Conext™ RL Photovoltaic Grid Tie Inverters

Conext RL 3000 E-S
Conext RL 3000 E
Conext RL 4000 E-S
Conext RL 4000 E
Conext RL 5000 E-S
Conext RL 5000E

Installation and Operation Manual

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Date and Revision

July 2013 Revision B

Part Number

975-0687-01-01

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About This Manual

Purpose

The purpose of this Installation and Operation Manual is to provide explanation and procedures for installing, operating, maintaining, and troubleshooting the below mentioned inverters:

- Conext RL 3000 E-S (part number PVSNVC3000S)
- Conext RL 3000 E (part number PVSNVC3000)
- Conext RL 4000 E-S (part number PVSNVC4000S)
- Conext RL 4000 E (part number PVSNVC4000)
- Conext RL 5000 E-S (part number PVSNVC5000S)
- Conext RL 5000 E (part number PVSNVC5000)

Scope

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

Audience

The information in chapters “Introduction” on page 1–1, “Operation” on page 3–1, and “Troubleshooting” on page 5–1 is intended for the owner and operator of the Conext RL inverter. The information in chapters “Installation and Configuration” on page 2–1 and “Preventative Maintenance” on page 4–1 is intended for qualified personnel only. Qualified personnel have training, knowledge, and experience in:

- Installing electrical equipment and PV power systems (up to 600 V).
- 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 Conext RL inverter must be done only by qualified personnel.

Organization

This manual is organized into the following chapters and appendices.

Chapter 1, “Introduction” contains information about the features and functions of Conext RL inverter.

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

Chapter 3, “Operation” contains information on the basic operation of the Conext RL inverter.

Chapter 4, “Preventative Maintenance” contains information and procedures for performing preventative maintenance on the Conext RL inverter.

Chapter 5, “Troubleshooting” describes the event messages that might be displayed on the LCD of the inverter and recommended solutions.

Appendix A provides the electrical, environmental, and other specifications of the Conext RL inverter.

Appendix B provides the information on how to configure Conext RL inverter using Conext RL Config tool.

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

Conventions Used

This manual uses the following conventions for conveying important safety related information.

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

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

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

NOTICE
NOTICE indicates important information that you must read carefully.

Product Names

This manual includes information for six products: the Conext RL 3000 E-S/ Conext RL 3000 E, Conext RL 4000 E-S/ Conext RL 4000 E, and Conext RL 5000 E-S/ Conext RL 5000 E Photovoltaic grid tie inverters. The following table lists the naming conventions used to differentiate information that only applies to one of the six inverters. For information common to all six products, “Conext RL inverter” is used.

Product Name	Usage
Conext RL 3000 E-S	Information provided is specific to the 3 kVA Conext RL inverter with integrated DC switch
Conext RL 4000 E-S	Information provided is specific to the 4 kVA Conext RL inverter with integrated DC switch
Conext RL 5000 E-S	Information provided is specific to the 5 kVA Conext RL inverter with integrated DC switch
Conext RL 3000 E	Information provided is specific to the 3 kVA Conext RL inverter without DC switch
Conext RL 4000 E	Information provided is specific to the 4kVA Conext RL inverter without DC switch
Conext RL 5000 E	Information provided is specific to the 5kVA Conext RL inverter without DC switch

Abbreviations and Acronyms

Term	Definition/description
AC	Alternating Current
ADC	Analog to Digital Converter
Cap	Capacitive
DC	Direct Current
DSP	Digital Signal Processing
GND	Ground
Ind	Inductive
IEC	International Electrotechnical Commission

Term	Definition/description
I_{SC}	Short circuit current rating of an PV panel under Standard Test Condition
$I_{SC\ max}$	Absolute maximum short circuit current permitted from the PV array
L	Line or Phase
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
OD	Outer Diameter
OOCP	Output Over Current Protection
P	Active Power
PCC	Point of Common Coupling
PE	Protective Earth (ground)
Pn	Real power nominal
Pm	Percentage of Rated Power
PPE	Personal Protective Equipment
PV	Photovoltaic
Q	Reactive power
RCD	Residual Current Detection
RCMU	Residual Current Monitoring Unit
SELV	Safety Extra Low Voltage
Sn	Apparent power nominal

Term	Definition/description
STC	Standard Test Conditions specific to photo voltaic panels (1000 W/m^2, light spectrum AM 1.5 and 25 °C [77 °F]); panel nameplate ratings are based on STC and may be exceeded under some conditions
V	Voltage
UTE	UNION TECHNIQUE DE L'ELECTRICITE
UV	Ultraviolet
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 the PV array

Symbols on the Inverter

Symbols	Explanation
	Hazard of fire, arc flash, or electric shock from multiple sources
	The Conext RL inverter is energized from two sources. Before opening the cover, disconnect all the sources of power, and then wait at least five minutes for internal capacitors to discharge.
	Refer to the Conext RL Installation and Operation Manual.
	Burn hazard due to hot surface. Do not touch the heat sink.
	Protective earthing connection

Related Information

You can find more information about Schneider Electric, as well as its products and services, at www.schneider-electric.com.

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 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 and operating instructions for the Conext RL inverter that must be followed during operation, installation and maintenance of the inverter. Be sure to read, understand, and save these safety instructions.

⚠ DANGER

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

- The Conext RL inverter has no user serviceable parts inside. It must be installed and serviced only by qualified personnel equipped with appropriate personal protective equipment and following safe electrical work practices.
- The Conext RL inverter is energized from two sources: PV array while exposed to sunlight and AC grid. Before opening the cover, check the system diagram to identify all sources are de-energised, and wait for at least five minutes for internal capacitors to discharge to safe voltages.
- The Conext RL inverter employs field adjustable voltage and frequency set points and time delays that are factory set in compliance with local utility and safety requirements and can be changed only by trained technicians with approval by both the local utility and equipment owner.
- Before servicing, test the inverter using a meter, rated at least 600V AC and DC to make sure all circuits are de-energized.
- Do not use the Conext RL inverter in connection with life support systems, medical equipments, or where human life or medical property could be at stake.
- Before installing and using the Conext RL inverter read all the instructions and cautionary markings on the Conext Inverter, and all appropriate sections of this guide.
- To reduce shock, fire, and energy hazards, installation must be in accordance with all applicable local installation codes. It is the responsibility of the installer to ensure adherence to applicable codes.

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

The term “qualified personnel” is defined on page iii of this manual. Personnel must be equipped with appropriate PPE and follow safe electrical work practices. The inverter is energized from the AC grid and up to four PV arrays. Before servicing the inverter or accessing the communication module, disconnect all sources and wait for at least five minutes to allow internal circuits to discharge.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, FIRE AND EQUIPMENT DAMAGE

- The DC disconnect switch integrated or external to the unit turns off the DC power to the inverter.
- Ensure AC power to the inverter is switched off.
- All operations on the inverter must be performed with both PV and AC connectors physically isolated.

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

⚠ WARNING

LIMITATIONS ON USE

- Use the inverter only in grid-interconnected PV systems. The inverter does not support off-grid, stand-alone, power backup function.
- Persons with pacemakers must avoid coming in close proximity of this equipment.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by equipment may be impaired.

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

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, FIRE AND EQUIPMENT DAMAGE

To prevent unsafe conditions and damage to the inverter, comply with the instructions and the electrical, physical, and environmental installation specifications listed in this manual.

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

⚠ CAUTION

HAZARD OF BURN

- The Conext RL inverter heat sink can reach temperatures over 158 ºF (70 ºC) and can cause skin burns if touched.

Failure to follow these instructions can result in minor injury.

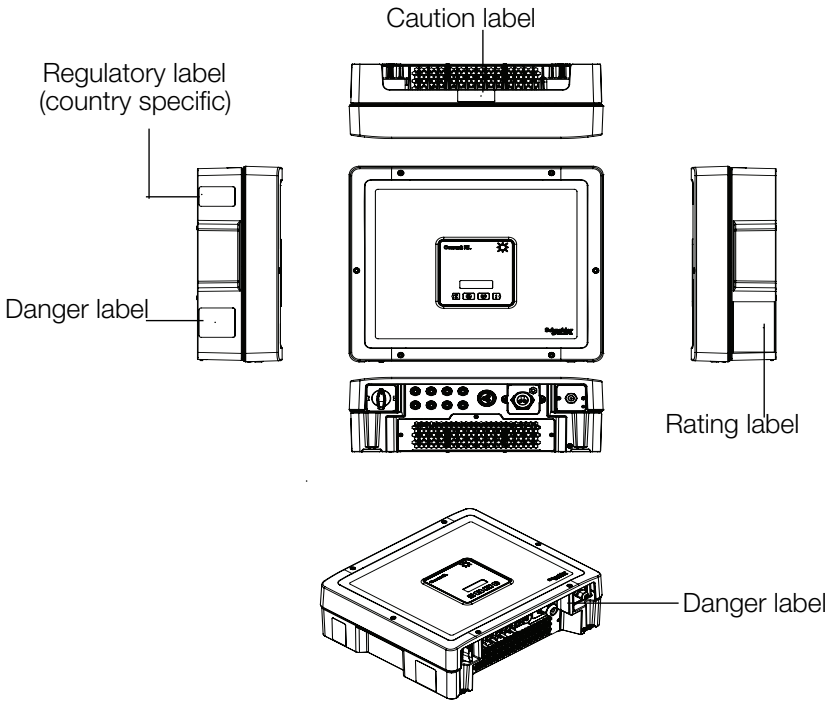
NOTICE

RISK OF EQUIPMENT DAMAGE

- Observe the clearance recommendations as described on Figure 2-19, “Correct installation distances” on page 2–27
- Do not install the inverter in a zero-clearance or in unventilated compartments.

Failure to follow these instructions can result in equipment damage.

Safety and Rating labels



Safety equipment

Qualified service personnel must be equipped with appropriate personal protective equipments that include the following, but may not be limited to:

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

Check local safety regulations for other requirements.

Contents

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1 Introduction

Chapter 1, “Introduction” contains information about the features and functions of Conext RL inverter.

Description of the Conext Grid Tie Solar Inverter

The Conext RL inverter is designed to convert solar electric (photovoltaic or PV) power into utility grade electricity that can be used for commercial or non commercial purpose.

The Conext RL inverter provides a feature to collect the maximum available energy from the PV array by constantly adjusting its output power to track the maximum power point (MPP) of the PV array. The Conext RL inverter has two MPPT channels (DC1 and DC2). Two independent PV arrays, each having one or two PV strings can be connected to the inverter. Each PV array, can be loaded to different peak power points, to harvest the maximum possible energy. The Conext RL inverter can accommodate arrays with open circuit voltage as high as 550 VDC.

Figure 1-1 shows the major components of a typical PV grid-tie installation, the energy flow in a system using the inverter, and the placement of typical balance-of-system components.

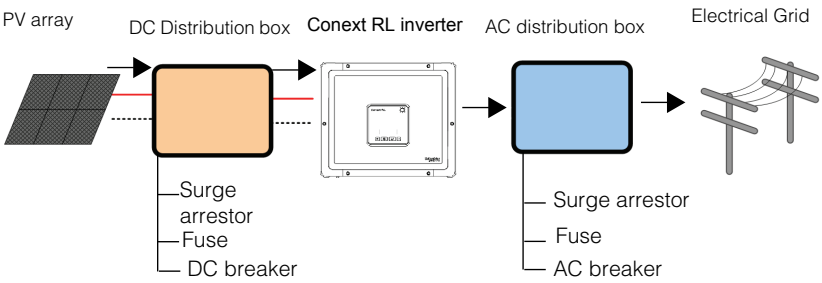

Figure 1-1 Typical installation

Installing the inverter consists of mounting it to the wall and connecting the DC input to a PV array and the AC output to the utility. For installation details, see “Installation and Configuration” on page 2–1.

Features

The inverter has the following features:

- Power rating:
  - Conext RL 3000 E-S/ Conext RL 3000 E inverter: 3 kVA
  - Conext RL 4000 E-S/ Conext RL 4000 E inverter: 4 kVA
  - Conext TL 5000 E-S/ Conext RL 5000 E inverter: 5 kVA
- PV compatibility: Designed to work with Mono Crystalline or Multi Crystalline panel
- Single-phase (Phase + N + PE), grid-tie, transformerless
- Conext RL inverter uses Proprietary MPPT technology -- Shade tolerant algorithm

- Full-Power MPPT range: Conext RL 3000 E-S/ Conext RL 3000 E (160 - 500 V), Conext RL 4000 E-S/ Conext RL 4000 E (180 - 500 V) and Conext RL 5000E-S/ Conext RL 5000 E (180 - 500 V)
- Two independent MPPT channels
- RS485 (Modbus) Communications
- IP65 protection class for outdoor environment
- DC (MC4) locking connectors
- Pluggable AC connector (IP67)
- Peak power conversion efficiency: 97.5%
- European weighted power conversion efficiency: 97%
- Energy harvest (MPPT) efficiency: > 99%
- Power factor adjustment range: 0.8 capacitive to 0.8 inductive
- Low AC output current distortion (THD < 3%) @ rated power
- Natural convection (fanless) cooling
- Logs up to 15 events
- 2x16 Alpha numeric display
- Multiple inverters can be networked together for increased net metering capacity or future system growth. All models have adjustable voltage and frequency disconnect settings and can be aggregated above 30 kW on a single point of common coupling-PCC.

Physical Features

Figure 1-2 illustrates the block diagram of Conext RL inverters.

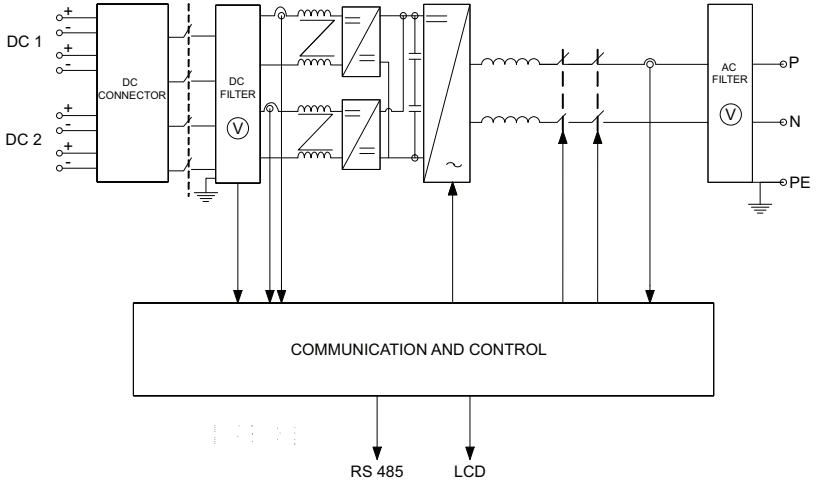

Figure 1-2 Block diagram for Conext RL inverters

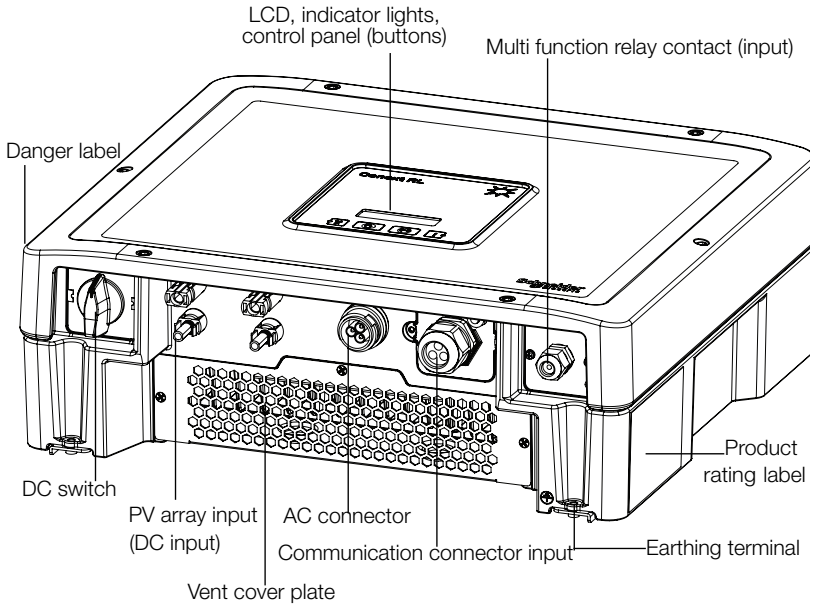

Figure 1-3 Location of important physical features of Conext RL 3000 E-S inverter

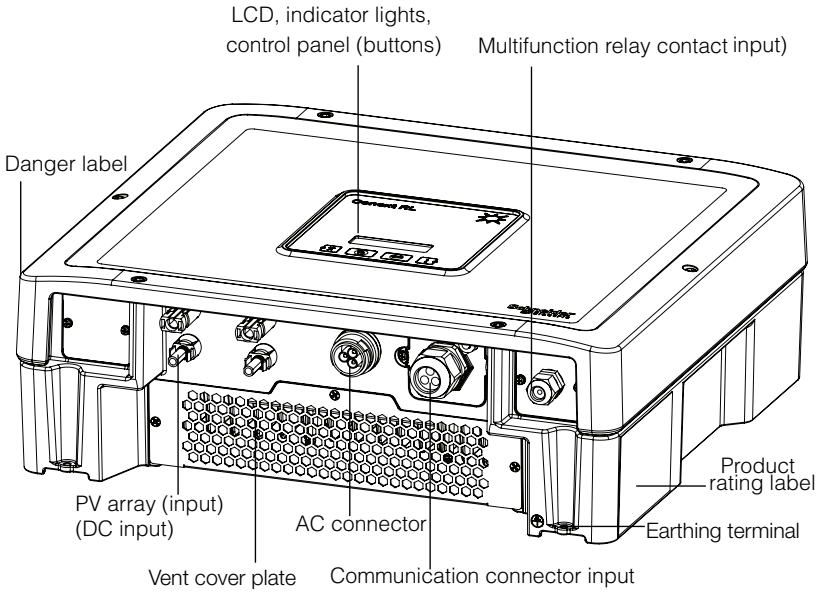

Figure 1-4 Location of important physical features of Conext RL 3000 E inverter

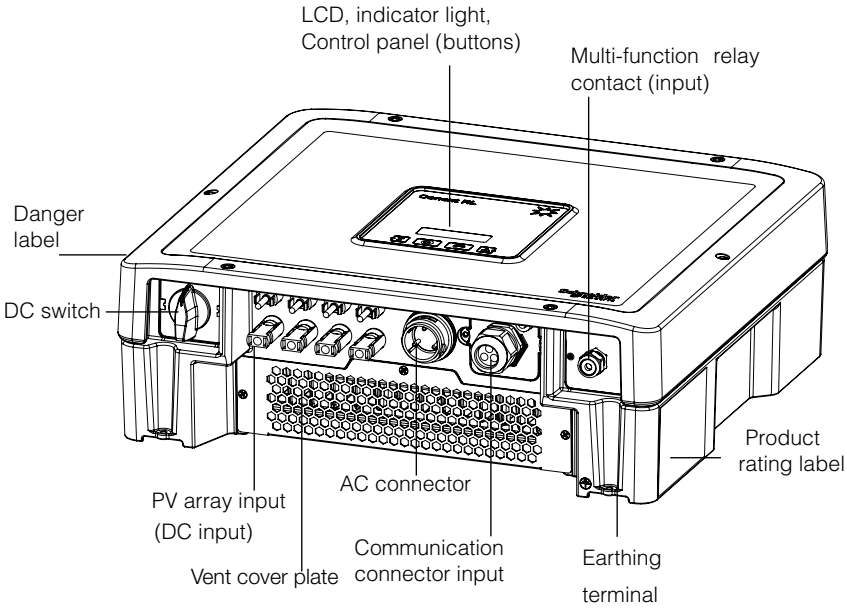

Figure 1-5 Location of important physical features of Conext RL 4000 E-S/ 5000 E-S inverter

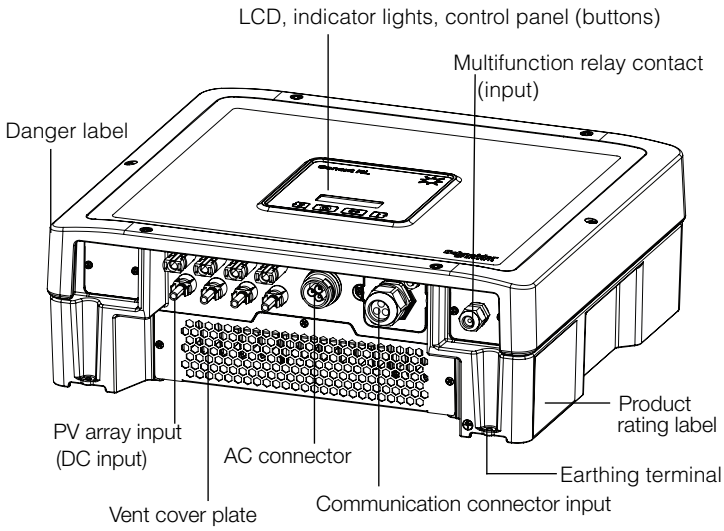

Figure 1-6 Location of important physical features of Conext RL 4000 E/ 5000 E inverter

Safety Label

The safety labels are as shown in figure under section “Important Safety Instructions”. The label is in English, and is shown in Figure 1-7 , Figure 1-9 and Figure 1-10.

