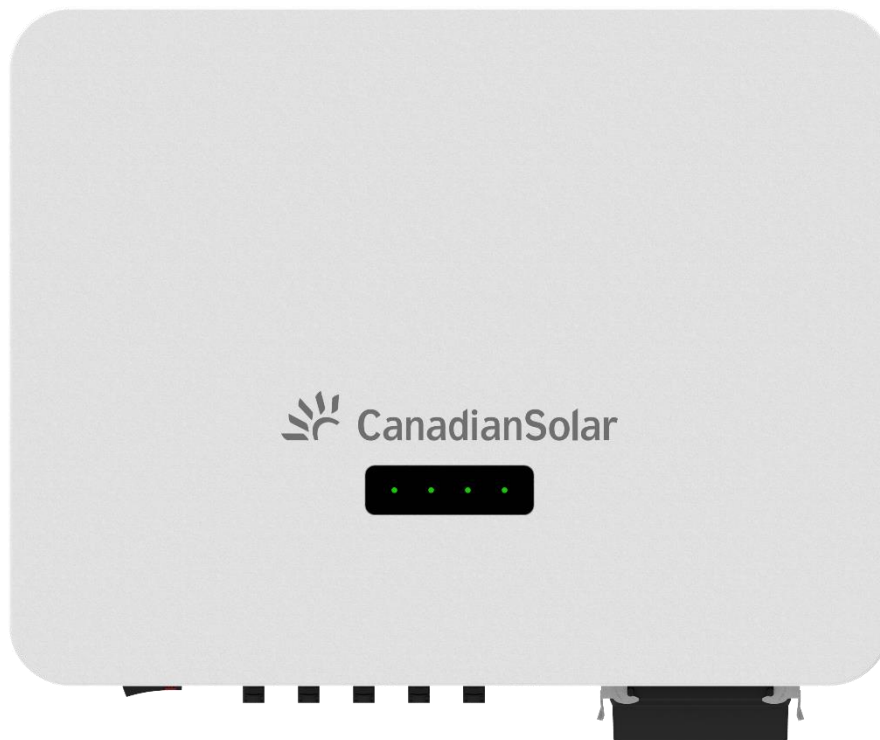


CSI-40K-T4001A-E  
CSI-50K-T4001A-E  
CSI-60K-T4001A-E



## **PV Inverter User Manual**

(Part No: 91000207; Release Date: May, 2023)

## Contents

<b>All Rights Reserve</b>	<b>1</b>
<b>About This Manual</b>	<b>1</b>
<b>Limitation of Liability</b>	<b>1</b>
<b>Target Group</b>	<b>1</b>
<b>Symbol Conventions</b>	<b>1</b>
<b>1 Safety</b>	<b>1</b>
<b>1.1 Utility Grid</b>	<b>2</b>
<b>1.2 Inverter</b>	<b>2</b>
<b>1.3 Skills of Qualified Personnel</b>	<b>3</b>
<b>2 Product Introduction</b>	<b>3</b>
<b>2.1 Intended Usage</b>	<b>3</b>
<b>2.2 Product Introduction</b>	<b>4</b>
2.2.1 Appearance and dimension	4
2.2.2 LED Indicator Panel	5
<b>2.3 Circuit Diagram</b>	<b>5</b>
<b>2.4 Function Description</b>	<b>6</b>
<b>3 Unpacking and Storage</b>	<b>6</b>
<b>3.1 Unpacking and Inspection</b>	<b>6</b>
<b>3.2 Identifying the Inverter</b>	<b>7</b>
<b>3.3 Scope of Delivery</b>	<b>8</b>
<b>3.4 Storage</b>	<b>8</b>
<b>4 Mechanical Mounting</b>	<b>8</b>
<b>4.1 Safety during Mounting</b>	<b>8</b>
<b>4.2 Location Requirements</b>	<b>9</b>
4.2.1 Installation Environment Requirements	9
4.2.2 Carrier Requirements	9
4.2.3 Installation Angle Requirements	9
4.2.4 Installation Clearance Requirements	10
<b>4.3 Moving the Inverter</b>	<b>10</b>
4.3.1 Manual Handling	10
4.3.2 Hoisting Transport	11
<b>4.4 Assembling the mounting-bracket</b>	<b>11</b>
<b>4.5 Standard C or U Steel Installation</b>	<b>12</b>
<b>4.6 Steel Frame Installation</b>	<b>12</b>
<b>4.7 Wall-Mounted Installation</b>	<b>12</b>

<b>4.8 Inverter Installation</b>	<b>13</b>
<b>5 Electrical Connection</b>	<b>13</b>
<b>5.1 Safety</b>	<b>13</b>
<b>5.2 Electrical Connection Overview</b>	<b>13</b>
<b>5.3 Connecting the PE Cable</b>	<b>14</b>
5.3.1 Additional Grounding Requirements	14
5.3.2 Connection Procedure	15
<b>5.4 Communication Cable Connection</b>	<b>15</b>
5.4.1 Data Logger Connection	15
5.4.2 RS485 Communication Connection	16
5.4.3 Smart Meter Connection (Optional)	17
<b>5.5 AC Cable Connection</b>	<b>17</b>
5.5.1 AC Side Requirements	17
5.5.2 Connection Procedure	18
5.5.3 Aluminium Cable Requirement	20
<b>5.6 DC Cable Connection</b>	<b>20</b>
5.6.1 PV Input Configuration	21
5.6.2 DC input Terminals Configuration	21
5.6.3 DC cable connection	23
5.6.4 Installing the PV Connectors.	23
<b>6 Commissioning Inverter</b>	<b>24</b>
<b>6.1 Electrical Inspection</b>	<b>24</b>
<b>6.2 Commissioning Procedure</b>	<b>24</b>
<b>7 CSI CloudPro APP</b>	<b>25</b>
<b>7.1 APP Introduction</b>	<b>25</b>
<b>7.2 Download and Install the App</b>	<b>25</b>
<b>7.3 Use the Local Mode to Login the App</b>	<b>25</b>
<b>8 System Decommissioning</b>	<b>27</b>
<b>8.1 Disconnecting the Inverter</b>	<b>27</b>
<b>8.2 Dismantling the Inverter</b>	<b>27</b>
<b>8.3 Disposal of the Inverter</b>	<b>27</b>
<b>9 Daily Maintenance</b>	<b>28</b>
<b>10 Troubleshooting</b>	<b>28</b>
<b>10.1 Warning</b>	<b>28</b>
<b>10.2 Errors</b>	<b>29</b>
<b>ANNEX: Specification</b>	<b>31</b>

## All Rights Reserve

This manual provides important safety information on relating to the installation, maintenance and usage of three phase PV inverters. Both users and professional installers must read these guidelines carefully and strictly follow these instructions. Failure to follow these instructions may result in death, serious injury or property damage. Only qualified professionals and service personnel can do the installation and operation. Installers must inform end-users (consumers) about the aforesaid information accordingly.

This manual is only valid for the PV inverter types: CSI-40K-T4001A-E, CSI-50K-T4001A-E, CSI-60K-T4001A-E

## About This Manual

The information contained in this manual is subject to change by CSI Solar Co., Ltd. without prior notice. CSI Solar Co., Ltd. gives no warranty of any kind whatsoever, either explicitly or implicitly, with respect to the information contained herein.

In the event of any inconsistency among different language versions of this document, the English version shall prevail. Please refer to our product lists and documents published on our website at: <http://www.csisolar.com> as these lists are updated on a regular basis.

### Limitation of Liability






CSI Solar Co., Ltd. shall not be held responsible for damages of any kind, including-without limitation-bodily harm, injury or damage to property, in connection with handling PV inverters, system installation, or compliance or non-compliance with the instructions set forth in this manual.

### Target Group

This document is intended for installers and users.

### Symbol Conventions

The Important instructions contained in this manual should be followed during installation, operation and maintenance of the inverter. They will be highlighted by the following symbols.

Symbol	Description
 DANGER	Indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.
 WARNING	Indicates a hazard with a medium level of risk that, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a hazard with a low level of risk that, if not avoided, could result in minor or moderate injury.
 NOTICE	Indicates a situation that, if not avoided, could result in equipment or property damage.
 Information	Indicates additional information, emphasized contents or tips that may be helpful, e.g. to help you solve problems or save time.

## 1 Safety

The inverter has been designed and tested strictly according to international safety regulations. Read all safety instructions carefully prior to any work and observe them at all times when working on or with the inverter.


Incorrect operation or work may cause:

- Injury or death to the operator or a third party; or
- Damage to the inverter and other property safety of the operator or a third party. All detailed work-related safety warning and notes will be specified at critical points in this manual.

Notice:


The safety instructions in this manual cannot cover all the precautions that should be followed. Perform operations considering actual onsite conditions.

CSI Solar shall not be held liable for any damage caused by violation of the safety instructions in this manual.





 <p><b>DANGER</b></p>	<p>PV strings will produce electrical power when exposed to sunlight and can cause a lethal voltage and an electric shock.</p> <ul style="list-style-type: none"> <li>• Always keep in mind that the inverter is dual power supplied. Electrical operators must wear proper personal protective equipment: helmet, insulated footwear, glove, etc.</li> <li>• Before touching the DC cables, operator must use a measuring device to ensure that the cable is voltage - free.</li> <li>• Follow all warnings on the PV strings and in its manual.</li> </ul>
--	--

## 1.1 Utility Grid



Please follow the regulations related to the utility grid.




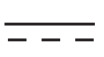

 <p><b>NOTICE</b></p>	<ul style="list-style-type: none"> <li>• All electrical connections must be in accordance with local and national standards.</li> <li>• Only with the permission of the utility grid, the inverter can be connected to the utility grid.</li> </ul>
--	---

## 1.2 Inverter

Symbol	Description
 <p><b>DANGER</b></p>	<p>Danger to life from electric shocks due to live voltage</p> <p>Do not open the enclosure at any time. Unauthorized opening will void guarantee and warranty claims and in most cases terminate the operating license.</p>
 <p><b>WARNING</b></p>	<p>Risk of inverter damage or personal injury!</p> <ul style="list-style-type: none"> <li>• Do not pull out the PV connectors when the inverter is running.</li> <li>• Wait at least 5 minutes for the internal capacitors to discharge. Ensure that there is no voltage or current before pulling any connector.</li> </ul>
 <p><b>CAUTION</b></p>	<p>Risk of burns due to hot components!</p> <p>Do not touch any hot parts (such as heat sink) during operation. Only the DC switch can safely be touched at any time.</p>
 <p><b>NOTICE</b></p>	<p>Only qualified personnel can perform the country setting.</p> <ul style="list-style-type: none"> <li>• Unauthorized alteration of the country setting may cause a breach of the type-certificate marking.</li> </ul> <p>By touching the electronic components, you may damage the inverter. For inverter handling, be sure to:</p> <ul style="list-style-type: none"> <li>• avoid any unnecessary touching;and,</li> <li>• wear a grounding wristband before touching any connectors.</li> </ul> <p>Persons with limited mobility or mentally retarded are not allowed to operate the inverters.</p>

### Warning Label

Symbol	Description
	<p>Hot surfaces!</p> <p>Risk of burns due to hot components!</p>
	<p>Disconnect the inverter from all the external power sources before service!</p>

	Danger to life due to high voltage!
	Time need to discharge stored energy in the capacitors.
	Grounding
	Direct Current (D C)
	Alternating Current(A C)

1.3 Skills of Qualified Personnel

All installations should be performed by qualified personnel. They should have:

- Training in the installation and commissioning of the electrical system, as well as the dealing with hazards.
- Knowledge of the manual and other related documents.
- Knowledge of the local regulations and directives.

2 Product Introduction

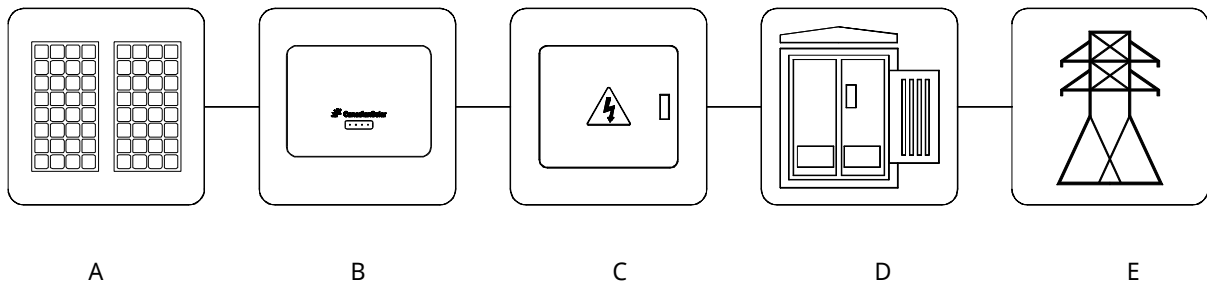
2.1 Intended Usage

The inverter is a transformerless three-phase PV grid-connected inverter, is an integral component in the PV power system.

This document involves the following product models:


CSI-40K-T4001A-E, CSI-50K-T4001A-E, CSI-60K-T4001A-E.

