SOLAR RELAY

INSTALLATION & USERS GUIDE

CATCH Power
A trademark of Project H Pty Ltd
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NSW   2370
Australia
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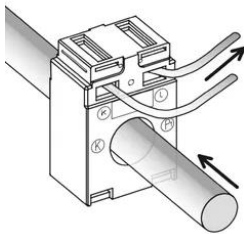| IMPORTANT | | This product must be installed by a licensed electrician. This product must be installed according to the AS/NZ3000 – Australian Wiring Standards. |

| DANGER | | **Danger to life due to high voltage AC**

Always ensure all electricity sources are appropriately isolated when installing this piece of equipment. |

| DANGER | | **Electric Shock Risk with CT's**

CT's must be fitted to insulated cables only. Ensure CT is terminated into the device before clamping onto cables. |

Inside the package
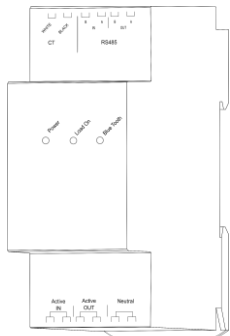
1 x CATCH Solar Relay
1 x Current Transformers

Specifications

Operational Voltage	230VAC
Operational Frequency	50Hz
Maximum AC Load	4A
Load Types	Any
Max A/C Cable Size	2.5mm^2
CT lead length	1m
IP Rating	IP2X
Operating Temperature range	-20ºC to +45ºC
Size	35W x 85H x 65D (mm)
Standards Conformity	IEC 60730-1, AS/NZS CISPR 32:2015

CATCH **SOLAR RELAY** Installation

CATCH Solar Relay has been designed specifically for the solar industry, as such the terminal layouts are designed for maximum flexibility and simplicity of wiring.

Highlights on the installation are:

- CATCH Solar Relay is the size of a 2 pole miniature circuit break, it must be mounted inside an electrical enclosure such as a switch board, sub board, load centre, or any other enclosure designed to house electrical switch gear. CATCH Solar relay is designed to be DIN mounted inside a standard miniature circuit breaker cover.

- **DIN Mounted.**

- **Same size as a 2 Pole miniature circuit breaker**

- CATCH Solar Relay is designed to control loads via an external contactor. This means the number and type of loads controllable by CATCH Solar Relay is only limited by your imagination.

  CATCH Solar Relay can control one or more contactor coils (up to a maximum load current of 4A). CATCH Solar Relay will happily drive one or more single or 3 phase contactors.

- Power terminals are duplicated for easy daisy chaining to other power control devices.
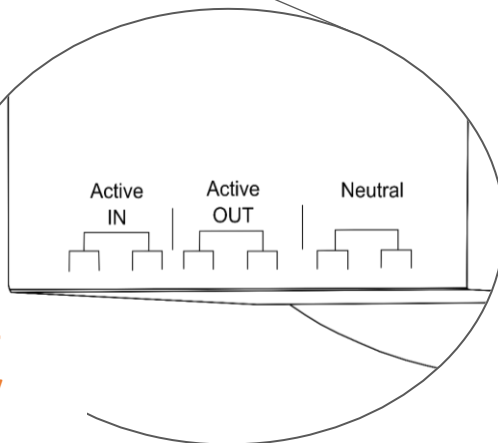
Duplicated power terminals for easy daisy chaining.

INSTALLATION - Overview

Before Going to Site:

- Download the CATCH Power Configuration App to your phone. The App can be downloaded from Google Play Store or the Apple iStore.

Onsite Site:

- Install CATCH Solar Relay as per the circuit diagram below.

- Power the device up and connect to it using the CATCH Power Configuration App on your phone or tablet. The Configuration App uses Bluetooth to communicate with the CATCH Solar Relay.

- Adjust the device settings to suit the installation.

