SUN2000-(33KTL, 36KTL, 40KTL)-US
Quick Guide (Mounting Bracket Supplied with the SUN2000, Amphenol Helios H4)

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WARNING
1. The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.
3. Only qualified and trained electrical technicians are allowed to operate the device. Operators should understand the components and functioning of a grid-tied PV power system and be familiar with relevant local standards.
4. Before installing the device, check that deliverables are intact and complete against the packing list. If any damage is found or any component is missing, contact the dealer.
5. Use insulated tools when installing the device. For personal safety, wear insulation gloves and protective shoes.
6. Huawei shall not be liable for any consequence caused by violation of the storage, transportation, installation, and operation regulations specified in this document and the user manual.

1 Product Overview

Front View

(1) PV connection indicator
(2) Grid-tied indicator
(3) Communication indicator
(4) Alarm/Maintenance indicator
(5) Maintenance compartment door
(6) Host panel

Ports

(1) 3/4-inch waterproof cable connectors (COM1, COM2, and COM3)
(2) 2-inch waterproof cable connector (AC OUTPUT)
(3) USB port (USB)
(4) DC switch 1 (DC SWITCH 1)
(5) DC switch 2 (DC SWITCH 2)
(6) 1/2-inch waterproof cable connector (RESERVE)
(7) DC input terminals (controlled by DC SWITCH 1)
(8) DC input terminals (controlled by DC SWITCH 2)
(9) PV side ground point (GND)

NOTE
Waterproof cable connector is abbreviated as waterproof connector in the following text.
2 Installation Requirements

2.1 Installation Angle

Wall-mounted Installation and Normal Support-mounted Installation

Tilted Support-mounted Installation

2.2 Installation Space

NOTE
For ease of installing the SUN2000 on the mounting bracket, connecting cables to the bottom of the SUN2000, and maintaining the SUN2000 in future, it is recommended that the bottom clearance be between 600 mm (23.62 in.) and 730 mm (28.74 in.).
3 Installing the Mounting Bracket

**NOTE**
- The SUN2000 mounting bracket has four groups of tapped holes, each group containing four tapped holes. Mark any hole in each group based on site requirements and mark four holes in total. Two round holes are preferred.
- The SUN2000 is delivered with M12x60 expansion bolts and M12x40 bolt assemblies. If the bolt assembly length does not meet the installation requirements, prepare M12 bolt assemblies by yourself and use them together with the delivered M12 nuts.
- Before installing the mounting bracket, remove the security torx wrench from the mounting bracket and set it aside.

**Wall-mounted Installation**

**DANGER**
Avoid drilling holes in the water pipes and power cables buried in the wall.

**NOTICE**
- To prevent dust inhalation or contact with eyes, wear safety goggles and an anti-dust mask when drilling holes.
- Wipe away any dust in or around the holes and measure the hole distance. If the holes are inaccurately positioned, drill holes again.
- Level the head of the expansion sleeve with the concrete wall after removing the bolt, spring washer, and flat washer. Otherwise, the mounting bracket will not be securely installed on the concrete wall.

1. Mark hole positions.

2. Install expansion bolts.

3. Secure the mounting bracket.
Normal Support-mounted Installation

1. Mark hole positions.
2. Drill holes. (You are advised to apply anti-rust paint on the hole positions for protection.)
3. Secure the mounting bracket.

Tilted Support-mounted Installation

1. Mark hole positions.
2. Drill holes. (You are advised to apply anti-rust paint on the hole positions for protection.)
3. Secure the mounting bracket.

4 Installing the SUN2000

1. Install the SUN2000 on the mounting bracket.
2. Tighten security torx screws.
5 Electrical Connections

**NOTICE**
Connect cables in accordance with the installation laws and regulations of the country or region where the project is located.

### 5.1 Selecting a Connection Method

Cables can be connected to the maintenance compartment in a common way or through a pipe. Select a connection method based on site requirements.