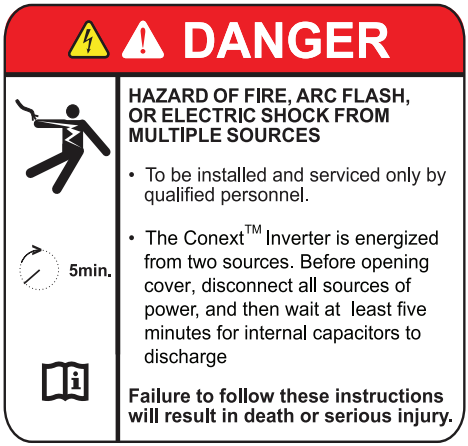

Figure 1-7 Danger label

The French label is as shown in Figure 1-8.

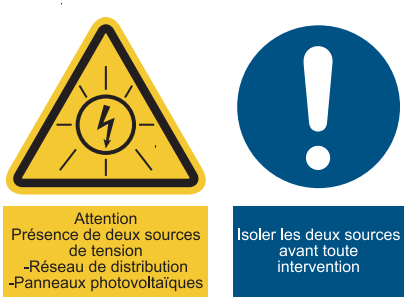

Figure 1-8 French UTE C 15-712-1 label

In the event of installation in France, the device must be provided with the warning sticker as per UTE C15-712-1. This warning label is included in the packaging. The label must be affixed on the inverter in accordance with the local regulations in the country.

Figure 1-9 Temperature safety label

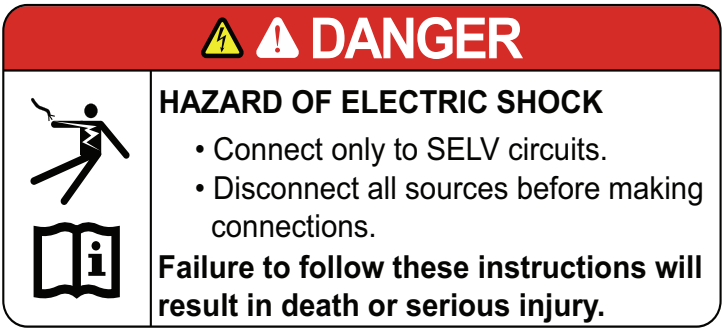

Figure 1-10 Communication port safety label

Interface Panel

The connectors are located at the bottom of the inverter, and are shown in Figure 1-11 and Figure 1-12.

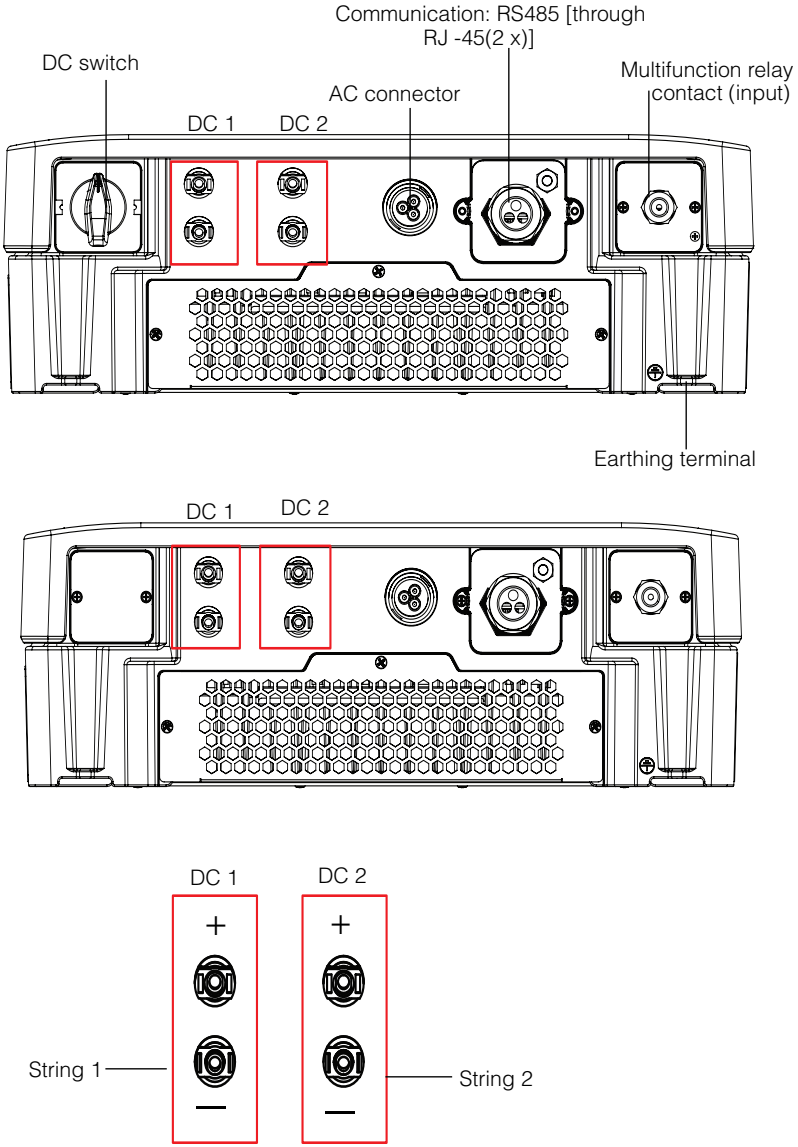

Figure 1-11 Interface panel- Conext RL 3000 E-S/ 3000 E

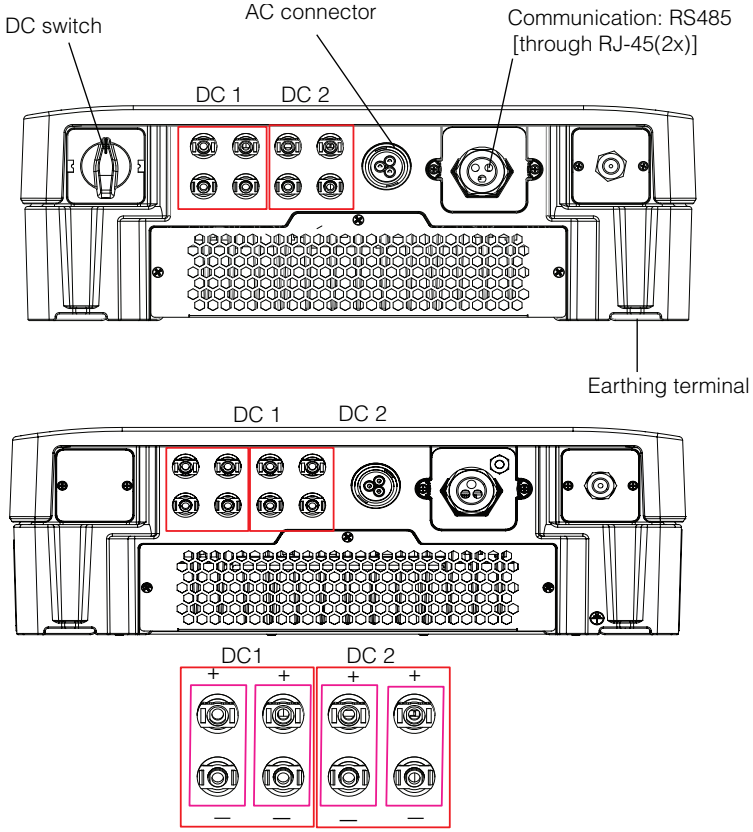

Figure 1-12 Interface panel - Conext RL 4000 E-S/ 5000 E-S and Conext RL 4000 E /Conext RL 5000 E

Item	See this section:
AC connector	“AC Wiring” on page 2–32
DC string connectors	“DC Wiring (From PV Array)” on page 2–39

Item	See this section:
Earthing terminal	“Earthing Terminal” on page 2–40
Communication connectors	“Communication Module” on page 2–41
DC switch	“Turning the Inverter On” on page 3–2

2 Installation and Configuration

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

This chapter is for use by qualified personnel only

Installation Overview

⚠ DANGER

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

The Conext RL 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.

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

Installation Options

The Conext RL inverter can be installed as a single inverter for one or two PV strings connected to each MPPT. When more than one string is connected to each MPPT, use of an external fuse is recommended.

The Conext RL inverter can also be installed in a multiple inverter system. If multiple inverters are used, wire each Conext RL inverter to an independent PV array.

Enable communication between Conext RL inverters by installing network cabling to the RJ45 ports.

Planning for Installation

Planning for a system requires the complete understanding of all the components that are involved to successfully install the inverter for performance and reliability, and to meet applicable installation codes.

Location

⚠ CAUTION

BURN HAZARD

- Ensure that the Conext RL inverter is located away from normal traffic areas.
- Do not touch the heat sink. In extreme conditions, the Conext RL inverter heat sink can reach temperatures over 158 °F (70 °C) and can cause skin burns if touched.

Failure to follow these instructions can result in minor injury.

The Conext RL inverter uses an IP65-rated enclosure (vertical mount only) that can be mounted indoors or outdoors. IP65- rated enclosures are intended for outdoor use as it provides protection from rain and formation of ice on the enclosure.

A shaded location is recommended for outdoor installations. Under bright sun conditions, when the Conext RL inverter is at or near full output with an ambient temperature above 104 °F(45 °C), shade the Conext RL inverter to increase its performance. The sun shade should be made of an opaque (dark) material, large enough and positioned so as to shade the entire unit when the inverter is operating at full power (usually a four hour time period

during noon). See “Environmental Requirements” on page 2–13.

Debris Free

Excessive debris (such as dust, leaves, and cobwebs) can accumulate on the Conext RL inverter, interfering with wiring connections and ventilation.

⚠ WARNING

LIMITATIONS ON USE

Do not install Conext RL inverter in a location where debris can accumulate (eg: under a tree) and near flammable materials.

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

Clearance

Adequate ventilation and service access should be considered when installing the inverter. See “Environmental Requirements” on page 2–13.

Planning

This section provides information to consider before installing the inverter.

PV Planning

⚠ DANGER

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

- The PV array voltage must never exceed 550 VOC max (Absolute maximum open circuit voltage) under any condition.
- The Absolute Maximum PV array ISC max (short circuit current) per MPPT must not exceed the specified limit as mentioned in product rating label under any conditions.

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

A PV array sizing tool “Conext Designer” is available for download at http://www.schneider-electric.com/products/ww/en/6900-solar-for-residential/6910-grid-tie-inverters-ce-emea-apac/62091-conext-rl/?CATEGORY=6910&BUSINESS=7.

This software is an optional tool to help match the PV panel type and quantity to the power rating of the inverter.

⚠ DANGER

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

Use this inverter only with PV modules that have an IEC 61730 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.
- Ensure that if two PV arrays are connected to one MPP tracker (for example, DC1; see Figure 1-12 on page 1–12), the maximum power available from the array will not exceed 3.2 kW (for Conext RL 3000E-S/ Conext RL 3000 E and Conext RL 4000E-S/ Conext RL 4000 E) and 3.5kW for Conext RL 5000E-S/ Conext RL 5000 E.
- For maximum efficiency of the inverter, connect the PV Arrays to both PV inputs (DC1 and DC2). Ensure power of both arrays are balanced.

Failure to follow these instructions can result in equipment damage.

Ensure that the following requirement is met:

- Any component installed between the PV array and the inverter (for example, fuses, breakers, wiring, and connectors) must be rated at least 550 VDC and 1.25 times the total array short circuit current nameplate rating (at STC) unless the applicable installation codes require a higher multiplier.

Table 2-1 Summary chart for PV input requirements

Parameter	Conext RL 3000 E-S/ Conext RL 3000 E	Conext RL 4000 E-S /Conext RL 4000 E	Conext RL 5000 E-S /Conext RL 5000 E
Maximum input voltage, open circuit	550 VDC		
Maximum input current per MPPT	10 A	12 A	18 A
Absolute maximum short circuit current per MPPT	13.9 A	16.7 A	25 A

NOTE: For more details refer to “System Specifications” on page A–2.

Recommended Protection Devices and Conductor Sizing

It is the responsibility of the installer to determine and provide the external overcurrent protection and disconnecting means required for the PV input wiring. Determine the need for overcurrent protection, and its rating or setting, based on:

- Applicable installation codes
- Array currents involved
- Expected ambient temperatures
- Any other system parameters required by the installation codes

The MC4 connectors accept conductor sizes of 4 mm^2 or 6 mm^2. Select the conductor size in accordance with installation codes and to limit the connector temperature to less than 105 °C (221 °F). Use the required crimping tool from the manufacturer (Multi-Contact Part Number PV-CZM-19100). For further information, contact the connector manufacturer.

⚠ DANGER

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

- Use only MC4 connectors from Multi-Contact. Do not mix and match connectors from different manufacturers.
- Use only the crimping tool (MC part # PV- CZM- 19100) required by Multi-Contact.
- Do not disconnect MC4 connectors under load.

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

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

NOTICE

RISK OF EQUIPMENT DAMAGE

To ensure protection class IP65, to protect against penetrating moisture and dirt, close unused inputs and outputs with included caps.

Failure to follow these instructions can result in equipment damage.

PV Wiring Diagrams

For connection details, see Figure 2-1, Figure 2-2, Figure 2-3, and Figure 2-4. The inverter can accept PV input on both DC1 and DC2. If both PV inputs are shorted (DC1 and DC2), it functions as a Single MPP tracker. If the two PV inputs are individually connected to DC1 and DC2 respectively then the inverter functions as a Dual MPP tracker.

For connecting several inverters, see also Figure 2-37 on page 2–45.

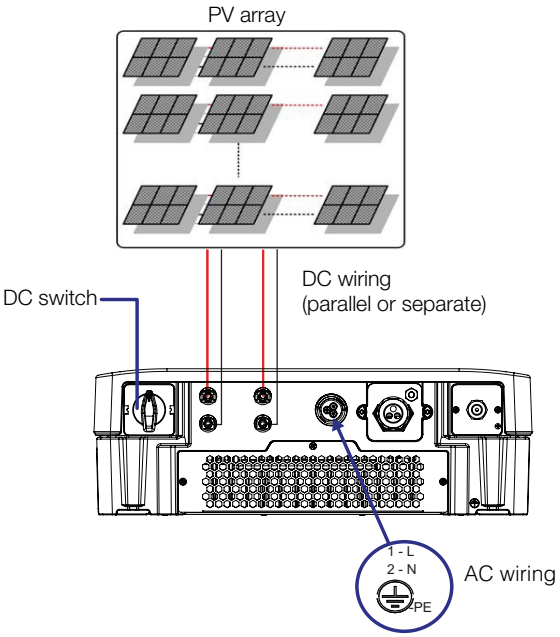

Figure 2-1 Typical connection diagram of Conext RL 3000E-S

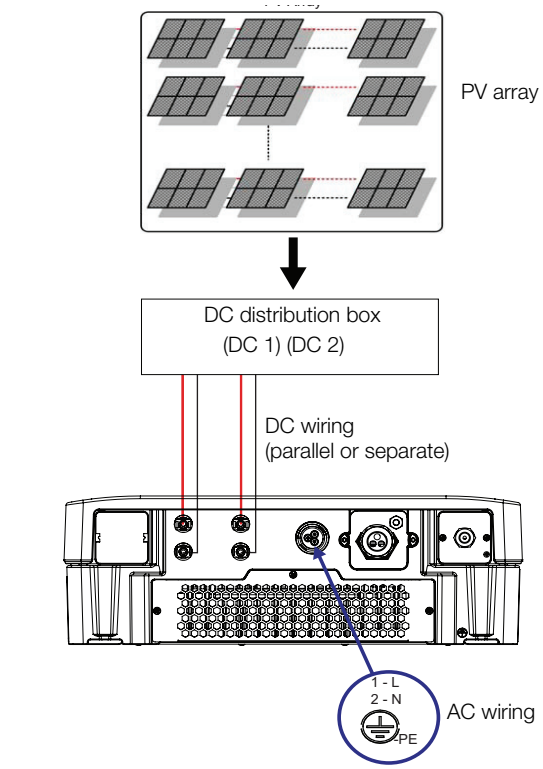

Figure 2-2 Typical connection diagram of Conext RL 3000E

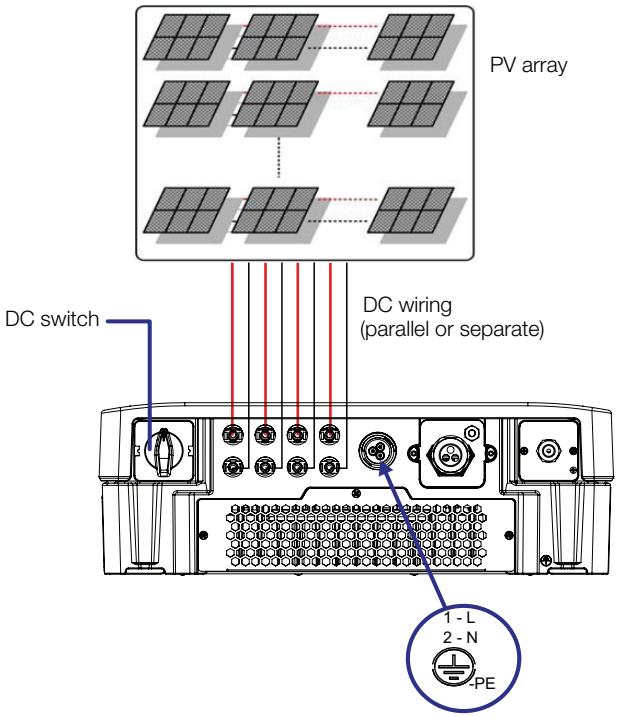

Figure 2-3 Typical connection diagram of Conext RL 4000 E-S/ 5000 E-S

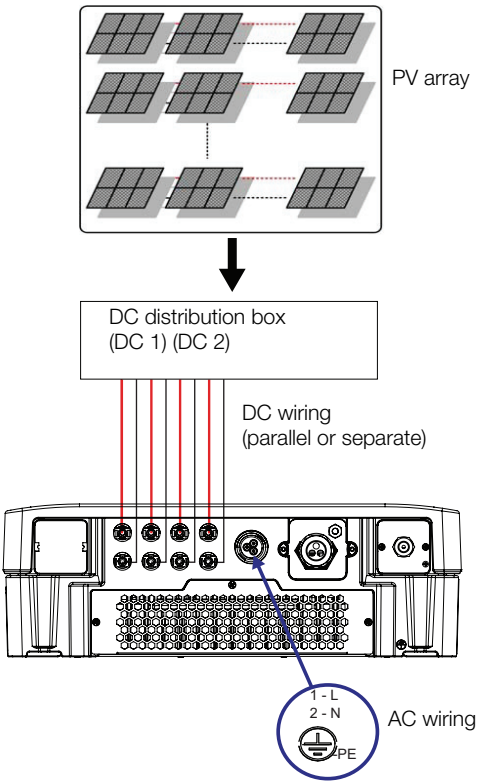

Figure 2-4 Typical connection diagram of Conext RL 4000 E/ 5000 E

For models without integrated DC disconnect Switch

Installation of an external DC disconnect switch is mandatory in certain countries. The external DC switch needs to meet the regulatory requirement of that country. Figure 2-5 shows an example of how to connect an external DC switch with 1 PV input per MPP tracker.

