Solar Relay

An Electricians Guide

We all know Electricians are absolute legends, but even legends need some guidance from time to time.

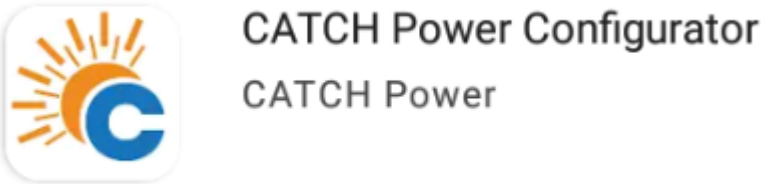
This guide was written by electricians for electricians. It is designed to help you unlock the power of the CATCH Solar Relay.

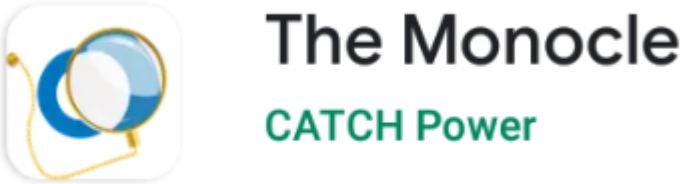
CATCH Power
A trademark of Project H Pty Ltd
180 Dumaresq Street
Glen Innes
NSW 2370
Australia
Ph: +64 2 5700 5717
W: www.catchpower.com.au
E: sales@catchpower.com.au

Before Getting to Site

1 - Getting the right software on your phone.

You will need **BOTH** of these.. Download them from your phone's app store.





The "**CATCH Power Configurator"** is used for setting up the hardware while you are on site.

"The Monocle" is the CATCH Power monitoring platform used by you and your customer for consumption monitoring and load control

"My Fleet Manager" is where you can log in to view your fleet of installations from the office. This platform is available on the computer and provides historic site data while allowing you to monitor and make changes to your sites remotely. Log in with your installer log in at https://myfleet.edde.world

ARE YOU UP FOR THE CHALLENGE?

Throughout this manual we assume you are a **CUTTER** quality electrician. If you are scratching your heading wondering how to download an app onto your phone you may want to give this job to somebody else…it only gets more technical from here.

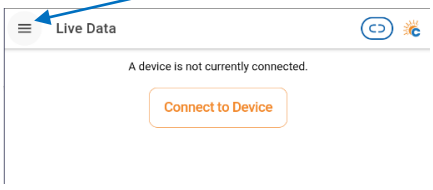
Before Getting to Site

2 – Create your Configurator Account

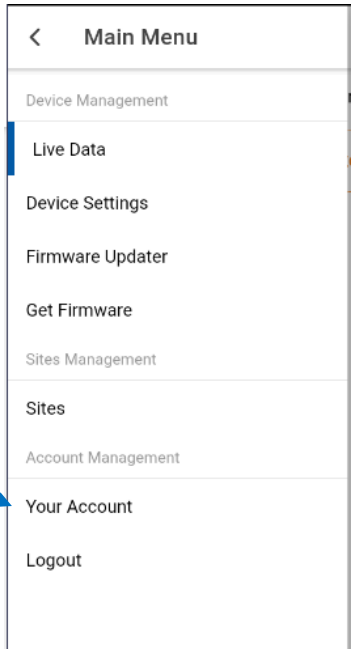
CATCH Power Configurator
CATCH Power

Use the CATCH Power Configurator App on your phone for this…open it.

1. Click on the menu button on the top left.



2. Click Here

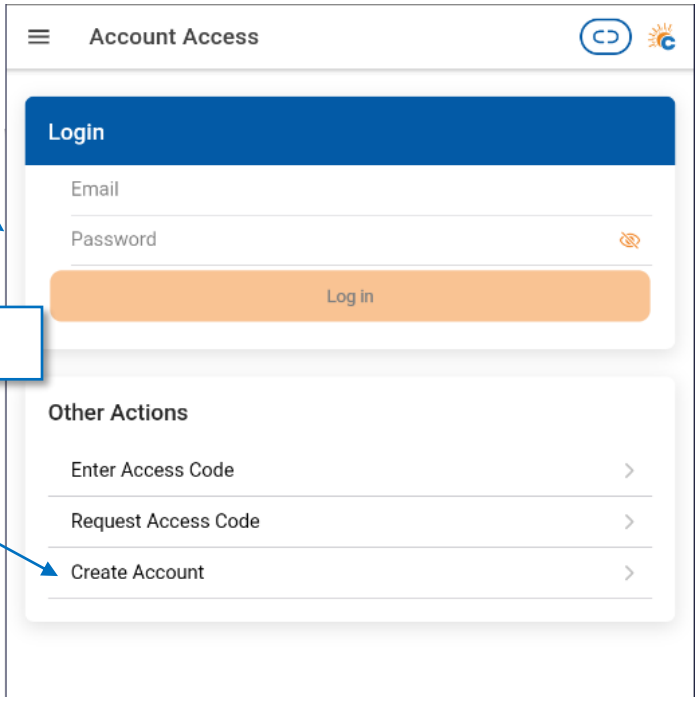


Before Getting to Site

2 – Create your Configurator Account…Cont'd

3. If you already have a Configurator account put the username and password in here.

4. Need to create a new Account?



SUGGESTION!!

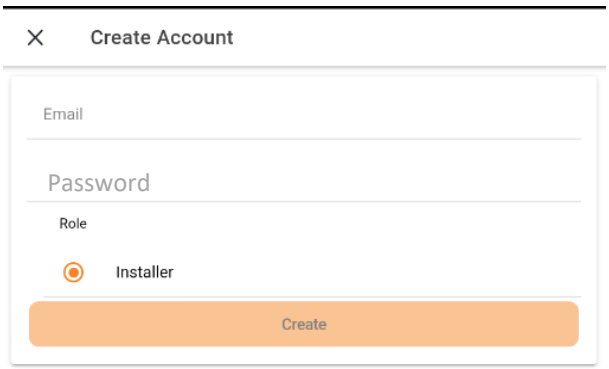
If you have multiple contractors doing work for you then we suggest you create a single company wide account and have everybody log in using that account..

we aren't NETFLIX, we are happy for you to share.

Before Getting to Site

2 – Create your Configurator Account…Cont'd

5. You know what to do here… Username and password please.



AND YOU ARE DONE…
OFF TO SITE WE GO.

IMPORTANT!!

Check your email address before pressing save…an incorrect email address is going to mean you miss out on heaps of cool features…

AUTO LOGIN

The configurator will keep you logged in for a few days, but for security reasons it will ask you to re-login every now and then, so you need to store the username and password away somewhere. You might be cutter Spec, but you're not superman/woman, you will forget the login details for sure.

Hardware Installation Overview

The hardware installation is broken down into the following steps.

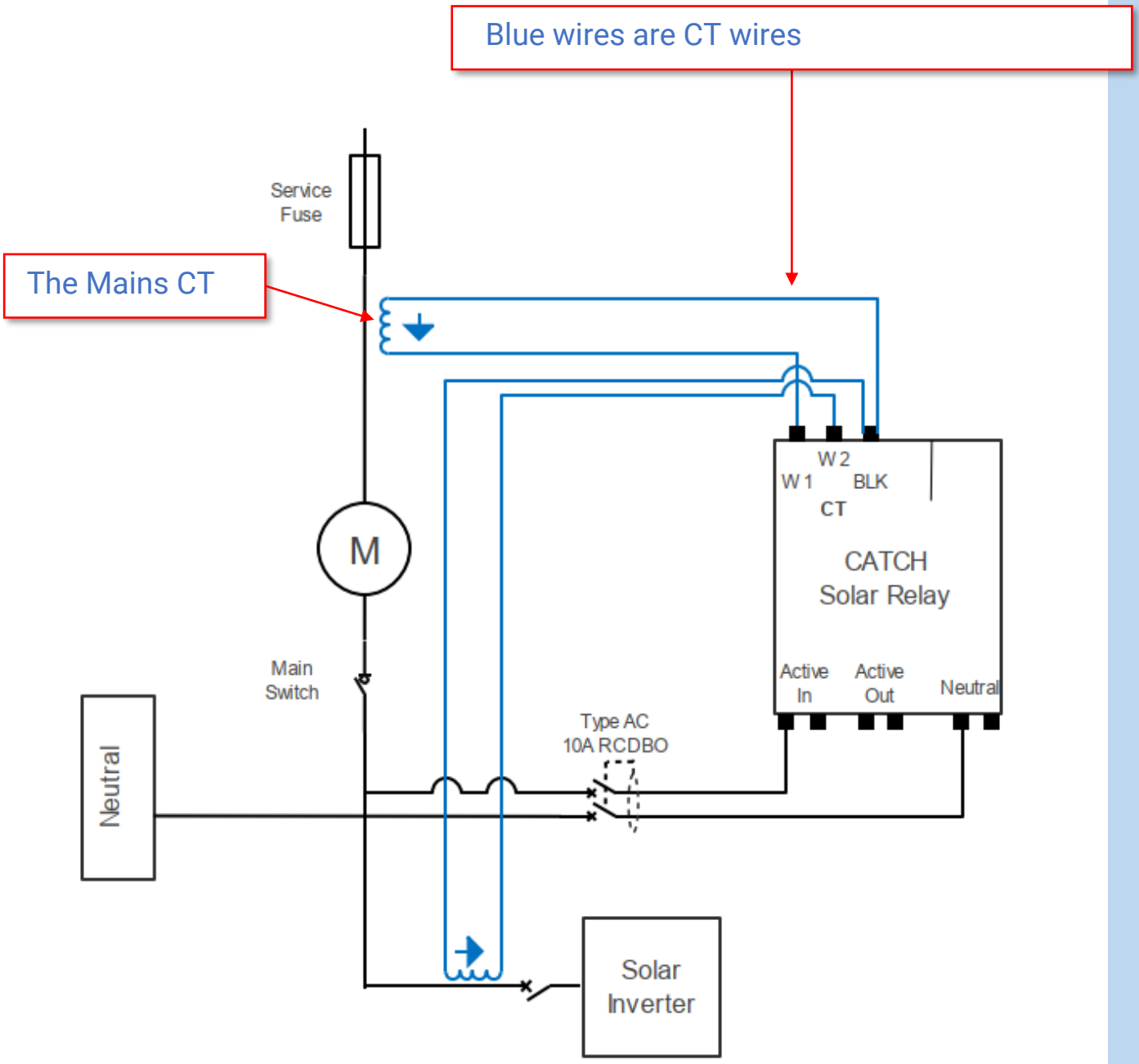
- Power and CT's - Installing the CATCH Solar Relay
- Load Control – Connecting a load to the relay
- Inverter Control – Connecting an inverter to the relay

LOOKING FOR CLOUD TETHERED REMOTE CONTROL?

Are you controlling a load or inverter over a distance, away from the main metering point? No need to dig a trench, use 2x CATCH Solar Relays via Cloud Tethering. Please refer to our Cloud Tethering Manual for more detail. Find the manual on the Tech Docs page of our website.

Hardware Installation Power & CT's

The wiring diagram is shown below



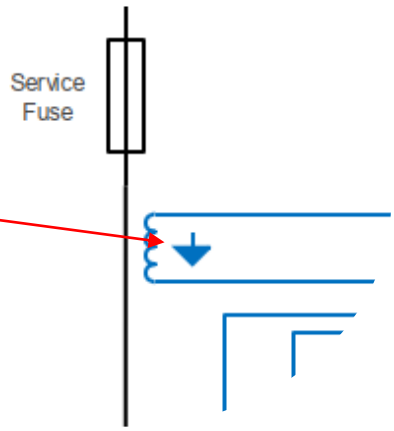
IMPORTANT!!

