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MS SERIES USER MANUAL



SOLAR INVERTER

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1 Symbols


| | |
|---|---|
|  | Risk of injury due to improper handling of the device |
|  | Recyclable materials |
|  | Danger of high voltage & electric shock |
|  | Keep upwards |
|  | Don't touch, hot surface! |
|  | Stack no more than 4 |
|  | Special disposal instructions |
|  | Fragile |
|  | Keep Dry |
|  | Refer to operation instructions |
|  | Wait at least 5 minutes after disconnecting the inverter before touching internal parts |
|  | CE mark. |

2 Safety measures & warning

The MS series inverter of Jiangsu GoodWe Power Technology Co., Ltd. (hereinafter referred to as GoodWe) strictly conforms to related safety rules in design and test.

Safety regulation relevant to the location shall be followed during installation, commissioning, operation and maintenance. Improper operation may have a risk of electric shock or damage to equipment and property. (MS: Three MPPT, Single-Phase)

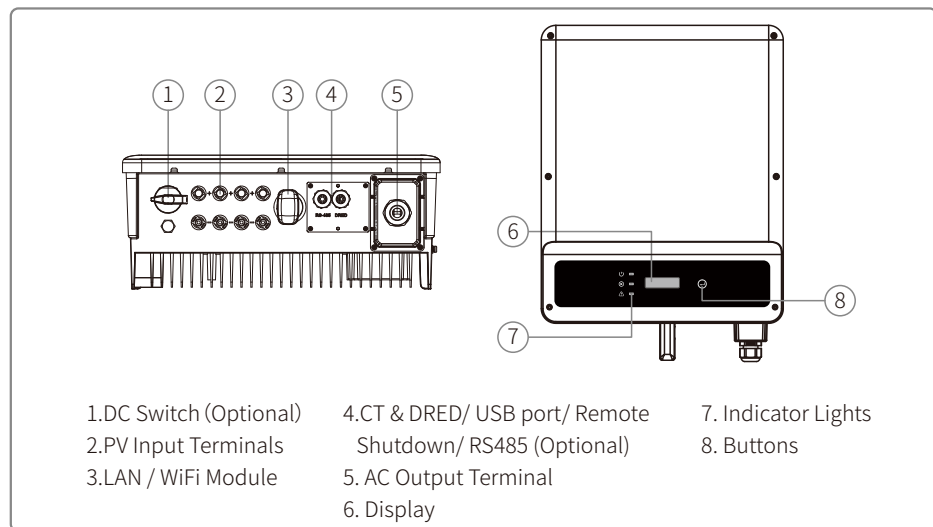
- Installation, maintenance and connection of inverters must be performed by qualified personnel, in compliance with local electrical standards, regulations and the requirements of local power authorities and/or companies.
- To avoid electric shock, DC input and AC output of the inverter must be disconnected and wait at least 5 minutes before performing any installation or maintenance.
- The temperature of some parts of the inverter may exceed 60°C during operation. To avoid being burnt, do not touch the inverter during operation. Let it cool before touching it.
- Keep children away from inverters.
- Do not open the front cover of the inverter. Apart from performing work at the wiring terminal (as instructed in this manual), touching or changing components without authorization may cause injury to people, damage to inverters and annulment of the warranty.
- Static electricity may damage electronic components. Appropriate method must be adopted to prevent such damage to the inverter, otherwise the inverter may be damaged and the warranty annulled.
- Ensure the output voltage of the proposed PV array is lower than the maximum rated input voltage of the inverter; otherwise the inverter may be damaged and the warranty annulled.
- When exposed to sunlight, the PV array generate dangerous high DC voltage, Please operate according to our instructions, or it will result in danger to life.
- PV modules should have an IEC61730 class A rating.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Completely isolate the equipment should: switch off the DC switch, disconnect the DC terminal, and disconnect the AC terminal or AC breaker.
- Prohibit inserting or pulling the AC or DC terminals when the inverter is electrified.
- An earthing photovoltaic system needs to connect an Arc fault detector on DC side.
- The inverter can exclude the possibility of DC residual currents to 6mA in the system, Where an external RCD is required in addition to the built-in RCMU, type A RCD must be used to avoid tripping.
- The PV is not grounded as default configuration.

 To ensure IP65, inverters must be sealed well, please install the inverters in one day after unpacking, otherwise please seal all unused terminals/holes, not allowed to keep any terminals/holes open, confirm there is no risk to have water&dust in.

3 Product introduction

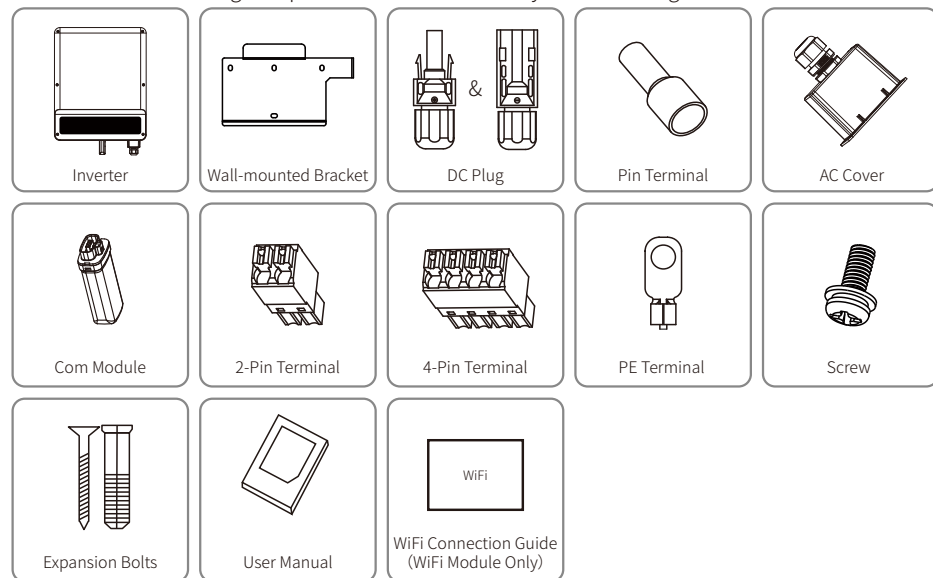
3.1 Inverter Overview

Please refer as below.



3.2 Package

Check if there is missing components and if there is any visible damage.

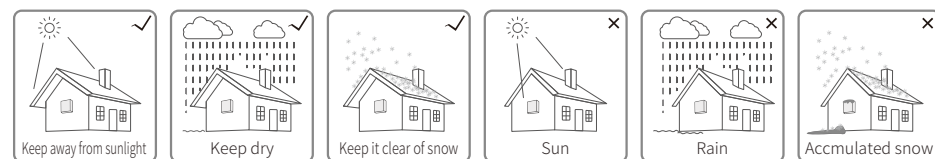


2-Pin terminal is used for CT; 4-Pin terminal is used for RS485; 6-Pin terminal is used for DRED/ Remote shutdown.

