MaxAir HVAC Setup Guide

MaxAir will initially be configured as a WiFi AP (Access Point) named MaxAirHotspot, connect to the AP using the password **1234567890** and browse to IP address **192.168.50.5** where you will be presented with the initial connection screen.

Select your local WiFi SSID from the dropdown list and enter the associated password.

Alternatively, if you want MaxAir to operated as a 'stand-alone' AP, just click to select AP Mode.

Finally click on 'Set and Restart.

If working in AP Mode you will be presented with the MaxAir login screen, otherwise reconnect to your local AP and browse to the IP address associated with MaxAir (if your AP is using DHCP, then access your router to determine which IP address has been allocated).

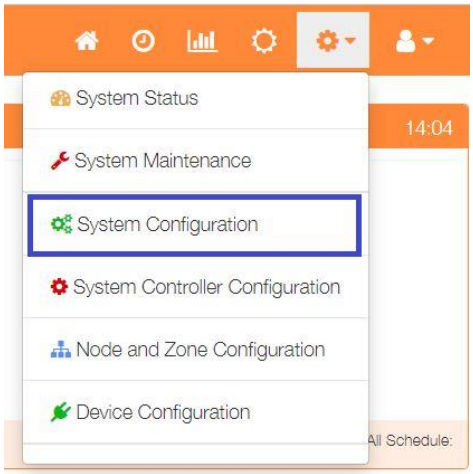
The system can be accessed from a suitable WEB browser using its IP address on the local network. The system can be configured with both a wireless and/or an Ethernet wired connection.

The default login credentials are username – **admin** and password - **pihome**

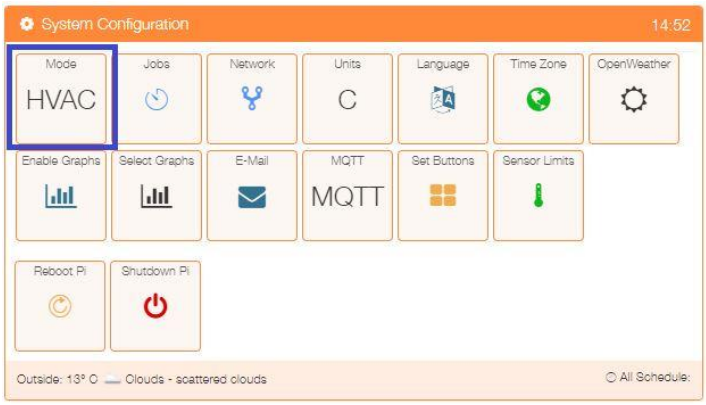
System Modes

The MaxAir system has two ***system modes***:

1. HVAC – MaxAir is configured to control heating, ventilation and air conditioning installations, where three switching relays are required. Multi Zone operation is also supported, through the use of additional zone control relays.
2. Boiler - MaxAir is configured to control heating systems where a boiler and zone relays are used, typically switching relays will be required for the boiler and each zone.



The system mode by selecting 'System Configuration' from the Settings dropdown list, then clicking the 'Mode' button.



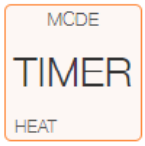
The Mode button on the Home page can operate either as a cyclic button, scrolling through each mode of operation or can be used to open a pop-up menu, which allows selection of the desired operating mode.

Click on the 'Mode' button then select the system mode from the dropdown list and click on the 'Save' button to update the system.

Operating Modes – HVAC Configuration, Cyclic Operation

When configured to operate in 'HVAC Mode', the MaxAir system has eight operating modes:

The system is disable.



The system is operating in Heating Timer Mode, with on/off timings and temperatures controlled by schedules, but with no cooling capability.

The system is operating in Cooling Timer Mode, with on/off timings and temperatures controlled by schedules, but with no heating capability.

The system is operating in Auto Timer Mode, with on/off timings controlled by schedules and with the temperature controlled by the Zone Default Temperature, switching between heating and cooling as required.

The HVAC zone operates continually with the temperature controlled by the Zone Default Temperature, switching between heating and cooling as required.

The fan operates continually.

The HVAC zone operates continually with the temperature controlled by the Zone Default Temperature but with no cooling capability.

The HVAC zone operates continually with the temperature controlled by the Zone Default Temperature but with no heating capability.

Operating Modes – Button Operation

The operating modes are the same as above. The Home screen button is of a slightly different format:

The Mode button shows the currently selected operating mode in the legend at the top of the button, clicking on the button will open a popup menu showing the available options.

When the system is configured to work in HVAC mode, the selection screen reflects the available HVAC operating modes.

Example Configuration – Single Zone Mode

The example will configure the system to operate in HVAC mode with a single zone providing the temperature control. An additional 'stand-alone' temperature sensor located in the Main Bedroom is also configured

Before use the system must be configured to match the local system to be controlled.

Configuration

The system configuration follows a four-layer model: -

Schedules
Zones
Devices
Nodes

Each layer is built from the previous layer e.g. Devices are built using Nodes and Schedules are built using Zones.

Nodes

The nodes are the basic hardware devices that control the system. Some nodes are auto-detected, others must be defined manually.

Examples of auto-detected nodes are MySensors temperature sensors and MySensors relay modules, while examples of manually defined devices are GPIO connected relays, I2C relay modules, Tasmota type switches and MQTT sensors/controlleers.

Devices

Devices define how the system recognises the nodes hardware, devices are either Temperature Sensors or Relays. The devices are defined manually.

Zones

For HVAC systems a single zone will be created to control the heating, colling and fan components. Further zones can be added for example to control Tasmota switch/s.

Schedules

Schedules are time related definitions which dictate when the system performs actions and the parameters associated with those actions. An example would be a schedule to control the hot water zone, with a start time 0f 0600 hours, a stop time of 0930 hours and a maximum temperature of 40°C.

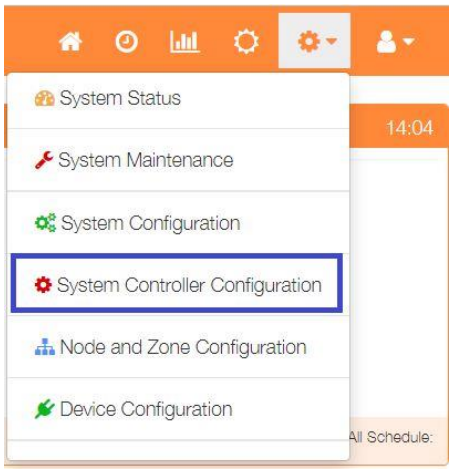
The system to be configured comprises the following elements:

1. A HVAC system requiring 3 controller relays
2. A MySensors Temperature to control the HVAC system.
3. A MySensors Temperature to measure a bedroom temperature

The above will determine the MaxAir nodes requirements as follows:

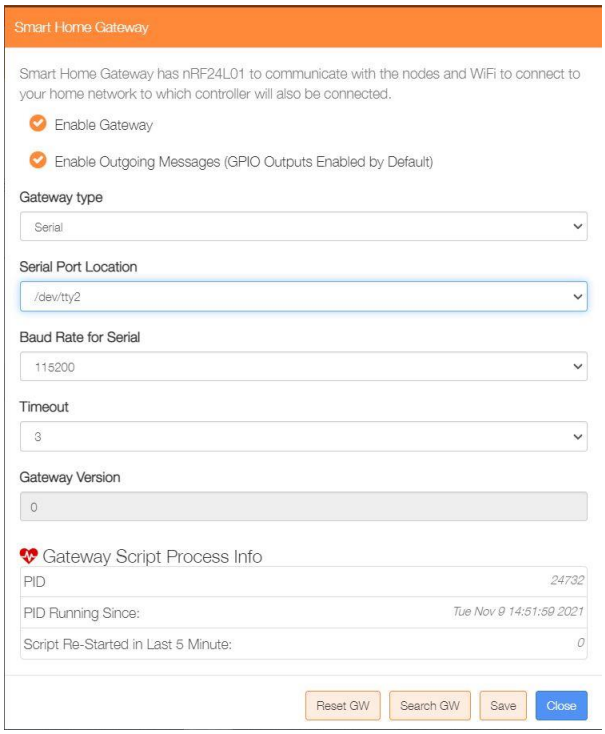
1. Two MySensors Temperature Sensors
2. Three GPIO pins for relays
3. A serial or WiFi gateway device to send/receive messages to/from 1 and 2

