About This Document

Purpose

This document describes the SUN2000 inverter in terms of its installation, electrical connections, commissioning, maintenance, and troubleshooting. Readers should be familiar with the SUN2000 features and functions and safety precautions provided in this document before installing and operating the SUN2000.

Store the physical documentation shipped with the product properly for future reference.

This document is subject to update and revision. The latest version can be downloaded from http://support.huawei.com.

Intended Audience

This document is intended for photovoltaic (PV) plant operators and qualified electrical technical personnel.

Symbol Conventions

The symbols that may be found in this document are defined as follows.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="icon.png" alt="DANGER" /></td>
<td>Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.</td>
</tr>
<tr>
<td><img src="icon.png" alt="WARNING" /></td>
<td>Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.</td>
</tr>
<tr>
<td><img src="icon.png" alt="CAUTION" /></td>
<td>Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.</td>
</tr>
<tr>
<td><img src="icon.png" alt="NOTICE" /></td>
<td>Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.</td>
</tr>
</tbody>
</table>
Symbol | Description
--- | ---
📖 NOTE | Calls attention to important information, best practices and tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

**Issue 10 (2017-07-30)**
- Updated certain content of 5.4.1 Communications Ports.
- Updated 10 Technical Specifications.

**Issue 09 (2017-02-21)**
- Updated certain content of 4.3 Determining the Installation Position.
- Updated certain content of 8.2 Routine Maintenance.

**Issue 08 (2015-12-08)**
- Deleted descriptions about the SUN2000-24.5KTL.
- Updated descriptions in 5.2 Connecting AC Output Power Cables.
- Updated descriptions in 7.2.1 Viewing System Operating Information.
- Added the On-grid recovery time parameter to 7.2.9 Setting Protection Parameters.
- Added parameters RCD enhancing and K-factor to 7.2.10 Setting Feature Parameters.
- Added 7.2.16 Resetting Alarms.
- Added 7.2.17 Resetting the System.
- Updated B Power Grid Codes.

**Issue 07 (2014-07-30)**
- Added 4.4 Support-mounting the SUN2000.
- Supplemented AC power cable specifications and models.
- Modified the start time of the warranty period.

**Issue 06 (2014-06-05)**
- Added descriptions about the SUN2000-24.5KTL.
- Added more precautions for Installation and Maintenance and Replacement in 1 Safety Precautions.
Added 3 SUN2000 Storage.
Added more maintenance items to 8.2 Routine Maintenance.
Added B Power Grid Codes.

Issue 05 (2014-03-25)
Added cable types and precautions for cable connections in 5.3 Connecting DC Input Power Cables.
Modified the output power of the inverter at different temperatures in General Data in 10 Technical Specifications.

Issue 04 (2013-11-25)
Added description about the SUN2000-23KTL.

Issue 03 (2013-10-11)
Added descriptions about the SUN2000-28KTL.

Issue 02 (2013-06-08)
This issue is the second official release.

Issue 01 (2013-04-26)
This issue is the first official release.
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1 Safety Precautions

Strictly follow all the safety precautions in this document to prevent personal injury or death.

Personnel Requirements

- Only qualified and trained electrical technicians are allowed to operate the SUN2000.
- Operators should understand the components and functioning of a grid-tied PV power system, and they should be familiar with relevant local standards.

Label Protection

- Do not tamper with any warning signs on the SUN2000 enclosure because these signs contain important information about safe operation.
- Do not remove or damage the nameplate on the SUN2000 enclosure because it contains important product information.

Installation

---

**DANGER**

Ensure that DC and AC power supplies are disconnected before operations.

---

**NOTICE**

Read this document before installation. Huawei shall not be liable for any consequence caused by violation of the regulations specified in this document.

- Shield the PV modules with opaque cloth before connecting cables to the SUN2000.
- Ensure that the SUN2000 is not connected to a power supply and is not powered on before starting installation.
- Ensure that there are no objects within 200 mm of both sides of the SUN2000, and no objects within 500 mm, 600 mm, and 1000 mm of the top, bottom, and front, respectively. This is to allow sufficient space for installation and heat dissipation.
• Install the SUN2000 in an environment with good ventilation to ensure efficient and long-term system performance.
• Ensure that the SUN2000 heat sinks are free from blockage.
• Do not touch any components except the wiring terminals at the bottom inside the enclosure.

Electrical Connection

**DANGER**

Before connecting cables to the SUN2000, ensure that the SUN2000 is securely positioned and not damaged in any way. Otherwise, electrical shock or fire may occur.

- Ensure that all electrical connections comply with local electrical standards.
- Obtain approval from the local power supply department before using the SUN2000 to generate electricity in grid-tied mode.
- Ensure that the cables to the solar power system are properly connected and insulated and meet specifications. Confirm that the insulation resistance between the ground and the main circuit formed by the PV module strings, the SUN2000, and protective devices is at least 1 megohm.

Operation

**DANGER**

High voltage may cause electrical shock or death during operation. Strictly comply with the safety precautions in this document and associated documents when operating the SUN2000.

- Do not disconnect the DC power supply during the SUN2000 operation.
- Do not touch parts of the SUN2000 other than the liquid crystal display (LCD) and DC SWITCH. The SUN2000 enclosure and heat sinks are extremely hot when the SUN2000 is in operation and touching these parts can cause severe burns and personal injury.
- Ensure that only qualified personnel are allowed to set initialization parameters during the first power-on of the SUN2000. Incorrect settings may affect the SUN2000 operation and cause the SUN2000 to conflict with local certifications.
- Follow local laws and regulations when operating the device.

Maintenance and Replacement

- Before performing maintenance tasks, power off the SUN2000 by referring to 8.1 Powering Off the SUN2000. Then wait for at least 5 minutes before performing operations on the SUN2000.
- Place temporary warning signs or erect fences to prevent unauthorized access to the maintenance site.
• Rectify any faults that may compromise the SUN2000 security performance before restarting the SUN2000.

• A faulty SUN2000 requires overall maintenance. Contact the dealer if the SUN2000 is faulty.

• Maintain the SUN2000 with sufficient knowledge of this document and proper tools and testing equipment.

• Wear electrostatic discharge (ESD) gloves and comply with ESD protection regulations when maintaining the SUN2000.
2 Overview

This chapter introduces the SUN2000 and describes its functioning, appearance, label conventions, and monitoring panel.

2.1 Introduction

This section describes the functions, models, and application of the SUN2000.

Function

The SUN2000 is a three-phase grid-tied PV string inverter. It converts DC power generated by PV strings into AC power and then feeds the AC power into the power grid.

Models

Figure 2-1 shows how to read the SUN2000 model number, using SUN2000-17KTL as an example.

Figure 2-1 Model number description

Table 2-1 lists all the models of the SUN2000 and their rated output power.

Table 2-1 SUN2000 models and rated output power

<table>
<thead>
<tr>
<th>Model</th>
<th>Rated Output Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUN2000-8KTL</td>
<td>8 kW</td>
</tr>
<tr>
<td>SUN2000-10KTL</td>
<td>10 kW</td>
</tr>
</tbody>
</table>
Network Application

The SUN2000 applies to grid-tied PV power systems for commercial rooftops and large power stations. A typical grid-tied PV power system consists of PV strings, grid-tied inverters, and AC distribution units (ACDUs), as shown in Figure 2-2.

![Figure 2-2 SUN2000 network application](image)

A. PV string  B. SUN2000  C. ACDU
D. Transformer  E. Power grid

**NOTE**
A model in the range from SUN2000-8KTL to SUN2000-23KTL can connect to the low-voltage power grid directly without connecting to a transformer.

Power Grid Modes for the SUN2000

All SUN2000 models except the SUN2000-28KTL support the power grid modes TN-S, TN-C, TN-C-S, and TT, as shown in Figure 2-3. The SUN2000-28KTL supports the IT mode, as shown in Figure 2-4.
**NOTICE**

- The valid neutral-ground voltage for the TT grid mode must be less than 30 V.
- The SUN2000-28KTL applies to medium-voltage and low-voltage power grids. If the output voltage of the SUN2000 (three-phase, with a PE cable, 480 V) does not match the power grid voltage, connect a transformer to adapt to the power grid voltage.

For example, if the SUN2000 is connected to a low-voltage power grid (three-phase, with an N cable and a PE cable, 400 V), a transformer is required to convert the 480 V voltage to the 400 V voltage.

---

**Figure 2-3** Power grid modes supported by all SUN2000 models except the SUN2000-28KTL

---

**Figure 2-4** Power grid mode supported by the SUN2000-28KTL

---

### 2.2 Appearance

This section describes the appearance and specifications of the SUN2000.
External Dimensions

Figure 2-5 Appearance

- 255 mm
- 610 mm
- 520 mm
Bottom View

Figure 2-6 Ports

(1) DC switch
(2) Ventilation valves
(3) DC input terminals
(4) USB port
(5) RS485 IN port
(6) RS485 OUT port
(7) AC output terminal
(8) Protective earthing (PE) bolt
(9) DC input terminals

2.3 Label Conventions

This section describes the symbols on the SUN2000 and the nameplate.

Symbols

Table 2-2 describes all symbols on the SUN2000.

Table 2-2 Symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Label</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Symbol" /></td>
<td>Danger high voltage</td>
<td>The SUN2000 operates at high voltage. All operations on the SUN2000 may only be carried out by a trained electrician.</td>
</tr>
</tbody>
</table>
## Symbol and Label Meaning

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Label</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Delay discharge" /></td>
<td>Delay discharge</td>
<td>Any residual voltage in the SUN2000 takes 5 minutes to fully discharge.</td>
</tr>
<tr>
<td><img src="image" alt="Burn warning" /></td>
<td>Burn warning</td>
<td>The SUN2000 must not be touched when in operation because its enclosure and heat sinks are extremely hot.</td>
</tr>
<tr>
<td><img src="image" alt="Refer to documentation" /></td>
<td>Refer to documentation</td>
<td>Remind operators to refer to the documentation shipped with the SUN2000.</td>
</tr>
<tr>
<td><img src="image" alt="Grounding" /></td>
<td>Grounding</td>
<td>The SUN2000 must be connected to a ground bar for grounding purposes.</td>
</tr>
<tr>
<td><img src="image" alt="Operation warning" /></td>
<td>Operation warning</td>
<td>The DC input connector must not be removed when the SUN2000 is in operation.</td>
</tr>
</tbody>
</table>

### Nameplate

Figure 2-7 shows the SUN2000 nameplate, which contains the model information, technical specifications, and compliance symbols.

**Figure 2-7 Nameplate**

![Nameplate Image]

1. Trademark, product name, and model number
2. Technical specifications
3. Compliance symbols
4. Company name and country of manufacture
Table 2-3 describes the compliance symbols.

Table 2-3 Compliance symbols on the nameplate

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="CE certification mark" /></td>
<td>CE certification mark</td>
<td>The SUN2000 complies with CE certification standards.</td>
</tr>
<tr>
<td><img src="image" alt="Environmentally friendly use period (EFUP)" /></td>
<td>Environmentally friendly use period (EFUP)</td>
<td>The SUN2000 is environmentally friendly for at least 50 years.</td>
</tr>
<tr>
<td><img src="image" alt="EU WEEE mark" /></td>
<td>EU WEEE mark</td>
<td>The SUN2000 must not be disposed of as domestic waste.</td>
</tr>
</tbody>
</table>

2.4 Monitoring Panel

This section describes the monitoring panel, including the LCD, LED indicators, buttons, and the default screen displayed on the LCD.

Appearance

The monitoring panel has an LCD, four indicators, and four buttons, as shown in Figure 2-8.
Figure 2-8 Monitoring panel

1. LCD
2. Indicators
3. Buttons

NOTE
The LCD displays SUN2000 operating data such as input power, output power, energy yield, and alarms. The indicators show the SUN2000 operating status.

LCD

The LCD displays the SUN2000 data in graphics and text, including the operating information, alarm information, system parameters, and user parameters.

If no button is pressed within 90s on a non-default screen, the LCD automatically displays the default screen, which is shown in Figure 2-9.

Figure 2-9 Default page
(1) Energy yield histogram

The energy yield for each hour of the current day.

(2) Energy yield data

- The current date and time.
- The total energy yield for the current day from 00:00 to the current time.
- The total energy yield from the initial startup to the current time.

(3) Power flow diagram

- The number of PV string inputs. This is represented by the row of boxes under the PV module icon.
  - A box with a cross indicates a PV string that is not connected or has low power.
  - A box marked white or black indicates a PV string that is working normally.
- The power flow from the PV strings to the SUN2000 and the voltage and current of each input.
- The power flow from the SUN2000 to the power grid and the voltage and current of each output.
  - All models except the SUN2000-28KTL display the effective phase voltage and current of the SUN2000 three-phase output.
  - The SUN2000-28KTL displays the effective line voltage and current.

**NOTE**
The system displays the voltage and current from the PV string corresponding to the box marked black and switches between the connected PV strings every 10 seconds. Manual switching can be performed by pressing ▲ and ▼.

(4) Output/Peak power

The output power and peak power of the SUN2000.

---

**Indicators**

Table 2-4 describes the four indicators on the SUN2000 monitoring panel.

**Table 2-4 Indicator description**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>State</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV connection indicator</td>
<td>Steady green</td>
<td>The SUN2000 is properly connected to at least one PV string.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>The SUN2000 is disconnected from all PV strings.</td>
</tr>
<tr>
<td>Grid-tie indicator</td>
<td>Steady green</td>
<td>The SUN2000 is properly connected to the power grid.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>The SUN2000 is disconnected from the power grid.</td>
</tr>
</tbody>
</table>
### Buttons

Table 2-5 describes the four buttons on the SUN2000 monitoring panel.

<table>
<thead>
<tr>
<th>Button</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESC</td>
<td>Escape</td>
</tr>
<tr>
<td>▲</td>
<td>Up</td>
</tr>
<tr>
<td>▼</td>
<td>Down</td>
</tr>
<tr>
<td>▼</td>
<td>Confirm</td>
</tr>
</tbody>
</table>

NOTE  
The backlight lasts for 60s after any button is pressed.

### 2.5 Working Principles

This section describes the circuit diagrams and working modes of the SUN2000.

#### Conceptual Diagrams

- The SUN2000-15KTL, SUN2000-17KTL, SUN2000-20KTL, SUN2000-23KTL, and SUN2000-28KTL receive inputs from six PV strings. The inputs are then grouped into...
three maximum power point tracking (MPPT) routes inside the SUN2000 to track the maximum power point of the PV strings.