4 Installation

4.1 Mounting instructions

- In order to achieve optimal performance, the ambient temperature should be lower than 45°C.
- For easy maintenance, we suggest to install the inverter at eye level.
- Inverters should NOT be installed near inflammable and explosive items. Strong electro-magnetic charges should be kept away from installation site.
- Product label and warning symbols should be placed at a location that is easy to read by the users.
- Make sure to install the inverter at a place where it is protected from direct sunlight, rain and snow.

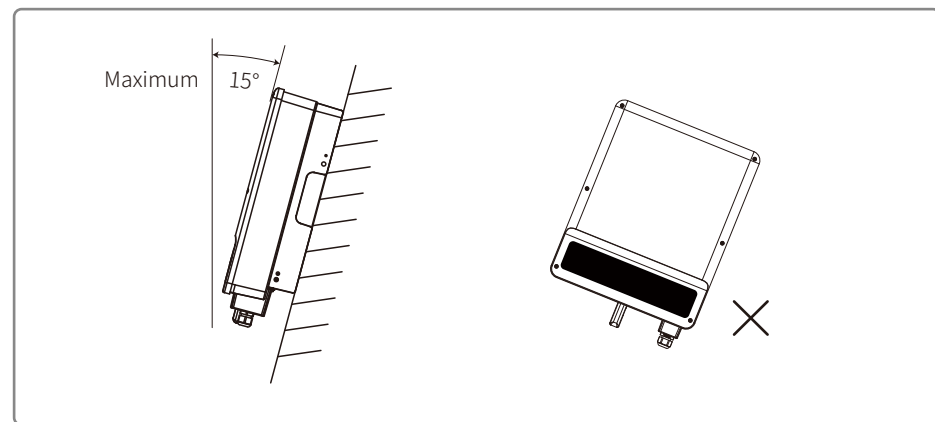


4.2 Inverter Installation

4.2.1 Selecting the installation location

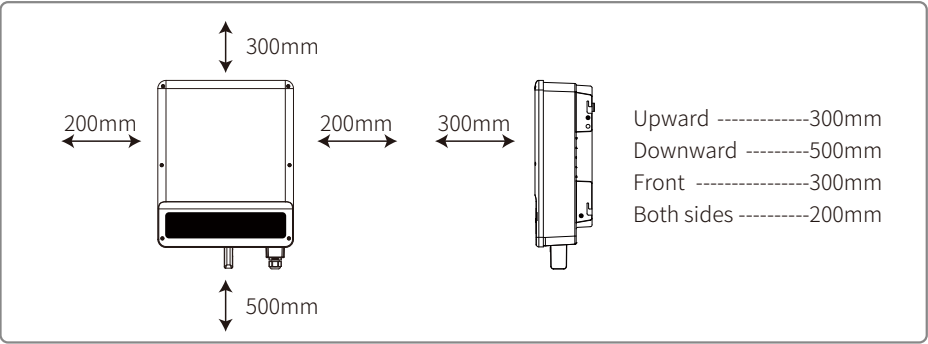
The following must be considered when selecting the best location for an inverter:

- The mounting and installation method must be appropriate for the inverter's weight and dimensions.
- The location must be well ventilated and sheltered from direct sunlight.
- The inverter must be installed vertically or with a backward tilt of no more than 15 degrees. No sideways tilt is allowed. The connection area must face downwards.



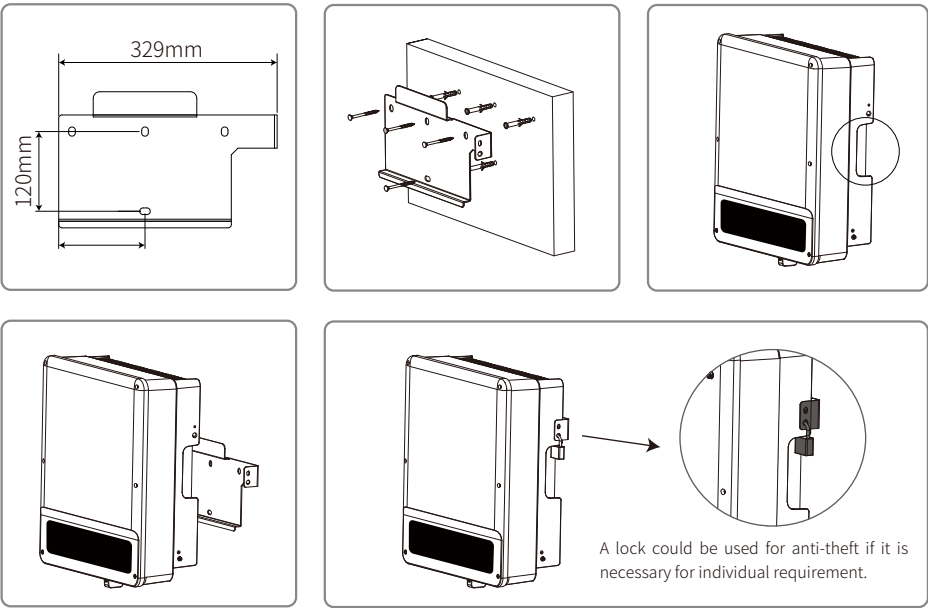
For dissipation of heat and convenience of dismantling, clearnaces around the inverter must meet the standard as shown below :

The installation position should not prevent access to the disconnection means.



4.2.2 Mounting Procedure

1. Use the wall-mounted bracket as a template and drill holes in the wall, 10 mm in diameter and 80mm deep
2. Fix the wall-mounted bracket on the wall by using the expansion bolts in the accessory bag.
3. Hold the inverter by the side groove.
4. Install the inverter on the wall-mounted bracket.



4.3 Electrical Connection

4.3.1 Connection to grid (AC side Connection)

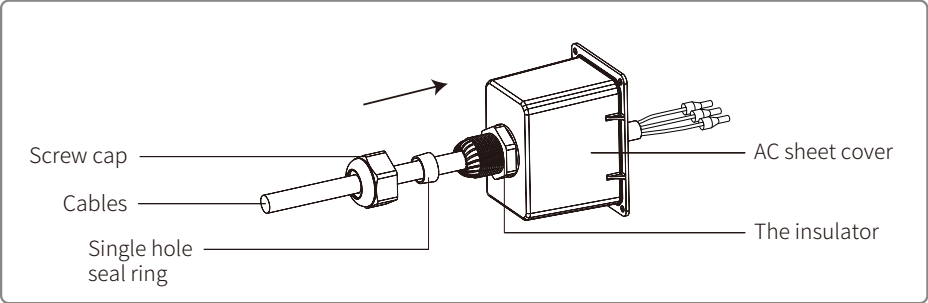
1. Check the grid voltage and frequency to see if it can comply with the required voltage and frequency of the inverter connection.
2. Add a breaker or fuse to AC side, the specification should be more than 1.25 times of rated AC output current.
3. The PE line of inverter should be connected to the earth, make sure the impedance of neutral wire and earth wire is less than 10ohm.
4. Disconnect the breaker or fuse between the inverter and the utility.
5. Connect the inverter to the gird as follows.

Cable specification of AC side .