INSTALLATION – Circuit Diagram
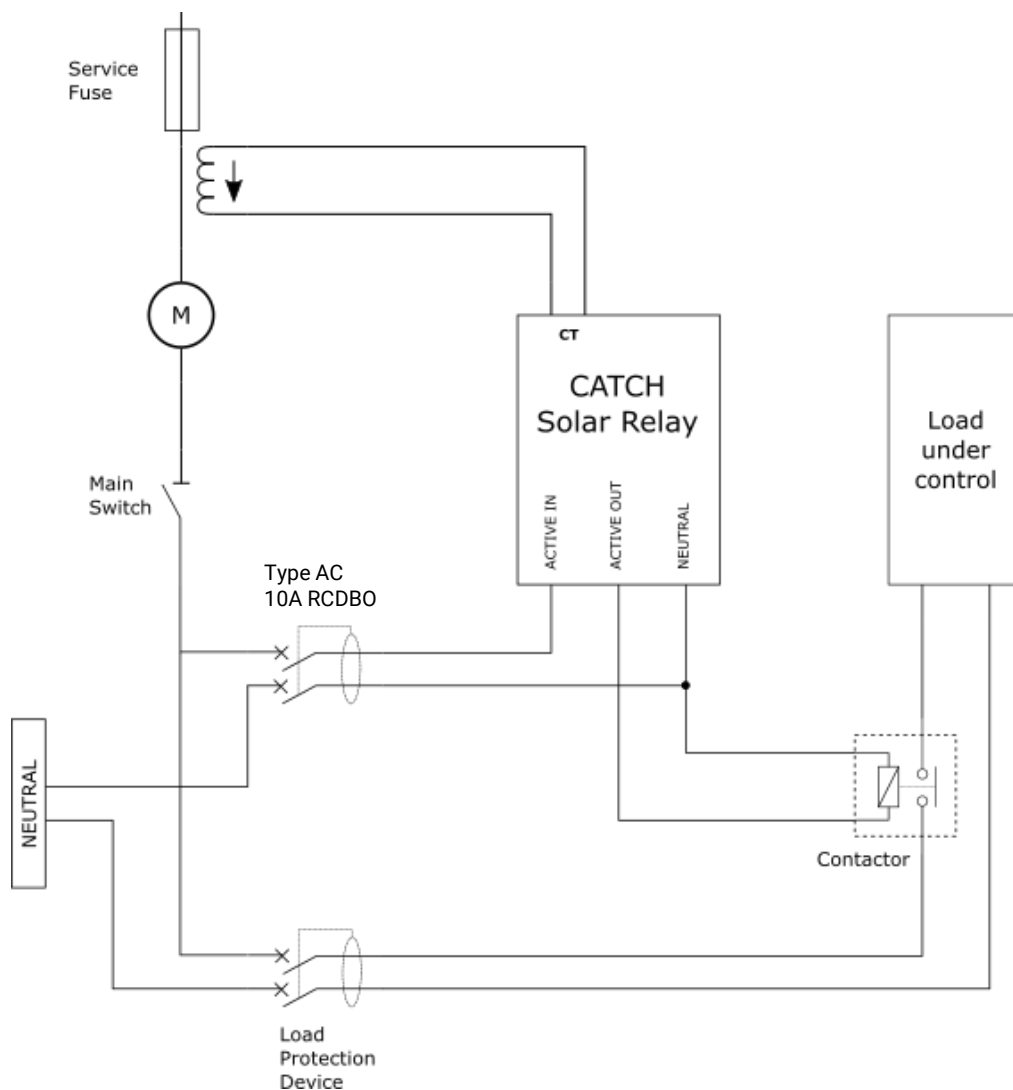
Cable Sizes:
Maximum wire size for the Solar Relay is 2.5mm^2.

Contactor:
Contactor selection should be made based on load requirements. The solar relay requires the coil voltage to be 240VAC, with a maximum coil current of 4A.

