USER MANUAL

SCH275KTL-DO/US-800 Grid-Tied PV Inverter

(1.0101.0815/1.0101.0759/1.0101.0792 Models)

CHINT POWER SYSTEMS AMERICA CO., LTD.

Rev 1.2 June 2023

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0 Preface

Thank you for choosing a CPS Grid-tied PV Inverter (hereinafter referred to as “PV Inverter”) developed by CHINT POWER SYSTEMS AMERICA CO., LTD (hereinafter referred to as "CPS").
This PV Inverter is a high performance and highly reliable product specially designed for the North American Solar market.

IMPORTANT!

Please read this manual carefully and make sure that you have understood all the contents thoroughly before you start any operation.

Main Contents

This Installation and Operation manual contains important information, safety guidelines, detailed planning and setup information for installation, as well as information about configuration, operation and troubleshooting. Be sure to read this manual carefully before using.

Target Readers

Plant owner

Project Engineer

Installation engineer

Maintenance engineer

Installation, commissioning, troubleshooting, and maintenance of the inverter must be done only by qualified personnel. If you encounter any problems during installation or operation of this unit, please check the user manual carefully before contacting CPS Customer Service.

Manual Management

Please keep this user manual on hand for quick reference.

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Version

This manual is subject to change or modification without prior notice. The latest version of this manual can be acquired via the website at: www.chintpowersystems.com.

1 IMPORTANT SAFETY INSTRUCTIONS (SAVE THESE INSTRUCTIONS)

Please read this user manual carefully before the installation and operation of this PV Inverter. CPS reserves the right to refuse warranty claims for equipment damage if users fail to install the equipment according to the instructions in this manual.

Failure to follow these instructions and other relevant safety procedures may result in voiding of the warranty and/or damage to the inverter or other property.

Warnings and Symbols in this Document

Symbols	Meanings
	**DANGER!** DANGER indicates a hazardous situation with high level of risk which, if not avoided, will result in death or serious injury. **DANGER!** DANGER indique une situation dangereuse avec un niveau de risque élevé qui, si elle n'est pas évitée, entraînera la mort ou des blessures graves.
	**WARNING!** WARNING indicates a hazardous situation with medium level of risk which, if not avoided, could result in death or serious injury. **ATTENTION!** AVERTISSEMENT indique une situation dangereuse avec un niveau de risque moyen qui, si elle n'est pas évitée, pourrait entraîner la mort ou des blessures graves.
	**CAUTION!** CAUTION indicates a hazardous situation with low level of risk which, if not avoided, could result in minor or moderate injury. **AVERTIR!** ATTENTION indique une situation dangereuse avec un faible niveau de risque qui, si elle n'est pas évitée, pourrait entraîner des blessures mineures ou modérées.
	**NOTICE!** NOTICE indicates a hazardous situation which, if not avoided, could result in equipment working abnormally or property loss. **AVIS!**

	indique une situation dangereuse qui, si elle n'est pas évitée, pourrait entraîner un fonctionnement anormal de l'équipement ou la perte de biens.
	**IMPORTANT!** INSTRUCTION indicates important supplementary information or provides skills or tips that can be used to help you solve a problem or save you time. **IMPORTANT!** indique des informations supplémentaires importantes ou fournit des compétences ou des conseils qui peuvent être utilisés pour vous aider à résoudre un problème ou vous faire gagner du temps.

Table 1-1 Warnings and Symbols in this Document

Markings on the Product

Symbols	Meanings
	**WARNING:** Risk of Electric Shock. **ATTENTION:** Risque de choc electrique.
	**CAUTION:** Risk of electric shock from energy stored in capacitor. Do not remove cover until 5 minutes after disconnecting all sources of supply. **ATTENTION:** Risque de choc électrique à partir d´énergie stockée dans les condensateurs. Retirer le couvercle du boîtier au moins 5 minutes après avoir débranché toutes les sources d´approvisionnement.
	**CAUTION:** Hot surfaces. To reduce the risk of burns. Do not touch. **ATTENTION:** Surface chaude. Pour réduire le risqué de brûlures ne pas toucher.
	For more details please see the user manual. Pour plus de détails, veuillez consulter le manuel d'utilisation.

	**WARNING:** For continued protection against risk of fire, replace only with same type and ratings of fuse. Refer to instruction manual for details. **ATTENTION:** Pour continuer d'assurer la protection contre les risques d'incendie, il faut remplacer les fusibles de même type et courant. Reportez-vous au manuel d'instructions pour plus de détails.
	**EARTH GROUND!** This symbol marks the location of a grounding terminal, which must be securely connected to the earth through the PE (protective earthing) cable to ensure operational safety. **TERRE TERRE !** Ce symbole marque l'emplacement d'une borne de mise à la terre, qui doit être solidement connectée à la terre via le câble PE (mise à la terre de protection) pour assurer la sécurité de fonctionnement.
	**RoHS SYMBOL** In accordance with 2011/65/EU regulations, the inverter imposes restrictions on the use of specific hazardous substances in electrical and electronic equipment. **SYMBOLE RoHS** Conformément à la réglementation 2011/65/UE, l'onduleur impose des restrictions sur l'utilisation de substances dangereuses spécifiques dans les équipements électriques et électroniques.
	**TUV Certification** This inverter has passed TUV Certification. **Certification TUV** Cet onduleur a passé la certification TUV.
	Phase information of the inverter. Information de phase de l'onduleur.

Table 1-2 Markings on the Product

Safety Instructions of Operating the PV Inverter

	**DANGER!** Disconnect the inverter from PV modules and the AC grid before maintaining and operating the equipment. Make sure hazardous high voltage and energy inside the equipment has been discharged. Do not operate or maintain the inverter until at least 5 minutes after disconnecting all sources from DC and AC sides. The DC conductors of this PV system are normally ungrounded but will become intermittently grounded without indication when the inverter measures the PV array isolation.
	**WARNING!** All the installation and wiring connections should be performed only by qualified technical personnel. Disconnect the inverter from PV modules and the AC grid before maintaining and operating the equipment. **Risk of electric shock and fire.** Use only with PV modules in conformance with the maximum system voltage. **Electric shock Hazard.** The DC conductors of this photovoltaic system are normally ungrounded but will become intermittently grounded without indication when the inverter measures the PV array isolation. **Shock Hazard.** The inverter is energized from both AC and DC sources. Disconnect all sources before servicing.
	**CAUTION!** The total weight of the inverter is approx.119kg (262.4pounds). Please ensure the mounting bracket is properly installed before hanging the inverter and wire-box on the bracket. It is recommended to have at least 3 people mount the inverter due to the weight of the equipment. This AFCI device automatically resets and may only be used when allowed by NFPA 70 and CSA C22.1.
	**NOTICE!** This inverter is designed to connect AC power only to the public grid. Do not connect the AC output of this equipment directly to any private AC power equipment. The inverters are to be installed with floating or ungrounded PV arrays only.

	IMPORTANT! Please check with your local electricity supply company before selecting a Grid Code. If the inverter is operated with an incorrect grid standard, the electric utility supply company may cancel the interconnection agreement. Placing the inverter into operation before the overall system complies with the national rules and safety regulations of the application is not permitted.
	WARNING! 

WARNING: The DC Switch is rated to break loads under normal operating conditions. However, a DC short circuit could be hazardous, and the following procedures should be followed before turning OFF the DC Switch under fault conditions.

If there is a fault and it is safe to access the inverter:

1. Read/record the fault code(s) displayed on the APP interface.
2. Turn OFF the inverter via the APP or Remote access.
3. Turn OFF the AC feed breaker or AC fuse switch disconnect.
4. If possible, read the DC MPPT currents displayed on the APP interface:
    a. If the MPPT current is lower than 20A or the irradiation is obviously low, turn OFF the DC switch.
    b. If it is safe to open the front cover, proceed with troubleshooting procedures. Make sure appropriate safety precautions and PPE are used.
5. If it is not possible to read the DC MPPT currents through the APP interface, and no fire, smoke or voltage (AC or DC) to ground is present in the enclosure:
    a. Follow general safety practices including PPE to open the wire-compartment.
    b. Measure the DC current on each string. If zero, open the fuse

holder (when applicable) for each string reading approximately zero amps.

c. If the DC current is higher than 0.25A, do not open the fuse holder (when applicable).
d. When all possible fuses are open, measure each MPPT current. If it is lower than 20A, turn OFF the DC switch.
e. If turning OFF the DC switch causes smoke, then (if safe) turn the DC switch back ON and wait until low irradiation ~30min prior to sunset to continue troubleshooting.

If there is a fault and it is unsafe to access the inverter:

1. Notify someone else. Initiate emergency mitigation plan if necessary. If smoke or fire exists, procure a fire extinguisher.
2. If a fire has escaped the inverter enclosure – notify 911 immediately!
3. Turn OFF the AC feed breaker as soon as possible/safe.
4. If safe but conditions are deteriorating, consider:
    a. Using the fire extinguisher.
    b. Cutting the string conductors – one cable at a time with insulated cutters (while wearing appropriate PPE).
5. Monitor conditions until low irradiation ~30min prior to sunset. If safe, turn OFF DC switches on the inverter and AC switches/disconnect external to the inverter and proceed with normal troubleshooting procedures, refer to chapter 7 Troubleshooting.

2 Product Introduction

Inverter for Grid-tied PV Systems

CPS 3-Phase String Inverters SCH275KTL-DO/US-800 series are designed for use with an UNGROUNDED PV array in Commercial and Utility scale PV grid-tied systems. The system is generally made up of PV modules, PV inverter and AC power distribution equipment, as shown in Figure 2-1. The inverter converts the available DC energy from the PV modules to AC power by synchronizing the output current to the same frequency and phase as the AC grid. All or part of the AC power is supplied to local loads, and the surplus power is exported to the electric utility grid.

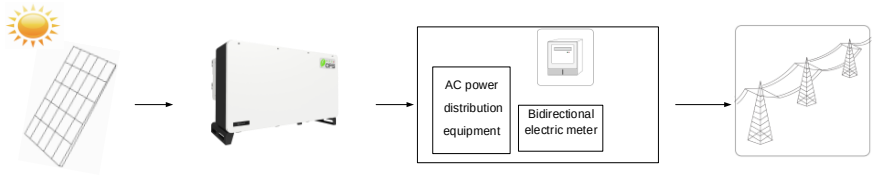


Figure 2-1 Grid-tied PV system

Product Appearance and Dimensions

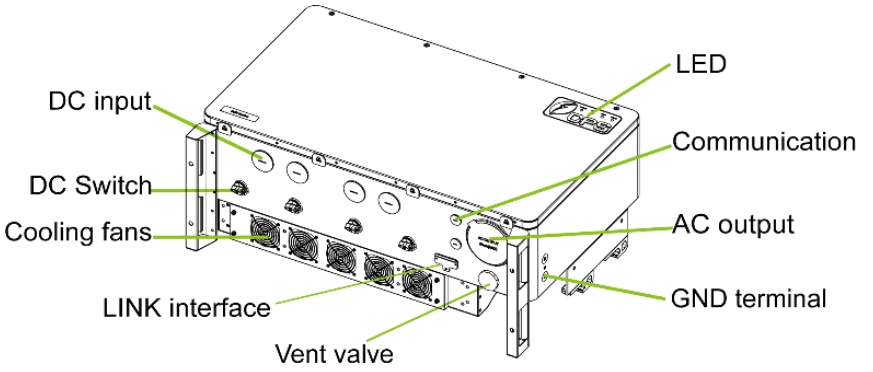


Figure 2-2 Product appearance

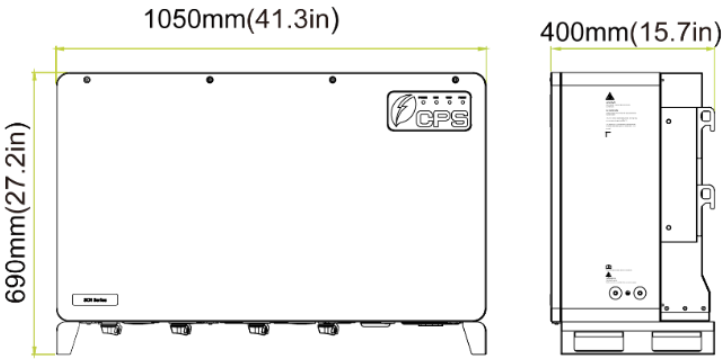


Figure 2-3 Product dimensions

IMPORTANT!

SCH275KTL-DO/US-800 inverter has 36 input (fused) and 24 input (unfused) versions. Both of these versions have similar appearance, similar dimensions and their mounting procedures are also the same. However, their DC connection methods and communication methods are different, hence will be introduced separately in the following contexts.

Product Features

High conversion efficiency: Advanced 3-level conversion technology with Space-Vector PWM; Max. efficiency: 99%; CEC efficiency: 98.5%.

Grid adaptability: Selectable grid standards: IEEE 1547-2018, CA Rule 21, ISO-NE, and HECO; Reactive power; PF value: ±0.8, and optional local or remote Active Power Curtailment.

Flexible communication: Supports standard CPS Modbus RS485, SunSpec Modbus, Ethernet TCP/IP, and AC-PLC communications to ensure compatibility with 3rd party monitoring and control systems. The FlexOM gateway card enables further command/control as well as remote firmware upgrades. (FlexOM gateway card is an optional accessory. Refer to FlexOM gateway card manual for further detailed information.)

Wide DC input voltage range: Operating DC Input Voltage Range: 500-1450Vdc; Max DC input voltage: 1500Vdc.

Long Service Life: Uses thin-film and electrolytic capacitors to extend inverter's service life.

High protection degree: NEMA Type 4X enclosure meets the demanding needs of both indoor and outdoor use.

Intelligent Integration: Integrated load break rated DC disconnect switches; DC switches can be locked out in the OFF position to prevent operation. Up to 36 fused string inputs or 24 unfused inputs eliminate the need for external combiner boxes, simplifying installation.

Schematic Diagram and Circuit Design

The electrical schematic diagrams of inverter are as shown in Fig. 2-4.

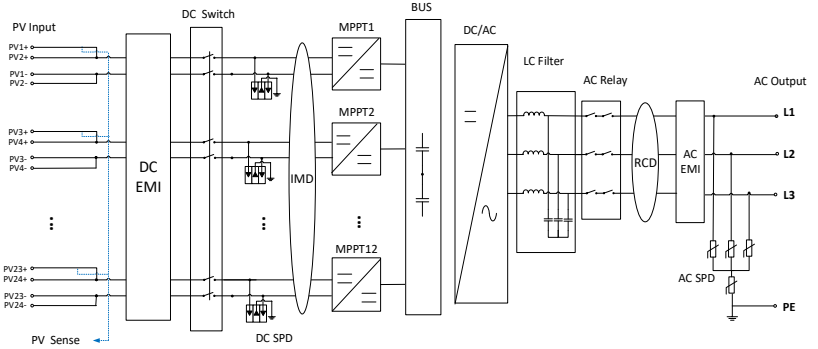


Figure 2-4a Schematic Diagram of the 24 Input Inverter Model

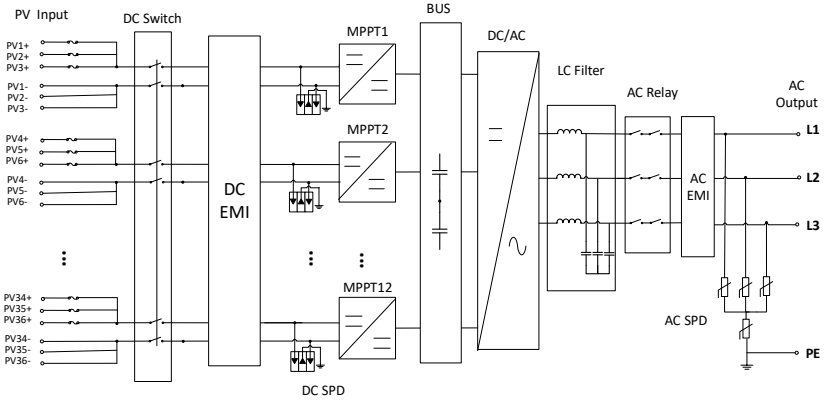


Figure 2-4b Schematic Diagram of the 36 Input Inverter Model

Product Protection Functions

AC and DC short circuit protection

AC output voltage and frequency monitoring

Leakage current to ground monitoring

DC Input and AC output over-current protection

DC input insulation ground fault monitoring

DC injection of AC output

Anti-islanding protection with bi-directional frequency perturbation

DC Input and AC output over-voltage protection

External environmental temperature monitoring

IGBT power module temperature monitoring

Smart Inverter Functions and Default Activation

The CPS SCH275KTL-DO/US-800 3-Phase String Inverters employ Smart Inverter (Grid Support) functions in compliance with UL 1741-SA8-SA18 and UL1741-SB standards. The default activation status is indicated below.

Smart Inverter Function	IEEE1547-2018	Rule 21	ISO-NE
Anti-islanding	Enabled	Enabled	Enabled
Low/High Voltage Ride-through	Enabled	Enabled	Enabled
Low/High Frequency Ride-through	Enabled	Enabled	Enabled
Dynamic Volt/VAR Operation	Enabled	Enabled	Enabled
Ramp Rate	Enabled	Enabled	Enabled
Fixed Power Factor	Disabled	Disabled	Disabled
Reconnect by “Soft-Start”	Enabled	Enabled	Enabled
Frequency-Watt	Enabled	Enabled	Enabled
Volt/Watt	Enabled	Enabled	Enabled

Table 2-1 Smart inverter functions and default activation

Anti-islanding Detection

The inverter includes Anti-Islanding detection as required by UL1741/IEEE1547. The inverter will continuously make bi-directional perturbations to the frequency of the output current by injecting a small amount of reactive power in order to detect a possible islanding condition. If the grid is stable, these small perturbations will have negligible effects on the system voltage frequency. However, in an islanded condition the changes in reactive power will force the frequency of the system voltage to deviate

significantly, which will trigger the inverter to cease operation and disconnect from the grid.

DC Ground Fault Protection

The inverters include residual current detection GFCI as part of the DC ground fault detection method required by UL 1741. If there is a ground fault in the PV array, the ground fault detection circuitry will detect leakage current, trigger an alarm, and the inverter will cease operation. See Chapter 6 for further information regarding GFCI Static and Dynamic trip thresholds and operation.

Surge Suppression

Standard Waveform Peak Values		
Surge Category	Ring Wave	Combination Wave
B	6kV/0.5kA	6kV/3kA

Table 2-2 Standard Waveform Peak Values

Notes:

- “Standard 0.5μs - 100 kHz Ring Wave”
- “Standard1.2/50μs - 8/20μs Combination Wave”

3 Mechanical Installation

Unpacking for Inspection

All the delivery items are shipped in one package, which includes the inverter, mounting bracket, four PE accessory bags and one ziploc bag.

Before performing installation, check the product for any obvious damages or if the items on the delivery list are complete. Contact your supplier if any problem is found. The delivery list is as below:

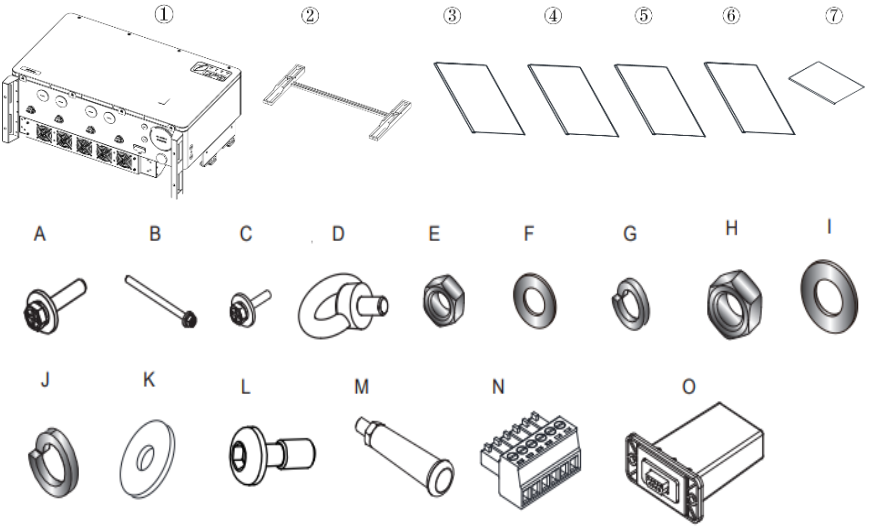


Figure 3-1 Delivery list items

No.	Item	QTY	Note
1	Inverter	1	
2	Mounting bracket	1	Bracket upon which the PV inverter is hung and mounted
3	Accessory bag	1	Includes accessories A-D
4	Accessory bag	1	Includes accessories E-K
5	Accessory bag	1	Includes accessories I-N
6	Accessory bag	1	Includes accessory O
7	Quick Guide	1	Quick Guide
A	M10x50 Hex. combination bolt	6	For mounting bracket

B	M6x90 Hex.comb. bolt	2	For fastening the inverter onto the mounting bracket
C	M6x16 Comb. bolt	2	For external ground connection
D	M10 Lifting eyebolt	2	For lifting inverter
E	M10 nut	6	For mounting bracket
F	M10 flat gasket	6	For mounting bracket
G	M10 spring washer	6	For mounting bracket
H	M12 nut	6	For AC terminal block
I	M12 flat gasket	6	For AC terminal block
J	M12 spring washer	6	For AC terminal block
K	M12 big flat gasket	6	For AC terminal
L	M6x18 bolt with plastic flat washer	1	Spare for front cover
M	Handle	2	For lifting the inverter
N	6-pin connector plug	1	For RS485 communication
O	LINKIT	1	For mobile app interface via CPS Connect Pro app

Table 3-1 Accessory list

IMPORTANT!

