io7 Installation Guide

Thank you for choosing the io7

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bsi Electric Vehicle Charging KITEMARK™

bsi ISO 9001 Quality Management Systems CERTIFIED FM602456 | ISO 14001 Environmental Management CERTIFIED EMS698072 | ISO 45001 Occupational Health and Safety Management CERTIFIED OHS731415

Preface

About this document

This manual contains technical descriptions and instructions for the following product:

Category of product	Electric Vehicle Charger
Product name	io7
Art. No.	io7xxx
Serial number:	
Ad hoc password:	
Charger password:	

Please refer to Ratio's T&C's at ratioev.uk

This manual contains all instructions and safety information for installation, commissioning, use and maintenance of the product.

This manual is intended for:

- the qualified electrician who installs the product;
- the end-user who uses the charger;
- the product owner who maintains the product.

Copyright

Disclaimer of liability

Ratio EV Charging cannot be held responsible for personal injury, damage to the product or property damage caused by incorrect use, foreseeable misuse or failure to follow the instructions in this manual. This also applies to unauthorized modifications of the product and the use of non-approved spare parts, tools or accessories.
Ratio EV Charging reserves the right to modify this manual without notification beforehand.

Table of contents

1. Safety

Please make sure the instructions have been fully read and understood before commencing the installation or use of the product. Failure to follow the instructions from this manual can put people, surroundings, the environment and product at risk. Store this manual securely for future reference.

Always comply with the information, such as labels and the nameplate, attached directly to the product and keep the information in a legible condition.

Always comply with any applicable laws and regulations that have not been accounted for in this manual for example IET regulations.

1.1. Symbols and labels

1.1.1. Safety warnings

This manual contains safety warnings that may result in injury if ignored. Each safety warning is indicated with a safety identifier. The identifier corresponds with the level of risk of the described hazardous situation, see the table below.

Safety Identifier	Risk of injury	Result when instruction is ignored or not followed correctly
⚠ WARNING	Medium	Could result in death or serious injury
⚠ CAUTION	Low	Could result in minor or moderate injury

Safety warnings at the start of a section apply to the entire section.
Safety warnings that refer to a particular sentence or procedure step are embedded in the running text.

1.1.2. Notices

Messages that are not hazard-related are indicated with the safety identifier **NOTICE**. These messages do not have a safety alert symbol.

Signal word	Meaning
NOTICE	Could result in damage to the product when instruction is ignored or not followed correctly.
Note	Additional information or emphasis on an instruction.

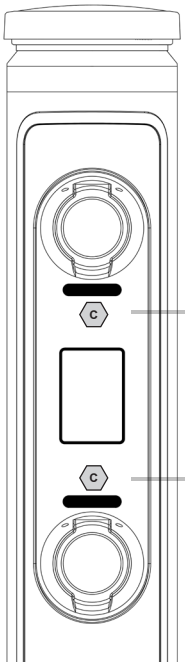
1.1.3. Fuel Identifier

The Fuel Identifier symbol is located at the front of the charger by each socket.

This is to inform the user the fuel type (electricity) produced by this charger and to instruct which end of the Electric Vehicle charging cable is to be plugged into the socket of the charger.

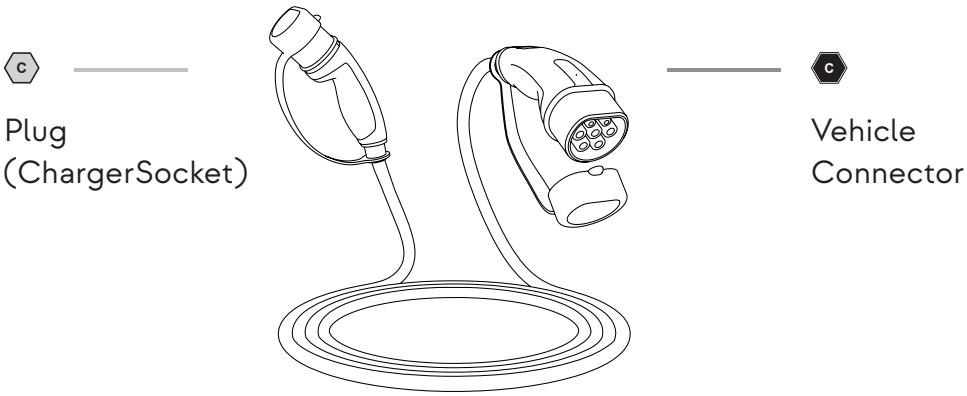
The socket on the io7 receives the Plug end (as illustrated below) of the cable which should be indicated with a smaller similar graphical illustration which can be either silver or white in colour. The vehicle end of the charging cable should have a small black Fuel Identifier.

Fuel
Identifier



Fuel identifier
for socket 1

Fuel identifier
for socket 2



Plug
(ChargerSocket)

Vehicle
Connector

1.2. Intended use

The io7 is a restricted charger intended to charge electric vehicles using power from the main electrical supply network. The product is intended for outdoor use only.
The product must only be operated within its performance limits and under the permitted ambient conditions, as stated in the technical specifications in chapter 3.
The product should only be mounted flush to the floor (non-insulating and with drainage).
Safe use of the product is only guaranteed if it is used as intended.

1.3. Reasonably foreseeable misuse

The following is considered foreseeable misuse:

- Use in an environment that varies from or exceeds the given environmental conditions.
- Use that varies from or exceeds the given operating conditions.
- Failure to comply with the instructions in this manual.
- Failure to eliminate faults, malfunctions or defects of the product that impose safety risks.
- Failure to carry out the inspections and maintenance operations as described in this manual.
- Unauthorised removal or modification of parts or safety devices of the product.
- Use of spare parts or accessories that have not been approved by the manufacturer.
- Operation in a flammable and/or explosive environment.

1.4. Qualification of personnel

Only qualified electricians are allowed to perform installation and maintenance of the product. They must meet the below stated criteria;

- are of legal age.
- are familiar and abide by the safety instructions and sections of this manual related to installation and maintenance of the product.
- are familiar with and abide by the applicable local, national and international laws and regulations.
- are able to recognise the possible dangers of the product and take the necessary measures to protect persons and property.
- have received adequate training in the safe installation and maintenance of this product.
- hold the relevant qualifications.

1.5. Personal Protective Equipment

NOTICE

Wear the appropriate Personal Protective Equipment (PPE) according to the manual of any tools used during installation of the charger.
Wear insulating gloves when installing wires and touching electrical components to avoid damaging the product by static discharge.

1.6. Safety precautions

Despite the safe design and construction of the product and the prescribed protective measures, the product possesses residual risks. This manual provides safety messages to indicate these risks. The formatting and appearance of safety messages that are dedicated to a particular section or sentence is explained in chapter 1.1.
Read all the safety warnings and instructions before using the product. Failure to follow the warnings and the instructions may result in electric shock, fire and/or serious injury.

⚠ WARNING

- Do not put fingers into the electric vehicle connector.
- Do not use this product if the flexible power cord or EV cable are frayed, have broken insulation, or show any other signs of damage.
- Do not use the product if the enclosure or EV connector are broken, cracked, open, or show any other indication of damage.
- The electrical installation must be isolated during the entire installation period.
- Improper connection of equipment-grounding conductor can result in a risk of electric shock. Check with a qualified electrician if you doubt whether the product is properly grounded.
- Do not use this product if it does not function according to the instructions in this manual. Seek advice from Ratio, your vendor, or a qualified electrician.
- Do not attempt to remove the charging plug while a charging session is active.
- Children should not be allowed to use this product. Do not allow children to play near the product. Children should be supervised when using this device around them.
- The installation must be conducted by a qualified electrician in line with local and national legislation and IET regulation.
- Open PEN fault protection is incorporated into single and three phase io7 charger variants.

⚠ CAUTION

- Ensure the supply cable of the product is positioned so it will not be stepped on, tripped over, or otherwise subjected to damage or stress.
- There are no user serviceable parts inside. Refer to the Customer Support section in this manual for service information. Do not attempt to repair or service the product yourself.
- Only use this product to charge electric vehicles equipped with a conductive charge port. See the vehicle owner's handbook to determine the vehicle is equipped with a conductive charge port.
- Use of any adaptors is not allowed with this product.
- Only use certified Type 2 charging cables with this product.
- Cord extension sets are not allowed to be used.

NOTICE

- Do not drop the product and avoid impacts.
- Do not store the product in an environment that exceeds the ambient conditions stated in this manual.
- Do not expose the internal components of the product to moisture.
- Do not immerse the product in water or any other liquid.

2. Product description

The io7 is a Mode 3 charger for charging electric vehicles (EVs) which complies with the IEC61851 series of standards.

The io7 incorporates professional lighting systems which have been designed in acordance to BS EN 60598-1 and BS EN 62196.

The io7 is equipped with several features to optimise power consumption and charging performance.

Over the air (OTA) updates

The io7 charger is equipped with the technology to receive over the air updates, enabling your charger to receive the available updates over the internet through a back-end software management platform.

The io7 must be used in conjunction with a back-end software management platform, such as Monta or Fuuse. This will allow full visibility over the charger use, energy consumption etc.

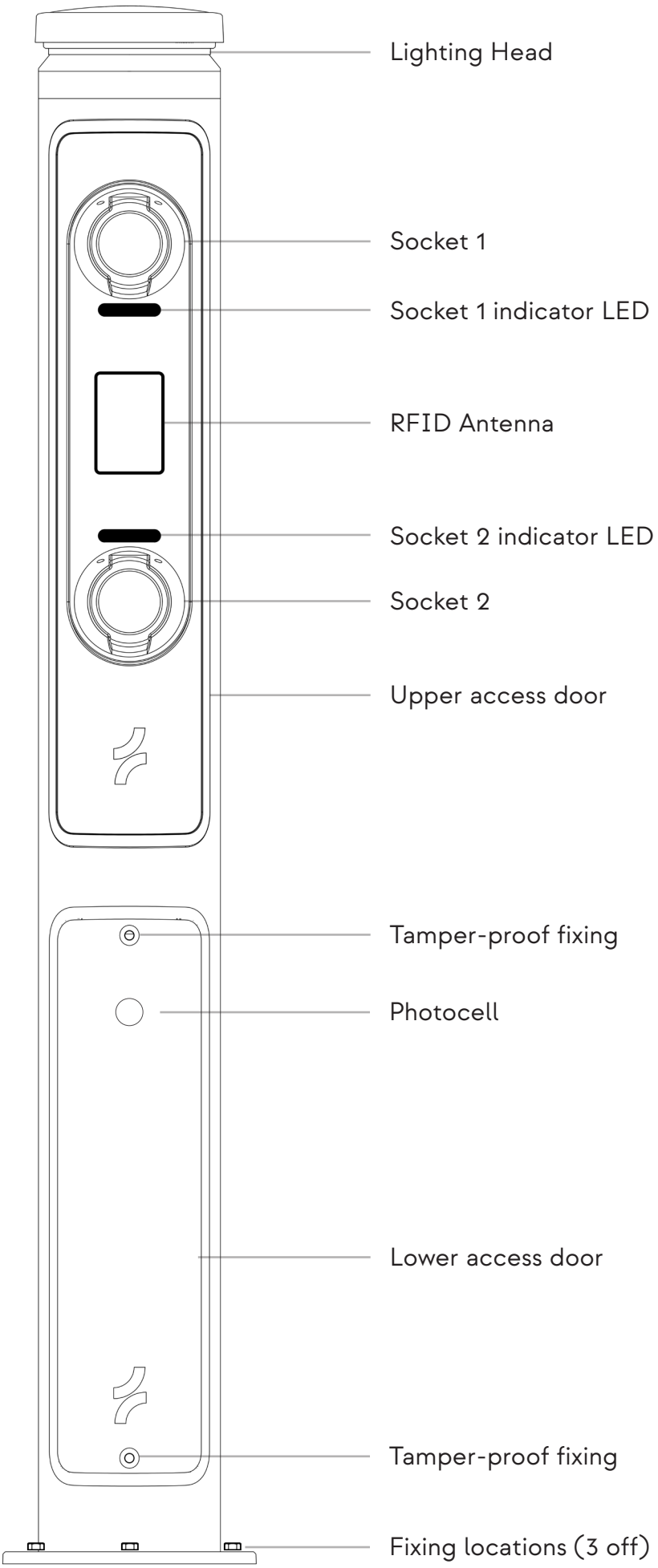
Charging Mode	To be configured through the back-end software such as Monta or Fuuse. These will commonly be private, public or schedule.

