

Domoticz Home Automation Workbook

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

- ❖ There might be better solutions for what is shared and might change whilst evolving.
- ❖ This is a working document – idea's & todo's will never cease to exist.
- ❖ The source code for scripts & flows etc. is not fully shared or might have changed – check the [GitHub](#) scripts folder for the latest source code.
- ❖ The scripts are mainly developed using dzVents Lua scripts (few in Python).
- ❖ Hardware Plugin development in Python.
- ❖ Several functions are using Node-RED flows (one of my favorite tools).
- ❖ The screenshots shared might not be update as functionality is evolving.
- ❖ To-do: These are tagged with <TODO>. The To-do list, with prefix, i.e. NEW, UPD ..., are captured in the file TODO.md.
- ❖ Abbreviations: GUI = the Domoticz UI in web browser

Functions

- Display temperature & humidity measured in rooms.
- Charts for selective weather items, room temperature & humidity.
- Control Somfy roller shutters with RTS motors in rooms.
- Philips Hue Lighting System control via Hue Bridge for ZigBee devices.
- HomeMatic (RaspberryMatic) CCU3 integration with variety of devices.
- Security door & window wireless contact detectors.
- Information on key dates (calendar type information).
- MQTT subscribe & publish messages to trigger actions or information.
- Raspberry Pi system information with charts and threshold email notification.
- Electricity power & energy for the house from “volkszaehler” with charts.
- Electricity power & energy for selected devices / rooms.
- Coffee machine monitor – start and end time, info message.
- Control Volumio music player whilst listening to web radio.
- Monitor stock quotes.
- Ambient light (from ESP8266 running ESP Easy) with threshold.
- Hue Light controlled via ESP8266 with slide potentiometer & 4-digit-7-segment-display.
- Event monitor for selected devices.
- Hardware Monitor for the Raspberry Pi's used.
- Custom icons.
- Soil Moisture monitor for plants (plugin).
- Air Quality Monitor (plugin).

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 CCU3 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.

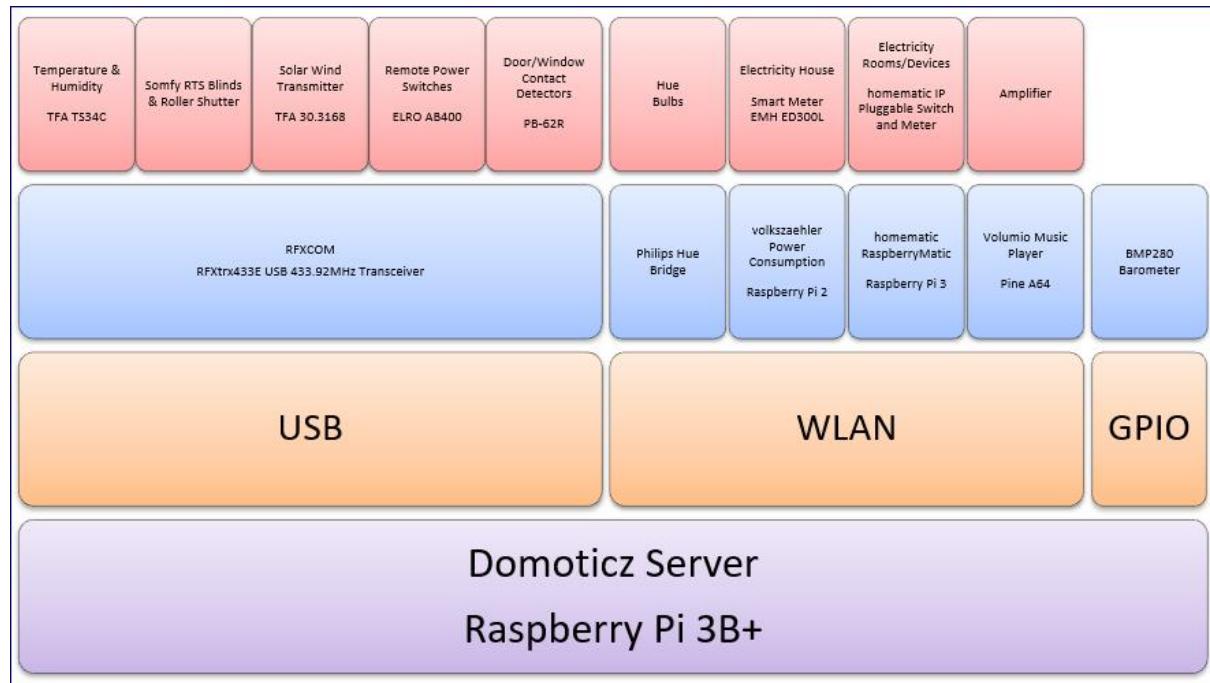
Components

Hardware and software used for this project.

More details to be found in sections, like [Setup](#), [Functions](#) and other.

Hardware

Overview of the various hardware used.



- Raspberry Pi 3B+ v1.2 (Domoticz server)
- 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 CCU3 (Raspberry Pi 3B+) with variety of connected devices like HMIP-PSM, HMIP-eTRV-2, HMIP-SDWO
- Volumio Music Player (Pine A64 1GB)
- Raspberry Pi GPIO for BPM280 Barometer (I2C)
- Raspberry Pi 3B+ for various testing
 - Domoticz V4.1xxxx BETA to ensure include latest fixes
 - Node-RED

Software

- Raspbian GNU/Linux 9 (Stretch) based upon NOOBS Version 2.8.2, 2018-06-27
- Domoticz V4.10417 Stable
- 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 3.45.7.20190504 (full compatibility HomeMatic CCU3 3.45.7 firmware)
- WinSCP - to exchange files between the Development Device and the Raspberry Pi's
- PuTTY - to run terminal commands
- Idle - Python Script development
- 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 Home Automation server, 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 Raspbian
 - 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.

WLAN Static IP

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://rpi-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.

```
Select Configure > Interface > wlan0:  
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.N.NNN
```

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 and check the WLAN address

```
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  
...
```

Note

In this documentation the IP address of the Raspberry Pi Domoticz Server is referred to as:
<http://rpi-domoticz-ip:8080>

WLAN Power Save Mode

If the openHAB Basic UI 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](#).

Hints: 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 Server

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
Writeable = 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 \\ rpi-domoticz-ip\DoProDomoticz
(DoProDomoticz is previous defined in the samba configuration)

To connect from the Windows explorer:

Network drives:

Add new drive with url \\rpi-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: \\rpi-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:
1rwxrwxrwx 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:

Services:

http, Port: 8080.

Domoticz Folder:

/home/pi/domoticz

Domoticz URL:

http://rpi-domoticz-ip:8080

or

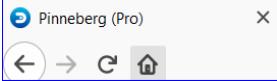
http://localhost:8080 (when using the Monitor connected to Raspberry Pi)

If everything went ok, enter the Domoticz URL in the Browser and ... the Domoticz UI is shown. The Domoticz version is displayed as V4.9700.

Now READY to configure the Domoticz Home Automation 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 |
| Log History | Set to 1 days |
| Notifications | See under Functions where applicable |
| Email | |
| Email enabled | username <email-address> |
| Send Email notification alerts | Enabled |
| Meters / Counters | |
| Wind Meter | Display: Beaufort |
| Floorplan | See under Functions where applicable |
| Other | |
| 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

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](#).

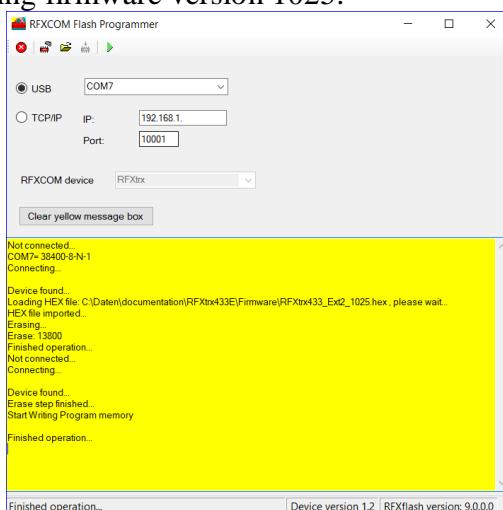
Note

Use the same procedure for updating the firmware, i.e.

Steps to install/upgrade

- Shutdown the Domoticz server (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 server
- Reboot the Domoticz server
- Open Domoticz in web 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 Set Mode | /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.

Temperature & Humidity

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.

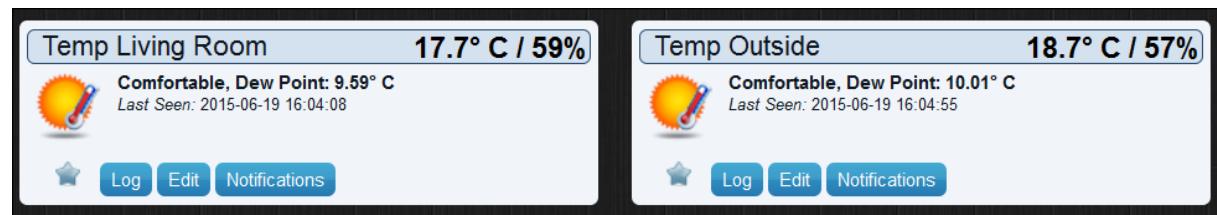
Setup

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 | Tel | Log | Notifications | 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



Anemometer

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)



Wind

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

Event dzVents

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 script using the Domoticz Event Editor.

| Event Name | Interpreter | Event Type | Event Active |
|--|-------------|------------|--------------|
| wind_update.lua | dzVents | Device | Enabled |
| <pre>--[[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. Project: atHome Interpreter: dzVents, Device See: athome.pdf Author: Robert W.B. Linn Version: 20180910]]-- -- 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 } </pre> | | | |
| Domoticz Log Entry | | | |
| <pre>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</pre> | | | |

Somfy Blinds

Purpose

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

Domoticz Configuration

1. Open Domoticz URL (like http://rpi-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 screenshot shows the Domoticz software interface divided into three main sections:

- Add Manual Light/Switch Device (Left):** A configuration dialog box where "Hardware" is set to "RFXtrx433e", "Device name" is "Blind Bed Room", "Switch Type" is "Blinds", "Type" is "RFY", "ID" is "1E 1E 1E", "Unit Code" is "2", and "Test" button is present. Below the form is a radio button group for "As:" with options "Main Device" (unchecked) and "Sub/Slave Device" (checked). At the bottom are "Add Device" and "Cancel" buttons.
- Blind Bed Room (Top Right):** A device card showing the name "Blind Bed Room", status "Stopped", last seen "2015-06-19 15:06:34", type "RFY, RFY, Blinds", and controls for Stop, Log, Edit, Timers, and Notifications.
- Devices List (Bottom Right):** A table listing various devices with columns for Idx, Hardware, ID, Unit, Name, Type, SubType, Data, and Last Seen. The row for "Blind Bed Room" (Idx 13) is highlighted with a red border. The table includes rows for RFXCom modules (Idx 14, 11, 6, 12), a GPIO Port (Idx 18), and other blinds.

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 } |

Air Pressure

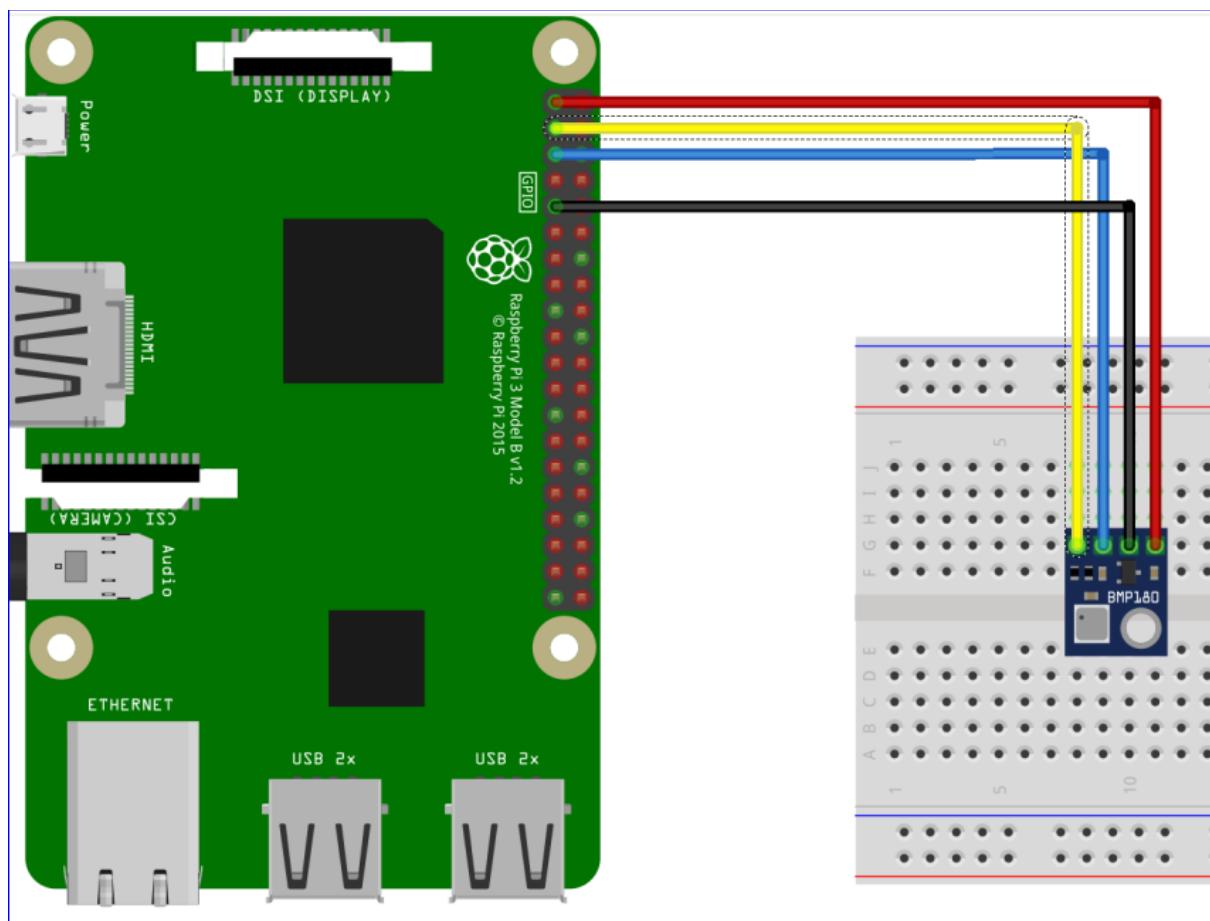
Purpose

To measure the Air Pressure using a BMP280 sensor connected to the GPIO of the Raspberry Pi.

Circuit

The BMP280 sensor (Type Sunfounder), is connected to the Raspberry Pi SDA & SCL pins.

| BMP180 | Raspberry Pi 3B+ (wirecolor) |
|-------------|---|
| 3.3v | 3.3v (red) |
| SDA | SDA = I2C1 = Pin #3 (yellow) |
| SCL | SCL = I2C2 = Pin#5 (blue) |
| GND | GND (black) |
| I2C Address | 76 Use command <i>i2cdetect -y 1</i> |



Note

Drawing created with Fritzing. Adding multiple I2C sensors, requires a unique address for each sensor and two 1.k resistors between Vcc and SDA, SCL.

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 --
```

Hardware & Device

(Setup > Hardware)

| | |
|---|--|
| Enabled: | <input checked="" type="checkbox"/> |
| Name: | BMP280 |
| 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) |

Note

The path to the I2C Bus is taken from previous 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 list

| Idx | Name | Enabled | Type | Address | Port |
|-----|--------|---------|---------------------------------|---------|------------|
| 13 | BMP280 | Yes | I2C sensor BME280 Temp+Hum+Baro | I2C | /dev/i2c-1 |

Check the log entry after adding the hardware

```
2018-08-31 11:34:50.758 Status: I2C Start HW with 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 the BMP280 Device

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

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

| | | | | | | | |
|-----|--------|------|---|-------------|------------------------------|--------------------|-------------------------|
| 115 | BMP280 | 0001 | 1 | TempHumBaro | Temp + Humidity + Baro | Weather Station | 20.2 C, 0 %, 1021.0 hPa |
|-----|--------|------|---|-------------|------------------------------|--------------------|-------------------------|

Add the device, named BMP280 and check the widgets.

| Weather Widget | Temperature Widget |
|---|---|
| <div style="border: 1px solid #ccc; padding: 10px;"> <p>BMP280 1021 hPa</p>  <p>Prediction: Sunny Last Seen: 2018-08-31 11:42:51</p> <p>Log Edit Notifications</p> </div> | <div style="border: 1px solid #ccc; padding: 10px;"> <p>BMP280 19.7° C / 0%</p>  <p>Dry, Barometer: 1027.8 hPa, Prediction: Sunny Dew Point: 19.70° C Last Seen: 2018-08-31 16:00:48</p> <p>Log Edit Notifications</p> </div> |

Barometer Widget

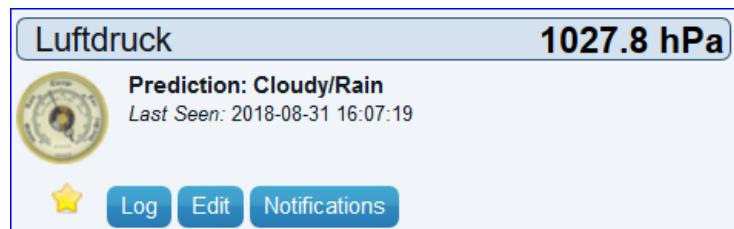
The BMP280 measures pressure, temperature and humidity.
 The temperature and the humidity are not of interest because these are measured at the Raspberry Pi location and not outside.
 In the Dashboard would like to have a Barometer Widget with value taken from the BMP280.

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



Note

Default (=wrong) data as the event to obtain date is developed next.

Barometer Event (dzEvents)

Created an event to update the pressure and pressure forecast from the BMP280 data.
 This is done via a Lua script using the Domoticz Event Editor.

| | | | | | | | |
|-----|--------|------|---|--------|------------------------------|--------------------|-------------------------|
| 115 | BMP280 | 0001 | 1 | BMP280 | Temp + Humidity + Baro | Weather Station | 19.5 C, 0 %, 1028.0 hPa |
|-----|--------|------|---|--------|------------------------------|--------------------|-------------------------|

- TEMP = Temperature
- HUM = Humidity
- BAR = Barometric pressure

Event Editor

Event properties: luftdruck_update, dzEvents, Device

dzVents Script

```
--[[[luftdruck_update.lua
If the a value of the BMP280 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_BMP280 = 115;
local IDX_LUFTDRUCK = 116;

-- Event handling changes of the BMP280 device
return {
  on = {
    devices = {
      IDX_BMP280
    }
  },
  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
    pressure = math.floor(device.barometer)

    -- Forecast from the BMP 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

```
2018-09-11 13:51:36.606 Status: dzVents: Info: Handling events for: "BMP280",
value: "19.9;0;2;1024.0;4"
2018-09-11 13:51:36.606 Status: dzVents: Info: ----- Start internal script:
luftdruck_update: Device: "BMP280 (BMP280)", Index: 115
2018-09-11 13:51:36.606 Status: dzVents: Info: Barometer: 1024/4/Cloudy
2018-09-11 13:51:36.607 Status: dzVents: Info: ----- Finished luftdruck_update
```

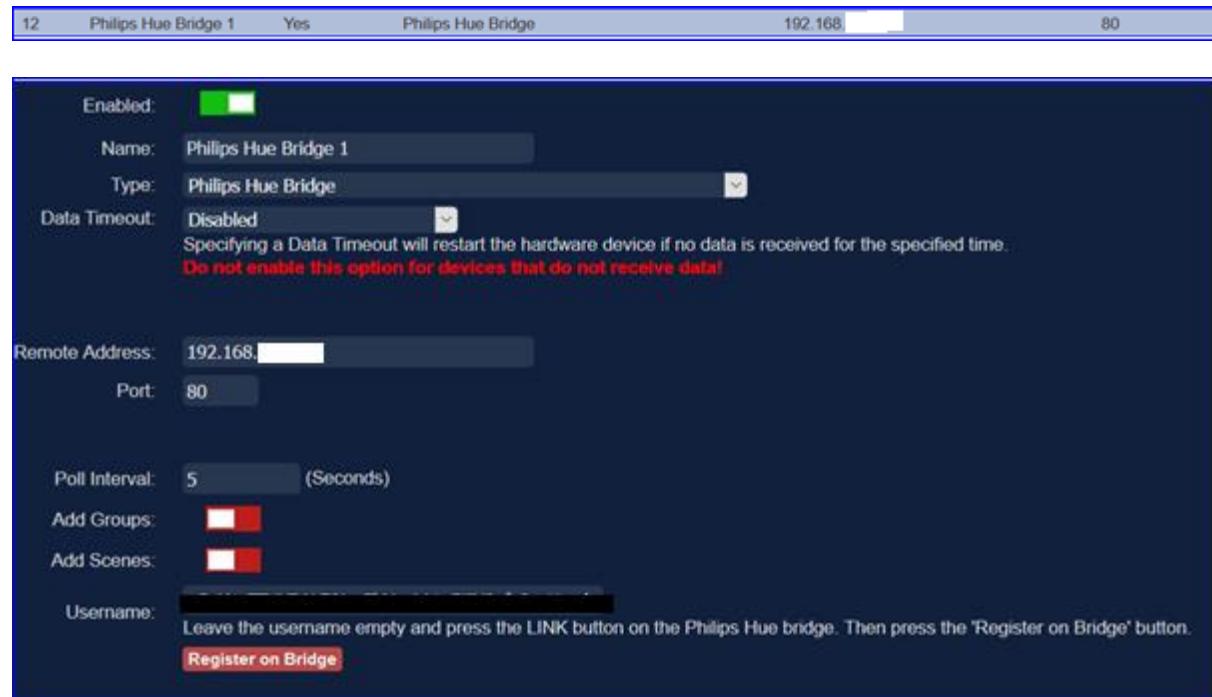
Philips Hue

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).

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

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 |
|---|---|--|

Script 1 – Device Trigger

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

dzEvents Script

```
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
}
```

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’.

dzEvents Script

```
-- 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.

dzEvents Script

```
--[[[  
    hue_wz_timer.lua  
    Turn WZ Hue lamps 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.  
]]--  
  
-- 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.converttimehhmm(os.date("%X",now+(30*60)))  
            local message= 'Hue Lampen gehen an ' .. nowplus30minutes  
            msgbox.alertmsg(domoticz, domoticz.ALERTLEVEL_GREEN, message)  
        end  
    end  
}
```

```
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

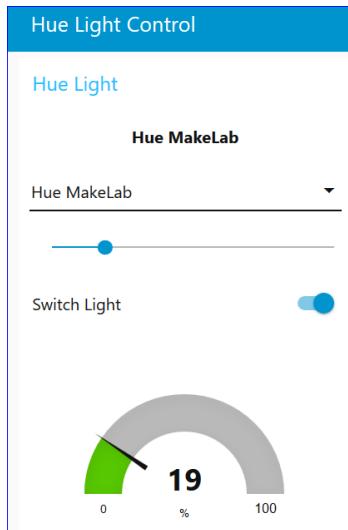
```
2018-09-05 20:02:00.394 (Philips Hue Bridge 1) Color Switch (Hue WZ Ablage)
2018-09-05 20:02:00.417 (Philips Hue Bridge 1) Lighting 2 (Hue WZ TV)
2018-09-05 20:02:00.259 Status: dzVents: Info: ----- Start internal script: hue_wz_timer:, trigger: at
sunset
2018-09-05 20:02:00.276 Status: dzVents: 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 webbrowser.
Select a Hue and switch the light ON|Off or set Brightness Level.

