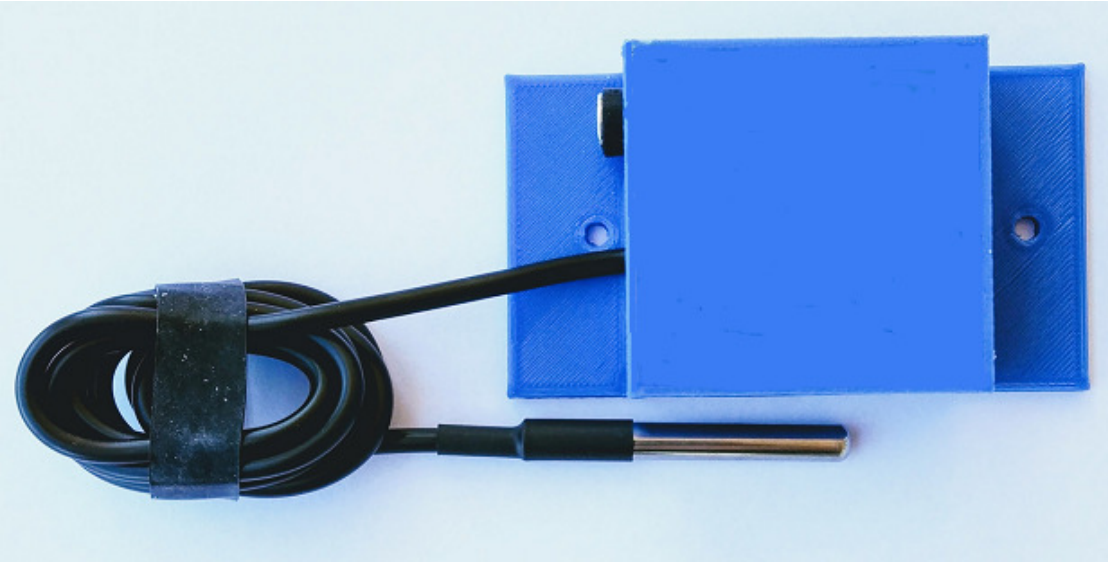
UBWH Australia

Tasmota-Plus
Smart Gauge - Temperature



SG-TEMP
User Guide

V20210331

Latest Version of this document available at:
https://github.com/UBWH/ubwh.github.io/blob/master/assets/UserGuides

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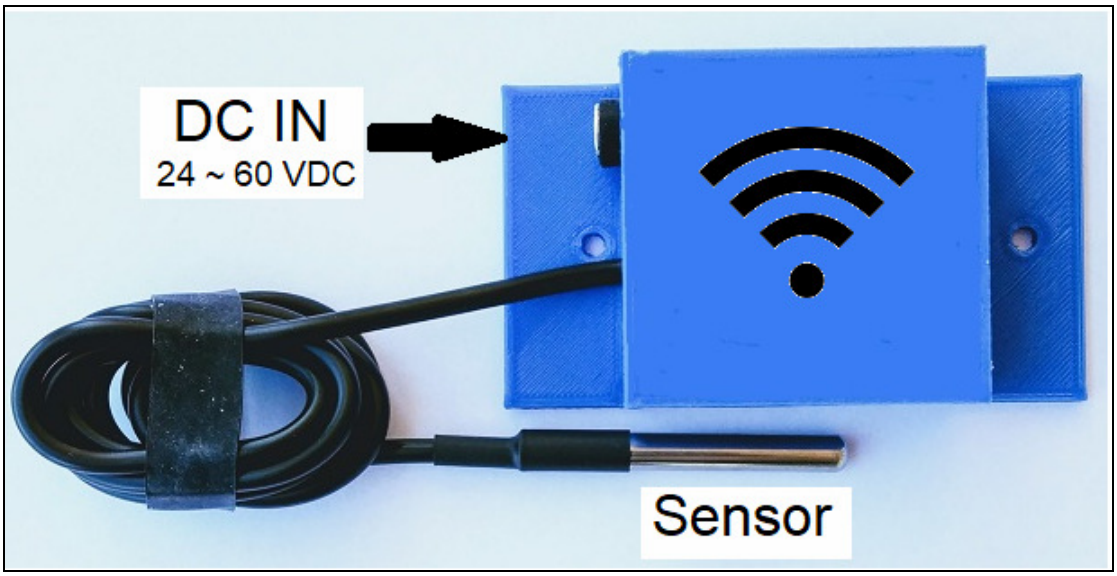
Introduction

The SG-TEMP is a Temperature sensor with a smart WiFi interface.



