USER MANUAL

SCH275KTL-DO/US-800 V2
Grid-Tied PV Inverter
(1.0101.0835/1.0101.0836 Models)

Installation and Operation Manual - Rev 1.7

CHINT POWER SYSTEMS AMERICA CO.

Revision 1.7 – April 2024

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0 Before You Start…

Scope

This Installation and Operation Manual contains important information, safety guidelines, detailed planning, and setup information for installation, as well as information about configuring, operating, and troubleshooting the CPS SCH275KTL-DO/US-600 utility grid-tied PV inverter. Read this manual carefully before operating or servicing the inverters.

Audience

The information in Sections 2 Overview, 6 App Interface and Settings, and 7 Troubleshooting is intended for the owner and operator of the inverter and does not require any special training or qualifications. The information in Sections 3 Mechanical Installation, 4 Electrical Connection, 5 Commissioning, and 8 Product Maintenance is intended for qualified personnel only. Qualified personnel have training, knowledge, and experience in:

- Installing electrical equipment and PV power systems.
- Applying all local installation codes.
- Analyzing and eliminating the hazards involved in performing electrical work.
- Selecting and using personal protective equipment (PPE).

Thank you for choosing a CPS grid-tied PV inverter. This inverter is a high performance and highly reliable product specifically designed for the North American solar market.

Installation, commissioning, troubleshooting, and maintenance of this inverter must be performed only by qualified personnel. If you encounter any problems during installation or operation of this unit, first check the user manual before contacting your local dealer or supplier.

Please keep this user manual on hand for quick reference.

The manual will be periodically updated or revised due to product development or improvement. The latest version of this manual can be acquired via our website: www.chintpowersystems.com.

1 Important Safety Instructions

(SAVE THESE INSTRUCTIONS)

Please read this user manual carefully before installing and operating the inverter. CPS reserves the right to refuse warranty claims for equipment damage if the user fails to install the product according to the instructions in this manual.

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

Warnings and symbols in this document include:

	**DANGER:** DANGER indicates a hazardous situation which, if not avoided, will result in death or injury.
	**WARNING:** WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	**CAUTION:** CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	**NOTICE:** NOTICE indicates a hazardous situation which, if not avoided, could result in the inverter working abnormally or property loss.
	**INSTRUCTION:** INSTRUCTION indicates important supplementary information or provides skills or tips that can be used to help you solve a problem or save you time.

Warnings and markings on the product include:

	**WARNING:** Risk of electric shock
	**CAUTION:** Risk of electric shock from energy stored in capacitor. Do not remove cover until 5 minutes after disconnecting all sources of supply.
	**HOT SURFACE:** This equipment is designed to meet international safety standards, but surfaces can become hot during operation. Do not touch the heat sink or peripheral surfaces during or shortly after operation.
	For more details, please see the user manual.
	**WARNING:** For continued protection against risk of fire, replace only with the same type and ratings of fuse. Refer to instruction manual for details.
	**EARTH GROUND:** This symbol marks the location of the grounding terminal, which must be securely connected to the earth ground through the PE (protective earthing) cable to ensure operational safety.
	**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.
	**TUV Certification:** This inverter has passed TUV certification.
	Phase information of the inverter.

1.1 Safety Instructions of Operating the PV Inverter

DANGER:

Disconnect the inverter from the AC grid and PV modules *before* maintaining and operating the equipment. Ensure that hazardous high voltage and energy inside the equipment has been discharged.

Do not operate or maintain the inverter until at least five (5) minutes after disconnecting all sources from DC and AC sides.

WARNING:

All the installation and wiring connections should be performed ONLY by qualified technical personnel. Disconnect the inverter from the PV modules and 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 PV 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 approximately 262.4 lb (119 kg). Ensure the mounting bracket is properly installed *before* hanging the inverter and wire box on the bracket. CPS recommends to have at least four (4) people mount the inverter due to the weight of the equipment.

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.

INSTRUCTION:

Check with your local electricity supply company *before* selecting a grid standard. If the inverter is operated with an incorrect grid code setting, 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 is not permitted.

WARNING:

This product can expose you to chemicals including lead, known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov

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 CPS Connect Pro app interface.
2. Turn OFF the inverter via app or remote access.
3. Turn OFF the AC feed breaker and the AC switch.
4. If possible, read the DC MPPT currents displayed on the app interface:
    a. If the MPPT current is < 20 A or the irradiation is obviously low, turn OFF the DC switch.
    b. If it is safe to open the wire box, proceed with troubleshooting procedures listed in Section 7. Make sure the 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 box.
    b. Measure the DC current on each string:
        i. If zero, open the fuse holder for each string reading approximately zero amps.
        ii. If > 0.25 A, do not open the fuse holder.
    c. When all possible fuses are open, measure the total MPPT current.
    d. If the total MPPT current is < 20 A, 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—approximately 30 minutes prior to sunset—to continue troubleshooting.

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

1. Notify someone else and initiate emergency mitigation if necessary.
    a. If smoke or fire exists, procure a fire extinguisher.
    b. If a fire has escaped the inverter enclosure, notify 911 immediately!
2. Turn OFF the AC feed breaker as soon as possible / safe.
3. 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).
4. Monitor conditions until low irradiation (approximately 30 minutes prior to sunset).
5. If safe, turn OFF the AC and DC switches on the inverter and proceed with troubleshooting procedures (Section 7).

2 Overview

2.1 Inverter for Grid-Tied PV Systems

CPS SCH275KTL-DO/US-800 3-phase string inverters 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(s), and AC power distribution equipment (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 supplied to the electricity grid.

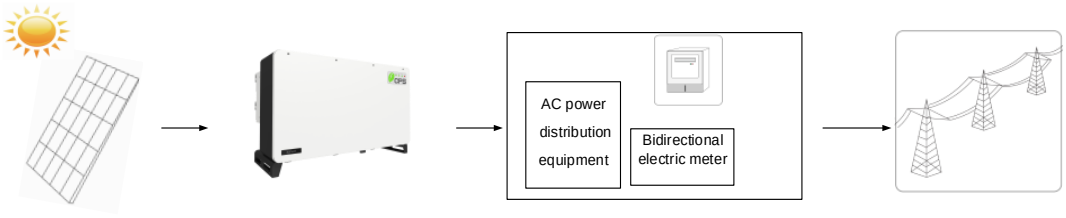


Figure 2-1 Grid-Tied PV System

2.2 Product Appearance and Dimensions

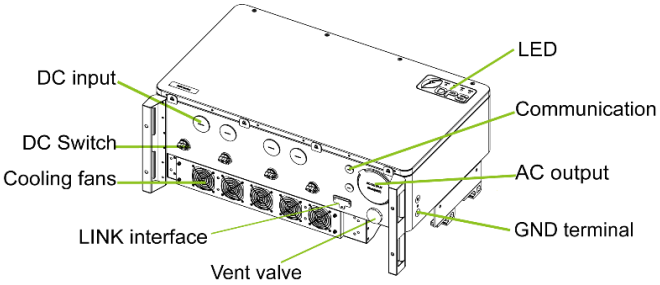


Figure 2-2 Product Appearance

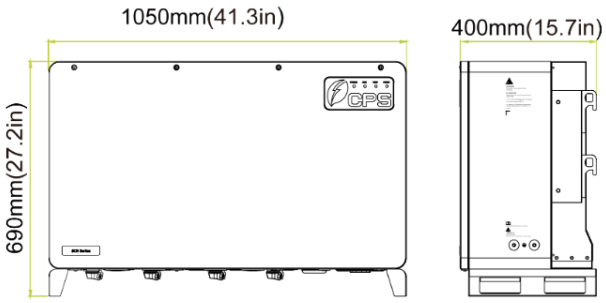


Figure 2-3 Product Dimensions

INSTRUCTION:

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

2.3 Product Features

- **High Conversion Efficiency**
  - Advanced three-level conversion technology with SVPWM (space-vector pulse width modulation).
  - 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 adjustable), optional local or remote active power curtailment.
- **Flexible Communication**
  - Supports standard CPS Modbus RS485, SunSpec Modbus, Ethernet TCP/IP, CAN, and AC-PLC communications to ensure compatibility with third party monitoring and control systems.
  - The FlexOM gateway card enables further command/control as well as remote firmware upgrades. (The FlexOM gateway card is an optional accessory. Refer to the FlexOM gateway card manual for further details and information.)
- **Wide DC Input Voltage Range**
  - Operating DC input voltage range: 500-1450 V_{DC}.
  - Max. DC input voltage: 1500 V_{DC}.
- **Long Service Life**: Uses thin-film and electrolytic capacitors to extend inverter's service life.
- **High Protection Degree**: NEMA 4X enclosure meets the demanding needs of both indoor and outdoor use.
- **Intelligent Integration**:
  - Integrated load break rated DC disconnect switches, which 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.

2.4 Schematic Diagram and Circuit Design

The electrical schematic diagrams of the inverter are shown in Figures 2-4a and 2-4b:

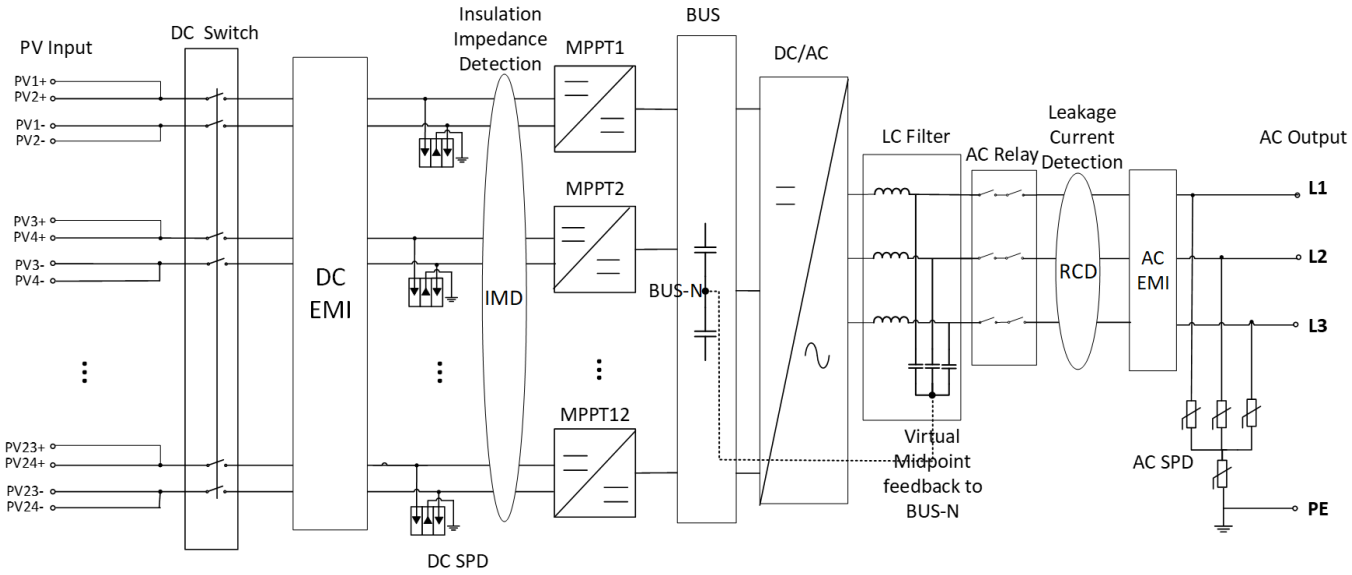


Figure 2-4a Schematic Diagram of the 24 Input Inverter Model

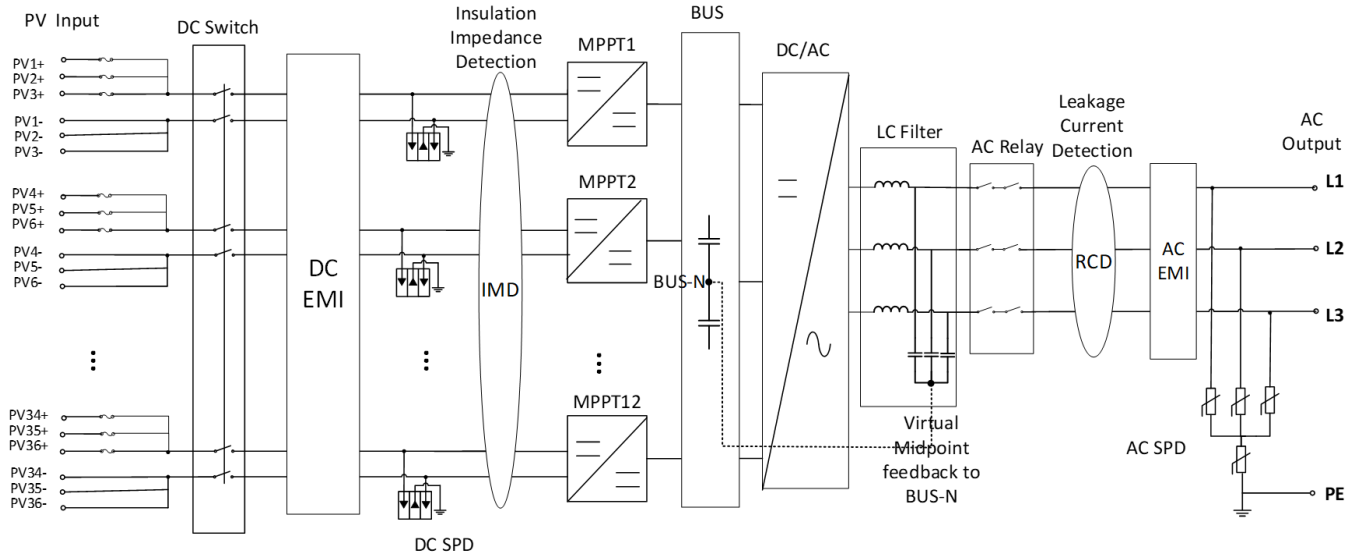


Figure 2-4b Schematic Diagram of the 36 Input Inverter Model

2.5 Product Protection Functions

- ✓ AC and DC short circuit protection
- ✓ AC output voltage and frequency monitoring
- ✓ Anti-islanding protection with bi-directional frequency perturbation
- ✓ DC input and AC output over-voltage protection
- ✓ DC input and AC output overcurrent protection
- ✓ DC input insulation to ground monitoring
- ✓ DC injection of AC output
- ✓ Leakage current against ground monitoring
- ✓ External environmental temperature monitoring
- ✓ IGBT power module temperature monitoring

2.6 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 UL1741-SA8-SA18 and UL1741-SB standards. The default activation status is indicated below:

Table 2-1 Smart Inverter Functions and Default Activation

Function	IEEE 1547-2018	CA Rule 21	ISO-NE	HECO
Anti-islanding	Enabled	Enabled	Enabled	Enabled
Low/high voltage ride-through	Enabled	Enabled	Enabled	Enabled
Low/high frequency ride-through	Enabled	Enabled	Enabled	Enabled
Dynamic volt/VAR operation	Disabled	Enabled	Enabled	Disabled
Ramp rate	Enabled	Enabled	Enabled	Enabled
Fixed power factor	Disabled	Disabled	Disabled	Disabled
Reconnect by soft start	Enabled	Enabled	Enabled	Enabled
Frequency-watt	Enabled	Enabled	Enabled	Enabled
Volt/watt	Enabled	Enabled	Enabled	Enabled
Watt-var	Disabled	Disabled	Disabled	Disabled

2.7 Anti-Islanding Detection

The CPS SCH275KTL-DO/US-800 inverter includes anti-islanding detection as required by UL1741 and IEEE 1547. 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.

2.8 DC Ground Fault Protection

The CPS SCH275KTL-DO/US-800 inverter includes residual current detection GFCI as part of the DC ground fault detection method required by UL1741. If there is a ground fault in the PV array, the ground fault detection circuitry will detect leakage current and trigger an alarm, after which the inverter will cease operation. See Section 6 for further information regarding GFCI static and dynamic trip thresholds and operation.

2.9 Surge Suppression

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

* Standard 0.5 µs – 100 kHz Ring Wave

** Standard 1.2/50 µs – 8/20 µs Combination Wave

3 Mechanical Installation

3.1 Unpacking for Inspection

Before unpacking, check whether the packaging box, safety labels, warning labels, and nameplate on the product are intact. These labels must always be clearly visible and must not be removed. All the delivery items are shipped in one package, which includes the inverter, the mounting bracket, four PE accessory bags, and one zipper storage bag.

Before performing installation, check the product for any obvious damage or if any items from the delivery list (Table 3-1) are absent. The delivery list is as follows:

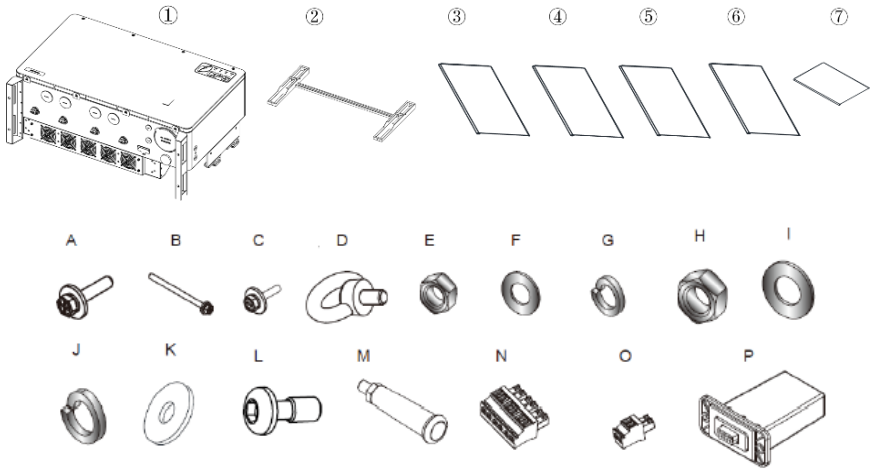


Figure 3-1 Delivery List Items

Table 3-1 Delivery List

No.	Item	Qty.	Note
1	Inverter	1	N/A
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	M 6x16 comb. bolt	2	For external ground connection.
D	M10 lifting eyebolt	2	For lifting the 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	2	Spare for front cover.
M	Handle	2	For lifting the inverter.
N	6-pin connector plug	1	For RS485 communication.
O	2-pin connector plug	1	For CAN communication.
P	LINKIT	1	For mobile app interface via CPS Connect Pro app.

Note: Additional accessories for the inverter are available and can be purchased separately.

3.2 Recommendations Before Installation

For detailed specification ranges and limits, see Section 9.3.

PRE-INSTALLATION CHECKLIST:

- ✓ Check that the product environmental specifications (protection degree, operating temperature range, humidity, altitude, etc.) meet the requirements of the specific project location.
- ✓ Ensure that the power grid voltage is within range for the grid standard chosen.
- ✓ Ensure that the local electricity supply authority has granted permission to connect to the grid.
- ✓ Installation personnel must be qualified electricians or those who have received professional training.
- ✓ Wear and use proper PPE during installation.
- ✓ Sufficient space (Figures 3-4 and 3-5) must be provided to allow the inverter cooling system to operate normally.
- ✓ Install the inverter away from flammable and explosive substances (this includes unmaintained grass).
- ✓ Do not install the inverter below water pipes, air vents, or other locations prone to condensation.
- ✓ Avoid installing the inverter in locations that exceed the specified temperature limits to prevent undesirable power loss.
- ✓ Do not install the inverter near an electromagnetic source which can compromise the normal operation of electronic equipment.
- ✓ Install the inverter at least 1640.42 ft (500 m) away from the seacoast.
- ✓ Ensure the PV array is not grounded.
- ✓ Install the inverter at a height such that the LED indicators are easily visible and the electrical conditions are accessible for operation and maintenance.
- ✓ The conduits' entries meet the following criteria:
    - ALL conduit entries must use watertight fittings.
    - ALL conduit entries use sealant around the wires inside the wire box to prevent moisture ingress.
    - ALL conduit fittings are metal to contain any thermal event in the wire box caused by moisture ingress.

NOTICE:

The allowable temperature ranges for the CPS SCH275KTL-DO/US-800 3-phase string inverters are defined based on the following conditions:

Condition 1: -40°F to 158°F (-40°C to 70°C), inverter not installed, in storage (in packaging or unpackaged).

Condition 2: -22°F to 140°F (-30°C to 60°C), inverter installed, connected to electric utility grid, and operating during daylight hours.

Condition 3: No low temperature limit to 158°F (70°C), inverter installed and 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 to be exposed to cycles of freezing temperatures without both DC and AC power connected to the inverters under normal operation.

The CPS inverter enclosures are designed to conform to NEMA 4 (or IP65), but the possibility of water condensation inside the inverter exists 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 live semiconductor devices to short-circuit. 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 inspecting the inverter for water condensation *before* any DC or AC power can be applied to the 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 schedule for CPS service personnel to perform an inspection of the inverter on-site.

CPS Customer Service: 855-584-7168

3.3 Installation Requirements

3.3.1 Installation Methods

The inverter must be installed as follows:

a) If the location permits, install the inverter vertically.

b) If the inverter cannot be installed vertically, it may be tilted backward 0-15 degrees from vertical.

c) Do not mount the inverter leaning forward.

d) Do not mount the inverter upside down.

e) Do not mount the inverter horizontally.

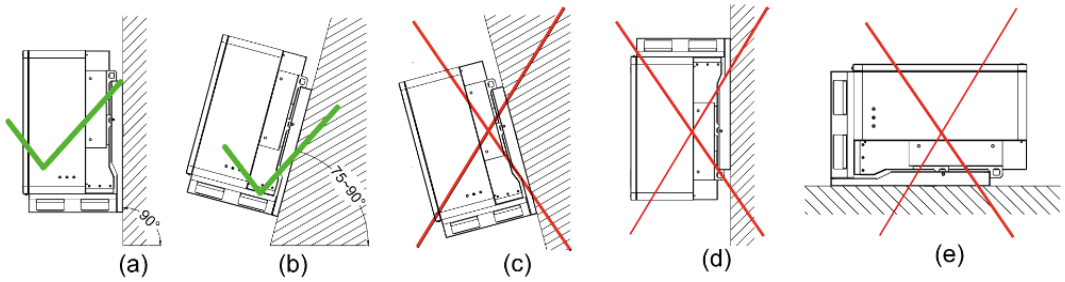


Figure 3-2 Inverter Mounting Options

NOTICE:

Ensure that the mounting structure (bearing wall, rack, etc.) is rated to bear the weight of the inverter.

3.3.2 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.

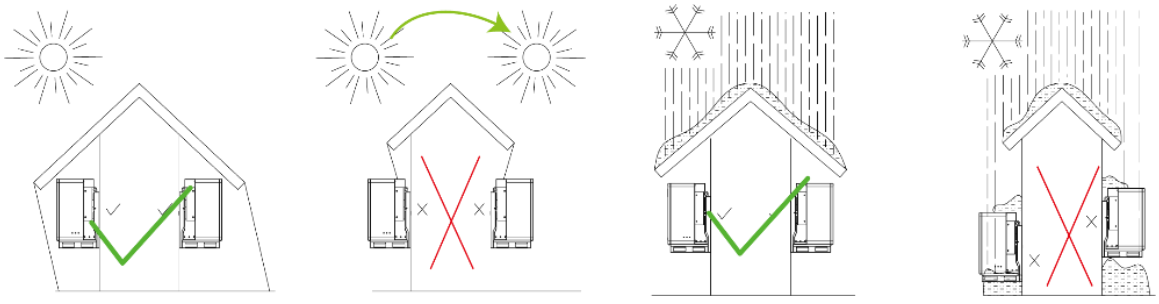


Figure 3-3 Inverter Mounting Suggestion

3.3.3 Space Requirements

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

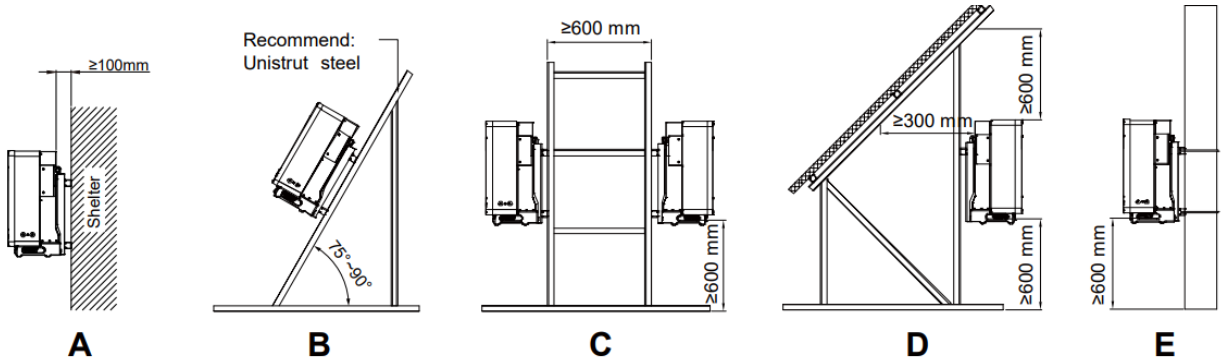


Figure 3-4 Space Requirements

A) Keep designated distance between the inverter and the shelter to ensure proper ventilation.