The inverter is designed to convert the direct current power generated from the PV modules into grid-compatible AC current and feeds the AC current to the utility grid. The intended usage of the inverter is illustrated in figure as bellow, inverter application in PV power system.



A) PV string; B) Inverter; C) AC distribution box/cabinet; D) Transformer station; E) Utility grid

FIG. 2-1 Inverter application in PV power system

**WARNING**

Inverter cannot connect the PV strings whose positive and negative terminals need to be grounded.  
Do not connect any local load between the inverter and the AC circuit breaker.

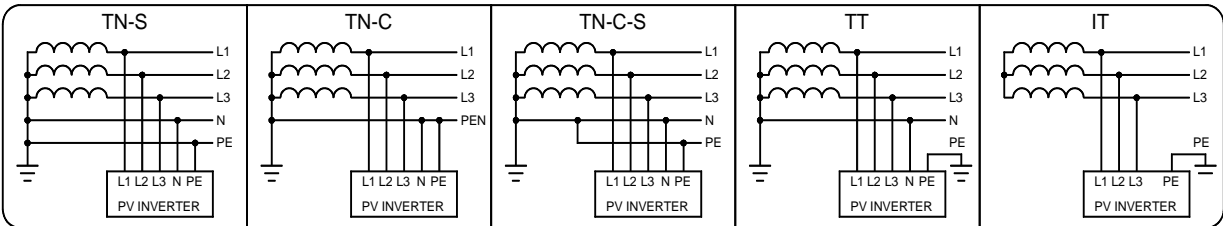
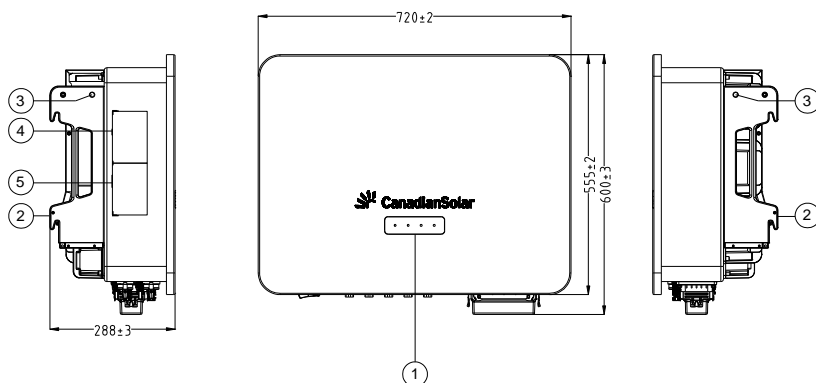


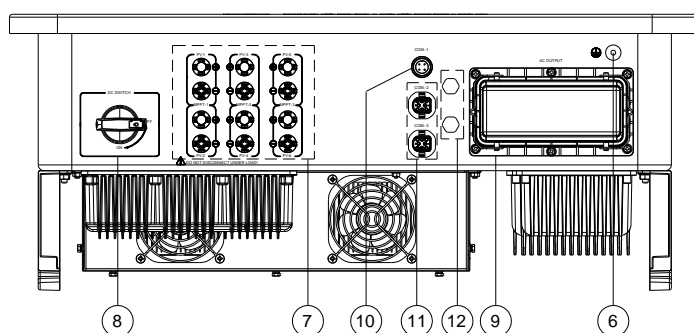
FIG 2-2 Power grid types supported by the inverter

## 2.2 Product Introduction

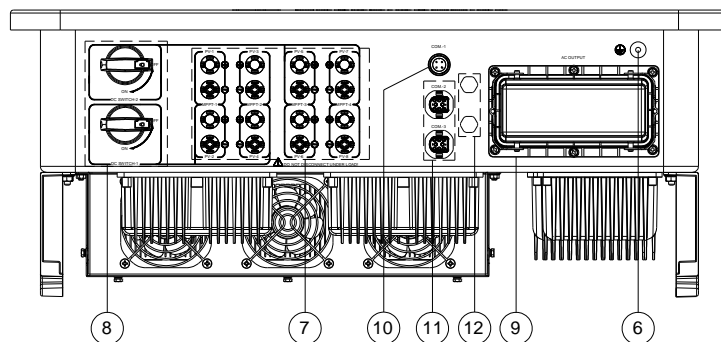
### 2.2.1 Appearance and dimension



CSI-40K-T4001A-E



CSI-50K-T4001A-E



CSI-60K-T4001A-E

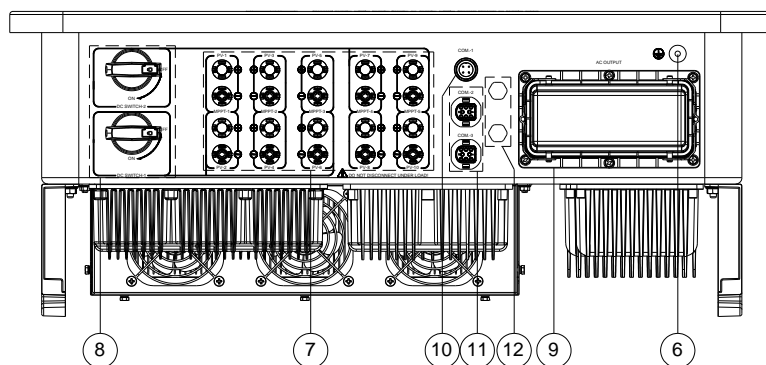


FIG 2-3 Product introduction (The picture is for reference only)

1. LED indicator panel

2. Side handles and mounting ears

3. M12 holes for lifting eyes

4. Rating label

5. Warning label

6. Additional grounding point
7. PV input connectors

8. DC disconnect switch

9. AC terminal block and protection cover

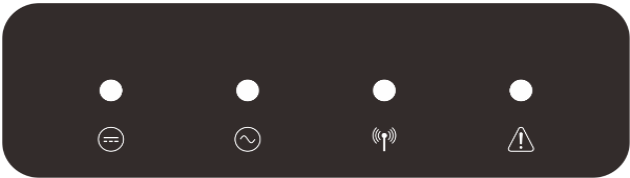
10. Connector for wireless communication

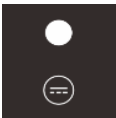
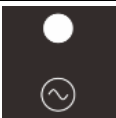


11. Connectors for RS485 and export limited

12. Breather valve

2.2.2 LED Indicator Panel

As an HMI, the LED indicator panel on the front of the inverter can indicate the present working state of the inverter.



LED indicator	LED state	Definition
 PV connection indicator	Steady green	At least one PV string is properly connected, and the DC input voltage of the corresponding MPPT circuit is at least 200V.
	Off	The solar inverter disconnects from all PV strings, or the DC input voltage of all MPPT circuits is less than 200V.
 Grid connection indicator	Steady green	The solar inverter is in grid-tied mode.
	Blinking green	The solar inverter is in self-test mode or wait mode.
	Off	The solar inverter is not in grid-tied mode.
 Communications/Maintenance indicator	Blinking green	The solar inverter receives communication data normally
	Off	The solar inverter has not receives communication data for 10 seconds.
	Steady green	The solar inverter is in maintenance status
 Alarm indicator	Steady red	A major alarm is generated.
	Blinking red	A minor or warning alarm is generated.
	Off	No alarm



Turn the DC switches to the ON position before restarting the inverter.

2.3 Circuit Diagram

The MPPT is utilized for DC input to ensure the maximum power from the PV array at different PV input conditions. The inversion circuit converts the DC power into AC power and feeds the AC power into the utility grid through the AC terminal. The protection circuit is equipped to ensure the safe operation of the device and personal safety. The following figure shows the main circuit of the inverter.

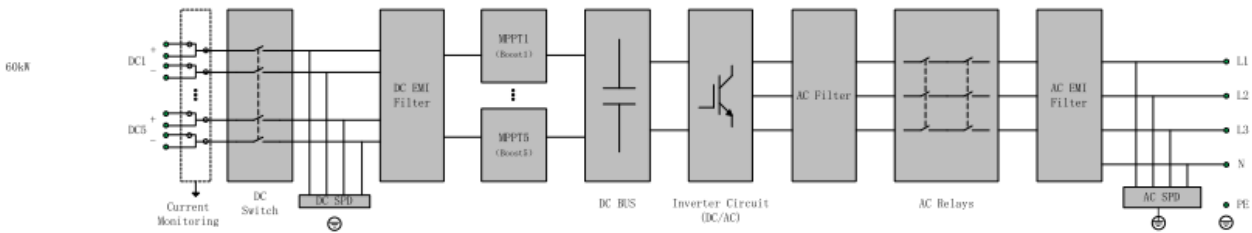


FIG 2-4 Product topological diagram



## 2.4 Function Description

The inverter is equipped with the following functions:

### 1) Conversion function

The inverter converts the DC current into grid-compatible AC current and feeds the AC current into the grid.

### 2) Data storage

The inverter logs running information, error records, etc.

### 3) Parameter configuration

The inverter provides various settable parameters. Users can set parameters via the App to meet the requirements and optimize the performance.

### 4) Communication interface

The inverter is designed with standard RS485 communication interfaces.

The standard RS485 communication interfaces are used to establish communication connection with monitoring devices and upload monitoring data by using communication cables.

After communication connection is established, users can view inverter information or set inverter parameters through the iSolarCloud.

### 5) Protection Function

The protective functions are integrated in the inverter, including anti-island protection, LVRT/ZVRT, DC reversed polarity protection, AC short circuit protection, leakage current protection, DC overvoltage/overcurrent protection, etc.

### 6) PID function (optional)

After the PID function is enabled, the voltage to ground of all PV modules is greater than 0, that is, the PV module-to-ground voltage is a positive value.

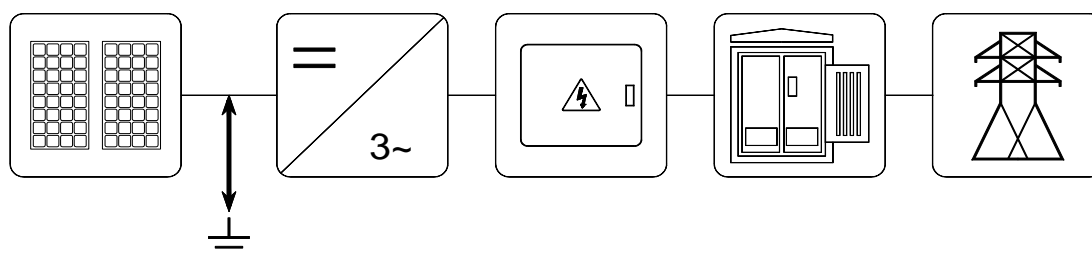




FIG 2-5 PID functional system diagram

 <b>NOTICE</b>	<ul style="list-style-type: none"> <li>Before enabling the PID recovery function, make sure the voltage polarity of the PV modules to ground meets requirement. If there are any questions, contact the PV module manufacturer or read its corresponding user manual.</li> <li>If the voltage scheme for the PID protection/recovery function does not meet the requirement of corresponding PV modules, the PID function will not work as expected or even damage the PV modules.</li> </ul>
--	---


### • Anti-PID function

When the inverter is running, the PID function module rises the potential between the negative pole of the PV array and the ground to a positive value, to suppress the PID effect.

	<p>Make sure the inverter is applied to an IT system before enabling the anti-PID function.</p>
---	---

### • PID recovery function

When the inverter is not running, the PID module will apply inverse voltage to PV modules, to restore the degraded modules.

	<ul style="list-style-type: none"> <li>If the PID recovery function is enabled, it only works at night.</li> <li>After the PID recovery function is enabled, the voltage of the PV string to ground is 500Vdc by default, and the default value can be modified through the App.</li> </ul>
---	---

## 3 Unpacking and Storage

### 3.1 Unpacking and Inspection

Before unpacking the inverter, check the package appearance thoroughly, such as for holes and cracks, and check the inverter model accordingly. If you discover any damage to the packaging which indicates the inverter may have been

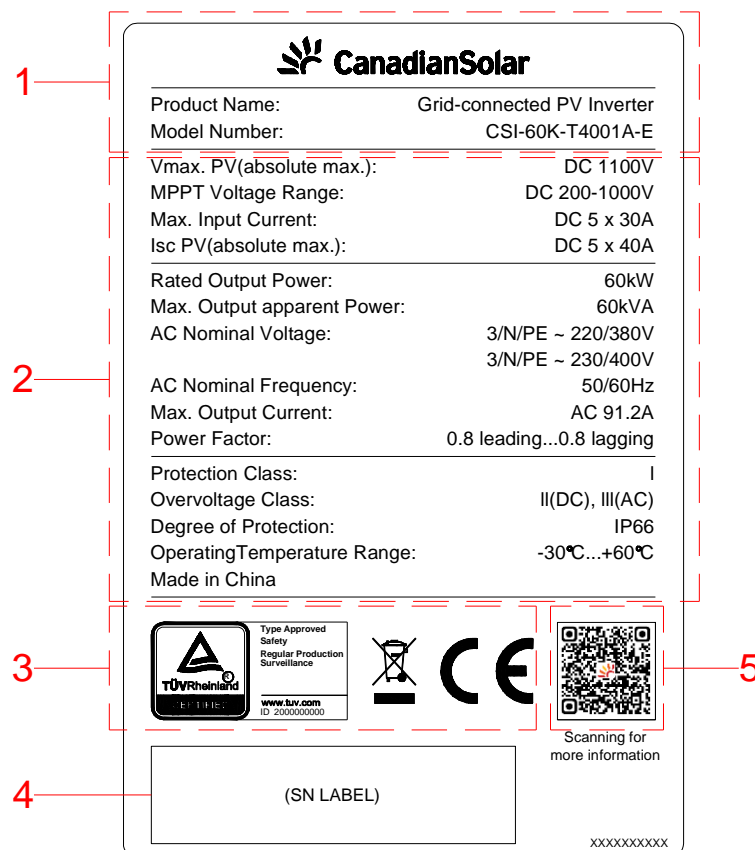
damaged, or the inverter model is not the one you requested, do not unpack the product and contact your dealer immediately.

