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Note: The information above is subject to change without prior notice, for details refer to www.goodwe.com
1 Symbols

Failure to observe a warning indicated in this manual may result in injury.

Recyclable materials

Danger of high voltage & electric shock

This side up - The package must always have the arrows point up

Don’t touch, hot surface!

No more than six (6) identical packages be stacked on each other.

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

This manual contains important instructions for SMT series inverter that shall be followed during installation of the inverter.

The SMT series for Three MPPT, Three-Phase solar inverter without transformer, which consists of GW12KLV-MT, GW15KLV-MT, GW20KLV-MT, GW25K-MT, GW29.9K-MT, GW30K-MT and GW36K-MT model type.

SMT Series have been designed and tested strictly according to the international safety regulation. As electrical and electronic equipment, safety instructions related to them must be complied with during installation, commissioning, operation. Incorrect or improper work may result in damage to:

1. The life and well-being of the operator or a third party.
2. The inverter and other properties that belong to the operator or a third party.

Therefore the following safety instructions must be read and always kept in mind prior to any work. All detailed work-related safety warnings and notes will be specified at the critical points in corresponding chapter.

All installation and electrical work must only be performed by qualified personnel. They have been trained specially;

- Already completely read through and understood the manual and related documents.
- Be familiar with safety requirements for electrical systems.

The inverter must be installed and maintained by professionals in compliance with local electrical standards regulations and the requirements of local power authorities or companies.

- Improper handling of this device will pose a risk of injury.
- Always follow the instructions contained in the manual when moving or positioning the inverter.
- The weight of the equipment can cause injuries, serious wounds or bruise if improperly handled.
- Please install it in a place beyond children’s reach.
- Prior to installing and maintaining the inverter, it is crucial to make certain that the inverter in not electrically connected.
- Before maintaining the inverter, disconnect the connection between the AC grid and the inverter first, and then disconnect the connection between the DC input and the inverter, you should wait at least 5mins after these disconnection in case of electric shock.
- All cables must be firmly attached, undamaged, properly insulated, and adequately dimensioned.
- The temperature of some parts of the inverter may exceed 60°C during operation. To avoid
The temperature of some parts of the inverter may exceed 60℃ during operation. To avoid

- Without permission, opening the front cover of the inverter is not allowed. Users should not touch/replace any components of the inverter except the DC/AC connectors. Manufacturer will not bear any consequences caused by unauthorized actions which will lead to potential injury to people and damage to inverters.

- 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 will be annulled.

- Ensure that 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 will be annulled.

- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

- When exposed to sunlight, the PV array will generate very high voltage which can cause electrical shock hazard. Please strictly follow the instruction we provided.

- PV modules should have an IEC61730 class A rating.

- Prohibit inserting or pulling the AC or DC terminals when the inverter is operational. Or the inverter will be destroyed.

Only DC connectors provided by Manufacturer are permitted for use, otherwise the inverter may be damaged and the warranty will be annulled.

- 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 default photovoltaic module is not grounded.

- It is recommended to add a fuse when there is more than two PV string inputs into one MPPT.

The IP65 premise is that the machine is completely sealed. Please install it within one day after unpacking, otherwise please block the unconnected port and do not open it to ensure that the machine is not exposed to water and dust.

To our inverter product, GOODWE provides standard manufacture warranty which comes with the product and prepaid warranty extension solution to our customer. You can find the details about the terms and solution from below linkage. https://en.goodwe.com/warranty.asp

3 Product Introduction

3.1 Intended Usage

The SMT series which is a Four MPPT, three phase transformer-less grid-connected inverter which is a crucial unit between the PV string and the utility grid in the PV power system.

Inverter is dedicated to converting direct current generated by the PV module into alternating current, which conforms to parameters of local utility grid and fed it into the utility grid. The intended usage of the inverter is illustrated in the below figure.

The reason why the inverter can’t be connected to the PV module is that the positive or negative terminal should be grounded, except when a transformer has been used between the inverter and grid.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>PV string</td>
<td>Monocrystalline silicon, polycrystalline silicon and others.</td>
</tr>
<tr>
<td>B</td>
<td>Inverter</td>
<td>MT Series</td>
</tr>
<tr>
<td>C</td>
<td>Meter device</td>
<td>Meter cupboard with distributed generation system</td>
</tr>
<tr>
<td>D</td>
<td>Utility grid</td>
<td>TN-S, TN-C, TN-C-S, TT, IT (different Model types with different types of utility grid as below)</td>
</tr>
</tbody>
</table>

When neutral wire of inverter is not connected to grid, "Delta Grid" should be selected in grid type(ITT) setting page.

3.2 Inverter Overview

SMT series inverter illustration.

