

 ratio

io7



INSTALLATION AND  
COMMISSIONING  
MANUAL

**POWERED BY  
SIMPLICITY**

# Thank you for choosing the Ratio io7

## Manufacturer

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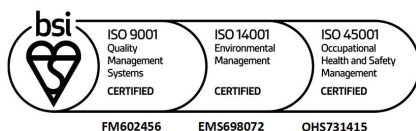
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XXXXX - V00\_09 - 08/2024



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# Preface

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## About this document

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

<b>Category of product</b>	Electric Vehicle Charger
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<b>Product name</b>	Ratio io7 Double
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<b>Art. No.</b>	389xx
-----------------	-------

<b>Serial number</b>	
----------------------	--

<b>Ad hoc password</b>	
------------------------	--

<b>Charger password</b>	
-------------------------	--

Please refer to Ratio's T&C's at [ratioev.uk](http://ratioev.uk)

Write the serial number, ad hoc password, and charger password in the table above for safe keeping.

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

This manual is intended for:

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

## Original instructions

This manual has been translated into multiple languages. The original manual is written in UK English. All other language versions are translations of the original manual.

## Copyright

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## 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 Electric B.V. reserves the right to modify this manual without notification beforehand.

Ratio EV Charging reserves the right to modify this manual without notification beforehand.

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# 1. Safety

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Please make sure you have fully read and understood the instructions in this manual before you start installing or using the product. If you fail to follow the instructions from this manual you can put persons, surroundings, the environment and the product at risk. Store this manual in an accessible place near the product 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.

## 1.1. Symbols and labels

### 1.1.1. Safety warnings

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

Signal word	Risk of injury	Result when instruction is ignored or not followed correctly
 <b>WARNING</b>	Medium	Could result in death or serious injury
 <b>CAUTION</b>	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 signal word NOTICE. These messages do not have a safety alert symbol.

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

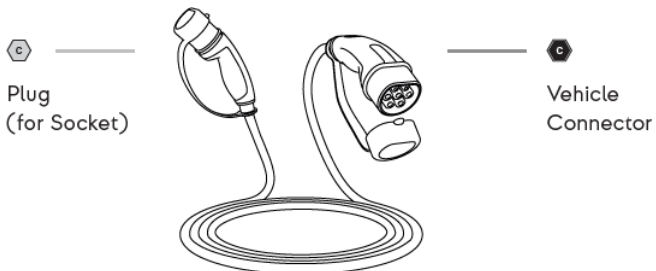
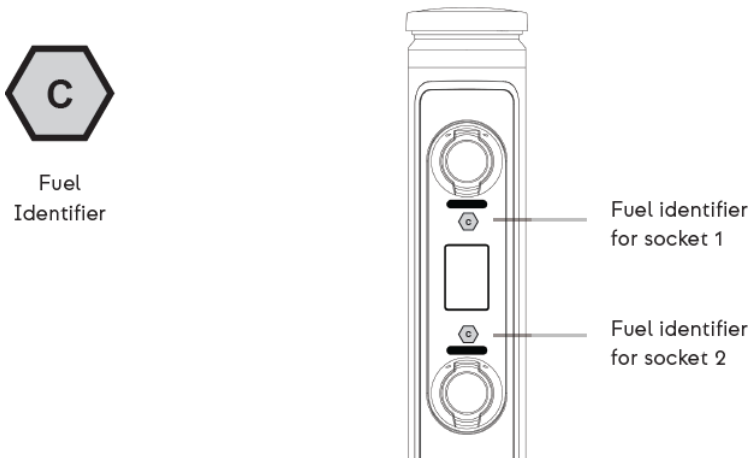
### 1.1.3. Fuel Identifier

The Fuel Identifier symbol is located at the front of the charger by each socket. They are part of the installation packs.

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 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.



## **1.2. Intended use**

The Ratio 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 authorised technicians are allowed to perform installation and maintenance of the product. They must possess the following qualifications:

- are legal of 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 you use 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.

The single and three phase io7 charger variants are equipped with open PEN fault protection.

### ⚠ 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 any other signs of damage.
- Do not use this product if the enclosure or EV connector are broken, cracked, open, or show any other indication of damage.
- Always make sure all electrical components are 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 or serviceman 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 or serviceman.
- Do not 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 with or near the product. Children should be supervised when they are near the io7.
- The installation must be done by a qualified electrician in line with local and national legislation and IET Regulations.
- Open PEN fault protection is incorporated into single and three phase io7 charger variants.



### **⚠ CAUTION**

- Make certain the supply cable of the product is positioned so it will not be stepped on, tipped 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's owner's handbook to determine if 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 bumping.
- Do not store the product in an environment that exceeds the ambient conditions as stated in this manual.
- Do not expose the internal components product to moisture.
- Do not immerse the product in water or any other liquid.
- The charging cable is liable to get warm during normal operation.

## **2. Description of the product**

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The io7 is a Mode 3 charger for charging electrical vehicles (EV) that complies with the IEC61851 standard.

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

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

The single and three phase io7 charger variants are equipped with open PEN fault protection.

### **Over the air updates (OTA)**

The io7 charger is equipped with the technology to receive over the air updates, enabling your charger to receive the available updates over internet.

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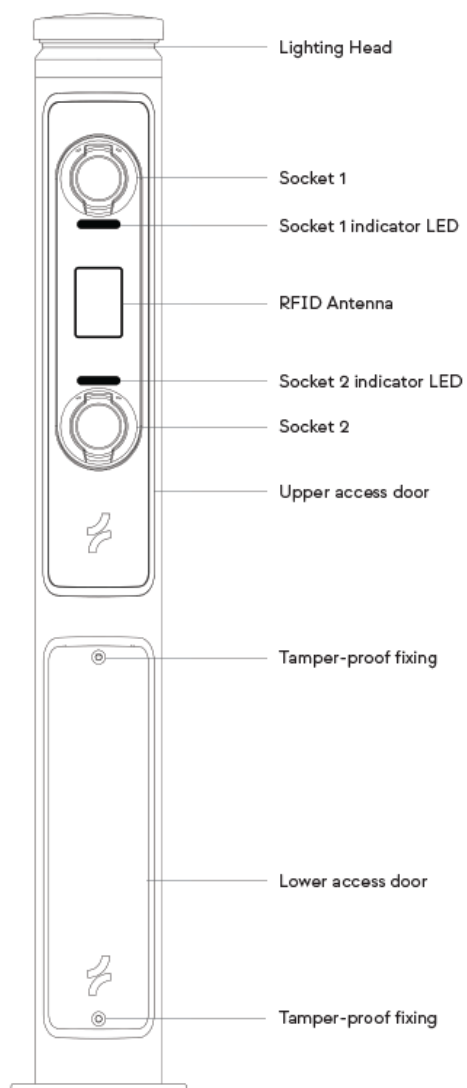
#### **Charging mode**

The charging mode needs to be configured within the back-end software. The most common modes are private, public and schedule.

