# Safety instructions

## Single phase LV hybrid Inverter

## D5K~D12K-SL（-S）


## 1.Overview

This document describes the product information, installation, electrical connection, configuration and commissioning, troubleshooting and maintenance, and technical specifications of the single phase hybrid inverter. Before installing and using the product, read this manual carefully to familiarize yourself with the safety information and functions and features of the product. Manuals may be updated from time to time, please obtain the latest version from the official website for more product information.

**Note: Since the product will be overload protected at an ambient temperature above 40 ℃, the high temperature mode test in the Italian Grid Specification certification will be carried out at an ambient temperature of 40 ℃.**

### 1.1 Applicable Personnel

This document is intended for only professional and technical personnel who are familiar with local regulations, standards, and electrical systems, and have professional training and knowledge about this product.

### 1.2 Symbol Definition

In order to ensure the personal and property safety of users when using single -phase hybrid inverters, as well as the efficient use of this product, the manual provides relevant safe operation information and uses corresponding symbols to highlight. To avoid personal injury and property damage, please fully understand and absolutely comply with these stressed information. The symbols used in this manual are listed below.

| | |
|---|---|
| ⚠ Danger | Indicates a highly hazardous situation which, if not avoided, will result in death or serious injury. |
| ⚠ Warning | Indicates a hazard with a medium level of risk that could result in death or serious injury if not avoided. |
| ⚠ Caution | Indicates a hazard with a low level of potential that, if not avoided, could result in moderate or minor injury. |
| ⚠ Attenion | Indicates a potentially hazardous situation that, if not avoided, may cause equipment failure or property damage. |

## 2. Safety Precautions ⚠ Attenion

The inverter has been designed in strict accordance with safety regulations and has passed the tests. However, as an electrical device, you must comply with relevant safety instructions before performing any operation on the device. Improper operation may result in serious injury or property damage.

### 2.1 Operation Safety ⚠ Attenion

Read this manual carefully before installing the device to understand the products and precautions.

All operations on the equipment must be carried out by professional electrical technicians who are familiar with the local standards and safety regulations.

When operating inverters, use insulation tools and wear personal protective equipment. Wear ESD gloves, an ESD wrist strap, and an ESD suit when touching electronic components to prevent damage caused by static electricity.

The manufacturer shall not be liable for inverter damage or personal injury caused by failure to install, use, or configure the equipment in accordance with the requirements of this manual.

## 2.2 PV String Safety

| |
|---|
| Danger Use the DC wiring terminal delivered with the chassis to connect the DC cables of the inverter. Use of other types of DC terminals may cause serious consequences. Therefore, the manufacturer is not responsible for the damage to the device. |
| Warning Ensure that the assembly frame is properly grounded to the support system.<br>After connecting DC cables, ensure that the cables are securely connected.<br>Use a multimeter to check whether the positive and negative DC wiring terminals of the battery are connected correctly and the voltage is within the allowable range.<br>Do not connect the same PV series to multiple inverters; otherwise, the inverters will be damaged. |

## 2.3 Battery Safety Warning

Read the battery safety contents in the user manual carefully before installing the device, and strictly follow the instructions in the user manual.

The battery current may be affected by external environment, such as temperature and humidity, which may cause battery current limiting and affect battery on-load performance.

If the battery does not start, contact the after-sales service center as soon as possible. Otherwise, the battery may be permanently damaged.

Use a multimeter to check whether the positive and negative DC wiring terminals of the battery are connected properly and the voltage is within the allowable range.

Do not connect the same battery string to multiple inverters. Otherwise, the inverters may be damaged.

The inverter manufacturer will not assume any responsibility due to battery explosion, burning and other accidents and related personnel and property losses.

## 2.4 Inverter Safety Warning

Ensure that the voltage and frequency of the grid-connected access point comply with the inverter grid-connected specifications.

A protection device, such as a circuit breaker or fuse, is recommended for the AC side of the inverter. Ensure that the protection device is greater than 1.25 times the maximum AC output current of the inverter.

The GND cable for the inverters must be securely connected. When multiple inverters are combined, ensure that the protection ground points on all inverters' chassis shells are equipotential connected.

If the battery is not configured in the photovoltaic system, it is not recommended to use the off-grid function, and the resulting system electricity risk will not be covered by the equipment manufacturer's warranty.

## 2.5 Personnel Requirements Attenion

When the inverter is running, some components may be charged or hot. Improper use, incorrect installation, or operation may result in serious injury to person or property. Transportation, loading, unloading, installation, starting and maintenance operations must be performed by qualified electrical engineers.