- The SUN2000-8KTL, SUN2000-10KTL, and SUN2000-12KTL receive inputs from four PV strings. The inputs are then grouped into two MPPT routes inside the SUN2000 to track the maximum power point of the PV strings.

The DC power is then converted into three-phase AC power through a converter circuit. There is surge protection for both DC and AC sides. Figure 2-10, Figure 2-11, and Figure 2-12 show the circuit diagrams for the different models.

**Figure 2-10** Conceptual diagram for the SUN2000-8KTL, SUN2000-10KTL, and SUN2000-12KTL

**Figure 2-11** Conceptual diagram for the SUN2000-15KTL, SUN2000-17KTL, SUN2000-20KTL, and SUN2000-23KTL
Each component of the SUN2000 works as follows:

- The input current check circuit determines the operating status of each PV string and generates an alarm prompting for repair if a PV string is not working properly.
- The DC switch can be used to disconnect internal circuits from the DC input of the SUN2000 to facilitate manual operations during maintenance.
- The class II DC surge protective device (SPD) provides a discharge loop for DC overvoltage to protect SUN2000 internal circuits against the impact of power surges.
- The input and output electromagnetic interference (EMI) filters remove EMI from the SUN2000 to meet electromagnetic compatibility requirements.
- The MPPT circuits measure the voltage and current of the PV strings in real time and track the maximum power point to ensure maximum output power of the system.
- The DC-AC converter circuit converts DC power into AC power which is then fed to the power grid with equivalent output frequency and voltage.
- The LCL filter removes high-frequency components from the output current of the SUN2000 to ensure that the output current meets power grid requirements.
- The output isolation relay isolates the AC output of the SUN2000 from the power grid if either of them is faulty.
- The class II AC SPD provides a discharge loop for AC overvoltage to protect the SUN2000 internal circuits against the impact of power surges.

**Working Modes**

Figure 2-13 shows the changes in conditions that cause the SUN2000 to switch between working modes.
Table 2-6 describes the working modes shown in Figure 2-13.

Table 2-6 Working mode description

<table>
<thead>
<tr>
<th>Working Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standby</td>
<td>The SUN2000 enters standby mode when the external environment does not meet the SUN2000 operation requirements. In this mode, the SUN2000 continuously performs a self-check and enters operating mode once operation requirements are met. The SUN2000 switches to shutdown mode when it detects a shutdown command or a fault.</td>
</tr>
</tbody>
</table>
| Operating    | In this mode:  
|              | • The SUN2000 converts DC power from PV strings into AC power and feeds the power to the power grid.  
|              | • The SUN2000 always tracks the maximum power point to maximize the PV string output.  
|              | • The SUN2000 enters the shutdown mode after detecting a fault or a shutdown command, and enters the standby mode after detecting that the PV string output power does not meet the requirements for grid-tied electricity generation. |
| Shutdown     | The SUN2000 switches from standby or operating mode to shutdown mode when it detects a fault or a shutdown command. The SUN2000 switches to standby mode when it receives a startup command or when it detects that a fault is rectified. |
This chapter describes SUN2000 storage requirements.

The following storage instructions apply if the SUN2000 will not be deployed immediately:

- Do not unpack the SUN2000.
- Store the SUN2000 at a temperature range of -40°C to +70°C and with the relative humidity of 5% to 95%.
- The SUN2000 should be stored in a clean and dry place and be protected from dust and water vapor corrosion.
- Do not stack more than four SUN2000s.
- Conduct periodic inspection during storage. Replace the packing materials immediately if any rodent bites are found.
- Ensure that qualified personnel inspect and test the SUN2000 before use if it has been stored for a long time.
4 Installation

This chapter describes how to install the SUN2000.

Context

⚠️ DANGER
- Do not install the SUN2000 on flammable building materials.
- Do not store the SUN2000 in areas with flammable or explosive materials.

⚠️ CAUTION
Do not install the SUN2000 in places prone to body contact because the SUN2000 shelf and heat sinks become hot during the SUN2000 operation.

4.1 Checking Before Installation

Before unpacking, check that the outer packing is intact. After unpacking, check that the product and accessories are intact and complete.

Checking Outer Packing Materials

Before unpacking the SUN2000, examine the outer packing for damage such as holes and cracks. If any such damage is found, do not unpack the SUN2000 and contact the dealer immediately.

📝 NOTE
Remove the outer packing only 24 hours before installation.
Checking the Product and Accessories

After unpacking the SUN2000, check the product and accessories. If any damage is found or any component is missing, contact the dealer.

Figure 4-1 shows the product and accessories included in the delivery.

Figure 4-1 Product and accessories

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SUN2000</td>
<td>1</td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td>Rear panel</td>
<td>1</td>
<td>N/A</td>
</tr>
<tr>
<td>3</td>
<td>Expansion bolt</td>
<td>3</td>
<td>Secures the rear panel to a wall.</td>
</tr>
<tr>
<td>4</td>
<td>DC input connector</td>
<td>8/12</td>
<td>Connects to a DC input power cable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- SUN2000-8KTL/10KTL/12KTL: 8 (4 positive connectors and 4 negative connectors)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- SUN2000-15KTL/17KTL/20KTL/23KTL/28KTL: 12 (6 positive connectors and 6 negative connectors)</td>
</tr>
<tr>
<td>5</td>
<td>Waterproof RJ45 connector</td>
<td>2</td>
<td>Connects to a communications cable.</td>
</tr>
<tr>
<td>6</td>
<td>AC output connector</td>
<td>1</td>
<td>Connects to an AC output power cable.</td>
</tr>
<tr>
<td>7</td>
<td>Metal terminal</td>
<td>8/12</td>
<td>Secures a connector to a DC input power cable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- SUN2000-8KTL/10KTL/12KTL: 8 (4 positive connectors and 4 negative connectors)</td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>Quantity</td>
<td>Description</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------</td>
<td>----------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Documentation</td>
<td>1</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**NOTICE**
Positive and negative metal terminals are packed with positive and negative connectors respectively. After unpacking, keep the positive and negative ones separate to avoid confusion.

### 4.2 Tools

Prepare the tools required for installation and cable connections.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Model</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hammer drill</td>
<td>With a drill bit of Φ14 mm</td>
<td>Drills holes.</td>
</tr>
<tr>
<td>Adjustable wrench</td>
<td>With an open end ≥ 32 mm</td>
<td>Tightens expansion bolts.</td>
</tr>
<tr>
<td>Torque screwdriver</td>
<td>• Hexagon socket head: 5 mm</td>
<td>• Hexagon socket head: Secures screws to mechanical parts.</td>
</tr>
<tr>
<td></td>
<td>• Flat head: M6</td>
<td>• Flat head: Removes plastic screws from lifting holes.</td>
</tr>
<tr>
<td>Flat-head screwdriver</td>
<td>3 x 100</td>
<td>• Tightens or loosens screws when installing AC power cables.</td>
</tr>
<tr>
<td></td>
<td>• Head width: 3-3.5 mm</td>
<td>• Removes AC connectors from the SUN2000.</td>
</tr>
<tr>
<td></td>
<td>• Pole length (excluding the handle): at least 100 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Large handle</td>
<td></td>
</tr>
<tr>
<td>Tool</td>
<td>Model</td>
<td>Function</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Socket wrench</td>
<td>With an open end of 10 mm</td>
<td>Tightens ground bolts.</td>
</tr>
<tr>
<td>Diagonal pliers</td>
<td>N/A</td>
<td>Cut cable ties.</td>
</tr>
<tr>
<td>Wire stripper</td>
<td>Applies to cables with cross-sectional areas of 4 mm², 6 mm², and 10 mm²</td>
<td>Peels off cable jackets.</td>
</tr>
<tr>
<td>Rubber mallet</td>
<td>N/A</td>
<td>Hammers expansion bolts into holes.</td>
</tr>
<tr>
<td>Guarded blade utility knife</td>
<td>N/A</td>
<td>Removes packaging.</td>
</tr>
<tr>
<td>Cable cutter</td>
<td>Applies to cables with cross-sectional areas of 4 mm², 6 mm², and 10 mm²</td>
<td>Cuts power cables.</td>
</tr>
<tr>
<td>Tool</td>
<td>Model</td>
<td>Function</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Crimping tools</td>
<td>H4TC0001</td>
<td>Crimps cables.</td>
</tr>
<tr>
<td></td>
<td>Manufacturer: AMPHENOL</td>
<td></td>
</tr>
<tr>
<td>RJ45 crimping tool</td>
<td>N/A</td>
<td>Prepares RJ45 connectors for communications cables.</td>
</tr>
<tr>
<td>Removal tool</td>
<td>H4TW0001</td>
<td>Removes DC connectors from the SUN2000.</td>
</tr>
<tr>
<td></td>
<td>Manufacturer: AMPHENOL</td>
<td></td>
</tr>
<tr>
<td>Vacuum cleaner</td>
<td>N/A</td>
<td>Cleans up dust after drilling holes.</td>
</tr>
<tr>
<td>Multimeter</td>
<td>N/A</td>
<td>Measures voltage.</td>
</tr>
<tr>
<td>Marker</td>
<td>Diameter: maximum 10 mm</td>
<td>Marks signs.</td>
</tr>
</tbody>
</table>
### Table 4.3.1: Tools and Their Functions

<table>
<thead>
<tr>
<th>Tool</th>
<th>Model</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring tape</td>
<td>N/A</td>
<td>Measures distances.</td>
</tr>
<tr>
<td>Level</td>
<td>N/A</td>
<td>Checks the levelness of the rear panel.</td>
</tr>
<tr>
<td>ESD gloves</td>
<td>N/A</td>
<td>Protect operators when drilling holes.</td>
</tr>
<tr>
<td>Safety goggles</td>
<td>N/A</td>
<td>Protect operators when drilling holes.</td>
</tr>
<tr>
<td>Anti-dust respirator</td>
<td>N/A</td>
<td>Protects operators from dust inhalation when drilling holes.</td>
</tr>
</tbody>
</table>

### 4.3 Determining the Installation Position

The requirements described in this section apply to both wall mounting and support mounting. This section uses wall-mounting the SUN2000 as an example.

Comply with the following requirements when determining an appropriate position to install the SUN2000:

...
**DANGER**

- Do not install the SUN2000 on flammable building materials.
- Do not install the SUN2000 in an area that stores flammable or explosive materials.

---

**CAUTION**

Do not install the SUN2000 in a place where personnel are likely to come into contact with its enclosure and heat sinks. These parts are extremely hot during operation.

- The SUN2000 is protected to IP65 and can be installed indoors or outdoors.
- The installation method and position must be appropriate for the weight and dimensions of the SUN2000. For details, see 10 Technical Specifications.
- The wall must be solid enough to support the weight of the SUN2000.
- The cable connection area must face downwards.
- Install the SUN2000 either vertically or with a backward lean of a maximum of 15 degrees.
- The SUN2000 must be installed at an appropriate height for ease of observation and operation of the monitoring panel.
- The SUN2000 must be installed in a well ventilated environment to ensure good heat dissipation. When installed under direct sunlight, performance de-rate may be initiated due to additional temperature rise.
- Do not install the SUN2000 on a wall made of gypsum boards or similar materials with weak sound insulation, to avoid noise disturbance in a residential area.
- Ensure that there are no objects within 200 mm of both sides of the SUN2000, and no objects within 500 mm, 600 mm, and 1000 mm of the top, bottom, and front, respectively (as shown in Figure 4-2). This is to ensure optimal heat dissipation and sufficient space for installation.
**Figure 4-2** Minimum installation clearance

![Minimum installation clearance diagram]

**NOTICE**

The minimum installation clearance shown in Figure 4-2 must be provided in any installation scenario, including wall-mounted and support-mounted scenarios.

- Multiple SUN2000s must be installed in a line if sufficient space is available. Otherwise, they must be installed in checkerboard mode as shown in Figure 4-3. The stacked installation mode shown in Figure 4-4 is not recommended. The clearance between SUN2000s must meet requirements shown in the following figures.
Figure 4-3 Checkerboard installation mode (recommended)
The clearance between multiple SUN2000s must be increased to ensure proper heat dissipation when they are installed in a hot area.

### 4.4 Support-mounting the SUN2000

When installing the SUN2000, the accompanying rear panel must first be secured to a support. The SUN2000 is then secured to the rear panel using hexagon screws.

**Context**

Figure 4-5 shows the SUN2000 from the back.
Figure 4-5 SUN2000 rear view

(1) Heat sink  (2) Mounting bracket

Figure 4-6 shows the dimensions of holes in the rear panel of the SUN2000.

Figure 4-6 Dimensions of holes in the SUN2000 rear panel

---

**Procedure**

**Step 1** Determine the positions for drilling holes using the rear panel in the packing case, and mark the hole positions using a marker, as shown in Figure 4-7.
Step 2  Drill holes using a hammer drill, as shown in Figure 4-8.

Step 3  Align the rear panel with hole positions, insert M10x60 bolts into the holes, and tighten the bolts to a torque of 30 N·m using a torque wrench, as shown in Figure 4-9.
Figure 4-9 Securing a rear panel

**Step 4**  Hold the handle at the bottom of the SUN2000 with one hand and hold the end of the other handle near the SUN2000 top with the other end, and then stand the SUN2000, as shown in Figure 4-10. Two persons are required to install the SUN2000.

---

**CAUTION**

To prevent personal injury caused by a falling SUN2000, keep balance when lifting the SUN2000 because the SUN2000 has a heavy top.

---

Figure 4-10 Lifting a SUN2000

**Step 5**  Mount the SUN2000, keeping the mounting brackets in alignment with the rear panel, as shown in Figure 4-11.
**Figure 4-11** Mounting a SUN2000 on a rear panel

**Figure 4-12** Tightening hexagon screws

**Step 6**  
Tighten the two hexagon screws at the bottom of the SUN2000 to a torque of 5 N·m, as shown in **Figure 4-12**.

**Step 7**  
(Optional) Install an antitheft lock, as shown in **Figure 4-13**.  
The function of an antitheft lock is to secure the SUN2000 to the rear panel and protect it from stealing.
4.5 Wall-mounting the SUN2000

When installing the SUN2000, the accompanying rear panel must first be secured to a wall. The SUN2000 is then secured to the rear panel using hexagon screws.

Context

Figure 4-14 shows the SUN2000 from the back.
Figure 4-14 SUN2000 rear view

(1) Heat sink  (2) Mounting bracket

Figure 4-15 shows the dimensions of holes in the rear panel of the SUN2000.

