

# Conext™ CL Three Phase Grid Tie Inverters

## Conext CL 18000NA

## Conext CL 25000NA

### Installation and Operation Manual

990-5058B-001 Rev 04  
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Conext™ CL Three Phase Grid Tie Inverters

Conext CL 18000NA

Conext CL 25000NA

Installation and Operation Manual

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# About This Manual

## Purpose

The purpose of this Installation and Operational Manual is to provide explanations and procedures for installation, operation, maintenance, and troubleshooting information for the following inverter models:

Part Number	Description
PVSCL18NA100	Conext CL 18000NA Outdoor Base
PVSCL18NA200	Conext CL 18000NA Outdoor Essential
PVSCL18NA201	Conext CL 18000NA Outdoor Essential plus
PVSCL18NA300	Conext CL 18000NA Outdoor Optimum
PVSCL18NA301	Conext CL 18000NA Outdoor Optimum plus
PVSCL25NA100	Conext CL 25000NA Outdoor Base
PVSCL25NA200	Conext CL 25000NA Outdoor Essential
PVSCL25NA201	Conext CL 25000NA Outdoor Essential plus
PVSCL25NA300	Conext CL 25000NA Outdoor Optimum
PVSCL25NA301	Conext CL 25000NA Outdoor Optimum plus

## Scope

The Manual provides safety information and guidelines, detailed planning and setup information, procedures for installing Conext CL inverter, as well as information about operating and troubleshooting the inverter. It does not provide details about particular brands of photovoltaic panels. For more information, consult individual PV manufacturers.

## Audience

The information in this document is intended for a qualified personnel, who has training, knowledge, and experience in:

- Installing electrical equipment and PV power systems up to 1000 VDC.
- Applying all local installation codes.
- Analyzing and eliminating the hazards involved in performing electrical work.
- Selecting and using Personal Protective Equipment (PPE).

Installation, commissioning, troubleshooting, and maintenance of the inverter must be done only by qualified personnel.

## Organization

This manual is organized into the following chapters and appendices.

Chapter 1, “Introduction” provides information about Conext CL18000NA and Conext CL 25000NA three phase grid tie inverters.

Chapter 2, “Installation and Configuration” provides information and procedures for installing and configuring the inverter and the wiring box.

Chapter 3, “Operation” contains information on the basic operation of the inverter and the wiring box.

Chapter 4, “Troubleshooting” describes the event and service messages that might be displayed on the LCD of the inverter and the recommended solutions.

Chapter 5, “Maintenance” contains information and procedures for performing preventive maintenance on the inverter and the wiring box.

Appendix A provides the environmental, electrical, and other specifications for the inverters.

Appendix B describes the information that can be displayed on the LCD of the inverter.

“Information About Your System” can be used to record information about the inverter package.

Save this manual for easy access during the installation, maintenance and trouble shooting of the inverter.

## Related Information

You can find more information about Schneider Electric Solar, as well as its products and services, at [solar.schneider-electric.com](http://solar.schneider-electric.com).

## Conventions Used

The following conventions are used in this guide.

### **DANGER**

DANGER indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.

### **WARNING**

WARNING indicates a potentially hazardous situation, which, if not avoided, can result in death or serious injury.

**▲ CAUTION**

CAUTION indicates a potentially hazardous situation, which, if not avoided, can result in moderate or minor injury.

**NOTICE**

NOTICE indicates a potentially hazardous situation, which, if not avoided, can result in equipment damage.

## Product Names

This manual includes information for two products: Conext CL 18000NA and Conext CL 25000NA photovoltaic three phase transformerless grid tie inverters each with five models of the wiring box. The following table lists the naming conventions used to differentiate information that only applies to one of the two inverters. For information common to all products, “inverter” is used.

Product Name	Usage
Conext CL 18000NA	The information provided is specific to the 18 kVA Conext CL photovoltaic grid tie inverter
Conext CL 25000NA	The information provided is specific to the 25 kVA Conext CL photovoltaic grid tie inverter







## Abbreviations and Acronyms

Term	Definition/description
AC	Alternating Current
ADC	Analog to Digital Converter
AFD	Arc Fault Detector
AFDI	Arc Fault Detector and Interrupter
Cap	Capacitive
CSA	Canadian Standards Association
DC	Direct Current
EOL	End Of Life
DSP	Digital Signal Processing
GND	Ground
Ind	Inductive
IP	Ingress protection

Term	Definition/description
$I_{SC}$	Short circuit current rating of a PV panel under STC. (See STC, below)
$I_{SC\ max}$	Absolute maximum short circuit current permitted from the PV array
L1	AC Line 1
L2	AC Line 2
L3	AC Line 3
LCD	Liquid Crystal Display
LED	Light Emitting Diode (indicator light)
LVRT	Low Voltage Ride Through
MPP	Maximum Power Point
MPPT	Maximum Power Point Tracking
N	Neutral
NA	North America
NEC	National Electrical Code
NC	Normally Closed
NO	Normally Open
OD	Outer Diameter
OOC	Output Over Current Protection
P	Active Power
PE	Protective Earth (ground)
$P_n$	Real power nominal
$P_m$	Percentage of Rated Power
$P_o$	Output power
PPE	Personal Protective Equipment
PV	Photovoltaic
Q	Reactive power
RCD	Residual Current Detection
RCMU	Residual Current Monitoring Unit
RPO	Remote Power Off
SELV	Safety Extra Low Voltage
$S_n$	Apparent power nominal
STC	Standard Test Conditions specific to photovoltaic panels (1000 W/m <sup>2</sup> , light spectrum AM 1.5 and 25 °C [77 °F]); panel nameplate ratings are based on STC and may be exceeded under some conditions.

Term	Definition/description
THD	Total Harmonic Distortion
UL	Underwriters Laboratories
UV	Ultraviolet
V	Voltage
VAC	Volts AC
VDC	Volts DC
VMPP	Voltage at Maximum Power Point
VOC	Open circuit voltage rating of a PV panel under STC
VOC max	Absolute maximum open circuit voltage permitted from a PV array

Symbols on the Inverter

Symbols	Explanation
	Hazard of fire, arc flash, or electric shock from multiple sources
	The inverter is energized from two sources. Before opening the cover, physically isolate all the sources of power, and then wait atleast five minutes for internal capacitors to discharge.
	Refer to Conext CL Installation and Operation Manual.
	Protective earthing connection
	The product works with high voltages. All work on Conext CL Inverter must follow the described documentation and must comply with all the prevailing codes and regulations associated with high voltages.
	Caution, risk of danger

Product Recycling



Do not dispose of this product with general household waste!

Electric appliances marked with the symbol shown, must be professionally treated to recover, reuse, and recycle materials in order to reduce negative environmental impact. When the product is no longer usable, the consumer is legally obligated to ensure that it is collected separately under the local electronics recycling and treatment scheme.

# Important Safety Instructions

## READ AND SAVE THESE INSTRUCTIONS - DO NOT DISCARD

This manual contains important safety instructions that must be followed during the installation and maintenance of Conext CL 18000 NA and Conext CL 25000 NA three phase transformerless grid tie inverters. Read and keep this manual for future reference.

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



The addition of this symbol either to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



### **DANGER**

DANGER indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.

### **WARNING**

WARNING indicates a potentially hazardous situation, which, if not avoided, can result in death or serious injury.

### **CAUTION**

CAUTION indicates a potentially hazardous situation, which, if not avoided, can result in moderate or minor injury.

**NOTICE**

NOTICE is used to address practices not related to physical injury. The safety alert symbol shall not be used with this signal word.

## Safety Information

- Before using the inverter, read all instructions and cautionary markings on the unit, and all appropriate sections of this manual.
- Use of accessories not recommended or sold by the manufacturer may result in a risk of fire, electric shock, or injury to persons.
- The inverter is designed to be permanently connected to your AC and DC electrical systems. The manufacturer recommends that all wiring be done by a certified technician or electrician to ensure adherence to the local and national electrical codes applicable in your jurisdiction.
- Do not operate the inverter if it is damaged in any way.
- This inverter (excluding the wiring box) does not have any user-serviceable parts. Do not disassemble the inverter except where noted for connecting wiring and cabling. See your warranty for instructions on obtaining service. Attempting to service the unit yourself may result in a risk of electrical shock or fire. Internal capacitors remain charged after all power is disconnected.
- To reduce the risk of electrical shock, isolate both AC and DC power from the inverter before attempting any maintenance or cleaning or working on any components connected to the inverter. Putting the unit in Standby mode will not reduce this risk.
- The inverter must be provided with an equipment-grounding conductor connected to the AC input ground.
- Remove personal metal items such as rings, bracelets, necklaces, and watches when working with electrical equipment.
- Conext CL inverter is energized from two sources: PV array while exposed to sunlight and AC grid. Before opening the cover for servicing, check the system diagram to identify all the sources, de-energize, lock-out and tag-out\*, and wait for at least five minutes for the internal capacitors to discharge completely.  
\*It may be noted that, lock-out and tag-out instructions does not hold good during firmware upgrade as either AC grid supply or DC power supply is required to upgrade the firmware.
- Conext CL inverter employs field adjustable voltage and frequency set points and time delays that are factory set in compliance with local utility and safety requirements. This can be changed only by qualified personnel with approval by both the local utility and equipment owner.
- Before servicing, test the inverter using a meter, rated at least 1000 VDC and 600 VAC to make sure all the circuits are de-energized.
- Do not use Conext CL inverter in connection with life support systems, medical equipment, or where human life or medical property could be at stake.



- Use the inverter only in grid-interconnected PV systems. The inverter does not support off-grid, stand-alone, power backup function.
- A person with pacemaker must avoid coming in the close proximity of the inverter.
- In outdoor installations, do not open the wiring box cover when humidity is higher(>95%), during snow fall, rain fall or during any other adverse environmental conditions.
- Do not install the inverter in a zero-clearance or in unventilated compartments.
- Conext CL must be used only in countries specified by Schneider Electric (contact Schneider Electric for the latest list of approved countries).
- Ensure to operate all the components within the permitted range.
- Do not attempt to modify/replace/remove the components and protective barriers that are not supplied with the package, unless otherwise specified in this manual.
- Do not use grounded PV modules with Conext CL inverters.

The term “qualified personnel” is defined on page iii of this manual. Personnel must be equipped with appropriate PPE and follow standard electrical work practices. The inverter is energized from the AC grid and up to eight PV circuits on the DC side. Before servicing the inverter or accessing the wiring box, isolate all the sources and wait at least five minutes to allow internal circuits to discharge. Ensure that all the components inside the wiring box have attained safe temperature before accessing the internal components.

Operating the RPO (Remote Power Off) circuit or switching off the DC disconnect does not remove the DC and AC power from the inverter. The internal parts and the external wiring remain live unless the PV and AC circuits are physically isolated.

## **DANGER**

### **HAZARD OF ELECTRIC SHOCK, EXPLOSION, AND ARC FLASH FROM MULTIPLE SOURCES**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized with covers removed.
- Conext Inverter is energized from two sources. Before opening cover, disconnect all sources of power, and then wait at least five minutes for internal capacitors to discharge.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers, before turning on power to this equipment.

**Failure to follow these instructions will result in death or serious injury.**

**⚠ ⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, AND ARC FLASH**

The inverter is not user serviceable. To be installed and serviced by qualified personnel, equipped with appropriate personal protective equipment and following safe electrical work practices.

**Failure to follow these instructions will result in death or serious injury.**

**⚠ WARNING**

**HAZARD OF ELECTRIC SHOCK AND EXPLOSION**

- Disconnect all the power sources before making any connection.
- Connect the communication ports to Safety Extra Low Voltage (SELV) circuits only.

**Failure to follow these instructions can result in death or serious injury.**

## FCC Information to the User

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

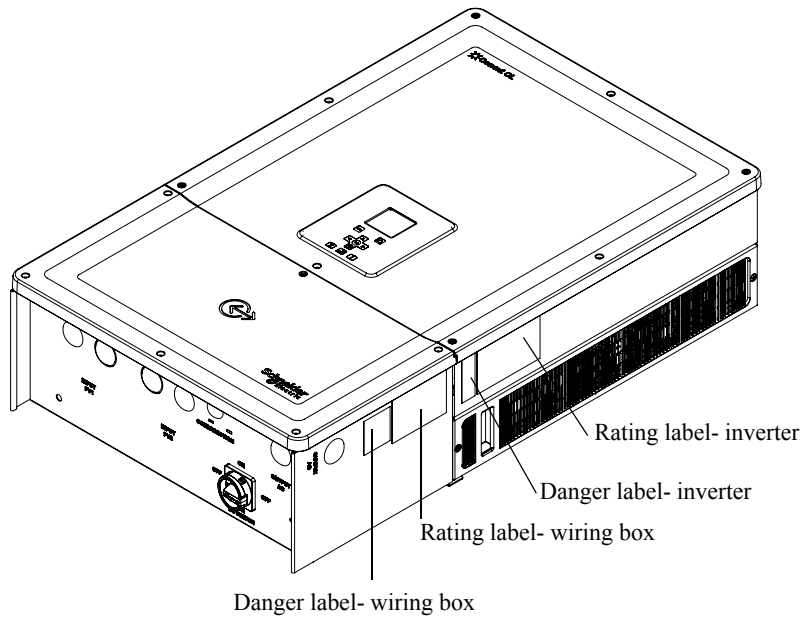
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

All electrical installations must be done in accordance with the local and National Electrical Code, ANSI/NPFA 70 or the Canadian Electrical Code CSA C22.1. All installations must conform with the laws, regulations, codes and standards applicable in the jurisdiction of installation. Wiring of the product should be done by a qualified personnel only.

The product contains no user-serviceable parts. For all repair and maintenance, contact Schneider Electric.

## Safety and Rating labels

The safety labels are on the right side of the inverter and wiring box as shown in the figure below.



## Safety equipment

Qualified service personnel must be equipped with appropriate Personal Protective Equipment (PPE) that include, but are not necessarily limited to the following:

- Safety gloves
- Safety glasses
- Composite-toed safety boots
- Safety hard hats
- Double-insulated tools
- Appropriate meter to verify that the circuits are de-energized (1000 volts DC or 600 volts AC rated, minimum)

Check the local safety regulations for other requirements.



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# 1

## Introduction

Chapter 1, “Introduction” provides information about Conext CL18000NA and Conext CL25000NA three phase grid tie inverters.

It contains information about:

- Description of Conext Grid Tie Solar Inverter
- Key Features
- Block Diagram
- Physical Features
- Air Ventilation
- Bottom view of Wiring box

## Description of Conext Grid Tie Solar Inverter

Conext CL Inverter is a three phase transformerless string inverter designed for high efficiency, easy installation and maximum yield. The inverter converts the solar electric (photovoltaic or PV) power into utility grade electricity that can be used for commercial or residential applications.

The inverter is designed to collect maximum available energy from the PV array by constantly adjusting its output power to track maximum power point (MPP) of the PV array. The inverter has two MPPT channels (MPPT1 and MPPT 2). A maximum of four string inputs can be connected to each independent MPPT channels. The two independent PV arrays can operate at different peak power points, to capture the maximum possible energy. The inverter accommodates PV arrays with open circuit voltages up to 1000 VDC.

Conext CL is a transformerless design and therefore has no galvanic isolation.

Figure 1-1 shows the major components of a typical PV grid-tie installation, the energy flow in a system using Conext CL inverter, and the typical wiring box components.

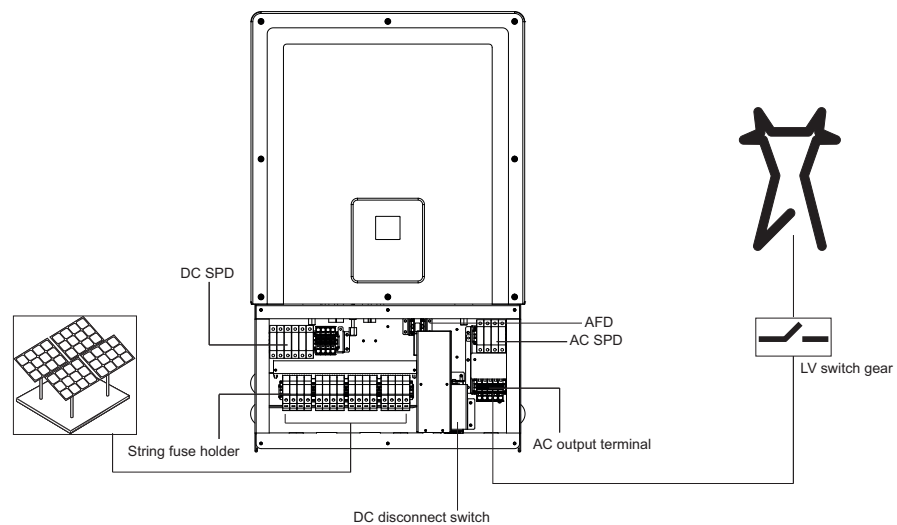


Figure 1-1 **Typical installation (Optimum plus Configuration)**

For installation details, see **Installation and Configuration** on page 2-1.



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# Key Features

## Inverter

- Power rating:
  - Conext CL 18000NA inverter: 18 kVA (600 VDC and 1000 VDC systems)
  - Conext CL 25000NA inverter: 25 kVA (1000 VDC systems)
- PV compatibility: Designed to work with Mono Crystalline or PolyCrystalline panel
- Three-phase (3-Phase + N + PE [ground]), four wire, grid-tie, transformerless
- Wide MPPT voltage range
  - 300- 800 VDC for 18 KVA
  - 500- 800 VDC for 25 KVA
- Supports high array to inverter ratio
- Two independent MPP Trackers with option to combine together
- Energy harvest (MPPT) efficiency: >99%
- Fast sweep MPPT tracking
- Maximum power conversion efficiency: >98%
- Power factor adjustment range: 0.8 capacitive to 0.8 inductive
- Low AC output current distortion (THD < 3%) @ nominal power
- TYPE 4 (electronics)/TYPE 3R (rear portion) protection class for installation in outdoor environments
- -13 to 140° F (-25 to 60° C) operating temperature range
- Flexible installation
  - Inverter and wiring box separable installation
  - Vertical and lay flat installation (10° orientation, from ground plane)\*
- Dry Contact (Multi function) relay
- Remote Power Off (RPO)
- Modbus RS485 and Modbus TCP communications
- USB device host for local firmware upgrade
- Custom data Logging (User configurable via USB or Webpage)
- 3" (diagonally) graphical display (LCD) with integrated 7- button control panel
- Embedded Web server via Ethernet (TCP/IP)
- Supports SunSpec Modbus

## Wiring Box\*

- Integrated DC switch
- Touch safe fuse holder for PV string protection
- DC Arc Fault Detection (AFD)
- AC and DC Surge Protection (SPD) & Monitoring
- Bottom and Side cable entry for easy installation

- AC cable termination using cage clamp terminal block

\*For more details about different wiring box configuration and features, refer **Wiring Box Configurations**.

## Block Diagram

Figure 1-2 shows the block diagram of Conext CL 18000NA and Conext CL 25000NA inverters. Figure 1-3 and Figure 1-4 shows the location of important physical features of the inverter.

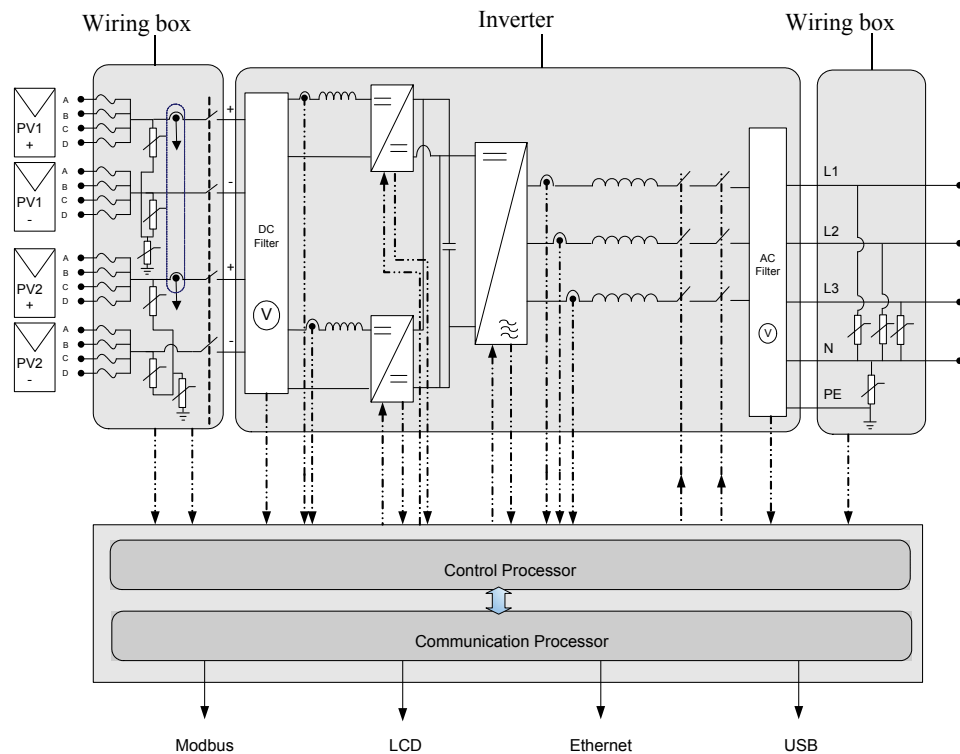


Figure 1-2 **Block diagram of Conext CL 18000NA and 25000NA models**

## Physical Features

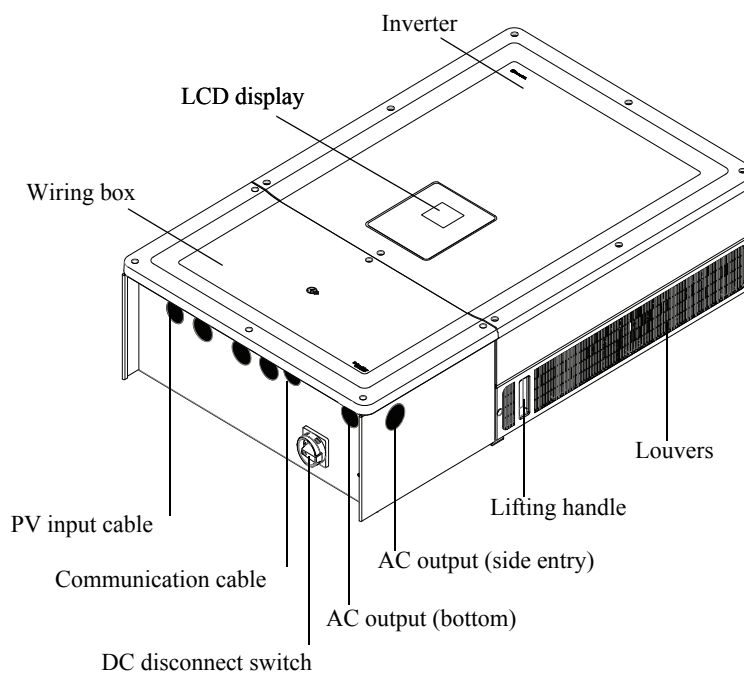


Figure 1-3 Location of physical features of the inverter and the wiring box- right side view

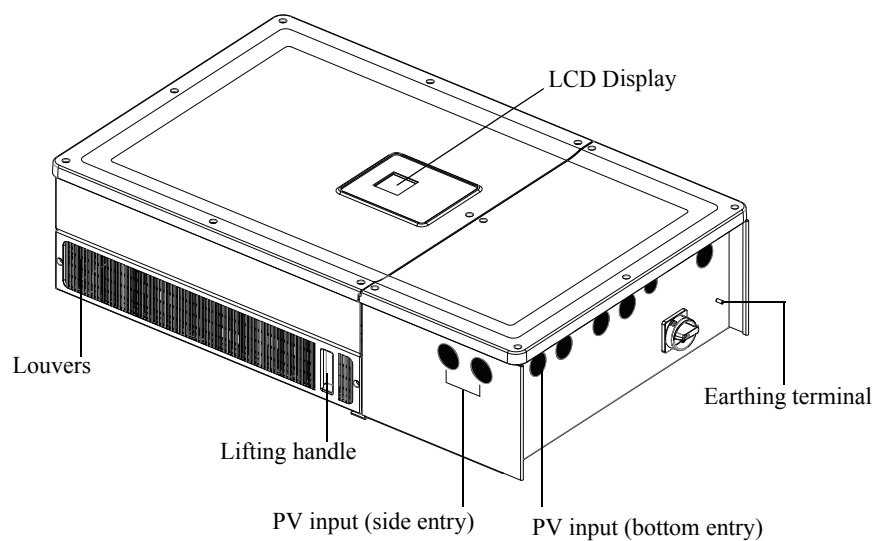


Figure 1-4 Location of physical features of the inverter and the wiring box- left side view

## Air Ventilation

The air intake and outlet are located at the sides of the inverter, as shown in Figure 1-5.

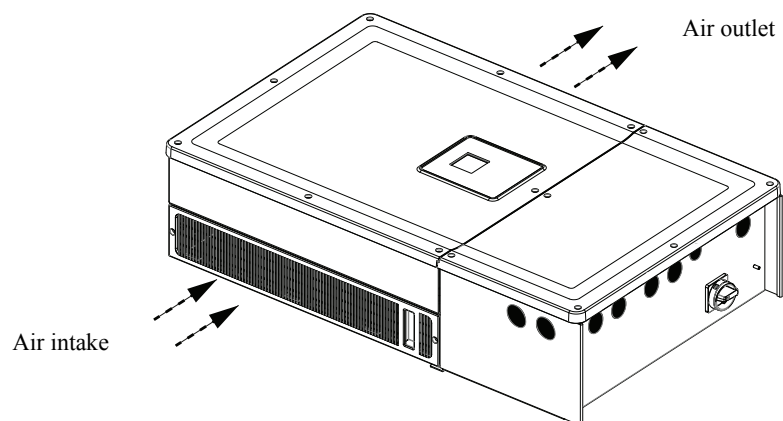


Figure 1-5 Cooling arrangement of the inverter

## Bottom view of Wiring box

The Ingress Protection rated hole plugs are located at the bottom of the wiring box, as shown in Figure 1-6.

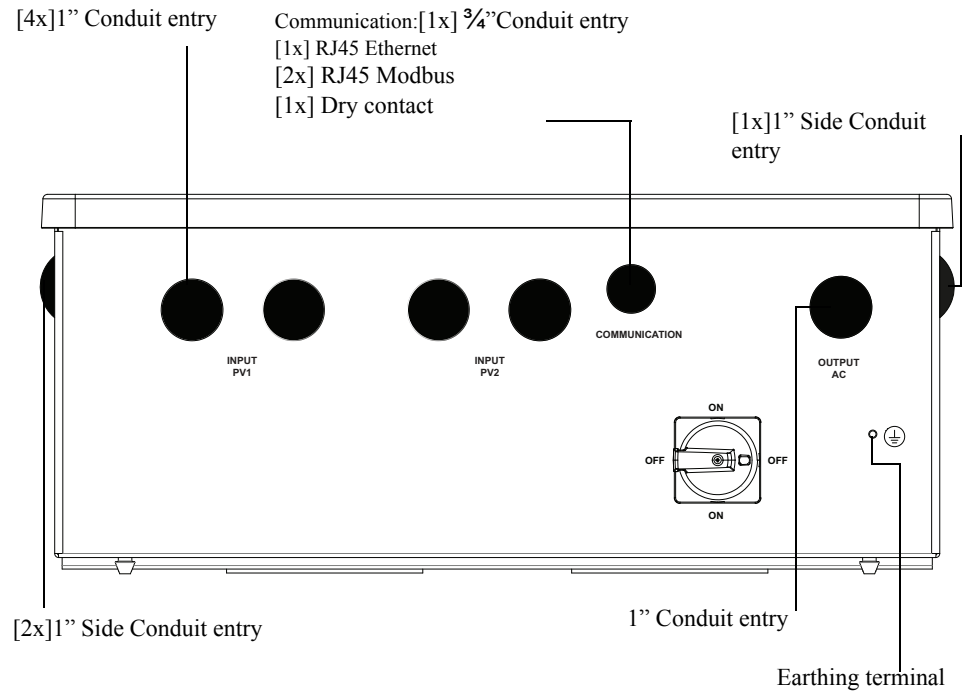


Figure 1-6 Bottom view of the wiring box

### **⚠ DANGER**

#### **HAZARD OF ELECTRIC SHOCK, EXPLOSION, FIRE OR ARC FLASH**

Replace any plugs that are removed and unused, to prevent water from entering the wiring box.

**Failure to follow these instructions will result in death or serious injury.**

Item	See this section:
AC output	<b>AC Wiring</b> on page 2-37
Communication interface	<b>Communication Interface</b> on page 2-42
PV input	<b>Planning</b> on page 2-33
Earthing terminal	<b>Earthing Terminal</b> on page 2-41



---

# 2

## Installation and Configuration

Chapter 2, “Installation and Configuration” provides information and procedures for installing and configuring the inverter and the wiring box.

It contains information about:

- Transportation
- Lifting
- Package Inspection
- Planning for Installation
- Dimensions
- Wiring Box Configurations
- Tools Required
- Torque Table
- Package Inspection
- Planning for Installation
- Dimensions
- Wiring Box Configurations
- Tools Required
- Torque Table
- Mounting
- Planning and Wiring
- Communication Interface
- Daisy Chain Configuration
- RPO and Dry contact relay connection
- PV String Protection

- Surge Protection Device Monitoring
- Web Interface



---

## Transportation

Conext CL consists of two packaging boxes, the inverter and the wiring box. The transportation of the equipment should be carried out without any abnormal vibration or shock that may damage any of the internal parts.

## Lifting

<b>▲ CAUTION</b>
<b>CRUSH HAZARD</b> <ul style="list-style-type: none"><li>• The service person should be equipped with appropriate PPE.</li><li>• Lift the inverter with the help of another person.</li></ul> <b>Failure to follow these instructions can result in moderate or serious injury.</b>



The inverter and the wiring box weighs approximately 119 lbs (54 kg) and 33 lbs (15 kg) respectively. It is recommended to ensure all necessary precautions for personal as well as equipment safety while lifting, to avoid any mishandling and physical injury.

Do not attempt to lift multiple inverters together.

## Package Inspection

1. Check the wiring box and the inverter for damage during shipping. If it is damaged beyond cosmetic damage, contact Schneider Electric.
2. Check the nameplate label on the wiring box and the inverter for correctness of the model ordered, see Figure 2-2 and Figure 2-5.
3. Fill in **Information About Your System** on page D-1.

## Wiring box

### Scope of delivery

While unpacking the wiring box, verify that the package includes all the items as listed in the table below.

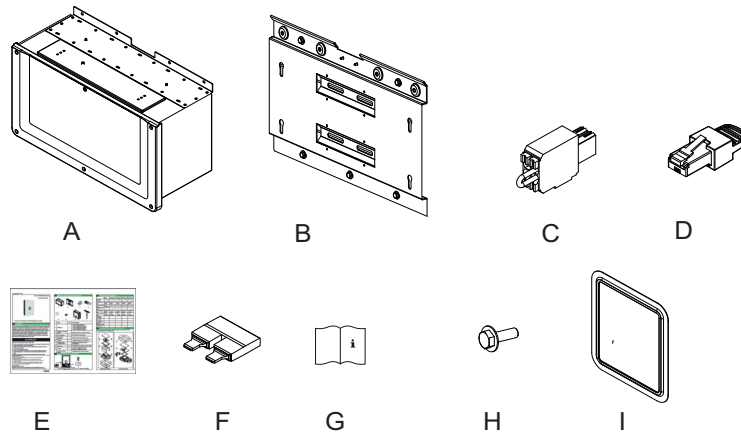


Figure 2-1 **Packing list- Wiring box**

Table 2-1 **Packing list- Wiring box**

	Item/ Description	Quantity
A	Wiring box	1
B	Wiring box mounting bracket	1
C	Relay and RPO connector	1
D	Modbus RC terminator (RJ45 plug)	1
E	Quick start guide	1
F	MPPT shorting jumper	2
G	Installation and Operation manual	1
H	M8 screws (8 mm) for fastening wiring box to the bracket	4
I	Silicone layer for LCD panel	1

### Wiring box Nameplate

The nameplate\* affixed to the wiring box provides the following information:

- Model name
- Configuration
- Enclosure type
- Part number

\*A typical nameplate is as shown below.

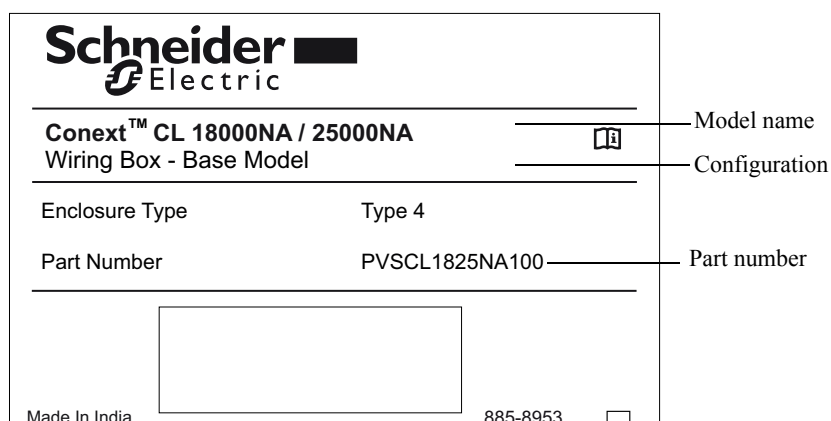


Figure 2-2 Nameplate label- Wiring box

Note: Technical data in this manual is subject to change. Always refer the label affixed on the product.

Wiring box SKU/ Order Code **	Configuration
PVSCL1825NA100	Base
PVSCL1825NA200	Essential
PVSCL1825NA201	Essential plus
PVSCL1825NA300	Optimum
PVSCL1825NA301	Optimum plus

\*\* Refer wiring box name plate for the correct part number ordered.

