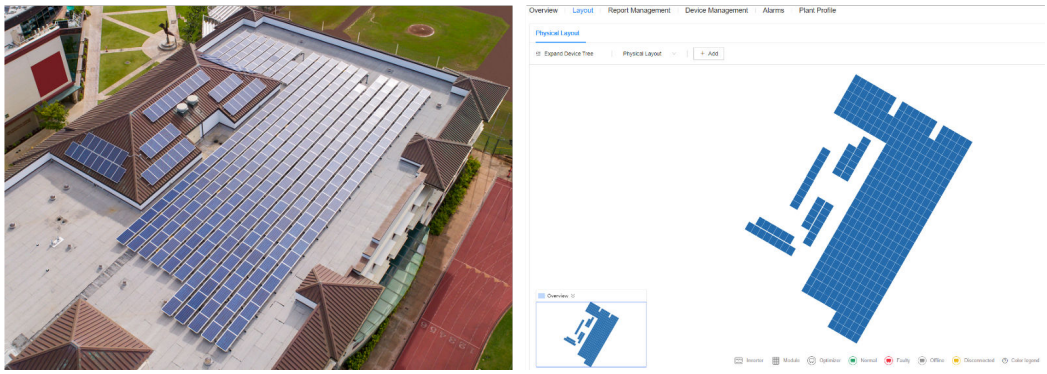
modules one by one to locate the faulty one, which is time-consuming and inefficient.

For details about the physical location layout of the optimizers, see **FusionSolar Physical Layout User Guide**.

Figure 7-6 Viewing a physical layout on the FusionSolar app

Figure 7-7 Viewing a physical layout on the FusionSolar SmartPVMS



7.3.3 AFCI

Function

If PV modules or cables are not properly connected or damaged, electric arcs may occur, which may cause fire. Huawei SUN2000s provide unique arc detection in compliance with UL 1699B-2018 to ensure the safety of users' lives and property.

This function is enabled by default. The SUN2000 automatically detects arc faults. To disable this function, log in to the FusionSolar App, enter the **Device Commissioning** screen, choose **Settings** > **Feature parameters**, and disable **AFCI**.

NOTE

The AFCI function works only with Huawei optimizers or ordinary PV modules, but does not support third-party optimizers or intelligent PV modules.

Clearing Alarms

The AFCI function involves the **DC arc fault** alarm.

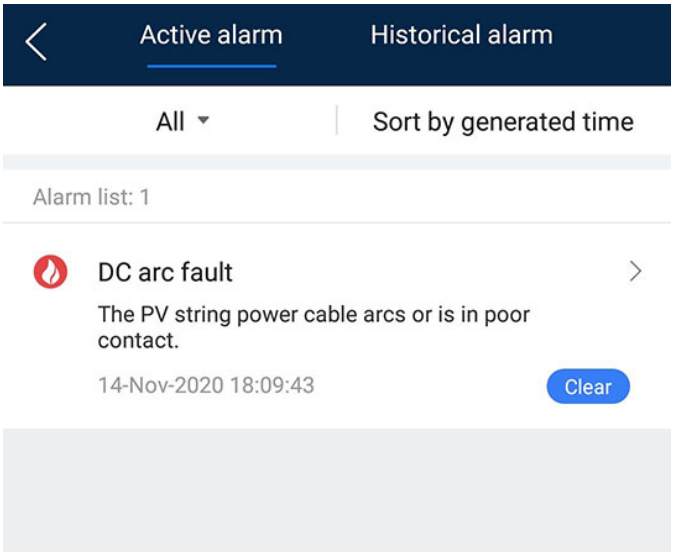
The SUN2000 has the AFCI alarm automatic clearance mechanism. If an alarm is triggered for less than five times within 24 hours, the SUN2000 automatically clears the alarm. If the alarm is triggered for five times or more within 24 hours, the SUN2000 locks for protection. You need to manually clear the alarm on the SUN2000 so that it can work properly.

You can manually clear the alarm as follows:

- **Method 1**: FusionSolar App

  Log in to the FusionSolar App and choose **Me** > **Device commissioning**. On the **Device commissioning** screen, connect and log in to the SUN2000 that generates the AFCI alarm, tap **Alarm management**, and tap **Clear** on the right of the **DC arc fault** alarm to clear the alarm.

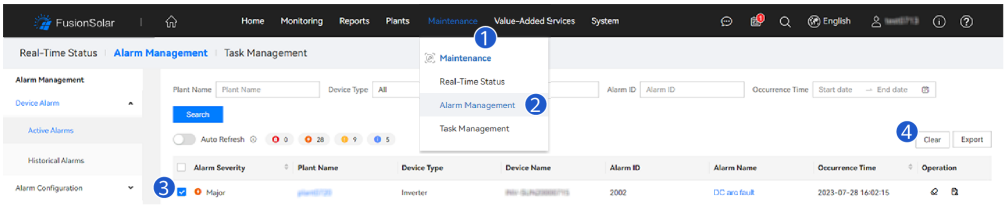
  Figure 7-8 Alarm management



- **Method 2**: FusionSolar Smart PV Management System

  Log in to the FusionSolar Smart PV Management System using a non-owner account, choose **Maintenance** > **Alarm Management**, select the **DC arc fault** alarm, and click **Clear** to clear the alarm.

Figure 7-9 Clearing alarms



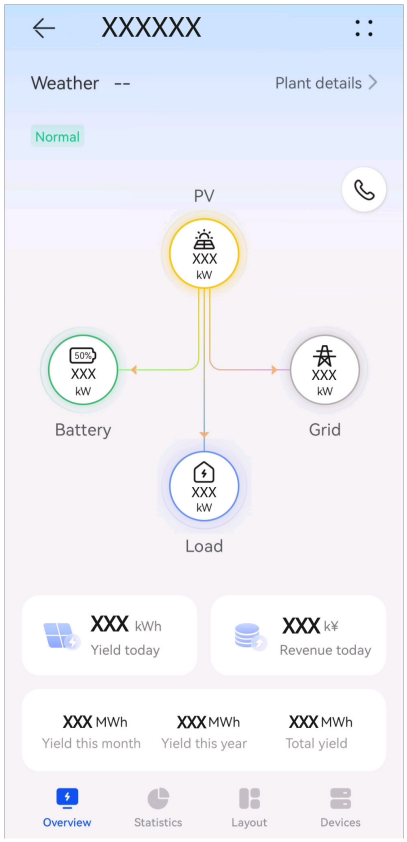
Switch to the owner account with PV plant management rights. On the home page, click the PV plant name to go to the PV plant page, and click **OK** as prompted to clear the alarm.

7.4 Viewing the Plant Creation Status

The FusionSolar app provides an overview of plants. You can view the plant running status, energy yield and consumption, revenue, and energy flow diagram in real time.

Log in to the app, tap **Home**, and tap **Plants**. This screen displays the real-time running status and basic information of all plants managed by the user by default.

Figure 7-10 Viewing the plant creation status



7.5 SmartLogger Networking Scenario

See the ***PV Plants Connecting to Huawei Hosting Cloud Quick Guide (Inverters + SmartLogger3000 + RS485 Networking)***. You can scan the QR code to obtain it.

Figure 7-11 SmartLogger3000

8 System Maintenance

DANGER

- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.

WARNING

- Before performing maintenance, power off the equipment, follow the instructions on the delayed discharge label, and wait for a period of time as specified to ensure that the equipment is not energized.

8.1 Routine Maintenance

To ensure that the inverter can operate properly for a long term, you are advised to perform routine maintenance on it as described in this section.

CAUTION

Power off the system before cleaning the system, connecting cables, and checking grounding reliability.

Table 8-1 Maintenance checklist

Check Item	Check Method	Maintenance Interval
System cleanliness	Check periodically whether the heat sinks are blocked or dirty.	Once every 6 to 12 months

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Check Item	Check Method	Maintenance Interval
Cleanness of air intake and exhaust vents	Check periodically whether there is dust or foreign objects at the air intake and exhaust vents.	Power off the inverter and remove dust and foreign objects. If necessary, remove the baffle plates from the air intake and exhaust vents for cleaning. Once every 6 to 12 months (or once every 3 to 6 months based on the actual dust conditions in the environment)
Fan	Check whether the fan generates abnormal noise during operation.	Remove foreign objects from the fan. If the abnormal noise persists, replace the fan. For details, see **8.5 Replacing a Fan**. Once every 6 to 12 months
System running status	• Check whether the inverter is damaged or deformed. • Check whether the inverter generates abnormal sound during operation. • Check whether all inverter parameters are correctly set during operation.	Once every 6 months
Electrical connection	• Check whether cables are disconnected or loose. • Check whether cables are damaged, especially whether the cable sheath that contacts a metal surface is damaged.	6 months after the first commissioning and once every 6 to 12 months after that
Grounding reliability	Check whether the PE cable is securely connected.	6 months after the first commissioning and once every 6 to 12 months after that
Sealing	Check whether all terminals and ports are properly sealed.	Once a year

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8.2 System Power-Off

Precautions

WARNING

- After the system is powered off, the inverter is still energized and hot, which may cause electric shocks or burns. Therefore, wait for 5 minutes after power-off and then put on insulated gloves to operate the inverter.
- Power off the system before maintaining optimizers and PV strings. Otherwise, electric shocks may occur when the PV strings are energized.

Procedure

Step 1 Send a shutdown command on the app.

Step 2 Turn off the AC switch between the inverter and the power grid.

Step 3 Set the **DC SWITCH** to **OFF**.

Step 4 (Optional) Install the locking screw for the **DC SWITCH**.

Step 5 Turn off the DC switch between the inverter and PV strings.

Step 6 (Optional) Turn off the battery switch between the inverter and the battery.

----End

8.3 Troubleshooting

NOTE

Contact your dealer if all failure analysis procedures listed above are completed and the fault still exists.