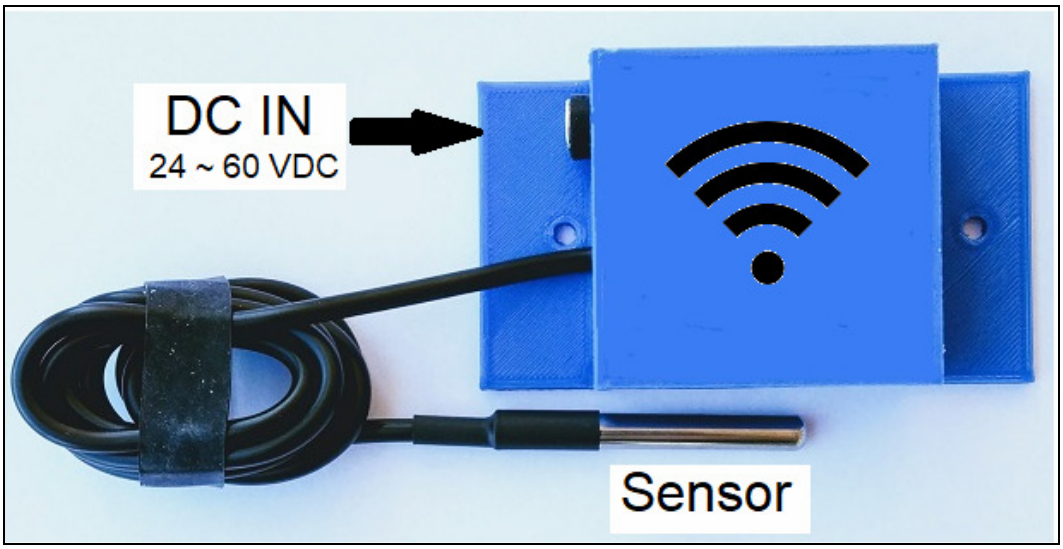
Features include:

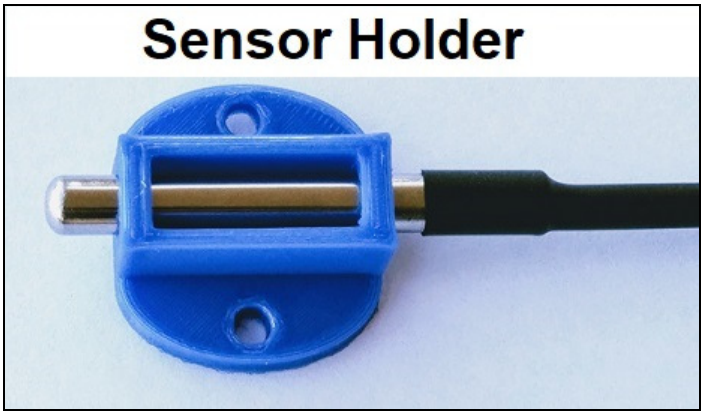
Temperature monitoring	Real-time temperatures can be viewed locally, or from anywhere in the world, accessible by any web browser.
Temperature logging	When combined with an openHAB/MQTT[1] server, current and past temperatures are accessible locally, or from anywhere in the world, accessible by any web browser.
Flexible DC power supply	This device is powered by un-regulated DC. (Power supply not included) Voltages between 24 and 60 VDC can be used.
Relay	A SPST[2] relay (16 A / 240 V) is included, which can be temperature controlled (ON/OFF). For example: a Fan or Heater could be turned on/off as the temperature passes user-defined set-points.
External switch monitoring	A user-supplied, external switch can be connected and monitored; i.e. Open or Closed.

Table 1 – Available Features

[1] https://openhab.org & https://mqtt.org
[2] Single Pole, Single Throw

Hardware





The **SG-TEMP** comes pre-assembled and tested. It consists of:

- a waterproof temperature sensor,
- a waterproof cable,
- a wall-mount enclosure with built-in SS-1CHPro[3] smart WiFi interface, and
- a bonus wall mount sensor holder.

Accessing the Relay and Switch Terminals

Gently pry off the enclosure cover with a small, flat-bladed screwdriver inserted from the base.

Consult the SS-1CHPro User Guide for details:
`https://github.com/UBWH/ubwh.github.io/blob/master/assets/UserGuides/UG-SS-1CHPro.pdf`

[3] https://ubwh.com.au/SS-1CHPro

Requirements

The SS-1CHPro requires:

- **Initial Setup**
  - A device with a Web Browser & WiFi interface, located close to the SG-TEMP. A smart-phone, or tablet will usually be sufficient.
- **Operation**
  - A WiFi Access Point (AP) connected to the local LAN[4], within the WiFi Range[5] of the SG-TEMP.
  - A DHCP[6] server on the LAN.
- **Ongoing Management**
  - Any device with a Web browser and connected to the same LAN as the SG-TEMP.

[4] Local Area Network. See https://en.wikipedia.org/wiki/Local_area_network
[5] See Specifications, page 19
[6] Dynamic Host Configuration Protocol: See https://en.wikipedia.org/wiki/Dynamic_Host_Configuration_Protocol

