



## **UC20-SL2000-OLAC-EC**

### **Quick Start Guide for Node-RED on Studio Controller**

#### **Abstract:**

This Quick Start Guide describes how to set up Node-RED on a UC20-SL2000-OLAC-EC controller. The document contains instructions to install the Node-RED software unit on the controller and first steps stating how to use it.

### Hardware reference

No.	Component name	Article No.	Hardware / Firmware version
1	UC20-SL2000-OLAC-EC	263892000	HW 01.xx.xx

### Software reference

No.	Software name	Article No.	Software version
1	u-create studio	2660130000	1.20.2 or higher

### File reference

No.	Name	Description	Version
1	-	-	-

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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 Installing Node-RED Software Unit

There are two options to Install the Software Unit.

- 1.) If you have a working PLC / Linux image running on your controller, it is possible to add the missing software unit.
- 2.) Another possibility is to create a new target with the missing software unit.

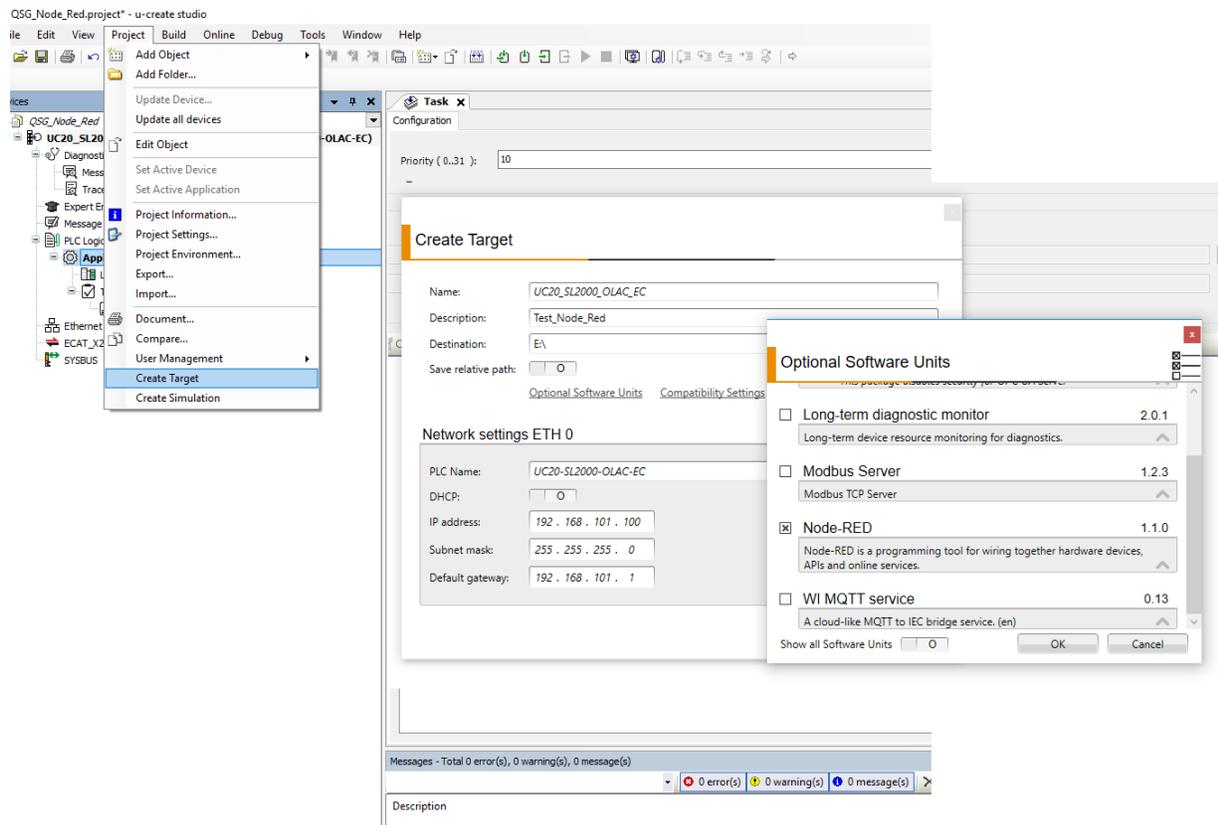
### 2.1 Create a new target



To create a target and to install it on the u-control you first need an empty micro SD card and insert it into the computer.

