

MPPT-Level ISO Detection Function Guide

PV Grid-Connected Inverter

SG305HX / SG320HX-20 / SG350HX-20



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- It is prohibited to perform reverse engineering, cracking, or any other operations that compromise the original program design of the software developed by SUNGROW.

About This Manual

This manual gives an introduction to the inverter product as well as instructions on the installation, operation, and maintenance of the inverter, yet not all-encompassing regarding the information about the PV system. You can visit www.sungrowpower.com or the website of the device manufacturer for more information.

Validity

This manual is intended mainly for the following products:

- SG305HX
- SG320HX-20
- SG350HX-20

It is referred to as "the inverter" hereinafter unless otherwise specified.

Target Group

This manual is intended for qualified technical persons who are responsible for inverter installation, operation, and maintenance and users who need to check its parameters.

Installation can only be done by qualified technical persons. Qualified technical persons must:

- Have certain electrical wiring, electronic, and mechanical expertise, and be familiar with electrical and mechanical schematics.
- Have received professional training in the installation and commissioning of electrical equipment.
- Be able to respond quickly to dangers or emergencies that may occur during the process of installation and commissioning.
- Be familiar with applicable local standards and relevant safety regulations for electrical systems.
- Read through this manual carefully and have a good understanding of the relevant safety instructions.

How to Use This Manual

Read through this manual carefully before using the product, and keep it properly in an easy-to-reach place.

The manual may be updated and revised from time to time, however, there still might be slight deviations from the real product or errors. In such cases, the actual product you have purchased should take precedence. You can find the latest version of the manual at support.sungrowpower.com or reach your sales for it.

Security Declaration

For details on the product's network security vulnerability response process and vulnerability disclosure, please visit the following website: <https://en.sungrowpower.com/security-vulnerability-management>.

For more information on network security, please refer to the user manual of the communication module or the Data Logger that comes with the product.

Symbols in the Manual

To ensure the safety of life and property for users when using the product and to improve the efficiency of product use, the manual provides relevant information, which are highlighted by the following symbols.

Symbols used in this manual are listed below. Please review carefully for better use of this manual.

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a moderately hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION

Indicates a slightly hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

Indicates a potential hazard which, if not avoided, will result in product malfunction or property damage.



"NOTE" indicates supplementary information, emphasis on specific points, or tips related to the use of the product that might help to solve your problems or save your time.

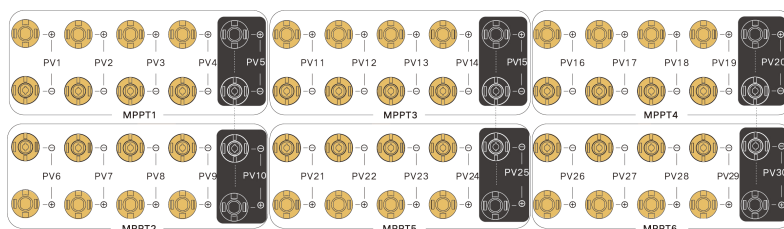
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1 Function Introduction

MPPT-level insulation monitoring (MPPT Level ISO Detection) helps identify the MPPT with a DC short circuit fault and indicates the location of the faulty PV module as a percentage. This feature effectively reduces the risk of electric shocks or fires caused by ground faults on the DC side.

- The positive and negative terminals of the PV string are connected to the PV+ and PV– terminals of the inverter, respectively. The PV– terminal is indicated as 0%, and the PV+ terminal as 100%. Other percentages indicate that the fault occurs in a module or cable within the PV string.
- The possible location of the fault is calculated as: Fault location = Total number of PV modules in the string × Fault location percentage. For example, if the total number of modules is 32 and the fault location percentage is 83.5%, the fault is likely located between the 26th and 28th PV modules ($32 \times 83.5\% = 26.72$). The accuracy is ± 1 module.
- The correspondence between the MPPT and the PV strings is listed below. The detection feature can only identify the MPPT where the fault is located. To further pinpoint the fault, connect the strings of the faulty MPPT to the inverter one by one, following the instructions in this manual.