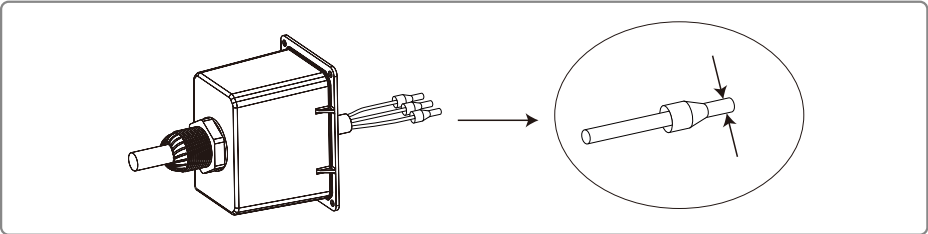
| Grade | Description | Value |
|-------|------------------------|-----------|
| A | Outside diameter | 13~18mm |
| B | Separated wire length | 20~25mm |
| C | Conductor wire length | 7~9mm |
| D | Conductor core section | 2.5~10mm² |

| Inverter | Conductor core section |
|--------------------|------------------------|
| GW5000-MS/GW6000MS | 2.5mm² |
| GW7000-MS | 4mm² |
| GW8500-MS/GW10K-MS | 10mm² |

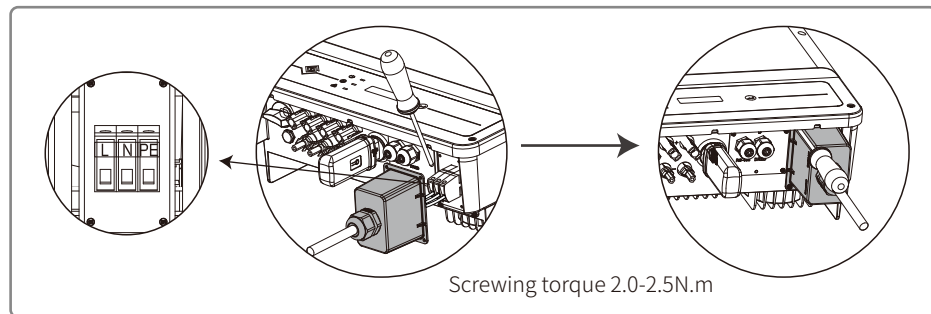
Step 1: Put AC cable through terminal cover follow the sequence.



Step 2: Press the 3 connectors on cable conductor core tightly.



Step 3: Lock the cover and screw the cap.1. Connect the assembled AC cables into AC terminals with fastening torque about 2.0-2.5N.m. Then lock the cover and screw the cap.



4.3.2 AC circuit breaker and leakage current protection device

In order to ensure that the inverter can be safely and reliably disconnected from the power grid, please install an independent two pole circuit breaker to protect the inverter.

| Inverter model | AC breaker specification |
|-----------------------|--------------------------|
| GW5000-MS | 32A |
| GW6000-MS | 40A |
| GW7000-MS / GW8500-MS | 50A |
| GW10K-MS | 63A |

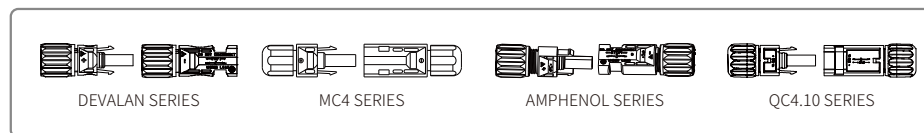
Note: Multiple inverters are not allowed to share a circuit breaker.

The integrated leakage current detection device of the inverter can detect external leakage current in real time. When the detected leakage current exceeds the limit value, inverter will quickly disconnect from the grid, If the leakage current protection device is installed externally, the action current should be 300mA or higher.

4.3.3 DC Side Connection

- Before connecting the PV strings, please ensure that the plug connectors have the correct polarity. Incorrect polarity could permanently damage the unit.
- The open circuit voltage of the PV strings cannot exceed the maximum input voltage of the inverter.
- Only DC connectors provided by manufacturer are permitted for use.
- The positive and negative pole are not allowed to connect to the PE wire (Ground wire). Otherwise, it will damage the unit.
- Do not connect positive or negative pole of PV string to PE wire. Otherwise, it will cause damage to inverter.
- Positive cable shall be red, negative cable shall be black.
- The minimum insulation resistance to ground of the PV panels for MS series must exceed 33.4K Ω ($R=1000/30mA$). There is a risk of shock hazard if the requirements of minimum resistance are not met.

There are four types of DC connectors, DEVALAN, MC4, AMPHENDL H4 and QC4.10 series.

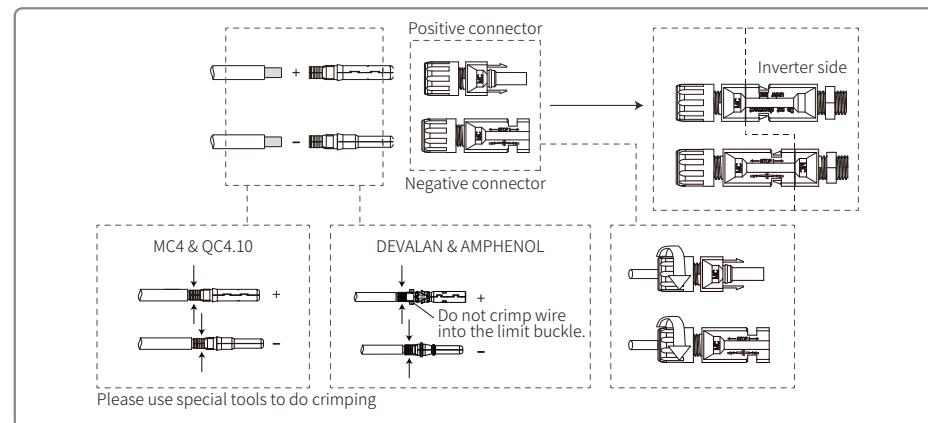


DC Cable specification:

| Grade | Description | Value |
|-------|-----------------------------------|----------------------|
| A | Outside diameter | 4~5mm |
| B | Conductor Material Sectional Area | 2.5~4mm ² |
| C | Bare Wire Length | 7mm around |

DC Cable should use dedicated PV cable (Suggest using 4mm PV1-F wire).

Installation instruction of DC connector:



4.3.4 Earth Terminal Connection

The earth terminal should be added according to the requirement of IEC62109-1:2010. It is necessary that installation person must connect the terminal to earthing wire.