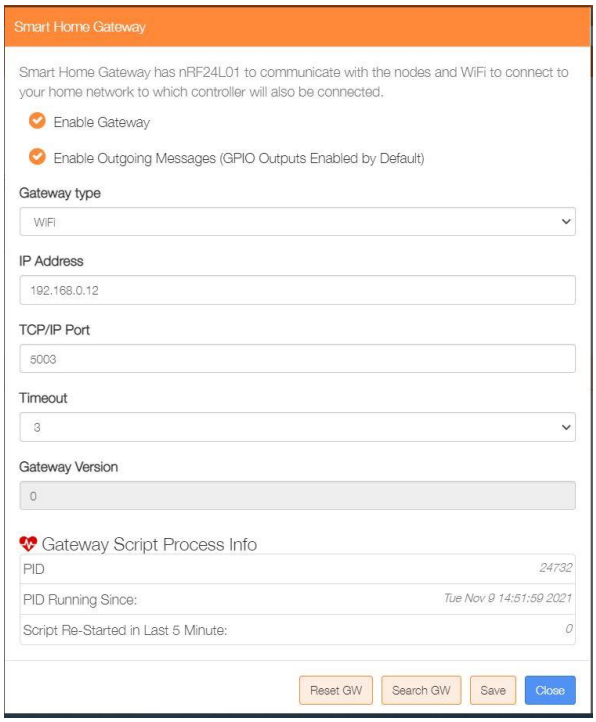
Step 1 – Configure the Gateway



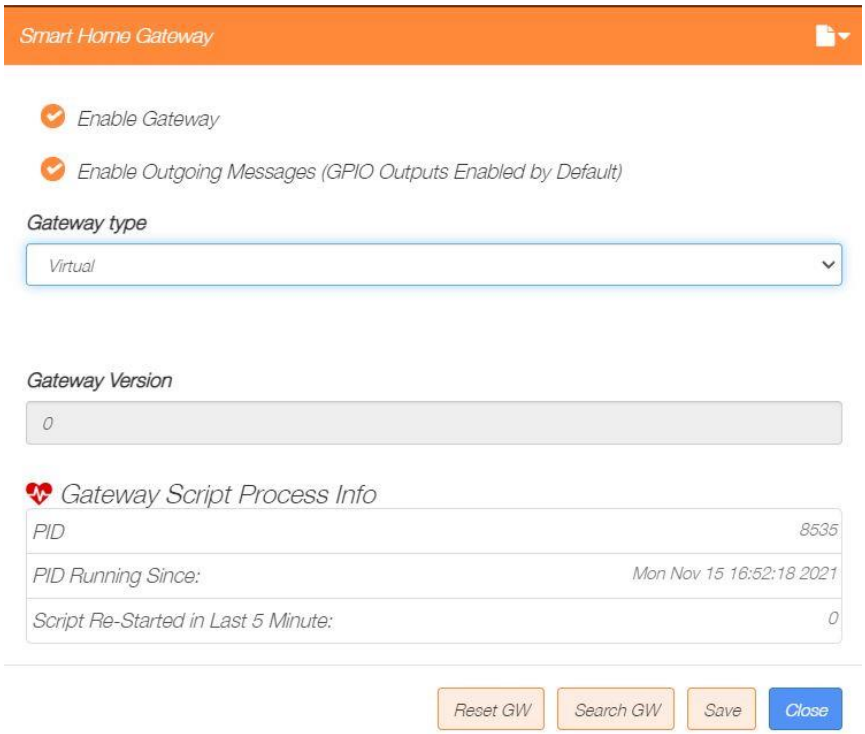
The gateway is configured by selecting 'Node and Zone Configuration' from the Settings dropdown list, then clicking the 'Gateway' button.

For this example, a MySensor gateway is required and should be configured as either Serial or WiFi.

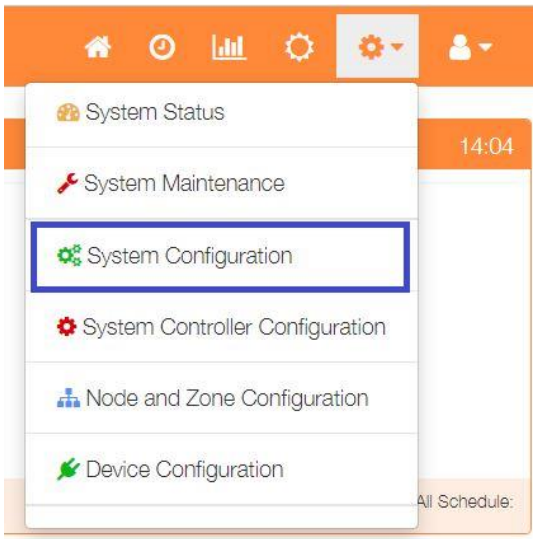


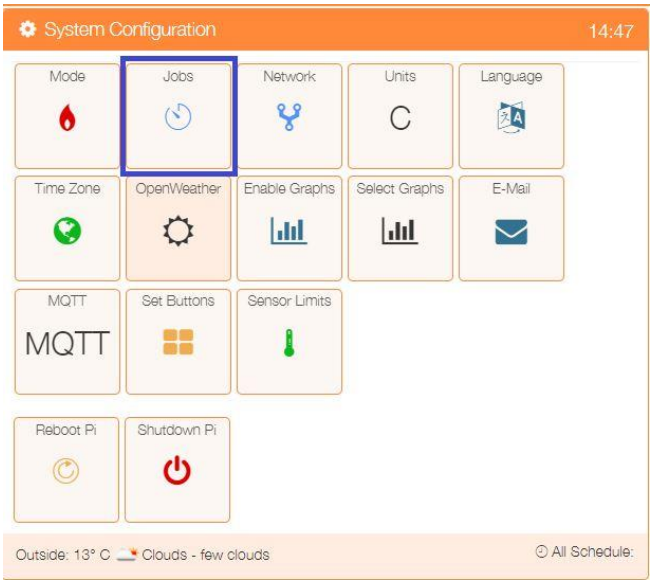


If no MySensors gateway is required eg where both sensors and relays are connected to the GPIO port or when MQTT devices are used, then configure as a Virtual gateway (this is the initial default configuration).