Current Transformer:
If the export control feature of CATCH Solar Relay is required then the CT must be installed. The CT can be positioned anywhere in the installation that sees all loads and solar.
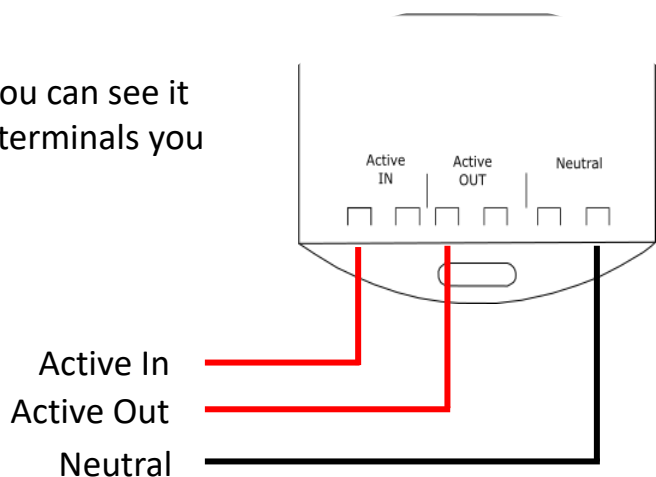
INSTALLATION - Cable Termination
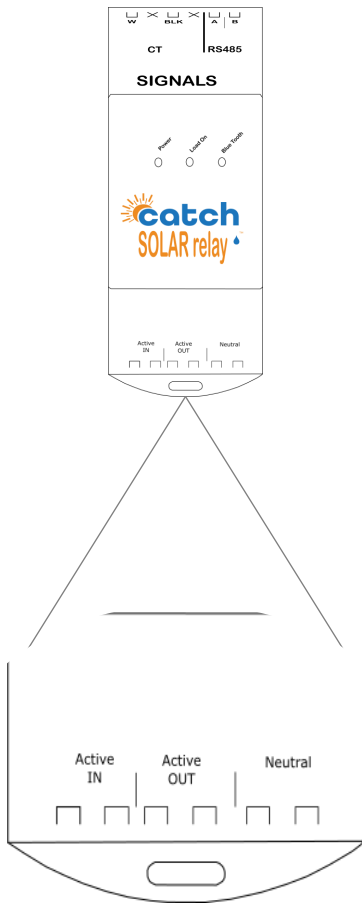
Ideal cable size 1.5mm² Maximum cable size is 2.5mm2

There are 3 connections that need to be made on the bottom of the CATCH Relay, each connection can be made from one of two connection points.

For example: The **Active IN** connection point is made from one of the left two connectors. You can choose either one, as they are bussed together inside the device.

Example:
Wiring for a basic installation. As you can see it does not matter which of the two terminals you choose for each connection.

Active In
Active Out
Neutral

INSTALLATION – Current Transformer

ALL CT's ARE DIRECTIONAL.

Make sure you know which direction the arrow is pointing before placing the CT.

IMPORTANT Current Transformer Rules

- The arrows next to the CT's in the wiring diagram represent the arrows on the inside of the CT's.

- Matching the CT's to the correct phase is critically important special care must be taken to ensure this happens.

- NEVER disconnect CT's from the Solar Relay while they are wrapped around a current carrying conductor.

- Multiple wires can be put through the CT, as long as all currents are in the same direction and in phase.

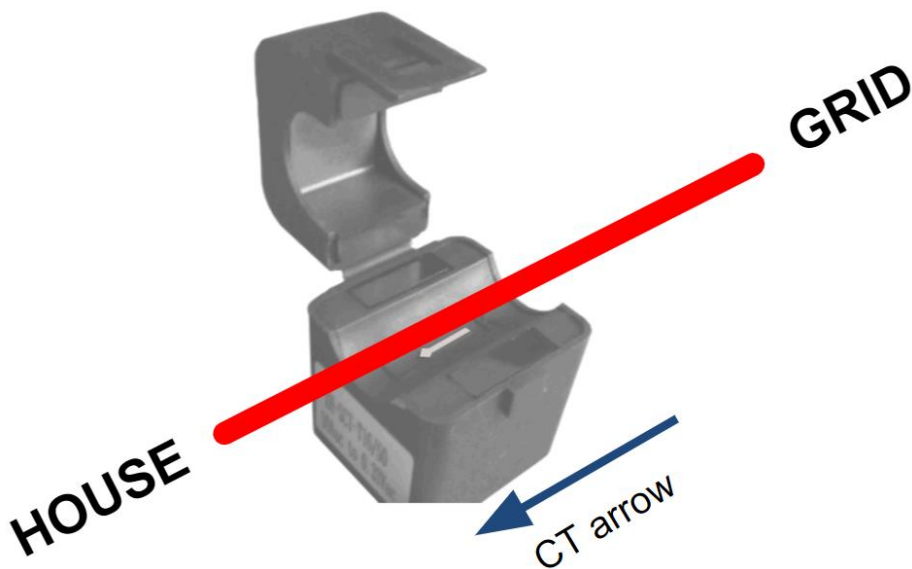| IMPORTANT | | **It is vitally important the CT's are pointing in the right direction.** |