After opening the package, check all of the accessories carefully in the carton. If any damage is found or any component is missing, contact your local installer.

### 3.2 Identifying the Inverter

The nameplate provides a unique identification of the inverter (Product type, device -specific characteristics, certificates and approvals).

The nameplate is on the left side of the enclosure.



- (1) Company name and product model
- (2) Important technical specifications
- (3) Compliance symbols
- (4) Series number
- (5) QR Code for user manual

FIG 3-1 Inverter Nameplates (for reference)

### 3.3 Scope of Delivery

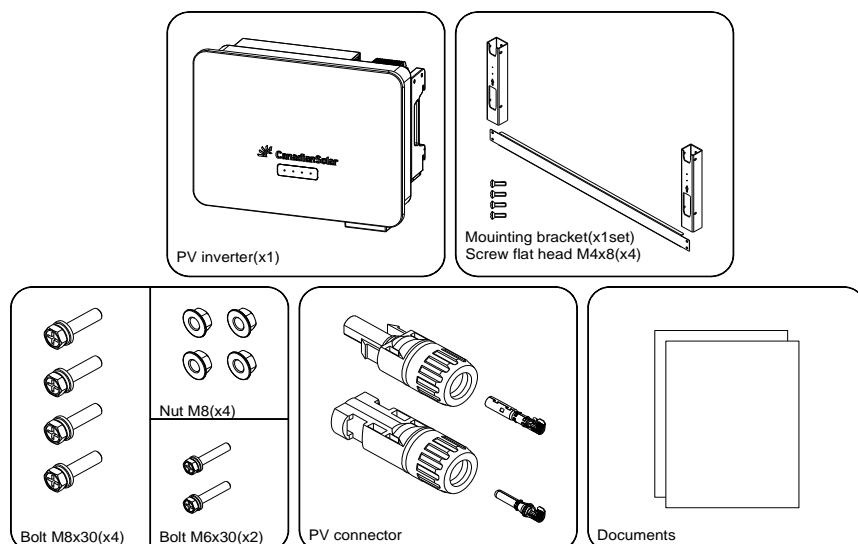


FIG 3-2 Scope of supply diagram (The actual configuration in order to prevail in kind)

Note (PV connector): CSI-40K-T4001A-E (x6 pairs)  
 CSI-50K-T4001A-E (x8 pairs)  
 CSI-60K-T4001A-E (x10 pairs)

### 3.4 Storage

The following requirements should be met when the inverters need to be stored:

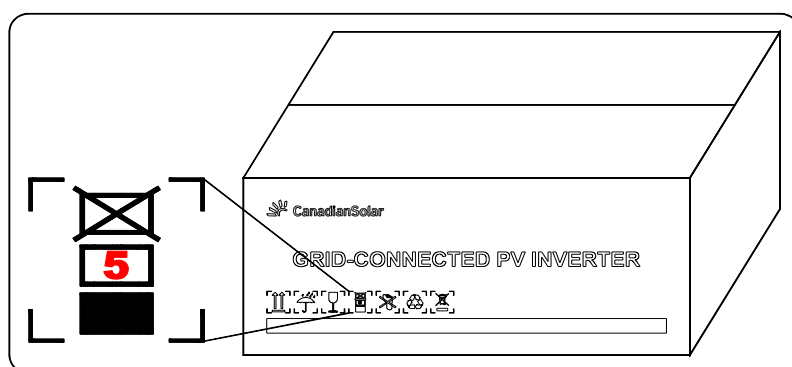
Storage temperature:  $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$ .

Storage humidity: 0% ~ 100%RH (Non-Condensing).

The warehouse should be clean, well-ventilated, and non-corrosive gas (corrosive or flammable gases), meanwhile it should be accessible all the time.

No smoking, no illegal use of electricity and fire.

When storing inverters, do not stack more than the allowed layers to avoid damage, which number marked on the product packaging.





Do not tilt the package or place it upside down.

Regular inspection is required during the storage.

If the inverter has been stored more than half a year, it must be checked and tested by professionals before put into use.

## 4 Mechanical Mounting

### 4.1 Safety during Mounting

 <b>DANGER</b>	<p>Make sure there is no electrical connection before installation.</p> <p>In order to avoid electric shock or other injury, be sure there is no electricity or plumbing installations before drilling holes.</p>
 <b>CAUTION</b>	<p>Risk of injury due to improper handling</p> <ul style="list-style-type: none"> <li>• Always follow the instructions when moving and positioning the inverter.</li> <li>• Improper operation may cause injuries, serious wounds, or bruise.</li> </ul> <p>System performance loss due to poor ventilation!</p> <p>Keep the heat sinks uncovered to ensure heat dissipation performance.</p>

## 4.2 Location Requirements

Select an optimal mounting location for safe operation, long service life, and outstanding performance.

- The inverter with IP 66 can be installed both indoors and outdoors.
- Install the inverter in a place convenient for electrical connection, operation, and maintenance.

### 4.2.1 Installation Environment Requirements

- 1) Do not install the inverter on the structures constructed of flammable, thermolabile or explosive materials.
- 2) Ensure the inverter is out of children's reach.
- 3) The ambient temperature should be between -30°C to 60°C.
- 4) The humidity of the installation location should be below 100% without condensation.
- 5) Do not install the inverter outdoors in salt, sulfur or other corrosive areas.

The inverter would be corroded in salt (i.e. marine environments) area, and the corrosion may cause fire. In salt area refers to the region within 500 meters from the coast.

Please consult the CSI Solar Co., Ltd. technical support department on the use of inverters in special climates (i.e. salt, sulfur, or ammonia areas) which may affect the product warranty.

- 6) Prevent the inverter from direct exposure to sun, rain and snow.
- 7) The inverter should be well ventilated. Ensure air circulation
- 8) Never install the inverter in living areas. The inverter will generate noise during operation, affecting daily life.
- 9) Install at an appropriate height for ease of viewing LED indicators and operating switches
- 10) Do not install in small closed cabinet where air cannot circulate freely.

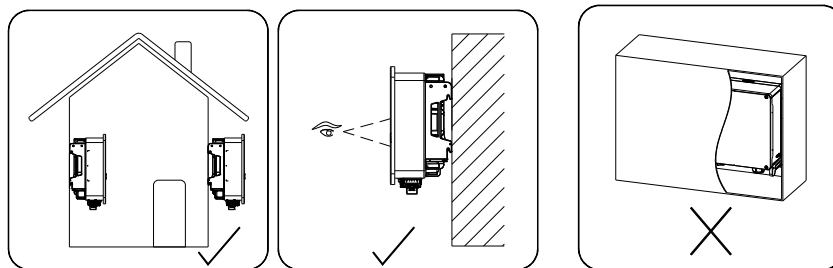


FIG 4-1 Installation site

### 4.2.2 Carrier Requirements

The installation carrier should meet the following requirements:

Made of non-flammable materials;

Max. load bearing capacity  $\geq 4$  times of inverter weight.

### 4.2.3 Installation Angle Requirements

It is recommended to install the inverter vertically. Forward installation or upside down installation is prohibited.

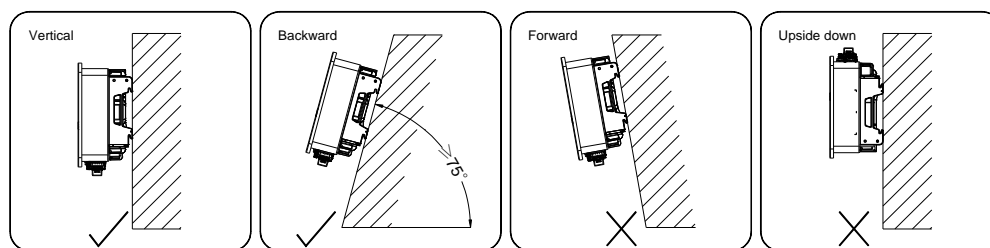


FIG 4-2 Installation angle

#### 4.2.4 Installation Clearance Requirements

1) Reserve enough clearance around the inverter to ensure sufficient space for heat dissipation. (Under the premise of ensuring installability, the gap between the left and right sides of the inverter can be reduced to 200mm, and it is recommended to be  $\geq 500\text{mm}$ .)

2) In case of multiple inverters, reserve specific clearance between the inverters.

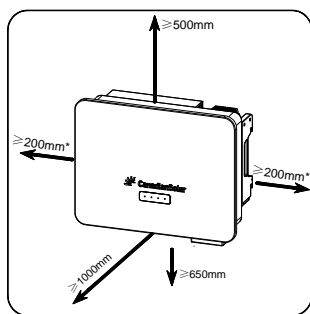


FIG 4-3 Single installation space

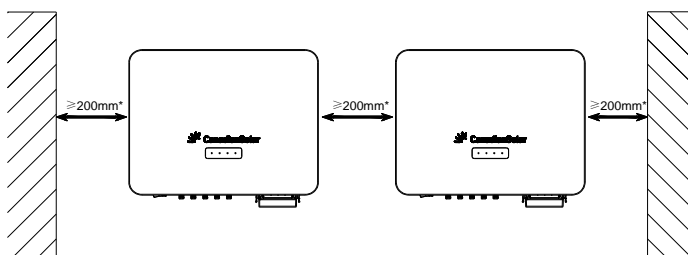


FIG 4-4 Multiple installation space

3) In case of back-to-back installation, reserve specific clearance between the two inverters.

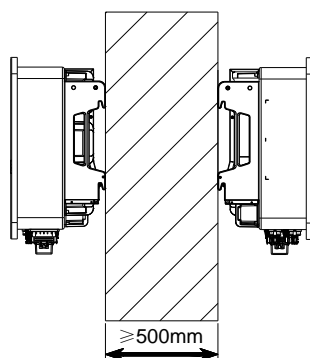


FIG 4-5 Back-to-back installation

### 4.3 Moving the Inverter

Move the inverter to the specified position before installation. The inverter can be moved manually or via a hoist.

#### 4.3.1 Manual Handling

Use the backplane and handles on the base to transport the inverter to the destination.

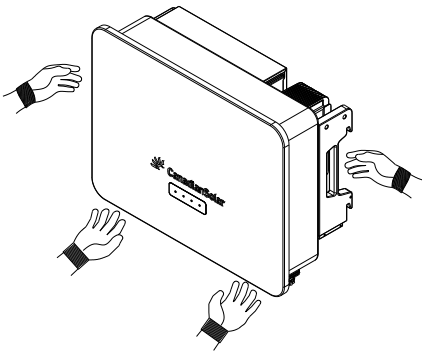


FIG 4-6 Manual handling

4.3.2 Hoisting Transport

- Step 1: Install two M12 lifting eye nuts into the corresponding M12 holes at side handles of the inverter.
- Step 2: Lead the sling through the two lifting eye nuts and fasten the tie-down strap.
- Step 3: Hoist the inverter, and stop to check for safety when the inverter is 100mm above the ground. Continue hoisting the device to the destination after ensuring the safety.
- Step 4: Remove the two lifting eye nuts.

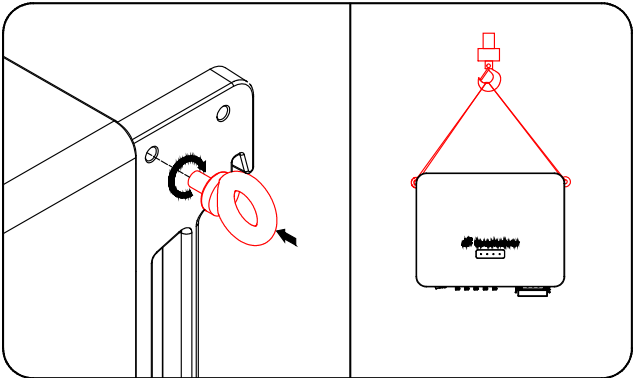




FIG 4-7 Lifting and handing schematic diagram

 <b>CAUTION</b>	Keep the inverter balanced throughout the hoisting process and avoid collisions with walls or other objects. Stop hoisting in the event of severe weather, such as heavy rain, thick fog, or strong wind.
	The lifting rings and the sling are not within the delivery scope.