Figure 4-15 Dimensions of holes in the SUN2000 rear panel

**NOTE**
- If the installation location is near the ground, connect the PGND cable to the ground before installing the SUN2000. For details, refer to 5.1 Connecting PGND Cables.
- It is recommended that the SUN2000 be installed at eye level to facilitate operation and maintenance.
Procedure

**Step 1**  Locate the positions for drilling holes using the rear panel provided with the SUN2000 in the packing case, and mark the positions using a marker, as shown in Figure 4-16.

*Figure 4-16 Locating and marking the hole positions*

**Step 2**  Drill holes using a hammer drill and install expansion bolts, as shown in Figure 4-18. An expansion bolt is composed of four parts, as shown in Figure 4-17.

*Figure 4-17 Expansion bolt composition*

(1) Expansion sleeve  (2) Flat washer  (3) Spring washer  (4) M10x60 bolt
1. Drill a hole at the marked position to a depth of 52-60 mm using a hammer drill with a Ф14 mm bit.

### CAUTION
- Wear safety goggles to prevent dust in the eyes when drilling holes. Wear an anti-dust respirator to prevent dust inhalation when drilling holes.
- Vacuum any dust in or around the holes using a vacuum cleaner and measure the distance between holes. If the holes are inaccurately positioned, drill new holes.

2. Partially tighten an expansion bolt, vertically insert it into the hole, and drive the expansion bolt completely into the hole using a rubber mallet.
3. Remove the M10x60 bolt, spring washer, and flat washer by rotating them counterclockwise.

### NOTICE
Ensure that the top surface of the expansion sleeve is level with the surface of the concrete wall after removing the bolt, spring washer, and flat washer. Otherwise, the rear panel will not be securely installed on the wall.

**Step 3** Align the rear panel with the holes, insert expansion bolts into the holes through the rear panel, and tighten the expansion bolts to a torque of 30 N·m using a torque wrench with a 17 mm open end, as shown in Figure 4-19.
Step 4  If the rear panel has been installed low enough for the SUN2000 to be mounted, go to Step 9 after performing Step 7.

Step 5  If the rear panel has been installed too high for the SUN2000 to be mounted, perform Step 6 to Step 10.

Step 6  Remove the two rubber screws from the top of the SUN2000 using a flat-head screwdriver and install two M10 lifting eyes, as shown in Figure 4-20.

Figure 4-20 Installing lifting eyes

Step 7  Ensure that two people lift the SUN2000 and turn it upright. Lift the SUN2000 by grasping the handle at the bottom of the SUN2000 with one hand and the handle at the top with the other, as shown in Figure 4-21.
CAUTION
To prevent personal injury, maintain balance when lifting the SUN2000 because it is top-heavy.

Figure 4-21 Lifting the SUN2000

Step 8 Run a rope that is sufficiently weight-bearing for the SUN2000 through the lifting eyes and hoist the SUN2000, as shown in Figure 4-22.

NOTICE
When hoisting the SUN2000, maintain balance to protect the SUN2000 from knocking into the wall or other objects.
**Step 9** Mount the SUN2000, keeping the mounting brackets in alignment with the rear panel, as shown in Figure 4-23 and Figure 4-24.

*Figure 4-23* Mounting the SUN2000 on the rear panel (front view)
Step 10  Tighten the two hexagon screws at the bottom of the SUN2000 to a torque of 5 N·m, as shown in Figure 4-25.

Step 11  (Optional) Install an antitheft lock, as shown in Figure 4-26.

The antitheft lock secures the SUN2000 to the rear panel to prevent theft.
Figure 4-26 Installing an antitheft lock

----End
5 Electrical Connections

This topic describes the SUN2000 electrical connections. Read this part carefully before protection ground (PGND) cables, DC input power cables, AC output power cables, and communications cables for the SUN2000.

Context

⚠️ DANGER
Before performing any electrical connection, ensure that the DC SWITCH is OFF. Otherwise, the high voltage can result in fatal injury.

⚠️ NOTICE
The cable colors shown in electrical connection schematic drawings are only for reference. Select cables according to local cable specifications (Yellow-green wires are only used for grounding).

5.1 Connecting PGND Cables

Connect the SUN2000 to a ground bar using a PGND cable for grounding purposes.

Prerequisites

A PGND cable should be available. The PGND cable is recommended to be an outdoor copper-core cable with a cross-sectional area of 6 mm² or 10 AWG.
Good grounding for the SUN2000 helps resist the impact of surge voltage and improve EMI performance. Connect the PGND cable before connecting the AC power cables, DC power cables, and communications cables.

It is recommended that the ground cable be connected to a nearby ground position. For a system with multiple inverters connected in parallel, connect the ground points of all inverters to ensure equipotential connections.

**NOTE**

If the installation location is near the ground, connect the PGND cable to the ground before installing the SUN2000.

A ground terminal has five parts, as shown in Figure 5-1.

**Figure 5-1** Ground terminal composition

1. M6 welded stud
2. OT terminal
3. Flat washer
4. Spring washer
5. Nut

**Procedure**

**Step 1** Remove an appropriate length of the insulation layer from the PGND cable using a wire stripper, as shown in Figure 5-2.

**Figure 5-2** Stripped length

Note: L2 is 2 mm to 3 mm longer than L1.

**Step 2** Insert the exposed core wires into the conductor crimp area of the OT terminal and crimp them using a crimping tool, as shown in Figure 5-3.

Recommended OT terminal: OT-6 mm² or 10 AWG-M6.
Figure 5-3 Position of the crimp area

![Diagram showing crimp area with L3 < 2 mm and L4 < 1.5 mm]

Note 1: L3 is the distance between the cable insulation layer and the conductor crimp area of the OT terminal. L4 is the length of the cable conductors protruding out of the crimp area.

Note 2: The crimping must result in full containment of the cable conductors and complete contact between the cable conductors and the terminal.

Step 3 Install the crimped OT terminal, a flat washer, and a spring washer on the M6 welded stud in sequence, and tighten the nut to a torque of 5 N·m using a socket wrench, as shown in Figure 5-4.

Figure 5-4 Connecting the PGND cable to the SUN2000

![Diagram showing PGND cable connection to SUN2000]

NOTE
To prevent corrosion, apply silica gel to the ground terminal after connecting the PGND cable.

---End

Follow-up Procedure

To disconnect the PGND cable, remove the nut from the M6 welded stud using an adjustable wrench, and then remove the spring washer, flat washer, and crimped OT terminal.
5.2 Connecting AC Output Power Cables

Connect the SUN2000 to the AC power distribution frame (PDF) or power grid using AC output power cables. Ensure that the cable connections meet the requirements of the local power grid operator.

Prerequisites

A three-phase AC switch needs to be configured outside the AC side of the SUN2000. To ensure that the SUN2000 can safely disconnect from the power grid under abnormal conditions, select an appropriate overcurrent protection device according to local power distribution regulations.

---

**WARNING**

- Do not install a single circuit breaker for several SUN2000s.
- Do not connect loads between the SUN2000 and circuit breaker.

---

Context

Flexible cables are recommended for ease of installation. The outer diameter of the cable conductor should be less than or equal to 4.2 mm. Table 5-1 lists the specifications.

---

**NOTE**

If the PID module is used in a PV array containing the SUN2000, verify that the working voltage of AC cables to the ground is no less than 600 V AC, and that the voltage between AC cables is no less than 1000 V AC.
### Table 5-1 Recommended AC output power cable specifications

<table>
<thead>
<tr>
<th>Inverter Model</th>
<th>Cable Type</th>
<th>Cross-sectional Area (mm²)</th>
<th>Cable Outer Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Range</td>
<td>Recommended Value</td>
</tr>
<tr>
<td>SUN2000-8KTL</td>
<td>• 4-core outdoor cable (3+N)</td>
<td>4-10 (or 12 AWG-8 AWG)</td>
<td>4 (or 12 AWG)</td>
</tr>
<tr>
<td></td>
<td>• 5-core outdoor cable (3+N+PE)</td>
<td>6-10 (or 10 AWG-8 AWG)</td>
<td>6 (or 10 AWG)</td>
</tr>
<tr>
<td>SUN2000-10KTL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUN2000-12KTL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUN2000-15KTL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUN2000-17KTL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUN2000-20KTL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUN2000-23KTL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUN2000-28KTL</td>
<td>• 3-core outdoor cable</td>
<td>3-core outdoor cable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 4-core outdoor cable (3+PE)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**
- For a cable with an outer diameter of 11 mm to 13 mm, add cable clamps.
- For a cable with an outer diameter of 16 mm to 20 mm, strip a seal ring from inside the cable gland.
- For an armored cable with an outer diameter exceeding 20 mm, strip the jacket and armored layer and waterproof and ultraviolet-proof the cable.

---

**NOTICE**
- If the PGND cable has already been installed according to 5.1 Connecting PGND Cables, there is no need to connect the PE wire of the AC output power cable.
- If a cable with a cross-sectional area of 4 mm² to 10 mm² is used, crimp a tubular cord end terminal at the cable end before installing the cable.

An AC output connector has three parts: coupler, adapter, and cable gland, as shown in Figure 5.5.
Figure 5-5 AC output connector

(1) Coupler (2) Adapter (3) Cable gland

Procedure

**Step 1** Remove the cable gland and adapter from the AC output connector.

**Step 2** Remove an appropriate length of the jacket and insulation layer of the core wires from the AC output cable using a wire stripper, as shown in Figure 5-6.

---

⚠️ NOTICE

The core wires (L1, L2, L3, and N) of the AC power cable must be correctly identified to prevent incorrect cable connections which can cause device damage or startup failure. (No neutral cable connections are involved for the SUN2000-28KTL.)

1. Strip the jacket of the AC output cable by 55 mm.
2. Strip the insulation layer of each core wire by 12 mm.

Figure 5-6 Stripped length

---

⚠️ NOTE

The preceding figure shows the stripped length only for all SUN2000 models except the SUN2000-28KTL. For the SUN2000-28KTL, align the neutral cable with the protective jacket and cut off the neutral cable.
CAUTION
When cutting off the cable, take protective measures to prevent personal injury.

Step 3  Insert the core wires (L1, L2, L3, and N) of the AC output cable into the cable gland and the adapter, as shown in Figure 5-8.

NOTE
If the outer diameter of the cable is greater than 16 mm, remove a seal ring from the interior of the cable gland (as shown in Figure 5-7) before inserting the power cable into the cable gland and the adapter.

Figure 5-7 Stripping a seal ring

Figure 5-8 Installing a cable gland and adapter

Step 4  Loosen the screws of the coupler holes using a torque screwdriver. Insert the core wires into the corresponding holes as shown in Figure 5-9. Tighten the screws to a torque of 0.7 N·m, as shown in Figure 5-10.
Figure 5-9 Coupler

- Connect L1 to hole number 1.
- Connect L2 to hole number 2.
- Connect L3 to hole number 3.
- Connect N to hole number 4.

For the SUN2000-28KTL, do not connect the neutral wire to hole number 4.

Figure 5-10 Connecting an AC output cable to the coupler

Step 5  Check that all core wires are properly connected, as shown in Figure 5-11.
Step 6  Secure the adapter to the coupler, as shown in Figure 5-12.
Tighten the adapter to a torque of 1-2 N·m.

Step 7  Secure the cable gland to the adapter, as shown in Figure 5-13.
Tighten the cable gland to a torque of 5 N·m using a tool.

Step 8  Connect the AC output connector to the bayonet coupling of the AC output wiring terminal on
the SUN2000 and rotate it clockwise until a "click" sound is heard, as shown in Figure 5-14.
Because there is insufficient space on the right of the AC terminal, tighten the terminal with
the left hand.
**Figure 5-14** Connecting an AC output connector

The AC output connector is securely connected to the AC output wiring terminal after the bayonet coupling snaps into place.

---

**NOTE**

Reserve a margin of more than 0.5 meter for the cable at the AC output power cable connector to reduce the cable terminal disconnection due to external force.

---End

### Follow-up Procedure

To remove the AC output connector from the SUN2000, press down the locking plate on the AC output wiring terminal using a flat-head screwdriver as shown in Figure 5-15. Rotate the AC output connector counterclockwise.

---

**WARNING**

Before removing the AC output connector, switch off the circuit breaker between the SUN2000 and the power grid.
5.3 Connecting DC Input Power Cables

Connect the SUN2000 to PV strings using DC input power cables.

Prerequisites

---

**DANGER**
- PV modules generate electric energy when exposed to sunlight and can create an electrical shock hazard. Therefore, when connecting DC input power cables, shield the PV modules with opaque cloth.
- Before connecting DC input cables, ensure that the voltage on the DC side is under the safety limit (60 V DC) and that the DC SWITCH on the SUN2000 is OFF. Otherwise, high voltage may result in fatal injury.

---

**WARNING**

Ensure that the following requirements are met to prevent fire accidents:
- PV modules connected in series in each PV string must be of the same specifications.
- The maximum open-circuit voltage of each PV string must be always lower than or equal to 1000 V DC.
- The maximum short-circuit current of each PV string must be always lower than or equal to 23 A.
- The positive and negative terminals of PV modules must be connected to the positive and negative DC input terminals of the SUN2000 respectively.

**NOTICE**

- If the SUN2000 is directly connected to the power grid and no three-phase four-wire isolation transformer is connected to the output side, ensure that the PV strings are not grounded.
- If the DC voltage is a stable non-zero value between the positive terminal of a PV string and the ground, the PV string has an insulation fault. Rectify the fault before connecting cables.
- During PV string and SUN2000 installation, the positive or negative terminals of PV strings may be grounded if power cables are not properly installed or routed. In this case, an AC or DC short circuit may occur and damage the SUN2000.
- If the PV strings need to be grounded, install a three-phase four-wire isolation transformer on the output side and set the parameter of **Isolation** to **Input Grounded, With TF** by following the instructions in 7.2.11 Setting Isolation Parameters. If no isolation transformer is connected, the SUN2000 will not operate properly.

**Context**

**Figure 5-16** shows the MPPT distribution of the SUN2000.

**Figure 5-16 MPPT distribution**

- The SUN2000-8KTL to SUN2000-12KTL provide two MPPT routes to track the maximum power point for PV strings. Therefore, two to four DC inputs should be evenly distributed on two terminal groups.
- The SUN2000-15KTL to SUN2000-28KTL provide three MPPT routes to track the maximum power point for PV strings. Therefore, two to six DC inputs should be evenly distributed on three terminal groups.
Table 5-2 describes the recommended DC input cable specifications.