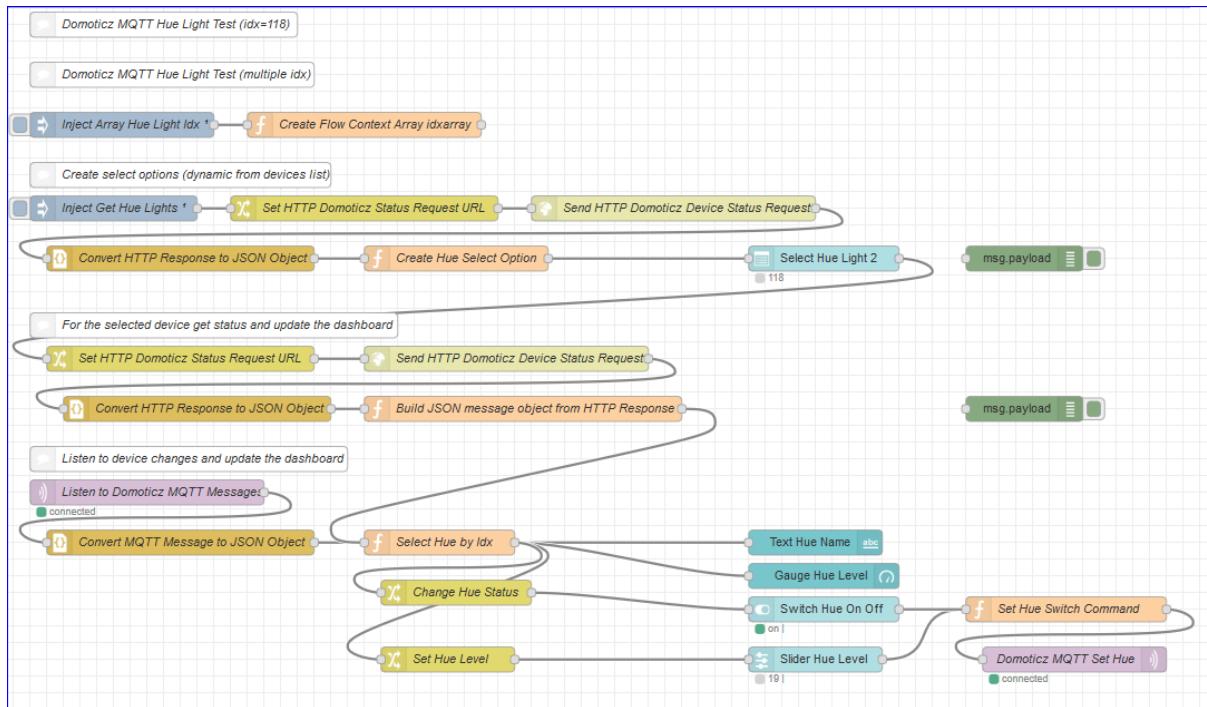
Read more about Node-RED [Appendix Node-RED](#).

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 web 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’s, 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 web 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](#).

Remote Switch

Purpose

To remote switch devices, i.e. lamps etc.

Device

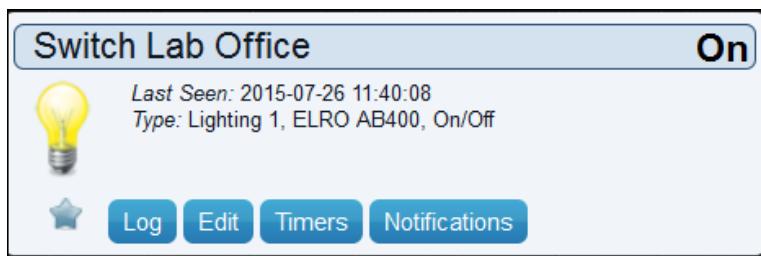
The remote switch used is a Mumbai Wireless Switch Module.
The remote switch is connected to the RFXCOM RFXtrx433E.

Setup

1. Select Switches > Manual Light Switch
2. Add the Properties > See Picture right
 - On the Remote Control of the Switch, the Type is displayed (AB440R which is compatible with AB400D)
 - To determine the House Code and the Unit Code, open the Switch and NOT the state of the dip switches and lookup the corresponding RFXCom values (see below)
3. Press Add Device
4. Select Setup > Devices
5. Select Switch Lab, click green V to add

| House Code | | | | Unit Code | | | | | | | | | | Add Manual Light/Switch Device | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---|---|-------------|---|---|---|---|---|---|---|---|---|--------------------------------|---|---|---|----------------------|---|---|---|-------------------------|---|---|---|---------------------|---|---|---|--------------|---|---|---|---|---|-----|--|--|--|--|--|--|--|--|--|--|--|
| 1 | 2 | 3 | 4 | 5 | A | B | C | D | E | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | 5 | 6 | 7 | 8 | 9 | 10 | 5 | 6 | 7 | 8 | 9 | D-C | | | | | | | | | | | |
| HC===== | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A 0 0 0 0 | | | | 0 0 0 0 0 0 | | | | | | | | | | 33 0 0 0 0 0 | | | | Hardware: RFXtrx433e | | | | Device name: Switch Lab | | | | Switch Type: On/Off | | | | Type: AB400D | | | | | | | | | | | | | | | | | |
| B 0 0 0 1 | | | | 0 0 1 0 0 0 | | | | | | | | | | 34 0 0 0 1 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C 0 0 1 0 | | | | 0 0 1 1 0 0 | | | | | | | | | | 35 0 0 1 1 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D 0 0 1 1 | | | | 0 1 0 0 0 0 | | | | | | | | | | 36 0 0 1 1 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E 0 1 0 0 | | | | 0 1 0 1 0 0 | | | | | | | | | | 37 0 1 0 0 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F 0 1 0 1 | | | | 0 1 1 0 0 0 | | | | | | | | | | 38 0 1 0 1 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| G 0 1 1 0 | | | | 0 1 1 1 0 0 | | | | | | | | | | 39 0 1 1 0 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H 0 1 1 1 | | | | 0 1 1 1 0 0 | | | | | | | | | | 40 0 1 1 1 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I 1 0 0 0 | | | | 1 0 0 0 1 0 | | | | | | | | | | 41 1 0 0 0 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| J 1 0 0 1 | | | | 1 0 0 1 0 0 | | | | | | | | | | 42 1 0 0 1 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| K 1 0 1 0 | | | | 1 0 1 0 0 0 | | | | | | | | | | 43 1 0 1 0 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| L 1 0 1 1 | | | | 1 0 1 1 0 0 | | | | | | | | | | 44 1 0 1 1 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M 1 1 0 0 | | | | 1 0 0 0 1 0 | | | | | | | | | | 45 1 1 0 0 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| N 1 1 0 1 | | | | 1 0 0 1 1 0 | | | | | | | | | | 46 1 1 0 1 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O 1 1 1 0 | | | | 1 0 1 0 0 0 | | | | | | | | | | 47 1 1 1 0 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P 1 1 1 1 | | | | 1 0 1 1 0 0 | | | | | | | | | | 48 1 1 1 1 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 49 0 0 0 0 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 50 0 0 0 1 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 51 0 0 1 0 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 52 0 0 1 1 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 53 0 1 0 0 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 54 0 1 0 1 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 55 0 1 1 0 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 56 0 1 1 1 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 57 1 0 0 0 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 58 1 0 0 1 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 59 1 0 1 0 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 60 1 0 1 1 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 61 1 1 0 0 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 62 1 1 0 1 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 63 1 1 1 0 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 64 1 1 1 1 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dip Switches for this device translated into HC and UC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1234 5ABCDE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1000 001000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HC=1 UC=3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Remote Switch Widget



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 |

| Waste Type | 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, “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.

dzVents Lua Script

A dzVents Lua script is time triggered once per day at 00:30. See source for details.

```
-- [[
    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.
    Project: atHome
    Interpreter: dzVents, Timer
    See: athome.pdf
    Author: Robert W.B. Linn
    Version: 20180930
]]-- 

-- 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

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:      wastecalicstocsv.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 server:
## /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'
    icskwargs = {}
    csvaccess = 'wb'
    csvkwargs = {}
else:
    icsaccess = 'rt'
    icskwargs = {'newline':''}
    csvaccess = 'a'
    csvkwargs = {}
    #csvkwargs = {'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(wastecalendarics, 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 to be 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()
```

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 script**, once a day at 00:15, to calculate the date difference in days and update the devices.

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

Event Properties

Event name: `days_to_go_update.lua`

Interpreter: `dzVents`

Event type: Timer

Event active

Event Script dzVents

(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
```

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 | | | |
| | | Update | Delete |
| 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. Do not enable this option for devices that do not receive data!</small> | | | |

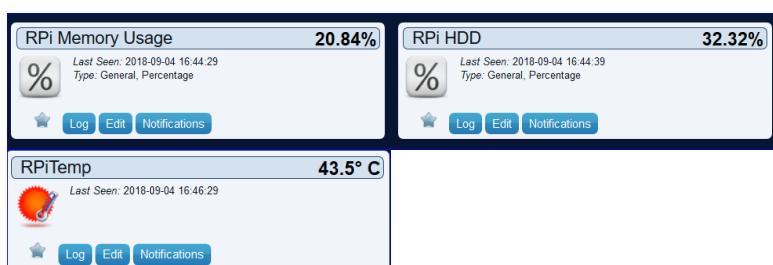
Devices derived from Hardware Motherboard

| | 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 |

dzVents Script

```
--[[[  
    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
}
```

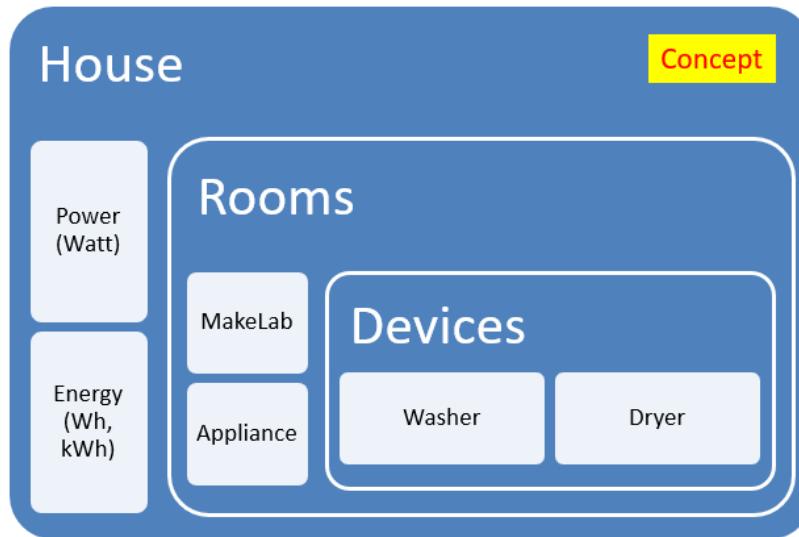
Electric Usage Monitoring

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

Purpose

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

Solution

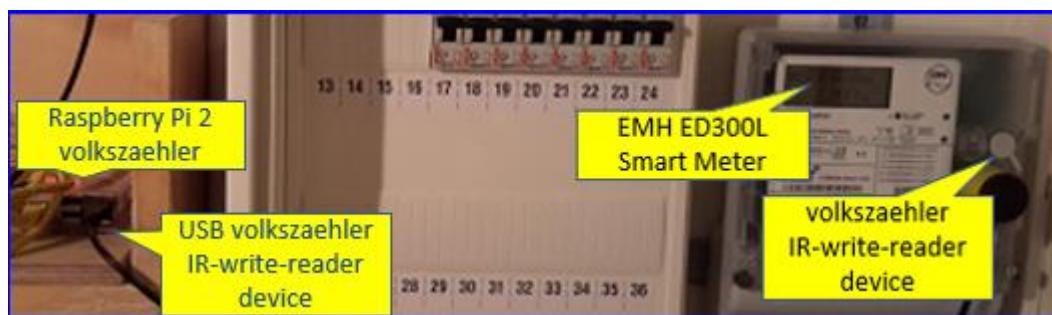
The house has a Smart Meter (Type EMH ED300L) which records consumption of electric energy used for monitoring and billing.

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

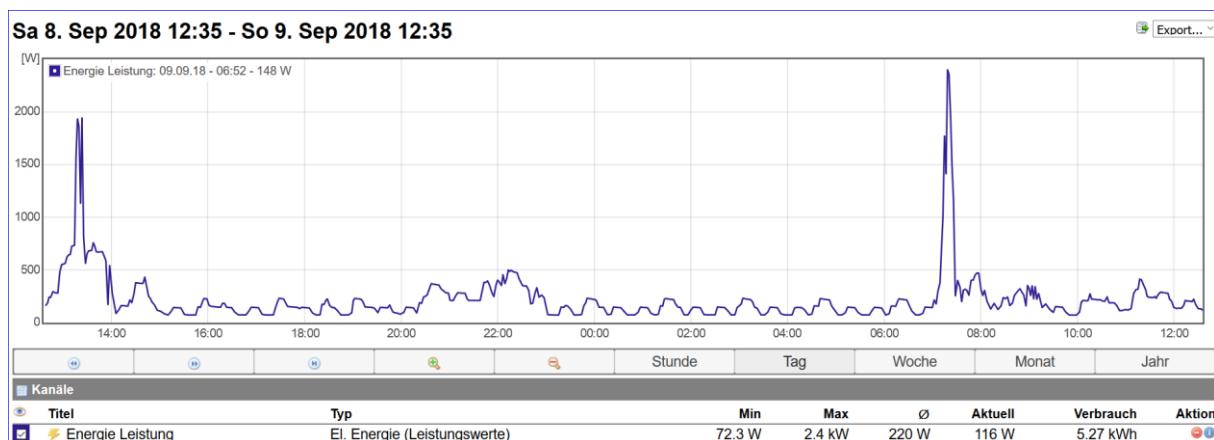
The Domoticz server polls the volkszaehler every minute for average power data, which is assigned to a Domoticz devices.

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 **Electricity House** and Type **Electric (Instant+Counter)**.
The list of devices with the new device:

Idx=171, Name=Electricity House, Type=General, SubType=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 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 | / kWh | Costs R2: 0 | / kWh |

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.

| 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 script “electricity_usage_update.lua” 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://rpi-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],[1559376674756,403.135,1],[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":155937664129,806.72268794865],"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.

dzEvents Script

The dzEvents script “electricity_usage_update.lua” 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).

```

local DOMOTICZURL = 'http://rpi-domoticz-ip:8080'
local REQUESTURL = 'http://rpi-domoticz-ip /middleware.php/data/5b8ea2a0-b342-11e8-bec6-
15c040e6d041.json?from=1+minutes+ago&to=now'
local HTTPCALLBACKNAME = 'ElectricityUsageCallback'
local IDX_ELECTRICITYHOUSE = 171      -- Type=General, SubType=kWh
local IDX_POWERCONSUMPTION = 44       -- Type=Usage, SubType=Electric

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

        if (item.isHTTPResponse) and (item.trigger == HTTPCALLBACKNAME) then
            if (item.ok) then -- statusCode == 2xx
                local power = math.floor(tonumber(item.json.data.average))
                domoticz.devices(IDX_POWERCONSUMPTION).updateEnergy(power)
                -- NOT WORKING
                -- parse the json string to get the energy consumption from key data.consumption
                -- local energy = tonumber(item.json.data.consumption)
                -- update the electrichouse device (Watt, Wh)
                -- domoticz.devices(IDX_ELECTRICITYHOUSE).updateElectricity(power, energy)
                -- WORKAROUND using HTTP API
                domoticz.openURL({
                    url = '' .. DOMOTICZURL .. '/json.htm?type=command&param=udevice&idx=' ..
IDX_ELECTRICITYHOUSE .. '&nvalue=0&svalue=' .. tostring(power) .. ';0',method = 'GET'})
            end

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

```

Domoticz Log Entry

```

#Script Start and Finish
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

#Script HTTP Callback after previous finishing
2019-06-01 10:33:01.117 Status: dzVents: Info: Handling httpResponse-events for:
"ElectricityUsageCallback"
2019-06-01 10:33:01.117 Status: dzVents: Info: ----- Start internal script: electricity_usage_update:
HTTPResponse: "ElectricityUsageCallback"
2019-06-01 10:33:01.141 Status: dzVents: Info: [INFO] Electric usage updated: 112 W, status:200
2019-06-01 10:33:01.141 Status: dzVents: Info: ----- Finished electricity_usage_update

```

MQTT

Example MQTT payload (topic "domoticz/out") for Device “Electricity House” 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" : "Electricity 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://rpi-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.lua”:

```
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

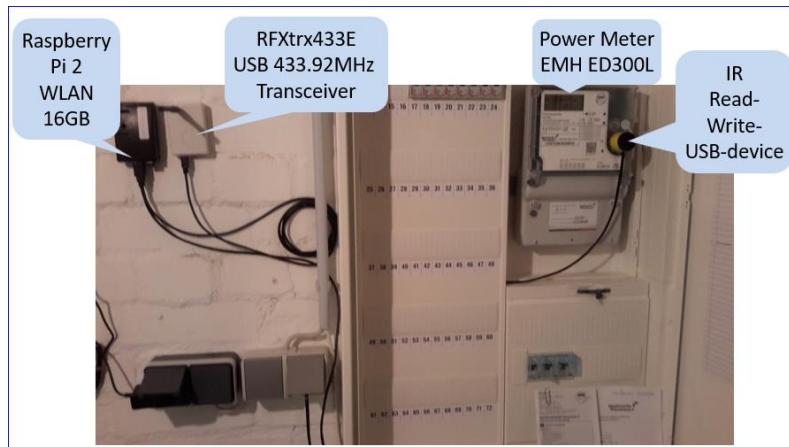
Example SQL SELECT on table Meter

```
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 Server and the vz Server via WLAN. The vz Server has a fixed IP address NNN.NNN.1.NNN, which is defined in files:

/etc/dhcpcd.conf

```
# wlan interface
interface wlan0
static ip_address=rpi-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 **rpi-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*
```

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.b.rc
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 .....EM
```

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://rpi-vz-ip>) is crucial.

Must read: 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 Kanal erstellen</p> <table border="1"> <thead> <tr> <th>Eigenschaft</th><th>Wert</th></tr> </thead> <tbody> <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> </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> </tbody> </table> <p>Erstellen Cookie: <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 | | Stil | steps | Füllgrad | | Achse | auto | Kosten | | Initialverbrauch | | <p>Kanal hinzufügen</p> <p>Öffentliche Kanäle Private Kanäle Kanal erstellen</p> <table border="1"> <thead> <tr> <th>Eigenschaft</th><th>Wert</th></tr> </thead> <tbody> <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> </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> </tbody> </table> <p>Erstellen Cookie: <input checked="" type="checkbox"/></p> | Eigenschaft | Wert | Middleware: | Local (default) | Typ: | El. Energie (Leistungswerte) | Titel: | Energie Leistung | Öffentlich | <input checked="" type="checkbox"/> | Farbe | | Stil | lines | Füllgrad | | Achse | auto | Auflösung | | Kosten | | Initialverbrauch | |
| Eigenschaft | Wert | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Middleware: | Local (default) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Typ: | El. Energie (Zählerstände) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Titel: | Energie Zählerstand | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Auflösung | 1000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Öffentlich | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Farbe | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Stil | steps | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Füllgrad | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Achse | auto | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Kosten | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Initialverbrauch | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Eigenschaft | Wert | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Middleware: | Local (default) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Typ: | El. Energie (Leistungswerte) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Titel: | Energie Leistung | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Öffentlich | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Farbe | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Stil | lines | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Füllgrad | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Achse | auto | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Auflösung | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Kosten | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Initialverbrauch | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UUID 5b8ea2a0-b342-11e8-bec6-15c040e6d041 | UUID 958bce60-b342-11e8-b54f-bbec0573e1f4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <pre>// /etc/vzlogger.conf { // Zählerstand "uuid" : "5b8ea2a0-b342-11e8-bec6-15c040e6d041", "middleware" : "http://localhost/middleware.php", "identifier" : "1-0:1.8.0" }</pre> | <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 1 minute 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],[155931132891,188.285,1],[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://rpi-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.
 Browser URL = <http://rpi-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 | Browse Structure Search Insert Empty Drop | ~2,612,489 | InnoDB | latin1_swedish_ci | 190.3 MiB | - |
| data | Browse Structure Search Insert Empty Drop | 0 | InnoDB | utf8_unicode_ci | 48 KiB | - |
| entities | Browse Structure Search Insert Empty Drop | 16 | InnoDB | utf8_unicode_ci | 32 KiB | - |
| entities_in_aggregator | Browse Structure Search Insert Empty Drop | 0 | InnoDB | utf8_unicode_ci | 48 KiB | - |
| properties | Browse Structure Search Insert Empty Drop | 127 | InnoDB | utf8_unicode_ci | 48 KiB | - |
| 5 tables | Sum | 2,612,632 | InnoDB | latin1_swedish_ci | 190.5 MiB | 0 B |

Check Database Size

URL

```
http://rpi-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://rpi-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://rpi-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://rpi-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 than 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://rpi-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 l, then the log is
printed to the console.
Run the script: python3 vzclean.py or python3 vzclean.py l
The script is executed via crontab "5 0 * * * /home/pi/scripts/vzclean.sh l" 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 == 'l':
        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: 1 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
pi@169.254.87.85's password: *****
- The pi@DoPro prompt is shown

Electric Usage Rooms/Devices

Purpose

To measure the Power (Watt) and Energy Usage (kWh) for selected devices (washer, dryer etc.) or dedicated rooms (MakeLab, Library).

homematicIP HMIP-PSM (Plugin)

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

The Domoticz Python Plugin is used:

| Idx | Name | Enabled | Type | Address | Port | Data Timeout |
|-----|----------------|---------|---|---------------|------|--------------|
| 17 | MakeLab Energy | Yes | homematicIP Pluggable Switch and Meter (HMIP-PSM) | 192.168.1.225 | | Disabled |

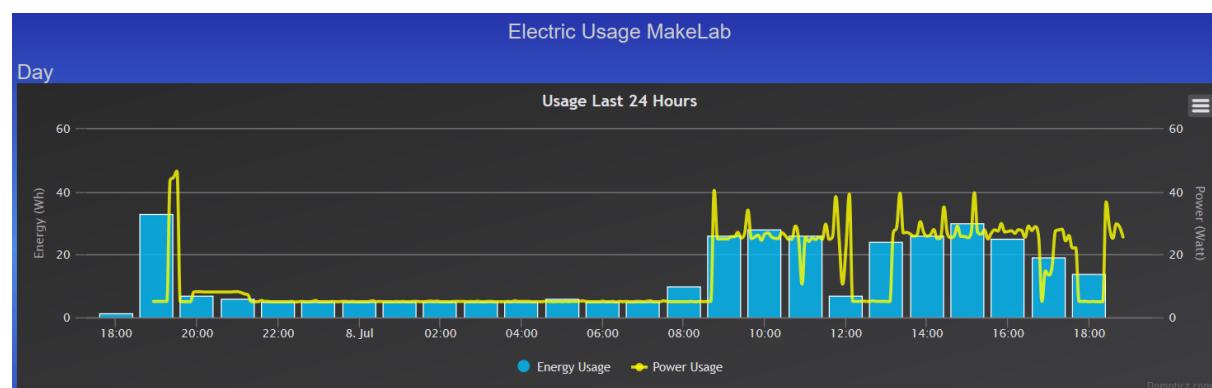
The plugin is described and can be downloaded [here](#).

Devices (created by the plugin)

| Idx | Hardware | ID | Unit | Name | Type | SubType | Data |
|-----|----------------|----------|------|------------------------|--------------|---------|-----------|
| 179 | MakeLab Energy | 00110001 | 1 | Electric Usage MakeLab | General | kWh | 1.613 kWh |
| 180 | MakeLab Energy | 00110002 | 2 | MakeLab - Voltage | General | Voltage | 230.1 V |
| 181 | MakeLab Energy | 00110003 | 3 | MakeLab - Current | General | Current | 0.21 A |
| 182 | MakeLab Energy | 00110004 | 4 | Powerswitch MakeLab | Light/Switch | Switch | On |

Note

The device idx=179, Electric Usage MakeLab is relevant.



The dashboard for room Energy shows the devices which belong to the Domoticz Plugins

- homematicIP Radiator Thermostat (HMIP-eTRV-2)
- Pluggable Switch and Meter (HMIP-PSM)

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** (~14EUR).

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

- RFXtrx type2 firmware,
- ELEC5 protocol,
- RSL option (Hardware > RFXTRX433E > 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:

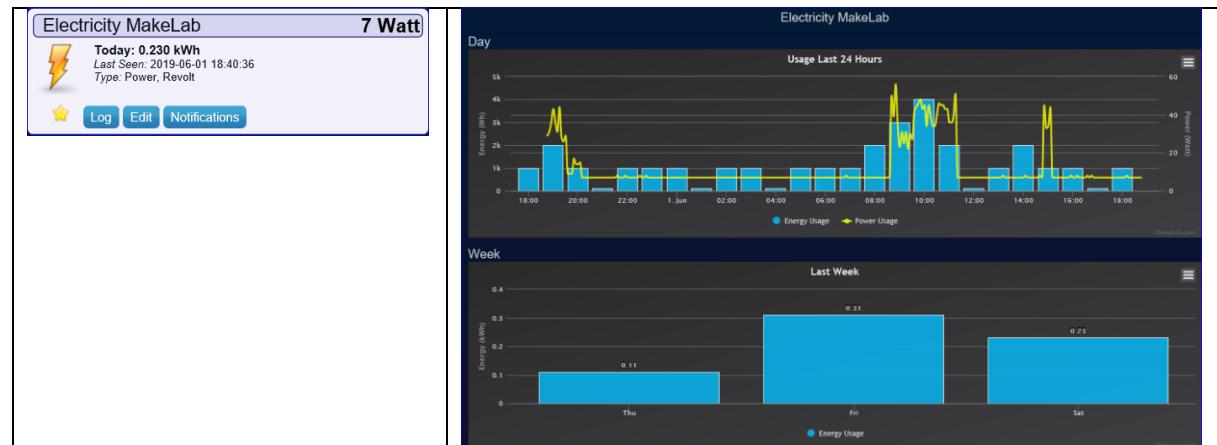
1. Type=Power, SubType=Revolt, Data=0.070kWh, Idx=167
2. Type=General, SubType=Voltage, Data=228 V, Idx=168
3. Type=General, SubType=Percentage, Data=0.73%, Idx=169 Note: power factor.
4. Type=General, SubType=Percentage, Data=50%, Idx=170 Note: frequency Hz.

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://rpi-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.

Coffee Machine Monitor

Purpose

To monitor the start & end time of the Coffee Machine.

The Coffee Machine switches OFF, two hours after being switched ON.

Solution

Monitor the Electric Usage Device (idx=44) value if above certain threshold (> 1500 Watt) between 07:00 – 08:00. If above threshold, set the Alert Message.

Monitoring is handled by a dzVents Script for device changes and timer.

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

dzVents Script

