CL 30, CL 33, and CL 50 inverter

Owner's Guide

990-91392B

May 2022

https://solar.se.com/

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Document Number: 990-91392B **Date:** May 2022

Contact Information

For country-specific details, please contact your local Schneider Electric Sales Representative or visit the Schneider Electric Solar Business website at: https://solar.se.com/

Information About Your System

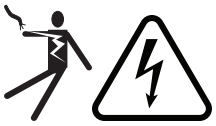
As soon as you open your product, record the following information and be sure to keep your proof of purchase.

Serial Number	_____
Product Number	_____
Purchased From	_____
Purchase Date	_____

Safety Information

Important Information

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



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

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved. For more information, see *Audience*.

Label Symbols

The following symbols appear on labels on or in the inverter.

Hazardous voltage

Hot surface

Stored energy hazard discharge time

Refer to the Installation or Operation instructions

Product Safety Information

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- The CL Series inverter is energized from multiple sources. Before removing covers, identify, de-energize, lock-out, and tag-out all power sources, and wait 10 minutes
- Do not open fuse under load. Do not open the front cover without physically disconnecting the PV cables or opening the external DC disconnect device before servicing.
- Never energize the inverter with the covers removed.
- Always use a properly rated voltage sensing device (1500VDC Cat II, 600VAC Cat III minimum rated) to confirm that all circuits are de-energized.
- Replace all devices and covers before turning on power to this equipment.
- The DC conductors of this photovoltaic system are ungrounded and may be energized.

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

⚠⚠ WARNING

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

- Do not install the CL Series inverter in areas with flammable or explosive materials.
- The surface where the CL Series inverter is installed must be fireproof.
- Reserve enough clearance around the CL Series inverter to ensure sufficient space for heat dissipation.

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

⚠ CAUTION

RISK OF PERSONAL INJURY AND EQUIPMENT DAMAGE

- A minimum of two people must be present to lift the inverter.
- If mandated by local work safety rules, use a motorized hand truck and/or portable crane system to lift the inverter.

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

NOTICE

RISK OF EQUIPMENT DAMAGE

- All cables connected to the CL Series must run through the cable glands on the unit.
- This unit is susceptible to damage from EMI and nearby lightning strikes unless a surge protection device (a lightning arrestor) is installed.
- Turn Off all devices before connecting cables.
- Use the CL Series's DC switch[1] as its On/Off switch.
- To isolate the CL Series, see *Lock-Out Tag-Out (LOTO) Procedure on page 10*.

Failure to follow these instructions can result in equipment damage.

[1] For ANZ countries use of external DC switch may be required. Please follow the country installation guidelines.

This guide contains important safety instructions for the CL Series that must be followed during installation procedures. Read and keep this Owner's Guide for future reference.

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

1. Before using this product, read all instructions and cautionary markings on the unit and all appropriate sections of this manual.
2. Use of accessories not recommended or sold by the manufacturer may result in a risk of fire, electric shock, or injury to persons.
3. The manufacturer recommends that all wiring be done by a certified technician or electrician to ensure adherence to the local and national electrical codes applicable in your jurisdiction.
4. To avoid a risk of fire and electric shock, make sure that existing wiring is in good condition and that wire is not undersized. Do not operate the equipment with damaged or substandard wiring.
5. Do not operate the equipment if it has been damaged in any way.
6. Do not disassemble the CL Series inverter except where noted for connecting wiring and cabling. See your warranty for instructions on obtaining service. Attempting to service the unit yourself may result in a risk of electrical shock or fire.
7. To reduce the risk of electrical shock, disconnect the power supply from the equipment before attempting installation, and any maintenance (including cleaning or working on any components connected to the equipment). Internal capacitors remain charged for ten minutes after all power is disconnected.
8. The equipment must be grounded. Use the protective grounding conductor provided with the AC input conductors.
9. This product is designed for outdoor use and is rated IP66.
10. To reduce the chance of short-circuits, always use insulated tools when installing or working with this equipment. Do not leave tools inside.
11. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with electrical equipment.
12. Do not open nor disassemble the top half of the unit. There are no user-serviceable parts inside.
13. To disconnect the unit from DC power, turn the DC switch to OFF and then remove all PV string connectors from the DC terminals.

CL Series Inverter Storage Requirements

The following requirements must be met if the CL Series inverter is not put into use immediately:

IMPORTANT: CL Series inverters must be commissioned before 2 years from the date of shipment. If stored longer than 2 years then warranty would be void. For more information please refer to our warranty policy.

- The CL Series inverter must be packed inside its original carton with the desiccant bags inside and sealed with standard packaging tape.
- Store the inverter with its front panel facing up. The carton should lay flat and parallel to the ground.
- Keep the storage temperature at -40°C to +70°C (-40°F to +158°F) and the humidity at 0 to 95%, non-condensing.
- The CL Series inverter should be stored in a clean and dry place and be protected from dust, water vapor corrosion, and chemically corrosive materials.
- A maximum of four CL Series inverters can be stacked.
- Periodic inspections are required during the storage. If there is any deterioration to the packaging, such as rodent bites, replace the packing materials immediately.
- CL Series inverters use electrolytic capacitors. A thorough and professional inspection may be required before installing the inverter after more than six months in storage. Contact Schneider Electric support for information.

Audience

This manual is intended for use by qualified personnel installing a system involving Schneider Electric CL Series inverter.

The qualified personnel have training, knowledge, and experience in:

- Installing electrical equipment and PV input systems (up to 1100 VDC).
- Applying all applicable installation codes.
- Analyzing and reducing the hazards involved in performing electrical work.
- Selecting and using Personal Protective Equipment (PPE).

Personal Protective Equipment (PPE)

To perform this work, qualified personnel must be equipped with appropriate personal protective equipment including the following:

- Electrical rated rubber insulating gloves with leather protectors (optional liners)
- Protective glasses or goggles
- Arc-rated long sleeve shirt and arc-rated pants or arc-rated coverall or arc-rated flash suit (minimum Arc Thermal Performance Value (ATPV) of 12 cal/cm^2)
- Hearing protection
- Electrically rated footwear
- Arc-rated face shield with arc-rated hard hat and hood or arc flash suit hood
- Minimum five LOTO locks and tags
- Multimeter or voltage tester with minimum ratings of
  Multimeter: up to a steady state voltage of 1500 V
  Voltage Tester : CATIII - 1500 V

Check local safety regulations for additional PPE selection requirements.

Lock-Out Tag-Out (LOTO) Procedure

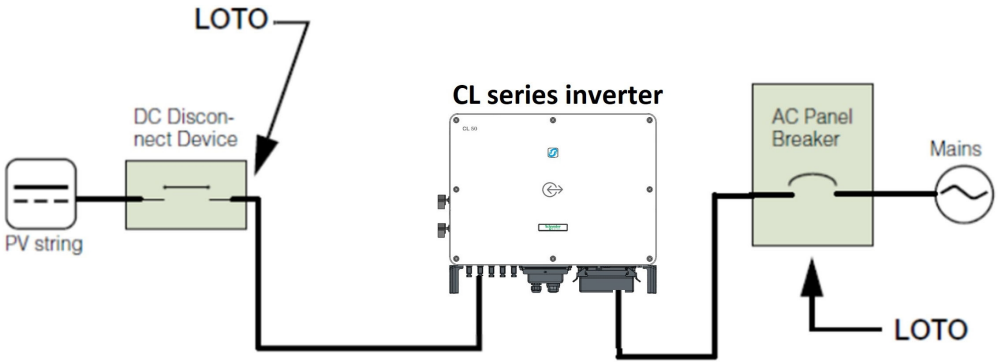
Lock-out refers to the practice of preventing de-energized circuits from being reenergized by putting locks on the disconnecting devices, holding them open. Tag-out refers to the practice of attaching a tag to the disconnect-device locks warning others not to operate the disconnect device and containing information relating to the lock-out, such as the person responsible, the reason, and the date and time. Combined these two practices are called the lock-out and tag-out (LOTO) procedure.

⚠ ⚠ DANGER

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

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never energize the inverter with the covers removed.
- Always use a properly rated voltage sensing device (1500 VDC Cat II, 600 VAC Cat III minimum rated) to confirm all circuits are de-energized.
- Replace all devices and covers before turning on power to this equipment.
- The inverter is energized from multiple sources. Before opening the cover identify the power source, de-energize, lock-out and tag out, and wait ten minutes for circuits to discharge.

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



1. Identify any disconnect device upstream from the CL Series unit.
2. Open the disconnect device that connects to the CL Series to turn off DC power.
   If there is no DC disconnect device between the PV panel and inverter, remove all PV string connectors from the PV terminals.
3. Turn the CL Series's DC switch to OFF position.
4. Lock-out and tag out the external DC disconnect device.
5. Identify the AC panel breaker downstream from the CL Series unit.

6. Open the AC panel door.
7. Turn off the AC panel breaker (open the switch) that connects to the CL Series to turn off AC power.
8. Lock-out and tag out the AC panel breaker and close the AC panel door.
9. Close the AC panel door.
10. Wait ten minutes for the circuits in the CL Series to discharge.
11. Check the inverter is in zero energy state by measuring voltage at AC connection terminals and MC4 connectors using a suitable rated multimeter before performing any work.

Purpose

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

CL 30 (Product Part Number PVSCL30E): 30kW IEC Solar Inverter

CL 33 (Product Part Number PVSCL33E): 33kW IEC Solar Inverter

CL 50 (Product Part Number PVSCL50E): 50kW IEC Solar Inverter

Where all inverter models are being referenced together, the name CL Series will be used.

Scope

This manual provides safety information and guidelines, planning and installation procedures for the CL Series inverters, as well as information about operating and troubleshooting the inverter. It does not provide details about brands of photovoltaic panels. For more information, consult individual PV manufacturers.

Related Information

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

Abbreviations and Acronyms

ANZ	Australia and New Zealand markets
EMI	Electromagnetic Interference
G or GND	Ground (also referred as Protective Earth)
HMI	Human-Machine Interface
LOTO	Lock-Out and Tag-Out
LAN/WAN	Local Area Network / Wide Area Network
LED	Light Emitting Diode (used for indicator lights)
MPPT	Maximum Power Point Tracking
NFPA	National Fire Protection Association
PE	Protective Earth (also referred as Ground)
PPE	Personal Protective Equipment
PV	Photovoltaic (or Solar)
SPD	Surge Protection Device
THD	Total Harmonic Distortion

Contents

Figures

Tables

1 Introduction

What's in This Chapter?

Product Overview

The CL Series is a transformerless three-phase PV string inverter that is designed to be an integral part of any utility grid-connected PV Power System.

The CL Series is designed to convert DC power generated from the PV array into AC power that is compatible with utility grade AC power. The following diagram illustrates its fundamental application.

Model

Model	Rated Output Power	Working Voltage Range
CL 30	30 kW	400 V (L-L) 3/N/PE 312 V to 528 V (L-L)
CL 33	33 kW	400 V (L-L) 3/N/PE 312 V to 528 V (L-L)
CL 50	50 kW	400 V (L-L) 3/N/PE 312 V to 528 V (L-L)

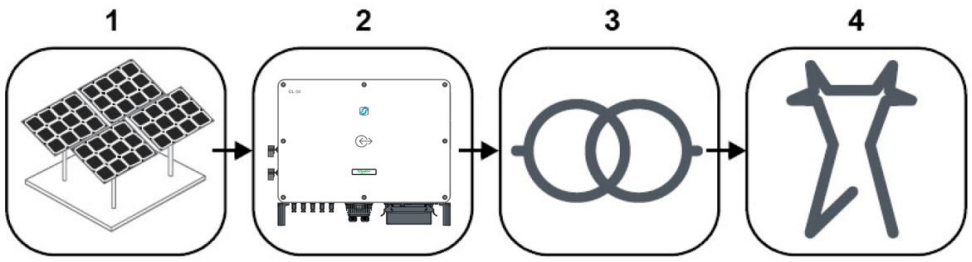
⚠ WARNING

ELECTRICAL SHOCK HAZARD

- Do not connect the inverter to a PV string where the either positive and/or negative terminals of the PV strings need to be grounded.
- Do not connect any local load between the inverter and the AC circuit breaker.
- Use the inverter ONLY in a grid-connected PV system.

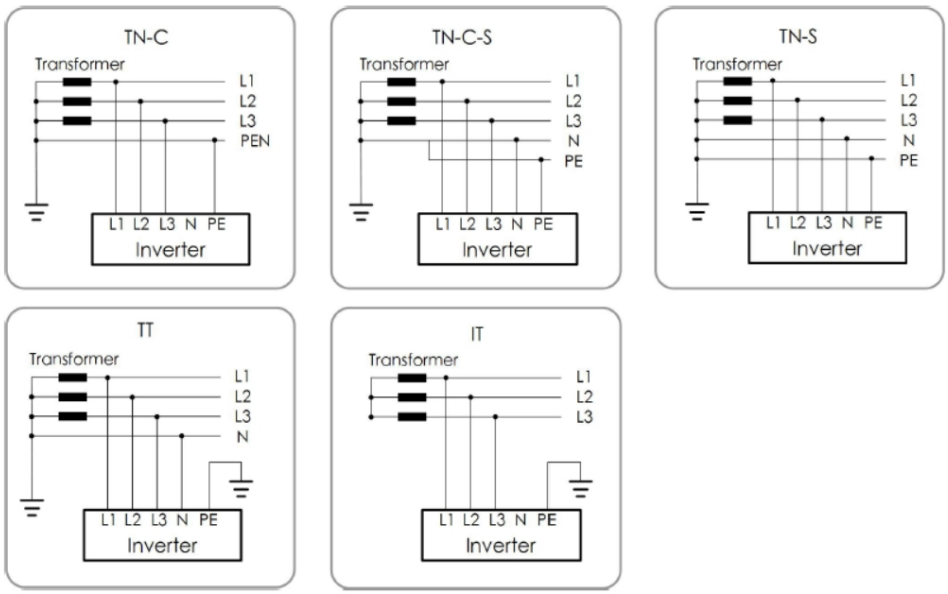
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Figure 1 Fundamental Application



1	PV array (without grounding)
2	CL Series
3	Transformer
4	Utility grid (TN-C, TN-S, TN-C-S, TT, IT.)

Figure 2 Types of System Earthing Connections



Grid Connection Conditions

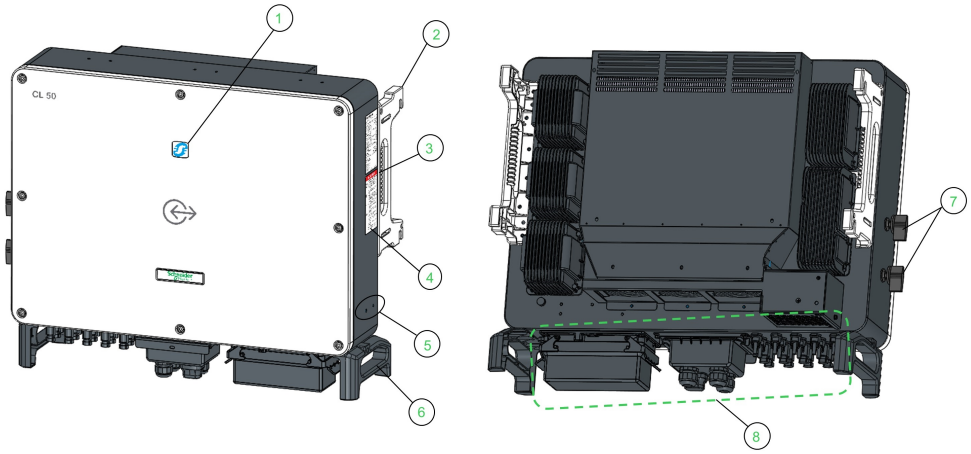
More than one CL Series inverter can be connected to the PV system if the total capacity of the PV system (PV array) exceeds the capacity of a single inverter. Each inverter in the multiple setup connects individually to a PV string at the inverter's DC input side. Then the inverter's AC output side connects to the AC mains (the grid).

NOTICE
EQUIPMENT DAMAGE Follow local regulations when installing a connection to a TN system. An additional external Type B RCD (residual current detection) device rated 300 mA continuous may be required and combined with additional automatic disconnect devices. **Failure to follow these instructions can result in equipment damage.**

NOTE: This inverter complies with IEC 62109-2 clause 13.9 for Fault Indication. If a Ground Fault occurs,either the fault code "012" (excessive current leakage detected) or the fault code "039" (low PV Array insulation resistance detected) will be displayed in the InsightMobile app screen and the LED indicator on the front cover will turn "Steady Red". Refer to *"LED Indicator Panel" on page 29* and to *"Residual Current Device" on page 60*

Physical Features

Figure 3 CL Series Components



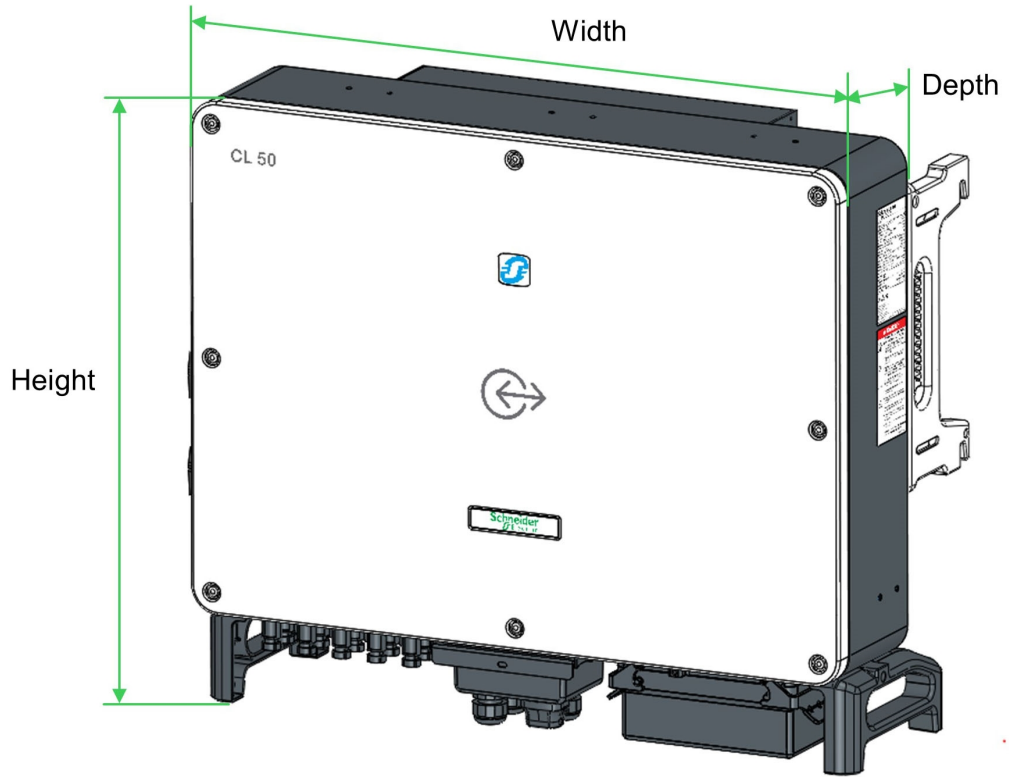
1	LED indicator panel HMI interface to indicate the present working state of the inverter.
2	Mounting ears (four), used to hang the inverter on to the mounting-bracket.
3	Side handles are used for moving, handling, and mounting the PV inverter.
4	Labels Warning symbols, nameplate, and QR code
5	Additional grounding terminals
6	Side handles are used for moving, handling, and mounting the PV inverter.
7	DC switch(es) to disconnect the DC current.[1] CL 30 and CL 33 have a single DC switch. CL 50 has two DC switches.
8	Wiring area AC terminals, DC terminals, and communication terminals

[1] For ANZ countries use of external DC switch may be required. Please follow the country installation guidelines.

Dimensions

Inverter Dimensions

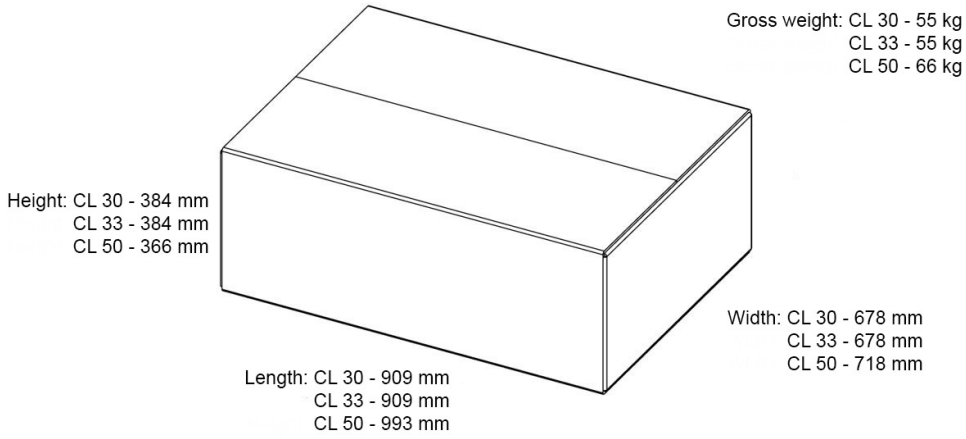
Figure 4 CL Series Dimensions



Model	Dimensions (WxHxD) (mm)	Weight (kg)
CL 30	702 x 595 x 310	50
CL 33	702 x 595 x 310	50
CL 50	782 x 645 x 310	62

Packing Box Dimensions

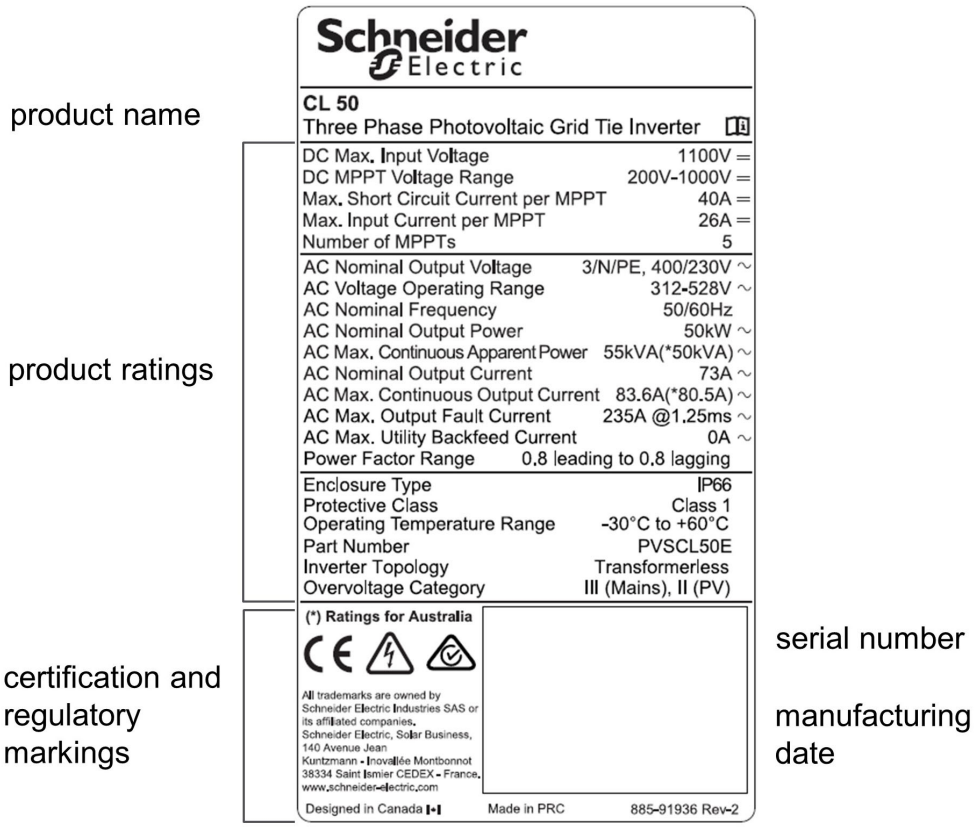
Figure 5 CL Series Packing Box Dimensions



Model	Dimensions (LxWxH) (mm)	Weight (kg)
CL 30	909 x 678 x 384	55
CL 33	909 x 678 x 384	55
CL 50	993 x 718 x 366	66

Product Label

Figure 6 CL Series Sample Product Label (CL 50)



LED Indicator Panel

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

Table 1 Description of LED indicator

LED Indicator	LED State	Description
	Steady blue	The CL Series is connected to the grid and operating normally.
	Periodical flashing blue Period: 0.2 seconds 	The Bluetooth communication is connected and there is data communication. No Inverter Event or Alarm is present..
	Periodical flashing blue Period: 2 seconds 	The DC or AC side is powered on and the device is in standby or startup state (not feeding power into the grid).
	Steady red	An Event or Alarm is present and the inverter cannot connect to the grid.
	Flashing red	An Event or Alarm is present. The Bluetooth communication is connected and there is data communication.
	OFF	Both the AC and DC sides are powered down.

DC Switch(es)

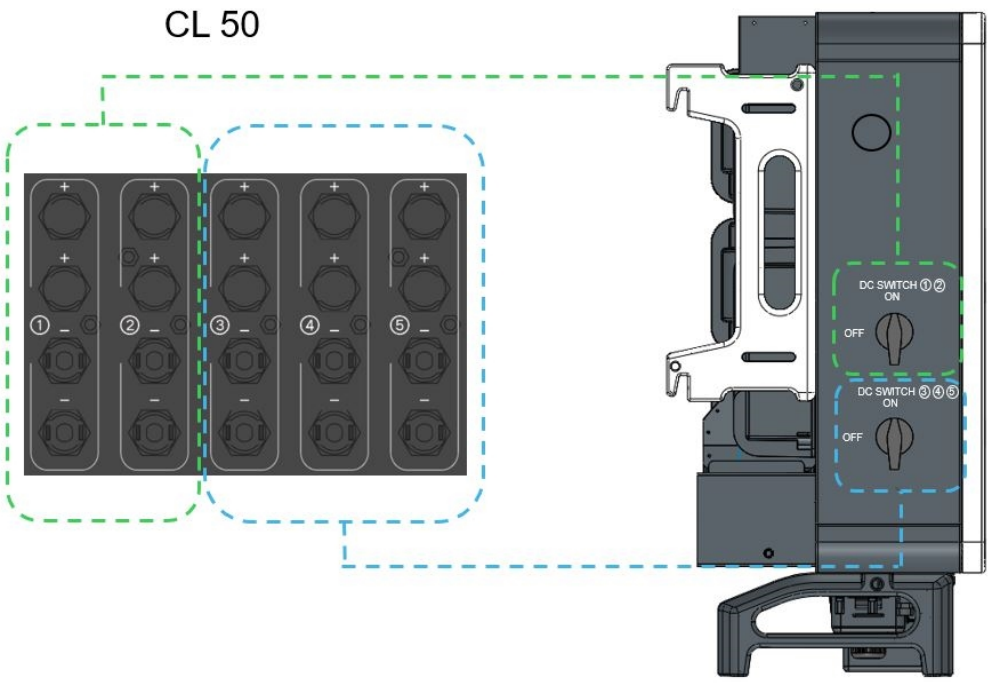
The CL 30 is equipped with one DC switch to control the connection and disconnection of all DC terminals. It may need to be equipped with an external DC switch (not supplied) to meet local requirements in Australia and New Zealand.

The CL 33 is equipped with one DC switch to control the connection and disconnection of all DC terminals.

The CL 50 is equipped with two DC switches to control the connection and disconnection of all DC terminals. However it may needed to be equipped with an external DC switch (not supplied) to meet local requirements in ANZ countries.

The below diagram shows how the two DC switches connect and disconnect MPPTs.

Figure 7 DC Switches



The DC switch(es) is/are both the main power switch and a protective component which is used to safely disconnect DC power between the PV array and the PV inverter whenever necessary to do so.

The CL Series operates automatically (without the need to switch On or Off) when DC input and AC output requirements are continuously met. Turn the DC switch(es) to the Off position only to stop PV inverter operation when a ground fault condition is detected or when there is a non-ground fault condition to stop inverter operation such as maintenance and servicing. CL 30, turn both DC switches (on the unit and external) to the OFF position to stop inverter operation for ground fault or for inverter maintenance and service.

⚠ ⚠ WARNING

ELECTRIC SHOCK HAZARD

- Do not perform maintenance and servicing without totally disconnecting the DC source from the inverter.
- To remove power to the inverter, disconnect power from the PV disconnect device. See *Lock-Out Tag-Out (LOTO) Procedure on page 10*.
- Alternatively, to remove power to the inverter, open all MC4 type connectors after ensuring that no current is flowing and by using a special tool for disconnection.

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

Technical Features

CL Series Circuit Diagram

Figure 8 shows the main circuit of the CL Series.

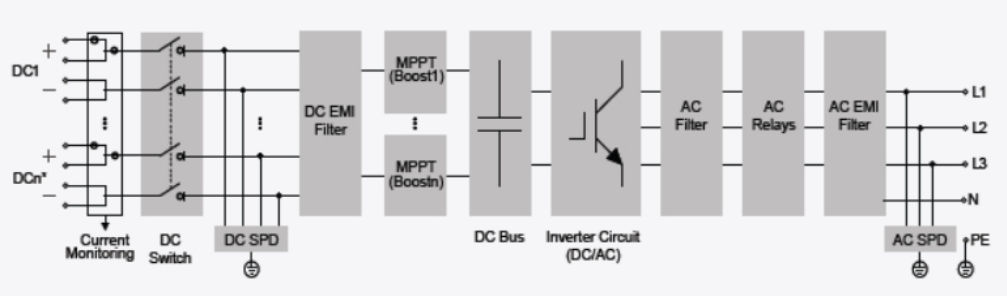
Maximum Power Point Tracking (MPPT) is utilized to optimize harvesting DC power from the PV array with different PV input conditions.

The CL Series circuit converts DC power into AC power and feeds it to the utility grid through the inverter's AC terminal. The protection circuits, such as RCMU, PV ground fault detection, grid monitoring circuits, and thermal derating circuits, help to ensure the device's safe operation and also personal safety.

The DC switch(es) is/are used to disconnect DC power from the PV array to the inverter.

The inverter provides standard RS-485 ports for communication.

Figure 8 CL Series Circuit Diagram



- DC switch
- CL 30: 6 inputs (2+2+2 strings)
- CL 33: 6 inputs (2+2+2 strings)
- CL 50: 10 inputs (2+2+2+2+2 strings)
- type 2 DC and AC SPD
- string current monitoring

Standard Features

Inverter Function

The device's main function is to convert DC current into grid-compatible AC current then feed this current into the grid.

Data Storage and LED Indicator

The inverter onboard memory contains logs, running information, error records etc. The LED indicator shows the running status of the inverter

Device Configuration

The inverter has various settable parameters. Users can set parameters via the InsightMobile app to meet their requirements and optimize the performance.

Communication Interface

The inverter is designed with standard RS485 communication interfaces and communication accessory port; the standard RS485 port can be connected with an external monitoring and control gateways, such as InsightHome or InsightFacility.

Protection Features

The unit is equipped with the following features to help prevent inverter damage, other equipment damage, and personal injury hazards.

- Short-circuit protection
- Ground insulation resistance detection
- Inverter output voltage monitoring
- Inverter output frequency detection
- Residual current protection
- DC injection of AC output current surveillance
- Anti-islanding protection
- Ambient temperature monitoring
- DC over-voltage protection
- Over-current protection
- Power module over-temperature protection
- Fan life protection
- DC reverse polarity protection
- HVRT/LVRT/ZVRT

PID Function

⚠ ⚠ WARNING

UNEXPECTED OPERATION

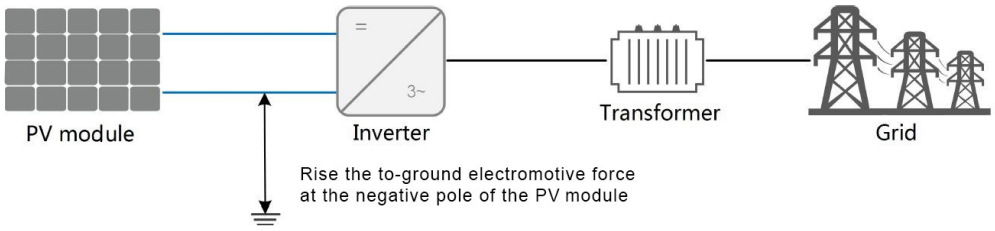
Before enabling the PID recovery function, make sure the voltage polarity of the PV modules meets all requirements. If there are any questions, contact the PV module manufacturer or read the corresponding user manual.

If the voltage scheme for the PID protection/recovery functions does not meet the requirements of the corresponding PV modules, the PID function will not work as expected or may damage the PV modules.

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

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

Figure 9 PID Function



PID Recovery Function

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

NOTE:

- If the PID recovery function is enabled, it only works at night.
- After the PID recovery function is enabled, the voltage of the PV string to ground is 500 Vdc by default, and the default value can be modified through the InsightMobile app.

Derating Feature

Output derating is a way to protect the inverter from overload or potential event detections. These situations prompt the PV inverter to initiate power derating:

- Altitude higher than 3000 meters
- Internal temperature is too high (including ambient temperature and internal components temperature)
  NOTE: For example, installing the inverter in an enclosed space may hasten derating.
- Grid voltage is too low
- External power class adjustment
- Grid frequency is too high
- High grid voltage with a simultaneous low PV voltage

Power Limit Setting

Inverter output power can be adjusted via the InsightMobile app or a remote grid dispatch from the utility company. The corresponding operating state will be displayed on the InsightMobile app.

Over-temperature Derating

High ambient temperature, a blocked fan, or poor ventilation will initiate inverter power derating.

When the temperature inside the unit exceeds the upper limit, the inverter will derate its power output until the internal temperature drops within the allowable range.

Figure 10 CL 30 Over-temperature Derating

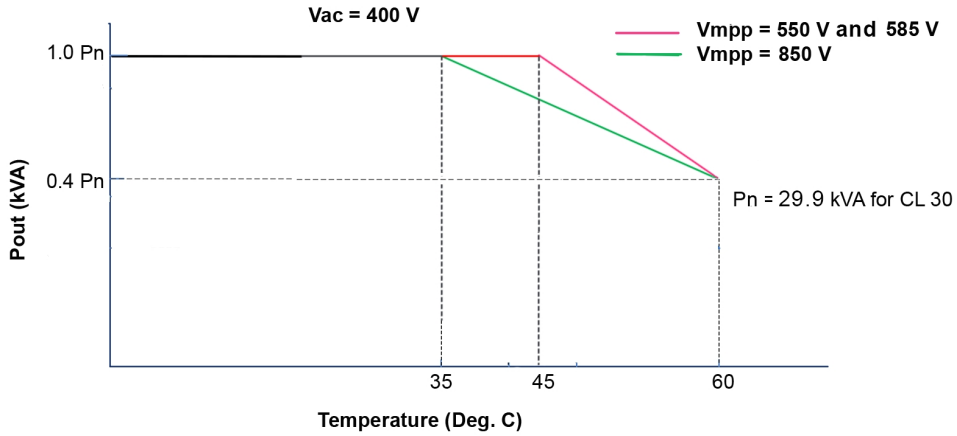
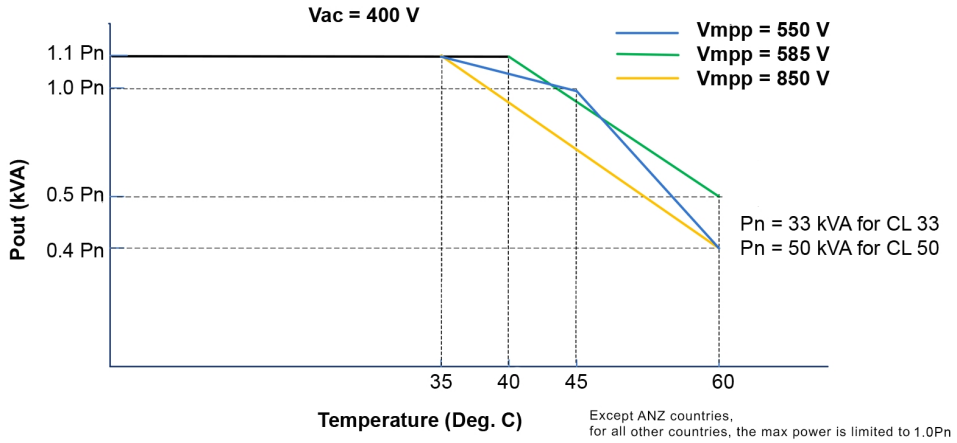


Figure 11 CL 33 and CL 50 Over-temperature Derating

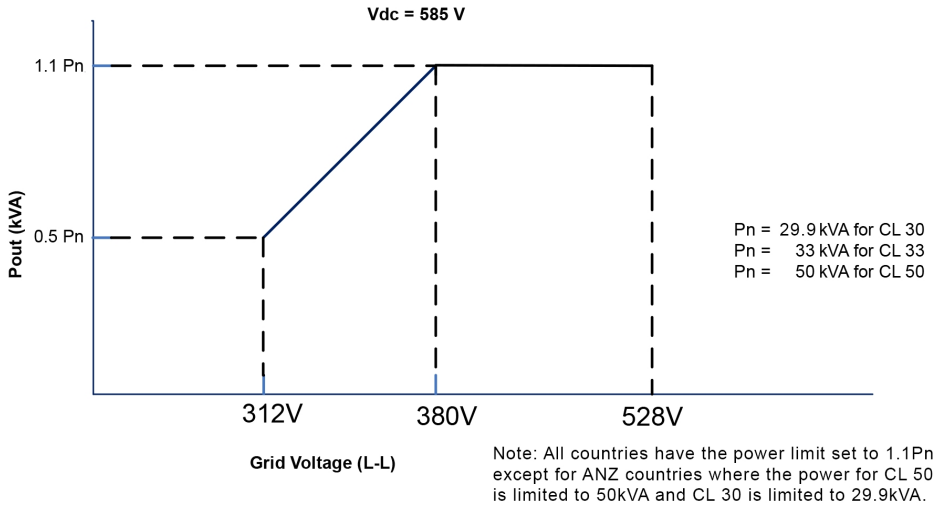


NOTE: If both the module and internal temperatures reach power derating conditions, the inverter will derate the power output based on the lower temperature between the two.