4.4 Assembling the mounting-bracket

Dimensions of the assembled mounting-bracket are as follows.

Assemble the mounting-bracket by using the connecting bar.

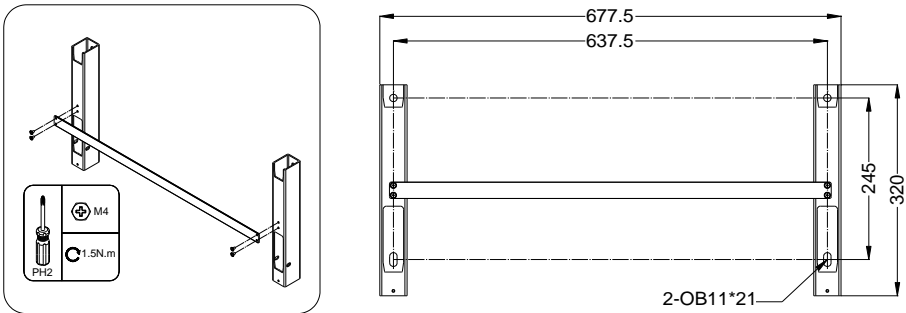


FIG 4-8 Assembly mounting bracket

## 4.5 Standard C or U Steel Installation

Mounting Steps:

Step 1 Localize the hole positions in C or U-section steel to install mounting bracket.

Step 2 Secure the mounting bracket with M8 bolts and nuts.

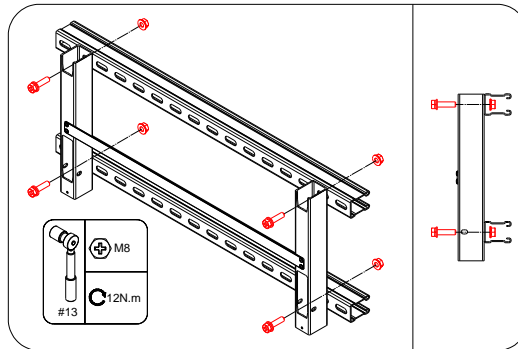


FIG 4-9 Locate the mounting hole

## 4.6 Steel Frame Installation

Mounting Steps:

Step 1: Level the assembled mounting-bracket by using a level, and mark the positions for drilling holes on the steel frame. Drill the holes by using a hammer drill. Recommended aperture:10mm.

Step 2: Secure the mounting-bracket with M8 bolts and nuts.

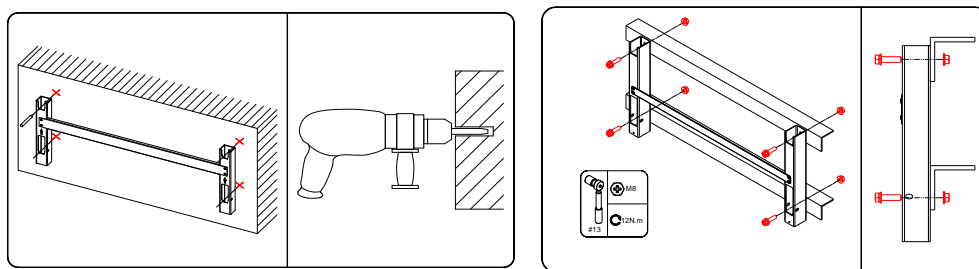


FIG 4-10 Install the wall bracket

## 4.7 Wall-Mounted Installation

M8 or M10 expansion bolts can be used to fix the wall bracket on the wall. (Note: No expansion bolt is supplied)

Mounting Steps

Step 1: Level the assembled mounting-bracket by using a level, and mark the positions for drilling holes on the installation site.

Step 2: Insert the expansion bolts into the holes and secure them with a rubber hammer. Fasten the nut with a wrench to expand the bolt. Remove the nut, spring washer, and flat washer, and store them properly.

Step 3: Fix the mounting-bracket with the expansion bolts.

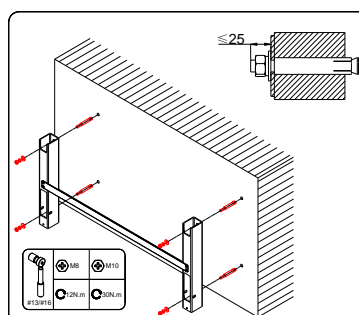


FIG 4-11 Install the wall bracket

4.8 Inverter Installation

- Step 1: Take out the inverter from the packing carton.
- Step 2: If the inverter is installed in a high position, hoisting the inverter is recommended (refer to "4.3.2 Hoisting Transport"). If not, skip performing this step.
- Step 3: Hang the inverter to the mounting-bracket and ensure that the mounting ears perfectly engage with the mounting-bracket.
- Step 4: Fix the inverter with screws M6x30 (Note: It is not locked or fixed here, and the screw can be locked to the end).

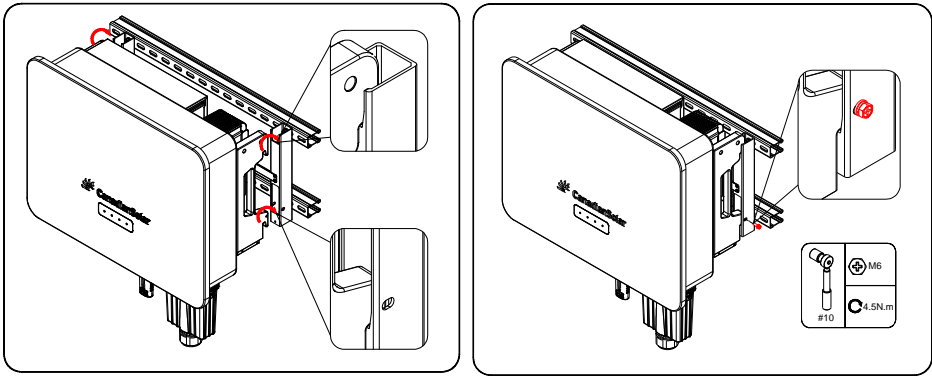





FIG 4-12 Install the inverter

5 Electrical Connection

5.1 Safety

Prior to any electrical connections, keep in mind that the inverter has dual power supplies.

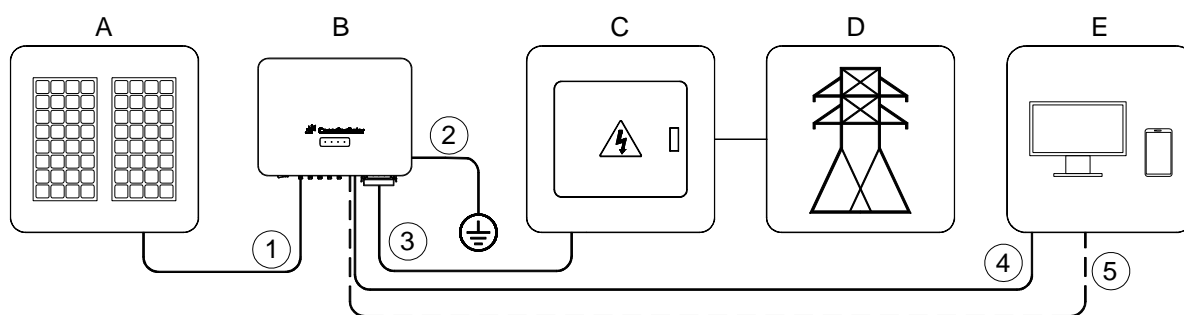
It is mandatory for the qualified personnel to wear personal protective equipments (PPE) during the electrical work.

 <b>DANGER</b>	<ul style="list-style-type: none"><li>• Danger to life due to a high voltage inside the inverter!</li><li>• The PV string will generate lethal high voltage when exposed to sunlight.</li><li>• Before starting electrical connections, disconnect the DC and AC circuit. breakers and prevent them from inadvertent reconnection.</li><li>• Ensure that all cables are voltage free before performing cable connection.</li></ul>
 <b>WARNING</b>	<ul style="list-style-type: none"><li>• Any improper operations during cable connection can cause device damage or personal injury.</li><li>• Only qualified personnel can perform cable connection.</li><li>• All cables must be undamaged, firmly attached, properly insulated and adequately dimensioned.</li></ul>
 <b>NOTICE</b>	<ul style="list-style-type: none"><li>• Comply with the safety instructions related to the PV strings and the regulations related to the utility grid.</li><li>• All electrical connections must be in accordance with local and national standards.</li><li>• Only with the permission of the utility grid, the inverter can be connected to the utility grid.</li></ul>

5.2 Electrical Connection Overview

Electrical connection in the PV system includes additional grounding connection, AC connection, and PV string connection.





A) PV string; B) Inverter; C) AC distribution box/cabinet; D) Utility grid; E) Monitoring device

FIG 5-1 General electrical connection diagram

Table 5-1 Recommended Cables


No.	Cable Name	Cable Type	Conductor Cross-Sectional Area	Outer Diameter
1	DC cable	PV cable, complying with 1500V standard	4~6mm <sup>2</sup>	6~9mm
2	Additional Grounding cable	Outdoor single core copper conductor cable	The same as that of the PE wire in the AC cable	N/A
3	AC cable	Four/Five-core outdoor copper or aluminum cables* 【1】	L1/L2/L3/N (40kW) : 16~35 mm <sup>2</sup> L1/L2/L3/N (50~60kW) : 25~50 mm <sup>2</sup> PE wire: refer to "table 5-2 PE wire requirements"	22~38mm
4	Communication cable	Shielded twisted pair	0.25~1.0 mm <sup>2</sup> (24-18 AWG)	4.0~5.5mm
5	Wireless communication	N/A	N/A	N/A

\* 【1】 A copper to aluminum adapter terminal is required when an aluminum cable is used.

Table 5-2 PE wire requirements

Phase wire cross section S	PE wire cross section	Note
16<S≤35 mm <sup>2</sup>	16 mm <sup>2</sup>	The specifications are valid only when the phase wire and PE wire use the same material. If otherwise, ensure that the cross section of PE wire produces a conductance equivalent to that of the wire specified in the table.
S > 35mm <sup>2</sup>	S/2	

### 5.3 Connecting the PE Cable

 <b>WARNING</b>	<p>Since the inverter is a transformerless inverter, neither the negative pole nor the positive pole of the PV string can be grounded. Otherwise, the inverter will not operate normally.</p> <p>Connect the additional grounding terminal to the protective grounding point before AC cable connection, PV cable connection, and communication cable connection.</p> <p>The ground connection of this additional grounding terminal cannot replace the connection of the PE terminal of the AC cable. Make sure those terminals are both grounded reliably.</p>
---	--

#### 5.3.1 Additional Grounding Requirements

All non-current carrying metal parts and device enclosures in the PV power system should be grounded, for example, brackets of PV modules and inverter enclosure. When there is only one inverter in the PV system, connect the additional grounding cable to a nearby grounding point.

When there are multiple inverters in the PV system, connect grounding points of all inverters and the PV array frames

to the equipotential cable (according to the onsite conditions) to implement an equipotential connection.

### 5.3.2 Connection Procedure

Step 1 Prepare an external ground cable according to the following figure: strip the cable - > crimp the terminal - > cover the heat shrinkable sleeve. Recommended terminal type: DT/OT.

Step 2 Remove the screw on the grounding terminal and fasten the cable with a wrench.

Step 3 Apply paint to the grounding terminal to ensure corrosion resistance.

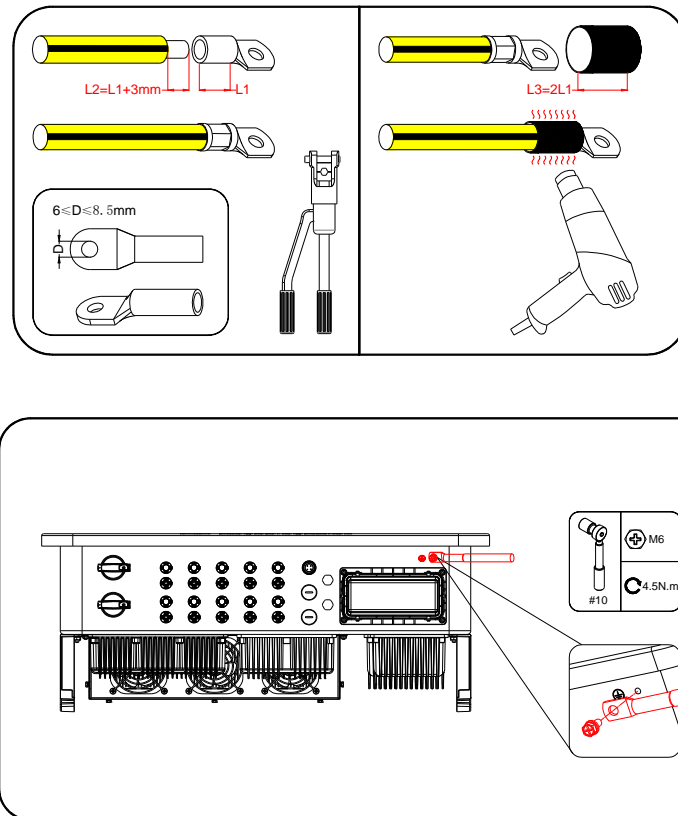


FIG 5-2 Install ground cables



The grounding screws have been anchored to the side of the inverter before delivery, and do not need to be prepared.