| DANGER | | **Electric Shock Risk with CT's**
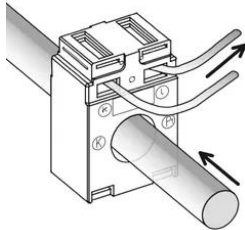
CT's must be fitted to insulated cables only. Ensure CT is terminated into the device before clamping onto cables. |

Mains

** CT arrow points in same direction as current flow

INSTALLATION – Current Transformer

Match the CT wire colours to the labels on the case.
Note there is a 1 terminal gap between the white and black wire.

White wire

Black wire

SIGNALS					
W		BLK		A	B
CT			RS485		

SIGNALS

Power   Load On   Blue Tooth

catch
SOLAR relay

Active IN   Active OUT   Neutral
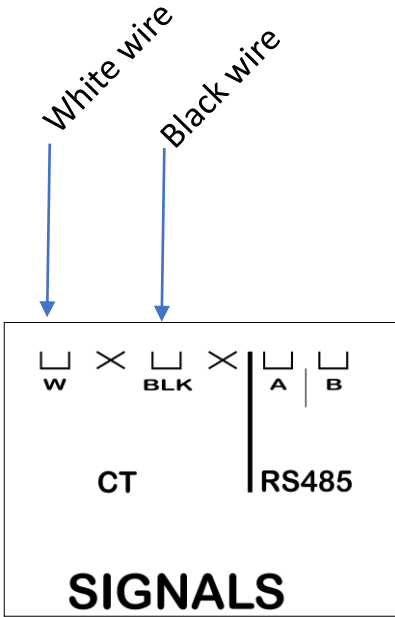
Solar Relay Terminal	CT wire colour
W	white
BLK	Black

INSTALLATION – Power Up

There are 3 LEDs on the Solar Relay that provide indicators on what is happening.

Power: Green indicates power is applied to the unit, and the unit is functional.

Load On: When green it means power has been applied to the Active Out port.

Blue Tooth: When Blue it means the Solar Relay is connected to a mobile device.

When power is applied to the unit all three lights flash on and off together for 20 seconds, then under normal conditions the Power light will come on by itself.

At this point you can connect to the device via the mobile application and begin the configuration process.
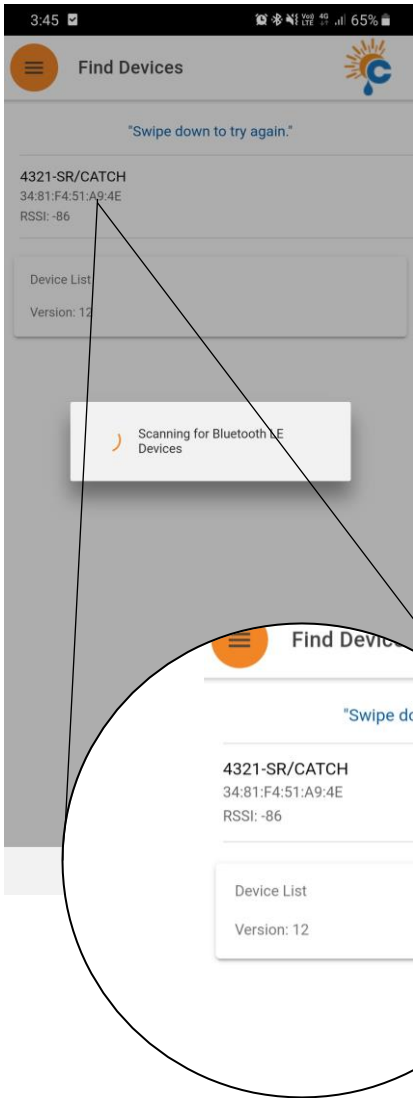
IMPORTANT

The Factory default configuration has the Solar Relay permanently turned off. You must override the default configuration.