Grid Under-voltage Derating

When grid voltage is lower than 400 V, the inverter will derate the output power to keep the output current within the allowable range. Once the grid voltage is greater than 400 V, the inverter will deliver its rated output power.

Figure 12 CL Series Grid Under-voltage Derating



PV Over-voltage Derating

The inverter regularly scans the PV voltage every 25 minutes and forces the PV to derate to test whether the maximum power point is less than 850 volts.

At 29.9 KVA (CL 30), 33 KVA (CL 33), or 50/55 KVA (CL 50), if the maximum power point is higher than 850 volts, then the inverter will return to the higher voltage limit before it starts derating.

Figure 13 CL 30 PV Over-voltage Derating

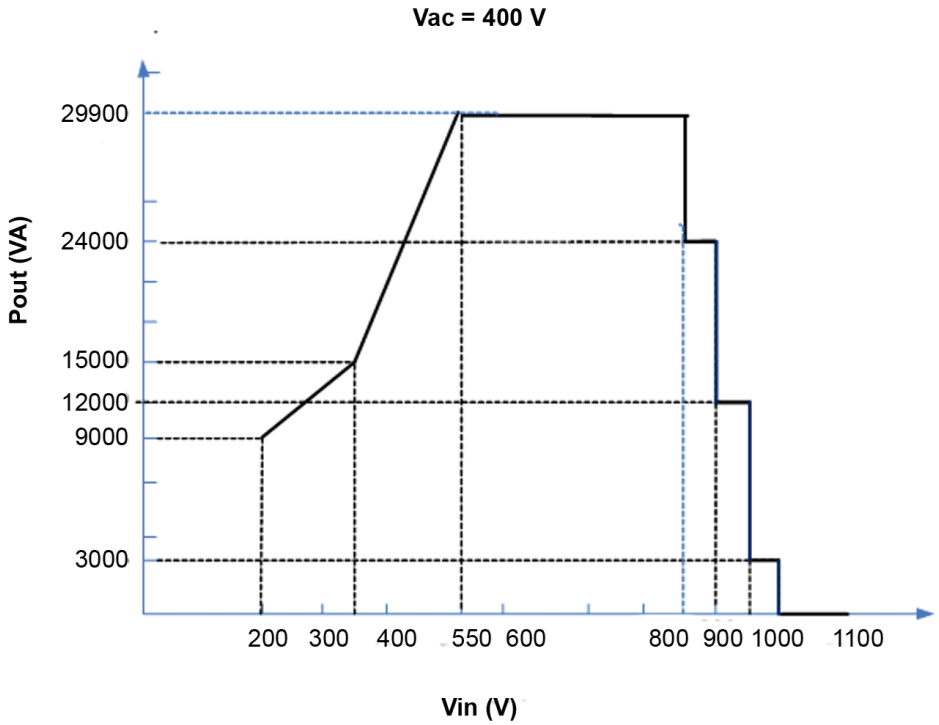


Figure 14 CL 33 PV Over-voltage Derating

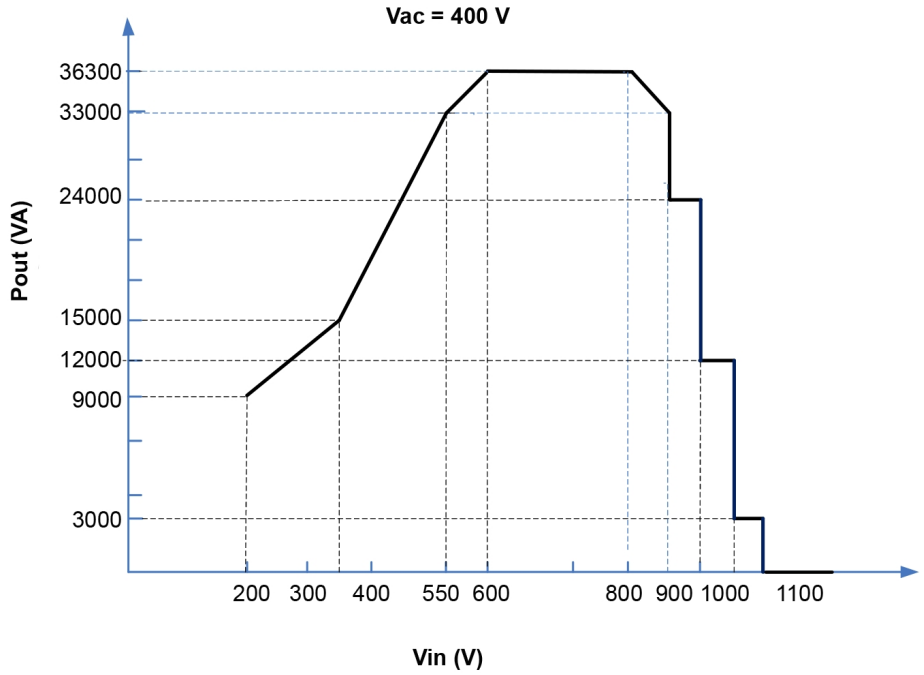
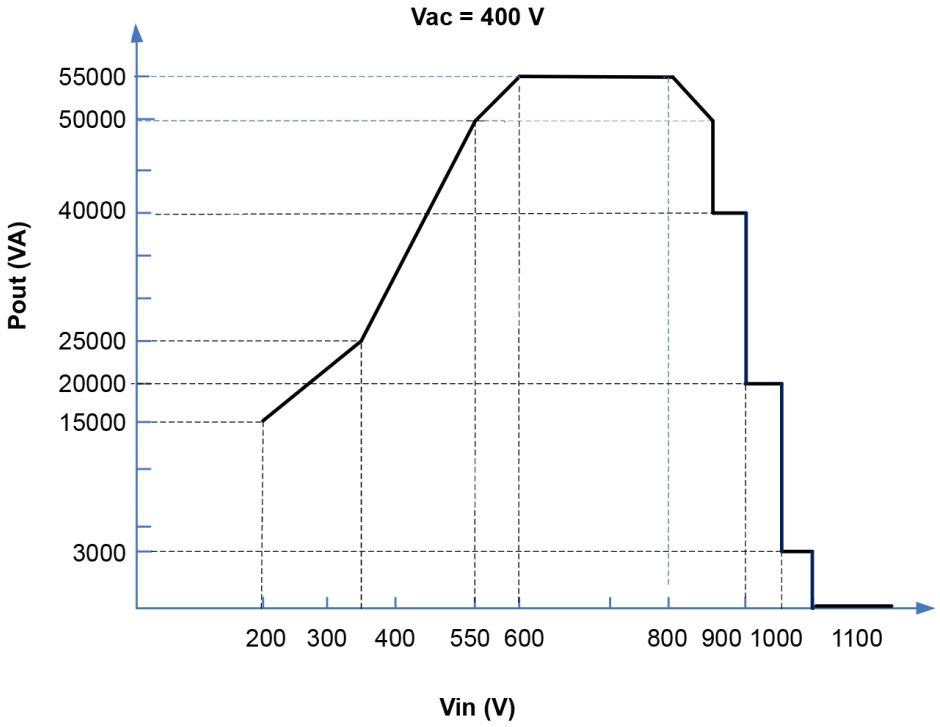


Figure 15 CL 50 PV Over-voltage Derating



2 System Installation

What's in This Chapter?

Pre-Installation

Before installing the CL Series, read all instructions and cautionary markings in this Guide.

NOTE: Obtain all necessary permits prior to starting the installation. Installations must meet all local codes and standards. Installation of this equipment should only be performed by qualified personnel as defined in *Audience on page 8*.

Planning the Installation

- Read this entire chapter before beginning the installation. It is important to plan the installation from beginning to end.
- Assemble all tools and materials needed for the installation.

⚠ ⚠ DANGER

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

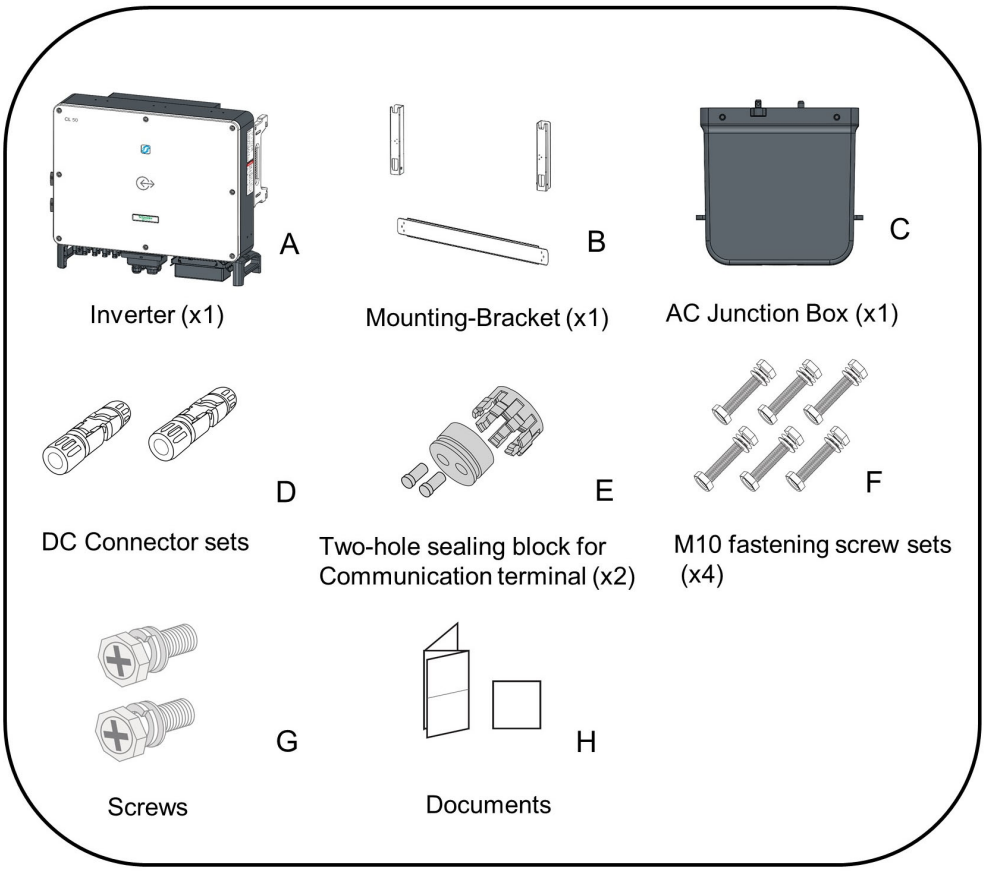
- Do not connect the PV inverter to a live power source prior to cabling and wiring found in *Electrical Connections on page 56*. The inverter can be energized from two sources namely, DC from the PV array and AC from the grid.
- Do not connect any powered device to the PV inverter during installation.

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

What's In The Box

The following materials are supplied in the CL Series package:

Figure 16 What's in the Box



A	CL 30, CL 33 or CL 50 unit
B	Wall-mounting backplate (includes 2 mounting-bracket components and 1 connecting bar)
C	AC junction box
D	DC connector sets (PV-ADSP4-S2-UR/x and PV-ADBP4-S2-UR/x) CL 30 – 6 sets CL 33 – 6 sets CL 50 – 10 sets
E	Two hole sealing block for communication terminal(2x)
F	M10 fastening screw sets(x4)
G	M4X25 screws – 1Nos' M4X10 screws – 3Nos' M6X65 screws – 2Nos'
H	CL 30, CL 33 or CL 50 Quick Install Guide, Quality Certificate, and Product Test Report

Material and Tools

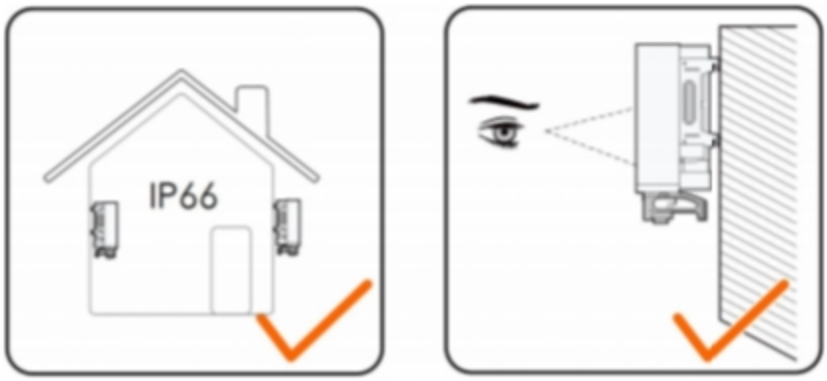
The following materials and tools are not supplied but are required to complete the installation:

- AC power cable (5-wire)+
- DC power cables (red+, black-, or clearly marked with labels)
- Shielded RS-485 cable
- Wire stripper, standard molex crimper, AC/DC crimp pins
- Screwdriver and drill set with drill bit diameter 12 mm, 4 mm (powered and/or manual)
- Calibrated professional digital multimeter (1500 VDC)
- Crimping tool from Multi-contact (http://ec.staubli.com/)
- M4/M6/M8, #2 Phillips screwdrivers or power screwdriver for mounting the bracket
- M2/M6 slotted screw driver
- Stripper and crimping tool for both AC and DC wiring (DC crimp range 4~6 mm^2)
- Bubble level or spirit level to ensure the straight installation of the mounting bracket
- Torque adjustable wrench (opening:13 mm, 16 mm)
- RJ45 crimping tool
- Rubber mallet
- Wrist strap

Location Information

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

- The inverter with IP 66 can be installed both indoors and outdoors.
- Install the inverter in a place convenient for electrical connection, operation, and maintenance.
- Install the inverter at an appropriate height for ease of viewing LED indicators and operating switches.



⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- The CL Series inverter is energized from multiple sources. Before removing covers, identify, de-energize, lock-out, and tag-out all power sources, and wait 10 minutes
- Do not open fuse under load. Do not open the front cover without physically disconnecting the PV cables or opening the external DC disconnect device before servicing.
- Never energize the inverter with the covers removed.
- Always use a properly rated voltage sensing device (1500VDC Cat II, 600VAC Cat III minimum rated) to confirm that all circuits are de-energized.
- Replace all devices and covers before turning on power to this equipment.
- The DC conductors of this photovoltaic system are ungrounded and may be energized.

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

Fire Safety

⚠ WARNING

IGNITION AND FIRE HAZARD

- This equipment is not ignition protected. To prevent fire or explosion, do not install this product in locations that require ignition-protected equipment. This includes any confined space containing lead acid batteries, or flammable chemicals such as, natural gas (NG), liquid petroleum gas (LPG) or gasoline (Benzine/Petrol).
- Do not install in a confined space with machinery powered by flammable chemicals, or storage tanks, fittings, or other connections between components of fuel or flammable chemical systems.
- Do not install the CL Series on a wooden or plastic wall.
- Do not install the CL Series near readily flammable materials such as cloth, paper, straw, or plastic sheeting. Keep flammable materials from all sides including the front of the CL Series.

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

Flammable or combustible materials are defined as “any material containing wood, compressed paper, cellulose, plant fibers, plastics, liquids, or other material that will ignite and burn, whether flame-proofed or not” according to NFPA 70E. Flammable liquids are defined as “any liquid whose flash point does not exceed 38 °C.” Examples of flammable liquids are gasoline, methanol, and ether.

When choosing a wall or flat surface to install the CL Series, choose a wall or flat surface that is not considered a flammable material such as concrete, brick, or metal.

Environment

The CL Series is IP 66 rated. It is suitable for indoor and outdoor installation.

The ambient temperature should be within the range of –30 to 60 °C. To prevent automatic power derating in over-temperature conditions, refer to the thermal derating *Over-temperature Derating on page 33*. Relative humidity at the installation site can be from 0 to 95%.

Installation Clearance Requirements

Reserve enough clearance around the inverter to ensure sufficient space for heat dissipation. The fans are located on the left side of the inverter: allow for at least 600 mm clearance on the fan side of the inverter and 200 mm clearance on all other sides.

Figure 17 Clearances and Ambient Temperature

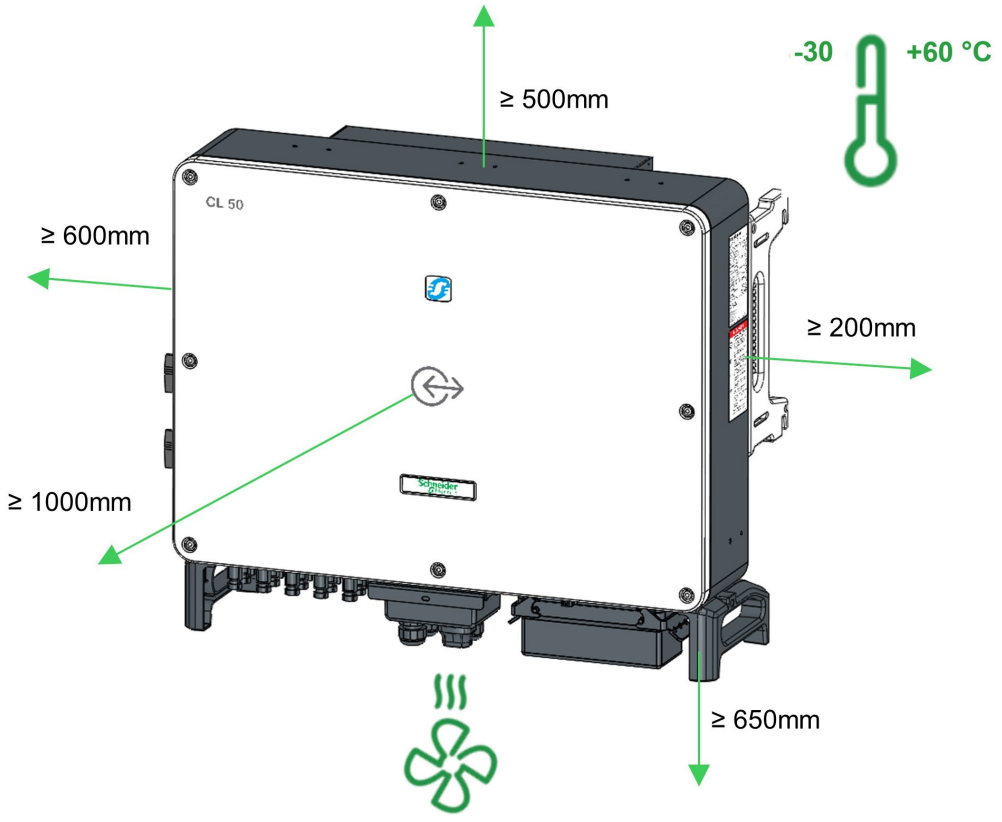
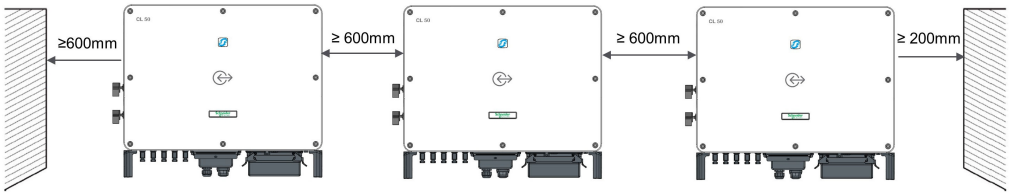
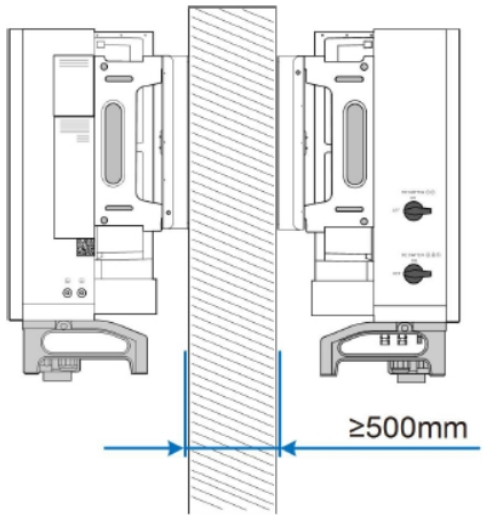


Figure 18 Multiple Inverter Clearances



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

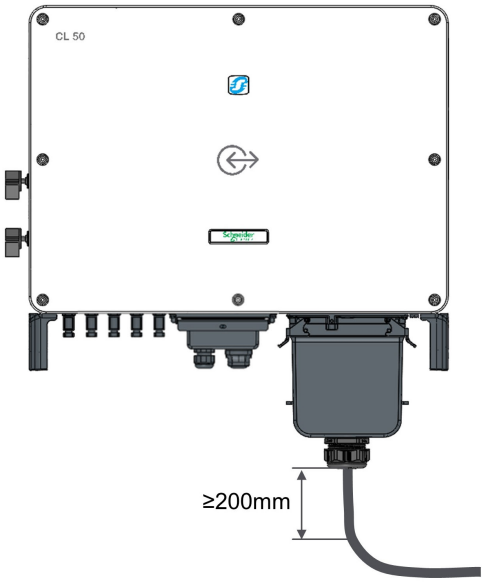
Figure 19 Clearances in Back-to-back Installations



In addition, the following conditions must be met:

- The distance between the bottom of the inverter and the ground surface is not less 650 mm. This is determined according to the bending radius of the AC cable used and the installation environment. Consult the AC cable manufacturer's documentation to determine the bend radius.
- The AC cable is vertically led into the cabinet, and the straight length is not less 200 mm.

Figure 20 Cable Minimum Distance



Location Hazards

In order to avoid other potential hazards follow the instructions in the WARNING below.

⚠ ⚠ WARNING

ELECTRICAL SHOCK, FIRE, AND PHYSICAL INJURY HAZARD

- Install the CL Series on a concrete wall or metal frame which can support the weight (50 kg for CL 30 and CL 33 and 62 kg for CL 50) of the unit over time. When installing multiple units, make sure the wall or metal frame can support the total weight of the units over time.
- Install the unit upright at 90° vertical angle, or at minimum back tilt of 10°, in relation to the floor.
- Install the unit at the recommended height of ~1 m for easy access to the terminals and ports.
- Avoid installing the CL Series in completely uncovered locations where persistent rain and moisture spray can eventually penetrate the enclosure. Install under a covered structure.
- Install a separate and external surge protection device to protect the CL Series's power module and communication ports.

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

NOTICE

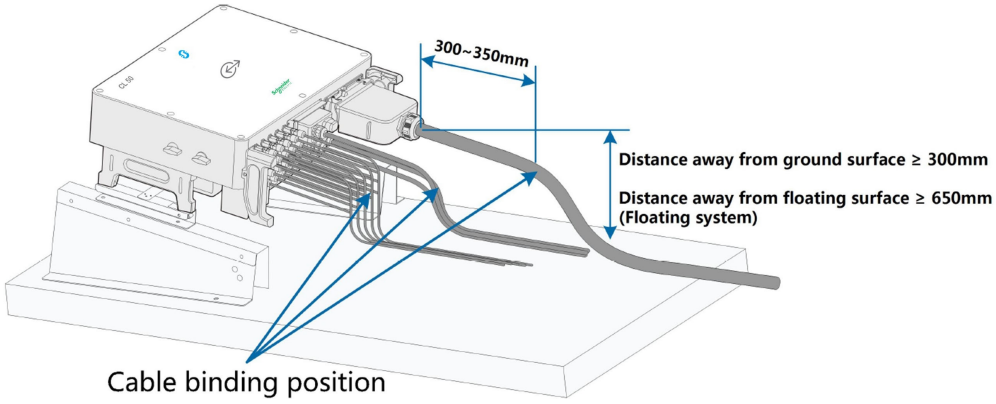
EQUIPMENT DAMAGE

- Never install the CL Series in direct sunlight or near other heat sources like the exhausts of inverters and generators, steam exhausts from boilers and dryers, and engine compartments. Install in shaded locations.
- Choose a location and an installation layout that minimizes potentially induced voltage spikes that might damage the electronics.

Failure to follow these instructions can result in equipment damage.

If the installation site is a level surface, mount the inverter to the horizontal-mounting bracket following the mounting angle requirements, as shown in the figure below.

Figure 21 Horizontal Mounting Requirements



NOTICE

MOISTURE INGRESS

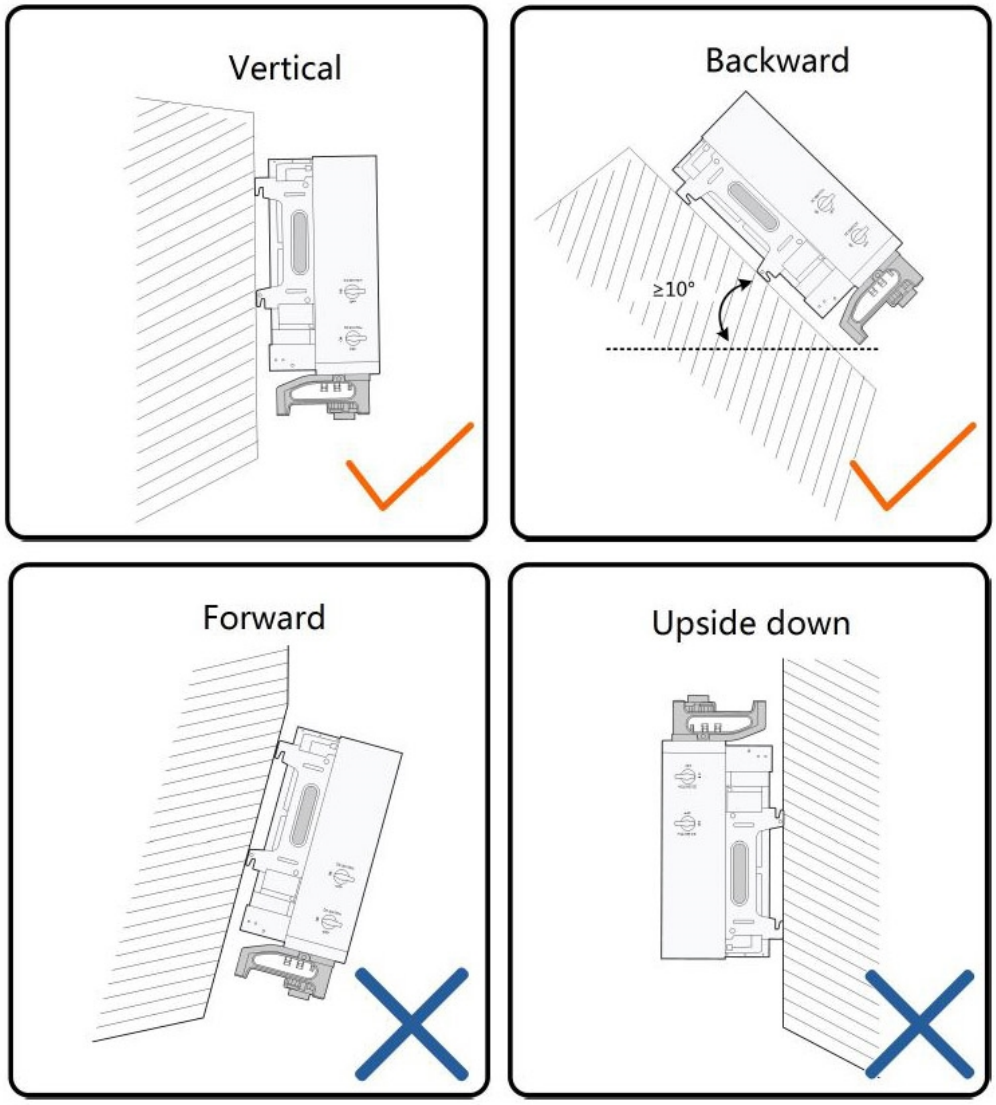
Take the following items into account when designing the bracket scheme:

- Consider on-site climate conditions and take anti-snow and anti-rain measures if necessary.
- Ensure that the waterproof connectors are at least 1 m higher than the ground surface.
- Bind the cables at the each location 300~350 mm away from the DC connector, AC waterproof terminal, and communication waterproof terminal.
- The various waterproof terminals should be tightened in accordance with the torque requirements in this manual to ensure that they are tight and sealed.

Failure to follow these instructions can result in equipment damage.

Contact Schneider Electric if you have any questions.

Figure 22 Mounting Orientations



Handling Precautions

⚠ CAUTION

HEAVY LOAD HAZARD

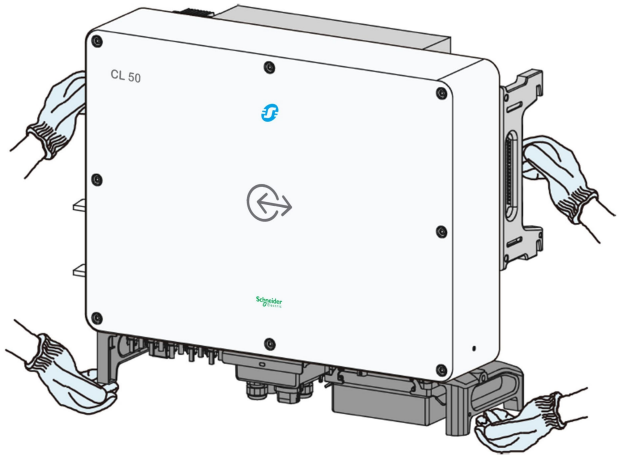
- Do not handle and lift the unit by yourself. Use two people to move, lift, and mount the unit.
- Always use proper lifting techniques during installation.
- When handling the inverter, use the side and bottom handles, on each side of the inverter.
- Use mechanical or motorized hand trucks, hoists, and/or lifts whenever possible to aid in proper handling.
  - Keep the inverter balanced throughout the hoisting/lifting process and aviod collisions with walls and other objects.
  - Do not hoist/lift the inverter and do not open any connections in the event of adverse weather, such as heavy rain, thick fog, or strong wind.

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

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

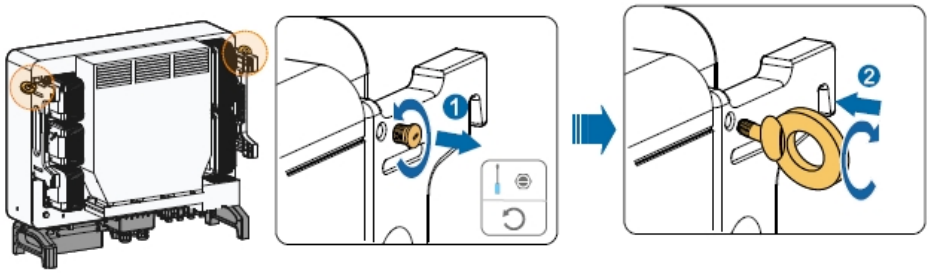
Manual Transport

1. Lift and move the inverter using the side and bottom handles.
2. Ensure that the ground surface on which the inverter will be placed before installation is covered with a sponge pad, foam cushion, or similar padding to prevent the bottom of the inverter from scratches.

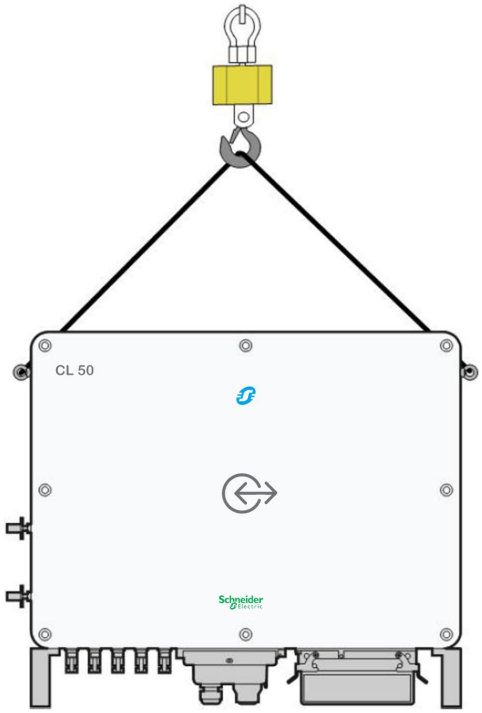


Hoist or Lift Transport

1. Release the sealing screws on the mounting ears and store them properly.
2. Anchor two M12 thread lifiting rings to the hangers of the inverter.



3. Lead the sling through the two lifting rings and fasthen the tie-down strap.
4. Hoist the inverter, and stop to check for safety when the inverter is 100 mm above the ground. Continue hoisting the device to the destination after confirming safety.



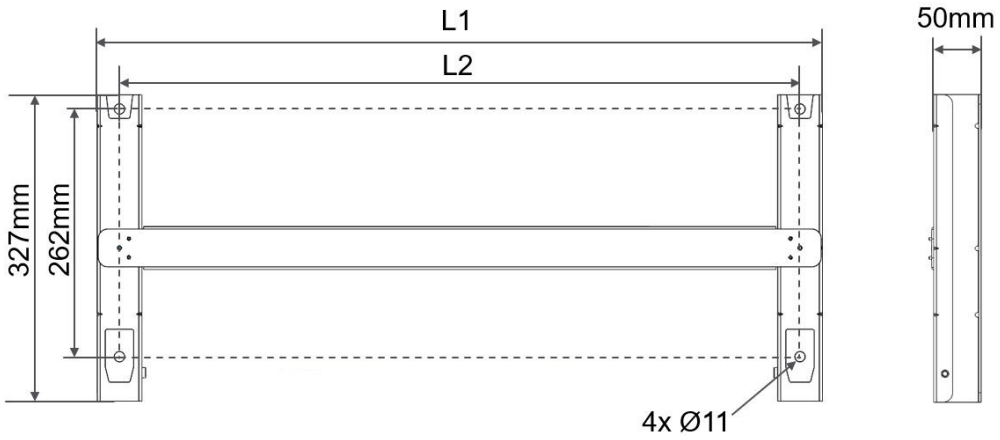
5. Remove the lifiting rings and reassemble the sealing screws removed in Step 1.

Storage Considerations

If the inverter cannot be installed immediately after delivery at the installation site, consider storing the inverter inside its original carton and setting it aside away from potential damage. For more guidelines, see *CL Series Inverter Storage Requirements on page 7*.

Install and Mount the CL Series

Figure 23Wall-mounting Backplate Dimensions



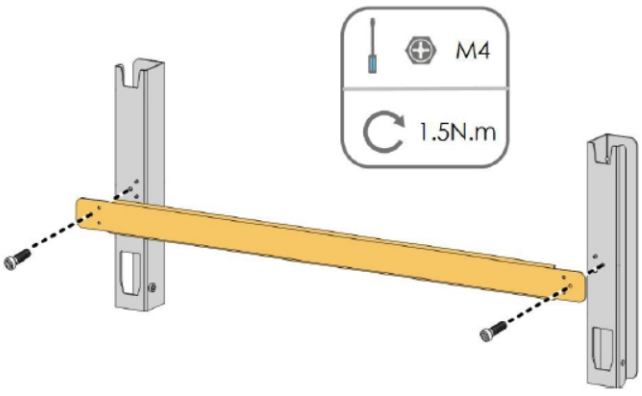
	CL 30	CL 33	CL 50
L1	687 mm	687 mm	767 mm
L2	640 mm	640 mm	720 mm

Installing on Concrete or Brick

To install on a concrete or brick wall:

Part	Quantity	Specification	Source
Grub screw	2	M4 x 10	Supplied with inverter
	2	M6 x 65	Supplied with inverter
Expansion bolts	4	M10 x 95	Not supplied

1. Remove the wall-mounting backplate and spare parts from the CL Series packaging.
2. Ensure you have read and understood the information in *Pre-Installation on page 39*.
3. Assemble the mounting-bracket by using the connecting bar.



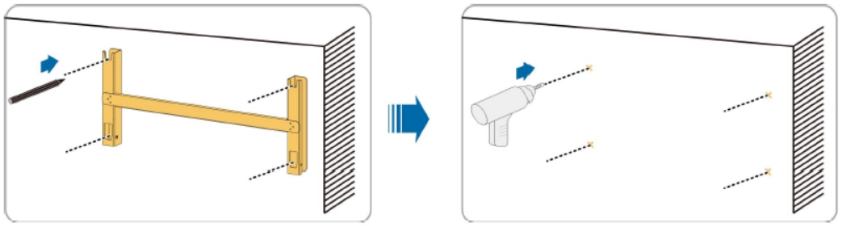
4. Level the assembled mounting-bracket by using the level and mark the positions for drilling holes on the installation site.

⚠ ⚠ DANGER

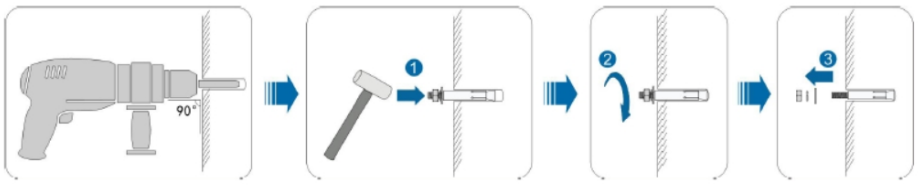
HAZARD OF ELECTRIC SHOCK, EXPLOSION, ARC FLASH, AND FIRE

Check that there are no plumbing or gas pipes or electrical conduits behind the wall when marking for holes and before drilling.

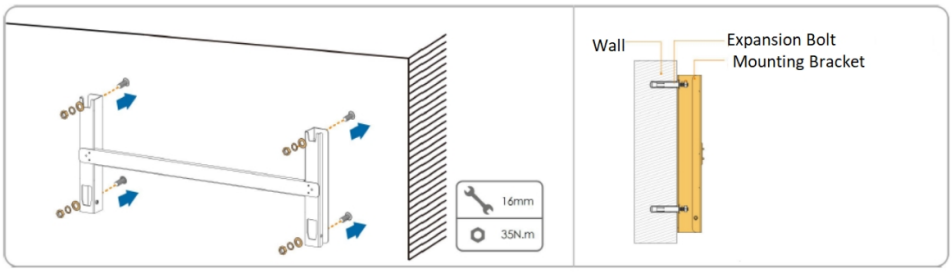
Failure to follow these instructions will result in death or serious injury.