## 5.4 Communication Cable Connection

This series of models provides standard wireless communication function and optional wired communication function.

### 5.4.1 Data Logger Connection

Connect the Data Logger to the communication accessory port.

After successful connection, information such as power generation and running state of the inverter can be viewed via the APP on the phone.

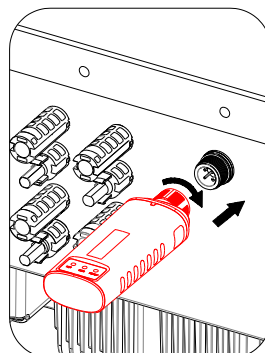


FIG 5-3 Data logger connection

## 5.4.2 RS485 Communication Connection

### 5.4.2.1 Multi-inverter communication system

In case of multiple inverters, select COM-2 port to achieve communication connection in daisy chain form.

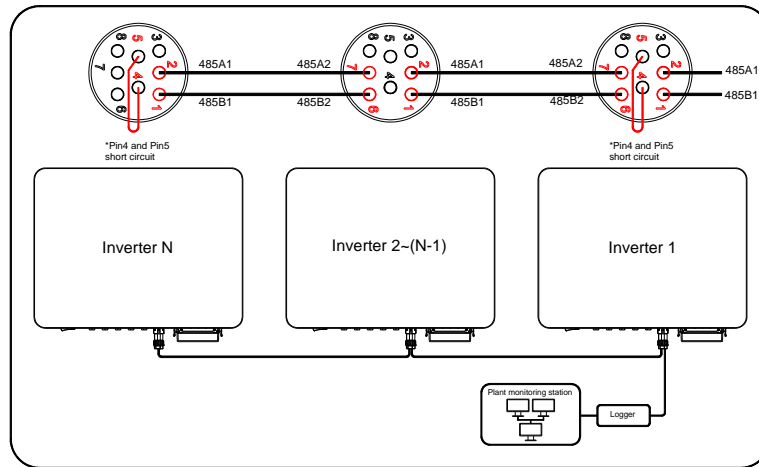


FIG 5-4 Multiple Communication Networks



**NOTE:** When more than 15 inverters are connected on the same daisy chain, the two inverters at both ends of the daisy chain, Pin4 and Pin5 of the terminals must be short circuited to ensure communication quality, and the shielding layer of the communication cable should be grounded at a single point.

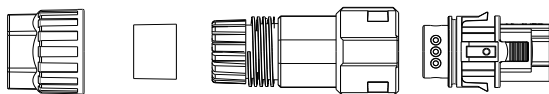
### 5.4.2.2 RS485 communication cable connection

Wiring signal connector

1) Diagram of connector, as per FIG.5-5.

2) Prepare the Signal Cable

Remove the signal cable's jacket about 23mm, and then strip the wire insulation layer about 7mm, as per FIG.5-6.



Pressure Nut Sealing Ring Threaded Sleeve Plug (Metal Pins and shell)  
FIG.5-5 Components of Connector

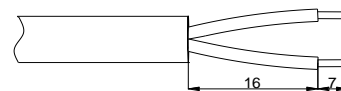
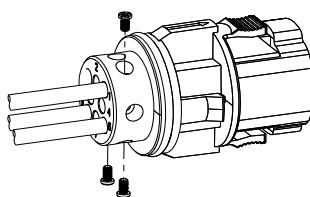


FIG.5-6 Strip Signal Cable

3) Insert the conductors into the corresponding pins of the plug, and then fix the conductors by screws firmly.

Tool: Phillips screwdriver #1. Torque: 0.6~0.8N.m.



Pin No.	Function	Inverter
PIN1	485A1	Inverter 1
PIN2	485B1	
PIN3	GND	
PIN6	485A2	Inverter 2
PIN7	485B2	
PIN8	GND	

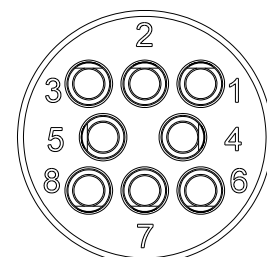


FIG.5-7 Pin positions of Connector

4) Tighten the pressure nut, and then push the threaded sleeve into the plug, as per FIG.5-8.

5) Finally insert the assembled connector into the RS485 receptacle (COM.-2) on the inverter.

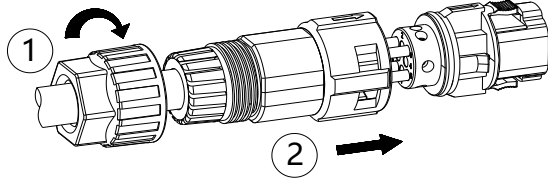


FIG.5-8 Assembling the Connector

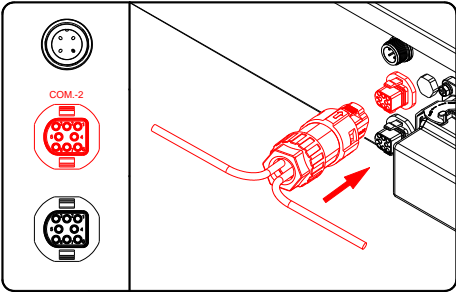


FIG.5-9 Insert the connector into receptacle

5.4.3 Smart Meter Connection (Optional)

The inverter has integrated export limitation functionality. To use this function, a smart meter must be installed.

For installation and operation methods, please refer to the instructions in the smart meter package.

5.5 AC Cable Connection

5.5.1 AC Side Requirements

Before connecting the inverter to the grid, ensure the grid voltage and frequency comply with requirements, for which, refer to Specification. Otherwise, contact the electric power company for help.



Connect the inverter to the grid only after getting an approval from the local electric power company.

AC Circuit Breaker

An independent four-pole circuit breaker is installed on the output side of the inverter to ensure safe disconnection from the grid.

Inverter	Recommended rated voltage	Recommended rated current
CSI-40K-T4001A-E	400V	80A
CSI-50K-T4001A-E	400V	100A
CSI-60K-T4001A-E	400V	125A

If multiple inverters need to share a circuit breaker, the circuit breaker should be selected according to the capacity.



**NOTICE**

Never connect a load between the inverter and the circuit breaker.

Multiple Inverters in parallel Connection

If multiple inverters are connected in parallel to the grid, ensure that the total number of parallel inverters does not exceed 25. Otherwise, please contact CSI Solar for technical scheme.

MV transformer

The MV transformer used together with the inverter should meet the following requirements:

- 1) The transformer may be a distribution transformer, and it must be designed for the typical cyclical loads of a PV system (load in the day and no load at night).
- 2) The transformer may be of the liquid-immersed type or dry type, and shield winding is not necessary.
- 3) The line-to-line voltage on the LV side of the transformer should endure the output voltage of inverter. When the transformer is connected to the IT grid, to-ground withstanding voltage of the LV winding of the transformer, the AC cables, and the secondary equipment (including the relay protection device, detection & measuring device, and other related auxiliary devices) should not be lower than 1,100V.
- 4) The line-to-line voltage on the HV side of transformer should comply with local power grid voltage.
- 5) A transformer with a tap changer on the HV side is recommended in order to keep consistent with the grid voltage.

- 6) At an ambient temperature of 45°C, the transformer can run in 1.1 times of load for long time.
- 7) Transformer with a short-circuit impedance 6% (permissible tolerance:  $\pm 10\%$ ) is recommended.
- 8) The voltage drop of system cable is no more than 3%.
- 9) The DC component that the transformer can withstand is 1% of the fundamental current at rated power.
- 10) For thermal rating, the load curve of the transformer and environment conditions should be taken into account.
- 11) The apparent power of the inverter should never exceed the power of the transformer. The maximum AC current of all inverters connected in parallel must be taken into account. If more than 25 inverters are connected to the grid, contact CSI Solar.
- 12) The transformer must be protected against overloading and short circuit.
- 13) The transformer is an important part of grid-connected PV generation system. The fault tolerance capacity of the transformer should be taken into account at all times.  
The fault include: system short circuit, grounding fault, voltage drop, etc.
- 14) Take ambient temperature, relative humidity, altitude, air quality, and other environmental conditions into account when selecting and installing the transformer.
- 15) When the anti-PID function is enabled, observe the following items:
  - If the LV side winding is in Y shape, neutral point grounding is prohibited.
  - Surge protective devices (SPD) for the AC combiner box and on the LV side of the transformer are recommended to be connected in the "3 +1" manner, as shown in the figure below. The Min. continuous operating voltages of M1-M4 are 460VAC.
  - The LV side winding of the transformer, AC cables, and secondary devices (- including protective relay, detection and measurement instruments, and related auxiliary devices) must withstand the voltage to ground of at least 1,000V.

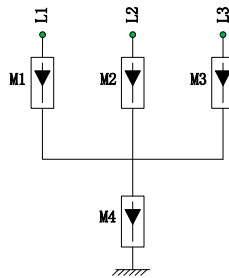


FIG 5-10 Anti-PID function connection diagram



Ensure that the selected terminal can directly contact with the copper bar.  
If there are any problems, contact the manufacturer of terminal.  
Direct contact between the copper bar and the aluminium cable will cause electrochemical corrosion and impair the reliability of electrical connection.

### 5.5.2 Connection Procedure

Step 1: Disconnect the AC-side circuit breaker and prevent it from inadvertent reconnection.

Step 2: Open the wiring compartment, loosen the swivel nut of the AC waterproof connector, take out the multi-layer sealing ring and select a seal rings according to the cable outer diameter. Lead the cable through the swivel nut, seal rings, and wiring compartment successively.

Step 3: Strip the protection layer and insulation layer by specific length, as described in the figure below.

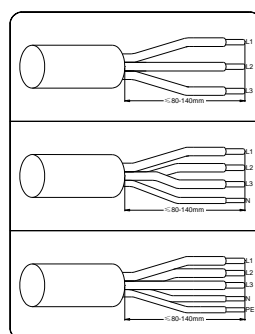


FIG 5-11 Strip the protection layer and insulation layer

Step 4: Make the cable and crimp OT/DT terminal.

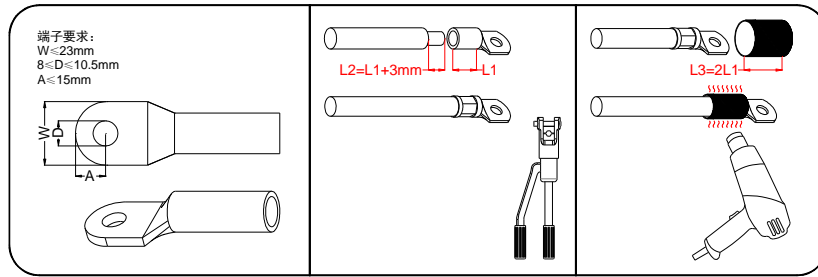


FIG 5-12 Make the cable

Step 5: Remove the protective box by pushing the clasp in the left and right directions. Take out the inter-pole insulation shield of the terminal block delivered with the machine and install it on the terminal block.

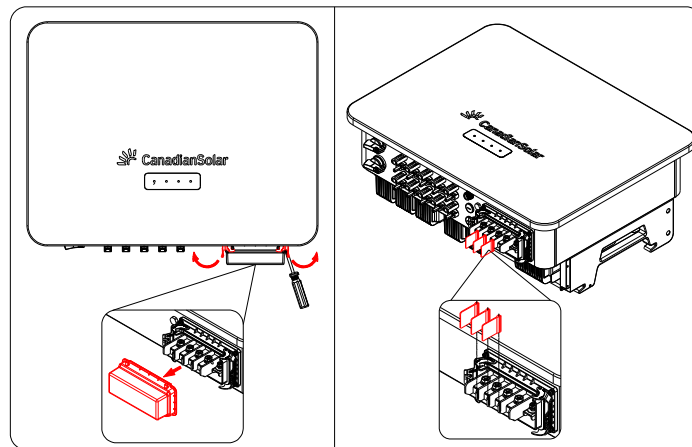


FIG 5-13 Remove the protective box and install the insulation shield between terminals

Step 6: Connect the AC cable with crimped terminals to the inverter AC terminal block.

Recommended locking torque: 8-10N.m

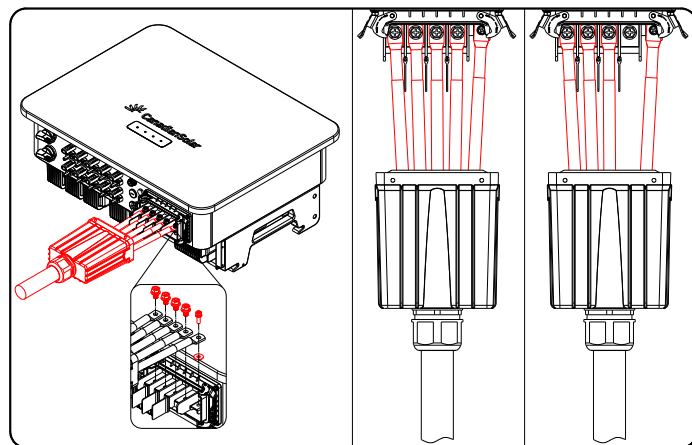


FIG 5-14 Connect AC cable

Step 7: Pull back the buckle to secure the wiring compartment.