Additional accessories for the CPS SCH275KTL-DO/US-800 inverters are available and can be purchased separately.

Pre-Installation Checklist

Check that the product environmental specifications (protection degree, operating temperature range, humidity and altitude, etc.) meet the requirements of the specific project location.

Make sure that the power grid voltage is within the normal range of the Grid Code chosen.

Ensure that you have been authorized by the local electricity supply authority to connect to the grid.

Installation personnel must be qualified electricians or those who have received professional training.

Wear and use proper PPE (personal protective equipment) during installation.

Sufficient space must be provided to allow the inverter cooling system to operate normally.

Install the inverter away from flammable and explosive substances.

Make sure the installation condition doesn't exceed the temperature limits specified for the inverter, to prevent undesirable power loss.

Do not install the inverter near an electromagnetic source which can compromise the normal operation of electronic equipment.

The PV Array is not grounded (floating).

The conduits entries meet the following:

ALL Conduit Entries must use water-tight fittings.

ALL Conduit Entries should use sealant around wires inside wire-compartment to prevent moisture ingress.

Metal Conduit Fittings are recommended to prevent propagation.

For detailed specification ranges and limits, see Chapter 9.

NOTICE: The allowable ambient temperature ranges for the CPS SCH275KTL-DO/US-800 3-Phase String Inverters are defined based on the following conditions:

Condition 1: -40°C to 70°C, Inverter not installed, and in storage (in packaging or unpackaged).

Condition 2: -30°C to 60°C, Inverter installed, connected to electric utility grid and operating during daylight hours.

Condition 3: No low temp limit to 70°C, Inverter installed, connected to electric utility grid but non-operating (daylight or nighttime hours).

NOTICE:

Outdoor Installations for Extended Periods without Power

CPS advises against leaving inverters mounted outdoors for an extended period of time (more than 90 days) and/or allowing inverters exposed to cycles of freezing temperature without both DC and AC power connected to the inverters under normal operation.

The CPS inverter enclosures are designed to conform to NEMA4 (or IP65), however there exists the possibility of water condensation inside the inverter

enclosure when it is left exposed to an outdoor environment without power to operate for an extended period of time. Moisture in the air could enter the inverter during the time that the cover is opened for wiring purposes. When the inverter is exposed to temperature swings, especially in cold weather, moisture inside the inverter could condense over the aluminum heatsink area where inverter semiconductors are mounted. Water droplets on the heatsink may cause a short-circuit to live semiconductor devices. When the PV source is applied to the inverter, this PV power source could cause the inverter to fail and result in a short-circuit across the PV array.

If such a situation in which the inverter is mounted outdoors without operating power occurs, CPS recommends that the inverter be inspected for water condensation before any DC or AC power can be applied to inverter. Without inspection, customers will run the risk of having inverter electronic circuit damage when power is applied to inverter during startup. It is advised that customers contact CPS for further advice and to arrange schedule for CPS service personnel to perform inspection of inverter on site.

CPS hotline: 855-584-7168

Installation Requirements

3.1.1 Installation Methods

The inverter shall be installed as follows:

If the location permits, install the inverter vertically.

If the inverter cannot be mounted vertically, it may be tilted backward 0 to15 degrees from vertical.

Do not mount the inverter leaning forward.

Do not mount the inverter upside down.

Do not mount the inverter horizontally.

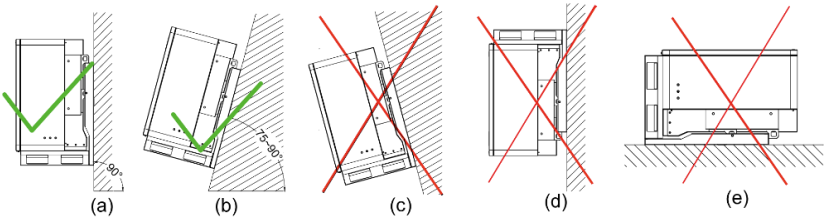


Figure 3-2 Inverter Mounting Options

NOTICE!
Make sure that the mounting structure (bearing wall, rack, etc.) is rated to bear the weight of the inverter.

3.1.2 Installation Environment

If the installation environment allows, avoiding direct sunlight, rain and snow can reduce power derating and extend the life of the inverter. It is recommended that the inverter is installed under a roof or sunshade. However, installation outdoors with direct sunlight, rain and snow does not impact the warranty.

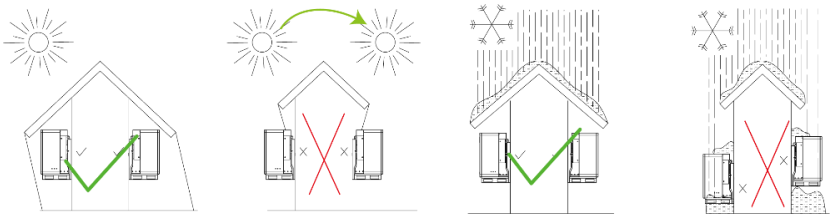


Figure 3-3 Inverter Mounting Suggestion

3.1.3 Space Requirements

The distances between the inverters or the surrounding objects should meet the following conditions:

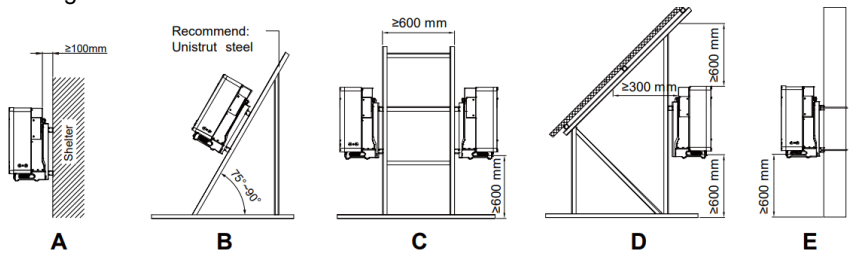


Figure 3-4 Space Requirements

A: Keep a proper distance between the inverter and the shelter to ensure good ventilation.

B: The inverter can be installed at an angle of 75° ~90° and its back shall not be blocked to ensure good ventilation.

C: Two inverters can be installed back to back, and proper distance shall be kept to ensure good ventilation.

D: The inverter can be installed under the PV module, while its back and top shall not be blocked to ensure good ventilation.

E: The inverter can be installed on a single column holding rod and shall be checked to confirm a secure installation.

Installation Procedures

3.1.4 Install the Inverter

1. Mark hole-positions on the installation structure (shelter, steel rack, etc.) according to the size of the mounting brackets.

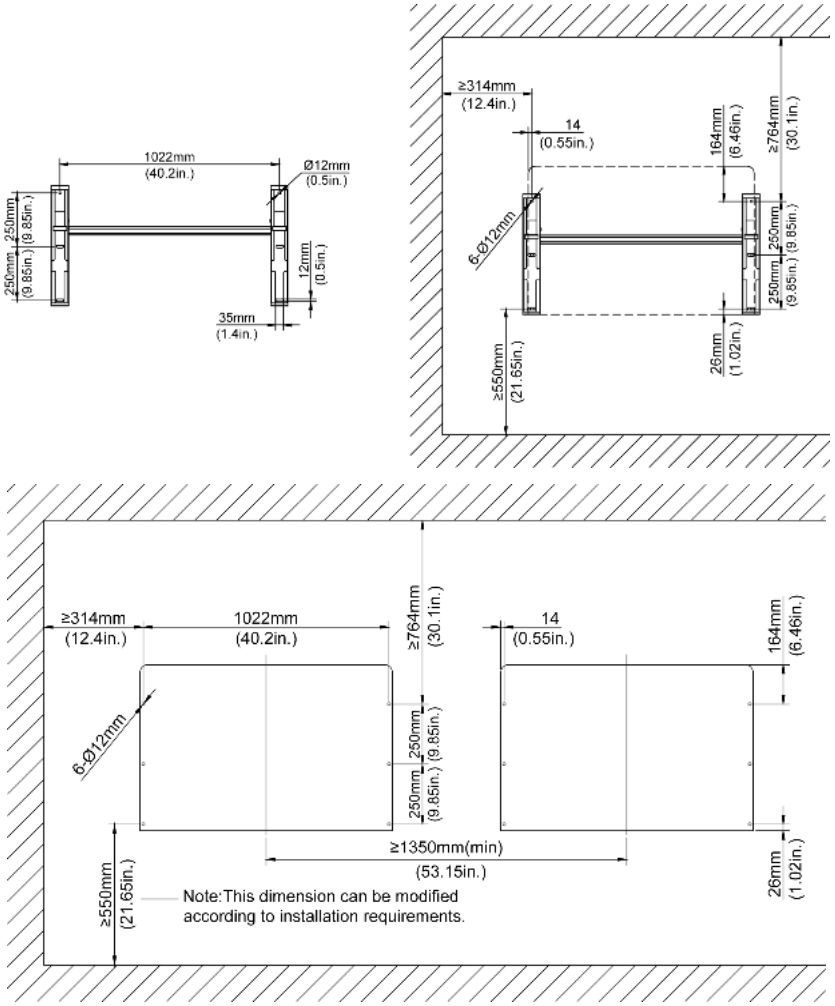


Figure 3-5 Hole positions of mounting bracket

2. Drill holes with a Φ12mm drill at the marked position, and then fasten the mounting bracket ① on the installation structure with six M10x50 hexagon combination screws ② included in the PE accessory bag.
   Tools required: 16mm hex socket wrench, torque: 12.5N.m,110 in-lbs.

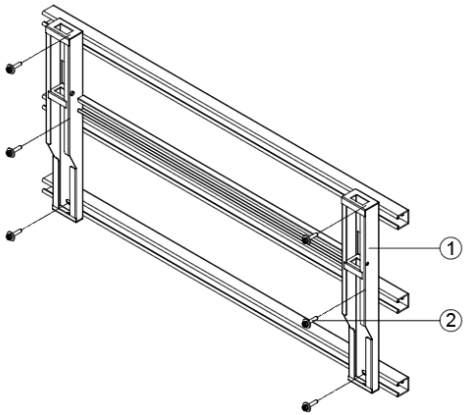
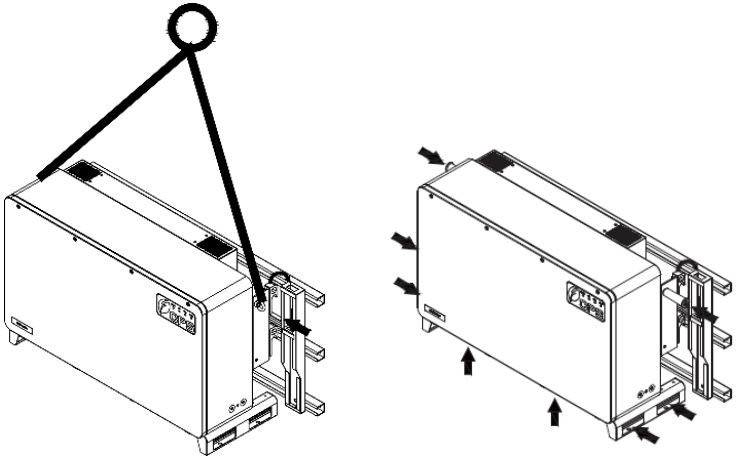


Figure 3-6 Fasten the mounting bracket

3. Hang the inverter onto the mounting brackets by either:

   A. Hoist mounting: screw two M10 lifting eyebolts to the studs at the top of the inverter. Use sling rope or bar (inserted through both lifting eyebolts) to lift the inverter onto the mounting bracket. The minimum angle between the two sling ropes should be less than 90 degrees, as shown in Figure 3-7 left.

   B. Manual mounting: Four people are needed to properly lift the inverter by the two handles and supporting positions marked by the arrows in Figure 3-7 right, and mount the inverter onto the mounting bracket.



A – Hoist Mounting B – Manual Mounting

Figure 3-7 Inverter Mounting Methods

CAUTION!

The total weight of the inverter is approx. **119 kg (262.4 pounds)**. Ensure the mounting bracket is properly installed before hanging the inverter on the bracket. It is recommended to have at least 4 people to mount the inverter due to the weight of the equipment.

4. Use two M6X90 screws to fasten inverter on mounting bracket.
   Tools required: #3 Philips head screwdriver, torque: 6 N.m, 53 in-lbs.

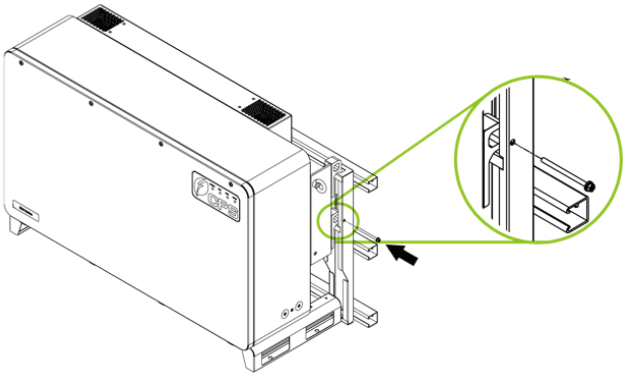


Figure 3-8 Fasten the inverter

4 Electrical Connection

Cable Specifications

Cable	Type	Acceptable wire range
DC	Use 90℃ Copper wire only	• 36 fused input: screw clamp fuse holder (wire range: #14 - #8 AWG CU). • 24 non-fused input: screw clamp terminal (wire range: #14 - #8 and #6 - #4 AWG CU). One threaded hole per MPPT for connecting #6 - #4 AWG CU. • Terminals are 90C rated.
GND	Outdoor copper core wire	Phase wire diameter/2
AC	Use 90°C Cu/Al wire	• L1, L2, L3: either 4/0AWG~750kcmil copper wire or 250kcmil~750kcmil aluminum wire. • PE: Phase wire diameter/2 • Terminals are 90C rated.
Comm.	Communication cable UTP CAT-5e or Belden 3106A or equivalent.	

Table 4-1 Cable Specifications

Tools Required and Torque Values

No.	Tools	Usage	Torque value
1	No.2 Phillips head screwdriver	DC Cable	3 N.m, 26 in-lbs
2	18mm hex socket wrench	AC terminal block L1-L3	31 N.m, 275 in-lbs
3	10mm hex socket wrench	External grounding	6 N.m, 53 in-lbs
4	5mm flat screwdriver	DC internal grounding bar AC internal grounding bar	3 N.m, 26 in-lbs 5 N.m, 45 in-lbs
5	1.5mm flat screwdriver	RS485 comm. terminal	0.2 N.m, 1.8 in-lbs

6	Diagonal pliers	Cut cable	-
7	Wire stripping pliers	Remove jacket	-
8	Crimping pliers	Crimp terminal	-

Table 4-2 Tools required and torque values

Connect Interfaces and Connection Points

In the following section, you will find the connect interfaces, internal connection points, as well as their names, positions etc.

4.1.1 Connection Interfaces

The connection interfaces of inverter are as shown in figure 4-1.

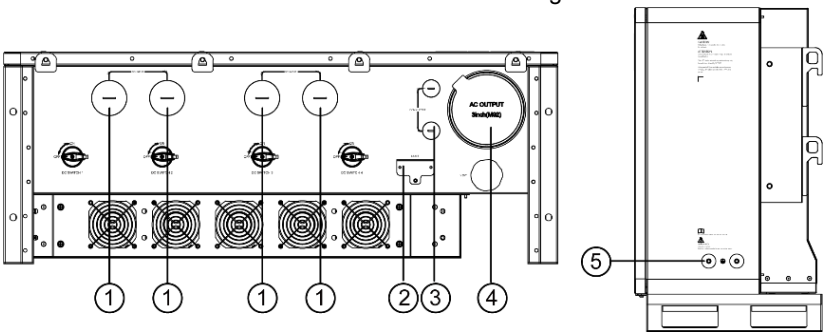


Figure 4-1 Connection interfaces

No.	Item name
1	Four Knockouts for DC inputs (2 inch Trade Size)
2	LINKIT interface
3	Two Knockouts for communication (3/4 inch Trade Size)
4	One Knockout for AC output (3 inch Trade Size)
5	External GND connection point

Table 4-3 Connection interfaces

4.1.2 Internal Connection Points

The internal connection points of inverter are as shown in figure 4-2.

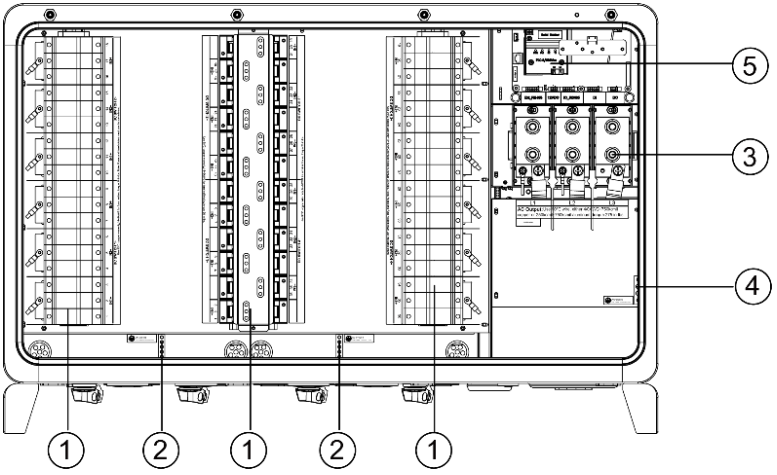


Figure 4-2a Internal connection points of 36 input inverter

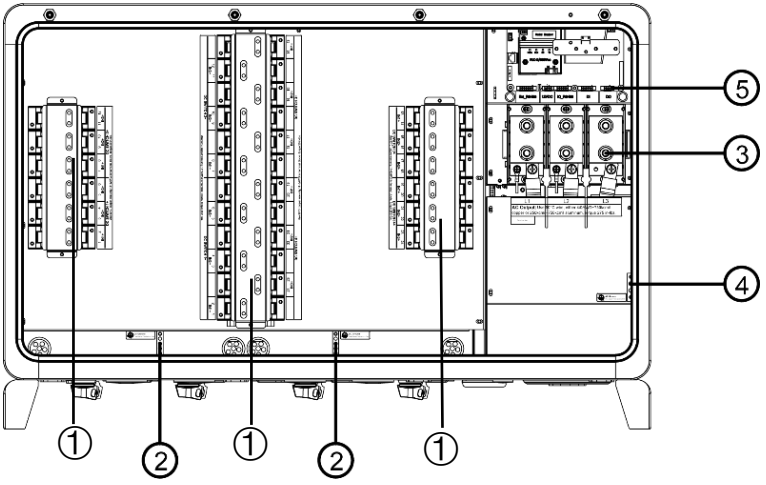


Figure 4-2b Internal connection points of 24 input inverter

No.	Item name
1	DC input fuse holder/terminal (Non-fused inputs for 24 input inverter)
2	DC Ground
3	AC output terminal block
4	AC Ground
5	Communication board

Table 4-4 Names of Internal connection points

Electrical Cable Connection

CAUTION!

The cables shall be connected in accordance with the National Electrical Code NFPA 70, CSA C22.1 and all other applicable local codes or jurisdictions.

WARNING!

This unit is not provided with a GFDI device for AC ground fault protection. External AC ground fault protection is required by code NEC 2017/2020 Section 250.21 when CPS inverters are connected to Wye Floating or Delta Floating transformer windings. The inverter will provide DC ground Fault detection.

For the 24 input and 36 input inverter models, there is no significant difference in their Ground terminals and AC terminals wiring methods. The 36 input version is shown below as an example. There are differences for their DC terminals layout and wiring methods, so the DC wiring methods separately in following texts.

