



EPISODE 51

Pay attention to these
common O&M problems
with inverters in the winter time

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>> Background

With winter comes cold temperature and sometimes extreme weather, such as snow, freezing rain, or even polar freezes. In low temperatures, you need to pay more close attention to your inverter's operation and maintenance (O&M). This episode of Solis' seminar will let you know what to watch out for in the winter time.



>> 1. Influence of low temperatures on inverters

As we all know, temperature has a great influence on inverters. Temperatures that are too high will affect the output capacity of the inverter, the performance of components and even the life of the equipment. But the extreme low temperatures will also affect the operation of the inverter, such as condensation, low temperature shutdown, misoperation, abnormal power, DC overvoltage, and other faults. Therefore, winter is a time when you need to pay attention to the maintenance of the inverter.

>> 2. Winter inverter maintenance attention to the problem

Inverter maintenance in winter includes paying special attention to the following problems:

1. Prevent snow around the inverter

Snow removal in winter is one of the important links in the operation and maintenance of photovoltaic power stations. For inverters, the surrounding snow should be removed, especially at the top and bottom. The snow on the top will damage the stability of the inverter installation structure and could cause serious damage to the shell. Snow at the bottom may bury the AC/DC ports and communication devices, which may cause fault alarms, such as leakage current, or affect communication. Use a flexible and dry tool, such as a shovel, to clear the snow. Do not damage the inverter housing or AC/DC cables during the cleaning process.



If conditions permit, we suggest to install snow retaining equipment for the inverter or installing the inverter in sheltered places or indoors.

2. Ice on the inverter housing should wait for naturalization

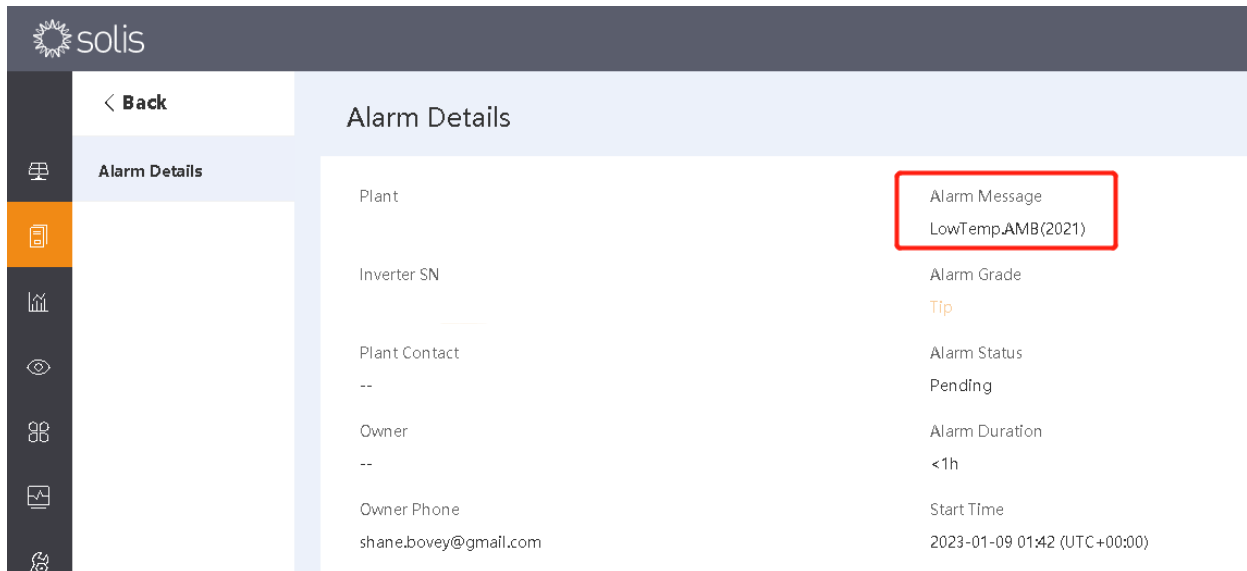
At very low temperatures, it is normal for ice to form on the inverter shell. It is not recommended that you use hot water or hard objects to remove the ice as these methods may harm the inverter shell and overall structure. Allow the ice to melt naturally.

3. Keep an eye on the operation of the power station through Solis' online O&M platform

During the winter, the operation and maintenance of the power station can be difficult. We can pay attention to the operation of the power station through the SolisCloud online platform, but we need to pay attention to the alarm information of the power station, especially the "under-temperature protection", "DC overvoltage", "PV insulation failure" and other information. Please work on these issues as soon as they come up to protect the longevity of the inverter. Below are the different issues and how to resolve them.

