

# Domoticz Home Automation Workbook

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Exploring Domoticz Home Automation System

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# Purpose

To build a Home Automation Solution, running on a Raspberry Pi with [Domoticz](#) Home Automation System.

## Objectives

- ✓ Explore & learn Domoticz & Scripting.
- ✓ Build a Home Automation Solution.
- ✓ Write up experiences during development ... and enhance further.

## Notes

- ❖ This is a working document  
... solution changes, idea's & todo's will probably never cease to exist 😊.
- ❖ There might be better solutions for what is shared  
... updates or changes will happen as progressing with the learning curve.
- ❖ Source code for the scripts & flows not fully shared in this document or have changed  
... check the [GitHub](#) scripts folder for the latest full source code.
- ❖ Automation scripts developed as dzVents Lua script events  
... very few in Python (to be replaced).
- ❖ Domoticz Hardware Plugin development in Python.
- ❖ Some functions make initially use of Node-RED flows  
... but target is to replace by dzVents scripts if possible.
- ❖ Functions that have been replaced by another solution are kept in this document as reference – might be of use.
- ❖ Screenshots shared might not be update as functionality is evolving.

- ❖ To-do's are tagged with <TODO>.
- The To-do list, with prefix, i.e. NEW, UPD ..., are captured in the file TODO.md.
- ❖ Abbreviations: GUI = Domoticz UI in browser, HmIP = homematicIP, TF = TinkerForge

## Functions

- Air Quality monitor [[Plugin](#)].
- Ambient light (from ESP8266 running ESP Easy) with threshold.
- Charts for selective weather items, room temperature & humidity.
- Coffee machine monitor – start and end time, info message.
- Control Somfy roller shutters with RTS motors in rooms.
- Control Volumio music player whilst listening to web radio.
- Custom icons.
- Display temperature & humidity measured in rooms.
- Electricity power & energy for selected devices / rooms (washer, MakeLab etc.).
- Electricity power & energy for the house from “volkszaehler” with charts.
- Event monitor for selected devices.
- Hardware Monitor for the Raspberry Pi's used (see HardwareMonitor.zip).
- HomeMatic (RaspberryMatic) CCU3 integration with variety of devices and plugins [[HmIP-eTRV](#)], [[HmIP-PSM](#)].
- Information on key dates (calendar type information).
- MQTT subscribe & publish messages to trigger actions or information.
- Monitor stock quotes.
- Philips Hue Lighting System control via Hue Bridge for ZigBee devices.
- Philips Hue Light controlled via ESP8266 with slide potentiometer & 4-digit-7-segment-display.
- Postbox Notifier.
- Raspberry Pi system information with charts and threshold email notification.
- Remote Control Domoticz devices using Email client - includes a simple Android test app.
- Security door & window wireless contact detectors.
- Soil Moisture monitor for plants [[Plugin](#)].
- Timers for single devices or complex tasks (Automation events dzVents script).
- Web App Site Control [[Info](#)] – Node-RED alternative to the standard Domoticz Web UI.

## *Explore How to Use/Develop*

- Domoticz running on a Raspberry Pi (setup, configure).
- Scripting Python, Lua, dzVents, JavaScript.
- Python Plugin Development (mainly with Tinkerforge Building Blocks).
- Domoticz JSON/API interaction.
- MQTT messaging.
- Node-RED as an alternative script engine and User Interface.
- SQLite to read the Domoticz Database.
- ESP8266, ESP Easy.
- RFXCOM RFXtrx433E USB RF Transceiver for
  - Temperature & Humidity devices.
  - External Wind device (only for RFXCOM tests).

- Other 433Mhz devices, i.e. door & window contacts.
- Philips Hue Light Control.
- homematicIP using RaspberryMatic CCU and integrate into Domoticz.
- External services.
- Domoticz Android App (native client, to be determined).
- Advanced User Interfaces, i.e. Node-RED, Bootstrap ...

### *Credits*

To the developers of Domoticz and to all sharing information about Domoticz. Without these, it would not be possible to build this project and write the workbook.

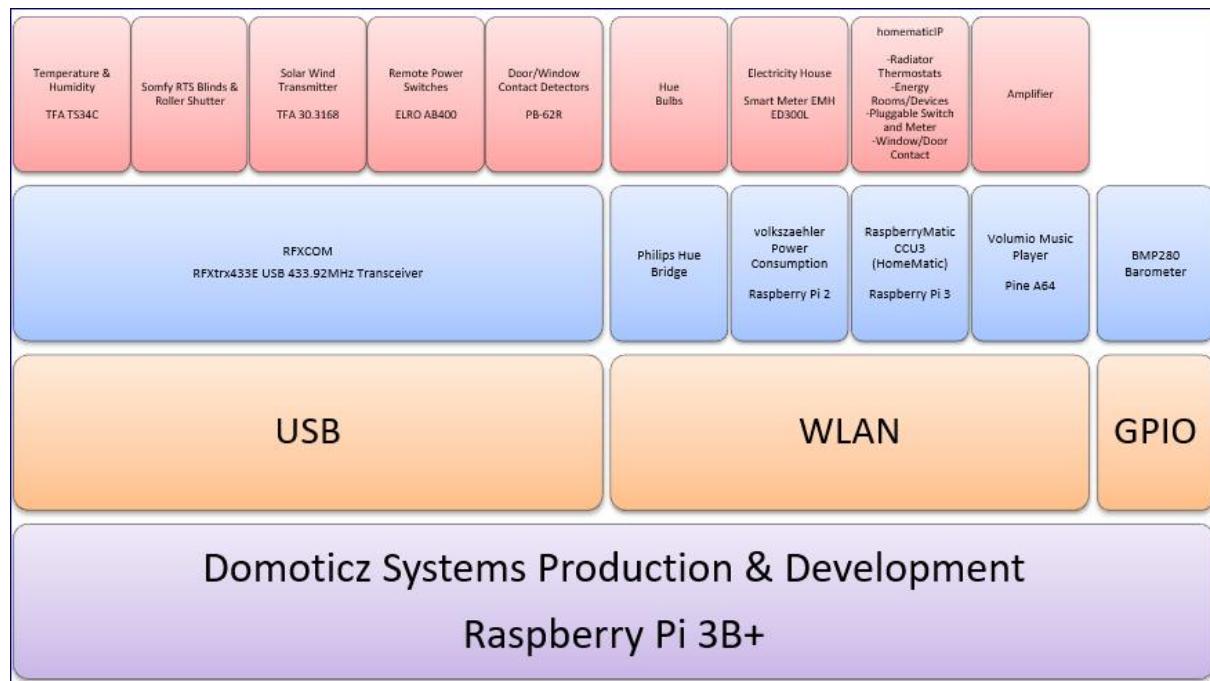
Drawings are created with [Fritzing](#).

# Components

Hardware and software used for this project.  
More details to be found in chapters [Setup](#), [Functions](#) and other.

## Hardware

Overview of the various hardware used.



- Raspberry Pi 3B+ v1.2 (Domoticz Production System)
- RFXCOM RFXtrx433E USB 433.92MHz Transceiver
  - TFA Dostmann TS34C (temperature & humidity)
  - TFA Dostmann 30.3168 Wind Meter (speed, direction, temperature)
  - Somfy Blinds RTS Pure (blinds & rollershutter)
  - Revolt SF-436 (electricity rooms/devices – tested only = not used)
  - PB-62R (door & window wireless contact detectors)
  - ELRO AB400 (remote power switches)
- Philips Hue Bridge
  - Hue Bulbs
- SmartMeter EMH ED300L connected to a Raspberry Pi 2 running volkszaehler
- RaspberryMatic CCU (Raspberry Pi 3B+) with variety of connected devices like HmIP-PSM, HmIP-eTRV-B, HmIP-eTRV-2, HmIP-SDWO, HmIP-SDWM
- Pine A64 1GB - Volumio Music Player
- Raspberry Pi GPIO - BMP280 Barometer (I2C)
- Raspberry Pi 3B+ (Domoticz Development System) for testing
  - Domoticz latest BETA version to ensure up-to-date with development
  - Node-RED
  - Interfacing, i.e. GPIO, RaspberryMatic

# Software

- Raspbian GNU/Linux 9 (Stretch) based upon NOOBS Version 2.8.2, 2018-06-27
- Domoticz V4.10417 Stable (Domoticz Production System); for the development system using the latest BETA version (like V4.11570)
- RFXCOM RFXflash Programmer 8.0.0.0 - to update the firmware on the RFxTrx433E
- RFXCOM RFxMngr 18.0.0.18 - to test and manage RFxTrx433E connected devices
- RaspberryMatic 3.45.7.20191130  
(full compatible HomeMatic CCU3 3.45.7 firmware)
- Node-RED v1.0.3 – various functions
- WinSCP - to manage & exchange files between the development device and the Raspberry Pi's
- PuTTY - to run terminal commands
- Idle - Python Script development

*Note*

The software versions mentioned have been used during the initial setup of the project. Recommend checking out for newer versions available – newer versions are mentioned in the related chapters.

# External Services

External Services are used to request information

- Alpha Vantage (stock data)

# Setup

Various setup steps prior starting to build the solution in Domoticz.

## Development Device

A **Notebook**, running **Windows 10**, is used to support the setup and as development device.  
Additional software installed:

- [RealVNC](#) - Remote access Raspberry Pi Desktop
- [Python](#) - Script development and testing
- [Notepad++](#) - Text and source code editor

## Raspberry Pi

### Installation

The Raspberry Pi running as the Domoticz system, has a monitor, keyboard and mouse connected. This to ease the setup.

After initial installation, the Raspberry Pi is running headless and VNC is used to remote access the Raspberry Pi desktop.

#### *NOOBS*

Download the Raspberry Pi NOOBS version from [here](#).

NOOBS Version 2.8.2, 2018-06-27, Zip archive NOOBS\_v2\_8\_2.zip.

#### On the Development PC

- insert a new SD card (used 32GB)
- format the SD card (used SDFormatter)
- unzip NOOBS\_v2\_8\_2.zip to the SD card

#### On the Raspberry Pi

- insert the SD card (ensure no power connected)
- connect power to the Raspberry Pi
- from the initial installation menu
  - select Raspian
  - select expand partition (extra 512 MB)
  - set WiFi connection
  - press install
  - installation procedure starting, wait for completion (~10 minutes)
  - reboot
  - complete the Assistant steps incl. Check for Updates (~20 minutes)

Additional configuration Desktop Menu Preferences > Raspberry Pi Configuration >  
Interfaces enabled SSH, VNC, SPI, I2C, 1-Wire

Any other software for the project [Functions](#) are described under Functions.

## Network Static IP Address

It is useful to define a static IP address for the Raspberry Pi running Domoticz, i.e. fix IP address to access Domoticz from a browser (<http://domoticz-ip:8080>) and for a Samba shared folder used f.e. to edit Scripts from the Development PC or backup or read the Domoticz database.

For release Raspbian GNU/Linux 8 (stretch), set a fixed IP address using the Desktop. This is done by right clicking on the LAN icon at the top right of the desktop and select menu:

### Wireless & Wired Network Settings.

```
Wireless
Select Menu Configure > Interface > wlan0:
set IPv4: NNN.NNN.N.NNN, Router: NNN.NNN.N.NNN

Wired
Select Menu Configure > Interface > eth0:
set IPv4: NNN.NNN.N.NNN, Router: NNN.NNN.N.NNN

Apply and Close.
```

#### *Note*

Just as an FYI, the file `/etc/dhcpcd.conf` is updated by the Raspberry Pi Desktop application.

```
sudo nano /etc/dhcpcd.conf
interface wlan0
inform NNN.NNN.N.NNN
static routers=NNN.NNN.1.1

interface eth0
inform NNN.NNN.N.NNN
static routers=NNN.NNN.1.1
static domain_name_servers=NNN.NNN.1.1
```

### WLAN Router SSID

```
sudo nano /etc/wpa_supplicant/wpa_supplicant.conf
ctrl_interface=DIR=/var/run/wpa_supplicant GROUP=netdev
update_config=1
country=DE

network={
    ssid="*****"
    psk="*****"
    key_mgmt=WPA-PSK
}
```

## Reboot the Raspberry Pi

Check, using command ifconfig, the WLAN address (wlan0) or Ethernet address (eth0)

```
ifconfig
Output:
wlan0      Link encap:Ethernet  HWaddr b8:27:eb:fa:44:fc
            inet addr:NNN.NNN.N.NN  Bcast:NNN.NNN.0.255  Mask:255.255.255.0
...
eth0:  flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
            inet NNN.NNN.N.NNN  netmask 255.255.255.0  broadcast NNN.NNN.1.255
...
```

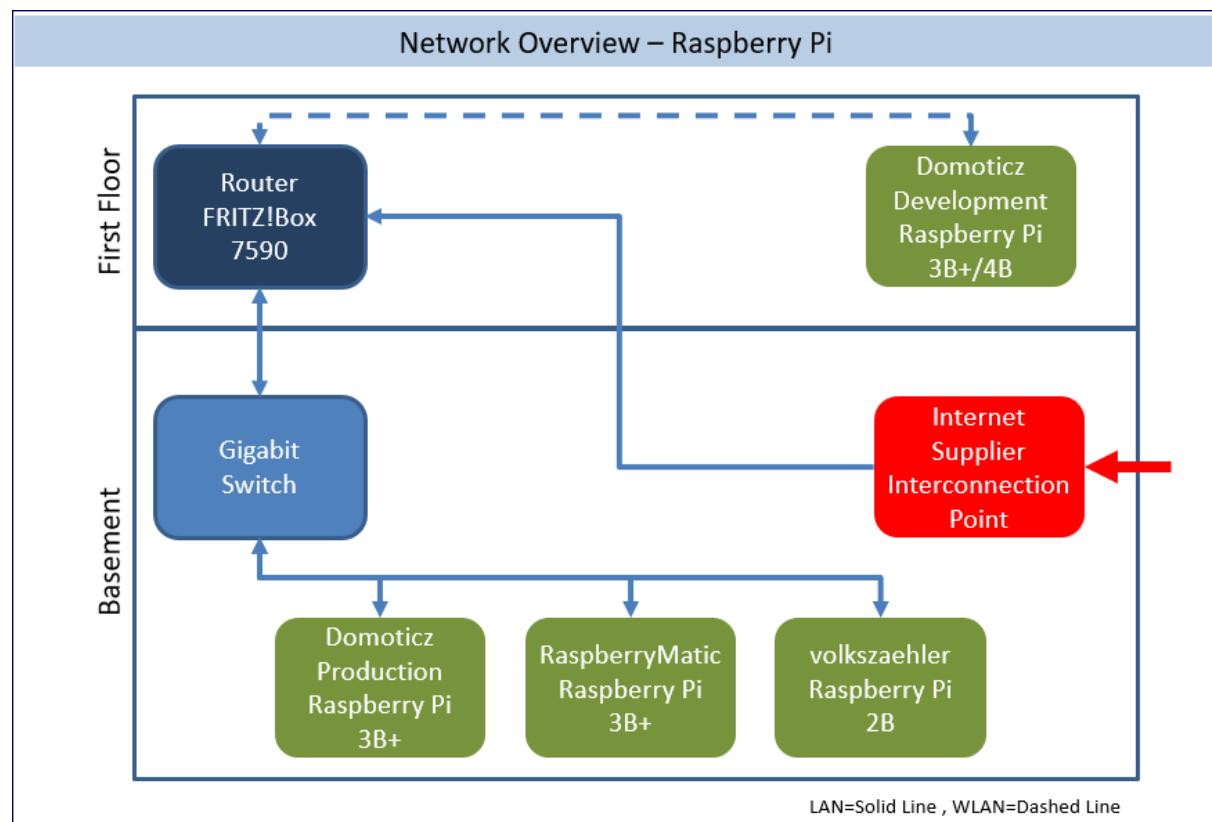
*Note*

In the documentation the IP address of the Raspberry Pi Domoticz system (production and development) is referred to as: <http://domoticz-ip:8080>

## Wired Network

Whilst this Home Automation solution is evolving, decided to use wired connections for the several Raspberry Pi's in the network.

The reason is that the hardware is placed in the basement near the power distribution = need to ensure highest available network speed.



## WLAN Power Save Mode

If the Domoticz GUI is not refreshing, the cause could be that the Raspberry Pi WLAN Power Save Mode is ON. After certain time, the network connection drops.

### Check the Raspberry Pi WLAN power save mode

```
iw wlan0 get power_save
```

Output

```
Power save: on
```

*Note*

The command *iwconfig* provides this information also, i.e. shows Power Management: off

To turn the Raspberry Pi WLAN “Power Save Mode” OFF, run

```
sudo iw wlan0 set power_save off
```

*Note*

Run as sudo else error message: command failed: Operation not permitted (-1)

Check again the Power Save Mode:

```
iwconfig or iw wlan0 get power_save
```

The “Power Save Mode” is set back to default ON when the Raspberry Pi reboots.

To turn the Raspberry Pi WLAN “Power Save Mode” OFF during reboot, add to crontab

```
sudo crontab -e
# Disable wlan power save
@reboot sudo iw wlan0 set power_save off
```

Reboot the Raspberry Pi and check power save mode

```
iw wlan0 get power_save
Power save: off
```

# Raspian Check Version & Update

## Raspian Check version installed.

```
cat /etc/os-release
PRETTY_NAME=" "
NAME="Raspbian GNU/Linux"
VERSION_ID="9"
VERSION="9 (stretch)"
ID=raspbian
ID_LIKE=debian
HOME_URL="http://www.raspbian.org/"
SUPPORT_URL="http://www.raspbian.org/RaspbianForums"
BUG_REPORT_URL="http://www.raspbian.org/RaspbianBugs"
```

## Raspian Update to the latest version.

Perform regular updates (doing this once a week):

```
Desktop Select Menu > Preferences > Add / Remove Software > Options > Check for Updates
```

Or run alternative from a terminal:

```
sudo apt-get update && sudo apt-get upgrade
```

## Samba

Start by reading [here](#).

### Hint

Do not forget to set the password and restart Samba.

```
sudo smbpasswd -a pi
sudo systemctl restart smbd.service
```

## Domoticz Home Folder as a share

The Domoticz home folder /home/pi/domoticz can also be set as a shared folder.

### Prework Raspberry Pi Domoticz System

The shared folder, DoProDomoticz, uses samba and is configured with:

```
sudo nano /etc/samba/smb.conf
```

#### Content

```
[DoProDomoticz]
Comment = Raspberry Pi Domoticz Production folder
Path = /home/pi/domoticz
Browseable = yes
Writable = Yes
only guest = no
create mask = 0777
directory mask = 0777
Public = yes
Guest ok = yes
```

#### *Details Samba settings:*

[DoProDomoticz]	Name of the share
comment	Text is displayed as Comments in the Share detail view
path	Specifies the folder with the shared files
browsable	yes no - Set share visible when running <i>net view</i> command and browsing network shares.
writable	yes no - Allows user to add/modify files and folders. Default samba shares are readonly
guest ok	yes no - Allows “non authenticated” users to access the share

**After configuration:** Perform following steps after the Samba configuration.

Ensure to set the directory mask for the domoticz folder to 0777:

```
sudo chmod 777 /home/pi/domoticz
```

Restart samba:

```
sudo /etc/init.d/samba restart
```

Restart domoticz:

```
sudo service domoticz.sh restart
```

## Prework Windows

In Windows (Version 10 is used) connect to the shared folder using the Windows Explorer > Connect Network:

Path for drive Z: is \\ domoticz-ip\DoProDomoticz  
(DoProDomoticz is previous defined in the samba configuration)

To connect from the Windows explorer:

Network drives:

Add new drive with URL: \\domoticz-ip\DoProDomoticz

Username: pi, Password: \*\*\*\*\*

## Example Music Shared Folder

Another example in setting up a music shared folder “MyMusic” pointing to folder /home/pi/music.

Create the folder music:

```
mkdir /home/pi/music
```

Add to the Samba configuration file, /etc/samba/smb.conf

```
[MyMusic]
comment=Raspberry Pi Music Share
path=/home/pi/music
browseable=Yes
writeable=Yes
only guest=no
create mask=0777
directory mask=0777
public=yes
```

Ensure to set the directory mask for the folder to 0777:

```
sudo chmod 777 /home/pi/music
```

Restart samba:

```
sudo /etc/init.d/samba restart
```

Restart domoticz:

```
sudo service domoticz.sh restart
```

Connect from Windows explorer using

URL: \\domoticz-ip\MyMusic

Username: Pi

Password: \*\*\*\*\*

## Persistent USB Devices

On the Raspberry Pi, the RFXtrx433E device is connected to an USB port.

If multiple USB devices connected, the device order could change after reboot, resulting in Domoticz using the wrong devices.

To ensure the right USB Port is used by Domoticz, a symbolic link (**symlink**) is assigned for the USB Port associated to the RFXtrx433E.

### USB Symlink for RFXCOM RFXtrx344E

#### Create symlink:

1. Do not plug in the RFXtrx433E.
2. List the devices: `ls /dev/tty*`
3. Plug in the RFXtrx433E to an USB port.
4. List the devices again to check out the new USB device: `ls /dev/tty*`
5. A new device should be listed, i.e: **/dev/ttyUSB0**

To define the symlink, USB device information is required: *idVendor*, *idProduct*, *iSerial*.

#### Get USB device information

```
sudo lsusb -v | grep 'idVendor\|idProduct\|iProduct\|iSerial'
```

#### Seek the RFXCOM RFXtrx433 entry listed under iProduct, i.e. RFXtrx433

```
Bus 001 Device 008: ID 0403:6001 Future Technology Devices International, Ltd FT232 USB-Serial (UART)
IC
Device Descriptor:
...
idVendor      0x0403 Future Technology Devices International, Ltd
idProduct     0x6001 FT232 USB-Serial (UART) IC
iProduct       2 RFXtrx433
iSerial        3 A1YQCEQY
...
```

The data required to define the symlink are the idVendor (0x0403), idProduct (0x6001), iSerial (A1YQCEQY).

#### Create the symlink

On the Raspberry Pi, edit the file `/etc/udev/rules.d/99-usb-serial.rules` and reboot!

```
sudo nano /etc/udev/rules.d/99-usb-serial.rules
Add:
SUBSYSTEM=="tty", ATTRS{idVendor}=="0403", ATTRS{idProduct}=="6001", ATTRS{serial}=="A1YQCEQY",
SYMLINK+="ttyUSB-RFX433E-A", MODE="0666"
```

**Reboot** the Raspberry Pi (`sudo shutdown -r now`) and **check** the USB Port after boot, check the USB port

```
ls -l /dev/ttyUSB-RFX433E-A
Output:
lrwxrwxrwx 1 root root 7 Aug 29 19:24 /dev/ttyUSB-RFX433E-A -> ttyUSB0
```

Preparation of the RFXtrx433E is completed, next to install & configure the RFXCOM device in Domoticz.

# Domoticz

## Installation

The Domoticz installation is initiated by running terminal command:

```
curl -L install.domoticz.com | sudo bash
```

Answers to the questions

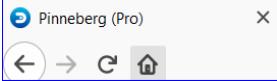
Question	Answer
Services	http, Port: 8080
Domoticz Folder	/home/pi/domoticz
Domoticz URL	http://domoticz-ip:8080 or http://localhost:8080 (when using the monitor connected to Raspberry Pi)

If everything went ok, enter the Domoticz URL in a browser and ... the Domoticz UI is shown. The Domoticz version is displayed as V4.9700 (or newer).

Now READY to configure the Domoticz Home Automation System solution further.

# Settings

Changes made to the default Domoticz settings:

System	
User Interface	Language: English Theme: Default
Location	Name: Pinneberg (Pro) Latitude: 53.636470 Longitude: 9.798251 <i>Note</i> The browser shows as tab Pinneberg (Pro) 
Dashboard	Mode: Mobile (for access via Smartphone)
Local Networks	Networks: NNN.NNN.1.*
Software Updates	Check Release Channel: beta
<b>Log History</b>	Set to 1 days
<b>Notifications</b>	See under Functions where applicable
<b>Email</b>	
Email enabled	username <email-address>
Send Email notification alerts	Enabled
<b>Meters / Counters</b>	
Wind Meter	Display:Beaufort
<b>Floorplan</b>	See under Functions where applicable
<b>Other</b>	
Event System	Enabled
dzVents	Enabled
	<i>Note</i> dzVents is the main Event scripting used.

## Folders

Folder	Path
Domoticz Home	/home/pi/domoticz
Scripts	/home/pi/domoticz/scripts
Bash scripts -created new folder, make sure all scripts are executable, i.e. sudo chmod +x myscripts.sh	/home/pi/domoticz/scripts/bash

## Events

Events are developed using mainly dzVents (Domoticz Easy Events), which is Domoticz Next Generation Lua scripting (described [here](#)).

The Domoticz internal event editor is used.

External Lua modules have been defined, to provide common functions across the dzVents scripts.

In the meantime, these modules are replaced by a dzVents script global\_data, maintained using the internal event editor.

There are a few exceptions, where an event is written in Python and triggered via crontab. These events are not yet converted to Lua (planned).

# Functions

## Introduction

This project has a modular setup, which are called **functions**.

Each **function** has a specific purpose, makes use of required hardware & software and Domoticz configuration settings.

### Function examples are

- RFXCOM - wireless receive & transmit between devices/sensors at 433.92Mhz.  
(Temperature Sensors, Wind Sensors, Light/Switch Devices)
- Philips Hue Light Control (Light/Switch Devices)
- Waste Calendar – inform about waste dates for residual waste, organic waste, paper waste, plastic waste (Utility Sensors)
- Days since / to calculation (Utility Sensors)
- Raspberry Pi system information (Utility Sensors)

Just a few functions to mention:

- ▷ RFXCOM RFxTrx433E
- ▷ Temperature & Humidity
- ▷ Anemometer
- ▷ Wind
- ▷ Somfy Blinds
- ▷ Airpressure BMP280
- ▷ Hue
- ▷ Remote Switch
- ▷ Waste Calendar
- ▷ Days-To-Go
- ▷ **Raspberry Pi Monitoring**
- ▷ Electric Usage
- ▷ Coffee Machine Monitor
- ▷ Alert Message
- ▷ User Variables

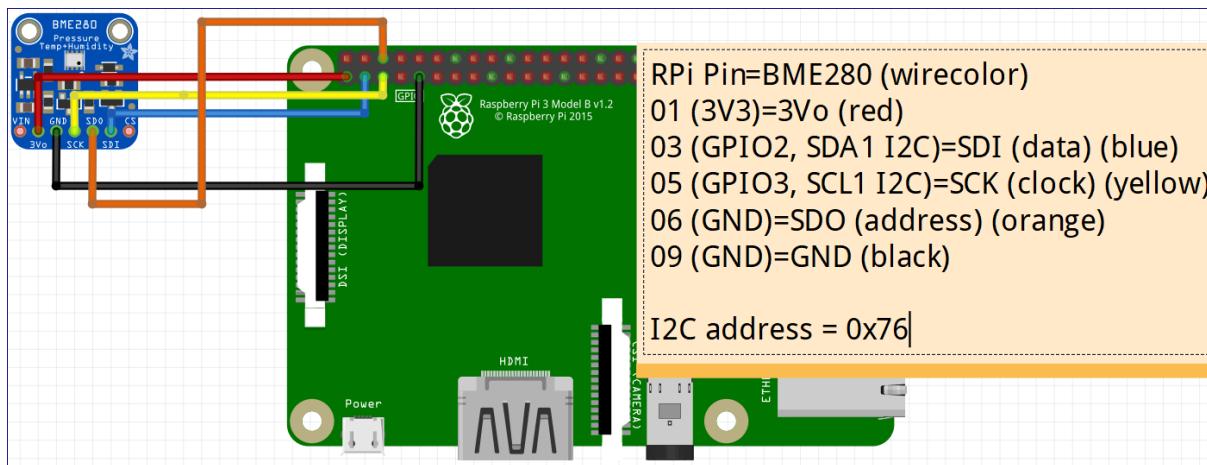
# Air Pressure (BME280)

## Purpose

To measure the Air Pressure using a Waveshare BME280 Environmental Sensor Module connected to the GPIO of the Raspberry Pi.

## Circuit

The BME280 sensor (Waveshare) connected to the Raspberry Pi:



### Notes

- By connecting SDO to Ground, the default I2C Address 0x76 is set. Use the command `i2cdetect -y 1` to check
- Domoticz uses the default address 0x76
- Adding multiple I2C sensors, requires a unique address for each sensor and two 1.k resistors between Vcc and the data & clock lines

### Raspberry Pi B+ GPIO Header



## I2C

Check if the I2C module (`i2c_bcm2835`) is loaded.

If not, activate the I2C interface in the Raspberry Pi preferences.

Below list is only an extract...

```
lsmod
Module           Size  Used by
i2c_bcm2835      16384  0
spi_bcm2835      16384  0
w1_gpio          16384  0
wire              40960  1 w1_gpio
i2c_dev          16384  0
ip_tables         24576  0
x_tables          32768  1 ip_tables
ipv6              434176 58

ls -l /dev/i2c-
crw-rw---- 1 root i2c 89, 1 Aug 30 12:08 /dev/i2c-1

i2cdetect -l
i2c-1  i2c          bcm2835 I2C adapter                  I2C adapter
i2cdetect -y 1
  0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:  --  --  --  --  --  --  --  --  --  --  --  --  --
10:  --  --  --  --  --  --  --  --  --  --  --  --  --
20:  --  --  --  --  --  --  --  --  --  --  --  --  --
30:  --  --  --  --  --  --  --  --  --  --  --  --  --
40:  --  --  --  --  --  --  --  --  --  --  --  --  --
50:  --  --  --  --  --  --  --  --  --  --  --  --  --
60:  --  --  --  --  --  --  --  --  --  --  --  --  --
70:  --  --  --  --  --  --  --  --  --  --  --  --  76  --
```

## Domoticz Configuration

GUI > Setup > Hardware > Select Type, give Name, set path I2C bus > Add

Enabled:

Name: BME280

Type: I2C sensors

Data Timeout: Disabled

Specifying a Data Timeout will restart the hardware device if no data is received for the specified time.  
Do not enable this option for devices that do not receive data!

SubType: I2C sensor BME280 Temp+Hum+Baro

Path to I2C bus: /dev/i2c-1 (etc. /dev/i2c-1, or empty for autodetection)

**Add**

### Note

The path to the I2C Bus is given by this terminal command:

```
ls -l /dev/i2c-*
crw-rw---- 1 root i2c 89, 1 Aug 30 12:08 /dev/i2c-1
```

### Check if the hardware has been added to the hardware list

Name	Enabled	Type	Address	Port	Data Timeout
BME280	Yes	I2C sensor BME280 Temp+Hum+Baro	I2C	/dev/i2c-1	Disabled

### Check the Domoticz log entry after adding the hardware

```
2018-08-31 11:34:50.758 Status: I2C Start HW wif ID: 13 Name: I2C_BME280 Address: 0 Port: /dev/i2c-1
Invert:0
2018-08-31 11:34:50.758 Status: I2C_BME280: Worker started...
```

### Add new Device

Setup > Settings > Hardware/ Devices > Allow new Devices 5 minutes

A new device is added with idx=115 (Setup > Devices).

Idx	Hardware	ID	Unit	Name	Type	SubType	Data
115	BME280	0001	1	Server Room	Temp + Humidity + Baro	Weather Station	22.6 C, 53 %, 1009.7 hPa

Add the device, named BME280 and check the widgets.

Temperature Widget	Weather Widget
<p>BME280 <span style="font-size: 2em;">↓ 22.5° C / 53%</span></p>  <p>Comfortable, Barometer: 1010 hPa, Prediction: Cloudy Dew Point: 12.45° C Last Seen: 2019-07-18 15:49:08</p> <p><span style="color: #f00;">★</span> Log Edit Notifications</p>	<p>BME280 <span style="font-size: 2em;">1010 hPa</span></p>  <p>Prediction: Cloudy Last Seen: 2019-07-18 15:49:38</p> <p><span style="color: #f00;">★</span> Log Edit Notifications</p>

## Barometer Widget

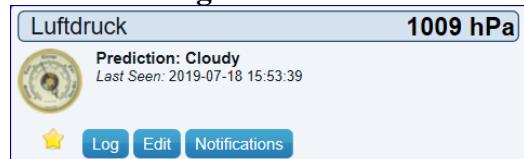
The BME280 measures pressure, temperature and humidity. As the BME280 is directly connected to the Raspberry Pi, the temperature and the humidity are used to monitor the Server Room (holding various hardware). In the Domoticz GUI, a Barometer Widget holds the value taken from the BME280.

The solution is to create a Virtual Sensor Type Barometer named “Luftdruck”.

### Luftdruck Virtual Sensor Device List Entry (idx=116)

116	VirtualSensors	00082116	1	Luftdruck	General	Barometer	1027.6 hPa
-----	----------------	----------	---	-----------	---------	-----------	------------

### Weather Widget Luftdruck



## Automation Script

Created a dzVents Lua script event to update the pressure and pressure forecast from the BME280 data. This is done using the Domoticz Event Editor.

Idx	Hardware	ID	Unit	Name	Type	Sub-Type	Data
115	BMP280	0001	1	BME280	Temp + Humidity + Baro	Weather Station	22.5 C, 53 %, 1010.0 hPa

The data holds: TEMP = Temperature C, HUM = Humidity %, BAR = Barometric pressure

### dzVents Lua Script

Event name: luftdruck\_update

```
-- [[
luftdruck_update.lua
If the a value of the BME280 device (idx=115) has changed,
update the value of the Virtual Sensor Barometer named Luftdruck (idx=116)
Use print(device.dump()) ONLY ONCE to get the properties.
Project: atHome
Interpreter: dzVents, Device
See: athome.pdf
Author: Robert W.B. Linn
Version: 20180911
]]-- 

-- Idx of the devices
local IDX_BME280 = 115;
local IDX_LUFTDRUCK = 116;

-- Event handling changes of the BME280 device
return {
  on = {
    devices = {
      IDX_BME280
    }
  },
  execute = function(domoticz, device)
    -- print(device.dump())
    -- domoticz.log('Device '.. device.name .. ' changed ', domoticz.LOG_INFO)
    domoticz.log('Barometer: '.. device.barometer .. '/' .. device.forecast .. '/' ..
device.forecastString, domoticz.LOG_INFO)

    -- Round the pressure
  end
}
```

```

pressure = math.floor(device.barometer)

-- Forecast from the BME280 device to the Barometer device
-- See source code RFXNames.cpp, BMP_Forecast_Desc
-- Map the BMP_Forecast_Desc string to dzEvents Forecast value:
-- domoticz.BARO_STABLE, BARO_SUNNY, BARO_CLOUDY, BARO_UNSTABLE, BARO_THUNDERSTORM

forecast = -1
if (device.forecastString == 'Stable') then forecast = domoticz.BARO_STABLE end
if (device.forecastString == 'Sunny') then forecast = domoticz.BARO_SUNNY end
if (device.forecastString == 'Cloudy') then forecast = domoticz.BARO_CLOUDY end
if (device.forecastString == 'Unstable') then forecast = domoticz.BARO_UNSTABLE end
if (device.forecastString == 'Thunderstorm') then forecast = domoticz.BARO_THUNDERSTORM end
if (device.forecastString == 'Unknown') then forecast = domoticz.BARO_STABLE end
if (device.forecastString == 'Cloudy/Rain') then forecast = domoticz.BARO_CLOUDY end

-- Update the virtual sensor Luftdruck
domoticz.devices(IDX_LUFTDRUCK).updateBarometer(pressure, forecast)
end
}

```

## Domoticz Log Entry

```

2019-07-18 15:57:39.571 Status: dzVents: Info: Handling events for: "BME280", value:
"22.5;53;1;1009.9;4"
2019-07-18 15:57:39.572 Status: dzVents: Info: ----- Start internal script: luftdruck_update: Device:
"BME280 (BMP280)", Index: 115
2019-07-18 15:57:39.572 Status: dzVents: Info: Barometer: B=1009.9000244141/F=4/FS=Cloudy
2019-07-18 15:57:39.573 Status: dzVents: Info: ----- Finished luftdruck_update

```

# Alert Message

## Purpose

To display an Alert Message on the GUI tabs Dashboard and Utility.  
If the Alert Level is 4 (ALERTLEVEL\_RED), then send email notification to the recipients defined in the GUI > Setup > Settings > Email)

The Alert Message is populated by various dzEvents, i.e.

- Raspberry Pi monitor (Script: rpi\_monitor.lua)
- Hue lamps living room timed switch (Script: hue\_wz\_timer.lua)
- More see the dedicated functions

## Solution

Add a Virtual Device named “Alert Messages”, Type General, SubType Alert, Idx=55.

Idx	Hardware	ID	Unit	Name	Type	SubType	Data
55	VirtualSensors	82054	1	Alert Messages	General	Alert	08.07.2019 14:41 - Postbox opened!

Add a User Variable IDX\_ALERTMSG, Integer, Value=55 (see previous).

6	IDX_ALERTMSG	Integer	55
---	--------------	---------	----

## Dashboard

Utility Sensors

Alert Messages

08.07.2019 14:41 - Postbox opened!

Last Seen: 2019-07-08 14:41:39

Type: General, Alert

Log Edit Notifications

## Widget

Alert Messages

08.07.2019 14:41 - Postbox opened!

Last Seen: 2019-07-08 14:41:39

Type: General, Alert

Log Edit Notifications

## Log Entries

Alert Messages	
Show 25 entries	
Date	Data
2019-07-08 14:41:39	08.07.2019 14:41 - Postbox opened!
2019-07-07 23:00:00	Hue Lampen aus 23:00
2019-07-07 21:21:00	Hue Lampen an 21:21
2019-07-07 20:51:01	Hue Lampen gehen an 21:21

## Automation Script

Monitor the level of the Alert Messages Device with idx=55.

If level (nValue) > 4 (or any other value set by uservar TH\_ALERTTOEMAIL) then send the Alert Message to Email recipients.

Event name: alertmsg\_monitor

```
local IDX_ALERTMSG = 55
local IDX_TH_ALERTTOEMAIL = 14

return {
  on = {
    devices = { IDX_ALERTMSG }
  },
  execute = function(domoticz, device)
    -- Send email notification in case level = 4 (or other see user var TH_ALERTTOEMAIL)
    if (device.nValue == domoticz.variables(IDX_TH_ALERTTOEMAIL).value) then
      domoticz.notify('ALERT:' .. device.text, device.text, domoticz.PRIORITY_HIGH)
    end
  end
}
```

Switch the Hue MakeLab ON and update the Alert Messages Device with a message.

Event name: hue\_control

```
local IDX_HUE_MAKELAB = 118;

return {
  on = {
    devices = { IDX_HUE_MAKELAB }
  },
  execute = function(domoticz, device)
    domoticz.log('device.name .. ' changed to ' .. device.state, domoticz.LOG_INFO)
    if (device.state == 'On') then
      local msg = device.name .. ' switched on at ' .. domoticz.helpers.isnow(domoticz)
      domoticz.helpers.alertmsg(domoticz, domoticz.ALERTLEVEL_YELLOW, msg)
      domoticz.log(msg, domoticz.LOG_INFO)
    end
  end
}
```

For all events, the helper functions are defined in the dzVents Lua script “global\_data”.

For this example, the helper functions “isnow” and “alertmsg” are used which are referenced as

- domoticz.helpers.isnow(domoticz)
- domoticz.helpers.alertmsg(domoticz, domoticz.ALERTLEVEL\_YELLOW, msg)

# Alert Message Reset

## Purpose

To reset the Alert Message to a default text using a Switch.

## Solution

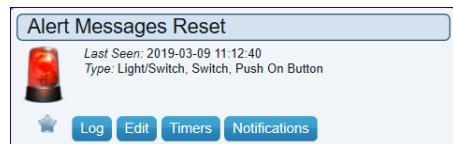
Create a virtual device type: Light/Switch, SubType: Switch.

If the switch is turned ON, the text of the alert sensor (Type=General, SubType=Alert, idx=55) is set to the value of the User Variable DEF\_ALERTMSG is set and the switch is turned OFF again. This is handled using a dzVents script.

## Device List

Idx	Hardware	ID	Unit	Name	Type	SubType	Data
119	VirtualSensors	000140C7	1	Alert Messages Reset	Light/Switch	Switch	Off

## Widget



## User Variable

Idx	Variable name	Variable type	Current value
7	DEF_ALERTMSG	String	Keine

## dzVents Script

```
local IDX_ALERTMSG_RESET = 119

return {
  on = {
    devices = { IDX_ALERTMSG_RESET }
  },
  execute = function(domoticz, device)
    domoticz.log('Device ' .. device.name .. ' was changed ' .. 
domoticz.devices(domoticz.variables('IDX_ALERTMSG').value).text, domoticz.LOG_INFO)

    if (device.state == 'On') then
      -- only change if the current text differs from the default text
      if (domoticz.devices(domoticz.variables('IDX_ALERTMSG').value).text ~= 
domoticz.variables('DEF_ALERTMSG').value) then
        local message = domoticz.variables('DEF_ALERTMSG').value
        domoticz.helpers.alertmsg(domoticz, domoticz.ALERTLEVEL_GREY, message)
        domoticz.log(message)
      end
    end
  end
}
```

## Database Tables

The Alert Message device (idx=55) is stored in the domoticz.db, table DevicesStatus.

SELECT * FROM DeviceStatus WHERE ID=55;																										
ID	Har...	Devic...	Unit	Name	Used	Type	Sub...	Swit...	Fav...	Sign...	Batt...	nVal...	sValue	LastUpdate	Order	Addj...	Addj...	Addj...	Addj...	StrP...	StrP...	Last...	Prot...	Cust...	Des...	Opt
55	6	82054	1	Alert Meldung	1	243	22	0	1	12	255	0	Reset	2018-09-13 13:57:03	55	0.0	1.0	0.0	1.0	0	0	0	0	0	Opt	

The log entries are stored in table LightingLog.

SELECT * FROM LightingLog WHERE DeviceRowID=55;				
Devi...	nVal...	sValue	Date	User
55	2	[ERROR] Powerconsumption: 7	2018-09-13 11:50:00	
55	2	[ERROR] Powerconsumption: 7	2018-09-13 11:55:00	
55	2	[ERROR] Electric usage: 7	2018-09-13 12:00:00	
55	2	[ERROR] Powerconsumption: 7	2018-09-13 12:00:00	
55	2	[ERROR] Electric usage: 7	2018-09-13 12:05:00	
55	2	[ERROR] Powerconsumption: 7	2018-09-13 12:05:00	
55	2	[ERROR] Powerconsumption: 7	2018-09-13 12:10:00	
55	0	Keine	2018-09-13 13:50:36	
55	0	Keine	2018-09-13 13:50:42	
55	0	Reset	2018-09-13 13:57:03	

In case entries should be deleted, stop domoticz, delete the rows using an SQLite tool and start domoticz.

# Ambient Light (BH1750)

## Purpose

To measure, using an ESP8266 microcontroller running [ESP Easy](#), the Ambient Light in Lux with a BH1750 sensor and send the value to a Domoticz Device. A light bulb is switched ON when the Lux value is below a threshold.

## I2C

The BH1750 sensor communicates with the ESP8266 microcontroller via I2C.  
The BH1750 sensor supports two addresses depending the ADDR pin connection:

BH1750 Pin	ESP8266 Pin	I2C Address
ADDR	A3 or GND	0x23 (Default)
ADDR	Vin	0x5C

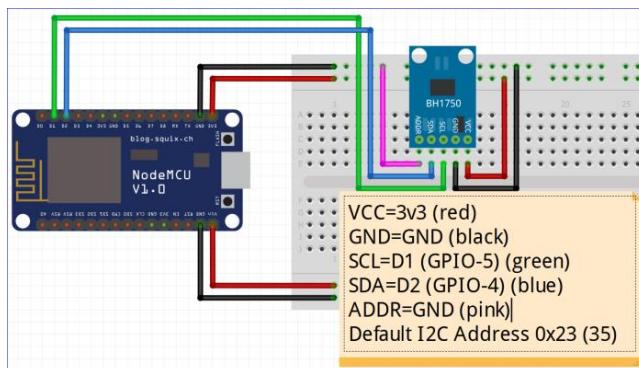
This device uses the default address 0x23 (ADDR connected to GND).

## Parts Needed

- 1x ESP8266 = used a NodeMCU v1.0 with 4M
- 1x BH1750FVI Sensor

## Wiring

The circuit shows the NodeMCU with BH1750 connected to I2C pins.



## Device Setup Domoticz

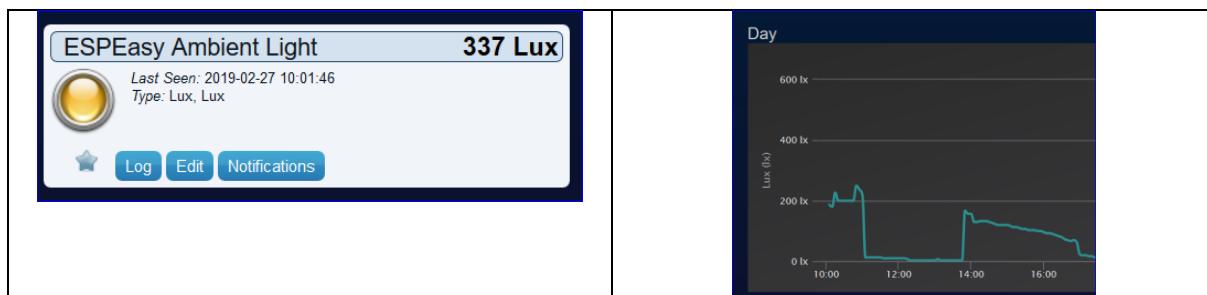
Create a virtual sensor: Sensor Type Lux with Name “ESPEasy Ambient Light”.  
After adding the new device, the idx is required for the ESP device settings: idx=46.

### Devices List Entry

46	VirtualSensors	82045	1	ESPEasy Ambient Light	Lux	LUX	177 Lux	9
----	----------------	-------	---	-----------------------	-----	-----	---------	---

## Widget

The widget and day chart showing actual values.



## Device Setup ESP Easy

Define the device via a browser by opening:

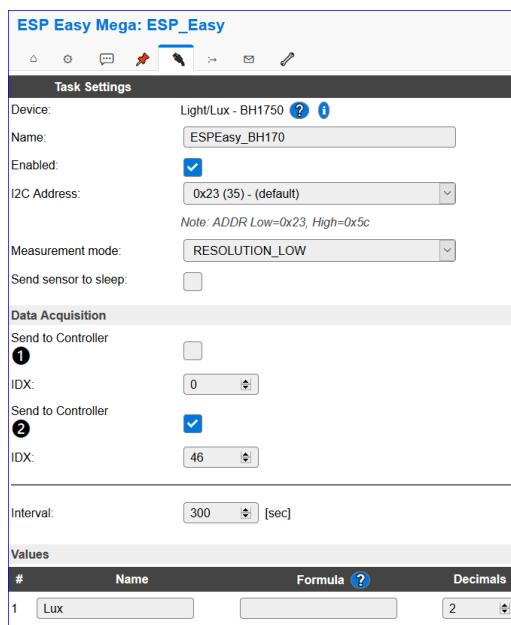
<http://esp-device-ip> > goto Devices > select Task Edit and configure.

The Domoticz MQTT controller is used and Domoticz device with idx=46 (as previous defined).

The Lux value is updated every 300 seconds (5 minutes) to Domoticz.

## Domoticz Log Entry Sample

```
2019-02-26 10:10:08.783 MQTT: Topic: domoticz/in, Message:
>{"idx":46,"RSSI":10,"nvalue":0,"svalue":"183.33"}
```



## ESP Easy Devices List Entry

<input type="button" value="Edit"/>	4	<input checked="" type="checkbox"/>	Light/Lux - BH1750	ESPEasy_BH170		<input checked="" type="checkbox"/> (46)	GPIO-4 GPIO-5	Lux: <input type="text" value="290.00"/>
-------------------------------------	---	-------------------------------------	--------------------	---------------	--	--	------------------	--

## Trigger Switch Light

If the Domoticz Ambient Light device (idx=46) Lux value is below threshold, then switch on a light. The light used, is a Philips Hue named MakeLab with idx=118. Instead a light as switch, other switches could be used as well.

### Threshold

Defined as Domoticz user variable: TH\_AMBIENT\_LIGHT with value integer 100.  
(Setup > More Options > User variables)

Idx	Variable name	Variable type	Current value
10	TH_AMBIENT_LIGHT	Integer	100

## Automation Script

Listen to device changes (device idx=46), check if the value is below threshold (user variable idx=9), switch light (device idx=118).

Event name: ambient\_light\_control\_espeasy

```
--[[[ambient_light_control_espeasy.lua
Measure the ambient light Lux value and if below threshold switch on hue light.
]]]

-- External modules:
local msgbox = require('msgbox')

-- Idx of the devices used
local IDX_AMBIENT_LIGHT = 46
local IDX_HUE_MAKELAB = 118
local IDX_TH_AMBIENT_LIGHT = 10

return {
  on = {
    devices = {
      IDX_AMBIENT_LIGHT
    }
  },
  execute = function(domoticz, device)
    -- get the threshold
    local althreshold = domoticz.variables(IDX_TH_AMBIENT_LIGHT).value

    domoticz.log('Device ' .. device.name .. ' changed to ' .. tostring(device.lux) .. ' / ' ..
    tostring(althreshold), domoticz.LOG_INFO)

    -- check threshold
    if (device.lux < althreshold) and (domoticz.devices(IDX_HUE_MAKELAB).state == 'Off') then
      domoticz.log('Ambient Light below threshold. Switched on light', domoticz.LOG_INFO)
      domoticz.devices(IDX_HUE_MAKELAB).switchOn()
      -- optional check leveland set to default 20%
      if domoticz.devices(IDX_HUE_MAKELAB).level < 20 then
        domoticz.devices(IDX_HUE_MAKELAB).dimTo(20)
      end
    end
  end
}
```

## Domoticz Log Entry

The log entry shows a Lux value which is below threshold, resulting in switching on the light.

```
2019-02-27 10:52:05.762 MQTT: Topic: domoticz/in, Message:  
{"idx":46,"RSSI":3,"nvalue":0,"svalue":"23.33"}  
2019-02-27 10:52:05.933 Status: dzVents: Info: Handling events for: "ESPEasy Ambient Light", value:  
"23.33"  
2019-02-27 10:52:05.933 Status: dzVents: Info: ----- Start internal script:  
ambient_light_control_espeasy: Device: "ESPEasy Ambient Light (VirtualSensors)", Index: 46  
2019-02-27 10:52:05.934 Status: dzVents: Info: Device ESPEasy Ambient Light changed to 23.33 / 100  
2019-02-27 10:52:05.934 Status: dzVents: Info: Ambient Light below threshold. Switched on light  
2019-02-27 10:52:05.935 Status: dzVents: Info: ----- Finished ambient_light_control_espeasy
```

# Android App atHome

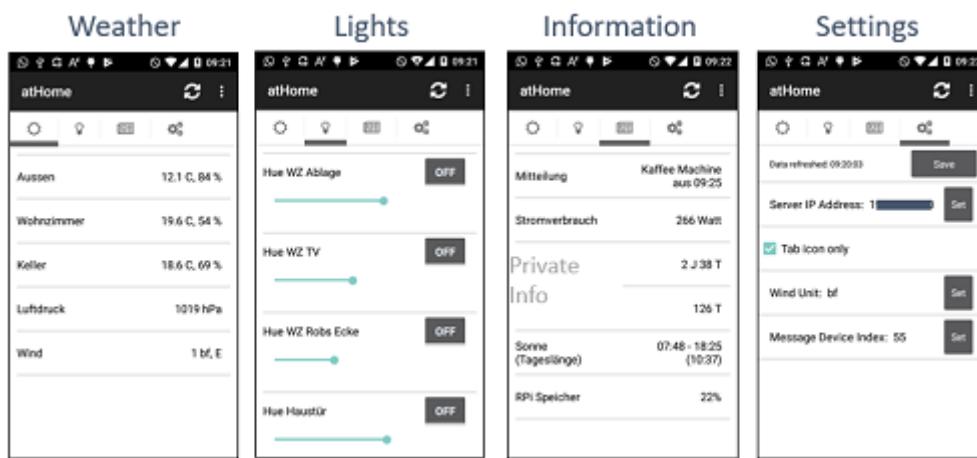
## Purpose

To develop an Android & Windows Desktop App displaying & controlling the Domoticz favorite devices, i.e. the devices shown in the Domoticz GUI Tab Dashboard.

## Solutions

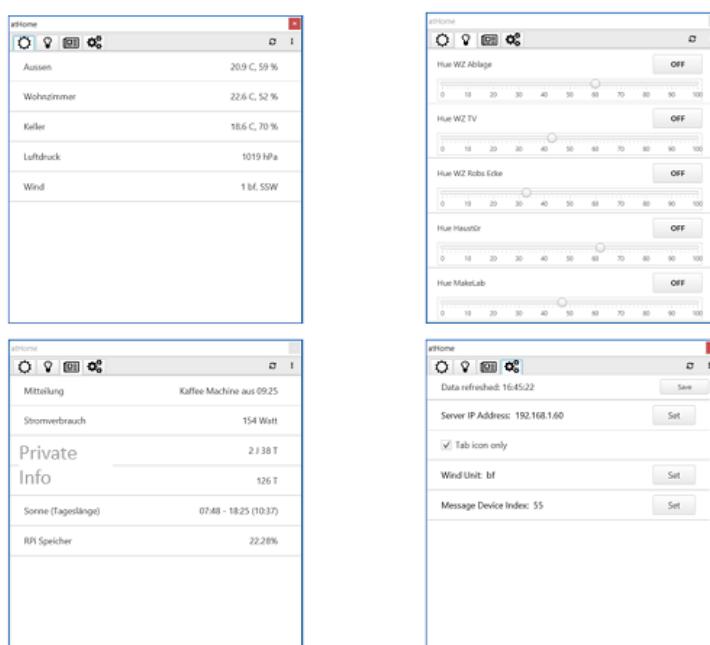
Android app developed with [B4A](#) v8.5.

Read the B4A Forum *Share My Creations* post [here](#).



Windows Desktop application developed with [B4J](#) v6.8.

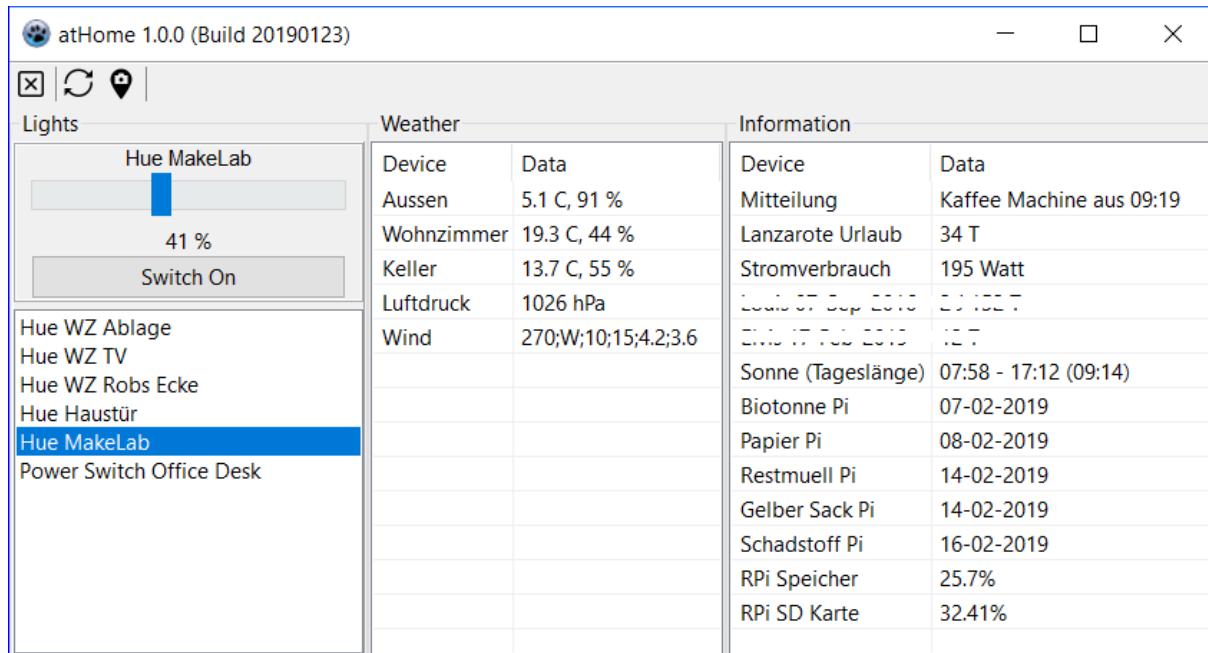
Read the B4J Forum *Share My Creations* post [here](#).



Note: current version in use has many more devices.

## Windows Desktop application developed with [Lazarus](#) v1.8.4.

Not published yet.



# Anemometer (TFA 30.3168)

## Purpose

To measure the wind speed (m/s, bft), direction and air temperature.

### Note

Only the wind speed & direction of this device are used and assigned to a Virtual Sensor Wind (see Function Wind) which is used for the Dashboard.

## Device

Device (433MHz): Anemometer **TFA Dostmann 30.3168 Windmeter**

Location: Garden shed (“Gartenhaus”).

The anemometer is connected to the RFXCOM RFXtrx433E.

## Setup

1. Open the device battery flip and take out the battery blocker
2. The device will be recognized automatically and listed under the devices list
3. Select the green arrow to give the device the name and the name will be shown in the list (see below)

### Anemometer Device List Entry (idx=28)

28	RFXtrx433e	9D16	0	Windmesser	Wind	TFA	293.00,WNW;9,9;14.6;14.6
----	------------	------	---	------------	------	-----	--------------------------

### Anemometer Widgets (Tabs Utility & Temperature)



# Blinds (Somfy RTS Pure)

## Purpose

To control (open, close, stop) Somfy Blinds (RTS Pure) using the RFXtrx433E Transceiver.

## Domoticz Configuration

1. Open Domoticz URL (like http://domoticz-ip:8080)
2. Domoticz GUI Tab Switches > Select Manual Switches
3. Select Manual/Light Switch
4. Define the properties (see right)

### Do NOT press Add Device

5. On the Remote RTS Pure Telis 1:  
Press the Prog Button for 3 seconds.  
The Blind will move short (=react).
6. Click Add Device
7. The new device is added to the Switches

#### Note

When adding more devices define a new ID and set the Unit Code, i.e. 2.

The existence of a device is checked by its unique ID + Unit Code

8. The device is listed under Settings > Devices (see below, idx 13)

The image consists of three vertically stacked screenshots from the Domoticz software interface.

**Screenshot 1: Add Manual Light/Switch Device**

This screenshot shows the configuration dialog for adding a new device. The fields are filled as follows:

- Hardware: RFXtrx433e
- Device name: Blind Bed Room
- Switch Type: Blinds
- Type: RFY
- ID: 1E 1E 1E
- Unit Code: 2

At the bottom, there is a "Test" button and a note: "As:  Main Device  Sub/Slave Device".

**Screenshot 2: Device Overview**

This screenshot shows the device details for "Blind Bed Room". The status is "Stopped". The last seen time is 2015-06-19 15:06:34. The type is listed as RFY, RFY, Blinds. Below the details are buttons for Star, Log, Edit, Timers, and Notifications.

**Screenshot 3: Devices List**

This screenshot shows the list of devices in Domoticz. The table includes columns for Idx, Hardware, ID, Unit, Name, Type, SubType, Data, and Last Seen. The device "Blind Bed Room" (Idx 13) is highlighted with a red border. Its details are identical to the ones shown in the first screenshot.

Idx	Hardware	ID	Unit	Name	Type	SubType	Data	Last Seen
14	RFXCom	450E	2	Temp Outside	Temp + Humidity	Cresta, TFA TS34C	19.0 C, 55 %	2015-06-19 15:55:10
11	RFXCom	2A0E	1	Temp Living Room	Temp + Humidity	Cresta, TFA TS34C	17.6 C, 59 %	2015-06-19 15:54:06
6	GPIO Port	18	LED GPIO18	Lighting_1	Impuls	Off	-	2015-06-19 15:20:16
12	RFXCom	1F1F1F	1	Blind Living Room	RFY	Stopped	-	2015-06-19 15:18:55
13	RFXCom	1E1E1E	2	Blind Bed Room	RFY	Stopped	-	2015-06-19 15:06:34

# Dashboard & Switches Widget

## Dashboard



Domoticz GUI Tab Switches Widgets Blind Living & Bed Room



## MQTT Messages

Example MQTT Messages for Topic="Domoticz/out", idx=13, name="Blind Bed Room".

The messages are related to switching states Open > Stop > Close > Stop, which is Payload Property nvalue.

Open	Stop	Close	Open
domoticz/out { "Battery" : 255, "RSSI" : 12, "description" : "", "dtype" : "RFY", "id" : "1E1E1E", "idx" : 13, "name" : "Blind Bed Room", "nvalue" : 1, "stype" : "RFY", "switchType" : "Blinds", "unit" : 2 }	domoticz/out { "Battery" : 255, "RSSI" : 12, "description" : "", "dtype" : "RFY", "id" : "1E1E1E", "idx" : 13, "name" : "Blind Bed Room", "nvalue" : 0, "stype" : "RFY", "switchType" : "Blinds", "unit" : 2 }	domoticz/out { "Battery" : 255, "RSSI" : 12, "description" : "", "dtype" : "RFY", "id" : "1E1E1E", "idx" : 13, "name" : "Blind Bed Room", "nvalue" : 3, "stype" : "RFY", "switchType" : "Blinds", "unit" : 2 }	domoticz/out { "Battery" : 255, "RSSI" : 12, "description" : "", "dtype" : "RFY", "id" : "1E1E1E", "idx" : 13, "name" : "Blind Bed Room", "nvalue" : 0, "stype" : "RFY", "switchType" : "Blinds", "unit" : 2 }

# Coffee Machine Monitor

## Purpose

To monitor, the start & end time of the Coffee Machine running early morning.

If the coffee machine is tuned on, an [Alert Message](#) is set.

The Coffee Machine switches OFF after two hours.

## Solution

Monitor the value of the Electric Usage House Device (idx=171, ).

If it is above a threshold (defined as User Variable, Integer) between timeframe.

If above threshold, then set the Alert Message.

Monitoring is handled by a dzVents Lua script event for device changes and timer.

The script uses a script level persistent variable “notified” to handle the Alert Message notifications (see dzvents script).

The threshold is set by a User Variable (i.e. 1100 Wh):

Idx	Variable name	Variable type	Current value
15	TH_COFFEEMACHINEMONITOR	Integer	1100

### Notes

1. The actual Wh is determined from the House Power Measurement. If another device is turned on prior coffee machine resulting in power usage above threshold, then the Coffee Machine Alert Message is sent – which is misleading.  
A solution, is to connect a power plug to the Coffee Machine (see [Electric Usage Rooms/Devices](#)).
2. The alertlevel orange (value 3) is used. if the uservar “th\_alerttoemail” is set to 3 then an email is sent if the electricusage threshold is reached (see dzVents Script).

# Automation Script

Event name: coffee\_machine\_monitor

```
-- Idx of the device kWh
local IDX_ELECTRICUSAGEHOUSE = 171
-- Idx of the user variable for the threshold (as integer)
local IDX_TH_COFFEE MACHINE MONITOR = 15
-- Monitor the whactual between 7 and 9 if above threshold
local MONITOR_START_END = 'at 07:00-09:00'

return {
  on = {
    -- monitor the whactual between start end time
    timer = {
      MONITOR_START_END
    },
  },
  data = {
    -- set a flag if already notified within timeframe
    notified = { initial = 0 }
  },
  execute = function(domoticz)
    -- Check if below threshold and notified flag set
    -- Action: reset notified flag
    if (domoticz.devices(IDX_ELECTRICUSAGEHOUSE).WhActual <
domoticz.variables(IDX_TH_COFFEE MACHINE MONITOR).value) and (domoticz.data.notified == 1)
      then
        domoticz.data.notified = 0
      end

    -- Check if above threshold and notified flag not set
    -- Action: set notified flag and alert message
    if (domoticz.devices(IDX_ELECTRICUSAGEHOUSE).WhActual >
domoticz.variables(IDX_TH_COFFEE MACHINE MONITOR).value) and (domoticz.data.notified == 0)
      then
        -- set notified flag
        domoticz.data.notified = 1
        -- get the time on and log
        timeon = os.date("*t")
        message = ('Coffee Machine On %02d:%02d'):format(timeon.hour, timeon.min)
        domoticz.log(message, domoticz.LOG_INFO)
        -- calculate the time off = timeon + 2 hours
        timeoff = os.date("*t", os.time() + 2*60*60)
        -- define message to notify the time coffee machine switches off
        message = ('Coffee Machine Off %02d:%02d'):format(timeoff.hour, timeoff.min)
        -- update alert message
        domoticz.helpers.alertmsg(domoticz, domoticz.ALERTLEVEL_ORANGE, message)
        domoticz.log(message, domoticz.LOG_INFO)
      end
    end
  }
}
```

# Contact Detection (433 Mhz)

## Purpose

To monitor opening of doors/windows (or other like monitoring the postbox) and trigger a “contact open” notification action.

## Solution Sensor PB-62R

This solution makes use of the wireless 433Mhz contact detector PB-62R (from KOBERT-GOODS) connected to RFXCOM RFxTrx433E.

Tested two devices:

<b>PB-62R</b>	<b>PB-67R</b>
From: KOBERT-GOODS Costs: ~10EUR Battery: 12V (MN21/23) with duration ~4 month.	From: KOBERT-GOODS Costs: ~10EUR
 <ul style="list-style-type: none"> <li>• Left = Magnet</li> <li>• Right = Detector with               <ul style="list-style-type: none"> <li>◦ top left red LED (lights up if the contact is “broken”),</li> <li>◦ Middle right reset button used for Domoticz to learn the device.</li> </ul> </li> </ul>	<p>(Status 20190521)  <b>Tested but not supported by RFXCOM RFxTrx433E.</b>            The RFXCOM Manager recognized the switch as:            Packettype = Lighting5            ERROR: Unknown Sub type for Packet type=14: 11            Signal level = 7</p>
<p><b>Ways-of-Working</b>            If the state of the contact switch changes to “Alarm + Tamper” and a notification is sent to inform.            If the door is closed again, the contact switch does not send a change state, which means a manual or timer trigger is required to reset the state to “Normal”.</p>	<p>&lt;TODO&gt;            Watch for RFXCOM updates and check if this device is supported.</p>

## Domoticz Configuration

Learn the new device:

Domoticz GUI > Setup > Settings > Hardware/Devices > Allow for 5 minutes

Press and hold for a few seconds the reset button on the device.

Check the devices list for the new device:

Domoticz GUI > Setup > Devices > Scroll down to the last list entry.

A new device is listed:

- Idx: 160
- HW: RFXtrx433e
- Name: Unknown
- Type: Security
- SubType: X10 security
- Data: Alarm + Tamper
- Battery: full green

Add and name the device: Security Main Door.

	Idx	Hardware	ID	Unit	Name	Type	SubType	Data	Full	Battery
(Device icon)	160	RFXtrx433e	5C0700	0	Security Main Door	Security	X10 security	Alarm + Tamper	7	Full battery icon

The device widget is listed in the tab Switches.

## Alarm Detection

 <p><b>Security Main Door</b>      <b>Alarm + Tamper</b></p> <p>Last Seen: 2019-05-20 09:43:46 Type: Security, X10 security, Security</p> <p>   </p>	<p>If door is opened, the alarm state is set to <b>Alarm + Tamper</b>. The state is not reset by the device itself and requires a trigger, i.e. Button or dzVents timer script!</p>
 <p><b>Security Main Door</b>      <b>Normal</b></p> <p>Last Seen: 2019-05-20 09:36:00 Type: Security, X10 security, Security</p> <p>   </p>	<p>State reset to Normal via HTTP API Request:  <a href="http://domoticz-ip:8080/json.htm?type=command&amp;param=switchlight&amp;idx=160&amp;switchcmd=Normal">http://domoticz-ip:8080/json.htm?type=command&amp;param=switchlight&amp;idx=160&amp;switchcmd=Normal</a></p>

## Automation Script

Solution to reset all PB-62R devices (applies to X10 switches with state Alarm + Tamper) to state **Normal** by using a dzVents Lua script event.

If a device state changes to **Alarm + Tamper**, notify email and set user variable DEF\_SECURITY\_ALARM to monitor state to 1.

Reset, via timer every 5 minutes, the state of the devices defined in the array SECURITYDEVICES and set the user variable to 0.

Event name: security\_monitor

```
-- Array holding the idx for the security devices:security main door (160), ...
local SECURITYDEVICES = {160}
-- User variable holding the state of the alarm (0=Normal, 1=Alarm)
local IDX_DEF_SECURITY_ALARM = 13

return {
  on = {
    devices = SECURITYDEVICES
    ,
    timer = {'Every 5 minutes'}
  },
  execute = function(domoticz, item)
    if (item.isDevice) then
      if (item.state ~= 'Normal') then
        domoticz.email('SECURITY ALERT atHome', item.name .. ' state ' .. item.state, , 'email-address')
        domoticz.variables(IDX_DEF_SECURITY_ALARM).set(1)
      end
    end

    if (item.isTimer) then
      if (domoticz.variables(IDX_DEF_SECURITY_ALARM).value == 1) then
        domoticz.variables(IDX_DEF_SECURITY_ALARM).set(0)
        for i, idx in ipairs(SECURITYDEVICES) do
          domoticz.devices(idx).setState('Normal')
        end
      end
    end
  end
}
```

### User Variable

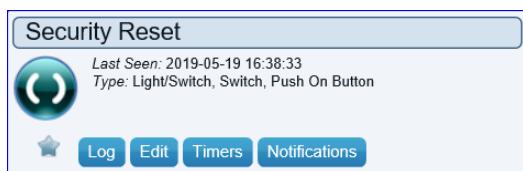
Idx	Variable name	Variable type	Current value
13	DEF_SECURITY_ALARM	Integer	0

## Alarm State Reset Switch

Solution to reset all security devices (mainly X10) to state Normal by using a switch:

- Idx: 162
- Name: Security Reset
- Type: Light/Switch
- SubType: Switch
- Switch Type: Push On Button

which triggers a dzVents Lua script event “security\_reset”.



	Idx	Hardware	ID	Unit	Name	Type	SubType	Data
⑥	162	VirtualSensors	000140F2	1	Security Reset	Light/Switch	Switch	On

Event name: security\_reset

```
-- security_reset.lua
-- The push button to reset the contacts
local IDX_SECURITY_RESET = 162
-- Array of the idx for the security devices: security front door, ...
local securitydevices = {160}
return {
  on = {
    devices = {IDX_SECURITY_RESET}
  },
  execute = function(domoticz, device)
    domoticz.log('SECURITY RESET: ' .. device.name, domoticz.LOG_INFO)
    -- Loop over the array
    for i, idx in ipairs(securitydevices) do
      domoticz.devices(idx).setState('Normal')
    end
  end
}
```

## MQTT

Explored MQTT payload when the X10 security device state changes.

### Alarm State Change to "Alarm + Tamper"

#### MQTT Result

```
{
  "Battery" : 100,   "RSSI" : 5,    "description" : "",    "dtype" : "Security",   "id" : "5C0700",
  "idx" : 160,     "name" : "Main Door State",   "nvalue" : 130,    "stype" : "X10 security",   "switchType"
  : "On/Off",      "unit" : 0}
```

#### Note

If the state is in Alarm, the nvalue is greater 0, in this case 130 for state "Alarm + Tamper". The MQTT JSON string shows the "switchType" : "On/Off", means the switchlight command/param can be used.

#### Domoticz Log

```
2019-05-18 11:17:04.661 (RFXtrx433e) Security (Main Door State)
2019-05-18 11:17:04.816 Status: dzVents: Info: Handling events for: "Main Door State", value: "Alarm +
Tamper"
2019-05-18 11:17:04.816 Status: dzVents: Info: ----- Start internal script: event_monitor: Device:
"Main Door State (RFXtrx433e)", Index: 160
2019-05-18 11:17:04.817 Status: dzVents: Info: ----- Finished event_monitor
2019-05-18 11:17:04.818 Status: EventSystem: Script event triggered:
/home/pi/domoticz/dzVents/runtime/dzVents.lua
```

### Alarm State Reset to "Normal"

#### HTTP API Request Test

```
http://domoticz-ip:8080/json.htm?type=command&param=switchlight&idx=160&switchcmd=Normal
```

#### HTTP JSON Result

```
{"status" : "OK","title" : "SwitchLight"}
```

#### MQTT JSON Result

```
{
  "Battery" : 100,   "RSSI" : 12,    "description" : "",    "dtype" : "Security",   "id" : "5C0700",
  "idx" : 160,     "name" : "Main Door State",   "nvalue" : 0,    "stype" : "X10 security",   "switchType"
  : "On/Off",      "unit" : 0}
```

#### Note

If the state is Normal (so not in Alarm), the nvalue is 0.

#### Domoticz Log

```
2019-05-18 11:14:43.559 (RFXtrx433e) Security (Main Door State)
2019-05-18 11:14:43.552 Status: User: Admin initiated a switch command (160/ Main Door State/Normal)
2019-05-18 11:14:43.711 Status: dzVents: Info: Handling events for: " Main Door State", value: "Normal"
2019-05-18 11:14:43.711 Status: dzVents: Info: ----- Start internal script: event_monitor: Device:
"Main Door State (RFXtrx433e)", Index: 160
2019-05-18 11:14:43.712 Status: dzVents: Info: ----- Finished event_monitor
2019-05-18 11:14:43.713 Status: EventSystem: Script event triggered:
/home/pi/domoticz/dzVents/runtime/dzVents.lua
```

## Another HTTP API Request Test

```
http://domoticz-ip:8080/json.htm?type=command&param=switchlight&idx=160&switchcmd=Alarm
```

The MQTT nvalue is 2.

*Note*

For the state "Alarm + Tamper" the nvalue is 130.

# Days-To-Go

## Purpose

To calculate, once a day around midnight, the days-to-go for several Virtual Devices.  
Beside days-to-go, days-left are also calculated depending date given.  
Update the Control Message after updating the devices.

### Widget Sample



### Note

Changed the name and the days calculated use different dates then the script below.

## Solution

Run a dzVents Lua script event “days\_to\_go\_update”, once a day at 00:15, to calculate the date difference in days and update the devices.

The dzVents Lua script event is written using the Domoticz Event Editor (GUI > Setup > More Options > Events).

# Atomation Script

Event name: days\_to\_go\_update  
 (code stripped)

```
-- Idx of the devices
local IDXDAYSX = 29;
local IDXDAYSY = 57;
local IDXDAYSZ = 97;
local IDXCONTROLMSG = 52;

-- Calculate the date difference in days between now and the target date
-- Return days
local function datediffnow(d,m,y)
  local targetdate = os.time{day=d, month=m, year=y}
  local daysdiff = os.difftime(targetdate, os.time()) / (24 * 60 * 60)
  return math.floor(daysdiff)
end

-- Get the current date & time from the domoticz instance with time object
-- Return date & time now, i.e. 2018-09-05 09:09:00
local function isnow(domoticz)
  return domoticz.time.rawDate .. ' ' .. domoticz.time.rawTime
end

return {
  on = {
    timer = {
      -- 'every minute',
      'at 00:15'
    }
  },
  execute = function(domoticz, timer)
    domoticz.devices(IDXDAYSX).updateText(datediffnow(1,9,2021) .. ' Tage')
    domoticz.devices(IDXDAYSY).updateText(datediffnow(1,9,2016) .. ' Tage')
    domoticz.devices(IDXDAYSZ).updateText(datediffnow(1,9,2019) .. ' Tage')
    domoticz.devices(IDXCONTROLMSG).updateText('Days-to-go updated ' .. isnow(domoticz))
  end
}
```

## Domoticz Log Entry

*Script saved*

```
2018-09-04 14:44:35.496 Status: EventSystem: reset all events...
2018-09-04 14:44:35.497 Status: dzVents: Write file:
/home/pi/domoticz/scripts/dzVents/generated_scripts/days_to_go_update.lua
```

*Script running*

(for tests running every minute instead of once per day)

```
2018-09-04 15:36:00.068 Status: dzVents: Info: ----- Start internal script: days-to-go-update:, trigger: every minute
2018-09-04 15:36:00.085 Status: dzVents: Info: ----- Finished days-to-go-update
```

## Addition

A script addition is made to calculate an age in xx Years yy Days.

```
ageyearsdays(7,9,2016)
```

### *Lua Functions*

```
-- Calculate the date difference in days between now and the target date
-- Return days
local function datediffnow(d,m,y)
    -- Set the target date from the parameter
    local targetdate = os.time{day=d, month=m, year=y}

    -- Get the time diff between now and the target date in seconds in a day
    local daysdiff = os.difftime(targetdate, os.time()) / (24 * 60 * 60)

    -- Return the days
    return math.floor(daysdiff)
end

-- Calculate the age in years + days
-- Return age as string years J days T
local function ageyearsdays(dbirth,mbirth,ybirth)
    -- get the actual date
    t = os.date ("*t")

    -- get the year, month, day for now
    ynow = t.year
    mnow = t.month
    dnow = t.day

    -- year difference between now year and the target year
    ydiff = ynow - ybirth
    -- days difference between now and the target day+month for the now year
    -- i.e. dtarget+mtarget+ynow
    ddiff = math.abs(datediffnow(dbirth, mbirth, ynow))

    -- build the age string to return
    age = ydiff .. ' J ' .. ddiff .. ' T'
    -- print(age)
    return age
end
```

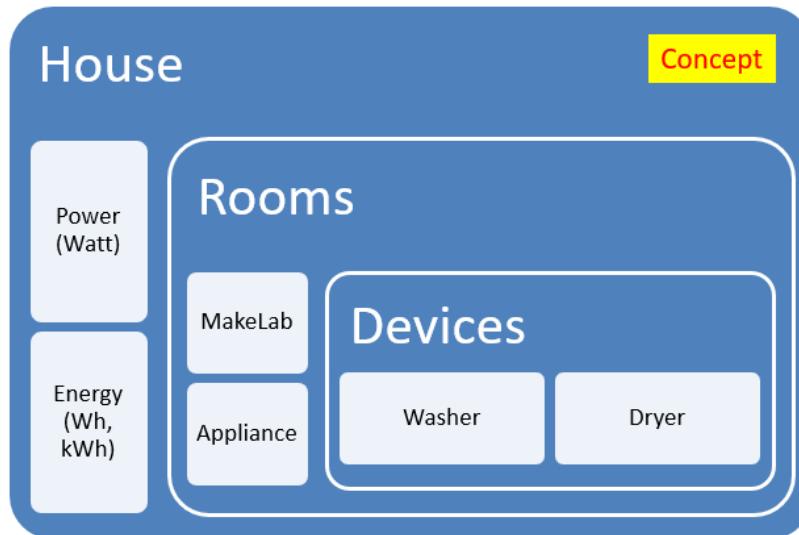
# Electric Usage

## Purpose

To monitor the Power (Watt) and Energy (kWh) consumption for

- the house (as total)
- selected rooms
- selected devices

## Solution



The solution makes use of several functions, described in the dedicated chapters:

- [Electric Usage House](#)
- [Electric Usage Rooms/Devices](#)

<TODO> Add more

# Electric Usage House (volkszaehler)

## Purpose

To measure the total Power (Watt) and Energy (Wh, kWh) for the house.

## Solution

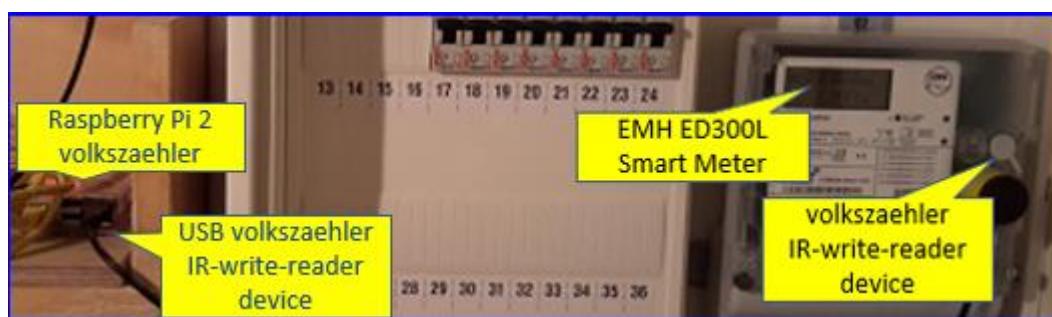
The house has a Smart Meter (Type EMH ED300L) which records consumption of electric energy used for monitoring and billing.

A [volkszaehler](#) (Open Source Smart Meter solution) IR-write-reader device sends data, via USB, to a Raspberry Pi 2 running the volkszaehler middleware.

The Domoticz system polls the volkszaehler every minute for average power data, which is assigned to a Domoticz devices.

For more information, read the [Appendix volkszaehler Setup](#), but some screenshots of the volkszaehler setup and web frontend.

### Hardware Setup volkszaehler



### Web Frontend volkszaehler



# Domoticz Configuration

## Device

Create a Virtual Sensor with Name **Electric Usage House** and Type **Electric (Instant+Counter)**.

Idx	Hardware	ID	Unit	Name	Type	SubType	Data
171	VirtualSensors	00082171	1	Electric Usage House	General	kWh	333.939 kWh

The widget is added to the Utility tab.

Idx	Hardware	ID	Unit	Name	Type	SubType	Data
171	VirtualSensors	00082171	1	Electricity House	General	kWh	3.775 kWh

The screenshot shows the 'Edit Device' dialog for 'Electric Usage House' and its corresponding utility tab widget. The utility tab displays current power usage (2317 Watt) and energy usage (3.775 kWh). The edit dialog shows the device name, type (Usage), and energy read setting (Computed).

The widget shows:

- Top Right: Current Power Usage (Watt) obtained from volkszaehler data.average property.
- Under Today: Energy Usage (kWh) calculated by Domoticz.

The widget is edited to set the property “Energy read” to computed, means Domoticz calculates the Energy (Wh, kWh) using the Power Usage (Watt).

## RFXMeter

To calculate the Energy costs, following settings used:  
(Domoticz GUI > Setup > Settings > RFXMeter/Counter Dividers)

RFXMeter/Counter Dividers:		Costs T1: 0.2217 / kWh		Costs T2: 0.2217 / kWh	
Energy:	1000	Costs R1:	0	Costs R2:	0

T1 = energy usage meter tariff 1 (Night)

T2 = energy usage meter tariff 1 (Day)

The costs can be obtained from the Device Log > Report. The info below uses initial data just to show the calculation, i.e. June 1.86 EUR = 8.403 kWh x 0.2217 EUR/kWh.

Electricity House 2019			
Total Usage: 10.057 kWh Counter: 10.085 kWh Year Cost: 2.23			
Month	Usage	Costs	
05. May	1.654	0.37	=
06. June	8.403	1.86	↑

## Polling

To get the electricity data from the volkszaehler server and update the Domoticz device, a dzVents Lua script event “electricity\_usage\_update” is executed every minute (Timer):

1. Send, every minute – polling interval, an HTTP GET Request to the Raspberry Pi running the volkszaehler.  
The request response is handled using callback in the script.
2. The volkszaehler response is a JSON string containing the tuples, data.average, data.consumption.
3. Parse the JSON string to get the power usage from key “data.average”.  
(which calculates the average electric usage over the last minute- the polling interval)
4. Update the Domoticz device Electricity House  
The device property “Energy read” is set to Computed, which means Domoticz calculated the Energy (kWh) from the given Power (Watt).

### Cross Check Domoticz Calculation vs Smart Meter Display

Compared, with data for several hours, the Domoticz calculation (Wh from the Day chart export data table) against the Smart Meter (Type EMH ED300L) display (kWh without digits, difference between start and end time in hours).

The result:

Domoticz 3.2 kWh vs Smart Meter 3 kWh (display delta 8077 – 8074).

As the Smart Meter does not display digits, the result is getting close.

<TODO>Performsome more cross checks.

## HTTP API GET Request

The HTTP GET request uses Channel 1 (1.8.0 Zählerstand, which is also displayed on the Meter) with UUID: 5b8ea2a0-b342-11e8-bec6-15c040e6d041) and timestamp parameter:

- **from=1+minutes+ago**
- **to=now**

### Request Examples with JSON Response

(see also the volkszaehler reference) (ensure to replace, in the URL request, the space by a +)

Obtain the Power Usage from key: data.average

#### Data for the last minute

```
http://domoticz-ip /middleware.php/data/5b8ea2a0-b342-11e8-bec6-15c040e6d041.json?from=1+minutes+ago&to=now
```

```
{"version":"0.3","data":{"tuples":[[1559376630383,296.907,1],[1559376632787,299.501,1],[1559376635056,317.32,1],[1559376637366,311.688,1],[1559376639582,324.91,1],[1559376641817,322.148,1],[1559376643928,341.071,1],[1559376646081,334.417,1],[1559376648138,350.024,1],[1559376650187,351.391,1],[1559376652233,351.906,1],[1559376654260,355.205,1],[1559376656255,360.902,1],[1559376658459,326.679,1],[1559376660686,323.305,1],[1559376662344,651.387,1],[1559376664129,806.723,1],[1559376665925,400.891,1],[1559376667657,415.704,1],[1559376669441,403.587,1],[1559376671175,415.225,1],[1559376672970,401.114,1],[155937667475,6,403.135,1],[1559376676530,405.862,1],[1559376678314,403.587,1],[1559376680046,415.704,1],[1559376681844,400.445,1],[1559376683575,415.945,1],[1559376685339,408.163,1],[1559376687028,426.288,1],[1559376688804,405.405,1],[1559376690535,415.945,1]],"uuid":"5b8ea2a0-b342-11e8-bec6-15c040e6d041","from":1559376627958,"to":1559376690535,"min":1559376630383,296.90721677136,"max":1559376664129,806.72268794865],"average":385.445,"consumption":6.7,"rows":33}}
```

The average power is 385.445 Watt calculated from 33 tuples.

#### Data now with one tuple

```
http://NNN.NNN.1.139/middleware.php/data/5b8ea2a0-b342-11e8-bec6-15c040e6d041.json?from=now&tuples=1
```

```
{"version":"0.3","data":{"tuples":[[1559377278643,334.728,1]]}, "uuid": "5b8ea2a0-b342-11e8-bec6-15c040e6d041", "from": 1559377276492, "to": 1559377278643, "min": 1559377278643, 334.72803378454, "max": 1559377278643, 334.72803378454, "average": 334.728, "consumption": 0.2, "rows": 1}}
```

The average power is 334.728 Watt calculated from 33 tuples.

## Automation Script

The dzEvents Lua script event “electricity\_usage\_update” runs every minute and has a callback “ElectricityUsageCallback“ handling the volkszaehler server response.