Use a **5mm socket head screw wrench** to remove the four screws on the front cover, and then lift the cover slightly to remove it.

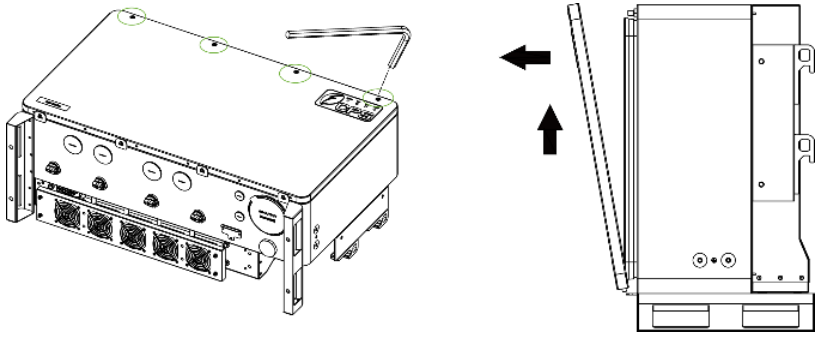


Figure 4-3 Remove the front cover

IMPORTANT!

It is important to use hand tools (e.g. socket wrench) instead of power drivers or other types of screw drivers.

4.1.3 Grounding

IMPORTANT!

The following wiring diagrams will take the 36 string input inverter as an example since there are no obvious differences in ground wiring terminals.

There are two kinds of grounding methods for this inverter. You can choose one of the following:

a) Connect two internal DC grounding terminals (in the middle) and one AC grounding terminal (on the right side) as shown in Figure 4-4, or

b) Connect the external grounding point as shown in Figure 4-5 using the M6x16 Comb. bolt.

Figure 4-4 Internal DC and AC Ground Terminals

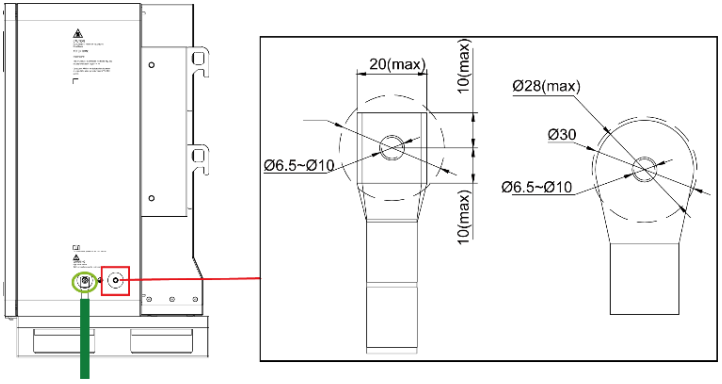


Figure 4-5 External Ground Cable Connection

IMPORTANT!

There are no differences on Internal DC and AC Ground Terminals, External Ground Cable Connections, and AC wiring terminals between 24 input inverter and 36 input inverter versions. Therefore, the 36 input inverter is shown as an example in the following section.

4.1.4 AC Wiring

1. Remove the watertight plug from the AC output of the wiring box to install 3 inch Trade Size conduit and conduit fittings into the hole. Then route the cables through the conduit inside the wiring box.
2. A Circuit Ground should run with the AC Power cables and connected to the internal ground bus.
3. A separate Ground wire should bond the Inverter to the local ground connection for personnel safety. By bonding at this location, it is easy for the operator to determine the inverter is safely grounded.
4. Connect the AC (L1, L2, L3) cables to the copper bus bar and connect the ground cable to the internal grounding terminal block.

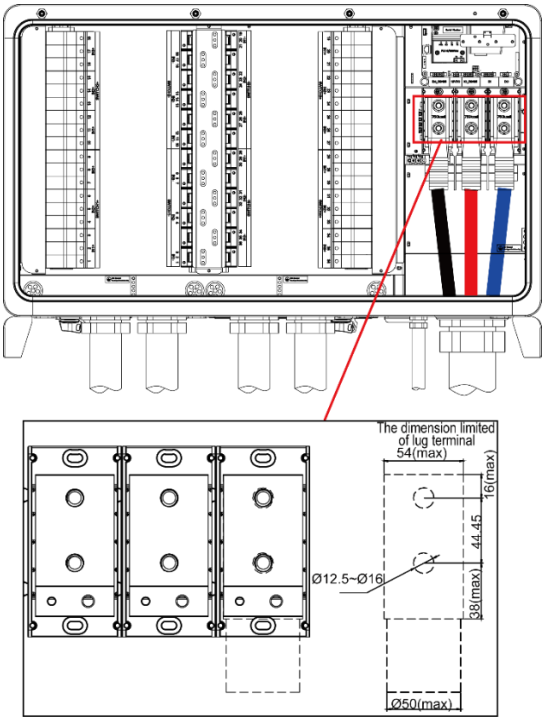


Figure 4-6 AC wiring terminals

When the output of the inverter is connected to the grid, an external AC circuit breaker or fused disconnect device is required to be installed to safely disconnect the inverter

from the grid should an overcurrent event occur. The minimum size breaker is determined by NEC calculations. The internal temperature of the AC Panel must be considered and appropriate thermal derating applied to prevent nuisance tripping.

Inverter model	Min AC OCPD	Max AC OCPD
CPS SCH275KTL-DO/US-800	250A	300A

Table 4-5 Specification of AC OCPD

The inverter operates at 800VAC output. If another voltage/configuration is required, a transformer may be necessary.

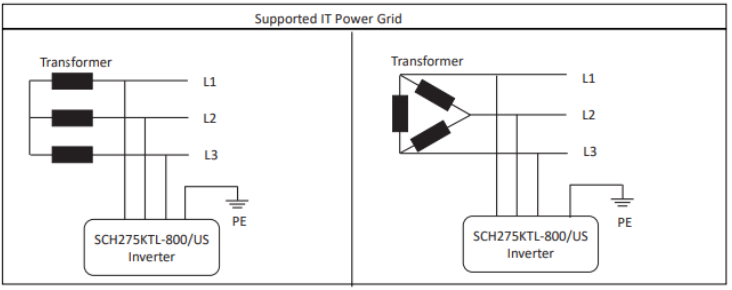


Figure 4-7 Acceptable Transformer Winding Configurations

IMPORTANT!

The CPS SCH275KTL-DO/US-800 inverter is only compatible with Wye Floating and Delta Floating transformer winding configurations. External AC Ground Fault detection is required by code NEC 2017/2020 Section 250.21 when CPS inverters are connected to Wye Floating or Delta Floating transformer windings. The inverter will provide DC Ground Fault detection

NOTES:

- Transformer short-circuit impedance (Z%) should be less than 6%.
- The transformer VA rating should be at least 100% of the sum of the connected inverter VA ratings.
- CPS recommends the transformer VA rating be selected based on IEEE C57.159-2016 *Guide on Transformers for application in Distributed Photovoltaic (DPV) Power Generation Systems*. It is the responsibility of the system designer to determine and take into account the reliability of the

transformer and other system parameters.

- The transformer does not require a static shield.
- Up to 20 inverters may be connected in parallel for use with a single transformer.
- The recommended maximum voltage-drop on the Inverter to Point of Common Coupling (to the grid) is 2% at full load – including conductor temperature considerations. Voltage drop greater than 2% may require changing the transformer tap or as last resort adjusting the GridMaxVolt trip point settings.

4.1.5 DC Wiring

4.1.5.1 DC fuse configuration

The 36 input inverter version includes touch safe fuse holders and preinstalled 20A DC fuses. Customers must verify that the appropriate fuses are installed depending on the configuration of PV array and by performing PV fuse sizing calculations for each string.

Each MPPT DC input from the PV that has more than 2 strings requires fuse protection.

The rated voltage of the fuse should be 1500VDC. ADLER series 1500VDC fuse are recommended.

The ampere rating of the fuse is generally selected as 1.56 × module Isc of the PV string. Refer to NEC 690.8 for Circuit Sizing and Current requirements.

The following table lists the names, types and specifications of ADLER series fuses, which are within the rated voltage of PV modules.

Names	20A fuses	25A fuses	30A fuses
Types	A74 (36 input)	A74 (36 input)	A74 (36 input)
Spec.	20A/1500V	25A/1500V	30A/1500V

Table 4-6 DC Fuse selection

WARNING!

Replace only with the same ratings and type of fuses.
Different fuses or incorrectly sized fuses could result in equipment damage or unsafe working conditions.
Any damage resulting from incompatible fuses is not covered by warranty.

CAUTION!

Disconnect all power sources before replacing fuses.

4.1.5.2 DC Cable Connection

To ensure the optimum performance of the inverter, please read the following guidelines before performing any DC connections:

Confirm the DC configuration and ensure that the maximum open circuit voltage of the PV modules is lower than 1500VDC under any conditions.

Confirm that the PV modules for each MPPT within the inverter are of the same type and specification before connection.

Ensure correct polarity of the PV strings before terminating the DC cables according to the following steps, as shown in figure 4-8:

i. Use a multi-meter to measure the PV strings' cable ends and check the polarity.

ii. The positive (+) terminal of cable should match the positive (+) terminal of inverter's DC input.

iii. The negative (-) terminal of cable should match the negative (-) terminal of inverter's DC input.

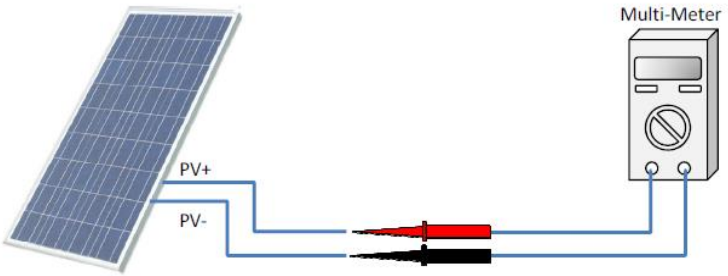


Figure 4-8 Polarity Check

NOTICE!

It is important to use a multi-meter to check the polarity of the DC input cables to avoid any risk of reverse polarity.

WARNING!

A reversed string is extremely hazardous and will result in a blown fuse when the irradiation is high.
The voltage across the blown fuse can be as much as two times Voc and could prevent proper fuse operation resulting in a fire.

Perform cable connection as per the following steps:

1. Remove the liquid-tight hole plugs from the DC input of the wiring box and install 2 inch Trade Size conduit and conduit fittings into the holes. If the use of smaller conduit is desired, proper weather-tight reducing bushings may be installed. Confirm all fittings are NEMA 4X rated, properly tightened, and route the cables through the conduit into the wiring compartment.
2. Connect the DC cables to the fuse holders of 36 input inverter as shown in Figure 4-9a; or connect to the DC terminals of 24 input inverter as shown in Figure 4-9b, and then tighten the screws.
3.

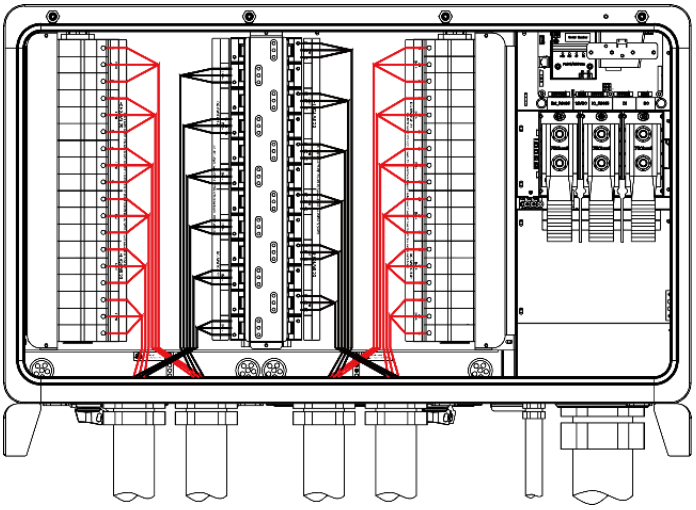


Figure 4-9a Connect the DC cable to fuse holder

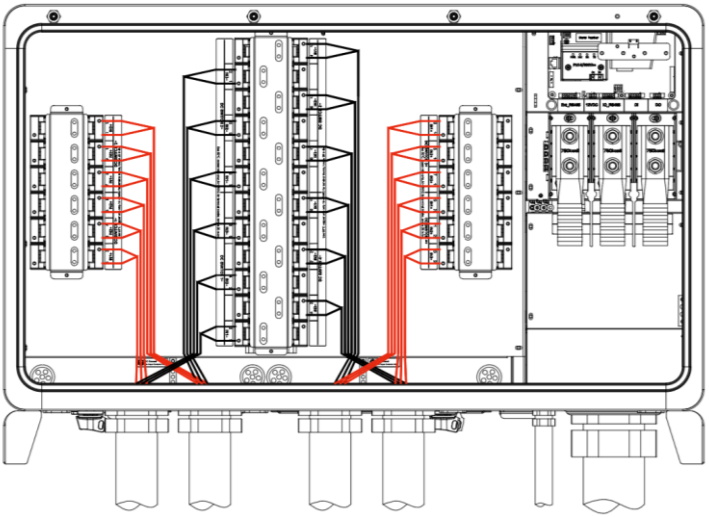


Figure 4-9b Connect the DC cable to DC terminal

NOTICE!

To maximize production, reduce clipping losses, and optimize thermal performance, the DC input power should be distributed across all 12 MPPTs as evenly as possible (e.g. difference in number of strings per MPPT not larger than 1.)

NOTICE!

The use of ferrules is recommended for all stranded wire connections.

Communication Cable Connection

4.1.6 Communication Board

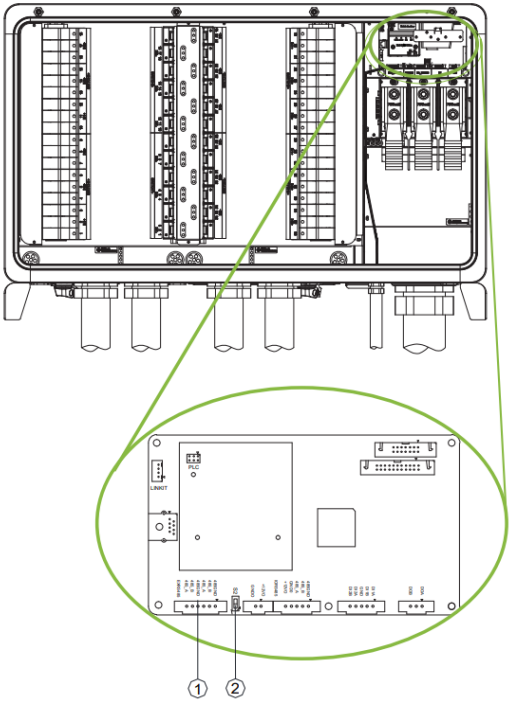


Figure 4-10 Communication Board

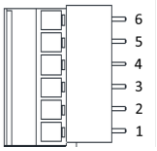
No.	Item names	Picture	Configuration
1	RS485 port 6-pin connector plug		6 - RS485_GND (Common) 5 - RS485_B 4 - RS485_A 3 - RS485_GND (Common) 2 - RS485_B 1 - RS485_A
2	S2 Selector switch (set terminal resistor)		OFF - Disable terminal resistor ON - Enable terminal resistor

Table 4-7 Communication board Interfaces

4.1.7 Communication Connection

The inverter supports industry standard Modbus RS485, Ethernet, and AC-PLC communication modes. AC-PLC communication requires connection of the CPS AC-PLC Kit accessory.

4.1.7.1 RS485 Communication Schematic Diagram

Connect RS485 communication cables with the help of 6-pin terminal to 485 communication module, referring to figure 4-11 (1) for a single inverter RS485 communication connection and figure 4-11 (2) for network configuration. (Wiring methods of new and old communication boards are the same, here we take the new one for instance as below).

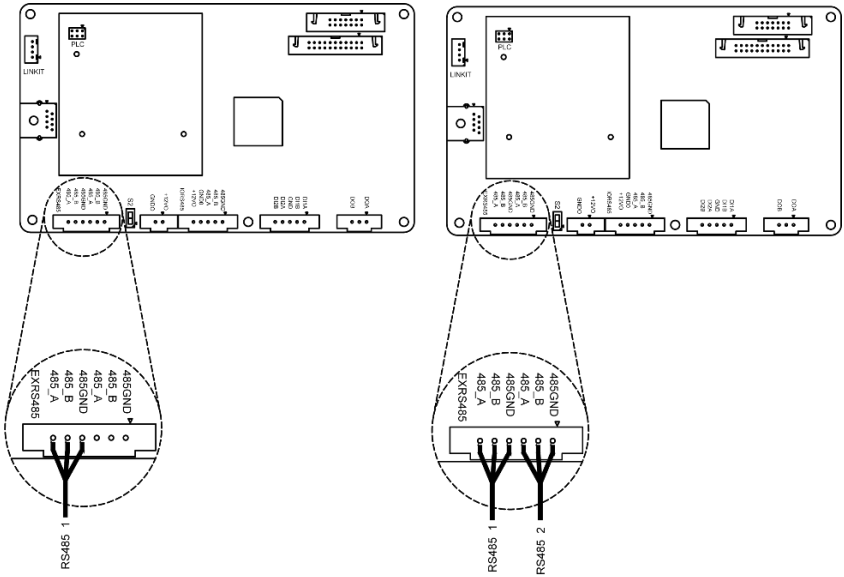


Figure 4-11 RS485 communication cable connection

It is recommended that industrial grade shielded twisted pair RS485 cable be used in lieu of unshielded twisted pair. Communication cable such as (CAT5e) or Belden 3106A cable for RS485 6-pin connector is preferred.

4.1.7.2 RS485 Network Connection

When the inverters are monitored via the RS485 communication, a unique RS485 address for each inverter can be set up through the APP interface. Up to 32 inverters can be connected in a serial fashion in the RS485 communication network. Therefore, the daisy-chain topology (see Figure 4-12) is recommended for the RS485 network connection, which can minimize the noise and bus reflections. Other communication topologies, such as the star networks, are not recommended.

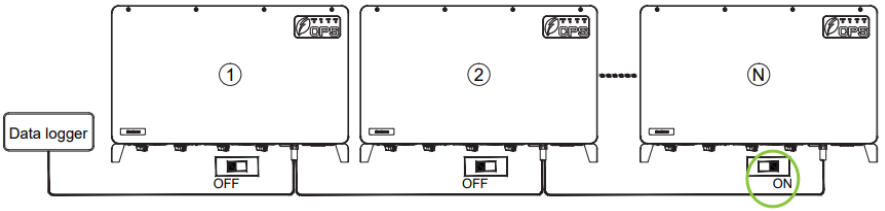


Figure 4-12 RS485 Network Connection

If there are multiple inverters in the RS485 network and the last inverter is more than 200 m distant from data logger, the selector switch S2 of the last inverter in the daisy-chain should be in ON position, to enable the 120ohm terminal resistor. The selector switch S2 of all other inverters should be in the OFF position to disable the terminal resistor.

It is important to daisy chain the inverter RS485 connections to minimize noise and bus collisions. All RS485 connections must be terminated in a serial fashion and not to exceed 32 in total. Daisy Chain configuration is recommended.

DANGER!

Make sure all DC and AC power has been disconnected before opening the wire box and ensure that hazardous high voltage and power has been discharged to avoid risk of electric shock.

Wait at least 5 minutes after disconnecting from the DC and AC sources before servicing or maintaining the inverter.

4.1.7.3 Communication Wiring

The detailed steps to perform the communication wiring for a single inverter or a network of inverters are as follows:

1. Open the inverter wire box.
2. Insert the communication cables into the wire box through the knockout holes at the bottom. Conduit and knockouts must be sealed and water-tight to maintain the NEMA 4X rating.
3. Connect the RS485 wires to their corresponding connectors, ensuring correct polarity and using a shielded twisted pair cable.
4. (a). If the inverter is the **last** Modbus device in the daisy chain and it's more than 200m distant from data logger, make sure the Modbus termination switch S2/ LEFT S150 is in the ON position to enable Modbus termination; while all other switches shall be in the OFF position.
   (b). If there is only one inverter and it's more than 200m distant from data logger, the Modbus termination switch should also be set to ON, otherwise, it can be set as OFF.
5. The shield of the individual cables must be open (not connected to ground) on one end – the other end of the shield must be grounded.

WARNING!

Failure to follow this installation practice will increase lightning surge damage to the inverter and will void the warranty.

After completing all the wiring steps, reinstall the front cover and press down to lock it. Finally, fasten the four screws on the front cover as shown in the figure.
Tools required: 5mm socket head screw wrench, torque: 3N.m, 26in-lbs.

