

Regularly maintain the external inverter fan to ensure ongoing optimum performance

Solution

PV inverters are generally installed outdoors and are affected by natural factors such as sunlight, rain, sand, or extreme temperature. Its heat dissipation performance is an important factor to guarantee stable and reliable operation of the inverter.

There are two ways of cooling an inverter: one is to use natural heat dissipation, that is, rely on its own radiator to dissipate heat, and the other is to supplement the cooling fan, relying on external force for forced cooling. With high temperatures in summer, good heat dissipation is the key to efficient power generation and many factors in the external environment will affect the operation of the fan. Regular maintenance is essential.

In this Solis seminar, we will share some common causes and effects of poorly maintained inverter fans.

Common Causes and Effects of Fan Failure

Reasons for Fan Failure:

Solar inverters are regularly installed outdoors, so many uncontrollable factors will affect the operation of the inverter fan. Accumulation of fallen leaves, sand, mice and other animal damage can all prove problematic.



Figure 1: The accumulation of fallen leaves blocks the cooling air ducts and fans



Figure 2: Rodent bites the fan cable, and the sand gets stuck on the fan

Effects of Fan Failure:

For the inverter, once the external cooling fan fails (the fan is blocked and does not rotate, or an animal bites the power supply cable), this in turn causes poor heat dissipation of the inverter and induces over-temperature protection.

In this situation the inverter will display an alarm code “Fan Abnormal”. Particularly in summer, the “over-temperature protection” will not only affect the power generation of the system, but can cause damage to the inverter.

Solution

To ensure the normal operation of the inverter fan, consideration should be given to this at the time of installation as well as in the early stages of operation and during ongoing system maintenance. It is vital to clear the installation area of foreign matter and include preventative measures to ensure fan stays clear of blockages. Regularly clean and replace the fan through monitoring and on-site inspection. Follow these simple steps for ongoing, efficient operation:

1. Consideration During Installation

Comprehensive installation considerations can improve system reliability and reduce operation and maintenance costs later.

① Inspect the installation area

Fully evaluate the overall environment of the inverter installation. It is not recommended to choose an area with heavy ash accumulation, fallen leaves, or overgrown weeds. These will affect the normal operation of the fan. The noise will increase, cooling air ducts and the fan will become blocked, resulting in inverter failure.



Figure 3: Debris blocks the inverter air ducts and fans, causing inverter failure

As shown in Figure 4, above, the first image shows a mountain power plant where the inverter was installed close to overgrown plants, resulting in the accumulation of leaves and blocking the inverter air ducts and fans. In the next, the wall where the inverter is installed has been affected by weathering over time, causing debris to fall and block the inverter fan. As a result, the fans do not operate normally, the heat dissipation is effected and ultimately the power generation is reduced. The inverter reports a fault.

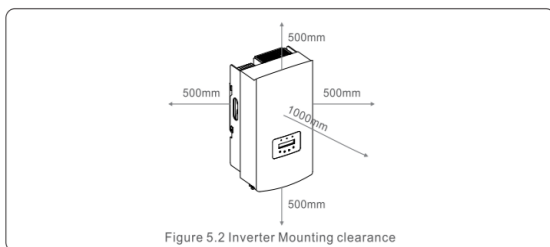
The inverter installation area needs to be considered as a whole. It is recommended that large-scale power station inverters be installed away from bushes or placed under PV modules to form a shield. In residential installations, consider

a solid wall without any chance of falling debris, preferably an area covered by eaves.

② Pay Attention to the Space Around the Inverter(s)

When multiple inverters are installed, the space between is also very important as this determines the heat dissipation performance of the inverters and the working efficiency of the fans. If the distance between each is too small, the fan speed will increase, and the heat dissipation will not be optimized, which will affect the power generation of the system.