Alarm severities are defined as follows:

- Major: The inverter is faulty. As a result, the output power decreases or the grid-tied power generation is stopped.
- Minor: Some components are faulty without affecting the grid-tied power generation.
- Warning: The inverter works properly. The output power decreases or some authorization functions fail due to external factors.

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Table 8-2 Common alarms and troubleshooting measures

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
2001	High string input voltage	Major	The PV array is not properly configured. Excessive PV modules are connected in series to the PV string, and therefore the PV string open-circuit voltage exceeds the maximum inverter operating voltage. • Cause ID 1: PV strings 1 and 2 • Cause ID 2: PV strings 3 and 4	Reduce the number of PV modules connected in series to the PV string until the PV string open-circuit voltage is less than or equal to the maximum inverter operating voltage. After the PV string configuration is corrected, the alarm disappears.
2003	DC arc fault	Major	The PV string power cables arc or are in poor contact. Cause ID 1–4: PV strings 1–4	Check whether the PV string cables arc or are in poor contact.
2011	String reverse connection	Major	The PV string polarity is reversed. Cause ID 1–4: PV strings 1–4	Check whether the PV string is reversely connected to the inverter. If yes, wait until the solar irradiance declines at night and the PV string current drops to below 0.5 A. Then, turn off the DC switch and correct the PV string connection.

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
2012	String current backfeed	Warning	The number of PV modules connected in series to the PV string is insufficient. As a result, the terminal voltage is lower than that of other strings. Cause ID 1–4: PV strings 1–4	1. Check whether the number of PV modules connected in series to the PV string is less than that of other PV strings. If yes, wait until the PV string current drops below 0.5 A, turn off all DC switches, and adjust the number of PV modules in the PV string. 2. Check whether the open-circuit voltage of the PV string is abnormal. 3. Check whether the PV string is shaded.
2021	AFCI self-check failure	Major	Cause ID = 1 The AFCI self-check fails.	Turn off the AC output switch and DC input switch, and then turn them on after 5 minutes. If the alarm persists, contact Huawei technical support.
2031	Phase wire short-circuited to PE	Major	Cause ID = 1 The impedance of the output phase wire to PE is low or the output phase wire is short-circuited to PE.	Check the impedance of the output phase wire to PE, locate the position with low impedance, and rectify the fault.
2032	Grid loss	Major	Cause ID = 1 • Power grid outage occurs. • The AC circuit is disconnected or the AC switch is off.	1. The alarm is cleared automatically after the power grid recovers. 2. Check whether the AC circuit is disconnected or the AC switch is off.

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
2033	Grid undervoltage	Major	Cause ID = 1 The power grid voltage is below the lower threshold or the low-voltage duration has lasted for more than the value specified by LVRT.	1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm persists, check whether the power grid voltage is within the acceptable range. If not, contact the local power operator. If yes, modify the grid undervoltage protection threshold through the app, SmartLogger, or NMS with the consent of the local power operator. 3. If the alarm persists for a long time, check the AC circuit breaker and AC output power cable.
2034	Grid overvoltage	Major	Cause ID = 1 The power grid voltage exceeds the upper threshold or the high voltage duration has lasted for more than the value specified by HVRT.	1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm persists, check whether the power grid frequency is within the acceptable range. If not, contact the local power operator. If yes, modify the grid overfrequency protection threshold through the app, SmartLogger, or NMS with the consent of the local power operator. 3. Check whether the peak voltage of the power grid is too high. If the alarm persists and lasts for a long time, contact the local power operator.

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
2035	Grid volt. Imbalance	Major	Cause ID = 1 The difference between power grid phase voltages exceeds the upper threshold.	1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm persists, check whether the power grid voltage is within the acceptable range. If not, contact the local power operator. 3. If the alarm lasts for a long time, check the AC output power cable connection. 4. If the AC output power cable is correctly connected, yet the alarm persists and affects the energy yield of the PV plant, contact the local power operator.
2036	Grid overfrequency	Major	Cause ID = 1 Power grid exception: The actual power grid frequency is higher than the requirements for the local power grid code.	1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm persists, check whether the power grid frequency is within the acceptable range. If not, contact the local power operator. If yes, modify the grid overfrequency protection threshold through the app, SmartLogger, or NMS with the consent of the local power operator.

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
2037	Grid underfrequency	Major	Cause ID = 1 Power grid exception: The actual power grid frequency is lower than the requirements for the local power grid code.	1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm persists, check whether the power grid frequency is within the acceptable range. If not, contact the local power operator. If yes, modify the grid underfrequency protection threshold through the app, SmartLogger, or NMS with the consent of the local power operator.
2038	Unstable grid frequency	Major	Cause ID = 1 Power grid exception: The actual change rate of the power grid frequency does not meet the requirements for the local power grid code.	1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm persists, check whether the power grid frequency is within the acceptable range. If not, contact the local power operator.
2039	AC Overcurrent	Major	Cause ID = 1 The power grid voltage drops dramatically or the power grid is short-circuited. As a result, the inverter transient output current exceeds the upper threshold, and protection is triggered.	1. The inverter monitors its external operating conditions in real time and automatically recovers after the fault is rectified. 2. If the alarm persists and affects the energy yield of the PV plant, check whether the output is short-circuited. If the fault cannot be rectified, contact your dealer or Huawei technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
2040	Output DC component overhigh	Major	Cause ID = 1 The DC component of the inverter output current exceeds the upper threshold.	1. The inverter monitors its external operating conditions in real time and automatically recovers after the fault is rectified. 2. If the alarm persists and affects the energy yield of the PV plant, contact your dealer or Huawei technical support.
2051	Abnormal residual current	Major	Cause ID = 1 The insulation impedance of the input side to PE decreases when the inverter is operating.	1. If the alarm occurs accidentally, the external power cable may be abnormal temporarily. The inverter automatically recovers after the fault is rectified. 2. If the alarm persists or lasts a long time, check whether the impedance between the PV string and ground is too low.
2061	Abnormal grounding	Major	Cause ID = 1 ● The neutral wire or PE cable of the inverter is not connected. ● The output mode set for the inverter is inconsistent with the cable connection mode.	Power off the inverter (turn off the AC output switch and DC input switch, and wait for a period of time. For details about the wait time, see the description on the device safety warning label), and then perform the following operations: 1. Check whether the PE cable for the inverter is connected properly. 2. If the inverter is connected to a TN power grid, check whether the neutral wire is properly connected and whether the voltage of the neutral wire to ground is normal. 3. After the inverter is powered on, check whether the output mode set for the inverter is consistent with the output cable connection mode.

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
2062	Low insulation resistance	Major	Cause ID = 1 • The PV array is short-circuited with PE. • The PV string has been in a moist environment for a long time and the circuit is not well insulated to ground.	1. Check the impedance between the PV string and the PE cable. If a short circuit occurs, rectify the fault. 2. Check whether the PE cable of the inverter is correctly connected. 3. If you have confirmed that the impedance is lower than the specified protection threshold in a cloudy or rainy environment, log in to the app, SmartLogger, or NMS and set **Insulation resistance protection threshold**.
2063	Cabinet overtemperature	Minor	Cause ID = 1 • The inverter is installed in a place with poor ventilation. • The ambient temperature exceeds the upper threshold. • The inverter is not operating properly.	1. Check the ventilation and ambient temperature at the inverter installation position. 2. If the ventilation is poor or the ambient temperature exceeds the upper threshold, improve the ventilation and heat dissipation. 3. If both the ventilation and ambient temperature meet requirements yet the alarm persists, contact your dealer or Huawei technical support.
2064	Device fault	Major	Cause ID = 1–5, 7–12 An unrecoverable fault occurs on a circuit inside the inverter.	Turn off the AC output switch and DC input switch, and then turn them on after 5 minutes. If the alarm persists, contact your dealer or Huawei technical support. **NOTICE** Cause ID = 1: Perform the preceding operations when the PV string current is less than 1 A.

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
2065	Upgrade failed or version mismatch	Minor	Cause ID = 1–4, 7 The upgrade is not completed normally.	1. Perform an upgrade again. 2. If the upgrade fails several times, contact your dealer or Huawei technical support.
61440	Faulty monitoring unit	Minor	Cause ID = 1 • The flash memory is insufficient. • The flash memory has bad sectors.	Turn off the AC output switch and DC input switch, and then turn them on after 5 minutes. If the alarm persists, replace the monitoring board or contact your dealer or Huawei technical support.
2067	Faulty power collector	Major	Cause ID = 1 The power meter is disconnected.	1. Check whether the configured power meter model is the same as the actual model. 2. Check whether the communications parameters of the power meter are the same as the RS485 configurations of the inverter. 3. Check whether the power meter is powered on and whether the RS485 communications cable is connected.

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
2080	Abnormal PV module configuration	Major	• Cause ID = 2 The PV string power or the number of optimizers connected in series in a PV string exceeds the upper threshold. • Cause ID = 3 The number of optimizers connected in series in a PV string is less than the lower threshold, the PV string output is reversely connected, or the output of some optimizers in the PV string is reversely connected. • Cause ID = 6 Under the same MPPT, the number of optimizers connected in series in PV strings connected in parallel is different, or the output of some optimizers in	Check whether the total number of PV modules, number of PV modules in a PV string, and number of PV strings meet requirements and whether the PV module output is reversely connected. • Cause ID 2: Check whether the PV string power or the number of PV strings connected in series exceeds the upper threshold. • Cause ID 3: 1. Check whether the number of optimizers connected in series in the PV string is below the lower threshold. 2. Check whether the PV string output is reversely connected. 3. Check whether the PV string output is disconnected. 4. Check whether the optimizer output extension cable is correct (positive connector at one end and negative connector at the other). • Cause ID 6: 1. Check whether the number of optimizers connected in series in the PV strings connected in parallel under the same MPPT is the same. 2. Check whether the optimizer output extension cable is correct (positive connector at one end and negative connector at the other). • Cause ID 7: When the sunlight is normal, perform the optimizer search function again.