**NOTE**
- The following describes how to route cables through the AC OUTPUT waterproof connector in a common way and through a pipe. Processing of other waterproof connectors is similar.
- Following are the reference torque values for the waterproof connector and pipe. Observe the requirements of the specific manufacturer, if any.
  - AC OUTPUT and COM ports: 7.5 N·m (plastic) or 10 N·m (metal)
  - RESERVE port: 3.75 N·m (plastic) or 6.25 N·m (metal)

#### Common Connection

If you choose the common connection, prepare appropriate cables by yourself.

1. Remove the locking cap and plug from the waterproof connector.
2. Route the cable through the locking cap and then the waterproof connector.
3. Install the cable.
4. Tighten the locking cap.
5. Check that the cables are connected correctly and securely. Then seal the waterproof connectors and cable holes.
6. Clear foreign matter from the maintenance compartment.

#### Connection Through a Pipe

If you choose the connection through pipes, prepare appropriate cables and pipes by yourself.

**NOTE**
The pipe specifications should comply with the waterproof connector specifications. For example, for a 2-inch waterproof connector, prepare a 2-inch pipe. The pipe appearance shown in the following figure is for reference only. The actual pipe prevails.
1. Remove the AC filter and keep the screws aside.
2. Remove the locking cap and plug from the waterproof connector, and then remove the waterproof connector.
3. Secure the pipe fittings.
4. Place the AC filter.

5. Route the cable through the conduit and fitting of the pipe, and then the AC filter.
6. Install the cable.
7. Connect the conduit and fitting of the pipe.
8. Check that the cables are connected correctly and securely. Then take appropriate measures to ensure that the tube conduit and fittings are secured reliably, and seal the cable holes.
9. Secure the AC filter using screws.
10. Clear foreign matter from the maintenance compartment.

**NOTICE**
- How to handle the bottom waterproof connectors depends on the connection method. For details, see "Common Connection" and "Connection Through a Pipe."
- Cables to the maintenance compartment interior are connected in the same way irrespective of which connection method is used. The following uses common connection as an example.

### 5.2 Preparing an OT Terminal

**NOTICE**
- Pay attention to not scratch the core wire when stripping a cable.
- The cavity formed after the conductor crimp strip of the OT terminal is crimped must wrap the core wires completely. The core wires must contact the OT terminal closely.
- Wrap the wire crimping area with heat shrink tubing or PVC insulation tape. The following figure uses heat shrink tubing as an example.
- When using the heat gun, protect devices from being scorched.
5.3 Installing the Ground Cable

Proper grounding is helpful for resisting the impact of surge voltage and improving the electromagnetic interference (EMI) performance. Before connecting the AC power cable, DC power cable, and communications cable, connect ground cables to the PE point and PV side ground point.

**NOTE**
- Both the maintenance compartment and shell of the SUN2000 provide a PE point. Select either for connecting the ground cable. If you connect a ground cable to the PE point in the maintenance compartment, see section 5.5 "Installing AC Output Power Cables."
- You are advised to use outdoor copper-core cables with a cross-sectional area of 6 AWG and M6 OT terminals. The ground cable must be secured.
- It is recommended that the ground cable be connected to a nearby ground point. Connect the ground points of all SUN2000s in the same PV array to ensure equipotential connections to ground cables.
- To enhance the corrosion resistance of the ground terminal, apply silica gel or paint on it after connecting the ground cable.

1. Connect the ground cable to the PE point (on the chassis shell).
2. Connect the ground cable to the PV side ground point.

5.4 Opening the Maintenance Compartment Door

**WARNING**
- Never open the host panel of the SUN2000.
- Before opening the SUN2000 maintenance compartment door, turn off the downstream AC output switch and the two bottom DC switches.

1. Remove the two security torx screws from the maintenance compartment door using a security torx wrench. (Set the two screws aside. Use the idle ground screw on the chassis shell as the standby screw, and the idle floating nut on the chassis as the standby floating nut.)
2. Open the maintenance compartment door and install the support bar.
3. Remove the AC terminal cover.