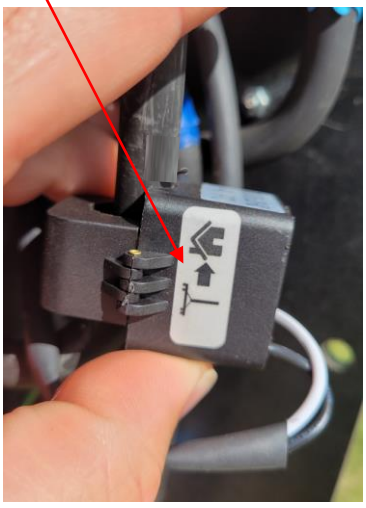
If you are planning to use inverter control. Make sure the white wire of the mains CT is connected to the W1 connection.

Hardware Installation Power & CT's

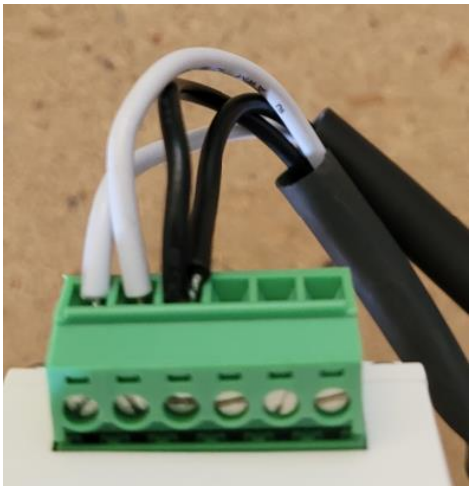
- Only use compatible CT's supplied by CATCH Power.
- The CT's should ALWAYS be placed on the active Wire, never the Neutral.
- Always terminate the CT into the Device BEFORE clamping it around the wire.

Make sure the arrow on your CT is pointing in the same direction as the arrows in the circuit diagram





The white CT wires go into the W1 and W2 connections at the top of the relay. The black wires share the same BLK connection at the top of the relay.



Hardware Installation
Power & CT's

A Quick Discussion about the CT's

The Solar Relay allows you to use up to two CT's per device. In CATCH Power land each CT is called a Channel.

Channel 1 – corresponds to the CT that has its white wire connected to the W1 connection.

Channel 2 – corresponds to the CT that has its white wire connected to the W2 connection.

And remember the black wires shared a common connection point labelled BLK

For most configurations of the CATCH Solar Relay, we want:

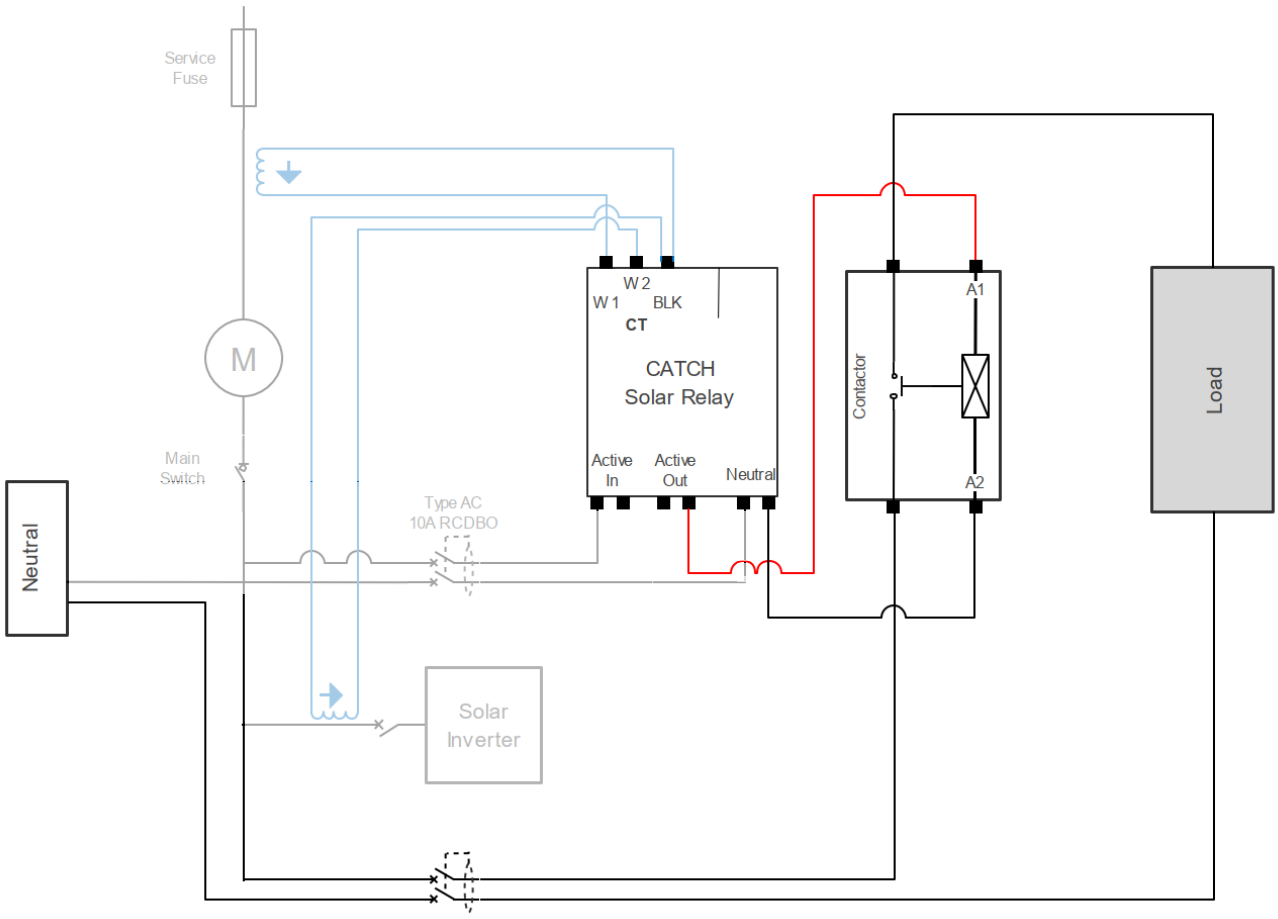
Channel 1 – (W1) to be measuring the entire sites current draw… ie the CT needs to be placed on the incoming mains.
We call this CT the **Mains CT**

Channel 2 – (W2) to be measuring ALL the solar being produced on the premise.
We call this CT the **Solar CT**

IMPORTANT!!

For split phase and 3 phase sites you need to make sure the CTs are measuring current on the same phase as the voltage connected to the Active In terminal of the relay… failure to do this will result in bad power readings.

Hardware Installation
LOAD CONTROL



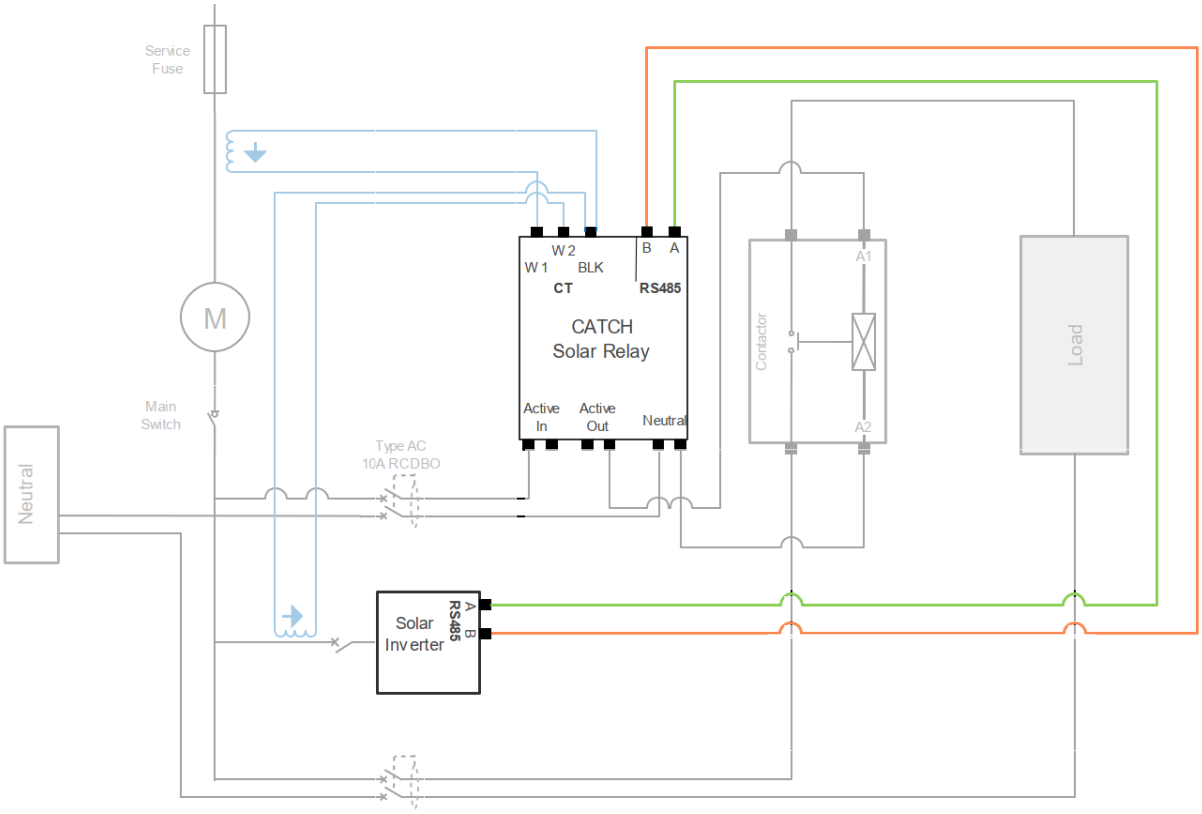
Choosing the right Contactor:
As a Cutter Spec electrician, we will leave choosing the right contactor for your load to you.. But rest assured, it doesn't matter if you need 1, 2, or many Contactors for your load the CATCH Solar Relay can drive them…even 3 phase contactors.

All we require is that the contactor has a 230V drive coil.

IMPORTANT!!

Connect the Solar Relay **Active Out** to either A1 or A2 of the contactor.
The Relay CANNOT drive the load directly.

Hardware Installation
INVERTER CONTROL



Every inverter has a slightly different setup for the inverter control. Download the specific inverter instructions from the CATCH Power tech docs page.

https://www.catchpower.com.au/tech-docs

Hardware Installation
INVERTER CONTROL

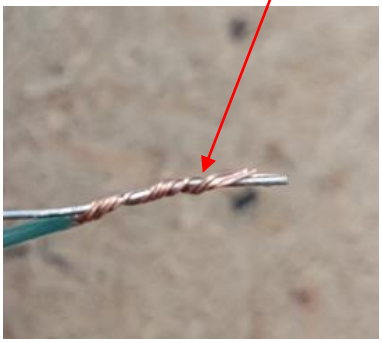
The inverter control interface is MODBUS over RS485. Good RS485 installation techniques are required to ensure a reliable connection.

The highlights are below:

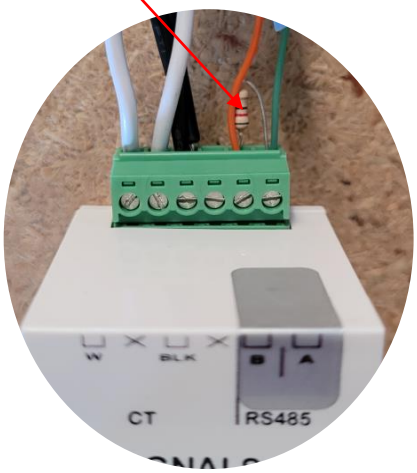
- Use CAT6 or equivalent cable. The voltage rating needs to be 600V or better as it is being run through the switchboard.
- Use a twisted pair as the A and B conductors (ie Blue and Blue Strip).
- Keep the cable away from large current carrying conductors if possible.
- For runs longer than 10m terminate the Solar Relay end with the 200 Ohm resistor supplied in the box.

When terminating with the resistor follow the technique below.

1. Twist the cable around the resistor legs as shown



2. Bend one side of the resistor lead over as shown for a clean termination



Testing the Installation

Even legends make mistakes..
Don't leave site without testing the installation

We are going to test the following aspects of the Installation:

1. Power to the CATCH Solar Relay
2. Placement of the CT's.
3. Contactor installation.
4. RS485 interface.

Test 1 – Apply power to the CATCH Solar Relay

Did smoke come out?
If no, congratulations you have passed test 1.