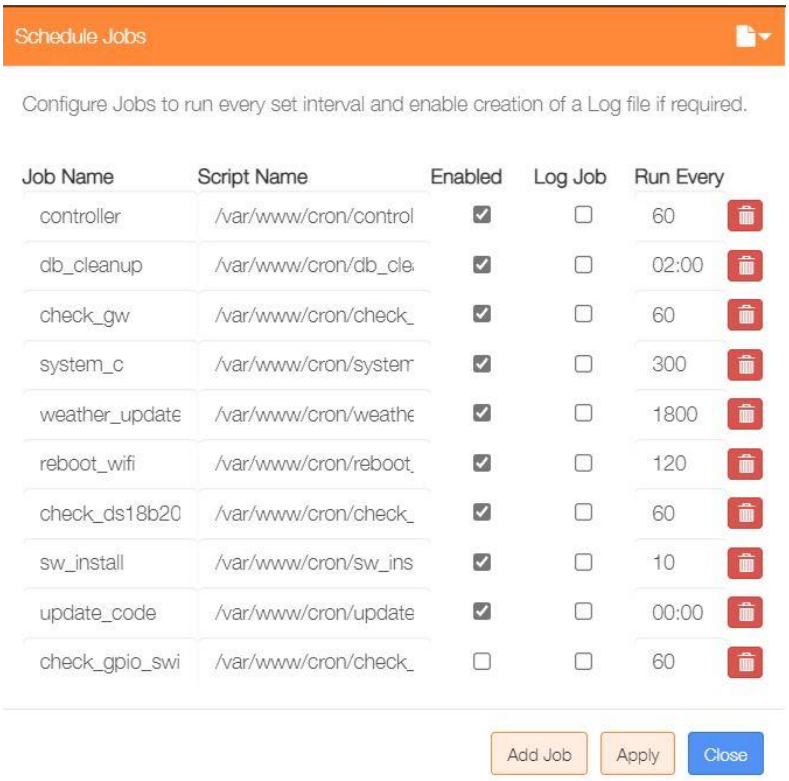


Once the gateway has been configured, the script file which executes the task on a regular time interval will be executed by the 'Job Scheduler', which is configured by default. It can be accessed by selecting 'System Configuration' from the Settings dropdown list, then clicking the 'Jobs' button.





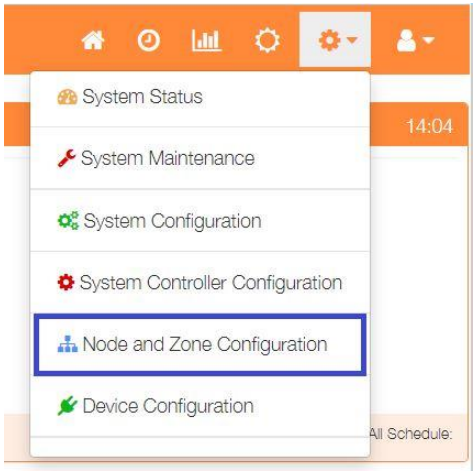
A listing of the scheduled jobs will be displayed. New Jobs can be added or the settings for existing Jobs modified or deleted.



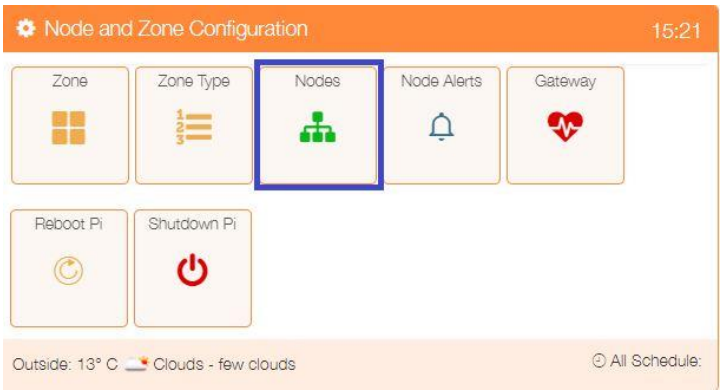
Step 2 – Layer 1 Configuration - Connect the Nodes

Step 2 – Layer 1 Configuration - Connect the Nodes

Once the gateway is running, connect the MySensors Temperature Sensor devices, so that they can be detected.

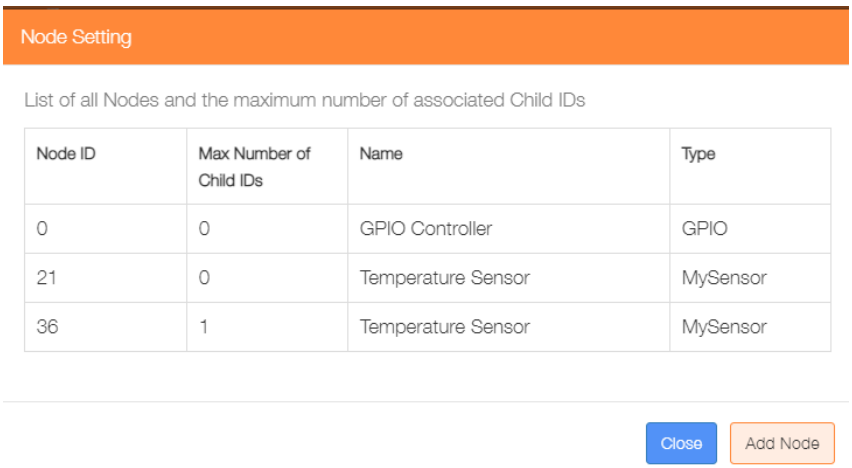


To show the nodes currently available, select 'Node and Zone Configuration' from the Settings dropdown list, then



The example configuration uses relays connected via GPIO pins, the GPIO node is created by default as part of the initial setup process.

The Nodes menu option will show the default GPIO node plus the 2 autodetected MySensor nodes.



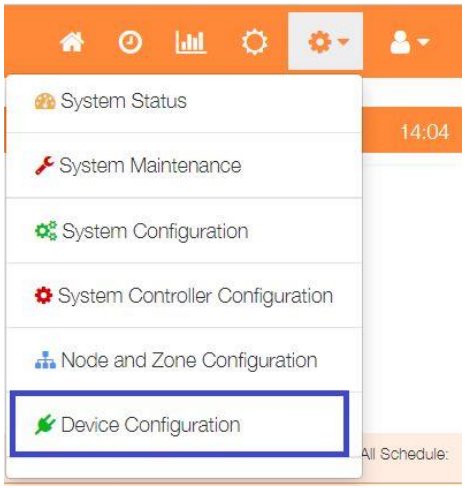
This completes the Layer 1 configuration.

Step 3 – Layer 2 Configuration - Add Devices

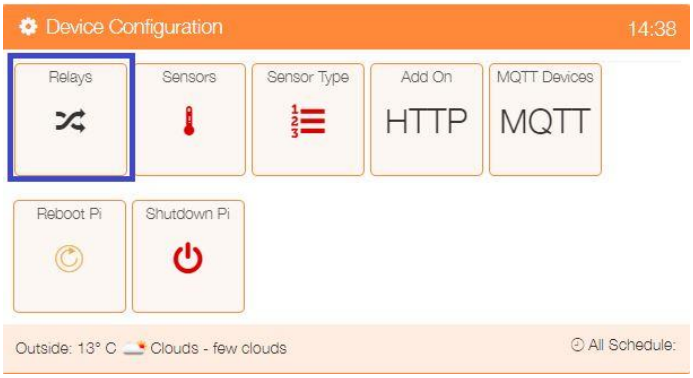
This step will add the Relay and Temperature Sensor devices.

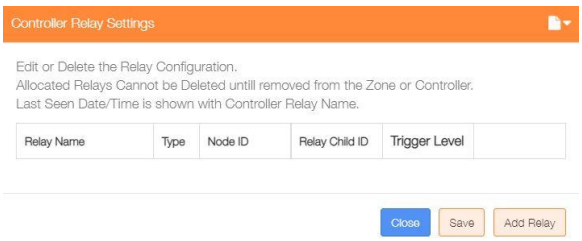
Relays

The example system will require 3 HVAC control relays.

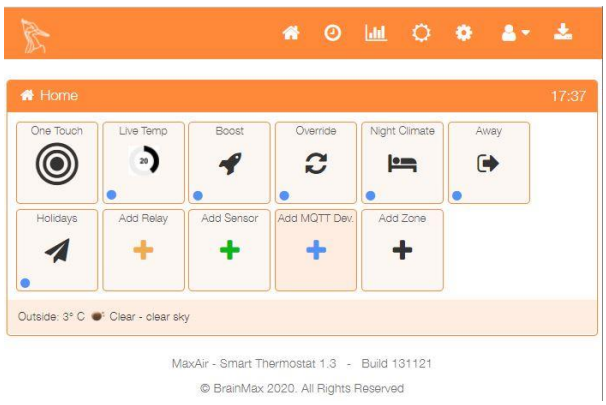


Select Device Configuration from the Settings dropdown list, then click the 'Relay' button.to display a list of any currently configured relays.