A. LowTemp.AMB:

This fault is common and is caused by the low ambient temperature(Low ambient temperature may cause the inverter to fail to connect to the grid or shut down).



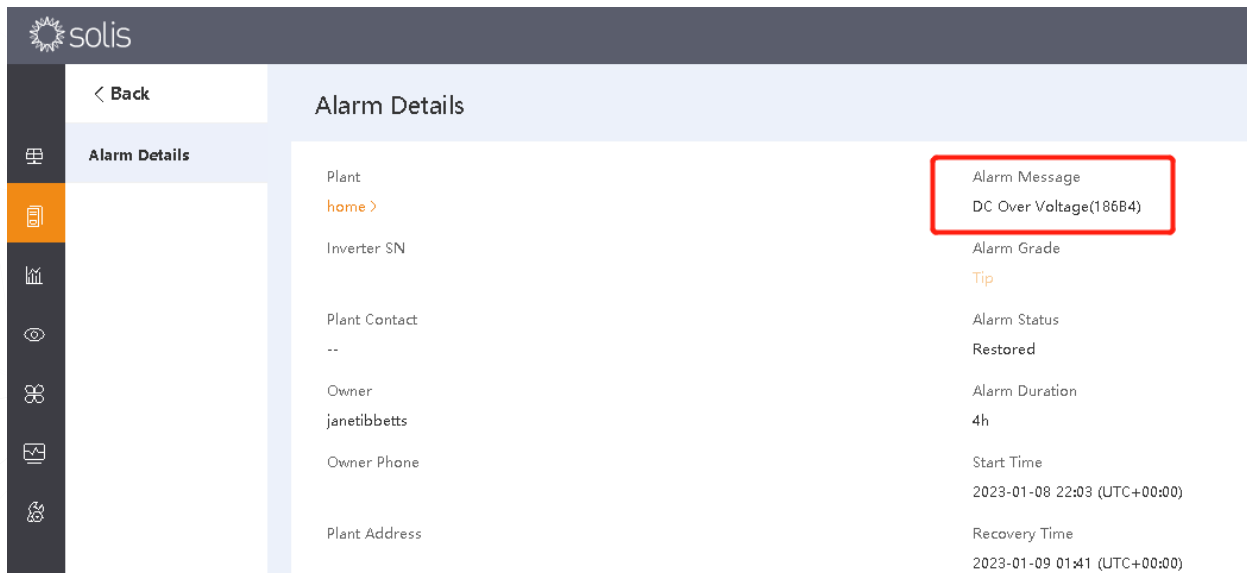
Field	Value
Plant	
Inverter SN	
Plant Contact	--
Owner	--
Owner Phone	shane.bovey@gmail.com
Alarm Message	LowTemp.AMB(2021)
Alarm Grade	Tip
Alarm Status	Pending
Alarm Duration	<1h
Start Time	2023-01-09 01:42 (UTC+00:00)

Resolution Method:

Check whether the ambient temperature is too low and restart the inverter.

B. DC Over Voltage:

The early design of the power station did not consider the PV string voltage increase caused by the extreme low temperature that may occur in this area.



Field	Value
Plant	home >
Inverter SN	
Plant Contact	--
Owner	janetibbetts
Owner Phone	
Plant Address	
Alarm Message	DC Over Voltage(186B4)
Alarm Grade	Tip
Alarm Status	Restored
Alarm Duration	4h
Start Time	2023-01-08 22:03 (UTC+00:00)
Recovery Time	2023-01-09 01:41 (UTC+00:00)

Resolution Method:

1. Use a multimeter to check whether the input voltage exceeds the maximum input voltage of the inverter
2. Restart the inverter
3. If still not excluded, please contact Solis customer service.

In addition, "DC Bus Over Voltage" and "DC Bus Unbalance" both belong to this type of DC over voltage fault, and the treatment methods are similar.

C. PV Isolation Protection:

There is an increase of moisture in the air during winter that easily leads to the low impedance of the system. Exposed cables and connections also cause the inverter to report PV Isolation Protection.

