Saturn Mini CT (SS9000/SS9007)

Product and Driver Installation Guide

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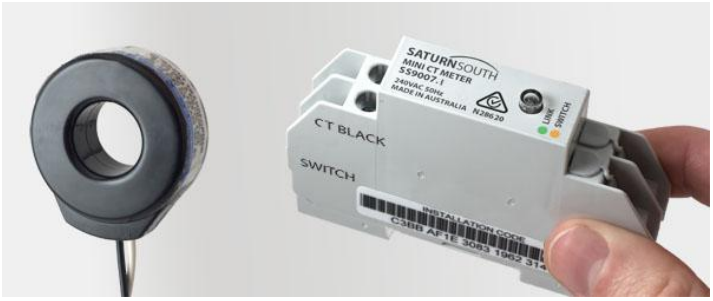
Overview

The Mini CT Meter can be used to monitor and control single phase domestic loads of almost any size, and suits a range of applications including whole-of-site metering, sub-metering, and Demand Management. The Mini CT Meter can be installed in minutes by a qualified electrician, with a process almost identical to the installation of a standard circuit breaker. The Mini CT Meter is rated as a Class 1 meter when equipped with a suitable current transformer, and provides comprehensive time series data on connected loads, including:



- Active and reactive power
- RMS and Peak voltage and current
- Frequency, power factor, and temperature
- Cumulative import and export active/reactive energy
- Added Protection: Can be configured to provide over-current, under/over-voltage, and frequency protection for the connected circuits.
- In the event of a fault, the Mini CT Meter can be reset remotely.

The Mini CT Meter can include a closed-contact switch for triggering an external relay, contactor or control device to switch arbitrarily large loads (Optional Model).

Integration into Control4 gives live energy monitoring and control over a single circuit or single phase incoming mains. This monitoring can be used for several different scenarios such as.

- Automate white good start up upon high PV solar/wind energy production
- Automate energy savings when energy usage is too high by dimming lights and setting back HVAC set points.
- Shut down delicate electronics upon over or under voltage detection
- Detect faulty equipment early and warn the customer should excessively high or low energy usage readings occur.
- Warn customers when a circuit has been in use for long periods of time (eg oven has been on for more than 2 hours).

Combine with the Chowmain Virtual ESBox driver for Control4 to upload the data to a ESCo server (eg ourgreenhome.com.au) so you can record and review historical data.

Important:
The SS9000/SS9007 Mini CT Meter is not rated as a protection device, and must be placed downstream of an approved protection device.

Section 1: Device Installation

Equipment Required:

- Mini CT Meter – **Saturn SS9007.2 40A or Saturn SS9007.2 40R (40R contains a 240V 5A Relay)**
- 40A CT – **Supplied with Saturn Device (Up to 200A CTs may be used, ordered prior to installation) IMPORTANT: Attaching a third party CT to the device can damage the device and will void the product warranty.**

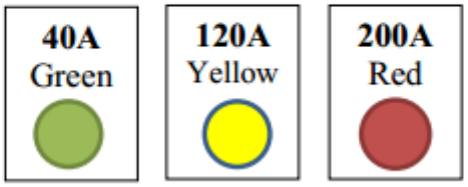
Before you install:

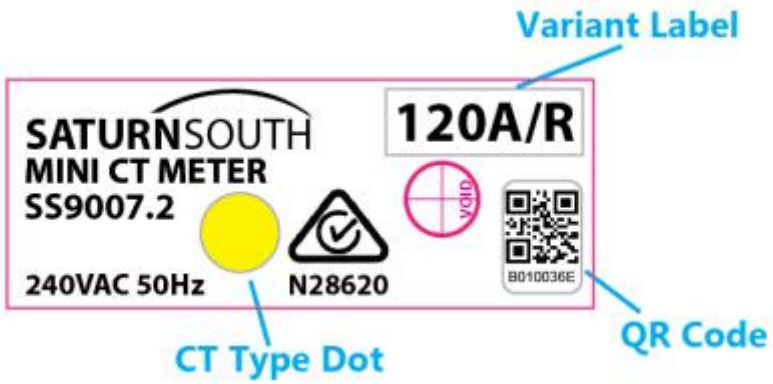
- Ensure you have all the parts required to complete the installation
- Ensure you have a registered electrician install the 230V components
- Ensure you have adequate Zigbee range to reliably communicate with all mesh devices in your design
- Ensure you have the Audit Book documentation thoroughly completed prior to install
- Ensure you have adequate space in the switch board for installation

Saturn South SS9007 Model Descriptions

There are several variations of the Saturn South SS9007 hardware. This section describes the differences in hardware based upon the labelling on the unit.

The CT Type Dot labels are used as a quick visual reference for electricians in the field to ensure they connect the right 'size' of CT to each meter (e.g. 40A, 120A, or 200A). CT Type Dot labels should be applied to devices according to the following key:





Model Number	Model Description
SS9007.2 40A	Model with 40 Amp CT Clamp
SS9007.2 40A/R	Model with 40 Amp CT Clamp and relay
SS9007.2 120A	Model with 120 Amp CT Clamp
SS9007.2 120A/R	Model with 120 Amp CT Clamp and relay
SS9007.2 200A	Model with 200 Amp CT Clamp
SS9007.2 200A/R	Model with 200 Amp CT Clamp and relay

Button Push Sequences

Feature Name	Button Action	Resulting Action
Association Join	5 second press and release	Device will join any ZigBee HA network with 'Permit Joining' mode enabled. When the button is pressed the button colour will change to yellow, and then begin to rapidly blink green once is has been held long enough to trigger an Association Join. At this point the button should be released, and the button will shine solid green while it scans for a suitable network. The button will then blink green if the join operation is successful, or blink amber on failure.
Factory Reset	Press and hold button for at least 10 seconds	Returns the device to its factory reset state. When the button is pressed, the button colour will change to yellow, and after 10 seconds the button will begin to blink rapidly between green and amber indicating that the device has been factory reset. The user should wait about 5 seconds before attempting another Association Join following a Factory Reset.
Manual Switch	Press the button briefly (<1 second)	Manually switches the device relay. Has no effect on non-switching variants of this device.