Web Browser Interface

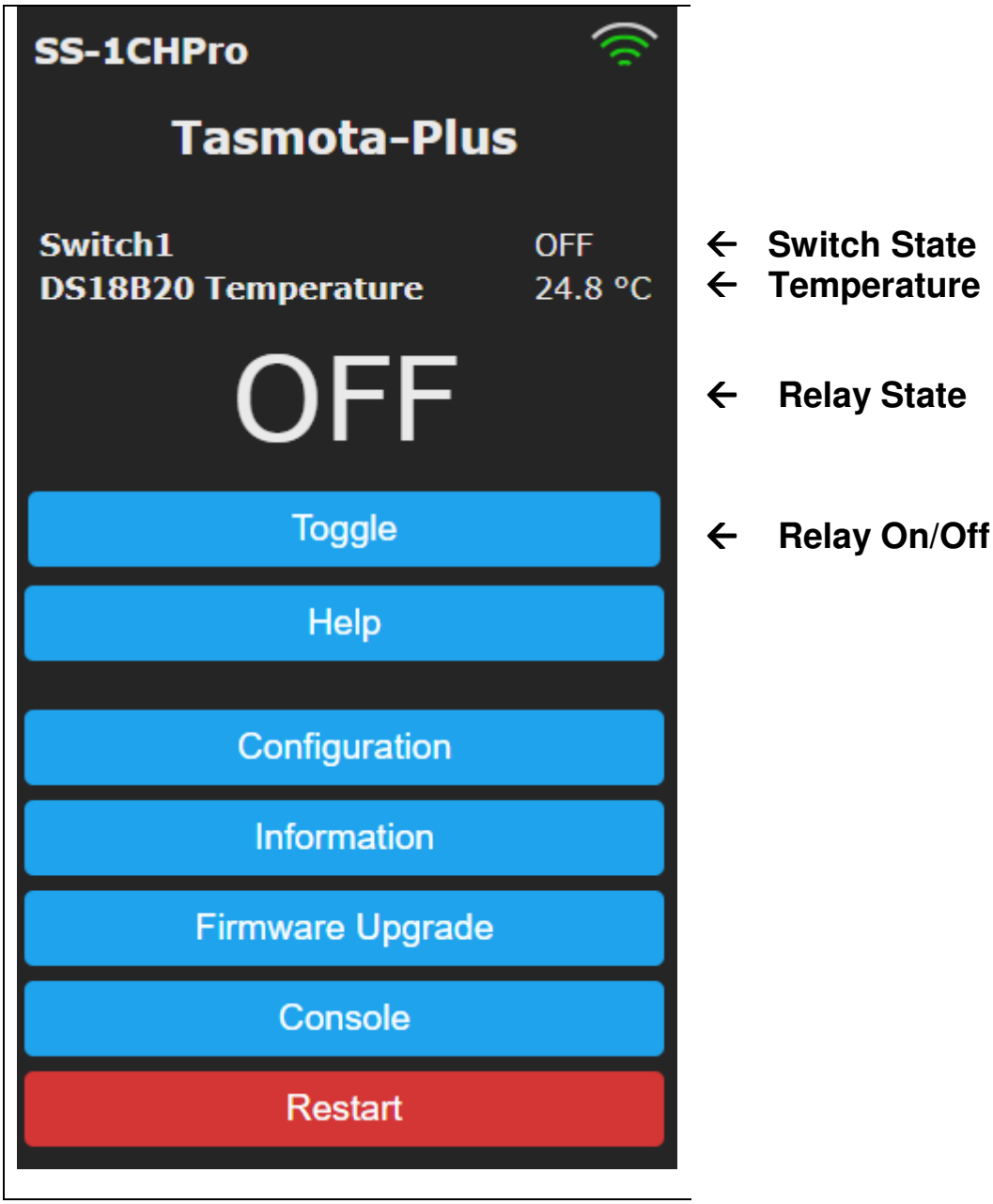


Figure 1 - The Tasmota Web Interface is available from any Web browser

Simply use any web browser to open the web page
`http://<device.ip.address>/`

See documentation here: `https://tasmota.github.io/docs/WebUI/`

Power Options

The DC-IN port is a common 2.1mm x 10 mm , centre-positive jack.

There are two common installation scenarios:

Near a Power Point (GPO)

In this case, simply use any DC power supply between 24 and 60V that has a suitable DC plug.

Example suitable power supply: **https://ubwh.com.au/PSU-24VDC-24W**

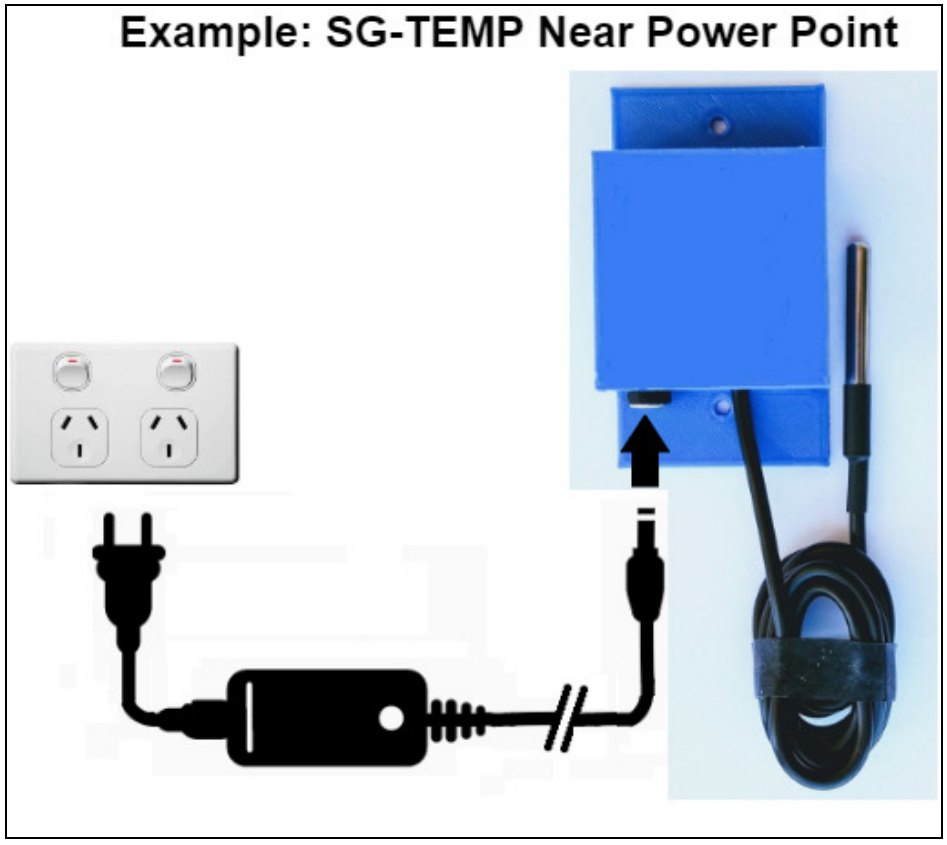


Figure 2 – Powering the SG-TEMP from a nearby power point

Far from a Power Point (GPO)