## Inverter

### Scope of delivery

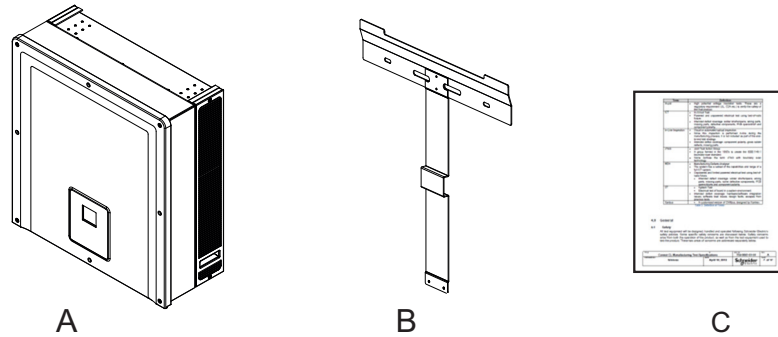


Figure 2-3 Packing list- Inverter

Table 2-2 Packing list- Inverter

	Item/ Description	Quantity
A	Inverter	1
B	Inverter mounting bracket	1
C	Routine test report	1

### Packaging label

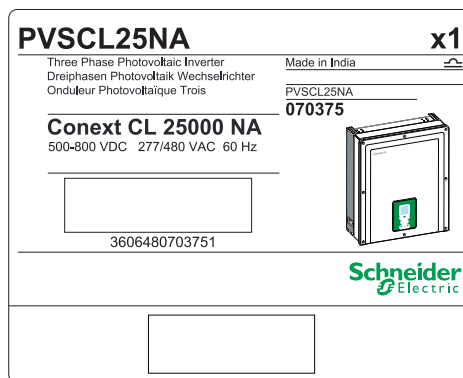


Figure 2-4 Inverter packaging label

### Nameplate

The nameplate\* shown below is affixed to the inverter and provides the following information:

- Model name
- Part number
- DC input data
- AC output data
- Certification

\*A typical nameplate is as shown below in Figure 2-5.

Schneider Electric	
<b>Conext™ CL 25000 NA</b>	
Three Phase Photovoltaic Grid Tie Inverter	
Max Input Voltage	1000V
Max Array Short Circuit Current	36A
PV MPPT Voltage Range Max. Power	500-800V
AC Nominal Output Voltage	480V (3φ +N)
AC Voltage Operating Range	422-528 V
AC Nominal Output Frequency	60Hz
AC Nominal Output Power	25kVA
AC Max. Continuous Output Current	31A
Max Output Over Current Protection	39A
Max Utility Back Feed Current	0A
Power Factor	>0.995
Enclosure Type	Type 3R (Rear Portion) / Type 4 (Electronics)
Operating Temperature Range	-25°C to +60°C (-13°F to +140°F)
Part Number	PVSCL25NA
<ul style="list-style-type: none"> <li>UL 1741</li> <li>IEEE 1547</li> <li>CSA 107.1</li> <li>MC159409</li> </ul>	
Photovoltaic Transformer less Inverter	
<small>All trademarks are owned by Schneider Electric Industries SAS or its affiliated companies. www.schneider-electric.com</small>	
Made in India	885-6550B

Figure 2-5 Inverter nameplate label

Note: Technical data in this manual is subject to change. Always refer the label affixed on the product.

# Planning for Installation

## Installation Overview

<b>⚠ ⚠ DANGER</b>
<b>HAZARD OF ELECTRIC SHOCK, EXPLOSION, FIRE OR ARC FLASH</b> Conext CL inverter must be installed and serviced only by qualified personnel equipped with appropriate personal protective equipment and following safe electrical work practice and all applicable code requirements. <b>Failure to follow these instructions will result in death or serious injury.</b>
<b>NOTICE</b>
<b>RISK OF EQUIPMENT DAMAGE</b> In the Base model, string fuse protection and DC disconnect switch are not available. Ensure that suitable external protection is installed as per local installation standards. <b>Failure to follow these instructions can result in equipment damage.</b>

Installation Options	Conext CL inverter can be installed as a single inverter with a maximum of four PV strings connected to each MPPT. In the Base model wiring box, when more than two strings are connected to each MPPT, the use of a suitably rated external fuse is recommended. The inverter can also be installed in a multiple inverter system. If multiple inverters are used, each of the inverter must be wired to an independent set of PV array. To enable communication between Conext CL inverters, network cabling must be installed to the RJ45 ports.
Installation Codes	Ensure adherence to all necessary installation codes as applicable to the specific location of installation. Some examples include the following: <ul style="list-style-type: none"><li>• The U.S. National Electrical Code (NEC)</li><li>• The Canadian Electrical Code (CEC)</li><li>• The U.S. Code of Federal Regulations (CFRs)</li><li>• Canadian Standards Association (CSA)</li></ul> It is the responsibility of the installer to ensure that all the applicable installation requirements are met.
Planning	Planning for a system requires a complete understanding of all the components that are involved to successfully install the inverter. This helps to achieve optimum performance and reliability, and to meet applicable installation codes.
Location	The inverter is rated and certified for both indoor and outdoor installation. Conext CL inverter uses a TYPE 4 (electronics)/ TYPE 3R (rear portion) rated protection, that can be installed indoors or outdoors.

Debris Free Excessive debris (such as dust, leaves, and cobwebs) can accumulate at the rear side of the inverter, interfering with the wiring connections and ventilation.

<b>NOTICE</b>
<p><b>RISK OF EQUIPMENT DAMAGE</b></p> <p>Mount the inverter in a dust free environment where debris cannot accumulate which may interfere with the connections and ventilation.</p> <p><b>Failure to follow these instructions can result in equipment damage.</b></p>

Clearance Consider adequate ventilation and service access when installing the inverter. Refer to the Wiring Box Configurations on page 2-13.

## Environmental Requirements

<b>⚠ WARNING</b>
<p><b>HAZARD OF FIRE</b></p> <p>Keep the area under and around the inverter clear of flammable material and debris.</p> <p><b>Failure to follow these instructions can result in death or serious injury.</b></p>

- The enclosure of the inverter can tolerate some ingress of dust, however, minimizing the exposure to dust will improve the performance and life of the inverter.
- While the TYPE 4 (electronics)/ TYPE 3R (rear portion) rated protection of the inverter protects it from rain and water sprayed on the inverter from a nozzle, it is recommended that outdoor installations be located away from lawn sprinklers and other sources of spray such as a hose or pressure washer.
- The inverter is designed to operate in a -68 °F to 140 °F (-25 °C to 60 °C) ambient environment, however, the optimal power harvest is achieved up to an ambient temperature of 113 °F (45 °C). Above 45 °C, the power may derate.
- It is recommended to install the inverter away from direct exposure to sunlight; or else it might result in the following consequences:
  - output power limitation (loss of production).
  - premature aging of electronic components.
  - premature aging of mechanical components and the display interface.
- The mounting location and structure must be suitable to withstand the weight of the inverter and the wiring box.
- Install the inverter in a location where the DC disconnect switches are easily accessible.
- Install the inverter with the display located at an eye level so that the display and LED status are seen easily.

**⚠ CAUTION**

**CRUSH HAZARD**

- The inverter and wiring box together weighs approximately 154.3 lbs (70 kg). Ensure that the surface on which the inverter will be mounted, and the mounting hardware used, are strong enough to withstand this weight.
- Use proper lifting techniques in accordance with local workplace safety rules, and always use assistance when moving, lifting and installing the inverter.

**Failure to follow these instructions can result in injury, or equipment damage.**

**NOTICE**

**RISK OF EQUIPMENT DAMAGE**

- The enclosure of the inverter protects the internal parts from rain; however, outdoor installations must be located away from the lawn sprinklers and other sources of spray such as a garden hose or a pressure washer.
- Direct sunlight on the inverter could raise internal temperatures, causing a reduction of output power during hot weather. It is recommended to install the inverter in a shaded area, away from direct exposure to sunlight for better performance.
- The performance of the product might be impaired without adequate ventilation. Allow a clearance of at least 23.6 in (600 mm) at the sides of the inverter.
- Do not obstruct the air intakes and outlets.

**Failure to follow these instructions can result in equipment damage.**

## Improper Usage

It is recommended not to install Conext CL inverter under the following conditions:

- Environment with flammable conditions.
- Usage of substandard safety devices along with the equipment.
- Installation of the inverter in conjunction with other equipment which is not recommended in this user manual or not meant for this application.
- Installation or handling the inverter without proper understanding of the procedure specified in this manual.
- Improper installation clearance between adjacent inverters.
- In corrosive environments, including but not limited to acidic rain and chemical plants.



**⚡ ⚠ DANGER**

**HAZARD OF CRUSH OR STRAIN**

Follow the correct procedures when lifting, moving, or mounting the inverter.

**Failure to follow these instructions will result in death or serious injury.**

***NOTICE***

**RISK OF EQUIPMENT DAMAGE**

When removing the inverter, place it on cardboard to prevent cosmetic damage to the back surface.

**Failure to follow these instructions can result in equipment damage.**

Correct Mounting Position

***NOTICE***

**RISK OF EQUIPMENT DAMAGE**

- Mount the inverter only upright or at an angle of 10 degrees with reference to a ground plane (plastic louvers facing downward) and only on a flat surface.
- Do not install the inverter horizontally.
- Local codes might impose additional mounting requirements in case of earthquake or other high-risk areas.

**Failure to follow these instructions can result in poor performance or damage to equipment.**

The correct mounting position is as shown in Figure 2-6. Examples of incorrect positions are shown in Figure 2-7. The inverter does not require any clearance at the rear side and it may be mounted flat on a surface with a minimum of 10° inclination. Install the device at eye level for optimum user comfort.

Note: For lay flat installation, it is recommended to install the inverter on a Power Rack and PowerSkid (not included in the package). The ordering details for Power Rack and PowerSkid: Part number: BTK10-IPS-SCH-XX. For more details, <http://www.benteksolar.com>.

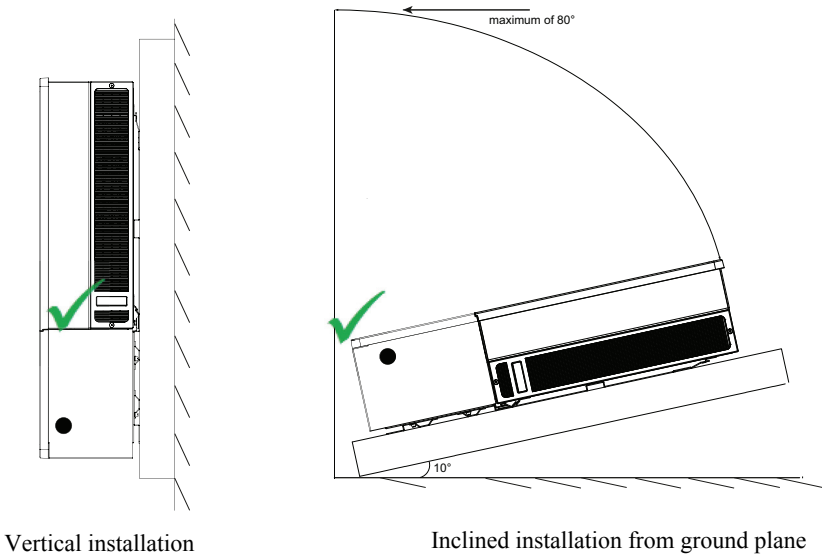


Figure 2-6 Correct mounting position

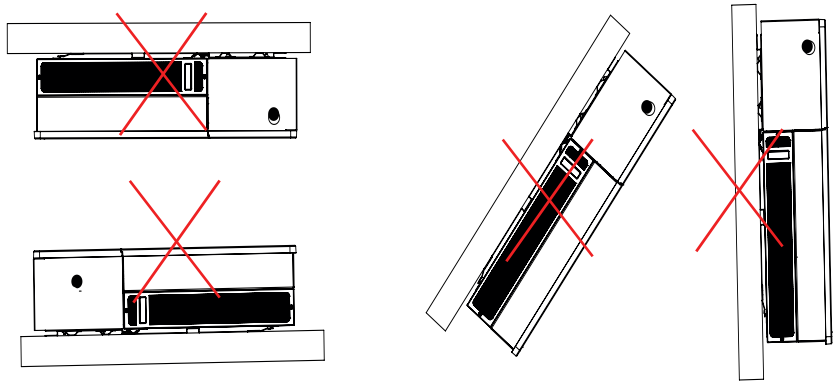


Figure 2-7 Incorrect mounting positions



## Wiring Box Configurations

There are five models of the wiring box available for Conext 18000NA and Conext 25000NA products.

		Base	Essential	Essential plus	Optimum	Optimum plus
Cable Entry	Bottom	✓	✓	✓	✓	✓
	Side	✓	✓	✓	✓	✓
DC connection	Knock-out size	1"	1"	1"	1"	1"
	Conductor size	#10 to #6 AWG	#10 to #4 AWG	#10 to #4 AWG	#10 to #4 AWG	#10 to #4 AWG
	Connection type	Spring connector	Screw type	Screw type	Screw type	Screw type
	Single MPPT configuration	✓	✓	✓	✓	✓
AC connection	Knock-out size	1"	1"	1"	1"	1"
	Conductor size	#10 to #4 AWG	#10 to #4 AWG	#10 to #4 AWG	#10 to #4 AWG	#10 to #4 AWG
	Connection type	Spring connector	Spring connector	Spring connector	Spring connector	Spring connector
DC protection	Touch-safe fuse holder		✓	✓	✓	✓
	DC switch		✓	✓	✓	✓
	DC SPD (Two)				✓	✓
	Arc Fault Detection (AFD)			✓		✓
AC protection	AC SPD (One)				✓	✓

\* PV connectors:

- (8x) male connector.

- (8x) female connector.
- \*\* Applicable only for 4 to 10 mm<sup>2</sup> single insulated copper cable.
- \*\*\* Applicable only for 10 mm<sup>2</sup> (max) single insulated copper cable.

The different features of the five wiring box layouts are as shown below:

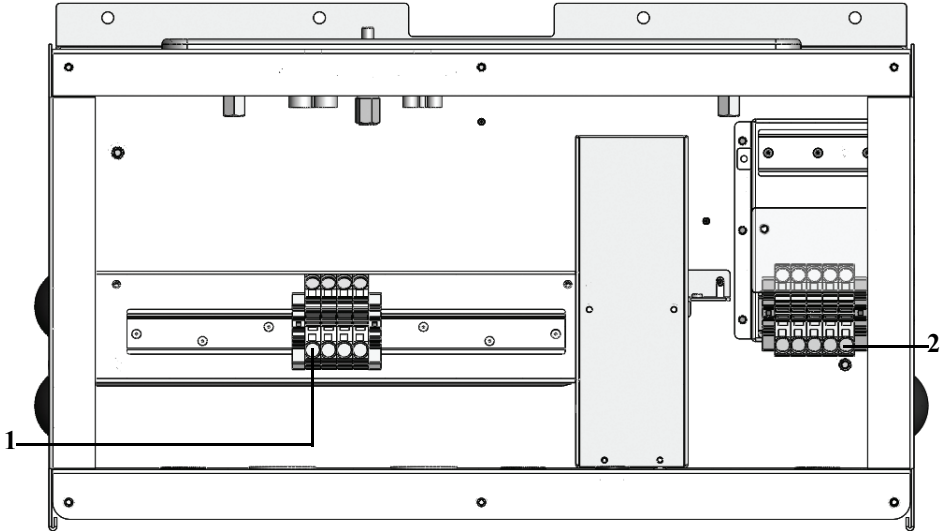


Figure 2-10 Wiring box- Base (PVSC1825NA100)

Table 2-3 Wiring box- Base (PVSC1825NA100)

Ref:	Description
1	DC terminal block
2	AC terminal block

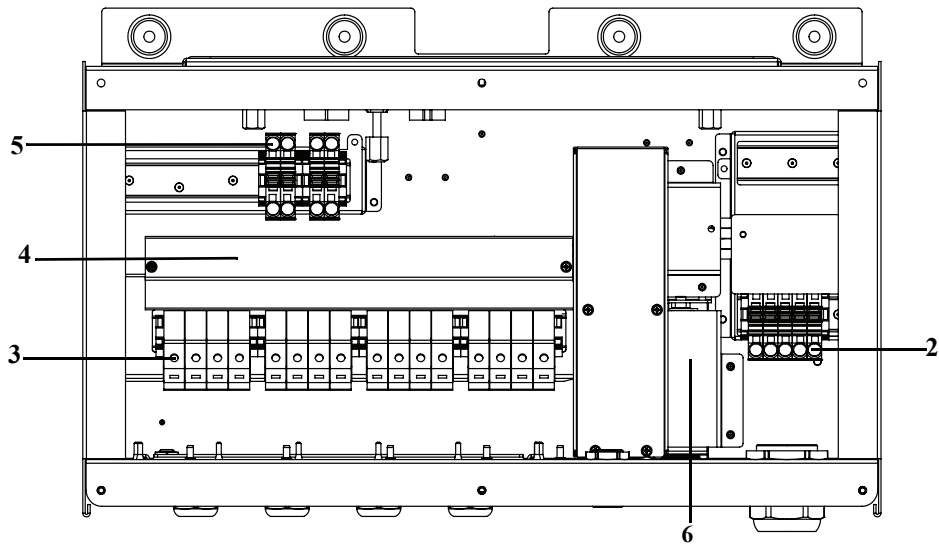


Figure 2-11 Wiring box- Essential (PVSC1825NA200)

Table 2-4 Wiring box- Essential (PVSC1825NA200)

Ref:	Description
2	AC terminal block
3	DC fuse holder
4	Fuse holder insulator
5	MPPT shorting terminal block
6	DC disconnect switch

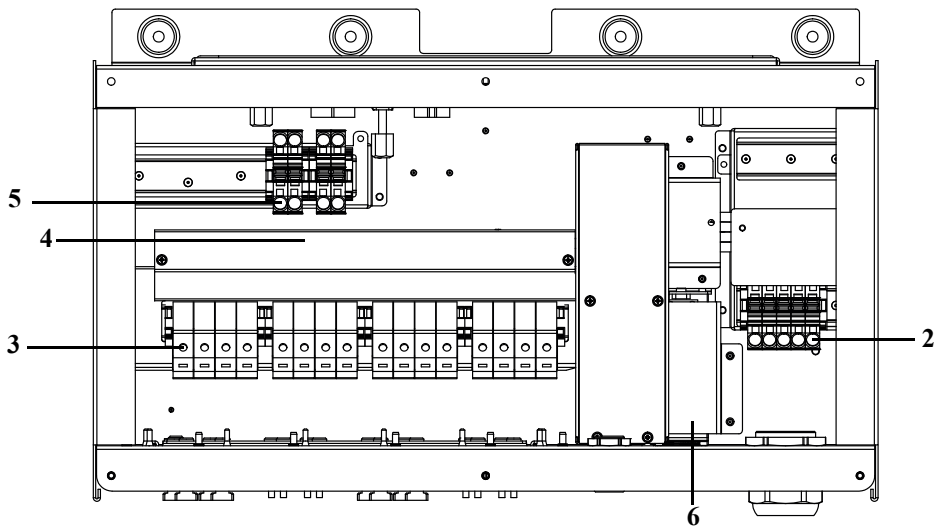


Figure 2-12 Wiring box- Essential plus (PVSC1825NA201)

Table 2-5 **Wiring box- Essential plus (PVSC1825NA201)**

Ref:	Description
2	AC terminal block
3	DC fuse holder
4	Fuse holder insulator
5	MPPT shorting terminal block
6	DC disconnect switch

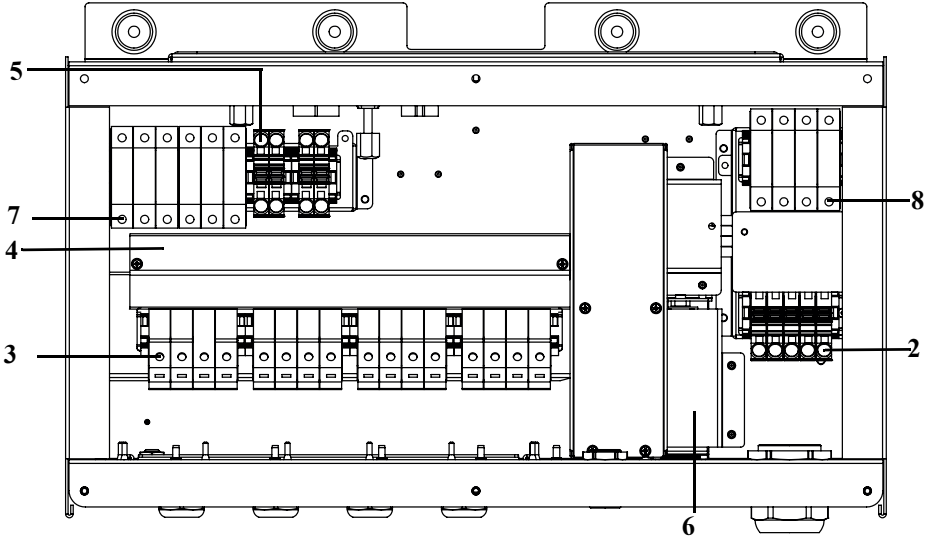


Figure 2-13 **Wiring box- Optimum (PVSC1825NA300)**

Table 2-6 **Wiring box- Optimum (PVSC1825NA300)**

Ref:	Description
2	AC terminal block
3	DC fuse holder
4	Fuse holder insulator
5	MPPT shorting terminal block
6	DC disconnect switch
7	DC SPD - Surge protection device
8	AC SPD - Surge protection device

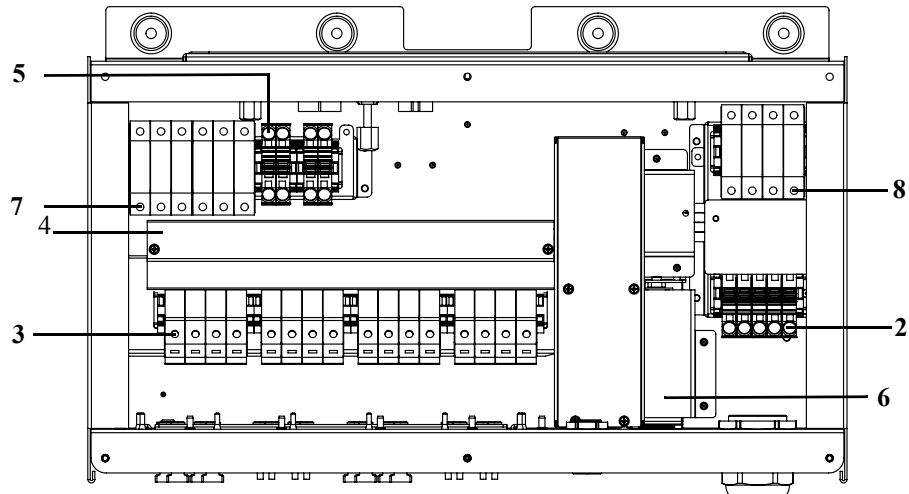


Figure 2-14 **Wiring box- Optimum plus (PVSCL1825NA301)**

Table 2-7 **Wiring box- Optimum plus (PVSCL1825NA301)**

Ref:	Description
2	AC terminal block
3	DC Fuse holder
4	Fuse holder insulator
5	MPPT shorting terminal block
6	DC disconnect switch
7	DC SPD - Surge protection device
8	AC SPD - Surge protection device

## Tools Required

To install the inverter, the following tools are required:

- Slotted screwdriver set
- #2 Phillips screwdriver or power screwdriver for mounting the bracket
- Flat screw driver (~1/4" wide)
- Wire stripper and crimping tool for both AC and DC wiring
- Bubble level or Spirit level to ensure the straight installation of the mounting bracket
- Torque adjustable wrench (metric)
- Torx head screw driver T25



## Torque Table

Table 2-8 **Torque table**

Fastener Type	Description	Torque Nm/in-lbf
M5	Wiring box front cover screw	2.75/ 24.3
M8	Wiring box and wall mount screw	6/ 53.1
M8	Inverter and Wiring box bracket screws	6/ 53.1
Guide Bushing screw	Inverter and Wiring box guide bushing locking screw	10/ 88.5
Thumb screw	Inverter and Wiring box power connector thumb screw	5/ 44.3
M6 Nut	Second protective equipment grounding	5/ 44.3
M4	Wiring Box Fuse Insulator	0.75/6.6
Phillips head (#2)	Fuse holder termination screw	3/ 26.6

## Mounting

This section describes how to mount the inverter and the wiring box to the mounting surface.

### **⚠ CAUTION**

#### **CRUSH HAZARD**

- Always use the specified and sufficient number of screws to install the mounting brackets.
- Ensure to fasten the mounting bracket tightly to the wall or mounting structure.
- The service person should be equipped with appropriate PPE.
- Lift the inverter with the help of another person.

**Failure to follow these instructions can result in moderate or serious injury.**

### Fastening the Mounting Plate to the Wall

To fasten the mounting plate to the wall:

Install the wiring box mounting bracket first, and then mount the inverter bracket using the locating pins.

1. Select a wall or other suitable, solid, vertical surface capable of supporting the weight of the inverter and the wiring box.
2. Maintain a minimum clearance of 36" from the ground to the bottom edge of the wiring box mounting bracket. Refer to the Figure 2-15 on page 2-21.
3. Using the five M8 screws, securely attach the wiring box mounting bracket to the mounting surface. An example of mounting on plywood, wallboard, and wall studs is shown in Figure 2-16 on page 2-22.
4. Align the inverter mounting bracket using the two alignment pins. Refer to the Figure 2-17 on page 2-23.
5. Secure the bracket to the mounting surface using two M8 screws. An example of mounting on plywood, wallboard, and wall studs is shown in Figure 2-17 on page 2-23.
6. Use a level to ensure that the mounting bracket is horizontal.

## Dimensions of the Mounting Brackets

The dimensions of the mounting brackets are as shown in figure below.

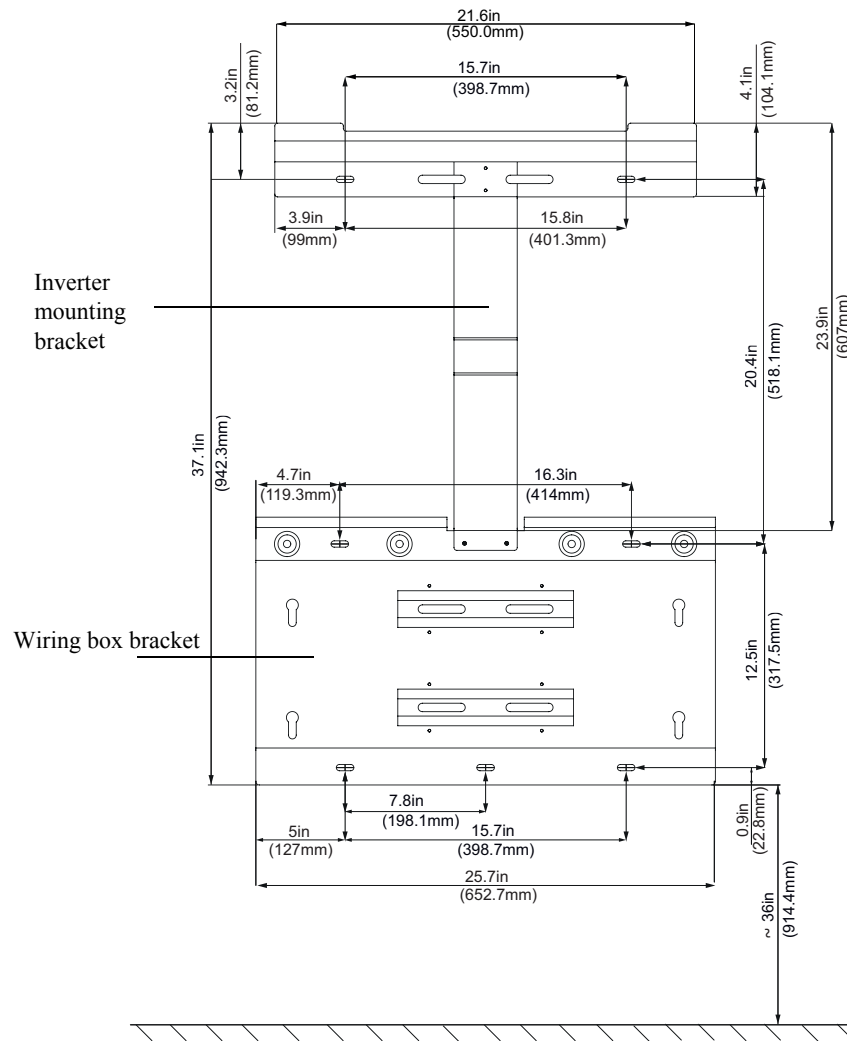


Figure 2-15 Mounting bracket dimensions- Wiring box and Inverter

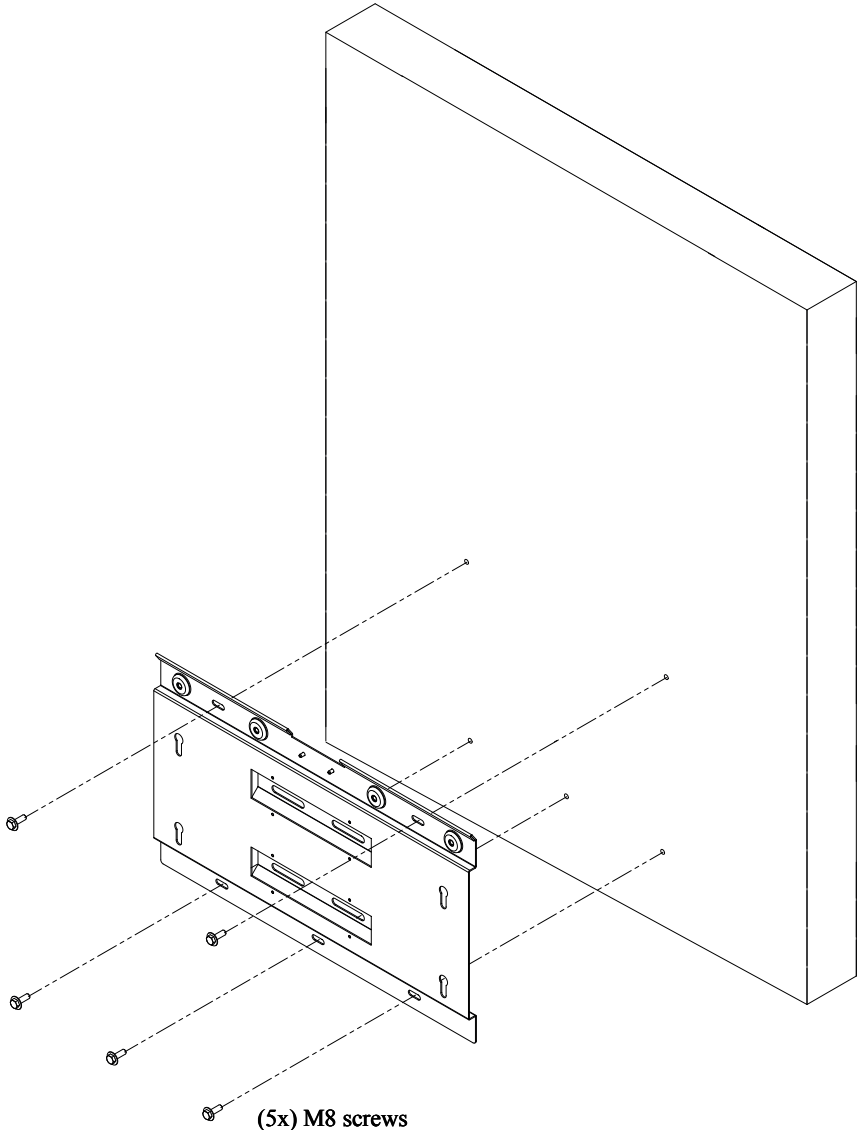


Figure 2-16 Fastening the wiring box mounting plate to the wall

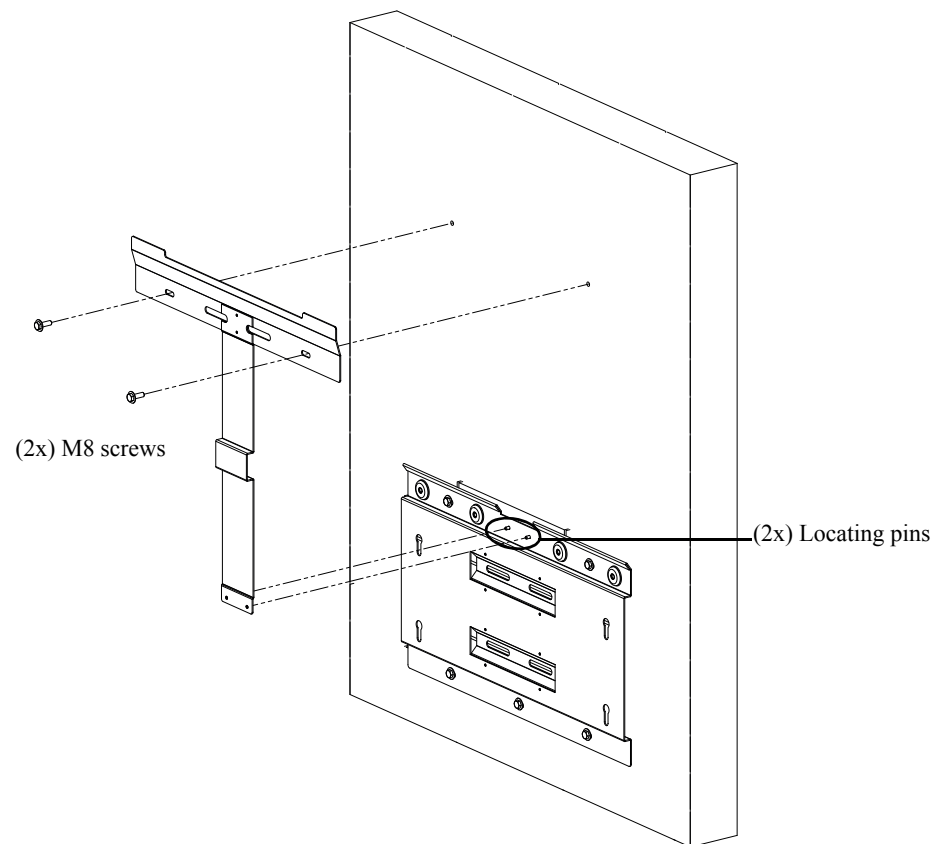


Figure 2-17 Fastening the inverter mounting plate to the wall

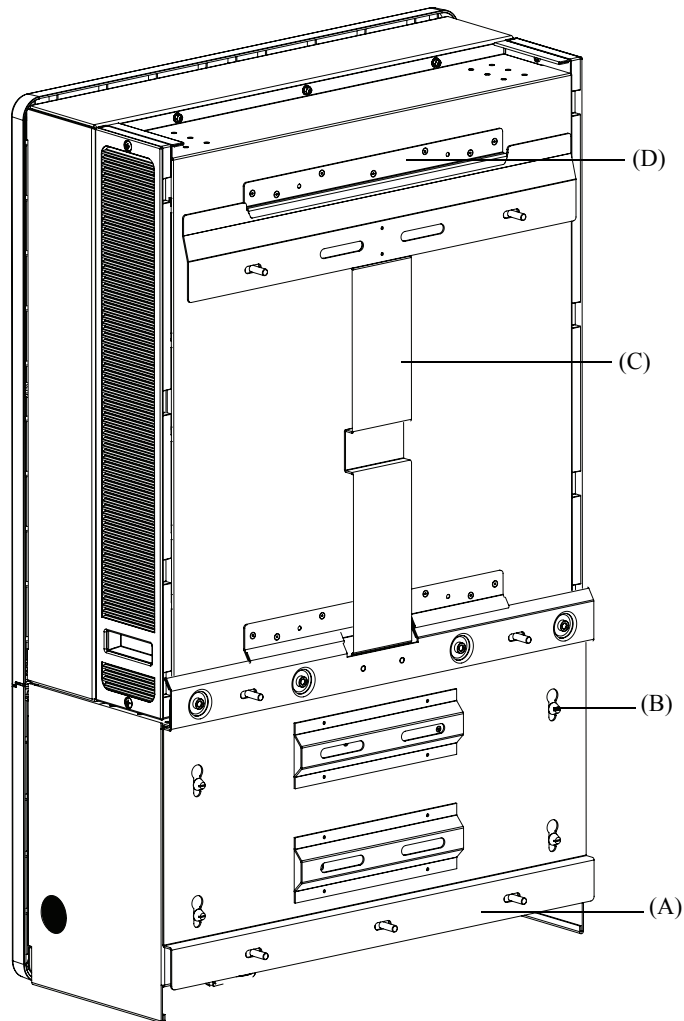


Figure 2-18 Inverter rear view with mounting bracket

- (A) Mounting bracket- wiring box
- (B) Locating pin
- (C) Mounting bracket - inverter
- (D) Mounting flange

## Pole Mounting

Conext CL inverter can be mounted on a pole structure with three additional U-clamps. (not included in the package).