## 2.6 Description of Symbols

There are some safety-related labels on the single -phase hybrid inverter. Please read and fully understand these labels before installing the product.

| Symbol | Symbol name | Symbol meaning |
|---|---|---|
|  | It indicates the danger of residual voltage in the inverter. | Please wait for 5 minutes until the capacitor is completely discharged after the DC side of the inverter has been disconnected with power for a period of time. |
|  | It indicates the danger of high voltage. | High voltage exists during inverter operation. If you need to operate the inverter, please make sure the inverter is disconnected. |
|  | It indicates to be careful of high temperature surface. | The temperature of inverter housing is high during operation, so do not touch it, otherwise it may cause burns. |
|  | It indicates grounding terminal. | Connect the inverter to ground for grounding protection purpose. |
|  | It indicates reading the manual. | Please read and understand this manual carefully before installing the inverter. |

# 3.Product Description

## 3.1 Product Overview

hybrid inverter is a photovoltaic grid-connected inverter and battery energy storage as one, with a variety of built-in working modes to suit the diversified needs of users. In the period of rising energy costs such as oil and coal, the continuous decline of energy subsidies for photovoltaic grid-connected systems, mountain areas or base stations without grid, uninterrupted power supply and emergency power supply needs, single -phase hybrid inverters can provide a complete solution.

## 3.2 Application Scenario ⚠ Warning

The photovoltaic system is not suitable for devices that rely on stable power supply, such as life-sustaining medical devices. Ensure that no personal injury is caused when the system is powered off.

Do not use a load with a high starting current in the photovoltaic system. Otherwise, the off-grid output may fail due to excessive instantaneous power.

When the inverter overload protection occurs for a single time, the inverter can automatically restart; If it happens several times, the inverter will stop, and after the fault is rectified, the inverter can be restarted immediately through the App.

If the load capacity exceeds the rated power of the inverter during power failure, the off-grid function of the inverter automatically shuts down. To start, turn off the large load and ensure that the load power is smaller than the rated power of the inverter.

When the inverter is in off-grid mode, it can be used normally for ordinary household load.

Inductive load: 1.5P non-variable frequency air conditioners are supported. The standby mode may be unstable if two or more non-variable frequency air conditioners are connected.

Capacitive load: total power ≤0.7 x rated output power of inverter.

## 3.3 Appearance Description

### 3.3.1 Appearance Description

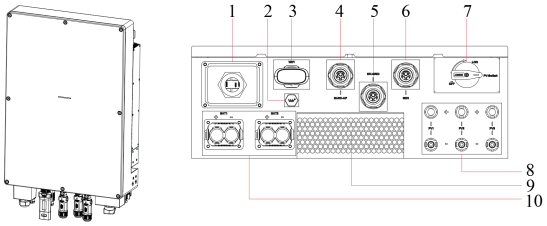


**Figure 3.1 Appearance of the inverter**

**Table 4-1 Appearance of the inverter**

| | | | |
|---|---|---|---|
| 1 | Communication module interface | 2 | Waterproof and breathable device |
| 3 | WiFi/4G interface | 4 | Off-grid AC wiring port |
| 5 | Grid-connected AC wiring port | 6 | Generator-connected AC wiring port |
| 7 | PV DC input switch | 8 | PV DC input port (PV+/-) |
| 9 | Fan assembly | 10 | Battery DC input port (BAT+/-) |

## 3.4 Inverter Transportation ⚠ Caution

Remove the inverter from the outer packaging and carry it horizontally to the designated mounting position. Open the outer packaging box and the two operators need carry the inverter out of the outer packaging box and carry it to the designated mounting position.

When carrying out the transportation, turnover, and installation, you must comply with the laws, regulations and related standards of the country or region where you are located.

The inverter is heavy. Please keep it balanced during handling to prevent the inverter from falling and injuring the operator.

The power cable and signal cable ports at the bottom of the inverter cannot bear any weight. Do not touch wiring terminals directly. Place the inverter horizontally.

When the inverter is placed on the ground, put foam or paper under it to avoid damage to the shell.

## 3.5 Wall Mounted ⚠ Attenion

When drilling holes, ensure that the holes are drilled away from water pipes and cables in the wall to avoid dangers.

When drilling holes, wear goggles and a dust mask to prevent dust from inhaling into the respiratory tract or falling into the eyes.

## 4. Electrical Connection

Before installation and maintenance, ensure that the AC/DC side is not powered on. The capacitors are still powered on for a period of time after the inverter is powered off. Therefore, wait at least five minutes to ensure that the capacitors are fully discharged. single -phase hybrid inverters are used in battery energy storage photovoltaic systems. Equipment can be damaged if not used as intended.