Script source code with minimal comments (the full latest version can be found on GitHub).  
Event name: electricity\_usage\_update

```

local URL_DOMOTICZ = 'http://DOMOTICZ-IP:8080'
local URL_VZREQUEST = 'http://VZ-IP/middleware.php/data/5b8ea2a0-b342-11e8-bec6-
15c040e6d041.json?from=1+minutes+ago&to=now'
local RES_VZREQUEST = 'electricusagehouse'
local IDX_ELECTRICUSAGEHOUSE = 171 -- Type=General, SubType=kWh

return {
    -- active = true,
    on = {
        timer = {
            'every minute'
        },
        httpResponses = {
            RES_VZREQUEST
        }
    },
    execute = function(domoticz, item)
        if (item.isTimer) then
            domoticz.openURL({ url = URL_VZREQUEST, method = 'GET', callback = RES_VZREQUEST })
        end

        if (item.isHTTPResponse) and (item.trigger == RES_VZREQUEST) then
            if (item.ok) then -- statusCode == 2xx
                local power = math.floor(tonumber(item.json.data.average))
                domoticz.openURL({
                    url = '' .. URL_DOMOTICZ .. '/json.htm?type=command&param=udevice&idx=' ..
IDX_ELECTRICUSAGEHOUSE .. '&nvalue=0&svalue=' .. tostring(power) .. ';0',
                    method = 'GET'})
                local message = ('Electric Usage vz: %02d W, Status: %02d'):format(power, item.statusCode)
                domoticz.log(message, domoticz.LOG_INFO)
                message = ('Wh = Actual: %02d, Today: %02d, Total:
%02d'):format(domoticz.devices(IDX_ELECTRICUSAGEHOUSE).WhActual,
domoticz.devices(IDX_ELECTRICUSAGEHOUSE).WhToday,domoticz.devices(IDX_ELECTRICUSAGEHOUSE).WhTotal)
                domoticz.log(message, domoticz.LOG_INFO)
            end

            if not (item.ok) then -- statusCode != 2xx
                local message = '[ERROR] ' .. HTTPCALLBACKNAME .. ':' .. tostring(item.statusCode) .. ' ' ..
msgbox.isnowdatetime(domoticz)
                domoticz.helpers.alertmsg(domoticz, domoticz.ALERTLEVEL_YELLOW, message)
                domoticz.log(message, domoticz.LOG_INFO)
            end
        end
    end
}
}

```

## Domoticz Log Entry

```
#Script Start Finished
2019-06-01 10:33:00.619 Status: dzVents: Info: ----- Start internal script: electricity_usage_update:, trigger: every minute
2019-06-01 10:33:00.620 Status: dzVents: Info: ----- Finished electricity_usage_update
2019-07-29 10:03:00.259 Status: EventSystem: Script event triggered: /home/pi/domoticz/dzVents/runtime/dzVents.lua

#Script HTTP Callback after previous finishing
2019-07-29 10:03:00.396 Status: dzVents: Info: Handling httpResponse-events for: "electricusagehouse"
2019-07-29 10:03:00.396 Status: dzVents: Info: ----- Start internal script: electric_usage_house: HTTPResponse: "electricusagehouse"
2019-07-29 10:03:00.403 Status: dzVents: Info: Electric Usage vz: 2528 W, Status: 200
2019-07-29 10:03:00.420 Status: dzVents: Info: Wh = Actual: 2408, Today: 2579, Total: 334381
2019-07-29 10:03:00.420 Status: dzVents: Info: ----- Finished electric_usage_house
```

## MQTT

Example MQTT payload (topic "domoticz/out") for Device “Electric UsageHouse” with idx=171.

```
{"Battery" : 255, "EnergyMeterMode" : "1", "RSSI" : 12, "description" : "Energy (Wh) & Power (Watt) provided, every minute, by the volkszaehler Raspberry Pi.\nThe Energy is computed from the Power.", "dtype" : "General", "id" : "00082171", "idx" : 171, "name" : "Electri Usage House", "nvalue" : 0, "stype" : "kWh", "svalue1" : "824", "svalue2" : "4119.1", "unit" : 1}
```

## Properties

- svalue1 = current power usage (Watt)
- svalue2 = total energy cumulated over all days (kWh).

## HTTP API Request

### Request

```
http://domoticz-ip:8080/json.htm?type=devices&rid=171
```

### JSON Response (extract)

```
{
  ...
  "app_version" : "4.10717",
  "result" : [
    {
      "CounterToday" : "2.484 kWh",
      "Data" : "4.146 kWh",
      "EnergyMeterMode" : "1",
      "HardwareName" : "VirtualSensors",
      "LastUpdate" : "2019-06-01 10:49:00",
      "Name" : "Electricity House",
      "SubType" : "kWh",
      "Type" : "General",
      "TypeImg" : "current",
      "Unit" : 1,
      "Usage" : "510 Watt",
      "Used" : 1,
      "idx" : "171"
    }
  ],
  "status" : "OK",
  "title" : "Devices"
}
```

## Properties

- Usage = current power usage (Watt)
- Data = total energy cumulated over all days (kWh).

### *HTTP API Information*

```
Electricity (instant and counter)
/json.htm?type=command&param=udevice&idx=IDX&nvalue=0&svalue=POWER;ENERGY
IDX = id device
POWER = current power
ENERGY = cumulative energy in Watt-hours (Wh)
Incrementing counter because type "Energy read : Computed"
```

## Log Examples

The log for the device “Electricity House” shows the

- Day = Power (Watt, every 5 minutes) + Energy (Wh, every hour)
- Week = total daily energy (kWh).

In the MQTT and HTTP API Request, the total energy is returned (~4.1 kWh).



### Note

This information can also be obtained by amending the previous dzVents Lua script “electricity\_usage\_update”:

```
domoticz.log('[INFO] WhToday: ' .. tostring(domoticz.devices(IDX_ELECTRICITYHOUSE).WhToday),
domoticz.LOG_INFO)
domoticz.log('[INFO] WhTotal: ' .. tostring(domoticz.devices(IDX_ELECTRICITYHOUSE).WhTotal),
domoticz.LOG_INFO)
domoticz.log('[INFO] WhActual: ' .. tostring(domoticz.devices(IDX_ELECTRICITYHOUSE).WhActual),
domoticz.LOG_INFO)
```

```
2019-06-01 11:08:00.984 Status: dzVents: Info: [INFO] Electric usage updated: 106 W, status:200
2019-06-01 11:08:00.985 Status: dzVents: Info: [INFO] WhToday: 2671
2019-06-01 11:08:00.985 Status: dzVents: Info: [INFO] WhTotal: 4333.2
2019-06-01 11:08:00.985 Status: dzVents: Info: [INFO] WhActual: 162
```

## Database Table

The device “Electricity House” stores its data in database “domoticz.db”, table Meter with structure

```
CREATE TABLE [Meter] (
[DeviceRowID] BIGINT NOT NULL,
[Value] BIGINT NOT NULL,
[Usage] INTEGER DEFAULT 0,
[Date] DATETIME DEFAULT (datetime('now','localtime'))
);
```

- Value is current Power in Watt
- Usage is cumulated Energy in Wh

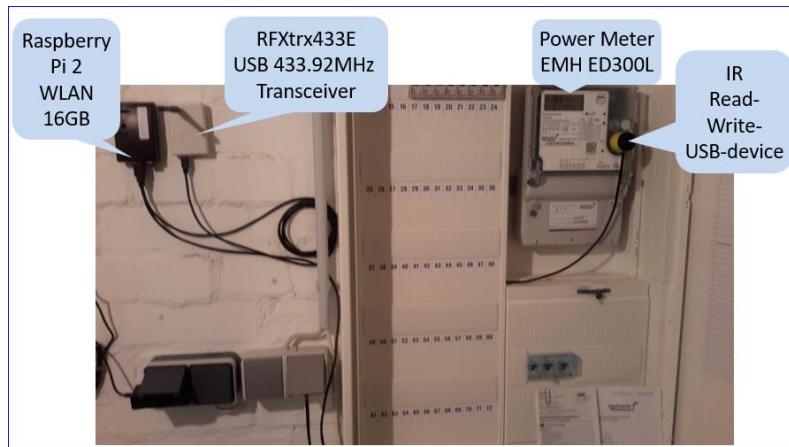
### Example SQL SELECT on table Meter

```
cd domoticz
~/domoticz $ sqlite3
SQLite version 3.16.2 2017-01-06 16:32:41
sqlite> .open domoticz.db
sqlite> select * from Meter where DeviceRowID = 171 and Date > "2019-06-02 09:50:00";
171|10115|1690|2019-06-02 09:55:00
171|10132|1690|2019-06-02 10:00:00
```

# volkszaehler

## Overview

The volkszaehler (vz) Raspberry Pi (Model 2 with stretch) is connected to the electric meter reader [EMH ED300L](#) using the IR-Read-Write-USB-Device (provided by volkszaehler). The data is polled on power consumption change and stored in a vz MySQL database. Every 5 minutes Domoticz requests the average power consumption over the last 5 minutes. The vz data is kept in the MySQL database for 24 hours (older data is deleted at midnight by a Python script – see Database Management).



### Note

See [Appendix volkszaehler Setup](#) for actual update and more details.

References: [Raspberry-Pi](#), [API](#), [Debug](#), [EMH ED300L](#), [Node-RED](#).

## Setup Raspberry Pi

The Raspberry Pi is installed following the installation procedure described [here](#).

### Fix IP Address

The communication between the Domoticz system and the vz Server is via WLAN. The vz Server has a fixed IP address NNN.NNN.1.NNN, which is defined in the configuration files:

#### /etc/dhcpcd.conf

```
# wlan interface
interface wlan0
static ip_address=vz-ip/24
static routers=NNN.NNN.1.1
static domain_name_servers=NNN.NNN.1.1
```

#### /etc/wpa\_supplicant/wpa\_supplicant.conf

```
ctrl_interface=DIR=/var/run/wpa_supplicant GROUP=netdev
update_config=1
country=DE
network={
    ssid="o2-WLAN78_EXT"
    psk="*****"
}
```

In the documentation, the volkzaehler IP is referred as **vz-ip**

# USB Port Symlink

To ensure the right USB port is used, the Symlink `ttyUSB-VZ` is defined.

```
sudo nano /etc/udev/rules.d/99-usb-serial.rules
SUBSYSTEM=="tty", ATTRS{idVendor}=="10c4", ATTRS{idProduct}=="ea60", ATTRS{serial}=="00F2E620",
SYMLINK+="ttyUSB-VZ", MODE="0666"
```

## Check

```
ls /dev/ttyU*
/dev/ttyUSB0  /dev/ttyUSB-VZ
```

## Serial Link

The serial link must be setup with 9600 baud, 8n1. This is done by terminal command:

which must be added to rc.local to ensure correct settings for the USB port during setup.

Check if data is received from the IR-Read-Write-USB-device:

```
xxd </dev/ttyUSB-VZ
00000000: 1b1b 1b1b 0101 0101 7607 000f 0016 bc87 .....v.....
00000010: 6200 6200 7263 0101 7601 0107 000f 0553 b.b.rc..v....S
00000020: 942d 0b09 0145 4d48 0000 532f 3801 0163 .-...EMH..S/8..c
00000030: 6a00 7607 000f 0016 bc88 6200 6200 7263 j.v.....b.brc
00000040: 0177 010b 0901 454d 4800 0053 2f38 0701 .w....EMH..S/8..
00000050: 0062 0aff ff72 6201 6505 530d fc7a 7707 .b...rb.e.S..zw.
00000060: 8181 c782 03ff 0101 0101 0445 4d48 0177 .....EMH.w
00000070: 0701 0000 0009 ff01 0101 010b 0901 454d .....EMH.w
```

Note

The tool minicom can also be used to setup the serial port.

```
sudo apt-get install minicom  
sudo minicom -s
```

## vz Setup Channels

Setting up the channels using the vz frontend (url=http://vz-ip) is crucial.

Must read: [https://wiki.volkszaehler.org/howto/emh\\_pv-anlage?redirect=1](https://wiki.volkszaehler.org/howto/emh_pv-anlage?redirect=1)

After the channels have been defined, the `vzlogger.conf` must be changed to add the channels.

## Important

The EMH ED300L is sending in SML (Obis-Codes), which are 1.8.0 etc.

These are NOT S0-Impulses, but counters, i.e. „Zählerstände, Leistungswerte“ depending Obis-Code.

The meter displays the OBIS Code 1.8.0, meter reading (“Zählerstand”, kWh) and current power usage (“Momentane Leistung”, Watt).

There are two channels defined:

**Channel 1:** Haus 1.8.0 (Bezug +A), Typ El. Energie (Zählerstände), Auflösung 1000

UUID:5b8ea2a0-b342-11e8-bec6-15c040e6d041

**This channel is used for Domoticz.**

**Channel 2:** Haus 16.7.0 (Leistung), Typ El. Energie (Leistungswerte)

UUID: 958bce60-b342-11e8-b54f-bbec0573e1f4

Channel: Zählerstand	Channel: Leistung																																																
Haus 1.8.0 (Bezug +A), Typ El. Energie (Zählerstände), Auflösung 1000, kWh	Haus 16.7.0 (Leistung), Typ El. Energie (Leistungswerte), Watt																																																
<p>Kanal hinzufügen</p> <p>Öffentliche Kanäle Private Kanäle <b>Kanal erstellen</b></p> <table> <tr> <td>Eigenschaft</td> <td>Wert</td> </tr> <tr> <td>Middleware:</td> <td>Local (default)</td> </tr> <tr> <td>Typ:</td> <td>El. Energie (Zählerstände)</td> </tr> <tr> <td>Titel</td> <td>Energie Zählerstand</td> </tr> <tr> <td>Auflösung</td> <td>1000</td> </tr> <tr> <td>Öffentlich</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>Farbe</td> <td><span style="background-color: cyan; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span></td> </tr> <tr> <td>Stil</td> <td>steps</td> </tr> <tr> <td>Füllgrad</td> <td></td> </tr> <tr> <td>Achse</td> <td>auto</td> </tr> <tr> <td>Kosten</td> <td></td> </tr> <tr> <td>Initialverbrauch</td> <td></td> </tr> </table> <p><b>Erstellen</b> <b>Cookie:</b> <input checked="" type="checkbox"/></p>	Eigenschaft	Wert	Middleware:	Local (default)	Typ:	El. Energie (Zählerstände)	Titel	Energie Zählerstand	Auflösung	1000	Öffentlich	<input checked="" type="checkbox"/>	Farbe	<span style="background-color: cyan; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>	Stil	steps	Füllgrad		Achse	auto	Kosten		Initialverbrauch		<p>Kanal hinzufügen</p> <p>Öffentliche Kanäle Private Kanäle <b>Kanal erstellen</b></p> <table> <tr> <td>Eigenschaft</td> <td>Wert</td> </tr> <tr> <td>Middleware:</td> <td>Local (default)</td> </tr> <tr> <td>Typ:</td> <td>El. Energie (Leistungswerte)</td> </tr> <tr> <td>Titel</td> <td>Energie Leistung</td> </tr> <tr> <td>Öffentlich</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>Farbe</td> <td><span style="background-color: cyan; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span></td> </tr> <tr> <td>Stil</td> <td>lines</td> </tr> <tr> <td>Füllgrad</td> <td></td> </tr> <tr> <td>Achse</td> <td>auto</td> </tr> <tr> <td>Auflösung</td> <td></td> </tr> <tr> <td>Kosten</td> <td></td> </tr> <tr> <td>Initialverbrauch</td> <td></td> </tr> </table> <p><b>Erstellen</b> <b>Cookie:</b> <input checked="" type="checkbox"/></p>	Eigenschaft	Wert	Middleware:	Local (default)	Typ:	El. Energie (Leistungswerte)	Titel	Energie Leistung	Öffentlich	<input checked="" type="checkbox"/>	Farbe	<span style="background-color: cyan; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>	Stil	lines	Füllgrad		Achse	auto	Auflösung		Kosten		Initialverbrauch	
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Auflösung																																																	
Kosten																																																	
Initialverbrauch																																																	
<p><b>UUID</b> 5b8ea2a0-b342-11e8-bec6-15c040e6d041</p> <pre>// /etc/vzlogger.conf { // Zählerstand "uuid" : "5b8ea2a0-b342-11e8-bec6-15c040e6d041", "middleware" : "http://localhost/middleware.php", "identifier" : "1-0:1.8.0" }</pre>	<p><b>UUID</b> 958bce60-b342-11e8-b54f-bbec0573e1f4</p> <pre>/etc/vzlogger.conf { // Leistungswert "uuid" : "958bce60-b342-11e8-b54f-bbec0573e1f4", "middleware" : "http://localhost/middleware.php", "identifier" : "1-0:16.7.0" }</pre>																																																

Web Frontend Settings	Web Frontend Settings
<pre>{ "version":"0.3", "entity": { "uuid":"5b8ea2a0-b342-11e8-bec6-15c040e6d041", "type":"electric meter", "color":"aqua", "fillstyle":0, "public":true, "resolution":1000, "style":"steps", "title":"Energie Z\u00fchlerstand", "yaxis":"auto" }</pre>	<pre>{ "version":"0.3", "entity": { "uuid":"958bce60-b342-11e8-b54f-bbec0573e1f4", "type":"powersensor", "color":"aqua", "fillstyle":0, "public":true, "style":"lines", "title":"Energie Leistung", "yaxis":"auto" }</pre>

Example requesting Data for Channel 1 for the timeframe 1minute ago till now

<http://rpi-volkszaehler-ip/middleware.php/data/5b8ea2a0-b342-11e8-bec6-15c040e6d041.json?from=1+minutes+ago&to=now>

Output

```
{"version":"0.3","data":{"tuples":[[1559311263427,190.476,1],[1559311265329,189.274,1],[1559311267248,187.598,1],[1559311269139,190.375,1],[1559311271039,189.474,1],[1559311272928,190.577,1],[1559311274860,186.335,1],[1559311276762,189.274,1],[1559311278640,191.693,1],[1559311280542,189.274,1],[1559311282443,189.374,1],[1559311284374,186.432,1],[1559311286253,191.591,1],[1559311288048,200.557,1],[1559311289875,197.044,1],[1559311291775,189.474,1],[1559311293613,195.865,1],[1559311295568,184.143,1],[1559311297457,190.577,1],[1559311299399,185.376,1],[1559311301330,186.432,1],[1559311303284,184.237,1],[1559311305205,187.402,1],[1559311307116,188.383,1],[1559311309048,186.335,1],[1559311310979,186.432,1],[1559311312891,188.285,1],[1559311314865,182.371,1],[1559311316619,205.245,1],[1559311318351,207.852,1],[1559311320072,209.181,1],[1559311321804,207.852,1],[1559311323589,201.681,1]],"uuid":"5b8ea2a0-b342-11e8-bec6-15c040e6d041","from":1559311261537,"to":1559311323589,"min":[1559311314865,182.37082168777],"max":[1559311320072,209.18070811092],"average":191.452,"consumption":3.3,"rows":34}}
```

The properties **data.average** and **data.consumption** are used to update the Domoticz devices.

## vzlogger

The [vzlogger](#) is used to read the serial data and transfer the data to the middleware.

### Configuration File

The configuration file is /etc/vzlogger.conf. Must [read](#) to understand the settings.

Ensure no empty lines are spaces after the last }.

#### Important

After making changes (sudo nano /etc/vzlogger.conf) restart the vzlogger and check status.

```
sudo systemctl restart vzlogger
sudo systemctl status vzlogger
```

#### /etc/vzlogger.conf

```
{
  "daemon": true,
  "verbosity": 0,
  "log": "/var/log/vzlogger.log",
  "retry": 30,
  "local": {
    "enabled": false,
    "port": 8080,
    "index": true,
    "timeout": 30,
    "buffer": 600
  },
  "push": [],
  "meters" : [
    {
      "enabled" : true,
      "protocol" : "sml",
      "device" : "/dev/ttyUSB-VZ",
      "baudrate": 9600,
      "parity": "8n1",
      "channels": [
        {
          // Leistungswert
          "uuid" : "958bce60-b342-11e8-b54f-bbec0573e1f4",
          "middleware" : "http://localhost/middleware.php",
          "identifier" : "1-0:16.7.0"
        },
        {
          // Zählerstand
          "uuid" : "5b8ea2a0-b342-11e8-bec6-15c040e6d041",
          "middleware" : "http://localhost/middleware.php",
          "identifier" : "1-0:1.8.0"
        }
      ]
    }
  ]
}
```

## Start Stop Status

### Terminal commands

```
Stop:      sudo systemctl stop vzlogger
Start:     sudo systemctl start vzlogger
Restart:   sudo systemctl restart vzlogger
Status:    sudo systemctl status vzlogger
```

## Logfile

### Check

```
sudo cat /var/log/vzlogger.log
```

### Delete

```
sudo systemctl stop vzlogger
sudo rm /var/log/vzlogger.log
sudo systemctl start vzlogger
sudo cat /var/log/vzlogger.log
```

## vz Web Frontend

URL=<http://vz-ip/?uuid=958bce60-b342-11e8-b54f-bbec0573e1f4>  
(Leistungswerte)

Read more [here](#).



## Database Management

To manage the data stored in a MySQL database, the tool phpMyAdmin is used.  
Enter in a browser, the URL <http://vz-ip/phpmyadmin/>

### User vz-admin

Prior using, create a user vz-admin and grant access.

```
sudo mysql -uroot -praspberry
CREATE USER 'vz-admin'@'%' IDENTIFIED BY 'secure';
GRANT USAGE ON *.* TO 'vz-admin'@'%';
GRANT ALL PRIVILEGES ON `volkszaehler`.* TO 'vz-admin'@'%' WITH GRANT OPTION;
exit
```

### Login phpMyAdmin

Username: vz-admin, Password: \*\*\*\*\*, Database: volkszaehler

Table	Action	Rows	Type	Collation	Size	Overhead
aggregate	<a href="#">Browse</a> <a href="#">Structure</a> <a href="#">Search</a> <a href="#">Insert</a> <a href="#">Empty</a> <a href="#">Drop</a>	2,612,489	InnoDB	latin1_swedish_ci	190.3 Mib	-
data	<a href="#">Browse</a> <a href="#">Structure</a> <a href="#">Search</a> <a href="#">Insert</a> <a href="#">Empty</a> <a href="#">Drop</a>	0	InnoDB	utf8_unicode_ci	48 Kib	-
entities	<a href="#">Browse</a> <a href="#">Structure</a> <a href="#">Search</a> <a href="#">Insert</a> <a href="#">Empty</a> <a href="#">Drop</a>	16	InnoDB	utf8_unicode_ci	32 Kib	-
entities_in_aggregator	<a href="#">Browse</a> <a href="#">Structure</a> <a href="#">Search</a> <a href="#">Insert</a> <a href="#">Empty</a> <a href="#">Drop</a>	0	InnoDB	utf8_unicode_ci	48 Kib	-
properties	<a href="#">Browse</a> <a href="#">Structure</a> <a href="#">Search</a> <a href="#">Insert</a> <a href="#">Empty</a> <a href="#">Drop</a>	127	InnoDB	utf8_unicode_ci	48 Kib	-
5 tables	<a href="#">Sum</a>	2,612,632	InnoDB	latin1_swedish_ci	190.5 Mib	0 B

### Check Database Size

#### URL

```
http://vz-ip/middleware.php/capabilities/database.json?
```

#### Result

```
{"version":"0.3", "capabilities": {"database": {"data_rows":67235725,"data_size":5935382528,"aggregation_enabled":1,"aggregation_rows":2611868,"aggregation_ratio":25.742}}}
```

### Size of database and access\_log

#### Limit logging

```
sudo nano /etc/mysql/my.cnf
[mysqld]
expire_log_days = 2
max_binlog_size = 5M
```

## Delete Data

There are several ways to delete data from the vz MySQL database.

### Option 1

This is the hard way of deleting data via MySQL commands.

Example deleting all data older than 24 hours from database volkszaehler, table data.

```
mysql --user=root -praspberry

mysql> grant select, update, insert, delete on volkszaehler.* to vz@localhost;
Query OK, 0 rows affected (0.01 sec)

mysql> use volkszaehler

mysql> delete FROM data where timestamp< (unix_timestamp(current_timestamp)-24*60*60)*1000 ;
```

*Note*

This operation might take long...

Check the database size after completion

### Option 2

Use terminal command

```
wget -O - -q "http://vz-ip/middleware.php/data/27e28d00-b2dc-11e8-903d-
c3b75ae4ef20.json?operation=delete&from=now"
```

### Option 3

Use URL

#### Prepare mysql

```
mysql --user=vz-admin -psecure

mysql> grant select, update, insert, delete on volkszaehler.* to vz@localhost;
Query OK, 0 rows affected (0.01 sec)
```

#### URL deleting data

```
http://vz-ip/middleware.php/data/958bce60-b342-11e8-b54f-
bbec0573e1f4.json?operation=delete&from=1+day+ago
```

#### Result JSON

```
{"version":"0.3","rows":37466}
```

#### URL Check database size

```
http://vz-ip/middleware.php/capabilities/database.json?
```

#### Result JSON

```
{"version":"0.3","capabilities":{"database":{"data":{"rows":72047,"size":12632064}, "aggregation":{"rows":0,"size":49152,"ratio":0}}}}
```

## vzclean

### Purpose

To delete, every day at midnight, data which is older then 24 hours from the database volkszaehler, table data.

### Solution

A Python script (vzclean.py) logs into the database as user vz-admin and deletes the data from table data. The script is executed, via bash script (vzclean.sh) once a day at 00:05.

Script location:

```
/home/pi/scripts
```

The script uses the config file vzclean.ini to obtain MySQL database and user login information.

### Hint

After running vzclean or to check adhoc, use URL

```
http://vz-ip/middleware.php/capabilities/database.json?
```

## Python

### vzcleanconfig.py

```
## See https://pypi.org/project/configparser/
import configparser

def read_db_config(filename='vzclean.ini', section='mysql'):
    """ Read database configuration file and return a dictionary object
    :param filename: name of the configuration file
    :param section: section of database configuration
    :return: a dictionary of database parameters
    """
    # create parser and read ini configuration file
    parser = configparser.ConfigParser()
    parser.read(filename)

    # get section, default to mysql
    db = {}
    if parser.has_section(section):
        items = parser.items(section)
        for item in items:
            db[item[0]] = item[1]
            # print(db[item[0]])
    else:
        raise Exception('{0} not found in the {1} file'.format(section, filename))

    # print(db)
    return db
```

### vzclean.ini

```
[mysql]
host = localhost
database = volkszaehler
user = vz-admin
password = *****
```

### vzclean.py

```
#!/usr/bin/env python
"""

File: vzclean.py
Author: Robert W.B. Linn, 20180909
Project: AtHome
Purpose: Delete all channel data prior last 24 h from database volkszaehler, table data. Run once per day via crontab.
The scripts logs to a file. If the script is executed with parameter 1, then the log is printed to the console.
Run the script: python3 vzclean.py or python3 vzclean.py 1
The script is executed via crontab "5 0 * * * /home/pi/scripts/vzclean.sh 1" using the bash script vzclean.sh.
    cd /home/pi/scripts
    python3 vzclean.py $1
Example Log
    vzclean 20180909
    Connection: OK
    Rows befor delete: 31
    Rows after delete: 1
    Rows last 24h: 25067
    Connection closed

Install mysql-connector
sudo apt-get update
sudo apt-get upgrade
sudo apt-get -y install python-mysql.connector
sudo apt-get -y install python3-mysql.connector

References
http://www.mysqltutorial.org/python-mysql-query/
```

```
volkszaehler database structure
https://wiki.volkszaehler.org/development/schema
volkszaehler API ref:
https://wiki.volkszaehler.org/development/api/reference
Table data
    id, int(11); channel_id, int(11); timestamp, bigint(20); value, double
"""

# Import
from mysql.connector import MySQLConnection, Error
from vzcleanconfig import read_db_config
import sys

vzclean = 'vzclean 20180909'
logfilename = 'vzclean.log'

# Define the queries including test queries
query_select_entities = "SELECT * FROM entities ;"
query_select_data = "SELECT * FROM data ;"
query_select_data_by_channel_ts = "SELECT * FROM data WHERE timestamp > (unix_timestamp(current_timestamp)-24*60*60)*1000 ;"
query_select_data_prior_last24h = "SELECT * FROM data WHERE timestamp < (unix_timestamp(current_timestamp)-24*60*60)*1000 ;"
query_select_data_prior_last24h_count = "SELECT COUNT(channel_id) FROM data WHERE timestamp < (unix_timestamp(current_timestamp)-24*60*60)*1000 ;"
# Ref: http://www.mysqltutorial.org/python-mysql-delete-data/
query_delete_data_prior_last24h = "delete FROM data where timestamp< (unix_timestamp(current_timestamp)-24*60*60)*1000 ;"

def log(logfile, text):
    """Write a line to the logfile
    :logfile: Logfile opened for writing (w+) or append (a+)
    :text: Line to write
    """
    logfile.write('{}\r\n'.format(text))

def logprint(logfilename):
    """Print the content of the logfile
    :logfile: Logfile opened for reading (r)
    """
    f = open(logfilename, "r")
    content = f.read()
    print(content)

def show_tables(conn):
    """Show the table for database volkszaehler
    :conn: Database connection
    """
    cursor = conn.cursor()
    cursor.execute("SHOW TABLES")
    for x in cursor:
        print(x)

def select_fetchone(conn, qry):
    """Query a table
    :conn: Database connection
    :qry: Query to execute
    """
    cursor = conn.cursor()
    cursor.execute(qry)

    row = cursor.fetchone()

    while row is not None:
        print(row)
        row = cursor.fetchone()

def select_count(conn, qry):
    """Get the number of records
    :conn: Database connection
    :qry: Select query with COUNT()
    :return: Number of records
    """
    cursor = conn.cursor()
    cursor.execute(qry)
```

```

        result = cursor.fetchone()
        return result[0]

def delete_data(conn, qry):
    """Delete data from a
    :conn: Database connection
    :qry: Delete statement
    """
    cursor = conn.cursor()
    cursor.execute(qry)
    # accept the change
    conn.commit()

# Connect and run queries
def cleandata(showlog):
    logfile = open(logfilename,"w+")
    log(logfile, vzclean)

    """ Connect to MySQL database """
    db_config = read_db_config()

    try:
        conn = MySQLConnection(**db_config)

        if conn.is_connected():
            log(logfile, 'Connection: OK')
            #show_tables(conn)
            #select_fetchone(conn, query_select_entities)
            #select_fetchone(conn, query_select_data_by_channel_ts)

            # delete data prior last 24h
            log(logfile, 'Rows before delete: {}'.format(select_count(conn,
query_select_data_prior_last24h_count)))
            delete_data(conn, query_delete_data_prior_last24h)
            log(logfile, 'Rows after delete: {}'.format(select_count(conn,
query_select_data_prior_last24h_count)))
            log(logfile, 'Rows last 24h: {}'.format(select_count(conn,
query_select_data_by_channel_ts)))
        else:
            log(logfile, '[ERROR] Database connection: failed')

    except Error as error:
        log(logfile, '[ERROR] Database connection:{}'.format(error))

    finally:
        conn.close()
        log(logfile, 'Connection closed')
        logfile.close()

    # If showlog argument is given, print the log to the console
    if showlog == '1':
        logprint(logfilename)

if __name__ == '__main__':
    if (len(sys.argv) == 2):
        cleandata(sys.argv[1])
    else:
        cleandata('')

```

## Bash

### vzclean.sh

```

#!/bin/bash
# Run vzclean Python script
# Optional Parameter: l to show the log
# Ensure to make the script executable: sudo chmod +x vzclean.sh
# Robert W.B. Linn, 20180909

# Set the scripts folder
cd /home/pi/scripts

```

```
# Run the script
python3 vzclean.py $1
```

## Crontab

Add to crontab the following lines to execute the script daily at 5 minutes past midnight.

```
crontab -e
# Run vzclean daily at 00:05
5 0 * * * /home/pi/scripts/vzclean.sh 1
```

## Ethernet Link volkszaehler Raspberry Pi

This is an example incase the vz Raspberry Pi and the Domoticz Raspberry Pi are direct connected via an Ethernet cable.

For the wired connection, a standard cable is used, no twisted wires required.  
The communication uses ETH0 with a static network addresses on both sides.

### Important

The ETH0 network address must be different then the WLAN network address.

### Configuration

vz Raspberry Pi [Raspbian GNU/Linux 8 (stretch)]	Domoticz Raspberry Pi [Raspbian GNU/Linux 8 (stretch)]
eth0 inet addr:169.254.87.85 Bcast:169.254.255.255 Mask:255.255.0.0	eth0 inet addr:169.254.87.84 Bcast:169.254.255.255 Mask:255.255.0.0
Set the static Ethernet network Address sudo nano /etc/dhcpcd.conf	sudo nano /etc/dhcpcd.conf
Add the lines	
interface eth0 static ip_address=169.254.87.85 static routers=169.254.0.1	interface eth0 static ip_address=169.254.87.84 static routers=169.254.0.1

### Note

\$ uname –a to determine the Linux version

\$ cat /etc/os-release to determine the Raspberry Pi release

Steps to login from vz Raspberry Pi to the Domoticz Raspberry Pi:

- Login to vz Raspberry Pi as user pi.
- Check if the Raspberry Pi Domoticz is reachable: \$ping 169.254.87.85
- Check if the sshd service is running on the vz Raspberry Pi: \$ps ax | grep sshd
- Connect to the Domoticz Raspberry Pi via ssh: \$ssh [pi@169.254.87.85](mailto:pi@169.254.87.85)  
pi@169.254.87.85's password: \*\*\*\*\*
- The pi@DoPro prompt is shown

# Electric Usage Rooms/Devices

## Purpose

To control the power and measure the energy consumption, voltage, current, power of connected devices to an power outlet.

The power outlet could be used for selected devices (coffee machine, washer, dryer etc.) or dedicated rooms (MakeLab, Library).

## Solution

The Homematic IP Pluggable Switch and Meter is used, as this device enables to switch on and off connected loads and meter the corresponding energy consumption as well as voltage, current and power of the connected devices.

The Domoticz Python plugin “homematicIP Pluggable Switch and Meter (HmIP-PSM)” has been developed for this purpose - described [here](#).

**For testing, the power & energy for the room MakeLab is controlled & measured.**

## homematicIP HmIP-PSM (Plugin)

New hardware added using the plugin.

The screenshot shows the Domoticz software interface for managing hardware devices. At the top, there is a table with columns: Idx, Name, Enabled, Type, Address, Port, and Data Timeout. One entry is visible: Idx 25, Name Schalt-Mess-Steckdose MakeLab, Enabled Yes, Type homematicIP Pluggable Switch and Meter (HmIP-PSM), Address CCU-IP, Port 0, and Data Timeout Disabled. Below this table, a message says "Showing 1 to 1 of 1 entries (filtered from 16 total entries)".

The main configuration area for the device "Schalt-Mess-Steckdose MakeLab" includes the following fields:

- Enabled:**
- Name:** Schalt-Mess-Steckdose MakeLab
- Type:** homematicIP Pluggable Switch and Meter (HmIP-PSM)
- Data Timeout:** Disabled (with a note: "Specifying a Data Timeout will restart the hardware device if no data is received for the specified time. Do not enable this option for devices that do not receive data!")
- homematicIP Pluggable Switch and Meter (HmIP-PSM) v1.0.3**
  - Switch the device On or Off.
  - Measure, in regular intervals, the power (W), energy (Wh), voltage (V), current (mA).
- Domoticz Devices Name (TypeName)**
  - Energy (kWh)
  - Voltage (Voltage)
  - Current (Current)
  - Switch (Switch)
- Configuration**
  - CCU IP address (default: CCU-IP)
  - IDs (obtained via XML-API script <http://ccu-ip-address/addons/xmlapi/statelist.cgi> using the HomeMatic WebUI Device Channel, i.e. HmIP-PSM 0001D3C99C6AB3:3 (switch) or .6 (meter))
    - Device ID HmIP-PSM (default: 1418)
    - Datapoint ID SWITCH: STATE (default: 1451)
    - Datapoint IDs ENERGY(#4): ENERGY\_COUNTER, POWER, VOLTAGE, CURRENT as comma separated list in this order (default: 1467,1471,1473,1465)
- CCU IP:** CCU-IP
- Device:** 1418
- Datapoint ID STATE:** 1451
- Datapoint IDs ENERGY:** 1467,1471,1473,1465
- Check Interval (sec):** 60
- Debug:** False

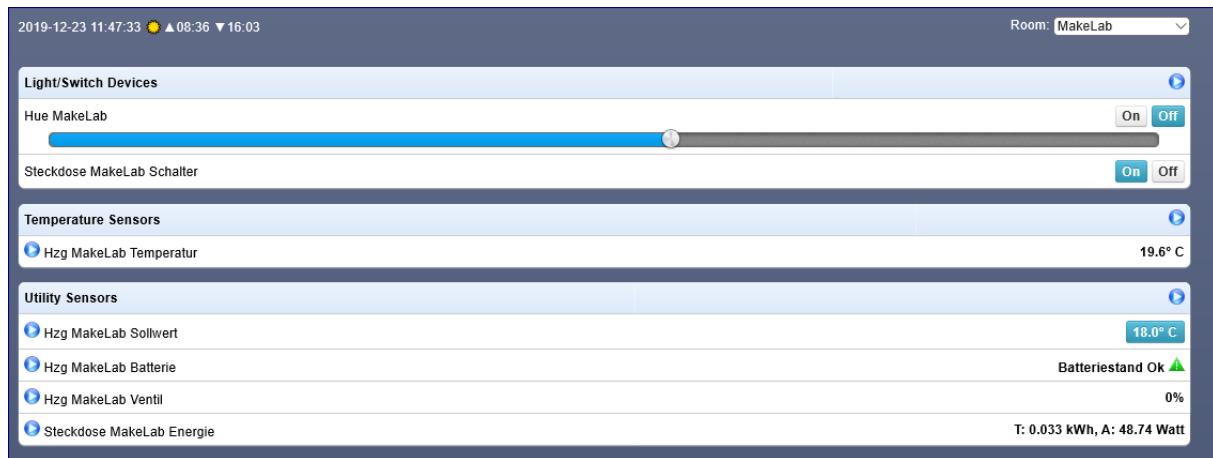
## Devices (created by the plugin)

	226	Schalt-Mess-Steckdose MakeLab	00190004	4	Steckdose MakeLab Schalter	Light/Switch	Switch	On
	225	Schalt-Mess-Steckdose MakeLab	00190003	3	Steckdose MakeLab Ampere	General	Current	0.29 A
	224	Schalt-Mess-Steckdose MakeLab	00190002	2	Steckdose MakeLab Volt	General	Voltage	227.8 V
	223	Schalt-Mess-Steckdose MakeLab	00190001	1	Steckdose MakeLab Energie	General	kWh	6.595 kWh

*Note*

The devices with the idx=226 & 223 are used.

## Roomplan MakeLab



*Note*

The dashboard for the room makeLab shows the two devices Steckdose MakeLab Schalter & Steckdose MakeLab Energie.

## Revolt SF-436.m

NOT USED – see issues.

**For testing this solution, the power & energy for the room MakeLab is measured.**

The Electric Usage is measured by a **433.92 MHz wireless plug Revolt SF-436.m**.

This device communicates with the [RFXCOM RFXtrx433E](#) with following requirements:

- RFXtrx type2 firmware,
- ELEC5 protocol,
- RSL option (Hardware > RFXTX433E > set mode).

### RFXCOM Test

#### Step 1

Plug the Revolt SF-436.m device in the wall plug (without pressing the green button!).

#### Step 2

Test if the Revolt device is recognized by the RFXtrx433E (with firmware version RFXtrx433E\_Ext2\_1025) using the RFXCOM RFXmngr.

If the device is recognized, the RFXmngr logs an entry with packettype POWER and subtype ELEC5Revolt.

```
Packettype=POWER,  
subtype=ELEC5Revolt,  
Sequencenbr=27, ID=32321,  
Voltage=233Volt, Current=0,07Ampere, Instantpower=10,9Watt, totalusage=0,06kWh,  
powerfactor=0,62, Frequency=50, Signallevel=8
```

#### Notes

- The Revolt SF-436.m is sending data almost every second.
- The ID is unique for this device and used by Domoticz (see next step).

As the device is recognized by RFXtrx433E, checked the Domoticz source for Revolt / ELEC5 support and found = pTypePOWER, sTypeELEC5, "Revolt".

Moved on with the Domoticz Configuration.

## Domoticz Configuration

### Step 1

Allow Domoticz to receive new hardware for 5 minutes (Domoticz GUI > Setup > Settings > Hardware/Devices).

The Domoticz log lists initial entries for the new Power Device:

```
2019-05-30 13:23:01.301 (RFXtrx433e) Power (Unknown)
2019-05-30 13:23:04.359 (RFXtrx433e) Power (Unknown)
2019-05-30 13:23:07.869 (RFXtrx433e) Power (Unknown)
2019-05-30 13:23:13.989 (RFXtrx433e) Power (Unknown)
```

This means Domoticz recognizes the new Power device.

### Step 2

Switch to the Domoticz Devices List to check out the new devices

Recognized by Domoticz (Type, SubType, Data, Idx) are these four devices:

1. Type=Power, SubType=Revolt, Data=0.070kWh, Idx=167
2. Type=General, SubType=Voltage, Data=228 V, Idx=168
3. Type=General, SubType=Percentage, Data=0.73%, Idx=169  
*Note:* This value is the Power Factor.
4. Type=General, SubType=Percentage, Data=50%, Idx=170  
*Note:* This value is the frequency in Hz.

## Initial Devices List

	Idx	Hardware	ID	Unit	Name	Type	SubType	Data
💡	167	RFXtrx433e	32321	0	Revolt Power	Power	Revolt	0.090 kWh
💡	168	RFXtrx433e	32321	1	Revolt Voltage	General	Voltage	228 V
⚡	169	RFXtrx433e	32321	2	Revolt Powerfactor	General	Percentage	0.59%
⚡	170	RFXtrx433e	32321	3	Revolt Frequency	General	Percentage	50%

The **ID=32321** is the same as logged by the RFXmngr, which ensures this is the right device. The device **Type=Power, SubType=Revolt** is added as " Electricity MakeLab" (renamed from "Revolt Power"), the other devices are not used.

## Utility Tab Widget & Log with a few days





## MQTT

Example MQTT payload (topic "domoticz/out") for Device “Electricity MakeLab” with idx=167.

```
{"Battery" : 255, "RSSI" : 8, "description" : "Energy (Wh) & Power (Watt) provided, every few seconds, by a Revolt SF-436 device. The Energy is computed from the Power.", "dtype" : "Power", "id" : "32321", "idx" : 167, "name" : "Electricity MakeLab", "nvalue" : 0, "stype" : "Revolt", "svalue1" : "7", "svalue2" : "720.00", "unit" : 0}
```

## Properties

- svalue1 = current Power usage (Watt)
- svalue2 = total Energy cumulated over all days (kWh).

## HTTP API Request

### Request

```
http://domoticz-ip:8080/json.htm?type=devices&rid=167
```

### JSON Response (extract)

```
{
  "app_version" : "4.10717",
  "result" : [
    {
      "CounterToday" : "0.230 kWh",
      "Data" : "0.720 kWh",
      "EnergyMeterMode" : "",
      "HardwareName" : "RFXtrx433e",
      "HardwareType" : "RFXCOM - RFXtrx433 USB 433.92MHz Transceiver",
      "ID" : "32321",
      "Name" : "Electricity MakeLab",
      "SubType" : "Revolt",
      "SwitchTypeVal" : 0,
      "Type" : "Power",
      "Unit" : 0,
      "Usage" : "7 Watt",
      "idx" : "167"
    }
  ],
  "status" : "OK",
  "title" : "Devices"
}
```

## Properties

- Usage = current power usage (Watt)
- Data = total energy cumulated over all days (kWh).

## HTTP API Information

```
Electricity (instant and counter)
/json.htm?type=command&param=udevice&idx=IDX&nvalue=0&svalue=POWER;ENERGY
IDX = id device
POWER = current power
ENERGY = cumulative energy in Watt-hours (Wh)
Incrementing counter because type "Energy read : Computed"
```

## Issues

Whilst using this device, encountered several issues.

- 1) If the RFXtrx433E is more then about 10 meters range away from the device, then no data is received else working ok. Probably rather weak antenna.  
Explore how to improve the range ELSE consider other solution.
- 2) The device is causing high traffic on the 433.92MHz frequency. Sending almost every few seconds data.  
The Domoticz log is getting spoiled with data and of course the RFXtrx433E is rather busy.
- 3) Had been thinking about additional devices - but regarding issues 1 and 2 will not continue.

Put this solution On Hold for now.

# Email Control

## Purpose

To control Domoticz remote via Email, i.e. sent Domoticz commands to trigger actions.

Examples: Switch Outdoor light on, set thermostat setpoint, request status devices etc.

The idea behind this function is control Domoticz without the need to have access to the Domoticz system from the public internet.

*This solution is basically an experiment out of curiosity if it would be possible to remote access the Domoticz system.*

### Notes

1. The solution is rather technical as it requires knowledge of the Domoticz HTTP API or MQTT commands as well as the idx of devices and the device properties from JSON result. A thought on simplification could be
  - create email templates with subject & body.
  - an App (i.e. Android) acting as an email client submitting predefined commands.
2. **Security** is always an issue – checkout the hints for some thoughts.
3. There might be other solutions, but the one shared works fine so far.

... must say it is fun submitting an email with a Domoticz command and watching the actions.

# Solution

## Overview

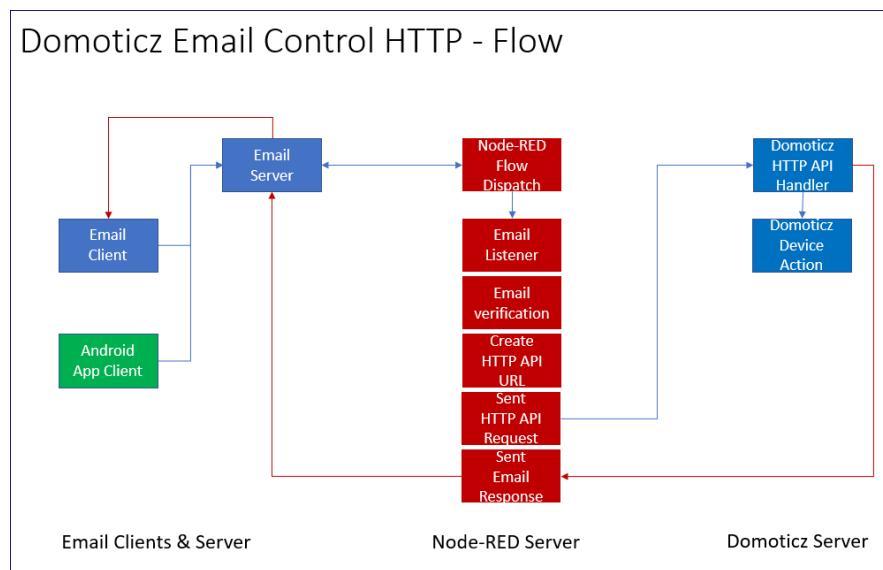
The solution uses a Node-RED flow (named Email Control), acting as kind of middleware, to handle Domoticz commands being sent via email (i.e. email client or App).

Required are the Node-RED nodes: [node-red-node-email](#) (thanks to the author).

There are two solutions developed based on MQTT or HTTP

The preferred solution is HTTP, because it offers more commands but it is also the underlying Domoticz API.

The MQTT solution is not described futher.



## Concept

### Email Client

An email (plain text) is created with a subject using the *prefix:description* line.

The prefix used is “DOMOTICZ:” (in uppercase).

The description can be any short text, i.e. Switch Light On.

The full subject would be “DOMOTICZ:Switch Light On”.

### Node-RED Flow

1. listens, every 60 seconds (value can be changed) to new email messages
2. checks first the fixed “from email address” (hardcoded in the flow, i.e your email address).
 

**For Security:** Only a single hardcoded email address is accepted. Use a dedicated email address.
3. checks next the email subject (start with a prefix, i.e. “DOMOTICZ:”)
 

**For Security:** Use a prefix which is only known to the sender.
4. parses the email body containing the HTTP API command and creates the HTTP API Request URL.
 

**For Security:** Add a key to the email body, which is checked and stripped for the submitted HTTP API Request URL.
5. submits the Domoticz HTTP API Request URL.

6. Handle HTTP response message, which is sent as email to a fixed “*to email address*” (i.e the same as the sender address).
7. The response email
  - a. subject starts with “RESPONSE:” and the description set as created
  - b. body contains the HTTP response in JSON format

#### *Notes*

- When using Domoticz Authorization over HTTP, then check if the "Authorization" HTTP request header" needs to be set (see documentation “Domoticz API/JSON URL's”).
- The email addresses “from” and “to” are hardcoded in the respective Node-RED nodes.
- **Security:** If the flow is not used, disable the Node-RED flow.

## Email Subject & Body

The email subject must start with prefix in uppercase: DOMOTICZ:

The email body, as plain text, contains a string with commands.

Any command as described in the [Domoticz API/JSON URL's manual](#) can be defined in the email body.

The HTTP API URL is created with the prefix and message payload added (in Node-RED function node *Create HTTP Request*)

```
"http://DOMOTICZ-IP:8080/json.htm?" + msg.payload;
```

### Examples

The first line is the email subject (starting with the prefix DOMOTICZ.) and the second line is the email body as plain text holding the API command. NNN=Idx of the device.

```
DOMOTICZ:Switch HUE Light ON
type=command&param=switchlight&idx=NNN&switchcmd=On
```

```
DOMOTICZ:Switch HUE Light OFF
type=command&param=switchlight&idx=NNN&switchcmd=Off
```

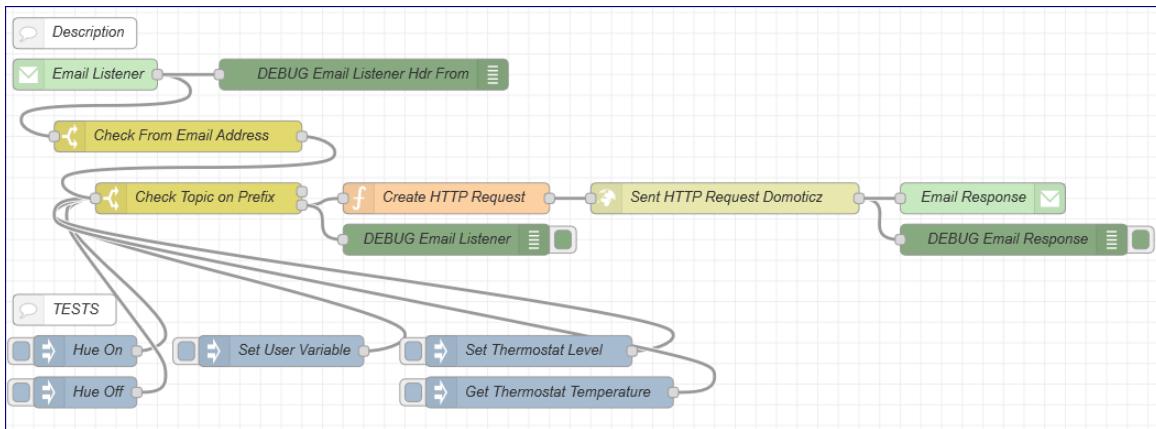
```
DOMOTICZ:Set User Variable AlertToEmail to 1
type=command&param=updateuservariable&vname=TH_ALERTTOEMAIL&vtype=0&vvalue=1
```

```
DOMOTICZ:Get Status Uservariable TH_ALERTTOEMAIL
type=command&param=getuservariable&idx=NNN
```

```
DOMOTICZ:Thermostat MakeLab Off
type=command&param=switchlight&idx=NNN&switchcmd=Set%20Level&level=0
```

```
DOMOTICZ:Thermostat MakeLab 20 Degrees
type=command&param=switchlight&idx=NNN&switchcmd=Set%20Level&level=30
```

## Node-RED Flow



### Node Email Listener (Type email in)

Listens to incoming emails automatically every 60 seconds (polling time) from the email server using the IMAP protocol, SSL, Port 993, Folder INBOX, Disposition Mark Read, Criteria Unseen.

#### Important

As given by the Node Description - this node only gets the most recent single email from the inbox, so set the repeat (polling) time appropriately.

Workaround:

- if getting no response within the polling timeframe after sending the email, then either submit again or decrease the polling time.
- Use a dedicated email address for this solution which does not receive any other emails than from the “from email address”.

### Node Check From Email Address (Type switch)

Check the header from email address. This depends on the email header as send by the provider email server. The message header is JSON parsed.

Example:

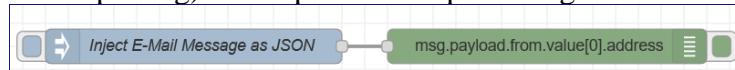
```
msg.header.from.value[0].address
```

to compare against a dedicated (=hardcoded) email address.

This ensures only emails are handled which are sent by an accepted email address.

#### Note

The node “DEBUG Email Listener Hdr From” can be used to determine the from address property (requires JSON parsing). A simple flow helps finding out:



Copy the output of debug note and insert a JSON string in the Inject node. Analyze the string on the from address. Set the JSON property in the debug node to determine the from address. If too complex then consider to check if the msg.payload contains the from email address string.

### **Node Check Topic on Prefix (Type switch)**

Check if the message topic starts with the defined prefix “DOMOTICZ:”. A JSONata exp is used = check substring first 9 characters match the prefix.

```
(  
$substring(topic, 0, 9) = "DOMOTICZ:"  
)
```

### **Node Create HTTP Request (Type function)**

Function node to create the message URL to be submitted to Domoticz.

The prefix DOMOTICZ: is replaced by RESPONSE: to indicate the HTTP API response is sent.

```
var t = msg.topic;  
msg.topic = t.replace("DOMOTICZ:", "RESPONSE:");  
// Set the URL  
msg.url = "http://domoticz-ip:8080/json.htm?" + msg.payload;  
// Return the message to be published by the mqtt out node  
return msg;
```

*Note*

If Node-RED is running on the same system as Domoticz, then “localhost” can be used as IP address.

### **Node Sent HTTP Request Domoticz (Type http request)**

Sent the message URL using GET method and return a UTF-8 string.

### **Node Email Response (Type email)**

Sent the HTTP API Request response as email.

The SMTP server uses port 587 without option “Use secure connection”, but with option “Use TLS?”. This is required for the email server used by the author.

The response from Domoticz is a JSON formatted string as email body.

If the result of the command is OK, then the email body is like:

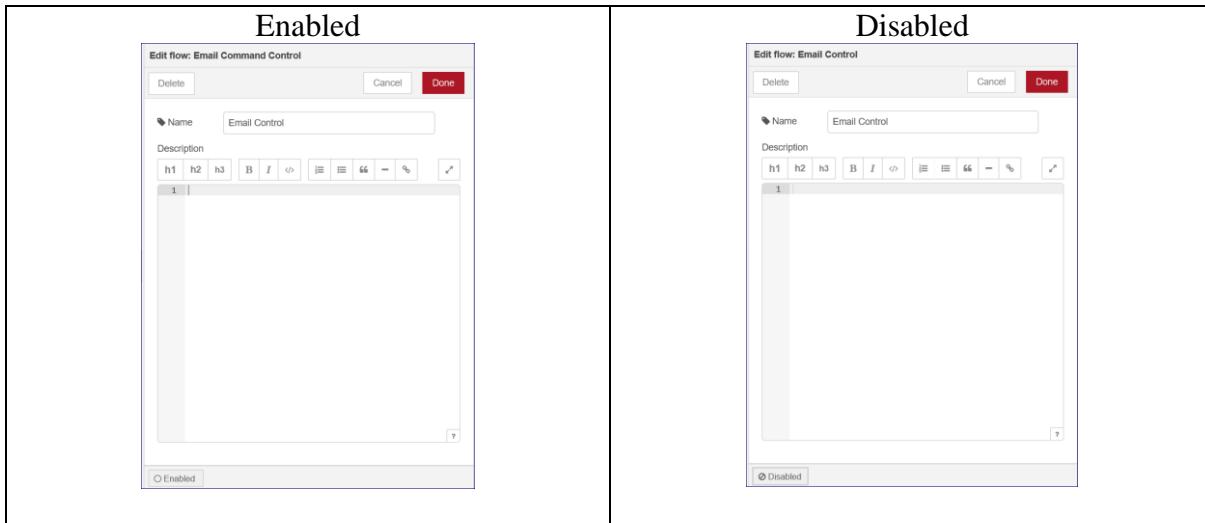
```
{"status" : "OK", "title" : "SwitchLight"}
```

If the result of the command is an ERROR, then the email body is like:

```
{"status" : "ERR"}
```

## Node-RED Flow Enabled or Disabled

If not using the flow, the flow can be disabled in Node-RED.  
Edit the flow and tick at the bottom of the dialog, the option Enabled or Disabled.



## Control Examples

### Domoticz E-Mail Control HTTP - Example Thermostat

#### Control Action

Set homematic thermostat level in room MakeLab to Off (Level 0).

#### E-Mail Subject & Body

DOMOTICZ:Thermostat MakeLab Off  
type=command&param=switchlight&idx=183&switchcmd=Set%20Level&level=0

*Note:* Thermostat device properties Level=Temperature; 0=Off,10=18°,20=19°,30=20°

#### Domoticz Log Entries

2019-11-07 09:59:01.798 Status: User: Admin initiated a switch command (183/MakeLab Thermostat - Setpoint/Set Level)

2019-11-07 10:00:34.918 (MakeLab Thermostat) T=21.7,S=4.5  
*Note:* The second entry confirms that the thermostat setpoint has been set to Off which is stated by S=4.5 (homematic specific value)

#### Node-RED Debug Log after the e-mail is sent

```
07/11/2019, 09:59:01 node: Create HTTP Request
function: (wem)
"DOMOTICZ:Thermostat MakeLab Off"
07/11/2019, 09:59:01 node: Create HTTP Request
function: (wem)
"RESPONSE:Thermostat MakeLab Off"
07/11/2019, 09:59:01 node: Create HTTP Request
function: (wem)
"http://<ip-address>/0/json.htm?type=command&param=switchlight&idx=183&switchcmd=Set%20Level&level=0"
07/11/2019, 09:59:01 node: DEBUG Email Listener
DOMOTICZ:Thermostat MakeLab Off : msg.payload: string[8]
"type=command&param=switchlight&idx=183&switchcmd=Set%20Level&level=0"
07/11/2019, 09:59:01 node: DEBUG Email Response
RESPONSE:Thermostat MakeLab Off: msg.payload: string[5]
>"{"status": "OK", "title": "SwitchLight"}"
```

#### E-Mail Response Subject & Body

```
RESPONSE:Thermostat MakeLab Off
{
  "status": "OK",
  "title": "SwitchLight"
}
```

*Note:* This is a second e-mail as the first e-mail contains the request with subject DOMOTICZ:Thermostat MakeLab Off and the command string as plain text in the body.

## Domoticz E-Mail Control HTTP - Example Get User Variable

### Control Action

Get the status of the user variable TH\_ALERTTOEMAIL with IDX=14

### E-Mail Subject & Body

DOMOTICZ:Get Status Uservariable TH\_ALERTTOEMAIL  
type=command&param=getuservariable&idx=14

### Domoticz Log Entries

This request is not logged.

The e-mail response should be sufficient.

### Node-RED Debug Log after the e-mail is sent

```
07/11/2019, 10:59:41 node: Create HTTP Request
function : (wam)
"DOMOTICZ:Get Status Uservariable TH_ALERTTOEMAIL"
07/11/2019, 10:59:41 node: Create HTTP Request
function : (wam)
"RESPONSE:Get Status Uservariable TH_ALERTTOEMAIL"
07/11/2019, 10:59:42 node: Create HTTP Request
function : (wam)
"HTTP:// ip-address 80/json.htm?type=command&param=getuservariable&idx=14"
07/11/2019, 10:59:43 node: DEBUG E-Mail Listener
DOMOTICZ:Get Status Uservariable TH_ALERTTOEMAIL: msg.payload : string[4]
"type=command&param=getuservariable&idx=14"
07/11/2019, 10:59:44 node: DEBUG E-Mail Response
RESPONSE:Get Status Uservariable TH_ALERTTOEMAIL: msg.payload : string[240]
{"result": [{"LastUpdate": "2019-11-07 10:49:35", "Name": "TH_ALERTTOEMAIL", "Type": "0", "Value": "4", "Idx": "14"}], "status": "OK", "title": " GetUserVariable"}
```

### E-Mail Response Subject & Body

RESPONSE:Get Status Uservariable TH\_ALERTTOEMAIL
{
 "result": [
 {
 "LastUpdate": "2019-11-07 10:49:35",
 "Name": "TH\_ALERTTOEMAIL",
 "Type": "0",
 "Value": "4",
 "Idx": "14"
 }
 ],
 "status": "OK",
 "title": " GetUserVariable"
}

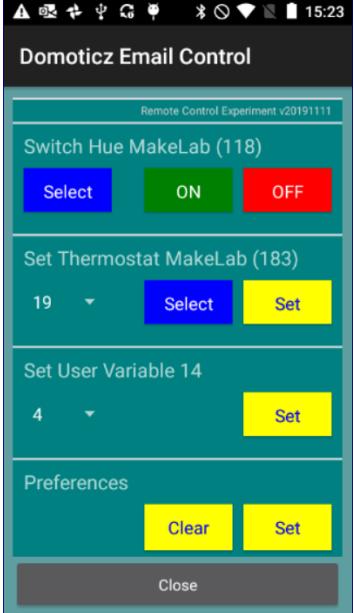
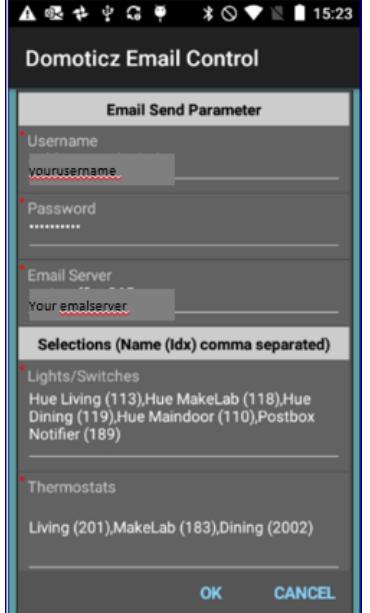
## Android Client App

An example of a simple app to test sending emails with commands (subject & body) to the Domoticz system via Node-Red as the middleware.

The Android app is created with the development tool [B4A](#) from Anywhere Software. B4A offers a simple way to develop native Android apps with the B4X language.

The app has a few controls (views) which are used to create the email with the subject and the body which is then sent using SMTP (Simple Mail Transfer Protocol). The SMTP parameter are hardcoded in the app except username & password which are requested prior sending the email.

The email response from the Node-RED flow, is not handled by the app but in the email client inbox. The email sent is also kept on the email server.

	
<p>The app uses a B4X customlistview with items related to a function.</p> <ol style="list-style-type: none"> <li>1. Switch Light / Switch Select a device and switch ON or OFF Example Hue MakeLab</li> <li>2. Set Thermostat Select a device and set the temperature from dropdown list between 0 (Off), 18, 19, 20</li> <li>3. Set User Variable with idx 14 This is a hardcoded example to set a value for the user var TH-ALERTTOEMAIL holding the level for sending alerts (email)</li> </ol>	<p>The preferences dialog uses the B4XPreferences library with a json configuration file (Files Folder &gt; prefdialog.json).</p>

# Event Monitor

## Purpose

To monitor the state change of selected devices to a text device with logging option.  
This function is used as to control or watch devices, for example security or time triggers.

Date	Data
2019-05-23 10:05:00	Security Main Door changed to Normal
2019-05-23 10:03:19	Security Main Door changed to Alarm + Tamper
2019-05-23 10:03:13	Security Main Door changed to Alarm + Tamper
2019-05-23 10:03:09	Security Main Door changed to Alarm + Tamper

*Note*

Just a few entries as an example.

## Domoticz Configuration

Create a text device to display the events.

Domoticz GUI > Setup > Hardware > Hardware VirtualSensors > Press Create Virtual Sensors

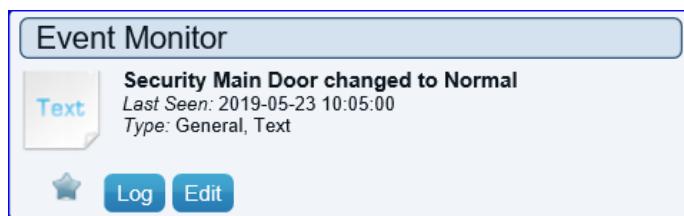
Name: Event Monitor

Sensor Type: Text

Domoticz GUI > Setup > Devices > Scroll down to the last list entry.

A new device is listed:

- Idx: 161
- Hardware: VirtualSensors
- Name: Event Monitor
- Type: General
- SubType: Text
- Data: Hello World



## Automation Script

The event, defined as a dzVents Lua script, monitors the state change of selected devices (by their idx) and updates the text of the device Event Monitor (idx=161).

Create a new Event type dzVents Lua: GUI > Setup > More Options > Events

### Shared helper function: global\_data

Add a function to update the text of the Event Monitor device.

```
(in chapter Helpers)
IDX_EVENTMONITORMSG = 161,

(in chapter Messages)
-- Update the event monitor message with text
eventmonitormsg = function(domoticz, msg)
    domoticz.devices(domoticz.helpers.IDX_EVENTMONITORMSG).updateText(msg)
end
```

### Event name: event\_monitor

```
return {
  on = {
    devices = {
      -- list of the idx of the devices monitored
      -- update accordingly
      110,111,112,113,118,160
    }
  },
  execute = function(domoticz, device)
    local message = '' .. device.name .. ' changed to ' .. device.state
    domoticz.helpers.eventmonitormsg(domoticz, message)
  end
}
```

<TODO>

Check if possible, to define a user variable (type String) with the idx of the devices to monitor. Example:

Name: DEF\_EVENTMONITOR\_DEVICES

String: 110,111,112,113,118,160

Update the dzVents Lua script to loop over the devices.

```
on = {
  devices = {
    -- list of the idx of the devices monitored
    -- update accordingly
    Loop over user variable DEF_EVENTMONITOR_DEVICES
  }
},
```

# Maintenance

Clear the device log from time-to-time.

## Option Domoticz GUI

Tab Utility > Widget Event Monitor > Log > Clear

## Option SQLite3 Command

*Note*

Requires [SQLite3 Package](#) to be installed.

*Example*

1. Open a terminal.
2. Login as user Pi
3. Change to the domoticz database folder  
cd /home/pi/domoticz
4. Start sqlite3 command  
sqlite3
5. Select device log entries to check if there are entries  
select count(\*) from lightinglog where devicerowid=161;
6. Delete device log entries  
delete from lightinglog where devicerowid=161;
7. Select device log entries to check if entries are deleted  
select count(\*) from lightinglog where devicerowid=161;

```
Login Using username "pi".
cd domoticz
sqlite3
SQLite version 3.16.2 2017-01-06 16:32:41
sqlite> .open domoticz.db
sqlite> select count(*) from lightinglog where devicerowid=161;
46
sqlite> delete from lightinglog where devicerowid=161;
sqlite> select count(*) from lightinglog where devicerowid=161;
0
```

# Indoor Air Quality (Plugin, Tinkerforge)

## Purpose

- To measure the Indoor Air Quality Index, Condition and Accuracy, Air Pressure, Humidity, Temperature, Illuminance.
- To display values in an Indoor Air Quality Station and in Domoticz.
- To enable additional functionality by using scripts (preferred dzVents Lua scripts), i.e. switch LCD backlight, switch room light depending Lux threshold.

## Solution

An **Indoor Air Quality Station** is built out of [Tinkerforge](#) Building Blocks:  
Master Brick with WiFi Extension, Bricklets Air Quality, LCD 20x4, RGB LED, Ambient Light.



### Note

A screenshot of the prototype in action.

**Air Quality Bricklet** measures the IAQ Index (ppm), IAQ Condition, IAQ Accuracy, Air Pressure (mbar), Humidity (%), Temperature (C).

Referencing Tinkerforge [documentation](#): *The IAQ index is a measurement for the quality of air. To calculate the IAQ index the Bricklet detects ethane, isoprene (2-methylbuta-1,3-diene), ethanol, acetone and carbon monoxide (often called VOC, volatile organic components) by adsorption. These gas measurements are combined with the measurements of air pressure, humidity and temperature to calculate the final IAQ index.*

- **IAQ Condition Levels** (6) range=condition (color):  
0-50=Good (green), 51-100=Moderate (yellow), 101-150=Unhealthy sensitive groups (orange), 151-200=Unhealthy (red), 201-300=Very Unhealthy (purple), 301-500=Hazardous (maroon).
- **IAQ Index Accuracy Levels** (4): Unreliable, Low, Medium, High.

**Ambient Light Bricklet** measures the Illuminance (lx).

**LCD 20x4 Bricklet** displays the IAQ Index ppm, IAQ Condition, Temperature C, Humidity %, Air Pressure mbar, Illuminance lx.

**RBG LED Bricklet** indicates the IAQ Condition Level Color.

The plugin polls in regular intervals data from the **Indoor Air Quality Station**.

**Domoticz Indoor Air Quality Devices** created - Name (Type,SubType):

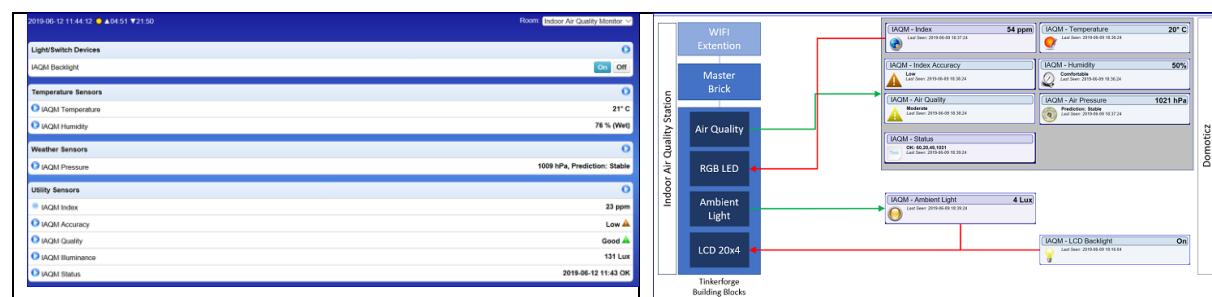
- Index (General, Custom Sensor), Index Accuracy (General, Alert), Air Quality (General, Alert [Text=Level]).
- Temperature (Temp, LaCrosse TX3), Humidity (Humidity, LaCrosse TX3), Air Pressure (General, Barometer), Ambient Light (Lux, Lux).
- LCD Backlight (Light/Switch, Switch), Status (General, Text).

*Note*

Enhanced functionality, like switch LCD backlight, switch lights (depending Lux) are realized with dzVents Lua scripts.

For more information or get the latest version, go [here](#) (GitHub).

See also [Python Plugin Development](#).



*Note*

The dashboard with room Indoor Air Quality Monitor (in mobile mode).

# Info Message

## Purpose

**NOT USED – Replaced by the Alert Message.**

To display an Info Message on the Dashboard.

The Info Message is populated by various dzVents events, i.e.

- Raspberry Pi monitor (event name: rpi\_monitor)
- Hue lamps living room timed switch (event name: hue\_wz\_timer)
- More see the dedicated functions

## Solution

Add a Virtual Sensor named “Control Message”, Type General, SubType Text.

52	VirtualSensors	00082051	1	Control Message	General	Text	Hue MakeLab Switching OFF 16:55:34
----	----------------	----------	---	-----------------	---------	------	------------------------------------

In the various dzVents events, the device is updated.

Control Message	Hue MakeLab switched OFF 17:18:05	
Text	Last Seen: 2018-09-05 17:18:05	
Type: General, Text		
	Log	Edit

## Automation Script

Event name: info\_msg

```
local IDX_HUE_MAKELAB = 118;
local IDX_CONTROLMSG = 52

local function isnowtime(domoticz)
    return domoticz.time.rawTime
end

return {
    active = true,
    on = {
        devices = {
            IDX_HUE_MAKELAB
        }
    },
    execute = function(domoticz, device)
        if (device.state == 'On') then
            device.switchOff()
            domoticz.devices(IDX_CONTROLMSG).updateText(device.name .. ' switched OFF ' ..
isnowtime(domoticz))
        end
    end
}
```

# Hardware Monitor Raspberry Pi

## Purpose

To monitor hardware data for the Raspberry Pi (RPi) devices used in this Home Automation system solution.

### RPi Data Monitored

CPU Usage %, CPU Temperature °C, Discspace Used %, RAM Used %.

### RPi Devices (Name)

Domoticz Production (pidopro), Domoticz Development (pidodev), volkszaehler (pivz), homematic (pihm - planned).

The hardware data for all the RPi's is displayed in the Domoticz development system.

Screenshots of the Hardware Monitor Dashboard & Floorplan.

The image contains two screenshots of the Domoticz software interface. The top screenshot shows the 'Hardware Monitor' dashboard with sections for 'Temperature Sensors' and 'Utility Sensors'. The bottom screenshot shows a 'Floorplan' view with four panels labeled 'Domoticz Production', 'Domoticz Development', 'volkszaehler', and 'homematic', each displaying real-time hardware monitoring data in a grid format.

Temperature Sensors			
pidopro CPU Temp	49.4 °C		
pidodev CPU Temp	48.9 °C		
pivz CPU Temp	37.932 °C		

Utility Sensors			
pidopro CPU Usage	2.23%		
pidopro RAM Usage	24.5%		
pidopro Disc Usage	32.61%		
pidodev CPU Usage	2.17%		
pidodev RAM Usage	47.84%		
pidodev Disc Usage	82.25%		
pivz CPU Usage	2%		
pivz RAM Usage	46.493%		
pivz Disc Usage	16%		

Domoticz Production			
CPU Temp	CPU Usage	RAM	Disc
49.4°C	2.14%	24.2%	32.61%

Domoticz Development			
CPU Temp	CPU Usage	RAM	Disc
48.3°C	2.56%	43.35%	62.24%

volkszaehler			
CPU Temp	CPU Usage	RAM	Disc
37.532°C	1%	46.6135%	16%

homematic			
CPU Temp	CPU Usage	RAM	Disc

## Solution

The data provided by each RPi: CPU Temp, CPU Usage, RAM Usage, Disc Usage.

For the RPis running a Domoticz instance, data from the hardware "Motherboard Sensors" is used.

The devices are named as mentioned, added to the Domoticz instance roomplan "Hardware Monitor" which is used as a dashboard on that instance including a floorplan.

For the other RPis, a webserver solution "hwmon" is used to gather the hardware data.

The Domoticz Development system:

- has 4 virtual sensor devices (device name data) for each of the RPis, i.e. pivz CPU Temp, pivz CPU Usage etc.
- has a roomplan "Hardware Monitor" with all the hardware monitor devices
- has a flooplans "Hardware Monitor" using the roomplan "Hardware Monitor"
- gathers the data in regular intervals via dzVents Lua script events (one for each RPi), i.e. event name: hwmon-pivz, hwmon-pidopro.
- displays the data in the dashboard and floorplan

### Node-RED

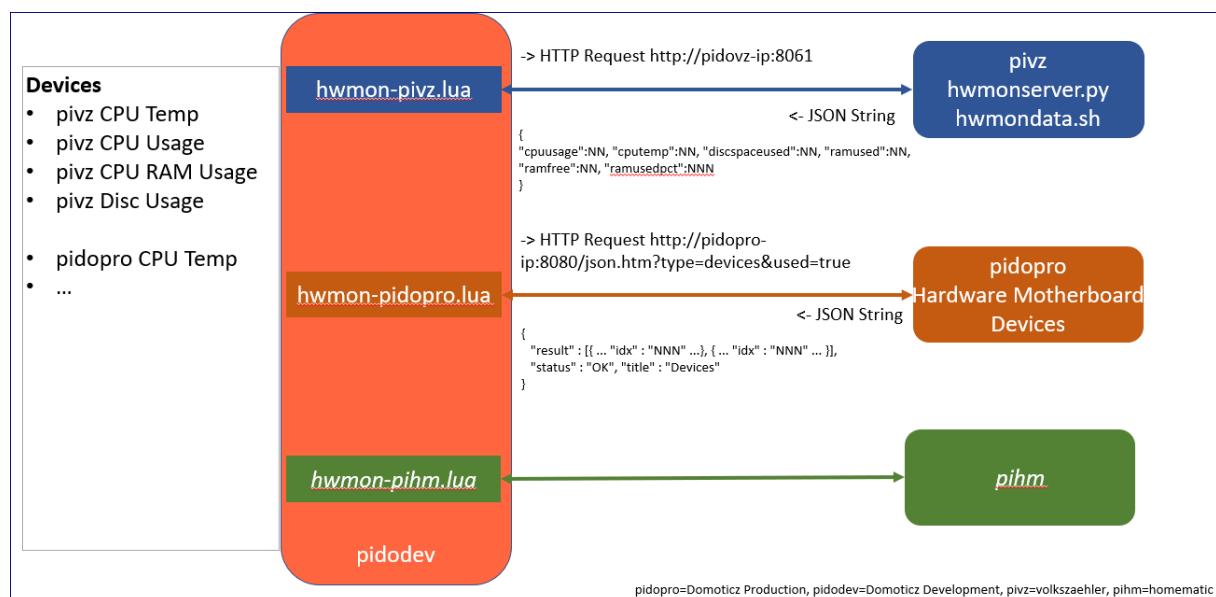
Tested various Node-RED flows for pivz data.

- Simple flow with a HTTP request node, triggered every 5 minutes by an Inject node, gathers the data and logs.
- Dashboard UI more complex flow with gauges and charts grouped by data property.

#### Note

For the latest version of the source code scripts & flows check the source code files.  
Only the pseudo code is shared.

### Flow



## Solution RPi volkszaehler

Device name: pivz

This solution, called hwmon, has various scripts:

1. Bash script, *hwmondata.sh*, gets the data and outputs a JSON string. This script can be run from the CLI or via webserver request.
2. Python3 webserver, *hwmonserver.py*, running as a service, *hwmon.service* returns the JSON string on the HTTP API Request by running the as script.
3. Domoticz: dzVents Lua script opens the HTTP API Request URL and parses the HTTP response JSON string into Domoticz Virtual Sensors devices.

The files *hwmondata.sh*, *hwmonserver.py*, *hwmon.service* are located in folder /home/pi/scripts. Included are also tmp files generated.

Example of the JSON string returned by the bash script, which is called by the webserver and parsed by the dzVents Lua script event “hwmon-pivz” to update the Domoticz devices:

```
{"cpuusage":2,"cputemp":37.394,"discspaceused":16,"ramused":234,"ramfree":274,"ramusedpct":46.063}
```

### Bash Script

File: *hwmondata.sh*

Folder: /home/pi/scripts

#### Pseudo Code

Run rpi commands to obtain system data in single var:

1. CPU Usage %
2. CPU Temp C
3. RAM Usage %
4. Disc Usage %

Build and output the JSON string.

#### Note

This Bash script is handy to use for a quick check by running from the CLI:

```
pi@vz:~ $ cd scripts  
pi@vz:~/scripts $ ./hwmondata.sh  
{"cpuusage":3,"cputemp":37.932,"discspaceused":16,"ramused":237,"ramfree":262,"ramusedpct":47.495}
```

## Python3 Webserver

File: hwmonserver.py  
 Folder: /home/pi/scripts  
 Python version: 3.7

### Pseudo Code

Run and wait for incoming HTTP API Requests.  
 Handle request by executing Bash script *hwmondata.sh*.  
 Create and return the HTML response

- code 200
- header content-type application/json
- content JSON string from output *hwmondata.sh*.

### Service hwmon.service

The webserver runs as a service from folder /home/pi/scripts.

Create the service file

```
nano hwmon.service
[Unit]
Description=Hardware Monitor Service
After=network.target

[Service]
ExecStart=/usr/bin/python3 -u hwmonserver.py
WorkingDirectory=/home/pi/scripts
StandardOutput=inherit
StandardError=inherit
Restart=always
User=pi

[Install]
WantedBy=multi-user.target
```

### Copy the service file to the systemd folder

```
sudo cp hwmon.service /etc/systemd/system/hwmon.service
```

### Start service

```
sudo systemctl start hwmon.service
```

### Check service is running

```
ps ax | grep hwmonserver
2299 ? Ss 0:00 /usr/bin/python3 -u hwmonserver.py
```

### Stop service

```
sudo systemctl stop hwmon.service
```

### Start Service at Boot

```
sudo systemctl enable hwmon.service
```

The `systemctl` command can also be used to restart the service or to disable. Example output:

```
sudo systemctl enable hwmon.service
Created symlink /etc/systemd/system/multi-user.target.wants/hwmon.service →
/etc/systemd/system/hwmon.service.
```

### Issues

If there are issues to copy the service file after a change, ensure

1. to stop the server: `sudo systemctl stop hwmon.service`
2. reload the deamon: `sudo systemctl daemon-reload`

## Automation Script

Event name: hwmon-pivz (embedded in the domoticz database).

### Pseudo Code

Place a HTTP API Request to the *pivz webserver* every minute triggered by a timer.

The HTTP request has a unique callback.

Handle the HTTP JSON response by updating the Domoticz Devices.

### Domoticz Log Example

```
2019-06-19 09:30:00.542 Status: dzVents: Info: ----- Start internal script: hwmon-rpi-vz:, trigger:  
every minute  
2019-06-19 09:30:00.542 Status: dzVents: Info: ----- Finished hwmon-rpi-vz  
2019-06-19 09:30:01.138 Status: dzVents: Info: Handling httpResponse-events for: "hwmonrpivz  
2019-06-19 09:30:01.138 Status: dzVents: Info: ----- Start internal script: hwmon-rpi-vz:  
HTTPResponse: "hwmonrpivz"  
2019-06-19 09:30:01.144 Status: dzVents: Info: CPU Usage % = 1.5  
2019-06-19 09:30:01.144 Status: dzVents: Info: CPU Temp C = 37.932  
2019-06-19 09:30:01.144 Status: dzVents: Info: Disc Used % = 16  
2019-06-19 09:30:01.144 Status: dzVents: Info: RAM Used % = 46.063  
2019-06-19 09:30:01.163 Status: dzVents: Info: ----- Finished hwmon-rpi-vz
```

# Solution RPi Domoticz Production

Device name: pidopro

A dzvents Lua script event is running on the Domoticz development system, gathers all used devices data from the Domoticz production system.

The hardware monitor devices (#4) are selected ad used to update the devices on the Domoticz development system.

## Automation Script

Event name: hwmon-pidopro (embedded in the domoticz database).

### Pseudo Code

Place a HTTP request to the Domoticz production system (pidopro) every minute triggered by a timer.

The request obtains all data from the used devices.

The HTTP request has a unique callback.

Handle the HTTP JSON response by

- selecting a device by its idx
- get the data and update the Domoticz device on the Domoticz development system

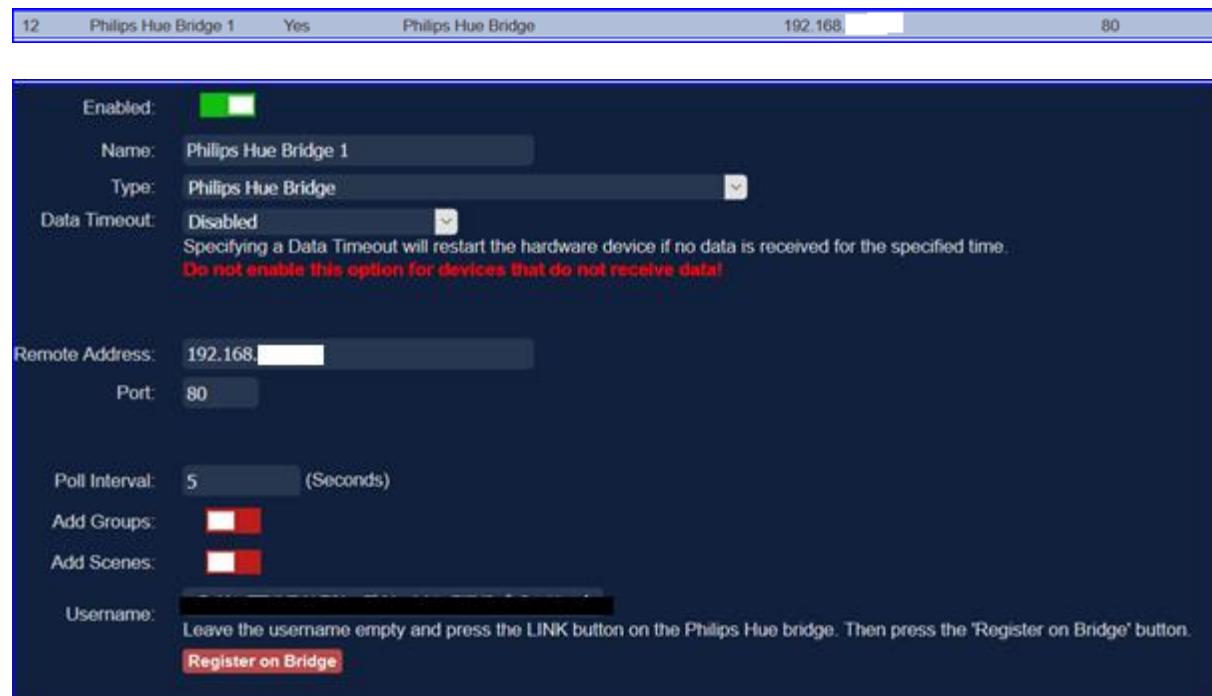
# Philips Hue

## Purpose

To control devices connected to the Philips Hue Bridge.

## Hue Bridge Configuration

There is one Hue Bridge (Hardware idx=12) connected to the Router.



### Note

Initially Groups & Scenes are not used.

## Hue Devices

The list of Hue Devices, which are automatically created by Domoticz (Setup > Settings > Hardware allow for 5 minutes), in order of their idx:

Idx	Hardware	ID	Unit	Name	Type	SubType
110	Philips Hue Bridge 1	0000001	1	Hue Haustür	Lighting 2	AC
111	Philips Hue Bridge 1	0000002	1	Hue WZ Ablage	Color Switch	WW
112	Philips Hue Bridge 1	0000003	1	Hue WZ TV	Lighting 2	AC
113	Philips Hue Bridge 1	0000004	1	Hue WZ Robs Ecke	Lighting 2	AC
118	Philips Hue Bridge 1	0000005	1	Hue MakeLab	Lighting 2	AC

## Hue Light Add New

Example adding a Hue white light.

First the new Hue Lamp is added to the Hue Bridge. This is done by using the Hue App (Android).

After the Hue Lamp has been added to the Hue Bridge, Domoticz adds the device (idx=118) to the list (after Setup > Settings > Hardware allow for 5 minutes).

*Note*

This might take few minutes.

### Examples

118	Philips Hue Bridge 1	0000005	1	Hue white lamp 4	Lighting 2	AC
-----	----------------------	---------	---	------------------	------------	----

Idx	Hardware	ID	Unit	Name	Type	SubType	Data
194	Philips Hue Bridge 1	00000007	1	Hue Bloom Schrankwand	Color Switch	RGBW	Set Color

Domoticz Log Entry – Listen to new devices and add the new Hue white lamp 4.

2018-09-05 13:22:14.995 Status: New sensors allowed for 5 minutes...
2018-09-05 13:25:41.749 (Philips Hue Bridge 1) Lighting 2 (Hue white lamp 4)

Add the device with name Hue MakeLab, set the level to 100%.



118	Philips Hue Bridge 1	0000005	1	Hue MakeLab	Lighting 2	AC	Set Level: 100 %
-----	----------------------	---------	---	-------------	------------	----	------------------

### Domoticz Log Entry – Hue Lamp Level Change

If the level of the Hue Lamp is changed, the Domoticz Log Entry:

2018-09-05 13:37:55.133 Status: User: Admin initiated a switch command (118/Hue MakeLab/Set Level)
--

## Hue Control Tests

Lets start playing around with dzVents and a Hue Lamp Hue MakeLab (idx=118). The Hue Lamp can be handled like a dimmer switch, with methods to be used like device.dimTo(pct), switchOff(), switchOn().