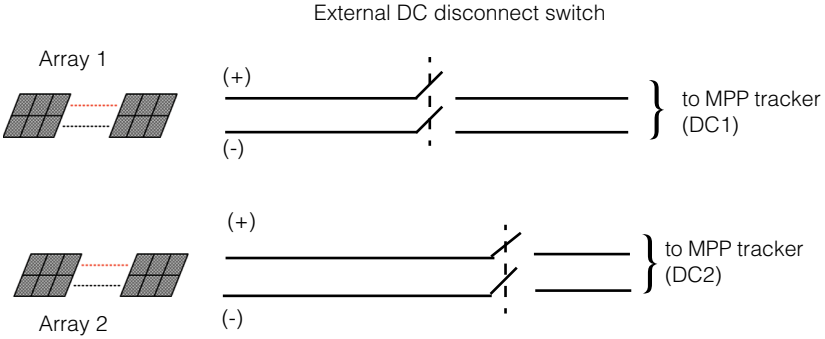

Figure 2-5 Array connections using external DC Disconnect

Note:

- Maximum of one PV array can be connected to each DC1 and DC2 in Conext RL 3000E-S/ Conext RL 3000 E type inverters.
- Maximum of two PV arrays can be connected to each DC1 and DC2 in Conext RL 4000E-S/ Conext RL 4000 E and Conext RL 5000E-S/ Conext RL 5000 E type inverters.
- DC1 and DC2 can be paralleled for a Single MPPT tracker.

⚠ WARNING

HAZARD OF FIRE

When more than two PV strings are connected to the inverter, limit the flow of reverse current in the PV strings caused due to short circuit in the PV module, by adding suitable rated string fuses.

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

⚠ WARNING

HAZARD OF FIRE

The DC disconnect switch integrated or external to the unit turns off the DC power to the inverter. Ensure AC power to the inverter is switched off. All operations on the inverter must be performed with both PV and AC connectors physically isolated.

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

AC Grid Connection Planning

This section describes the requirements regarding the AC output wiring.

Recommended Protection Devices, Conductor Type and Sizing

It is the responsibility of the installer to determine and provide the external overcurrent protection and disconnection means required for the AC output wiring. Determine the rating or setting of the over current protection, and the size of the conductors used, based on:

- Applicable installation codes
- Current rating (see “Specifications” on page A–1)
- Expected ambient temperature
- Any other system parameters required by the installation codes.

The AC cable must be jacketed and carry three insulated copper conductors to allow connection to L, N, and PE (protective earth). Any cable or wiring located outdoors must be outdoor rated and UV (sunlight) resistant.

The AC connector provided is designed for AC cable with outer diameters from 8 mm to 12 mm. The recommended AC cable diameter is 8 to 10 mm. The maximum cross sectional area of the AC wires is 4.0 mm^2 to 6.0 mm^2 and the length of the cable shall be selected appropriately to limit the voltage drop and power loss to less than one percent. Refer to the PV array sizing tool “Conext Designer” available for download at http://www.schneiderelectric.com/products/ww/en/6900-solar-for-residential/6910-grid-tie-inverters-ce-emeaapac/62091-conext-rl/?CATEGORY=6910&BUSINESS=7, to calculate the voltage drop and power loss. It is recommended to use twisted cables to reduce the grid line inductance and for improved performance. If single core cables are used in open duct, keep the distance between cores as minimum as possible.

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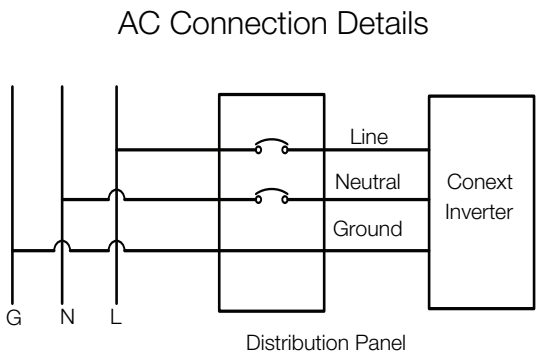


Figure 2-6 AC connection details

Conext RL inverter supports TN-S, TN-C, TN-C-S and TT connection types (earthing system). It does not support IT connection.

Environmental Requirements

See “Environmental Specifications” on page A–2.

The environmental requirements for Conext RL inverter installation are as follows:

- While the IP-65 rated enclosure protects the inverter from rain and water sprayed at the inverter from a nozzle, it is recommended to install the inverter away from lawn sprinklers and other sources of spray such as a hose or pressure washer.
- The inverter is designed to operate in a -20 °C to 65 °C (-4 °F to 149 °F) ambient environment. Refer to derating curves Figure A-4, Figure A-5, and Figure A-6 for maximum power harvest.

Choosing the right location for mounting

⚠ WARNING
HAZARD OF FIRE Keep the area around the inverter clear of flammable materials and debris. **Failure to follow these instructions can result in death or serious injury.**

⚠ CAUTION

CRUSH HAZARD

- The inverter weighs approximately 21 kgs (46 lbs) for Conext RL 3000E-S/ Conext RL 3000 E and Conext RL 4000E-S/ Conext RL 4000 E, and 24kgs for Conext RL 5000E-S/ Conext RL 5000 E. Ensure that the surface on which the inverter will be mounted, and the mounting hardware used, are strong enough to support this weight.
- Use proper lifting techniques in accordance with local workplace safety rules, and always use assistance when moving or lifting.

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

NOTICE

RISK OF EQUIPMENT DAMAGE AND REDUCED PERFORMANCE

- The enclosure of the inverter protects internal parts from rain, however outdoor installations must be located away from lawn sprinklers and other sources of spray such as garden hose or a pressure washer.
- Direct sunlight on the inverter could raise internal temperatures, causing a reduction of output power during hot weather. If possible, install the inverter in an area shaded from exposure to direct sunlight.
- Product performance might be impaired without adequate ventilation. Allow suitable clearance at the sides, top, and bottom of the inverter. Refer to figure 2-15.
- Do not obstruct the air intakes and outlets.

Failure to follow these instructions can result in deteriorated product performance or equipment damage

Unpacking

Before you install the inverter, perform the steps in this section.

Verify the Package Contents

Before you remove the inverter, verify that the package includes all the items listed in Table 2-2.

Table 2-2 Packing list

Item	Quantity	Description
Inverter	1	Conext RL 3000 E-S/ Conext RL 3000 E(3 kVA) or Conext RL 4000 E-S/ Conext RL 4000 E(4 kVA) or Conext RL 5000 E-S/ Conext RL 5000 E(5 kVA) inverter
Installation and operation manual	1	This document
AC plug	1	Connector for AC connection (Amphenol- C016 20E002 800 1)
Vent cover plate	1	To cover the heat sink fins
Mounting plate	1	Wall mounting plate to mount the inverter on the wall.
Fasteners	3	Screws (flat type) to mount the vent cover plates
	2	Screws (hexagonal head) to fasten the inverter to the mounting plate
	8	Screws to mount the mounting bracket on to the wall
	8	Plain washers
French label UTE C15-712-1	1	Safety label for units to be installed in France only. See Figure 1-8 on page 1–9.

Unpack the Inverter

⚠ CAUTION

CRUSH OR STRAIN HAZARD

Use caution and correct procedures when lifting, moving, or mounting the inverter.

Failure to follow these instructions can result in serious injury, and damage to the equipment.

NOTICE
RISK OF EQUIPMENT DAMAGE • Check the inverter for damage before receiving it from the shipper. • When removing the inverter, place it on a cardboard, to prevent the back surface from cosmetic damage. **Failure to follow these instructions can result in equipment damage.**

To unpack the inverter:

◆ With the help of another person, carefully remove the inverter and place it on a flat surface. See Figure 2-7.

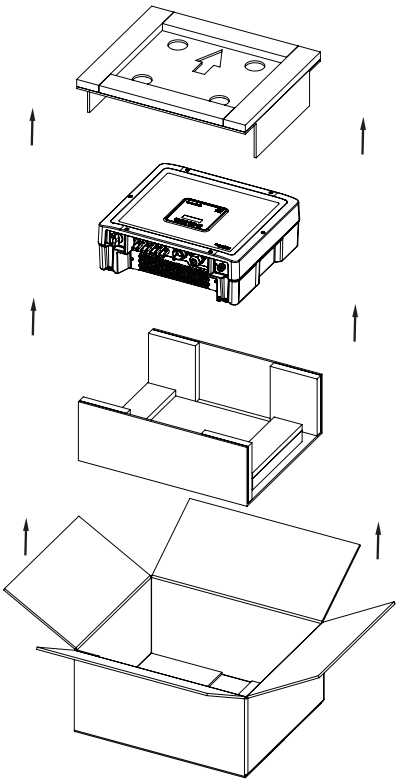


Figure 2-7 Lifting the inverter out of the box

To check the inverter:

- Check the inverter for damage from shipping. If it is damaged, contact Schneider Electric.
- Check the nameplate label on the inverter to make sure it is the model you ordered. For the location of the label, see Figure 2-9, Figure 2-10, Figure 2-11 and Figure 2-12.
- Fill in “Information About Your System” on page C–1.

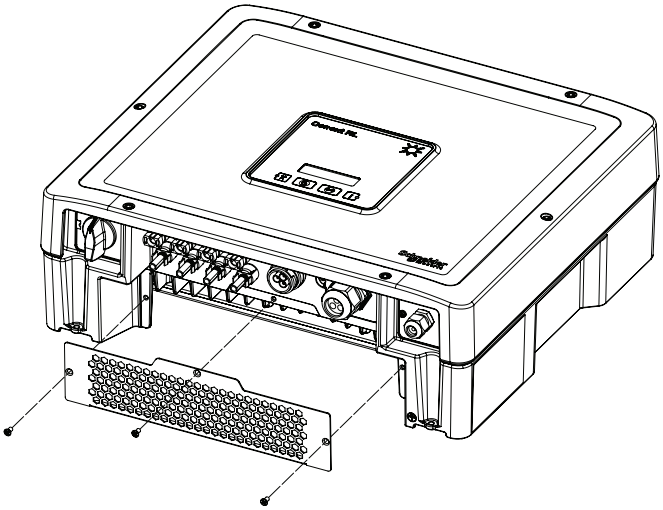


Figure 2-8 Assembly of vent plate- Conext RL inverter

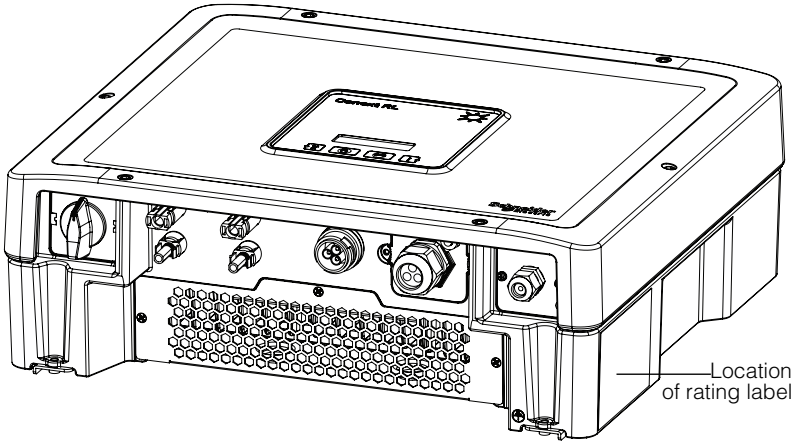


Figure 2-9 Location of rating label- Conext RL 3000 E-S

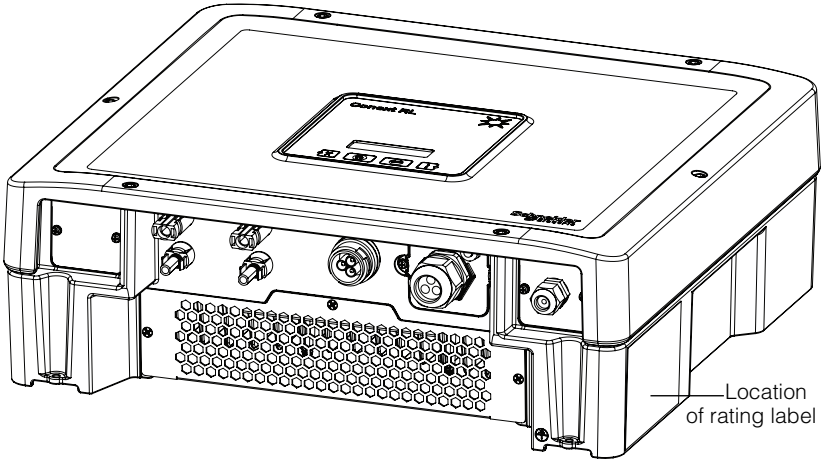


Figure 2-10 Location of rating label- Conext RL 3000 E

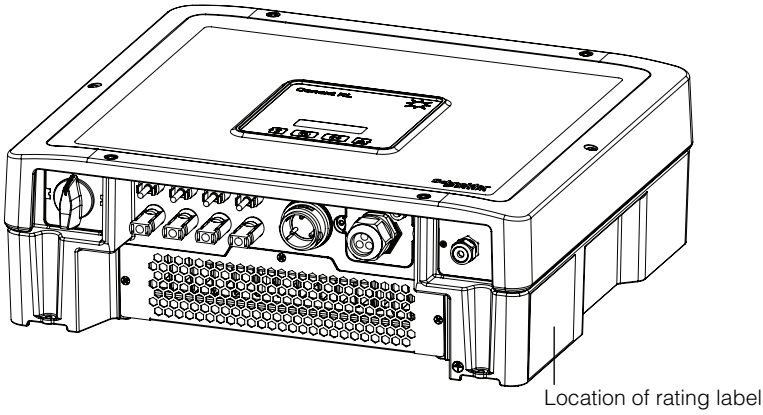


Figure 2-11 Location of rating label- Conext RL 4000 E-S/ 5000 E-S

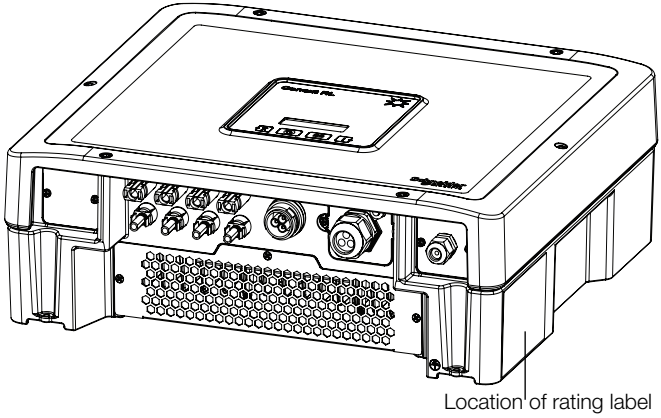


Figure 2-12 Location of rating label- Conext RL 4000 E/ 5000 E

Tools Required

To install the inverter, the following tools are required

- ❒ #2 Phillips screwdriver or drilling machine for mounting the bracket.
- ❒ Tools for preparing and connecting the wiring. See the user instructions from the connector manufacturer
- ❒ Wire stripper for both AC and DC wiring
- ❒ Level for ensuring mounting bracket is straight
- ❒ Adjustable wrench to tighten AC Cable nut
- ❒ MC4 Connector removal tool
- ❒ Hexagonal key driver for securing the inverter to the mounting plate

Views and Dimensions

The views and dimensions of the inverter are shown in Figure 2-13, Figure 2-14, and Figure 2-15.

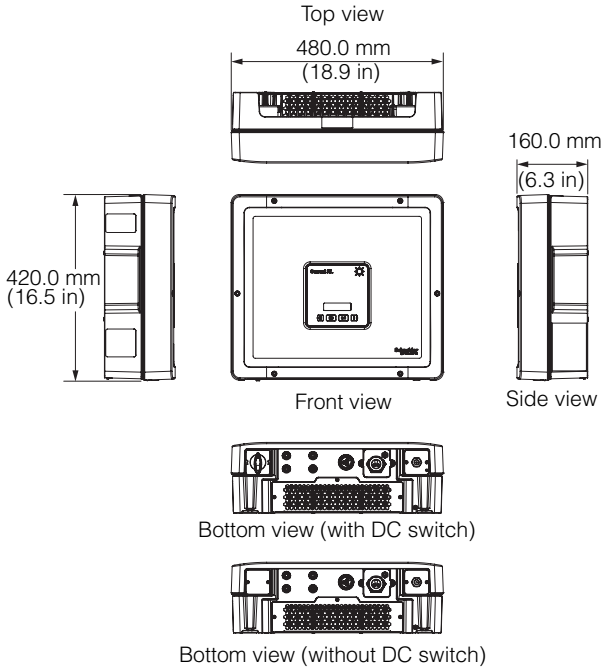


Figure 2-13 Views and dimensions of Conext RL 3000 E-S/ 3000 E

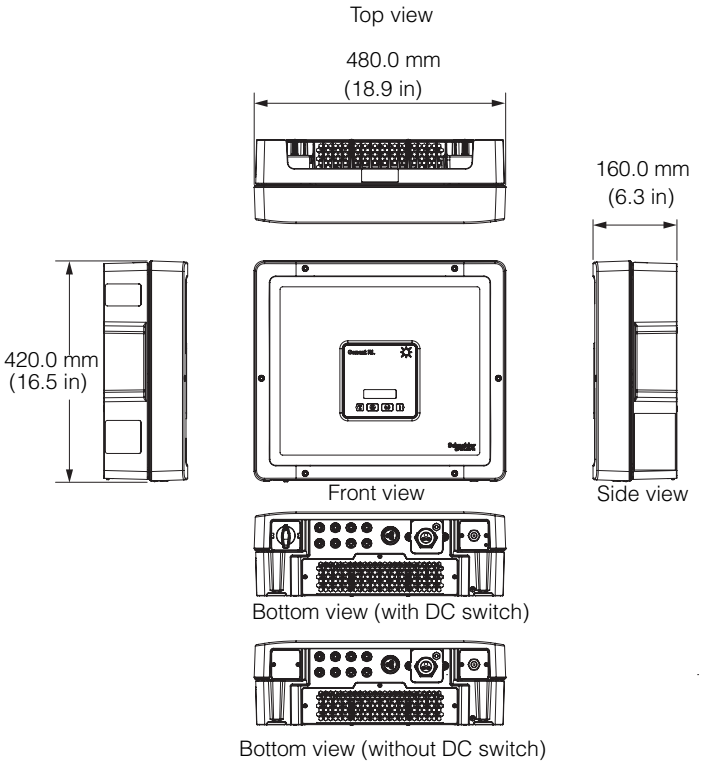


Figure 2-14 Views and dimensions of Conext RL 4000E-S/ 4000 E

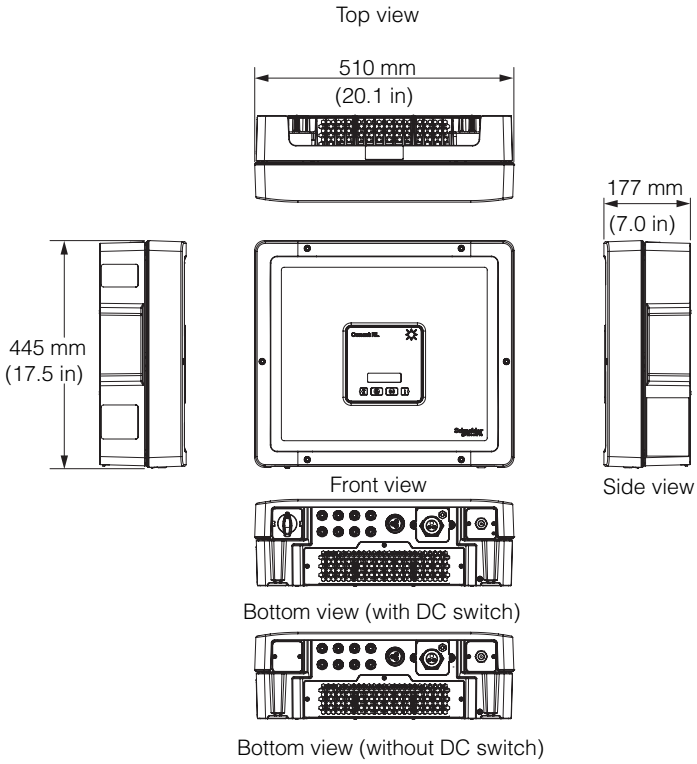


Figure 2-15 Views and dimensions of Conext RL 5000E-S/ 5000 E

Ventilation

The air intakes are located at the bottom of the inverter, and the outlets are on the top of the inverter, as shown in Figure 2-16.

