

Installing and using Node-RED App on u-OS

Abstract:

This document contains instructions on how to install the Node-RED App on u-OS. It outlines differences between Node-RED on u-create web and Node-RED on u-OS, the variants of Node-RED apps available for u-OS and how to use them.

Hardware reference

No.	Component name	Article No.	Hardware / Firmware version
1	UC20-WL2000-AC	1334950000	FW: 2.0.0 or later
2	IOT-GW30	2682620000	FW: 2.0.0 or later
3	IOT-GW30-4G-EU	2682630000	FW: 2.0.0 or later

Software reference

No.	Software name	Article No.	Software version
1	Recent web browser	-	-
2	u-os-app-node-red-bridge	-	3.0.2-1
3	u-os-app-node-red-host	-	3.0.2-1
4	u-os-app-filebrowser	-	2.23.0-5 or later

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<https://www.weidmueller.com/countries>

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1 Warning and Disclaimer

Warning

Controls may fail in unsafe operating conditions, causing uncontrolled operation of the controlled devices. Such hazardous events can result in death and / or serious injury and / or property damage. Therefore, there must be safety equipment provided / electrical safety design or other redundant safety features that are independent from the automation system.

Disclaimer

This Application Note / Quick Start Guide / Example Program does not relieve you of the obligation to handle it safely during use, installation, operation and maintenance. Each user is responsible for the correct operation of his control system. By using this Application Note / Quick Start Guide / Example Program prepared by Weidmüller, you accept that Weidmüller cannot be held liable for any damage to property and / or personal injury that may occur because of the use.

Note

The given descriptions and examples do not represent any customer-specific solutions, they are simply intended to help for typical tasks. The user is responsible for the proper operation of the described products. Application notes / Quick Start Guides / Example Programs are not binding and do not claim to be complete in terms of configuration as well as any contingencies. By using this Application Note / Quick Start Guide / Example Program, you acknowledge that we cannot be held liable for any damages beyond the described liability regime. We reserve the right to make changes to this application note / quick start guide / example at any time without notice. In case of discrepancies between the proposals Application Notes / Quick Start Guides / Program Examples and other Weidmüller publications, like manuals, such contents have always more priority to the examples. We assume no liability for the information contained in this document. Our liability, for whatever legal reason, for damages caused using the examples, instructions, programs, project planning and performance data, etc. described in this Application Note / Quick Start Guide / Example is excluded.

Security notes

In order to protect equipment, systems, machines and networks against cyber threats, it is necessary to implement (and maintain) a complete state-of-the-art industrial security concept. The customer is responsible for preventing unauthorized access to his equipment, systems, machines and networks. Systems, machines and components should only be connected to the corporate network or the Internet if necessary and appropriate safeguards (such as firewalls and network segmentation) have been taken.

2 Differences to Node-RED on u-create web

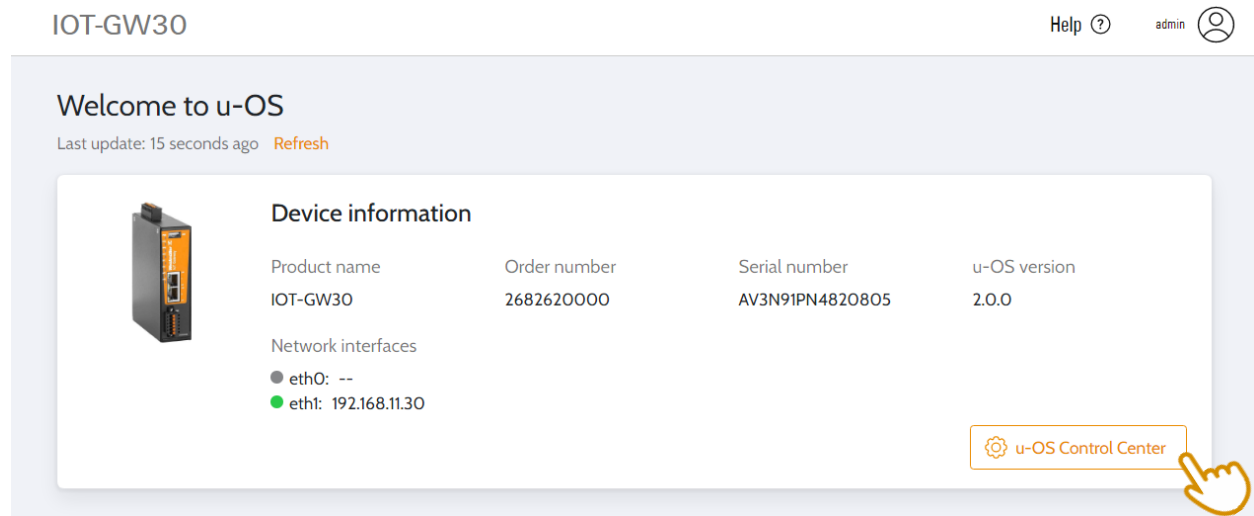
With u-create web, Node-RED was a service running natively in the device's Linux OS. With u-OS, Node-RED now is an app based on container technology (Docker). This brings the advantage of allowing independent updates of Node-RED and the devices firmware.

The transition from running natively to running in a container as well as the update from u-create web to u-OS entail the following breaking changes:

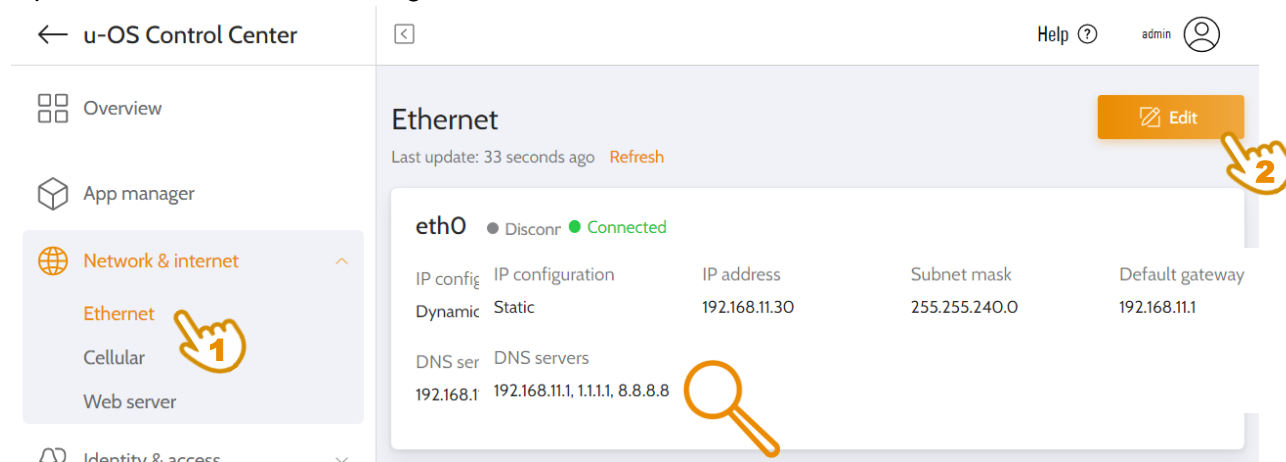
- UC20-WL2000: Missing *iodata nodes*: u-OS does not include the Global Variable List known from u-create web, therefore the *iodata nodes* are not available. This will be addressed with a future u-OS update.
- IOT-GW30: Missing *IO nodes* and access to user-controllable LEDs: This version of Node-RED does not include the IOT-GW30 specific IO nodes nor provides access to the front LEDs AP1 and AP2. An IOT-GW30 specific version of the Node-RED app will be provided via the Support Center.
- Networking: The bridge network version of Node-RED is running in a Docker bridge network. Only the TCP port for the Node-RED editor is exposed via the u-OS reverse proxy. It is protected by u-OS' user and role management. This offers increased security but means that this version cannot be used to host services like Modbus TCP or OPC-UA in Node-RED. Use the host network version of the Node-RED app for this.
- Limited user rights and role management: It is not possible to have separate permissions for the Node-RED Editor, the Node-RED dashboard, and custom HTTP Endpoints as with u-create web. This also means that only signed in users can access the Node-RED dashboard.
- *exec node* cannot interact with the device's Linux OS: As Node-RED is now running in a container, the *exec node* has no access to the Linux OS of the device, only to the Linux of the container.
- Different filesystem structure: The Node-RED app has no access to the device's filesystem. The following folders are available in Node-RED:
 - `/data`: Use this directory to store data locally. Nodes from the palette are installed here, too.
 - `/public`: This directory is accessible via the File Browser app. The `settings.js` and `flows.json` are stored here, but you may also store other files here to make them accessible via the File Browser.
 - `/media`: External memory media is mounted at this path, e.g., `/media/sda1` for a usb pendrive.

3 Connecting the device to the internet

Internet connection is required if you want to install the Node-RED app via the App hub, and if additional Node-RED nodes are to be installed within Node-RED using “manage palette”. To setup the internet connection, access the u-OS interface as described in the operations manual of the device. If you do not want to connect your device to the internet, skip to chp. 4.2.



Open the Control Center, Navigate to Network & internet – Ethernet:



If you are using a static IP configuration, configure the following. When using DHCP, check if the following are set correctly by the DHCP server:

1. Connection state: must be “connected”. If not, double check the cable connections.
2. IP address and subnet mask: If you are using a static IP configuration, set the device’s IP address to an unused address in the local network of your router. Configure the subnet mask accordingly.
3. Default gateway: This is usually the LAN IP of the router that your device is connected to.
4. DNS servers: Set this to the IP address of a public DNS server that you trust. Popular choices are 1.1.1.1 for Cloudflare DNS and 8.8.8.8 / 8.8.4.4 for Google DNS.

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If you require local name resolution set the first entry to the IP address of your local DNS server. This is often the same as the default gateway.