3.2.2 DC Switch

The DC switch is designed such that the DC input can be disconnected safely. The inverter works automatically when the input and output meet the requirements. Rotating the DC switch to “OFF” position will immediately cut off the flow of DC current. Rotate the DC switch to “ON” position before starting the inverter.

3.3 Technical Description

3.3.1 Principle Description

PV string voltage is transmitted to DC BUS via BOOST circuit. The SMT series is equipped with Three MPPTs for six DC inputs to ensure that the maximum power is utilized even in different PV installation condition.

DC/AC converter circuit convert DC power into AC power, which can be fed into the utility. Protective circuit are designed to protect the inverter safety and human safety.

DC switch is integrated to allow for a safe disconnection from the DC input. The inverter provides standard interface RS485, WIFI/GPRS(optional) for communication. Inverters also provide running recode data display, parameter configuration via LCD panel. For the main block diagram please refer to "7.2 Block Diagram".

Note: The figures are shown here for reference only, actual product you receive may differ.
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3.3.2 Function Description

Inverter functions can be grouped as following.

1. Conversion function
   Inverter converts direct current power into alternating current power, which conforms to the grid requirement of its installation country.

2. Data storage and display
   Inverter stores the running information and fault records and display them on the LCD screen.

3. Parameter configuration
   Inverter provides various parameter configurations for optional operation.

4. Communication interface
   Inverter provides standard RS485&DRED communication interface, also WIFI (optional) can be provided.

5. Protection functions
   >Insulation resistance to ground surveillance.
   >Input voltage monitor
   >Residual current monitoring unit
   >Anti-islanding protection
   >PV array string fault monitoring
   >DC switch
   >DC SPD
   >AC SPD
   >SPD fault monitoring
   >AC over current protection
   >Insulation monitoring

3.4 Package

3.4.1 Unpacking And Inspection

The unit is thoroughly tested and strictly inspected before delivery. Damage may still occur during shipping.

1. Check the package for any visible damage upon receiving.
2. Check the inner contents for damage after unpacking.
3. Check the Package list and it is shown as below:

   ![Diagram of package components]

   - Inverter
   - Backboard
   - Positive DC Plug [1]
   - Negative DC Plug [1]
   - Connecting Terminal
   - RS-485 & DRED Communication Terminal
   - Fixed Screw
   - Safe Screw
   - Expansion Bolt
   - Grounding Screw
   - PE Terminal
   - AC Cover
   - WiFi Module (WiFi communication Or without LCD)
   - Quick Installation Instruction
   - WiFi Configuration Instruction
   - User's Guide of SolarGo App

4 Installation

4.1 Mounting Instructions

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

4.2 Equipment Installation

4.2.1 Select The Installation Location

1. Take the bearing capacity of the wall into account. The wall (such as concrete walls and metal structures) should be strong enough to hold the weight of the inverter over a long period of time.
2. Install the unit where it is accessible to service or do the electrical connection.
3. Do not install the unit on the wall of flammable material.
4. Make sure the installation location is well ventilated.
5. Inverters should not be installed near flammable or explosive items. Any strong electro-magnetic equipment should be kept away from installation site.
6. Install the unit at eye level to for convenient operation and maintenance.
7. Install the unit vertically or tilted backwards of no more than 15 degrees, and wiring area should should be facing downwards. Horizontal installation requires more than 250mm off the ground.

4.2.2 Mounting Procedure

1. Use the wall-mounted bracket as a template and drill 4 holes on the wall, 10 mm in diameter and 65 mm deep.
2. Fix the wall-mounted bracket on the wall with six expansion bolts in accessory bag.
3. Carry the inverter with the handles on both sides of the inverter.
4. Place the inverter on the wall-mounted bracket as illustrated.

To ensure heat dissipation and convenient disassembly, the minimum clearance around the inverter should not be less than the following values.

<table>
<thead>
<tr>
<th>Component</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Upward part</td>
<td>200mm</td>
</tr>
<tr>
<td>The downward part</td>
<td>500mm</td>
</tr>
<tr>
<td>The front part</td>
<td>500mm</td>
</tr>
<tr>
<td>Both sides</td>
<td>1000mm</td>
</tr>
<tr>
<td>Interval</td>
<td>1200mm</td>
</tr>
</tbody>
</table>

Note:
Two mounting holes in the middle of the wall-mounted bracket are only used for single column installation, other environments may not be used.
4.3 Electrical Connection

4.3.1 Connection To Grid (AC Side Connection)

1. Measure the voltage and frequency of grid-connected access point, and make sure it is in accordance with the grid-connected standard of inverter.