Step 8: Gently pull the cable backwards to ensure firm connection, and fasten the swivel nut clockwise.

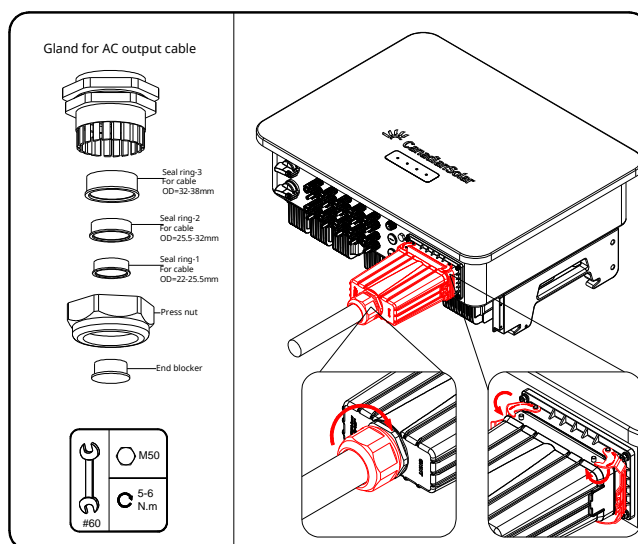


FIG 5-15 Recommended AC cable connection position

Note: The gap between AC cable and waterproof gland must be blocked with fireproof mud to prevent water or moisture.

### 5.5.3 Aluminium Cable Requirement

If an aluminium cable is selected, use a copper to aluminium adapter terminal to avoid direct contact between the copper bar and the aluminium cable.

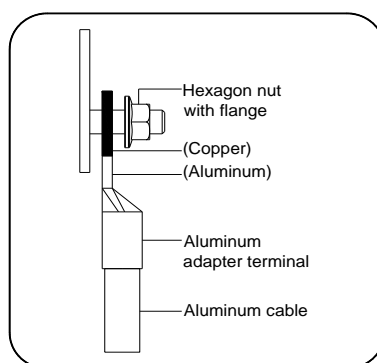






FIG 5-16 Aluminium Cable Requirement

## 5.6 DC Cable Connection

 <p><b>DANGER</b></p>	<p>Electric shock!</p> <p>The PV array will generate lethal high voltage once exposed to sunlight.</p> <p>Before performing electrical operations, ensure that all cables are uncharged.</p> <p>Do not turn on the AC circuit breaker before the inverter is electrically connected.</p>
 <p><b>DANGER</b></p>	<p>Before connecting the DC input power cable, please pay attention to the following items:</p> <ul style="list-style-type: none"> <li>• Ensure that the DC voltage is within the safe range (lower than 60 V DC) and that all the DC switches on the solar inverter are set to OFF. Failing to do so may result in electric shocks.</li> <li>• If you turn a DC SWITCH to ON by mistake when connecting or disconnecting DC input power cables, do not remove or insert DC input terminals. If you need to remove or insert a DC input terminal, perform the operations provided in 7.1 for Disconnect the inverter.</li> </ul> <p>When the solar inverter operates in grid-tied mode,</p> <ul style="list-style-type: none"> <li>• do not perform maintenance or operations on the DC circuit, such as connecting or disconnecting a PV string or a PV module in the PV string. Failing to do so may cause electric shocks or arcing, which may also cause fire.</li> </ul>
 <p><b>CAUTION</b></p>	<p>Make sure the PV array is well insulated to ground before connecting it to the inverter.</p> <p>During the installation of PV strings and the solar inverter, the positive or negative terminals of PV strings may be short-circuited to ground if the power cable is not properly installed or routed. In this case, an AC or DC short circuit may occur and damage the solar inverter. The</p>

	caused device is not covered under any warranty.
 <b>NOTICE</b>	<p>There is a risk of inverter damage! The following requirements should be met. Failure to do so will void guarantee and warranty claims.</p> <ul style="list-style-type: none"> <li>• Make sure the maximum voltage of each string is always less than 1100 V.</li> <li>• The inverter enters the standby state when the input voltage ranges between 1,000V and 1,100V. The inverter returns to the running state once the voltage returns to the MPPT operating voltage range, namely, 200 to 1,000V.</li> </ul> <p>Make sure the maximum short circuit current on the DC side is within the permissible range.</p> <ul style="list-style-type: none"> <li>• The polarities of electric connections are correct on the DC input side. The positive and negative terminals of a PV module connect to corresponding positive and negative DC input terminals of the solar inverter.</li> </ul>


#### 5.6.1 PV Input Configuration

1) The inverter is provided with multiple PV inputs: PV inputs 1~n; and each PV input is designed with an MPP tracker. Each PV input operates independently and has its own MPPT. In this way, string structures of each PV input may differ from each other, including PV module type, number of PV modules in each string, angle of tilt, and installation orientation.

2) Each PV input includes two DC input strings.

The two input PV strings should be the same in PV string structure, including the type, number, tilt, and orientation of the PV modules.

3) The solar inverter does not support full parallel connection for PV strings (full parallel connection: PV strings connect to one another in parallel outside the solar inverter and then connect to the solar inverter separately).

 <b>CAUTION</b>	Use the connectors delivered with the solar inverter. If the PV connectors are lost or damaged, purchase the connectors of the same model. The device damage caused by incompatible PV connectors is beyond the warranty scope.
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#### 5.6.2 DC input Terminals Configuration

When the DC input is not fully configured, the DC input terminals must meet the following requirements:

1. Evenly distribute the DC input power cables on the DC input terminals controlled by the three DC switches.

DC SWITCH 1 is preferred.

2. Maximize the number of connected MPPT circuits.

When the DC input is not fully configured, recommend the connection as follows

Table 5-1, For inverter model types, CSI-40K-T4001A-E

DC input terminal positions of the inverter						
输入组串数量	DC switch					
1	PV-1	x	x	x	x	x
2	PV-1	x	PV-3	x	x	x
3	PV-1	x	PV-3	x	PV-5	x
4	PV-1	PV-2	PV-3	x	PV-5	x
5	PV-1	PV-2	PV-3	PV-4	PV-5	x



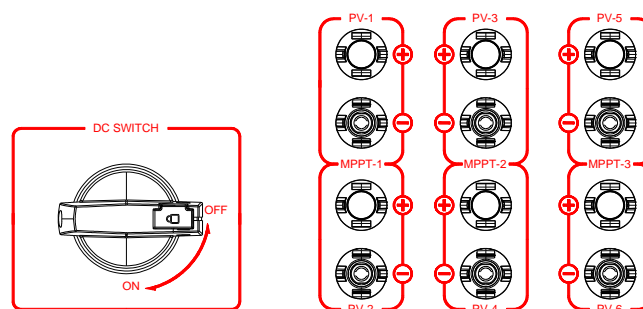


FIG 5-17 DC input terminal of inverter

Table 5-2, For inverter model types CSI-50K-T4001A-E

DC input terminal positions of the inverter

输入组串数量	DC switch-1				DC switch-2			
1	PV-1	x	x	x	x	x	x	x
2	PV-1	x	x	x	PV-5	x	x	x
3	PV-1	x	PV-3	x	PV-5	x	x	x
4	PV-1	x	PV-3	x	PV-5	x	PV-7	x
5	PV-1	PV-2	PV-3	x	PV-5	x	PV-7	x
6	PV-1	PV-2	PV-3	x	PV-5	PV-6	PV-7	x
7	PV-1	PV-2	PV-3	PV-4	PV-5	PV-6	PV-7	x

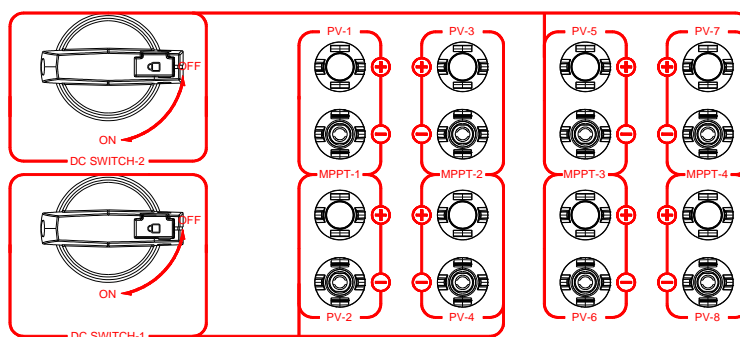


FIG 5-18 DC input terminal of inverter

Table 5-3, For inverter model types CSI-60K-T4001A-E

DC input terminal positions of the inverter

输入组串数量	DC switch-1						DC switch-2			
1	PV-1	x	x	x	x	x	x	x	x	x
2	PV-1	x	x	x	x	x	PV-7	x	x	x
3	PV-1	x	PV-3	x	x	x	PV-7	x	x	x
4	PV-1	x	PV-3	x	x	x	PV-7	x	PV-9	x
5	PV-1	x	PV-3	x	PV-5	x	PV-7	x	PV-9	x
6	PV-1	PV-2	PV-3	x	PV-5	x	PV-7	x	PV-9	x

7	PV-1	PV-2	PV-3	X	PV-5	X	PV-7	PV-8	PV-9	X
8	PV-1	PV-2	PV-3	PV-4	PV-5	X	PV-7	PV-8	PV-9	X
9	PV-1	PV-2	PV-3	PV-4	PV-5	X	PV-7	PV-8	PV-9	PV-10

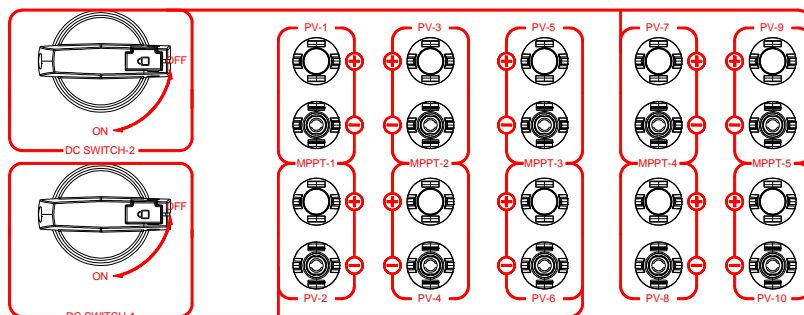


FIG 5-19 DC input terminal of inverter

### 5.6.3 DC cable connection

CSI Solar provides corresponding plug connectors in the scope of delivery for quick connection of PV inputs. DC cables should be connected to the inverter via PV connectors which are included in the scope of delivery.



**NOTICE**

Check the positive and negative polarity of the PV strings, and connect the PV connectors to corresponding terminals only after ensuring polarity correctness.

Arc or contactor over temperature may occur if the PV connectors are not firmly in place, and CSI Solar shall not be held liable for any damage caused.

Step 1: Strip the insulation from each DC cable by 7mm.

Step 2: Assemble the cable ends with the crimping pliers

Step 3: Lead the cable through cable gland, and insert into the insulator until it snaps into place.

Gently pull the cable backward to ensure firm connection. Tighten the cable gland and the insulator (torque 2.5 N.m to 3 N.m).

Step 4: Check for polarity correctness.

The inverter will not function properly if any PV polarity is reversed.

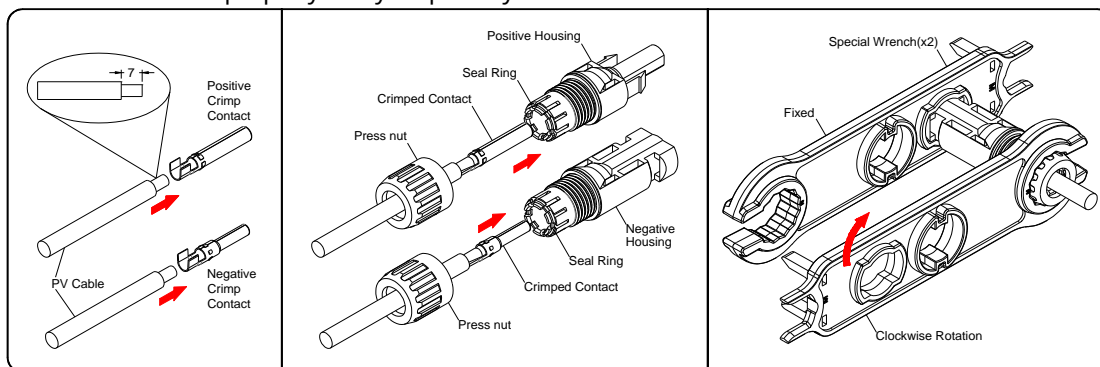


FIG 5-20 DC cable connection

### 5.6.4 Installing the PV Connectors.

step 1: Rotate all the DC switches to "OFF" position.

step 2: Check the cable connection of the PV string for polarity correctness and ensure that the open circuit voltage in any case does not exceed the inverter input limit of 1,100V.

step 3: Connect the PV connectors to corresponding terminals until there is an audible click.

step 4: Follow the foregoing steps to connect PV connectors of other PV strings.

step 5: Seal the unused PV terminals with the terminal caps.