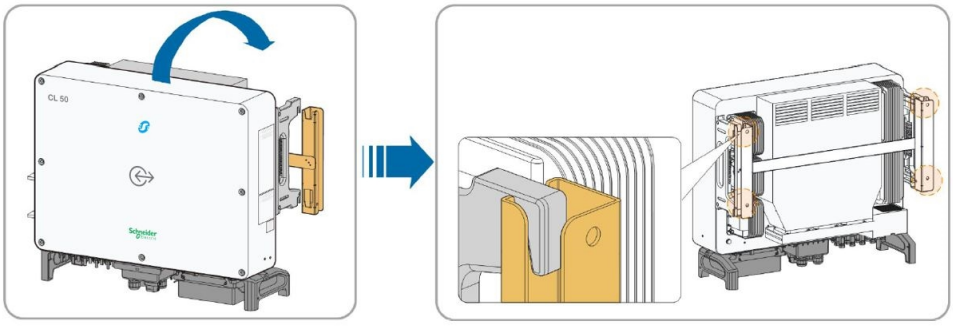
5. Drill 4x holes as marked using the appropriate drill bit for the selected anchors.
6. Insert the expansion bolts into the holes and secure them with a rubber hammer. Fasten the nut with a wrench to expand the bolt. Remove the nut, spring washer, and flat washer, and store them properly.



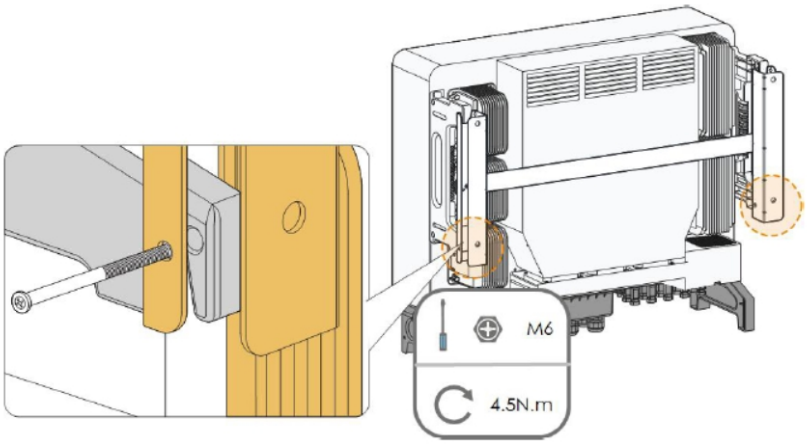
7. Fix the mounting-bracket with the expansion bolts.



8. Remove the inverter from the packing case. Refer to *Handling Precautions on page 48* for lifting information. Hang the inverter to the mounting-bracket and ensure that the mounting ears perfectly engage with the mounting-bracket.



9. Fix the inverter with screws.



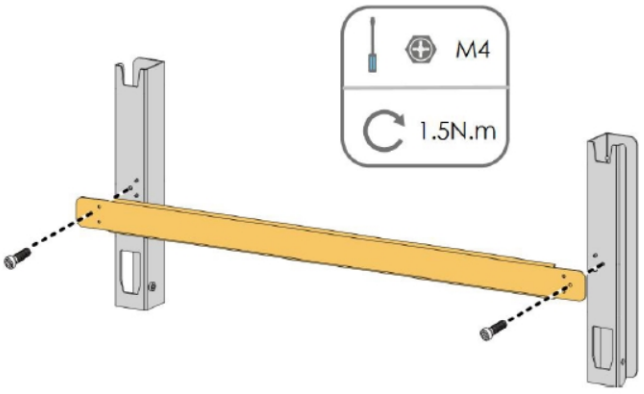
10. Do not store anything inside the inverter enclosure.

Installing on a Metal Frame

To install on a metal frame in an upright position:

Part	Quantity	Specification	Source
Grub screw	2	M4 x 10	Supplied with inverter
	2	M6 x 65	Supplied with inverter
Bolt assembly	4	M10	Supplied with inverter

1. Remove the backplate, its corresponding metal frame fasteners, and the screws from the CL Series packaging. Use only the provided metal frame fasteners for attaching to a metal frame structure.
2. Ensure you have read and understood the information in *Pre-Installation on page 39*.
3. Assemble the mounting-bracket by using the connecting bar.



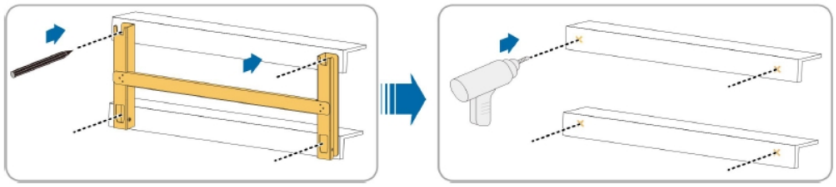
4. Level the assembled mounting-bracket by using the level and mark the positions for drilling holes on the installation site. Drill the holes by using an M10 drill bit and a hammer drill.

⚠⚠ DANGER

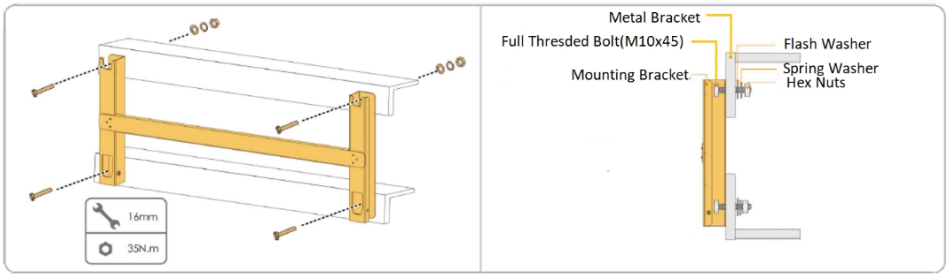
HAZARD OF ELECTRIC SHOCK, EXPLOSION, ARC FLASH, AND FIRE

Check that there are no plumbing or gas pipes or electrical conduits behind the wall when marking for holes and before drilling.

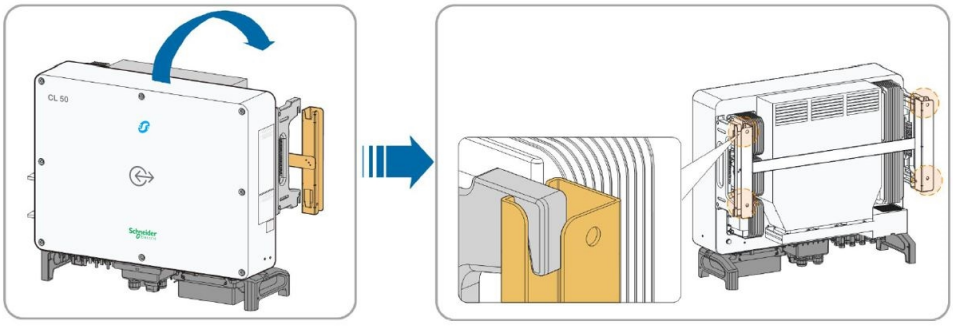
Failure to follow these instructions will result in death or serious injury.



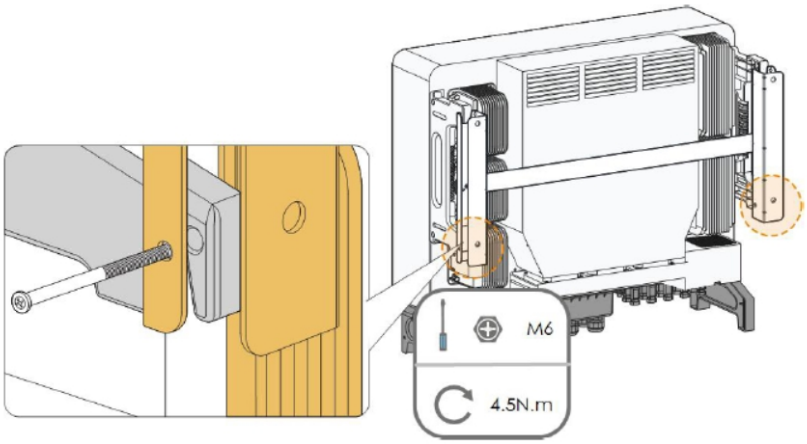
5. Secure the mounting-bracket with bolts.



6. Remove the inverter from the packing case. Refer to *Handling Precautions on page 48* for lifting information. Hang the inverter to the mounting-bracket and ensure that the mounting ears perfectly engage with the mounting-bracket.



7. Fix the inverter with two M6 x 65 screws.



Torque Values

⚠ CAUTION

FIRE HAZARD

Tighten fasteners such as screws, nuts, bolts, and cable glands (used for routing field wiring and current carrying cable) according to the recommendations in the table below. Incorrect torque may cause a fire.

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

NOTICE

EQUIPMENT DAMAGE

Tighten fasteners such as wall screws, metal frame nuts, and panel screws according to the recommendations in the table below. Over torquing may damage the head of the fastener. Under torquing may loosen the installation over time.

Failure to follow these instructions can result in equipment damage.

Table 2 Summary of Torque Values

Type	Description	Nm
Cable gland	for communication cables such as RS-485 Ethernet cable	5 – 6
Cable gland	for larger AC cables	8 – 12
Connector screw	RS-485 wire connector (M2)	0.2
Fastener (metal)	metal frame-mounting backplate nut (M4)	1.5
Fastener (wall)	wall-mounting backplate expansion (M10)	35
Fastener	to secure the CL Series unit to the mounting backplate	4.5

Type	Description	Nm
Terminal gland	MC4 DC terminal	2.5 – 3
Terminal screw	AC terminal block (L1, L2, L3, N & PE)	10 – 12
Terminal screw	External additional PE (ground) terminal	4.2 – 4.5

3 Electrical Connections

What's in This Chapter?

Precautions

Before connecting the CL Series to electrical cables, wires, and communication cables, read all instructions and cautionary markings in this Guide.

NOTE: Obtain all necessary permits prior to starting the installation. Installations must meet all local codes and standards. Installation of this equipment should only be performed by skilled personnel such as qualified electricians and Certified Renewable Energy (RE) System installers.

- Read this entire chapter before making electrical connections to and from the unit. It is important to plan the installation from beginning to end.
- Assemble all tools and materials needed for the installation.

⚠ DANGER

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

- All wiring must be done by qualified personnel to ensure compliance with all applicable installation codes and regulations.
- Do not connect the CL Series to a live power source prior to finishing all cabling and wiring. The inverter can be energized from two sources namely, DC from the PV array and AC from the grid.
- Do not connect any powered device to the CL Series during cabling and wiring.

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

Material and Tools

The following materials and tools are not supplied but are required to complete the installation:

- AC power cable (5-wire)
- DC power cables (red+, black-, or clearly marked with labels)
- Shielded RS-485 cable for Modbus/RS-485 device
- Wire stripper, standard molex crimper, AC/DC crimp pins
- Screwdriver and drill set (powered and/or manual)
- Calibrated professional digital multimeter
- Crimping tool from Multi-Contact
- #2 Phillips screwdrivers or power screwdriver for mounting the bracket
- Slotted screw driver
- Stripper and crimping tool for both AC and DC wiring bubble level or Spirit level to ensure the straight installation of the mounting bracket
- Torque adjustable wrench

Once the CL Series is installed at the site, it is now ready to be connected to the PV array and the utility grid.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

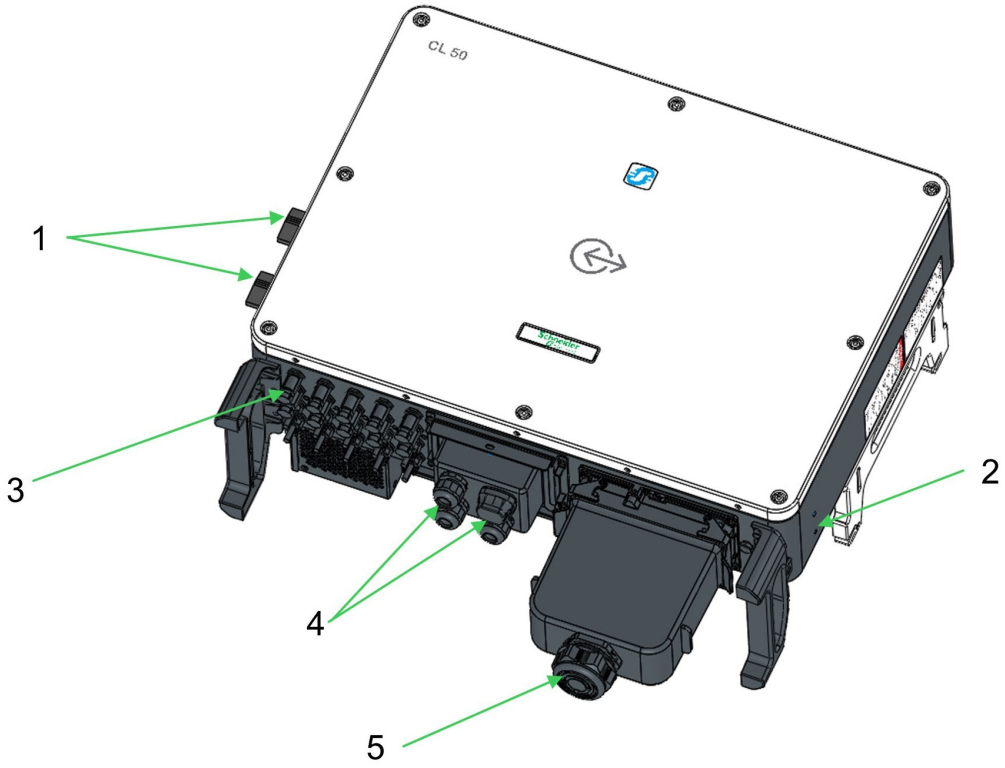
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- The CL Series inverter is energized from multiple sources. Before removing covers, identify, de-energize, lock-out, and tag-out all power sources, and wait 10 minutes
- Do not open fuse under load. Do not open the front cover without physically disconnecting the PV cables or opening the external DC disconnect device before servicing.
- Never energize the inverter with the covers removed.
- Always use a properly rated voltage sensing device (1500VDC Cat II, 600VAC Cat III minimum rated) to confirm that all circuits are de-energized.
- Replace all devices and covers before turning on power to this equipment.
- The DC conductors of this photovoltaic system are ungrounded and may be energized.

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

Terminal and Cable Entry Points

The inverter’s electrical connection terminals are located inside the inverter wiring box and the cable entry points are at the bottom of the unit. 16 < S

Figure 24 Terminals and Cable Entry Points



1	DC switch
2	Second PE (ground) location
3	DC input MC4 terminals
4	Communication cable glands
5	AC cable gland (large)

AC Side Cable Connection

AC Side Requirements

NOTE: Connection to the utility grid must be done only after receiving approval from the local company.

Before connecting to the grid, verify that both the grid voltage and frequency meet the requirements of the inverter's voltage and frequency settings. Contact the local utility company for a solution if the grid does not meet the specifications. For information on the settings, see *Specifications on page 162*.

AC Circuit Breaker

An independent four-pole circuit breaker must be installed downstream from the inverter before the grid connection. This is to ensure that the inverter can be disconnected safely from the grid.

Inverter	Recommended rated voltage	Recommended AC circuit breaker
CL 30	400 V	63 A
CL 33	400 V	63 A
CL 50	400 V	100 A

NOTICE

EQUIPMENT DAMAGE

- Do not connect multiple PV inverters to a single circuit breaker.
- Do not connect loads between the CL Series and the circuit breaker.

Failure to follow these instructions can result in equipment damage.

Residual Current Device

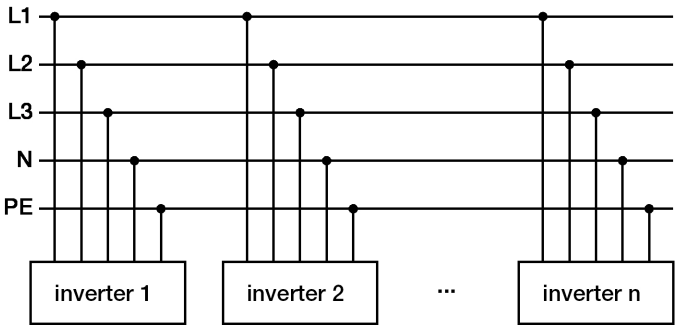
With an integrated comprehensive residual current monitoring component, the inverter is capable of distinguishing a ground fault current from normal capacitive leakage current. This allows the inverter to disconnect from the grid as soon as the ground fault is detected.

Multiple Inverters in Parallel Connection

Follow either of the two scenarios when attempting to connect several inverters in parallel to the grid.

Scenario 1

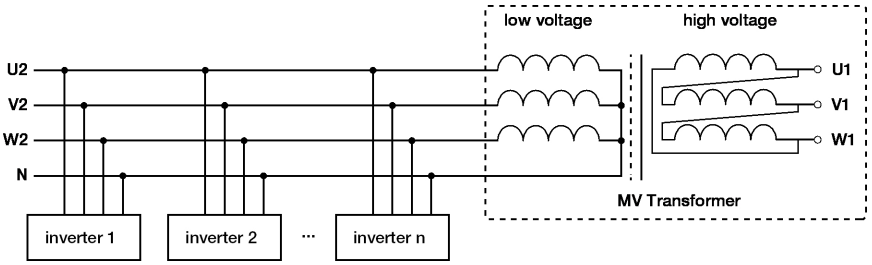
Several inverters are in parallel connection to the 3-phase low voltage grid.



Requirements: If the number of the grid-connected PV inverters exceed 30, contact Schneider Electric technical support.

Scenario 2

Several inverters are in parallel connection to the low voltage side of the MV transformer. The high voltage side is connected to the MV grid.



Requirements: If the number of the grid-connected PV inverters exceed 30, contact Schneider Electric technical support.

The nominal power of the MV transformer's low voltage side matches the inverter's output power.

NOTE: It is recommended to use a transformer with a short circuit impedance of less than 6%.

Other Requirements: The following is a list of requirements for installing MV transformers.

- The inverter transformer can be a distribution transformer but it must be designed for typical cyclical loads of a PV system such as, loads during daylight and possibly no loads during nighttime.
- The inverter transformer can be of two types - liquid-immersed or dry. Shield winding is not necessary.
- The line-to-line voltage on the low voltage side of the transformer must endure the output voltage of the inverter. When connecting to the IT grid, the withstanding voltage of the low voltage winding side of the transformer, the AC cables, and secondary devices (including relay protection, detection and measuring, and other auxiliary devices) to the ground must not be lower than 1100 VAC.
- The line-to-line voltage on the high voltage side of the MV transformer must comply with the power grid voltage of the installation site.
- A transformer with a tap changer on the high voltage side is recommended in order to remain consistent with the grid voltage.
- Transformers must withstand 110% of the total load rating at an ambient temperature of 45 °C.
- The short circuit impedance (%) of the transformer must be 6% (the impedance allows 10% error margin).
- The DC component that the transformer can withstand is 1% of the fundamental current at rated power.
- The voltage drop of system cable is no more than 3%.
- The load curve of the transformer and the ambient conditions at the installation site must be taken into account for thermal rating.
- The inverter's apparent power is not permitted to exceed the transformer power. The maximum nominal AC current of all connected inverters must be taken into account.
- The transformer must have overload and short circuit protections.

- Since the transformer is an important part of the grid-connected PV system, the fault carrying capacity of the transformer must be taken into account at all times. Such fault types include system short circuit, ground fault, voltage drop, etc.
- Ambient temperature, relative humidity, altitude, air quality and other relevant environmental indexes must be taken into account at all times.
- The geographical and jurisdictional specific power grid frequency must be taken into account.
- The regional, national, and local specific standards and directives must be taken into account.

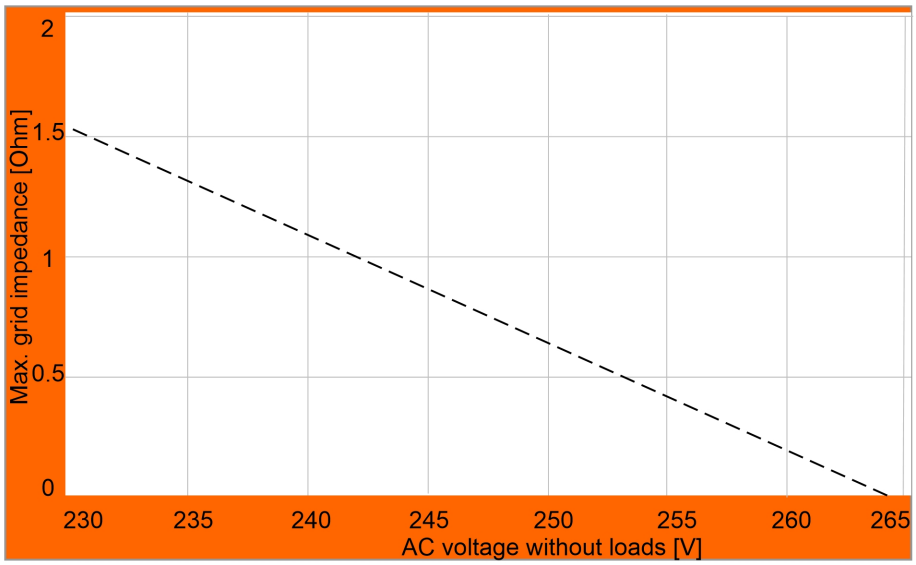
Grid Connection

The AC terminal block on the bottom of the CL Series inverter accommodates an AC connection for a 3-phase-5-wire grid connection (L1, L2, L3, N and PE).

AC Cable Requirements

Select AC cables according to the following factors:

- Grid impedance should correspond to the specifications below to avoid accidental short-circuit or output power derating.



- When calculating voltage drop, a cable with a higher cross section area could be selected to ensure power loss within a 1% limit. The voltage drop of the system cable should be less than 3%. Check that the AC cable outer diameter is suitable for the AC terminals of the inverter.
- Ambient temperature
- Cable layout (that is, inside wall, underground, free air, etc.)
- UV resistance
- Cable resistance / length

AC Cable Connection

To connect the CL Series to the grid:

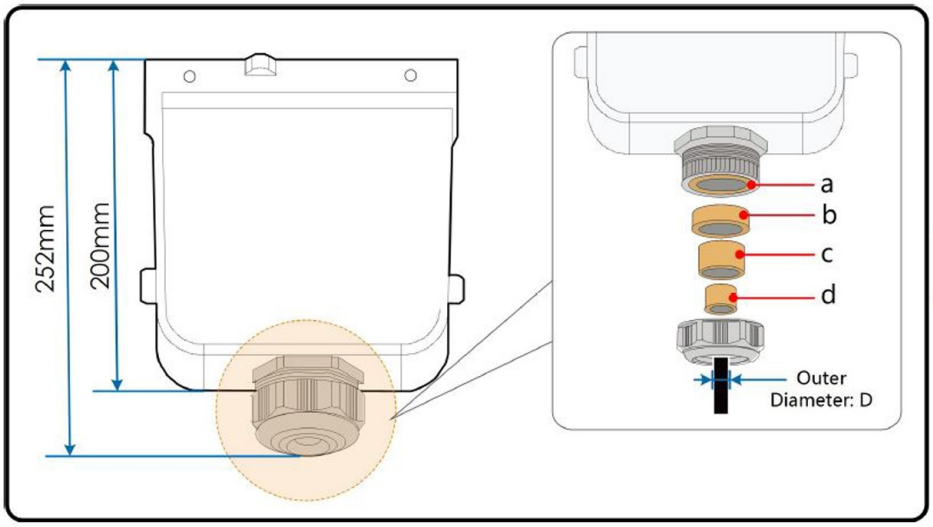
⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

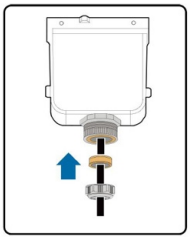
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- The CL Series inverter Inverter is energized from multiple sources. Before removing covers, identify de-energize, lock-out, and tag-out all power sources, and wait 10 minutes
- Do not open fuse under load. The fuse must be de-energized by disconnecting PV cables before servicing.
- Never energize the inverter with the covers removed.
- Always use a properly rated voltage sensing device (1500 VDC, 600 VAC) to confirm that all circuits are de-energized.
- Replace all devices and covers before turning on power to this equipment.
- The DC conductors of this photovoltaic system are ungrounded and may be energized.
- Do not connect to the AC circuit breaker until all inverter electrical connections are completed.

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

1. Open the AC circuit breaker (turn it OFF) and perform the *Lock-Out Tag-Out (LOTO) Procedure on page 10*.
2. Take out the AC junction box and loosen the swivel nut.
3. Remove the seals and select an appropriate one according to cable outer diameter.
4. Lead the cable through the swivel nut, seal, and junction box successively.

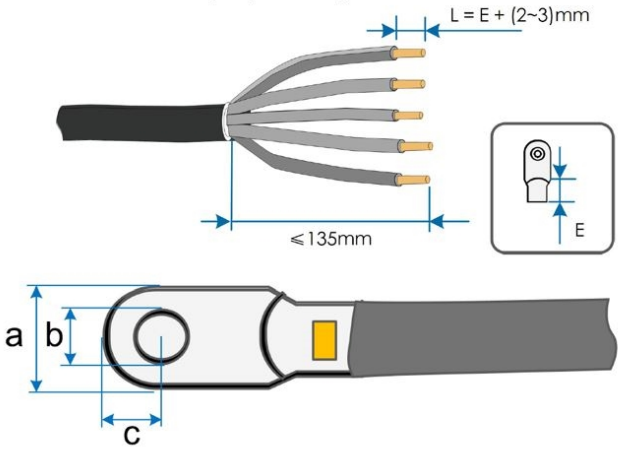


Outer diameter D(mm)	Seals
20~25	a+b+c+d
25~30	a+b+c
30~40	a+b
40~50	a



5. Strip the cables and crimp the lug as shown below. Example below is for a five-wire cable.

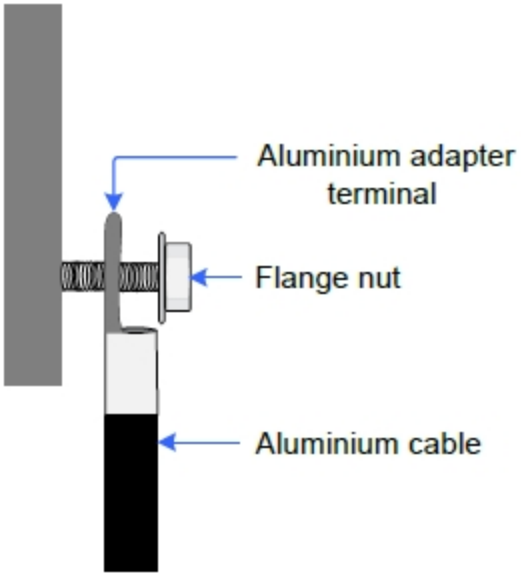
* For illustration purpose only



Lug Type: M8
Dimensions: a: <=30mm
b: <=8.4mm to 10.5mm
c: <=16mm

Description	Cable specifications
Cable diameter	External diameter of the cable: 20 to 50 mm
CL 30: Cross section of AC cable	Range: 16 to 35 mm^2 Recommended value: 35 mm^2
CL 33: Cross section of AC cable	Range: 16 to 35 mm^2 Recommended value: 35 mm^2
CL 50: Cross section of AC cable	Range: 35 to 70 mm^2 Recommended value: 70 mm^2
Type	Copper

NOTE:If an aluminium cable is selected, use a copper to aluminium adapter terminal to avoid direct contact between the copper bar and the aluminium cable. Direct contact between the copper bar and the aluminium cable will cause electrochemical corrosion and impair the reliability of the electrical connections.



NOTE: For AC cables with stranded wires, use cold-press terminal lugs for termination. Always use lugs that grip the shape of the wires on AC cables. Always use the proper lugs according to the type of metal of the wires on AC cables.

NOTE: The cross-section diameter of the AC cable must be selected carefully in order to prevent accidental disconnections of the inverter from the grid due to high impedance of the cable.

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

The following table lists the recommended maximum length of the AC cable based on its cross-section diameter.

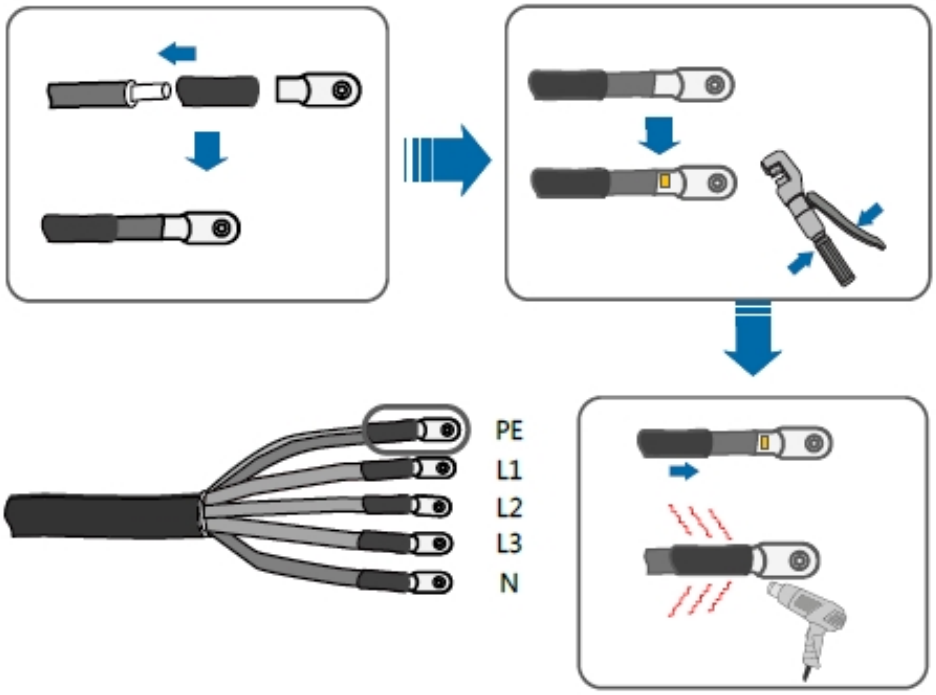
Table 3 Cable requirements

Cross-section of the AC cable (mm^2) CL 30	Cross-section of the AC cable (mm^2) CL 33	Cross-section of the AC cable (mm^2) CL 50	Max. length of the AC cables (m) Cu
16	16	35	0–50
25	25	50	50–100
35	35	70	>100

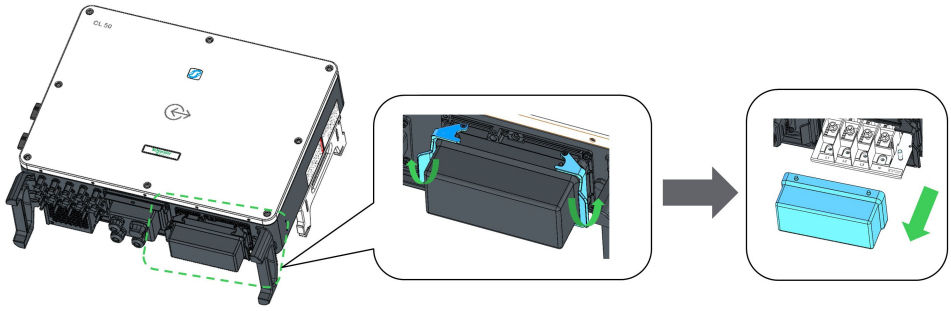
Table 4 PE wire requirements

Phase wire cross-section S	PE wire cross-section	Note
16 < S ≤ 35 mm^2	16 mm^2	The correspondence is available only when materials of the phase wires and PE wires are the same. If otherwise, ensure that the cross-sectional area of the PE wire produces a conductance equivalent to that of the wire specified in the table.
S > 35 mm^2	S/2	

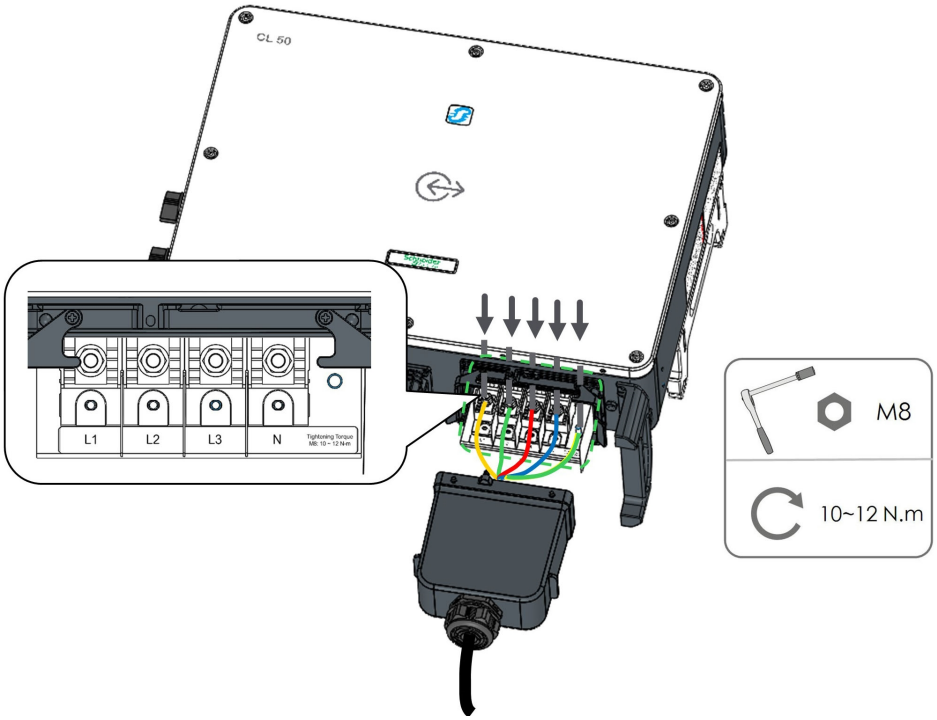
6. Prepare the cable and crimp OT terminal.



7. Unfasten the buckle and remove the protective cap.



8. Secure the cable to corresponding terminals and secure the junction box, fasten the buckle, and secure it with the supplied M4 x 10 screw.



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

⚠ DANGER

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

- Observe and strictly follow the AC terminal layout. The CL Series will not work normally if the phase wire is connected to the PE terminal.
- Do not insert wires without stripping the insulation layer. Damaged wires may affect the normal operation of the inverter.

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

PV Array Connection

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- The CL Series inverter is energized from multiple sources. Before removing covers, identify, de-energize, lock-out, and tag-out all power sources, and wait 10 minutes
- Do not open fuse under load. Do not open the front cover without physically disconnecting the PV cables or opening the external DC disconnect device before servicing.
- Never energize the inverter with the covers removed.
- Always use a properly rated voltage sensing device (1500VDC Cat II, 600VAC Cat III minimum rated) to confirm that all circuits are de-energized.
- Replace all devices and covers before turning on power to this equipment.
- The DC conductors of this photovoltaic system are ungrounded and may be energized.

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

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Be careful when handling cables from PV arrays. PV arrays produce electrical energy when exposed to light.
- Check that the PV impedance to ground is within specifications before connecting the PV array to the inverter.

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

PV Input Configuration

The CL Series has a PV input area and is equipped with multiple Maximum Power Point Tracker (MPPT).

- CL 30 and CL 33 have three MPPTs
- CL 50 has five MPPTs

NOTICE

EQUIPMENT DAMAGE

- Check and make sure that the open circuit voltage rating of each PV array is less than 1100 V.
- Check that the maximum short circuit current on the DC side is within specifications.

Failure to follow these instructions can result in equipment damage.

To make full use of the DC input power, PV modules should be homogenous for each MPPT. This means that each module in the PV string must be of the same type and the same number of PV cells. All the PV strings should have identical tilt and orientation as each MPPT input has 2 strings connected.

Before connecting a PV string to the inverter, the following electrical parameters must be met.

Total DC power limit	Max. open-circuit voltage limit for each input	Short-circuit current limit of each input
33700 W[1]	1100 V	30 A

Considering the negative voltage temperature coefficient of PV cells, more attention should be paid to the open-circuit voltage of PV strings when the ambient temperature is the lowest. For example, consider the Poly crystalline CS6U-315P module.

Item	Parameter
PV module model	CS6U-315P
Power	315 W
Open-circuit voltage (STC)	45.1 V
Short-circuit current (STC)	9.18 A
Open-circuit voltage temperature coefficient (ß)	-0.31%/°C
No. of PV modules in a PV string	20

Under the STC condition, where ambient temperature is 25 °C, the open-circuit voltage of PV cells is:

$45.1\ V \times 20 = 902\ V < 1100V$

Suppose that the operating temperature is -5 °C, the open-circuit voltage of PV cells is:

$20 \times 45.1\ V \times [1 + \beta \times (\text{min. ambient temperature} - \text{STC temperature})] = 20 \times 45.1\ V \times [1 + (-0.31\%/°C) \times (-5°C - 25°C)] = 986V < 1100V$ (meets the operational requirement)

Therefore, the PV string should be designed to meet the open-circuit voltage requirement even under the lowest ambient temperature condition.

[1] Multiply by a factor of 1.35 for over-panelling.

PV Input Connection

DC input cables are connected to the PV input terminals of the inverter. DC cables from the PV string should be equipped and terminated with MC4 connectors.

NOTE: To maintain the IP66 protection rating, use only the supplied DC connectors (MC4). When replacing lost connectors, they have to match the same supplied connectors. Using other connectors will invalidate the warranty.