The earth connecting terminal is on the side of inverter, illustrated as right. The customer should select the right place to grounding based on site condition.

| NO. | Name | Explanation |
|-----|-----------------------|-----------------|
| A | Cold-pressed terminal | |
| B | Screw | M5*14 (1~1.5Nm) |
| C | Yellow and green line | |

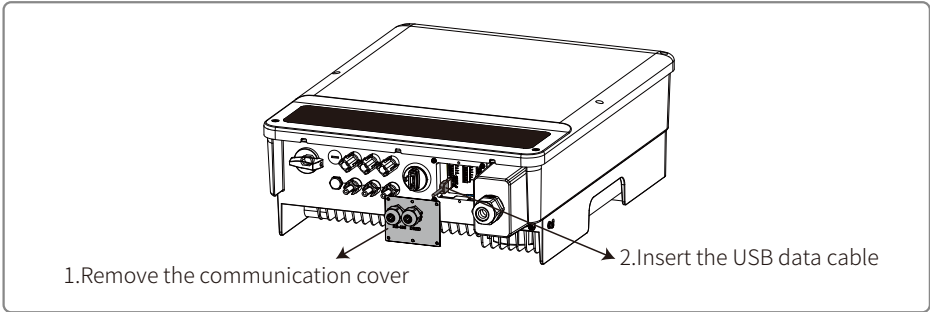
| Inverter | Conductor core section |
|---------------------------------------|------------------------|
| GW5000-MS/GW6000MS/GW7000-MS/GW8500MS | 6mm ² |
| GW9000-MS/GW10K-MS | 10mm ² |

4.4 Communication connection

Inverter operation data can be transferred by USB, RS485 or WIFI Modular to a PC with monitoring software or to a data logger device such as Ezlogger Pro. USB is only used for service debug; RS485 is the standard communication choice for inverter, and WIFI modular can be used optionally for communication.

4.4.1 USB connection

USB cable must be connected according to the following steps as below:



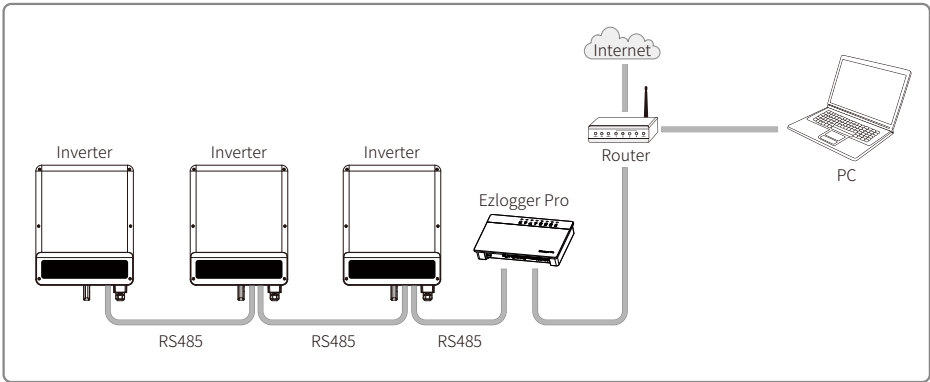
USB communication is only used for the inverter configuration by operation and maintenance personel.Please do not use for other purpose.

4.4.2 RS485 Communication

This function only applies to the inverter with RS485 ports.

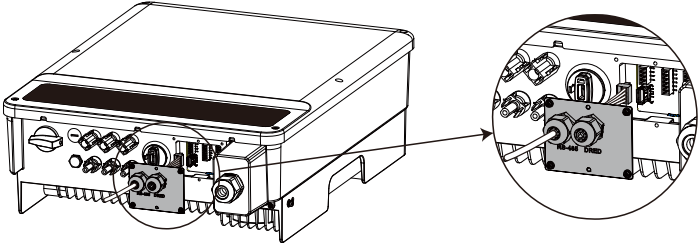
The RS485 port of inverter is used to connect the EzLogger Pro, and the total length of connecting cable should not exceed 800m.

Communication lines must be separated from other power lines to prevent the communication from being interfered. RS485 connection please refer as below.



The connection steps of RS485 communication of MS series are as follows:

Step 1: Screw this plate off from inverter.



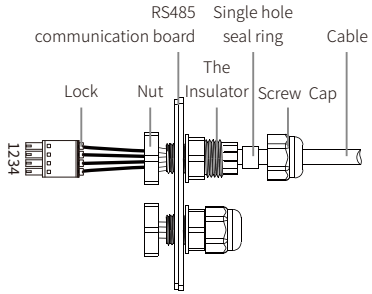
Step 2:

Put the cable through the plate.

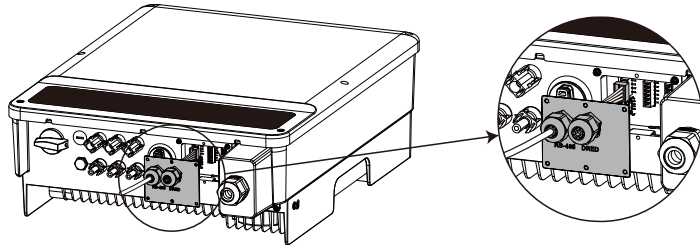
Connect RS485 cable on the 4-pin terminal.

Advise to use cable 16AWG-26AWG.

| No. | Function |
|-----|----------|
| 1 | RS485+ |
| 2 | RS485- |
| 3 | RS485+ |
| 4 | RS485- |



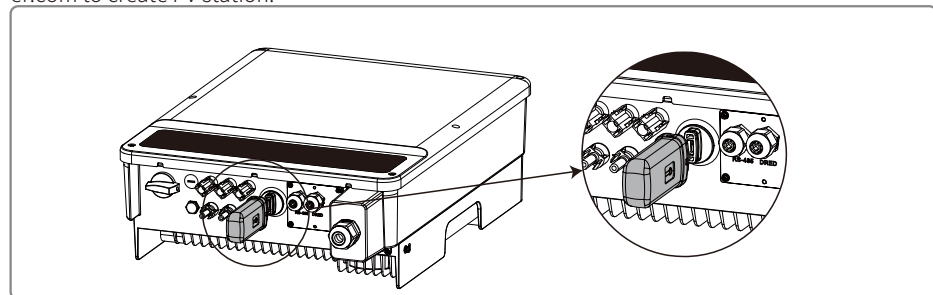
Step 3: Connect the terminal to the right position onto the inverter and screw the plate.



Connect the inverter to Ezlogger Pro through communication cables of RS485.Connect the Ezlogger Pro to the interchanger or the router through UTP (Unshielded Twisted Pair).

4.4.3 Wi-Fi/LAN Communication

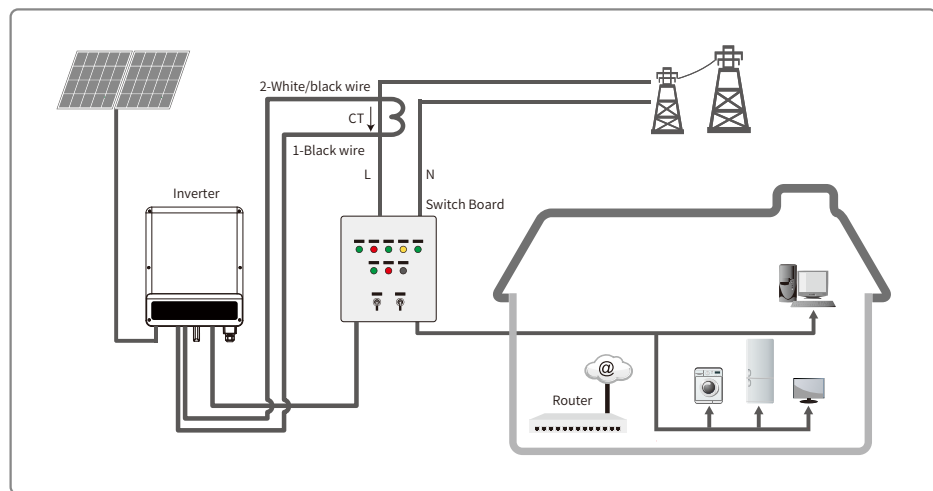
The Wi-Fi/LAN communication function is only applicable if the inverter has a WiFi module. The detailed configuration instruction please refer to Wi-Fi Configuration/LAN Module Quick Installation Guide in the accessory box. After configuration, please browse <http://www.goodwe-power.com> to create PV station.