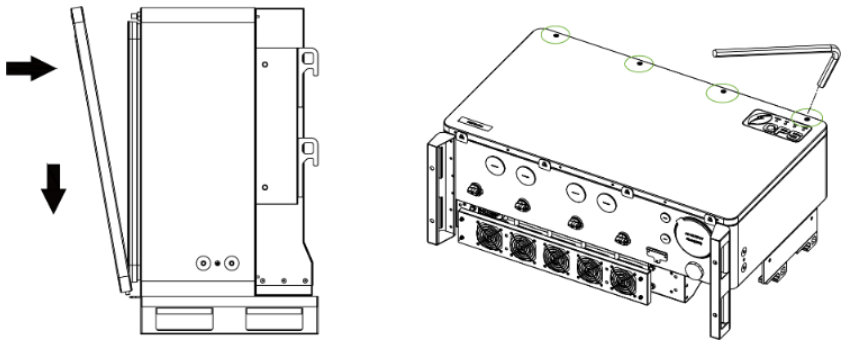


Figure 4-13 Re-install the upper cover

IMPORTANT!

- It is important to use hand tools (e.g. socket wrench) instead of power drivers or other types of screw drivers.
- During installation, it is recommended the cover is in alignment with balanced force to avoid thread damage.
- Partially engage the screws into the threaded inserts before tightening.

Install the LINKIT Module

INSTRUCTION

The LINKIT module is required for the commissioning of the inverter. This step does not need to be completed until commissioning.

1. Remove the two M4x10 fixing screws on the DB9 connector cover, as shown in Figure 4-14.

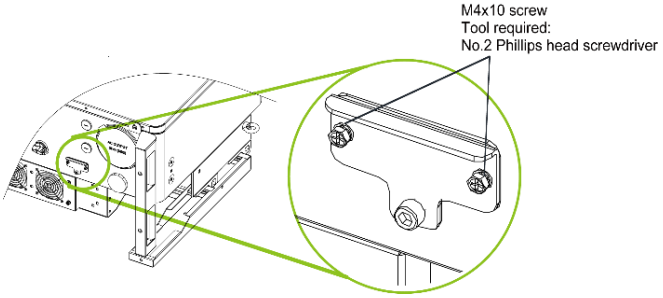


Figure 4-14 Expose the connector

2. Rotate the cover to expose the connector and then install the LINKIT module with the two screws just removed. Pay attention to the control torque of 1.6 Nm (14 in-lbs), to ensure that the seal watertight.

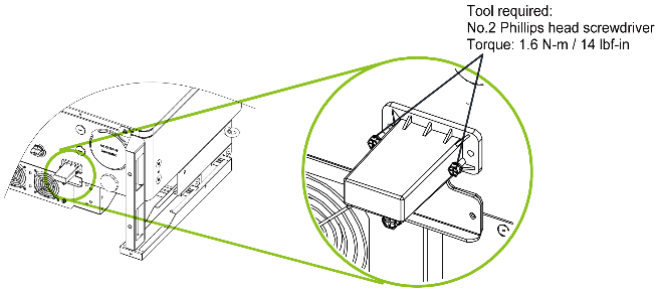


Figure 4-15 Install LINKIT module

Cable Connection Notices for Joints and Seals

All the electrical cables and communication cables shall be jointed and sealed properly according to the following requirements to ensure their excellent performance and good water tightness.

The cable must be vertical to prevent excessive cable stress.

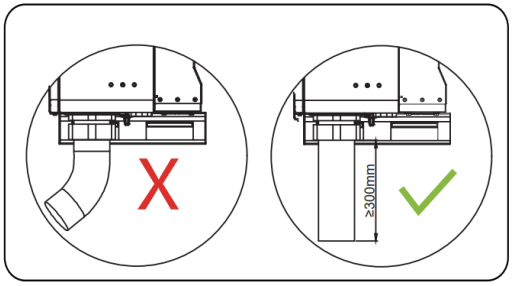


Figure 4-16 Cable must be vertical

After the cable passes through the fastening head, fireproof putties shall be applied to seal the joint tightly to prevent water vapor from entering.

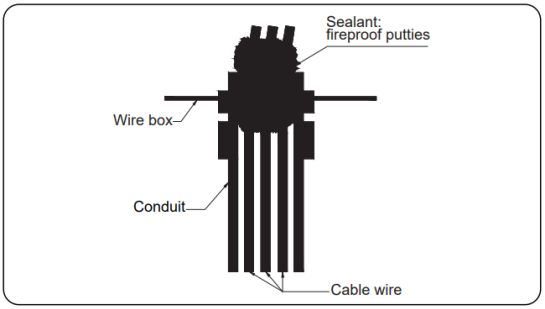


Figure 4-17 Apply fireproof putties

After tightening the fastening head, watertight sealants shall be applied on its inner surface and outer surface to avoid loosening or prevent water from entering.

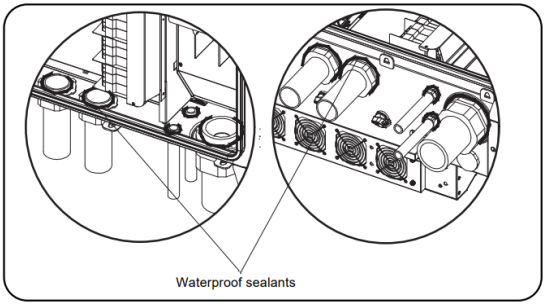


Figure 4-18 Apply watertight sealants

Before and after tightening the fastening head, check carefully to ensure the watertight gasket is in good condition, i.e. its surface is uniform and unbroken.

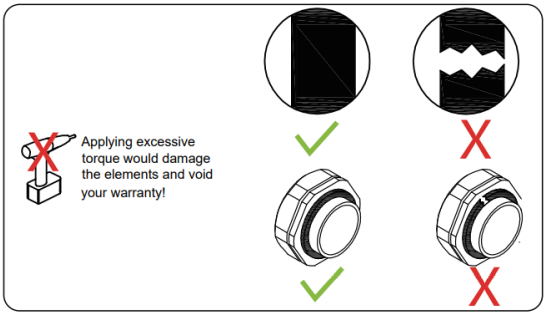


Figure 4-19 Check watertight gasket

5 Commissioning

WARNING!

Please follow the guidelines below before performing any on-grid operation to eliminate possible danger. Before powering up the PV system it is important to check the installation for any hazards that may be present.

Pre-commissioning Checks

5.1.1 Mechanical Installation

Make sure all the mounting brackets are secure.

Make sure all the screws have been tightened to the specified torque values.

Confirm all knockouts are sealed and conduit is securely attached to the inverter, creating a water-tight seal.

5.1.2 Cable Connections

Make sure all cables are connected to the right terminals and properly labeled.

Ensure appropriate cable management to avoid physical damage.

Check polarity of DC input conductors. The DC Switches should be in the OFF position.

5.1.3 Electrical Check

Make sure the AC circuit breaker and/or fused switch disconnect is appropriately

sized.

Test and check that the AC voltage is within the normal operating range.

Make sure the DC open circuit voltage of input strings is less than 1500V.

Commissioning Steps

Complete the list above before commissioning the inverter as follows:

1. Turn on the AC circuit breaker or fused switch disconnect.
2. Turn on the DC circuit breaker. (Skip this step if there is no DC circuit breaker).
3. Switch the Inverter's DC Switches to the ON position. When the energy supplied by the PV array is sufficient, the POWER indicator of inverter will light up. The inverter will then start up and enter the self-check process.
4. Connect to the inverter via the **CPS Connect Pro** app according to the procedures introduced in section 6.1 APP Download and section 6.2 APP Setting to select the inverter parameter settings.

6 APP Interface and Setting

APP Download

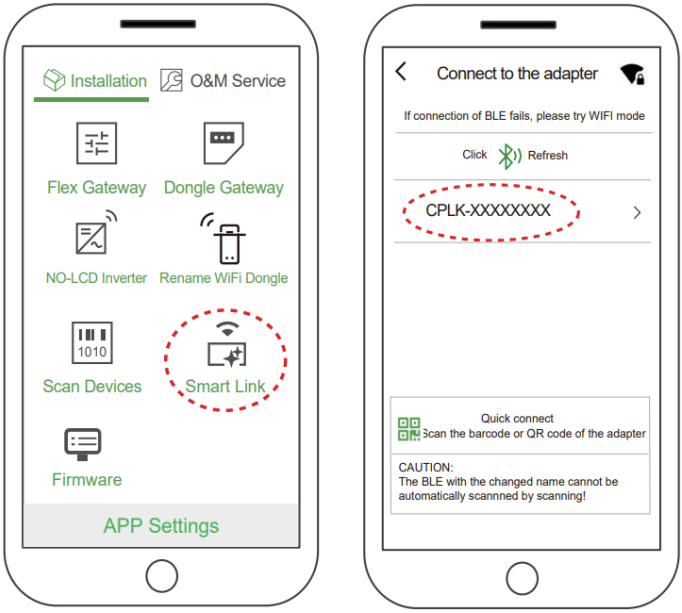
The inverter settings are accessed through the CPS Connect Pro application.

Users can download iOS version at Apple store or Android version in Google store or scan the QR code (Support Android 4.1 and IOS 9.0 or later).

CPS Connect Pro

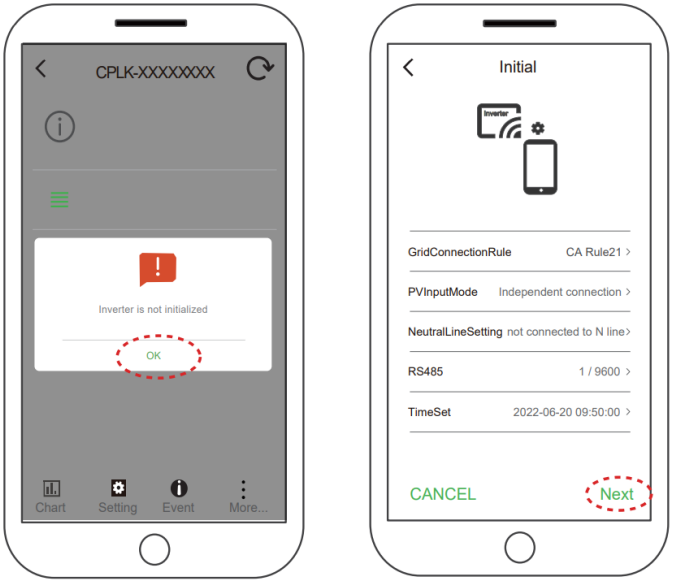
APP Setting

Once powered, the inverter will automatically create a wireless network that can be visible as an Access Point from the user communication devices (tablet, smartphone, etc.). Users can perform the following procedures to set the APP easily. First of all, open your Bluetooth function, and then open CPS Connect Pro APP.



1. Touch **Smart Link** icon to enter smart link interface and then click Next to enter the **Connect to the adapter** interface.

2. Touch the wireless network named CPLK-XXXXXXX (X can be found on the LINKIT label) shown in the Bluetooth List, or touch the green QR icon under the list to scan LINKIT car code to connect network; Or you can choose the **WiFi Mode** tab in the top right corner to set WiFi and input the password “Password” (Capital P), to connect network.



3. Touch **OK** icon to finish initialization process during the first commissioning.
4. Set correct inverter parameters, such as Grid Code, PV Link Type, Neutral line, RS485, then click **Next** button, it will go to home interface

Grid Connection Rule: Choose the Grid Code according to the requirements of your local authority. the available Grid Codes include IEEE 1547-2018, CA Rule 21, ISO-NE, IEEE 1547_2014 and HECO.

PV Input Mode: The working mode of the DC input connection and MPPT can only be configured as Independent.

Neutral Line Setting: this inverter can only be applied in IT system, the neutral line connection is not supported.

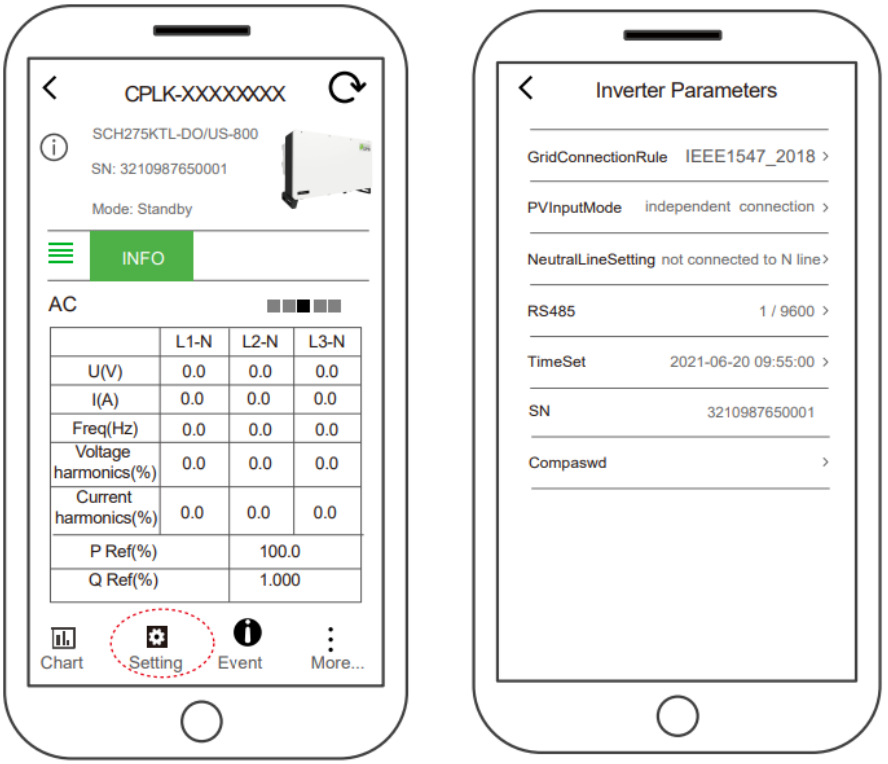
RS485: Choose the communication data Modbus Address and Baud Rate.

Time Set: Set the system clock.

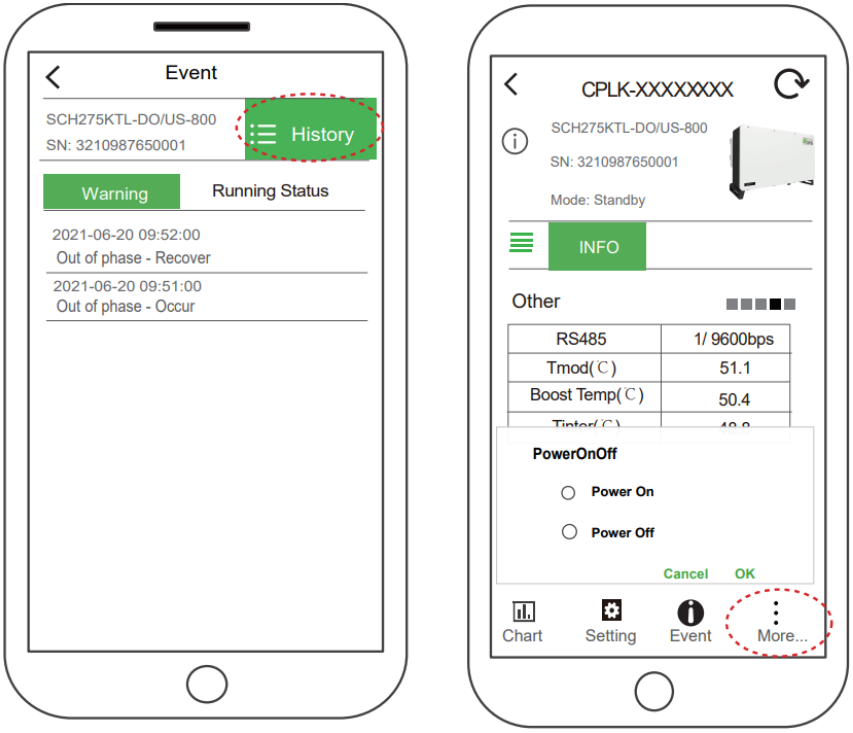
IMPORTANT!

Please check with your local electricity supply company before selecting a Grid Code. If the inverter is operated with a wrong Grid Code, the electricity supply company may cancel the interconnection agreement.

Placing the inverter into operation before the overall system complies with the national rules and safety regulations of the application is not permitted.



5. When the device screen shows the normal operation status and the RUN light on the LED panel is illuminated, it indicates that the grid connection and power generation are successful. You can now browse through the real-time data in the APP now. Sliding the interface left and right can browse through DC, AC, Other and Version pages. Touch the **Setting** icon and input the password “1111”, it will go to Setting interface.
6. You can reset or modify inverter parameters such as Grid Code, PV Link Type, RS485 or password as required.



7. If the inverter fails to operate normally, the FAULT light will illuminate and the fault information will be shown on the interface. Touching **Event** icon in the bottom can skip to **Event** page, you can check the detailed current and history information here. Troubleshoot related problems and restart. Contact our after-sale department if necessary.

8. Touch **More** icon and input password "1111" to power on/off device.

Structure Tree of App Interface

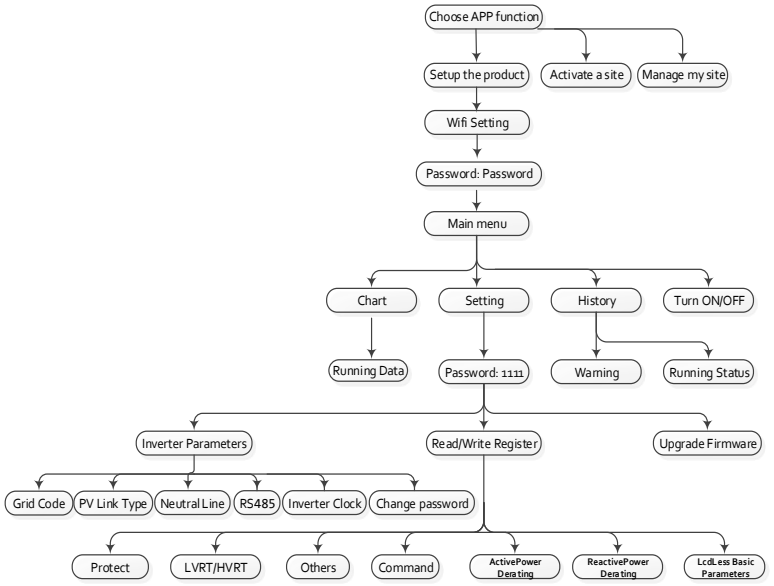


Figure 6-1 Structure tree of App Interface

Main Menu

In the Main interface, you can access the DC, AC, OTHER and VERSION information.

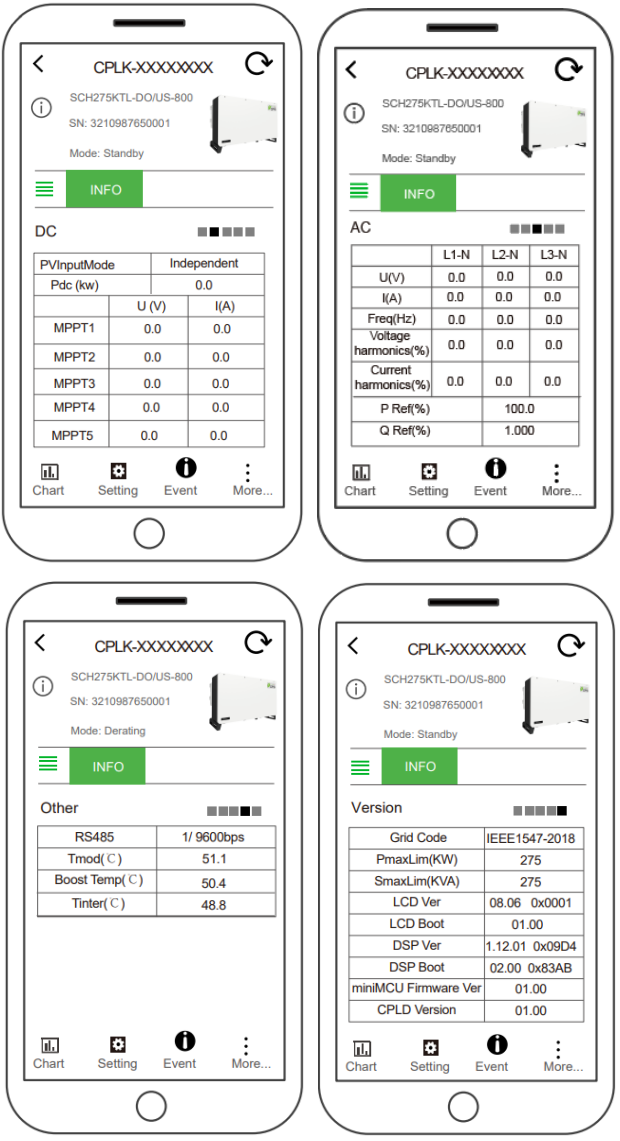


Figure 6-2 Main information on Main Interface

In addition, you can see four submenus: Chart, Setting, History and Turn ON/OFF.