B) The inverter can be installed at an angle of 75-90 degrees; its back must not be blocked to ensure proper ventilation.

C) Two inverters can be installed back-to-back; adequate distance must be kept to ensure proper ventilation.

D) The inverter can be installed under the PV module, but its back and top must not be blocked to ensure proper ventilation.

E) The inverter can be installed on a single column-holding rod and must be checked to confirm a secure installation.

3.4 Installation Procedure

3.4.1 Install the Inverter

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

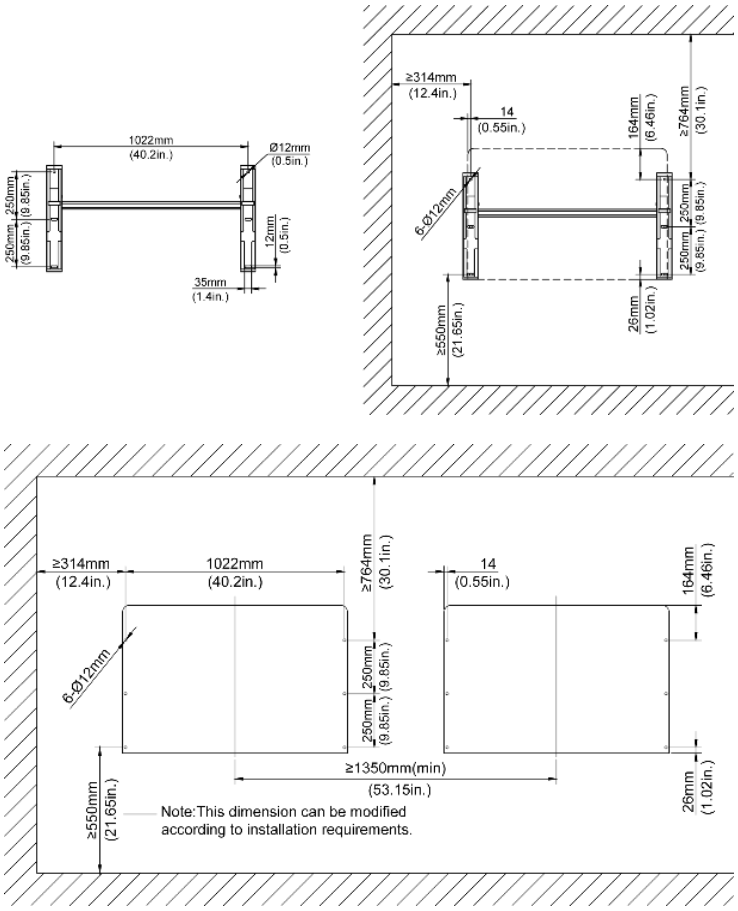


Figure 3-5 Hole Positions of Mounting Bracket

2. Using a 12 mm drill, drill holes at the marked position.

3. Fasten the mounting bracket ① onto the installation structure with six M10x50 hexagon combination screws ② included in the accessory bag and torque to 110 in-lb (12.5 N·m).

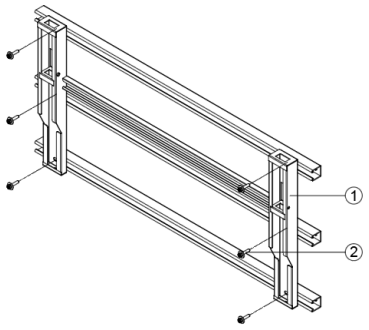


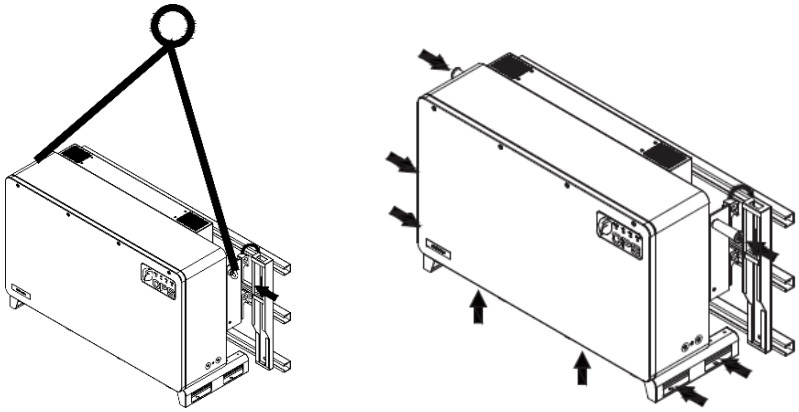
Figure 3-6 Fasten the Mounting Bracket

CAUTION:

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

4. Using one of the two methods listed below, hang the inverter onto the mounting brackets:

   - **Hoist mounting**: Screw two (2) M10 lifting eyebolts to the studs at the top of the inverter, then use a sling rope or bar (inserted through both lifting eye bolts) to lift the inverter onto the bracket. The minimum angle between the two sling ropes must be less than 90° (Figure 3-7 left).
   - **Manual mounting**: At least 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

5. With the #3 Phillips head screwdriver, use two M6x90 screws to fasten the inverter onto the mounting bracket and torque to 53 in-lb (6 N·m):

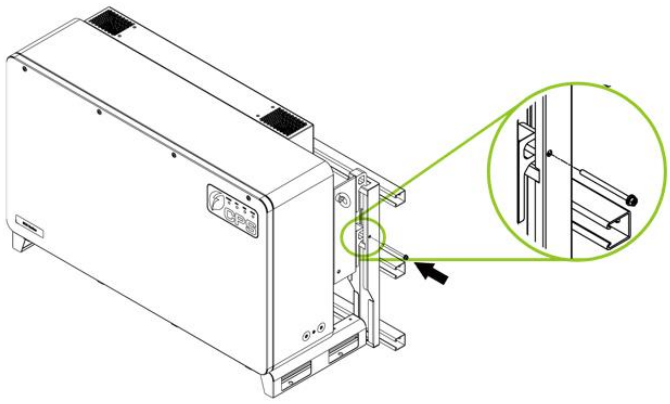


Figure 3-8 Fasten the Inverter

4 Electrical Connection

Table 4-1 Cable Specifications

Cable	Type	Acceptable Wire Range
DC	Use copper conductors 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 90°C rated.
GND	Use copper or aluminum conductors.	• DC grounding bar: #14-4 AWG (CU/AL) • AC grounding bar: #14-2 AWG (CU/AL)
AC	Use copper or aluminum conductors.	• L1/L2/L3: 4/0 AWG – 750 kcmil (CU/AL) • Terminals are 90°C rated.
Comm.	Use industrial grade shielded twisted pair RS485 cable.	

Table 4-2 Tools Required and Torque Values

No.	Tools	Use	Torque Value
1	#2 Phillips head screwdriver	DC cable	26 in-lb (3 N·m)
2	18 mm hex socket wrench	AC terminal block L1-L3	275 in-lb (31 N·m)
3	10 mm hex socket wrench	External grounding	53 in-lb (6 N·m)
4	5 mm flat screwdriver	DC internal grounding bar	26 in-lb (3 N·m)
		AC internal grounding bar	45 in-lb (5 N·m)
5	1.5 mm flat screwdriver	RS485 comm. terminal	1.8 in-lb (0.2 N·m)
6	Diagonal pliers	Cut cable	-
7	Wire stripping pliers	Remove jacket	-
8	Crimping pliers	Crimp terminal	-

4.1 Connection Interfaces and Connection Points

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

4.1.1 Connection Interfaces

The connection interfaces of the inverter are as shown in Figure 4-1:

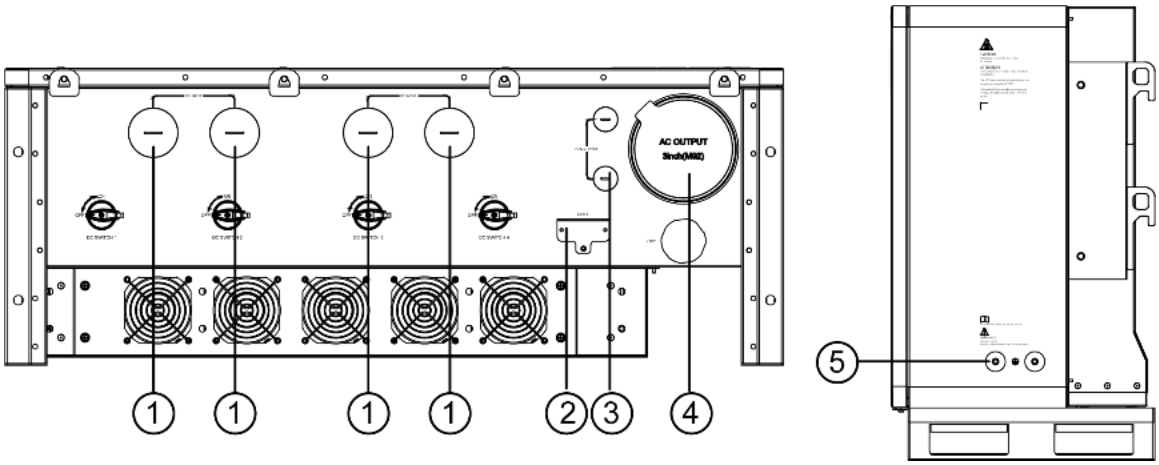


Figure 4-1 Connection Interfaces

No.	Item Name
1	Four (4) knockouts for DC inputs (2 inch trade size)
2	LINKIT interface
3	Two (2) knockouts for communication (0.75 inch trade size)
4	One (1) knockout for AC output (3 inch trade size)
5	External GND connection point

NOTICE:

Ensure the inverter cover is securely closed and attached after wiring is completed to avoid water condensation inside the unit.

Before the first power-on operation, or before running the inverter after a long period of non-operation (6-12 months), check to see if the water-sensitive label in the bottom left corner of the AC and DC wire boxes and on the capacitive plate have turned red. NEVER power on the inverter if any water sensitive-label is red.

Never damage or tamper with the vent valve.

4.1.2 Internal Connection Points

The internal connection points of the inverter are as shown in Figure 4-2:

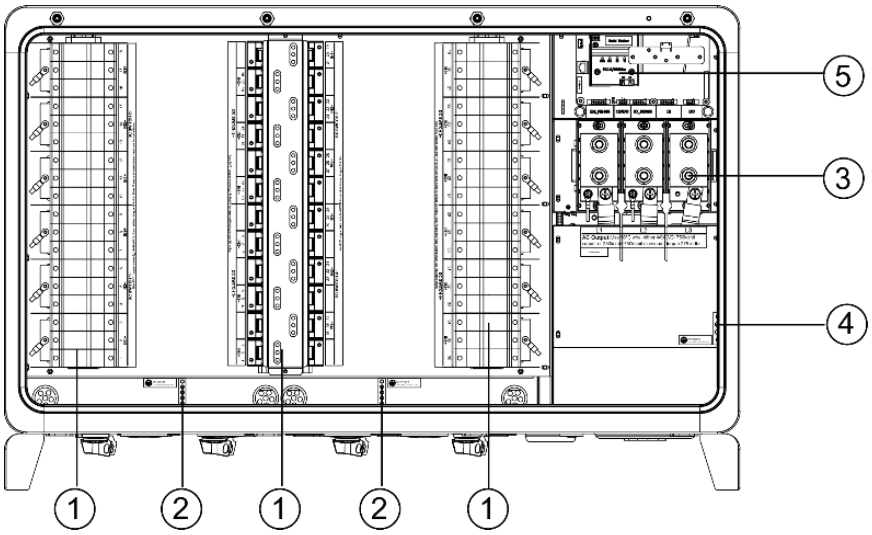


Figure 4-2a Internal Connection Points of 36 Input Inverter

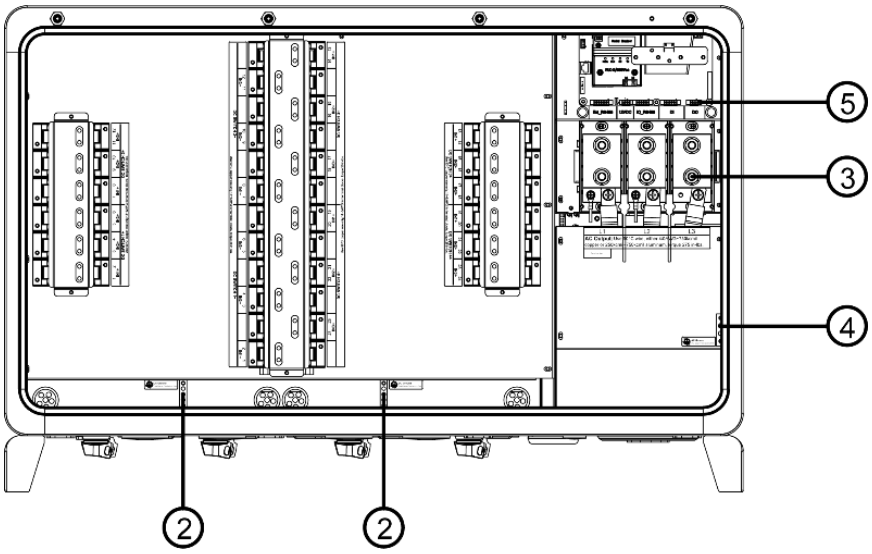


Figure 4-2b Internal Connection Points of 24 Input Inverter

No.	Item Name
1	DC input fuse holder/terminal (non-fused inputs for 24 input inverter)
2	DC internal grounding bars
3	AC output terminal block
4	AC internal grounding bars
5	Communication board

4.2 Electrical Cable Connection

CAUTION:

The cables must 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 detection. External AC ground fault detection may be required by 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 in their DC terminals layout and wiring methods, so the DC wiring methods are explained separately in this section.

INSTRUCTION:

Use hand tools (e.g., socket wrench) instead of power drivers or other types of screwdrivers.

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

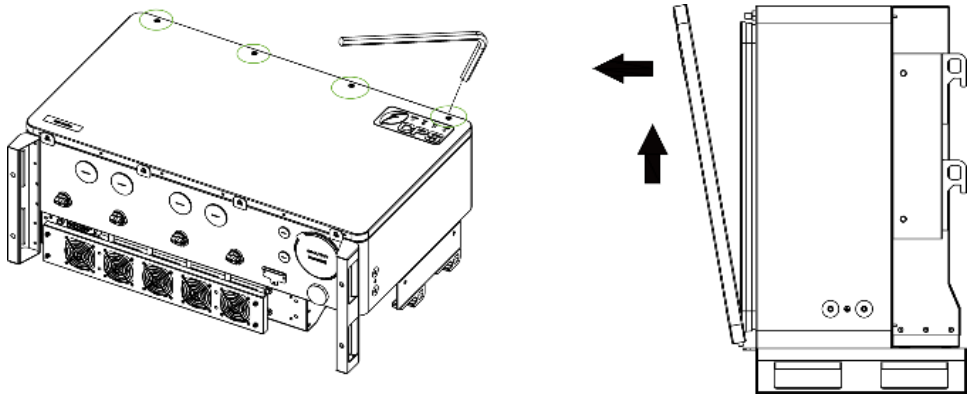


Figure 4-3 Remove the Front Cover

4.2.1 Grounding

INSTRUCTION:

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

Choose at least one of the following three kinds of grounding methods for this inverter:

- Connect at the two internal DC grounding terminals (as shown in Figure 4-4 below the DC fuse holders).
- Connect at the internal AC grounding terminal (as shown in Figure 4-4 below the AC terminal block).
- Connect at the external grounding point as shown in Figure 4-5) using the M6x16 combination bolt.

Figure 4-4 Internal DC and AC Ground Terminals

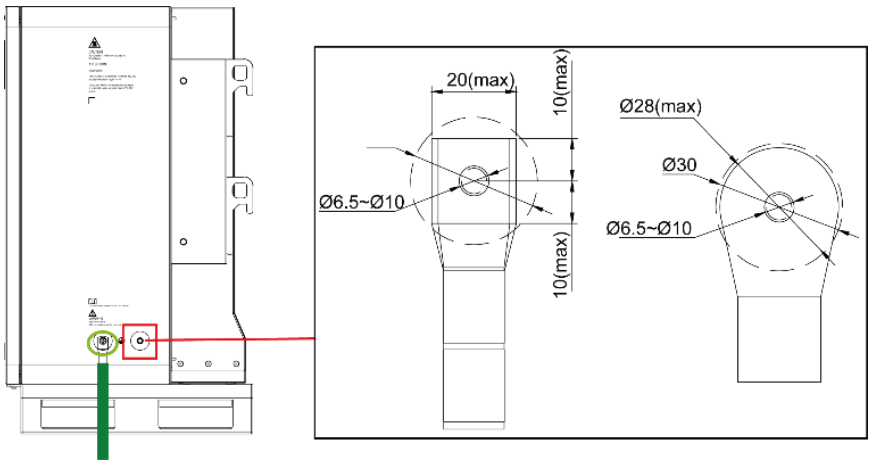


Figure 4-5 External Ground Cable Connection

4.2.2 AC Wiring

1. Remove the watertight plug from the AC output of the wire box to install 3 in trade size conduit and conduit fittings into the hole.
2. Route the cables through the conduit inside the wire box; a circuit ground should run with the AC power cables and connect to the internal ground bus.
3. Connect the AC (L1, L2, L3) cables to the copper busbar.
4. Connect the ground cable to the internal grounding terminal block.

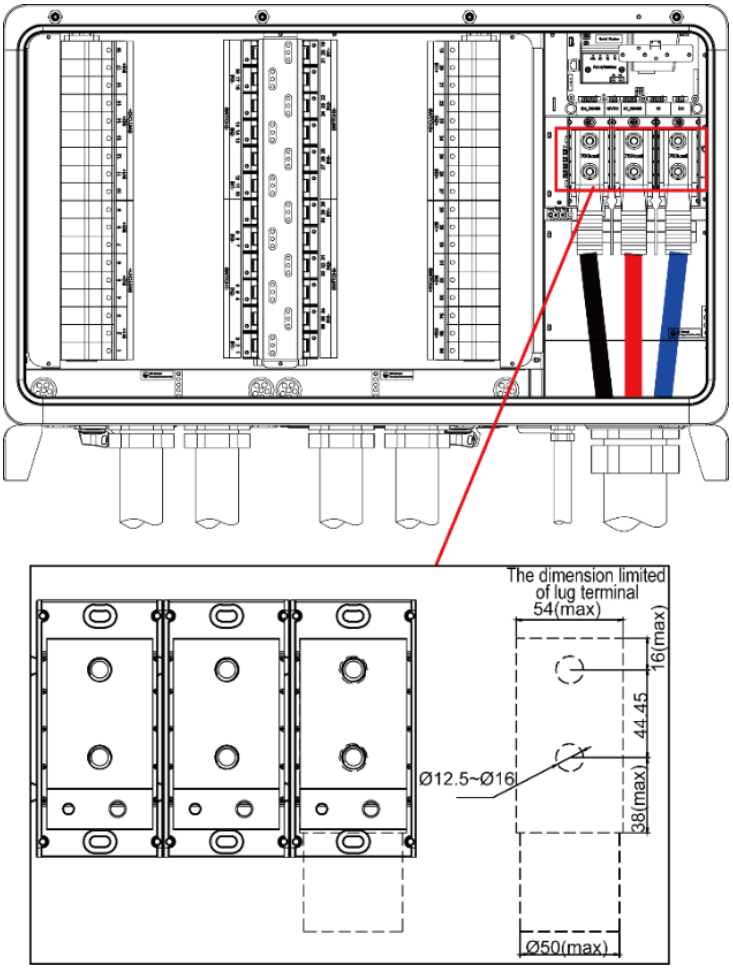


Figure 4-6 AC Wiring Terminals

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.

Table 4-3 AC OCPD Specification

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

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

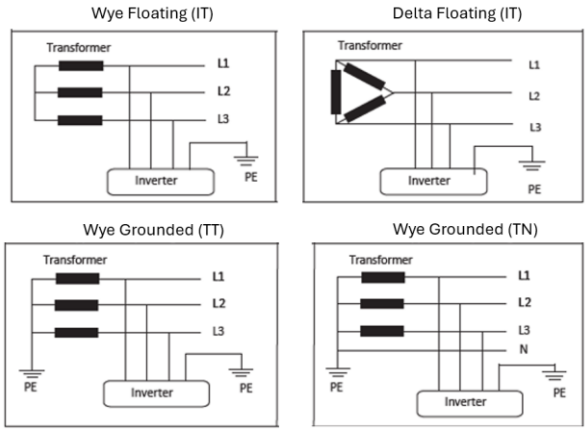


Figure 4-7 Acceptable Transformer Winding Configurations

INSTRUCTION:

The CPS275KTL-DO/US-800 inverter is ONLY compatible with wye floating, delta floating, and wye grounded transformer winding configurations. External AC ground fault detection may be required by NEC 2017/2020 Section 250.21 for floating AC systems. The inverter will provide DC ground fault detection.

Notes:

- The transformer short-circuit impedance (Z%) must follow the recommendations in the table below (Figure 4-8) to assure the best inverter performance.

Recognized minimum values of short-circuit impedance for transformers with two separate windings

Short-circuit impedance at rated current	
Rated power kVA	**Minimum short-circuit impedance** %
25 to 630	4,0
631 to 1 250	5,0
1 251 to 2 500	6,0
2 501 to 6 300	7,0
6 301 to 25 000	8,0
25 001 to 40 000	10,0
40 001 to 63 000	11,0
63 001 to 100 000	12,5
above 100 000	>12,5

NOTE 1 Values for rated power greater than 100 000 kVA are generally subject to agreement between manufacturer and purchaser.

NOTE 2 In the case of single-phase units connected to form a three-phase bank, the value of rated power applies to three-phase bank rating.

Figure 4-8

- The transformer VA rating should be at least 100% of the sum of the connected inverters' maximum VA ratings. Most liquid-filled transformers are continuous-rated; however, dry type transformers are typically *not* continuous-rated and may require a 1.25 derating factor applied. Consult your transformer supplier and/or engineering consultant to confirm.
- CPS recommends the transformer VA rating be selected based on the IEEE C57.159-2016 *Guide on Transformers for Application in Distributed Photovoltaic (DPV) Power Generation Systems*. Another source is the IEEE C57.91-1995 *Guide for Loading Mineral Oil Immersed Transformers*. It is the responsibility of the system designer to determine and account for 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 (except when using grounded Wye transformers).
- The recommended maximum voltage drop on the inverter to the 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 a last resort, adjusting the GridMaxVolt trip point settings with approval and mutual agreement from the utility or EPS operator. In addition, the added impedance may cause inverter control issues.
- If the nearest upstream transformer is YG-yg, the neutral on the utility side (H0) and inverter side (X0) may be connected internally, brought out as one terminal in the LV compartment, and labeled (H0X0).
- When connecting these inverters with grounded wye transformer windings at the low voltage (inverter) side, the following additional restrictions apply:
    - The maximum number of inverters that may be connected in parallel to a single transformer is 15.
    - The inverter's external PE is recommended to be connected to the nearest grounding point (e.g., the mounting rack). Refer to Section 4.2.1 Grounding for additional grounding requirements.
    - The daytime PID mitigation function (PidSvgEnable) cannot be enabled when the inverters are connected to a grounded-wye transformer. Please note that, regardless of transformer configuration, the PID mitigation function and SVG (nighttime reactive power) function cannot be enabled simultaneously.
    - CPS America recommends a joint technical review with CPS engineers for each project using these inverters with a grounded-wye transformer.

4.2.3 DC Wiring

4.2.3.1 DC fuse configuration

The 36 input inverter version includes touch-safe fuse holders and preinstalled 25 A DC fuses. Customers must verify that the appropriate fuses are installed depending on the configuration of the PV array and by performing PV fuse sizing calculations for each string.