```
local msgbox = require('msgbox')
local IDX_STROMVERBRAUCH = 44
local TH_STROMVERBRAUCH = 1500
local MONITOR_START = 'at 07:00'
local MONITOR_START_END = 'at 07:01-07:59'
local MONITOR_END = 'at 08:00'

return {
  on = {
    devices = {
      IDX_STROMVERBRAUCH
    },
    timer = {
      MONITOR_START,
      MONITOR_START_END,
      MONITOR_END,
    },
  },
  data = {
    notified = { initial = 0 }
  },
  execute = function(domoticz, item)
    if (item.isTimer) then
      if (item.trigger == MONITOR_START) then
        domoticz.data.notified = 0
      end
      if (item.trigger == MONITOR_END) then
        timeoff = os.date("*t")
        message = ('Kaffee Machine AUS %02d:%02d'):format(timeoff.hour, timeoff.min)
        msgbox.alertmsg(domoticz, domoticz.ALERTLEVEL_GREY, message)
      end
    end
    if (item.isDevice) then
      device = item
      if (device.WhActual > TH_STROMVERBRAUCH) and (domoticz.data.notified == 0) then
        timeon = os.date("*t")
        message = ('Kaffee Machine AN %02d:%02d'):format(timeon.hour, timeon.min)
        -- 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 = ('Kaffee Machine aus um %02d:%02d'):format(timeoff.hour, timeoff.min)
      end
    end
  end
}
```

```
-- update alert message
msgbox.alertmsg(domoticz, domoticz.ALERTLEVEL_ORANGE, message)
-- set notified flag
domoticz.data.notified = 1
end
end
end
}
```

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 > Setting > Email)

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

- Raspberry Pi monitor (rpi_monitor.lua)
- Hue lamps living room timed switch (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

A screenshot of the Domoticz Dashboard. At the top, there's a header bar with 'Utility Sensors' and a timestamp '08.07.2019 14:41'. Below it, a blue status bar shows 'Alert Messages' and the same timestamp. The main area displays a single alert message: '08.07.2019 14:41 - Postbox opened!', with smaller text below it: 'Last Seen: 2019-07-08 14:41:39' and 'Type: General, Alert'. There are three buttons at the bottom: 'Log' (yellow star icon), 'Edit' (blue edit icon), and 'Notifications' (blue bell icon).

Widget

A screenshot of a Domoticz widget titled 'Alert Messages'. It contains the same alert message as the dashboard: '08.07.2019 14:41 - Postbox opened!', with the same timestamp and type information. At the bottom, there are three buttons: 'Log' (yellow star icon), 'Edit' (blue edit icon), and 'Notifications' (blue bell icon).

Log Entries

A screenshot of the Domoticz Log Entries table. The title bar says 'Alert Messages'. The table has columns for 'Date' and 'Data'. It lists several log entries, including the one from the alert message: '2019-07-08 14:41:39 08.07.2019 14:41 - Postbox opened!'. Other entries include 'Hue Lampen aus 23:00' on 2019-07-07, 'Hue Lampen an 21:21' on 2019-07-07, and 'Hue Lampen gehen an 21:21' on 2019-07-07.

dzEvents Scripts

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.

```
--[[[  
    alertmsg_monitor.lua  
]]--  
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  
}
```

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

```
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 helper functions are defined in the script global_data.
 For this example, the helper functions isnow and alertmsg are used.

Alert Message Reset

Purpose

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

Solution

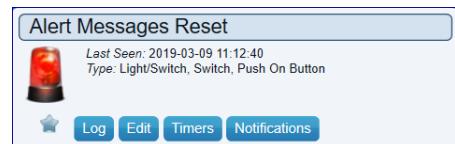
Create a virtual device type: Light/Switch, SubType: Switch.

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 '.. device.state)
    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... | Dev... | 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 | StrP... | StrP... | 0 | 0 | 0 | 0 | Opt |

The log entries are stored in table LightingLog.

| SELECT * FROM LightingLog WHERE DeviceRowID=55; | | | | |
|---|--------|-----------------------------|---------------------|------|
| DeviceRowID | nValue | 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.

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 dzEvents, i.e.

- Raspberry Pi monitor (rpi_moonitor.lua)
- Hue lamps living room timed switch (hue_wz_timer.lua)
- 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 dzEvents, 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 |

dzEvents Script

```

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
}
}
```

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

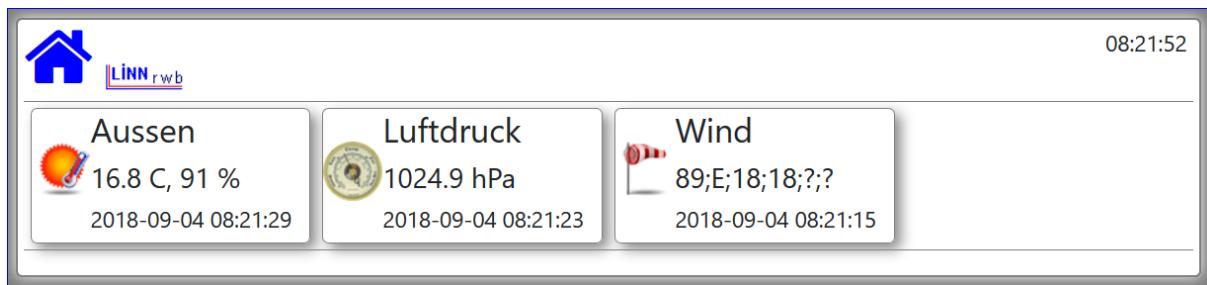
(Name="Aussen", idx=14, Hardware=RFXtrx433e, Type=Temp + Humidity, SubType=Cresta, TFA TS34C)

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 server 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://rpi-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:
    })
  </script>
</body>

```

```

// Update the sensorinfo
$(function() {
    updateClock();
    updateSensors();
});

// Returns the image of the sensor that is stored in the image folder on the Domoticz
server
// /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>'+
        '</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.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>
```

App atHome

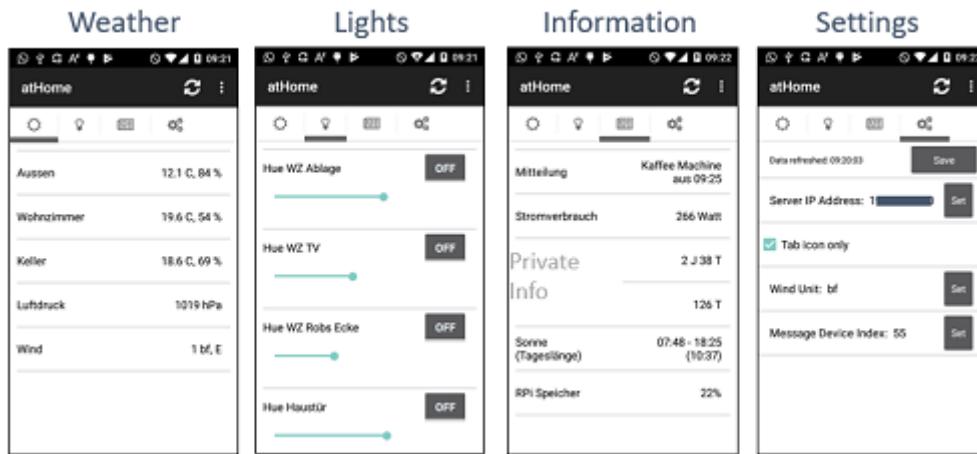
Purpose

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

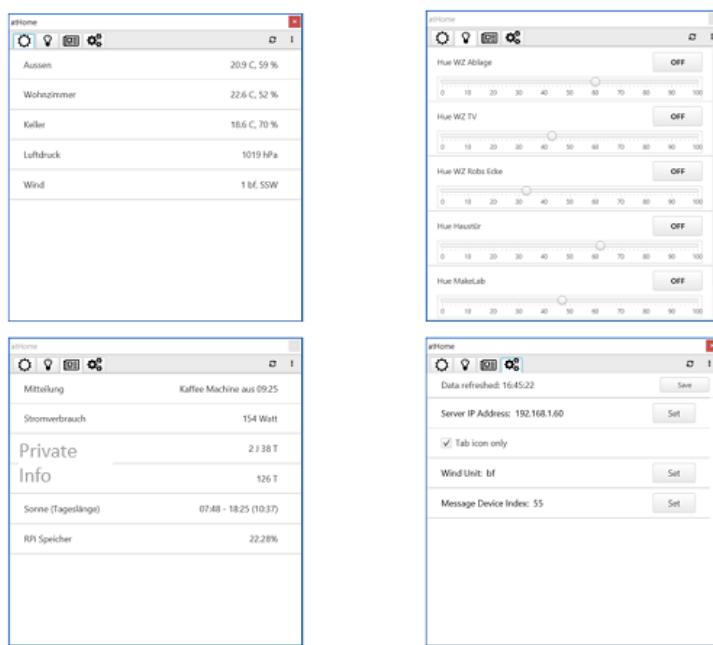
Android app developed with [B4A](#) v8.5.

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



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

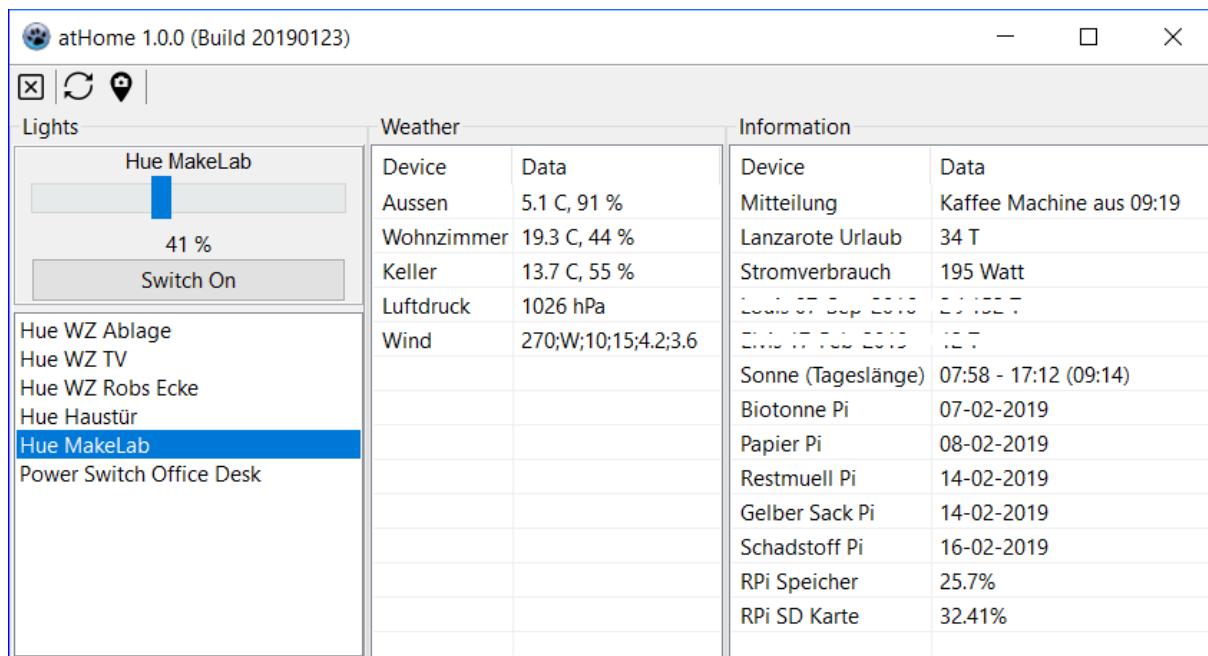
Read the B4J Forum *Share My Creations* post [here](#).



Note: current version in use has many more devices.

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

Not published yet.



Volumio Webradio

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 with the following sections:

- Light/Switch Devices:**
 - Volumio Play: On
 - Volumio Refresh: On
 - Volumio Volume: A slider set to approximately 75.
 - 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 (green triangle icon)

| 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 | |
| <input type="checkbox"/> Volumio Status | PLAY |
| Volumio Status STOP = if the server is started or if switch Volumio Play is set to Off | |
| <input type="checkbox"/> Volumio Status | STOP |
| Volumio Status OFF = server not reachable (network) or server turned off (shutdown) | |
| <input type="checkbox"/> Volumio Status | 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 web 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.
- **Important:** 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 scripting with Lua** ([reference](#)).

Domoticz dzVents Scripts

Identified two challenges to resolve:

1. The dzVents 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 dzVents

Domoticz Configuration

Devices

| Idx | Name | Type | SubType | Function |
|------------|-------------------------|---------------------|---|--|
| 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><TODO>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 | Dasboard with Roomplan Volumio |
|-------------------------|---------------------------------------|

The screenshot shows the Domoticz interface with the following details:

- Left Panel (Devices):**
 - Section title: 5 Volumio
 - Text: Showing 1 to 5 of 5 entries
 - Buttons: Edit, Delete
 - Section title: Devices (Select Plan first to Edit...)
 - Text: Show [dropdown] entries
 - Table header: Idx Name
 - Table rows:
 - 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
 - Text: Showing 1 to 8 of 8 entries
- Right Panel (Light/Switch Devices):**
 - Section title: Light/Switch Devices
 - Items:
 - Volumio Play: On/Off switch (On)
 - Volumio Refresh: On/Off switch (On)
 - Volumio Volume: A slider control set to 1.
 - Volumio Bookmark: On/Off switch (On)
 - Section title: Utility Sensors
 - Items:
 - Volumio Current Song: This is the song title
 - Volumio Favorites: This is the last bookmarked song title
 - Volumio Status: PLAY button with a green triangle icon

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

dzVents Scripts

The dzVents Lua scripts 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= (extract from the script *volumio_play*):

```
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

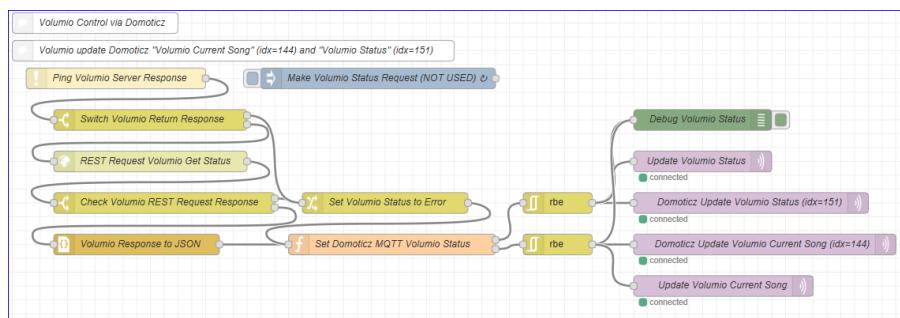
Switch Volumio Refresh

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;).

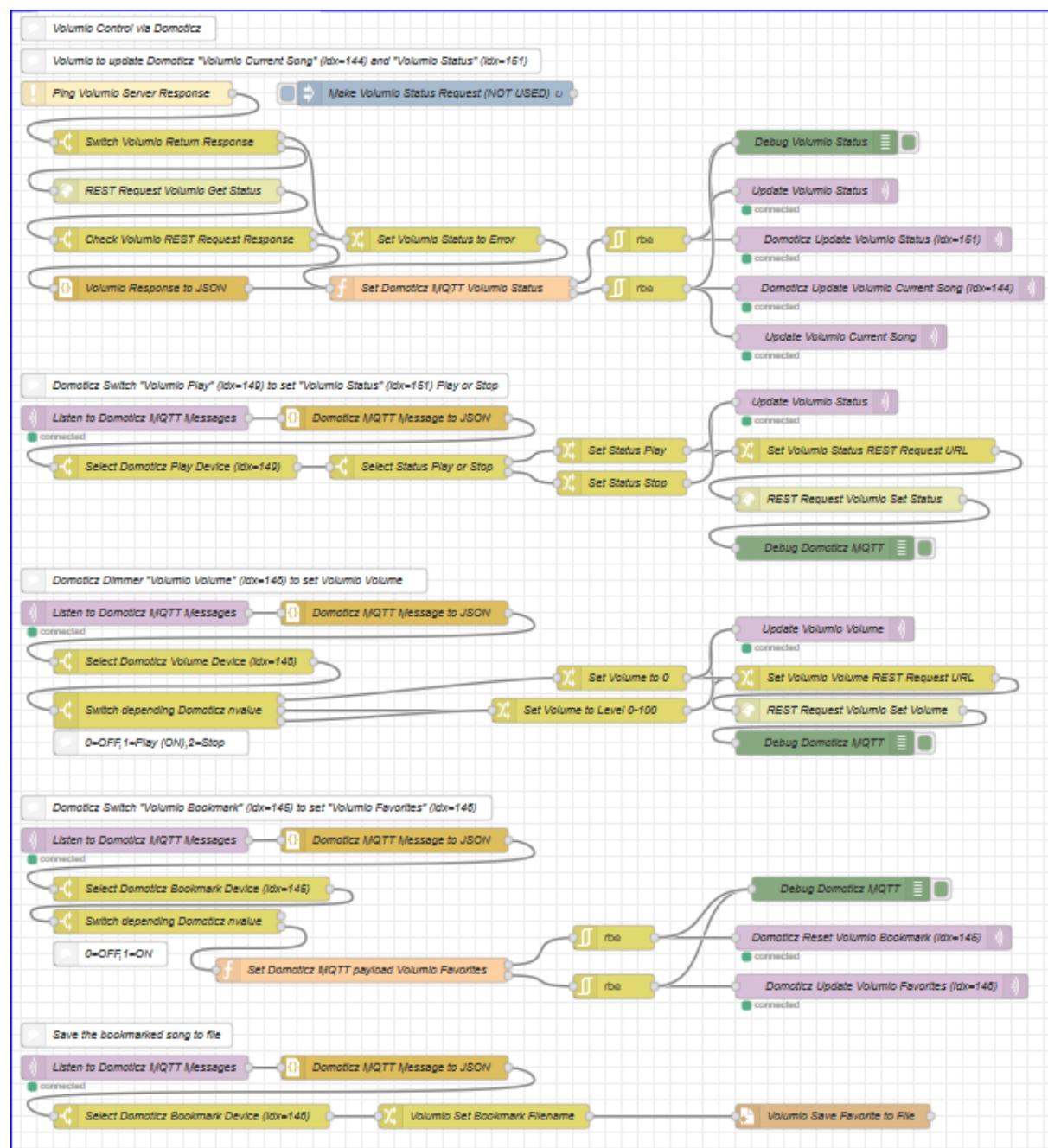
The output of the *Function Node* goes to a *MQTT Out Node*, which connects to the Domoticz MQTT broker (localhost:1883) and publishes the messages.

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

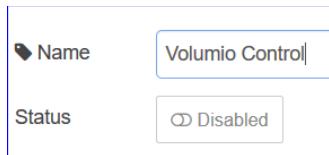


Notes

- 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 web 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

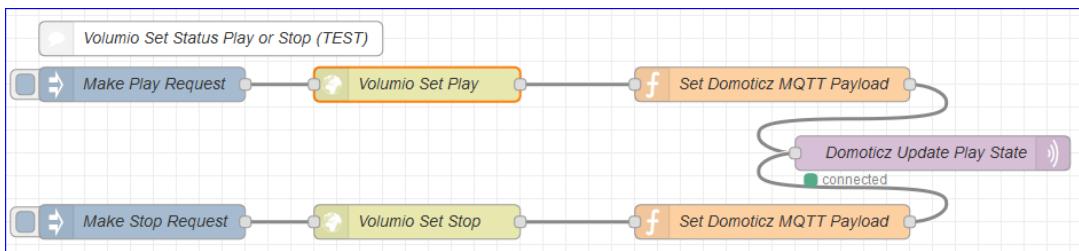
The Node-RED flow *Volumio Control* can be enabled and disabled by clicking on the Tab *Volumio Control*:



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*.



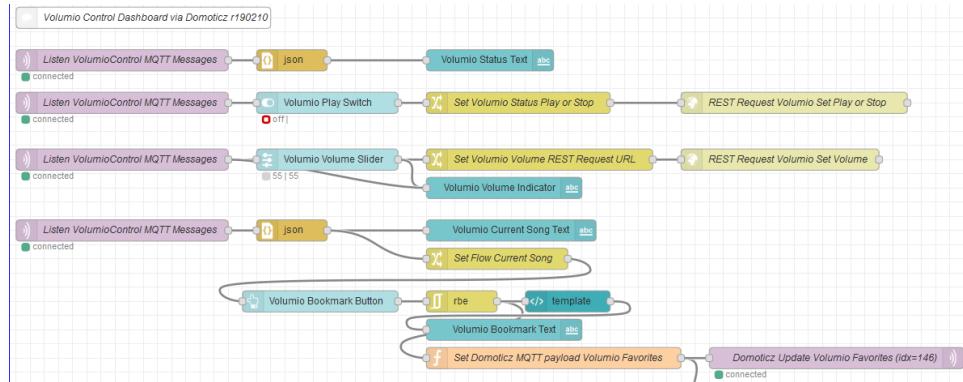
Note

This flow can be simplified using Change Node to set the status to then trigger Volumio and update the Domoticz Device.

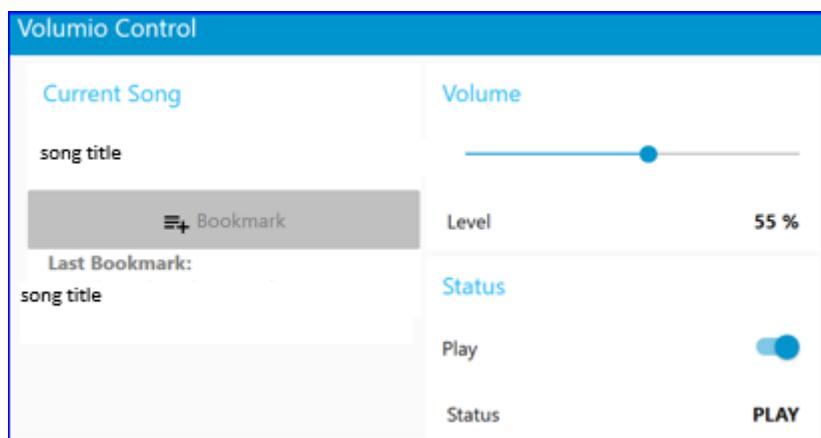
Volumio Control Dashboard

For Node-RED, [Dashboard UI](#) nodes are available, which could be used to create a Domoticz Alternate Dashboard (accesses via web browser).