LED Feedback Guide

Green	Amber	Connectivity	Switch	Comment
Fast, continuous blinking between Green and Amber.		N/A	N/A	When device is in the Factory Reset state
Four blinks of amber, four blinks of green, repeating.		Connected	N/A	When device is set to *Locate* Mode
Off	Off	Not connected	Open	Not Connected, switch open
Off	On	Not connected	Closed	Not Connected, switch closed
Short blink every 4s	Off	Connected	Open	Connected, switch open
Short blink every 4s	On	Connected	Closed	Connected, switch closed
On (up to 10s)	Off	Attempting to connect	N/A	While device is attempting to join network
Fast Blink (3s)	Off	Joined or re-joined successfully	N/A	Indicates successful network join or re-join attempt
Off	Fast Blink (3s)	Failed to join or re-join	N/A	Indicates unsuccessful network join or re-join attempt
Slow blink between green and amber at ~1Hz		Connected	N/A	Indicates that the device is being remotely updated

Installation procedure

1. Identify the circuit that is to be monitored by the device. Note the major appliance or load that the circuit is connected to for future reference.

   The SS9007 Mini CT Meter requires a phase and neutral connection to the device, both to power the device and to provide a reference for high accuracy voltage measurements. The reference phase connected to the device must be the same phase from which the load current is to be sensed by the supplied clip-on Current Transformer, and must be drawn downstream from an existing or dedicated protection device (e.g. MCB or RCD).

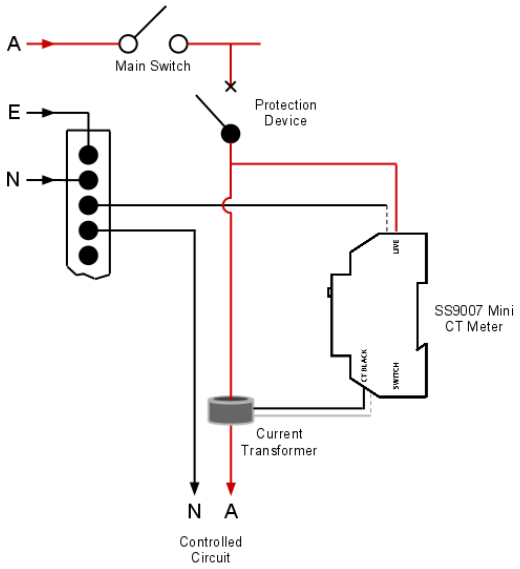
   IMPORTANT:
   - **Ensure the source of the reference phase is isolated before performing these steps.**
   - **The SS9000 Mini Smart Meter is not rated as a protection device and may only be connected to a circuit that is protected up-stream by an approved circuit breaker.**

2. Mount the device in the switchboard.

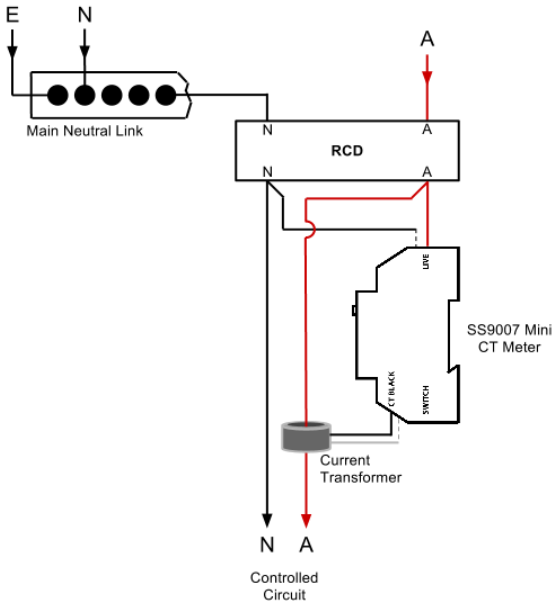
3. Wire the Current Transformer (CT) to the device, taking care to match the CT leads with the appropriate "CT Black" and "CT White" terminals.

4. Clip the CT on to the target load conductor, ensuring that the arrow on the CT points towards the load (away from the grid).

5. Connect the output of a MCB, RCD, or other protection device to the “Live” terminal of the Mini CT Meter, and a neutral line to the “Neutral” terminal. The protection device used for this purpose need not necessarily be on the same circuit that the device will be monitoring (i.e. the circuit to which the CT is connected), although care should be taken to ensure the current source and voltage share the same phase.