MPPT	Corresponding PV Strings
MPPT1	PV1–PV5
MPPT2	PV6–PV10
MPPT3	PV11–PV15
MPPT4	PV16–PV20
MPPT5	PV21–PV25
MPPT6	PV26–PV30

2 Step-by-Step Instructions

2.1 Requirements

Software Version

Software versions that support MPPT-level insulation monitoring (MPPT Level ISO Detection) are listed below:

- Logger4000: P019.
- SG305HX / SG320HX-20 / SG350HX-20 inverters: MALACHITE-S_B000.V000-.P011-20240524 or later.
- iSolarCloud: 2.1.6.20240401 or later.

Log in to the iSolarCloud App

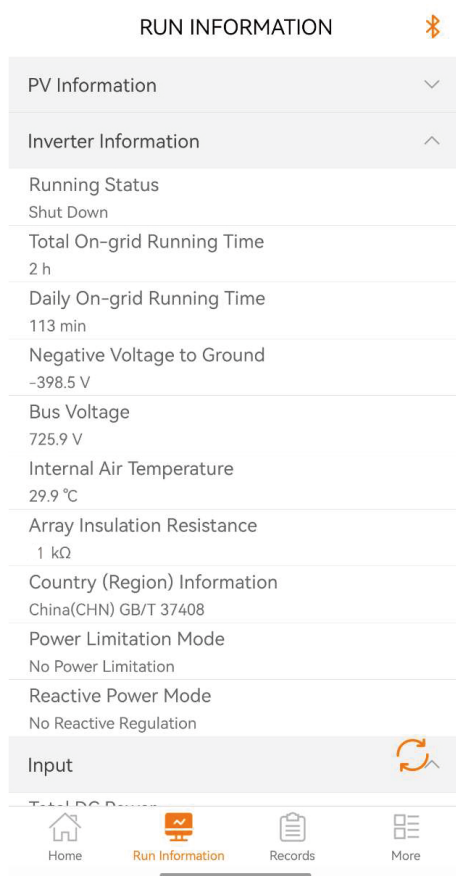
Before logging in to the iSolarCloud App, ensure that:

- The AC and DC sides of the inverter are powered on.
- The mobile phone is within 5 meters of the inverter, with no obstructions in between.
- Bluetooth is enabled on the mobile phone.

Check the Insulation Resistance

MPPT-level insulation faults will be triggered if the insulation resistance value is $\leq 1 \text{ k}\Omega$. You can check the resistance value by following the below steps:

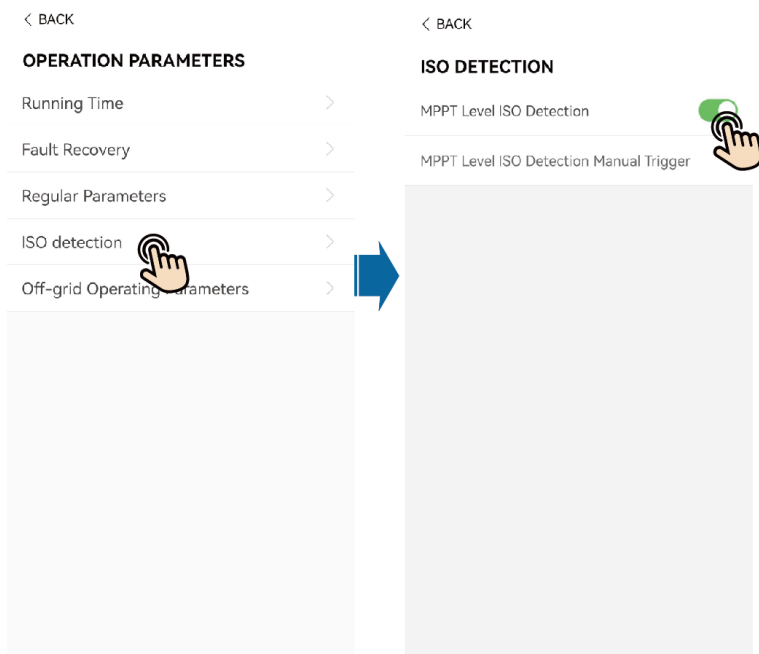
Navigate to **Run Information > Array Insulation Resistance** on the iSolarCloud App to check if the insulation resistance value is in the allowable range.



2.2 MPPT-Level ISO Detection

Enabling **MPPT Level ISO Detection** is necessary for automatic insulation resistance testing during the inverter's start-up stage before grid connection.