5.5 Installing AC Output Power Cables

**NOTE**
- Recommended: a copper cable that can withstand 90°C (194°F) or 105°C (221°F) and has a cross-sectional area of 4 AWG for each core wire.
- If you connect a ground cable to the PE point on the chassis shell in the scenario with no neutral wire, you are advised to use a three-core (L1, L2, and L3) outdoor copper cable (common connection) or three (L1, L2, and L3) single-core outdoor copper cables (connected through a pipe).
- If you connect a ground cable to the PE point in the maintenance compartment in the scenario with no neutral wire, you are advised to use a four-core (L1, L2, L3, and PE) outdoor copper cable (common connection) or four (L1, L2, L3, and PE) single-core outdoor copper cables (connected through a pipe).
- If you connect a ground cable to the PE point on the chassis shell in the scenario with a neutral wire, you are advised to use a four-core (L1, L2, L3, and N) outdoor copper cable (common connection) or four (L1, L2, L3, and N) single-core outdoor copper cables (connected through a pipe).
- If you connect a ground cable to the PE point in the maintenance compartment in the scenario with a neutral wire, you are advised to use a five-core (L1, L2, L3, N, and PE) outdoor copper cable (common connection) or five (L1, L2, L3, N, and PE) single-core outdoor copper cables (connected through a pipe).
- OT terminal: M8 (L1, L2, L3, and N) and M6 (PE)
- Copper-core cables with copper wiring terminals are recommended. For the requirements on the cables and terminals made of other materials as well as more detailed cable specifications, see the SUN2000-(33KTL, 36KTL, 40KTL)-US User Manual.

1. Remove an appropriate length of the jacket and insulation layer from the AC output power cable using a wire stripper. (Ensure that the jacket is in the maintenance compartment.)

   a. Three-core cable (excluding the ground cable and neutral wire)

   b. Four-core cable (including the ground cable but excluding the neutral wire)

   c. Four-core cable (excluding the ground cable but including the neutral wire)

   d. Five-core cable (including the ground cable and neutral wire)
2. Prepare OT terminals.
3. Route the AC output power cable into the maintenance compartment.
4. Connect the AC output power cables and secure them using a socket wrench with an extension rod.

⚠️ NOTICE

Ensure that the AC output power cable is connected securely. Otherwise, the SUN2000 may fail to operate or experience any fault that will cause the damage of the terminal block. For example, the SUN2000 may generate heat during operation due to unreliable connection.

- a. Three-core cable (excluding the ground cable and neutral wire)
- b. Four-core cable (including the ground cable but excluding the neutral wire)
- c. Four-core cable (excluding the ground cable but including the neutral wire)
- d. Five-core cable (including the ground cable and neutral wire)
### 5.6 Installing DC Input Power Cables

#### Selecting DC Input Terminals

<table>
<thead>
<tr>
<th>Number of Inputs</th>
<th>SUN2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connects to any route.</td>
</tr>
<tr>
<td>2</td>
<td>Connects to routes 1 and 5.</td>
</tr>
<tr>
<td>3</td>
<td>Connects to routes 1, 3, and 5.</td>
</tr>
<tr>
<td>4</td>
<td>Connects to routes 1, 3, 5, and 7.</td>
</tr>
<tr>
<td>5</td>
<td>Connects to routes 1, 2, 3, 5, and 7.</td>
</tr>
<tr>
<td>6</td>
<td>Connects to routes 1, 2, 3, 5, 6, and 7.</td>
</tr>
<tr>
<td>7</td>
<td>Connects to routes 1, 2, 3, 4, 5, 6, and 7.</td>
</tr>
<tr>
<td>8</td>
<td>Connects to routes 1, 2, 3, 4, 5, 6, 7, and 8</td>
</tr>
</tbody>
</table>

**NOTE**
The SUN2000 provides two DC switches, namely, DC SWITCH 1 and DC SWITCH 2. DC SWITCH 1 controls the first to fourth routes of DC input terminals, whereas DC SWITCH 2 controls the fifth to eighth routes of DC input terminals.