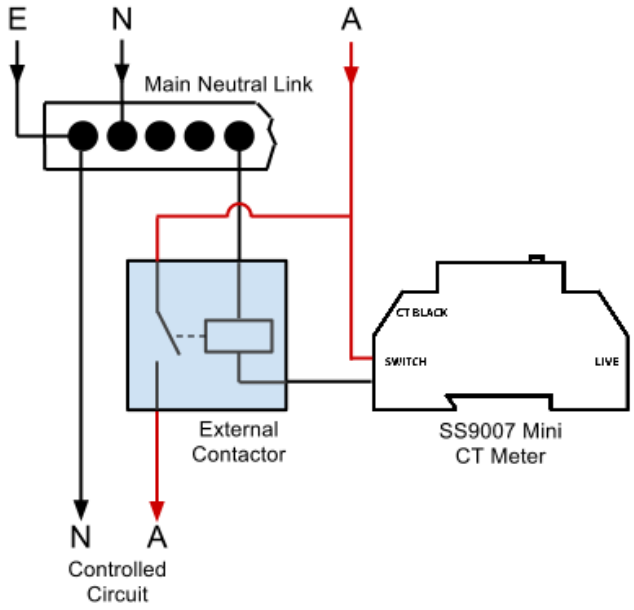
A Cable of minimum cross section 0.1mm and maximum cross section 1.5mm (stranded) or 2.5mm (solid core) may be used. The device must be connected in the correct polarity to ensure proper operation. The Live terminal, Neutral terminal, two Current Transformer (CT) terminals (“CT BLACK” and “CT WHITE”), and two SWITCH terminals are marked on the side of the device enclosure.



6. If your Mini CT Meter has switching capability, the two terminals marked 'SWITCH' are connected internally to an isolated relay rated for 5A at 240V. The front panel button will glow amber to indicate that the relay is closed. This relay can be used to switch an external relay, contactor, or control system.

7. Switching variants of the SS9007 Mini CT Meter can be used to switch loads of arbitrary size indirectly using an inbuilt 5A 240VAC latching relay. If your device is marked with an R on its variant label (e.g. “120A/**R**”), the two terminals marked 'SWITCH' are connected internally to an isolated relay.
The internal relay would typically be used to control a third party external contactor or to signal a control system. Because the relay contacts are isolated, the SS9007 Mini CT Meter can be connected directly to a digital IO on a control device such as a PLC.

   The example below shows a SS9007 Mini CT Meter being used to control an external contactor with a 240V coil by switching the active input to the contactor’s control coil.



   The internal relay in the SS9007 Mini CT Meter is rated for over 20000 switching operations of a 5A load at unity power factor. The relay is limited to one switch state transition per second (e.g. the device cannot be switched on and off at a rate faster than 0.5Hz).

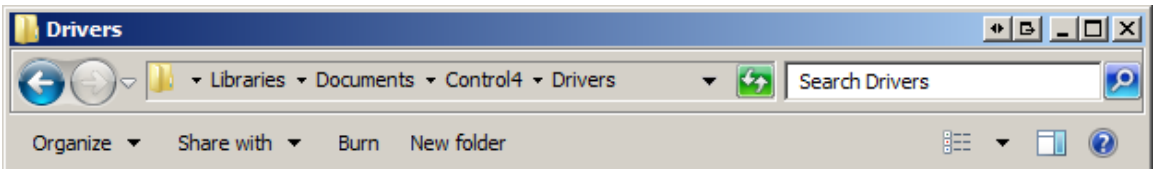
8. Apply power to the device. The button will blink continuously between green and amber to indicate that the device is in factory reset state. If the device is not in its factory reset state when it is initially powered up, it can be reset by pressing and holding the front panel button for at least 10 seconds, until the button starts to blink continuously between green and amber.

Section 2: Programming

Driver Installation

1. The driver you have downloaded will be in a zip file. Double click on this file to open it in your preferred zip program (WinZip, WinRar, etc.).

2. Extract the c4z file to the My Documents\Control4\Drivers directory. If you are using Windows 7 or 8 this will be extracted to the Libraries\Documents\Control4\Drivers directory.



3. You are now ready to add and configure the driver via the Composer Pro software.

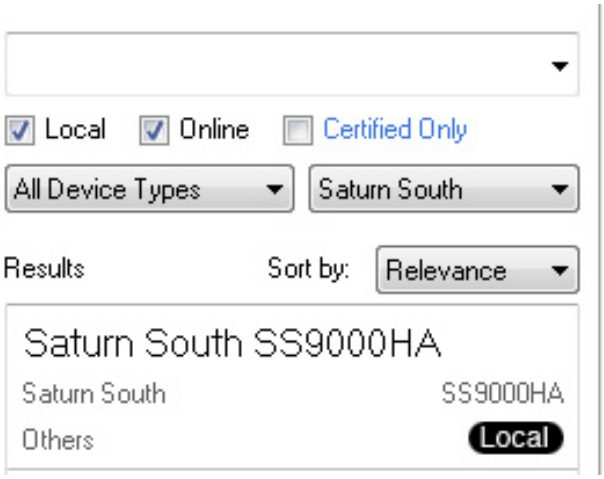
Adding the driver to your project

IMPORTANT – Before undertaking the installation of the driver please follow the licencing steps outlined at the end of this document.

1. Launch the Composer Pro application and connect to your project

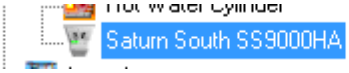
2. In the '**System Design**' page select the '**Search**' tab on the right hand side.