6.1.1 Chart

In the chart sub-menu, you can view the power generation situation at different times, such as Current, Today and Total. These data can also be displayed in Day, Month, Year, shown as below in Figure 6-3.

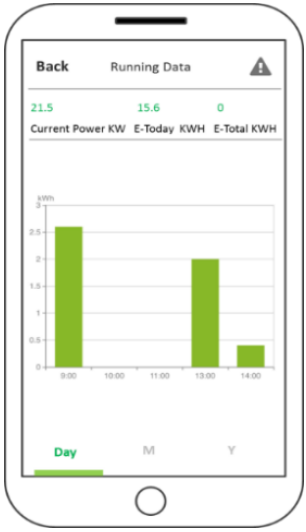


Figure 6-3 power generation screen

6.1.2 Setting

Touch the **Setting** icon and input the password “1111”, you will go to the setting interface.

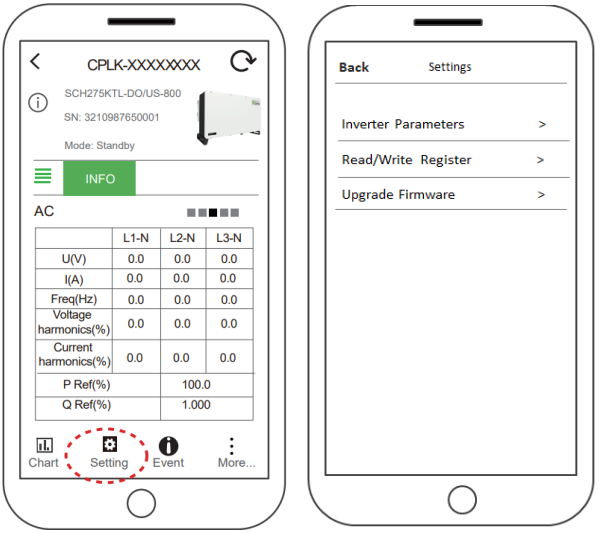


Figure 6-4 Setting interface

It's possible to access three submenus on the setting interface: Inverter Parameters, Read/Write Register and Upgrade Firmware.

6.1.2.1 Inverter Parameters

Touch the Inverter Parameters tab, you can set the following parameters as required.

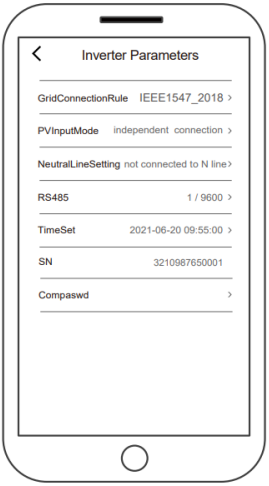


Figure 6-5 Inverter Parameters

IMPORTANT!
Check with your local electric supply company before selecting a grid code. If the inverter operates with a wrong grid code, the electric supply company may cancel the interconnection agreement.

6.1.2.2 Read/Write Register

In the Read/Write Register interface, you can find the following sub-menus:

Protect

LVRT/HVRT

Others

Command

ActivePowerDerating

ReactivePowerDerating

LcdLess Basic Parameters

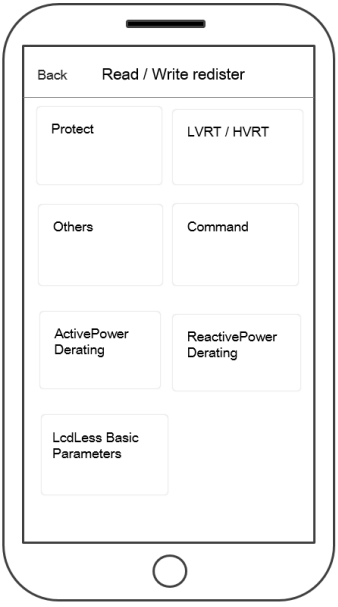
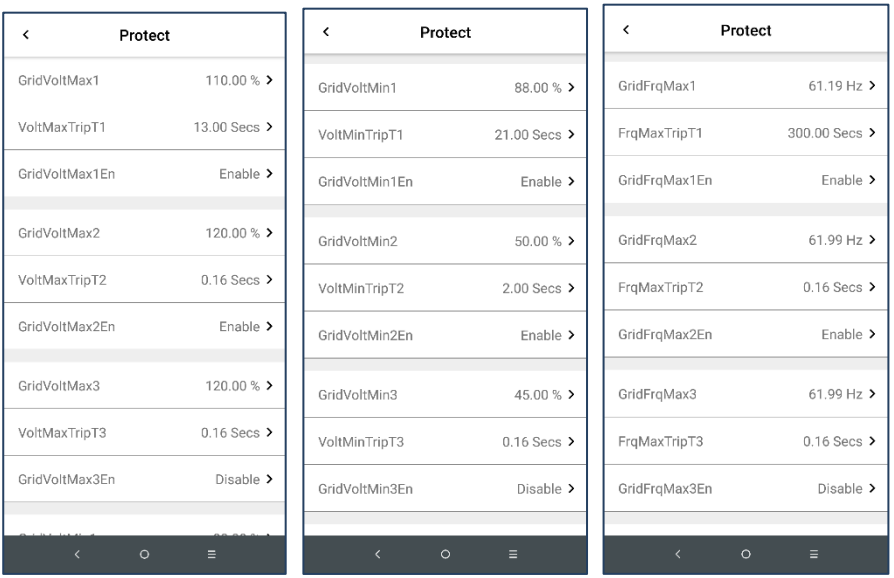


Figure 6-6 Read/Write Register

IMPORTANT!
The following mobile screenshots show parameters in accordance with IEEE 1547-2018 Grid Code.

6.1.2.2.1 Protect

The Protect interface displays the protect parameters of the AC grid voltage, frequency and recovery, etc. In addition, you can find and set the protection levels of over voltage, under voltage, over frequency and under frequency.



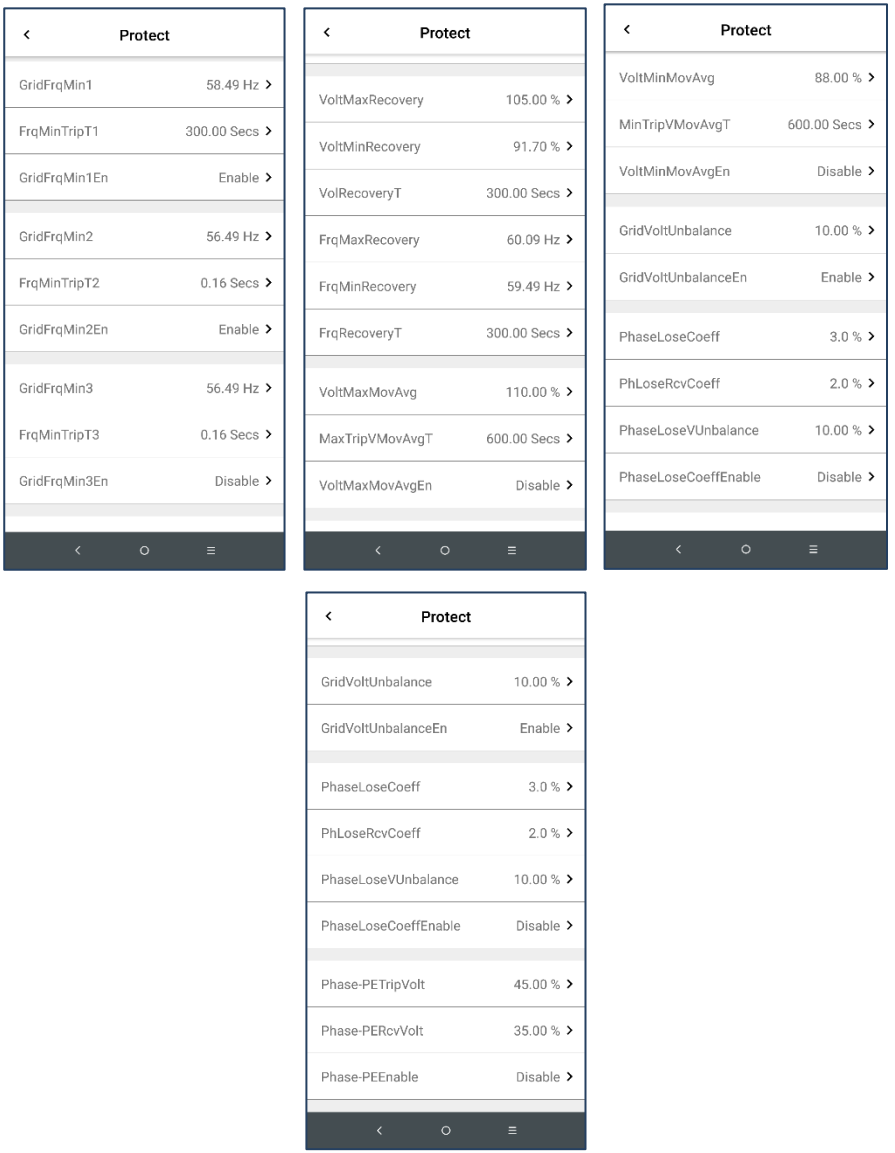


Figure 6-7 Protection Parameters

In addition, the table listed below can provide detailed parameter information for you.

Parameter name	Description	Range	Grid code IEEE-1547	Grid code RULE-21	Grid code ISO-NE	Unit
Grid Over Voltage Protection						
GridVoltMax1	Threshold Level 1 Max. grid voltage	{100.00%,135.00%}	110.00%	110.00%	110.00%	%
VoltMaxTripT1	Trip Time Level 1 Max. grid voltage	{0, 655.35}	13.00	12.50	2	Secs
GridVoltMax1En	Level 1 Max. grid voltage protection	{Disable, Enable}	Enable	Enable	Enable	
GridVoltMax2	Threshold Level 2 Max. grid voltage	{100.00%,135.00%}	120.00%	120.00%	120.00%	%
VoltMaxTripT2	Trip Time Level 2 Max. grid trip voltage	{0, 655.35}	0.16	0.16	0.16	Secs
GridVoltMax2En	Level 2 Max. grid voltage protection	{Disable, Enable}	Enable	Enable	Enable	
GridVoltMax3	Threshold Level 3 Max. grid voltage	{100.00%,135.00%}	120.00%	120.00%	120.00%	%
VoltMaxTripT3	Trip Time Level 3 Max. grid trip voltage	{0, 655.35}	0.16	0.16	0.16	Secs
GridVoltMax3En	Level 3 Max. grid voltage protection	{Disable, Enable}	Disable	Disable	Disable	
Grid Under Voltage Protection						
GridVoltMin1	Threshold Level 1 Min. grid voltage	{0.00%,100.00}	88.00%	88.00%	88.00%	%
VoltMinTripT1	Trip Time Level 1 Min. grid trip voltage	{0, 655.35}	21.00	20.50	2	Secs
GridVoltMin1En	Level 1 Min. grid voltage protection	{Disable, Enable }	Enable	Enable	Enable	
GridVoltMin2	Threshold Level 2 Min. grid voltage	{20.00%,100.00%}	50.00%	70.00%	50.00%	%
VoltMinTripT2	Trip Time Level 2 Min. grid trip voltage	{0, 655.35}	2.00	10.50	1.1	Secs
GridVoltMin2En	Level 2 Min. grid voltage protection	{Disable, Enable }	Enable	Enable	Enable	
GridVoltMin3	Threshold Level 3 Min. grid voltage	{20.00%,100.00%}	45.00%	50.00%	50.00%	%
VoltMinTripT3	Trip Time Level 3 Min. grid trip voltage	{0, 655.35}	0.16	1.50	1.1	Secs
GridVoltMin3En	Level 3 Min. grid voltage protection	{Disable, Enable }	Disable	Enable	Disable	
Grid Over Frequency Protection						
GridFrqMax1	Threshold Level 1 Max. grid frequency	{60, 72}	61.19	60.49	61.19	Hz
FrqMaxTripT1	Trip time of Level 1 Max. grid frequency	{0, 1310}	300.00	599.00	599.00	Secs
GridFrqMax1En	Level 1 Max. grid frequency protection	{Disable, Enable}	Enable	Enable	Enable	
GridFrqMax2	Threshold Level 2 Max. grid frequency	{60, 72}	61.99	61.99	61.99	Hz
FrqMaxTripT2	Trip time of Level 2 Max. grid frequency	{0, 1310}}	0.16	0.32	0.32	Secs
GridFrqMax2En	Level 2 Max. grid frequency protection	{Disable, Enable}	Enable	Enable	Enable	

GridF.Max3	Threshold Level 3 Max. grid frequency	{60, 66}	61.99	61.99	61.99	Hz
FrqMaxTripT3	Trip time of Level 3 Max. grid frequency	{0, 1310}	0.16	0.32	0.32	Secs
GridFrqMax3En	Level 3 Max. grid frequency protection	{Disable, Enable}	Disable	Disable	Disable	
Grid Under Frequency Protection						
GridFrqMin1	Threshold Level 1 Min. grid frequency	{48, 60}	58.49	58.49	58.49	Hz
FrqMinTripT1	Trip time of Level 1 Min. grid frequency	{0, 1310}	300.00	599.00	599.00	Secs
GridFrqMin1 En	Level 1 Min. grid frequency protection	{Disable, Enable}	Enable	Enable	Enable	
GridFrqMin2	Threshold Level 2 Min. grid frequency	{48, 60}	56.49	57	56.5	Hz
FrqMinTripT2	Trip time of Level 2 Min. grid frequency	{0, 1310}	0.16	0.32	0.16	Secs
GridFrqMin2 En	Level 2 Min. grid frequency protection	{Disable, Enable}	Enable	Enable	Enable	
GridFrqMin3	Threshold Level 3 Min. grid frequency	{48, 60}	56.49	57.00	56.50	Hz
FrqMinTripT3	Trip time of Level 3 Min. grid frequency	{0, 1310}	0.16	0.32	0.32	Secs
GridFrqMin3 En	Level 3 Min. grid frequency protection	{Disable, Enable}	Disable	Disable	Disable	
Voltage and Frequency Protection Recovery						
VoltMaxRecovery	Recovery Max threshold grid voltage protection	{80.00%, 135.00%}	105.00%	108.00%	108.00%	%
VoltMinRecovery	Recovery Min threshold. grid voltage protection	{20.00%,100.00%}	91.70%	90.00%	90.00%	%
VolRecoveryT	Recovery time of grid voltage protection	{0, 655.35}	300.00	300.00	300	Secs
FrqMaxRecovery	Recovery Max threshold grid Frequency protection	{54, 72}	60.09	60.40	61.00	Hz
FrqMinRecovery	Recovery Min threshold. grid Frequency protection	{48, 60}	59.49	58.60	58.80	Hz
FrqRecoveryT	Recovery time of grid frequency protection	{0, 655.35}	300	600	600	Secs
Moving Average Parameters						
VoltMaxMovAvg	Threshold max Voltage move average	{100.00%,135.00%}	110.00%	110.00%	110.00%	%
MaxTripVMovAvgT	Trip time of max. voltage move average	{0, 655.35}	600	600	600	Secs
VoltMaxMovAvgEn	max voltage move average enable	{Disable, Enable}	Disable	Disable	Disable	
VoltMinMovAvg	Threshold min voltage move average	{80.00%, 100.00%}	88.00%	87.99%	88.00%	%

MinTripVMovAvgT	Trip time of min voltage move average	{0, 655.35}	600	600	600	Secs
VoltMinMovAvgEn	min voltage move average enable	{Disable, Enable}	Disable	Disable	Disable	
Voltage Unbalance						
GridVoltUnbalance	Threshold grid voltage unbalance	{0.01%, 50%}	10%	10%	10%	%
GridVoltUnbalanceEn	grid voltage unbalance enable	{Disable, Enable}	Enable	Enable	Enable	
PhaseLose and Phase-PE parameters						
PhaseLoseCoeff	Phase lose protection trigger value	{0.5%,30.0%}	3.0%	3.0%	3.0%	%
PhaseLoseRcvCoeff	Phase lose protection recovery value	{0.5%,30.0%}	2.0%	2.0%	2.0%	%
PhaseLoseVUnbalance	PhaseLose Voltage Unbalance	{0.1%,10.0%}	10.0%	10.0%	10.0%	%
PhasLoseCoeffEnable	Phase lose protection	{Disable, Enable}	Disable	Disable	Disable	
Phase-PETripVolt	Phase-PE Trip Voltage	{0.01,100.00}	45%	45%	45%	%
Phase-PERcvVolt	Phase-PE grid recovery	{0.01,100.00}	35%	35%	35%	%
Phase-PEEnable	Enable Phase-PE protection	{Disable, Enable}	Disable	Disable	Disable	

Table 6-1 Protection Parameters (IEEE1547 2018, Rule21 and ISO-NE)

6.1.2.2.2 LVRT/HVRT

The LVRT/HVRT interface is used to set the LVRT (Low voltage ride through) and HVRT (High voltage ride through) parameters as shown in the following interfaces:

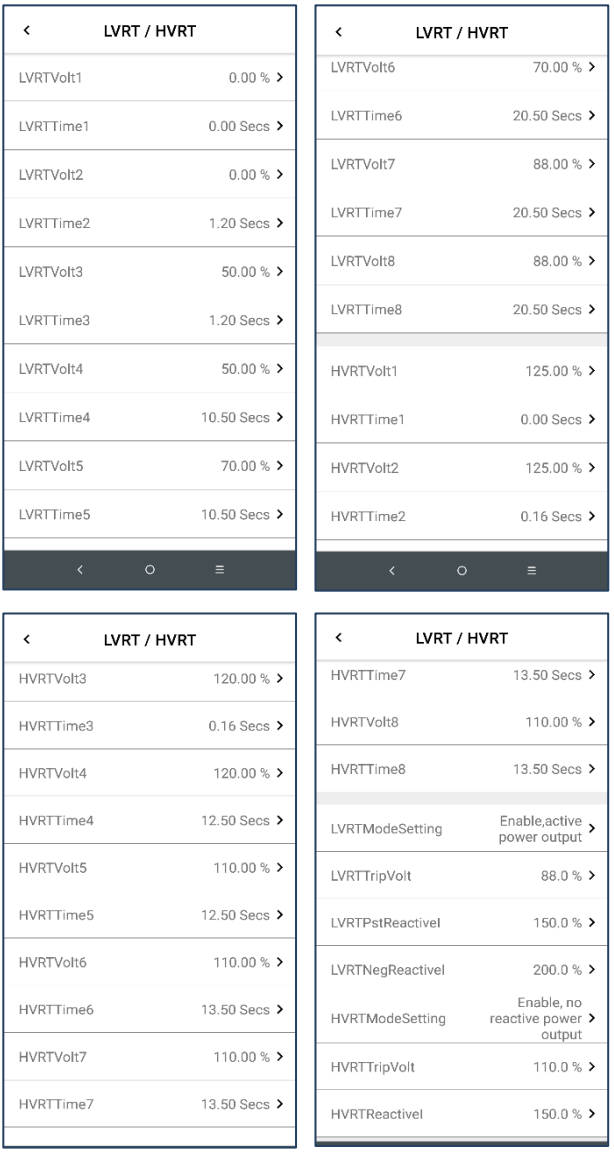


Figure 6-8 LVRT/HVRT interface

You can also see the LVRT Curve in figure 6-9 and HVRT Curve in figure 6-10.