2. It is recommended to add a breaker or fuse to AC side, the specification should be more than 1.25 times of rated of AC output current.

3. The PE line of inverter should be connected to the earth, make sure that the impedance between the neutral wire and earth wire is less than 10 ohm.

4. Disconnect the breaker or fuse between the inverter and the utility.

5. Connect the inverter to the grid as follows:
   - The wiring installation method on the AC output side is shown in the below figure.
   - Fix (Torque: 1.2–2 N.m) the connector of AC cable to the corresponding terminals.
   - Neutral conductor should be blue, line conductor should be black or brown (preferred), protective earth bonding line should be yellow-green.
   - The AC line construction shall be such that if the cord should slip in its anchorage, placing a strain on conductors, the protective earthing conductor will be the last to take the strain.

   ![Diagram showing AC connection](image)

4.3.2 AC Circuit Breaker And Residual Current Device

An independent three or four pole circuit breaker for each inverter must be installed at the output side to ensure that the inverter can be securely disconnected from the grid.

<table>
<thead>
<tr>
<th>Inverter Model</th>
<th>Output Current</th>
<th>Recommended Nominal Current Of AC Breaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>GW12KLV-MT</td>
<td>31.5A</td>
<td>&gt;40A</td>
</tr>
<tr>
<td>GW15KLV-MT</td>
<td>40A</td>
<td>&gt;50A</td>
</tr>
<tr>
<td>GW20KLV-MT</td>
<td>54.5A</td>
<td>&gt;68A</td>
</tr>
<tr>
<td>GW25K-MT</td>
<td>40A</td>
<td>&gt;50A</td>
</tr>
<tr>
<td>GW29.9K-MT</td>
<td>43.3A</td>
<td>&gt;55A</td>
</tr>
<tr>
<td>GW30K-MT</td>
<td>48A</td>
<td>&gt;60A</td>
</tr>
<tr>
<td>GW36K-MT</td>
<td>53.3A</td>
<td>&gt;66A</td>
</tr>
</tbody>
</table>

Note: It’s not allowed for several inverter to use the same circuit breaker. It’s not allowed to connect loads between inverter and circuit breaker.

The internal integrated residual current detection device (RCD) of inverter can detect external leakage current in real time, when detecting the leakage current value exceeds the limit value, the inverter will be disconnected from the grid as soon as possible. If an external RCD is installed, the action current should be 500mA or higher.

4.3.3 Earth Terminal Connection

The inverter is equipped with earth terminal according to the requirement of EN 50178.

All non-current carrying exposed metal parts of the equipment and other enclosures in the PV power system must be grounded.

Please follow the steps below to connect "PE" cable to ground.

**Step 1**
Strip the wire insulation sheet of a suitable length with a wire stripper.

**Step 2**
Insert the stripped wire into the terminal and compress it tightly by crimping pliers.

---

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>O.D</td>
<td>22–30mm</td>
</tr>
<tr>
<td>B</td>
<td>Section area of conduction material (mm²)</td>
<td>10–25mm² (It is recommended to use 16mm² copper wire)*</td>
</tr>
<tr>
<td>C</td>
<td>Length of Bare wire</td>
<td>About 20mm</td>
</tr>
<tr>
<td>D</td>
<td>Length of wire</td>
<td>About 45mm</td>
</tr>
</tbody>
</table>

*If you choose aluminum wire, please contact the service provider for aluminum terminal.
4.3.4 Connecting Inverter To PV Panel

Caution
Make sure the DC switch is turned off before connecting PV string to the inverter.
Make sure PV string polarity confirms with DC connector, otherwise, it will damage the inverter.
Make sure the maximum open circuit voltage (Voc) of each PV string does not exceed the maximum input voltage of the inverter under any condition (1100V).
Make sure that the maximum short circuit current of each DC input is less than the inverter allowable limit.
Do not connect positive or negative pole of PV string to earth (PE terminal). Otherwise, it will permanently destroy the inverter.
Positive wire shall be red, negative wire shall be black.
The minimum insulation resistance to ground of the PV panels must exceed 33.7kΩ, there is a risk of shock hazard if the requirement of minimum resistance is not met.
The SMT series has three PV input area PV1 input, PV2 input, PV3 input, each with MPPT tracker, therefore the three PV input can be different with each other, including different type of modules, different numbers of connecting PV strings, different orientation angle of PV modules.
There are four types of DC connectors, DEVALAN, MC4, AMPHENOL H4 and QC4.10 series.

Step 3
Fix the earth wire on the machine.
In order to improve the corrosion resistance of the terminal, it is recommended to apply silica gel on the earth terminal for corrosion protection after the grounding cable assembly is completed.