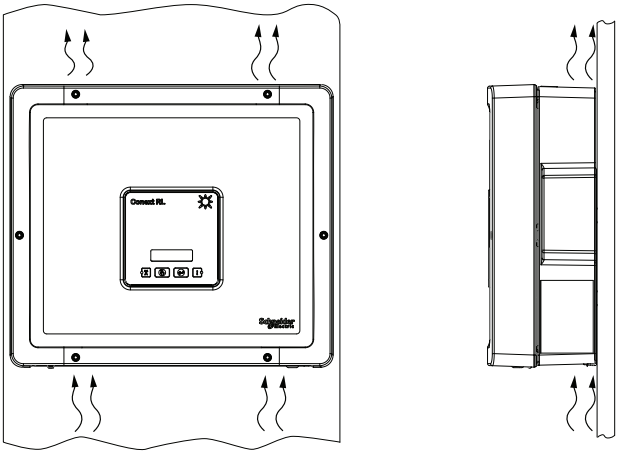


Figure 2-16 Airflow

Mounting

This section describes how to mount the inverter.

Correct Mounting Position

The correct mounting position is shown in Figure 2-17. Examples of incorrect positions are shown in Figure 2-18. The inverter does not require any clearance at the rear and it may be mounted flush on a surface. Install the device at eye level to ensure optimum user comfort. Make sure that the mounting surface or structure can support the weight of the Conext RL inverter and associated wiring.

NOTICE

RISK OF EQUIPMENT DAMAGE

- Mount the inverter only upright (PV inputs facing downward) and only on a vertical surface.
- Local codes might impose additional mounting requirements in case of earthquake or other high-risk areas.

Failure to follow these instructions can result in equipment damage.

Correct installation distances are shown in Figure 2-19.

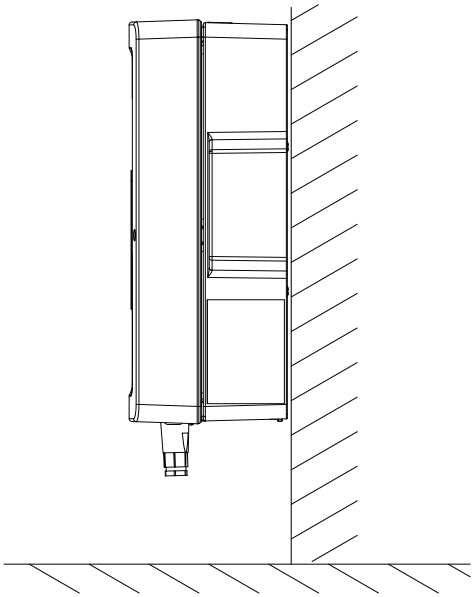


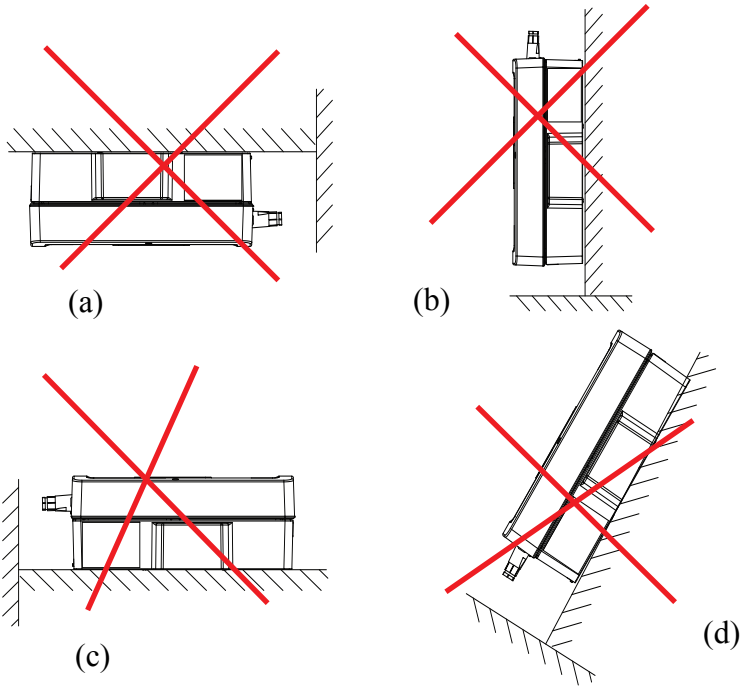
Figure 2-17 Correct vertical mounting position

⚠ CAUTION

HAZARD OF BURN

- Observe the clearance recommendations as described on Figure 2-19, “Correct installation distances” on page 2–27
- Do not install the Conext RL inverter in a zero-clearance or in unventilated compartments.

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



(a): inverted position
(b): vertically inverted
(c): horizontal position
(d): slanting position

Figure 2-18 Incorrect mounting positions

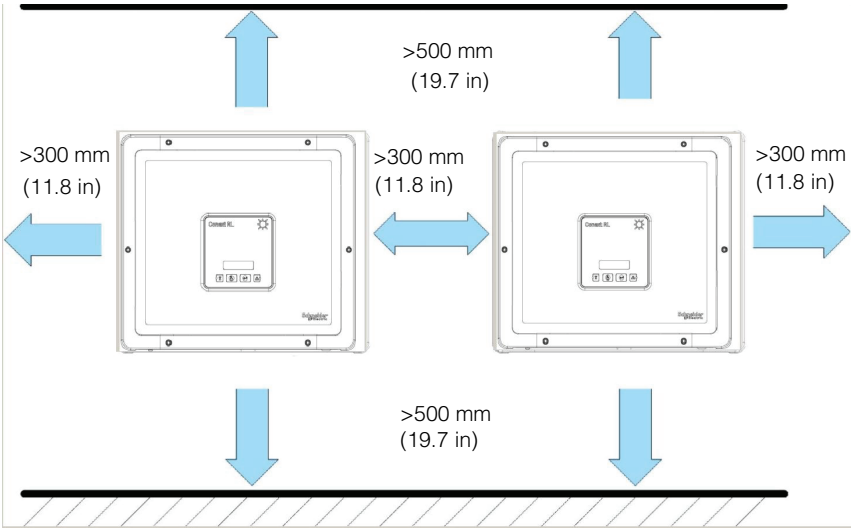


Figure 2-19 Correct installation distances

Mounting Plate

This section describes the mounting plate used to mount the inverter to the wall.

Dimensions of the Mounting Plate

The dimensions of the mounting plate are shown in Figure 2-20.

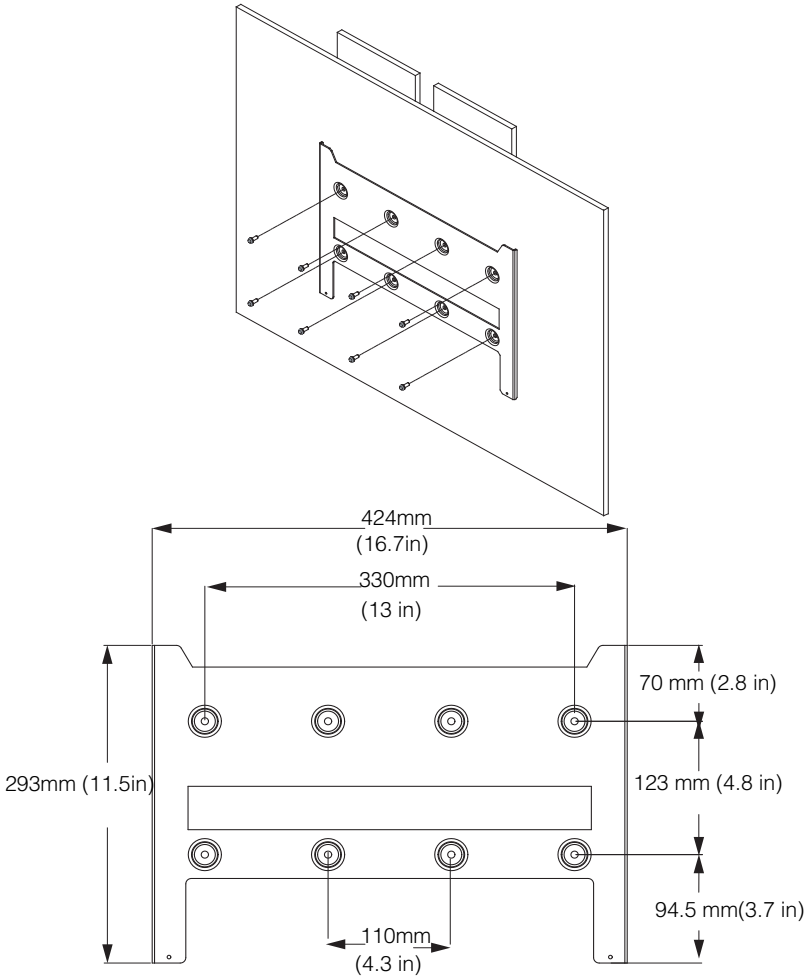


Figure 2-20 Mounting plate dimensions

Correct Position of the Mounting Plate

The correct position of the mounting plate (in relation to the inverter) is shown in Figure 2-21.

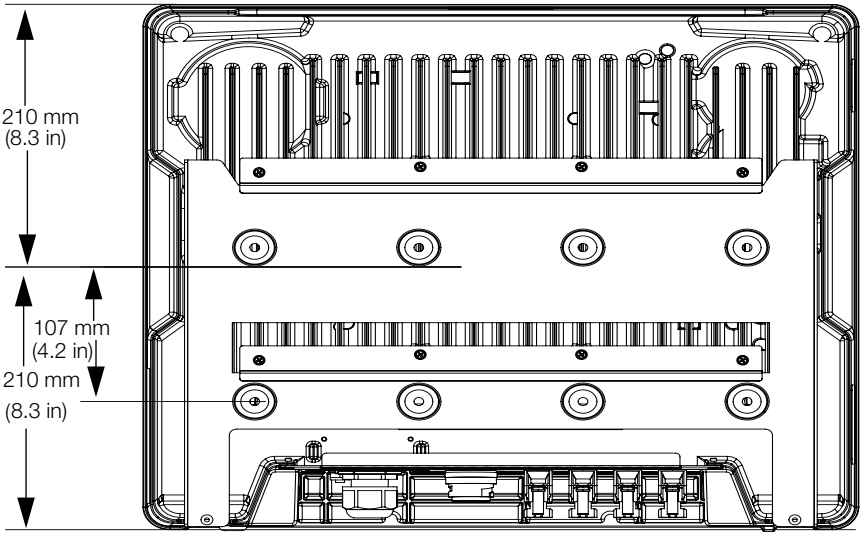


Figure 2-21 Position of mounting plate (rear view of the inverter)

Fastening the Mounting Plate to the Wall

To fasten the mounting plate to the wall:

1. Select a wall or other suitable, solid, vertical surface capable of supporting the weight of the inverter and the mounting plate.
2. Using eight wood mounting screws appropriate for the mounting surface, securely attach the mounting plate to the mounting surface. An example of mounting on plywood, wallboard, and wall studs is shown in Figure 2-22 on page 2–30.
3. Ensure mounting plate is vertical.

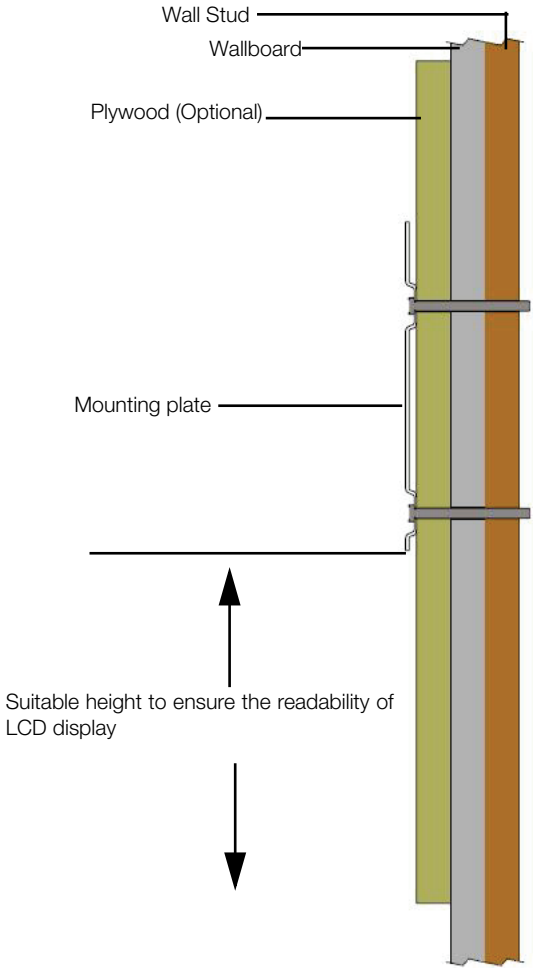


Figure 2-22 Example of fastening the mounting plate to the wall

1. Locate the wall studs.
2. If necessary, enhance the support surface with a plywood panel at least 20 mm [0.8 in] thick secured to the wall studs. Plywood should span three wall studs.
3. Use hardware sized to support a minimum of 25 kg (approximately 55 lbs) to secure the plywood to the wall.

4. Using a level, secure the mounting plate to the wall. Use wooden screw provided to secure the plate.

Mounting the Inverter

To mount the inverter

1. Place the inverter on the mounting plate, ensuring that the upper edge of the mounting plate engages the flange on the back of the inverter.
2. Using the two included hexagonal head screws appropriate for the mounting surface, fasten the bottom of the inverter to the mounting plate. For the location of the mounting tabs, see Figure 2-23.

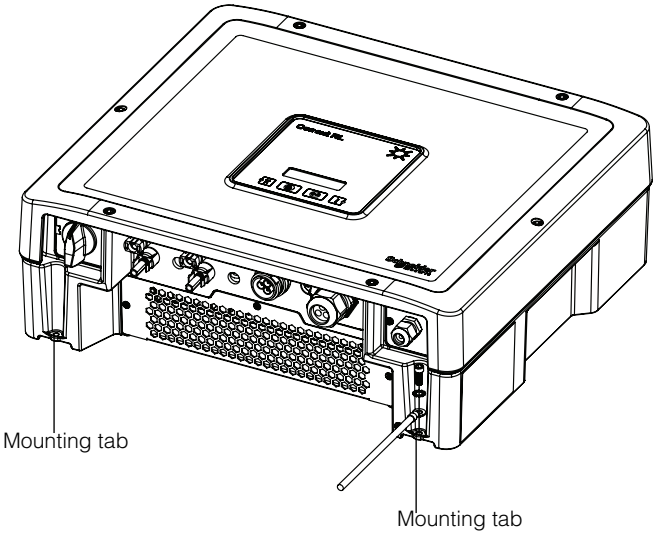


Figure 2-23 Location of mounting tabs (for fastening the bottom of the inverter to the mounting plate)

Wiring

This section describes how to connect the AC wiring (to the grid) and DC wiring (from the PV array) to the inverter.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK FROM MULTIPLE SOURCES

- All electrical work must be done in accordance with local electrical codes.
- The Conext RL 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 the external disconnecting means provided in the installation. If possible, follow a lock-out tag-out procedure.
- Do not connect 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.

AC Wiring

This section describes how to connect the inverter to the AC grid.

AC Plug Wiring

Many single phase AC distribution systems in Europe follow the IEC color-code to identify the different conductors.

Table 2-3 IEC color-coding

Component of AC wiring	Color
Line	Grey
Neutral	Blue
Protective earth	Green-yellow striped

Maximum AC Cable Length

The following table provides recommended maximum cable lengths for a 6 mm^2 conductor size.

Table 2-4 Maximum AC cable length

Inverter	1% losses
Conext RL 3000 E/ Conext RL 3000 E-S	25 m (82 ft)
Conext RL 4000 E/ Conext RL 4000 E-S	15 m (49 ft)
Conext RL 5000 E/ Conext RL 5000 E-S	12 m (39 ft)

If the AC cable voltage drop exceeds one percent of the rated voltage, the use of an AC distribution box closer to the inverter is recommended. For more information, refer to “AC Grid Connection Planning” on page 2–12.

Connecting the AC Plug

To connect the AC plug:

1. Separate the AC plug into three parts, as shown in Figure 2-24.
   a) Holding the middle (central) part of the female insert, rotate the back shell to loosen it, and then detach it from the female insert.
   b) Remove the cable nut (with rubber insert) from the back shell.

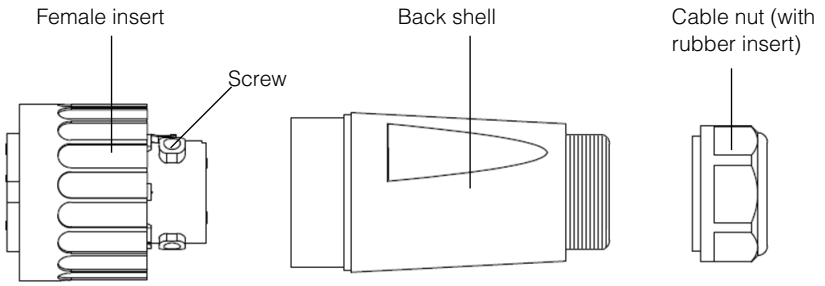


Figure 2-24 AC plug (exploded view)

2. The diameter of the AC cable should be maximum of 10 mm, so that it can be easily inserted into the cable nut.

NOTICE
RISK OF EQUIPMENT DAMAGE If the ring of the connector is damaged and the inverter is used outdoors, obtain a replacement rubber insert from Schneider Electric, and then repeat the above steps. **Failure to follow these instructions can result in equipment damage.**

3. Slide the cable nut and then the back shell onto the cable, as shown in Figure 2-25.

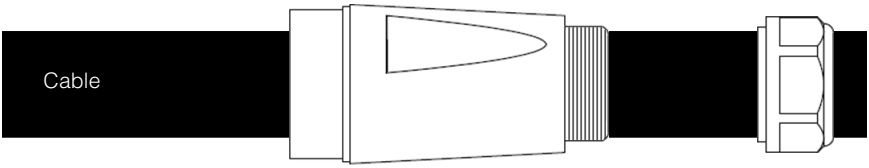


Figure 2-25 Sliding the cable nut and the back shell onto the cable

4. Using an appropriate tool, strip the wires:

⚠ DANGER
HAZARD OF ELECTRIC SHOCK • Make sure you do not cut the wire insulation and expose the wires (other than the stripped ends). • Make sure you follow the recommended specifications of stripping/trimming of the wires. **Failure to follow these instructions will result in death or serious injury.**

a) Remove 40 mm (1.6 in) of the outer jacket (shown in Figure 2-26).

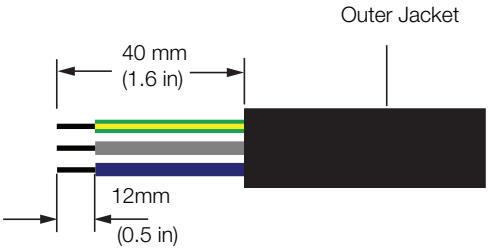


Figure 2-26 Stripping the wires

b) Trim all the wires, to 40 mm (1.6 in).

c) Using an appropriate tool, strip 12 mm (0.5 in.) of insulation from all wire ends, as shown in Figure 2-26 (above).

5. Insert the stripped end of each of the three wires into the appropriate hole in the female insert, and then tighten each screw to 0.7 Nm (to hold each wire in place). See Figure 2-27 on page 2–36.

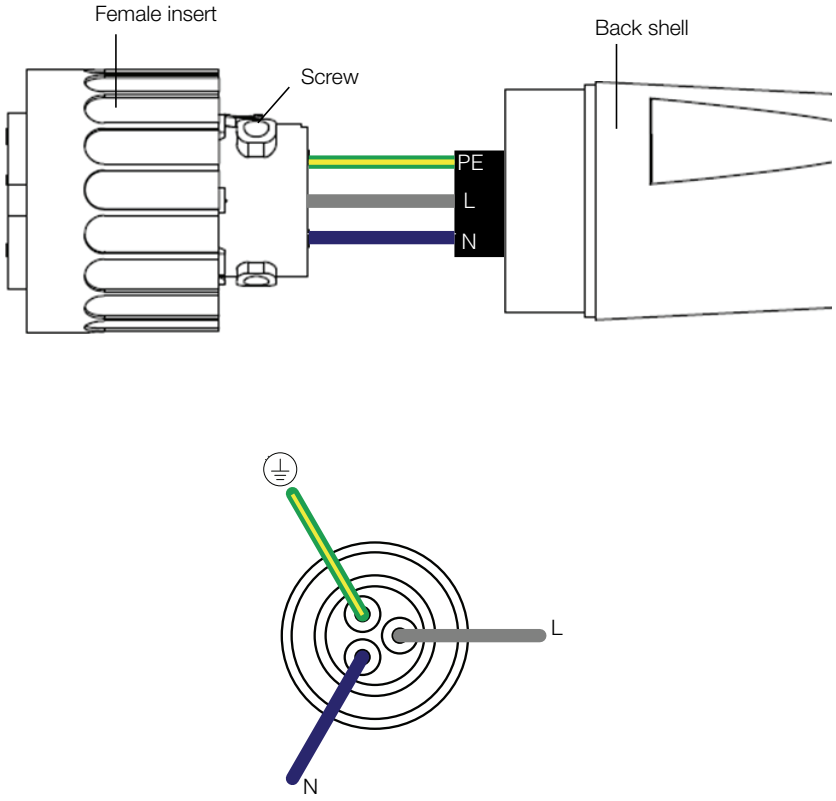


Figure 2-27 Plug wiring

⚠ DANGER

HAZARD OF ELECTRIC SHOCK

Do not connect the PV or AC grid until the inverter is earthed through the earthing terminal.

