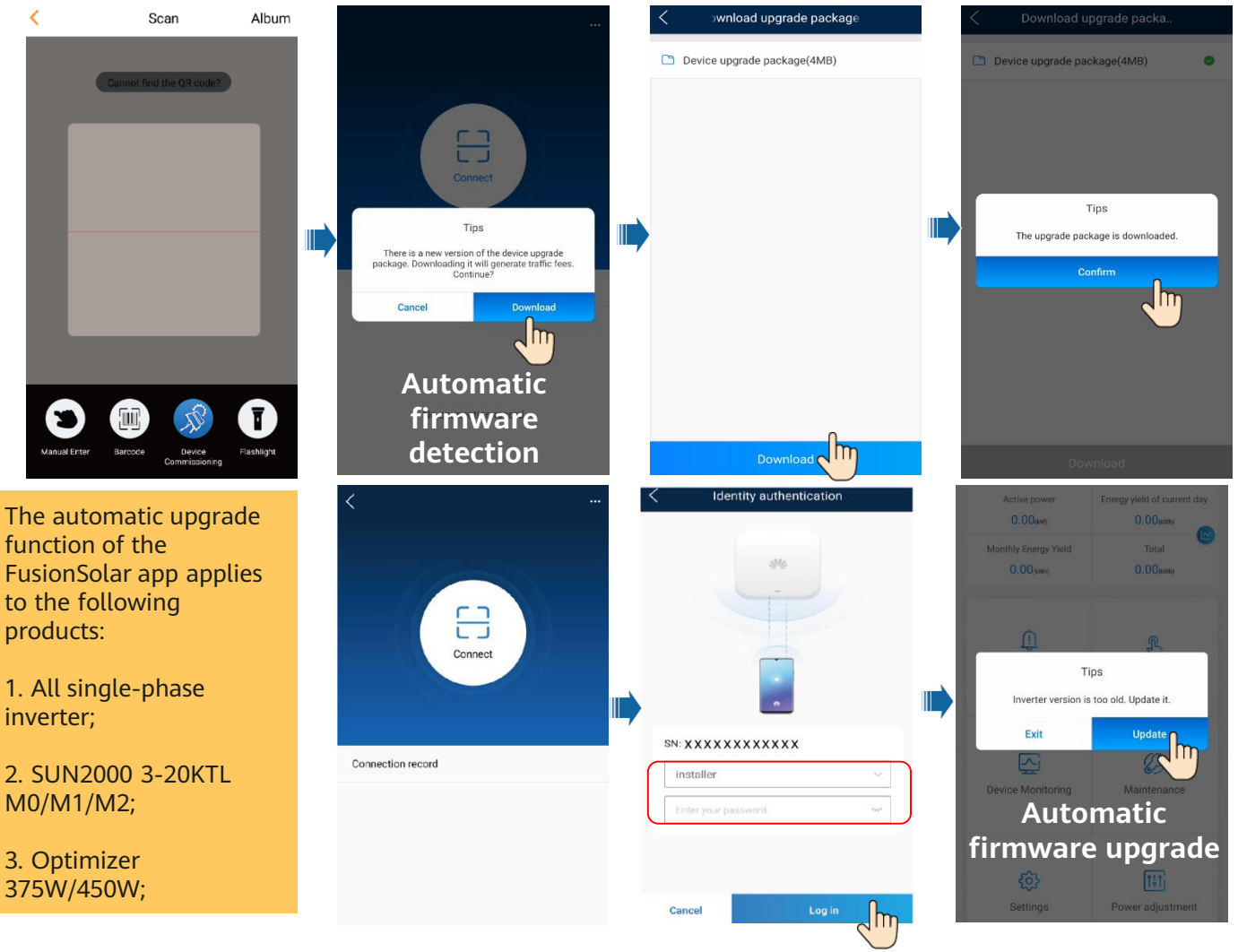
4.1 Upgrading Device Firmware

Method 1: Auto firmware detection and upgrade during setup wizard when Internet is available



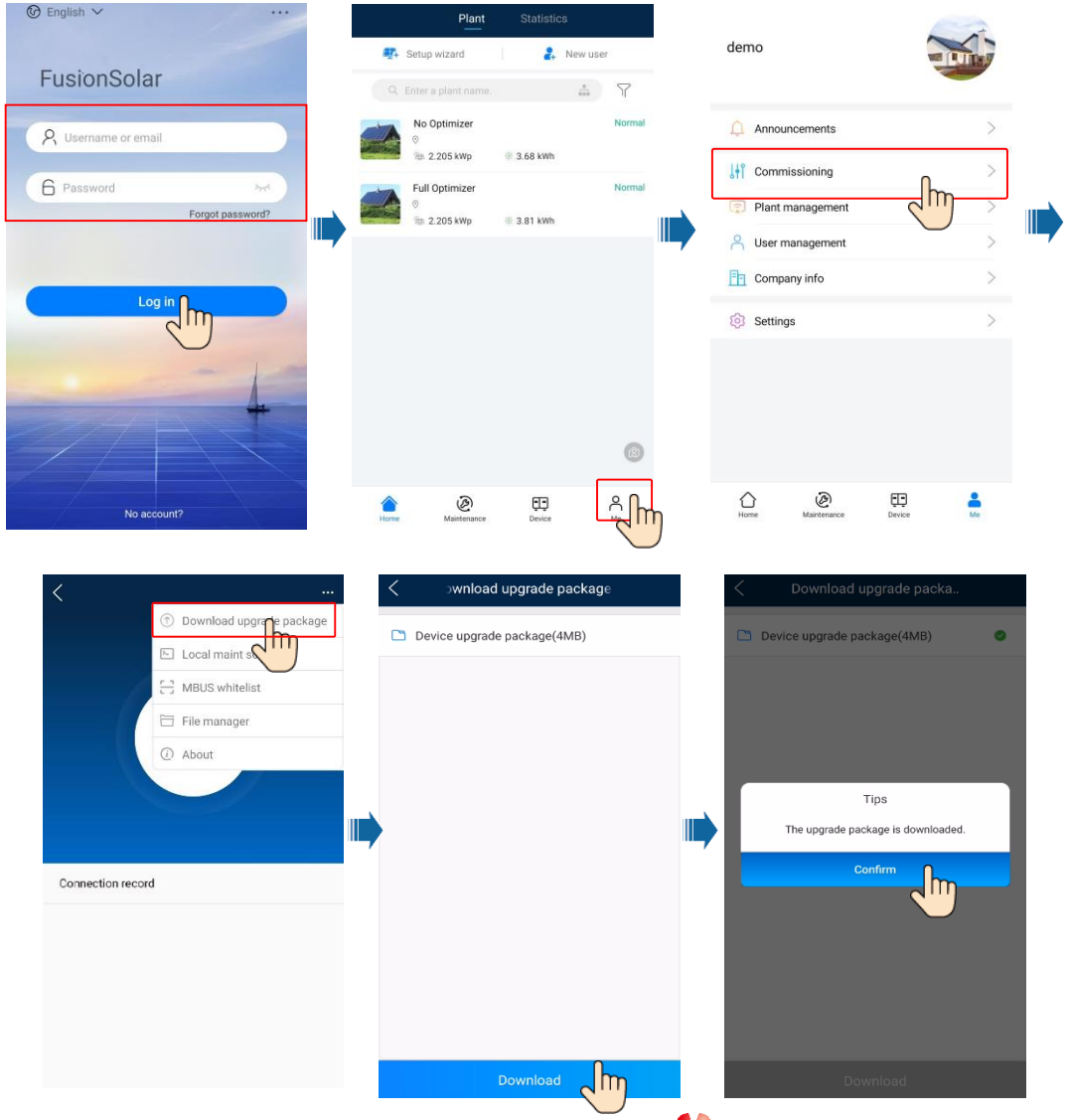
The automatic upgrade function of the FusionSolar app applies to the following products:

1. All single-phase inverter;

2. SUN2000 3-20KTL M0/M1/M2;

3. Optimizer 375W/450W;

Method 2: Manual firmware downloading



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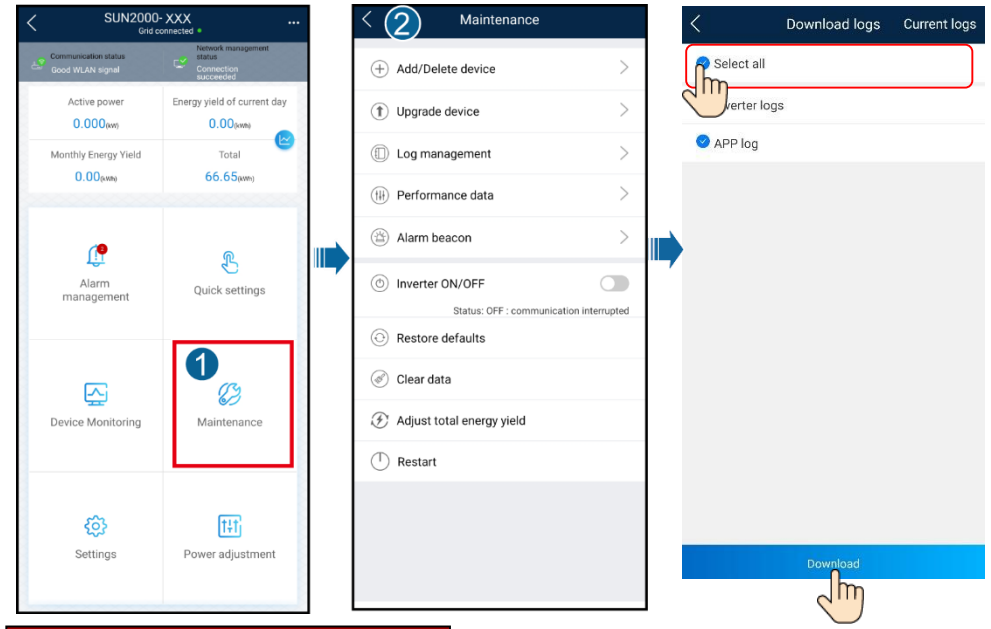
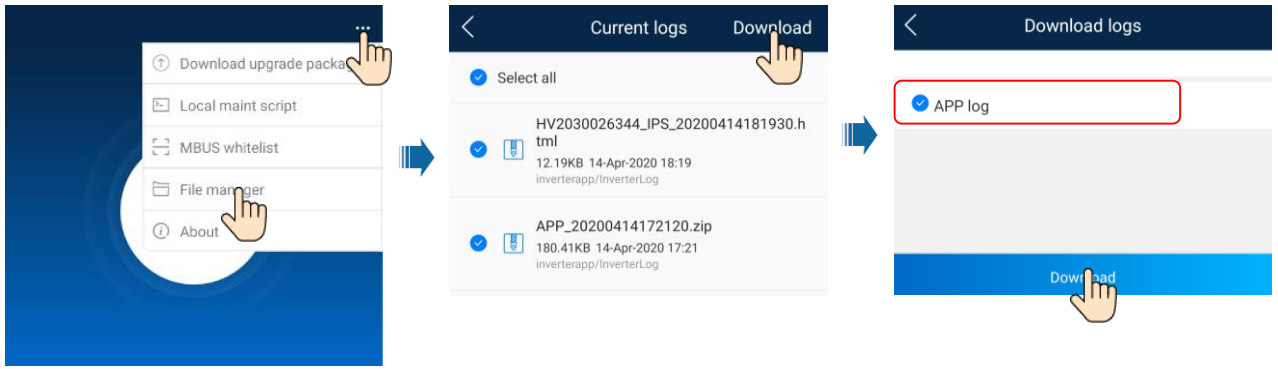
4.2 Exporting Device Logs