3. Select '**Saturn South**' as the manufacturer.



4. Double click on the '**Saturn South SS9000HA**' driver to add it to your project

5. Highlight the '**Saturn South SS9000HA**' driver on the left hand side.

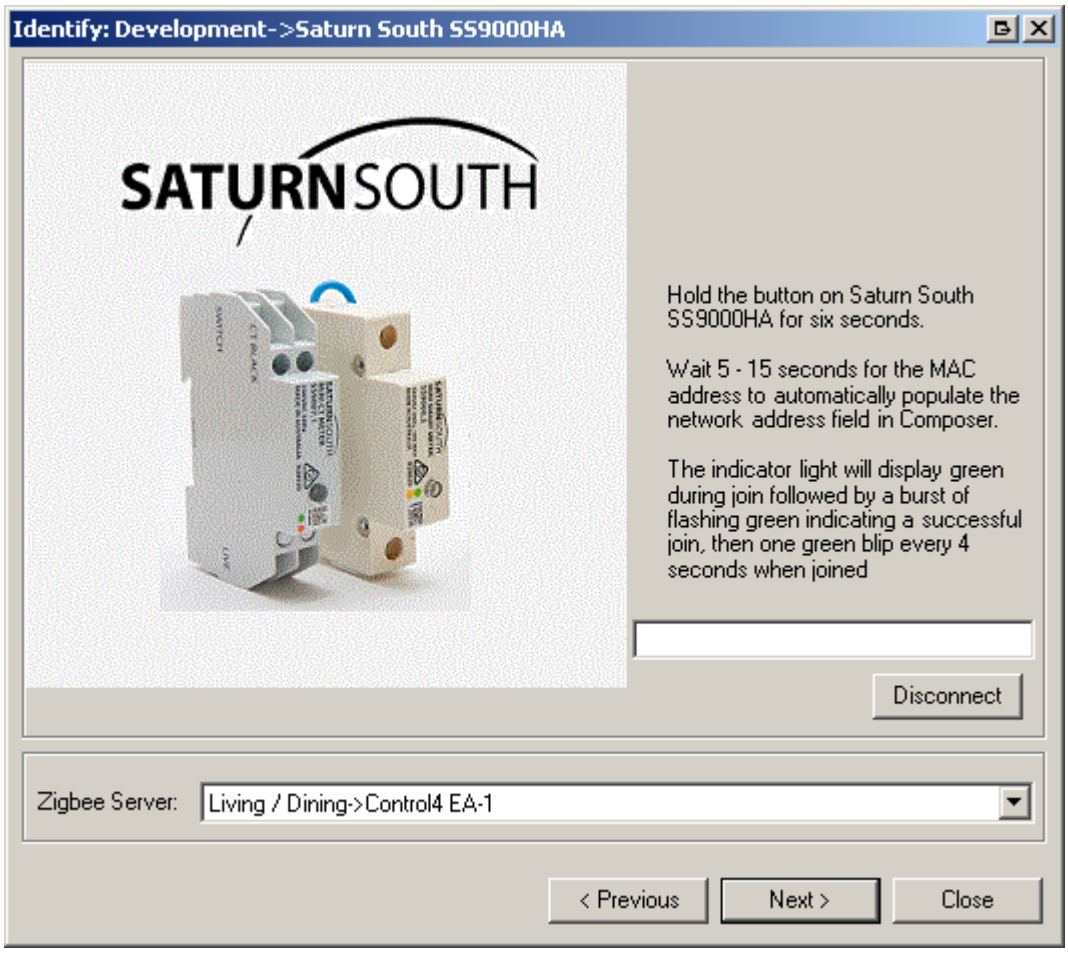


6. In the driver properties enter in the Houselogix licence details.

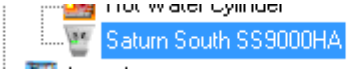
7. Click on the Connections Tab.

8. Click on the Network Tab

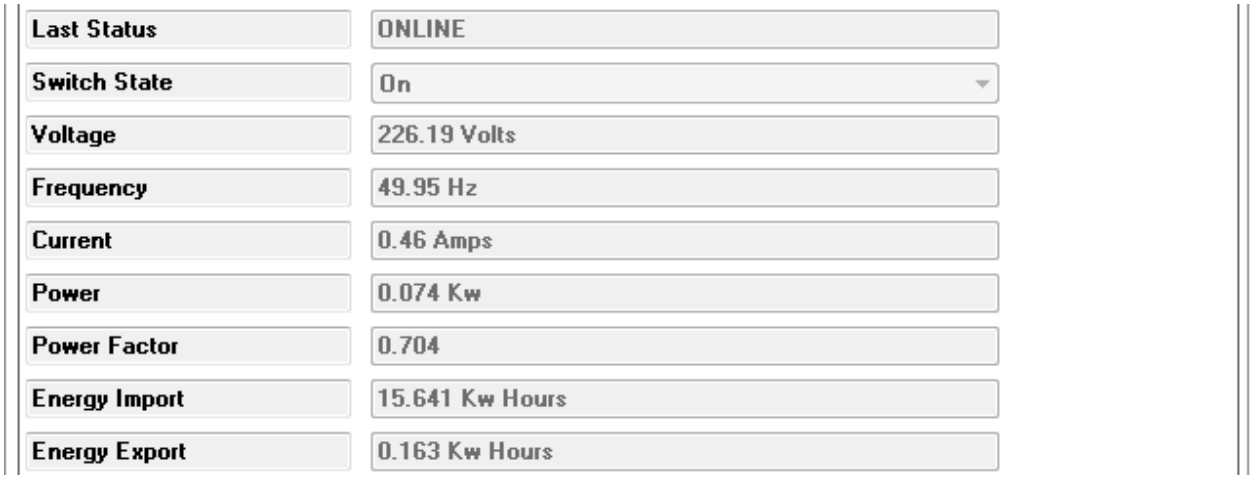
9. Identify the Saturn South SS9000 device as per instructions.



10. In the '**System Design**' page highlight the '**Saturn South SS9000HA**' driver on the left hand side.



11. In the driver properties you should now be able to see the live data being produced from the device as it updates regularly.