Created a flow *Volumio Control Dashboard*, to explore the use of Dasboard UI nodes.



Displayed in web browser with <http://domoticz-ip-address: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}} % |

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.

Stock Monitor

Purpose

To monitor stock quotes (values):

- Request every 30 minutes stock quotes from [Alpha Vantage](#)
- Display quotes in dedicated Domoticz dashboard (Room Stocks)
- View trends in charts day, month, year
- Notify via alert message and (optional) email on thresholds

Screenshots Stock Monitor with Dashboard Room Stocks

The screenshot displays several components of the Domoticz interface related to stock monitoring:

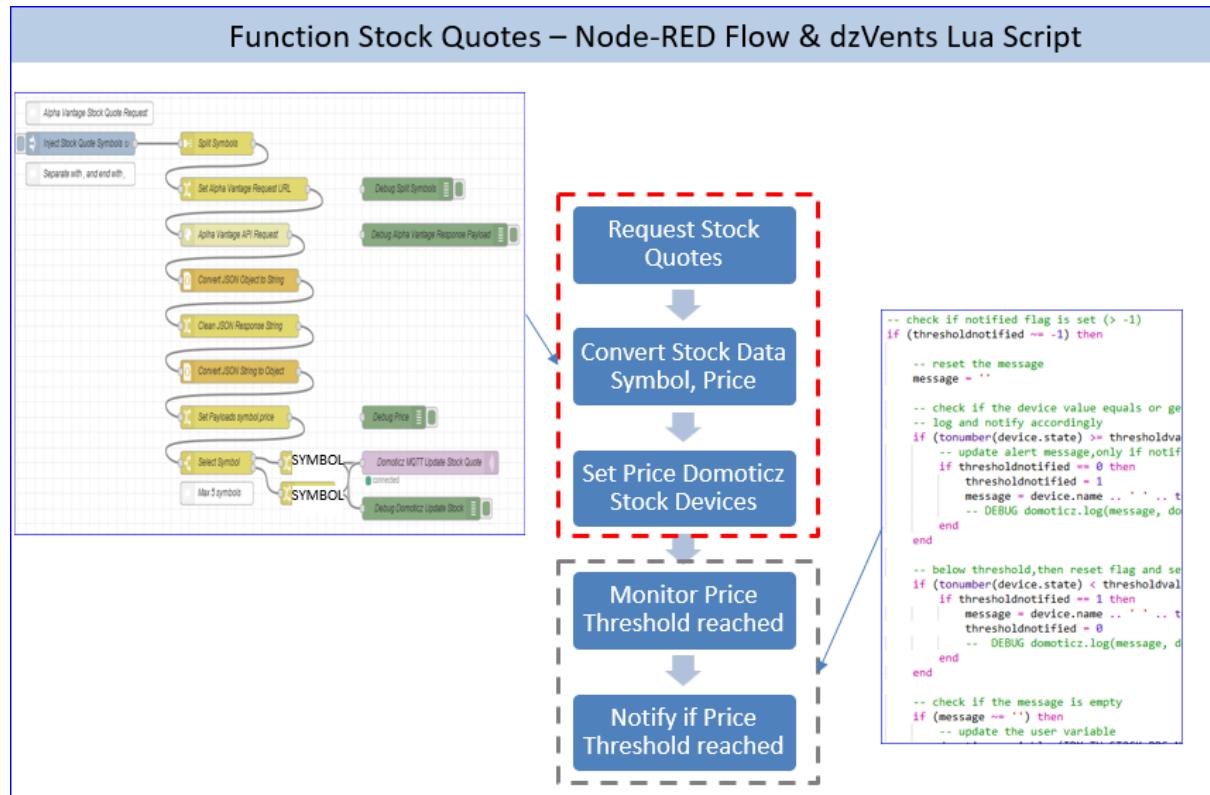
- Utility Sensors:** A list of two stock sensors. The first sensor shows a value of **27.985 EUR**, and the second shows **14.275 EUR**. Both entries include a "SYMBOL" placeholder.
- Stock Details:** Two detailed views for the stocks. The left one for **27.985 EUR** shows it was last seen at 09:21:04 and is a General, Custom Sensor. The right one for **14.275 EUR** shows it was last seen at 09:21:09 and is also a General, Custom Sensor. Both details include a "SYMBOL" placeholder and buttons for "Log", "Edit", and "Notifications".
- Alert Configuration:** A table for setting alerts. It includes columns for "Type" (set to "Usage"), "When" (set to "Greater 28"), "Active Systems" (set to "email"), and "Custom Message" (set to "Stock Name 28 EUR").
- Day Chart:** A line chart titled "Day" showing the price of the stock over a 24-hour period. The Y-axis is labeled "EUR" and ranges from 27.7 to 28.1. The X-axis shows times from 12:00 to 18:00. The chart shows a sharp drop from approximately 27.95 to 27.85 around 12:00, followed by a steady recovery and minor fluctuations towards the end of the day.

Solution

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.

An Alpha Vantage API key is required to place requests (get [here](#)).



Example API Request & Response

```
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%"
  }
}
```

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

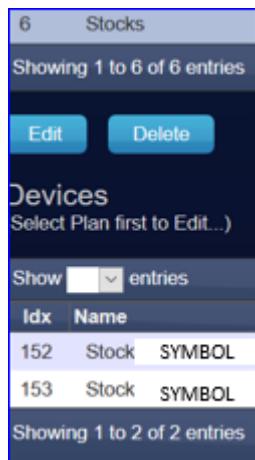
The custom sensors data are stored in the Domoticz database tables Percentage and Percentage_Calendar (Percentage_Min, Max, _Value for per day).

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.

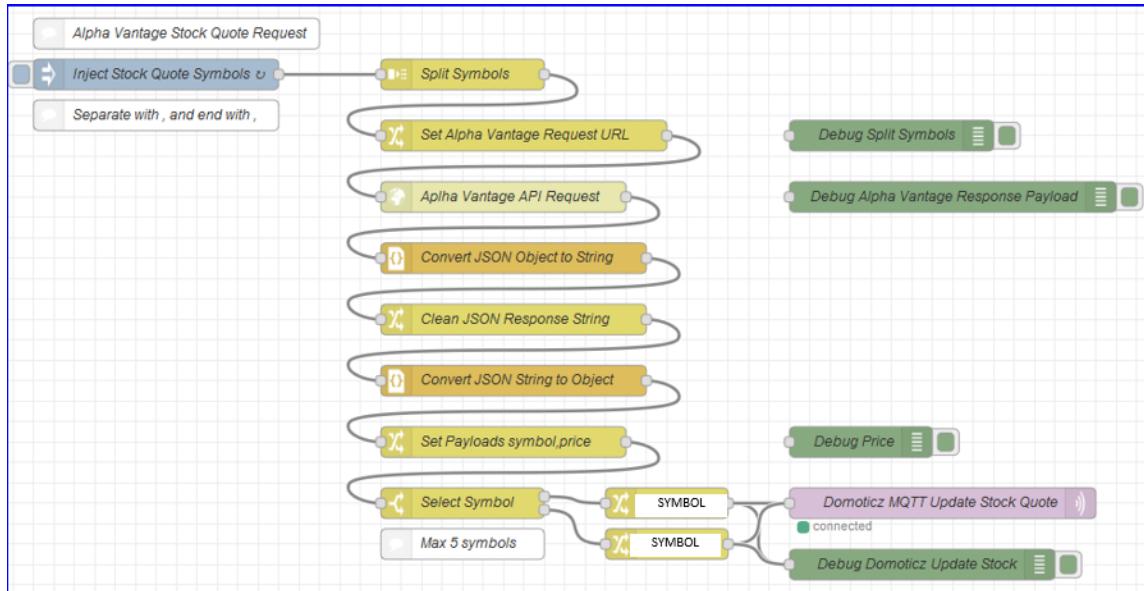
Screenshot Roomplan number 6 named Stocks with 2 devices



Add more devices as required.

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:

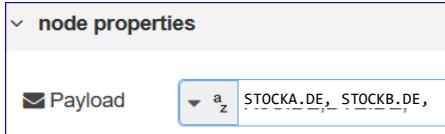
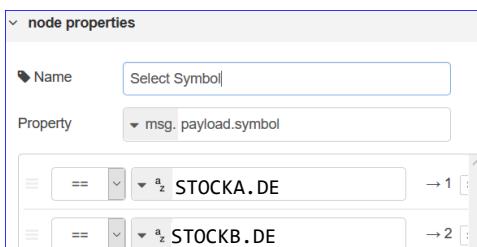
```
STOCKA.DE, STOCKB.DE,
```

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"}
```

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.

The screenshot shows the Domoticz GUI. At the top, a stock device is displayed with the symbol 'SYMBOL', last seen on 2019-02-14 09:21:04, and a value of 27.985 EUR. Below this, the device type is listed as 'General, Custom Sensor'. At the bottom of the device card are buttons for 'Log', 'Edit', and 'Notifications'.

Below the device card is a table titled 'Active Systems' with one row:

| 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).

The screenshot shows the 'User Variable with Threshold' table in the Domoticz GUI. The table has columns: Idx, Variable name, Variable type, and Current value. There are two rows:

| Idx | Variable name | Variable type | Current value |
|-----|--------------------------|---------------|---------------|
| 9 | TH_STOCK_SYMBOL_NOTIFIED | Integer | 1 |
| 8 | TH_STOCK_SYMBOL | Float | 27 |

A tooltip is shown over the 'Current value' column for the row with Idx 9, defining the values: -1 = do not use notifier, 0 = not notified, 1 = notified.

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.

dzVents Script

```
-- 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

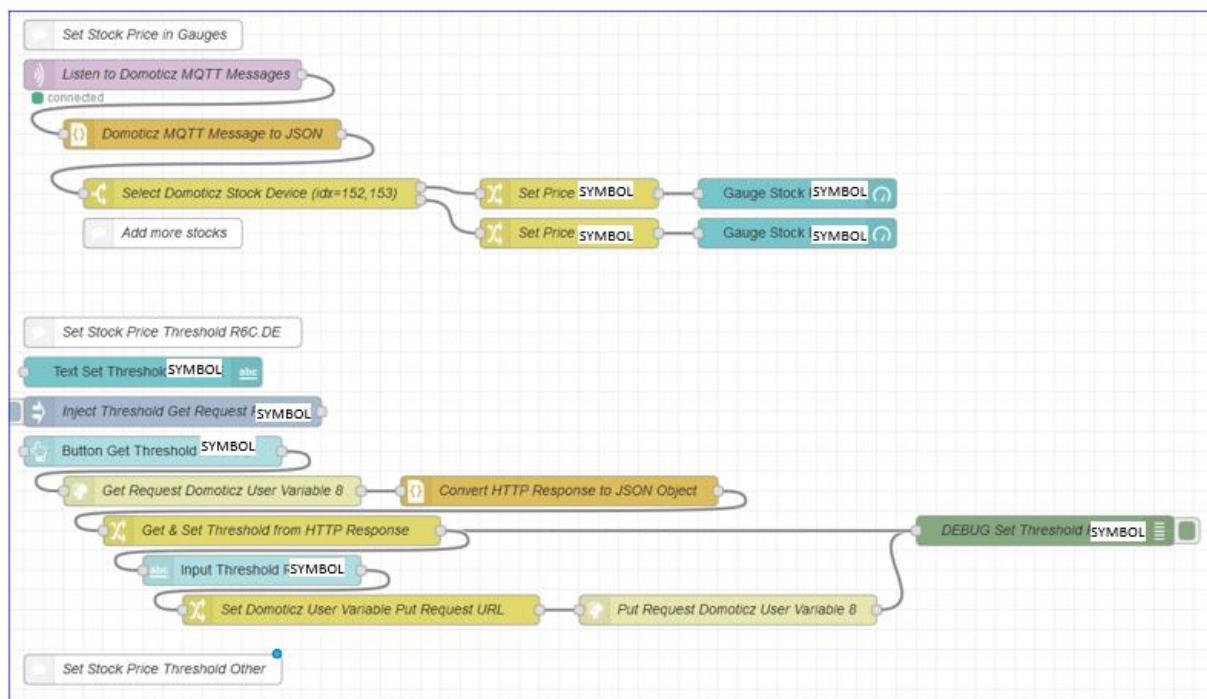
return {
  on = {
    devices = {
      IDX_STOCK_ NAME
    }
  },
  execute = function(domoticz, device)
    domoticz.log('Device ' .. device.name .. ' was changed to '.. device.state, domoticz.LOG_INFO)

    -- 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
}
```

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> |
|--|---|



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
...
```

Ambient Light

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 |

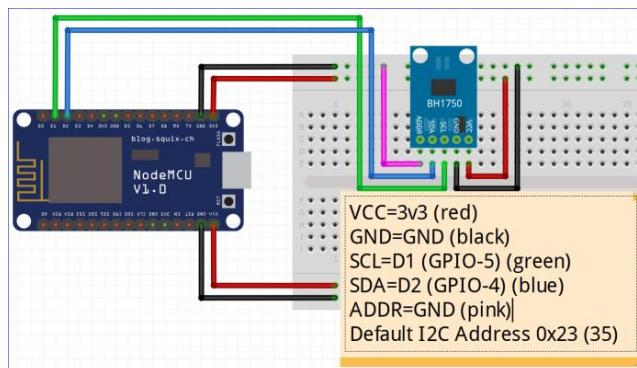
This device uses the default address 0x23 (ADDR connected to GND).

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

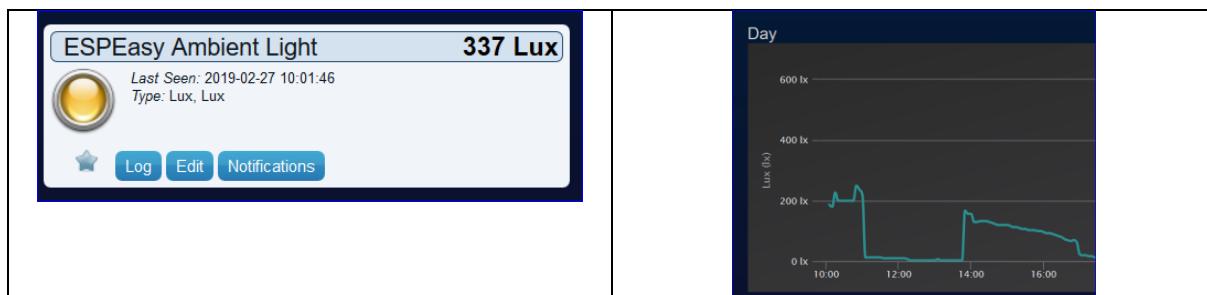
Create a virtual sensor: Sensor Type Lux with Name “ESPEasy Ambient Light”.
After adding the new device, the idx is required for the ESP device settings: idx=46.

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 web browser by opening:

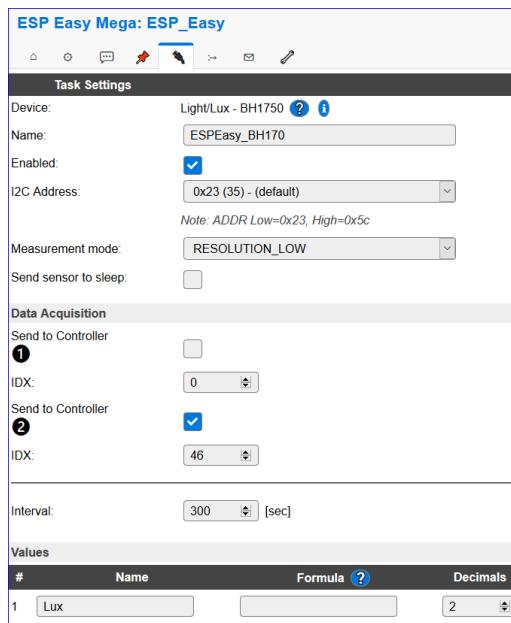
<http://esp-device-ip-address> > goto Devices > select Task Edit and configure.

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 |

dzVents Script

Script name: ambient_light_control_espeasy

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

```
--[[[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 level and 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
```

Contact Detection (PB62R)

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 433 Mhz contact detector PB-62R (from KOBERT-GOODS) connected to RFXCOM RFXtrx433E.

Tested two devices:

| PB-62R | PB-67R |
|--|--|
| <p>From: KOBERT-GOODS Costs: ~10EUR Battery: 12V (MN21/23) with duration ~4 month.</p>  <ul style="list-style-type: none"> Left = Magnet Right = Detector with <ul style="list-style-type: none"> top left red LED (lights up if the contact is “broken”), Middle right reset button used for Domoticz to learn the device. | <p>From: KOBERT-GOODS Costs: ~10EUR</p> <p>(Status 20190521) Tested but not supported by RFXCOM RFXtrx433E. The RFXCOM Manager recognized the switch as: Packettype = Lighting5 ERROR: Unknown Sub type for Packet type=14: 11 Signal level = 7</p> |
| <p>Ways-of-Working 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><TODO> 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 | Tell | |
|---------------|-----|------------|--------|------|--------------------|----------|--------------|----------------|------|----------------|
| (Device icon) | 160 | RFXtrx433e | 5C0700 | 0 | Security Main Door | Security | X10 security | Alarm + Tamper | 7 | (Battery icon) |

The device widget is listed in the tab Switches.

Alarm Detection

| | |
|---|---|
|  <p>Security Main Door Alarm + Tamper</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 Alarm + Tamper. The state is not reset by the device itself and requires a trigger, i.e. Button or dzVents timer script!</p> |
|  <p>Security Main Door Normal</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 (as test): http://rpi-domoticz-ip:8080/json.htm?type=command&param=switchlight&idx=160&switchcmd=Normal</p> |

Alarm State Reset 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.

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.

```
-- security_monitor.lua
-- 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

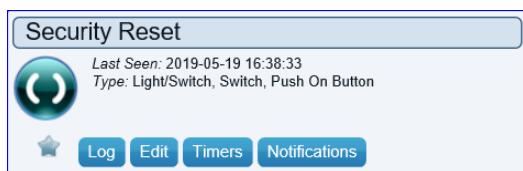
| Idx | Variable name | Variable type | Current value |
|-----|--------------------|---------------|---------------|
| 13 | DEF_SECURITY_ALARM | Integer | 0 |

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 Event security_reset.lua



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

```
-- 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 Test

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

HTTP Result

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

MQTT 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 Test

```
http://rpi-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.

Postbox Watcher

Purpose

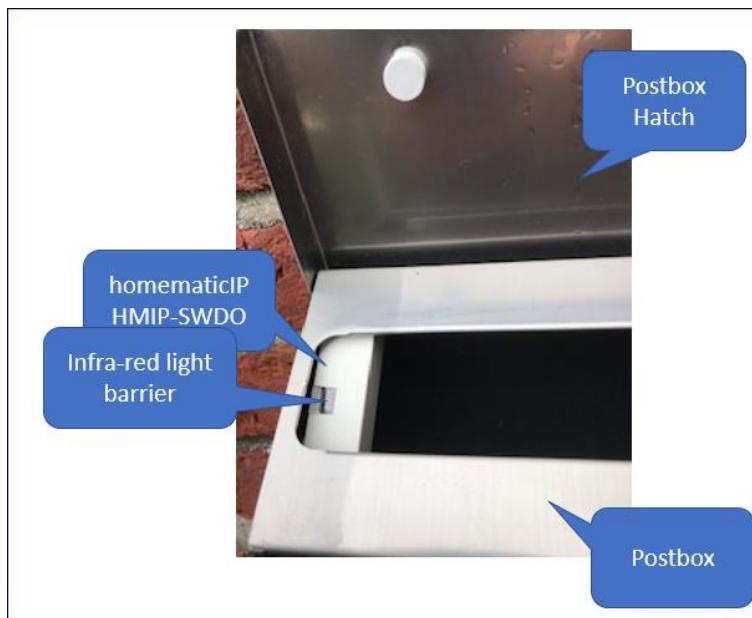
To watch the postbox for post and inform via Email Notification and Alert Message.

Solution

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 using either the HomeMatic CCU XML-API Addon or Domoticz using HTTP REST requests (See also section Explore RaspberryMatic).

The hardware used is a homematicIP Window and Door Contact – optical (HMIP-SDWO, 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-SDWO dtasheet).



Communication Flow

1. HMIP-SWDO detects opening the hatch of the postbox.
2. HMIP-SWDO triggers script which submits HTTP REST request to Domoticz server to update Alert Message device to Level 4 with message “Postbox opened!”.
3. Domoticz updates the device and sends out Email notification.

Domoticz Configuration

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

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 main sections of the HomeMatic Web-UI:

- (1) Add new device:** The 'Device inbox' page. It lists a single device: 'HMIP-SWDO DO'. The device details are: Type: HMIP-SWDO, Description: Homematic IP Window / Door Contact - optical, Serial number: 0000DA498D5859, Interface category: HMIP-RF, Transmission mode: Secured, Name: HMIP-SWDO 0000DA498D5859. In the 'Action' column, there are buttons for 'Test', 'Delete', 'Set', and 'Done'. A green 'OK' button is highlighted.
- (2) Device Status and control:** The 'Status and control' page. It shows a list of devices on the left and a detailed view of the 'HMIP-SWDO 0000DA498D5859' device on the right. The detailed view includes columns for Channel, Room, Function, Last modified, and Control (with 'Open' and 'Closed' buttons).

Step 2

Create a program to trigger sending the Alert Message to Domoticz in case the device state changes to open.

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

The screenshot shows a configuration screen for a script rule:

| Name | Description | Condition (if...) | Activity (then..., or else...) | Action |
|--|---------------|---|--------------------------------|------------------------------------|
| SWDOS5859 | Postbox Alert | Channel status: HMIP-SWDO 0000DA498D5859:1 when open trigger when updated | Script: ... immediately run | <input type="checkbox"/> intrinsic |
| Condition: If... Device selection: HMIP-SWDO 0000DA498D5859:1 when open trigger when updated OR DR Activity: Then... <input checked="" type="checkbox"/> Stop all current delays before performing the activity (e.g. retriggering). Script: !Function: Postbox Alert string \$function = "Postbox Alert"..., immediately Activity: Else... <input checked="" type="checkbox"/> Stop all current delays before performing the activity (e.g. retriggering). | | | | |

SCRIPT

The SCRIPT makes use of a CUxD device to run system commands – here

```
wget -q -O - 'http://domoticz-ip-
address: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

```
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 ensor 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 rest request url
string cAmp = "&";
string sDomUrl = "'http://domoticz-ip-address:8080/json.htm"; ! Production
string sUrl =
sDomUrl#"?type=command#cAmp#param=udevice#cAmp#idx="#nIdx#cAmp#"nvalue="#nLevel#cAmp#"svalue="#sTex
t#"";

! 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_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(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
```

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

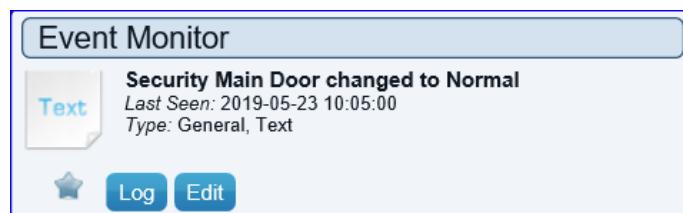
Name: Event Monitor

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



Event 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
 Domoticz GUI > Setup > More Options > Events