Downloading inverter and app logs

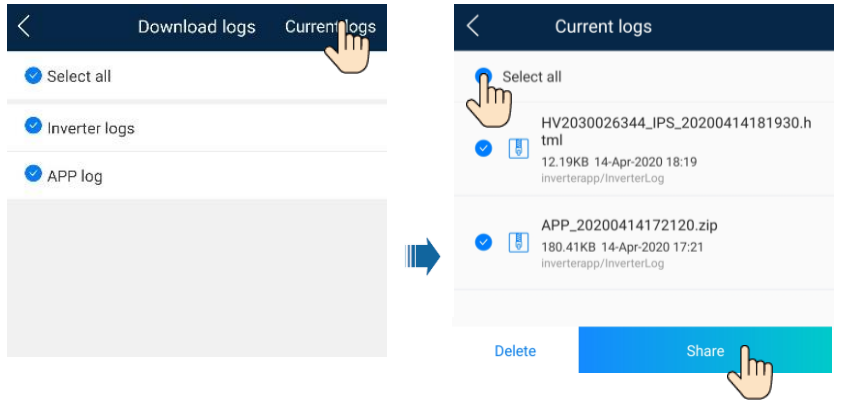


Downloading app logs

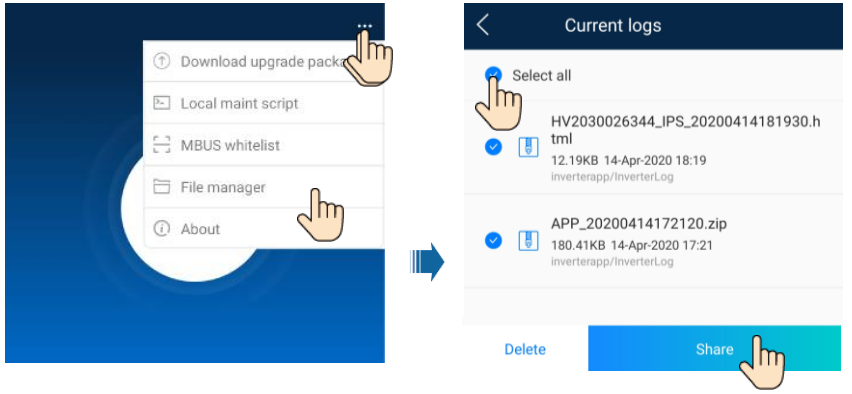


Sharing logs

Method 1: Share logs through log management



Method 2: Share files through **File manager**.



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4.3 IPS Self-Check (Italy CEI0-21)

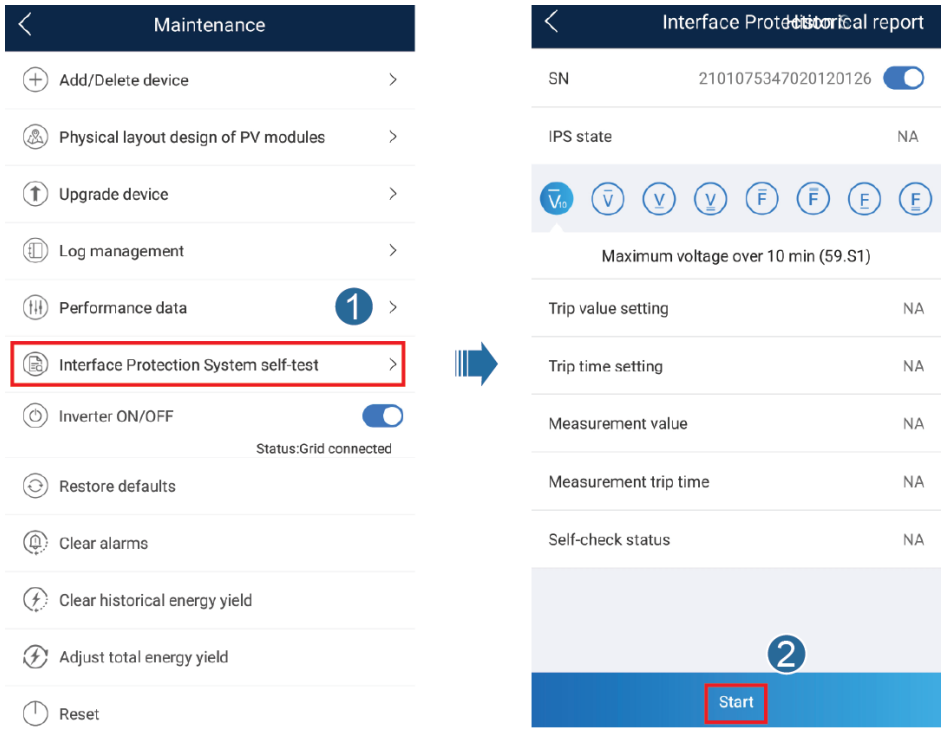
Description

The Italy CEI0-21 grid code requires an IPS self-check for the inverter. During the self-check, the inverter checks the protection threshold and protection time of the maximum voltage over 10 min (59.S1), maximum overvoltage (59.S2), minimum undervoltage (27.S1), minimum undervoltage (27.S2), maximum overfrequency (81.S1), maximum overfrequency (81.S2), minimum underfrequency (81.S), and minimum underfrequency (81.S2).

IPS Self-check Type	Description
Maximum voltage over 10 min (59.S1)	The default maximum voltage over 10 min protection threshold is 253 V (1.10 Vn), and the default protection time threshold is 3s.
Maximum overvoltage (59.S2)	The default overvoltage protection threshold is 264.5 V (1.15 Vn), and the default protection time threshold is 0.2s.
Minimum undervoltage (27.S1)	The default undervoltage protection threshold is 195.5 V (0.85 Vn), and the default protection time threshold is 1.5s.
Minimum undervoltage (27.S2)	The default undervoltage protection threshold is 34.5 V (0.15 Vn), and the default protection time threshold is 0.2s.
Maximum overfrequency (81.S1)	The default overfrequency protection threshold is 50.2 Hz, and the default protection time threshold is 0.1s.
Maximum overfrequency (81.S2)	The default overfrequency protection threshold is 51.5 Hz, and the default protection time threshold is 0.1s.
Minimum underfrequency (81.S1)	The default underfrequency protection threshold is 49.8 Hz, and the default protection time threshold is 0.1s.
Minimum underfrequency (81.S2)	The default underfrequency protection threshold is 47.5 Hz, and the default protection time threshold is 0.1s.