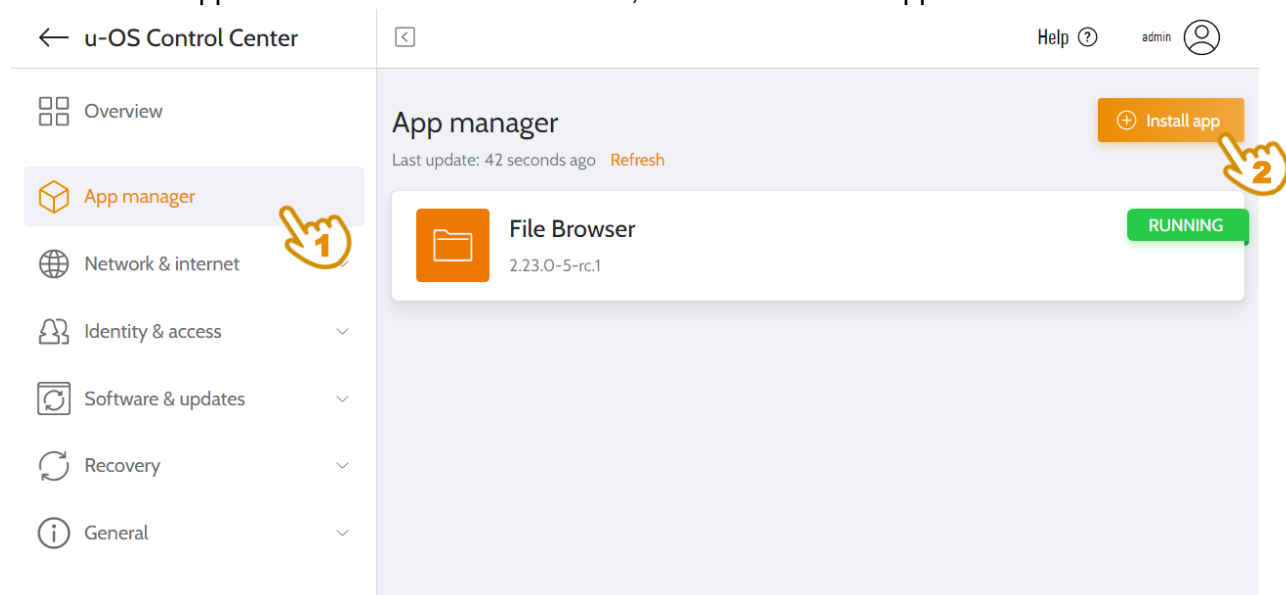
4 Installing the Node-RED App

This app note describes two ways to install an App on u-OS:

- If your device has an internet connection, the default way to install an app is to use the App hub. The App hub will list all apps available for download and guide you through the installation process.
- For devices which do not have an internet connection, we provide an alternative method to install apps via a local file upload. This method is based on SWupdate, which is the same tool used to update the device firmware.

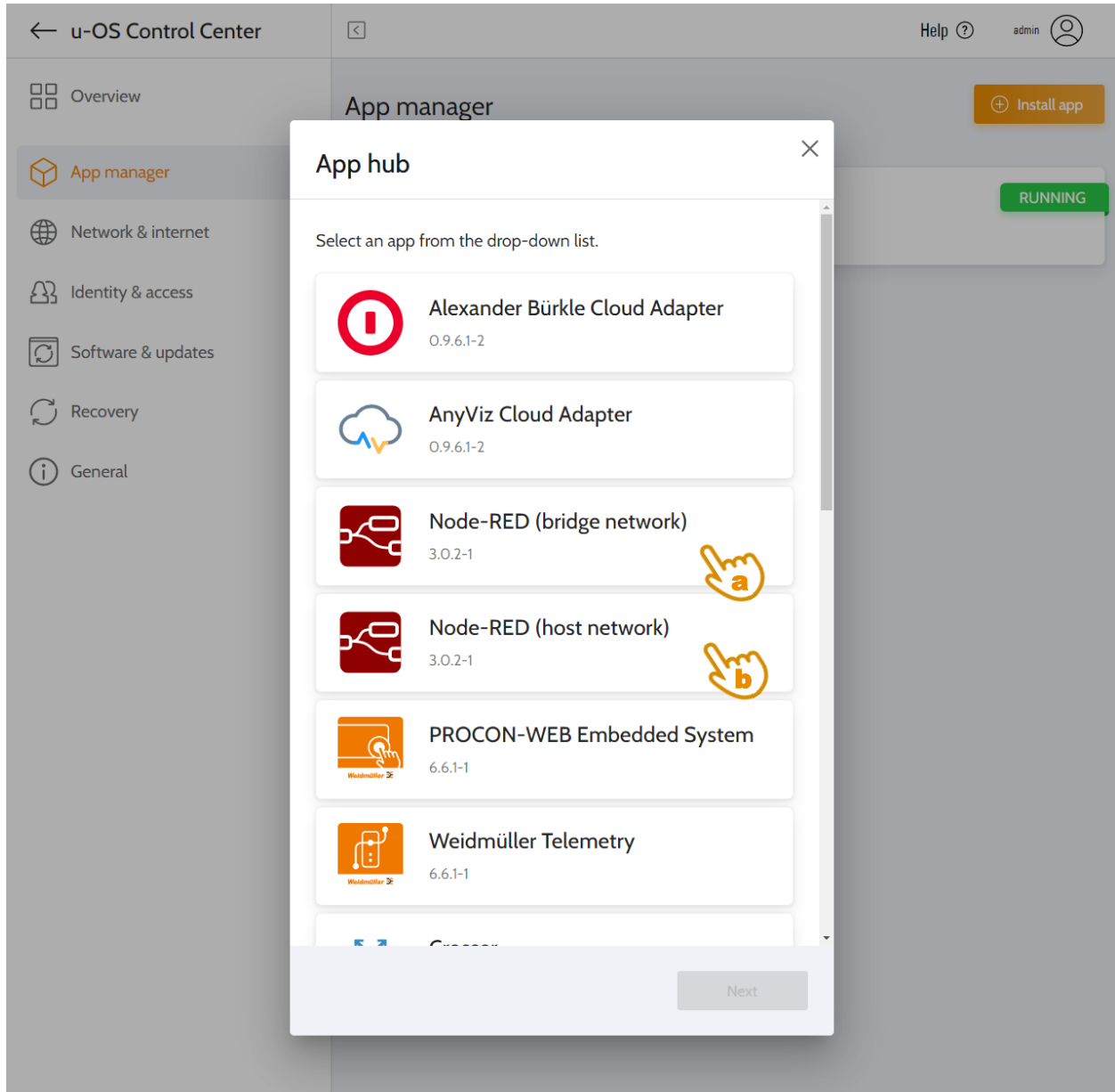
4.1 Online installation using the App hub

In the u-OS Control Center, navigate to the App manager. In this example, we already have the File Browser app installed. To install Node-RED, click on the Install app button.



Installing and using Node-RED App on u-OS

The App hub will fetch all available applications. This might take a minute or two. You will be presented with a list and can choose an app to install.



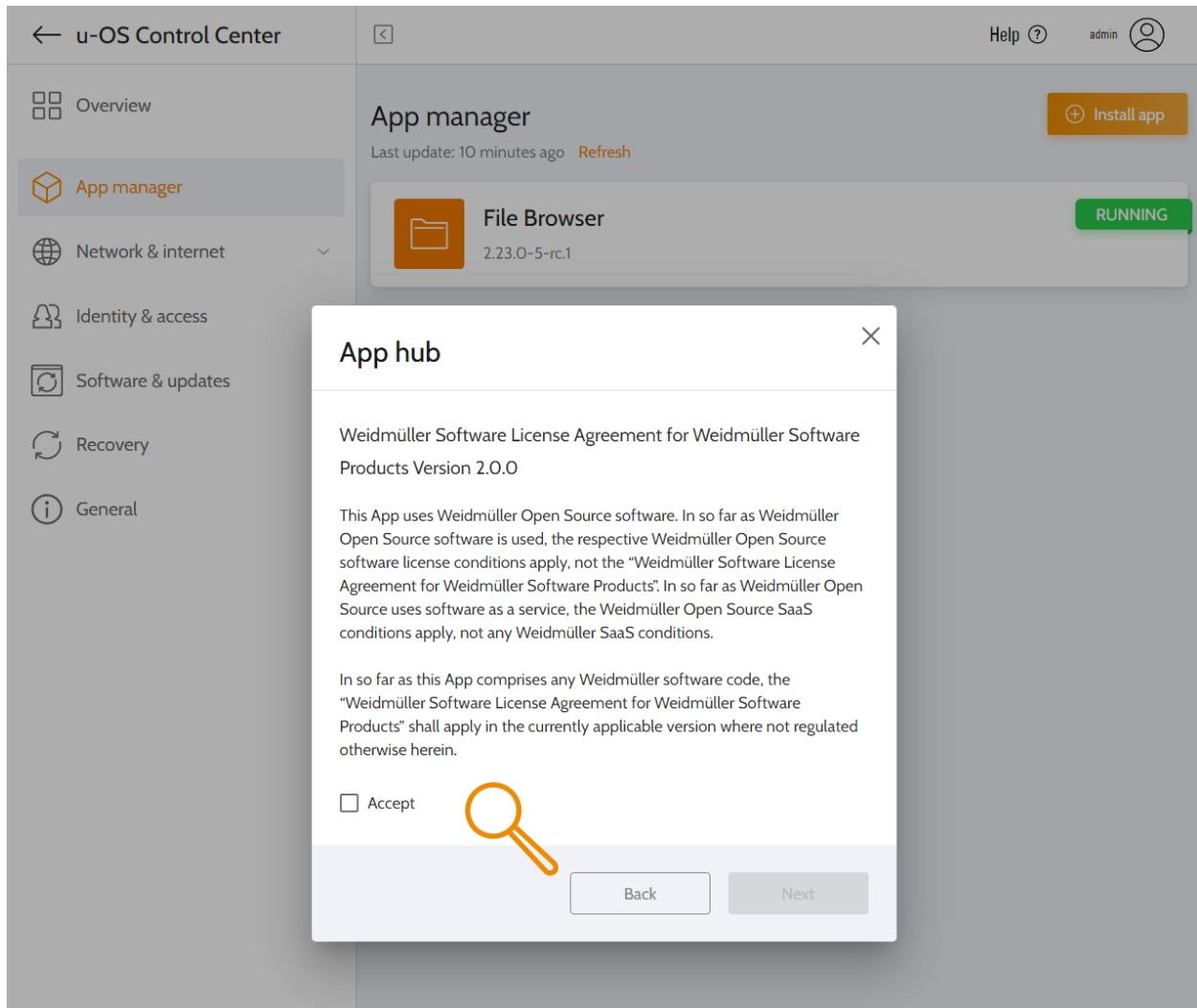
There are two variants of Node-RED to choose from:

- a) Node-RED (bridge network)
This app is running in a Docker bridge network. Only the TCP port for the Node-RED editor is exposed via the u-OS reverse proxy. This can offer increased security, but means that this variant cannot be used to host services like Modbus TCP or OPC-UA in Node-RED.
- b) Node-RED (host network)
This app is running with the Docker network mode host, meaning there is no isolation between the device's local networks and the app. This allows to host services on the network using Node-RED.