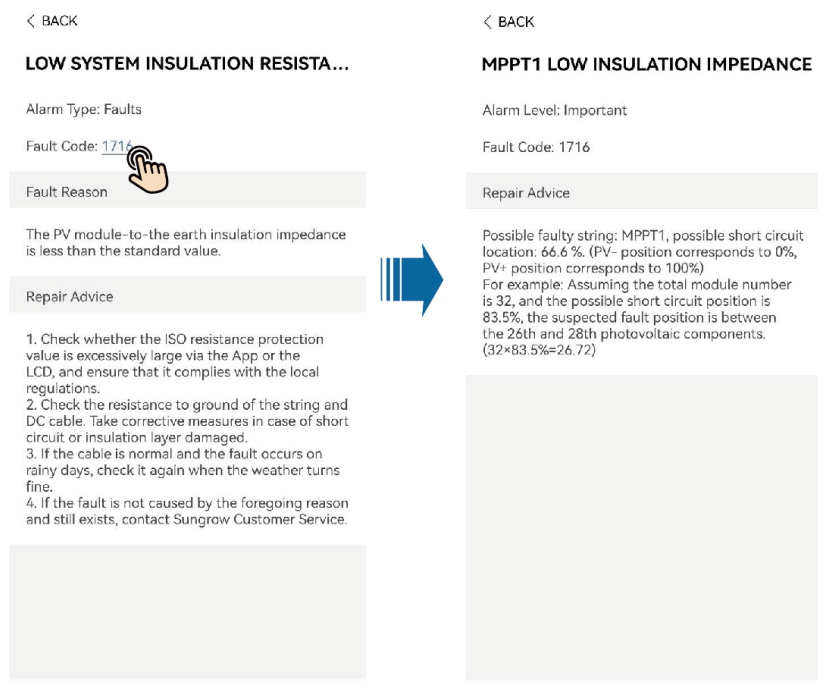
step 1 Check that **MPPT Level ISO Detection** is enabled. If it is not, navigate to **More > Settings > Operation Parameters > ISO Detection** to enable **MPPT Level ISO Detection** for the inverter.



step 2 In case of anything abnormal with the inverter, an icon  will show up in the lower-right corner of the inverter icon in the power flow diagram. You can tap this icon to view the details of the fault and the corresponding solutions.



step 3 If an MPPT-level insulation fault occurs (for example, “MPPT1 Low Insulation Resistance (Impedance)”), perform troubleshooting by referring to [3 Locating the Fault](#).



-- End

2.3 Manually Activating MPPT-Level ISO Detection

MPPT Level ISO Detection Manual Trigger allows users to manually check for insulation faults using the iSolarCloud App.



The inverter can only be paired with one phone via Bluetooth at a time.

step 1 Navigate to **Settings > System Parameters**, as shown below, and select **Boot/Shutdown** to shut down the inverter. Set the auxiliary switch to OFF first. After confirming that the current is below 0.5A , set the DC switches to OFF.



step 2 Check that **MPPT Level ISO Detection** is enabled. If it is not, navigate to **More > Settings > Operation Parameters > ISO Detection** to enable **MPPT Level ISO Detection** for the inverter.

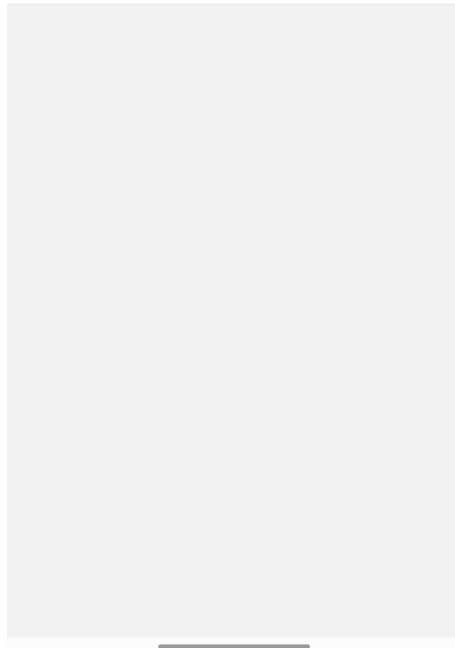
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ISO DETECTION