#### Positive and Negative Metal Terminals

- Positive metal terminal (female)
- Negative metal terminal (male)

**WARNING**
- Ensure that the PV module output is well insulated to ground.
- Before inserting the positive and negative connectors respectively into the positive and negative DC input terminals of the SUN2000, check that the DC voltage does not exceed 1000 V using a multimeter and that the cables are connected correctly. Otherwise, the SUN2000 will be damaged.
  - If the voltage is a negative value, the PV string is reversely connected. Correct the polarity.
  - If the voltage is greater than 1000 V DC, too many PV modules are configured. Remove some PV modules.

**NOTICE**
1. Use the positive and negative metal terminals and DC connectors supplied with the SUN2000. Using other models of positive and negative metal terminals and DC connectors may result in serious consequences. The caused device damage is not covered under any warranty or service agreement.
2. Before connecting DC input power cables, label the cable polarities to ensure correct cable connections. If the cables are connected incorrectly, the SUN2000 may be damaged.
3. Insert the crimped metal terminals of the positive and negative power cables into the appropriate positive and negative connectors. Then pull back the DC input power cables to ensure that they are connected securely.
4. Connect the positive and negative connectors to the appropriate positive and negative DC input terminals. Then pull back the DC input power cables to ensure that they are connected securely.
5. If the DC input power cable is reversely connected, do not operate the DC switches and positive and negative connectors immediately. Otherwise, the SUN2000 will be damaged. The caused equipment damage is beyond the warranty scope. Wait until the solar irradiance declines at night and the PV string current reduces to below 0.5 A. Then, turn off the two DC switches, remove the positive and negative connectors, and correct the polarity of the DC input power cable.
5.7 Selecting a Communication Mode

The SUN2000 supports either PLC or RS485 communication mode.

**NOTE**
1. If PLC is used, you do not have to connect any communications cable to the SUN2000, but have to connect the PLC CCO module or SmartLogger2000 to the AC power cable. For detailed operations, see the *PLC CCO01A User Manual* or *SmartLogger2000 User Manual*.
2. If RS485 is used, do not connect the PLC CCO module to the AC power cable.

5.8 Installing the RS485 Communications Cable

**NOTICE**
1. When routing communications cables, separate communications cables from power cables to prevent communication from being affected by signal interference.
2. An RS485 cable can connect to either a terminal block or an RJ45 network port. It is recommended that the RS485 cable connect to a terminal block.

**Terminal Block Connection (Recommended)**

Recommended: outdoor communications cable with a conductor cross-sectional area of 18 AWG and an outer diameter range of 14 mm to 18 mm (0.55 in. to 0.71 in.)

1. Remove an appropriate length of the jacket and core wire insulation layer from the communications cable using a wire stripper.
2. Route the communications cables into the maintenance compartment.

3. Remove the cable terminal base from the terminal block. Connect the communications cables to the terminal base.

```
No. | Port Definition  | Description               
----|------------------|---------------------------
 1  | RS485A IN        | RS485A, RS485 differential signal + 
 2  | RS485A OUT       | RS485A, RS485 differential signal + 
 3  | RS485B IN        | RS485B, RS485 differential signal – 
 4  | RS485B OUT       | RS485B, RS485 differential signal – 
```

4. Install the terminal base on the terminal block, and connect the shield layer to the ground point.

5. Bind the communications cables.

**NOTE**

When connecting the shielded cables, choose whether to crimp the OT terminal based on site requirements.

**RJ45 Network Port Connection**

You are advised to use a CAT 5E outdoor shielded network cable with an outer diameter less than 9 mm (0.35 in.) and internal resistance not greater than 1.5 ohms/10 m (1.5 ohms/393.70 in.), as well as a shielded RJ45 connector.
1. Prepare an RJ45 connector.