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
			PV strings is reversely connected. • Cause ID = 7 The optimizer installation position is changed, or PV strings are combined or exchanged. • Cause ID = 8 The sunlight is weak or changes abnormally. • Cause ID = 9 In partial configuration scenarios, the PV string voltage exceeds the inverter input voltage specifications.	• Cause ID 8: When the sunlight is normal, perform the optimizer search function again. • Cause ID 9: Calculate the PV string voltage based on the number of PV modules in the string and check whether the string voltage exceeds the upper threshold of the inverter input voltage.
2081	Optimizer fault	Warning	Cause ID = 1 The optimizer is offline or faulty.	Go to the optimizer information screen to view the fault details.

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
2085	Built-in PID operation abnormal	Minor	Cause ID = 1, 2 ● The output resistance of PV arrays to ground is low. ● The system insulation resistance is low.	● Cause ID = 1 1. Turn off the AC output switch and DC input switch, wait for a period of time (for details about the wait time, see the description on the device safety warning label), and then turn on the DC input switch and AC output switch. 2. If the alarm persists, contact your dealer or Huawei technical support. ● Cause ID = 2 1. Check the impedance between the PV array output and the ground. If a short circuit occurs or the insulation is insufficient, rectify the fault. 2. If the alarm persists, contact your dealer or Huawei technical support.
2086	External fan abnormal	Major	Cause ID = 1 The external fan is short-circuited, the power supply is insufficient, or the air channel is blocked.	1. Shut down the fan, turn off the DC switch, check whether the fan blades are damaged, and clear the foreign matter around the fan. 2. Reinstall the fan, turn on the DC switch, and wait for the inverter to start. If the alarm persists after 15 minutes, replace the external fan.

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	Troubleshooting
2090	Abnormal active power scheduling instruction	Major	Cause ID = 1 • The DI input is abnormal. • The DI input is inconsistent with the configuration.	1. Check whether the cables are connected correctly to the DI ports. 2. On the **DI active scheduling** screen under the dry contact scheduling settings, view the DI signal configuration mapping table. Contact the power grid company to check whether the configurations in the mapping table are complete and meet the requirements.
2091	Abnormal reactive power scheduling instruction	Major	Cause ID = 1 • The DI input is abnormal. • The DI input is inconsistent with the configuration.	1. Check whether the cables are connected correctly to the DI ports. 2. On the **DI reactive power scheduling** screen under the dry contact scheduling settings, view the DI signal configuration mapping table. Contact the power grid company to check whether the configurations in the mapping table are complete and meet the requirements.
2102	Protection upon Communication Failure	Warning	Cause ID = 1 When the disconnection of communication exceeds the specified time threshold, the device starts the protection function.	1. Check whether the communications cable is connected properly. 2. After communication is restored, the device will recover upon receiving a scheduling command. 3. If the **Protection upon Communication Failure** function is not required, disable it.

8.4 Replacing an Inverter

Step 1 Remove the inverter.

1. Power off the system. For details, see **8.2 System Power-Off**.
2. Disconnect all cables from the inverter, including signal cables, DC input power cables, battery cables, AC output power cables, and PE cables.

3. Remove the inverter from the mounting bracket.
4. Remove the mounting bracket.

Step 2 Pack the inverter.

- If the original packaging is available, put the inverter inside it and then seal it using adhesive tape.
- If the original packaging is unavailable, put the inverter inside a suitable hard cardboard box and seal it properly.

Step 3 Dispose of the inverter.

If the inverter reaches the end of its service life, dispose of it according to local regulations for the disposal of electrical equipment.

Step 4 Install a new inverter.

----End

8.5 Replacing a Fan

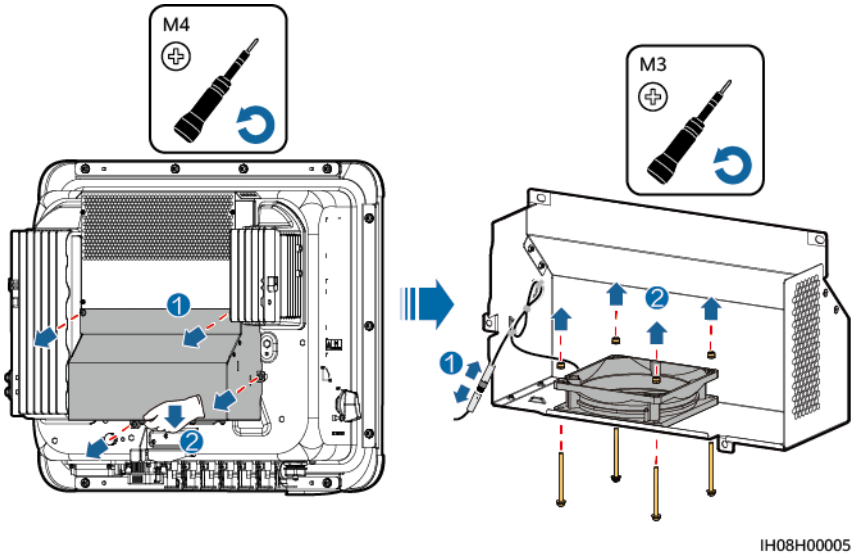
⚠ CAUTION

- Before replacing a fan, power off the inverter.
- When replacing a fan, use insulated tools and wear PPE.

Procedure

Step 1 Remove the fan cover, disconnect fan cables, and remove the faulty fan.

Figure 8-1 Removing the faulty fan



Step 2 Install a new fan, connect and bind the cables, and install the fan cover.

----End

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8.6 Locating Insulation Resistance Faults

If the ground resistance of a PV string connected to the inverter is too low, the inverter generates a **Low insulation resistance** alarm. The alarm ID is 2062.

The possible causes are as follows:

- A short circuit has occurred between the PV array and the ground.
- The ambient air of the PV array is damp and the insulation between the PV array and the ground is poor.

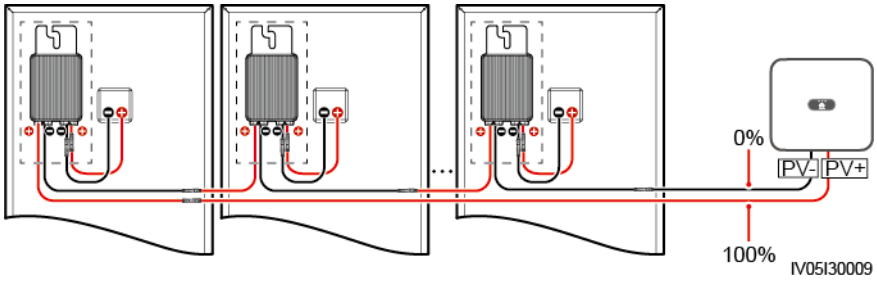
After the **Low insulation resistance** alarm is reported by the inverter, insulation resistance fault location is automatically triggered. If the fault location is successful, the location information is displayed on the **Alarm details** screen of the **Low insulation resistance** alarm on the FusionSolar app.

Log in to the FusionSolar app, choose **Alarm** > **Active alarm**, select **Low insulation resistance** to enter the **Alarm details** screen.

NOTE

- The positive and negative terminals of a PV string are respectively connected to the PV+ and PV– terminals of the inverter. The PV– terminal represents a possibility of 0% for the short-circuit position and the PV+ terminal represents a possibility of 100% for the short-circuit position. Other percentages indicate that the fault occurs on a PV module or cable in the PV string.
- Possible fault position = Total number of PV modules in a PV string x Percentage of possible short-circuit positions. For example, if a PV string consists of 14 PV modules and the percentage of the possible short-circuit position is 34%, the possible fault position is 4.76 (14 x 34%), indicating that the fault is located near PV module 4, including the previous and the next PV modules and the cables. The inverter has a detection precision of ±1 PV module.
- The possible faulty PV string MPPT1 corresponds to PV1 and PV2, and the possible faulty PV string MPPT2 corresponds to PV3 and PV4. The fault can be located only to the MPPT level. Perform the following steps to connect the PV strings corresponding to the faulty MPPT to the inverter one by one to further locate and rectify the fault.
- When a non-short-circuit fault occurs, the possible short-circuit percentage is not displayed. If the insulation resistance is greater than 0.001 MΩ, the fault is not related to short circuit. Check all PV modules in the faulty PV string one by one to locate and rectify the fault.

Figure 8-2 Percentage of short-circuit positions



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Procedure

NOTICE

If the irradiance or the PV string voltage is too high, the insulation resistance fault location may fail. In this case, the fault location status on the **Alarm details** screen is **Conditions not met**. Perform the following steps to connect PV strings to the inverter one by one to locate the fault. If the system is not configured with any optimizer, skip the corresponding optimizer operations.

Step 1 Ensure that the AC connections are normal. Log in to the FusionSolar app, choose **Maintenance** > **Inverter ON/OFF** on the home screen, and send a shutdown command. Set **DC SWITCH** to **OFF**.

Step 2 Connect one PV string to the inverter, and set **DC SWITCH** to **ON**. If the inverter status is **Shutdown: Command**, log in to the app, choose **Maintenance** > **Inverter ON/OFF** on the home screen, and send a startup command.

Step 3 Choose **Alarm** on the home screen, enter the **Active alarm** screen, and check whether a **Low insulation resistance** alarm is reported.

- If no **Low insulation resistance** alarm is reported 1 minute after the DC side is powered on, choose **Maintenance** > **Inverter ON/OFF** on the home screen, and send a shutdown command. Set **DC SWITCH** to **OFF**. Go to **Step 2** and check rest of the PV strings one by one.
- If a **Low insulation resistance** alarm is reported 1 minute after the DC side is powered on, check the percentage of possible short-circuit positions on the **Alarm details** screen and calculate the location of the possible faulty PV module based on the percentage. Then go to **Step 4**.