CATCH Solar Relay is configured over a Bluetooth connection using the CATCH Configurator App.

The CATCH Configurator app is available on the Apple App Store and Google Play.
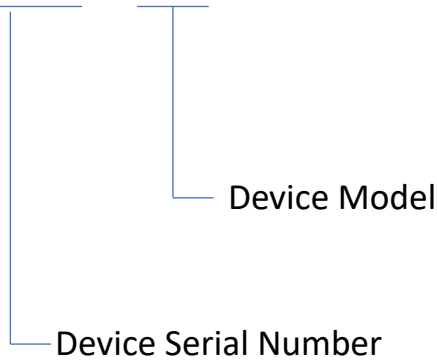
Scanning for new Devices

When the Configurator opens it will automatically start searching for any Catch Power devices.

In the example shown to the left a single device has been found. You can tap the screen to end the search once the device is found.

Device name format

4321-SR/CATCH

Device Model

Device Serial Number

Once you have chosen the device, the Configurator App will connect. At this point the Bluetooth light on the device will turn on and the Configurator App will show you the Live Data View.
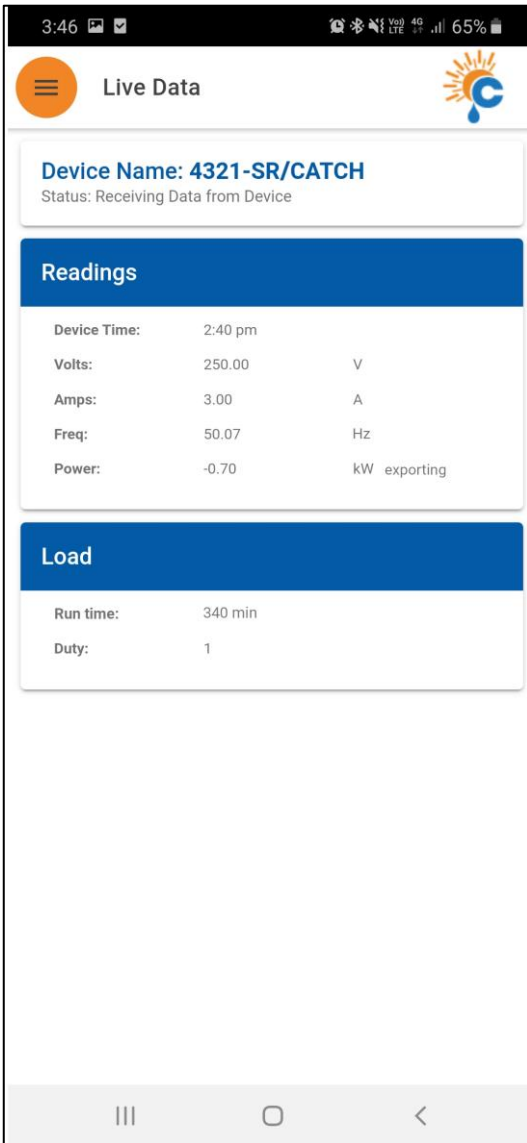
Understanding the Live Data

CATCH Solar Relay is monitoring all aspects of the connected site. The data is visible on this screen.

Device Time: The current time as reported by the device. This is updated automatically when the configuration is changed.

Volts: The RMS voltage as seen for the Relay.

**Amps:** RMS current as measured by the CT.

Freq: Grid Frequency

Power: The power measured at the point the CT is connected. A negative number represents exporting power flow.

Run time: The amount of minutes since midnight the load has had a voltage applied.

Duty: Status of the connected load. 1 means the load has a voltage applied. 0 means no voltage is applied (the load is off).