- Each MPPT DC input from the PV that has more than two (2) strings requires fuse protection.
- The rated voltage of the fuse should be 1500 V_{DC}. ADLER series 1500 V_{DC} fuses 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 range of PV modules:

Table 4-4 DC Fuse Selection

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

WARNING:

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

CAUTION:

Disconnect all power sources *before* replacing fuses.

4.2.3.2 DC Cable Connection

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

1. Confirm the DC configuration and ensure that the maximum open circuit voltage of the PV modules is lower than 1500 V_{DC} under *any* conditions.
2. Confirm that the PV strings for the MPPT of the inverter are of the same type and specification before connecting.
3. Check the polarity (Figure 4-9) before terminating the DC cables of the PV strings according to the following steps:
   a. Use a multimeter to measure the PV strings' cable ends and check the polarity.
   b. Ensure the positive (+) terminal of the cable matches the positive (+) terminal of the inverter's DC input.
   c. Ensure the negative (-) terminal of the cable matches the negative (-) terminal of the inverter's DC input.

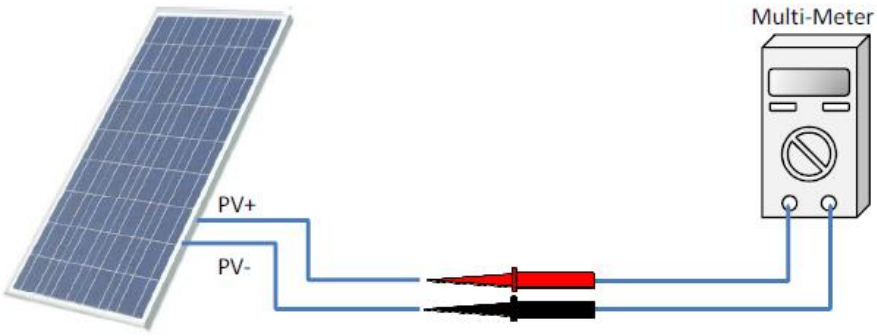


Figure 4-9 Polarity Check

NOTICE:

It is important to use a multimeter rated at least 1500 V to check the polarity of the DC input conductors to avoid any risk of reverse polarity.

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

Perform cable connection as follows:

1. Remove the watertight hole plugs from the DC input of the wire box and install 2 in trade size conduit and conduit fittings into the holes.

   Note: If the use of smaller conduit is desired, proper watertight 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 the 36 input inverter as shown in Figure 4-10a, or connect to the DC terminals of the 24 input inverter as shown in Figure 4-10b, then tighten the screws.

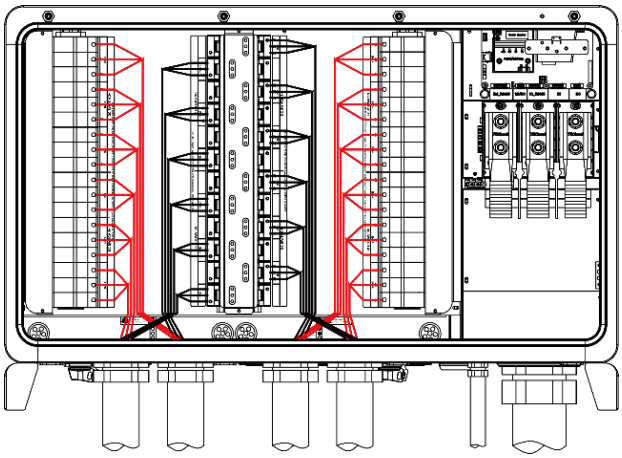


Figure 4-10a Connect the DC Cable to the Fuse Holder

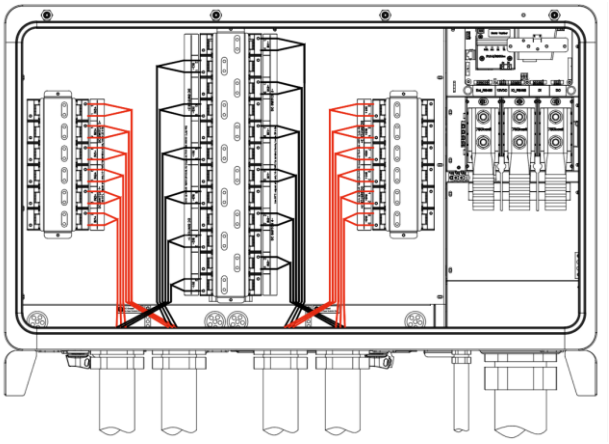


Figure 4-10b Connect the DC Cable to the DC Terminal

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., the difference in the number of strings per MPPT is not larger than one).

NOTICE:

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

NOTICE:

Place labels or marks on all positive and negative DC input cables to identify their correct strings (e.g., PV1+, PV1-, PV2+, PV2-). Ensure all strings are connected to the corresponding ports according to the port names printed on the device to avoid incorrect connections that may result in hazards or damage.

4.2.4 Communication Cable Connection

4.2.4.1 Communication Board

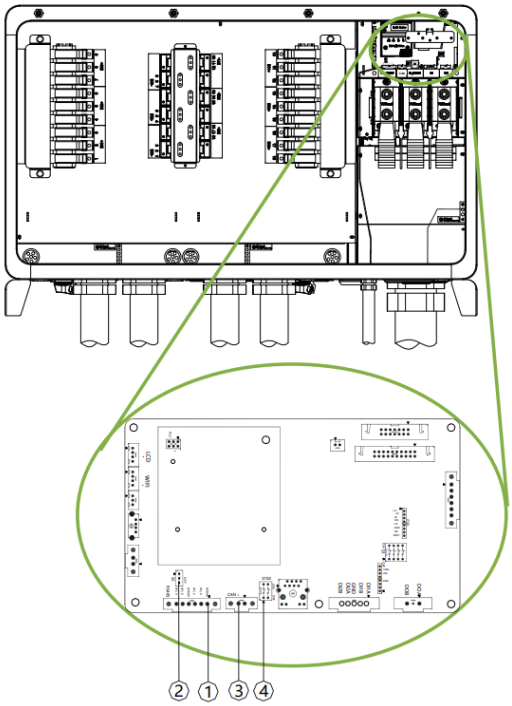
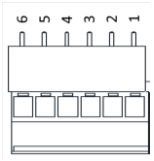
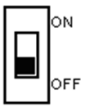
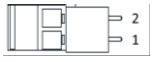
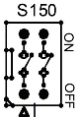


Figure 4-11 Communication Board

Table 4-5 Communication Board Interfaces

No.	Name	Picture	Configuration
1	RS485 port 6-pin connector plug		6 – RS485_A 5 – RS485_B 4 – RS485_GND (common) 3 – RS485_A 2 – RS485_B 1 – RS485_GND (common)
2	S2 selector switch (set terminal resistor)		OFF – disable terminal resistor ON – enable terminal resistor
3	CAN port (2-pin connector)		2 – CAN_L 1 – CAN_H
4	Left S150 selector switch (number 1)		OFF – disable terminal resistor ON – enable terminal resistor

4.2.5 Communication Connection

The inverter supports industry standard Modbus R485, Ethernet, CAN, and AC-PLC communication modes. AC-PLC communication requires connection of the CPS AC-PLC kit accessory.

4.2.5.1 RS485 and CAN Communication Schematic Diagram

1. Connect RS485 communication cables using the 6-pin terminal to 485 communication module, referring to Figure 4-12 (1, left) for a single inverter RS485 communication connection and Figure 4-12 (2, right) for network configuration.
2. Connect CAN communication cables using the 2-pin terminal to CAN communication module, referring to Figure 4-12 (1, left) for a single inverter CAN communication connection and Figure 4-12 (2, right) for network configuration.

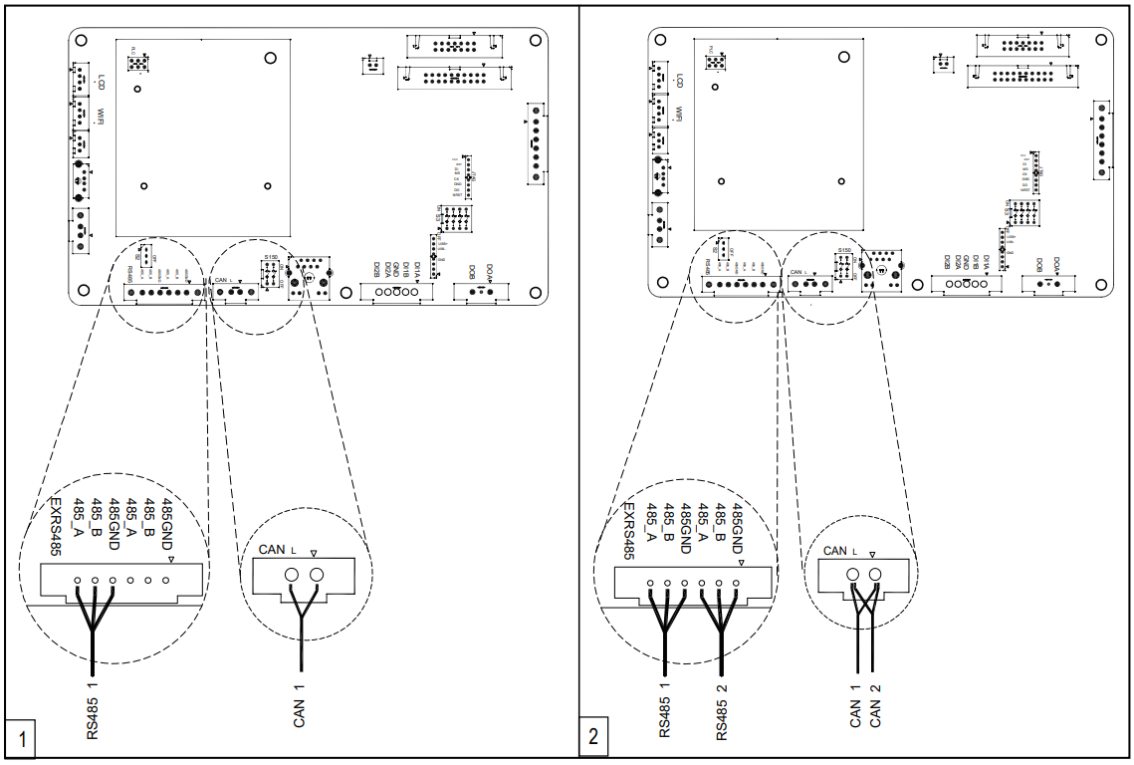


Figure 4-12 RS485/CAN Communication Cable Connection

It is recommended that industrial grade shielded twisted pair RS485 cable be used in lieu of unshielded twisted pair cable. Communication cables such as Belden 3106A or similar for the RS485 6-pin connector can be used.

4.2.5.2 RS485/CAN Network Connection

When the inverters are monitored via the RS485/CAN communication, a unique RS485/CAN address for each inverter can be set up through the app interface. Use the CPS Connect Pro app to assign an address to each inverter on the network. Up to 32 inverters can be connected together in the RS485/CAN communication network. The daisy-chain topology is recommended for the RS485 network connection, as shown in Figure 4-13, to minimize noise and bus reflections. Other communication topologies, such as the star networks, are not recommended.

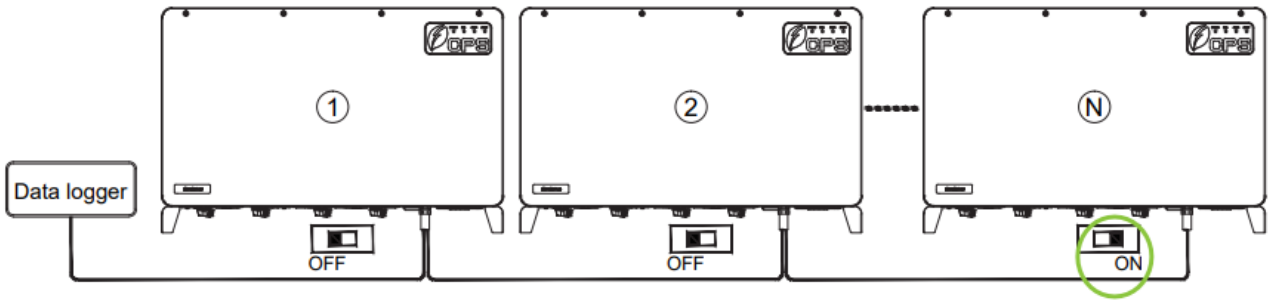


Figure 4-13 RS485/CAN Network Connection

If there are multiple inverters in the RS485 network and the last inverter is more than 656.2 (200 m) in distance from the data logger, the selector switch S2 of the last inverter in the daisy chain should be in the ON position to enable the 120 ohm terminal resistor. The selector switch S2 of all other inverters should be in the OFF position to disable the terminal resistor.

If there are multiple inverters in the CAN network and it is more than 656.2 ft (200 m) in distance from the data logger, the left switch S150 ① of the last inverter on the daisy chain should be in the ON position, to enable the 120 ohm terminal resistor. The left switch S150 ① 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 reflections. All RS485 connections must be terminated in a serial fashion and must not exceed 32 in total. A daisy chain configuration is recommended above a multiple branch configuration.

WARNING: Risk of Electric Shock.

Ensure that *all* DC and AC power to the unit has been disconnected and that hazardous high voltage and power inside the equipment has been discharged *before* opening the inverter wire box. Wait at least five minutes before opening the wire box.

4.2.5.3 Communication Wiring

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 watertight to maintain NEMA 4X rating.
3. Connect the RS485/CAN wires to their corresponding connectors, ensuring correct polarity and using a shielded twisted pair cable.
   a. If the inverter is the *last* Modbus device in the daisy chain and it is more than 656.2 ft (200 m) in distance from the data logger, ensure that the Modbus termination switch S2/left S150 is in the ON position to enable Modbus termination; all other switches must be in the OFF position.
   b. If there is only one inverter and it is more than 656.2 ft (200 m) in distance from the data logger, the Modbus termination switch must also be in the ON position; otherwise it can be set in the OFF position.

Note: 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.

---

4. After completing all wiring steps, reinstall the front cover and press down to lock it.

INSTRUCTION:

- Use hand tools (e.g., socket wrench) instead of power drivers or other types of screwdrivers.
- During installation, it is recommended that the cover is in alignment with balanced force to avoid thread damage.
- Partially engage the screws into the threaded inserts before tightening.
- Screws must be tightened when reinstalling the front cover to prevent water ingress.

---

5. Finally, use a 5 mm socket head screw wrench to fasten the four screws on the front cover as shown in Figure 4-14 and torque to 26 in-lb (3 N·m):

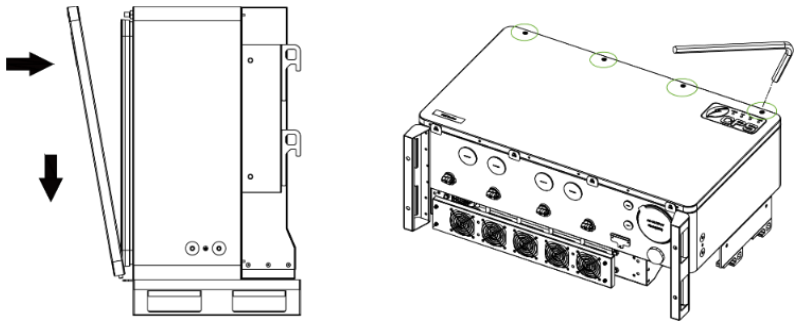


Figure 4-14 Reinstall the Upper Cover

4.2.6 Install the LINKIT Module

INSTRUCTION:

The LinKIT module is required to commission 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 4-15:

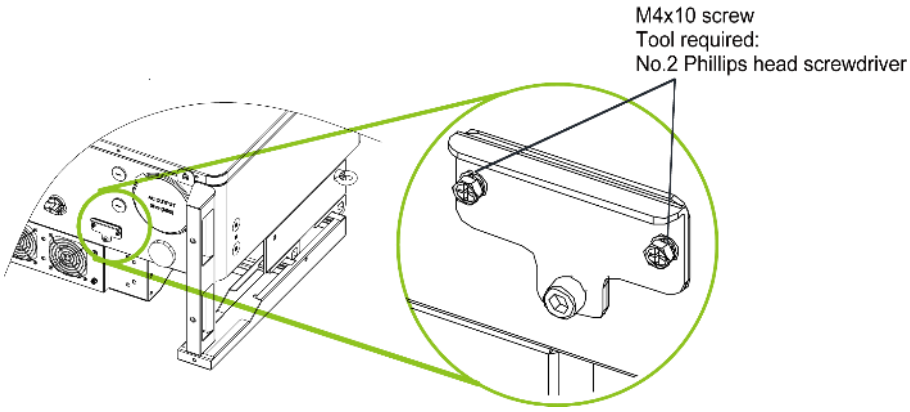


Figure 4-15 Expose the Connector

2. Rotate the cover to expose the connector, install the LinKIT module with the two screws just removed, and torque to 14 in-lb (1.6 N·m) to ensure the seal is watertight.

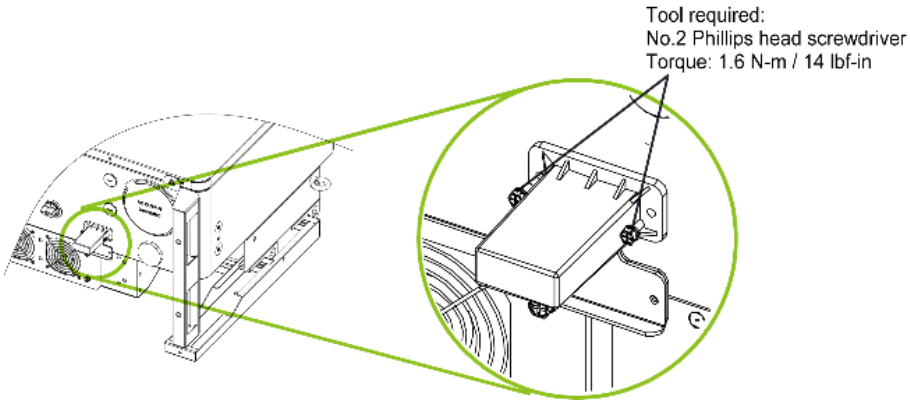


Figure 4-16 Install LinKIT Module

4.3 Cable Connection Notices for Joints and Sales

All electrical cables and communication cables must be jointed and sealed properly according to the following requirements to ensure their excellent performance and watertightness:

- The cable must be vertical to prevent excessive cable stress:

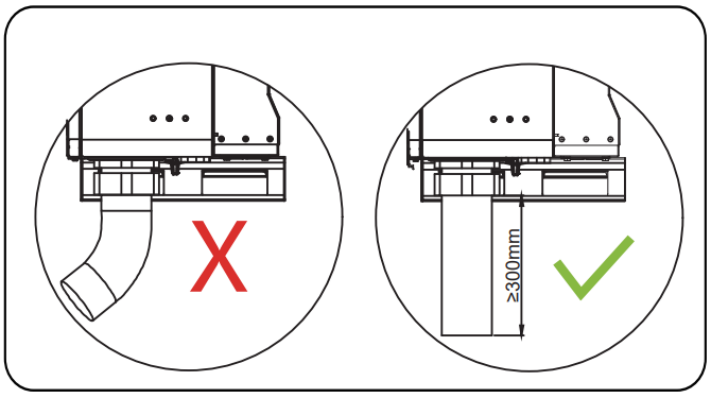


Figure 4-17 Cable Must Be Vertical

- After the cable passes through the fastening head, fireproof putties must be applied to seal the joint tightly and prevent water vapor from entering:

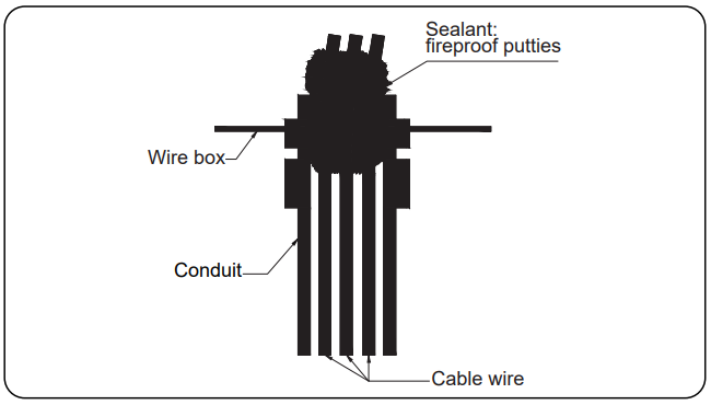


Figure 4-18 Apply Fireproof Putties

- 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):

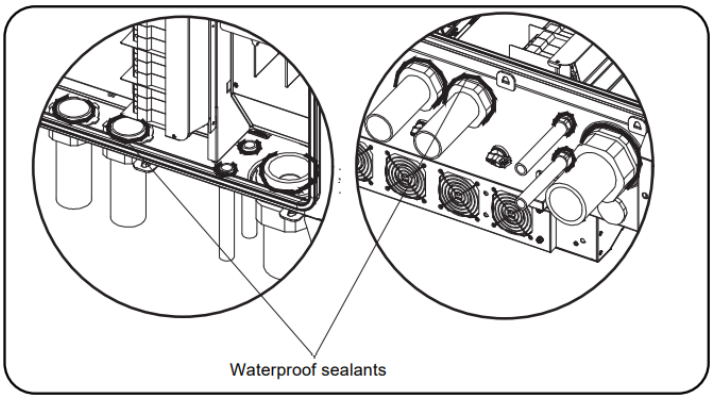


Figure 4-19 Apply Watertight Sealants

- After tightening the fastening head, watertight sealants must be applied on its inner and outer surfaces to avoid loosening and prevent water ingress:

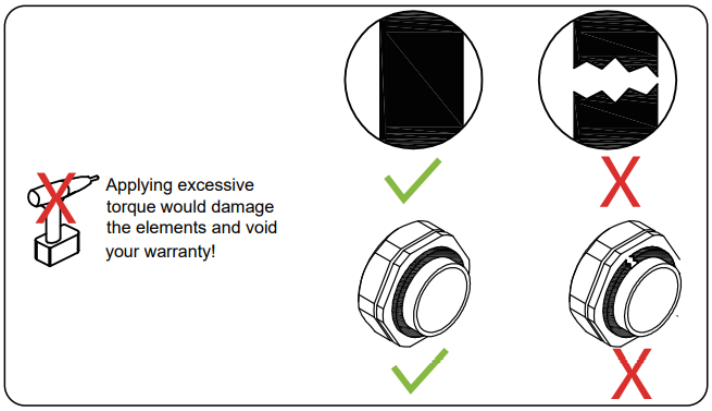


Figure 4-20 Check Watertight Gasket

5 Commissioning

WARNING:

Follow the guidelines below *before* on-grid operation to eliminate possible dangers and ensure safety.

Check the installation for any hazards *before* powering up the PV system.

5.1 Pre-commissioning Checks

5.1.1 Mechanical Installation

- ✓ Ensure all mounting brackets are secure.
- ✓ Ensure all screws have been tightened to the specified torque values.
- ✓ Confirm that all knockouts are sealed and conduit is securely attached to the inverter, creating a watertight seal.

5.1.2 Cable Connections

- ✓ Ensure that all cables are connected to the correct terminals and properly labeled.
- ✓ Practice appropriate cable management to avoid physical damage.
- ✓ Ensure the polarity of the DC input cables is correct and that the DC switch is in the OFF position. (Refer to Section 4.2.3.)

5.1.3 Electrical Check

- ✓ Ensure that the AC circuit breaker and/or fused switch disconnect is appropriately sized.
- ✓ Test to determine if the AC voltage is within the normal operating range.
- ✓ Ensure that the DC open circuit voltage of input strings is less than 1500 V.

5.2 Commissioning Steps

Complete the list above (Sections 5.1.1, 5.1.2, and 5.1.3), then commission the inverter as follows:

1. Turn ON the AC circuit breaker and/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 the 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 in Section 6.1 App Download and Section 6.2 App Settings to select the inverter parameter settings.

