Clearline
EV

Installation & Commissioning

CEV-S7

v1.01
80044

viridian solar

Clearline EV

Table of Contents

Important: Read carefully before use. Keep for future reference.

1.0 Introduction

This document details the installation instructions for the Clearline EV and includes:

- How to mount and wire up Clearline EV.
- How to complete the software configuration.
- Charger LED status description.

It is important to note that the information in this document is subject to change without notice, please download the latest version from

https://www.viridiansolar.com/assets/ClearlineEV-Installation-Guide.pdf

In accordance with current UK legislation the customer has the facility to view the charging history and modify the default charging schedules and random start delay by logging into the charging station using their dedicated EV user account credentials.

2.0 Pre-requisites

For installation of Clearline EV you will require the following:

1. A Wi-Fi enabled device with a browser such as a laptop or mobile phone.
2. Appropriate cable gland based on your cable sizing.
3. Where Ethernet connection is required a hole cutter and cable gland of suitable size.
4. The “Installer Access Label” - found attached to the rear housing.

2.1 Residential Wi-Fi

Weak or unstable Wi-Fi signals may result in an unreliable or failed installation of the Clearline EV. If the building has a Wi-Fi connection available at the time of installation we recommend that the integrity of the Wi-Fi signal is checked before fitting the device in its proposed location.

This can be done using a suitable Wi-Fi analyser app on your mobile device to verify that signal stability, strength, and interference levels are adequate. Apps are available for both Android and iOS devices. The customer will need to provide their Wi-Fi SSID, found on the router label.

While standing at the intended charger installation location use the Wi-Fi analyser app to measure the signal integrity. The ideal value should be no greater than -60dB. (See section 13 for more details).

If the Wi-Fi integrity is not suitable, the following options are available:

1) Choose a different location for Clearline EV
2) Install a 2.4gHz Wi-Fi booster.
3) Use the hard-wired Ethernet option.
4) Re-locate the Wi-Fi router.

3.0 Installation Instructions

3.1 Physical Installation

1. Remove Clearline EV from its packaging.

   The charger has a detachable fascia and this will be the final component to fit.

   The centre section contains the charger socket and main electrical components.

   The rear housing contains the Wi-Fi and where applicable the GSM PCB. You will also find the “Installer Access Label” attached to the inside of this housing.

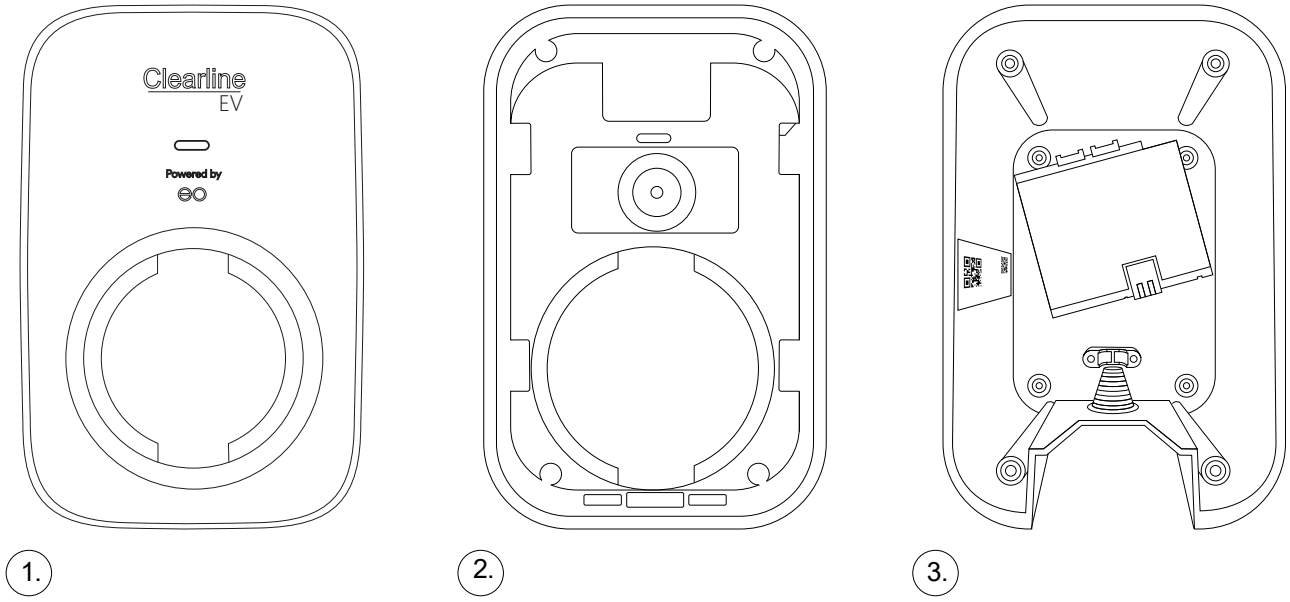

Figure 1: Box contents.

1. Clearline EV front fascia.
2. Main section.
3. Rear housing, Wi-Fi PCB and “Installer Access Label”.

2. After you have found a suitable mounting location (see section 2.1), offer the base of the Clearline EV to the installation location; make sure the surface is flat and level.

   Level the Clearline EV base and mark the position of the four holes. Take the Clearline EV base away and drill the four holes in the mounting surface.

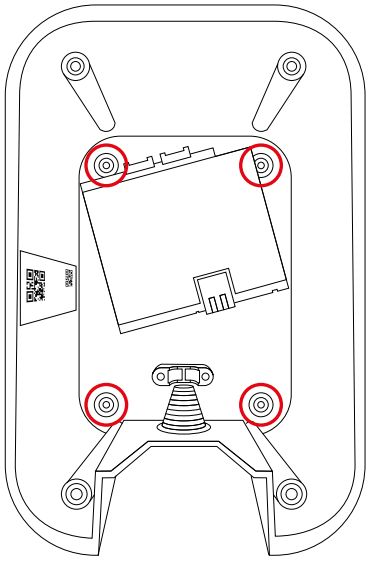

Figure 2: Clearline EV backplate.