<table>
<thead>
<tr>
<th>Cable Type</th>
<th>Cross-sectional Area (mm²)</th>
<th>Cable Outer Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Range</td>
<td>Recommended Value</td>
</tr>
<tr>
<td>Common PV cable</td>
<td>4-6</td>
<td>4</td>
</tr>
</tbody>
</table>

### NOTICE

Highly rigid cables, such as armored cables, are not recommended because bending may cause poor contact.

The positive and negative DC input connectors are used, as shown in Figure 5-17 and Figure 5-18.

**Figure 5-17** Positive connector composition

![Figure 5-17](image1)

- (1) Insulation housing
- (2) Locking nut

**Figure 5-18** Negative connector composition

![Figure 5-18](image2)

- (1) Insulation housing
- (2) Locking nut
NOTICE

Positive and negative metal terminals are packed with positive and negative connectors respectively. After unpacking, keep the positive and negative ones separate to avoid confusion.

Procedure

**Step 1** Unscrew the locking nuts from the positive and negative connectors.

**Step 2** Remove an appropriate length of the insulation layer from the positive and negative power cables using a wire stripper, as shown in Figure 5-19.

**Figure 5-19** Stripped length

![Image of stripped length](image)

(1) Positive power cable  (2) Negative power cable

**Step 3** Insert the exposed area of the positive and negative power cables into the metal terminals of the positive and negative connectors respectively and crimp them using a crimping tool, as shown in Figure 5-20. Ensure that the cables are crimped tightly such that they cannot be pulled out by a force less than 400 N.
Step 4 Insert the crimped positive and negative power cables into the corresponding insulation housings until they snap into place, as shown in Figure 5-21.

Figure 5-21 Engaging metal terminals

---

⚠️ **NOTICE**

After inserting the crimped areas of the positive and negative power cables into the corresponding insulation housings, ensure that the cables are in position by checking for resistance when a slight pull is applied.

---

Step 5 Reinstall cable glands on positive and negative connectors and rotate them against the insulation covers.

It is recommended that you secure the nut by using removal wrenches, as shown in Figure 5-22.
Step 6   Take off the blue dustproof plugs from the bottom of the DC input connectors.

Step 7   Insert the positive and negative connectors into the corresponding DC input terminals of the SUN2000 until a "click" sound is heard, as shown in Figure 5-23.
### 5.4 Connecting Communications Cables

This section describes the functions of USB and RS485 ports and the method of connecting RS485 communications cables.

#### 5.4.1 Communications Ports

This section describes the functions of the USB and RS485 ports.

**Overview**

The SUN2000 provides three communications ports: USB port, RS485 IN port, and RS485 OUT port, which are on the left, upper right, and lower right respectively. For details, see **Bottom View** in 2.2 Appearance.
USB Port

- The SUN2000 communicates with a USB flash drive through the USB port to upgrade firmware, download and load configurations, and download data.
- The SUN2000 can communicate with the SUN2000 app over a Bluetooth module or USB data cable connected to the USB port, so that you can view the operating information and set parameters over the app.

NOTE
- The SUN2000 app (Android) can communicate with the SUN2000 over a Bluetooth module or USB data cable, whereas the SUN2000 app (iOS) supports the communication with the SUN2000 only over a Bluetooth module. For details about version mappings and the operations on the SUN2000 app, see the SUN2000 APP User Manual.
- Use the USB port only during maintenance (such as power-on setting, upgrade, and data export). Ensure that the USB cover is tightened when the USB port is not in use.

RS485 Ports

The SUN2000 sends alarm information, operating status, and data such as energy yield to a PC that runs network management software such as the NetEco or a local data collection and display device such as the SmartLogger through an RS485 port.

RS485 communication is implemented by connecting the SUN2000 according to the following guidelines:

- If only one SUN2000 is used, connect a communications cable with waterproof RJ45 connectors to either of the two RS485 ports and block the other one with a waterproof cover.
- If multiple SUN2000s are used, connect all SUN2000s in daisy chain mode over the RS485 communications cable.
- Connect the SUN2000 to the SmartLogger to implement data collection and monitoring, or connect it to the PC over the SmartLogger to implement communication.

Figure 5-25 shows how one SUN2000 connects to the SmartLogger and the PC. Figure 5-26 shows how multiple SUN2000s connect to the SmartLogger and the PC.
Figure 5-26 Communication mode for multiple SUN2000s

- For the SUN2000 on the end of the chain, on the Comm. Param. screen of the LCD, set Match Resistance to Connect (Disconnect by default) to enable the build-out resistor (see 7.2.8 Setting Communications Parameters for details).
- Match Resistance can also be set using the SUN2000 APP. For details, see the SUN2000 APP User Manual. If the SUN2000 APP needs to be used for setting, ensure that the SUN2000 firmware version is V100R001C81SPC101 or later.
- The communications cable should be shorter than 1000 m.
- If multiple SUN2000s need to communicate with one another and are connected to a PC over the SmartLogger, a maximum of three daisy chains can be configured to support up to 80 devices. It is recommended that the number of devices on each daisy chain be less than 30.

5.4.2 Connecting RS485 Communications Cables

Connect the SUN2000 to communications equipment (such as the data collector and PC) using RS485 communications cables.

Context

A 24 AWG outdoor shielded network cable with the following specifications is recommended for use as an RS485 communications cable:

- With an internal resistance less than or equal to 1.5 ohms/10 m
- With an outer diameter of 4.5-7.5 mm (8 core wires, each with a diameter of 1.00-1.07 mm)

A waterproof RJ45 connector has five parts: shielded plug, plastic housing, coupling nut, seal ring, and sealing nut. See Figure 5-27.
Figure 5-27 Waterproof RJ45 connector composition

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

(1) Shielded plug  (2) Plastic housing  (3) Coupling nut
(4) Seal ring  (5) Sealing nut

**NOTICE**
When routing communications cables, ensure that they are separated from power cables and away from interference sources to prevent communication interruptions.

**Procedure**

**Step 1** Remove an appropriate length of the insulation layer from the shielded network cable using a wire stripper.

**Step 2** Insert the shielded network cable through the sealing nut, seal ring, coupling nut, and plastic housing.

**Step 3** Line up the exposed wires of the network cable in sequence and connect them to the corresponding pins on the plug, as shown in Figure 5-29.
Figure 5-28 Connection sequence

Figure 5-28 shows the connector side that does not have a clip. Table 5-3 lists the mapping between the pins and wires.

Table 5-3 Mapping between pins and wires

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Color</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>White-orange</td>
<td>RS485A, RS485 differential signal +</td>
</tr>
<tr>
<td>2</td>
<td>Orange</td>
<td>RS485B, RS485 differential signal -</td>
</tr>
<tr>
<td>3</td>
<td>White-green</td>
<td>PGND</td>
</tr>
<tr>
<td>4</td>
<td>Blue</td>
<td>RS485A, RS485 differential signal +</td>
</tr>
<tr>
<td>5</td>
<td>White-blue</td>
<td>RS485B, RS485 differential signal -</td>
</tr>
<tr>
<td>6</td>
<td>Green</td>
<td>PGND</td>
</tr>
<tr>
<td>7</td>
<td>White-brown</td>
<td>PGND</td>
</tr>
<tr>
<td>8</td>
<td>Brown</td>
<td>PGND</td>
</tr>
</tbody>
</table>
Step 4  Crimp the plug using a crimping tool.

Step 5  Secure the plastic housing to the plug, as shown in Figure 5-30.

Step 6  Insert the seal ring into the plastic housing and secure the coupling nut to the plastic housing, as shown in Figure 5-31.

Step 7  Secure the sealing nut to the plastic housing, as shown in Figure 5-32.

Step 8  Insert the plug into the RS485 port on the SUN2000, and tighten the coupling nut.

---End
Follow-up Procedure

To remove the waterproof RJ45 connector from the SUN2000, remove the coupling nut, press the clip on the RJ45 connector, and pull out the RJ45 connector.
This chapter describes the SUN2000 power-on and initialization process.

### 6.1 Checking Before Power-On

To ensure normal SUN2000 operation, check the SUN2000 before powering it on.

Before powering on the SUN2000, check that:

1. The SUN2000 is installed correctly and securely.
2. The PGND cable is securely connected.
3. All AC output power cables are securely connected.
4. All DC input power cables are securely connected.
5. Idle DC input terminals are protected with sealing caps.
6. Idle USB and RS485 ports are blocked with waterproof plugs.

### 6.2 Powering On the SUN2000

Power on the SUN2000 after electrical connections are completed.

**Procedure**

- **Step 1** Switch on the AC circuit breaker between the SUN2000 and the power grid.

---

⚠ **NOTICE**

If **Step 2** is performed before **Step 1**, the SUN2000 reports a fault about abnormal shutdown on the LCD. Start the SUN2000 only after the fault is automatically rectified. This takes a default clearance time of 1 minute. The clearance time can be modified using LCD or the network management software running on a PC connected to the SUN2000.

---

⚠ **NOTE**

The monitoring panel is activated only after power is supplied to the DC or AC side.
Step 2 Set the DC SWITCH at the bottom of the SUN2000 to ON.

Step 3 (Optional) Measure the temperatures at the joints between the DC terminals and the connectors using a point thermometer.

---End

6.3 Setting Initialization Parameters

When starting the SUN2000 for the first time, set initialization parameters such as the system language, system time, and power grid code on the monitoring panel.

Context

If the SUN2000 is started for the first time, follow the instructions to set the initialization parameters. If the SUN2000 is not started for the first time, the startup detection screen is displayed.

---

!!! NOTICE

Before setting initialization parameters, ensure that the power-on operation in 6.2 Powering On the SUN2000 has been completed.

Procedure

- The following table lists the procedure for setting initialization parameters. The parameter values in the figures are for reference only.

<table>
<thead>
<tr>
<th>LCD Screen</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="HUAWEI SUN2000 System Starting" /></td>
<td>1. Start with the initialization screen displayed while the system is loading. The default system language is <strong>English</strong>.</td>
</tr>
<tr>
<td><img src="image" alt="HUAWEI Start initialization setting, ESC:Cancel, J:Confirm" /></td>
<td>2. Press <strong>J</strong> to enter the <strong>Wizard</strong> screen. To return to the default screen, press <strong>ESC</strong>. To reset initialization parameters, choose <strong>Settings &gt; Wizard</strong> as <strong>Advanced User</strong>.</td>
</tr>
</tbody>
</table>
### LCD Screen

<table>
<thead>
<tr>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Select a display language and press &lt;kbd&gt;▼&lt;/kbd&gt;.&lt;br&gt;The screens will be displayed in the selected language.</td>
</tr>
</tbody>
</table>

#### Initialization->Wizard

**Language**
- English
- 中文
- Deutsch
- Italiano
- Français
- Polski

#### Initialization->Wizard

**Date & Time**
- **Date:** 2013-06-17
- **Time:** 09:42:17

#### Wizard->Grid Code

**Grid Code**
- VDE-AR-N-4105
- NB/T 32004
- UTE C 15-712-1 (A)
- UTE C 15-712-1 (B)
- UTE C 15-712-1 (C)
- VDE 0126-1-1-BU

#### Initialization->Wizard

**Finished**
- Language: English
- Time: 2013-06-17 00:38:06
- Grid Code: VDE-AR-N4105

---

### Procedure

4. Set the date and time and press <kbd>▼</kbd>.
- To select a parameter, press <kbd>▲</kbd>. To set the parameter value, press <kbd>▲</kbd> or <kbd▼</kbd>.
- The date format is `YYYY-MM-DD`. `YYYY`, `MM`, and `DD` stand for year, month, and day respectively. The time format is `hh-mm-ss`. `hh`, `mm`, and `ss` stand for hour, minute, and second respectively.

5. Set the power grid code and press <kbd>▼</kbd>.<br>To select a power grid code, click <kbd>▲</kbd> or <kbd▼</kbd>.

**NOTICE**
Incorrectly setting Grid Code will cause a SUN2000 startup failure.

**NOTE**
- For details about power grid codes, see B Power Grid Codes. Select an appropriate power grid code based on the requirements of the country or region.
- When the sunlight is insufficient, the grid code cannot be successfully set. Wait until the sunlight becomes sufficient, log in to the system as Advanced User, and choose Settings > Wizard to set the grid code.
- The SUN2000-28KTL applies only to the medium-voltage grid connection scenarios, and supports only the Chinese, German, and customized medium-voltage grid codes.


---

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NOTICE

After the initialization parameters are set for multiple SUN2000s in the same network, set the address and baud rate for each SUN2000 based on the following rules:

- Every SUN2000 in the same daisy chain must have a unique address. If communication with the SmartLogger is required, every SUN2000 in the daisy chain must have a unique address within the address scope configured for the SmartLogger.

- All SUN2000s in the same daisy chain must have the same baud rate. If communication with the SmartLogger is required, all SUN2000s in the daisy chain must have the same baud rate configured for the SmartLogger.

---End
7 Man-Machine Interaction

Context

Users can interact with the SUN2000 using the LCD or SUN2000 APP. This topic uses operations on the LCD as an example. For details about operations on the SUN2000 APP, see the SUN2000 APP User Manual.

7.1 Monitoring Menu Hierarchy

This section describes the hierarchy of the monitoring menus on the LCD, which facilitates monitoring of the SUN2000.

Figure 7-1 shows the hierarchy of the Main Menu.
The parameters vary with user types. The three types of user are **Common User**, **Advanced User**, and **Special User**. Figure 7-2 and Figure 7-3 show the hierarchies under the **Settings** and **Maintenance** menus.

---

**NOTICE**

The initial password for **Common User**, **Advanced User**, and **Special User** is **000001**. Use the initial password to log in to the SUN2000 for the first time and change the password immediately (see **7.2.7 Changing a User Password**) to ensure account safety.
Figure 7-2 Hierarchy of the Settings menu
Figure 7-3 Hierarchy of the Maintenance menu

Due to permission restrictions, the submenus under Maintenance will not appear when a user logs in as a Common User.

### 7.2 Monitoring Operations

This section describes how to perform monitoring operations, such as viewing system operating information and setting user parameters, on the monitoring panel.

#### 7.2.1 Viewing System Operating Information

The SUN2000 operating information can be viewed on the monitoring panel. The operating information includes the daily, monthly, yearly, historical, and total energy yields, insulation resistance, input data, output data, and internal temperature.