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## 2.1. Charger components

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## 2.2. LED Lighting

The LEDs on the charger indicate the chargers status.

LED Colour	Status
 White	Boot up
 Green	Ready
 Magenta	Cable inserted
 Yellow	Waiting to charge
 Blue (pulsing)	Charging
 Blue (solid)	Charging delayed
 Red	Fault

**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. Technical data

Product name	Ratio io7 Double
Art. no.	389xx
Charging System	IEC61851, Mode 3
Cable version car connector	IEC 62196, Type 2
Outlet version	IEC 62196, 2x Type 2 Outlets
Power input	single-phase or three-phase, 230V-400V AC, 16A-32A
Max Power output	7.4 kW / 230V AC, 22 kW / 400V AC
Frequency	50 Hz $\pm$ 5%
Protection against electric shock	Class I
Surge protection	Surge protection 4kV
Protection	AC 30 mA and DC 6 mA

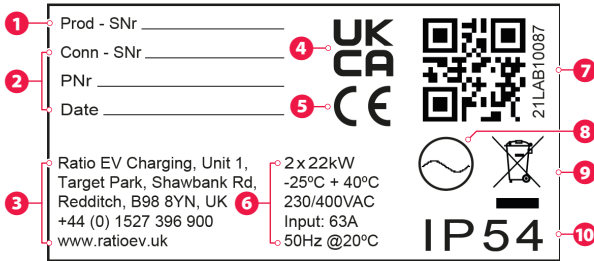
<b>Rated peak withstand current (IPK)</b>	≤80 kA <sup>2</sup> s
<b>Rated short-time withstand current (Icw)</b>	N/A
<b>Rated conditional short circuit current (Icc)</b>	5 kA <sup>2</sup> s
<b>Rated diversity factor</b>	1
<b>Pollution degree</b>	Pollution Degree 2
<b>Compatible earthing systems</b>	TN, IT, TT
<b>EMC classification</b>	<ul style="list-style-type: none"> <li>• EN 61851-21-2:2021</li> <li>• Residential &amp; Non-Residential</li> <li>• EN 55032:2015 + A1:2020 Class B</li> <li>• ETSI EN 301 489-1 V2.2.3:2019</li> <li>• EMC Directive 2014/30/EU &amp; UK</li> <li>• EN 300 328 V2.2.2:2019</li> <li>• Electromagnetic compatibility Regulations 2016</li> </ul>
<b>Dimensions</b>	1410 mm × 230 mm × 230 mm
<b>Housing</b>	Polyester, Power Coated Aluminium
<b>Weight</b>	17 kg
<b>Country of Manufacture</b>	United Kingdom
<b>IP Protection rating</b>	IP54/IK08
<b>Ambient temperature</b>	-25 °C to +30 °C
<b>Markings</b>	CE UKCA
<b>Earthing</b>	PME fault detection on single and three phase versions
<b>Ventilation</b>	Not supported
<b>Metering</b>	CT Clamp or MID meter versions available
<b>Required protection device type</b>	Type A (refer to table in chapter 5.1.3)
<b>Supported connectivity protocols</b>	Wi-Fi 4G Ethernet
<b>RFID</b>	Included 13.56MHz

<b>Standards</b>	BS EN IEC 61851-1
	BS EN IEC 60598-1
	BS EN IEC 62196
	BS 7671:2018 + A2:2022
<b>EV Communications</b>	OCPP 1.6J

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

### 3.1. Nameplate/Marking

The product is marked in accordance with the applicable legislation requirements. All product labels are located within the main housing behind the protective cover.



- |   |                                |
|---|--------------------------------|
| <b>1</b> Serial number                      | <b>6</b> Technical data        |
| <b>2</b> Product identification information | <b>7</b> Commissioning QR code |
| <b>3</b> Manufacturer                       | <b>8</b> AC Supply             |
| <b>4</b> UKCA marking                       | <b>9</b> WEEE-logo             |
| <b>5</b> CE marking                         | <b>10</b> IP rating            |

**ratio**  
INSTALLER INFORMATION

Installer Portal  
 Username : Installer  
 Password : <pvord>  
 ADHOC WIFI  
 SSID : Ratioio7  
 Password : <pvord>

Installation Guide

21LAB10050

**ratio**  
CUSTOMER INFORMATION

Please store this in a safe location for future reference.

ratio.eu.uk  
 Ad hoc WiFi  
 SSID : Ratioio7  
 Password : <ad hoc pvord>

21LAB10051

**SAFETY ELECTRICAL CONNECTION DO NOT REMOVE**

**Danger High Voltage**

21LAB10086

**WARNING ISOLATE BEFORE REMOVING COVER**

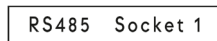
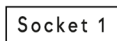
21LAB10085

Installer information  
Commissioning QR Code

Customer information  
Commissioning QR Code

Safety electrical  
connection - Danger  
High Voltage

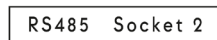
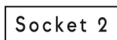
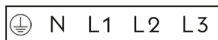
Warning -  
Isolate before  
removing  
cover



Fuel Identifier Earth, Neutral, Live 1

Socket 1

RS485 Socket 1



RFID Indicator

Earth, Neutral, Live 1, Live 2, Live 3

Socket 2

RS485 Socket 2

## 4. Transport and storage

### 4.1. Transport

Transport the product in the original packaging, or suitable replacement packaging that provides adequate protection from vibrations, bumps, moisture, dust, and debris. Be careful not to drop the product and prevent it from moving or bumping into objects while transporting.

Excessive vibrations could loosen wire connections and cause the product to 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**

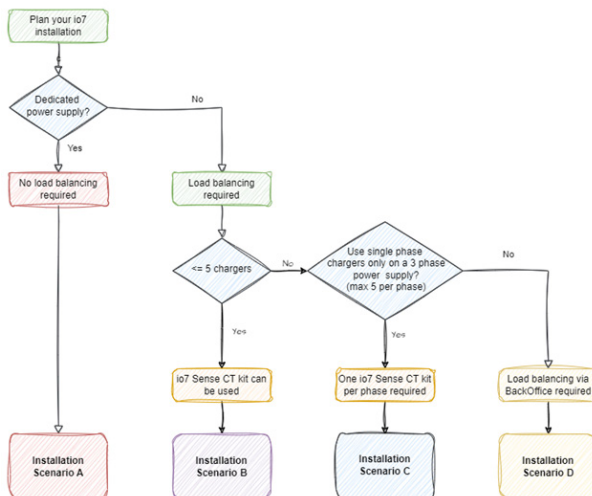
- The installation must be carried out by a qualified electrician in accordance with local and national legislation, and IET Regulations.
- The electrical installation must be isolated during the entire installation period.
- This charging unit uses circuits that reference to ground. Do not conduct insulation resistance testing on the unit after connecting it to the supply network.