This port is used for connection of Wi-Fi or LAN module only. No connection to USB is allowed. Do not connect PC or other device to this port.

4.4.4 Export power limit connection diagram

The methods of connecting the Power Limiting device CT is shown below.



4.4.5 DRED /Remote Shutdown /CT connection

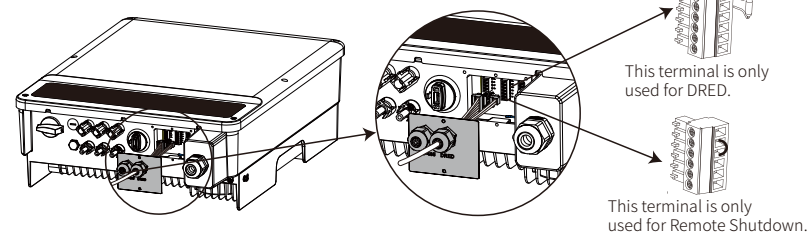
DRED (Demand response enabling device) is only for Australian and New Zealand installations, in compliance with Australian and New Zealand safety requirements. And DRED is not provided by manufacturer.

Remote shutdown is only for Europe installations, in compliance with European safety requirements. And Remote shutdown device is not provided by manufacturer.

Detailed operation is shown as below:

The connection steps of DRED /Remote Shutdown& CT communication of MS series as follows:

Step 1: Screw this plate off from inverter.



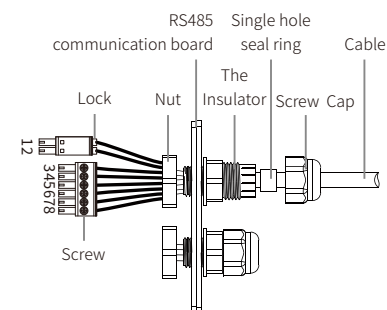
Step 2-1 For DRED& CT:

Put the cable through the plate.

Connect RS485 cable on the terminal.

Advise to use cable 16AWG-26AWG.

| No. | Function | No. | Function |
|-----|----------|-----|----------|
| 1 | CT- | 3 | COM/DRMO |
| 2 | CT+ | 4 | REFGEN |
| | | 5 | DRM4/8 |
| | | 6 | DRM3/7 |
| | | 7 | DRM2/6 |
| | | 8 | DRM1/5 |



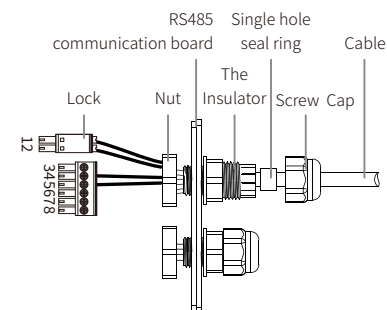
Step 2-2 For Remote Shutdown& CT:

Put the cable through the plate.

Connect RS485 cable on the terminal.

Advise to use cable 16AWG-26AWG.

| No. | Function | No. | Function |
|-----|----------|-----|----------|
| 1 | CT- | 3 | NC |
| 2 | CT+ | 4 | REFGEN |
| | | 5 | DRM4/8 |
| | | 6 | NC |
| | | 7 | NC |
| | | 8 | NC |

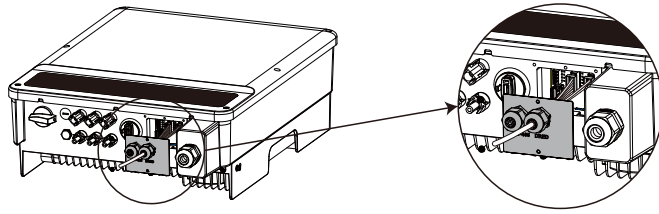


Notes:

2-pin terminal is used to make connection to CT device. You can find it in the accessory bag.

6-pin terminal is used to make connection to DRED / remote shutdown device. If DRED / remote shutdown device is not available, please keep it unconnected.

Step 3: Connect the terminal to the right position onto the inverter and screw the plate.



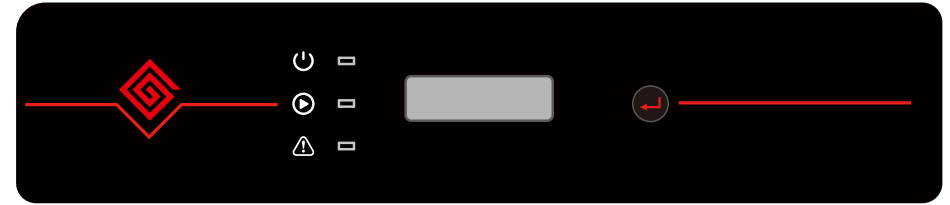
1. Supported DRM command: DRM0, DRM5, DRM6, DRM7, DRM8.
2. After finishing the installation, please set up power limiting function referring to section 4.2(6).
3. Pay attention to the direction of CT when wiring. CT clip should be locked tightly. White / Black cable should be connected to Line 2, black cable should be connected to Line 1. Tighten them with screwdriver. Make sure that CT cables are connected to the right output phase lines of inverter when in use.
4. If not connected to CT, the inverter will show "CT Disconnect". If CT is connected reversely, the inverter will show "CT Reverse" when it enters into on-grid status.

4.4.7 Earth Fault Alarm

The inverter complies with IEC62109-2 chapter 13.9. When earth fault occurs, the fault indicator LED on the front cover will light up. For non-wifi inverter, the buzzer in the inverter will keep ringing for 1 minute every half an hour unless the fault is resolved (This function is only available for Australia/New Zealand).