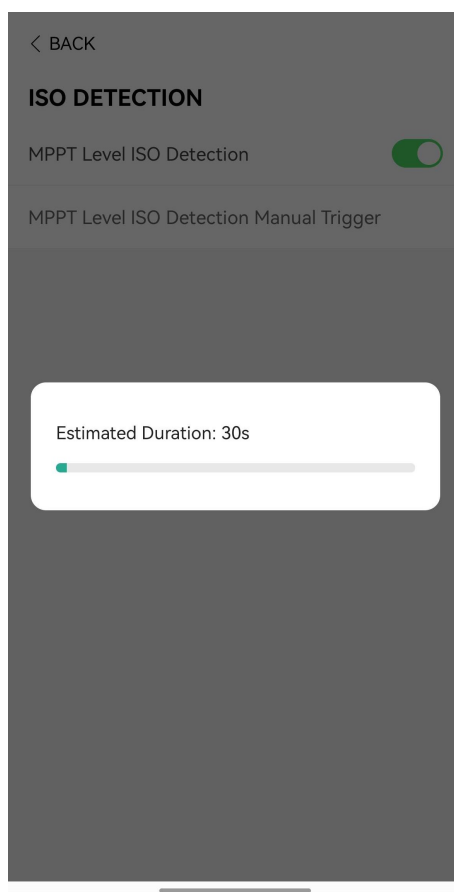
MPPT Level ISO Detection



MPPT Level ISO Detection Manual Trigger

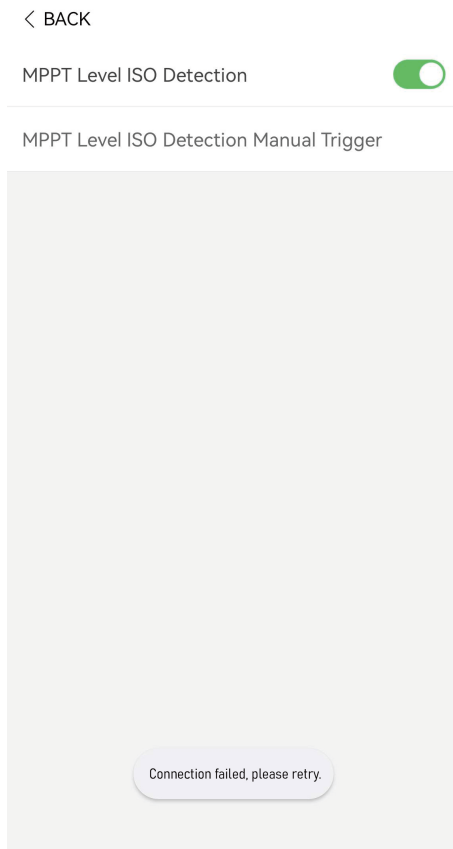


step 3 Tap **MPPT Level ISO Detection Manual Trigger**, then wait 30 seconds.

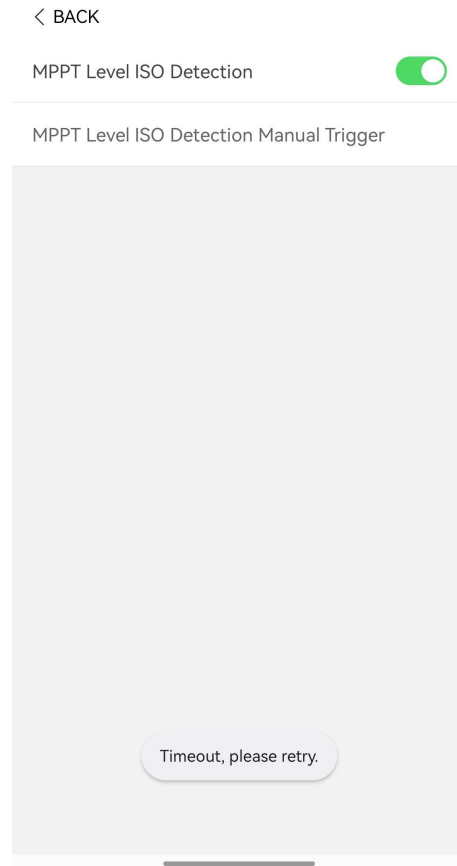


step 4 Check the results in the pop-up window:

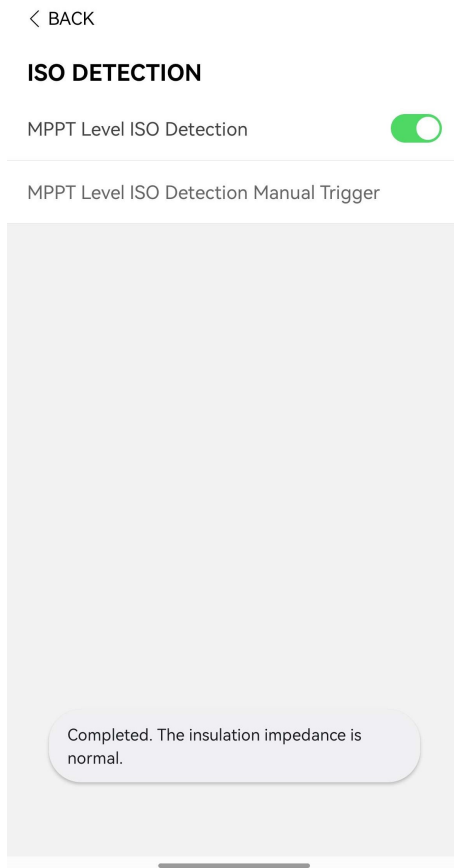
- “Connection failed, please retry”: Verify that all prerequisites for logging in to the App are met.



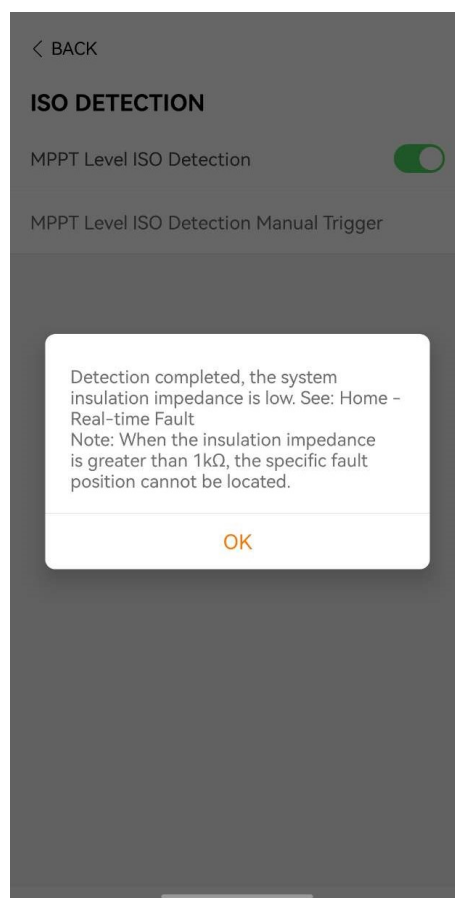
- “Timeout, please retry”: Verify that the network and Bluetooth connections are stable.

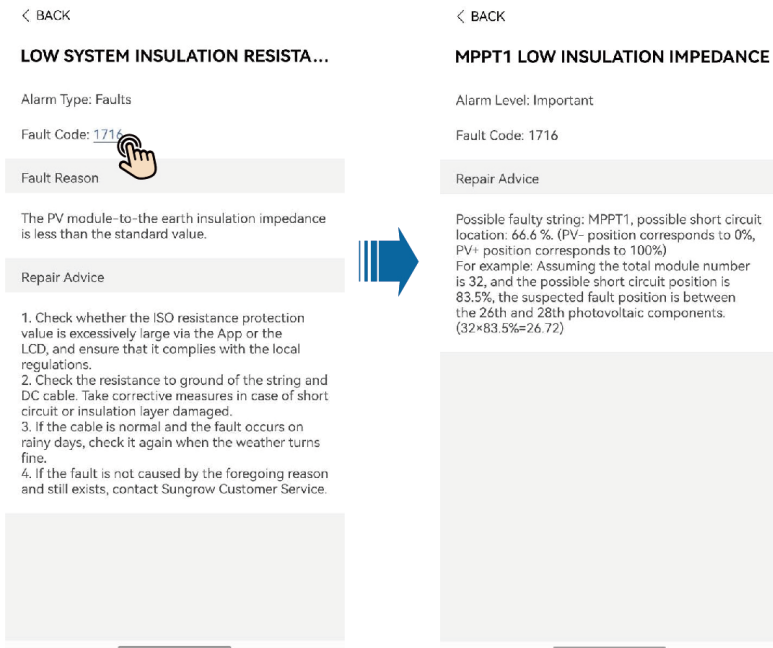


- "Completed. The insulation resistance (impedance) is normal": This string is operating properly. You can proceed to inspect the remaining strings in order.