Click on the 'Add Relay' button to configure the first relay



An alternative method to go directly to the Add Relay dialogue, is from the Home screen click on the 'One Touch' button then select the 'Add Relay' menu item.

Select the Controller Type e.g. HVAC - Heat

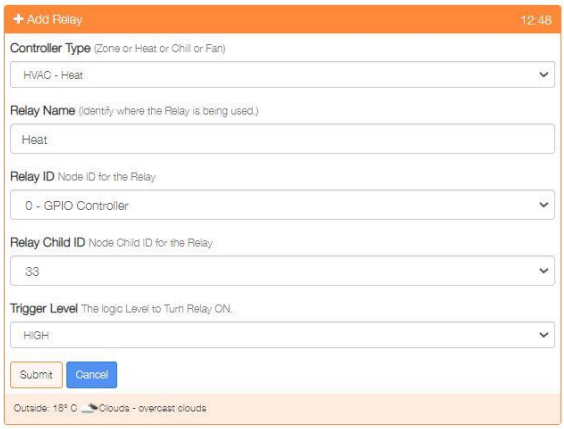
Provide a name for this relay device

Select the Relay ID from the dropdown list of available Nodes

Choose the Child ID from the dropdown list, in the case of a GPIO controller, this will be a GPIO pin.

Select the level to trigger the relay ON.

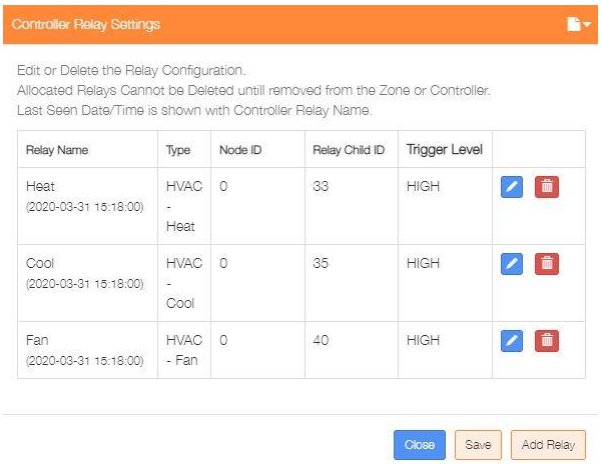
Click on 'Submit' to add the device.



Repeat the process to add the two further Controller relays.

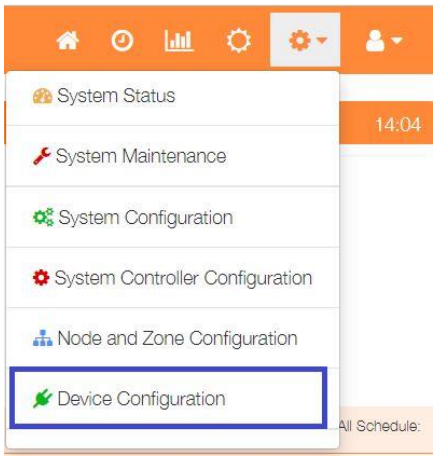
Re-selecting the Relays menu item from the Settings/Node and Zone Configuration menu will display the updated list of currently configured relays.

This dialogue can be used to Add/Delete/Edit the relay configurations.

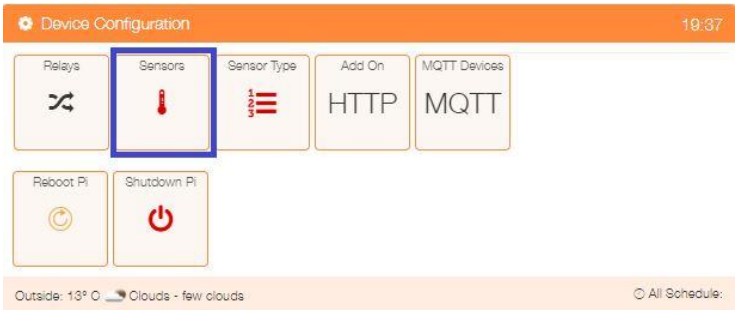


Temperature Sensors

The example system will use 3 temperature sensors, one for the Central Heating, one for the Hot Water and a third to monitor a bedroom temperature. The configuration process is very similar to that used to configure the relay devices.

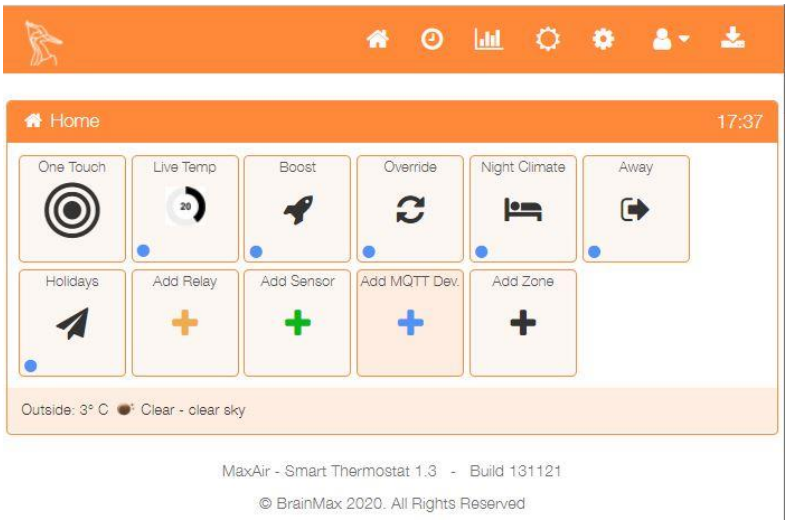


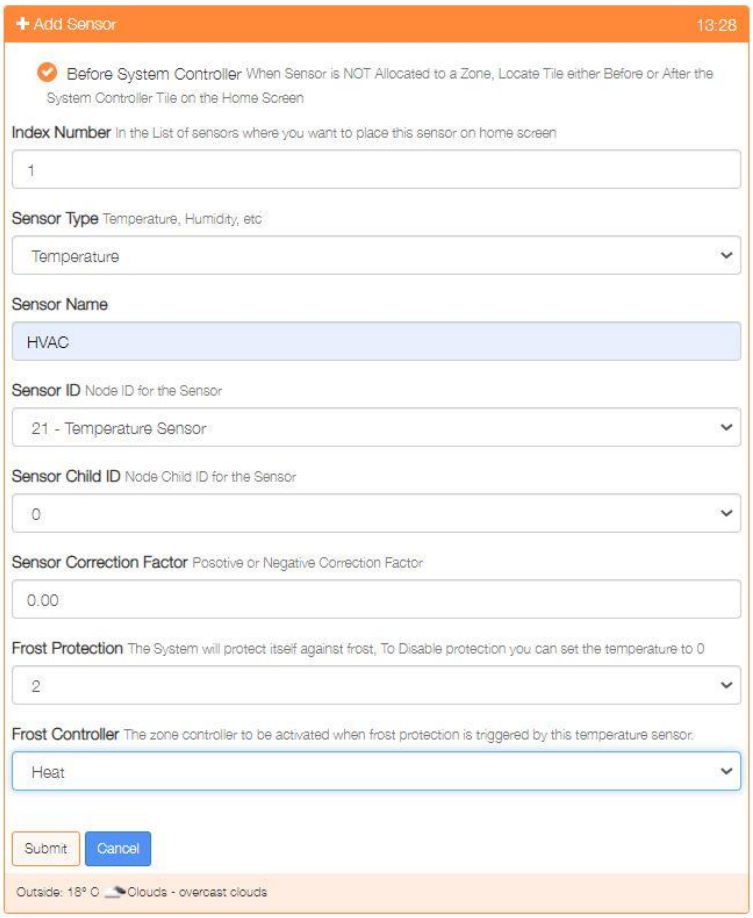
To display a list of any currently configured sensors, select 'Device Configuration' from the Settings dropdown list, then click the 'Sensors' button.