<table>
<thead>
<tr>
<th>NO.</th>
<th>Name</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Cold-pressed terminal</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Screw</td>
<td>M5*12</td>
</tr>
<tr>
<td>C</td>
<td>Green &amp; Yellow Cable</td>
<td>10~16mm²</td>
</tr>
</tbody>
</table>

Note: The actual DC connector used is as shown in the accessory box.

DC cable specification:

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>External diameter of wire stock</td>
<td>4~5mm</td>
</tr>
<tr>
<td>B</td>
<td>Cross-sectional area of conductor material</td>
<td>2.5~4mm²</td>
</tr>
<tr>
<td>C</td>
<td>Length of bare wire</td>
<td>About 7mm</td>
</tr>
</tbody>
</table>

The installation method of DC connector is shown in the two figures below.
4.4 Communication Connection

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

4.4.1 RS485 / DRED / Remote Shutdown Communication

The RS485 port of inverter is used to connect the EzLogger Pro, and the total length of connecting cable should not exceed 1000m.

DRED (Demand response enabling device) is only for Australian and New Zealand installations, in compliance with Australian and New Zealand safety requirements. DRED is not provided by manufacturer. DRM function is achieved by Ezlogger Pro or DRED COM port, and please connect the Ezlogger Pro through RS485 port. Detailed DRED connection refer to Ezlogger Pro manual.

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

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

Detailed operation steps of SMT series are as follows:

**Step 1:**
Plug out the terminal and dismantle the resistor / short wire, if you want use the DRED and Remote shutdown function.

Note: DRED should be connected through "COM port". Remote Shutdown device should be connected through "2-pin COM port".

**Step 2-1 For DRED:**
Put the cable through the plate.

**Step 2-2 For Remote shutdown:**
Put the cable through the plate.

**Step 2-3 For RS485:**
Put the cable through the plate.

In order to better dustproof and waterproof the internal inverter, all the DC connectors provided by accessory bag should be connected to the inverter. If only some of the DC connectors are used, the DC connectors without connection should be blocked with non-conductive insulator.

![Plug with PV waterproof plug](image-url)
4.4.2 Earth Fault Alarm
The inverter complies with IEC62109-2 13.9. When earth fault occurs, Buzzer in EzLogger Pro will ring for 1 minute, and run LED will be lighting for 1 minute. The alarm will ring again in half an hour unless the fault is resolved.

4.4.3 WiFi Communication
The Wi-Fi Communication function is only applied for WiFi Module, for detailed configuration instruction refer to "Wi-Fi Configuration Instruction" in the accessory box. After the configurations are completed, please register on the website www.goodwe.com. The WiFi module installation of SMT series are shown in the below figure.

Note: The name and password of Wi-Fi cannot use symbols, only Arabic numerals or uppercase/lowercase letters.

4.4.4 SEMS Portal
SEMS Portal is an online monitoring system. After completing the installation of communication connection, you can access www.semsportal.com or download the App by scanning the QR code to monitor your PV plant and device. Please contact the after-sales for more operation of SEMS Portal.

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

Caution
Cable requirements of RS485 communication: Shielded twisted-pair cable or shielded twisted-pair.
Ethernet cable 120ohm termination resistor is controlled by dip switch. "ON" means connected, and "OFF" means disconnected, illustrated as the above figure.
Selection mode of terminal resistance dial switch with 120ohm.
• When single inverter is in communication, dial the terminal resistance dial switch to ON state (The default is OFF) which is next to the RS485 communication port of inverter, so that the RS485 terminal is with 120ohm, and make the shielding layer of munication line single-point grounding, as shown in the last figure.
• If multiple inverters are in communication, connect all the inverters in a daisy chain through the RS485 communication cable. For device at the end of daisy chain, dial the terminal resistance dial switch to ON state (The default is OFF), and make the shielding layer of communication line single-point grounding.
As shown in Figure 4.4.1-3, waterproof covers should be removed first if remote shutdown function and RS485 communication are in need. To enable remote shutdown function, short-circuit pin should be removed and then cables for remote shutdown function should be connected. Please do not remove the short-circuit pin or waterproof cover if remote shutdown function is not required. Inverter with RS485 port or RS485 port & DRED function is slightly different, as shown in Figure 4.4.1-4.

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5 System Operation

5.1 LCD Panel And LED

As a human-computer interaction interface, LCD display panel comprise LED indicators, buttons and LCD display on the front panel of the inverter.

LED indicates the working status of the inverter.

Buttons and LCD are used for configuration and viewing parameters.

LED panel is shown as below.