5 System Operation

5.1 Indicator Lights



Inverter with LCD, indicator lights in Yellow/Green/Red correspondently refer to / /

| Indicator | Status | Explanation |
|-----------|--------|---|
| | | ON = WiFi/ LAN connected / active |
| | | BLINK 1 = WiFi/ LAN system resetting |
| | | BLINK 2 = WiFi/ LAN router problem |
| | | BLINK 4 = WiFi/ LAN server problem |
| | | OFF = WiFi/ LAN not active |
| | | ON = Inverter is feeding power |
| | | OFF = Inverter is not feeding poweratthe moment |
| | | ON = Fault occurred |
| | | OFF = No fault |

5.2 User Interface and Use of The Display

Set Country /Region's Safety Setting :

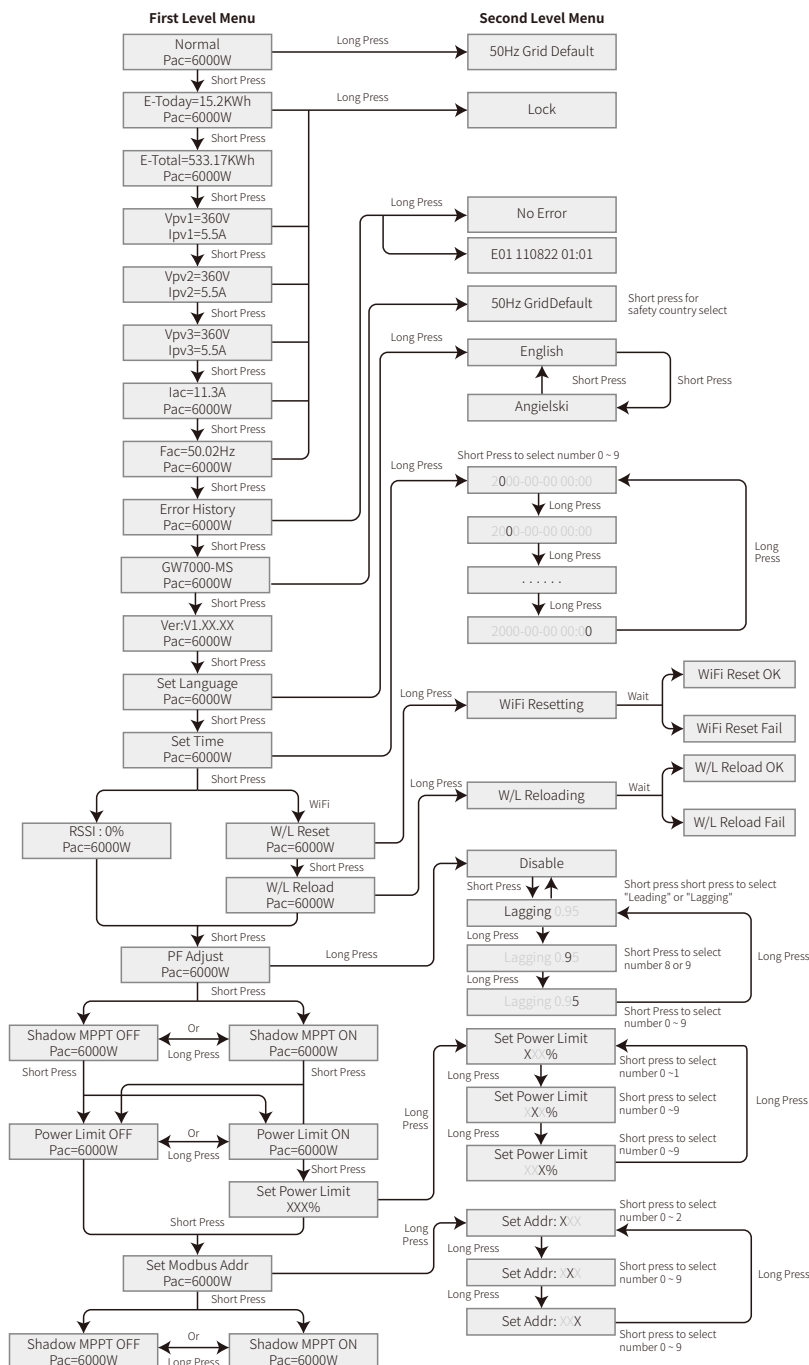
If display shows "**Select-Country/Region**", then long press (2S) the key to enter the second level menu. Short press to browse the countries available. Please wait (10s) after choosing the suitable country/region's safety setting according the location of installation.

1. A schematic of the display screen is shown as below:

Normal
Pac=6000.0W

Display area is divided as follows:

Line 1
Line 2



2. Display area

Line 1---Working status information

Line 2---Diaplays of the real-time power generated by the inverter.

This area displays the status information. **"Waiting Pac=0.0W"** indicates the inverter is standing by for power generation; **"Checking**S Pac=0.0W"** (checking time is based on safety, and varies from country/region to country/region) indicates the inverter is self-checking, counting down and preparing for power generation. **"Normal Pac=6000.0W"** indicates the inverter is generating power. If any condition of the system is abnormal, the screen will display an error message. Refer to the chapter Troubleshooting.

Through button operation, the screen can display different information such as operation parameters and power generation status in this area.

3. Operation of the display

There are 2 modes of button operation: short press and long press.

The display allows access to the configuration of the basic parameters. All the languages, time and country/region safety setting can be configured by pressing the buttons. The menu shown in the LCD display area has two levels. Short pressing or long pressing will take you to different menus. Normally, in all levels of the menu, if no action is taken over 20 seconds, the backlight of the LCD display will be switched off, and the display will automatically revert to the first item of the first level menu, and then any modifications made to the data will be stored into internal memory.

Items in the first level menu will be locked if the second level menu doesn't show. For these items, when the button is pressed for two second, the LCD will display the word **"Lock"**, the display will stay in the lastest locked menu. The locked menu can only be unlocked through system mode switching, fault occurrence or button operation.

4. Menu introduction

- When the PV panel is feeding power to the inverter, the screen will show the first-level menu.
- The initial display is the first item of the first level menu, and the interface displays the current status of the system, it shows **"Waiting Pac=0.0W"** in the initial state; it shows **"Normal Pac=6000.0W"** during power generation mode; if there is something wrong with the system, an error message is shown. Please refer to the chapter Troubleshooting.

The way to view all the data in the menu:

- Short press the button to enter the E-Today menu which displays the total power generation for today.
- Short press the button to enter the E-Total menu which displays the total power generation up to today.
- Short press the button to enter the menu which displays the PV1 voltage in "V" and current in "A".
- Short press the button to enter the menu which displays the PV2 voltage in "V" and current in "A".

- Short press the button to enter the menu which displays the PV3 voltage in "V" and current in "A".
- Short press the button to enter the Vac which displays the grid voltage in "V".
- Short press the button to enter the Fac which displays the grid frequency in "Hz".
- Ways to view Error message:

Short press the button to enter the Error Message History menu.

Long press (2s) the button to enter the second level menu of error detection. The last five inverter error message will be shown by short pressing the button in this second level menu. The records include error message and error times (190520 15:30). Error message can be found in "5.3 Erroe message".

- The way to view model name and reconfigure safety country/region:

From the error message history item in the first level menu, short press the button once to see model name.

If you want to change the country/region's safety setting , please long press the button for 2 seconds, then the LCD screen will access to the second level menu.

In the second level menu, short pressing the button can change the safety country/region. If you change nothing in second level menu and without pressing button over 20 seconds, then the backlight of LCD will power off and return to the first level menu.

- View software version

Short press the button from the model name item to check the software version in the first level menu.