Bluetooth™

Once you are connected to the Solar Relay there are a number of menu options you can choose from.
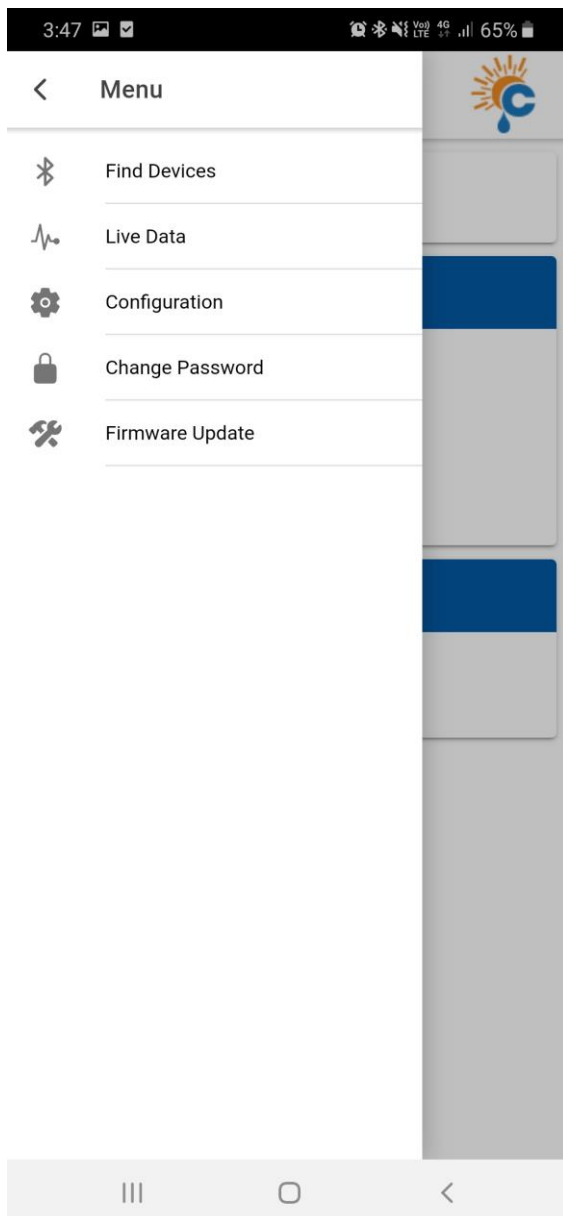
Understanding the menu

Find Devices: Will disconnect you from the current device and perform another device scan

**Live Data:** opens the Live Data screen.

Configuration: Opens the configuration screen which allows you to adjust the device settings.

Change Password: The device is shipped with a blank password, which means you will not be prompted for a password when you open the configuration screen.

Firmware Update: Opens a screen that allows you to update the latest firmware on the device.

CATCH Solar Relay is highly flexible and can operate in many modes. The details of all configuration options are outlined below.

General Configuration

General Configuration
Device Time
25 Aug, 2020 2:40 pm
CT Ratio
3000
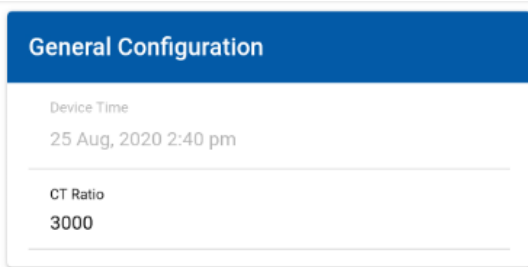
General Configuration

Date/Time: This is the time that will be loaded into the device. It is based on the time current held on the mobile device running the Configuration App.

CT Ratio: If you are using the standard model (CP-SR-STD) you will be using the supplied CT. as such you do not need to change this number.

The industrial version of the Relay uses standard 5A secondary CT's. You will need to specify the applicable CT ratio. For example if you are using 400A primary current CT's the CT ratio will be $\frac{400}{5} = 80$

By default the solar relay sits idle, you must specify 1 or more overrides in order to get the unit controlling the load.