Green / green /green / red light respectively corresponds to: ⚫ / ⚫ / ⚫ / ⚫

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚫</td>
<td>ON</td>
<td>Equipment Powered-on</td>
</tr>
<tr>
<td>⚫</td>
<td>OFF</td>
<td>Equipment Powered-off</td>
</tr>
<tr>
<td>⚫</td>
<td>ON</td>
<td>Inverter is feeding power</td>
</tr>
<tr>
<td>⚫</td>
<td>OFF</td>
<td>Inverter is not feeding power</td>
</tr>
<tr>
<td>⚫</td>
<td>Single Slow Flash</td>
<td>Self check before grid connects</td>
</tr>
<tr>
<td>⚫</td>
<td>Single Flash</td>
<td>Connecting / active</td>
</tr>
<tr>
<td>⚫</td>
<td>On</td>
<td>Wireless connected / active</td>
</tr>
<tr>
<td>⚫</td>
<td>Blink 1</td>
<td>Wireless system resetting</td>
</tr>
<tr>
<td>⚫</td>
<td>Blink 2</td>
<td>Wireless router problem</td>
</tr>
<tr>
<td>⚫</td>
<td>Blink 4</td>
<td>Wireless server problem</td>
</tr>
<tr>
<td>⚫</td>
<td>Blink 2</td>
<td>RS485 Connected</td>
</tr>
<tr>
<td>⚫</td>
<td>OFF</td>
<td>Wireless not active</td>
</tr>
<tr>
<td>⚫</td>
<td>On</td>
<td>Fault occurred</td>
</tr>
<tr>
<td>⚫</td>
<td>OFF</td>
<td>No fault</td>
</tr>
</tbody>
</table>

5.3 User Interface Introduction

①: Communication information icon:GPRS and WiFi show the signal strength, RS485 shows the communication address.
②: Communication icon: The way of communication, There are GPRS, WiFi LAN and RS485
③: LVRT/HVRT icon: The icon indicates that the system LVRT/HVRT function is on
④: Grid Type icon: The icon indicates that the system select Delta Grid/Star Grid
⑤: Power limit icon: The Power limit icon indicates that the Power limit function is on
⑥: Shadow scan: The icon indicates that the Shadow scan function is on
⑦: Safety icon: The number represents the safety country number
⑧: Real-time power
⑨: E-day: daily generation
⑩: E-Total: Total generation
⑪: System date and time
⑫: System status information
⑬: Carbon: Energy conservation and emission reduction

NOTE:
Download SolarGo App from Google Play Store or Apple App Store to complete the system operation if the inverter has no screen. You can also scan the QR code to download it.
5.3.1 Overview Of Menu Architecture

The display menu has a total of three levels. Use the "Up" "Down" "Enter" "ESC" button to operate the menu. The enter button has two operating ways: long press (greater than 3s) and short press the button. In summary, it has 5 buttons in total to operate the menu.

Press the "Enter" / "ESC" to enter / exit the each level menu, use the "Up" / "Down" to select the item and change the parameters, and long press the "Enter" (greater than 3s) to set the parameters.

5.3.2 First Level Menu

First level menu interface through the up and down button cycle, in the historical information, configuration, advanced settings interface, pressing the Enter button will enter the second level menu. To enter the second level menu, select the item from the up and down buttons. Press Enter to enter the project setup menu, go to the third level menu, change the setting contents by pressing the up and down buttons, and press the Enter button to set the contents. If country safety setting is not selected (shows 'Configure Safety' on display at home page), press any button will enter country safety setting page.
5.4 System Configuration

5.4.1 Basic Settings

Basic Settings is mainly used to set the commonly used parameters, including language settings, time settings, communication settings and safety settings for projects. And these parameters could be set by App.

5.4.2 Advanced Settings

User must enter password to operate advanced settings because permission is required.

Note: Initial password: "1111".

5.4.3 History Information
The history information mainly includes the information of the generating capacity of the equipment, the power generation information mainly includes the amount of electricity generation, daily power generation, monthly power generation and annual power generation information.

