SG1000MX
PV Grid-Connected Inverter
Installation Manual
About This Manual

Thank you for purchasing SG1000MX (hereinafter will be referred to as the inverter unless otherwise specified) from Sungrow Power Supply Co., Ltd.. We hope that the device will meet your satisfaction when you use it with your PV plant system.

Aim

The aim of this installation manual is to provide the installer and user the safety instructions, all the necessary information about installation of SG1000MX Grid Connected Inverters.

Target Group

The Manual is aimed at installers who need to set up a system that includes the inverter. Installers must be qualified electricians only.

How to Use This Manual

Read this manual and other related documents before installing the inverter.

The document must be stored at hand during installation and must be available at all times.

All rights reserved including the pictures, markings and symbols used. Any reproduction or disclosure, even partially, of the contents of this manual is strictly forbidden without prior written authorization of Sungrow.

The contents of this manual will be periodically updated or revised due to the product development. Discrepancies therefore cannot be excluded. Please refer to the actual product received or download the latest version of this manual via visiting the web site at www.sungrowpower.com.

Symbols Explanation

This manual contains important safety and operational instructions that must be accurately understood and followed during the installation of the inverter.

To ensure optimum use of this manual, note the following explanations of symbols used.

⚠️ DANGER

DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

⚠️ WARNING

WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

⚠️ CAUTION

CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE indicates a situation which, if not avoided, could result in equipment or property damage.
Symbols on the Inverter Body

The symbols below may be pasted on the electrical parts of the inverter. Make sure to read the following symbols and fully understand them before installing the equipment.

This symbol indicates that you should wait at least 10 minutes after disconnecting the inverter from the utility grid and from the PV input before touching any inner live parts.

Hot surface! In order to reduce the risk of burns, do not touch the hot surface when the device is running.

Look over the user manual before any operation on the inverter!

The installation and service of the inverter unit can only be performed by qualified personnel.

Do not disconnect DC connectors from the unit under load!
Content

1 Safety Instructions ........................................................................................................... 1
  1.1 Appropriate Usage .................................................................................................... 1
  1.2 Safety Instructions ................................................................................................. 2
  1.3 Service Safety ........................................................................................................... 4

2 Delivery .......................................................................................................................... 5
  2.1 Scope of Delivery ........................................................................................................ 5
  2.2 Cabinet Composition ............................................................................................... 5
  2.3 Identify the Inverter ................................................................................................. 6
  2.4 Storage ..................................................................................................................... 6
  2.5 Transport .................................................................................................................. 7

3 Introduction .................................................................................................................... 8
  3.1 Appearance .............................................................................................................. 8
  3.2 Appearance Description .......................................................................................... 9
    3.2.1 Dimensions and weight .................................................................................. 9
    3.2.2 Ventilation Design ......................................................................................... 10
    3.2.3 Cable Routing Design .................................................................................... 10
  3.3 Circuit Diagram ........................................................................................................ 10
  3.4 Electrical Connections Interface ............................................................................ 12
  3.5 DC Side Connection Solution .................................................................................. 12

4 Installation Design .......................................................................................................... 15
  4.1 The Solution with Optional Devices from Sungrow .............................................. 15
  4.2 Basic Requirements ............................................................................................... 15
  4.3 Installation Environment Design ............................................................................ 16
    4.3.1 Floor ............................................................................................................... 16
    4.3.2 Clearance Space ............................................................................................. 17
    4.3.3 Cable Trench ................................................................................................. 18
    4.3.4 Ventilation ..................................................................................................... 18
    4.3.5 Other Protections ........................................................................................... 19
  4.4 Wiring Specification ............................................................................................... 19
  4.5 Tightening Torques and Cable Protection ............................................................. 19
    4.5.1 Tightening Torques for Power Cable Connections ....................................... 19
4.5.2 Cable Protections ......................................................................................................... 20
4.6 Installation Process ......................................................................................................... 20

5 Preparations for Installation ................................................................. 22
5.1 Checking the Unit ............................................................................................................. 22
5.2 Required Tools .................................................................................................................. 22

6 Mechanical Installation ................................................................. 23
6.1 Transport and Shipping ........................................................................................................ 23
   6.1.1 Instructions .................................................................................................................. 23
   6.1.2 Moving the Packed inverter ...................................................................................... 23
6.2 Field Installation .............................................................................................................. 26
   6.2.1 Removal of the Inverter from the Wooden Crate .............................................. 26
   6.2.2 Securing the inverter .............................................................................................. 26

7 Electrical Connection ........................................................................ 28
7.1 Cable Specifications .......................................................................................................... 28
7.2 Parts for Cabling .............................................................................................................. 29
   7.2.1 Copper Cable Connection ....................................................................................... 30
   7.2.2 Aluminum Cable Connection ............................................................................... 30
7.3 Starting Electrical Connections .......................................................................................... 31
   7.3.1 Opening the front door .......................................................................................... 31
   7.3.2 Leading the cables ................................................................................................. 31
7.4 DC Connections .............................................................................................................. 31
   7.4.1 DC input terminals .................................................................................................. 31
   7.4.2 Connection procedure: ........................................................................................ 32
7.5 AC Grid Connections ..................................................................................................... 33
7.6 Ground Connections ...................................................................................................... 34
7.7 Communication Connection ........................................................................................... 34
   7.7.1 Terminals illustration ............................................................................................ 34
   7.7.2 RS485 Communication Solutions ....................................................................... 35
   7.7.3 Ethernet Communication Solution ..................................................................... 37
7.8 Power Supply Modes ....................................................................................................... 37
   7.8.1 Brief Introduction .................................................................................................. 37
   7.8.2 Internal Power Supply (Default) ........................................................................... 38
   7.8.3 External Power Supply Mode (Optional) ............................................................. 38

8 Installation Checklist ..................................................................................... 39

9 Commissioning .......................................................................................... 40
10 Appendix .................................................................................................................. 43
  10.1 Technical Data ..................................................................................................... 43
  10.2 Exclusion of Liability ......................................................................................... 44
  10.3 About Us ............................................................................................................. 45
  10.4 Contact Information ............................................................................................ 45
1 Safety Instructions

1.1 Appropriate Usage

The inverter is a transformer-less Central Inverter. It can convert the direct (DC) current from PV arrays to alternative (AC) current. Through an external step-up transformer, AC can be fed to public grid.

With a Type 3R rating, it is suitable for both indoor and outdoor installation.

A PV generation system, equipped with the inverter, is shown in Fig. 1-1.

![Fig. 1-1 PV Generation System with the inverter]

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>PV arrays</td>
</tr>
<tr>
<td>B</td>
<td>SG1000MX</td>
</tr>
<tr>
<td>C</td>
<td>Transformer</td>
</tr>
<tr>
<td>D</td>
<td>Public grid</td>
</tr>
</tbody>
</table>

The types of system device suitable for the inverter are illustrated in Table 1-1.

**WARNING**

The inverter can only be installed in full compliance with the description in this section. Any other operation may cause physical injury or device damage and void relevant warranty from Sungrow.

**NOTICE**

To ensure safe operation of the inverter and all other devices in PV generation system, the inverter shall be provided with external disconnection devices for DC input and AC output circuit.