### 5.1.1. Choose your installation scenario

There are many possibilities to setup a Ratio io7 or a group of Ratio io7s. Consider the power supply and network configuration before starting the actual installation of the Ratio io7 and laying cables. The table in Appendix A – Installation Scenarios displays a few power supply and network scenarios.

When choosing one of the installation scenarios, consider the possibility of adding one or more Ratio io7s in the future. This can impact the number of data cables needed (especially when you start with a single Ratio io7).

It can be helpful to use this flowchart to decide which Installation Scenario suits your situation.



**Note:** Some situations do not require Dynamic Load Balancing. In these cases it is possible to set up the chargers without io7 Sense CT kit. This is called Static Load Management and limits all chargers to a configurable maximum current, preventing overloading the grid connection in case all chargers are in use simultaneously. To set up Static Load Management, follow the instructions for Installation Scenario B or Installation Scenario C, without the installation of the io7 Sense CT kit(s).

### 5.1.2 Required tools

Spirit level	Size 3 flathead	HM5 Pin Hex Allen key
--------------	--------------------	--------------------------



- Equipment for ground fixing (M10 bolts and nuts recommended)
- Installer label
- Ethernet switch (only when group load management is needed)

### 5.1.3. Required wiring and electrical protection

**Note:** A data cable is required for Ethernet versions of the io7.

Charger model	Recommended supply cable *	Internal RCBO	Residual Current Device (RCD) at source**
Twin 7.4 kW	3 core 16 mm <sup>2</sup>	2 × 40 A Type A 30 mA 2 pole	63 A, 150 mA time delayed / 300 mA Type A minimum 2 pole
Twin 22 kW	5 core 16 mm <sup>2</sup>	2 × 40 A Type A 30 mA 4 pole	63 A, 150 mA time delayed / 300 mA Type A minimum 4 pole

\* Max 25 m cable length

\*\* Ensure the RCD is compliant with BS EN 61008-1 and switches all poles (including neutral).



#### 5.1.4. Network wiring

Ratio io7s come equipped with a 4G SIM card. This eliminates the need for a local network connection to connect to a Charge Point Operator (CPO). A local network is only required for Installation Scenario B or Installation Scenario C when installing more than one Ratio io7.

**Note:** The local network should be dedicated exclusively to Ratio io7s. Do not connect other devices to this network.

**Note:** Ratio does not provide the required local network switch. Ensure you have a suitable device before beginning the installation.

#### 5.1.5. io7 Sense CT Kit - CT Clamps

For Installation scenario B or Installation scenario C where Dynamic Load Balancing is required, install an io7 Sense CT kit with CT Clamps. This kit measures the usage on the power grid. For Static Load Management, the io7 Sense CT kit is not necessary.

In a group of Ratio io7s, one charger becomes the Master io7. This charger divides the available currents to the other Ratio io7s in the group. Connect the io7 Sense CT kit and the Master io7 with an io7 Sense CT kit connection cable. For this connection, use any straight CAT-5 or CAT-6 network cable, either off-the-shelf or assembled in the field.

For Installation scenario C (three-phase power supply with multiple single-phase chargers on alternate phases, up to 5 chargers per phase), install an io7 Sense CT kit for each phase. Each phase should have a Master io7 connected to an io7 Sense CT kit via an io7 Sense CT kit connection cable.

**Note:** The arrow on the inside of the CT clamps should point towards the load.

**Note:** Do not connect the io7 Sense CT kit connection cable between the io7 Sense CT kit and the Master io7 to a local network switch.

## 5.2. Power cabinet

### 5.2.1. Power distribution board

The installation of the power distribution board requires careful attention to safety and proper procedures. Follow these steps to install the power distribution board:

1. Isolate the electrical installation during the entire installation period. Do not use the io7 until you have completed the installation.
2. Run a power cable from the distribution board to the installation location of the charger.
3. For circuit protection devices, refer to section 5.1.3 of this manual.
4. Connect the power cable wires to the dedicated protection devices in the distribution board.

### 5.2.2. Network setup

For Installation Scenario B and Installation Scenario C, follow these steps to set up the network:

1. Install a network switch in a safe and dry place. Ensure the location is protected from moisture and other environmental factors that could damage the equipment.
2. Lay down network cables between the network switch and each io7 charger. Use appropriate cable management techniques to ensure a neat and organized installation
- 3 Plug the network cable from the network switch into the grey connector in the io7.

### 5.2.3. io7 Sense CT kit installation

Only Installation Scenario B and Installation Scenario C require the installation of the io7 Sense CT kit with CT clamps. Follow the specific instructions for each scenario below.

#### Installation Scenario B

Requires one io7 Sense CT kit.

1. Connect the CT clamps to the three phases (or just to one phase in the case of a single-phase io7) in the power cabinet.

**Note:** The arrow on the inside of the CT clamps should point towards the load.

2. Plug the CT clamps into the io7 Sense CT kit. Ensure that each phase is connected to the corresponding input of the io7 Sense CT kit.

For a single-phase installation: Always connect to input 1 of the io7 Sense CT kit.

3. Lay down the io7 Sense CT kit connection cable between the distribution board and the Master io7 to connect the io7 Sense CT kit
4. Plug the io7 Sense CT kit connection cable into the io7 Sense CT kit.
5. Connect the io7 Sense CT kit connection cable from the io7 Sense CT kit to the purple cable in the Master io7.

---

<add picture of where to find the connection point for the io7 Sense CT Kit connection cable.>

---

## Installation Scenario C

Requires each used phase to have its own io7 Sense CT kit.

1. Connect the CT clamps to the used phases in the power cabinet
2. Plug the CT clamps into input 1 of the io7 Sense CT kit.
3. Lay down the io7 Sense CT kit connection cable between the distribution board and each Master io7 to connect the io7 Sense CT kit.
4. Plug the io7 Sense CT kit connection cables into each io7 Sense CT kit.
5. Connect the io7 Sense CT kit connection cable from the io7 Sense CT kit to the purple cable in the Master io7.



