Open Energy For All

Technical Note

Hoymiles HRSD System Troubleshooting Guide

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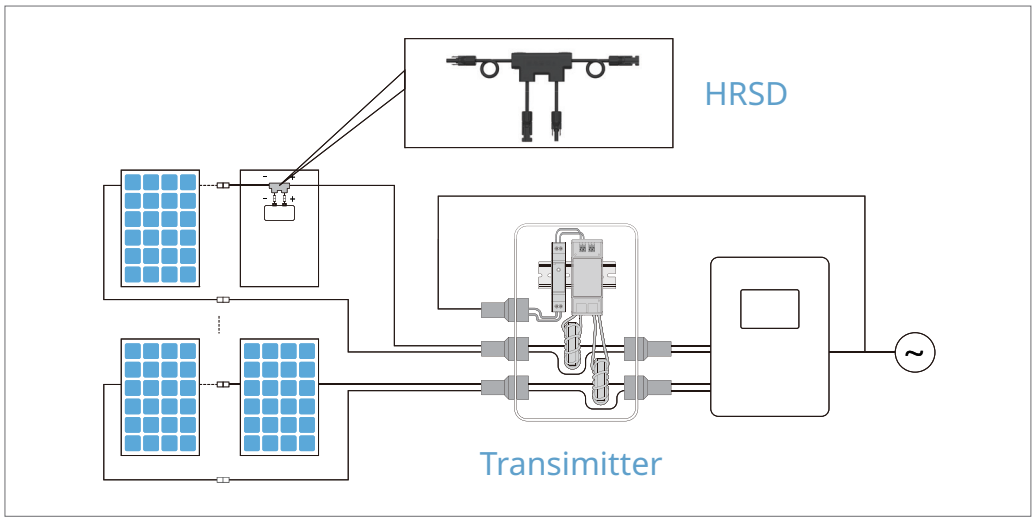
0 Overview

This document describes how to troubleshoot Hoymiles Rapid Shutdown (HRSD) System-related errors.

The Hoymiles HRSD system is a safety mechanism that rapidly shuts down high-voltage DC flow to a safe voltage level for PV systems during emergency situations. It has two main parts, the HRSD device and the Transmitter.

To properly run the PV system, the HRSD device must be paired with and receive a "permission to operate" signal from the Transmitter. During an emergency, the PV system can rapidly shut down at the module-level through two methods: disconnecting the Transmitter's AC power or using an external initiator.

Its typical wiring diagram is shown in figure below.



1 Term

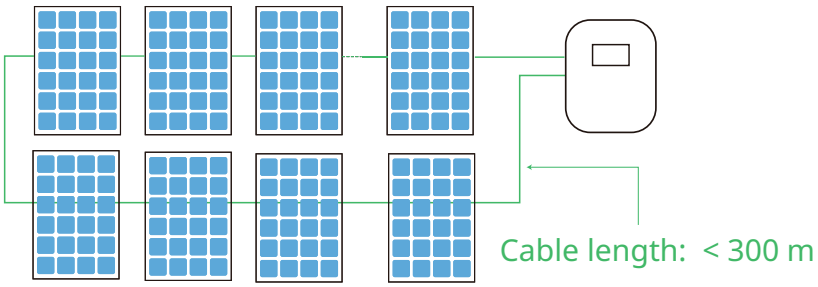
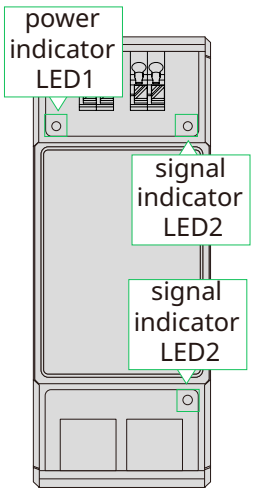
- HRSD: HRSD stands for Hoymiles rapid shutdown devices. It refers to a device that is installed in PV systems to quickly shut off power to the system in case of an emergency.
- PV module string: PV module string refers to a group of panels wired into a single input on your inverter.
- Voc: Stands for open-circuit voltage, which is the maximum voltage the PV module can produce when it is not connected to a load.