SG1000MX has two model types. From left to right, the components of the default model type are DC cabinet, main power cabinet, and AC cabinet. The components of the other model type are symmetrically distributed (from left to right: AC cabinet, main power cabinet and DC cabinet). This model type is identified by SG1000MX-R in the nameplate. The example pictures, figures and installation described in this manual are all taking the default model type for example. For the pictures, figures and installation of the SG1000MX-R model type, please also refer to this manual.

SUNGROW
### 1.2 Safety Instructions

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>The servicing instructions are for use only of qualified personnel. Do not perform any servicing other than that specified in the operating instructions.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shock Hazard!</td>
</tr>
<tr>
<td>Death resulting from burning and electric shock upon touching the live components of the inverter.</td>
</tr>
<tr>
<td>• Do not touch the live components of the inverter.</td>
</tr>
<tr>
<td>• Comply with all safety regulations.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shock Hazard!</td>
</tr>
<tr>
<td>The enclosure of the inverter may contain high voltage conductors. During operation, make sure that all covers and doors are closed.</td>
</tr>
<tr>
<td>To avoid the risk of electrical shock hazards, do not perform any action or operation other than that specified in the operating instructions unless you are qualified to do so.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shock Hazard!</td>
</tr>
<tr>
<td>• Please make sure the unit is thoroughly shut down and isolated from the public grid and PV arrays before opening the front door.</td>
</tr>
<tr>
<td>• To avoid the risk of electric shock, wait at least 5 minutes after shut-down to discharge the stored potentials before opening the door.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lethal Voltage!</td>
</tr>
<tr>
<td>Damage to the inverter may result in death by electric shock or fire!</td>
</tr>
<tr>
<td>• Only operate the inverter when it is safe to do so!</td>
</tr>
<tr>
<td>• Only operate the inverter when no damage is visible!</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Voltage!</td>
</tr>
<tr>
<td>The PV array will provide the inverter with DC voltage when exposed to sun radiation. An electrical shock during installation, wiring or maintenance may follow if the PV array is not covered.</td>
</tr>
</tbody>
</table>
**WARNING**

Comply with the country-specific standards at all times.

**WARNING**

Limitation of Use!
The inverter is not intended for use in connection with life support systems or other medical equipment or devices.

**WARNING**

Service Safety!
Never work alone when servicing this equipment. Two persons are required until the equipment is properly de-energized and verified with a meter, and locked out.

**WARNING**

• There is more than one live circuit in the inverter.
• Do not mount the inverter to combustible surfaces.

**WARNING**

Parallel connection of the inverter output is forbidden. The following methods can be adopted:
• Each inverter is equipped with one step-up transformer; or
• For more than one inverter, an external split-type transformer can be used.

**WARNING**

External transformer is not required to have the connection terminal “N” on its low voltage side. If the “N” does exist, never connect or ground it.

**CAUTION**

Tools Precaution!
Thoroughly inspect the equipment prior to energizing. Verify that no tools or equipment have inadvertently been left behind.

**CAUTION**

For usage in a controlled environment, refer to the environmental conditions in the manual.

**NOTICE**

ESD Protection!
The inverter may be damaged irreversibly by electrostatic discharge (ESD).
During the operation of the inverter, please observe all ESD safety regulations!
Discharge electrostatic charge by touching the grounded enclosure of the inverter before handling electronic components!

Please keep this installation manual and other related document at a handy place near the inverter.
These documents must be available to operators and maintenance personnel at all times.

1.3 Service Safety

Never work alone when servicing this equipment. Two persons are required until the inverter is properly shut down and the de-energization is verified with a meter.

The symbols below may be pasted on the electrical parts of the inverter. Make sure to read the following symbols and fully understand them before installing the equipment.

- Electrical shock hazards!
- Hot surface
- Equipment grounding conductor (Main grounding protective earth, PE)
2 Delivery

2.1 Scope of Delivery

Materials in Table 2-1 should be included in the crate.

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SG1000MX PV Grid-Connected Inverter</td>
<td>Including keys</td>
</tr>
<tr>
<td>2</td>
<td>Installation Manual</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Operation Manual</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Warranty Card</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Certificate of Quality</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Product Test Report</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>GFDI fuse</td>
<td>4A/5A</td>
</tr>
</tbody>
</table>

Users can download the latest version of this manual and the monitoring software at www.sungrowpower.com.

NOTICE

The inverter has been carefully checked and tested before delivery, yet damages may occur during shipping. So once you receive the device, a detailed inspection is necessary.

If any damage is detected, contact Sungrow immediately. A relevant photo is preferred. We will provide you with the fast and best service.

2.2 Cabinet Composition

SG1000MX has two model types ("Left hand system" and "Right hand system"). The components of the other model type are symmetrically distributed, see figure 2-1.
2.3 Identify the Inverter

You can identify the inverter through the nameplate. There are two nameplates affixed to the back panel and inside of the door respectively.

**WARNING**

Very important information about the inverter is contained in the nameplate. Please protect the nameplate consciously!

Two factories of Sungrow can manufacture the inverter. One is located in China, and the other in Canada. For specific origin information, please refer to the real nameplate on the product. Pictures here are indicative only.

2.4 Storage

If the inverter is not installed immediately, store it appropriately.

- Pack the inverter up in the crate.
- Keep the desiccant in the crate.
- The inverter can only be stored in a dry room to protect the internal circuits against dust and moisture.
- Temperature: -40°C~+75°C; Relative humidity: 0~95%
- Routine check at least once a week.
• Unpacking check and change desiccant every 6 months.

**NOTICE**

*Keep the crate upright.*

*No stacking on top of the crate.*

If the inverter is to be installed after long-time storage, a professional thorough test is necessary.

### 2.5 Transport

Transport not complying with the methods described in this manual is forbidden.

Central of gravity has been clearly marked outside the crate. It must be considered at all times.
3 Introduction

3.1 Appearance

The appearance of the inverter is shown below.

Main external components description:

- Door lock
  Close or open the front door of the inverter.
- LCD display
  Display data and perform control functions
- DC Load Switch
  DC side load switch
- Grid Main Switch
  AC side circuit breaker switch
- Emergency-stop button
  Shut down the inverter immediately when press it down
- Start/Stop Switch
  Turn the switch to the “Stop” position, the inverter will stop immediately.

The inverter will start when this switch is in the “Start” position.
3.2 Appearance Description

3.2.1 Dimensions and weight

Dimensions: 2598mm (102inch) x 2164mm (85inch) x 1076mm (42.3inch) (Width Ax Height C x Depth B).

Weight: approximately 2050kg (4519lbs)

![Dimensions of the inverter](image)

**NOTICE**

Keep the crate upright.

No stacking on top of the crate.

**NOTICE**

The weight here is for reference only. Different internal components selection may lead to slight weight differences.
3.2.2 Ventilation Design

Ventilation design is illustrated below.

![Ventilation design diagram](image)

**Fig. 3-3 Ventilation design**

3.2.3 Cable Routing Design

Cables can be routed into the inverter via the following two methods:

- pass the cables inside the inverter through the side panel: A metal sheet located on the lower part of the side panel is designed for this purpose. Remove the sheet screws first and then remove the sheet off.
- pass the cables inside the inverter through the inverter base: All cables can be inserted into the inverter base through the sealed cable inlets.

