Node-RED for UniPi Axon

# Step-by-step guide

Table of contents

Introduction

This step-by-step guide will lead you through the complete process of installing the Node-RED into your UniPi Axon programmable logic controller. For more information about Node-RED or UniPi Neuron controllers, please visit the **UniPi Knowledge Base** or the UniPi.technology **product catalogue**.

Detecting Axon's IP address

The next step is to detect the controller's IP address. The easiest method is to use the **Fing** mobile app, available at Google Play (Android smartphones) or App Store (iOS smartphones)
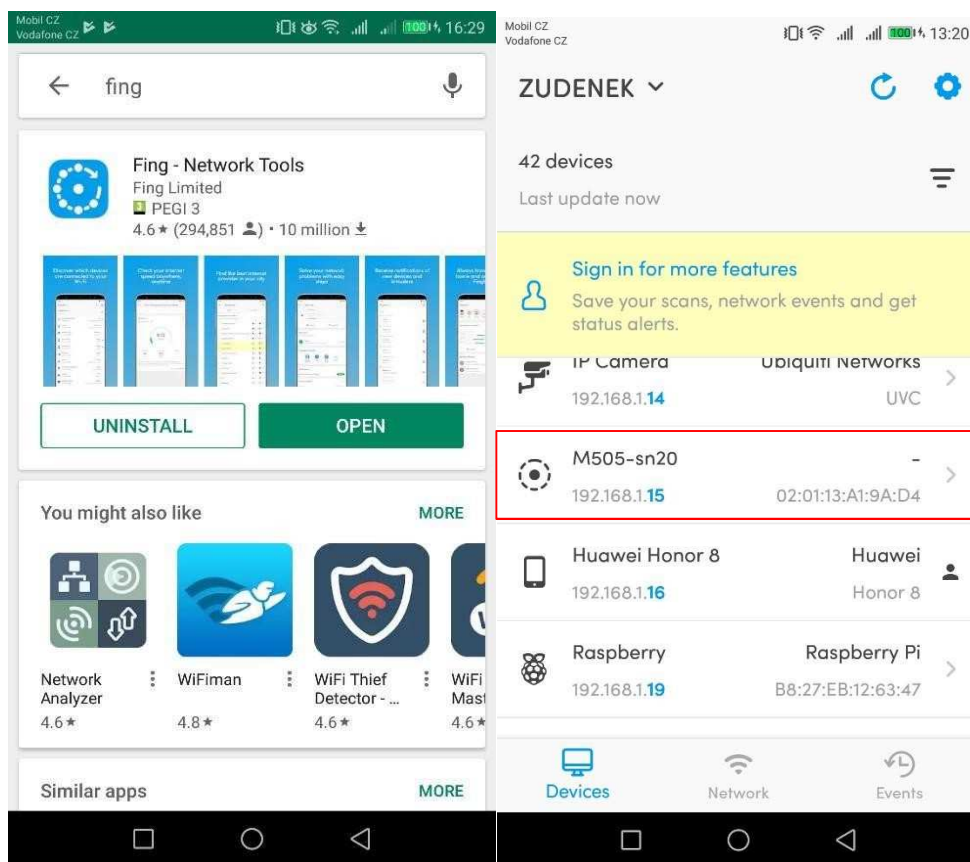

If the Fing app was used, the controller will appear under its model name – in the example above, the **M505** model was used. The IP address can be also detected by Windows IP lookup tools, or by using any other IP lookup application.