The ordering details for U-clamp: Part number: 3042T67  
(for a pole diameter of 6").

For more details, <http://www.mcmaster.com/#catalog/121/1564/=xcg6cl>

The installation details for U-clamp with the inverter and wiring box mounting bracket are as shown below. The U-clamp grips the entire circumference of the pole for a secure hold. It has two locking nuts; additional hex nuts can be added.

Conext CL inverter is tested with McMaster U-clamps for a pole size of 6" diameter.

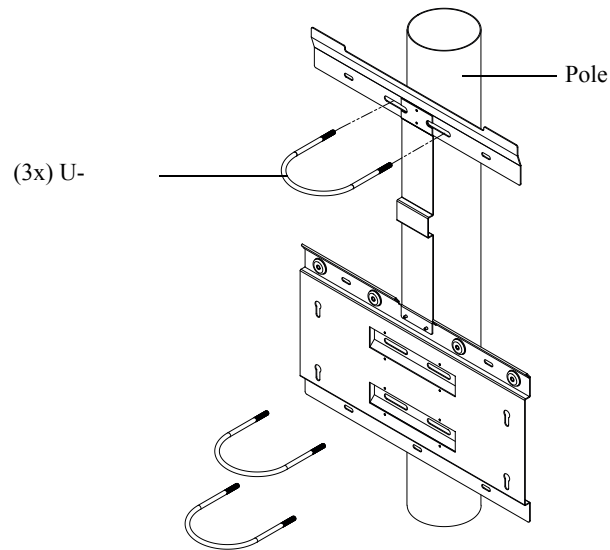


Figure 2-19 Front view of the pole mounting installation

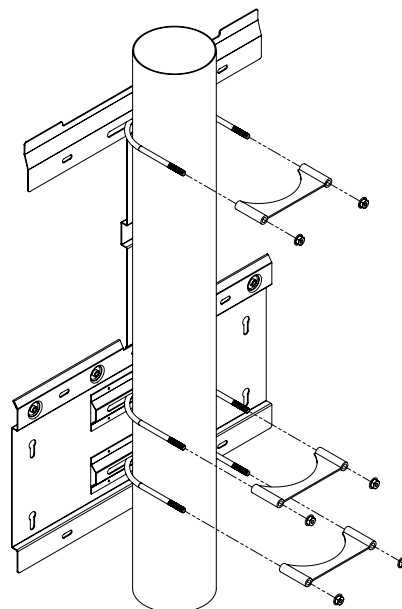


Figure 2-20 Rear view of the pole mounting installation

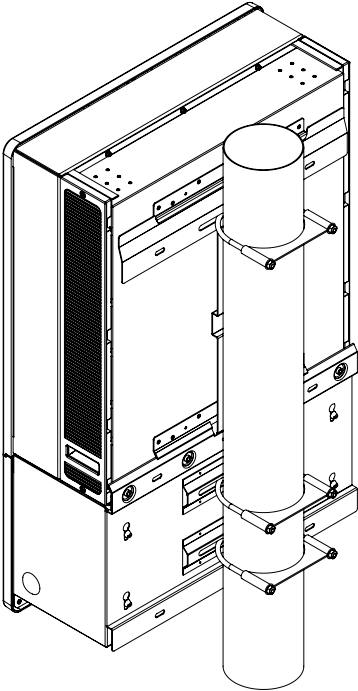


Figure 2-21 Pole mounting- rear view with the inverter installed

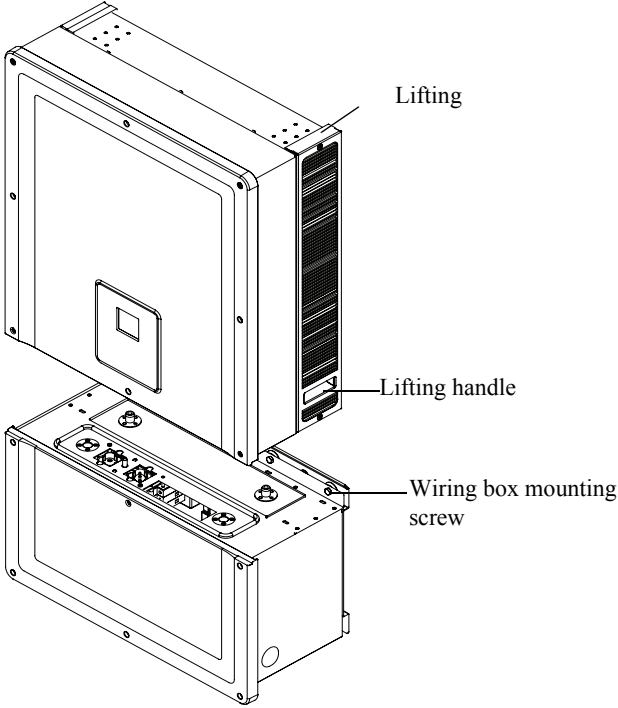


Figure 2-22 Inverter and Wiring box- Exploded view



## Mounting the Wiring box and Inverter

To mount the wiring box

1. Align the locating pins of the wiring box to the mounting slots on the lower mounting bracket. Refer to the Figure 2-23 on page 2–28.
2. Slide down the wiring box to stay on the mounting bracket.
3. Secure the wiring box in place and tighten using the four M8 screws firmly, as shown in Figure 2-24 on page 2–29. Refer to the Table 2-8, Torque table on page 2-17 for torque values.
4. Open the front cover of the Wiring box as shown in Figure 2-25 on page 2–29.
5. Remove the connector cover by loosening the guide bushing as shown in Figure 2-26 on page 2–30.
6. Anchor the connector cover as shown in Figure 2-27 on page 2–30.

Note: This plate is required to prevent dust and water ingress, when the inverter is removed for service.

### CAUTION

#### **PINCH HAZARD**

- Use extreme caution while lifting the inverter.
- Ensure that the inverter mounting hook fully engages with the mounting plate.
- After placing the inverter into the mounting bracket, carefully release your hands off the lifting provision.

**Failure to follow these instructions can result in moderate or serious injury.**

To mount the inverter

1. Lift the inverter using the lifting provision as shown in Figure 2-22 on page 2–26.
2. Place the inverter on the mounting bracket, and ensure that the upper edge of the mounting bracket engages the flange on the upper edge at the back of the inverter. Refer to the Figure 2-18 on page 2–24.
3. Ensure that the guide bushing (2x) provided with the inverter engages with the wiring box bushing. Refer to the Figure 2-28 on page 2–31 and Figure 2-29 on page 2–31.
4. Tighten the guide bushing screw of the wiring box as shown in Figure 2-30 on page 2–32. Ensure that the inverter and the wiring box are clamped/ fixed together firmly. Refer to the Table 2-8, Torque table on page 2-17 for torque values.
5. Lock the inverter and the wiring box power connectors using the thumb screw provided as shown in Figure 2-31 on page 2–32.

Note: Ensure to use the correct torque values, refer to the Table 2-8 on page 2–19.

**⚠ ⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, FIRE AND EQUIPMENT DAMAGE**

Ensure to tighten the power connector between the inverter and the wiring box and avoid poor electrical contact.

**Failure to follow these instructions will result in death or serious injury.**

6. Complete the DC, AC, equipment ground connection and Communication Interface connections as described in the following sections. Refer to the page 2-33.
7. Close the front cover as shown in Figure 2-32 on page 2-33. Ensure that the front cover is fastened correctly as per the specified torque value. Refer to the Table 2-8, Torque table on page 2-17 for torque values.
8. Peel off the adhesive backing and fix the silicone layer (provided along with the packaging) on the LCD panel as shown in Figure 2-33 on page 2-33.

Note:

- Clean the surface of the LCD panel before affixing the silicone layer.
- The clarity of the display might be reduced after fixing the label.

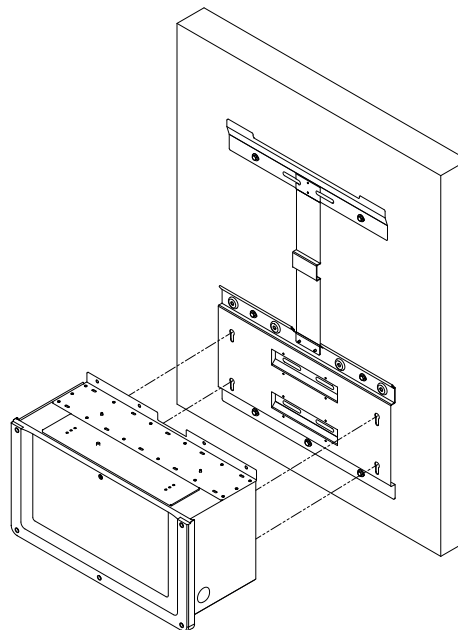


Figure 2-23 Mounting the wiring box on the bracket

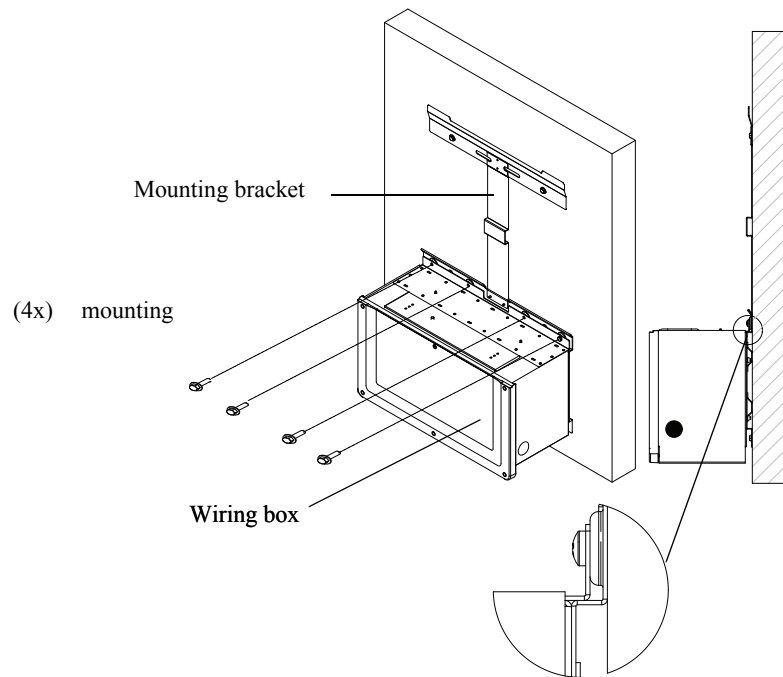


Figure 2-24 **Fastening the wiring box to the mounting bracket**

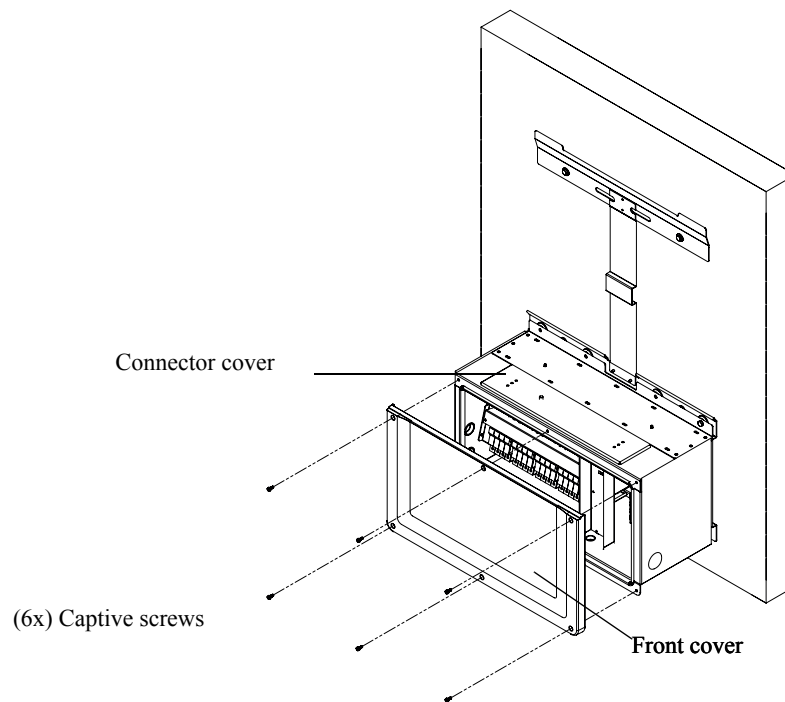


Figure 2-25 **Opening the front cover of the wiring box**

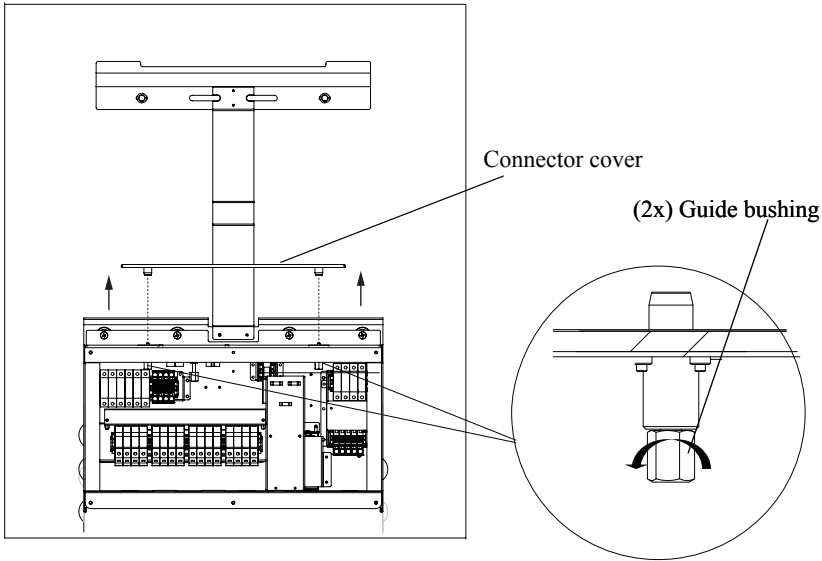


Figure 2-26 Removing the connector cover

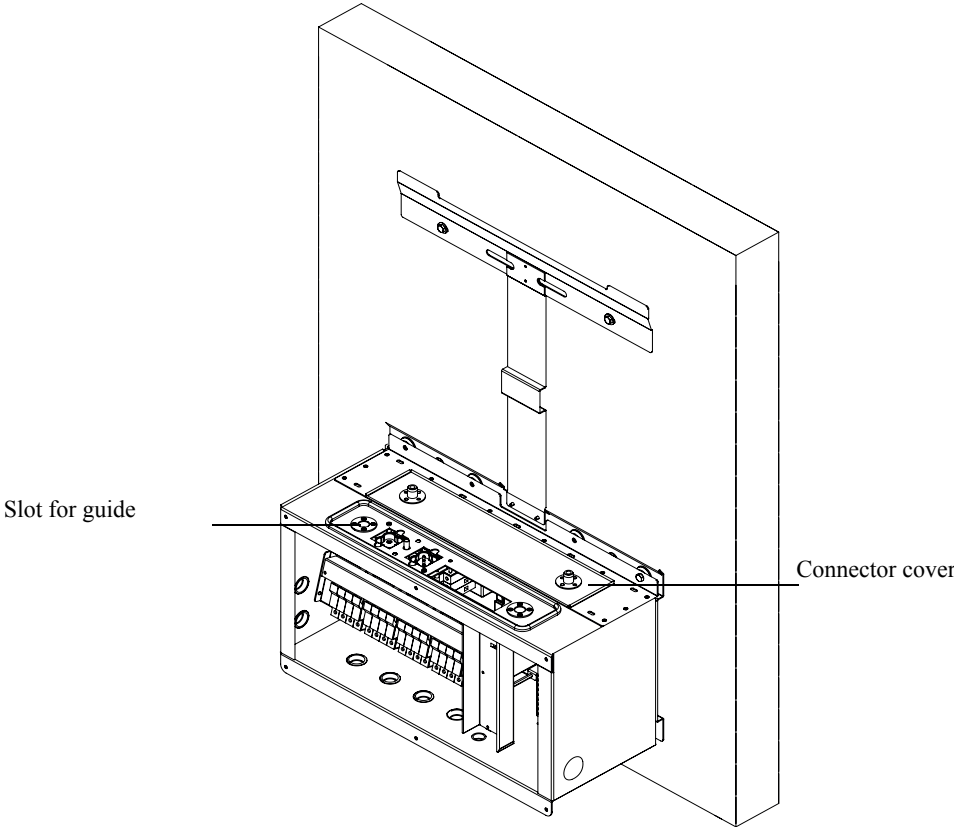


Figure 2-27 Anchoring the connector cover

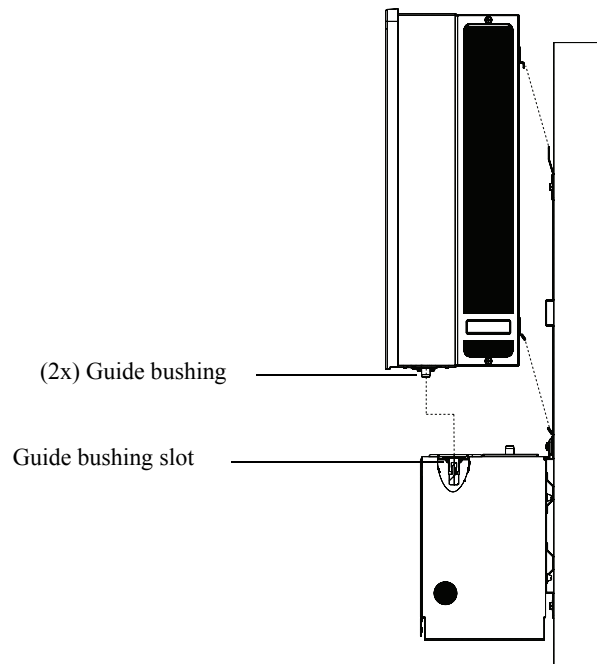


Figure 2-28 Inverter assembly- side view

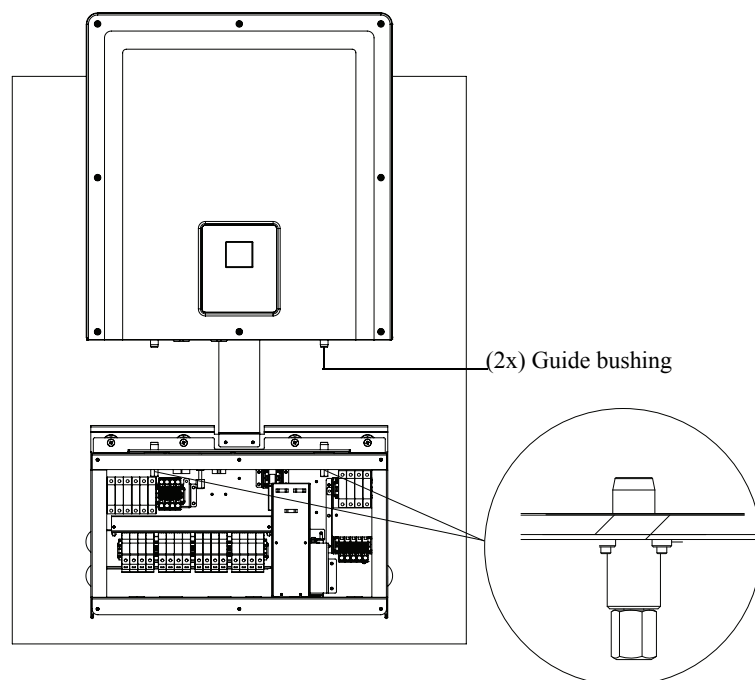


Figure 2-29 Inverter assembly- front view

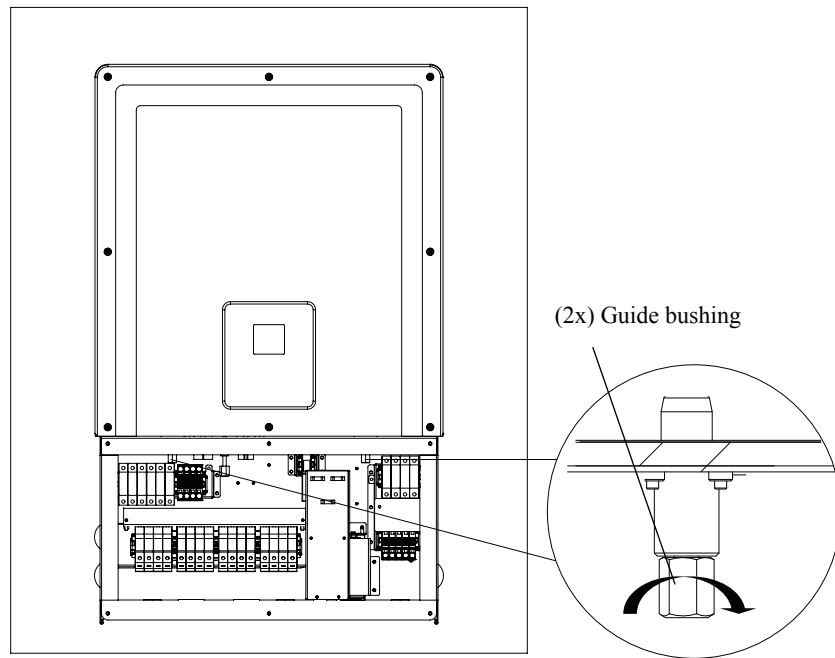


Figure 2-30 Locking the inverter to the wiring box

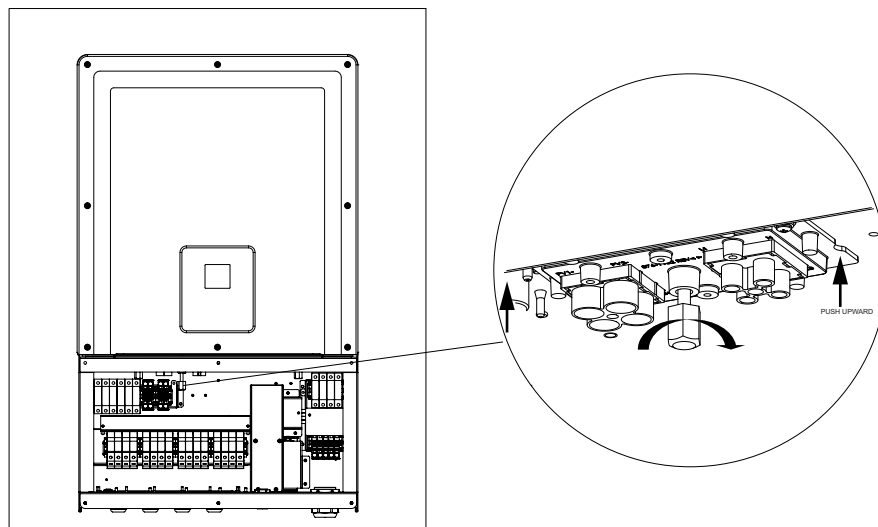


Figure 2-31 Locking Inverter and Wiring box power connector

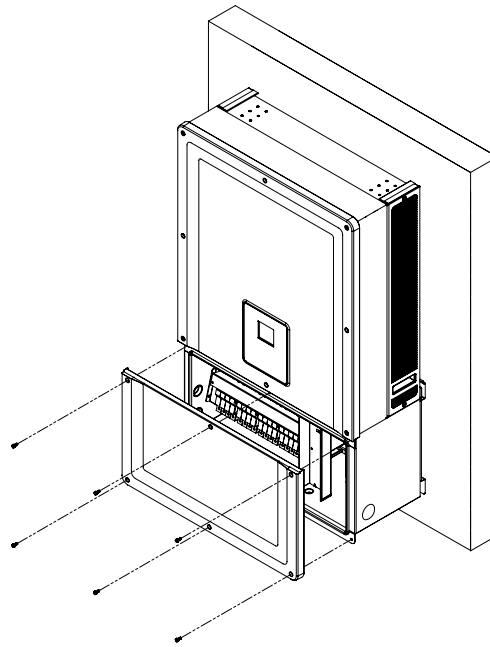


Figure 2-32 Closing the wiring box

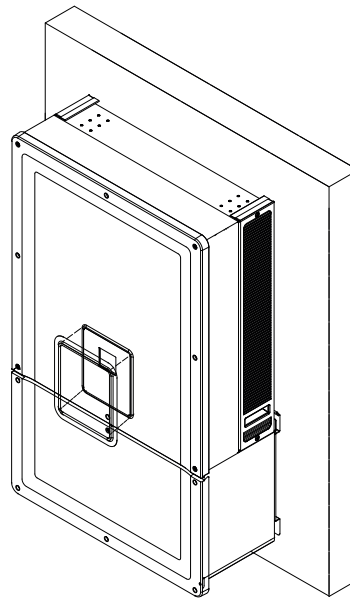


Figure 2-33 Affixing the silicone layer

## Planning and Wiring

This section describes the PV Planning, DC Wiring to the inverter, and AC grid connection Planning and Wiring.

### **DANGER**

#### **HAZARD OF ELECTRIC SHOCK AND FIRE**

- All the electrical work must be done in accordance with the local electrical codes.
- Conext CL inverter has no user serviceable parts inside. To be installed and serviced only by qualified personnel equipped with appropriate PPE and following safe electrical work practices.
- Before installation, de-energize the AC and PV sources using external disconnecting means provided in the installation.
- Test using a meter rated at least 600 VAC and 1000 VDC to make sure all the circuits are de-energized. Follow a lock-out tag-out procedure.
- Connect the PV conductors, only after earthing the inverter through the AC connection and the earthing terminal.

**Failure to follow these instructions will result in death or serious injury.**

## Recommended Protection Devices and Conductor Sizing

### **CAUTION**

#### **HAZARD OF FIRE**

- To reduce the risk of fire, connect the inverter only to a circuit provided with 39A maximum branch circuit overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA 70.
- The inverter shall be connected only to a dedicated branch circuit.

**Failure to follow these instructions can result in moderate or serious injury.**

It is the responsibility of the installer to determine and provide the external over current protection and disconnecting means if required, in addition to the integrated features for the PV input wiring. Determine the need for over current protection, and its rating or setting, based on the:

- Applicable installation codes, as per ANSI/NFPA 70 or the Canadian Electrical Code® CSA C22.1 wiring methods and section 690.35 section for installation.
- Array currents involved
- Current ratings (see **Specifications** on page A-1)
- Expected ambient temperatures
- Any other system parameters required by the installation codes.



## Planning

This section provides information about the PV planning.

### PV Planning

#### **DANGER**

##### **HAZARD OF ELECTRIC SHOCK, FIRE AND EQUIPMENT DAMAGE**

Use this inverter only with PV modules that have a UL Class A rating.

**Failure to follow these instructions will result in death or serious injury.**

#### **NOTICE**

##### **RISK OF EQUIPMENT DAMAGE**

- Do not ground either the positive or negative conductor from the PV array.
- The maximum power of an array connected to each MPPT must not exceed 11400 W (for Conext CL 18000NA inverter) or 15900 W (for Conext CL 25000NA inverter).

**Failure to follow these instructions can result in equipment damage.**

#### **WARNING**

##### **HAZARD OF ELECTRIC SHOCK, FIRE, AND EQUIPMENT DAMAGE**

- The PV array voltage must never exceed 1000 VOC (open circuit voltage) under any condition.
- The DC conductors of this photovoltaic system are ungrounded and may be energized.
- The Absolute Maximum PV array  $I_{SC}$  (short circuit current) must not exceed the specified limit per MPPT under any conditions.

**Failure to follow these instructions can result in death or serious injury, and equipment damage.**

Conext CL must be used only with ungrounded/ floating connections, wherein the positive and negative terminals of PV array are not grounded. The inverter design is compatible with Mono Crystalline or Polycrystalline panel.

Ensure that the following requirement is met for installation:

All the components installed between the PV array and the inverter shall be rated for at least 1000 VDC and as per the applicable installation codes.

Table 2-9 **PV input parameters**

Parameter	Conext CL 18000NA	Conext CL 25000NA
Maximum input voltage, open circuit	1000 VDC	1000 VDC
Maximum input current per MPPT	32 A	26.5 A
Absolute maximum short circuit current per MPPT	36 A	36 A
MPPT full power range	300 - 800 V	500 - 800 V

Note: For more details, refer to the **System Specifications** on page A-2.

Any cable or wiring located outdoors must be outdoor rated, UV (sunlight) resistant with suitable voltage and flammability rating, and should comply with the local code requirements.

NOTICE
RISK OF EQUIPMENT DAMAGE
To ensure protection class TYPE 4 (electronics)/ TYPE 3R (rear portion), and to protect against penetrating moisture and dirt, close the unused inputs and outputs with the hole plugs provided.
<b>Failure to follow these instructions can result in equipment damage.</b>

### PV Wiring Diagrams

The inverter can accept PV input on all the four PV array input terminals on each MPPT. A maximum of four PV string inputs can be connected to each MPPT.

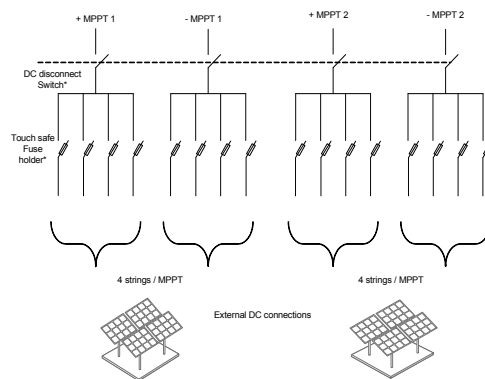


Figure 2-34 **PV Wiring diagram**

\*Not applicable for the base model

## Independent or Parallel Configuration of Two Inputs

Conext CL inverters have dual PV input circuits, each with independent Maximum Power Point Tracking (MPPT) control. The inverter has the flexibility to configure for dual/single MPPT operation mode. When operated in the dual input mode, the inverter can optimize the operating point of the two independent arrays. Each of the input is dedicated to a separate array with an independent MPPT control. This means that the two arrays can be installed with different orientation.

### Dual MPPT Configuration

This configuration is most suitable for PV installations with multi roof orientations and asymmetrical string sizes. The dual MPPT design permits two separate PV input circuits for each MPPT trackers.

### Single MPPT Configuration

This configuration is most suitable for PV installation with homogeneous panel orientation and symmetrical string sizes. The single MPPT configuration permits only one PV input circuit. Both the MPPT trackers are wired and operate in parallel. The MPPT parallel option is applicable for all the models. For more information on selecting the MPPT, refer Figure 3-3 on page 3–7.

To operate the inverter in single MPPT mode,

1. Connect the MPPT shorting terminal block by means of a solid copper jumper, (provided with the wiring box accessory kit), to parallel the MPPT trackers.
2. Install the jumpers between the two channels (positive and negative) and ensure for proper slide in connection to avoid arcing.

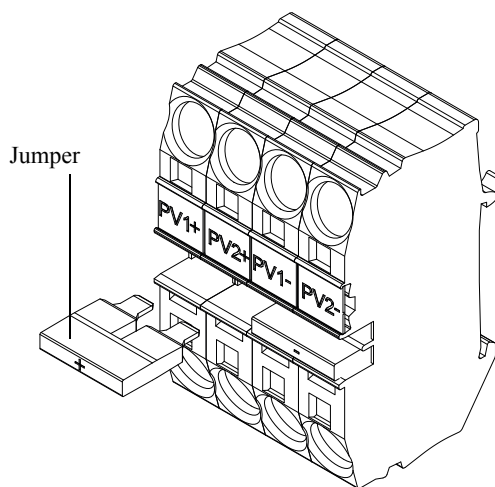


Figure 2-35 MPPT Shorting Connector and Jumper arrangement

PV1(-) and PV2(-): Connect these two terminal blocks with a jumper to parallel the NEGATIVE MPPTs.

PV1(+) and PV2(+): Connect these two terminal blocks with a jumper to parallel the POSITIVE MPPTs.

You can change the MPPT configuration anytime later after the First time power up using the Install Settings menu.