2. Route the communications cables into the maintenance compartment.

3. Insert the RJ45 connectors into the RJ45 network ports in the SUN2000 maintenance compartment.

4. Bind the communications cables.

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### No. | Color | Pin Definition
---|---|---
1 | White-and-orange | RS485A, RS485 differential signal +
2 | Orange | RS485B, RS485 differential signal –
3 | White-and-green | N/A
4 | Blue | RS485A, RS485 differential signal +
5 | White-and-blue | RS485B, RS485 differential signal –
6 | Green | N/A
7 | White-and-brown | N/A
8 | Brown | N/A

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### 6 Checking After Installation

1. The SUN2000 is installed correctly and securely. Yes ☐ No ☐ N/A ☐
2. The DC switches and downstream AC switch are OFF. Yes ☐ No ☐ N/A ☐
3. Ground cables are connected correctly and securely, without open circuits or short circuits. Yes ☐ No ☐ N/A ☐
4. AC output power cables are connected correctly and securely, without open circuits or short circuits. Yes ☐ No ☐ N/A ☐
5. DC input power cables are connected correctly and securely, without open circuits or short circuits. Yes ☐ No ☐ N/A ☐
6. The communications cables are connected correctly and securely. Yes ☐ No ☐ N/A ☐
7. All pipes and the waterproof connectors in use at the chassis bottom are sealed. Yes ☐ No ☐ N/A ☐
8. The AC terminal cover is reinstalled. Yes ☐ No ☐ N/A ☐
9. Check that the maintenance compartment is clean and tidy, without foreign matter. Yes ☐ No ☐ N/A ☐
10. The maintenance compartment door is closed and the door screws are tightened. Yes ☐ No ☐ N/A ☐
11. Idle DC input terminals are sealed. Yes ☐ No ☐ N/A ☐
12. Idle USB ports are plugged with covers. Yes ☐ No ☐ N/A ☐
13. Idle RESERVE and COM waterproof connectors are plugged and the locking caps are tightened. Yes ☐ No ☐ N/A ☐
7 Powering On the System

⚠️ NOTICE
Before turning on the AC switch between the SUN2000 and the power grid, use a multimeter to check that the AC voltage is within the operating voltage range of the SUN2000.

1. Turn on the AC switch between the SUN2000 and the power grid.
2. Ensure that the DC switches at the chassis bottom are ON.
3. (Optional) Measure the temperatures at the joints between DC terminals and connectors using a point-test thermometer.

🔍 NOTE
To ensure that the DC terminals are in good contact, check the temperatures at the joints between DC terminals and connectors after the SUN2000 has been running for a period of time. Ensure that the temperature rise does not exceed 40°C (104°F).

4. Observe the indicators to check the SUN2000 operating status.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV connection indicator</td>
<td>Steady green</td>
<td>At least one PV string is properly connected, and the DC input voltage of the corresponding MPPT circuit is higher than or equal to 200 V.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>The SUN2000 disconnects from all PV strings, or the DC input voltage of each MPPT circuit is less than 200 V.</td>
</tr>
<tr>
<td>Grid-tied indicator</td>
<td>Steady green</td>
<td>The SUN2000 has connected to the power grid.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>The SUN2000 does not connect to the power grid.</td>
</tr>
<tr>
<td>Communications indicator</td>
<td>Blinking green (on for 0.5s and then off for 0.5s)</td>
<td>The SUN2000 receives data over RS485/PLC communication.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>The SUN2000 has not received data over RS485/PLC communication for 10 seconds.</td>
</tr>
<tr>
<td>Alarm/Maintenance indicator</td>
<td>Alarm status</td>
<td>A warning alarm is generated.</td>
</tr>
<tr>
<td></td>
<td>Blinking red at short intervals (on for 0.5s and then off for 0.5s)</td>
<td>A minor alarm is generated.</td>
</tr>
<tr>
<td></td>
<td>Steady red</td>
<td>A major alarm is generated.</td>
</tr>
<tr>
<td></td>
<td>Local maintenance status</td>
<td>Local maintenance is in progress.</td>
</tr>
<tr>
<td></td>
<td>Blinking green at long intervals (on for 1s and then off for 1s)</td>
<td>Local maintenance fails.</td>
</tr>
<tr>
<td></td>
<td>Blinking green at short intervals (on for 0.125s and then off for 0.125s)</td>
<td>Local maintenance succeeds.</td>
</tr>
<tr>
<td></td>
<td>Steady green</td>
<td>Local maintenance succeeds.</td>
</tr>
</tbody>
</table>
1. The SUN2000 app enables the SUN2000 to communicate with the monitoring system through a USB data cable or Bluetooth for you to query alarms, configure parameters, and perform routine maintenance. The SUN2000 app is a convenient platform for local monitoring and maintenance. The app name is **SUN2000**.

