

Specific working method:

- During the valley period: the power grid ④ and PV give priority to supplying power to the AC load ①, and the remaining energy is used to charge the battery ②.



- Other periods: Self-use

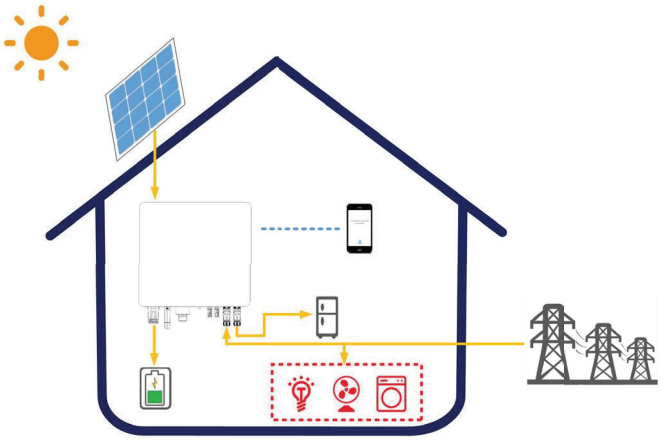
4.3.3 Disaster Backup Mode

Function:

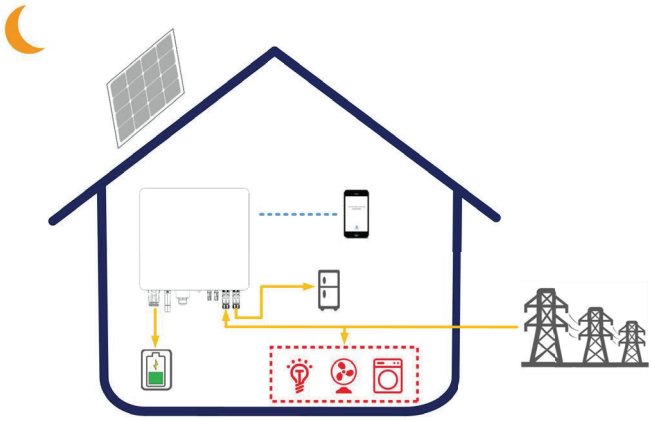
In the event of abnormal power grid, the energy storage system will provide power to the user alone. This mode can still maintain power supply when the user encounters a special situation such as an abnormal grid untility. (The battery needs to be charged and discharged every six months, which needs to be set manually)

Specific working method:

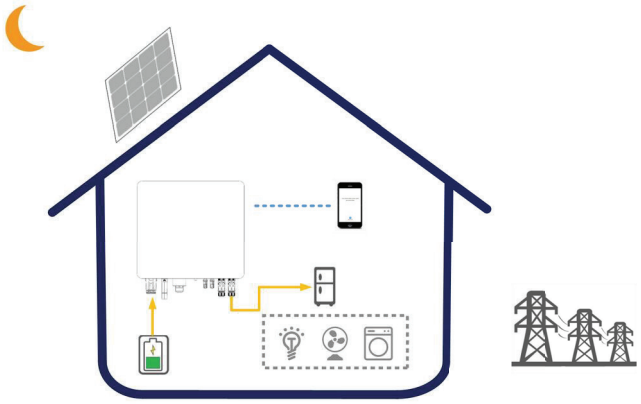
- PV and the grid jointly supply power to the battery and the load (the PV is given priority to charging the battery).



- The battery SOC is always fully charged when the grid utility is normal.



- The battery will discharge only when the grid utility is abnormal.



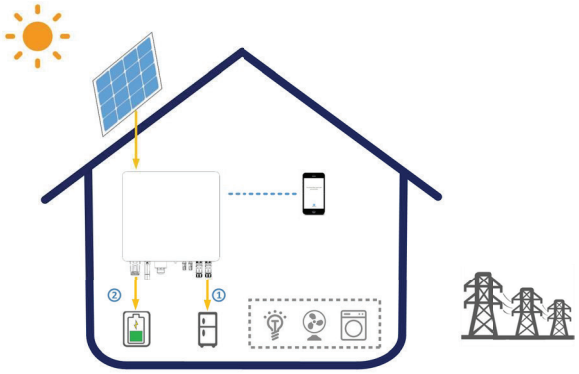
4.3.4 Off-grid Mode

Function:

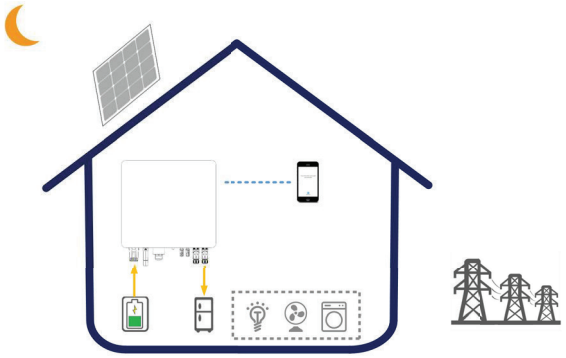
PV and batteries form an off-grid system, and the inverter is used without grid power.

Specific working method:

- If the PV is sufficient, the PV will give priority to supplying power to the AC load ①, and the excess energy is used to charge the battery ②.



- If the PV is not working, the battery supplies power to the AC load.



4.3.5 Schedule Charging/Discharging Mode

Function:

Set the charging and discharging time according to the user's needs.

Specific working method:

Set the charging and discharging schedule of the battery according to your own needs. If the power outage notification is known in advance, the battery can be fully charged in advance to prepare for the use of household loads during power outages.

4.4 Inverter Running Status

Table 4-1 Description of inverter running status

No.	Running status	Description
1	Waiting	➢ After the machine is powered on, it enters the waiting stage. ➢ When the conditions are met, it enters the self-check. ➢ If there is a fault, the inverter enters the fault state.
2	Self-check	➢ Self-check and initialization are performed continuously before the inverter starts. ➢ If the conditions are met, it will enter the grid-connected mode, and the inverter starts grid-connected operation. ➢ If the grid is not detected, it will enter the off-grid state, and the inverter will run off-grid. ➢ If the self-check fails, it will enter the fault state.
3	Grid-connected	➢ The inverter is normally connected to the grid. ➢ If it is detected that the grid does not exist, it will enter the off-grid working mode. ➢ If a fault is detected, it will enter the fault state. ➢ If it is detected that the grid conditions do not meet the grid-connection requirements, and the off-grid output function is not enabled, it will enter the waiting state. ➢ If switch to off-grid mode, it is detected that the grid conditions meet the grid-connection requirements, and the grid-connection function is enabled, it will enter the grid-connection state.
4	Off-grid	➢ When the grid is powered off, the inverter will switch to off-grid mode and continue to supply power to the load.

		➢ When the working mode is set to off-grid before running, the inverter works off-grid. ➢ When the off-grid mode is set during operation, it needs to be turned off and on again, and the off-grid mode will take effect. ➢ If a fault is detected, it will enter the fault state.
5	Fault	➢ If a fault is detected, the inverter enters the fault state, and after the fault is cleared, it resumes the previous operation mode.

4.5 Appearance Description

4.5.1 Appearance Introduction

Please check the product packaging and accessories carefully before installation.

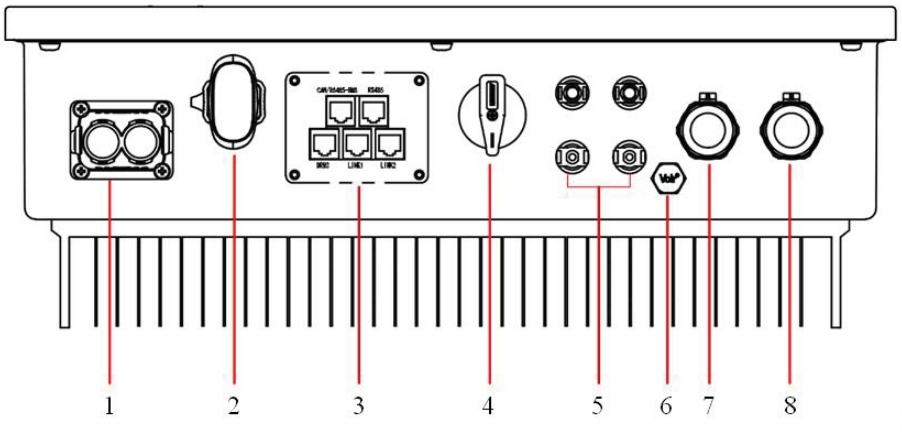
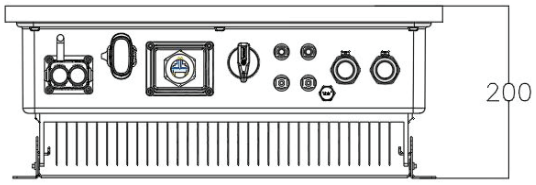