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

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Error message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>SPI Failure</td>
<td>Internal communication failure</td>
</tr>
<tr>
<td>02</td>
<td>EEPROM R/W Failure</td>
<td>Memory chip failure</td>
</tr>
<tr>
<td>03</td>
<td>Fac Failure</td>
<td>Grid frequency out of range</td>
</tr>
<tr>
<td>07, 25</td>
<td>Relay Check Failure</td>
<td>Relay self-checking failure</td>
</tr>
<tr>
<td>13</td>
<td>DC Injection High</td>
<td>Overhigh DC injection</td>
</tr>
<tr>
<td>14</td>
<td>Isolation Failure</td>
<td>Ground insulation impedance is too low</td>
</tr>
<tr>
<td>15</td>
<td>Vac Failure</td>
<td>Grid voltage out of range</td>
</tr>
<tr>
<td>16</td>
<td>EFan Fault</td>
<td>External fan failure</td>
</tr>
<tr>
<td>17</td>
<td>PV Over Voltage</td>
<td>Overvoltage at DC input</td>
</tr>
<tr>
<td>19</td>
<td>Over Temperature</td>
<td>Overtemperature on the case</td>
</tr>
<tr>
<td>20</td>
<td>IFan Fault</td>
<td>Internal fan failure</td>
</tr>
<tr>
<td>21</td>
<td>DC Bus High</td>
<td>Overhigh BUS voltage</td>
</tr>
<tr>
<td>22</td>
<td>Ground I Failure</td>
<td>Overhigh ground leakage current</td>
</tr>
<tr>
<td>23</td>
<td>Utility Loss</td>
<td>Grid disconnection/fault</td>
</tr>
<tr>
<td>30</td>
<td>Ref 1.5V Failure</td>
<td>1.5V reference voltage failure</td>
</tr>
<tr>
<td>31, 24</td>
<td>AC HCT Failure</td>
<td>Output current sensor failure</td>
</tr>
<tr>
<td>32, 26</td>
<td>GFCI Failure</td>
<td>Detection circuit of ground leakage current failure</td>
</tr>
<tr>
<td>Others</td>
<td>Device Failure</td>
<td>Internal device failure</td>
</tr>
</tbody>
</table>

5.5 Wi-Fi Reset & Wi-Fi Reload
These functions are only available for Wi-Fi model inverters.
1. Press “Up” / “Down” to select “Basic” and press “Enter”.
2. Press “Up” / “Down” to select “Communication” and press “Enter”.
3. Press “Up” / “Down” to select “WiFi Set” and press “Enter”.
4. Press “Up” / “Down” to select “WiFi Reset” / “WiFi Reload” and long press “Enter”.

5.6 Precaution For Initial Startup
1. Make sure the AC circuit is connected and AC breaker is turned off.
2. Make sure the DC cable between inverter and PV string is connected, and the PV voltage is normal.
3. Turn on the DC switch, and set safety according to the local regulation.
4. Turn on the AC breaker, and check the inverter work normal.

5.7 Special Adjustable Setpoints
The inverter has a field where the user could set functions, such as trip points, trip times, reconnect time, active and inactive of QU curve and PU curve. It is adjustable through special software, if you want to use it, please contact with after sales.

To achieve manuals for using the software, you can download them from official web-site or contact with after-sales.
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.

<table>
<thead>
<tr>
<th>Type of fault</th>
<th>Troubleshooting</th>
</tr>
</thead>
</table>
| Isolation Failure| 1. Check the impedance between Ground and PV (+) & PV (-). The impedance value must be greater than 100kΩ. Make sure the inverter is earthed.  
2. Contact local service office for help if the problem still persist. |
| Ground I Failure | 1. The ground current is too high.  
2. Unplug the inputs from the PV generator and check the peripheral AC system.  
3. When the problem is cleared, reconnect the PV panel and check the Inverter status.  
4. Contact local service office for help if the problem still persist. |
| Vac Failure      | 1. The PV Inverter will automatically restart within 5 minutes if the grid returns to normal.  
2. Make sure grid voltage conforms with the specification.  
3. Make sure neutral (N) wire and PE wire are connected well.  
4. Contact local service office for help if the problem still persist. |
| Fac Failure      | 1. Grid is not connected.  
2. Check grid connection cables.  
3. Check availability of grid. |
| Utility Loss     | 1. Not connect to the grid.  
2. Check if the power grid is connected to cable.  
3. Check the availability of power grid. |
| PV Over Voltage  | 1. Check if the PV open circuit voltage is higher or too close to the maximum input voltage or not.  
2. If the problem still persist when PV voltage is less than the maximum input voltage, contact local service office for help. |
| Over Temperature | 1. The internal temperature is higher than normal value specified.  
2. Reduce ambient temperature.  
3. Move the inverter to a cool place.  
4. If the problem still exists, contact local service office for help. |

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

### Inverter Failure

<table>
<thead>
<tr>
<th>Type of fault</th>
<th>Troubleshooting</th>
</tr>
</thead>
</table>
| Relay-Check Failure | 1. Turn off DC switch of the inverter.  
2. Wait till the inverter's LCD light is off.  
3. Turn on DC switch and make sure it is connected.  
4. If the problem still exists, contact local service office for help. |
| DCI Injection High | 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 250V, please check configuration of inverter module.  
4. If voltage is higher than 250V, please contact local office. |
| EEPROM R/W Failure | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| SCI Failure    | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| SPI Failure    | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| DC BUS High    | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| BUS Unbalance  | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| GFCI Failure   | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| Ifan Fault     | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| Efan Fault     | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| Afan Fault     | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |

**Others**

<table>
<thead>
<tr>
<th>Type of fault</th>
<th>Troubleshooting</th>
</tr>
</thead>
</table>
| Wi-Fi module fail to connect to network | 1. If the Wi-Fi module fail to connect to network after choosing the right router hotspot and entering the right passwords, it’s possible that there are special characters not supported by module in the hotspot passwords. Please modify the password to consist of only Arabic numerals or uppercase / lowercase letters.  
2. If the problem still exists, contact local service office for help. |

<table>
<thead>
<tr>
<th>Type of fault</th>
<th>Troubleshooting</th>
</tr>
</thead>
</table>
| Relay-Check Failure | 1. Turn off DC switch of the inverter.  
2. Wait till the inverter's LCD light is off.  
3. Turn on DC switch and make sure it is connected.  
4. If the problem still exists, contact local service office for help. |
| DCI Injection High | 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 250V, please check configuration of inverter module.  
4. If voltage is higher than 250V, please contact local office. |
| EEPROM R/W Failure | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| SCI Failure    | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| SPI Failure    | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| DC BUS High    | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| BUS Unbalance  | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| GFCI Failure   | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| Ifan Fault     | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| Efan Fault     | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |
| Afan Fault     | 1. Ifan Fault  
2. Efan Fault  
3. Afan Fault |

**Note:**
When sunlight is insufficient, the PV Inverter may continuously start up and shut down automatically due to insufficient power generation by the PV panel.
### Technical Parameters & Block Diagram

#### 7.1 Technical Parameters

<table>
<thead>
<tr>
<th>Technical Data</th>
<th>GW12KLVL-MT</th>
<th>GW15KLVL-MT</th>
<th>GW20KLVL-MT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PV String Input Data</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. DC Input Power (Wp)</td>
<td>15600</td>
<td>19500</td>
<td>26000</td>
</tr>
<tr>
<td>Max. DC Input Voltage (V)</td>
<td>800</td>
<td>800</td>
<td>800</td>
</tr>
<tr>
<td>MPPT Range (V)</td>
<td>200–650</td>
<td>200–650</td>
<td>200–650</td>
</tr>
<tr>
<td>Start-up Voltage (V)</td>
<td>140</td>
<td>140</td>
<td>140</td>
</tr>
<tr>
<td>Nominal DC Input Voltage (V)</td>
<td>370</td>
<td>370</td>
<td>370</td>
</tr>
<tr>
<td>No. of MPP Trackers</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>No. of Input Strings Per MPP Tracker</td>
<td>2/2/2</td>
<td>2/2/2</td>
<td>2/2/2</td>
</tr>
<tr>
<td><strong>AC Output Data</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal Output Power (W)</td>
<td>208VAC 11300</td>
<td>220VAC 12000</td>
<td>240VAC 13100</td>
</tr>
<tr>
<td>Max. Output Apparent Power (VA)</td>
<td>16600</td>
<td>17000</td>
<td>16600</td>
</tr>
<tr>
<td>Nominal Output Voltage (V)</td>
<td>220, 3L/N/PE or 3L/PE 16600</td>
<td>220, 3L/N/PE or 3L/PE 220VAC 16600</td>
<td>220, 3L/N/PE or 3L/PE 220VAC 16600</td>
</tr>
<tr>
<td>Nominal Output Frequency (Hz)</td>
<td>50/60</td>
<td>50/60</td>
<td>50/60</td>
</tr>
<tr>
<td>Max. Output Current (A)</td>
<td>31.5</td>
<td>40</td>
<td>54.5</td>
</tr>
<tr>
<td>Output Power Factor</td>
<td>&lt;1 (Adjustable from 0.8 leading to 0.8 lagging)</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Output THDI (@Nominal Output)</td>
<td>&lt;3%</td>
<td>&lt;3%</td>
<td>&lt;3%</td>
</tr>
<tr>
<td><strong>Efficiency</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Efficiency</td>
<td>98.7%</td>
<td>98.7%</td>
<td>98.7%</td>
</tr>
<tr>
<td>European Efficiency</td>
<td>&gt;98.4%</td>
<td>&gt;98.5%</td>
<td>&gt;98.5%</td>
</tr>
<tr>
<td><strong>Protection</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anti-islanding Protection</td>
<td>Integrated</td>
<td>Integrated</td>
<td>Integrated</td>
</tr>
<tr>
<td>Input Reverse Polarity Protection</td>
<td>Integrated</td>
<td>Integrated</td>
<td>Integrated</td>
</tr>
<tr>
<td>Insulation Resistor Detection</td>
<td>Integrated</td>
<td>Integrated</td>
<td>Integrated</td>
</tr>
<tr>
<td>DC Surge Protection</td>
<td>Type III (Type II optional)</td>
<td>Type III (Type II optional)</td>
<td>Type III (Type II optional)</td>
</tr>
<tr>
<td>Residual Current Monitoring Unit</td>
<td>Integrated</td>
<td>Integrated</td>
<td>Integrated</td>
</tr>
<tr>
<td>Output Over Current Protection</td>
<td>Integrated</td>
<td>Integrated</td>
<td>Integrated</td>
</tr>
<tr>
<td>Output Short Protection</td>
<td>Integrated</td>
<td>Integrated</td>
<td>Integrated</td>
</tr>
<tr>
<td>Output Over Voltage Protection</td>
<td>Integrated</td>
<td>Integrated</td>
<td>Integrated</td>
</tr>
<tr>
<td>AFCI</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
</tr>
<tr>
<td>Terminal Temperature Detection</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
</tr>
</tbody>
</table>