In this case, one recommendation is to use a common passive PoE[7] power supply that provides either 24 or 48 VDC, with widely available LAN[8] cable.

One end of the LAN cable can be terminated with either a:

- **DC Plug**, soldered onto the conductors carrying the PoE voltage, or
- **RJ45 LAN plug**, with a PoE Splitter[9] to break out the DC to a 2.1mm plug.

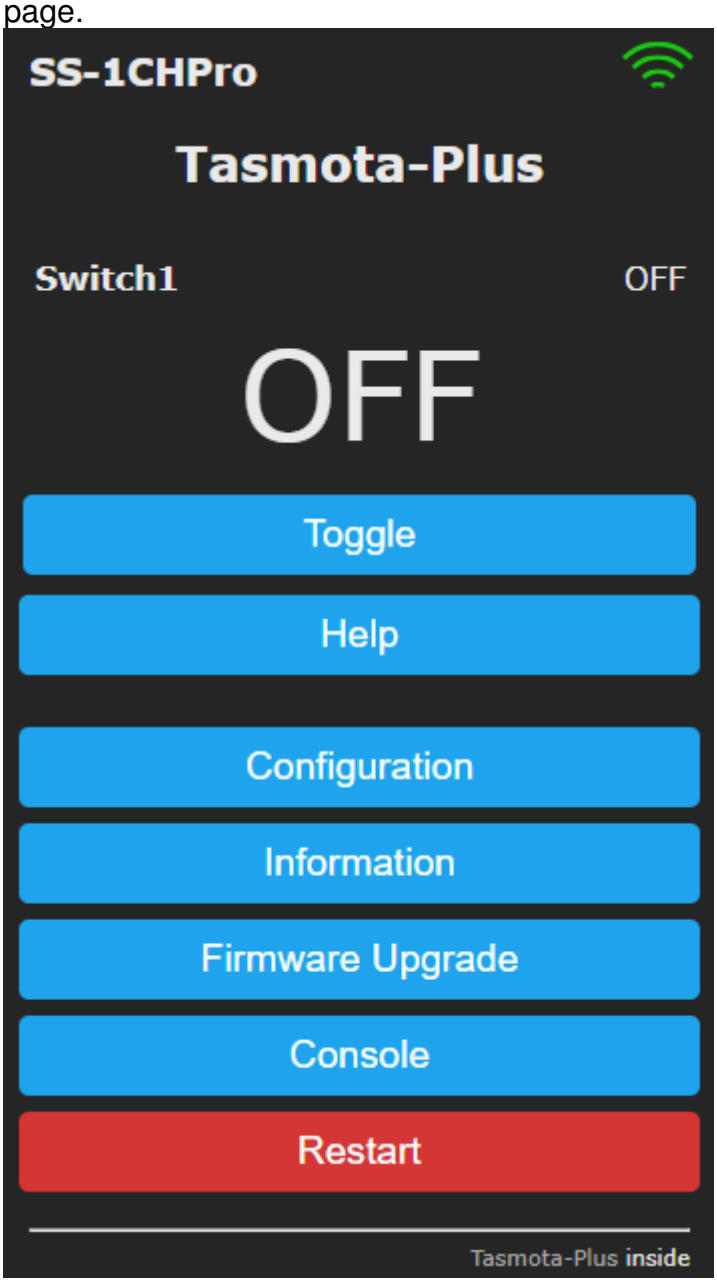
Example suitable power supplies:
https://ubwh.com.au/POE-24-12W
https://ubwh.com.au/POE-48-24W
https://ubwh.com.au/WI-PS306GF-UPS-V2

Figure 3 – Powering the SG-TEMP over distance with passive PoE

[7] Power-Over-Ethernet
[8] e.g. CAT5e
[9] e.g. https://ubwh.com.au/POE-P-SPLIT

Getting Started

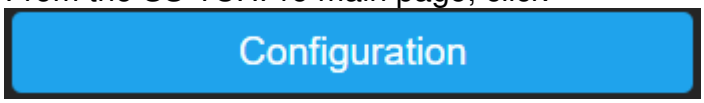
1. Power the SG-TEMP.
2. Follow the instructions in the ***SS-1CHPro User Guide***[10] until you see this page.