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

6. Slide the back shell towards the female insert.
7. Holding the middle (central) part of the female insert, rotate the back shell to connect it to the female insert and then tighten it, as shown in Figure 2-28.

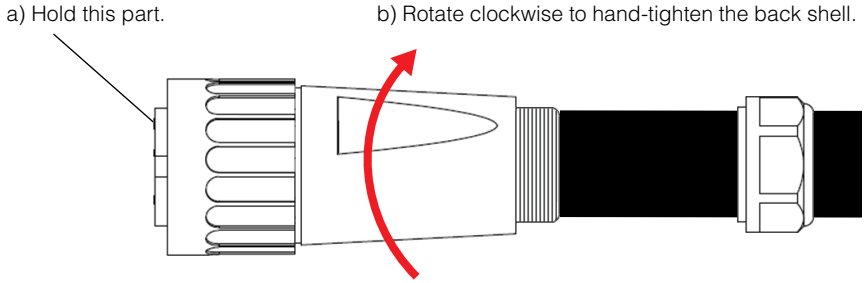


Figure 2-28 Tightening the back shell

8. Slide the cable nut towards the back shell.
9. Rotate the cable nut to secure the cable, as shown in Figure 2-29.

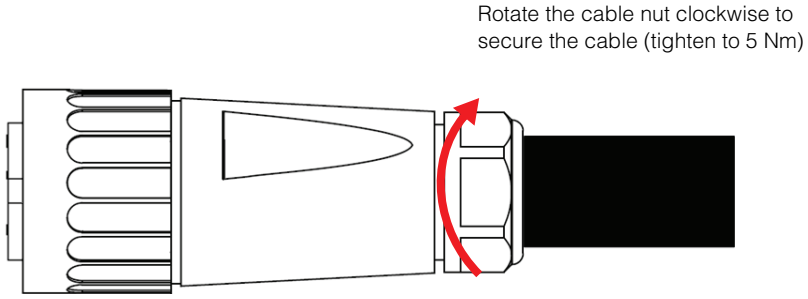


Figure 2-29 Securing the AC cable

⚠ WARNING

HAZARD OF FIRE

- To prevent damage to wire strands and the subsequent overheating, ensure proper installation and to tighten the screw to the AC plug assembly.
- Ensure the AC plug is properly connected with the locking ring tightened.
- Do not cross-thread the inverter male connector and female wiring connector. It can damage the connector if cross-threaded.

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

NOTE: Ensure that the AC plug and cable are fully assembled before connecting them to the inverter.

10. Connect the AC plug to the inverter, and then rotate the locking ring of the female insert to secure the plug to the inverter. See Figure 2-30.

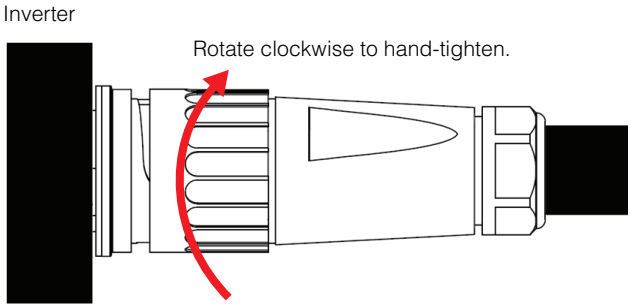


Figure 2-30 Connecting the AC plug to the inverter and rotating the locking ring

11. Using insulated cable clamps, secure the cable to the wall or structure.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK

Ensure the clamp nearest the inverter is at a distance that:

- Allows the AC plug to be connected and disconnected from the inverter.
- Does not allow the AC plug to reach the ground or other surface under the inverter where water might collect.

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

DC Wiring (From PV Array)

Polarity

NOTICE

RISK OF EQUIPMENT DAMAGE

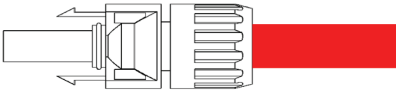
- Ensure correct polarity for all the power connections.
- In case of reverse polarity on the DC wiring, internal diode protection prevents damage to the inverter. The PV array will be in a short circuit condition and there will be no DC voltage on the MPPT input.
- Do not ground either the (+) or the (-) conductor of the PV array.

Failure to follow these instructions can result in equipment damage.

The PV wiring connects to the inverter using polarized connectors. The polarity of the connectors to be used in the wiring to the inverter is shown in Figure 2-31. The inverter has the matching connectors to mate with the connectors.

Type: PV-KBT4/6 II, from Multi-Contact AG (www.multi-contact.com)

\+



Type: PV-KST4/6 II, from Multi-Contact AG

\-

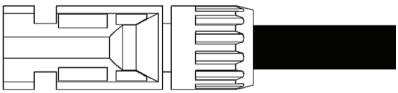


Figure 2-31 DC wiring polarity and connector types, for the array wiring

Connection

To connect the PV wires:

1. Follow the instructions of the manufacturer to assemble the MC4 connectors onto the PV wiring (preferably PV1-F type cable). Make sure to use the right connector polarities, as shown in Figure 2-31 on page 2–39.
2. Connect the wires to the DC1 and DC2 connectors of the inverter. Refer Figure 2-1 on page 2–7, Figure 2-2 on page 2–8, Figure 2-3 on page 2–9, and Figure 2-4 on page 2–10.
3. Use insulated cable clamps to secure the PV cables to the wall or structure.

4. Remove caps from MC4 terminals. It is recommended to close the unused open inputs with the included MC4 terminal caps.

Earthing Terminal

The use of the earthing terminal depends upon local installation codes. 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: Use 2.5 mm^2 copper earthing conductor for Conext RL inverters.

⚠ WARNING

HAZARD OF ELECTRIC SHOCK

If the PV array metal frame grounding is done at the inverter, removal of the inverter or disconnection of the AC plug from the inverter will leave the PV metalwork not grounded; provide temporary additional grounding to avoid this.

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

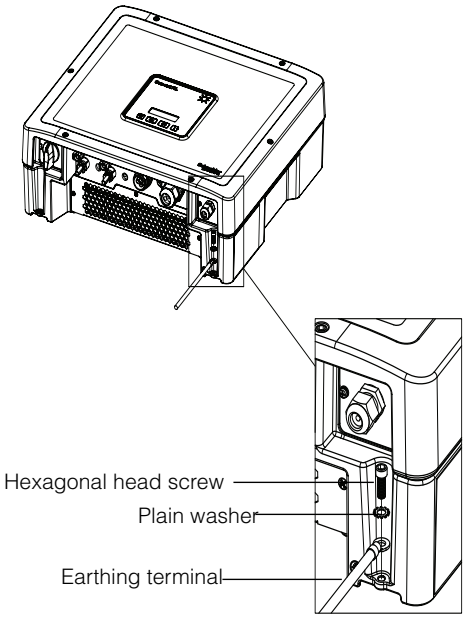


Figure 2-32 Connecting the earthing conductor in Conext RL inverter

Communication Module

⚠ DANGER

HAZARD OF ELECTRIC SHOCK

- Connect only to Safety Extra Low Voltage (SELV) circuits.
- The circuits provided for use with external communications and control equipment are designed to provide isolation from 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-SELV electrical circuits, both within the inverter and outside the inverter.

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

The communication module supports the Modbus communication protocol through an RS485 interface.The module is shown in Figure 2-33 and the location of the module on the inverter is as shown in Figure 2-1 on page 2–7

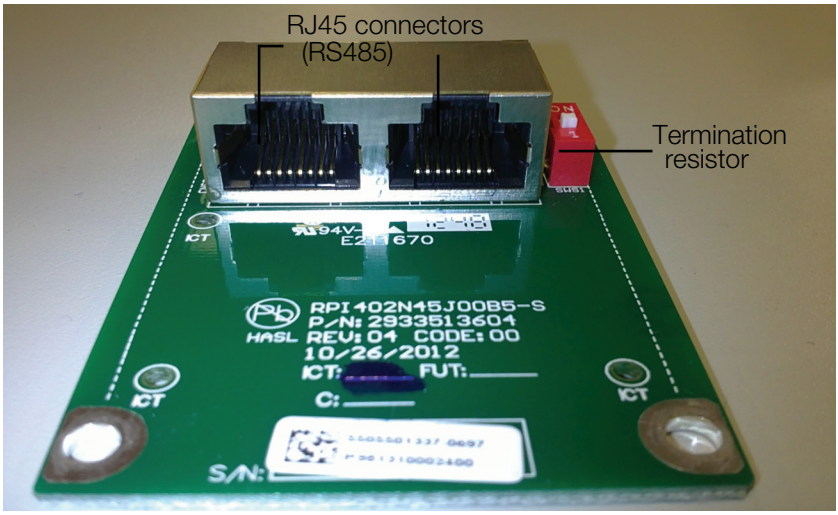


Figure 2-33 Communication module

Removing the Communication Module

⚠ DANGER

HAZARD OF ELECTRIC SHOCK

Disconnect all the sources of energy before removing the Communication module.

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

To remove the communication module:

1. Turn the DC switch (internal or external) and external AC breaker to the “OFF” position. For the integrated switch location, see Figure 1-12 on page 1–12.
2. Wait at least five minutes for internal voltages to discharge, and then disconnect the AC plug and all the PV connectors from the inverter, being careful not to allow water or dirt to contact any of the connectors.
3. Remove the two screws—one on each side of the connector labeled “RS485”. For the connector location, see Figure 1-12 on page 1–12.
4. Pull the cover off to remove the communication module.

Internal Data Logger

Table 2-5 Internal Data Logger specifications

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

Connecting Cables to the Communication Module

NOTE: The drawings in this section show the connection of only one cable. There are provisions to connect up to three cables to the communication module.

To connect the cables:

1. For connecting each cable, pull one of the plugs out from the end of the seal, as shown by the arrow in Figure 2-34.

NOTICE
RISK OF EQUIPMENT DAMAGE To ensure that the seal is not compromised, remove only the number of plugs equal to the number of cables you are connecting. **Failure to follow these instructions can result in equipment damage.**

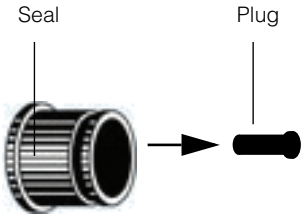


Figure 2-34 Removing a plug from the end of the seal

2. Insert the cables into the seal, and then assemble the claw and seal, as shown in Figure 2-35.
   A maximum of three communication cables can be connected. The seal has one cut outside, down the length of the seal, for each of the plugs. This is for easy insertion of the cable.

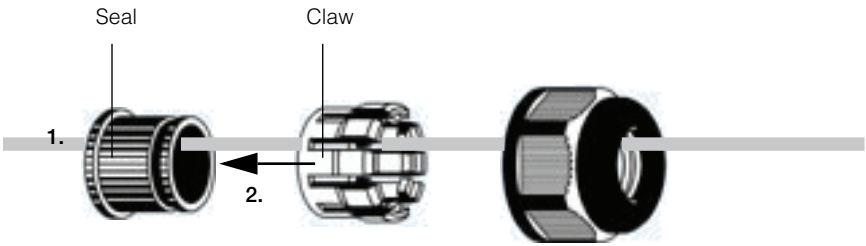


Figure 2-35 Inserting the cables into the seal and assembling the claw and seal

3. For each cable, leave 100 to 170 mm (3.9 to 6.7 in.) from the end of the cable to the seal. This is to provide sufficient length of cable to reach the connector on the communication module, when the module is inserted in the inverter.
4. Connect the body of the cable gland to the claw and seal, as shown in the left part of Figure 2-36.

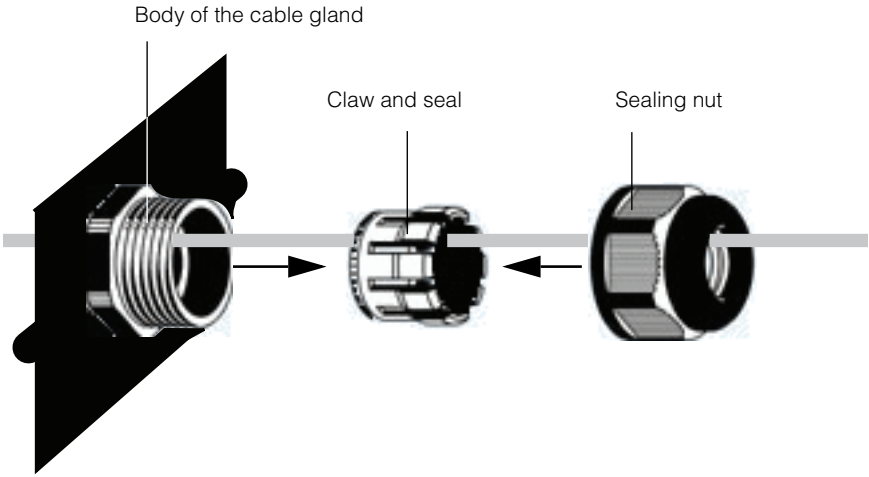


Figure 2-36 Connecting the body of the cable gland, the claw and seal, and the sealing nut

5. Slide the sealing nut towards the body of the cable gland with claw and seal (as shown in the right part of Figure 2-36), and then hand-tighten the sealing nut onto the body.
6. Connect the end of each cable to the appropriate connector on the communication module.
7. Insert the communication module into the inverter.

8. Tighten each of the two captive screws to 0.7 Nm.

RS485 Connection

NOTICE
RISK OF EQUIPMENT DAMAGE Make sure the other end of the RS485 connection is also RS485. Connection to any other type of communication port, such as Ethernet, can result in equipment damage. **Failure to follow these instructions can result in equipment damage.**

Implementing the RS485 connection:

In a single unit configuration, only one RJ45 connection is used and the termination resistor is ON. In a multiple unit configuration both RJ45 connections are used except on the first and the last units. The termination resistor for the first and last unit should be ON while for others it is OFF. A maximum of 32 inverters can be daisy chained. For multiple inverter connection refer to Figure 2-37.

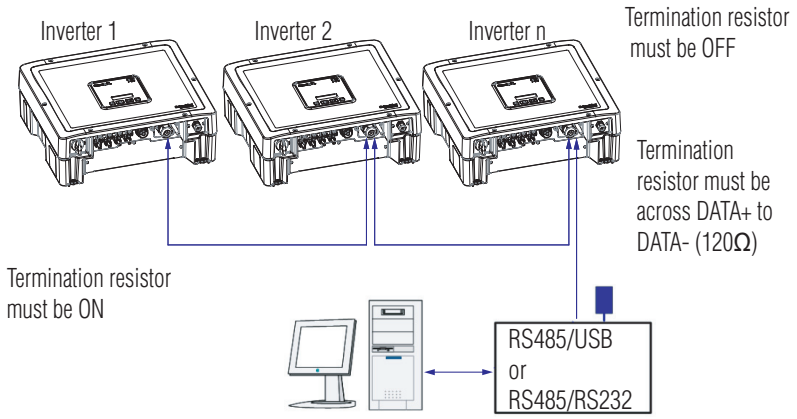


Figure 2-37 RS485 wiring: multiple inverters

The data format for the RS485 connection is shown in Table 2-6.

Table 2-6 RS485 data format

Parameter	Value
Baud rate	9600
Data bits	8
Stop bits	1
Parity	None

RS485 Connection Using the RJ-45 Connectors

The pin definitions of the RJ45 connection are shown in Table 2-7. For the location of pin 8, see Figure 2-33 on page 2–42.

Table 2-7 RJ45 pin definitions

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

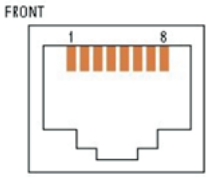


Figure 2-38 RJ45 Connectors

Termination Resistor

If the inverter is the first or the last device of the RS485 chain, set the termination resistor to on; otherwise, set it to off. The location of the termination resistor is shown in Figure 2-39.

Figure 2-39 Termination resistor—switch numbering

Multifunction relay contact output connection

⚠ DANGER

HAZARD OF ELECTRIC SHOCK

Do not connect circuits exceeding 28 VDC and 3 A to the dry contact output. Use of a 3 A / 32 VDC certified fuse is recommended.

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

One set of dry contact connections is provided to give a remote indication of inverter status. When the inverter is operating normally, the contact is closed. Using the Conext RL Config tool, the relay can be configured to operate when any events occur. For the location of the connection, see Figure 2-40.

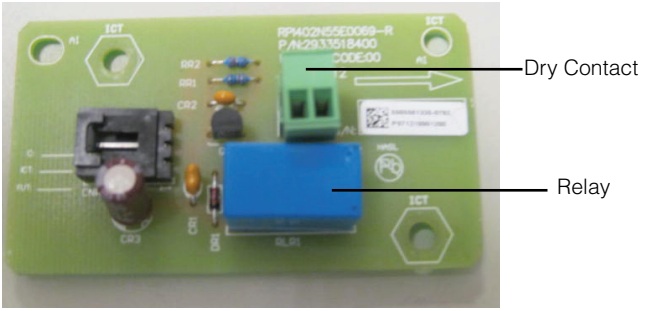


Figure 2-40 Dry contact location

Remote Monitoring Services

- Conext Monitor 20: Data logger by Schneider Electric
- Web Log: Data logger by MeteoControl.
- Solar Log: Data logger by Solare Datensysteme.

When the above dataloggers are used, data is imported from the inverters through an RS485 interface. For more information refer to the operation instructions of the particular data logger.

3 Operation

Chapter 3, “Operation” contains information on the basic operation of the Conext RL inverter.

This chapter is for use by qualified personnel only

Turning the Inverter On

To turn the inverter on:

1. Ensure to complete the AC and DC wiring. See “AC Wiring” on page 2–32 and “DC Wiring (From PV Array)” on page 2–39.
2. Check polarity of the DC wires and ensure the open circuit voltage is less than 550V.
3. Ensure the unused DC connectors have protective caps in place. Ensure the proper insertion of the communication module.
4. Connect both the Grid and the PV terminals to the inverter.
5. Turn the DC switch to the “ON” position. For the switch location, see Figure 1-5 on page 1–7. For units without a DC disconnect switch, use of an external DC disconnect is mandatory.
6. Check the status of the green indicator light (LED; see Table 3-2, “Inverter Status and Indicator lights” on page 3–4). The green LED blinks for approximately one minute and then becomes solid green. As long as the green LED blinks, a countdown timer is visible on the screen.
7. If the green LED is “OFF” and the red LED is “ON”, this indicates an event. Check the event message on the LCD screen and refer to the Chapter 5, “Troubleshooting”.

The inverter has an LCD and control panel, shown in Figure 3-1 and the locations are shown in Figure 1-5 on page 1–7.

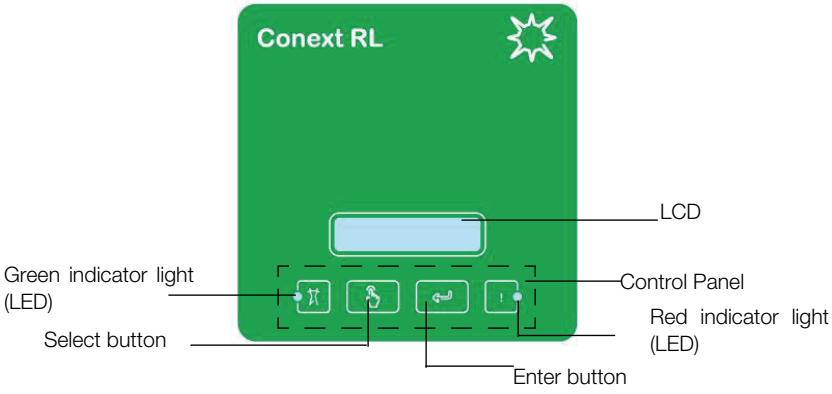


Figure 3-1 LCD and control panel

Navigating the LCD Menus and Screens

Use the two buttons below the LCD to navigate the LCD menus and screens, as shown in Table 3-1.