3. Attach the Clearline EV base to the wall using four screws provided. Ensure the charger is secure and flush against the wall. Use packing washers if necessary for a flush fit.

4. Strip and prepare the power cable and feed into the pre-made hole and stepped grommet. A 25mm gland can be used if required.

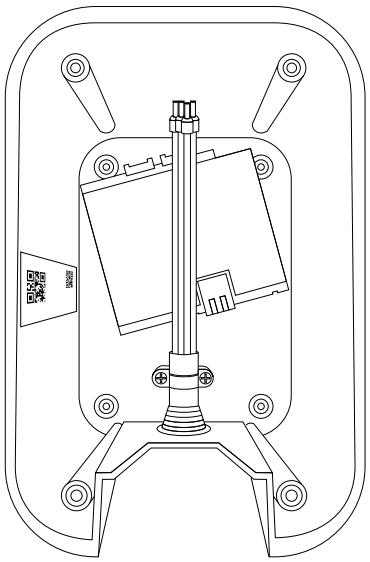

Figure 3: Stripped power cable and entry point.

5. Connect the Live, Neutral, and Earth wires to the charger connector block accordingly. The connection block is positioned lower left.

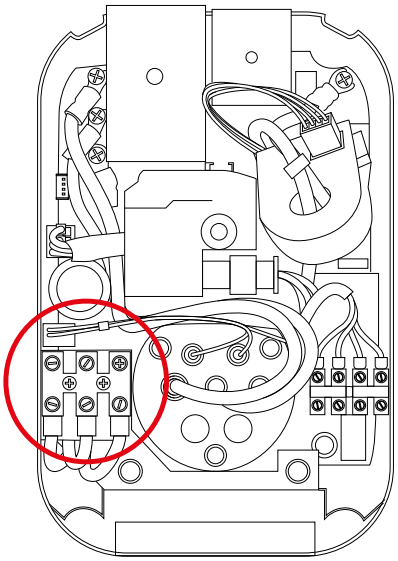

Figure 4: Connector block.

6. If using Ethernet as means of connecting to the client router, feed the Ethernet cable through the second aperture this can be drilled out and a suitable gland fitted.

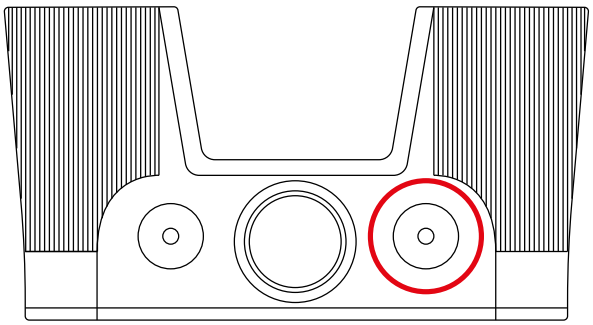

Figure 5: Ethernet cable entry point.

7. The rear charger housing allows for one rear cable entry using the position as shown on the image.

DO NOT drill into any other area of the housings as doing so will Invalidate the product warranty and could damage the rear internal PCB.

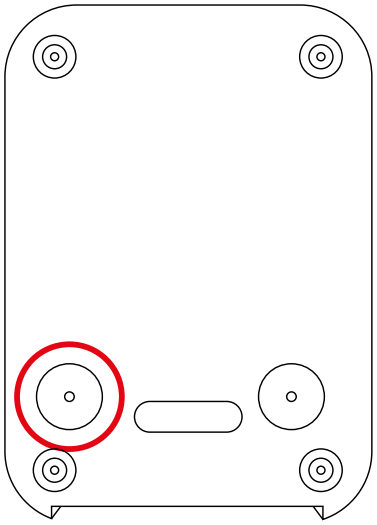

Figure 6: Rear view - cable entry point.

8. If using Ethernet, connect it to the RJ45 female connector located on the circuit board.

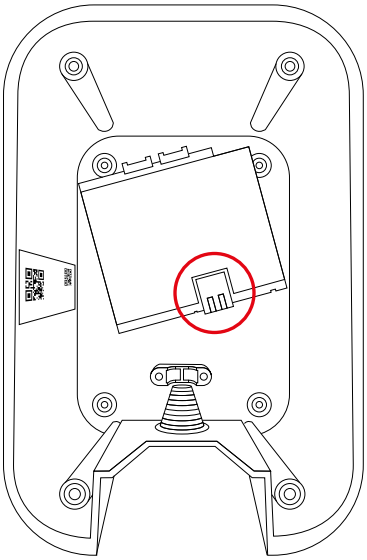

Figure 7: RJ45 female connector location.

9. Connect the CT clamp for Net Solar and Active Load Management (ALM) functionality to the four-pin connector block situated lower right as seen in figure 8.

IMPORTANT: If a separate CT wiring label is supplied with the charger, follow the instructions on this label as will it be specific to the charger version and supersedes this document.

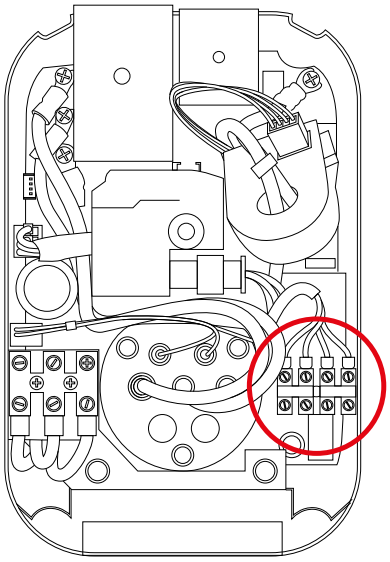

Figure 8: CT connector block.