See [this](#) documentation, chapter Switch.

To get an overview of the object properties, use device.dump() first.

secondsSinceMidnight: 49075 ruleIsBeforeCivilTwilightStart() daysAgo: 0 updateBarometer() setState() kodiSwitchOff() description: updateMode() hardwareType: Philips Hue Bridge updateRadiation() updateWind() dump() updateElectricity() updateWaterflow() updateYouless() updateVoltage() updateVisibility() stop() playFavorites() updateUV() updatePercentage() isGroup: false updateCustomSensor() deviceId: 0000005 changed: true updateText() updateLux() deviceType: Lighting 2 updateTempHumBaro() isScene: false isHTTPResponse: false updateSetPoint() updateTempHum()	updateSoilMoisture() bState: false isTimer: false usedByCamera: false unit: 1 update() armAway() setNightMode() setDiscoMode() setWhiteMode() baseType: device setKelvin() kodiSetVolume() updateP1() hardwareID: 12 updateAirQuality() isSecurity: false play() deviceSubType: AC hardwareTypeValue: 38 levelVal: 5 kodiStop() lastLevel: 33 updateCounter() setVolume() cancelQueuedCommands() updatePressure() active: false data: lastUpdate: 2018-09-05 13:37:55 description: data: hardwareTypeValue: 38	unit: 1 _state: Off hardwareType: Philips Hue Bridge maxDimLevel: 15 icon: dimmer levelVal: 5 usedByCamera: false protected: false _nValue: 0 hardwareName: Philips Hue Bridge 1 hardwareID: 12 id: 118 switchType: Dimmer baseType: device signalLevel: 12 name: Hue MakeLab switchTypeValue: 7 deviceID: 0000005 lastLevel: 33 changed: true batteryLevel: 255 deviceType: Lighting 2 rawData: 1: 15 subType: AC timedOut: false id: 118 rawData: 1: 15 isVariable: false _nValue: 0
---	---	--

## Automation Script 1 – Device Trigger

If the Hue Lamp is switched ON, then switch it OFF again.

Event name: hue\_control

```
local IDX_HUE_MAKELAB = 118;

return {
  on = {
    devices = {
      IDX_HUE_MAKELAB
    }
  },
  execute = function(domoticz, device)
    domoticz.log('Device ' .. device.name .. ' changed to ' .. device.state, domoticz.LOG_INFO)
    if (device.state == 'On') then
      domoticz.log('Switching OFF', domoticz.LOG_INFO)
      device.switchOff()
      domoticz.log('OK', domoticz.LOG_INFO)
    end
    -- domoticz.log(device.dump(), domoticz.LOG_INFO)
  end
}
```

## Automation Script 2 – Timer Trigger

Switch the Hue Lamp ON at 'HH:MM' and switch it OFF again one minute later.

This type of script could be used, to switch

- the Hue Lamps in the Living Room, ON 'at sunset' and OFF 'at 23:00'.
- The Hue Lamp Outside ON 'at sunset' and OFF 'at sunrise'.

Event name: hue\_control2

```
-- Idx of the devices
local IDX_HUE_MAKELAB = 118;

return {
  active = true,
  on = {
    timer = {
      'at 15:49',
      'at 15:50'
    }
  },
  execute = function(domoticz, timer)
    if (timer.trigger == 'at 15:49') then
      domoticz.devices(IDX_HUE_MAKELAB).switchOn()
    end

    if (timer.trigger == 'at 15:50') then
      domoticz.devices(IDX_HUE_MAKELAB).switchOff()
    end
  end
}
```

# Hue Timed Switch Lights

Switch the Hue lights in the living room ('WZ'), ON '30 minutes before sunset' and OFF 'at 23:00'.

Update the Alert Message.

## Automation Script

Event name: hue\_wz\_timer

```
--[[[  
    hue_wz_timer.lua  
    Turn WZ Hue lamps on & off by given time: ON at sunset, OFF at 23:00.  
    Update the alert message.  
    Ensure the timer and the timer trigger are the same.  
]]--  
  
-- External modules  
local utils = require('utils')  
local msgbox = require('msgbox')  
  
-- Idx of the devices  
local IDX_HUE_WZABLAGE = 111  
local IDX_HUE_WZTV = 112  
local IDX_HUE_HAUSTUER = 110  
  
-- Update alert message with alert level green.  
local function setalertmsg(domoticz, state)  
    local message= 'Hue Lampen ' .. state .. ' ' .. utils.isnowhhmm(domoticz)  
    msgbox.alertmsg(domoticz, domoticz.ALERTLEVEL_GREEN, message)  
end  
  
local function hueswitchon(domoticz)  
    domoticz.devices(IDX_HUE_WZABLAGE).switchOn()  
    domoticz.devices(IDX_HUE_WZTV).switchOn()  
    domoticz.devices(IDX_HUE_HAUSTUER).switchOn()  
    setalertmsg(domoticz, 'an')  
end  
  
local function hueswitchoff(domoticz)  
    domoticz.devices(IDX_HUE_WZABLAGE).switchOff()  
    domoticz.devices(IDX_HUE_WZTV).switchOff()  
    domoticz.devices(IDX_HUE_HAUSTUER).switchOff()  
    setalertmsg(domoticz, 'aus')  
end  
  
return {  
    active = true,  
    on = {  
        timer = {  
            '60 minutes before sunset',  
            '30 minutes before sunset',  
            'at 23:00',  
            'at 07:00',  
            'at 08:00'  
        }  
    },  
    execute = function(domoticz, timer)  
  
        -- in the evening send message hue lights will be switched on  
        if (timer.trigger == '60 minutes before sunset') then  
            -- format date & time see www.lua.org/pil/22.1.html. X = time.  
            local now=os.time()  
            local nowplus30minutes = utils.convertimehhmm(os.date("%X",now+(30*60)))  
            local message= 'Hue Lampen gehen an ' .. nowplus30minutes  
            msgbox.alertmsg(domoticz, domoticz.ALERTLEVEL_GREEN, message)  
        end  
  
        -- switch the hue lights on & off in the evening  
        if (timer.trigger == '30 minutes before sunset') then hueswitchon(domoticz) end  
        if (timer.trigger == 'at 23:00') then hueswitchoff(domoticz) end  
  
        -- switch the hue lights on & off in the morning
```

```
-- NOT USED
-- if (timer.trigger == 'at 07:00') then hueswitchon(domoticz) end
-- if (timer.trigger == 'at 08:00') then hueswitchoff(domoticz) end

end
}
```

## Domoticz Log Entry

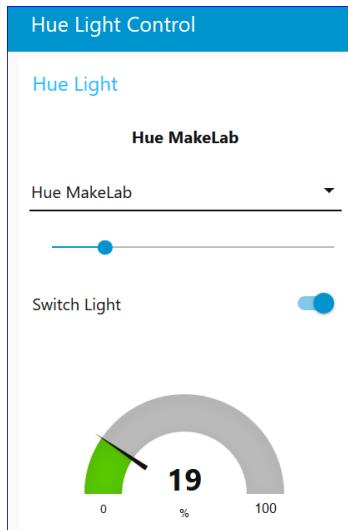
```
2018-09-05 20:02:00.394 (Philips Hue Bridge 1) Color Switch (Hue WZ Ablage)
2018-09-05 20:02:00.417 (Philips Hue Bridge 1) Lighting 2 (Hue WZ TV)
2018-09-05 20:02:00.259 Status: dzVents: Info: ----- Start internal script: hue_wz_timer:, trigger: at sunset
2018-09-05 20:02:00.276 Status: dzVents: Info: ----- Finished hue_wz_timer
2018-09-05 20:02:00.357 Status: EventSystem: Script event triggered:
/home/pi/domoticz/dzVents/runtime/dzVents.lua
```

## Hue Lights Control Node-RED

An example of controlling Hue lights via Node-RED Dashboard UI in a browser.  
Select a Hue and switch the light ON|Off or set Brightness Level.

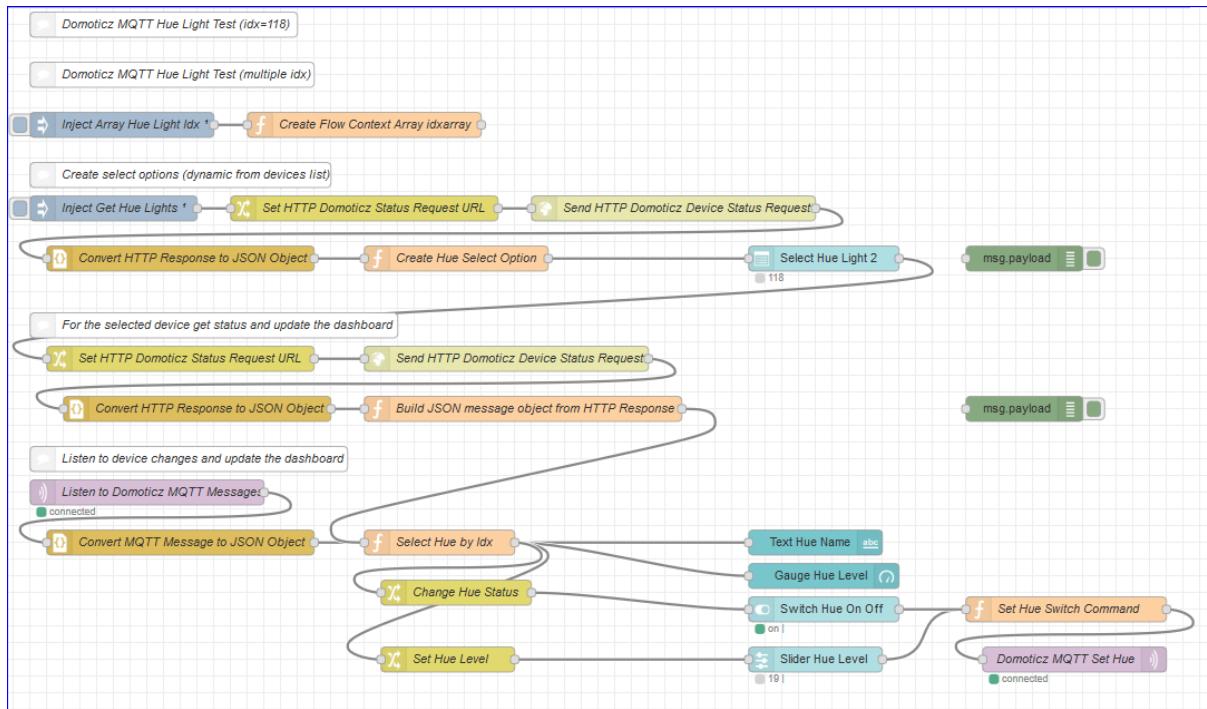
Read more about Node-RED [Appendix Node-RED](#).

### Dashboard



The dashboard ui contains the tab Hue Light Control with a single group Hue Light.  
The dropdown lists the Hue devices to control. If selected the state gets updated first, i.e the slider position, switch and the gauge level are set.  
Change the light by moving the slider or set the switch.  
If the device gets updated in the browser by the Domoticz GUI, then the Node-RED dashboard is updated.

## Flow



### Note

When the flow starts, a flow context array “idxarray” is defined with the Hue deviceidx’es, which are used for the dropdown with the Hue lights. An initial Hue is set in the dropdown. The dropdown notifies a change and requests the selected Hue device information via HTTP request. The HTTP response contains the full device information from which only a subset are used. A new JSON message is created with the required properties. These are send to the node selecting the Hue. The properties are used to update the Dashboard UI nodes, i.e. text\_ui, gauge\_ui, switch\_ui and slider\_ui.

If a Hue device changes (f.e. via the browser Domoticz GUI), the MQTT listener node recognized this and the message payload is handled also by the node selecting the Hue with the connected nodes.

So, the “Select Hue by Idx” node has two inputs

1. from a converted HTTP request and
2. from the MQTT listener.

## Other Information

Learn more in depth about Hue at [meethue](#).

# Postbox Notifier (RaspberryMatic)

## Purpose

To watch the postbox for post and notify via Email Notification and Alert Message.

## Solutions

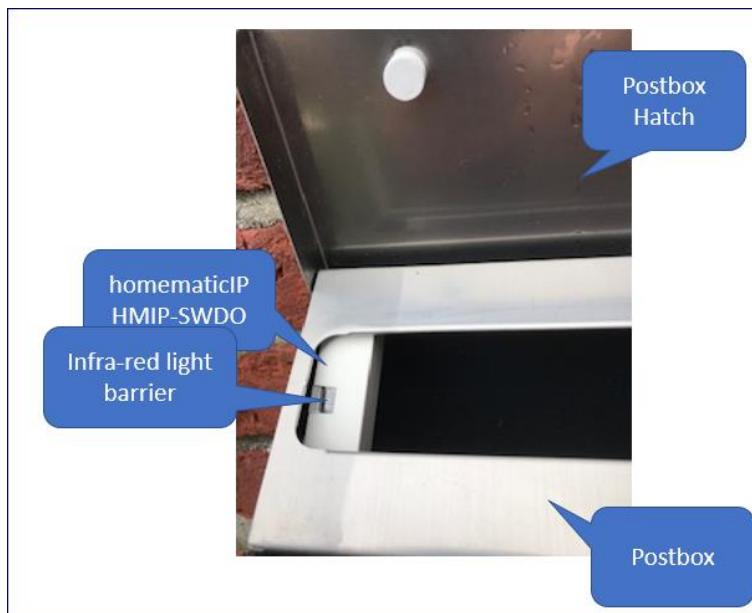
A detector (with an integrated infra-red light barrier) detects opening the hatch of the postbox and triggers sending an Email Notification displayed in the [Alert Message](#).

This solution is part of a RaspberryMatic CCU (HomeMatic compatible) which has several connected homematicIP devices communicating with/between Domoticz via

- HomeMatic CCU XML-API Addon or
- Domoticz HTTP API Requests

See also chapter Explore [RaspberryMatic](#).

The hardware used is a *homematicIP Window and Door Contact – optical* (HMIP-SWDO, Product ref: 140733A09) and Metal Postbox with dimensions (W x H x D) 35 x 40 x 10 cm. The postbox is ~40 m distance from the CCU (which is in range of 300 m according HMIP-SWDO datasheet).



### Hint

The device HmIP-SWDO is light sensitive, means if it's dark then not signal. If that's an issue, use the device HmIP-SWDM = window / door contact which magnet.

Whilst evolving, several solutions have been developed. The third solution is in place.

Solution	Description
Alert	If the postbox is opened, set the Alert message and send email notification (no manual intervention required).
Alert + Switch	As previous plus functionality: Turn a switch on, indicating the postbox has been opened. Manual turn the switch to off after checking the postbox. This solution handles the situation where the postbox latch is kept open instead of closing after post has been dropped. If the latch remains open, the homematicIP SWDO device keeps on sending messages. This is avoided by sending a message onl once and manual reset the switch after the postbox has been checked.
Alert + Switch + Voltage <b>This solution is in place.</b>	As previous plus functionality: Monitor the voltage of the homematicIP device SWDO and send Alert if the value is below threshold. The threshold is a Domoticz User Variable. The homematicIP device SWDO is not an outdoor device. The first experience showed that the battery (1.5V) is getting low after ~3 month and the device is not reachable by the RaspberryMatic server.

## Solution Alert

### Communication Flow

1. HMIP-SWDO detects opening the hatch of the postbox.
2. HMIP-SWDO triggers a script which submits a HTTP API Request to the Domoticz system to update Alert Message device to Level 4 with message “Postbox opened”.
3. Domoticz updates the device and sends out Email notification as triggered by comparing Alert Level 4 against user variable TH\_ALERTTOEMAIL (which has integer value 4).

#### Issue

If the hatch remains open, the HMIP-SWDO keeps on sending alert messages. To avoid this, the alert message script checks if an alert is sent again within a short timeframe threshold, but

- in case other alert messages are received, these are not captured and
- also if the threshold is reached, alerts are still sent.

Therefor option two is developed which requires manual intervention.

### RaspberryMatic CCU Configuration

#### Step 1

The device HMIP-SWDO is added to the CCU following the Teach-in devices procedure (used entering the Key and SGTIN data).

The screenshot shows two parts of the RaspberryMatic interface:

**(1) Add new device:** A screenshot of the "Device inbox" page. It shows a table with one row for the HMIP-SWDO device. The device details are as follows:

Type	Description	Picture	Description	Serial number	Interface category	Transmission mode	Name	Function	Room	Functional test	Action	Done
HMIP-SWDO	Homematic IP Window / Door Contact - optical			0000DA498D5859	HmIP-RF	Secured	HMIP-SWDO 0000DA498D5859			<input type="button" value="Test"/> <input type="button" value="Delete"/> <input checked="" type="button" value="OK"/> <input type="button" value="Set"/> <input checked="" type="checkbox" value="operable"/> <input checked="" type="checkbox" value="visible"/> <input checked="" type="checkbox" value="logged"/>	<input type="button" value="Done"/>	

**(2) Device Status and control:** A screenshot of the "Status and control > Devices" page. It lists several devices, including the HMIP-SWDO which is currently selected. The device status is shown as "Open".

#### Step 2

Create a RaspberryMatic program to trigger sending the Alert Message Level 4 (RED) to Domoticz in case the device state changes to open.

Domoticz handles the Alert via dzVents Lua script event “alertmsg\_monitor”.

```
IF HMIP-SWDO..:1 is OPEN THEN trigger WHEN updated SCRIPT
```

Name	Description	Condition (if...)	Activity (then..., or else...)	Action
SWDO5859	Postbox Alert	Channel status: HMIP-SWDO 0000DA498D5859:1 when open trigger when updated	Script: ... immediately run	<input type="checkbox"/> intrinsic
<b>Condition: If...</b>				
Device selection: HMIP-SWDO 0000DA498D5859:1 when open trigger when updated OR DR				
<b>Activity: Then...</b> <input checked="" type="checkbox"/> Stop all current delays before performing the activity (e.g. retriggering). Script: Function: Postbox Alert string sFunction = "Postbox Alert" ... <input checked="" type="checkbox"/> immediately				
<b>Activity: Else...</b> <input checked="" type="checkbox"/> Stop all current delays before performing the activity (e.g. retriggering).				

## RaspberryMatic Script

The script makes use of a CUxD device (see Addon CUxD) to run system commands.

The system command, which triggers a HTTP API Request, to update the Domoticz Alert Message device (IDX=55) with Alert Level 4 (nvalue) and the message (svalue):

```
wget -q -O - 'http://domoticz-ip:8080/json.htm?type=command&param=udevice&idx=IDX&nvalue=4&svalue=MESSAGE'
```

The CUxD device used is “CUxD (28) System” with Function Exec – Remote Control with 19 keys = key :1 is used.

### Script Code

#### RaspMatic Script: postbox\_notifier.script

```
string sFunction = "Postbox Alert";
string sDate = system.Date("%d.%m.%Y"); ! sDate = "09.08.2019";
string sTime = system.Date("%H:%M"); ! sTime = "07:32";
! A domoticz alert sensor is used
string nIdx = 55; ! Type: General; SubType: Alert
string nLevel = 4; ! Red
string sText = sDate # "%20" # sTime # "%20-%20Postbox%20opened!";
! Build the domoticz HTTP API Request url
string cAmp = "&";
string sDomUrl = "http://domoticz-ip:8080/json.htm"; ! Production
string sUrl =
sDomUrl#"?type=command#cAmp#"param=udevice#cAmp#"idx="#nIdx#cAmp#"nvalue="#nLevel#cAmp#"svalue="#sText#cAmp#";
;

! Define the command to execute
dom.GetObject("CUxD.CUX2801001:1.CMD_SETS").State ("wget -q -O - "#sUrl);

! Set the return flag to 1 to be able to read the json result
dom.GetObject("CUxD.CUX2801001:1.CMD_QUERY_RET").State (1);

! Start the command, wait till completed and get the result JSON string, i.e.
! {"status" : "OK","title" : "Update Device"}
! NOTE: script running on CCU waits until completion=ensure not to execute commands take long time.
string sRes = dom.GetObject("CUxD.CUX2801001:1.CMD_RETS").State();
! WriteLine("VT="#sRes.VarType()#"#sRes); ! VT=4, {"status" : "OK","title" : "Update Device"}
! handle result
var dl = dom.GetObject ("DomoticzLog");
! Update the var with result text
if (sRes.Find("OK") > 0) {
  dl.Variable(sFunction#"-Last update OK")
}
else {
  dl.Variable(sFunction#"Last update ERROR")
};
! WriteLine("VT="#dl.VarType()); ! VT=9
! WriteLine(dl.Variable()); ! shows the last update string
```

## Domoticz Configuration

This solution makes use of the [Alert Message](#). No additional configuration required.

## Automation Script

Event name: alertmsg\_monitor

```
--[[  
alertmsg_monitor.lua  
If level (nValue) of the Alert Messages device > threshold  
(set by uservariable TH_ALERTTOEMAIL), send email notification.  
]]--  
  
-- Idx of the devices used  
local IDX_ALERTMSG = 55  
local IDX_TH_ALERTTOEMAIL = 14  
  
return {  
    -- Check which device(s) have a state change  
    on = {  
        devices = { IDX_ALERTMSG}  
    },  
    data = {  
        -- keep the prev notified date  
        prevtimenotified = { initial = os.time() }  
    },  
    execute = function(domoticz, device)  
        -- Send email notification for level = 4  
        -- (or use other level but then change uservar TH_ALERTTOEMAIL)  
        -- Only the subject is used in the email notification  
        if (device.nValue == domoticz.variables(IDX_TH_ALERTTOEMAIL).value)  
        and (domoticz.helpers.timediff(domoticz.data.prevtime) > 60) then  
            domoticz.notify(device.text, '', domoticz.PRIORITY_HIGH)  
            domoticz.data.prevtime = os.time()  
        end  
    end  
}
```

*Note*

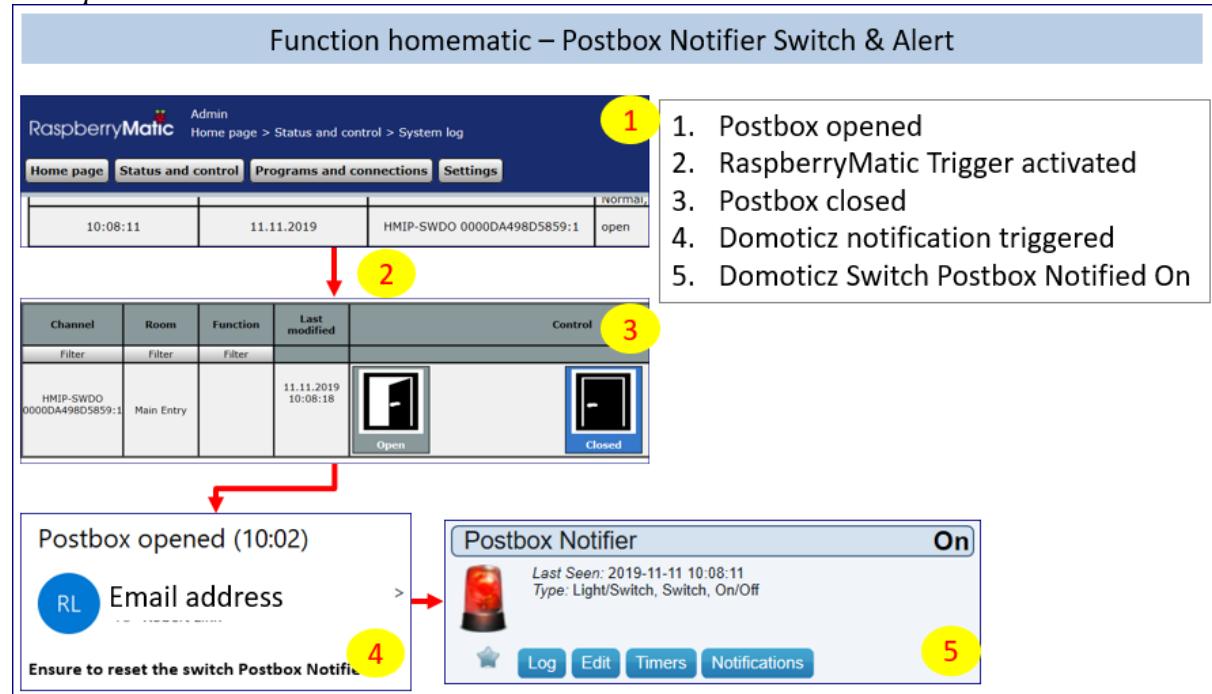
To avoid sending bulk emails within short timeframe, the notified time is checked against the previous notified time.

# Solution Alert + Switch

## Communication Flow

1. HMIP-SWDO detects opening the hatch of the postbox.
2. HMIP-SWDO triggers script which submits HTTP API Request to Domoticz system to set the state of the switch “Postbox Notifier” (idx: 189) to “On” and sends out an Alert Message
  - a. subject “Postbox opened (HH:MM)”
  - b. body “Ensure to reset the switch Postbox Notifier.”
3. The switch “Postbox Notifier” is set to “Off” manually.

### Example



## RaspberryMatic CCU Configuration

### Step 1

The device HMIP-SWDO is added to the CCU following the Teach-in devices procedure (used entering the Key and SGTIN data).

(1) Add new device

(2) Device Status and control

### Step 2

Create a program to trigger sending the Alert Message Level 4 (RED) to Domoticz in case the device state changes to open.

Domoticz handles the Alert via dzVents Lua script event “alertmsg\_monitor.lua”.

```
IF HMIP-SWDO..:1 is OPEN THEN trigger WHEN updated SCRIPT
```

Name	Description	Condition (if...)	Activity (then..., or else...)	Action
SWDO5859	Postbox Alert	Channel status: HMIP-SWDO 0000DA498D5859:1 when open trigger when updated	Script: ... immediately run	<input type="checkbox"/> intrinsic
<b>Condition: If...</b> Device selection: HMIP-SWDO 0000DA498D5859:1 when open trigger when updated OR DR				
<b>Activity: Then...</b> <input checked="" type="checkbox"/> Stop all current delays before performing the activity (e.g. retriggering). Script: Postbox Alert string sFunction = "Postbox Alert"..., immediately				
<b>Activity: Else...</b> <input checked="" type="checkbox"/> Stop all current delays before performing the activity (e.g. retriggering).				

## RaspberryMatic Script

The script makes use of a CUxD device to run system commands.

The system command, which triggers a HTTP API Request, to update the Domoticz Alert Message device (IDX=55) with Alert Level 4 (nvalue) and the message (svalue):

```
wget -q -O - 'http://domoticz-ip:8080/json.htm?type=command&param=switchlight&idx=IDX&switchcmd=CMD'
```

*Note*

The switch command “CMD” is case sensitive: On | Off.

The CUxD device used is “CUxD (28) System” with Function Exec – Remote Control with 19 keys = key :1 is used.

## Script Code

```

! Function: Postbox Notifier, 20191110 by rwbl
string sFunction = "Postbox Notifier";
string sDate = system.Date("%d.%m"); ! sDate = "09.08";
! string sDate = system.Date("%d.%m.%Y"); ! sDate = "09.08.2019";
string sTime = system.Date("%H:%M"); ! sTime = "07:32";
! string sTime = system.Date("%H:%M:%S"); ! sTime = "07:32:00";

! A domoticz alert sensor is used
string nIdx = 189; ! Type: Light/Switch; SubType: On/Off
string sOn = "On";
string sText = "Postbox%20opened%20(" # sDate # "%20" # sTime # ")";

! Build the domoticz HTTP API Request url
string cAmp = "&";
string sDomUrl = "'http://domoticz-ip:8080/json.htm'; ! Production
string sUrl =
sDomUrl#"?type=command#cAmp#"param=switchlight#cAmp#"idx="#nIdx#cAmp#"switchcmd="#sOn#"';
WriteLine(sUrl);

! OPTION: Run the command without a return result
! res = dom.GetObject("CUxD.CUX2801001:1.CMD_EXEC").State("wget -q -O - "#sUrl);

! OPTION: Run the command with a return result
! Define the command to execute
dom.GetObject("CUxD.CUX2801001:1.CMD_SETS").State ("wget -q -O - "#sUrl);

! Set the return flag to 1 to be able to read the json result
dom.GetObject("CUxD.CUX2801001:1.CMD_QUERY_RET").State (1);

! Start the command, wait till completed and get the result JSON string, i.e.
! {"status" : "OK","title" : "Update Device"}
! NOTE: The script running on the CCU waits until the completion - ensure not to execute commands which
take long time.
string sRes = dom.GetObject("CUxD.CUX2801001:1.CMD_RET").State();
! WriteLine("VT="#sRes.VarType()#/##sRes); ! VT=4, {"status" : "OK","title" : " SwitchLight" }

! handle result
var dl = dom.GetObject ("DomoticzLog");
! Update the var with result text
if (sRes.Find("OK") > 0) {
    dl.Variable(sFunction#"-Last update OK:#sDate#" "#sTime ")
}
else {
    dl.Variable(sFunction#"Last update ERROR:#sDate#" "#sTime")
};
! WriteLine("VT="#dl.VarType()); ! VT=9
! WriteLine(dl.Variable()); ! shows the last update string

```

## Domoticz Configuration

This solution makes use of the

- [Alert Message](#). No additional configuration required.
- Switch. Type: Light/Switch, SubType: Switch.

## Automation Script

Event name: postbox\_notifier

```
-- postbox_notifier.lua
local IDX_POSTBOXNOTIFIER = 189

return {
    -- Check which device(s) have a state change
    on = {
        devices = { IDX_POSTBOXNOTIFIER }
    },
    data = {
        -- set a flag if already notified
        pbnnotified = { initial = 0 }
    },
    -- Handle the switch if its state has changed to On
    execute = function(domoticz, device)
        -- Send email notification in case device is switched on
        -- Only the subject is used
        if (domoticz.devices(IDX_POSTBOXNOTIFIER).state == 'On') and (domoticz.data.pbnnotified == 0) then
            local subject = 'Postbox opened (' .. domoticz.helpers.isnowhhmm(domoticz) .. ')'
            local msg = 'Ensure to reset the switch Postbox Notifier.'
            domoticz.data.pbnnotified = 1
            domoticz.notify(subject, msg, domoticz.PRIORITY_HIGH)
        end
        if (domoticz.devices(IDX_POSTBOXNOTIFIER).state == 'Off') and (domoticz.data.pbnnotified == 1) then
            domoticz.data.pbnnotified = 0
        end
    end
}
```

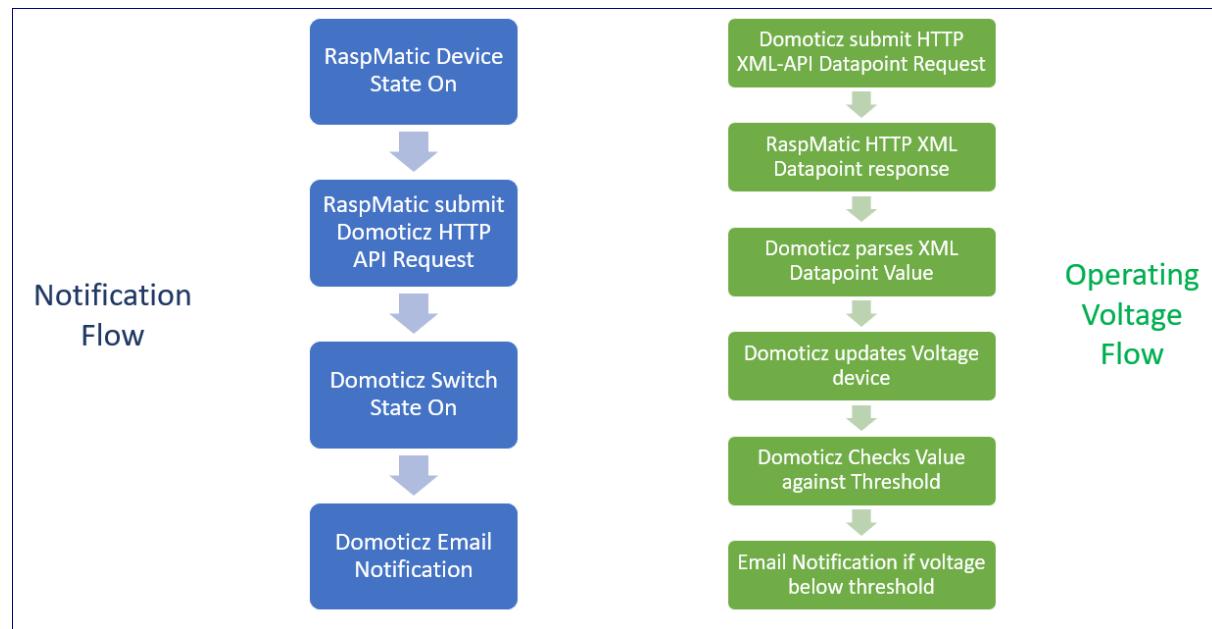
## Solution Alert + Switch + Voltage

This solution is in place. It is based upon the “Solution Alert + Switch” and enhanced with monitoring the Operating Voltage of the homematicIP device SWDO.

### Communication Flow

There are two communication flows:

1. Notification – RaspMatic pushes the SWDO device state change to Domoticz.
2. Operating Voltage – Domoticz pulls the SWDO device Operating Voltage value.



### RaspberryMatic CCU Configuration

As “Solution Alert + Switch”.

### RaspberryMatic Script

As “Solution Alert + Switch”.

## Domoticz Configuration

### Domoticz State Device “Postbox Notifier State”

Idx	Hardware	ID	Unit	Name	Type	SubType	Data
189	VirtualSensors	0001410D	1	Postbox Notifier State	Light/Switch	Switch	On

**Postbox Notifier State** Off



Last Seen: 2019-12-11 18:46:31  
Type: Light/Switch, Switch, On/Off

Log Edit Timers Notifications

**Postbox Notifier State** On



Last Seen: 2019-12-11 18:52:49  
Type: Light/Switch, Switch, On/Off

Log Edit Timers Notifications

**Email Notification**

Robert Linn
Postbox opened (11:38)
Wed 11/12/2019 11:38
47 KB

Postbox Notifier: Ensure to reset switch. <end>

**Domoticz Log Entry Switch On**

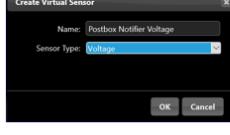
```
2019-12-11 11:38:25.383 Status: User: Admin initiated a switch command (189/Postbox Notifier State/On)
2019-12-11 11:38:25.578 Status: dZvents: Info: Handling events for: "Postbox Notifier State", value: "On"
2019-12-11 11:38:25.578 Status: dZvents: Info: ----- Start internal script: postbox_notifier: Device: "Postbox Notifier State (VirtualSensors)", Index: 189
2019-12-11 11:38:25.579 Status: dZvents: Info: Device Postbox Notifier State changed On = 0
2019-12-11 11:38:25.579 Status: dZvents: Info: POSTBOXNOTIFIER Postbox Notifier State notification sent: Postbox opened (11:38) (Postbox Notifier: Ensure to reset switch.)
2019-12-11 11:38:25.580 Status: dZvents: Info: ----- Finished postbox_notifier
2019-12-11 11:38:25.580 Status: EventSystem: Script event triggered: /home/pi/domoticz/dZvents/runtime/dZvents.lua
2019-12-11 11:38:25.586 Status: Notification: Postbox opened (11:38)
2019-12-11 11:38:26.648 Notification sent (email) => Success
```

**Domoticz Log Entry Switch Off**

```
2019-12-11 11:38:13.305 Status: User: Admin initiated a switch command (189/Postbox Notifier State/Off)
2019-12-11 11:38:13.409 Status: dZvents: Info: Handling events for: "Postbox Notifier State", value: "Off"
2019-12-11 11:38:13.410 Status: dZvents: Info: ----- Start internal script: postbox_notifier: Device: "Postbox Notifier State (VirtualSensors)", Index: 189
2019-12-11 11:38:13.410 Status: dZvents: Info: Device Postbox Notifier State changed Off = 0
2019-12-11 11:38:13.411 Status: dZvents: Info: ----- Finished postbox_notifier
```

### Domoticz Voltage Device “Postbox Notifier Voltage”

Create a user variable to set the threshold of the Operating Voltage of the homematicIP device SWDO.  
 If the threshold is reached, than a notification is sent out by the Automation script “postbox\_notifier.lua”.  
 The value of the threshold is the same as defined in RaspberryMatic Set device / channel parameter.



Idx	Hardware	ID	Unit	Name	Type	SubType	Data
190	VirtualSensors	00082190	1	Postbox Notifier Voltage	General	Voltage	1.5 V

**Postbox Notifier Voltage** 1.5 V



Last Seen: 2019-12-11 18:56:00  
Type: General, Voltage

Log Edit Notifications

## Domoticz User Variable “TH\_POSTBOXNOTIFIER\_VOLTAGE”

Create a user variable to set the threshold of the Operating Voltage of the homematicIP device SWDO.  
If the threshold is reached, than a notification is sent out by the Automation script “postbox\_notifier.lua”.  
The value of the threshold is the same as defined in RaspberryMatic Set device / channel parameter.

The screenshot shows two parts of the Domoticz interface. The top part is a table of variables, where a new row 'TH\_POSTBOXNOTIFIER\_VOLTAGE' has been added with a value of 1.0. The bottom part shows the 'Devices' section of the RaspberryMatic interface, specifically the 'Postbox Notifier' device. In the 'Channel parameter' tab, there is a configuration for 'Low. sat. threshold' which is set to 1.00 V. This configuration is highlighted with a red border.

## Domoticz Log Entries

2019-12-11 18:24:00.564 Status: d2Vents: Info: ----- Start internal script: postbox\_notifier:, trigger: every minute  
 2019-12-11 18:24:00.571 Status: d2Vents: Info: ----- Finished postbox\_notifier

2019-12-11 18:24:00.942 Status: d2Vents: Info: Handling httpResponse-events for: "RESPOSTBOXNOTIFIER"  
 2019-12-11 18:24:00.942 Status: d2Vents: Info: ----- Start internal script: postbox\_notifier: HTTPResponse: "RESPOSTBOXNOTIFIER"  
 2019-12-11 18:24:00.942 Status: d2Vents: Info: Postbox Notifier Voltage:Voltage=1.5  
 2019-12-11 18:24:00.959 Status: d2Vents: Info: ----- Finished postbox\_notifier

2019-12-11 18:26:51.854 (VirtualSensors) Light/Switch (Postbox Notifier State)  
 2019-12-11 18:26:51.841 Status: User: Admin initiated a switch command (189/Postbox Notifier State/On)  
 2019-12-11 18:26:51.861 Status: Incoming connection from: 192.168.1.225  
 2019-12-11 18:26:52.061 Notification sent (http) => Success  
 2019-12-11 18:26:52.032 Status: d2Vents: Info: Handling events for: "Postbox Notifier State", value: "On"  
 2019-12-11 18:26:52.032 Status: d2Vents: Info: ----- Start internal script: postbox\_notifier: Device: "Postbox Notifier State (VirtualSensors)", Index: 189  
 2019-12-11 18:26:52.033 Status: d2Vents: Info: Device Postbox Notifier State changed On = 0  
 2019-12-11 18:26:52.034 Status: d2Vents: Info: POSTBOXNOTIFIER Postbox Notifier notification sent: Postbox opened (18:26) (Postbox Notifier: Ensure to reset switch.)  
 2019-12-11 18:26:52.034 Status: d2Vents: Info: ----- Finished postbox\_notifier

2019-12-11 18:28:30.907 (VirtualSensors) Light/Switch (Postbox Notifier State)  
 2019-12-11 18:28:30.903 Status: User: Admin initiated a switch command (189/Postbox Notifier State/Off)  
 2019-12-11 18:28:31.009 Status: d2Vents: Info: Handling events for: "Postbox Notifier State", value: "Off"  
 2019-12-11 18:28:31.009 Status: d2Vents: Info: ----- Start internal script: postbox\_notifier: Device: "Postbox Notifier State (VirtualSensors)", Index: 189  
 2019-12-11 18:28:31.010 Status: d2Vents: Info: Device Postbox Notifier State changed Off = 1  
 2019-12-11 18:28:31.011 Status: d2Vents: Info: ----- Finished postbox\_notifier

## Domoticz Roomplan & Dashboard

The screenshot shows the Domoticz Roomplan & Dashboard interface. It includes a list of devices (Postbox Notifier, Postbox Notifier State, Postbox Notifier Voltage), a detailed view of the Postbox Notifier State (which is currently off), and a detailed view of the Postbox Notifier Voltage (which is currently at 1.5V). The dashboard also displays a timestamp (2019-12-11 18:40:34), a light switch icon, and a utility sensor icon.

## Automation Script

Event name: postbox\_notifier

```
-- postbox_notifier.lua
-- Domoticz Idx
local IDX_POSTBOXNOTIFIER_STATE = 189
local IDX_POSTBOXNOTIFIER_VOLTAGE = 190
-- Domoticz Idx of the user variable for the operating voltage threshold (as float)
local IDX_TH_POSTBOXNOTIFIER_VOLTAGE = 16
-- homematic device datapoint id (device HMIP-SWDO)
local URL_RASPMATIC = 'http://ccu-ip/addons/xmlapi/state.cgi?datapoint_id=';
-- datapoint
JSON = (loadfile "/home/pi/domoticz/scripts/lua/JSON.lua")() -- For Linux
local DATAPOINT2543 = JSON:decode('{"name":"Postbox Notifier"
Voltage","id":2543,"xpath":"/datapoint[@ise_id=2543]/@value","response":"RESPOSTBOXNOTIFIER"}');

return {
    -- Combined rules defined
    on = {
        -- Check operating voltage datapoint SWDO homematicIp device submit http xml-pi request
        timer = { 'every 30 minutes' },
        -- Check state postbox notifier switch has changed to on as triggered by raspmatic script
        devices = { IDX_POSTBOXNOTIFIER_STATE },
        -- Handle the response of the http xml-api url request
        httpResponses = { DATAPOINT2543.response, }
    },
    data = {
        -- set a flag if already notified
        pbnnotified = { initial = 0 }
    },
    -- Handle rules for the item isDevice, isTimer, isHTTPResponse
    execute = function(domoticz, item)
        -- Handle state change
        if (item.isDevice) then
            -- Send email notification in case device is switched on
            -- Only the subject is used
            if (domoticz.devices(IDX_POSTBOXNOTIFIER_STATE).state == 'On') and
                (domoticz.data.pbnnotified == 0) then
                local subject = 'Postbox opened (' .. domoticz.helpers.isnowhhmm(domoticz) .. ')'
                local message = 'Postbox Notifier: Ensure to reset state.'
                domoticz.data.pbnnotified = 1
                -- notify via email
                domoticz.notify(subject, message, domoticz.PRIORITY_HIGH)
                -- update alert level orange (3) = does not sent an email if user var TH_ALERTTOEMAIL = 4
                domoticz.helpers.alertmsg(domoticz, domoticz.ALERTLEVEL_YELLOW, message)
            end
            -- Reset the notify flag if switch is manually switched Off
            if (domoticz.devices(IDX_POSTBOXNOTIFIER_STATE).state == 'Off') and
                (domoticz.data.pbnnotified == 1) then
                domoticz.data.pbnnotified = 0
            end
        end
        -- check if the item is a device, then request datapoint information
        if (item.isTimer) then
            domoticz.openURL({url=URL_RASPMATIC..DATAPOINT2543.id,method='GET',callback=
DATAPOINT2543.response,})
        end
        -- check if the item is a httpresponse from the openurl callback
        if (item.isHTTPResponse) then
            if (item.statusCode == 200) then
                -- domoticz.log(item.data);
                -- Select the callback
                if (item.callback == DATAPOINT2543.response) then
                    -- Get the operating voltage
                    local voltage = tonumber(domoticz_applyXPath(item.data, DATAPOINT2543.xpath))
                    domoticz.log(DATAPOINT2543.name .. ':' .. voltage)
                    -- Update the domoticz device
                    domoticz.devices(IDX_POSTBOXNOTIFIER_VOLTAGE).updateVoltage(voltage)
                    -- Check if below threshold
                    if voltage < domoticz.variables(IDX_TH_POSTBOXNOTIFIER_VOLTAGE).value then

```

```
        local message= DATAPOINT2543.name .. ':LOW' .. voltage .. ' ' ..
domoticz.helpers.isnowhhmm(domoticz)
        domoticz.log(message)
        domoticz.helpers.alertmsg(domoticz, domoticz.ALERTLEVEL_RED, message)
    end
end
else
    domoticz.log('[ERROR] Request:' .. item.statusText, domoticz.LOG_ERROR)
end
end
end
}
```

# Radiator Thermostat HmIP-eTRV (Plugin)

## Purpose

- To set the temperature setpoint of a radiator thermostat.
- To measure, in regular intervals, the room temperature.
- To check, in regular intervals, the low battery state of the device.

## Solution

The homematicIP Radiator Thermostats HmIP-eTRV-B & HmIP-eTRV-2 are installed at several radiators in the house.

The homematicIP devices are connection partner radiator thermostat (manual operation, transmitter) and connected to the [RaspberryMatic](#) system ([HomeMatic](#) compatible).

- Various Domoticz device timers are put in place to control the temperature depending the radiator location.
- If an open window is detected by the thermostat, the setpoint is decreased to 12 °C until the window is closed, than the setpoint is back to previous value.
- Each device has a battery which is regulary checked and alert given if below threshold 2.2V (defined in the HomeMatic WebUI for each device).
- Just as an experiment: a [Node-RED Dashboard](#).

A Domoticz Python Plugin has been created, called **homematicIP Radiator Thermostat (HmIP-eTRV)**.

# Installation

These steps apply for every Radiator Thermostat Device:

**HomeMatic WebUI (RaspberryMatic):**

Add the thermostat device to RaspberryMatic (Teach-in)

Download the HmIP-eTRV plugin repository from [here](#)

On the Domoticz system, create folder: /home/pi/domoticz/plugins/hmip-etrv

Copy the file plugin.py to the folder: /home/pi/domoticz/plugins/hmip-etrv

Restart Domoticz either via command line or GUI:

- sudo service domoticz.sh restart
- GUI > Setup > More Options > Restart System

The plugin requires the parameters:

- CCU IP Address
- Device id of the thermostat device HmIP-eTRV-B or HmIP-eTRV-2
- Datapoint id's for the selected device:  
SET\_POINT\_TEMPERATURE, ACTUAL\_TEMPERATURE, LOW\_BAT, LEVEL  
as comma separated list in this order

## Note

Obtain the device & datapoint id's by requesting the device state list from the CCU via URL: <http://ccu-ip/addons/xmlapi/statelist.cgi>

Get the devices state list: <http://ccu-ip-address/addons/xmlapi/statelist.cgi> with XML tree result.

1. Select Device HmIP-eTRV-B with name "Thermostat Dining Room"
2. Get the Device ID **3637**
3. Get the Datapoints IDs for the properties:  
SET\_POINT\_TEMPERATURE=3680,ACTUAL\_TEMPERATURE=3663,LOW\_BAT=3645,LEVEL=3672

The ids are used to

1. get the actual temperature, battery low voltage status & level
2. set the thermostat setpoint.

```
<device config_pending="False" unreach="False" ise_id="3637" name="Thermostat Dining Room">
  <channel ise_id="3637" name="Thermostat Dining Room" operate="true" visible="true" index="0">
    <datapoint ise_id="3639" name="HmIP-RF-000A1A49A0D878:0.CONFIG_PENDING" operations="5" timestamp="1577009479" valueunit="" valueType="2" value="false" type="CONFIG_PENDING"/>
    <datapoint ise_id="3643" name="HmIP-RF-000A1A49A0D878:0.DUTY_CYCLE" operations="5" timestamp="1577009479" valueunit="" valueType="2" value="false" type="DUTY_CYCLE"/>
    <datapoint ise_id="3649" name="HmIP-RF-000A1A49A0D878:0.LOW_BAT" operations="5" timestamp="1577009479" valueunit="" valueType="2" value="false" type="LOW_BAT"/>
    <datapoint ise_id="3650" name="HmIP-RF-000A1A49A0D878:0.OPERATING_VOLTAGE" operations="5" timestamp="1577009479" valueunit="" valueType="4" value="3.000000" type="OPERATING_VOLTAGE"/>
    <datapoint ise_id="3651" name="HmIP-RF-000A1A49A0D878:0.OPERATING_VOLTAGE_STATUS" operations="5" timestamp="1577009479" valueunit="" valueType="16" value="0" type="OPERATING_VOLTAGE_STATUS"/>
    <datapoint ise_id="3652" name="HmIP-RF-000A1A49A0D878:0.RSSI_DEVICE" operations="5" timestamp="1576990804" valueunit="" valueType="8" value="206" type="RSSI_DEVICE"/>
    <datapoint ise_id="3653" name="HmIP-RF-000A1A49A0D878:0.UNREACH" operations="5" timestamp="1577009479" valueunit="" valueType="2" value="false" type="UNREACH"/>
    <datapoint ise_id="3657" name="HmIP-RF-000A1A49A0D878:0.UPDATE_PENDING" operations="5" timestamp="1576940478" valueunit="" valueType="2" value="false" type="UPDATE_PENDING"/>
  </channel>
  <channel ise_id="3661" name="HmIP-RF-000A1A49A0D878:1" operate="true" visible="true" index="1">
    <datapoint ise_id="3662" name="HmIP-RF-000A1A49A0D878:1.ACTIVE_PROFILE" operations="5" timestamp="1577009479" valueunit="" valueType="16" value="1" type="ACTIVE_PROFILE"/>
    <datapoint ise_id="3663" name="HmIP-RF-000A1A49A0D878:1.ACTUAL_TEMPERATURE" operations="5" timestamp="1577009479" valueunit="" valueType="4" value="22.700000" type="ACTUAL_TEMPERATURE"/>
    <datapoint ise_id="3664" name="HmIP-RF-000A1A49A0D878:1.BOOT_MODE" operations="5" timestamp="1577009479" valueunit="" valueType="16" value="0" type="BOOT_MODE"/>
    <datapoint ise_id="3665" name="HmIP-RF-000A1A49A0D878:1.BOOST_MODE" operations="6" timestamp="1577009479" valueunit="" valueType="2" value="false" type="BOOST_MODE"/>
    <datapoint ise_id="3666" name="HmIP-RF-000A1A49A0D878:1.BOOST_TIME" operations="5" timestamp="1577009479" valueunit="" valueType="16" value="0" type="BOOST_TIME"/>
    <datapoint ise_id="3667" name="HmIP-RF-000A1A49A0D878:1.CONTROL_DIFFERENTIAL_TEMPERATURE" operations="2" timestamp="0" valueunit="" valueType="4" value="0" type="CONTROL_DIFFERENTIAL_TEMPERATURE"/>
    <datapoint ise_id="3668" name="HmIP-RF-000A1A49A0D878:1.CONTRAL_MODE" operations="2" timestamp="0" valueunit="" valueType="16" value="0" type="CONTRAL_MODE"/>
    <datapoint ise_id="3669" name="HmIP-RF-000A1A49A0D878:1.DURATION_UNREACH" operations="2" timestamp="0" valueunit="" valueType="16" value="0" type="DURATION_UNREACH"/>
    <datapoint ise_id="3670" name="HmIP-RF-000A1A49A0D878:1.DURATION_VALUE" operations="2" timestamp="0" valueunit="" valueType="16" value="0" type="DURATION_VALUE"/>
    <datapoint ise_id="3671" name="HmIP-RF-000A1A49A0D878:1.FROST_PROTECTION" operations="5" timestamp="1577009479" valueunit="" valueType="2" value="false" type="FROST_PROTECTION"/>
    <datapoint ise_id="3672" name="HmIP-RF-000A1A49A0D878:1.LEVEL" operations="7" timestamp="1577009479" valueunit="" valueType="4" value="0.120000" type="LEVEL"/>
    <datapoint ise_id="3673" name="HmIP-RF-000A1A49A0D878:1.LEVEL_STATUS" operations="5" timestamp="1577009479" valueunit="" valueType="16" value="0" type="LEVEL_STATUS"/>
    <datapoint ise_id="3674" name="HmIP-RF-000A1A49A0D878:1.PARTY_MODE" operations="5" timestamp="1577009479" valueunit="" valueType="2" value="false" type="PARTY_MODE"/>
    <datapoint ise_id="3675" name="HmIP-RF-000A1A49A0D878:1.PARTY_SET_POINT_TEMPERATURE" operations="5" timestamp="0" valueunit="" valueType="4" value="0.000000" type="PARTY_SET_POINT_TEMPERATURE"/>
    <datapoint ise_id="3676" name="HmIP-RF-000A1A49A0D878:1.PARTY_TIME_END" operations="7" timestamp="0" valueunit="" valueType="20" value="0" type="PARTY_TIME_END"/>
    <datapoint ise_id="3677" name="HmIP-RF-000A1A49A0D878:1.PARTY_TIME_START" operations="7" timestamp="0" valueunit="" valueType="20" value="0" type="PARTY_TIME_START"/>
    <datapoint ise_id="3678" name="HmIP-RF-000A1A49A0D878:1.POINT_MODE" operations="5" timestamp="1577009479" valueunit="" valueType="16" value="1" type="POINT_MODE"/>
    <datapoint ise_id="3679" name="HmIP-RF-000A1A49A0D878:1.SET_POINT_MODE" operations="7" timestamp="1577009479" valueunit="" valueType="16" value="1" type="SET_POINT_MODE"/>
    <datapoint ise_id="3680" name="HmIP-RF-000A1A49A0D878:1.SET_POINT_TEMPERATURE" operations="7" timestamp="1577009479" valueunit="" valueType="4" value="21.000000" type="SET_POINT_TEMPERATURE"/>
    <datapoint ise_id="3681" name="HmIP-RF-000A1A49A0D878:1.SWITCH_POINT_OCCURRED" operations="5" timestamp="1577009479" valueunit="" valueType="2" value="false" type="SWITCH_POINT_OCCURRED"/>
    <datapoint ise_id="3682" name="HmIP-RF-000A1A49A0D878:1.VALVE_ADAPTION" operations="7" timestamp="0" valueunit="" valueType="2" value="false" type="VALVE_ADAPTION"/>
    <datapoint ise_id="3683" name="HmIP-RF-000A1A49A0D878:1.VALVE_STATE_OPERATIONS" "5" timestamp="1577009479" valueunit="" valueType="16" value="4" type="VALVE_STATE"/>
    <datapoint ise_id="3684" name="HmIP-RF-000A1A49A0D878:1.WINDOW_STATE" operations="7" timestamp="1577009479" valueunit="" valueType="16" value="0" type="WINDOW_STATE"/>
  </channel>
</device>
```

## Important

Prior adding new hardware, ensure Domoticz accepts new hardware as devices will be created when adding the plugin.

Check: GUI > Setup > Settings > Hardware

Either mark accept or click Allow for 5 minutes

Goto GUI > Setup > Hardware

Select Type: homematicIP Radiator Thermostat (HMIP-eTRV)

Give a name, i.e. Thermostat Dining
Set initially the parameter: Keep debug to true
Click button Add
Check the Domoticz log if the four devices are created and updated: Thermostat Dining - Setpoint,Thermostat Dining - Temperature,Thermostat Dining - Battery,Thermostat Dining - Valve
Check the device widgets on the GUI tabs.
If all OK, set the hardware parameter Debug to false
Optional steps (see also screenshots below):
<ul style="list-style-type: none"> <li>• Add the devices to a room plan, i.e Dining Room</li> <li>• Add a device timer to ensure the thermostat is turned Off to avoid heating overnight</li> <li>• Add a switch device to turn the thermostat off</li> </ul>
<i>Notes</i>
If adding device timers for the setpoint, set the thermostat to “Manu mode” in the HomeMatic WebUI (RaspberryMatic) else if “Auto mode” is set, the selected Week profile is used.

## Add new Hardware (GUI > Setup > Hardware)

The screenshot shows the 'Add new Hardware' configuration dialog in the Domoticz interface. The configuration fields are as follows:

- Enabled:**
- Name:** Thermostat Dining
- Type:** homematicIP Radiator Thermostat (HMIP-eTRV)
- Data Timeout:** Disabled

A note below the timeout field states: "Specifying a Data Timeout will restart the hardware device if no data is received for the specified time. Do not enable this option for devices that do not receive data!"

The device description for homematicIP Radiator Thermostat (HMIP-eTRV) v1.2.0 lists the following features:

- Set the setpoint (degrees C).
- Get the actual temperature (degrees C).
- Get the low battery state (true or false). Threshold is set in the HomeMatic WebUI.
- Get the valve position (0 - 100%).
- Supported are the devices HmIP-eTRV-B, HmIP-eTRV-2

**Domoticz Devices (Type,SubType)**

- Setpoint (Thermostat,Setpoint)
- Temperature (Temp,LaCrosse TX3)
- Battery (General,Alert)
- Valve (General,Percentage)

**Hardware Configuration**

- Address (CCU IP address, default: 192.168.1.225)
- IDs (obtained via XML-API script <http://ccu-ip-address/addons/xmlapi/statelist.cgi>):
  - Device ID HmIP-eTRV-B or HmIP-eTRV-2 (default: 1541)
  - Datapoint IDs(#4): SET\_POINT\_TEMPERATURE, ACTUAL\_TEMPERATURE, LOW\_BAT, LEVEL as comma separated list in this order (defaults: 1584,1567,1549,1576)
- Note: After configuration update, the setpoint is 0. Click the setpoint to set the value.

Configuration parameters:

- CCU IP: 192.168.1.225
- Device ID: 3637
- Datapoint IDs: 3680,3663,3645,3672
- Check Interval (sec): 60
- Debug:

At the bottom right is a blue 'Add' button.

## Devices, Roomplan & Dashboard for selected room

The screenshot displays three main sections of the Domoticz interface:

- Devices "Dining Room":** A table listing devices with columns for Idx, Hardware, ID, Unit, Name, Type, and SubType. Devices listed include Thermostat Dining - Valve, Thermostat Dining - Battery, Thermostat Dining - Temperature, and Thermostat Dining - Setpoint.
- Roomplan "Dining Room":** A list of room plans, showing one entry for the Dining Room.
- Dashboard "Dining Room":** A summary dashboard for the Dining Room. It shows current temperature (21.9°C), battery level (22%), and battery status (Batteriestand Ok). It also includes a "Change setpoint" button and a "Set" button.

## Enhancement Push Off Button

### Purpose

To define a switch to handle the thermostat device state change action to Off.

### How

Define a VirtualSensor device with properties:

- Name, i.e. “MakeLab Thermostat - Off”
- Sensor Type Switch.

After adding the device, select the device widget and change the properties:

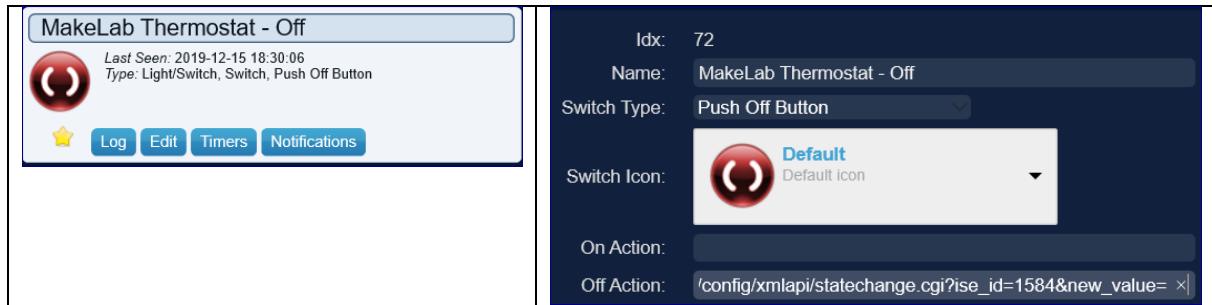
- Switch Type:  
Push Off Button
- Off Action:  
[http://ccu-ip/addons/xmlapi/statechange.cgi?ise\\_id=1584&new\\_value=0](http://ccu-ip/addons/xmlapi/statechange.cgi?ise_id=1584&new_value=0)

The datapoint SET\_POINT\_TEMPERATURE of the device is required, i.e. 1584.

Obtain this datapoint id (ise\_id), by requesting the state of the thermostat device with id=1541. The HTTP XML response holds various datapoints, select:  
SET\_POINT\_TEMPERATURE.

```
http://192.168.1.225/addons/xmlapi/state.cgi?device_id=1541
```

```
<datapoint ise_id="1584" name="HmIP-RF.000A18A9A64DAC:1.SET_POINT_TEMPERATURE" timestamp="1576829294" valueunit="°C" valuetype="4" value="20.000000" type="SET_POINT_TEMPERATURE"/>
```



### Domoticz Log Example

Performed test by pushing the icon on the widget, which send the HTTP XML-API request to the RaspberryMatic system to set the setpoint of the MakeLab thermostatstat to 0.

```
2019-12-15 18:30:06.767 (VirtualDevices) Light/Switch (MakeLab Thermostat - Off)
2019-12-15 18:30:06.758 Status: User: Admin initiated a switch command (72/MakeLab Thermostat - Off/Off)
```

## Timers

Each radiator thermostat has one or more timers to control the temperature.  
The timers are defined in the Domoticz Database table SetpointTimers.

Examples SQL SELECT statement to obtain the setpoint timers from the Domoticz Production database. The device names are in German.

```
SELECT d.Name, t.* FROM DeviceStatus d, SetpointTimers t WHERE d.ID=t.DeviceRowID;
```

### Output Tool SQLiteSpy

Name	ID	Active	DeviceRowID	Date	Time	Type	Temperature	TimerPlan	Days	Month	MDay	Occurrence
Hrg Bad Sollwert	1	1	207	2019-12-15	06:00	2	20.0	0	128	0	0	0
Hrg Bad Sollwert	2	1	207	2019-12-15	11:00	2	19.0	0	128	0	0	0
Hrg Bad Sollwert	3	1	207	2019-12-14	23:00	2	17.0	0	128	0	0	0
Hrg EZ Sollwert	4	1	204	2019-12-14	06:00	2	20.0	0	128	0	0	0
Hrg EZ Sollwert	5	1	204	2019-12-14	22:00	2	17.0	0	128	0	0	0
Hrg WZ Sollwert	6	1	201	2019-12-15	06:15	2	21.0	0	128	0	0	0
Hrg WZ Sollwert	7	1	201	2019-12-14	22:00	2	0.0	0	128	0	0	0
Hrg Dusche Sollwert	8	1	198	2019-12-14	21:30	2	21.0	0	128	0	0	0
Hrg Dusche Sollwert	9	1	198	2019-12-14	23:00	2	0.0	0	128	0	0	0
Hrg MakeLab Sollwert	10	1	195	2019-12-14	19:00	2	0.0	0	128	0	0	0

### Examples SQLite Shell

The header (.header on) and mode CSV (.mode csv) are set.

More information, read chapter [SQLite Shell](#).

### Full Overview

```
sqlite> SELECT d.Name, t.* FROM DeviceStatus d, SetpointTimers t WHERE d.ID=t.DeviceRowID ORDER BY d.name;
```

```
Name, ID, Active, DeviceRowID, Date, Time, Type, Temperature, TimerPlan, Days, Month, MDay, Occurrence
"Hrg Bad Sollwert", 1, 1, 207, 2019-12-17, 06:00, 2, 21.0, 0, 128, 0, 0, 0
"Hrg Bad Sollwert", 2, 1, 207, 2019-12-15, 11:00, 2, 19.0, 0, 128, 0, 0, 0
"Hrg Bad Sollwert", 3, 1, 207, 2019-12-17, 19:00, 2, 21.0, 0, 128, 0, 0, 0
"Hrg Bad Sollwert", 11, 1, 207, 2019-12-17, 23:00, 2, 17.0, 0, 128, 0, 0, 0
"Hrg Dusche Sollwert", 8, 1, 198, 2019-12-14, 21:30, 2, 21.0, 0, 128, 0, 0, 0
"Hrg Dusche Sollwert", 9, 1, 198, 2019-12-14, 23:00, 2, 0.0, 0, 128, 0, 0, 0
"Hrg EZ Sollwert", 12, 1, 210, 2019-12-21, 22:00, 2, 17.0, 0, 128, 0, 0, 0
...and more ...
```

### Brief Overview

```
sqlite> SELECT d.Name, t.Time, t.Temperature FROM DeviceStatus d, SetpointTimers t WHERE d.ID=t.DeviceRowID ORDER BY d.name, t.Time;
```

```
Name, Time, Temperature
"Hrg Bad Sollwert", 06:00, 21.0
"Hrg Bad Sollwert", 11:00, 19.0
... and more
```

## Example Device Timer Definition

Name: Hzg Bad Sollwert					
2019-12-15 19:27:34 ⏪ ▲08:31 ▼16:01					
Show 25 ▾ entries					
Active	Type	Date	Time	Command	Days
Yes	On Time		06:00	Temperature, 20	Everyday
Yes	On Time		11:00	Temperature, 19	Everyday
Yes	On Time		23:00	Temperature, 17	Everyday

## Timerplans

The timerplan default (ID=0) is assigned.

In the GUI > Setup > Settings > Other: the timer plan can be set.



The selected timer plan ID, can be found in the Domoticz database, table Preferences , field Key with content ActiveTimerPlan.

# Raspberry Pi Monitoring

## Purpose

To measure & show specific Raspberry Pi system information and trigger alarm if a value is above a certain threshold.

Monitored are: Memory Usage, Hard Disc Space, Temperature.

## Solution

Use the Domoticz Hardware Motherboard, which will create several devices. The devices can be used to trigger events.

### Hardware Motherboard

1	Motherboard	Yes	Motherboard sensors
Showing 1 to 8 of 8 entries			
		<b>Update</b>	<b>Delete</b>
Enabled: <input checked="" type="checkbox"/> Name: <input type="text" value="Motherboard"/> Type: <input type="text" value="Motherboard sensors"/> Data Timeout: <input type="text" value="Disabled"/> <small>Specifying a Data Timeout will restart the hardware device if no data is received for the specified time. <b>Do not enable this option for devices that do not receive data!</b></small>			

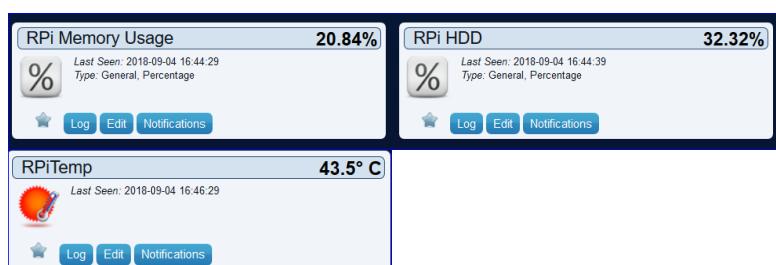
### Devices derived from Hardware Motherboard

	Idx	Hardware	ID	Unit	Name	Type	SubType	
<input type="checkbox"/>	1	Motherboard	0000044C	1	RPi Memory Usage	General	Percentage	20.93%
<input type="checkbox"/>	2	Motherboard	0000044E	1	HDD /boot	General	Percentage	1.5%
<input type="checkbox"/>	3	Motherboard	0000044F	1	RPi HDD	General	Percentage	32.32%
<input type="checkbox"/>	4	Motherboard	0001	1	RPiTemp	Temp	LaCrosse TX3	44.0 C
<input type="checkbox"/>	5	Motherboard	0000044D	1	CPU_Usage	General	Percentage	2.84%

#### Note

Not all devices are added, (only) RPi Memory Usage, RPi HDD, RPi Temp.

### Widgets (Tabs Utility & Temperature)



# Monitoring

To monitor selective devices and notify if above threshold.

The notification is done using the Virtual Device Alert Message (idx=55).



An email notification is send!

## User Variables Thresholds

The thresholds are defined as user variables and used by the dzVents script.  
(Setup > More Options > User variables).

Idx	Variable name	Variable type	Current value
5	TH_RPI_MEMORYUSAGE	Integer	80
4	TH_RPI_HDDUSAGE	Integer	70
3	TH_RPI_TEMPERATURE	Integer	41

## Automation Script

Event name: rpi\_monitor

```
--[[[rpi_monitor.lua
Monitor the Raspberry Pi and notify, via alert message, in case threshold reached or exceeded.
Project: AtHome
Interpreter: dzVents, Device
See: AtHome.pdf
Author: Robert W.B. Linn
Version: 20180910
]]]

-- Module msgbox: /home/pi/domoticz/scripts/dzVents/scripts
local msgbox = require('msgbox')

-- Idx of the devices
local IDX_RPI_MEMORYUSAGE = 1
local IDX_RPI_HDDUSAGE = 3
local IDX_RPI_TEMPERATURE = 4

-- Thresholds are set via user variables, i.e. TH_RPI_MEMORYUSAGE

-- Check if the device state exceeds threshold and update control message
local function checkthreshold(domoticz, device, threshold)
    if (tonumber(device.state) > threshold) then
        local message = device.name .. ' above threshold ' .. threshold .. ' (' .. device.state .. ')'
        msgbox.alertmsg(domoticz, domoticz.ALERTLEVEL_RED, message)
    end
end

return {
    on = {
        -- Devices idx to monitor
        devices = {
            IDX_RPI_MEMORYUSAGE,
            IDX_RPI_HDDUSAGE,
```

```
        IDX_RPI_TEMPERATURE
    }
},
execute = function(domoticz, device)
    -- RPi Memory Usage
    if (device.idx == IDX_RPI_MEMORYUSAGE) then
        checkthreshold(domoticz,device,domoticz.variables('TH_RPI_MEMORYUSAGE').value)
    end
    -- RPi HDD Usage
    if (device.idx == IDX_RPI_HDDUSAGE) then
        checkthreshold(domoticz,device,domoticz.variables('TH_RPI_HDDUSAGE').value)
    end
    -- RPi Temperature
    if (device.idx == IDX_RPI_TEMPERATURE) then
        checkthreshold(domoticz,device,domoticz.variables('TH_RPI_TEMPERATURE').value)
    end
end
}
```

# River Elbe Tide

## Purpose

To monitor the tide of the river “Elbe” at location “Schulau” near Hamburg (Germany).

## Solution

A Node-RED flow is used to obtain, every 5 minutes river “Elbe” information via HTTP request to a German webservice PEGELONLINE.wsv.de.

The HTTP JSON response is parsed to get the river level current measurement "Relative PNP" and the reference value "PNP" which are used to calculate the "Abs NHN".

The "Abs NHN" value is compared to the previous "Abs NHN" value to determine the tide Ebb or Flood.

**Only the river level “Abs NHN” is used for now.**

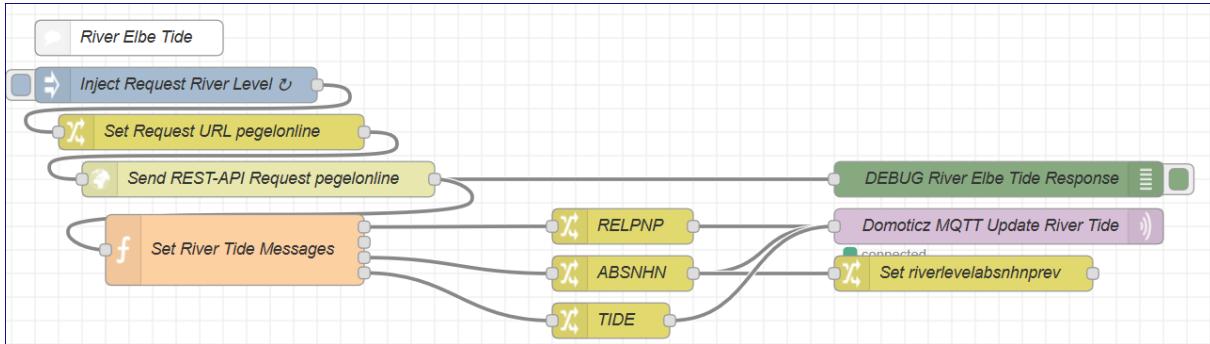
### Example HTTP JSON Response

From which two keys are used in the Node-RED Function Node “Set River Tide Messages” (see below):

```
var riverlevelrelpnp = msg.payload.timeseries[0].currentMeasurement.value;
var riverlevelpnp = msg.payload.timeseries[0].gaugeZero.value;
```

```
Response: {
  "uuid": "f3c6ee73-5561-4068-96ec-364016e7d9ef",
  "number": "5950090",
  "shortname": "SCHULAU",
  "longname": "SCHULAU",
  "km": 641.0,
  "agency": "WSA HAMBURG",
  "longitude": 9.702887479041944,
  "latitude": 53.567910528723715,
  "water": {
    "shortname": "ELBE",
    "longname": "ELBE"
  },
  "timeseries": [
    {
      "shortname": "W",
      "longname": "WASSERSTAND ROHDATEN",
      "unit": "cm",
      "equidistance": 1,
      "currentMeasurement": {
        "timestamp": "2019-09-15T11:50:00+02:00",
        "value": 393.0,
        "trend": 1,
        "stateMnwMhw": "unknown",
        "stateNswHsw": "unknown"
      },
      "gaugeZero": {
        "unit": "m. ü. NHN",
        "value": -5.006,
        "validFrom": "2001-11-01"
      }
    }
  ]
}
```

## Node-RED Flow



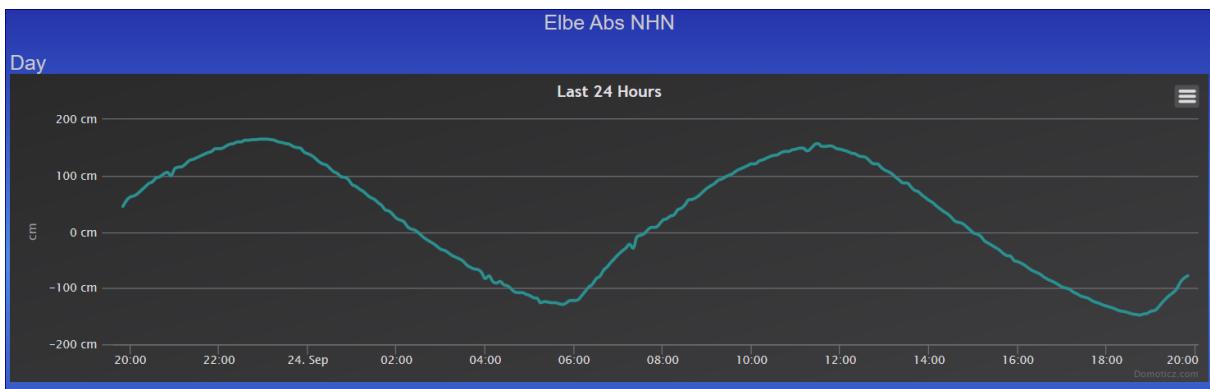
## Domoticz Configuration

Idx	Hardware	ID	Unit	Name	Type	SubType	Data
188	VirtualSensors	00082188	1	Elbe Tide	General	Text	Ebbe
187	VirtualSensors	00082187	1	Elbe Rel PNP	General	Custom Sensor	418 cm
186	VirtualSensors	00082186	1	Elbe Abs NHN	General	Custom Sensor	-82 cm

The devices have been added to the newly created roomplan "River Elbe".



Nice tide graph.



### Outlook

A notification could be given if very high tide has reached – threshold for example at 200 cm.

# Roomplans

## Purpose

To define roomplans containing all devices. The roomplans are used to control the rooms via the GUI, but also to organize the devices in a proper way.

To access a device, a roomplan should be selected.

The GUI Dashboard contains (only) a few devices for a quick lookup.

## Define Roomplan

The roomplans are defined via the GUI > Setup > More options > Plans.

Example list of roomplan and for a room with devices.

Idx	Name
1	\$Hidden Devices
13	Bad
14	Dusche
11	Esszimmer (EZ)
18	Flur
16	Haus
2	Information
17	Keller
15	MakeLab
19	Schlafzimmer (SZ)
4	Termine
12	Wohnzimmer (WZ)
8	Hardware Monitor
5	Volumio

Idx	Name
12	Wohnzimmer (WZ)
Showing 1 to 1 of 1 entries (filtered)	
<a href="#">Edit</a>	<a href="#">Delete</a>
<b>Devices</b> (Select Plan first to Edit...)	
Show 10 entries	
Idx	Name
112	Hue WZ TV
185	Hue WZ Stehlampe
113	Hue WZ Rob
40	WZ Temperatur
201	Htzg WZ-1 Sollwert
202	Htzg WZ-1 Temperatur
203	Htzg WZ-1 Batterie
204	Htzg WZ-2 Sollwert
205	Htzg WZ-2 Temperatur
206	Htzg WZ-2 Batterie
12	Markise WZ
Showing 1 to 11 of 11 entries	

### Notes

The definition of the roomplans is not completed yet.

Still thinking about how to organize in a simple way, do not have too many rooms and the naming convention of the roomplan (which is used for defining the device names = see next). This also relates for defining floorplans.

# Define Device Names

Define naming convention and organise device according roomplans.

## Rules

- Device naming convention: Hardware Roomplan Device.
- A roomplan gets an abbreviation, max 3 characters, if the roomplan name is longer than 7 characters.
- Domoticz production system: all device names translated to german.
- Domoticz development system: all device names in english.
- Define roomplans and associate devices.
- All devices must be associated with a roomplan.

## Examples\_(Hardware, Roomplan, Device)

- Hue Light located in the living room near TV.  
Roomplan: Wohnzimmer (WZ).  
Device name: Hue WZ TV
- Thermostat dining room with three devices setpoint,temperature, battery.  
Roomplan: Esszammer (EZ).  
Device name: Hzg EZ Sollwert, Hzg EZ Temperatur, Hzg EZ Batterie

## Overview Roomplans

There is no complete overview of the roomplans defined with devices associated.

An option to get the list of roomplans and devices, is using the SQLite command-line shell (see [SQLite Shell](#)) to get the information from the Domoticz database by direct accessing the tables:

- **Database**  
/home/pi/domoticz/domoticz.db
- **Tables**
  - DeviceStatus – get the device name for a given ID (=Idx)
  - Plans – get the roomplans
  - DeviceToPlansMap – get the roomplans with associated devices

The SQLite command-line shell is opened with

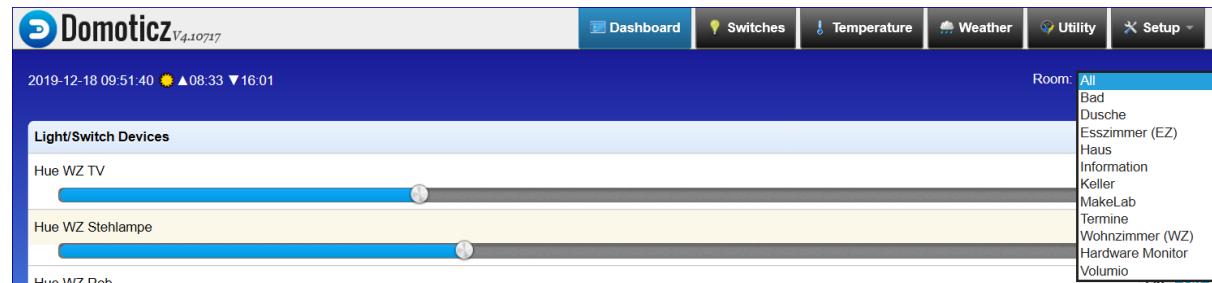
```
cd /home/pi/domoticz
sqlite3
```

## Plans

### Get the roomplans

The output is in order of appearance.

```
sqlite> .header on
sqlite> .mode column
sqlite> select * from plans order by "Order";
ID      Order     Name          FloorplanID Area
-----  -----  -----
1       1        $Hidden Devices  0
13      4        Bad           0
14      5        Dusche         0
11      7        Esszimmer (EZ)  0
16      8        Haus          0
2       9        Information    1
17      10       Keller         0
15      11       MakeLab        0
4       12       Termine        0
12      13       Wohnzimmer (WZ)  0
8       17       Hardware Monito  0
5       18       Volumio        3             123,118
```



*Note*

Screenshot of the GUI with the dropdown list showing the roomplans.

### Get the roomplans

List the plans with their associated devices. The output format is CSV.

If the device name contains blanks, the name is put between "", i.e. Device Name"

```
cd /home/pi/domoticz
sqlite3

sqlite> .open domoticz.db
sqlite> .header on
sqlite> .mode csv
sqlite> select p.Name as Plan,p.ID as PlanID,d.Name as Device,d.ID as Idx from devicestatus d,
devicetoplansmap m, plans p WHERE d.ID=m.DeviceRowID and p.ID=m.PlanID order by p.Name;

Plan,PlanID,Device,Idx
Bad,13,"Hdg Bad Batterie",209
Bad,13,"Hdg Bad Sollwert",207
Bad,13,"Hdg Bad Temperatur",208
Dusche,14,"Hdg Dusche Batterie",200
Dusche,14,"Hdg Dusche Sollwert",198
Dusche,14,"Hdg Dusche Temperatur",199
"Esszimmer (EZ)",11,"Hdg EZ Batterie",206
"Esszimmer (EZ)",11,"Hdg EZ Sollwert",204
"Esszimmer (EZ)",11,"Hdg EZ Temperatur",205
"Esszimmer (EZ)",11,"Hue EZ",111
... and more ..
```

# RFXCOM RFxTrx433E

## Purpose

The [RFXCOM RFxTrx433E](#) Transceiver is a 433Mhz transmitter and receiver (transceiver) to control or respond to 433Mhz devices (sensors).  
More Product information [here](#) (including successor products).

## Prepare RFxTrx433E

Install the utility programs RFXflash and RFXmngr on the Development Device.

*Note*

For upgrading the firmware, the RFX Flash Programmer is required. Always download the latest version prior flashing.

Flash latest firmware (RFxTrx433\_Ext2\_Firmware) as described in [RFxTrx User Guide](#).

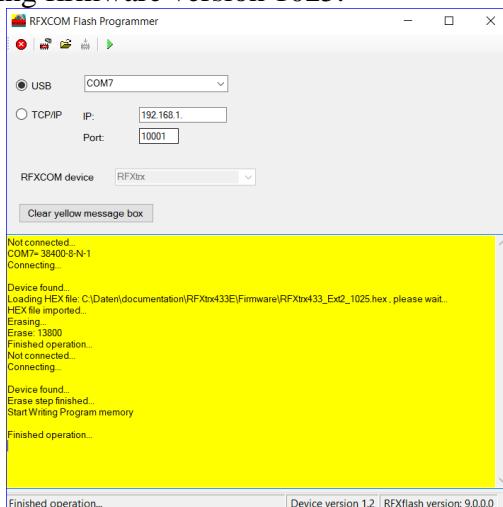
*Note*

Use the same procedure for updating the firmware, i.e.

### Steps to install/upgrade

- Shutdown the Domoticz system (i.e. Raspberry Pi)
- Connect the RFXCOM device to USB port of development device (used COM7 on a notebook)
- Download and unzip the latest firmware
- Download and start the RFXCOM Flash Programmer
- Select the latest hex file
- Write to the device
- Connect the RFXCOM device to the Domoticz system
- Reboot the Domoticz system
- Open Domoticz in a browser and check the log (Setup > Log) and if the hardware device (Setup > Hardware) RFxTrx433e shows the correct version (in this case Version: Ext2/1025)
- In case issues, restart Domoticz from terminal:  
sudo service domoticz.sh restart

Example screenshot flashing firmware version 1025.



Open the RFXmngr, connect to the RFXtrx433E, obtain status information and log incoming messages for devices found.

### Example RFXmngr Log

```
Get Status
-----
Packettype      = Interface Message
subtype        = Interface Response
Sequence nbr   = 1
response on cmnd = Get Status
Transceiver type = 433.92MHz
Firmware version = 1022
Firmware Type   = Ext2
Transmit power   = 10dBm
Hardware version = 1.2
...
```

Depending devices found, incoming **messages** are logged, i.e. for a TFA TS34C (Temperature & Humidity sensor)

```
30.12.2017 13:46:01
Packettype      = TEMP_HUM
subtype        = TH7 - Cresta, TFA TS34C
                  channel 1
Sequence nbr   = 102
ID             = 280E decimal:10254
Temperature     = 17,3 °C
Humidity       = 54
Status          = Comfortable
Signal level    = 5  -80dBm
Battery         = OK
```

#### Note

The RFXmngr is not only used to log connected devices but also to manually configure connected devices, like the Somfy RTS Devices.

## Domoticz Configuration

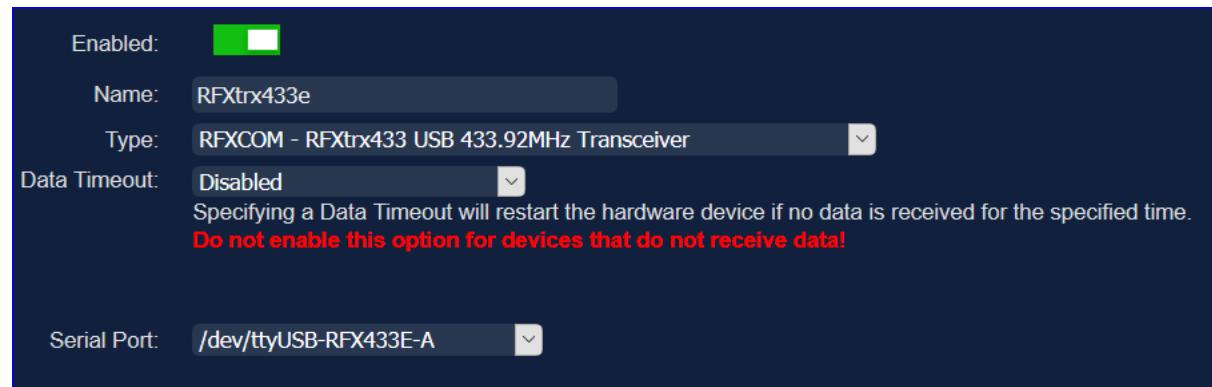
The hardware device is added / updated via **Settings > Hardware**.

4	RFXtrx433e	Yes	RFXCOM - RFXtrx433 USB 433.92MHz Transceiver Version: Ext2/1022 <a href="#">Set Mode</a>	/dev/ttyUSB-RFX433E-A	Disabled
---	------------	-----	--	-----------------------	----------

*Note*

When updating the firmware, ensure to use the version Ext2/NNNN.

The firmware can be downloaded [here](#).