The installation distance of inverters is different depending on and size and model type. It is recommended to refer to the corresponding product manual:



- Temperature of inverter heat sinker might 167°F/75°C.
- Inverter is designed for working extreme environment, operation temperature range: -15°F/25°C~149°F/65°C.
- When 1 or more inverters are installed in one location, a minimum 500mm clearance should be kept between each inverter or other object. The bottom of the inverter should be 500mm clearance to the ground.

- The temperature of the inverter heat-sink can reach 75°C.
- The inverter is designed to work in an ambient temperature range between -25 to 60°C.
- If multiple inverters are installed on site, a minimum clearance of 700mm should be kept between each inverter and all other mounted equipment. The bottom of the inverter should be at least 700mm above of the ground or floor (see Figure 3.1).
- The LED status indicator lights and the LCD located on the inverter's front panel should not be blocked.
- Adequate ventilation must be present if the inverter is to be installed in a confined space.

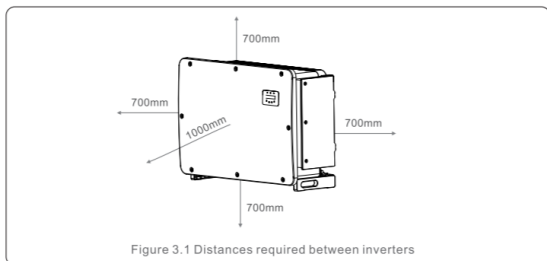


Figure 4: Inverter installation distance, refer to the manual

③ Adding a Protection Device

The best solution in all cases is to prevent the issue in the first place by adding preventative measures such as sun visors to the inverter, which can not only prevent soil or litter from blocking the cooling channels and fans, but also block direct sunlight and moderate the temperature of the inverter.

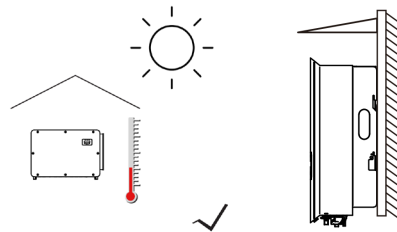


Figure 5: Installation of external facilities such as sun visors

2. Regular Maintenance

① Inspection

Regularly check the operation status of the fan, which can be monitored or checked on site. If the inverter is installed in a residential area, it should be fixed on a solid concrete wall.

② Cleaning

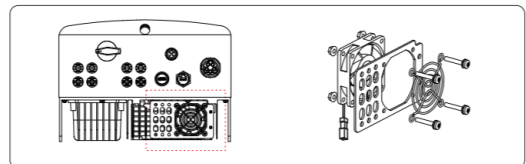
Regularly clean the external fan with a soft brush, one a month following the recommended steps in the installation manual as shown below in Figure 6.

8.1 Fan Maintenance

If the fan does not work properly, the inverter will not be cooled effectively, and it may affect the effective operation of the inverter.

Therefore, it is necessary to clean or replace a broken fan as follows:

1. Disconnect the AC power.
2. Turn the DC switch to "OFF" position.
3. Wait for 10 minutes at least.
4. Disconnect all electric connection.
5. Place the inverter on the platform.
6. Remove the 4 screws on the fan plate and pull out the fan assembly slowly.



7. Disconnect the fan connector carefully and take out the fan.
8. Clean or replace the fan. Assemble the fan on the rack.
9. Connect the electrical wire and reinstall the fan assembly. Restart the inverter.

Figure 6: Fan Cleaning and Maintenance Guide, Reference Manual

③ Troubleshooting

If the inverter displays an alarm code such as "Fan Abnormal" or "Over-Temperature Protection", it is necessary to check whether the inverter fan is running or if there is debris blocking the ducts. Clean up the foreign matter and clear the alarm code. If the fan still does not run you should contact [Solis after-sales support](#).

Summary

In summer, the heat dissipation performance of the inverter is critical. During the design stage, consideration needs to be taken to where the inverter will be sited to ensure sufficient shade and that no debris will easily fall and block the air ducts. The fan needs to be regularly checked and cleaned to ensure ongoing rapid cooling of the inverter isn't effected and to maintain efficient power generation of the system.