6 App Interface and Settings

6.1 App Download

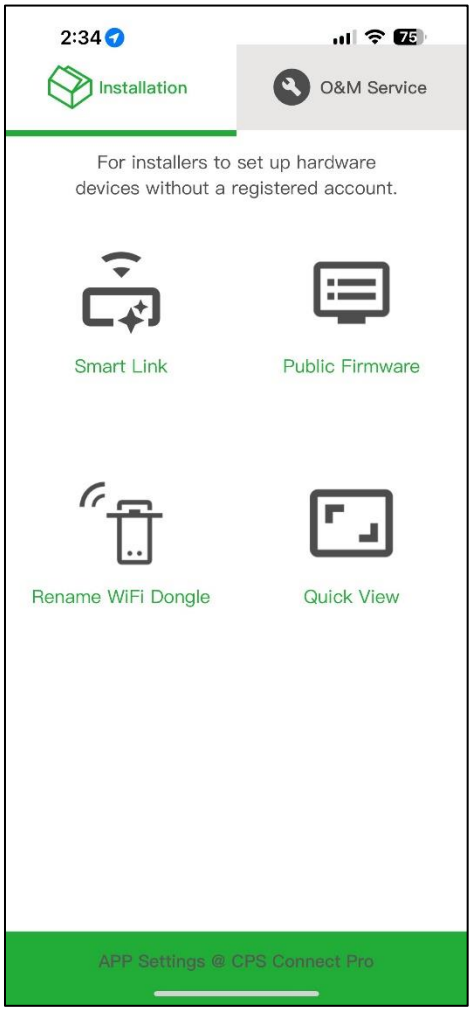
The inverter settings are accessed through the CPS Connect Pro application. Users can download the iOS version from the App Store or the Android version from the Google Play store. (Supports iOS 9.0 and Android 4.1 or later.)

CPS Connect Pro

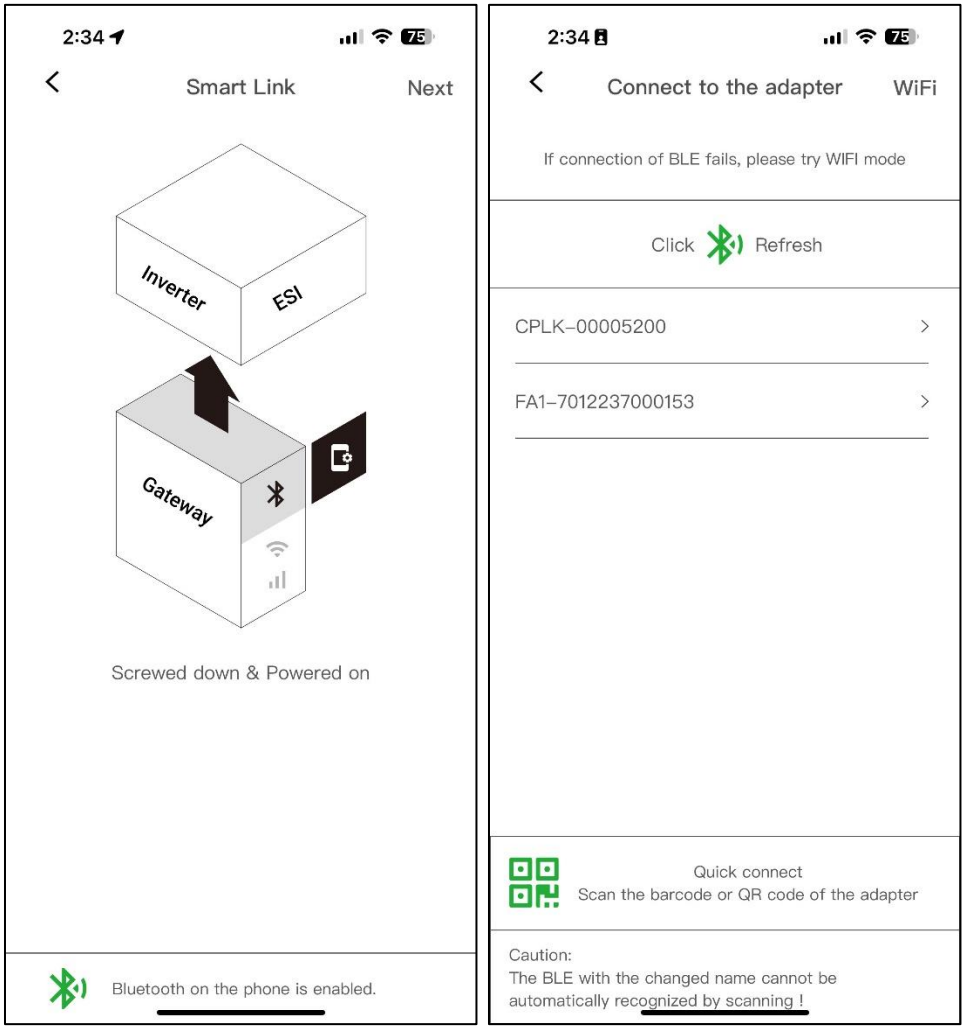
6.2 App Settings

Once powered, the inverter will automatically create a wireless network that can be visible as an access point from user communication devices (tablet, smartphone, etc.). Users can perform the following procedures to set the app easily.

1. Ensure Bluetooth is enabled on your device.
2. Open the CPS Connect Pro app.
3. Tap the **Smart Link** icon to enter the Smart Link interface.



4. If necessary, tap **App Settings** at the bottom to change the language, then tap **Save**.
5. Tap **Next** to navigate to the Connect the Adapter interface.
6. Enable the wireless connection on the device using one of the following methods:
   a. Tap the wireless network named *CPLK-XXXXXXX* (where X can be found on the LinKIT label) shown in the Bluetooth list.
   b. Tap the green QR icon under the list to scan the LinKIT bar code to connect the network.
   c. Select the **WiFi Mode** tab in the top right corner to set the Wi-Fi, then input “Password” (with a capital P) as the password to connect to the network.



7. Tap the **Setting** icon and enter “1111” as the password to access the **Setting** interface.

8. Set the correct inverter parameters:

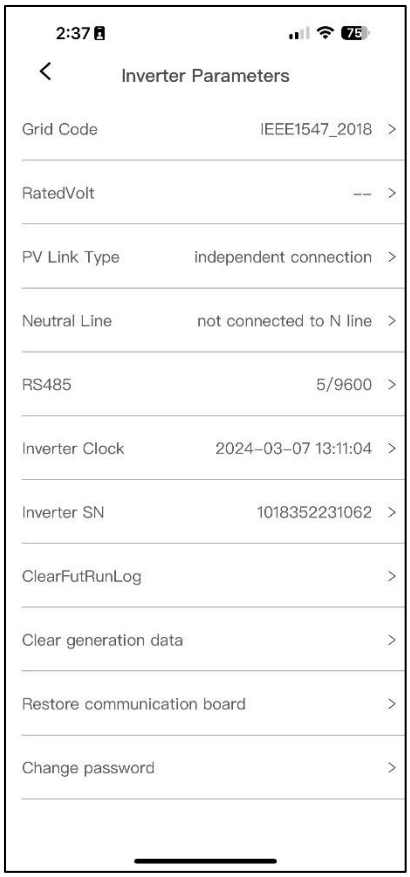
   a. **Grid Connection Rule**: Choose the grid code according to the requirements of your local authority. The available grid codes are IEEE 1547-2018, CA Rule 21, ISO-NE, IEEE 1547-2014, and HECO.

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

   c. **Neutral Line Setting**: This inverter can only be applied in IT systems; the neutral line connection is not supported.

   d. **RS485**: Choose the communication data Modbus address and baud rate.

   e. **Time Set**: Set the system clock.



9. Tap **Next** to navigate to the home interface.

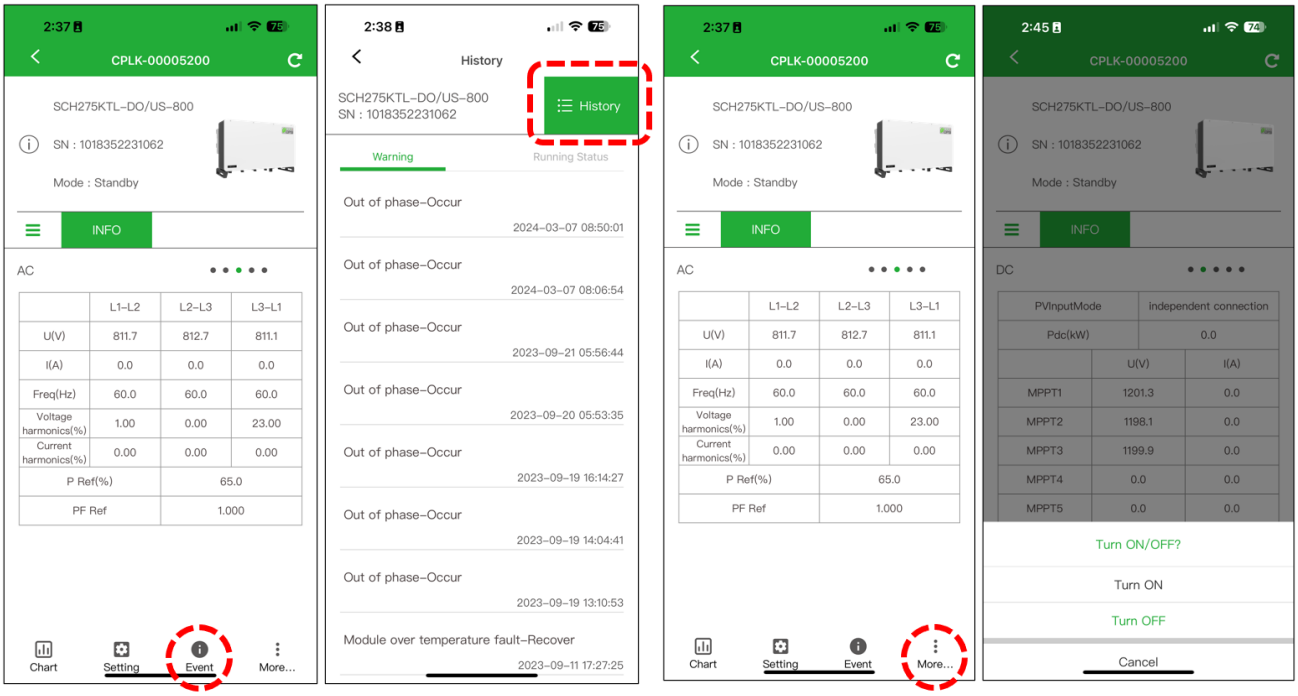
INSTRUCTION:

Check with your local electricity supply company *before* selecting a grid standard. If the inverter is operated with an incorrect grid code, the electricity supply company may cancel the interconnection agreement. Placing the inverter into operation before the overall system complies with national rules and safety regulations is not permitted.

10. When the device screen shows normal operation status and the RUN light on the inverter LED panel is illuminated, this indicates that the grid connection and power generation are successful. You can now browse through the real-time data in the app.

Notes:

- Sliding the interface left and right shows the DC, AC, Other, and Version pages.
- If the inverter fails to operate normally, the FAULT light will illuminate and the fault information will be shown on the interface.
- Tapping the **Event** icon will display the Event screen.
    - Tap **History** to check the detailed current and history information.
    - Troubleshoot related problems and restart.
    - Contact CPS Customer Service if necessary.
- Tap the **More** icon and input the password “1111” to power on or off the device.



6.3 Structure Tree of App Interface

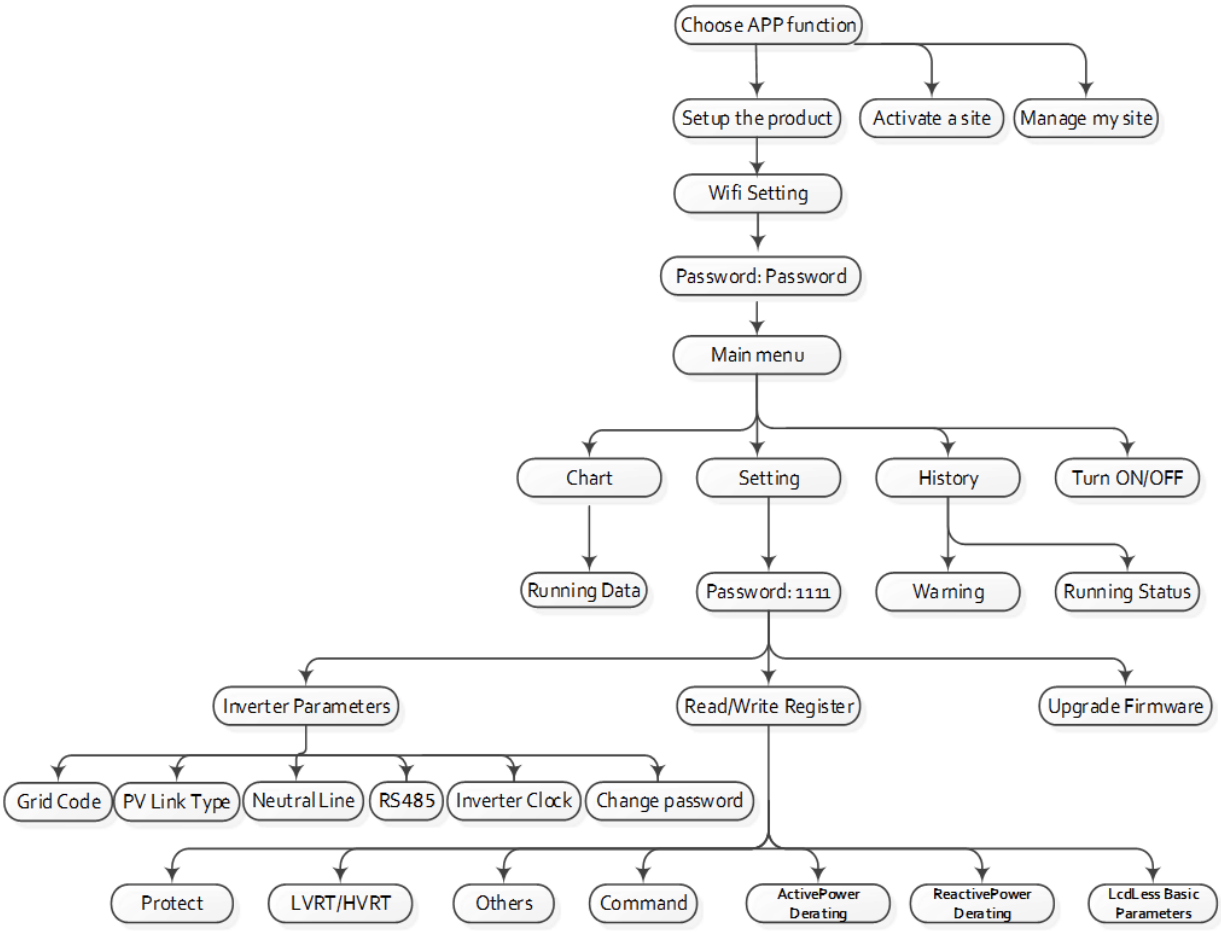
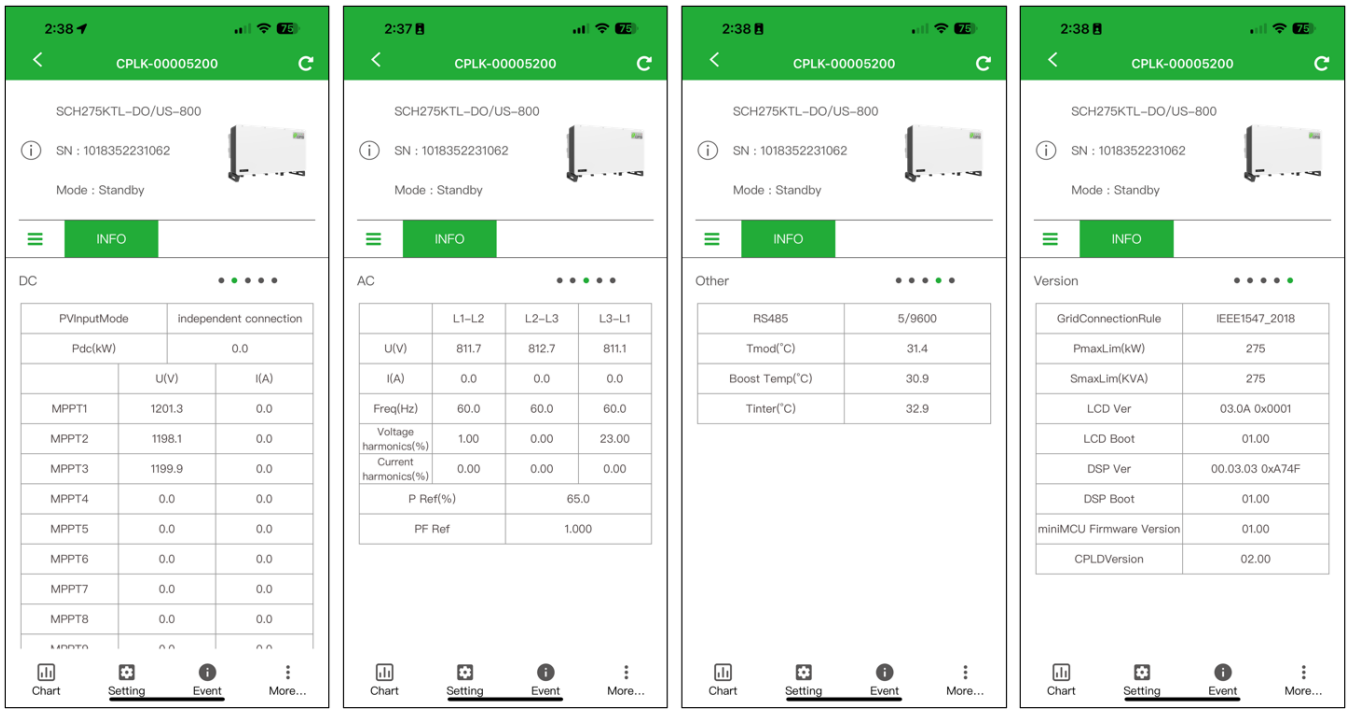


Figure 6-1 Structure Tree of App Interface

6.4 Main Menu

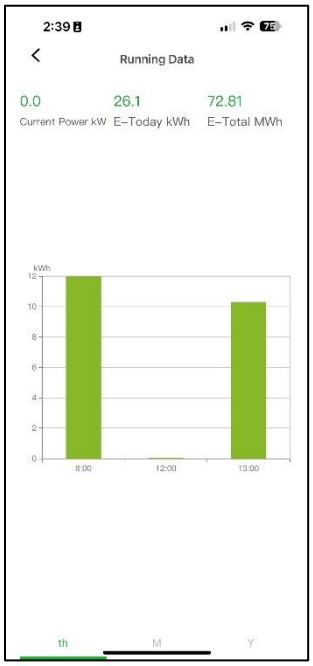
In the **Main Menu** interface, you can access **DC**, **AC**, **Other**, and **Version** information:



Additionally, there are four submenus: **Chart**, **Setting**, **Event**, and **More**.

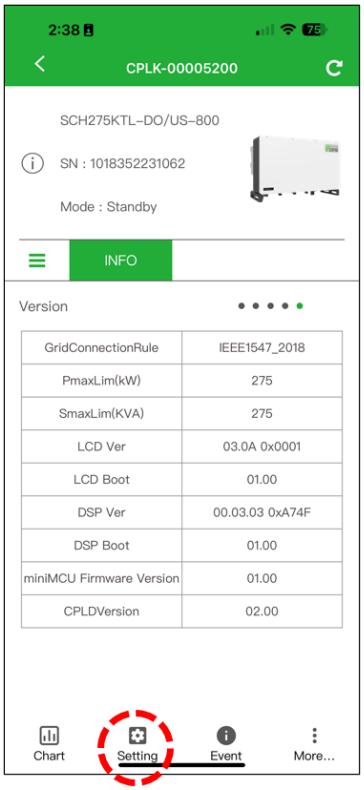
6.4.1 Chart

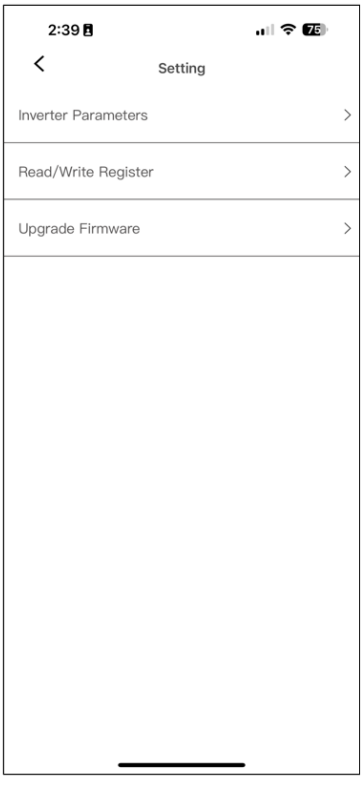
In the **Chart** submenu, you can view power generation at different times, such as Current, Today, and Total. This data can also be displayed by Day, Month, and Year.



6.4.2 Setting

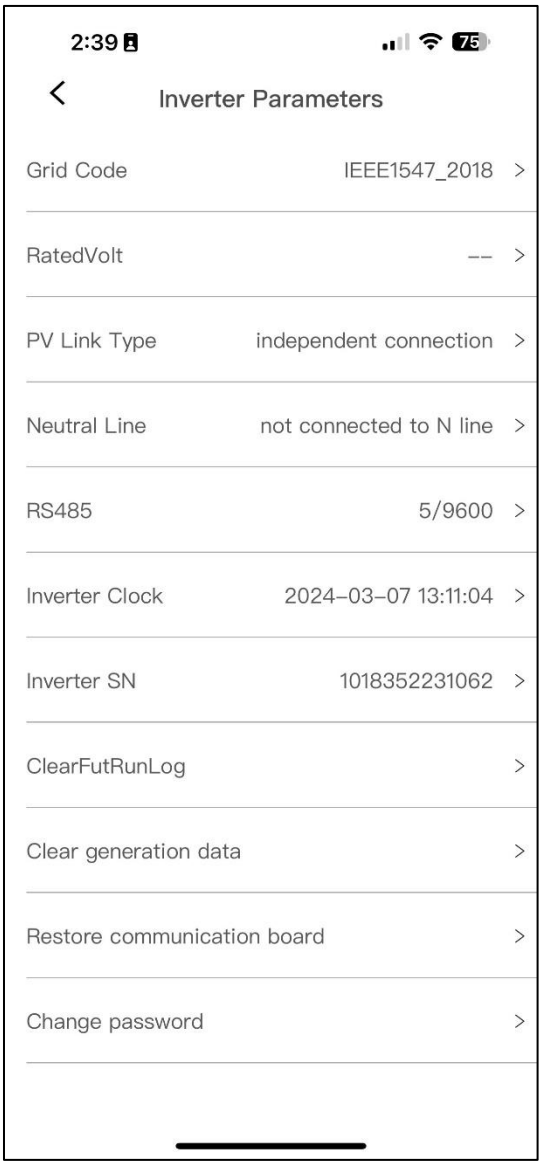
Tap the **Setting** icon and input the password “1111” to navigate to the setting interface. This interface has three submenus: Inverter Parameters, Read/Write Register, and Upgrade Firmware.