Enabling the SSH/disabling the Mervis

In contrast to the UniPi Neuron line, UniPi Axon controllers feature an onboard eMMC memory and does not require a microSD card. All Axons also have the Mervis software platform pre-installed; to install the Node-RED, Mervis thus has to be disabled first along and SSH must be activated. On the Axon controller, these steps can be performer by switching the controller to the **service mode:**

1. push and hold the button on upper side of the controller's chassis, using a thin tool. The button is located next to USB port labels.
2. plug the power supply in while holding the button
3. wait until the Axon finishes booting. The service mode is indicated by LEDs flashing in an alternate fashion.
4. open a browser in your computer and connect to Axon using either an Ethernet cable or a Wi-Fi connection. The following steps differ slightly according to the method chosen:
   a. Ethernet LAN: the service interface is accessible on **192.168.200.200.** The controller will also attempt to get a dynamic IP address through DHCP if the DHCP is available
   b. Wi-Fi: Axon will create a wireless access point (SSID: UNIPICONFIG, password:unipi.technology). The service interface will be then accessible on **192.168.200.200** and **192.168.201.1**

If all these steps were performer correctly, a following interface will appear on the corresponding IP address.
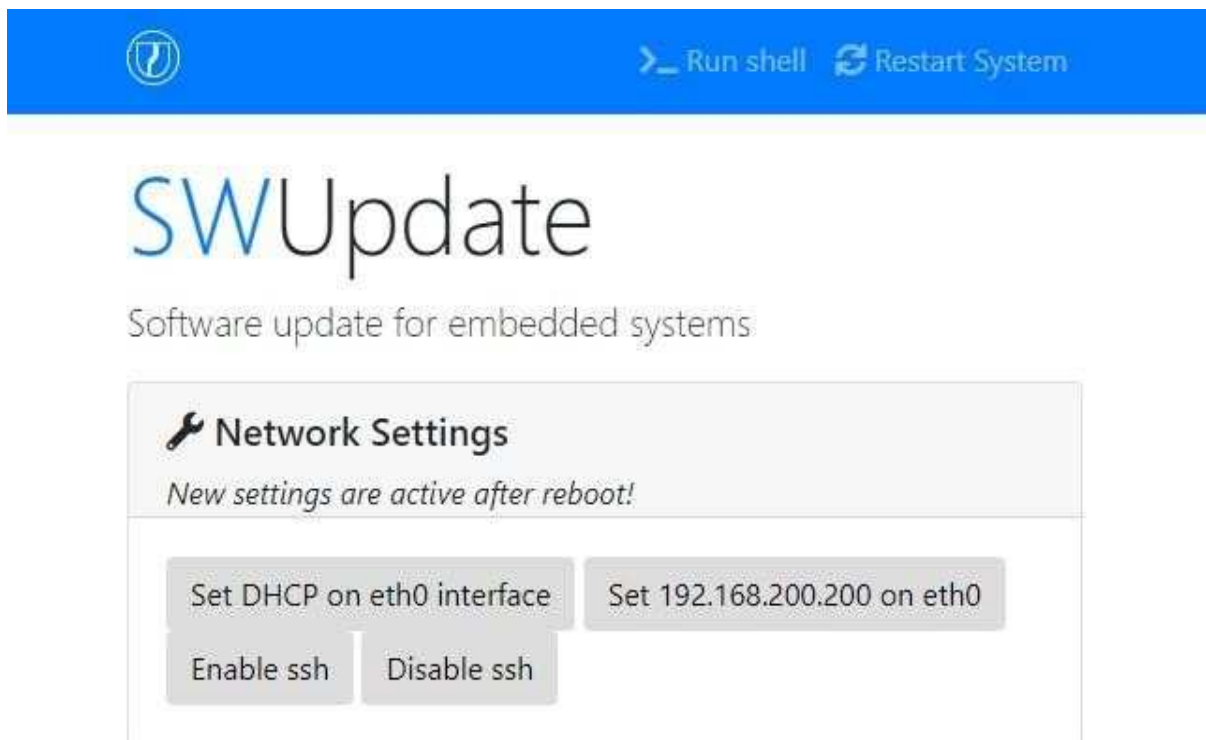

In the interface, follow these steps:

1. click on **Enable SSH**
2. click on **Disable Mervis runtime**
3. click on **Restart system**

The controller will reboot automatically. After that, you can proceed to the next step.

Communication with the controller through SSH/PuTTY

After detecting the controller's IP address, you can communicate with the controller using an SSH terminal. To create one you need to download **PuTTY** application (available for download on **this link**). PuTTY is the most suitable choice for Windows OS and was used for the purpose of this manual. You can, however, use any other available SSH utility.