Step 4 Log in to the app, choose **Maintenance** > **Inverter ON/OFF** on the home screen, and send a shutdown command. Set **DC SWITCH** to **OFF**. Check whether the connectors or DC power cables between the optimizer and PV module, between adjacent PV modules, or between adjacent optimizers on the possible fault position are damaged.

- If yes, replace the damaged connectors or DC power cables, and then set **DC SWITCH** to **ON**. If the inverter status is **Shutdown: Command**, choose **Maintenance** > **Inverter ON/OFF**, and send a startup command. View alarm information.
  - If no **Low insulation resistance** alarm is reported 1 minute after the DC side is powered on, troubleshoot the insulation resistance fault of the PV string. Log in to the app, choose **Maintenance** > **Inverter ON/OFF** on the home screen, and send a shutdown command. Set **DC SWITCH** to **OFF**. Go to **Step 2** and check rest of the PV strings one by one. Then, go to **Step 8**.
  - If the DC side is powered on 1 minute later, the **Low insulation resistance** alarm is still reported. Log in to the app, choose **Maintenance** > **Inverter ON/OFF** on the home screen, and send a shutdown command. Set **DC SWITCH** to **OFF** and go to **Step 5**.
- If no, go to **Step 5**.

Step 5 Disconnect the possible faulty PV module and the paired optimizer from the PV string, and use a DC extension cable with an MC4 connector to connect the PV

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module or optimizer adjacent to the possible faulty PV module. Set **DC SWITCH** to **ON**. If the inverter status is **Shutdown: Command**, choose **Maintenance** > **Inverter ON/OFF** on the home screen, and send a startup command. View alarm information.

- If no **Low insulation resistance** alarm is reported 1 minute after the DC side is powered on, the fault occurred on the disconnected PV module and optimizer. Choose **Maintenance** > **Inverter ON/OFF**, send a shutdown command, and set **DC SWITCH** to **OFF**. Go to **Step 7**.
- If the **Low insulation resistance** alarm is reported 1 minute after the DC side is powered on, the fault did not occur on the disconnected PV module and optimizer. Go to **Step 6**.

Step 6 Log in to the app, choose **Maintenance** > **Inverter ON/OFF** on the home screen, and send a shutdown command. Set **DC SWITCH** to **OFF**, reconnect the disconnected PV module and optimizer, and repeat **Step 5** to check the PV modules and optimizers adjacent to the possible fault location.

Step 7 Determine the position of the ground insulation fault:

- Disconnect the possible faulty PV module from the optimizer.
- Connect the possible faulty optimizer to the PV string.
- Set **DC SWITCH** to **ON**. If the inverter status is **Shutdown: Command**, choose **Maintenance** > **Inverter ON/OFF**, and send a startup command. View alarm information.
  - If no **Low insulation resistance** alarm is reported 1 minute after the DC side is powered on, the fault is on the possible faulty PV module.
  - If the **Low insulation resistance** alarm is reported 1 minute after the DC side is powered on, the fault is on the possible faulty optimizer.
- Log in to the app, choose **Maintenance** > **Inverter ON/OFF** on the home screen, and send a shutdown command. Set **DC SWITCH** to **OFF**, replace the faulty component, and complete troubleshooting the insulation resistance fault. Go to **Step 2** and check rest of the PV strings one by one. Then, go to **Step 8**.

Step 8 Set **DC SWITCH** to **ON**. If the inverter status is **Shutdown: Command**, choose **Maintenance** > **Inverter ON/OFF**, and send a startup command.

----End

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9 Technical Specifications

9.1 SUN2000-(15K-25K)-MB0-ZH Technical Specifications

Efficiency

Technical Specifications	SUN2000-15K-MB0-ZH	SUN2000-17K-MB0-ZH	SUN2000-20K-MB0-ZH	SUN2000-25K-MB0-ZH
Maximum efficiency	98.5%	98.5%	98.5%	98.5%
Chinese efficiency	97.4%	97.5%	97.6%	98.0%

Input

Technical Specifications	SUN2000-15K-MB0-ZH	SUN2000-17K-MB0-ZH	SUN2000-20K-MB0-ZH	SUN2000-25K-MB0-ZH
Recommended maximum input DC power	22500 W	25500 W	30000 W	37500 W
Maximum input voltage[a]	1100 V			
Maximum input current per MPPT	20 A (one PV string)/30 A (one MPPT)			

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Technical Specifications	SUN2000-15K-MB0-ZH	SUN2000-17K-MB0-ZH	SUN2000-20K-MB0-ZH	SUN2000-25K-MB0-ZH
Maximum short-circuit current per MPPT	40 A			
Minimum startup voltage	200 V			
MPPT voltage range	200–1000 V			
Full-load MPPT voltage range	410–800 V	440–800 V	480–800 V	530–800 V
Rated input voltage	600 V			
Maximum number of inputs	4			
Number of MPPTs	2			
Rated battery voltage	600 V DC			
Battery voltage range	600–980 V DC			
Maximum battery current	26.25 A			
Battery type	Li-ion			
Note a: The maximum input voltage is the maximum DC input voltage that the inverter can withstand. If the input voltage exceeds this value, the inverter may be damaged.				

Output

Technical Specifications	SUN2000-15K-MB0-ZH	SUN2000-17K-MB0-ZH	SUN2000-20K-MB0-ZH	SUN2000-25K-MB0-ZH
Rated output power	15000 W	17000 W	20000 W	25000 W

Technical Specifications	SUN2000-15K-MB0-ZH	SUN2000-17K-MB0-ZH	SUN2000-20K-MB0-ZH	SUN2000-25K-MB0-ZH
Maximum apparent power	16500 VA	18700 VA	22000 VA	27500 VA
Maximum active power (cosϕ = 1)	16500 W	18700 W	22000 W	27500 W
Rated output voltage	220 V/380 V, 3W/N+PE 230 V/400 V, 3W/N+PE			
Maximum output voltage at long-term operation	Refer to the local power grid standards.			
Rated output current	22.8 A/380 V 21.7 A/400 V	25.8 A/380 V 24.5 A/400 V	30.4 A/380 V 28.9 A/400 V	38.0 A/380 V 36.1 A/400 V
Maximum output current	25.2 A/380 V 23.9 A/400 V	28.6 A/380 V 27.1 A/400 V	33.6 A/380 V 31.9 A/400 V	42.0 A/380 V 39.9 A/400 V
Output voltage frequency	50 Hz/60 Hz			
Power factor	0.8 leading ... 0.8 lagging			
Output DC component (DCI)	< 0.5% of the rated output			
Maximum total harmonic distortion (AC THDi)	< 3% under rated conditions. Single harmonic meets the VDE 4105 requirements.			

Protection

Technical Specifications	SUN2000-15K-MB0-ZH	SUN2000-17K-MB0-ZH	SUN2000-20K-MB0-ZH	SUN2000-25K-MB0-ZH
Overvoltage category	PV II/AC III			

Technical Specifications	SUN2000-15K-MB0-ZH	SUN2000-17K-MB0-ZH	SUN2000-20K-MB0-ZH	SUN2000-25K-MB0-ZH
Input DC switch	Supported			
Anti-islanding protection	Supported			
Output overcurrent protection	Supported			
Input reverse connection protection	Supported			
DC surge protection	TYPE II			
AC surge protection	Yes, compatible with TYPE II protection class according to EN/IEC 61643-11			
Insulation resistance detection	Supported			
Residual current monitoring unit (RCMU)	Supported			

Display and Communication

Technical Specifications	SUN2000-15K-MB0-ZH	SUN2000-17K-MB0-ZH	SUN2000-20K-MB0-ZH	SUN2000-25K-MB0-ZH
Display	LED indicators; WLAN+app			
WLAN-FE Dongle	Supported			
4G Smart Dongle	Standard			
RS485 communication	Supported			
Built-in WLAN	Supported			
DC MBUS	Supported			

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Technical Specifications	SUN2000-15K-MB0-ZH	SUN2000-17K-MB0-ZH	SUN2000-20K-MB0-ZH	SUN2000-25K-MB0-ZH
AFCI	Supported			
PID recovery	Supported			

General Specifications

Technical Specifications	SUN2000-15K-MB0-ZH	SUN2000-17K-MB0-ZH	SUN2000-20K-MB0-ZH	SUN2000-25K-MB0-ZH
Dimensions (H x W x D)	460 mm x 546 mm x 228 mm			
Net weight	21 kg			
Noise	< 45 dB (typical working condition)	< 45 dB (typical working condition)	< 50 dB (typical working condition)	< 50 dB (typical working condition)
Operating temperature	–25°C to +60°C			
Relative humidity	0–100% RH			
Cooling mode	Smart air cooling			
Maximum operating altitude	4000 m (derated when the altitude is greater than 2000 m)			
Storage temperature	–40°C to +70°C			
IP rating	IP66			
Topology	Transformerless			

Wireless Communication Parameters

Technical Specifications	Inverter Built-in WiFi	WLAN-FE Smart Dongle	4G Smart Dongle
Frequency	2400–2483.5 MHz	SDongleA-05: 2400–2483.5 MHz	SDongleB-03-CN: • Supports LTE FDD: B1/B3/B5/B8. • Supports LTE TDD: B34/B38/B39/B40/B41. • Supports GSM/GPRS/EDGE: 900 MHz/1800 MHz. SDongleB-06-CN (WiFi): 2400–2483.5 MHz SDongleB-06-CN (4G): • Supports LTE FDD: B1/B3/B5/B8. • Supports LTE TDD: B34/B38/B39/B40/B41. • Supports GSM/GPRS/EDGE: 900 MHz/1800 MHz.