Press any of these buttons from the home page (“E-Today”), to display the main menu. See “Home Page” on page 3–4 and “Start-up Menu” on page 3–5.

Table 3-1 Buttons below the LCD

Button	Result
 Select	Go to the next item in a menu or to the next screen (in a series of screens).
 Enter	Executes the selected menu item or accepts the changes.

Figure 3-2 shows an example of the effects of the buttons.

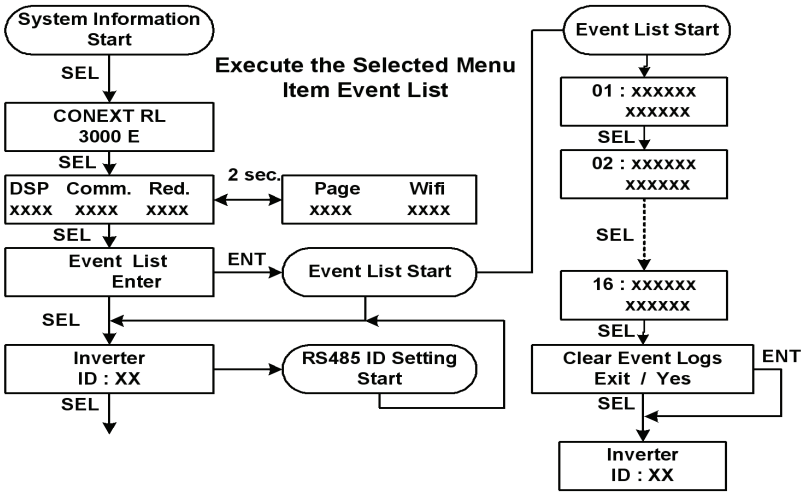


Figure 3-2 Navigating the LCD menus and screens

The LCD backlight turns off after 10 seconds without any operation and turns on again after pressing any button.

Indicator Lights

There are two indicator lights (LED) below the LCD. The left indicator light is green and the right indicator light is red. The two indicator lights together indicate the inverter status, as shown in Table 3-2 on page 3–4.

Table 3-2 Inverter Status and Indicator lights

Inverter status	Green indicator light	Red indicator light
Normal	ON	OFF
Count down	Blink	OFF
FW update	Blink	Blink
Event	OFF	ON
No or low DC input	OFF	OFF

Home Page

When the inverter is operating normally, the LCD shows the home page as shown in Figure 3-3. The home page shows:

- Energy harvested today (“Today”)
- Output power (“Output”)

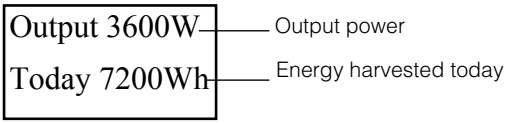


Figure 3-3 Home page (E-Today)

From the home page, press the Select button to navigate further on the Main Menu as shown in “Start-up and Main Menu” section on page 3–5 and page 3–6.

Start-up Menu

The Select Country screen is displayed when the inverter is energized and turned on for the first time. The navigation is shown in Figure 3-4. To display this screen at a later time, use the qualified personnel password to access the Install Settings menu.

Figure 3-4 on page 3–5 shows selecting the country at the time of installation.

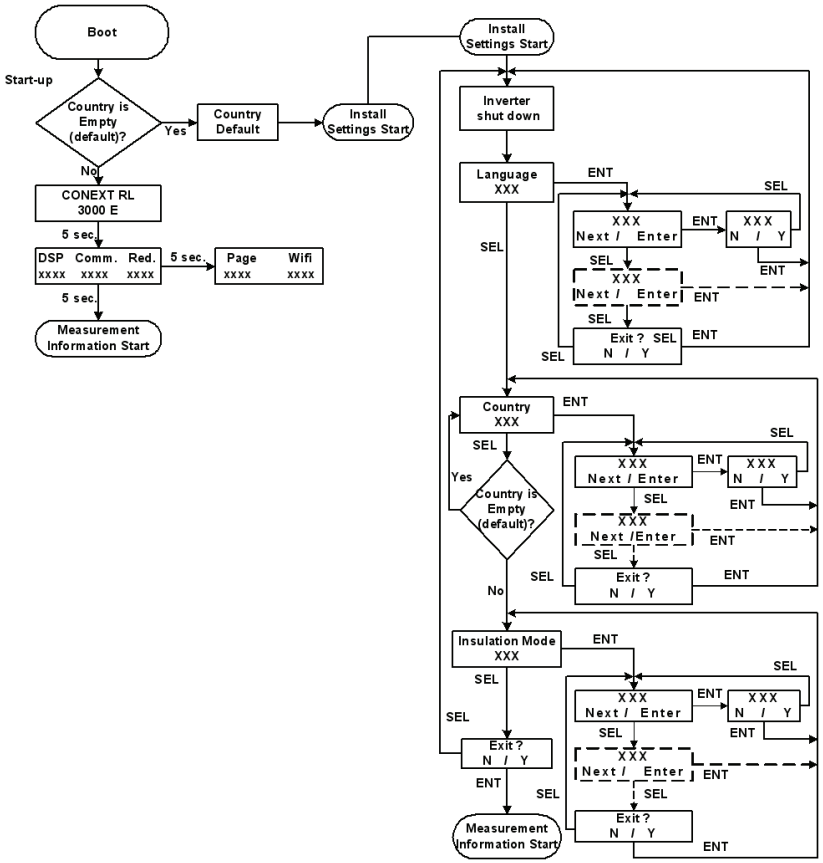


Figure 3-4 Selecting the country at the time of installation

Note: For more information on specific approvals that the inverters have, see Appendix A, “Regulations and Directives” on page A–5.

The country selection sets specific parameters for protection and other features, according to country-specific requirements. For a listing of settings contained in each country selection, refer to www.schneider-electric.com/solar.

Main Menu Screen

Figure 3-5 and Figure 3-6 shows the main menu screen.

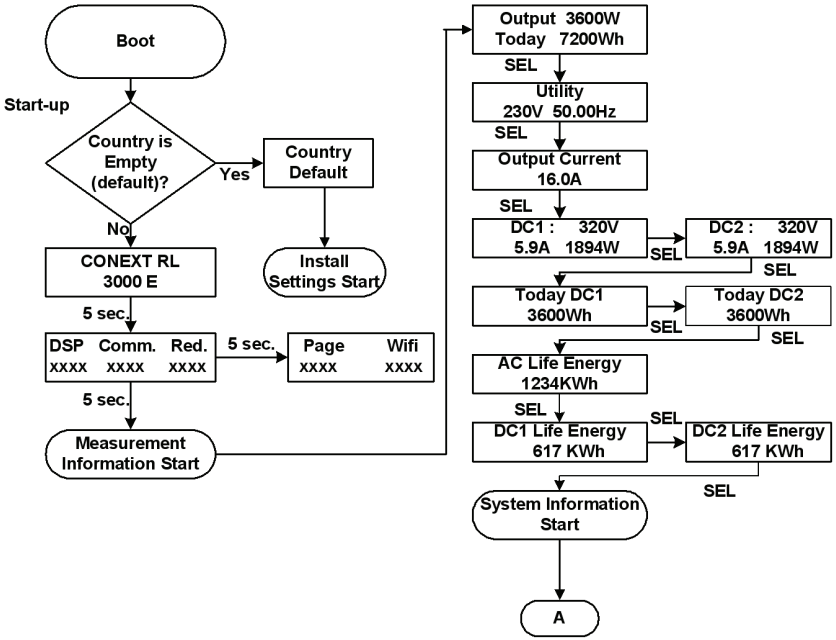


Figure 3-5 Main menu (figure 1 of 2)

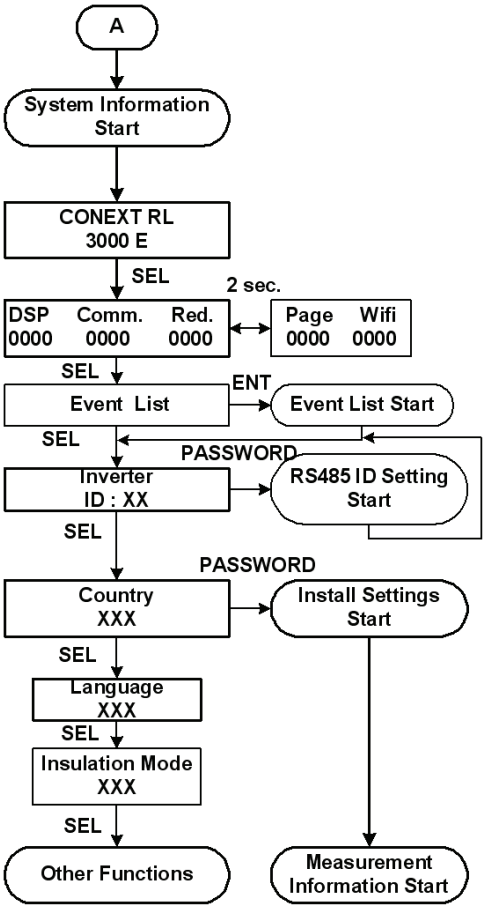


Figure 3-6 Main Menu (figure 2 of 2)

Table 3-3 provides the explanations for the menu items in the Main Menu screen.

Table 3-3 Explanation of menu items in the Main Menu screen

Output _____ ____W Today _____ _____ Wh	Current output power in W Energy generation today in Wh
Utility __ ___ V __ ____Hz	Grid voltage (V) and frequency (Hz)
Output current _ __ A	Output current in A
DC1: ___ ___V _ ___ A ____ __W	DC input 1 voltage, current and power
DC2: ___ ___V _ ___A ____ __W	DC input 2 voltage, current and power
Today DC1 ____ ____ Wh	PV energy at input 1 today in Wh
Today DC2 ____ ____ Wh	PV energy at input 2 today in Wh
AC Life Energy ____ ____ kWh	Output energy harvested over the lifetime of the PV plant in kWh
DC1 Life Energy ___ ____ kWh	PV energy at input1 over the lifetime of the PV plant in kWh
DC2 Life Energy ____ ___ kWh	PV energy at input 2 over the lifetime of the PV plant in kWh
DSP Comm Red. ____ ____ ____	Denotes the firmware rev of the Digital Signal Processor, Comm and Redundant processor
Page Wifi ____ ____	Page code rev and WiFi module code revision
Event List	Access to internal log with the latest 15 events (You can view the event list after clicking on 'Enter')

Table 3-3 Explanation of menu items in the Main Menu screen

Inverter ID: __	Unique inverter ID, used to distinguish each inverter if you have several of them installed
Country ___	Setting for the country of installation
Language ___	Language setting
Insulation Mode ___	Insulation mode is Normal
Settings	Ethernet or Ethernet/ WiFi card settings (You can execute the settings after clicking on 'Enter')
Comando Locale	If the country setting is 'Italy' you can enable or disable 'Comando Locale' i.e. 'Local Control'
Italy Self Test	If the country setting is 'Italy' you can execute 'Italy Self Test' or view the history of the previous self test

Note: Ethernet/WiFi card is presently not available as an accessory. Visit www.schneider-electric.com/solar for updates on accessories available with Conext RL.

Event List

You can choose to view the Event List through the Main Menu screen shown in Figure 3-5 on page 3–6 and Figure 3-6 on page 3–7

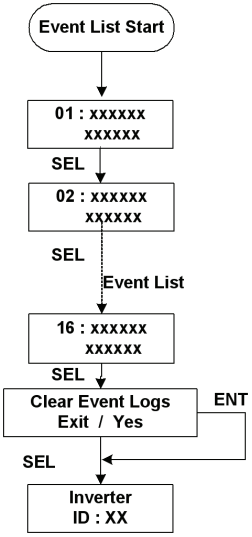


Figure 3-7 Event list menu

A maximum of the last 15 most recent events can be viewed, or all event logs can be cleared.

Inverter ID Setting

Multiple inverters can be monitored through RS485 connection (Figure 5-5), but each inverter must have a unique ID. Access the Inverter ID Setting through the Main Menu screen shown in Figure 3-4 on page 3–5.

Inverter ID is selected using the Select button as shown in Figure 3-7 below. Select the desired inverter ID and then, press Enter to set the ID. Inverter ID can be any number between 1 and 254.

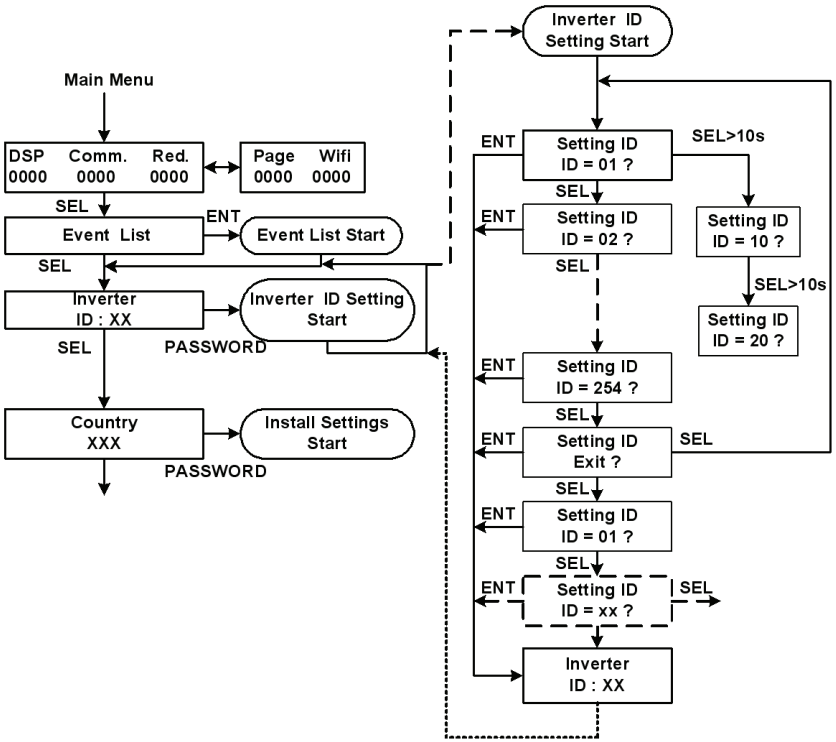


Figure 3-8 Setting inverter ID

Country and Language Settings

Use the qualified personnel password to get access to the country and language settings options through the Main Menu screen as shown below.

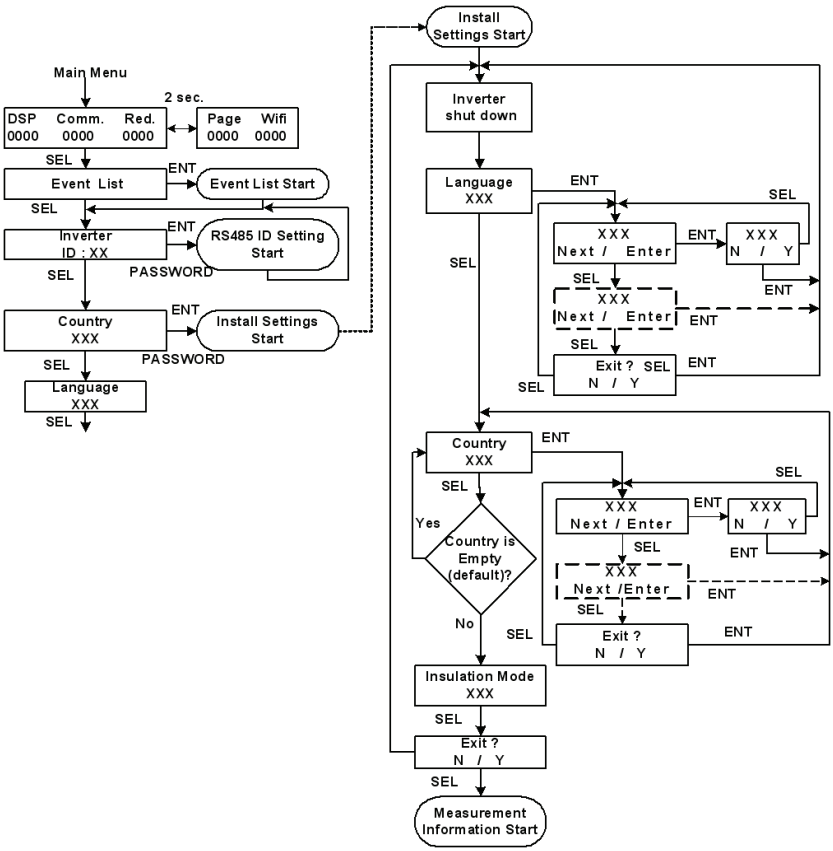


Figure 3-9 Country and Language settings

Communication Settings

Execute the Communication Settings, if the Ethernet or Ethernet/WiFi card for monitoring the PV plant performance is installed.

To execute the Communication Setting: In the Main Menu screen, click the Enter button.

Refer to Figure 3-10 below for Communication Settings options.

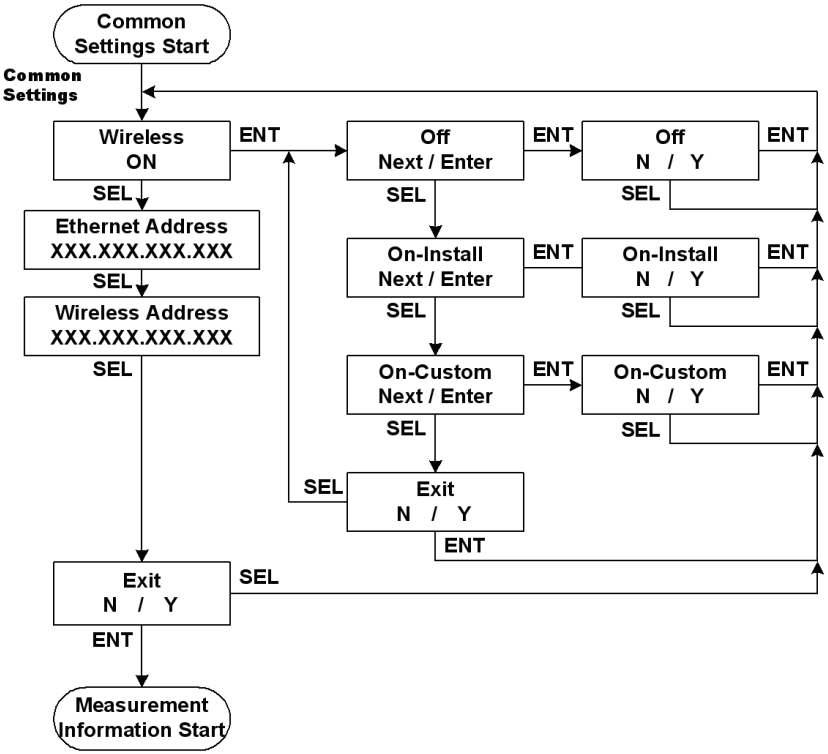


Figure 3-10 Communication settings for Ethernet or Ethernet/WiFi card

Note: Ethernet/WiFi card is presently not available as an accessory. Visit www.schneider-electric.com/solar for updates on accessories available with Conext RL.

Comando Locale

If the country setting is 'Italy' enable or disable 'Comando Locale' i.e. 'Local Control' through the Main Menu screen shown in Figure 3-6 on page 3–7.

Refer to Figure 3-11 below for details about the Comando Locale settings.