6.4.2.1 Inverter Parameters

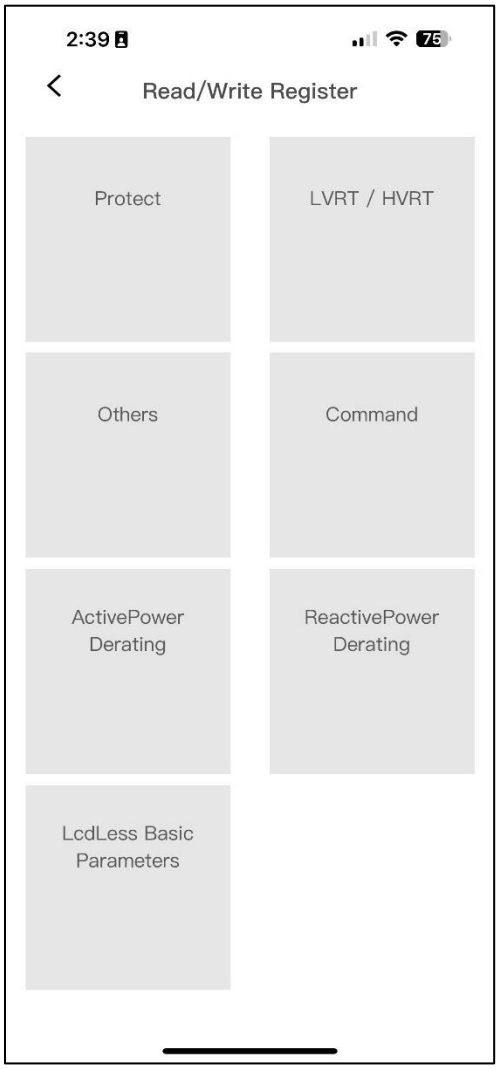
In the **Inverter Parameters** interface, you can set the following parameters as necessary:



6.4.2.2 Read/Write Register

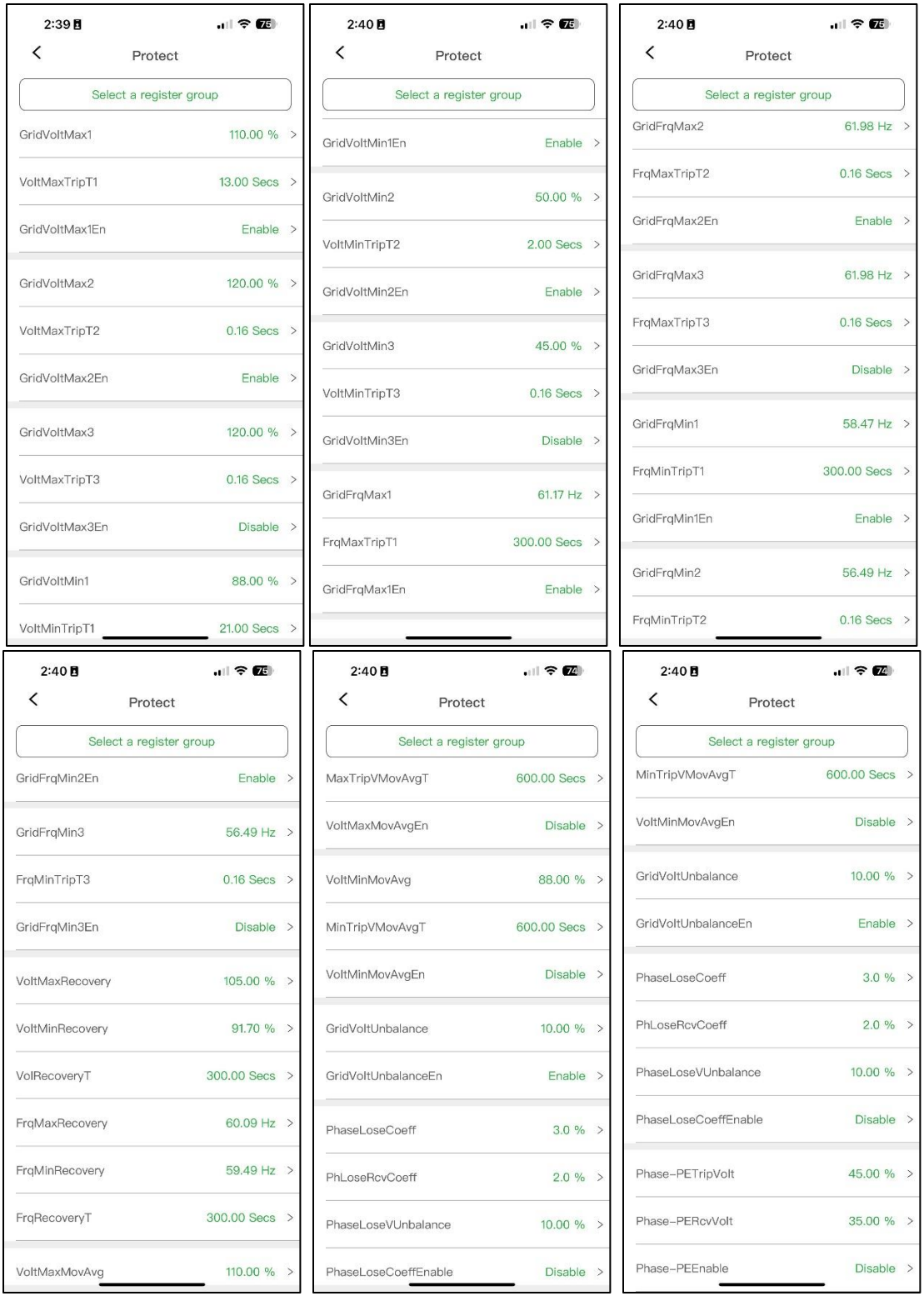
In the Read/Write Register interface, you can access the following submenus:

- Protect
- LVRT / HVRT
- Others
- Command
- ActivePowerDerating
- ReactivePowerDerating
- LcdLess Basic Parameters



6.4.2.3 Protect

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



In addition, the table listed below (Table 6-1) can provide detailed parameter information.

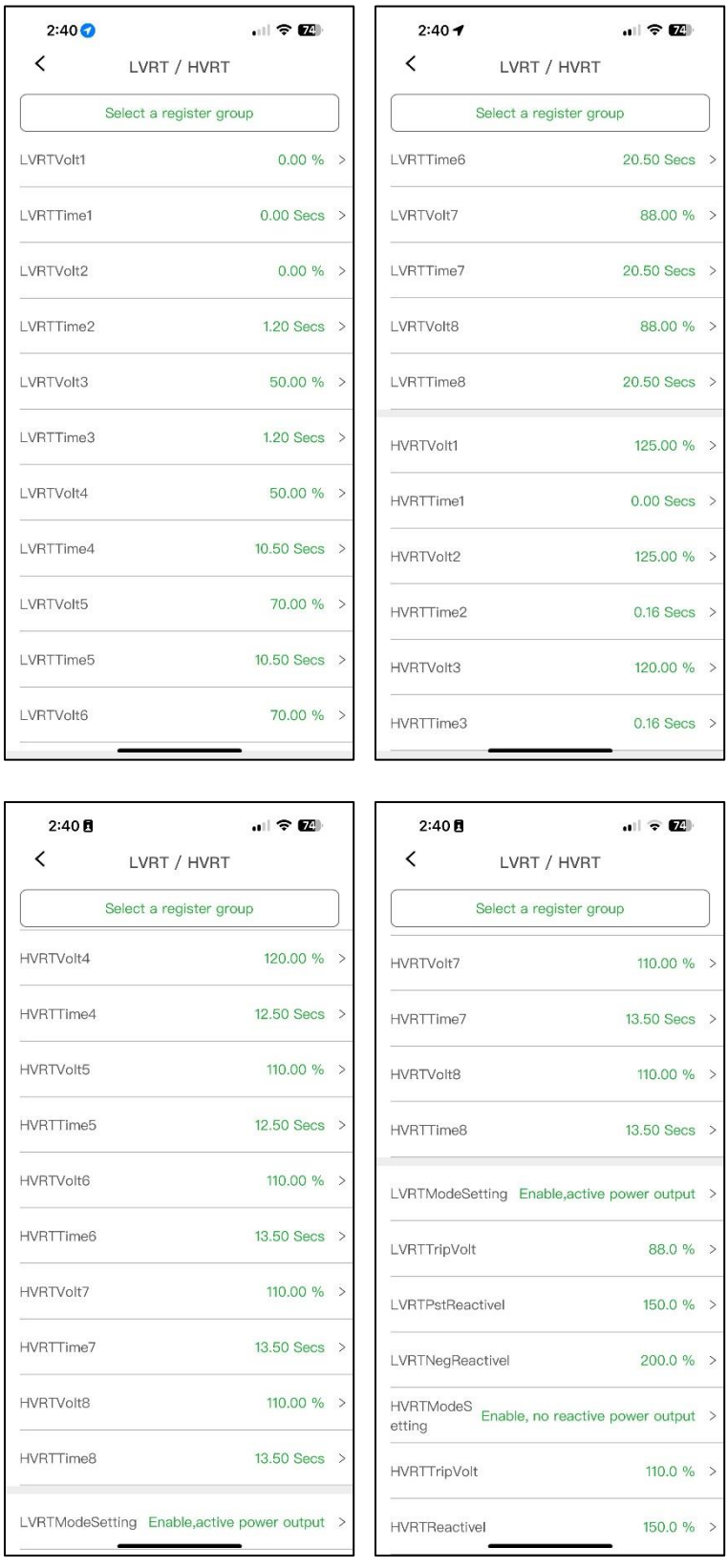
Table 6-1 Protection Parameters (IEEE 1547, Rule 21, ISO-NE)

Parameter Name	Description	Range	IEEE 1547	Rule 21	ISO-NE
Grid Over Voltage Protection					
GridVoltMax1 (%)	Level 1 max. grid voltage	{100.00%, 135.00%}	110.00%	110.00%	110.00%
VoltMaxTripT1 (S)	Level 1 max. grid trip voltage	{0, 655.35}	13.00	12.50	2
GridVoltMax1En	Level 1 max. grid voltage protection	{Disable, Enable}	Enable	Enable	Enable
GridVoltMax2 (%)	Level 2 max. grid voltage	{100.00%, 135.00%}	120.00%	120.00%	120.00%
VoltMaxTripT2 (S)	Level 2 max. grid trip voltage	{0, 655.35}	0.16	0.16	0.16
GridVoltMax2En	Level 2 max. grid voltage protection	{Disable, Enable}	Enable	Enable	Enable
GridVoltMax3 (%)	Level 3 max. grid voltage	{100.00%, 135.00%}	120.00%	120.00%	120.00%
VoltMaxTripT3 (S)	Level 3 max. grid trip voltage	{0, 655.35}	0.16	0.16	0.16
GridVoltMax3En	Level 3 max. grid voltage protection	{Disable, Enable}	Disable	Disable	Disable
Grid Low Voltage Protection					
GridVoltMin1 (%)	Level 1 min. grid voltage	{0.00%, 100.00%}	88.00%	88.00%	88.00%
VoltMinTripT1 (S)	Level 1 min. grid trip voltage	{0, 655.35}	2.0	20.50	2
GridVoltMin1En	Level 1 min. grid voltage protection	{Disable, Enable}	Enable	Enable	Enable
GridVoltMin2 (%)	Level 2 min. grid voltage	{30.00%, 100.00%}	50.00%	70.00%	50.00%
VoltMinTripT2 (S)	Level 2 min. grid trip voltage	{0, 655.35}	2.00	10.50	1.1
GridVoltMin2En	Level 2 min. grid voltage protection	{Disable, Enable}	Enable	Enable	Enable
GridVoltMin3 (%)	Level 3 min. grid voltage	{30.00%, 100.00%}	45.00%	50.00%	50.00%
VoltMinTripT3 (S)	Level 3 min. grid trip voltage	{0, 655.35}	0.16	1.50	0.16
GridVoltMin3En	Level 3 min. grid voltage protection	{Disable, Enable}	Disable	Disable	Disable
Grid Over Frequency Protection					
GridFrqMax1	Level 1 max. grid frequency	{60, 72}	61.19	60.49	61.19
FrqMaxTripT1 (S)	Level 1 max. grid trip frequency	{0, 1310}	300.00	599.00	299.50
GridFrqMax1En	Level 1 max. grid frequency protection	{Disable, Enable}	Enable	Enable	Enable
GridFrqMax2	Level 2 max. grid frequency	{60, 72}	61.99	61.99	61.99
FrqMaxTripT2 (S)	Level 2 max. grid trip frequency	{0, 1310}	0.16	0.32	0.16
GridFrqMax2En	Level 2 max. grid frequency protection	{Disable, Enable}	Enable	Enable	Enable
GridFrqMax3	Level 3 max. grid frequency	{60, 66}	61.99	61.99	61.99
FrqMaxTripT3 (S)	Level 3 max. grid trip frequency	{0, 1310}	0.16	0.32	0.16
GridFrqMax3En	Level 3 max. grid frequency protection	{Disable, Enable}	Disable	Disable	Disable
Grid Under Frequency Protection					
GridFrqMin1	Level 1 min. grid frequency	{48, 60}	58.49	58.49	58.49
FrqMinTripT1 (S)	Level 1 min. grid trip frequency	{0, 1310}	300.00	599.00	299.50
GridFrqMin1En	Level 1 min. grid frequency protection	{Disable, Enable}	Enable	Enable	Enable
GridFrqMin2	Level 2 min. grid frequency	{48, 60}	56.49	57	56.5
FrqMinTripT2 (S)	Level 2 min. grid trip frequency	{0, 1310}	0.16	0.32	0.16
GridFrqMin2En	Level 2 min. grid frequency protection	{Disable, Enable}	Enable	Enable	Enable
GridFrqMin3	Level 3 min. grid frequency	{48, 60}	56.49	57	56.5
FrqMinTripT3 (S)	Level 3 min. grid trip frequency	{0, 1310}	0.16	0.32	0.16
GridFrqMin3En	Level 3 min. grid frequency protection	{Disable, Enable}	Disable	Disable	Disable

Parameter Name	Description	Range	IEEE 1547	Rule 21	ISO-NE
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 (S)	Recovery time of grid voltage protection	{0, 655.35}	300.00	300.00	300.00
FrqMaxRecovery (Hz)	Recovery max. threshold grid frequency protection	{54, 72}	60.09	60.40	61.00
FrqMinRecovery (Hz)	Recovery min. threshold grid frequency protection	{48, 60}	59.49	58.60	58.80
FrqRecoveryT (S)	Recovery time of grid frequency protection	{0, 655.35}	300	600	300
Moving Average Parameters					
VoltMaxMovAvg	Threshold max. move average voltage	{100.00%, 135.00%}	110.00%	110.00%	110.00%
MaxTripVMovAvgT	Trip time of max. move average voltage	{0, 655.35}	600	600	600
VoltMaxMovAvgEn	Max. voltage move average enable	{Disable, Enable}	Disable	Disable	Disable
VoltMinMovAvg	Threshold min. move average voltage	{80.00%, 100.00%}	88.00%	87.99%	88.00%
MinTripMovAvgT	Trip time of min. move average voltage	{0, 655.35}	600	600	600
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%
PhLoseRcvCoeff	Phase lose protection recovery value	{0.5%, 30.0%}	2.0%	2.0%	2.0%
PhaseLoseVUnbalance	Phase lose voltage unbalance	{0.1%, 30.0%}	10.0%	10.0%	10.0%
PhaseLoseCoeffEnable	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

6.4.2.4 LVHRT/HVRT

The **LVRT/HVRT** interface is used to set the LVRT and HVRT parameters.



The LVRT curve and HVRT curve are pictured below in Figures 6-2 and 6-3, respectively:

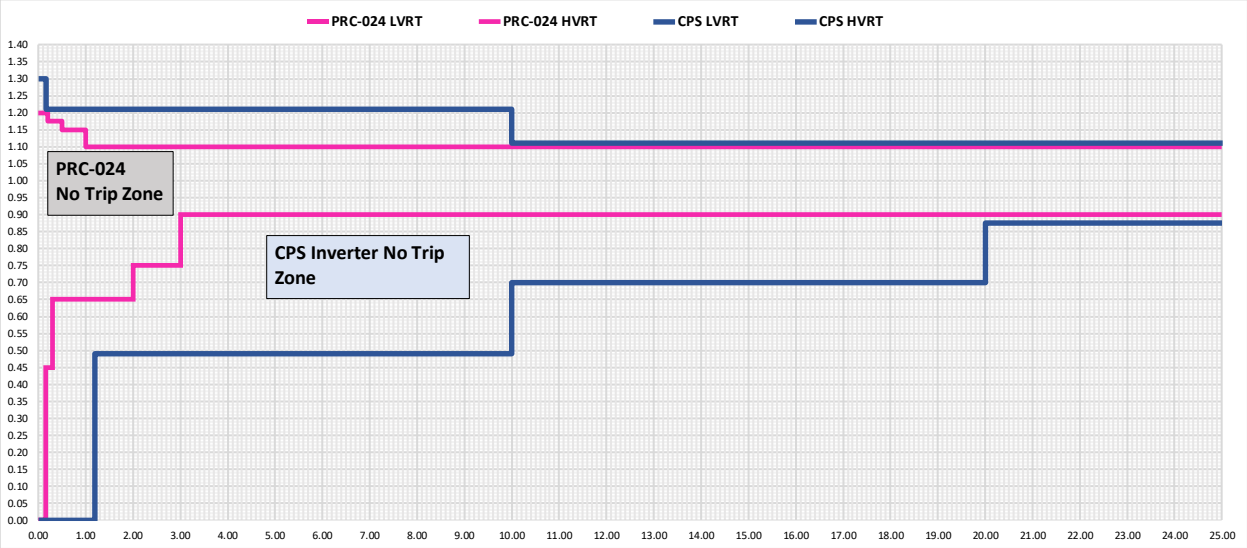


Figure 6-2 LVRT Curve

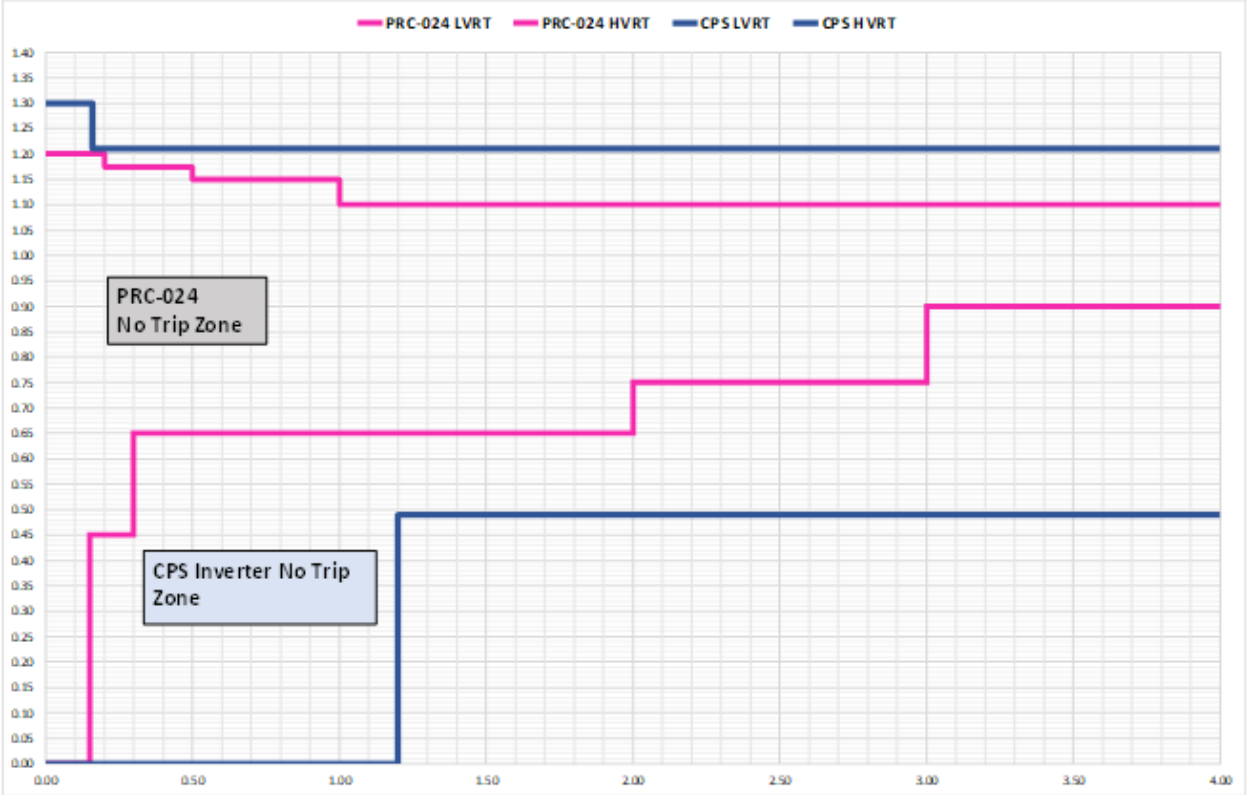


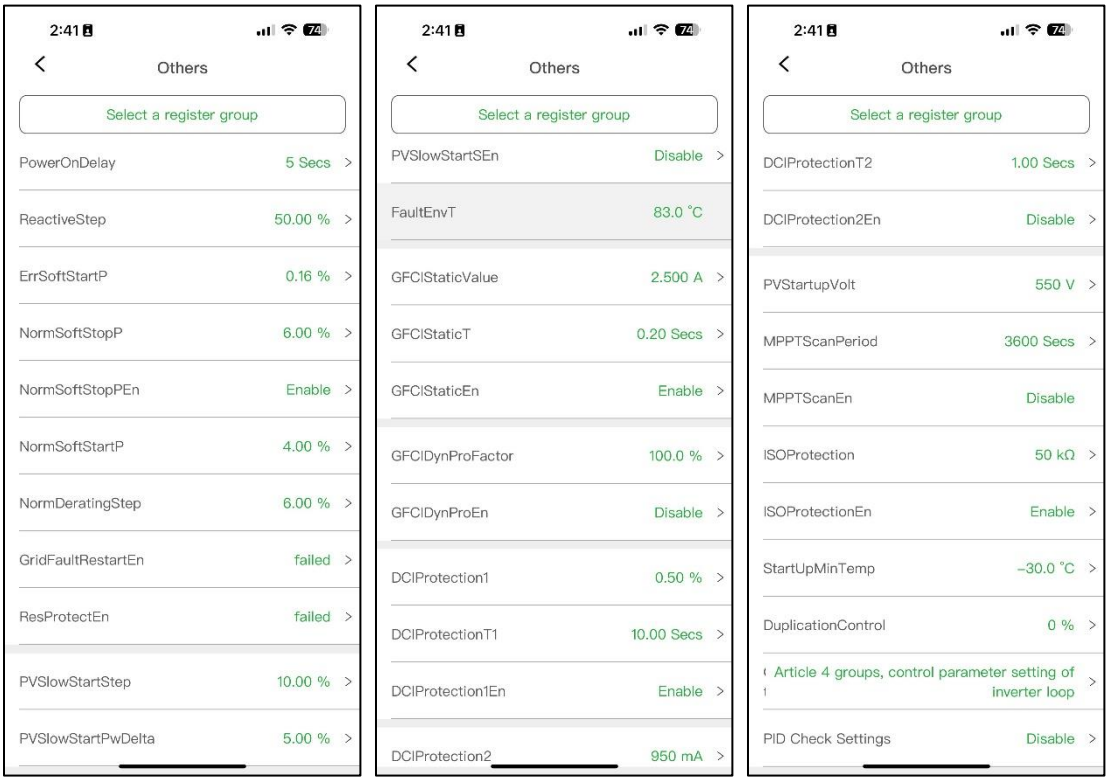
Figure 6-3 HVRT Curve

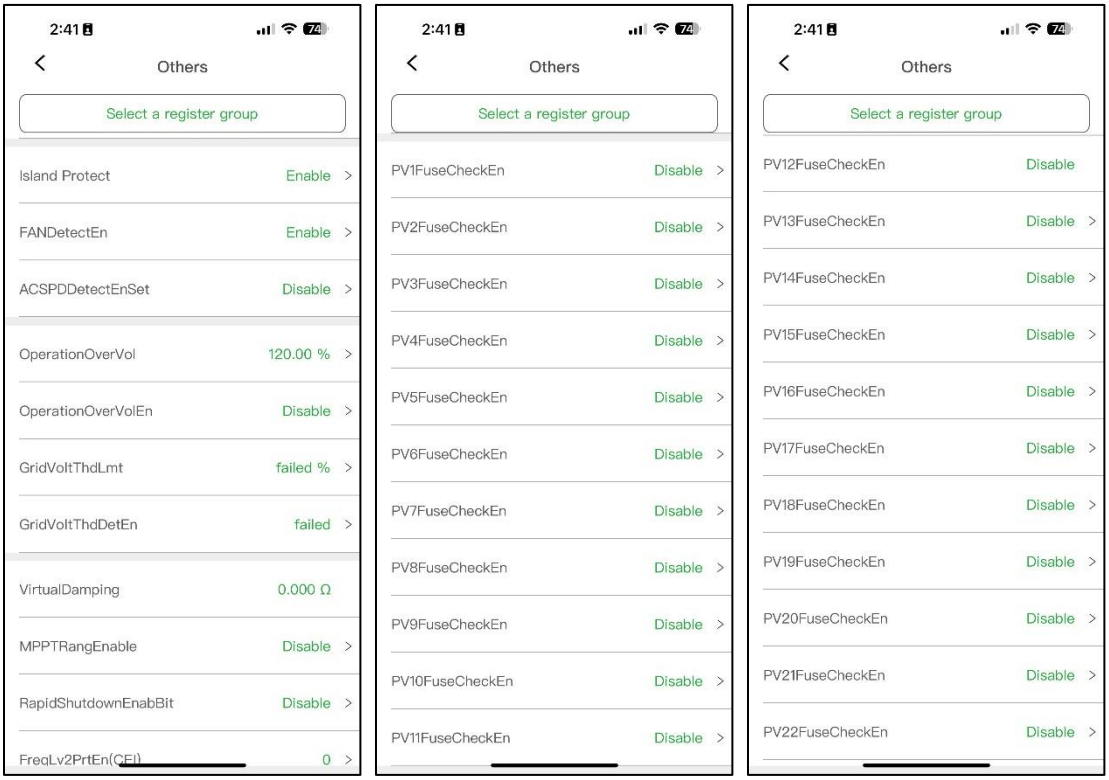
Table 6-2 LVRT and HVRT Parameters (IEEE 1547, Rule 21, ISO-NE)