Click on the ‘Add Sensor’ button to configure the first sensor

An alternative method to go directly to the Add Sensor dialogue, is from the Home screen click on the ‘One Touch’ button then select the ‘Add Sensor’ menu item.





Show either before or after the system controller on the Home screen

Used to order where on the Home screen the sensor is displayed

Select the sensor type, either Temperature or Humidity.

Provide a name for this sensor device

Select the Sensor ID from the dropdown list of available Nodes

Choose the Child ID from the dropdown list, for nodes with only 1 sensor, this will be 0

Enter a positive or negative correction factor to be applied to the sensor reading.

Select the frost protection temperature or 0 to disable this feature

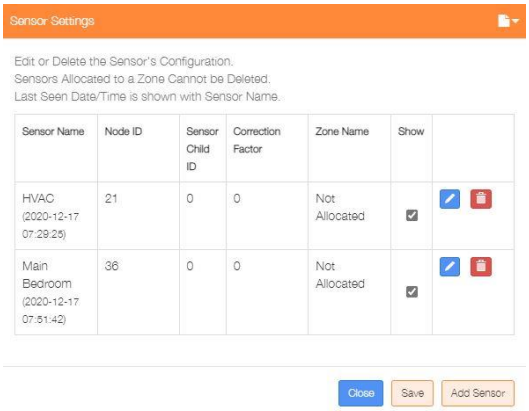
If frost protection is enabled, then select the zone to be activated on protection

Click on 'Submit' to add the device.

Repeat the process to add any other temperature sensors.

Re-selecting the Sensors menu item from the Settings/Node and Zone Configuration menu will display the updated list of currently configured temperature sensors.

This dialogue can be used to Add/Delete/Edit the sensor configurations.

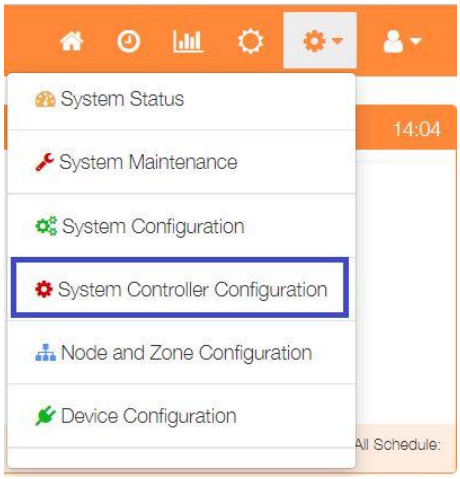


The 'Show' tickbox can be used suppress displaying a sensor on the Home screen.

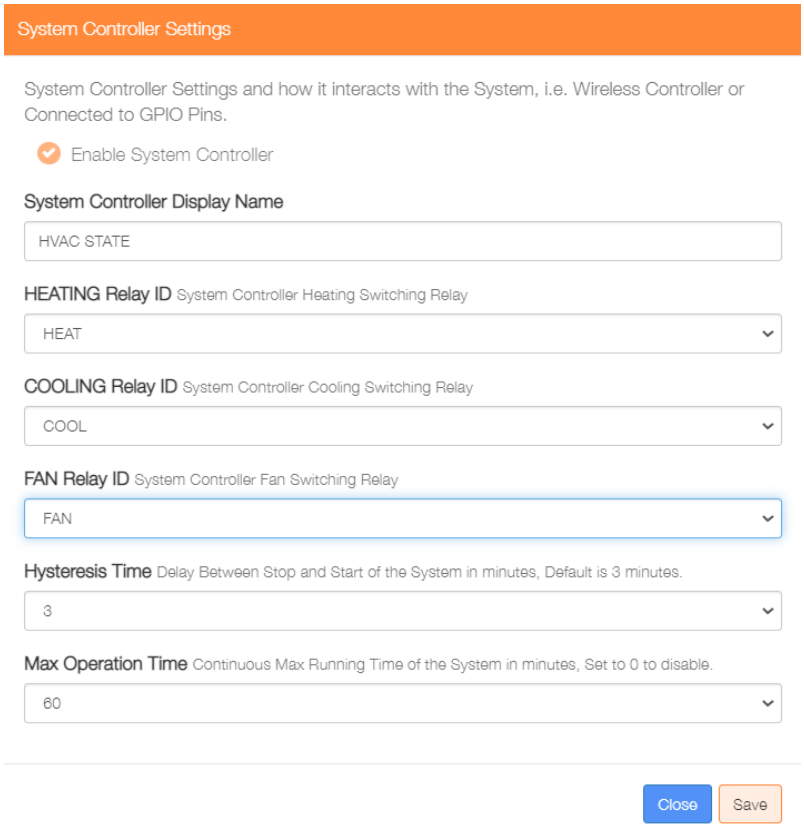
All the sensors are shown as 'Not Allocated' until the later zone configuration step has been completed.

System Controller Configuration

Three relays are used to activate the heating, cooling and fan functions of the HVAC system, these relays were added as a relay devices above and now need to be associated with the 'system Controller'.



Select 'System Controller Configuration' from the Settings dropdown list, then click the 'SC' button.



Enter a name for this controller

Select the HEATING relay from the dropdown list

Select the COOLING relay from the dropdown list

Select the FAN relay from the dropdown list

Enter a hysteresis value in minutes

Enter a maximum running time in minutes

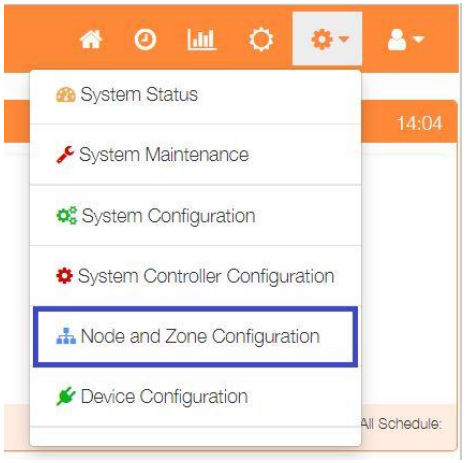
Click on 'Save' to update

This completes the Layer 2 configuration.

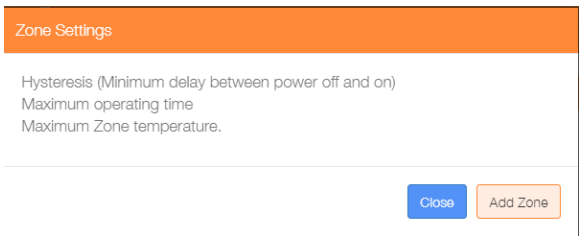
Layers 1 and 2 define the basic hardware configuration of the system.

Step 4 – Layer 3 Configuration - Add Zones

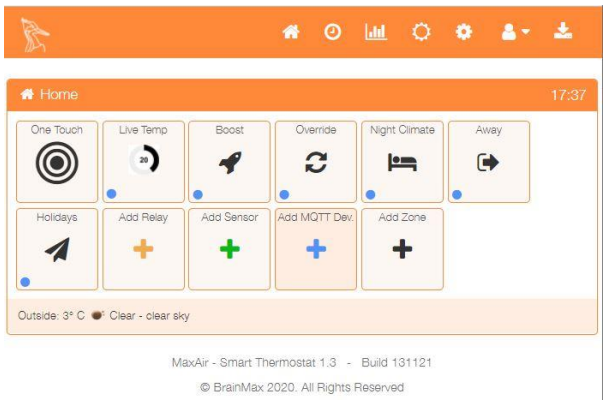
The example configuration has a single zone to control the HVAC system.