[10] https://tinyurl.com/28nybtzx

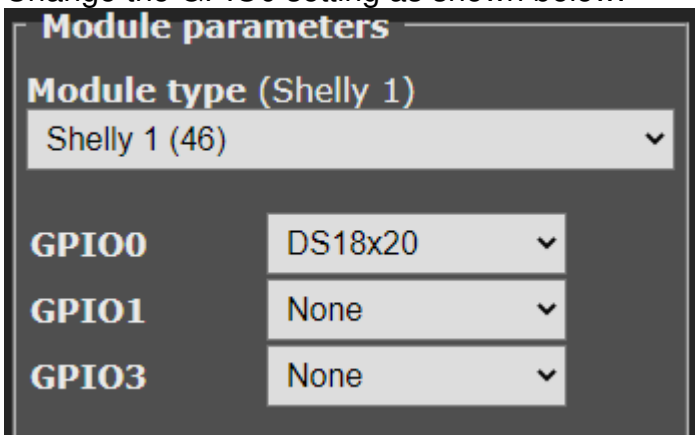
Enabling the SG-TEMP Sensor

1. From the SS-1CHPro main page, click



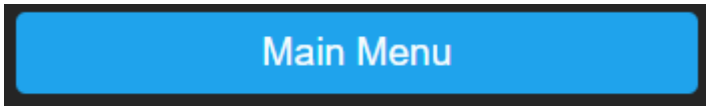
then

2. Change the GPIO0 setting as shown below.

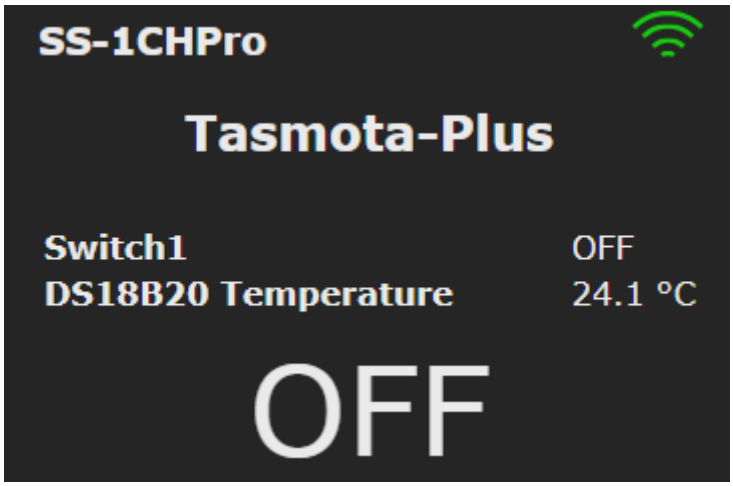


3. Click

then



4. You should now see



Relay Control based on Temperature

Using the Tasmota Rules[11] feature, the relay can be controlled by temperature.

This is done by setting two values:

- Relay ON set-point temperature
- Relay OFF set-point temperature

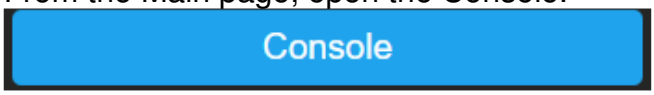
Note: Do not set these two values the same, as the relay may switch ON/OFF rapidly.

In the steps below you will define 3 *Rules*. These rules remain active after a reboot or power cycle.

> **Hint**: To avoid typing mistakes, it is recommended to Copy (from the PDF file of this document) and Paste (to the Console input line).

Step 1 – Common Configuration

From the Main page, open the Console.



Enter these 2 commands, followed by the [Enter] key on your keyboard.

```
RULE2 ON system#boot DO BACKLOG VAR3 %VAR1%; VAR4 %VAR2%
ENDON
```

```
BACKLOG RULE1 ON; RULE2 ON; RULE3 ON
```

Continue to next page.

[11] https://tasmota.github.io/docs/Rules/

Two cases are given below. Follow Step 2a or Step 2b:

Step-2a – Relay ON when Temperature is too HIGH

Enter these 2 commands, followed by the [Enter] key on your keyboard.

```
RULE3 ON DS18B20#temperature>%VAR4% DO BACKLOG POWER1 ON; VAR4 1000; VAR3 %VAR1% ENDON
RULE3 + ON DS18B20#temperature<%VAR3% DO BACKLOG POWER1 OFF; VAR3 -1000; VAR4 %VAR2% ENDON
```

Step-2b – Relay ON when Temperature is too LOW

Enter these 2 commands, followed by the [Enter] key on your keyboard.

```
RULE3 ON DS18B20#temperature>%VAR4% DO BACKLOG POWER1 OFF; VAR4 1000; VAR3 %VAR1% ENDON
RULE3 + ON DS18B20#temperature<%VAR3% DO BACKLOG POWER1 ON; VAR3 -1000; VAR4 %VAR2% ENDON
```

Step 3 – Changing the Set-point Temperatures

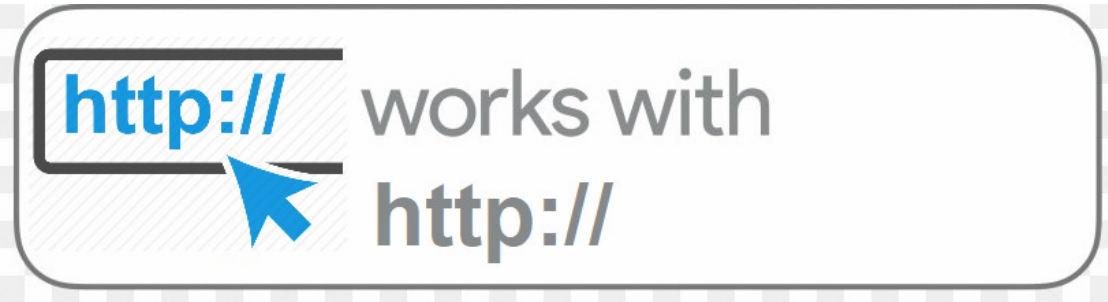
The set-point temperatures are set in RULE1.