2 Troubleshooting Guide

2.1 PV module string has no DC voltage (0 V)

Problem	The output voltage of one or more PV module strings display as 0.0 V on the inverter monitoring platform.
Possible Cause	There is an open circuit condition within the PV module string due to the wiring issues in the connectors, or there is an operation abnormal of HRSD.
Troubleshooting Procedure	
Step 1	Find the failed PV module string and disconnect the inverter from it. **Check each connector in the faulty string for accidental disconnections or loose connections.** If any looseness or disconnection issues are found, replug the connectors and check whether the string voltage displayed on the inverter monitoring platform has returned to normal. If the voltage has not returned to normal, move on to **Step 2**.
Step 2	**Visually check the HRSD for a bulging cover or any visible damage**. If there are visible signs of damage around the HRSD, contact the distributor for a replacement. Otherwise, reconnect the inverters to the PV module strings and observe the voltage changes of the PV module string.
Step 3	If the string output is still 0 V, refer to **2.3 HRSD has no output voltage (0 V)**.

2.2 PV module string has less output voltage than expected

Problem	The voltage displayed on the inverter monitoring platform is significantly lower than the expected Voc × n*. *n: Here, n refers to the number of PV modules in each string.
Possible Cause	This issue may be related to various factors, such as power supply failure in the transmitter, signal interference between the transmitter and the HRSD, internal malfunction or power supply failure in the HRSD, wiring issues in the PV module string, or damage to the PV modules.
Troubleshooting Procedure	
Step 1	**Confirm the following installation are correct:** • The current passing through the Core aligns with the data specified in the Transmitter's user manual. Refer to "User Manual_HT10_Global_EN". • The cable length (the PV+ to PV- loop of each PV string) should not exceed 300 m. • The homeruns passing through the Core must be of the same polarity, either all positive or all negative. 
Step 2	**Check and ensure the power supply to the Transmitter is functioning properly**. Observe whether the power indicator LED1 is **solid**. If LED1 is **solid**, proceed to **Step 3**. Otherwise, manually test the power supply with a multimeter to check whether the voltage is 12V. If the voltage is 12 V, move on to **Step 3**. If not, replace the power supply.
Step 3	**Check and ensure the signal indicator of the Transmitter is functioning properly.** Observe whether the signal indicator LED2 is flashing. If the LED2 is flashing, proceed to **Step 4**. If the LED2 is **solid**, it means that the Transmitter has not sent a "Permission to Operate" signal. Restart the transmitter and observe whether the LED2 returns to flashing. If it does, proceed to **Step 4**. If the LED2 is still **solid**, contact Hoymiles technical support team.
	
Step 4	**Check whether there are loose connections between PV modules and HRSD.** If there are loose connections, reconnect the connectors. Otherwise, proceed to Step 5.
Step 5	**Check if the PV modules and the HRSD are functioning properly.** If the Transmitter is functioning and generating a "Permission to Operate" signal, follow the steps below to check the PV modules and the HRSD. (If you don't have the necessary equipment, skip the following steps.) 1. Use a **camera** or a **handheld temperature gun** to check if there is a module with an abnormally low-temperature reading in the PV module string. 2. Use a **multimeter** to sequentially test the voltage on OUT+ and OUT- of each HRSD. • If an HRSD's OUT+ and OUT- give the same voltage, it indicates that this HRSD has no output voltage and should be replaced. • If there is a certain voltage difference between the OUT+ and OUT- of the HRSD, it indicates that this HRSD is working normally. Disconnect this HRSD and measure the PV module's output voltage. If the PV module has no output voltage, it means that the issue may be the PV module and it needs to be replaced.

2.3 HRSD has no output voltage (0 V)

Problem	The output voltage of a certain HRSD is measured at 0 V.
Possible Cause	There is an internal malfunction in this equipment.
Troubleshooting Procedure	
Step 1	**Check and ensure the rapid shutdown system is connected properly.**
Step 2	**Check if the PV modules are functioning properly.** Disconnect the HRSD from the PV module and use a multimeter to measure the output voltage of the PV module. If the output voltage is normal (depending on the specification of your PV plant, the standard of 'normal ' might be different), it indicates that the issue may be the HRSD. Proceed to measure the output voltage of the HRSD with a **multimeter**. Otherwise, replace the PV module.
Step 3	**Check if the HRSD is functioning properly.** Check and ensure that the PV modules are functioning properly and the PV modules and HRSDs are correctly connected. Once these have been confirmed, measure the output voltage of the HRSD with a multimeter. If the output voltage is still 0 V, it means that there is an internal malfunction in HRSD. Contact Hoymiles Technical Support Team to replace the HRSD.