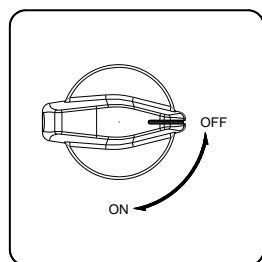


FIG 5-21 DC switch

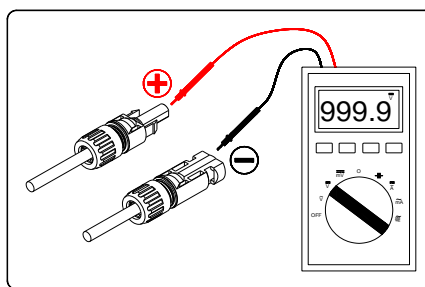


FIG 5-22 Check the polarity of PV string

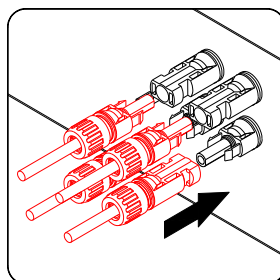


FIG 5-23 Connect the PV connectors to the inverter



**NOTICE**

If the DC input power cable is reversely connected and DC switches are set to ON, do not immediately turn off the DC switches or reconnect the positive and negative connectors. Otherwise, the device may be damaged. The caused device damage is not covered under any warranty. Wait until the solar irradiance declines at night and the PV string current reduces to below 0.5 A. Then, turn off the three DC switches, remove the positive and negative connectors, and rectify the connection of the DC input power cable.

## 6 Commissioning Inverter

### 6.1 Electrical Inspection

- 1) The inverter DC switch and external circuit breaker are disconnected
- 2) The inverter should be accessible for operation, maintenance and service.
- 3) Nothing is left on the top of the inverter.
- 4) The inverter is correctly connected to the external devices, and the cables are routed in a safe place or protected against mechanical damage.
- 5) The selection of the AC circuit breaker is in accordance with this manual and all applicable local standards.
- 6) All unused terminals at the bottom of the inverter are properly sealed.
- 7) Warning signs & labels are suitably affixed and durable.

### 6.2 Commissioning Procedure

If all of the items mentioned above meet the requirements, proceed as follows to start up the inverter for the first time.

Step 1: Rotate the DC switch of the inverter to "ON" position.

Step 2: Connect the AC switch (if applicable) between the inverter and the grid.

Step 3: Connect the DC switch (if applicable) between the inverter and the PV string.

Step 4: Set initial protection parameters via the CSI Cloud App. If the irradiation and grid conditions meet requirements, the inverter will normally operate.

Step 5: Observe the LED indicator to ensure that the inverter operates normally. (Refer to Tab. 2-2LED indicator description).

## 7 CSI CloudPro APP

### 7.1 APP Introduction

The CSI CloudPro APP can establish communication connection to the inverter via the Blue-tooth, thereby achieving near-end maintenance on the inverter. Users can use the App to view basic information, alarms and events, set parameters, etc.

### 7.2 Download and Install the App

Method 1: Scan the following QR Code to download and install the App according to the prompt information.



Method 2: Download and install the App through the following application stores:

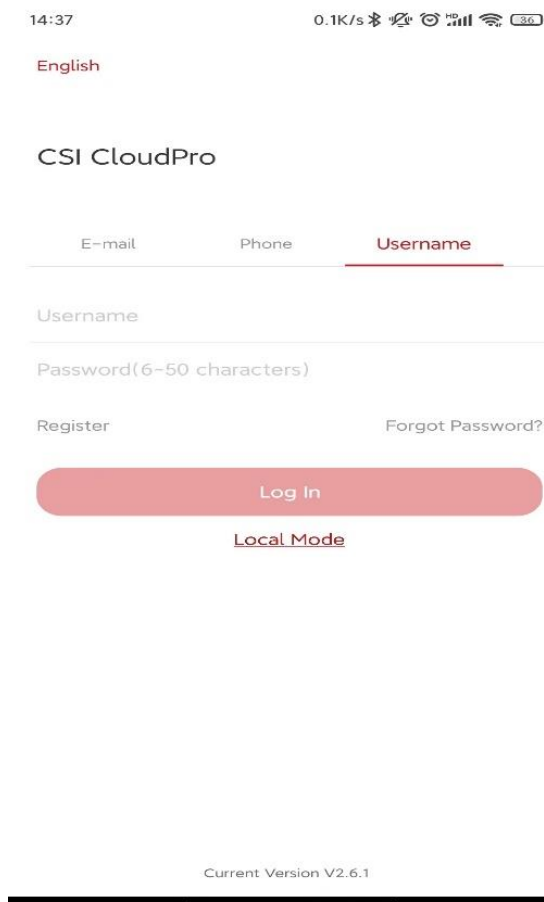
- Google Play(Android)
- APP Store(iOS)

### 7.3 Use the Local Mode to Login the App

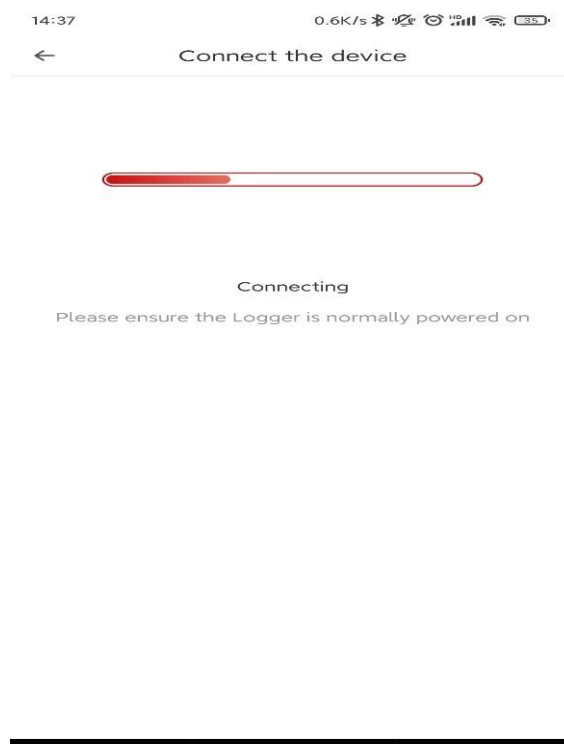
Notice: To use the local mode, the following conditions should be met:

- (1) The collector is connected to the inverter and powered on.
- (2) The distance between the mobile phone and the collector should be within 5m and there is no shelter.

Step 1: Open the CSI CloudPro APP.

A screenshot of the CSI CloudPro mobile application interface. At the top, the status bar shows the time 14:37, signal strength, and battery level at 36%. Below the status bar, the text 'English' is displayed. The main title 'CSI CloudPro' is centered. There are three tabs for login: 'E-mail', 'Phone', and 'Username', with 'Username' being the active tab. Below the tabs are two input fields: 'Username' and 'Password(6-50 characters)'. At the bottom of the login section are links for 'Register' and 'Forgot Password?'. A large red 'Log In' button is centered below the password field. At the very bottom, there is a link for 'Local Mode' and a footer indicating 'Current Version V2.6.1'.

Step 2: Select "Local Mode", then scan logger SN. The mobile phone will connect to the collector automatically.



Step 3: After the connection succeeds, users can view the real-time operating data of the inverter.

14:38 0.3K/s

Logger  
2019007595

Generation			Failure		
DC					
DC	Voltage(V)	Current(A)		AC	
PV1	599.8	0.1		AC	Voltage(V) Current(A)
PV2	599.8	0.0		R	0.0 0.0
PV3	20.2	0.0		S	0.0 0.0
PV4	20.2	0.0		T	0.0 0.0
<div> <div>Inverter operating status</div> <div>FaultMode</div> </div>					
<div> <div>Daily power generation</div> <div>0.0kWh</div> </div>					
<div> <div>Total power generation</div> <div>389kWh</div> </div>					
<div> <div>Line voltage Uab</div> <div>0.0V</div> </div>					
<div> <div>Line voltage Ubc</div> <div>0.0V</div> </div>					
<div> <div>Line voltage Uca</div> <div>0.0V</div> </div>					
<div> <div>Phase A voltage Ua</div> <div>0.0V</div> </div>					
<div> <div>Phase B voltage Ub</div> <div>0.0V</div> </div>					
<div> <div>Phase C voltage Uc</div> <div>0.0V</div> </div>					
<div> <div>Phase A grid frequency</div> <div>0.0Hz</div> </div>					

Overview Real-time Params Debugging

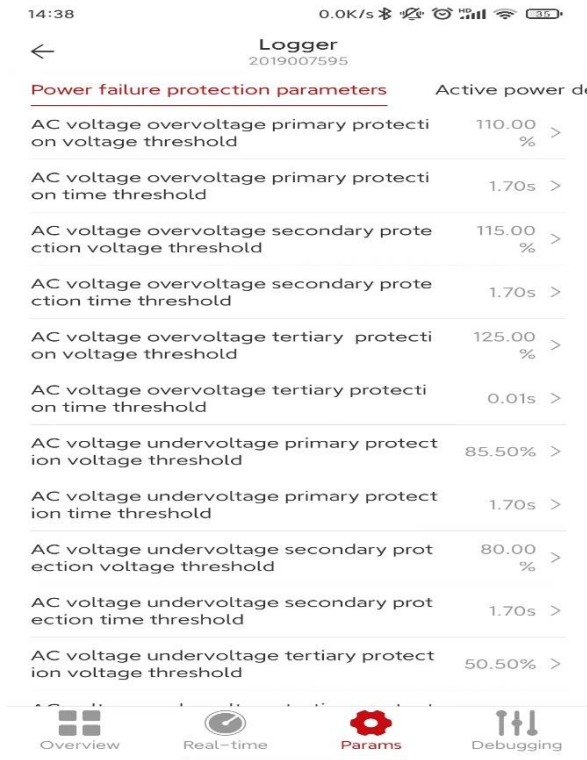
14:38 0.1K/s

Logger  
2019007595

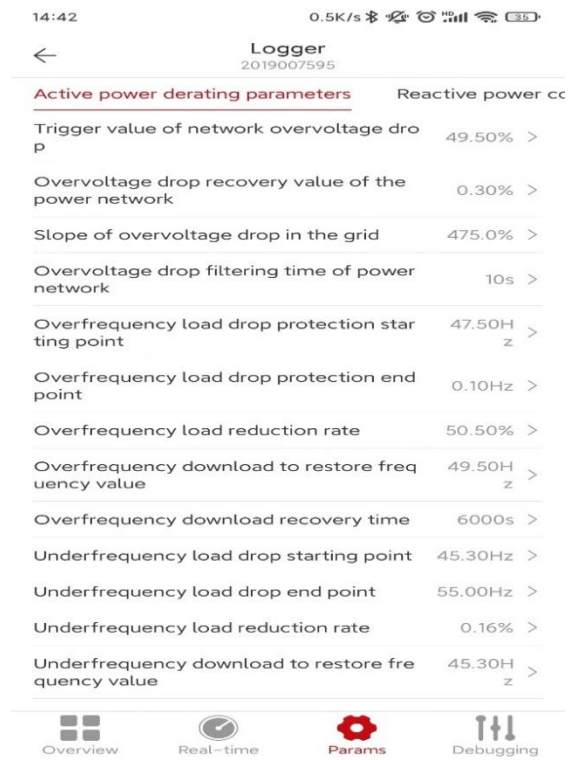
Generation		Failure	
Internal alarm failure		None	
Internal recoverable fault 1		No Utility Err	
Internal recoverable fault 2		Freq Detect Err	
Internal recoverable fault 3		None	
Internal recoverable fault 4		None	
Internal recoverable fault 5		None	
Internal recoverable fault 6		None	
Internal recoverable fault 7		None	
Permanent internal failure		None	
ARMC fault		None	

Overview Real-time Params Debugging

Step 4: Select "Params", enter the password 000000 and login the system. Then, users can view and modify parameters.