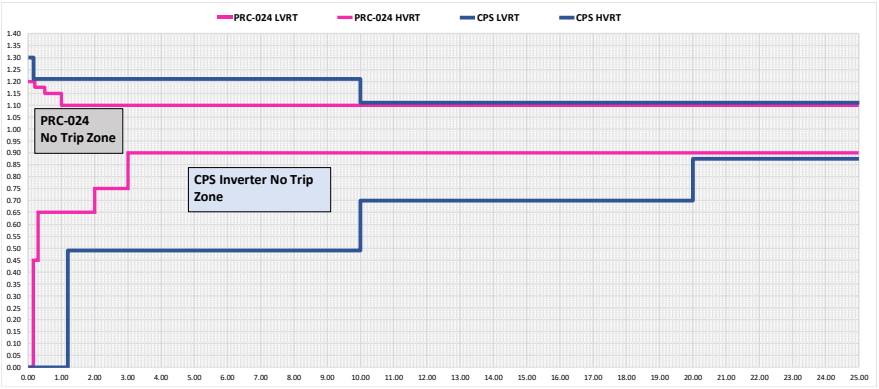


Figure 6-9 LVRT Curve

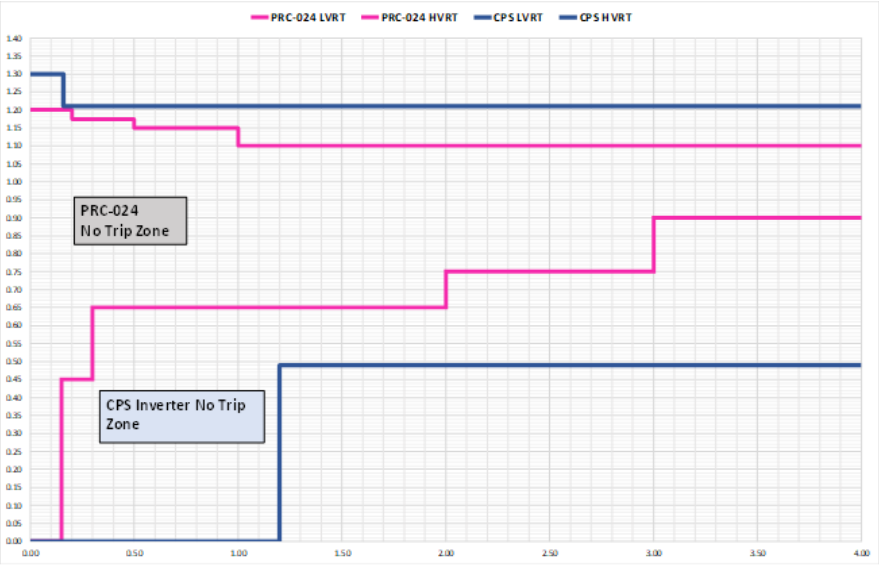


Figure 6-10 HVRT Curve

In addition, the table listed below can provide detailed parameter information for you.

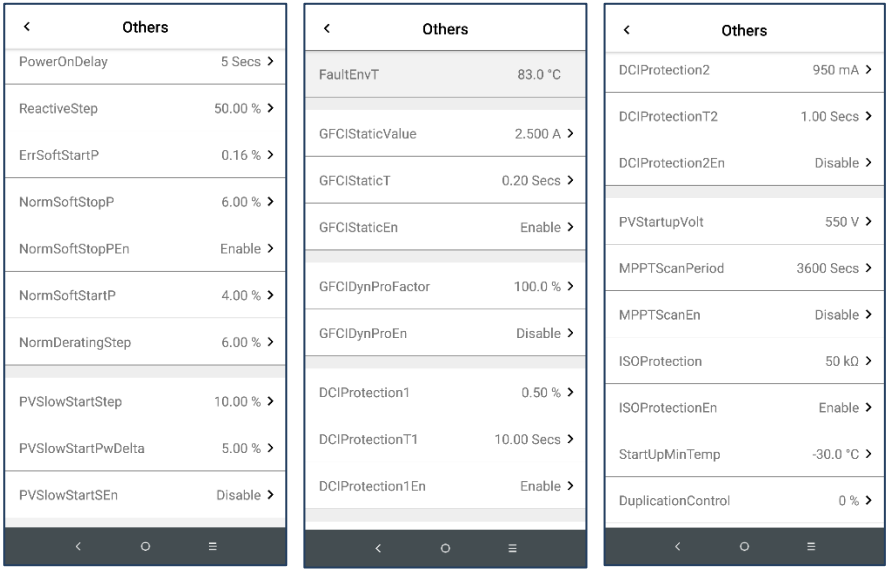
Parameter name	Description	Range	Grid code IEEE-1547	Grid code RULE-21	Grid code ISO-NE	Unit
LVRT						
LVRTVolt (1,2)	Threshold LVRT (1st or 2nd point)	{0%, 100%} {0%, 100%}	0% 0%	0% 0%	0% 49%	%
LVRTTime (1,2)	Time of LVRT (1st or 2nd point)	{0, 655.35} {0, 655.35}	0 1.2	0 1.2	0 1.2	Secs
LVRTVolt (3,4)	Threshold LVRT (3rd or 4th point)	{0%, 100%} {0%, 100%}	50% 50%	50% 50%	45% 45%	%
LVRTTime (3,4)	Time of LVRT (3rd or 4th point)	{0, 655.35} {0, 655.35}	1.2 10.5	1.2 10.5	1.2 10.5	Secs
LVRTVolt (5,6)	Threshold LVRT (5th or 6th point)	{0%, 100%} {0%, 100%}	70% 70%	70% 70%	65% 65%	%
LVRTTime (5,6)	Time of LVRT (5th or 6th point)	{0, 655.35} {0, 655.35}	10.50 20.50	10.50 20.50	10.50 20.50	Secs
LVRTVolt (7,8)	Threshold of LVRT (7th or 8th point)	{0%, 100%} {0%, 100%}	88% 88%	88% 88%	83% 83%	%
LVRTTime (7,8)	Time of LVRT (7th or 8th point)	{0, 655.35} {0, 655.35}	20.5 20.5	20.5 20.5	20.5 20.5	Secs
HVRT						
HVRTVolt (1,2)	Threshold of HVRT (1st or 2nd point)	{100%, 135%} {100%, 135%}	125% 125%	125% 125%	125% 125%	%
HVRTTime (1,2)	Time of Level HVRT (1st or 2nd point)	{0, 655.35} {0, 655.35}	0 0.16	0 0.11	0 0.80	Secs
HVRTVolt (3,4)	Threshold of HVRT (3rd or 4th point)	{100%, 135%} {100%, 135%}	120% 120%	120% 120%	124% 124%	%
HVRTTime (3,4)	Time of Level HVRT (3rd or 4th point)	{0, 655.35} {0, 655.35}	0.16 12.50	0.11 12.50	0.80 12.50	Secs
HVRTVolt (5,6)	Threshold of HVRT (5th or 6th point)	{100%, 135%} {100%, 135%}	110% 110%	110% 110%	115% 115%	%
HVRTTime (5,6)	Time of Level HVRT (5th or 6th point)	{0, 655.35} {0, 655.35}	12.50 13.50	12.50 12.50	12.50 12.50	Secs
HVRTVolt (7,8)	Threshold of HVRT (7th or 8th point)	{100%, 135%} {100%, 135%}	110% 110%	110% 110%	115% 115%	%
HVRTTime (7,8)	Time of Level HVRT (7th or 8th point)	{0, 655.35} {0, 655.35}	13.50 13.50	12.50 12.50	12.50 12.50	Secs
LVRT Setting						
LVRTModeSetting	LVRT mode setting	{Disable; Enable reactive power output; Enable no reactive power output; Enable, active power output }	Enable, active power output	Enable, active power output	Enable, reactive power output	
LVRTTripVolt	Trigger Voltage of LVRT	{70%, 100%}	88%	88%	88%	%
LVRTPstReactivel	Coefficient of LVRT positive current	{0%, 500%}	150%	150%	150%	%
LVRTNegReactivel	Coefficient of LVRT negative current	{0%, 500%}	200%	200%	200%	%
HVRT Setting						

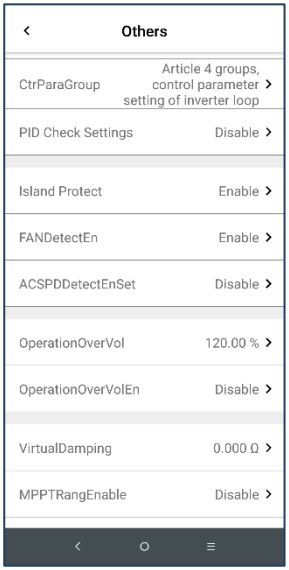
HVRTModeSetting	HVRT mode setting	{Disable; Enable reactive power output; Enable no reactive power output; Enable, active power output }	Enable, no reactive power output	Enable, no reactive power output	Enable, no reactive power output	
HVRTTripVolt	Trigger Voltage of HVRT	{110%,135%}	110%	110%	110%	%
HVRTReactiveI	Coefficient of HVRT reactive current	{0%,500%}	150%	150%	150%	%

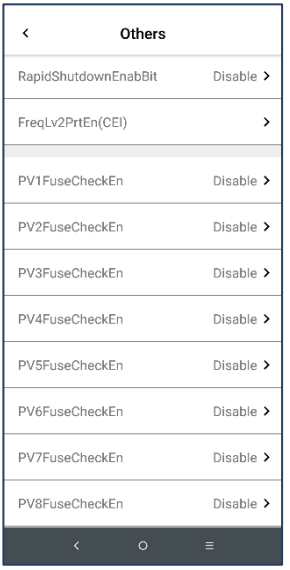
Table 6-2 LVRT and HVRT Parameters (IEEE1547 2018, Rule21 and ISO-NE)

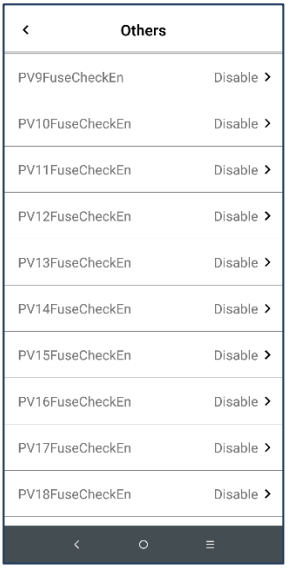
6.1.2.2.3 Others

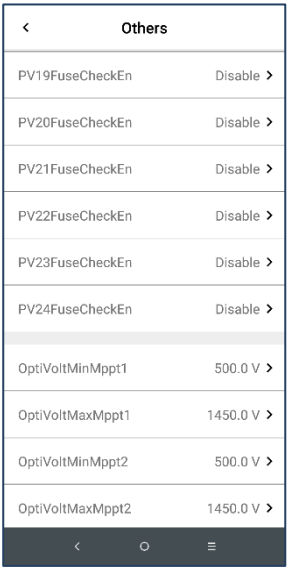
In the others interface, you can find following common parameters shown as below, such as power on delay, Normal Start Power Rate, PV slow start step, DCI protection, ISO protection, as well as Min. and Max. Voltage of MPPT optimizer.











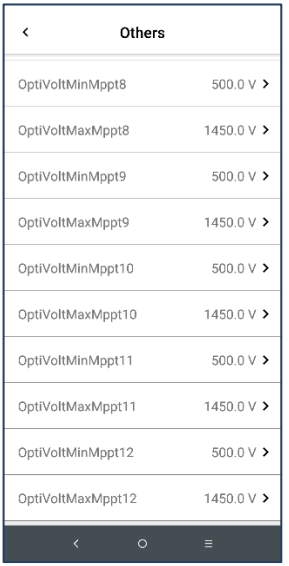


Figure 6-11 Others interface

In addition, the table listed below can provide detailed parameter information for you.

Parameter name	Description	Range	Grid code IEEE-1547	Grid code RULE-21	Grid code ISO-NE	Unit
PowerOnDelay	Startup delay time	{0,1200}	5	5	5	Secs
ReactivePowerStep	Reactive Power Step	{0.01%,655.35%}	50.00%	50.00%	50.00%	
ErrSoftStartP	Pwr Ramp after Fault	{0.01%,100%}	0.16%	2.00%	0.16%	%
NomSoftStopP	Normal Stop Pwr Rate	{0.01%,100%}	6.00%	10.00%	10.00%	%
NomSoftStopPEn	Normal Stop Pwr Rate Enable	{Disable, Enable}	Enable	Enable	Enable	
NomSoftStartP	Normal Start Pwr Rate	{0.01%,100%}	4.00%	100.00%	2.00%	%
NomDeratingStep	Normal Pwr Derating Step	{0.01%,100%}	6.00%	100.00%	6.00%	%
PVSlowStartStep	PV Slow Start Step	{0.01%,10%}	10%	10%	10%	%
PVSlowStartPwDelta	PV Slow Start Pwr slope	{0.01%,100%}	5.00%	5.00%	5.00%	%
PVSlowStartSEn	PV Slow Start Setting	{Disable, Enable}	Disable	Disable	Disable	
FaultEnvT	Enclosure Fault Temp	NA	83.0	83.0	83.0	℃
GFCIStaticValue	Static Threshold Leakage current	{0.100,5.000}	2.500	2.500	2.500	A
GFCIStaticT	Static Threshold Leakage Time	{0,655.35}	0.20	0.20	0.20	Secs
GFCIStaticEn	Enable Static Threshold Leakage current	{Disable, Enable}	Enable	Enable	Enable	
GFCIDynProFactor	Threshold dynamic coefficient Leakage current	{0.0%,500%}	100%	100%	100%	%
GFCIDynProEn	Enable Dynamical ground fault circuit interrupter	{Disable, Enable}	Disable	Disable	Disable	
DCIProtection1	Max. DCI value 1	{0.1%,5.00%}	0.50%	0.50%	0.50%	%
DCIProtectionT1	Trip time 1 of DCI value	{0.00,120.00}	10.00	10.00	60.00	Secs
DCIProtection1En	Enable Maximum DCI value 1	{Disable, Enable}	Enable	Enable	Enable	
DCIProtection2	Max. DCI value 2	{5,5000}	950	950	950	mA
DCIProtectionT2	Trip time 2 of DCI value	{0.00,120.00}	1.00	1.00	1.00	Secs
DCIProtection2En	Enable Max. DCI value 2	{Disable, Enable}	Disable	Disable	Disable	
PVStartupVolt	PV start-up voltage	(500, 700)	550	550	550	V
MPPTScanPeriod	MPPT Scan Cycle	{300,5400}	3600	3600	3600	Secs
MPPTScanEn	Enable MPPT Scan	{Disable, Enable}	Disable	Disable	Disable	
ISOProtection	Minimum insulation resistance	{1, 2000}	50	50	50	kΩ
ISOProtectionEn	Insulation detection	{Disable, Enable}	Enable	Enable	Enable	
StartUpMinTemp	Min Startup Temperature	{-35℃, -20℃}	-30	-30	-30	℃
DuplicationControl	Duplication Control	{0%,100%}	0%	0%	0%	%
CtrParaGroup	control parameter setting of inverter loop	Article 1~5 groups,	Article 4 groups	Article 4 groups	Article 4 groups	
Island Protect	anti-Island protection	{Disable, Enable}	Enable	Enable	Enable	

Parameter name	Description	Range	Grid code IEEE-1547	Grid code RULE-21	Grid code ISO-NE	Unit
FANDetectEn	fans detection	{Disable, Enable}	Enable	Enable	Enable	
ACSPDDetectEnSet	AC surge protection device test	{Disable, Enable}	Disable	Disable	Disable	
OperationOverVol	Operation over voltage protect value	{100%,135%}	120%	120%	120%	%
OperationOverVolDectEn	Over voltage detection	{Disable, Enable}	Disable	Disable	Disable	
VirtualDamping	Resonance damping coefficient	{0.000, 5.000}	0.000	0.000	0.000	Ω
MPPTRangEnable	Enable MPPT	{Disable, Enable}	Disable	Disable	Disable	
RapidShutdownEnabBit	Enable Rapid Shutdown	{Disable, Enable}	Disable	Disable	Disable	
FreqLv2PrtEn (CEI)	Only for Italian Grid Code	{Disable, Enable}				
OptiVoltMinMpptxx (xx=1..12)	Minimal voltage of Mppt optimizer	{500, 1450}	500	500	500	V
OptiVoltMaxMpptxx (xx=1..12)	Maximal voltage of Mppt optimizer	{500, 1450}	1450	1450	1450	V

Table 6-3 Other Parameters (IEEE1547 2018, Rule21 and ISO-NE)

6.1.2.2.4 Command

In the Command interface, you can access the following information:

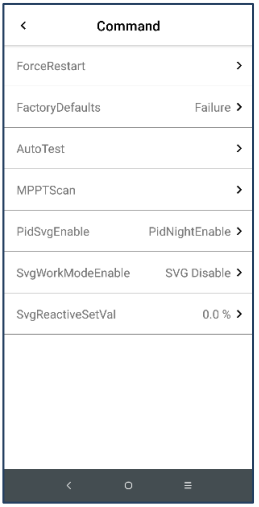


Figure 6-12 Commands interface

Force Restart: If a fault shutdown happens, a severe fault may have occurred inside the inverter. The user can perform a force reboot for one time per Power On in this menu if the user needs to restart the inverter.

Factory Defaults: The manufacturer's parameter default values can be restored when the inverter is not in operation mode. Otherwise a "Fault Operated" alarm will be indicated.

AutoTest: Only for Italian Grid Code.

MPPT Scan: This function is used to manually execute the MPPT scan. The device screen will skip to normal operation interface if the MPPT scanning succeeds or remain on the interface if the scanning fails.
MPPT scan function is used for multi-MPP tracking, and is useful if the PV modules are partly shadowed or installed with different angles. The factory setting of MPPT Scan is Enabled, yet can also be set to Disabled. When the MPPT scan function is enabled, the scan period is 60 minutes.
The inverter will scan the maximum power point in the MPPT range, according to the following conditions:

The total input power is lower than 90% of the active power.

Once this MPPT scan function is activated on the device, it will search the maximum power point at a voltage step of 5V in the MPPT range for full load, and retrieve the maximum power point.

6.1.2.2.5 ActivePowerDerating

The ActivePower Derating menu is used to set the active power derating parameters, including Active Power Derating, Over Voltage Derating, Over Frequency Derating, etc.

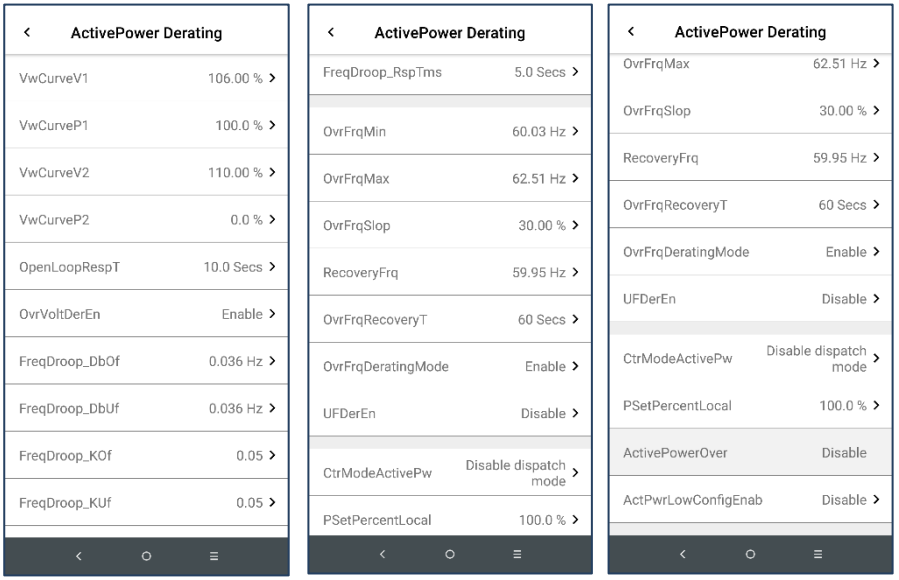


Figure 6-16 ActivePower Derating interface

You can see the Curve of over voltage derating in figure 6-17 and Curve of over frequency derating in figure 6-18.

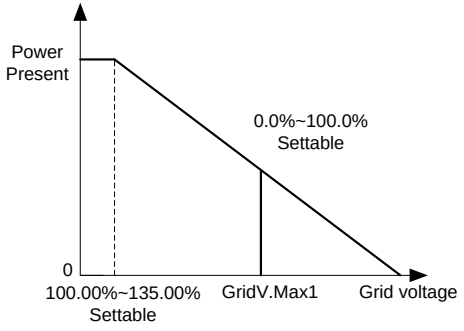


Figure 6-17 Curve of over voltage derating

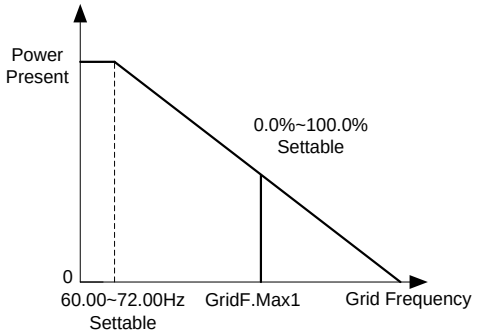


Figure 6-18 Curve of over frequency derating

In addition, the table listed below can provide detailed parameter information for you.