Event global_data

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

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

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

Event 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
```

Hardware Monitor

Purpose

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

Screenshots of the Hardware Monitor Dashboard & Floorplan.

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 Device:

- 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 scripts (one for each RPi), i.e. hwmon-pivz.lua, hwmon-pidopro.lua.
- displays the data in the dashboard and floorplan

Node-RED

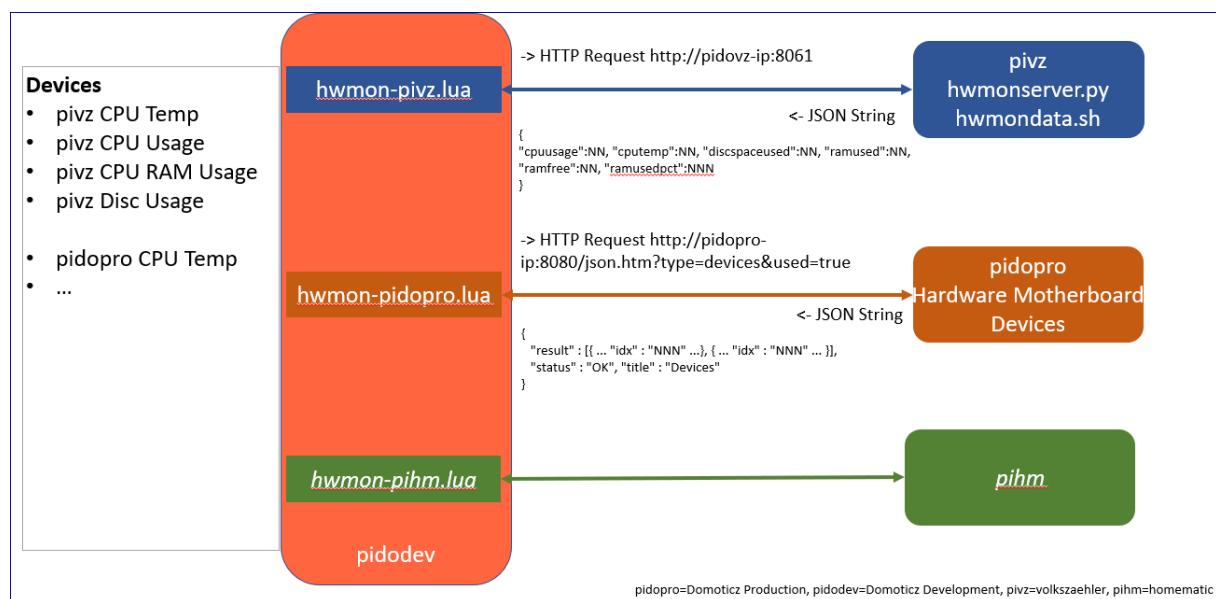
Tested various Node-RED flows for pivz data.

- 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 HTTP request by running the as script.
3. Domoticz: dzVents Lua script opens the HTTP 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 hwmon-pivz.lua 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 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

dzVents Lua script

File: hwmon-pivz.lua

Folder: Embedded in domoticz.db

Pseudo Code

Place a HTTP 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 running on the Domoticz Development server, gathers from the Domoticz Production server, all used devices data.

The hardware monitor devices (4) are selected ad used to update the devices on the Domoticz Development server.

dzVents Lua script

File: hwmon-pidopro.lua

Folder: Embedded in domoticz.db

Pseudo Code

Place a HTTP request to the Domoticz Production (pidopro) server 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 server

Soil Moisture Monitor (Plugin)

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. A note specifies a data timeout of 10 seconds. The configuration section details the connection to a Tinkerforge Moisture Bricklet, mentioning regular intervals for reading moisture values, and defines three states based on moisture levels: dry (0-19), adequately wet (20-59), and irrigation advice (60-99). It also describes the use of an RGB LED bricklet to indicate the state (RED for dry, YELLOW for irrigation advice, GREEN for saturated).</p> | <p>The photograph shows a mini palm tree in a black pot. A Tinkerforge Moisture Bricklet is attached to the soil. 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 moisture 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 23x30 plate.</p> |

| Domoticz – Hardware & Soil Moisture Device | |
|--|--|
| <p>The screenshot shows the 'Devices List' in Domoticz. It lists two entries under the 'Hardware' category: 'Soil Moisture Monitor' (ID 16) and 'Soil Moisture Monitor - Status' (ID 17). Both entries are of type 'General' and have a 'Soil Moisture' subtype. The status for both is 'OK'.</p> | <p>The screenshot shows the 'Utility Sensors' section. It displays the 'Soil Moisture Monitor - Soil Moisture' sensor with a value of 59. A note below it explains the moisture scale: 00-09 = saturated, 10-19 = adequately wet, 20-59 = irrigation advice, 60-99 = irrigation, and 100-200 = dangerously dry. To the right, a 'Soil Moisture Monitor - Status' sensor is shown with a value of 41.</p> |
| <p>The screenshot shows the 'Room Plan „Soil Moisture Monitor“' section. It includes a note about the room plan: 'Room Plan „Soil Moisture Monitor“ with Soil Moisture Monitor Devices'. Below this, a 'Devices' list shows the same two entries as the devices list: 'Soil Moisture Monitor' (ID 16) and 'Soil Moisture Monitor - Status' (ID 17). A graph titled 'Room: Soil Moisture Monitor' shows the soil moisture value over the last 24 hours, starting at 59 and dropping to around 25.</p> | |

Indoor Air Quality Monitor (Plugin)

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: 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).

Radiator Thermostat (Plugin)

For testing this solution, the temperature for the room MakeLab is controlled.

Purpose

- To set the temperature setpoint of a Radiator Thermostat.
- To measure, in regular intervals, the room temperature.

Solution

The homematicIP Radiator Thermostat (HMIP-eTRV-2, Product ref.: 140280A0) is used. The HMIP-eTRV-2 is a connection partner radiator thermostat (manual operation, transmitter) and connected to a homematicIP system (see [RaspberryMatic](#)).

A Domoticz Plugin has been created, called **homematicIP Radiator Thermostat (HMIP-eTRV-2)**. The plugin is described and can be downloaded [here](#).

Installation

1. Download the repository
2. Create folder /home/pi/domoticz/plugins/hmip-etrv-2
3. Copy plugin.py to /home/pi/domoticz/plugins/hmip-etrv-2
4. Restart Domoticz
5. For the hardware parameters are required:
 - a. CCU IP Address
 - b. Device ID of the Device HMIP-eTRV-2
 - c. Datapoints TEMPERATURE (#2): SET_POINT_TEMPERATURE, ACTUAL_TEMPERATURE as comma separated list in this order
 - d. Obtain the ID's by requesting the device state list from the CCU (<http://ccu-ip-address/config/xmlapi/statelist.cgi>)
6. GUI > Setup > Hardware
7. Select Type: homematicIP Radiator Thermostat (HMIP-eTRV-2)
8. Give a name: MakeLab Thermostat
9. Set the parameters; Keep debug to true
10. Ensure Domoticz Accepts New hardware (GUI > Setup > Settings > Hardware)
11. Add
12. Check the Domoticz Log if the two devices Setpoint and Temperature are created and updated
13. Check the widgets
14. If all OK, set the parameter Debug to false
15. Additional steps:
 - a. Add the two devices to a room plan, i.e Energy

Widgets Example

MakeLab Thermostat - Setpoint

Last Seen: 2019-07-09 15:58:55
Type: Light/Switch, Selector Switch, Selector

0 19 20

MakeLab Thermostat - Temperature

Last Seen: 2019-07-09 15:59:01

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_DEVICE_NAME 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-address/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-  
address/json.htm?type=command&param=updateuservariable&vname=TH_STOCK_STOCKA&vtype  
=1&vvalue=29
```

Response

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

Usage in Node-RED

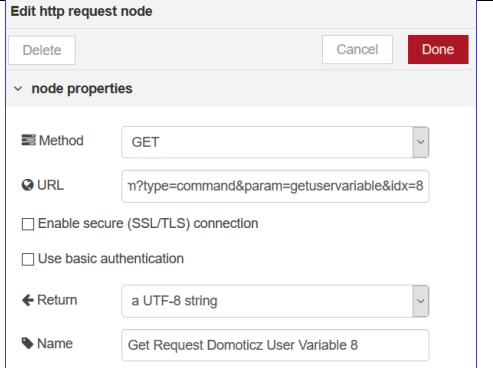
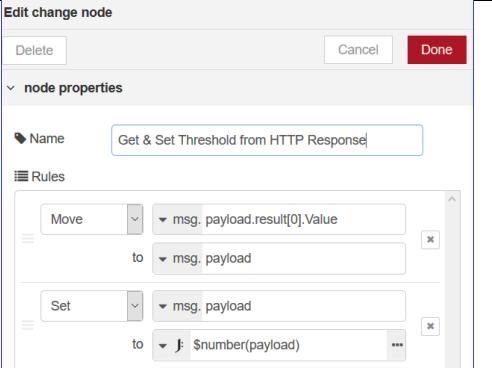
Examples on how to use the User Variables in Node-RED.

For Node-RED, there are several possibilities.

This example uses HTP Response Nodes.

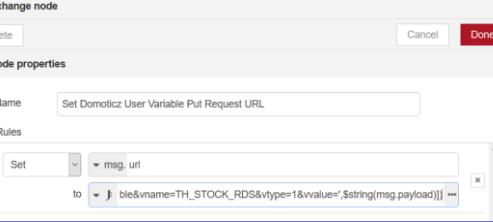
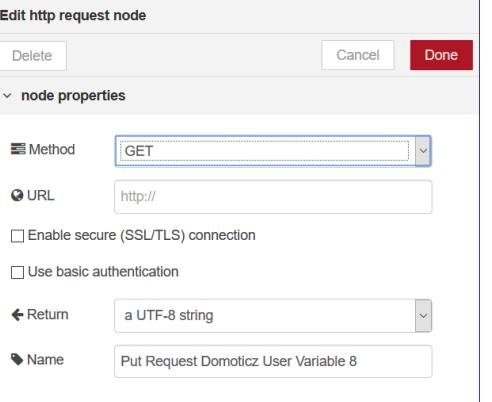
Read Value

Same request as previous used in 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.

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

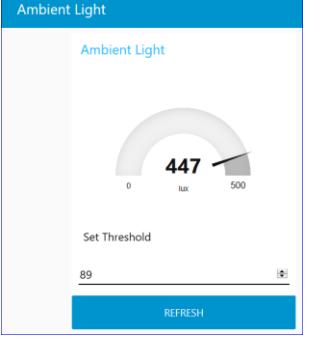
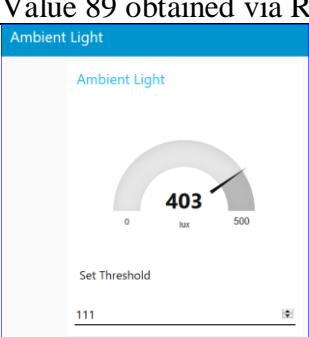
Define a User Variable (like TH_AMBIENT_LIGHT_SWITCH) holding the idx of the light (better switch) to be turned ON when the value is below threshold. A ui_dropdown list could be defined to select the light (switch) and update the User Variable.

Node-RED Dashboard

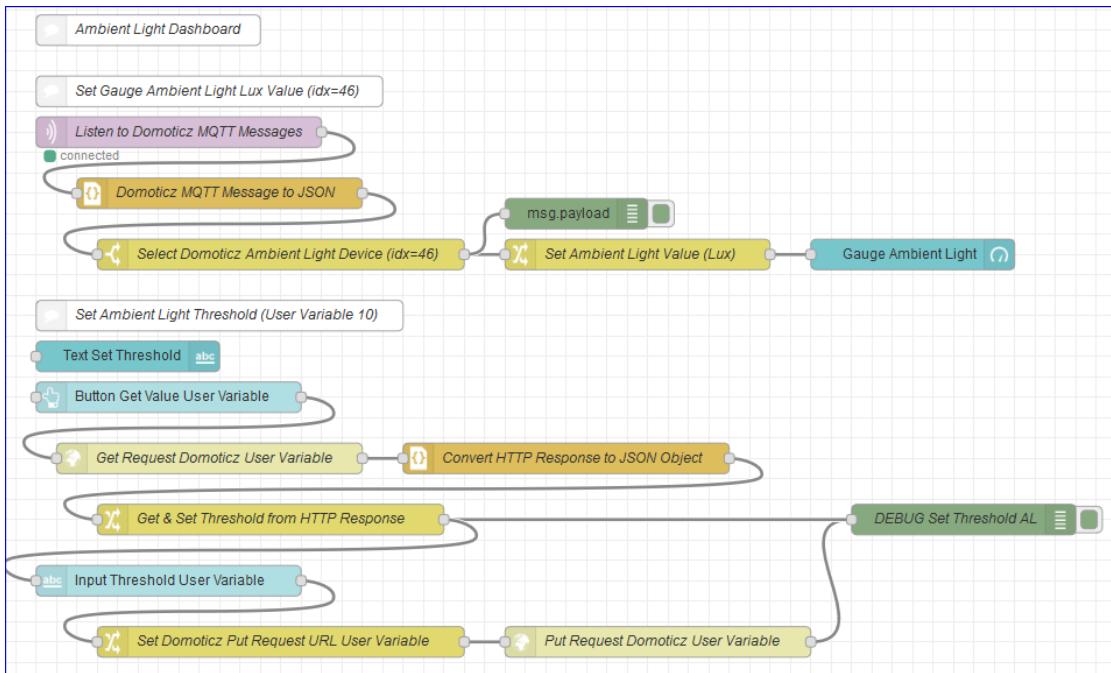
A ui_gauge node displays the actual Ambient Light Lux value, which is obtained from MQTT payload of the Ambient Light device. Example from which property "svalue1" is used by the gauge:

```
{"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¶m=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¶m=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.

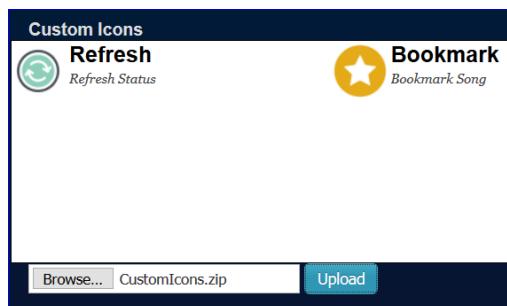
Note

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)

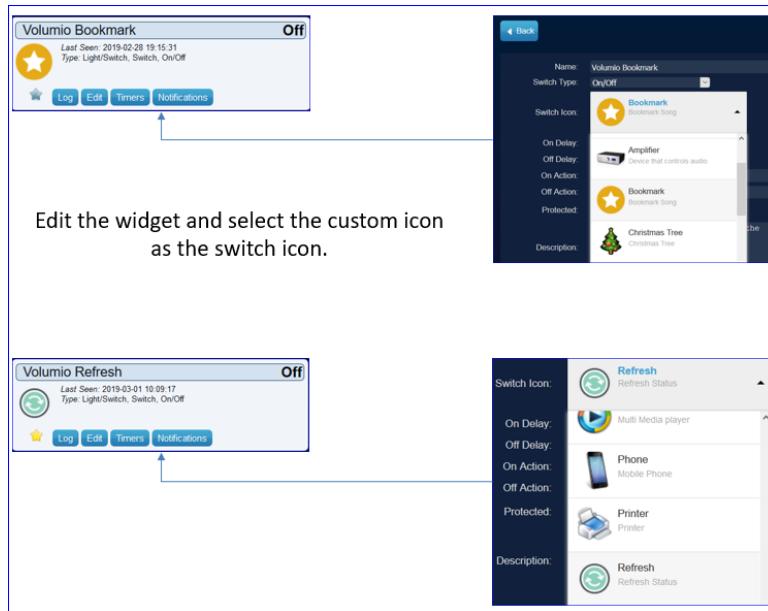
```
Refresh;Refresh;Refresh Status
Bookmark;Bookmark;Bookmark Song
```

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-address: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-address: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 section is used to explore areas, like Domoticz functions, MQTT, SQL, Node-RED and more.

Events System

Purpose

To explore the Domoticz Events System and the Event Editor (see 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.

Important 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.

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 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

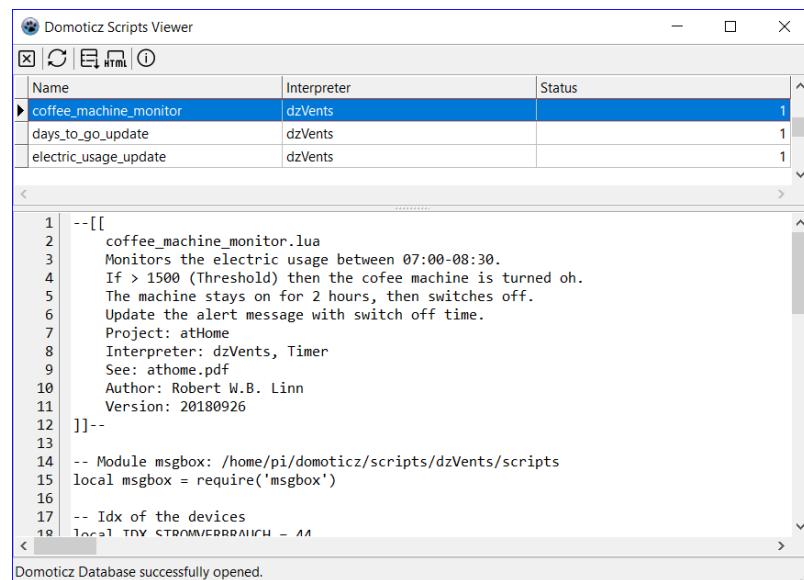
The events which are created using the Domoticz Event Editor, are stored in tables [EventMaster] and [EventRules]

```
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.



| Name | Interpreter | Status |
|------------------------|-------------|--------|
| coffee_machine_monitor | dzVents | 1 |
| days_to_go_update | dzVents | 1 |
| electric_usage_update | dzVents | 1 |

```

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 TDY_STROMERRRAUFLU = 11

```

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.



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 ≥ 70 (threshold), write a message to the Domoticz Log.

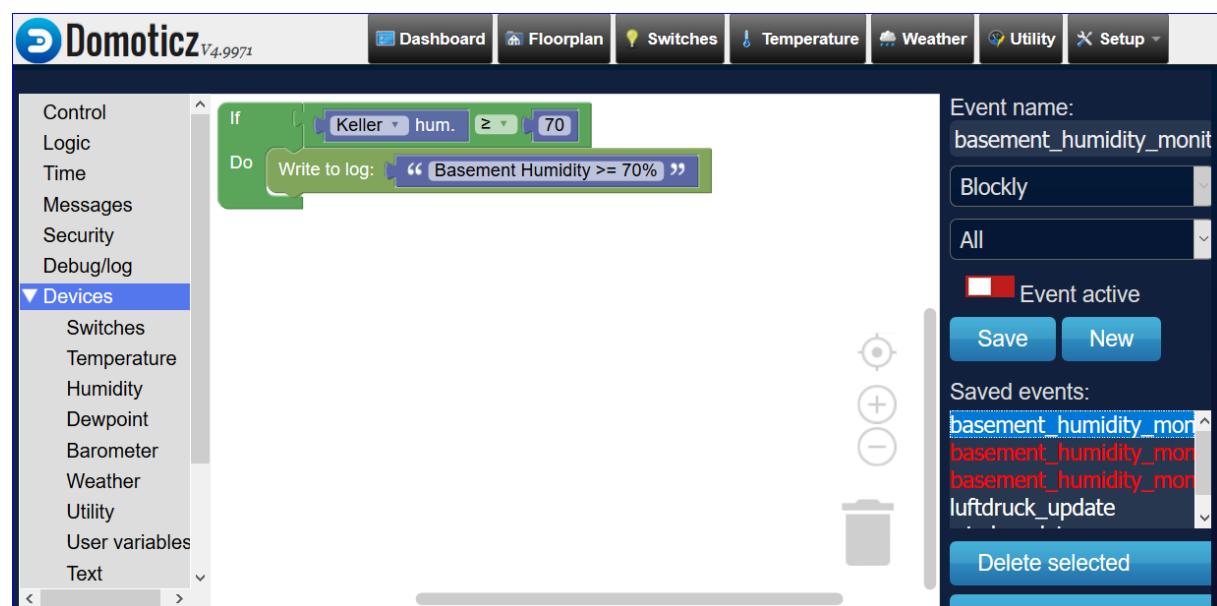
Note

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_l, Lua, Device.

```

1 -- basement_humidity_monitor_l
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, there is a code editor window displaying a Python script named 'basement_humidity_monitor_p'. The script includes comments and imports for the domoticz library. It defines a device 'Keller' with ID 11 and name 'Keller'. A threshold of 70 is set for monitoring humidity. The script uses a 'changed' event to log device changes and extract the s_value (humidity) from the log entry. It then splits the s_value into a list of three elements: T (temperature), H (humidity), andComfort (comfort level).

On the right, there is a configuration panel for the event. It shows the event name as 'basement_humidity_monitor_p', the interpreter as 'Python', and the device as 'Device'. There is a checked checkbox for 'Event active'. Below the configuration are buttons for 'Save' and 'New'. A list of saved events is shown, with 'basement_humidity_monitor_p' listed multiple times. At the bottom, there is a button for 'Delete selected'.

```

5  #<interpreter>: devices, 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 server 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(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 ({}%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+H
umidity+%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)

```

dzVents

The event system 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,
      IDXTEMPERATURE
    }
  },
  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:

| | | |
|---|--|---|
| <pre> 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 </pre> | <pre> 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 </pre> | <pre> 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 </pre> |
|---|--|---|

External Modules

Purpose

To use external modules in dzVents scripts, which are created with the Events editor.

Important

In the meantime, these modules are replaced by a dzVents script *global_data* (containing shared helper functions), maintained using the internal 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 messagebox = 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 script hue_control2.lua, created with the 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 function used by the dzVents scripts.

The functions are defined, using the internal events editor, in the file global_data.lua.

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)
```

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](#).

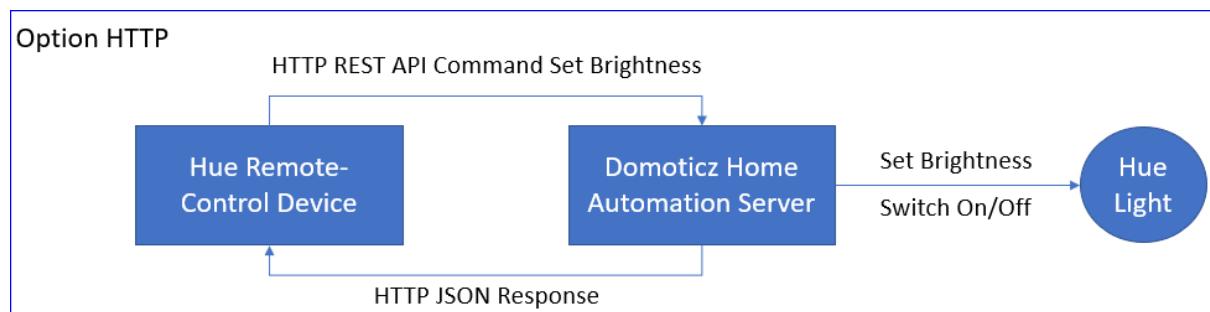
This section does not go into the depth – just a small example on setting the brightness of a Hue Light via a remote-control device, which could be a micro-controller like an ESP8266 or ESP32 or a Raspberry Pi Zero W.

The remote-control device requires communication with the Domoticz Home Automation server which is integrated in the SMART Home network.

Option HTTP

Domoticz allows you to interact with all devices using HTTP REST API Commands.
This means, it is possible to sent commands to the Domoticz server to act upon and receive a response back.

Sending a command and view the server response can be easily done via web browser.



Note

Under the hood, Domoticz uses HTTP API Commands, which is the preferred way to communicate with the devices.

Example HTTP REST API command issued via web browser

Goal

Set the brightness to 50% for Hue Device with Domoticz idx=118.