Installing and using Node-RED App on u-OS

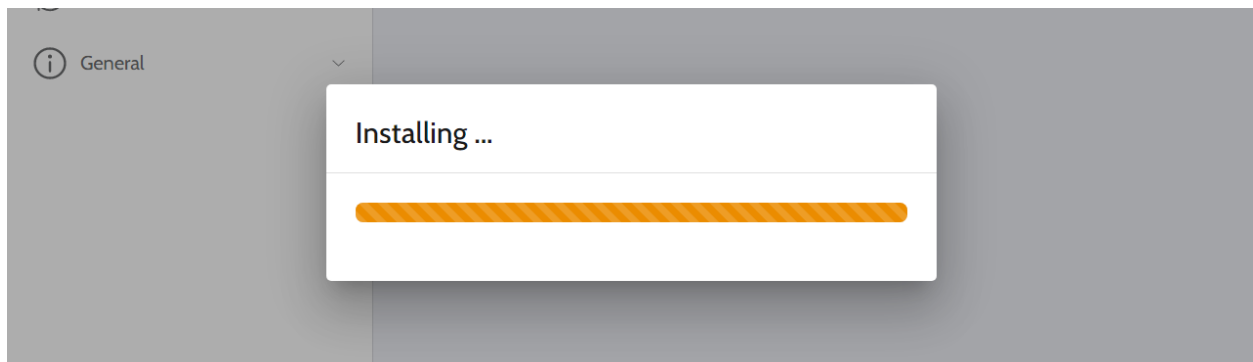
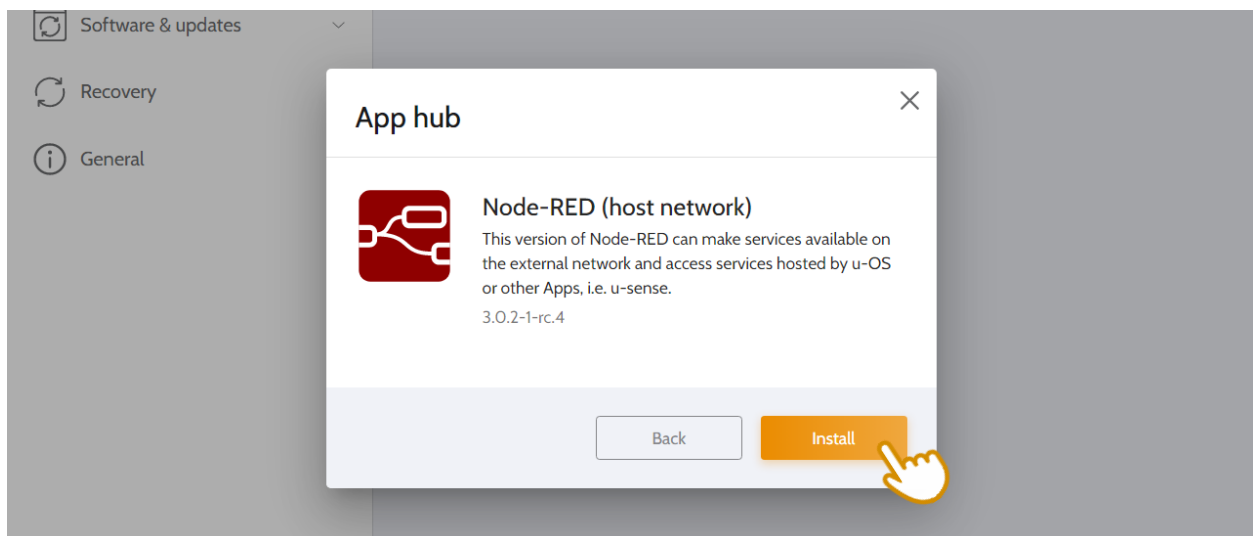
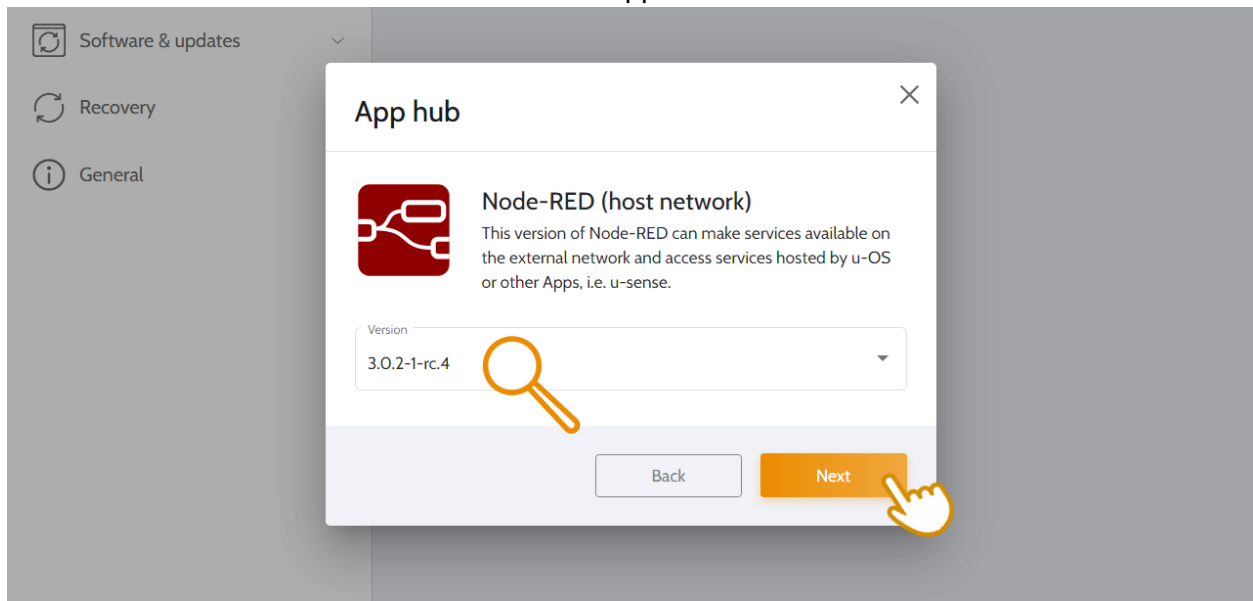
For both apps the Node-RED editor and dashboard are protected by the u-OS user and role management and are not accessible to unauthenticated users by default.

Click on the App that you would like to install. Since Node-RED is an open-source project and not a commercial offering from Weidmüller, a license agreement for Weidmüller Open Source Software is displayed. Read and acknowledge the agreement to proceed with the installation.



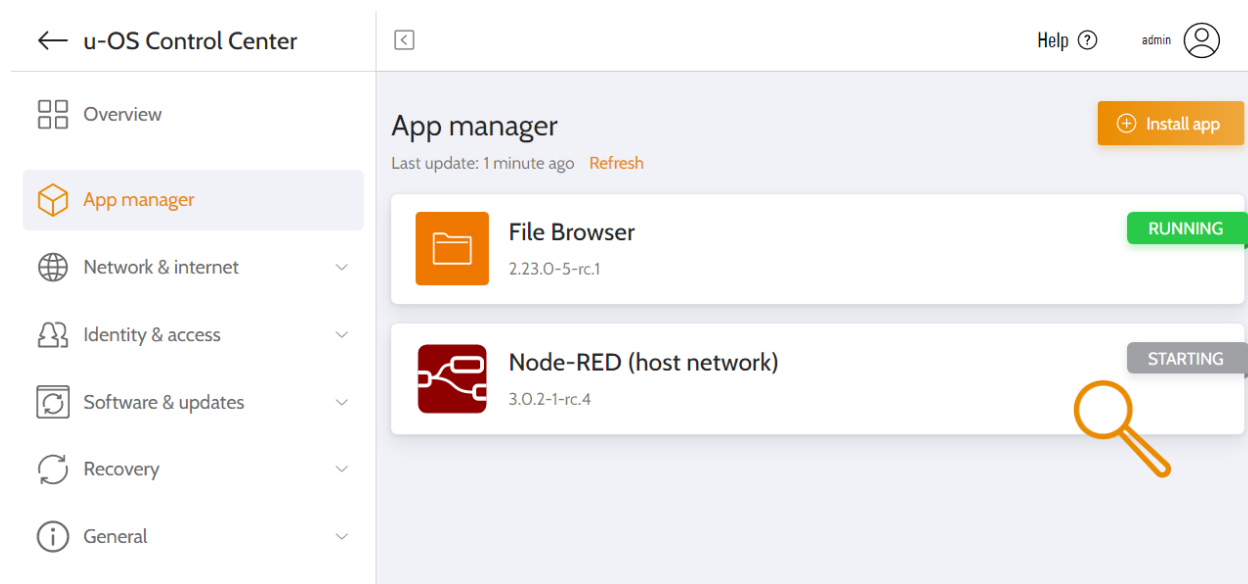
Installing and using Node-RED App on u-OS

Follow the on-screen instructions to install the app.