To display a list of any currently configured sensors, select 'Node and Zone Configuration' from the Settings dropdown list, then click the 'Zones' button.



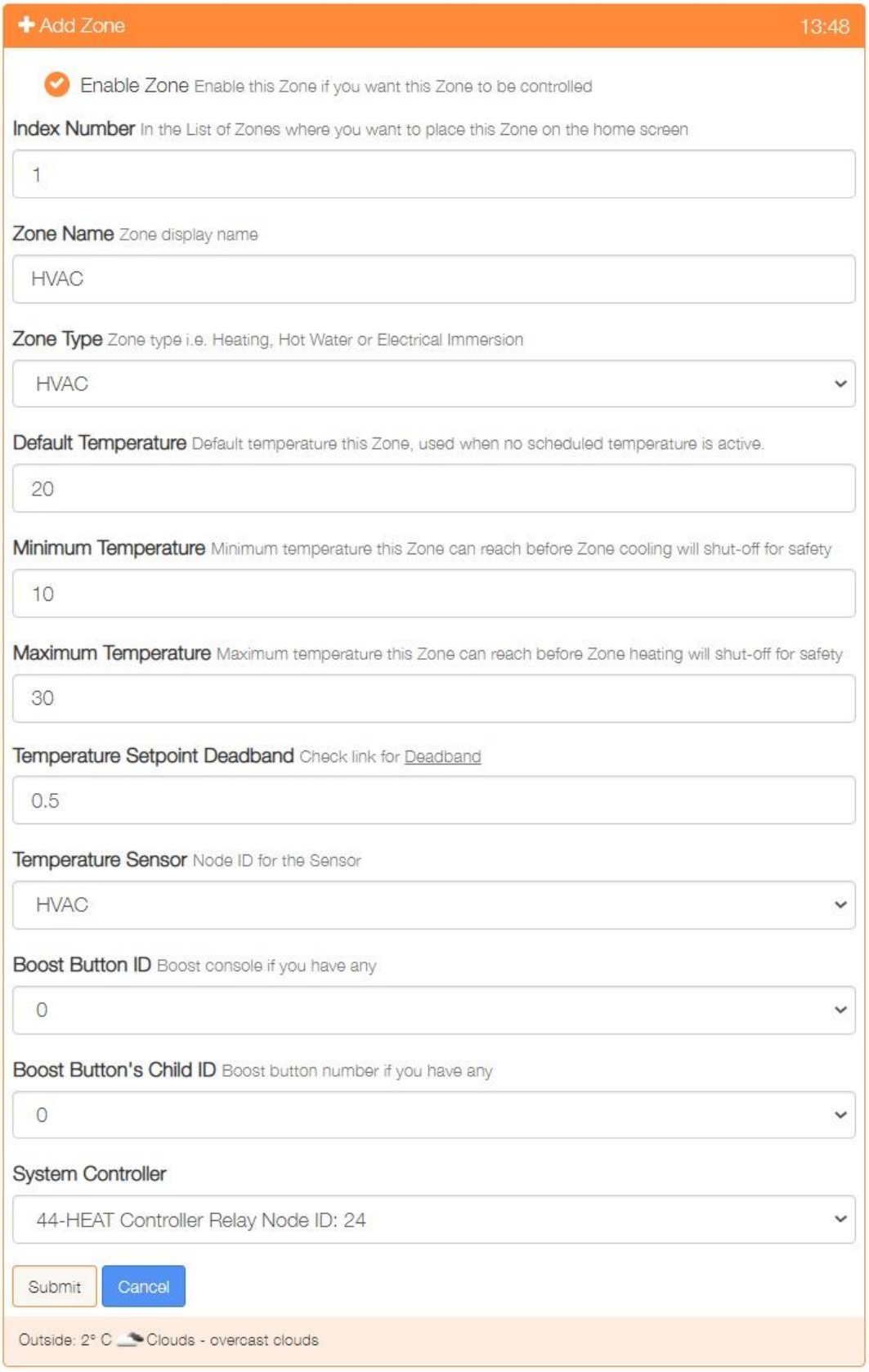
Click on the 'Add Zone' button to configure the first zone.



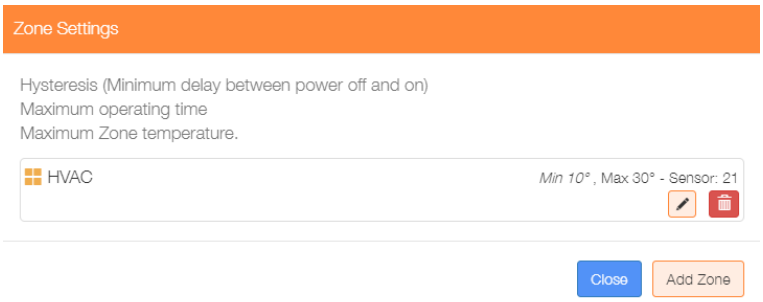
An alternative method to go directly to the Add Zone dialogue, is from the Home screen click on the 'One Touch' button then select the 'Add Zone' menu item.

There are currently eight types of zone, Heating, Water, Immersion, Switch, HVAC, HVAC-M, Humidity and Binary. The format of the Add Zone dialogue will depend on the type of zone selected, for example Immersion type zones will disable 'System Controller' selection, while Switch type zones will disable all temperature sensor related selections, together with the 'System Controller' selection, as these parameters do not apply to these zone types.

The example below shows a typical HVAC zone configuration. Once the parameters have been entered, click on the 'Submit' button.


Add Zone
13:48
Enable Zone Enable this Zone if you want this Zone to be controlled
Index Number In the List of Zones where you want to place this Zone on the home screen
1
Zone Name Zone display name
HVAC
Zone Type Zone type i.e. Heating, Hot Water or Electrical Immersion
HVAC
Default Temperature Default temperature this Zone, used when no scheduled temperature is active.
20
Minimum Temperature Minimum temperature this Zone can reach before Zone cooling will shut-off for safety
10
Maximum Temperature Maximum temperature this Zone can reach before Zone heating will shut-off for safety
30
Temperature Setpoint Deadband Check link for Deadband
0.5
Temperature Sensor Node ID for the Sensor
HVAC
Boost Button ID Boost console if you have any
0
Boost Button's Child ID Boost button number if you have any
0
System Controller
44-HEAT Controller Relay Node ID: 24
Submit
Cancel
Outside: 2° C Clouds - overcast clouds

Re-selecting the Zone menu item from the Settings/Node and Zone Configuration menu will display the updated list of currently configured zones.

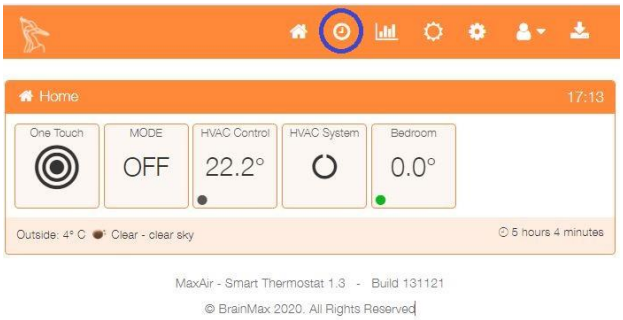


This dialogue can be used to Add/Delete/Edit the zone configurations.

This completes the Layer 3 configuration.

Step 5 – Layer 4 Configuration - Add Schedules

The example configuration will have a single schedule to control the Central Heating and Hot Water zones.