3.3 Circuit Diagram

The inverter utilizes the advanced power conversion technology with the latest IGBT to convert the DC power from the PV array into stable three-phase AC power. Through an external step-up transformer, the AC power can be fed to the utility grid.
Fig. 3-4 Main circuit diagram (version with 14 fuses on the DC side)
3.4 Electrical Connections Interface

The inverter provides multiple electrical connection terminals as illustrated below:

![Connection terminals](image)

**Fig. 3-5 Connection terminals**

**Table 3-1 Terminal descriptions:**

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>DC+ &amp; DC- input terminals</td>
<td>Positive and negative poles are connected to relevant PV arrays outputs respectively.</td>
</tr>
<tr>
<td>B</td>
<td>AC output terminals, grounding terminals</td>
<td>Three phase outputs of the inverter are connected to the low voltage side of step-up transformer respectively. The grounding terminals should be connected to the earth appropriately.</td>
</tr>
<tr>
<td>C*</td>
<td>Communication Terminals</td>
<td>Through the series RS485 or Ethernet communication cable, the inverter can communicate with upper computer.</td>
</tr>
</tbody>
</table>

The actual location of the communication terminals may differ.

**C*: Description of the Communication terminals:**

- 1~2: RS485 communication terminal
- 3~5: Device operation state node. (Power, Operation, Fault)

**If the inverter is to be installed after long-time storage, a professional thorough test is necessary.**

**A RS485/RS232 converter is needed for communications with the upper computer.**

3.5 DC Side Connection Solution

There are three DC side connection solutions for SG1000MX:

- Max 14 Fuses and 2000A Load Switch (Standard)

For this solution, at most 14 DC inputs can be provided and each input is equipped with fuse. The DC side configuration is shown below:
Max 14 Breakers (Optional)

For this solution, there are 14 micro-circuit breakers and each circuit breaker controls one group of input. There can be no power distribution cabinet in the system. The DC side configuration is shown below:

Max 4 Switches and 14 fuses and 2000A Load Switch (Optional)

For this solution, there are 4 switches and 1 load switch. Each switch controls the connection and disconnection of 4 inputs and all the 14 inputs are equipped with fuse. The DC side configuration is shown below:
Fig. 3-8 DC side solution 3

- DC+
- DC-

Dimensions:
- 499.5mm (19.7 inch)
- 545mm (21.4 inch)
4 Installation Design

4.1 The Solution with Optional Devices from Sungrow

PV Grid-connected system configured with optional devices from Sungrow is shown below.

![Diagram of the solution from Sungrow](image)

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SolarInfo EM Environment Monitoring Device</td>
<td>Apply to PV power generation system to measure the environmental conditions (e.g. wind speed, wind direction and solar radiation) and to upload the monitored data to SolarInfo Logger and upper computer.</td>
</tr>
<tr>
<td>B</td>
<td>SunBox PVS PV Array Combiner Box</td>
<td>By using PV array combiner box, different strings of PV array can be converged into the PV array string box. Together with lightning arresters and circuit breakers, the system installation time can be reduced while the system safety can be increased.</td>
</tr>
<tr>
<td>C</td>
<td>SunBox PMD-D DC Power Distribution Cabinet</td>
<td>Circuit breaker is configured to each PV input to disconnect the inverter from the module when fault is detected to the module (e.g. short circuit).</td>
</tr>
<tr>
<td>D</td>
<td>SunBox PMD-A AC Power Distribution Cabinet</td>
<td>The AC distribution unit is a distribution and protection interface between the inverter and the utility network, which contains grid-side circuit breaker, lightning protection devices and power meters.</td>
</tr>
<tr>
<td>E</td>
<td>SolarInfo Logger Inverter Data Acquisition and Transmission Device</td>
<td>Data acquisition device is used for processing the data from PV power plants which can be communicated with the PV grid-connected inverter for PV power plants. It is capable to monitor one single inverter up to 100 inverters.</td>
</tr>
</tbody>
</table>

4.2 Basic Requirements

Requirements listed below should be met to ensure the normal operation of the inverter.

- With an IP54 (NEMA 3R) rating, the inverter can be installed both indoors and outdoors. As an electrical device, do not install the inverter in high humidity areas.
- Select a well-ventilated place sheltered from direct sun radiation. Power output may be influenced by the high ambient temperature if otherwise.
- The installation place should be dry and clean.
• Unobstructed air flow.
• Don't install the inverter near residential areas.
• Don't install the inverter in an unstable place.
• Install the inverter in a place where you can see the LED indicators or LCD display clearly and conveniently.
• Ambient temperature range: -30°C~+60°C (derating above +55°C); Relative humidity: 0~95% (no-condensation).
• For indoor installation, sufficient room should be kept around the inverter for convenient repairmen and maintenance.
• Enough escape routes must be kept at all times.
• Do not install the inverter in special environment conditions, for example sea salt fog, acidic or alkaline environment. It should be installed 15 kilometers away from the seaboard and 10 kilometers away from heavy polluting chemical plants (for example, chemical fertilizer plant, sulphuric plant and power station, etc.) in outdoors environment. Please contact the manufacturer beforehand if inverter has to install in the aforesaid environment and take proper protection methods.
• Inverter cannot be installed in heavy polluting places, e.g. (Sulfur dioxide > 0.5mg/m³; Hydrogen sulfide > 0.14mg/m³; Nitrogen oxides > 0.2mg/m³; CO > 0.5mg/m³; Ammonia > 35mg/m³)

4.3 Installation Environment Design

The inverter can be installed both indoors and outdoors.

For indoor installation, the design of electrical service room should meet many requirements, such as floor, space, cable trench, ventilation air duct, and other protective measures.

For outdoor installation, the following requirements should be met.

4.3.1 Floor

The foundation must be solid and safe enough to position the inverter. It must provide the load-carrying capacity necessary to cope with the weight of the inverter.

Any existing unevenness, depressions or slope must be corrected prior to installation.

Before placing the inverter, users should bear in mind that the cables should enter the inverter from underneath and through the sealed cable inlets.
4.3.2 Clearance Space

The minimum clearances around the inverter shown below are suggested to be maintained for easy servicing, ventilation and escape.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C*</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500mm</td>
<td>800mm</td>
<td>500mm</td>
<td>600mm</td>
<td>600mm</td>
</tr>
<tr>
<td>(60inch)</td>
<td>(32inch)</td>
<td>(20inch)</td>
<td>(24inch)</td>
<td>(24inch)</td>
</tr>
</tbody>
</table>

**NOTICE**
- DC and AC power distribution cabinets can be placed in the right or left of the inverter. The D and E distance should be maintained between the leftmost or the rightmost device and the wall.
- Keep a min. 500mm escape route before fully open the device front door.
- If two devices are placed face to face, the min. escape route requirement must be fulfilled. Only the front door of device on one side can be opened once.
- Please refer to country-specific codes for detailed escape route requirements.
4.3.3 Cable Trench

Cable trenches or steel supports above the floor are recommended. (Refer to relevant design guides or standards). Suitable cable trenches or cables should be installed prior to inverter installation.

- If the inverter is to be installed after long-time storage, a professional thorough test is necessary.
- Customer can dimension, design and build the cable trenches. Cable support arms can be used to support cables. Signal cables and power cables, DC cables and AC cables should be separated by enough distance to avoid interference.