Installing and using Node-RED App on u-OS

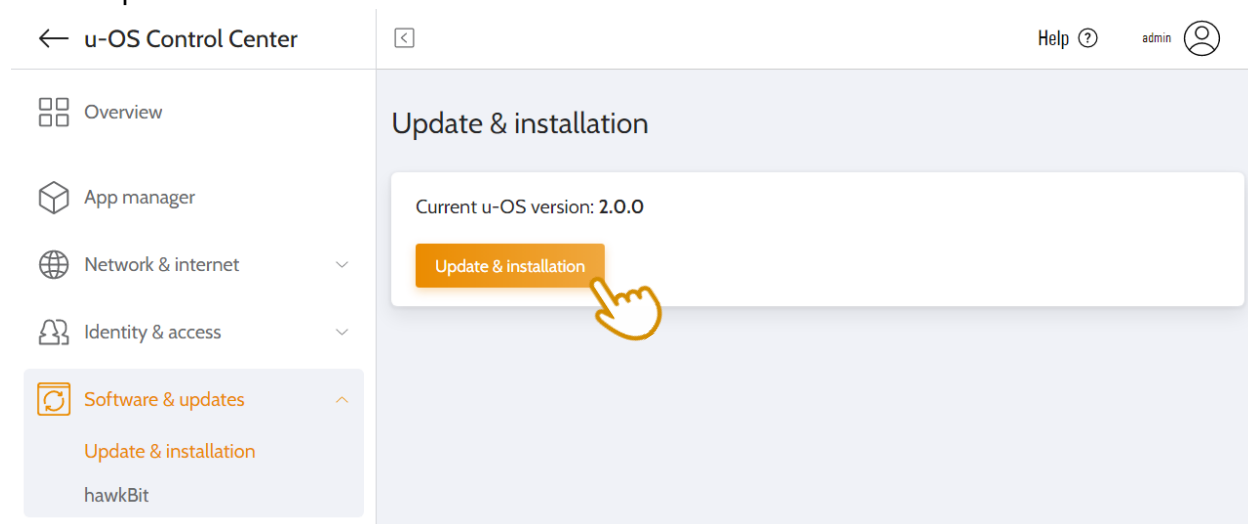
The App installation will take some time, anything between 10 and 30 minutes depending on the device's performance. Once the install has finished, you will see Node-RED in the list of installed applications. Note that it has the status "starting". It should take less than a minute to start up, but the status display might not update. You might want to refresh the page to see if it changed to "running".



4.2 Offline installation using Software and Updates menu

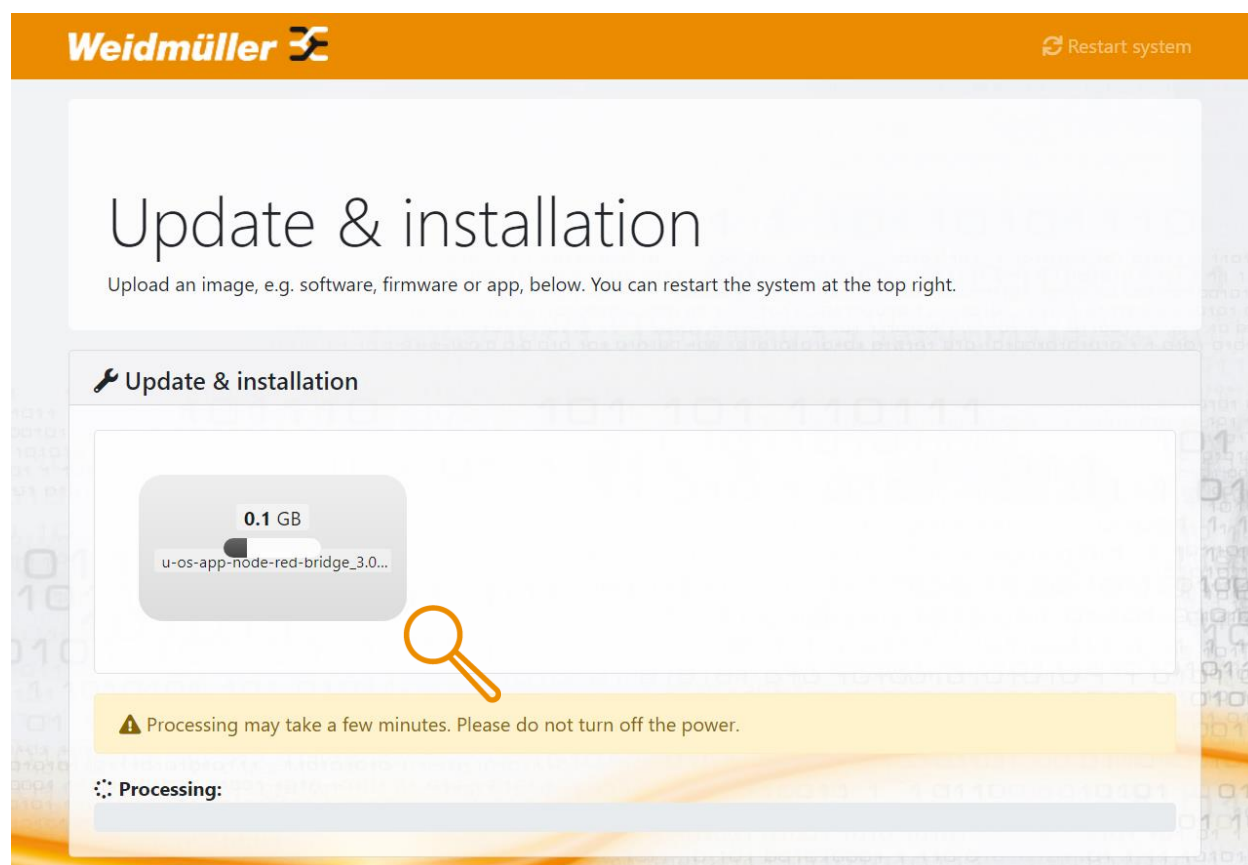
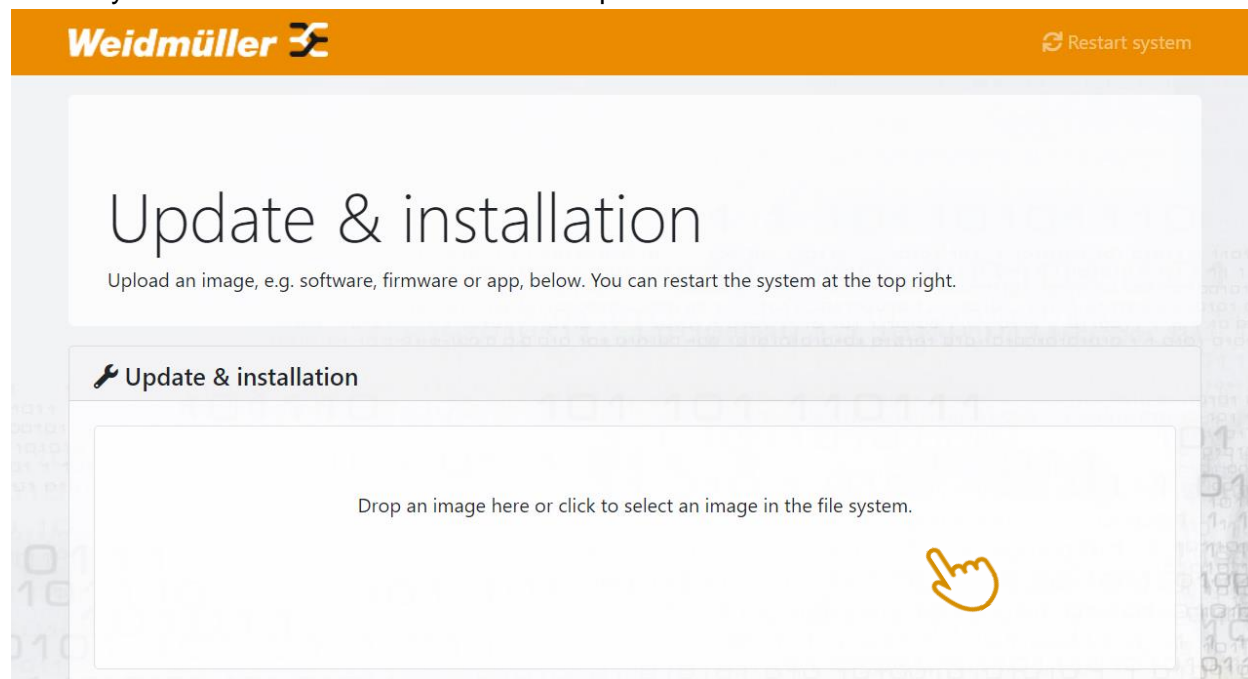
Weidmüller also provides files for offline installation for all apps. These files can be downloaded from the support center: support.weidmueller.com