But in all seriousness.. When power is applied to the Solar Relay the Power and Bluetooth light will flash on and off for about 20sec, then just the power light will stay on.

The rest of the tests will be done from within the CATCH Configurator App.

Testing the Installation

Logging In

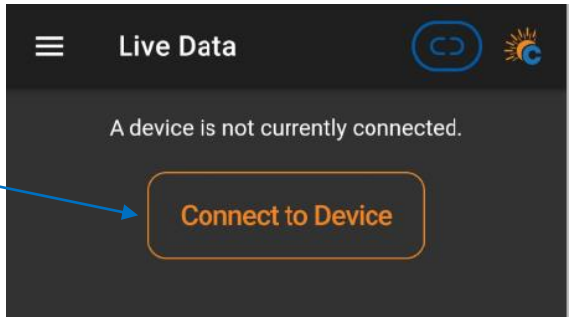
CATCH Power Configurator
CATCH Power

Use the CATCH Power Configurator App on your phone for this…open it.

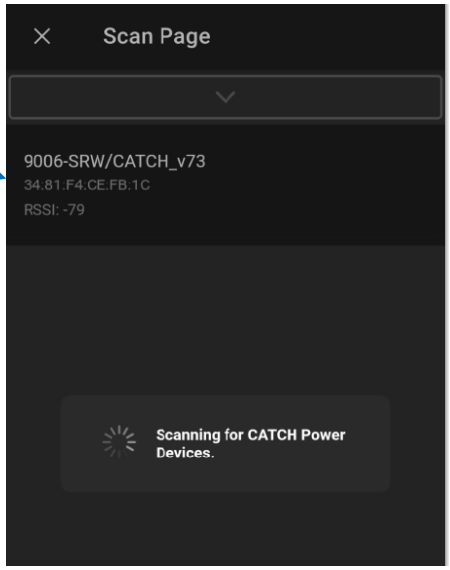
STAND CLOSE TO THE DEVICE

You are about to make a Bluetooth connection to the CATCH Solar Relay, so stand close to the device.

1. Connect to a device.



2. Your device should show in the list. Once the scan stops. Tap the device to connect.



Testing the Installation

Logging In..Cont'd

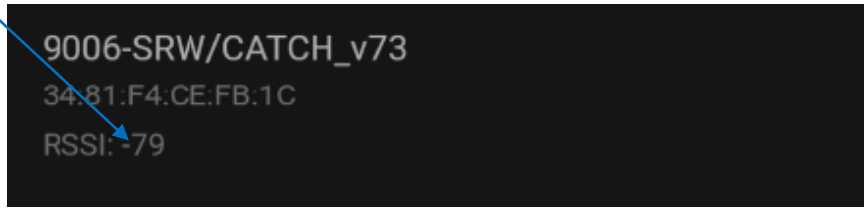
Device discovery will start. You should also see the Bluetooth light on the device turn on.

Discovery can take a few seconds..

And discovery can also fail… if it fails shut the app down, restart, rescan and connect again.

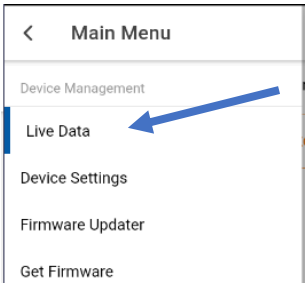
If discovery keeps failing, check the signal strength. Any number lower than -85 will result in a poor connection… stand closer.

Signal Strength..
Closer to zero the better. For example, -50 is better than -60



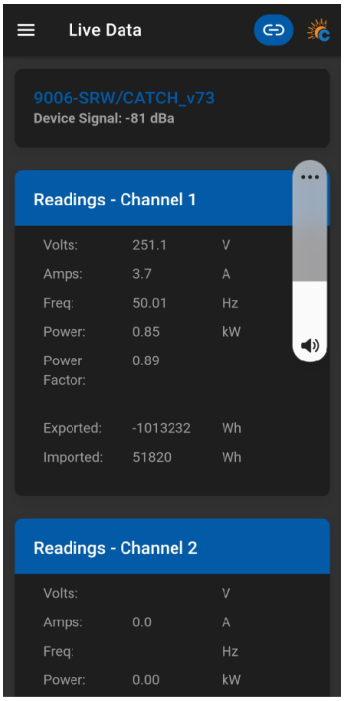
Testing the Installation

Logging In..Cont'd



Once logged in you should be at the Live Data screen.

If you are not at the Live Data Screen, use the top left menu to take you there.



The Live Data screen shows all the key metrics updated every second.

It is the place to be when testing the installation...

KEEPING LIVE LIVE

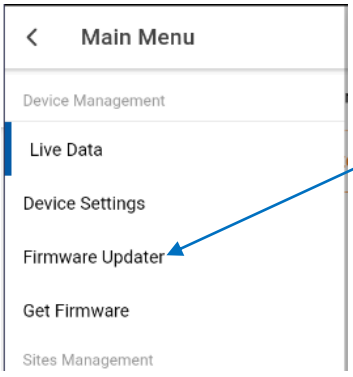
Keep your eye on the voltage measurement. If you don't see it changing the live data screen may have stopped refreshing. It does this to conserve phone battery.

To make it start refreshing again use the menu on the top left to navigate to a different screen, then come back to the Live Data page.

Testing the Installation

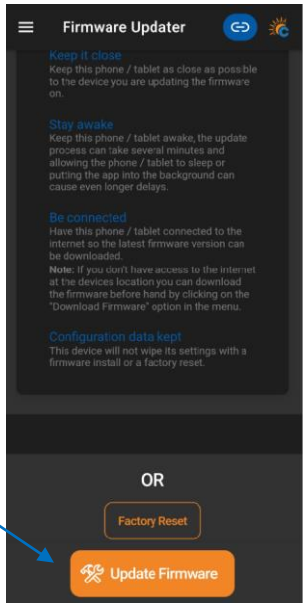
FIRMWARE UPGRADE

Things change quickly.. And CATCH Power is no different. By upgrading your firmware, you ensure your device has all the bells and whistles.



1. Use the top left menu to go to the firmware upgrade screen

2. Start the firmware Update



READ THE TIPS FOR UPDATING

There is a little story on the firmware update screen… read it. It will help make your firmware upgrade process seamless.

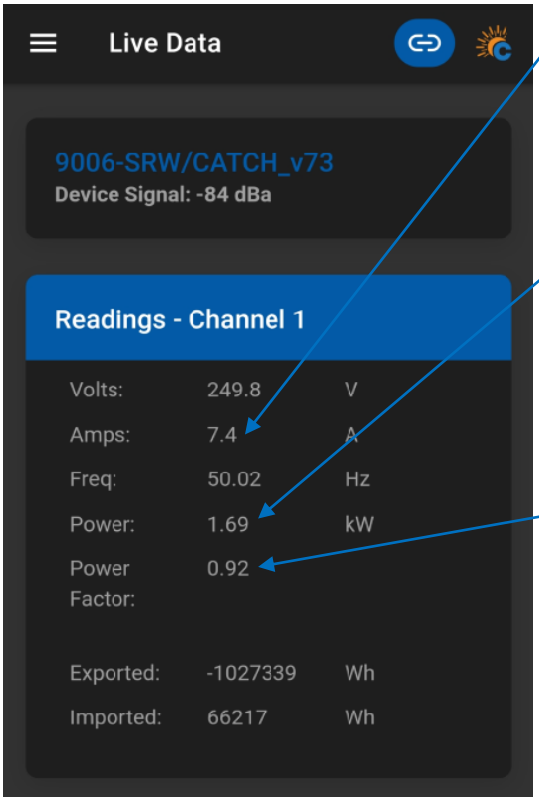
Testing the Installation

Placement of MAINS CT

Step 1 – Shutdown all solar on the premises

Step 2 – Navigate to the Live data screen on the Configurator.

Step 3 – Put your tong tester on the house Mains and measure the current. You want to see at least 2 Amps on the house mains. Turn on some loads if you need to.



1. This should be close to what your tong tester says.
   If the number is significantly different (ie 0.5A or more) chances are your CT is in the wrong spot, or your tong tester is in the wrong spot

2. This should be a positive number.
   If you see a negative number you have the CT arrow pointing in the wrong direction. Turn the CT around.

3. This should be close to 1.
   If you see a number less than 0.7, you are most likely on a multi phase site and your CT is clamped around a different phase to the phase supplying voltage to the Solar Relay. Change the CT phase.

WELL DONE…
Looks like your Mains CT is good.

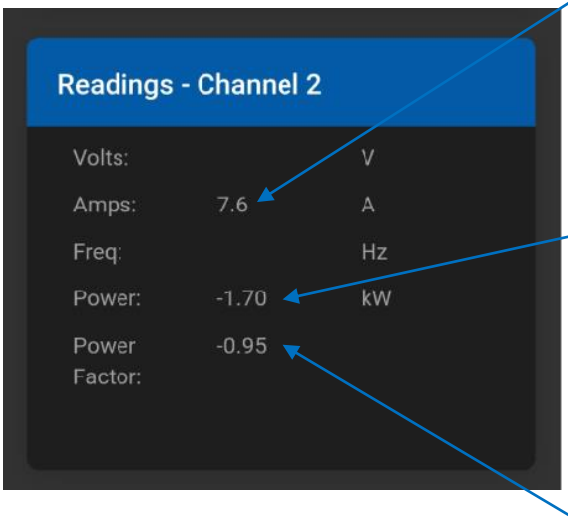
Testing the Installation

Placement of SOLAR CT

Step 1 – Turn on all solar on the premises

Step 2 – Navigate to the Live data screen on the Configurator.

Step 3 – Put your tong tester on the Solar Supply and measure the current. You want to see at least 2 Amps on the solar mains.



1. This should be close to what your tong tester says.
If the number is significantly different (ie 0.5A or more) chances are your CT is in the wrong spot, or your tong tester is in the wrong spot

2. This should be a NEGATIVE number.
If you see a positive number you have the CT arrow pointing in the wrong direction. Turn the CT around.

3. This should be close to 1.
If you see a number less than 0.7, you are most likely on a multi phase site and your CT is clamped around a different phase to the phase supplying voltage to the Solar Relay. Change the CT phase.

It is normal for the power factor to be a negative number when the power is negative.

WELL DONE...
Looks like your SOLAR CT is good.

Testing the Installation

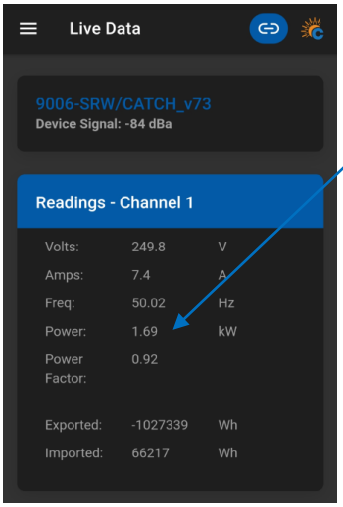
Placement of CT's

A Quick Discussion on Power Conventions

The CATCH convention for power is as follows:

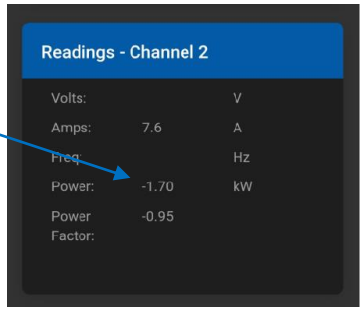
A **POSITIVE** power number is power being consumed (or imported) on the premises.

A **NEGATIVE** power number is power being produced (or exported) from the premises.