## 5.3 Installing the io7

### 5.3.1 Preparing the foundation

Before installing the io7, prepare the foundation to ensure it is free from debris and any potential water accumulation that may occur.

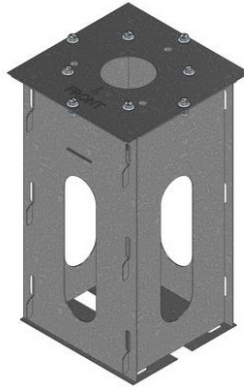
#### **⚠ WARNING**

##### **Risk of electric shock**

- Never mount the charger on insulating material. Always make sure the charger is earthed (with an earth electrode or use PEN for UK).

### Universal Mounting Base

The easiest way to mount the io7 is by using the Universal Mounting Base. This base facilitates easy cable entry and secure mounting of the io7.



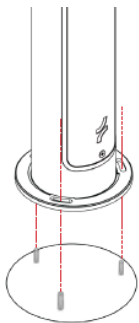
### Flange Mount - Anchor Bolts

For mounting on existing concrete or similar surfaces, or on a dedicated 600 x 600 x 200 mm concrete pad, use the surface mounting foundation adaptor.

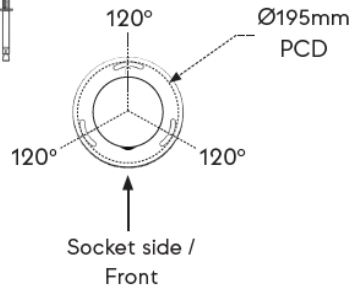
Secure the surface mounting plate to the ground using three M10 x 150mm (minimum) expanding countersunk concrete anchor bolts (not provided) or an equivalent fixing.

#### 5.3.2 Mount the io7

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

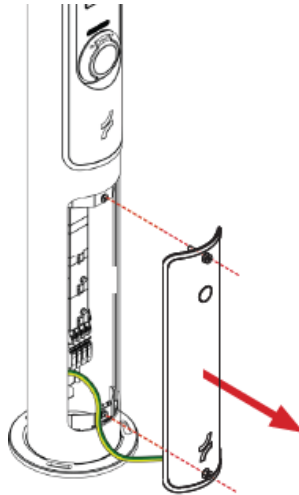


M10  
x 3



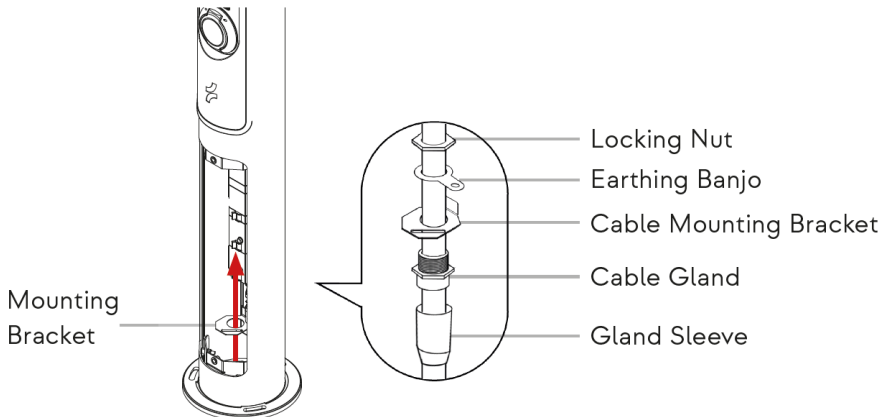
### 5.3.3. Remove the front door

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



### 5.3.4 Electrical installation

1. Install the Steel Wire Armored (SWA) cable gland to the cable plate, ensuring the Earth tag is affixed as shown below.



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

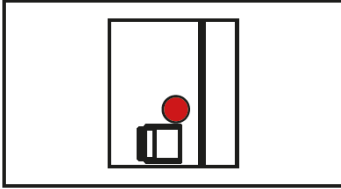
2. Perform the insulation resistance tests prior to terminating to the io7.

**⚠ WARNING**

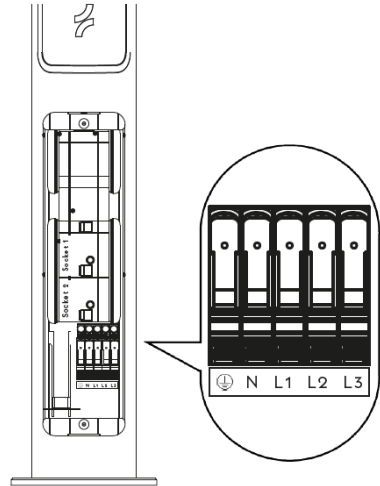
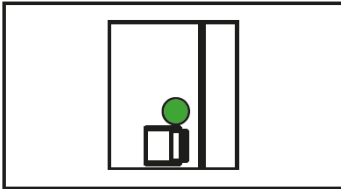
Performing this test whilst the io7 is fully terminated could cause serious damage to the charger.

3. Terminate the Supply cables (up to 25mm<sup>2</sup>).

**RCBO on position (Red)**



**RCBO off position (Green)**



Earth = Green/Yellow

N = Blue

L1 = Brown

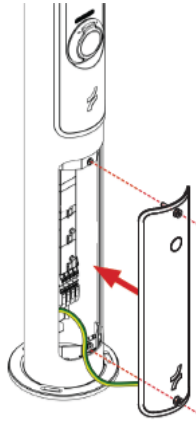
L2 = Black\*

L3 = Gray\*

\* for 3 phase installation only.

**5.3.5. Close the front door**

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



## 6. Commissioning the io7

### 6.1. Initial steps

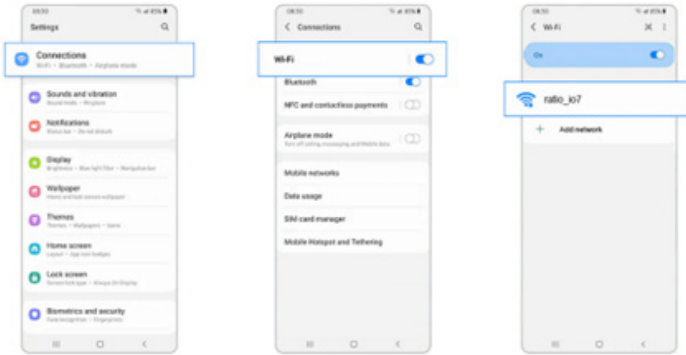
Follow these steps to prepare the io7 for connection to the preferred communication method and third-party back-end software:

1. Power up the io7. During the booting process, the LEDs will illuminate white. Once the charger is ready, the LEDs will turn green.
2. The charger's Adhoc WiFi hotspot will be enabled for 10 minutes after powering up. Complete the login process within this time frame.