Table 5 DC Cable Requirements

Model	Cross-sectional area	Cable External diameter	Max. withstand voltage	Max input current for each PV string
CL Series	4 to 6 mm^2	6 to 9 mm	1500 V	13 A

DC Cable Connection

⚠⚠ DANGER

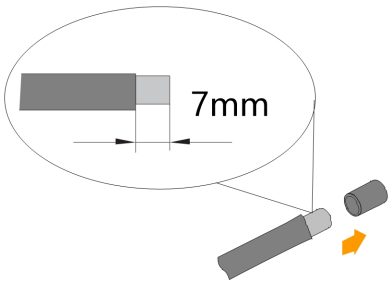
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- The CL Series inverter Inverter is energized from multiple sources. Before removing covers, identify de-energize, lock-out, and tag-out all power sources, and wait 10 minutes
- Do not open fuse under load. The fuse must be de-energized by disconnecting PV cables before servicing.
- Never energize the inverter with the covers removed.
- Always use a properly rated voltage sensing device (1500 VDC, 600 VAC) to confirm that all circuits are de-energized.
- Replace all devices and covers before turning on power to this equipment.
- The DC conductors of this photovoltaic system are ungrounded and may be energized.
- Do not connect to the DC circuit breaker until all inverter electrical connections are completed.

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

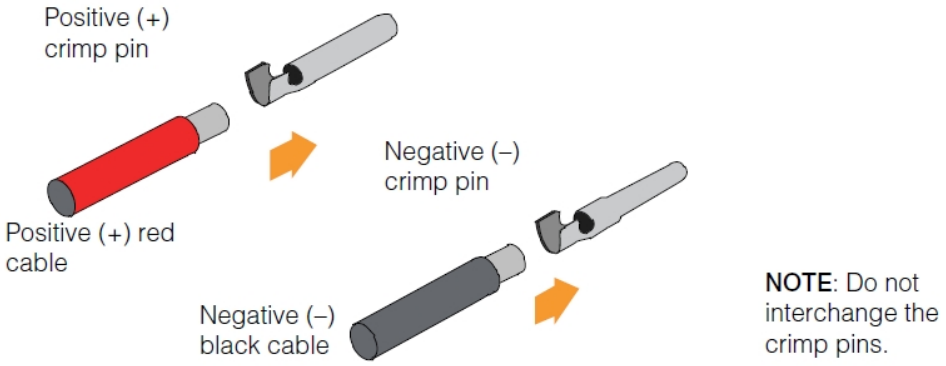
To connect DC input cables to the inverter:

1. Perform the *Lock-Out Tag-Out (LOTO) Procedure on page 10*.
2. Strip off 7 mm (~¼ inch) of insulation layer from all DC cables. Use a standard wire stripper.

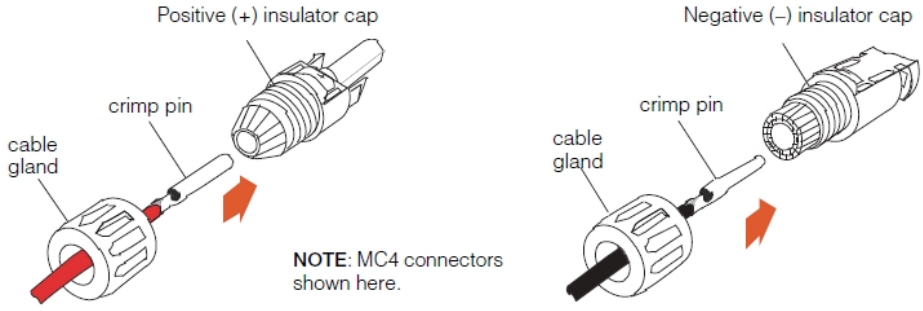


3. Terminate the cable ends with their matching crimp pins (supplied with the DC connector) as shown.

> **⚠ CAUTION**
>
> **FIRE HAZARD**
>
> Use only the recommended crimping tool from Multi-Contact (http://ec.staubli.com/). Any other crimping tool may create improperly crimped cables and wires which can cause sparks and a short circuit.
>
> **Failure to follow these instructions can result in injury or equipment damage.**

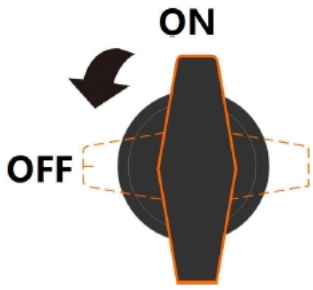


4. Lead and route the cable through the cable gland of the DC connector.
5. Insert the crimp pin into the insulator cap until it snaps into place.
6. Pull the cable away from the insulator cap to make sure the cable does not disconnect from the cap.



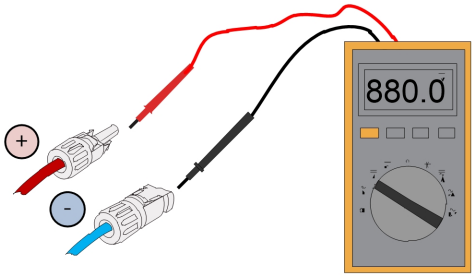
7. Tighten the cable gland onto the insulator cap with a torque of 2.5-3 Nm. Use a pair of MC4 connector tool spanners.

8. Check to make sure the polarities of the PV string's DC cables are correct. The DC cable must match its insulator cap (positive cable = positive insulator cap, negative cable = negative insulator cap).
   NOTE: The inverter will not function properly if the DC polarities are reversed.
9. Ensure the inverter's DC switch is in the OFF position.

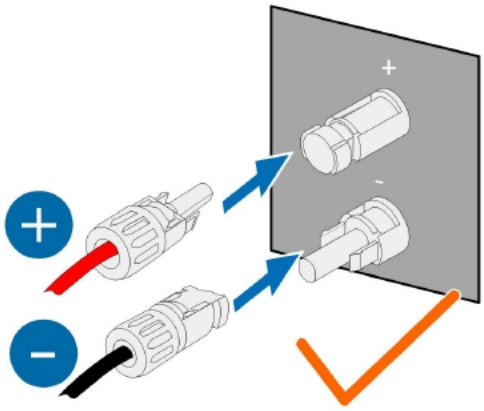


10. Double check the polarity of the DC cables and then check the open-circuit voltage and make sure it does not exceed the inverter's input limit of 1100 V (even under the lowest operating temperature).

NOTICE
EQUIPMENT DAMAGE ■ Check the positive and negative polarity of the PV cells. After confirming the correct polarities, insert the DC connectors into the PV input terminals of the inverter. ■ Check every PV array in the string and avoid reversing the polarities. ■ Use a calibrated, professional digital multimeter. **Failure to follow these instructions can result in equipment damage.**



11. Insert the positive and negative DC connectors into the PV input terminals on the inverter until a clear clicking sound is heard.



12. Repeat the steps for each PV string in the PV array.
13. Seal the unused DC terminals with waterproof plugs.

NOTE: For CL Series inverters, use an external 15 A in-line fuse connector (see *Figure 25 on page 74*) on the negative line, if required by local installation codes (such as in the UK, France, and Australia).

Connectors

The following are illustrations and product information of the different connectors.

Figure 25 In-line Fuse Connector

An in-line fuse connector is available to purchase from Multi-Contact for PV inverters. To order, use the following part number:

- Part No.: 55000128-0050UR
- Description: PV-K/ILF 15/6N0050-UR in-line fuse harness

Grounding the Inverter

⚠⚠ WARNING

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Do not ground either DC positive or negative poles of the PV string. The CL Series does not isolate the PV from the grid.

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

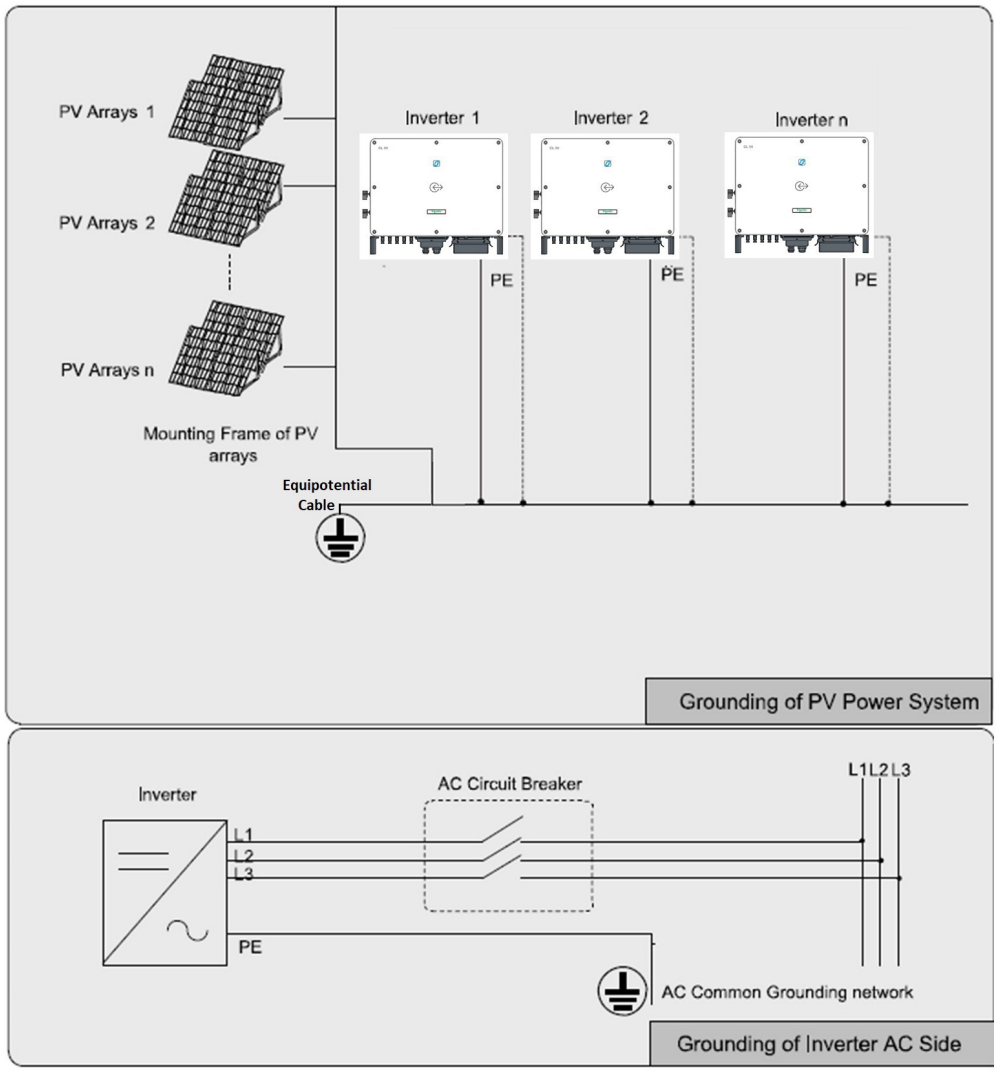
Grounding System Overview

In this PV system, all non-current carrying metal parts and device enclosure should be grounded (such as the PV array frame and the inverter enclosure).

When there is only one inverter in the PV system, connect the additional grounding cable to a nearby grounding point.

When there are multiple inverters in the PV system, they can be grounded at multiple points. Connect the PE cables of all the inverters and the mounting metal frames of the PV array to the equipotential cable (depends on the situation at the site) in order to establish an equipotential connection. See figure below.

Figure 26 Grounding of Single or Multiple PV Inverters



Second Protective Earth Terminal

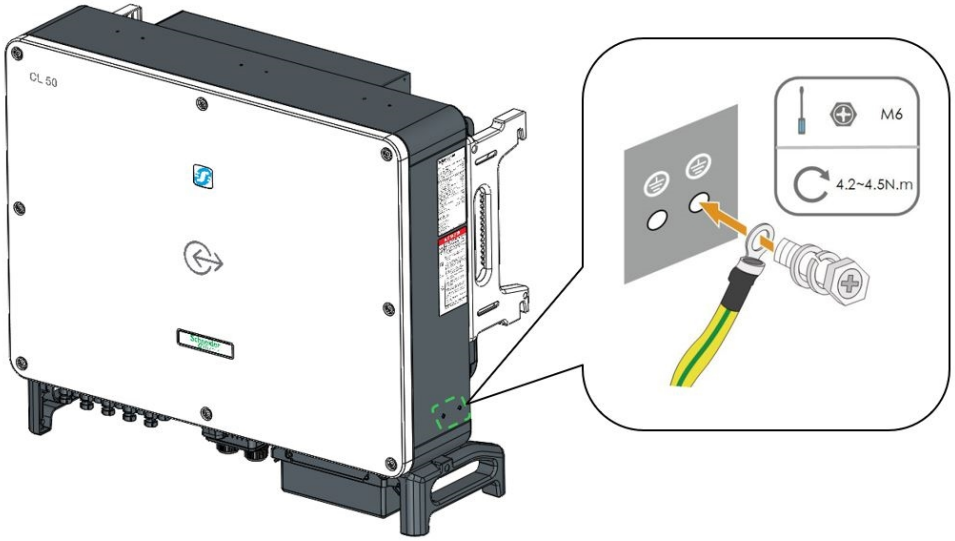
The CL Series is equipped with a second protective earth (PE) terminal as specified in IEC/EN 62109-1.

- Since the CL Series is a transformerless inverter, for proper operation, do not ground the negative pole or the positive pole of the PV string.
- Connect the additional grounding terminal to the protective grounding point before AC cable connection, PV cable connection, and communciation cable connection.

Position of Second PE Terminal

There is a second PE terminal on the right side of the inverter. Perform a PE connection, if necessary. The second PE terminal of the single inverter requires near-end grounding. When there are multiple inverters, second grounding terminals of all these inverters and grounding point of the PV module brackets should be connected together first and then to a equipotential line. Specific operation depends on onsite conditions

Figure 27 Second PE Terminal



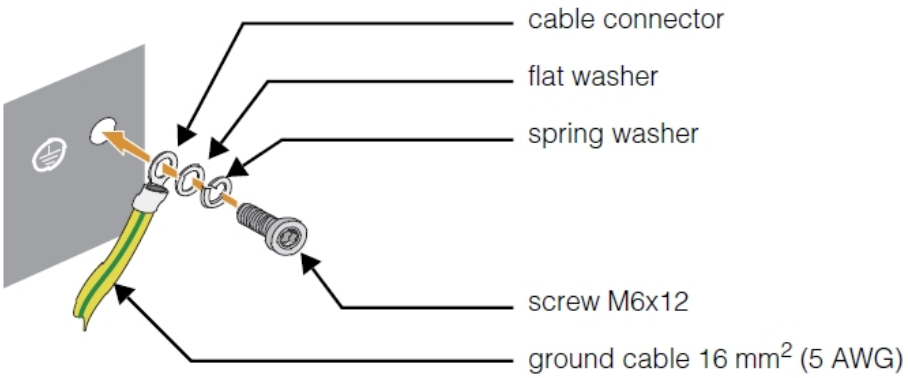
Ground Cable Connection

To connect a PE cable to the PE terminal:

Follow the illustration below.

The specifications are valid only when the phase wire and PE wire use the same material. If this is not true, ensure that the cross section of the PE wire produces a conductance equivalent to that of the wire specified above.

Figure 28 PE Terminal Connection



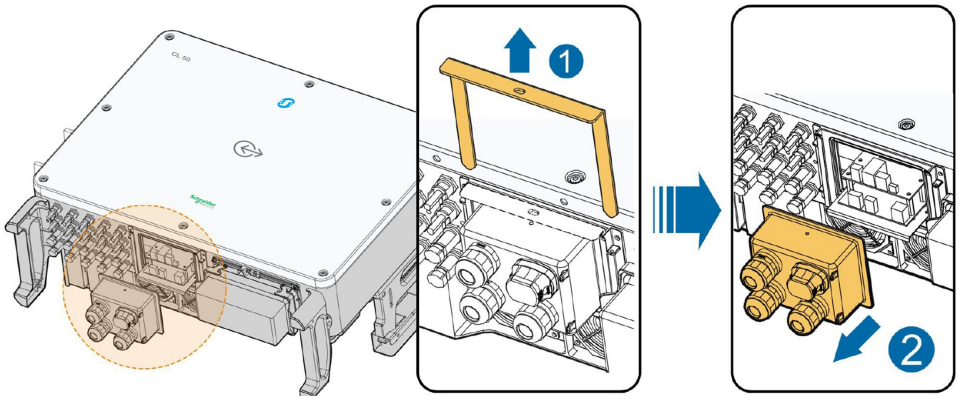
Communication Connection

Communciation Junction Box Access

A junction box is used to route the communication wiring.

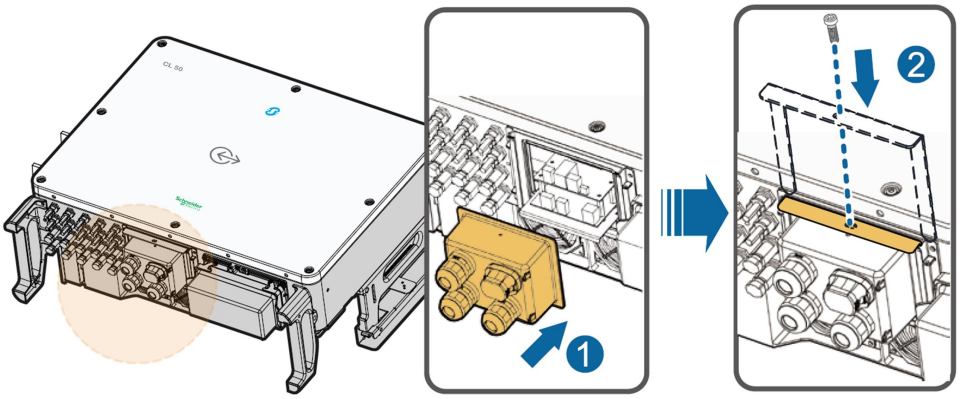
To remove the junction box:

1. Remove the screw attaching the clip to the junction box.
2. Pull the clip up.
3. Pull the junction box out.



To install the junction box:

1. Push the junction box firmly in place.
2. Insert the clip.
3. Reinstall the screw attaching the clip to the junction box.



Communication Wiring Board

The CL Series PV inverter communication board has two layers. The upper layer communication board mainly includes RS485 communication interfaces while the lower layer communication board mainly includes the DI/DO interface and the DRM interface (CL 30 and CL 50 only).

The inverter is equipped with three RS485 communication interfaces and one dip switch, which are located on the communication circuit board via a communication junction box.

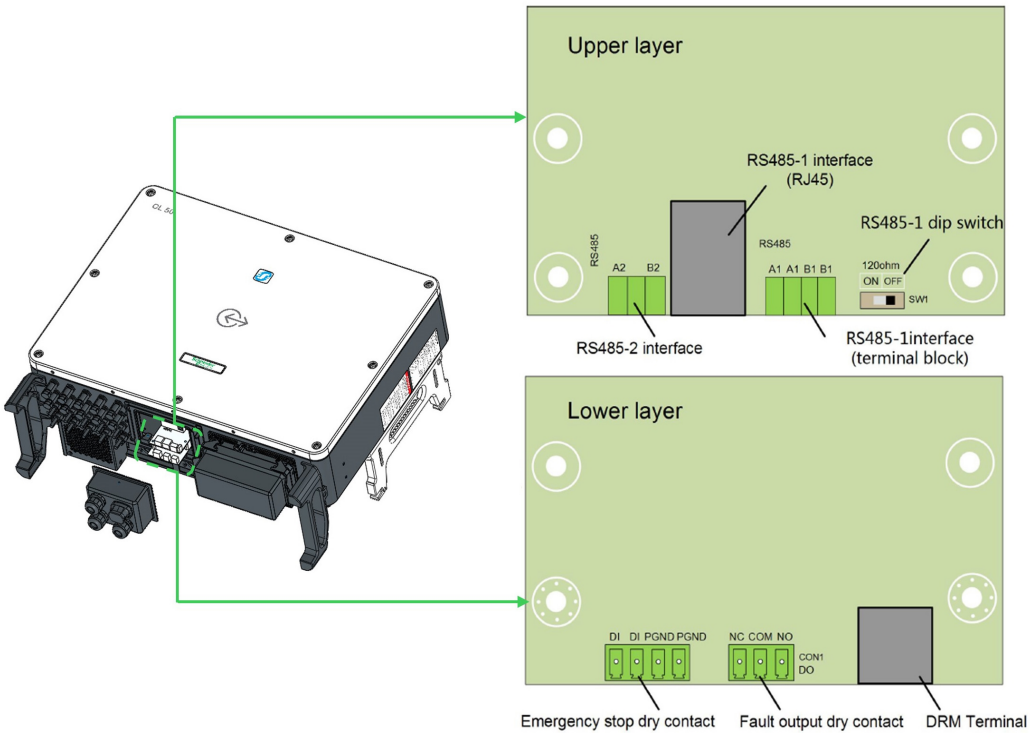
All the three interfaces can be connected to a data acquisition device (Logger), to achieve data exchange with a PC or other monitoring devices.

The RS-485-2 interface can only be applied to the application scenario of single inverter communication.

The RS-485-1 terminal block and the RJ45 interface can be applied to applications where multiple inverters communicate in a daisy-chain form.

A 120 Ω resistor can be connected in parallel between RS-485-1 A/B pins by configuring the dip switch.

Figure 29 Communication Configuration



PV inverter operational information can be transferred to a local data logging device through RS-485.

NOTE: Before proceeding, plan and prepare the correct type of RS-485-1 communication cables.

The RS-485 cables should be either of these two:

- shielded twisted pair cable
- shielded twisted pair Ethernet cable

A converter such as the RS-485-to-USB converter is needed to convert signals between the PV inverter and the computer.

It is recommended to install an external surge protection device on the RS-485 communication line.

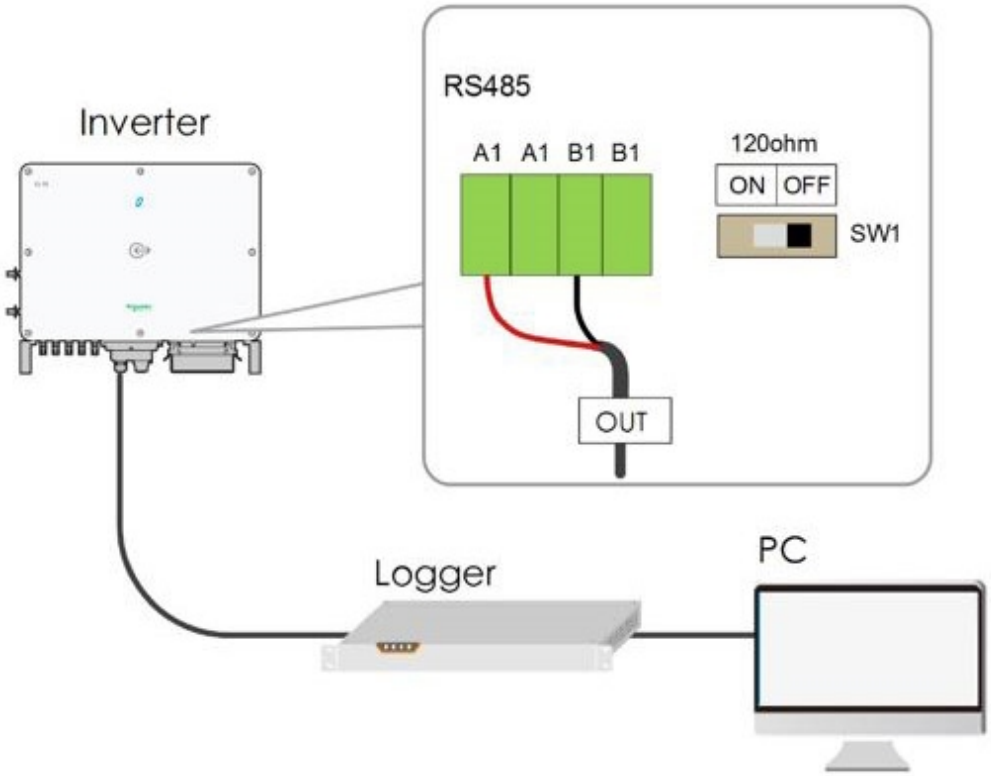
Single PV Inverter Configuration

One RS-485 cable is needed for this connection. The RS-485 cable should be either of these two:

- shielded twisted pair cable
- shielded twisted pair Ethernet cable

If there is a single inverter, it must be terminated with a 120 W resistor (set SW1 to OFF).

Figure 30 RS-485 Single Inverter Connection



Multiple PV Inverter Configuration

A number of RS-485 cables is needed for multiple connections.

Use the formula of X = n – 1, where X is the number of RS-485 cables needed and n is the total number of PV inverters.

The RS-485 cables should be either of these two:

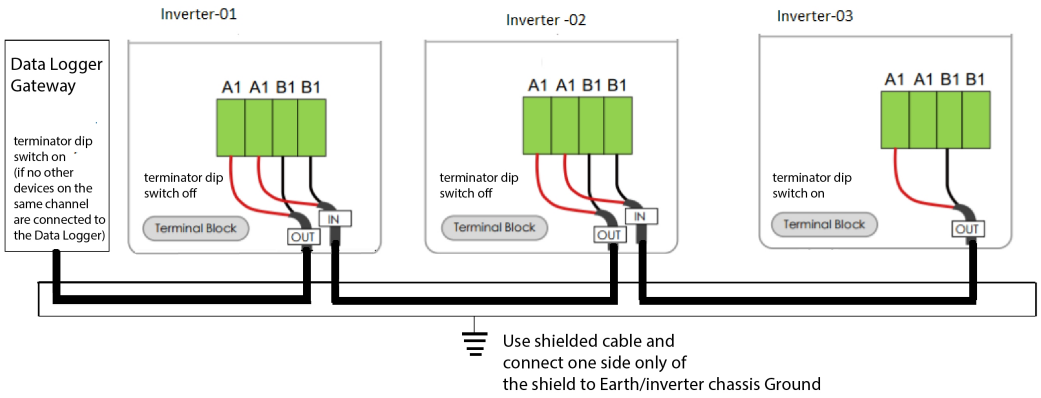
- shielded twisted pair cable
- shielded twisted pair Ethernet cable

The inverters are inter-connected by daisy chain and the first and last devices in the chain must be terminated with a 120 W resistor (set SW1 to ON).

The shielding layer of the RS-485 cable should be single-point grounded (PE gnd). The grounding point varies based on installation.

The total length of RS-485 communication cable should be less than 1000 m.

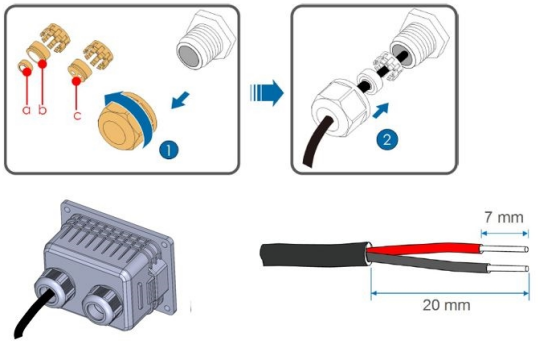
Figure 31 RS-485 Multiple Inverter Connection



RS-485 Communication Connection

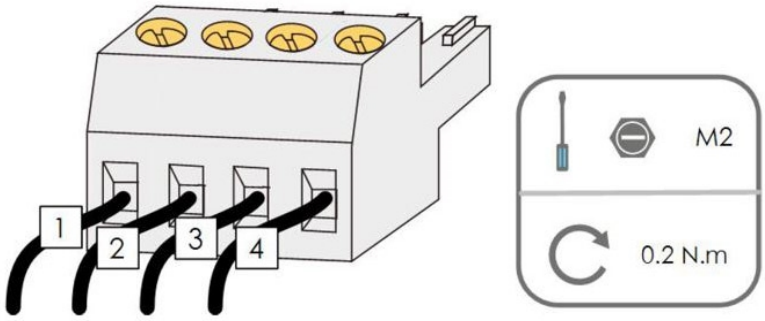
To connect an RS-485 cable to the terminal:

1. Remove the communication junction box as shown in *Figure 29 on page 78*.
2. Strip the protection layer and insulation layer by appropriate length
3. Loosen the swivel nut of the junction box and select an appropriate seal according to cable outer diameter.
4. Lead the cable through the swivel nut, seal, and junction box successively, as shown below.



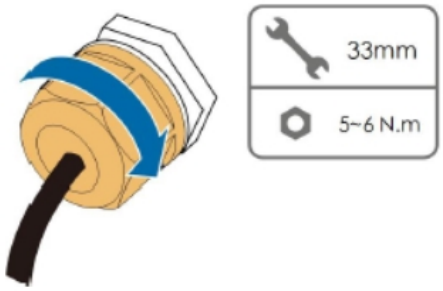
Outer diameter D(mm)	Seal
4.5~6	c
6~12	a+b
13~18	b

5. **Applies to multiple inverters.** Repeat steps 1 through 5 according to the position of the inverter.
6. Secure the cable to the terminal base. and insert the terminal base into the corresponding terminal.



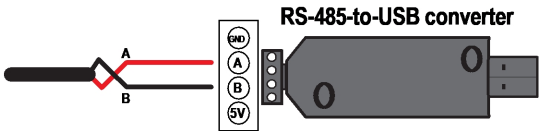
Item	Definition
1	RS-485 A IN, RS-485A differential signal+
2	RS-485 A OUT, RS-485A communication signal+
3	RS-485 B IN, RS-485B differential signal-
4	RS-485 B OUT, RS-485B communication signal-

7. Switch the terminating resistor to ON or OFF, according to the position of the inverter in the case of multiple inverters. Refer to *Figure 29 on page 78* (for single-inverter configurations) and *Figure 29 on page 78* (for multiple-inverter configurations).
8. Install the junction box, if there are no other connection procedures to be done.
9. Pull the cable gently to make sure it is secure, then tighten the swivel nut clockwise with the proper tool.



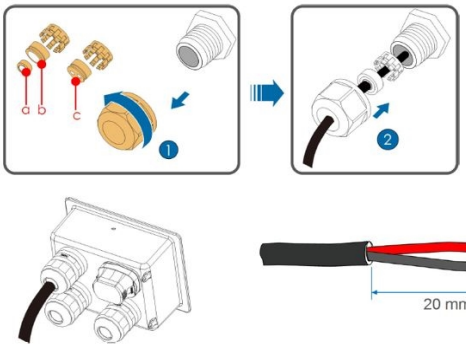
10. Connect the other end of the communication cables to their respective devices. Refer to the manuals of 3rd party devices or the Conext Gateway for connection information.
11. Set the communication parameters using the HMI and then confirm that there is a communication connection between the interconnected devices.
    NOTE: For multiple CL Series units, the first and last units' terminating resistor in the RS-485 daisy chain must be switched to ON and the middle units are switched to OFF.
    NOTE: If more than one inverter is connected to computer or logging device, set the RS-485 communication parameters from the InsightMobile app. See *Configuration Options on page 98*.

Figure 32 Wiring a Sample RS-485 to USB Converter



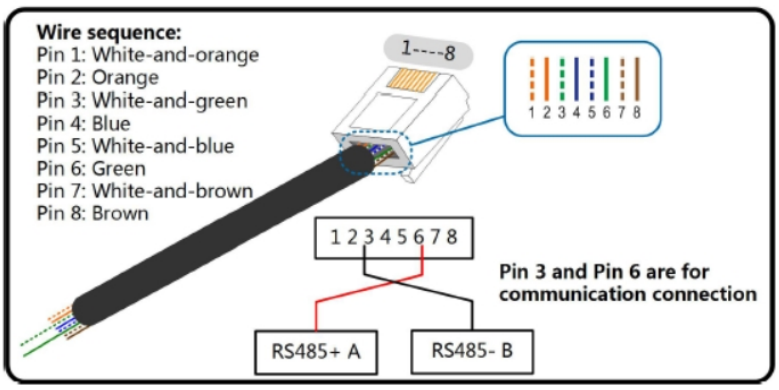
RJ45 Network Port Connection Procedure

1. Remove the communication junction box as shown in *Figure 29 on page 78*.
2. Loosen the swivel nut of the junction box and select an appropriate seal according to cable outer diameter. Lead the cable through the swivel nut, seal, and junction box successively.

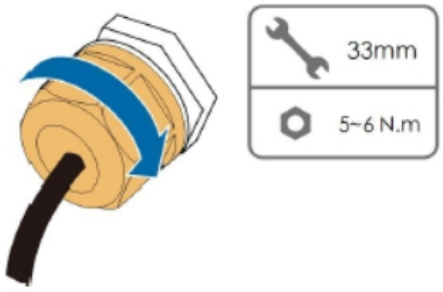


Outer diameter D(mm)	Seal
4.5~6	c
6~12	a+b
13~18	b

3. Strip the insulation layer of the shielded Ethernet cable with a wire stripper, and insert the signal wires to the RJ45 connector. Crimp the RJ45 connector with a crimping tool.



4. Insert the RJ45 connector in to the RJ45 jack where the shield is grounded.
5. Install the junction box, if there is no other connection procedures to be done.
6. Pull the cable gently to make sure it is secure, then tighten the swivel nut clockwise with the proper tool.



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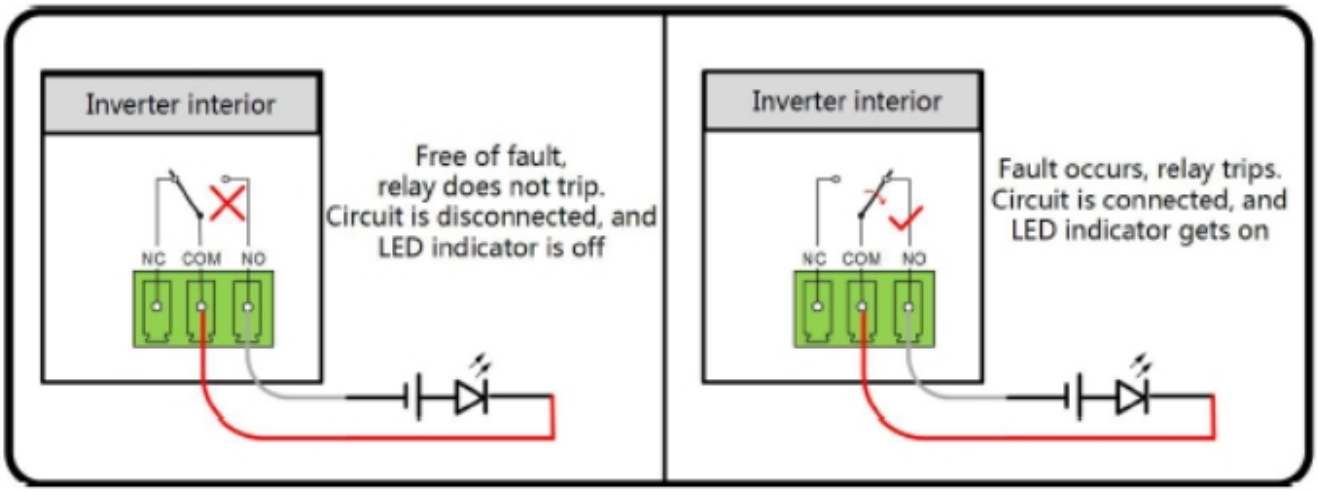
Dry Contact Connection

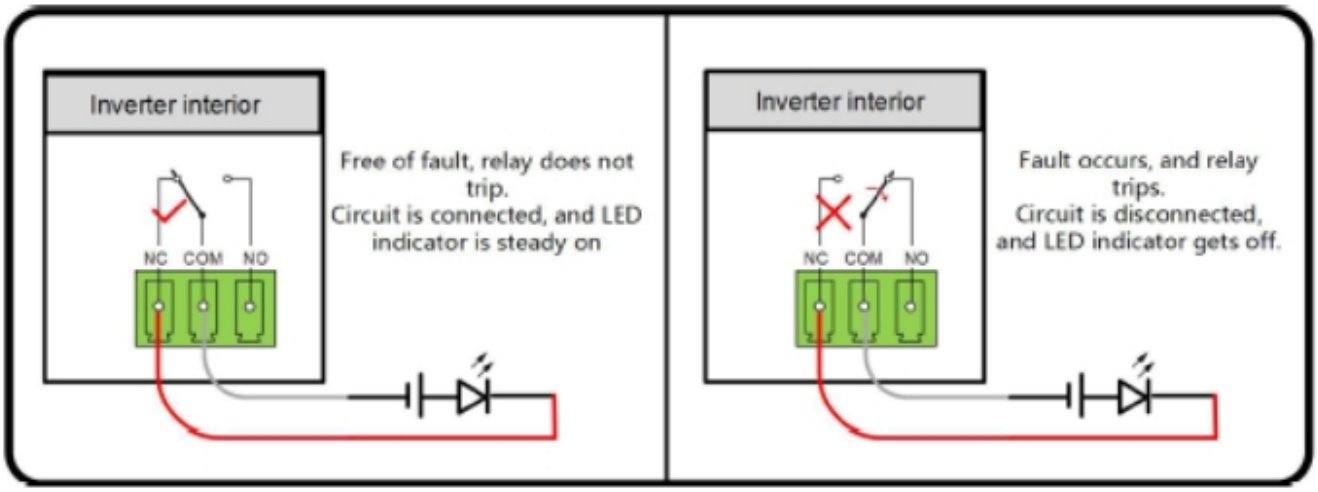
The configuration circuit board is provided with event output dry contact and emergency stop dry contact as shown in *Figure 29 on page 78*.

DO terminal (event output dry contact): the relay can be set to event alarm output, and user can configure it to be a normal open contact (COM and NO) or a normal close contact (COM and NC). The relay is initially at the NC terminal, and it will trip to another contact when a event occurs.

Use LED indicators or other equipment to indicate whether the inverter is in operational state. The following figures show the typical applications of normal open contact and normal close contact.



Normal open contact



Normal close contact

Devices connected to the relay should comply with related requirements:

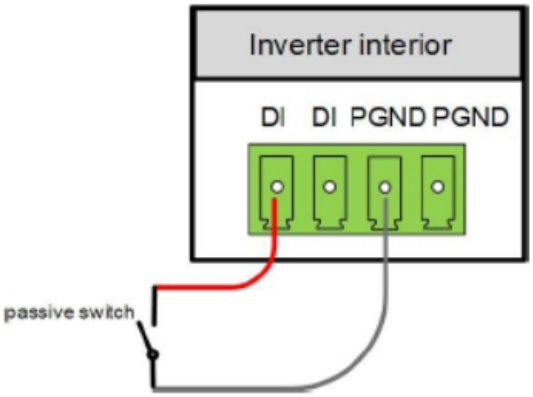
AC-side Requirements	DC-side Requirements
Max. voltage 250 VAC	Max. voltage 30 VDC
Max. current 5 A	Max. current 5 A

Digital Input (DI) terminal (emergency stop): the DI contact can be configured to be an emergency stop contact.