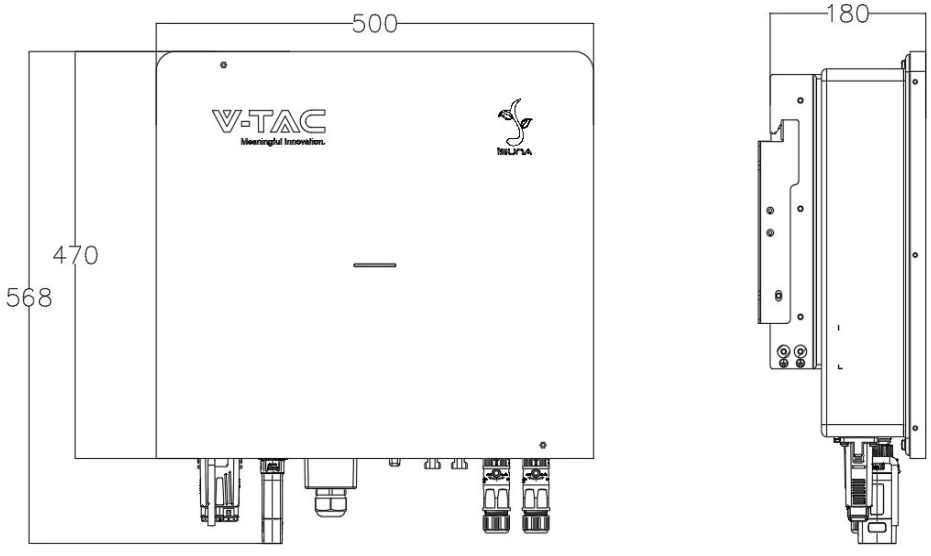
Table 4-2 Definition of external terminals

1	Battery DC input port (BAT+/-)	5	PV DC input port (PV+/-)
2	WIFI/4G/Bluetooth	6	Explosion-proof ventilation device
3	Multifunctional communication interface	7	Grid-connected AC wiring port
4	PV DC input switch	8	Load wiring port