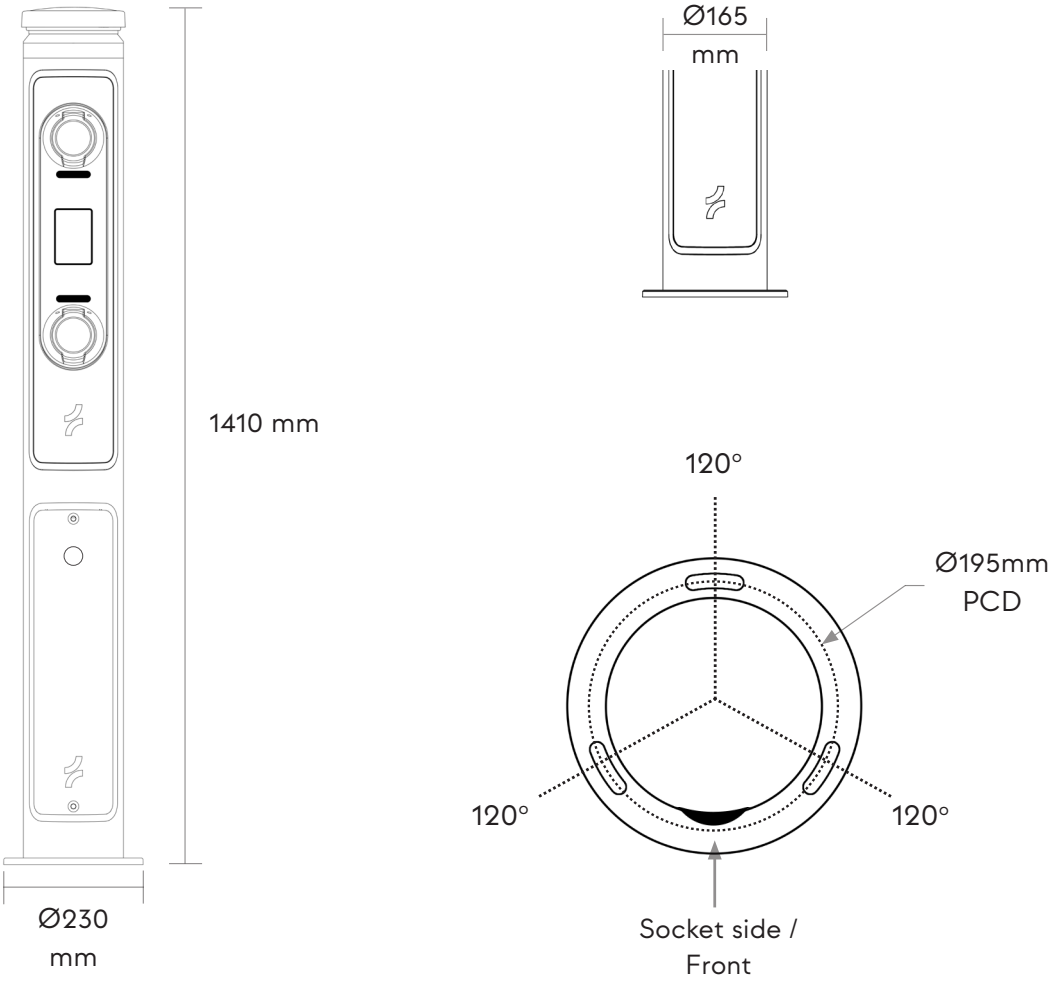
3. Technical data

Product name	io7
Art. no.	io7xxx
Charging System	IEC61851, Mode 3
Cable version car connector	IEC 62196, Type 2
Outlet version	IEC 62196, 2 x Type 2 Outlets
Power input	Single-phase or three-phase, 230V-400V AC, 16A-32A
Power output	Output 7.4 kW / 230V AC, 22 kW / 400V AC
Frequency	50 Hz
Protection against electric shock	Class I
Protections	AC 30mA and DC 6mA
Surge Protection	Surge Protection 4kV
Rated peak withstand current (IPK)	≤80 kA2s
Rated short-time withstand current (Icw)	N/A
Rated conditional short circuit current (Icc)	5000A^2s
Rated diversity factor	1
Pollution degree	Pollution Degree 2
Compatible earthing systems	TN, IT, TT
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
	Electromagnetic compatibility Regulations 2016
Housing	Polyester Powder Coated Aluminium
Dimensions	1410mm × 230mm × 230mm
Weight	17 kg
Country of Manufacture	United Kingdom
Enclosure rating	IP54/IK08
Ambient temperature	-25°C to +30°C
Markings	CE & UKCA
Earthing	PME fault detection on single and three phase versions
Ventilation	Not supported
Metering	CT Clamp or MID meter versions available
Required protection device type	Type A (refer to table in section 5.1.3)
Supported connectivity protocols	Wi-Fi
	4G
	Ethernet
RFID	Included 13.56MHz
Standards	BS EN IEC 61851-1
	BS EN 60598-1
	BS EN 62196
	BS 7671:2018+A2:2022
EV Communications	OCPP 1.6J

Note: The io7 will connect to most back-end software platforms (e.g. Monta or Fuuse) for visibility over charger usage, performance and fault reporting.

io7


Lighting Head
Socket 1
Socket 1 indicator LED
RFID Antenna
Socket 2 indicator LED
Socket 2
Upper access door
Tamper-proof fixing
Photocell
Lower access door
Tamper-proof fixing
Fixing locations (3 off)



LED Colour Description

The LEDs on the io7 provides the user with a visual representation of the chargers status. Please see below the table with the colour and the status description.

	LED Colours	Status
	White	Boot up
	Green	Ready
	Magenta	Cable inserted
	Yellow	Waiting to charge
	Blue (Pulsing)	Charging
	Blue (Solid)	Charging delayed
	Red	Fault (See table in page 31)

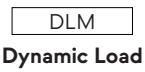
Note: If the LEDs are **Red**, the fault will be reported via OCPP to the back-end software. Consult the back-end software fault logs, or if the problem persists contact Ratio for remote assistance.

3.1. Product Labelling/Marking

The product is marked in accordance with the applicable legislative requirements. All product labels are located on the mounting plate within the protective cover in the inside of the main housing behind the lower access door.

RFID Indicator

Fuel Identifier



Dynamic Load Management Cable

Socket 1

Socket 2

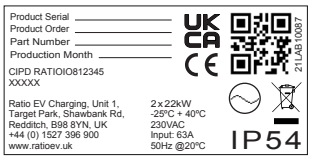
Earth, Neutral & Live 1

Earth Neutral Live 1 Live 2 Live 3

RS485 Socket 1

RS485 Socket 2

Warning - Isolate before removing cover



Product Information
Manufacturer's Information
Commisioning QR Code
Serial Number, WEEE,
AC Supply, IP54

Installer Information
Commisioning QR Code

Customer Information
Commisioning QR Code

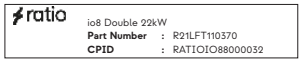
Safety Electrical connection - Danger High Voltage

Eel Loom Socket 1 - Single Phase

Eel Loom Socket 2 - Single Phase

Eel Loom Socket 1 - Three Phase

Eel Loom Socket 2 - Three Phase



Charger Information

4. Transport and Storage

4.1. Transport

Transport the product in the original packaging, or suitable replacement that provides adequate protection from vibrations, impacts, moisture, dust, and debris.

Ensure to not drop the product and prevent it from impacts.
Excessive vibrations could loosen connections and cause product malfunction.

4.2. Storage

Store the product in the original packaging or a suitable replacement packaging to protect the product from moisture, dust, and debris.

Do not store anything on top of the product.

5. Installation

5.1. Preparation

⚠ WARNING

- The installation must be done by a qualified electrician in accordance with local and national legislation and IET regulations.
- The electrical installation must be isolated during the entire installation period.
- Since this charging unit uses circuits that reference to ground, no insulation resistance testing should be conducted on the unit after connecting to the supply network.

5.1.2. Required tools

- Spirit level
- Flat-head screwdriver size 3
- H5 Pin Hex Allen key
- Suitable equipment for ground fixings (M10 advisable)

5.1.3. Required wiring and electrical protection

Note: On Ethernet versions a Data cable will be required.

Charger Model	Recommended supply cable[1]	Internal RCBO	Residual Current Device (RCD) at source[2]
Twin 7.4kW	3 core 16mm^2	2 x 40A Type A 30mA 2 pole	63A, 150mA time delayed / 300mA Type A minimum 2 pole
Twin 11kW	5 core 10mm^2	2 x 20A Type A 30mA 4 pole	32A, 150mA time delayed / 300mA Type A minimum 4 pole
Twin 22kW	5 core 16mm^2	2 x 40A Type A 30mA 4 pole	63A, 150mA time delayed / 300mA Type A minimum 4 pole

1 - For cable lengths up to 25m and in accordance with table 4E4A of BS7671.
2 - Ensure RCD is compliant with BS EN 61008-1 and switches all poles (including neutral).

5.2. Install the power cable in the distribution board

1. The electrical installation must be isolated during the entire installation period. Do not use the io7 until the installation has been completed.
2. Lay down a power cable and data cable (optional) between the distribution board and the installation location of the charger.
3. It is advised to connect the charger to your internet through Wi-Fi. Alternatively, you can connect via 4G or through the use of an Ethernet cable to gain internet connectivity.
4. For circuit protection devices please refer to section 5.1.3
5. Connect the power cable wires to the dedicated protection devices in the distribution board.

---------Universal mounting base info here----------

5.3. Installing the io7

1. Prepare the foundations of the ground prior to installing the io7, ensuring it is free from debris as well as any possible water accumulation that may occur.

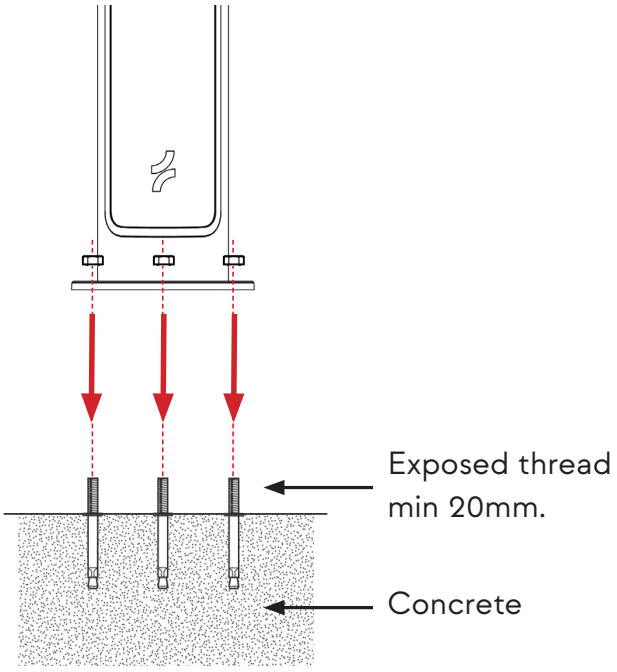
⚠ WARNING

The io7 should **never** be mounted onto an insulating material unless an earth electrode is installed.

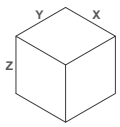
Flange Mount - Anchor Bolts

The surface mounting foundation adaptor can be used to secure the charger to the existing concrete (or similar) surfaces, or to a purpose laid 600 x 600 x 200mm concrete pad.

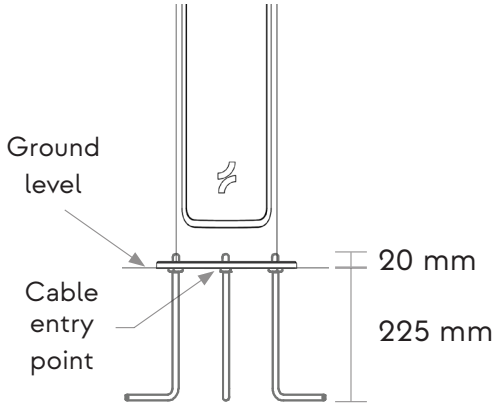
The surface mounting plate is secured to the ground using three M10 x 150mm (minimum) expanding countersunk concrete anchor bolts (not provided) or preferred equivalent fixing.