HTTP URL

```
http://rpi-domoticz-ip:8080/json.htm?type=command&param=switchlight&idx=118&switchcmd=Set%20Level&level=50
```

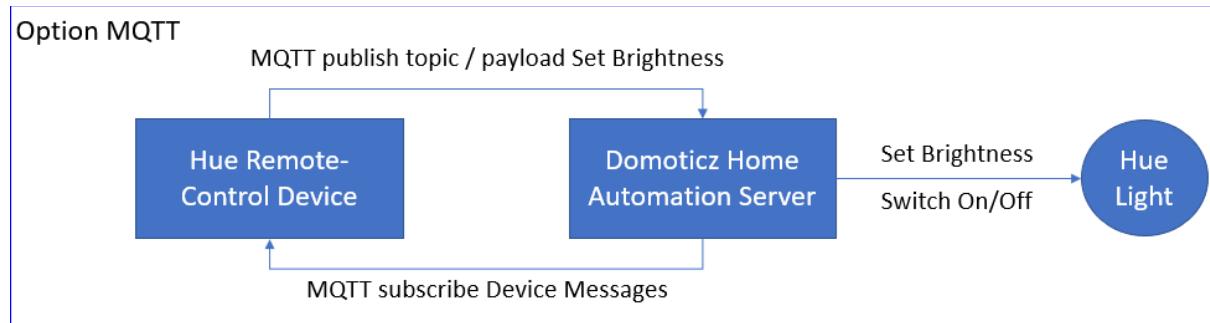
HTTP JSON Response

```
{
    "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 responds. 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 REST 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 HTTPvs 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 Request

```
http://rpi-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 Request

```
http://rpi-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" |

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.
```

MQTT Hints

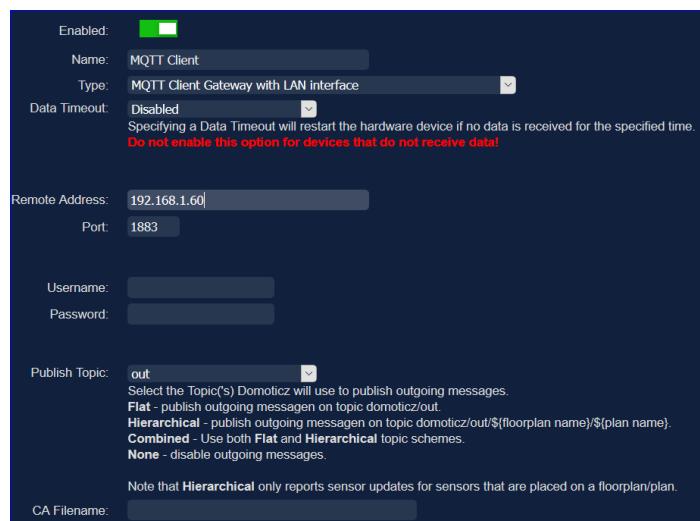
Add the host to the mosquitto command:

```
-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 | rpi-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 rpi-domoticz-ip:1883
2018-08-27 12:21:12.228 Status: MQTT: connected to: rpi-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 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)

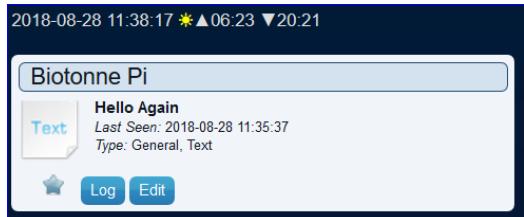
print(version)
print("Creating new instance")
client = mqtt.Client("P1")
client.on_connect = on_connect
client.on_message = on_message
client.on_log = on_log
print("Connecting to the broker", broker)
client.connect(broker, 1883, 60)
time.sleep(4)
print("Publishing message to topic",topic, "with payload",payload)
domoticz/in, Message: {"command": "udevice", "idx": 9, "svalue": "Hello Again"}
client.publish(topic,payload)
time.sleep(4)
client.loop_stop()
```

Output

```
pi@DomoticzDev:~/python3 $ 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



SQL

Purpose

To execute CRUD (Create, Read, Update, Delete) operations on the Domoticz SQLite Database located in /home/pi/Domoticz/domoticz.db.

<TODO> Identify and build solution to manage entries, i.e. select or delete data esp. from the Measurement Tables.

Thoughts:

- using Python3 scripts triggered by a Switch or Node-RED with Dashboard UI (and input field)
- using Python3 with guizero – simple UI
- using Node-RED SQLite3 Nodes
- using the SQLite3 package from a terminal

HINTS

- To analyse the database, external tools like the SQLiteSpy are useful helpers, but also using SQLite3 from the terminal command prompt.
- For tests, the Domoticz database has been exported from the Raspberry Pi to the Development Device (Domoticz GUI > Setup > Settings > Backup/Restore > Backup Database).
- For final solution, need to ensure Domoticz is stopped first, then perform CRIUD operations on the Domoticz database and start Domoticz afterwards.

SQL Command Tests

For testing of SQL statements on the Domoticz database, used

- the Domoticz database “Pinneberg.db” which has been exported via Setup > Settings > Backup/Restore > Backup Database
The database “Pinneberg.db” has been downloaded from the Raspberry Pi to the Downloads folder of the Development Device.
- the table tables [DeviceStatus] and [Temperature] of the Domoticz database “Pinneberg.db”.
- the tool SQLiteSpy.

Tables

The tables holding measurement data are

```
'MultiMeter', 'MultiMeter_Calendar', 'Percentage', 'Percentage_Calendar', 'Rain', 'Rain_Calendar', 'Temperature', 'UV', 'UV_Calendar', 'Wind', 'Wind_Calendar'
```

<TODO> need to check if this will change depending Domoticz version.

SQL Create Statements for the tables [DeviceStatus] and [Temperature]

```
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 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')));
```

Select

Purpose

To select device status and temperature data from the Domoticz database tables [DeviceStatus], [Temperature].

Python

```
#!/usr/bin/env python
import sqlite3
from sqlite3 import Error
import time
import os

version="SQL Test v20180828"
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 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 main():
    print(version)
    if DatabaseExists(database):
        print("Connecting to the database...",database)
        # create a database connection
        conn = create_connection(database)
        with conn:
            select_all_device_status(conn)
            select_all_temperatures(conn)
            select_temperature_by_threshold(conn, 41.0)

        conn.close()

if __name__ == '__main__':
    main()
```

Output data from a Domoticz Test Database

Command

```
python3 sql-select-test.py
```

Output

```
SQL Test v20180828
Database /home/pi/domoticz/domoticz.db found.
Connecting to the database... /home/pi/domoticz/domoticz.db
Select Device Status
(1, 4, '0000044D', 1, 'CPU_Usage', 0, 243, 6, 0, 0, 12, 255, 0, '0.33', '2018-08-28 19:04:15', 1, 0.0,
1.0, 0.0, 1.0, '', '', 0, 0, 0, None, None)
(2, 4, '1', 1, 'Internal Temperature', 0, 80, 5, 0, 0, 12, 255, 0, '41.3', '2018-08-28 19:03:35', 2,
0.0, 1.0, 0.0, 1.0, '', '', 0, 0, 0, None, None)
(3, 4, '0000044C', 1, 'Memory Usage', 0, 243, 6, 0, 0, 12, 255, 0, '16.82', '2018-08-28 19:03:25', 3,
0.0, 1.0, 0.0, 1.0, '', '', 0, 0, 0, None, None)
(4, 4, '000005DC', 1, 'Process Usage', 0, 243, 31, 0, 0, 12, 255, 0, '20.5800', '2018-08-28 19:03:25',
4, 0.0, 1.0, 0.0, 1.0, '', '', 0, 0, 0, '1;MB', None)
(5, 4, '0000044E', 1, 'HDD /media/pi/SETTINGS', 0, 243, 6, 0, 0, 12, 255, 0, '1.50', '2018-08-28
19:04:35', 5, 0.0, 1.0, 0.0, 1.0, '', '', 0, 0, 0, None, None)
(6, 4, '0000044F', 1, 'HDD /boot', 0, 243, 6, 0, 0, 12, 255, 0, '32.32', '2018-08-28 19:04:35', 6, 0.0,
1.0, 0.0, 1.0, '', '', 0, 0, 0, None, None)
(7, 4, '00000450', 1, 'HDD /media/pi/data', 0, 243, 6, 0, 0, 12, 255, 0, '0.08', '2018-08-28 19:04:35',
7, 0.0, 1.0, 0.0, 1.0, '', '', 0, 0, 0, None, None)
(8, 4, '00000451', 1, 'HDD /', 0, 243, 6, 0, 0, 12, 255, 0, '17.52', '2018-08-28 19:04:35', 8, 0.0,
1.0, 0.0, 1.0, '', '', 0, 0, 0, None, None)
(9, 2, '00082009', 1, 'Biotonne Pi', 1, 243, 19, 0, 0, 12, 255, 0, 'Hello Again', '2018-08-28
11:40:52', 9, 0.0, 1.0, 0.0, 1.0, '', '', 0, 0, 0, None, None)
Select all Temperatures
(2, 40.8, 0.0, 0, 0.0, 0.0, '2018-08-28 17:05:00')
(2, 41.9, 0.0, 0, 0.0, 0.0, '2018-08-28 17:10:00')
(2, 41.3, 0.0, 0, 0.0, 0.0, '2018-08-28 17:15:00')
(2, 40.8, 0.0, 0, 0.0, 0.0, '2018-08-28 17:20:00')
Select Temperature by Threshold 41.0
(2, 41.9, 0.0, 0, 0.0, 0.0, '2018-08-28 17:10:00')
(2, 41.3, 0.0, 0, 0.0, 0.0, '2018-08-28 17:15:00')
```

Delete

Purpose

To delete data from the Domoticz database devices tables using where clause on field Date.

Sample SQL create statement for table [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')));
```

The date is stored in field [Date] with format DATETIME DEFAULT i.e. datetime('now','localtime').

Sample Entries for table [Temperature] for device with idx=28

| DeviceRowID | Temperature | Chill | Humidity | Barometer | DewPoint | SetPoint | Date |
|-------------|-------------|-------|----------|-----------|----------|----------|---------------------|
| 28 | 17.5 | 17.5 | 0 | 0 | 0.0 | 0.0 | 2018-08-27 14:30:00 |
| 28 | 18.9 | 18.9 | 0 | 0 | 0.0 | 0.0 | 2018-08-27 14:45:00 |
| 28 | 19.0 | 19.0 | 0 | 0 | 0.0 | 0.0 | 2018-08-27 14:50:00 |
| ... | | | | | | | |

SELECT statement with WHERE clause

```
SELECT * FROM [Temperature] WHERE [DeviceRowID] = 28 AND [Date] < date('2018-08-28');
```

This works and returns all entries with a date < 2018-08-28.

DELETE statement with WHERE clause

Delete all entries from table [Temperature] with Date < 2018-08-28

```
DELETE FROM [Temperature] WHERE [DeviceRowID] = 28 AND [Date] < date('2018-08-28');
```

Checked result:

```
SELECT * FROM [Temperature] WHERE [DeviceRowID] = 28;
```

The result is OK, i.e. all entries with a date < 2018-08-28 have been deleted.

Delete all data related to device with idx=44 (Stromverbrauch)

Delete all data from Table Meter for the device with idx=44 (Stromverbrauch) with Select statement to check.

```
DELETE FROM Meter WHERE DeviceRowID=44
SELECT * FROM Meter WHERE DeviceRowID=44
DELETE FROM MultiMeter_Calendar WHERE DeviceRowID=44
SELECT * FROM MultiMeter_Calendar WHERE DeviceRowID=44
```

Python

Task: Delete temperature data.

Table: [Temperature]

<TODO> Add function, i.e. delete_temperature_by_date(conn, date).

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

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_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()
```

Command

```
python3 sql-delete-test.py
```

Output

```
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
```

SQLite3 Package

The sqlite 3 package enables to perform SQL operations from the command shell.

Install SQLite3

Login as user Pi and install the package by invoking:

```
sudo apt install sqlite3
```

Output

```
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) ...
```

SQL Statements Examples

For the examples, the Domoticz database domoticz.db is used:

```
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;

Schema Table

Use “.schema” tablename with semicolon. The tablename is case sensitive.

.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);
```

.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);
```

Selecting Entries

Select all entries from table LightingLog for the device with idx=161.

```
select * from lightinglog where devicerowid=161;
```

```
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 data for the device Aussen with idx=120.

```
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 data for the device Aussen with idx=120 and show the device Name and limit the number of entries to 5.

```
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
```

Select temperature data for the device Aussen with idx=120 for a specific day.*Note*

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.

```
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  
..
```

Deleting Entries

Delete all entries from table LightingLog for the device with idx=161.

```
delete from lightinglog where devicerowid=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>  
sqlite> delete from lightinglog where devicerowid=161;  
sqlite> select * from lightinglog where devicerowid=161;  
sqlite>
```

Updating Device

Be careful on using this – it 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 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|
```

Node-RED

Purpose

To explore Node-RED functionality for this Home Automation Solution:

- 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](#) enables Flow-based programming for the Internet of Things.

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](#) .

Installation

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://rpi-domoticz-ip:1880>).

Use disable, to disable autostart:

```
sudo systemctl disable nodered.service
```

Update

<TODO> Check if it is possible to update via Desktop Check Updates.

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_DomoticzDev.json

or

flows_DoPro.json

After updating, reboot the Raspberry Pi.

```
cd /home/pi/.node-red
update-nodejs-and-nodered

or if not working

bash <(curl -sL https://raw.githubusercontent.com/node-red/raspbian-deb-
package/master/resources/update-nodejs-and-nodered)
```

Note

on using command *update-nodejs-and-nodered*:

If this message occurs, then use the bash command:

This Node-RED install doesn't support using apt. Please see the online docs at <https://nodered.org/docs/hardware/raspberrypi> for the best way to update and upgrade.

Update Log Example

```
This script will remove versions of Node.js prior to version 6.x, and Node-RED and
if necessary replace them with Node.js 8.x LTS (carbon) 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
Running Node-RED update for user pi at /home/pi
This can take 20-30 minutes on the slower Pi versions - please wait.
```

| | |
|--|----------------------------------|
| Stop Node-RED | ✓ |
| Remove old version of Node-RED | ✓ |
| Remove old version of Node.js | - |
| Update Node.js LTS | ✓ Node v8.11.4 Npm 6.4.1 |
| Clean npm cache | ✓ |
| Install Node-RED core | ✓ 0.19.3 |
| Move global nodes to local | - |
| Install extra Pi nodes | - |
| Npm rebuild existing nodes | ✓ |
| Add menu shortcut | ✓ |
| Update systemd script id=Node-RED.desktop | ✓ |

```
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 Thu 6 Sep 15:10:56 CEST 2018 - Finished Thu 6 Sep 15:13:05 CEST 2018

Access Flows & Dashboard UI

To access Node-RED, point a browser at
`http://localhost:1880` (when using a Raspberry Pi with a connected monitor)
or
`http://rpi-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:

```
http://rpi-domoticz-ip:1880/ui
```

Start, Stop, Log

| Task | Terminal Command |
|---------------------------------|-----------------------------|
| Node-RED Start | <code>node-red-start</code> |
| Node-RED Stop | <code>node-red-stop</code> |
| Node-RED view recent log output | <code>node-red-log</code> |

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
```

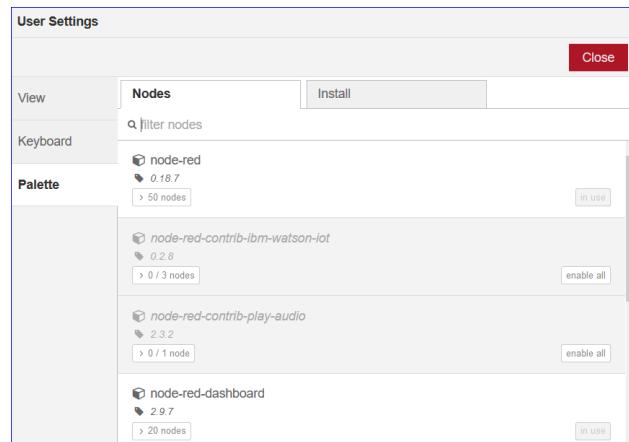
Install/Updates

To install or update any node package, NR recommends via *Node-RED Menu Settings > Manage Palette > Install*.

Note

If direct install 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>With a payload example (Hue Light with idx=118)</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> | |

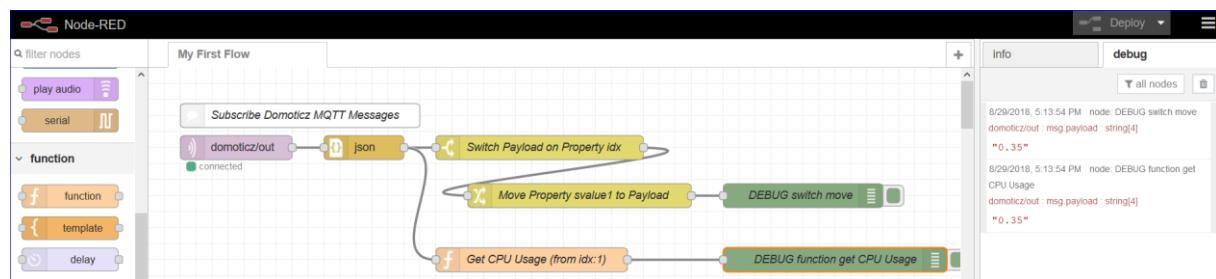
Flow Raspberry Pi CPU Usage

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}
```

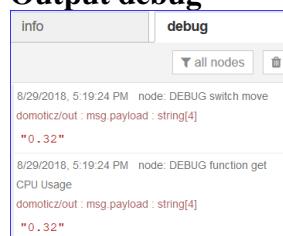
Node-RED Flow



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": [[{"id": "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": [[{"id": "5f7a4a09.abb57c", "x2": 360, "y2": 100}, {"id": "13e0d06f.2b15d", "x2": 360, "y2": 140}], {"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": [[{"id": "912289d2.e8c1", "x2": 580, "y2": 100}], {"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;\ncpu_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    //\n    node.warn(\"Idx=1, CPU Usage=\\" + cpu_usage);\n    // Assign the cpu usage to the message payload\n    msg.payload = cpu_usage;\n}\n// Return the message\nreturn msg;\n", "x": 580, "y": 140, "wires": [[{"id": "c030082a.286338", "x2": 670, "y2": 140}], {"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": 580, "y": 200, "wires": [[{"id": "35214a2f.f89656", "x2": 670, "y2": 200}], {"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": 860, "y": 300, "wires": []}, {"id": "d58d713d.0e0eb8", "type": "mqtt-broker", "z": "", "name": "Domoticz MQTT Broker", "broker": "localhost", "port": "1883", "clientid": "", "usestls": false, "compatmode": true, "keepalive": "60", "cleansession": true, "birthTopic": "", "birthQos": "0", "birthPayload": "", "closeTopic": "", "closeQos": "0", "closePayload": "", "willTopic": "", "willQos": "0", "willPayload": ""}], {"id": "info", "type": "info", "z": "76cb1798.6a823", "name": "Info", "x": 780, "y": 100, "wires": []}, {"id": "debug", "type": "debug", "z": "76cb1798.6a823", "name": "debug", "x": 780, "y": 140, "wires": []}]]
```

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.

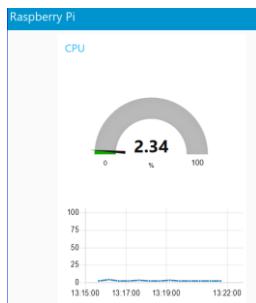
Dashboard UI

The Node-RED [Dashboard](#) module offers UI nodes to build a Dashboard.

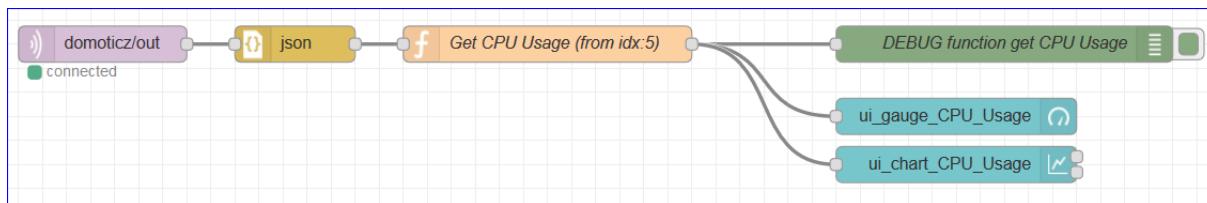
Flow Monitor CPU Usage

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": [[[ "db5fff92.295628"]]]}, {"id": "db5fff92.295628", "type": "json", "z": "76cb1798.6a823", "name": "", "property": "payload", "action": "", "pretty": false, "x": 270, "y": 240, "wires": [[[ "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": [[[ "c030082a.286338", "61fef7cc.4fc02", "d5bc4ce8.ae1f28"]]]}, {"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": "61fef7cc.4fc02", "type": "ui_gauge", "z": "76cb1798.6a823", "name": "ui_gauge_CPU_Usage", "group": "c3b6865e.2b93e", "order": 0, "width": 0, "height": 0, "gtype": "gage", "title": "", "label": "%", "form": "at": "{{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", "#ff9966", "#9467bd", "#c5b0d5"], "useOldStyle": false, "x": 820, "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": ""}, {"id": "c3b6865e.2b93e", "type": "ui_group", "z": "", "name": "CPU", "tab": "8a1743ab.9d931", "disp": true, "width": 6, "collapse": false}, {"id": "8a1743ab.9d931", "type": "ui_tab", "z": "", "name": "Raspberry Pi", "icon": "dashboard"}]
```

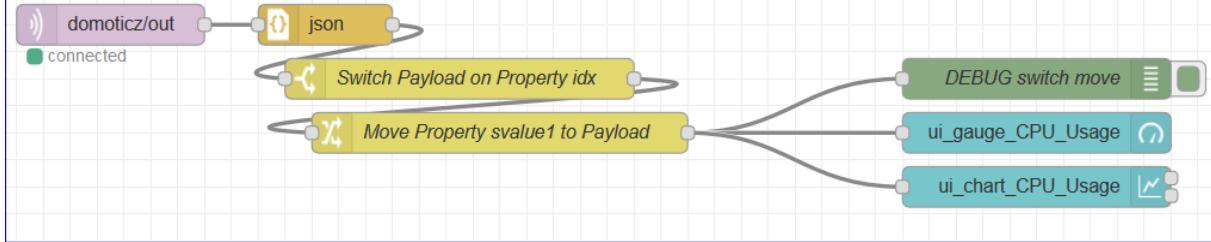
Note

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



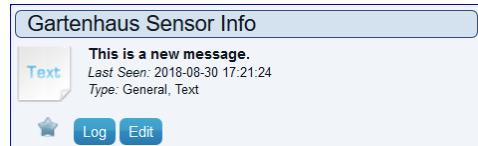
Node-RED Flow Source

```
[{"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", "property": "payload", "action": "", "pretty": false, "x": 270, "y": 180, "wires": [[[ "5f7a4a09.abb57c"]]}], {"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"}]}, {"id": "35214a2f.f89656", "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": 270, "y": 220, "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", "#ff9896", "#9467bd", "#c5b0d5"], "useOldStyle": false, "x": 270, "y": 260, "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": ""}, {"id": "c3b6865e.2b93e", "type": "ui_group", "z": "76cb1798.6a823", "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.

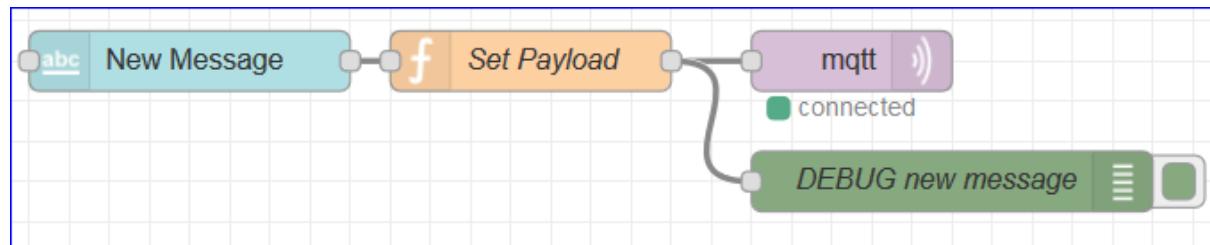
Widget showing the updated text



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": "d4be5444.33e23", "type": "mqtt"}]}, {"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\ntext = 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;\n", "outputs": 1, "noerr": 0, "x": 290, "y": 820, "wires": [[{"id": "d4be5444.33e23", "x2": 450, "y2": 200}], [{"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", "display": 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.

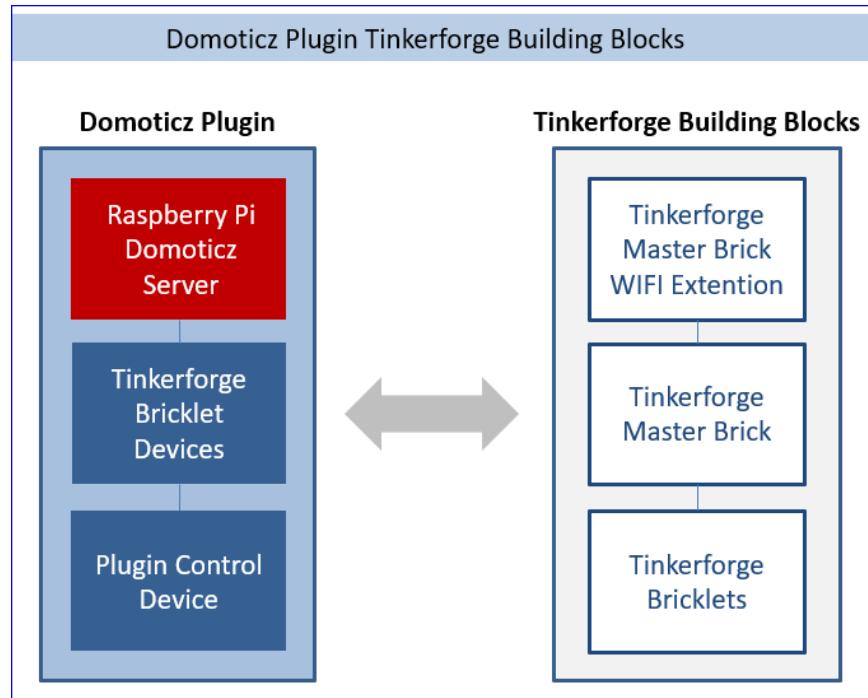
Mandatory to consult this [manual](#) as reference.

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'.
```

TabError

Ensure to set the tab indents right, else error message in the Domoticz log during start: "TabError".