**Procedure**

- The following table lists the procedure for viewing system operating information. The parameter values in the figures are for reference only.
### LCD

<table>
<thead>
<tr>
<th>Time</th>
<th>Power</th>
<th>Output/Feed Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>521W</td>
<td>3390W / 3390W</td>
</tr>
<tr>
<td>8:10</td>
<td>521W</td>
<td>3390W / 3390W</td>
</tr>
<tr>
<td>8:20</td>
<td>521W</td>
<td>3390W / 3390W</td>
</tr>
<tr>
<td>8:30</td>
<td>521W</td>
<td>3390W / 3390W</td>
</tr>
</tbody>
</table>

### Procedure

1. On the default screen, press down to enter the main menu.

2. Choose → and press ↓.

3. Select an operating parameter by pressing ▼ and press ↓.
### LCD

#### Procedure

4. View the daily energy yield.

a. On the **E-Day** screen, view the total energy yield and hourly energy yield for the current day. The displayed information includes the daily energy yield histogram, date, total energy yield of the current day, CO₂ emission reduction, and revenue from the energy yield.

**NOTE**

In the daily energy yield histogram, the time is represented by the horizontal axis in one-hour intervals. The energy yield is represented by the vertical axis. Each bar represents the total energy yield for that hour.

**NOTICE**

To view the energy yield in the past 30 days (including the current day), press ▲ or ▼. To view the hourly energy yield on a specific day, press ↓.

b. Press ↓ to view the energy yield for a specific hour on the current day. To switch between hours, press ▲ or ▼.

**NOTE**

The selected block is displayed in white.

5. View the monthly energy yield.

a. On the **E-Month** screen, view the total energy yield and daily energy yield in the current month. The displayed information includes the monthly energy yield histogram, date, total energy yield of the current month, CO₂ emission reduction, and revenue from the energy yield.

**NOTE**

In the monthly energy yield histogram, the month is represented by the horizontal axis in one-day intervals. The energy yield is represented by the vertical axis. Each bar represents the total energy yield for that day.

**NOTICE**

To view the energy yield in the past 12 months (including the current month), press ▲ or ▼. To view the daily energy yield in a specific month, press ↓.

b. Press ↓ to view the energy yield on a specific day of the current month. To switch between days, press ▲ or ▼.

**NOTE**

The selected block is displayed in white.
6. View the yearly energy yield.

   a. On the E-Year screen, view the total energy yield and monthly energy yield in the current year. The displayed information includes the yearly energy yield histogram, date, total energy yield of the current year, CO\textsubscript{2} emission reduction, and revenue from the energy yield.

   **NOTE**
   In the yearly energy yield histogram, the year is represented by the horizontal axis in one-month intervals. The energy yield is represented by the vertical axis. Each bar represents the total energy yield for that month.

   **NOTICE**
   To view the energy yield in the past 25 years (including the current year), press \( \uparrow \) or \( \downarrow \). To view the monthly energy yield in a specific year, press \( \downarrow \).

   b. Press \( \downarrow \) to view the energy yield in a specific month of the current year. To switch between months, press \( \uparrow \) or \( \downarrow \).

   **NOTE**
   The selected block is displayed in white.

7. On the E-History screen, view the historical energy yield. The LCD displays the yearly energy yield histogram, time periods, total energy yield of the selected year, CO\textsubscript{2} emission reduction, and revenue from the energy yield. Data of the past 25 years (current year included) are available.

   **NOTE**
   In the yearly energy yield histogram, the year is represented on the horizontal axis. The energy yield is represented by the vertical axis. Each bar represents the total energy yield for that year.

   Press \( \downarrow \), then press \( \uparrow \) or \( \downarrow \) to view the energy yield of the selected year.
### LCD

**Running→E-Total**
- E-Total: 2993.36 kWh
- CO₂ Reduction: 2984.38 kg
- Gain: 751.3334 ¥

### Procedure

8. On the **E-Total** screen, view the total energy yield, CO₂ emission reduction, and revenue.

9. On the **Information** screen, view the address, firmware version, and device name.

10. On the **ISO Value** screen, view the daily insulation resistance (ISO value) in the current month.

Press ↓ to view the insulation resistance detected at the last connection to the power grid for each day of the current month.

### Information

- Address: 1
- Version: V100R001C31SPC103
- Name:

### ISO Value

**Running→ISO Value**

- 2013-06
- 2.800Megohm

**ESC ▲ ▼ ↓**

**Running→ISO Value**

- 2013-06-01
- 2.490Megohm

**ESC ▲ ▼**
### LCD

**Running→Input Data**

<table>
<thead>
<tr>
<th>PV1 V/I</th>
<th>PV2 V/I</th>
<th>PV3 V/I</th>
<th>PV4 V/I</th>
<th>PV5 V/I</th>
<th>PV6 V/I</th>
</tr>
</thead>
<tbody>
<tr>
<td>461.9V/1.60A</td>
<td>461.9V/0.63A</td>
<td>186.4V/0.03A</td>
<td>186.3V/0.00A</td>
<td>187.7V/0.05A</td>
<td>187.7V/0.00A</td>
</tr>
</tbody>
</table>

**Procedure**

11. On the **Input Data** screen, view the voltage and current of each PV input.

**Running→Output Data**

<table>
<thead>
<tr>
<th>Ua</th>
<th>Ib</th>
<th>Ic</th>
<th>Active power</th>
</tr>
</thead>
<tbody>
<tr>
<td>230.40V</td>
<td>4.87A</td>
<td>4.88A</td>
<td>3390W</td>
</tr>
</tbody>
</table>

The preceding screen is displayed on all models except the SUN2000-28KTL.

12. On the **Output Data** screen, view the output voltage and current of each phase, active power, output frequency, and output power factor.

**NOTE**

As the SUN2000-28KTL has three-phase, three-wire outputs, the output voltage and current are the line voltage and line current.

**Running→Cabinet Temp.**

| Cabinet Temp. : 26.6degC |

13. On the **Cabinet Temp.** screen, view the internal temperature of the SUN2000.

--- End

### 7.2.2 Viewing Alarm Records

The monitoring panel displays the active and historical alarm records and allows setting of the sort mode of the alarm records.

**Context**

The LCD displays a maximum of 800 latest alarm records.
Procedure

- The following table lists the procedure for viewing active and historical alarms and setting the alarm record sort mode. The parameter values in the figures are for reference only.

<table>
<thead>
<tr>
<th>LCD</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image of LCD showingalarms and menu options]</td>
<td>1. On the default screen, press to enter the main menu.</td>
</tr>
<tr>
<td>2013-06-14 DAILY: 96,522Wh.</td>
<td>2. Choose and press</td>
</tr>
<tr>
<td>16:57:00 TOTAL: 3683,711Wh.</td>
<td></td>
</tr>
<tr>
<td>![Image of alarm menu options]</td>
<td></td>
</tr>
<tr>
<td>![Image of alarm menu options]</td>
<td></td>
</tr>
<tr>
<td>3. Select a menu by pressing and press You can view alarm details, or set the alarm record sort mode.</td>
<td></td>
</tr>
<tr>
<td>- To view active alarms, go to step 4.</td>
<td></td>
</tr>
<tr>
<td>- To view historical alarms, go to step 5.</td>
<td></td>
</tr>
<tr>
<td>- To set the alarm record sort mode, go to step 6.</td>
<td></td>
</tr>
</tbody>
</table>
4. On the **Active Alarm (A/B)** screen, select an alarm record, and press \( \rightarrow \) to view the alarm details.

5. On the **Alarm History (A/B)** screen, select an alarm record, and press \( \rightarrow \) to view the alarm details.
6. On the Sort By screen, select By Generation Time or By Alarm Severity.

--- End

7.2.3 Setting System Time

The date format and date and time can be set on the monitoring panel.

Procedure

- The following table lists the procedure for setting the date format and date and time. The parameter values in the figures are for reference only.

<table>
<thead>
<tr>
<th>LCD Screen</th>
<th>Operation Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="LCD Screen" /></td>
<td>1. On the default screen, press ( \rightarrow ) to enter the main menu.</td>
</tr>
</tbody>
</table>
## LCD Screen Operation Procedure

2. Choose 🌡️ and press ⬅️.

### Settings→The password.

- **User Name:** Advanced User
- **Password:** 000000

### NOTE

- The optional user names are Common User and Advanced User. The initial password for Common User and Advanced User is 000001. If you forgot the password, contact Huawei technical support for a dynamic password that is effective only on the current day. Change the password after login.
- After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the Settings screen and log in again within 30 seconds, no authentication is required.


5. Choose Date Format or Date&Time by pressing ⬇️, and press ⬅️.

---

An Advanced User has logged in to the SUN2000.
6. On the **Date Format** screen, select a date format, and press ![arrow_icon].

7. On the **Date&Time** screen, set the date and time, and press ![arrow_icon].
   - To select a parameter, press ![arrow_icon]. To set the parameter value, press ![arrow_icon] or ![arrow_icon].
   - The date format is **YYYY-MM-DD**. **YYYY**, **MM**, and **DD** stand for year, month, and day respectively. The time format is **hh-mm-ss**. **hh**, **mm**, and **ss** stand for hour, minute, and second respectively.

---

### 7.2.4 Setting the System Language

This topic describes how to set the SUN2000 display language on the monitoring panel.

**Procedure**

- The following table lists the procedure for setting the display language. The parameter values in the figures are for reference only.
1. On the default screen, press to enter the main menu.

2. Choose and press .

3. Enter the correct user name and password by pressing or , and press .

**NOTE**
- The optional user names are Common User and Advanced User. The initial password for Common User and Advanced User is 000001. If you forgot the password, contact Huawei technical support for a dynamic password that is effective only on the current day. Change the password after login.
- After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the Settings screen and log in again within 30 seconds, no authentication is required.


An Advanced User has logged in to the SUN2000.
5. Choose Language by pressing ▼ and press ↓.

6. On the Language screen, select a display language, and press ↓.

The screens will be displayed in the selected language.

7.2.5 Setting the Contrast

Procedure

- The following table lists the procedure for setting the contrast. The parameter values in the figures are for reference only.

1. On the default screen, press ↓ to enter the main menu.

---End
### LCD Screen

<table>
<thead>
<tr>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Choose 🔄 and press ↓.</td>
</tr>
</tbody>
</table>

### Procedure

1. Choose Settings and press ↓.

2. Enter the correct user name and password by pressing ↑ or ↓, and press ↓.

   **NOTE**
   - The optional user names are *Common User* and *Advanced User*. The initial password for *Common User* and *Advanced User* is 000001. If you forgot the password, contact Huawei technical support for a dynamic password that is effective only on the current day. Change the password after login.
   - After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the Settings screen and log in again within 30 seconds, no authentication is required.

3. After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the Settings screen and log in again within 30 seconds, no authentication is required.


5. Choose Contrast by pressing ↓, and press ↓.
6. On the **Contrast** screen, press ▲ and ◄ to set the contrast.

---

### 7.2.6 Setting the Currency and Currency Factor

The currency and the revenue per kilowatt hour can be set on the monitoring panel, which allows the calculation of revenue from the energy yield.

#### Procedure

- The following table lists the procedure for setting the currency and currency factor. The parameter values in the figures are for reference only.

<table>
<thead>
<tr>
<th>LCD Screen</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="LCD Screen" /></td>
<td>1. On the default screen, press ◄ to enter the main menu.</td>
</tr>
<tr>
<td><img src="image" alt="LCD Screen" /></td>
<td>2. Choose ☀ and press ◄.</td>
</tr>
</tbody>
</table>
3. Enter the correct user name and password by pressing ▲ or ▼, and press ◄.

**NOTE**
- The optional user names are **Common User** and **Advanced User**. The initial password for **Common User** and **Advanced User** is **000001**. If you forgot the password, contact Huawei technical support for a dynamic password that is effective only on the current day. Change the password after login.
- After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the **Settings** screen and log in again within 30 seconds, no authentication is required.

An **Advanced User** has logged in to the SUN2000.


5. Set the currency.
   a. Select **Currency** by pressing ▼, and press ◄.
   b. Select a currency and press ◄.
6. Set the currency factor.

**NOTE**
The currency factor is the local price of electricity.

a. Select **Currency Factor** by pressing ▼, and press ◄.

b. Set the currency factor by pressing ▲ or ◄, and press ◄.

---

### 7.2.7 Changing a User Password

The user password can be changed on the monitoring panel.

**Procedure**

- The following table lists the procedure for setting a new password. The parameter values in the figures are for reference only.

<table>
<thead>
<tr>
<th>LCD Screen</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Settings-&gt;User Param</strong></td>
<td>1. On the default screen, press ◄ to enter the main menu.</td>
</tr>
<tr>
<td>Date Format</td>
<td></td>
</tr>
<tr>
<td>Date&amp;Time</td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td></td>
</tr>
<tr>
<td>Contrast</td>
<td></td>
</tr>
<tr>
<td>Currency</td>
<td></td>
</tr>
<tr>
<td><strong>Currency Factor</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>0 0 0.251</td>
<td></td>
</tr>
</tbody>
</table>

---
2. Choose 🔄 and press ↓.

3. Enter the correct user name and password by pressing ↑ or ↓, and press ↓.

**NOTE**
- The optional user names are Common User, Advanced User, and Special User. The initial password for these accounts is 000001. If you forgot the password, contact Huawei technical support for a dynamic password that is effective only on the current day. Change the password after login.
- After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the Settings screen and log in again within 30 seconds, no authentication is required.


5. Enter the old password and press ↓. Increase or decrease the value by pressing ↑ or ↓. Switch between digits by pressing ↓.
6. Enter a new password and press ↓. Increase or decrease the value by pressing ▲ or ▼. Switch between digits by pressing ↓.

7. Enter the new password again and press ↓.

**NOTE**

Ensure that the re-entered password is the same as the new password. Otherwise, an error message will be displayed.

After the password has been changed, the LCD displays a success message.

### 7.2.8 Setting Communications Parameters

RS485 communications parameters such as the address, protocol, baud rate, and check mode can be set on the monitoring panel.

**Procedure**

- The following table lists the procedure for setting communications parameters. The parameter values in the figures are for reference only.
### LCD Screen

| 16.57KVA | 0 | 4 | 8 | 12 | 16 | 20 | 24 |

*2013-06-14| DAILY: 98.52KWH*  
*16:57:00 | TOTAL: 3065.71KWH*

### Procedure

1. On the default screen, press \( \_ \) to enter the main menu.

2. Choose \( \_ \) and press \( \_ \).

3. Enter the correct user name and password by pressing \( \_ \) or \( \_ \), and press \( \_ \).

**NOTE**
- The optional user name is *Advanced User*. The initial password for *Advanced User* is *000001*. If you forgot the password, contact Huawei technical support for a dynamic password that is effective only on the current day. Change the password after login.
- After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the *Settings* screen and log in again within 30 seconds, no authentication is required.