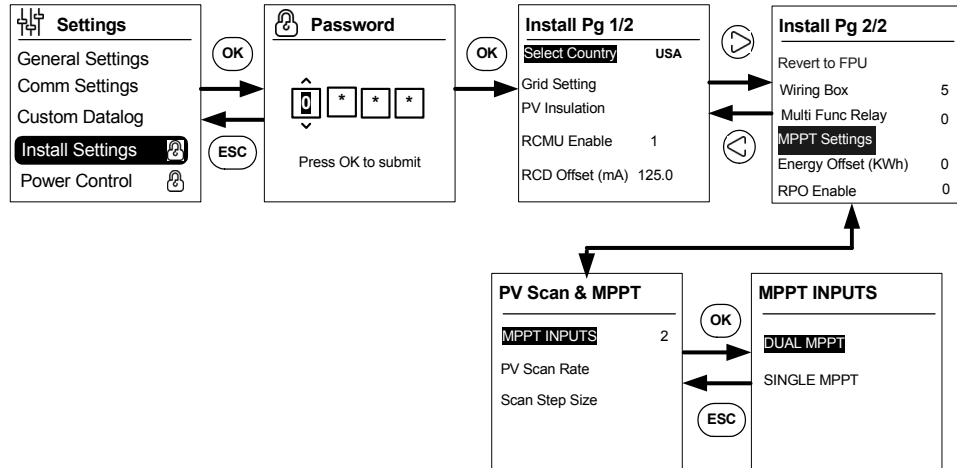


Figure 2-36 MPPT settings through Install settings menu

## DC Wiring (From PV Array)

### DC Wiring Polarity

Conext CL inverter has in-built reverse polarity protection of PV, provided by a diode. The inverter will display error message for any reverse polarity wiring at the DC input. When the array is shorted, there will be no DC voltage on the MPPT input and the PV generator will be in short circuit condition.

<b>NOTICE</b>
<p><b>RISK OF EQUIPMENT DAMAGE</b></p> <ul style="list-style-type: none"> <li>• Ensure that correct polarity is used at all the power connections.</li> <li>• Do not ground either the (+) or the (-) conductor of the PV array.</li> <li>• Avoid reverse polarity. If one of the string polarity is reversed in parallel with other strings, it will cause 2000 VDC across the inverter input.</li> <li>• Ensure proper termination and avoid poor connection.</li> </ul> <p><b>Failure to follow these instructions can result in equipment damage.</b></p>

### DC wiring

Before connecting the wires to the wiring box, ensure that the DC disconnect switch is in the OFF position.

The provision for conduit entries are provided at the bottom and at the left side of the wiring box. Select the appropriate conduit entry as per the location convenience. The conduit entries and the DC disconnect switch are as shown in Figure 1-6 on page 1–7.

The conduit size and associated accessories selection should be appropriate to ensure the TYPE 4 environmental protection.

Cable requirements

- Cable type: solid or stranded, copper wire
- Cross section: 10 AWG (5.3 mm<sup>2</sup>) to 6 AWG (13.3 mm<sup>2</sup>)
- The DC cables must be approved for temperatures over 194° F (+90° C)
- The maximum cable length subject to conductor cross-section must be observed
- The DC cables must be sized in accordance with the installation requirements.

## AC Grid Connection Planning

This section describes the requirements regarding the AC output wiring.

The AC cable must be jacketed and has five insulated copper conductors to allow connection to L1, L2, L3, N, and PE (protective earth). Any cable or wiring located outdoors must be outdoor rated and UV (sunlight) resistant.

The AC terminal block provided can accommodate AC cable sizes from 20 AWG to 4 AWG. The recommended AC cable diameter is 8 AWG to 4 AWG. The length of the cable should be selected to limit the voltage drop to <1%.

It is recommended to use twisted wire cables to reduce the grid line inductance and for improved performance. If single core cables are used in the open duct, keep the distance between the cores as minimum as possible.

**NOTICE**

**RISK OF EQUIPMENT DAMAGE**

- Ensure that L1, L2, L3, line connections are done correctly, not swapped with neutral connections.
- Conext CL inverter supports TN-S, TN-C, TN-C-S and TT connection types (earthing systems). It does not support IT connections.

**Failure to follow these instructions can result in equipment damage.**

## AC Wiring

This section describes how to connect the inverter to the AC grid. All the electrical installations must be carried out in accordance with the applicable local standards. The installer should ensure that the DC input and AC output circuits are isolated from the enclosure and the system grounding. The connection requirements of the grid operator must also be met.

The line voltage must be within the permissible range. (Refer to the **System Specifications** on page A-2.

### Cable requirements

- Cable type: solid or stranded, copper wire.
- Cross section: 10 AWG to 4 AWG.
- The AC cables must be approved for temperatures over 194° F (+90° C).
- The maximum cable length subject to conductor cross-section must be observed.
- The AC cables must be sized in accordance with the installation requirements.

### Installing the Wire

Stripped solid conductors or stranded conductors with ferrules are easily connected by simply pushing the conductor into the wire entry. For conductors rated 20 AWG (0.5 mm<sup>2</sup>) to 6 AWG (13.3 mm<sup>2</sup>) stranded conductors can also be easily inserted without using any tools.

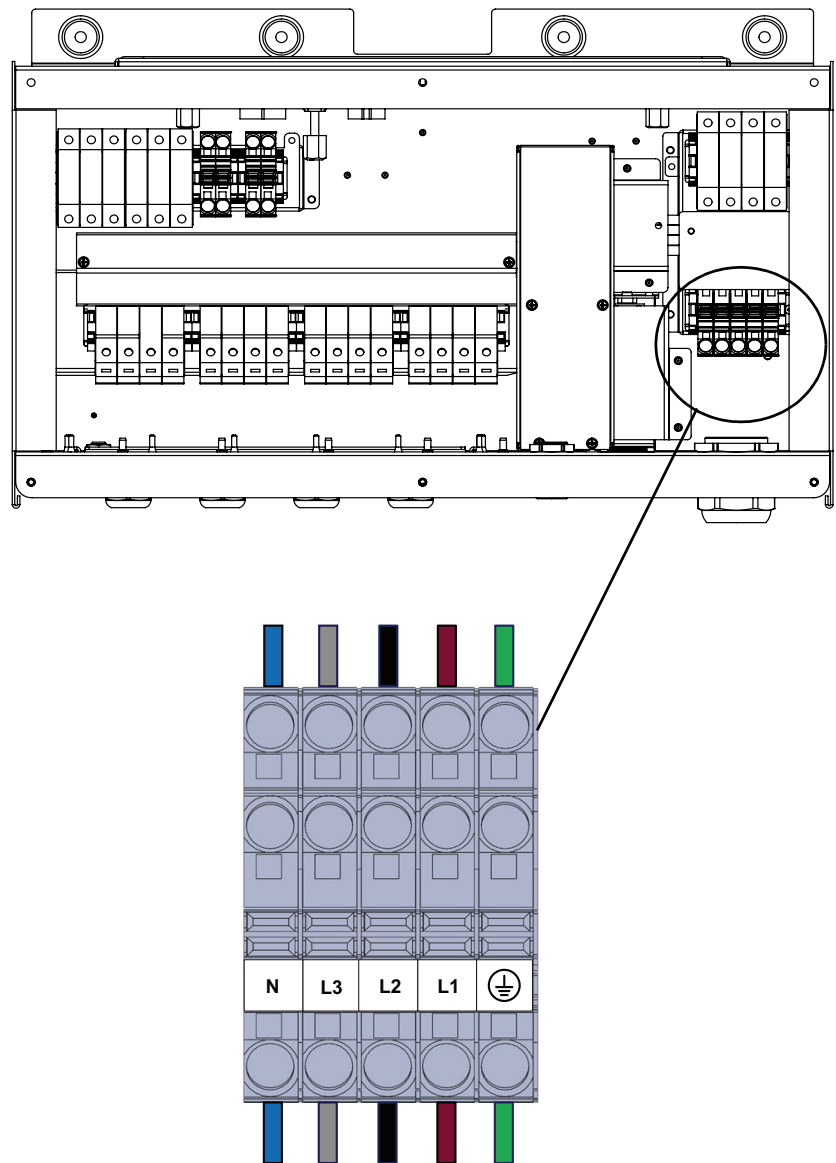


Figure 2-37 **Wire installation**

For wires with smaller cross-section, use a small flat screwdriver (1/4" wide) to connect stranded conductors without ferrules. Refer to the figure below.

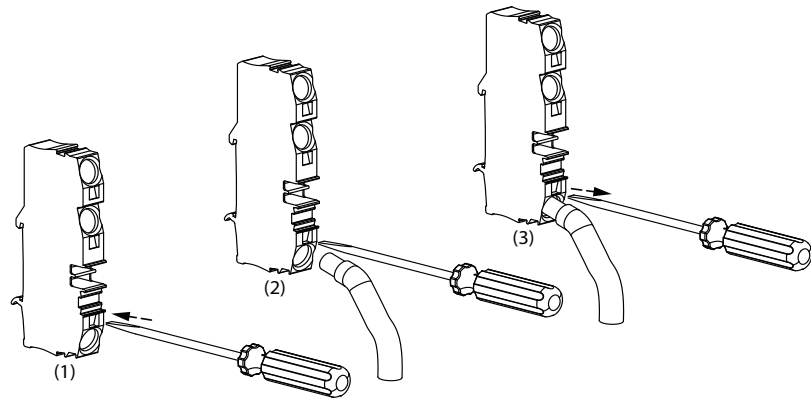


Figure 2-38 Wire installation-2

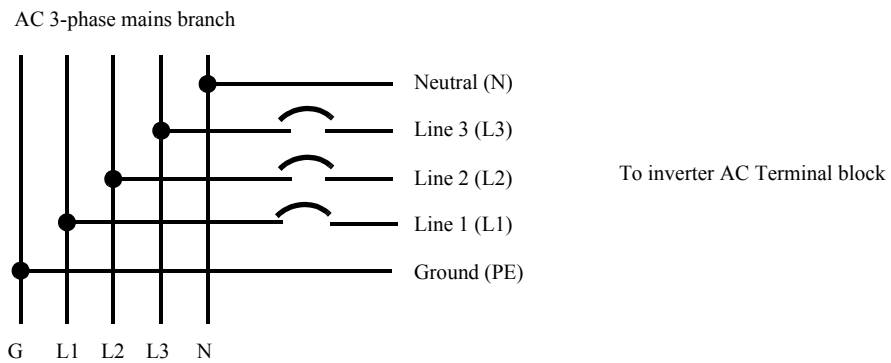


Figure 2-39 AC connection details

Table 2-10 Color-coding to identify the phase sequence (phase rotation)

Component of AC wiring	Color
Line 1 (phase 1)	Brown
Line 2 (phase 2)	Black
Line 3 (phase 3)	Gray
Neutral	Blue
Protective earth	Green

**NOTICE**

**RISK OF EQUIPMENT DAMAGE**

The inverter supports positive and negative phase sequences. The sequence of L1 ~ L3 can be reversed; N and PE are not bonded together and must be connected to the correct pins regardless of the phase sequence.

**Failure to follow these instructions can result in equipment damage.**



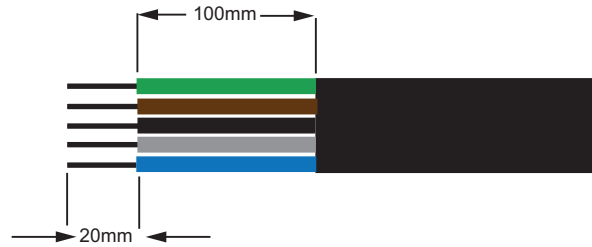


Figure 2-40 AC wiring

- Trim all the wires to 3.94 in (100 mm).
- Using an appropriate tool, strip 0.79 in (20 mm) of insulation from all wire ends.
- Insert the stripped end of each of the five wires into the appropriate hole in the female insert.

### Maximum AC Cable Length

The following table provides recommended maximum cable lengths for 8 AWG, 6AWG and 4AWG conductor size from inverter to AC distribution box.

Table 2-11 AC cable loss details- copper

KVA	Percentage losses (Copper cable)		
AC cable length	8 AWG	6 AWG	4 AWG
<b>18 KVA</b>			
25 m	0.4%	0.22%	0.14%
50 m	0.7%	0.45%	0.28%
75 m	1.1%	0.67%	0.42%
100 m	1.4%	0.90%	0.56%
<b>25 KVA</b>			
25 m	0.7%	0.42%	0.27%
50 m	1.3%	0.85%	0.53%
75 m	2.0%	1.27%	0.80%
100 m	2.7%	1.69%	1.06%

If the AC cable length exceeds 32.8ft (10 m), the use of an AC distribution box closer to the inverter is recommended.

Note: The values mentioned above are only for general reference.

**⚠ ⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, AND ARC FLASH**

- Always be cautious of nicked wire insulation.
- Always use the specified cable length while stripping the AC and DC cable.

**Failure to follow these instructions will result in death or serious injury.**

## Earthing Terminal

The use of an earthing terminal depends on the local installation codes. It is recommended to use this terminal for effective earthing means. It can be used to connect the PV metalwork to earth, or to provide a second protective ground connection for the inverter chassis as required by some countries. It is the responsibility of the installer to determine proper use of this terminal.

Note:

- It is recommended to:
  - follow the local installation codes for earthing conductor size selection.
  - use M6 lug for crimping.
- The DC input and AC output circuits are isolated from the enclosure and that system grounding, if required by Sections 690-40 and 690-42 of the National Electric Code, ANSI/NFPA 70, is the responsibility of the installer. Use at least a minimum of 8 AWG (8 mm<sup>2</sup>) copper earthing conductor.
- The selected cable should be rated for 194° F (90° C) minimum.

**⚠ WARNING**

**HAZARD OF ELECTRIC SHOCK**

If the PV metal work grounding is done at the inverter, removal of the inverter from the wiring box or disconnection of the AC plug from the inverter will leave the PV metal work ungrounded; in these cases provide suitable temporary additional grounding.

**Failure to follow these instructions can result in death or serious injury.**

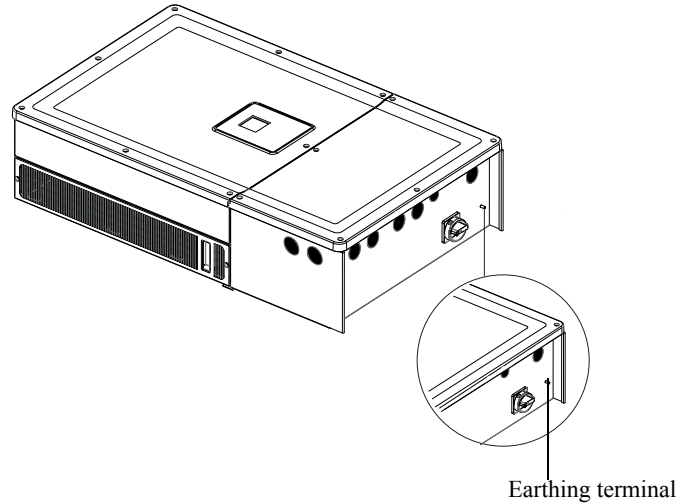


Figure 2-41 Connecting the earthing conductor

## Communication Interface

The communication interface wires are of Safety Extra Low Voltage (SELV) type circuits. Conext CL supports multiple communication interfaces such as Modbus, Ethernet and USB Host services. In addition, the inverter supports RPO (Remote Power Off) and Dry contact relay.

### **⚠ WARNING**

#### **HAZARD OF ELECTRIC SHOCK**

- Connect only to Safety Extra Low Voltage (SELV) circuits.
- The circuits provided for external communications and control equipment are designed to provide isolation from the neighbouring hazardous circuits within the inverter. The communications and control circuits are classified as Safety Extra Low Voltage (SELV) and must only be connected to other SELV circuits of the types described in this manual.
- Maintain physical and electrical separation of the communications and control circuits from non-Safety Extra Low Voltage (SELV) electrical circuits, both within and outside the inverter.

**Failure to follow these instructions can result in death or serious injury.**

The below diagram shows the front view of the communication interface.

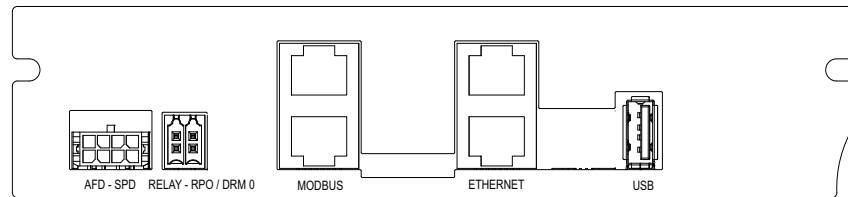


Figure 2-42 **Communication interface**

Note: DRM 0 is applicable only for the Australia country settings.

## Connecting Cables to the Communication Module

To access the communication ports, remove the communication hole plugs. Refer to the Figure 1-3 on page 1–5 for the location of the communication cable.

The connections for the Modbus, Ethernet, RPO and Dry Contact Relay are done through an appropriate conduit connector. The conductor protection should be in-line with the applicable wiring codes.

- For non conduit installations, the cables can be brought into wiring box via a 3/4” box connector with plastic or metal cable glands (UL approved). To maintain TYPE 4X rating, ensure that proper glands are used.
- For conduit use, applicable raceway needs to be placed and termination is done at the wiring box chassis, using conduit connectors appropriate for the raceway. The conduit must be terminated at the 3/4” opening.

The RPO and dry contact relay cables can be connected to the communication card using the mating connectors provided along with the wiring box lit kit. Refer to the Table 2-1 on page 2–4.

## SPD- AFD monitoring cable connection

The SPD- AFD monitoring cable to be connected to communication card as shown in Figure 2-44 on page 2-47.

1. Check for the SPD- AFD monitoring cable at the cable tray end.

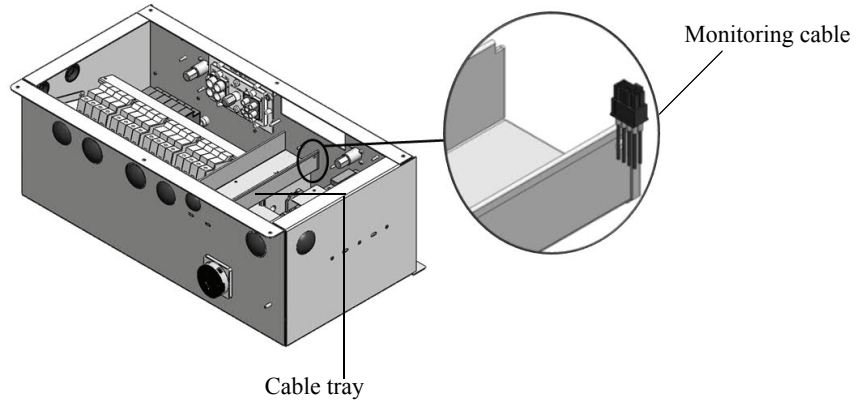


Figure 2-43 SPD- AFD monitoring cable

2. Cut the cable tie to separate the monitoring cable.
3. Remove the ESD cover over the connector.
4. Connect the SPD- AFD monitoring cable to the Comm card.

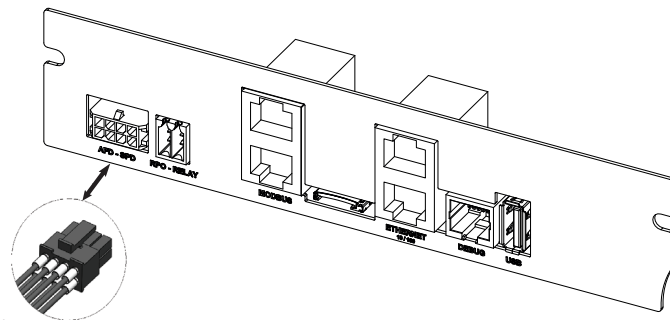


Figure 2-44 SPD- AFD monitoring cable connection

Note:

- The monitoring cable connection to Comm card remains the same for PVSCL1825NA201, PVSCL1825NA300 and PVSCL1825NA301.
- The SPD- AFD connector will not be present in PVSCL1825NA100 and PVSCL1825NA200.

## Modbus RS485 Connection

The pin definitions of the Modbus (RJ-45) connection are shown in Table 2-12. Figure 2-45 on page 2–49 shows the RJ-45 connectors.

Use external Modbus surge protection devices to avoid any damages to Modbus communication circuits when communication cables are exposed outside. Also refer to the application notes (“Modbus/RS485 Wiring for Conext™ Core XC Series Inverters” or "Conext™ SmartBox-BA – Application note on field wiring and surge protection for communication ports") of Conext family devices to choose the external surge protection devices.

<b><i>NOTICE</i></b>
<p><b>RISK OF EQUIPMENT DAMAGE</b></p> <p>Make sure the other end of the Modbus (RS485) connection is also Modbus (RS485). Connection to any other type of communication port, such as Ethernet, may result in an equipment damage.</p> <p><b>Failure to follow these instructions can result in equipment damage.</b></p>

Note:

- Using incorrect pin out for RS-485 cable and interchanging the GND pins, results in discontinuity on the network and poor communication.
- It is recommended to use the shielded Cat5 cable 24 AWG.

Table 2-12 RJ-45 pin details

Pin	Function
4	DATA+
5	DATA-
7	NC (Not connected)
8	Modbus ground

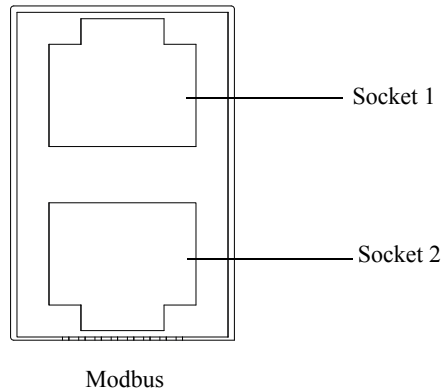


Figure 2-45 Modbus (RS485) connectors

The serial settings for the RS485 connection is shown in Table 2-13.

Table 2-13 Serial settings for the RS485 connection

Parameter	Value
Baud rate	9600 (default), 19200, 38400, 57600, 115200
Data bits	8
Stop bits	1 (default)
Parity	None (default), Odd, Even

## Ethernet Connection

Conext™ CL supports Ethernet communication in star network configurations. By default, the DHCP setting is enabled. For network communication, enable the DHCP setting.

### Home> Settings> Comm Settings> Network Settings

Note: If DHCP is enabled the Inverter acquires the IP address automatically when connected to any router/switch. The DHCP can be enabled or disabled through front display under the shown Figure 2-46 on page 2-49.

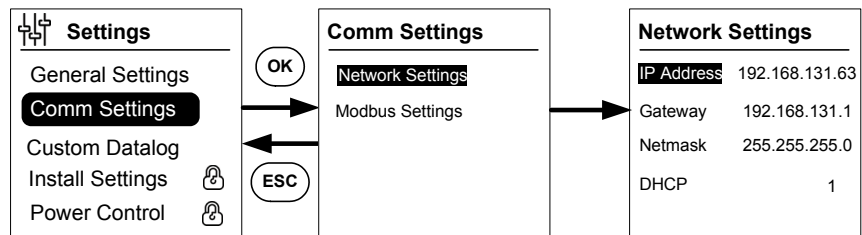


Figure 2-46 Checking the IP address

Ensure to connect the Ethernet cable only to socket1 as shown in Figure 2-47 on page 2–50.

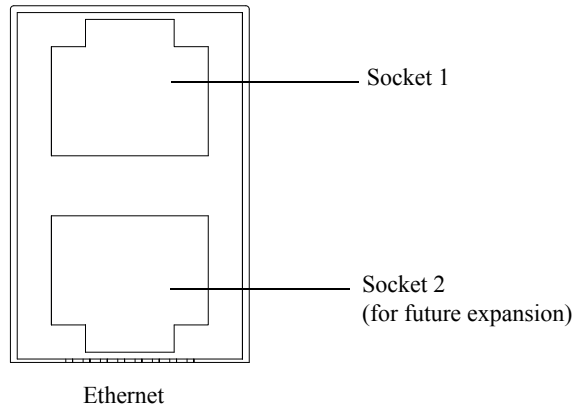


Figure 2-47 Ethernet Connection

The Conext CL inverter also supports direct communication between Inverter and Laptop/PC. To use this feature make the DHCP setting to DISABLE and connect the inverter directly to either PC/laptop using CAT5/CAT6 Cable. In PC/laptop side configure the settings as shown below Figure 2-48 on page 2–50.

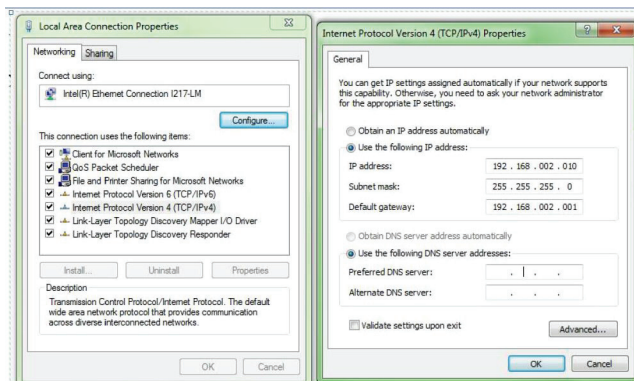


Figure 2-48 Ethernet Connection

## Daisy Chain Configuration

In a single unit configuration, only one RJ45 connection is used and the end terminator plug (Modbus Terminator) provided with the wiring box packaging is connected into the other RJ45 connector as shown in Figure 2-49.



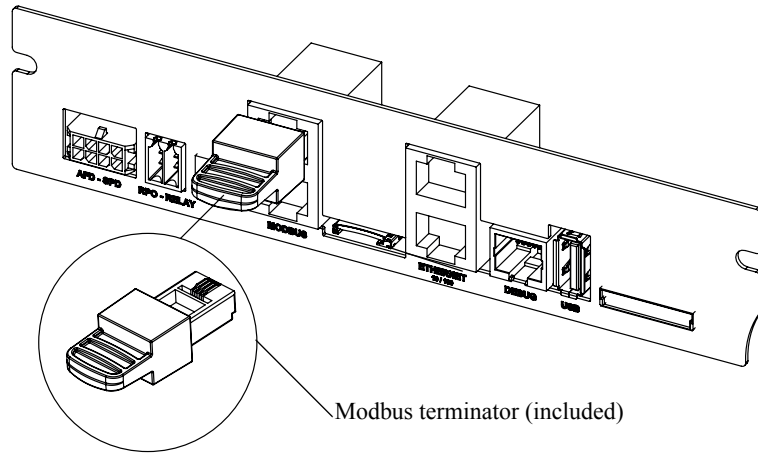


Figure 2-49 **Daisy chain configuration**

Conext CL inverters can be connected in Daisy chain configuration. In this case both RJ45 connections are used except either on the first or the last units in the network. The end terminator plug for the first or last unit should be connected on the RJ45 connector as shown in Figure 2-49. A maximum of 32 inverters can be daisy chained.

Note: Ensure to use a Modbus Terminator in one of the inverters connected in the network, for proper communication.

For multiple inverter connection, refer to the Figure 2-50.

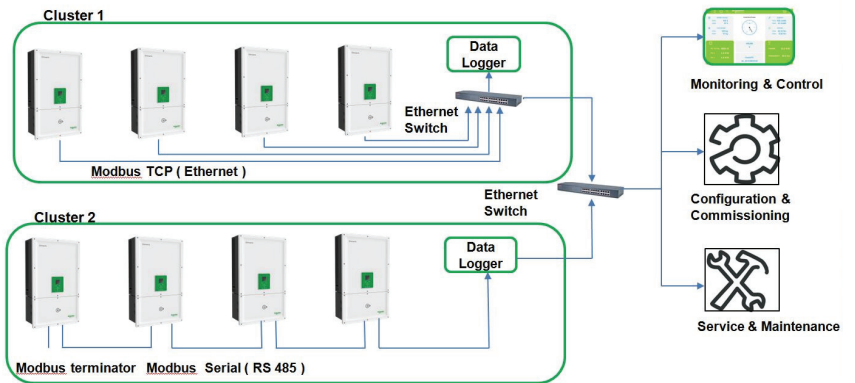


Figure 2-50 **Cluster 1: Modbus TCP and Cluster 2: Modbus RS485 connections**

## RPO and Dry contact relay connection

**⚠ WARNING**

**HAZARD OF SHOCK AND RISK OF EQUIPMENT DAMAGE**

- Do not connect circuits exceeding 28 VDC and 3 A to the dry contact output. The use of a 3 A/32 VDC certified fuse is recommended.
- Do not interchange the RPO and Dry Contact.
- Enabling the RPO will not isolate the inverter from PV and grid sources. It is required to de-energize all the connected sources manually.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

One set of dry contact relay and RPO connectors are provided along with the wiring box packaging.

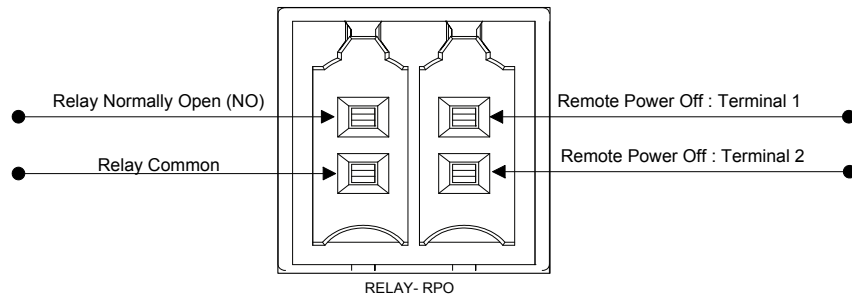


Figure 2-51 RPO and Relay Contact terminal details

### Multifunction dry Contact Relay

The Conext CL inverter supports Multi function Dry Contact Relay modes. By Default the Dry contact relay mode has been set to Basic (Mode-0).

When the inverter is operating under normal conditions, the dry contact is open. The display can be used to configure the relay to operate in multi function mode under different events as mentioned. The configurable events modes are:

**Home> Settings> Install Settings> Page 2/2**

Modes:

- 0: Basic Mode - No relay Operation.
- 1: Relay enabled on any one of user set inverter event (Max of three event code).
- 2: Relay enabled based on inverter status (Online/offline).
- 3: Relay enabled on inverter temperature set limit.
- 4: Relay enabled based on inverter power level set limit.
- 5: Relay Enabled on any inverter events (Faults/Errors/Warnings).

Refer to the Figure 2-52 for typical connection. A maximum of 28 VDC supply can be connected in series with the relay terminals. It is also recommended to use a wire size of  $0.82 \text{ mm}^2$  for relay wiring, and a suitable external fuse ( $<3 \text{ A}$ ) for additional protection.

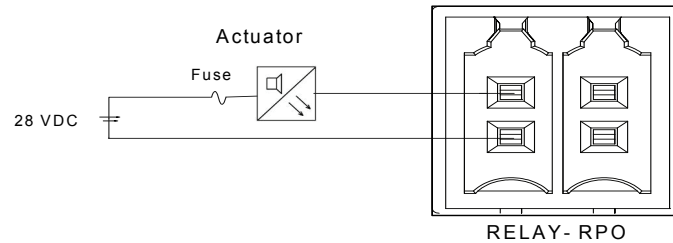


Figure 2-52 **Dry Contact Relay connection**

## Remote Power Off

The remote power off terminals (potential free contact) can be used to turn off the inverter from a far distance with in the site. By default, the RPO option is disabled. This feature is operational, only when the inverter is online and the RPO enable option is configured. The RPO terminals should be connected to a switch which has a normally closed (NC) contact. The inverter can be turned off by opening the contact. The maximum permissible distance for RPO switch from the inverter location should be limited to 30 m. The recommended wire size for RPO switch wiring is 22 AWG, 2 wires.

- The inverter will not turn ON if the RPO terminals are not wired properly (Normally Closed (NC) configuration) and the RPO enable option is configured from the LCD Settings menu.

**Home> Settings> Install Settings.**

- Ensure that there is no break in the RPO terminals.

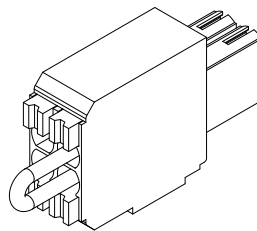


Figure 2-53 **RPO connection with shorting link**

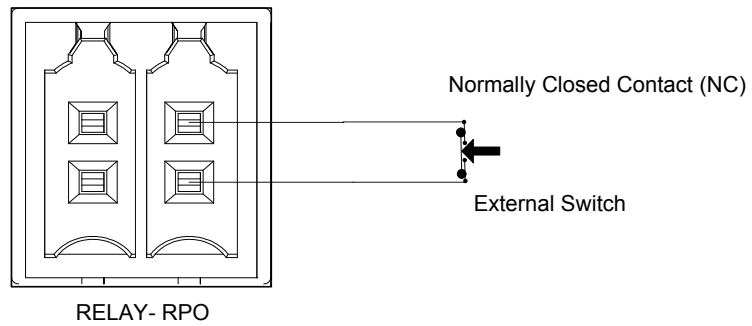


Figure 2-54 **RPO connection for single inverter**

The connection diagram for RPO with multiple inverters is as shown below.

Note: The RPO is disabled by default (**Home> Settings> Install Settings> RPO Enable**).

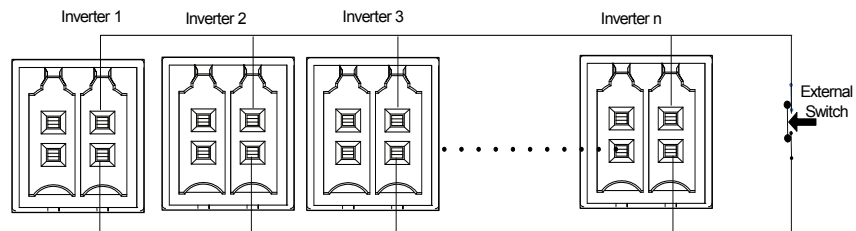


Figure 2-55 **RPO connection with multiple inverters**

## PV String Protection

<b><i>NOTICE</i></b>
<p><b>RISK OF EQUIPMENT DAMAGE</b></p> <p>It is required to use only gPV class fuses for protecting PV array from short circuit current as per UL 2579. The selection of appropriate fuse rating is very important for any given PV installation.</p> <p>Do not use the fuse holder to disconnect the PV input to inverter during operation.</p> <p><b>Failure to follow these instructions can result in equipment damage.</b></p>

For calculating the PV fuse rating for a specific PV array installation, refer to the PV panel manufacturer documentation and NEC 690.8 and 690.9 in addition to local electrical installation code.