#### General Data

- **Operating Temperature Range (°C)**: 30–60
- **Relative Humidity**: 0–100%
- **Operating Altitude (m)**: <3000
- **Cooling**: Fan Cooling
- **User Interface**: LCD & LED or APP & LED
- **Communication**: RS485 or WiFi or GPRS or PLC
- **Weight (kg)**: 40
- **Size (Width*Height*Depth mm)**: 480*590*200
- **Protection Degree**: IP65
- **Night Self Consumption (W)**: <1
- **Topology**: Transformerless

#### Certifications & Standards

- **Grid Regulation**: Transformerless
- **Safety Regulation**: Transformerless
- **EMC**: Transformerless

Visit homepage to achieve information.
**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**

<table>
<thead>
<tr>
<th>Moisture parameters</th>
<th>3K3</th>
<th>4K2</th>
<th>4K4H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Range</td>
<td>0~+40°C</td>
<td>-33~+40°C</td>
<td>-20~+55°C</td>
</tr>
<tr>
<td>Humidity Range</td>
<td>5%~85%</td>
<td>15%~100%</td>
<td>4%~100%</td>
</tr>
</tbody>
</table>

**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.

---

**7.2 Block Diagram**

SMT series main circuit is shown in the below figure:
8 Caution

Regular maintenance ensures a long operating life and optimal efficiency of the entire PV plant.

Caution: Before maintenance please disconnect the AC breaker first and then disconnect DC breaker. Wait 5 minutes until the residual voltage has been released.

8.1 Clearing The Fan

SMT series inverter is equipped with three fans on its left side. The fan intakes and handle covers should be cleaned yearly with a vacuum cleaner. For more thorough cleaning, completely remove the fans.

Disconnect the AC breaker first and then disconnect DC breaker.

Wait 5 minutes until the residual voltage has been released and the fans are no longer turning.

Disassemble the fans (refer to the below figure).

1. Loosen the five screws with a crosshead screwdriver, then remove the fans out the cabinet about 50mm slowly.
2. Open the lockers of the three fans connectors and remove them from housing, then take the fans away.
   - Clean the ventilation grid and the fan with a soft brush, a paint brush, a cloth, or compressed air.
   - Reassemble the fans into the cabinet
   - Please use towel to clean the heatsink once a year.

8.2 Checking The DC Switch

DC switch does not require any maintenance.

It is recommended, though not compulsory, to:

- Check the DC switch regularly.
- Activate the DC switch 10 times in a row once a year.

Operating the switch will clean the contacts and will extend the life of the DC switch.

Boot order:

1. Turn on the breaker on AC side.
2. Turn on the DC switch.
3. Turn on the breaker on DC side.

Caution: if there is no switch, step 2 is not required.

Shutdown order:

1. Turn off the breaker on AC side.
2. Turn off the DC switch.
3. Turn off the breaker on DC side.

Caution: if there is no switch, step 2 is not required.

8.3 Checking The Electrical Connection

1. Check if the AC or DC wire is loose.
2. Check if the earth wire is reliably grounded.
3. Check if the waterproof covers of RS485/WiFi port are fasten.

Caution: Maintenance cycle is once every half a year.

4. Please use torque wrench to tighten the AC terminal wiring connection once a year;

Caution: Maintenance cycle is once every half a year.
5.3 System Configuration

5.3.1 Select Country Code

Note:
Please press "Enter" over 3 seconds to save the setting.

5.3.2 Set Date & Time

Please press "Enter" over 3 seconds to save the setting.