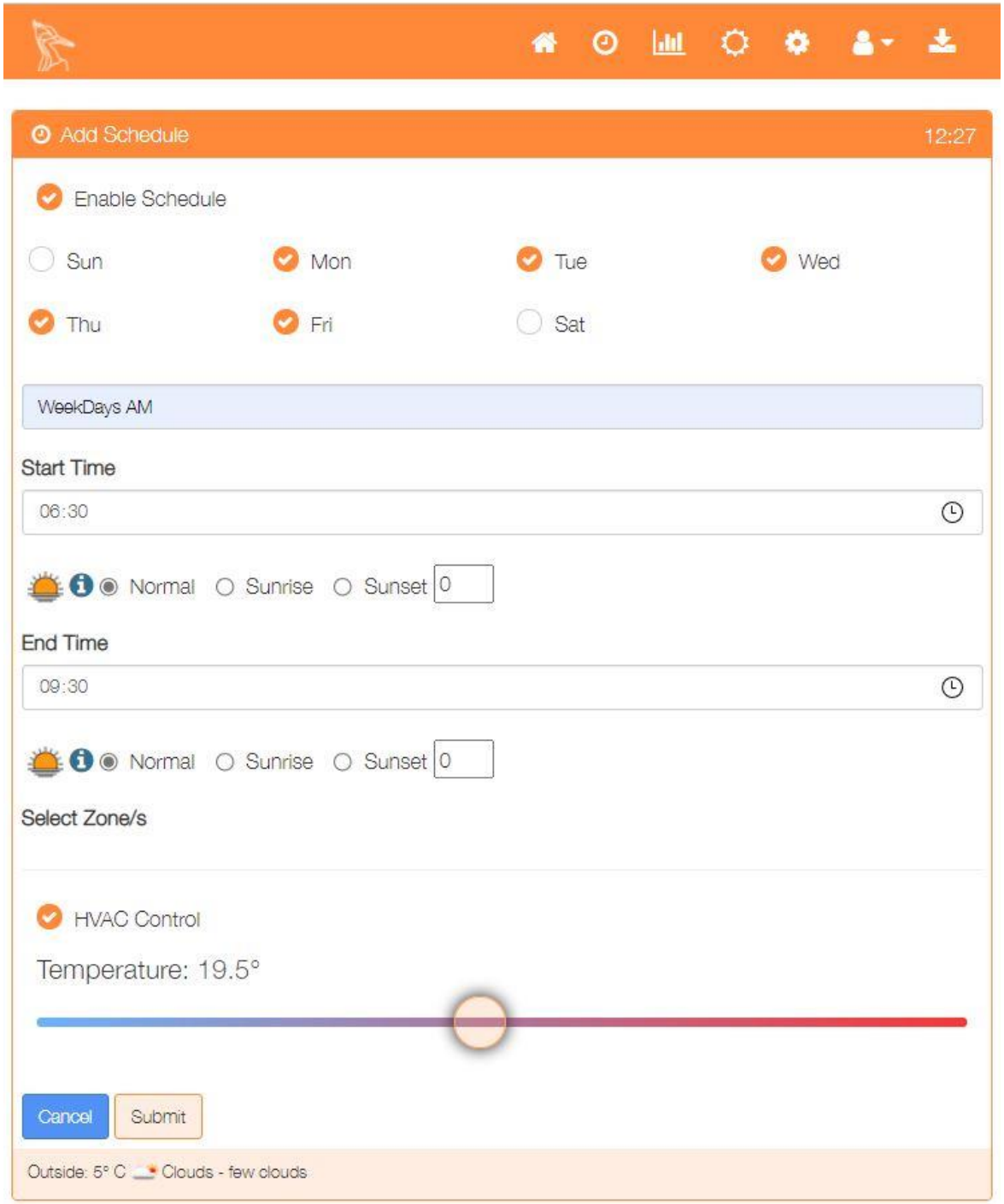


Click on the toolbar clock icon to configure the first schedule.

Click on + or ‘Add Schedule’

The Add schedule screen will be presented, the example below shows:

- An enabled schedule
- Operated Monday to Friday
- Titled Weekdays AM
- Operated between 0630 hours and 0930 hours
- Uses 19°C as the Target temperature



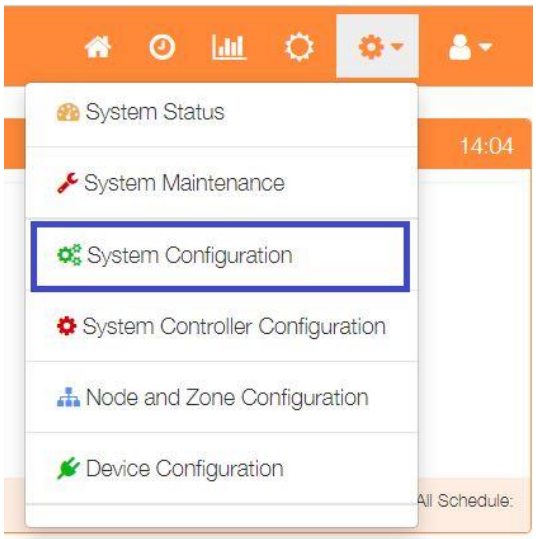
Once configured, click on the 'Submit' button to add the schedule.

Add any other schedules as required.

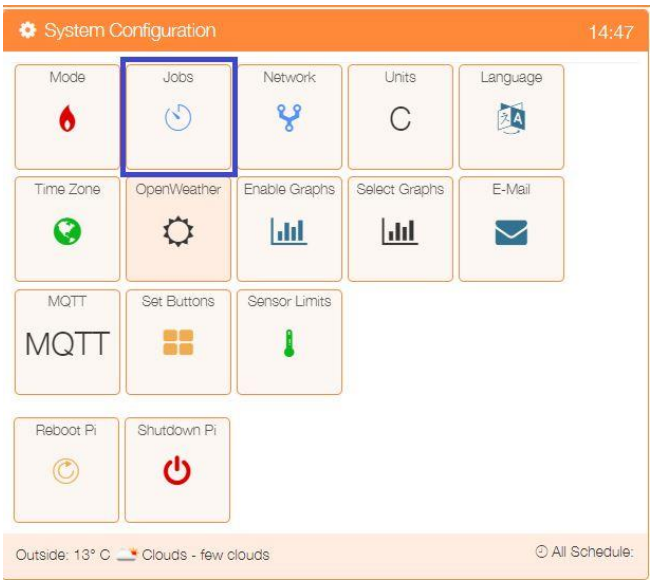
This completes the Layer 4 configuration.

Step 6 – Scheduled Jobs

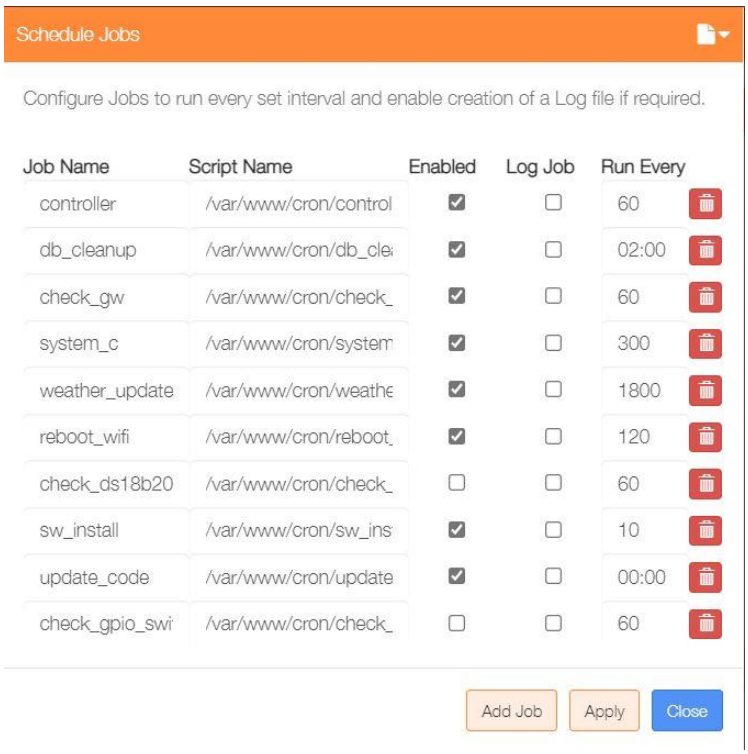
In order for the system to function a number of tasks need to operate at pre-determined time intervals. These tasks are configured as part of the initial setup process.