Hint: VAR2 **must** be higher than VAR1
e.g. VAR1 21 VAR2 22
e.g. VAR1 -6 VAR2 -5

To change the set-point temperatures to (e.g.) 21 & 22, enter these 2 commands, followed by the [Enter] key on your keyboard.

```
RULE1 ON system#init DO BACKLOG VAR1 21; VAR2 22 ENDON
RESTART 1
```

http:// Command Interface



Simple commands as below will (e.g.) turn the Relay ON.

Note: %20 in a URL = Space character

From Web Browser

```
http://<device.ip.address>/cm?cmnd=power1%20on
```

From Windows or Linux command/terminal window

```
curl http://<device.ip.address>/cm?cmnd=power1%20on
```

From a Windows Batch file (*.bat file)

```
curl http://<device.ip.address>/cm?cmnd=power1%%20on
```

Note: need double **%** characters if in a batch file

From a PHP script (*.php file)

```
file_get_contents(
 'http://<device.ip.address>/cm?cmnd=power1%20on');
```

You can retrieve the **Switch and Temperature Status** as below.

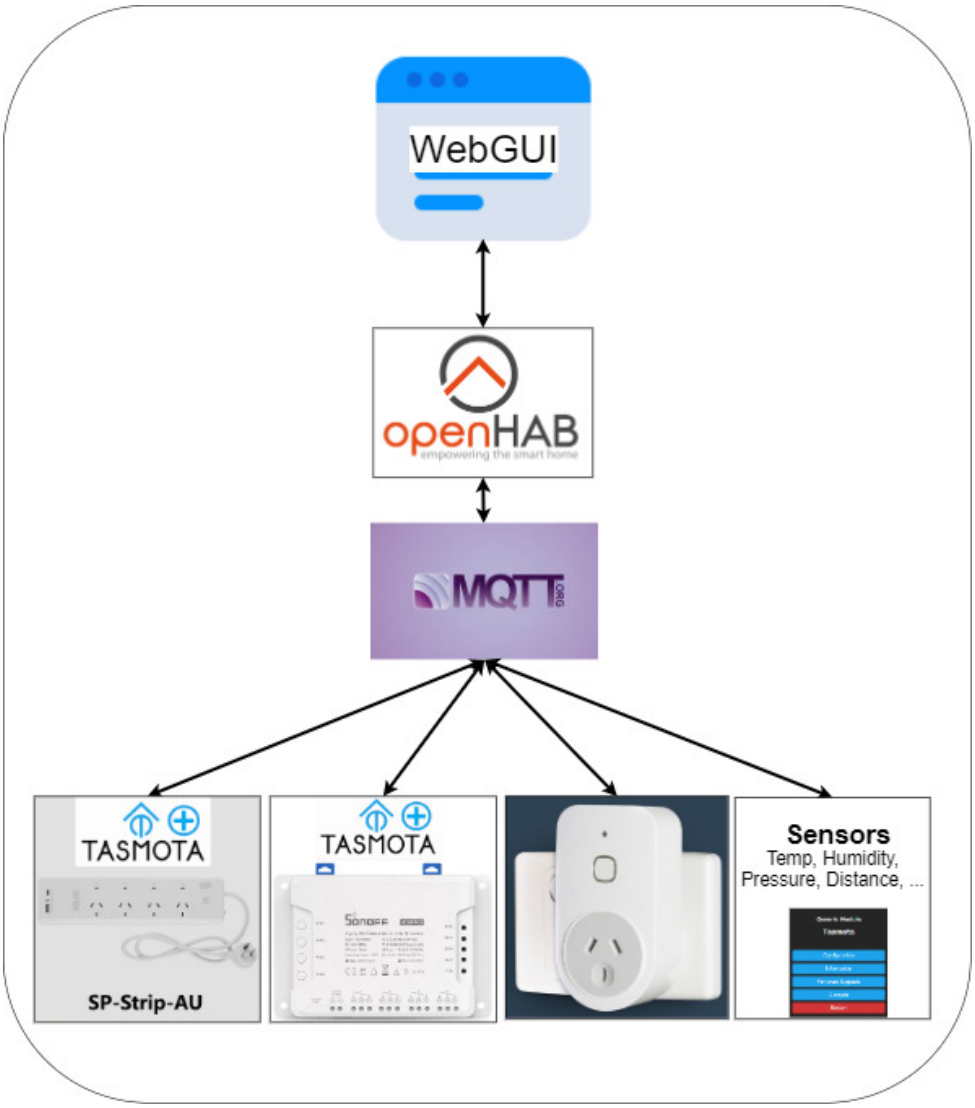
```
http://<device.ip.address>/cm?cmnd=status%208
```

A typical JSON response looks like:

```
{
  "StatusSNS":{
     "Time":"2021-01-18T02:06:53",
     "Switch1":"OFF",
     "DS18B20":{
          "Id":"011937A99651",
          "Temperature":24.4
     },
     "TempUnit":"C"
   }
}
```

More information:
https://tasmota.github.io/docs/Commands/#management

Centralised Monitoring & Control



While this device can operate 100% stand-alone, it can also be monitored and controlled, along with multiple other devices, from a single management platform.

