

Error 039 / 302 Low PV Insulation Resistance

Disclaimer

The material in this document has been prepared by Sungrow Australia Group Pty. Ltd. ABN 76 168 258 679 and is intended as a guideline to assist solar installers for troubleshooting. It is not a statement or advice on any of the Electrical or Solar Industry standards or guidelines. Please observe all OH&S regulations when working on Sungrow equipment.

A Low Insulation Resistance Error (039 for Grid-Connected and 302 for Hybrid Inverters) indicates that there could be an Earth Fault in the PV array. This type of fault can appear at different times and frequencies, hence, could be caused due to different reasons.

Early Mornings Faults

A Low Insulation Resistance fault most commonly can occur during the start of the day starting from early morning possible continuing for a couple hours (possible noon as well). This is a common issue caused due to moisture in the air due during dawn.

This type of fault is usually not an inverter fault hence it will clear overtime however, if this issue is persistent over a long period, some troubleshooting can be performed on the inverter.

Frequent Occurrence

If the fault is occurring frequently, it is possible that there could be an earth fault on the PV array. Often, if the inverter is restarted, it may be **stuck in Start-Up mode** which could also indicate a possible 039/302 issue.

For such issues, it would be essential to test the PV strings thoroughly to find and clear the issue.

Testing and Troubleshooting Procedures

Down below are the various troubleshooting steps the technician can perform to clear the 039/302 fault.

Sungrow also recommends bringing the system online on iSolarCloud monitoring platform which can help monitor the system's performance remotely. For information on bringing the system online, please refer to the document below.

- [iSolarCloud APP Commissioning Guide_202101](#)

Firmware Update

Sungrow introduced a newer firmware to improve the sensitivity of the insulation resistance. Hence, it is recommended to upgrade the firmware for the inverter to prevent unnecessary 039/302 faults. The firmware can be upgraded both locally and remotely. Please refer to the documents below.

- [Local Firmware Upgrade](#)
- [Remote Firmware Upgrade](#)

PV String Testing

It is likely that the fault is caused due to a string issue hence, these must be checked well.

1. Firstly, **the insulation resistance for each PV string needs to be measured safely in accordance with AS/NZS:5033:2014 inc amdt 1&2 Appendix D4** for the steps. This needs to be checked between **the Positive and Earth** as well as the **Negative and Earth** terminals with the array(s) disconnected from the inverter.
2. **If the insulation resistance is less than minimum insulation resistance (see below table - less than 1 MΩ) for each string by using *Insulation Resistance Tester ('megger' or similar)***, check the rooftop isolator to make sure it has not been affected by moisture, and the DC cable for damage etc.

System voltage ($V_{oc\ stc} \times 1.25$)	Test voltage	Minimum insulation resistance, MΩ
<120	250	0.5
120–500	500	1
>500	1000	1

3. If the PV array and wiring are clear, please shut the inverter down and turn it back on after 10 minutes.
4. **Test each set of strings on each MPPT input** to identify which string / MPPT is causing the fault (e.g. only connect string 1 to the inverter and disconnect string 1 and only connect string 2 to the inverter).

If the issue still persists, please take photos testing on site and contact Sungrow Service Department on 1800 786 476 or email to service@sungrowpower.com.au