![Cross-section of Cable Trench](image)

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Cable Trench</td>
</tr>
<tr>
<td>B</td>
<td>Cable Support Arms</td>
</tr>
</tbody>
</table>

4.3.4 Ventilation

The heat generated (hot air exhausted) by the inverter must be dissipated as soon as possible. Otherwise, the output power may be decreased. In the worst case, the inverter may be damaged. Respect the following requirements to guarantee the safe and effective operation.

**NOTICE**

For indoor installation, the inverter needs approximately 4425m³/h cooling air.

**Ventilation environment**

- Plenty of fresh air should be available. Install ventilation equipment, e.g. fans, blowers, ventilation grilles, and so on, if necessary.
- Air should be pure and dust-free.
- For outdoor installation, clean the air inlets periodically.

**Ventilation device**

To keep the inverter in proper working conditions, the ambient temperature of the device must be within a permitted range.

- According to the ventilation design of the inverter, cold air inlets and exhaust air outlets must be clean and dust-free at all times.
• Directions of air inlet and outlet should be designed in accordance with the local wind directions.
• Exhaust fans are recommended to keep the air pressure balance.
• If the inverter is installed outdoors, propose select a shaded place to avoid direct sun radiation.

4.3.5 Other Protections

With an NEMA 3R (IP54) rating, the inverter is suitable for outdoor installation. A degree of protection against falling rain, sleet and external ice formation should be provided.

The inverter should be installed in a dry, clean industrial environment in accordance with EMC threshold and noise level. After connecting all the cables, cable inlets and outlets should be firmly sealed.

**NOTICE**

*Avoid direct sun radiation to ensure high feed-in power.*

4.4 Wiring Specification

Cables in the inverter can be classified into either power cables or control (data) cables.

It is recommended that the power cables and control cables be installed on separate cable support arms. Avoid long parallel runs of the two kinds of cables to decrease the electromagnetic interference.

Where control cables must cross power cables, make sure they are arranged at an angle as near to 90° as possible. Do not run extra cables through the inverter.

The cable support arms must have good electrical bonding to each other and to the grounding electrodes. Aluminum cable support arm systems can be used to improve local equalizing of potential.

Table below shows the recommended minimum distances between different parallel lengths shielded control cables and power cables.

| Table 4-1 Min. Distances between Control Cable and Power Cable |
|------------------|------------------|
| **Parallel length (inch, m)** | **Min. Distances (inch, mm)** |
| 7874 inch (200m) | 12 inch (0.3m) |
| 11811 inch (300m) | 20 inch (0.5m) |
| 19685 inch (500m) | 48 inch (1.2m) |

4.5 Tightening Torques and Cable Protection

4.5.1 Tightening Torques for Power Cable Connections

Tighten the cable lugs with proper torque shown in table below to prevent the poor contact, high contact resistance, or fire caused by the looseness of cable lugs.

<table>
<thead>
<tr>
<th>Screw size</th>
<th>Torque (N·m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M4</td>
<td>18 in-lbs (2 N·m)</td>
</tr>
<tr>
<td>M5</td>
<td>28 in-lbs (3.2 N·m)</td>
</tr>
<tr>
<td>M6</td>
<td>62 in-lbs (7 N·m)</td>
</tr>
</tbody>
</table>
### 4.5.2 Cable Protections

- **Protection of communication cables:**
  - Communication cables are thin and easily broken. Lay power cables first and then communication cables.
  - Communication cables should be laid in cable trenches or cable support arms and tightened up by cable ties.
  - Avoid heating elements and strong electric fields.

- **Protection of power cables:**
  - Strong electric currents remain in the power cables. Protect the insulating layer from damages.
  - Fix power cables with insulated cable ties if necessary.

### 4.6 Installation Process

Fig. 4-5 shows the installation process of the inverter and Table 4-2 gives the detailed description.

<table>
<thead>
<tr>
<th>Process</th>
<th>Specification</th>
<th>Reference Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparations before Installation</td>
<td>Check the unit.</td>
<td>5 Preparations for Installation</td>
</tr>
<tr>
<td></td>
<td>Check the required tools.</td>
<td></td>
</tr>
<tr>
<td>Mechanical Installation</td>
<td>Transport and shipping</td>
<td>6 Mechanical Installation</td>
</tr>
<tr>
<td></td>
<td>Field installation</td>
<td></td>
</tr>
<tr>
<td>Electrical Connection</td>
<td>Open the door and remove the cover</td>
<td>7 Electrical Connection</td>
</tr>
<tr>
<td></td>
<td>DC connections</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AC grid connections</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ground connection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Communication connection</td>
<td></td>
</tr>
<tr>
<td>Installation Check</td>
<td>Check mechanical installation</td>
<td>8 Installation Checklist</td>
</tr>
<tr>
<td></td>
<td>Check electrical connection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>Commissioning</td>
<td>Check before commissioning</td>
<td>9 Commissioning</td>
</tr>
<tr>
<td></td>
<td>Preparations before start-up</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Start-up procedure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complete the commissioning</td>
<td></td>
</tr>
</tbody>
</table>
Fig. 4-5 Installation process
5 Preparations for Installation

5.1 Checking the Unit

The first thing customer must do before installation is to check the packaging and the device for any possible damages and verify the contents of the delivery in accordance with the delivery list. Please contact Sungrow immediately in case you find any visual damage or loss of the delivery components that are supposed to be included in the package.

Check that there are no signs of damages. Before installation and operation, check the information on the crate to verify that the delivery is of the correct type.

![WARNING]

Install the inverter only when it is technically faultless and safe to do so!

5.2 Required Tools

The tools required for moving the unit to its final position, fastening it to the floor, tightening the connections are listed below:

- Crane, fork-lift or pallet truck (check load capacity!); rail steels, jack and roller
- Torque wrench
- Screwdrivers for the tightening of the frame screws
- Set of wrenches and sockets
- Wire stripper
- Pliers
- Inner hexagon spanner
- Alcohol blast burner or hot air blower
- Meg-ohmmeter or multi-meter
- Screws, lugs, nuts and washers

Should it be necessary to install the inverter at an altitude of more than 3000 meters, accounts should be taken of the drop of the rated current. For detailed derating information, contact Sungrow.
6 Mechanical Installation

6.1 Transport and Shipping

6.1.1 Instructions

**WARNING**
The inverter should be transported or installed as an integrated unit. Disassembly of it without the permission of SUNGROW may void all warranty rights from SUNGROW.

**CAUTION**
- Always keep the inverter upright!
- Avoid sudden force and vibration!

**CAUTION**
Only specific transport methods for the inverter are acceptable. Note the heavy weight of the equipment and the non-central center of gravity.

**CAUTION**
Please take the heavy weight of the inverter into consideration during shipping and moving.

Lay the power cables before the mechanical installation of the inverter.

6.1.2 Moving the Packed inverter

Pay attention to the symbols and data on the crate, to make an informed choice on modes of transport and installation site, see the table below.

<table>
<thead>
<tr>
<th>Symbol or Data Name</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="THIS END UP" /></td>
<td>THIS END UP</td>
</tr>
<tr>
<td><img src="image" alt="KEEP UPRIGHT" /></td>
<td>KEEP UPRIGHT</td>
</tr>
<tr>
<td><img src="image" alt="FRAGILE" /></td>
<td>FRAGILE</td>
</tr>
</tbody>
</table>
The moving of the packed inverter must be carried out with the aid of specific equipment and in the way shown in Fig. 6-1. Always keep in mind the heavy weight and the uneven distribution of the weight of the inverter when moving.