5. Basic setting:

- Set language:

Short press the button to enter the Set Language menu. Long press (2s) the button to enter the second level menu. Short press to browse the available languages. If you change nothing in second level menu and without pressing button over 20 seconds , then the backlight of LCD will power off and screen return to the first level menu.

- Set time:

From Set language menu in the first level, short press the button to enter the Set Time menu.

Long press (2s) the button to enter the second level menu. The initial display is "2019-00-00 00:00", in which the first four numbers represent the year (e.g 2000-2099); the fifth and sixth numbers represent the month (e.g 01-12); the seventh and the eighth numbers represent the date(e.g 01-31). The remaining numbers represent the time.

Short press to change the number in current location, and long press (2s) to move the cursor to next position. The inverter will store the time if there is no input over 20 seconds, and the LCD will automatically return to the main menu and the backlight will switch off.

- MPPT (Maximum Power Point Track) function for Shadow:

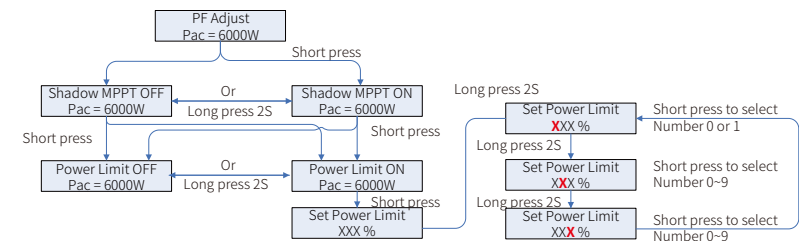
The default setting for shadow optimizer is disabled.

Please do not enable the function when there is no shadow on panel. Otherwise it could lead to generating less power.

Short press the button to enter Shadow Optimize menu. When it shows "**Shadow MPPT OFF**", it means the shadow optimizer is off. Long press the button for 2s to turn on the function.

- Power limiting function setting

The Operations of the ON/OFF power limiting function (the default is OFF) and the power limiting settings (the default is 2% rated) are shown below:



Note:

If the power limiting function is ON, the maximum output power of the inverter will be limited to the value of the power limiting settings while the inverter is without a power limiting device or the device is not working.

You need to enter a password before being able to set the power limit. The default password is "1111".(This function is only available for Australia/New Zealand)

- Explanation of some Messages

| Message | Explanation |
|-------------------|--|
| F/W Updating | DSP firmware is upgrading |
| 70% Rated Enable | Only for German safety code. The output power limit of inverter is set as 70% of nominal power of inverter. |
| 100% Rated Enable | Only for German safety code. The output power limit of inverter is set as 100% of nominal power of inverter. |
| Shadow MPPT OFF | Turn off shadow scan function |
| Shadow MPPT ON | Turn on shadow scan function |
| RSSI: % | Signal intensity of GPRS in percentage. |
| % Prated | Export power limit setting. The export power to the grid is **% of nominal power. |

6. Operation of display under grid-connected mode.

When the input voltage reaches the inverter's turn-on voltage, the LCD starts to work, the yellow light will be turned on and the LCD will display "**Waiting**". More information will be displayed within a few second. If the inverter is connected to the grid, "**Checking XXs**" will be displayed and a countdown will commence from XX seconds (Different countries or regions have different regulation of time for countdown). When it shows "**Checking 0S**", you will hear the relay be triggered some times. Then the LCD will display "**Normal**". The instant power output will be shown at the bottom of the LCD.

5.3 Error Message

An error message will be displayed on the LCD if a fault occurs.

| Error code | Description |
|------------|--|
| 03 | Grid frequency out of permissible range. |
| 14 | Ground insulation impedance is too low. |
| 15 | Grid voltage out of permissible range. |
| 17 | Overvoltage at DC input. |
| 19 | Over temperature on the case. |
| 23 | Utility is unavailable. |

5.4 W/L Reset & W/L Reload

The two functions are only available for Wi-Fi/ LAN model inverters.

W/L reload function is used to change the W/L configuration to default value.

Please configure the Wi-Fi/LAN as 4.4.3 after using the function.

Press the button until the LCD displays "**W/L Reset**", then long press (2S) until the LCD displays "**W/L Resetting...**". Stop press and wait for the screen to show "**W/L Reset OK**" or "**W/L Reset Failed**".

Press the button until the LCD displays "**W/L Reload**", then long press (2S) until the LCD displays "**W/L Reloading...**". Stop pressing and wait for the screen to show "**W/L Reloading OK**" or "**W/L Reloading Failed**".

5.5 Special Adjustable Setpoints

The inverter has a field where the user could set functions, such as trip point, trip time, time of reconnection, active and inactive of QU curve and PU curve. Functions can be adjusted through special software. If interested, please contact After-Sales. The software installation package are available on the official website. Alternatively, please contact after-sales for more information.

6 Troubleshooting

If the Inverter is not able to work properly, please refer to the following instructions before contacting your local service. If any problems arise, the red (FAULT) LED indicator on the front panel will light up and the LCD screen will display relevant information. Please refer to the following table for a list of error message and associated solutions.

| Type of fault | | Troubleshooting |
|----------------|-------------------|---|
| System failure | Isolation Failure | <ol style="list-style-type: none">1. Turn off DC switch first, then take off DC connector and AC connector. Check the impedance between PV (+) & PV (-) to earth.2. If impedance is less than 100KΩ, please check the insulation of PV string wiring to the earth.3. If impedance is larger than 100KΩ, please contact local service office.4. Take off AC connector, measure the impedance between neutral wire and PE line. If it is larger than 10KΩ, please check AC wiring. |
| | Ground I Failure | <ol style="list-style-type: none">1. Turn off DC switch first, then take off DC connector and AC connector, check the insulation of PV string wiring to earth.2. Restart the DC switch.3. If the problem still exists, please call the local service office. |
| | Vac Failure | <ol style="list-style-type: none">1. Turn off DC switch first, then take off the AC connector and DC connector, measure the voltage between live line and neutral wire in connector. Check if it conforms to the grid-connected specification of inverter.2. If not, please check grid wiring.3. If conforming to the specification, please connect AC connector, restart DC switch. The inverter will connect grid automatically. If the problem still exists, please call the local service office. |
| | Fac Failure | <ol style="list-style-type: none">1. Turn off DC switch first, then take off the AC connector and DC connector, check if the AC line and PE line are right.2. If the problem still exists, please call the local service office. |
| | Utility Loss | <ol style="list-style-type: none">1. Turn off DC switch first, then take off the AC connector and DC connector, measure the voltage between live line and neutral wire in connector. Check if it conforms to the grid-connected specification of inverter.2. If not, please check if the distribution switch is connected and the grid is normal.3. If conforming to the specification, reconnect AC connector and DC connector. If the problem still exists, please call the local service office. |
| | PV Overvoltage | <ol style="list-style-type: none">1. Turn off DC switch first, then take off the AC connector and DC connector, check PV string voltage. Check if it exceeds the input voltage in inverter specification.2. If it does, please reconfigure PV panel string.3. If the problem still exists, please call the local service office. |
| | Over Temperature | <ol style="list-style-type: none">1. Turn off DC switch first, then take off the AC connector and DC connector2. Reduce ambient temperature.3. Move the inverter to a cool place.4. If the problem still exists, contact local service office for help. |

| Type of fault | | Troubleshooting |
|------------------|---------------------|--|
| Inverter failure | Relay-Check Failure | 1. Disconnect the DC connector and AC. 2. Reconnect the DC connector. 3. If the problem still exists, please call the local service office. |
| | DCI Injection High | |
| | EEPROM R/W Failure | |
| | SPI Failure | |
| | DC BUS High | |
| | GFCI Failure | |
| Others | No display | 1. Turn off DC switch, take off DC connector, measure the voltage of PV array. 2. Plug in DC connector, and turn on DC switch. 3. If PV array voltage is lower than 150V, please check configuration of invert module. 4. If voltage is higher than 150V and the problem still exists, please contact local office. |

Note:

When sunlight is insufficient, the PV Inverter may continuously start up and shut down automatically due to insufficient power generated by the PV panel.