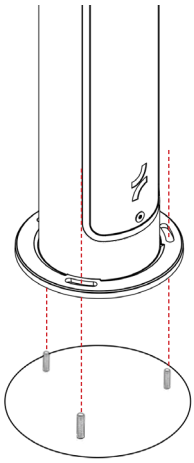
Flange Mount - J-Bolts

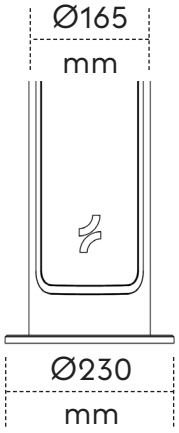


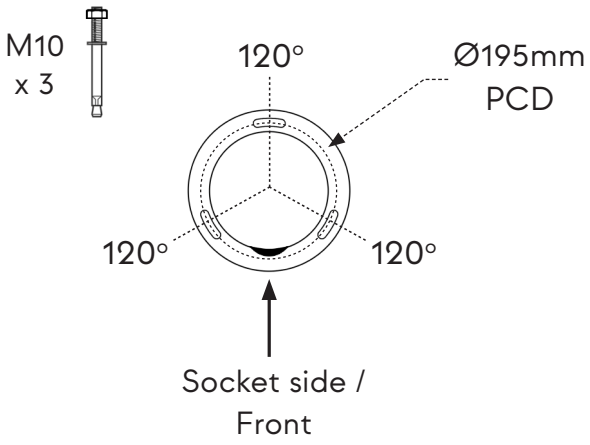
Foundation Dimensions	
	Flange Mount
X	400 mm
Y	400 mm
Z	300 mm



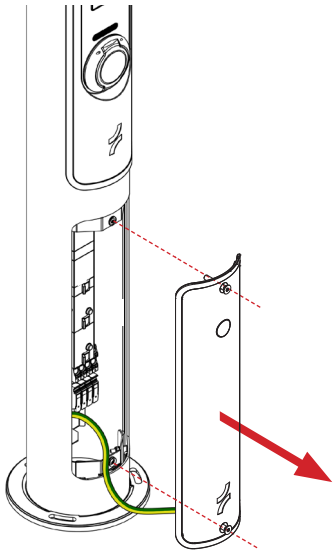
2. Place the io7 securely onto the fixings and use a spirit level to ensure the io7 is mounted vertically.



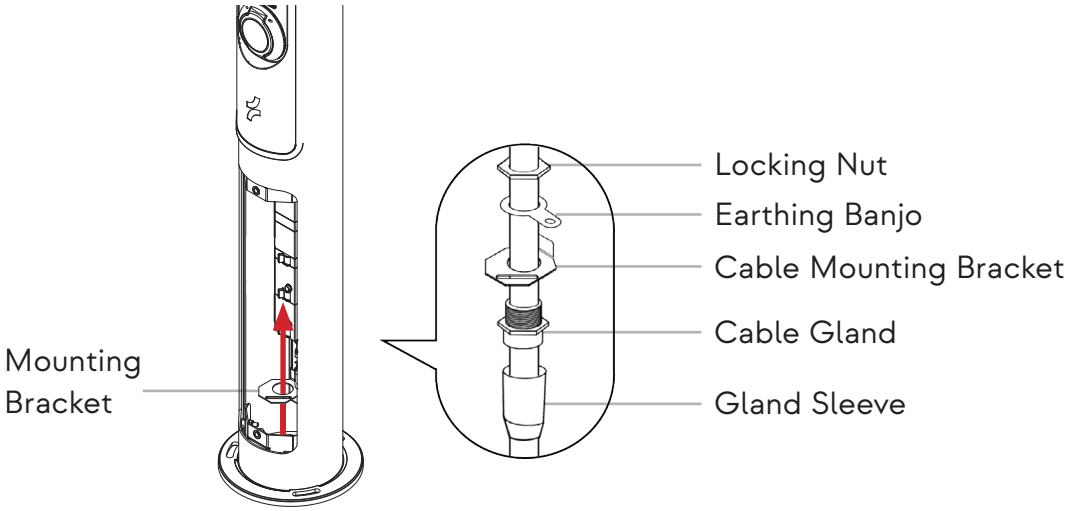




3. Remove the front door using the H5 Pin Hex Allen key.



4. Install the Steel Wire Armoured (SWA) cable gland to the cable plate, ensuring the Earth tag (banjo loop) is affixed as shown below.



Note: Ensure SWA cable is connected to the Earth block using cable supplied.

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5. Perform the insulation resistance tests prior to terminating to the io7.

⚠ WARNING Performing this test whilst the io7 is fully terminated could cause serious damage to the charger.

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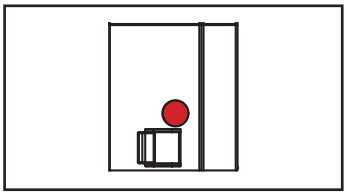
6. Terminate the Supply cables (up to 25mm^2).

- Earth = Green/Yellow
- N = Blue
- L1 = Brown
- L2 = Black*
- L3 = Grey*

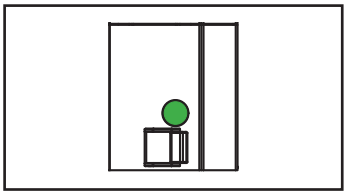
a) Ensure the RCBOs are in the "on" position.
b) Conduct all other relevant tests, as specified by local regulations.

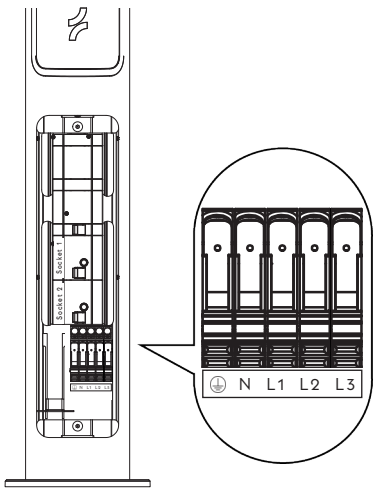
* for 3 phase installation only.

RCBO on position (Red)

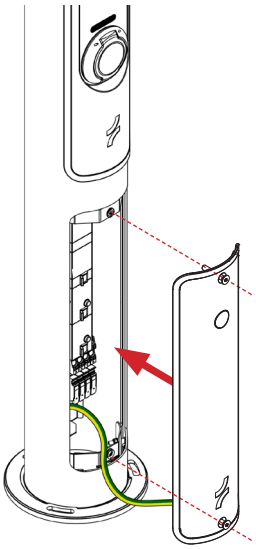


RCBO off position (Green)





7. Close the door and secure using the H5 Pin Hex Allen Key. Ensure Earth cable is connected, remains intact and is not trapped when the door is repositioned and closed.



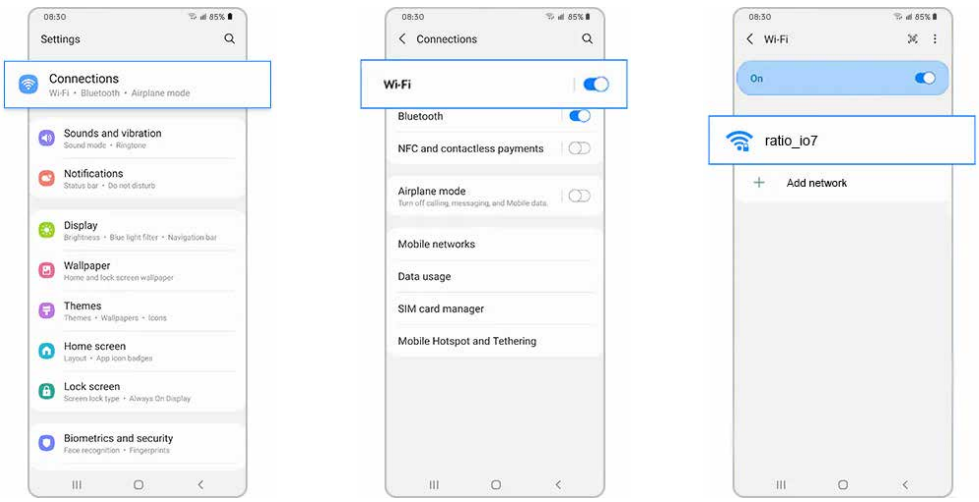
6. Commissioning the io7

6.1. Initial Steps

The installer must follow the next steps to prepare the io7 to be connected to the preferred communication method and third party back-end software.

The main sequence of steps are as follows:
1. The charger should be powered up. The LEDs will illuminate white whilst the charger is booting up. Once ready, the charger LEDs will turn green. At this point the user interface can be accessed. This will enable the charger's Wi-Fi Hotspot for 10 mins. If the log in process is not completed within this time frame, the charger must be rebooted.

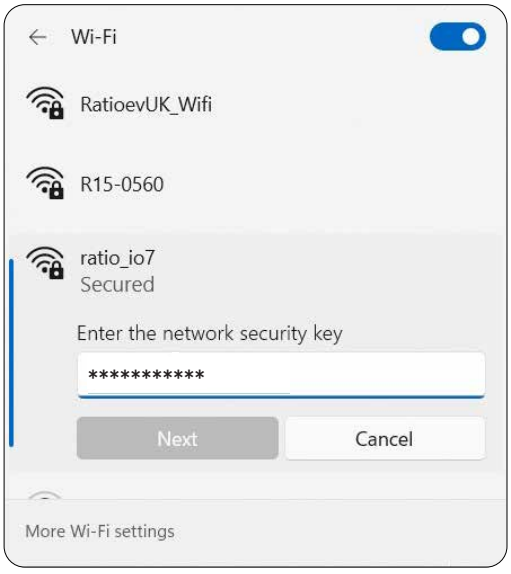
2. Using a mobile device or laptop, search for the chargers Wi-Fi Hotspot as illustrated below using Password "Ratioio7"



3. If using a laptop, navigate to the Wi-Fi settings on your computer and select "ratio_io7".

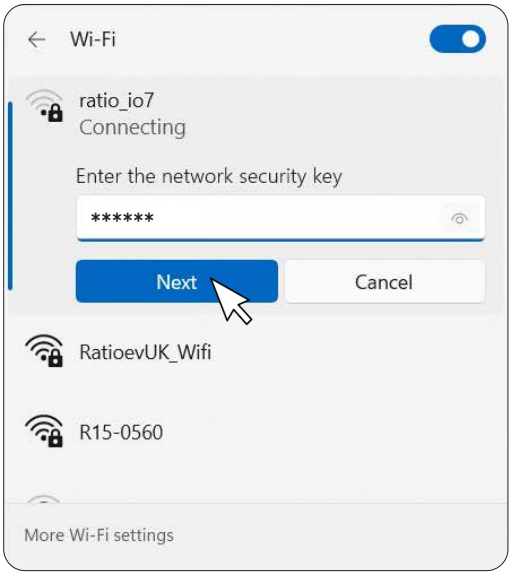
4. Select "Connect using a security key instead".

5. A new window will open. Click on the window and insert password which can be found in the Installer Pack.



Password is on the Installer Information label provided with the charger.

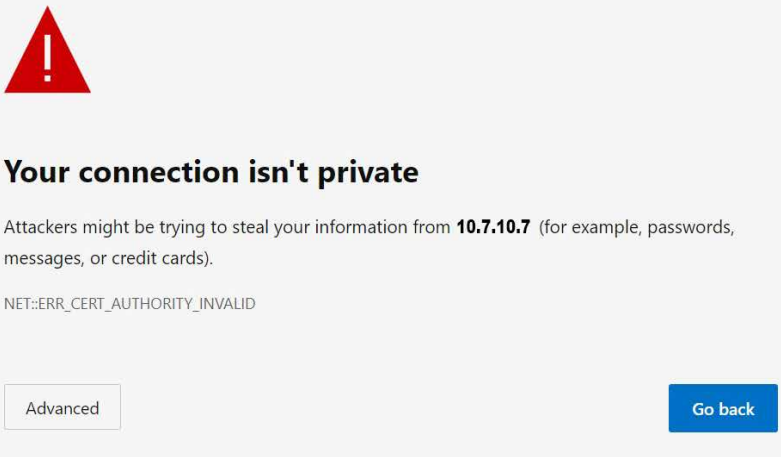
6. Select "Next".



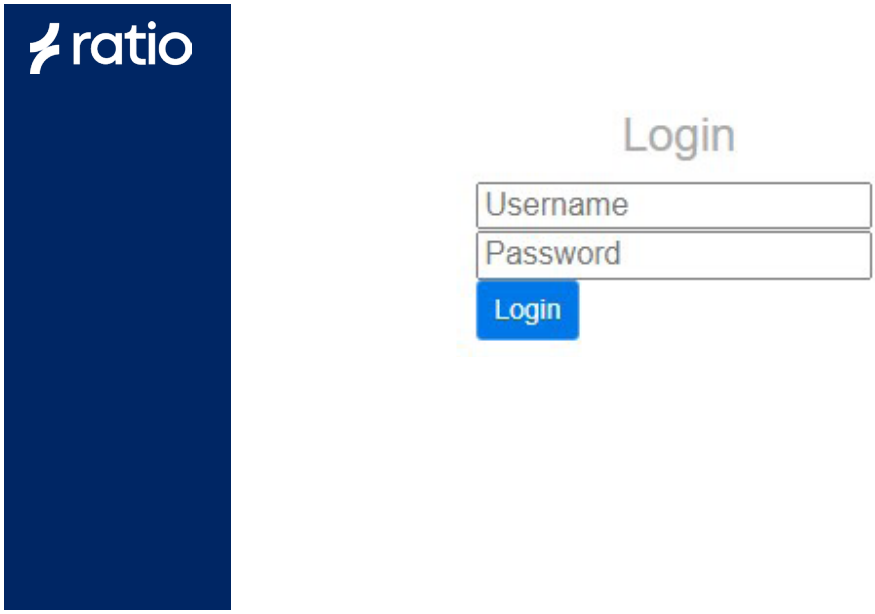
Note: If after entering the password you receive a message stating “Internet no connection” continue to step 7.

7. Open a web browser on a mobile device or laptop and input 10.7.10.7 into the URL search bar. This should take you to the page below. Alternatively, scan the QR code which will navigate you directly to the site.

Note: If this page appears, click on the “Advanced” option and select “Continue”.



This will navigate you to the following page.

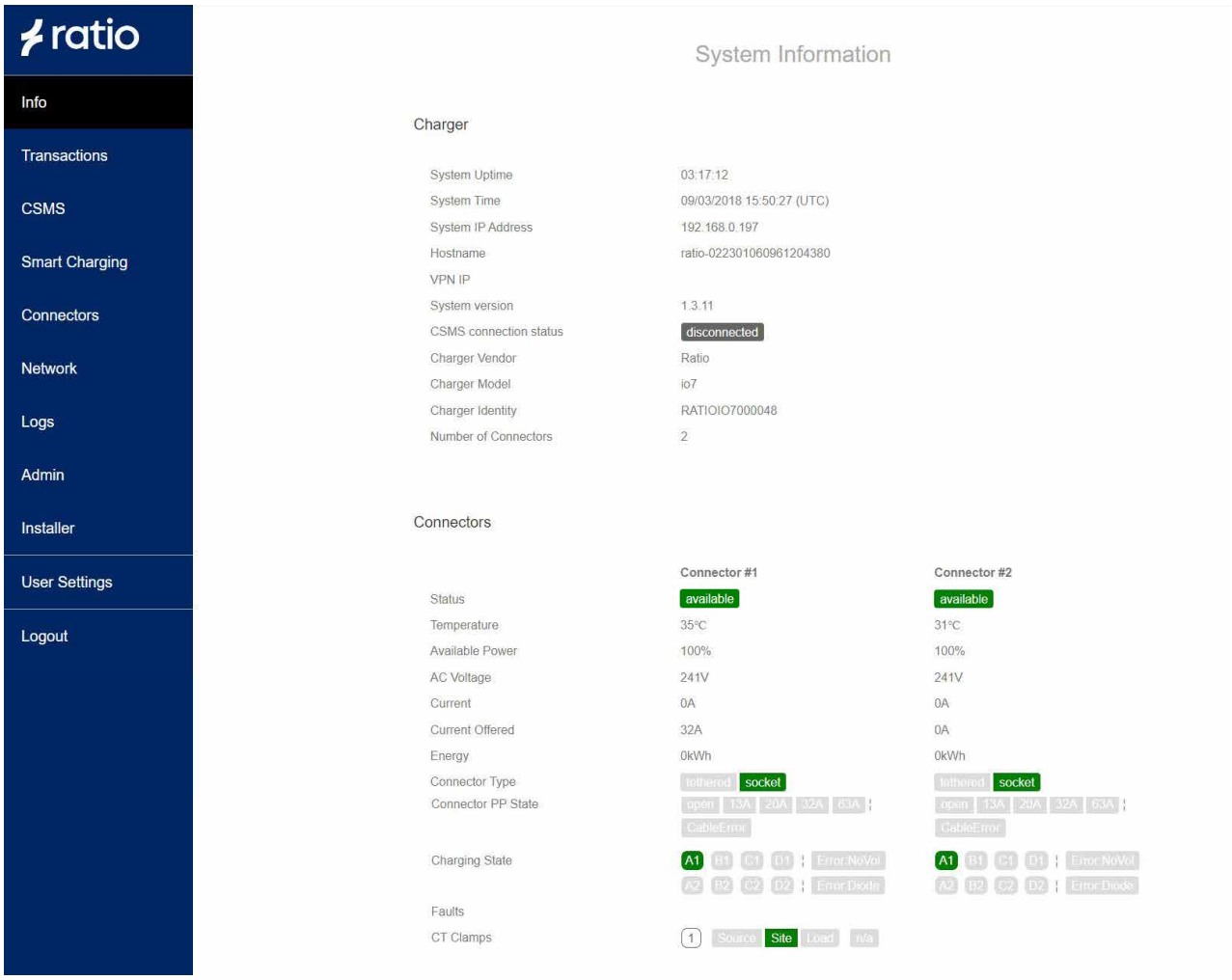


8. Log into your charger by inputting the username 'Installer' and then use the password provided in the suppplied documentation.

9. Now navigate to the User Settings section and change the password to a memorable secure password and store in a safe location.

6.1.2. General Information Page

Once logged in, the general information screen (below) will show system details such as the charger make and model, the System IP Address and the Host name.



6.1.3. CSMS

1. Go to the CSMS tab on the left hand side of the page and define the devices parameter settings on the CSMS Server address.

For this, please follow the steps below;

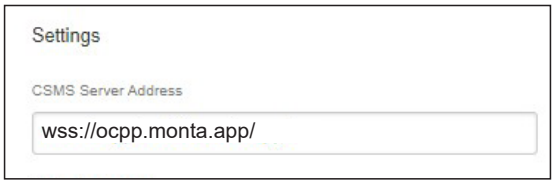
The charger server connection status will be shown in this section. It will show “connected” or “disconnected” accordingly.

1. Ensure the toggle is set to “Authorisation via CSMS Server” if a back-end software is being used. If no back-end software (example image below) is required, set to “Local Authorisation” and proceed to Step 3.

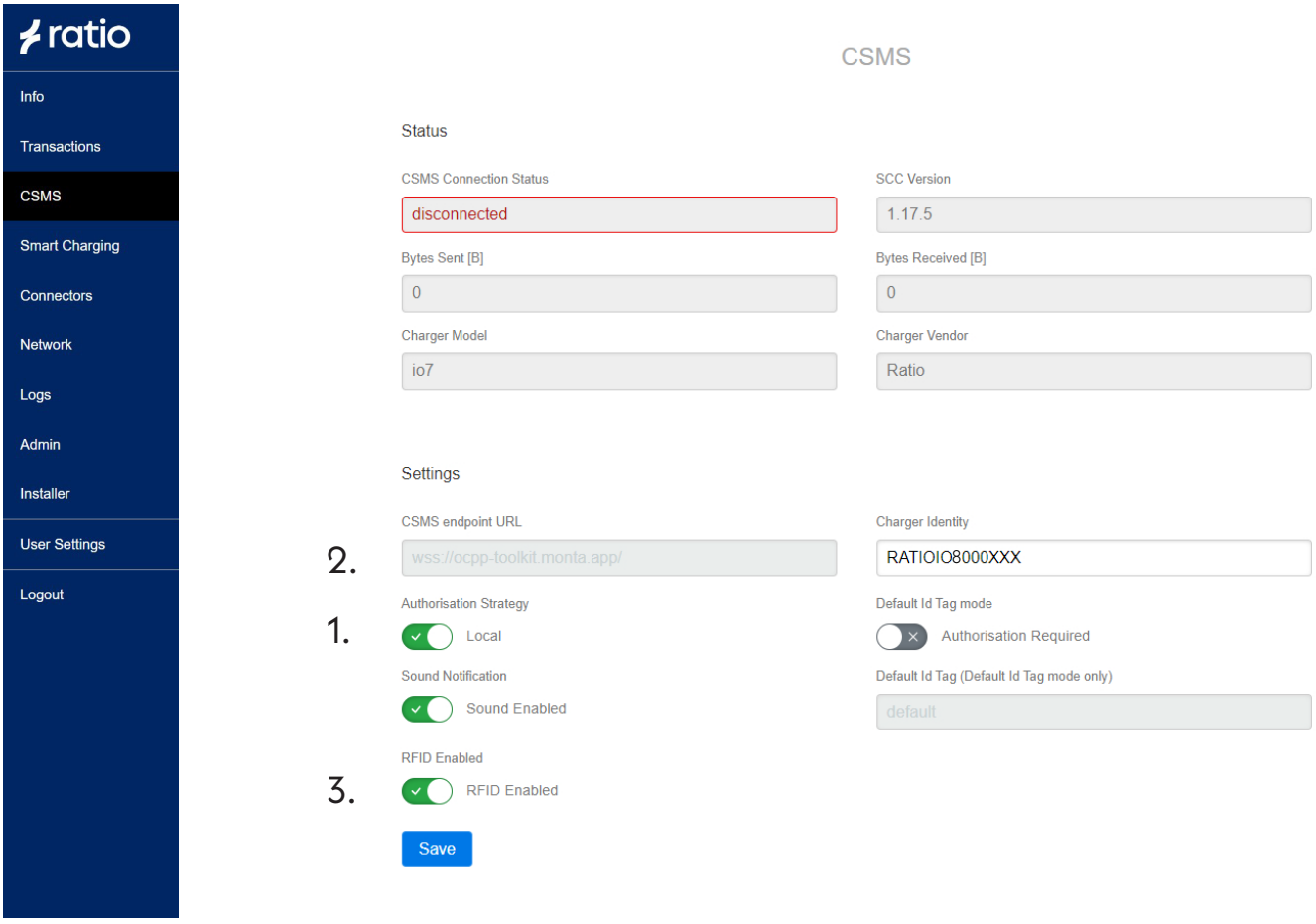
2. The URL address of the selected back-end software should be added to this section. Example below.

3. Select your required RFID status.

Select “Save”.



Example: If using a back-end software provider, (example on the left as Monta) the CSMS Server Address would be similar to the image shown on the left.



6.1.4. Network Settings/Parameters

Connectivity to the internet can be achieved by either using an Ethernet cable, Wi-Fi or 4G. Connect the device to the internet. Follow the steps shown below;

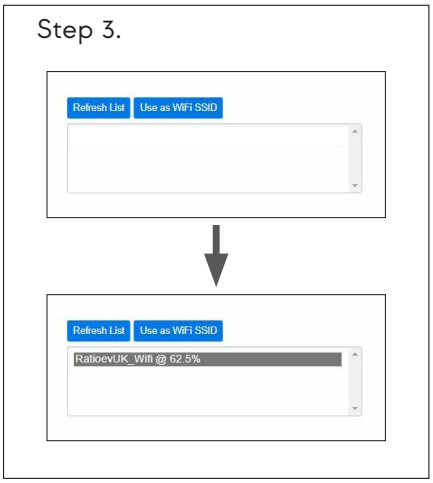
1. The toggle named DHCP will allow you to set either a Static or Dynamic IP dependant on requirements.

2. If Wi-Fi is required, enable the Wi-Fi toggle.

3. Select “Refresh list” to view available Wi-Fi networks and select your required one.

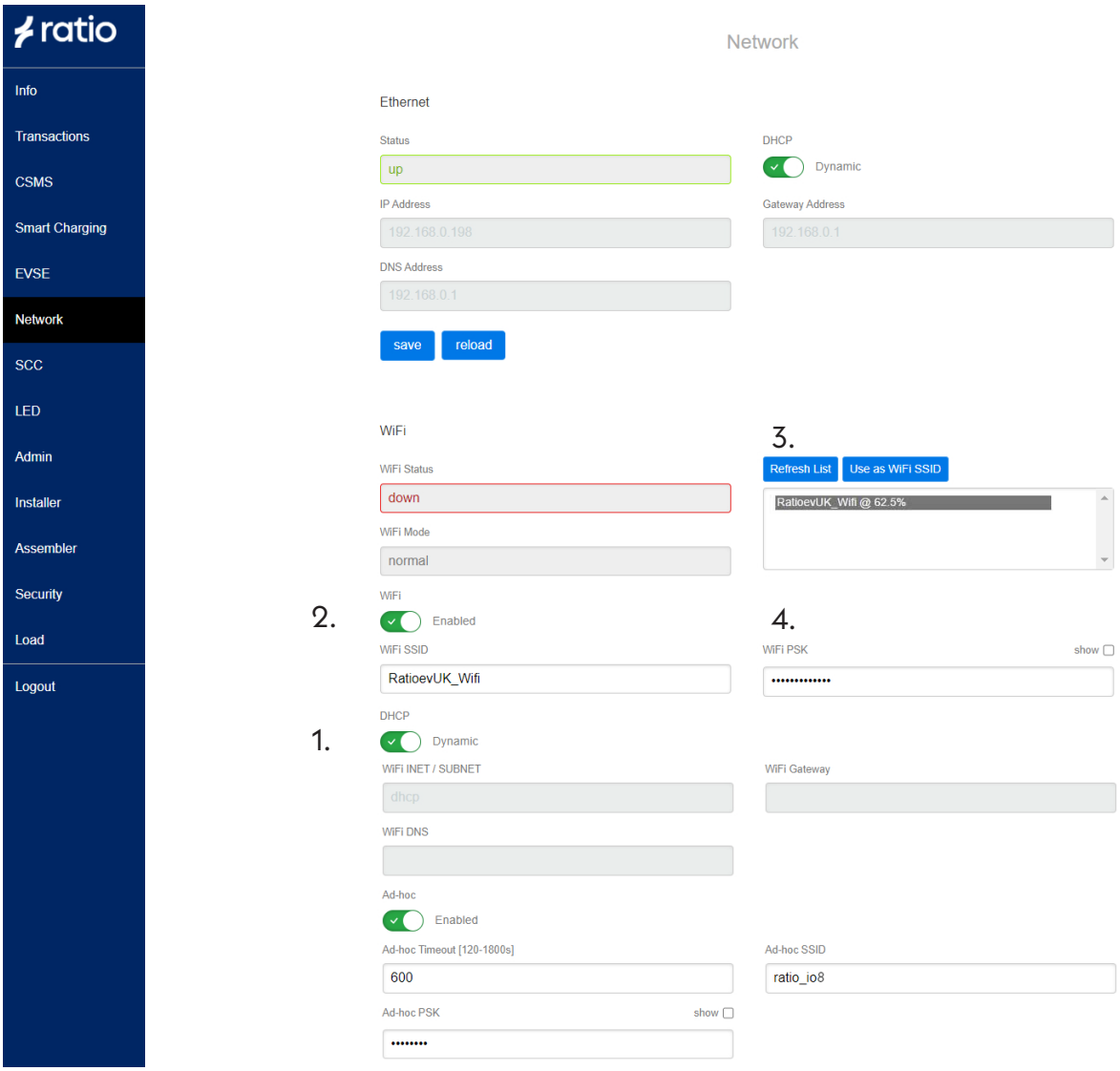
4. Input the Wi-Fi password.

Select “save”.



Note: If you select "save + connect" the hotspot will be dropped.

Note: If using Ethernet or 4G the Wi-Fi toggle must be switched dissabled.



Note: Wi-Fi Ad Hoc configuration settings **must not** to be adjusted.

6.1.5. 4G Enabled

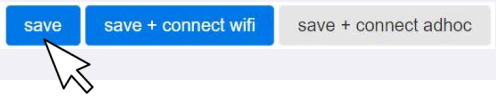
Navigate to the **Network** page as above and follow the steps below;

1. Toggle to dissable the Wi-Fi.

2. Ensure Ad-hoc LinkLocal remains enabled.

4. Select “Save”.

Note: Ensure to Select the "Save" illustrated below.



Note: If Ad-hoc is disabled, the Wi-Fi is left enabled or the Ethernet cable is not removed, the Wi-Fi or the Ethernet will override the 4G.

6.1.6. Ethernet Enabled

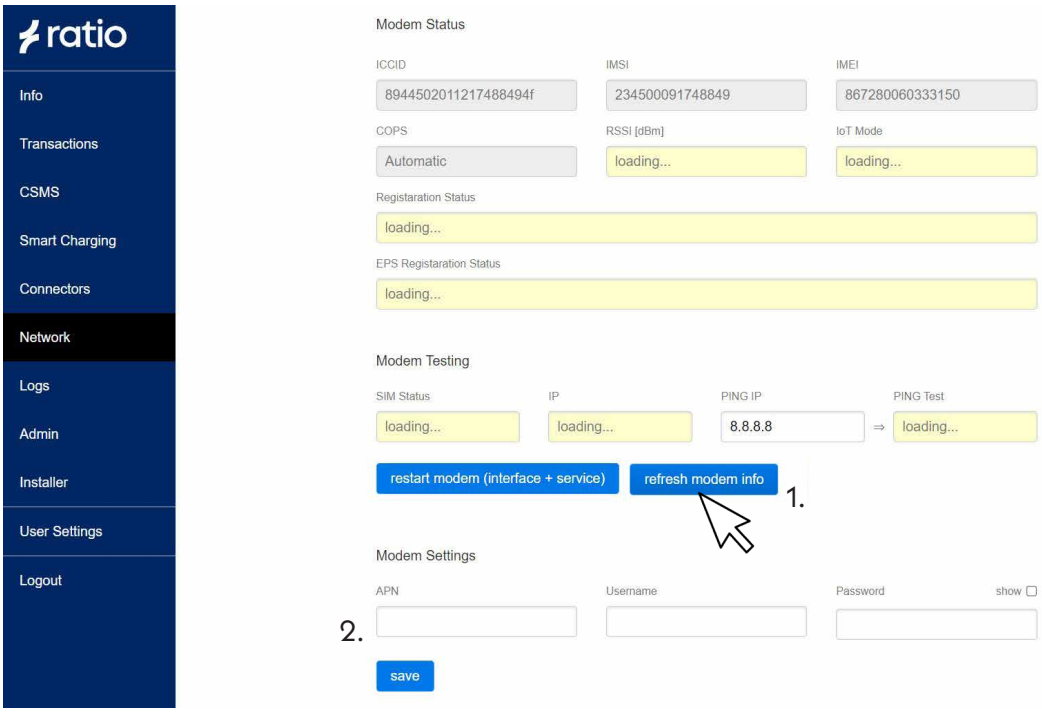
For Ethernet enabled option, ensure that the Ethernet cable is connected to your network and ensure the Wi-Fi toggle is dissabled in the **Network** page as per step 1. in section 6.1.5.

6.1.7. SIM Enabled

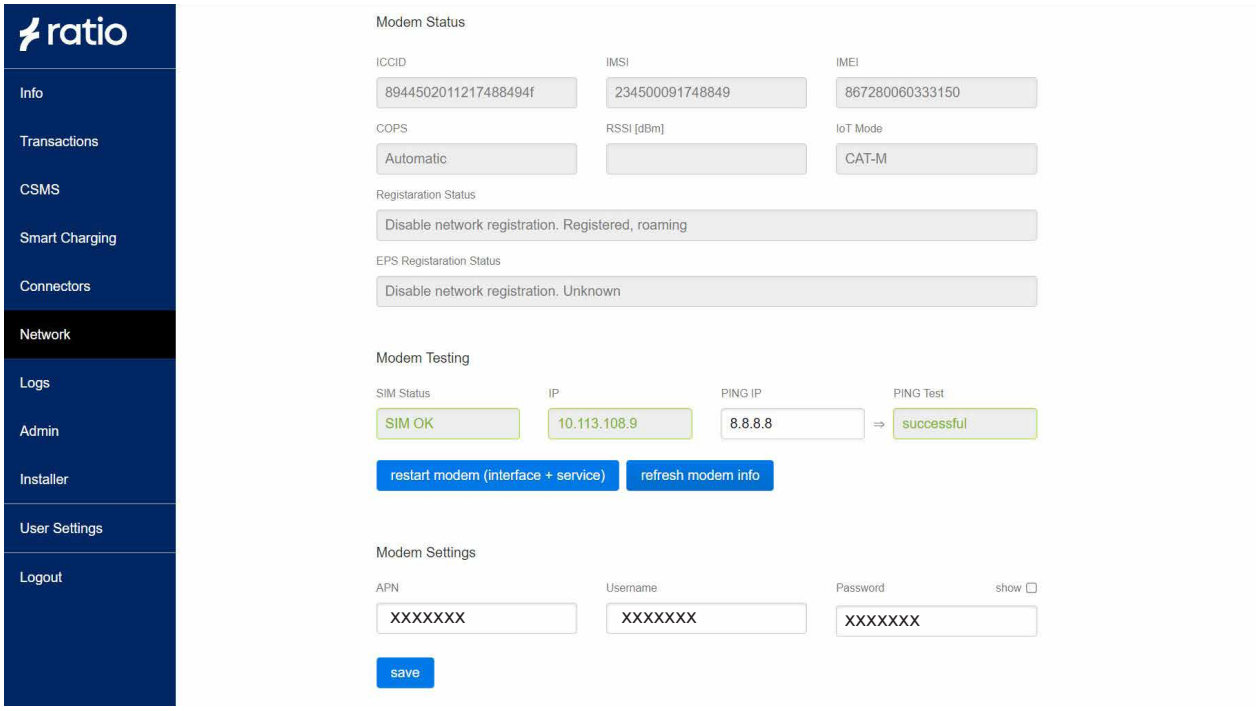
To configure the charger to use 4G, navigate to the **Network** page. and select "refresh modem info" as shown below.

1. Select "refresh modem info" as shown below.

2. Insert the back office details into the APN, Username and Password in the Modem Settings section and select "save".



Once the refresh has completed, the Modem Testing section will reflect the SIM information.



Click "save".

6.1.8. Installer Settings

Navigate to the **Installer** page and follow the steps shown below;

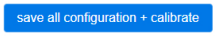
1. Ensure the "Charger Settings "displays the correct time zone.

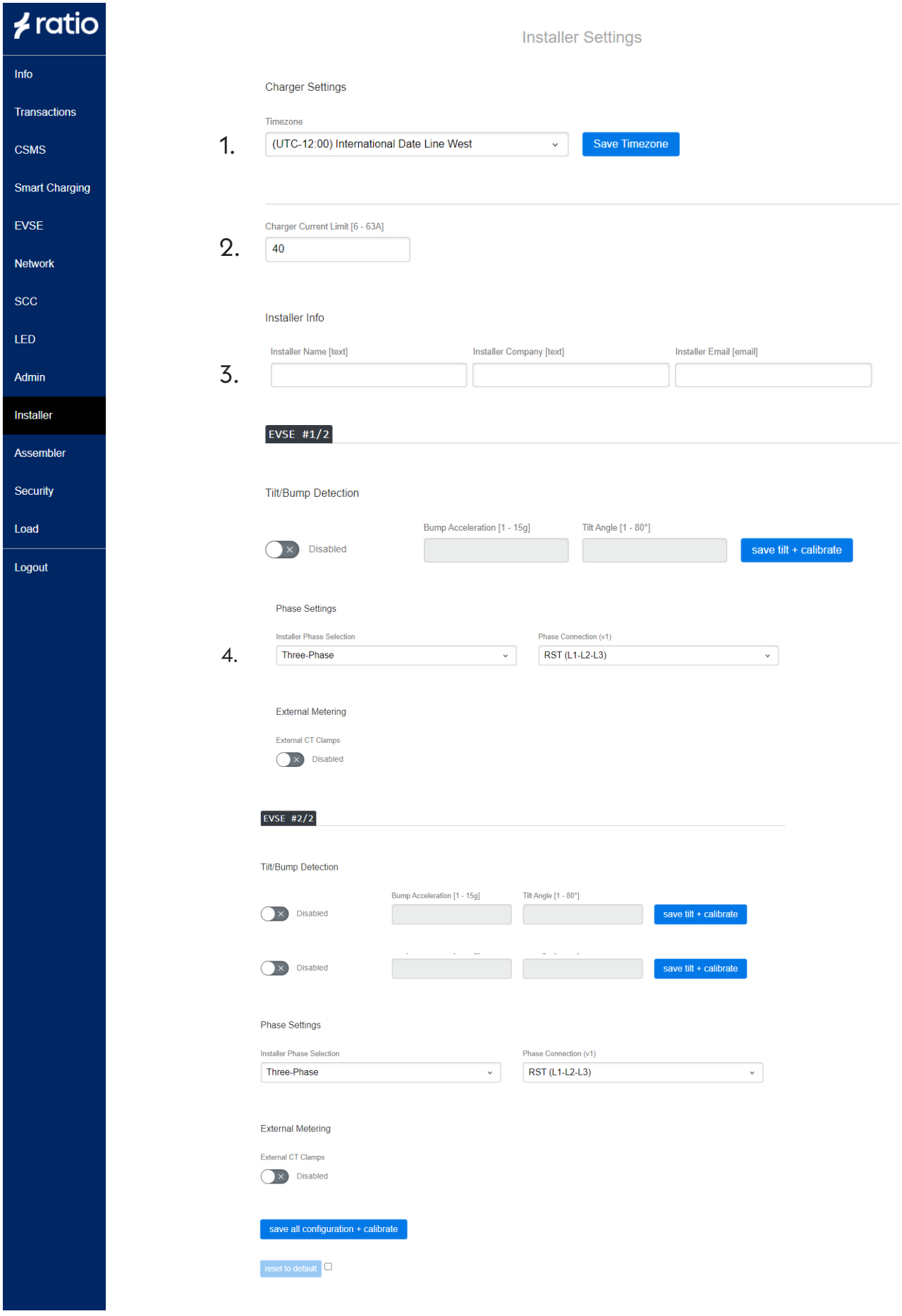
2. Add the maximum available current for the io7 on "Charger Current Limit [6-63A]". This value should be between 6 - 63A. This is the maximum available current within the installation.

3. Enter the Installer Name, Company and Email in the relevant cells.

4. Select the Phase connection to the charger from the drop down menu for EVSE1 and EVSE2.

Select “save all configuration + calibrate”.




ratio
Info
Transactions
CSMS
Smart Charging
EVSE
Network
SCC
LED
Admin
Installer
Assembler
Security
Load
Logout
Installer Settings
Charger Settings
1.
Timezone
(UTC-12:00) International Date Line West
Save Timezone
2.
Charger Current Limit [6 - 63A]
40
Installer Info
3.
Installer Name [text]
Installer Company [text]
Installer Email [email]
EVSE #1/2
Tilt/Bump Detection
Disabled
Bump Acceleration [1 - 15g]
Tilt Angle [1 - 80°]
save tilt + calibrate
Phase Settings
4.
Installer Phase Selection
Three-Phase
Phase Connection (v1)
RST (L1-L2-L3)
External Metering
External CT Clamps
Disabled
EVSE #2/2
Tilt/Bump Detection
Disabled
Bump Acceleration [1 - 15g]
Tilt Angle [1 - 80°]
save tilt + calibrate
Disabled
save tilt + calibrate
Phase Settings
Installer Phase Selection
Three-Phase
Phase Connection (v1)
RST (L1-L2-L3)
External Metering
External CT Clamps
Disabled
save all configuration + calibrate
reset to default

6.1.9. Dynamic Load Management

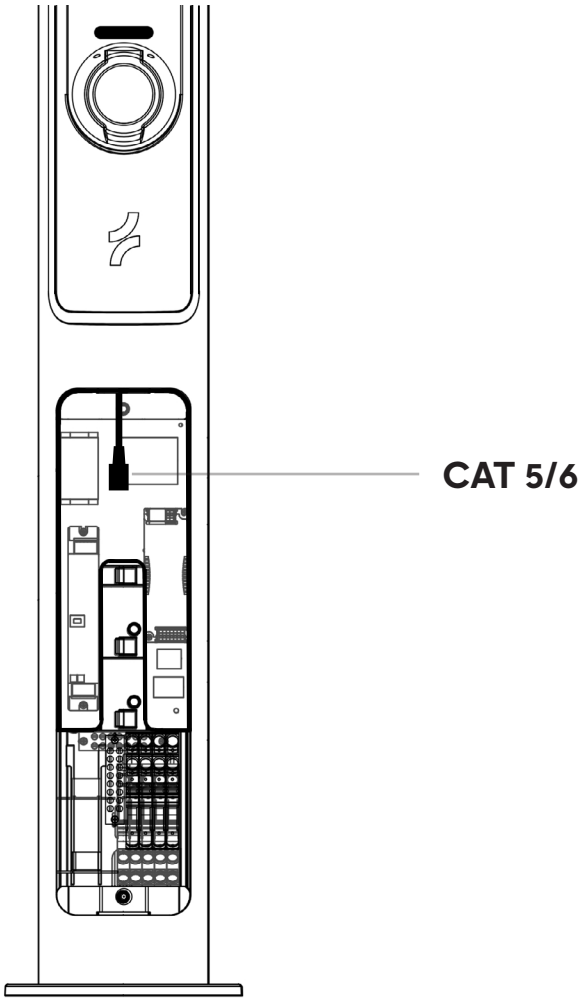
To set up the Dynamic Load Management on the charger a Ratio Sense Lite kit and a CAT5/6 running straight through will be required.

The Ratio Sense Lite kit contains;

- Ratio Sense Lite
- CT clamp (one for Single Phase or three for Three Phase)

Installation

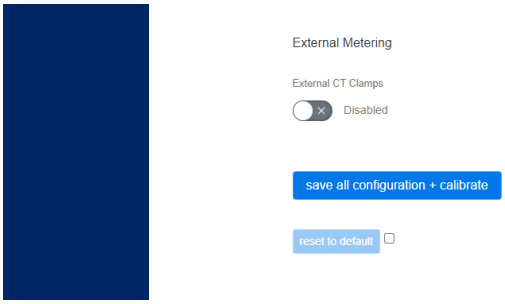
1. Run the CAT5/6 Cable straight through from the io7 to the mains incomer of the building.
2. Connect the CAT5/6 straight through to the Ratio Sense Lite at the mains end and the connection provided within the charger.
3. Install the CT clamp around the Mains tails with the arrow pointing towards the load.
4. Commision the charger.

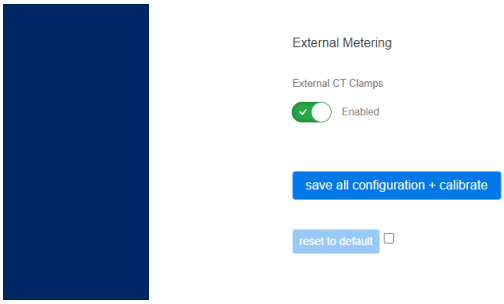


6.1.10. Load Management Commisioning

Power up the charger and follow the steps from page 20 to log into the web browser.

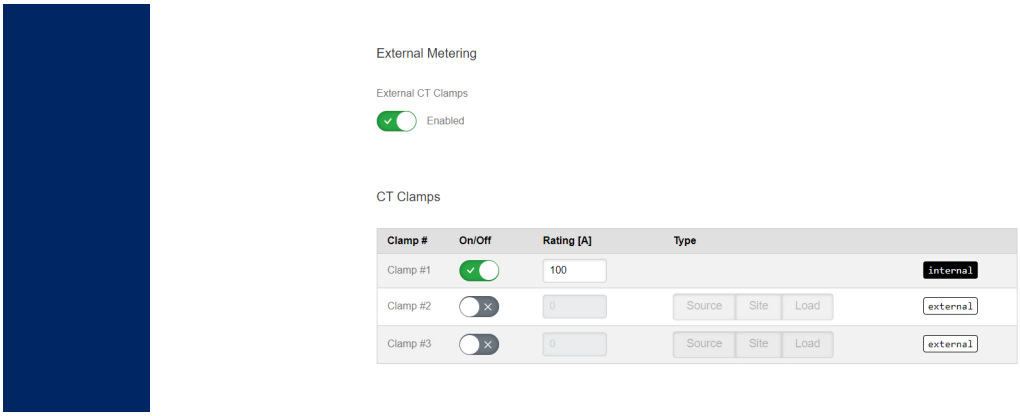
Navigate to the Installer tab and scroll down to the External Metering section and enable the toggle.



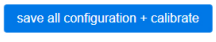


> **Note:** This is for connector one only.

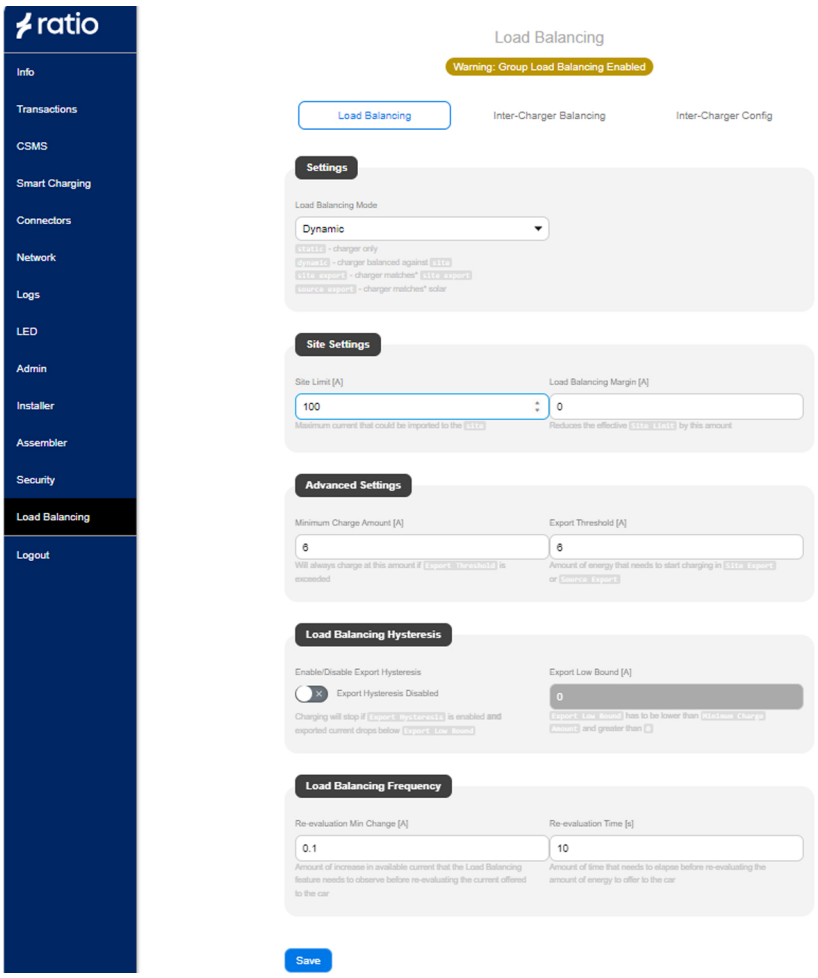
Turn on the required CT Clamps - one for Single Phase and three for Three Phase and input their rating and select Site.



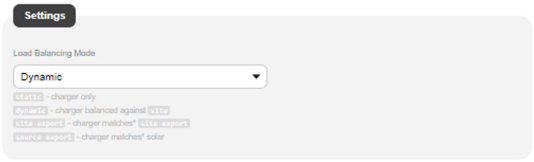
Scroll down and press Save all Configuration + Calibrate.



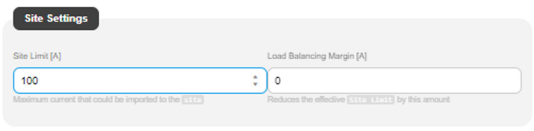
Navigate to the Load Balancing tab (shown below).



Select the required Load Balancing mode using the drop down menu.



Input the Site Limit of the building (Main fuse cut-out size).



Scroll down and click Save

6.1.11. Inter Charger Load Management

For installations that require Load Management (maximum of five per Ratio Sense Lite) complete the following steps.

> **Note:** This will work on Firmware 1.4.4 thereafter only.

For this the chargers will need to be grouped together. The next steps will demonstrate how to set up the intitial charger in the group.

1. Navigate to Load Balancing.

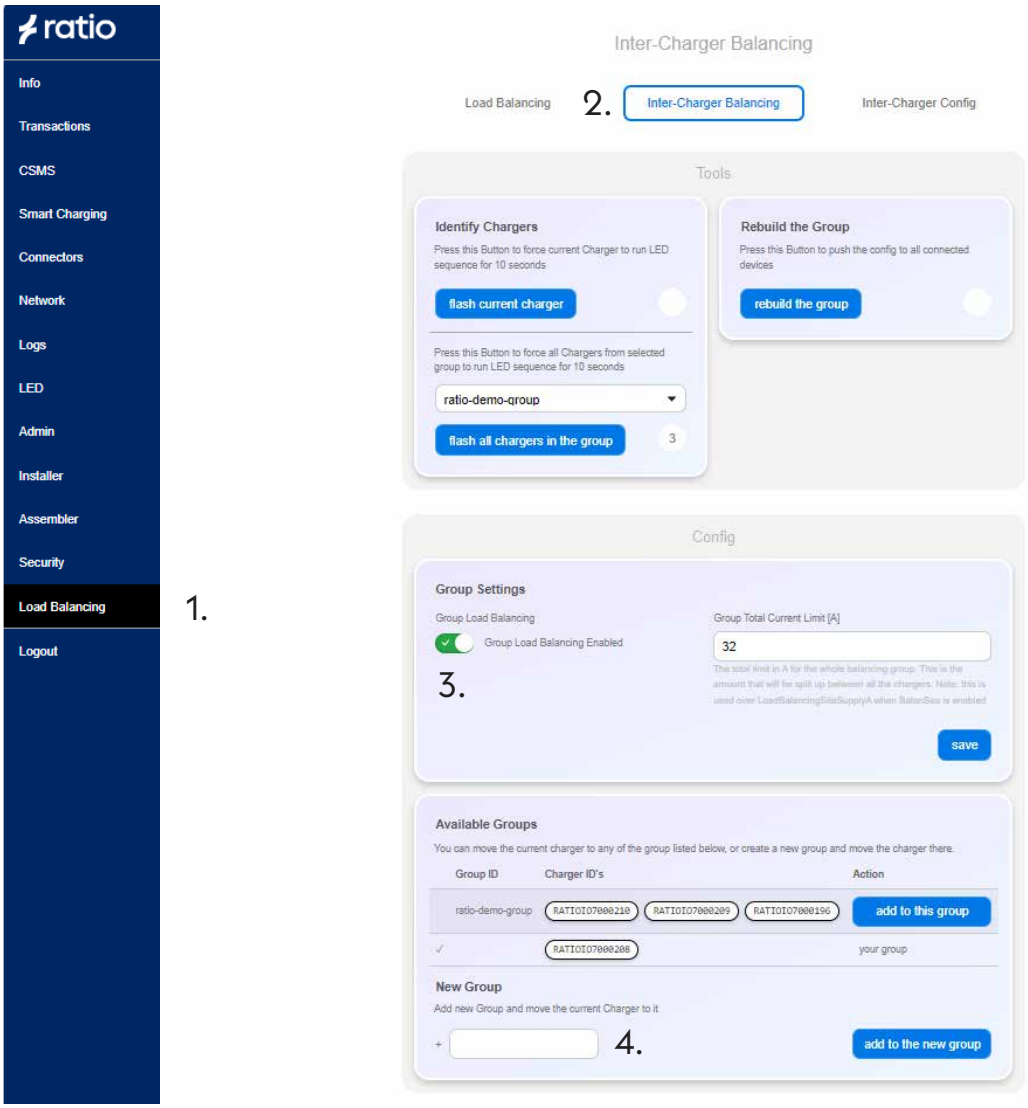
2. Select the Inter-Charger Balancing sub page.

> **Note:** Inter-Charger setting will override any Load Balancing Settings.

3. Enable Group Load Balancing.

4. Set Group Total Current Limit [A] For example, if there is a total of 3 chargers and limit of 30A, the max the whole group can pull is 30A, split between the three chargers and click "save".

5. Set a Group ID and click "Add to the new group".



Inter-Charger Balancing Settings

- **Rebuild Group** - (See adding or removing chargers).

Once the chargers are grouped they can be configured to a single charger. Available settings are in the "Inter-Charger Config" and "Inter-Charger Balancing" sub-pages. The settings will be added to all chargers upon pressing "Save".

Inter Charger Settings

Select the Balancing mode required for your installation.

- **Group Balancing Mode** – For Static Balancing: This will allocate the whole Group Total Current Limit [A]. For example, if the limit is set to 100A, 100A will be allocated between chargers.
  For Dynamic Balancing: This will balance against a connected CT clamp. If the limit is 100A and a site CT clamp on the master is reading 30A, only 70A will be allocated between chargers. (Note: if the CT clamp reading is negative, the limit will not increase).

Set offline charger strategy according to the installation risk assessment of available electrical power in the case of a charger fault.

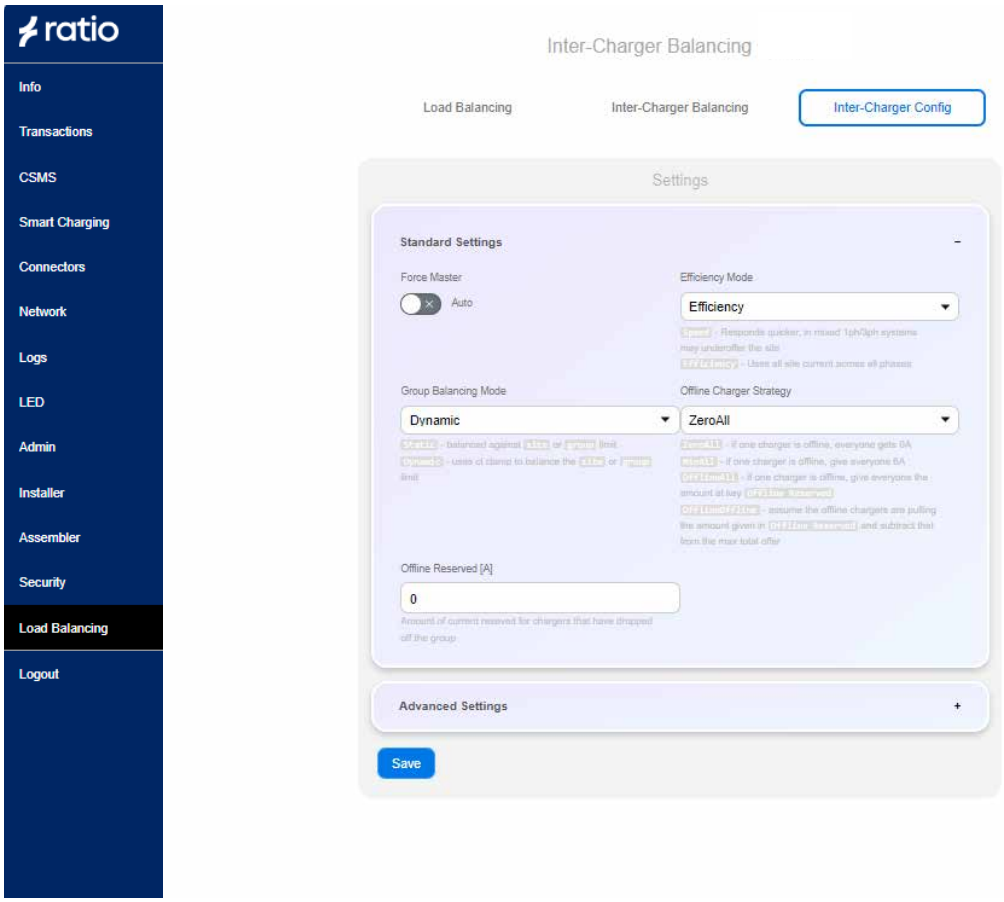
- **Offline Charger Strategy** – This will determine how the group will handle one or more chargers going offline within their group. An offline charger will always go into suspendedEVSE and offer 0A, and the remaining chargers in the group can behave in a number of different ways:
  "ZeroAll" – When one charger is offline, all remaining chargers are limited to 0A (disabled) until the charger returns online.
  "MinAll" – When one charger is offline, all remaining chargers are limited to 6A until the charger returns online.
  "OfflineAll" – When one charger is offline, all remaining chargers are limited to the amount specified in Offline Reserved [A] until the charger returns online.
  "OfflineOffline" – When one charger is offline, all remaining chargers are limited to (Group Total Current Limit [A] – number offline* Offline Reserved [A]) until the charger returns online.

> **Note:** Assume all offline chargers are pulling Offline Reserved [A] and allocate the rest.

- Offline Reserved [A] – The amount of current in amps that will be used for either "OfflineAll" or "OfflineOffline" charger strategies.

Click Save

Note: The main charger will now remain inoperative until a secondary charger is added to the group.



Adding additional chargers to the group

Follow installation manual to set your charger up to page 31, then finilase the set up using the required settings below.

Navigate to Load Balancing tab on the Menu and select the sub menu Inter Charger Balancing

Note: Inter Charger Config Advanced Settings - These are Advanced settings and should not be changed unless strictly necessary.

Enable Group Load Balancing and click save.

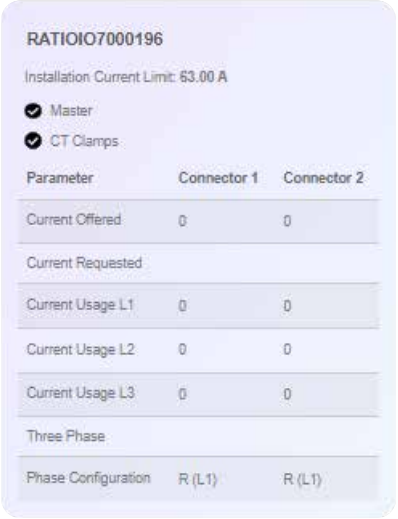
Note: All chargers must be on the same subnet and using the same encryption key for this to work.

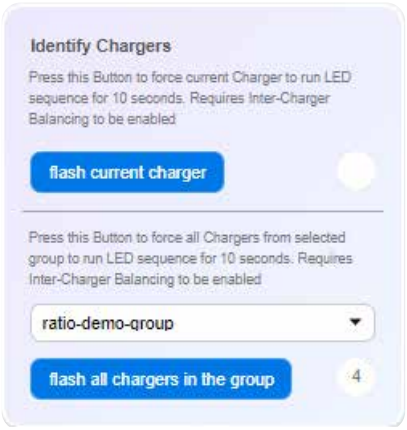
Available groups will now show on your Available Groups section. Click "Add to this Group".

Scroll to the bottom of the page. The chargers in the group will be displayed.

Repeat the steps above to add more chargers to the group (maximum of 5 per Sense lite).

A display will be shown for all chargers in the group including the master charger. If any chargers (including the master charger) have CT clamps (the Ratio Sense lite kit) the current each charger is drawing and what each chargers are offered (current) will be shown here.





Note: The chargers in the group can be identified by pressing the flash all chargers button after selecting the group you wish to be identified.

Adding or Removing Chargers

Group Load Management does not differenciate between an offline or removed charger. If a charger is removed from a group, a new group will be required to be rebuild. This is done by hitting the "Rebuild the Group" button on the config page.

6.1.12. Smart Charging

Click on the **Smart Charging** tab on the left and follow the steps below;

1. Use the toggle to enable or disable Smart Charging. If disabled, refer to step **7**.

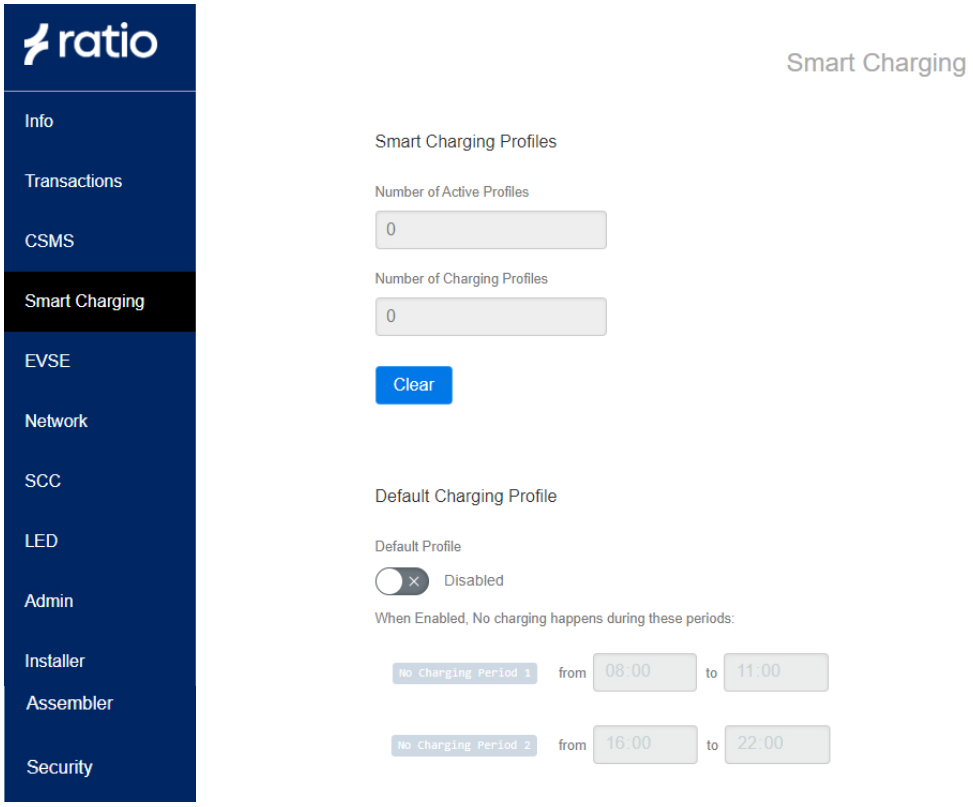
Note: The io7 complies with the UK Smart Charging Regulations. If charging is required during peak hours, smart charging must be disabled using the toggle switch. See point 3 for adjusting the delayed start.

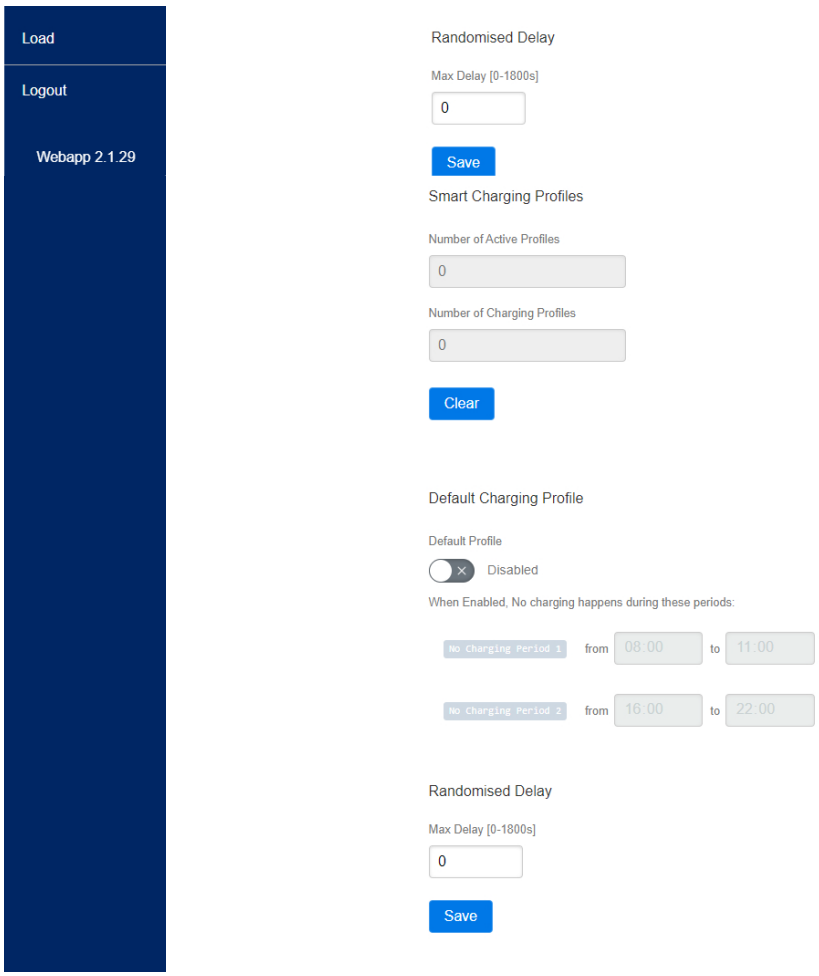
Note: When enabled, no charging will take place within the set times.

2. Set the no charging periods.

3. The randomised delay is set to 600 seconds. This setting forces the charger to offer power to a vehicle anywhere between a 0 and 10 minute interval. The randomised delay can be overridden if required for instantaneous charging. To do this, insert 0 into the box.

Select “Save”.





4. Click on "Logout" on the left hand column and select "log out + drop adhoc".

6.2. Back-end software Provider

The io7 will now be visible to the back-end software. The back-end software instruction should be followed to finalise the commissioning.

> **Note:** Before the charger is ready for use, it will require the full configuration process.

7. io7 Power up

Upon powering up, the io7 lights will turn on and light up white. Once this has been completed, the lights will turn Green when powering up has been completed.

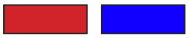
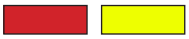
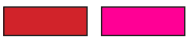
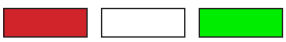
The LEDs on the io7 provides the user with a visual representation of the chargers status.
For futher colour codes, please refer to the table in Section 3. Technical data (page 12).

For trouble shooting colour codes, please refer to table in Section 8. Troubleshooting.

> **Note:** If the LEDs are **Red**, the fault will be reported via OCPP to the back-end software. Consult the back-end software fault logs, or if the problem persists contact Ratio for remote assistance.

8. Troubleshooting

The charger is equipped with monitoring software that detects faults and reports these through Open Charge Point Protocol (OCPP) via the back-end software. In the event of experiencing problems with your charger, please contact the back-end software provider to assist and solve the issue.

Colour sequence	LED colour description	Status
	Red / White	Card not authorised
	Red / White / Blue	Error bump detected
	Red / Green	Error control pilot voltage
	Red / Blue / Magenta	Error current leakage
	Red / Blue	Error diode
	Red / Magenta / Green	Error ee prom currupt
	Red / Yellow	Error general
	Red / White / Yellow	Error high temperature
	Red / Magenta	Error meter read time out
	Red / Blue / Magenta	Error current failure
	Red / White / Green	Error over/under voltage
	Red / Green / Blue	Error reader failure
	Red / Blue / Yellow	Error reset failiure
	Red / Yellow / Magenta	Error under current
	Green / Blue	Firmware update
	Magenta / Yellow	Inoperative
	White / Magenta	RFID white list mode
	Magenta / Blue	Suspended EV
	Magenta / Blue	Suspended EV Seb
	Magenta / Blue	Suspended EV Sec
	Yellow / Green	Tamper state

9. Use

9.1.1. Start Charging through back-end software

Charging sessions can be started by using the back-end app.

9.1.2. Start Charging RFID

In order to enable users to charge vehicles using RFID, the settings must be adjusted within the back-end software provider and enable the RFID feature.

Once activated, simply plug the charging cable into the io7 and the vehicle, and activate the charging session by swiping your RFID tag.

To begin your charging session;

1. Plug the charging cable into a socket on the io7.

2. Plug the vehicle connector side of your charging cable into your vehicle.

3. The light correspondent to your charge point will turn from Green to Magenta to indicate that the EV is detected.

4. Swipe your RFID tab onto the reader to activate charge. The LED should turn from Purple to Yellow, to indicate waiting for vehicle or back-end software. Once the vehicle begins to charge, the light will go from Yellow to pulsing Blue, to signify that your vehicle is being charged. Once the session is complete, the lights will flash Blue to Magenta to indicate the end of charge.

9.2. During charging

During a charging session, the measured charge times and power usage will be displayed in kW in your back-end software App.

9.2.1. Charging paused

In case there is less than 6A available on the main grid, the charging session will automatically be paused.
Switch off any power demanding devices or wait until more than 6A power is available.
As soon as there is sufficient available power, the charging session will automatically resume.

9.3. Stop charging

The charging session will stop automatically when the vehicle is charged to the maximum battery level, set within the EV.

You can also manually stop the charging session through your chosen back-end software app by or by swiping your RFID tag (if applicable) over the reader again or by unlocking the vehicle.

1. Unplug the EV charging connector from the EV.
2. Unplug the EV Charging connector from the io7.

The back-end software App will no longer show current directions and power usage values.

10. Maintenance

Ratio chargers are practically maintenance-free, aside from periodic cleaning of the housing.

1. Switch off the charger before cleaning the housing.
2. Clean the io7 using a soft cloth lightly moistened with mild detergent solution.

⚠ WARNING

Risk of electric shock

- Switch off the charger before cleaning the housing.
- Be careful when cleaning the inlets and socket, do not use excessive amounts of water to avoid water leaking into the charger.

11. Service

To avoid risk of electric shock, only qualified electricians should perform service or maintenance on the charger. If your charger is in need of servicing, please contact Ratio, your local vendor or a qualified electrician.

12. Data protection

Please refer to the privacy statement on the Ratio website at www.ratioev.uk

13. Warranty

Ratio EV Charging warrants this product to be free from defects in material, manufacture and design for a period of 3 years after the date of purchase. If this product is defective in materials, manufacture or design during this warranty period, Ratio EV Charging will, at its option, repair or replace the product.

Repair parts and/or replacement products may be either new or reconditioned at the discretion of Ratio EV Charging.
This limited Carry-In Warranty does not include service to repair damage from improper installation, improper connections with peripherals, external electrical fault, accident, disaster, misuse, vandalism, unauthorized alteration or repair, abuse or modifications to the product not approved in writing by Ratio EV Charging.

Any evidence of an attempt to disassemble the io7 Charger will void this warranty.

Any service repair outside the scope of this limited warranty shall be at applicable rates and terms then in effect.

14. Disposal

If the charger is defective beyond repair, or you no longer wish to use the charger, please recycle the charger according to Ratio's Terms and Conditions of recycling WEEE products.

15. EC Declarations of Conformity

Declaration of Conformity

Manufacturer:	Ratio EV Ltd
Date:	29/03/2024
Address:	Unit 1 Target Park, Shawbank Road, Lakeside, Redditch, Worcs, UK, B98 8YN
Product:	iO8 EVSE Charing Pillar
Model/Type:	IO8T74M, IO8T22C, IO8T22M, IO8T74C, IO8S74M, IO8S22C, IO8S22M, IO8S74C

We declare that the above stated product range is in conformity with the provisions of the following statutory requirements, including all amendments, and with national legislation implementing these regulations:

2014/35/EU	LCD - Low Voltage Directive
2014/30/EU	EMC - Electromagnetic Compatibility
2011/65/EU	RoHS - Restriction of Hazardous Substances in Electrical and Electronic Equipment.
EC 1907/2006	REACH – Registration Evaluation, Authorisation and Restriction of Chemicals

All products are manufactured in accordance with our ISO9001 quality system and are 100% tested for safety and operation during production.

Reference	Type
BS EN IEC 61851-1:2019	Electric Vehicle Conductive Charging System General Requirements
BS EN IEC 61851-21-2:2021	Electric Vehicle Conductive Charging System Electric Vehicle Requirements for Conductive Connection to an AC/DC Supply. EMC Requirements for Off Board Electric Vehicle Charging Systems
BS EN IEC 61000-6-1:2019	Electromagnetic compatibility (EMC). Generic standards. Immunity standard for residential, commercial, and light-industrial environments
BS EN IEC 61000-6-3:2021	Electromagnetic compatibility (EMC). Generic standards. Emission standard for equipment in residential environments
BS 7671:2018 + A2:2022	Requirements for Electrical Installations. IET Wiring Regulations.

Name and signature of authorised person

Tom Jennings – General Manager

CE

Declaration of Conformity

Manufacturer:	Ratio EV Ltd
Date:	29/03/2024
Address:	Unit 1 Target Park, Shawbank Road, Lakeside, Redditch, Worcs, UK, B98 8YN
Product:	iO8 EVSE Charing Pillar
Model/Type:	IO8T74M, IO8T22C, IO8T22M, IO8T74C, IO8S74M, IO8S22C, IO8S22M, IO8S74C

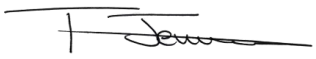
We declare that the above stated product range is in conformity with the provisions of the following statutory requirements, including all amendments, and with national legislation implementing these regulations:

UK SI 2016 No. 1101	The Electrical Equipment (Safety) Regulations 2016
UK SI 2016 No. 1091	Electro Magnetic Compatibility Regulations 2016
UK SI 2016 No. 3032	Restriction of the use of Certain Hazardous Substances in Electrical and Electronic Equipment.

All products are manufactured in accordance with our ISO9001 quality system and are 100% tested for safety and operation during production.

Reference	Type
BS EN IEC 61851-1:2019	Electric Vehicle Conductive Charging System General Requirements
BS EN IEC 61851-21-2:2021	Electric Vehicle Conductive Charging System Electric Vehicle Requirements for Conductive Connection to an AC/DC Supply. EMC Requirements for Off Board Electric Vehicle Charging Systems
BS EN IEC 61000-6-1:2019	Electromagnetic compatibility (EMC). Generic standards. Immunity standard for residential, commercial, and light-industrial environments
BS EN IEC 61000-6-3:2021	Electromagnetic compatibility (EMC). Generic standards. Emission standard for equipment in residential environments
BS 7671:2018 + A2:2022	Requirements for Electrical Installations. IET Wiring Regulations.

Name and signature of authorised person



Tom Jennings – General Manager

UK CA

Notes

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