If less than 2x strings are used per MPPT, fusing may not be needed, dummy link can be used.

Recommended Fuse: Part number: PV-15A10F  
 Make: Cooper Bussman

Rating: 1000 VDC, 15 A.  
 Schneider order code: OJ-512-0073-Z (set of 20 fuses)  
 Recommended dummy link part number: C10NL  
 Make: Cooper Bussman  
 Schneider order code: OJ-512-1028-Z (set of 10 links)  
 Note: Not applicable for Base model.

## Arc Fault Detection

Conext CL has an external arc fault detection unit integrated in the wiring box as shown in Figure 2-59. The AFD unit is powered internally from the inverter. The digital output from the AFD unit is connected to the communication interface. In the event of an Arc fault in the PV system, the AFD detects the Arc Fault, the inverter will stop producing output power and AC output relay will be opened.

The arc fault status is stored in the memory and will remain active until reset manually by an operator.

Every time the inverter starts, a self test happens. At any time of operation, the user can initiate an AFD self test via LCD, to check the healthiness of the AFD device. For more details, refer, **AFD Fault** on page 5-11.

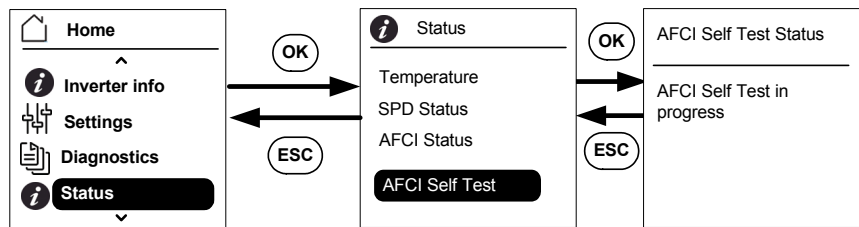


Figure 2-56 AFD self test

A tripped AFD can be reset only manually. It is necessary to power down the inverter, investigate the cause of the Arc fault and power up the inverter later. The inverter will then display the Arc fault reset screen.

To reset the fault, in the Arc Fault reset screen, press **OK** and enter the password.

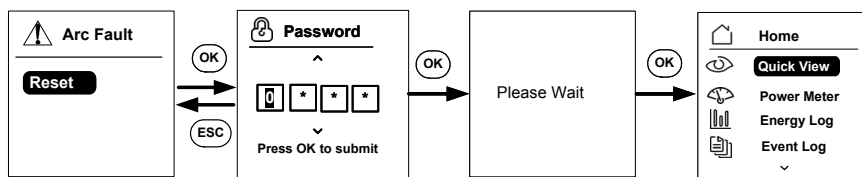


Figure 2-57 Arc Fault reset

In the Home screen, select the Status> Clear AFCI.

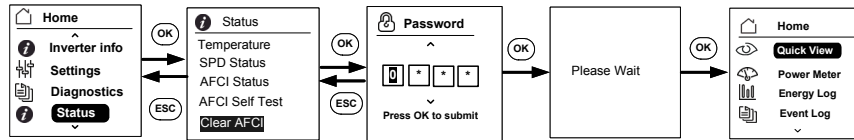


Figure 2-58 Clearing AFCI

Note: In accordance with NEC, Article 690.11, the inverter has a Type 1 photovoltaic AFD. The AFD is an optional feature. For more details, refer to the Wiring Box Configurations on page 2-13.

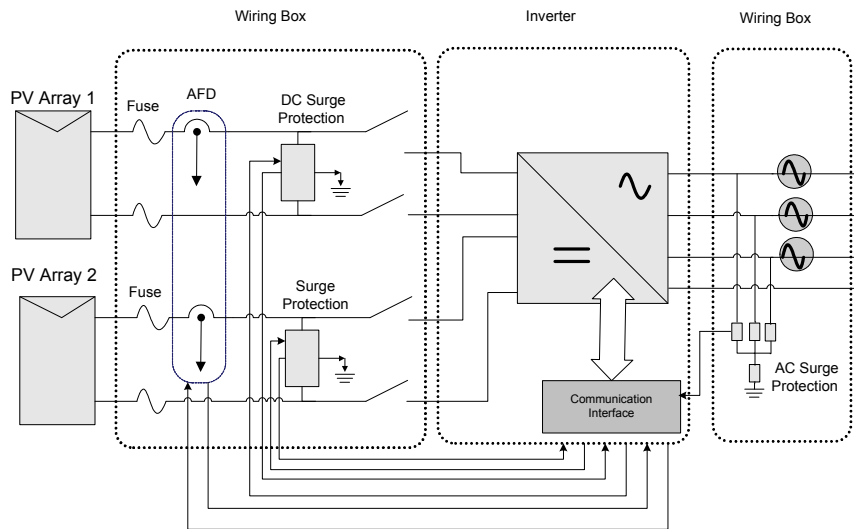


Figure 2-59 Arc Fault Detection and Surge Protection device wiring

## Surge Protection Device Monitoring

Over-voltage surge arrestors are provided on the DC and AC side for protecting the inverter from high voltage surges due to any abnormal conditions.

Figure 2-59 shows the connection details for both AC and DC SPD's. Conex CL has SPD monitoring feature, that indicates the End of Life and need for the SPD module replacement.

Note: SPD is an optional feature. For more details, refer to the Wiring Box Configurations on page 2-13.

## Web Interface

Conext CL inverter has an integrated built in web server. The user can access the inverter data using an Ethernet network connection. The following steps explain how to access the webpage of inverter.

1. Connect one end of the Ethernet Cable to the RJ45 Ethernet port (socket 1) on the inverter.
2. Connect the other end of the Ethernet cable to the network router or laptop/PC.
3. Check the IP address on the LCD display.
4. Note down the IP address of the inverter by navigating through the LCD display.

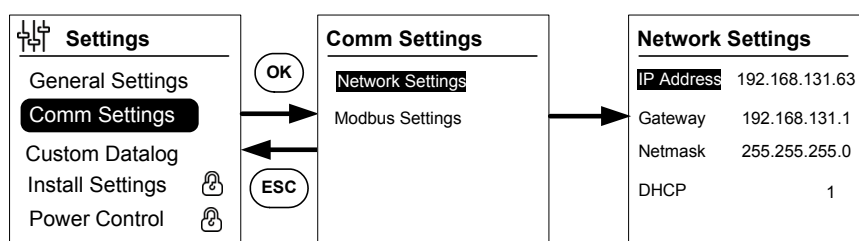


Figure 2-60 Checking the IP address

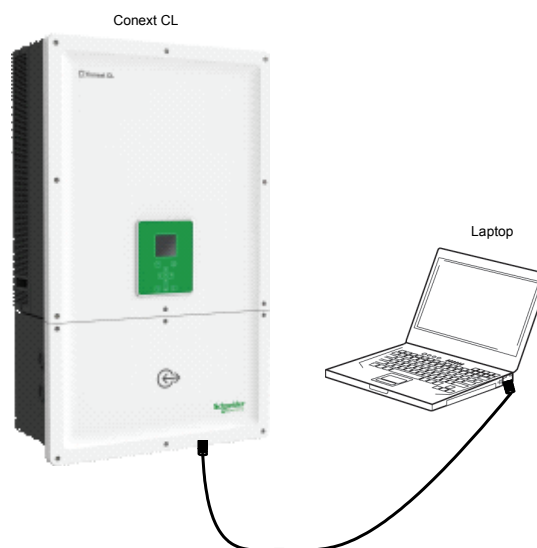


Figure 2-61 Web Interface connection diagram

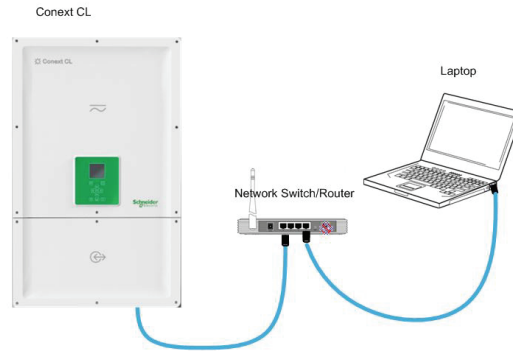


Figure 2-62 **Web Interface connection** via router diagram

5. Open a web browser on your laptop or tablet and type the IP address displayed on the LCD display. The web browser now loads and displays Conext CL login web page.
6. In the login page, select the preferred language.
7. Login using the user name and password.
  - The default user name is ‘owner’
  - The default password is ‘conextcl’

On successful login, Conext CL dashboard is displayed as shown below.

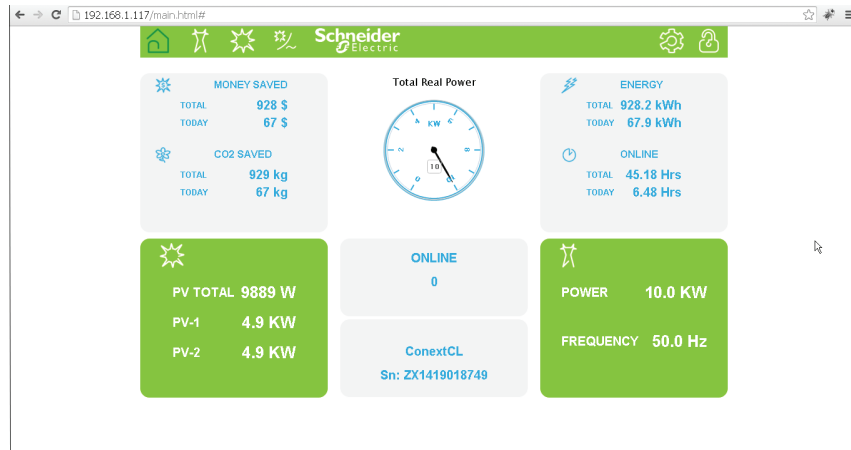


Figure 2-63 **Web interface dashboard screen**

Note: When inverter is directly connected to Laptop/PC and DHCP Enabled it takes good amount of time to acquire the IP Address based on the Laptop/PC network settings. To have faster access it is advised to disable the DHCP before connecting to Laptop/PC and configure the network settings as shown in the figure.



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## Internal Data Logger

Conext™ CL has a built-in integrated data logger. The logging frequency and parameters can be configured using the webpage interfaces only (webpage home> Conext CL Status tab> Logging>Data logging). The Minimum data-logging frequency is 300 seconds.

Table 2-14 Internal Data Logger specifications

Recording Cycle	Storage Time
1 record/5 minute	1 day
1 record/15 minutes	1 month
1 record/1 day	1 year
1 record/1 month	10 years

Note: The Data log and all the logs are disabled by default except energy logs which are cleared periodically at every 3 months due to storage limitation.



---

# 3

## Operation

Chapter 3, “Operation” contains information on the basic operation of the inverter and the wiring box.

It contains information about

- Commissioning
- LCD and Control Panel
- Navigating the LCD Menus and Screens
- Active/Reactive Power and LVRT Menu
- Active Power Control
- Active/Reactive Power and LVRT Menu
- Low Voltage Ride Through

## Commissioning

Start up procedure:

1. Ensure that the DC and AC breaker are turned OFF.
2. Complete the wiring as described in chapter 2.
  - AC wiring
  - DC wiring
  - Earthing
  - Communication Interface
3. Check the polarity of the DC wires and ensure that the maximum DC voltage is not more than 1000 V.
4. Ensure to place the string protection fuses\*. (Refer to the **PV String Protection** on page 2-49.).
5. Ensure proper insertion of communication interface cables to the appropriate connectors.
6. Ensure the dry contact and RPO connections are wired properly (if RPO is enabled).
7. Ensure all the cable glands are sealed properly after completing the terminations.
8. Turn ON the AC or DC breaker (external) and ensure that the grid is connected to the inverter. The inverter will boot up and stays in **First time power up** state and requires user inputs to configure. Follow step 15.
9. Check <http://solar.schneider-electric.com/product/conext-cl-na-solar-inverter> for the latest firmware version. If the version on the inverter and website matches, follow step 15.
10. Remove the wiring box cover.
11. Connect the USB drive with the latest firmware version to the USB device socket and then in LCD press OK to upgrade the inverter firmware.
12. The inverter now starts upgrading the new firmware available in the USB drive.
13. The inverter will boot up and complete the Power on Self test. If the LCD displays any event message, refer to the **Troubleshooting** on page 4-1.
14. Follow the procedures mentioned in the **Firmware Upgrade process** on page 5-11.
15. On successful completion of the Power on Self test, follow the first time power up settings as described in **First Time Power Up** on page 3-6.
16. After first time power up, turn ON the DC disconnect switch. For the switch location, refer to the Figure 1-3.

If there is sufficient sunlight, the inverter will start producing power.

17. Check the status of the indicator light (LED; refer to the Table 3-1 on page 3-4). The PV status LED should be green.
18. If the PV status LED is not green, check whether:
  - All the connections are correct.
  - All the external disconnect switches are closed.
  - The DC disconnect switch\* on the inverter is in the **ON** position.

\*The DC disconnect switch and string protection fuse are not part of the Base model.

For more details on Configuration settings, refer to the **Descriptions of LCD Information**.

## LCD and Control Panel

The inverter has an LCD control panel, as shown in Figure 3-1. The location is shown in Figure 1-4 on page 1-6.

- To navigate across the LCD menus, use the five navigation buttons shown below in Figure 3-1 on page 3-3.
- To view the **Main** menu, press the **Home** button.
- To escape from any of the sub menus to the main menu, press the **ESC** button.

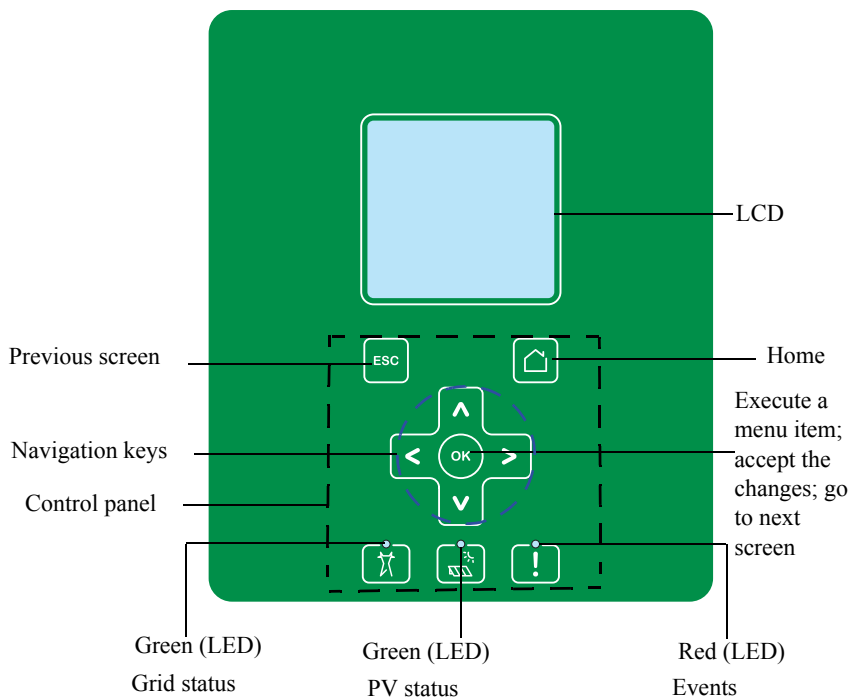







Figure 3-1 LCD Control Panel

## LED Indicators

Table 3-1 LED Indicators

LED	Description
Event (red)	<p>ON: an active service condition</p> <p>OFF: no service condition</p> <p>Blink:</p> <ul style="list-style-type: none"> <li>• Slow Blink: Warning</li> <li>• Fast Blink: RPO is open</li> </ul> <p>Note:</p> <ul style="list-style-type: none"> <li>• Slow Blink: one per second</li> <li>• Fast Blink: five per second</li> </ul>
PV On (green)	<p>ON: input PV voltage available</p> <p>OFF: input PV voltage not available</p> <p>Fast Blink: Unit is de-rating due to PV side conditions.</p>
AC On (green)	<p>ON: the unit is connected to the grid and power is available.</p> <p>OFF: the unit is not connected to the grid or grid power is not present.</p> <p>Blink:</p> <ul style="list-style-type: none"> <li>• Slow Blink: Unit is trying to reconnect to grid.</li> <li>• Fast Blink: Unit is de-rating due to AC side conditions.</li> </ul>

Table 3-2 Buttons below the LCD

Button	Result
	Go to the home screen
ESC	Go to the previous screen
	Go to the previous item in a main menu or to the previous screen (in a series of screens)
	Go to the next item in a main menu or to the next screen (in a series of screens)
	Go to the previous submenu item/ screen in the main menu
	Go to the next submenu item/ screen in the main menu
OK	Execute the selected menu item, accept the changes, or go to the next screen (in a series of screens).

## Navigating the LCD Menus and Screens

### First Time Power Up

When power is turned ON first time (AC and DC) the LCD screen in the inverter shows the Schneider Electric logo and a progress bar indicating the power up progress.

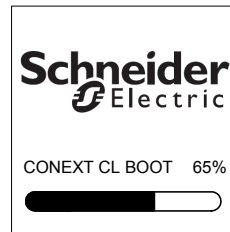


Figure 3-2 **Progress bar**

1. To operate the inverter for the first time, setup the following quick configuration settings:
  - Language
  - Country selection
  - Time zone and time setting
  - Date/ time
  - Wiring box selection
  - MPPT selection
  - Modbus selection
2. To set the Country and Wiring box selection, enter the access password. Password: **1234**.
3. The system reboots after the settings are completed. On subsequent startups the inverter will follow the **Normal Power Up** sequence.

Note:

- Without completing the Country and Wiring box selection, the first time power up will not progress further.
- In case of any wrong settings or selection, the user can restore the factory default settings from the Settings- Install Settings menu. By loading the factory default settings, the inverter restores the default values. Then repeat the first time power up procedure.
- Based on the selected country grid code requirement, inverter will monitor grid voltage and frequency values for certain duration of time before reconnection. This monitoring time will be indicated as VERIFY on the left side of DUI screen.



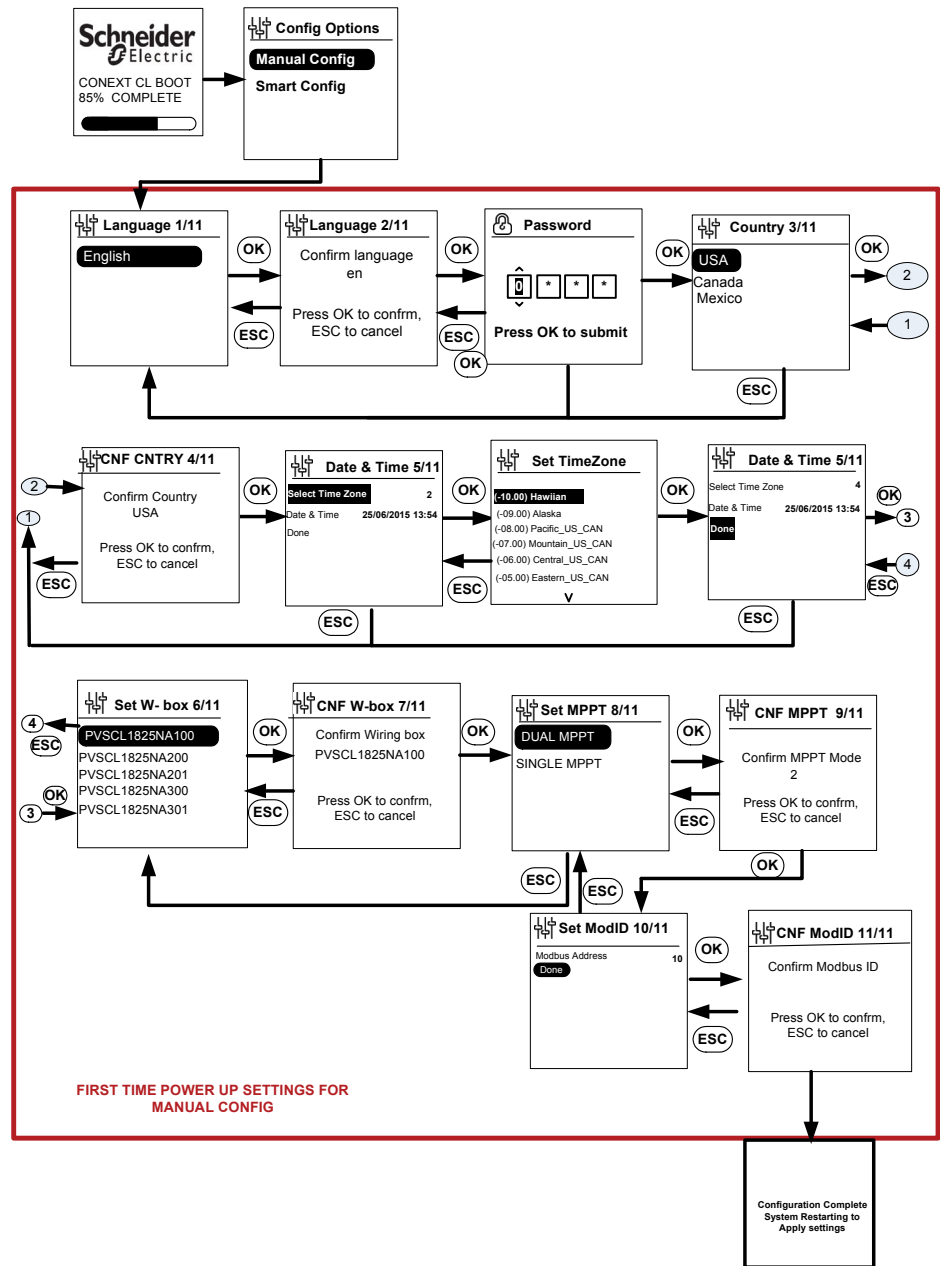


Figure 3-3 First Time Power Up screen

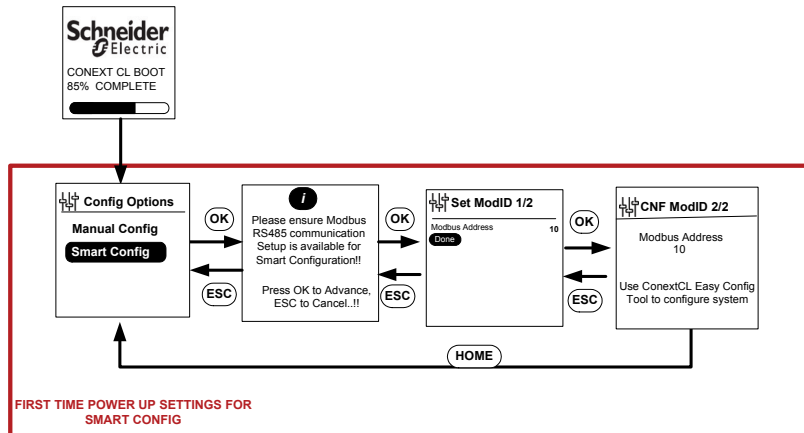


Figure 3-4 First Time Power Up: Smart Config screen

<b>NOTICE</b>
<p><b>RISK OF EQUIPMENT DAMAGE</b></p> <p>The wiring box selection in the LCD Menu Settings should match with the part number on the wiring box label.</p> <p><b>Failure to follow these instructions can result in equipment damage.</b></p>

When the inverter starts running, the home page displays a daily overview of the energy produced.

## Menu Settings

There are a series of settings screens for configuring the inverter.

Settings screens for configuring the inverter

- To select an item to edit, in the Settings screen, use the up/down keypad buttons. The selected item is highlighted.

General Settings	
Name	Conext CL
<b>Language</b>	en
Date	
Contrast	55
Backlight	10
Backlight Timeout (s)	300

⏪      ⏩

Figure 3-5 General Settings screen1

2. To edit the selected item, press the OK button. The first digit (or character) to edit is highlighted.

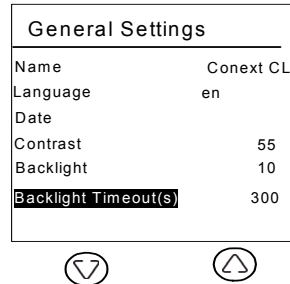


Figure 3-6 **General Settings** screen 2

- To increase/ decrease the highlighted value, press the **up/down** (V / Λ) arrows. Press **left/ right** keypad buttons to move the cursor in the left/ right direction.
- To write the new value in the configuration, press the **OK** button.
- To **cancel** the editing, press the **ESC** button.

## Normal Power up

During normal power up, the screen shows the Schneider Electric logo and a progress bar indicating the power up progress. The inverter will boot up and complete the power on self test routine. On successful completion of normal power up, the LCD screen displays a daily overview of energy produced (Quick view).

## Quick view

The home page now displays the:

- Energy harvested today
- Status of the inverter (for example, **On Grid**)
- Today's power curve

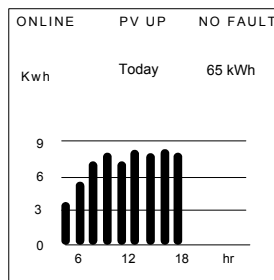


Figure 3-7 **Quick view**

## Menu Structure

The following Figure 3-8 to Figure 3-18 shows the menu structure and navigation flow for accessing the different inverter settings and logs.