Install PuTTY through its installer and launch it.
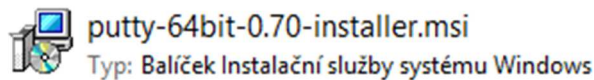
A following window will appear. Enter the controller's IP address to the *Host Name* box (see the image below)
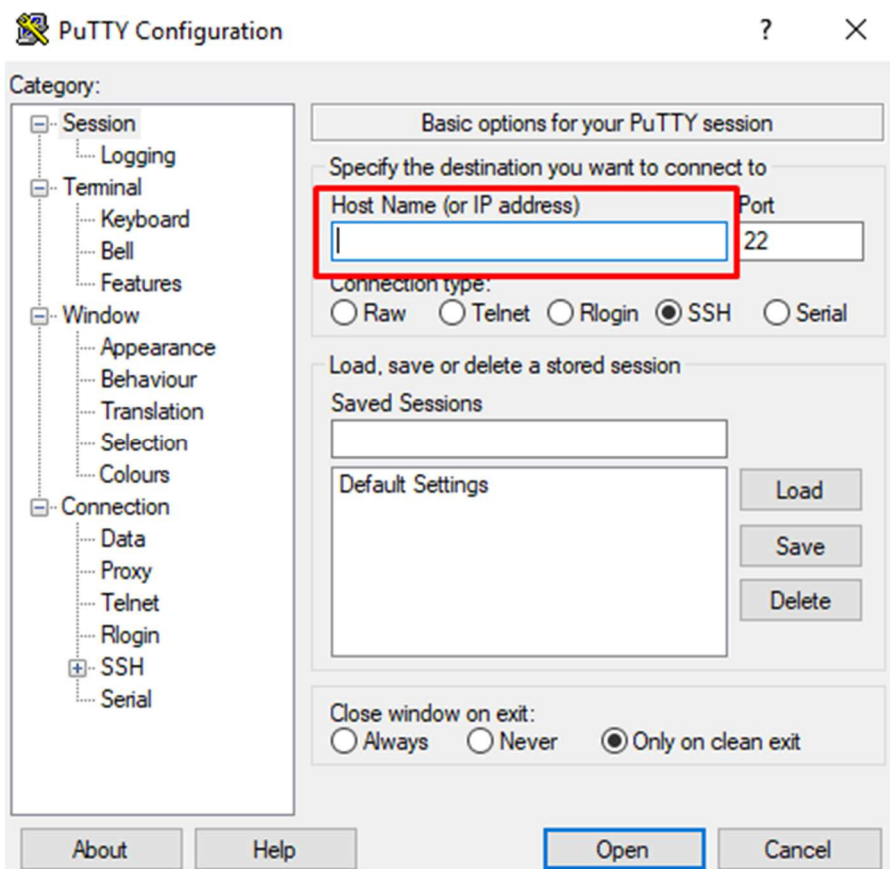
Confirm by klicking *Open*. A security alert will appear – confirm it as well by clicking *Yes*.