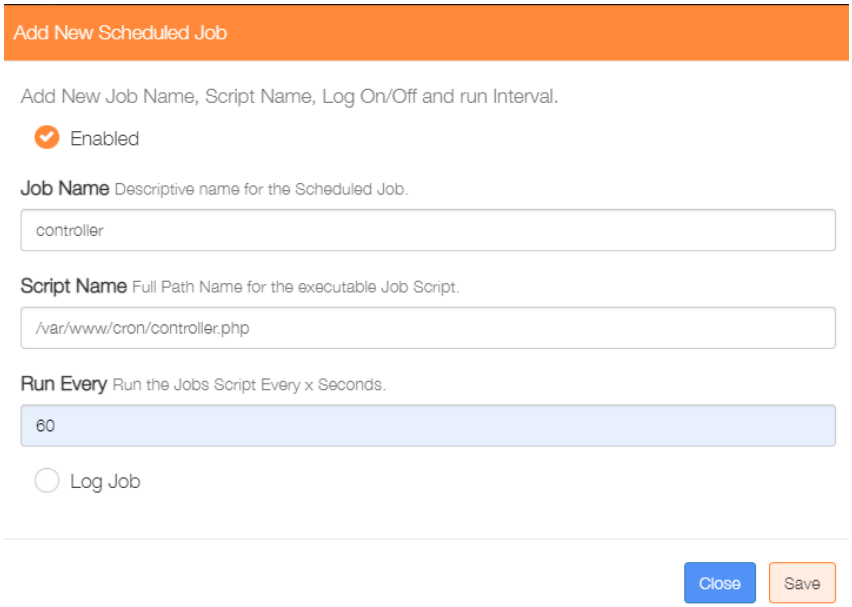


To show the list of active tasks, select 'System Configuration' from the Settings dropdown list, then click the 'Jobs' button.



The default configuration is as shown and for example, as can be seen the 'check_ds18b20' is not enabled, this job is only required if 1-Wire temperature sensors are connected to the GPIO bus.





New scheduled tasks can be added by clicking on the 'Add Job' button.

THIS COMPLETES THE BASIC SETUP

The Single Zone configuration is available as an example database at:

/var/www/MySQL_Database/hvac_example_231121.sql

Example Configuration – Multi Zone Mode

The difference between Single Zone and Multi Zone modes is that 'Zone Controller' relays are required to control the operation of individual zones, for example by activating and deactivating 'Dampers' on a zone-by-zone basis. Control for the individual zones will be through the use of temperature sensors allocated to each zones.

The changes to the previous Single Zone example will be:

Layer 1 Configuration

Add additional sensor and controller nodes as required to support each zone.

Layer 2 Configuration

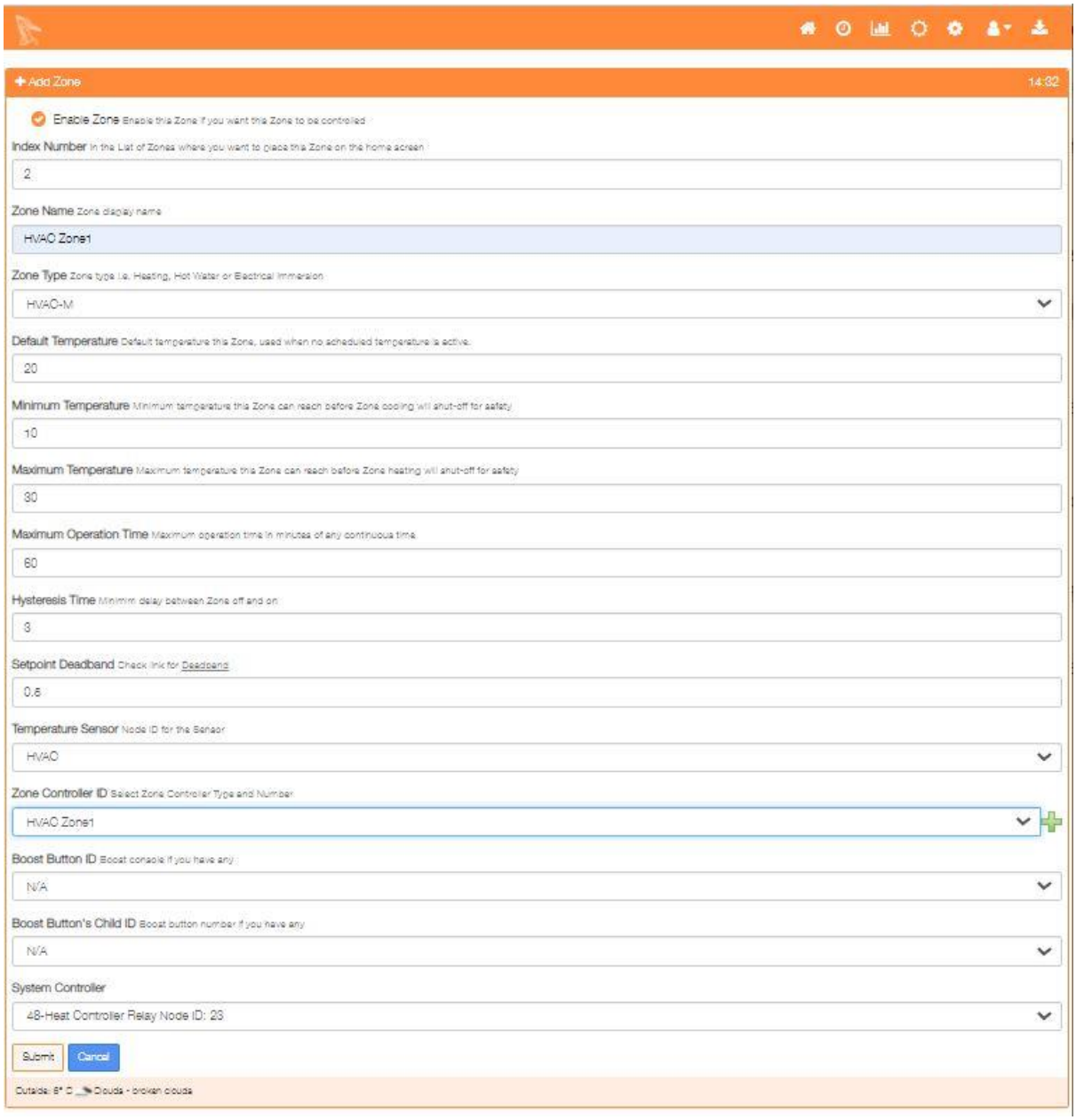
Create Sensor and Relay devices as required to support each zone.

Layer 3 Configuration

Multiple Zones will be created depending on the configuration of the HVAC system. The difference in the case of Multi Zone is that the 'Zone Controller' selection box will be available, so that one or more zone controller relay can be associated with the zone.

The example below shows the configuration for 'HVAC Zone1', with its associated Sensor and Controller.

This process would be repeated for any additional zones, using the relevant Sensor and Controller.



Layer 4 Configuration

Schedules would be created for the individual zones as required.