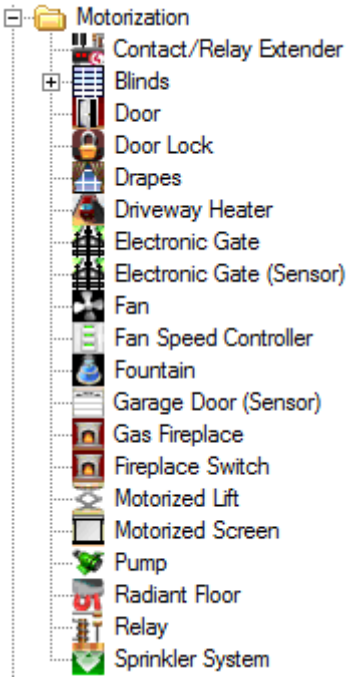
12. Congratulations you have successfully added the Saturn South SS9000HA driver into Control4.

Binding the driver to a motorized device

1. Launch the Composer Pro application and connect to your project

2. Click on **My Drivers** on the right hand side.

3. Under Motorisation double click on the device type you want to use (note this will be the icon for your device).

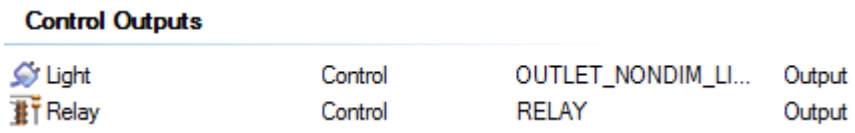


4. In the motorised device properties make sure that it is set to hold type and not pulse type.

5. Click on the **Connections tab**.

6. Highlight **Saturn South SS9000HA** on the left hand side.

7. Bind the Relay to the device you want control over.



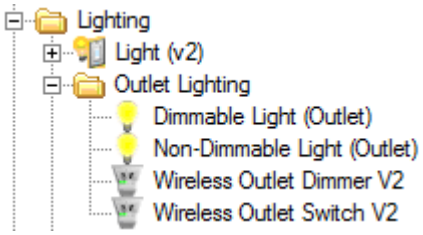
8. Click on the File and **Refresh Navigators**. Congratulations you have set up the relay portion of the driver.

Binding the driver to a light

1. Launch the Composer Pro application and connect to your project

2. Click on **My Drivers** on the right hand side.

3. Under Lighting double click on the '**Non-Dimmable Light (Outlet)**'.

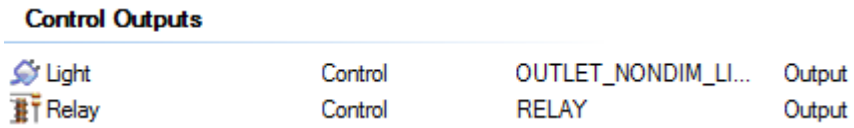


4. In the motorised device properties make sure that it is set to hold type and not pulse type.

5. Click on the **Connections tab**.

6. Highlight **Saturn South SS9000HA** on the left hand side.

7. Bind the Light to the '**Non-Dimmable-Light (Outlet)**' driver we just added.



8. Click on the File and Refresh Navigators. Congratulations you have set up the lighting portion of the driver.

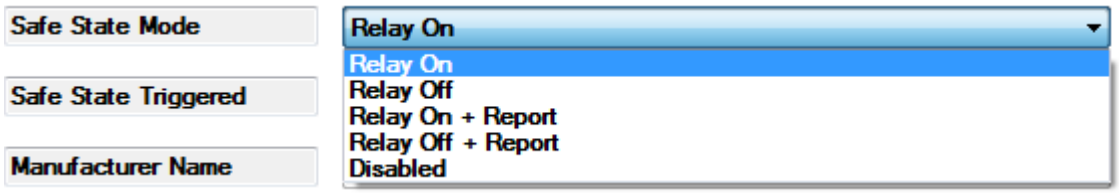
Safe State Modes

The SS9007_R relay versions of the Saturn South Meters have the ability to revert to a safe state (on or off) upon loss of communications with the Zigbee Host. The node will revert to a safe state upon any of the following conditions

- If the node is joined to the Control4 network and subsequently loses contact with the Zigbee Co-ordinator
- When the node is requested to leave the network
- At manufacturing time (out of box the SS9007's will be in the default safe state)

How to setup Safe State Modes

1. In the '**System Design**' page highlight the '**Saturn South SS9000HA**' driver on the left hand side.
2. In the driver properties, Click on the Safe State Mode drop down box.



3. Select the mode you want the device to revert to upon loss of communications.
4. Click on Set

Safe State Definitions

Relay On	Relay will switch to the ON (Closed) position when it reverts to safe state
Relay Off	Relay will switch to the OFF (Closed) position when it reverts to safe state
Relay On + Report	Relay will switch to the ON (Closed) position when it reverts to safe state and will also report when this state has been triggered (via the Safe State Triggered variable / property)
Relay Off + Report	Relay will switch to the OFF (Closed) position when it reverts to safe state and will also report when this state has been triggered (via the Safe State Triggered variable / property)
Disabled	No Safe State

How to set up minimum and maximum triggers

With this driver you can set up minimum and maximum event triggers to automated the power consumption in your home or provide warnings should abnormal power usage is detected. This is useful for detecting faulty equipment or potential fire risks like ovens being left on.

1. In the '**System Design**' page highlight the '**Saturn South SS9000HA**' driver on the left hand side.

2. In the driver properties, the min and max properties for each channel should now pop up.

3. Monitor the circuit to obtain the idle wattage and turn on/off devices to get an understanding of the potential energy usage for that circuit.

4. Enter in the minimum (if required) and maximum (if required) wattage.

   Note: A value of 0 (zero) is ignored by the driver and will never fire an event. If you require a low wattage utilise the nearest value 1 (one).