Parameter name	Description	Range	Grid code IEEE-1547	Grid code RULE-21	Grid code ISO-NE	Unit
Over-Voltage Derate						
VwCurveV1	Grid Volt of VwCurve point V1	{100.00%, 110%}	106.00%	106.00%	106.00%	%
VwCurveP1	Power of VwCurve point P1	{0%,110%}	100%	100%	100%	%
VwCurveV2	Grid Volt of VwCurve point V2	{100%,115%}	110.00%	110.00%	110.00%	%
VwCurveP2	Power of VwCurve point P2	{0%,110%}	0.0%	0.0%	0.0%	%
OpenLoopRespT	Open loop response time	{0.5, 90.0}	10.0	10.0	10.0	Secs
OvrVoltDerEn	Over voltage derating enable	{ Disable, Enable}	Enable	Enable	Disable	
FreqDroop_DbOf	The dead zone of overfrequency active power regulation	{0.001, 2.000}	0.036	0.036	0.036	Hz
FreqDroop_DbUf	The dead zone of underfrequency active power regulation	{0.001, 2.000}	0.036	0.036	0.036	Hz
FreqDroop_KOf	Coefficient of overfrequency active power regulation	{0.01, 0.10}	0.05	0.05	0.05	NA
FreqDroop_KUf	Coefficient of underfrequency active power regulation	{0.01, 0.10}	0.05	0.05	0.05	NA
FreqDroop_RspT ms	Response time of frequency active regulation	{0.1, 900.0}	5.0	5.0	5.0	Secs
Over-Frequency Derate						
OvrFrqMin	The trigger frequency of over frequency derating	{60, 72}	60.03	60.03	60.49	Hz
OvrFrqMax	The end frequency of over frequency derating	{60, 72}	62.51	62.03	61.39	Hz
OvrFrqSlop	The rate of over frequency derating	{0.01, 100}	30%	30%	0.16%	%

RecoveryFrq	The recovery frequency of over frequency derating	{58.8, 66}	59.95	59.96	60.00	Hz
OvrFrqRecoveryT	The recovery time of over frequency derating	{0,1200}	60	60	60	Secs
OvrFrqDerating Mode	Over frequency derating mode	{Disable, Enable}	Enable	Enable	Disable	
UFDerEn	under frequency derating enable	{Disable, Enable}	Disable	Disable	Disable	
CtrModeActivePw	Active power control mode	{ Disable dispatch mode, Remote dispatch mode, Local control}	Disable dispatch mode	Disable dispatch mode	Disable dispatch mode	
PSetPercentLocal	Local Active power derating percent	{0%,110%}	100%	100%	100%	%
ActPwrLowConfig Enab	250kW active power mode	{Disable, Enable}	Disable	Disable	Disable	

Table 6-4 ActivePower Derating para. (IEEE1547 2018, Rule21 and ISO-NE)

6.1.2.2.6 ReactivePowerDerating

The ReactivePowerDerating interface is used to set the Grid reactive power derating parameters, including PF parameters and Qu parameters, etc.

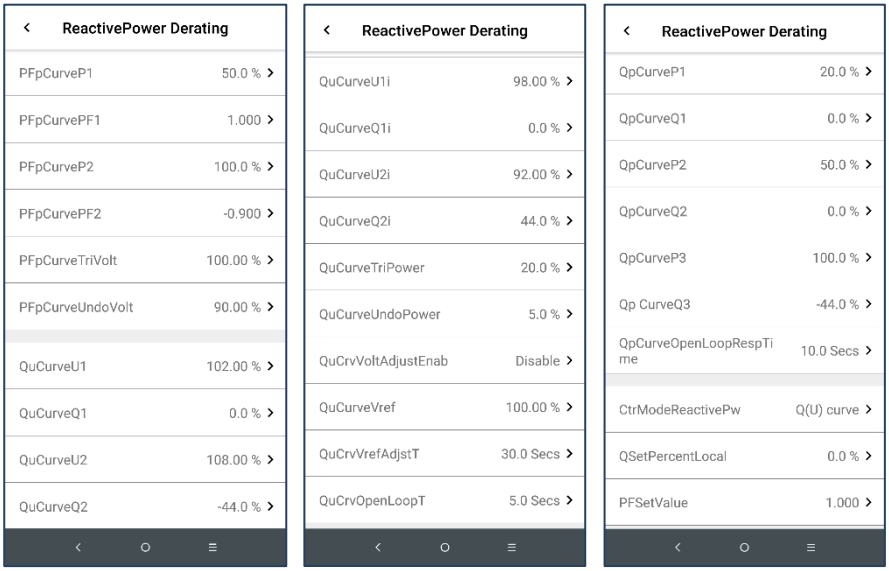


Figure 6-19 The ReactivePowerDerating interface

Note: The PF and Q value can be adjusted by remote software if the “Remote” is selected.

PF Set: Set the PF value. Note: Change the reactive power by adjusting the

power factor.

PF(P) Curve：PF curve mode. Note: The power factor changes according to the power change, as shown in Figure 6-20.

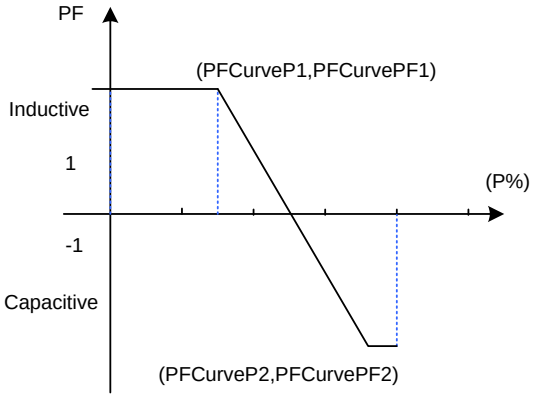


Figure 6-20 PF(P) Curve Mode

Q(u) Curve：Q(u) curve mode.

Note: The reactive compensation changes according to the grid voltage change, as shown in Figure 6-21.

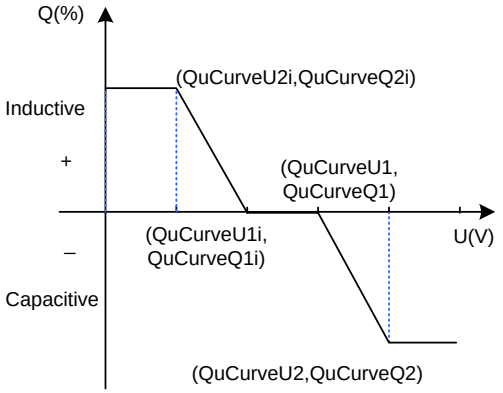


Figure 6-21 Q(u) Curve Mode

In addition, the table listed below can provide detailed parameter information for you.

Parameter name	Description	Range	Grid code IEEE-1547	Grid code RULE-21	Grid code ISO-NE	Unit
PF(P) Power Factor Vs. Power						
PFpCurveP1	Power of PF(P) point 1	{0,110%}	50%	50%	50%	%
PFpCurvePF1	PF of PF(P) point 1	{-1,1}	1	1	1	NA
PFpCurveP2	Power of PF(P) point 2	{0,110%}	100%	100%	100%	%
PFpCurvePF2	PF of PF(P) point 2	{-1,1}	-0.9	-0.9	-0.9	NA
PFpCurveTriVolt	Trigger voltage of PF(P)	{100%,110%}	100%	100%	100%	%
PFpCurveUndoVolt	The undo voltage of PF(P)	{90%,100%}	90%	90%	90%	%
Q(u) Dynamic Var Support						
QuCurveU1	Voltage of Q(u) point 1	{100%, 110%}	102.00%	103.30%	107.99%	%
QuCurveQ1	Reactive power of Q(u) point 1	{-66%, 66%}	0%	0%	0%	%
QuCurveU2	Voltage of Q(u) point 2	{100%,110%}	108%	107%	110%	%
QuCurveQ2	Reactive power of Q(u) point 2	{-66%, 66%}	-44%	-30%	-50%	%
QuCurveU1i	Voltage of Q(u) point 1i	{90% ,100%}	98.00%	96.70%	92.01%	%
QuCurveQ1i	Reactive power of Q(u) point 1i	{-66%, 66%}	0%	0%	0%	%
QuCurveU2i	Voltage of Q(u) point 2i	{80%, 100%}	92%	92%	90%	%
QuCurveQ2i	Reactive power of Q(u) point 2i	{-66%, 66%}	44%	30%	50%	%
QuCurveTriPower	The trigger power of Q(u)	{5%, 100%}	20%	20%	20%	%
QuCurveUndoPower	The undo power of Q(u)	{5%, 100%}	5%	5%	5%	%
QuCrvVoltAdjustEnab	Adjustment of rated reference voltage of Q(U) curve	{Disable, Enable}	Disable	Disable	Disable	
QuCurveVref	The rated reference voltage of Q(U) curve	{80.00, 110.00}	100.00%	100.00%	100.00%	%
QuCrvVrefAdjstT	Adjust time of rated reference voltage of Q(U) curve	{0, 6553.5}	30.0	30.0	30.0	Secs
QuCrvOpenLoopT	Open Loop Time of Q(U) curve	{0.1, 900.0}	5.0	5.0	5.0	Secs
Qp Dynamic Var Support						
QpCurveP1	Active power of Q(p) point P1	{0,110%}	20.0%	20.0%	20.0%	%

Parameter name	Description	Range	Grid code IEEE-1547	Grid code RULE-21	Grid code ISO-NE	Unit
QpCurveQ1	Reactive power of Q(p) point Q1	{-66%, 66%}	0.0%	0.0%	0.0%	%
QpCurveP2	Active power of Q(p) point P2	{0,110%}	50.0%	50.0%	50.0%	%
QPCurveQ2	Reactive power of Q(p) point Q2	{-66%, 66%}	0.0%	0.0%	0.0%	%
QpCurveP3	Active power of Q(p) point P3	{0,110%}	100.0%	100.0%	100.0%	%
QpCurveQ3	Reactive power of Q(p) point Q3	{-66%, 66%}	-44%	-44%	-44%	%
QpCurveOpenLoopRespTime	Open loop response time	{0.0, 900.0}	10.0	10	10	Secs
Mode Setting						
CtrModeReactivePw	Reactive power control mode	{Disable, Remote,Q,PF,PF(P),Q(u), Q(p)}	Q(U) curve	Q(U) curve	Q(u) curve	
QSetPercentLocal	Local Reactive power derating percent	{-66%,66%}	0.0%	0.0%	0.0%	%
PFSetValue	PF setting value	{-1,-0.8},{0.8,1}	1.000	-0.950	1	NA
ReactivePowerOver	Reactive power over matching	NA	Disable	Disable	Enable	

Table 6-5 ReactivePowerDerating Para. (IEEE1547 2018, Rule21 and ISO-NE)

6.1.2.2.7 LcdLess Basic Parameters

The LcdLess Basic Parameters interface is used to set the parameters as below.

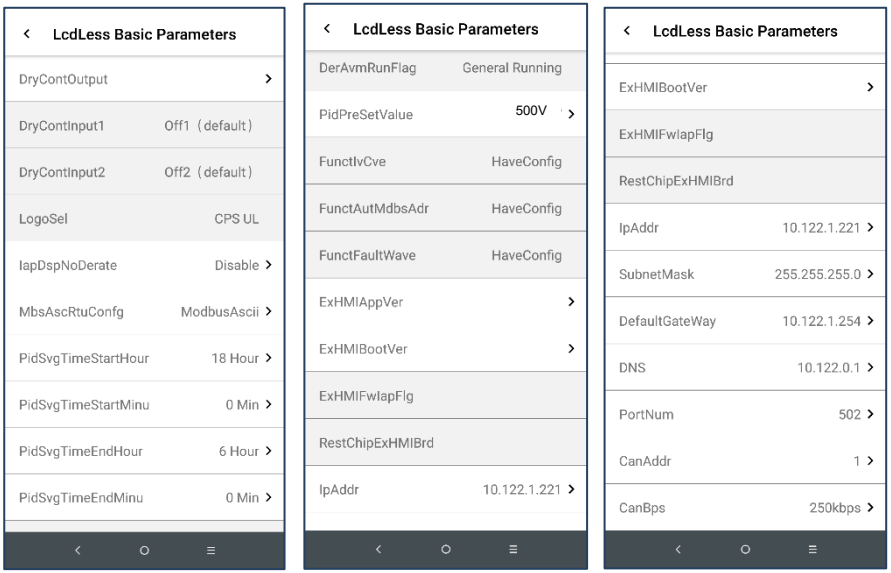


Figure 6-22 LcdLess Basic Parameters interface

The last three registers are configured as standard, i.e. the inverter supports IV curve function, Automatic MdbsAdr assignment function and the Fault recording function. However, almost all these parameters are read-only, that means you cannot change them randomly. More information, please contact the after-sale service personnel.

6.1.2.3 Firmware Upgrade

As to the detailed procedures for firmware upgrade, Refer to specific instructions or consult our after-sale support personnel.

6.1.3 Event

Touch the Event icon, it will go to the Event interface.
There are 2 submenus in the Event menu: “Current” and “History”.

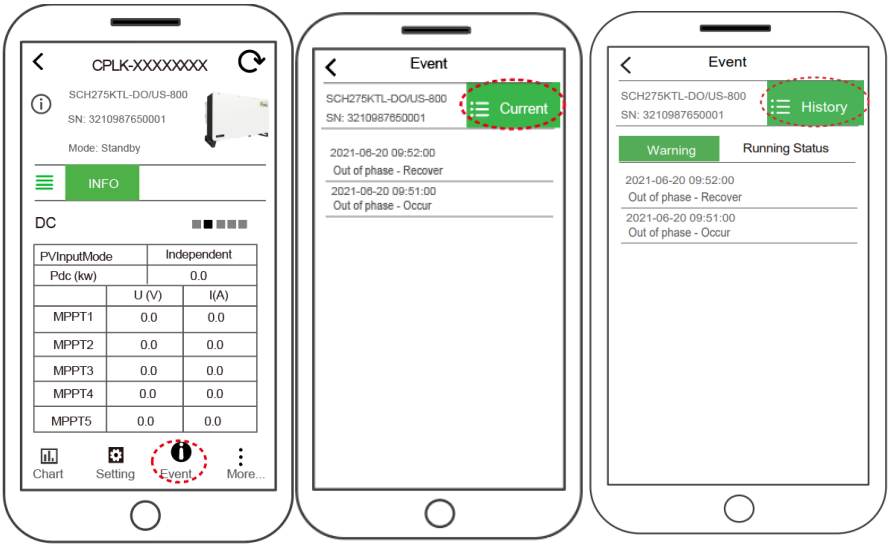


Figure 6-23 Event interface

6.1.4 More

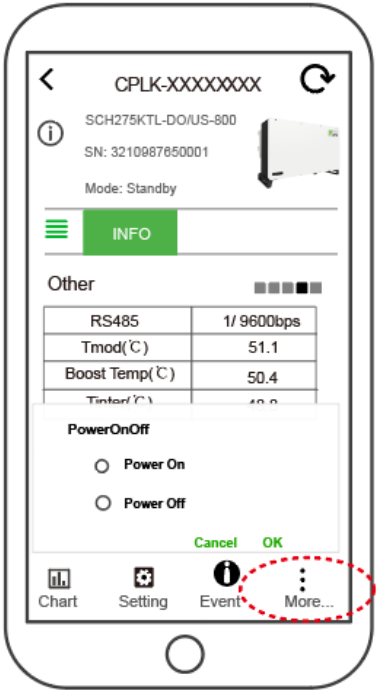


Figure 6-24 Turn ON/OFF interface

Manual Turn ON/OFF: Manual Power ON/OFF is required after Grid Code setting or manual (fault) shut-down. Touch to submenu **"**More". Then move the cursor to "Turn ON" to start the inverter, the inverter will start up and operate normally if the start-up condition is met. Otherwise, the inverter will go to stand-by mode.
Normally, it is not necessary to Turn OFF the inverter, but it can be shut down manually if Grid Code setting or maintenance is required.
Move the cursor to submenu "More". Move the cursor to "Turn OFF" and ensure, then the inverter will be shut down.

Automatic Turn ON/OFF: The inverter will start up automatically when the output voltage and power of PV arrays meet the set value, AC power grid is normal, and the ambient temperature is within allowable operating range.
The inverter will be shut down automatically when the output voltage and power of PV modules are lower than the set value, or AC power grid fails; or the ambient temperature exceeds the normal range.

7 Troubleshooting

LED Indicator Troubleshooting

LED display of the inverter is shown as follows:

Figure 7-1 LED display of the inverter

Indicators and their indications are shown in Table 7-1.

LED Icon	Name	Status	Indication
POWER	Working power light	ON	PV Energized (control panel starts to work)
		OFF	No Power working
RUN	Grid-tied operation indication light	ON	In grid-tied power generation state
		Flash	Derated running status (light up 0.5s, light off 1.5s)
		OFF	In other operation status or power supply not working
GRID	Grid status indication light	ON	Grid is normal
		Flash	Grid fault (light up 0.5s, light off 1.5s)
		OFF	Power supply not working
FAULT	Fault status indication light	ON	Indicates a Fault
		Slow flash	Indicates Alarm (light up 0.5s, light off 2s)
		Fast flash	Protective action (light up 0.5s, light off 0.5s)
		OFF	No fault or power supply not working
ALL	Upgrade status	flash	LCD or DSP upgrading

Table 7-1 LED Indicators and their meanings

If the LED light indicates any faults, please perform troubleshooting according to the Table 7-2.

LED status	Solutions
Neither the Power LED nor the LCD screen lights up.	Turn off the external AC breaker. Switch the DC switch to OFF position. Check the PV input voltage and polarity.
The GRID LED is blinking.	Turn off the external AC breaker. Switch the DC switch to OFF position. Check if the grid voltage is normal. Check if the cable connection of AC side is correct and secure.
The RUN LED lights off or FAULT LED lights up.	Refer to Table 7-3 for troubleshooting.

Table 7-2 Troubleshooting based on LED Lights

Common Fault and Troubleshooting

The inverter will be shut down automatically if the PV power generation system fails, such as output short circuit, grid overvoltage/under voltage, grid over frequency/under frequency, high environmental temperature or internal malfunction of the machine. The fault information will be displayed on the APP interface.

The issue can be identified and resolved based on the definitions, possible causes and recommended solutions listed in the following table. There are generally 3 types of faults: warning, protection and hardware fault, see the detailed information in table 7-3. Proper analysis is recommended before contacting after-sales service.

Types	Fault Codes	Solutions
Warning Faults	CommErr	Definition: Communication inside inverter fails
		Possible causes: Terminal block connecters of internal communication wires have poor contact
		Recommended solutions: Observe for 5 minutes and see whether the alarm will be eliminated automatically; Switch off 3-phase working power supply and then reboot the system; Contact after-sales service personnel.
	ExtFanErr	Definition: Cooling fan failure by visual check

		Possible causes: Fan is blocked; Fan service life has expired; Fan socket connecter has poor contact.
		Recommended solutions: Observe for 5 minutes and see whether the alarm will be eliminated automatically; Check for foreign objects on fan blades; Switch off 3-phase work power supply and then reboot the system; Contact after-sales service personnel.
	IntFanErr	Recommended solutions: Observe for 5 minutes and see whether the alarm will be eliminated automatically; Check for foreign objects on fan blades; Switch off 3-phase work power supply and then reboot the system; Contact after-sales service personnel.
	Warn0030 (EepromErr)	Definition: Internal alarm
		Recommended solutions: Observe for 5 minutes and see whether the alarm will be eliminated automatically; Contact after-sales service personnel.
	Warn0040 (DC SPD fault)	Recommended solutions: The alarm is reserved now. The alarms in field can be ignored.
	Warn0050 (TempSensorErr)	Recommended solutions: Observe temperature display; Switch off 3-phase working power supply and then reboot the system; Contact after-sales service personnel.
	Warn0100 (AC SPD fault)	Recommended solutions: The alarm is reserved now. The alarms in field can be ignored.
	Protect0090	Restart inverter by recycle both AC and DC switches.

Protection Faults	(Bus over voltage)	Wait for 1 minute between OFF and ON for all energy to discharge. If inverter cannot clear fault, replace inverter.
	Protect0070 (Bus imbalance)	Raise limit of IDCmax (for example, 400mA) to allow inverter more room to adjust in transient condition to cope with imbalance of impedance and voltage between Grid phases If after adjustment, alarm still occurs, replace inverter
	Protect0030 (Inverter over Current)	Restart inverter by recycle both AC and DC switches. Wait for 1 minute between OFF and ON for all energy to discharge. If inverter cannot clear fault, replace inverter.
	GridV.OutLim	Make sure the grid connection is good. Restart the inverter again.
	GridF.OutLim	Check the AC wires connection and AC frequency is in range; Check the measurement value in LCD, if the grid frequency is in limit, restart the inverter.
	Protect0020 (Grid relay error)	Restart inverter by recycle both AC and DC switches. Wait for 1 minute between OFF and ON for all energy to discharge. If inverter cannot clear fault, replace inverter.
	TempOver (Over-temperature protection)	Confirm that external ambient temperature is within the specified range of operating temperature; Check whether air inlet is blocked; Check whether fan is blocked; Check whether the location of installation is appropriate or not; Observe for 30 minutes and see whether the alarm will be eliminated automatically; Contact after-sales service personnel.
	Protect0180 (Sampling offset of DCI)	If the inverter can start up, then recalibrate. If the inverter always report this alarm and cannot start up, then replace inverter.