After adding the device, restart Domoticz (Settings > More Options > Restart) and check the Domoticz Log (Settings > Log), i.e.

```
2018-08-30 11:27:51.659 Status: RFXCOM: Using serial port: /dev/ttyUSB-RFX433E-A
2018-08-30 11:27:52.311 subtype = Interface Response
2018-08-30 11:27:52.311 Sequence nbr = 2
2018-08-30 11:27:52.311 response on cmd = Get Status
2018-08-30 11:27:52.311 Transceiver type = 433.92MHz
2018-08-30 11:27:52.311 Firmware version = 1022
2018-08-30 11:27:52.311 Firmware type = Ext2
2018-08-30 11:27:52.311 Hardware version = 1.2
2018-08-30 11:27:52.311 Undec off
2018-08-30 11:27:52.311 X10 enabled
2018-08-30 11:27:52.311 ARC enabled
2018-08-30 11:27:52.311 AC enabled
2018-08-30 11:27:52.311 HomeEasy EU enabled
2018-08-30 11:27:52.311 Meiantech/Atlantic enabled
2018-08-30 11:27:52.311 Oregon Scientific enabled
2018-08-30 11:27:52.311 ATI/Cartellectronic enabled
2018-08-30 11:27:52.311 Visonic enabled
2018-08-30 11:27:52.311 Mertik enabled
2018-08-30 11:27:52.311 AD enabled
2018-08-30 11:27:52.311 Hideki enabled
2018-08-30 11:27:52.311 La Crosse enabled
2018-08-30 11:27:52.311 Legrand enabled
2018-08-30 11:27:52.311 MSG4Reserved5 enabled
2018-08-30 11:27:52.311 BlindsT0 enabled
2018-08-30 11:27:52.311 BlindsT1 enabled
2018-08-30 11:27:52.311 AE enabled
2018-08-30 11:27:52.311 RUBiCSOn enabled
2018-08-30 11:27:52.311 FineOffset enabled
2018-08-30 11:27:52.311 Lighting4 enabled
2018-08-30 11:27:52.311 Conrad RSL enabled
2018-08-30 11:27:52.311 ByronSX enabled
2018-08-30 11:27:52.311 IMAGINTRONIX enabled
2018-08-30 11:27:52.311 KEELOQ enabled
2018-08-30 11:27:52.311 Home Confort enabled
2018-08-30 11:27:52.402 (RFXtrx433e) Temp + Humidity (Garage)
```

## Troubleshooting

If Domoticz recognizes a new device and the device is added to the device, but the data is not correct or not updated by Domoticz, then check the device data using the RFXmngr.

### Example

A door contact switch PB-67R is recognized by Domoticz as Type: Lighting 5, SubType: Kangtai / Cotech, Data: Off.

If the switch changes state, Domoticz does not update.

Monitoring using the RFXmngr, shows:

```
Packettype = Lighting5
ERROR: Unknown Sub type for Packet type=14: 11
Signal level = 7
```

It confirms, that this device is not (status 20190521) supported by RFXtrx433E.

# Soil Moisture (Plugin, Tinkerforge)

## Purpose

To measure the Soil Moisture value of a plant, display in Domoticz and near the plant on a 4-Digit LED Display and indicate moisture state on a LED indicator.

## Solution

A Domoticz Python plugin "Soil Moisture Monitor" with a Soil Moisture Monitor device obtaining the Moisture value from a Tinkerforge Moisture Bricklet.

The Tinkerforge Moisture Bricklet is connected to a Tinkerforge Master Brick with WiFi extension.

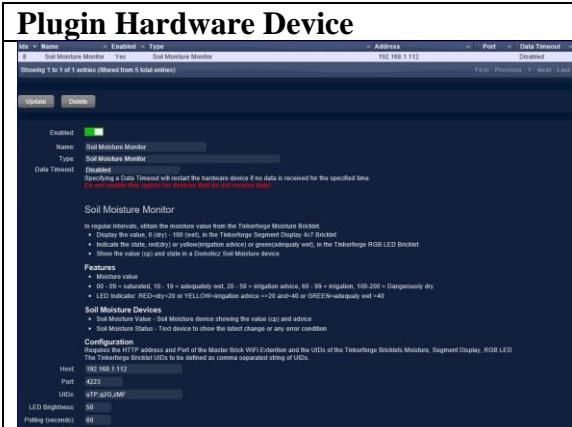
The Moisture value is converted to a range 0 (dry) – 100 (saturated) and displayed in a Tinkerforge Segment Display 4x7.

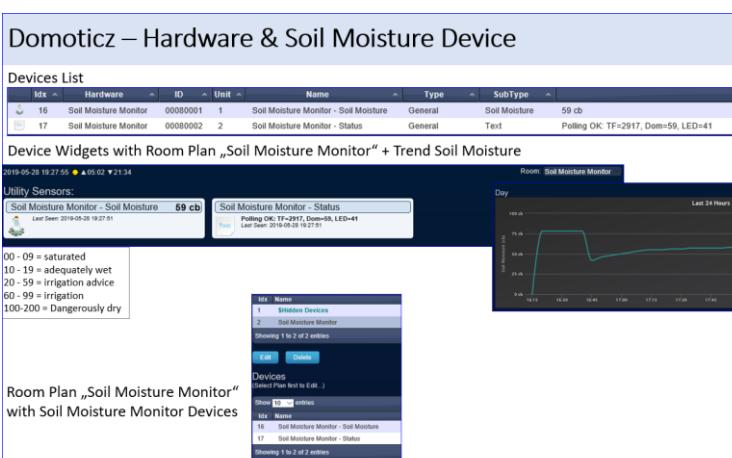
In addition, a Tinkerforge RGB LED bricklet indicates the state RED (dry) or YELLOW (irrigation advice) or GREEN (saturated).

A prototype device is built and tested on a mini palm tree in author's MakeLAB. It is planned to create a weather proof case, to monitor the Moisture value in garden areas.

More information or get the latest version, go [here](#) (GitHub).

See also [Python Plugin Development](#).

Plugin Hardware Device		Monitoring Mini Palm Tree
 <p>The screenshot shows the 'Hardware' tab of the Domoticz configuration interface. It lists a single device entry for a 'Soil Moisture Monitor' with ID 16. The device is enabled and assigned to the 'Soil Moisture Monitor' type. The address is set to 192.168.1.112 and the port to 4223. The data timeout is checked. Below the table, there are sections for 'Features', 'Soil Moisture Devices', and 'Configuration'. The 'Features' section includes a note about obtaining moisture values from the Tinkerforge Moisture Bricklet. The 'Soil Moisture Devices' section describes the device as a soil moisture sensor with a color of green. The 'Configuration' section specifies the HTTP address and port for the Master Brick WiFi Extension and the UIDs of the Tinkerforge Bricks: Moisture, Segment Display, RGB LED, and Status.</p>	 <p>The photograph shows a mini palm tree in a black pot. A Tinkerforge Moisture Bricklet is attached to the base of the plant. A Tinkerforge Master Brick with a WiFi Extension is connected to the bricklet. A Tinkerforge Segment Display 4x7 Bricklet is connected to the master brick, showing the value '0000'. A Tinkerforge RGB LED Bricklet is also connected. The setup is powered by a Tinkerforge Master Brick Power Supply and mounted on a Tinkerforge Mounting Plate 22x30. A note at the bottom right states: 'Note: The Tinkerforge Segment Display 4x7? • shows moisture value 9 with prefix d (for dry) • is discontinued and is no longer sold • alternative solution would analog in bricklet with g=soil moisture sensor'.</p>	



The screenshot displays the Domoticz software interface. At the top, it shows the 'Devices List' with two entries: 'Soil Moisture Monitor' (ID 16) and 'Soil Moisture Monitor - Status' (ID 17). Below this is the 'Device Widgets with Room Plan „Soil Moisture Monitor“ + Trend Soil Moisture'. The room plan shows a single room with a sensor labeled 'Soil Moisture Monitor - Soil Moisture' with a value of 59. A trend graph titled 'Room: Soil Moisture Monitor' shows the moisture level over the last 24 hours, starting at 59, dropping to 20, and then stabilizing around 25. At the bottom, there are two smaller windows: one showing the 'Devices' list and another showing the 'Room Plan „Soil Moisture Monitor“ with Soil Moisture Monitor Devices'.

# Stock Quotes

## Purpose

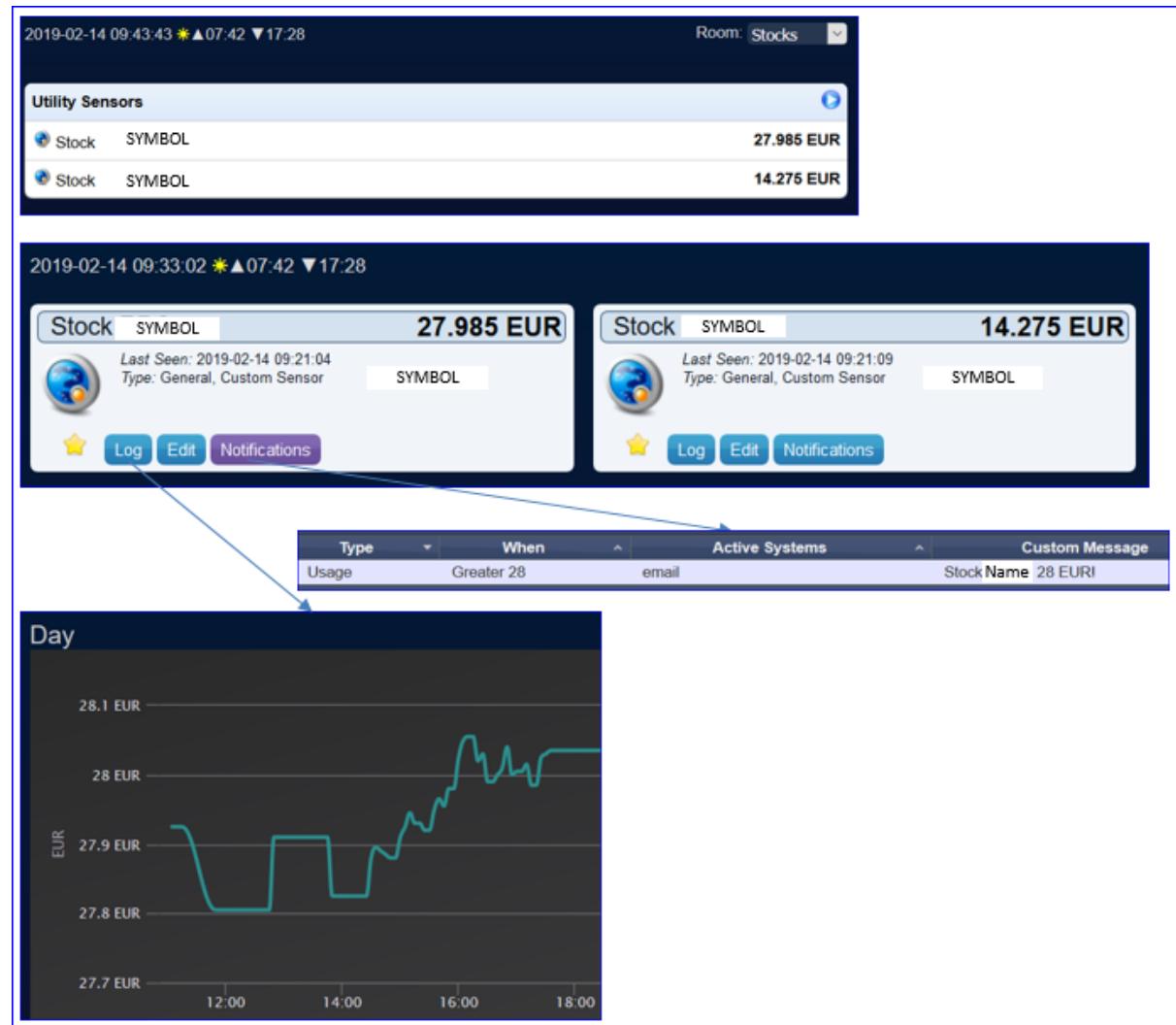
To monitor stock quotes (values):

- Request every 30 minutes stock quotes from [Alpha Vantage](#)  
An Alpha Vantage API key is required to place requests (get [here](#)).
- Display quotes in a dedicated Domoticz dashboard (Room Stocks).
- View trends in charts day, month, year.
- Notify via alert message and (optional) email on thresholds.

*Note*

Initially a Node-RED solution has been developed and running for a while. Whilst getting on with scripting, a dzVents solution has been put in place which replaced the Node-RED flows.

## Screenshots Stock Monitor with Dashboard Room Stocks



# Domoticz Configuration

## Devices

Created Virtual Sensors to monitor a Stockprice.

Idx	Name	Type	SubType	Function
152	Stock STOCKA	General	Custom Sensor	Monitor the stock price for STOCKA
153	Stock STOCKB	General	Custom Sensor	Monitor the stock price for STOCKB
	Add more stocks ...			

### Note

The custom sensors data are stored in the Domoticz database tables

- Percentage (DeviceRowID [the device Idx], Percentage [the value], Date) and
- Percentage Calendar (DeviceRowID, Percentage\_Min, Max,\_Value for per day)

SQL Select Statement Example with few Results:

Select * from Percentage_Calendar where DeviceRowID=153;				
DeviceRowID	Percentage_Min	Percentage_Max	Percentage_Avg	Date
153	14.145	14.235	14.1728	2019-02-13
153	14.07	14.275	14.1551	2019-02-14
153	13.975	14.28	14.1697	2019-02-15
153	14.26	14.26	14.26	2019-02-16

## Roomplan

Created a roomplan *Stocks* with the previous defined devices (Domoticz GUI Setup > More Options > Plans > Roomplan).

The roomplan is used as the Domoticz Dashboard (see earlier screenshot) to monitor the stocks.

### Screenshot Roomplan number 6, named Stocks with 2 devices

The screenshot shows the Domoticz Roomplan configuration screen. At the top, it says "6 Stocks" and "Showing 1 to 6 of 6 entries". Below this are two buttons: "Edit" and "Delete". The main area is titled "Devices" with the sub-instruction "Select Plan first to Edit...". It includes a "Show" dropdown menu and a table with columns "Idx", "Name", and "Symbol". The table contains two rows: row 152 with "Stock" and "SYMBOL", and row 153 with "Stock" and "SYMBOL". At the bottom, it says "Showing 1 to 2 of 2 entries".

Add more devices as required.

## Solution Automation Script

The dzVents Lua script event sends a HTTP API request for several symbols to the Alpha Vantage service.

The HTTP response, per symbol, is a JSON string, which is parsed to obtain the symbol and the price. Then the Domoticz stock device value is updated with the price.

### Example HTTP API request with JSON response

```
https://www.alphavantage.co/query?function=GLOBAL_QUOTE&symbol=YOURSYMBOL&apikey=YOURAPIKEY
```

```
{  
    "Global Quote": {  
        "01. symbol": "YOURSYMBOL",  
        "02. open": "25.7500",  
        "03. high": "25.7700",  
        "04. low": "25.7350",  
        "05. price": "25.7700",  
        "06. volume": "5250",  
        "07. latest trading day": "2019-12-05",  
        "08. previous close": "25.6200",  
        "09. change": "0.1500",  
        "10. change percent": "0.5855%"  
    }  
}
```

## Automation Script

The stocks are defined in a JSON string. Each stock has its own JSON definition.

The Lua package JSON.lua (stored in /home/pi/domoticz/scripts/lua/) is required – many thanks to the author.

The JSON key:value pairs for a symbol assigned to a variable:

```
local STOCKA = JSON:decode('{"symbol":"YOURSYMBOL", "idx":YOURDEVICEIDX,  
"response":"SQMRESYOURSYMBOL"}')
```

Ensure the response key contains a unique value. In the script, sequential characters are used starting with A ("SQMRESA").

In the HTTP response, the response string is checked to then select & update the Domoticz device value with the price.

Prior updating the device, a calculation like converting local currency to EUR can be performed.

### Event name: stock\_quotes

```

local SQM_APIKEY    = '*****' -- Your API Key
local SQM_URL        = 'https://www.alphavantage.co/query?function=GLOBAL_QUOTE&apikey=' .. SQM_APIKEY
.. '&symbol='
-- JSON response keys used - case sensitive (see comments above)
local KEYGLOBALQUOTE   = 'Global Quote'
local KEYSYMBOL        = '01. symbol'
local KEYPRICE         = '05. price'
-- Stocks with Symbol, device idx, unique HTTP response
JSON = (loadfile "/home/pi/domoticz/scripts/lua/JSON.lua")()
local STOCKA = JSON:decode('{"symbol":"YOURSYMBOL","idx":152,"response":"SQMRESA"}')
-- local STOCKE = JSON:decode('{"symbol":"YOURSYMBOL","idx":NNN,"response":"SQMRESE"}')

return {
on = {
  timer = { 'every 30 minutes' },
  httpResponses = { STOCKA.response, --STOCKE.response, }
},
execute = function(domoticz, item)
  if (item.isTimer) then
    domoticz.openURL({url=SQM_URL .. STOCKA.symbol,method='GET',callback = STOCKA.response,})
    --domoticz.openURL({url=SQM_URL .. STOCKE.symbol,method='GET',callback = STOCKE.response,})
  end

  if (item.isHTTPResponse) then
    -- Checking statuscode, callback. Item is type json (item.isJSON)
    if (item.statusCode == 200) then
      local symbol = item.json[KEYGLOBALQUOTE][KEYSYMBOL]
      local price = item.json[KEYGLOBALQUOTE][KEYPRICE]
      domoticz.log(symbol .. ' = ' .. price)
      if (item.callback == STOCKA.response) then
        domoticz.devices(STOCKA.idx).updateCustomSensor(price)
      end
      --if (item.callback == STOCKE.response) then
      --  domoticz.devices(STOCKE.idx).updateCustomSensor(price)
      --end
      return
    else
      domoticz.log('[ERROR]' .. item.statusText, domoticz.LOG_ERROR)
      return
    end
  end
end
end
}
}

```

### Domoticz Log Entry for a single stock

```

2019-12-05 14:15:03.461 Status: dzVents: Info: Handling httpResponse-events for: "SQMRESA"
2019-12-05 14:15:03.461 Status: dzVents: Info: ----- Start internal script: stock_quote_monitor:
HTTPResponse: "SQMRESA"
2019-12-05 14:15:03.466 Status: dzVents: Info: SQM Status Code = 200, Name=SQMRESA
2019-12-05 14:15:03.466 Status: dzVents: Info: SQM Updating SQMRESA
2019-12-05 14:15:03.466 Status: dzVents: Info: YOURSYMBOL = 16.7900
2019-12-05 14:15:03.482 Status: dzVents: Info: ----- Finished stock_quote_monitor

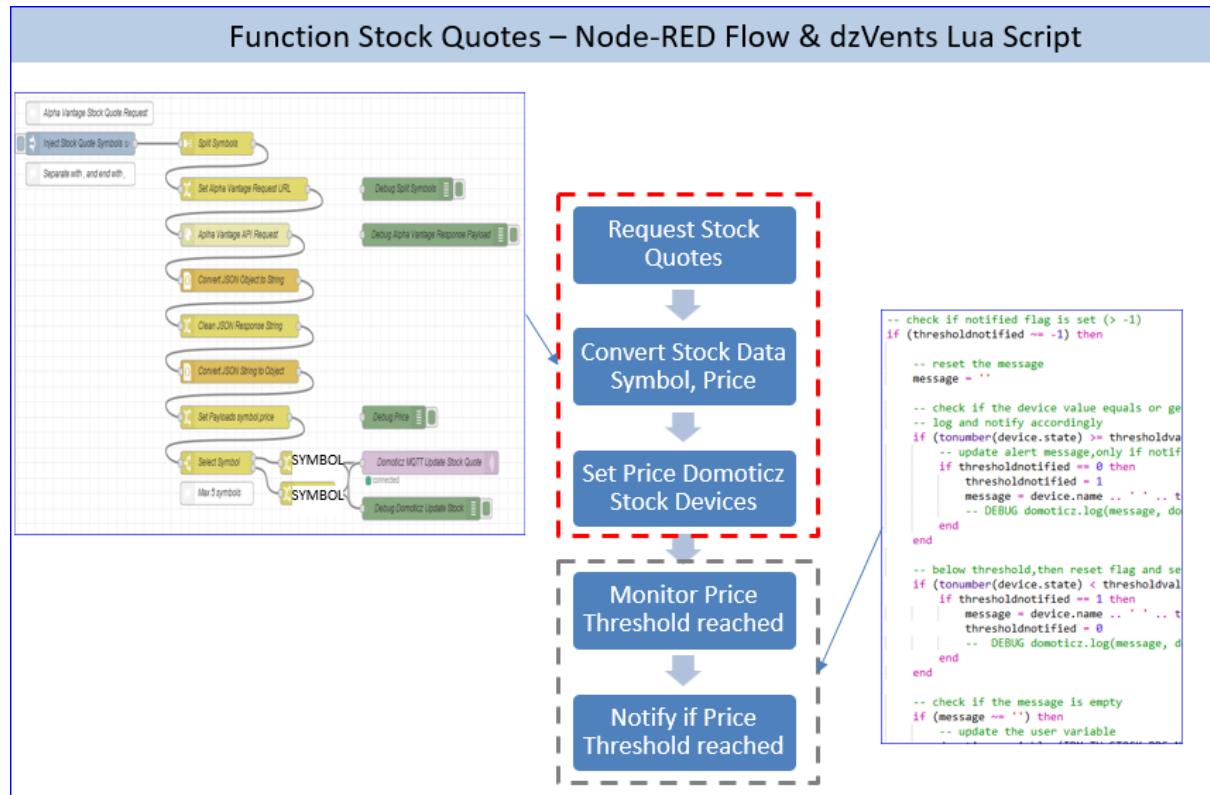
```

## Solution Node-RED

NOT USED – replaced by the Solution Automation Script.

Outlined is a Node-RED solution for two XETRA stock quotes.

The stock quote information is requested, every 30 minutes, via an Alpha Vantage API request (URL), which returns a JSON string with price information etc. The symbol and price are extracted and send to the respective Domoticz device.



## Example API Request & Response

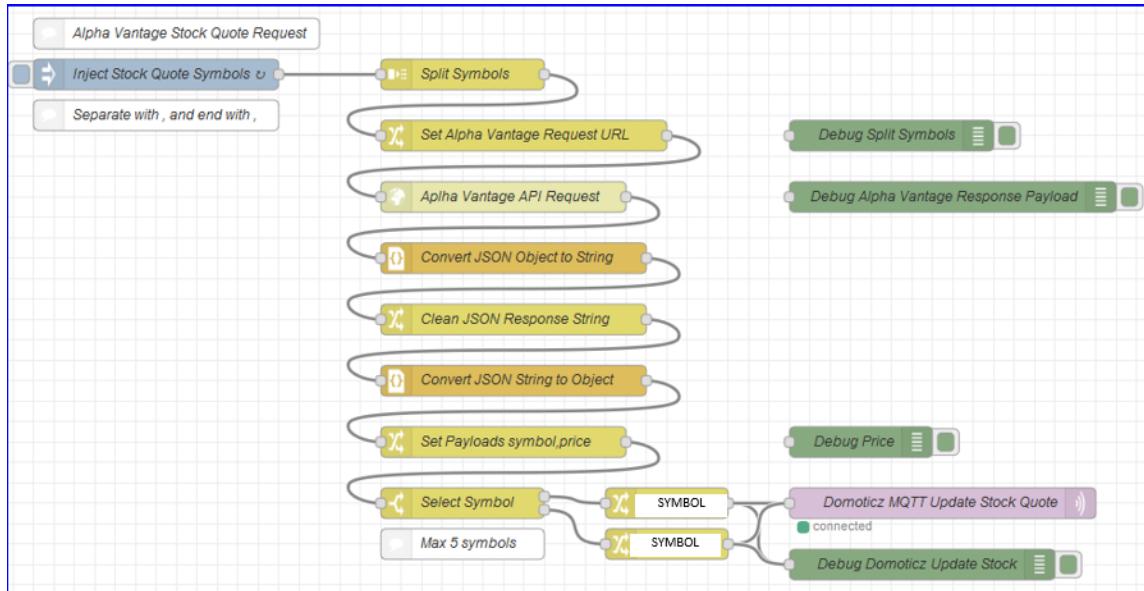
[https://www.alphavantage.co/query?function=GLOBAL\\_QUOTE&symbol=STOCKA&apikey=YOURAPIKEY](https://www.alphavantage.co/query?function=GLOBAL_QUOTE&symbol=STOCKA&apikey=YOURAPIKEY)

## JSON Response

```
{
  "Global Quote": {
    "01. symbol": "STOCKA",
    "02. open": "0.0000",
    "03. high": "0.0000",
    "04. low": "0.0000",
    "05. price": "16.0550",
    "06. volume": "0",
    "07. latest trading day": "2019-02-12",
    "08. previous close": "15.9000",
    "09. change": "0.1550",
    "10. change percent": "0.9748%"
  }
}
```

## Node-RED Flow

The flow is used to define the Stock Quote Symbols, obtain the data from Alpha Vantage, extract the price and update the Domoticz devices.



### Inject Node

The stocks to monitor are defined in the Inject Node, with their symbol as a comma separated string (last symbol **MUST** end with a comma).

Example for two stocks:

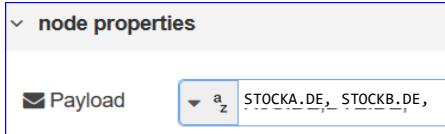
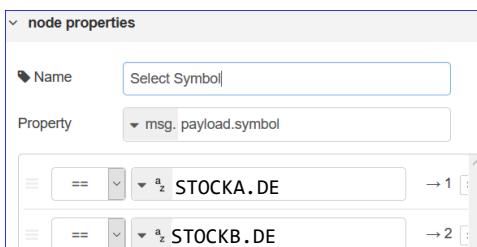
```
STOCKA.DE, STOCKB.DE,
```

### Select Symbol Node

The Select Symbol switch node splits the symbols, which require each a change node to define the Domoticz MQTT update command.

## Add, change or remove symbols

Change following nodes in the flow:

Inject Node	Property Payload String 
Select Symbol Node	Properties 
Change Node	Properties for each of the Change Nodes for a Stock 

## Domoticz Log Entry

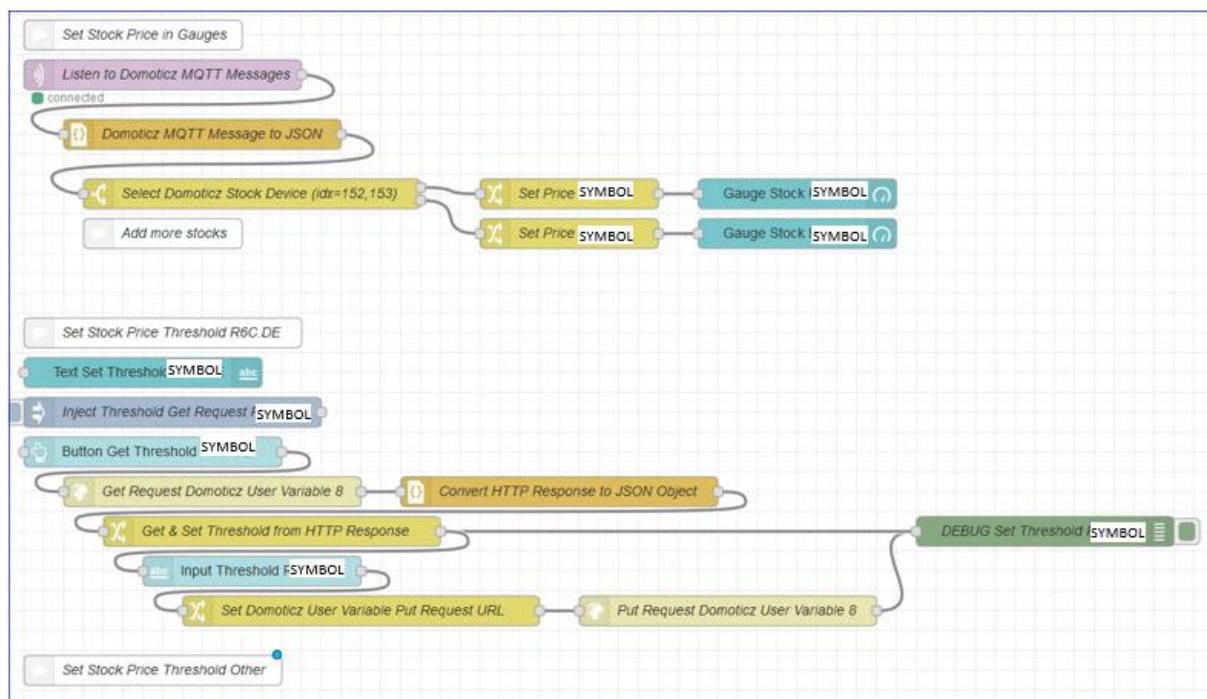
Example Domoticz log when the devices are updated.

```
2019-02-19 09:41:52.053 MQTT: Topic: domoticz/in, Message:  
{"command":"udevice","idx":152,"nvalue":0,"svalue":"27.6300"}  
2019-02-19 09:41:52.259 MQTT: Topic: domoticz/in, Message:  
{"command":"udevice","idx":153,"nvalue":0,"svalue":"14.5100"}
```

## Node-RED Dashboard UI

A Node-RED Dashboard with UI nodes can be used to monitor price, thresholds and setting thresholds.

	<p>Two stocks, one with just a gauge to show the value, the other with the option to change the threshold.</p> <p>This solution can be enhanced, to f.e. set the threshold message or show simple trend in a graph.</p>
---	---



## Notifications

Optional feature to notify incase a stock price is above or below a threshold.

### Option Widget

Notify by using the device configuration to set the threshold for a stock and notify via email.

Type	When	Active Systems	Custom Message
Usage	Greater 28	email	Stock Name 28 EUR!

To change the threshold, modify the rule.

### Option dzVents

Notify by using User Variables and a dzVents script to monitor the threshold.

If a threshold is reached or is below the threshold, send a notification and update the alert message.

### User Variables

The User Variables are defined in the Domoticz GUI  
(Setup >More Options > User variables).

Idx	Variable name	Variable type	Current value
9	TH_STOCK_SYMBOL_NOTIFIED	Integer	1
8	TH_STOCK_SYMBOL	Float	27

Name uses syntax: PREFIX\_TYPE\_SYMBOL\_NAME

The TH\_STOCK\_SYMBOL sets the value of the threshold for the stock.

The TH\_STOCK\_SYMBOL\_NOTIFIED is used to determine if notification should be used (0), if not notified (0) or if notified (1).

The values 0 and 1 are to avoid sending out new messages when the stock value is checked against its threshold. These values are set via the dzVents script “stock\_monitor”.

Changing the value of the threshold can be done via Domoticz GUI changing the User Variable or as an alternative via Node-RED Dashboard UI Input Node.

## Automation Script

Event name: stock\_monitor

```
-- External modules:
local utils = require('utils')
local msgbox = require('msgbox')
-- Stock NAME - idx device, idx uservariable threshold, idx uservariable thresholdnotified
local IDX_STOCK_NAME = 152
local IDX_TH_STOCK_NAME = 8
local IDX_TH_STOCK_NAME_NOTIFIED = 9
-- temp var for the threshold value
local thresholdvalue
-- flag to check if notified, to avoid notifying for every change above threshold
local thresholdnotified = 0
-- message
local message

return {
  on = {
    devices = {
      IDX_STOCK_NAME
    }
  },
  execute = function(domoticz, device)
    domoticz.log('Device '..device.name..' was changed to '..device.state, domoticz.LOG_INFO)

    -- select the device to obtain the thresholdvalue
    if device.idx == IDX_STOCK_NAME then
      thresholdvalue = domoticz.variables(IDX_TH_STOCK_NAME).value
      thresholdnotified = domoticz.variables(IDX_TH_STOCK_NAME_NOTIFIED).value
      domoticz.log('Device '..device.name..': '..tostring(thresholdvalue)..', '..
      tostring(thresholdnotified), domoticz.LOG_INFO)
    end;
    -- add more devices
    -- check if notified flag is set (> -1)
    if (thresholdnotified ~= -1) then
      -- reset the message
      message = ''
      -- check if the device value equals or geater threshold (user_variable)
      -- log and notify accordingly
      if (tonumber(device.state) >= thresholdvalue) then
        -- update alert message,only if notifiedflag = 0 to avoid duplication
        if thresholdnotified == 0 then
          thresholdnotified = 1
          message = device.name .. ' ' .. tonumber(device.state) .. ' reached threshold ' ..
          tostring(thresholdvalue)
          -- DEBUG domoticz.log(message, domoticz.LOG_INFO)
        end
      end
      -- below threshold,then reset flag and set message
      if (tonumber(device.state) < thresholdvalue) then
        if thresholdnotified == 1 then
          message = device.name .. ' ' .. tonumber(device.state) .. ' below threshold ' ..
          tostring(thresholdvalue)
          thresholdnotified = 0
          -- DEBUG domoticz.log(message, domoticz.LOG_INFO)
        end
      end
      -- check if the message is empty
      if (message ~= '') then
        -- update the user variable
        domoticz.variables(IDX_TH_STOCK_RDS_NOTIFIED).set(thresholdnotified)
        -- write to log
        domoticz.log(message, domoticz.LOG_INFO)
        -- set the alert message
        msgbox.alertmsg(domoticz, domoticz.ALERTLEVEL_ORANGE, message)
        -- and notification
        -- domoticz.notify(message)
      end
    end
  end
}
```

# Enhancements

## Total Stock Value

Beside showing the current stock value, it is also interesting to show, with trend, the total value of shares in stock.

### Solution

#### User Variable

Define User Variable holding the total number of shares in stock

Name: DEF\_STOCK\_NAME\_COUNT

Type: Integer

Set the value

Note the idx: idx=12

#### Create Custom Sensor

Name: Stock Name Total

Axis Label: EUR

Note the idx: idx=156

#### dzVents Script

Enhance the dzVents script stock\_monitor with two local vars for the idx of the totalvalue device and number of shares user variable

```
local IDX_STOCK_NAME = 152          -- price
local IDX_TH_STOCK_NAME = 8          -- threshold
local IDX_STOCK_NAME_TOTAL = 156     -- total value all shares
local IDX_DEF_STOCK_NAME_COUNT = 12  -- number of shares

...
-- select the device to obtain the thresholdvalue
if device.idx == IDX_STOCK_NAME then
    -- update total value custom sensor
    stockvalue = math.floor(domoticz.variables(IDX_DEF_STOCK_NAME_COUNT).value * tonumber(device.state))
    domoticz.log('Device ' .. device.name .. ' Stock Value: ' .. tostring(stockvalue), domoticz.LOG_INFO)
    domoticz.devices(IDX_STOCK_NAME_TOTAL).updateCustomSensor(stockvalue)
end
-- add more devices
...
```

# Temperature & Humidity 433Mhz

## Purpose

To measure the temperature (°C) & humidity (%RH) in various rooms.

## Device

Device (433MHz): Temperature TFA Dostmann / Wertheim TS34C.

The devices are connected to the RFXCOM RFXtrx433E.

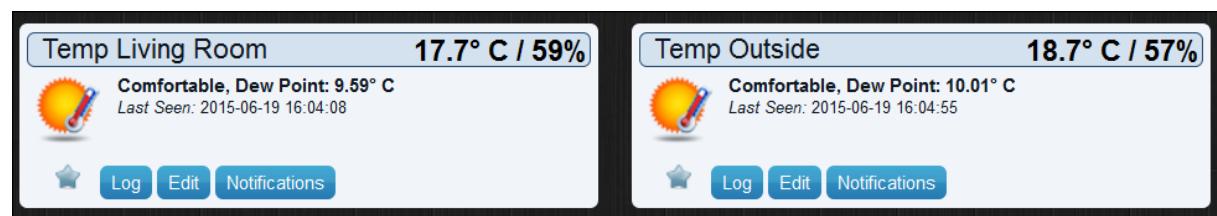
## Setup

1. Open the device battery flip and set the channel.  
Start with 1.
2. Take out the battery blocker
3. The device will be recognized automatically and listed under the devices list
4. Select the green arrow to give the device the name and the name will be shown in the list (see below)

### Device List Entries (idx=14,11)

Idx	Hardware	ID	Unit	Name	Type	SubType	Data	Tail	Last Seen
14	RFXCom	450E	2	Temp Outside	Temp + Humidity	Cresta, TFA TS34C	19.0 C, 55 %	4 100	2015-06-19 15:55:10
11	RFXCom	2A0E	1	Temp Living Room	Temp + Humidity	Cresta, TFA TS34C	17.6 C, 59 %	6 100	2015-06-19 15:54:06
6	GPIO Port	18	LED GPIO18	Lighting 1	Impuls	Off	7 -		2015-06-19 15:20:16
12	RFXCom	1F1F1F	1	Blind Living Room	RFY	RFY	Stopped	7 -	2015-06-19 15:18:55
13	RFXCom	1E1E1E	2	Blind Bed Room	RFY	RFY	Stopped	7 -	2015-06-19 15:06:34

## Temperature & Humidity Widgets



# Timers

## Purpose

To perform, in regular intervals, a task or tasks.

Timers can be defined as an Automation Event (all devices) or as a Device Timers (device type Switches only).

### *Note*

Started off by defining timers for all devices by using Automation Events dzVents Lua scripts only.

In the mean time, more and more all kind of Swiches have been added which perform “On Time” tasks.

## Rule

Dediced (as a rule) to use single device timers if a task has been performed “On Time” with a single action, i.e. switch device Off, change setpoint.

For complex tasks make use of an Automation Event with dzVents Lua script.

## Device Timers

The device timers are device specific for Switches only.

They are created via the Device widget > option Timers.

Enables to perform simple tasks i.e. On | Off, change setpoint value etc.

Types supported (not the full list, these are used for the workbook):

- Thermostat,SetPoint
- Light/Switch,Switch,Dimmer
- Light/Switch,Switch,Push On Button
- Light/Switch,Switch,Push Off Button
- RFY,RFY,Blinds
- Lighting 1, ELRO AB400,On/Off
- Lighting 2, AC,On/Off
- Lighting 4, PT2262,Contact
- Color Switch,WW,Dimmer
- More...

## Setpoint Timers

Each radiator thermostat device (type: Thermostat, SubType: SetPoint) has one or more timers to control the temperature.

### Setpoint Timers Example

#### Device

Idx	Hardware	ID	Unit	Name	Type	SubType	Data
207	Bath Thermostat	00160001	1	Hwg Bad Sollwert	Thermostat	SetPoint	20.0

#### Timers

Name: Hwg Bad Sollwert				
2019-12-15 19:27:34 ⏪ 08:31 ⏴ 16:01				
Show 25 entries	Type	Date	Time	Command
Active	On Time	06:00	Temperature, 20	Everyday
Yes	On Time	11:00	Temperature, 19	Everyday
Yes	On Time	23:00	Temperature, 17	Everyday

### Setpoint Timers Overview

To get an overview of the setpoint device timers defined, perform an SQL SELECT query on the Domoticz Database. The timers are defined in the table SetpointTimers. The device name is taken from field Name of table DeviceStatus

#### Example

SQL Select statement to obtain all setpoint timers from the Domoticz Production database. The device names are in German.

```
SELECT d.Name, t.*
FROM DeviceStatus d, SetpointTimers t
WHERE d.ID=t.DeviceRowID
```

Name	ID	Active	DeviceRowID	Date	Time	Type	Temperature	TimerPlan	Days	Month	MDay	Occurence
Hwg Bad Sollwert	1	1	207	2019-12-15	06:00	2	20.0	0	128	0	0	0
Hwg Bad Sollwert	2	1	207	2019-12-15	11:00	2	19.0	0	128	0	0	0
Hwg Bad Sollwert	3	1	207	2019-12-14	23:00	2	17.0	0	128	0	0	0
Hwg EZ Sollwert	4	1	204	2019-12-14	06:00	2	20.0	0	128	0	0	0
Hwg EZ Sollwert	5	1	204	2019-12-14	22:00	2	17.0	0	128	0	0	0
Hwg WZ Sollwert	6	1	201	2019-12-15	06:15	2	21.0	0	128	0	0	0
Hwg WZ Sollwert	7	1	201	2019-12-14	22:00	2	0.0	0	128	0	0	0
Hwg Dusche Sollwert	8	1	198	2019-12-14	21:30	2	21.0	0	128	0	0	0
Hwg Dusche Sollwert	9	1	198	2019-12-14	23:00	2	0.0	0	128	0	0	0
Hwg MakeLab Sollwert	10	1	195	2019-12-14	19:00	2	0.0	0	128	0	0	0

## Switch Timers

Example Switch Device (idx=30). Type: Lighting 2, AC, On/Off



Active	Type	Date	Time	Randomness	Command	Days
No	On Time		00:00	No	On	Everyday
No	On Time		00:05	No	Off	Everyday

### SQL SELECT on table Timers

```
SELECT d.Name, t.*  
FROM DeviceStatus d, Timers t  
WHERE d.ID=t.DeviceRowID
```

Name	ID	Active	DeviceRowID	Date	Time	Type	Cmd	Level	Hue	UseRandomness	TimerPlan	Days	Month	MDay	Occurence	Color
TimerSwitch	1	0	30	2018-09-04	00:00	2	0	100	0	0	0	128	0	0	0	
TimerSwitch	2	0	30	2018-09-04	00:05	2	1	100	0	0	0	128	0	0	0	

*Note*

The timers are not active in this case.

<TODO>Clarify why field Date has content although the timer definitions do not set a Date but Time only.

<TODO>Add more device timers. Replace Automation scripts which use only one device.

<TODO>Exploere if there are any other tables where times are defined.

## Timerplans

In the Domoticz settings, several timer plans can be defined.

Initially there is one timer plan: default (with ID=0). This plan is assigned to the timers defined. See previous SQL SELECT query result, field TimerPlan, which has value 0.

In the GUI > Setup > Settings > Other: the timer plan can be set.



The selected timer plan ID, can be found in the Domoticz database, table Preferences , field Key = ActiveTimerPlan, nValue = 0, sValue = “” (empty).

```
SELECT *
FROM Preferences
WHERE Key="ActiveTimerPlan"
|
```

Key	nValue	sValue
ActiveTimerPlan	0	

The timer plans are defined in GUI > Setup > More Options > Plans > Timerplan.

Idx	Name
0	default
1	Holiday

Showing 1 to 2 of 2 entries

First | Previous | 1 | Next | Last

Edit | Duplicate | Delete

## Automation Events

The events are created with the Domoticz Event Editor using dzVents scripts.  
Enables to create complex tasks for all devices.

Below some examples. More Automation events sing timers can be found in functions like Coffee Machine Monitor, Days-To-Go, Stock Quotes, Waste Calendar.

### Example Astro Info

Idx	Hardware	ID	Unit	Name	Type	SubType	Data
121	VirtualSensors	00082121	1	Sonne (Tageslänge)	General	Text	04:53 - 21:55 (17:02)

Sonne (Tageslänge)

04:53 - 21:55 (17:02)  
Last Seen: 2019-06-28 01:00:00  
Type: General, Text

Text Log Edit

```
-- [[
  astro_info.lua
  Display the sunrise and sunset time plus daylength in a virtual text sensor.
  Updated once a day.
]]-- 

-- Idx of the devices
local IDX_SUNRISESET = 121

return {
  on = { timer = { 'at 01:00' } },

  execute = function(domoticz, timer)
    local daylength = domoticz.time.sunsetInMinutes - domoticz.time.sunriseInMinutes
    local msg = domoticz.helpers.MinutesToClock(domoticz.time.sunriseInMinutes).. ' - ' ..
    domoticz.helpers.MinutesToClock(domoticz.time.sunsetInMinutes).. ' (' ..
    domoticz.helpers.MinutesToClock(daylength).. ')'
    domoticz.devices(IDX_SUNRISESET).updateText(msg)
    domoticz.log(msg)
  end
}
```

## Example Hue Lights Timer

```
--[[  
hue_lights_timer.lua  
Turn Hue devices ON & OFF by given time: ON at sunset, OFF at 23:00. Update the alert message.  
IMPORTANT: Ensure the timer and the timer trigger are the same.  
]]--  
  
-- Idx of the devices  
local IDX_HUE_LIVINGSHELF = 111  
local IDX_HUE_LIVINGTV = 112  
local IDX_HUE_DINING = 185  
local IDX_HUE_MAINDOOR = 110  
  
-- Update alert message with alert level green.  
local function setalertmsg(domoticz, state)  
    local message= 'Hue WZ '.. state .. ' ' .. domoticz.helpers.isnowhhmm(domoticz)  
    domoticz.helpers.alertmsg(domoticz, domoticz.ALERTLEVEL_GREEN, message)  
end  
  
local function hueswitchon(domoticz)  
    domoticz.devices(IDX_HUE_LIVINGSHELF).switchOn()  
    domoticz.devices(IDX_HUE_LIVINGTV).switchOn()  
    domoticz.devices(IDX_HUE_DINING).switchOn()  
    domoticz.devices(IDX_HUE_MAINDOOR).switchOn()  
    setalertmsg(domoticz, 'on')  
end  
  
local function hueswitchoff(domoticz)  
    domoticz.devices(IDX_HUE_LIVINGSHELF).switchOff()  
    domoticz.devices(IDX_HUE_LIVINGTV).switchOff()  
    domoticz.devices(IDX_HUE_DINING).switchOff()  
    domoticz.devices(IDX_HUE_MAINDOOR).switchOff()  
    setalertmsg(domoticz, 'off')  
end  
  
return {  
    active = true,  
    on = {  
        timer = {  
            '60 minutes before sunset',  
            '30 minutes before sunset',  
            'at 23:00',  
            'at 07:00',  
            'at 08:00'  
        }  
    },  
    execute = function(domoticz, timer)  
        if (timer.trigger == '30 minutes before sunset') then hueswitchon(domoticz) end  
        if (timer.trigger == 'at 23:00') then hueswitchoff(domoticz) end  
    end  
}
```

## Example Radiator Thermostat

A complex test script to obtain the setpoint temperature and actual temperature from a homematicIP radiator thermostat connected to a RaspberryMatic system (see [RaspberryMatic](#)). A text device is updated with the setpoint and temperature.

```
-- Domoticz device text (named MakeLab Thermostat Info)
local IDX_THERMOSTAT_MAKELAB_INFO = 175;
-- homematic defines
local ID_DEVICE = 1541;
-- url of the CCU to obtain device information
local URL_CCU = 'http://ccu-ip/addons/xmlapi/state.cgi?device_id=' .. ID_DEVICE;
-- callback of the url request - must be unique across all dzevents
local RES_CCU = 'thermostatmakelabinfo';
-- helper to round a number to n decimals
local DECIMALS = 1;

return {
  on = { timer = { 'every minute'}, httpResponses = { RES_CCU } },
  execute = function(domoticz, item)
    -- check if the item is a device, then request information
    if (item.isTimer) then
      domoticz.openURL({ url = URL_CCU, method = 'GET', callback = RES_CCU })
    end
    -- check if the item is a httpresponse from the openurl callback
    if (item.isHTTPResponse) then
      if (item.statusCode == 200) then
        -- SETPOINT °C
        local setpointvalue = domoticz_applyXPath(item.data,'//datapoint[@ise_id="1584"]/@value')
        -- TEMPERATURE °C
        local temperaturevalue = domoticz_applyXPath(item.data,'//datapoint[@ise_id="1567"]/@value')
        -- log
        domoticz.log('Setpoint: ' .. setpointvalue)
        domoticz.log('Temperature: ' .. temperaturevalue)
        local msg = 'SP: ' .. tostring(domoticz.helpers.roundnumber(setpointvalue, DECIMALS)) .. ', T: ' ..
.. tostring(domoticz.helpers.roundnumber(temperaturevalue, DECIMALS))
        -- update the thermostat info device
        domoticz.devices(IDX_THERMOSTAT_MAKELAB_INFO).updateText(msg);
      else
        domoticz.log('[ERROR] Problem handling the request:' .. item.statusText, domoticz.LOG_ERROR)
      end
    end
  end
}
```

# Waste Calendar

## Purpose

To display waste calendar dates (“Abfall Termine”) for a city (location) and waste type. The waste types are (in German): Rest, Bio, Gelb, Papier, Schad. The dates are provided by the respective city waste management (“Abfallwirtschaft”) for the cities Pinneberg and Hohenfelde. A room plan “Termine” is defined (Domoticz GUI Setup > More Options > Plans > Roomplan).

## Example Room Termine

Sensor	Date
Biotonne Pi	06-09-2018
Gelber Sack Pi	30-08-2018
Papier Pi	21-09-2018
Restmüll Pi	30-08-2018
Schadstoff Pi	08-09-2018
Biotonne Ho	27-08-2018
Gelber Sack Ho	28-08-2018
Papier Ho	17-09-2018
Restmüll Ho	27-08-2018

Point	Date
Biotonne Pi	06-09-2018
Gelber Sack Pi	30-08-2018
Papier Pi	21-09-2018
Restmüll Pi	30-08-2018
Schadstoff Pi	08-09-2018
Biotonne Ho	27-08-2018
Gelber Sack Ho	28-08-2018
Papier Ho	17-09-2018
Restmüll Ho	27-08-2018

## Devices Configuration

The devices are created as Virtual Sensors using the Dummy Hardware.

98	VirtualSensors	00082098	1	Biotonne Pi	General	Text	06-09-2018
99	VirtualSensors	00082099	1	Papier Pi	General	Text	21-09-2018
100	VirtualSensors	00082100	1	Restmüll Pi	General	Text	30-08-2018
101	VirtualSensors	00082101	1	Gelber Sack Pi	General	Text	30-08-2018
102	VirtualSensors	00082102	1	Schadstoff Pi	General	Text	08-09-2018
103	VirtualSensors	00082103	1	Biotonne Ho	General	Text	27-08-2018
104	VirtualSensors	00082104	1	Papier Ho	General	Text	17-09-2018
105	VirtualSensors	00082105	1	Restmüll Ho	General	Text	27-08-2018
106	VirtualSensors	00082106	1	Gelber Sack Ho	General	Text	28-08-2018

## Concept

A dzVents Lua script event, “waste\_calendar\_update” executed dzVents time trigger reads a CSV file, which contains per line the Device Idx, Interval, waste dates.

The device is updated based upon the difference in days between now and the waste date within a given interval (i.e. 16 or 32 days).

The script also notifies via email (recipients defined in the Domoticz Settings Email and Notification) if the waste target date is 1 days from actual date.

## CSV Input File

The CSV file is read line by line, using per line, the Device Index idx (field 1) to update a date (fields 2 and more depending available dates).

A date is published if within the next 13 days from the actual date.

CSV Line Syntax: idx, interval, date1, dateN

idx	NN 98, 99...
interval	Number of days between waste dates. The intervals might not be exact with 14 days or a month. To go for sure, use 16 instead of 14 16, 31
date	Format Day-Month-Year dd-mm-YYYY 09-08-2018

### Example CSV file line entry

The example shows for idx 98 (“Biotonne Pi”), an interval every 16 days and number of dates for the remaining year 2018 and full year 2019.

```
98,16,13-12-2018,28-12-2018,10-01-2019,24-01-2019,07-02-2019,21-02-2019,07-03-2019,21-03-2019,04-04-2019,18-04-2019,03-05-2019,16-05-2019,31-05-2019,14-06-2019,27-06-2019,11-07-2019,25-07-2019,08-08-2019,22-08-2019,05-09-2019,19-09-2019,04-10-2019,17-10-2019,01-11-2019,14-11-2019,28-11-2019,12-12-2019,27-12-2019,09-01-2020
```

## CSV File name & location

The CSV file wastecal.csv, located in folder /home/pi/domoticz/scripts/dzVents/scripts.

The file is used by a dzVents Lua script *waste\_calendar\_update* created using the Domoticz Script editor.

## Automation Script

A dzVents Lua script vent is time triggered once per day at 00:30. See source for details.

Event name: *waste\_calendar\_update*

```
--[[[  
    waste_calendar_update.lua  
    Read a csv file with wastecalendar dates per device.  
    Update the device text with the date if the date is within interval specified.  
    The wastecalender file "wastecal.csv" is located in the dzVents scripts folder.  
    Line entry csv file: idx,interval,date1,dateN.  
]]--  
  
-- External modules: /home/pi/domoticz/scripts/dzVents/scripts  
local utils = require('utils')  
local msgbox = require('msgbox')  
  
-- threshold in days to notify  
-- if the difference of the current day to a wastecalendarday equals threshold  
-- then notify  
local TH_WASTECAL = 1  
  
-- Helpers  
function string:split( inSplitPattern, outResults )  
    if not outResults then  
        outResults = { }  
    end  
    local theStart = 1  
    local theSplitStart, theSplitEnd = string.find( self, inSplitPattern, theStart )  
    while theSplitStart do  
        table.insert( outResults, string.sub( self, theStart, theSplitStart-1 ) )  
        theStart = theSplitEnd + 1  
        theSplitStart, theSplitEnd = string.find( self, inSplitPattern, theStart )  
    end  
    table.insert( outResults, string.sub( self, theStart ) )  
    return outResults  
end  
  
-- the wastecalender file is updated once per year  
local wastecalfile = '/home/pi/domoticz/scripts/dzVents/scripts/wastecal.csv'  
local sep = ","  
  
-- read the csv file  
function readandupdate(domoticz)  
    -- read the file line by line.  
    -- each line contains an array with device[1], wasteinterval[2], dates[2...]  
    for line in io.lines(wastecalfile) do  
        -- split the line by , and assign to a table  
        local wastetable = line:split(sep)  
        local idx = tonumber(wastetable[1])  
        local interval = tonumber(wastetable[2])  
        -- flag to check if a wastedate has been found  
        local datefound = 0  
  
        -- check the dates, start at 3 because 1=idx, 2=interval and number of table entries  
        for i = 3, #wastetable do  
  
            -- get the wastedate array entry  
            local wastedate = wastetable[i]  
            -- split the wastedate into an array with 3 entries day, month, year  
            local wastedatesplit = wastedate:split("-")  
            -- calculate the daysdiff between now and the wastedate  
            local daysdiff = utils.datediffnow(wastedatesplit[1], wastedatesplit[2], wastedatesplit[3])  
            --  
            local month = tonumber(wastedatesplit[2])  
  
            -- check if daysdiff within interval
```

```

-- if daysdiff >= 0 and daysdiff < interval then
if daysdiff >= 0 and datefound == 0 then
    datefound = 1
    print (domoticz.devices(idx).name .. '(' .. idx .. ')=' .. wastedate .. ', days=' .. daysdiff
.. ', interval=' .. interval)

    -- update the device text with the new date
    domoticz.devices(idx).updateText(wastedate)

    -- check number of days left compared to the threshold
    -- i.e. if 1 day left, then notify using device name & text.
    -- the device text contains the date
    -- NOT USED = handled by the dzVents script waste_calendar_notifier
if daysdiff == TH_WASTECAL then
    -- print ('Device ' .. idx .. ' notifying...')
    message = '[ACHTUNG] ' .. domoticz.devices(idx).name .. ' ' ..
domoticz.devices(idx).text
        -- update alert message
        -- msgbox.alertmsg(domoticz, domoticz.ALERTLEVEL_RED, message)
        domoticz.log(message, domoticz.LOG_INFO)
        domoticz.notify(message)
    end
end

    -- check if for the last entry daysdiff less 0, then no new date available
    -- this is used f.e. for hohenfelde as last wastedate is sep or oct
if i == #wastetable and daysdiff < 0 then
    datefound = 1
    print (idx .. '=' .. wastedate .. ', days=' .. daysdiff .. ', interval=' .. interval .. ',
KEIN TERMIN')

    -- update the device text with the info that there is no date (yet) available
    domoticz.devices(idx).updateText('Kein neuer Termin')
end

end

    -- check if a wastedate has been found, if not then set Kein termin message
if datefound == 0 then
    print (idx .. '=' .. 'KEIN TERMIN')
    -- update the device text with the info that there is no date (yet) available
    domoticz.devices(idx).updateText('Kein neuer Termin')
end

    -- JUST SOME LEARNERS
    -- print the content
    -- for i = 1, #wastetable do
    --   print( wastetable[i] )
    -- end
end
end

return {
  on = {
    timer = {
      -- for tests use every minute
      -- 'every minute',
      'at 00:30'
    }
  },
  execute = function(domoticz)
    readandupdate(domoticz)
  end
}
}

```

# Python CSV File Generation Script

A Python 2 script is used to create the wastecal.csv file.  
The script reads a iCal file.

## Script

```
# -*- coding: cp1252 -*-
## File:      wastecalictstocsv.py (Python 2)
## Project:   atHome
## Purpose:  Create a CSV file with waste dates from an ICS iCal file Pinneberg and empty entries for
## Hohenfelde
## Author:   Robert W.B. Linn
## Version:  20181209

## Notes:
## The generated csv file wastecal.csv must be placed in /home/pi/domoticz/scripts/dzVents/scripts
## Domoticz Device Idx and Interval
## Biotonne Pi=98,16
## Papier Pi=99,32
## Restmuell Pi=100,16
## Gelber Sack Pi=101,16
## Schadstoff Pi=102,32
## Biotonne Ho=103,16
## Papier Ho =104,32
## Restmuell Ho=105,16
## Gelber Sack Ho=106,16

## The generated file has to be merged with the wastecal.csv file located on the Domoticz system:
## /home/pi/domoticz/scripts/dzVents/scripts

import csv, io, sys
import datetime
from datetime import date

wastecalendarics = 'wastecal-pi-2019.ics'

# Define the wastecalender csv file located in the same folder as the python script.
# CSV Format: wastetype, date1, date2 ...
# Date format dd-mm-YYYY, i.e. 09-08-2018
wastecalendarcsv = 'wastecal-2019.csv'

# Check the python version to set the file open arguments
if sys.version_info[0] == 2: # Not named on 2.6
    icsaccess = 'rb'
    icskargs = {}
    csvaccess = 'wb'
    csvkargs = {}
else:
    icsaccess = 'rt'
    icskargs = {'newline':''}
    csvaccess = 'a'
    csvkargs = {}
    #csvkargs = {'newline':''}

# Define the ics tokens
TOKEN_EVENT_BEGIN = "BEGIN:VEVENT"
TOKEN_EVENT_END = "END:VEVENT"
TOKEN_EVENT_DESCRIPTION = "DESCRIPTION:"
TOKEN_EVENT_START = "DTSTART:"
TOKEN_REST = "Restabfall 2"
TOKEN_BIO = "Bio"
TOKEN_SCHAD = "Schad"
TOKEN_GELB = "Gelb"
TOKEN_PAPIER = "Papier"

# Define the lists holding the dates per waste types. The lists are used to create the csv file
pirestlist = []
pibiolist = []
pischadlist = []
pigelblist = []
```

```

pipapierlist = []
horestlist = []
hobiolist = []
hogelblist = []
hopapierlist = []

# Define helpers
eventfound = 0
eventdescription = ""
eventstart = 0
eventyear = 0
eventmonth = 0
eventday = 0

def csv2string(data):
    si = io.BytesIO()
    cw = csv.writer(si)
    cw.writerow(data)
    return si.getvalue().strip('\r\n')

# Get the actual year month day
s = datetime.date.today().strftime("%d-%m-%Y")
# Get the date now in format i.e. 09-08-2018
datenow = datetime.datetime.strptime(s, "%d-%m-%Y")

# Set the waste type as the first entry in the waste lists
## Biotonne Pi=98,16
## Papier Pi=99,32
## Restmuell Pi=100,16
## Gelber Sack Pi=101,16
## Schadstoff Pi=102,32
## Biotonne Ho=103,16
## Papier Ho =104,32
## Restmuell Ho=105,16
## Gelber Sack Ho=106,16

pibiolist.append('98,16')
pipapierlist.append('99,32')
pirestlist.append('100,16')
pigelblist.append('101,16')
pischadlist.append('102,32')
hobiolist.append('103,16')
hopapierlist.append('104,32')
horestlist.append('105,16')
hogelblist.append('106,16')

# Open the wastecalendar ics file in read access
with open(wastecalendars, icsaccess, **icskwargs) as icsfile:
    # lines = icsfile.readlines()
    # Loop thru the file line by line
    for line in icsfile:
        # Strip the CRLF from the line
        linet = line.strip()
        # Print the line for tests
        # print linet
        # Check the entries

        # If token event end is found and an event has been build then add a waste entry date to the
        list.
        if linet.startswith(TOKEN_EVENT_END):
            if eventfound == 1 and len(eventdescription)> 0 and eventstart > 0:
                wastedate = "%s-%s-%s" % (eventday,eventmonth,eventyear)
                # print "Adding the line ", eventdescription, eventstart, eventyear, eventmonth,
                eventday

                # Workout the waste types and add the date
                if eventdescription.startswith(TOKEN_REST):
                    pirestlist.append(wastedate)
                    # print "Adding ", eventdescription, "-", wastedate

                if eventdescription.startswith(TOKEN_BIO):
                    pibiolist.append(wastedate)

                if eventdescription.startswith(TOKEN_PAPIER):
                    pipapierlist.append(wastedate)

```

```

if eventdescription.startswith(TOKEN_GELB):
    pigelblist.append(wastedate)

if eventdescription.startswith(TOKEN_SCHAD):
    pischadlist.append(wastedate)

# Reset the globals which are used for the next event
eventdescription = ""
eventstart = 0
eventyear = 0
eventmonth = 0
eventday = 0
eventfound = 0

# Set the flag if an new event is found
if linet.startswith(TOKEN_EVENT_BEGIN):
    eventfound = 1

# Event was found and now the description
if eventfound and linet.startswith(TOKEN_EVENT_DESCRIPTION):
    eventdescription = linet.replace(TOKEN_EVENT_DESCRIPTION, "")

# Event was found and now the start date
# Extract from the date, the year, month, day
if eventfound and linet.startswith(TOKEN_EVENT_START):
    # Example = DTSTART:20180105T053000Z
    eventstartstr = linet.replace(TOKEN_EVENT_START, "")
# Get the date in format 20180105
    index = eventstartstr.index('T')
    eventstartstr = eventstartstr[0:index]
    eventstart = int(eventstartstr)
# Get the year, month, day
    eventyear = eventstartstr[0:4]
    eventmonth = eventstartstr[4:6]
    eventday = eventstartstr[6:8]
    # print eventyear, eventmonth, eventday

# Example to show the content of a list
#print len(biolist)
#for wastedate in biolist:
#    print wastedate
#print csv2string(biolist)

# Write the lists to the CSV file. Each row contains a waste type with dates.
# Sample: 98,16,12-01-2018,09-02-2018, ...
with open(wastecalendarcsv, csvaccess, **csvkwargs) as csvfile:
    # Pinneberg
    csvfile.write(",".join(pipapierlist))
    csvfile.write("\n")
    csvfile.write(",".join(pirestlist))
    csvfile.write("\n")
    csvfile.write(",".join(pibiolist))
    csvfile.write("\n")
    csvfile.write(",".join(pigelblist))
    csvfile.write("\n")
    csvfile.write(",".join(pischadlist))
    csvfile.write("\n")
    # Hohenfelde - the dates needs tobe added manually
    csvfile.write(",".join(hopapierlist))
    csvfile.write("\n")
    csvfile.write(",".join(horestlist))
    csvfile.write("\n")
    csvfile.write(",".join(hobiolist))
    csvfile.write("\n")
    csvfile.write(",".join(hogelblist))
    csvfile.write("\n")
    # Close with message
    csvfile.close()
    print "Created CSV file", wastecalendarcsv

# Exit the script
icsfile.close()
sys.exit()

```

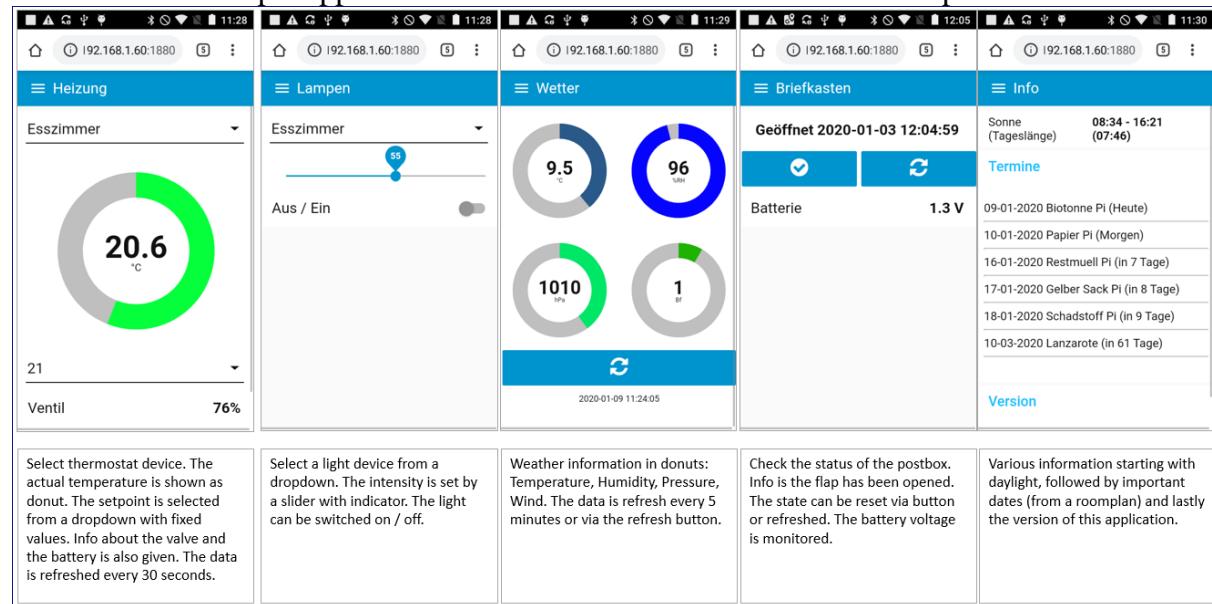
# Web App Site Control

## Purpose

To control the Domoticz Home Automation System, running on a Raspberry Pi 3B+, via a browser-based application (WebUI, built with Node-RED).

- Easy-to-use User Interface accessible from any device capable of running a browser (smartphones, tablets, PC, SBC, TV)
- Control heating (HomematicIP) & lights (Philips Hue)
- Information only for weather data, key dates and status postbox
- ... and more to follow ...
- ✓ The goal has been to develop a prototype first, i.e. workout the concept with initial functionality, to be able to enhance or modify the application further.
- ✓ This solution is also meant as a trigger for ideas or as a suggestion building an alternate GUI (WebUI) to access the Domoticz Homeautomation System.
- ✓ The User Interface is translated to the German language.
- ✓ **Detailed information** about the app can be found on [GitHub](#).

**Screenshot - example application access from a browser on an Android phone.**



# Web Frontend Customized

## Purpose

To build a Custom Web Frontend running on a dedicated web server.

## Web Front End Sample

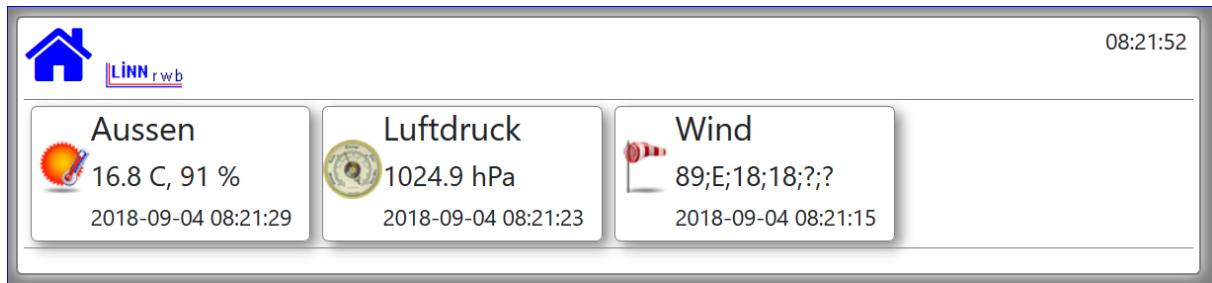
Display weather data from 3 devices and update every 5 seconds.  
A clock is running every second.

### Devices Used

```
Temperature & Humidity
(Name="Aussen", idx=14, Hardware=RFXtrx433e, Type=Temp + Humidity, SubType=Cresta, TFA TS34C)

Luftdruck
(Name="Luftdruck", idx=116, Hardware=VirtualSensors, Type=General, SubType=Barometer)

Wind
(Name="Wind", idx=117, Hardware=VirtualSensors, Type=Wind, SubType=WTGR800)
```



## Concept

The device data is requested (URL) via the Domoticz engine using JSON.  
The Domoticz engine allows to interact with all devices using JSON (nice solution).

The UI uses jQuery, Bootstrap and Domoticz icons.

The data for the favourite (=Dashboard) devices is requested from the Domoticz system via URL.

```
URL: domoticzurl:8080/json.htm?type=devices&used=true&filter=all&favorite=1
```

From the request result (JSON string), selective data for the devices with idx=14,116,117 is obtained.

## JSON Result Snippet

The URL returns the data in JSON format.

This snippet shows some of the properties for the devices.

The key `result[]` is an array with the device information.

In this example the results array (made bold) has a length of 3 for the devices with idx,14,116,117. For each of the devices, the Keys “Data” and “Idx” are used.

Using JavaScript, the result array is parsed (see below).

```
{
  "ActTime" : 1536051617,
  ...
  "app_version" : "4.9980",
  "result" : [
    {
      "Data" : "20.9 C, 79 %",
      "idx" : "14"
    },
    {
      "Data" : "1025 hPa",
      "idx" : "116"
    },
    {
      "Data" : "89;E;14;21;?;?",
      "idx" : "117"
    }
  ],
  "status" : "OK",
  "title" : "Devices"
}
```

## JavaScript Snippet

```
// Define the idx to of the devices display
var arrayIdx = [14,116,117];
url = domoticzURL + "json.htm?type=devices&used=true&filter=all&favorite=1"
$.getJSON(url, function(result){
  var idx = 0;
  var sensorInfo = "";
  for (i = 0; i < result.result.length; i++) {
    idx = parseInt(result.result[i].idx);
    if (arrayIdx.indexOf(idx) > -1) {
      sensorInfo += setSensorInfo(result,i);
      console.log("Found idx=" + idx);
    }
    ...
  }
})
```

## HTML & JavaScript

```

<!DOCTYPE html>
<html>
<head>
    <title>AtHome Weather Frontend</title>
    <meta name="viewport" content="width=device-width, initial-scale=1">
    <meta charset="utf-8"/>
    <!-- Reference to the external CSS -->
    <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/4.1.3/css/bootstrap.min.css">
    <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/4.7.0/css/font-awesome.min.css">
    <!-- Reference to the external JS -->
    <script src="https://ajax.googleapis.com/ajax/libs/jquery/3.2.1/jquery.min.js"></script>
    <script src="https://maxcdn.bootstrapcdn.com/bootstrap/4.1.3/js/bootstrap.min.js"></script>
    <!-- Styling -->
    <style>
        body{background-color: grey; padding: 0px 1% 0% 1%;}

        .container{padding: 0px 20px 20px; border-radius: 5px; background-color: white; border-style: solid; border-color: grey; border-width: 2px; box-shadow: 0px 10px white; margin-top: 2%}

        .row {border-bottom-style: solid; border-color: grey; border-width: 1px; }

        #linn_logo {max-width: 100px; margin: 5px; }

        #top-bar{text-align: left; margin-bottom: 1px; padding: 0px; }

        #clock{float: right; margin: 5px; }

        .v-align {float: none; display: inline-block; vertical-align: middle;} /*class for vertically aligning elements in a row*/

        #house-image{font-size: 9em; vertical-align: middle; display: inline-block; margin-top: 10px; margin-bottom: 10px; }

        #house-status-text{text-align: left; }

        #outside-temperature{text-align: left; }

        #outside-humidity{text-align: left; }

        #outside-humiditystatus{text-align: left; }

        #outside-lastupdate{text-align: left; }

        .sensor-outer-box{padding: 0px; }

        .sensor-box{padding: 0px; margin: 5px; background-color: white; box-shadow: 5px 10px #888888; border-style: solid; border-color: grey; border-width: 1px; border-radius: 5px; }

        .sensor-icon{vertical-align: 80%; margin: 0px; }

        .sensor-data {display: inline-block; margin: 0px; }

    </style>
</head>

<body>
    <div class="container">
        <div class="row">
            <div class="col-sm-12" id="top-bar">
                <i class="fa fa-home" style="font-size:60px; color:blue;"></i>
                
                <div id="clock">
                </div>
            </div>
        </div>
        <div class="row" id="sensor-container">
        </div>
    </div>

    <script>
        $(document).ready(function(){
            var domoticzURL = "http://vz-ip:8080/";
            //var domoticzURL = "http://localhost:8080/";
            // Define the idx to of the devices display
            var arrayIdx = [14,116,117];
            // Timer interval polling data (ms)
            var intervalTimer = 5000;

            // Update the sensorinfo
            $(function() {
                updateClock();
                updateSensors();
            });

            // Returns the image of the sensor that is stored in the image folder on the Domoticz system
            // /home/pi/domoticz/www/images
            function getSensorImage(TypeImg){
                var sensorURL = "";

```

```

switch(TypeImg) {
    case "dimmer":
        return domoticzURL + "images/Light48_On.png";
        break;
    case "temperature":
        return domoticzURL + "images/temp-20-25.png";
        break;
    case "wind":
        return domoticzURL + "images/wind48.png";
        break;
    case "gauge":
        return domoticzURL + "images/baro48.png";
        break;
    default:
        return domoticzURL + "images/Light48on.png";
}
}

function setSensorInfo(result,i){
    var sensorInfo = "";
    sensorInfo += '+
        '<div class="col-sm-6 col-md-4 col-lg-3 sensor-outer-box">'+
            '<div class="sensor-box">'+
                '</img>' +
                    '<div class="sensor-data">'+
                        '<h4>' + result.result[i].Name + '</h4>'+
                        '<h5>' + result.result[i].Data + '</h5>'+
                        '<h6>' + result.result[i].LastUpdate+ '</h6>'+
                    '</div>' +
                '</div>';
    return sensorInfo;
}

function updateClock() {
    var d = new Date();
    var hours = d.getHours();
    if (hours < 10) { hours = '0' + hours;}
    var minutes = d.getMinutes();
    if (minutes < 10) { minutes = '0' + minutes;}
    var seconds = d.getSeconds();
    if (seconds < 10) { seconds = '0' + seconds;}
    document.getElementById("clock").innerHTML = hours + ":" + minutes + ":" + seconds;
    setTimeout(updateClock, 1000);
}

function updateSensors() {
    // Get data for the favorite (=Dashboard) devices and select the idx=14,116,117
    // URL: domoticzurl:8080/json.htm?type=devices&used=true&filter=all&favorite=1
    url = domoticzURL + "json.htm?type=devices&used=true&filter=all&favorite=1"
    $.getJSON(url, function(result){
        var idx = 0;
        var sensorInfo = "";
        for (i = 0; i < result.length; i++) {
            idx = parseInt(result.result[i].idx);
            if (arrayIdx.indexOf(idx) > -1) {
                sensorInfo += setSensorInfo(result,i);
            }
        }
        document.getElementById("sensor-container").innerHTML = sensorInfo;
        //Finally set a timer to repeatedly poll the status of the sensors
        setTimeout(updateSensors,intervalTimer);
    });
}
</script>
</body>
</html>

```



# Webradio Volumio

## Purpose

To listen to & control, via Domoticz Dashboard, Web Radio provided by [Volumio](#) - the Open Audiophile Music Player.

### Features to control Volumio Web Radio

- Set Volumio status Play or Stop.
- Show the title of the current song, updated real time or refresh via switch.
- Set Volume 0 – 100 or switch On | Off.
- Bookmark the current song to the favorites list.
- Indicate status OFF, PLAY, STOP.
- Control via Domoticz Dashboard with dedicated Room Plan.
- Handle Volumio offline state without spoiling logs with error messages.
- Solution must be open for enhancements.

Of course, many options to enhance, but the intention is not to replace the Volumio Web UI.

### Screenshot Domoticz Dashboard with Room Volumio

The screenshot shows the Domoticz Dashboard interface. In the 'Light/Switch Devices' section, there are four items: 'Volumio Play' (On), 'Volumio Refresh' (On), 'Volumio Volume' (a slider set to approximately 80, with On/Off buttons), and 'Volumio Bookmark' (On). In the 'Utility Sensors' section, there are three items: 'Volumio Current Song' (This is the song title) and 'Volumio Favorites' (This is the last bookmarked song title), both with edit icons; and 'Volumio Status' (PLAY button).

Volumio Current Song List sample	Volumio Favorites List sample
Show 25 entries Date 2019-02-10 12:18:25 song title 2019-02-10 12:14:04 song title 2019-02-10 12:08:38 song title 2019-02-10 12:04:18 song title	Show 25 entries Date 2019-02-10 11:45:05 song title 2019-02-10 11:33:13 song title 2019-02-10 11:18:31 song title 2019-02-10 11:15:55 song title
Volumio Status PLAY = switch Volumio Play set to On	
PLAY	PLAY
Volumio Status STOP = if the server is started or if switch Volumio Play is set to Off	
STOP	STOP
Volumio Status OFF = server not reachable (network) or server turned off (shutdown)	
OFF	OFF

## Volumio Setup

A Volumio server has been setup on a [Pine A64](#) (one of the first devices shipped back 2016).

Download the Volumio 2 Pine A64 SD Image from [here](#) (see additional [info](#)).

Image version: Volumio Digital Audio Player [2.383-2018-03-17].

The Pine A64 is connected to an external amplifier and not using a DAC (<TODO> planned for future).

### Get Started

To get started, read the [Volumio manual](#) first.

- Connect to Volumio from browser with URL **volumio.local**.  
If not working, determine the server IP address via f.e. the connected router interface.
- Configuration done via the Volumio Web UI Settings.
- Set fixed IP addresses for WLAN and Ethernet.
- Enable [SSH](#) (required to access the server via WinSCP or Putty).
- Created an USB with loads of MP3 and plugin to the USB port of the PineA64.
- Do shutdown the server via the Volumio menu Settings > Shutdown.

## Solution Options

Experimented with solutions Domoticz dzVents and Node-RED using the Volumio API or the MPD (Music Player Deamon) commands.

My preferred solution is to go with Domoticz **dzVents Lua scripting** ([reference](#)).

### Automation Scripts

Identified two challenges to resolve:

1. The dzVents script event timer updates every 1 minute which means that if a new song is playing, the displayed current song is still the previous and could also result in bookmarking the wrong song.  
*Resolved:* Adding a switch enabling to update current state.
2. If the Volumio is not reachable, the Domoticz Error Log is getting spoiled with messages.  
*Resolved:* If Volumio state is OFF, set play mode to OFF which does not trigger the timer to request Volumio status update.

## Node-RED

### *Option 1*

with the libraries [MPD](#) and [Advanced Ping](#) went well until handling volume changes – did not work via the *setvol* command. There might be more issues with MPD commands.

### *Option 2*

Decided to use Node-RED to control Volumio via REST API commands as documented [here](#), thus to stick to what's defined (supported) by Volumio.

The available subset of Volumio REST API commands are suitable for this solution.

The communication between Volumio and Domoticz is based on MQTT messaging.

### To know

This solution does not update the status of Domoticz Devices if Volumio is controlled via the Volumio Web Interface or any other (like an App).

<TODO>For future solutions, consider implementing in Volumio MQTT to be handled by Domoticz.

# Solution Automation Script

## Domoticz Configuration

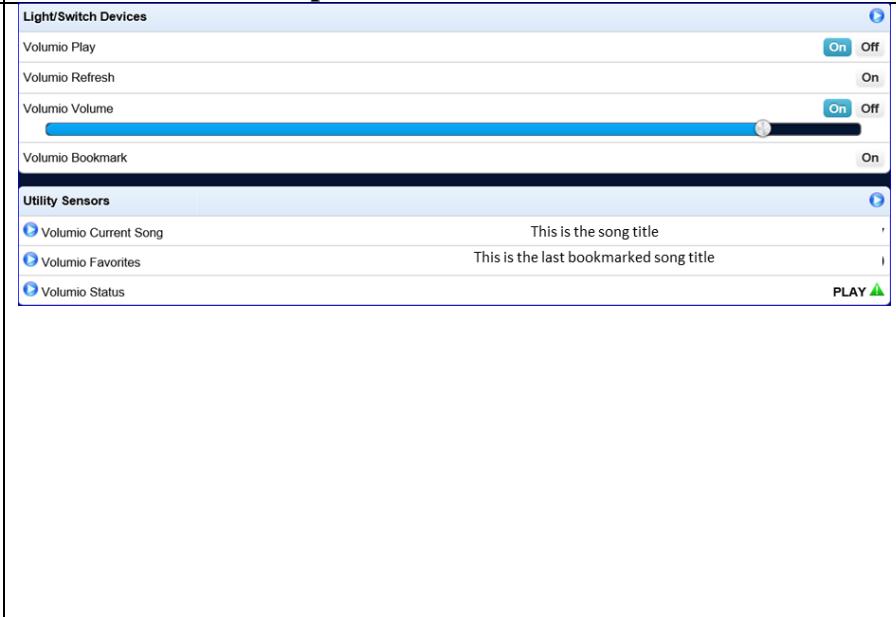
### Devices

<b>Idx</b>	<b>Name</b>	<b>Type</b>	<b>SubType</b>	<b>Function</b>
145	Volumio Bookmark	Light/Switch	Switch <i>Switch Type:</i> Push On Button	Switch ON adds (bookmarks) the current song playing to Favorites device (List)
146	Volumio Favorites	General	Text	Favorite songs
148	Volumio Volume	Light/Switch	Switch <i>Switch Type:</i> Dimmer	Set the volume between 0-100
149	Volumio Play	Light/Switch	Switch <i>Switch Type:</i> On/Off	Set Play (switch On) or Stop (switch Off)
150	<i>Volumio Shutdown</i>	<i>Light/Switch</i>	<i>Switch</i>	<i>NOT USED</i> <i>&lt;TODO&gt;Find solution how to shutdown.</i>
151	Volumio Status	General	Alert	Show the status of Volumio: OFF (Red) STOP (Yellow) PLAY (Green)
155	Volumio Refresh	Light/Switch	Switch <i>Switch Type:</i> Push On Button	Updates the current song and the status.

## Roomplan

Created a roomplan *Volumio* with the previous defined devices (Domoticz GUI Setup > More Options > Plans > Roomplan).

The roomplan (idx=5) is used as the Domoticz Dashboard to control Volumio.

Roomplan Volumio	Dashboard with Roomplan Volumio																		
 <p>5 Volumio Showing 1 to 5 of 5 entries Edit Delete  Devices (Select Plan first to Edit...) Show [dropdown] entries <table border="1"><thead><tr><th>Idx</th><th>Name</th></tr></thead><tbody><tr><td>149</td><td>Volumio Play</td></tr><tr><td>155</td><td>Volumio Refresh</td></tr><tr><td>148</td><td>Volumio Volume</td></tr><tr><td>144</td><td>Volumio Current Song</td></tr><tr><td>145</td><td>Volumio Bookmark</td></tr><tr><td>146</td><td>Volumio Favorites</td></tr><tr><td>151</td><td>Volumio Status</td></tr><tr><td>150</td><td>Volumio Shutdown</td></tr></tbody></table> Showing 1 to 8 of 8 entries</p>	Idx	Name	149	Volumio Play	155	Volumio Refresh	148	Volumio Volume	144	Volumio Current Song	145	Volumio Bookmark	146	Volumio Favorites	151	Volumio Status	150	Volumio Shutdown	 <p>Light/Switch Devices Volumio Play (On), Volumio Refresh (On), Volumio Volume (On) Volumio Bookmark (On)  Utility Sensors Volumio Current Song: This is the song title Volumio Favorites: This is the last bookmarked song title Volumio Status: PLAY</p>
Idx	Name																		
149	Volumio Play																		
155	Volumio Refresh																		
148	Volumio Volume																		
144	Volumio Current Song																		
145	Volumio Bookmark																		
146	Volumio Favorites																		
151	Volumio Status																		
150	Volumio Shutdown																		

## Volumio API Commands

The commands are used in nodes as payload, either incoming or outgoing. To learn which commands are available and how to use, check out the Reference documentation.

### Volumio ([Reference](#))

- volumio.local/api/v1/getstate
- volumio.local/api/v1/commands/?cmd=play&N=0
- volumio.local/api/v1/commands/?cmd=stop
- volumio.local/api/v1/commands/?cmd=volume&volume=NN

## Automation Scripts

The dzVents Lua script events are created and maintained via Domoticz GUI > Setup > More Options > Events.

Script Name	Purpose
volumio_getstate	Obtain and update the devices Volumio Status and Volumio Current Song playing.
volumio_play	Switch the device Volumio Play to set the play mode to PLAY or STOP.
volumio_setvolume	Set the device Volumio Volume between 0-100 or switch ON   OFF.
volumio_bookmark	Switch device Volumio Bookmark to add (bookmark) the current song to the Volumio Favorites device.

The scripts are

- rather comprehensive and can be downloaded [here](#).
- well documented to understand the logic.

## Notes

### Track Played

In the dzVents Lua script *volumio\_play*, the Volumio play command uses the ordinal track number 0, i.e. the first track of the queue:

```
volumio.local/api/v1/commands/?cmd=play&N=0
```

If there are more tracks, i.e. web radios defined then change the track number or define a User Variable (DEF\_VOLUMIO\_TRACK) holding the track number to play.

Idx	Variable name	Variable type	Current value
11	DEF_VOLUMIO_TRACK	Integer	0

The User Variable value can be added to the play command ...play&N=

Event name: volumio\_play

(extract)

```
local IDX_VOLUMIOPLAYSWITCH = 149
local IDX_VOLUMIOSTATUS = 151
local IDX_DEF_VOLUMIO_TRACK = 11

local cmdplay = 'play&N=' -- track queue number is added from user variable
local cmdstop = 'stop'
local cmd

if (domoticz.devices(IDX_VOLUMIOPLAYSWITCH).state == 'On') then
    cmd = cmdplay .. tostring(domoticz.variables(IDX_DEF_VOLUMIO_TRACK).value)
    domoticz.log(cmd, domoticz.LOG_INFO)
    domoticz.devices(IDX_VOLUMIOSTATUS).updateAlertSensor(1, MSGVOLUMIOPLAY)
else
    cmd = cmdstop
    domoticz.devices(IDX_VOLUMIOSTATUS).updateAlertSensor(2, MSGVOLUMIOSTOP)
end
```

## Logging

Check from time-to-time the log of the devices and clean up.

Examples to clear log entries (recommended), because every change is logged:  
Volumio Status, Volumio Current Song.

## Refresh

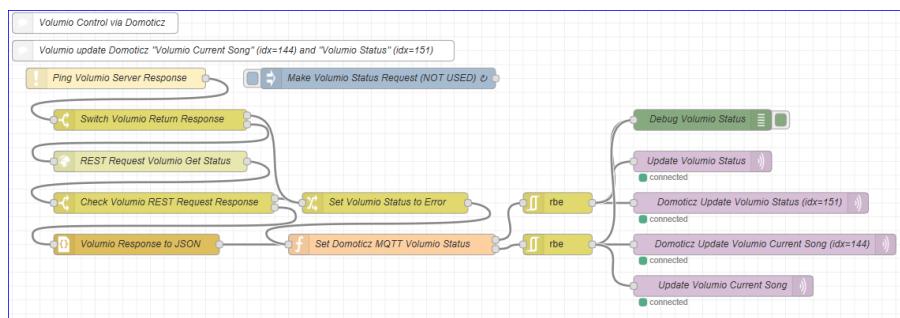
### Switch Volumio Refresh

Prior bookmarking the current song, press *Refresh* first to ensure the current song played is actual (because of the Domoticz one-minute refresh interval).

The same applies, if not checked the Dashboard for a while – press Refresh to update.

### Node-RED Option

Use a Node-RED flow to ping, every 10 seconds, the Volumio server and update the status on the Dashboard.



## Solution Node-RED

### Domoticz Configuration

#### Devices

Created following Virtual Sensors with function

Idx	Name	Type	SubType	Function
145	Volumio Bookmark	Light/Switch	Switch	Set (switch On) the current song playing to Favorites
146	Volumio Favorites	General	Text	Favorite songs
148	Volumio Volume	Light/Switch	Switch	Set the volume between 0- 100
149	Volumio Play	Light/Switch	Switch	Set Play (switch On) or Stop (switch Off)
150	Volumio Shutdown	Light/Switch	Switch	NOT USED
151	Volumio Status	General	Alert	Show the status: OFF (Red), STOP (Yellow), PLAY (Green)

#### Note

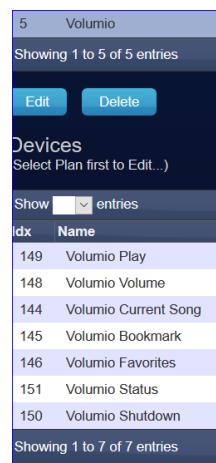
<TODO>The device *Volumio Shutdown* is not used – seeking for a proper solution to shutdown the Volumio server.