- It is recommended to move the packed inverter with the aid of a forklift truck, see Fig. 6-1A:
  - Insert the prongs of the forklift to the bottom of the wooden crate.
  - Keep forks distant and elevate the inverter.
- Use a crane to move the packed inverter as described in Fig. 6-1B.

Flexible slings with lock catches on both ends are recommended. You can order the slings from SUNGROW.

Move the inverter after Unpacking

You can use a forklift, rail steels or crane to move the unpacked inverter.

- If the unpacked inverter is far from the storage room, the inverter can be moved together with the wooden baseboard by a forklift truck, see Fig. 6-2.
Fig. 6-2 Move the inverter with the Wooden Pallet through a Forklift

- Use a forklift truck to move the inverter without wooden baseboard, see Fig. 6-3.
  - Remove the front and rear base covers.
  - Insert the prongs of the forklift to the bottom of the inverter at the points specified.
  - Lift the inverter.

Be sure to use a forklift with a sufficiently spaced fork span.

Fig. 6-3 Using forklift to move the inverter

- To move the inverter only through a crane, see Fig. 6-4.
  - Unscrew the four top panels using a screwdriver.
  - Lift the equipment using a crane with sufficient load capacity.
  - Reassemble the panels after lifting.
6.2 Field Installation

6.2.1 Removal of the Inverter from the Wooden Crate

Proceed as follows to unpack the inverter:

**Step 1** Remove the side and top panels from the wooden crate.

**Step 2** Remove the shielding material from the inverter.

**Step 3** Remove the inverter's anchor hardware that secures the inverter to the pallet.
  - Remove the front and rear base covers at the back of the inverter.
  - Unscrew the nuts under the wooden pallet.
  - Remove the bolts in order to extract the inverter.

Pack the inverter following the reversed procedures of unpacking. While packing, be careful to keep the shielding materials and desiccant inside.

6.2.2 Securing the inverter

Proceed to secure the inverter as follows:
**Step 1** Remove the front and rear base covers.

**Step 2** Fasten the cabinet to the foundation using M12 bolts and nuts.

The connection sequence is shown below.

![Connection to the foundation](image-url)
7 Electrical Connection

**WARNING**
The country-specific standards and regulations should be followed at all times.

**WARNING**
- A disconnect switch shall be provided for the DC input and AC output circuit.
- The inverter shall be connected only to a dedicated branch circuit.

**WARNING**
All the work described in this chapter must be carried out by qualified personnel only.

7.1 Cable Specifications

**WARNING**
All wiring methods and processes should be performed in accordance with Local Electrical Code.

**WARNING**
Cables must be chosen according to the rules below:
- 1mm² cable bears less than 2.5A current.
- Cables for one pole or phase should be of the same type and specification.

**DC cables**
The DC input cables (including DC positive and DC negative) should be 194°F (90°C) copper cables or 194°F (90°C) aluminum cables. Four wiring methods are provided for DC connections. Users can choose one of the followings according to situations on-site.

<table>
<thead>
<tr>
<th>DC Cables</th>
<th>Num of DC strings</th>
<th>Cable Size (AL 90°)</th>
<th>Cable Size(Copper 90°)</th>
<th>DC fuse rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC+</td>
<td>12</td>
<td>500kcmil</td>
<td>400kcmil</td>
<td>400A</td>
</tr>
<tr>
<td>DC-</td>
<td>12</td>
<td>500kcmil</td>
<td>400kcmil</td>
<td>400A</td>
</tr>
</tbody>
</table>

**AC cables**
The AC output cables (including L1, L2, and L3) should be 194°F (90°C) copper cables. They shall be chosen according to the recommended sizes below.
Table 7-2 Recommended Sizes of AC Cables (Copper Cables)

<table>
<thead>
<tr>
<th>Cables</th>
<th>Number of Cables</th>
<th>Cable Size</th>
<th>Torque</th>
<th>Hole Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>6</td>
<td>500Kcmil (253 mm²)</td>
<td>94N.m (825 lbs-in)</td>
<td>Ф17</td>
</tr>
<tr>
<td>L2</td>
<td>6</td>
<td>500Kcmil (253 mm²)</td>
<td>94N.m (825 lbs-in)</td>
<td>Ф17</td>
</tr>
<tr>
<td>L3</td>
<td>6</td>
<td>500Kcmil (253 mm²)</td>
<td>94N.m (825 lbs-in)</td>
<td>Ф17</td>
</tr>
<tr>
<td>N</td>
<td>Floating</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 7-3 Recommended Sizes of AC Cables (Aluminum Cables)

<table>
<thead>
<tr>
<th>Cables</th>
<th>Number of Cables</th>
<th>Cable Size</th>
<th>Torque</th>
<th>Hole Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>6</td>
<td>700Kcmil (355 mm²)</td>
<td>113N.m (1000 lbs-in)</td>
<td>Ф17</td>
</tr>
<tr>
<td>L2</td>
<td>6</td>
<td>700Kcmil (355 mm²)</td>
<td>113N.m (1000 lbs-in)</td>
<td>Ф17</td>
</tr>
<tr>
<td>L3</td>
<td>6</td>
<td>700Kcmil (355 mm²)</td>
<td>113N.m (1000 lbs-in)</td>
<td>Ф17</td>
</tr>
<tr>
<td>N</td>
<td>Floating</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Ground cables

The ground cables should be copper cables, and they must be chosen according to the recommended sizes below. The wiring methods should be in accordance with the National Electrical Code and ANSI/NFPA 70. And in Canada the wiring methods should be in accordance with the Canadian Electrical Code, Part I.

Table 7-4 Recommended Sizes of Ground Cables

<table>
<thead>
<tr>
<th>Ground Cables</th>
<th>Requirements (mm²)</th>
<th>Requirements (AWG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC side</td>
<td>42.4mm²</td>
<td>1 AWG</td>
</tr>
<tr>
<td>AC side</td>
<td>107 mm²</td>
<td>4/0 AWG</td>
</tr>
</tbody>
</table>

Earthling resistance should be less than 4Ω. The communication cables must be chosen according to the recommended sizes below.

Table 7-5 Recommended Sizes of Communication Cables

<table>
<thead>
<tr>
<th>Cables</th>
<th>Requirements (mm²)</th>
<th>Requirements (AWG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication cable</td>
<td>2×0.75 or 2×1.0</td>
<td>2×18AWG or 2×17AWG</td>
</tr>
</tbody>
</table>

Shield cables are recommended.

Based on the tables above, customers should use proper cables for terminals with different specifications.

7.2 Parts for Cabling

The sequence of the parts for connecting power cables is shown in Fig. 7-1.

⚠️ DANGER

- Incorrect connection of power cables can cause fires.
- Follow the sequence when connecting the power cables.
7.2.1 Copper Cable Connection

![Fig. 7-1 Power Cable Connection Terminal]

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Copper bus</td>
<td>Terminal</td>
<td>Bolt</td>
<td>Spring washer</td>
<td>Flat washer</td>
<td>Nut</td>
</tr>
</tbody>
</table>

7.2.2 Aluminum Cable Connection

Where the aluminum wire is connected, the albronze filter is required as shown in the following figure.