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Technical Specifications	Inverter Built-in WiFi	WLAN-FE Smart Dongle	4G Smart Dongle
Protocols and standards	WLAN 802.11b/g/n	SDongleA-05: WLAN 802.11b/g/n	SDongleB-03-CN: • Supports LTE FDD (with receive diversity): B1/B3/B5/B8. • Supports LTE TDD (with receive diversity): B34/B38/B39/B40/B41. • Supports GSM: 900 MHz/1800 MHz. • Supports digital audio. SDongleB-06-CN (WiFi): WLAN 802.11b/g/n SDongleB-06-CN (4G): • Supports LTE FDD (with receive diversity): B1/B3/B5/B8. • Supports LTE TDD (with receive diversity): B34/B38/B39/B40/B41. • Supports GSM: 900 MHz/1800 MHz. • Supports digital audio.

Technical Specifications	Inverter Built-in WiFi	WLAN-FE Smart Dongle	4G Smart Dongle
Bandwidth	20 MHz/40 MHz (optional)	20 MHz/40 MHz (optional)	LTE features: • Supports a maximum of 3GPP R8 non-CA Cat 4 FDD and TDD. • Supports 1.4 MHz/3 MHz/5 MHz/10 MHz/15 MHz/20 MHz RF bandwidth. • Supports MIMO in the downlink. • LTE FDD: maximum downlink rate of 150 Mbit/s and maximum uplink rate of 50 Mbit/s • LTE TDD: maximum downlink rate of 130 Mbit/s and maximum uplink rate of 30 Mbit/s UMTS features: • Supports 3GPP R7 HSDPA+, HSDPA, HSUPA, and WCDMA. • Supports QPSK and 16QAM modulation. • HSDPA+: maximum downlink rate of 21 Mbit/s • HSUPA: maximum uplink rate of 5.76 Mbit/s • WCDMA: maximum downlink rate of 384 kbit/s and maximum uplink rate of 384 kbit/s GSM features: GPRS: • Supports GPRS multislot class 12. • Coding schemes: CS-1, CS-2, CS-3, and CS-4 • Maximum downlink rate: 85.6 kbit/s; maximum uplink rate: 85.6 kbit/s EDGE:

Technical Specifications	Inverter Built-in WiFi	WLAN-FE Smart Dongle	4G Smart Dongle
			• Supports EDGE multislot class 12. • Supports GMSK and 8-PSK modulation and coding schemes. • Downlink coding format: MCS 1–9 • Uplink coding format: MCS 1–9 • Maximum downlink rate: 236.8 kbit/s; maximum uplink rate: 236.8 kbit/s SDongleB-06-CN (WiFi): 20 MHz/40 MHz (optional)
Maximum transmit power	≤ 20 dBm EIRP	≤ 20 dBm EIRP	• Class 4 (33 dBm±2 dB), EGSM900 frequency band • Class 1 (30 dBm±2 dB), DCS1800 frequency band • Class E2 (27 dBm±3 dB), EGSM900 8-PSK • Class E2 (26 dBm±3 dB), DCS1800 8-PSK • Class 3 (24 dBm+1/–3 dB), WCDMA frequency band • Class 3 (23 dBm±2 dB), LTE FDD frequency band • Class 3 (23 dBm±2 dB), LTE TDD frequency band SDongleB-06-CN (WiFi): ≤ 20 dBm EIRP

9.2 SUN2000-(12K-25K)-MB0 Technical Specifications

Efficiency

Technical Specifications	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0	SUN2000-20K-MB0	SUN2000-25K-MB0
Maximum efficiency	98.4%	98.4%	98.4%	98.4%	98.4%
European efficiency	97.9%	98.0%	98.1%	98.1%	98.2%

Input

Technical Specifications	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0	SUN2000-20K-MB0	SUN2000-25K-MB0
Recommended maximum input DC power	18000 W	22500 W	25500 W	30000 W	37500 W
Maximum input voltage[a]	1100 V				
Maximum input current per MPPT	20 A (one PV string)/30 A (one MPPT)				
Maximum short-circuit current per MPPT	40 A				
Minimum startup voltage	200 V				
MPPT voltage range	200–1000 V				

Technical Specifications	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0	SUN2000-20K-MB0	SUN2000-25K-MB0
Full-load MPPT voltage range	370–800 V	410–800 V	440–800 V	480–800 V	530–800 V
Rated input voltage	600 V				
Maximum number of inputs	4				
Number of MPPTs	2				
Rated battery voltage	600 V DC				
Battery voltage range	600–980 V DC				
Maximum battery current	26.25 A				
Battery type	Li-ion				
Note a: The maximum input voltage is the maximum DC input voltage that the inverter can withstand. If the input voltage exceeds this value, the inverter may be damaged.					

Output

Technical Specifications	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0	SUN2000-20K-MB0	SUN2000-25K-MB0
Rated output power	12000 W	15000 W	17000 W	20000 W	25000 W
Maximum apparent power	13200 VA	16500 VA	18700 VA	22000 VA	27500 VA

Technical Specifications	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0	SUN2000-20K-MB0	SUN2000-25K-MB0
Maximum active power (cosϕ = 1)	13200 W	16500 W	18700 W	22000 W	27500 W
Rated output voltage	220 V/380 V, 3W/N+PE 230 V/400 V, 3W/N+PE 240 V/415 V, 3W/N+PE				
Maximum output voltage at long-term operation	Refer to the local power grid standards.				
Rated output current	18.2 A/380 V 17.3 A/400 V 16.7 A/415 V	22.8 A/380 V 21.7 A/400 V 20.9 A/415 V	25.8 A/380 V 24.5 A/400 V 23.7 A/415 V	30.4 A/380 V 28.9 A/400 V 27.8 A/415 V	38.0 A/380 V 36.1 A/400 V 34.8 A/415 V
Maximum output current	20.2 A/380 V 19.1 A/400 V 18.5 A/415 V	25.2 A/380 V 23.9 A/400 V 23.1 A/415 V	28.6 A/380 V 27.1 A/400 V 26.1 A/415 V	33.6 A/380 V 31.9 A/400 V 30.8 A/415 V	42.0 A/380 V 39.9 A/400 V 38.5 A/415 V
Output voltage frequency	50 Hz/60 Hz				
Power factor	0.8 leading ... 0.8 lagging				
Output DC component (DCI)	< 0.5% of the rated output				
Maximum total harmonic distortion (AC THDi)	< 3% under rated conditions. Single harmonic meets the VDE 4105 requirements.				

Protection

Technical Specifications	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0	SUN2000-20K-MB0	SUN2000-25K-MB0
Overvoltage category	PV II/AC III				
Input DC switch	Supported				
Anti-islanding protection	Supported				
Output overcurrent protection	Supported				
Input reverse connection protection	Supported				
DC surge protection	TYPE II				
AC surge protection	Yes, compatible with TYPE II protection class according to EN/IEC 61643-11				
Insulation resistance detection	Supported				
Residual current monitoring unit (RCMU)	Supported				

Display and Communication

Technical Specifications	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0	SUN2000-20K-MB0	SUN2000-25K-MB0
Display	LED indicators; WLAN+app				
WLAN-FE Dongle	Supported				
4G Smart Dongle	Optional				

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Technical Specifications	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0	SUN2000-20K-MB0	SUN2000-25K-MB0
RS485 communication	Supported				
Built-in WLAN	Supported				
DC MBUS	Supported				
AFCI	Supported				
PID recovery	Supported				

General Specifications

Technical Specifications	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0	SUN2000-20K-MB0	SUN2000-25K-MB0
Dimensions (H x W x D)	460 mm x 546 mm x 228 mm				
Net weight	21 kg				
Noise	< 45 dB (typical working condition)	< 45 dB (typical working condition)	< 45 dB (typical working condition)	< 50 dB (typical working condition)	< 50 dB (typical working condition)
Operating temperature	–25°C to +60°C				
Relative humidity	0–100% RH				
Cooling mode	Smart air cooling				
Maximum operating altitude	4000 m (derated when the altitude is greater than 2000 m)				
Storage temperature	–40°C to +70°C				
IP rating	IP66				

Technical Specifications	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0	SUN2000-20K-MB0	SUN2000-25K-MB0
Topology	Transformerless				

Wireless Communication Parameters

Technical Specifications	Inverter Built-in WiFi	WLAN-FE Smart Dongle	4G Smart Dongle
Frequency	2400–2483.5 MHz	SDongleA-05: 2400–2483.5 MHz	SDongleB-06-EU (WiFi): 2400–2483.5 MHz SDongleB-06-EU (4G): • Supports LTE FDD: B1/B3/B5/B8. • Supports LTE TDD: B7/B20/B28/B38/B40/B41. • Supports GSM/GPRS/EDGE: 900 MHz/1800 MHz.
Protocols and standards	WLAN 802.11b/g/n	SDongleA-05: WLAN 802.11b/g/n	SDongleB-06-EU (WiFi): WLAN 802.11b/g/n SDongleB-06-EU (4G): • Supports LTE FDD (with receive diversity): B1/B3/B5/B8. • Supports LTE TDD (with receive diversity): B7/B20/B28/B38/B40/B41. • Supports GSM: 900 MHz/1800 MHz. • Supports digital audio.