The CT clamp should be wired to the connector block as follows:

CT Assignment	CT wiring colour	Function
CT1A	Red	ALM & Net Solar
CT1B	White	ALM & Net Solar

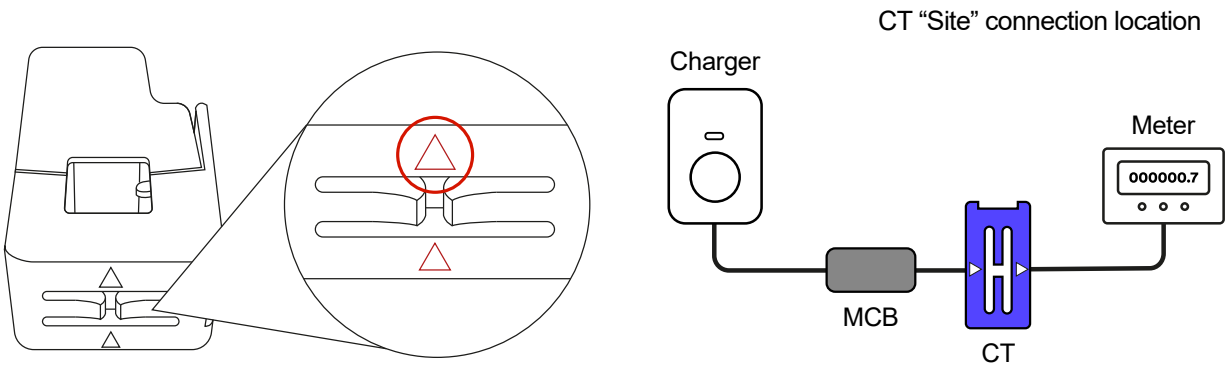

Figure 9: CT orientation (image for illustration purposes only).

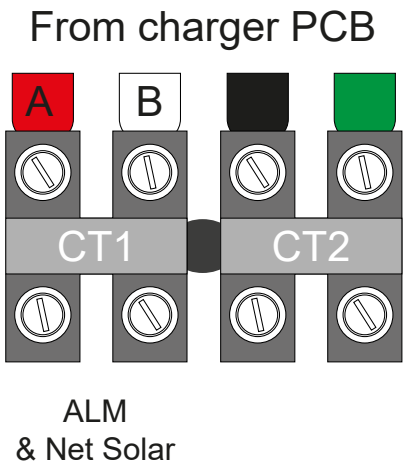

Figure 10: CT destinations.

The CT clamp will have a red and a white wire which should be connected to CT1. Connect the red wire to position A and the white wire to position B.

Clip the CT clamp around the incoming mains cable between the electricity meter and the consumer unit (referred to as “Site” connection). The clamps have an arrow which should be orientated **towards** the direction of incoming current flow - i.e. away from the consumer unit and towards the meter.

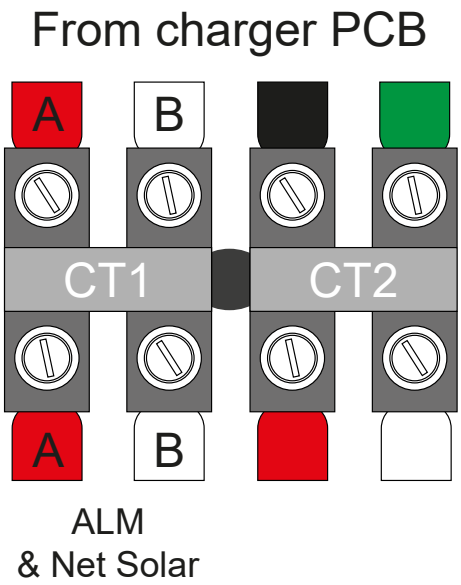

Figure 11: CT clamps connected.

10. Before closing the charger case, make sure the PCB tethering lead is plugged in and connects both front and rear PCB boards together.

Make sure the lead is connected in the right-hand female connector of the rear case, as seen in the image.

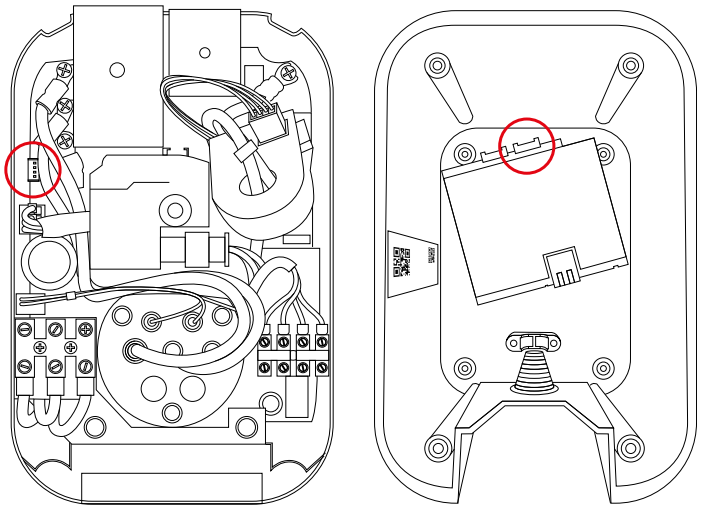

Figure 12: PCB connectors - front to rear case.

11. With all cables securely connected, close the Clearline EV cases together, making sure all internal cabling is not trapped and secure the housings together with the four hex bolts and washers.

12. Attaching the fascia to the Clearline EV should be carried out after all testing is complete.

Figure 13: Clearline EV

4.0 Charger Initialisation Steps

The charger will require setting up before handing over to the homeowner.

The steps to follow will be:

1. Powering up the charger.
2. Locate the installer “Access Label”.
3. Using a mobile device, connect to the charger hotspot.
4. Accessing the charger interface via your mobile device web browser.
5. Logging into the charger user interface using credentials printed on the “Access Label”.
6. Applying a few basic settings such as property supply current, circuit voltage, charger power output requirement including Load management if required and smart charging.