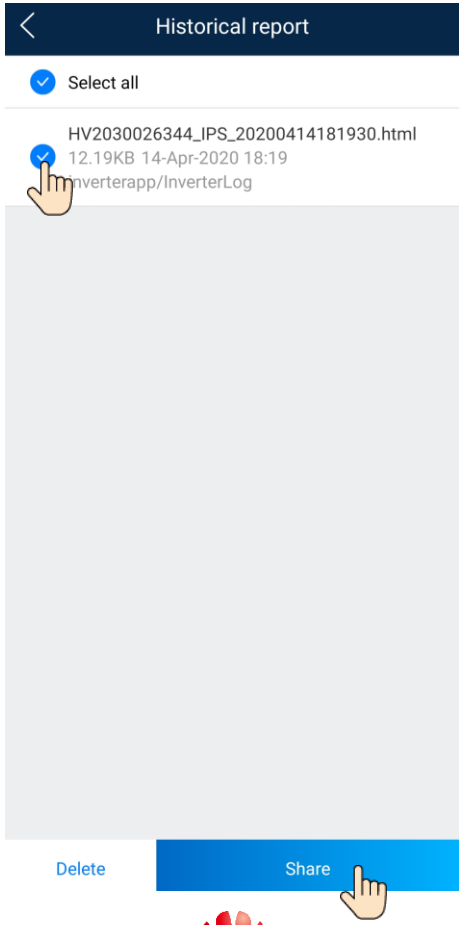
Starting an IPS self-check

1. Choose **Maintenance** > **Interface Protection System self-test**. The Interface Protection System self-test screen is displayed.
2. Tap **Start** to start an IPS self-check. The inverter detects maximum voltage over 10 min (59.S1), maximum overvoltage (59.S2), minimum undervoltage (27.S1), minimum undervoltage (27.S2), maximum overfrequency (81.S1), maximum overfrequency (81.S2), and minimum underfrequency (81.S1), and minimum underfrequency (81.S2).



Exporting reports

After the IPS self-check is complete, **IPS state** is displayed as **IPS state success**. Tap **Historical report** in the upper right corner of the screen to view the IPS self-check report.



Note: The SUN2000L-2-5KTL and SUN2000-3/4/5/6/8/10KTL-M0 require SUN2000L V100R001C00SPC334 or later and SUN2000MA V100R001C00SPC121 or later, respectively.

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4.4 Checking the Indicator Status

SUN2000-2-6KTL-L1

Category	Status (Blinking Slowly: On for 1s and then Off for 1s; Blinking Fast: On for 0.2s and then Off for 0.2s)		Meaning
Running indication	LED1	LED2	N/A
	Steady green	Steady green	The inverter is operating in grid-tied mode.
	Blinking green slowly	Off	The DC is on and the AC is off.
	Blinking green slowly	Blinking green slowly	Both the DC and AC are on, and the inverter is not exporting power to the power grid.
	Off	Blinking green slowly	The DC is off and the AC is on.
	Off	Off	Both the DC and AC are off.
	Blinking red fast	N/A	There is a DC environmental alarm, such as High String Input Voltage, String Reverse Connection, or Low Insulation Resistance.
	N/A	Blinking red fast	There is an AC environmental alarm, such as Grid Undervoltage, Grid Overvoltage, Grid Overfrequency, or Grid Underfrequency.
	Steady red	Steady red	The inverter is faulty.
Communication indication	LED3		N/A
	Blinking green fast		Communication is in progress.
	Blinking green slowly		A mobile phone is connected to the inverter.
	Off		There is no communication.

Category	Status			Meaning
Device replacement indication	LED1	LED2	LED3	N/A
	Steady red	Steady red	Steady red	The inverter hardware is faulty. The inverter needs to be replaced.

Alarm ID	Alarm Name	Alarm Severity	Possible Causes	LED Indicator Type
2021	AFCI Check Failure	Major	The AFCI check fails.	Device fault
2064	Device Fault	Major	An unrecoverable fault has occurred on a circuit inside the inverter.	Device fault
61440	Monitoring Unit Faulty	Minor	• The flash memory is insufficient. • The flash memory has bad sectors.	Device fault
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 open-circuit voltage exceeds the maximum inverter operating voltage.	DC power supply
2002	DC Arc Fault	Major	The PV string power cables arc or are in poor contact.	DC power supply
2011	String Reversed	Major	The PV string is reversely connected.	DC power supply
2062	Low Insulation Resistance	Major	•A short circuit occurs 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.	DC power supply
2068	Battery Abnormal	Minor	The battery is faulty, disconnected, or the battery circuit breaker is OFF when the battery is running.	DC power supply
2080	Abnormal PV Module Configuration	Major	PV module configuration does not meet requirements, or the PV module output is reversely connected or short-circuited.	DC power supply
2081	Optimizer Fault	Warning	The optimizer is offline or faulty.	DC power supply
2032	Grid Failure	Major	• The power grid experiences an outage. • The AC circuit is disconnected or the AC circuit breaker is OFF.	AC power supply
2033	Grid Undervoltage	Major	The grid voltage is below the lower threshold or the low voltage duration has lasted for more than the value specified by low voltage ride-through (LVRT).	AC power supply
2034	Grid Overvoltage	Major	The grid voltage exceeds the higher threshold or the high voltage has lasted for more than the value specified by high voltage ride-through (HVRT).	AC power supply
2036	Grid Overfrequency	Major	Power grid exception: The actual power grid frequency is higher than the standard requirement for the local power grid.	AC power supply
2037	Grid Underfrequency	Major	Power grid exception: The actual power grid frequency is lower than the standard requirement for the local power grid.	AC power supply
2038	Unstable Grid Frequency	Major	Power grid exception: The actual grid frequency change rate does not comply with the local power grid standard.	AC power supply
2039	Output Overcurrent	Major	The grid voltage drops dramatically or the power grid is short-circuited. As a result, the transient output current of the inverter exceeds the upper threshold and therefore protection is triggered.	AC power supply
2040	Output DC Component Overhigh	Major	The DC current in the power grid exceeds the upper threshold.	AC power supply
2051	Abnormal Residual Current	Major	The input-to-ground insulation impedance has decreased during the inverter operation.	AC power supply
2067	Faulty Power Collector	Major	The power meter is disconnected.	AC power supply
2070	Active Islanding	Major	When the power grid experiences an AC power outage, the inverter detects islanding proactively.	AC power supply
2063	Overtemperature	Minor	• The inverter is installed in a place with poor ventilation. • The ambient temperature is higher than the upper threshold. • The inverter is not working properly.	Fault
2065	Upgrade Failed or Version Mismatch	Minor	The upgrade does not complete normally.	Fault