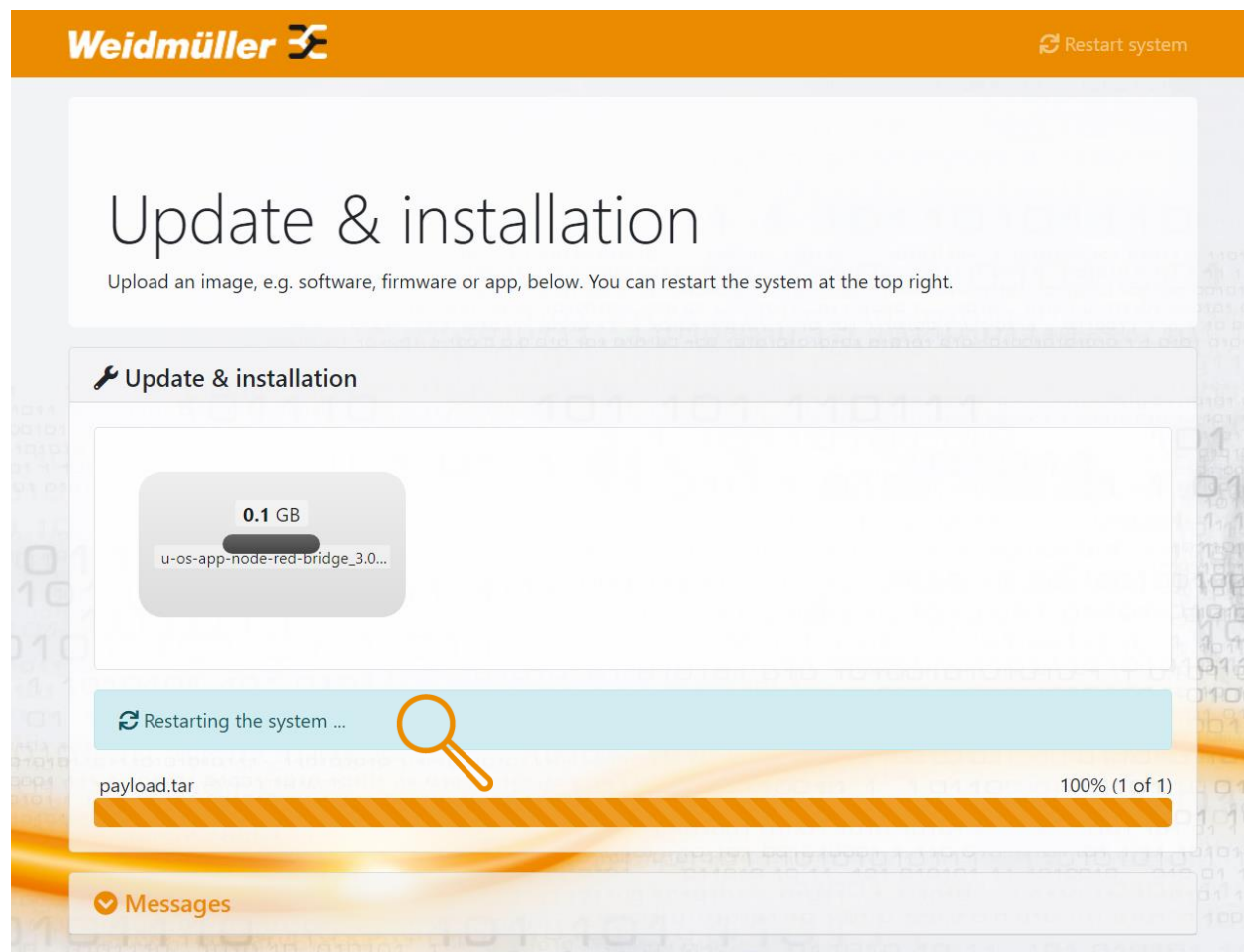
To upload the app to the device, navigate to Software & updates – Update & installation and click on the Update & installation button:



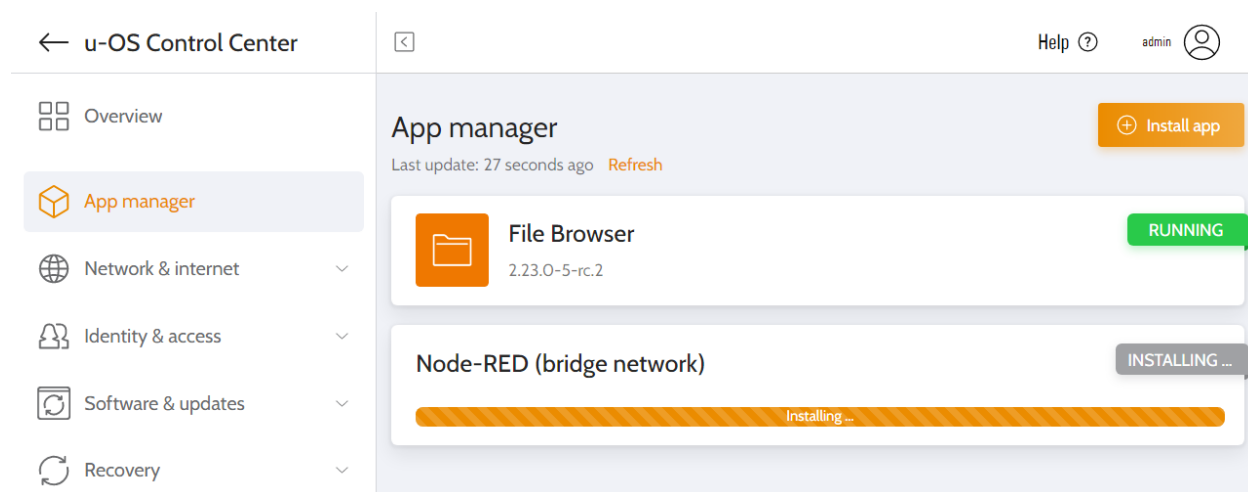
Installing and using Node-RED App on u-OS

The Update & installation screen will open. Follow the on-screen instructions to upload an app. If the archive that you downloaded contains multiple `.swu` files, make sure to select the correct one for your device. The device name will be part of the filename.



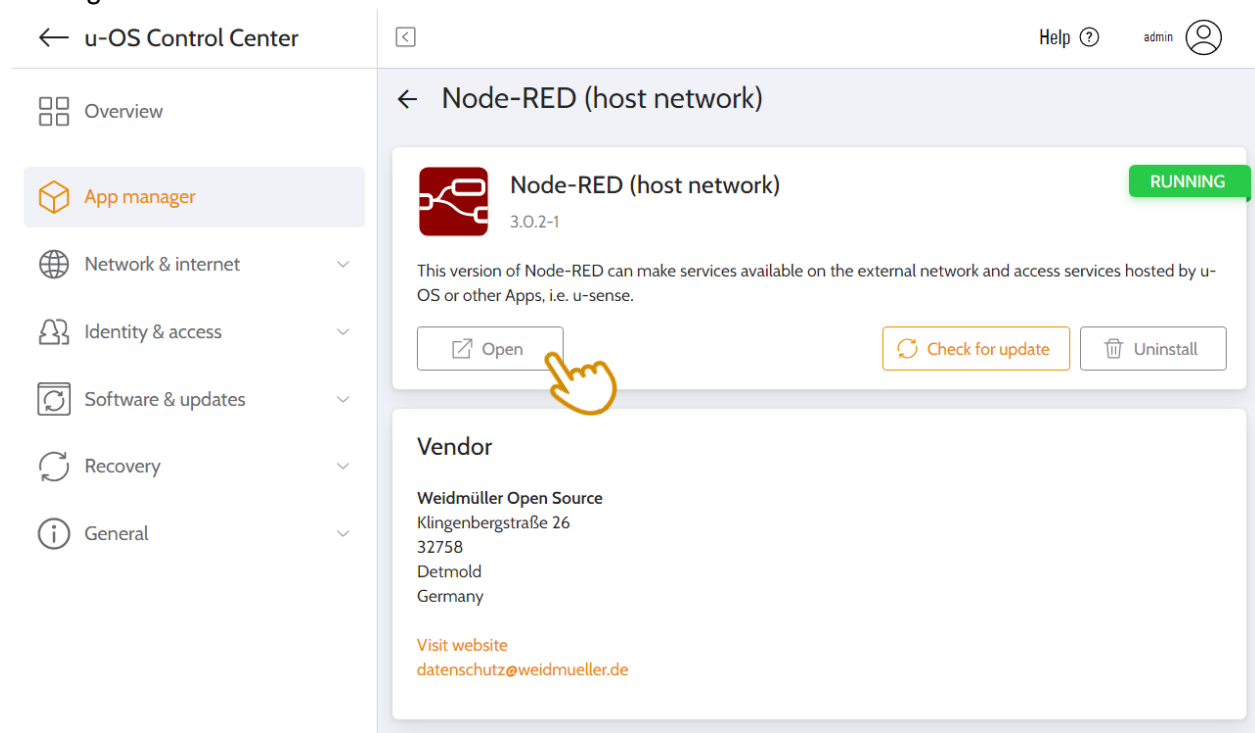


Once the upload has finished, the screen will display a message “Restarting the system”. This is incorrect, the device will not restart as this is not necessary for the app installation. Using your browser, navigate back to the previous page. You will see that the App manager is now installing Node-RED:



4.3 Managing and updating the App

To see more details about the installed app, to update or to uninstall it, click on the app in the App manager:



To open the Node-RED editor, click on the Open button.

5 Using Node-RED on u-OS


To open the Node-RED editor, you can either click on the Open button on the app detail page as described above, or click on the Node-RED tile on the u-OS welcome screen as shown below:

IOT-GW30

Help ? admin

Welcome to u-OS

Last update: 1 hour ago Refresh



Device information


Product name	Order number	Serial number	u-OS version
IOT-GW30	2682620000	AV3N91PN4820805	2.0.0

Network interfaces

● eth0: --


● eth1: 192.168.11.30

u-OS Control Center




File Browser

Browse, edit and download files made available by other Apps on this device.