Parameter Name	Description	Range	IEEE 1547	Rule 21	ISO-NE
LVRT					
LVRTVolt (1,2)	Threshold of LVRT (1st or 2nd point)	{0%, 100%} {0%, 100%}	{0%} {0%}	{0%} {0%}	{0%} {0%}
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}
LVRTVolt (3,4)	Threshold of 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}
LVRTVolt (5,6)	Threshold of 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}
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}
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 HVRT (1st or 2nd point)	{0, 655.35} {0, 655.35}	{0} {0.16}	{0} {0.11}	{0} {0.80}
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 HVRT (3rd or 4th point)	{0, 655.35} {0, 655.35}	{0.16} {12.50}	{0.11} {12.50}	{0.80} {12.50}
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 HVRT (5th or 6th point)	{0, 655.35} {0, 655.35}	{12.50} {13.50}	{12.50} {12.50}	{12.50} {12.50}
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 HVRT (7th or 8th point)	{0, 655.35} {0, 655.35}	{13.50} {13.50}	{12.50} {12.50}	{12.50} {12.50}
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%
LVRTPstReactiveI	Coefficient of LVRT positive current	{0%, 500%}	150%	150%	150%
LVRTNegReactiveI	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%

6.4.2.5 *Others*

In the Others interface, you can find common parameters as shown below:





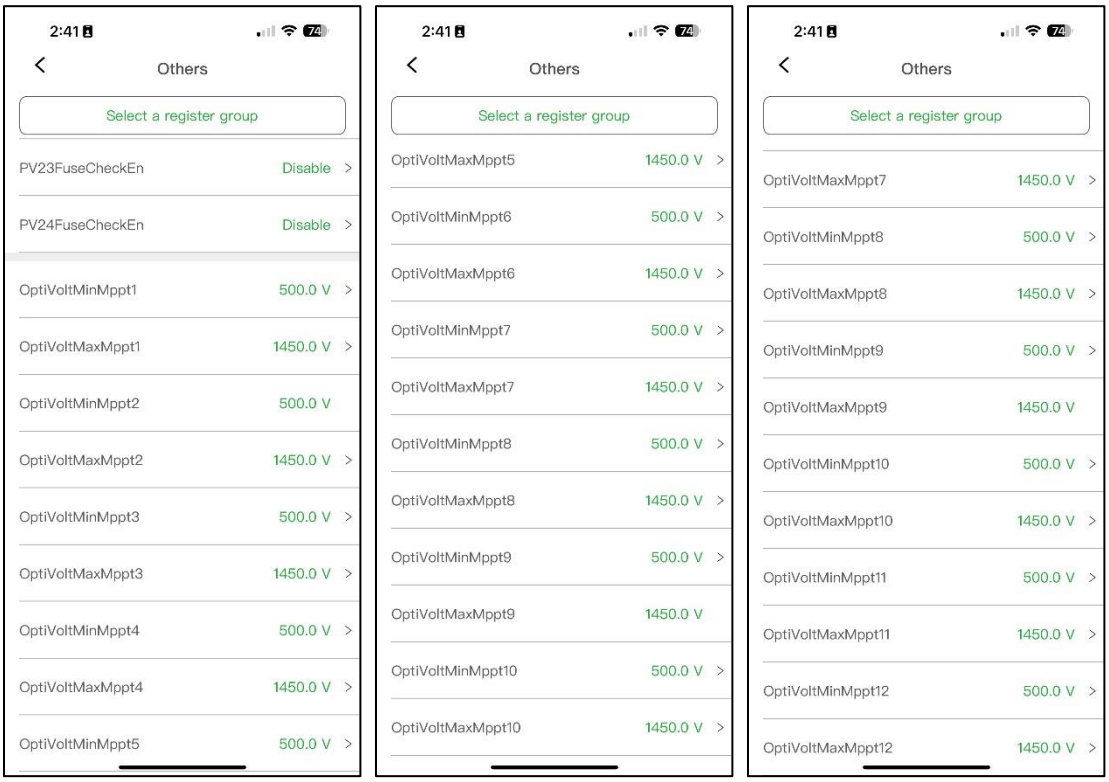
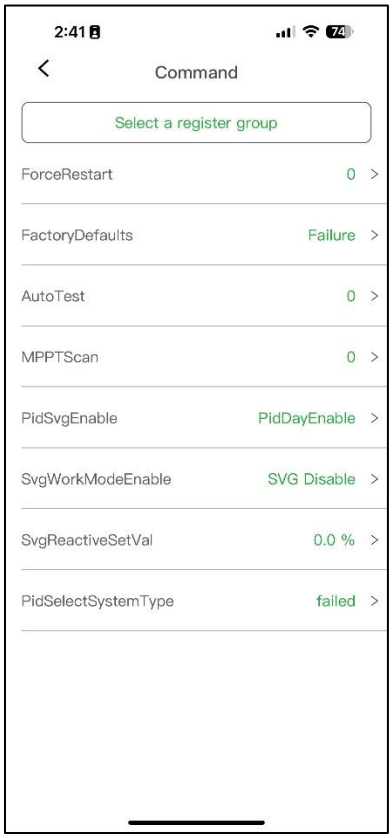

2:41
Others
Select a register group
PV23FuseCheckEn Disable
PV24FuseCheckEn Disable
OptiVoltMinMppt1 500.0 V
OptiVoltMaxMppt1 1450.0 V
OptiVoltMinMppt2 500.0 V
OptiVoltMaxMppt2 1450.0 V
OptiVoltMinMppt3 500.0 V
OptiVoltMaxMppt3 1450.0 V
OptiVoltMinMppt4 500.0 V
OptiVoltMaxMppt4 1450.0 V
OptiVoltMinMppt5 500.0 V
2:41
Others
Select a register group
OptiVoltMaxMppt5 1450.0 V
OptiVoltMinMppt6 500.0 V
OptiVoltMaxMppt6 1450.0 V
OptiVoltMinMppt7 500.0 V
OptiVoltMaxMppt7 1450.0 V
OptiVoltMinMppt8 500.0 V
OptiVoltMaxMppt8 1450.0 V
OptiVoltMinMppt9 500.0 V
OptiVoltMaxMppt9 1450.0 V
OptiVoltMinMppt10 500.0 V
OptiVoltMaxMppt10 1450.0 V
2:41
Others
Select a register group
OptiVoltMaxMppt7 1450.0 V
OptiVoltMinMppt8 500.0 V
OptiVoltMaxMppt8 1450.0 V
OptiVoltMinMppt9 500.0 V
OptiVoltMaxMppt9 1450.0 V
OptiVoltMinMppt10 500.0 V
OptiVoltMaxMppt10 1450.0 V
OptiVoltMinMppt11 500.0 V
OptiVoltMaxMppt11 1450.0 V
OptiVoltMinMppt12 500.0 V
OptiVoltMaxMppt12 1450.0 V

Table 6-3 Other Parameters

Parameter Name	Description	Range	IEEE 1547	Rule 21	ISO-NE
PowerOnDelay (s)	Startup delay time	{0, 1200}	5	5	5
ReactiveStep	Reactive power step	{0.01%, 655.35%}	50.00%	50.00%	50.00%
ErrSoftStartP	Power ramp after fault	{0.01%, 100%}	0.16%	2.00%	0.16%
NormSoftStopP	Normal stop power rate	{0.01%, 100%}	6.00%	10.00%	10.00%
NormSoftStopPEn	Normal stop power rate enable	{Disable, Enable}	Enable	Enable	Enable
NormSoftStartP	Normal start power rate	{0.01%, 100%}	4.00%	100.00%	2.00%
NormDeratingStep	Normal power derating step	{0.01%, 100%}	6.00%	100.00%	6.00%
GridFaultRestartEn	Grid fault restart enable setting	{Disable, Enable}	Enable	Enable	Enable
ResProtectEn	Resonant protection enable setting	{Disable, Enable}	Enable	Enable	Enable
PVSlowStartStep	PV slow start step	{0.01%, 10%}	10%	10%	10%
PVSlowStartPwDelta	PV slow start power slope	{0.01%, 100%}	5.00%	5.00%	5.00%
PVSlowStartSEn	PV slow start setting	{Disable, Enable}	Disable	Disable	Disable
FaultEnvT (°C)	Enclosure fault temperature	N/A	83.0	83.0	83.0
GFCIStaticValue (A)	Static threshold leakage current	{0.100, 5.000}	2.500	2.500	2.500
GFCIStaticT (s)	Static threshold leakage time	{0.01, 655.35}	0.20	0.20	0.20
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	Maximum DCI value 1	{0.1%, 5.00%}	0.50%	0.50%	0.50%
DCIProtectionT1 (s)	Trip time 1 of DCI value	{0.00, 120.00}	10.00	10.00	60.00
DCIProtection1En	Enable max. DCI value 1	{Disable, Enable}	Enable	Enable	Enable
DCIProtection2 (mA)	Maximum DCI value 2	{5, 5000}	950	950	950
DCIProtectionT2 (s)	Trip time 2 of DCI value	{0.00, 120.00}	1.00	1.00	1.00
DCIProtection2En	Enable max. DVI value 2	{Disable, Enable}	Disable	Disable	Disable
PVStartupVolt (V)	PV startup voltage	{500, 700}	550	550	550
MPPTScanPeriod (s)	MPPT scan cycle	{300, 5400}	3600	3600	3600
MPPTScanEn	Enable MPPT scan	{Disable, Enable}	Disable	Disable	Disable
ISOProtection (kΩ)	Minimum insulation resistance	{1, 2000}	50	50	50
ISOProtectionEn	Insulation detection	{Disable, Enable}	Enable	Enable	Enable
StartUpMinTemp (°C)	Minimum startup temperature	{-35, -20}	-30	-30	-30
DuplicationControl	Current replication THDi	{0%, 100%}	0%	0%	0%
CtrParaGroup	Control parameter setting of inverter loop	Article 1-5 groups	4	4	4

Parameter Name	Description	Range	IEEE 1547	Rule 21	ISO-NE
PID Check Settings	PID check setting	{Disable, Enable}	Disable	Disable	Disable
Island Protect	Anti-island protection	{Disable, Enable}	Enable	Enable	Enable
FANDetectEn	Fan 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%
OperationOverVolEn	Over voltage detection	{Disable, Enable}	Disable	Disable	Disable
GridVoltThdLmt	Grid voltage harmonic limiting	{0%, 15%}	10%	10%	10%
GridVoltThdDetEn	Enable detect grid volt harmonic limiting	N/A	N/A	N/A	N/A
VirtualDamping (Ω)	Virtual resistance	{0.00, 5.00}	0	0	0
MPPTRangEnable	Enable MPPT	{Disable, Enable}	Disable	Disable	Disable
RapidShutdownEnabBit	Rapid shutdown enable setting	{Disable, Enable}	Disable	Disable	Disable
FreqLv2PrtEn (CEI)	0x5555: Enable 0x7777: Disable	N/A	N/A	N/A	N/A
PVxFuseCheckEn (xx = 1…24)	PV fuse detection enable setting	{Disable, Enable}	Enable	Enable	Enable
OptiVoltMinMpptxx (V) (xx = 1…12)	Minimum voltage of MPPT optimizer	{500, 1450}	{500}	{500}	{500}
OptiVoltMaxMpptxx (V) (xx = 1…12)	Maximum voltage of MPPT optimizer	{500, 1450}	{1450}	{1450}	{1450}

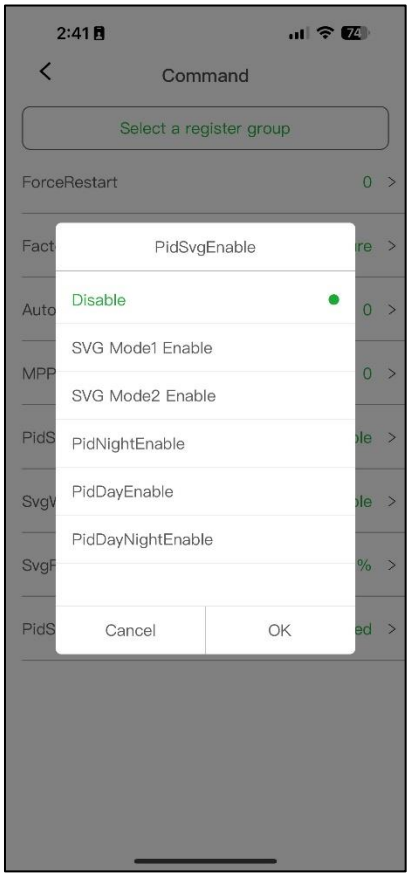
6.4.2.6 *Command*



In the **Command** section, you can access the following submenus:

- **Power On/Off**: Manual Turn ON/OFF is required after regulation setting or manual (fault) shutdown.
- **Force Restart**: If there is a fault shutdown, a severe fault may have occurred inside the inverter. The user can perform a force reboot in this menu if the inverter needs to be restarted.
- **Factory Reset**: The manufacturer's parameter default values can be restored when the inverter is not in operation mode. Otherwise, "Fault Operated" will be reported.
- **Auto Test**: for Italian grid standard only.
- **MPPTScan**: Used to manually execute MPPT scanning. The device screen will skip to the normal operation interface if the scanning fails.
    - The MPPT scan function is used for multi-MPP tracking and is useful if the PV panels are partly shadowed or installed at different angles.
    - The factory default setting of MPPTScan is **Enabled**, but it can also be set to **Disabled**.
    - When the MPPTScan function is enabled, the scan period is 60 minutes. The inverter will scan the maximum power point in the MPPT range if the total input is lower than 90% of the active power.
    - After the MPPTScan function is activated on the device, it will search the maximum power point at a voltage step of 5 V in the MPPT range for the full load and retrieve the maximum power point.

- **PID Mitigation Function (PidSvgEnable)**: The PidSvgEnable function can help reduce or eliminate PID effects that can occur with PV modules. PID modes can be set as Disable, PidNight Enable, or PidDay Enable. You can choose applicable function modes as required.
    - **Disable**: Disables the PID and Q at Night modes.
    - **SVG Mode 1 Enable**: Not yet available for use.
    - **SVG Mode 2 Enable**: Enables the Q at Night function (the SvgWorkMode on the interface shown below must first be enabled before enabling SVG Mode 2).
    - **PidNight Enable**: PidNight mode can be enabled to prevent and recover PID effects during the night.
    - **PidDay Enable**: PidDay mode can be enabled to reduce or eliminate PID effects in the daytime while PV modules are generating power.
    - **PidDayNightEnable**: Not yet available for use.



INSTRUCTION:

It is recommended that the start time is a slightly earlier than sunrise and the end time is slightly after sunset so the inverter can take full advantage of sunshine to output power. PID and SVG modes cannot be enabled at the same time.

6.4.2.7 *ActivePowerDerating*

The **ActivePowerDerating** interface is used to set the active power derating parameters (shown in Table 6-4). To make static changes to these settings, either onsite or via the FlexOM Gateway Portal, the active power mode must be set to “Local Control.” The setting made in Remote Dispatch Mode will reset when the DC power cycles.

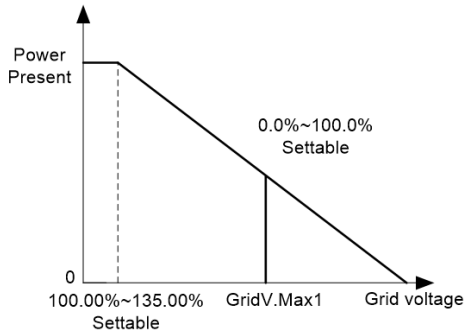


Figure 6-4 Curve of Over Voltage Derating

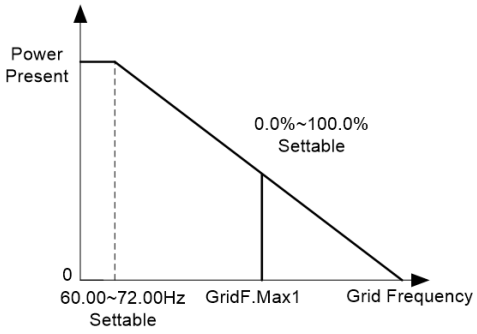


Figure 6-5 Curve of Over Frequency Derating

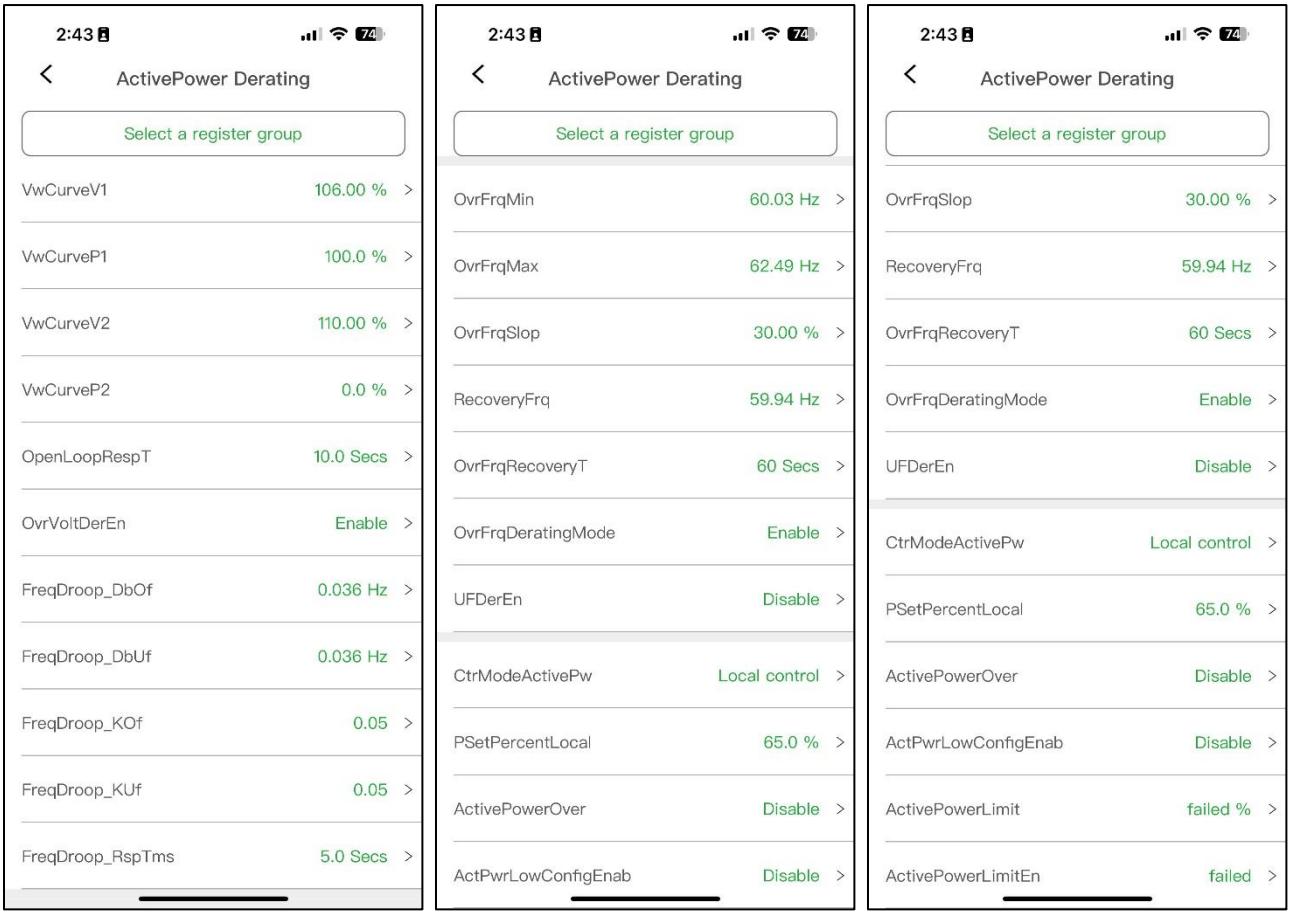
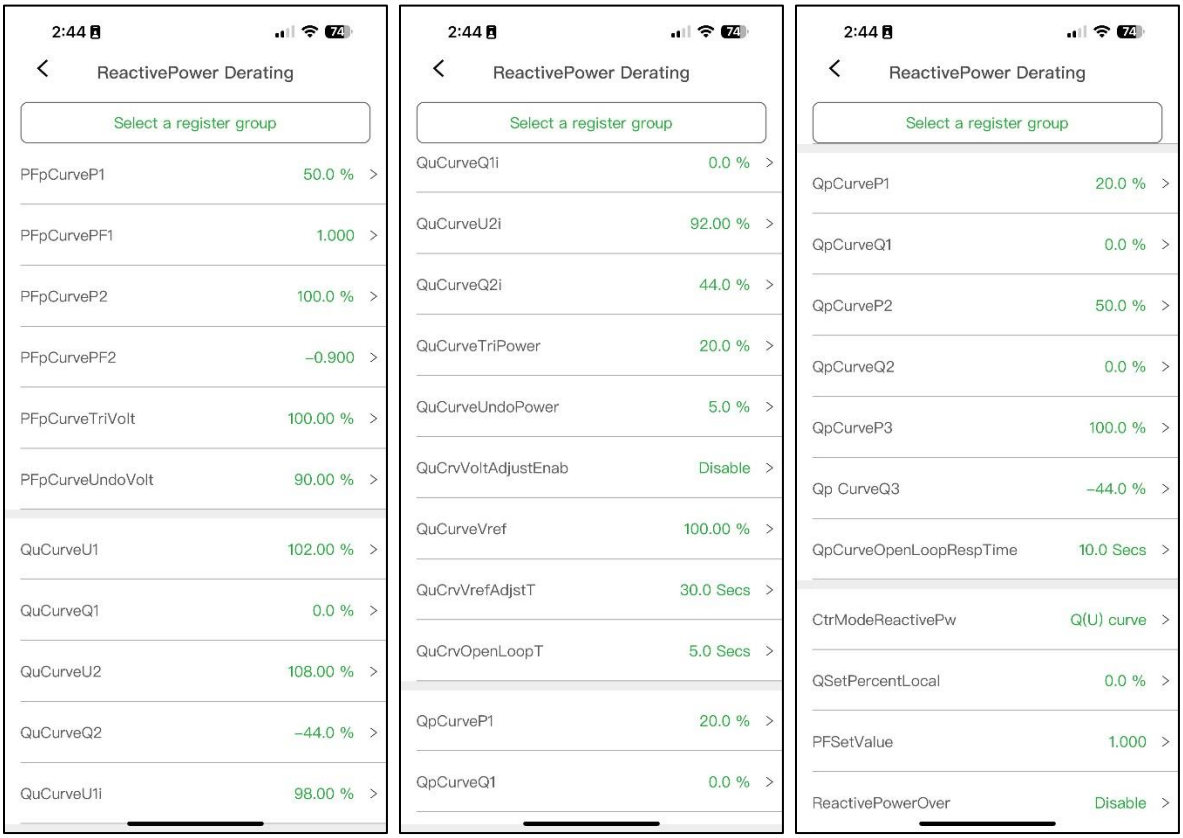


Table 6-4 Active Power Derating Setup

Parameter Name	Description	Range	IEEE 1547	Rule 21	ISO-NE
Over Voltage Derate					
VwCurveV1	Grid Volt of VwCurve point V1	{100%, 110%}	106.00%	106.00%	106.00%
VwCurveP1	Power of VwCurve point P1	{0%, 110%}	100%	100%	100%
VwCurveV2	Grid Volt of VwCurve V2	{100%, 115%}	110.00%	110.00%	110.00%
VwCurveP2	Power of VwCurve P2	{0%, 110%}	0.0%	0.0%	0.0%
OpenLoopRespT (s)	Open loop response time	{0.5, 90.0}	10.0	10.0	10.0
OvrVoltDerEn	Over voltage derating enable	{Disable, Enable}	Enable	Enable	Enable
FreqDroop_DbOf (Hz)	The dead zone of over frequency active power regulation	{0.001, 2.000}	0.036	0.036	0.036
FreqDroop_DbUf (Hz)	The dead zone of underfrequency active power regulation	{0.001, 2.000}	0.036	0.036	0.036
FreqDroop_KOf	Coefficient of over frequency active power regulation	{0.01, 0.10}	0.05	0.05	0.05
FreqDroop_KUf	Coefficient of underfrequency active power regulation	{0.01, 0.10}	0.05	0.05	0.05
FreqDroop_RspTms (s)	Response time of frequency active regulation	{0.1, 900.0}	5.0	5.0	5.0
Over Frequency Derate					
OvrFrqMin (Hz)	Trigger frequency of over frequency derating	{60, 72}	60.03	60.03	60.49
OvrFrqMax (Hz)	End frequency of over frequency derating	{60, 72}	62.51	62.03	61.39
OvrFrqSlop	Rate of over frequency derating	{0.01, 100}	30%	30%	0.16%
RecoveryFrq (Hz)	Recovery frequency of over frequency derating	{58.8, 66}	59.95	59.96	60.00
OvrFrqRecoveryT (s)	Recovery time of over frequency derating	{0, 1200}	60	60	60
OvrFrqDeratingMode	Over frequency derating mode	{Disable, Enable}	Enable	Enable	Enable
UFDerEn	Under frequency derating mode	{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%
ActivePowerOver	Active overpower enable setting	{0.0, 1.0}	0.0	0.0	0.0
ActPwrLowConfigEnab	250 kW active power mode	{Disable, Enable}	Disable	Disable	Disable
ActivePowerLimit	Active power limit	{0%, 110%}	N/A	N/A	N/A
ActivePowerLimitEn	Active power limit enable	N/A	N/A	N/A	N/A

6.4.2.8 ReactivePowerDerating

The **ReactivePowerDerating** interface is used to set the grid reactive power derating parameters (shown in Table 6-5). These functions are enabled according to the mode selected. The Remote Dispatch Mode is used when a site controller is actively setting or changing reactive mode parameters. Any setting changes made in Remote Dispatch Mode will reset to the factory default settings when the DC power cycles.