Example Domoticz Log Error Message

```
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

Log entry

```
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/pl
at-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

Log Entry

```
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="")
```

Plugin Traffic Light (Tinkerforge Building Blocks)

Sample building a Domoticz Plugin using Tinkerforge Building Blocks.

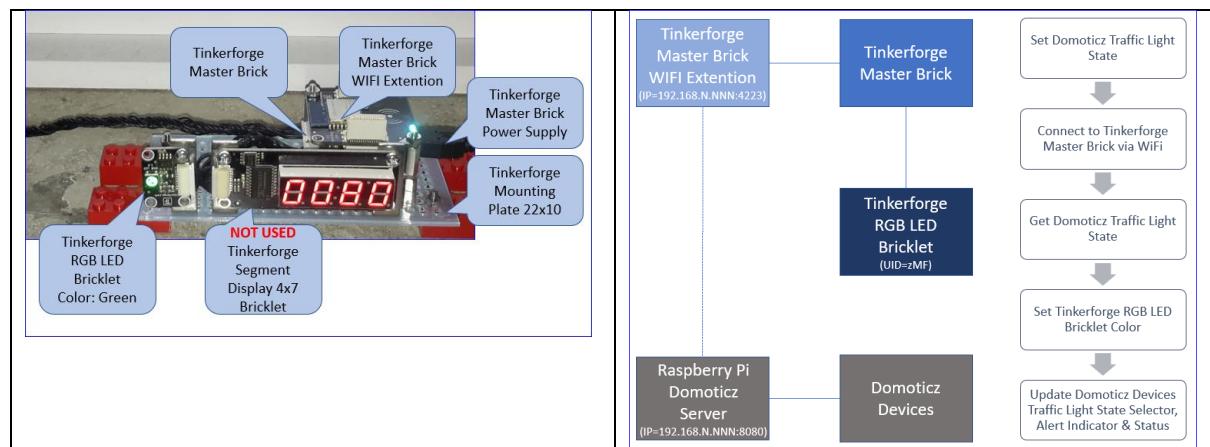
Objectives

- 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 Home Automation 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-address
```

Domoticz Plugin Folder & File

The plugin plugin.py is installed in a subfolder of the Domoticz Plugin folder on the Domoticz Server.

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 Server, 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 server
- Putty session connected to the Domoticz server

The web 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':'rpi-domoticz-ip'
2019-05-27 09:43:32.550 (Traffic Light) 'Author':'rwBL'
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" : "",
  "dtype" : "Light/Switch",
  "id" : "00050001",
  "idx" : 13,
  "name" : "Traffic Light - State Selector",
  "nvalue" : 2,
  "stype" : "Selector Switch",
  "svalue1" : "30",
  "switchType" : "Selector",
  "unit" : 1
}
```

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

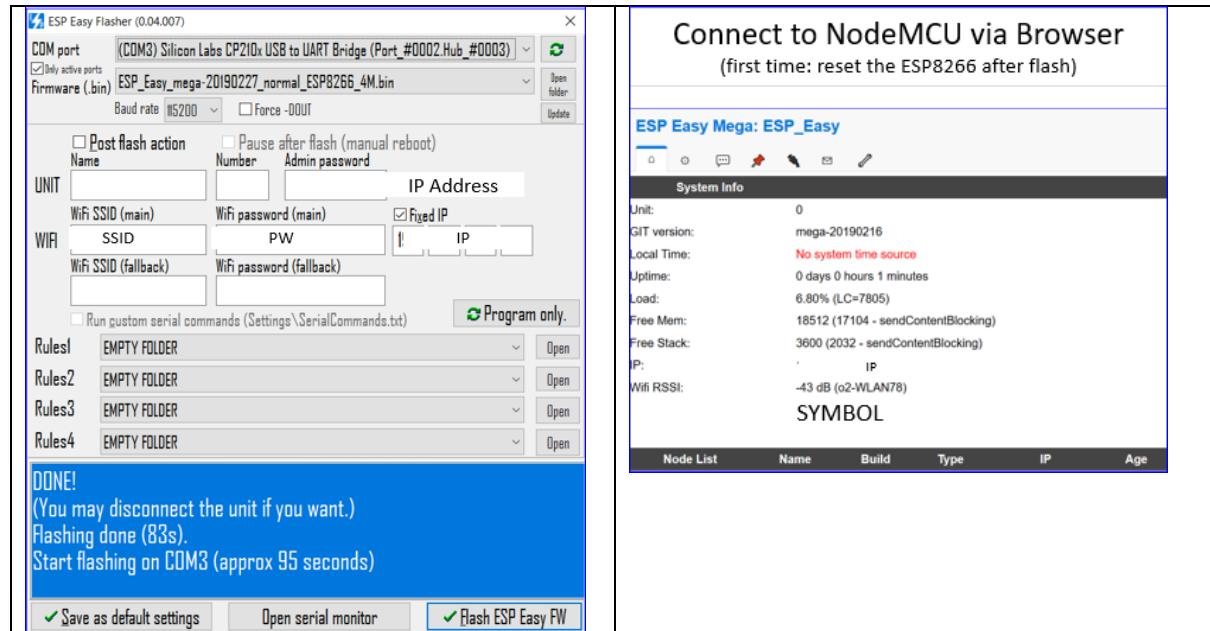
Downloaded ESPEasy_mega-20190227.zip from GitHub and extracted to a temp folder, i.e. domoticz-home-automation-workbook\functions\ESPEasy\r200\.

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
- Unzip to a temp folder, i.e. domoticz-home-automation-workbook\functions\ESPEasy\r200\.
- Open Browser
- Enter 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 Server IP address. For other settings, the defaults are used.

| | |
|---|-------------------------------------|
| ESP Easy Mega: ESP_Easy <input type="radio"/> Main <input type="radio"/> Config <input checked="" type="radio"/> Controllers <input type="radio"/> Hardware | |
| Controller Settings | |
| Protocol: | Domoticz HTTP |
| Locate Controller: | Use IP address |
| Controller IP: | IP Address |
| Controller Port: | 8080 |
| Minimum Send Interval: | 100 [ms] |
| Max Queue Depth: | 10 |
| Max Retries: | 10 |
| Full Queue Action: | Ignore New |
| Check Reply: | Ignore Acknowledgement |
| Client Timeout: | 1000 [ms] |
| Controller User: | |
| Controller Password: | |
| Enabled: | <input checked="" type="checkbox"/> |
| Protocol: | Domoticz MQTT |
| Locate Controller: | Use IP address |
| Controller IP: | IP Address |
| Controller Port: | 1883 |
| Minimum Send Interval: | 100 [ms] |
| Max Queue Depth: | 10 |
| Max Retries: | 10 |
| Full Queue Action: | Ignore New |
| Check Reply: | Ignore Acknowledgement |
| Client Timeout: | 1000 [ms] |
| Controller User: | |
| Controller Password: | |
| Controller Subscribe: | domoticz/out |
| Controller Publish: | 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 | | 2 (46) | GPIO-4 GPIO-5 | Lux: | 183.33 |
| Values | | | | | | |
| # | 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-address/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-address/control?cmd=gpio,14,0>

Result JSON Response

```
{"log": "GPIO 14 Set to 0", "plugin": 1, "pin": 14, "mode": "output", "state": 1}
```

Experiment: Domoticz Switch ESP GPIO LED

Purpose

To switch, via Domoticz Switch, an LED connected pin D5 (GPIO14) of the NodeMCU.

Parts

1x NodeMCU

1x LED

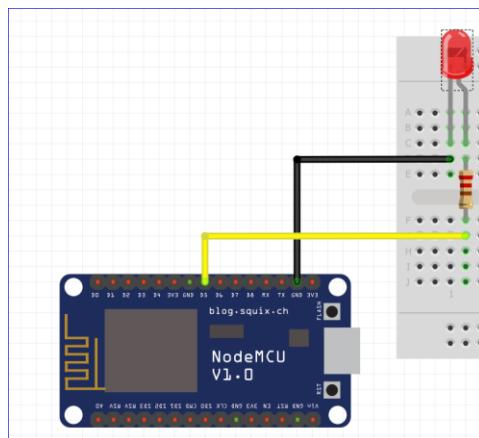
1x Breadboard

2x Wires male-male

Wiring

| LED | NodeMCU [wirecolor] |
|---|----------------------|
| Anode = PLUS connected to 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 commands.

Domoticz

Create a switch device (Hardware Virtual Sensor) with properties:

| Switch Type | HTTP Commands to switch On (1) / Off (0) |
|-------------|---|
| On Action | http://espeasy-ip-address/control?cmd= gpio,14,1 |
| Off Action | http://espeasy-ip-address/control?cmd= gpio,14,0 |

After saving, click the switch On and check if the LED connected to GPIO14 of the ESP device is turned on.

Experiment: Measure Ambient Light Sensor BH1750

Purpose

To measure the ambient light from sensor BH1750FVI connected to the NodeMCU and send the Lux value to Domoticz device.

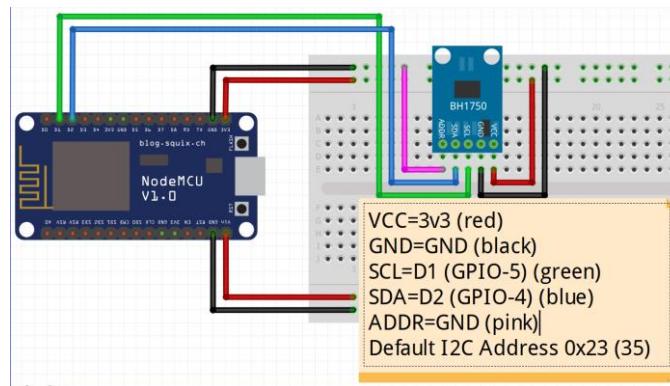
Parts

- 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 | <p>The screenshot shows the 'Devices' tab in the ESP Easy software. The device is configured as a 'Light/Lux - BH1750'. It has the name 'ESPEasy_BH1750', is enabled, and its I2C address is set to 0x23 (35) (default). The measurement mode is 'RESOLUTION_LOW'. The 'Send sensor to sleep' option is unchecked. In the 'Data Acquisition' section, 'Send to Controller' is set to controller 1 (idx 0) and controller 2 (idx 46). The interval for sending data is set to 10 seconds. Under 'Values', there is a table with one row showing idx 1 and name Lux.</p> |

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

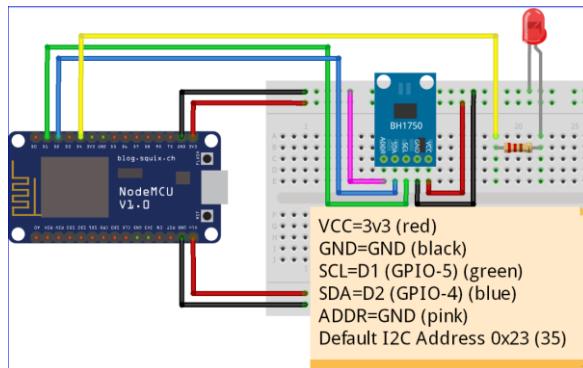
Purpose

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 |
|----------------------|---------|--------|------------------------|-----------------------|-----------|------|-----------------------------------|
| Edit | 6 | ✓ | Generic - Dummy Device | AmbientLight_Settings | | | Threshold: 100 State: 0 ... |

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
```

Experiment: Control Hue Brightness Potentiometer

Purpose

To control the brightness of the Hue light “MakeLab” with idx=118 via potentiometer connected to an ESP8266 NodeMCU.

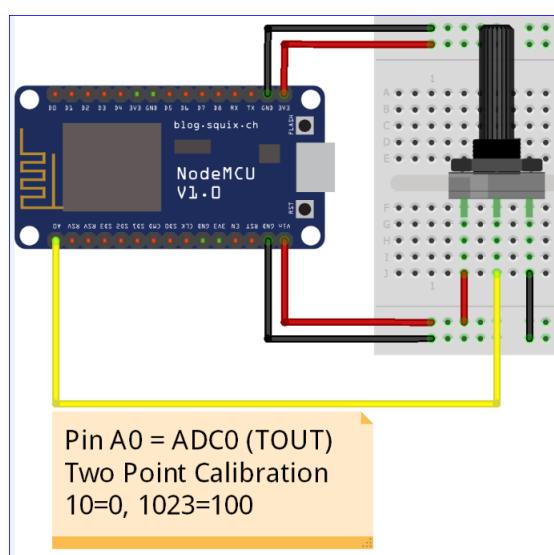
Parts

- 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 'Task Settings' tab for an 'Analog input - internal' device. The device is named 'HUE_Dimmer'. It is enabled and has two-point calibration points at 10 (0.000) and 1023 (100.000). The current value is 9, minimum is 0, maximum is 1023, and step size is 1. The 'Send to Controller' section shows two entries: one for ID# 154 and another for ID# 118, both with interval set to 2 seconds. The 'Values' section lists one analog value named 'Analog'.

ESP Easy Device Configuration – Dummy Devices

The screenshot shows the 'Task Settings' tab for a 'Generic - Dummy Device' named 'Varstore'. It is enabled and simulates a single-type sensor. The 'Send to Controller' section shows two entries: one for ID# 0 and another for ID# 0, both with interval set to 60 seconds. The 'Values' section lists two values: 'HUE_Dimmer' and 'HUE_Dimmer_Delta'.

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 server to set brightness level  
    if [Varstore#HUE_Dimmer_Delta]>2  
        SendToHTTP rpi-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 script

```
--[[[  
    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  
}
```

ESP8266

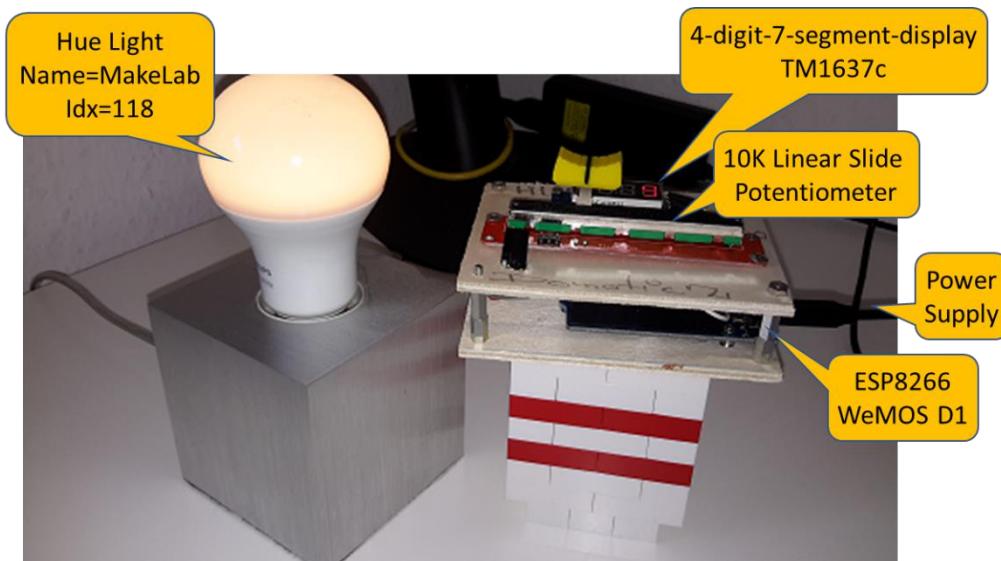
Purpose

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 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]

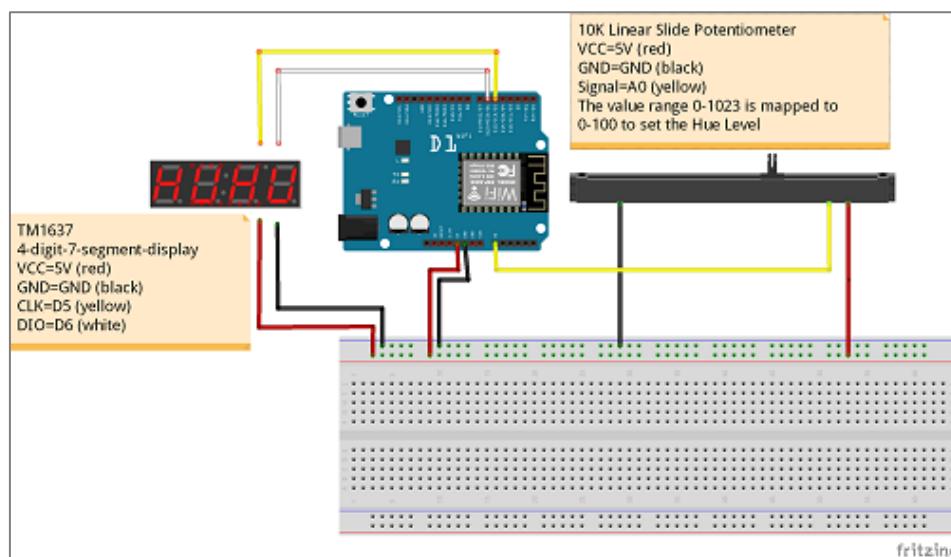
Wiring

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 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)
```

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 collaborate 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 3.45.7.20190622 is used (check out for newer versions).

Several Addons are installed:

| Additional software for RaspMatic | | |
|--------------------------------------|--|--|
| System-Update | Installed version: 1.13.12 Available version: 1.13.12 Download Uninstall Set | rmupdate addon https://github.com/j-a-n/raspberrymatic-addon-rmupdate |
| Mosquitto | Installed version: 1.5.8+2 Available version: 1.5.8+2 Download Restart Uninstall |  mosquitto |
| XML-API | Installed version: 1.20 Available version: 1.20 Download Uninstall Set | XML-API CCU Addon https://github.com/hobbyquaker/XML-API |
| CUX-Daemon | Installed version: 2.3.2 Available version: 2.3.2 Download Restart Uninstall Set |  CUX-Daemon 2.3.2 |
| Install / update additional software | Select additional software: <input type="text"/> Browse... Install | Please note: Additional software installed by the user can lead to unexpected results, data loss or even system instability. eQ-3 AG does not assume any liability for additional software installed by the user. To finish installation, the CCU will be restarted automatically. |

Note

<TODO>The Mosquitto addon installed but not explored (yet).

Addon XML-API

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.

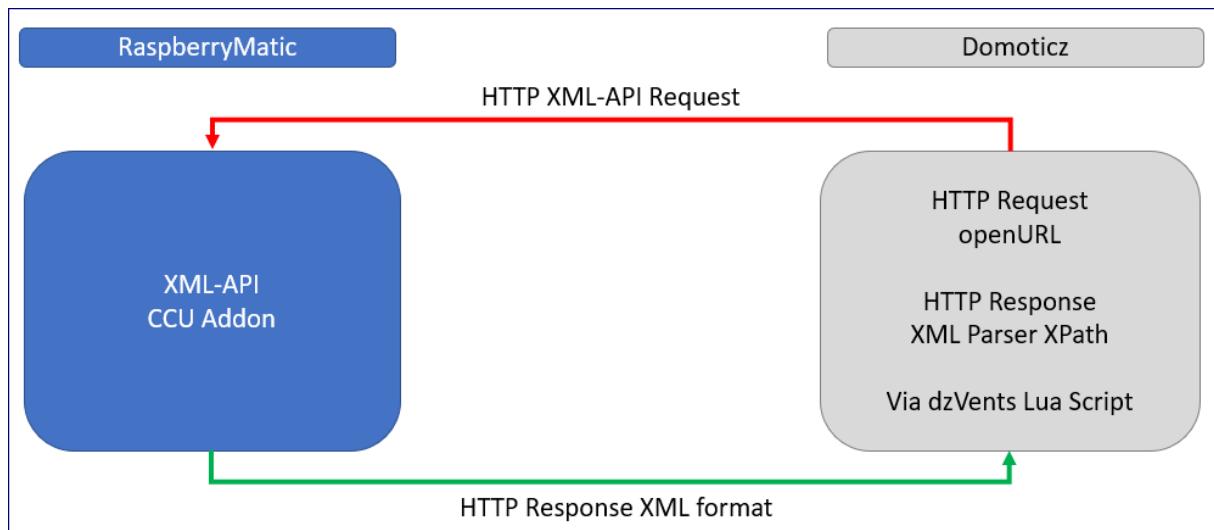
The option *set*, lists the available scripts with their parameter.

Understanding the XML-API concept is essential to communicate between Domoticz and the CCU v.v. = keep the [reference](#) at hand.



XML-API Communication Flow

Domoticz triggers an HTTP XML-API request to the CCU and parses the HTTP response in XML format using XPath.



XML-API Request Example

Task

Domoticz requests setpoint & temperature homematicIP radiator thermostat (HMIP-eTRV-2):

1. dzVents Lua script sends every minute, HTTP request (with callback) for device information (using device id) to the CCU
(i.e. http://ccu-ip-address/config/xmlapi/state.cgi?device_id=1541)
2. CCU sends HTTP response XML format to Domoticz server
3. dzVents Lua script handles callback, parses XML string using XPath
4. dzVents Lua script updates the Domoticz text device

dzVents Lua Script

```
local IDX_THERMOSTAT_MAKELAB_INFO = 175;
local ID_DEVICE = 1541;
local URL_CCU = 'http://ccu-ip-address/config/xmlapi/state.cgi?device_id=' .. ID_DEVICE;
local RES_CCU = 'thermostatmakelabinfo';
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 setpoint = domoticz_applyXPath(item.data,'//datapoint[@ise_id="1584"]/@value') -- C
        local temperature = domoticz_applyXPath(item.data,'//datapoint[@ise_id="1567"]/@value') -- Wh
        domoticz.log('Setpoint: ' .. setpoint .. ', Temperature: ' .. temperature)
        local msg = 'Setpoint: ' .. tostring(setpoint) .. ', Temperature: ' .. tostring(temperature)
        domoticz.devices(IDX_THERMOSTAT_MAKELAB_INFO).updateText(msg);
      else
        domoticz.log('[ERROR] Problem handling the request:' .. item.statusText, domoticz.LOG_ERROR)
      end
    end
  end
}
```

Addon CUxD

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 Geräte 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.

| Name | Picture | Channel | Room | Function | Last modified | |
|----------------------------|---------|-----------------------|--------|---------------------|---------------------|--|
| Filter | | Filter | Filter | Filter | | |
| HM-RC-19 CUX2801001 | | HM-RC-19 CUX2801001:1 | | Push button channel | 07.07.2019 08:58:05 | |
| HM-RCV-50 BidCoS-RF | | | | | | |
| HmIP-eTRV-2 000A18A9A64DAC | | | | | | |
| HMIP-PSM 0001D3C99C6AB3 | | | | | | |
| HmIP-RCV-50 61A7D7098E047C | | HM-RC-19 CUX2801001:2 | | | | |

Check the device channels and datapoints with a XML-API HTTP Request:

```
http://ccu-ip-address/config/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="true" visible="true" 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="15624282685" 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="0" 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="0" type="PRESS_SHORT"/>
  <datapoint ise_id="1653" name="CUxD.CUX2801001:2.PRESS_LONG" operations="6" timestamp="0" valueunit="" valuetype="2" value="0" type="PRESS_LONG"/>
  <datapoint ise_id="1639" name="CUxD.CUX2801001:2.CMD_KILL" operations="2" timestamp="0" valueunit="" valuetype="20" value="0" type="CMD_KILL"/>
```

CUXD Example Domoticz Text Device

Task

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 Watcher](#) 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 |
| Condition: If... | | | | |
| Device selection HM-RC-19 CUX2801001:1 when Button press short AND OR | | | | |
| Activity: Then... <input checked="" type="checkbox"/> Stop all current delays before performing the activity (e.g. retriggering). Script string sDate = system.Date("%d.%m.%Y"); ! sDate = "09.08.201..." immediately | | | | |
| Activity: Else... <input type="checkbox"/> Stop all current delays before performing the activity (e.g. retriggering). | | | | |

RaspMatic Script

Submit Domoticz HTTP REST request via system command wget, to update the Domoticz Text Device.

```
wget -q -O - URL
```

The URL is the HTTP request (as defined in the Domoticz HTTP API/JSON documentation).

```
http://domoticz-ip-
address: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-address: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 on my GitHub [repositories](#) starting with domoticz-plugin-hmip-<short description>, i.e. domoticz-plugin-hmip-psm, domoticz-plugin-hmip-etrv-2.

More are planned...

CCU Device(s) Information

All Devices List

HTTP request to obtain the list of all devices.