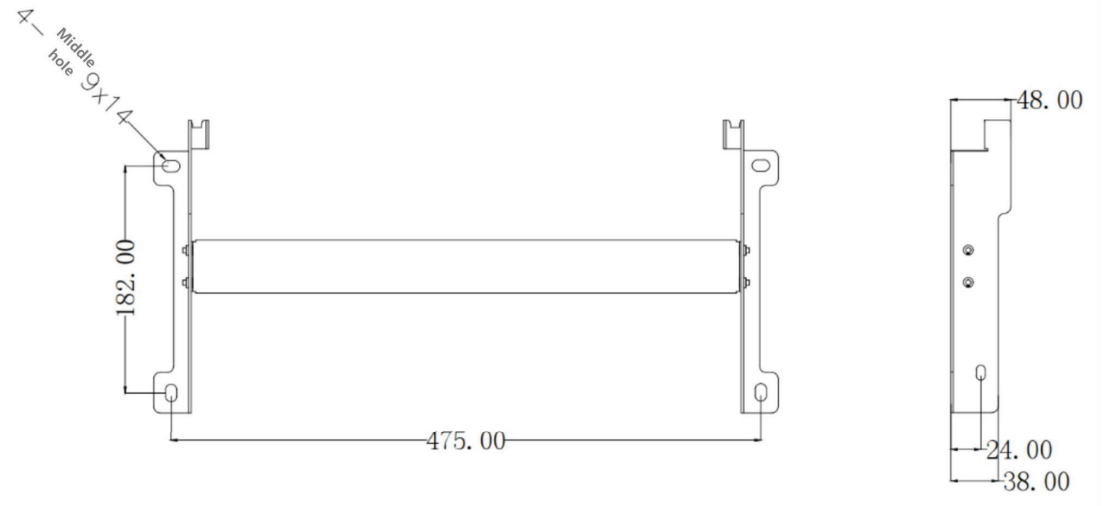
4.5.2 Size Description

Inverter dimensions





Wall hanging size chart



5 Installation

5.1 Installation Requirements

5.1.1 Installation Environment

1) Do not install the equipment in flammable, explosive or corrosive environments.
2) Please keep away from the water pipes and cables in the wall at the installation location to avoid danger when drilling holes.
3) The installation location should be kept out of the reach of children, and should not be installed in places that are easy to touch. The surface may be hot when the equipment is in operation. Be careful to prevent burns.
4) The installation environments of inverter need to avoid direct sunlight, rain and snow. It is recommended to install it in a sheltered installation location. If necessary, a sunshade can be built.
5) The installation space must meet the equipment ventilation and heat dissipation requirements and operating space requirements.
6) The protection level of the equipment meets indoor and outdoor installation, and the temperature and humidity of the installation environment must be within the appropriate range.
7) Please ensure that the indicator lights and all labels of the equipment are easily visible and the terminal blocks are easily accessible.
8) The inverter installation altitude is lower than the maximum working altitude of 4000m.
9) Keep away from strong magnetic field environment to avoid electromagnetic interference. If there are radio stations or wireless communication equipment below 30MHz near the installation location, please install the equipment according to the following requirements:

- Add a multi-turn ferrite core to the DC input line or AC output line of the inverter, or add a low-pass EMI filter.
- The distance between the inverter and the wireless electromagnetic interference device exceeds 30m.

5.1.2 Installation Carrier

1) The installation carrier must not be a flammable material and must have fire resistance.

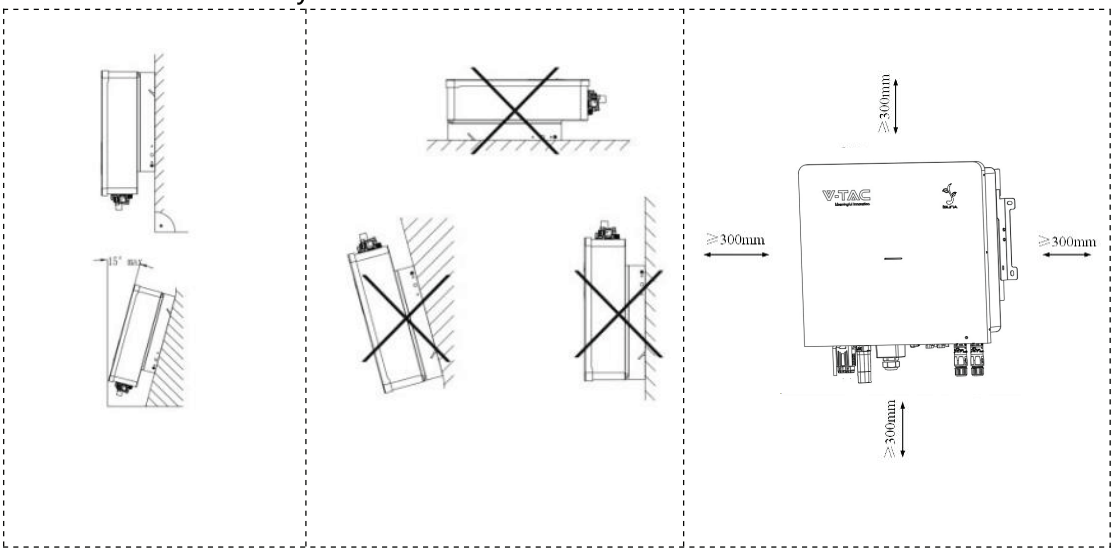
2) Please ensure that the installation carrier is firm and reliable, and can bear the weight of the inverter.

3) When the equipment is running, it will emit noise. Do not install it on a carrier with poor sound insulation, so as to avoid the noise generated by the equipment when it is working, causing troubles to the residents in the living area.

5.1.3 Installation Angle

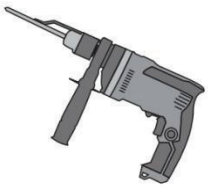
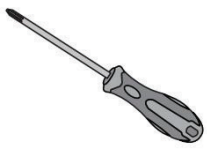
1) Recommended inverter installation angle: vertical or backward ≤ 15°.

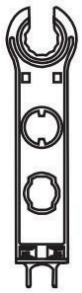
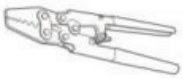
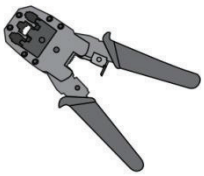
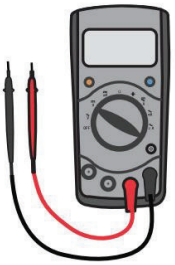
2) Do not install the inverter upside down, tilt forward or backward beyond the angle, or install it horizontally.

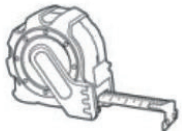
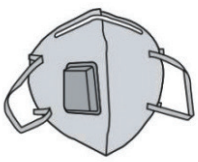


5.2 Installation Tools

Table 5-1 List of installation tools

No.	Tool	Description	Function
1		Impact drill 8mm drill bit recommended	For drilling in wall
2		6mm cross screwdriver	For removing and installing screws and wiring
3		4mm cross screwdriver	For removing and installing load terminal screws

4		Removal tool	For removing PV terminal
5		Wire strippers	For wire stripping
6		Crimping pliers	For crimping power cables
7		Crimping pliers	For crimping signal network cable
8		6mm inner hexagonal wrench	For fastening the grid terminal and the cable
9		Multimeter	Check whether the cable connection is correct, whether the positive and negative poles of the battery are correct, whether the grounding is reliable, and whether the voltage is within

			the specification range
10		Marker pen	Mark for drilling
11		Measuring tape	For measuring distance
12		Level ruler	To ensure the level of the back panel
13		Protective gloves	Wear when installing the machine
14		Goggles	Wear when drilling
15		Dust mask	Wear when drilling

5.3 Moving the Inverter

Take the inverter out of the package and move it horizontally to the designated installation location. Open the outer packing box, two operators respectively put their hands under the inverter radiator, move the inverter out of the outer packing box, and move it to the designated installation location.

	➢ When carrying out operations such as transportation, turnover, and installation, the laws, regulations, and relevant standards of the country and region where it is located must be met. ➢ Since the inverter is heavy, please keep the balance when carrying it, so as not to hurt the operators when the machine falls. ➢ The power line interface and signal line interface at the bottom of the inverter can’ t bear the load. Do not make the terminal directly contact the ground. Please place the inverter horizontally. ➢ When the inverter is placed on the ground, place foam or cardboard under it to avoid damage to the casing.

5.4 Inverter Installing

	➢ When drilling, ensure that the drilling position avoids water pipes and cables in the wall to avoid danger. ➢ When punching holes, please wear goggles and dust mask to prevent dust from being inhaled into the respiratory tract or falling into the eyes.

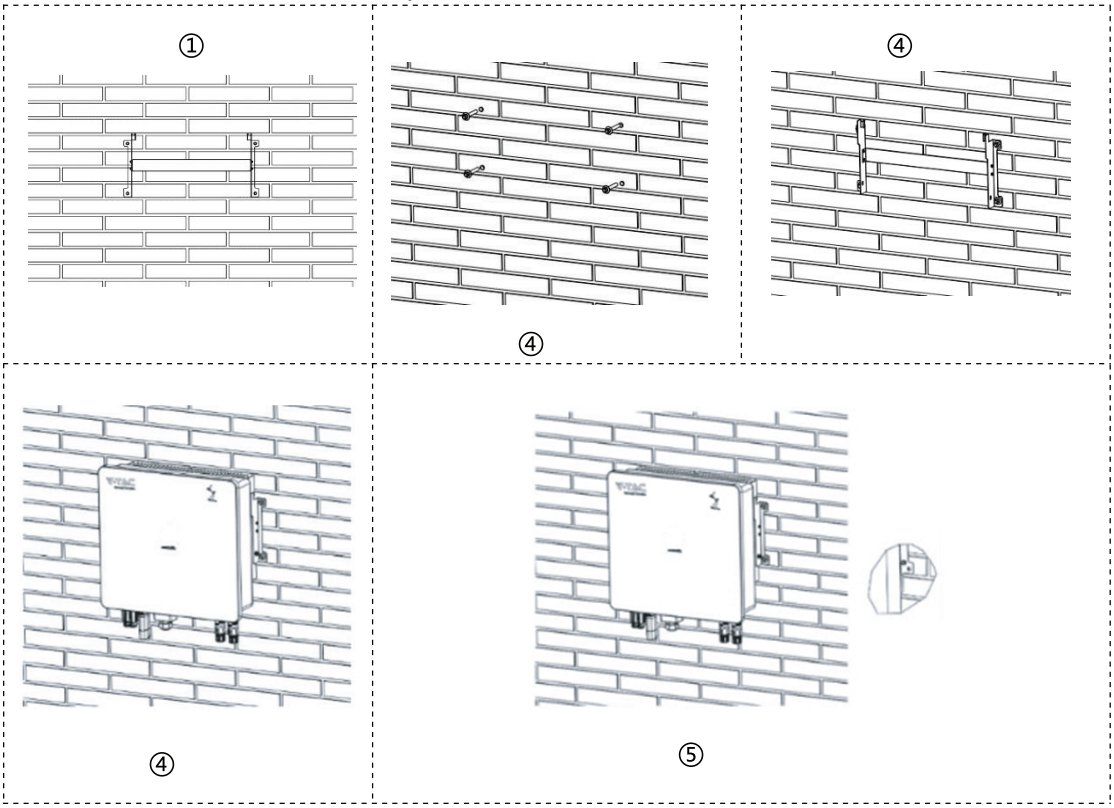
Step 1: Please choose a wall with sufficient bearing capacity, attach the wall mount to the installation wall horizontally, mark the position on the wall where the wall mount needs to be drilled with a marker pen, and then use an impact drill to drill holes on the wall. When drilling, keep the impact drill perpendicular to the wall. Do not shake it, so as not to damage the wall. If the hole drilling error is large, it needs to be repositioned;

Step 2: Insert the M8*80 expansion bolt vertically into the hole. The insertion depth of the expansion bolt should not be too shallow;

Step 3: Align the hole position of the wall mount, and fix the wall mount to the wall with nuts;

Step 4: Hang the inverter on the wall mount, ensure that the inverter is correctly inserted into the wall mount slot, then fix the inverter to the wall mount with 2*M6 hexagon screws.

Step 5: In order to prevent theft, the user can configure a suitable small lock to lock the inverter and the wall mount (optional).



6. Electrical Connection

Before installation and maintenance, ensure that the AC and DC sides are disconnected. Since the capacitor is still charged after the inverter is powered off, it is necessary to wait for at least 5 minutes to ensure that the capacitor is fully discharged. Residential Hybrid inverters are used in battery energy storage PV systems. The inverter may be damaged if it is not used as intended.

6.1 Electrical System Connection Diagram

	➢ According to the regulatory requirements of different regions, the wiring methods of the N wire and PE wire of the AC-GRID and AC-LOAD ports of the inverter are different. The specific requirements of the local regulations shall prevail. ➢ The AC-GRID and AC-LOAD ports of the inverter have built-in relays. When the inverter is in the off-grid mode, the built-in AC-GRID relay is in the disconnected state; when the inverter is in the grid-connected mode, the built-in AC-GRID relay is in the connected state. ➢ When the inverter is powered on, the AC-LOAD port is live. If you need to maintain the AC-LOAD, please powered off the inverter, or it may cause electric shock.

Residential hybrid inverter wiring system (schematic structure, not electrical wiring standard).