![Fig. 7-2 Albronze filter connection]

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Copper bus</td>
<td>Ground terminal</td>
<td>Bolt</td>
<td>Spring washer</td>
<td>Flat washer</td>
<td>Nut</td>
<td>Albronze filter</td>
</tr>
</tbody>
</table>

Beware the direction of the albronze filter, i.e. the copper side must be closely attached to the copper bus and the aluminum side must be closely attached to the aluminum connection terminal.

![Fig. 7-3 Albronze filter connection direction]

When the busbar has several connection terminals, an intact albronze filter is required as shown in the following figure.
7.3 Starting Electrical Connections

7.3.1 Opening the front door

Step 1 Unlock the door as shown in the following figure.

Step 2 Open the door with the help of the handle.

7.3.2 Leading the cables

Cables can be routed into the inverter from either the bottom or the side of the inverter cabinet. There are metal plates attached on the cable inlet/outlet areas. Remove the corresponding metal plates, route cables, and finally seal cables inlet/outlet areas with appropriate materials.

7.4 DC Connections

7.4.1 DC input terminals

Generally, the output of PV Array Combiner Box will be connected to the DC input of the inverter. In the inverter DC side, there are max. 14 inputs can be connected to the DC side. For their position, please refer to the figure below.

Max. 14 inputs can be connected to the DC side as shown in the following figure. Fuse is an optional device with little fuse and SPFJ Series available. Selection range: 250A, 300A, 350A, 400A. For more information, please contact Sungrow.
7.4.2 Connection procedure:

**Step 1** Disconnect the upstream DC circuit breakers to ensure that there's no electricity in DC cables.

**Step 2** Ensure that the open circuit voltage of PV arrays is in the permissible range with the help of a multi-meter.

**Step 3** Ensure the correct positive and negative poles with a multi-meter.

**Step 4** Strip off insulation covers of cable connection terminals with a strip length of 5mm, insert the cable length inside cable lugs.

**Step 5** Insert the stripped terminals of DC cables into cable lugs tightly, with the help of relevant tools.

**Step 6** Install heat-shrinkable tubing for each cable. A length of 5cm tubing is recommended.

**Step 7** Connect the cables to DC (+) and DC (-) terminal on the DC copper bus bar respectively, refer to Fig. 7-1.

**Step 8** Secure the DC cables to the terminals using appropriate screws.

**NOTICE**
Three DC input groups should be connected with same cable type and same cable numbers.

**NOTICE**
If the re-combiner box is employed, DC can be connected to the connection bus directly without any fuse connection.
7.5 AC Grid Connections

The AC output voltage of the inverter is 385VAC. Through relevant transformer, the AC energy can finally be fed to low-voltage or medium-voltage grid.

**WARNING**
- Disconnect down-stream circuit breaker to ensure that both AC connection terminals and AC cables are voltage-free.
- Observe country-specific standards and regulations at all times.

The connection terminals are located in the lower right corner of the cabinet. Connection process is as follows:

**Step 1** Ensure that the AC grid cables are electricity-free.

**Step 2** Strip off insulation covers of cable connection terminals with a strip length of 5mm; insert the cable length inside cable lugs.

**Step 3** Insert stripped terminals of AC cables to cables lugs tightly, with the help of relevant tools.

**Step 4** Install heat-shrinkable tubing for each cable. A length of 5cm tubing is recommended.

**Step 5** Connect the cables to terminals marked by L1, L2, L3, see Fig. 7-1.

**Step 6** Secure the AC Line cables to the terminal with screws.

The AC connection areas are shown in the following figure.

Note: Three beams are reserved on the bottom of the cabinet to secure the AC cables.

**WARNING**
If the “N” terminal exist on the low voltage side of the transformer, do not connect it or ground it.
7.6 Ground Connections

It is crucial to connect all inverter to ground via appropriately sized conductor for safety’s sake.

PE copper bar has been firmly connected to the inverter enclosure before delivery. Firmly attach PE copper bar to grounding electrode during PE connection.

The cross area of grounding cable is AWG 5 (16mm²). The grid impedance must not exceed 4Ω.

**WARNING**

If there is one more inverter in parallel connection, a single-core yellow-green cable at least AWG 4/0 (107mm²) is needed to connect the enclosures of all inverters to make them equipotential. This will prevent current in the shielding layer of communication cable resulted from potential differences.

Connect the factory ground to the ground terminal with leakage current detector to detect the leakage current.

7.7 Communication Connection

7.7.1 Terminals illustration

The inverter is equipped with standard RS485 communication interface.
7.7.2 RS485 Communication Solutions

**One inverter solutions**

Figure below shows the communication for a single inverter: connect the communication port A1 and B2 to RS485/RS232 converter and then to the monitoring PC.

**Multiple communication solutions**

If there are two or more inverters to be monitored, Sungrow provides the following communication solution.

SolarInfo Logger data collection device is recommended for sake of better communication,
lower distance of RS485 bus and fewer errors.

Fig. 7-10 Communication Solutions for multiple inverters

• SolarInfo Logger is an optional device. You can order it from Sungrow. For more information on SolarInfo Logger, please download via www.sungrowpower.com.

When there is more than one inverter room in the PV plant, each monitoring system of the inverter room should be equipped with a SolarInfo Logger. The monitored data will then be transferred to the central monitoring room.

PC can monitor the devices via SolarInfo Insight, which can be downloaded at www.sungrowpower.com.

**NOTICE**

RS232 communication distance should be within 15 meters and RS485 communication distance should be within 1200 meters. Communication beyond this distance should adopt optical fiber LAN. Electricity-optics change device and the optical cables should be designed in accordance with the reality or adopt the available LAN system. Sungrow may provide professional solutions.
7.7.3 Ethernet Communication Solution

Connect the Ethernet port of the inverter to the PC by network cable for single inverter’s Ethernet communication solution.

For several inverters’ Ethernet communication, Ethernet switch is needed. The following monitoring solution can be adopted.

PC can monitor the devices via SolarInfo Insight software, which can be downloaded at www.sungrowpower.com.

7.8 Power Supply Modes

7.8.1 Brief Introduction

**WARNING**

Respect all internal connection marks and instructions.

**Information**

Observe markings and steps inside the inverter to change the power supply mode when necessary.

The inverter provides two kinds of power supply modes: internal power supply mode (default mode) and external power supply mode.
7 Electrical Connection  Installation Manual

**Fig. 7-12** Terminals to set the power supply mode

<table>
<thead>
<tr>
<th>Circuit breaker</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>Control the internal power supply mode</td>
</tr>
<tr>
<td>Q2</td>
<td>Control the external power supply mode</td>
</tr>
</tbody>
</table>

**7.8.2** Internal Power Supply (Default)

**NOTICE**

*Internal power supply mode is set before delivery. User can select this mode without any modification.*

Proceed as follows to set the internal power supply mode:

**Step 1** Disconnect the Q2.

**Step 2** Connect the Q1.

**7.8.3** External Power Supply Mode (Optional)

**DANGER**

*Shock Hazard!*

*Disconnect all devices before connecting to external power supply.*

External power supply should be 480V three-phase AC power. The cable cross-sectional area should be more than 2.5mm². Proceed as follows to set the external power supply mode:

**Step 1** Disconnect Q1.

**Step 2** Connect the three-phase AC cables to Q2.

**Step 3** Connect Q2.
8 Installation Checklist

Check the mechanical and electrical installation of the inverter before commissioning. Go through the checklist below together with another person.