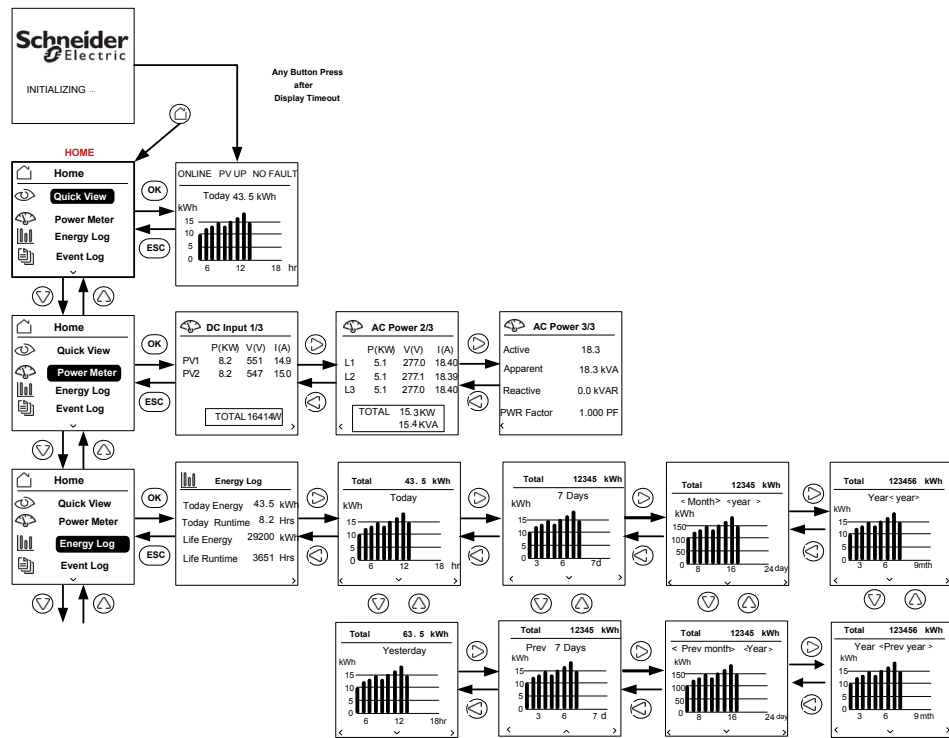


Figure 3-8 Menu Structure -1

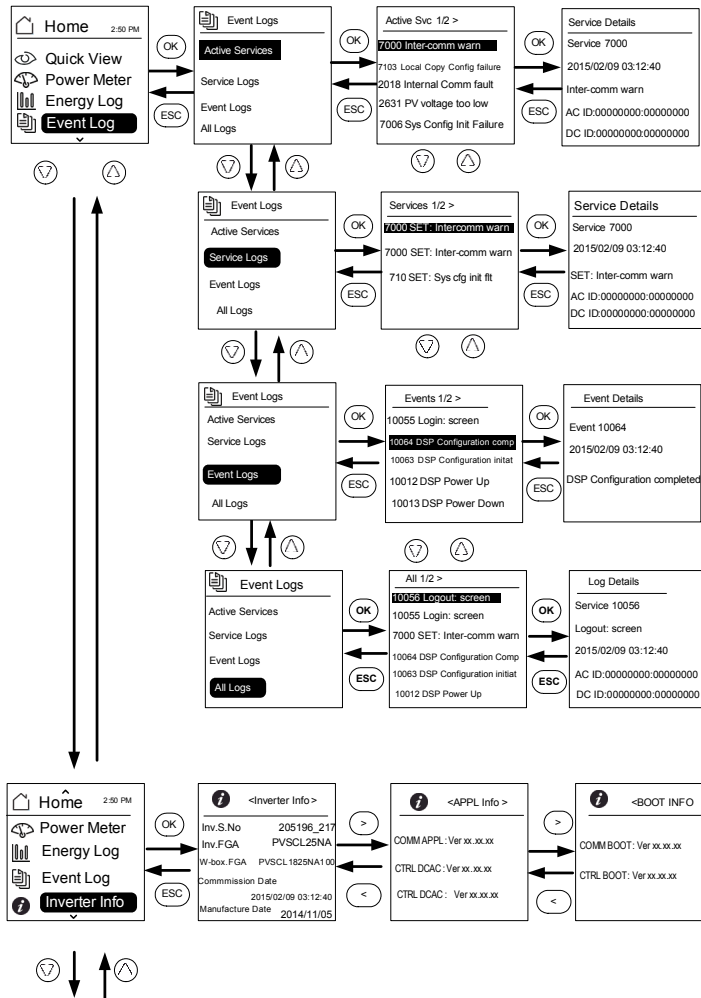


Figure 3-9 Menu Structure- 2

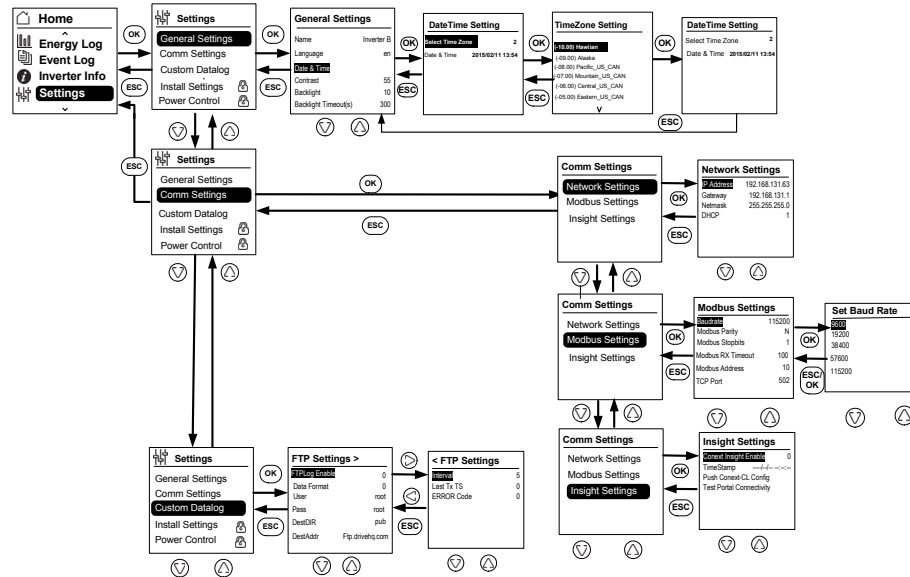


Figure 3-10 Menu Structure -3

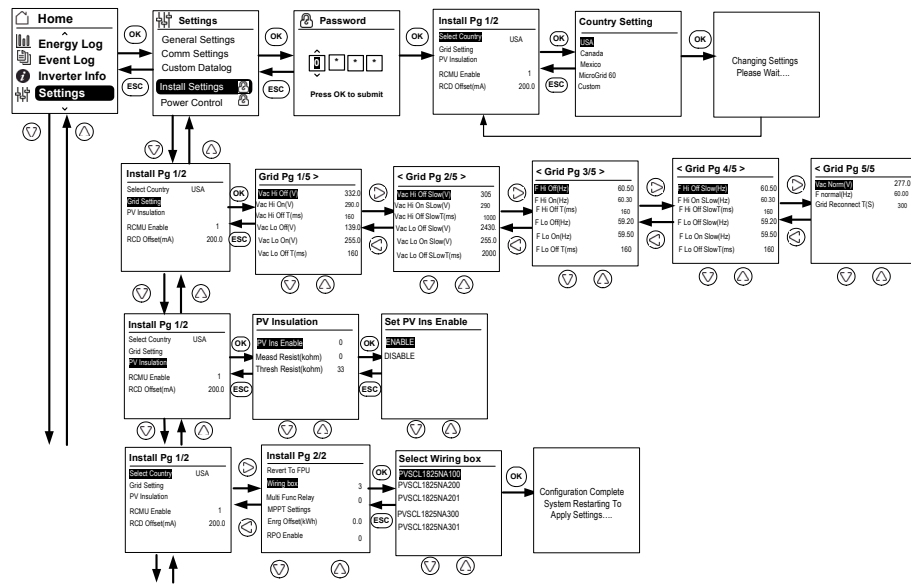


Figure 3-11 Menu Structure -4

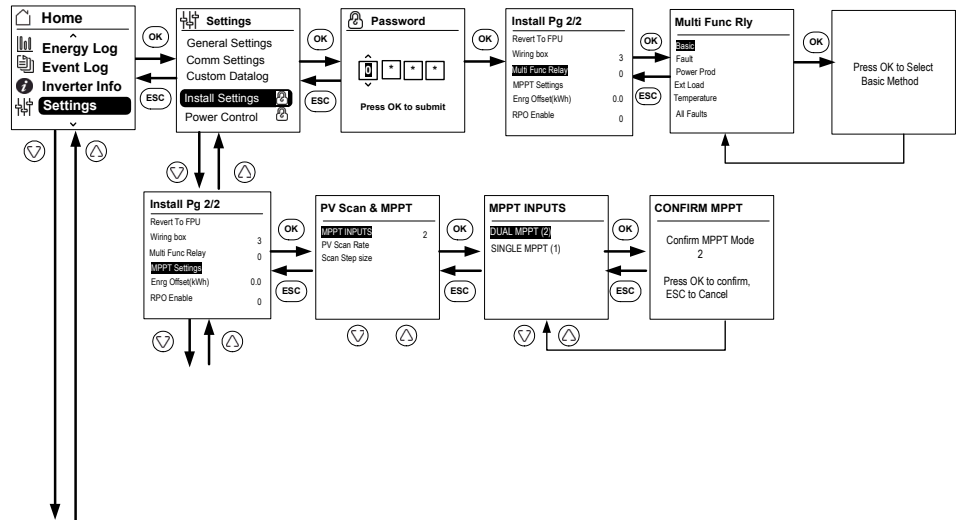


Figure 3-12 Menu Structure -5

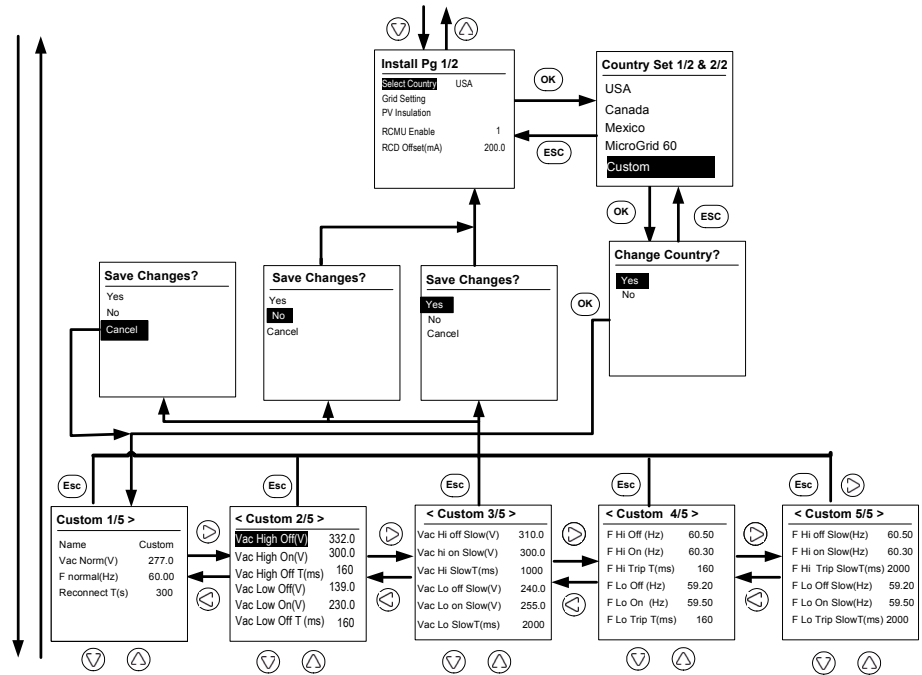


Figure 3-13 Menu Structure -6

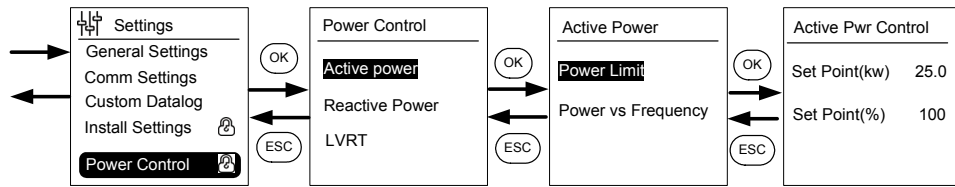


Figure 3-14 Menu structure -5

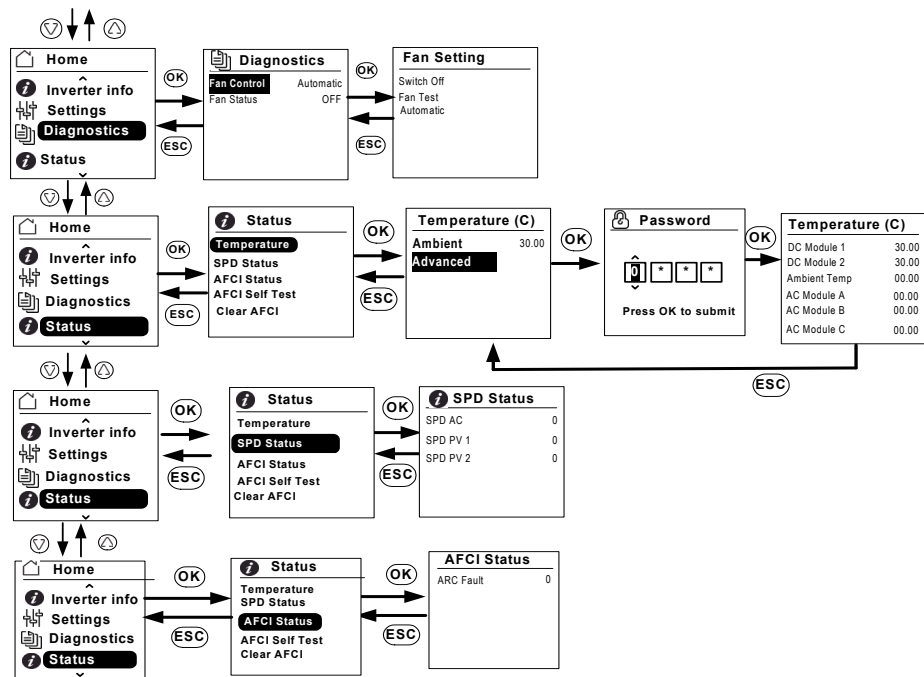


Figure 3-15 Menu Structure - 10



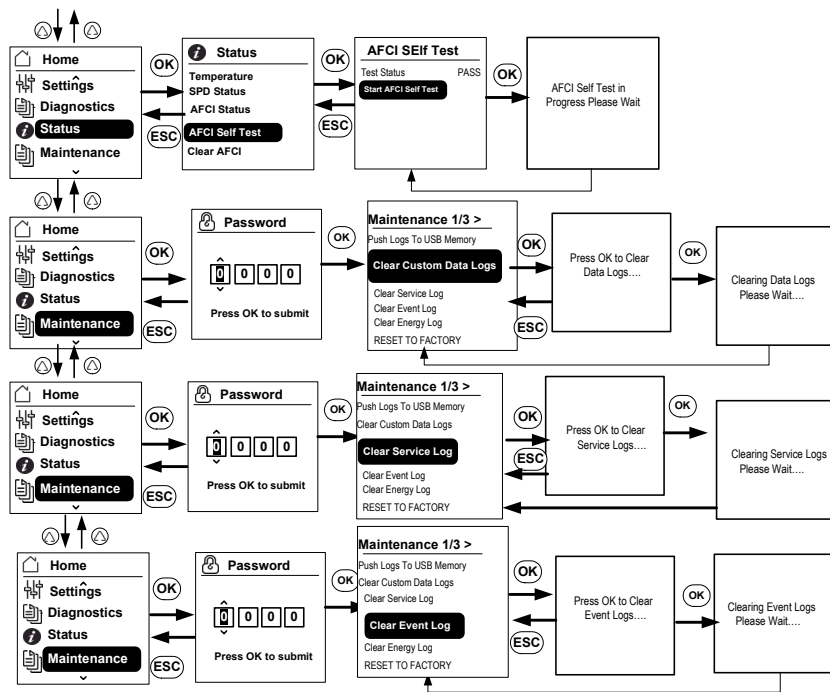


Figure 3-16 Menu Structure - 11

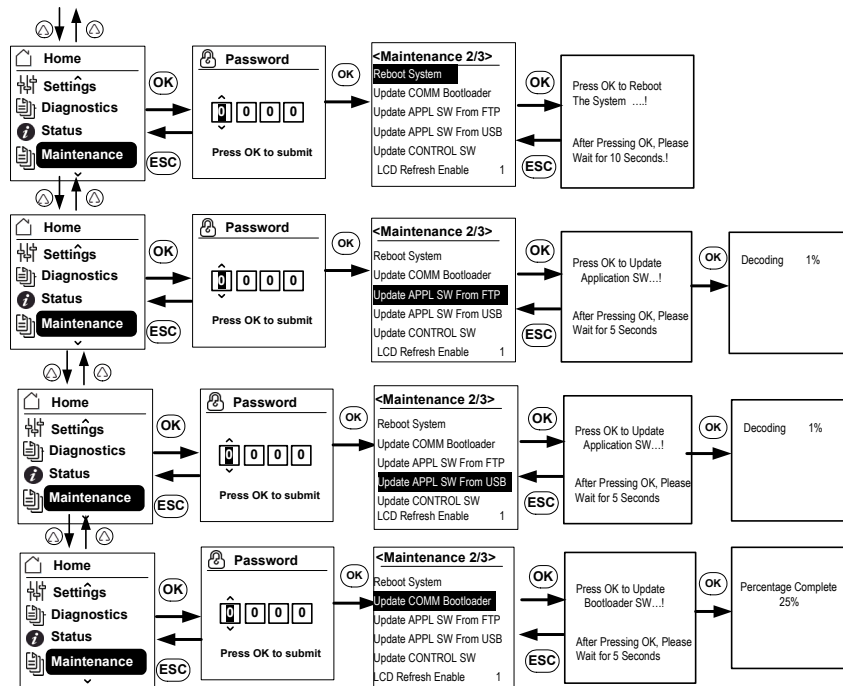


Figure 3-17 Menu Structure - 12

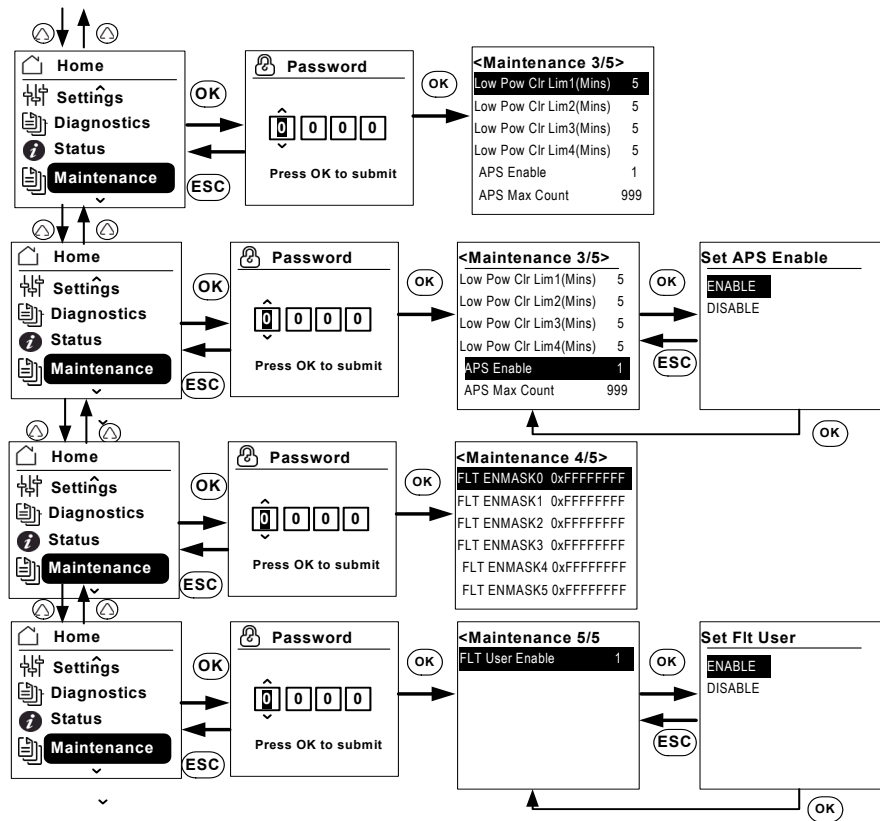


Figure 3-18 Menu Structure - 13

## Home Page

To navigate through the menus:

- In the **Home** page, press any of the **four navigation** buttons.
- To go to the **previous** screen or to a **higher-level** menu, press the **ESC** button.

During the normal operation of the inverter, the LCD shows the Home page as shown in below.

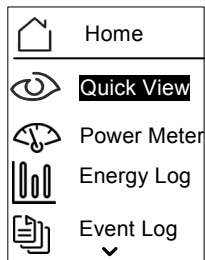


Figure 3-19 Home page

## Inverter Information

The Inverter Information screen displays the following information about the inverter:

- Inverter serial number
- Inverter FGA
- Wiring box serial number
- Wiring box FGA
- Communication application firmware version number
- Communication boot loader firmware version number
- DC-AC control firmware application version number
- DC-DC control firmware application version number

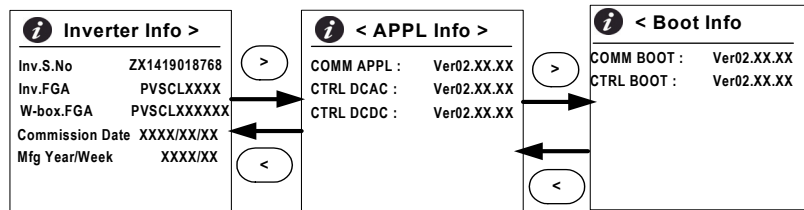


Figure 3-20 Inverter Info

To view the Inverter Information screen:

From the **Main menu**, select **Inverter Information**, and then press the **OK** button.

## Logs

You can view the event logs and energy logs through the **Home page** screen as shown in Figure 3-12 on page 3-13.

### Event Log

The event log shows a maximum of 10 most recent events. The most recent event is shown at the top of the list. There are four submenus under Event Log.

- Active Services

- All Logs
- Service Logs
- Event Logs
- Active Services show the list of events that have occurred most recently and are not cleared.
- All Logs show both services and events as per the sequence of occurrence.
- Service Logs show all the events or warnings that have occurred during any abnormal operating condition.
- Event Logs show the list of all events.

Use the scroll button to navigate through the list of events. To know more details about an event, select the event and then press the **OK** button.

## Energy Log

The Energy Log menu shows the power generation over the:

- Current or last year
- Previous and current month
- Previous and current week
- Yesterday's and today's energy
- Energy summary

Use the scroll button to navigate through the list of submenus. To view the energy produced over a specific period of time, select the appropriate energy log menu and then press the **OK** button.

## Active/Reactive Power and LVRT Menu

**NOTE:** The menu is available based on the grid interconnection requirement for various countries. See local grid interconnection codes for the need to turn this feature **ON** or **OFF**, for the characteristic to select, and allowed values for the various parameters.

To display the Active/Reactive Power and LVRT menu:

1. From the **Main** menu, select **Power control**, and then press **OK**.
2. Use the navigation buttons as shown in Figure 3-1 on page 3-3, to enter each of the four digits in the password, to move to next digit and then press **OK**.

## Active Power Control

**To Set the Power Limit:**

You can limit the output active power of the inverter to a percentage of rated power (kVA).

1. Select the **Active / Reactive Power** and **LVRT** menu.
2. In the Set Point field (% or kW), use the ▼ and ▲ buttons to specify the percentage (kW) that you want to use as the limit. Valid range is 0 to 100%.

**Setting the Frequency-Dependent Active Power Control**

You can turn this feature **ON** or **OFF**, and adjust the settings to meet the utility requirements.

**To set the frequency-dependent active power control:**

1. Select the **Active / Reactive Power** and **LVRT** menu (See page no 3-14,3-15, and 3-16).
2. Select **Power vs frequency** and then press **OK**.
3. Select **ENABLE** and then press **OK**.

Specify the desired frequencies and gradient as per Figure 3-21 on page 3–20.

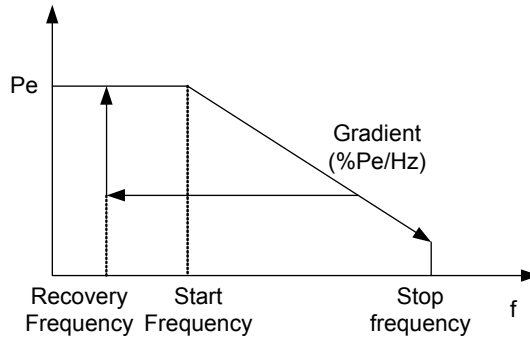


Figure 3-21 Power factor as a function of active power

- Start frequency is the frequency where active power de-rating starts.
- Recovery frequency value is the frequency where inverter will come out of frequency derating mode and starts increase in active power.
- Gradient is used to calculate the slope of derating curve. Statism is used for ITALY only to calculate the slope of power derating curve as per following equation

$$\text{Gradient (Italy only)} = \frac{200}{\text{Statism}}$$

For Australia(AS4777.2) gradient will be calculated using following equation

$$\text{Gradient (Australia/NZ only)} = \frac{100}{(\text{Stop frequency} - \text{Start frequency})}$$

- Restore time delay is the time where the inverter has to stay on the power if frequency comes back to normal till this time is up. Response time delay is the delay time for enabling the frequency derating mode.

NOTE: See local grid interconnection codes for the need to turn this feature ON or OFF, and the allowed values for each of the parameters shown in the above figures.

## Setting the Reactive Power Control

There are four methods available for setting the reactive power control.

Note: Only one of the methods can be enabled at a time.

Refer the local grid interconnection codes to turn this feature ON or OFF, for the characteristic to select, and for the allowed values of various parameters. The available methods are:

- Fixed power factor (constant  $\cos\Phi$ ).
- Power factor as a function of active power ( $\cos\Phi(P)$ ).
- Reactive power as a function of voltage ( $Q(U)$ ).
- Constant reactive power (Constant Kvar).

The inverter stops reactive power flow when the output power is below 10% of rated.

To disable any reactive power mode select **Disable RPWR Operation** on DUI.

### Setting the Fixed Power Factor (Constant $\cos\phi$ )

With this method, the inverter delivers reactive power determined by the available active power and the power factor you specified.

To set the fixed power factor (Constant  $\cos\Phi$ ):

1. Select the **Reactive Power** menu (refer Figure 3-11 on page 3-14).
2. Select **Constant  $\cos\Phi$** , and then press **OK**.
3. In the **Command PF** field, specify the **value** (from 0.8 capacitive (negative sign) to 0.8 inductive (positive sign)). The adjustment resolution is 0.01.
4. Specify the **Minimum lock** in power (output power above which inverter supplies reactive power).

Specify the **Response delay** (time lag from set point to final output).

### Setting a Power Factor as a Function of Active Power ( $\cos\phi(P)$ )

With this method, the inverter delivers reactive power determined by the available active power and the power factor. The power factor varies, depending on the output active power at that moment.

To set  $\cos\Phi(P)$ :

1. Select the **Reactive Power** menu (refer **Figure 3-15** on page 3-15).
2. Select  **$\cos\Phi$  of P control**, and then press **OK**.

3. In the **low P cutoff** field, specify the **% of maximum active power** value (refer **Figure 3-22 on page 3-23**). The adjustment resolution is 1%.
4. In the **Mid P cutoff** field, specify the **% of maximum active power** value (refer **Figure 3-22 on page 3-23**).
5. In the **High P cutoff** field, specify the **% of maximum active power** value (refer **Figure 3-22 on page 3-23**).
6. Select **PF CAP MAX** and specify the **value (0.8 to 1)**.
7. Select **PF IND MAX** and specify the **value (0.8 to 1)**.
8. Specify **lock in** voltage (grid voltage above which inverter supplies reactive power).
9. Specify **lock out** voltage (grid voltage below which inverter stops reactive power flow).

Specify the response delay (time lag from set point to final output).

## Setting Constant Reactive Power

With this method, the inverter delivers reactive power (Q) at a constant, specific level.

1. Select the **Reactive Power** menu.
2. Select **Constant Reactive PWR**, and then press OK.
3. In the **Constant Reactive PWR** field, specify the value as % of nominal apparent power (S). Positive value for capacitive and negative value for inductive reactive power.
4. The adjustment resolution is 1%.
5. Specify **Minimum lock in power** (output power above that inverter supplies reactive power.).
6. Specify **Response delay** (time lag from set point to final output).

## Setting Reactive Power as a Function of Voltage (Q(U))

This setting allows the inverter to vary the reactive power flow as a function of AC voltage.

To set reactive power as a function of voltage (Q(U)):

1. Display the **Reactive Power** menu (refer Figure 3-14 and Figure 3-15).
2. Select **(Q(U))** control, and then press **OK**.
3. In the **Q(U) CAP MAX(%)** field, specify the maximum capacitive reactive power value as % of maximum active power (refer **Figure 3-24 and Figure 3-25 on page 3-26**). The adjustment resolution is 1%.
4. In the **Q(U) IND MAX(%)** field, specify the maximum inductive reactive power value as % of maximum active power (Refer **Figure 3-24 and Figure 3-25 on page 3-26**). The adjustment resolution is 1%.
5. Specify **Q(U) Vhset, Q(U) Vlset, Q(U) Vmax, Q(U) Vmin, Q(U) Hyst**.
6. Specify **lock in** power (output power above which inverter supplies reactive power).



- Specify **lock out** power (output power below which inverter stops reactive power flow).

Specify the **Response delay** (time lag from set point to final output).

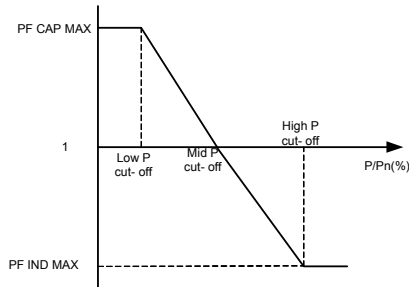


Fig 1.0 : PF(P)

Figure 3-22 Power factor as a function of active power

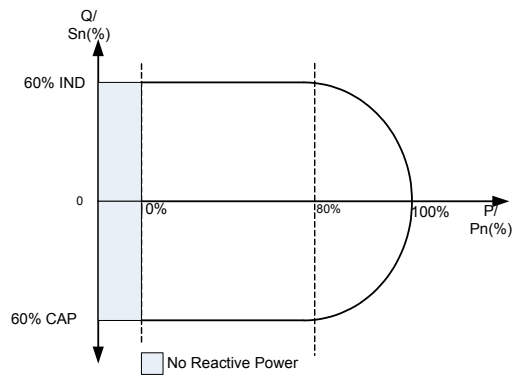


Fig 4.0 : Constant Reactive PWR

Figure 3-23 Power factor as function of reactive power

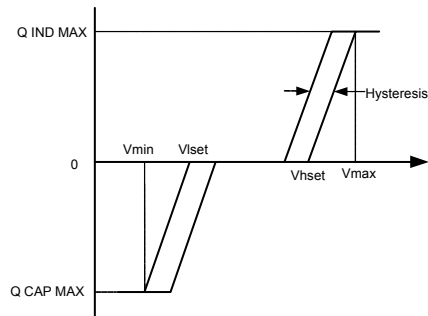


Fig 2.0 : Curve A

Figure 3-24 Reactive power as a function of voltage Curve A

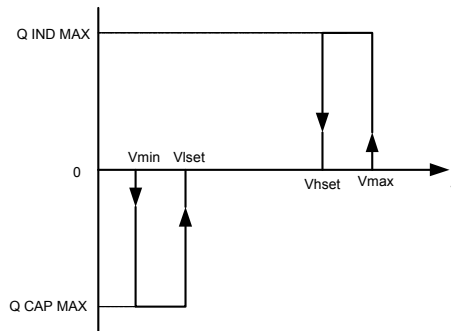


Fig 2.0 : Curve B

Figure 3-25 Reactive power as a function of voltage Curve B

## Low Voltage Ride Through

NOTE: Low Voltage Ride Through (LVRT) is also known as Fault Ride Through (FRT), and refers to a feature that keeps the inverter online during short-duration voltage dips, to help support the grid.

From the FRT screen, you can set the following:

1. LVRT Enable: **ON** or **OFF**
2. Dead band - Vh:  $1.1 \cdot V_n$
3. Dead band - Vl:  $0.9 \cdot V_n$
4. K factor: Reactive current ratio during FRT.
5. Vdrop: If the grid voltage drops below this value, the inverter immediately trips.
6. t1: If the grid voltage drops and does not come back to U1 within t1 seconds, the inverter trips.
7. V1: voltage (% of  $V_n$ )
8. t2: If the grid voltage drops and does not come back to  $0.9 \cdot V_n$  within t2 seconds, the inverter trips.

9.  $t_3$ : If the grid voltage drops and does not come back to  $0.9 \cdot V_n$  within  $t_3$  seconds, the inverter trips. The inverter might trip for a short time or for a long time.

NOTE: The screen is available only for the countries where LVRT operation is required.

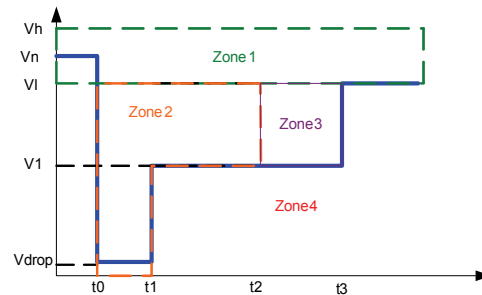


Figure 3-26 Low Voltage Ride Through

**To Display the LVRT Screen:**

1. From the Main menu, select **Power control**, and then press **OK**.
2. Use the **▼** and **▲** buttons to enter each of the four digits in the password, and then press **OK**. Figure 3-26 on page 3–25 shows graphs related to LVRT.

Additional information on the areas indicated by Zone 1, 2, 3, and 4 in Figure 3-26 on page 3–25.

- a) Zone 1: Does not lead to disconnect from network.
- b) Zone 2: Pass through fault without disconnecting from network, feed in\* short circuit current.
- c) Zone 3: Short-term disconnect from network.
- d) Zone 4: Disconnects from network.



# 4

## Troubleshooting

Chapter 4, “Troubleshooting” describes the event and service messages that might be displayed on the LCD of the inverter and the recommended solutions.

It contains information about:

- Troubleshooting Checklist
- Pushing Logs to USB Device
- Messages

# Troubleshooting Checklist

Make sure to check the below mentioned points before contacting to customer care.

**Table 4-1** Checklist

Site/Installer:

Product Serial Number(s)		
Commissioning/Purchase Date		
Energy Produced till shutdown		
Warranty Expiration Date		
Software Version(s) Installed		
Attach Event Log, Service Log and Energy Log downloaded from inverter		
Detailed description of the problem:		
What is the problem (what happened)?		
When did the problem occur (when did it take place)?		
Where was the problem detected (where did it take place, consider environmental factors)		
How was the problem detected (how did it happen)?		
How many times has the problem been detected (how often has it happened)?		
Other details		
Attach any other useful information (photographs, reports, printouts) that will be useful in analyzing the issue.		
AC System		
Grid type (120/240, 230/400, etc)		
Measurements/readings during incident and point of measurement		
Conductor size/length (1 way)		
Fuse/Breaker rating		
Generator Make/Model/Power		
Surge Protection details		
Power quality/Harmonics for DG & Grid		

**Table 4-1** Checklist

Neutral to Ground voltage with/with out DG		
Majority of load type (Motor, AC, lighting)		
Frequency of DG switching during day time		
Voltage/Phase/Frequency values		
Min/Max Voltage and Freq range		
LV/MV transformer details (Capacity type, Grounding etc)		
Single Line Diagram, detailing connection with DG, Voltage stabilizer		
Other		
Photovoltaic system		
	MPPT1	MPPT2
Modules installed (make/model)		
Module specifications (Pmp/Voc/Isc/T cof of Voc)		
Array configuration/Orientation		
Grounding system details		
Measurements/readings during incident and point of measurement		
Site record low/average high temperature		
Surge protection details		
Combiner box details		
Conductor size/length (1 way)		
Fuse/breaker ratings		
Age of array		
Accessory/Network		
Type (monitor, AGS, SCP)		
Connector/Protocols		
Source of power		
Network topology/layout		
Device address/port		
Cable type/length		

**Table 4-1** Checklist

3rd party network devices (routers, controllers)		
External Application software and OS		
Output during incident and source of data		
Network traffic/activity level		
Other		

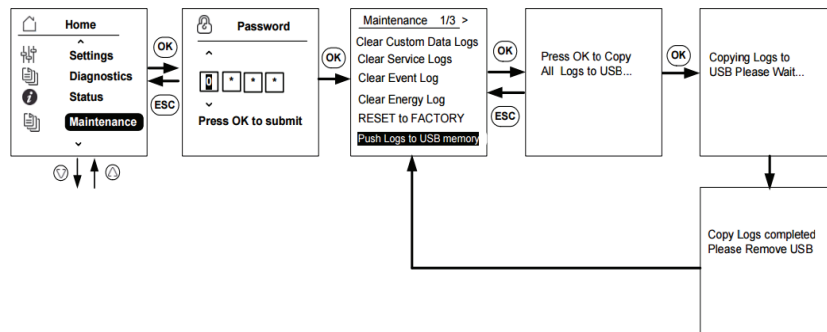
To save the event logs prior to service, refer to Table 4-2 on page 4–5.

1. Plug the USB flash device to the Conext™ CL’s USB port.
2. Follow the instructions below on **Pushing Logs to USB Device**.
3. Go to <http://solar.schneider-electric.com/tech-support/> for Technical Support contact information.

## Pushing Logs to USB Device

To save the Service, Event, Energy and Custom Data Logs to a USB flash device:

- From the Maintenance menu, select **Push Logs to USB memory**.



**Figure 4-1** Pushing Logs to USB flash Device

Note: the Inverter may take more time in pushing all the logs to USB flash drive depends upon logs size.

## Messages

The inverter indicates events / warnings on the display during any abnormal operating conditions. Table 4-2 describes alert messages that might be displayed on the LCD of the inverter.



Note: The Event code in the below table refers to the alert code that can be read through the Modbus communications.

Table 4-2 Alert message descriptions

State	Event Code	Description	Causes	Recommended Corrective Plan
<b>Services</b>	10	<b>AC relay flt</b> Line tie relay is either welded or opened.	Inverter internal component failure.	<b>END User / Installer:</b>  1. Re-start the Inverter.  2. If the event persists, contact Schneider Electric customer service.
	0031	<b>AC Curr snsr flt</b> The Grid current sensor is not measuring the grid current accurately.		
	0032	<b>AC temp snsr flt</b> The AC Module temperature is either very high or low.		
	0033	<b>DC temp snsr flt</b> The DC Module temperature is either very high or low.		
	0047	<b>AC volt snsr flt</b> The Grid voltage sensor fails to measure the voltage accurately. Reset the unit by turning off the DC disconnect.		
	0131	<b>Low Eff flt</b> The losses in the unit are higher than normal and hence the efficiency is low.		

Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	0203	<b>DC init flt</b> Initialization of control processor fails.	Inverter internal firmware problem.	<b>END User / Installer:</b> <ol style="list-style-type: none"> <li>1. Check the configuration as per <b>First Time Power Up</b> section for any mismatch of parameters.</li> <li>2. Re-start the Inverter.</li> <li>3. If the event persist, upgrade the Firmware (refer the Firmware Upgrade process).</li> <li>4. If the event persists, contact Schneider Electric customer service.</li> </ol>
	0205	<b>AC init flt</b> Initialization of control processor fails.		
	0711	<b>Share sys cfg flt</b> The internal configuration shared between processors is incorrect.		
	0712	<b>AC int cfg flt</b> The internal configuration is incorrect on the control processors.		
	0713	<b>DC int cfg flt</b> The internal configuration is incorrect on the control processors.		
	0204	<b>DC BIST flt</b> Built in Self Test of the control processor fails	Inverter internal hardware problem.	<b>END User / Installer:</b> <ol style="list-style-type: none"> <li>1. Re-start the Inverter.</li> <li>2. If the event persist, upgrade the Firmware (refer the Firmware Upgrade process).</li> <li>3. If the event persists, contact Schneider Electric customer service.</li> </ol>
	0206	<b>AC BIST flt</b> Built in Self Test of the control processor fails.		

Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	0702	<b>RCMU flt</b> The Earth leakage current is repeatedly detected to be greater than limited value	<ul style="list-style-type: none"> <li>• Water logging or moisture around the PV panels.</li> <li>• Improper connection to safety ground.</li> <li>• Damaged PV wiring.</li> </ul>	<p><b>END User / Installer:</b></p> <ol style="list-style-type: none"> <li>1. Check for any water logging or moisture around the PV panels. If yes, wait till the PV panel surroundings becomes dry.</li> <li>2. Check the PV wiring and connections at junction boxes or terminals for any suspected damage or any dust accumulation or any trapped foreign objects.</li> <li>3. If fault persists, recommended to perform insulation resistance test using an Insulation tester (Suggested testers: Schneider IM20 Vigil ohm or Fluke 1587 or similar).</li> </ol> <p><b>NOTE:</b> Insulation Test shall be done by an authorized electrician with proper protective equipment.</p> <p>Insulation Test Guidelines:</p> <ol style="list-style-type: none"> <li>1. Turn OFF both DC and AC and then turn ON DC and AC and observe if the alarm persists, Turn OFF Inverter.</li> <li>2. Check the insulation resistance between (PV+) and (PV-) using a insulation tester. Follow the insulation tester guidelines for measurement procedure.</li> <li>3. If the insulation resistance is less than configured value, check the installation for any possible insulation failure. If the insulation resistance is more than configured value, contact Schneider Electric customer service.</li> </ol>
	0708	<b>RCMU Flt Redundant</b> The Earth Leakage current is repeatedly detected to be greater than limited value. This fault is similar to '0702-RCMU flt', but detected by an independent redundant circuit, thus providing a double check for leakage protection	<ul style="list-style-type: none"> <li>• Foreign objects trapped between DC cable terminations and safety ground.</li> <li>• Electrical insulation from the PV system to safety ground is lower than safety limit or insufficient.</li> </ul>	

Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	0705	<b>PV input wiring reversed.</b>	PV Positive and Negative wiring reversed.	<p><b>END User / Installer:</b></p> <p><b>Note:</b> The following instructions shall be performed by an authorized electrician only.</p> <ol style="list-style-type: none"> <li>1. Switch OFF DC &amp; AC. Dis-engage all fuse holders inside the wiring box.</li> <li>2. Check visually, any positive cable (red Color) connected to negative fuse holder block. Similarly check for any presence of negative cable (Black color) in positive fuse holder block.</li> <li>3. With the help of digital multimeter, check the voltage measurement between PV positive with respect to PV negative terminals of each string at fuse holder input terminals. If voltage measured is negative value, then the respective string is reversed and needs correction. repeat the similar measurement for rest of the strings.</li> </ol> <p>Note: After fuse holders dis-engaged, live PV string voltage can be measured at the input of the respective string fuse holders.</p>
	0704	<b>AFD self test fail</b>	Arc fault detection module failure detected.	<p><b>END User / Installer:</b></p> <ol style="list-style-type: none"> <li>1. Re-start the Inverter.</li> <li>2. If the event persists, contact Schneider Electric customer service.</li> </ol>

Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	0709	<b>ARC Fault</b> The unit has detected an Arc fault condition. For more details, refer to the <b>Arc Fault Detection</b> section on page 2–55.	ARC detected	<b>END User / Installer:</b> 1. Check the PV wiring for any improper connection. 2. Verify the proper alignment between wiring box and inverter power connection (most likely this is applicable during installation). 3. If the fault occurs frequently, contact Schneider Electric customer service.
	0710	<b>Sys cfg init flt</b> The System configuration done by the user/ installer is incorrect.	Configuration mismatch.	<b>END User / Installer:</b> 1. Check the configuration parameters as per <b>First Time Power Up</b> section. 2. Re-start the Inverter. 3. If the event persist, upgrade the Firmware (refer the Firmware Upgrade process).
Error	701	<b>DC injection err</b> The DC content in the AC output current is higher than rated value.	• Inverter internal parameters drift.	<b>END User / Installer:</b> *If the event persists, contact Schneider Electric customer service.
	706	<b>DC injection inst</b> The instantaneous value of DC content in the AC output current is higher than rated value		
	714	<b>RPO power mod err</b> RPO power module error.	• The RPO power module not operative.	<b>END User / Installer:</b> Contact Schneider Electric customer service.

Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	2018	<b>AC inter-comm err</b> This error occurs, when the internal communication between processors in the control board fails after time out.	<ul style="list-style-type: none"> <li>Communication between unit (inverter) internal processors not functioning due to loose cable connection between control and communication printed circuit boards.</li> <li>Unit internal control board power supply not operative.</li> </ul>	<b>END User / Installer:</b> <ul style="list-style-type: none"> <li>Re-start the inverter.</li> </ul> * If the event persists then contact Schneider Electric customer service.
	2101	<b>DC inter-comm err</b> This error occurs, when the internal communication between processors in the control board fails after time out.		
	2102	<b>DCAC comm err</b> Communication error in the Control processor detected by Comm processor.		
	2060	<b>AC low temp</b> The temperature on the AC power modules is lower than the limits. The unit does not start.	Ambient temperature can be less than minimum operating temperature.	<b>END User / Installer:</b> <ul style="list-style-type: none"> <li>Wait for ambient temperature raise above minimum operating temperature for inverter to start.</li> </ul>

Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	2061	<b>AC modules OT</b> AC module temperature above safe operating limits	<ul style="list-style-type: none"> <li>Ambient temperature can be higher than operating limits.</li> <li>Insufficient air flow due to dust accumulation on air inlet and air outlet.</li> <li>Cooling fan not operative.</li> </ul>	<p><b>END User / Installer:</b></p> <ul style="list-style-type: none"> <li>Wait for ambient temperature to cool down to operating limits. Once ambient temperature is within operating limits, inverter recovers automatically.</li> <li>Check air ventilation ducts for dust or any foreign objects accumulation. Clean ducts with a clean cloth or soft brush.</li> <li>Ensure all fans are working by performing fan self diagnostic check as per <b>Fan maintenance</b> section.</li> </ul> <p>* If the event persists, contact Schneider Electric customer service.</p>
	2062	<b>DC modules OT</b> The temperature on DC Power modules is beyond the limits. The ambient temperature is beyond the operating limits.		
	2401	<b>AC UF fast err</b> The frequency has fallen below the limit requiring immediate shutdown.	Utility frequency fluctuations are beyond the set limits.	<p><b>END User / Installer:</b></p> <ul style="list-style-type: none"> <li>Monitor the frequency, to record fluctuations beyond set limits.</li> <li>Check for any deviation between measured values and grid set limits. Please refer respective grid set limits using <b>Display &gt; install Settings &gt; Grid Settings</b>. If any deviation found, please talk to local grid operator to adjust the parameters as per respective country grid code set limits.</li> </ul> <p>Note: Conext CL Inverter is automatically configured as per the selected country during first time power up.</p>
	2402	<b>AC OF fast err</b> The frequency has risen above the limit requiring immediate shutdown.		
	2416	<b>AC UF slow err</b> The Grid Frequency is below the set limits.		
	2417	<b>AC OF slow err</b> The Grid Frequency is above the set limits.		

Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	2406	<b>AC UV fast err</b> The voltage has risen above the limit requiring immediate shutdown.	<ul style="list-style-type: none"> <li>Utility voltage fluctuations are beyond the set limits</li> </ul>	<p><b>END User / Installer:</b></p> <ul style="list-style-type: none"> <li>Monitor the voltage, to record fluctuations beyond set limits.</li> <li>Check for any deviation between measured values and grid set limits. Please refer respective grid set limits using <b>Display &gt; install Settings &gt; Grid Settings</b>. If any deviation found, please talk to local grid operator to adjust the parameters as per respective country Grid CODE set limits.</li> </ul> <p>Note: Conext CL Inverter is automatically configured as per the selected country during first time power up.</p>
	2407	<b>AC OV fast err</b> The voltage has fallen below the limit requiring immediate shutdown.		
	2418	<b>AC UV slow err</b> The Grid Voltage is below the set limits.		
	2419	<b>AC OV slow err</b> The Grid Voltage is above the set limits.		



Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	2408	<b>AC UV inst</b> The Grid Voltage is below the set limits instantaneously	<ul style="list-style-type: none"> <li>Poor power quality of connected grid.</li> <li>Sudden glitches in voltage in terms of surge or swell.</li> </ul>	<b>END USER /Installer:</b> Check the local grid operator for improving the grid quality.
	2410	<b>AC OV inst</b> The Grid Voltage is above the set limits instantaneously		
	2415	<b>AC OV inst</b> The Grid Voltage is above the set limits instantaneously	Average Grid Voltage taken for set time period (default 10 minutes) is more than normal limit.	<b>END User / Installer:</b> <ul style="list-style-type: none"> <li>Monitor the frequency, to record fluctuations beyond set limits.</li> <li>Check for any deviation between measured values and grid set limits. Please refer respective grid set limits using <b>Display &gt; install Settings &gt; Grid Settings</b>. If any deviation found, please talk to local grid operator to adjust the parameters as per respective country grid code set limits.</li> <li>Note: Conext CL Inverter is automatically configured as per the selected country during first time power up.</li> </ul>
	2450	<b>No-Grid err</b> Grid is Not Available	<ul style="list-style-type: none"> <li>Grid voltage not viable.</li> <li>Improper AC wiring.</li> <li>Loose connection.</li> <li>AC cable disconnect.</li> </ul>	<b>END User / Installer:</b> <ol style="list-style-type: none"> <li>Check the grid metering for Availability of grid</li> <li>Check the AC circuit breaker status.</li> <li>Visual inspect the AC Wiring for any damage.</li> <li>With proper safety PPE, check the any loose AC wiring at terminations.</li> </ol>

Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	2411	<b>AC OC inst</b> The Grid Current is above the set limits instantaneously.	Sudden grid voltage distortions.	<b>END User / Installer:</b> * If the event persists, then contact Schneider Electric customer service.
	2460	<b>AC OC err</b> The current measured in any one phase is beyond the specified limits.	Sudden grid voltage distortions.	<b>END User / Installer:</b> * If the event persists, then contact Schneider Electric customer service.
	2605	<b>PV 1 OV err</b> The voltage measured at PV1 input terminal is greater than the specified limit. (> 950 V).	<ul style="list-style-type: none"> <li>• Improper PV string sizing.</li> <li>• Abnormally low ambient temperature causing open circuit voltage to raise above the operating limit.</li> </ul>	<b>END User / Installer:</b> <ul style="list-style-type: none"> <li>• Verify the String sizing as per standard guidelines such that PV open circuit voltage is less than 950V under lower temperature for that region.</li> <li>• Check the ambient temperature and if it is abnormally low, wait till temperature raises to operating limits.</li> </ul>
	2606	<b>PV 2 OV err</b> The voltage measured at PV2 input terminal is greater than the specified limit. (>950 V).	<ul style="list-style-type: none"> <li>• Improper PV string sizing.</li> <li>• Abnormally Low ambient temperature causing open circuit voltage to raise above the operating limit.</li> </ul>	<b>END User / Installer:</b> <ul style="list-style-type: none"> <li>• Verify the string sizing as per standard guidelines such that PV open circuit voltage is less than 950V under lower temperature for that region.</li> <li>• Check the ambient temperature and if it is abnormally low, wait till temperature raises to operating limits.</li> </ul>

Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	2631	<b>PV UV err</b> PV voltages on both the channels are lesser than the specified value (<200 V).	<ul style="list-style-type: none"> <li>• Low radiance.</li> <li>• PV cable not connected.</li> <li>• DC switch not operative.</li> </ul>	<b>END User / Installer:</b> <ul style="list-style-type: none"> <li>• Check the open circuit voltage in display. If Voltage equal to zero, check the proper contact of PV cables and terminations.</li> <li>• Ensure DC switch is in ON condition. Wait for solar irradiance to increase.</li> </ul>
	2648	<b>Low Elf err</b> The losses in the unit are higher than normal so efficiency is low.	<ul style="list-style-type: none"> <li>• Inverter internal control board calibration is loaded with incorrect parameters</li> </ul>	<b>END User / Installer:</b> <ul style="list-style-type: none"> <li>• Ensure to have the latest firmware version to correct this alert. Please download the latest version from <a href="http://www.sesolar.com">www.sesolar.com</a>.</li> </ul> <p>* If the event persists, contact Schneider Electric customer service.</p>
	2624	<b>PV12 OC err</b> The current measured on both the PV channels is higher than the rated values.	<ul style="list-style-type: none"> <li>• Overated PV String.</li> <li>• Inverter internal hardware not controllable.</li> </ul>	<b>END User / Installer:</b> <p>* If the event persists, then contact Schneider Electric customer service.</p>

Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	2616	<b>PV insulation err</b>	<ul style="list-style-type: none"> <li>Water logging or moisture around the PV panels.</li> </ul>	<p><b>END User / Installer:</b></p> <ul style="list-style-type: none"> <li>This event will be periodically checked and unit recovers automatically once the event clears.</li> <li>Check for any water logging or moisture around the PV panels. If yes, wait till the PV panel surroundings becomes dry.</li> <li>Inspect the visual inspection of PV wiring and connections at junction boxes or terminals for any suspected damage or any dust accumulation or any trapped of foreign objects.</li> <li>If fault persists, it is recommended to perform insulation resistance test using an Insulation tester (Suggested testers: Schneider IM20 Vigil ohm or Fluke 1587 or similar).</li> </ul> <p><b>NOTE:</b> Insulation Test shall be done by an authorized electrician with proper protective equipment.</p> <p>Insulation Test Guidelines:</p> <ul style="list-style-type: none"> <li>Turn OFF both DC and AC and then turn ON DC and AC and observe if the alarm persists, Turn OFF the unit.</li> <li>Check the insulation resistance between (PV+) and (PV-) using a insulation tester. Follow the insulation tester guidelines for measurement procedure.</li> <li>If the insulation resistance is less than configured value, check the installation for any possible insulation failure. If the insulation resistance is more than configured value, contact Schneider Electric customer service.</li> </ul>
	2646, 2647	<p><b>RCMU err red</b></p> <p><b>RCMU error detected.</b></p> <p>Excessive steady state residual current or sudden change in residual current.</p>	<ul style="list-style-type: none"> <li>Improper connection to protective earth.</li> <li>Damaged PV wiring.</li> <li>Foreign objects trapped between DC cable terminations and Inverter protective earth (PE).</li> <li>Electrical insulation from the PV system to protective earth is lower than safety limit or insufficient.</li> </ul>	

Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	7000	<b>Comm internal error</b>	<p>The hardware in the communication board has failed.</p> <ul style="list-style-type: none"> <li>• Communication processor fails to communicate with the Control processors.</li> <li>• Initialization of the communication processor fails.</li> <li>• Internal communication with its peripherals fails.</li> <li>• Built in self test fails.</li> <li>• The file system is not proper or initialization of processor fails.</li> <li>• The memory test of comm processor fails.</li> <li>• The watch dog fails.</li> <li>• Incorrect configuration parameters are entered.</li> <li>• Communication with DUI processor fails.</li> <li>• MD5 sum NOT operative or firmware loading fails.</li> </ul>	<p><b>END User / Installer:</b></p> <ul style="list-style-type: none"> <li>• Re-start the Inverter and If the event persists, contact Schneider Electric customer service.</li> </ul>

Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	8000	<b>AC internal err</b>	<p>An Internal Error is detected by the processor due to the following conditions:</p> <ul style="list-style-type: none"> <li>• The grid current measured exceeds the rating of the unit.</li> <li>• The DC bus voltage is greater than the trip value.</li> <li>• The top or bottom DC bus voltage is greater than the trip value.</li> <li>• The voltage difference between top and bottom DC bus voltage is greater than the set value.</li> <li>• The DC bus voltage is lesser than the set value.</li> <li>• The DC voltage sensor fails to measure the DC BUS voltage.</li> <li>• The ADC reference is not within the tolerance of 1.5V.</li> <li>• The Phase lock loop fails during inverting.</li> </ul>	<p><b>END User / Installer:</b></p> <ul style="list-style-type: none"> <li>• Re-start the Inverter and If the event persists, contact Schneider Electric customer service.</li> </ul>

Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	9000	<b>DC Internal err</b>	<ul style="list-style-type: none"> <li>• The PV current measured exceeds the rating of the unit.</li> <li>• The DC bus voltage is greater than the trip value.</li> <li>• The top or bottom DC bus voltage is greater than the trip value.</li> <li>• The voltage difference between top and bottom DC bus voltage is greater than the set value.</li> <li>• The DC bus voltage is lesser than the set value.</li> <li>• The DC voltage sensor fails to measure the DC bus voltage.</li> <li>• The ADC reference is not within the tolerance of 1.5V.</li> <li>• The auxiliary power supply output is out of range.</li> </ul>	<p>END User / Installer:</p> <ul style="list-style-type: none"> <li>• Re-start the Inverter.</li> </ul> <p>* If the event persists, contact Schneider Electric customer service with the display details.</p>

Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
Warning	2633	<b>PV1 OC wrn</b> PV1 Over current detected, hence the power output from PV1 is stopped.	<ul style="list-style-type: none"> <li>Over sizing of PV panel.</li> <li>Inverter internal hardware not controllable.</li> </ul>	<b>END User / Installer:</b> * If the event persists, then contact Schneider Electric customer service.
	2634	<b>PV2 OC wrn</b> PV2 Over current detected, hence the power output from PV2 is stopped.		
	4003	<b>Replace fan</b> Fan is not operative or fan EOL detected and needs fan replacement.		<b>END User / Installer:</b> *Purchase fan spare kit with part number 0J-0N-10482 replace as per procedure given in chapter <b>Maintenance</b> .
	4004	<b>Loss of cooling</b> Fan control circuit hardware not operative.		<b>END User / Installer:</b> * Contact Schneider Electric customer service.
	4061	<b>Ambient OT wrn</b>	<ul style="list-style-type: none"> <li>Ambient temperature is near to maximum operating limit.</li> <li>Insufficient air flow due to dust accumulation on air inlet &amp; air outlet.</li> <li>Cooling fan is not operative.</li> </ul>	<b>END User / Installer:</b> <ul style="list-style-type: none"> <li>This event automatically clears once the ambient temperature cools down below to the operating limit.</li> <li>Check air ventilation ducts for dust or any foreign objects accumulation. If require clean ducts with a clean cloth or soft brush.</li> <li>Ensure all fans are working by performing fan self diagnostic check as per fan maintenance section.</li> </ul>
	4065	<b>DC mod1 OT wrn</b>		
	4066	<b>DC mod2 OT wrn</b>		
	4660	<b>AC mod OT wrn</b>		



Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	4068	<b>DC mod1 OT trip</b> The DC Module 1 over temperature is detected and the power output from PV1 channel is stopped.	<ul style="list-style-type: none"> <li>Ambient temperature more than maximum operating limit.</li> <li>Insufficient air flow due to dust accumulation on air inlet &amp; air outlet</li> </ul>	<b>END User / Installer:</b> <ul style="list-style-type: none"> <li>This event automatically clears once the ambient temperature cools down below the limit and unit recovers back to operation</li> <li>Check air ventilation ducts for dust or any foreign objects accumulation. If required, clean ducts with a clean cloth or soft brush.</li> <li>Ensure all fans are working by performing fan self diagnostic check as per <b>Fan maintenance:</b> section.</li> </ul>
	4069	<b>DC mod2 OT trip</b> The DC Module 2 over temperature detected and power output from PV2 channel is stopped.	<ul style="list-style-type: none"> <li>Cooling fan is not operative</li> </ul>	
	4656	<b>PV1 UV wrn</b> PV voltages on both the channels are lesser than the specified value (<200 V).	Insufficient irradiance.	<b>END User / Installer:</b> <ul style="list-style-type: none"> <li>Wait for more time, till sufficient irradiance established to start the inverter.</li> </ul>
	4657	<b>PV2 UV wrn</b> PV voltages on both the channels are lesser than the specified value (<200 V).	Insufficient irradiance.	<b>END User / Installer:</b> <ul style="list-style-type: none"> <li>Wait for more time, till sufficient irradiance established to start the inverter.</li> </ul>
	4700	<b>Low power wrn</b>	Insufficient irradiance.	<b>END User / Installer:</b> <ul style="list-style-type: none"> <li>Wait for more time, till sufficient irradiance established to start the inverter.</li> </ul>

Table 4-2 Alert message descriptions (Continued)

State	Event Code	Description	Causes	Recommended Corrective Plan
	4661	<p><b>PV1 SPD service</b></p> <p>The SPD module connected on the PV1 input channel reached EOL and needs replacement.</p>		<p><b>END User / Installer:</b></p> <ul style="list-style-type: none"> <li>Purchase SPD spare kit with part number 0J-0713 and replace as per procedure given in document 993-0522 Rev B.</li> </ul>
	4662	<p><b>PV2 SPD service</b></p> <p>The SPD module connected on the PV2 input channel reached EOL and needs replacement.</p>		
	4663	<p><b>AC SPD service</b></p> <p>The SPD module connected on the AC output channel reached EOL and needs replacement.</p>		

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# 5

## Maintenance

Chapter 5, “Maintenance” contains information and procedures for performing preventive maintenance on the inverter and the wiring box.

- It contains information about:
- Periodic Maintenance
- Performing General Maintenance
- Semi-Annual Maintenance
- De-commissioning
- Firmware Upgrade process

## Periodic Maintenance

The term “qualified personnel” is defined in page iii of this manual. Personnel must be equipped with appropriate PPE and follow the safe electrical work practices. The inverter is energized from the AC grid and up to four PV circuits. Before servicing the inverter or accessing the wiring box, disconnect all the sources and wait at least five minutes to allow the internal circuits to discharge. Operating the RPO (Remote Power Off) circuit or switching off the inverter does not isolate the inverter from all the power sources. The internal parts and the external wiring remain live unless the PV and AC circuits are disconnected as appropriate for each model of the inverter.

To ensure reliable operation of the inverter, it is recommended for a semi-annual maintenance cycle, based on less severe environment site conditions. For sites with blowing dust or for sites subject to extreme temperatures, frequency of the maintenance cycle should be increased.

Note: Use only original spare parts provided by the manufacturer. Use of non-original parts invalidates the warranty.

For any problems associated with the inverter, contact Schneider Electric.

### **DANGER**

#### **HAZARD OF ELECTRIC SHOCK AND FIRE**

- All electrical work must be done in accordance with local electrical codes.
- Conext CL inverter has no field/ user serviceable parts inside, only the wiring box has user replaceable parts (Fuse & SPD)\*. To be installed and serviced only by qualified personnel equipped with appropriate PPE and following safe electrical work practices.
- Before installation, de-energize the AC and PV sources using external disconnecting means provided in the installation, and test using a meter rated at least 1000 VDC and 600 VAC to make sure all circuits are de-energized. Follow a lock-out tag-out procedure.
- Do not connect the PV conductors until the inverter is earthed either through the AC connection or through the earthing terminal.

**Failure to follow these instructions will result in death or serious injury.**

\*Refer the applicable model number in “Wiring Box Configurations” on page 2–14.

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## Factors Affecting the Inverter Performance

This section describes several factors that affect the performance of the inverter.

### PV Array Factors

- PV array ratings

PV arrays are rated under standard conditions as listed below:

- specified illumination (1000 W/m<sup>2</sup>)
- spectrum of the light
- specified temperature (77 ° F/ 25° C)

This is called the Standard Test Condition (STC) rating and is the figure that appears on the PV module nameplate label.

- Expected Performance

Due to several unavoidable environmental factors, a PV array produces only around 60 to 70% of its peak STC-rated output for a well designed and installed PV system on a typical day.

- Temperature and reduced output

The PV array temperature affects the output of the entire system. As the temperature of the array surface rises, its energy output decreases. The arrays mounted on roof also collect the heat generated by the roof surface (or trapped under the array) and will produce less output than pole-mounted arrays, which allow greater air circulation behind the panels.

Note: Conext CL inverter reduces the energy output to protect its electronic circuits from overheating and to protect from possible damage under high heat conditions. For maximum output under hot climate, mount the inverter in a shaded location with good air flow.

- Partial shade

The shading of even only a single module of the array reduces the output of the entire system. For example, the shadow caused by a utility wire or tree branch on a portion of the array's surface. This reduces the total output, though the output loss is not proportional to the shading.

Conext CL inverter is designed to maximize its energy production in the above situation using its MPPT algorithm.

### Other Factors

Other factors that contribute to system losses are:

- Dust or dirt on the array
- Fog or smog
- Mismatched PV array modules, with slight inconsistencies in performance from one module to another

- Wire losses
- Utility grid voltage

For additional information and technical notes concerning PV array performance, refer to [solar.schneider-electric.com](http://solar.schneider-electric.com).

## Performing General Maintenance

Follow these simple routines to ensure long years of service and optimal performance of the inverter.

- Keep the unit away from dust and debris.
- Clean the PV array under non-illuminated conditions whenever it is visibly dirty.
- Periodically inspect the system to make sure that all the wiring and supports are securely in place.
- Maintain a log of system performance readings so that you can recognize when the performance becomes inconsistent.

## Semi-Annual Maintenance

Have qualified personnel (as defined on page iii) perform the following semi-annual maintenance:

1. Visually inspect all the conductors and connectors at the bottom of the inverter for signs of corrosion or overheating.
2. Check that all the connectors, screws, and cables are connected properly and are tightened to the proper torque specified in this manual.
3. If there are any defective parts, contact Schneider Electric.

Note: For detailed information on service procedures refer to Conext CL- Service Procedures - Fan Replacement.

4. Clean the louver cover and fans:
  - a) Loosen the two screws of the louver cover (one screw at each of the corners of the cover, as shown by the arrows in Figure 5-1 on page 5-5 and Figure 5-2 on page 5-5).

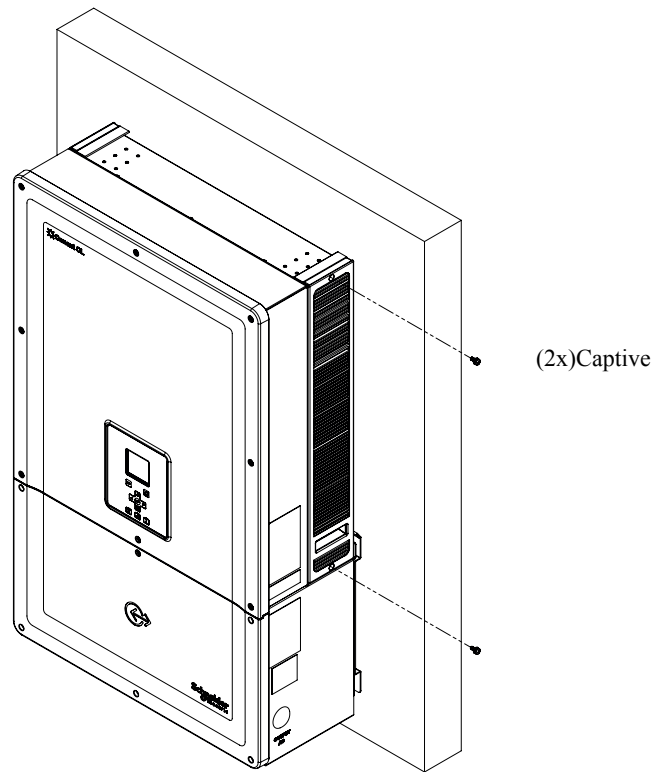


Figure 5-1 Loosening the louver cover- right side

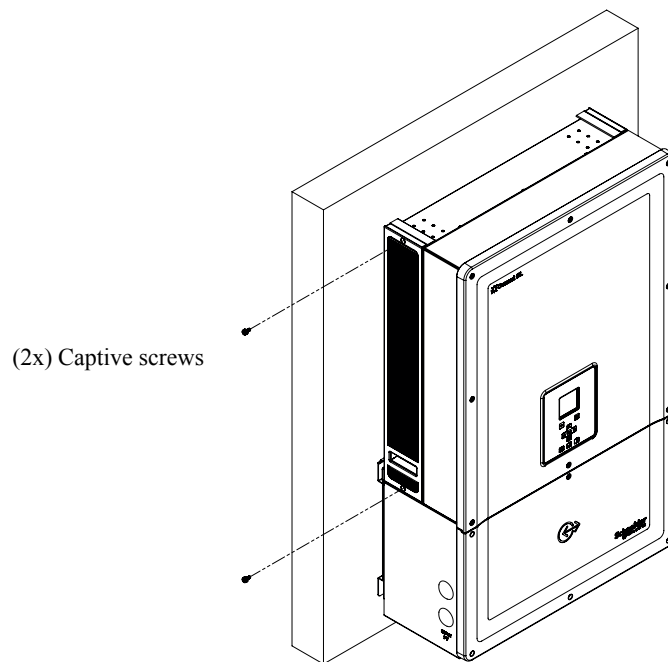


Figure 5-2 Loosening the louver cover- left side

- b) Remove the louver cover as shown in the figure below.
  - i Slide up the louver cover.
  - ii Pull out the louver cover.

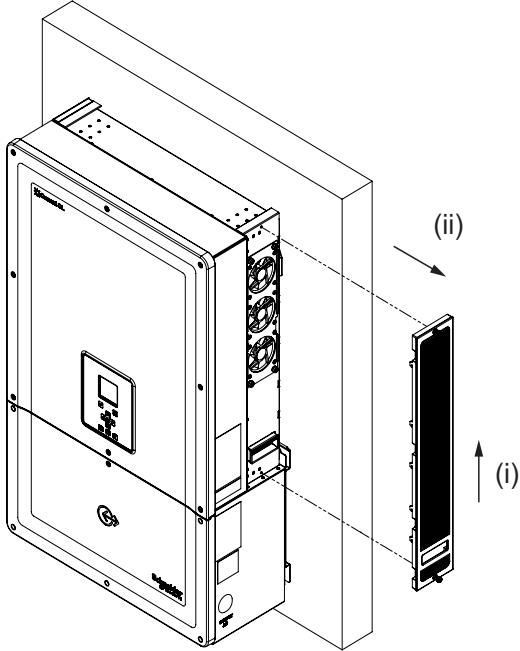


Figure 5-3 Removing the louver cover- right side

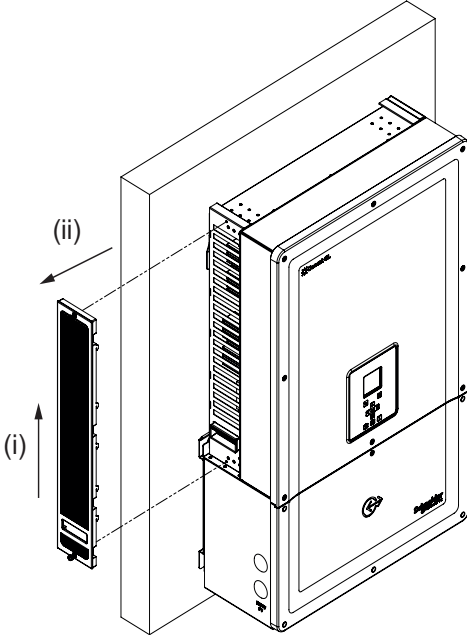


Figure 5-4 Removing the louver cover- left side



## Cleaning the Louver Cover

After removing the louver cover gently with a screw driver, clean the cover with a soft brush, paint brush or compressed air. Ensure that the rear enclosure is covered properly while cleaning, to prevent the entry of foreign bodies.

## Cleaning the Fans

The fans are located at the right hand side of the unit.

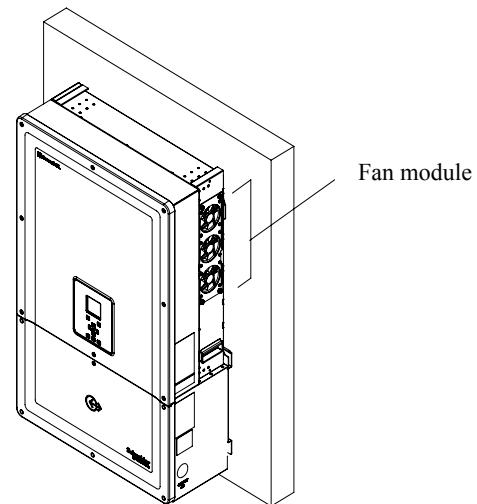


Figure 5-5 Fan location

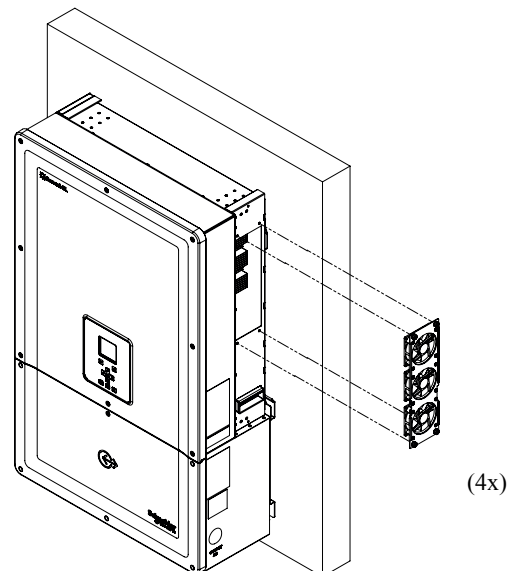


Figure 5-6 Removing the fan

A typical single fan removal is as shown in Figure 5-6.

Fan maintenance:

1. Unfasten the screws of fan module and remove the fan gently with a screw driver.
2. Unlock the fan connectors as shown below in Figure 5-8.
3. Take the fan out and clean it only with a soft brush or clean cloth.

Note: Handle the fan connector gently to avoid any physical damage.

<b><i>NOTICE</i></b>
<b>RISK OF EQUIPMENT DAMAGE</b> Do not use compressed air for cleaning the fan, as this may damage the blades of the fan. <b>Failure to follow these instructions can result in equipment damage.</b>

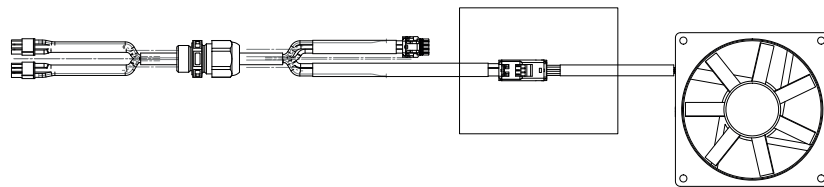


Figure 5-7 **Removing the fan connector**

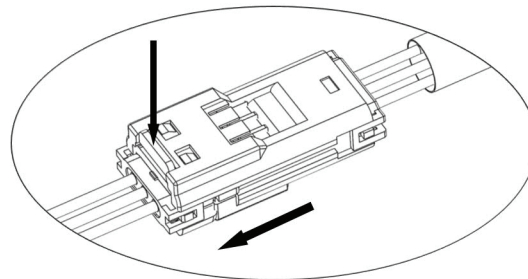


Figure 5-8 **Unlocking the fan connector tabs**

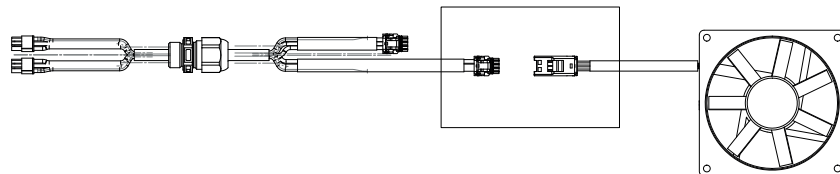


Figure 5-9 **Inserting the fan connector**

4. Insert the fan connectors back as shown in Figure 5-9. Make sure that the connector clicks in place.

5. Mount the fans back at proper location, refer Figure 5-5.
6. Insert the louver covers back and ensure that the louver covers are secured properly in place, refer Figure 5-3 and Figure 5-4.
7. Check for proper working of fans using the Diagnostics menu as shown in Figure 5-10.

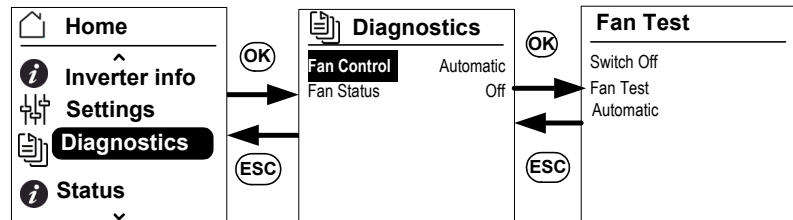


Figure 5-10 Diagnostics menu

## SPD Replacement

If any of the SPDs reach End of Life, there will be a warning message active on the display. In the event of SPD open fault, follow the procedure below:

- Disconnect the DC and AC power to the wiring box through appropriate external means.
- Open the wiring box.
- Inspect the PV and AC wiring and rectify any short circuit or other faults on the input and output PV array circuits.
- Observe the inspection window provided in the SPD cartridge.
  - A red color in the cartridge indicates that the SPD is damaged.
- Replace the damaged SPD cartridge with a new working cartridge.
- Clear the SPD protection open event on the display.
- Close the wiring box.

The above mentioned procedures should be performed only by a trained technician.