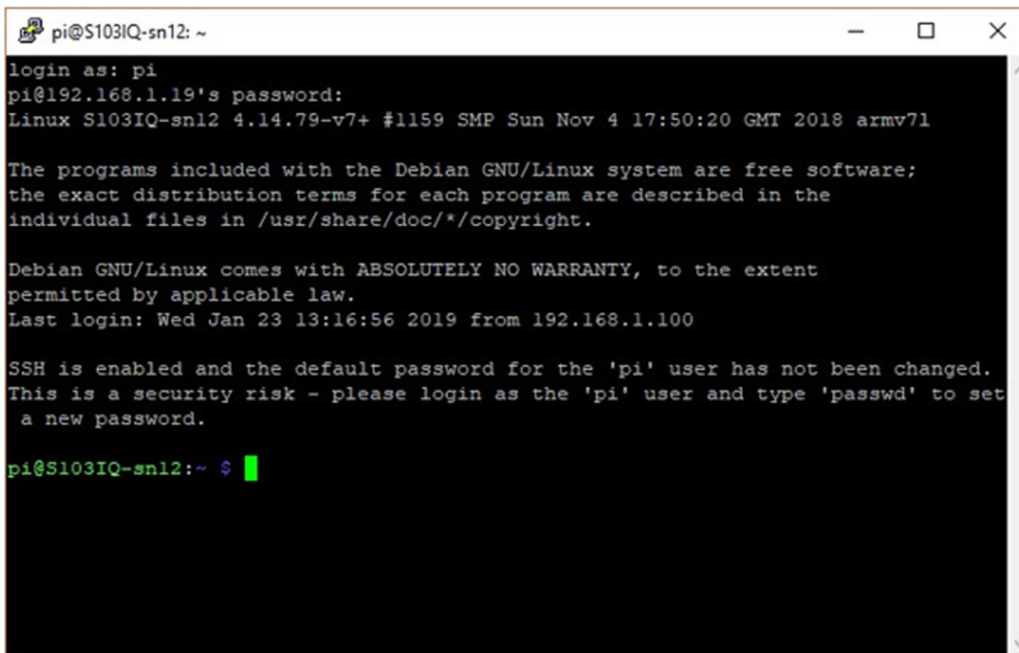The SSH control console will appear

Enter login and password.

- login: **pi**
- password: **raspberry** (*the password is written as invisible; cursor not moving is not an error)*

Confirm the login by pressing *Enter*

Caution: Login has a security time out. If the time runs out, the login will not be possible. If you failed to enter login and/or password in time, repeat the process by restarting PuTTY

If you entered the login info correctly, a following message will appear

The SSH is now active and ready to receive commands for the next step of the installation process.

Installation of the EVOK

EVOK is an open-source application programming interface (API) allowing a basic access to I/Os of UniPi controllers. EVOK is freely accessible on its **GitHub repository,** containing general info and installation instructions. As the Axon requires **a manual EVOK installation,** follow these instructions.

With the EVOK installed, open a web browser and enter the controller's IP address in the address bar. If the installation was successful, a following interface will appear.

This interface gives you a basic control over the controller's I/Os. Proper function of the interface can be tested simply by switching one of the I/Os; if everything works fine, a corresponding LED indication will light up on the controller.

Node-RED installation

With the EVOK installed, you can finally install the Node-RED itself. **Caution: Node-RED requires EVOK version 2.0.7g or higher!"**

Node-RED install is again performed through the SSH terminal by following these steps:

- enter the `sudo apt-get install build-essential` install command. The installation does not require any input. You can see its progress in the SSH terminal window

- after finishing the previous step, enter the following command:

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

Three questions will appear in a following sequence:

`    Are you really sure you want to install as root? [y/N]?`

`    Are you really sure you want to do this? [y/N]?`

`    Would you like to install the Pi-specific nodes? [y/N]?`

Enter answers in a following order: **Y,Y,N.** (see the picture below)

Upon entering all the answers, the Node-RED installation will begin automatically. Its progress is visualised with green ticks appearing next to each step. The installation is completed when all steps are ticked.

If the installation is successful, the whole process is completed. All you need to do to launch Node-RED is to enter `node-red` command.