2. Mobile phone operating system: Android 4.0 or later, iOS 7.0 or later. When the iOS is used, the app supports only Bluetooth connection.


4. Connect a USB data cable or a Bluetooth module to the USB port of the SUN2000 to implement the communication between the SUN2000 and the app.

**Bluetooth Module Connection (Android and iOS)**

**Data Cable Connection (Android)**

**NOTE**

- Always Available for Highest Yields
- Common User
- Enter a password
- Tool Kit
- Log In
- Select Connection Mode
- Bluetooth connection
- USB data cable
- Select Bluetooth
- Connect Device
- Search for Device
- Log In
- Bluetooth connection
- Common User
- Enter a password
- Tool Kit
Quick settings

Function Menu

- Tap to return to the login screen.
- By default, the SUN2000 can be grid-tied and you do not have to set parameters. You can modify the parameters based on site requirements. For details about parameter configuration, see the SUN2000 APP User Manual.

- The preset passwords for Common User, Advanced User, and Special User of the SUN2000 app are 00000a.
- Use the preset password upon initial login. To ensure account security, change the password immediately after login.
- The screenshots in this document correspond to app 2.1.20.101 (Android).

NOTE
- Tap  to return to the login screen.
- By default, the SUN2000 can be grid-tied and you do not have to set parameters. You can modify the parameters based on site requirements. For details about parameter configuration, see the SUN2000 APP User Manual.

9 FAQ

How Should I View Active Alarms?

Connect a USB data cable or a Bluetooth module to the USB port of the SUN2000 to implement the communication between the SUN2000 and the app. After login, tap Alarm on the Function Menu screen to display the Active Alarm screen.

10 Troubleshooting

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Suggestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>The PV string is connected reversely.</td>
<td>The PV string cables are connected reversely during the SUN2000 installation.</td>
<td>Wait until the solar irradiance declines at night and the PV string current reduces to below 0.5 A. Then, turn off the two DC switches, remove the positive and negative connectors, and correct the polarity of the DC input power cable.</td>
</tr>
</tbody>
</table>

Appendix: Power Grid Codes

<table>
<thead>
<tr>
<th>No.</th>
<th>Power Grid Code</th>
<th>Country and Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IEEE 1547-MV480</td>
<td>US medium-voltage power grid</td>
</tr>
<tr>
<td>2</td>
<td>IEEE 1547a-MV480</td>
<td>2016 US medium-voltage power grid</td>
</tr>
<tr>
<td>3</td>
<td>PRC_024_ERCOT-MV480</td>
<td>Texas medium-voltage power grid</td>
</tr>
<tr>
<td>4</td>
<td>PRC_024_Eastern-MV480</td>
<td>Eastern US medium-voltage power grid</td>
</tr>
<tr>
<td>5</td>
<td>PRC_024_Western-MV480</td>
<td>Western US medium-voltage power grid</td>
</tr>
<tr>
<td>6</td>
<td>PRC_024_Quebec-MV480</td>
<td>Quebec medium-voltage power grid</td>
</tr>
<tr>
<td>7</td>
<td>ELECTRIC RULE NO.21-MV480</td>
<td>California medium-voltage power grid</td>
</tr>
<tr>
<td>8</td>
<td>HECO-MV480</td>
<td>Hawaii medium-voltage power grid</td>
</tr>
</tbody>
</table>

NOTE
- Grid codes are subject to change. The listed codes are for your reference only.
Scan here for technical support (carrier):

Apple Store  Google Play  Huawei App Store

Scan here for more documents:

Support  WeChat

You can also log in to Huawei technical support website:
http://support.huawei.com