	Protect0170 (High DCI)	Raise limit of DCImax (for example, 400mA) to allow inverter more room to adjust in transient condition to cope with imbalance of impedance and voltage between Grid phases After raising limit, if inverter cannot clear fault, replace inverter.
	IsolationErr (Low insulation resistance)	Check wires of PV and ground: Turn OFF AC switch to disconnect inverter from Grid. Open fuse drawers to de-couple PV strings from each other. Test strings with string test set. Add one PV string at a time, and start up inverter to see if alarm occurs. If there is no alarm, turn OFF AC switches to disconnect from Grid and add in the next string. Startup inverter again. Continue until you can find the string that triggers the alarm. Trace wirings of faulted string to find any leakage to Earth Ground. The parameter ISOResist in hidden menu can be adjusted a bit.
	GFCIErr (High leakage current)	Check wires of PV and ground: Turn OFF AC switch to disconnect inverter from Grid. Open fuse drawers to de-couple PV strings from each other. Test strings with string test set. Add one PV string at a time, and startup inverter to see if alarm occurs. If there is no alarm, turn OFF AC switches to disconnect from Grid and add in the next string. Startup inverter again. Continue until you can find the string that triggers the alarm. Trace wirings of faulted string to find any leakage to Earth Ground.
	Protect0150 (Mini MCU Fault)	Restart inverter by recycle both AC and DC switches. Wait for 1 minute between OFF and ON for all energy to discharge. If inverter cannot clear fault, replace inverter.
	Protect0110	Restart inverter by recycle both AC and DC switches.

	(BUS over voltage (firmware))	Wait for 1 minute between OFF and ON for all energy to discharge. If inverter cannot clear fault, replace inverter.
	Protect0100 (Sensor fault of leakage current)	Restart inverter by recycle both AC and DC switches. Wait for 1 minute between OFF and ON for all energy to discharge. If inverter cannot clear fault, replace Filt board or inverter.
	Reverse PVx electrode (x=1,2…36/24/18)	Turn DC Switch OFF Open Fuse holder to isolate PV strings Use meter to find out which PV string is connected in reverse polarity. Correct PV string connection. Contact after-sales service personnel.
	High PVx Input current (x=1,2…36/24/18)	Restart inverter by recycle both AC and DC switches. Wait for 1 minute between OFF and ON for all energy to discharge. Contact after-sales service personnel.
	High PVx Input voltage (x=1,2…36/24/18)	Check if its input voltage is within 1100V; Restart inverter by recycle both AC and DC switches. Wait for 1 minute between OFF and ON for all energy to discharge. Contact after-sales service personnel.
	PVVoltOver	Measure voltage at DC terminals in wiring box and compare with reading in Measurement menu. PV voltage must be less than 1000V in open circuit condition. If display reading is not within 2% of meter reading, replace inverter. If display reading is within 2% of meter reading, adjust number of panel in the string.
	Protect0230 (Inverter open-loop self-test fault)	Restart inverter by recycle both AC and DC switches. Wait for 1 minute between OFF and ON for all energy to discharge. If inverter cannot clear fault, replace inverter.

Hardware Faults	Fault0130 (Bus over total voltage)	Restart inverter by recycle both AC and DC switches. Wait for 1 minute between OFF and ON for all energy to discharge. If inverter cannot clear fault, replace inverter.
	Fault0110 (Bus imbalance)	Raise limit of IDCmax (for example, 400mA) to allow inverter more room to adjust in transient condition to cope with imbalance of impedance and voltage between Grid phases If after adjustment, alarm still occurs, replace inverter.
	Fault0100 (Grid relay fault)	Restart inverter by recycle both AC and DC switches. Wait for 1 minute between OFF and ON for all energy to discharge. If inverter cannot clear fault, replace inverter.
	Fault0090 (High static leakage current)	Check wires of PV and ground: Turn OFF AC switch to disconnect inverter from Grid. Open fuse drawers to de-couple PV strings from each other. Test strings with string test set Add one PV string at a time, and startup inverter to see if alarm occurs. If there is no alarm, turn OFF AC switches to disconnect from Grid and add in the next string. Startup inverter again. Continue until you can find the string that triggers the alarm. Trace wirings of faulted string to find any leakage to Earth Ground.
	Fault0060 (CPLD Fault)	Restart inverter by recycle both AC and DC switches. Wait for 1 minute between OFF and ON for all energy to discharge. If inverter cannot clear fault, replace Control Board or inverter.
	Fault0020 (Bus over volt Hardware)	Restart inverter by recycle both AC and DC switches. Wait for 1 minute between OFF and ON for all energy to discharge. If inverter cannot clear fault, replace inverter.
	Fault0150	Restart inverter by recycle both AC and DC switches.

	(Open-loop self-check failure)	Wait for 1 minute between OFF and ON for all energy to discharge. If inverter cannot clear fault, replace inverter.

Table 7-3 Troubleshooting list

DANGER!

Please disconnect the inverter from AC grid and PV modules before opening the equipment. Make sure hazardous high voltage and energy inside the equipment has been discharged.

Do not operate or maintain the inverter until at least 5 minutes after disconnecting all sources of DC and AC.

8 Maintenance

DANGER!

Before starting any product maintenance, the inverter should be stopped running, the AC circuit breaker connected to the grid and the PV input on the DC side shall be all disconnected, and then wait at least 5 minutes before starting any operation.

These servicing instructions are for use by qualified personnel only.

To reduce the risk of electrical shock, do not perform other servicing other than those specified in the operation instructions unless you are qualified to do so.

Check Electrical Connections

Check all the cable connections as a regular maintenance inspection every 6 months or once a year.

Check the cable connections. If loose, please tighten all the cables acc. to section 4.5 Electrical Cable Connection.

Check for cable damage, especially whether the cable surface is scratched or smooth. Repair or replace the cables if necessary.

Clean the Air Vent Filter

The inverter can become hot during normal operation. Inverter uses built-in cooling fans to provide sufficient air flow to help with heat dissipation.

In order to ensure good ventilation and heat dissipation of the inverter, it is necessary to check the air inlet and outlet regularly.

Ensure that air inlets and outlets are not blocked and clean the vent with soft brush or vacuum cleaner if necessary.

Replace the Cooling Fans

If the internal temperature of the inverter is too high or abnormal noise is heard assuming the air vent is not blocked and is clean, it may be necessary to replace the external fans.

IMPORTANT!

Please disconnect the AC & DC power before replacing the fans.

Refer to Figure 8-1 for replacing the cooling fans.

1. Use a No.2 Phillips head screwdriver to remove the 8 screws fixing the fan tray.

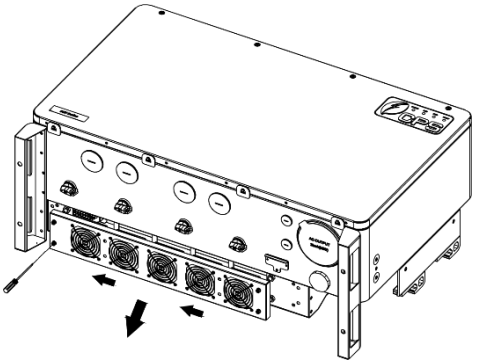


Figure 8-1 Remove the fan tray and fan

2. Disconnect the watertight cable connector from cooling fan, as shown in Figure 8-2.

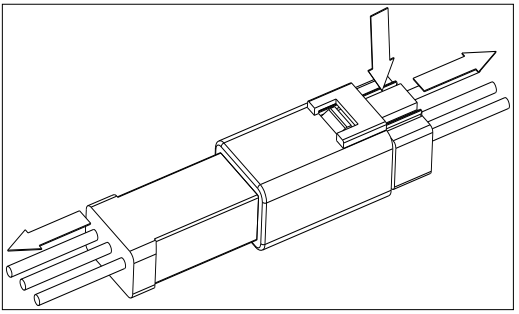


Figure 8-2 Disconnect the watertight cable connector

3. Use a No.2 Phillips head screwdriver to remove the 4 screws fixing every fan. (Figure 8-3)

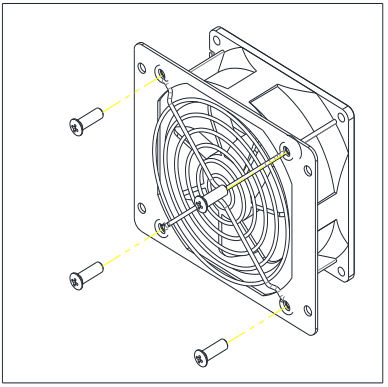


Figure 8-3 Replace cooling fans

4. Place the new cooling fans on the fan tray, and fasten the cable on the fan tray with cable ties. Tools required: No.2 Phillips head screwdriver, torque value: 14~18kgf.cm
5. Reinstall the assembled fans onto the inverter. Tools required: No.2 Phillips head screwdriver, torque value: 16kgf.cm.

Replace the Inverter

IMPORTANT!

Make sure the AC breaker and DC switch of inverter are turned off.

Replace the inverter in reverse order relative to the installation steps in section 3.4 Install the Inverter:

1. Use a #3 Philips head screwdriver to remove the two M6X90 screws.
2. Remove the inverter from its mounting bracket with the coordination of 3 people.
3. Replace the new inverter on the mounting bracket and fasten it.

9 Technical Data

Datasheet

Model No.	CPS SCH275KTL-DO/US-800
DC Input	
Nominal input power	285 kW/260 kW
Max input voltage	1500Vdc
MPPT full load operating input voltage range (1)	900-1300Vdc
MPPT voltage range @ PF>0.99	500-1450Vdc
Turn on voltage/Power	550V/500W
Nominal input voltage	1190 Vdc
Number of DC input channels	2 x 12/ 3 x 12
No. of DC input	36 Fused Inputs, 3 per MPPT or 24 Non-Fused Inputs, 2 per MPPT (determined by SKU)
Max input current	26A x 12
Max input short-circuit current	50A x 12
DC Disconnection Type	Load-rated DC switches
AC Output	
Nominal AC output power(2)	275kW/250kW
Maximum AC output power	275kVA
Nominal AC voltage(2)	800Vac
Output voltage range	704-880Vac
Grid connection form	3Φ (Three phase)/ PE
Maximum AC output current @800Vac	198.5A
Nominal power frequency	60Hz
Output frequency range	57- 63Hz
Power factor	>0.99 (±0.8 adjustable)
Current harmonic distortion	<3%
AC disconnect type	-
Max. output fault current and duration	910A @11.6 ms
Max. output overcurrent protection	300A

System parameters	
Topology	Transformerless
Maximum efficiency	99.0%
China efficiency	98.5%
Standby/Night loss	<5W
Environmental parameters	
Protection level	NEMA TYPE 4X
Cooling method	Variable speed cooling fans
Operating temperature(3)	-22°F to +140°F / -30°C to +60°C (derating from +107°F / +42°C)
Operating humidity	0-100%, No condensation
Operating altitude(4)	2500m， No derating
Display and communication	
Display	LED indicators, WiFi + APP
Communication	Modbus RS485/Ethernet TCP/IP/PLC
Structural parameters	
Dimensions (WxHxD) (mm)	1050x690x400
Weight (kg)	119
Fused String Inputs(5)	20A fuses provided (Fuse values up to 30A acceptable)
Safety	
Safety and EMC standards	UL1741_2018; CSA-22.2 NO.107.1-16; FCC CFR 47 part15.
Grid-connected specification	IEEE1547_2003; IEEE1547_2014; IEEE1547_2018; CA Rule21; ISO-NE.

Table 9-1 Datasheet of the inverter

Notes:

1. When the DC input voltage is lower than 900V or higher than 1300V, the inverter begins derating. Once the input voltage is between 900-1300V, the inverter supports full output power. Derating curve of PV input voltage are as shown in Figure 9-1.

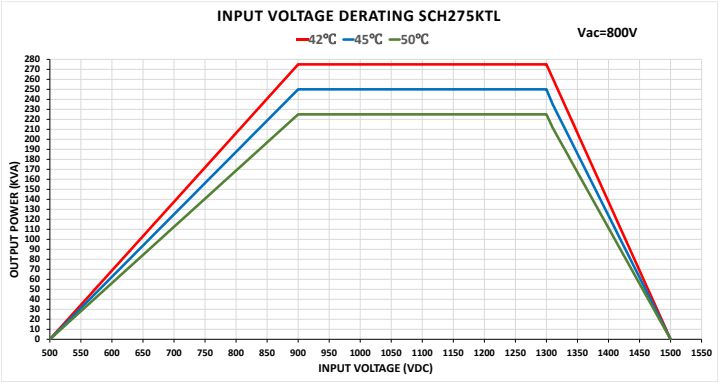


Figure 9-1 Derating curve with DC input voltage

2. When the grid Voltage is within 100%~110% of the rated output voltage, the inverter output power may reach 100%. When the grid voltage is lower than 100%, the inverter will limit the AC Output Current and the output power will begin to derate, as shown in Figure 9-2.

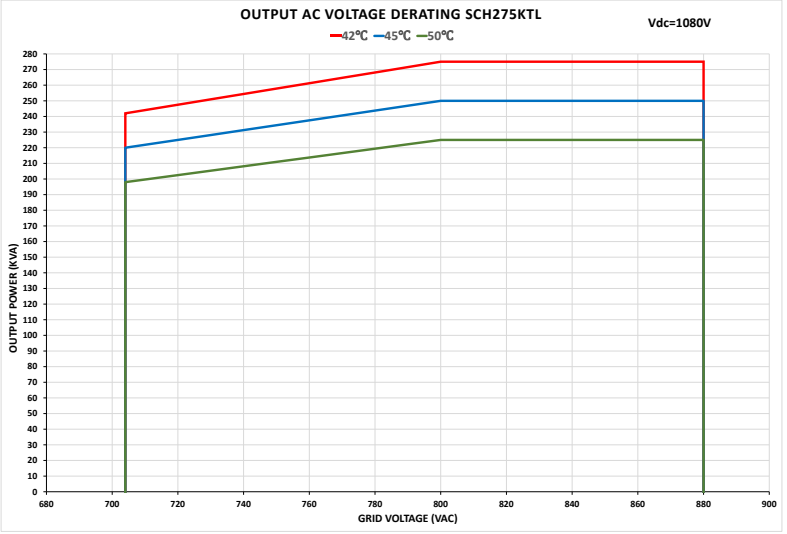


Figure 9-2 Derating curve with grid voltage

3. When the ambient temperature is higher than 42°C, the inverter output power will begin to derate, as shown in Figure 9-3.

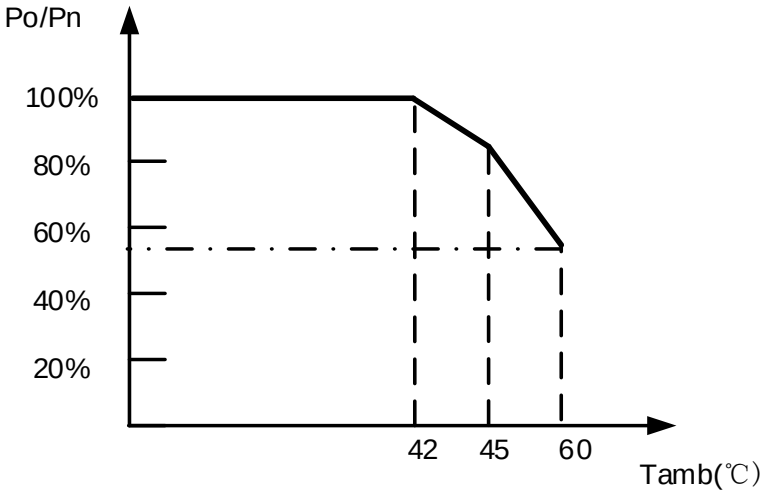


Figure 9-3 Derating curve with high temperature

4. The highest no-derating working altitude level is 2500m for this inverter, its derating situation is as shown in Figure 9-4.

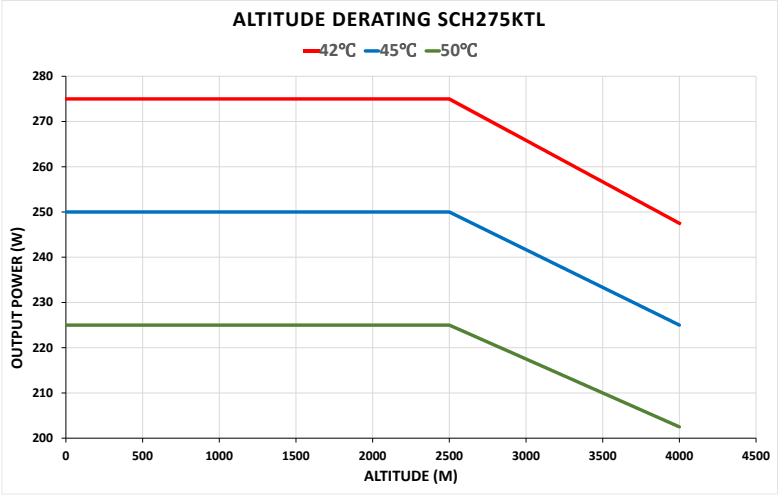


Figure 9-4 Derating curve with working altitude

5. Fused string inputs only applicable to the SCH275KTL 36 input model.

P-Q Capabilities at Nominal Output Voltage

Inverter is capable providing reactive power of ±165kVAR at nominal grid voltage and rated ambient temperature. Chart below details inverter reactive power capabilities at various input voltages and various ambient temperature condition.

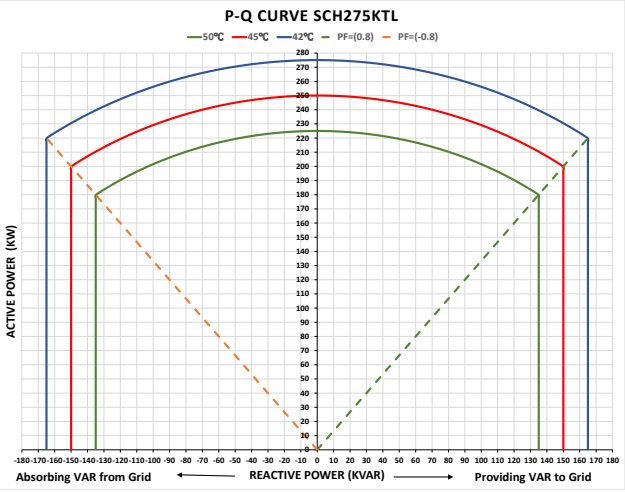


Figure 9-5 P-Q Capabilities at Nominal Output Voltage

Measurement Tolerance

The data supplied by the inverter may differ from measurements taken by certified measuring instruments (e.g. output meters, millimeters and grid analyzers). The inverter is not a measuring instrument and has wider tolerances for the measurement results it gives.
The general inverter tolerances are as below:

±5% for real-time measurements with output power below 20% nominal power

±3% for real-time measurements with output power above 20% nominal power

±4% for all statistical data

CPS inverter tolerances are specified as below:

Voltage tolerances: ±1%

Current tolerances: ±2%

Frequency tolerances: ±0.01Hz

Power tolerances: ±5%

Power factor tolerances: ±0.01

Time tolerances: ±1%

Temperature tolerances: ±2degC

10 Limited Warranty

The warranty policy of this product is specified in the contract; otherwise, the standard warranty is 5 years.

For service, Chint Power Systems America will provide technical support. For warranty terms, please refer to the CPS America standard warranty policy in place at time of purchase.

11 Recycling

Distributors or installers should contact the inverter manufacturer after removing the inverter from the photovoltaic module and follow the instructions.

The inverter cannot be disposed of as household waste.
When the inverter's service life expires, please dispose of it in accordance with the electrical waste disposal laws applicable to the installation location.
You can contact the inverter manufacturer or distributor for handling.

CHINT POWER SYSTEMS AMERICA CO., LTD.
Address: 1380 Presidential Drive, Richardson Texas 75081
Service Hotline: 855-584-7168
Email: AmericaSales@chintpower.com
Website: www.chintpowersystems.com

Shanghai CHINT Power Systems Co., Ltd.
Headquarters: Building 4, No. 3255, Sixian Road,
Songjiang District, Shanghai, China
Tele: +86 -21 -3779 1222 -6300
Fax: +86 -21 -3779 1222 -6001

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