The ordering details for SPD spare parts:

0J-367-0803-Z: DC SPD 1000V 2POLE DINRAIL HB BOS UL ROHS - NA

0J-367-0804-Z: AC SPD 3P +NEUTRAL DIN RAIL HB UL ROHS - NA

## Fuse Replacement

In the event of a short circuit in any of the PV string, the inverter will display ‘Low PV1 input voltage’ or ‘Low PV2 input voltage’ event message, and there could be a possibility of string fuse failure.

**⚠ ⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, FIRE AND EQUIPMENT DAMAGE**

- Do not attempt to replace the fuse without rectifying the PV array short circuit fault, failing to which, there can be a risk of arc.
- Turn Off the DC and AC breaker before opening the wiring box cover.

**Failure to follow these instructions will result in death or serious injury.**

**⚠ ⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

DC disconnect located in the bottom of unit, switch off before doing any service.

**Failure to follow these instructions will result in death or serious injury.**

**⚠ ⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Do not open fuse holders under PV load.

**Failure to follow these instructions will result in death or serious injury.**

To replace the fuse,

1. Turn OFF the DC and AC breaker before opening the wiring box cover.
2. Turn OFF the DC disconnect located in the bottom of wiring box.
3. Open the wiring box cover.
4. Inspect the PV circuit and rectify if there are any faults.
5. Remove the fuse holder insulator, refer to **Torque Table**.

Note: Keep fuse holder insulator safely.

6. Replace the faulty fuse with a new one.
7. Assemble the fuse holder insulator, refer to **Torque Table**.
8. Close the wiring box cover.

To replace the fuse,

1. Turn off the DC disconnect and AC breaker.
2. Open the wiring box cover.
3. Inspect the PV circuit and rectify if there are any faults.
4. Replace the faulty fuse with a new one.
5. Close the cover.

Recommended Fuse: Part number: PV1510F

Make: Cooper Bussman

Rating: 1000 VDC, 15 A.

The ordering details for FUSE and FUSELINK:

- FUSE: Part number: PVSCL2025FUSE
- FUSELINK: Part number: CL2025FUSELNK (only for two strings/ MPPT).

## AFD Fault

If the inverter is tripped due to AFD fault and the display message shows “Arc Fault” (fault code 709), follow the procedure below to restore the inverter operation. The inverter will not start until the AFD fault is manually reset.

The below mentioned procedures should be performed only by a trained technician.

1. Ensure that there is no physical damage observed in the DC input wiring.
2. Disconnect the AC (external) and DC breaker.
3. Rectify the cause of the Arc Fault event.
4. Turn ON the AC and DC breaker.
5. Acknowledge the ‘AFD Fault’ in the LCD display.

The inverter will resume operation.

## De-commissioning

To decommission the inverter

1. Turn Off the AC and DC breaker.
2. Open the wiring box cover as shown in Figure 2-25 on page 2–29.
3. Remove all the communication interface connections.
4. Unlock the inverter and wiring box power connectors using the thumb screw provided. Refer to the Figure 2-31 on page 2–32 for the connector location.
5. Unfasten the guide bush screw of the wiring box, refer Figure 2-30 on page 2–32 for the screw location.
6. Ensure the inverter is free to lift from the wiring box.

7. Lift the inverter from the mounting bracket and keep it in a safe place.
8. Close the wiring box cover. Refer to the Figure 2-32 on page 2–33.

To decommission the Wiring box

After de-commissioning the inverter,

1. Remove the AC and DC wiring.
2. Close the connector cover using the guide bushing. Refer to the Figure 2-26 on page 2–30 for guide bushing location.
3. Unfasten the four M8 screws. Refer to the Figure 2-24 on page 2–29 for screw location.
4. Remove the wiring box from the bracket and keep it in a safe place.

## Firmware Upgrade process

The below mentioned procedures should be performed only by a trained technician.

**⚠ ⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, FIRE OR ARC FLASH**

A voltage of 1000 VDC and AC grid voltage will be present inside the wiring box.  
Ensure to use all the necessary PPE.

**Failure to follow these instructions will result in death or serious injury.**

Note: During firmware upgrade process, ensure:

- not to disconnect the interface cables.
- no power interruption happens.

Such interruptions cause unsuccessful firmware upgrade.

In Conext CL, the firmware can be upgraded by using any of the following methods:

- USB (Local firmware upgrade)
- Ethernet (Local/ Remote firmware upgrade)

### USB

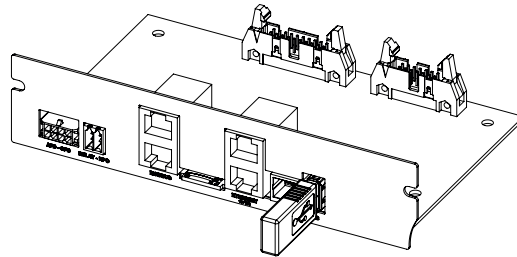
For upgrading the firmware locally, use an external USB flash drive (not included), and follow the steps as described below:

Recommended USB drives are:

- a) Sandisk - refer to <http://www.sandisk.com/home/usb-flash/cruzer-blade>.
- b) Toshiba(4GB) - refer to <http://us.toshiba.com/computers/storage/usb-flash/usb-2/thn-u202w0080u4>.
- c) Kingston- refer to [http://www.kingston.com/us/usb/personal\\_business/dtse9h](http://www.kingston.com/us/usb/personal_business/dtse9h).

- d) Transcend(TS4GJF350): refer to <http://www.transcend-info.com/Products/No-375>.

1. Ensure to delete older firmware versions stored in the USB.



USB flash drive

Figure 5-11 Communication interface with USB flash drive

2. Copy the latest firmware into the USB flash drive that will be used to load the firmware to the inverter. The latest version of firmware can be downloaded from <http://solar.schneider-electric.com/>.
3. Open the wiring box cover.
4. Ensure both AC and Sufficient PV input (>300V) is available to power up control circuit of the inverter.
5. Connect the USB drive to the USB device socket. The inverter display will now ask for user confirmation to start the upgrade process.
6. Press the OK button. The inverter now starts upgrading the new firmware available in the USB drive. The upgrade process will take approximately 20 to 25 minutes.

After completing the upgrade process, the inverter will restart.

Note:

- The user confirmation window will be active only for few seconds.
  - If the OK button is not pressed, 'NO REQUEST RECEIVED' appears and the system returns to the home screen.
7. Under 'Inverter Info' menu verify the firmware version number in the display with the latest firmware version number. If it matches, follow step 10 or else step 9.

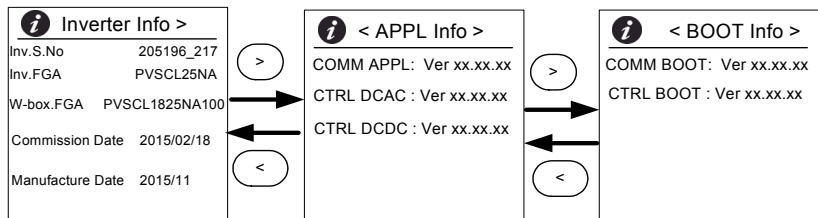


Figure 5-12 Inverter Info

8. If COMM APPL version displayed is not matching then repeat the step 2 and after firmware upgrade step is completed make sure the version matches.
9. Check the CTRL DCAC, CTRL DCDC are matches with firmware version if not go to LCD menu (Home-> Maintenance Menu) select Update Control SW.
10. On successful completion of the upgrade process, unplug the USB drive.
11. Close the cover of the wiring box properly.
12. In case of any event or failure in the upgrade process, contact Schneider Electric.

Ethernet (Webpages)

1. Establish the connection as mentioned in “Web Interface” on page 2–57.
2. Copy the latest firmware to the personal computer. The latest version of firmware can be downloaded from solar.schneider-electric.com.

The webpage dashboard screen is displayed as shown below.

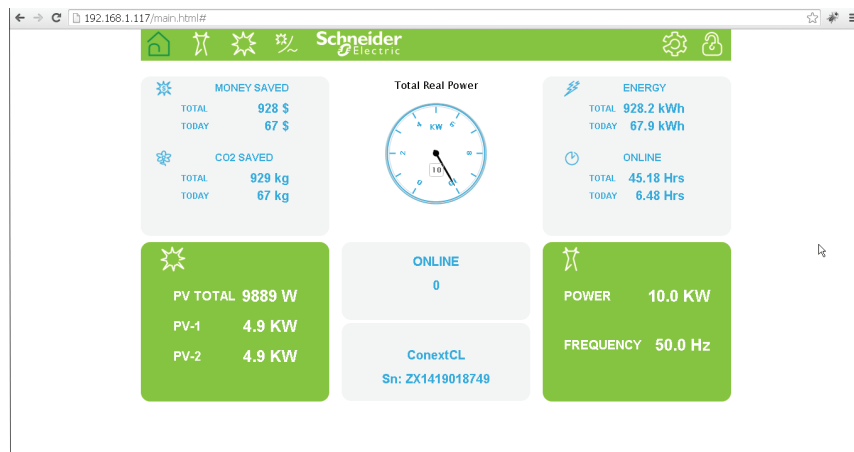


Figure 5-13 **Web page dashboard** screen

3. Click on the Settings icon(). The below screen appears.



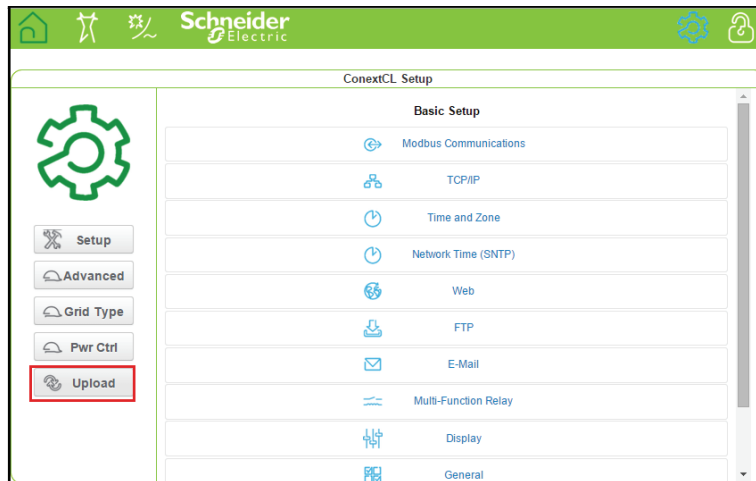


Figure 5-14 Web page upload screen

4. Select the Upload option (displayed on the left hand side of the screen).

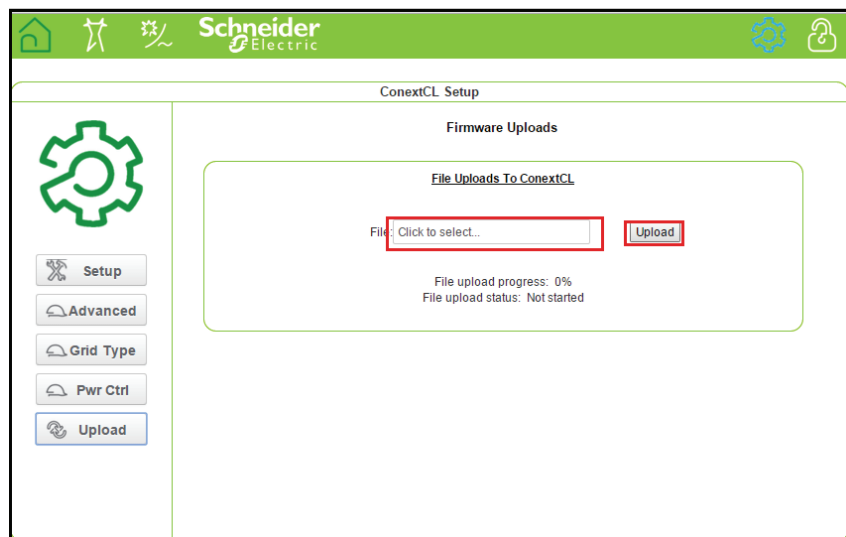


Figure 5-15 Web page firmware upgrade screen

5. Click on the **Click to select** field and navigate to the firmware file in the personal computer.
6. Select the file.
7. After selecting the appropriate file, please click **Upload** button to start the process.
8. Under **Inverter Info** menu verify the firmware version number in the display with the latest firmware version number. If it matches, perform step 11 or else step 10.

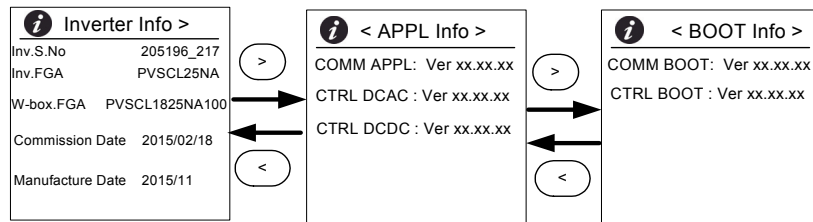


Figure 5-16 **Inverter Info**

9. If COMM APPL version displayed is not matching then repeat the steps above and after firmware upgrade step is completed make sure the version matches.
10. If control firmware version (CTRL DCAC, CTRLDCDC) are not matching then use the Update Control SW option in the DUI to update the control processor firmwares
11. Click upload to start the firmware upgrade process. On successful completion of firmware upgrade process, the inverter will reboot.

---

# A

# Specifications

Appendix A provides the environmental, electrical, and other specifications for the inverters.

It contains information about:

- System Specifications
- RCMU
- Efficiency Curves
- Derating Curves

Note:

- Specifications are subject to change without notice.
- Refer to [solar.schneider-electric.com](http://solar.schneider-electric.com) for the latest list of approved countries.

## System Specifications

Table A-1 System specifications

Parameter	Unit of measurement	Conext CL 18000NA	Conext CL 25000NA
<b>Input (DC)</b>			
Full power MPPT voltage range	Volts	300 - 800	500 - 800
Operating voltage range	Volts	250 - 1000	
Maximum input voltage, open circuit	Volts	1000	
Rated input voltage	Volts	720	
Minimum input voltage	Volts	150	
Maximum input current	Ampere	32	26.5
Number of independent MPPT input		2/1	
Absolute maximum PV array short circuit current per MPPT	Ampere	36	
Nominal DC input power (cos phi = 1)	Watts	19000	26500
Maximum DC input power per MPPT	Watts	11400	15900
DC connection type		Base: Push type connector Essential & Optimum: Fuse holder	
Reverse polarity protection		Short circuit diode	
<b>Output (AC)</b>			
Nominal output power	KVA	18	25
Rated Grid Voltage	Voltage (L-L)	480	
AC voltage range	Voltage (L-L)	422 - 528	
Grid Connection Type		3-phase 4-wire wye	

Table A-1 System specifications (Continued)

Frequency	Hertz	60	
Frequency range (adjustable)	Hertz	+/- 3	
Start up current	Ampere	0	
Maximum output current	Ampere	24	31
Maximum output short circuit current	Ampere	40 A (rms) for 100 msec	
Total harmonic distortion	Percentage	<3 @ rated power	
Power factor		> 0.99 @full power Adjustable: 0.8 capacitive to 0.8 inductive	
AC connection type		Bottom and side conduit/cable entry Spring cage clamp connector	
Grid monitoring		AC voltage, AC frequency, and anti- islanding protection	
Output characteristics		Current source	
Output current waveform		Sine wave	
Efficiency			
Peak	%	98.0	98.4
CEC	%	97.5	98.0
General Specifications			
Power consumption, night time	Watts	<3	
Enclosure Rating		TYPE 4 (electronics) /TYPE 3R (rear side)	
Cooling		Fan cooled	
Inverter weight	lb (kg)	119 (54)	
Inverter shipping weight (With Pallet)	lb (kg)	200 (91)	
Wiring Box weight	lb (kg)	33 (15)	
Wiring Box shipping weight (With Pallet)	lb (kg)	59 (27)	
Inverter dimensions (H x W x D)	in (mm)	28.1 x 26.5 x 10.5 (714 x 674 x 268)	
Wiring Box dimensions (H x W x D)	in (mm)	14.2 x 26.5 x 10.5 (361 x 674 x 268)	

Specifications

Table A-1 System specifications (Continued)

Inverter shipping dimensions (With Pallet) (H x W x D)	in (mm)	21.6 x 47.2 x 31.4 (550 x 1200 x 800)
Wiring Box shipping dimensions (H x W x D)	in (mm)	21.6 x 31.4 x 23.6 (550 x 800 x 600)
Ambient air temperature for operation	°F (°C)	-13° to 140° (-25° to 60°)
Operating altitude	m (ft)	2000 (6560)
Relative humidity%	%	up to 100 condensing
Noise emission (at 1 m distance)	dBA	58
Features and Options		
Remote reset	Yes	
Storage temperature	-40° F to 140°F (-40° C to +60° C)	
User Interface	Graphic display, button	
Communication Interface	RS485 (MODBUS RTU), Ethernet / MODBUS TCP (Ethernet), USB and Dry Contact	
Monitoring	SunSpec Alliance profile, SPD and Arc Fault Detection (AFD) monitoring available with device	
Regulatory approvals		
Certifications	UL 1741, IEEE 1547- 2003, IEEE 1547.1- 2005, UL 1998- 2013, CSA C22.2 107.1-0, FCC Class A compliant	
Available product variants		
Base: AC connector and DC connector	PVSCL18NA100	PVSCL25NA100
Essential: Touch-safe fuse holder, DC switch and AC connector	PVSCL18NA200	PVSCL25NA200
Essential plus: Essential + AFD	PVSCL18NA201	PVSCL25NA201
Optimum: Essential + DC SPD and AC SPD	PVSCL18NA300	PVSCL25NA300
Optimum plus: Optimum + AFD	PVSCL18NA301	PVSCL25NA301

## RCMU

Conext CL transformerless inverters have an integrated electronic RCMU. This trips if the constant leakage exceeds 300 mA, or suddenly occurring residual currents of 30 mA. The integrated RCMU is sensitive to both AC and DC leakage currents.

Note: If an external RCD is used, it shall be a Type B RCD and trip current has to be at least 300 mA.

Maximum AC current during a voltage drop with LVRT function is limited to follow with Conext CL:

- Conext CL 18000NA: 25 A
- Conext CL 25000NA: 33 A

## Efficiency Curves

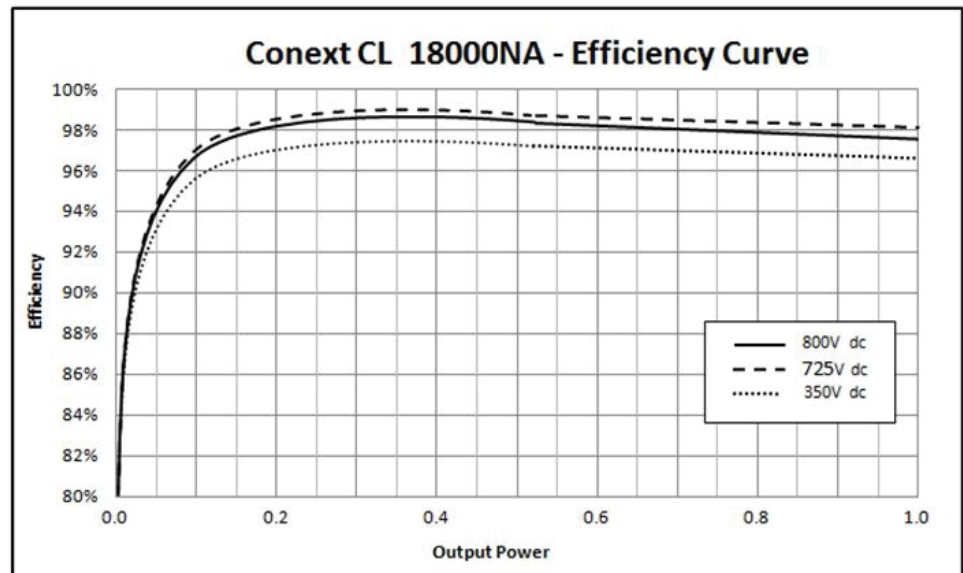


Figure A-1 Efficiency curve - 18kW

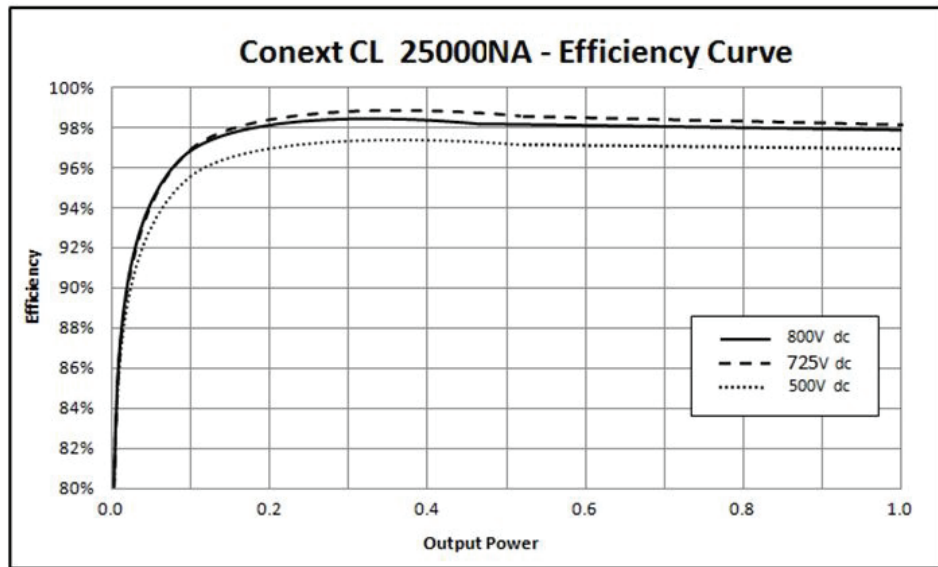


Figure A-2 Efficiency curve- 25kW

## Derating Curves

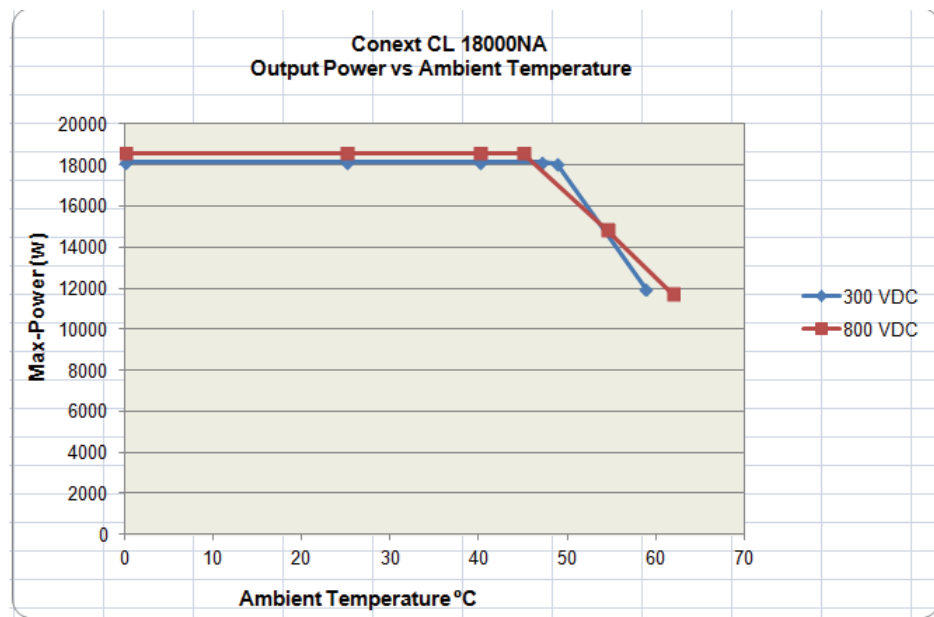


Figure A-3 Derating curve- 18kW



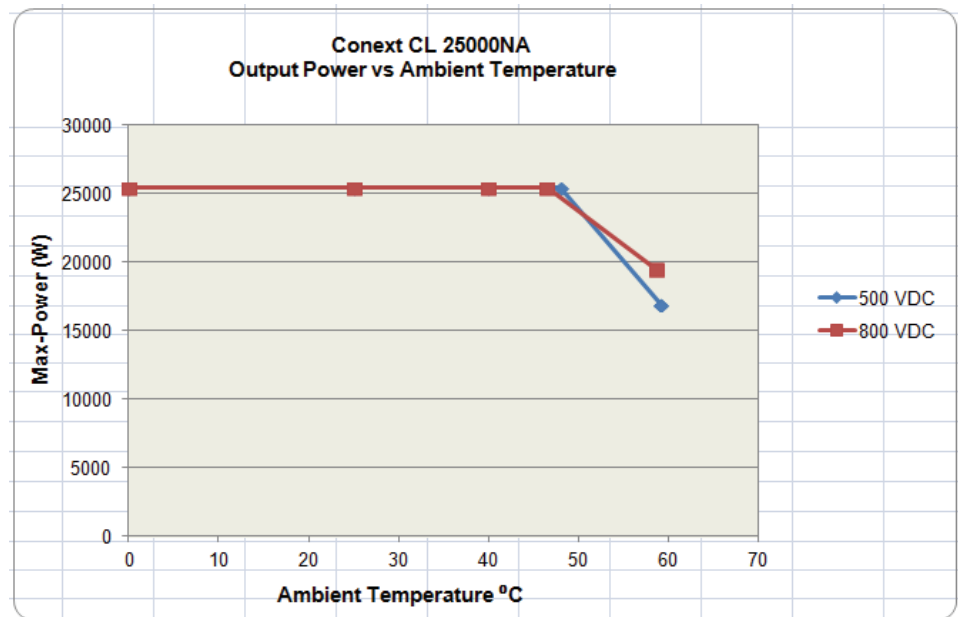


Figure A-4 Derating curve- 25kW



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# B

## Descriptions of LCD Information

Appendix B describes the information that can be displayed on the LCD of the inverter.

It contains information about:

- Description of Information Displayed on the LCD

## Description of Information Displayed on the LCD

Table B-1 describes text that is displayed on the LCD.

For a description of error messages, see Table 4-2 on page 4–5.

Table B-1 LCD texts

LCD text	Description
Home	Main screen on the LCD
Quick View	Displays the inverter status (online, offline and reconnecting), PV is Up/No PV, Fault (or) No Fault, and Today's Energy Production along with graph
Power Meter	Displays the DC input power and AC output power menus.
Energy Log	Displays the summary of energy of days, week, month and year.
Event Log	Displays the services, errors, warnings and events occurred inside the inverter
Inverter Info	Displays the inverter information such as serial number, FGA number, wiring box and firmware version.
Settings	Displays the General Settings, Comm Settings, Install Settings, and Power Control menus
Diagnostics	Displays the Fan Control & Fan Status
Status	Displays the Temperature, SPD Status, AFCI status menus
Password	Enter the password for authentication wherever it is applicable such as the Grid code/ Country selection, Install settings, Power control, Advanced temperature status and so on.
Power Meter	<b>Home&gt; Power Meter</b> Displays the total DC input power screen and total AC output power screen
P (kW)	Power in kilo watts
V (v)	Voltage in volts
I(A)	Current in Ampere
PV1 - P (kW)	PV channel 1 DC input power
PV1- V(V)	PV channel 1 DC input voltage
PV1 - I(A)	PV channel 1 DC input current

Table B-1 LCD texts (Continued)

LCD text	Description
PV2 - P (kW)	PV channel 2 DC input power
PV2 - V(V)	PV channel 2 DC input voltage
PV2 - I(A)	PV channel 2 DC input current
L1 - P (kW)	3 phase Phase A - AC output power
L1 - V (v)	3 phase Phase A - AC output voltage
L1 - I(A)	3 phase Phase A - AC output current
L2 - P (kW)	3 phase Phase B - AC output power
L2 - V (v)	3 phase Phase B - AC output voltage
L2 - I (A)	3 phase Phase B - AC output current
L3 - P (kW)	3 phase Phase C - AC output power
L3 - V (v)	3 phase Phase C - AC output voltage
L3 - I(A)	3 phase Phase C - AC output current
Energy Log	<p><b>Home&gt; Energy Log</b></p> <p>Displays:</p> <ul style="list-style-type: none"> <li>• The Energy production information in kWh (kilo Watt Hour) for today and life time.</li> <li>• The inverter online time for today and life time in Hr (hours)</li> </ul>
Today Energy	Total power or electricity generated today from the inverter
Today Runtime	Total operation time of the inverter with energy produced
Life Energy	Total electricity generated by unit
Life Runtime	Total operation time of the inverter
Today	Total energy generated today
Yesterday	Total energy generated yesterday
Month	Total energy generated present month
Last Month	Total energy generated last month
Year	Total energy generated present year
Last year	Total energy generated last year

Table B-1 LCD texts (Continued)

LCD text	Description
7 Days	Energy generated in last seven days
Prev 7 Days	Energy generated in previous seven days
Event Log	<b>Home&gt; Event Log</b> Displays the Active Services, Service Logs, Event Logs and All Logs (All up to 10 entries)
Active Services	Displays the active errors and services in the inverter.
All Logs	Displays all the errors, services, warnings and events and displays up to 10 logs
Service Log	Displays the set and clear of all errors, services warnings and events.
Event Log	Displays all the events
Service Details	Displays the detailed description of a service along with date and time
Event Details	Displays the detailed description of an event along with date and time
Log Details	Displays the detailed description of Log along with the date and time on the inverter
Inverter Info	<b>Home&gt; Inverter Info</b> Displays the inverter information such as inverter details, wiring box details and firmware version
Inv.S.No.	Inverter serial number
Inv.FGA	Inverter FGA number
W.box.FGA	Wiring box FGA number
W.box.S.No. (optional)	Wiring box serial number
COMM APPL	Communication application firmware version number
COMM BOOT	Communication bootloader firmware version number
CTRL DCAC	AC processor application firmware version number
CTRL DCDC	DC processor application firmware version number
General Settings	<b>Home&gt; Settings&gt; General Settings</b> Displays the settings of name, language, date and time, contrast, back light and backlight time out

Table B-1 LCD texts (Continued)

LCD text	Description
Name	Name given by user/ installer for the inverter identification
Language	View/ set language for display
Date & Time	View/ set date, time zone and time
Contrast	View/ set LCD contrast (range 43- 65)
Backlight	View/ set LCD Backlight brightness (range 0-10)
Backlight timeout(s)	View/set LCD backlight ON timeout in seconds (range 0-999)
Network settings	Home> Settings> Comm Settings> Network Settings Network related settings like IP-Address, Net mask, Gateway and DHCP
IP Address	View/ set inverter IP address
Gateway	View/ set inverter network gateway
Netmask	View/ set inverter network mask
DHCP	View/ set DHCP Enable(1)/ Disable(0)
Modbus settings	<b>Home&gt; Settings&gt; Comm Settings&gt; Modbus Settings</b> Configure the Modbus parameters
Baud rate	View/ set the inverter to operate at different Modbus Baud rates
Modbus Address	View/ set Modbus address or slave ID, default set to 10
TCP port	View/ set TCP port for communication, Default 502
Install settings	Install settings are settings related to PV insulation, DC - injection, RCMU enable, reset factory and Multifunction relay
Select Country	Lets you to select country / grid setting, displays the selected settings and lets you to change the settings, with in predefined grid code
Grid setting	Displays the grid related parameters and predefined values of the selected grid
PV Insulation	Displays the PV insulation menu
Enable	PV insulation check enable(1)/ disable(0)
Thresh Resist (kohm)	PV insulation resistance value threshold in Kilo Ohms

Table B-1 LCD texts (Continued)

LCD text	Description
RCMU Enable	RCMU enable (1)/ disable (0)
Factory Default	Restores all the default values
Revert To FPU	Select this option and restart the inverter to reset to the first time power up configuration settings
Wiring Box selection	Displays the different wiring box options to configure as per part number
Multi function relay	Displays the Multiple Relay settings with respect to either of temperature, power, external load and fault limits
MPPT Settings	View/ set MPPT configuration (single/ dual)
Custom	Customise the existing grid settings or new grid code settings
Power control	<b>Home&gt; Settings&gt; Power Control</b> To control the Active and Reactive power
Active power	<b>Home&gt; Settings&gt; Power Control&gt; Active Power</b> To control the Active power or real power (KW)
Power limit	<b>Home&gt; Settings&gt; Power Control&gt; Active Power&gt; Power limit</b> Limits the inverter power in terms of percentage or KW level
PCT Enabled	View/ set the power control (enable/ disable)
Set Point (%)	Displays the Power control in percentage with respect to the rated power
Set Point (KW)	Displays the Power control in kw (Kilo watt) with respect to the rated power
Temperature	<b>Home &gt; Status&gt; Temperature&gt; Advanced</b> Displays the temperature values of different modules in the inverter.
DC Module 1	Displays the Boost Module 1 temperature
DC Module 2	Displays the Boost Module 2 temperature
Ambient Temp	Displays the external Ambient temperature of the inverter
AC Module A	Displays the internal Module A heatsink temperature of the inverter



Table B-1 LCD texts (Continued)

LCD text	Description
AC Module B	Displays the internal Module B heatsink temperature of the inverter
AC Module C	Displays the internal Module C heatsink temperature of the inverter
SPD Status	<b>Home &gt; Status&gt; SPD Status</b> Displays the SPD status (based on the wiring box selection)
SPD AC	Displays the AC side SPD (Surge protection Devices) monitoring status
SPD PV1	Displays the PV1 or DC1 side SPD monitoring status
SPD PV2	Displays the PV2 or DC2 side SPD monitoring status
AFCI Status	<b>Home &gt; Status&gt; AFCI Status</b> Displays the AFCI (depends on the wiring box selection)
Arc Fault	Displays the status of Arc fault detected by the AFD module
Diagnostics	Home> Diagnostics Displays the Diagnostics menu
Fan Setting	<b>Home &gt; Diagnostics&gt; Fan Control&gt; Fan Setting</b>
Fan Status	Displays the status of the Fan operation
Fan Control	To switch on/ off the inverter fan
Switch Off	Turns off the Fan. (All the three fans turn Off)
Fan Test	Turns On the Fan. (All the three fans turn On)
Automatic	To set the fan in automatic control, unit temperature dependant. (All three fans in automatic control)



# Information About Your System

As soon as you open your Conext CL series photovoltaic grid tie inverter package, record the following information and be sure to keep your proof of purchase.

- Serial Number                      • \_\_\_\_\_
- Part Number                        • \_\_\_\_\_
- Purchased From                    • \_\_\_\_\_
- Purchase Date                      • \_\_\_\_\_



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