LCD Screen

<table>
<thead>
<tr>
<th>Setting</th>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Settings→Comm. Param.</td>
<td>RS485</td>
<td></td>
</tr>
</tbody>
</table>

Procedure

5. On the **Comm. Param.** screen, press ↓

   - The optional addresses range from 1 to 247.
   - The optional protocol is **modbus**.
   - The optional baud rates are **4800bps**, **9600bps**, and **19200bps**.
   - The optional parities are **None**, **Even parity**, **Odd parity**.
   - The optional values of match resistance are **Disconnect** and **Connect**.
   - This parameter is set to **Disconnect** by default. If signals are distorted or the communication is of poor quality because of a lengthy communications cable, set the parameter to **Connect**.

---

End

7.2.9 Setting Protection Parameters

SUN2000 protection parameters can be set on the monitoring panel.

**Procedure**

- The following table lists the procedure for setting protection parameters. The parameter values in the figures are for reference only.
**LCD Screen**

1. On the default screen, press \[ \] to enter the main menu.

2. Choose \[ \] and press \[ \].

3. Enter the correct user name and password by pressing \[ \] or \[ \], and press \[ \].

   **NOTE**
   - The optional user names are **Advanced User** and **Special User**. The initial password for **Advanced User** and **Special User** is 000001. If you forgot the password, contact Huawei technical support for a dynamic password that is effective only on the current day. Change the password after login.
   - After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the **Settings** screen and log in again within 30 seconds, no authentication is required.

4. Choose **Protect Param.** and press \[ \].
   - If you have logged in to the SUN2000 as **Advanced User**, perform step 5.
   - If you have logged in to the SUN2000 as **Special User**, perform step 6.

An **Advanced User** has logged in to the SUN2000.
### Setting Feature Parameters

SUN2000 feature parameters can be set on the monitoring panel.

#### Procedure

- The following table lists the procedure for setting feature parameters. The parameter values in the figures are for reference only.

<table>
<thead>
<tr>
<th>LCD Screen</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>An <strong>Advanced User</strong> has logged in to the SUN2000.</td>
<td><strong>5.</strong> Set <strong>Insulation res. protec.</strong>, <strong>Soft start time</strong> and <strong>On-grid recovery time</strong>, and press ↓. The parameters displayed vary with the setting of <strong>Grid Code</strong>.</td>
</tr>
<tr>
<td><strong>Settings</strong>→<strong>Protect Param.</strong></td>
<td><strong>6.</strong> Select a parameter and press ↓.</td>
</tr>
<tr>
<td><strong>OV Protection</strong></td>
<td></td>
</tr>
<tr>
<td><strong>UV Protection</strong></td>
<td></td>
</tr>
<tr>
<td><strong>OF Protection</strong></td>
<td></td>
</tr>
<tr>
<td><strong>UF Protection</strong></td>
<td></td>
</tr>
<tr>
<td>A <strong>Special User</strong> has logged in to the SUN2000.</td>
<td></td>
</tr>
</tbody>
</table>

---

#### 7.2.10 Setting Feature Parameters

SUN2000 feature parameters can be set on the monitoring panel.

**Procedure**

- The following table lists the procedure for setting feature parameters. The parameter values in the figures are for reference only.

<table>
<thead>
<tr>
<th>LCD Screen</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. On the default screen, press ↓ to enter the main menu.</td>
<td></td>
</tr>
</tbody>
</table>
### LCD Screen

<table>
<thead>
<tr>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Choose 🛠️ and press ⬅️.</td>
</tr>
</tbody>
</table>

#### Settings

- User Name: **Advanced User**
- Password: **000000**

#### Procedure

3. Enter the correct user name and password by pressing ⬆️ or ⬇️, and press ⬅️.

**NOTE**
- The optional user names are **Advanced User** and **Special User**. The initial password for **Advanced User** and **Special User** is **000000**. If you forgot the password, contact Huawei technical support for a dynamic password that is effective only on the current day. Change the password after login.
- After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the **Settings** screen and log in again within 30 seconds, no authentication is required.

#### Procedure

4. Choose **Feature Param.** and press ⬅️.
   - If you have logged in to the SUN2000 as **Advanced User**, perform step 5.
   - If you have logged in to the SUN2000 as **Special User**, perform step 6.

#### Procedure


If **String monitor** is set to **Enable**, the SUN2000 monitors the operating status of all the connected PV strings in real time. A warning is generated as a reminder to rectify an abnormality that has been detected (for example, modules are shielded for a long time or are faulty).
A Special User has logged in to the SUN2000.

--- End

7.2.11 Setting Isolation Parameters

SUN2000 isolation parameters can be set on the monitoring panel.

Context

⚠️ NOTICE
If PV strings are grounded, install a three-phase four-wire isolation transformer and set Isolation to Input Grounded, With TF.

Procedure

- The following table lists the procedure for setting isolation parameters. The parameter values in the figures are for reference only.

<table>
<thead>
<tr>
<th>LCD</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Figure" /></td>
<td>1. On the default screen, press ⬅️ to enter the main menu.</td>
</tr>
</tbody>
</table>
### LCD Settings

- Choose **Settings** and press ↓.

#### Procedure

2. Choose **Settings** and press ↓.

#### Notes

- **User Name**: Advanced User
- **Password**: 000000

#### Settings

- User Name: Advanced User
- Password: 000000

#### Main Menu

- **Isolation**
  - Input Grounded, With TF
  - Input Ungrounded, Without TF
  - Input Ungrounded, With TF

#### End

---

**NOTE**

- The optional user names are Common User and Advanced User. The initial password for Common User and Advanced User is 000001. If you forgot the password, contact Huawei technical support for a dynamic password that is effective only on the current day. Change the password after login.
- After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the Settings screen and log in again within 30 seconds, no authentication is required.
7.2.12 Manually Starting and Shutting down the SUN2000

The SUN2000 can be manually started and shut down on the monitoring panel.

Procedure

- The following table lists the procedure for manually starting and shutting down the SUN2000. The parameter values in the figures are for reference only.

<table>
<thead>
<tr>
<th>LCD Screen</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="LCD Screen Image" /></td>
<td>1. On the default screen, press ( ) to enter the main menu.</td>
</tr>
<tr>
<td><img src="image" alt="Procedure Image" /></td>
<td>2. Choose ( ) and press ( )</td>
</tr>
<tr>
<td><img src="image" alt="Settings Image" /></td>
<td>3. Enter the correct user name and password by pressing ( ) or ( ), and press ( )</td>
</tr>
</tbody>
</table>

**NOTE**

- The optional user names are Common User, Advanced User, and Special User. The initial password for these accounts is 000001. If you forgot the password, contact Huawei technical support for a dynamic password that is effective only on the current day. Change the password after login.
- After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the Settings screen and log in again within 30 seconds, no authentication is required.
An **Advanced User** has logged in to the SUN2000.

### LCD Screen

<table>
<thead>
<tr>
<th>Settings</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wizard</strong></td>
<td>4. Choose <strong>Power-On/Off</strong> and press ↓</td>
</tr>
<tr>
<td><strong>User Param.</strong></td>
<td>- To manually start the SUN2000, go to step 5.</td>
</tr>
<tr>
<td><strong>User Password</strong></td>
<td>- To manually shut down the SUN2000, go to step 6.</td>
</tr>
<tr>
<td><strong>Comm. Param.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Protect Param.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Feature Param.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Power-On/Off</strong></td>
<td></td>
</tr>
</tbody>
</table>

An **Advanced User** has logged in to the SUN2000.

### Procedure

5. Manually start the SUN2000.

   a. Choose **Power-On** and press ↓  
   b. Press ↓ again to confirm the operation.
## 7.2.13 Restoring Factory Settings

Factory settings for the SUN2000 can be restored on the monitoring panel. The operation will restore all configured parameters except the current date and time to their factory settings. The operation will not impact alarm records, system logs, and operating information.

### Context

- Perform this operation with caution because all configured parameters except the current date and time will be restored to their factory settings.
- If PV strings are grounded, install a three-phase four-wire isolation transformer and set **Isolation** to **Input Grounded, With TF**.

### Procedure

- The following table lists the procedure for restoring factory settings. The parameter values in the figures are for reference only.

### Procedure

<table>
<thead>
<tr>
<th>LCD Screen</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Off</td>
<td>b. Press ↓ again to confirm the operation.</td>
</tr>
<tr>
<td>Power-On/Off→Power-Off</td>
<td></td>
</tr>
<tr>
<td>Power off?</td>
<td></td>
</tr>
<tr>
<td>ESC:Cancel</td>
<td>↓:Enter</td>
</tr>
</tbody>
</table>
## LCD

<table>
<thead>
<tr>
<th>Time</th>
<th>Daily kWH</th>
<th>Total kWH</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-06-14</td>
<td>52.1 kWH</td>
<td>3063.71 kWH</td>
</tr>
</tbody>
</table>

### Procedure

1. On the default screen, press \( \text{Setting} \) to enter the main menu.

2. Choose \( \text{Setting} \) and press \( \text{Enter} \).

3. Enter the correct user name and password by pressing \( \text{Up} \) or \( \text{Down} \), and press \( \text{Enter} \).

   **NOTE**
   - The optional user names are **Advanced User** and **Special User**. The initial password for **Advanced User** and **Special User** is **000001**. If you forgot the password, contact Huawei technical support for a dynamic password that is effective only on the current day. Change the password after login.
   - After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the Settings screen and log in again within 30 seconds, no authentication is required.

4. Choose **Restore Defaults** and press \( \text{Enter} \).

An **Advanced User** has logged in to the SUN2000.
5. On the displayed screen, press \[ \]

6. Press \[ \] to complete the settings.

**NOTE**

After factory settings are restored, the display language is English and the **Wizard** screen is displayed.

### 7.2.14 Enabling USB Guide Functions

USB guide functions can be enabled on the monitoring panel. Upgrade firmware, import configurations, export configurations and export data with a USB flash drive when USB guide functions have been enabled.

**Context**

The USB guide functions are described as follows:

- **Firmware upgrade**: Upgrade the SUN2000 software.

  **NOTE**

  Inverters can be upgraded in batches using the SmartLogger or NMS.

- **Configuration importing**: Load an existing configuration file to the SUN2000 and update the configuration parameters in batches (all parameter settings on the LCD).

- **Configuration exporting**: Download the configuration parameters to the local computer as a file.

- **Data exporting**: Download the alarm records, performance data, and logs to the local computer as a file to facilitate analysis.

**Procedure**

- The following table lists the procedure for enabling USB guide functions. The parameter values in the figures are for reference only.
### LCD

![LCD Image]

#### Procedure

1. On the default screen, press 🔄 to enter the main menu.

   **NOTE**
   
   On the default screen, after you insert a USB flash drive and log in to the system, the USB expansion screen is displayed. In this case, perform operations in step 5.

2. Choose 🔨 and press 🔄

3. Enter the correct user name and password by pressing 🔼 or ▼, and press 🔄

   **NOTE**
   
   - The optional user names are **Advanced User** and **Special User**. The initial password for **Advanced User** and **Special User** is **000001**. If you forgot the password, contact Huawei technical support for a dynamic password that is effective only on the current day. Change the password after login.
   
   - After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the **Maintenance** screen and log in again within 30 seconds, no authentication is required.

4. Choose **USB Expansion** and press 🔄

   **NOTE**
   
   If no USB flash drive is detected, the LCD displays a message prompting that a flash drive needs to be inserted.
<table>
<thead>
<tr>
<th>LCD</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| **Maintenance→USB Expansion**<br>**Firmware Upgrade** | 5. Select a menu by pressing ▲ and ▼, and press ↓. The menu that can be selected are Firmware Upgrade, Config Import, Config Export, and Data Export.  
- To upgrade the firmware, perform step 6.  
- To import configurations, perform step 7.  
- To export configurations, perform step 8.  
- To export alarms, performance data, and log data, perform step 9. |
| **Current**: V100R001C00SPC002<br>**Target**: V100R001C00SPC003 | 6. Confirm the target version and press ↓.  
**NOTICE**
- Firmware upgrade is allowed only when the SUN2000 is properly connected to the PV strings (the PV connection indicator is green).  
- Before upgrading the firmware, download the upgrade package from [http://support.huawei.com](http://support.huawei.com), decompress the package, and copy the files to the root directory of the USB flash drive. |
| **Maintenance→USB Expansion**<br>**Config Import** | 7. Press ↓. |
|  | **Maintenance→USB Expansion**<br>**Config Export**<br>100% | 8. After the configurations are successfully exported, press ↓. |

7 Press ↓
### 7.2.15 Cleaning the User Data

This topic describes how to clean the energy yield data and the historical alarms for the SUN2000. The energy yield data includes the daily energy yield (E-Day), monthly energy yield (E-Month), yearly energy yield (E-Year), historical energy yield (E-History), and total energy yield (E-Total).

#### Context

The operation of clearing user data is performed to delete the energy yield data and historical alarms during the commissioning phase. Data cannot be restored after being deleted. Therefore, exercise caution when deciding to perform this operation.

#### Procedure

- The following table lists the procedure for cleaning user data. The parameter values in the figures are for reference only.

<table>
<thead>
<tr>
<th>LCD</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance-&gt;USB Expansion</td>
<td>9. After the data is successfully exported, press ↓</td>
</tr>
<tr>
<td>Data Export</td>
<td></td>
</tr>
<tr>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>↓:Enter</td>
<td></td>
</tr>
</tbody>
</table>

---

#### End

---
<table>
<thead>
<tr>
<th>LCD</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Maintenance Icon]</td>
<td>2. Choose ![User Icon] and press ↓</td>
</tr>
</tbody>
</table>

**Maintenance→The password.**

![User Name and Password]

**User Name:** Advanced User

**Password:** 000000

**NOTE**
- The optional user names are Advanced User and Special User. The initial password for Advanced User and Special User is 000001. If you forgot the password, contact Huawei technical support for a dynamic password that is effective only on the current day. Change the password after login.
- After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the Maintenance screen and log in again within 30 seconds, no authentication is required.