5.0 Charger Software Setup

1. Power up the charger.
2. A hot spot will be displayed [only active for 10 minutes]. Example eo-01234567891011
3. Use your laptop or mobile device to, search for the Wi-Fi hotspot and join it [joining credentials are shown on the “Access Label”].
4. Once connected to the hotspot, open up your device’s web browser.
5. In the browser address bar type 10.10.10.1 [your browser may warn you with a security message. Accept and proceed].
6. You are now presented by the charge point “User Interface” [UI] login page.

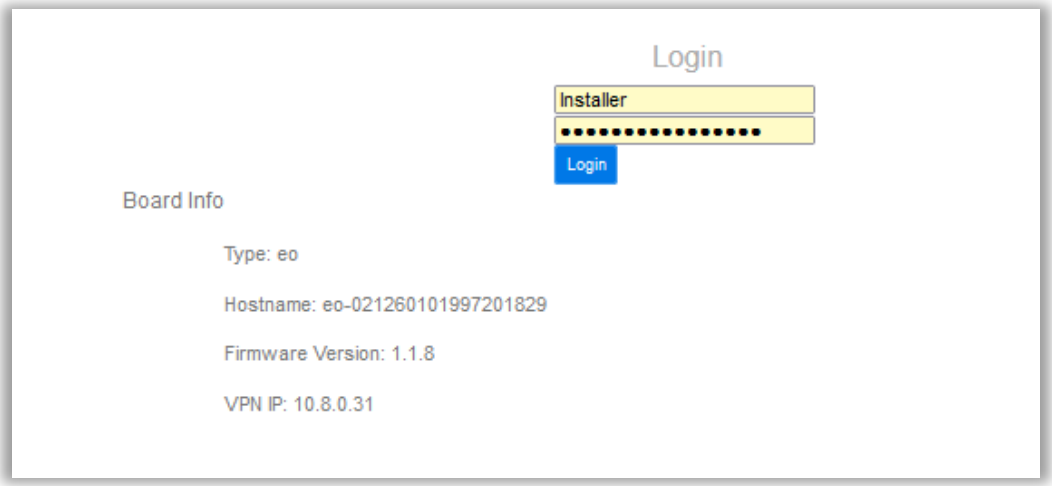

Figure 14: Charge point login page

7. Enter the UI credentials. The credentials can be found on the “Installer Access Label” in the packaging or attached to the charger.

6.0 Smart charging

In accordance with UK regulations Clearline EV is, by default, supplied with a smart charging profile enabled which introduces a random time delay before a charging session starts and prevents charging during peak periods.

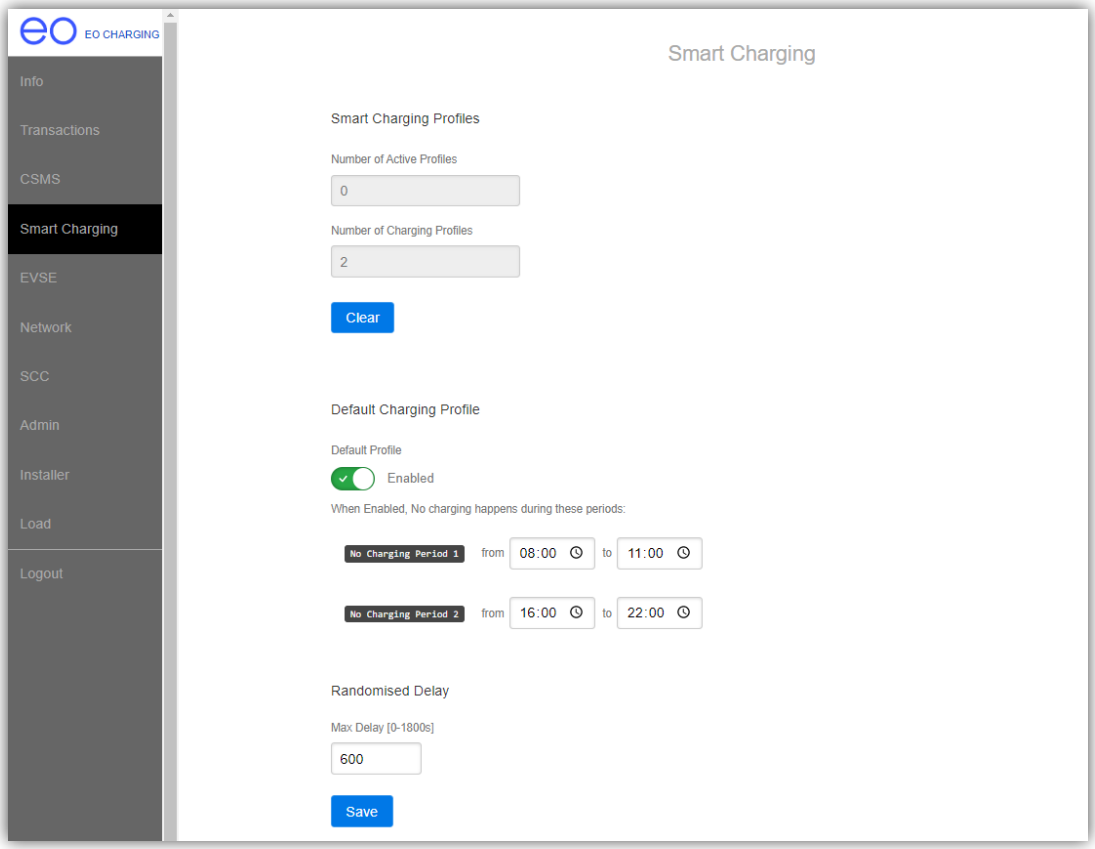

Figure 15: EO Charging software smart charging page.

The default profile will be automatically overridden by the “EO Charging” app during the product registration process carried out by the homeowner.

If the charger is to be operated as a non-smart charger and not to be used with the “EO Charging” app, you will need to review this profile to suit the homeowner’s requirements. This is important as the charge sessions will only operate outside of the charging periods set by the factory. Refer to the above image.