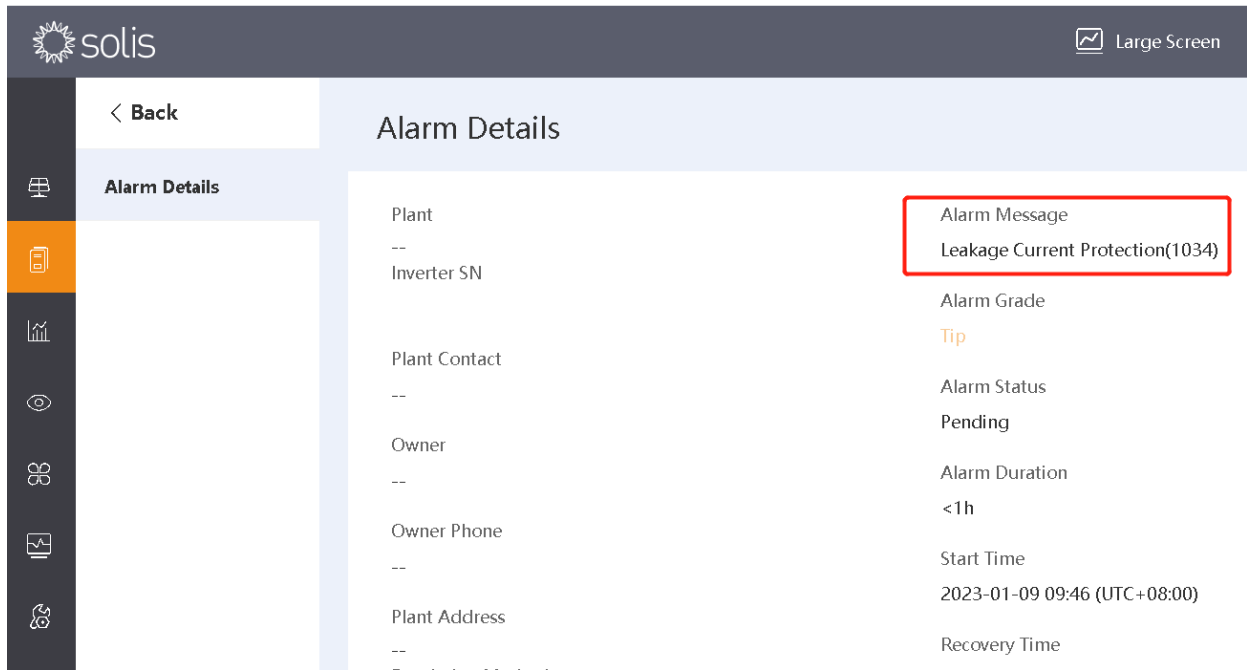
The screenshot displays the Solis inverter's alarm details page. The left sidebar contains navigation icons, with 'Alarm Details' highlighted. The main content area is titled 'Alarm Details' and is divided into two columns. The left column lists fields: Plant, Inverter SN, Plant Contact, Owner (displayed as --), Owner Phone, and Plant Address. The right column lists alarm details: Alarm Message (PV Isolation Protection(1033)), Alarm Grade (Emergency), Alarm Status (Pending), Alarm Duration (< 1h), Start Time (2023-01-09 07:15 (UTC+05:30)), Recovery Time (--), and Historical alarm.

Resolution MethodResolution Method:

1. Check with the inverter alarm function. Remove all PV strings and connect them to the inverter one by one. With the help of the inverter alarm function, if the inverter does not continue to report errors after starting up, it means that the insulation of the string is good. If the inverter reports an error, it means that the newly connected string has bad insulation which does not meet the requirements.
2. Check with a multimeter, Turn off the inverter, remove the PV strings, and use the multimeter to measure the DC voltage of the strings to ground respectively. The red test lead is connected to the positive or negative pole of the PV, and the black test lead is grounded. Observe whether the DC voltage drops to within 20V. If it is fixed as open circuit voltage (voltage between PV+ and -), there is poor insulation in the string.
3. Use a megger to measure the insulation resistance of the PV+/PV- cables between string and ground one by one. The impedance must be greater than 1MΩ. If it is less than this value, the insulation of the string is poor.
4. if still not excluded, can contact Solis customer service.

D. Leakage Current Protection:

The main reason that this fault occurs is similar to PV Isolation Protection. In most cases, due to the increase of water in the environment, the photovoltaic module has large parasitic capacitance to the ground, or the cables and connections are soaked (water), worn, or exposed. Therefore, the inverter reports leakage current.



Resolution Method:

1. Connect each string component individually to determine if it is caused by a component problem. If there is no error when inserting one of the string components, it can be determined that it is a string problem. Check whether the string in question is broken or not.
2. If this error is only caused by a after snowmelt day or a certain time of the morning, it is because the aging of the module causes the leakage current to be too large. When the weather is fine or the air humidity is reduced, the error will be cleared automatically. This can be resolved through remote upgrade software, for details, consult the official Solis service platform

Conclusion:

>> Although winter is cold and the situation is out of our control, as long as you are proactive with resolving any issues that may pop up, your photovoltaic power station can provide plenty of electricity even through extreme weather.