4.5 Resetting Passwords

SUN2000-2-6KTL-L1

If you forget the WLAN connection password or user login password, you need to reset the password. The WLAN name, WLAN connection password, user login password, router parameters, and management system parameters are restored to factory settings.

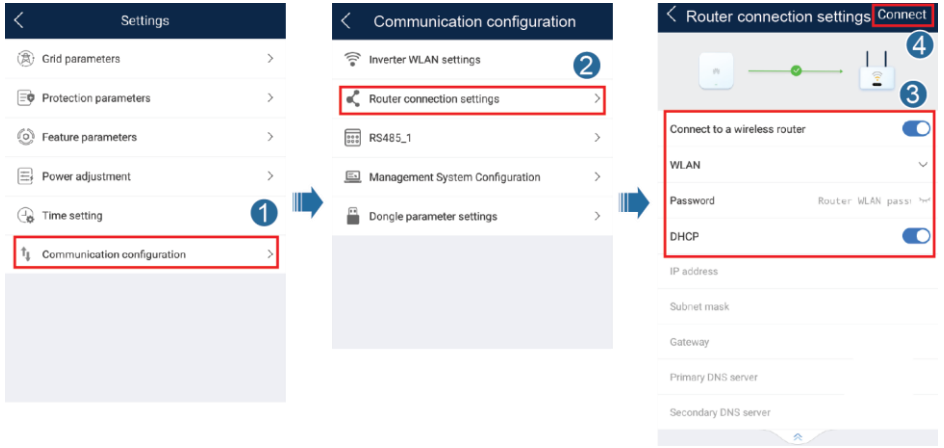
1. Ensure that the SUN2000 connects to the AC and DC power supplies at the same time. Indicators and are steady green or blink at long intervals for more than 3 minutes.
2. Perform the following operations within 3 minutes:
   a. Turn off the AC switch and set the DC switch at the bottom of the SUN2000 to OFF. If the SUN2000 connects to batteries, turn off the battery switch. Wait until all the LED indicators on the SUN2000 panel turn off.
   b. Set the DC switch to ON and ensure that the AC power supply is not connected and the indicator is blinking green at long intervals.
   c. Set the DC switch to OFF and wait until all LED indicators on the SUN2000 panel are off.
   d. Set the DC switch to ON. Ensure that the AC power supply is not connected.
3. Reset the password within 10 minutes. (If no operation is performed within 10 minutes, all inverter parameters remain unchanged.)
   a. Wait until the indicator blinks green at long intervals.
   b. Obtain the initial WLAN hotspot name (SSID) and initial password (PSW) from the label on the side of the SUN2000 and connect to the app.
   c. On the login screen, set a new login password and log in to the app.
4. Set router and management system parameters to implement remote management.

Resetting a user password

Log in to the FusionSolar app and go to the **Device commissioning** screen. On the password setting screen that is displayed, set the user password.

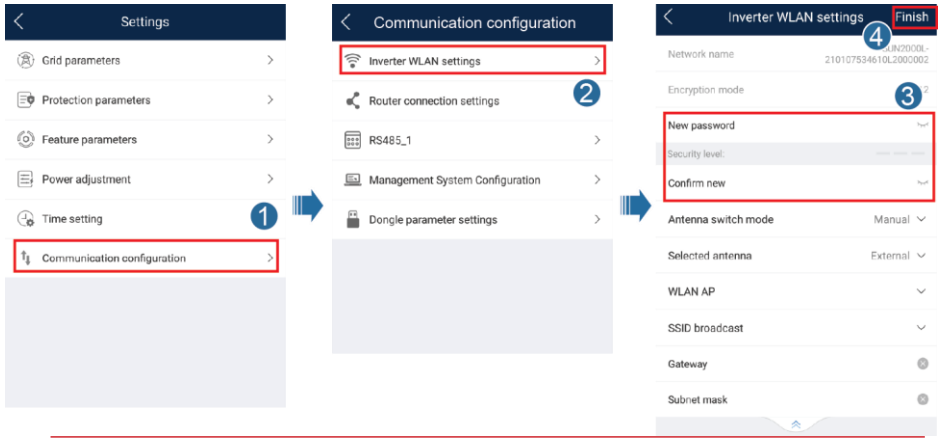
Resetting router parameters

Log in to the FusionSolar app, choose **Device commissioning** > **Settings** > **Communication configuration** > **Router connection settings**, and set router parameters.



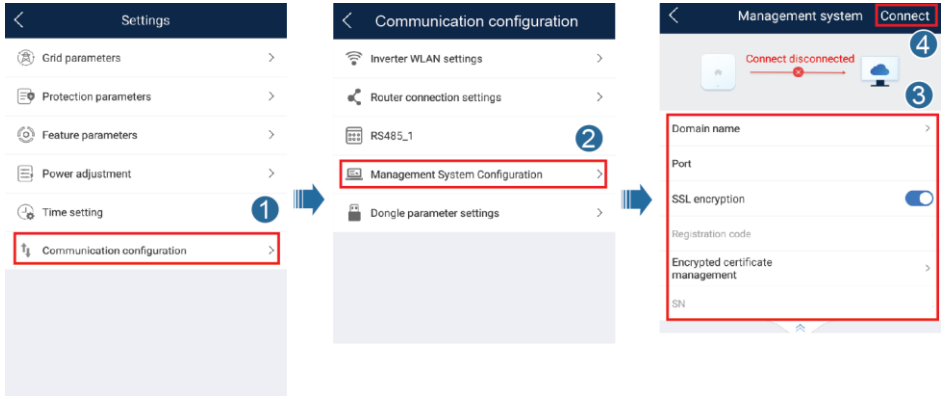
Resetting the WLAN password

Log in to the FusionSolar app, choose **Device commissioning** > **Settings** > **Communication configuration** > **Inverter WLAN settings**, and reset the WLAN password.