Technical Specifications	Inverter Built-in WiFi	WLAN-FE Smart Dongle	4G Smart Dongle
Bandwidth	20 MHz/40 MHz (optional)	20 MHz/40 MHz (optional)	LTE features: • Supports a maximum of 3GPP R8 non-CA Cat 4 FDD and TDD. • Supports 1.4 MHz/3 MHz/5 MHz/10 MHz/15 MHz/20 MHz RF bandwidth. • Supports MIMO in the downlink. • LTE FDD: maximum downlink rate of 150 Mbit/s and maximum uplink rate of 50 Mbit/s • LTE TDD: maximum downlink rate of 130 Mbit/s and maximum uplink rate of 30 Mbit/s UMTS features: • Supports 3GPP R7 HSDPA+, HSDPA, HSUPA, and WCDMA. • Supports QPSK and 16QAM modulation. • HSDPA+: maximum downlink rate of 21 Mbit/s • HSUPA: maximum uplink rate of 5.76 Mbit/s • WCDMA: maximum downlink rate of 384 kbit/s and maximum uplink rate of 384 kbit/s GSM features: GPRS: • Supports GPRS multislot class 12. • Coding schemes: CS-1, CS-2, CS-3, and CS-4 • Maximum downlink rate: 85.6 kbit/s; maximum uplink rate: 85.6 kbit/s EDGE:

Technical Specifications	Inverter Built-in WiFi	WLAN-FE Smart Dongle	4G Smart Dongle
			• Supports EDGE multislot class 12. • Supports GMSK and 8-PSK modulation and coding schemes. • Downlink coding format: MCS 1–9 • Uplink coding format: MCS 1–9 • Maximum downlink rate: 236.8 kbit/s; maximum uplink rate: 236.8 kbit/s SDongleB-06-EU (WiFi): 20 MHz/40 MHz (optional)
Maximum transmit power	≤ 20 dBm EIRP	≤ 20 dBm EIRP	• Class 4 (33 dBm±2 dB), EGSM900 frequency band • Class 1 (30 dBm±2 dB), DCS1800 frequency band • Class E2 (27 dBm±3 dB), EGSM900 8-PSK • Class E2 (26 dBm±3 dB), DCS1800 8-PSK • Class 3 (24 dBm+1/–3 dB), WCDMA frequency band • Class 3 (23 dBm±2 dB), LTE FDD frequency band • Class 3 (23 dBm±2 dB), LTE TDD frequency band SDongleB-06-EU (WiFi): ≤ 20 dBm EIRP

A Grid Codes

NOTE

The grid codes are subject to change. The listed codes are for reference only.

Table A-1 SUN2000-(15K-25K)-MB0-ZH grid codes

No.	Grid Code	Description	SUN2000-15K-MB0-ZH	SUN2000-17K-MB0-ZH	SUN2000-20K-MB0-ZH	SUN2000-25K-MB0-ZH
1	NB/T 32004	China Golden Sun low-voltage power grid	Supported	Supported	Supported	Supported
2	Custom (50 Hz)	Reserved	Supported	Supported	Supported	Supported
3	CHINA-LV220/380	China low-voltage power grid	Supported	Supported	Supported	Supported

Table A-2 SUN2000-(12K-25K)-MB0 grid codes

No.	Grid Code	Description	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0	SUN2000-20K-MB0	SUN2000-25K-MB0
1	VDE-AR-N-4105	Germany low-voltage power grid	Supported	Supported	Supported	Supported	Supported
2	UTE C 15-712-1(A)	France mainland power grid	Supported	Supported	Supported	Supported	Supported

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No.	Grid Code	Description	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0	SUN2000-20K-MB0	SUN2000-25K-MB0
3	UTE C 15-712-1(B)	France island power grid	Supported	Supported	Supported	Supported	Supported
4	UTE C 15-712-1(C)	France island power grid	Supported	Supported	Supported	Supported	Supported
5	CEI0-21	Italy power grid	Supported	Supported	Supported	Supported	Supported
6	RD1699/661	Spain low-voltage power grid	Supported	Supported	Supported	Supported	Supported
7	C10/11	Belgium power grid	Supported	Supported	Supported	Supported	Supported
8	IEC61727	IEC 61727 low-voltage grid-connection (50 Hz)	Supported	Supported	Supported	Supported	Supported
9	Custom (50 Hz)	Reserved	Supported	Supported	Supported	Supported	Supported
10	Custom (60 Hz)	Reserved	Supported	Supported	Supported	Supported	Supported
11	CEI0-16	Italy power grid	Supported	Supported	Supported	Supported	Supported
12	TAI-PEA	Thailand grid-connection standard	Supported	Supported	Supported	Supported	Supported
13	TAI-MEA	Thailand grid-connection standard	Supported	Supported	Supported	Supported	Supported
14	Philippines	Philippines low-voltage power grid	Supported	Supported	Supported	Supported	Supported
15	NRS-097-2-1	South Africa power grid standard	Supported	Supported	Supported	Supported	Supported

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No.	Grid Code	Description	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0	SUN2000-20K-MB0	SUN2000-25K-MB0
16	IEC61727-60Hz	IEC 61727 low-voltage grid-connection (60 Hz)	Supported	Supported	Supported	Supported	Supported
17	PO12.3	Spain low-voltage power grid	Supported	Supported	Supported	Supported	Supported
18	EN50549-LV	Ireland power grid	Supported	Supported	Supported	Supported	Supported
19	Jordan-Transmission	Jordan low-voltage power grid	Supported	Supported	Supported	Supported	Supported
20	ABNT NBR 16149	Brazil power grid	Supported	Supported	Supported	Supported	Supported
21	DUBAI	Dubai low-voltage power grid	Supported	Supported	Supported	Supported	Supported
22	Jordan-Distribution	Jordan power distribution network low-voltage power grid	Supported	Supported	Supported	Supported	Supported
23	TAIPOWER	Taiwan Power low-voltage power grid	Supported	Supported	Supported	Supported	Supported
24	OMAN	Oman low-voltage power grid	Supported	Supported	Supported	Supported	Supported
25	Pakistan	Pakistan power grid	Supported	Supported	Supported	Supported	Supported
26	Austria	Austria power grid	Supported	Supported	Supported	Supported	Supported
27	G99-TYPEA-LV	UK G99_TypeA_LV power grid	Supported	Supported	Supported	Supported	Supported

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No.	Grid Code	Description	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0	SUN2000-20K-MB0	SUN2000-25K-MB0
28	G99-TYPEB-LV	UK G99_TypeB_LV power grid	Supported	Supported	Supported	Supported	Supported
29	EN50549-MV400	Ireland new standard	Supported	Supported	Supported	Supported	Supported
30	VDE-AR-N4110	Germany medium-voltage power grid (230 V)	Supported	Supported	Supported	Supported	Supported
31	NTS	Spain power grid	Supported	Supported	Supported	Supported	Supported
32	SINGAPORE	Singapore low-voltage power grid	Supported	Supported	Supported	Supported	Supported
33	HONGKONG	Hong Kong low-voltage power grid	Supported	Supported	Supported	Supported	Supported
34	EN50549-SE	Sweden low-voltage power grid	Supported	Supported	Supported	Supported	Supported
35	EN50549-PL	Poland power grid	Supported	Supported	Supported	Supported	Supported
36	DENMARK-EN50549-DK1-LV230	Denmark power grid	Supported	Supported	Supported	Supported	Supported
37	DENMARK-EN50549-DK2-LV230	Denmark power grid	Supported	Supported	Supported	Supported	Supported
38	SWITZERLAND-NA/EEA:2020-LV230	Switzerland power grid	Supported	Supported	Supported	Supported	Supported
39	AUSTRALIA-AS4777_A-LV230	Australia power grid	Supported	Supported	Supported	Supported	Supported

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No.	Grid Code	Description	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0	SUN2000-20K-MB0	SUN2000-25K-MB0
40	AUSTRALIA-AS4777_B-LV230	Australia power grid	Supported	Supported	Supported	Supported	Supported
41	AUSTRALIA-AS4777_C-LV230	Australia power grid	Supported	Supported	Supported	Supported	Supported
42	AUSTRALIA-AS4777_NZ-LV230	Australia power grid	Supported	Supported	Supported	Supported	Supported
43	NA_CODE	Default country code	Supported	Supported	Supported	Supported	Supported
44	CZECH-EN50549-LV230	Czech Republic power grid	Supported	Supported	Supported	Supported	Supported

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B Connecting to the Inverter

Step 1 Access the **Commission Device** screen.

Figure B-1 Method 1: before login (not connected to the Internet)