<table>
<thead>
<tr>
<th>Maintenance</th>
<th>Data Clear</th>
</tr>
</thead>
<tbody>
<tr>
<td>![USB Expansion Icon]</td>
<td>![Data Clear Icon]</td>
</tr>
<tr>
<td>![Alarm Reset Icon]</td>
<td>![System Reset Icon]</td>
</tr>
</tbody>
</table>

**Maintenance→Data Clear**

![Clear Historical Data]

**Clear historical data?**

**ESC:** Cancel  ↓: Enter


5. On the displayed screen, press ↓.
7.2.16 Resetting Alarms

You can reset alarms on the LCD.

Context

If you reset alarms on the LCD, all the active and historical alarms for the inverter are deleted and the SmartLogger starts to collect new alarms.

Procedure

- The following table lists the procedure for resetting alarms. The parameter values in the figures are for reference only.

<table>
<thead>
<tr>
<th>LCD</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance-&gt;Data Clear</td>
<td>6. Press ↓ to finish the operation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LCD</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance</td>
<td>1. On the default screen, press ← to enter the main menu.</td>
</tr>
</tbody>
</table>

---End
3. Enter the correct user name and password by pressing ▲ or ▼, and press ↓.

**NOTE**
- The optional user names are Advanced User and Special User. The initial password for Advanced User and Special User is 000001. If you forgot the password, contact Huawei technical support for a dynamic password that is effective only on the current day. Change the password after login.
- After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the Maintenance screen and log in again within 30 seconds, no authentication is required.


5. After alarms are reset, press ↓.

7.2.17 Resetting the System

You can reset the system on the LCD.

**Context**

The inverter automatically shuts down and restarts after a system reset.
Procedure

- The following table lists the procedure for resetting the system. The parameter values in the figures are for reference only.

<table>
<thead>
<tr>
<th>LCD</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Procedure Image]</td>
<td>1. On the default screen, press ![Enter] to enter the main menu.</td>
</tr>
<tr>
<td>![Procedure Image]</td>
<td>2. Choose ![Maintenance] and press ![Enter]</td>
</tr>
<tr>
<td>![Procedure Image]</td>
<td>3. Enter the correct user name and password by pressing ![Up/Down] or ![Left/Right], and press ![Enter]</td>
</tr>
<tr>
<td>![Procedure Image]</td>
<td>4. Choose ![System Reset] and press ![Enter]</td>
</tr>
</tbody>
</table>

**NOTE**
- The optional user names are Advanced User and Special User. The initial password for Advanced User and Special User is 000001. If you forgot the password, contact Huawei technical support for a dynamic password that is effective only on the current day. Change the password after login.
- After the authentication is successful, the system keeps the authentication information for 30 seconds. If you exit from the Maintenance screen and log in again within 30 seconds, no authentication is required.
5. After the system is reset, press ↓.

----End

7.2.18 Viewing the System Version

This topic describes how to view the SUN2000 version on the monitoring panel.

**Procedure**

- The following table lists the procedure for viewing the SUN2000 version information. The parameter values in the figures are for reference only.

<table>
<thead>
<tr>
<th>LCD</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance→System Reset</td>
<td>5. After the system is reset, press ↓.</td>
</tr>
<tr>
<td>Reset system?</td>
<td></td>
</tr>
<tr>
<td>ESC:Cancel ←:Enter</td>
<td></td>
</tr>
</tbody>
</table>

1. On the default screen, press ← to enter the main menu.
2. Choose ?? and press ⌃.  
   The version information includes **Model**, **Version**, and **SN**.

--- End
This chapter describes routine maintenance and troubleshooting practices that ensure optimal performance of the SUN2000.

8.1 Powering Off the SUN2000

Comply with the safety precautions and operation procedures specified in this section when powering off the SUN2000 for maintenance or replacement.

Context

**WARNING**

After the SUN2000 has shut down, residual electricity and heat may still cause electrical shock and body burns. Therefore, only begin servicing the SUN2000 five minutes later after shutting down.

Procedure

- To maintain the SUN2000, perform a to e. To replace the SUN2000, perform a to g.
  - Enter the shutdown command on the LCD.
    - For details, see 7.2.12 Manually Starting and Shutting down the SUN2000.
    - A shutdown command can also be run from the element management system (EMS).
    - For details, see the *NetEco 1000S V100R002C00 User Manual*.
  - Switch off the circuit breaker between the SUN2000 and the power grid.
  - Set the DC SWITCH to OFF.
  - Disconnect the RS485 communications cables.
  - Disconnect the DC input power cables.
    - For details, see **Follow-up Procedure** in 5.3 Connecting DC Input Power Cables.
  - Disconnect the AC output power cables.
    - For details, see **Follow-up Procedure** in 5.2 Connecting AC Output Power Cables.
8.2 Routine Maintenance

To ensure that the SUN2000 can operate properly for a long term, you are advised to perform routine maintenance on it as described in this chapter.

---

**CAUTION**

- Before cleaning the system, and maintaining the cable connections and grounding reliability, power off the system (see 8.1 Powering Off the SUN2000) and ensure that the DC SWITCH on the inverter is OFF.
- Before wiping the heat sink clean, switch off the circuit breaker between the SUN2000 and the power grid, set the DC SWITCH to OFF, and wait at least 5 minutes after the SUN2000 is powered off.

---

Table 8-1 Maintenance list

<table>
<thead>
<tr>
<th>Check Item</th>
<th>Check Method</th>
<th>Maintenance Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>System cleaning</td>
<td>Check periodically that the heat sinks are free from obstacles or dust.</td>
<td>Semiannually to annually.</td>
</tr>
<tr>
<td>System running status</td>
<td>• Check that the SUN2000 is not damaged or deformed.</td>
<td>Semiannually.</td>
</tr>
<tr>
<td></td>
<td>• Check for normal sound emitted during operation of the SUN2000.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Check that all SUN2000 parameter settings are correctly set during operation.</td>
<td></td>
</tr>
<tr>
<td>Electrical Connections</td>
<td>• Check that cables are securely connected.</td>
<td>Half a year after the initial commissioning, and semiannually to annually afterwards.</td>
</tr>
<tr>
<td></td>
<td>• Check that cables are intact and the parts in contact with a metallic surface are not scratched.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Check that the idle RS485 and USB ports are covered by waterproof caps.</td>
<td></td>
</tr>
<tr>
<td>Grounding reliability</td>
<td>Check that PGND cables are securely connected.</td>
<td>Half a year after the initial commissioning, and semiannually to annually afterwards.</td>
</tr>
</tbody>
</table>
8.3 Troubleshooting

This section describes troubleshooting measures for common fault alarms in the SUN2000.

Alarms range in severity according to the following definitions:

- **Major**: The fault causes the SUN2000 to enter the shutdown mode and stop feeding electricity to the power grid.
- **Minor**: Some components are faulty but the SUN2000 can still feed electricity to the power grid.
- **Warning**: The SUN2000 output power decreases due to external factors.

Table 8-2 lists the measures taken to rectify common fault alarms in the SUN2000.

<table>
<thead>
<tr>
<th>Alarm ID</th>
<th>Name</th>
<th>Severity</th>
<th>Causes</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>103</td>
<td>DC Over Voltage</td>
<td>Major</td>
<td>Too many PV modules connected in series lead to excessively high PV string output voltage, making the PV string open-circuit voltage greater than the maximum operating voltage of the SUN2000.</td>
<td>Check whether too many PV modules are connected in series, making the PV string open-circuit voltage greater than the maximum operating voltage of the SUN2000. If so, reduce the number of PV modules connected in series until the PV string output voltage drops to the specified range for the SUN2000. After the adjustment, the SUN2000 will work properly.</td>
</tr>
</tbody>
</table>
| 106 to 111 | String 1-6 Abnormal | Warning  | - PV strings have been shielded for a long time.  
- PV strings have deteriorated. | a. Check whether the output current of a PV string is obviously less than the output current of other PV strings.  
b. If so, check whether the PV string is shielded.  
c. If the PV string is clean of contaminants and not shielded, check whether the PV modules are faulty. |
| 120 to 125 | String 1-6 Reverse   | Warning  | The cables between PV strings were connected in reverse during SUN2000 installation. | Check whether the cables between PV strings are correctly connected. If they are connected in reverse, reconnect the cables. |
## Alarm ID: 200 - DC Bus Voltage Fault

<table>
<thead>
<tr>
<th>Alarm ID</th>
<th>Name</th>
<th>Severity</th>
<th>Causes</th>
<th>Measures</th>
</tr>
</thead>
</table>
| 200      | DC Bus Voltage Fault | Major    | Abnormal external conditions have triggered DC circuit protection inside the SUN2000. The possible causes are as follows: | a. The SUN2000 monitors its external working conditions in real time and automatically reverts to normal operating status after the fault is rectified.  

- Reason ID = 3  
The SUN2000 input is suddenly disconnected, or the shielded PV strings result in a sharp change in output power.  

- Reason ID = 9 or 11  
The input energy of the SUN2000 cannot be vented quickly due to the sharp change of grid voltage. As a result, the internal voltage increases.  

- Reason ID = 10  
The internal control circuit of the SUN2000 is unable to keep up with changes due to grid phase imbalances.  

b. If the alarm occurs repeatedly, contact Huawei technical support. |
### Alarm ID 202: Invert Module Fault

<table>
<thead>
<tr>
<th>Alarm ID</th>
<th>Name</th>
<th>Severity</th>
<th>Causes</th>
<th>Measures</th>
</tr>
</thead>
</table>
| 202      | Invert Module Fault | Major    | Abnormal external conditions have triggered converter circuit protection inside the SUN2000. The possible causes are as follows: | Reason ID = 4, 13, 14, 16, or 17  
   - Reason ID = 4  
      A sharp drop in grid voltage or a short-circuit has occurred, resulting in high output current from the SUN2000.  
   - Reason ID = 13  
      A sharp drop in grid voltage or a short-circuit has occurred, resulting in a fault in the voltage check circuit of the SUN2000.  
   - Reason ID = 14  
      A sharp drop in grid voltage or a short-circuit has occurred, resulting in instantaneous high output current from the SUN2000.  
   - Reason ID = 16  
      The grid DC current exceeds the allowed range.  
   - Reason ID = 17  
      The grid voltage or frequency is abnormal.  
   - Reason ID = 20  
      The SUN2000 output short-circuits, leading to a sharp increase in output current. |

#### Measures

- **Reason ID = 4, 13, 14, 16, or 17:**
  - a. The SUN2000 monitors its external working conditions in real time and automatically reverts to normal operating status after the fault is rectified.
  - b. If the alarm occurs repeatedly, contact Huawei technical support.

- **Reason ID = 20:**
  - a. Check whether the SUN2000 output cables are short-circuited. Rectify any fault.
  - b. If the alarm occurs repeatedly, contact Huawei technical support.
### Alarm ID 301: Grid Voltage Abnormal

**Severity:** Major

The grid voltage is beyond the allowed range. The possible causes are as follows:

- **Reason ID = 1 to 6**
  The grid A, B, or C phase voltage is less than the allowed range.

- **Reason ID = 13 to 18**
  The grid A, B, or C phase voltage is higher than the allowed range.

- **Reason ID = 26**
  The grid voltage is higher than the allowed range.

- **Reason ID = 27 or 28**
  There is a large difference in grid voltage among the three phases.

- **Reason ID = 29**
  The grid has a power outage, or the AC line or the AC circuit breaker is disconnected.

**Measures:**

- **Reason ID = 1 to 6**
  a. If the alarm occurs accidentally, it is possible that there is an accidental grid abnormality. The SUN2000 automatically reverts to normal operating status after the fault is rectified.

  b. If the alarm occurs repeatedly, check whether the grid voltage is within the allowed range. If so, change the grid overvoltage and undervoltage protection points after obtaining approval from the local power operator. For details about how to change the protection points, see 7.2.9 Setting Protection Parameters. If the grid voltage is not within the allowed range, contact the local power operator.

  c. If the alarm persists for a long time, check that the AC circuit breaker and output cables of the SUN2000 are properly connected.

- **Reason ID = 13 to 18, or 26**
  a. Check whether the grid-tied point voltage is too high. If it is, contact your local power operator.

  b. If the grid-tied point voltage is higher than the allowed range, change the overvoltage and undervoltage protection points after obtaining approval from the local power operator.

  c. Check whether the grid voltage peak is too high.

- **Reason ID = 27 or 28**
  a. The SUN2000 monitors its external working conditions in real time and automatically reverts to normal operating status after the fault is rectified.

  b. If the alarm occurs repeatedly and affects the normal power generation of the power station, contact the local power operator.