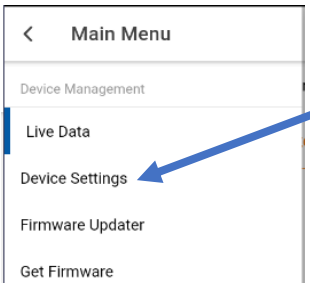
Consuming / Importing power

Producing / Exporting power



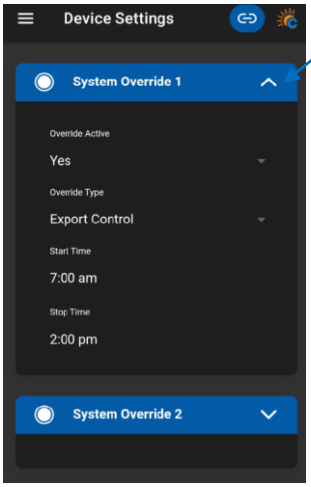
Testing the Installation

CONTACTOR installation



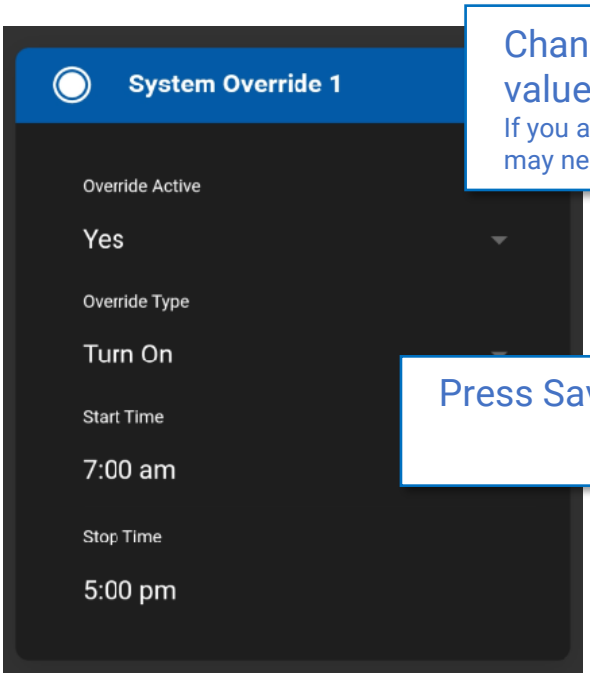
Use the top left menu to navigate to device settings.

Expand System Override 1 by pressing the arrow



Change it from its default to the values below.

If you are doing an early morning or late evening you may need to change time times a bit.



Press Save

Testing the Installation

CONTACTOR installation

At this point the following should have happened:

1. The Solar Relay **Load On** light should have turned on.
   If the Load On light didn't turn on check the settings you used in Override 1. Make sure the time period suites your current time, and make sure you choose TURN ON.

2. You should hear the contactor go "CLUNK", and the contactor indicator light should be on.

   If you didn't get this, then check the following:

   - make sure the Active Out from the Relay is connected to either A1 **OR** A2 on the contactor.
   - Make sure that Neutral is connected to the other A1, A2 terminal (the one that Active Out is not connected to).
   - Check to make sure an RCD has not tripped. If an RCD has tripped check to make sure your neutrals are as they should be. Remember the most common cause of an RCD tripping will be neutral return currents not passing through the RCD.

3. Tong the load wire passing through the contactor, and make sure there is power flowing to the load.

WELL DONE…
Looks like your CONTACTOR is good.

4. Go back to device settings and change them back to the defaults.

POPPING & SMOKE ARE NOT NORMAL

If you hear a popping sound, or smell burn at any point in this process you have screwed the pooch…don't laugh, people have done it. The Solar Relay is designed to power a contactor coil. Not a 4.8kW electrical load.

Testing the Installation

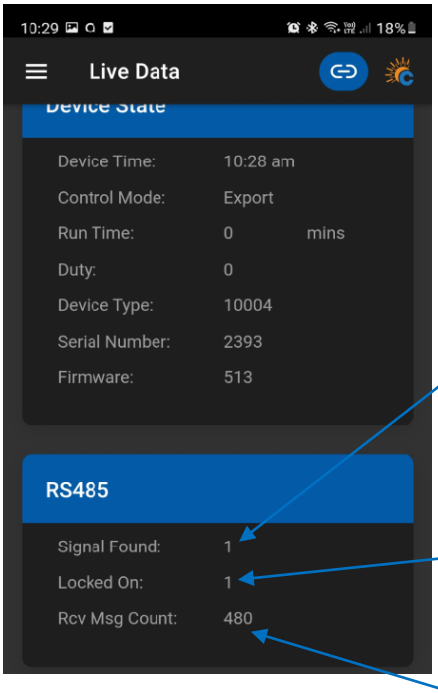
Testing RS485

Step 1 – make sure your inverter is on and configured for an energy meter.

You will know if the RS485 is or is not working because the inverter will have a fault code on it.

If your inverter is not detecting the energy meter the steps below can help you trouble shoot.

Step 1 – Navigate to the Live data screen on the Configurator.



(1) Indicates a signal has been found. This means the cable is good.
If the number is 0 check to make sure there are no breaks in the cable, everything is connected to where it should be and the inverter is setup to use an energy meter.

(1) Indicates rs485 is working correctly.
If the number is 0 check to make sure the Modbus configuration on the invert and relay are correct.

Successful Message count
This will steadily increase

WELL DONE…
If the RS485 looks like the screen above all is good.

Testing the Installation

WELL DONE…

All of your hardware is installed correctly

Its time to configure….

Configuration

The configuration process will involve two key elements:

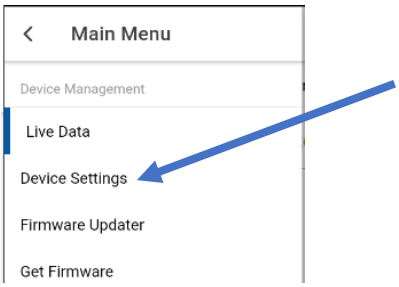
1. Configuring the device for Load Control.

2. Configuring the device to connect to the Monocle cloud monitoring platform.

Both of these steps are performed in the CATCH Configurator

Configuration

For LOAD CONTROL



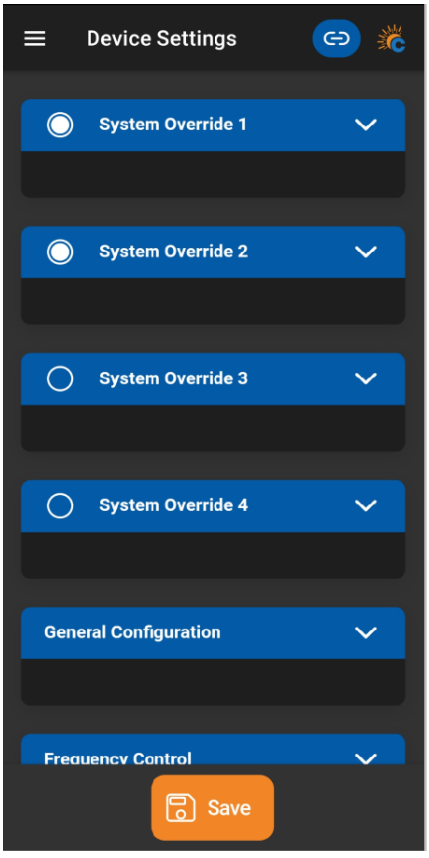
Use the top left menu to navigate to device settings.

You can program up to 4 different modes of operation on the Solar Relay.

By default the device is setup to a common configuration used for controlling hot water loads in Queensland. Have a look at the settings and see if they suite your specific circumstance, **if not then change them**.

For details on each mode see the Solar Relay user guide.

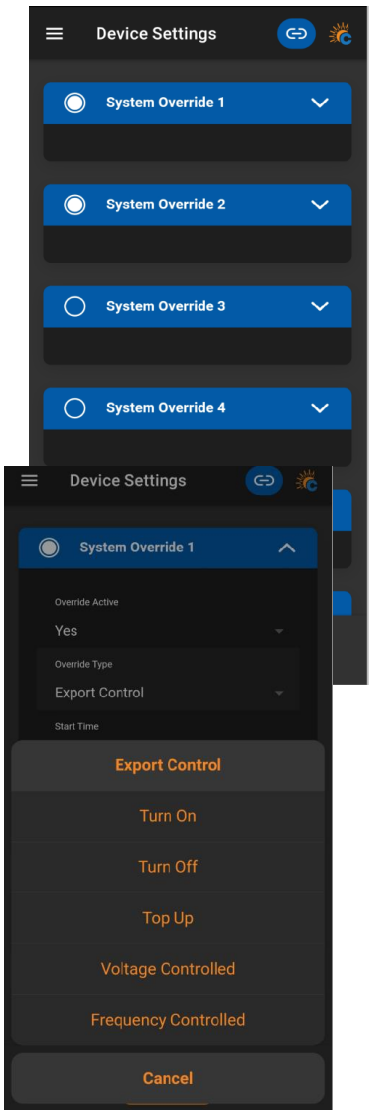
https://www.catchpower.com.au/tech-docs



Configuration

For LOAD CONTROL

The Summary of Load Control with the Solar Relay



- You can choose up to 4 configurations.
- Each configuration will be active for a particular period in a 24hr window.
- The control modes are fairly self explanatory:
  - **Export Control**: turning on and off based on solar export levels. Good for Solar self consumption
  - **Voltage Control**: turning on and off based on voltage levels. Good for trying to reduce voltage rise issues
  - **Frequency Control**: turning on and off based on frequency. Good for use in a microgrid environment.
  - **Turn On/Off**: These two are not rocket science.
  - **Top up**: this one is a little tricky. Top up mode ensures a minimum amount of energy delivered to the load every 24hrs. *Excellent for ensuring nobody runs out of hot water.*

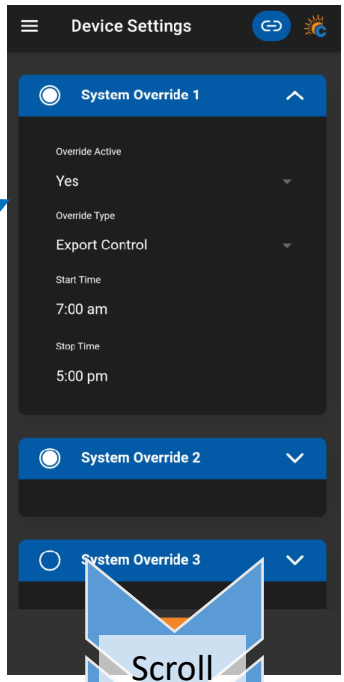
https://www.catchpower.com.au/tech-docs

Configuration

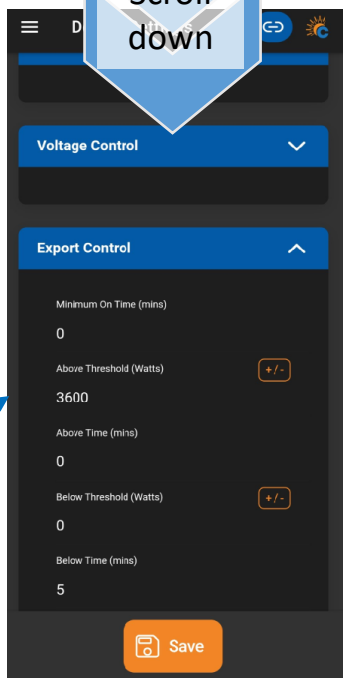
For LOAD CONTROL

An Example Configuration

System Override 1 is **active**, for **Export Control**, between **7am** and **5pm**



Scroll down



The export control parameters are:
Turn the load on at **3.6kW** export and shut the load down if the mains export falls below **0W** for more than **5min**.

WHICH CHANNEL??

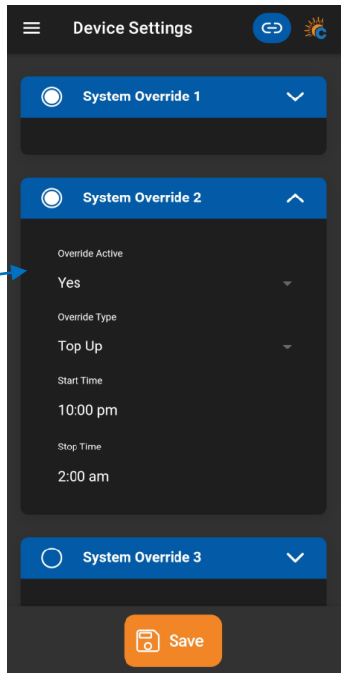
The load control power numbers ALWAYS come from Channel 1 (the CT connected to the W1 connection). That's why in most configurations W1 must be the Mains CT.

Configuration

For LOAD CONTROL

The Summary of Load Control with the Solar Relay

System Override 2 is **active**, for **Top Up**, between **10pm** and **2am**



This mode does not have any configuration details at the bottom of the screen.

The above configuration is described as…
We want a minimum of 4hrs of energy delivered to the load.
The number of hours between **10pm** and **2am** defines the 4 hours.

At **10pm** the Solar Relay will look at how much energy has already been delivered to the load from other overrides (in our example System Override 1).

If the amount of energy is **less** than the 4 hours we have defined, the Solar Relay will make up the difference by turning the load on at **10pm**.

If the amount of energy already delivered is greater than or equal to the 4 hours, nothing will happen at **10pm**.

Configuration

For the Monocle

Summary of Steps

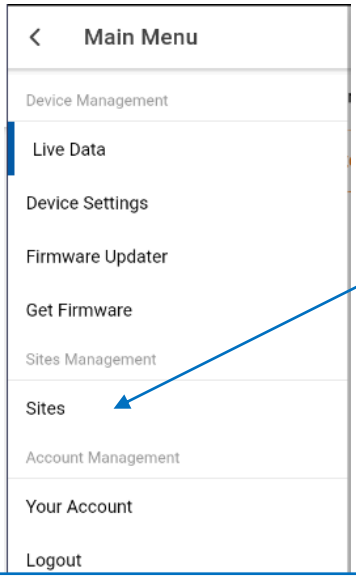
1. Create a new Site
2. Attach the Solar Relay to the site
3. Activate the Solar Relay WiFi so that it can send and receive messages.

Configuration

For the Monocle

CATCH Power Configurator
CATCH Power

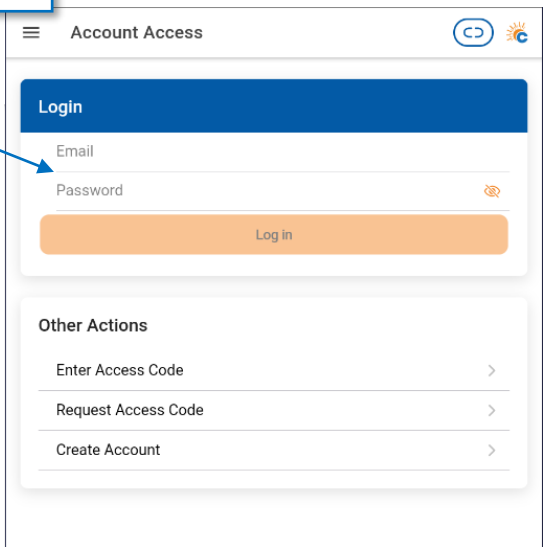
Use the CATCH Power Configurator App on your phone for this… open it.



1. Click Here

2. If you haven't already done so log in..

Remember the account you created back at the office.



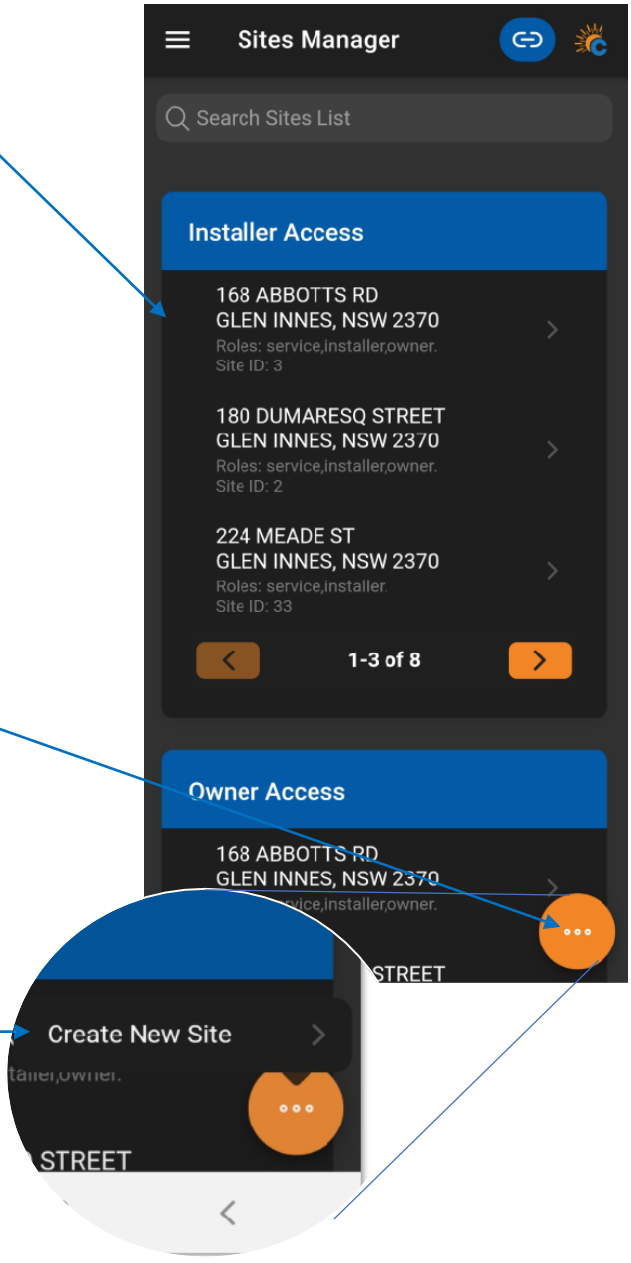
Configuration

For the Monocle

This is the list of sites you are registered as an installer for.

This is the **ACTION** button. When you want to create/delete/add something you will likely find it on the action button.

Tap the action Button and choose
Create New Site



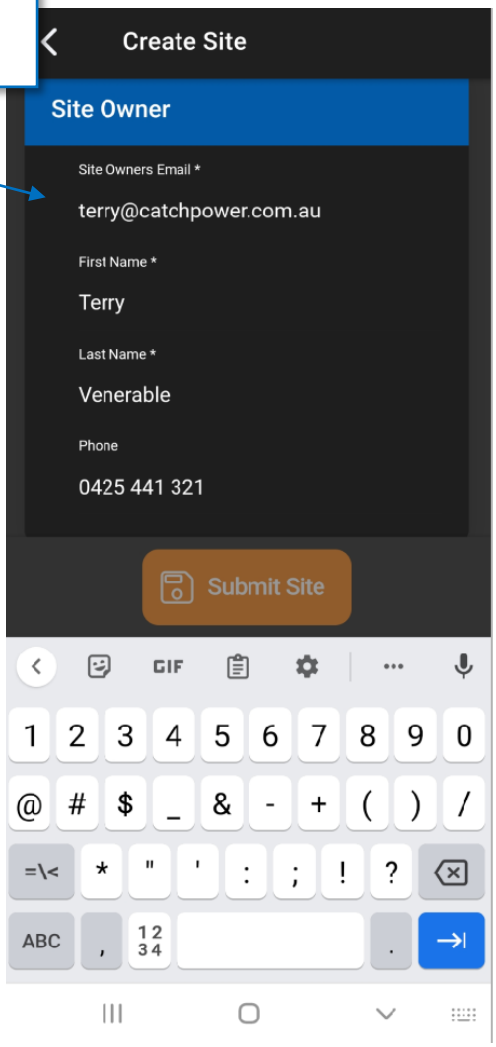
Configuration

For the Monocle

Creating the Site

1. This is your customers email address **DON'T GET THIS WRONG**.

An email will be sent to this email address with instructions on how to register for the MONOCLE



Fill in the rest of the information and press

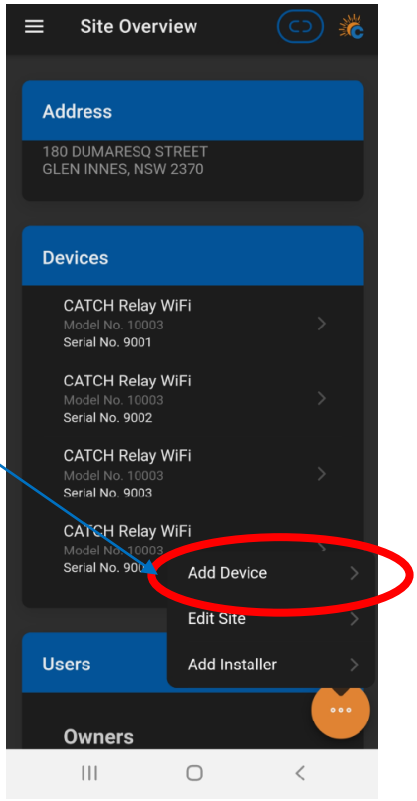
Submit Site

Configuration

For the Monocle

Attach the Solar Relay to the Site

1. Press the action button and choose **Add Device**



This particular site already has 4 Solar relays attached to it.. but we are adding one more.

Configuration

For the Monocle

Attach the Solar Relay to the Site

1. Type in device serial number and model

if you are connected to the device via Bluetooth these values will default for you.

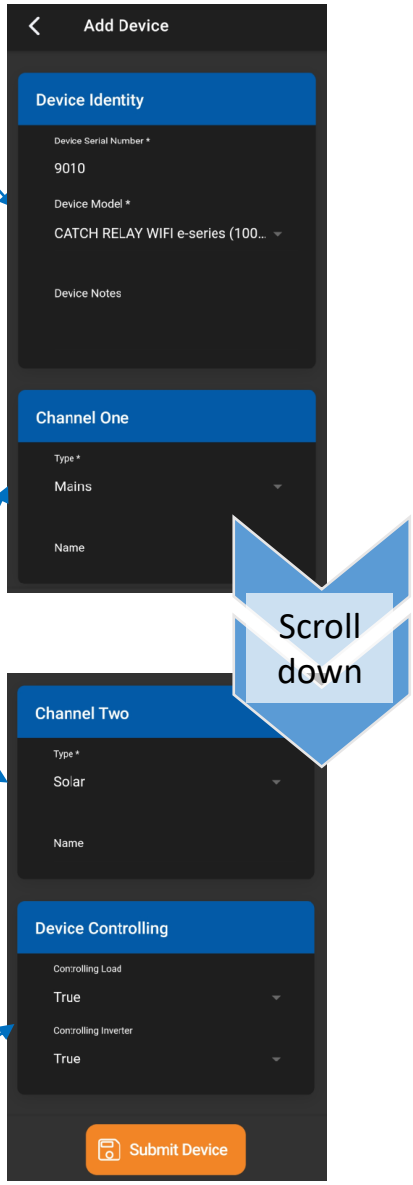
2. Specify the channel types

as we have already discussed, Channel One will most likely be Mains and Channel 2 will be Solar.
If you have followed the wiring instructions above, then assign the channel as shown.

3. Control Settings

Controlling Load: true if you have a contactor and load connected.

Controlling Inverter: true if the RS485 is connected to an inverter.



Press “Submit Device”
And you are done..
the Monocle has been configured.

Configuration

For the Monocle

At this point you have create the site and attached the device, and all of this information has been sent to the MONOCLE.

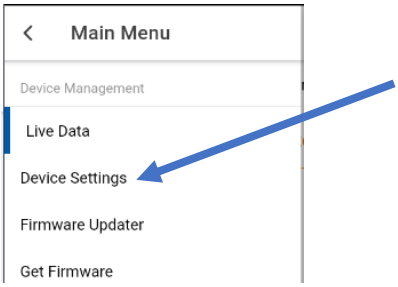
As part of the site creation process, an email has been created and sent to the customer (remember the site Owner email address). The instructions for how the customer can get access to the MONOCLE are in that email.

The email to the customer will contain an **access token** the customer will need in order to register themselves as the owner of the site you have just created.

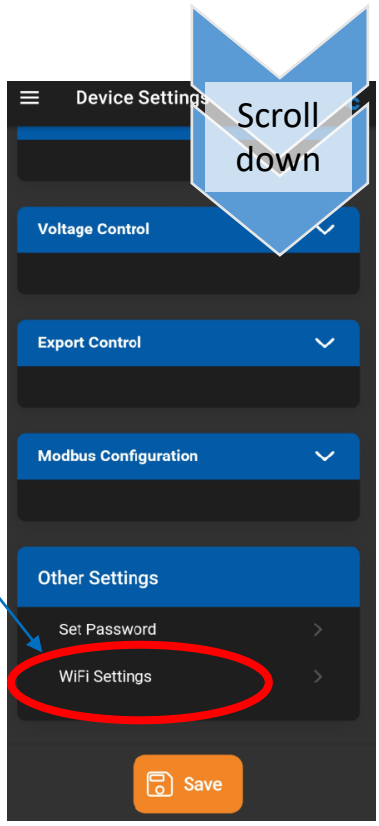
The last thing for you to do is connect the Solar Relay to the customers WiFi
and
check everything looks ok in the MONOCLE.

Configuration

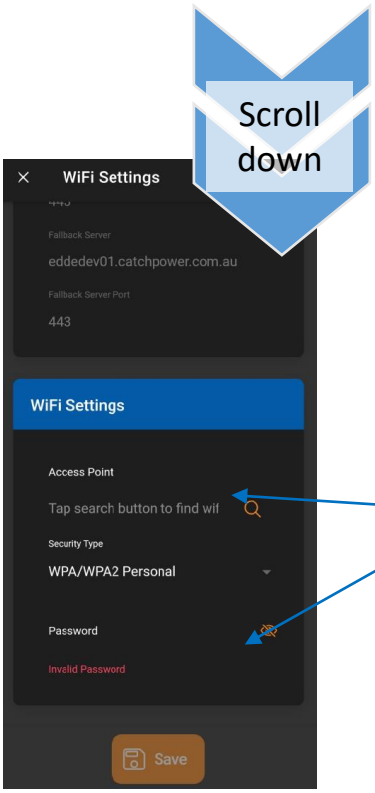
WiFi



Use the top left menu to navigate to device settings.



1. Open the WiFi Settings



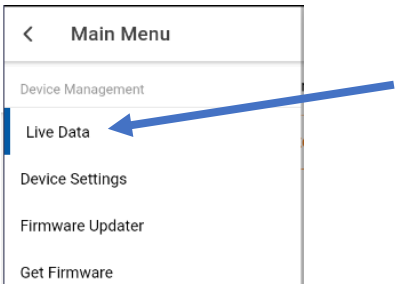
2. Type in the customers SSID and password

Then press **SAVE**

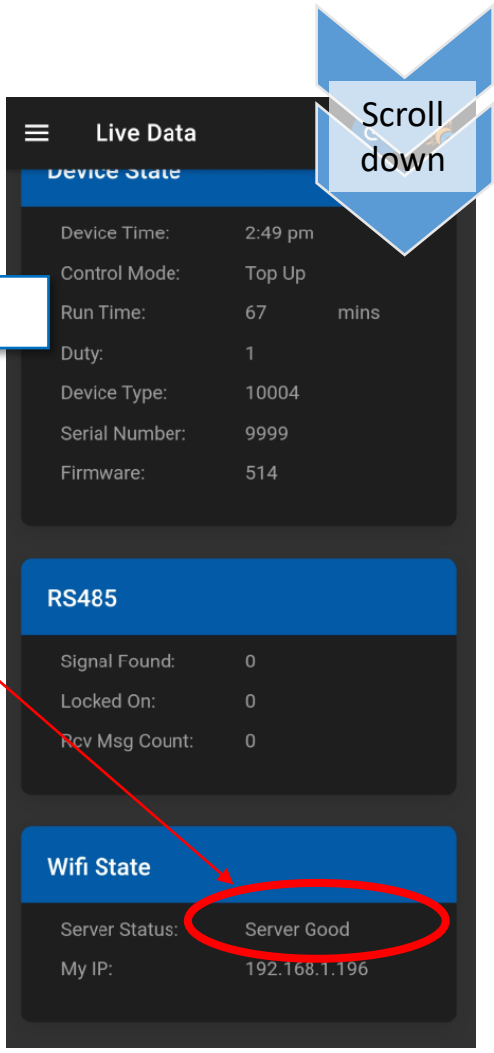
Configuration

WiFi

Check the status of the WiFi Connection



Use the top left menu to navigate to the Live Data Screen.



Check the Status of the network connection

There are a number of different statuses that can appear here:

Server Good:
The Solar Relay has connected to the internet.

IP Assigned:
The Solar Relay has connected to the local network, but cannot connect to the Internet. This could mean a weak WiFi signal, or port 443 on the customers router is blocked.

WiFi:
Connection to the WiFi router was successful, but the DHCP server did not allocate an IP address. You may need to configure a static IP.

No WiFi:
Cannot connect to the WiFi router. The SSID and password could be wrong, or a weak signal.

Configuration

WiFi

A Quick discussion on WiFi Signal Strength

-30dB to -60dB : Good Strong signal
-60dB to -70dB : Average Signal
-70dB to -80dB : Weak and potentially troublesome signal
-90dB : All most no signal

Small changes in the signal strength matter:
Every -3dB is a halving of the signal strength.
As an example. -60dB is twice as strong as -63dB. And 10x stronger than -70dB.

To ensure trouble free operation of the Solar Relay, ensure the Wi-Fi signal just outside the switchboard is at least **-64dB** or better.

How can you check the signal quality?

The best option is to use a Wi-Fi signal checker. There are many of them available for your phone. One that we use regularly is show below. It will give you the signal strength in dB.

WiFi Analyzer

olgor.com Tools

Everyone

Contains ads

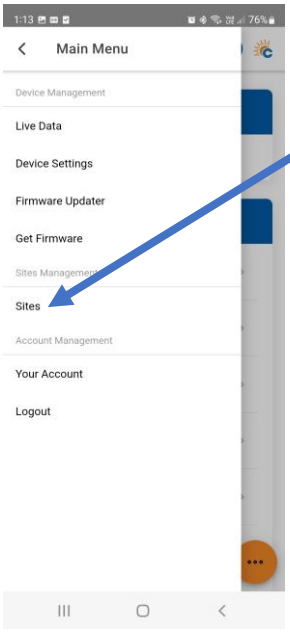
This app is available for all of your devices

Dynamic / Flexible Exports

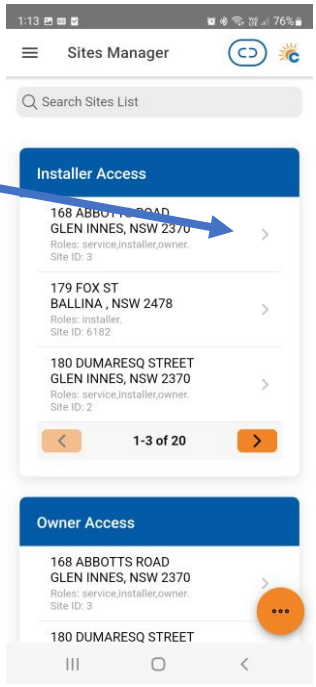
The following requisites are required before beginning this step:

- The Solar Relay is connected to the local WiFi
- The Solar Relay is registered with the MONOCLE.

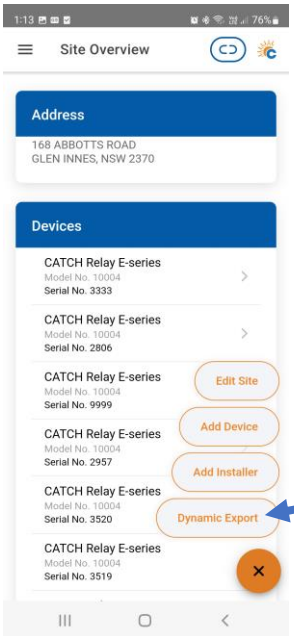
(See Previous Steps for details)



1. On the left menu choose "**Sites**"



2. Choose the site of interest



3. Tap on the 3 dots at the bottom right and choose "**Dynamic Exports**"

Dynamic / Flexible Exports

1. Enable Export Control

2. Enter the customers NMI.

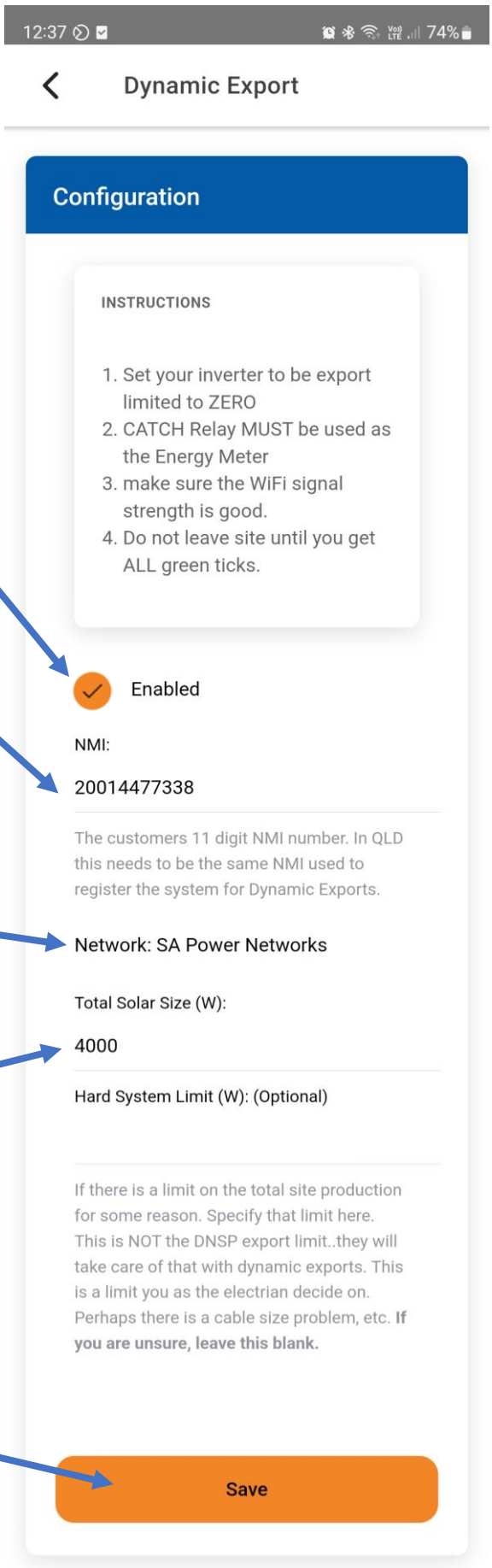
This needs to be the 11 digit NMI, if you have been dealing with your DNSP they may have only wanted the first 10 digits..But we need the 11th digit

If the NMI is correct the name of the DNPS should appear here.

3. Tell us the Solar Size

This needs to be specified in Watts, and is the TOTAL amount of solar on site as defined by inverter ratings.

4. Press Save.

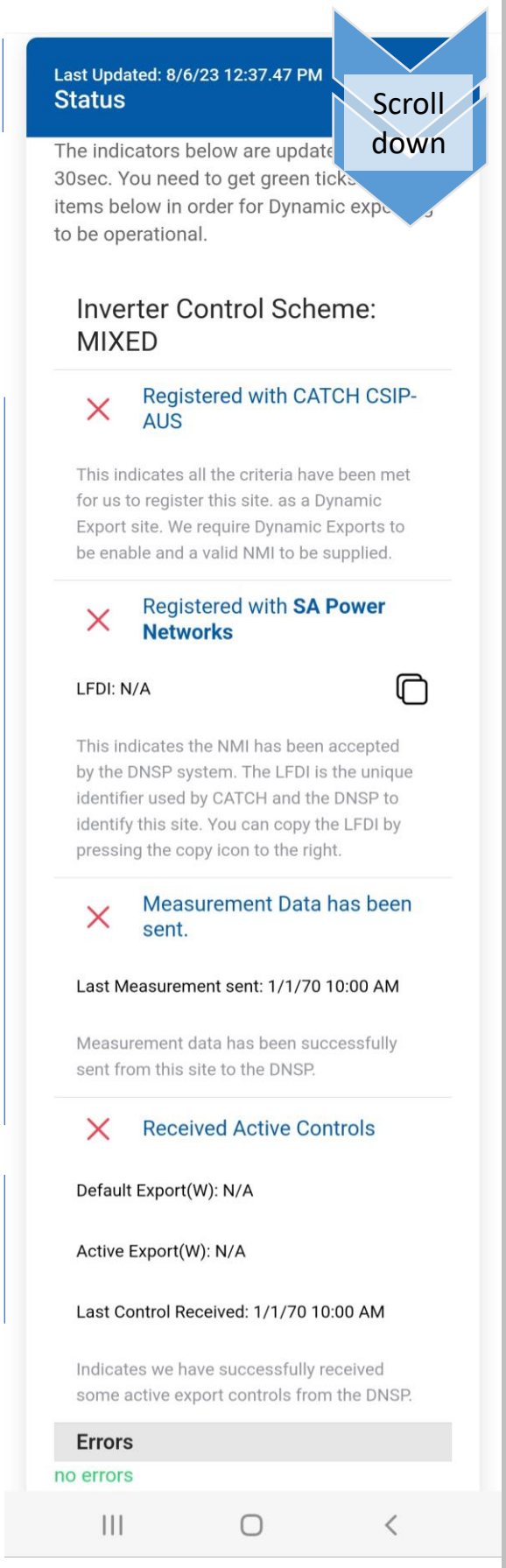


Dynamic / Flexible Exports

The screen Auto refreshes. The last refresh time is here

It may take a few minutes, but you need all crosses to turn GREEN.

The default and active export limits for the site are shown here:



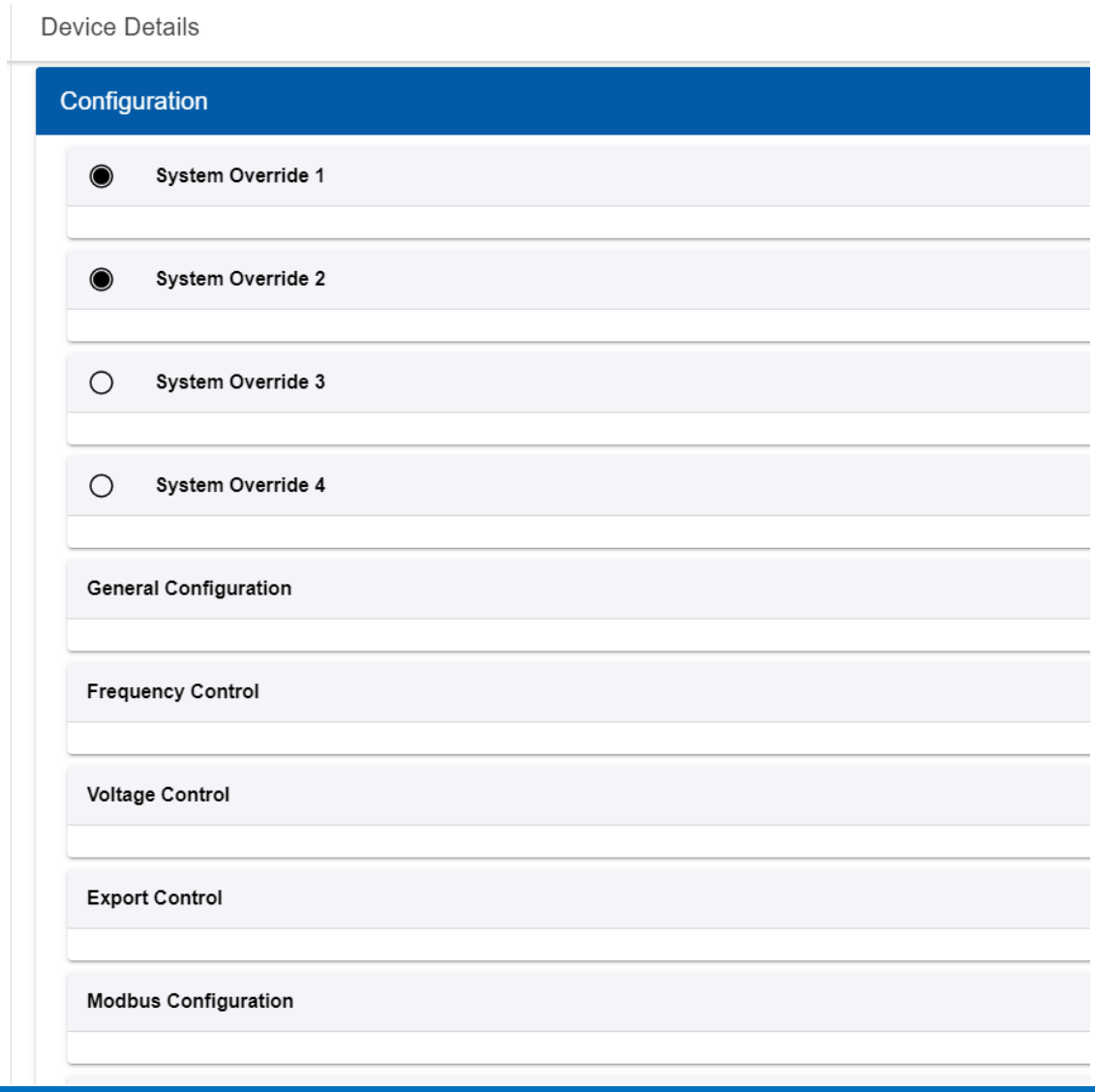
AND WE ARE DONE…

“My Fleet Manager”

Remote Control of your Fleet

Access your fleet of installations at
https://myfleet.edde.world

1. Log in using the same installer “log in” you use for The Configurator App.
2. Make changes to your sites from the computer. Access a site remotely and change the configuration, monitor the historic consumption data, view the version of the firmware, check the WiFi signal strength and more.



DIAGNOSTICS, REMOTE CHANGES & MONITORING

“My Fleet Manager”

Remote Control of your Fleet

Device Details

Identity

Serial#	[redacted]
FW Ver	3072
Type	CATCH Relay E-series
Device time	3:16 pm
Details	phase 1

Override Control

ON

OFF

RELEASE

Runtime: 108 mins

Please Note: Turning a device on or off here is overriding the devices own logic. This will remain in place until the release button is activated.

Watt Hour Data

Ch1 Exported	-10341 Wh
Ch1 Imported	46 Wh
Ch2 Exported	-13147 Wh
Ch2 Imported	0 Wh

DIAGNOSTICS, REMOTE CHANGES & MONITORING

“My Fleet Manager”

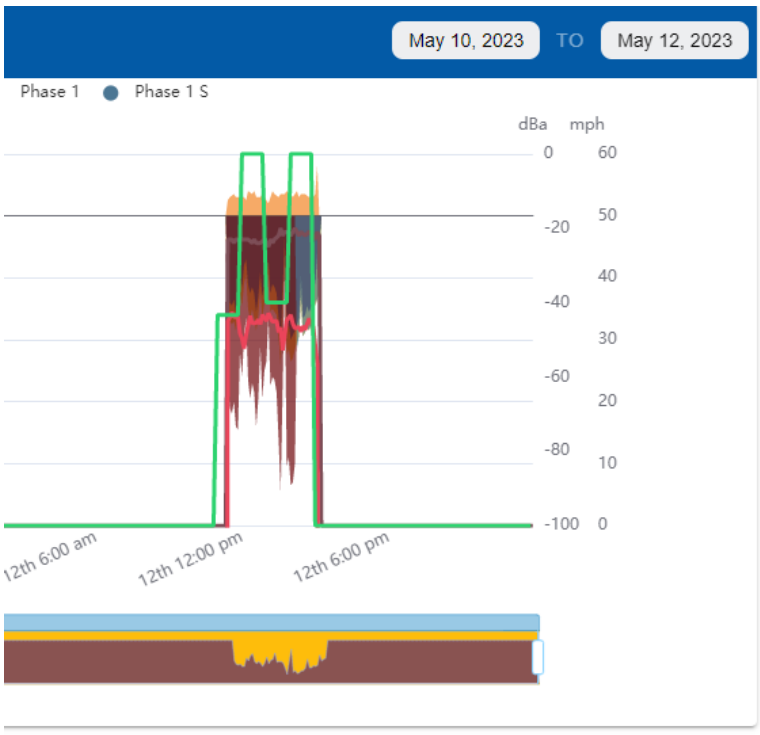
Remote Control of your Fleet

Connection Status (ONLINE)

Status	ONLINE
RS485 Signal Found	1
RS485 Inverter Lock	1
RS485 Received Packets	3958

Wifi Information

WiFi SSID	Optus_[redacted]
WiFi PWD	**********
Local IP	[redacted]
RSSI	0 dB



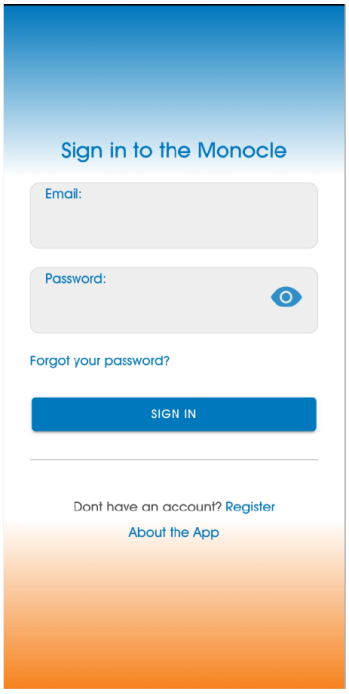
DIAGNOSTICS, REMOTE CHANGES & MONITORING

The MONOCLE

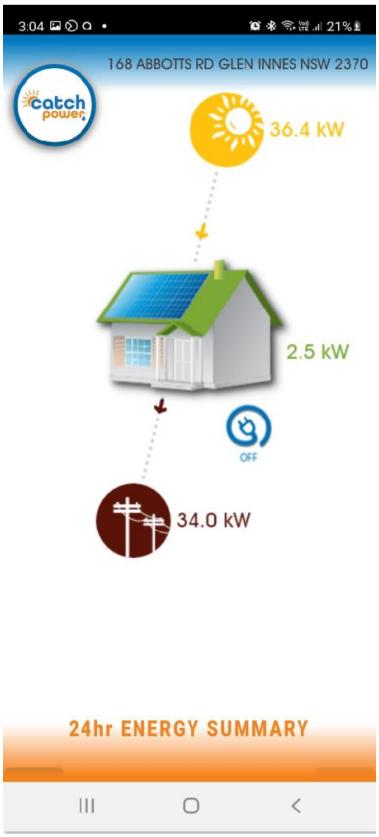
The last step is to check the MONOCLE and make sure everything looks ok from the customers point of view.

1. Open the MONOCLE and press Login

2. Use the username and password created back in the office for the configurator



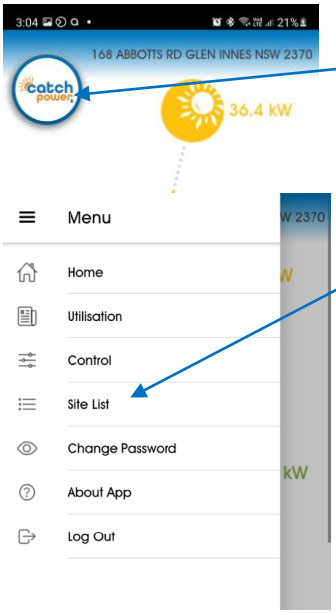
The MONOCLE



If this is your very first Monocle site, the site should open as the default site, and the data should be displayed as shown here.

If you have more than one site you may need to go and find it.

Change Sites on the Monocle.



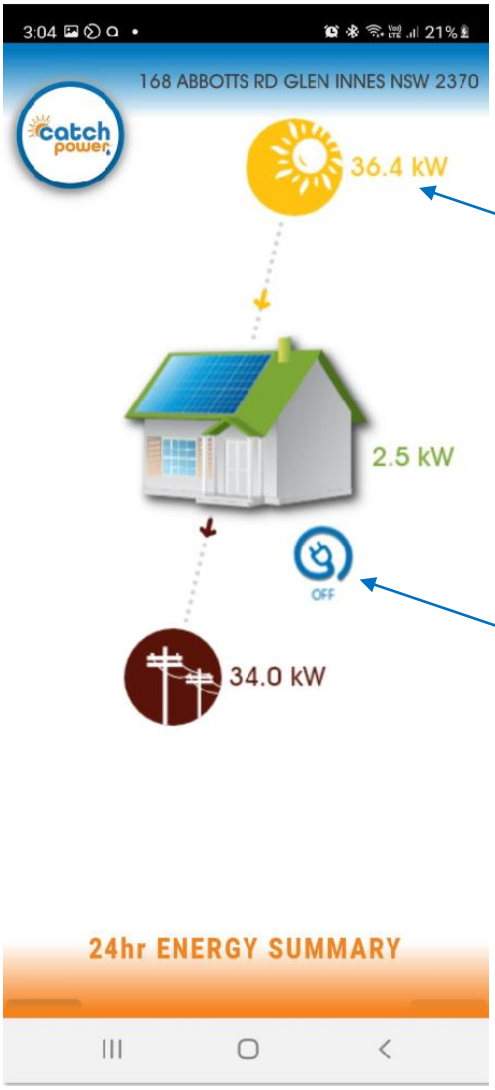
1. Press the menu Button

2. Choose Site List

The MONOCLE

168 ABBOTTS RD GLEN INNES NSW 2370
AVAILABLE SITES
Search Sites List
180 DUMARESQ STREET GLEN INNES NSW 2370
168 ABBOTTS RD GLEN INNES NSW 2370
Owner: Not Available
GREEN TEST SITES GLEN INNES NSW 2370
1-3 of 8
3. Search for your site address
4. Expand the desired sites details
5. Tap the Site Jump Button

The MONOCLE

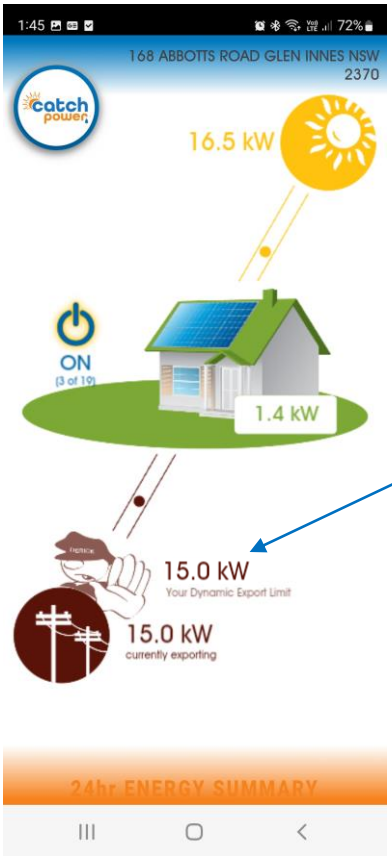


Things to Check

1. Make sure the power numbers look correct.

2. If there is a load connected. Use this button to turn it on and off.

The MONOCLE



Dynamic / Flexible Exports

If the site is participating in a DNSP dynamic / Flexible Exports program then Derick the Dynamic Gateway control should be present, letting you know the current site export limit. The current site Export limit is 15kW

Adding an EV Charger

The technical term for an EV Charger is **E**lectric **V**ehicle **S**upply **E**quipment (or EVSE for short).

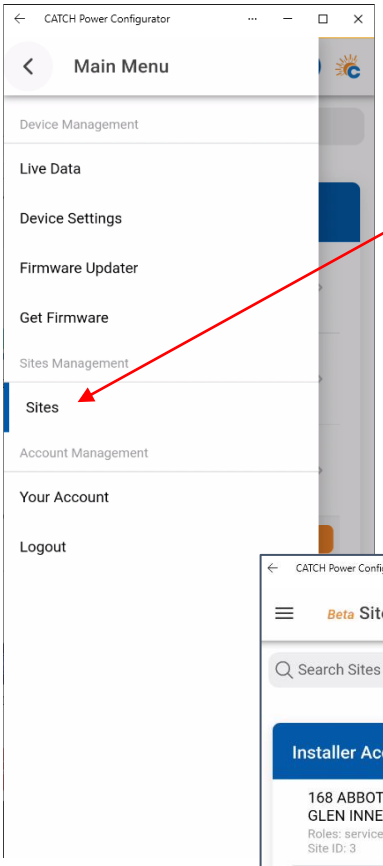
You can't just get any old EVSE. The EVSE needs to be OCPP compliant and support the *Smart Charging* profile.

You can go to our website for a list of EV Chargers that we have tested and know will give you trouble free charging.
http://www.catchpower.com.au/evse

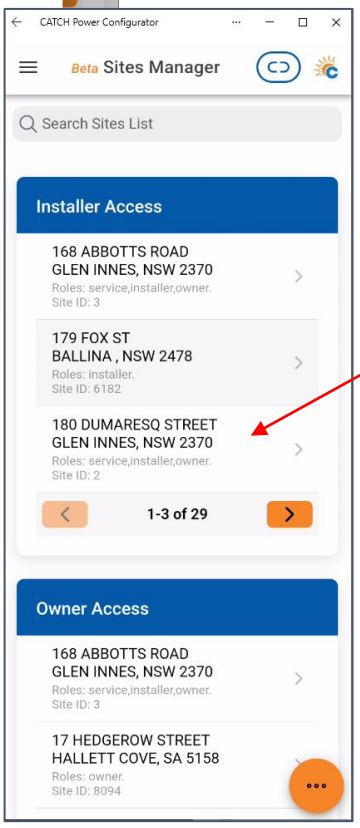
Adding an EV Charger

1 – Adding the EV Charger to the CATCH Site

- Open the “**CATCH Power Configurator”,** Log in with your installer account.



Open the menu and click on the **Sites** menu Option

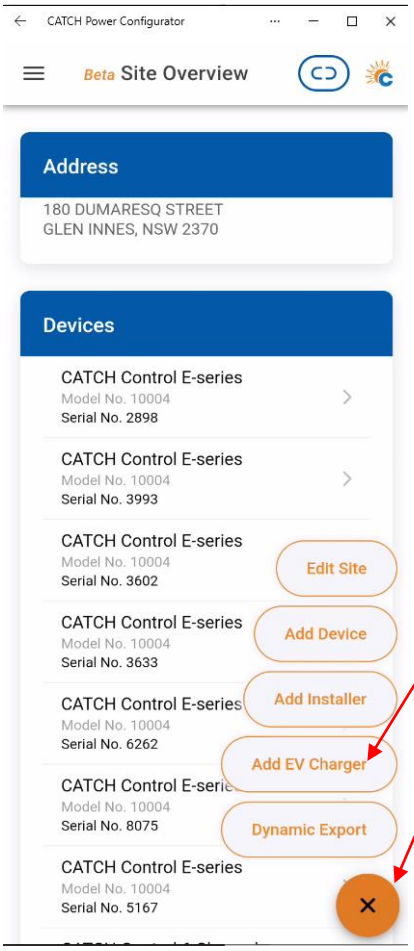


Click on the Site you wish to register he EV Charger against.

Note: This is a new Site you will need to create it by pressing the orange button in the bottom right.

Adding an EV Charger

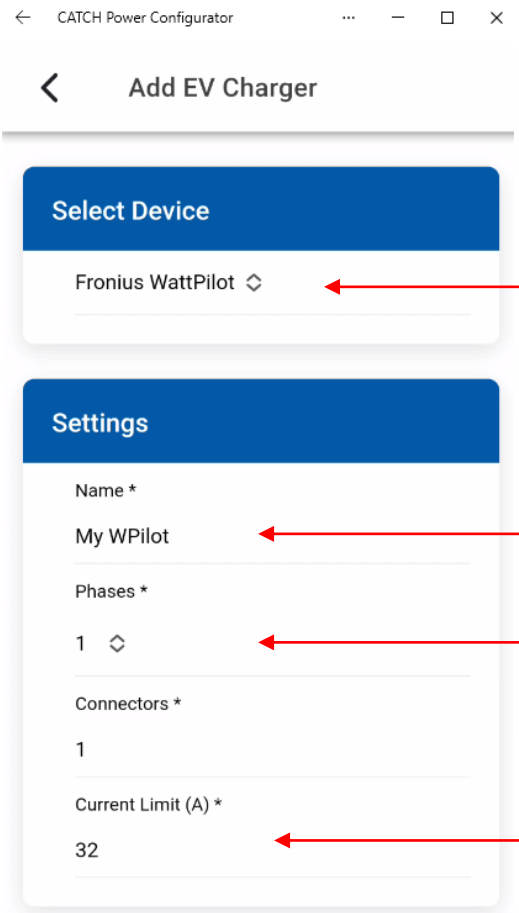
1 – Adding the EV Charger… continued



Click on the orange circle in the bottom right. Then click on **Add EV Charger**

Adding an EV Charger

1 – Adding the EV Charger… continued



Choose the inverter Brand. If your brand is not there Choose Generic OCPP.

Give it a name

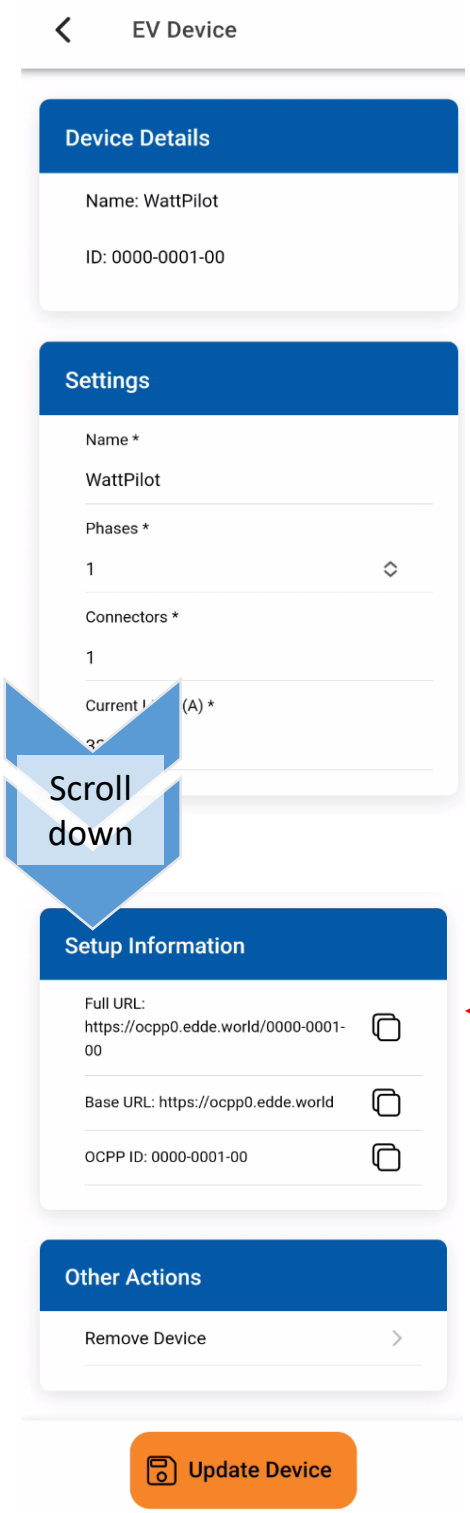
Is it single or 3 phase

This will limit the per phase charging current to this value.

Add the Device

Adding an EV Charger

1 – Adding the EV Charger… continued



You will need one of these URLs to be entered into the EV Charger Setup. Press on the square on the right hand side to copy the value.

See your EV charger installation guide on how to enable OCPP.