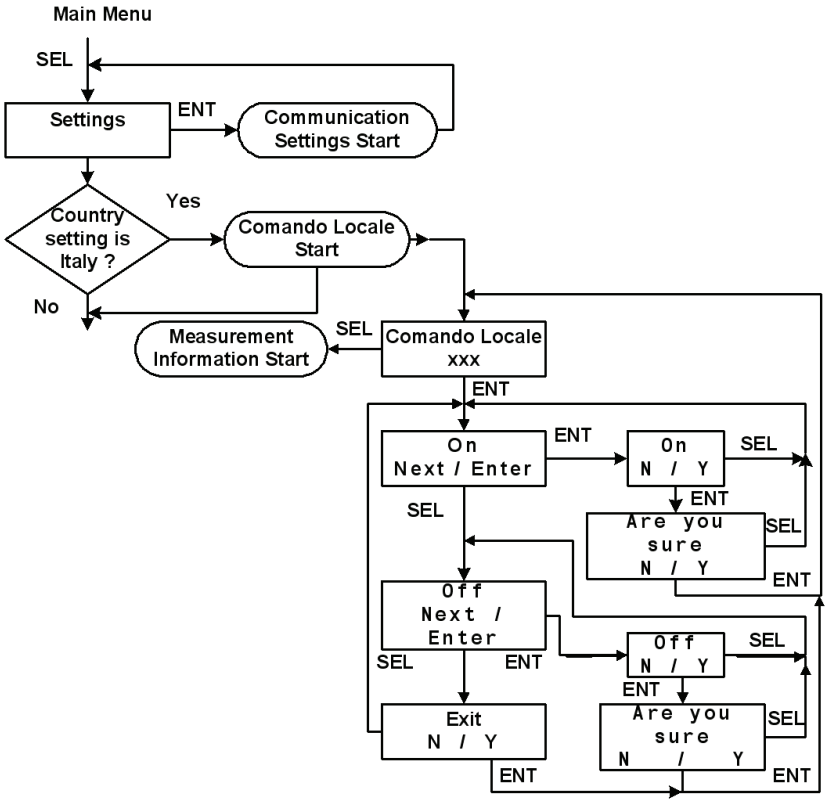


Figure 3-11 Setting Comando Locale for Italy

Italy Self Test

If the country setting is 'Italy', after Comando Locale settings execute 'Italy Self Test' or view the history of the previous self test as shown in Figure 3-12 below.

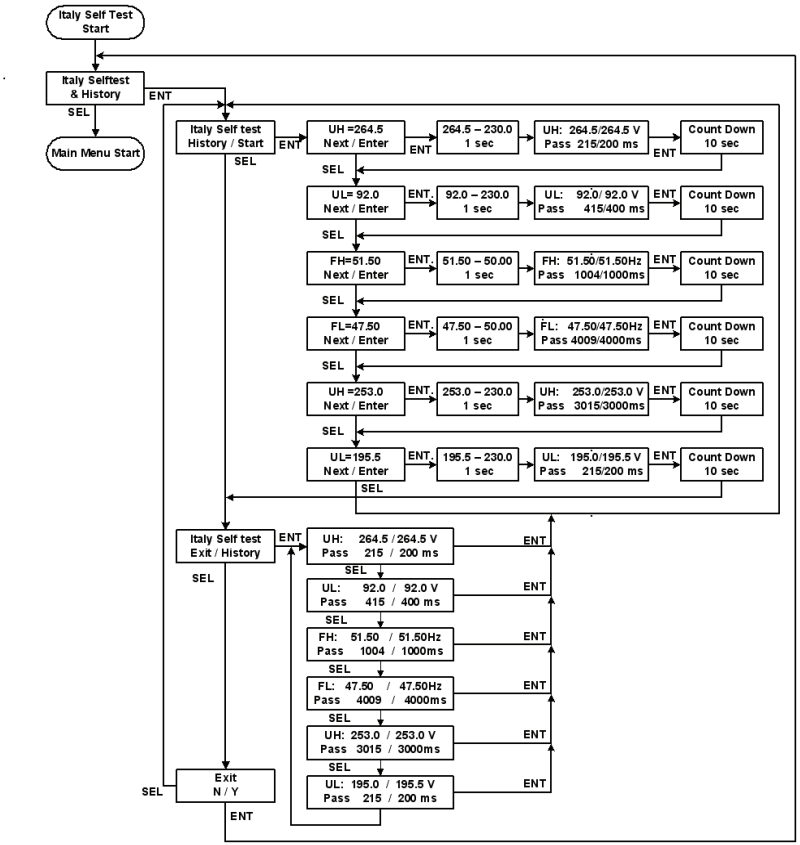


Figure 3-12 Italy Self Test setting

Note: The values present in the flow charts are for reference only. For exact values, refer www.schneider-electric.com/ solar.

Conext RL Config Tool

The Conext RL Config Tool can be used to connect the inverter to a PC through the RS485 port. For connection, refer to Figure 3-13 on page 3–16. This tool can also be used to monitor and configure inverter parameters, control the inverter for active or reactive power and other functions such as enable shade tolerant algorithm, configure multifunction relay, log faults etc.

For installation and operation instructions of the Conext RL Config Tool, refer to www.schneider-electric.com/solar for the software and user guide.

Inverter Monitoring

The user can view the voltages, currents, and energy harvested by the inverter through the Main button in the Conext RL Config Tool.

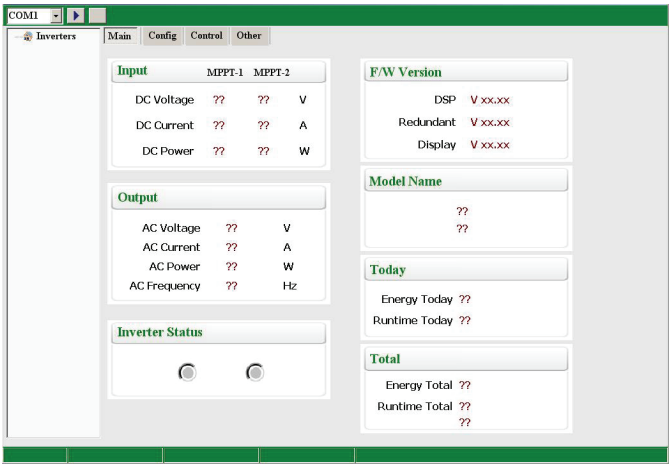


Figure 3-13 Inverter monitoring

Shade Tolerant Algorithm

This setting ensures that the inverter tracks global maxima to harvest maximum power even under shaded conditions. This feature can be enabled or disabled. If enabled, the scan interval is set to the required time to achieve maximum dynamic efficiency. For more information on the benefits of the Shade Tolerant Algorithm refer to our website:

http://www.schneiderelectric.com/documents/support/white-papers/seshadetolerantwp.pdf.

Multifunction Relay

Configure the multifunction relay using the Config tool to become energized during various events. e.g: ground faults. It can also be used for in-house load management, and power production.

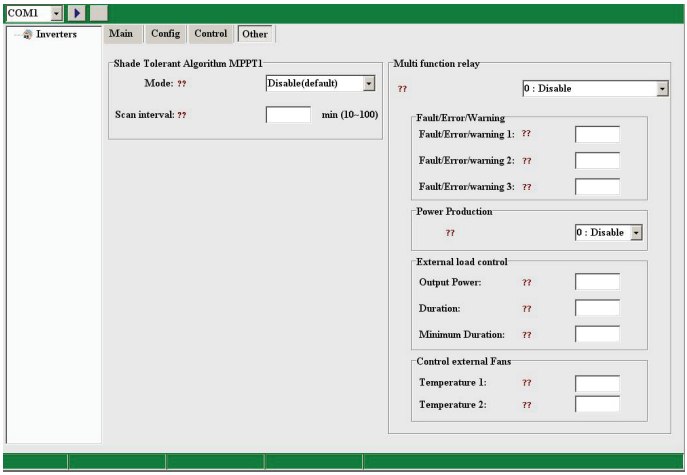


Figure 3-14 Configuration setting of Multifunction Relay

4 Preventative Maintenance

Chapter 4, “Preventative Maintenance” contains information and procedures for performing preventative maintenance on the Conext RL inverter.

This chapter is for use by qualified personnel only

Periodic Maintenance

⚠ DANGER

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

- The Conext RL inverter has no user serviceable parts inside. It must be installed and serviced only by qualified personnel equipped with appropriate personal protective equipment and following safe electrical work practices.
- The Conext RL inverter is energized from two sources: PV array while exposed to sunlight and AC grid. Before servicing, de-energize the AC and PV sources using external disconnecting means provided in the installation, wait at least five minutes for internal capacitors to discharge, and test using a meter rated at 600 V AC and DC to make sure all circuits are de-energized to safe voltage level. If possible, follow a lock-out-tag-out procedure.
- Do not connect 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.

The term “qualified personnel” is defined on page iii of this manual. Personnel must be equipped with appropriate PPE and follow safe electrical work practices. The inverter is energized from the AC grid and PV sources. Before servicing the inverter or accessing the communication module, disconnect all sources and wait at least five minutes to allow internal circuits to discharge to safe voltage levels.

Factors Affecting Conext RL Inverter Performance

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

PV Array Factors

- PV array ratings

  PV arrays are rated under standard conditions as listed below:

  - specified illumination (1000W/m^2)
  - spectrum of the light
  - specified temperature (25**º**C /77**º**F)

  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 properly designed and installed PV system on a typical day.

- Temperature and reduced output

  PV array temperature affects the output of the entire system. As the temperature of the array surface rises, its energy output decreases. Roof mounted arrays 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: The Conext RL inverter reduces its energy output to help protect its electronic circuits from overheating and to help protect from possible damage in high heat conditions. For maximum output in hot climates, mount the Conext RL inverter in a shaded location with good air flow.

- Partial shade

  Shading of only a single module of the array reduces the output of the entire system. Such shading can be caused by something as simple as the shadow of a utility wire or tree branch on part of the array's surface. This condition acts like a weak battery in a flashlight, reducing the total output even though the other batteries are good. However, the output loss is not proportional to the shading.

The Conext RL inverter is designed to maximize its energy production in the above situation using its MPPT algorithm.The shade tolerant algorithm can be enabled and disabled using Conext RL config tool.

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 inconsistences in performance from one module to another
- Conext RL inverter efficiency
- Wire losses
- Utility grid voltage

For additional information and technical notes concerning PV array performance, see www.schneider-electric.com/solar

Performing General Maintenance

⚠ DANGER

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

- The Conext RL inverter has no user serviceable parts inside. It must be installed and serviced only by qualified personnel equipped with appropriate personal protective equipment and following safe electrical work practices.
- The Conext RL inverter is energized from two sources: PV array while exposed to sunlight and AC grid. Before servicing, de-energize the AC and PV sources using external disconnecting means provided in the installation, wait at least five minutes for internal capacitors to discharge, and test using a meter rated at 600 V AC and DC to make sure all circuits are de-energized to safe voltage level. If possible, follow a lock-out-tag-out procedure.
- Do not connect 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.

Follow these simple routines to ensure many years of service and optimal performance of your solar energy system:

- Keep the unit clear of 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 wiring and supports are securely in place.
- Maintain a log of system performance readings so that you can recognize when the performance becomes inconsistent.

Replacing Parts

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, FIRE OR ARC FLASH

The Conext RL inverter has no user serviceable parts inside. It must be installed and serviced only 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.

5 Troubleshooting

Chapter 5, “Troubleshooting” describes the event messages that might be displayed on the LCD of the inverter and recommended solutions.

This chapter is for use by qualified personnel only

Messages

Table 5-1 describes event messages that might be displayed on the LCD of the inverter.

NOTE: The third column (“Number”) refers to the event code from the Modbus communications.

Table 5-1 Event message descriptions

Message	Description and Solution	Number
No Alarm	No active alarms	0000
Current Sensor	Issue with CT current sensor • Contact Schneider Electric customer service.	0031
Thermal Sensor 1	Issue in detecting ambient temperature inside the unit • Contact Schneider Electric customer service.	0032
Thermal Condition (LTP)	Low temperature protection. • After the inverter temperature returns to normal, the inverter resumes normal operation.	0080
Thermal Condition (OTP)	Over-temperature protection. • After the inverter temperature returns to normal, the inverter resumes normal operation. • Ensure that the backside of the unit is free of objects. • Ensure that the inverter is not exposed to direct sunlight and the ventilation is good.	0084
HW COMM2	An internal communication service between Main controller and Redundant Controller is interrupted. • If the alert persists for more than a few hours, contact Schneider Electric customer service.	0095

Table 5-1 Event message descriptions (Continued)

Message	Description and Solution	Number
Thermal Sensor 2	Issue with the front end (Boost) semiconductor temperature. • Contact Schneider Electric customer service.	0103
Thermal Sensor 3	Issue with the inverter semiconductor temperature. • Contact Schneider Electric customer service.	0104
Analog Input Bias 1	Issue with DSP ADC. The grid voltage to output current values of the analog-to-digital converter in the main DSP have deviated from reference values. • Contact Schneider Electric customer service.	0120
Analog Input Bias 2	Issue with DSP ADC. The input voltage to DC link voltage values of the analog-to-digital converter in the main DSP have deviated from reference values. • Contact Schneider Electric customer service.	0121
Analog Input Bias 3	Issue with DSP ADC. The PV input current to Boost current values of the analog-to-digital converter in the main DSP have deviated from reference values. • Contact Schneider Electric customer service.	0122
Analog Input Bias 4	Issue with the Redundant Processor ADC. The grid voltage to inverter voltage values of the analog-to-digital converter in the redundant processor have deviated from reference values. • Contact Schneider Electric customer service.	0123

Table 5-1 Event message descriptions (Continued)

Message	Description and Solution	Number
Analog Input Bias 5	Issue with Redundant Processor ADC. The output dc current values of the analog-to-digital converter in the redundant processor have deviated from reference values. • Contact Schneider Electric customer service.	0124
HW Efficiency	Efficiency abnormal • Contact Schneider Electric customer service.	0130
RCMU Fault	Issue with RCMU. The self-test is not working properly, and the inverter is disabled. • Contact Schneider Electric customer service.	0140
Relay Test S/C	Relay test short • Contact Schneider Electric customer service.	0150
Relay Test O/C	Relay test open • Contact Schneider Electric customer service.	0151
HW ZC Fail	Issue with Zero crossing circuit • Contact Schneider Electric customer service.	0160
HW COMM1	Internal communication service interruption has occurred between main processor and display • If the event persists for more than a few hours, contact Schneider Electric customer service.	0195
AC Current High	Output current exceeds the rated value. • If the event occurs frequently, contact Schneider Electric customer service.	0460

Table 5-1 Event message descriptions (Continued)

Message	Description and Solution	Number
AC Over Current	HW OOCP (Output Over Current Protection) circuit • If the event occurs frequently, contact Schneider Electric customer service.	0461

Overvoltage DC	Bus voltage, Bus Positive, or Bus Negative over voltage rating
	• Have a qualified installer verify whether:
	  • the PV array installation is correct.
	  • DC wiring is done according to this manual.
	• Contact Schneider Electric customer service.
		0601

DC Over current	PV1 over current or PV1 over current due to transient PV2 Over current or PV2 over current due to transient • Contact Schneider Electric customer service.	0620
DC Injection	DC Injection • If the event occurs frequently, contact Schneider Electric customer service.	0701
Ground Current High	RCMU tripped. Excessive steady-state residual current or sudden change in residual current. • Have a qualified installer check the PV array for ground faults. • If the event occurs frequently, contact Schneider Electric customer service.	0702

Table 5-1 Event message descriptions (Continued)

Message	Description and Solution	Number
AC Freq Low	Under frequency range Some of the parameters of the grid are temporarily out of normal range. After the parameters return to normal, the inverter resumes normal operation; the green LED is solid. • Wait for the inverter to resume power production.	2401
AC Freq High	Over frequency range Some of the parameters of the grid are temporarily out of normal range. After the parameters return to normal, the inverter resumes normal operation. • Wait for the inverter to resume power production.	2402
AC Volt Low	Under Voltage alert Some of the parameters of the grid are temporarily out of normal range. After the parameters return to normal, the inverter resumes normal operation. • Wait for the inverter to resume power production.	2406
AC Volt High	Slow Over Voltage Range alert Some of the parameters of the grid are temporarily out of normal range. After the parameters return to normal, the inverter resumes normal operation. • Wait for the inverter to resume power production.	2407

Table 5-1 Event message descriptions (Continued)

Message	Description and Solution	Number
Grid Quality	Voltage Total Harmonic Distortion is greater than three percent Some of the parameters of the grid are temporarily out of normal range. After the parameters return to normal, the inverter resumes normal operation. • Wait for the inverter to resume power production.	2440
No Grid	Grid voltage is out of range or not present at all • If this event persists, have a qualified installer verify whether the AC plug connection and AC wiring are correct.	2450
PV Voltage High	String1 or String 2 PV input voltage too high • Have a qualified installer verify the PV array voltage is within the allowed specifications for the inverter.	2606
Isolation Impedance Error	Array impedance to ground in either input is below the Insulation test set point (default value 1200 kOhms) • Have a qualified installer check the PV array for ground faults.	2616

A Specifications

Appendix A provides the electrical, environmental, and other specifications of the Conext RL inverter.

This chapter is for use by qualified personnel only

NOTE: Specifications are subject to change without notice.

System Specifications

Environmental Specifications

Table A-1 Environmental specifications

Specification	Description
Operation altitude	Up to 2000 m (6561.6 ft.)
Enclosure	Powder coated aluminum. Color: RAL 9003.
Storage temperature	-25 to +85 °C (-13 to 185 °F)
Operating temperature	-20 to +65 °C (-4 to 149 °F)
Power derating	See Figure A-4 on page A–9, Figure A-5 on page A–9 and Figure A-6 on page A–10
Environmental category	Outdoor
Pollution degree	PD3
Protection degree	IP65
Relative humidity	4-100% condensing
Galvanic isolation	No electrical isolation between AC grid and PV.
Safety class	Class I metal enclosure with protective earth
Overvoltage category	Category III
Weight	20.0 kg (44.1 lbs) for 3kVA , 21.0 kg (46.3 lbs) for 4kVA and 24.0 kg (52.9 lbs) for 5kVA
Product Dimensions (H x W x D)	420 x 480 x 160mm (16.5 x 18.9 x 6.3 in.) for 3kVA and 4kVA. 445 x 510 x 177mm (17.5 x 20.1 x 7.0 in) for 5kVA
Shipping Dimensions (H x W x D)	505 x 595 x 295 mm (19.9 x 23.4 x 11.6 in) for 3 and 4kVA 566 x 619 x 331 mm (22.3 x 24.4 x 13.0 in) for 5kVA
Shipping Weight	25.0 kg (55.1 lbs) for 3 and 4kVA, 30.0 kg (66.1 lbs) for 5kVA
Connectors	Weather-resistant AC and DC connectors

Electrical Specifications

Table A-2 Electrical specifications

Parameter	Conext RL 3000 E-S/ Conext RL 3000 E	Conext RL 4000 E-S/ Conext RL 4000 E	Conext RL5000 E-S/ Conext RL 5000 E
DC (PV) input			
Nominal input power for maximum output	3.2 kW	4.2 kW	5.3 kW
Nominal voltage	350 VDC		
Operating voltage range	90–550 VDC		
Standby power	10 W		
Night time power	<1 W		
MPP tracker	Parallel inputs: 1 MPP tracker (DC1 and DC2 paralleled) Separate inputs: 2 MPP trackers (DC1 and DC2 connect to separate PV arrays)		
Maximum input voltage, open circuit	550 VDC		
MPPT voltage range, full power	160–500 VDC	180–500 VDC	
DC connection type	MC4, 2 pairs (1 + 1)	MC4, 4 pairs (2 +2)	
Maximum input current per MPPT	10 A	12 A	18 A
Absolute maximum short circuit current per MPPT	13.9 A	16.7 A	25 A
AC output (grid side)			
Nominal output power	3 kVA	4 kVA**	5 kVA*
Nominal output voltage	230 VAC (1-phase + PE + N)		

Table A-2 Electrical specifications (Continued)

Parameter	Conext RL 3000 E-S/ Conext RL 3000 E	Conext RL 4000 E-S/ Conext RL 4000 E	Conext RL5000 E-S/ Conext RL 5000 E
Maximum current	13.9 A	18.2 A	23.2 A
Frequency range	45–65 Hz		
Total harmonic distortion	< 3% @ rated power		
Power factor	> 0.99 @ full power. Adjustable: 0.80 capacitive to 0.80 inductive		
DC current injection limit	< 0.5% rated output current		
Peak efficiency	97.5%		
European efficiency	97%		
AC connector	3 wire, solderless; IP67		
Acoustic noise level	<40 dBA at 1 meter		
Cooling	Natural cooling		
Max. inverter back feed current to the array	0 A		
Max inrush current and duration	1ms duration, 30 A peak, 1A, 3-cycle RMS		

* 4.6 kVA for Germany

** 3.68 kVA for UK

RCMU

The Conext RL transformerless inverter has an integrated electronic RCMU and it trips if the constant leakage current exceeds 300 mA, or suddenly occurring residual currents exceed 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.

AC breaker recommendation:

For AC external protection we recommend to use the breakers with the current ratings as given below.