One popular management platform is **openHAB**[12].

In simple terms:

- MQTT compatible devices (e.g. Tasmota) connect to an **MQTT** Broker[13] .
  Status information sent TO the MQTT broker.
  Commands received FROM the MQTT broker.

[12] https://www.openhab.org/ (Freeware, Open source)

[13] https://mqtt.org/ (Freeware, Open source)

- **openHAB** also connects to the MQTT broker.
  Status information received FROM the MQTT broker.
  Commands sent TO the MQTT broker.

- Users interact via web pages (WebGUI)

WebGUI Interfaces

openHAB supports a number of User Interfaces (UIs). Each UI is highly customisable.

The images below show example visualisations.

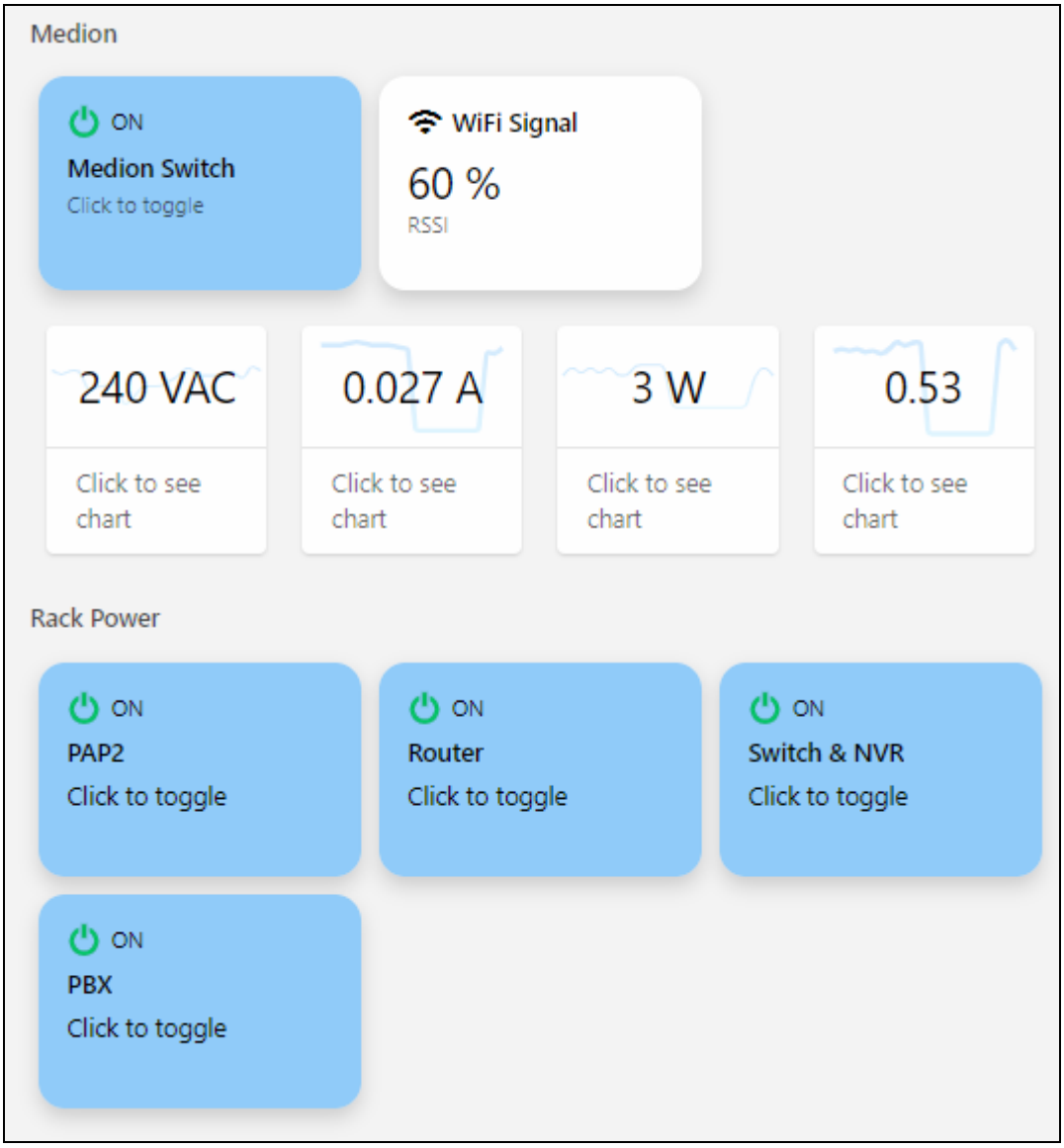


Figure 4 - Classic UI. Mobile friendly.

Figure 5 - Basic UI. Mobile friendly.

Figure 6 - Panel UI. Ideal for touch screens.

openHAB Channel Definition (Example)

Below is shown the channel definition for an SG-TEMP correctly integrated into openHAB.