5. Click on the '**Programming**' Tab

6. Click on the '**Saturn South SS9000HA**' driver under the Device Events side of the screen.

7. Under the Saturn South SS9000HA Events click on the event you wish to program for.

8. Add the action you want to perform into the script section

9. Congratulations you have successfully setup an automated energy response.

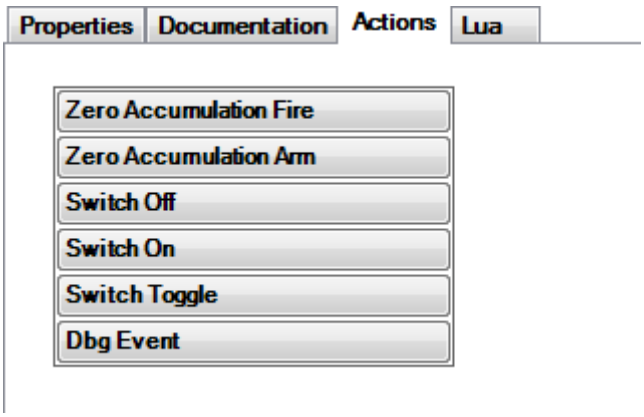
How to Zero Accumulators

The Saturn South Meters have inbuilt accumulation of energy import and energy export data (in Kw Hours). This data is persistent through reboots and will increment as more energy is detected. There are certain scenarios where it is necessary to reset these accumulators to zero for a fresh start.

As this data is extremely important we have made it slightly difficult for the programmer to reset the accumulators. To do so please follow the steps below.

1. In the '**System Design**' page highlight the '**Saturn South SS9000HA**' driver on the left hand side.

2. In the driver properties click on the '**Actions**' tab



3. Click on the Zero Accumulation Arm button

4. Within two seconds of pressing Zero Accumulation Arm you must click on Zero Accumulation Fire. If you do not click on it within 2 seconds you will need to repeat step 3.

5. Click on the Properties Tab.

6. You should notice that the Energy Import and Energy Export fields now report 0.000 Kw Hours

7. Congratulations you have successfully reset the Energy Import and Export Accumulators.

Licencing

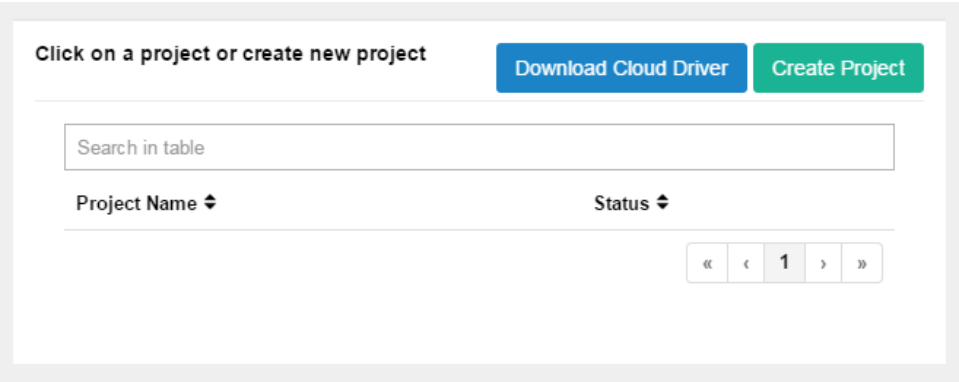
Chowmain drivers require a valid licence to use the driver. Drivers can be purchased from our distributor driverCentral however all Chowmain drivers come with a 7 day trial. We recommend that prior to purchasing a driver that you test the driver out to ensure that it will work with your hardware and will meet your requirements. The licencing procedure is broken down into 4 steps. A summary of the steps are below along however we have also provided detailed steps if the summary is not sufficient.

Summary

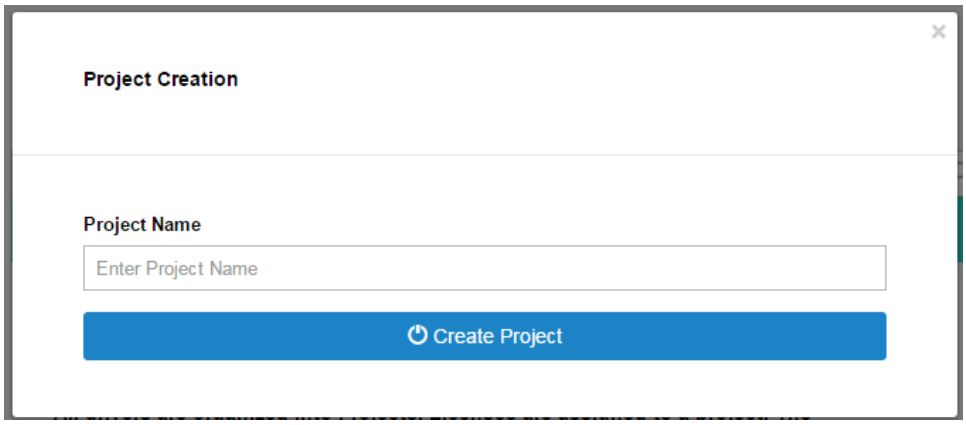
1. Create your project on the driverCentral.io website (This will generate a specific token which you will use in the next step)
2. Download, install and activate the driverCentral cloud driver in your project (Only once per project. Use the token generated in step 1)
3. (Optional) To try a driver, simply download it and install it in your project
4. To purchase a driver:
    a. On driverCentral, purchase a license and register it to your project
    b. If the driver is not already installed in your project, download it and install it
    c. If necessary, use the cloud driver's Action: "Check Drivers" to force licence download to the project.