Node-RED launch on device start up

By default, the Node-RED must be launched by `node-red` command each time the controller is started. To ease the start up, you can enter the following command upon Node-RED launch
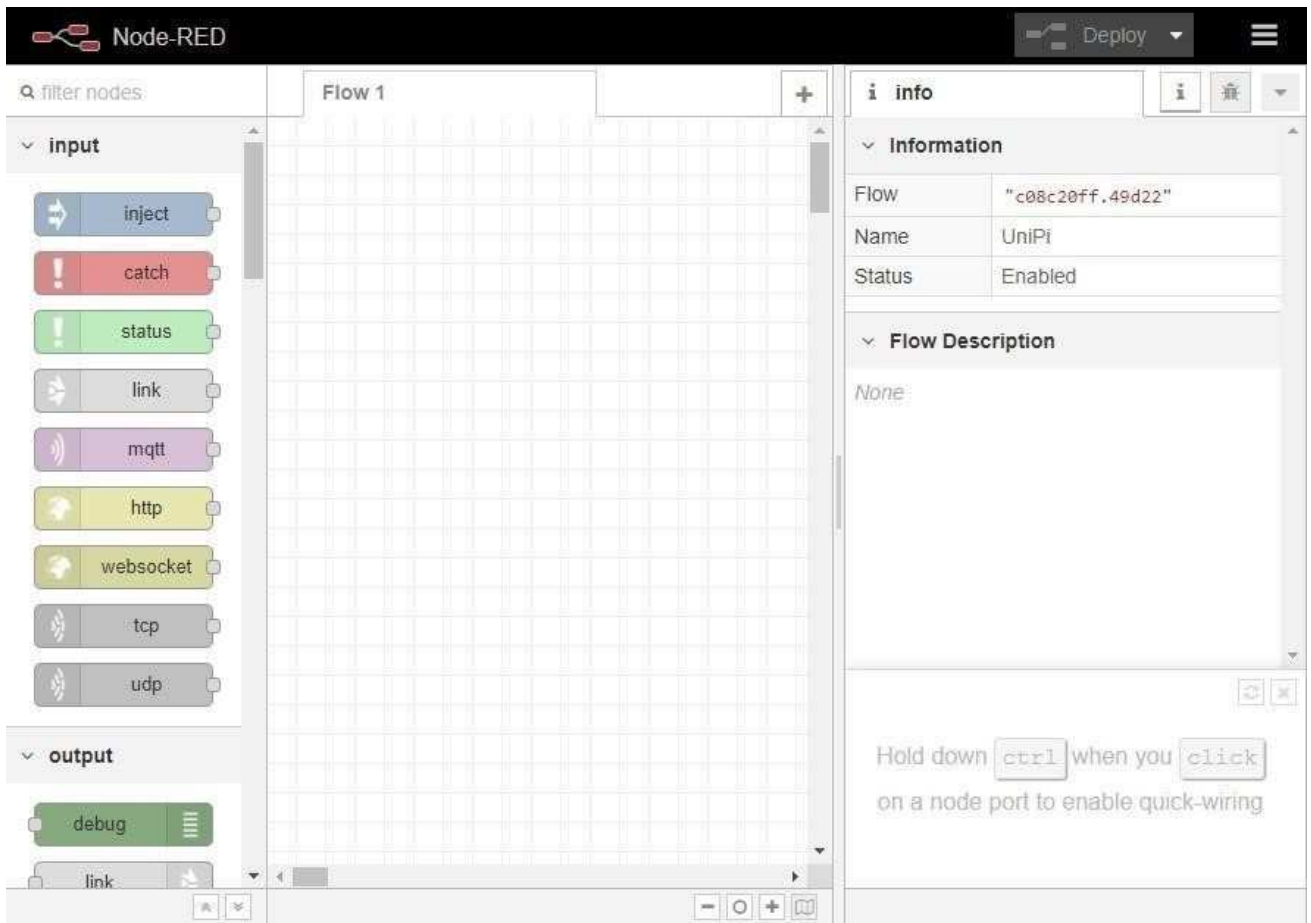
`sudo systemctl enable nodered.service`

Node-RED will now automatically launch on controller's startup.