Resetting management system parameters

Log in to the FusionSolar app, choose **Device commissioning** > **Settings** > **Communication configuration** > **Management System Configuration**, and set management system parameters.



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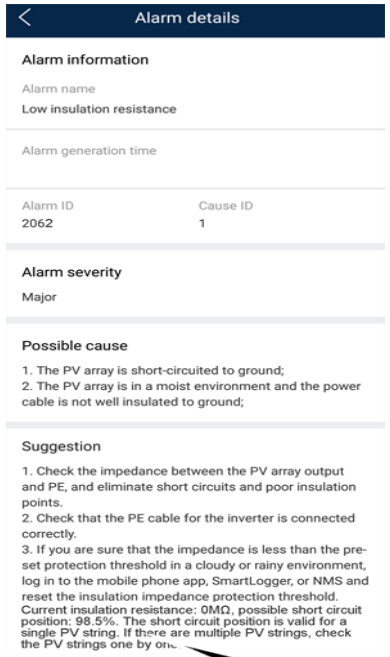
4.6 Locating Insulation Resistance Faults

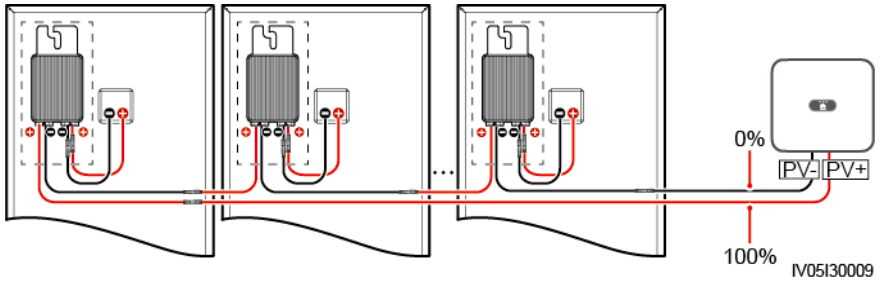
If the ground impedance of a PV string connected to the inverter is too low, the inverter generates a **Low insulation resistance** alarm.
The possible causes are as follows:

- A short circuit occurs 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.

If a system is not configured with any optimizer, skip the corresponding operations. To locate the fault, do as follows:

Step 1 Locate the faulty PV string: Connect each PV string to the inverter, power on and check the inverter, and locate the fault based on the alarm information reported by the FusionSolar app.



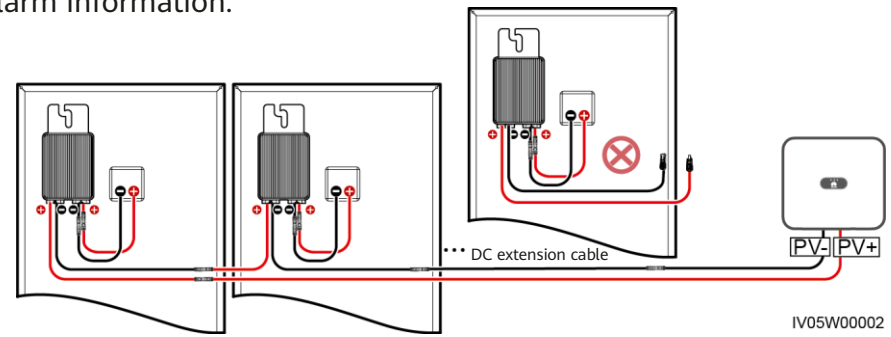


- The positive and negative terminals of a PV string are respectively connected to the PV+ and PV– terminals of the inverter. The PV– terminal represents a possibility of 0% for the short-circuit position and the PV+ terminal represents a possibility of 100% for the short-circuit position. Other percentages 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 of PV module 4. The inverter has a detection precision of ±1 PV module.

Current insulation resistance: XX MΩ; possible short circuit position: XX%. The short circuit position is valid for a single PV string. If there are multiple PV strings, check the PV strings one by one.

Step 2 Locate the faulty cable: Power off the inverter. Check whether the connector or DC cable between the possible faulty PV modules and the corresponding optimizers, or those between the adjacent PV modules and the corresponding optimizers are damaged. Replace the damaged connector or DC cable. Power on the inverter and view the alarm information.

Step 3 Locate the faulty PV module: Power off the inverter, disconnect the possible faulty PV modules and corresponding optimizers from the PV string, and connect a DC extension cable with an MC4 connector to the adjacent PV modules or optimizers. Power on the inverter and view the alarm information.



Step 4 Locate the faulty component:

1. Disconnect the possible faulty PV module from the optimizer.
2. Power off the inverter.
3. Connect the possible faulty optimizer to the PV string.
4. Power on the inverter. Check whether the **Low insulation resistance** alarm is reported.
   - If the **Low insulation resistance** alarm is not reported, the PV module is faulty.
   - If the **Low insulation resistance** alarm is still reported, the optimizer is faulty.
5. Replace the faulty component to clear the insulation resistance fault.

If two or more ground insulation faults occur in a single PV string, the following method cannot locate the fault. You need to check the PV modules one by one.