STEP 1 - Creating your project on driverCentral

1. Visit http://www.drivercentral.io
2. Log into your driver Central dealer account.
3. Visit the Project Portal
4. Click on Create Project

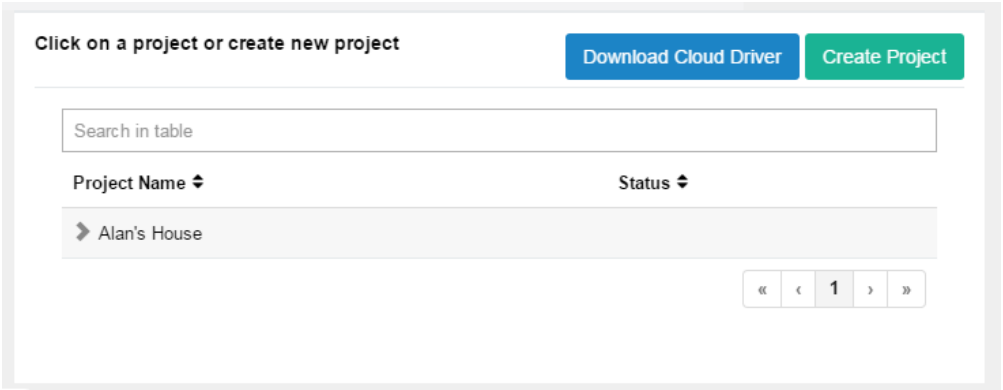


5. It will prompt you for a project name. Type in a meaningful name for your customer's project

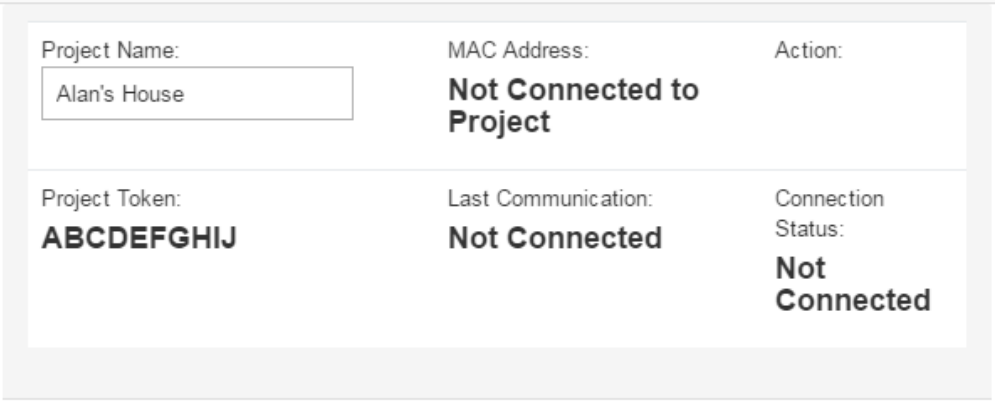


6. Click on Create Project

7. Click on the project we just created to expand the project



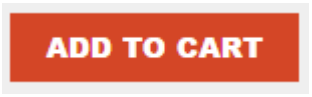
8. Take note of the Project Token as this will be used in STEP 3 when we install the driverCentral cloud driver.