First Node-RED start up

With the Node-RED installed, open your web browser and enter the IP address of your controller into the address tab. Add the **:1880** behind the IP address as on the picture below
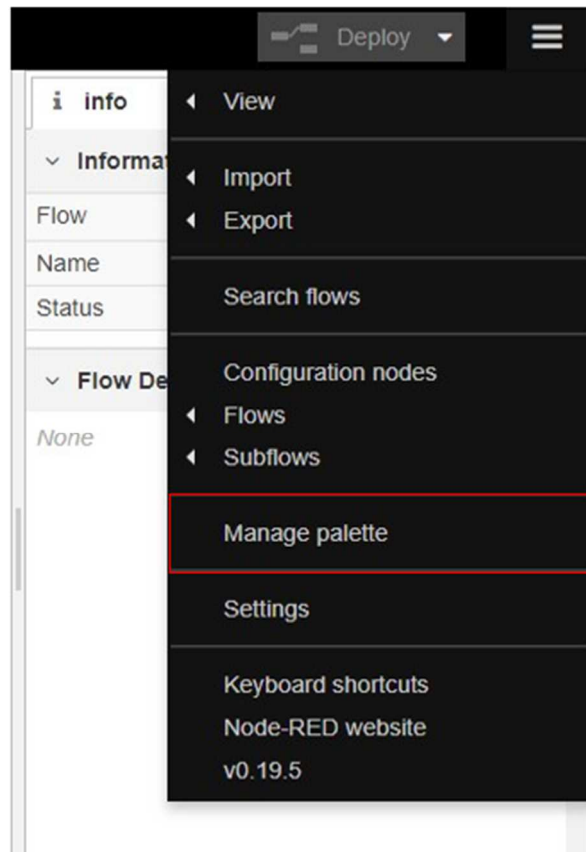
If the IP address is correct, a following interface will appear:
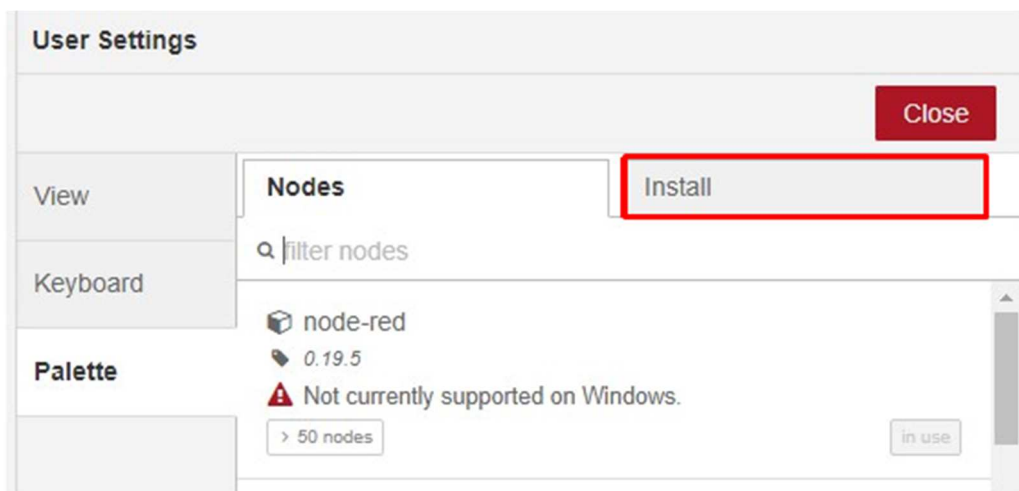

Node-RED is now fully functional

Connecting Node-RED with UniPi Axon controllers

To communicate with the controller, you need to add corresponding UniPi nodes to the node palette. Click on the menu symbol in the upper right corner of your screen. A following menu will appear. Click on *Manage Palette.*

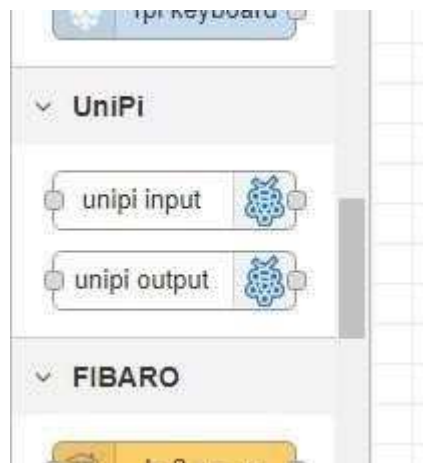A following window will be displayed. Click on *Install* tab.