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

PF(P) Curve: PF curve mode. The power factor changes according to the power change (see Figure 6-6).

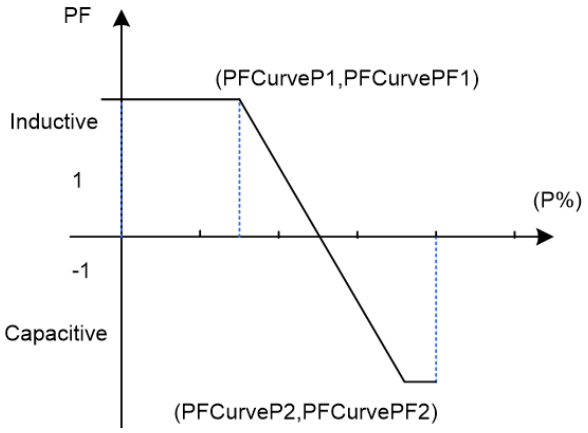


Figure 6-6 PF(P) Curve Mode

Q(U) Curve: Q(U) curve mode. The reactive compensation changes according to the grid voltage change (see Figure 6-7).

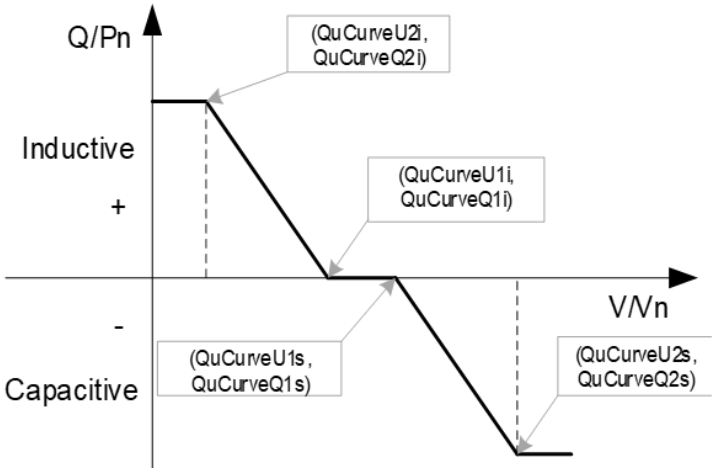


Figure 6-7 Q(U) Curve Mode

Q(P) Curve: Q(P) curve mode. The reactive compensation changes according to the active power change (see Figure 6-8).

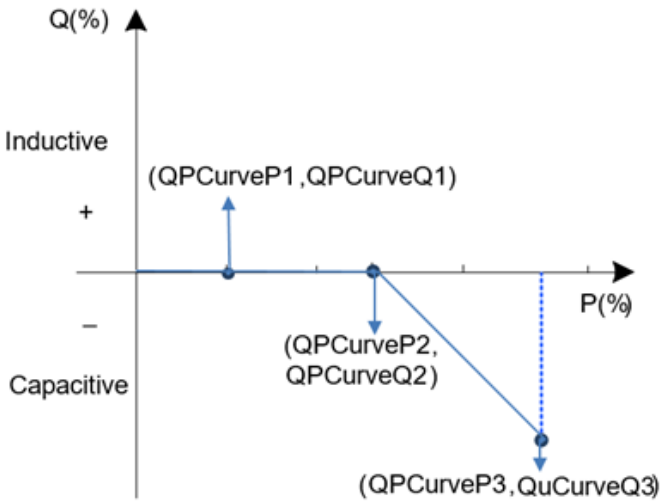


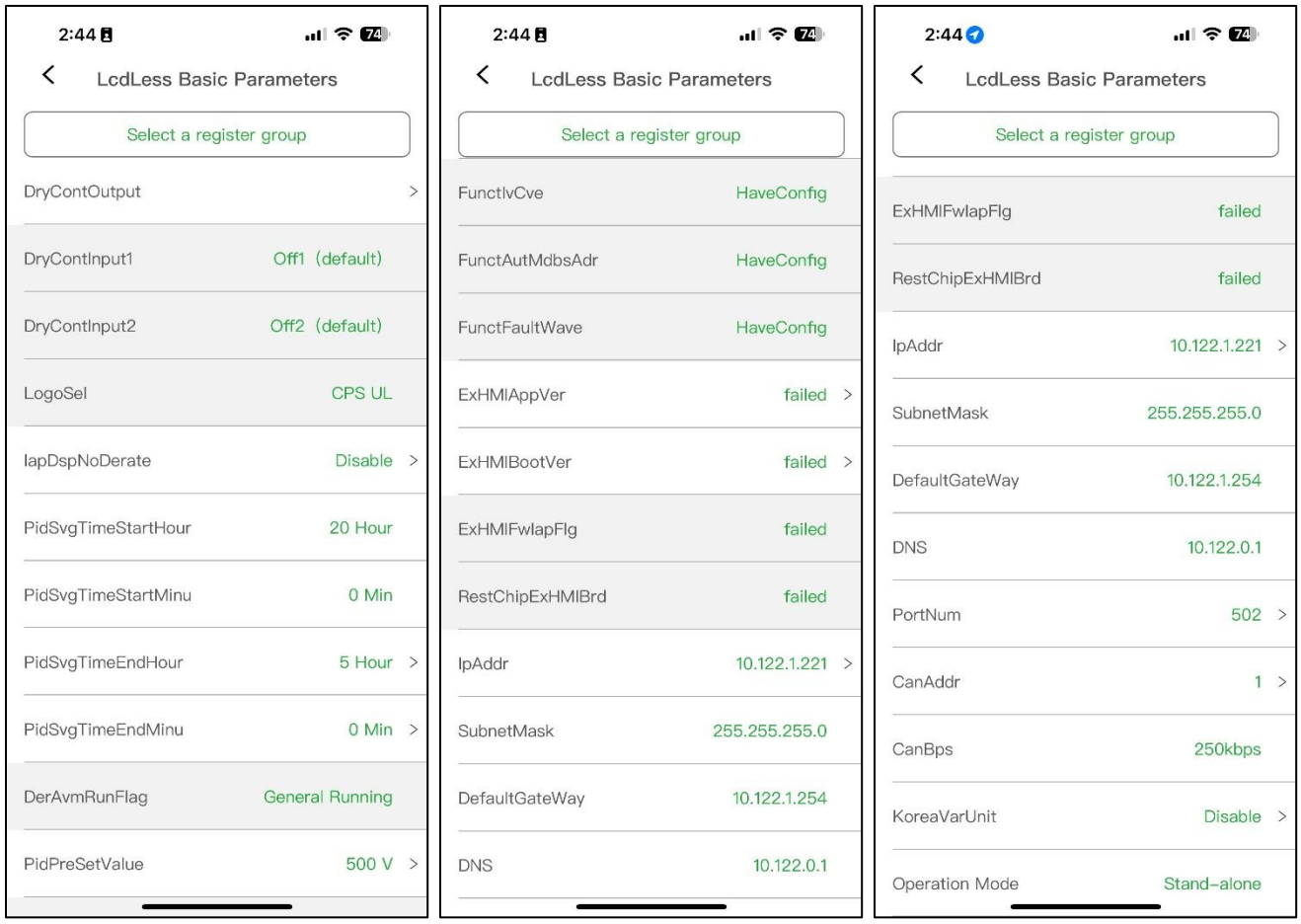
Figure 6-8 Q(P) Curve Mode

Table 6-5 Parameters of Reactive Power Control (IEEE-1547, Rule 21, ISO-NE)

Grid Reactive Power Derating					
Parameter Name	**Description**	**Range**	**IEEE 1547**	**Rule 21**	**ISO-NE**
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
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
PFpCurveTriVolt	Trigger voltage of PF(P)	{100%, 110%}	100%	100%	100%
PFpCurveUndoVolt	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	Trigger voltage of Q(U)	{5%, 100%}	20%	20%	20%
QuCurveUndoPower	The undo power of Q(U)	{5%, 100%}	5%	5%	5%
QuCrvVoltAdjustEnab	The rated reference voltage enable 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 (s)	The rated reference voltage regulation time of Q(U) curve	{0, 655.35}	30.0	30.0	30.0
QuCrvOpenLoopT (s)	Open loop response time of Q(U) curve	{0.1, 900.0}	5.0	5.0	5.0
Q(P) Dynamic VAR Support					
QpCurveP1	Active power of Q(P) Curve point 1	{0, 110%}	20.0%	20.0%	20.0%
QpCurveQ1	Reactive power of Q(P) Curve point 1	{-66%, 66%}	0.0%	0.0%	0.0%
QpCurveP2	Active power of Q(P) Curve point 2	{0, 110%}	50.0%	50.0%	50.0%
QpCurveQ2	Reactive power of Q(P) Curve point 2	{-66%, 66%}	0.0%	0.0%	0.0%
QpCurveP3	Active power of Q(P) Curve point 3	{0, 110%}	100.0%	100.0%	100.0%
QpCurveQ3	Reactive power of Q(P) Curve point 3	{-66%, 66%}	-44%	-44%	-44%
QpCurveOpenLoopRespTime	Open loop response time in seconds	{0.0, 900.0}	10	10	10
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
ReactivePowerOver	Reactive power over matching	N/A	Disable	Disable	Enable

6.4.2.9 *LcdLess Basic Parameters*

The **LcdLess Basic Parameters** interface is used to set the following parameters:



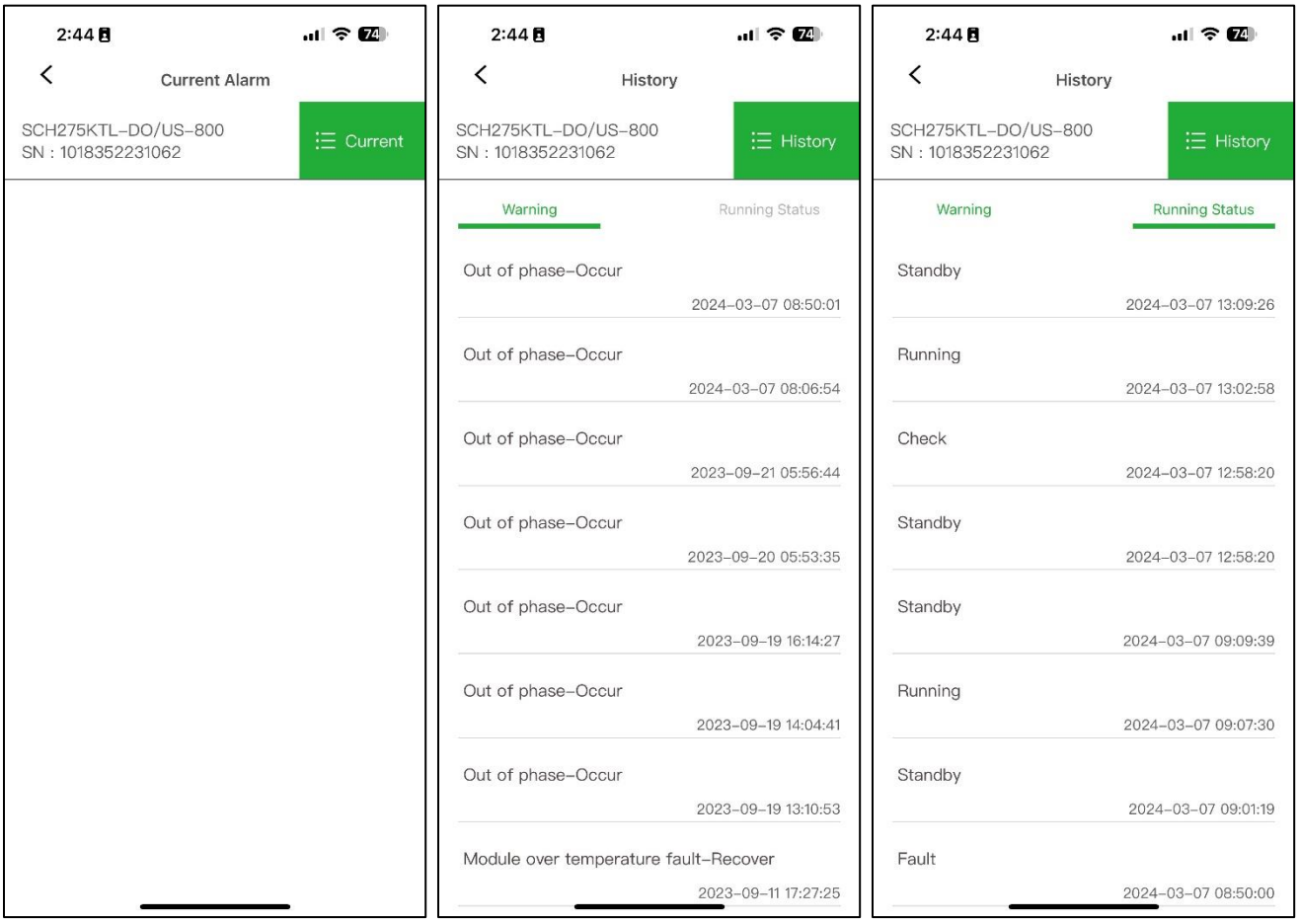
The last three are configured as standard (i.e., the inverter supports IV curve function, automatic MdbsAdr assignment function, and the fault recording function). However, almost all these parameters are read-only, thus you cannot change them. For more information, contact CPS Customer Service.

6.4.2.10 *Firmware Upgrade*

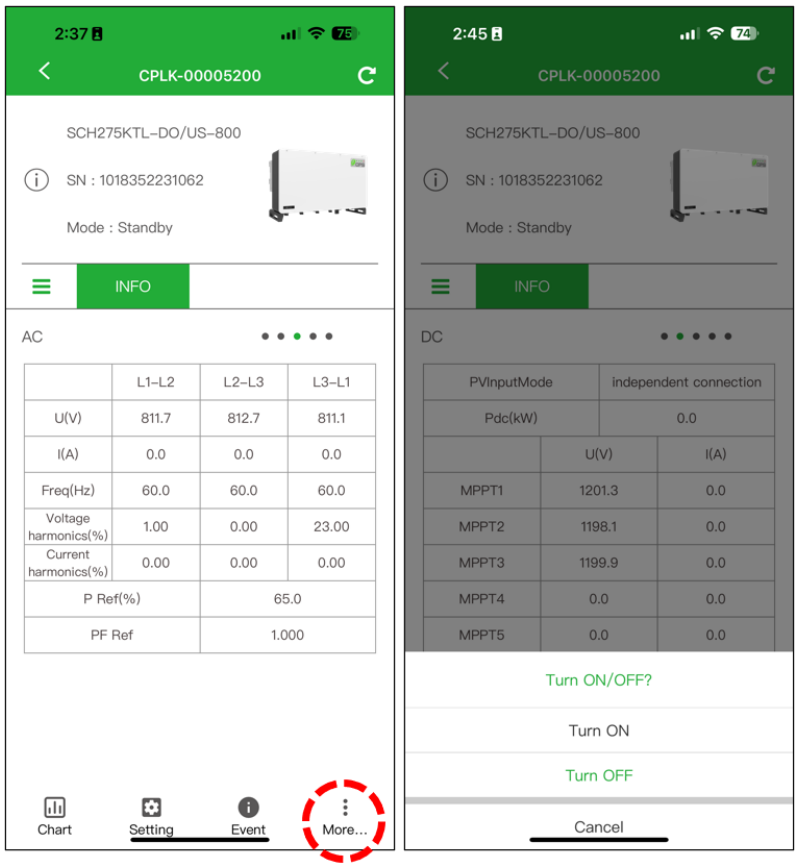
If the inverter firmware version needs to be updated, please contact the CPS Service Hotline at +1 (855) 584-7168, Ext. 1.

6.4.3 History

There are two submenus in the **History** menu, **Warning** and **Running Status**:



6.4.4 More (Turn ON/OFF)



- **Manual Turn ON/OFF**: Required after regulation setting or manual (fault) shutdown.
  - To manually turn on the inverter:
    1. Tap the **More** icon at the bottom of the screen.
    2. Select **Turn ON** to start the inverter.
       a. If the startup condition is met, the inverter will turn on and operate normally.
       b. Otherwise, the inverter will go into standby mode.
  - It is not normally necessary to manually turn off the inverter, but it can be shut down manually if regulation setting or maintenance is required. To manually turn off the inverter:
    1. Tap the **TURN ON/OFF** icon at the bottom of the screen.
    2. Select **Turn OFF** to shut down the inverter.
- **Automatic Turn ON/OFF**:
  - The inverter will start up automatically when the output voltage and power of the PV arrays meet the set value, the AC power grid is normal, and the ambient temperature is within the allowable operating range.
  - The inverter will shut down automatically when the output voltage and power of the PV modules are lower than the set value, the AC power grid fails, or the ambient temperature exceeds the normal range.

7 Troubleshooting

7.1 LED Indicator Troubleshooting

The LED display of the inverter is shown as follows:

Table 7-1 Description of LED Light Indicators

LED Light	Name	Status	Indication
POWER	Working power light	Light on	PV energized (control panel starts to work)
		Light off	No power working
RUN	Grid-tied operation indication light	Light on	In grid-tied power generation state
		Flashing	Derated running status (light on for 0.5 seconds, light off for 1.5 seconds)
		Light off	In other operation status OR power supply not working
GRID	Grid status indication light	Light on	Grid is normal
		Flashing	Grid fault (light on for 0.5 seconds, light off for 1.5 seconds)
		Light off	Power supply not working
FAULT	Fault status indication light	Light on	Indicates a fault
		Slow flash	Indicates an alarm (light on for 0.5 seconds, light off for 2 seconds)
		Fast flash	Protective action (light on for 0.5 seconds, light off for 0.5 seconds)
		Light off	No fault OR power supply not working
ALL	Upgrade status	Flashing	LCD or DSP upgrading

Table 7-2 Troubleshooting LED Lights

LED Fault Status	Solutions
Neither the **POWER** LED nor the LCD screen lights up.	1. Turn OFF the external AC breaker. 2. Turn OFF the DC switch. 3. Check the PV input voltage and polarity.
The **GRID** LED is blinking.	1. Turn OFF the external AC breaker. 2. Turn OFF the DC switch. 3. Determine whether the grid voltage is normal and whether the cable connection of the AC side is correct and secure.
The **RUN** LED light is off OR the **FAULT** LED light is on.	See Table 7-3 for troubleshooting.

7.2 Fault and Troubleshooting

DANGER:

Disconnect the inverter from the AC grid and PV modules and ensure that hazardous high voltage and energy inside the equipment has been discharged *before* opening the equipment. Do not operate or maintain the inverter until at least five minutes after disconnecting all sources of DC and AC.

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

The causes of a fault can be identified based on the faults listed in Table 7-3 through Table 7-6. Proper analysis is recommended before contacting CPS Customer Service.

Table 7-3 Troubleshooting Alarm Codes

ALARM CODES	
CommErr	**Definition**: Communication inside the inverter failed.
	Possible cause: Terminal block connectors of the internal communication wires have poor contact.
	Recommended solution: 1. Observe for five minutes to determine if the alarm will be eliminated automatically. 2. Turn OFF the 3-phase working power supply and reboot the system. 3. Contact CPS customer service.
ExtFanErr	**Definition**: Cooling fan failure by visual check.
	Possible causes: ▪ Fan is blocked. ▪ Fan service life has expired. ▪ Fan socket connector has poor contact.
	Recommended solution: 1. Observe for five minutes to determine if the alarm will be eliminated automatically. 2. Check for foreign objects on the fan blades. 3. Turn OFF the 3-phase power supply and reboot the system. 4. Contact CPS customer service.
IntFanErr	**Recommended solution**: 1. Observe for five minutes to determine if the alarm will be eliminated automatically. 2. Check for foreign objects on the fan blades. 3. Turn OFF the 3-phase power supply and reboot the system. 4. Contact CPS customer service.

Table 7-4 Troubleshooting Warning Codes

WARNING CODES	
Warn0030 (EepromErr)	**Definition**: internal alarm.
	Recommended solution: 1. Observe for five minutes to determine if the alarm will be eliminated automatically. 2. Contact CPS customer service.
Warn0040 (DC SPD fault)	**Recommended solution**: The alarm is reserved now; alarms in field can be ignored.
Warn0050 (TempSensorErr)	**Recommended solution**: 1. Observe the temperature display. 2. Turn OFF the 3-phase power supply and reboot the system. 3. Contact CPS customer service.
Warn0100 (AC SPD fault)	**Recommended solution**: The alarm is reserved now; alarms in field can be ignored.

Table 7-5 Troubleshooting Protection Codes

PROTECTION CODES	
Code	**Recommended Solution**
Protect0090 (bus over voltage)	1. Restart the inverter by power cycling both AC and DC switches. 2. Wait for one minute between OFF and ON for all energy to discharge. 3. If the inverter cannot clear the fault, replace the inverter.
Protect0030 (inverter over current)	
Protect0020 (grid relay error)	
Protect0150 (mini MCU fault)	
Protect0110 (bus over voltage (FW))	
Protect0100 (sensor fault of leakage current)	
Protect0230 (inverter open-loop self-test fault)	
Protect0070 (bus imbalance)	1. Raise the limit of DCImax (e.g., 400 mA) to allow the inverter more room to adjust in transient condition to cope with imbalance impedance and voltage between grid phases. 2. If the alarm still occurs after the adjustment, replace the inverter.
Protect 0170 (DCI high)	

PROTECTION CODES	
Code	**Recommended Solution**
GridV.OutLim	1. Ensure the grid connection is good. 2. Restart the inverter again.
GridF.OutLim	1. Check the AC wires' connection. 2. Check if the AC frequency is in range. 3. Check the measurement value in LCD; if the grid frequency is in limit, restart the inverter.
TempOver (over-temperature protection)	1. Confirm that the external ambient temperature is within the specified operating range. 2. Check if the air inlet is blocked. 3. Check if the fan is blocked. 4. Check if the location of installation is appropriate. 5. Observe for 30 minutes to see whether the alarm will be eliminated automatically. 6. Contact CPS customer service.
Protect0180 (sampling offset of DCI)	1. If the inverter can start up, recalibrate. 2. If the inverter consistently reports this alarm and cannot start up, replace the inverter.
IsolationErr (insulation resistance low)	1. Turn OFF the AC switch to disconnect the inverter from the grid. 2. Open the fuse drawers to de-couple the PV strings from each other. 3. Test strings with a string test set. 4. If there is no alarm, turn OFF the AC switches to disconnect from the grid and add in the next string, then start up the inverter again. 5. Continue until you can locate the string that triggers the alarm. 6. Trace the wirings of the faulted string to find any leakage to earth ground.
GFCIErr (leakage current high)	Check the wires of the PV and ground: 1. Turn OFF the AC switch to disconnect the inverter from the grid. 2. Open the fuse drawers to de-couple the PV strings from each other. 3. Test strings with a string test set. 4. If there is no alarm, turn OFF the AC switches to disconnect from the grid and add in the next string, then start up the inverter again. 5. Continue until you can locate the string that triggers the alarm. 6. Trace the wirings of the faulted string to find any leakage to earth ground.
Reverse PVx electrode (x=1, 2…36/24/18)	1. Turn the DC switch OFF. 2. Open the fuse holder to isolate the PV strings. 3. Use a meter to locate which PV string is connected in reverse polarity. 4. Correct the PV string connection. 5. Contact CPS customer service.
High PVx input voltage (x=1, 2…36/24/18)	1. Check PV input current is within 1100 V. 2. Restart the inverter by power cycling both AC and DC switches. 3. Wait for one minute between OFF and ON for all energy to discharge. 4. If the inverter cannot clear the fault, contact CPS customer service.