You must consult with the homeowner on what setting they wish to have applied, or the charger may not operate as expected.

Note: Smart charging settings will influence your final testing using EV-dedicated test equipment. You will have to disable the **Smart Charging** profile temporarily and re-enable it after your tests are completed. Follow the initial hotspot connection process as explained in section 6.0 to re-enable the profile.

6.1 Randomised Delay

This setting should be explained to the customer as it could easily lead to confusion.

When a vehicle connects to the charger, the charger will offer power to a vehicle after a random time delay which could mean that charging starts immediately or after a period of time up to the maximum delay setting. The default setting for the maximum delay is 600 seconds (10 minutes).

If the figure is set to zero, the charger will always try and offer power to a connected vehicle immediately when plugged in.

If your customer complains of charging sessions being delayed when their vehicle is plugged in, it could well be due to this “Randomised Delay” setting.

Important: The customer will have to access the charger UI using their dedicated access credentials and amend the value. Under no circumstances should you offer your “installer” access credentials to the homeowner.

The homeowner is provided with their own access label which offers limited functions for safety purposes.

7.0 Installer

7. Once logged in select the “Installer” section.

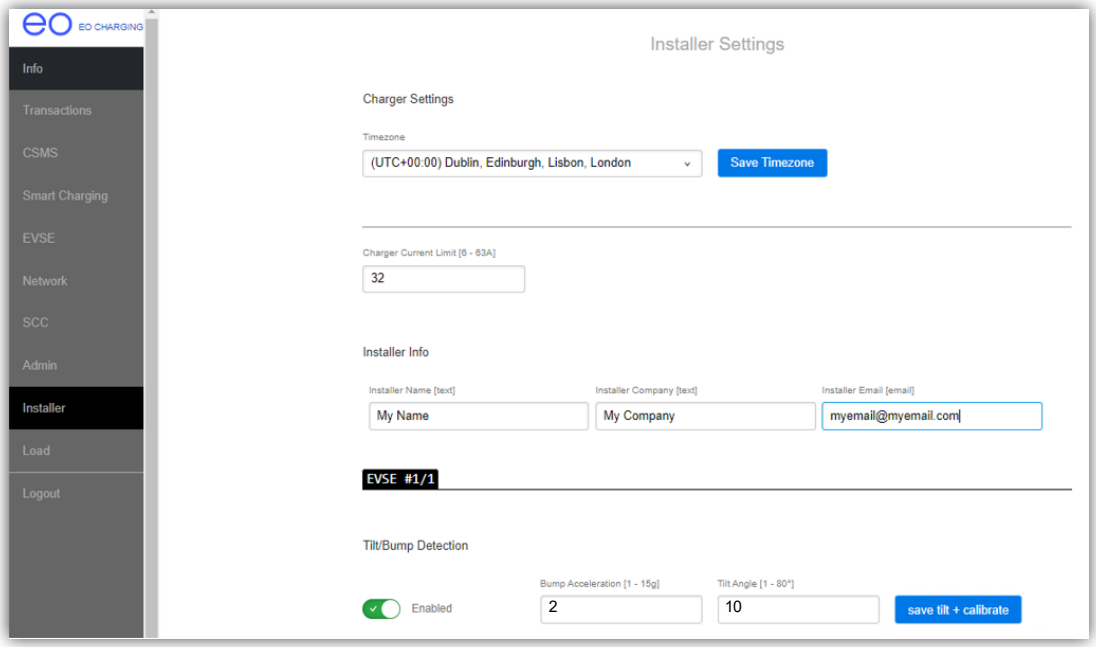

Figure 16: EO Charging software installer page.

Here you will need to input the following:

1. Check and set the time according to your location.
2. Enter the charger current limit. By default, this is set at 32A however you may want to reduce this if site capacity is low.
3. Enter your name, company and email address.
4. Make sure the “Tilt/Bump Detection” is enabled, set the acceleration to 2g and tilt angle to 10 degrees and click the save and calibrate button.

5. Check and amend the phase selection and connection where applicable.
6. Ensure “External CT Clamps” is enabled with Clamp #1 set to Site. The default 100A Rating is suitable for the CT clamp provided. If the CT clamp was not installed, disable the External CT Clamps option and switch Clamp #1 to off - Net Solar and ALM will then be unavailable.
7. Making sure your CT clamp is connected at the incomer, click “Save + Calibrate”.

Important: Both the External metering “Enable” and CT “On/Off” toggles must match. If “External CT Clamps” is enabled at least one Clamp must be set to “On”. Where CT’s are NOT being fitted, all toggles should be set as Disabled/ Off.” Otherwise the charger will enter a paused state “Yellow LED” when tested or connected to a vehicle.