#### Roomplan

Created a roomplan *Volumio* with the previous defined devices (Domoticz GUI Setup > More Options > Plans > Roomplan).

The roomplan is used as the Domoticz Dashboard (see earlier screenshot) to control Volumio.

#### Screenshot Roomplan number 5 named Volumio with 7 devices



#### Volumio API Commands

The commands are used in nodes as payload, either incoming or outgoing. To learn which commands are available and how to use, check out the Reference documentation.

## Volumio

([Reference](#))

- volumio.local/api/v1/getstate
- volumio.local/api/v1/commands/?cmd=play
- volumio.local/api/v1/commands/?cmd=stop
- volumio.local/api/v1/commands/?cmd=volume&volume=NN

The getstate command is triggered every 5 seconds by an *Inject Node*.

The response is either a string in case the Volumio server is not reachable (which is converted to a JSON string with status error) or a JSON string containing current song information.

## Domoticz

([Reference](#))

- {"command": "udevice", "idx": idxvolumiostatus, "nvalue":4, "svalue": "OFF"};
- {"command": "udevice", "idx": idxvolumiostatus, "nvalue":1, "svalue": "PLAY"};
- {"command": "udevice", "idx": idxvolumiostatus, "nvalue":2, "svalue": "STOP"};
- {"command": "udevice", "idx": idxvolumiocurrentsong, "svalue": currentsong};
- {"command": "switchlight", "idx": idxvolumiobookmark, "switchcmd": "Off"};
- {"command": "udevice", "idx": idxvolumiofavorites, "nvalue":0, "svalue": currentsong};

The listed message payloads are created in *Function Nodes* with variables, like the idx names and current song (i.e. var idxvolumiostatus = 151;).

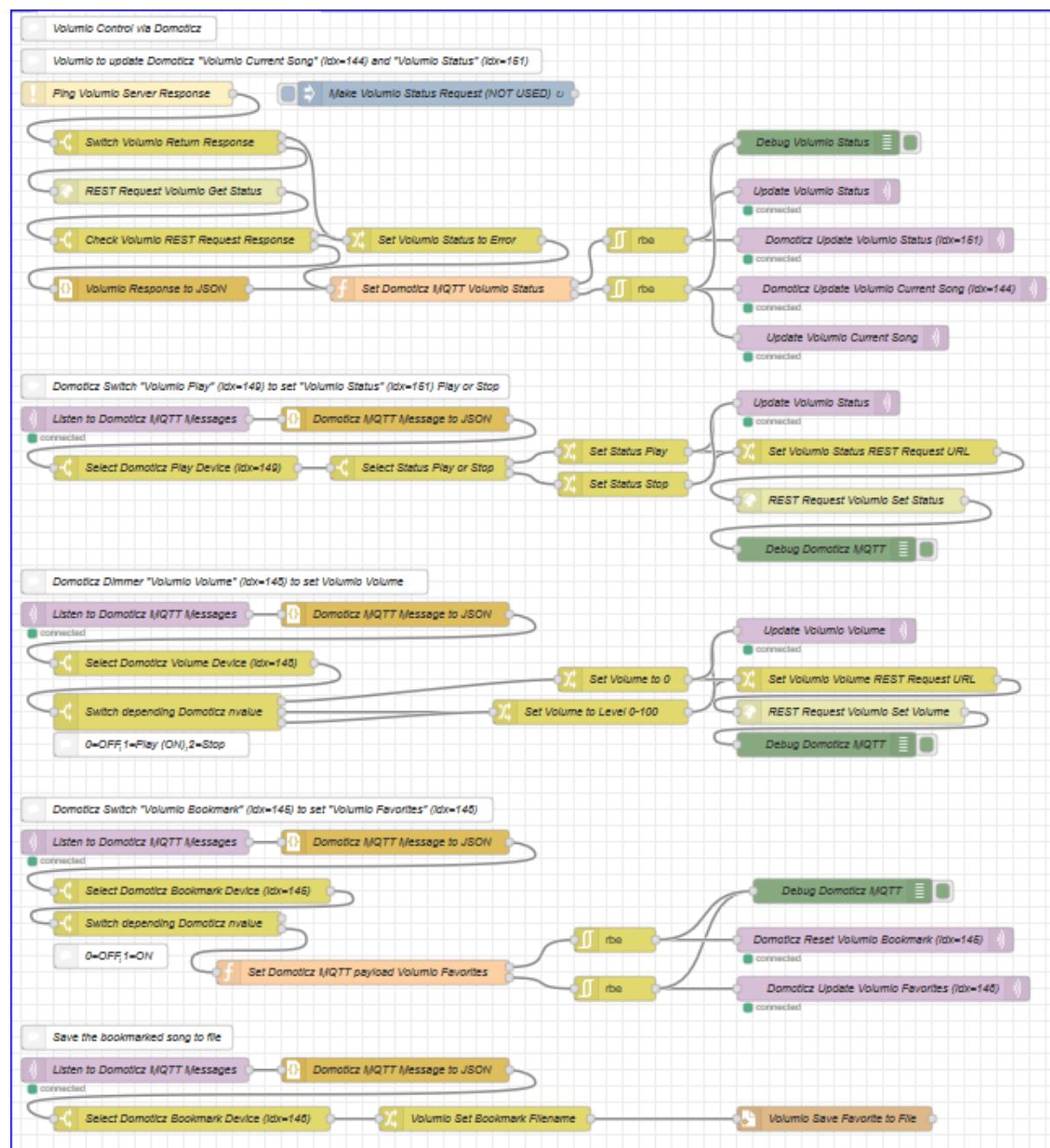
The output of the *Function Node* goes to a *MQTT Out Node*, which connects to the Domoticz MQTT broker (localhost:1883) and publishes the messages.

## Node-RED Flows

### Volumio Control

The comprehensive Volumio Control flow with subflows:

- Volumio to update Domoticz "Volumio Current Song" (idx=144)
- Domoticz Switch "Volumio Play" (idx=149) to set "Volumio Status" (idx=151) PLAY or STOP
- Domoticz Dimmer "Volumio Volume" (idx=148) to set Volumio Volume
- Domoticz Switch "Volumio Bookmark" (idx=145) to set "Volumio Favorites" (idx=146)
- If Volumio shutdown or not reachable set "Volumio Status" (idx=151) OFF

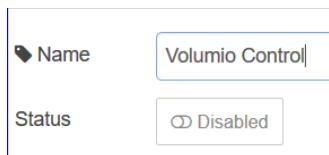


## Notes

- Tried to set meaningful nodes names for easier understanding of the flows.
- The comments nodes and the function nodes contain additional information.
- For testing commands used *Inject nodes*, which are removed from the final flow.
- Flow development:  
Opened in a browser following windows (tabs):
  - Domoticz Dashboard
  - Domoticz Log  
(Domoticz Setup > Log)
  - Node-RED Development
  - Optional PuTTY session showin the Node-RED log  
(console command node-red-log)
- Flow development:  
Used Debug nodes to check results or learn message content (esp. MQTT).  
Give the Debug nodes meaning full names to easier read the log (Node-RED Debug tab).
- To check if the Volumio server is reachable, the Ping Node is used. Depending response, the Volumio REST request to get the status is “make”.

## Disable Flow

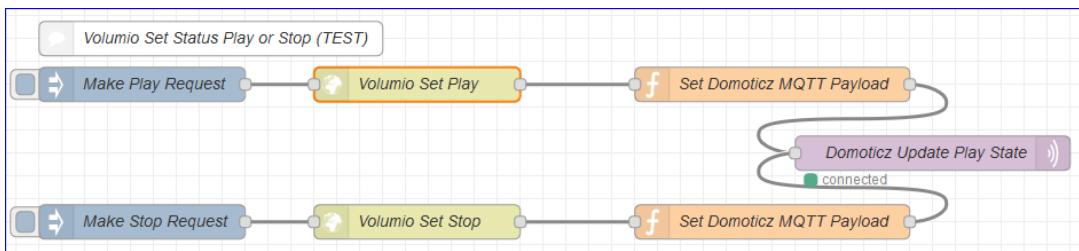
The Node-RED flow *Volumio Control* can be enabled and disabled by clicking on the Tab *Volumio Control*:



If the flow is enabled again, then the Volumio Status is updated depending reachability of the Volumio server (OFF, PLAY or STOP).

## Test Example

Use the Inject Node to set the Volumio status to Play or Stop and update the Domoticz device *Volumio Status*.



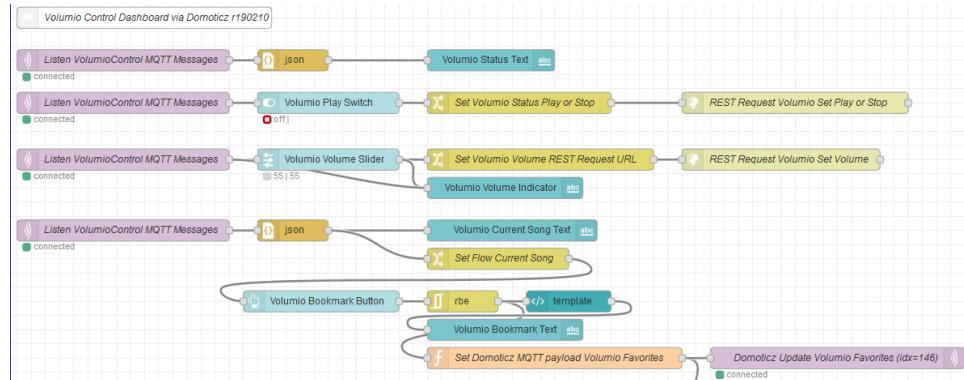
## Note

This flow can be simplified using Change Node to set the status to then trigger Volumio and update the Domoticz Device.

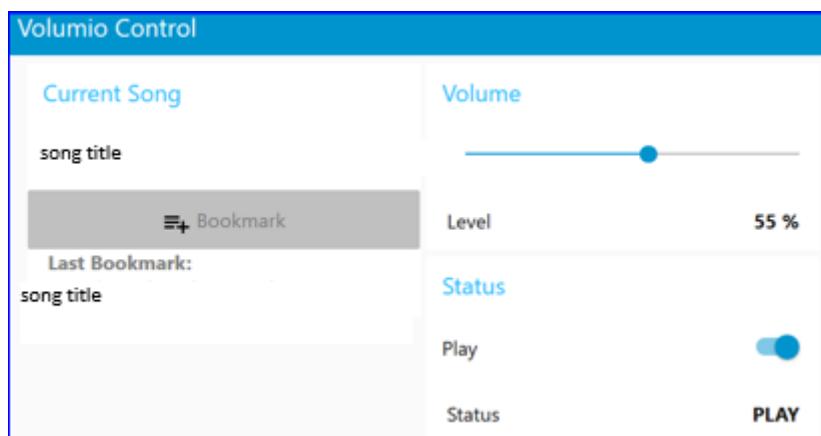
## Volumio Control Dashboard

For Node-RED, [Dashboard UI](#) nodes are available, which could be used to create a Domoticz Alternate Dashboard (accesses via browser).

Created a flow *Volumio Control Dashboard*, to explore the use of Dasboard UI nodes.



Displayed in browser with <http://domoticz-ip:1880/ui>



### Description (Dasboard UI Node Types)

- Display the current song playing (ui\_text)
- Button to bookmark the current song (ui\_button)
- Show the last bookmarked song (ui\_text)
- Set the volume 0-100 (ui\_slider)
- Show volume level (ui\_text)
- Set status play or stop (ui\_switch)
- Show the status OFF,PLAY,STOP (ui\_text)

## Dashboard Properties

Tab: Volumio Control, Groups: Current Song & Bookmark, Volume, Status

Used the flow *Volumio Control* to create dedicated MQTT messages (prefix volumiocontrol), which are used by the flow *Volumio Control Dashboard* to set properties.

MQTT Message	Properties
Topic	volumiocontrol/status
Payload Sample	{"command":"udevice","idx":151,"nvalue":1,"svalue":"PLAY"}
Usage	To set the status of Volumio in a Dashboard ui_text node:
Topic	volumiocontrol/currentsong
Payload Sample	{"command":"udevice","idx":144,"svalue":"Current Song Title"}
Usage	To set the text of the current song playing in a Dashboard ui_text node: Value format: {{msg.payload.svalue}}
Topic	volumiocontrol/volume
Payload Sample	NN containing the level
Usage	To set the volume level of the slider and text of the indicator. Value format: {{msg.payload}} &percnt;

## Favorites List

The bookmarked songs are added to the favorites device *Volumio Favorites* (idx=146) and are listed (log).

The list is used to follow up on favorite song via other media.

Show 25 entries	
Date	
2019-02-10 11:45:05	song title
2019-02-10 11:33:13	song title
2019-02-10 11:18:31	song title
2019-02-10 11:15:55	song title

The favorite songs are stored in the Domoticz database domoticz.db, located in folder /home/pi/domoticz/ on the Raspberry Pi.

The table LightingLog contains the records.

Access via SQLite Tool:

To select the favorite songs, use SQL Query command like

```
SELECT * FROM LightingLog WHERE DeviceRowID=146;
```

This enables to create applications using these records from the database.

<TODO>Brainstorm a Favorite Songs application. Thoughts: 1) Node-RED with the SQLite3 Library to select and list in a customised widget. 2) Lazarus or B4J Desktop application.

# Wind TFA 30.3168

## Purpose

To display wind direction and wind speed obtained from the Anemometer.

## Solution

The **Wind Sensor Device (Wind Meter TFA Dostmann 30.3168)** “Windmesser” measures wind direction, wind speed and temperature.

The measured temperature is not used as the temperature is provided by a **Temperature & Humidity Device (TFA Dostmann / Wertheim TS34C)**, which means that (only) the wind direction and wind speed are used and displayed on the dashboard.

The solution is to create a Virtual Sensor Type Wind named “Wind” and assign the wind direction and wind speed from the Wind Sensor.

### Wind Virtual Sensor Device List Entry (idx=117)

117	VirtualSensors	140C5	1	Wind	Wind	WTGR800	0;N;0;0;0;0
-----	----------------	-------	---	------	------	---------	-------------

### Weather Widget Wind Virtual Sensor



#### Note

The data displayed is provided by the Event Lua Script script\_device\_wind.

### Wind Sensor Device with actual data (idx=28)

28	RFXtrx433e	9D16	0	Windmesser	Wind	TFA	304.00;WNW;12;12;21.2;21.2
----	------------	------	---	------------	------	-----	----------------------------

The data contains: WB,WD,WS,WG,T,TW

- WB = Wind bearing (0-359)
- WD = Wind direction (S, SW, NNW, etc.)
- WS = 10 \* Wind speed [m/s]
- WG = 10 \* Gust [m/s]
- T = 21.2 = Temperature
- TW = 21.2 = Temperature Windchill

# Automation Script

To update the wind direction and wind speed from the Wind Sensor Device data and assign to the Wind Virtual Sensor.

This is done via a dzVents Lua script event using the Domoticz Event Editor.

Event name: wind\_update

```
--[[  
wind_update.lua  
If the a value of the device Windmesser (idx=28) changes,update the value (Wind direction & speed) of  
the Virtual Sensor Wind named Wind (ix=117). Use print(device.dump()) ONLY ONCE to get the properties.  
]]--  
  
-- Idx of the devices  
local IDX_WINDMESSER = 28;  
local IDX_WIND = 117;  
  
-- Event handling changes of the Windmesser device  
return {  
  on = {  
    devices = {  
      IDX_WINDMESSER  
    }  
  },  
  execute = function(domoticz, device)  
    -- print(device.dump())  
    -- domoticz.log('Device ' .. device.name .. ' changed ', domoticz.LOG_INFO)  
  
    bearing = device.direction  
    direction = device.directionString  
    speed = device.speed  
    gust = device.gust  
    temperature = device.temperature  
    chill = device.chill  
    -- Update the virtual sensor Luftdruck  
    domoticz.devices(IDX_WIND).updateWind(bearing,direction,speed,gust, temperature,chill)  
  end  
}
```

## Domoticz Log Entry

```
2018-09-10 16:09:12.797 (RFXtrx433e) Wind (Windmesser)  
2018-09-10 16:09:12.020 Status: EventSystem: Script event triggered:  
/home/pi/domoticz/dzVents/runtime/dzVents.lua  
2018-09-10 16:09:12.943 Status: dzVents: Info: Handling events for: "Windmesser", value:  
"281.00;W;7;13;21.2;21.2"  
2018-09-10 16:09:12.944 Status: dzVents: Info: ----- Start internal script: wind_update: Device:  
"Windmesser (RFXtrx433e)", Index: 28  
2018-09-10 16:09:12.944 Status: dzVents: Info: Device Windmesser changed  
2018-09-10 16:09:12.945 Status: dzVents: Info: ----- Finished wind_update
```

# User Variables

The User Variables defined are mainly used for dzVents events.

In addition, used by Node-RED flows to f.e. set a new value.

Node-RED is an option, to configure User Variables other then the Domoticz GUI.

## Syntax

The naming convention for a User Variable uses as syntax

- Prefix DEF or IDX or TH,
- Suffix = the device name, without special characters and blanks (replace by underscore),
- Prefix & suffix in UPPERCASE connected with an underscore.

```
PREFIX_DEVICENAME in UPPERCASE
```

Prefix	Meaning	Example
DEF	Default	DEF_ALERTMSG
IDX	Device Index	IDX_ALERTMSG
TH	Threshold	TH_RPI_HDDUSAGE

## List

### SQL

Created list direct from the Domoticz database via SQL statement:

```
SELECT * FROM UserVariables
```

ID	Name	ValueType	Value	LastUpdate
3	TH_RPI_TEMPERATURE	0	50	2018-09-11 19:36:34
4	TH_RPI_HDDUSAGE	0	70	2018-09-05 11:15:20
5	TH_RPI_MEMORYUSAGE	0	80	2018-09-05 11:15:47
6	IDX_ALERTMSG	0	55	2018-09-05 18:58:40
7	DEF_ALERTMSG	2	Reset	2018-09-13 13:52:44
8	TH_STOCK_RDS	1	27	2019-03-03 09:53:40
9	TH_STOCK_RDS_NOTIFIED	0	0	2019-02-16 10:51:07
10	TH_AMBIENT_LIGHT	0	111	2019-02-27 15:15:43
11	DEF_VOLUMIO_TRACK	0	0	2019-03-01 10:27:47
12	DEF_STOCK_RDS_COUNT	0	1500	2019-05-17 11:17:39
13	DEF_SECURITY_ALARM	0	0	2019-05-21 09:20:00

#### Note

User variables are stored in table UserVariables of the Domoticz database domoticz.db.

### Examples SQL Statements

Select	SELECT * FROM UserVariables.
Update	UPDATE UserVariables SET Value = 1 WHERE Name = "DEF_SECURITY_ALARM"

# Python

Simple Python3 script to list the user variables.

```
import urllib.request
import json
'''

{
    "result" : [
        {
            "LastUpdate" : "2018-09-11 19:36:34",
            "Name" : "TH_RPI_TEMPERATURE",
            "Type" : "0",
            "Value" : "50",
            "idx" : "3"
        },
        {
            "LastUpdate" : "2018-09-05 11:15:20",
            "Name" : "TH_RPI_HDDUSAGE",
            "Type" : "0",
            "Value" : "70",
            "idx" : "4"
        },
        ...
    ],
    # define url
    url = 'http://rpi-address:8080/json.htm?type=command&param=getuservariables'
    # request list
    try:
        req = urllib.request.Request(url)
    except HTTPError as e:
        print('HTTP Error code: ', e.code)
    except URLError as e:
        print('URL Reason: ', e.reason)
    else:
        # parsing response
        response = urllib.request.urlopen(req).read()
        content = json.loads(response.decode('utf-8'))
        # get the status
        print(content['status'])
        # get the result array
        result_array = content['result']
        # loop over the array and fetch the device with idx=4
        print('Name','Idx','Value',sep=';')
        for item in result_array:
            print(item['Name'],item['idx'],item['Value'],sep=';')
```

## Run

```
pi@DoPro:~/domoticz/scripts/python $ python3 user_variables_list.py
```

## Result

```
OK
Name;Idx;Value
TH_RPI_TEMPERATURE;3;50
TH_RPI_HDDUSAGE;4;70
TH_RPI_MEMORYUSAGE;5;80
IDX_ALERTMSG;6;55
DEF_ALERTMSG;7;No alert
TH_STOCK_RDS;8;27
TH_STOCK_RDS_NOTIFIED;9;0
TH_AMBIENT_LIGHT;10;111
DEF_VOLUMIO_TRACK;11;0
DEF_STOCK_RDS_COUNT;12;1500
DEF_SECURITY_ALARM;13;0
TH_ALERTTOEMAIL;14;4
```

# Usage in Scripts

Examples on how to use the User Variables in scripts.

## **dzVents, Lua**

Read more [here](#) how to use with dzVents.

### *Read Value*

```
-- Update the alert message with level.  
function msgbox.alertmsg(domoticz, level, msg)  
    domoticz.devices(domoticz.variables('IDX_ALERTMSG').value).updateAlertSensor(level, msg)  
end
```

```
local message = domoticz.variables('DEF_ALERTMSG').value
```

### *Set Value*

```
domoticz.variables('DEF_ALERTMSG').set('Hello World')
```

# Usage in Browser Interactive

Examples on how to use the User Variables in scripts.

Read more [here](#) how to use.

## *Read Value*

A value is obtained by using the idx of the user variable.

```
http://rpi-ip/json.htm?type=command&param=getuservariable&idx=8
```

## Response

```
{  
    "result" : [  
        {  
            "LastUpdate" : "2019-02-15 14:29:34",  
            "Name" : "TH_STOCK_STOCKA",  
            "Type" : "1",  
            "Value" : "29",  
            "idx" : "8"  
        }  
    ],  
    "status" : "OK",  
    "title" : " GetUserVariable"  
}
```

## *Set Value*

Set a new value for the threshold of a monitored stock. The value is type 1 (float).

```
http://rpi-ip/json.htm?type=command&param=updateuservariable&vname=TH_STOCK_STOCKA&vtype=1&vvalue=29
```

## Response

```
{  
    "status" : "OK",  
    "title" : " UpdateUserVariable"  
}
```

# Usage in Node-RED

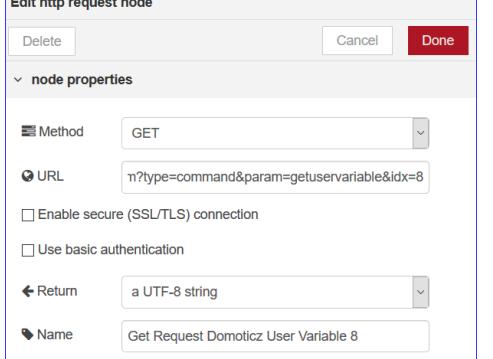
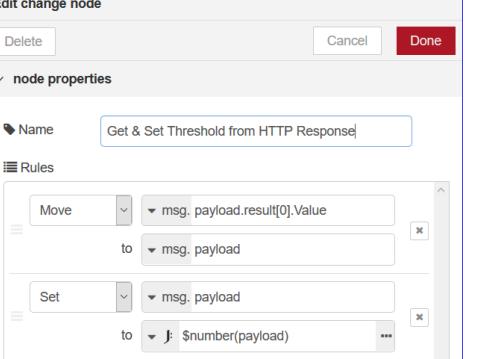
Examples on how to use the User Variables in Node-RED.

For Node-RED, there are several possibilities.

This example uses HTP Response Nodes.

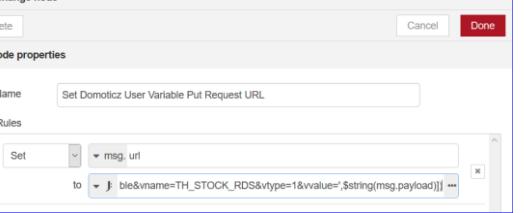
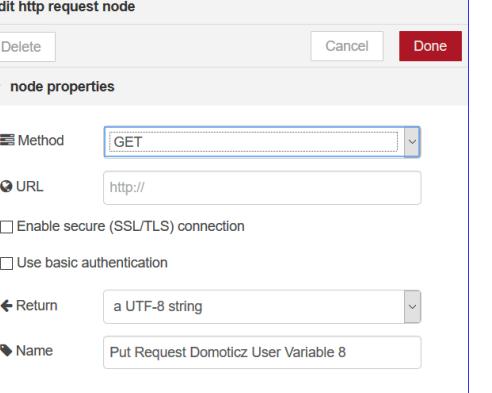
## Read Value

Same request as previous used in the browser request.

 <p>Use a JSON node to convert the output to JSON Object used by the Change Node.</p>	 <p>Two rules, first move the property Value from the JSON response to the msg.payload, then use that string to get converted to a number using JSONata function.</p>
--	---

## Set Value

Set a new value for the threshold of a monitored stock. The value is type 1 (float).

 <p>Set the property msg.url using JSONata function join (JSON/API + Value)</p>	 <p>The request uses the previous defined msg.url to send to Domoticz</p>
--	---

# Usage in Node-RED Dashboard

The Node-RED Dashboard has input widgets.

This makes it possible to build a web page (with several tabs and groups) to configure User Variables.

Next an example setting the value of a User Variable.

## Example Ambient Light Threshold

Set the threshold of the Ambient Light Sensor. If below threshold, then a light is switched on. The threshold is used by a dzVents script to control the light (see [Ambient Light](#)).

### Enhancement Idea

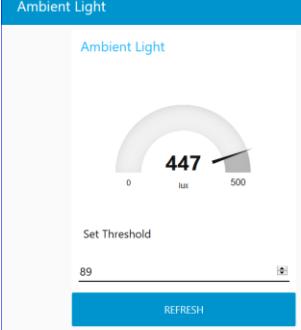
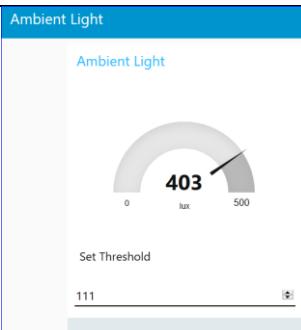
Define a User Variable (like TH\_AMBIENT\_LIGHT\_SWITCH) holding the idx of the light (better switch) to be turned ON when the value is below threshold. A ui\_dropdown list could be defined to select the light (switch) and update the User Variable.

## Node-RED Dashboard

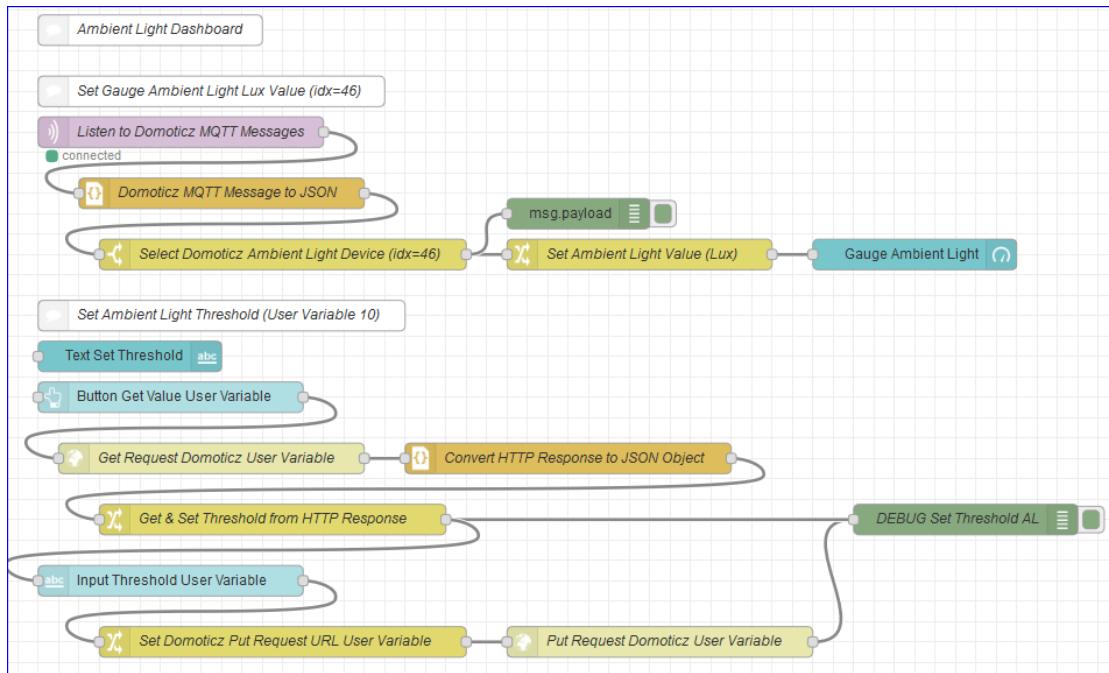
A ui\_gauge node displays the actual Ambient Light Lux value, which is obtained from MQTT payload of the Ambient Light device. Example from which property "svalue1" is used by the gauge:

```
{"Battery":255, "RSSI":5, "description":"The ambient light intensity in Lux using a BH1750 sensor.", "dtype": "Lux", "id": "82045", "idx": 46, "name": "ESPEasy Ambient Light", "nvalue": 0, "stype": "Lux", "svalue1": "3050.00", "unit": 1}
```

The threshold is set through the ui\_input node, which is configured for number input. Entering the new number and pressing Enter, the value is updated in Domoticz.

 <p>Value 89 obtained via Refresh</p>	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Idx</th> <th>Variable name</th> <th>Variable type</th> <th>Current value</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>TH_AMBIENT_LIGHT</td> <td>Integer</td> <td>89</td> </tr> </tbody> </table> <p>Domoticz User Variable List (extract for idx=10)</p>	Idx	Variable name	Variable type	Current value	10	TH_AMBIENT_LIGHT	Integer	89
Idx	Variable name	Variable type	Current value						
10	TH_AMBIENT_LIGHT	Integer	89						
 <p>Changed to 111 and pressed enter</p>	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Idx</th> <th>Variable name</th> <th>Variable type</th> <th>Current value</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>TH_AMBIENT_LIGHT</td> <td>Integer</td> <td>111</td> </tr> </tbody> </table> <p>Refresh the page in the browser, shows the updated value for the User Variable</p>	Idx	Variable name	Variable type	Current value	10	TH_AMBIENT_LIGHT	Integer	111
Idx	Variable name	Variable type	Current value						
10	TH_AMBIENT_LIGHT	Integer	111						

## Node-RED Flow



## Overview API Requests

### Defined User Variable

Variable Name: TH\_AMBIENT\_LIGHT, Type: Integer, Idx: 10

### HTTP Request Get User Variable

<http://localhost:8080/json.htm?type=command&param=getuservariable&idx=10>

### HTTP Response (JSON Format)

```
{
  "result": [
    {
      "LastUpdate": "2019-02-27 14:37:28",
      "Name": "TH_AMBIENT_LIGHT",
      "Type": "0",
      "Value": "89",
      "idx": "10"
    }
  ],
  "status": "OK",
  "title": " GetUserVariable"
}
```

### HTTP Request Update User Variable

[http://localhost:8080/json.htm?type=command&param=updateuservariable&vname=TH\\_AMBIENT\\_LIGHT&vtype=0&vvalue=NNNN](http://localhost:8080/json.htm?type=command&param=updateuservariable&vname=TH_AMBIENT_LIGHT&vtype=0&vvalue=NNNN)

*Note*

vtype is 0 which is an Integer.

### HTTP Response (JSON Format)

```
{
  "status": "OK",
  "title": "UpdateUserVariable"
}
```

# Custom Icons

Custom icons are used for several devices.

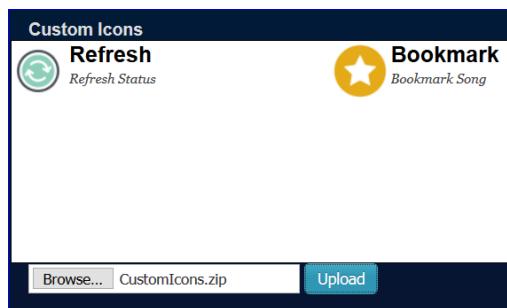
*Note*

Not all devices support icon customizing, i.e. General, Text.

Sharing an example for two icons *Refresh* and *Bookmark* used by the Function Volumio.

## Steps

1. Open Domoticz GUI > Setup > More Options > Custom Icons.
2. Browse for the file *CustomIcons.zip* and upload.
3. After upload, the custom icons are shown and listed when editing the icon on a device (via Widget > Edit).



Each icon has 3 files (size width pixel x height pixel):

- Icon.png (size 16x16 pixel)
- Icon\_On.png (size 48x48 pixel)
- Icon\_Off.png (size 48x48 pixel)

*Note*

The icons Icon\_On.png & Icon\_Off.png are mandatory (even if the device is not a switch type)!

The archive *CustomIcons.zip* contains the files.

- icons.txt
- Refresh.png
- Refresh48\_On.png
- Refresh48\_Off
- Bookmark.png
- Bookmark48\_On.png
- Bookmark48\_Off.png

The content of the file *icons.txt* for the two icons Refresh and Bookmark:  
(icon file name, icon interface name, icon description)

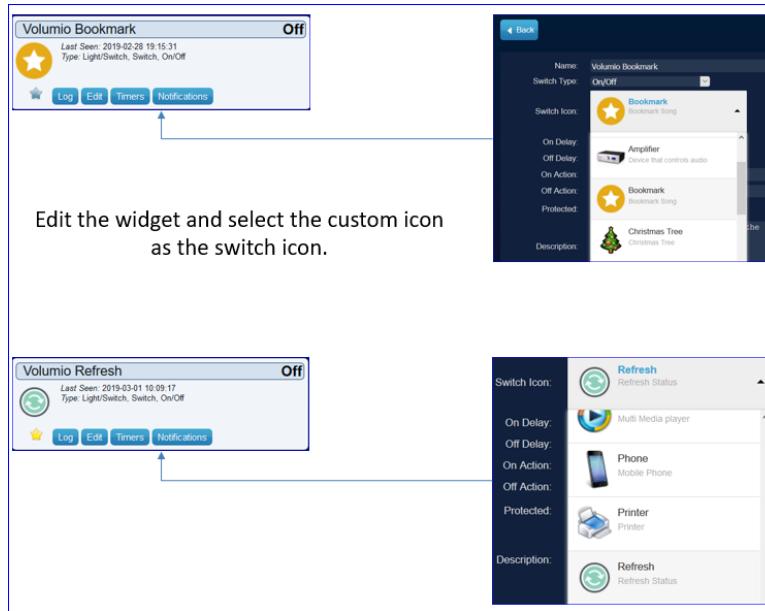
```
Refresh;Refresh;Refresh Status
Bookmark;Bookmark;Bookmark Song
```

*Note*

Ensure the first two entries match the icon file name!

## Add Icon to a Device Widget

The icons are added to the device widgets by selecting from the icon list (edit):



## Get List of Icons

### HTTP API Request

```
http://rpi-ip:8080/json.htm?type=custom_light_icons
```

*Returns a JSON string*

This is an extract of the list showing the two icons added with their idx. The icons are selected from the file /home/pi/domoticz/www/switch\_icons.txt and Domoticz database query table CustomImages.

```
{
  "result" : [
    ...
    {
      "description" : "Set a Bookmark",
      "idx" : 102,
      "imageSrc" : "Bookmark",
      "text" : "Bookmark"
    },
    {
      "description" : "Refresh Status",
      "idx" : 101,
      "imageSrc" : "Refresh",
      "text" : "Refresh"
    },
    ...
  ],
  "status" : "OK"
}
```

#### Notes

- The custom image idx is 100 + ID (from the field ID of database table CustomImages).  
The *Refresh icon* is the first in icons.txt, has table ID=1 and idx=101 (100+1).
- The idx of the custom icon can be used for example when creating Plugin devices (Parameter Image=idx, i.e. Image=101). Ensure to add the custom image prior creating new devices when using the optional parameter Image=idx.

## Location of the Custom Images

### Domoticz Database

This is an example querying, the Domoticz database on the development server, for custom images. Only 1 custom image *Airquality* has been added:

```
Using username "pi".
Linux dodev 4.19.42-v7+ #1219 SMP Tue May 14 21:20:58 BST 2019 armv7l

cd domoticz
sqlite3
SQLite version 3.16.2 2017-01-06 16:32:41
sqlite> .open domoticz.db
sqlite> SELECT ID,Base,Name,Description FROM CustomImages;
1|Airquality|Airquality|Air Quality
sqlite> .exit
```

*Extract of the Query result for the icon list via HTTP API*

```
http://rpi-ip:8080/json.htm?type=custom_light_icons
```

```
{
```

```
    "result" : [
      ...
      {
        "description" : "Air Quality",
        "idx" : 101,
        "imageSrc" : "Airquality",
        "text" : "Airquality"
      },
      ...
    ],
    "status" : "OK"
}
```

## Folder

The images are copied from the *CustomIcons.zip* to the folder

```
/home/pi/domoticz/www/images/
```

```
ls /home/pi/domoticz/www/images/Airquality*.*
/home/pi/domoticz/www/images/Airquality48_Off.png
/home/pi/domoticz/www/images/Airquality48_On.png
/home/pi/domoticz/www/images/Airquality.png
```

## SQL command to set a Custom Icon

Setting a custom icon via SQL example.

Set the custom icon “Air Quality” with idx=101, to the device with idx 41.

```
UPDATE DeviceStatus SET CustomImage = 101 WHERE ID=41
```

# Explore

This chapter is used to explore areas, like Domoticz functions, MQTT, SQL, Node-RED and more.

## API Interaction

### Purpose

To explore how to interact using Domoticz API commands and handle response accordingly. Ensure also to lookup the reference [Domoticz API/JSON Url's](#).

This chapter does not go into the depth – just a small example on setting the brightness of a Hue Light via a remote-control device, which could be a micro-controller like an ESP8266 or ESP32 or a Raspberry Pi Zero W.

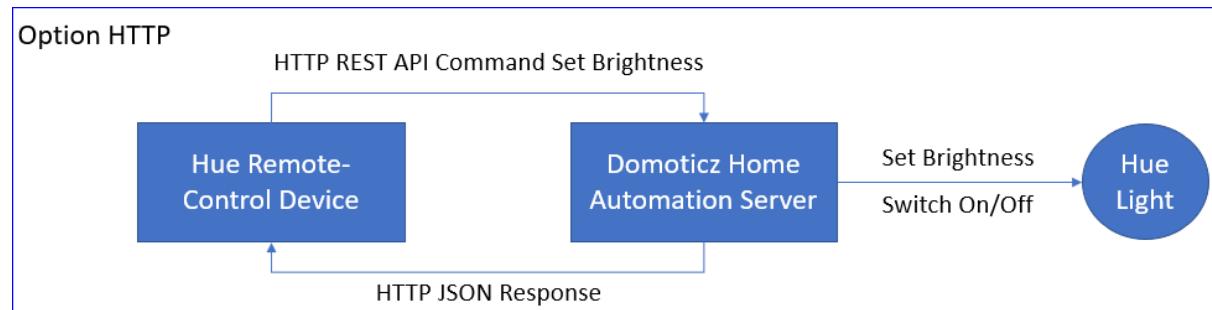
The remote-control device requires communication with the Domoticz system which is integrated in the SMART Home network.

### Option HTTP

Domoticz allows you to interact with all devices using HTTP API Commands generating JSON returns.

This means, it is possible to sent commands to the Domoticz system to act upon and receive a response back.

Sending a command and view the server response can be easily done via a browser.



#### Note

Under the hood, Domoticz uses HTTP API Commands, which is the preferred way to communicate with the devices.

#### Example HTTP API Request via Browser

##### Goal

Set the brightness to 50% for Hue Device with Domoticz idx=118.

##### HTTP API Request URL

```
http://domoticz-ip:8080/json.htm?type=command&param=switchlight&idx=118&switchcmd=Set%20Level&level=50
```

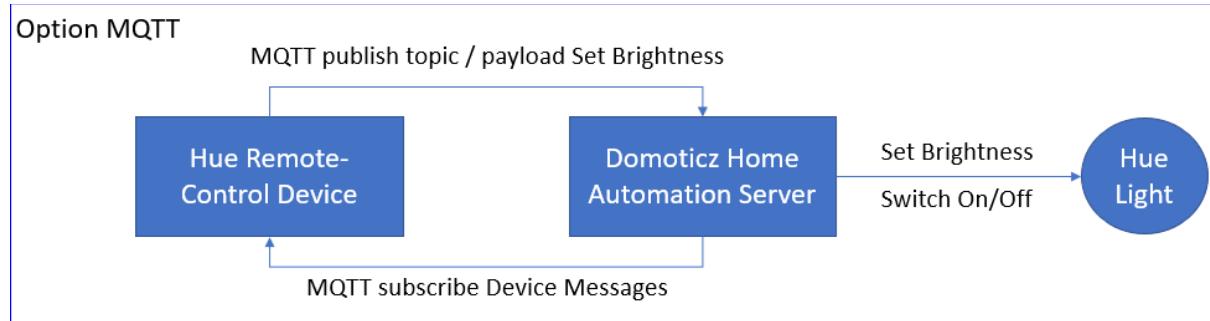
##### HTTP JSON Response

```
{  
    "status": "OK", "title": "SwitchLight"  
}
```

## Option MQTT

MQTT is a machine-to-machine (M2M)/"Internet of Things" connectivity protocol. MQTT provides a publish/subscribe message pattern to provide one-to-many message distribution and decoupling of applications.

Read more in chapter [MQTT](#).



To be able to use MQTT in Domoticz, a MQTT Broker (like mosquito) and a MQTT Client (Hardware MQTT Client Gateway with LAN interface) must be installed ([read](#)).

Communication from and to Domoticz works via JSON.

Default MQTT topics of the Domoticz for incoming (domoticz/in) and outgoing (domoticz/out) messages.

To set the brightness of the Hue Light, a message must be published from the Hue Remote-Control to Domoticz.

### Example MQTT Messages publish & subscribe

#### *Goal*

Set the brightness to 50% for the Hue Device with Domoticz idx=118.

#### *Publish*

The MQTT message to publish requires a topic and payload.

Topic:

domoticz/in

Payload:

```
{"command": "switchlight", "idx": 118, "switchcmd": "Set Level", "level": 100}
```

#### *Note*

Lookup for the payload syntax in the API reference.

The API reference uses HTTP syntax which is used for MQTT as well.

Again, the example:

### HTTP

```
type=command&param=switchlight&idx=118&switchcmd=Set%20Level&level=100
```

### MQTT

```
{"command": "switchlight", "idx": 118, "switchcmd": "Set Level", "level": 100}
```

## Subscribe

Topic:

domoticz/out

After publishing the message, the light brightness gets updated and Domoticz responses.

When subscribing to topic domoticz/in, the message payload received for the device with idx=118:

```
{"Battery" : 255,"Level" : 100,"RSSI" : 12,"description" : "", "dtype" : "Light/Switch","id" : "00000005","idx" : 118,"name" : "Hue MakeLab","nvalue" : 2, "stype" : "Switch", "svalue1" : "100", "switchType" : "Dimmer","unit" : 1}
```

## Python Script Example

```
#!/usr/bin/env python

import time
import paho.mqtt.client as mqtt

# Define globals
version="MQTT Test v20190408"
# MQTT broker running on the Raspberry Pi
broker= "localhost"
# MQTT Domoticz topic for sending messages to Domoticz - Ensure the topic is in lowercase
topic = "domoticz/in"
# Device Idx to get its value = Hue Light named MakeLab
idx = 118
payload='{"command": "switchlight", "idx": %s, "switchcmd":"Set Level", "level": 0}' % (idx)

# MQTT Callback Functions
def on_connect(client, userdata, flags, rc):
    print("Connected with result code " + str(rc))

def on_message(client, userdata, message):
    print("message received " ,str(message.payload.decode("utf-8")))
    print("message topic=",message.topic)
    print("message qos=",message.qos)
    print("message retain flag=",message.retain)

def on_log(client, userdata, level, buf):
    print("log: ",buf)

print(version)
print("Creating new instance")
client = mqtt.Client("P1")
# Attach callback functions
client.on_connect = on_connect
client.on_message = on_message
client.on_log = on_log
print("Connecting to the broker", broker)
client.connect(broker, 1883, 60)
# Wait
time.sleep(4)
# Publish
print("Publishing message to topic",topic, "with payload",payload)
# Publish.
# Example Domoticz Log Entry:
# 2019-04-09 09:25:19.481 MQTT: Topic: domoticz/in, Message: {"command": "switchlight", "idx": 118, "switchcmd": "Set Level", "level": 50}
# 2019-04-09 09:25:19.511 (Philips Hue Bridge 1) Light/Switch (Hue MakeLab)
client.publish(topic,payload)
# Wait
time.sleep(4)
# Stop the loop
client.loop_stop()
```

## Recommendation

Use **HTTP API commands** to stick to the Domoticz preferred way of communication and parse the JSON response accordingly.

MQTT is more complex to use in terms of publishing & subscribing to messages.

## Example Syntax HTTP vs MQTT

The purpose is to show the syntax for setting the

- brightness of a Hue Light (Idx=118) to 50% and
- text of a Virtual Text Sensor

via HTTP or MQTT.

It helps understanding how to apply commands for HTTP vs. MQTT.

Lookup for the payload syntax in the [Domoticz JSON/API reference](#).

The API reference uses HTTP syntax which is also used for MQTT commands.

### Example Set Hue Light Brightness

#### HTTP API Request

```
http://domoticz-ip:8080/json.htm?type=command&param=switchlight&idx=118&switchcmd=Set%20Level&level=50
```

#### HTTP JSON Response

```
{
  "status": "OK", "title": "SwitchLight"
}
```

#### MQTT Command

```
{
  "command": "switchlight", "idx": 118, "switchcmd": "Set Level", "level": 50
}
```

#### MQTT JSON Response

```
{
  "Battery" : 255, "Level" : 50, "RSSI" : 12, "description" : "", "dtype" : "Light/Switch", "id" : "00000005", "idx" : 118, "name" : "Hue MakeLab", "nvalue" : 2, "stype" : "Switch", "svalue1" : "50", "switchType" : "Dimmer", "unit" : 1
}
```

## Summary

Comparison HTTP parameters vs MQTT Key: Value pairs

HTTP	MQTT Key: Value
param=switchlight	"command": "switchlight"
idx=118	"idx": 118
switchcmd=Set%20Level	"switchcmd": "Set Level"
level=50	"level": 50



## Example Set Virtual Text Sensor

### HTTP API Request

```
http://domoticz-ip:8080/json.htm?type=command&param=udevice&idx=52&nvalue=0&svalue>Hello%20World
```

### HTTP JSON Response

```
{
  "status": "OK", "title": "Update Device"
}
```

### MQTT

```
payload='{"command": "udevice", "idx": 52, "nvalue": 0, "svalue": "Hello World"}
```

### MQTT JSON Response

```
{
  "Battery" : 255, "RSSI" : 12, "description" : "Display control message from several events.", "dtype" :
  "General", "id" : "00082051", "idx" : 52, "name" : "Control Message", "nvalue" : 0, "stype" :
  "Text", "svalue1" : "Hello World", "unit" : 1
}
```

### Domoticz Log Entry

```
2019-04-09 09:52:27.424 MQTT: Topic: domoticz/in, Message: {"command": "udevice", "idx": 52, "nvalue": 0, "svalue": "Hello World"}
```

### Summary

Comparison HTTP parameters vs MQTT Key: Value pairs

HTTP	MQTT Key: Value
param=udevice	"command": "udevice"
idx=52	"idx": 52
nvalue=0	"nvalue": 0
svalue=Hello%20World	"svalue": "Hello World"

# Events - Overview

## Purpose

To explore the Domoticz Events System and the Event Editor (see GUI Setup > More Options > Events) supporting the interpreter:  
Blockly, Lua, Python, dzVents (next generation Lua Scripting)

*Some notes regarding the various Domoticz Interpreters.*

### Blockly

NOT USED – all events via dzVents. For learning & testing developed a script.

### Lua

NOT USED – all events via dzVents. For learning & testing developed a script.

### Lua dzVents

Target is using the next generation Lua Scripting dzVents - Domoticz Easy Events – with the Domoticz build-in Editor.

Ensure to read [this](#) first.

#### Note

The Lua editor is context sensitive, prompt with auto-complete options and show common errors to help with debugging. The editor theme can be changed by pressing the control and comma keys at the same time. Domoticz will save the scheme when events are saved.

### Python

In favour to program using Python instead Lua, **BUT** the new **dzVents** is so great, that for event scripting will use dzVents.

For building Domoticz PlugIns will use Python.

#### Note

The Python Event System uses Python3 (same as Python Plugin System). Events are enabled along with plugins, it's no longer possible to enable one without the other.

#### Note

The file EXPLORE\_SCRIPTING.md (in folder scripts) contains sample dzVents Lua, Lua, Python and Blockly scripts to explore automation events.

These scripts are not used anymore but kept as learning reference.

## Event Execution Order

The order of events being executed, is:

1. file scripts - stored in the folder /home/pi/domoticz/scripts/...
2. database scripts - stored in tables [EventMaster] and [EventRules]
3. on/off action script - explore usage & storage

### Important (taken from the Domoticz Wiki)

Scripts that written on the file system and inside Domoticz using the internal web-editor share the same namespace. If there are two scripts with the same name, only the file system script will be used – this is logged.

## Event Scheduling & Trigger

The scheduling is fixed in Domoticz.

- ALL "device" scripts (scripts with "device" in their name) run everytime ANY device status changes.
- ALL "time" scripts (scripts with "time" in their name) run every MINUTE.

So far, have been using file scripts but considering moving to database solution only for device events.

For event triggered once per day, target to use crontab with Python scripts.

## Event Database Tables

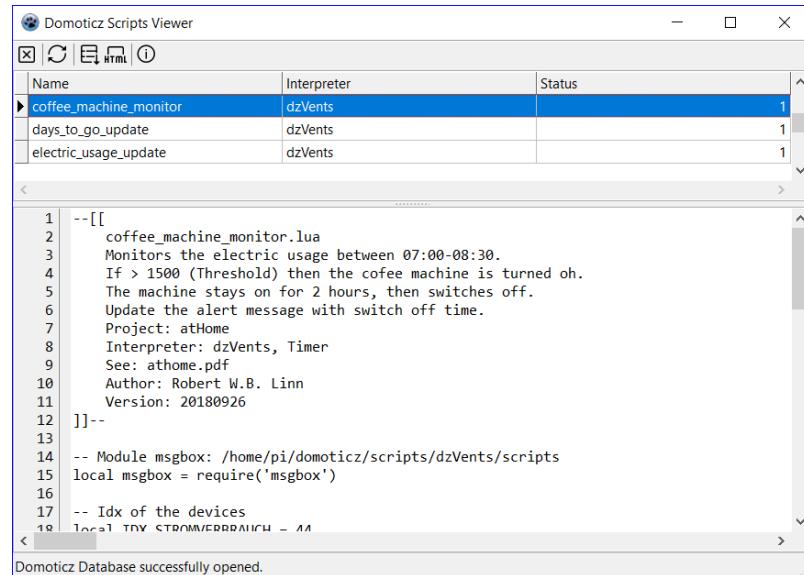
The events which are created using the Domoticz Event Editor, are stored in tables [EventMaster] and [EventRules]

```
CREATE TABLE [EventMaster] ([ID] INTEGER PRIMARY KEY, [Name] VARCHAR(200) NOT NULL, [XMLStatement] TEXT NOT NULL, [Status] INTEGER DEFAULT 0, [Interpreter] VARCHAR(10) DEFAULT 'Blockly', [Type] VARCHAR(10) DEFAULT 'All');
```

```
CREATE TABLE [EventRules] ([ID] INTEGER PRIMARY KEY, [EMID] INTEGER, [Conditions] TEXT NOT NULL, [Actions] TEXT NOT NULL, [SequenceNo] INTEGER NOT NULL, FOREIGN KEY (EMID) REFERENCES EventMaster(ID));
```

## Event Script Viewer

Developed, with Lazarus, an application to view the dzVents scripts.



The screenshot shows the 'Domoticz Scripts Viewer' application window. At the top, there are tabs for 'Domoticz Scripts Viewer', 'File', 'Edit', 'HTML', and 'Help'. Below the tabs is a table with three columns: 'Name', 'Interpreter', and 'Status'. The table contains three rows:

Name	Interpreter	Status
coffee_machine_monitor	dzVents	1
days_to_go_update	dzVents	1
electric_usage_update	dzVents	1

Below the table is a large text area displaying the script content for 'coffee\_machine\_monitor.lua'. The script is as follows:

```

1 --[[[
2   coffee_machine_monitor.lua
3   Monitors the electric usage between 07:00-08:30.
4   If > 1500 (Threshold) then the coffee machine is turned on.
5   The machine stays on for 2 hours, then switches off.
6   Update the alert message with switch off time.
7   Project: atHome
8   Interpreter: dzVents, Timer
9   See: athome.pdf
10  Author: Robert W.B. Linn
11  Version: 20180926
12 ]]]-
13 
14 -- Module messagebox: /home/pi/domoticz/scripts/dzVents/scripts
15 local messagebox = require('messagebox')
16 
17 -- Idx of the devices
18 local idx_STROMVERbrauch = 11

```

At the bottom of the text area, it says 'Domoticz Database successfully opened.'

## Event Development

Whilst creating scripts using the Event Editor, two browser tabs are open:

- Domoticz Event Editor – to create/modify scripts using Ace Editor, to activate/deactivate a script,
  - Domoticz Log (Domoticz GUI Setup > Log > Tab All) – to check if the script is running OK after save.

```
Domoticz V4.996a
Dashboard Floorplan Switches Temperature Weather Utility Setup

Event name: script_device_basement-h
Lua
Device
Event active
Save New
Saved events:
basement-humidity-watch
script_device_basement-
script_device_luftdruck
Delete selected

18  end
19  return result;
20 end
21
22
23 -- Domoticz IDX and names of the needed devices
24
25 local KellerName = "Keller";
26 local KellerID = 13;
27
28 -- Thresholds
29 local HumidityThreshold = 70;
30
31 -- Specific device
32 -- Action for specific device
33
34 if devicechanged[KellerName] then
35
36   time = os.date("%Y-%m-%d %H:%M:%S", time+hour*3600+min*60+sec);
37   print(string.format("Device %s changed @ %s", KellerName, time));
38   -- The values contain: TEMP,HUM,HUM_STAT
39   -- HUM = Humidity (0..100)
40   -- HUM_STAT = Humidity status
41   -- Device All Values: ... otherdevices_values[KellerName]);
42
43   -- Get the humidity
44   Humidity = math.floor(otherdevices_humidity[KellerName] * 10) / 10;
45
46   -- Trigger the luftdruck
47   if Humidity >= HumidityThreshold then
48     luftdruck();
49   end
50 end

2018-05-01 16:21:20.497 Status: LHA: Device barometer: 1033.1999511719
2018-05-01 16:21:20.497 Status: LHA: Barometer Forecast: 4
2018-05-01 16:21:20.701 Status: EventSystem: Script event triggered: script_device_luftdruck
2018-05-01 16:21:20.701 Status: LHA: Device barometer: 1033.1999511719
2018-05-01 16:21:29.950 Status: BPFx2rx133e: Temp + Humidity (Aussen)
2018-05-01 16:21:29.950 Status: BPFx2rx133e: Wind (Windgeschae)
2018-05-01 16:21:29.950 Status: BPFx2rx133e: Rain (Regen)
2018-05-01 16:21:29.950 Status: BPFx2rx133e: DewPoint (DewPoint)
2018-05-01 16:21:29.950 Status: LHA: Device Keller changed 0 16:21:28
2018-05-01 16:21:29.950 Status: LHA: Device All Values: 18.70;70.1
2018-05-01 16:21:29.950 Status: LHA: Device barometer: 1033.1999511719
2018-05-01 16:21:30.726 Status: BPFx2G10: Temp + Humidity + Baro (BMP280)
2018-05-01 16:21:30.726 Status: LHA: LUFTDRUCK2-Device BPFx2G10 changed 0 16:21:30
2018-05-01 16:21:30.726 Status: LHA: Device barometer: 1033.1999511719
2018-05-01 16:21:30.726 Status: LHA: Device barometer: 1033.1999511719
2018-05-01 16:21:30.726 Status: LHA: Barometer Forecast: 4
2018-05-01 16:21:30.726 Status: EventSystem: Script event triggered: script_device_luftdruck
2018-05-01 16:21:30.726 Status: BPFx2rx133e: Temp + Humidity (Wohnraum)
2018-05-01 16:21:30.726 Status: BPFx2rx133e: Temp + Humidity (Aussen)
2018-05-01 16:21:30.726 Status: BPFx2rx133e: Wind (Windgeschae)
2018-05-01 16:21:30.726 Status: BPFx2rx133e: Rain (Regen)
2018-05-01 16:21:30.726 Status: BPFx2rx133e: DewPoint (DewPoint)
2018-05-01 16:21:30.726 Status: LHA: Device Keller changed 0 16:22:20
2018-05-01 16:21:22.047 Status: BPFx2rx133e: Temp + Humidity + Baro (BMP280)
2018-05-01 16:21:22.047 Status: LHA: LUFTDRUCK2-Device BPFx2G10 changed 0 16:22:20
2018-05-01 16:21:22.047 Status: LHA: Device barometer: 1033.1999511719
2018-05-01 16:21:22.047 Status: LHA: Device barometer: 1033.1999511719
2018-05-01 16:21:22.047 Status: LHA: Barometer Forecast: 4
2018-05-01 16:21:22.047 Status: EventSystem: Script event triggered: script_device_luftdruck
2018-05-01 16:21:31.374 Status: BPFx2rx133e: Temp + Humidity (Keller)
2018-05-01 16:21:31.374 Status: BPFx2rx133e: Temp + Humidity (Aussen)
2018-05-01 16:21:31.374 Status: BPFx2rx133e: Wind (Windgeschae)
2018-05-01 16:21:31.374 Status: BPFx2rx133e: Rain (Regen)
2018-05-01 16:21:31.374 Status: BPFx2rx133e: DewPoint (DewPoint)
2018-05-01 16:21:31.374 Status: LHA: Device Keller changed 0 16:22:31
2018-05-01 16:21:31.374 Status: LHA: Device All Values: 18.71;69.9
2018-05-01 16:21:31.374 Status: LHA: Barometer Forecast: 4
2018-05-01 16:21:31.374 Status: EventSystem: Script event triggered: script_device_luftdruck
2018-05-01 16:21:41.107 Status: BPFx2rx133e: Temp + Humidity (Wohnraum)
```

# Event Sample Basement Humidity Monitor

## Purpose

To explore the various interpreter using the same event to monitor a device:

Device: Keller (idx=11)

Property: humidity

Rule:

If the Basement Humidity is  $\geq 70$  (threshold), write a message to the Domoticz Log.

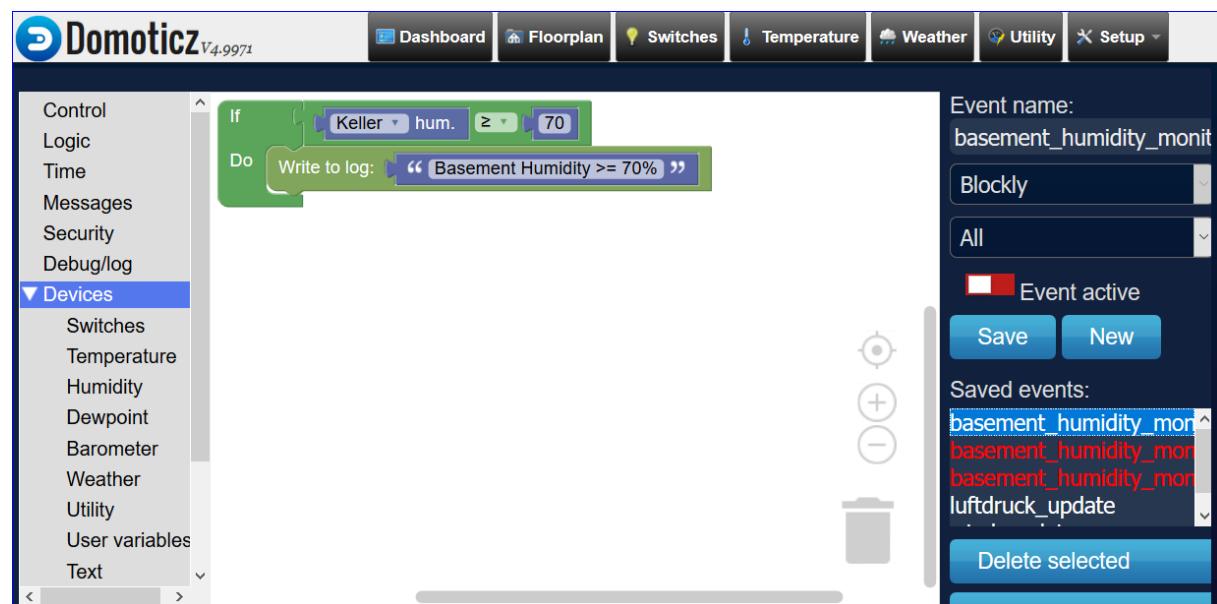
### Note

For the sample scripts, added to the Event Names, a suffix as an interpreter indicator:

\_d (Blockly), \_l (Lua), \_d (dzVents), \_p (Python).

## Blockly

**Event Properties:** basement\_humidity\_monitor\_b, Blockly, All.



## Domoticz Log Entry

```

2018-09-01 10:32:04.478 EventSystem: Event triggered: basement_humidity_monitor_b
2018-09-01 10:32:04.478 Status: Basement Humidity >= 70%
```

## Lua

**Event Properties:** basement\_humidity\_monitor\_1, Lua, Device.

```

1 -- basement_humidity_monitor_1
2 -----
3 -- Monitor the basement humidity if exceeds threshold and write to Domoticz log.
4 -- @project: mysmarthome
5 -- @interpreter: Lua, Device
6 -- @author: Robert W.B. Linn
7 -- @since: 20180901
8 -- @version: 1.0
9 -- @see: mysmarthome.doc
10 -----
11 commandArray = {}
12
13 -- Split a string by delimiter
14 function split(s, delimiter)
15     result = {}
16     for match in (s..delimiter):gmatch("(.-)"..delimiter) do
17         table.insert(result, match);
18     end
19     return result;
20 end
21
22 -----
23 -- Domoticz IDX and names of the needed devices
24 local KellerIdx = 11;
25 local KellerName = "Keller";
26
27 -- Thresholds
28
29

```

## Script

```

commandArray = {}

-- Domoticz IDX and names of the needed devices
local KellerIdx = 11;
local KellerName = "Keller";

local HumidityThreshold = 70;

if devicechanged[KellerName] then
    time = os.date("*t")
    ts = string.format("%02d:%02d:%02d", time.hour, time.min, time.sec);
    print(string.format('Device %s changed @ %s', KellerName, ts));
    print('Device All Values: ' .. otherdevices_svalues[KellerName]);
    -- The svalues contain: TEMP;HUM;HUM_STAT
    -- TEMP = Temperature
    -- HUM = Humidity (0-100 %)
    -- HUM_STAT = Humidity status
    -- Get the humidity
    Humidity = math.floor(otherdevices_humidity[KellerName] * 10) / 10;

    -- Check if the humidity is equal or above threshold - notify
    if Humidity >= HumidityThreshold then
        print('Basement Humidity >= ' .. HumidityThreshold .. ' (' .. Humidity .. ')');
    end
end

return commandArray

```

## Domoticz Log Entry

### *Sample Script – Error*

```
2018-09-01 13:20:29.442 Status: LUA: Device Keller changed @ 13:20:29
2018-09-01 13:20:29.442 Status: LUA: Device All Values: 18.7;74;3
2018-09-01 13:20:29.442 Error: EventSystem: in basement-humiditymonitor_1:
[string "-- script_device_basement-humidity..."]:41: bad argument #2 to 'format' (number expected, got
nil)
```

Caused by using wrong variable name, i.e. humidity instead of Humidity.

### *Sample Script – OK*

```
2018-09-01 13:43:25.433 Status: LUA: Device Keller changed @ 13:43:25
2018-09-01 13:43:25.433 Status: LUA: Device All Values: 18.6;75;3
2018-09-01 13:43:25.433 Status: LUA: Basement Humidity >= 70 (75)
```

## Lua dzVents

**Event Properties:** basement\_humidity\_monitor\_d, dzVents, Device.

```

1 --~/domoticz/scripts/lua/basement_humidity_monitor_d.lua
2 -----
3 -- Monitor the basement humidity if exceeds threshold and write to Domoticz log.
4 -- project: mysmarthome
5 -- @interpreter: dzVents, Device
6 -- @see: readme.txt
7 -- @author: Robert W.B. Linn
8 -- @version: 20180902
9 -----
10 -- Thresholds
11 -- Set the threshold to monitor the humidity (%RH)
12 local HumidityThreshold = 70;
13
14 -- dzVents
15 return {
16   on = {
17     devices = {
18       'Keller'
19     }
20   },
21   execute = function(domoticz, device)
22     if (device.name == 'Keller' and device.humidity >= HumidityThreshold) then
23       domoticz.log('Basement Humidity >= '..HumidityThreshold.. ' ('..device.humidity.. ')', domoticz.LOG_INFO)
24       -- domoticz.notify('Fire', 'The room is on fire', domoticz.PRIORITY_EMERGENCY)
25     end
26   end
27 }
28 <
29 <

```

## Script

```

local HumidityThreshold = 70;
return {
  on = {
    devices = {
      'Keller'
    }
  },
  execute = function(domoticz, device)
    if (device.name == 'Keller' and device.humidity >= HumidityThreshold) then
      domoticz.log('Basement Humidity >= '..HumidityThreshold.. ' ('..device.humidity.. ')', domoticz.LOG_INFO)
    end
  end
}

```

The script is stored in:

```
/home/pi/domoticz/scripts/dzVents/generated_scripts/basement_humidity_monitor_d.lua
```

With owner root.

## Domoticz Log Entry

*Sample Script – Error*

```

2018-09-01 19:05:55.584 Status: dzVents: Error (2.4.7): error loading module 'basement_humidity_monitor_d' from file '/home/pi/domoticz/scripts/dzVents/generated_scripts/basement_humidity_monitor_d.lua':
2018-09-01 19:05:55.584 .../generated_scripts/ basement_humidity_monitor_d.lua:12: 'then' expected near ')'

```

Caused by using double )) prior then.

*Sample Script – OK*

```
2018-09-01 19:09:42.474 Status: dzVents: Write file:  
/home/pi/domoticz/scripts/dzVents/generated_scripts/ basement_humidity_monitor_d.lua  
2018-09-01 19:11:39.449 Status: dzVents: Info: Handling events for: "Keller", value: "18.6;70;1"  
2018-09-01 19:11:39.449 Status: dzVents: Info: ----- Start internal script:  
script_device_basement_humidity_2: Device: "Keller (RFXtrx433e)", Index: 11  
2018-09-01 19:11:39.449 Status: dzVents: Info: Basement Humidity >= 70 (70)  
2018-09-01 19:11:39.449 Status: dzVents: Info: ----- Finished basement_humidity_monitor_d
```

## Python

**Event Properties:** basement\_humidity\_monitor\_p, Python, Device.

The screenshot shows the Domoticz software interface. On the left, the Python script editor displays the code for the 'basement\_humidity\_monitor\_p' event. The script imports domoticz and DomoticzEvents, defines a device named 'Keller', and monitors its s\_value for changes. It logs the event and splits the s\_value into a list to extract temperature and humidity values. On the right, the event configuration panel shows the event name as 'basement\_humidity\_monitor\_p', selected as Python, and assigned to a device. A checkbox for 'Event active' is checked. Below the event list, a 'Saved events' section lists multiple entries for 'basement\_humidity\_monitor\_p'. At the bottom, there are 'Save' and 'New' buttons, and a 'Delete selected' button.

```

5  #<interpreter>: device
6  #@see: readme.txt
7  @author: Robert W.B. Linn
8  @version: 20180902
9  -----
10 """
11
12 # Imports
13 import domoticz
14 import DomoticzEvents as DE
15
16 # Devices
17 KellerIdx = 11
18 KellerName = 'Keller'
19
20 # Set the threshold to monitor the humidity (%RH)
21 HumidityThreshold = 70
22
23 if DE.changed_device_name == KellerName:
24     # Test Log
25     # 2018-09-02 11:32:46.085 Python: Changed: ID: 11 Name: Keller, Type: 82, subType: 7, switchType: 0, s_
26     DE.Log("Python: Changed: " + DE.changed_device.Describe())
27     # Test s_value
28     # 2018-09-02 11:32:46.085 18.7;75;3
29     svalue = DE.Devices[KellerName].s_value
30     DE.Log(svalue)
31     # Get the humidity, which is at the 2nd entry of the svalue, i.e. 75
32     # Split the svalue by ;. The result is a list with length 3, data[0]=T,data[1]=H,data[2]=Comfort
33     data = svalue.split(";")
34 <

```

## Script

```

"""
Script: basement_humidity_monitor_p
project: AtHome
Monitor the basement humidity if exceeds threshold and write to Domoticz log.
@interpreter: Python, Device
@see: readme.txt
@author: Robert W.B. Linn
@version: 20180902
"""

# Imports
import domoticz
import DomoticzEvents as DE

# Devices
KellerIdx = 11
KellerName = 'Keller'

# Set the threshold to monitor the humidity (%RH)
HumidityThreshold = 70

if DE.changed_device_name == KellerName:
    # Test Log
    # 2018-09-02 11:32:46.085 Python: Changed: ID: 11 Name: Keller, Type: 82, subType: 7, switchType: 0, s_value: 18.7;75;3, n_value: 0, n_value_string: 18.7;75;3, last_update_string: 2018-09-02 11:32:46
    DE.Log("Python: Changed: " + DE.changed_device.Describe())
    # Test s_value
    # 2018-09-02 11:32:46.085 18.7;75;3
    svalue = DE.Devices[KellerName].s_value
    DE.Log(svalue)
    # Get the humidity, which is at the 2nd entry of the svalue, i.e. 75
    # Split the svalue by ;. The result is a list with length 3, data[0]=T,data[1]=H,data[2]=Comfort
    data = svalue.split(";")
    # Log all 3 entries
    # for temp in data:
    #     DE.Log(temp)
    # Get the :
    if len(data) == 3:
        Humidity = int(data[1])
        if Humidity >= HumidityThreshold:

```

```
# Log that the humidity is above threshold. The log string uses new string formatting
DE.Log('Basement Humidity >= {}%RH ({}%RH)'.format(HumidityThreshold, Humidity))
```

## Domoticz Log Entry

### *Sample Script – Error*

```
...
2018-09-02 11:58:34.884 Status: EventSystem: Script event triggered: luftdruck_update
2018-09-02 11:58:34.107 Error: EventSystem: Failed to execute python event script
"basement_humidity_monitor_p"
2018-09-02 11:58:34.108 Error: EventSystem: Traceback (most recent call last):
2018-09-02 11:58:34.108 Error: EventSystem: File "<string>", line 41, in <module>
2018-09-02 11:58:34.108 Error: EventSystem: IndexError: tuple index out of range
```

Caused by using wrong string format tuples, i.e. `{1} ({2})` instead of `0,1` or leave blank `{ } ({}).`

### *Sample Script – OK*

```
2018-09-02 12:01:26.253 Python: Changed: ID: 11 Name: Keller, Type: 82, subType: 7, switchType: 0,
s_value: 18.7;74;3, n_value: 0, n_value_string: 18.7;74;3, last_update_string: 2018-09-02 12:01:26
2018-09-02 12:01:26.253 18.7;74;3
2018-09-02 12:01:26.253 Basement Humidity >= 70%RH (74%RH)
```

## Python with Device Update

### Extending the previous Python script

Update the Virtual Sensor “Info Message” (idx=52) (Type: General, Text) with the message logged, if the humidity exceeds the threshold.

52	VirtualSensors	00082051	1	Info Message	General	Text	Basement Humidity >= 70%RH (78%RH)
----	----------------	----------	---	--------------	---------	------	------------------------------------

### Result



**Event Properties:** basement\_humidity\_monitor2\_p, Python, Device.

### Script

```
"""
script: basement_humidity_monitor2_p
project: AtHome
Monitor the basement humidity (device=Keller) if exceeds threshold, write to Domoticz log and update
the virtual sensor text (device=Info Message)
@interpreter: Python, Device
@see: readme.txt
@author: Robert W.B. Linn
@version: 20180902
-----
"""

# Imports
import domoticz
import DomoticzEvents as DE
from urllib.request import Request, urlopen
from urllib.error import URLError, HTTPError

# Define the domoticz system ip with port!
domoticzserver="localhost:8080"

# Devices
KellerIdx = 11
KellerName = 'Keller'
TextInfoIdx = 52
TextInfoName = 'Info Message'

# Set the threshold to monitor the humidity (%RH)
HumidityThreshold = 70

def domoticzrequest (url):
    """Send update request to domoticz
    :url: Domoticz JSON/API url
    :result: Result is a json object
    """
    req = Request(url)
    try:
        response = urlopen(req)
    except HTTPError as e:
        # print('Server couldn\'t fulfill the request.')
        # print('Error code: ', e.code)
        return "Error fulfilling the request." + e.code
    except URLError as e:
        # print('Failed to reach a server.')


```

```

# print('Reason: ', e.reason)
# return "Error reaching the server." + e.code
else:
    # everything is fine
    return response.read().decode('utf-8')

if DE.changed_device_name == KellerName:
    # Test Log
    # 2018-09-02 11:32:46.085 Python: Changed: ID: 11 Name: Keller, Type: 82, subType: 7, switchType: 0, s_value: 18.7;75;3, n_value: 0, n_value_string: 18.7;75;3, last_update_string: 2018-09-02 11:32:46
    DE.Log("Python: Changed: " + DE.changed_device.Describe())
    # Test s_value
    # 2018-09-02 11:32:46.085 18.7;75;3
    svalue = DE.Devices[KellerName].s_value
    DE.Log(svalue)
    # Get the humidity, which is at the 2nd entry of the svalue, i.e. 75
    # Split the svalue by ;. The result is a list with length 3, data[0]=T,data[1]=H,data[2]=Comfort
    data = svalue.split(";")
    # Log all 3 entries
    # for temp in data:
    #     DE.Log(temp)
    # Get the humidity at pos 2 which is index 1 :
    if len(data) == 3:
        Humidity = int(data[1])
        if Humidity >= HumidityThreshold:
            # Log that the humidity is above threshold. The log string uses new string formatting
            svalueinfo = 'Basement Humidity >= {}%RH ({})'.format(HumidityThreshold, Humidity)
            DE.Log(svalueinfo)

            # Update the Virtual Sensor Info_Message
            # This is not working - not sure why, might be only in plugins
            # DE.Command(TextInfoName, svalueinfo)

            # Require to escape the message string including spaces
            svalueinfo = urllib.parse.quote_plus(svalueinfo)
            # Build the url. Example:
            #
            http://localhost:8080/json.htm?type=command&param=udevice&idx=52&nvalue=0&svalue=Basement+Humidity+%3E%3D+70%25RH+%2877%25RH%29
            url = "http://" + domoticzserver + "/json.htm?type=command&param=udevice&idx=" +
            str(TextInfoIdx) + "&nvalue=0&svalue=" + svalueinfo
            # DE.Log(url)
            ret = domoticzrequest(url)
            # Log the return . which is a JSON string {"status" : "OK","title" : "Update Device"}
            # DE.Log(ret)

```

## Domoticz Log Entry

*Sample Script – OK*

```

2018-09-02 19:53:42.963 Python: Changed: ID: 11 Name: Keller, Type: 82, subType: 7, switchType: 0,
s_value: 18.8;78;3, n_value: 0, n_value_string: 18.8;78;3, last_update_string: 2018-09-02 19:53:42
2018-09-02 19:53:42.963 18.8;78;3
2018-09-02 19:53:42.963 Basement Humidity >= 70%RH (78%RH)

```

# Events - dzVents

The event system Domoticz Easy Events, dzVents, is the next generation of Domoticz Events.

As a general point, be very secure in writing the scripts, also when making changes, i.e. ensure all variables have the same name, do not mix local vars with the same name etc.

## Device Properties

To analyse the properties of a device, use device.dump(), to then select from the list.

## Script

This example checks if the defined devices (see idx of the devices) have changed, to then dump the properties but also show the device state property.

```
-- Idx of the devices
local IDXMEMORYUSAGE = 1;
local IDXHDDUSAGE = 3;
local IDXTEMPERATURE = 4;
local IDXCONTROLMSG = 52;

return {
  on = {
    devices = {
      IDXMEMORYUSAGE,
      IDXHDDUSAGE,
      IDXIDXTTEMPERATURE
    }
  },
  execute = function(domoticz, device)
    domoticz.log('RPi Monitor Device '.. device.name .. ',' .. device.idx .. ' was changed:' .. device.state .. '/' .. device.rawData[1], domoticz.LOG_INFO)
  end
}
```

## Domoticz Log Entry

```
2018-09-05 10:01:10.305 Status: dzVents: Info: Handling events for: "RPi Memory Usage", value: "24.20"
2018-09-05 10:01:10.305 Status: dzVents: Info: ----- Start internal script: rpi_monitor: Device: "RPi
Memory Usage (Motherboard)", Index: 1
2018-09-05 10:01:10.305 Status: dzVents: Info: RPi Monitor Device RPi Memory Usage,1 was
changed:24.20/24.20
2018-09-05 10:01:10.305 Status: dzVents: Info: ----- Finished rpi_monitor
```

## Property List

Example properties for device RPi Memory Usage:

ruleIsAtSunrise() wday: 4 isUTC: false ruleIsAfterCivilTwilightEnd() hour: 9 ruleIsAfterCivilTwilightStart() ruleIsBeforeCivilTwilightStart() current: isdst: true min: 49 year: 2018 day: 5 yday: 248 sec: 9 month: 9 wday: 4 hour: 9 secondsAgo: 80 ruleIsOnDate() milliSeconds: 0 millisecondsAgo: 80896 ruleIsInWeek() dDate: 1536133669 ruleIsAtDayTime() ruleIsAfterSunrise() day: 5 isdst: true min: 47 minutesAgo: 1	utils: fileExists() LOG_MODULE_EXEC_INFO: 2 LOG_ERROR: 1 toJSON() log() rgbToHSB() LOG_INFO: 3 osExecute() urlEncode() print() fromJSON() LOG_FORCE: 0.5 LOG_DEBUG: 4 updatePressure() deviceId: 0000044C updateRain() close() updateP1() _adapters: 1: Percentage device adapter disarm() startPlaylist() changed: true setVolume() stop() _data: deviceID: 0000044C data: unit: 1 icon: hardware hardwareTypeValue: 23 _state: 24.15 _nValue: 0 hardwareID: 1	hardwareName: Motherboard protected: false hardwareType: Motherboard sensors lastUpdate: 2018-09-05 09:47:49 subType: Percentage baseType: device changed: true batteryLevel: 255 switchType: On/Off switchTypeValue: 0 deviceType: General rawData: 1: 24.15 id: 1 signalLevel: 12 description: lastLevel: 0 name: RPi Memory Usage timedOut: false switchType: On/Off setWhiteMode() deviceType: General switchTypeValue: 0 protected: false isScene: false state: 24.15 hardwareTypeValue: 23 idx: 1 isTimer: false signalLevel: 12 bState: false isVariable: false hardwareType: Motherboard sensors
--	---	--

## External Modules

### Purpose

To use external modules in dzVents script events created with the Domoticz Events editor.

#### Note

As progressing, the external modules as described here, are replaced by a dzVents script “global\_data” (containing shared helper functions), maintained using the Domoticz Event Editor.

### Example

Update the virtual device named “Alert Message” (Type General, SubType Alert, Idx=55) by using a function defined in external module “msgbox.lua”.

```
local message = device.name .. ' switched OFF ' -- .. msg.isnowdatetime(domoticz)
msgbox.alertmsg(domoticz, domoticz.ALERTLEVEL_GREEN, message)
```

## Module Access

The module “msgbox.lua” MUST be in folder:

```
/home/pi/domoticz/scripts/dzVents/scripts
```

To access functions from the module, use the syntax **msgbox.functionname**, when the module is defined like:

```
local msgbox = require('msgbox')
```

### Example (screenshot from WinSCP)

/home/pi/domoticz/scripts/dzVents/scripts/*.*			
Name	Size	Changed	
..		08.10.2017 17:17:48	
msgbox.lua	2 KB	06.09.2018 13:15:11	
README.md	1 KB	29.08.2017 16:35:10	

## Module Script

The script defines date & time functions and functions to update a text device & alert device. The idx of the text device is set in the external module, for the alert device as a user variable. This is to show both ways – best would be to have both device idx as user variables to be flexible in assigning devices.

A domoticz object is required to access properties & methods.

```
msgbox.lua: /home/pi/domoticz/scripts/dzVents/scripts
```

```
-- msgbox.lua
-- Update the virtual devices to display a control (Text Sensor) or alert message (Alert Sensor).
-- Requires a user variable IDX_ALERTMSG for the Alert Sensor
-- Robert W.B. Linn
-- 20180906

local msgbox = {};

local IDX_CONTROLMSG = 52

-- Get the current date & time from the domoticz instance with time object
-- Return datetime now, i.e. 2018-09-06 09:09:00
function msgbox.isnowdatetime(domoticz)
    return domoticz.time.rawDate .. ' ' .. domoticz.time.rawTime
end

-- Get the current date from the domoticz instance with time object
-- Return date now, i.e. 2018-09-06
function msgbox.isnowdate(domoticz)
    return domoticz.time.rawDate
end

-- Get the current time from the domoticz instance with time object
-- Return time now, i.e. 09:09:00
function msgbox.isnowtime(domoticz)
    return domoticz.time.rawTime
end

-- Update the alert message with level.
function msgbox.alertmsg(domoticz, level, msg)
    domoticz.devices(domoticz.variables('IDX_ALERTMSG').value).updateAlertSensor(level, msg)
end

-- Update the control message.
function msgbox.controlmsg(domoticz, msg)
    domoticz.devices(IDX_CONTROLMSG).updateText(msg)
end

return msgbox
```

## dzVents Script

The Lua script “hue\_control2.lua”, created with the Domoticz Event editor, references the external module “msgbox.lua” as msgbox.

If the script is set to enabled, the scripts is stored in folder

```
/home/pi/domoticz/scripts/dzVents/generated_scripts
```

```
-- Module msgbox.lua: /home/pi/domoticz/scripts/dzVents/scripts
-- Access function using msgbox.functionname
local msgbox = require('msgbox')

-- Idx of the devices
local IDX_HUE_MAKELAB = 118

return {
    -- active = true,
    on = {
        devices = {
            IDX_HUE_MAKELAB
        }
    },
    execute = function(domoticz, device)
        if (device.state == 'On') then
            device.switchOff()
        local message = device.name .. ' = OFF ' -- .. msg.isnowdatetime(domoticz)
        msgbox.alertmsg(domoticz, domoticz.ALERTLEVEL_GREEN, message)
        msgbox.controlmsg(domoticz, message)
        domoticz.log('OK', domoticz.LOG_INFO)
        end
    end
}
```

## Folder Scripts

Scripts located in folder

```
/home/pi/domoticz/scripts/dzVents/scripts
```

are executed every minute, if these are not modules.

```
-- Lua script executed every minute in the dzVents scripts folder
print(os.date("today is %A, at %x"))
```

## Domoticz Log Entry

```
-- 2018-09-10 12:15:00.750 Status: dzVents: today is Monday, at 09/10/18
```

# Shared Helper Functions

## Purpose

To define common functions used by dzVents Lua script events i.e. my automation scripts. The functions are defined, using the Domoticz Event Editor, in the script “global\_data”.

## Example Functions

```
return {

    -- global helper functions
    helpers = {

        -- Idx of devices used
        IDX_ALERTMSG = 55,
        IDX_CONTROLMSG = 52,

        -- Update the alert message with level and text
        alertmsg = function(domoticz, level, msg)
            domoticz.devices(domoticz.helpers.IDX_ALERTMSG).updateAlertSensor(level, msg)
        end,

        -- Update the control message with text
        controlmsg = function(domoticz, msg)
            domoticz.devices(domoticz.helpers.IDX_CONTROLMSG).updateText(msg)
        end
    }
}

-- end return
```

## Usage

```
-- set the alert message
Local message = 'This is an alert message'
domoticz.helpers.alertmsg(domoticz, domoticz.ALERTLEVEL_ORANGE, message)
```

# ESP8266

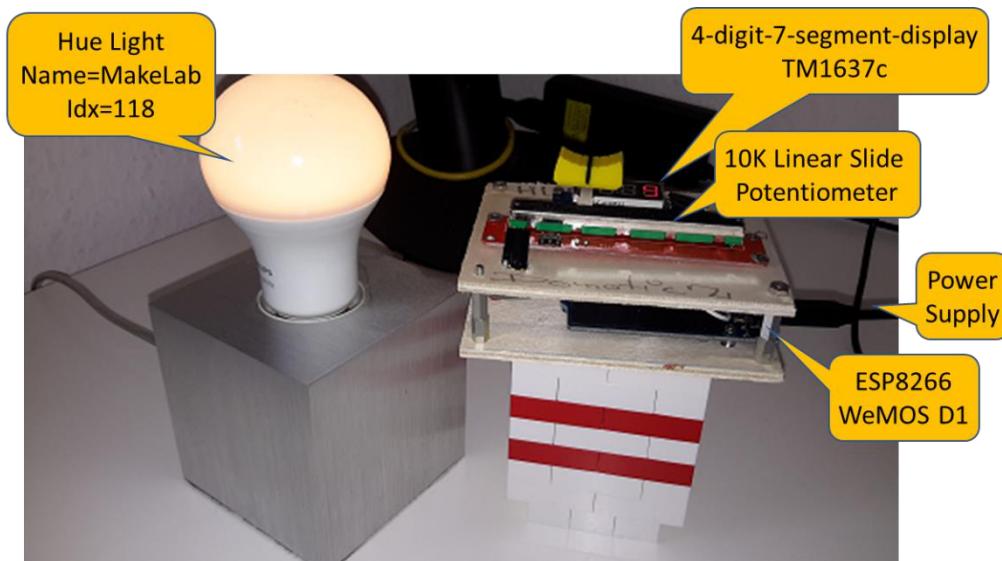
## Purpose

To explore programming an ESP8266 microcontroller in C++ using the Arduino IDE. It is basically a small fun project to tinker with microcontrollers and connected devices, but also an option to develop further integration of microcontrollers in the SMART Home Network.

## Experiment

Set the brightness of the Hue light (Name=MakeLab, Idx=118) connected to Domoticz, by using an ESP8266 microcontroller with a slide potentiometer (10K) and 4-digit-7-segment-display.

## Prototype



The prototype is assembled using wooden bottom plate to hold the microcontroller and a wooden top plate to hold the 4-digit-7-segment-display and the potentiometer slider. The plates are 8x10cm (3mm thick) and connected using 4 3x30mm screws.