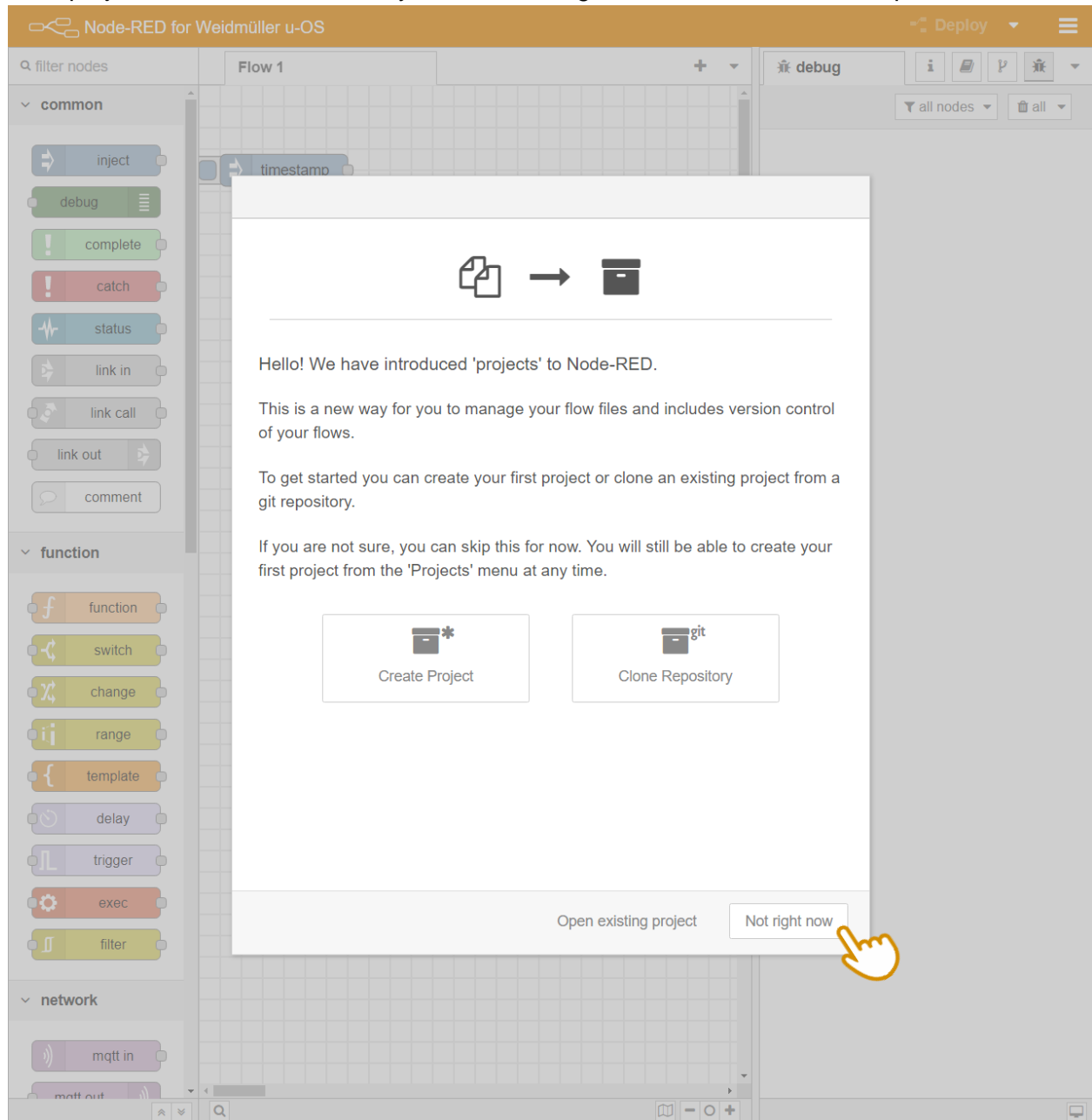
Node-RED (host network)

This version of Node-RED can make services available on the external network and access services hosted by u-OS or other Apps, i.e. u-sense.



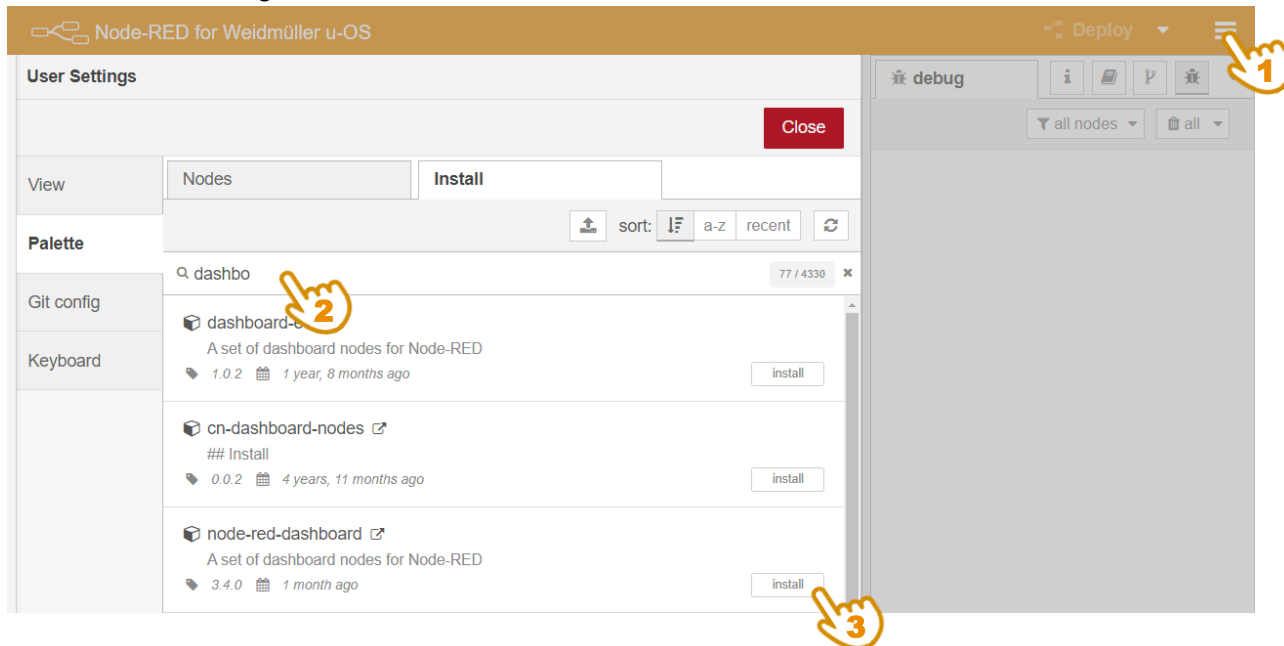
Installing and using Node-RED App on u-OS

The Node-RED editor will open. It will display an info about the new projects feature. Skip it for now, projects can be created at any later time using the Node-RED menu if required.

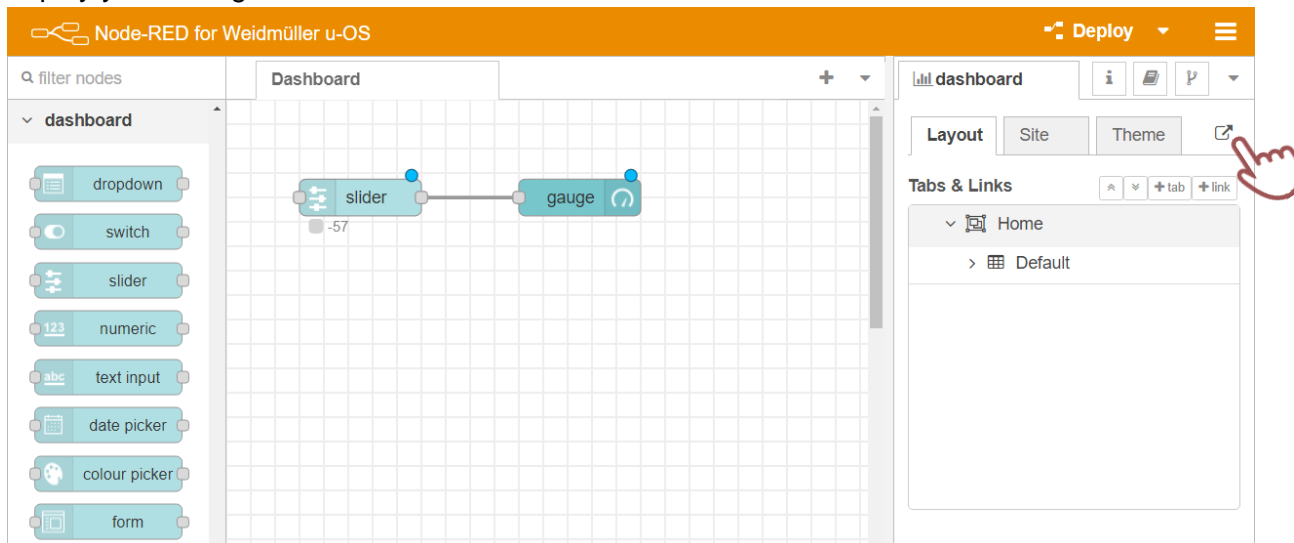


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As a quick example we will setup a minimal dashboard. Open the Node-RED palette from the Node-RED hamburger menu, search for dashboard and install the node-red-dashboard.



Create a simple flow with some dashboard nodes, like the slider and gauge shown below and deploy your changes.