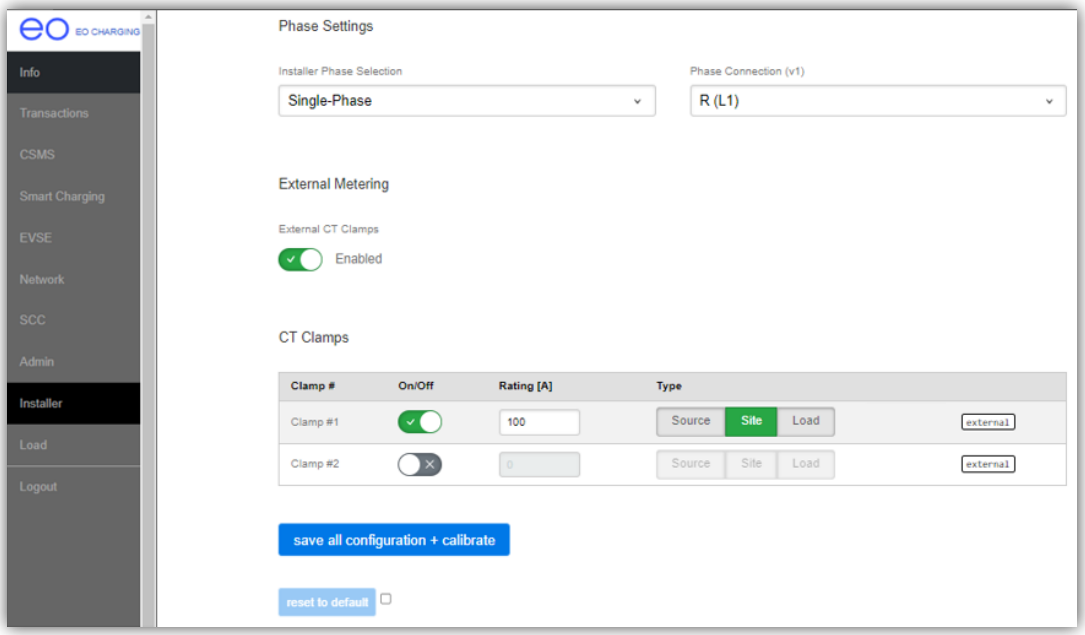

Figure 17: CT rating and type.

CT TYPES EXPLAINED:

Site: The CT Clamp measures power flowing across the boundary into a building, either to or from the electricity grid. This setting is used for Net Solar and Active Load Management functionality. **[Use this setting].**

Source: A CT Clamp located to measure power from a generator providing energy within the building .

Load: The CT Clamp is positioned to measure an external load to the charger which will not include the charger usage.

8.0 Load Management & Solar

If you have installed a CT clamp for Active Load Management and Net Solar functionality, this section describes the settings required.

With **Active Load Management** enabled Clearline EV controls its charging rate to keep the buildings total current draw (taking into account other loads) below a maximum level you set.

With **Net Solar** functionality enabled Clearline EV can be set by the user to control its charging rate to track surplus solar generation, (the amount by which solar generation exceeds other electrical demands in the building), with a minimum charge rate of 1.4kW

1. Select the “Load” page.

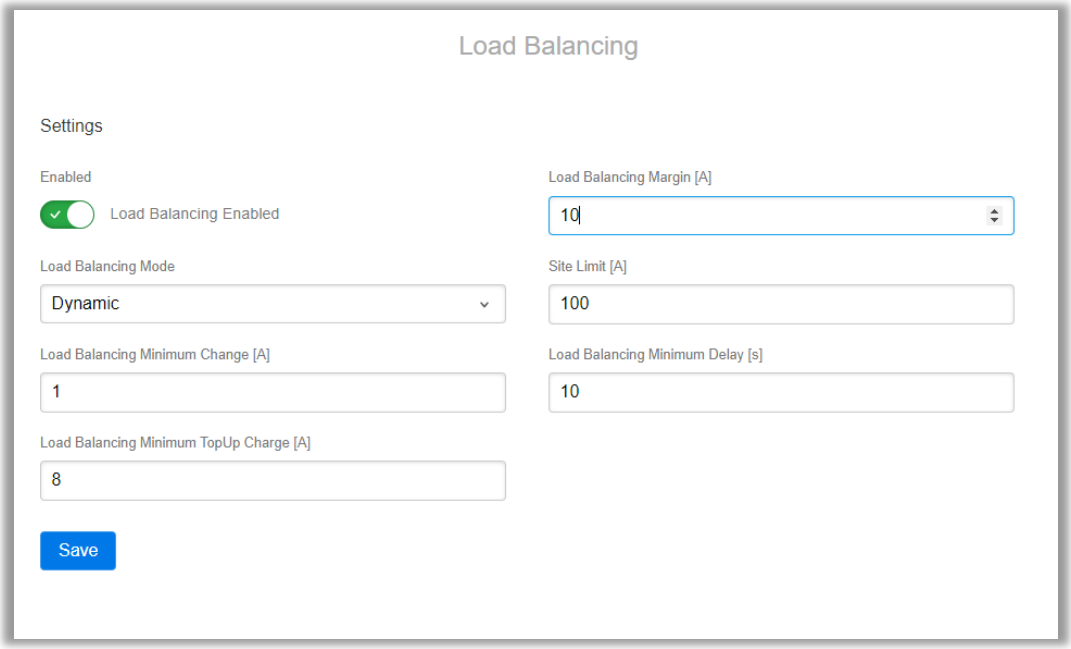

Figure 18: Load balancing.

Load balancing should be set to “Enabled”, if not slide the toggle to the “On” position which allows inputs to be made.

1. Set the site limit value. This is the incoming supply value to the property.
   e.g. 60 or 100 Amps.
2. Input a load balancing margin. This will be a safety value in amps, for example, you may wish to set a safety margin of 6A on a 60A incoming supply. We recommend this value be set at 10% of the site input. Refer to your site load tests for more accurate inputs in these fields.
3. Select “Dynamic” from the load balancing mode section and save your settings.
4. Set load balancing minimum change to 1A.
5. Set the “Site limit” and “Safety margin” to the appropriate values, e.g. 100A and 10A. Refer to point 2. above.
6. Other values can be left to the default ones.

7. For Net Solar functionality, the “Load Balancing Profile” should be enabled and the Profile Mode set to “Top-Up”.

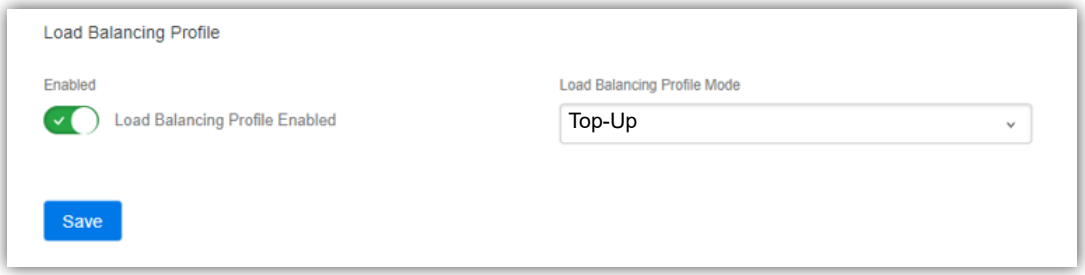

Figure 19: Load balancing profile.