## Prepare Arduino IDE

The Arduino IDE requires special ESP8266 setup:

- Download and install the [Arduino IDE](#).
- Start the Arduino IDE.
- Select menu File > Preferences.
- In the field “Additional Board Manager URLs”, set [http://arduino.esp8266.com/stable/package\\_esp8266com\\_index.json](http://arduino.esp8266.com/stable/package_esp8266com_index.json) followed by OK.
- Select menu Tools > Boards > Boards Manager...
- Enter esp8266 followed by selecting esp8266 by ESP8266 Community and press Install.
- Connect the ESP8266 board
- Select the board from Tools > Boards – in this case selected “WeMOS D1 R1”

- Install additional libraries required:  
ArduinoJson (used v6.10.0), TM1637 (used v1.2.0) – Thanks to the authors.

## Parts Needed

- 1x ESP8266 WeMOS D1 R1
- 1x 4-digit-7-segment-display TM1637
- 1x 10K Linear Slide Potentiometer
- 1x LED [on board]

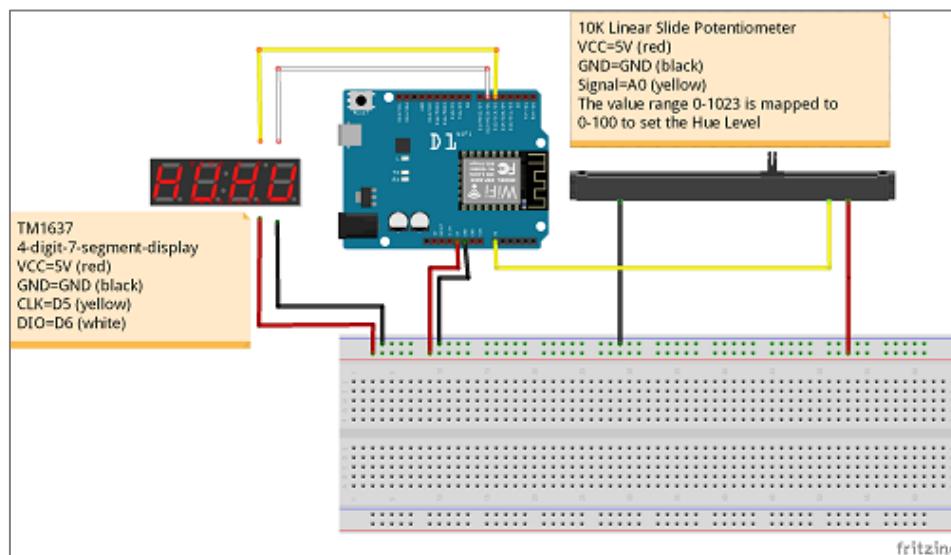
## Wiring

Potentiometer=ESP8266 WeMOS D1  
 VCC=5V (red)  
 Signal=A0 (yellow)  
 GND=GND (black)

4-digit-7-segment-display=ESP8266 WeMOS D1  
 VCC=5V (red)  
 CLK=SLK/D5 (yellow)  
 DIO=MISO/D6 (white)  
 GND=GND (black)

LED=ESP8266 WeMOS D1  
 Onboard LED used

## Circuit



## Source Code

See file hueremotecontrol.ino.

### Pseudo Code

- Define constant pins & objects & strings ssid,password,http request url
- Setup
  - Init serial connection
  - Set onboard led mode
  - Setup tm1637 brightness & initial value
  - Setup wifi connection & hide the ssid & wait for connection
- Loop
  - Listen to potentiometer value changes
  - Check absolute value against noise level
  - Define & sent HTTP API Request with new value to Domoticz
  - Wait & handle Domoticz JSON response

Domoticz Log Entry when changing the position of the slide potentiometer:

```
2019-04-13 10:44:34.895 (Philips Hue Bridge 1) Light/Switch (Hue MakeLab)
2019-04-13 10:44:34.868 Status: User: Admin initiated a switch command (118/Hue MakeLab/Set Level)
```

# ESP Easy

## Purpose

To explore connecting an ESP (i.e. ESP8266, ESP32 etc.) type microcontrollers (like the NodeMCU, WeMOS and many more), running [ESP Easy](#) with associated sensors, sending data from and to Domoticz.

If not familiar with ESP Easy, start with the previous link shared.

Further more learning [rules](#) and [commands](#) are needed.

Hard-/Software used:

Hardware: ESP8266 NodeMCU DevKit.

Software: ESP Easy Beta Mega Release ESPEasy\_mega-20190227.zip (see GitHub [releases](#)).

*Note*

The software has been updated regulary.

## Overview Experiments

Just a few experiments, to test how to connect and read values from sensors.

- Switch an LED connected to the ESP
- Measure ambient light with sensor BH1750 (I2C) connected to the ESP
  - Send Lux value to Domoticz device
  - Trigger switching a connected LED if below darkness threshold
- Potentiometer connected to the ESP, to control the brightness of a Hue light bulb, which is controlled via Domoticz
- *More to follow*

## Flash ESP

### Download

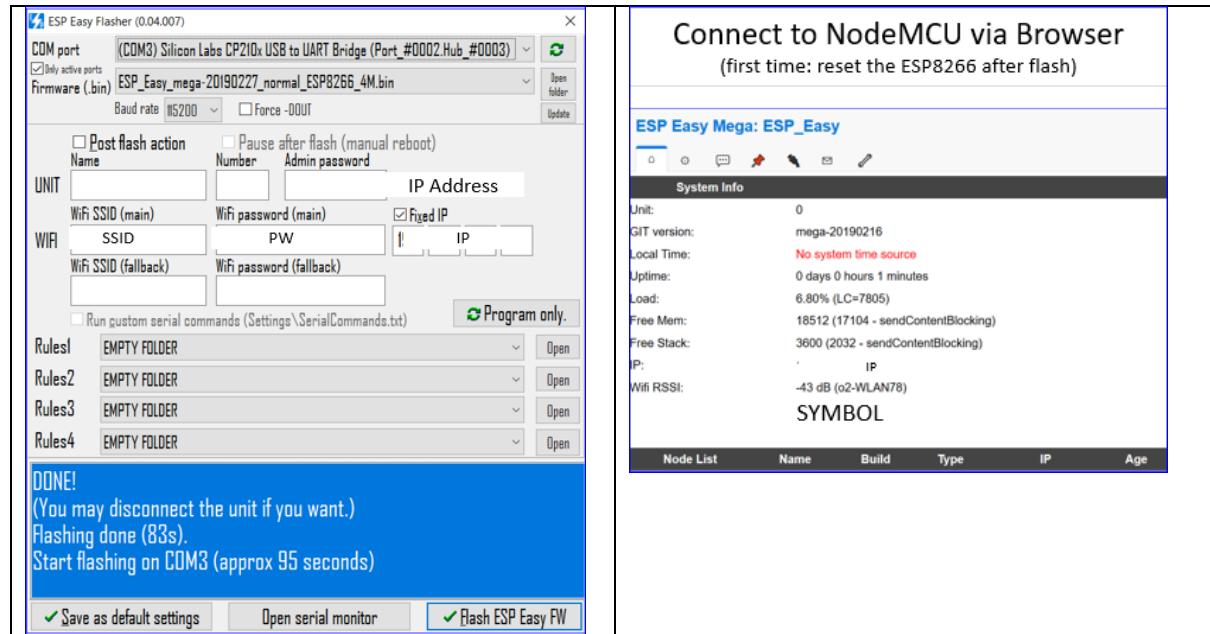
Downloaded ESPEasy\_mega-20190227.zip from GitHub and extracted to a temp folder, i.e. domoticz-home-automation-workbook\functions\ESPEasy\r200\.

There are daily builds available – checkout the change logs.

### Flashing

From the temp folder, start *ESP.Easy.Flasher.exe* and configure as below.

Used the firmware with 4M for an ESP8266 – the NodeMCU can handle 4M.



After pressing “Flash ESP Easy FW” it took about 2 minutes to complete.

## Update ESP

Update the ESP Easy Firmware using the ESP Easy Web Frontend.

- Download the latest version of the firmware, i.e. [https://github.com/letscontrolit/ESPEasy/releases/download/mega-20190315/ESPEasy\\_mega-20190315.zip](https://github.com/letscontrolit/ESPEasy/releases/download/mega-20190315/ESPEasy_mega-20190315.zip)
- Unzip to a temp folder, i.e. domoticz-home-automation-workbook\functions\ESPEasy\r200\.
- Open a browser
- Enter the ESP Easy URL
- Select menu Tools > Update Firmware
- Select ESP\_Easy\_mega-20190315\_normal\_ESP8266\_4M.bin
- Press Update
- Wait for completion which is followed by a reboot of the NodeMCU
- Refresh the browser window (F5)
- Check menu Tools > System Info if version is correct updated

Firmware	
Build:	20103 - Mega
System Libraries:	ESP82xx Core 2_4_2, NONOS SDK 2.2.1(cfd48f3), LWIP: 2.0.3 PUYA support
Git Build:	mega-20190315
Plugins:	46 [Normal]
Build Md5:	825459376171e63f211c028ecbf1f69
Md5 check:	passed.
Build Time:	Mar 15 2019 03:15:17
Binary Filename:	ESP_Easy_mega-20190315_normal_ESP8266_4M.bin

## Domoticz Controller

Communication between ESP Easy and Domoticz is possible via Controllers with the protocol's HTTP and MQTT, configured in ESP Easy using the Domoticz system IP address. For other settings, the defaults are used.

<b>ESP Easy Mega: ESP_Easy</b> <input type="radio"/> Main <input type="radio"/> Config <input checked="" type="radio"/> Controllers <input type="radio"/> Hardware <b>Controller Settings</b>		Protocol: <input type="button" value="Domoticz HTTP"/> Locate Controller: <input type="button" value="Use IP address"/> Controller IP: <input type="button" value="IP Address"/> Controller Port: <input type="button" value="8080"/> Minimum Send Interval: <input type="button" value="100 [ms]"/> Max Queue Depth: <input type="button" value="10"/> Max Retries: <input type="button" value="10"/> Full Queue Action: <input type="button" value="Ignore New"/> Check Reply: <input type="button" value="Ignore Acknowledgement"/> Client Timeout: <input type="button" value="1000 [ms]"/> Controller User: <input type="text"/> Controller Password: <input type="text"/> Enabled: <input checked="" type="checkbox"/>
		Protocol: <input type="button" value="Domoticz MQTT"/> Locate Controller: <input type="button" value="Use IP address"/> Controller IP: <input type="button" value="IP Address"/> Controller Port: <input type="button" value="1883"/> Minimum Send Interval: <input type="button" value="100 [ms]"/> Max Queue Depth: <input type="button" value="10"/> Max Retries: <input type="button" value="10"/> Full Queue Action: <input type="button" value="Ignore New"/> Check Reply: <input type="button" value="Ignore Acknowledgement"/> Client Timeout: <input type="button" value="1000 [ms]"/> Controller User: <input type="text"/> Controller Password: <input type="text"/> Controller Subscribe: <input type="button" value="domoticz/out"/> Controller Publish: <input type="button" value="domoticz/in"/>

## Rules

ESP Easy Rules can be used to create simple flows to control devices on your ESP.  
Read more [here](#).

### Example Rules Set #1

```
// Check ambient light device named ESPEasy_BH1750 value Lux
// (see devices properties).
// If Lux value less threshold (i.e. 100), switch the RED LED ON else OFF.
// The RED LED is connected to NodeMCU pin D5 (GPIO14)
// The command syntax: gpio, pin number, 1|0 - 1=ON,0=OFF

on ESPEasy_BH1750#Lux do

    if [ESPEasy_BH1750#Lux] < 100
        gpio,14,1
    else
        gpio,14,0
    endif

endon
```

Rules are logged (Menu Tools > System Log)

```
1011480: EVENT: ESPEasy_BH1750#Lux=120.00
1011499: ACT : gpio,14,0
1011502: SW : GPIO 14 Set to 0
1011524: Domoticz: Sensortype: 1 idx: 46 values: 120.00
1021477: BH1750 Address: 0x23 Mode: 0x1 : Light intensity: 63.33
1021480: EVENT: ESPEasy_BH1750#Lux=63.33
1021498: ACT : gpio,14,1
1021500: SW : GPIO 14 Set to 1
1021526: Domoticz: Sensortype: 1 idx: 46 values: 63.33
```

This example shows setting the LED, connected to GPIO14, to on (= state changes from 0 LOW to 1 HIGH) because the Lux value went below threshold of 100.

### Device Type (Light/Lux – BH1750), Name (ESPEasy\_BH1750) and Value (Lux)

Light/Lux - BH1750	ESPEasy_BH1750	<b>2</b> (46)	GPIO-4 GPIO-5	Lux:	183.33
<b>Values</b>					
#	Name				
1	Lux				

## GPIO Commands

It is possible using URL commands, to control basic GPIO output.

This could be used by Domoticz event to trigger a LED or else i.e. controlling a server motor.

### Turn an LED ON/OFF

ON

`http://espeasy-ip/control?cmd=gpio,14,1`

Result JSON Response

```
{"log": "GPIO 14 Set to 1", "plugin": 1, "pin": 14, "mode": "output", "state": 0}
```

OFF

`http://espeasy-ip/control?cmd=gpio,14,0`

Result JSON Response

```
{"log": "GPIO 14 Set to 0", "plugin": 1, "pin": 14, "mode": "output", "state": 1}
```

# Experiments

To explore connecting sensors to an ESP controller running ESP Easy and test communication between the ESP and Domoticz v.v.

The ESP controller used, is a NodeMCU v1.0.

## Domoticz switching ESP LED

### Purpose

To switch, via a Domoticz Switch, the LED connected to pin D5 (GPIO14) of the NodeMCU.

### Parts

1x NodeMCU

1x LED

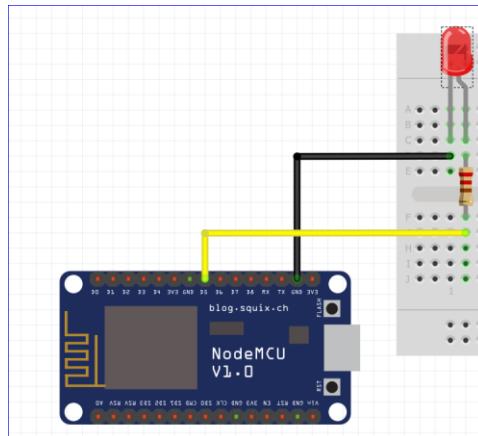
1x Breadboard

2x Wires male-male

### Wiring

<b>LED</b>	<b>NodeMCU [wirecolor]</b>
Anode = PLUS connected to a resistor 220 Ohm to pin	D5 (GPIO14) [yellow]
Cathode = MINUS	GND [black]

### Circuit



### ESP Easy

In ESP Easy there are no devices required as the LED is controlled via HTTP API commands submitted by Domoticz.

### Domoticz

Create a switch device (Hardware Virtual Sensor) with properties:

<b>Switch Type</b>	<b>HTTP API Commands to switch On (1) / Off (0)</b>
--------------------	---

On Action	<a href="http://espeasy-ip/control?cmd=gpio,14,1">http://espeasy-ip/control?cmd=gpio,14,1</a>
Off Action	<a href="http://espeasy-ip/control?cmd=gpio,14,0">http://espeasy-ip/control?cmd=gpio,14,0</a>

After saving, click the switch On and check if the LED connected to GPIO14 of the ESP device is turned on.

# ESP Ambient Light to Domoticz

## Purpose

To measure the ambient light from the sensor BH1750FVI connected to the NodeMCU and send the Lux value to a Domoticz Lux device.

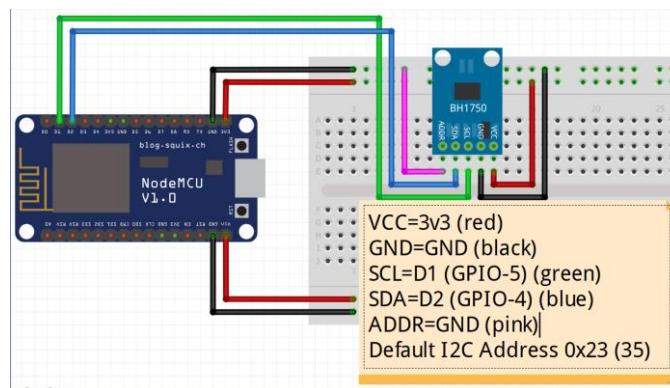
## Parts

- 1x NodeMCU
- 1x BH1750FVI sensor
- 1x Breadboard
- 7x Wires male-male

## Wiring

LED	NodeMCU [wirecolor]
SCL	D1 (GPIO5) [green]
SDA	D2 (GPIO4) [blue]
ADDR	GND [pink]. Default I2C address used: 0x23 (35)
VCC	3v3 [red]
GND	GND [black]

## Circuit



## ESP Easy

Hardware	<p><i>BH1750 = ESP8266 NodeMCU</i></p> <p>VCC = 3v3</p> <p>GND = GND</p> <p>SCL = D1 (GPIO5)</p> <p>SDA = D2 (GPIO4)</p> <p>ADDR = GND</p> <p>Default I2C address 0x23 (35)</p>
Devices	

## Domoticz

Create a Lux device (Hardware Virtual Sensor) with name ESPEasy Ambient Light.

	Idx	Hardware	ID	Unit	Name	Type	SubType	Data
	46	VirtualSensors	82045	1	ESPEasy Ambient Light	Lux	Lux	197 Lux

The idx is used in ESP Easy device ESPEasy\_BH1750 to set the property IDX for controller 2.

Check the Domoticz Log, if data from the sensor is received:

```
2019-04-26 18:49:27.040 MQTT: Topic: domoticz/in, Message: {"idx":46, "RSSI":10, "nvalue":0, "svalue":"210.00"}
```

## Enhancement

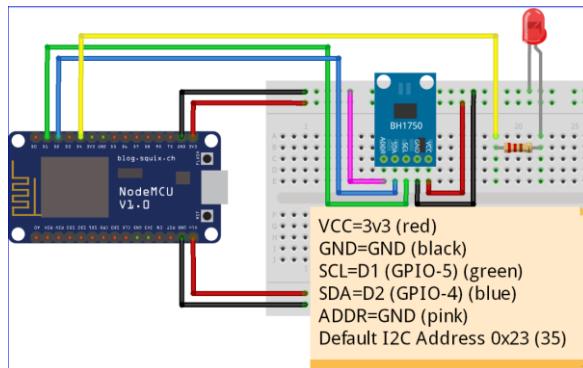
### Purpose

To test using ESP Easy local variables with task Generic - Dummy Device.

If the measured Lux value is less than the threshold set (i.e. 100), switch a red LED ON else OFF. The red LED is connected to pin D5 (GPIO14) of the NodeMCU.

There is no interaction with Domoticz, its just to understand using variables with Generic – Dummy Device.

### Circuit



### GPIO Command Syntax

The GPIO command is used to switch the LED ON or OFF.

```
gpio, gpio number, 1|0
```

*Note*

State 1=ON, 0=OFF

### Generic – Dummy Device

A dummy device with two values is used to

- Set the threshold
- Track the state of the red LED indicator, to avoid sending GPIO commands permanently.

### Task Settings for the Generic – Dummy Device

- Device: Generic – Dummy Device (with task number 6)
- Name: AmbientLight\_Settings
- Value Index 1: Threshold, Decimals: 0
- Value Index 2: State, Decimals: 1

**Task Settings**

Device: Generic - Dummy Device

Name: AmbientLight\_Var

Enabled:

Simulate Data Type: SENSOR\_TYPE\_SINGLE

Data Acquisition

Send to Controller 1:  IDX: 0

Send to Controller 2:  IDX: 0

Interval: 3600 [sec]

Values

#	Name	Decimals
1	Threshold	0
2	State	0

## Task List

Task	Enabled	Device	Name	Port	Ctr (IDX)	GPIO	Values
<a href="#">Edit</a>	6	✓	Generic - Dummy Device	AmbientLight_Settings			Threshold: 100 State: 0 ...0.00 ...0.00

### Extract from the list of devices.

The Generic - Dummy Device named AmbientLight\_Settings, has task number 6 with the 3 variables with index 1 to 2.

This information is required to update a variable in the rule using the command:

```
TaskValueSet TaskNr,VariableIndex,Value
```

## ESP Easy Rule

```
// Check ambient light device named ESPEasy_BH1750 value Lux (see devices properties).
// If Lux value less then threshold (i.e. 100), switch the LED ON else OFF.
// The LED is connected to pin D5 (GPIO14).
// Command syntax: gpio, gpio number, 1|0 - 1=ON;0=OFF
// A generic dummy device is used to set the threshold at boot and track the state of the LED
indicator, to avoid sending GPIO commands permanently
// [AmbientLight_Settings#Threshold], [AmbientLight_Settings#State]

// Init the variables for device AmbientLight_Settings
on System#Boot do
    // Set ambient light threshold setting
    TaskValueSet 6,1,100
    // Turn LED off
    gpio,14,0
    // Update led state setting
    TaskValueSet 6,2,0
endon

// Handleambientlight lux changes
on ESPEasy_BH1750#Lux do

    // Check if Lux below threshold and LED is OFF
    if [ESPEasy_BH1750#Lux]<[AmbientLight_Settings#Threshold] and [AmbientLight_Settings#State]=0
        // Turn LED on and update dummy variable
        gpio,14,1
        TaskValueSet 6,2,1
    endif

    // Check if Lux above/equal threshold and LED is ON
    if [ESPEasy_BH1750#Lux]>=[AmbientLight_Settings#Threshold] and [AmbientLight_Settings#State]=1
        // Turn LED off and update dummy variable
        gpio,14,0
        TaskValueSet 6,2,0
    endif

endon
```

## ESP Easy Log Entries

**LED switched ON triggered by Lux value 6.67 below threshold 100.**

```
531124: BH1750 Address: 0x23 Mode: 0x1 : Light intensity: 6.67
531128: EVENT: ESPEasy_BH1750#Lux=6.67
531259: ACT : gpio,14,1
531263: SW : GPIO 14 Set to 1
531266: ACT : TaskValueSet 6,2,1
531273: Command: taskvalueset
531394: Domoticz: Sensortype: 1 idx: 46 values: 6.67
```

**LED switched OFF triggered by Lux value 273.33 above threshold 100.**

```
546131: BH1750 Address: 0x23 Mode: 0x1 : Light intensity: 273.33
546135: EVENT: ESPEasy_BH1750#Lux=273.33
546324: ACT : gpio,14,0
546328: SW : GPIO 14 Set to 0
546331: ACT : TaskValueSet 6,2,0
546338: Command: taskvalueset
546431: Domoticz: Sensortype: 1 idx: 46 values: 273.33
```

# ESP controlling Hue Brightness

## Purpose

To control the brightness of the Hue light “MakeLab” with idx=118 via potentiometer connected to an ESP8266 NodeMCU.

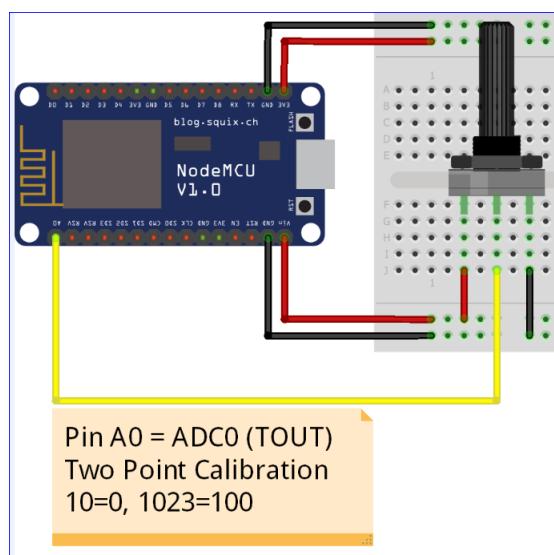
## Parts

- 1x NodeMCU
- 1x Potentiometer
- 1x Breadboard
- 3x Wires male-male

## Wiring

Potentiometer	NodeMCU
Vcc	Vin 5v – power supplied via USB from PC
Signal ADC0 (TOUT)	A0
GND	GND

## Circuit



## Solution 1

This preferred solution uses an ESP Easy Analog input device, ESP Easy Dummy Devices and ESP Easy Rule.

The ESP Easy rule updates the Hue brightness using the SendToHTTP command, which is the preferred method to update Domoticz devices.

### ESP Easy Device Configuration - Analog Input

The screenshot shows the configuration interface for an Analog input device named "HUE\_Dimmer". Key settings include:

- Task Settings:** Device is set to "Analog input - internal".
- Two Point Calibration:** Calibration is enabled with points at 10 (0.000) and 1023 (100.000).
- Data Acquisition:** Send to Controller 1 is configured with IDX 154. Send to Controller 2 is configured with IDX 118. The interval is set to 2 seconds.
- Values:** A table lists the value "Analog" with a formula of 1 and 0 decimal places.

### ESP Easy Device Configuration – Dummy Devices

The screenshot shows the configuration interface for a Generic - Dummy Device named "Varstore". Key settings include:

- Task Settings:** Device is set to "Generic - Dummy Device".
- Simulate Data Type:** Set to "SENSOR\_TYPE\_SINGLE".
- Data Acquisition:** Send to Controller 1 is configured with IDX 0. Send to Controller 2 is configured with IDX 0. The interval is set to 60 seconds.
- Values:** A table lists two values: "HUE\_Dimmer" and "HUE\_Dimmer\_Delta", both with a formula of 1 and 0 decimal places.

## ESP Easy Device Configuration – Overview Devices

The devices used, with name and value, are

- HUE\_Dimmer with value Analog
- Varstore with values HUE\_Dimmer and HUE\_Dimmer\_Delta

ESP Easy Mega: ESP_Easy							
Main	Config	Controllers	Hardware	Devices	Rules	Notifications	Tools
Task	Enabled	Device		Name	Port	Ctr (IDX)	GPIO
Edit	1	✓	Analog input - internal	HUE_Dimmer			ADC (TOUT) Analog: 40
Edit	2	✗	Switch input - Switch	Hue_Light_Switch		1 (154)	GPIO-14 Switch: 0
Edit	3	✗	Display - LCD2004				GPIO-4 GPIO-5
Edit	4	✓	Light/Lux - BH1750	ESPEasy_BH1750		2 (46)	GPIO-4 GPIO-5 Lux: 46.67
Edit	5	✓	Generic - Dummy Device	Varstore			HUE_Dimmer: 40 HUE_Dimmer_Delta: 1 : 0.00 : 0.00

## ESP Easy Rule

```
// Control Hue light via Potmeter named HUE_Dimmer with value Analog.
// A dummy device named Varstore (TaskNr 5) is used to store 2 values:
// Value 1 = HUE_Dimmer for the previous Hue light value
// Value 2 = HUE_Dimmer_Delta for the absolute delta brightness between Hue light and previous value

// Listen to Hue light analog value changes
on HUE_Dimmer#Analog do

    // Save the delta to dummy variable value 2
    TaskValueSet 5,2,[HUE_Dimmer#Analog]-[Varstore#HUE_Dimmer]
    Delay 5

    // Get the absolute delta for the new dimmer value
    // Update the dummy variable #2
    if [Varstore#HUE_Dimmer_Delta]<0

        TaskValueSet 5,2,[Varstore#HUE_Dimmer_Delta]*-1

    endif

    // Check if delta > 2, this to avoid noise
    // Submit api rest request to domoticz system to set brightness level
    if [Varstore#HUE_Dimmer_Delta]>2

        SendToHTTP domoticz-
        ip,8080,/json.htm?type=command&param=switchlight&idx=118&switchcmd=Set%20Level&level=[HUE_Dimmer#Analog]

    endif

    // Update the dummy variable #1
    TaskValueSet 5,1,[HUE_Dimmer#Analog]

endon
```

## Solution 2

This solution uses an ESP Easy Analog input device, Domoticz Text device (Hardware Virtual Sensor) and Domoticz dzVents script.

It is not the preferred way to set the brightness, it is just to show converting the MQTT default command into a value.

### ESP Easy

Hardware	<i>Potentiometer = ESP8266 NodeMCU</i> VCC = Vin (5v) GND = GND Signal = A0
Devices	

#### Notes

When using ESPEasy Controller #2 with a Hue Device (for example idx=118), the Domoticz log shows:

```
2019-04-26 19:02:24.720 MQTT: Topic: domoticz/in, Message:  
{"idx":118,"RSSI":10,"nvalue":0,"svalue":"75"}
```

With this command, a Hue light can not be controlled.

To control a Hue light, this command is required:

```
{"command": "switchlight", "idx": 118, "switchcmd": "Set Level", "level": 50}
```

As a workaround a Domoticz Text Device (Hardware Virtual Sensor) with a dzVents script is used.

## Domoticz

Create a Text device (Hardware Virtual Sensor) with name ESPEasy Hue Light.

	Idx	Hardware	ID	Unit	Name	Type	SubType	Data
	154	VirtualSensors	00082154	1	ESPEasy Hue Light	General	Text	51

Create a dzVents Lua script event.

Event name: hue\_control\_espeasy

```
--[[[  
    hue_control_espeasy.lua  
    Control a Hue Light via ESP8266 NodeMCU running ESPEasy.  
]]--  
  
-- Idx of the devices used  
local IDX_ESPEASY_HUE_LIGHT = 154  
local IDX_HUE_MAKELAB = 118  
  
return {  
    on = {  
        devices = {  
            IDX_ESPEASY_HUE_LIGHT  
        },  
    },  
    data = {  
        prevvalue = { initial = -1 }  
    },  
    execute = function(domoticz, device)  
        local currvalue = math.floor(tonumber(device.text))  
        if domoticz.data.prevvalue == -1 then  
            domoticz.data.prevvalue = currvalue  
        end  
        domoticz.log('Device ' .. device.name .. ' changed from ' .. tostring(domoticz.data.prevvalue) ..  
        ' to ' .. tostring(currvalue), domoticz.LOG_INFO)  
        -- handle noise, i.e. make changes delta > 1  
        if (math.abs(domoticz.data.prevvalue - currvalue)) > 1 then  
            domoticz.data.prevvalue = currvalue  
            if (domoticz.devices(IDX_HUE_MAKELAB).state == 'Off') then  
                domoticz.devices(IDX_HUE_MAKELAB).switchOn()  
            end  
            domoticz.devices(IDX_HUE_MAKELAB).dimTo(currvalue)  
        end  
    end  
}
```

# ESP BMP280 to Domoticz

## Purpose

To measure the temperature and air pressure from the sensor BMP280 connected to the NodeMCU and send the values to a Domoticz device.

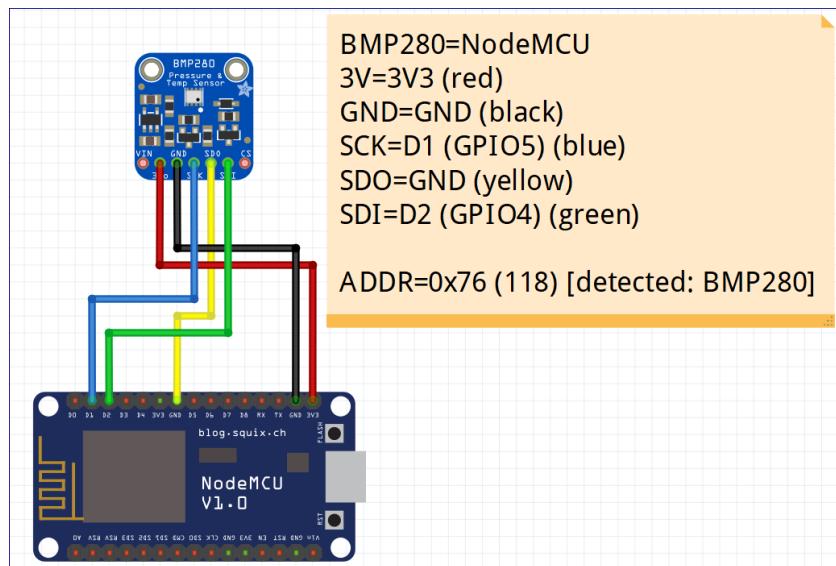
## Parts

- 1x NodeMCU
- 1x BMP280 sensor
- 1x Breadboard
- 5x Wires female-female

## Wiring

BMP280	NodeMCU [wirecolor]
VIN	n/a
3V	3V [red]
GND	GND [black]
SCK	D1 (GPIO5) [blue]
SDO	GND [yellow]
SDI	D2 (GPIO4) [green]
CS	n/a

## Circuit



## ESP Easy

### Task Settings for Device Environment - BMx280

Task Settings

Device: Environment - BMx280

Name: ESPEasy\_BMP280

Enabled:

I2C Address: 0x76 (118) - (default) [Detected BMP280]

Note: SDO Low=0x76, High=0x77

Altitude: 0 [m]

Temperature offset: 0 [x 0.1C] Note: Offset in units of 0.1 degree Celcius

Data Acquisition

Send to Controller

IDX: 60

Interval: 5 [sec]

Values

#	Name	Formula	Decimals
1	Temperature		2
2	Humidity		2
3	Pressure		2

#### Note

- The controller 1 is used. This is a Domotocz MQTT controller.
- The Idx of the Domoticz device receiving the data, is taken from next step adding a Domoticz Temp+Baro device.

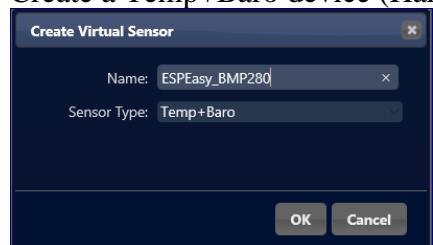
After adding check the if the values of the device are updating.

Task	Enabled	Device	Name	Port	Ctr (IDX)	GPIO	Values
Edit	1 ✓	Environment - BMx280	ESPEasy_BMP280			GPIO-4 GPIO-5	Temperature: 21.81 Humidity: 0.00 Pressure: 1017.75

The data is OK. Note that Humidity is 0 as not supported by this device BMP280.  
To measure also Humidity use a BME280

## Domoticz

Create a Temp+Baro device (Hardware Virtual Sensor) with name ESPEasy\_BMP280



Idx	Hardware	ID	Unit	Name	Type	SubType	Data
60	VirtualDevices	1408C	1	ESPEasy_BMP280	Temp + Baro	BMP085 I2C	0.0 C, 1038.0 hPa

The Domoticz Idx is used in the ESP Easy device ESPEasy\_BMP280 to set the property IDX for controller 1.

Check the Domoticz Log, if data from the sensor is received:

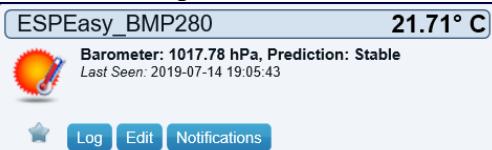
```
2019-07-14 19:00:47.890 MQTT: Topic: domoticz/in, Message:  
{"idx":60,"RSSI":9,"nvalue":0,"svalue":"21.71;1017.74;0;0"}
```

*Note*

The svalue contains:

Temperature;Barometric pressure;Barometer forecast;Altitude (not used, set to 0)

The widgets.

GUI Tab Temperature	GUI Tab Weather
 <p>ESPEasy_BMP280      <b>21.71°C</b> Barometer: 1017.78 hPa, Prediction: Stable Last Seen: 2019-07-14 19:05:43  ★ Log Edit Notifications</p>	 <p>ESPEasy_BMP280      <b>1017.78 hPa</b> Prediction: Stable Last Seen: 2019-07-14 19:06:39  ★ Log Edit Notifications</p>

The Barometer forecast can be one of:

0 = No Info, 1 = Sunny, 2 = Partly Cloudy, 3 = Cloudy, 4 = Rain

ESP Easy always delivers value 0, means the forecast requires to be adjusted.

<TODO> Find a way using the Domoticz internal calculations.

# MQTT

## Purpose

To enable subscribing and publishing MQTT messages ([see Wiki](#)).

Ensure also to lookup the reference [Domoticz API/JSON Url's](#).

## Install

### Raspberry Pi

Install [mosquitto](#) on the Raspberry Pi.

Open Terminal and run

```
sudo apt-get install mosquitto mosquitto-clients
```

Check if mosquitto is running:

```
mosquitto -h
```

### Output

```
mosquitto version 1.4.10 (build date Fri, 22 Dec 2017 08:19:25 +0000)
mosquitto is an MQTT v3.1 broker.
```

### Hint

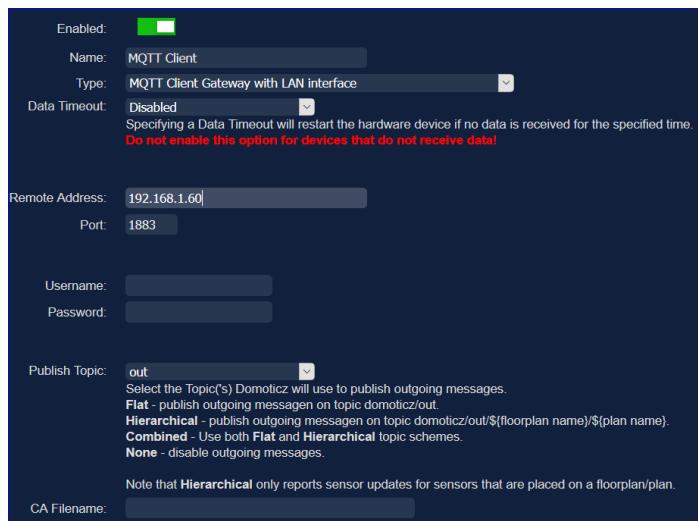
The MQTT parameter to add the host to the mosquitto command is

```
-h localhost
```

## Domoticz

Domoticz Add Hardware: Domoticz GUI > Setup > Hardware and add the “MQTT Client Gateway with LAN Interface”.

Property	Value
Type	MQTT Client Gateway with LAN Interface
Name	MQTT
Remote Address	domoticz-ip
Port	1883
Publish Topic	Out
Username	Empty
Password	Empty



Check the Domoticz Log: Domoticz GUI > Setup > Log

```
2018-08-27 12:21:12.126 Status: MQTT: Connecting to domoticz-ip:1883
2018-08-27 12:21:12.228 Status: MQTT: connected to: domoticz-ip:1883
2018-08-27 12:21:12.328 Status: MQTT: Subscribed
```

## Domoticz Topics

Subscribe to Topics from Domoticz	domoticz/out
Publish a Topic to Domoticz	domoticz/in

# Mosquitto

Test MQTT messaging using mosquitto commands from a terminal.

## Subscribe

### Command

Subscribe to all MQTT messages published by Domoticz (topic: domoticz/out):

```
mosquitto_sub -t 'domoticz/out'
```

### Sample Messages

Some messages published by Domoticz in JSON format.

The source is from the devices provided by the Hardware Device Motherboard (idx=1 and 2):

	2	Motherboard	0001	1	Internal Temperature	Temp	LaCrosse TX3	42.4 C
	1	Motherboard	0000044D	1	CPU_Usage	General	Percentage	0.19%

For each of the messages the topic is *domoticz/out* and the payload is a JSON string.

To get a value from a key, the JSON string needs to be parsed.

### CPU Usage

```
{
  "Battery" : 255, "RSSI" : 12, "description" : "", "dtype" : "General", "id" : "0000044D",
  "idx" : 1, "name" : "CPU_Usage", "nvalue" : 0, "stype" : "Percentage", "svalue1" : "0.19",
  "unit" : 1
}
```

### CPU Temperature

```
{
  "Battery" : 255, "RSSI" : 12, "description" : "", "dtype" : "Temp", "id" : "1",
  "idx" : 2, "name" : "Internal Temperature", "nvalue" : 0, "stype" : "LaCrosse TX3",
  "svalue1" : "42.4", "unit" : 1
}
```

## Publish

Let's change the text for a Virtual Device Type General, Text with Idx 9, Name "Biotonne Pi" from "Hello World" to "Moin Moin" (a typical greeting word in northern part of Germany).

	Idx	Hardware	ID	Unit	Name	Type	SubType	Data
	9	Virtual Devices	00082009	1	Biotonne Pi	General	Text	Hello World

## Command

```
mosquitto_pub -t 'domoticz/in' -m '{"idx":9,"nvalue":0,"svalue":"Moin Moin"}'
```

There is no terminal output from this command.

Possible checks if the command was successful:

Check Domoticz Widget has changed (Domoticz GUI Tab Utility)	
Check Domoticz Log entry (Domoticz GUI Tab Setup > Log)	2018-08-27 15:57:26.792 MQTT: Topic: domoticz/in, Message: {"idx":9,"nvalue":0,"svalue":"Moin Moin"}

# Python

To be able to use MQTT from python, the paho client library is required.

## Paho Client Library

To install, download the client and run the Python setup script to install the client.

There are two ways:

- cloning from github, which will install the client with source code and examples
- using pip and pip3

## GitHub

### Run from a terminal

```
mkdir /home/pi/python
git clone https://github.com/eclipse/paho.mqtt.python.git
cd paho.mqtt.python
sudo python setup.py install
```

## Output

```
pi@DomoticzDev:~ $ mkdir python
pi@DomoticzDev:~ $ git clone https://github.com/eclipse/paho.mqtt.python.git
Cloning into 'paho.mqtt.python'...
remote: Counting objects: 2932, done.
remote: Compressing objects: 100% (66/66), done.
remote: Total 2932 (delta 27), reused 85 (delta 24), pack-reused 2834
Receiving objects: 100% (2932/2932), 835.76 KiB | 447.00 KiB/s, done.
Resolving deltas: 100% (1487/1487), done.
pi@DomoticzDev:~ $ cd paho.mqtt.python
pi@DomoticzDev:~/paho.mqtt.python $ sudo python setup.py install
running install
...
Installed /usr/local/lib/python2.7/dist-packages/paho_mqtt-1.3.1-py2.7.egg
Processing dependencies for paho-mqtt==1.3.1
Finished processing dependencies for paho-mqtt==1.3.1
```

## Pip (Python2) & Pip3 (Python3)

### Run from a terminal with sample output

#### Command

```
pip install paho-mqtt
```

#### Output

```
Collecting paho-mqtt
  Downloading
    https://files.pythonhosted.org/packages/2a/5f/cf14b8f9f8ed1891cda893a2a7d1d6fa23de2a9fb4832f05cef02b79d
      01f/paho-mqtt-1.3.1.tar.gz (80kB)
        100% |81kB 989kB/s
  Building wheels for collected packages: paho-mqtt
    Running setup.py bdist_wheel for paho-mqtt ... done
    Stored in directory:
      /home/pi/.cache/pip/wheels/38/ca/67/86c7e4acc659ce5ab74cbb8cc38de50c90ed4f827133e36994
  Successfully built paho-mqtt
  Installing collected packages: paho-mqtt
  Successfully installed paho-mqtt-1.3.1
```

## Command

```
pip3 install paho-mqtt
```

## Output

```
Collecting paho-mqtt
  Downloading https://www.piwheels.org/simple/paho-mqtt/paho_mqtt-1.3.1-py3-none-any.whl (57kB)
    100% |61kB 437kB/s
Installing collected packages: paho-mqtt
Successfully installed paho-mqtt-1.3.1
```

## Subscribe Sample Script

This Python sample script connects to the MQTT broker running on the Raspberry Pi, subscribes to the Domoticz Out topic ('domoticz/out') and filters out the value for the device with idx 1, which is the Raspberry Pi motherboard CPU usage in percentage.

	Idx	Hardware	ID	Unit	Name	Type	SubType	
<input type="checkbox"/>	1	Motherboard	0000044D	1	CPU_Usage	General	Percentage	0.18%

```
#!/usr/bin/env python

import time
import paho.mqtt.client as mqtt
import json

broker= "localhost"
topic = "domoticz/out"
idx = 1

def on_connect(client, userdata, flags, rc):
    print("Connected with result code " + str(rc))
    client.subscribe(topic)

def on_message(client, userdata, message):
    print("message received " ,str(message.payload.decode("utf-8")))
    print("message topic=",message.topic)
    print("message qos=",message.qos)
    print("message retain flag=",message.retain)
    json_string = str(message.payload.decode("utf-8"))
    getidxvalue(json_string, idx)

def on_log(client, userdata, level, buf):
    print("log: ",buf)

# JSON Parsing
def getidxvalue(json_string, idx):
    parsed_json = json.loads(json_string)
    parsed_idx = int(parsed_json['idx'])
    if parsed_idx == idx:
        parsed_name = str(parsed_json['name'])
        parsed_value = str(parsed_json['svalue1'])
        print(parsed_idx, parsed_name, parsed_value)

print("Creating new instance")
client = mqtt.Client("P1")
client.on_connect = on_connect
client.on_message = on_message
client.on_log = on_log
print("Connecting to the broker", broker)
client.connect(broker, 1883, 60)
time.sleep(4)
client.loop_forever()
```

## Output Sample with lots of prints to show the steps & actions

```
$ python3 mqtttest.py
creating new instance
connecting to broker
log: Sending CONNECT (u0, p0, wr0, wq0, wf0, c1, k60) client_id=b'P1'
log: Received CONNACK (0, 0)
Connected with result code 0
log: Sending SUBSCRIBE (d0) [(b'domoticz/out', 0)]
log: Received SUBACK
log: Received PUBLISH (d0, q0, r0, m0), 'domoticz/out', ... (229 bytes)
message received {
    "Battery" : 255,
    "RSSI" : 12,
    "description" : "",
    "dtype" : "General",
    "id" : "0000044D",
    "idx" : 1,
    "name" : "CPU_Usage",
    "nvalue" : 0,
    "stype" : "Percentage",
    "svalue1" : "0.77",
    "unit" : 1
}

message topic= domoticz/out
message qos= 0
message retain flag= 0
1 CPU_Usage 0.77

message topic= domoticz/out
message qos= 0
message retain flag= 0
1 CPU_Usage 0.33
^CTraceback (most recent call last):
  File "mqtttest.py", line 54, in <module>
    client.loop_forever()
  File "/home/pi/.local/lib/python3.5/site-packages/paho/mqtt/client.py", line 1481, in loop_forever
    rc = self.loop(timeout, max_packets)
  File "/home/pi/.local/lib/python3.5/site-packages/paho/mqtt/client.py", line 988, in loop
    socklist = select.select(rlist, wlist, [], timeout)
KeyboardInterrupt
```

## Publish Sample Script

This sample script connects to the MQTT broker running on the Raspberry Pi and publishes text to a Virtual Device with idx 9, name Biotonne Pi, Type General, SubType Text

9	Virtual Devices	00082009	1	Biotonne Pi	General	Text	Moin Moin
---	-----------------	----------	---	-------------	---------	------	-----------

The script sets the text from “Moin Moin” to “Hello Again”.

### Python3 Script

```
#!/usr/bin/env python

import time
import paho.mqtt.client as mqtt

version="MQTT Test v20180827"
broker= "localhost"
topic = "domoticz/in"
idx = 9
payload='{"command": "udevice", "idx": %s, "svalue": "Hello Again"}' % (idx)

# MQTT Callback Functions
def on_connect(client, userdata, flags, rc):
    print("Connected with result code " + str(rc))

def on_message(client, userdata, message):
    print("message received " ,str(message.payload.decode("utf-8")))
    print("message topic=",message.topic)
    print("message qos=",message.qos)
    print("message retain flag=",message.retain)

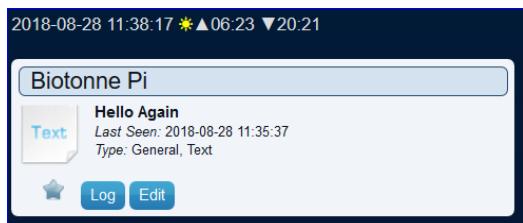
def on_log(client, userdata, level, buf):
    print("log: ",buf)

print(version)
print("Creating new instance")
client = mqtt.Client("P1")
client.on_connect = on_connect
client.on_message = on_message
client.on_log = on_log
print("Connecting to the broker", broker)
client.connect(broker, 1883, 60)
time.sleep(4)
print("Publishing message to topic",topic, "with payload",payload)
domoticz/in, Message: {"command": "udevice", "idx": 9, "svalue": "Hello Again"}
client.publish(topic,payload)
time.sleep(4)
client.loop_stop()
```

## Output

```
pi@DomoticzDev:~/python $ python3 mqtt-pub-test.py
MQTT Test v20180827
Creating new instance
Connecting to the broker localhost
log: Sending CONNECT (u0, p0, wr0, wq0, wf0, c1, k60) client_id=b'P1'
Publishing message to topic domoticz/in with payload {"command": "udevice", "idx": 9, "svalue": "Hello Again"}
log: Sending PUBLISH (d0, q0, r0, m1), 'b'domoticz/in'', ... (57 bytes)
```

## Widget with updated text



# Node-RED

## Purpose

To explore Node-RED functionality for the Domoticz Home Automation system:

- Node-RED as alternative script engine, i.e. perform tasks, i.e. MQTT subscribe or publish
- Node-RED UI Dashboard Add-On as a simple monitor using Gauges & Charts or to control using buttons / slider / input-fields
- Trigger notifications or as watchdog for Domoticz process

[Node-RED](#) = Low-code programming for event-driven applications.

If not familiar with the Node-RED concept, strongly recommend reading the Node-RED [get started](#) documentation.

Several Functions make use of Node-RED, like [Volumio](#) or [Email Control](#) and many other.

## Installation

### Option 1: Raspberry Pi Desktop

Desktop > Preferences > Recommended Software > All Programms > Click on Node-RED.  
Press OK.

The package will be installed.

After installation, a new Desktop Menu Entry is available:  
Programming > Node-RED.

To enable autostart of Node-RED at every boot, run terminal command:

```
sudo systemctl enable nodered.service
```

### Output

```
Created symlink /etc/systemd/system/multi-user.target.wants/nodered.service →  
/lib/systemd/system/nodered.service.
```

To go for sure if Node-RED is started during boot, reboot the Raspberry Pi

```
sudo shutdown -r now
```

and access Node-RED (<http://domoticz-ip:1880>).

Use disable, to disable starting Node-RED at autostart:

```
sudo systemctl disable nodered.service
```

## Option 2: Raspberry Pi Command Line

See next Update.

### Update

#### Important

Prior updating Node-RED, backup the flows file, located in

```
/home/pi/.node-red/
```

The flows have, depending on the Raspberry Pi device, following name:

```
flows_DoPro.json  
flows_DoDev.json
```

After updating, reboot the Raspberry Pi.

Read the [Update Reference](#).

#### Update Command

```
bash <(curl -sL https://raw.githubusercontent.com/node-red/linux-installers/master/deb/update-nodejs-and-nodered)
```

#### Update Log Example

This script will remove versions of Node.js prior to version 7.x, and Node-RED and if necessary replace them with Node.js 10.x LTS (dubnium) and the latest Node-RED from Npm.

It also moves any Node-RED nodes that are globally installed into your user `~/.node-red/node_modules` directory, and adds them to your package.json, so that you can manage them with the palette manager.

It also tries to run 'npm rebuild' to refresh any extra nodes you have installed that may have a native binary component. While this normally works ok, you need to check that it succeeds for your combination of installed nodes.

To do all this it runs commands as root - please satisfy yourself that this will not damage your Pi, or otherwise compromise your configuration. If in doubt please backup your SD card first.

Are you really sure you want to do this ? [y/N] ? y

Would you like to install the Pi-specific nodes ? [y/N] ? y

Running Node-RED install for user pi at /home/pi on raspbian

This can take 20-30 minutes on the slower Pi versions - please wait.

Stop Node-RED	✓
Remove old version of Node-RED	✓
Using N to manage Node.js	+
Update Node.js LTS	✓      Node v12.14.0    Npm 6.13.4
Clean npm cache	✓
Install Node-RED core	✓      1.0.3
Move global nodes to local	-
Install extra Pi nodes	✓
Npm rebuild existing nodes	-
Add shortcut commands	✓
Update systemd script	✓

Any errors will be logged to /var/log/nodered-install.log  
All done.

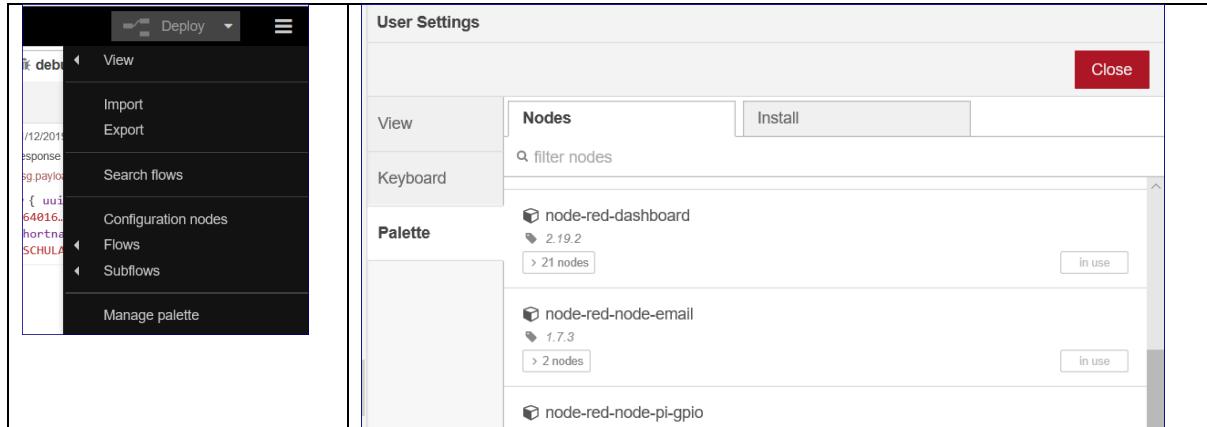
You can now start Node-RED with the command node-red-start or using the icon under Menu / Programming / Node-RED

Then point your browser to localhost:1880 or http://{your\_pi\_ip-address}:1880

Started Sat 21 Dec 10:10:17 CET 2019 - Finished Sat 21 Dec 10:12:28 CET 2019

## Install Add-Ons

It is strongly recommended to install Node-RED add-ons, via the Node-RED menu “Manage Palette”.



## Access Flows & Dashboard UI

To access Node-RED, point a browser at URL:

```
http://localhost:1880 (when using a Raspberry Pi with a connected monitor)
```

or

```
http://domoticz-ip:1880 (remote)
```

This enables to manage Node-RED, define & run flows etc.

If the Dashboard add-on is installed, access the UI with its tabs via URL:

```
http://domoticz-ip:1880/ui
```

## Start, Stop, Log

Task	Terminal Command
Node-RED Start	node-red-start
Node-RED Stop	node-red-stop
Node-RED view recent log output	node-red-log

## Manage Node Packages

npm

To manage node packages in Node-RED, the npm package is required.  
Check if installed:

```
npm -v
```

If package not found, then install via Desktop > Preferences > Add / Remove Software and restart Node-RED (terminal commands node-red-stop, node-red-start)

Check npm version:

```
npm -v
Output
6.4.1
```

## Install/Updates

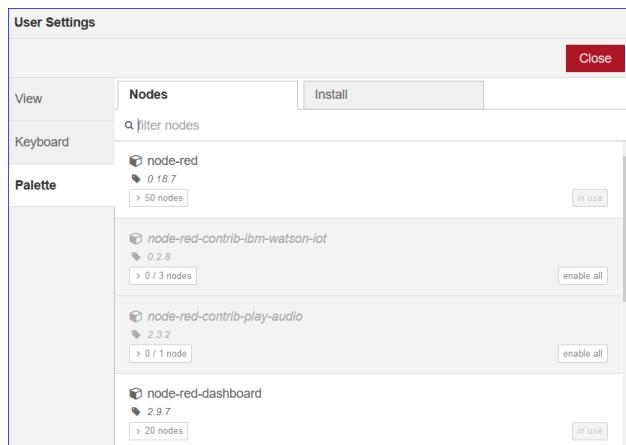
### Important

To install or update any node package, Node-RED recommends via *Node-RED Menu Settings > Manage Palette > Install*.

### Note

If direct installed via npm, Node-RED might be missing dependencies.

After install/update, restart Node-RED (terminal commands `node-red-stop`, `node-red-start`). It is not recommended to install using terminal commands.



## Folder Locations

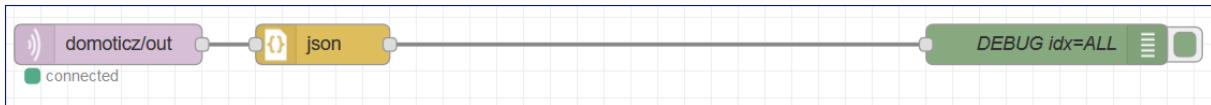
Data	Folder
Modules	/home/pi/.node-red
Flows	/home/pi/.node-red/flows_DomoticzDev.json
Additional Node Packages	/home/pi/.node-red/node_modules/<package name>
Additional Node Packages Sample Dashboard	/home/pi/.node-red/node_modules/node-red-dashboard

## Flow Domoticz MQTT Messages

A simple example flow, to test Node-RED.

Subscribe to MQTT topic “domoticz/out” to listen to all Domoticz MQTT messages.

### Node-RED Flow



The MQTT Broker is localhost with default port 1883.

The JSON node is used to convert JSON message to JavaScript message.

## Node-RED Flow Source

```
[{"id": "45e7c703.b9b9f", "type": "mqtt_in", "z": "76cb1798.6a823", "name": "", "topic": "domoticz/out", "qos": "2", "broker": "d58d713d.0e0eb8", "x": 110, "y": 340, "wires": [{"cc4fd39c.684108"}]}, {"id": "cc4fd39c.684108", "type": "json", "z": "76cb1798.6a823", "name": "", "property": "payload", "action": "", "pretty": false, "x": 270, "y": 340, "wires": [{"552cdad.37816a4"}]}, {"id": "552cdad.37816a4", "type": "debug", "z": "76cb1798.6a823", "name": "DEBUG idx=ALL", "active": true, "tosidebar": true, "console": false, "tostatus": false, "complete": "payload", "x": 810, "y": 340, "wires": []}, {"id": "d58d713d.0e0eb8", "type": "mqtt-broker", "z": "", "name": "Domoticz MQTT Broker", "broker": "localhost", "port": "1883", "clientid": "", "usetls": false, "compatmode": true, "keepalive": "60", "cleansession": true, "birthTopic": "", "birthQos": "0", "birthPayload": "", "closeTopic": "", "closeQos": "0", "closePayload": "", "willTopic": "", "willQos": "0", "willPayload": ""}]}
```

## Output debug

<p>The screenshot shows the Node-RED debug tab with three log entries:</p> <ul style="list-style-type: none"> <li>8/30/2018, 1:03:39 PM node: DEBUG idx=ALL domoticz/out : msg.payload : Object { Battery: 255, RSSI: 12, description: "", dtype: "General", id: "0000044C" ... }</li> <li>8/30/2018, 1:03:43 PM node: DEBUG idx=ALL domoticz/out : msg.payload : Object { Battery: 100, RSSI: 5, description: "", dtype: "Temp + Humidity", id: "10766" ... }</li> <li>8/30/2018, 1:03:49 PM node: DEBUG idx=ALL domoticz/out : msg.payload : Object</li> </ul>	<p><b>With a payload example (Hue Light with idx=118)</b></p> <pre>{   "Battery": 255,   "Level": 90,   "RSSI": 12,   "description": "",   "dtype": "Light/Switch",   "id": "00000005",   "idx": 118,   "name": "Hue MakeLab",   "nvalue": 2,   "stype": "Switch",   "svalue1": "90",   "switchType": "Dimmer",   "unit": 1}</pre>
<p>To access a property, convert the Domoticz message to a JSON object, then get the property, like msg.payload.idx or msg.payload.Level</p>	

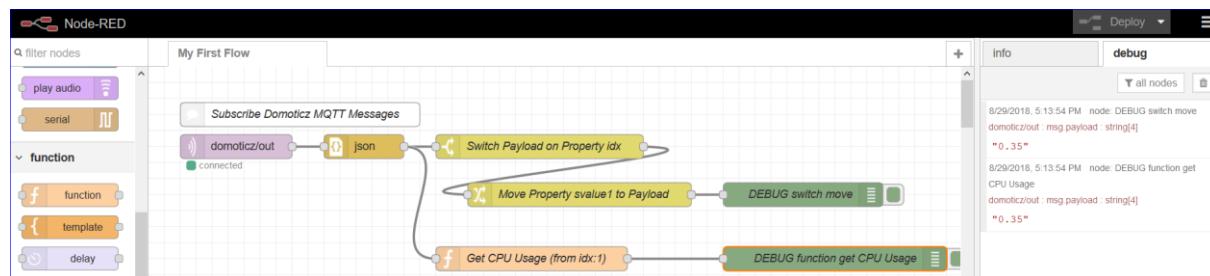
## Flow Raspberry Pi CPU Usage

Subscribe to MQTT topic “Domoticz/in” to listen to all Domoticz MQTT messages. From the message payload (after conversion to JSON), select the property idx with value 1. Then select the property svalue1 to get the CPU Usage.

### Domoticz Topic “Domoticz/in” Message Payload for idx = 1

```
{"Battery":255,"RSSI":12,"description":"","dtype":"General","id":"0000044D","idx":1,"name":"CPU_Usage","nvalue":0,"stype":"Percentage","svalue1":"0.28","unit":1}
```

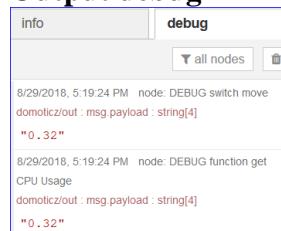
### Node-RED Flow



### Node-RED Flow Source

```
[{"id":"f67403bf.ebdc88","type":"mqtt_in","z":"76cb1798.6a823","name":"","topic":"domoticz/out","qos":2,"broker":"d58d713d.0e0eb8","x":110,"y":100,"wires":[[{"db5fff92.295628"}]},{ "id": "35214a2f.f89656", "type": "debug", "z": "76cb1798.6a823", "name": "DEBUG switch move", "active": true, "tosidebar": true, "console": false, "tostatus": false, "complete": "payload", "x": 820, "y": 160, "wires": []}, {"id": "db5fff92.295628", "type": "json", "z": "76cb1798.6a823", "name": "", "property": "payload", "action": "", "pretty": false, "x": 270, "y": 100, "wires": [{"5f7a4a09.abb57c", "13e0d06f.2b15d"}]}, {"id": "5f7a4a09.abb57c", "type": "switch", "z": "76cb1798.6a823", "name": "Switch Payload on Property idx", "property": "payload.idx", "propertyType": "msg", "rules": [{"t": "eq", "v": "1", "vt": "num"}], "checkall": true, "repair": false, "outputs": 1, "x": 490, "y": 100, "wires": [{"912289d2.e8c1"}]}, {"id": "13e0d06f.2b15d", "type": "function", "z": "76cb1798.6a823", "name": "Get CPU Usage (from idx:5)", "func": "// Get the property idx from the payload\nnidx = msg.payload.idx;\nncpu_usage=-1;\n// Check for idx 1\nif (idx == 5) {\n    // Get the cpu usage from property svalue1\n    cpu_usage = msg.payload.svalue1;\n    // Assign the cpu usage to the message payload\n    msg.payload = cpu_usage;\n}\n// Return the message\nreturn msg;\n"}, {"id": "912289d2.e8c1", "type": "change", "z": "76cb1798.6a823", "name": "Move Property svalue1 to Payload", "rules": [{"t": "move", "p": "payload.svalue1", "pt": "msg", "to": "payload", "tot": "msg"}], "action": "", "property": "", "from": "", "to": "", "reg": false, "x": 540, "y": 160, "wires": [{"35214a2f.f89656"}]}, {"id": "c030082a.286338", "type": "debug", "z": "76cb1798.6a823", "name": "DEBUG function get CPU Usage", "active": true, "tosidebar": true, "console": false, "tostatus": false, "complete": "payload", "x": 860, "y": 240, "wires": []}, {"id": "acdab92.b0151c8", "type": "debug", "z": "76cb1798.6a823", "name": "DEBUG idx=1", "active": true, "tosidebar": true, "console": false, "tostatus": false, "complete": "payload", "x": 800, "y": 100, "wires": []}, {"id": "d58d713d.0e0eb8", "type": "mqtt-broker", "z": "", "name": "Domoticz MQTT Broker", "broker": "localhost", "port": "1883", "clientid": "", "usetls": false, "compatmode": true, "keepalive": "60", "cleansession": true, "birthTopic": "", "birthQos": "0", "birthPayload": "", "closeTopic": "", "closeQos": "0", "closePayload": "", "willTopic": "", "willQos": "0", "willPayload": ""}]
```

### Output debug



## Node-RED as MQTT Publisher

Instead of defining MQTT topics, a Node-RED flow is an alternative to publish MQTT topics with payload.

For an example, see Dashboard UI > Flow Virtual Sensor.

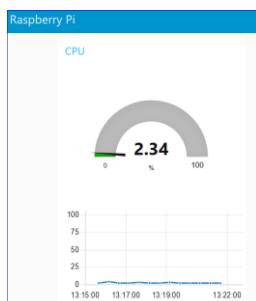
## Dashboard UI

The Node-RED [Dashboard](#) module offers UI nodes to build a Dashboard.

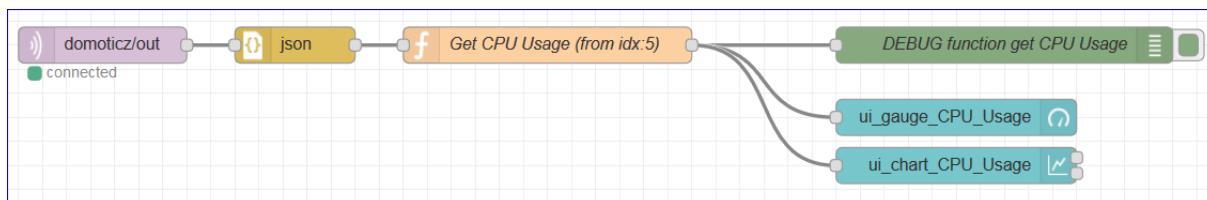
### Flow Monitor CPU Usage

Build a simple example of a dashboard using the Raspberry Pi CPU Usage information, which is displayed in a Gauge and Line Chart.

### Dashboard



### Node-RED Flow



The Function Node selects idx 5 and builds message payload holding the CPU Usage in %.

```
// Get the property idx from the payload
idx = msg.payload.idx;
cpu_usage=-1;
// Check for idx 1
if (idx == 5) {
    // Get the cpu usage from property svalue1
    cpu_usage = msg.payload.svalue1;
    // node.warn("Idx=1, CPU Usage=" + cpu_usage);
    // Assign the cpu usage to the message payload
    msg.payload = cpu_usage;
    // Return the message
    return msg;
}
```

## Node-RED Flow Source

```
[{"id": "f67403bf.ebdc88", "type": "mqtt_in", "z": "76cb1798.6a823", "name": "", "topic": "domoticz/out", "qos": "2", "broker": "d58d713d.0e0eb8", "x": 110, "y": 240, "wires": [[{"id": "db5fff92.295628"}]]}, {"id": "db5fff92.295628", "type": "json", "z": "76cb1798.6a823", "name": "", "property": "payload", "action": "", "pretty": false, "x": 270, "y": 240, "wires": [{"id": "13e0d06f.2b15d"}]}, {"id": "13e0d06f.2b15d", "type": "function", "z": "76cb1798.6a823", "name": "Get CPU Usage (from idx:5)", "func": "// Get the property idx from the payload\nidx = msg.payload.idx;\nncpu_usage=-1;\n// Check for idx 1\nif (idx == 5) {\n    // Get the cpu usage from property svalue1\n    cpu_usage = msg.payload.svalue1;\n    // node.warn(\"Idx=1, CPU Usage=\\" + cpu_usage);\n    // Assign the cpu usage to the message payload\n    msg.payload = cpu_usage;\n    // Return the message\n    return msg;\n}\n", "outputs": 1, "noerr": 0, "x": 480, "y": 240, "wires": [{"id": "c030082a.286338", "type": "debug", "z": "76cb1798.6a823", "name": "DEBUG function get CPU Usage", "active": true, "tosidebar": true, "console": false, "tostatus": false, "complete": "payload", "x": 860, "y": 240, "wires": []}], {"id": "c030082a.286338", "type": "ui_gauge", "z": "76cb1798.6a823", "name": "ui_gauge_CPU_Usage", "group": "c3b6865e.2b93e", "order": 0, "width": 0, "height": 0, "gtype": "gage", "title": "", "label": "%", "format": "{{value}}", "min": 0, "max": 100, "colors": ["#00b500", "#e6e600", "#ca3838"], "seg1": "", "seg2": "", "x": 820, "y": 300, "wires": []}, {"id": "d5bc4ce8.ae1f28", "type": "ui_chart", "z": "76cb1798.6a823", "name": "ui_chart_CPU_Usage", "group": "c3b6865e.2b93e", "order": 0, "width": 0, "height": 0, "label": "", "chartType": "line", "legend": false, "xformat": "HH:mm:ss", "interpolate": "linear", "nodata": "", "dot": true, "ymin": "0", "ymax": "100", "removeOlder": 1, "removeOlderPoints": "", "removeOlderUnit": "3600", "cutout": 0, "useOneColor": false, "colors": ["#1f77b4", "#aec7e8", "#ff7f0e", "#2ca02c", "#98df8a", "#d62728", "#ff9999", "#9467bd", "#c5b0d5"], "useOldStyle": false, "x": 820, "y": 340, "wires": [[{"id": "d58d713d.0e0eb8"}]]}, {"id": "d58d713d.0e0eb8", "type": "mqtt-broker", "z": "", "name": "Domoticz MQTT Broker", "broker": "localhost", "port": "1883", "clientid": "", "usetls": false, "compatmode": true, "keepalive": "60", "cleansession": true, "birthTopic": "", "birthQos": "0", "birthPayload": "", "closeTopic": "", "closeQos": "0", "closePayload": "", "willTopic": "", "willQos": "0", "willPayload": ""}], {"id": "c3b6865e.2b93e", "type": "ui_group", "z": "8a1743ab.9d931", "name": "CPU", "tab": "8a1743ab.9d931", "disp": true, "width": "6", "collapse": false}, {"id": "8a1743ab.9d931", "type": "ui_tab", "z": "", "name": "Raspberry Pi", "icon": "dashboard"}]
```

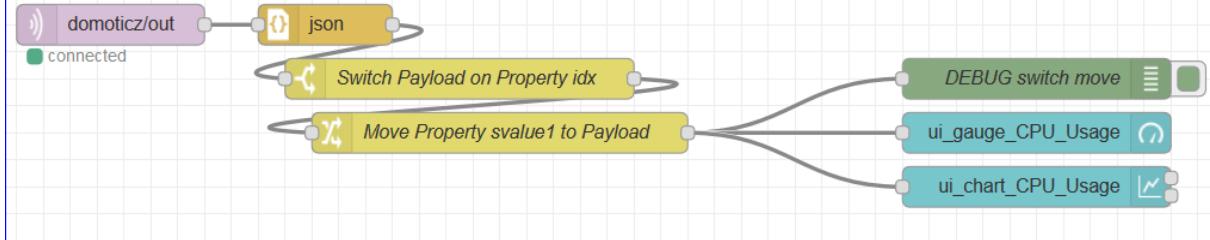
### Note

The charts display each data change which could result in a rather frequent update. To avoid many updates, use a Delay Node which limits the number of messages to for example 12 messages per hour (Properties: "pauseType": "rate", "rate": "12", "nbRateUnits": "1", "rateUnits": "hour").

## Switch Node and Change Node

Instead of using a Function Node, Switch Node and Change Node can be used.

### Node-RED Flow



### Node-RED Flow Source

```

[{"id": "f67403bf.ebdc88", "type": "mqtt_in", "z": "76cb1798.6a823", "name": "", "topic": "domoticz/out", "qos": "2", "broker": "d58d713d.0e0eb8", "x": 110, "y": 100, "wires": [[[ "db5fff92.295628"]]}, {"id": "35214a2f.f89656", "type": "debug", "z": "76cb1798.6a823", "name": "DEBUG switch move", "x": 270, "y": 140, "wires": []}, {"id": "5f7a4a09.abb57c", "type": "switch", "z": "76cb1798.6a823", "name": "Switch Payload on Property idx", "x": 270, "y": 180, "wires": [{"t": "eq", "v": "5", "vt": "num"}], "checkall": true, "active": true, "tosidebar": true, "console": false, "tostatus": false, "complete": "payload", "x": 280, "y": 140, "wires": [{"id": "db5fff92.295628", "type": "json", "z": "76cb1798.6a823", "name": "", "property": "payload", "action": "", "pretty": false, "x": 270, "y": 200, "wires": [{"id": "5f7a4a09.abb57c"}]}, {"id": "91289d2.e8c1", "type": "change", "z": "76cb1798.6a823", "name": "Move Property svalue1 to Payload", "x": 270, "y": 240, "wires": [{"t": "move", "p": "payload.svalue1", "pt": "msg", "to": "payload", "tot": "msg"}, {"t": "move", "p": "payload.svalue1", "pt": "msg", "to": "payload", "tot": "msg"}]}, {"id": "61fef7cc.4fc02", "type": "ui_gauge", "z": "76cb1798.6a823", "name": "ui_gauge_CPU_Usage", "group": "c3b6865e.2b93e", "order": 0, "width": 0, "height": 0, "gtype": "gauge", "title": "", "label": "%", "format": "{{value}}", "min": 0, "max": 100, "colors": ["#00b500", "#e6e600", "#ca3838"], "seg1": "", "seg2": "", "x": 370, "y": 180, "wires": [{"id": "d5bc4ce8.ae1f28"}]}, {"id": "d5bc4ce8.ae1f28", "type": "ui_chart", "z": "76cb1798.6a823", "name": "ui_chart_CPU_Usage", "group": "c3b6865e.2b93e", "order": 0, "width": 0, "height": 0, "label": "", "chartType": "line", "legend": false, "xformat": "HH:mm:ss", "interpolate": "linear", "nodata": "", "dot": true, "ymin": 0, "ymax": 100, "removeOlder": 1, "removeOlderPoints": "", "removeOlderUnit": "3600", "cutout": 0, "useOneColor": false, "colors": ["#1f77b4", "#aec7e8", "#ff7f0e", "#2ca02c", "#98df8a", "#d62728", "#ff9896", "#9467bd", "#c5b0d5"], "useOldStyle": false, "x": 370, "y": 220, "wires": [[{"id": "58d713d.0e0eb8"}]}], {"id": "58d713d.0e0eb8", "type": "mqtt-broker", "z": "", "name": "Domoticz MQTT Broker", "broker": "localhost", "port": 1883, "clientid": "", "usetls": false, "compatmode": true, "keepalive": 60, "cleansession": true, "birthTopic": "", "birthQos": 0, "birthPayload": "", "closeTopic": "", "closeQos": 0, "closePayload": "", "willTopic": "", "willQos": 0, "willPayload": ""}, {"id": "c3b6865e.2b93e", "type": "ui_group", "z": "", "name": "Raspberry Pi", "icon": "dashboard"}]

```

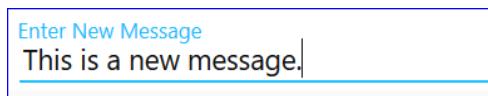
## Flow Virtual Sensor Text Update

Update the Virtual Sensor “Gartenhaus Sensor Info” with new text.  
The device has idx 52, Type General, Text.

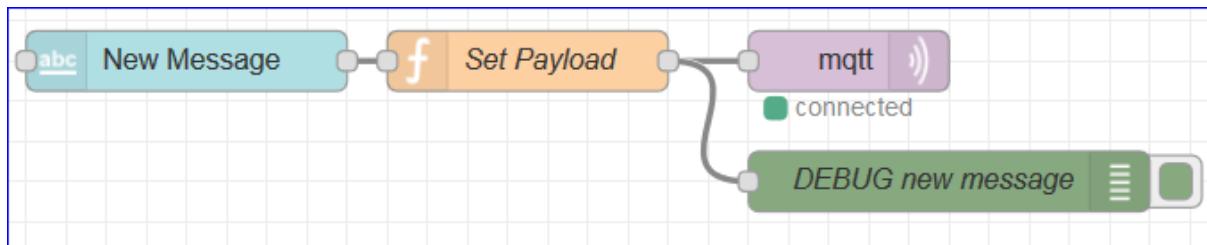
### Widget showing the updated text



### Node-RED Dashboard UI with ui\_text\_input Node



### Node-RED Flow with Nodes ui\_text\_input > function > mqtt out



The text input node has a delay of 0, means the content is sent after pressing enter.  
The function node created the new message which is published via MQTT using the localhost broker.

```

// Build a new message
var msginfo = {};
msginfo.topic = "domoticz/in";

// Get the text from the incoming payload from the text input node.
text = msg.payload;

// Build the new payload
msginfo.payload = { "idx" : 52, "nvalue": 0, "svalue": text};
node.warn(msginfo.payload);

// Return the message
return msginfo;

```

The information for building the MQTT payload is taken from the Domoticz API/JSON URL's documentation ([here](#)).

## Node-RED Flow Source

```
[{"id": "38d6f42f.539a94", "type": "ui_text_input", "z": "76cb1798.6a823", "name": "New Message", "label": "Enter New Message", "group": "27ca36a9.4c3cba", "order": 0, "width": 0, "height": 0, "passthru": false, "mode": "text", "delay": "0", "topic": "", "x": 120, "y": 820, "wires": [{"id": "896e27c.ed14dd8"}]}, {"id": "d4be5444.33e23", "type": "mqtt_out", "z": "76cb1798.6a823", "name": "", "topic": "", "qos": "", "retain": "", "broker": "d58d713d.0e0eb8", "x": 450, "y": 820, "wires": []}, {"id": "896e27c.ed14dd8", "type": "function", "z": "76cb1798.6a823", "name": "Set Payload", "func": "// Build a new message\nvar msginfo = {};\nmsginfo.topic = \\\"domoticz/in\\\";\n\n// Get the text from the incoming payload\nvar msg = msg.payload;\n\n// Build the new payload\nmsginfo.payload = {\n    \\\"idx\\\" : 52,\n    \\\"nvalue\\\" : 0,\n    \\\"svalue\\\" : text\n};\nnode.warn(msginfo.payload);\n\n// Return the message\nreturn\nmsginfo;"}, {"id": "f167bf33.2066e8", "type": "debug", "z": "76cb1798.6a823", "name": "DEBUG new message", "active": true, "tosidebar": true, "console": false, "tostatus": false, "complete": "true", "x": 500, "y": 880, "wires": []}, {"id": "27ca36a9.4c3cba", "type": "ui_group", "z": "", "name": "Hue", "tab": "8a1743ab.9d931", "disabled": true, "width": 6, "collapse": false}, {"id": "d58d713d.0e0eb8", "type": "mqtt-broker", "z": "", "name": "Domoticz MQTT Broker", "broker": "localhost", "port": 1883, "clientid": "", "usetls": false, "compatmode": true, "keepalive": 60, "cleansession": true, "birthTopic": "", "birthQos": 0, "birthPayload": "", "closeTopic": "", "closeQos": 0, "closePayload": "", "willTopic": "", "willQos": 0, "willPayload": ""}], {"id": "8a1743ab.9d931", "type": "ui_tab", "z": "", "name": "Raspberry Pi", "icon": "dashboard"}]
```

# Python Plugin Development

## Purpose

The Python Plugin Framework allows to create an interface between Hardware (or Virtual Hardware) and Domoticz.

Developed various Python Plugins mainly interacting with [TinkerForge](#) building blocks:

- Soil Moisture Monitor ([Info](#))
- Traffic Light ([Info](#))

Must state, it makes real fun to see how new hardware devices with according devices are created and used.

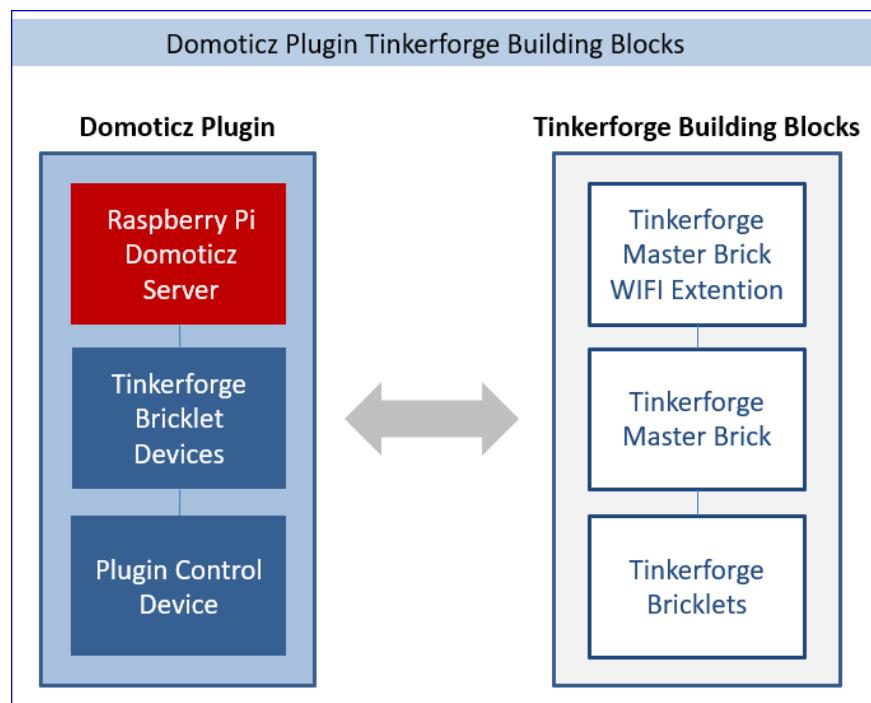
Mandatory to consult this [manual](#) as reference.

The next chapter describes in depth the build of a sample plugin interacting between Domoticz and Tinkerforge.

The picture shows the setup and interaction between the Domoticz Plugin and the Tinkerforge building blocks.

Each plugin is composed out of

- Domoticz Devices associated with one or more Tinkerforge Bricklets
- Domoticz Text Device (Virtual Sensor) to display plugin state information



## Hints

Some examples & hints on Plugin errors (from file plugin.py) shown in the Domoticz Log.

### KeyError

If a plugin starts for the first time and creates new devices in the function onStart, ensure to set the option Setup > Settings > Accept new Hardware (like Allow for 5 minutes). If this option is not set, Domoticz can not create new devices and logs an error like:

```
Device creation failed, Domoticz settings prevent accepting new devices.
2019-06-04 09:17:25.085 Error: (Soil Moisture Monitor - MakeLab) 'onStart' failed 'KeyError'.

OR
2019-12-14 14:21:53.070 Error: (MakeLab Thermostat) Device creation failed, Domoticz settings prevent accepting new devices.
2019-12-14 14:21:53.070 Error: (MakeLab Thermostat) 'onStart' failed 'KeyError'.
2019-12-14 14:21:53.070 Error: (MakeLab Thermostat) ----> Line 307 in '/home/pi/domoticz/plugins/hmip-etriv/plugin.py', function onStart
2019-12-14 14:21:53.070 Error: (MakeLab Thermostat) ----> Line 126 in '/home/pi/domoticz/plugins/hmip-etriv/plugin.py', function onStart
```

### TabError

Ensure to set the tab indents right, else error message in the Domoticz log during start: "TabError".

```
2019-05-24 11:07:17.254 Status: (Air Quality Livingroom) Started.
2019-05-24 11:07:17.424 Error: (AirQualityMonitor) failed to load 'plugin.py', Python Path used was ...
2019-05-24 11:07:17.424 Error: (Air Quality Livingroom) Module Import failed, exception: 'TabError'
2019-05-24 11:07:17.425 Error: (Air Quality Livingroom) Import detail: File:
/home/pi/domoticz/plugins/airqualitymonitor/plugin.py, Line: 165, offset: 92
2019-05-24 11:07:17.425 Error: (Air Quality Livingroom) Error Line ' iaq_index, iaq_index_accuracy,
temperature, humidity, air_pressure = ab.get_all_values()
```

### SyntaxError

```
2019-05-26 11:24:47.046 Error: (TrafficLight) failed to load 'plugin.py', Python Path used was
'/home/pi/domoticz/plugins/TrafficLight/:/usr/lib/python35.zip:/usr/lib/python3.5:/usr/lib/python3.5/plat-arm-linux-gnueabihf:/usr/lib/python3.5/lib-dynload:/usr/local/lib/python3.5/dist-
packages:/usr/lib/python3/dist-packages:/usr/lib/python3.5/dist-packages'.
2019-05-26 11:24:47.046 Error: (Traffic Light Control) Module Import failed, exception: 'SyntaxError'
2019-05-26 11:24:47.046 Error: (Traffic Light Control) Import detail: File:
/home/pi/domoticz/plugins/TrafficLight/plugin.py, Line: 159, offset: 120
2019-05-26 11:24:47.046 Error: (Traffic Light Control) Error Line ' Domoticz.Debug(Devices[2].Name + " -nValue;sValue:" + str(Devices[2].nValue) + ";" + Devices[2].sValue) )
```

### Cause

An additional bracket at the end of the line:

```
Domoticz.Debug(Devices[2].Name + "-nValue;sValue:" + str(Devices[2].nValue) + ";" + Devices[2].sValue)
)
```

### Fix

```
Domoticz.Debug(Devices[2].Name + "-nValue;sValue:" + str(Devices[2].nValue) + ";" + Devices[2].sValue)
```

## Error sValue missing

Example, device “Air Quality” error stating *sValue is missing* used by CDevice\_update

```
2019-06-04 14:58:29.215 Error: (CDevice_update) AQM - IAQ Index: Failed to parse parameters: 'nValue', 'sValue', 'Image', 'SignalLevel', 'BatteryLevel', 'Options', 'TimedOut', 'Name', 'TypeName', 'Type', 'Subtype', 'Switchtype', 'Used', 'Description', 'Color' or 'SuppressTriggers' expected.
2019-06-04 14:58:29.215 Error: (AQM) 'CDevice_update' failed 'TypeError': Required argument 'sValue' (pos 2) not found'.
```

### Cause

Caused by missing sValue parameter for Air Quality update (Devices[1].Update).

```
Devices[1].Update(nValue=iaq_index)
```

### Fix

Add empty sValue parameter.

```
# Update the value - only nValue is used, but mandatory to add an sValue
```

```
Devices[1].Update(nValue=iaq_index, sValue="")
```

## Initial Value New Device

To ensure a new device as an initial value, add update after device create.

Example code snippet from homematicIP HmIP-eTRV plugin.

```
class BasePlugin:

    def __init__(self):
        ...
        self.SetPoint = 0      # setpoint in C
        self.Temperature = 0   # actual temperature
        self.LowBat = "true"   # low battery "true" or "false"
        self.Level = 0         # valve position 0 - 100%
        ...

    def onStart(self):
        # if there no devices, create these and set initial value
        if (len(Devices) == 0):
            Domoticz.Debug("Creating new devices ...")
            ## SET_POINT_TEMPERATURE - TypeName: Thermostat
            Domoticz.Device(Name="Setpoint", Unit=UNITSETPOINTTEMPERATURE, Type=242, Subtype=1,
Used=1).Create()
            Devices[UNITSETPOINTTEMPERATURE].Update( nValue=1, sValue= str(self.SetPoint) )
            Domoticz.Debug("Device created: "+Devices[UNITSETPOINTTEMPERATURE].Name)

            ## ACTUAL_TEMPERATURE - TypeName: Temperature
            Domoticz.Device(Name="Temperature", Unit=UNITACTUALTEMPERATURE, TypeName="Temperature",
Used=1).Create()
            Devices[UNITACTUALTEMPERATURE].Update( nValue=0, sValue=str(self.Temperature) )
            Domoticz.Debug("Device created: "+Devices[UNITACTUALTEMPERATURE].Name)

            ## LOW_BAT - TypeName: Alert
            Domoticz.Device(Name="Battery", Unit=UNITLOWBAT, TypeName="Alert", Used=1).Create()
            Devices[UNITLOWBAT].Update( nValue=1, sValue=LOWBATMSGOK )
            Domoticz.Debug("Device created: "+Devices[UNITLOWBAT].Name)

            ## LEVEL - TypeName: Percentage
            Domoticz.Device(Name="Valve", Unit=UNITLEVEL, TypeName="Percentage", Used=1).Create()
            Devices[UNITLEVEL].Update( nValue=0, sValue=str(self.Level) )
            Domoticz.Debug("Device created: "+Devices[UNITLEVEL].Name)
        ...