- “Detection completed, the system insulation resistance (impedance) is low. See: Home - Real-time Fault”: This string is abnormal. Perform inspections as per the instructions in Current Fault (e.g., Fault 1716. You can tap for more details as shown below).





-- End

3 Locating the Fault

Below are instructions on how to locate the faulty string.

step 1 Open the iSolarCloud App. Navigate to **Settings > System Parameters** and shut down the inverter.



step 2 Open the AC circuit breaker.

step 3 Set the auxiliary switch to OFF. After confirming that the current is below 0.5A, set all DC switches to OFF.

step 4 Identify the faulty MPPT according to the onscreen instructions. Then, inspect the DC PV terminals of the target MPPT one by one in order. For example, for Fault 1718 MPPT3: Low Insulation Resistance (Impedance), inspect terminals PV11 to PV15.

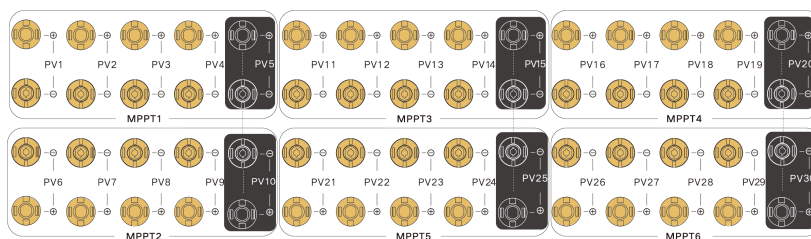


figure 3-1 Terminals at the Inverter Bottom

- 1 Disconnect PV12, PV13, PV14, and PV15. Ensure that the PV11 remains connected. Then, go to Step 5.
- 2 Disconnect PV11, PV13, PV14, and PV15. Ensure that the PV12 remains connected. Then, go to Step 5.
- 3 Disconnect PV11, PV12, PV14, and PV15. Ensure that the PV13 remains connected. Then, go to Step 5.
- 4 Disconnect PV11, PV12, PV13, and PV15. Ensure that the PV14 remains connected. Then, go to Step 5.
- 5 Disconnect PV11, PV12, PV13, and PV14. Ensure that the PV15 remains connected. Then, go to Step 5.



- 1 It is recommended to inspect the terminals in ascending order. For example, for MPPT2, follow the order: **PV11 > PV12 > PV13 > PV14 > PV15** (DO NOT use **PV15 > PV14 > PV13 > PV12 > PV11**).
- 2 Since faults may occur in multiple strings within a single MPPT, all five strings of the faulty MPPT must be checked.

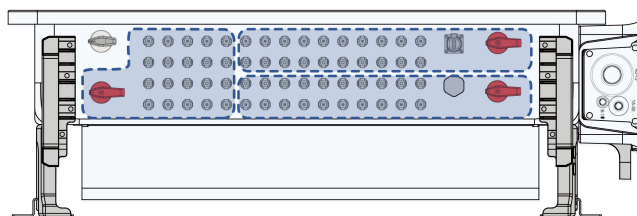


figure 3-2 PV Inputs Controlled by DC Switches

DC switch	PV Inputs Controlled by DC Switches
AUXILIARY SWITCH	-
DC SWITCH 1	PV1–PV10
DC SWITCH 2	PV11–PV20
DC SWITCH 3	PV21–PV30

step 5 Set the auxiliary switch to ON and then wait 30 seconds.

- 1 If the inverter indicator turns blue, set the DC switches corresponding to the faulty MPPT to ON.
- 2 If the inverter indicator does not turn blue, DO NOT turn on the DC switches (SWITCH1, SWITCH2, and SWITCH3 with red knobs), and meanwhile turn off the auxiliary switch. Then, check if the positive and negative input cables are connected in reverse, or if the PV1 input voltage meets the requirement of the start-up voltage. After inspection, go through again the commissioning procedure. If the indicator still does not light, turn off the auxiliary switch and contact SUNGROW for assistance.

step 6 Set the auxiliary switch to OFF.

step 7 Go to Step 2 in [2.3 Manually Activating MPPT-Level ISO Detection](#) . Run a detection manually and see if there is a fault in the string.

step 8 After troubleshooting:

- 1 Set all DC switches to ON.
- 2 Close the AC circuit breaker.
- 3 If the App shows that the inverter is in the shut down state, navigate to **Settings > System Parameters**, and tap **Boot/Shutdown** to start up the inverter.