8. Save your settings.

Configuration Options

If the installation does not require ALM or Net Solar, alternative settings are given below:

Operation	CT1	Load Balancing	Load Balancing Mode	Load Balancing Profile Mode
ALM & Net Solar (Default)	Site	Enabled	Dynamic	Top-Up
ALM	Site	Enabled	Dynamic	Disabled
No Load Management	Not connected	Disabled	Static	Disabled

The next section applies to GSM specific chargers and connectivity checks. If the charger is not GSM enabled or not using a GSM connection, make sure all your above changes have been applied and saved. Disconnect your mobile device or laptop from the charger hotspot and power cycle the charger at the RCD. Section 10.0 onwards should be reviewed before running all necessary EV electrical testing as set out in current regulations and conforming to BS7671.

9.0 GSM - EO SIM

Guidance for units which are GSM-enabled with an EO SIM.

1. Select the “Network” page from the left hand menu.
2. At the bottom of the page, you will find a “Modem” section showing SIM status details. These settings are not to be changed unless advised by Viridian Solar.
3. Modem Status messages:

3.1 **SIM Status:** This shows the charger can see the SIM and communicate with it.

3.2 **IP:** Displays the IP address assigned by the network provider.

3.3 **PING Test:** Displays a successful communication ping to the back office.

3.4 **RSSI:** Signal strength.

These settings are not to be changed unless advised by Viridian Solar.

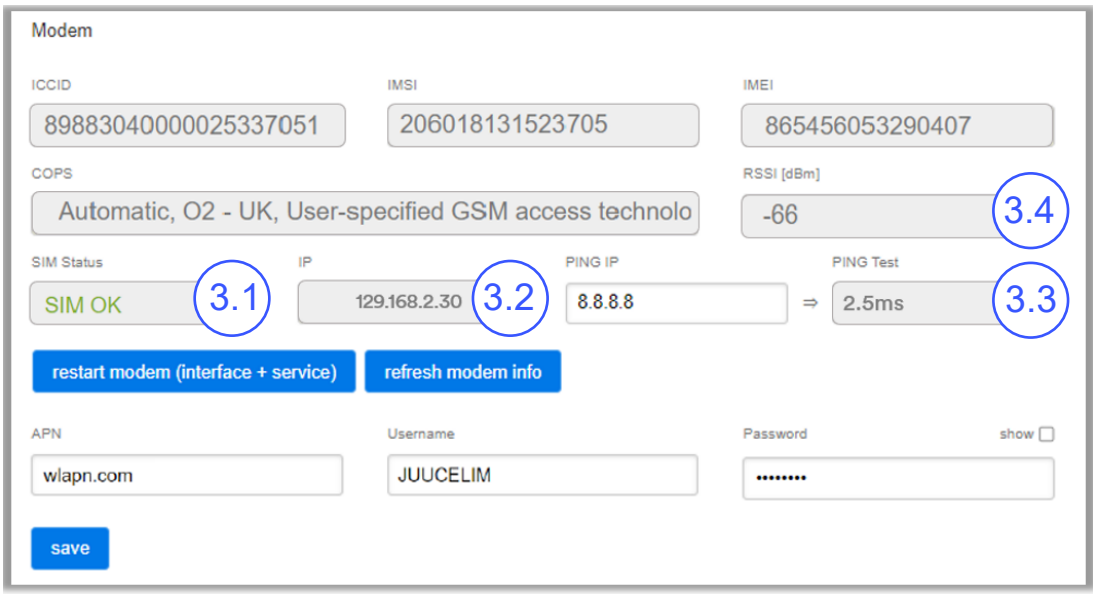

Figure 20: Modem information page.

4. Connection via GSM will not occur unless the following conditions are considered.
   A. Ethernet must not be connected.
   B. Wi-Fi should be disconnected or disabled.
   C. Hotspot connection should have timed out.

The Clearline EV is now physically installed and can be handed over to the homeowner for completion and online registration using their “EO Charging” smartphone app.

10.0 UK Smart Charging Legislation and Compliance

Due to current legislation and charger default parameters, the client can directly access the charger UI and make non-critical adjustments to the “Smart Charging page” by using the “EV” user credentials shown on their specific “Customer Access Label” provided.

11.0 Important Installation Information

Topic	Note
Characteristics of power supply input	Permanently connected to 230V
Characteristics of power supply output	Supplies 230V AC to the vehicle
Normal environmental conditions	Can be installed indoors or outdoors
Access requirements	Can be installed with no access restrictions
Mounting method	Stationary equipment intended for surface or post mounting
Protection against electric shock	Class I equipment
Charging mode	Mode 3 charging equipment
Ventilation during the supply of energy	Does not support ventilation during charging
Ingress protection	IP54
Mechanical strength	IK08
Operating temperature	-25°C to +50°C
Height of installation	The charging equipment should be mounted with the bottom face of the enclosure at least 0.9m above ground level. For tethered units, the holster height should be between 0.5m & 1.5m above ground level
Usage of adaptors/cord extension sets	Adaptors and conversion adaptors sets are not permitted to be used with the equipment. Cord extension sets are not permitted to be used
Maximum altitude	2000m
Pollution degree	Pollution Degree 2
Torque setting for main input cables	1.2 Nm
Skill level	Operation by ordinary – Installation by skilled authorised electrician
Nature of Short-circuit protective device	Upstream RCD Type A required Internal: 6mA DC Leakage, PEN, LoE, LoN

Topic	Note
Torque setting for main chassis screws	6Nm
Measures for protection against electric shock	A 30mA Type A RCD must be fitted at the supply. Viridian Solar recommends a 40A supply for a 32A charging station. Overcurrent protection (e.g. MCB) should be installed upstream of the charging station.
Short circuit protection of the charging cable	40A Type B or Type C MCB with a maximum I2t of • Socket version should be ≤ 75000 A2s • Tethered version should be ≤80000 A2s.
Fuse rating	3.15A, 240V time delayed cartridge fuse
Overvoltage category	Category 3
Rated Insulation Voltage	230V
Rated impulse withstand voltage Uimp	4000V
Rated peak withstand current (Ipk)	≤ 80kA2s
Rated short time withstand current (Icw)	N/A
Rated conditional short-circuit current of an ASSEMBLY (Icc)	5000A2s
Electromagnetic compatibility (EMC) classification	EN 61851-21-2;2021 Residential & Non Residential EN 55032:2015 + A1:2020 Class B ENSI EN 301 489-1 V2.2.3:2019 EN 300 328 V2.2.2:2019 EMC Directive 2014/30/EU & UK Electro magnetic compatibility Regulations 2016

Important: The installer must select the RCD and earthing configuration by following the current local regulations and best practices . The installer must follow national usage guidelines to ensure the unit is installed in accordance to any local restrictions. For the UK refer to the current IET code of practice.

12.0 PEN Fault Detection

The Clearline EV has inbuilt PEN fault detection. There are no configuration options required for this feature and it continually operates whilst the unit is powered on.

The Clearline EV will detect errors in the incoming grid connection. If a PEN fault is detected then the vehicle will be fully isolated from the charging station and the LED will illuminate solid RED. It is not be possible to charge a vehicle in this condition. In order to restart charging:

- The vehicle must be unplugged from the charging station.
- The Clearline EV must be power cycled or remotely reset.
- If the LED remains RED then the grid connection is still not within the defined safety limits and an installer must be contacted to inspect the incoming supply. If the normal pulsing Blue LED is shown then the system is safe to use.

13.0 Wi-Fi Integrity & Stability

Wi-Fi signal integrity: Wi-Fi signal strength depends on a variety of factors, such as how far you are from the router and even the materials of the walls around you. The closer you are to the router, the better. While 2.4ghz connections broadcast further, they might have interference issues. Thicker walls made of denser materials (like concrete) will block a Wi-Fi signal. A weaker signal, on the other hand, leads to, dropouts, unreliability and (in some cases) total disconnection. Measured in dBm [decibel milliwatts]

More detailed explanation on testing the integrity of Wi-Fi is provided in our online Academy training modules.

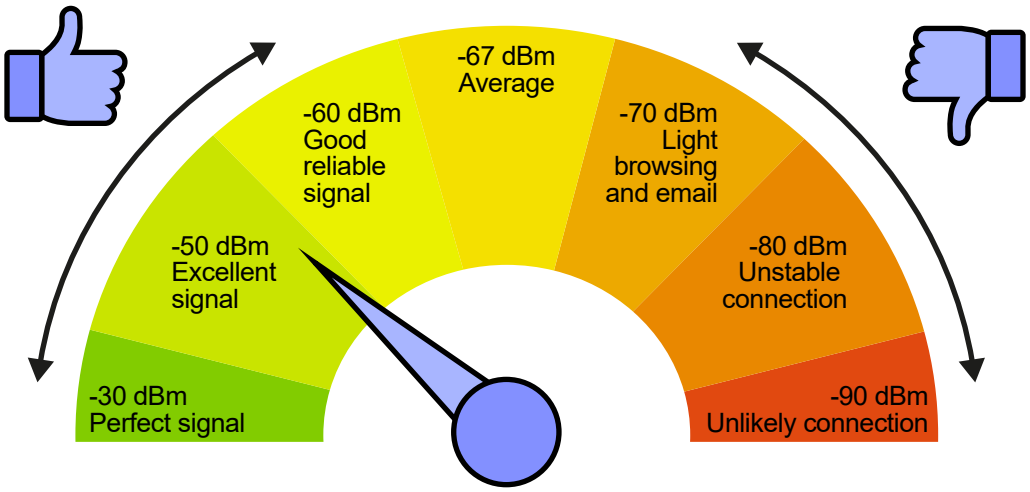

Figure 21: Wi-Fi signal integrity scale.

14.0 Wiring Connections

14.1 Physical Connections

Wiring System	Power connections on Clearline EV		
	PE	**N**	**L1**
TN (230V)	PE	N	L1
IT (220V)	PE	L1	L2

PE = Protective Earth
N = Neutral
L1 = Line/Phase 1
L2 = Line/Phase 2

15.0 Clearline EV Status Light

The Clearline EV has a status LED on its front face providing the user with its current status. Below describe the interpreted LED flash codes.

The colour of the LED should be interpreted as follows:

15.1 Charger Status Light on Power-up

The following LED sequence should be observed:

LED colour	State	Notes
Not illuminated	Power off	No power is available
LED solid white	Initialising	Initialising
LED pulses blue	Ready	The unit has started up successfully and is ready to charge

15.2 Normal Operation

LED colour	State	Notes
LED pulses blue	Ready	Ready to charge
LED pulses green	Cable is inserted	Clearline EV is communicating with the vehicle and trying to start a charging session
LED solid green	Charging	A charging session has started successfully
LED pulses blue	Cable is removed	Ready to charge
LED solid yellow	Paused	Clearline EV has been put on pause
LED pulses red	Fault condition	A fault has occurred
LED pulses white	RFID	RFID scanned and recognised

16.0 Help and Support

All technical documentation is published on the Viridian Solar website:

https://www.viridiansolar.co.uk/

The support team can be reached at:

Email: support@viridiansolar.co.uk

Phone: +44 (0) 1480 839 865

This document contains information that is subject to change without notice.

The latest version of this publication can be downloaded at:
https://www.viridiansolar.com/assets/ClearlineEV-Installation-Guide.pdf

Clearline
EV

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