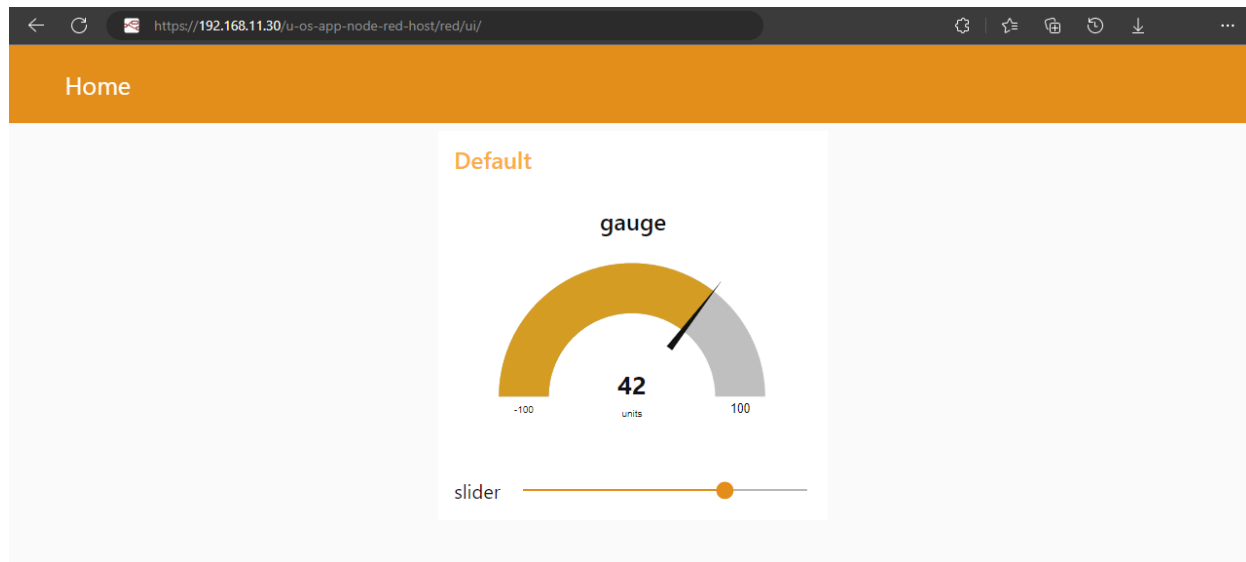
Please note that the “go to dashboard”-button does not work as intended. It will open a new tab, but redirects to the wrong URL, resulting in an error 404:



Installing and using Node-RED App on u-OS

To reach the Node-RED dashboard on u-OS, copy the URL of the Node-RED editor, remove everything after red/ and append ui to it. For example, change it

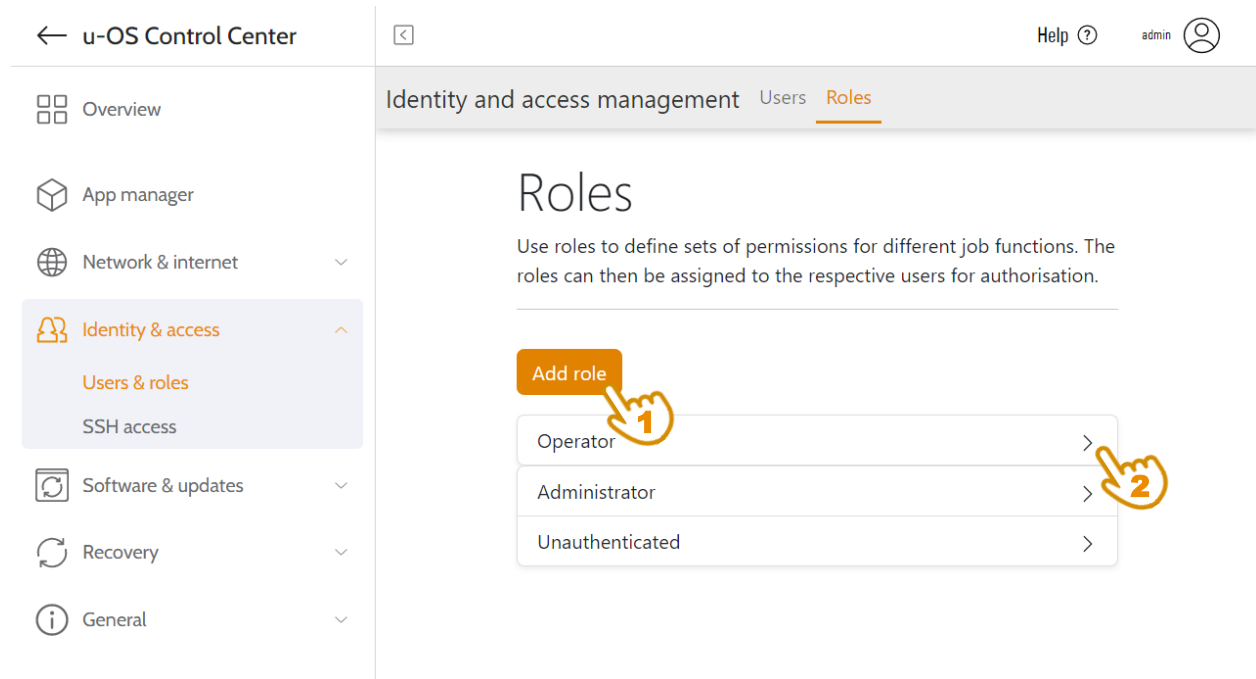
from <https://192.168.11.30/u-os-app-node-red-host/red/#flow/1d6129cfb3ecab80>
to <https://192.168.11.30/u-os-app-node-red-host/red/ui>



6 Granting a u-OS Role and User access to Node-RED

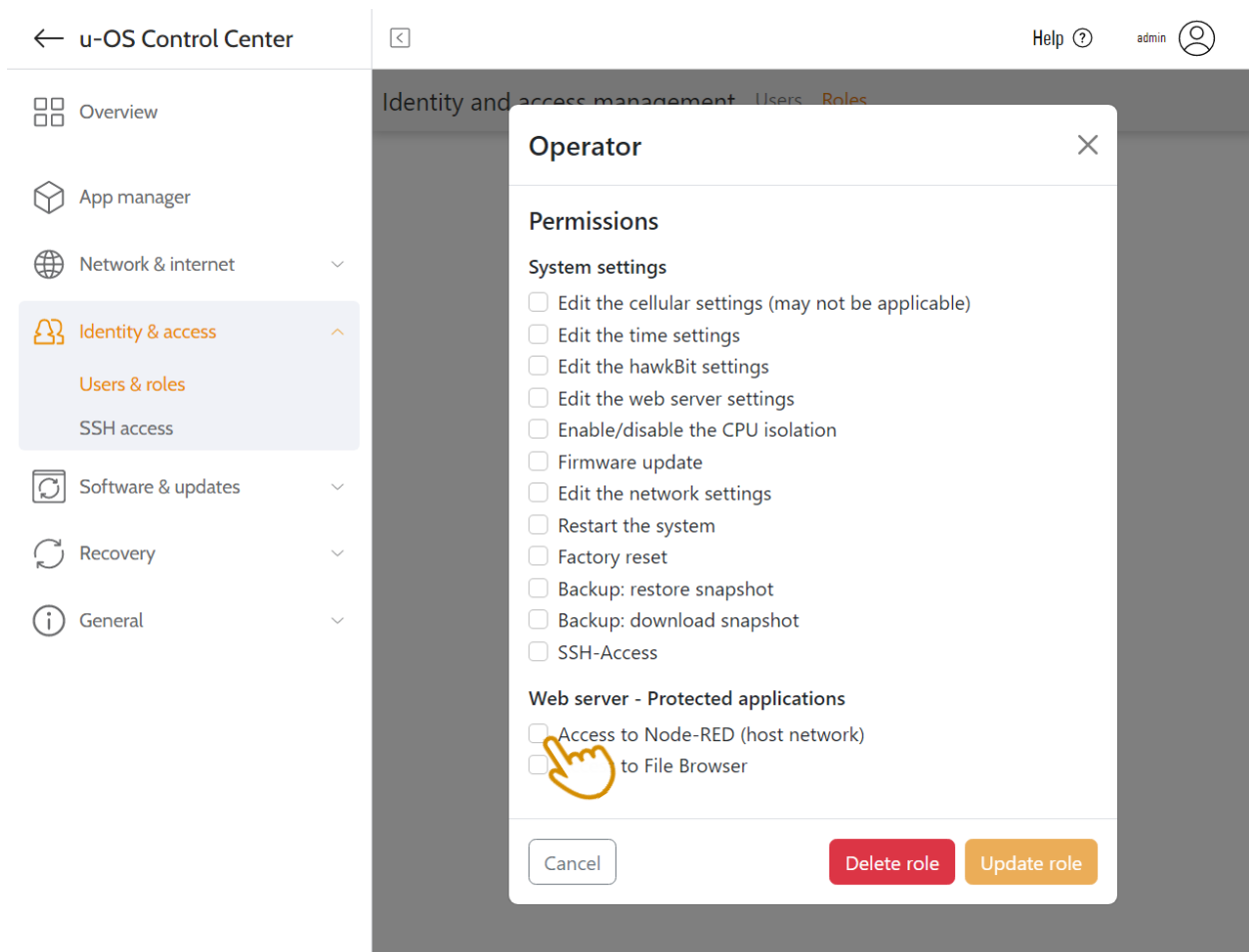
Access to all apps is controlled by the user and role management of u-OS. By default, only the role Administrator has access to the apps. To grant a non-admin user access to the Node-RED editor and dashboard, you need to first setup a role.

Navigate to Identity & access – Users & roles in the u-OS Control Center



Click on the newly created role to edit it.

Installing and using Node-RED App on u-OS



Select “Access to Node-RED” to give this role access to the Node-RED editor and dashboard. It is not possible to only grant access to the dashboard.

7 Modifying the settings.js using the File Browser

Node-RED is configured via a settings file called settings.js. This app note does not describe the settings file itself, but rather how to access and edit it via the File Browser app.

To learn more about the settings file, head to nodered.org/docs/user-guide/runtime/settings-file.