**Note:** If you do not complete the login process within 10 minutes, you must reboot the charger to reactivate the Adhoc WiFi hotspot. To reboot, perform a power cycle on the charger.

### 6.1.1. Connect to the AdHoc WiFi hotspot

1. On your mobile device or laptop, search for the charger's AdHoc WiFi hotspot. | The hotspot will be named "ratio\_io7" or "ratio\_io7\_xxxxxxxx".



2. Input the AdHoc WiFi password found on the Installer Label and select "Next".
3. Once connected, scan the QR code provided or visit the following URL: <https://10.7.10.7/> This will direct you to the login page of the Web User Interface of the io7.



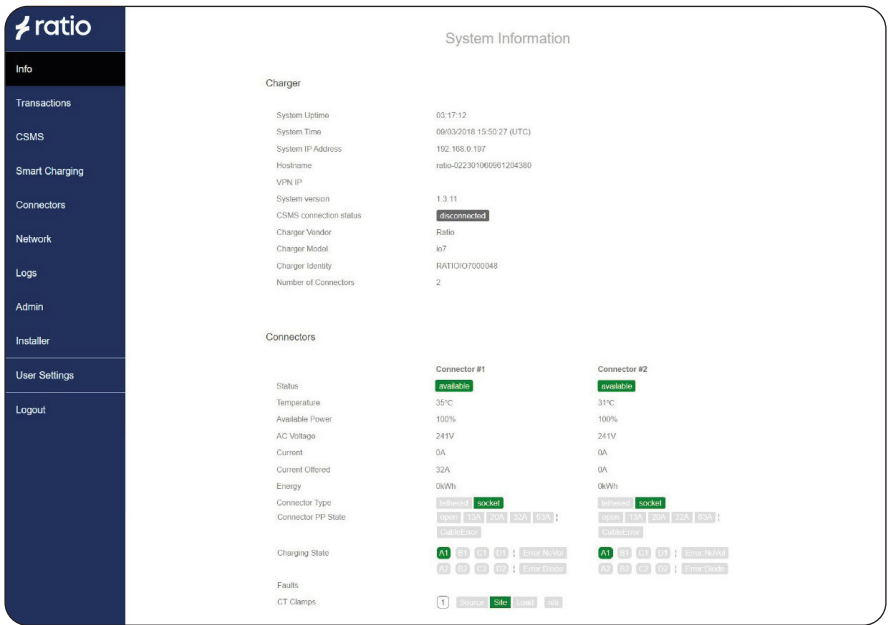
**Note:** If a notification appears stating "Your connection isn't private", click on "Advanced", then select "Proceed to https://10.7.10.7/ (unsafe)".

4. Log in with the credentials provided on the Installer Label.



### 6.1.2. General Information Page

The general information page will display system details, such as the charger make and model, the system IP address, and the host name.



## 6.2. Network Configuration

### Installation Scenario A

No additional network configuration changes required.

### Installation Scenario B and Installation Scenario C

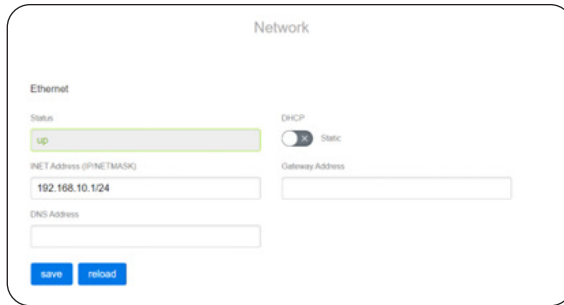
Static IP addresses must be configured when installing more than one io7.

#### 6.2.1. Configure a static IP address

1. Open the **Network** menu.
2. In the Ethernet connection settings, set the “DHCP” switch to “Static”.
3. Choose a unique IP address for each device in the network. Ensure that the first three numbers of the IP address are the same (for example, 192.168.10.1, 192.168.10.2).

4. Enter the IP address followed by "/24" in the "INET Address" field (for example, 192.168.10.1/24).

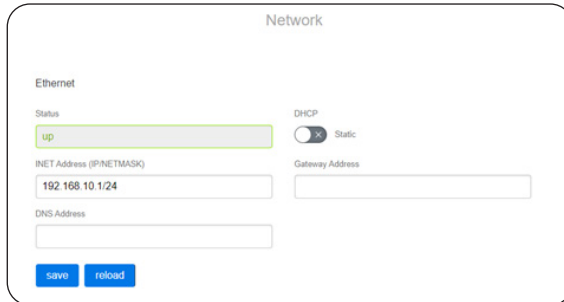
**Note:** Leave the gateway and DNS address fields empty.



The screenshot shows the "Network" configuration page. Under the "Ethernet" section, the "Status" is "Up". The "DHCP" switch is turned off, and the "Static" radio button is selected. The "INET Address (IP-NETMASK)" field contains "192.168.10.1/24". The "Gateway Address" and "DNS Address" fields are empty. At the bottom, there are "save" and "reload" buttons.

### 6.2.2. Configure dynamic IP address

1. Open the "Network" menu.
2. Ensure the "DHCP" switch is set to "Dynamic".
3. Click "Save".



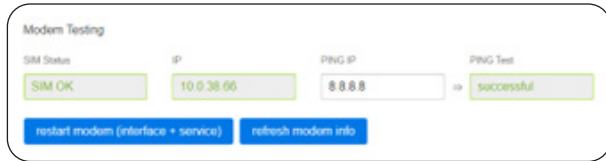
The screenshot shows the "Network" configuration page. Under the "Ethernet" section, the "Status" is "Up". The "DHCP" switch is turned on, and the "Dynamic" radio button is selected. The "INET Address (IP-NETMASK)" field contains "192.168.10.1/24". The "Gateway Address" and "DNS Address" fields are empty. At the bottom, there are "save" and "reload" buttons.

### 6.2.4. Modem Testing

Each Ratio io7 is delivered with a Ratio SIM card.

1. Open the "Network" menu.
2. Scroll down to "Modem Status".
3. Wait for all fields under "Modem Testing" to be filled with information.

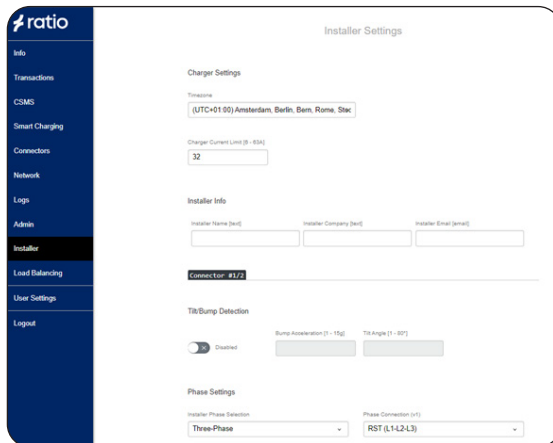
4. Verify the presence of a SIM card and an IP Address.



### 6.3. Installer settings

Go to the “Installer” page and follow these steps:

1. Ensure the “Charger Settings” display the correct time zone.
2. Enter the maximum available current for the io7 in the “Charger Current Limit [6-63A]” field. This value should be between 6 - 63A. This is the maximum available current for this io7.
3. Enter the Installer Name, Company and Email in the appropriate fields.
4. Select the Phase connection for the charger from the drop down menu for both connectors.
5. Click “save all configuration + calibrate”.

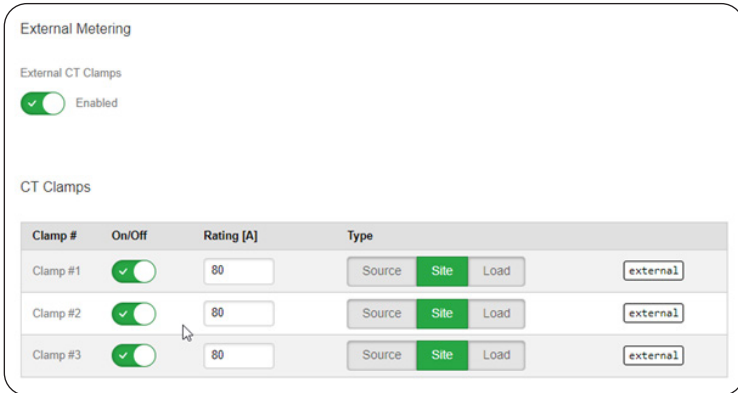


#### 6.3.1. Configure CT Clamps for io7 Sense CT kit

**Note:** For the non-master io7s the External CT Clamps should remain disabled.

1. For **Installation Scenario B** and **Installation Scenario C**:
  - a. Dynamic Load Balancing: Configure the CT Clamps on each Master io7.
  - b. Static Load Management: Configuring can be skipped.
2. Go to the “Installer” page and scroll to the “External Metering” section of **Connector #1**.
3. Enable “External CT Clamps” on Connector #1.

4. Enable the number of CT clamps in use:
  - a. Installation Scenario B: enable Clamp #1, Clamp #2 and Clamp #3.
  - b. Installation Scenario C: enable Clamp #1 only.
5. Enter the correct rating value for the CT clamps.
6. Set the type to “Site”.
7. Click “save all configuration + calibrate”.

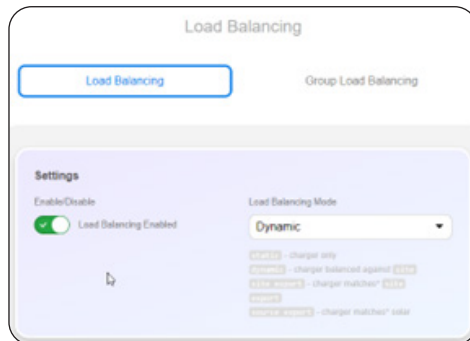


## 6.4. Load Balancing

### 6.4.1. Single Charger Load Balancing

This step can be skipped when setting up multi charger Load Balancing.

1. Go to the “Load Balancing” page.
2. Enable “Load Balancing”.
3. Select the required Load Balancing mode from the drop down menu.



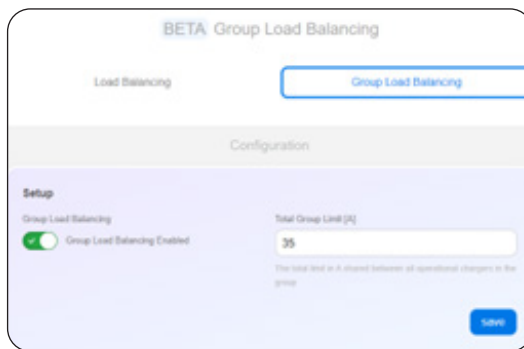
4. Input the “Site Limit [A]” of the building (main fuse cut-out size).
5. Scroll down and click “Save”.

#### 6.4.2. Group Load Balancing

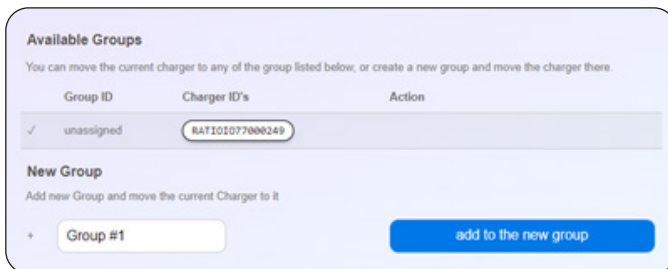
Only applicable for **Installation Scenario B** and **Installation Scenario C**.

##### Set up the master io7

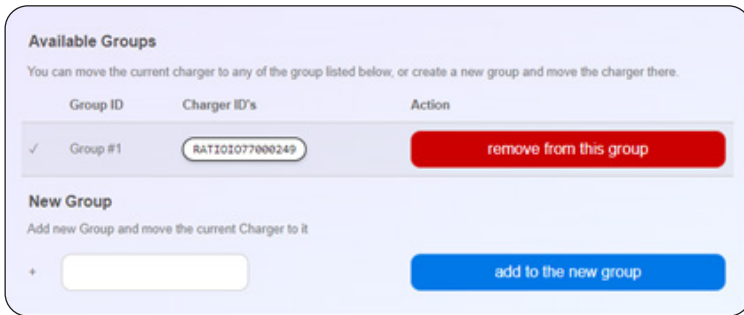
1. Go to the “Load Balancing” page.
2. Open the “Group Load Balancing” tab.
3. Enable “Group Load Balancing”.
4. Enter the “Total Group Limit [A]”.
5. Click “Save”.



6. Enter a “New Group” name.
7. Click “add to the new group”.



8. Refresh the webpage. The io7 appears in the newly created group.



9. Scroll down to the settings and select the appropriate “Group Balancing Mode” from the drop down menu:

“Static”      Use for **Static** Load Management.  
Distributes the entire Group Total Current Limit [A] between the chargers. For example, if the limit is set to 100A, 100A will be distributed between the chargers.

“Dynamic”      Use for **Dynamic** Load Balancing.  
Balances current based on the readings from a connected CT clamp. For example, if the limit is set to 100A and the site CT clamp on the master reads 30A, only 70A will be distributed between chargers. Note: if the CT clamp reading is negative, the limit will not increase.

10. Select the Offline Charger Strategy:

“Zero”      All chargers in the group will be set to 0 if any charger goes offline.

“Minimise”      All chargers in the group will be limited to the Minimum Offered Current if any charger goes offline.

“Maximise”      The total group limit is distributed among operational chargers. Offline chargers will be reduced to 0.

11. Click “Save”.

**Standard Settings**

**Force Master**  
 Forced Master

**Group Balancing Mode**  
 Dynamic

**Offline Charger Strategy**  
 Maximise

**Minimum Offered Current (0-30A)**  
 0

All chargers will be set to 0 if any charger goes offline in the group.  
 All chargers will be limited to .  
 If any charger goes offline in the group,  is shared between operational chargers. Offline chargers will be reduced to 0.

balanced against   
 sets of chargers to balance the Group

Minimum current to that will be offered to a car

**Set up non-master io7s**

1. Go to the “Load Balancing” page.
2. Open the “Group Load Balancing” tab.
3. Enable “Group Load Balancing”.
4. Find the previously created group and click “add to this group”.

**Available Groups**

You can move the current charger to any of the group listed below, or create a new group and move the charger there.

Group ID	Charger ID's	Action
✓ Group #1	RATIO1077000249	add to this group

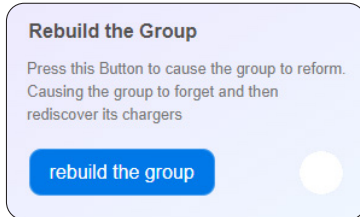
**New Group**

Add new Group and move the current Charger to it

+  add to the new group

### Remove a charger from a group

Group Load Balancing does not differentiate between an offline or removed charger. If a charger is removed from a group, the group needs to be rebuilt. To update the group after removing a charger, click the “rebuild the group” button on the config page.



## 6.5 Setup charging authorisation

There are several options to set up the authorization of a charging session:

“No authorization needed”	The charger will start charging immediately after plugging in the vehicle. Follow the steps in chapter 6.5.1.
“Local RFID authorization”	Use a local list of RFID tags to authorize a charging session. Follow the steps in chapter 6.5.2.
“Authorization via CSMS”	Use a backoffice (CSMS) to authorize a charging session. Follow the steps in chapter 6.5.3.

### 6.5.1. Setup to Plug & Charge without authorisation

1. Go to the “CSMS” page.
2. Set the “Authorisation Strategy” to “Local”.
3. Set “RFID Enabled” to “RFID Disabled”.
4. Set “RFID tag mode” to “Use local RFID value”.
5. Click “Save”.

### 6.5.2. Setup a local white list for authorization

1. Go to the “CSMS” page.
2. Set the “Authorisation Strategy” to “Local”.
3. Set “RFID Enabled” to “RFID Enabled”.
4. Set “RFID tag mode” to “RFID Required”.
5. Click “Save”.



Settings

CSMS endpoint URL

Charger Identity

Authorisation Strategy

Local

Sound Notification

Sound Enabled

RFID Enabled

RFID Enabled

RFID tag mode

RFID Required

Local RFID Tag

6. Go to the “Transactions” page.
7. Click “enable”.
8. Click “add”.
9. Scan the RFID tags that need to be authorized.

### 6.5.3. Setup a CSMS connection for authorization

1. Go to the “CSMS” page.
2. Set the “Authorisation Strategy” to “Remote via OCPP”.
3. Set “RFID Enabled” to “RFID Enabled”.
4. Set “RFID tag mode” to “RFID Required”
5. Enter the “CSMS endpoint URL” of the selected back-end.
6. Click “Save”.

Settings

CSMS endpoint URL

Charger Identity

Authorisation Strategy

Remote via OCPP

Sound Notification

Sound Enabled

RFID Enabled

RFID Enabled

RFID tag mode

RFID Required

Local RFID Tag

7. After reloading the page, the “CSMS Connection Status” should be “Connected”.

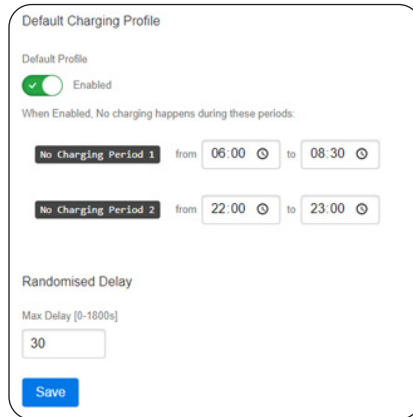
## 6.6. Smart Charging

The io7 complies with the UK Smart Charging Regulations, which ensure that charge points have smart functionality. This allows the charging of an electric vehicle when there is less demand on the grid or when more renewable electricity is available. Charge points must also allow a randomised delay function.

**Note:** When Smart Charging is Enabled, no charging will take place within the set times.

To enable the Smart Charging functionality:

1. Go to the “Smart Charging” page.
2. Set the “Default Profile” to “Enabled”.
3. Enter valid time slots for “No Charging Period 1” and “No Charging Period 2”.
4. Define a “Maximum Randomised delay” between 0-1800 seconds.
5. Click “Save”.



The screenshot shows a configuration window titled "Default Charging Profile". It contains the following elements:

- Default Profile:** A toggle switch labeled "Enabled" is turned on, indicated by a green checkmark.
- When Enabled, No charging happens during these periods:** This section contains two time slot configurations:
  - No Charging Period 1:** A dark grey button with the text "No Charging Period 1" is followed by "from" and a time input field set to "06:00", then "to" and another time input field set to "08:30".
  - No Charging Period 2:** A dark grey button with the text "No Charging Period 2" is followed by "from" and a time input field set to "22:00", then "to" and another time input field set to "23:00".
- Randomised Delay:** A section with the label "Randomised Delay" and a sub-label "Max Delay [0-1800s]". Below this is a text input field containing the number "30".
- Save:** A blue button labeled "Save" is located at the bottom of the form.

## 9. Maintenance

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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.

### **NOTICE**

#### **Risk of damage to the product**


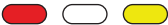
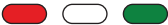



- Do not use aggressive chemicals to clean the charger.
- Do not use coarse cleaning tools that may damage or scratch the surface of the charger.
- Never use any type of abrasive pad, scouring powder, or flammable solvents such as alcohol or benzene.













## 10. Troubleshooting

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The charger is equipped with monitoring software that detects faults and displays them as colour sequences via the status LED. Every fault has a specific sequence for easy identification. An overview of the sequences is shown below. The charge point also reports the faults through Open Charge Point Protocol (OCPP) to the back-end software. In the event of experiencing problems with your charger, please contact your back-end software provider to assist and solve the issue.

If you experience problems with your charger, please contact the back-end software provider to assist and solve the issue.

LED Colour sequence	Meaning
 Red / White	Card not authorised
 Red / White / Yellow	Error high temperature
 Red / White / Green	Error over/under voltage
 Red / White / Blue	Error bump detected
 Red / Blue	Error diode
 Red / Blue / Yellow	Error reset failure

LED Colour sequence	Meaning
 Red / Blue / Magenta	Error current leakage
	Error current failure
 Red / Yellow	Error AC Safety
 Red / Yellow / Magenta	Error under current
 Red / Green	Error control pilot voltage
 Red / Green / Blue	Error reader failure
 Red / Magenta	Error meter read time out
 Red / Magenta / Green	Error ee prom corrupt
 Magenta / Blue	Suspended EV
 Magenta / Yellow	Inoperative
 Magenta / White	RFID white list mode
 Green / Yellow	Tamper state
 Green / Blue	Firmware update

## 11. Service

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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

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We refer you to our privacy statement on our website at [www.ratio.nl](http://www.ratio.nl)

## 13. Warranty

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Ratio Electric B.V. 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 will, at its option, repair or replace the product.

This limited Carry-In Warranty does not include service to repair damage from improper installation, improper connections with peripherals, external electrical fault, accident, isaster, misuse, vandalism, unauthorized alteration or repair, abuse or modifications to the product not approved in writing by Ratio EV Charging.

Repair parts and/or replacement products may be either new or reconditioned at Ratio discretion.

Repair parts and/or replacement products may be either new or reconditioned at Ratio discretion.

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.

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

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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.

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# EC Declaration of Conformity



## Declaration of Conformity

**Manufacturer:** Ratio EV Ltd  
**Date:** 29/01/2024  
**Address:** Unit 1 Target Park, Shawbank Road, Lakeside, Redditch, Worcs, UK, B98 8YN  
**Product:** Ratio io7 Double  
**Model/Type:** 389xx

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:

<b>2014/35/EU</b>	LCD - Low Voltage Directive
<b>2014/30/EU</b>	EMC - Electromagnetic Compatibility
<b>2011/65/EU</b>	RoHS - Restriction of Hazardous Substances in Electrical and Electronic Equipment.
<b>EC 1907/2006</b>	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.

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

Name and signature of authorised person

Tom Jennings – General Manager





## Declaration of Conformity

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<b>UK SI 2016 No. 1101</b>	The Electrical Equipment (Safety) Regulations 2016
<b>UK SI 2016 No. 1091</b>	Electro Magnetic Compatibility Regulations 2016
<b>UK SI 2012 No. 3032</b>	Restriction of the use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012.

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

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

Name and signature of the authorised person

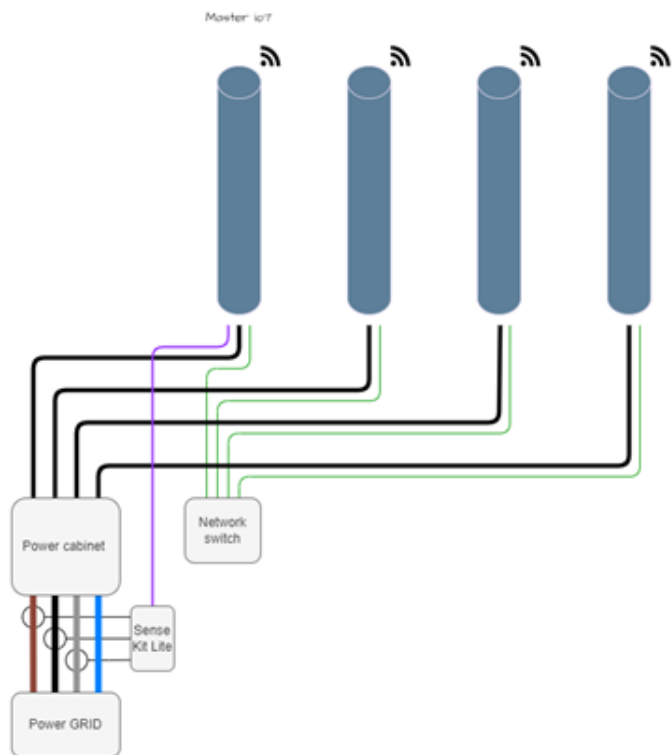
Tom Jennings – General Manager



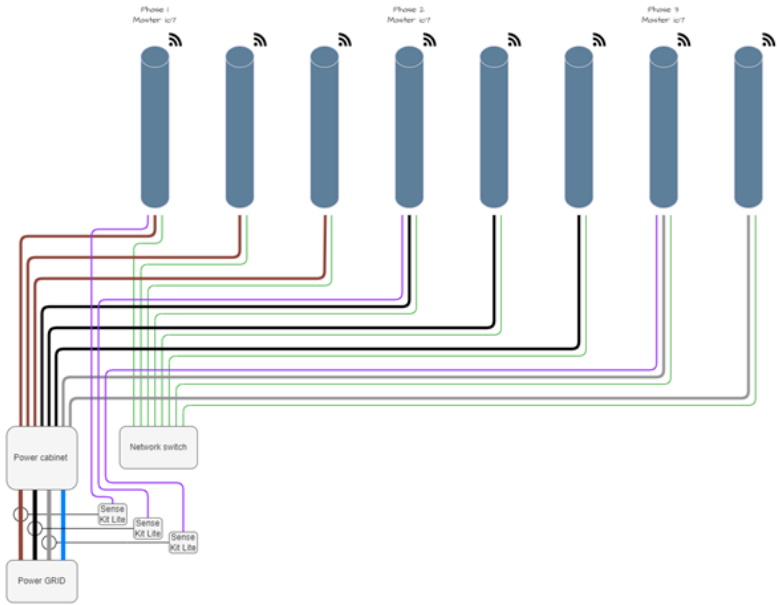


## Appendix A - Installation Scenario B

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## Appendix B - Installation Scenario C





Voor meer informatie, zie onze website  
[www.ratio.nl](http://www.ratio.nl)



For more information, check our website  
[www.ratioev.uk](http://www.ratioev.uk)



For mere information, se vores hjemmeside  
[www.ratioev.dk](http://www.ratioev.dk)

**Ratio Electric B.V.**

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[info@ratio.nl](mailto:info@ratio.nl)



V00-08 - 09/2024