A node install interface will appear. Here, you will need to find and install the following sets of nodes:

- **@unipitechnology/node-red-contrib-unipi-evok**
- **node-red-dashboard**

Enter the node's name into the search bar. After that, simply click on the *Install* button.

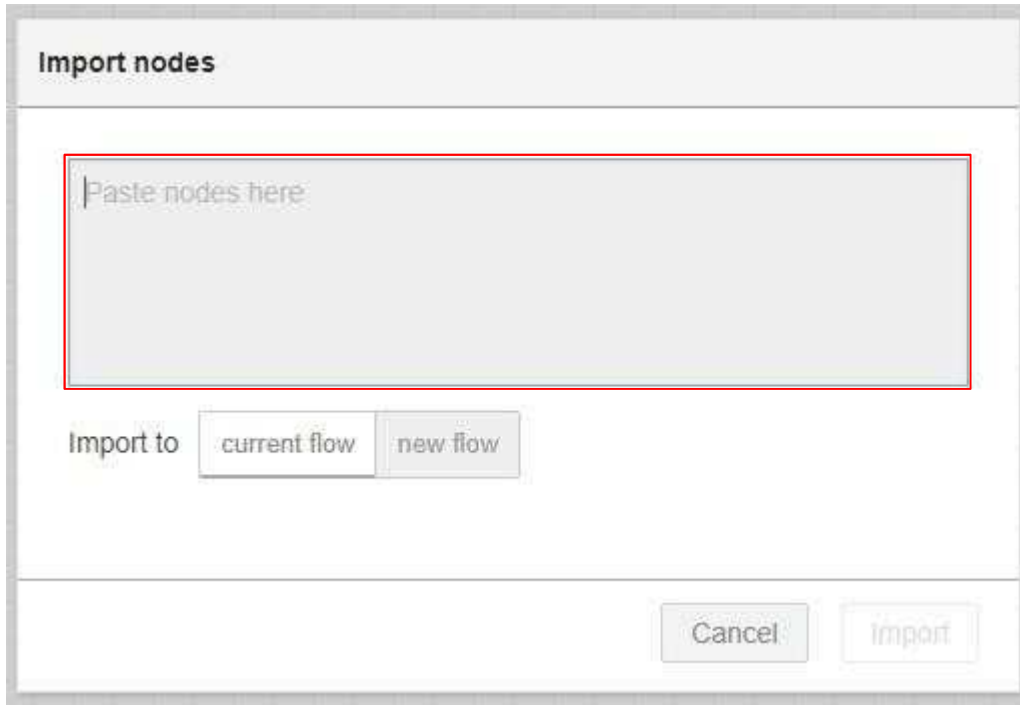Check new nodes that appeared in your node palette

Node-RED is now ready to communicate with the Axon.

Node-RED demonstration

For a better orientation in Node-RED and its interface, a simple showcase project was created to help you understand the Node-RED basics.

In the Node-RED main menu, click on *Import.* A following window will appear

Open the **demo_flow_1.0.json**. file, copy all its contents and paste it into the Paste nodes here text field. Then click on the *Import* button

The last step is to display a user interface by adding **/ui** after the IP address. See the picture below:
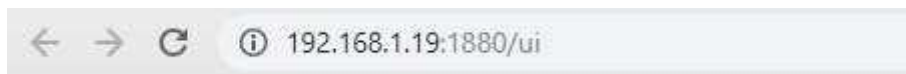
A following page shows a simple interface that will appear upon entering the **/ui** suffix.

Boiler controller

This termostat is designed for controlling a boiler acording to the set and the measured temperature. Measuring the temperature is done by a OneWire sensor and the actual temperature is compared with the set temperature by user. Acording to the result, the state of the relay 5 is set or reset.

Set temp		22°C
Act temp		20.15°C
Boiler controller		heat ON

Analog input

0V

Direct / Software switch

The input is a button. The first press of the button switches relay to the ON state, the second press of the button switches relay to the OFF state.

switch 1	
switch 2	
switch 3	
switch 4	

Analog control

Output 2.01	
Output 2.02	
Output 2.03	
Output 2.04	