```
http://ccu-ip/config/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.



All Devices State Information

To get detailed information about the state of all the devices, submit

```
http://ccu-ip-address/config/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/config/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 web browser, but also in the HomeMatic Web-UI.

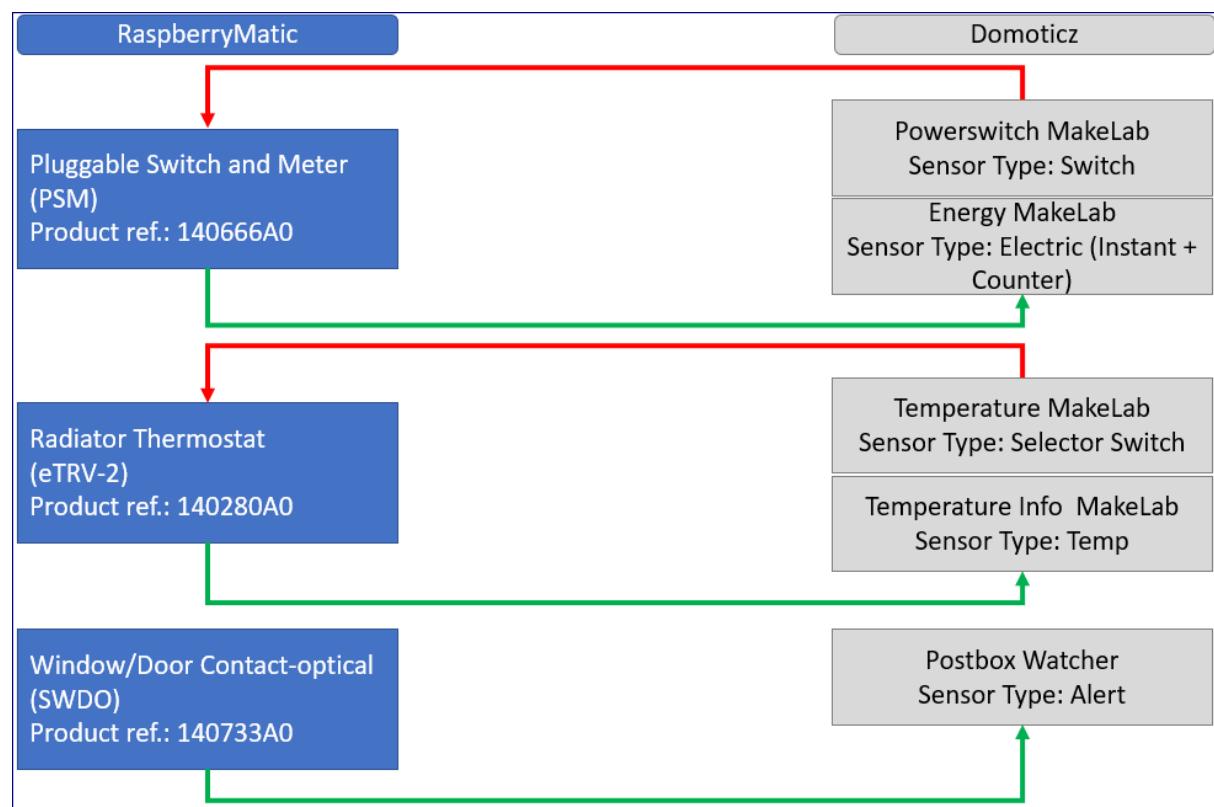
CCU Devices homematicIP

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"> • Room MakeLab • Switch main devices • Measure energy consumption (Wh) & power (W) | Max. switching capacity 3680 W |
| Radiator Thermostat (eTRV-2) Product ref.: 140280A0 Device ID: 1541 | <ul style="list-style-type: none"> • Room MakeLab • Control room temperature • Measure room temperature | |
| Window / Door Contact – optical (SWDO) Product ref.: 140733A0 Device ID: 2530 | <ul style="list-style-type: none"> • Postbox Watcher • Notify if the hatch of the postbox has been opened | |

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;"> OFF On </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 230.60 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 |

dzVents Lua Scripts

Source code: powerswitch_makelab.lua

```

local IDX_POWERSWITCH_MAKELAB = 177;
local ID_DATAPOINT_STATE = 1451
local URL_CCU = 'http://ccu-ip-address/config/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
}
}
```

Source code: electric_usage_makelab.lua

```
local IDX_ELECTRICUSAGEMAKELAB = 174;
local ID_DEVICE = 1418;
local URL_CCU = 'http://ccu-ip-address/config/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

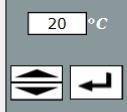
To measure and control the MakeLab room temperature.

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; align-items: center;"> <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;">Boost function</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;">Holiday mode</div> </div> <div style="display: flex; justify-content: space-between; align-items: center;"> 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: flex; align-items: center; justify-content: center;">20 °C</div> <div style="margin: 10px 0;">  </div> <div style="display: grid; grid-template-columns: 1fr 1fr; gap: 10px;"> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">Off</div> <div style="border: 1px solid #ccc; padding: 5px; text-align: center;">On</div> </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](#)

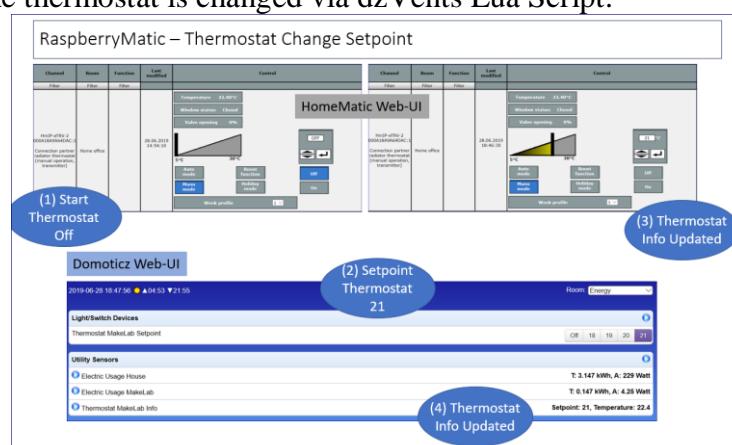
Thermostat MakeLab Info

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.



The diagram illustrates the workflow for changing the thermostat setpoint:

- (1) Start Thermostat Off**: Shows the HomeMatic Web-UI interface where the thermostat is currently off.
- (2) Setpoint Thermostat 21**: Shows the Domoticz Web-UI interface where the setpoint is being changed to 21.
- (3) Thermostat Info Updated**: Shows the HomeMatic Web-UI interface again, now displaying the updated setpoint of 21.
- (4) Thermostat Info Updated**: Shows the Domoticz Web-UI interface again, now displaying the updated setpoint of 21.

dzVents Lua Script

Source code: thermostat_makelab_setpoint.lua

```

local IDX_THERMOSTAT_MAKELAB_SETPOINT = 176;
local ID_DATAPOINT_SETPOINT = 1584;
local URL_RASPMATIC = 'http://ccu-ip-address/config/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

    -- 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
}
}

```

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)
      CGrou... /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

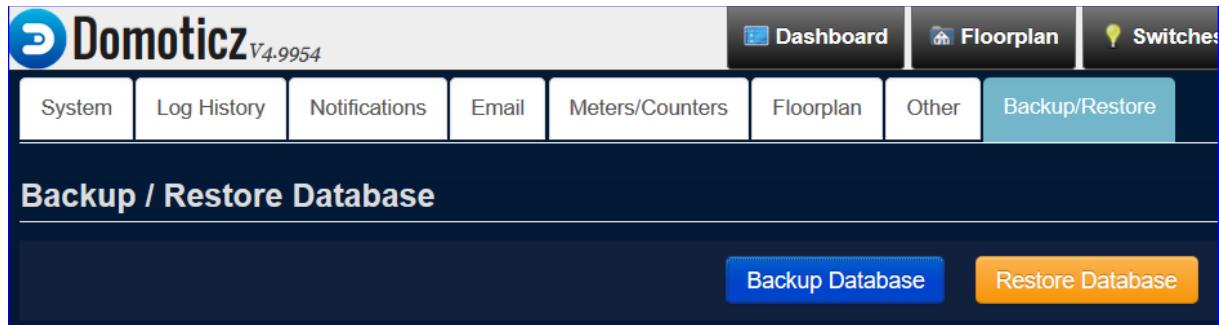
```
sudo ./domoticz -nowwwpwd
```

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 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: Initialzing event module.
2018-09-12 16:18:13.481 Status: EventSystem: Started
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

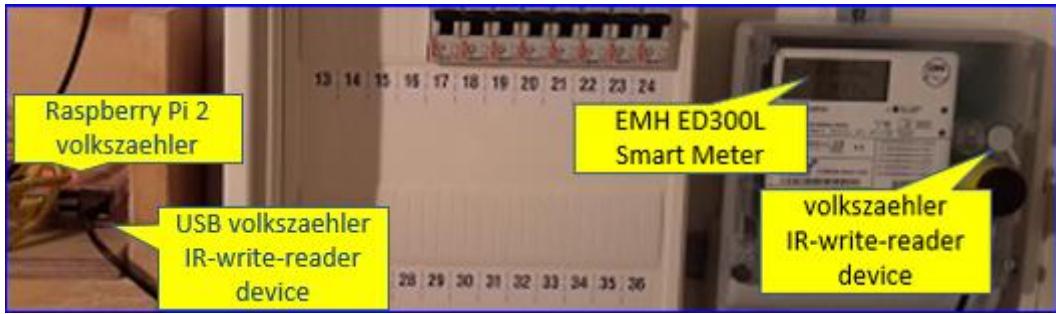
Beta: cd domoticz, ./updatebeta

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 is an Open Source (GPL license) Smart Metering Hard- and Software solution.

Important 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 rpi-domoticz-ip
        netmask 255.255.255.0
        broadcast NNN.NNN.0.255
        gateway rpi-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 volkszahler Raspberry Pi and the Home Automation Raspberry Pi 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.

| volkszahler Raspberry Pi [Raspbian GNU/Linux 8 (jessie)] Linux 39 4.1.19-v7+ #858 | Home Automation Raspberry Pi [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 static routers=169.254.0.1 | interface eth0 static ip_address=169.254.87.84 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***
- Important when changing the Raspberry Pi or adding USB devices, 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  
00000020 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 Webbrowser the volkszaehler Frontend using its ip address: <http://rpi-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
```

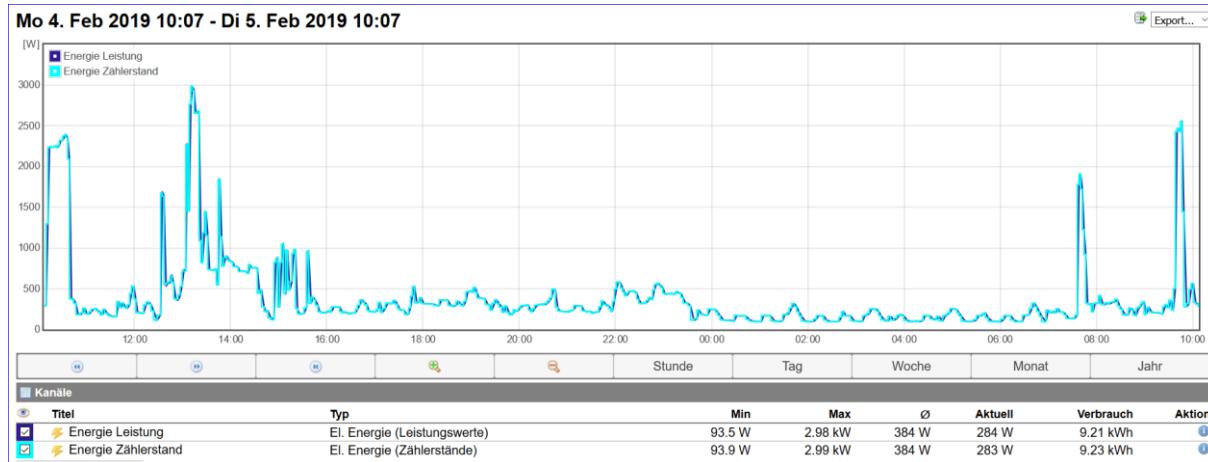
Two channels are defined "**Energie Leistung**" and "**Energie Zaehlerstand**":

```
/***
 * 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 server 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://rpi-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: 10px;"> <p>Details für Energie Leistung</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 style="text-align: center;">Daten Löschen Bearbeiten Schließen</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: 10px;"> <p>Details für Energie Zählerstand</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 style="text-align: center;">Daten Löschen Bearbeiten Schließen</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 | ✓ |
|---|--------------------------------------|------|-------|--------------------------------------|------------|----------------|-------|--------------------------------|--------|-------|----------|------------------|------------|------|-----------|---------|--------|--------|------------------|---|--|-------------|-------|-------|--|-------------|------|------------|--------------------------------------|------------|----------------|------|------------------------------|----------|---|-------|---------------------|-----------|----------|------------------|---|-------|------|------|--------|----------|---|-------|------|-------|---|
| 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 | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Bearbeiten von Energie Leistung</p> <table border="1"> <tr><th>Eigenschaft</th><th>Wert</th></tr> <tr><td>Titel</td><td>Energie Leistung</td></tr> <tr><td>Öffentlich</td><td>✓</td></tr> <tr><td>Farbe</td><td>darkblue</td></tr> <tr><td>Stil</td><td>lines</td></tr> <tr><td>Füllgrad</td><td>0</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 style="text-align: center;">Speichern Abbrechen</p> | Eigenschaft | Wert | Titel | Energie Leistung | Öffentlich | ✓ | Farbe | darkblue | Stil | lines | Füllgrad | 0 | Achse | auto | Auflösung | | Kosten | | Initialverbrauch | | <p>Bearbeiten von Energie Zählerstand</p> <table border="1"> <tr><th>Eigenschaft</th><th>Wert</th></tr> <tr><td>Titel</td><td>Energie Zählerstand</td></tr> <tr><td>Auflösung</td><td>1000</td></tr> <tr><td>Öffentlich</td><td>✓</td></tr> <tr><td>Farbe</td><td>darkcyan</td></tr> <tr><td>Stil</td><td>steps</td></tr> <tr><td>Füllgrad</td><td>0</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 style="text-align: center;">Speichern Abbrechen</p> | Eigenschaft | Wert | Titel | Energie Zählerstand | Auflösung | 1000 | Öffentlich | ✓ | Farbe | darkcyan | Stil | steps | Füllgrad | 0 | Achse | auto | Kosten | | Initialverbrauch | | | | | | | | | | | |
| Eigenschaft | Wert | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Titel | Energie Leistung | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Öffentlich | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Farbe | darkblue | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Stil | lines | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Füllgrad | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Achse | auto | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Auflösung | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Kosten | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Initialverbrauch | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Eigenschaft | Wert | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Titel | Energie Zählerstand | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Auflösung | 1000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Öffentlich | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Farbe | darkcyan | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Stil | steps | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Füllgrad | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Achse | auto | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Kosten | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Initialverbrauch | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

API Channel Properties

Energie Leistung (Channel 1)

```
http://rpi-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://rpi-vz-ip/middleware.php/channel/5b8ea2a0-b342-11e8-bec6-15c040e6d041.json
```

```
{"version":"0.3","entity":{"uuid":"5b8ea2a0-b342-11e8-bec6-15c040e6d041","type":"electricmeter","color":"aqua","fillstyle":0,"public":true,"resolution":1000,"style":"steps","title":"Energie Z\u00e4ehlerstand","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 service vzlogger start |
| vzlogger Stop | systemctl stop vzlogger OR service vzlogger stop |
| 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://rpi-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://rpi-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://rpi-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://rpi-vz-ip/middleware.php/data/23844c00-8895-11e5-a642-6d8ce36c9a44.json
```

Get One Record

```
http://rpi-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://rpi-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://rpi-vz-ip/middleware.php/data/23844c00-8895-11e5-a642-  
6d8ce36c9a44.json?ts=1284677961150&value=12
```

Using the volkzaehler Frontend to display data

<http://rpi-vz-ip/frontend/?uuid=23844c00-8895-11e5-a642-6d8ce36c9a44>

Appendix Tools

In progress developing some tools for managing Domoticz.

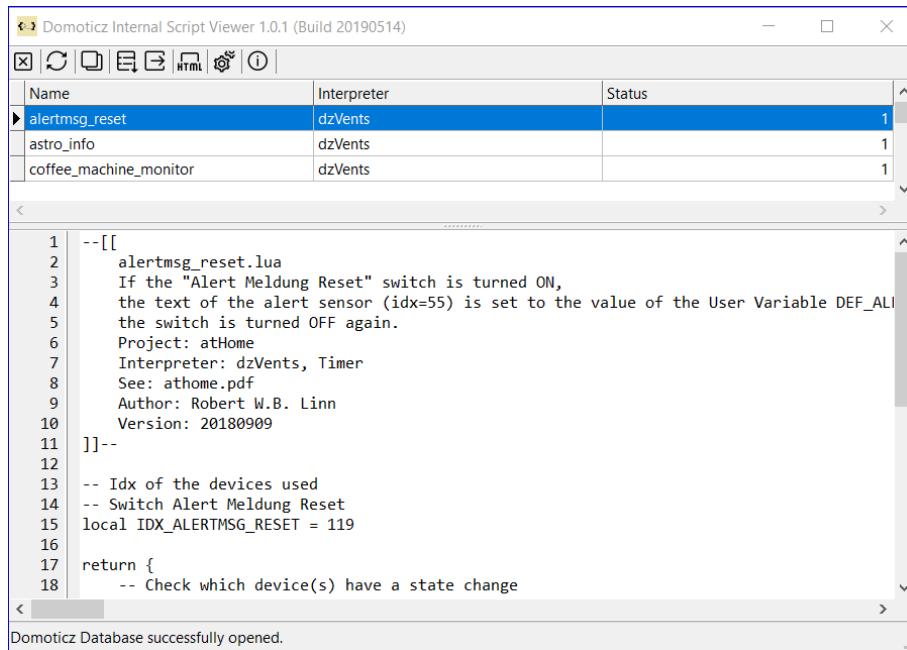
Domoticz Internal Script Viewer

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



The SQL query to select the scripts from the Domoticz database domoticz.db:

```
SELECT Name, Interpreter, XMLStatement, Status FROM EventMaster WHERE Interpreter="dzVents" ORDER BY Interpreter, Name;
```

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)

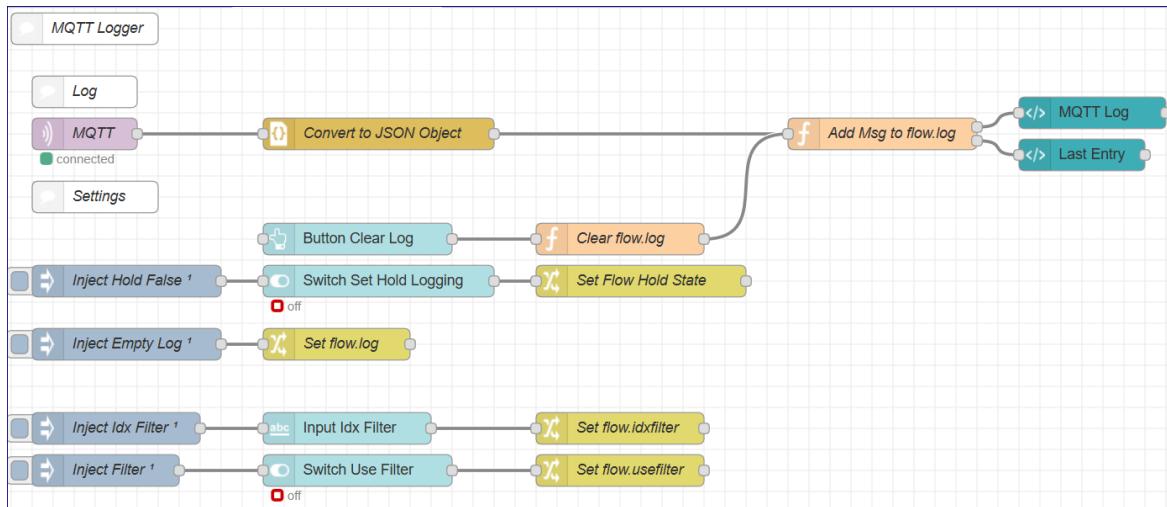
The tab Settings enables to set options:

- 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 on payload handling and lastly use the dashboard nodes to display.

Node-RED Flow



Node-RED Dashboard UI

The Tab **MQTT Logger** and two groups **Log** and **Settings**.

Log

- {"Battery":255,"EnergyMeterMode":1,"RSSI":12,"description":"Energy (Wh) & Power (Watt) provided, every minute, by the volkszaehler Raspberry Pi.\n\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}
- {"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}
- {"Battery":255,"RSSI":12,"description":"","dtype": "General", "id": "000000DC", "idx": 107, "name": "Usage", "nvalue": 0, "stype": "Custom Sensor", "svalue1": "46.0000", "unit": 1}

Last Entry (Idx:107, Name:Process Usage)

```
{"Battery":255,"RSSI":12,"description":"","dtype": "General", "id": "000000DC", "idx": 107, "name": "Usage", "nvalue": 0, "stype": "Custom Sensor", "svalue1": "46.0000", "unit": 1}
```

Settings

Idx Filter (separate by comma)
115

Use Filter

Hold Logging

CLEAR LOG

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:

1. Mqtt in – listen to topic “domoticz/out” from the Domoticz server
2. Json – convert the message payload to a Javascript object
3. Debug – log the full message object (i.e. msg.payload) or selective property (i.e. msg.payload.idx or msg.payload.svalue1)

Simple Flow



Output Debug Node (full message payload) (Web browser Node-RED development tab)

```

debug
all nodes
▼ all nodes
Message
domoticz/out; msg.payload : Object
▶ { Battery: 255, RSSI: 12,
description: "", dtype: "Humidity",
id: "00070005" ... }
15/06/2019, 18:01:58 node: DEBUG Domoticz MQTT
Message
domoticz/out; msg.payload : Object
▶ { Battery: 255, RSSI: 12,
description: "", dtype: "General",
id: "00070006" ... }
15/06/2019, 18:01:58 node: DEBUG Domoticz MQTT
Message
domoticz/out; msg.payload : Object
▶ { Battery: 255, RSSI: 12,
description: "", dtype: "Lux", id:
"00070007" ... }
15/06/2019, 18:01:58 node: DEBUG Domoticz MQTT
  
```

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}
```