## 4.1 Electrical System Connection Diagram ⚠ Attenion

Connect the N and PE cables to the GRID and BACK-UP ports of the inverters in different regions according to local regulations. For details, see local regulations.

If the BACK-UP AC port is powered on after the inverter is started, power off the inverter to maintain the backup load. Otherwise, electric shocks may occur.

Inverter GRID and BACK-UP AC ports have built-in relays. When the inverter is in off-grid state, the built-in GRID relay is in disconnected state; When the inverter is in the GRID state, the built-in GRID relay is in the closed state.

Recommended circuit breaker specifications: DC circuit breaker rated current ≥ 160A; AC circuit breaker rated current ≥ 100A (of which the grid-side AC circuit breaker needs to be decided according to the actual load power used and local

regulations).

**Note: During final installation, circuit breakers for external connections to the inverter shall comply with IEC 60947-1 and IEC 60947-2 certification requirements.**

## 4.2Connecting the Ground Cable (PE) Attenion

Since the inverter is a transformer-free type, it is required that the positive and negative electrodes of the photovoltaic array cannot be grounded, otherwise the inverter will fail. In the photovoltaic power generation system, all non-current-carrying metal components (such as brackets, distribution cabinet enclosures, inverter enclosures, etc.) should be connected to the ground.

## 4.3 Connecting the PV Cable and the Battery Cable

**PV series connection:** Danger

Do not connect the same PV series to multiple inverters. Otherwise, the inverters may be damaged.

Before connecting the PV series to the inverter, confirm the following information. Otherwise, the inverter may be permanently damaged or fire may occur, which may cause personal and property loss.

Ensure that the maximum short circuit current and maximum input voltage of each PV are within the allowable range of the inverter.

Ensure that the positive terminal of the PV string is connected to the PV+ of the inverter, and the negative terminal of the PV string is connected to the PV- of the inverter.

**Battery cable connection:** Danger

A battery short circuit may cause personal injury. However, a short circuit may release a large amount of energy, which may cause fire.

Before connecting the battery cable, ensure that the inverter and battery are powered off, and the front and rear switches of the device are off.

Do not connect or disconnect battery cables when the inverter is running. Improper operations may result in electric shock.

Do not connect the same battery string to multiple inverters. Otherwise, the inverters may be damaged.

Do not connect loads between the inverter and the battery.

When connecting battery cables, use insulation tools to prevent accidental electric shock or battery short circuit.

Ensure that the open circuit battery voltage is within the allowable range of the inverter.

When connecting and disconnecting the batteries, make sure that the inverter is completely disconnected and there is no voltage at the battery ports.

**PV series connection:** Warning

The PV string output does not support grounding. Before connecting the PV string to the inverter, ensure that the minimum insulation resistance to the ground of the PV string meets the minimum insulation impedance requirement.

**Battery cable connection:** Warning

When connecting cables, the battery cable matches BAT+ and BAT- on the battery terminal.

Ensure that the cable core is fully connected into the wiring hole of the terminal.

Ensure that the cables are securely connected. Otherwise, the terminal may overheat and damage the device.。

## 4.4 Connecting the AC Grid-Connected Cable Warning

Ensure that the AC cable matches the L3, N, and ground ports of the AC terminal properly. Incorrect connection may cause device damage.

Ensure that the cable core is fully connected into the wiring hole of the terminal.

Ensure that the insulation board at the AC terminal is tightly fastened.

Ensure that the cables are securely connected. Otherwise, the terminal may overheat and damage the device.

**The maximum current allowed to pass through the circuit breaker used for external connection from the grid shall be more than or equal to 100A; the maximum current allowed to pass through the circuit breaker used for external connection from off-grid loads shall be more than or equal to 100A.**

# 5.Troubleshooting and Maintenance

## 5.1 Regular maintenance Warning

Make sure that the inverter is disconnected from power. Wear personal protective equipment when operating the inverter.

**Table 5-2 Maintenance Instructions**

| Maintain content | Maintenance methods | Maintenance Cycle |
|---|---|---|
| System cleaning | Check for foreign objects and dust on the heat sink and air inlet/outlet. | Once/Half a year~Once/Year |
| DC switch | Continuously turn on and off the DC switch 10 times to ensure that the DC switch functions properly. | Once/Year |
| Electrical connection | Check whether the cable connection is loose or detached, whether the appearance of the cable is damaged, and whether there is copper leakage. | Once/Half a year~Once/Year |