- A maximum of four overrides can be configured.
- Each override has a start and stop time.

Each override represents a specific mode of operation. There are 6 operating modes that can be chosen.

Export Control: In this mode the Solar Relay controls the load based on solar export levels. This mode is ideal for maximising solar self consumption.

Turn On: In this mode the Solar Relay will turn the load on for the period of time specified.

Turn Off: This mode forces the unit to turn off the load for the period of time specified.

Top Up: In this mode the Solar Relay will ensure the load has been on for the period of time specified. For Example if the Top-up mode is specified to be between 10pm and 11:30pm (1.5hrs). It will turn the load on if we did not manage to get 1.5hrs of running time to occur during the day.

This mode is typically used in conjunction with another mode like Export Control and Voltage / Frequency Control. This mode guarantees a minimum amount of running time in a 24hr period.

Voltage Controlled: In this mode the relay will turn the load on and off based on Grid Voltage. This mode is best suited for helping to manage voltage rise issues at a solar installation.

Frequency Controlled: In this mode the relay will turn the load on and off based on grid frequency. This mode is ideal for operating in Off grid environments where frequency shifting is used to control devices. Systems such as SMA use frequency control in their off grid environments.

Each System override has the following settings

System Override 1

Override Active
Yes

Override Type
Export Control

Start Time
7:00 am

Stop Time
7:00 pm

System Override 2

Override Active
Yes

Override Type
Top Up

Start Time
11:00 pm

Stop Time
4:00 am

Override Active: Valid values are Yes or No. Any override with active status of No will be ignored.

Override Type: This is where you define how the Solar Relay will function for this override.

Start Time: When do you want the override to start

Stop Time: When do you want the override to finish.

Override Start and Stop times can overlap.

For example:

7am   6pm
Override 1

        Override 2
11am   2pm

In this example override 1 will be used to control the load between 7am and 11am, then Override 2 will be used from 11am – 2pm, then Override 1 will be used between 2pm and 6pm.

Override Stop time can be less than the Start time.
For example:
Override 1 : Starts at 11pm, and Stops at 6am

11pm   6am

Override 1

midnight
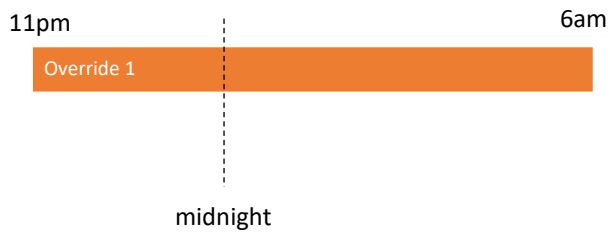
In this example Override 1 will start at 11pm tonight and continue until 6am the next morning.

In order to configure the solar relay to use the Export Control mode follow these steps.

1) Setup one of the four system overrides to be **Export Controlled**.

2) Configure the Export Control parameters as described below.

Export Control

Minimum On Time (mins)
0

Above Threshold (Watts)
6000

Above Time (mins)
1

Below Threshold (Watts)
0

Below Time (mins)
0

Example:

A site has 6kw of solar, and wish to turn a 1.5kW heat pump on when the solar export is above 3kW for 5 minutes. The customer does not want the load to be powered from any imported energy.

Settings:

```
Minimum on Time:     0
Above Threshold: 3000
Above Time:          5
Below Threshold:     0
Below Time:          0
```

Minimum On Time: Specifies the minimum time the load must stay on once it has been turned on.

Above Threshold: The number of watts to be exporting from the measuring point. The Solar Relay will turn the load on if exporting reaches this threshold.

Above Time: The number of minutes the Above Threshold needs to occur before the load turns on.

Below Threshold: The number of watts to be exporting from the measuring point. The Solar Relay will turn the load off if exporting goes below this threshold.

Below Time: The number of minutes the Below Threshold needs to occur before the load turns off

You must always ensure the difference between the Above and Below thresholds are greater than your load size. For example if you are powering a 3kW load the Above Threshold must be 3kW bigger than the Below Threshold otherwise contactor oscillations will occur.