- Conext RL 3000 E-S/ Conext RL 3000 E: 16 A
- Conext RL 4000 E-S/ Conext RL 4000 E: 20 A
- Conext RL 5000 E-S/ Conext RL 5000 E: 32 A

System Information and Communication Specifications

Table A-3 System information and communication

Feature	Description
User interface	Black-on-white Alpha-Numeric LCD Size = 2 lines by 16 characters Event logging: 365-day data logger and real-time clock with 15 events record.
Communication interface standard/ optional	RS 485, MODBUS / Ethernet (with built-in web server)
Dry contact output connection	For remote indication of inverter status and other functionalities Connected circuits must be rated for SELV and should not exceed 28 VDC and 3 A.

Regulations and Directives

Table A-4 Regulations and directives

Feature	Conext RL 3000 E	Conext RL 4000 E	Conext RL 5000 E
Electrical safety	CE marked to the Low Voltage Directive EN/IEC 62109-1 / EN/IEC 62109-2 AS 3100 (RCM)		
Grid interconnection	VDE0126-1-1, VDE 0126-1-1/ A1, VDE-AR-N 4105, RD1699, CEI 0-21, UTE C15-712-1, EN50438, IEC 62116, IEC 61727 AS 4777.2, AS 4777.3, G83/1, and G59/2.		
Environmental	RoHS, REACH		

Table A-4 Regulations and directives (Continued)

Feature	Conext RL 3000 E	Conext RL 4000 E	Conext RL 5000 E
EMC	CE marked for the EMC directive 2004-108-EC according to: • Emissions: EN 61000-6-3 (residential) • Immunity: EN 61000-6-2 (industrial)		

Dimensions

See “Views and Dimensions” on page 2–21.

Efficiency Curves

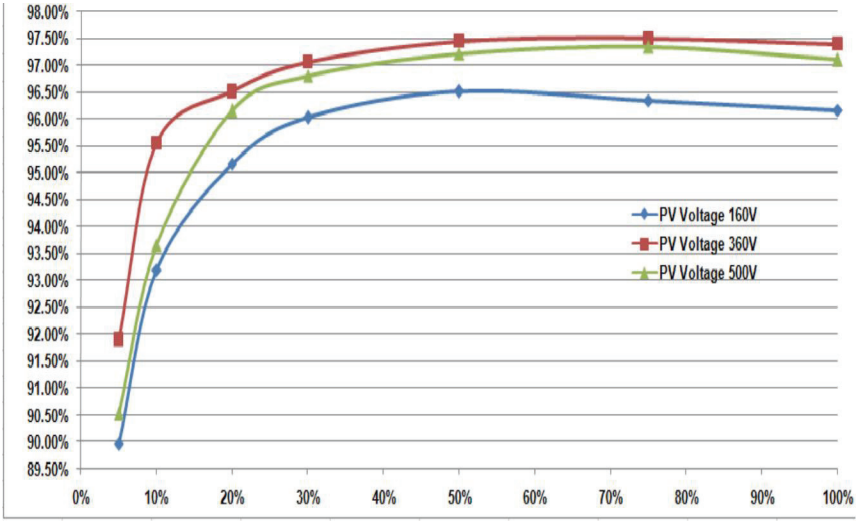


Figure A-1 Efficiency curves Conext 3000 E-S

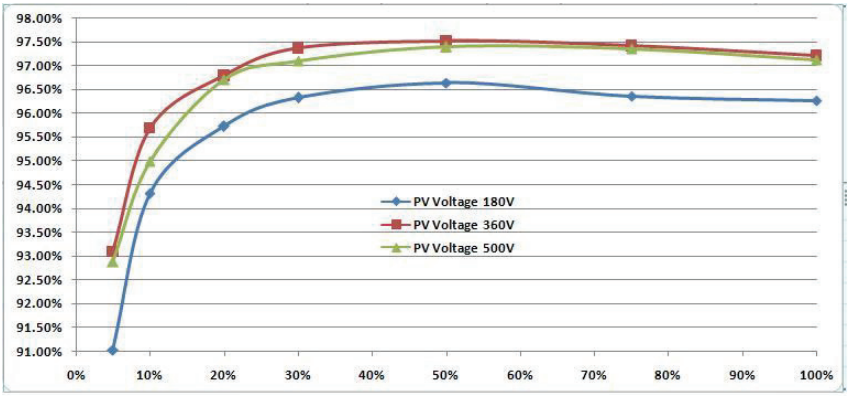


Figure A-2 Efficiency curves Conext 4000 E-S

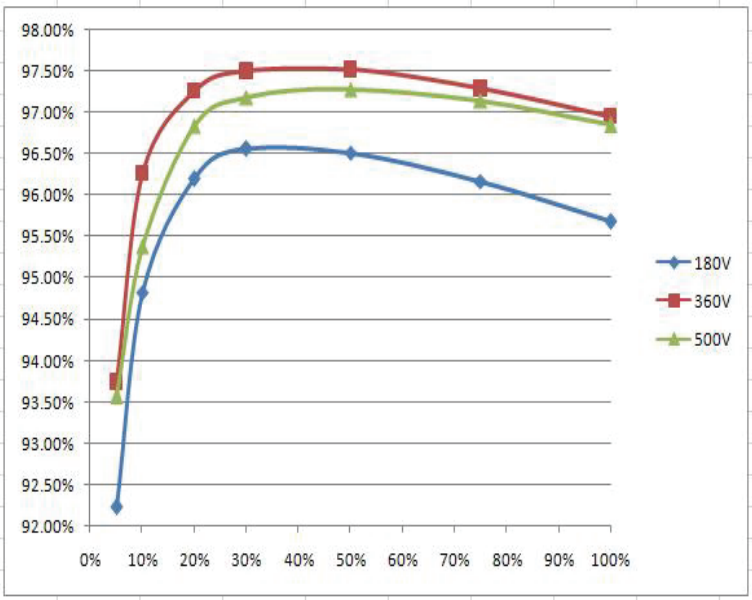


Figure A-3 Efficiency curves Conext 5000 E-S

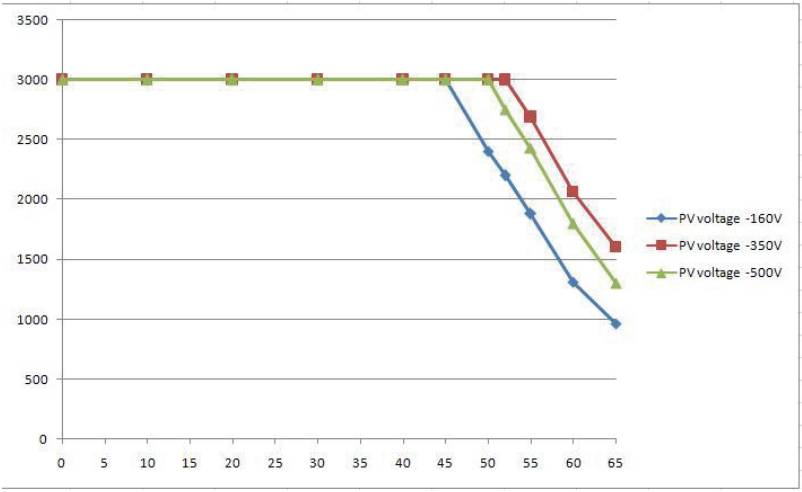


Figure A-4 Temperature derating curves Conext 3000 E-S

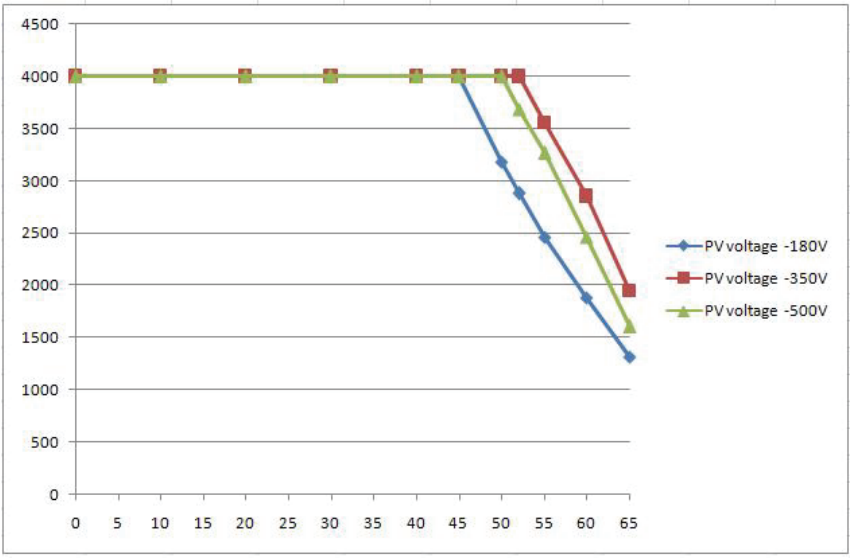


Figure A-5 Temperature derating curves Conext 4000 E-S

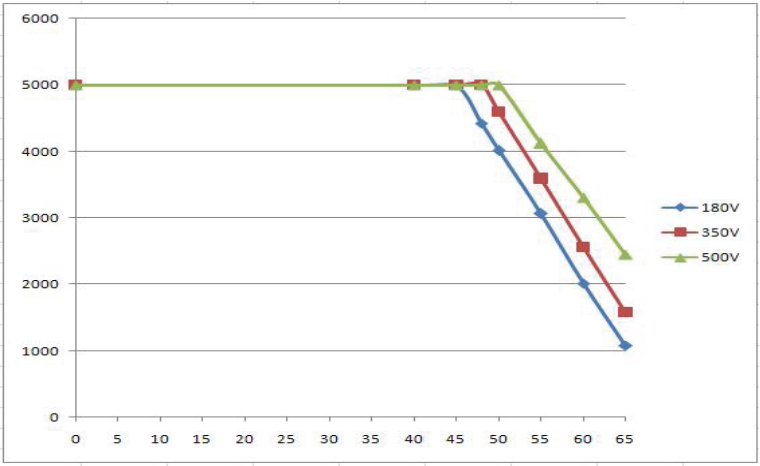


Figure A-6 Temperature derating curve Conext 5000 E-S

B Inverter Configuration

Appendix B provides the information on how to configure Conext RL inverter using Conext RL Config tool.

This chapter is for use by qualified personnel only

Inverter Configuration

Use the Config menu to configure the Grid Setting through the Conext RL Config tool. Figure 3-14 on page 3–17 shows the parameters that are configurable if the Grid Setting is set to Custom mode. This feature is available only to qualified personnel.

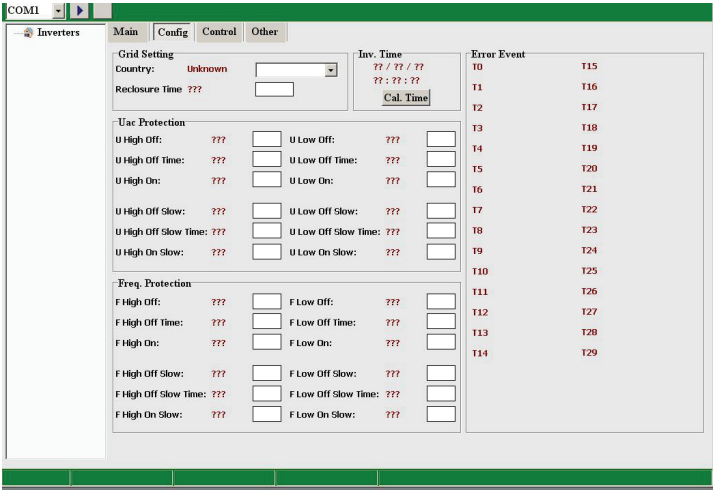


Figure B-1 Inverter configuration

Inverter Control Settings

Use this tool, to set the parameters for active, reactive power and low voltage fault ride through, called (LVRT).

There are two settings for active and four settings for reactive power control based on the requirement of network operator. Select either or both active power control methods and/ or one of the reactive power control methods.

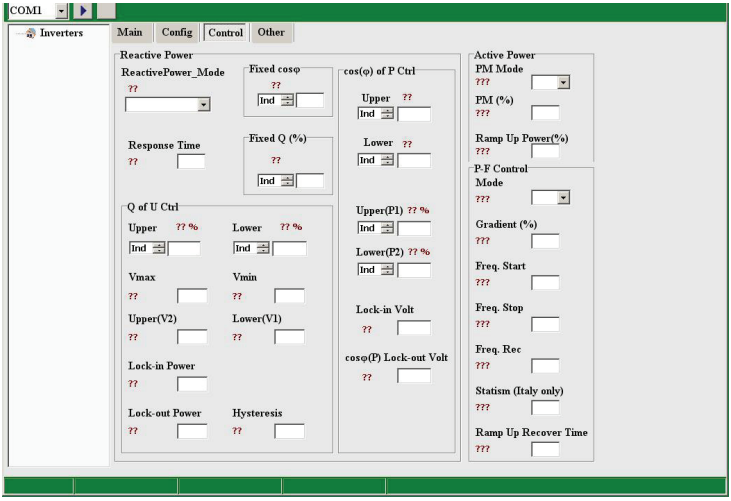


Figure B-2 Inverter control settings

Active Power Control

a) Power Limit (Active Power)

Active power can be set using Conext RL Config tool under Control. It is used to reduce the inverter output power by setting the percentage of rated power. Enabling the Power Monitoring (PM Mode) disables the MPPT tracking and the unit delivers the commanded power as a percentage of rated power. PM% means percentage of rated power.

b) Frequency Dependent Active Power Control (P-F control)

P-F Control can be set using Conext RL Config tool under Control menu. Active power delivered to the grid can be controlled by the inverter based on the frequency as shown in Figure B-3 (country requirements).

Freq Start is the frequency in Hz at which power starts derating.

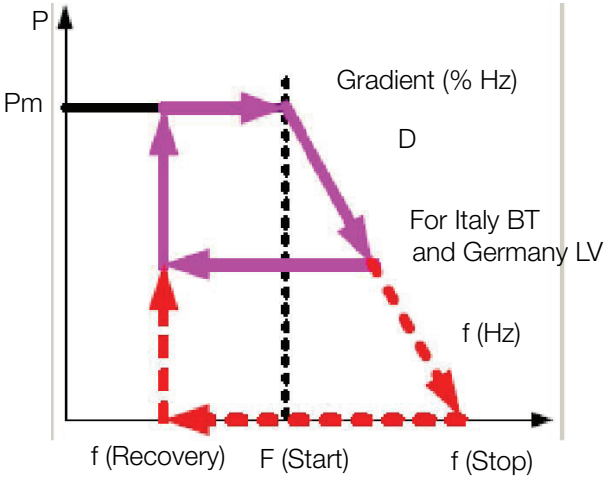


Figure B-3 Frequency dependent active power control

Freq Stop is the frequency in Hz of zero power. This value is calculated by the gradient.

Freq Rec value is equal to the frequency of connection.

Gradient (%) is the slope of power% per Hz.

Ramp up recover time is the maximum allowed time for the inverter to maintain power when the operation frequency is out of range, or recover into normal operation if the frequency comes back into normal operating range. See local grid interconnection codes for the need to turn OFF this feature.

Setting the Reactive Power Control

Four methods of reactive power control are available in Conext RL Config tool under the control section. Only one of the four methods can be enabled at a time. See local grid interconnection codes for the need to turn this feature on or off.

a) Constant Power factor (Fixed cos(phi))

With this method, the inverter delivers reactive power determined by the available active power and the power factor you specify. The Cos phi can be inductive or capacitive with an adjustment resolution of 0.01.

b) Power factor as a function of active power (Cos (phi) of P Ctrl)

With this method the inverter delivers reactive power determined by the available active power method and the power factor. All the settings are done on the Conext RL Config tool under the Configuration section. Refer to Figure B-7.

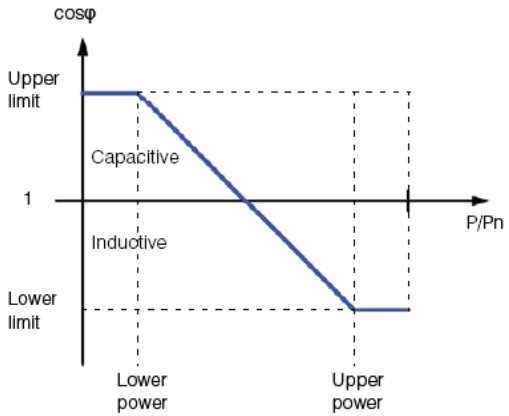


Figure B-4 Setting the reactive power control

c) Constant Reactive Power (Fixed Q)

With this method the inverter delivers reactive power (Q) at a constant, specific level using the Conext RL Config tool.

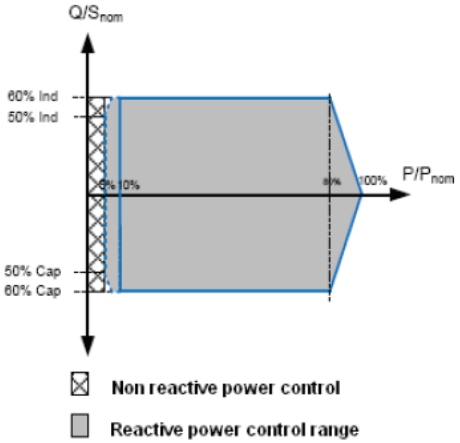


Figure B-5 Setting the constant reactive power

d) Reactive Power as a function of Voltage (Q of U cntrl)

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

Q/Sn has these characteristics.

- Capacitive 80% to Inductive 80%.
- Resolution is 1%
- U limit: 184 V to 276 V
- Response Time = 0 to 60 s.

Hysteresis can be between 3 to 20 V with resolution of 0.1 V and delay time between 10 to 60s. All the parameters can be set using Conext RL Config tool under Config section.

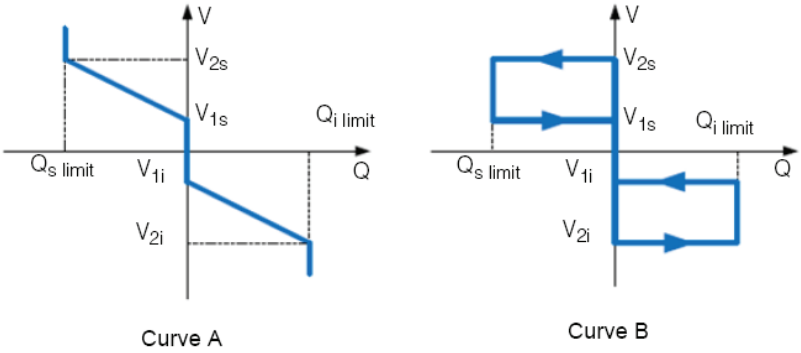


Figure B-6 Setting the reactive power as a function of Voltage

Low Voltage Ride Through

This feature keeps the inverter online during a short duration voltage dips to support the grid.The below parameter can be set using the Conext RL Config tool under the Control menu. Refer to the Figure B-2.

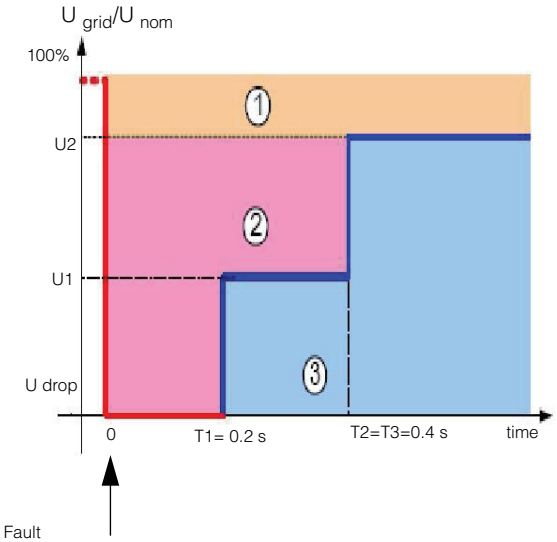


Figure B-7 Low voltage ride through

Dead band U min to 0.85 V nominal

Dead Band Umax to 1.1 V nominal

Kfactor: Reactive current ratio during Fault Ride Through

Vdrop: If the grid voltage is below this value the inverter immediately trips.

T1 Time: If the grid voltage drops and does not come back to U1 within T1 seconds the inverter trips.

T2 Time: If the grid voltage drop and does not come back within T2 seconds the inverter trips.

T3 Time: If the grid voltage drops and does not come back to 0.9* V nominal within T3 seconds then the inverter trips.

Information About Your System

Open your Conext RL 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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