- **Reason ID = 29**
  a. Check whether the AC voltage is normal.

  b. Check whether the AC line or circuit breaker is disconnected.
<table>
<thead>
<tr>
<th>Alarm ID</th>
<th>Name</th>
<th>Severity</th>
<th>Causes</th>
<th>Measures</th>
</tr>
</thead>
</table>
| 305     | Frequency Abnormal            | Major    | The actual frequency of the grid is higher than or lower than the required value for the local grid. | a. If the alarm occurs accidentally, it is possible that there is an accidental grid abnormality. The SUN2000 automatically reverts to normal operating status after the fault is rectified.  
b. If the alarm occurs repeatedly, check whether the grid frequency is within the allowed range. If yes, change the grid overfrequency and underfrequency protection points after obtaining approval from the local power operator. For details about how to change the protection points, see 7.2.9 Setting Protection Parameters. If the grid frequency is not within the allowed range, contact the local power operator. |
| 313     | Low Array Insulation Resistance | Major    | The insulation resistance against ground of the PV strings is low. The possible causes are as follows: |
|         |                               |          | - There is a short circuit between PV strings and the ground.           | a. Check the insulation resistance against the ground of the PV strings. If there is a short circuit, rectify the fault.  
b. If the insulation resistance against the ground is less than the default value in a rainy environment, set the ISO value. For details, see 7.2.9 Setting Protection Parameters. |
| 318     | Residual Current Abnormal     | Major    | The insulation resistance against ground of the input side of the SUN2000 decreases during operation, which causes excessively high residual current. | a. If the alarm occurs accidentally, it is possible that there is an accidental external circuit abnormality. The SUN2000 automatically reverts to normal operating status after the fault is rectified.  
b. If the alarm occurs repeatedly or lasts a long time, check whether the insulation resistance against ground of PV strings is too low. |
| 321     | Cabinet Over-Temp             | Major    |  
|         | p                             |          | - The SUN2000 is installed in a place with poor ventilation.            | Check whether the ambient temperature for the SUN2000 exceeds the upper limit. If so, improve ventilation to decrease the temperature.  
<p>|         |                               |          | - The ambient temperature is too high.                                 |<br />
|         |                               |          | - The internal fan is not working.                                     |                                                                                             |</p>
<table>
<thead>
<tr>
<th>Alarm ID</th>
<th>Name</th>
<th>Severity</th>
<th>Causes</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>326</td>
<td>Electrical Grounding Fault</td>
<td>Major</td>
<td>• The neutral wire or PGND cable is not connected to the SUN2000.</td>
<td>a. Check that the neutral wire and PGND cable are properly connected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• The isolation transformer is not connected to the SUN2000 at the output side when the PV strings are grounded.</td>
<td>b. Check that an isolation transformer is connected to the SUN2000 at the output side when the PV strings are grounded.</td>
</tr>
<tr>
<td>400</td>
<td>System Fault</td>
<td>Major</td>
<td>An unrecoverable fault has occurred on a circuit inside the SUN2000.</td>
<td>Flip the DC SWITCH on the SUN2000 to OFF, wait 5 minutes, and flip the DC SWITCH to ON. Check whether the fault is rectified. If the fault persists, contact Huawei technical support.</td>
</tr>
<tr>
<td>502</td>
<td>Internal Communication Fault</td>
<td>Minor</td>
<td>• The communication circuit of the SUN2000 is interrupted.</td>
<td>a. If the fault is caused by a short circuit of the communication circuit inside the SUN2000, the SUN2000 automatically reverts to normal operating status after the fault is rectified.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• The communication circuit is damaged.</td>
<td>b. If the fault persists for a long time, contact Huawei technical support.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• The internal communication address is incorrectly set.</td>
<td></td>
</tr>
<tr>
<td>504</td>
<td>Version Mismatch</td>
<td>Minor</td>
<td>The version of the software loaded during a software upgrade is incorrect.</td>
<td>Check whether a recent software upgrade has been performed. If so, upgrade the software again to the correct version.</td>
</tr>
<tr>
<td>505</td>
<td>Firmware Upgrade Failed</td>
<td>Major</td>
<td>The upgrade is incomplete.</td>
<td>Upgrade again.</td>
</tr>
<tr>
<td>61440</td>
<td>Flash Fault</td>
<td>Minor</td>
<td>• There is insufficient space on the flash drive.</td>
<td>a. Replace the monitoring board.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• The flash drive has bad blocks or is faulty.</td>
<td>b. If the monitoring board is built into the monitoring device, replace the monitoring device.</td>
</tr>
</tbody>
</table>

**NOTE**

If a fault cannot be rectified by the measures listed in Table 8-2, contact Huawei technical support.
This chapter describes how to remove, pack, and dispose of the SUN2000.

9.1 SUN2000 Removal

This section describes how to remove the SUN2000.

Perform the following operations to remove the SUN2000:

1. Disconnect all cables from the SUN2000, including RS485 communications cables, DC input power cables, AC output power cables, and PGND cables.
   For details, see 8.1 Powering Off the SUN2000.
2. (Optional) Open the anti-theft lock at the bottom of the SUN2000.
3. Unmount the SUN2000 from the rear panel.
4. Unfasten the rear panel.

9.2 SUN2000 Packing

This section describes how to pack the SUN2000.

- If the original packing case is available, place the SUN2000 inside the packing case and seal it with adhesive tape.
- If the original packing case is unavailable, place the SUN2000 inside a suitable hard carton and seal it properly.

9.3 Disposing the SUN2000

This topic describes how to dispose the SUN2000.

If the SUN2000 service life has expired, dispose of the SUN2000 in accordance with local rules for disposal of electrical equipment waste.
Efficiency

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum efficiency</td>
<td>98.5%</td>
<td>98.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>98.7%</td>
<td></td>
</tr>
<tr>
<td>European efficiency</td>
<td>98.0%</td>
<td>98.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>98.4%</td>
<td></td>
</tr>
</tbody>
</table>
# Input

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum input power</td>
<td>9000 W</td>
<td>11,400 W</td>
<td>13,500 W</td>
<td>17,000 W</td>
<td>19,100 W</td>
<td>22,500 W</td>
<td>23,600 W</td>
<td>28,200 W</td>
</tr>
<tr>
<td>Maximum input voltage</td>
<td>1000 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum input current (per MPPT)</td>
<td>18 A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum short-circuit current (per MPPT)</td>
<td>25 A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum operating voltage</td>
<td>950 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum operating/starup voltage</td>
<td>200 V/250 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. inverter backfeed current to PV array</td>
<td>0 A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full power MPPT voltage range</td>
<td>320–800 V</td>
<td>380–800 V</td>
<td>400–800 V</td>
<td>480–800 V</td>
<td>520–800 V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum number of inputs</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Number of MPP trackers</td>
<td>2&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>
a: Two MPPT routes can work independently or work in parallel.
b: Three MPPT routes can work independently or work in parallel, or any two of the three
MPPT routes can work in parallel.

### Output

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated active power</td>
<td>8000 W</td>
<td>10,000 W</td>
<td>12,000 W</td>
<td>15,000 W</td>
<td>17,000 W</td>
<td>20,000 W</td>
<td>23,000 W</td>
<td>27,500 W</td>
</tr>
<tr>
<td>Maximum apparent power</td>
<td>8800 VA</td>
<td>11,000 VA</td>
<td>13,200 VA</td>
<td>16,500 VA</td>
<td>18,700 VA</td>
<td>22,000 VA</td>
<td>23,000 VA</td>
<td>27,500 VA</td>
</tr>
<tr>
<td>Maximum active power (cosφ = 1)</td>
<td>8800 W</td>
<td>11,000 W</td>
<td>13,200 W</td>
<td>16,500 W</td>
<td>18,700 W</td>
<td>22,000 W</td>
<td>23,000 W</td>
<td>27,500 W</td>
</tr>
<tr>
<td>Rated output voltage</td>
<td>220 V, 230 V-380 V, 400 V, 3W + N + PE</td>
<td>277 V/480 V, 3W+PE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adapted grid frequency</td>
<td>50 Hz/60 Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum output current</td>
<td>13.4 A</td>
<td>17 A</td>
<td>20 A</td>
<td>25.2 A</td>
<td>28.5 A</td>
<td>33.5 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power factor</td>
<td>0.8 leading … 0.8 lagging</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum total harmonic distortion (rated power)</td>
<td>&lt; 3%</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
### Protection

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Input DC switch</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anti-islanding protection</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output overcurrent protection</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input reverse polarity protection</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PV string fault detection</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC surge protection</td>
<td>Type II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC surge protection</td>
<td>Type II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation resistance detection</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual current monitoring unit (RCMU)</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Display and Communication

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
<td>Graphical LCD, LED, Bluetooth module+app, USB data cable+app</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS485</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### General Data

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (W x H x D)</td>
<td>520 mm x 610 mm x 266 mm (including the mounting plate)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>About 41 kg (excluding the mounting plate)/About 42 kg (including the mounting plate)</td>
<td>About 49 kg (excluding the mounting plate)/About 50 kg (including the mounting plate)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>–25°C to +60°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling</td>
<td>Natural convection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum operating altitude</td>
<td>3000 m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>0%–100% RH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input terminal</td>
<td>Amphenol Helios H4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output terminal</td>
<td>Amphenol C16/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ingress Protection Rating</td>
<td>IP65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protective class</td>
<td>Class I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degree of pollution</td>
<td>III</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topology</td>
<td>Transformerless</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Acronyms and Abbreviations

<table>
<thead>
<tr>
<th>Letter</th>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>ACDU</td>
<td>AC Distribution Unit</td>
</tr>
<tr>
<td>E</td>
<td>EMC</td>
<td>Electromagnetic Compatibility</td>
</tr>
<tr>
<td></td>
<td>EMI</td>
<td>Electromagnetic Interference</td>
</tr>
<tr>
<td></td>
<td>EMS</td>
<td>Element Management System</td>
</tr>
<tr>
<td></td>
<td>ESD</td>
<td>Electrostatic Discharge</td>
</tr>
<tr>
<td>L</td>
<td>LCD</td>
<td>Liquid Crystal Display</td>
</tr>
<tr>
<td></td>
<td>LED</td>
<td>Light Emitting Diode</td>
</tr>
<tr>
<td>M</td>
<td>MPP</td>
<td>Maximum Power Point</td>
</tr>
<tr>
<td></td>
<td>MPPT</td>
<td>Maximum Power Point Tracking</td>
</tr>
<tr>
<td>P</td>
<td>PE</td>
<td>Protective Earthing</td>
</tr>
<tr>
<td></td>
<td>PGND</td>
<td>Protection Ground</td>
</tr>
<tr>
<td></td>
<td>PV</td>
<td>Photovoltaic</td>
</tr>
<tr>
<td>R</td>
<td>RCMU</td>
<td>Residual current monitoring unit</td>
</tr>
<tr>
<td>S</td>
<td>SPD</td>
<td>Surge Protective Device</td>
</tr>
</tbody>
</table>
B Power Grid Codes

Set the power grid code that applies to the country or region where the power station is located and the SUN2000 model.

Low-voltage power grid codes apply to SUN2000 models including the SUN2000-8KTL, 10KTL, 12KTL, 15KTL, 17KTL, 20KTL, and 23KTL. Table B-1 describes the countries to which low-voltage power grid codes apply.

<table>
<thead>
<tr>
<th>No.</th>
<th>Power Grid Code</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NB/T 32004</td>
<td>China Golden Sun low-voltage power grid</td>
</tr>
<tr>
<td>2</td>
<td>UTE C 15-712-1(A)</td>
<td>France low-voltage power grid</td>
</tr>
<tr>
<td>3</td>
<td>UTE C 15-712-1(B)</td>
<td>Islands of France 230 V 50 Hz</td>
</tr>
<tr>
<td>4</td>
<td>UTE C 15-712-1(C)</td>
<td>Islands of France 230 V 60 Hz</td>
</tr>
<tr>
<td>5</td>
<td>VDE 0126-1-1-BU</td>
<td>Bulgaria low-voltage power grid</td>
</tr>
<tr>
<td>6</td>
<td>VDE 0126-1-1-GR(A)</td>
<td>Mainland of Greece low-voltage power grid</td>
</tr>
<tr>
<td>7</td>
<td>VDE 0126-1-1-GR(B)</td>
<td>Islands of Greece low-voltage power grid</td>
</tr>
<tr>
<td>8</td>
<td>BDEW-MV</td>
<td>Germany medium-voltage power grid (400 V AC)</td>
</tr>
<tr>
<td>9</td>
<td>VDE-AR-N-4105</td>
<td>Germany low-voltage power grid</td>
</tr>
<tr>
<td>10</td>
<td>G59-England</td>
<td>England 230 V power grid (I &gt; 16 A)</td>
</tr>
<tr>
<td>11</td>
<td>G59-Scotland</td>
<td>Scotland 240 V power grid (I &gt; 16 A)</td>
</tr>
<tr>
<td>12</td>
<td>G83-England</td>
<td>England 230 V power grid (I &lt; 16 A)</td>
</tr>
<tr>
<td>13</td>
<td>G83-Scotland</td>
<td>Scotland 240 V power grid (I &lt; 16 A)</td>
</tr>
<tr>
<td>14</td>
<td>EN50438-CZ</td>
<td>Czech Republic low-voltage power grid</td>
</tr>
<tr>
<td>15</td>
<td>RD1699</td>
<td>Spanish low-voltage power grid (Pn &lt; 100 kW)</td>
</tr>
<tr>
<td>16</td>
<td>RD661</td>
<td>Spanish low-voltage power grid (Pn &gt; 100)</td>
</tr>
</tbody>
</table>
### Medium-voltage power grid codes

Medium-voltage power grid codes apply to SUN2000 models including the SUN2000-28KTL. Table B-2 describes the countries to which medium-voltage power grid codes apply.

#### Table B-2 Medium-voltage power grid codes

<table>
<thead>
<tr>
<th>No.</th>
<th>Power Grid Code</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CHINA-MV480</td>
<td>China medium-voltage power grid</td>
</tr>
<tr>
<td>2</td>
<td>BDEW-MV480</td>
<td>Germany medium-voltage power grid</td>
</tr>
<tr>
<td>3</td>
<td>G59-England-MV480</td>
<td>UK 480 V Medium-voltage power grid (I &gt; 16 A)</td>
</tr>
<tr>
<td>4</td>
<td>UTE C 15-712-1-MV480</td>
<td>France medium-voltage power grid</td>
</tr>
<tr>
<td>5</td>
<td>TAI-PEA-MV480</td>
<td>Thailand medium-voltage power grid (PEA)</td>
</tr>
<tr>
<td>6</td>
<td>TAI-MEA-MV480</td>
<td>Thailand medium-voltage power grid (MEA)</td>
</tr>
<tr>
<td>No.</td>
<td>Power Grid Code</td>
<td>Country</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>7</td>
<td>EN50438-DK-MV480</td>
<td>Denmark medium-voltage power grid</td>
</tr>
<tr>
<td>8</td>
<td>Japan (50Hz)</td>
<td>Japan power grid (50 Hz)</td>
</tr>
<tr>
<td>9</td>
<td>Japan (60Hz)</td>
<td>Japan power grid (60 Hz)</td>
</tr>
<tr>
<td>10</td>
<td>EN50438-TR-MV480</td>
<td>Turkey medium-voltage power grid</td>
</tr>
<tr>
<td>11</td>
<td>C11/C10-MV480</td>
<td>Belgium medium-voltage power grid</td>
</tr>
<tr>
<td>12</td>
<td>Philippines-MV480</td>
<td>Philippines medium-voltage power grid</td>
</tr>
<tr>
<td>13</td>
<td>AS4777-MV480</td>
<td>Australia medium-voltage power grid</td>
</tr>
<tr>
<td>14</td>
<td>NRS-097-2-1-MV480</td>
<td>South Africa medium-voltage power grid</td>
</tr>
<tr>
<td>15</td>
<td>IEC61727-MV480</td>
<td>IEC medium-voltage power grid (50 Hz)</td>
</tr>
<tr>
<td>16</td>
<td>IEC61727-MV480-60Hz</td>
<td>IEC medium-voltage power grid (60 Hz)</td>
</tr>
<tr>
<td>17</td>
<td>ANRE-MV480</td>
<td>Romania medium-voltage power grid</td>
</tr>
<tr>
<td>18</td>
<td>Custom-MV480 (50Hz)</td>
<td>Reserved</td>
</tr>
<tr>
<td>19</td>
<td>Custom-MV480 (60Hz)</td>
<td>Reserved</td>
</tr>
</tbody>
</table>