Top-up Control is typically configured in conjunction with another control mode. When configuring Top-up control you are telling the Solar Relay how many total minutes you want the load to run in a 24 period. If the run time of the load using other control mechanisms did not reach this duration, the Top-up mode will trigger and complete the running time.

System Override 1

Override Active
Yes

Override Type
Export Control

Start Time
7:00 am

Stop Time
7:00 pm

System Override 2

Override Active
Yes

Override Type
Top Up

Start Time
11:00 pm

Stop Time
4:00 am

In the example to the left you can see System Override 1 is setup to be Export Control and System Override 2 is our Top-up mode.

Between the hours of 7:00am and 7:00pm the Solar relay will run in export control. The number of minutes the load runs during this time will change from day to day based on the amount of exporting solar.

At 11pm the Solar Relay will start operating in Top-up mode. The number of minutes between the start and stop times on the Top-up override represents the total number of minutes we want the load to run for. In our example there are 300 minutes between 11:00pm and 4:00am the next morning. This tells the Solar Relay that we need a total of 300 running minutes for the entire day.

If we had a nice sunny day, and the total number of run time minutes during the Export Control mode was 300 minutes or better, when we get to 11pm the Solar Relay will not turn the load on.

If the day was not so great and the run time minutes during Export Control mode was only 200 minutes, when we get to 11pm the Solar Relay will turn the load on and run it for 100 minutes.

In order to configure the Solar Relay to use Export Control mode follow these steps.

1) Setup one of the four system overrides to be **Voltage Controlled**.

2) Configure the Voltage Control parameters as described below.

Voltage Control

Minimum On Time (mins)
0

Above Threshold (V)
0

Above Time (mins)
0

Below Threshold (V)
0

Below Time (mins)
0

Minimum On Time: Specifies the minimum time the load must stay on once it has been turned on.

Above Threshold: The voltage at which the Solar Relay will turn the load on.

Above Time: The number of minutes the Above Threshold needs to occur before the load turns on.

Below Threshold: The voltage at which the Solar Relay will turn the load off.

Below Time: The number of minutes the Below Threshold needs to occur before the load turns off.

Example:

A site has 6kw of solar, and a 4.8kW resistive hot water system. The site suffers voltage problems, so we are trying to keep voltages below 255V.

Settings:

```
Minimum on Time:      0
Above Threshold:    255
Above Time:           5
Below Threshold:    252
Below Time:           5
```

In order to configure the Solar Relay to use Frequency Control mode follow these steps.

1) Set up one of the four system overrides to be **Frequency Controlled**.

2) Configure the Frequency Control parameters as described below.

Frequency Control

Minimum On Time (mins)
0

Above Threshold (Hz)
0

Above Time (mins)
0

Below Threshold (Hz)
0

Below Time (mins)
0

Minimum On Time: Specifies the minimum time the load must stay on once it has been turned on.

Above Threshold: The frequency at which the Solar Relay will turn the load on.

Above Time: The number of minutes the Above Threshold needs to occur before the load turns on.

Below Threshold: The frequency at which the Solar Relay will turn the load off.

Below Time: The number of minutes the Below Threshold needs to occur before the load turns off.

CATCH Solar Relay can participate in a MODBUS RTU control system. The Modbus interface is implemented over an RS485 physical layer. All aspects of the relay can be updated, and controlled via the Modbus interface. For more information about using Modbus, visit the tech docs section of our website.

Modbus Configuration

Modbus Configuration
Modbus Device ID
1
Modbus Baud Rate
9600
Modbus Stopbits
1
Modbus Parity
None

Modbus Configuration

Modbus Device Id: The unique device id for this device on the Modbus. This can be a number between 0 and 255.

Baud Date: Baud rate in use on the Modbus.

Stop Bits: Valid values are 1 or two

Parity: Valid Values are even, odd or none.

IMPORTANT

The CATCH Solar Relay implements inverter control using the RS485 Modbus interface. My details on how to configure your inverter and the CATCH Solar Relay can be found under the tech docs page of our website. www.catchpower.com.au

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