PROTECTION CODES	
Code	**Recommended Solution**
PVVoltOver	1. Measure the voltage at the DC terminals in the wire box and compare with the reading in the Measurement menu. 2. PV voltage must be less than 1500 V in open circuit condition: a. If the display reading is not within 2% of the meter reading, replace the inverter. b. If the display reading is within 2% of the meter reading, adjust the number of panels in the string.

Table 7-6 Troubleshooting Fault Codes

FAULT CODES	
Code	**Recommended Solution**
Fault0130 (bus over total voltage)	1. Restart the inverter by power cycling both AC and DC switches. 2. Wait for one minute between OFF and ON for all energy to discharge. 3. If the inverter cannot clear the fault, replace the inverter.
Fault0100 (grid relay fault)	
Fault0060 (CPLD fault)	
Fault0020 (bus over volt hardware)	
Fault0150 (open-loop self-check failure)	
Fault0110 (bus imbalance)	1. Raise the limit of DCImax (e.g., 400 mA) to allow the inverter more room to adjust in transient condition to cope with imbalance impedance and voltage between grid phases. 2. If the alarm still occurs after the adjustment, replace the inverter.
Fault0090 (high static leakage current)	Check the wires of the PV and ground: 1. Turn OFF the AC switch to disconnect the inverter from the grid. 2. Open the fuse drawers to de-couple the PV strings from each other. 3. Test strings with a string test set. 4. If there is no alarm, turn OFF the AC switches to disconnect from the grid and add in the next string, then start up the inverter again. 5. Continue until you can locate the string that triggers the alarm. 6. Trace the wirings of the faulted string to find any leakage to earth ground.

8 Product Maintenance

8.1 General Maintenance

DANGER:

Before starting any product maintenance, check that the inverter is not running, the inverter is disconnected from the AC grid, and the inverter is disconnected from the PV modules. Ensure that hazardous high voltage and energy inside the equipment has been discharged.

Do not operate or maintain the inverter until at least five (5) minutes after disconnecting all sources from DC and AC sides.

Servicing of the inverter should be performed ONLY by qualified personnel.

8.1.1 Check Electrical Connections

- ✓ Check all cable connections as a regular maintenance inspection every six months or once per year.
- ✓ Check the cable connections and tighten if necessary per Section 4 Electrical Connection.
- ✓ Check for cable damage, especially whether the cable surface is scratched or smooth, and repair or replace cables if necessary.

8.1.2 Clean Air Vent Filter

The inverter can become hot during normal operation. The inverters use built-in cooling fans to provide sufficient air flow to help in heat dissipation. Check the air vent regularly to ensure it is not blacked; clean the vent with a soft brush or vacuum cleaner if necessary.

8.1.3 Replace Cooling Fans

If the internal temperature of the inverter is too high or the inverter is making an abnormal noise, check if the air vent is blocked or dirty. If the air vent is clean and not blocked, it may be necessary to replace the external fans; see Figure 8-1 for replacing the cooling fans.

DANGER:

Disconnect the AC and DC power *before* replacing the fans.

To replace the cooling fans:

1. Use a no. 2 Phillips head screwdriver to remove the eight (8) screws on the fan tray (Figure 8-1):

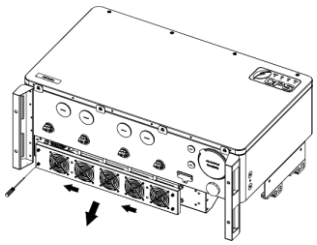


Figure 8-1 Remove Fan Tray and Fan

2. Disconnect the watertight cable connector from the cooling fan (Figure 8-2):

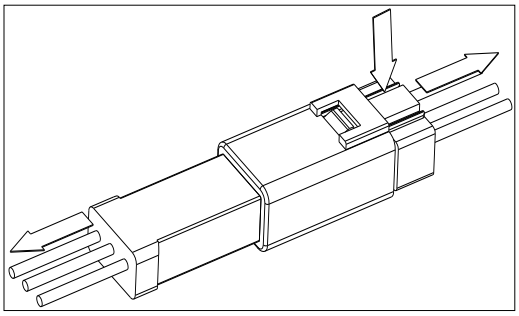


Figure 8-2 Disconnect Watertight Cable Connector

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

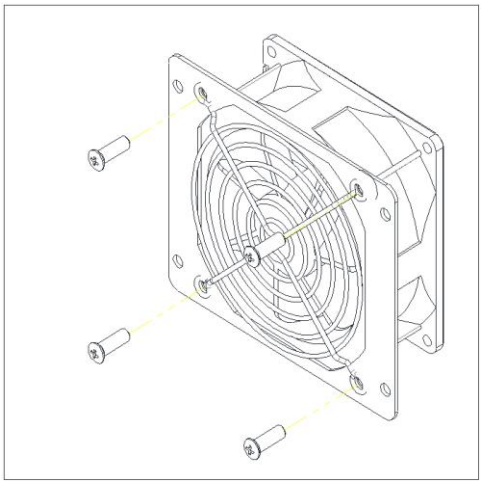


Figure 8-3 Replace Cooling Fans

4. Place the new cooling fans on the fan tray.
5. Fasten the cable on the fan tray with cable ties and torque to 12.4-15.9 in-lb (1.4-1.8 N·m).
6. Install the assembled fans back into the inverter and torque to 14.2 in-lb (1.6 N·m).

8.2 Replace the Inverter

INSTRUCTION:

Ensure the AC breaker and DC switch of the inverter are turned OFF.

To replace the inverter, reverse the installation steps outlined in Section 3.4:

1. Use a no. 3 Phillips head screwdriver to remove the two M6x90 screws.
2. Using at least four (4) people, remove the inverter from its mounting bracket.
3. Replace the new inverter on the mounting bracket and fasten it.

9 Technical Data

9.1 Datasheet

Model Name	CPS SCH275KTL-DO/US-800
DC Input	
Max. DC input voltage range	1500 V
Operating DC input voltage range	500-1450 V_{DC}
Startup DC input voltage / power	550 V_{DC} / 500 W
MPPT Voltage Range @ PF >0.99[1]	900-1300 V_{DC}
Number of MPP trackers	12
Max. PV input current (clipping point)	30 A per MPPT
Max. PV short-circuit current	600 A (50 A per MPPT)
Number of DC Inputs	36 fused inputs, 3 per MPPT or 24 non-fused inputs, 2 per MPPT (determined by SKU)
DC disconnection type	Load-rated DC switches
DC surge protection	Type II
AC Output	
Max. AC output power (selectable) @ PF >0.99	250 kW / 275 kW
Max. AC apparent power	275 kVA
Rated output voltage	800 Vac
Output voltage range[2]	704-880 Vac
Grid Connection Type	3-phase / PE
Max. AC Output Current @ 800 Vac	198.5 A
Rated output frequency	60 Hz
Output frequency range[2]	57-63 Hz
Power factor	>0.99 (±0.8 adjustable)
Current THD @ rated load	< 3%
Max. fault current contribution (1 cycle RMS)	135.2 A
Max. OCPD rating	300 A
AC surge protection	Type II
System and Performance	
Max. efficiency	99.0%
CEC efficiency	98.5%
Standby / night consumption	5 W
Environment	
Enclosure protection degree	NEMA 4X
Cooling method	Variable speed cooling fans
Operating temperature range[3]	-22°F to 140°F / -30°C to 60°C (derate from 107°F / 42°C)
Non-operating temperature range[3]	-40°F to 140°F / -40°C to 60°C
Operating humidity	0-100%
Operating altitude	8202 ft / 2500 m (no derating)
Audible noise	< 80 dBA @ 1 m and 77°F (25°C)

Display and Communication	
User interface and display	LED indicators, Wi-Fi, and app
Inverter monitoring	Modbus RS485 / PLC[4] / CAN
Site-level monitoring	CPS FlexOM (1 per 32 inverters)
Modbus data mapping	SunSpec / CPS
Remote diagnostics / firmware upgrade functions	Standard / (with FlexOM gateway)
Mechanical	
Dimensions (H × W × D)	27.2 × 41.3 × 15.7 in (690 × 1050 × 400 mm)
Weight	262 lb (119 kg)
Mounting / installation angle	Vertical installation
AC termination	Stud type terminal (wire range: 4/0 AWG – 750 kcmil AL/CU, lugs not supplied)
DC termination	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)[5]
Fused string inputs (3 per MPPT)[6]	25 A fuses provided (values up to 30 A acceptable)
Safety	
Certifications and standards	UL1741-SA/SB Ed.3, CSA-C22.2 NO.107.1-16, IEEE 1547a-2014, IEEE 1547-2018, FCC PART 15
Selectable grid standard	IEEE 1547a-2014, IEEE 1547-2018, CA Rule 21, ISO-NE
Smart-grid features	Volt-RideThru, Freq-RideThru, Ramp-Rate, Specified-PF, Volt-VAR, Freq-Watt, Vol-Watt
Protection Functions	
Reactive power at night	Yes
Anti-PID function	Yes
Insulation resistance monitoring	Yes
Onboard fault oscillography	Yes
PV MPPT current monitoring	Yes
Residual current monitoring	Yes
Output overcurrent protection	Yes
Output short-circuit protection	Yes
Output overvoltage protection	Yes
Warranty	
Standard	5 years
Extended terms	10, 15, and 20 years

1) See user manual for information regarding MPPT voltage range when operating at non-unity PF.

2) The output voltage range and output frequency range may differ according to specific grid standard.

3) See user manual for further requirements regarding non-operating conditions.

4) CPS AC-PLC kit required for AC PLC communication.

5) One threaded hole per MPPT for connecting #6-#4 AWG CU.

6) Fused string inputs only applicable to the 36-input model.

Notes:

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

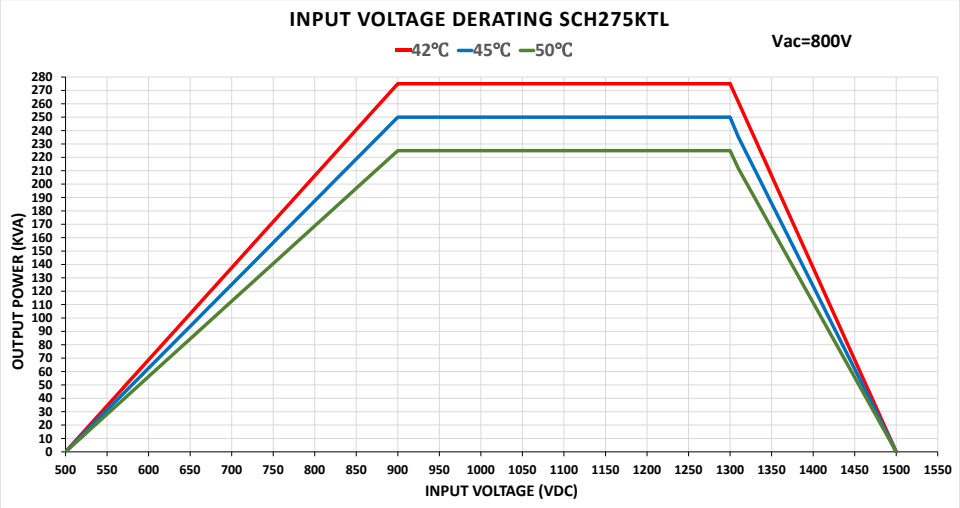


Figure 9-1 Derating Curve with DC Input Voltage

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:

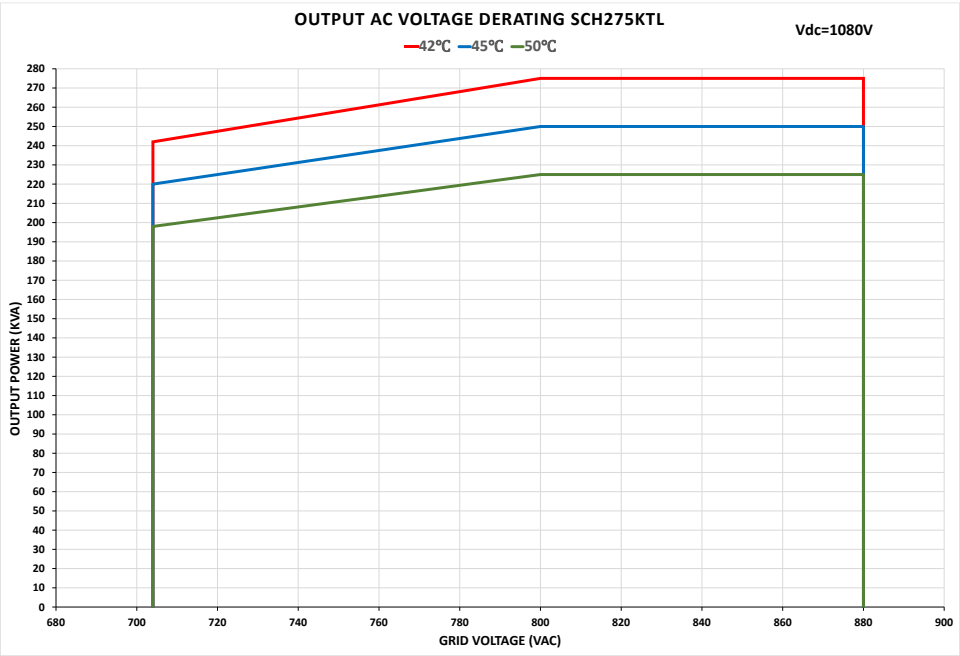


Figure 9-2 Derating Curve with Grid Voltage

When the ambient temperature is higher than 107.6°F (42°C), the inverter output will begin to derate, as shown in Figure 9-3:

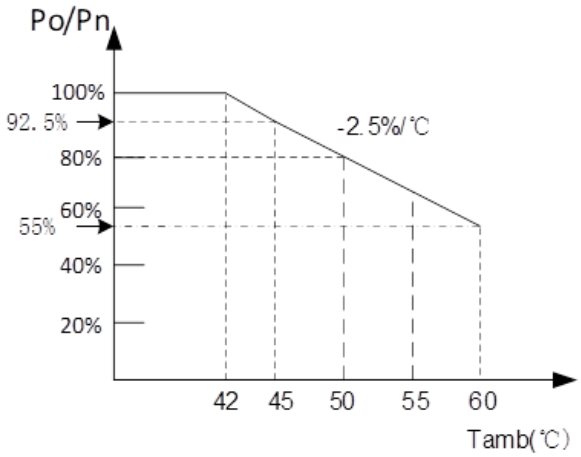


Figure 9-3 Derating Curve with High Temperature

The highest no-derating altitude level is 8202.1 ft (2500 m) for this inverter; its derating curve is as shown in Figure 9-4:

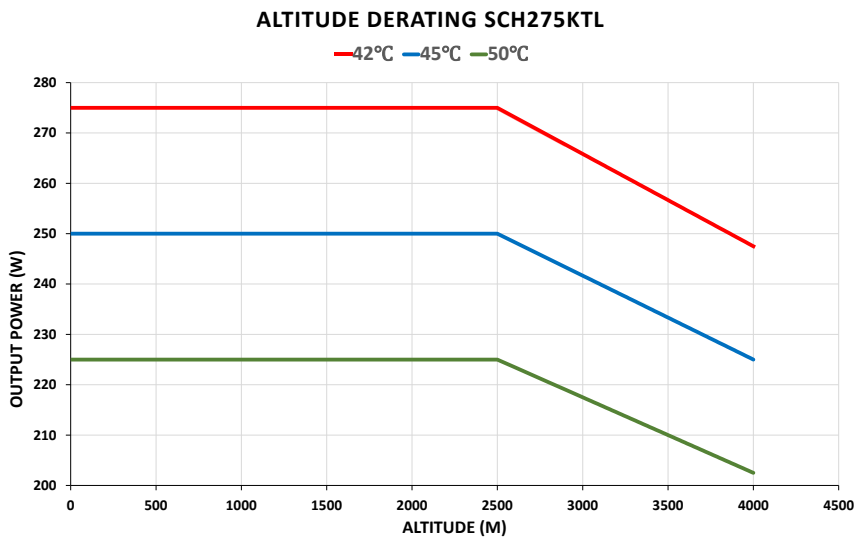


Figure 9-4 Derating Curve with Working Altitude

Fused string inputs only applicable to the 36 input model.

9.2 P-Q Capabilities at Nominal Output Voltage

The inverter is capable of providing reactive power of ±165 kVAR at nominal grid voltage and rated ambient temperature. The chart below (Figure 9-5) details the inverter reactive power capabilities at various input voltages and various ambient temperature conditions:

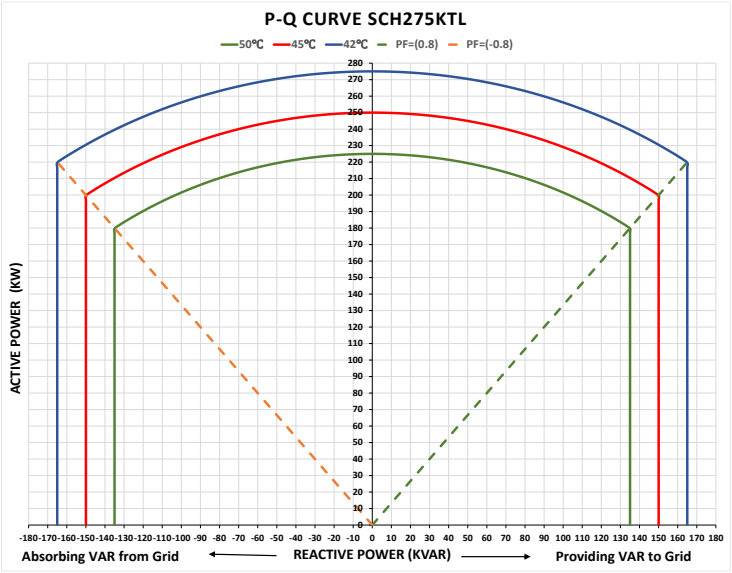


Figure 9-5 P-Q Capacities at Nominal Output Voltage

9.3 Measurement Tolerance

The data supplied by the inverter may differ from measurements taken by certified measuring instruments (e.g., output meters, multi-meters, and grid analyzers). The inverter is not a measuring instrument and has wider tolerances for the measurements it makes.

The inverter tolerances are shown 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 below:

- Voltage: ±1%
- Current: ±2%
- Frequency: ±0.01 Hz
- Power: ±5%
- Power factor: ±0.01
- Time: ±1%
- Temperature: ± 1.8°F (± 2°C)

10 Limited Warranty

The warranty policy for this product is specified in the contract; otherwise, the standard warranty is five (5) years.

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

11 Recycling

This product cannot be disposed of as a household waste. When the product has reached the end of its service life, dispose of it in accordance with the local applicable electrical waste regulations and standards. For more information, contact CPS Customer Service.

12 Appendix

12.1 Optimizing CPS 275 kW Inverter Performance

This appendix describes design considerations and guidelines for the CPS 275 kW inverter, as well as recommendations for performance modeling using PVsyst. However, it is always the responsibility of the engineer of record to design for local and national code compliance and utility requirements for each project.

BACKGROUND: The CPS 275 kW inverter has 12 separate MPPTs and is available with either 36 fused string inputs (three strings per MPPT) or 24 unfused string inputs (two strings per MPPT). Advantages of the 12 MPPT design include minimizing array mismatch losses caused by module mismatch, albedo variations, and terrain (module orientation) variations.

The standard 1.0101.0835/1.01010836 models of the CPS 275 kW inverter include an MPPT overhead feature to process 36.5 kW or 30.5 A maximum (limited by whichever condition is exceeded first). MPPT overhead enables design flexibility and maximized inverter power production even with imbalanced string inputs. The combined total of all 12 MPPTs is also limited by a maximum of 276.5 kW or 198.5 Aac, whichever condition is exceeded first. The table below summarizes the MPPT overhead feature:

	Specifications per MPPT			Total Output Specifications			
	Imax (A)	Vmp	Pmp (W)	max (Arms)		Vac	Pmp (KW)
275kW w/Overhead (1.0101.0835/1.0101.0836)	30.5	856	26100	198.5	>	804.2	276.5
		1197	36500	198.5	<	799.9	275.0

STRING SIZING & MODELING: The preliminary design must be checked to make sure the Isc and Pmp from the array do not exceed the inverter limits over a Typical Meteorological Year (TMY). This can be done using the CPS String Sizer tool on the CPS Website: http://www.chintpowersystems.com/. The tool checks for maximum Voc, Isc, and Pmp of a typical installation in the region selected and can be used to evaluate PV system string configurations as they relate to CPS inverter input specifications. The tool does not model or optimize the string configuration for energy production. This can only be achieved with TMY CAD software (e.g., PVsyst). The exact emulation of the MPPT overhead feature of the new 275 kW inverter model is currently not directly available in most simulation CAD and must be done with post process calculations. There are two other simulation options (**for 1.0101.0835/1.0101.0836 275kW inverter models only**):

1. In PVSYST – uncheck the multiple MPPT feature (implement power sharing) - Recommended.
2. In PVSYST – configure the inverter as a 324kW/324kVA and limit the output to 275kW in the energy management tab. Recommended cross-check for power sharing simulation above.

DC CONNECTIONS: PV input power from the array may be unbalanced between the 12 MPPT zones, but CPS recommends distributing the DC input power across all MPPTs as evenly as possible to maximize production, minimize clipping losses, and optimize thermal performance. When designing the PV system, ensure each PV string within a single MPPT zone includes the same module type (manufacturer and ratings), same series module count, and same module orientation (tilt and azimuth) to maximize MPPT performance and energy harvest.

When the MPPT inputs are unbalanced, it is important to evenly distribute the associated highest input power module on the heatsink to prevent premature thermal power derating. The connection sequence to optimize performance is documented in the table below. If there are any MPPTs with no connected PV, the empty MPPTs should be 2, 10, and 6 in that order from right to left:

MPPT Connection Sequence (Highest to Lowest Power)											
1	11	5	3	9	7	8	12	4	6	10	2

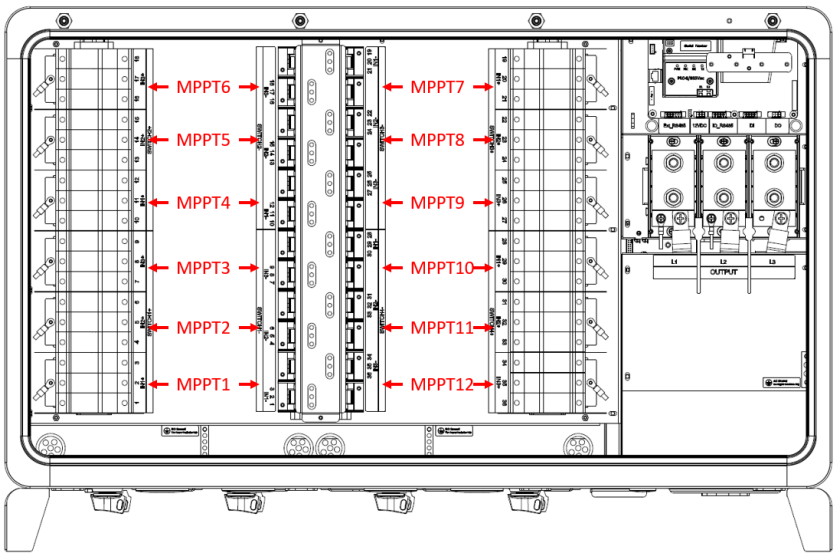


Figure 12-1 275 kW MPPT Layout (36 Input Version)

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