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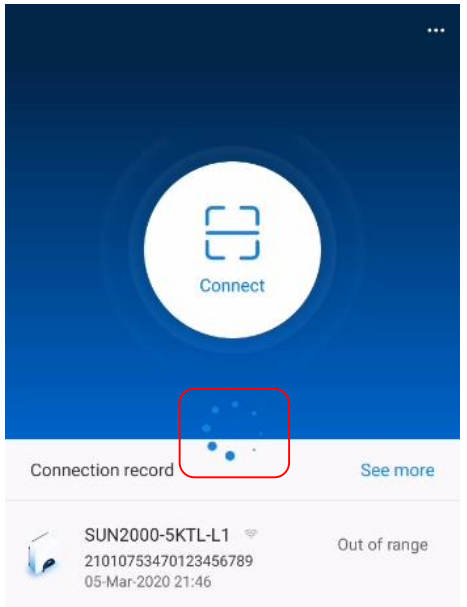
4.7 WLAN Connection Failure

Symptom	Possible Causes	Troubleshooting
WLAN connection failure	The WLAN network is not allowed.	Forget the WLAN network from the WLAN list in the phone system and reconnect to the network. The screen varies depending on the phone model.
	You have entered an incorrect WLAN password.	Forget the WLAN network from the WLAN list in the phone system and reconnect to the network using the correct password. The screen varies depending on the phone model.
	The WLAN network is being used by another phone.	Wait for the other phone to exit or restart the WLAN network.
	The login screen is inaccessible when the WLAN of the device is connected.	Disable the 4G network and try again.



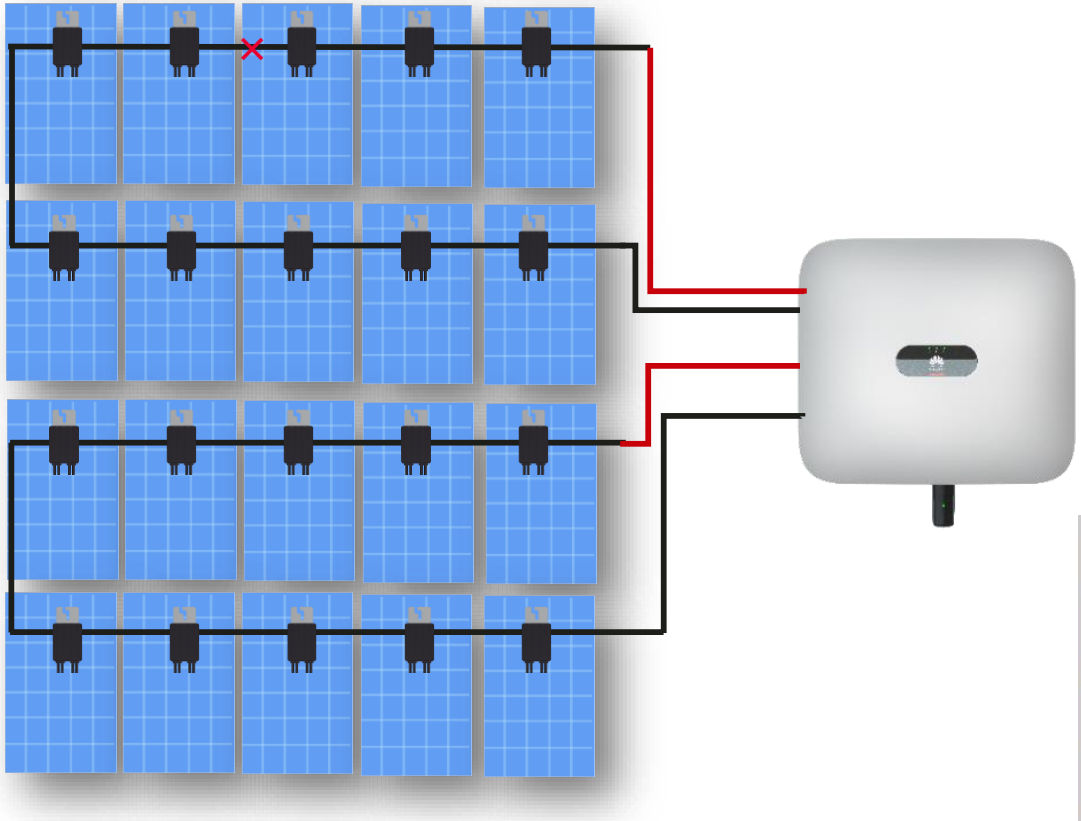
4.8 Rapid Shutdown

If all PV modules are equipped with optimizers, the PV system can perform a rapid shutdown, reducing the output voltage of the optimizer to 0 V within 30s.
Triggering methods of rapid shutdown:
Method 1: Turn off the AC switch between the inverter and the power grid.
Method 2: Turn off the DC switch at the bottom of the inverter.

4.9 Optimizer Disconnection Detection

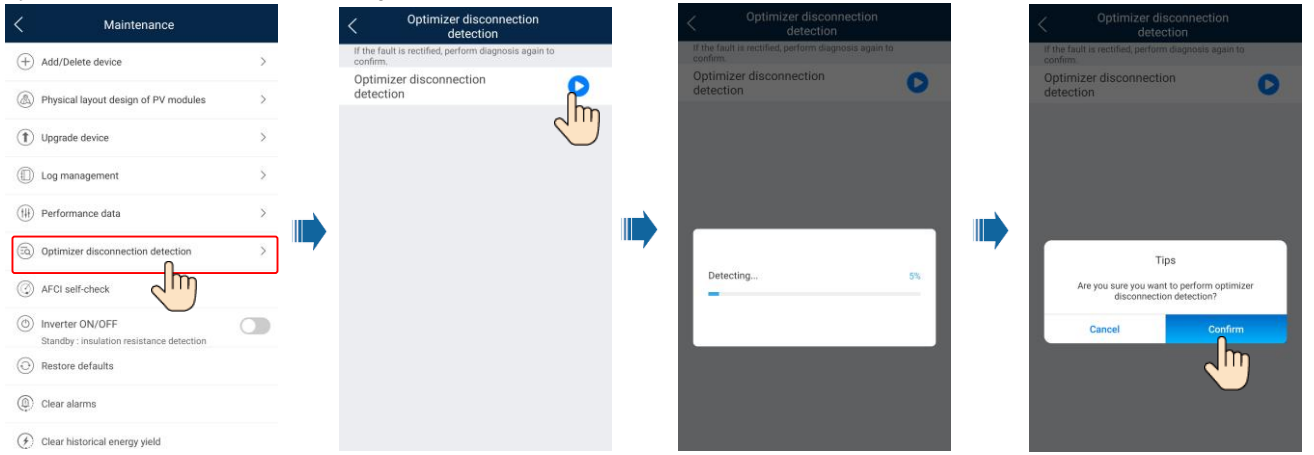
Description

Terminals are used to connect the inverter and PV strings and to interconnect adjacent PV modules. If the terminals are loose or in poor contact, the adjacent PV modules will be disconnected. As a large number of PV modules are deployed on a rooftop, the troubleshooting is laborious and inefficient. Optimizer disconnection detection can accurately and efficiently determine the physical location of a fault point.