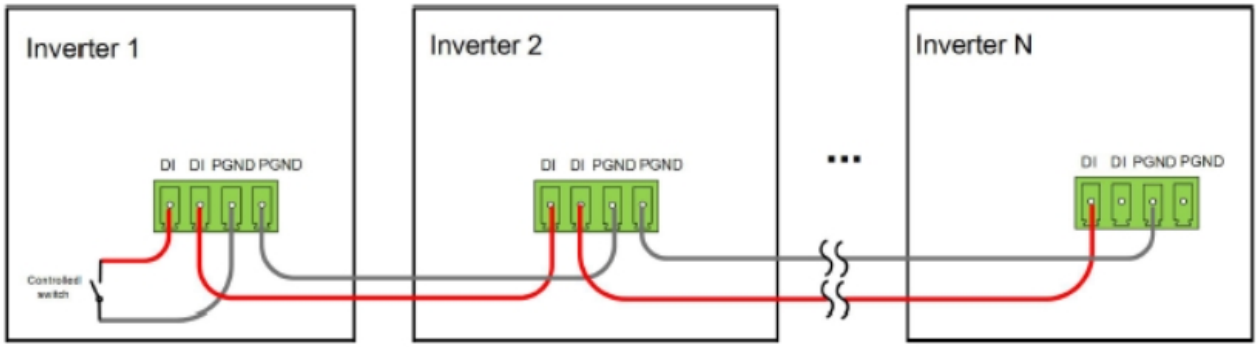
When the DI contact and GND contact are shorted by an externally controlled switch, the inverter will immediately stop.

Note: The DI only supports passive switch signal input.

The following figure shows the typical application of local stop dry contact.

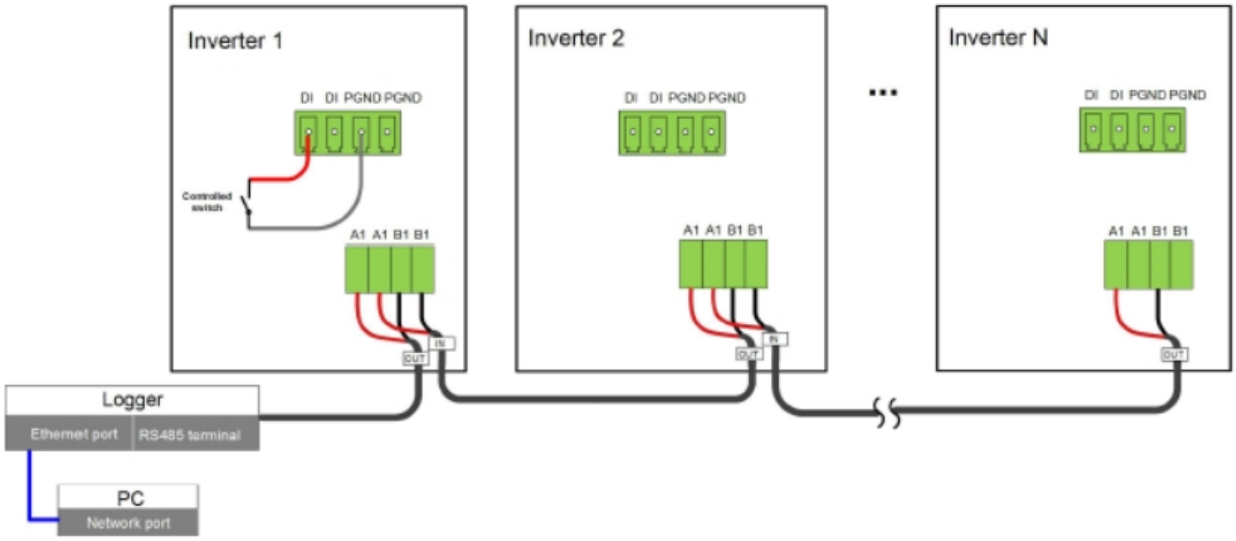


Local stop contact



Daisy chain topology

When the master unit is externally triggered to shut down the slave units will follow and shut down as well.The following figure shows the RS485 daisy chain in the master-slave mode:



Master-slave mode

Note: Refer to the terminal block wiring described in *RS-485 Communication Connection on page 80*

DRM Connection (CL 30 and CL 50 only)

DRM Function

CL 30 and CL 50 inverters support the demand response modes as specified in the standard AS/NZS 4777.2. The inverter has integrated a terminal for connecting to a DRED. After the connection, the method of asserting DRMs is as specified in the table below.

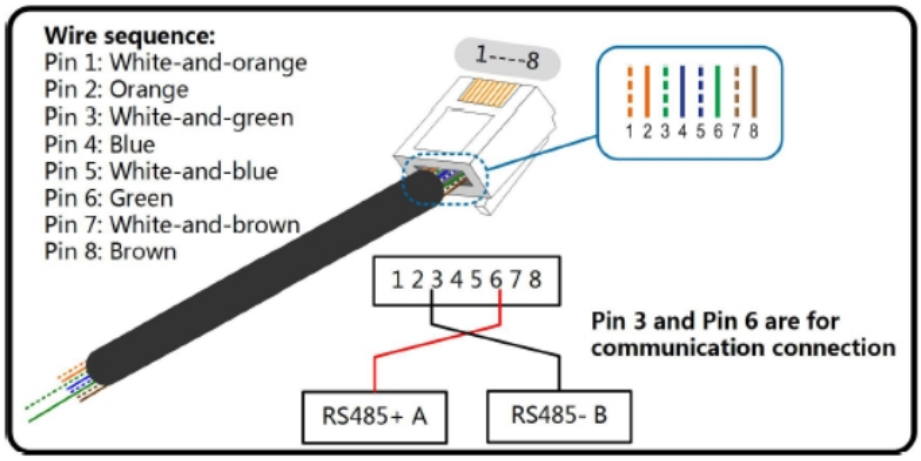
The mode DRM0 is supported by the inverter.

Mode	Method of Asserting
DRM0	Asserted by shorting pins 5 and 6
	Asserted when the impedance between pins 5 and 6 is detected to be above 20 kΩ

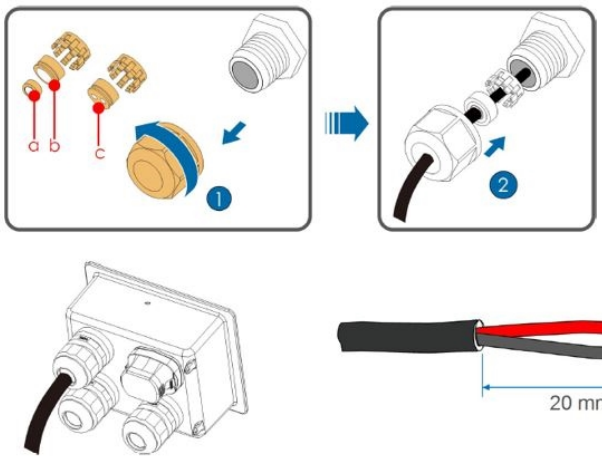
NOTE: The DRM function is only applicable to devices for Australia and New Zealand. Enable the DRM function through the InsightMobile app. If there are any problems, contact Schneider Electric.

Connection Procedure

1. Remove the communication junction box as shown in *Figure 29 on page 78*.
2. For higher reliability, use a premolded industrial graded shielded RJ45 cable.If you do not have access to this:
    a. Strip the insulation layer of the shielded Ethernet cable with a wire stripper, and insert the signal wires in to the RJ45 connector.
    b. Crimp the RJ45 connector with a crimping tool.

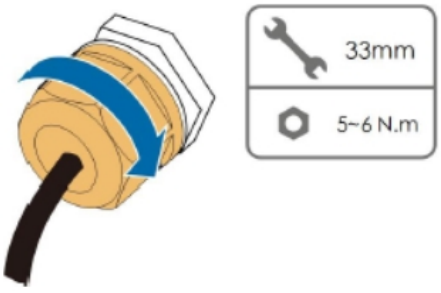


3. Loosen the swivel nut of the junction box and select an appropriate seal according to cable outer diameter. Lead the cable through the swivel nut, seal, and junction box successively.



Outer diameter D(mm)	Seal
4.5~6	c
6~12	a+b
13~18	b

4. Insert the RJ45 connector to the RJ45 jack.
5. Install the junction box, if there is no other connection procedures to be done.
6. Pull the cable gently to make sure it is secure, then tighten the swivel nut clockwise with the proper tool.



4 Commissioning

What's in This Chapter?

Inspection Before Commissioning

Before powering on the inverter, perform the following inspections:

❑ The PV inverter is accessible for operation, maintenance, and service.

❑Check to confirm that the inverter is stable and fixed on the wall/metal frame.

❑Check for ventilation.

❑Check for and remove any object such as tools and extra screws on top of the PV inverter.

❑Check that the PV inverter and its accessories are connected securely.

❑The cables are routed through the cable glands and protected against potential mechanical damage. Do not overtighten the sealing locks.

❑The AC circuit breaker is installed and the cables are properly connected.

❑The AC terminals are properly torqued according to recommended torque settings (see *Torque Values on page 54*). Check both top and bottom terminals and adjust accordingly.

❑The PV cables with MC4 DC cable connectors are properly connected to the DC input terminals of the inverter.

❑The product warning label and rating label are affixed permanently and not peeling off from the product.

❑Check that you have an iOS or Android smart device that supports Bluetooth 4.1 LE at the commissioning site.

❑Check that you have eSetup app installed on the smart device.

If you are viewing this Owner's Guide online from https://solar.schneiderelectric.com, make sure that you download a copy that you can access offline.

Commissioning Procedure

Make sure that *Inspection Before Commissioning on page 88* is done before operating the inverter.

1. After completing *Inspection Before Commissioning*, remove LOTO locks.
2. Close (turn On) the DC disconnect device from the PV string (or array).
3. Close (turn On) the AC circuit breaker.
4. Rotate the DC switch to the ON position. For CL 30 and CL 50 (in the Australia or New Zealand market) ensure that external DC switch and inverter DC switch are in the ON position.
5. Observe the LED indicator.
6. Follow the instructions in *"Commissioning with eSetup app" on page 90* to set up the initial configuration. If the irradiation and grid conditions meet requirements, the inverter will operate normally.
7. Observe the LED indicator to ensure that the inverter operates normally, see *Table 1*

on page 29.

8. Ensure no warnings are present. If so, refer to *Troubleshooting on page 144*.
9. Ensure power production is in the acceptable range for the current conditions.

Commissioning with eSetup app

eSetup app is a Bluetooth network-based smart device app that allows qualified installers to commission and configure the CL Series PV inverter.

eSetup app supports:

- Seamless Bluetooth connection over smartphone and tablet devices (smart devices)
- Both Android and iOS smart devices
- First time configuration of CL Series PV inverters (during commissioning)
- Initial configuration of various power control parameters, country selection etc.

While using eSetup app make sure that:

- your smart device is within five meters of the inverter and there are no objects that can disrupt communication between your smart device and the inverter. Signal reception is affected by these factors.
- the AC and DC sides or the AC side of the inverter is powered-on.
- the Bluetooth function on the mobile phone is enabled.

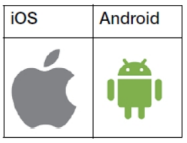
System Requirements

To run eSetup app you need:

- iOS 12 or above (iPhone 6 or newer models)
- Android 9 or above
- Bluetooth 4.1 LE

Installation

Go to your iOS or Android smart device app store and search for **Schneider Electric eSetup for Electrician** (the eSetup app app).



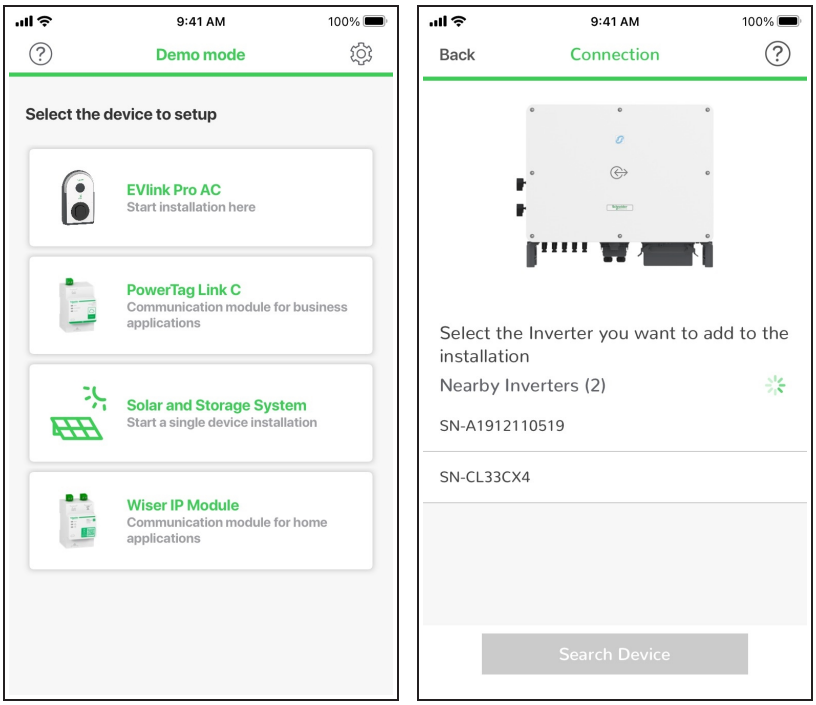
The eSetup app icon appears on your smart device upon successful installation.

Connecting to the CL Series PV Inverter

To connect the inverter:

1. Wake up the smart device and then tap the eSetup app icon to launch the app.
2. Tap **Solar and Storage System**.
3. In the **Nearby Inverters** screen all of the inverters within 5 meters will be listed by serial number. Tap to select and connect to the required inverter.
4. When the Bluetooth pairing request pops up, type the last six digits of the serial number of the inverter.

Figure 33 Connecting Screen



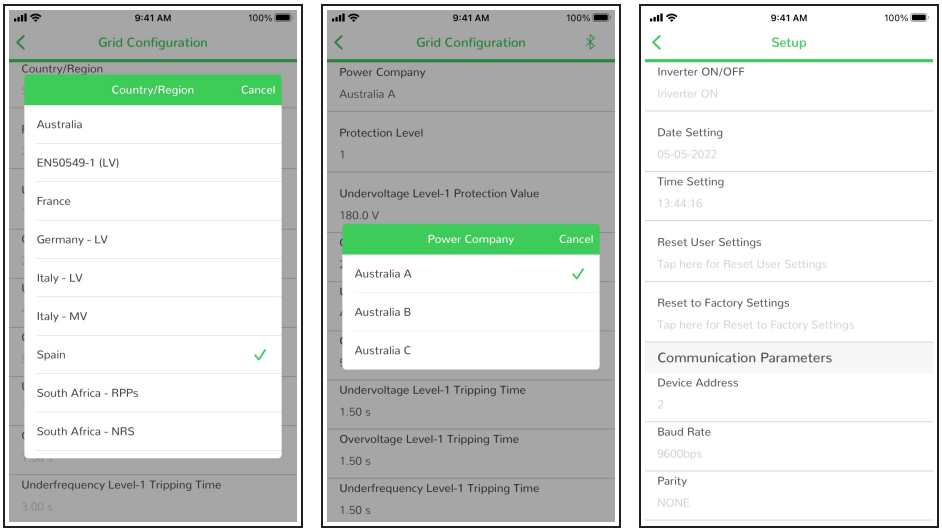
Commissioning a PV Inverter

Use eSetup app when a PV inverter is being configured for the first time. You must configure each of the option parameters for proper operation of the inverter. Read the warning messages and proceed accordingly.

1. In the **Country/Region** menu pop-up, select the country code according to the installation country of the inverter.
   Each country code represents corresponding local protective parameters that have been preset before delivery.
   a. For Australian markets, to comply with AS/NZS 4777.2:2020, select **Australia** from the list, then select **Australia A**, **B**, or **C** from the **Power Company** pop-up box.
   b. In European regions, such as Netherlands, Sweden, or Denmark, whose grid code complies with EN50549, select the parameter **EN50549_1 (LV)**.

2. In the **Setup** menu, set the date and time values, Modbus address, and the baud rate.
3. Click **Confirm** to accept the inverter settings.

Figure 34 Initializing Screen



Options	Usage
Country/Region	Tap to select the country or region.
Power Company	Tap to select the power company within the country or region.
Date and time setting	Tap to set the date and time settings. This is used for inverter event, alarm and energy production data.
Reset User Settings	Tap to reset user settings.
Reset to Factory Settings	Tap to reset to factory settings to restart the commissioning process.
Device address	Tap to set Modbus RS485 slave address. NOTE: When multiple inverters are connected to the same RS485 bus, this ID should be unique.
Baud Rate	Tap to set baud rate.

Configuring a PV Inverter

After the **Country/Region** is selected, you can modify other parameters within the **Settings** menu.

Refer to *"Power Regulation and Operation Parameters" on page 114* for details about the settings, what they mean, and guidance for changing parameters.

1. After setting the country code, proceed with setting other parameters in accordance with the specific requirements of the local grid.
2. After all configuration, go to the eSetup app **Dashboard** to review for any active events or alarms. See *"Dashboard Screen" on page 94*.

Figure 35 Settings Screen

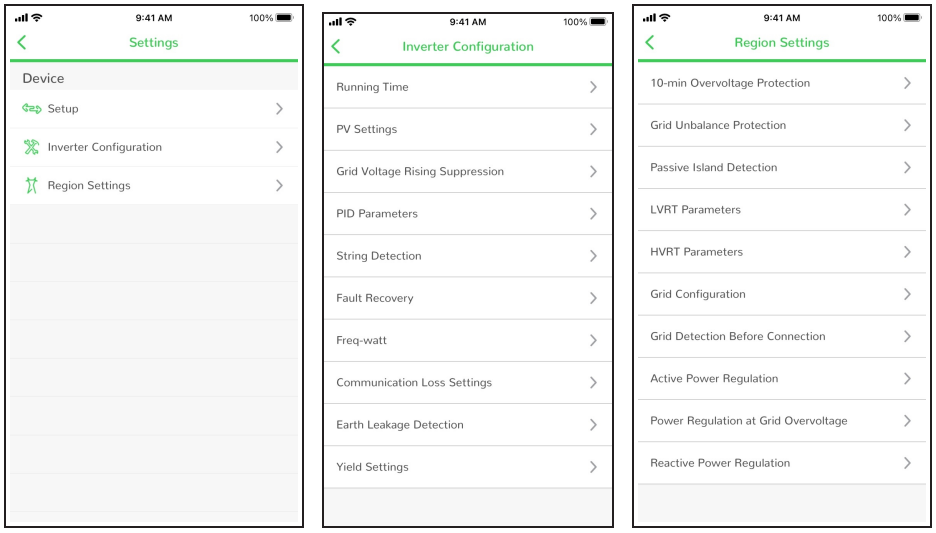


Table 6 Inverter Configuration menu

Options	Usage
Running Time	Tap to reconnect and set event recovery times to adjust the inverter's connecting time (not connected to the grid) and reconnecting time.
PV Settings	Tap to set MPPT global scan time.
Grid Voltage Rising Suppression	Tap to set active and reactive derating in relation to grid voltage see *"Active Power Adjustment (Active Power Regulation)" on page 124* and *"Reactive Power Control" on page 114*.
PID Paramters	Tap to set the passive islanding detection set points.
String Detection	Tap to set the string current set points.
Fault Recovery	Tap to reconnect and set fault recovery times.
Freq-watt	Power Reduction at Over Frequency: Active power reduction of the inverter when frequency increase (see *"Over frequency Power derating" on page 125*). Power Increment at Under Frequency: Active power increment of the inverter when frequency decrease(see *"Under Frequency Power Uprating" on page 127*).
Communication Loss Settings	Tap to set the Preset value of reactive power setting.
Earth Leakage Detection	Tap to enable and set the earth leakage detection settings.
Yield Settings	Tap to set the Yield adjustment, yield coefficient, Active power limit, Apparent power limit, relay self-test, fan and SPD self-test and RS485 port transmission validation.

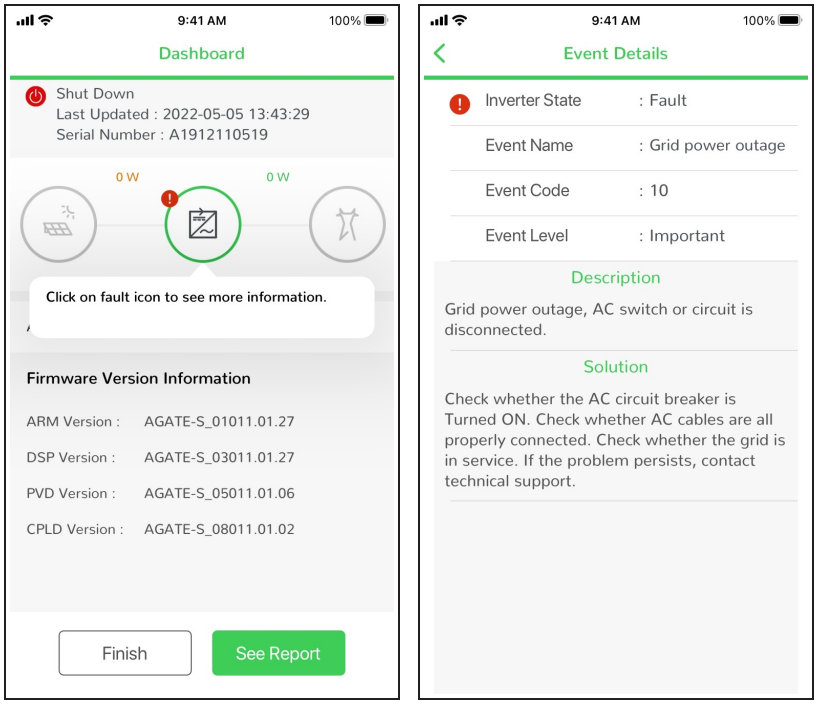
Table 7 Region Settings menu

Options	Usage
10min Overvoltage protection	Country/Grid type dependent feature.
Grid unbalance protection	These settings can use to set Amplitude and wait time (protection time) for the inverter to recover automatically when the amplitude deviation falls within the permissible range.
Passive Island detection	Tap to set the passive islanding detection set points. Country/Grid type dependent feature.
LVRT Parameters	See *"LVRT" on page 130*.
HVRT Parameters	See *"HVRT" on page 132*.
Grid Configuration	These are the country specific voltage and frequency trip settings. Which are configurable.
Grid Detection Before connection	These setting are used for inverter to reconnect after grid recovery. This has the settings of Reconnection Voltage, Frequency, Time, and Power gradient.
Reactive Power Regulation	See *"Reactive Power Control" on page 114*
Active Power Regulation	See *"Active Power Adjustment (Active Power Regulation)" on page 124*
Power Regulation at Grid Overvoltage	See *"Power Regulation and Operation Parameters" on page 114*

Dashboard Screen

The **Dashboard**screen displays the health of all connected PV inverters along with firmware versions. It also shows any active events or alarms using a red exclamation point. Tap the inverter status icon to investigate any active events or alarms.

Figure 36 Dashboard Screen



5 Configuration and Operation

What's in This Chapter?

Configuration Options

You can either use the InsightMobile app or InsightCloud to configure the CL Series. The InsightCloud option has available any-where-in-the-world cloud-based monitoring.

Introduction to the InsightMobile app

The InsightMobile app is a Bluetooth network-based smart device app that allows qualified installers to configure the CL Series PV inverter and customers to monitor the inverter.

The InsightMobile app supports:

- Seamless Bluetooth connection over smartphone and tablet devices (smart devices)
- Both Android and iOS smart devices
- Local monitoring of individual CL Series PV inverters
- Configuration of various power control parameters
- Event monitoring and data logging
- Firmware updates of CL Series PV inverters

Important Notes

While using the InsightMobile app make sure that:

- your smart device is within five meters of the inverter and there are no objects that can disrupt communication between your smart device and the inverter. Signal reception is affected by these factors.
- the AC and DC sides or the AC side of the inverter is powered-on.
- the Bluetooth function on the mobile phone is enabled.

Installing and Using InsightMobile app

InsightMobile app is a Bluetooth network-based smart device app that can be used to monitor and configure device and power control parameters for CL Series PV inverters.

The following operations are applicable for both iOS and Android-based smart devices.

- *Connecting to the CL Series PV Inverter on page 99*
- *Disconnect from the Inverter on page 113*
- *Installing and Using InsightMobile app on page 99*

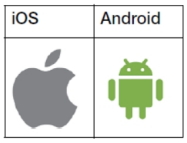
System Requirements

To run InsightMobile app you need:

- iOS 12 or above (iPhone 6 or newer models)
- Android 9 or above
- Bluetooth 4.1 LE

Installation

Go to your iOS or Android smart device app store and search for **InsightMobile SE**.



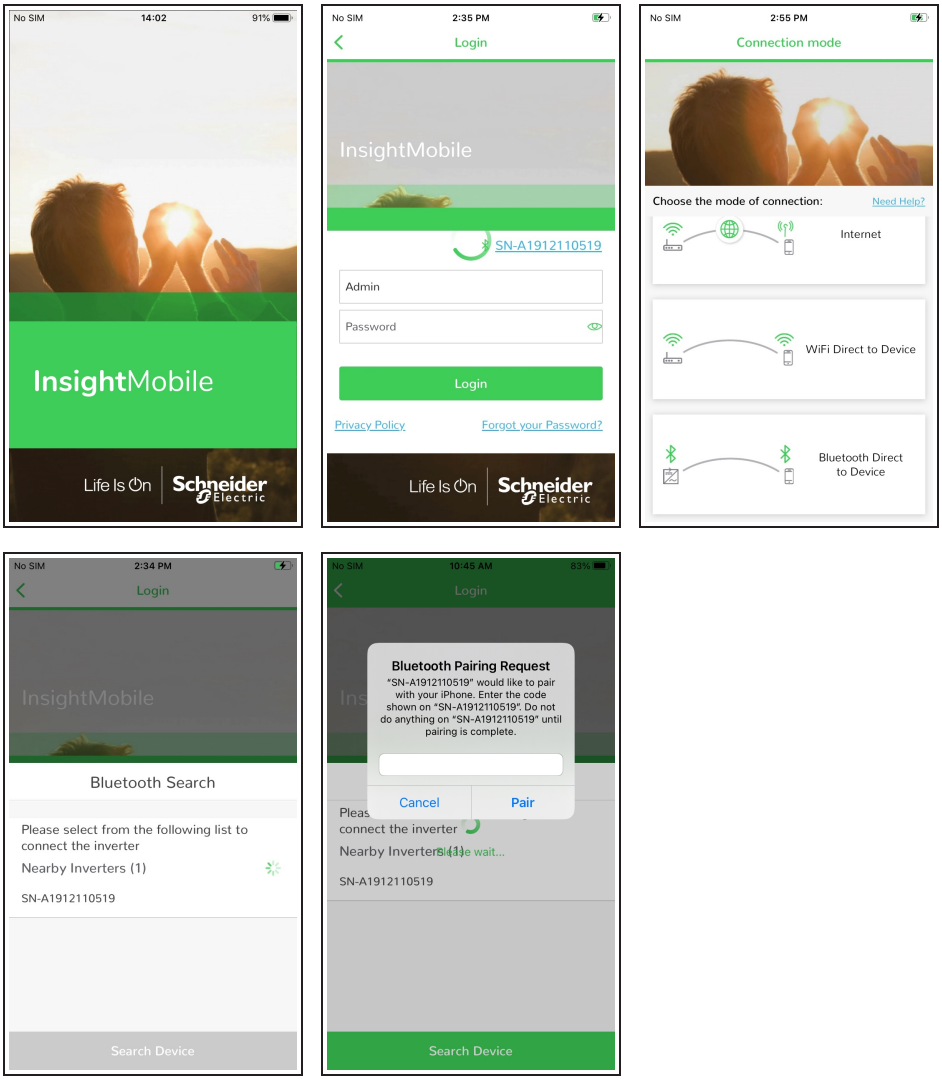
The InsightMobile app icon appears on your smart device upon successful installation.

Connecting to the CL Series PV Inverter

To connect the inverter:

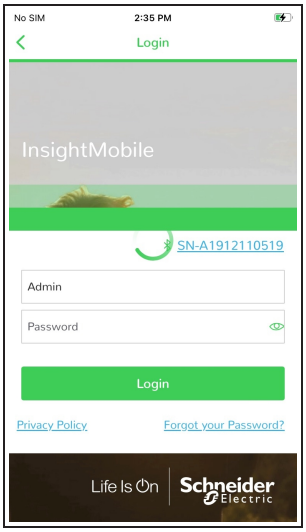
1. Wake up the smart device and then tap the InsightMobile app icon to launch the app.
2. Tap **Bluetooth Direct to Device** in the **Connection mode** screen.
3. In the Search screen all of the nearby inverters will be listed by serial number. Tap to select and connect to the required inverter.
4. When the Bluetooth pairing request pops up, type the last six digits of the serial number of the inverter.

Figure 37 Connecting Screen



5. InsightMobile app returns automatically to the Login page. Enter the Username and Password.

Figure 38 Login Screen



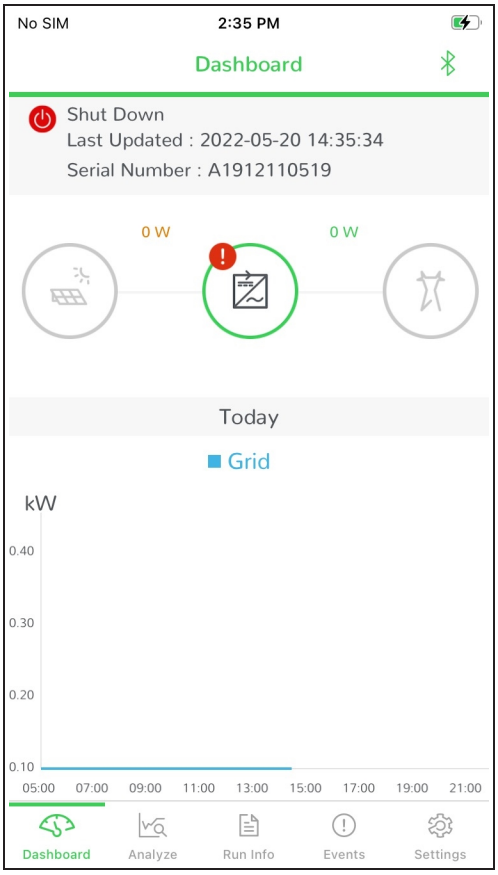
The following types of user accounts are supported.

Type	Name	Default Password
User login	User	User123
Admin/Level 2 login	Admin	Admin123

Note: For security reasons, we recommend that you change the password. See *Change or Reset Password on page 112*

6. Tap **Confirm** and the device will be initialized. InsightMobile app will send start instructions and the device will start and operate.

Figure 39 Home Screen



Home/Dashboard Screen

After login, the **Home** screen displays a snapshot of the system PV energy production and the health of all connected PV inverters along with some other relevant information. It also shows any active events or alarms using a red exclamation point. Tap the inverter status icon to investigate any active events or alarms or to find out more information about that inverter.

Figure 40 Home/Dashboard Screen

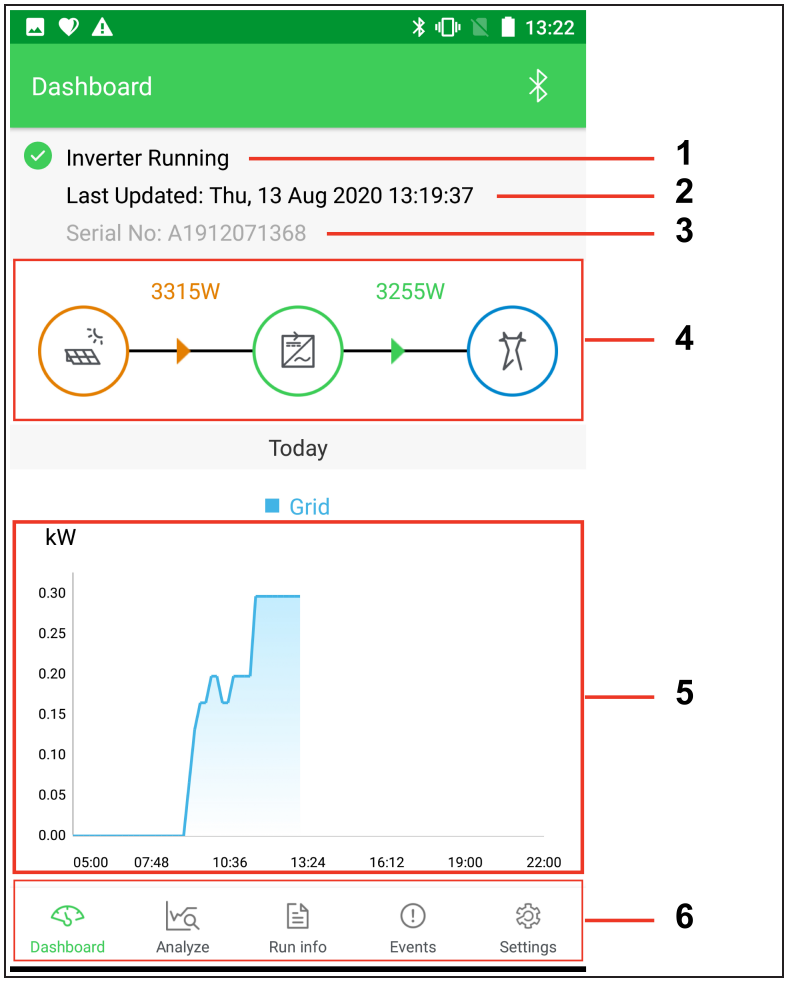


Table 8 Home/Dashboard screen description

Number	Item	Description
1	Inverter state	Present operation state, see *Table 9*.
2	Date and time	System date and time of the inverter.
3	Inverter serial	Inverter serial number
4	Power flow chart	Displays the PV power, generation power, feed-in power, etc. The line with an arrow indicates energy flow between connected devices, and the direction of the arrow indicates energy flow direction.
5	Power curve	Curve showing change of power between 5 am and 11 pm every day. Note: - There is delay of 12 minutes to display the power curve
6	Navigation bar	Tabs along the navigation bar include **Dashboard**, **Analyze**, **Run-info**, **Events**, and **Settings**.

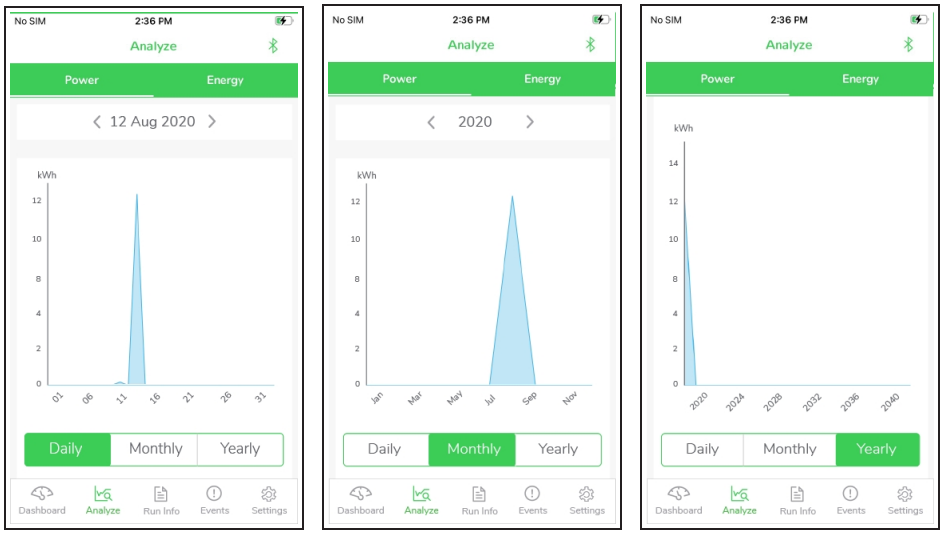
Table 9 Inverter state description

State	Description
Run	After being energized, the inverter tracks the PV arrays' maximum power point (MPP) and converts the DC power into AC power. This is the normal operation mode.
Stop	Inverter is stopped.
Key-stop	Inverter will stop operation when commanded manually to **stop** via the InsightMobile app. In this way, inverter internal DSP stops. To restart the inverter, manually send the **start** command via the InsightMobile app.
Standby	The inverter enters standby mode whent he DC-side input is insufficient. The inverter will remain in this mode until either the DC-side input is within range, or the standby maximum duration is reached.
Initial standby	The inverter is in the initial power-on standby state.
Starting	The inverter is initalizing and synchronizing with the grid.
Warning	Warning information is detected.
Derating running	The inverter actively derates due to environmental factors such as temperature or altitude.
Scheduling running	The inverter runs according the scheduling instructions received from the monitoring background.
Event	If an event occurs, the inverter will automatically stop operation and disconnected the AC relay. The event information will be displayed in the InsightMobile app. Once the event is removed within the recovery time, the inverter will automatically resume running.

If the inverter is running abnormally, the alarm or event icon will be displayed in the lower right corner of the inverter icon in the power flow chart on the **Home** screen . The user can tap this icon to enter the alarm or event screen to view detailed information and corrective measures.