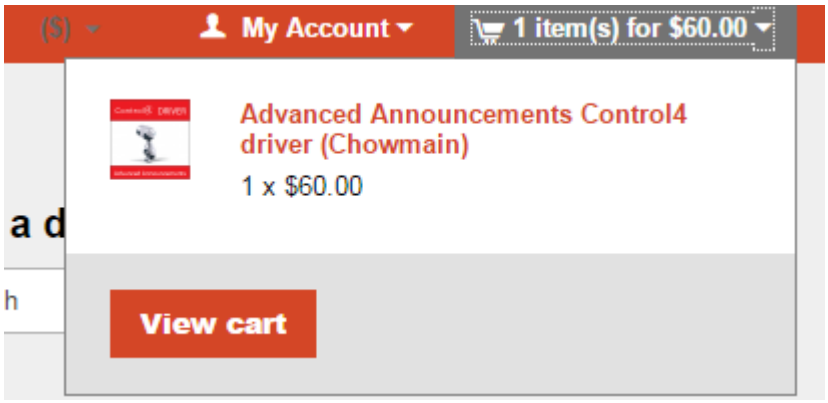
STEP 2 –Purchase driver licence

1. Visit https://www.drivercentral.io/chowmain-ltd/ and find the product/driver you want to purchase a licence for.

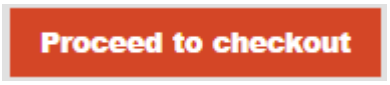
2. Click on the Add to Cart button



3. Click on the Shopping Cart icon in the top right corner and click on View cart



4. Confirm that your order is correct and click on Proceed to checkout

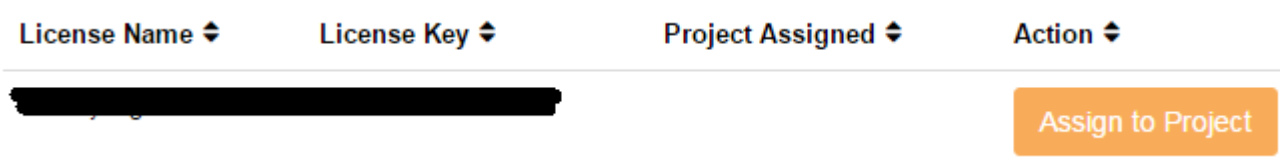


5. Follow the prompts and click on Sib,ot ,u Prder

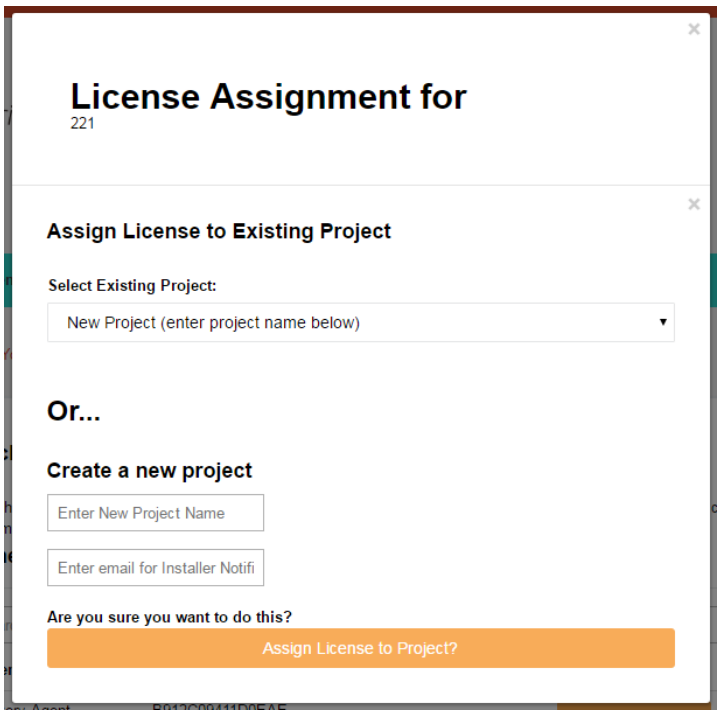
6. This will take you to PayPal for payment.

7. Pay via PayPal. It will automatically return to the marketplace when confirmed.

8. You will now be at a page where you can see your purchased licence.



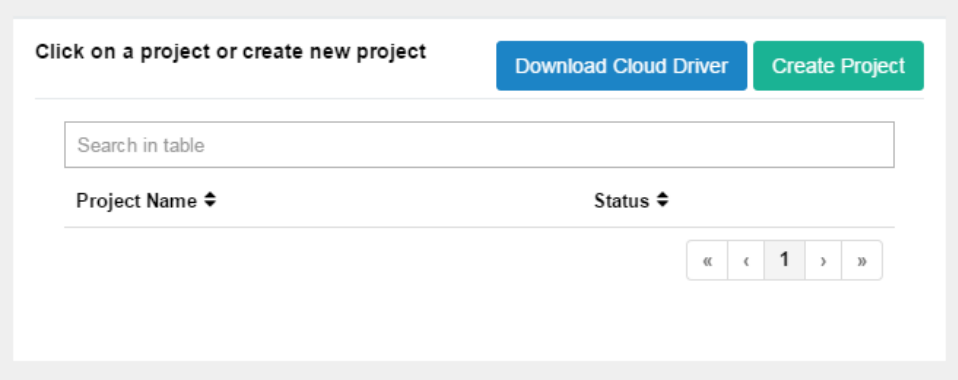
9. From here assign the licence to the project we created or if you did not follow that step create a new project



STEP 3 – Install and activate the driverCentral cloud driver

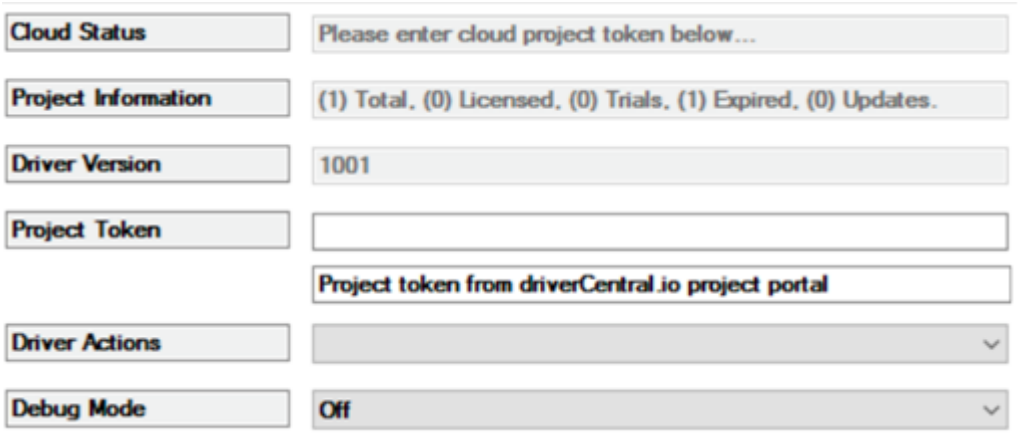
NOTE: Only one instance of the driverCentral cloud driver installed per project. Do not install additional cloud drivers.

1. Visit http://www.drivercentral.io
2. Log into your driver Central dealer account.
3. Visit the Project Portal
4. Click on Download Cloud Driver



5. Copy the C4Z driver to My Documents\Control4\Drivers directory.
6. Add the driver to your project.

7. Click on the driver to view it's properties



8. Type in the project token we took note of in STEP 1.
9. Click on the Actions tab
10. Click on Check Drivers

STEP 4 – Install Chowmain driver

1. Install the Chowmain driver
2. You will notice that the Activation Status reflects a Licence Activated state.
3. Any driver that does not have a purchased licence will have a trial licence activated via the marketplace. Note that there is no way to reactivate the trial so please use wisely.
4. If you do not then press the Check Drivers action in the driverCentral Cloud driver again.