<table>
<thead>
<tr>
<th>Mechanical Installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Check all the mechanical connections to make sure that there are no damages, scratches or abnormal parts.</td>
</tr>
<tr>
<td>□ The inverter has been fixed properly to the floor.</td>
</tr>
<tr>
<td>□ The clearances around the inverter are proper.</td>
</tr>
<tr>
<td>□ The ambient operating conditions are within the allowable range.</td>
</tr>
<tr>
<td>□ Cooling air circulates smoothly.</td>
</tr>
<tr>
<td>□ Protective enclosure seal is integrated and reliable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical Installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ The inverter is grounded properly.</td>
</tr>
<tr>
<td>□ The polarity of the PV input connections are correct.</td>
</tr>
<tr>
<td>□ The grid voltage matches the nominal output voltage of the inverter.</td>
</tr>
<tr>
<td>□ The grid connection to the output terminals is OK.</td>
</tr>
<tr>
<td>□ The communication cable connections are correct.</td>
</tr>
<tr>
<td>□ The communication cables are routed away from the power cables.</td>
</tr>
<tr>
<td>□ Marks on the cables are correct, clear and distinguishable.</td>
</tr>
<tr>
<td>□ Insulation shields are integrated and firm.</td>
</tr>
<tr>
<td>□ Warning labels are clear and distinguishable.</td>
</tr>
<tr>
<td>□ Make sure all the bolts that fix the cables are tightened and secured.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ No tools, foreign objects or dust is falling inside the inverter.</td>
</tr>
<tr>
<td>□ No condensation or ice in the cabinet.</td>
</tr>
</tbody>
</table>
9 Commissioning

9.1 Requirements of Commissioning

NOTICE
Before starting the device for the first time, all work performed on the device should be checked thoroughly.

NOTICE
Check to make sure the voltages of AC and DC sides meet the requirements of the inverter.

9.2 Inspection before Start-up

9.2.1 Checking PV Array

Step 1 Check the open-circuit voltage of each PV string to insure that it matches the nominal input voltage.

Step 2 Record the U-I curve if possible.

Step 3 Record the environmental parameters (temperature, radiation intensity, etc.).

Step 4 Measure and record the resistance of the cables if possible.

9.2.2 Checking Inverter

Before start-up check the inverter:

Step 1 Ensure that the mechanical and electrical installation of the inverter has been checked thoroughly.

Step 2 Ensure that the DC and AC (GRID) switches are in the “OFF” position.

Step 3 Ensure that the Emergency Stop Button and Start/Stop Switch are released (in Start position) and functioned normally.

9.2.3 Checking Ground Connection

Make sure that the ground cable passes through the hole of the ground fault detection device and has been connected to the factory ground securely.

9.2.4 Checking Serial Communication (Optional)

For external communication monitoring, the data cables must be connected. Make sure that the RS485 A and B cables are connected correctly and tightened to RS485/232 converter.

Make sure RS485/232 converter DB9 terminal is correctly connected to the PC DB9 serial port.
9.2.5 Checking Voltages

Checking AC Grid Voltage

It must be verified that the inverter is connected to the correct grid type and that a right-hand rotary field exists on L1, L2, L3 and Neutral. The AC side line voltage should comply with the inverter parameter.

Checking DC Voltage

The DC side should be connected from the DC combiner boxes to the inverter. The voltage on each DC cable should be approximately the same and within the maximum DC voltage. Besides the voltage checking, the polarity of DC inputs must also be verified. All DC connections should be checked to ensure that they are mechanically tight.

9.3 Starting the Inverter

If all tests and measurements have been succeeded, the device can be switched on for the first time.

Before starting up the inverter, ensure that:

- Nobody is working on the inverter.
- Cabinet doors are closed.

Step 1 Verify that the grid line voltage meets requirements.

Step 2 Close the door of the enclosure.

Step 3 Turn the AC (GRID) main switch to the “ON” position.

Step 4 Turn the DC switch to the “ON” position.

Step 5 It will take about 1 minute for the auto-initialization of both the power conversion circuit and the LCD panel. The "POWER" LED indicator will be on; the "com" LED indicator will flash every 1 or 2 seconds.

Step 6 If the DC voltage is below the DC low voltage point, inverter will stay at Stand-by state.

Step 7 If DC side voltage exceeds the startup voltage for a certain period of time, inverter will enter Run state from the Stand-by state.

Step 8 After starting up, inverter will automatically check if AC and DC side parameters meet grid-connection requirements. If both the AC side and DC side parameters meet the requirements and the set time is reached, inverter will enter Run state automatically.

Deviation of time in the inverter from the upper computer in the communication system will directly affect the data logging.
If you have any questions or queries in commissioning, please refer to the operation manual for troubleshooting or contact Sungrow service center.

9.4 Completing the Commissioning

If all the start-up procedures have been performed, check the operating condition of the inverter.

**Step 1** Check whether there are abnormalities: abnormal noise, over-heating, smoking or unusual odor.

**Step 2** Measure the grid-connected voltage, current and THD.

**Step 3** Check the grounding of cabinet.

**Step 4** Check the LCD display and external communication.

The commissioning of the inverter is completed.

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The inverter needs no manual control in daily operation.</td>
</tr>
<tr>
<td>Keep the door closed and locked.</td>
</tr>
<tr>
<td>The key of the door must be stored by appointed personnel.</td>
</tr>
</tbody>
</table>
10 Appendix

10.1 Technical Data

The following tables list the technical data of the inverter. Basic production information and performance of the inverter is available at these tables.

Input (DC)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SG1000MX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Input voltage</td>
<td>1000V</td>
</tr>
<tr>
<td>Min. Input voltage</td>
<td>550V</td>
</tr>
<tr>
<td>MPPT voltage range</td>
<td>550-950V</td>
</tr>
<tr>
<td>MPPT voltage range ( @full power )</td>
<td>570-850V</td>
</tr>
<tr>
<td>Max. Input current</td>
<td>2000A</td>
</tr>
<tr>
<td>Rated Input voltage</td>
<td>600V</td>
</tr>
<tr>
<td>Number of MPPT</td>
<td>1</td>
</tr>
<tr>
<td>Number of DC inputs</td>
<td>1, 8~14</td>
</tr>
<tr>
<td>DC inputs Configuration</td>
<td>12 Fuses and 2000A Load Switch (Standard) Fuse: 250A~400A</td>
</tr>
<tr>
<td>PV Array Configuration</td>
<td>Negative GND (Standard), Floating or Positive Ground (optional)</td>
</tr>
</tbody>
</table>