Analyze

The **Analyze** screen displays the energy production details in a graphical format; information can be displayed daily, monthly, or yearly:



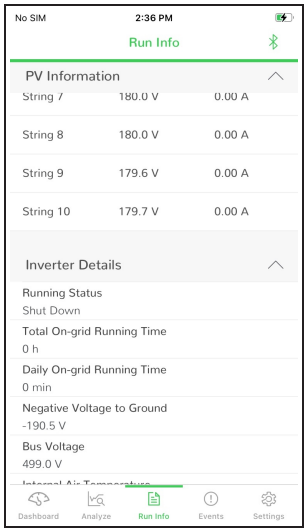
Tap on **Daily**, **Monthly** and **Yearly** to select the energy production details.

Run Info Screen

The **Run Info** screen displays active inverter settings such as DC voltage, DC current, DC power, AC voltage, AC current, AC power, AC power factor, inverter internal temperature, and country information.

- Click the down arrow button beside the category names to expand the information.

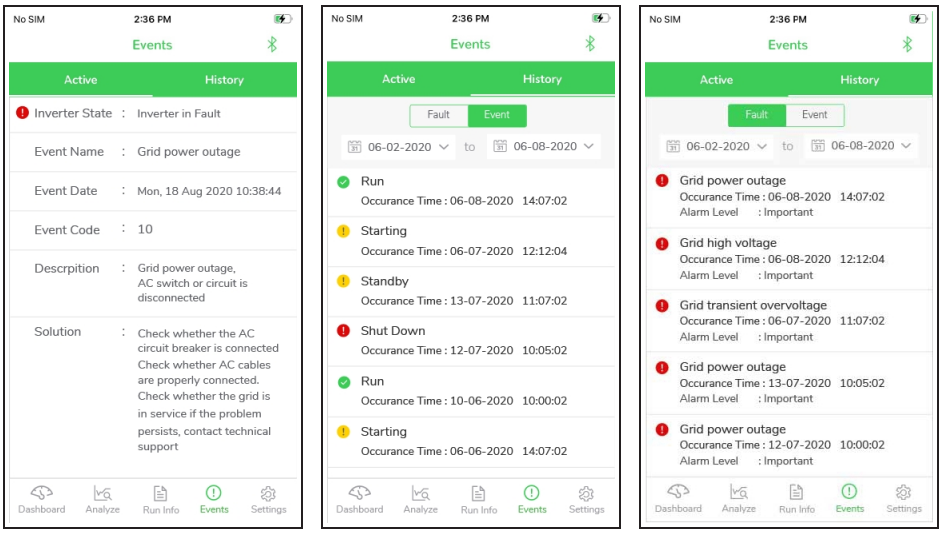
Figure 41 Run Info screen



Events Screen

The **Events** screen displays **Active** and **History** events.

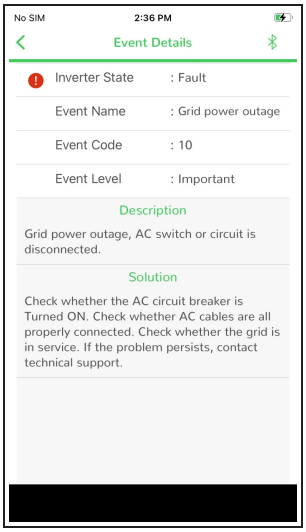
Figure 42 Events screen



Option	Usage	Access
Active Events	Tap to view all the inverter events.	All
	Tap on individual alarms to get more detailed information, timestamp, repair advice.	
History Events	Tap to view all historical alarms. Select the time period of the alarms by adjusting the date.	All
	Tap on individual alarms to get more detailed information, timestamp, repair advice.	

- Click on any event log to see the event details and some recommended solutions.

Figure 43 Event Details screen

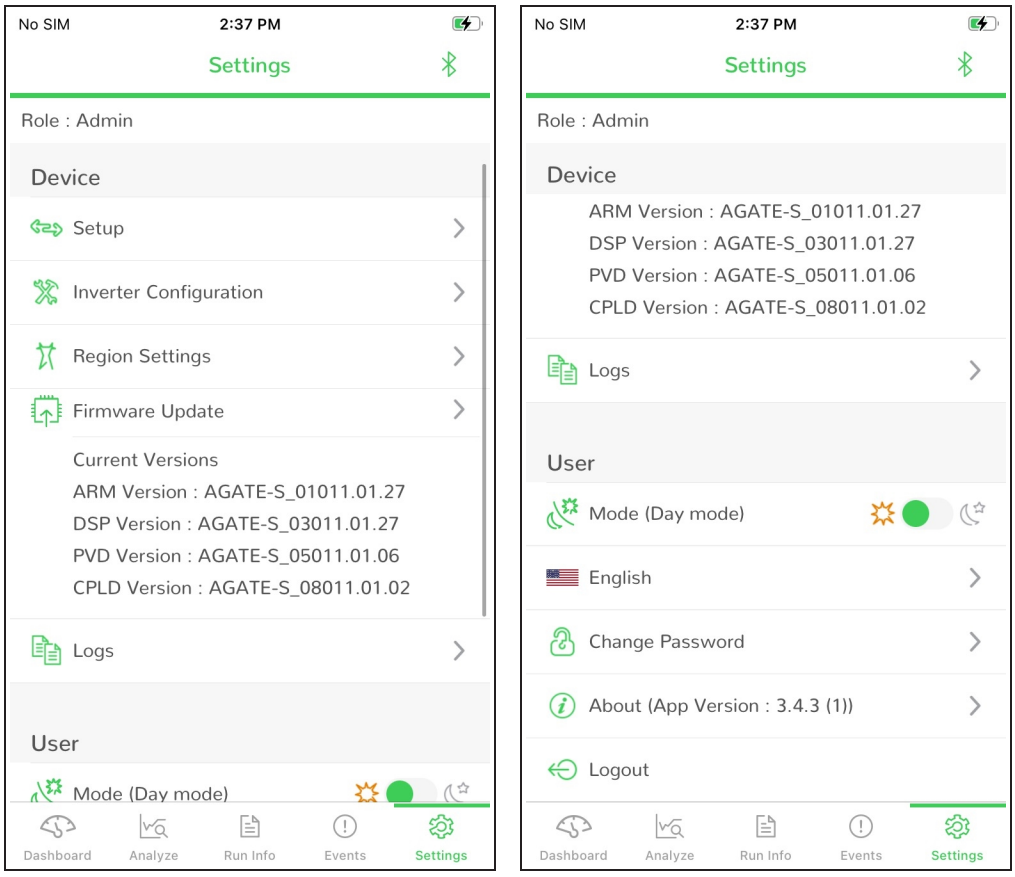


Settings Screen

The **Settings** screen allows access to several functions including:

- *Setup on page 107*, including turning the inverter ON and OFF
- *Operation Parameters on page 109*, such as Inverter Configuration and Region Settings
- *Generate and Download Logs on page 111*
- *Change or Reset Password on page 112*
- *Disconnect from the Inverter on page 113*
- *Firmware Update on page 134*

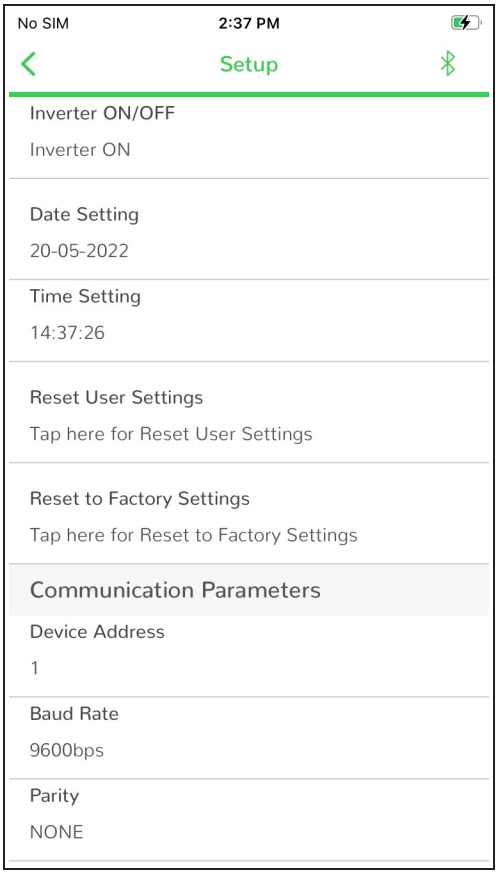
Figure 44 Settings screen



Setup

These settings are used to adjust the system date and time, country setting changes, restore to default and send an inverter power ON/OFF instruction to the inverter.

Figure 45 Setup screen



Options	Usage	Access
Inverter ON/OFF	Tap to Shutdown (turn off) the inverter	All
Date Setting	Tap to set the system date.	All
Time Setting	Tap to set the system time.	All
Restore to defaults	Tap to reset to the first-time configuration set up in order to select the grid type.	Level 2
Country/Region	Settings for country or region	Level 2
Firmware version	Firmware version details of ARM and MDSP.	All
Reset User Settings	Tap to reset user settings.	Level 2
Reset to Factory Settings	Tap to reset to factory settings to restart the commissioning process.	Level 2
Device address	Tap to set Modbus RS485 slave address. NOTE: When multiple inverters are connected to the same RS485 bus, this ID should be unique.	Level 2
Baud Rate	Tap to set baud rate.	Level 2

Operation Parameters

These settings are used to adjust inverter power controls. For more information about using these settings, see *"Power Regulation and Operation Parameters" on page 114*.

NOTICE

USER LEVEL ACCESS

Contact a Schneider Electric representative to request or set up a Level 2 user access account. Many settings require Level 2 user access.

Make sure that in the system parameters, the local control or local/remote control option is set. This is to allow operation parameters to be configured from the InsightMobile app.

Failure to follow these instructions may affect production yield.

Figure 46 Settings Screen

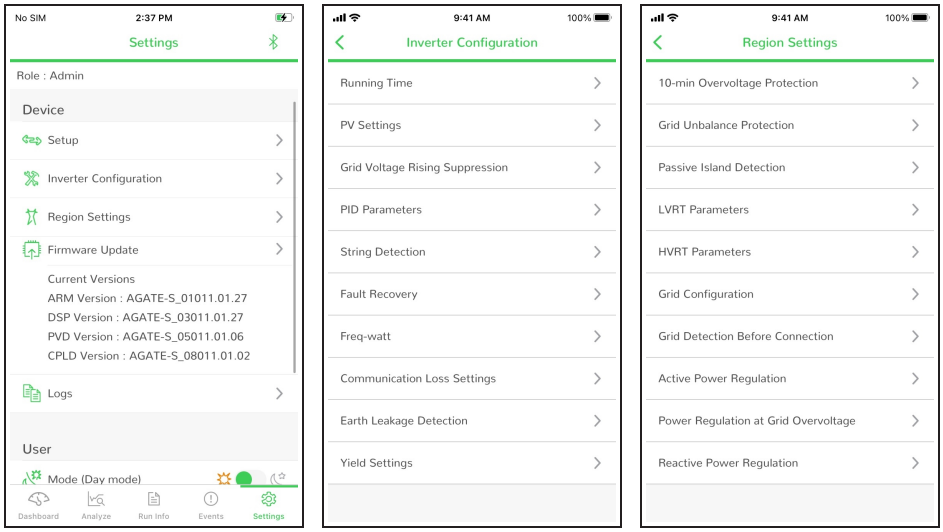


Table 10 Inverter Configuration menu

Options	Usage
Running Time	Tap to reconnect and set event recovery times to adjust the inverter's connecting time (not connected to the grid) and reconnecting time.
PV Settings	Tap to set MPPT global scan time.
Grid Voltage Rising Suppression	Tap to set active and reactive derating in relation to grid voltage see *"Active Power Adjustment (Active Power Regulation)" on page 124* and *"Reactive Power Control" on page 114*.
PID Paramters	Tap to set the passive islanding detection set points.
String Detection	Tap to set the string current set points.
Fault Recovery	Tap to reconnect and set fault recovery times.

Freq-watt	Power Reduction at Over Frequency: Active power reduction of the inverter when frequency increase (see *"Over frequency Power derating" on page 125*). Power Increment at Under Frequency: Active power increment of the inverter when frequency decrease(see *"Under Frequency Power Uprating" on page 127*).
Communication Loss Settings	Tap to set the Preset value of reactive power setting.
Earth Leakage Detection	Tap to enable and set the earth leakage detection settings.
Yield Settings	Tap to set the Yield adjustment, yield coefficient, Active power limit, Apparent power limit, relay self-test, fan and SPD self-test and RS485 port transmission validation.

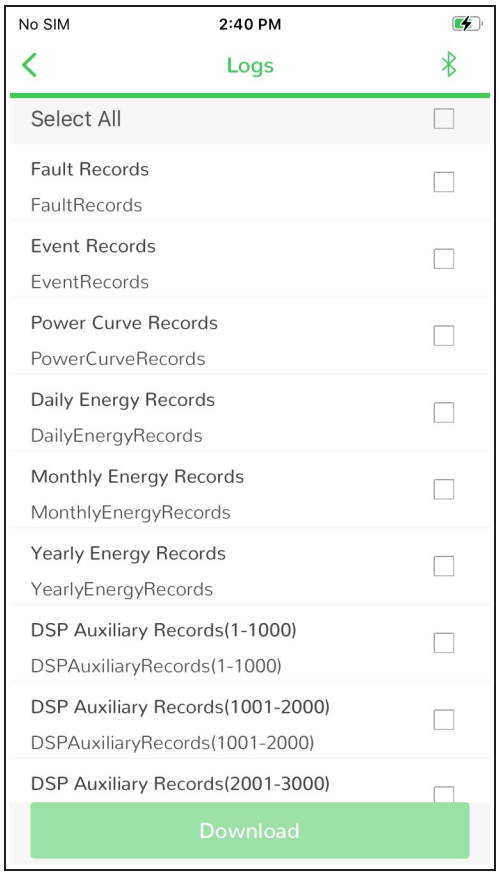
Table 11 Region Settings menu

Options	Usage
10min Overvoltage protection	Country/Grid type dependent feature.
Grid unbalance protection	These settings can use to set Amplitude and wait time (protection time) for the inverter to recover automatically when the amplitude deviation falls within the permissible range.
Passive Island detection	Tap to set the passive islanding detection set points. Country/Grid type dependent feature.
LVRT Parameters	See *"LVRT" on page 130*.
HVRT Parameters	See *"HVRT" on page 132*.
Grid Configuration	These are the country specific voltage and frequency trip settings. Which are configurable.
Grid Detection Before connection	These setting are used for inverter to reconnect after grid recovery. This has the settings of Reconnection Voltage, Frequency, Time, and Power gradient.
Reactive Power Regulation	See *"Reactive Power Control" on page 114*
Active Power Regulation	See *"Active Power Adjustment (Active Power Regulation)" on page 124*
Power Regulation at Grid Overvoltage	See *"Power Regulation and Operation Parameters" on page 114*

Generate and Download Logs

The **Log** menu enables you to generate and download several pre-configured log files.

Figure 47 Setup screen

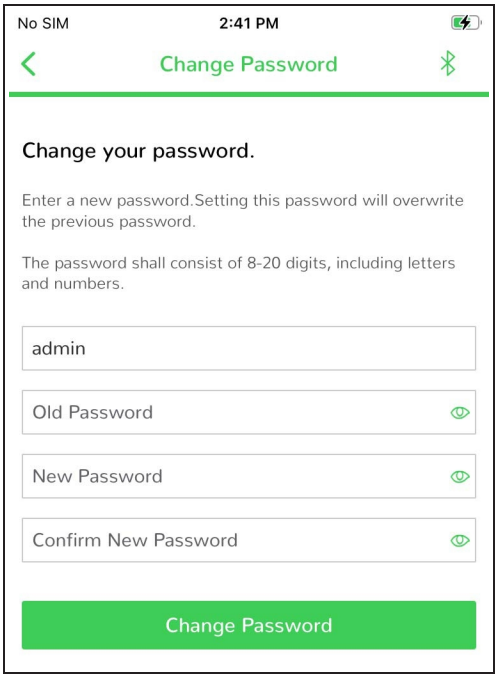


Change or Reset Password

From **Settings**, tap **Reset Password** to enter the change password screen.

NOTE: The password shall consist of 8–20 digits, including letters and numbers.

Figure 48 Password screen

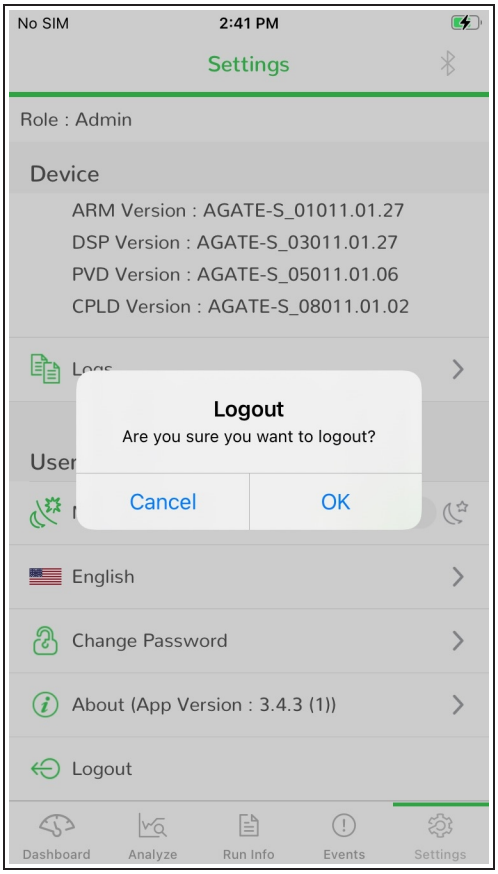


Disconnect from the Inverter

To logout and disconnect from the inverter:

1. Tap **Settings**.
2. Tap **Logout**.
3. Tap **Confirm** to close the session.

Figure 49 Logout Screen



Power Regulation and Operation Parameters

This section of the document gives information for qualified installers to make decisions about modifying settings after a country/region has been selected and applied. The instructions provide information for both the eSetup app and InsightMobile app applications. Screenshots are samples from the InsightMobile app and where the menu location is different in eSetup app it has been detailed.

This product meets the requirements of IEC standard.

Using reactive power control, we can set PF (Fixed Power Factor), Q(t) (Fixed Reactive Power Ratio), Q(U) (Voltage and Reactive Power Regulation), Q(P) (Active and Reactive Power Regulation).

Using active power control, we are able to achieve power grid dispatching function and active power response time regulation functions.

In FRT state, the inverter can quickly respond to the changes of the power grid and support the power grid.

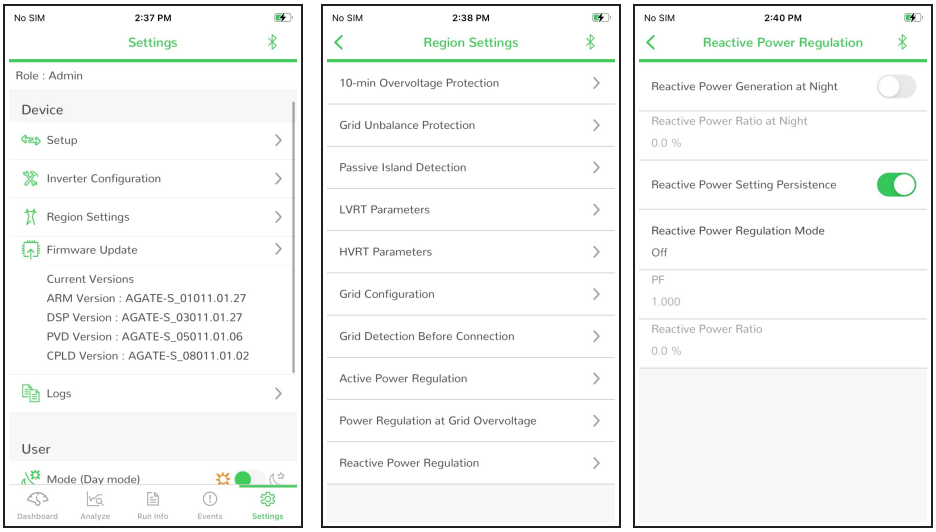
Reactive Power Control

PF Mode

PF mode: the power factor is fixed and reactive power setpoint is calculated according to the current power.

To set the PF mode:

1. Tap **Region Settings** > **Reactive Power Regulation** to view the **Reactive Power Regulation**.

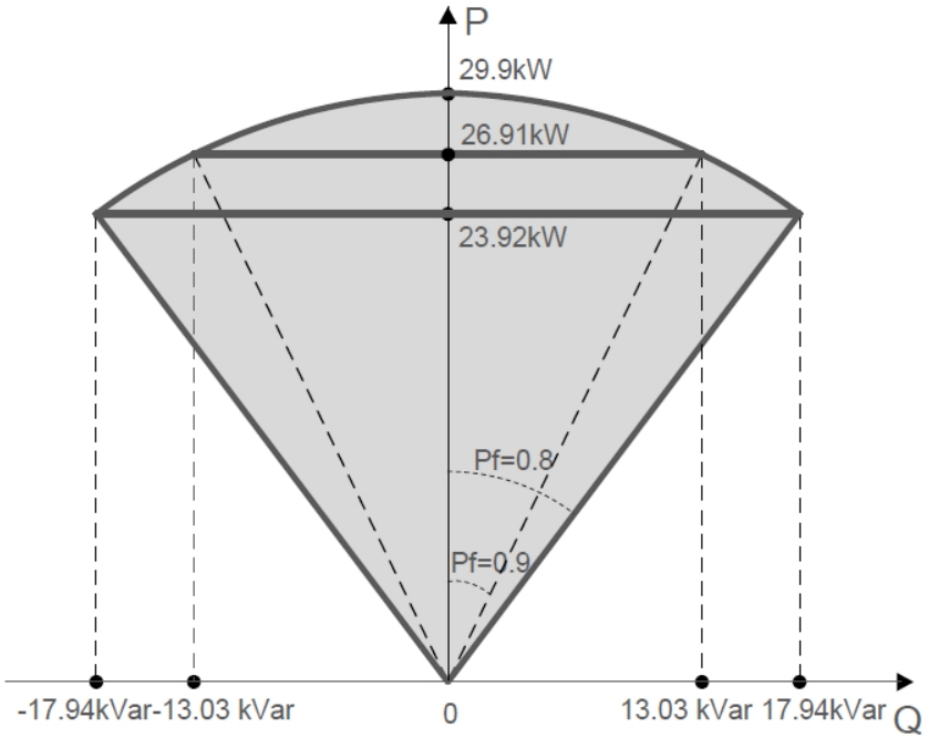


2. Set the **Reactive Power Regulation Mode** to **PF**.
3. Set the power factor value **(PF)** using the data below:

   The adjustable range of the power factor is -0.8~+0.8, and the adjustment curve in the PF mode is shown in the figures below. The shaded area in the figures shows the P-Q capability of the inverter in PF mode.

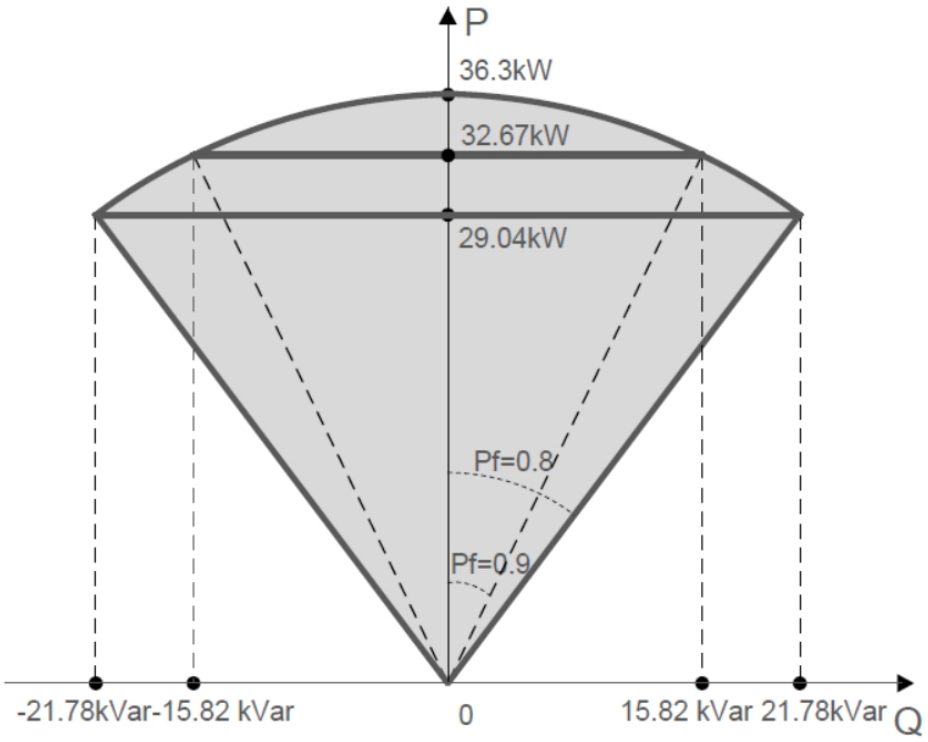
CL 30: The max. output active power of CL 30 is 29.9 kW, the max. output apparent power is 29.9 kVA. The max. output reactive power is ±17.94 kVar，when the power factor is ±0.8.

Figure 50 CL 30 P-Q diagram (PF mode)



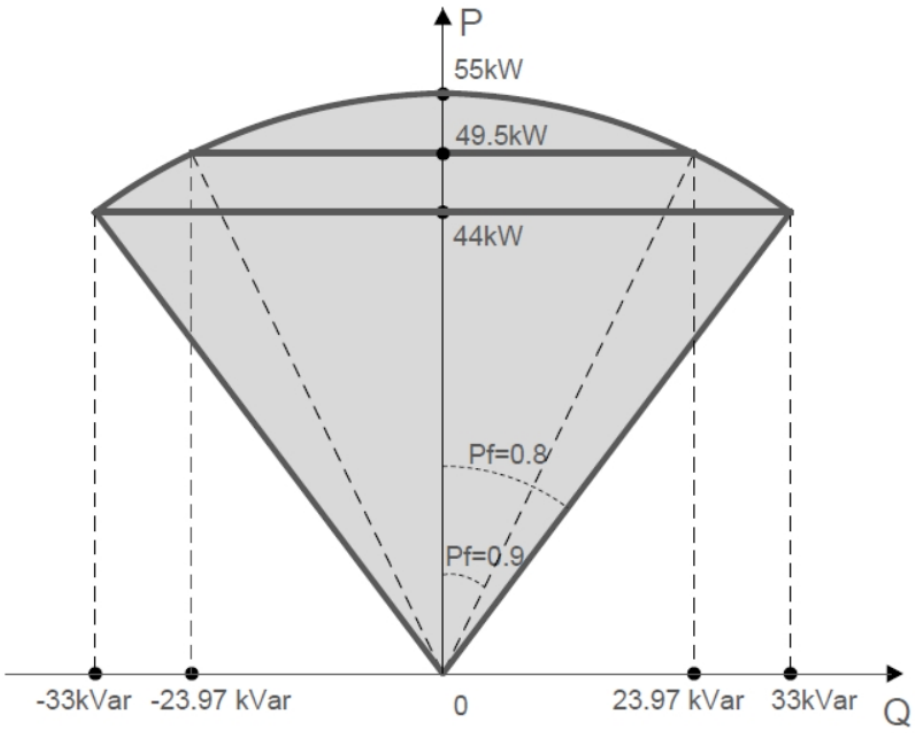
CL 33: The max. output active power of CL 33 is 36.3 kW, the max. output apparent power is 36.3 kVA. The max. output reactive power is ±21.78 kVar，when the power factor is ±0.8.

Figure 51 CL 33 P-Q diagram (PF mode)



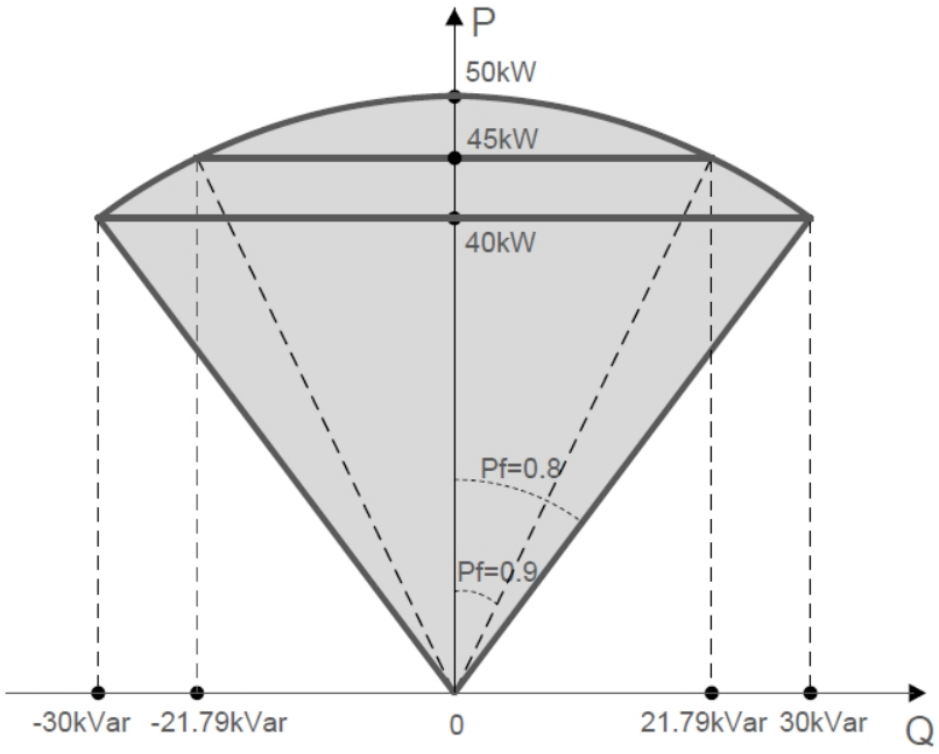
CL 50: The max. output active power of CL 50 is 55 kW, the max. output apparent power is 55 kVA. The max. output reactive power is ±33 kVar，when the power factor is ±0.8.

Figure 52 CL 50 P-Q diagram (PF mode)



CL 50 for Australia: The max. output active power of CL 50 for Australia is 50 kW, the max. output apparent power is 50 kVA. The max. output reactive power is ±30 kVar，when the power factor is ±0.8.

Figure 53 CL 50 for Australia P-Q diagram (PF mode)



Q(t) Mode

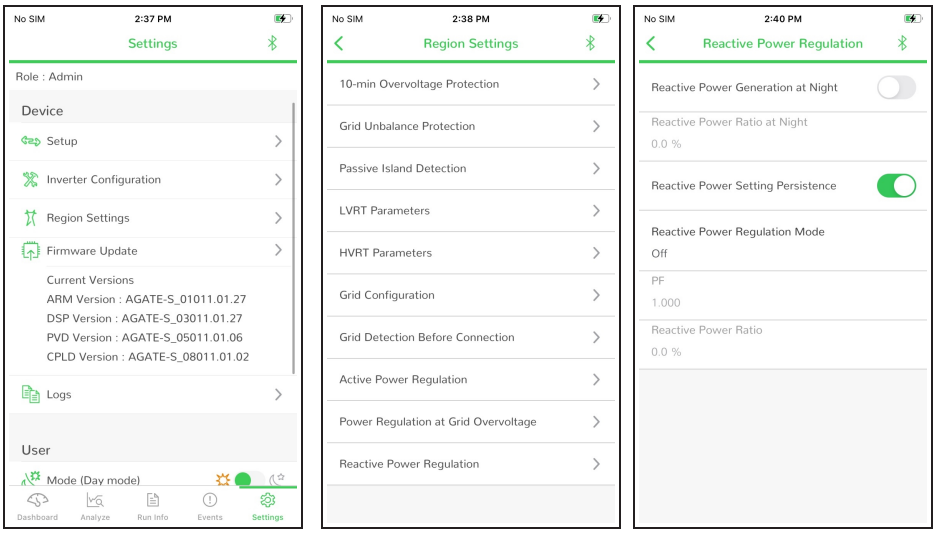
In the Q(t) mode, system rated reactive power is fixed, and the system outputs reactive power according to the delivered reactive power ratio.

For example, the max. reactive power of CL 33 is 0.6Smax (corresponding reactive power ratio is 100%) (Smax=1.1Pn=36.3kVA), and the "Reactive power limit" (namely Reactive power ratio value) is set through the App. Inverter outputs reactive power according to the set value. If the parameter "Reactive power limit" is set to 40.0%, the reactive power output is (0.6Smax)*40.0%=(0.6*36.3)*40.0%=8.71kVar.

The setting range of the reactive power ratio is 0~100% or 0~-100%, corresponding to the ranges of inductive and capacitive reactive power regulation respectively.

To set the Q(t) mode:

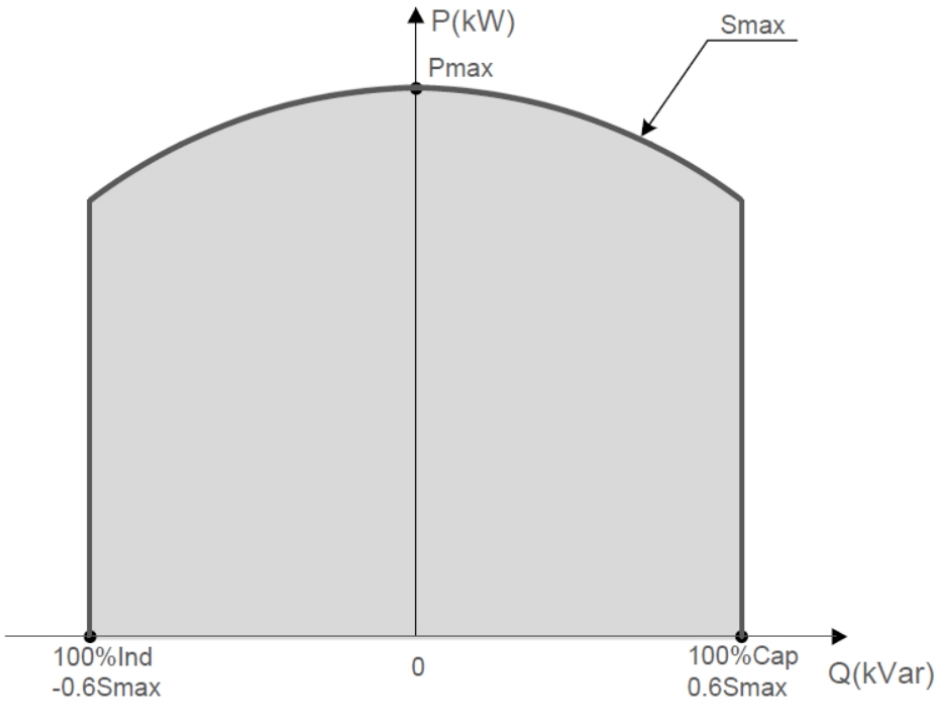
1. Tap **Region Settings** > **Reactive Power Regulation** to view the **Reactive Power Regulation**.



2. Set the **Reactive Power Regulation Mode** to **Q(t)**.
3. Set the **Reactive Power Ratio** using the data below:

   The setting range of the “reactive power ratio” is -100.0% to 100.0%, and the setting accuracy is 0.1%. The figure below shows the adjustment curve in Q(t) mode. The shaded area in the figure shows the P-Q capability of the inverter in Q(t) mode.