Power failure protection parameters	Active power de
AC voltage overvoltage primary protection voltage threshold	110.00 % >
AC voltage overvoltage primary protection time threshold	1.70s >
AC voltage overvoltage secondary protection voltage threshold	115.00 % >
AC voltage overvoltage secondary protection time threshold	1.70s >
AC voltage overvoltage tertiary protection voltage threshold	125.00 % >
AC voltage overvoltage tertiary protection time threshold	0.01s >
AC voltage undervoltage primary protection voltage threshold	85.50 % >
AC voltage undervoltage primary protection time threshold	1.70s >
AC voltage undervoltage secondary protection voltage threshold	80.00 % >
AC voltage undervoltage secondary protection time threshold	1.70s >
AC voltage undervoltage tertiary protection voltage threshold	50.50 % >



Active power derating parameters	Reactive power cc
Trigger value of network overvoltage drop	49.50 % >
Overvoltage drop recovery value of the power network	0.30 % >
Slope of overvoltage drop in the grid	475.0 % >
Overvoltage drop filtering time of power network	10s >
Overfrequency load drop protection starting point	47.50 Hz >
Overfrequency load drop protection end point	0.10 Hz >
Overfrequency load reduction rate	50.50 % >
Overfrequency download to restore frequency value	49.50 Hz >
Overfrequency download recovery time	6000s >
Underfrequency load drop starting point	45.30 Hz >
Underfrequency load drop end point	55.00 Hz >
Underfrequency load reduction rate	0.16 % >
Underfrequency download to restore frequency value	45.30 Hz >

\*APP pictures are for reference only.

## 8 System Decommissioning

### 8.1 Disconnecting the Inverter

For maintenance or other service work, the inverter must be switched off.

Proceed as follows to disconnect the inverter from the AC and DC power sources.

Lethal voltages or damage to the inverter will follow if otherwise.

Step 1: Wear personal protective equipment

Step 2: Disconnect the external AC circuit breaker and secure it against reconnection.

Step 3: Rotate the DC switches to the "OFF" position for disconnecting all of the PV string inputs.

Step 4: Wait about 5 minutes until the capacitors inside the inverter completely discharge.

Step 5: Measure the DC current of each PV input string using a clamp meter.

- If the current is less than or equal to 0.5 A, go to the next step.
- If the current is higher than 0.5 A, wait until the solar irradiance decreases and the PV string current

decreases below 0.5 A at night, and then go to the next step.

Step 6: Insert a MC4 wrench into the notch and press the wrench with an appropriate force to remove the DC connector.

Step 7: Ensure that the AC wiring terminals are voltage-free via a multimeter, and remove the AC wires and communication wires.

Step 8: Install the MC4 waterproof plugs.

### 8.2 Dismantling the Inverter

Step 1: Refer to "5 Electrical Connection" for the inverter disconnection of all cables in reverse steps.

Step 2: Dismantle the inverter referring to "4 Mechanical Mounting" in reverse steps.

Step 3: If necessary, remove the wall-mounting bracket from the wall.

Step 4: If the inverter will be reinstalled in the future, please refer to "3.4 Inverter Storage" for a proper conservation.

### 8.3 Disposal of the Inverter

Users take the responsibility for the disposal of the inverter.







**NOTICE**

Some parts and devices of the inverter, such as the capacitors, may cause environmental pollution.

Do not dispose of the product together with household waste but in accordance with the disposal

	regulations for electronic waste applicable at the installation site.
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## 9 Daily Maintenance

 DANGER	<p>Risk of inverter damage or personal injury due to incorrect service! Always keep in mind that the inverter is powered by dual sources: PV array and utility grid. Before any service work, observe the following procedure.</p> <p>1) Disconnect the inverter from the utility grid side first and then PV array; 2) Wait at least 5 minutes after shut down the inverter, for inner capacitors to discharge completely; 3) Verify that no voltage and current existing with appropriate testing devices.</p>
 NOTICE	<p>Risk of inverter damage if it is improperly serviced. Use accessories and spare parts approved by the inverter manufacturer only. Never modify the inverter or other components of the inverter. The loss of any or all warranty rights may follow if otherwise.</p>
 NOTICE	<p>Any malfunction that may impair the inverter safety operation must be repaired immediately before the inverter is restarted. Inverter contains no customer serviceable parts inside. Please contact local authorized personnel if any service work is required.</p>
 Information	<p>Servicing of the device in accordance with the manual should never be undertaken in the absence of proper tools, test equipment or the more recent revision of the manual with hasbeen clearly and thoroughly understood.</p>

Items	Methods	Period
System clean	<p>Check the temperature and dust of the inverter. Clean the inverter enclosure.</p> <p>Check the humidity and dust of the environment.</p> <p>Meanwhile check whether the filter function of the air inlet is ok.</p>	Six months to a year (it depends on the dust contents in air)
Fans	<p>Check whether there is fan warning using App.</p> <p>Check whether there is any abnormal noise when the fan is turning.</p> <p>Clean or replace the fans if necessary (see the following section).</p>	Once a year
Cable entry	<p>Check whether the cable entry is insufficiently sealed or the gap is excessively large, and reseal the entry when necessary.</p>	Once a year
Electrical Connection	<p>Check whether all cable are firmly in place.</p> <p>Check whether a cable is damaged, especially the part contacting the metal enclosure.</p>	Six months to a year

### 1) Cleaning Air Inlet and Outlet

A huge amount of heat is generated in the process of running the inverter. The inverter adopts a controlled forced-air cooling method.

In order to maintain good ventilation, please check to make sure the air inlet and outlet are not blocked.

Clean the air inlet and outlet with soft brush or vacuum cleaner if necessary.

## 10 Troubleshooting

When the inverter does not operate normally, we recommend the following actions for quick troubleshooting. Please review the error list table carefully.

### 10.1 Warning

The different LED colors and flashing status identify the current operation statuses of the inverter. If the red color is always on, it indicates the inverter fault. Usually the warnings can be cleared through an orderly shutdown / reset or a self-corrective action performed by the inverter.



## 10.2 Errors

Error codes identify a possible equipment fault, or incorrect setting/ configuration. Any and all attempts to correct or clear a fault must be performed by qualified personnel. Typically, the Errors code can be cleared once the cause or fault is removed.

However, some of the (E) codes may cannot be cleared, in this case please contact the dealer or CSI Solar Co., Ltd. to replace a new one.

Errors as indicated in the table below:

Description	Trouble shooting
External Fan Warning	<ol style="list-style-type: none"> <li>1. Check whether the fans operate normally and are blocked by sundries. If they are blocked, clear the sundries.</li> <li>2. If a fan does not operate normally, stop and disconnect the inverter to replace the fan.</li> </ol>
Internal Fan Warning	
Device anomaly	Wait for the inverter to return to normal. Disconnect the AC and DC switches, and reconnect the AC and DC switches 15 minutes later to restart the inverter. If the fault still exists, contact CSI Solar.
Input Spd Warning	Check the SPD, and replace it if necessary
Output Spd Warning	Check the SPD, and replace it if necessary
Grid Line Vol Overvolt Err	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the fault occurs repeatedly: <ol style="list-style-type: none"> <li>1. Measure the actual grid voltage, and contact the local electric power company for solutions if the grid voltage is higher than the set value.</li> <li>2. Check whether the protection parameters are appropriately set via the App or the LCD.</li> <li>3. Check whether the cross-sectional area of the AC cable meets the requirement.</li> <li>4. If the fault is not caused by the foregoing reasons and still exists, contact CSI Solar.</li> </ol>
Grid Phase Vol Overvolt Err	
Grid Freq High Err	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the fault occurs repeatedly: <ol style="list-style-type: none"> <li>1. Measure the actual grid frequency, and contact the local electric power company for solutions if the grid parameter exceeds the set value.</li> <li>2. Check whether the protection parameters are appropriately set via the App or the LCD.</li> <li>3. If the fault is not caused by the foregoing reasons and still exists, contact CSI Solar.</li> </ol>
Grid Freq Low Err	
No Utility Err	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the fault occurs repeatedly: <ol style="list-style-type: none"> <li>1. Check whether the grid supplies power reliably.</li> <li>2. Check whether the AC cable is firmly in place.</li> <li>3. Check whether the AC cable is connected to the correct terminal (whether the live wire and the N wire are correctly in place).</li> <li>4. Check whether the AC circuit breaker is connected.</li> <li>5. If the fault is not caused by the foregoing reasons and still exists, contact CSI Solar.</li> </ol>
Over Temp Err	<ol style="list-style-type: none"> <li>1. Check whether the inverter is directly exposed to sunlight. If so, take some shading measures.</li> <li>2. Check and clean the air ducts.</li> <li>3. Check whether there is A001 or A002 (fan anomaly) alarm via the App or the LCD. If so, replace the fans.</li> <li>4. If the fault is not caused by the foregoing reasons and still exists, contact CSI Solar.</li> </ol>
Iso Low Err	Wait for the inverter to return to normal. If the fault occurs repeatedly: <ol style="list-style-type: none"> <li>1. Check whether the ISO resistance protection value is excessively high via the App or the LCD, and ensure that it complies with the local regulations.</li> <li>2. Check the resistance to ground of the string and DC cable. Take correction measures in case of short circuit or damaged insulation layer.</li> <li>3. If the cable is normal and the fault occurs on rainy days, check it again when the weather turns fine.</li> <li>4. If the fault is not caused by the foregoing reasons and still exists, contact CSI Solar.</li> </ol>
GFCI High Err	<ol style="list-style-type: none"> <li>1. The fault can be caused by poor sunlight or damp environment, and the inverter will be reconnected to the grid after the environment is improved.</li> <li>2. If the environment is normal, check whether the AC and DC cables are well insulated.</li> <li>3. If the fault is not caused by the foregoing reasons and still exists, contact CSI Solar.</li> </ol>



Freq Detect Err	<p>Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the fault occurs repeatedly:</p> <ol style="list-style-type: none"> <li>1. Measure the actual grid frequency, and contact the local electric power company for solutions if the grid parameter exceeds the set value;</li> <li>2.4. If the fault is not caused by the foregoing reasons and still exists, contact CSI Solar.</li> </ol>
Grid Volt Unbalance Err	<p>Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the fault occurs repeatedly:</p> <ol style="list-style-type: none"> <li>1. Measure the actual grid voltage. If grid phase voltages differ greatly, contact the power company for solutions.</li> <li>2. If the voltage difference between the three phases is within the permissible range of the local power company, modify the grid voltage imbalance parameter through the App or LCD screen.</li> <li>3. If the fault is not caused by the foregoing reasons and still exists, contact CSI Solar.</li> </ol>
PV1-PV9 Rev Connect Err	<ol style="list-style-type: none"> <li>1. Check whether the corresponding string is of reverse polarity. If so, disconnect the DC switch and adjust the polarity when the solar radiation is low and the string current drops below 0.5A.</li> <li>2. If the fault is not caused by the foregoing reasons and still exists, contact CSI Solar.</li> </ol>

## ANNEX: Specification

Model	CSI-40K-T4001A-E		CSI-50K-T4001A-E	CSI-60K-T4001A-E
INPUT (DC)				
Max. Input Voltage	1100 V <sub>DC</sub>			
Start-up DC Input Voltage	195 V <sub>DC</sub>			
Rated Input Voltage	600 V <sub>DC</sub>			
MPPT Voltage Range	200-1000 V <sub>DC</sub>			
Max. String Input No.	6	8	10	
MPPT No.	3	4	5	
Max. Input Current	3 x 30 A	4 x 30 A	5 x 30 A	
Max. DC short-circuit current	3 x 40 A	4 x 40 A	5 x 40 A	
OUTPUT (AC)				
Rated AC Output Power	40 kW	50 kW	60 kW	
Max. AC Output Power (Apparent)	40 kVA	50 kVA	60 kVA	
Rated Output Voltage	380 / 400 V <sub>AC</sub>			
Grid Connection Type	3 L / N / PE			
Max. Output Current	60.8 A	76 A	91.2 A	
Rated Output Frequency	50 / 60 Hz			
THDi	< 3%			
Power Factor	0.8 leading ... 0.8 lagging			
Zero Export Solution	supported			
EFFICIENCY				
Max. Efficiency	98.7 %			
EU Efficiency	98.3 %			
ENVIRONMENT				
Protection Degree	IP66			
Cooling	Intelligent Fan Cooling			
Operating Temperature Range	-30 °C to +60 °C			
Operating Humidity	0 - 100 %			
Operating Altitude	4000 m (>3000 m derating)			
PROTECTION				
DC Switch	Yes			
Anti-Islanding Protection	Yes			
DC Reverse-Polarity Protection	Yes			
DC Insulation Resistance Dection	Yes			
Residual Current Monitoring	Yes			
String Monitoring	Yes			
AC Output Over Current Protection	Yes			
AC Short Circuit Protection	Yes			
Grid Monitoring	Yes			
Anti-PID Module	Optional			
Overvoltage Class	II (DC), III(AC)			
DC / AC SPD	DC SPD Type II / AC SPD Type II			
DISPLAY AND COMMUNICATION				
Display	LED & APP			
Communication	RS485 / WiFi (Optional)			
MECHANICAL DATA				
Dimensions (W / H / D)	720 x 555 x 288 mm			
Weight	48 kg	50 kg	51 kg	
DC Inputs Type	MC4			
AC Outputs Type	OT Terminals			
CERTIFICATION				
Safety	IEC62109			
EMC Standard	IEC 61000-6-2/3			
Grid Code	IEC61727 & IEC62116			

## China – Global Headquarters

CSI Solar Co., Ltd.

199 Lushan Road, SND, Suzhou, Jiangsu, China, 215129

Sales Inquiries Email: [support@csisolar.com](mailto:support@csisolar.com)

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