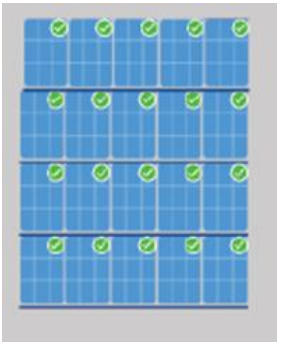


Optimizer disconnection detection

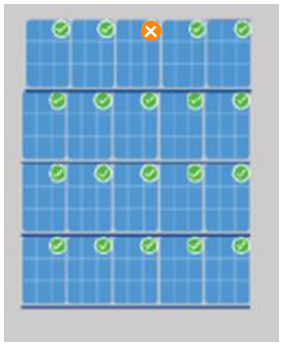
On the **Maintenance** screen, choose **Optimizer disconnection detection**, tap the detection button to detect the optimizer disconnection, and rectify the fault based on the detection result.

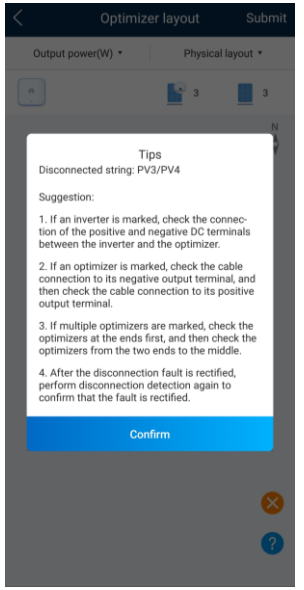


When PV string connections are normal, the optimizer connection status is green on the optimizer physical layout diagram.



When a PV string cable is disconnected, the connection status of the disconnected optimizer is orange on the optimizer physical layout diagram.

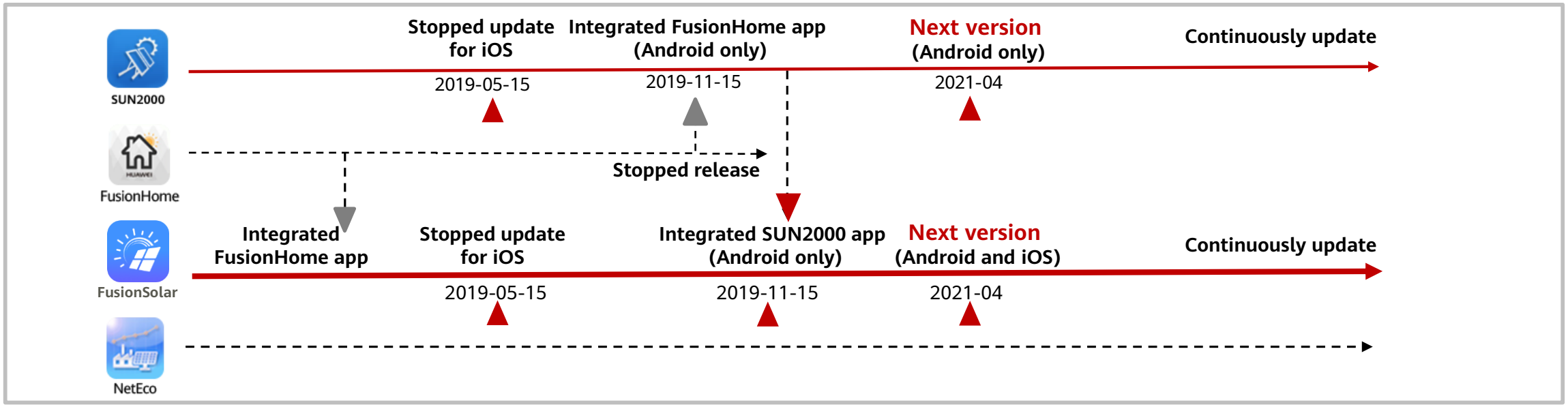




Suggestion

1. If an inverter is marked, check the connection of the positive and negative DC terminals between the inverter and the optimizer.
2. If an optimizer is marked, check the cable connection to its negative output terminal, and then check the cable connection to its positive output terminal.
3. If multiple optimizers are marked, check the optimizers at the ends first, and then check the optimizers from the two ends to the middle.
4. After the disconnection fault is rectified, perform disconnection detection again to confirm that the fault is rectified.

Appendix 1: Evolution of Apps



App	Positioning	Compatibility	Download Path
SUN2000 + FusionHome → SUN2000 (App version (Android): 3.2.00.008) SUN2000 app integrated FusionHome app (Android only)	• Local commissioning tool for connecting to a third-party system • Applied in areas without FusionSolar management system	• All Huawei inverters, SmartLogger, Smart Dongle	• Huawei AppGallery • QR code
SUN2000 + FusionSolar → FusionSolar (App version: 5.7.008) FusionSolar app integrated SUN2000 app (Android and iOS)	• Local commissioning and plant registration app for connecting to FusionSolar management system	• All Huawei inverters, SmartLogger, Smart Dongle	• Google Play • QR code

Appendix 2: Demo2.0 Kit

Demo2.0 Cabling Diagram

PV 1

PV 2

Signal Cable

AC Power Cable

DC Source Input

Grid-tied Power Cable

Demo2.0 Photo

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