   Figure 54 P-Q diagram (Q(t) mode)

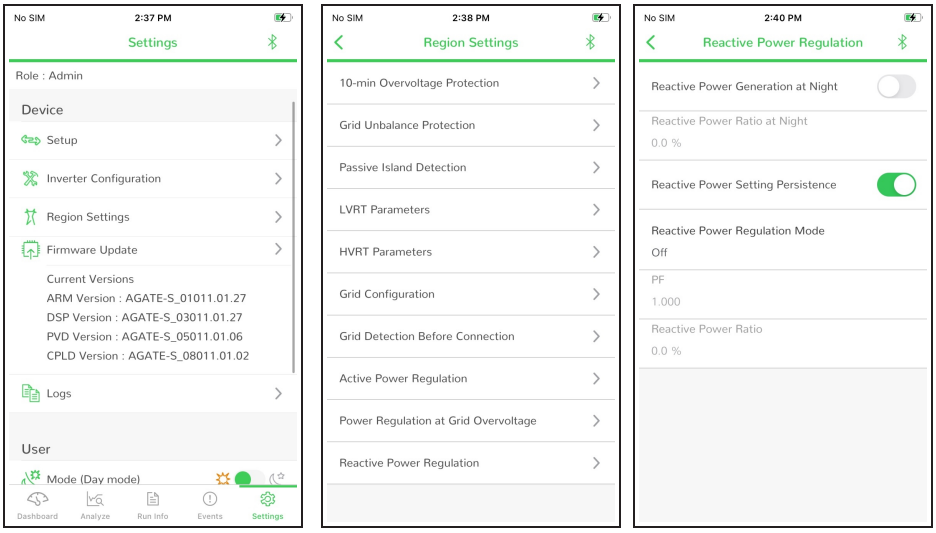


Parameter	Unit	Value			
		CL 30	CL 33	CL 50	CL 50 (for Australia)
Pn	kW	29.9	33	50	50
Pmax	kW	29.9	36.3	55	50
Smax	kVA	29.9	36.3	55	50

Q(U) Mode

To set the Q(U) mode:

1. Tap **Region Settings** > **Reactive Power Regulation** to view the **Reactive Power Regulation**.

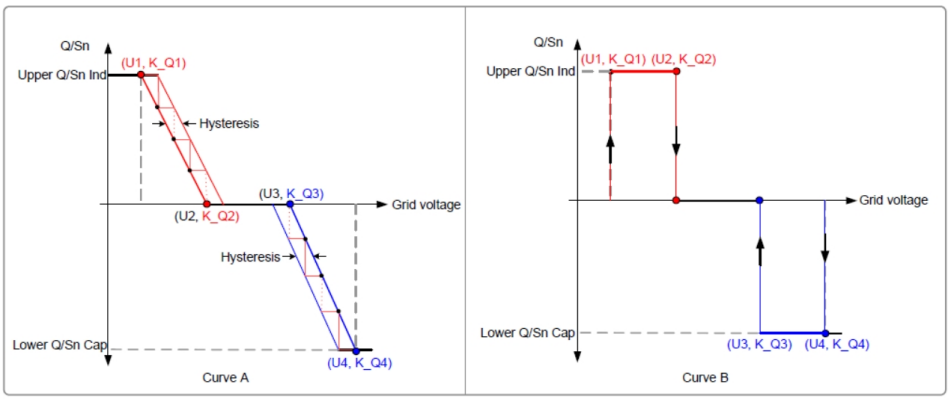


2. Set the **Reactive Power Regulation Mode** to **Q(U)**.

Parameter	Definition/Setting description	Range
Q(U) curve	Selection of Q(U) curve	Curve A/Curve B/Curve C**
Hysteresis ratio	Hysteresis ratio setting	0~5.0%
QU_V1	Pre-set grid voltage U1 that is reactive according to the grid voltage	80.0%~100.0%
QU_K1	Pre-set proportion of reactive power according to the grid voltage U1	[-66.0%-0%]* Overload Rate/1000
QU_V2	Pre-set grid voltage U2 that is reactive according to the grid voltage	80.0%~100.0%
QU_K2	Pre-set proportion of reactive power according to the grid voltage U2	[-66.0%-66.0%]* Overload Rate/1000
QU_V3	Pre-set grid voltage U3 that is reactive according to the grid voltage	100.0%~120.0%
QU_K3	Pre-set proportion of reactive power according to the grid voltage U3	[-66.0%-66.0%]* Overload Rate/1000
QU_V4	Pre-set grid voltage U4 that is reactive according to the grid voltage	100.0%~120.0%
QU_K4	Pre-set proportion of reactive power according to the grid voltage U4	[0%-66.0%]* Overload Rate/1000
QU_Enter Power	Pre-set active power point enabled by the Q (U) function	20.0%~100.0%
QU_Exit Power	Pre-set active power point disabled by the Q (U) function	1.0%~20.0%
QU_Enable Mode	Pre-set unconditional entry and exit Q (U) function	Yes/No/Yes, Limited by PF
QU_Limited PF Value	-	0-0.95

** Curve C is reserved and consistent with Curve A currently.

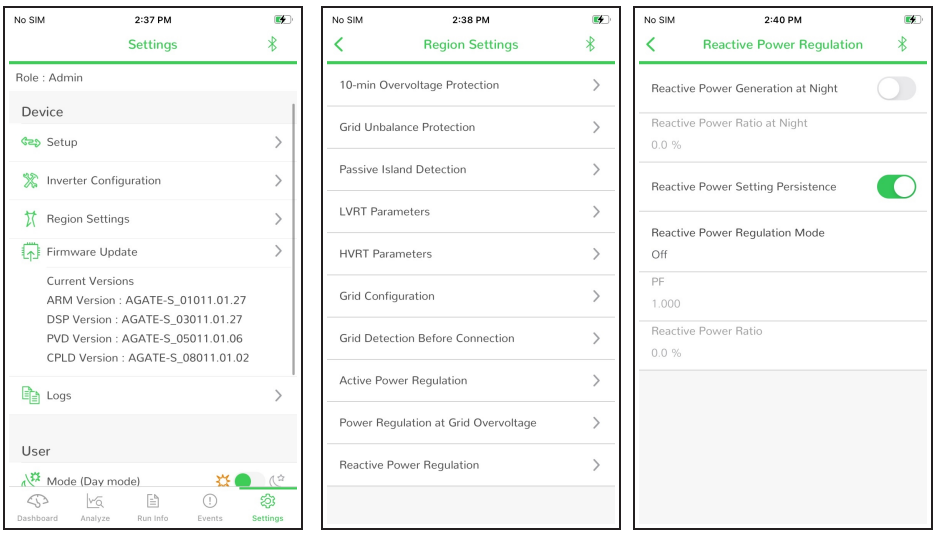
Figure 55 Q(U) mode curve



Q(P) Mode

To set the Q(P) mode:

1. Tap **Region Settings** > **Reactive Power Regulation** to view the **Reactive Power Regulation**.

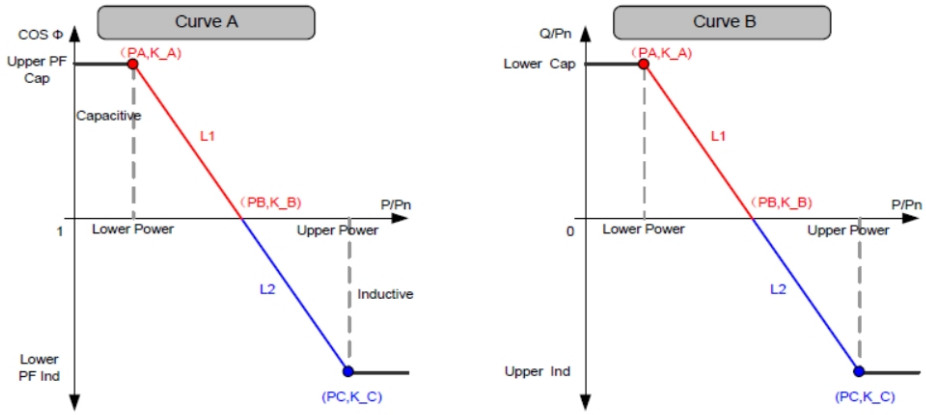


2. Set the **Reactive Power Regulation Mode** to **Q(P)**.

Parameter	Definition/Setting description	Range
Q(P) Curve	-	Curve A/Curve B/Curve C**
QP_P1	-	10.0%~100.0%
QP_P2		20.0%~100.0%
QP_P3	-	20.0%~100.0%
QP_K1	-	Curve A/Curve C: 0.800~1.000 Curve B: [-0.660~0.660]*Active Overload Rate/1000
QP_K2	-	Curve A/Curve C: 0.800~1.000 Curve B: [-0.660~0.660]*Active Overload Rate/1000
QP_K3	-	Curve A/Curve C: 0.800~1.000 Curve B: [-0.660~0.660]*Active Overload Rate/1000
QP_ EnterVoltage	-	100.0%~110.0%
QP_ ExitVoltage	-	90.0%~100.0%
QP_ExitPower	-	1.0%-20.0%
QP_ EnableMode	-	Yes/No

** Curve C is reserved and consistent with Curve A currently.

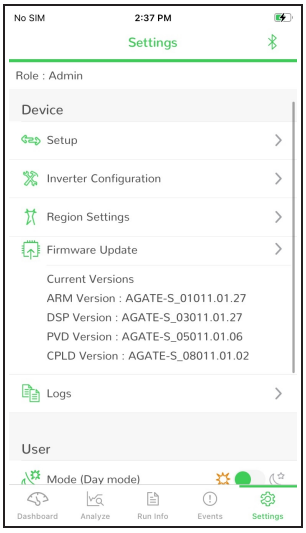
Figure 56 Q(P) mode curve

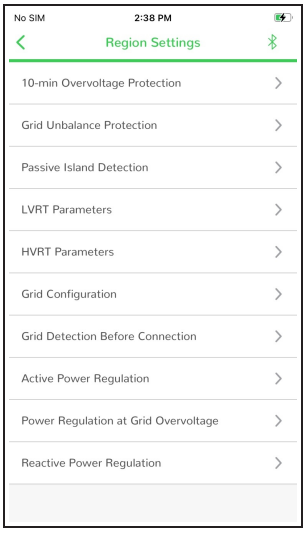


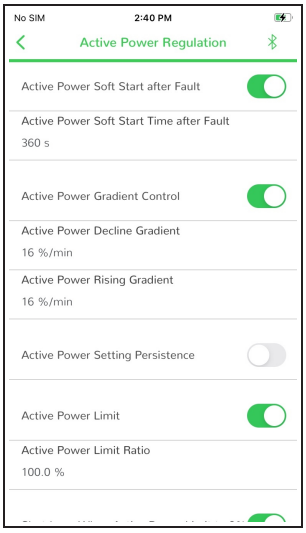
Active Power Adjustment (Active Power Regulation)

To set the Active Power Regulation:

1. Tap **Region Settings** > **Active Power Regulation** to view the **Active Power Regulation**.







Parameter	Definition/Setting description	Range
Active Power Soft Start after Event	The switch for enabling/disabling the soft start function after an event occurs	On/Off
Active Power Soft Start Time after Event	Time that the soft start takes to raise the power from 0 to 100% rated power	1s~1200s
Active Power Gradient Control	Switch for enabling/disabling the active power rate settable function	On/Off
Active Power Decline Gradient	The decline rate of inverter active power per minute	1%/min~6000%/min
Active Power Rising Gradient	The rise rate of inverter active power per minute	1%/min~6000%/min
Active Power Setting Persistence	Switch for enabling/disabling the function of saving output limited power	On/Off
Active Power Limit	The switch for limiting output power	On/Off
Active Power Limit Ratio	The ratio of limit output power to rated power in percentage	0%-100%
Shutdown When Active Power Limit to 0%	Switch used to determine whether the inverter is in stop state when the limited power reaches 0	On/Off
100% Scheduling to Achieve Active overload		On/Off

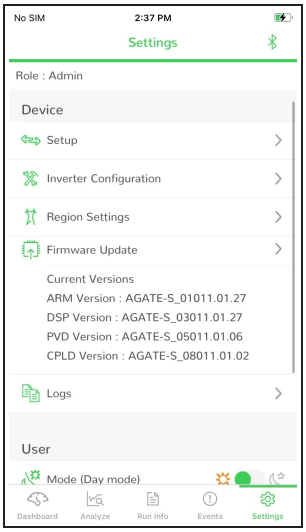
DRM	Displayed only for Australia country setting.	On/OFF

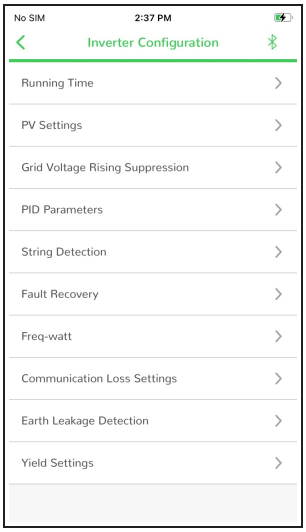
Frequency Vs Power Derating Function

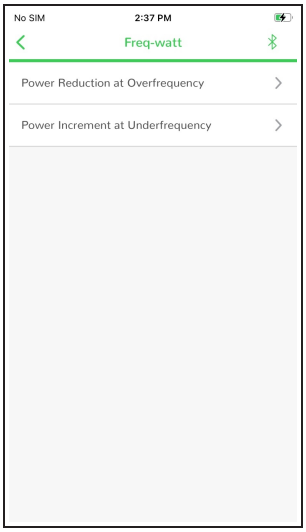
Over frequency Power derating

To set the Power reduction at Over frequency:

1. Tap **Inverter Configuration** > **Freq-watt** > **Power Reduction at Over frequency** to view the **Power Reduction at Over frequency**.







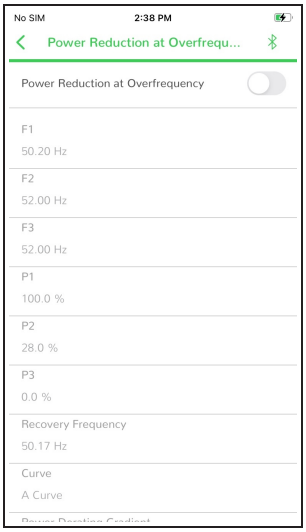
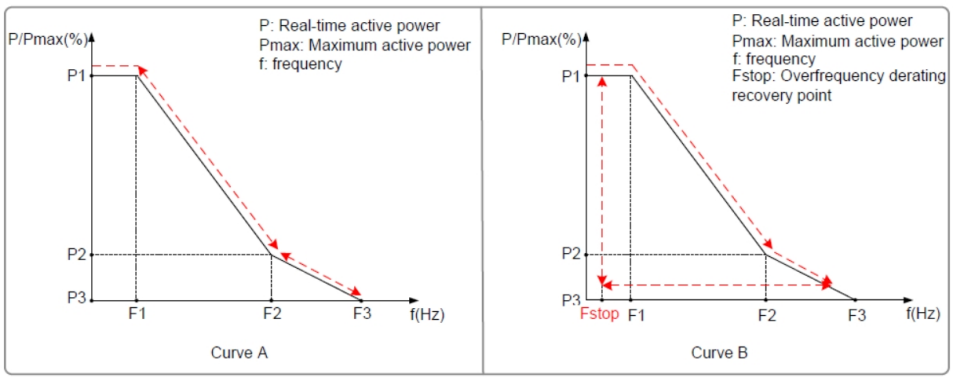


Figure 57 Over frequency derating curve



Curve A: The active power of inverter changes with the frequency in real time after over-frequency derating occurs.

Curve B: After over-frequency derating occurs, the active power of the inverter does not recover until the frequency reaches the over-frequency derating recovery point Fstop.

The table below shows the country setting at 50/60Hz.

Parameter	Description	Range
Power Reduction at Over frequency	When ON, the selected inverter will operate in active power derating mode when the grid frequency exceeds the set value.	ON/OFF
F1	These three values of frequency and power define the frequency derating curve. The user decides the slope of derating and enter the calculated values.	50.02 – 55.00 Hz 60.02 – 65.00 Hz
F2		50.02 – 55.00 Hz 60.02 – 65.00 Hz
F3		50.02 – 55.00 Hz 60.02 – 65.00 Hz
P1	P1>P2>P3	0.0 – 100.0%
P2		0.0 – 100.0%
P3		0.0 – 100.0%
Recovery Frequency	Power recovery frequency range.	50.00 – 55.00 Hz 60.00 – 65.00 Hz
Curve	This is to select the type of the derating curve.	A Curve / B Curve / C curve**
Power Derating Gradient	The gradient at which the power derating occurs.	1% -6000%/min

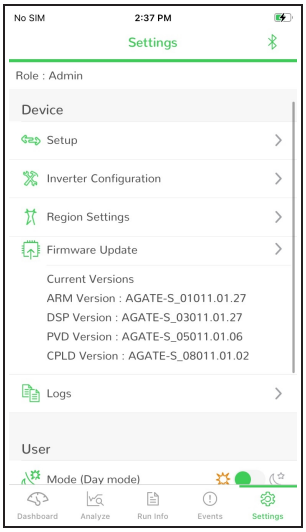
Power Recovery Time Delay	The delay to start the power recovery after frequency recovery.	0.0 – 1200.0 s
Power Recovery Gradient	The gradient at which the power recovery occurs.	1% -6000%/min
Power Response time	Set to change the response time .	0.0 – 10.00 s

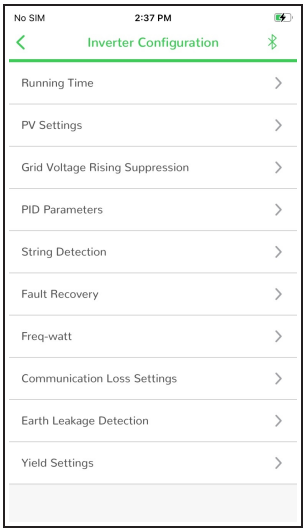
** Curve C is reserved and consistent with Curve A currently.

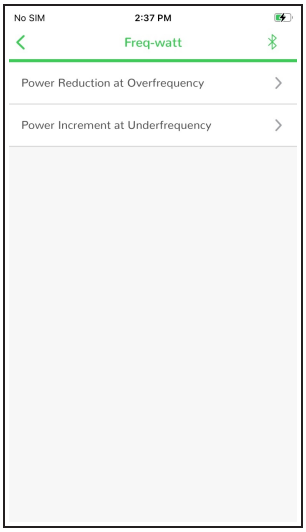
Under Frequency Power Uprating

To set the Power increment at Underfrequency:

1. Tap **Inverter Configuration** > **Freq-watt** > **Power increment at Underfrequency** to view the **Power increment at Underfrequency**.







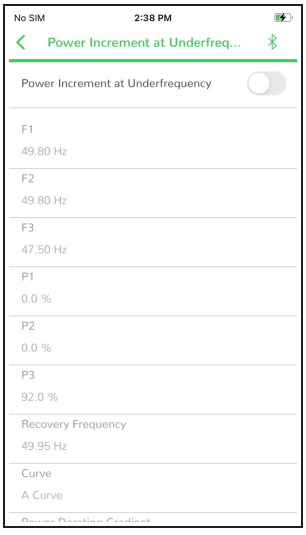
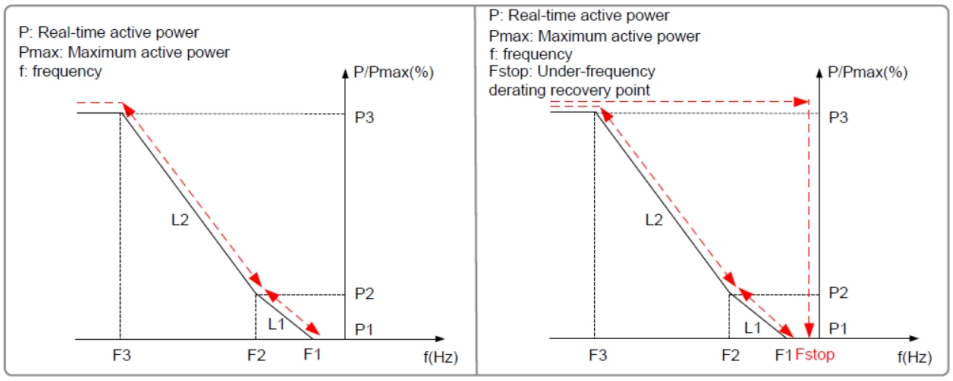


Figure 58 Under frequency uprating curve



The table below shows the country setting at 50/60Hz.

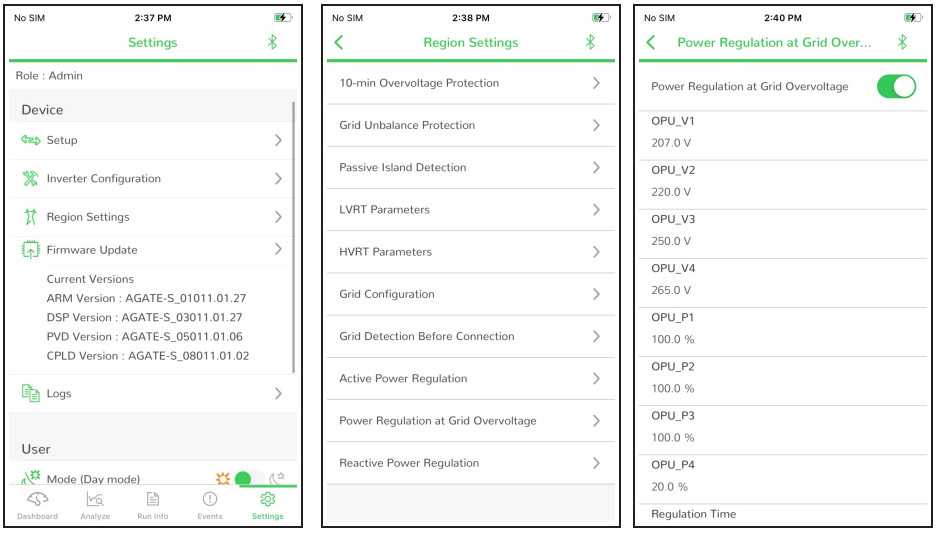
Parameter	Definition/Setting description	Range
Power uprating at Under frequency	When ON, the selected inverter will operate in active power uprating mode when the grid frequency goes below the set value.	ON/OFF
F1	These three values of frequency and power define the frequency uprating curve. The user decides the slope of uprating and enter the calculated values.	45 – 49.98Hz 55 – 59.98 Hz
F2		45 – 49.98Hz| 55 – 59.98 Hz
F3		45 – 49.98Hz 55 – 59.98 Hz
P1	P1<P2<P3	0.0 – 100.0%
P2		0.0 – 100.0%
P3		0.0 – 100.0%
Recovery Frequency	Power recovery frequency range	45.00 – 50.00 Hz 55.00- 60.00Hz
Curve	This is to select the type of the derating curve	A Curve / B Curve / C curve
Power Derating Gradient	The gradient at which the power derating occurs	1% -6000%/min
Power Recovery Time Delay	The delay to start the power recovery after frequency recovery	0.0 – 1200.0 s

Power Recovery Gradient	The gradient at which the power recovery occurs	1% -6000%/min
Power Response time	Set to change the response time	0.0 – 10.00 s

Volt-watt Mode (Power Regulation at Grid voltage)

To set the Power Regulation at Grid Overvoltage:

1. Tap **Region Settings** > **Power Regulation at Grid Overvoltage** to view the **Power Regulation at Grid Overvoltage**.



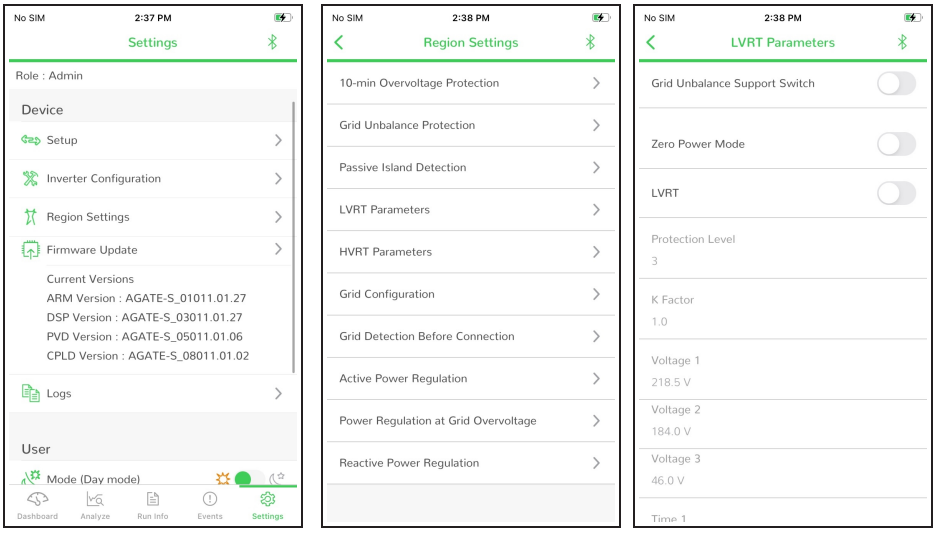
Parameter	Definition/Setting description	Range
Power Regulation at Grid Overvoltage	When ON, the selected inverter will operate in power regulation w.r.t grid voltage.	ON/OFF

OPU_V1	These four values of voltage and power define the power derating w.r.t Voltage. The user decides the slope of derating and enter the calculated values. P4<P3<P2<P1	184.0 - 322.0 V
OPU_V2		184.0 - 322.0 V
OPU_V3		184.0 - 322.0 V
OPU_V4		184.0 - 322.0 V
OPU_P1		0.0 – 100.0%
OPU_P2		0.0 – 100.0%
OPU_P3		0.0 – 100.0%
OPU_P4		0.0 – 100.0%
Regulation Time	Set to change the regulation time	1.0 s to 600 s

LVRT

To set the LVRT:

1. Tap **Region Settings** > **LVRT Parameters** to view the **LVRT Parameters**.



Parameter	Definition/Setting description	Range

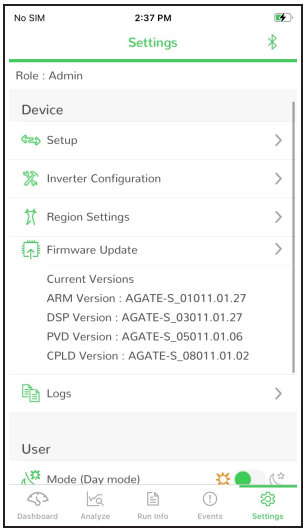
Grid Unbalance Support Switch	When the grid voltage is unbalanced and drops, the switch can be turned on to send unbalanced current to support the grid.	On/Off
Zero Power Mode	Whether power is output during LVRT.	On/Off
LVRT	LVRT function (Low voltage ride through: When faults of different types or disturbances in the power system cause voltage drop at the grid-connected point of the PV power plant, the PV plant can still keep running without disconnected from the grid within the specific voltage drop range and time interval).	On/Off
Protection Level	LVRT voltage protection level (1 to 5).	1~5
K Factor	The ratio of reactive current to voltage change.	0~10.0
Voltage N (N：1~5)	N-level LVRT voltage When the grid voltage exceeds this set value, the inverter sends reactive power according to the LVRT level and the factor K.	0-1.0 Rated voltage
Time N (N：1~5)	Specified time of N-level LVRT When the grid voltage is in the N-level LVRT voltage range and the duration exceeds this set value, the inverter will enter the standby mode.	40ms~14400000ms
Power Priority Mode	Set LVRT power priority mode.	Active Priority/Reactive Priority/Off
Limit Reactive Current	The switch for enabling/disabling the LVRT reactive power limit current.	On/Off
Maximum Reactive Current Value	LVRT maximum reactive current value.	0-100.0%
Zero Current Trigger	The switch for enabling/disabling the LVRT zero current trigger.	On/Off
Zero Current Trigger Voltage	LVRT zero current trigger voltage.	0-100.0%

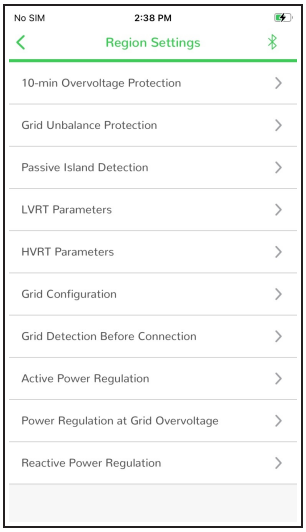
Reactive Superposition	The switch for enabling/disabling the LVRT reactive superposition.	On/Off
Voltage Mutation Triggers LVRT	The switch for enabling/disabling the Voltage mutation triggers LVRT.	On/Off
Voltage Mutation Value	LVRT voltage mutation value.	0-15.0%
LVRT Exit		On/Off
LVRT Exit Time		0-100s

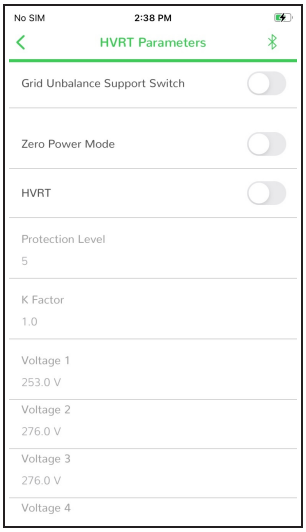
HVRT

To set the HVRT:

1. Tap **Region Settings** > **HVRT Parameters** to view the **HVRT Parameters**.







Parameter	Definition/Setting description	Range
Grid Unbalance Support Switch	When the grid voltage is unbalanced and high voltage ride through occurs, the switch can be turned on to send unbalanced current to support the grid.	On/Off
Zero Power Mode	Whether power is output during HVRT.	On/Off

HVRT	HVRT function (High voltage ride through: When faults of different types or disturbances in the power system cause voltage rise at the grid-connected point of the PV power plant, the PV plant can still keep running without disconnected from the grid within the specific voltage rise range and time interval).	On/Off
Protection Level	HVRT voltage protection level (1 to 5).	1~5
K Factor	The ratio of reactive current to voltage change during HVRT.	0~10.0
Voltage N (N：1~5)	N-level HVRT voltage When the grid voltage exceeds this set value, the inverter sends reactive power according to the HVRT level and the factor K.	1.0 to 1.4 times of rated voltage
Time N (N：1~5)	Specified time of N-level HVRT When the grid voltage is in the N-level HVRT voltage range and the duration exceeds this set value, the inverter will enter the standby mode.	40ms~14400000ms
Power Priority Mode	Set HVRT power priority mode.	Active Priority/Reactive Priority/Off
Limit Reactive Current	The switch for enabling/disabling the HVRT reactive power limit current.	On/Off
Maximum Reactive Current Value	HVRT maximum reactive current value.	0-100.0%
Zero Current Trigger	The switch for enabling/disabling the HVRT zero current trigger.	On/Off
Zero Current Trigger Voltage	HVRT zero current trigger voltage.	0-150.0%
Reactive Superposition	The switch for enabling/disabling the HVRT reactive superposition.	On/Off

Voltage Mutation Triggers HVRT	The switch for enabling/disabling the Voltage mutation triggers HVRT.	On/Off
Voltage Mutation Value	HVRT voltage mutation value.	0-15.0%
HVRT Exit		On/Off
HVRT Exit Time		0–100s

Firmware Update

The InsightMobile app can facilitate the firmware update of the CL Series inverter. The firmware update is done via Bluetooth, which eliminates physically opening the inverter enclosure.

Only personnel with Level 2 access can update firmware. Contact Schneider Electric Level 2 login and password information.

NOTICE

USER LEVEL ACCESS

- Charge the smart device to more than 50% to make sure that the smart device has sufficient battery for the firmware update.
- Do not switch off the smart device while updating the firmware.
- Stay near the inverter during the update process.
- Before going to the PV site to update the inverter, make sure that you have downloaded the latest firmware package to a laptop/PC and you have the latest InsightMobile app on your smart device.
- Ensure you bring the the USB cable for your smart device to the PV site.
- Ensure that the CL Series is powered by both AC and DC sources for the firmware update process.

Failure to follow these instructions may affect inverter operation.

System Requirements

To perform a firmware update on the CL Series, you need:

- Smart device
  - iOS 12 or above (iPhone 6 or newer models)
  - Android 7 or above
  - Bluetooth 4.1 LE

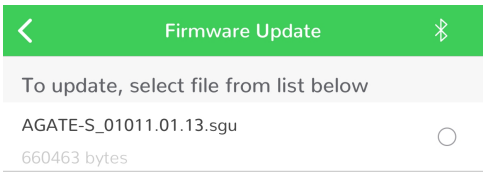
- Windows laptop/PC
  - Windows 7/10 (minimum)
  - Access to Internet

Android Smart Device

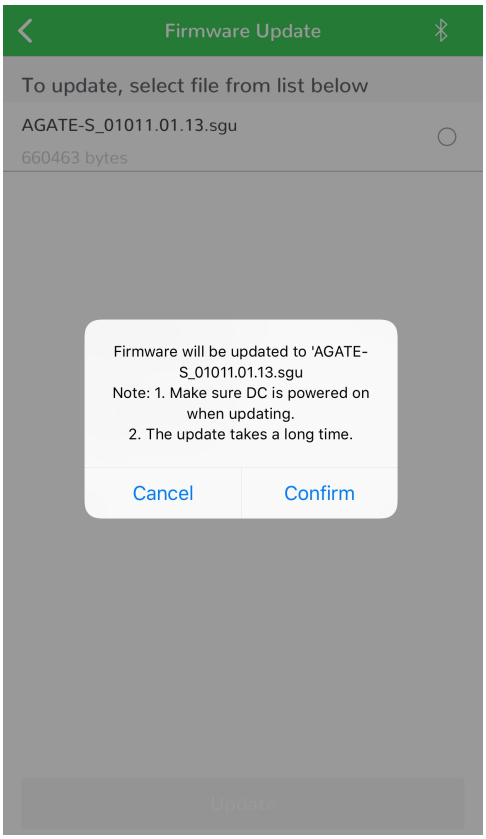
To update the firmware using a laptop/PC and an Android smart device:

1. From a laptop/PC, open a web browser and download the latest firmware package from the CL Series product website.

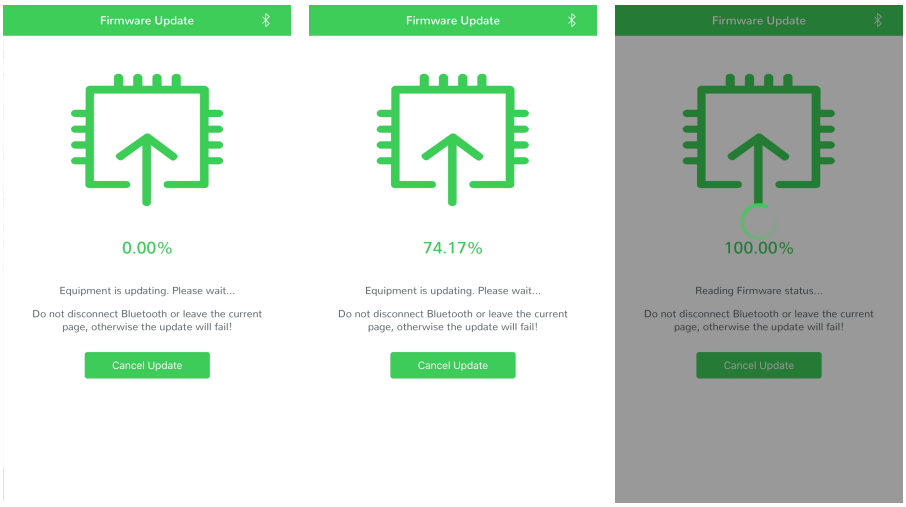
   https://solar.schneider-electric.com/product/conext-cl30-string-inverter-iec/
   https://solar.schneider-electric.com/product/conext-cl33-string-inverter-iec/
   https://solar.schneider-electric.com/product/conext-cl50-string-inverter-iec/
2. Open and unzip the firmware package.
3. Connect the device to the laptop/PC using a USB cable.
4. Connect the Android smart device as a USB device.
5. Browse the Android smart device's file system and navigate to the InsightMobile app files.
6. Copy the contents of the unzipped firmware package from the laptop/PC to the InsightMobile app files directory on the Android smart device.
7. Switch to your Android smart device and tap on the InsightMobile app icon.
8. Log in using admin credentials.
9. Tap **Settings**.
10. Tap **Firmware Update**.
11. Search and select the .sgu files firmware file.



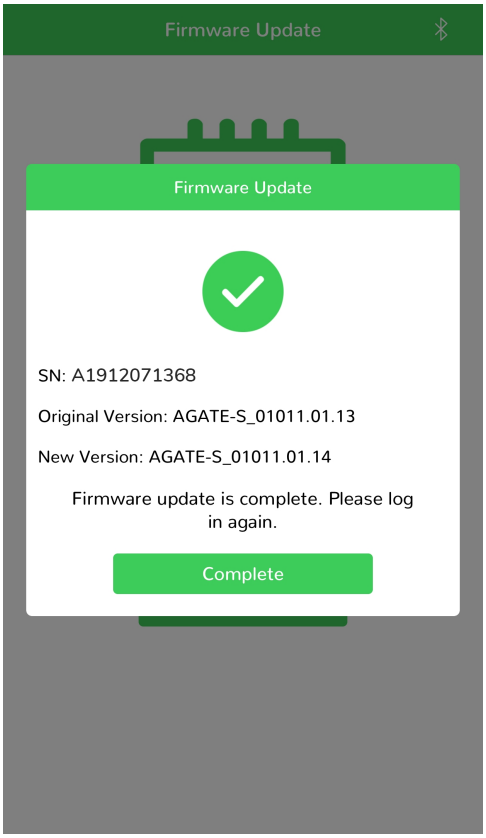
12. Tap **Confirm** to proceed with the Firmware update.



13. Observe the firmware update progress screen.
    You may tap the Cancel upgrade button to cancel the firmware update..



14. Tap **Complete** once the firmware update is finished.



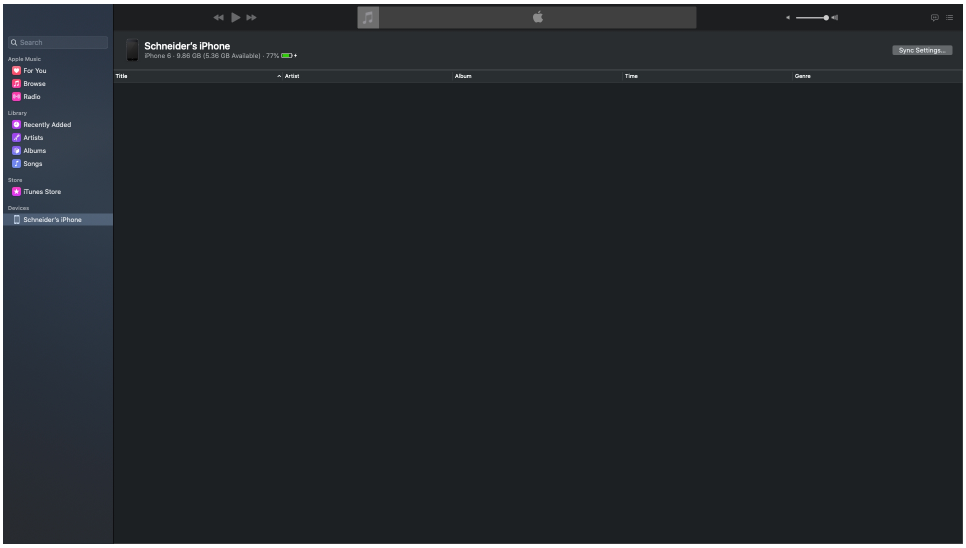
15. Restart the CL Series inverter by turning OFF both the AC and DC disconnect switches and then turning them ON.
16. Confirm that the firmware was updated from the InsightMobile app under **Settings** > **About**.

iOS Smart Device

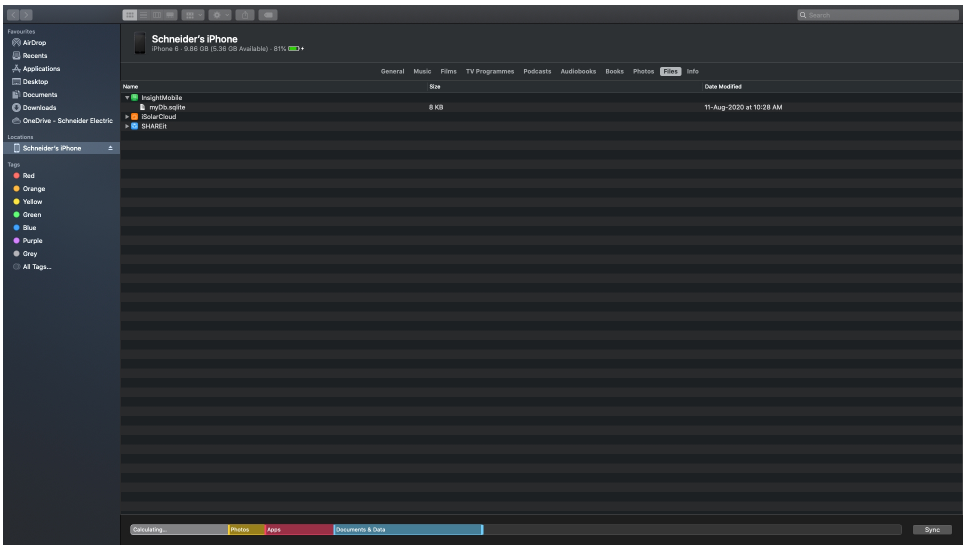
To update the firmware using a laptop/PC and an iOS smart device:

1. Download and install the latest Apple Music for Windows application from the Apple website. If you already have Apple Music on your Windows laptop/PC, simply update to the latest Apple Music for Windows version.
2. Open a web browser from the laptop/PC and download the latest firmware package from the CL Series product website.