```

## Extract Value XPath

Get a value from an XML tree.

Requires the Python library lxml XML toolkit.

The Python library lxml XML toolkit is used to parse the XML-API response.

### Install

```
sudo apt-get install python3-lxml
```

#### *Note*

If the plugin is added to the Domoticz Hardware without lxml installed, then delete the hardware prior installing lxml. After installing lxml, restart Domoticz: sudo service domoticz.sh restart

### Python Script Import

```
from lxml import etree
```

### Example

Get the value from XML tree entry - taken from function [Radiator Thermostat HmIP-eTRV \(Plugin\)](#).

```
<datapoint type="ACTUAL_TEMPERATURE" ise_id="1567" name="HmIP-RF.000A18A9A64DAC:1.ACTUAL_TEMPERATURE" timestamp="1577027367" valueunit="" valuetype="4" value="19.600000"/>
```

### XPath Statement

```
actualtemperaturevalue = tree.xpath('//datapoint[@ise_id=1566]/@value')
```

used below with variable.

Returned is an array with a single entry as the datapoint ise\_id is unique, i.e. to get the value use actualtemperaturevalue[0] after ensuring the array length is 1.

```
def onMessage(self, Connection, Data):
    Domoticz.Debug("onMessage called")

    # If not connected, then leave
    if self.httpConnected == 0:
        return

    # Parse the JSON Data Object with keys Status (Number) and Data (ByteArray)
    ## 200 is OK
    responseStatus = int(Data["Status"])
    ## Domoticz.Debug("STATUS=" + str(responseStatus))

    ## decode the data using the encoding as given in the xml response string
    responseData = Data["Data"].decode('ISO-8859-1')
    ## Domoticz.Debug("DATA=" + responseData)

    # Parse the xml string
    # Get the xml tree - requires several conversions
    tree = etree.fromstring(bytes(responseData, encoding='utf-8'))
    ...
    # Get the value for datapoint actual_temperature & update the device and log
    ## note that a list is returned from tree.xpath, but holds only 1 value
    actualtemperaturevalue = tree.xpath('//datapoint[@ise_id=' +
                                         self.DataPointsList[DATAPOINTINDEXACTUALTEMPERATURE] + ']/@value')
    if len(actualtemperaturevalue) == 1:
        Domoticz.Debug("T Act=" + actualtemperaturevalue[0])
        ## convert the raspberrymatic value to float
        atv = float(actualtemperaturevalue[0])
```



# Plugin Traffic Light (Tinkerforge Building Blocks)

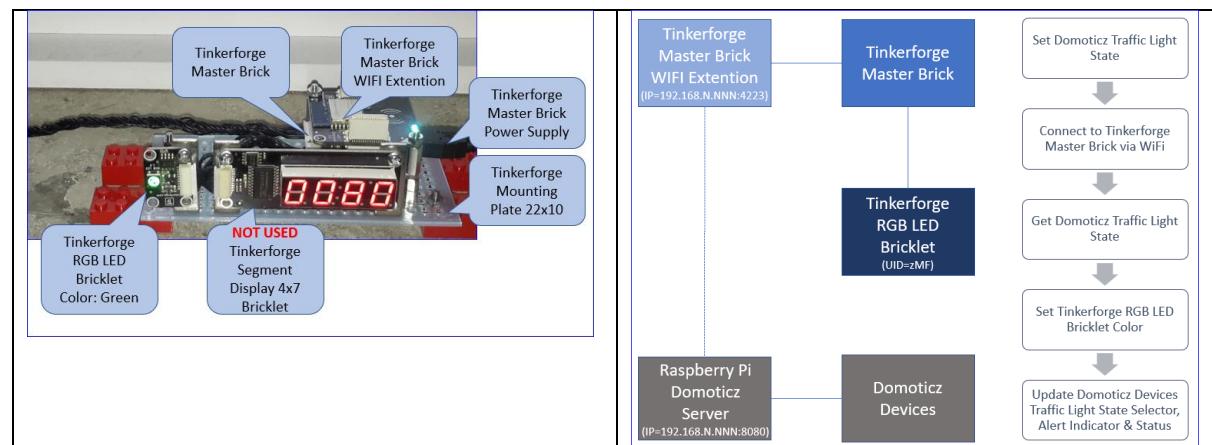
Sample building a Domoticz Plugin using Tinkerforge Building Blocks.

## Objectives

- To set the color of a Tinkerforge RGB Bricklet to red, yellow or green using a Domoticz Selector Switch Device.
- To learn how to write a Python [Plugin](#) for the Domoticz system.
- To learn how to interact with [Tinkerforge](#) building blocks.
- To use this sample plugin as a template for other Domoticz plugins interacting with Tinkerforge Building Blocks.

## Solution

A Domoticz Python plugin "Traffic Light" with a Tinkerforge RGB LED Bricklet. The Tinkerforge RGB LED Bricklet is connected to a Tinkerforge Master Brick with WiFi extension.



## Hardware

- Raspberry Pi 3B+ ([Info](#))
- Tinkerforge Master Brick 1.1 ([Info](#))
- Tinkerforge WIFI Master Extension 2.0 ([Info](#))
- Tinkerforge RGB LED Bricklet ([Info](#))

## Software

Versions for developing & using this plugin.

- Raspberry Pi Raspian Linux 4.19.42-v7+ #1219
- Domoticz Home Automation System V4.1nnnn (BETA)
- Tinkerforge Python Binding v2.1.22
- Python 3.5.3

## Setup Tinkerforge and Domoticz

### Tinkerforge Python API Bindings Installation

```
sudo pip3 install tinkerforge
```

Check if Tinkerforge Python API bindings are installed in folder: /usr/local/lib/python3.5/dist-packages

### Tinkerforge Master Brick and Bricklets Setup

Ensure the Master Brick and Bricklets are running with the latest firmware.

To update the Tinkerforge [Brick Viewer](#) is required.

For Tinkerforge development purposes installed the Brick Viewer and the required Brick Daemon on a Linux PC (gave it the name piDevBook as running [Raspberry Pi Desktop](#)).  
Steps to update the Master Brick and Bricklets:

1. Connect the Master Brick to the piDevBook using USB mini cable
2. Start the Brick Viewer (ensure latest version, used v2.4.4)
3. Connect localhost:4223
4. Check if Master brickand Bricklets found
5. Select Update and check version differences
6. Update Master Brick
  - a. Button Erase - press and hold (DO NOT RELEASE)!
  - b. Button Reset - press and release
  - c. Button Erase - release!

The Master Brick Blue LED is turned off indicating boot mode.

7. The Brick Viewer shows only the Brick Tab
8. Refresh serial port= Serial Port: /dev/ttyACM0, Firmware: Master (2.4.10)
9. Flash
10. Master Brick reboots > Blue LED turns on and the Brick Viewer shows tabs Brick and Bricklets

## Traffic Light Prototype

Build the prototype by connecting the Tinkerforge building blocks (see hardware). Connect the Master Brick to a device running the Brick Deamon and Viewer.

Summary steps to setup the Tinkerforge building blocks using the Tinkerforge Brick Viewer.

- Update the devices firmware
- Set the WiFi master extension fixed IP address in client mode
- Obtain the UID's of the Tinkerforge bricklets as required by the Python plugin

After setting up the Tinkerforge building blocks, reset the master brick and check if the master brick can be reached via WLAN:

```
ping tf-wifi-ext-ip
```

## Domoticz Plugin Folder & File

The plugin **plugin.py** is installed in a subfolder of the Domoticz Plugin folder on the Domoticz system.

### Folder:

```
mkdir /home/pi/domoticz/plugins/trafficlight
```

### File:

As a starter, take the template from [here](#).

Save as **plugin.py** in the folder /home/pi/domoticz/plugins/trafficlight

## Tinkerforge API Bindings Path

In the Python Plugin code **plugin.py** amend the import path to enable using the Tinkerforge API Bindings:

```
from os import path
import sys
sys.path
sys.path.append('/usr/local/lib/python3.5/dist-packages')
```

### Note

Use **pip3** to install the bindings in a common dist-packages folder, which is on the Raspberry Pi Domoticz system, folder:

```
/usr/lib/python3/dist-packages
```

### Running pip3:

```
sudo pip3 install tinkerforge
```

### Log Output Sample

```
Collecting tinkerforge
  Installing collected packages: tinkerforge
    Successfully installed tinkerforge-2.1.22
```

The Tinkerforge Python API bindings are installed in folder:

```
/usr/local/lib/python3.5/dist-packages
```

Check the content results in two folders, from which the folder tinkerforge is required

```
ls /usr/local/lib/python3.5/dist-packages  
tinkerforge tinkerforge-2.1.22.dist-info
```

### Important

Depending setup of the Python distributed packages, following steps are required.

Check the folder /usr/local/lib/python3.5/dist-packages if there are more distributed packages.

If that's the case, then leave the next steps out.

Copy the content of the folder /usr/local/lib/python3.5/dist-packages/tinkerforge to folder /usr/lib/python3/dist-packages/tinkerforge,

because all the Python distributed packages are in folder /usr/lib/python3/dist-packages/:

```
sudo cp -r /usr/local/lib/python3.5/dist-packages/tinkerforge /usr/lib/python3/dist-packages
```

Check the content of the dist-packages folder tinkerforge:

```
ls /usr/lib/python3/dist-packages/tinkerforge  
brick_dc.py bricklet_led_strip.py brick_hat.py bricklet_led_strip_v2.py ...
```

Remove the dist-packages folders:

```
sudo rm -r /usr/local/lib/python3.5/dist-packages/tinkerforge  
sudo rm -r /usr/local/lib/python3.5/dist-packages/tinkerforge-2.1.22.dist-info  
ls /usr/local/lib/python3.5/dist-packages
```

## Development Setup

Development PC:

- A shared drive Z: is defined pointing to /home/pi/domoticz
- Domoticz GUI > Setup > Log
- Domoticz GUI > Setup > Hardware
- Domoticz GUI > Setup > Devices
- WinSCP session connected to the Domoticz system
- Putty session connected to the Domoticz system

The browser tabs are required to add the new hardware with its device and monitor if the plugin code is running without errors.

## Development Iteration

The development process step:

1. Editor to develop z:\plugins\trafficlight\plugin.py – Note z: is shared [Samba](#) drive.
2. Make changes and save plugin.py
3. Restart Domoticz from Terminal: sudo service domoticz.sh restart
4. Wait a moment and refresh the browser tab Domoticz GUI > Setup > Log
5. Check the log and fix as required

### Important

In the Domoticz GUI > Setup > Settings, enable accepting new hardware.

This is required to add the new hardware with its device and monitor if the plugin code is running without errors.

## Domoticz GUI's

In a browser, opened three tabs Domoticz GUI

1. Setup > Hardware
2. Setup > Log
3. Setup > Devices

This is required to add the new hardware with its device and monitor if the plugin code is running without errors.

## Create the plugin

The plugin has a mandatory filename **plugin.py** located in the created plugin folder /home/pi/domoticz/plugins/trafficlight.

For Python development used Idle, running on a Windows 10 device.

See more, in the well documented Python Plugin source code **plugin.py**.

Domoticz Devices are created and set as used by the plugin.

```
Domoticz.Device(Name="State Selector", Unit=1, TypeName="Selector Switch", Options=Options, Used=1).Create()
Domoticz.Device(Name="Alert Indicator", Unit=2, TypeName="Alert", Used=1).Create()
Domoticz.Device(Name="Status", Unit=3, TypeName="Text", Used=1).Create()
```

The devices are manually added to the Domoticz Dashboard.

Handling the state change of the Traffic Light Selector Switch is done by the **onCommand** function.

This function updates the state of the Domoticz Devices: State Selector (idx=13), Alert Indicator (idx=14), Status (idx=15).

## Plugin Pseudo Code

FIRST TIME: Function **onStart** to create the Domoticz Devices

NEXT TIME(S): Function **onCommand** to handle state changes

1. Domoticz make IP connection to the Tinkerforge Master Brick  
If error, update Domoticz Device "Status" and return
2. Get the Level of the Domoticz Device "State Selector" (Selector Switch)  
If error, update Domoticz Device "Status" and return
3. Update the Tinkerforge Bricklet RGB LED with the new Color depending Level
4. Update the Domoticz Devices "Alert Indicator" and "Status"
5. Domoticz to disconnect from the Tinkerforge Master Brick

*Note*

Function **onHeartbeat** not used as not polling for the state of a Tinkerforge Bricklet and update Domoticz Device(s) accordingly.

## Restart Domoticz

Restart Domoticz to find the plugin:

```
sudo systemctl restart domoticz.service
```

*Note*

When making changes to the Python plugin code, ensure to restart Domoticz and refresh any of the Domoticz GUI's.

## Domoticz Add Hardware Traffic Light

Prior adding set in the Domoticz Settings the option to allow new hardware.

If this option is not enabled, no new soilmoisture device is created.

Check in the Domoticz log as error message Python script at the line where the new device is used i.e. Domoticz.Debug("Device created: "+Devices[1].Name).

### Add Hardware - Check the Domoticz Log

After adding, ensure to check the Domoticz Log (Domoticz GUI, select tab Setup > Log)

Example:

```
2019-05-27 09:43:31.992 Status: (Traffic Light) Started.
2019-05-27 09:43:32.550 (Traffic Light) Debug logging mask set to: PYTHON PLUGIN QUEUE IMAGE DEVICE CONNECTION MESSAGE ALL
2019-05-27 09:43:32.550 (Traffic Light) 'DomoticzHash':'fccd39bb'
2019-05-27 09:43:32.550 (Traffic Light) 'HardwareID':'7'
2019-05-27 09:43:32.550 (Traffic Light) 'Database':'/home/pi/domoticz/domoticz.db'
2019-05-27 09:43:32.550 (Traffic Light) 'Version':'1.0.0'
2019-05-27 09:43:32.550 (Traffic Light) 'HomeFolder':'/home/pi/domoticz/plugins/TrafficLight/'
2019-05-27 09:43:32.550 (Traffic Light) 'DomoticzVersion':'4.10826'
2019-05-27 09:43:32.550 (Traffic Light) 'Name':'Traffic Light'
2019-05-27 09:43:32.550 (Traffic Light) 'Mode6':'Debug'
2019-05-27 09:43:32.550 (Traffic Light) 'DomoticzBuildTime':'2019-05-24 10:04:40'
2019-05-27 09:43:32.550 (Traffic Light) 'Mode4':'100'
2019-05-27 09:43:32.550 (Traffic Light) 'StartupFolder':'/home/pi/domoticz/'
2019-05-27 09:43:32.550 (Traffic Light) 'Port':'4223'
2019-05-27 09:43:32.550 (Traffic Light) 'Key':'TrafficLight'
2019-05-27 09:43:32.550 (Traffic Light) 'Language':'en'
2019-05-27 09:43:32.550 (Traffic Light) 'Address':'domoticz-ip'
2019-05-27 09:43:32.550 (Traffic Light) 'Author':'rwl'
2019-05-27 09:43:32.550 (Traffic Light) 'UserDataFolder':'/home/pi/domoticz/'
2019-05-27 09:43:32.550 (Traffic Light) 'Mode1':'zMF'
2019-05-27 09:43:32.550 (Traffic Light) Device count: 0
2019-05-27 09:43:32.550 (Traffic Light) Creating new Devices
```

```

2019-05-27 09:43:32.551 (Traffic Light) Creating device 'State Selector'.
2019-05-27 09:43:32.552 (Traffic Light) Device created: Traffic Light - State Selector
2019-05-27 09:43:32.552 (Traffic Light) Creating device 'Alert Indicator'.
2019-05-27 09:43:32.553 (Traffic Light) Device created: Traffic Light - Alert Indicator
2019-05-27 09:43:32.553 (Traffic Light) Creating device 'Status'.
2019-05-27 09:43:32.554 (Traffic Light) Device created: Traffic Light - Change Info
2019-05-27 09:43:32.554 (Traffic Light) Pushing 'PollIntervalDirective' on to queue
2019-05-27 09:43:32.554 (Traffic Light) Processing 'PollIntervalDirective' message
2019-05-27 09:43:32.554 (Traffic Light) Heartbeat interval set to: 60.
2019-05-27 09:43:32.547 Status: (Traffic Light) Entering work loop.
2019-05-27 09:43:32.548 Status: (Traffic Light) Initialized version 1.0.0, author 'rwbl'

```

## Domoticz Log Entry State Change Off to RED

Handling the state changes are managed by the function `onCommand`.

```

2019-05-27 09:51:50.997 Status: User: Admin initiated a switch command (13/Traffic Light - State Selector/Set Level)
2019-05-27 09:51:51.002 (Traffic Light) Processing 'onCommandCallback' message
2019-05-27 09:51:51.002 (Traffic Light) Calling message handler 'onCommand'.
2019-05-27 09:51:51.003 (Traffic Light) onCommand called for Unit 1: Parameter 'Set Level', Level: 10
2019-05-27 09:51:51.012 (Traffic Light) IP Connection - OK
2019-05-27 09:51:51.012 (Traffic Light) Traffic Light - State Selector-Traffic Light State New=10
2019-05-27 09:51:51.012 (Traffic Light) Traffic Light - State Selector-nValue=0,sValue=
2019-05-27 09:51:51.017 (Traffic Light) Traffic Light - State Selector-RGB LED Colors R-G-B:0-100-0
2019-05-27 09:51:51.018 (Traffic Light) RGB LED Brightness updated:100
2019-05-27 09:51:51.018 (Traffic Light - State Selector) Updating device from 0:'' to have values 2:'10'.
2019-05-27 09:51:51.030 (Traffic Light) Traffic Light - State Selector-nValue=2,sValue=10
2019-05-27 09:51:51.030 (Traffic Light - Alert Indicator) Updating device from 0:'No Alert!' to have values 4:'RED'.
2019-05-27 09:51:51.038 (Traffic Light) Traffic Light - Alert Indicator-nValue=4,sValue=RED
2019-05-27 09:51:51.038 (Traffic Light - Status) Updating device from 0:'' to have values 0:'Traffic Light changed from 0 to 10'.
2019-05-27 09:51:51.045 (Traffic Light) Traffic Light - Change Info-nValue=0,sValue=Traffic Light changed from 0 to 10
2019-05-27 09:51:51.148 (Traffic Light) TrafficLight Update: OK

```

## Domoticz - MQTT Message

Example of an MQTT message issued by the Traffic Light Selector Switch.

Analyzing MQTT messages helps to understand the properties and values of a device.

```
{
"Battery" : 255,
"LevelActions" : "|||",
"LevelNames" : "Off|RED|YELLOW|GREEN",
"LevelOffHidden" : "true",
"RSSI" : 12,
"SelectorStyle" : "0",
"description" : "",
"stype" : "Light/Switch",
"id" : "00050001",
"idx" : 13,
"name" : "Traffic Light - State Selector",
"nvalue" : 2,
"stype" : "Selector Switch",
"svalue1" : "30",
"switchType" : "Selector",
"unit" : 1
}
```

# RaspberryMatic

## Purpose

- To explore [RaspberryMatic](#) functionality and how to control [HomeMatic](#) compatible devices via Domoticz.
- To setup a RaspberryMatic operating system running a HomeMatic Central-Control-Unit (CCU) interfacing with Domoticz.
- To create several functions using [homematicIP](#) devices, like Pluggable Switch and Meter, Radiator Thermostat, Window/Door Contact.  
For exploring & testing only homematicIP devices are used.

### Notes

As taken from [here](#): The RaspberryMatic project is a collaborative effort to provide a lightweight, Linux/buildroot-based [HomeMatic](#) compatible operating system for embedded single board computers (SBC) like the RaspberryPi or Tinkerboard.

## Solution

The solution runs the RaspberryMatic CCU on a Raspberry Pi 3B+ with an RPI-RF-MOD GPIO Radio Module HAT (~40EUR).

## Installation

### RaspberryMatic

The Raspberry Pi 3B+ has been setup according [these](#) guidelines.

RaspberryMatic version 3.47.22.20191130 is used (check out for newer versions).

Several Addons installed:

Additional software for RaspMatic			
System-Update	Installed version: 1.13.12 Available version: 1.13.13 <a href="#">Download</a> <a href="#">Uninstall</a> <a href="#">Set</a>		<b>rmupdate addon</b> <a href="https://github.com/j-a-n/raspberrymatic-addon-rmupdate">https://github.com/j-a-n/raspberrymatic-addon-rmupdate</a>
XML-API	Installed version: 1.20 Available version: 1.20 <a href="#">Download</a> <a href="#">Uninstall</a> <a href="#">Set</a>		<b>XML-API CCU Addon</b> <a href="https://github.com/hobbyquaker/XML-API">https://github.com/hobbyquaker/XML-API</a>
CUX-Daemon	Installed version: 2.3.4 Available version: 2.3.4 <a href="#">Download</a> <a href="#">Restart</a> <a href="#">Uninstall</a> <a href="#">Set</a>		<b>CUX-Daemon 2.3.4</b> 

## Addon XML-API

### Information

The [XML-API](#) CCU Addon is used to communicate between the CCU and Domoticz.

Installed via the RaspberryMatic WebUI > Home page > Settings > Control panel > Additional Software.

After installation, no further settings required.

The option *set*, lists the available scripts with their parameter.

Understanding the XML-API concept is essential to communicate between Domoticz and the CCU v.v. = keep the [reference](#) at hand.



### XML-API Scripts

There is a variety of scripts available (see the XML-API documentation).

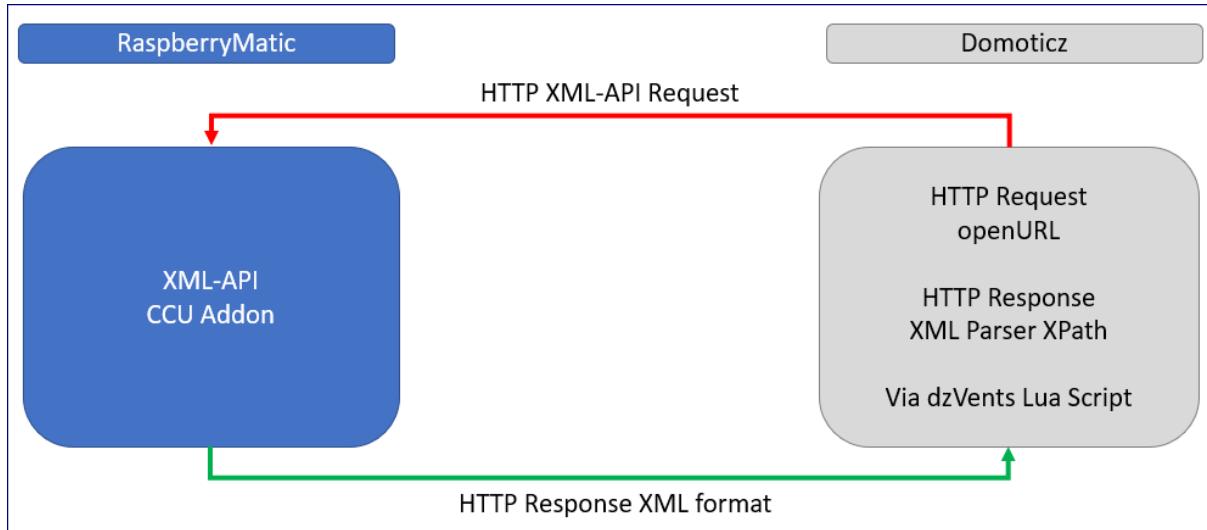
These are used by the automation scripts with relevant parameters.

Examples are

- Lists all devices with channels and current values: statelist.cgi  
This is a key script to get id's required by automation script to get or set values.  
Example:  
<http://ccu-ip/addons/xmlapi/statelist.cgi>
- List channels and values for single or multiple devices (1234,5678): state.cgi  
Example:  
[http://ccu-ip/addons/xmlapi/state.cgi?device\\_id=1541](http://ccu-ip/addons/xmlapi/state.cgi?device_id=1541).
- Changes one or more channel states: statechange.cgi  
Example:  
[http://ccu-ip/addons/xmlapi/statechange.cgi?ise\\_id=1584&new\\_value=20](http://ccu-ip/addons/xmlapi/statechange.cgi?ise_id=1584&new_value=20)

## Communication Flow

Domoticz triggers an HTTP XML-API request (with parameters depending script) to the CCU and parses the HTTP response in XML format using XPath.



*Note*

In the next examples, the wording “push” and “pull” are used:

- CCU to push data to Domoticz (i.e. device data)
- Domoticz to pull data from the CCU (i.e. device value read)
- Domoticz to push data to the CCU (i.e. device value change)

## Example List Devices

To be able to communicate between Domoticz and the CCU, the device id's and datapoint id's are used. These can be obtained via the statelist.cgi script.

### HTTP XML-API Request

```
http://ccu-ip/addons/xmlapi/statelist.cgi
```

### HTTP Response (extract)

The response is an XML formatted list with all devices, their channels and datapoints with values.

The device name is also listed in the HomeMatic WebUI > Settings > Devices > Click on a device entry shows the general devices settings which enables to change the device name.

Each device has a unique serial number.

The default device name is “device type serial number”, i.e. “HmIP-eTRV-2 000A18A9A64DAC”.

For this device, changed the name to “Radiator Thermostat MakeLab”.

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<stateList>
<device sticky_unreach="false" unreach="false" ise_id="1596" name="HM-RC-19 CUX2801001">
  <channel ise_id="1597" name="HM-RC-19 CUX2801001:0" operate="" visible="" index="0">
    <datapoint type="LOWBAT" ise_id="1598" name="CUxD.CUX2801001:0.LOWBAT" operations="5"
      timestamp="1575570253" valueunit="" valuetype="2" value="false"/>
    <datapoint type="UNREACH" ise_id="1606" name="CUxD.CUX2801001:0.UNREACH" operations="5"
      timestamp="1575570253" valueunit="" valuetype="2" value="false"/>
    <datapoint type="STICKY_UNREACH" ise_id="1602" name="CUxD.CUX2801001:0.STICKY_UNREACH"
      operations="7" timestamp="1575570253" valueunit="" valuetype="2" value="false"/>
  </channel>
  ...
</device>
<device ise_id="1011" name="HM-RCV-50 BidCoS-RF">
  <channel ise_id="1012" name="HM-RCV-50 BidCoS-RF:0" operate="" visible="" index="0">
    <datapoint type="INSTALL_MODE" ise_id="1013" name="BidCos-RF.BidCos-RF:0.INSTALL_MODE"
      operations="3" timestamp="1575570253" valueunit="" valuetype="2" value="false"/>
  </channel>
  ...

```

```

</device>
<device unreach="false" ise_id="1541" name="HmIP-eTRV-2 000A18A9A64DAC" config_pending="false">
  <channel ise_id="1542" name="HmIP-eTRV-2 000A18A9A64DAC:0" operate="true" visible="true" index="0">
    <datapoint type="LOW_BAT" ise_id="1549" name="HmIP-RF.000A18A9A64DAC:0.LOW_BAT" operations="5"
      timestamp="1575709506" valueunit="" valuetype="2" value="false"/>
    <datapoint type="OPERATING_VOLTAGE" ise_id="1553" name="HmIP-RF.000A18A9A64DAC:0.OPERATING_VOLTAGE"
      operations="5" timestamp="1575709506" valueunit="" valuetype="4" value="2.800000"/>
    <datapoint type="OPERATING_VOLTAGE_STATUS" ise_id="1554" name="HmIP-
      RF.000A18A9A64DAC:0.OPERATING_VOLTAGE_STATUS" operations="5" timestamp="1575709506" valueunit=""
      valuetype="16" value="0"/>
    <datapoint type="UNREACH" ise_id="1557" name="HmIP-RF.000A18A9A64DAC:0.UNREACH" operations="5"
      timestamp="1575709506" valueunit="" valuetype="2" value="false"/>
  ...
  </channel>
  <channel ise_id="1565" name="HmIP-eTRV-2 000A18A9A64DAC:1" operate="true" visible="true" index="1">
    <datapoint type="ACTUAL_TEMPERATURE" ise_id="1567" name="HmIP-
      RF.000A18A9A64DAC:1.ACTUAL_TEMPERATURE" operations="5" timestamp="1575709506" valueunit=""
      valuetype="4" value="21.600000"/>
    <datapoint type="SET_POINT_TEMPERATURE" ise_id="1584" name="HmIP-
      RF.000A18A9A64DAC:1.SET_POINT_TEMPERATURE" operations="7" timestamp="1575709506" valueunit="°C"
      valuetype="4" value="20.000000"/>
  </channel>
  ...
</device>
<device unreach="false" ise_id="1418" name="HMIP-PSM 0001D3C99C6AB3" config_pending="false">
  <channel ise_id="1419" name="HMIP-PSM 0001D3C99C6AB3:0" operate="true" visible="true" index="0">
    <datapoint type="OPERATING_VOLTAGE" ise_id="1426" name="HmIP-RF.0001D3C99C6AB3:0.OPERATING_VOLTAGE"
      operations="5" timestamp="0" valueunit="" valuetype="4" value="0.000000"/>
    <datapoint type="ACTUAL_TEMPERATURE" ise_id="3065" name="HmIP-
      RF.0001D3C99C6AB3:0.ACTUAL_TEMPERATURE" operations="5" timestamp="0" valueunit="" valuetype="4"
      value="0.000000"/>
  </channel>
  ...
</device>
</stateList>
```

*Note*

Device HmIP-eTRV-2 000A18A9A64DAC listed with default name.

```

<device unreach="false" ise_id="1541" name="Radiator Thermostat MakeLab" config_pending="false">
  <channel ise_id="1542" name="Radiator Thermostat MakeLab:0" operate="true" visible="true" index="0">
    <datapoint type="OPERATING_VOLTAGE" ise_id="1553" name="HmIP-RF.000A18A9A64DAC:0.OPERATING_VOLTAGE"
      operations="5" timestamp="1575710600" valueunit="" valuetype="4" value="2.800000"/>
  ...
  </channel>
  <channel ise_id="1565" name="HmIP-eTRV-2 000A18A9A64DAC:1" operate="true" visible="true" index="1">
    <datapoint type="ACTIVE_PROFILE" ise_id="1566" name="HmIP-RF.000A18A9A64DAC:1.ACTIVE_PROFILE"
      operations="7" timestamp="1575710600" valueunit="" valuetype="16" value="1"/>
  ...

```

*Note*

Device HmIP-eTRV-2 000A18A9A64DAC listed with name changed to “Radiator Thermostat MakeLab”.

## Example Device Request HmIP-eTRV-2

Domoticz to request (“pull”) the setpoint & temperature of the homematicIP radiator thermostat (HMIP-eTRV-2) with the device id=1541:

1. dzVents Lua script event sends, every minute, an HTTP XML-API request (with callback) for device information (using the device id) to the CCU  
[http://ccu-ip/addons/xmlapi/state.cgi?device\\_id=1541](http://ccu-ip/addons/xmlapi/state.cgi?device_id=1541).
2. The CCU sends a HTTP response, in XML format, to Domoticz system.
3. dzVents Lua script handles the callback, parses XML string using XPath to get the values of the setpoint & temperature by reading their datapoints.
4. dzVents Lua script updates the Domoticz text device with idx=175.

### HTTP XML-API Request Test

Test in a browser the HTTP URL and the HTTP response.

The response lists the datapoints to pick, i.e. use in the automation script (dzVents Lua).

#### *HTTP URL*

```
http://ccu-ip/addons/xmlapi/state.cgi?device_id=1541
```

#### *HTTP Response (extract)*

The datapoints required are the SET\_POINT\_TEMPERATURE (ise\_id=1584) and the ACTUAL\_TEMPERATURE (ise\_id=1567).

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<state>
  <device config_pending="false" unreach="false" ise_id="1541" name="HmIP-eTRV-2 000A18A9A64DAC">
    <channel ise_id="1542" name="HmIP-eTRV-2 000A18A9A64DAC:0">
      ...
      <datapoint ise_id="1553" name="HmIP-RF.000A18A9A64DAC:0.OPERATING_VOLTAGE" timestamp="1575647467"
      valueunit="" valuetype="4" value="2.800000" type="OPERATING_VOLTAGE"/>
      <datapoint ise_id="1554" name="HmIP-RF.000A18A9A64DAC:0.OPERATING_VOLTAGE_STATUS"
      timestamp="1575647467" valueunit="" valuetype="16" value="0" type="OPERATING_VOLTAGE_STATUS"/>
      ...
    </channel>
    <channel ise_id="1565" name="HmIP-eTRV-2 000A18A9A64DAC:1">
      ...
      <datapoint ise_id="1567" name="HmIP-RF.000A18A9A64DAC:1.ACTUAL_TEMPERATURE" timestamp="1575647467"
      valueunit="" valuetype="4" value="19.300000" type="ACTUAL_TEMPERATURE"/>
      <datapoint ise_id="1583" name="HmIP-RF.000A18A9A64DAC:1.SET_POINT_MODE" timestamp="1575647467"
      valueunit="" valuetype="16" value="1" type="SET_POINT_MODE"/>
      <datapoint ise_id="1584" name="HmIP-RF.000A18A9A64DAC:1.SET_POINT_TEMPERATURE"
      timestamp="1575647467" valueunit="°C" valuetype="4" value="20.000000" type="SET_POINT_TEMPERATURE"/>
      ...
    </channel>
    ...
  </device>
</state>
```

## Automation Script

Event name: thermostat\_makelab\_info

```
-- Domoticz device text (named MakeLab Thermostat Info)
local IDX_MAKELAB_THERMOSTAT_INFO = 50;
local ID_DEVICE = 1541;
-- url of the raspmatic webserver to obtain device information
local URL_RASPMATIC = 'http://ccu-ip/addons/xmlapi/state.cgi?device_id=' .. ID_DEVICE;
-- callback of the url request - must be unique across all automation events
local RES_RASPMATIC = 'RES_makelab_thermostat_info';
-- helper to round a number to n decimals
local DECIMALS = 1;

function round(number, decimals)
    local power = 10^decimals
    return math.floor(number * power) / power
end

return {
    on = {
        timer = {
            -- 'every minute' -- for tests
            'every 5 minutes'
        },
        httpResponses = {
            RES_RASPMATIC -- must match with the callback passed to the openURL command
        }
    },
    execute = function(domoticz, item)
        -- check if the item is a device, then request information
        if (item.isTimer) then
            domoticz.openURL({url = URL_RASPMATIC, method = 'GET', callback = RES_RASPMATIC})
        end

        -- check if the item is a httpresponse from the openurl callback
        if (item.isHTTPResponse) then
            if (item.statusCode == 200) then
                -- multiple datapoints - domoticz.log(item.data);
                -- parse the response using XPath
                -- select the attribute value of the datapoint element (this is XPath syntax)
                -- SETPOINT °C
                local setpointvalue = domoticz_applyXPath(item.data,'//datapoint[@ise_id="1584"]/@value')
                -- TEMPERATURE °C
                local temperaturevalue = domoticz_applyXPath(item.data,'//datapoint[@ise_id="1567"]/@value')

                -- log
                local msg = 'Setpoint: ' .. tostring(round(setpointvalue,DECIMALS)) .. ', Temperature: ' ..
                tostring(round(temperaturevalue,DECIMALS))
                domoticz.log(msg)

                -- update the domoticz device
                domoticz.devices(IDX_MAKELAB_THERMOSTAT_INFO).updateText(msg);

            else
                domoticz.log('[ERROR] Handling request:' .. item.statusText, domoticz.LOG_ERROR)
            end
        end
    end
}
```

## Example Datapoint Request HmIP-eTRV-2

Domoticz to request (“pull”) the temperature of the homematicIP radiator thermostat (HMIP-eTRV-2) with the device id=1541, datapoint id=1567:

1. dzVents Lua script event sends, every minute, an HTTP XML-API request (with callback) for datapoint information (using datapoint id) to the CCU  
[http://ccu-ip/addons/xmlapi/state.cgi?datapoint\\_id=1567](http://ccu-ip/addons/xmlapi/state.cgi?datapoint_id=1567).
2. The CCU sends a HTTP response, in XML format, to Domoticz system.
3. dzVents Lua script handles the callback, parses XML string using XPath to get the values of the temperature datapoint.
4. dzVents Lua script updates the Domoticz temp device with idx=65.

### *Domoticz Device*

Created as Virtual Sensor Type Temperature, listed as device type Temp, SubType LaCrosse TX3.

	Idx	Hardware	ID	Unit	Name	Type	SubType	Data
1	65	VirtualDevices	14091	1	MakeLab Thermostat Temperature	Temp	LaCrosse TX3	21.4 C

## HTTP XML-API Request Test

Test in a browser the HTTP URL and the HTTP response.

The response lists the datapoint to pick, i.e. use in the automation script (dzVents Lua).

### *HTTP URL*

```
http://ccu-ip/addons/xmlapi/state.cgi?datapoint_id=1567
```

### *HTTP Response*

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<state>
  <datapoint value="22.400000" ise_id="1567"/>
</state>
```

## Automation Script

Event name: thermostat\_makelab\_temp

```

local IDX_MAKELAB_THERMOSTAT_TEMP = 65;
local ID_DATAPOINT = 1567;
-- url of the raspmatic webserver to obtain device information
local URL_RASPMATIC = 'http://ccu-ip/addons/xmlapi/state.cgi?datapoint_id=' .. ID_DATAPOINT;
-- callback of the url request - must be unique across all automation events
local RES_RASPMATIC = 'RES_makelab_thermostat_temp';
-- helper to round a number to n decimals
local DECIMALS = 1;

function round(number, decimals)
    local power = 10^decimals
    return math.floor(number * power) / power
end

return {
    on = {
        timer = {
            -- 'every minute' -- for tests
            'every 5 minutes'
        },
        httpResponses = {
            RES_RASPMATIC -- must match with the callback passed to the openURL command
        }
    },
    execute = function(domoticz, item)
        -- check if the item is a device, then request information
        if (item.isTimer) then
            domoticz.openURL({url = URL_RASPMATIC, method = 'GET', callback = RES_RASPMATIC})
        end

        -- check if the item is a httpresponse from the openurl callback
        if (item.isHTTPResponse) then

            if (item.statusCode == 200) then
                -- <datapoint value="22.400000" ise_id="1567"/>
                local temperaturevalue = domoticz_applyXPath(item.data,'//datapoint[@ise_id="1567"]/@value')
                -- log
                local msg = 'Temperature: ' .. tostring(round(temperaturevalue,DECIMALS))
                domoticz.log(msg)
                -- update the domoticz device
                domoticz.devices(IDX_MAKELAB_THERMOSTAT_TEMP).updateTemperature(round(temperaturevalue,1));
            else
                domoticz.log('[ERROR] Handling request:' .. item.statusText, domoticz.LOG_ERROR)
            end
        end
    end
}

```

*Note*

By opening multiple URL's with unique callback string, it is possible to obtain multiple datapoints. This could be used to check the battery status of several homematicIP devices.

## Example Datapoint Request HmIP-SWDO

Another example of a Domoticz Automation Event to request (“pull”) the value of a homematicIP device datapoint value.

The device is a SWDO from which he datapoint Operating Voltage (id=2543) is pulled. The datapoint required information, i.e. ise\_id) is taken from the statelist request URL:

```
http://ccu-ip/addons/xmlapi/state.cgi
```

```
<datapoint ise_id="2543" name="HmIP-RF.0000DA498D5859:0.OPERATING_VOLTAGE" operations="5" timestamp="1575914670" valueunit="" valuetype="4" value="1.500000" type="OPERATING_VOLTAGE"/>
```

## HTTP XML-API Request Test

Test in a browser the HTTP URL and the HTTP response.

The response lists the datapoint information value and id, to be used in the automation script .

### HTTP URL

```
http://ccu-ip/addons/xmlapi/state.cgi?datapoint_id=2543
```

### HTTP Response

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<state>
  <datapoint value="1.400000" ise_id="2543"/>
</state>
```

## Automation Script

Event name: postbox\_voltage.lua

```
--[[
postbox_voltage.lua
Check the voltage of the homematicIP device SWDO built into the postbox.
Log if voltage is below threshold.

]]
local URL_RASPMATIC = 'http:// ccu-ip/addons/xmlapi/state.cgi?datapoint_id='
JSON = (loadfile "/home/pi/domoticz/scripts/lua/JSON.lua")() -- For Linux
local DATAPOINT2543 = JSON:decode('{"name":"Postbox Voltage","id":2543,"xpath":"/datapoint[@ise_id=2543]/@value","response":"RESPONSEBOXVOLTAGE"}');
-- swdo device: set low voltage threshold (same as the RaspberryMatic device parameter.
local TH_SWDO_LOW_VOLTAGE = 1.0;

return {
  on = {
    timer = {
      'every minute' -- for tests
      -- 'every 30 minutes'
    },
    httpResponses = {
      DATAPOINT2543.response,
    }
  },
  execute = function(domoticz, item)
    -- check if the item is a device, then request information
    if (item.isTimer) then
      domoticz.openURL({url = URL_RASPMATIC .. DATAPOINT2543.id, method = 'GET', callback =
DATAPOINT2543.response,})
    end

    -- check if the item is a httpresponse from the openurl callback
    if (item.isHTTPResponse) then
      if (item.statusCode == 200) then
        domoticz.log(item.data);
      end
    end
  end
}
```

```

-- Select the callback - in case several datapoints
if (item.callback == DATAPOINT2543.response) then
    local voltage = tonumber(domoticz_applyXPath(item.data, DATAPOINT2543.xpath))
    domoticz.log(DATAPOINT2543.name .. ':' .. voltage)
    if voltage < TH_SWDO_LOW_VOLTAGE then
        local message= DATAPOINT2543.name .. ':Low Voltage ' .. voltage .. ' ' ..
domoticz.helpers.isnowhhmm(domoticz)
        domoticz.log(message)
        -- in production system the set alert
        -- domoticz.helpers.alertmsg(domoticz, domoticz.ALERTLEVEL_GREEN, message)
    end
end
else
    domoticz.log('[ERROR] Request:' .. item.statusText, domoticz.LOG_ERROR)
end
end
}

```

## Domoticz Log Entries

```

2019-12-12 09:46:00.223 Status: dzVents: Info: ----- Start internal script: postbox_voltage:, trigger:
every minute
2019-12-12 09:46:00.224 Status: dzVents: Info: ----- Finished postbox_voltage
2019-12-12 09:46:00.224 Status: dzVents: Info: ----- Start internal script: thermostat_makelab_temp:, trigger: every minute
2019-12-12 09:46:00.224 Status: dzVents: Info: ----- Finished thermostat_makelab_temp

2019-12-12 09:46:00.224 Status: EventSystem: Script event triggered:
/home/pi/domoticz/dzVents/runtime/dzVents.lua
2019-12-12 09:46:00.362 Status: dzVents: Info: Handling httpResponse-events for: "RESPONSEBOXVOLTAGE"
2019-12-12 09:46:00.362 Status: dzVents: Info: ----- Start internal script: postbox_voltage:
HTTPResponse: "RESPONSEBOXVOLTAGE"
2019-12-12 09:46:00.367 Status: dzVents: Info: <?xml version="1.0" encoding="ISO-8859-1"
?><state><datapoint ise_id='2543' value='1.400000'/'></state>
2019-12-12 09:46:00.367 Status: dzVents: Info: Postbox Voltage: 1.4
2019-12-12 09:46:00.367 Status: dzVents: Info: ----- Finished postbox_voltage

```

## Example Datapoint Change Value HmIP-eTRV-2

Domoticz to request (“push”) changing the setpoint of the homematicIP radiator thermostat (HMIP-eTRV-2) with the device id=1541, datapoint id=1584.

Solutions have been worked:

1. Device Switch Type Selector – Selector Levels Actions
2. Automation Event (dzVents Lua script)
3. Device Switch Type Push Off Button

My preferred solution is using the Automation Script as easier to maintain, enables to handle multiple devices, handle HTTP response (for example log or set alert message).

### Solution Device Switch Type Selector – Selector Level Actions

For this solution, Domoticz uses device level actions (as the switch type is selector), by submitting for each level the HTTP XML-API request to the CCU.

The HTTP Response is not handled.

**MakeLab Thermostat Setpoint** 20

Last Seen: 2019-12-06 13:57:20  
Type: Light/Switch, Switch, Selector

Switch Icon: Heating device

On Delay: 0 (Seconds) 0 = Disabled  
Off Delay: 0 (Seconds) 0 = Disabled  
Protected:

Selector Style:  Button set  Select menu  
Hide Off level:

Level	Level name	Order
0	0	
10	18	
20	19	
30	20	
40	21	

Level name:  Add

Level Action

0	http://	i/config/xmlapi/statechange.cgi?ise_id=1584&new_value=0	
10	http://	i/config/xmlapi/statechange.cgi?ise_id=1584&new_value=18	
20	http:// CCU-IP	i/config/xmlapi/statechange.cgi?ise_id=1584&new_value=19	
30	http://	i/config/xmlapi/statechange.cgi?ise_id=1584&new_value=20	
40	http://	i/config/xmlapi/statechange.cgi?ise_id=1584&new_value=21	

Description: MakeLab homematicIP Radiator Thermostat change setpoint using Level Actions via HTTP XML-API requests.

Save Delete Replace

## HTTP XML-API Request Test

Test in a browser the HTTP URL and the HTTP response.

The HTTP URL used is the same as the device level action defined.

This example request changes the setpoint to 18°C for datapoint=1584.

The response confirms the changed id and the new value.

### *HTTP URL*

```
http://ccu-ip/addons/xmlapi/statechange.cgi?ise_id=1584&new_value=18
```

### *HTTP Response*

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<result>
  <changed id="1584" new_value="18"/>
</result>
```

## Solution Automation Script

Instead device level actions, an option is to use an Automation Script triggered by device changes (the level name is used as the new setpoint), which opens the URL (HTTP XML-API request) with a HTTP callback.

The callback handles the response.

The Automation Script could also handle multiple devices.

## Automation Script

```
-- makelab_thermostat_setpoint
-- set the setpoint of the radiator thermostat channel HmIP-eTRV-2 000A18A9A64DAC:1
-- set a new setpoint via url example:
-- http://ccu-ip/addons/xmlapi/statechange.cgi?ise_id=1584&new_value=17
-- response:
-- <result><changed id="1584" new_value="17.0"/></result>

-- Domoticz device idx
local IDX_MAKELAB_THERMOSTAT_SETPOINT = 49;

-- raspmatic datapoint id taken from statelist
-- <datapoint type="SET_POINT_TEMPERATURE" ise_id="1584" name="HmIP-
RF.000A18A9A64DAC:1.SET_POINT_TEMPERATURE" operations="7" timestamp="1575709506" valueunit="°C"
valuetype="4" value="20.00000"/>
local ID_DATAPOINT_SETPOINT = 1584;

-- url of the raspmatic webserver to set the new setpoint
local URL_RASPMATIC = 'http:// ccu-ip/addons/xmlapi/statechange.cgi?ise_id=' .. ID_DATAPOINT_SETPOINT
.. '&new_value='

-- callback of the url request - must be unique across all dzevents - use prefix res + script name
local RES_RASPMATIC = 'res_makelab_thermostat_setpoint';

-- helper to round a number to n decimals
local DECIMALS = 1;

function round(number, decimals)
  local power = 10^decimals
  return math.floor(number * power) / power
end

return {
  on = {
    devices = {
      IDX_MAKELAB_THERMOSTAT_SETPOINT
    },
  }
}
```

```

httpResponses = {
    RES_RASPMATIC
}
},
execute = function(domoticz, item)
    -- check if item is device to trigger setpoint change using the levelname (0,17,18,...)
    if (item.isDevice) then
        domoticz.log('Device ' .. domoticz.devices(IDX_MAKELAB_THERMOSTAT_SETPOINT).name .. ' was changed
to ' .. tostring(domoticz.devices(IDX_MAKELAB_THERMOSTAT_SETPOINT).levelName), domoticz.LOG_INFO)
        -- get the new setpoint from the levelname
        -- 0%=0(OFF) ; 10%-40%=18-21 ; min=18, max=21
        local level = domoticz.devices(IDX_MAKELAB_THERMOSTAT_SETPOINT).levelName;
        local newsetpoint = tonumber(level);
        -- set the new setpoint
        domoticz.log('New setpoint:' .. URL_RASPMATIC .. tostring(newsetpoint), domoticz.LOG_INFO);
        domoticz.openURL({url = URL_RASPMATIC .. tostring(newsetpoint), method = 'POST', callback =
RES_RASPMATIC});
    end

    -- check if the item is a httpresponse from the openurl callback
    if (item.isHTTPResponse) then
        if (item.statusCode == 200) then
            -- the full http xml response: domoticz.log(item.data);
            -- parse the response using XPath
            -- select the attribute value of the changed element (this is XPath syntax)
            -- <changed id="1584" new_value="18"/>
            domoticz.log('CCU Response new value: ' ..
domoticz_applyXPath(item.data,'//changed[@id="1584"]/@new_value'))
            -- The response could also be logged to an alert or control message device to log changes
        else
            domoticz.log('[ERROR] handling HTTP request:' .. item.statusText, domoticz.LOG_ERROR)
        end
    end
end
}

```

## Domoticz Log

The log shows the HTTP request and the HTTP response.

```

2019-12-07 11:48:54.970 (VirtualDevices) Light/Switch (MakeLab Thermostat Setpoint)
2019-12-07 11:48:54.963 Status: User: Admin initiated a switch command (49/MakeLab Thermostat
Setpoint/Set Level)

2019-12-07 11:48:55.103 Status: dzVents: Info: Handling events for: "MakeLab Thermostat Setpoint",
value: "19"
2019-12-07 11:48:55.103 Status: dzVents: Info: ----- Start internal script:
makelab_thermostat_setpoint: Device: "MakeLab Thermostat Setpoint (VirtualDevices)", Index: 49
2019-12-07 11:48:55.103 Status: dzVents: Info: Device MakeLab Thermostat Setpoint was changed to 19
2019-12-07 11:48:55.103 Status: dzVents: Info: New setpoint:http://ccu-
ip/addons/xmlapi/statechange.cgi?ise_id=1584&new_value=19
2019-12-07 11:48:55.103 Status: dzVents: Info: ----- Finished makelab_thermostat_setpoint

2019-12-07 11:48:55.104 Status: EventSystem: Script event triggered:
/home/pi/domoticz/dzVents/runtime/dzVents.lua
2019-12-07 11:48:56.019 Status: dzVents: Info: Handling httpResponse-events for:
"res_makelab_thermostat_setpoint"
2019-12-07 11:48:56.019 Status: dzVents: Info: ----- Start internal script:
makelab_thermostat_setpoint: HTTPResponse: "res_makelab_thermostat_setpoint"
2019-12-07 11:48:56.024 Status: dzVents: Info: CCU Response new value: 19
2019-12-07 11:48:56.024 Status: dzVents: Info: ----- Finished makelab_thermostat_setpoint

```

## Device Switch Type Push Off Button

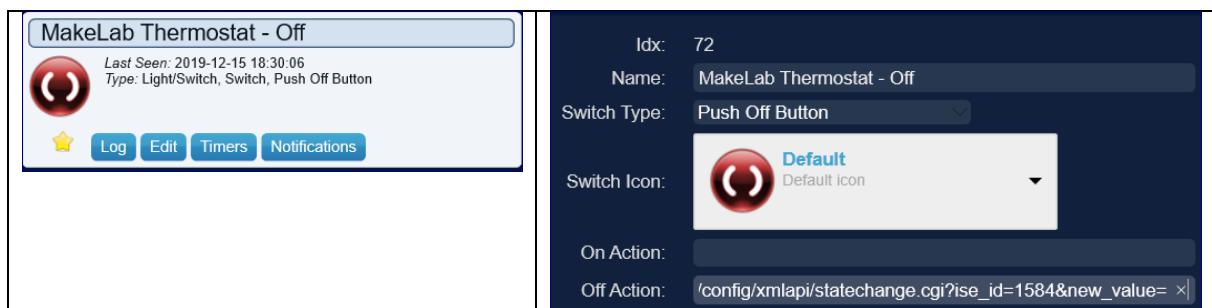
The state change action can also be assigned to a Switch to turn the thermostat Off.

Define a VirtualSensor device with

- Name, i.e. “MakeLab Thermostat - Off”
- Sensor Type Switch.

After adding the device, select the widget and change the properties:

- Switch Type: Push Off Button
- Off Action:  
`http://ccu-ip/addons/xmlapi/statechange.cgi?ise_id=1584&new_value=0`



## Domoticz Log Example

Test by pushing the icon.

```
2019-12-15 18:30:06.767 (VirtualDevices) Light/Switch (MakeLab Thermostat - Off)
2019-12-15 18:30:06.758 Status: User: Admin initiated a switch command (72/MakeLab Thermostat - Off/Off)
```

## Example Update Domoticz Device Value HmIP-eTRV-2

The CCU to update (“push”) the Domoticz device “MakeLab Thermostat Temperature” (idx=65), if the “Actual Temperature Value” from the homematicIP radiator thermostat (HmIP-eTRV-2) changes. So, every change in temperature is sent to Domoticz. For this example the Domoticz development system is used.

1. The RaspMatic script “HmIP-eTRV-2-MakeLab” immediately runs if the following rule applies:  
“Channel status: HmIP-eTRV-2 000A18A9A64DAC:1 when Actual temperature within value range / with value from 1.00 and less than 0.00 trigger when changed”
2. A script reads the actual state of the datapoint “HmIP-RF.000A18A9A64DAC:1.ACTUAL\_TEMPERATURE”, builds & submits the URL of the Domoticz API request to update the value of the Domoticz device “MakeLab Thermostat Temperature” (idx=65). The HTTP response is logged.

### Note

The solution is rather device bound, means for every device a XML-API script is required. If this is not required, to measure every value change, then consider using a Domoticz Automation Script Event to pull value(s) [of one or more devices] in regular intervals (i.e. every minute or 5 minutes). See previous Example Datapoint Request.

### XML-API Script

The script makes use of a CUxD device (see Addon CUxD) to run system commands.

The system command, which triggers a HTTP API Request, to update the Domoticz device. Example:

```
wget -q -O - 'http://domoticz-ip:8080/json.htm?type=command&param=udevice&idx=IDX&nvalue=0&svalue=20.89'
```

The CUxD device used is “CUxD (28) System” with Function Exec – Remote Control with 19 keys = key :1 is used.

HmIP-eTRV-2-MakeLab	Update the Domoticz device MakeLab Thermostat Temperature	Channel status: HmIP-eTRV-2 000A18A9A64DAC:1 when Actual temperature <i>within value range / with value from 1.00 and less than 0.00 trigger when changed</i>	
			Script: ... immediately run


## RaspberryMatic Script: thermostat\_makelab\_temp.script

```

! Function: Thermostat MakeLab Notify Actual Temperature change
! 20191208 by rwbl
string function = "Thermostat MakeLab Temperature";
string actdate = system.Date("%d.%m"); ! sDate = "09.08";
! string actDate = system.Date("%d.%m.%Y"); ! sDate = "09.08.2019";
string acttime = system.Date("%H:%M"); ! sTime = "07:32";
! string actime = system.Date("%H:%M:%S"); ! sTime = "07:32:00";

! A domoticz virtual temperature device is used
string idx = 65; ! Type: Temp; SubType: LaCrosse TX3
! Define the parameter nvalue and svalue - see domoticz api documentation
string nvalue = 0;
! The object string is taken from the raspmatic XML-API script statelist.cgi
string svalue = dom.GetObject("HmIP-RF.000A18A9A64DAC:1.ACTUAL_TEMPERATURE").State();
! for tests: string svalue = 20;

! Build the domoticz http api request url to set the actual temperature on the domoticz device
! Example: http://domoticz-ip:8080/json.htm?type=command&param=udevice&idx=65&nvalue=0&svalue=20.89
string amp = "&";
string urldom = "'http://domoticz-ip:8080/json.htm'; ! Production=60,Development=179
string urlrequest =
urldom#"?type=command##amp##param=udevice"##amp##idx="#"#idx#amp##nvalue="#"#nvalue#amp##svalue="#"#svalue#"';
! For Tests.
! Output'http://domoticz-ip:8080/json.htm?type=command&param=udevice&idx=65&nvalue=0&svalue=21.700000'
WriteLine(urlrequest);

! OPTION: Run the command without a return result
! res = dom.GetObject("CUxD.CUX2801001:1.CMD_EXEC").State("wget -q -O - "#sUrl);
! OPTION: Run the command with a return result
! Define the command to execute
dom.GetObject("CUxD.CUX2801001:1.CMD_SETS").State ("wget -q -O - "#urlrequest);
! Set the return flag to 1 to be able to read the json result
dom.GetObject("CUxD.CUX2801001:1.CMD_QUERY_RET").State (1);

! Start the command, wait till completed and get the result JSON string, i.e.
! {"status" : "OK", "title" : "Update Device"}
! NOTE: The script running on the CCU waits until the completion - ensure not to execute commands which
take long time.
string res = dom.GetObject("CUxD.CUX2801001:1.CMD_RETs").State();
! WriteLine("VT="#res.VarType()##"/#res); ! VT=4, {"status" : "OK", "title" : "Update Device"}

! handle result
var domlog = dom.GetObject ("DomoticzLog");
! Update the var with result text
if (res.Find("OK") > 0) {
    domlog.Variable(function#"Last update OK:#actdate##" "#acttime ")
}
else {
    domlog.Variable(function#"Last update ERROR:#actdate##" "#acttime")
};
! WriteLine("VT="#domlog.VarType()); ! VT=9
WriteLine(domlog.Variable()); ! shows the last update string

```

## RaspberryMatic Log Entry

Menu: Home page > Status and control > System variables

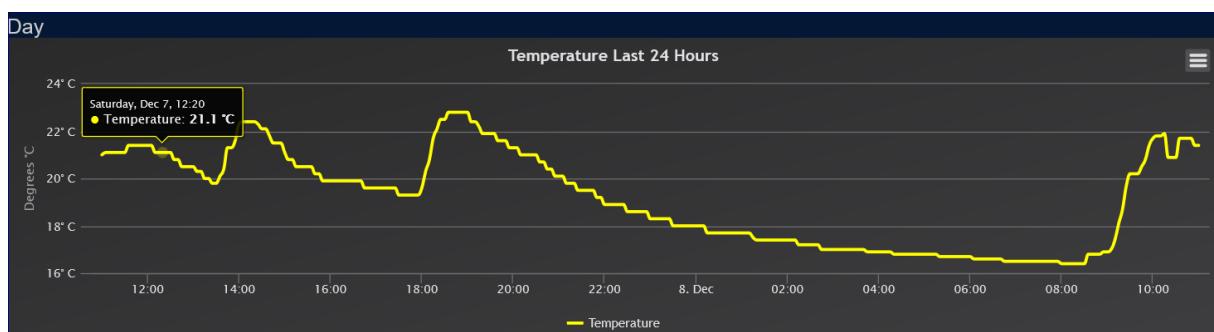
DomoticzLog	Domoticz Log Messages	03.12.2019 23:44:44	Thermostat MakeLab Temperature- Last update OK:08.12 11:14
-------------	-----------------------	---------------------	---

## Domoticz Device

The Domoticz device is a virtual device (see below properties).

The temperature is updated by the HTTP API request triggered by the CCU (“push”), there is no need to define an automation event.

Idx	Hardware	ID	Unit	Name	Type	SubType	Data
65	VirtualDevices	14091	1	MakeLab Thermostat Temperature	Temp	LaCrosse TX3	21.4 C



# Addon CUxD

## Information

The [CUxD CCU Addon](#) is used for communication triggered by the CCU to Domoticz. The CCU submits Domoticz HTTP API Requests via system command wget.

This concept can be used for example to

- handle Window/Door Contact state changes and update Domoticz Alert Device
- handle manual Radiator Thermostat changes and sync the Domoticz Setpoint Device

Get started, by reading [here](#) and [download](#) latest version.

Install via the RaspberryMatic WebUI > Home page > Settings > Control panel > Additional Software.

## CUxD Configure with Set



## CUxD Set Menu



## Add a new “Geräte” device

Select CUxD Gerätetyp (28) System with Function Exec, Leave Name empty, Use Gerät Icon “Fernbedienung 19 Tasten”.

Press Button “Gerät auf CCU erzeugen !”.



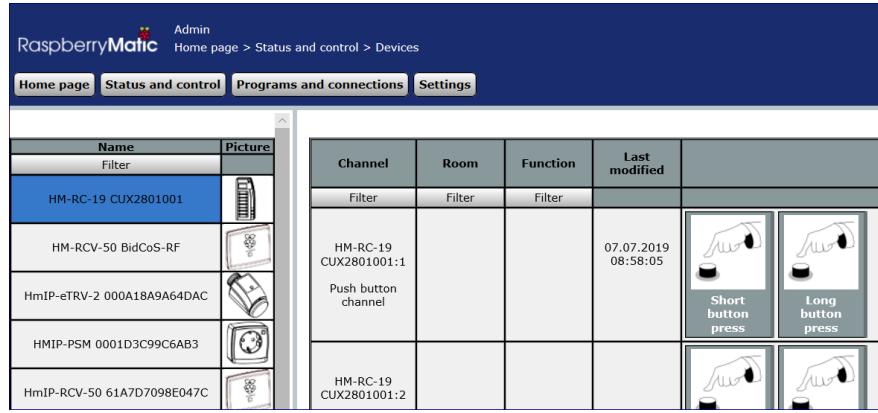
If all goes well, the RaspberryMatic WebUI Device Inbox lists the new device.

Switch to the RaspberryMatic WebUI.

## RaspberryMatic WebUI

Select Settings > Device Inbox and add the CUxD.

The CUxD device created is **HM-RC-19 CUX2801001** with 16 Push button channels.



Check the device channels and datapoints with a XML-API HTTP Request:

```
http://ccu-ip/addons/xmlapi/statelist.cgi
```

Resulting in:

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<statelist>
  - <device sticky_unreach="false" unreach="false" ise_id="1596" name="HM-RC-19 CUX2801001">
    - <channel ise_id="1597" name="HM-RC-19 CUX2801001:0" operate="" visible="" index="0">
      <datapoint ise_id="1598" name="CUxD.CUX2801001:0.LOWBAT" operations="5" timestamp="1562428172" valueunit="" valuetype="2" value="false" type="LOWBAT"/>
      <datapoint ise_id="1606" name="CUxD.CUX2801001:0.UNREACH" operations="5" timestamp="1562428172" valueunit="" valuetype="2" value="false" type="UNREACH"/>
      <datapoint ise_id="1602" name="CUxD.CUX2801001:0.STICKY_UNREACH" operations="7" timestamp="1562428172" valueunit="" valuetype="2" value="false" type="STICKY_UNREACH"/>
    </channel>
    - <channel ise_id="1610" name="HM-RC-19 CUX2801001:1" operate="true" visible="true" index="1">
      <datapoint ise_id="1628" name="CUxD.CUX2801001:1.PRESS_SHORT" operations="6" timestamp="1562482685" valueunit="" valuetype="2" value="false" type="PRESS_SHORT"/>
      <datapoint ise_id="1627" name="CUxD.CUX2801001:1.PRESS_LONG" operations="6" timestamp="0" valueunit="" valuetype="2" value="" type="PRESS_LONG"/>
      <datapoint ise_id="1612" name="CUxD.CUX2801001:1.CMD_KILL" operations="2" timestamp="0" valueunit="" valuetype="20" value="0" type="CMD_KILL"/>
      <datapoint ise_id="1611" name="CUxD.CUX2801001:1.CMD_EXEC" operations="2" timestamp="0" valueunit="" valuetype="20" value="0" type="CMD_EXEC"/>
      <datapoint ise_id="1634" name="CUxD.CUX2801001:1.WORKING" operations="5" timestamp="1562428036" valueunit="" valuetype="2" value="false" type="WORKING"/>
    </channel>
    - <channel ise_id="1636" name="HM-RC-19 CUX2801001:2" operate="true" visible="true" index="2">
      <datapoint ise_id="1654" name="CUxD.CUX2801001:2.PRESS_SHORT" operations="6" timestamp="0" valueunit="" valuetype="2" value="" type="PRESS_SHORT"/>
      <datapoint ise_id="1653" name="CUxD.CUX2801001:2.PRESS_LONG" operations="6" timestamp="0" valueunit="" valuetype="2" value="" type="PRESS_LONG"/>
      <datapoint ise_id="1638" name="CUxD.CUX2801001:2.CMD_KILL" operations="2" timestamp="0" valueunit="" valuetype="20" value="0" type="CMD_KILL"/>
    </channel>
  </device>
</statelist>
```

## Example Update Domoticz Text Device

Update the text of the Domoticz Text Device (idx=36) by a short button press of channel:1 (name HM-RC-19 CUX2801001:1) of the device HM-RC-19 CUX2801001.

See also function [Postbox Notifier \(RaspberryMatic\)](#) for live example.

### RaspMatic Program

Logic: If CHANNEL:1 button press short THEN execute script.

Name	Description	Condition (if...)	Activity (then..., or else...)	Action
CUX2801001Button1	Send Message to Domoticz Text Device	Channel status: HM-RC-19 CUX2801001:1 when Button press short	Script: ... immediately run	<input type="checkbox"/> intrinsic
<b>Condition: If...</b>				
Device selection <input type="button" value="HM-RC-19 CUX2801001:1"/> when <input type="button" value="Button press short"/> <input checked="" type="radio"/> AND <input type="radio"/> OR Activity: Then... <input checked="" type="checkbox"/> Stop all current delays before performing the activity (e.g. retriggering).				
<input type="button" value="Script"/> string sDate = system.Date("%d.%m.%Y"); ! sDate = "09.08.2019"; <input type="button" value="Immediately"/> <input type="button" value="..."/>				
Activity: Else... <input type="checkbox"/> Stop all current delays before performing the activity (e.g. retriggering).				

### RaspMatic Script

Submit Domoticz HTTP API Request via system command wget, to update the Domoticz Text Device.

```
wget -q -O - URL
```

The URL is the HTTP API Request as defined per Domoticz HTTP API/JSON documentation.

```
http://domoticz-ip:8080/json.htm?type=command&param=udevice&idx=iDX&nvalue=0&svalue=MESSAGE
```

```
string sDate = system.Date("%d.%m.%Y"); ! sDate = "09.08.2019";
string sTime = system.Date("%H:%M:%S"); ! sTime = "07:32:00";
string nIdx = 36;
string sMsg = sDate # " # sTime # " - Threshold reached! Take action...";
string cAmp = "&";
string sDomUrl = "'http://domoticz-ip:8080/json.htm";
string sUrl =
sDomUrl#"?type=command#cAmp#param=udevice#cAmp#idx="#nIdx#cAmp#nvalue=0#cAmp#svalue="#sMsg#"';
! Run the command with a return result
! Define the command to execute
dom.GetObject("CUxD.CUX2801001:1.CMD_SETS").State ("wget -q -O - "#sUrl);
! Set the return flag to 1 to be able to read the json result
dom.GetObject("CUxD.CUX2801001:1.CMD_QUERY_RET").State (1);
! Start the command, wait till completed and get the result JSON string, i.e.
! {"status" : "OK","title" : "Update Device"}
! NOTE: script running on CCU waits until completion - use commands which do not take long time.
string sRes = dom.GetObject("CUxD.CUX2801001:1.CMD_RET").State();
! WriteLine("VT="#sRes.VarType()#"/#sRes); ! VT=4, {"status" : "OK","title" : "Update Device"}
! handle result
var dl = dom.GetObject ("DomoticzLog");
! Update the var with result text
if (sRes.Find("OK") > 0) {
    dl.Variable("Last update OK")
}
else {
    dl.Variable("Last update ERROR")
};
! WriteLine("VT="#dl.VarType()); ! VT=9
! WriteLine(dl.Variable()); ! shows the last update string
```

*Note*

The Domoticz HTTP response string is checked against error and a RaspMatic systemvar “DomoticzLog” is updated.

## Button pressed and Domoticz Device Updated

Channel	Room	Function	Last modified		IAQM Status	
Filter	Filter	Filter			Text	
HM-RC-19 CUX2801001:1  Push button channel			09.07.2019 10:21:57	  Short button press	09.07.2019 10:21:57 - Threshold reached! Take action... Last Seen: 2019-07-09 10:21:56 Type: General, Text  ★ Log Edit	

## Plugin Considerations

Initially started testing by adding homematicIP devices to the CCU, determined the required device, channel and datapoint id's, triggered HTTP REST requests (XML-API) from Domoticz and parsed the CCU XML formatted HTTP response to newly created Domoticz devices as triggered by dzVents Lua script (timer).

These steps are defined next.

Then considered, that for additional devices, it requires effort to setup devices and dzVents Lua scripts ... which could get unclear or even confusing.

A better approach would be, to develop for each of the homematicIP devices a Domoticz Python Plugin.

After various iterations, developed plugins for the homematicIP devices Pluggable Switch and Meter (HMIP-PSM) and Radiator Thermostat (HMIP-eTRV-2).

These can be found in my GitHub [repositories](#) starting with domoticz-plugin-hmip-<short description>, i.e. domoticz-plugin-hmip-psm, domoticz-plugin-hmip-etrv-2.

More under consideration ...

## CCU Device(s) Information

### All Devices List

HTTP request to obtain the list of all devices.

```
http://ccu-ip/addons/xmlapi/devicelist.cgi
```

Example response

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<deviceList>
  <device ready_config="true" device_type="HmIP-eTRV-2" interface="HmIP-RF" ise_id="1541"
address="000A18A9A64DAC" name="HmIP-eTRV-2 000A18A9A64DAC">
    <channel ready_config="true" ise_id="1542" address="000A18A9A64DAC:0" name="HmIP-eTRV-2
000A18A9A64DAC:0" operate="true" visible="true" transmission_mode="AES" aes_available="false"
group_partner="" index="0" parent_device="1541" direction="UNKNOWN" type="30"/>
...
  </device>

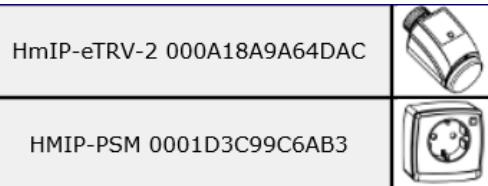
  <device ready_config="true" device_type="HMIP-PSM" interface="HmIP-RF" ise_id="1418"
address="0001D3C99C6AB3" name="HMIP-PSM 0001D3C99C6AB3">
    <channel ready_config="true" ise_id="1419" address="0001D3C99C6AB3:0" name="HMIP-PSM
0001D3C99C6AB3:0" operate="true" visible="true" transmission_mode="AES" aes_available="false"
...
...
```

#### Notes

The example response extract lists two devices

- HmIP-eTRV-2  
(device id=1541)
- HMIP-PSM  
(device id=1418)

with their device id and serial number (address).



### All Devices State Information

To get detailed information about the state of all the devices, submit

```
http://ccu-ip/addons/xmlapi/statelist.cgi
```

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<stateList>
<device ise_id="1011" name="HM-RCV-50 BidCoS-RF">
<device ise_id="1541" name="HmIP-eTRV-2 000A18A9A64DAC" config_pending="false" unreach="false">
  <channel ise_id="1542" name="HmIP-eTRV-2 000A18A9A64DAC:0" operate="true" visible="true" index="0">
    <datapoint ise_id="1543" name="HmIP-RF.000A18A9A64DAC:0.CONFIG_PENDING" type="CONFIG_PENDING"
operations="5" timestamp="1561796713" valueunit="" valuetype="2" value="false"/>
...
  </channel>
  <channel ise_id="1565" name="HmIP-eTRV-2 000A18A9A64DAC:1" operate="true" visible="true" index="1">
    <datapoint ise_id="1566" name="HmIP-RF.000A18A9A64DAC:1.ACTIVE_PROFILE" type="ACTIVE_PROFILE"
operations="7" timestamp="1561796714" valueunit="" valuetype="16" value="1"/>
    <datapoint ise_id="1567" name="HmIP-RF.000A18A9A64DAC:1.ACTUAL_TEMPERATURE"
type="ACTUAL_TEMPERATURE" operations="5" timestamp="1561796714" valueunit="" valuetype="4"
value="22.900000"/>
```

#### Notes

The response lists for each device the channels and the datapoints with unique ids.

## Single Device Information

Submit HTTP request to obtain detailed information for a single device, i.e. the thermostat.

```
http://ccu-ip/addons/xmlapi/state.cgi?device_id=1541
```

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<state>
<device ise_id="1541" name="HmIP-eTRV-2 000A18A9A64DAC" config_pending="false" unreach="false">
  <channel ise_id="1542" name="HmIP-eTRV-2 000A18A9A64DAC:0">
    ...
    <datapoint ise_id="1549" name="HmIP-RF.000A18A9A64DAC:0.LOW_BAT" type="LOW_BAT"
      timestamp="1561799020" valueunit="" valuetype="2" value="false"/>
    ...
  </channel>
  <channel ise_id="1565" name="HmIP-eTRV-2 000A18A9A64DAC:1">
    ...
    <datapoint ise_id="1567" name="HmIP-RF.000A18A9A64DAC:1.ACTUAL_TEMPERATURE"
      type="ACTUAL_TEMPERATURE" timestamp="1561799020" valueunit="" valuetype="4" value="22.900000"/>
    ...
    <datapoint ise_id="1584" name="HmIP-RF.000A18A9A64DAC:1.SET_POINT_TEMPERATURE"
      type="SET_POINT_TEMPERATURE" timestamp="1561799020" valueunit="°C" valuetype="4" value="4.500000"/>
    ...
  </channel>
  ...
</device>
</state>
```

### Notes

The response lists all the device datapoints, which can be used to obtain information or change a value via HTTP URL XML-API request.

These requests are used by the Domoticz dzVents Lua scripts.

To test, submit the HTTP URL and check the response on a browser, but also in the HomeMatic Web-UI.

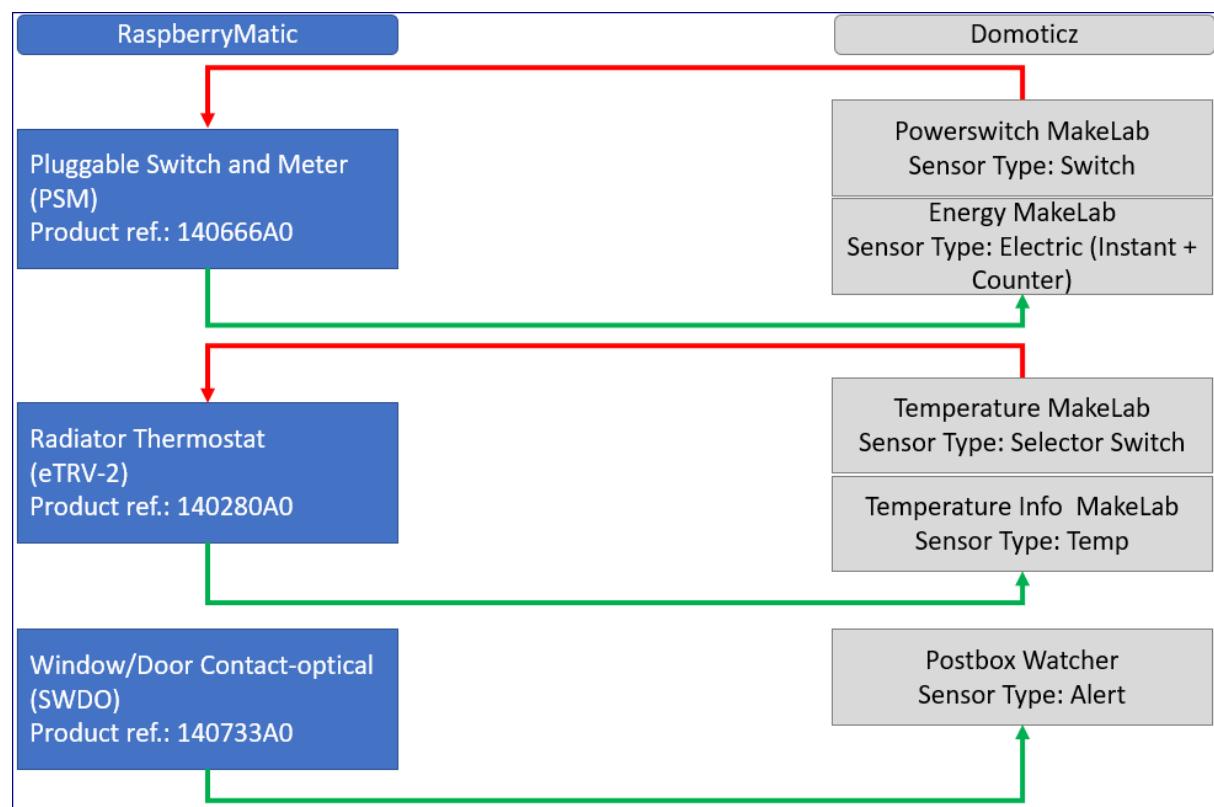
## CCU Devices homematicIP

To get started with homematicIP (controlled by RaspberryMatic via Domoticz), these three devices are used – for details see the respective functions.

### List

Device	Function	Notes
Pluggable Switch and Meter (PSM)  Product ref.: 140666A0 Device ID: 1418	<ul style="list-style-type: none"> <li>• Room MakeLab</li> <li>• Switch main devices</li> <li>• Measure energy consumption (Wh) &amp; power (W)</li> </ul>	Max. switching capacity 3680 W
Radiator Thermostat (eTRV-2)  Product ref.: 140280A0 Device ID: 1541	<ul style="list-style-type: none"> <li>• Room MakeLab</li> <li>• Control room temperature</li> <li>• Measure room temperature</li> </ul>	
Window / Door Contact – optical (SWDO)  Product ref.: 140733A0 Device ID: 2530	<ul style="list-style-type: none"> <li>• Postbox Watcher</li> <li>• Notify if the hatch of the postbox has been opened</li> </ul>	

### Communication Devices



# Experiments

Next are just a few experiments briefly described, to test connecting and using devices.

## HMIP-PSM

To switch the power on/off for all devices and measure the Power (W) and Energy Consumption (Wh) of the room MakeLab.

A homematicIP Pluggable Switch and Meter (HMIP-PSM, Product ref.: 140666A0, Device ID: 1418) connected to a RaspberryMatic operating system running a HomeMatic Central-Control-Unit (CCU).

Domoticz requests, in regular intervals, data from the CCU via a dzVents Lua script and updates Domoticz device information.

HomeMatic Configuration					Domoticz Configuration (Name/Type/SubType)
Channel	Room	Function	Last modified	Control	
HMIP-PSM 0001D3C99C6AB3:5 Switch actuator			30.06.2019 09:10:57	<div style="display: flex; justify-content: space-around;"> <span>OFF</span> <span>On</span> </div>	Powerswitch MakeLab Light/switch Switch
HMIP-PSM 0001D3C99C6AB3:6 Status report measured value channel	Home office		30.06.2019 09:10:57	<div style="display: flex; justify-content: space-around;"> <div>Energy counter RaspMatic 716.60 Wh</div> <div>Reset</div> </div> <div style="display: flex; justify-content: space-around;"> <div>Energy counter device 0.00 Wh</div> <div>Voltage 230.00 V</div> <div>Current 0 mA</div> </div> <div style="display: flex; justify-content: space-around;"> <div>Power 0.00 W</div> <div>Frequency 50.01 Hz</div> </div>	Electric Usage MakeLab General kWh

## Automation Script

Event name: powerswitch\_makelab

```

local IDX_POWERSWITCH_MAKELAB = 177;
local ID_DATAPOINT_STATE = 1451
local URL_CCU = 'http://ccu-ip/addons/xmlapi/statechange.cgi?ise_id=' .. ID_DATAPOINT_STATE .. '&new_value='
local RES_CCU = 'powerswitchmakelab';
return {
  on = {
    devices = {IDX_POWERSWITCH_MAKELAB},
    httpResponses = {RES_CCU}
  },
  execute = function(domoticz, item)
    if (item.isDevice) then
      local state = 'true';
      if domoticz.devices(IDX_POWERSWITCH_MAKELAB).state == 'Off' then
        state = 'false';
      end
      domoticz.openURL({ url = URL_CCU .. state, method = 'GET', callback = RES_CCU });
    end;
    if (item.isHTTPResponse) then
      if (item.statusCode == 200) then
        domoticz.log('[INFO] Switch : ' .. item.statusText)
      else
        domoticz.log('[ERROR] Can not switch : ' .. item.statusText, domoticz.LOG_ERROR)
      end
    end
  end
}
}
```

**Event name: electric\_usage\_makelab**

```
local IDX_ELECTRICUSAGEMAKELAB = 174;
local ID_DEVICE = 1418;
local URL_CCU = 'http://ccu-ip/addons/xmlapi/state.cgi?device_id=' .. ID_DEVICE;
local RES_CCU = 'electricusagemakelab';
local DECIMALS = 2;

return {
  on = {
    timer = {'every minute'},
    httpResponses = {RES_CCU}
  },
  execute = function(domoticz, item)
    if (item.isTimer) then
      domoticz.openURL({ url = URL_CCU, method = 'GET', callback = RES_CCU })
    end
    if (item.isHTTPResponse) then
      if (item.statusCode == 200) then
        local powervalue = domoticz_applyXPath(item.data,'//datapoint[@ise_id="1471"]/@value') -- W
        local energyvalue = domoticz_applyXPath(item.data,'//datapoint[@ise_id="1467"]/@value') -- Wh
        domoticz.devices(IDX_ELECTRICUSAGEMAKELAB).updateElectricity(
          domoticz.helpers.roundnumber(tonumber(powervalue),2), -- W
          domoticz.helpers.roundnumber(tonumber(energyvalue),2) ) -- Wh
      else
        domoticz.log('[ERROR] Problem handling the request:' .. item.statusText, domoticz.LOG_ERROR)
      end
    end
  end
}
```

## HMIP-eTRV-2

To measure and control the MakeLab room temperature.

A homematicIP Radiator Thermostat (eTRV-2, Product ref.: 140280A0, Device ID: 1541) connected to a RaspberryMatic operating system running a HomeMatic Central-Control-Unit (CCU).

The thermostat setpoint is set by a Domoticz Selector Switch.

Domoticz requests, in regular intervals, the setpoint and room temperature from the CCU via a dzVents Lua script and updates Domoticz device information.

### HomeMatic Configuration

Channel	Room	Function	Last modified	Control
Filter	Filter	Filter		
HmIP-eTRV-2 000A18A9A64DAC:1  Connection partner radiator thermostat (manual operation, transmitter)	Home office		30.06.2019 10:12:45	<div style="display: flex; justify-content: space-between;"> <div style="flex: 1;"> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Temperature 23.30°C</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Window status: Closed</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Valve opening 0%</div> <div style="text-align: center; margin-bottom: 10px;">  </div> <div style="display: grid; grid-template-columns: 1fr 1fr; gap: 10px;"> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">Auto mode</div> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">Manu mode</div> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">Boost function</div> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">Holiday mode</div> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;">Week profile 1 ▾</div> </div> <div style="flex: 1; text-align: right; margin-top: 20px;"> <div style="border: 1px solid #ccc; padding: 5px; width: 50px; height: 25px; display: inline-block; text-align: center;">20 °C</div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <span></span> <span></span> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <span>Off</span> <span>On</span> </div> </div> </div>

### Domoticz Configuration

Idx	Hardware	ID	Unit	Name	Type	SubType	Data
176	VirtualSensors	00014100	1	Thermostat MakeLab Setpoint	Light/Switch	Switch	Off
175	VirtualSensors	00082175	1	Thermostat MakeLab Info	General	Text	Setpoint: 4.5, Temperature: 23.2

**Thermostat MakeLab Setpoint** 20

 Last Seen: 2019-06-30 10:12:44  
Type: Light/Switch, Switch, Selector

Off
18
19
20
21

Log
Edit
Timers
Notifications

**Thermostat MakeLab Info**

Text

Setpoint: 20, Temperature: 23.3

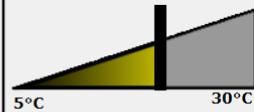
Last Seen: 2019-06-30 10:14:01
Type: General, Text

Log
Edit

### Change Thermostat Setpoint

The setpoint of the thermostat is changed via dzVents Lua Script.

**RaspberryMatic – Thermostat Change Setpoint**

Channel	Room	Function	Last modified	Control
Home office 2 (HOMEMATIC)	Home office		28.06.2019 10:12:37	<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Temperature 23.30°C</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Window status: Closed</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Valve opening 0%</div> <div style="text-align: center; margin-bottom: 10px;">  </div> <div style="display: grid; grid-template-columns: 1fr 1fr; gap: 10px;"> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">Auto mode</div> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">Manu mode</div> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">Boost function</div> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">Holiday mode</div> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;">Week profile</div>

(1) Start Thermostat Off
(2) Setpoint Thermostat 21
(3) Thermostat Info Updated

Domoticz Web-UI
Home Energy

2019-06-28 10:12:50 ● 04:53 21:55
T: 2.147 kWh, A: 229 Watt  
T: 0.147 kWh, A: 429 Watt  
Setpoint: 21, Temperature: 22.4

Light/Switch Devices
Utility Sensors

Thermostat MakeLab Setpoint
Electric Usage House

Thermostat MakeLab Info
Electric Usage MakeLab

(4) Thermostat Info Updated

## Automation Script

Event name: thermostat\_makelab\_setpoint

```
local IDX_THERMOSTAT_MAKELAB_SETPOINT = 176;
local ID_DATAPOINT_SETPOINT = 1584;
local URL_RASPMATIC = 'http://ccu-ip/addons/xmlapi/statechange.cgi?ise_id=' .. ID_DATAPOINT_SETPOINT
.. '&new_value='
local RES_RASPMATIC = 'thermostatmakelabsetpoint';
local DECIMALS = 2;

return {
on = {
    devices = {IDX_THERMOSTAT_MAKELAB_SETPOINT},
    httpResponses = {RES_RASPMATIC}
},
execute = function(domoticz, item)
if (item.isDevice) then
    -- get the new SETPOINT 0%=0(OFF); 10%-40%=18-21; min=18, max=21
    local level = domoticz.devices(IDX_THERMOSTAT_MAKELAB_SETPOINT).level;
    local newsetpoint = 0;
    if level > 0 then
        newsetpoint = 17 + (level * 0.1);
    end
    -- set the new setpoint
    domoticz.log('New setpoint:' .. URL_RASPMATIC .. tostring(newsetpoint), domoticz.LOG_INFO);
    domoticz.openURL({url = URL_RASPMATIC .. tostring(newsetpoint), method = 'POST', callback =
RES_RASPMATIC});
    end
end
-- check if the item is a httpresponse from the openurl callback
if (item.isHTTPResponse) then
    if (item.statusCode == 200) then
        -- multile datapoints
        domoticz.log(item.data);
        -- parse the response using XPath
        -- select the attribute value of the datapoint element (this is XPath syntax)
        -- domoticz.log(domoticz_applyXPath(item.data,'//datapoint[@ise_id="1584"]/@value'))
    else
        domoticz.log('[ERROR] Problem handling the request:' .. item.statusText, domoticz.LOG_ERROR)
    end
end
end
}
```

## Node-RED Dashboard

To create a Node-RED dashboard showing thermostat datapoints

- ACTUAL\_TEMPERATURE – measured at the thermostat (°C)
- SET\_POINT\_TEMPERATURE – at the thermostat (°C)
- LEVEL - the valve position (%)

The Node-RED dashboard add-on, enables to create live dashboards (see [Node-RED](#)).

This experiment is developed on the Domoticz development system.

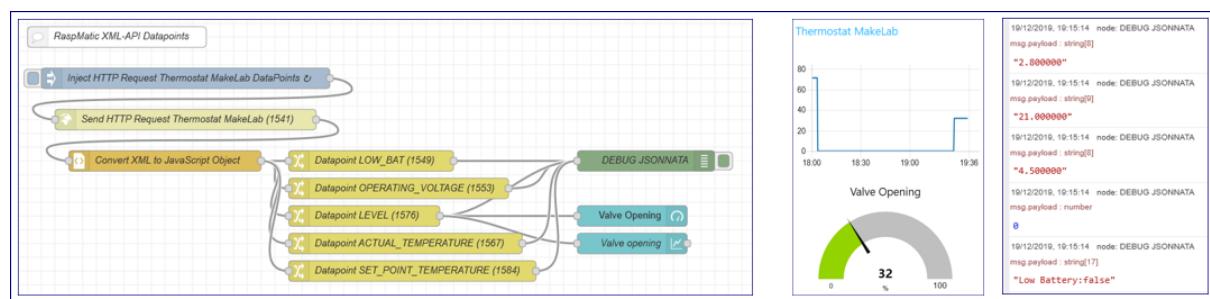
### Solution without Domoticz

For this solution, a Domoticz system is not required.

Node-RED communicates direct with the RaspberryMatic system to obtain the value of the datapoints by triggering HTTP XML-API requests (using the state.cgi script).

As a first test, several datapoints of the thermostat MakeLab are selected.

The picture below shows, the Node-RED flow, a simple dashboard with chart & gauge and the debug log.



#### Note

In a browser, enter URL <http://domoticz-ip:1880/ui> to view the Node-RED dashboard tab Homematic > Group Thermostat MakeLab.

### Flow

The **Inject node** triggers every 30s, the action for the **HTTP request node** to submit the URL

```
http://ccu-ip/addons/xmlapi/state.cgi?device_id=1541
```

to get the state information for the device with datapoint id 1541.

The HTTP request returns XML structured string with all device datapoints.

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<states>
  <device config_pending="false" unreach="false" ise_id="1541" name="Thermostat MakeLab">
    <channel ise_id="1542" name="Thermostat MakeLab0">
      <datapoint ise_id="1543" name="HmIP-RF.000A18A9A64DAC:0.CONFIG_PENDING" timestamp="1576843927" valueunit="" valuetype="2" value="false" type="CONFIG_PENDING"/>
      <datapoint ise_id="1544" name="HmIP-RF.000A18A9A64DAC:0.DUTY_CYCLE" timestamp="1576843927" valueunit="" valuetype="2" value="false" type="DUTY_CYCLE"/>
      <datapoint ise_id="1545" name="HmIP-RF.000A18A9A64DAC:0.LOW_BAT" timestamp="1576843927" valueunit="" valuetype="2" value="false" type="LOW_BAT"/>
      <datapoint ise_id="1553" name="HmIP-RF.000A18A9A64DAC:0.OPERATING_VOLTAGE" timestamp="1576843927" valueunit="" valuetype="4" value="2.800000" type="OPERATING_VOLTAGE"/>
      <datapoint ise_id="1554" name="HmIP-RF.000A18A9A64DAC:0.OPERATING_VOLTAGE_STATUS" timestamp="1576843927" valueunit="" valuetype="16" value="0" type="OPERATING_VOLTAGE_STATUS"/>
      <datapoint ise_id="1555" name="HmIP-RF.000A18A9A64DAC:0.POWERCYCLE" timestamp="1576843927" valueunit="" valuetype="2" value="false" type="POWERCYCLE"/>
      <datapoint ise_id="1556" name="HmIP-RF.000A18A9A64DAC:0.RSSI_PEER" timestamp="1576778404" valueunit="" valuetype="8" value="178" type="RSSI_PEER"/>
      <datapoint ise_id="1557" name="HmIP-RF.000A18A9A64DAC:0.UNREACH" timestamp="1576843927" valueunit="" valuetype="2" value="false" type="UNREACH"/>
      <datapoint ise_id="1561" name="HmIP-RF.000A18A9A64DAC:0.UPDATE_PENDING" timestamp="1575413140" valueunit="" valuetype="2" value="false" type="UPDATE_PENDING"/>
    </channel>
    <channel ise_id="1565" name="HmIP-eTRV-2 000A18A9A64DAC:1">
      <datapoint ise_id="1566" name="HmIP-RF.000A18A9A64DAC:1.ACTIVE_PROFILE" timestamp="1576843927" valueunit="" valuetype="16" value="1" type="ACTIVE_PROFILE"/>
      <datapoint ise_id="1567" name="HmIP-RF.000A18A9A64DAC:1.ACTUAL_TEMPERATURE" timestamp="1576843927" valueunit="" valuetype="4" value="20.900000" type="ACTUAL_TEMPERATURE"/>
      <datapoint ise_id="1568" name="HmIP-RF.000A18A9A64DAC:1.ACTUAL_TEMPERATURE_STATUS" timestamp="1576843927" valueunit="" valuetype="16" value="0" type="ACTUAL_TEMPERATURE_STATUS"/>
      <datapoint ise_id="1569" name="HmIP-RF.000A18A9A64DAC:1.BOOST_MODE" timestamp="1576843927" valueunit="" valuetype="2" value="0" type="BOOST_MODE"/>
      <datapoint ise_id="1570" name="HmIP-RF.000A18A9A64DAC:1.BOOST_TIME" timestamp="1576843927" valueunit="" valuetype="16" value="0" type="BOOST_TIME"/>
      <datapoint ise_id="1571" name="HmIP-RF.000A18A9A64DAC:1.CONTROL_DIFFERENTIAL_TEMPERATURE" timestamp="0" valueunit="" valuetype="16" value="0" type="CONTROL_DIFFERENTIAL_TEMPERATURE"/>
      <datapoint ise_id="1572" name="HmIP-RF.000A18A9A64DAC:1.CONTROL_MODE" timestamp="0" valueunit="" valuetype="16" value="0" type="CONTROL_MODE"/>
      <datapoint ise_id="1573" name="HmIP-RF.000A18A9A64DAC:1.DURATION_UNIT" timestamp="0" valueunit="" valuetype="16" value="0" type="DURATION_UNIT"/>
      <datapoint ise_id="1574" name="HmIP-RF.000A18A9A64DAC:1.DURATION_VALUE" timestamp="0" valueunit="" valuetype="16" value="0" type="DURATION_VALUE"/>
      <datapoint ise_id="1575" name="HmIP-RF.000A18A9A64DAC:1.FROST_PROTECTION" timestamp="1576843927" valueunit="" valuetype="2" value="false" type="FROST_PROTECTION"/>
      <datapoint ise_id="1576" name="HmIP-RF.000A18A9A64DAC:1.LEVEL_STATUS" timestamp="1576843927" valueunit="" valuetype="4" value="0.270000" type="LEVEL_STATUS"/>
      <datapoint ise_id="1577" name="HmIP-RF.000A18A9A64DAC:1.MODE" timestamp="1576843927" valueunit="" valuetype="16" value="0" type="MODE"/>
      <datapoint ise_id="1578" name="HmIP-RF.000A18A9A64DAC:1.PARTY_SET_POINT_TEMPERATURE" timestamp="0" valueunit="" valuetype="2" value="0" type="PARTY_SET_POINT_TEMPERATURE"/>
      <datapoint ise_id="1579" name="HmIP-RF.000A18A9A64DAC:1.PARTY_VETO_TIME" timestamp="1576843927" valueunit="" valuetype="0.000000" type="PARTY_VETO_TIME"/>
      <datapoint ise_id="1580" name="HmIP-RF.000A18A9A64DAC:1.PARTY_TIME_END" timestamp="0" valueunit="" valuetype="20" value="0" type="PARTY_TIME_END"/>
      <datapoint ise_id="1581" name="HmIP-RF.000A18A9A64DAC:1.PARTY_TIME_START" timestamp="0" valueunit="" valuetype="20" value="0" type="PARTY_TIME_START"/>
      <datapoint ise_id="1582" name="HmIP-RF.000A18A9A64DAC:1.QUICK_VETO_TIME" timestamp="1576843927" valueunit="" valuetype="16" value="0" type="QUICK_VETO_TIME"/>
      <datapoint ise_id="1583" name="HmIP-RF.000A18A9A64DAC:1.REHEAT_MODE" timestamp="1576843927" valueunit="" valuetype="2" value="0" type="REHEAT_MODE"/>
      <datapoint ise_id="1584" name="HmIP-RF.000A18A9A64DAC:1.SET_POINT_TEMPERATURE" timestamp="0" valueunit="" valuetype="4" value="20.000000" type="SET_POINT_TEMPERATURE"/>
      <datapoint ise_id="1585" name="HmIP-RF.000A18A9A64DAC:1.SWITCH_POINT_OCCURRED" timestamp="1576843927" valueunit="" valuetype="2" value="false" type="SWITCH_POINT_OCCURRED"/>
      <datapoint ise_id="1586" name="HmIP-RF.000A18A9A64DAC:1.VALVE_ADAPTION" timestamp="0" valueunit="" valuetype="2" value="false" type="VALVE_ADAPTION"/>
      <datapoint ise_id="1587" name="HmIP-RF.000A18A9A64DAC:1.VALVE_STATE" timestamp="1576843927" valueunit="" valuetype="16" value="0" type="VALVE_STATE"/>
      <datapoint ise_id="1588" name="HmIP-RF.000A18A9A64DAC:1.WINDOW_STATE" timestamp="1576843927" valueunit="" valuetype="16" value="0" type="WINDOW_STATE"/>
    </channel>
  </device>
</states>
```

### Note

All datapoints with the example datapoint ACTUAL\_TEMPERATURE highlighted as used in the example next

The **XML node** converts the XML structure to a Javascript object which is used by the various **Change nodes** to get the value of a specific datapoint by using JSONata expressions. JSONata makes it simple to parsing this kind of data.