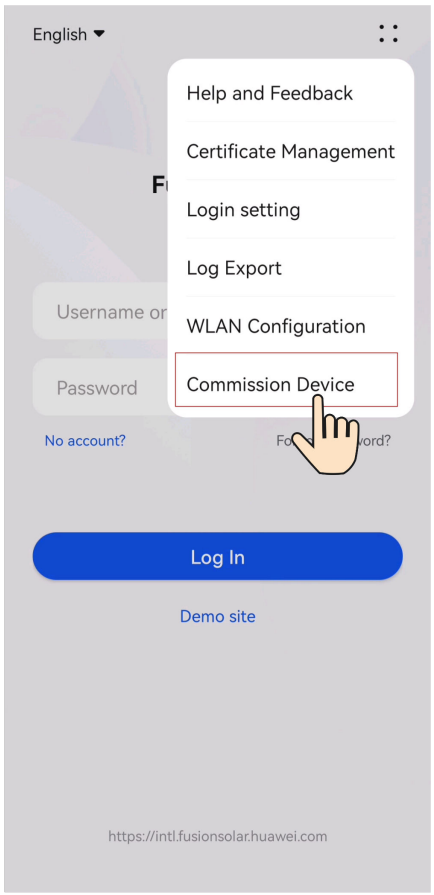
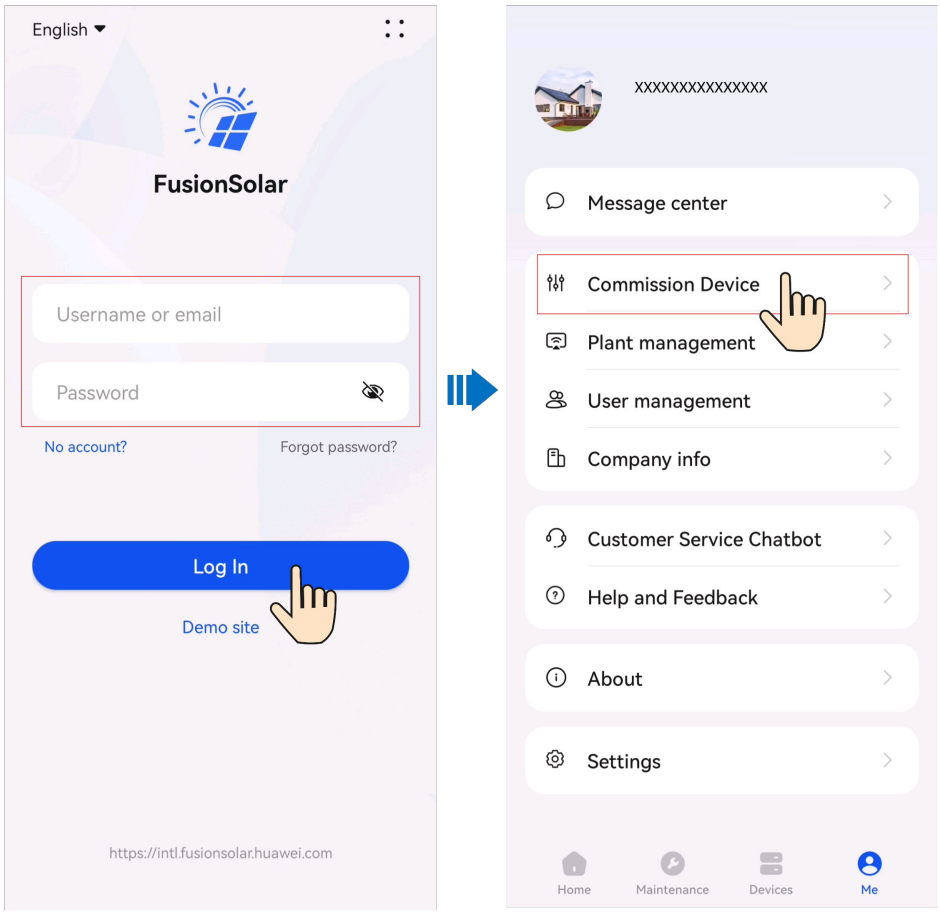


Figure B-2 Method 2: after login (connected to the Internet)



Step 2 Connect to the inverter WLAN and log in to the **Commission Device** screen as the installer user.

NOTICE

- If the mobile phone is directly connected to the SUN2000, the visible distance between the SUN2000 and the mobile phone must be less than 3 m when a built-in antenna is used and less than 50 m when an external antenna is used to ensure the communication quality between the App and the SUN2000. The distances are for reference only and may vary with mobile phones and shielding conditions.
- When connecting the SUN2000 to the WLAN over a router, ensure that the mobile phone and SUN2000 are in the WLAN coverage of the router and the SUN2000 is connected to the router.
- The router supports WLAN (IEEE 802.11 b/g/n, 2.4 GHz) and the WLAN signal reaches the SUN2000.
- The WPA, WPA2, or WPA/WPA2 encryption mode is recommended for routers. Enterprise-level encryption is not supported (for example, public hotspots requiring authentication such as airport WLAN). WEP and WPA TKIP are not recommended because these two encryption modes have serious security defects. If the access fails in WEP mode, log in to the router and change the encryption mode of the router to WPA2 or WPA/WPA2.

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NOTE

- Obtain the initial password for connecting to the solar inverter WLAN from the label on the side of the solar inverter.
- Set the password at the first login. To ensure account security, change the password periodically and keep the new password in mind. Not changing the initial password may cause password disclosure. A password left unchanged for a long period of time may be stolen or cracked. If a password is lost, devices cannot be accessed. In these cases, the user is liable for any loss caused to the PV plant.
- When you access the **Commission Device** screen of the inverter for the first time, you need to manually set the login password because the inverter does not have an initial login password.

----End

C Connecting to the EMMA

Step 1 Access the **Commission Device** screen.

Figure C-1 Method 1: before login (not connected to the Internet)

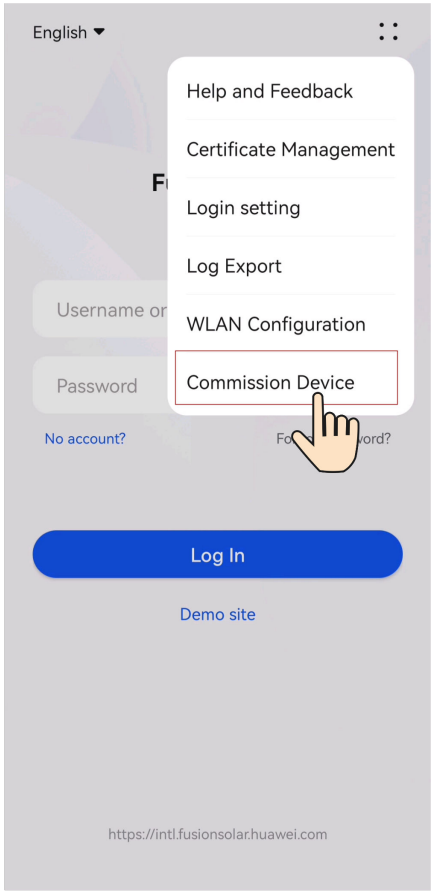
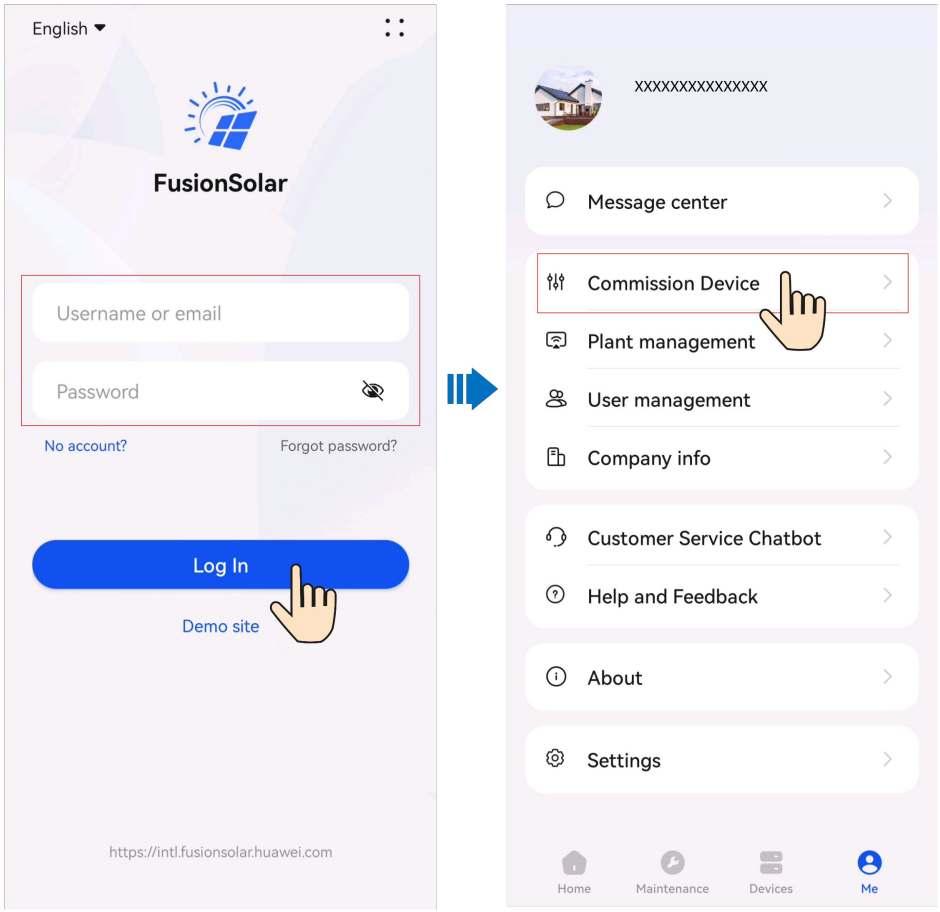


Figure C-2 Method 2: after login (connected to the Internet)



Step 2 Connect to the EMMA WLAN and log in to the **Commission Device** screen as the installer user.

NOTE

- The last six digits of the product WLAN name are the same as the last six digits of the product SN.
- For the first connection, log in with the initial password. You can obtain the initial password from the label on the device.
- To ensure account security, protect the password by changing it periodically, and keep it secure. Your password might be stolen or cracked if it is left unchanged for extended periods. If a password is lost, devices cannot be accessed. In these cases, the Company shall not be liable for any loss.
- If the login screen is not displayed after you scan the QR code, check whether your phone is correctly connected to the device WLAN. If not, manually select and connect to the WLAN, and tap **Next**.
- If the **This WLAN network has no Internet access. Connect anyway?** message is displayed when you connect to the built-in WLAN, tap **CONNECT**. Otherwise, you cannot log in to the system. The actual UI and messages may vary with mobile phones.

----End

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D Resetting Password

Step 1 Check that the AC and DC sides of the inverter are both powered on, and indicators and are steady green or blinking slowly for more than 3 minutes.

Step 2 Turn off the AC switch, set the DC SWITCH at the bottom of the inverter to OFF, and wait until all indicators on the inverter panel turn off.

Step 3 Complete the following operations within 4 minutes:

1. Turn on the AC switch and wait for about 90s or until the inverter indicator blinks.
2. Turn off the AC switch and wait about 30s or until all LED indicators on the inverter panel turn off.
3. Turn on the AC switch and wait for about 30s or until all LED indicators on the inverter panel blink and then turn off after about 30s.