-- End

4 Fault Codes

Inverter faults will be displayed in the iSolarCloud App. If the inverter is equipped with an LCD screen, users can also view the fault information directly on the screen.

The codes and troubleshooting methods of the insulation faults are listed in the table below and apply to all PV inverter products. Some of these faults may not be relevant to the product you have purchased. In case of an inverter fault, you can check detailed information by fault code on the iSolarCloud App.

Fault Code	Fault Name	Troubleshooting Methods
1716	MPPT1 Low Insulation Resistance (Impedance)	Possible location of the faulty string: MPPT1. Possible short circuit location: {0}% (PV–: 0%; PV+: 100%). Assuming the total number of modules is 32 and the possible short circuit location is 83.5%, the fault is likely to occur between the 26th and 28th PV modules ($32 \times 83.5\% = 26.72$).
1717	MPPT2 Low Insulation Resistance (Impedance)	Possible location of the faulty string: MPPT2. Possible short circuit location: {0}% (PV–: 0%; PV+: 100%). Assuming the total number of modules is 32 and the possible short circuit location is 83.5%, the fault is likely to occur between the 26th and 28th PV modules ($32 \times 83.5\% = 26.72$).
1718	MPPT3 Low Insulation Resistance (Impedance)	Possible location of the faulty string: MPPT3. Possible short circuit location: {0}% (PV–: 0%; PV+: 100%). Assuming the total number of modules is 32 and the possible short circuit location is 83.5%, the fault is likely to occur between the 26th and 28th PV modules ($32 \times 83.5\% = 26.72$).
1719	MPPT4 Low Insulation Resistance (Impedance)	Possible location of the faulty string: MPPT4. Possible short circuit location: {0}% (PV–: 0%; PV+: 100%). Assuming the total number of modules is 32 and the possible short circuit location is 83.5%, the fault is likely to occur between the 26th and 28th PV modules ($32 \times 83.5\% = 26.72$).
1720	MPPT5 Low Insulation Resistance (Impedance)	Possible location of the faulty string: MPPT5. Possible short circuit location: {0}% (PV–: 0%; PV+: 100%). Assuming the total number of modules is 32 and the possible short circuit location is 83.5%, the fault is likely to occur between the 26th and 28th PV modules ($32 \times 83.5\% = 26.72$).

Fault Code	Fault Name	Troubleshooting Methods
1721	MPPT6 Low Insulation Resistance (Impedance)	Possible location of the faulty string: MPPT6. Possible short circuit location: {0}% (PV–: 0%; PV+: 100%). Assuming the total number of modules is 32 and the possible short circuit location is 83.5%, the fault is likely to occur between the 26th and 28th PV modules ($32 \times 83.5\% = 26.72$).
1732	PV negative insulation resistance (impedance) is low	Possible location of the faulty string: PV–. Possible short circuit location: {0}% (PV–: 0%; PV+: 100%). Assuming the total number of modules is 32 and the possible short circuit location is 83.5%, the fault is likely to occur between the 26th and 28th PV modules ($32 \times 83.5\% = 26.72$).
39	Low System Insulation Resistance	Wait for the inverter to return to normal. If the fault occurs repeatedly: 1. Check whether the ISO protection value is excessively high via the App or the LCD, and ensure that it complies with the local regulations. 2. Check the resistance to ground of the strings and DC cables. Take corrective measures in case of short circuits or insulation layer damage. 3. If the cables function properly and the fault occurs on rainy days, perform inspection again when the weather improves. 4. If there is a battery in the system, inspect the battery cables for damage and check the connectors and terminals for loose connections or poor contact. Replace any damaged cables and tighten any loose connectors or terminals to ensure a reliable connection. 5. If the fault does not arise for the aforementioned reason and still cannot be resolved, please contact SUNGROW Customer Service.



Contact your dealer if you have already tried the troubleshooting methods listed in the table above but the problem remains unresolved. If the dealer is unable to assist you, contact SUNGROW.