Values that will be different for each installation have been replaced with XXXXXX.

```
UID: mqtt:topic:XXXXXX
label: SG-TEMP
thingTypeUID: mqtt:topic
configuration:
  payloadNotAvailable: Offline
  availabilityTopic: tele/tasmota_XXXXXX/LWT
  payloadAvailable: Online
bridgeUID: mqtt:broker:30e6c58453
channels:
  - id: Temp
    channelTypeUID: mqtt:number
    label: Temp
    description: null
    configuration:
      stateTopic: tele/tasmota_XXXXXX/SENSOR
      transformationPattern: JSONPATH:$.DS18B20.Temperature
      unit: C
  - id: Relay
    channelTypeUID: mqtt:switch
    label: Relay
    description: ""
    configuration:
      commandTopic: cmnd/tasmota_XXXXXX/POWER
      stateTopic: stat/tasmota_XXXXXX/POWER
      off: OFF
      on: ON
  - id: Switch
    channelTypeUID: mqtt:switch
    label: Switch
    description: ""
    configuration:
      stateTopic: tele/tasmota_XXXXXX/SENSOR
      transformationPattern: JSONPATH:$.Switch1
```

openHAB Sample History Plot

The plot below shows an example history from an SG-TEMP sensor immersed in a water tank.

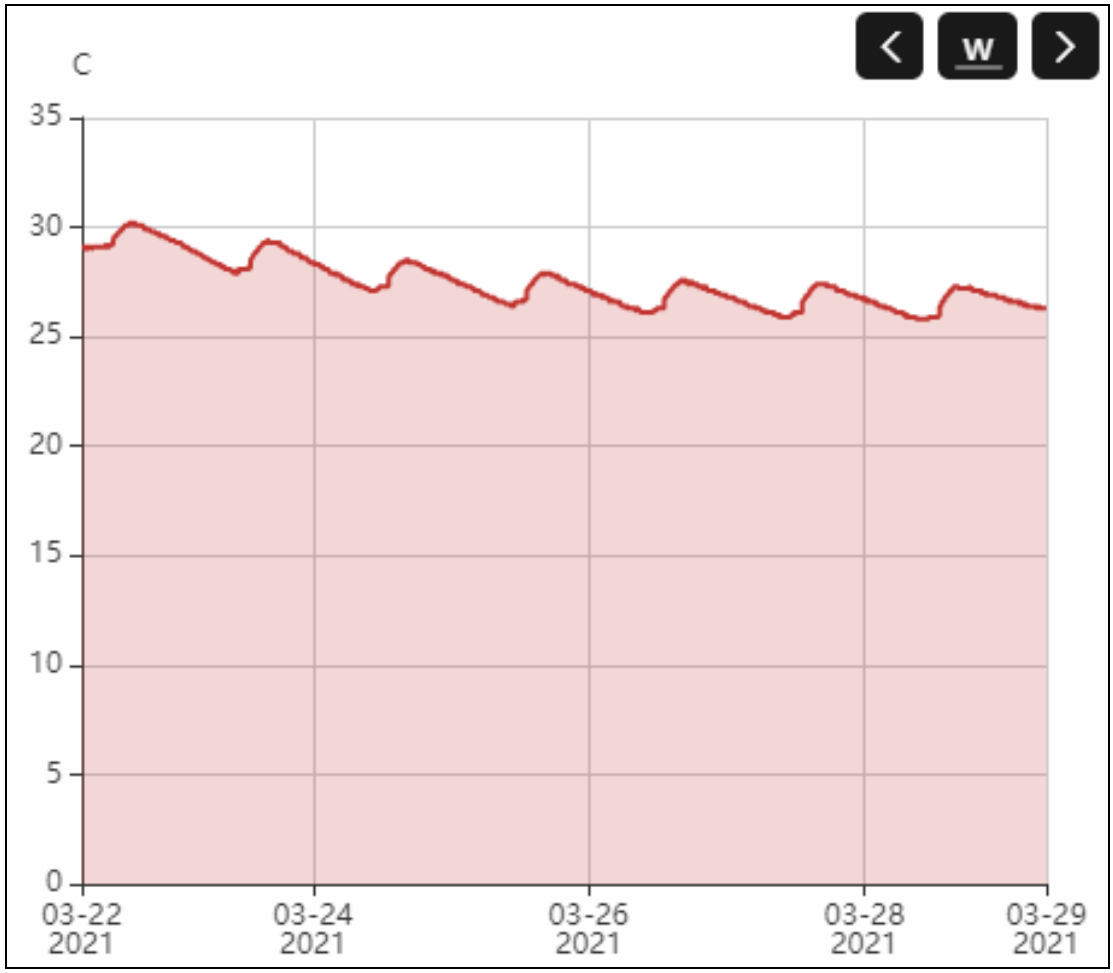


Figure 7 - Tank water temperature over 1 week

Specifications

Temperature sensor	Type: Range ±0.5 ℃ Accuracy Waterproof Length Diameter	DS18B20 -55 ℃ to +125 ℃ -10 ℃ to +85 ℃ Yes (to length of cable) 50 mm 6 mm (6.5 mm over black jacket)
Cable	Length Diameter Waterproof	900 mm 3.7 mm Yes
Enclosure	Material Dimensions Weight Mounting holes	PLA 90 x 50 x 27 mm (W x L x H) 60 g (including SS-1CHPro) 2 x 3 mm dia (71 mm spacing)
Power supply	DC Only Connector Power consumption	24 to 60 V DC (unregulated) 2.1 x 10 mm , Centre positive < 1W (= 40 mA @ 24 V)
WiFi	Range Standards	20 m (Typical, no walls) 10 m (Typical, walls) 802.11b/g/n 2.4 GHz