### Example JSONata expressions

Get the ACTUAL\_TEMPERATURE value for datapoint 1567.  
The payload returned is a string.

```
payload.**[ise_id="1567"].value
```

### Notes

The multi-level wildcard \*\* traverses all descendants. In this case, select all “ise\_id equals 1567” values, regardless of how deeply nested the information is in the XML structure.

The XML structure snippet parsed:

```
...
<datapoint ise_id="1567" name="HmIP-RF.000A18A9A64DAC:1.ACTUAL_TEMPERATURE" timestamp="1576843927"
valueunit="" valuetype="4" value="20.900000" type="ACTUAL_TEMPERATURE"/>
...
```

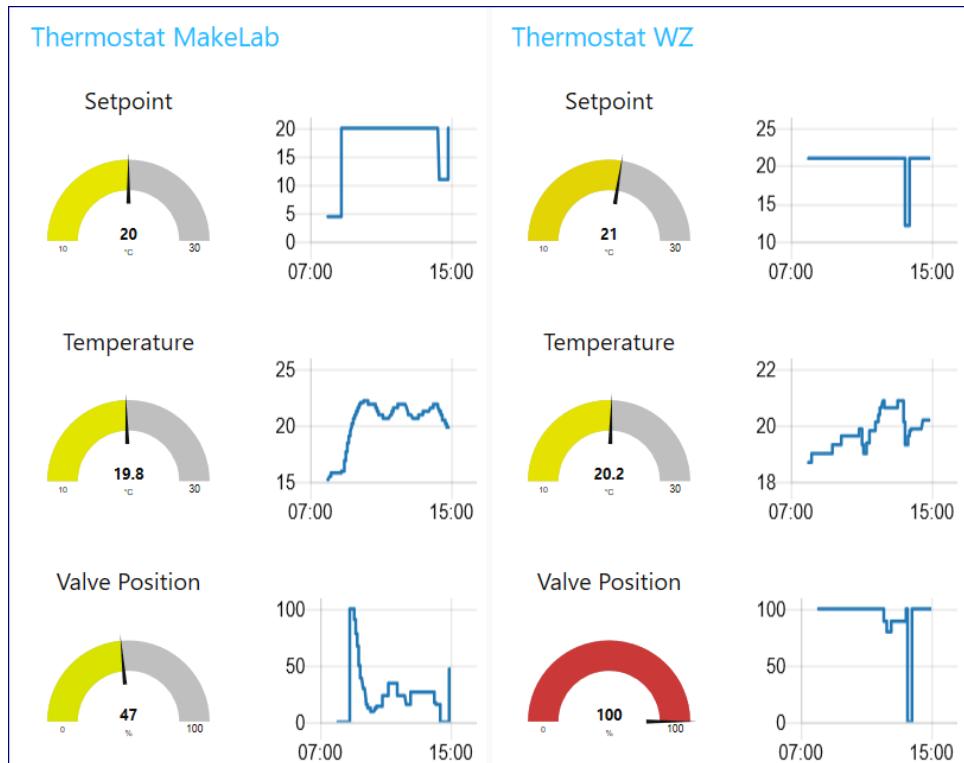
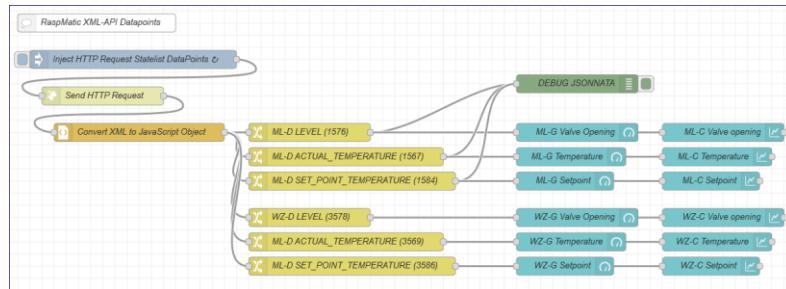
JSONata enables also to change the value, like for example the LEVEL value (=the valve position) from 0-1 to 0-100 (displayed with unit %).

The payload returned is a number.

```
$number(payload.**[ise_id=\\"1576\\"].value) * 100
```

The value is used by Node-Red Dashboard nodes like the Gauge (ui\_gauge) or Chart (ui\_chart).

The next flow has the two thermostats MakeLab and LivingRoom based on previous flow explained.



# SQL

## Purpose

To execute Read, Update & Delete operations on the Domoticz SQLite Database domoticz.db.

<TODO> Identify and build solution to manage entries, i.e. select or delete data esp. from the Measurement Tables.

## Thoughts

- Python3 scripts triggered by a Switch or Node-RED Dashboard UI (and input field)
- Python3 with guizero – simple UI
- Node-RED SQLite3 Nodes
- SQLite3 package from a terminal
- B4J application

## Approach

- **Explore Database Structure & SQL Statements**  
To analyse the database, external tools like the SQLiteSpy are useful helpers, but also using SQLite3 from the terminal command-line (Command Line Interface CLI).
- **For Tests**  
The Domoticz database is exported from the Domoticz production system to the Development Device:  
GUI > Setup > Settings > Backup/Restore > Backup Database.  
The CRUD operations are therefor executed in offline mode.
- **For Production**  
Ensure Domoticz is stopped first, then perform CRUD operations on the Domoticz database and start Domoticz after completing.  
This is only required if changes (Update or Delete) to the database are made. For Read (Select), no need to stop Domoticz.

## SQLite Shell

The sqlite3 package (include SQLite libraries) enables to perform SQL operations from the command-line shell (SQLite shell).

### Install SQLite3

Login as user “pi” and install the “sqlite3” package.

```
sudo apt install sqlite3
```

```
Reading package lists... Done
Building dependency tree
Reading state information... Done
Suggested packages:
  sqlite3-doc
The following NEW packages will be installed:
  sqlite3
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 709 kB of archives.
After this operation, 1,991 kB of additional disk space will be used.
Get:1 http://mirror.de.leaseweb.net/raspbian/raspbian stretch/main armhf sqlite3 armhf 3.16.2-5+deb9u1 [709 kB]
Fetched 709 kB in 2s (325 kB/s)
Selecting previously unselected package sqlite3.
(Reading database ... 96101 files and directories currently installed.)
Preparing to unpack .../sqlite3_3.16.2-5+deb9u1_armhf.deb ...
Unpacking sqlite3 (3.16.2-5+deb9u1) ...
Setting up sqlite3 (3.16.2-5+deb9u1) ...
Processing triggers for man-db (2.7.6.1-2) ...
```

### Prepare SQL Statements

For the examples, the Domoticz production database “domoticz.db” is used.  
Login as user “pi”, change directory to “domoticz” – contains SQLite3 database “domoticz.db”.

```
Login username "pi"
$cd domoticz
$sqlite3
SQLite version 3.16.2 2017-01-06 16:32:41
Enter ".help" for usage hints.
Connected to a transient in-memory database.
Use ".open FILENAME" to reopen on a persistent database.
sqlite> .open domoticz.db
```

#### Hint

Do not add a semicolon to the “.open” command, else a new database will be created with the semicolon at name end.

Example: .open domoticz.db; creates a new database with filename domoticz.db;

Usage semicolon “;”

On . commands, to control the SQLite shell, do not use the semicolon.

Use the semicolon on SQL statements, i.e. SELECT, UPDATE etc.

Next some SQL examples ...

## Get All Tables

```
sqlite> .tables
BackupLog          Meter          SceneTimers
Cameras            Meter_Calendar Scenes
CamerasActiveDevices MobileDevices SetpointTimers
CustomImages       MultiMeter     SharedDevices
DeviceStatus       MultiMeter_Calendar Temperature
DeviceToPlansMap  MySensors     Temperature_Calendar
EnoceanSensors    MySensorsChilds TimerPlans
EventMaster        MySensorsVars Timers
EventRules         Notifications ToonDevices
Fan                Percentage    UV
Fan_Calendar      Percentage_Calendar UV_Calendar
FibaroLink         Plans         UserSessions
Floorplans         Preferences   UserVariables
GooglePubSubLink  PushLink     Users
Hardware           Rain          WOLNodes
HttpLink           Rain_Calendar Wind
LightSubDevices   SceneDevices Wind_Calendar
LightingLog        SceneLog     ZWaveNodes
```

### Note

The various tables holding measurement data are

```
'MultiMeter','MultiMeter_Calendar','Percentage','Percentage_Calendar','Rain','Rain_Calendar','Temperature','UV','UV_Calendar','Wind','Wind_Calendar'
```

## Get Structure DeviceStatus

There are several ways to get the structure of a table.

### Command: .schema

#### *Note*

.schema devicestatus gives the same result.

```
sqlite> .schema devicestatus
CREATE TABLE [DeviceStatus] ([ID] INTEGER PRIMARY KEY, [HardwareID] INTEGER NOT NULL, [DeviceID] VARCHAR(25) NOT NULL, [Unit] INTEGER DEFAULT 0, [Name] VARCHAR(100) DEFAULT Unknown, [Used] INTEGER DEFAULT 0, [Type] INTEGER NOT NULL, [SubType] INTEGER NOT NULL, [SwitchType] INTEGER DEFAULT 0, [Favorite] INTEGER DEFAULT 0, [SignalLevel] INTEGER DEFAULT 0, [BatteryLevel] INTEGER DEFAULT 0, [nValue] INTEGER DEFAULT 0, [sValue] VARCHAR(200) DEFAULT null, [LastUpdate] DATETIME DEFAULT (datetime('now','localtime')), [Order] INTEGER BIGINT(10) default 0, [AddjValue] FLOAT DEFAULT 0, [AddjMulti] FLOAT DEFAULT 1, [AddjValue2] FLOAT DEFAULT 0, [AddjMulti2] FLOAT DEFAULT 1, [StrParam1] VARCHAR(200) DEFAULT '', [StrParam2] VARCHAR(200) DEFAULT '', [LastLevel] INTEGER DEFAULT 0, [Protected] INTEGER DEFAULT 0, [CustomImage] INTEGER DEFAULT 0, [Description] VARCHAR(200) DEFAULT '', [Options] TEXT DEFAULT null, [Color] TEXT DEFAULT NULL);
CREATE INDEX ds_hduts_idx on DeviceStatus(HardwareID, DeviceID, Unit, Type, SubType);
CREATE TRIGGER devicestatusupdate AFTER INSERT ON DeviceStatus
BEGIN
    UPDATE DeviceStatus SET [Order] = (SELECT MAX([Order]) FROM DeviceStatus)+1 WHERE DeviceStatus.ID = NEW.ID;
END;
CREATE INDEX ds_hduts_idx on DeviceStatus(HardwareID, DeviceID, Unit, Type, SubType);
CREATE TRIGGER devicestatusupdate AFTER INSERT ON DeviceStatus
BEGIN
    UPDATE DeviceStatus SET [Order] = (SELECT MAX([Order]) FROM DeviceStatus)+1 WHERE DeviceStatus.ID = NEW.ID;
END;
```

### Command: Pragma

```
sqlite> .header on
sqlite> .mode column
```

cid	name	type	notnull	dflt_value	pk
0	ID	INTEGER	0		1
1	HardwareID	INTEGER	1		0
2	DeviceID	VARCHAR(25)	1		0
3	Unit	INTEGER	0	0	0
4	Name	VARCHAR(100)	0	Unknown	0
5	Used	INTEGER	0	0	0
6	Type	INTEGER	1		0
7	SubType	INTEGER	1		0
8	SwitchType	INTEGER	0	0	0
9	Favorite	INTEGER	0	0	0
10	SignalLeve	INTEGER	0	0	0
11	BatteryLev	INTEGER	0	0	0
12	nValue	INTEGER	0	0	0
13	sValue	VARCHAR(200)	0	null	0
14	LastUpdate	DATETIME	0	datetime('now')	0
15	Order	INTEGER BIGINT	0	0	0
16	AddjValue	FLOAT	0	0	0
17	AddjMulti	FLOAT	0	1	0
18	AddjValue2	FLOAT	0	0	0
19	AddjMulti2	FLOAT	0	1	0
20	StrParam1	VARCHAR(200)	0	''	0
21	StrParam2	VARCHAR(200)	0	''	0
22	LastLevel	INTEGER	0	0	0
23	Protected	INTEGER	0	0	0
24	CustomImage	INTEGER	0	0	0
25	Description	VARCHAR(200)	0	''	0
26	Options	TEXT	0	null	0
27	Color	TEXT	0	NULL	0

## Command: Select Statement

```
sqlite> SELECT sql FROM sqlite_master WHERE name = "DeviceStatus";
sql
-----
CREATE TABLE [DeviceStatus] ([ID] INTEGER PRIMARY KEY, [HardwareID] INTEGER NOT NULL, [DeviceID] VARCHAR(25) NOT NULL, [Unit] INTEGER DEFAULT 0, [Name] VARCHAR(100) DEFAULT Unknown, [Used] INTEGER DEFAULT 0, [Type] INTEGER NOT NULL, [SubType] INTEGER NOT NULL, [SwitchType] INTEGER DEFAULT 0, [Favorite] INTEGER DEFAULT 0, [SignalLevel] INTEGER DEFAULT 0, [BatteryLevel] INTEGER DEFAULT 0, [nValue] INTEGER DEFAULT 0, [sValue] VARCHAR(200) DEFAULT null, [LastUpdate] DATETIME DEFAULT (datetime('now','localtime')), [Order] INTEGER BIGINT(10) default 0, [AddjValue] FLOAT DEFAULT 0, [AddjMulti] FLOAT DEFAULT 1, [AddjValue2] FLOAT DEFAULT 0, [AddjMulti2] FLOAT DEFAULT 1, [StrParam1] VARCHAR(200) DEFAULT '', [StrParam2] VARCHAR(200) DEFAULT '', [LastLevel] INTEGER DEFAULT 0, [Protected] INTEGER DEFAULT 0, [CustomImage] INTEGER DEFAULT 0, [Description] VARCHAR(200) DEFAULT '', [Options] TEXT DEFAULT null, [Color] TEXT DEFAULT NULL)
```

## Other Examples

```
sqlite> .schema Temperature
CREATE TABLE [Temperature] ([DeviceRowID] BIGINT(10) NOT NULL, [Temperature] FLOAT NOT NULL, [Chill] FLOAT DEFAULT 0, [Humidity] INTEGER DEFAULT 0, [Barometer] INTEGER DEFAULT 0, [DewPoint] FLOAT DEFAULT 0, [SetPoint] FLOAT DEFAULT 0, [Date] DATETIME DEFAULT (datetime('now','localtime')));
CREATE INDEX t_id_idx      on Temperature(DeviceRowID);
CREATE INDEX t_id_date_idx on Temperature(DeviceRowID, Date);
```

```
sqlite> .schema LightingLog
CREATE TABLE [LightingLog] ([DeviceRowID] BIGINT(10) NOT NULL, [nValue] INTEGER DEFAULT 0, [sValue] VARCHAR(200), [Date] DATETIME DEFAULT (datetime('now','localtime')), [User] VARCHAR(100) DEFAULT (''));
CREATE INDEX ll_id_idx      on LightingLog(DeviceRowID);
CREATE INDEX ll_id_date_idx on LightingLog(DeviceRowID, Date);
```

## Select DeviceStatus ID,Name

```
sqlite> select ID, Name from DeviceStatus;
1|RPi RAM Usage
2|RPi HDD /boot
... and many more
12|Blind Living Room
207|Hzg Bad Sollwert
208|Hzg Bad Temperatur
209|Hzg Bad Batterie
...
```

## Select DeviceStatus ID,Name,nValue,sValue,LastUpdate

For the device with id=201. The ID is the Idx of the device.

```
sqlite> select ID,Name,nValue,sValue,LastUpdate from DeviceStatus where ID=201;
201|Hzg WZ Sollwert|1|21.0|2019-12-17 06:15:02
```

## Select LightingLog Device idx=161

```
sqlite> select * from lightinglog where devicerowid=161;
161|0|Security Main Door changed to Alarm + Tamper|2019-05-21 09:01:07|
161|0|Security Main Door changed to Normal|2019-05-21 09:05:00|
161|0|Hue MakeLab changed to Off|2019-05-21 16:16:11|
... and many more ...
sqlite>
```

## Select Temperature Device idx=120

```
sqlite> select * from Temperature where devicerowid=120;
120|16.3|0.0|91|0|14.83|0.0|2019-05-21 09:40:00
120|16.3|0.0|91|0|14.83|0.0|2019-05-21 09:45:00
... and many more ...
```

## Select Temperature,Name Device idx=120

Show the device Name and limit the number of entries to 5.

```
sqlite> select * from Temperature, (select Name from devicestatus where id=120) as Name where
devicerowid=120 limit 5;
120|16.3|0.0|91|0|14.83|0.0|2019-05-21 09:45:00|Aussen
120|16.2|0.0|91|0|14.73|0.0|2019-05-21 09:50:00|Aussen
120|16.2|0.0|91|0|14.73|0.0|2019-05-21 09:55:00|Aussen
120|16.3|0.0|91|0|14.83|0.0|2019-05-21 10:00:00|Aussen
120|16.4|0.0|91|0|14.93|0.0|2019-05-21 10:05:00|Aussen
```

Another way to get the result using mode csv and nested tables.

```
sqlite> .mode csv
sqlite> select d.name, t.* from devicestatus d, temperature t where d.ID=t.devicerowid and
t.devicerowid=120 limit 5;

Name,DeviceRowID,Temperature,Chill,Humidity,Barometer,DewPoint,SetPoint,Date
"Aussen Temperatur",120,5.1,0.0,89,0,3.44,0.0,"2019-12-16 11:15:00"
"Aussen Temperatur",120,5.1,0.0,89,0,3.44,0.0,"2019-12-16 11:20:00"
"Aussen Temperatur",120,5.1,0.0,89,0,3.44,0.0,"2019-12-16 11:25:00"
"Aussen Temperatur",120,5.1,0.0,89,0,3.44,0.0,"2019-12-16 11:30:00"
"Aussen Temperatur",120,5.1,0.0,89,0,3.44,0.0,"2019-12-16 11:35:00"
```

## Select Temperature Device idx=120 specific day.

If using select with between datetime('2019-05-21') and datetime('2019-05-22');, the first entry of the last date (i.e. 2019-05-22) is also shown.

```
sqlite> select * from Temperature, (select Name from devicestatus where id=120) as Name where devicerowid=120 and date >=datetime('2019-05-21') and date < datetime('2019-05-22');

120|17.5|0.0|84|0|14.77|0.0|2019-05-21 13:35:00|Aussen
120|17.5|0.0|84|0|14.77|0.0|2019-05-21 13:40:01|Aussen
...
```

## Select Plans

The .header on and .mode column mode are set prior select command.

```
sqlite> .header on
sqlite> .mode column
sqlite> select * from plans;

ID      Order      Name      FloorplanID  Area
-----  -----  -----
1       1          $Hidden Devices  0
2       9          Information   1
4       12         Termine     0
5       18         Volumio     3           123,118
8       17         Hardware Monito 0
11      7          Esszimmer (EZ) 0
12      13         Wohnzimmer (WZ) 0
13      4          Bad          0
14      5          Dusche        0
15      11         MakeLab     0
16      8          Haus         0
17      10         Keller       0
```

## Select Roomplans with associated Devices

```
sqlite> select p.Name as Plan,p.ID as PlanID,d.Name as Device,d.ID as Idx from devicestatus d,
devicetoplansmap m, plans p WHERE d.ID=m.DeviceRowID and p.ID=m.PlanID order by p.Name;

Plan      PlanID      Device      Idx
-----  -----  -----
Bad       13          Hzg Bad Batterie  209
Bad       13          Hzg Bad Sollwert  207
Bad       13          Hzg Bad Temperat  208
Dusche    14          Hzg Dusche Batte  200
Dusche    14          Hzg Dusche Sollw  198
Dusche    14          Hzg Dusche Tempe  199
... and more ...
```

Another output in CSV format with header

*Note*

If the device name contains blanks, the name is put between "", i.e. Device Name"

```
cd /home/pi/domoticz
sqlite3

sqlite> .open domoticz.db
sqlite> .header on
sqlite> .mode csv
sqlite> select p.Name as Plan,p.ID as PlanID,d.Name as Device,d.ID as Idx from devicestatus d,
devicetoplansmap m, plans p WHERE d.ID=m.DeviceRowID and p.ID=m.PlanID order by p.Name;

Plan,PlanID,Device,Idx
Bad,13,"Hzg Bad Batterie",209
Bad,13,"Hzg Bad Sollwert",207
Bad,13,"Hzg Bad Temperatur",208
```

Dusche,14,"Hzg Dusche Batterie",200  
Dusche,14,"Hzg Dusche Sollwert",198  
Dusche,14,"Hzg Dusche Temperatur",199  
"Esszimmer (EZ)",11,"Hzg EZ Batterie",206  
"Esszimmer (EZ)",11,"Hzg EZ Sollwert",204  
"Esszimmer (EZ)",11,"Hzg EZ Temperatur",205  
"Esszimmer (EZ)",11,"Hue EZ",111  
... and more ...

## Select Setpoint Timers

Each radiator thermostat has one or more timers to control the temperature.  
The timers are defined in the Domoticz Database table SetpointTimers.

```
sqlite> .header on
sqlite> .mode csv
sqlite> SELECT d.Name, t.* FROM DeviceStatus d, SetpointTimers t WHERE d.ID=t.DeviceRowID;

Name, ID, Active, DeviceRowID, Date, Time, Type, Temperature, TimerPlan, Days, Month, MDay, Occurrence
"HZg Bad Sollwert", 1, 1, 207, 2019-12-15, 06:00, 2, 20.0, 0, 128, 0, 0, 0
"HZg Bad Sollwert", 2, 1, 207, 2019-12-15, 11:00, 2, 19.0, 0, 128, 0, 0, 0
"HZg Bad Sollwert", 3, 1, 207, 2019-12-14, 23:00, 2, 17.0, 0, 128, 0, 0, 0
"HZg EZ Sollwert", 4, 1, 204, 2019-12-14, 06:00, 2, 20.0, 0, 128, 0, 0, 0
"HZg EZ Sollwert", 5, 1, 204, 2019-12-14, 22:00, 2, 17.0, 0, 128, 0, 0, 0
"HZg WZ Sollwert", 6, 1, 201, 2019-12-15, 06:15, 2, 21.0, 0, 128, 0, 0, 0
"HZg WZ Sollwert", 7, 1, 201, 2019-12-14, 22:00, 2, 0.0, 0, 128, 0, 0, 0
"HZg Dusche Sollwert", 8, 1, 198, 2019-12-14, 21:30, 2, 21.0, 0, 128, 0, 0, 0
"HZg Dusche Sollwert", 9, 1, 198, 2019-12-14, 23:00, 2, 0.0, 0, 128, 0, 0, 0
"HZg MakeLab Sollwert", 10, 1, 195, 2019-12-14, 19:00, 2, 0.0, 0, 128, 0, 0, 0
```

## Delete LightingLog Rows Device idx=161

Delete all entries from table LightingLog for the device with idx=161.

```
Check if there are entries:  
sqlite> select * from lightinglog where devicerowid=161;  
161|0|Security Main Door changed to Alarm + Tamper|2019-05-21 09:01:07|  
161|0|Security Main Door changed to Normal|2019-05-21 09:05:00|  
161|0|Hue MakeLab changed to Off|2019-05-21 16:16:11|  
... and many more ...  
  
Delete the rows:  
sqlite> delete from lightinglog where devicerowid=161;  
  
Check again if there are entries = select returns no entries:  
sqlite> select * from lightinglog where devicerowid=161;  
sqlite>
```

## Delete Temperature Rows Date < 2018-08-28

Delete all entries from table [Temperature] with Date < 2018-08-28.

```
sqlite> DELETE FROM [Temperature] WHERE [DeviceRowID] = 28 AND [Date] < date('2018-08-28');  
  
Check if select returns no entries:  
sqlite> SELECT * FROM [Temperature] WHERE [DeviceRowID] = 28;  
sqlite>
```

## Delete all data device idx=44

Delete all data from Table Meter for the device with idx=44 (Stromverbrauch) with Select statement to check.

```
sqlite> DELETE FROM Meter WHERE DeviceRowID=44  
  
sqlite> SELECT * FROM Meter WHERE DeviceRowID=44  
  
sqlite> DELETE FROM MultiMeter_Calendar WHERE DeviceRowID=44  
  
sqlite> SELECT * FROM MultiMeter_Calendar WHERE DeviceRowID=44
```

The SQL statements are DELETE followed by a SELECT Query to check if no result.

## Updating Device

Be careful on using – this is just an example – NOT recommended to use.

**Change the device type and subtype in table DeviceStatus.**

```
UPDATE DeviceStatus SET Type="32" WHERE ID=163;  
UPDATE DeviceStatus SET SubType="0" WHERE ID=163;
```

## SQL Statement from File

Executing SQL statements from a text file, is an option to clean database entries (DELETE) or select multiple entries (SELECT).

```
.read FILE
```

If the path is not specified, the file read is taken from the current folder.

Example:

- .read test.sql (read in this case from the folder /home/pi/domoticz as set as default using cd domoticz)
- .read /home/pi/test.sql

```
File:  
/home/pi/domoticz/test.sql  
Content:  
select * from lightinglog where devicerowid=97;  
select * from lightinglog where devicerowid=98;
```

```
.read test.sql  
97|0|0 J 97 T|2019-05-21 01:00:00|  
97|0|0 J 98 T|2019-05-22 01:00:00|  
98|0|31-05-2019|2019-05-21 00:30:00|  
98|0|31-05-2019|2019-05-22 00:30:00|
```

## Python Scripts

Various examples of Python scripts to perform SQL operations.

The lastest version of the scripts can be found in the scripts folder (file names sql-\*.py), plus some additional scripts not documented here.

### Select Device Status

Select the device status for all devices from the Domoticz database table [DeviceStatus].

Scrip name: sql-select-devicestatus.py

```
...
#!/usr/bin/env python
## File: sql-select-devicestatus.py
## Project: Domoticz-Homeautomation-Workbook
## Purpose: Test select device status for all devices; select temperatures.
## Author: Robert W.B. Linn
## Version: 20191218

## Table(s) used
## CREATE TABLE [DeviceStatus] ([ID] INTEGER PRIMARY KEY, [HardwareID] INTEGER NOT NULL, [DeviceID]
VARCHAR(25) NOT NULL, [Unit] INTEGER DEFAULT 0, [Name] VARCHAR(100) DEFAULT Unknown, [Used] INTEGER
DEFAULT 0, [Type] INTEGER NOT NULL, [SubType] INTEGER NOT NULL, [SwitchType] INTEGER DEFAULT 0,
[Favorite] INTEGER DEFAULT 0, [SignalLevel] INTEGER DEFAULT 0, [BatteryLevel] INTEGER DEFAULT 0,
[nValue] INTEGER DEFAULT 0, [sValue] VARCHAR(200) DEFAULT null, [LastUpdate] DATETIME DEFAULT
(datetime('now','localtime')), [Order] INTEGER BIGINT(10) default 0, [AddjValue] FLOAT DEFAULT 0,
[AddjMulti] FLOAT DEFAULT 1, [AddjValue2] FLOAT DEFAULT 0, [AddjMulti2] FLOAT DEFAULT 1, [StrParam1]
VARCHAR(200) DEFAULT '', [StrParam2] VARCHAR(200) DEFAULT '', [LastLevel] INTEGER DEFAULT 0,
[Protected] INTEGER DEFAULT 0, [CustomImage] INTEGER DEFAULT 0, [Description] VARCHAR(200) DEFAULT '',
[Options] TEXT DEFAULT null, [Color] TEXT DEFAULT NULL);

import sqlite3
from sqlite3 import Error
import time
import os

# Define globals
version="SQL Test v20180828"
# Domoticz database path
database="/home/pi/domoticz/domoticz.db"

def DatabaseExists(database):
    if not os.path.exists(database):
        print("Database %s not found." % (database))
        return False
    else:
        print("Database %s found." % (database))
        return True

####
def create_connection(db_file):
    """ create a database connection to the SQLite database
        specified by the db_file
    :param db_file: database file
    :return: Connection object or None
    """
    try:
        conn = sqlite3.connect(db_file)
        return conn
    except Error as e:
        print(e)

    return None

def select_all_device_status(conn):
    """
    Query all rows in the tasks DeviceStatus
    :param conn: the Connection object
    :return:
    """
    print("Select Device Status")
```

```
cur = conn.cursor()
cur.execute("SELECT * FROM DeviceStatus")

rows = cur.fetchall()

for row in rows:
    print(row)

def main():
    print(version)

    if DatabaseExists(database):
        print("Connecting to the database...",database)
        # create a database connection
        conn = create_connection(database)
        # select data
        with conn:
            select_all_device_status(conn)

    conn.close()

if __name__ == '__main__':
    main()
```

```
python3 sql-select-devicestatus.py

SQL Test v20180828
Database /home/pi/domoticz/domoticz.db found.
Connecting to the database... /home/pi/domoticz/domoticz.db
Select Device Status
(1, 1, '0000044C', 1, 'RPi RAM Usage', 1, 243, 6, 0, 1, 12, 255, 0, '32.35', '2019-12-18 09:21:47',
104, 0.0, 1.0, 0.0, 1.0, '', '', 0, 0, 0, 'RPi Memory Usage increases over time and needs to be
watched.', None, None)
(2, 1, '0000044E', 1, 'RPi HDD /boot', 0, 243, 6, 0, 0, 12, 255, 0, '1.50', '2019-12-18 09:19:16', 1,
0.0, 1.0, 0.0, 1.0, '', '', 0, 0, 0, None, None)
(3, 1, '0000044F', 1, 'RPi Disc Usage', 1, 243, 6, 0, 1, 12, 255, 0, '32.86', '2019-12-18 09:19:16',
105, 0.0, 1.0, 0.0, 1.0, '', '', 0, 0, 0, None, None)
(4, 1, '1', 1, 'RPi CPU Temp', 1, 80, 5, 0, 0, 12, 255, 0, '41.9', '2019-12-18 09:21:47', 117, 0.0,
1.0, 0.0, 1.0, '', '', 0, 0, 0, None, None)
(5, 1, '0000044D', 1, 'RPi CPU Usage', 1, 243, 6, 0, 0, 12, 255, 0, '3.55', '2019-12-18 09:21:36', 11,
0.0, 1.0, 0.0, 1.0, '', '', 0, 0, 0, None, None)
...
and many more
```

## Select Device Status idx=201

Script name: sql-select-idx201.py

```
#!/usr/bin/env python
## File: sql-select-idx201.py
## Project: Domoticz-Homeautomation-Workbook
## Purpose: Test selecting device status for device with idx=201
## Author: Robert W.B. Linn
## Version: 20191218
import sqlite3
from sqlite3 import Error
import time
import os

version="SQL Test v20191218"
database="/home/pi/domoticz/domoticz.db"

def DatabaseExists(database):
    if not os.path.exists(database):
        print("Database %s not found." % (database))
        return False
    else:
        print("Database %s found." % (database))
        return True

def create_connection(db_file):
    """ create a database connection to the SQLite database
        specified by the db_file
    :param db_file: Database file
    :return: Connection object or None
    """
    try:
        conn = sqlite3.connect(db_file)
        return conn
    except Error as e:
        print(e)

    return None

def select_device_status(conn,idx):
    """
    Query rows table DeviceStatus for a specific device ID (=Idx)
    :param conn: connection object
    :param idx: idx of the device
    :return:
    """
    print("Select Device Status for Idx=%s " % (idx))
    cur = conn.cursor()
    table = "DeviceStatus"

    sql = "SELECT group_concat(name, ', ') FROM pragma_table_info(?)"
    args = (table,)
    cur.execute(sql, args)
    colnames = cur.fetchone()
    print(colnames[0])

    sql = "SELECT * FROM {tn} WHERE ID={idx}"
    cur.execute(sql.format(tn=table, idx=str(idx)))
    devicedata = cur.fetchall()
    print(devicedata)
    print("****")
    for row in devicedata:
        print(row) #all fields as tupels
        print("----")
        print("ID (=Idx)=%s" % row[0]) #id with value 201
        print("----")
        print(row[0],row[1],row[2]) #more fields
        print("****")

def main():
    print(version)
    if DatabaseExists(database):
        print("Connecting to the database...",database)
        # create a database connection
```

```
conn = create_connection(database)
with conn:
    select_device_status(conn, 201)

conn.close()

if __name__ == '__main__':
    main()
```

```
python3 sql-select-idx201.py

SQL Test v20191217
Database /home/pi/domoticz/domoticz.db found.
Connecting to the database... /home/pi/domoticz/domoticz.db
Select Device Status for Idx=201
ID, HardwareID, DeviceID, Unit, Name, Used, Type, SubType, SwitchType, Favorite, SignalLevel,
BatteryLevel, nValue, sValue, LastUpdate, Order, AdjValue, AdjMulti, AdjValue2, AdjMulti2,
StrParam1, StrParam2, LastLevel, Protected, CustomImage, Description, Options, Color
[(201, 20, '00140001', 1, 'Hzg WZ Sollwert', 1, 242, 1, 0, 0, 12, 255, 1, '21.0', '2019-12-17
06:15:02', 181, 0.0, 1.0, 0.0, 1.0, '', '', 0, 0, 0, None, '')]
***
201
201 20 00140001
***
```

## Delete Temperature Rows

<TODO> Add function, i.e. delete\_temperature\_by\_date(conn, date).

Script name: sql-delete-temperature-threshold.py

```
#!/usr/bin/env python
## File: sql-delete-temperature-threshold.py
## Project: Domoticz-Homeautomation-Workbook
## Purpose: Test deleting records from the SQLite database domoticz.db table Temperature
## Author: Robert W.B. Linn
## Version: 20180828

## Table(s) used
## CREATE TABLE [Temperature] ([DeviceRowID] BIGINT(10) NOT NULL, [Temperature] FLOAT NOT NULL, [Chill]
## FLOAT DEFAULT 0, [Humidity] INTEGER DEFAULT 0, [Barometer] INTEGER DEFAULT 0, [DewPoint] FLOAT DEFAULT
## 0, [SetPoint] FLOAT DEFAULT 0, [Date] DATETIME DEFAULT (datetime('now','localtime')));

import sqlite3
from sqlite3 import Error
import time
import os

# Define globals
version="SQL Test v20180828"
# Domoticz database path
# Tests
database="/home/pi/python/sql/domoticz.db"
# Production
#database="/home/pi/domoticz/domoticz.db"

def DatabaseExists(database):
    if not os.path.exists(database):
        print("Database %s not found." % (database))
        return False
    else:
        print("Database %s found." % (database))
        return True

#####
def create_connection(db_file):
    """ create a database connection to the SQLite database
        specified by the db_file
    :param db_file: database file
    :return: Connection object or None
    """
    try:
        conn = sqlite3.connect(db_file)
        return conn
    except Error as e:
        print(e)

    return None

def select_all_temperatures(conn):
    """
    Query all rows in the tasks Temperature
    :param conn: the Connection object
    :return:
    """
    print("Select all Temperatures")
    cur = conn.cursor()
    cur.execute("SELECT * FROM Temperature")

    rows = cur.fetchall()

    for row in rows:
        print(row)

def select_temperature_by_threshold(conn, threshold):
    """
    Query temperatures by threshold
    :param conn: the Connection object
    :param threshold:
```

```
:return:  
"""  
print("Select Temperature by Threshold %s" % (threshold))  
cur = conn.cursor()  
cur.execute("SELECT * FROM Temperature WHERE Temperature>?", (threshold,))  
  
rows = cur.fetchall()  
  
for row in rows:  
    print(row)  
  
def delete_temperature_by_threshold(conn, threshold):  
    """  
    Delete all temperatures by threshold  
    :param conn: the Connection object  
    :param threshold:  
    :return:  
    """  
    print("Delete Temperature by Threshold %s" % (threshold))  
    cur = conn.cursor()  
    cur.execute("DELETE FROM Temperature WHERE Temperature>?", (threshold,))  
    conn.commit()  
  
def main():  
    print(version)  
  
    if DatabaseExists(database):  
        print("Connecting to the database...",database)  
        # create a database connection  
        conn = create_connection(database)  
        with conn:  
            threshold = 40.0  
  
            select_temperature_by_threshold(conn, threshold)  
  
            delete_temperature_by_threshold(conn, threshold)  
  
            # Check if zero  
            select_temperature_by_threshold(conn, threshold)  
  
        conn.close()  
  
if __name__ == '__main__':  
    main()
```

```
python3 sql-delete-test.py  
  
SQL Test v20180828  
Database /home/pi/domoticz/domoticz.db found.  
Connecting to the database... /home/pi/domoticz/domoticz.db  
Select Temperature by Threshold 40.0  
(2, 40.8, 0.0, 0, 0, 0.0, 0.0, '2018-08-28 19:20:00')  
Delete Temperature by Threshold 40.0  
Select Temperature by Threshold 40.0
```

# Appendix Domoticz Hints

## Start, Stop, Status

### Terminal commands

```
sudo service domoticz.sh start
sudo service domoticz.sh stop
sudo service domoticz.sh status
```

### Output Status Sample

```
domoticz.service - LSB: Home Automation System
 Loaded: loaded (/etc/init.d/domoticz.sh)
 Active: active (running) since Mon 2018-08-27 09:32:39 CEST; 16min ago
 Process: 31803 ExecStop=/etc/init.d/domoticz.sh stop (code=exited, status=0/SUCCESS)
 Process: 32093 ExecStart=/etc/init.d/domoticz.sh start (code=exited, status=0/SUCCESS)
 CGroup: /system.slice/domoticz.service
         └─32100 /home/pi/domoticz/domoticz -daemon -www 8080 -sslww 443

Aug 27 09:32:39 139 domoticz.sh[32093]: 2018-08-27 09:32:39.694 Status: Dom...z
Aug 27 09:32:39 139 domoticz[32098]: Domoticz is starting up....
Aug 27 09:32:39 139 domoticz[32100]: Domoticz running...
Aug 27 09:32:39 139 domoticz.sh[32093]: 2018-08-27 09:32:39.695 Status: Bui...6
Aug 27 09:32:39 139 domoticz.sh[32093]: 2018-08-27 09:32:39.695 Status: Sys...i
Aug 27 09:32:39 139 domoticz.sh[32093]: 2018-08-27 09:32:39.695 Status: Sta.../
Aug 27 09:32:39 139 domoticz.sh[32093]: domoticz: Domoticz is starting up....
Aug 27 09:32:39 139 systemd[1]: Started LSB: Home Automation System.
Hint: Some lines were ellipsized, use -l to show in full.
```

## Lost Username and Password

Open terminal session and login as User Pi

Stop Domoticz and wait 15 seconds to complete

```
sudo service domoticz.sh stop
```

Check Domoticz Status

```
sudo service domoticz.sh stop
```

Change to Domoticz Folder

```
cd domoticz
```

*Note*

The full path is /home/pi/domoticz

Start Domoticz with parameter no www password

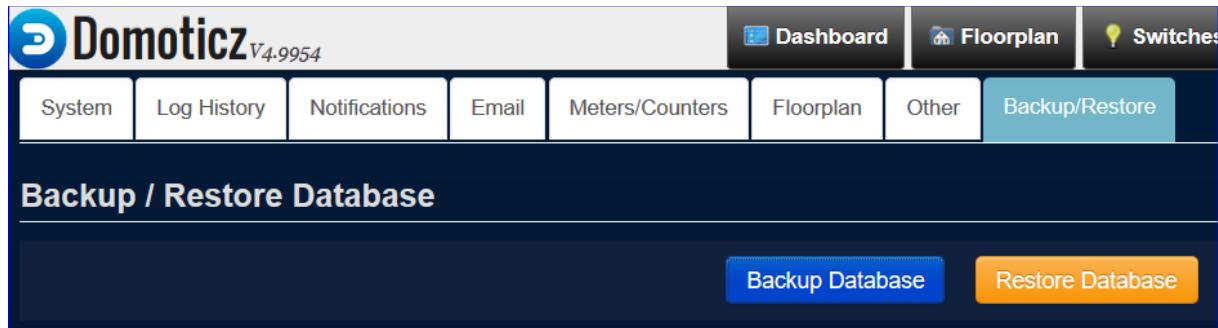
```
sudo ./domoticz -nowwwpwd
```

# Create Backup

From the Domoticz UI go to:

Setup > Settings > Backup/Restore : Click Backup Database

This will create a file in the downloads folder on the development device.



# Change Loglevel

```
Using username "pi".
Linux DoPro 4.19.42-v7+ #1219 SMP Tue May 14 21:20:58 BST 2019 armv7l

Edit
sudo nano /etc/init.d/domoticz.sh

Add the line:
DAEMON_ARGS="$DAEMON_ARGS -loglevel normal,status,error,debug"

Save, followed by:
sudo systemctl daemon-reload
sudo service domoticz.sh restart
```

# Troubleshooting

## Device Widget turns yellow/red

Check the device status using URL with parameter type=devices and rid=idx.

### Example

Checking device named Windmesser (TFA Dostmann 30.3168 Windmeter) because the weather widget turned yellow.



From a browser run:

```
http://NNN.NNN.1.60:8080/json.htm?type=devices&rid=28
```

### Result JSON string (snippet)

```
{  
    "app_version" : "4.9999",  
    "result" : [  
        {  
            "BatteryLevel" : 0,  
            "Data" : "22.00;NNE;5;0;26.5;26.5",  
            "HardwareName" : "RFXtrx433e",  
            "HardwareType" : "RFXCOM - RFXtrx433 USB 433.92MHz Transceiver",  
            "SignalLevel" : 6,  
            "Used" : 1,  
            "idx" : "28"  
        }  
    ],  
    "status" : "OK",  
    "title" : "Devices"  
}
```

From the returned result, the **BatteryLevel** is 0.

It seems that the rechargeable battery is defect for this device.

The battery is recharged by a small solar panel on top of the device.

# Appendix Domoticz Build Source

Sample commands for building Domoticz on a Raspberry Pi from the Domoticz Source. Followed the instructions from [here](#).

```
Swap File 100 to 500MB
sudo service dphys-swapfile status
sudo swapoff -a
free
sudo nano /etc/dphys-swapfile
    change 100 to 500
sudo swapon -a
free

Domoticz Build (took about 2 hours)
sudo apt-get install cmake make gcc g++ libssl-dev git libcurl4-gnutls-dev libusb-dev python3-dev
zlib1g-dev

mkdir boost

cd boost

wget https://dl.bintray.com/boostorg/release/1.68.0/source/boost_1_68_0.tar.gz
tar xfz boost_1_68_0.tar.gz
cd boost_1_68_0/
./bootstrap.sh
./b2 stage threading=multi link=static --with-thread --with-system
sudo ./b2 install threading=multi link=static --with-thread --with-system
cd ../../
rm -Rf boost/
cd /home/pi
free

git clone https://github.com/domoticz/domoticz.git dev-domoticz
Cloning into 'dev-domoticz'...
remote: Counting objects: 59677, done.
remote: Compressing objects: 100% (16/16), done.
remote: Total 59677 (delta 9), reused 13 (delta 6), pack-reused 59655
Receiving objects: 100% (59677/59677), 206.16 MiB | 3.82 MiB/s, done.
Resolving deltas: 100% (43178/43178), done.
Checking out files: 100% (2784/2784), done.

cd dev-domoticz

git pull
Already up-to-date.

cmake -DCMAKE_BUILD_TYPE=Release CMakeLists.txt
-- The C compiler identification is GNU 6.3.0
-- The CXX compiler identification is GNU 6.3.0
...
-- Compiling Revision #9700
-- Configuring done
-- Generating done
-- Build files have been written to: /home/pi/dev-domoticz

make
Scanning dependencies of target minizip
...
[100%] Linking CXX executable domoticz
```

```
[100%] Built target domoticz

ls
...
domoticz.sh
...

sudo ./domoticz
2018-09-12 16:18:10.882 Status: Domoticz V4.9999 (c)2012-2018 GizMoCuz
2018-09-12 16:18:10.882 Status: Build Hash: 9e8ea729, Date: 2018-09-09 18:27:57
2018-09-12 16:18:10.883 Status: Startup Path: /home/pi/dev-domoticz/
2018-09-12 16:18:11.292 Status: PluginSystem: Started, Python version '3.5.3'.
2018-09-12 16:18:11.299 Active notification Subsystems: gcm, http (2/13)
2018-09-12 16:18:11.304 Status: WebServer(HTTP) started on address: :: with port 8080
2018-09-12 16:18:11.318 Status: WebServer(SSL) started on address: :: with port 443
2018-09-12 16:18:11.319 Status: Proxymanager started.
2018-09-12 16:18:11.321 Starting shared server on: ::::6144
2018-09-12 16:18:11.321 Status: TCPServer: shared server started...
2018-09-12 16:18:11.322 Status: RxQueue: queue worker started...
2018-09-12 16:18:13.323 Status: EventSystem: reset all events...
2018-09-12 16:18:13.323 Status: EventSystem: reset all device statuses...
2018-09-12 16:18:13.472 Status: PluginSystem: Entering work loop.
2018-09-12 16:18:13.480 Status: Python EventSystem: Initializing event module.
2018-09-12 16:18:13.481 Status: EventSystem: Queue thread started...
2018-09-12 16:18:42.447 Status: Incoming connection from: NNN.NNN.1.3

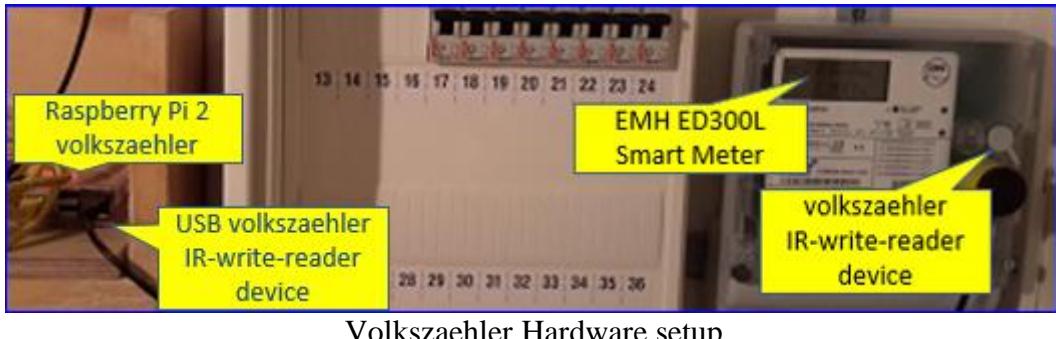
Updating Domoticz
Binary install update:
Use the Web Interface to update Domoticz (Setup->Check for Updates)

Manual update:
Stable: cd domoticz, ./updaterelease
Beta: cd domoticz, ./updatebeta
Source Update: cd domoticz, git pull, make -j 4 OR make
```

# Appendix volkszaehler Setup

Description of the **volkszaehler** with an **IR device**, connected to a Raspberry Pi.  
[volkszaehler.org](http://volkszaehler.org) is an Open Source (GPL license) Smart Metering Hard- and Software solution.

Ensure to read the "[howto get started](#)" first to get an understanding of the concept.



Volkszaehler Hardware setup

## Hardware

- Raspberry Pi Model 2 with WLAN and a 16GB SD Card.
- Power Meter EMH ED300L.

## Software

- Raspberry Pi Linux vz 4.14.62-v7+ #1134 (armv7l)
- volkszaehler Raspberry Pi image

# Setup Raspberry Pi

Download the volkszaehler image to a Windows PC, unpack the image, write the image using win32diskimager to a 16GB SD card. Stick the SD card in the Raspberry Pi and power on.

*Note*

This setup was done 2015 – things might have changed – checkout the volkszaehler website.

## Option 1 WLAN static IP address

The communication uses WLAN with a static network address.

Set a static IP address by changing /etc/network/interfaces and /etc/wpa\_supplicant/wpa\_supplicant.conf.

File /etc/network/interfaces:

Editing via **sudo nano /etc/network/interfaces**

```
auto lo
iface lo inet loopback
auto wlan0
iface wlan0 inet manual
wireless-power off
wpa-conf /etc/wpa_supplicant/wpa_supplicant.conf
iface wlan0 inet static
address domoticz-ip
netmask 255.255.255.0
broadcast NNN.NNN.0.255
gateway domoticz-ip
```

**Edit sudo nano /etc/wpa\_supplicant/wpa\_supplicant.conf**

```
ctrl_interface=DIR=/var/run/wpa_supplicant GROUP=netdev
update_config=1
network={
    ssid="YOURSSID"
    proto=RSN
    key_mgmt=WPA-PSK
    pairwise=CCMP
    group=CCMP
    psk="YOURPSK"
}
```

## Option 2 Ethernet static IP address

The Raspberry Pi volkszahler and the Raspberry Pi Domoticz production system are direct connected via an Ethernet cable. A standard cable is used, no twisted wires required.

The communication uses ETH0 with a static network addresses on both sides.

The ETH0 network address must be different then the WLAN network address.

Raspberry Pi volkszahler [Raspbian GNU/Linux 8 (jessie)] Linux 39 4.1.19-v7+ #858	Raspberry Pi Domoticz production [Raspbian GNU/Linux 8 (jessie)] Linux openHABianPi 4.9.35-v7+ #1014
eth0 inet addr:169.254.87.85 Bcast:169.254.255.255 Mask:255.255.0.0	eth0 inet addr:169.254.87.84 Bcast:169.254.255.255 Mask:255.255.0.0
Set the static Ethernet network Address sudo nano /etc/dhcpcd.conf	sudo nano /etc/dhcpcd.conf
Add the lines	
interface eth0 static ip_address=169.254.87.85	interface eth0 static ip_address=169.254.87.84

static routers=169.254.0.1	static routers=169.254.0.1
----------------------------	----------------------------

*Note*

- Determine the Linux version: `uname -a` to
- Determine the Raspberry Pi release: `cat /etc/os-release` to

Used option direct communication with ethernet cable.

# volkszaehler

## PowerMeter Setup

Powermeter: [EMH ED300L](#)

The powerpuls is captured using an [IR-write-reader device](#).

This device is connected via USB to the Raspberry Pi 2 Port /dev/ttyUSB22.

*Note*

- Check the connected USB devices with command **ls /dev/tty\***
- Ensure when changing the Raspberry Pi or adding USB devices, to use the same port for the IR-write-reader device ([read](#)).

Persistent USB devices are defined using:

```
sudo nano /etc/udev/rules.d/99-usb-serial.rules
```

Add Line

```
SUBSYSTEM=="tty", ATTRS{idVendor}=="10c4", ATTRS{idProduct}=="ea60", ATTRS{serial}=="00F2E620",
SYMLINK+="ttyUSB-VZ", MODE="0666"
```

Check USB device information

```
sudo lsusb -v
```

To check detailed USB port information, use the command:

```
udevadm info --query=all --name=/dev/ttyUSB-VZ
```

Output Example

```
P: /devices/platform/soc/3f980000.usb/usb1/1-1/1-1.5/1-1.5:1.0/ttyUSB0/tty/ttyUSB0
N: ttyUSB0
S: serial/by-id/usb-Silicon_Labs_CP2104_USB_to_UART_Bridge_Controller_00F2E620-if00-port0
S: serial/by-path/platform-3f980000.usb-usb-0:1.5:1.0-port0
S: ttyUSB-VZ
E: DEVLINKS=/dev/serial/by-path/platform-3f980000.usb-usb-0:1.5:1.0-port0 /dev/serial/by-id/usb-Silicon_Labs_CP2104_USB_to_UART_Bridge_Controller_00F2E620-if00-port0 /dev/ttyUSB-VZ
E: DEVNAME=/dev/ttyUSB0
E: DEVPATH=/devices/platform/soc/3f980000.usb/usb1/1-1/1-1.5/1-1.5:1.0/ttyUSB0/tty/ttyUSB0
E: ID_BUS=usb
E: ID_MODEL=CP2104_USB_to_UART_Bridge_Controller
E: ID_MODEL_ENC=CP2104\x20USB\x20to\x20UART\x20Bridge\x20Controller
E: ID_MODEL_FROM_DATABASE=CP210x UART Bridge / myAVR mySmartUSB light
E: ID_MODEL_ID=ea60
E: ID_PATH=platform-3f980000.usb-usb-0:1.5:1.0
E: ID_PATH_TAG=platform-3f980000_usb-usb-0_1_5_1_0
E: ID_REVISION=0100
E: ID_SERIAL=Silicon_Labs_CP2104_USB_to_UART_Bridge_Controller_00F2E620
E: ID_SERIAL_SHORT=00F2E620
E: ID_TYPE=generic
E: ID_USB_DRIVER=cp210x
E: ID_USB_INTERFACES=:ff0000:
E: ID_USB_INTERFACE_NUM=00
E: ID_VENDOR=Silicon_Labs
E: ID_VENDOR_ENC=Silicon\x20Labs
E: ID_VENDOR_FROM_DATABASE=Cygnal Integrated Products, Inc.
E: ID_VENDOR_ID=10c4
E: MAJOR=188
E: MINOR=0
E: SUBSYSTEM=tty
E: TAGS=:systemd:
E: USEC_INITIALIZED=5005222
```

## USB Configuration

The USB port settings are 9600 Baud 8 n.

Set via command stty:

**Minicom**

The setup can also be done via [minicom](#)

```
sudo apt-get install minicom  
sudo minicom -s
```

Ensure port is set during boot

Add this line into /etc/rc.local (by sudo nano /etc/rc.local)

Check Data coming from the USB device (option 1):

```
cat /dev/ttyUSB-VZ | od -tx1
```

Output Example:

---

00000000	2f	38	01	01	63	e4	c7	00	76	07	00	0a	00	07	db	75
0000020	62	00	62	00	72	63	07	01	77	01	0b	09	01	4d	48	00

Check Data coming from the USB device (option 2):

```
xxd </dev/ttyUSB-VZ
```

## Define Channels

To define the channels, reboot the RPi and access via a browser the volkszaehler Frontend using its ip address: <http://vz-ip>

Define Channels using the volkszaehler FrontEnd

```
Channel 1 =
{"version":"0.3","entity": {"uuid": "d14e9a80-8894-11e5-9dc8-298a9a1001ac", "type": "current", "active": true, "color": "aqua", "description": "Strom Direktverbrauch", "fillstyle": 0, "public": true, "resolution": 10000, "style": "steps", "title": "Direktverbrauch", "yaxis": "auto"}}

Channel 2 =
{"version":"0.3","entity": {"uuid": "e460bec0-8894-11e5-b0d8-3f141d19092c", "type": "current", "active": true, "color": "aqua", "description": "Strom Gesamtverbrauch", "fillstyle": 0, "public": true, "resolution": 10000, "style": "steps", "title": "Gesamtverbrauch", "yaxis": "auto"}}

Channel 3 = 1.8.0
{"version": "0.3", "entity": {"uuid": "23844c00-8895-11e5-a642-6d8ce36c9a44", "type": "electric meter", "active": true, "color": "#0033ff", "cost": 0.1992, "description": "Stromverbrauch Fuchsbau", "fillstyle": 0.2, "initialconsumption": 20, "public": true, "resolution": 1000, "style": "steps", "title": "Stromverbrauch", "yaxis": "auto"}}

Channel 4 = 16.7.0
{"version": "0.3", "entity": {"uuid": "a3c76600-8895-11e5-9432-333f81e04451", "type": "current", "active": true, "color": "aqua", "description": "Wirkleistung", "fillstyle": 0, "public": true, "resolution": 10000, "style": "steps", "title": "Wirkleistung", "yaxis": "auto"}}
```

## vzlogger Setup

The defined channels must be defined in the file /etc/vzlogger.conf :

```
sudo nano /etc/vzlogger.conf
```

Two channels are defined "**Energie Leistung**" and "**Energie Zaehlerstand**":

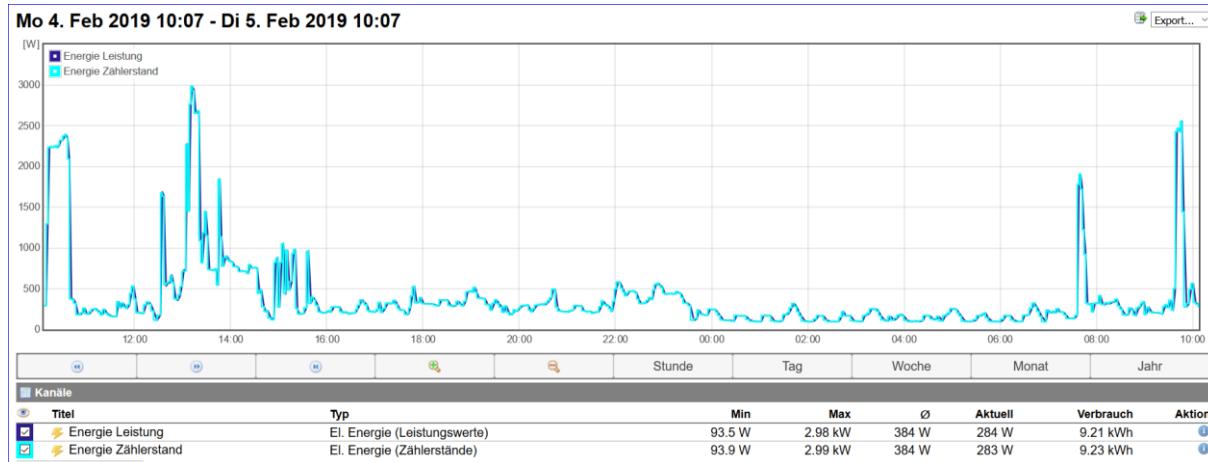
```
/***
 * vzlogger configuration
 * Use properly encoded JSON with javascript comments
 * http://wiki.volkszaehler.org/software/controller/vzlogger#configuration
 * Online configuration editor: http://volkszaehler.github.io/vzlogger/
 */

{
  // General settings
  "daemon": true, // run periodically
  "verbosity": 0, // log (0=log_alert,1=log_error,3=log_warning,5=log_info,10=log_debug,15=log_fine)
  "log": "/var/log/vzlogger.log", // log file, optional
  "retry": 30, // http retry delay in seconds

  // Build-in HTTP server
  "local": {
    "enabled": false, // enable local HTTPd for serving live readings
    "port": 8080, // TCP port for local HTTPd
    "index": true, // provide index listing of available channels if no UUID was requested
    "timeout": 30, // timeout for long polling comet requests in seconds (0 disables comet)
    "buffer": 600 // HTTPd buffer configuration for serving readings, default -1
      // >0: number of seconds of readings to serve
      // <0: number of tuples to serve per channel (e.g. -3 will serve 3 tuples)
  },

  "push": [],
  "meters" : [
    {
      "enabled" : true,
      "protocol" : "sml",
      "device" : "/dev/ttyUSB-VZ",
      "baudrate": 9600,
      "parity": "8n1",
      "channels":
        [
          {
            // Leistungswert
            "uuid" : "958bce60-b342-11e8-b54f-bbec0573e1f4",
            "middleware" : "http://localhost/middleware.php",
            "identifier" : "1-0:16.7.0"
          },
          {
            // Zaehlerstand
            "uuid" : "5b8ea2a0-b342-11e8-bec6-15c040e6d041",
            "middleware" : "http://localhost/middleware.php",
            "identifier" : "1-0:1.8.0"
          }
        ]
    }]
}
```

volkszaehler Frontend <http://vz-ip> showing the two channels defined.



Clicking on the Aktion (i) icon provides the details for the two channels defined:

<p>"uuid": "958bce60-b342-11e8-b54f-bbec0573e1f4" "identifier": "1-0:16.7.0" Watt (Aktuelle Gesamtwirkleistung (P+ - P-))</p> <div style="border: 1px solid #ccc; padding: 5px;"> <p><b>Details für Energie Leistung</b></p> <table border="1"> <tr><th>Eigenschaft</th><th>Wert</th></tr> <tr><td>UUID</td><td>958bce60-b342-11e8-b54f-bbec0573e1f4</td></tr> <tr><td>Middleware</td><td>middleware.php</td></tr> <tr><td>Typ</td><td>⚡ El. Energie (Leistungswerte)</td></tr> <tr><td>Cookie</td><td></td></tr> <tr><td>Titel</td><td>Energie Leistung</td></tr> <tr><td>Öffentlich</td><td></td></tr> <tr><td>Farbe</td><td>#311b92</td></tr> <tr><td>Stil</td><td>Linien</td></tr> <tr><td>Füllgrad</td><td>0</td></tr> <tr><td>Achse</td><td>auto</td></tr> <tr><td>Aktiv</td><td></td></tr> </table> <p><b>Daten</b> <b>Löschen</b> <b>Bearbeiten</b> <b>Schließen</b></p> </div>	Eigenschaft	Wert	UUID	958bce60-b342-11e8-b54f-bbec0573e1f4	Middleware	middleware.php	Typ	⚡ El. Energie (Leistungswerte)	Cookie		Titel	Energie Leistung	Öffentlich		Farbe	#311b92	Stil	Linien	Füllgrad	0	Achse	auto	Aktiv		<p>"uuid": "5b8ea2a0-b342-11e8-bec6-15c040e6d041" "identifier": "1-0:1.8.0" Wh (Positive Gesamtwirkenergie (A+))</p> <div style="border: 1px solid #ccc; padding: 5px;"> <p><b>Details für Energie Zählerstand</b></p> <table border="1"> <tr><th>Eigenschaft</th><th>Wert</th></tr> <tr><td>UUID</td><td>5b8ea2a0-b342-11e8-bec6-15c040e6d041</td></tr> <tr><td>Middleware</td><td>middleware.php</td></tr> <tr><td>Typ</td><td>⚡ El. Energie (Zählerstände)</td></tr> <tr><td>Cookie</td><td></td></tr> <tr><td>Titel</td><td>Energie Zählerstand</td></tr> <tr><td>Auflösung</td><td>1000/kWh</td></tr> <tr><td>Öffentlich</td><td></td></tr> <tr><td>Farbe</td><td>aqua</td></tr> <tr><td>Stil</td><td>Stufen</td></tr> <tr><td>Füllgrad</td><td>0</td></tr> <tr><td>Achse</td><td>auto</td></tr> <tr><td>Aktiv</td><td></td></tr> </table> <p><b>Daten</b> <b>Löschen</b> <b>Bearbeiten</b> <b>Schließen</b></p> </div>	Eigenschaft	Wert	UUID	5b8ea2a0-b342-11e8-bec6-15c040e6d041	Middleware	middleware.php	Typ	⚡ El. Energie (Zählerstände)	Cookie		Titel	Energie Zählerstand	Auflösung	1000/kWh	Öffentlich		Farbe	aqua	Stil	Stufen	Füllgrad	0	Achse	auto	Aktiv	
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Eigenschaft	Wert																																																		
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Auflösung																																																			
Kosten																																																			
Initialverbrauch																																																			
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Achse	auto																																																		
Kosten																																																			
Initialverbrauch																																																			

## API Channel Properties

### Energie Leistung (Channel 1)

```
http://vz-ip/middleware.php/channel/958bce60-b342-11e8-b54f-bbec0573e1f4.json
```

```
{"version":"0.3","entity": {"uuid": "958bce60-b342-11e8-b54f-bbec0573e1f4", "type": "powersensor", "color": "#311b92", "fillstyle": 0, "public": true, "style": "lines", "title": "Energie Leistung", "yaxis": "auto"}}
```

### Energie Zaehlerstand (Channel 2)

```
http://vz-ip/middleware.php/channel/5b8ea2a0-b342-11e8-bec6-15c040e6d041.json
```

```
{"version":"0.3","entity": {"uuid": "5b8ea2a0-b342-11e8-bec6-15c040e6d041", "type": "electric meter", "color": "aqua", "fillstyle": 0, "public": true, "resolution": 1000, "style": "steps", "title": "Energie Zaehlerstand", "yaxis": "auto"}}
```

## vzlogger Service

Ensure the vzlogger service is correctly defined.

*Note*

Ensure the vzlogger command is using the parameter -c (see ExecStart).

```
cd /etc/systemd/system  
sudo nano vzlogger.service
```

Content:

```
[Unit]  
Description=vzlogger  
After=syslog.target network.target  
Requires=mysql.service  
[Service]  
ExecStart=/usr/local/bin/vzlogger -c /etc/vzlogger.conf  
ExecReload=/bin/kill -HUP $MAINPID  
StandardOutput=null  
[Install]  
WantedBy=multi-user.target
```

## vzlogger Commands

vzlogger Enable as a Service	systemctl enable vzlogger
vzlogger Start	systemctl start vzlogger OR <u>service vzlogger start</u>
vzlogger Stop	systemctl stop vzlogger OR <u>service vzlogger stop</u>
vzlogger Status	systemctl status vzlogger Example output:
vzlogger Daemon reload	systemctl daemon-reload
vzlogger <u>Debug</u>	vzlogger -f

## Test

For test purposes a vzlogger.test can be used to check data flow ([vzlogger configuration](#)).

```
{
  "retry" : 30,      /* how long to sleep between failed requests, in seconds */
  "daemon": false,           /* run periodically */
  "verbosity" : 15,          /* between 0 and 15 */
  "log" : "/var/log/vzlogger.log",/* path to logfile, optional */
  "local" :
  {
    "enabled" : false, /* start the local HTTPD for serving live readings? */
    "port" : 80,       /* the TCP port for the local HTTPD */
    "index" : true,    /* provide a index listing of available channels? */
    "timeout" : 30,    /* timeout for long polling comet requests, 0 disables comet,sec*/
    "buffer" : 600    /* how long to buffer readings for the local interface, secs */
  },
  "meters" :
  [
    {
      "enabled" : true,      /* disabled meters will be ignored */
      "protocol" : "sml",    /* use 'vzlogger -h' for list of available protocols */
      "device" : "/dev/usb-ir-lesekopf0",
    },
    {
      "enabled" : true,      /* disabled meters will be ignored */
      "protocol" : "sml",    /* use 'vzlogger -h' for list of available protocols */
      "device" : "/dev/usb-ir-lesekopf1",
    }
  ]
}
```

### vzlogger Start:

```
vzlogger -c /etc/vzlogger.conf
```

### vzlogger Check status:

```
systemctl status vzlogger
```

### Output Example:

```
? vzlogger.service - vzlogger
   Loaded: loaded (/etc/systemd/system/vzlogger.service; enabled)
   Active: active (running) since Fri 2015-11-13 11:55:53 CET; 13min ago
     Main PID: 670 (vzlogger)
        CGroup: /system.slice/vzlogger.service
                  +-670 /usr/local/bin/vzlogger -c /etc/vzlogger.conf
Nov 13 11:55:53 raspberrypi systemd[1]: Started vzlogger.
```

## API volkszaehler Hints

API Reference: <http://wiki.volkszaehler.org/development/api/reference>

### API Obtain Configuration Request

`http://vz-ip/middleware.php/entity/958bce60-b342-11e8-b54f-bbec0573e1f4.json`

Result

```
{"version": "0.3", "entity": {"uuid": "958bce60-b342-11e8-b54f-bbec0573e1f4", "type": "powersensor", "color": "#311b92", "fillstyle": 0, "public": true, "style": "lines", "title": "Energie Leistung", "yaxis": "auto"}}
```

### API Channel Properties

`http://vz-ip/middleware.php/channel/958bce60-b342-11e8-b54f-bbec0573e1f4.json`

Result

```
{"version": "0.3", "entity": {"uuid": "958bce60-b342-11e8-b54f-bbec0573e1f4", "type": "powersensor", "color": "#311b92", "fillstyle": 0, "public": true, "style": "lines", "title": "Energie Leistung", "yaxis": "auto"}}
```

### API Entities

`http://vz-ip/middleware.php/capabilities/definitions/entities.json`

### API Read Data Requests

*Note*

Relative Dateformats = <http://de.php.net/manual/en/datetime.formats.relative.php>

#### Get All Data

`http://vz-ip/middleware.php/data/23844c00-8895-11e5-a642-6d8ce36c9a44.json`

#### Get One Record

`http://vz-ip/middleware.php/data/23844c00-8895-11e5-a642-6d8ce36c9a44.json?tuples=1`

Result

```
{"version": "0.3", "data": {"tuples": [[1447316802613, 246.491, 19046]], "uuid": "23844c00-8895-11e5-a642-6d8ce36c9a44", "from": 1447262000365, "to": 1447316802613, "min": [1447316802613, 246.49134831111], "max": [1447316802613, 246.49134831111], "average": 246.491, "consumption": 3752.3, "rows": 1}}
```

#### Get the last value

`http://vz-ip/middleware.php/data/23844c00-8895-11e5-a642-6d8ce36c9a44.json?from=now&to=now`

Result

```
{"version": "0.3", "data": {"tuples": [[1447317119885, 201.681, 1], [1447317121700, 198.347, 1]], "uuid": "23844c00-8895-11e5-a642-6d8ce36c9a44", "from": 1447317118100, "to": 1447317121700, "min": [1447317121700, 198.34710743513], "max": [1447317119885, 201.68067227331], "average": 200, "consumption": 0.2, "rows": 3}}
```

**API Logging**

```
http://vz-ip/middleware.php/data/23844c00-8895-11e5-a642-6d8ce36c9a44.json?ts=1284677961150&value=12
```

Using the volkzaehler Frontend to display data

<http://vz-ip/frontend/?uuid=23844c00-8895-11e5-a642-6d8ce36c9a44>

# Appendix Tools

In progress developing some tools for managing Domoticz.

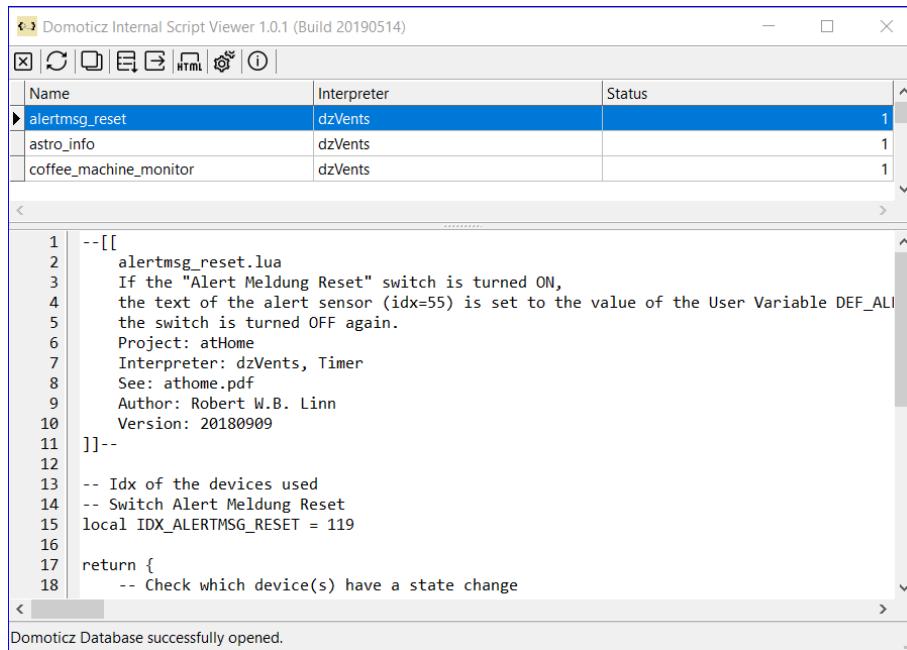
## Domoticz Internal Script Viewer

### Purpose

- To view offline the Domoticz internal scripts (focus on dzVents scripts) stored in the Domoticz database (domoticz.db), which are created using the Domoticz GUI Event editor (Setup > More Options > Events – My automation scripts)
- To export the scripts to the clipboard, text file or HTML file

[Download](#) the application from GitHub.

### Screenshot



# Domoticz MQTT Logger

## Purpose

To view Domoticz MQTT messages published, by subscribing to the topic “domoticz/out”.

Analyse the properties and the values for a device.

More information about [MQTT](#).

## Solution

A Node-RED flow, “**mqtt-logger.flow**”, using a mqtt-in node as entry point from which the message payload is routed to Node-RED Dashboard (node-red-dashboard) nodes.

The log lists three messages listed (the number of displayed messages is defined in the function node “Add msg to flow.log”).

The flow uses data stored as flow context for the

- log = an array for the messages displayed (flow.log)
- idx filter content = comma separated string to filter device idx (flow.idxfilter)
- use the idxfilter = flag 0 or 1 (flow.usefilter)

The tab Settings enables to set options:

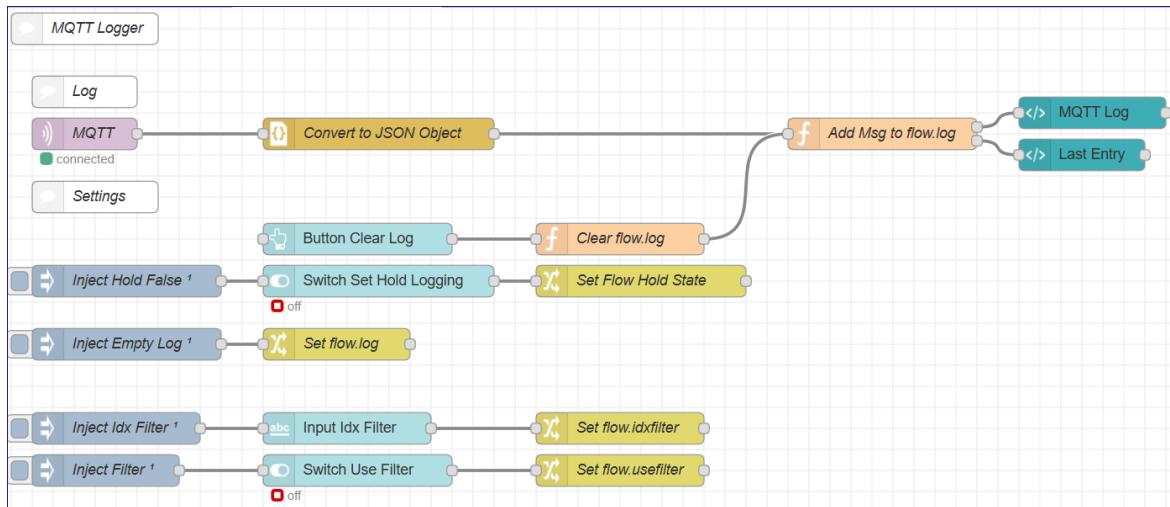
- Define the idx filter as comma separated string
- Switch to use the idx filter
- Switch to put logging on hold
- Button to clear the log

Recommend setting the flow disabled when not using, as rather high message traffic could take place.

It is easy to build flows in Node-RED for these kind of utility functions.

Scribbled first the concept on paper, some trial-and-error flows on payload handling and lastly use the Dashboard UI nodes to build the UI.

## Node-RED Flow



## Node-RED Dashboard UI

The Tab **MQTT Logger** and two groups **Log** and **Settings**.

Log	
<ul style="list-style-type: none"> <li>{"Battery":255,"EnergyMeterMode":"1","RSSI":12,"description":"Energy (Wh) &amp; Power (Watt) provided, every minute, by the volkszaehler Raspberry Pi.\nThe Energy is computed from the Power.","dtype":"General","id":"00082171","idx":171,"name":"Electricity House","nvalue":0,"stype":"kWh","svalue1":"481","svalue2":"86820.0","unit":1}</li> <li>{"Battery":255,"RSSI":12,"description":"RPi Memory Usage increases over time and needs to be watched.","dtype":"General","id":"00000044C","idx":1,"name":"RPi Speicher","nvalue":0,"stype":"Percentage","svalue1":"21.96","unit":1}</li> <li>{"Battery":255,"RSSI":12,"description":"","dtype":"General","id":"000000DC","idx":107,"name":"Usage","nvalue":0,"stype":"Custom Sensor","svalue1":"46.0000","unit":1}</li> </ul>	
<b>Last Entry (Idx:107, Name:Process Usage)</b> <pre>{"Battery":255,"RSSI":12,"description":"","dtype":"General","id":"000000DC","idx":107,"name":"Usage","nvalue":0,"stype":"Custom Sensor","svalue1":"46.0000","unit":1}</pre>	

Settings	
Idx Filter (separate by comma)	115
Use Filter	<input type="checkbox"/>
Hold Logging	<input type="checkbox"/>
<b>CLEAR LOG</b>	

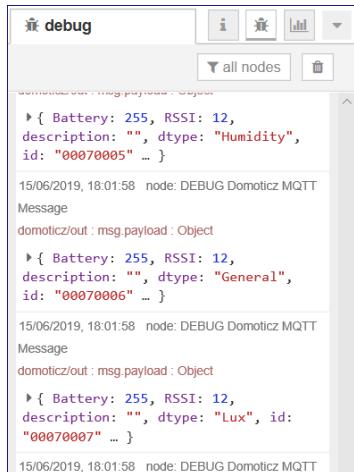
## Alternative Logger

An alternative, rather simple Nod-RED flow, to see Domoticz MQTT messages in JSON format, is to create a flow with three nodes:



Mqtt in	Json	Debug
Listen to topic "domoticz/out" from the Domoticz system	Convert the message payload to a Javascript object	Log the full message object (i.e. msg.payload) or selective property (i.e. msg.payload.idx or msg.payload.svalue1)

**Output Debug Node (as full message payload)**  
(see Browser > Node-RED development tab)



### Example Log Entry

```
{
"Battery":255,"RSSI":12,"description":"","dtype":"General","id":"00070006","idx":33,"name":"IAQM
Pressure","nvalue":0,"stype":"Barometer","svalue1":"1011","svalue2":"0","unit":6
}
```