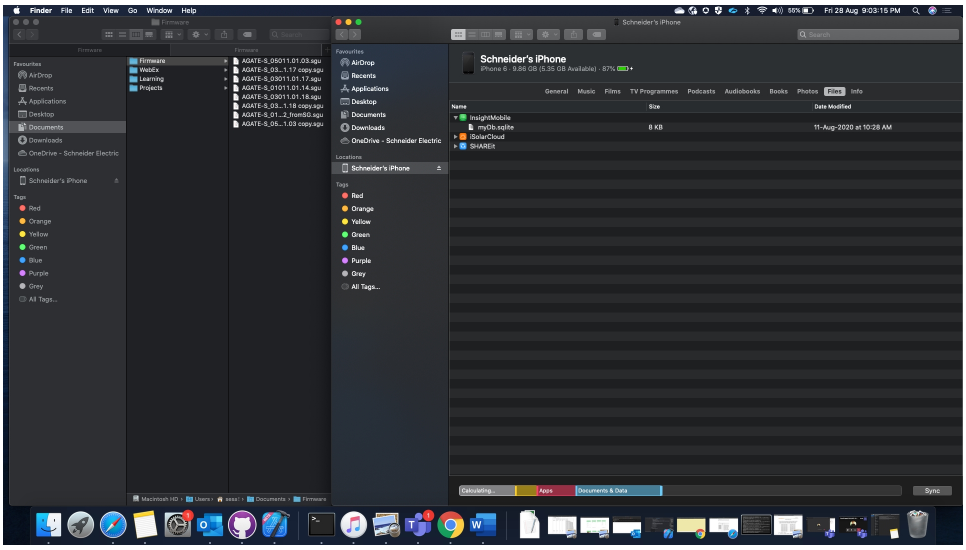
   https://solar.schneider-electric.com/product/conext-cl30-string-inverter-iec/
   https://solar.schneider-electric.com/product/conext-cl33-string-inverter-iec/
   https://solar.schneider-electric.com/product/conext-cl50-string-inverter-iec/
3. Open and unzip the firmware package and store the contents to a local folder.
4. Connect the iOS smart device to the laptop/PC using a USB cable.
5. Launch the Apple Music for Windows application.
6. Click the Phone icon.
7. Click **Sync Settings** at the top right of the screen.



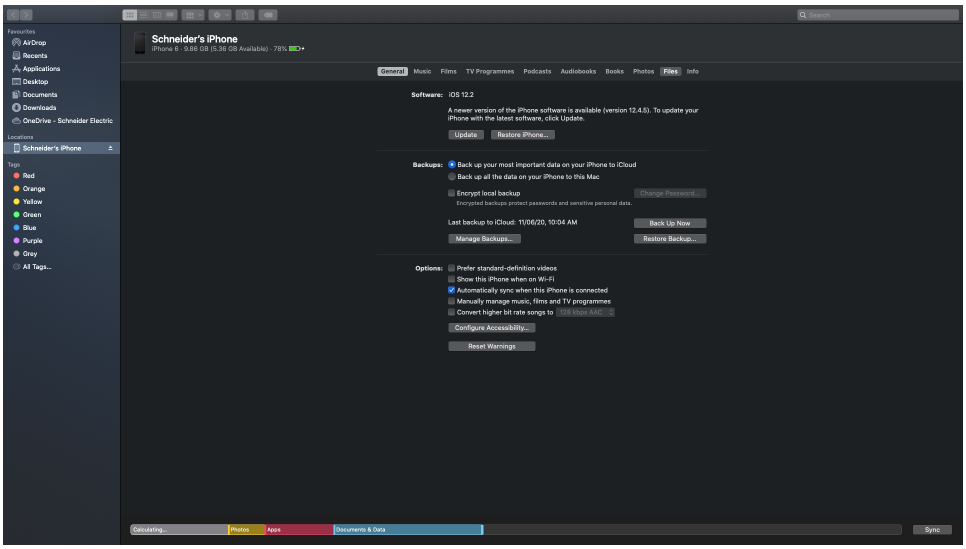
8. Click **Files** along the top bar.



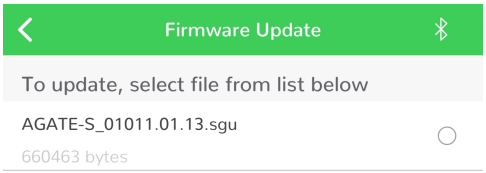
9. Put all your firmware files in Folder named as **Firmware** as shown. Folder name must be **Firmware**.
10. Drag and drop the **Firmware** folder under InsightMobile app.



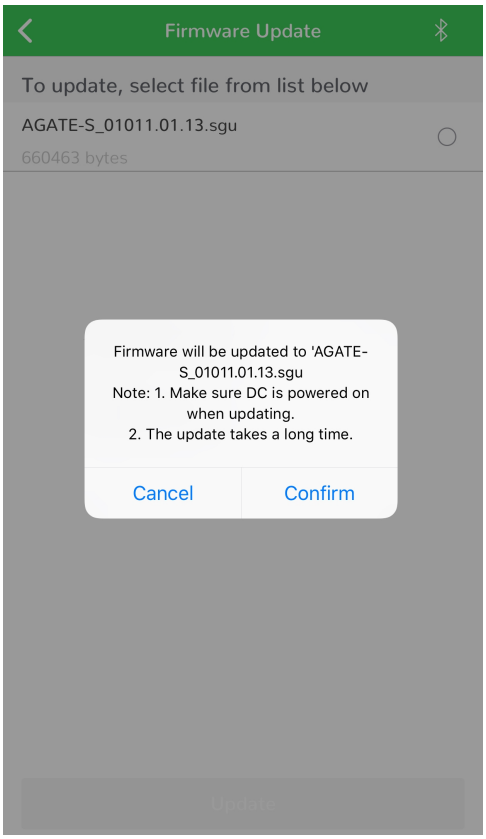
11. Click **Sync** at the bottom right of the screen and wait for cync to complete.



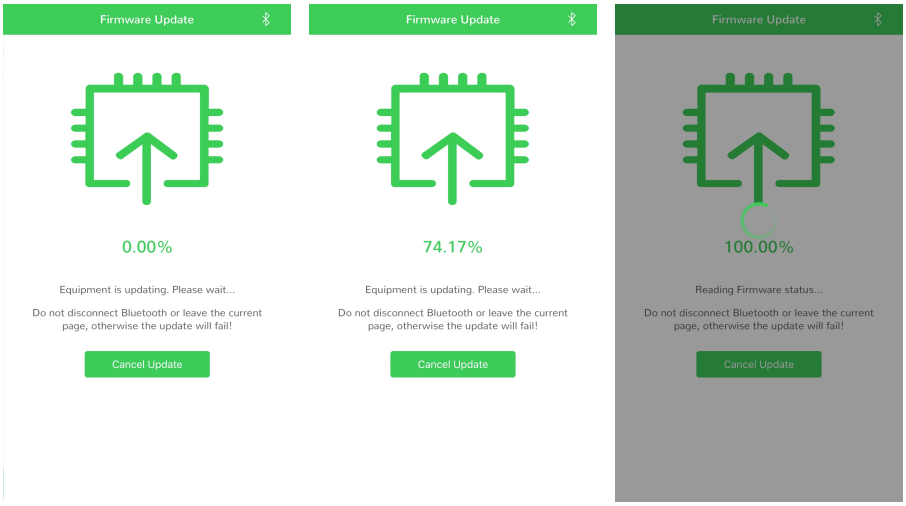
12. Switch to your iOS smart device and tap on the InsightMobile app icon.
13. Log in using admin credentials.
14. Tap **Settings**.
15. Tap **Firmware Update**.
16. Search and select the .sgu files firmware file.



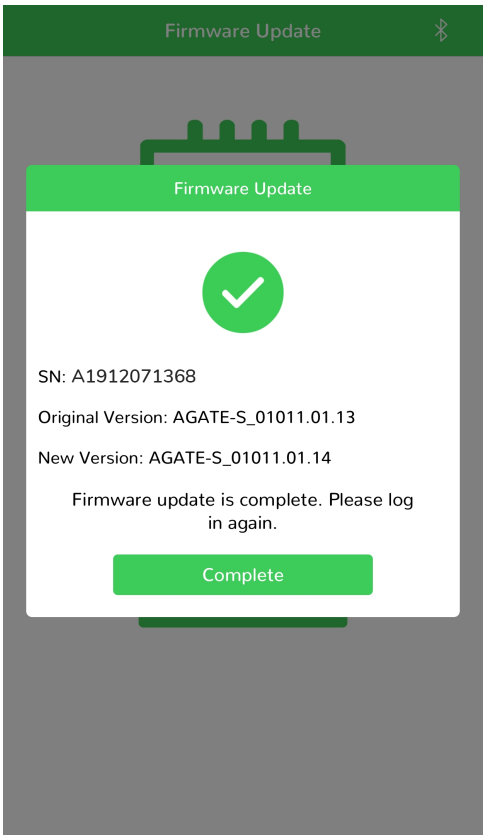
17. Tap **Confirm** to proceed with the Firmware update.



18. Observe the firmware update progress screen.
    You may tap the Cancel upgrade button to cancel the firmware update..



19. Tap **Complete** once the firmware update is finished.



20. Restart the CL Series inverter by turning OFF both the AC and DC disconnect switches and then turning them ON.
21. Confirm that the firmware was updated from the InsightMobile app under **Settings** > **About**.

6 Troubleshooting and Maintenance

What's in This Chapter?

Troubleshooting

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- The CL Series inverter is energized from multiple sources. Before removing covers, identify, de-energize, lock-out, and tag-out all power sources, and wait 10 minutes
- Do not open fuse under load. Do not open the front cover without physically disconnecting the PV cables or opening the external DC disconnect device before servicing.
- Never energize the inverter with the covers removed.
- Always use a properly rated voltage sensing device (1500VDC Cat II, 600VAC Cat III minimum rated) to confirm that all circuits are de-energized.
- Replace all devices and covers before turning on power to this equipment.
- The DC conductors of this photovoltaic system are ungrounded and may be energized.

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

Access to live parts shall be limited to suitably qualified electrical personnel.

LED Indicator

Table 12 Description of LED indicator

LED Indicator	LED State	Description
	Steady blue	The CL Series is connected to the grid and operating normally.
	Periodical flashing blue Period: 0.2 seconds 	The Bluetooth communication is connected and there is data communication. No Inverter Event or Alarm is present..
	Periodical flashing blue Period: 2 seconds 	The DC or AC side is powered on and the device is in standby or startup state (not feeding power into the grid).
	Steady red	An Event or Alarm is present and the inverter cannot connect to the grid.
	Flashing red	An Event or Alarm is present. The Bluetooth communication is connected and there is data communication.
	OFF	Both the AC and DC sides are powered down.

NOTE: If the problem persists, contact technical support at: http://solar.schneider-electric.com.

InsightMobile app

When a ground fault (or event) is detected, the InsightMobile app displays the messages. See *Configuration Options on page 98* for information on viewing events.

Event Code	Description	Solution
002	The grid voltage exceeds the inverter's allowable range. Protection time and protection thresholds depend on the country's requirements.	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the event occurs repeatedly: 1. Measure the grid voltage. Follow the DANGER message at the beginning of this chapter. 2. Check whether the protection parameters are appropriately set via the InsightMobile app. 3. Check whether the cross-sectional area of the AC cable meets the requirement. 4. Check if voltage drops are within acceptable limits. If the grid voltage exceeds the inverter's allowable range, contact the utility company for suggestions.
003	Grid transient voltage exceeds the allowable range.	This is a short term event caused by the grid. Wait for the inverter to recover automatically. If the problem persists, contact technical support.
004	The grid voltage is below the inverter's allowable lower limit. Protection time and protection thresholds depend on the country's requirements.	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the event occurs repeatedly: 1. Measure the grid voltage. Follow the DANGER message at the beginning of this chapter. 2. Check whether the protection parameters are appropriately set via the InsightMobile app. 3. Check whether the AC cable is firmly in place. 4. Check if voltage drops are within acceptable limits. If the grid voltage is lower than the inverter's allowable range, contact the utility company for suggestions. If the problem persists, contact technical support.

005	The grid voltage is lower than the set protection value	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the event occurs repeatedly: 1. Measure the grid voltage. Follow the DANGER message at the beginning of this chapter. 2. Check whether the protection parameters are appropriately set via the InsightMobile app. 3. Check whether the AC cable is firmly in place. 4. Check if voltage drops are within acceptable limits. This is a short term event caused by the grid. Wait for the inverter to recover automatically. If the problem persists, contact technical support.
007	AC instantaneous over current, AC output current exceeds the upper limit of the inverter.	Wait for the inverter to recover automatically.
008	The grid frequency exceeds the inverter's allowable upper limit.	Measure the grid frequency. Follow the DANGER message at the beginning of this chapter. Check whether the protection parameters are appropriately set via the InsightMobile app. If the grid frequency exceeds the inverter's allowable range, contact the utility company for suggestions.
009	The grid frequency exceeds the inverter's allowable lower limit.	
010	Grid power outage, AC switch or circuit is disconnected.	Check whether the AC circuit breaker is connected and turned on. Check whether AC cables are all properly connected. Check whether the grid is in service. If the problem persists, contact technical support.
011	Device anomaly	Wait for the inverter to recover automatically. Disconnect the AC and DC switches, and reconnect the AC and DC switches 15 minutes later to restart the inverter. If the problem persists, contact technical support.
012	Excessive current leakage is detected.	The event can be caused by excessive leakage current if the AC and DC cables with lower insulation resistance are installed in a damp environment. The inverter will be reconnected to the grid after the environment has improved. If the environment is normal, check whether the AC and DC cables are well insulated. If the problem persists, contact technical support.

013	Grid abnormal, the grid voltage or frequency is out of the permissible range, and the inverter cannot be connected to the grid normally.	If the grid voltage or frequency exceeds the inverter's allowable range, contact the utility company for suggestions. If the problem persists but the grid voltage is within the inverter's allowable range, contact technical support.
014	The average grid voltage keeps exceeding the allowable range for over 10 minutes.	Wait for the inverter to recover automatically. If the grid voltage exceeds the inverter's allowable range, contact the utility company for suggestions. If the problem persists, contact technical support.
015	Grid overvoltage, the grid voltage is higher than the set protection value	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the event occurs repeatedly: 1. Measure the grid voltage. Follow the DANGER message at the beginning of this chapter. 2. Check whether the protection parameters are appropriately set via the InsightMobile app. 3. Check whether the overall grid impedance of the AC cable meets the requirement. Wait for the inverter to recover automatically. If the grid voltage exceeds the inverter's allowable range, contact the utility company for suggestions. If the problem persists, contact technical support.
016	AC output overload The configured module power is excessively large and out of the normal operation range of the inverter.	Wait for the inverter to recover automatically. Check whether the DC/AC ratio is well within the specified limit (<1.3). If the problem persists, contact technical support.
017	Grid voltage imbalance	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the event occurs repeatedly: 1. Measure the actual grid voltage. If grid phase voltages differ greatly, contact the power company for solutions. 2. If the voltage difference between the three phases is within the permissible range of the local power company, modify the grid voltage imbalance parameter through the InsightMobile app. If the problem persists, contact technical support.

019-020	Device anomaly.	Wait for the inverter to recover automatically. Disconnect the AC and DC switches, and reconnect the AC and DC switches 15 minutes later to restart the inverter. If the problem persists, contact technical support.
021-022	Device anomaly.	Wait for the inverter to recover automatically. Disconnect the AC and DC switches, and reconnect the AC and DC switches 15 minutes later to restart the inverter. If the problem persists, contact technical support.
024-025 030-034	Device anomaly.	Wait for the inverter to recover automatically. Disconnect the AC and DC switches, and reconnect the AC and DC switches 15 minutes later to restart the inverter. If the problem persists, contact technical support.
036	Power module temperature is too high.	Check whether the inverter is directly exposed to sunlight. If so, take some shading measures. Check and clean the air ducts. Check whether there is 070 (fan anomaly) alarm via the InsightMobile app. If the problem persists, contact technical support.
037	Internal ambient temperature is too high.	Check whether the inverter is directly exposed to sunlight. If so, take some shading measures. Check and clean the air ducts. Check whether there is 070 (fan anomaly) alarm via the InsightMobile app. If the problem persists, contact technical support. If the problem persists, contact technical support.
038	Device anomaly	Wait for the inverter to recover automatically. Disconnect the AC and DC switches, and reconnect the AC and DC switches 15 minutes later to restart the inverter. If the problem persists, contact technical support.

039	Low PV array system insulation resistance, which is generally caused by poor insulation to ground of the module/cable or by rainy and damp environment.	Wait for the inverter to return to normal. If the event occurs repeatedly: 1. Check whether the ISO resistance protection value is excessively high via the InsightMobile app, and ensure that it complies with the local regulations. 2. Check the resistance to ground of the string and DC cable. Take corrective measures in case of short circuit or damaged insulation layer. 3. If the cable is normal and the event occurs on rainy days, check it again when the weather is not damp. If the event still occurs, then you need to improve the cable resistance. If the problem persists, contact technical support.
040-042	Device anomaly	Wait for the inverter to recover automatically. Disconnect the AC and DC switches, and reconnect the AC and DC switches 15 minutes later to restart the inverter. If the problem persists, contact technical support.
043	Ambient temperature is lower than the temperature at which the inverter can operate normally	Stop operating the inverter and disconnect it from all power sources. Wait for the ambient temperature to rise within the allowable range and then restart the inverter.
044-046	Device anomaly	Wait for the inverter to recover automatically. Disconnect the AC and DC switches, and reconnect the AC and DC switches 15 minutes later to restart the inverter. If the problem persists, contact technical support.
047	PV input configuration abnormal, PV input mode error	Disconnect the inverter from all power sources. Check all the PV inputs to ensure the parameters are well within the specification and check each PV input connection.
048-050 053-056 059-060	Device anomaly	Wait for the inverter to recover automatically. Disconnect the AC and DC switches, and reconnect the AC and DC switches 15 minutes later to restart the inverter. If the problem persists, contact technical support.
070	Fan alarm	Stop operating the inverter, disconnect from all power sources. Check the fan for excessive dust or debris and clean as required. If the problem persists, contact technical support.
071	AC side SPD event	If the problem persists, contact technical support.
072	DC side SPD event	

076	Device anomaly	Check the PV system design and adjust the connection of PV inputs. Wait for the inverter to recover automatically. Disconnect the AC and DC switches, and reconnect the AC and DC switches 15 minutes later to restart the inverter.
078	PV1 abnormal	Check the PV input terminals for loose connections. Tighten the connections according to torque specifications found in *Torque Values on page 54*. Check if the DC fuse of particular string is damaged . If so, replace the fuse. If the problem persists, contact technical support.
079	PV2 abnormal	
080	PV3 abnormal	
081	PV4 abnormal	
087	Electric arc detection module abnormal	The inverter can operate normally. Check whether the related cable connection and terminals are abnormal, and check whether the ambient environment is abnormal. If so, remove the corresponding abnormity. If the problem persists, contact technical support.
088	Electric arc event	Disconnect the DC inputs and check whether DC cables are damaged, whether the wiring terminals or fuses are loose or in poor contact, and whether component parts are burnt. If so, take corresponding corrective measures. After taking corresponding measures above, reconnect the DC inputs. Remove the arc event through the InsightMobile app so that the inverter will recover to be normal. If the problem persists, contact technical support.
089	Electric arc detection disabled	Enable the AFD function through the InsightMobile app so that the inverter will recover to be normal. If the problem persists, contact technical support.
105	Protection self-check event on grid side	Check the grid is within the specifications of the inverter. If its well within the range, restart the inverter or clear the event through the InsightMobile app. If the problem persists, contact technical support.
106	AC ground fault	Check whether the AC cable is correctly connected. Check whether the insulation between the ground cable and the live wire is normal. If the problem persists, contact technical support.

116-117	Device anomaly	Wait for the inverter to return to normal. Disconnect the AC and DC switches, and reconnect the AC and DC switches 15 minutes later to restart the inverter. If the problem persists, contact technical support.
220 221 222 223 224 225 226 227	PV5 Abnormal PV6 Abnormal PV7 Abnormal PV8 Abnormal PV9 Abnormal PV10 Abnormal PV11 Abnormal PV12 Abnormal	Check the PV input terminals for loose connections or bad crimps/terminations. Tighten the connections according to torque specifications found in *Torque Values on page 54*. Check if the crimping or termination of the particular string is damaged or incorrect. If the problem persists, contact technical support.
448~471	String x reverse connection event	Check whether the corresponding string is of reverse polarity. If so, disconnect the DC switch and adjust the polarity when the solar radiation is low and the string current drops below 0.5 A. If the problem persists, contact technical support. The code 448 to code 471 are corresponding to string 1 to string 24 respectively.
532-547	String x reverse connection alarm	Check whether the corresponding string is of reverse polarity. If so, disconnect the DC switch and adjust the polarity when the solar radiation is low and the string current drops below 0.5 A. If the problem persists, contact technical support. The code 532 to code 547 are corresponding to string 1 to string 16 respectively.
548-563	String x output current anomaly	Check whether the corresponding module is sheltered. If so, remove the shelter and ensure module cleanness. Check the module for abnormal aging. If the problem persists, contact technical support. The code 548 to code 563 are corresponding to string 1 to string 16 respectively.
564-571	String x reverse connection alarm	Check whether the corresponding string is of reverse polarity. If so, disconnect the DC switch and adjust the polarity when the solar radiation is low and the string current drops below 0.5A. If the problem persists, contact technical support. The code 564 to code 571 are corresponding to string 17 to string 24 respectively.

580-587	String x output current anomaly	Check whether the corresponding module is sheltered. If so, remove the shelter and ensure module cleanness. Check the module for abnormal aging. If the problem persists, contact technical support. The code 580 to code 587 are corresponding to string 17 to string 24 respectively.

NOTE: If the problem persists, contact technical support at: http://solar.schneider-electric.com.

Maintenance

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- The CL Series inverter is energized from multiple sources. Before removing covers, identify, de-energize, lock-out, and tag-out all power sources, and wait 10 minutes
- Do not open fuse under load. Do not open the front cover without physically disconnecting the PV cables or opening the external DC disconnect device before servicing.
- Never energize the inverter with the covers removed.
- Always use a properly rated voltage sensing device (1500VDC Cat II, 600VAC Cat III minimum rated) to confirm that all circuits are de-energized.
- Replace all devices and covers before turning on power to this equipment.
- The DC conductors of this photovoltaic system are ungrounded and may be energized.

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

Routine Maintenance

Component	Maintenance	Frequency
CL Series unit	Check the temperature and dust accumulation on the inverter. Clear the inverter enclosure of any leaves, sand, and dust build up and other debris, if necessary. Check if the air inlet and outlet are clear of any debris. Clean the air inlet and outlet, if necessary.	Every six months
Fans	Check whether there are visible cracks on the fan blades. Check for unusual noise when the fan is turning. Clean the fans (see *Fan Maintenance on page 154*).	Every six months
Firmware	Compare the firmware version on the product page with the firmware version installed on the inverter and upgrade, if necessary. To upgrade, see the *CL Series EasyConfig Tool Owner's Guide* for instructions.	Every six months
Electrical Connections	Check whether all cables are firmly in place. Check all cables for damage, especially any part contacting the metal enclosure.	Every six months

Maintenance Instructions

Fan Maintenance

Fans inside the PV inverter are used to cool the inverter during operation. If the fans do not operate normally, the inverter may not be cooled down and operational efficiency may decrease. Therefore, it is necessary to maintain the fans and keep them clean and free of debris.

Contact tech support at http://solar.schneider-electric.com.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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- Replace all devices and covers before turning on power to this equipment.
- The DC conductors of this photovoltaic system are ungrounded and may be energized.

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

To clean fans:

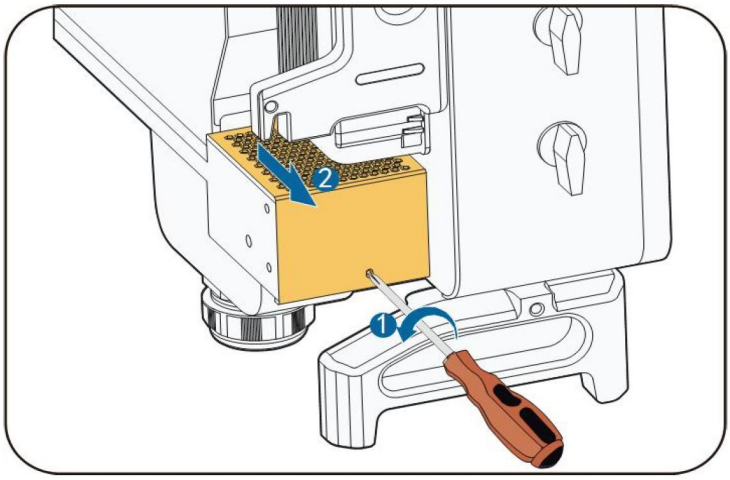
NOTICE

EQUIPMENT DAMAGE

Do not use pressurized air (compressed air) to clean the fan. This will force debris inside the enclosure.

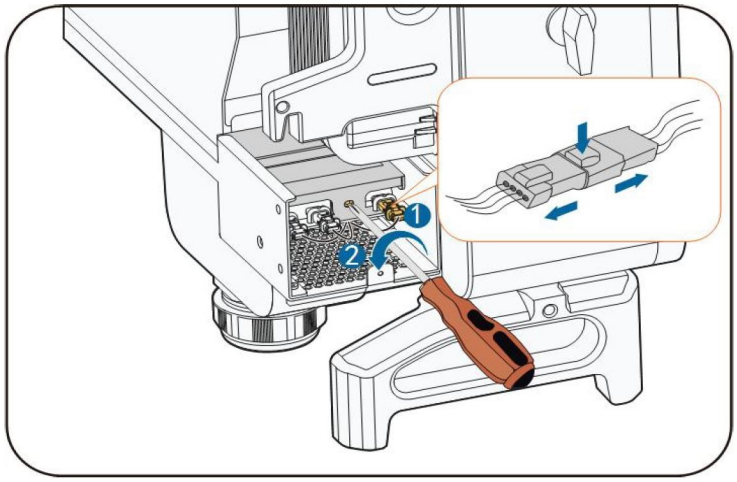
Failure to follow these instructions can result in equipment damage.

1. Perform the steps in *Disconnecting the CL Series on page 158*.
2. Remove the screws on the sealing plate of the fan module, as shown.

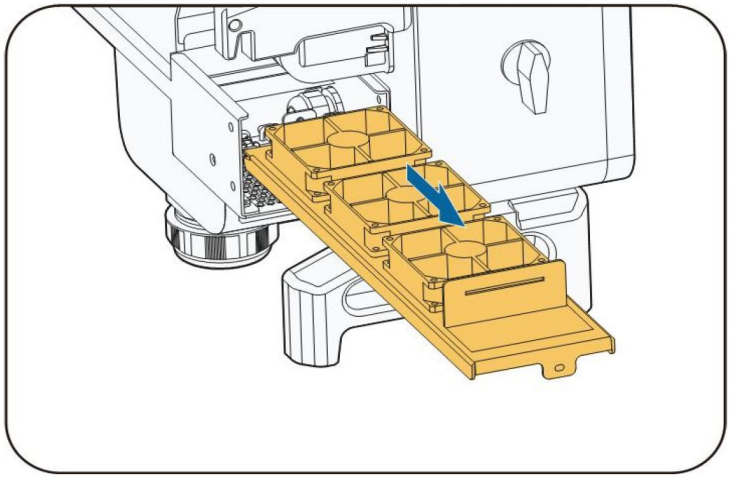


3. Press the hump of the latch hook, unplug the cable connection joint outwards, and

loosen the screw on the fan holder.



4. Pull out the fan module, clean the fans with soft brush or vacuum cleaner.



5. Reinstall the fan back to the inverter in reverse order.
6. Perform the *Commissioning Procedure on page 88*

Cleaning the Air Inlet and Outlet

Heat is generated in the process of running the inverter. The inverter adopts a controlled forced-air cooling method.

In order to maintain good ventilation, make sure that the air inlet and outlet grates are not blocked and they are clear of any debris.

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

NOTICE
EQUIPMENT DAMAGE Do not use pressurized air (compressed air) to clean the fan. This will force debris inside the enclosure. **Failure to follow these instructions can result in equipment damage.**

7 Decommissioning

What's in This Chapter?

Disconnecting the CL Series

For maintenance work or any service work, the CL Series PV inverter must be disconnected from all power sources.

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- The CL Series inverter is energized from multiple sources. Before removing covers, identify, de-energize, lock-out, and tag-out all power sources, and wait 10 minutes
- Do not open fuse under load. Do not open the front cover without physically disconnecting the PV cables or opening the external DC disconnect device before servicing.
- Never energize the inverter with the covers removed.
- Always use a properly rated voltage sensing device (1500VDC Cat II, 600VAC Cat III minimum rated) to confirm that all circuits are de-energized.
- Replace all devices and covers before turning on power to this equipment.
- The DC conductors of this photovoltaic system are ungrounded and may be energized.

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

To disconnect the inverter from DC and AC power sources:

Follow steps 1 and 2 in sequence exactly.

1. Open the AC circuit breaker (turn it OFF) and perform the *Lock-Out Tag-Out (LOTO) Procedure on page 10*, if not yet done.
2. Open the upstream DC disconnect device (turn it OFF).
3. Turn the DC switch(es) of the PV inverter to OFF position.
4. Pull all the DC cables from the MC4 connectors.
   Avoid using standard pliers. Use the proper MC4 tool to disconnect the DC cables from the terminals.
5. Wait about ten minutes until the capacitors inside the inverter have discharged.
6. Measure the AC voltage to ground at the AC terminal to confirm that the AC output voltage of the inverter at the AC circuit breaker is zero.
7. Remove the AC cables from the terminals.
8. Remove the DC cables and communication cables from the terminals.
9. Install the MC4 waterproof plugs.
10. Plug all other cable glands.

Dismantling the CL Series

To dismantle the CL Series inverter:

1. Refer to *Electrical Connections on page 56* for the steps to disconnect all communication, ground, AC and DC cables in reverse.
2. Reverse the steps found in *Install and Mount the CL Series on page 50*.
3. Store the PV inverter according to the guidelines below.
    a. Inverter must be packed inside its original carton with the desiccant bags inside.
    b. Store the inverter with its front panel facing up. The carton should lay flat and parallel to the ground.
    c. Seal the carton with standard packaging tape.
    d. Store the inverter in a dry and clean place to protect it against dust and moisture. See notice below.
    e. Relative temperature: -40 to 70 °C
    f. Relative humidity: 0 to 95%.
    g. Do not stack more than four inverters (carton) together.
    h. Keep the inverter away from chemically corrosive materials.
    i. Periodically check for any visible damages to the carton and inspect the inverter right away if the carton shows signs of penetration during the storage period. Replace the carton, if necessary.

NOTE: A thorough and professional inspection may be required before re-installing the inverter after more than six months in storage. Contact an qualified installer.

Disposing of the CL Series Inverter

The end user of the CL Series is responsible for the proper disposal of the PV inverter.

Follow the Schneider Elective directive and do not dispose of or discard the CL Series along with ordinary household garbage or organic waste.

Always follow regional, national, and/or local waste disposal directives concerning disposing, discarding, or recycling of equipment containing electronic and electrical components such as the CL Series.

8 Specifications

What's in This Chapter?

Specifications

	CL 30	CL 33	CL 50
DC side			
DC max. input voltage	1100 V	1100 V	1100 V
Full power MPPT voltage range (PF=1) (VDC)	550 – 850 V	550 – 850 V	550 – 850 V
Operating voltage range at nominal AC voltage	200 – 1000 V	200 – 1000 V	200 – 1000 V
Start voltage (VDC)	250 V	250 V	250 V
Max. DC short circuit current (ADC)	120 A	120 A	200 A
Max. PV input current (ADC)	78 A	78 A	130 A
Max. current for input connector	30 A	30 A	30 A
Number of MPPT / max. number of inputs per MPPT	3 MPPT / (2+2+2)	3 MPPT / (2+2+2)	5 MPPT / (2+2+2+2+2)
DC connectors / max. current per input (ADC)	MC4 / 30 A	MC4 / 30 A	MC4 / 30 A
DC switch / DC SPD[1]	YES (1 DC switch) / TypeII	YES (1 DC switch) / TypeII	YES (2 DC switches) / TypeII
Max. PV input	45 kW	49.5 kW	76 kW
Max. inverter backfeed current to the array	0 A	0 A	0 A
AC Side			
Nominal AC power @3 / N / PE，230 / 400V	29900 W	33000 W	50000 W
Max. AC output power @45°C , 415 Vac (Rated apparent power for Australia)	29.9 kVA (29.9 kVA)	36.3 kVA	55 kVA (50 kVA)
Max. output fault current (AC) and duration	168 A @1.4 ms	168 A @1.4 ms	235 A @ 1.25 ms
AC nominal output voltage (VAC) / AC voltage range A (VAC)	400 V (L-L) 3/N/PE 312 V (L-L) to 528 V (L-L)	400 V (L-L) 3/N/PE 312 V (L-L) to 528 V (L-L)	400 V (L-L) 3/N/PE 312 V (L-L) to 528 V (L-L)
Frequency / frequency range	50 Hz & 60 Hz / 45 to 55 Hz & 55 to 65 Hz	50 Hz & 60 Hz / 45 to 55 Hz & 55 to 65 Hz	50 Hz & 60 Hz / 45 to 55 Hz & 55 to 65 Hz
Max. output current (AAC)	48.15 A	55.2 A	83.6 A (80.5 A for Australia)
Power factor	0.8 lead to 0.8 lag	0.8 lead to 0.8 lag	0.8 lead to 0.8 lag

[1] The unit is provided with a DC disconnect switch. However for ANZ countries, there may be a requirement of an additional external DC disconnect (not provided) as per local installation guidelines.

THD at nominal power	<3%	<3%	<3%
AC connection	OT or DT terminal (max.70 mm^2)	OT or DT terminal (max.70 mm^2)	OT or DT terminal (max.70 mm^2)
AC disconnect	NO	NO	NO
AC connection	4 wire grounded WYE or ungrounded DELTA		
Grid support	Q atnight function, LVRT, HVRT, active & reactive power control and power ramp rate control		
General Specifications			
Acoustic noise	55 dB	55 dB	55 dB
Peak efficiency Euro efficiency	98.6% 98.3%	98.6% 98.3%	98.7% 98.4%
Power consumption at night time	<=2 W	<=2 W	<=2 W
Enclosure rating	IP66	IP66	IP66
Protective class	I	I	I
OVC	III (mains), II (PV)	III (mains), II (PV)	III (mains), II (PV)
PID recovery function	Yes	Yes	Yes
Inverter gross weight (including box)	55	55	66
Inverter box dimensions (L x W x H)	909 x 678 x 384	909 x 678 x 384	993 x 718 x 366
Inverter net weight	50 kg	50 kg	62 kg
Inverter dimensions (L x W x H) mm	702 × 595 × 310	702 × 595 × 310	782 × 645 × 310
Cooling method	Smart forced air cooling	Smart forced air cooling	Smart forced air cooling
Ambient air temperature for operation	-30 to 60 °C (> 45 °C derating)	-30 to 60 °C (> 45 °C derating)	-30 to 60 °C (> 45 °C derating)
Max. operating altitude	4000 m (> 3000 m derating)	4000 m (> 3000 m derating)	4000 m (> 3000 m derating)
Relative temperature (in storage)	-40 to 70 °C	-40 to 70 °C	-40 to 70 °C
Relative humidity, non-condensing(%)	0 – 100%	0 – 100%	0 – 100%
Inverter mounting	Vertical or inclined 10° with ground	Vertical or inclined 10° with ground	Vertical or inclined 10° with ground
User Interface and Communications			
User interface	LED, Bluetooth + InsightMobile app	LED, Bluetooth + InsightMobile app	LED, Bluetooth + InsightMobile app
Communication interface	RS485 / Wi-Fi (optional) / Ethernet (optional)	RS485 / Wi-Fi (optional) / Ethernet (optional)	RS485 / Wi-Fi (optional) / Ethernet (optional)

Regulatory Approvals	
Certifications	IEC/EN 62109-1, IEC/EN 62109-2, IEC/EN 61727, IEC/EN 62116, IEC/EN 61683, EN 50530, IEC/EN 60529, UTE C15-712, VDE-AR-N 4105:2018, AS/NZS 4777.2:2020 (applicable for CL 30 and CL 50 only), CEI 0-21, CEI 0-16, VDE 0126-1-1, UAE DEWA, Spain PO12.3, South Africa NRS 097-2-1 Emissions: IEC/EN 61000-6-3 Immunity: IEC/EN 61000-6-2
Environmental	RoHS, REACH, WEEE, IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-14, IEC 60068-2-30, IEC 60068-2-27, IEC 60068-2-64

Schneider Electric

As standards, specifications, and designs change from time to time, please ask for confirmation of the information given in this publication.

For other country details please contact your local Schneider Electric Sales Representative or visit the Schneider Electric Solar Business website at: https://solar.se.com/

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