Output (AC)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SG1000MX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated power</td>
<td>1000kW</td>
</tr>
<tr>
<td>Max. Output AC power</td>
<td>1100kVA</td>
</tr>
<tr>
<td>Max. Output current</td>
<td>1650A</td>
</tr>
<tr>
<td>Rated. Output current</td>
<td>1500A</td>
</tr>
<tr>
<td>Output Current THD</td>
<td>&lt;3% ( @ AC rated power )</td>
</tr>
<tr>
<td>Rated grid voltage</td>
<td>385Vac</td>
</tr>
<tr>
<td>Grid voltage range</td>
<td>338V~424Vac</td>
</tr>
<tr>
<td>Rated grid frequency</td>
<td>50Hz/60Hz</td>
</tr>
<tr>
<td>Grid frequency range</td>
<td>47~63Hz</td>
</tr>
<tr>
<td>Power factor at rated power</td>
<td>&gt;0.99</td>
</tr>
<tr>
<td>Outside Isolation Transformer</td>
<td>Optional</td>
</tr>
<tr>
<td>DC current injection</td>
<td>&lt;0.5% at rated AC current</td>
</tr>
<tr>
<td>Adjustable displacement factor</td>
<td>0.8(LG)~0.8(LD)</td>
</tr>
<tr>
<td>Feed-in phases / connection phases</td>
<td>3</td>
</tr>
</tbody>
</table>

Efficiency

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SG1000MX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Efficiency</td>
<td>98.8%</td>
</tr>
<tr>
<td>CEC Efficiency</td>
<td>98.5%</td>
</tr>
<tr>
<td>European Efficiency</td>
<td>98.4%</td>
</tr>
</tbody>
</table>

Protection

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SG1000MX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input side disconnection device</td>
<td>DC Load Switch</td>
</tr>
</tbody>
</table>
### Parameter | SG1000MX
--- | ---
Output side disconnection device | AC Circuit Breaker
Input Fuse protection | optional
Output Fuse protection | optional
DC over voltage protection | Yes
AC over voltage protection | Yes
Grid monitoring | Yes
Ground fault monitoring | Optional
Insulation monitoring | Optional
LVRT (configurable) | Yes
HVRT (configurable) | 1.25~1.15Ve /3S (Puerto Standard)
FRT (configurable) | 57.5~61.5 no tripping
Active Power v.s. Frequency control | Yes
Reactive Power v.s. Voltage control | Yes
Power Ramp rate control | Yes
Anti-Islanding Protection | UL1741, TUV

### Mechanical Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SG1000MX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (W/H/D)</td>
<td>2598mm (102inch) x 2164mm (85inch) x 1076mm (42.3inch)</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 2050kg (4519lbs)</td>
</tr>
<tr>
<td>Seismic Rating</td>
<td>ZONE 4</td>
</tr>
<tr>
<td>Wind Load</td>
<td>120mph</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-30°C~+60°C (-22~+140°F) (derating above 55°C)</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°C~+75°C</td>
</tr>
<tr>
<td>Noise emission (typical)</td>
<td>&lt;70dB(A)</td>
</tr>
<tr>
<td>Self-consumption at night</td>
<td>&lt;20W</td>
</tr>
<tr>
<td>External auxiliary supply voltage</td>
<td>480V/400V (3/N/PE)</td>
</tr>
<tr>
<td>Cooling concept</td>
<td>Controlled forced-air cooling</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>NEMA 3R (IP54)</td>
</tr>
<tr>
<td>Max. permissible value for relative humidity (non-condensing)</td>
<td>0~95%, non-condensing</td>
</tr>
<tr>
<td>Max. altitude</td>
<td>4000m (derating &gt; 2000m)</td>
</tr>
<tr>
<td>Fresh air consumption</td>
<td>4425 m3/h</td>
</tr>
<tr>
<td>Display</td>
<td>LCD</td>
</tr>
<tr>
<td>Communication protocols</td>
<td>Modbus</td>
</tr>
<tr>
<td>Communication. Interface</td>
<td>RS485 ; Ethernet</td>
</tr>
<tr>
<td>Certification</td>
<td>CSA, CE</td>
</tr>
<tr>
<td>Warranty</td>
<td>5 Years</td>
</tr>
</tbody>
</table>

### 10.2 Exclusion of Liability

The content of these documents is periodically checked and revised, where necessary. Discrepancies, therefore, may exist. Please call us or check our website www.sungrowpower.com for the latest information. No guarantee is made for the completeness of these documents. Please contact our company or distributors to get the latest version.

Guarantee or liability claims for damages of any kind are excluded if they are caused
• Improper or inappropriate use or install of the product
• Install or operate the product in unintended environment
• Install or operate the product without observing relevant safety regulations in the deployment location
• Ignore the safety warnings or instructions contained in all documents relevant to the product
• Install or operate the product under incorrect safety or protection conditions
• Alter the product or supplied software without authority
• Product malfunctions due to operation attached or neighboring devices running out of the allowed limit values
• Unforeseen calamity or force majeure

The use of supplied software produced by Sungrow Power Supply Co., Ltd., is subject to the following conditions:

• Sungrow Power Supply Co., Ltd. assumes no liability for direct or indirect damages arising from the use of SolarInfo software. This also applies to the provision or non-provision of support activities.
• SolarInfo software used for commercial purposes is prohibited.
• Decompiling, decoding or destroying the original program, including SolarInfo software and the embedded software, is prohibited.

10.3 About Us

Sungrow power supply is a Chinese leading manufacturer of various power electronics products for renewable energy generation systems. Our products include converters, inverters, battery chargers and other power supplies for distributable generation systems in both grid-connected and stand-alone applications. The power rating of SUNGROW products covers a range from several hundred watts to large mega-watt systems.

The pursuit of SUNGROW is to help our customers acquire stable and clean power with minimum cost, maximum reliability and enhanced safety.

10.4 Contact Information

Should you have any questions or queries about this product, please contact us through the following information. We will be more than happy to assist you!

Headquarters

<table>
<thead>
<tr>
<th>Company</th>
<th>Sungrow Power Supply Co., Ltd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://www.sungrowpower.com">www.sungrowpower.com</a></td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:info@sungrow.cn">info@sungrow.cn</a>; <a href="mailto:service@sungrow.cn">service@sungrow.cn</a></td>
</tr>
<tr>
<td>Address</td>
<td>No.1699 Xiyou Rd., New &amp; High Technology Industrial Development Zone, Hefei, P. R. China.</td>
</tr>
<tr>
<td>Zip</td>
<td>230088</td>
</tr>
<tr>
<td>Telephone</td>
<td>+86 551 6532 7834, +86 551 6532 7845</td>
</tr>
<tr>
<td>Fax</td>
<td>+86 551 6532 7856</td>
</tr>
</tbody>
</table>
### North America

- **Canada**

<table>
<thead>
<tr>
<th><strong>Add</strong></th>
<th>895 Edgeley Blvd, Vaughan, ON L4K 4V9</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Toll-Free Inquiry</strong></td>
<td>+1 855 5760 8618</td>
</tr>
<tr>
<td><strong>Tel</strong></td>
<td>+1 905 5760 8618</td>
</tr>
<tr>
<td><strong>Fax</strong></td>
<td>+1 905 5760 1158</td>
</tr>
<tr>
<td><strong>Business</strong></td>
<td><a href="mailto:info@sungrow.ca">info@sungrow.ca</a></td>
</tr>
<tr>
<td><strong>After-Sales</strong></td>
<td><a href="mailto:service@sungrow.ca">service@sungrow.ca</a></td>
</tr>
<tr>
<td><strong>Website</strong></td>
<td><a href="http://www.sungrow.ca">www.sungrow.ca</a></td>
</tr>
</tbody>
</table>