Explanation of some faults:

| Fault | Explanation |
|-----------------|---|
| Consistent Fail | Consistence failure between two DSP chips in inverter which check simultaneously grid voltage and frequency and other variables. Consistence error occurs when there is much difference in the results detected by both chips. |
| DCI High | The DC current injection exceeds the threshold and triggers protection. |
| EEprom R/W Fail | Error in reading/writing from/into the memory card data storage such as SN, generation. |
| SPI Fail | Error of abnormal data transmission between two DSP chips. |
| Ref 2.5v Fail | The reference voltage limitation is exceeded, which leads to detection deviation of voltage and current. |
| AC HCT fail | Error in AC current sensor. |
| E: | Error message. |

7 Technical Parameters

| Technical Data | GW5000-MS | GW6000-MS | GW7000-MS | GW8500-MS | GW10K-MS |
|-----------------------------------|---|----------------|----------------|----------------|----------------|
| PV Input Data | | | | | |
| Max. DC Input Power (Wp) | 10000 | 12000 | 13500 | 13500 | 13500 |
| Max. DC Input Voltage (V) | 600 | 600 | 600 | 600 | 600 |
| MPPT Range (V) | 80~550 | 80~550 | 80~550 | 80~550 | 80~550 |
| Start-up Voltage (V) | 80 | 80 | 80 | 80 | 80 |
| Min. Feed-in Voltage(V) | 120 | 120 | 120 | 120 | 120 |
| Nominal DC Input Voltage (V) | 360 | 360 | 360 | 360 | 360 |
| Max. Input Current (A) | 12.5/12.5/12.5 | 12.5/12.5/12.5 | 12.5/12.5/12.5 | 12.5/12.5/12.5 | 12.5/12.5/12.5 |
| Max. Short Current (A) | 15/15/15 | 15/15/15 | 15/15/15 | 15/15/15 | 15/15/15 |
| No. of MPP Trackers | 3 | 3 | 3 | 3 | 3 |
| No. of Input Strings per Tracker | 1/1/1 | 1/1/1 | 1/1/1 | 1/1/1 | 1/1/1 |
| AC Output Data | | | | | |
| Nominal Output Power (W) | 5000 | 6000 | 7000 | 8500 | 10000 |
| Max. Output Apparent Power (VA) | 5500 | 6600 | 7700 | 9350 | 10000 |
| Nominal Output Voltage (V) | 220/230 | 220/230 | 220/230 | 220/230 | 220/230 |
| Nominal Output Frequency (Hz) | 50/60 | 50/60 | 50/60 | 50/60 | 50/60 |
| Max. Output Current (A) | 25 | 30 | 35 | 42.5 | 45.5 |
| Output Power Factor | ~1 (Adjustable from 0.8 leading to 0.8 lagging) | | | | |
| Output THDi (@Nominal Output) | <3% | | | | |
| Efficiency | | | | | |
| Max. Efficiency | 97.7% | 97.7% | 97.7% | 97.7% | 97.7% |
| European Efficiency | 97.3% | 97.3% | 97.3% | 97.3% | 97.3% |
| Protection | | | | | |
| Anti-islanding Protection | Integrated | | | | |
| Input Reverse Polarity Protection | Integrated | | | | |
| Insulation Resistor Detection | Integrated | | | | |
| Residual Current Monitoring Unit | Integrated | | | | |
| Output Over Current Protection | Integrated | | | | |
| Output Short Protection | Integrated | | | | |
| Output Over Voltage Protection | Integrated | | | | |
| DC SPD Protection | Type II | | | | |
| AC SPD Protection | Type III (Type II optional) | | | | |
| General Data | | | | | |
| Operating Temperature Range (°C) | -25~60 | | | | |
| Relative Humidity | 0~100% | | | | |
| Operating Altitude(m) | ≤4000 | | | | |
| Cooling | Natural Convection | | | | |
| User Interface | LCD & LED | | | | |
| Communication | RS485; WiFi/LAN(optional) | | | | |
| Weight (kg) | 22.5 | | | | |
| Size (Width*Height*Depth mm) | 415*511*175 | | | | |
| Protection Degree | IP65 | | | | |
| Night Self Consumption (W) | <1 | | | | |
| Topology | Transformerless | | | | |
| Certifications & Standards | | | | | |
| Grid Regulation | Visit homepage to achieve information. | | | | |
| Safety Regulation | | | | | |
| EMC | | | | | |

Note:

Overvoltage category definition

Category I: applies to equipment connected to a circuit where measures have been taken to reduce transient overvoltage to a low level.

Category II: applies to equipment not permanently connected to the installation. For example, appliances, portable tools and other plug-connected equipment;

Category III: applies to fixed downstream equipment, including the main distribution board. For example, switchgear and other equipment in an industrial installation;

Category IV: applies to equipment permanently connected at the origin of an installation (upstream of the main distribution board). For example, electricity meters, primary overcurrent protection equipment and other equipment connected directly to outdoor open lines.

Moisture location category definition

| Moisture parameters | Level | | |
|---------------------|---------|-----------|-----------|
| | 3K3 | 4K2 | 4K4H |
| Temperature Range | 0~+40°C | -33~+40°C | -20~+55°C |
| Humidity Range | 5%~85% | 15%~100% | 4%~100% |

Environment category definition

Outdoor : the ambient air temperature is -20~50°C. Relative humidity range is from 4% to 100%, applied to PD3.

Indoor unconditioned: the ambient air temperature is -20~50 °C. Relative humidity range is from 5% to 95%, applied to PD3.

Indoor conditioned: the ambient air temperature is 0~40 °C. Relative humidity range is from 5% to 85%, applied to PD2.

Pollution degree definition

Pollution degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.

Pollution degree 2: Normally only non-conductive pollution occurs. However, a temporary conductivity occasionally caused by condensation must be expected.

Pollution degree 3: Conductive pollution occurs. Or dry, non-conductive pollution becomes conductive due to condensation, which is expected.

Pollution degree 4: Persistent conductive pollution occurs. For example, the pollution cause by conductive dust, rain and snow.