IOT-GW30

Help ? admin

Welcome to u-OS

Last update: 1 hour ago [Refresh](#)

Device information

Product name	Order number	Serial number	u-OS version
IOT-GW30	2682620000	AV3N91PN4820805	2.0.0

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- eth0: --
- eth1: 192.168.11.30

u-OS Control Center

File Browser

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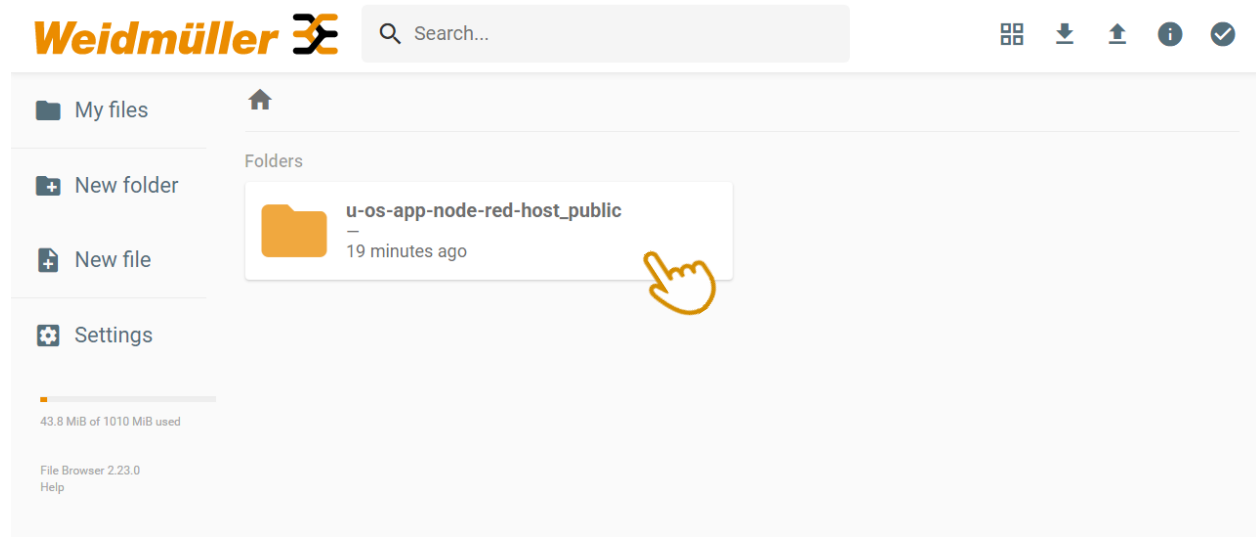
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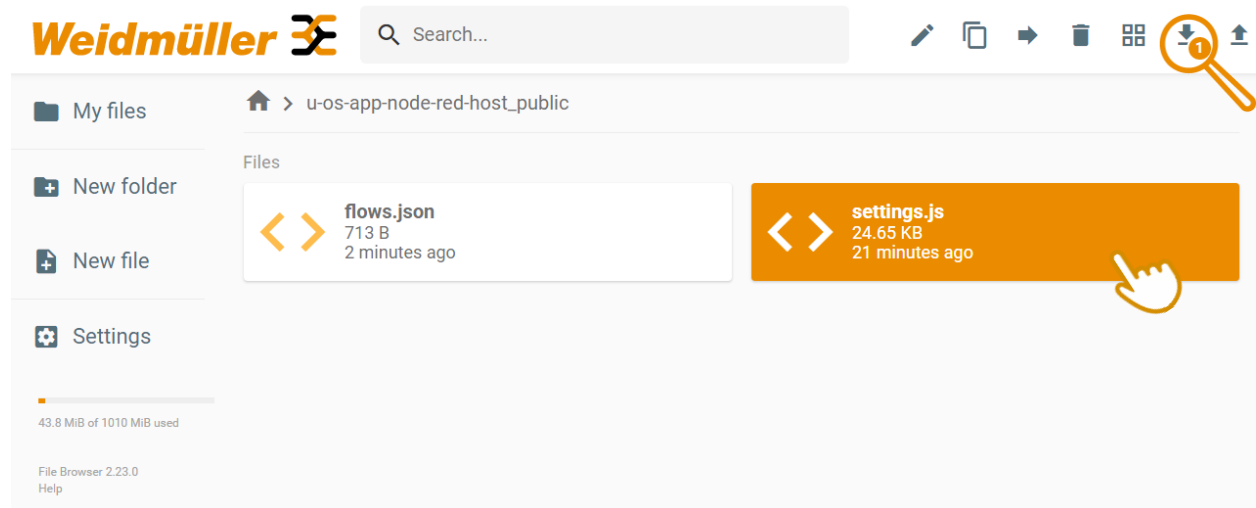
The File Browser app can be installed just like the Node-RED app. Once installed, click on it to open its interface.

Installing and using Node-RED App on u-OS

You will see a folder for each app that has a so-called public volume. Public volumes are used to make files of apps accessible via the File Browser app.



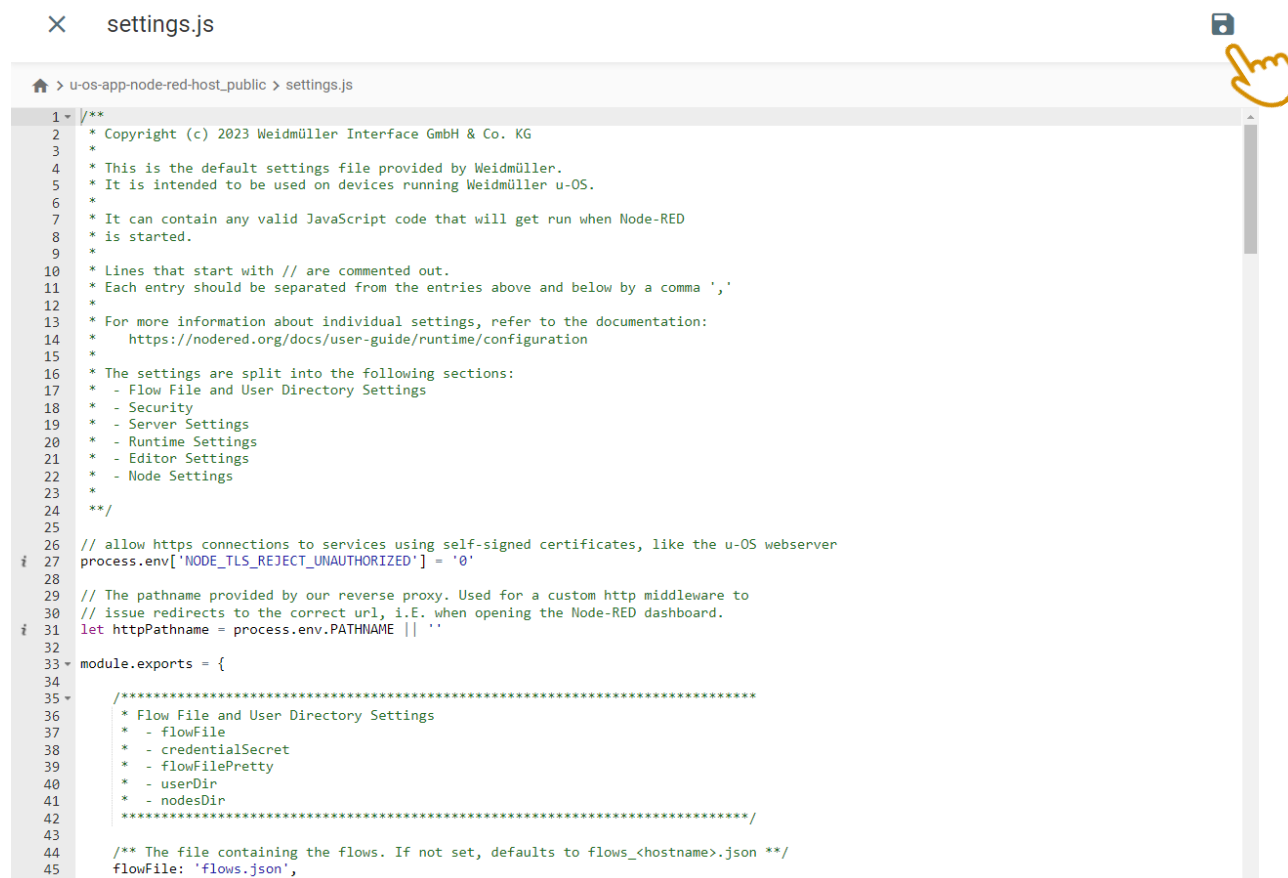
File Browser allows to upload, download, create, delete, and edit files. Click on the u-os-app-node-red folder. You will see the `settings.js` file listed. If you have already deployed a flow in Node-RED, you will also see a `flows.json` file.



Single-click on the `settings.js` file. It will be highlighted, and you get a list of file operations presented in the top-righthand corner. It is recommended you either download or duplicate the `settings.js`, so you have a backup should Node-RED fail to start after making changes to the `settings.js`.

Installing and using Node-RED App on u-OS

To edit the file, simply double-click on it. Once you made your changes, save the file.



```
1 /**
2  * Copyright (c) 2023 Weidmüller Interface GmbH & Co. KG
3  *
4  * This is the default settings file provided by Weidmüller.
5  * It is intended to be used on devices running Weidmüller u-OS.
6  *
7  * It can contain any valid JavaScript code that will get run when Node-RED
8  * is started.
9  *
10 * Lines that start with // are commented out.
11 * Each entry should be separated from the entries above and below by a comma ','
12 *
13 * For more information about individual settings, refer to the documentation:
14 * https://nodered.org/docs/user-guide/runtime/configuration
15 *
16 * The settings are split into the following sections:
17 * - Flow File and User Directory Settings
18 * - Security
19 * - Server Settings
20 * - Runtime Settings
21 * - Editor Settings
22 * - Node Settings
23 *
24 */
25
26 // allow https connections to services using self-signed certificates, like the u-OS webserver
27 process.env['NODE_TLS_REJECT_UNAUTHORIZED'] = '0'
28
29 // The pathname provided by our reverse proxy. Used for a custom http middleware to
30 // issue redirects to the correct url, i.E. when opening the Node-RED dashboard.
31 let httpPathname = process.env.PATHNAME || ''
32
33 module.exports = {
34
35   /**
36    * Flow File and User Directory Settings
37    * - flowFile
38    * - credentialSecret
39    * - flowFilePretty
40    * - userDir
41    * - nodesDir
42    */
43
44   /** The file containing the flows. If not set, defaults to flows_<hostname>.json */
45   flowFile: 'flows.json',
46 }
```

For the changes to take effect, Node-RED must be restarted. As of now, the easiest way to do this is to restart the device. Navigate to Recovery – Reset & restart in the u-OS Control Center:

