

# 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.

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## **<u>1 - Getting the right software on your phone.</u>**

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



CATCH Power Configurator



# The Monocle

CATCH Power

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 <u>https://myfleet.edde.world</u>



#### 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.

## 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.

≡ Live Data	(-) %	
A device is not currently connected. Connect to Device		< Main Menu
		Device Management
		Device Settings
		Firmware Updater Get Firmware
		Sites Management
		CIICK HERE Account Management
		Your Account Logout

## 2 - Create your Configurator Account...Cont'd

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

		🏀 🖒
	Login	
	Email	
*	Password	@
	Log in	
4. Need to create a new Account?		
	Other Actions	
	Enter Access Code	>
	Request Access Code	>
	Create 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.

## 2 - Create your Configurator Account...Cont'd

5. You know what to do here Usernam password please.	ne and
	X Create Account
	Email
	Password
	Role
	Create

## 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.



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.



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.



# Testing the Installation Logging In..Cont'd

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

9008-SRW/CATCH_v73 34:81:F4:CE:FF:AA			
RSSI:	Discovering 9006-		
9009 34:81	SRW/CATCH_v73		
RSSI: -78			
9006-SRW/CA 34.81.F4.CE.FB: RSSI: -79	<b>TCH_v73</b> 1C		

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.



# 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.

≡ Live D	ata	😑 💥	5
9006-SRW/CATCH_v73 Device Signal: -81 dBa			
Readings - Channel 1			
Volts:		v	
Amps:	3.7	A	L.
		Hz	
Power:	0.85	kW	
Power Factor:	0.89		l
Exported:			
Imported:			
Readings - Channel 2			
Volts:			
Amps:			
Freq:			
Power:	0.00		

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**



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





#### **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.



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.

😑 Live Data 😁 🛣	Consuming / Importing power	
9006-SRW/CATCH_v73 Device Signal: -84 dBa		
Volts:     249.8     V       Amps:     7.4     A       Freq:     50.02     Hz		
Power 0.92 Pactor: Exported: -1027339 Wh Imported: 66217 Wh		
Producing / Exporting po	Ner Readings - Channel 2 Volts: Amps: 7.6	
	Power: -1.70 Power -0.95 Factor:	W

# Testing the Installation CONTACTOR installation



# 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.

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....

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



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.a u/tech-docs



## <u>The Summary of Load Control</u> 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



#### 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.

# 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**.

## 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.



## For the Monocle



CATCH Power Configurator CATCH Power

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





## Creating the Site



## Attach the Solar Relay to the Site



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

## Attach the Solar Relay to the Site



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

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.

WiFi





## Check the status of the WiFi Connection



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.

## WiFi

## <u>A Quick discussion on WiFi Signal Strength</u>



-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 E 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)



## **Dynamic / Flexible Exports**



# **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:

#### Last Updated: 8/6/23 12:37.47 PM **Status** Scroll down The indicators below are update 30sec. You need to get green ticks items below in order for Dynamic exp to be operational. Inverter Control Scheme: MIXED Registered with CATCH CSIP-X AUS This indicates all the criteria have been met for us to register this site. as a Dynamic Export site. We require Dynamic Exports to be enable and a valid NMI to be supplied. Registered with SA Power Х Networks LFDI: N/A This indicates the NMI has been accepted by the DNSP system. The LFDI is the unique identifier used by CATCH and the DNSP to identify this site. You can copy the LFDI by pressing the copy icon to the right. Measurement Data has been х sent. Last Measurement sent: 1/1/70 10:00 AM Measurement data has been successfully sent from this site to the DNSP. **Received Active Controls** X Default Export(W): N/A Active Export(W): N/A Last Control Received: 1/1/70 10:00 AM Indicates we have successfully received some active export controls from the DNSP. **Errors** no errors

#### AND WE ARE DONE...

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## "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.

Device Details			
Config	Iration		
۲	System Override 1		
۲	System Override 2		
0	System Override 3		
0	System Override 4		
Gene	ral Configuration		
Frequ	ency Control		
Volta	je Control		
Expo	t Control		
Modb	us Configuration		

## **DIAGNOSTICS, REMOTE CHANGES & MONITORING**

# "My Fleet Manager" Remote Control of your Fleet

**Device Details** 

Identity	
Serial#	
FW Ver	3072
Туре	CATCH Relay E-series
Device time	3:16 pm
Details	phase 1

#### **Override Control**



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





## **DIAGNOSTICS, REMOTE CHANGES & MONITORING**

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





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.









24hr ENERGY SUMMARY				
	0	<		



#### **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

#### AND WE ARE DONE...