Step 4 Wait until the three green LEDs on the inverter panel blink fast and then the three red LEDs blink fast, which indicates that the password is restored.

Step 5 Reset the password within 10 minutes. (If no operation is performed within 10 minutes, all parameters of the inverter remain unchanged.)

1. Wait until the indicator blinks.
2. Connect to the app using the initial WLAN hotspot name (SSID) and initial password (PSW), which can be obtained from the label on the side of the inverter.
3. On the login page, set a new password and log in to the app.

Step 6 Set router and management system parameters to implement remote management.

----End

NOTICE

You are advised to reset the password in the morning or at night when the solar irradiance is low.

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E Rapid Shutdown

NOTE

- If method 3 is selected for rapid shutdown, log in to the FusionSolar app as an **installer** user to perform local commissioning, choose **Settings > Feature parameters > Dry contact function**, and set **Dry contact function** to **DI rapid shutdown**.

If optimizers are configured for all PV modules, the PV system can perform a rapid shutdown to decrease the output voltage to below 30 V within 30s.

Perform the following steps to trigger a rapid shutdown:

- Method 1: Turn off the AC switch between the inverter and the power grid (disconnect the voltages of all PV strings connected to the inverter under the AC switch).
- Method 2: Set the **DC SWITCH** of the inverter to **OFF** to trigger a rapid shutdown. The inverter shuts down several minutes later. (Turning off all external switches on the DC side of an inverter can trigger a rapid shutdown, and only the PV strings connected to the inverter is de-energized. Turning off only some external switches cannot trigger a rapid shutdown, and the PV strings may be energized.)
- Method 3: To enable the DI rapid shutdown function, connect a switch to pins DI and GND of the inverter communications terminal. The switch is turned on by default. Turn off the switch to trigger a rapid shutdown. The distance between the switch and the farthest inverter must be less than or equal to 10 m.
- Method 4: If **AFCI** is enabled, the inverter automatically performs arc fault detection and triggers a rapid shutdown when AFCI lock protection is implemented.

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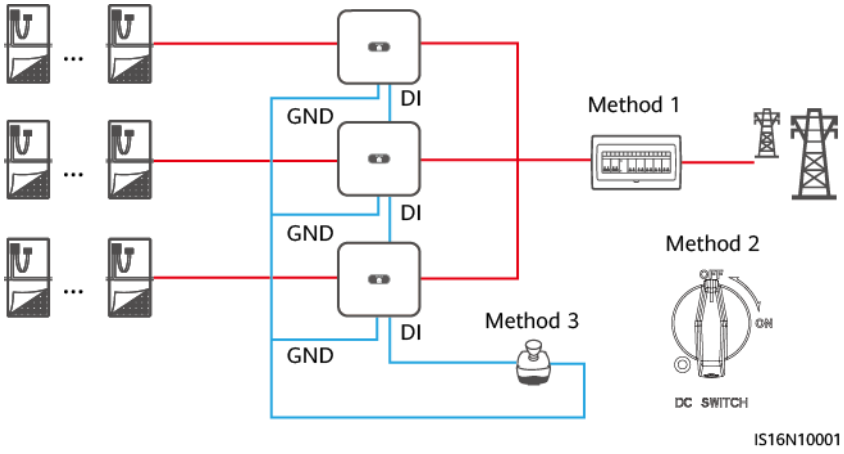
Figure E-1 Methods of triggering a rapid shutdown



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F Baud Rate Negotiation

Baud rate negotiation increases the communications rate between the inverter and devices such as batteries and power meters, and between the inverter and devices such as the Smart Dongles and the EMMA, solving or relieving communication congestion.

- During device search in a new plant, the system automatically negotiates the baud rate.
- When replacing or adding inverters, batteries, power meters, the Smart Dongle, or the EMMA at an existing plant, you need to manually send local commands on the FusionSolar app to reset the baud rate between devices and negotiate a higher rate.

NOTE

Users can send the baud rate negotiation commands on the FusionSolar app in two networking modes: EMMA networking and Smart Dongle networking.

Table F-1 Manual baud rate negotiation on the app

Networking Mode	Scenario	Operation
EMMA networking	Replacing the EMMA	1. Use the FusionSolar app to locally scan the QR code to connect to the EMMA. 2. Access the **Communication settings** screen, choose **RS485 Settings** > **Baud Rate Negotiation**, and tap **9600** and **Negotiate a higher rate**.

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Networking Mode	Scenario	Operation
	Replacing or adding an inverter	1. Use the FusionSolar app to locally scan the QR code to connect to the EMMA. 2. Access the **Communication settings** screen, choose **RS485 Settings > Baud Rate Negotiation**, and tap **9600** and **Negotiate a higher rate**. 3. Use the FusionSolar app to locally scan the QR code to connect to the inverter. 4. Access the **Communication configuration** screen, choose **RS485** > **Baud Rate Negotiation** > **RS485_2** > **Baud Rate Negotiation**, and tap **9600** and **Negotiate a higher rate**.
	Replacing or adding an RS485_2 device (such as a battery or power meter)	1. Use the FusionSolar app to locally scan the QR code to connect to the inverter. 2. Access the **Communication configuration** screen, choose **RS485** > **Baud Rate Negotiation** > **RS485_2** > **Baud Rate Negotiation**, and tap **9600** and **Negotiate a higher rate**.
Smart Dongle networking	Replacing the Smart Dongle	1. Use the FusionSolar app to locally scan the QR code to connect to the inverter. 2. Access the **Communication configuration** screen, choose **RS485** > **Baud Rate Negotiation** > **RS485_1** > **Baud Rate Negotiation**, and tap **9600** and **Negotiate a higher rate**.
	Replacing or adding an inverter	1. Use the FusionSolar app to locally scan the QR code to connect to the inverter. 2. Access the **Communication configuration** screen, choose **RS485** > **Baud Rate Negotiation** > **RS485_1** > **Baud Rate Negotiation**, and tap **9600** and **Negotiate a higher rate**. 3. Access the **Communication configuration** screen, choose **RS485** > **Baud Rate Negotiation** > **RS485_2** > **Baud Rate Negotiation**, and tap **9600** and **Negotiate a higher rate**.

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Networking Mode	Scenario	Operation
	Replacing or adding an RS485_2 device (such as a battery or power meter)	1. Use the FusionSolar app to locally scan the QR code to connect to the inverter. 2. Access the **Communication configuration** screen, choose **RS485** > **Baud Rate Negotiation** > **RS485_2** > **Baud Rate Negotiation**, and tap **9600** and **Negotiate a higher rate**.

Troubleshooting

If manual baud rate negotiation fails, refer to the following troubleshooting measures.

Table F-2 Troubleshooting measures

Scenario	Troubleshooting
Negotiation failed	1. Check whether the device cables are connected properly. If no, connect the device cables correctly. 2. Check whether service operations such as upgrade and log export are performed on the management system. If yes, perform baud rate negotiation again after such operations are complete. 3. To replace an RS485_2 device (such as a battery or power meter), choose **Maintenance > Subdevice management** on the home screen, touch and hold the replaced RS485_2 device to delete it. 4. Perform baud rate negotiation again. 5. When replacing or adding an inverter or an RS485_2 device (such as a battery or power meter), if you tap **Negotiate a higher rate** and a message "Negotiation failed. The southbound device does not support the rate." is displayed, it indicates that the device does not support baud rate negotiation. In this case, you only need to tap **9600**. 6. If the fault persists, contact your vendor.

G Contact Information

If you have any questions about this product, please contact us.

https://digitalpower.huawei.com

Path: **About Us** > **Contact Us** > **Service Hotlines**

To ensure faster and better services, we kindly request your assistance in providing the following information:

- Model
- Serial number (SN)
- Software version
- Alarm ID or name
- Brief description of the fault symptom

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NOTE

EU Representative Information: Huawei Technologies Hungary Kft.
Add.: HU-1133 Budapest, Váci út 116-118., 1. Building, 6. floor.
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H Digital Power Customer Service

https://digitalpower.huawei.com/robotchat/

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I Certificate Management and Maintenance

I.1 Preconfigured Certificate Risk Disclaimer

The Huawei-issued certificates preconfigured on Huawei devices during manufacturing are mandatory identity credentials for Huawei devices. The disclaimer statements for using the certificates are as follows:

1. Preconfigured Huawei-issued certificates are used only in the deployment phase, for establishing initial security channels between devices and the customer's network. Huawei does not promise or guarantee the security of preconfigured certificates.
2. The customer shall bear consequences of all security risks and security incidents involved in using preconfigured Huawei-issued certificates as service certificates.
3. A preconfigured Huawei-issued certificate is valid until October 11, 2041 starting from the manufacturing date.
4. Services using a preconfigured Huawei-issued certificate will be interrupted when the certificate expires.
5. It is recommended that customers deploy a PKI system to issue certificates for devices and software on the live network and manage the lifecycle of the certificates. To ensure security, certificates with short validity periods are recommended.

NOTE

You can view the validity period of a preconfigured certificate on the network management system.

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I.2 Application Scenarios of Preconfigured Certificates

File Path and Name	Scenario	Replacement
f:/sun_ca.crt	Authenticates the validity of the peer mobile app for communication through Modbus TCP.	For details about how to replace a certificate, contact technical support engineers to obtain the corresponding security maintenance manual. Certificates for communication between the Company's products can be replaced.
f:/sun_tomcat_client.crt		
f:/sun_tomcat_client.key		

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J Acronyms and Abbreviations

A	
AFCI	Arc-fault Circuit Interrupter
L	
LED	Light Emitting Diode
M	
MPP	Maximum Power Point
MPPT	Maximum Power Point Tracking
P	
PE	Protective Earthing
PID	Potential Induced Degradation
PV	Photovoltaic
R	
RH	Relative Humidity
S	
SOC	State of Charge

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