Then follow the next steps:

- 1.) Start u-create studio and create a new project or open an existing project.
- 2.) Find Project in your toolbar and click Create Target.
- 3.) Select destination path (SD-card).
- 4.) Select Node-Red in Optional Software Units.



- 5.) Create target (this may take several minutes).

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- 6.) Insert micro SD card into your u-control and reboot the device. Orange flashing RUN led indicates the installation process. When installation is finished successfully RUN led is constantly green.
- 7.) Remove SD card from u-control and restart.

## 2.2 Add the Software Unit to a running system



If you want to use this option, it is necessary to have an open communication on port 1744. So, this may not be blocked by security mechanisms.

- 1.) Open the current project and login to the controller.
- 2.) Go to the controller configuration and add the software unit.
- 3.) Restart the controller.

The screenshot displays the Studio Controller software interface. The main window shows the configuration for the software unit 'UC20\_SL2000\_OLAC\_EC\_CAN'. The 'Advanced' tab is selected, showing a list of software units to be managed. The 'Node-RED' unit is highlighted with a red box, and its checkbox is checked. The 'Add/Remove' dialog box is open, showing the 'Node-RED' unit selected. The 'Info' tab on the right shows details for the selected unit, including its name, description, vendor, and version. The 'Messages' window at the bottom shows a list of messages, including 'Ign http://192.168.101.30:1744 jessie-kebian/contrib Translation-en' and 'Ign http://192.168.101.30:1744 jessie-kebian/main Translation-en'. The status bar at the bottom indicates 'Device user: Anonymous', 'Last build: 0 0 0', 'Precompile: ✓', and 'RUN'.

## 3 Opening the Node-Red Software

### 3.1 IP-Address + Port

It is possible to open the Node-Red software directly by entering the IP address of the controller extended by the Node-Red default port.

- ▶ Default IP: <http://192.168.101.100:1880/>

### 3.2 Controller web interface (DevAdmin)

It is also possible to open the controller web interface and navigate to the Node-Red installation via Tab: **Plugins**

Open the web interface by entering the IP-Address of the controller.

- ▶ Default IP: <http://192.168.101.100>
- ▶ User: **Administrator**
- ▶ Password: **tobechanged**

The screenshot shows the DevAdmin web interface. The top navigation bar includes 'DevAdmin' with a wrench icon, and menu items: 'Diag.', 'Config.', 'Backup/Restore', 'System Overview', 'Licensing', 'Legal Info', and 'Plugins'. The 'Plugins' menu is open, showing 'Node-RED' selected. Below the navigation bar, the 'Device Information:' section contains a table with the following data:

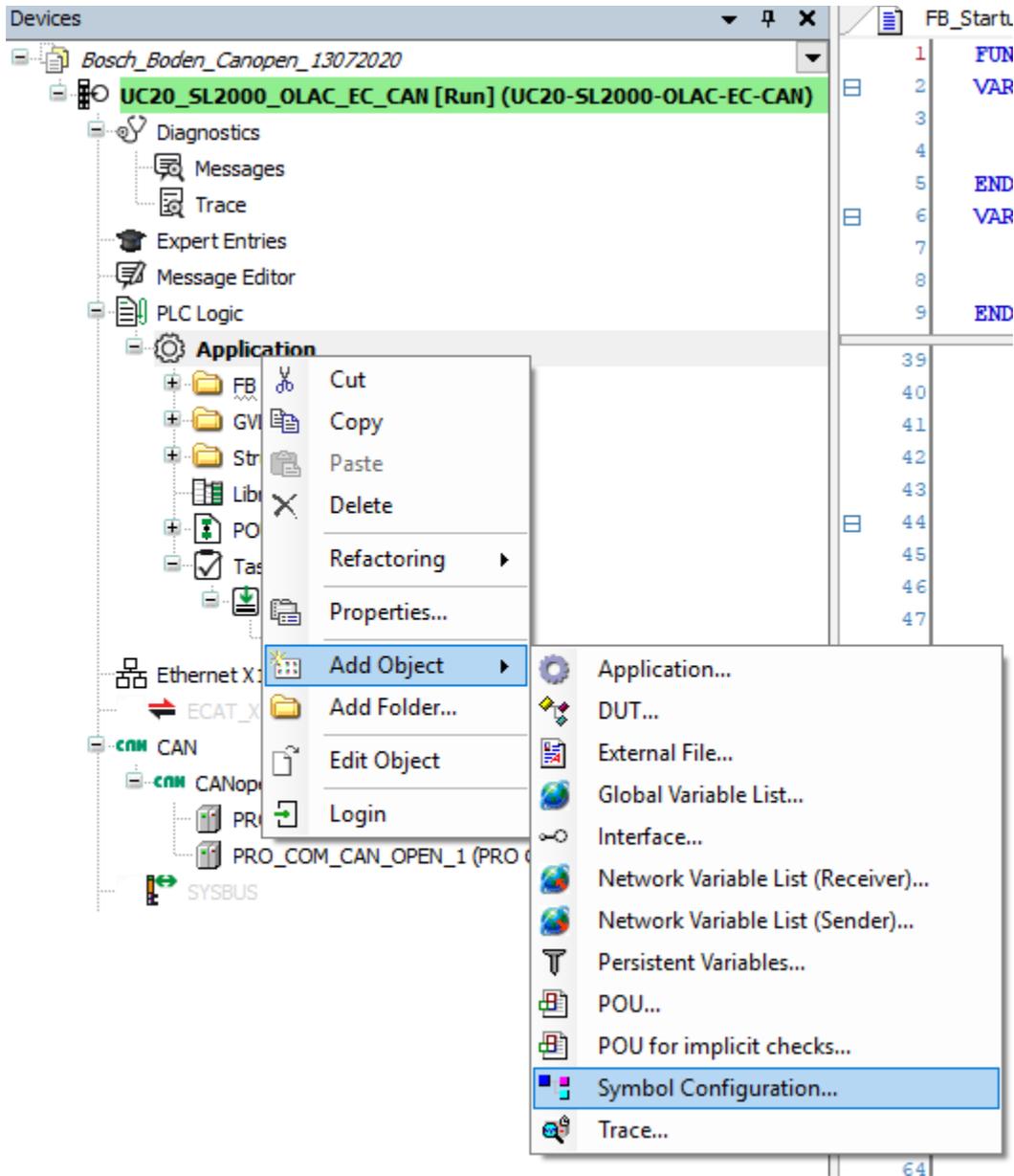
Device Name:	UC20-SL2000-EC
Ser.No.:	AT9P40PC7500437
Part No.:	2674520000
Rev.:	01.00.00
Operating Hours:	0
Workload:	22.79 %
Temperature:	52.415001 °C
Battery:	low/empty

Below the device information, the 'Device State:' section shows a single entry: 'Device State: Run'.

## 4 Communication between Node-RED and u-create studio

It is possible to exchange variables between Node-RED and u-create studio. The variables must be available in the variable pool of u-create studio. Therefore, the variables **must be** selected in the Symbol Configuration of u-create studio.

- 1.) Open u-create studio and create a Symbol Configuration. Right Click on Application → Add Object → Symbol Configuration.



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2.) Push the “Build” button to be able to select variables.



Only variables that are used in the program are available in the Symbol Configuration.

You can also create your own simple program with I/O variables and use it.

QSG0026.project - u-create studio

File Edit View Project Build Online Debug Tools Window Help

Devices

QSG0026

UC20\_SL2000\_OLAC\_EC [Run] (UC20-SL2000-OLAC-EC)

Diagnostics

Messages

Trace

Expert Entries

Message Editor

PLC Logic

Application

Library Manager

POU (PRG)

Symbol Configuration

Task Configuration

Task

POU

Ethernet X1

PCAT\_X2

SYSBUS

UR20\_16DO\_P (UR20-16DO-P)

UR20\_16DI\_P (UR20-16DI-P)

Symbol Configuration

```
1 PROGRAM POU
2 VAR
3     xOutput_1 : BOOL;
4     xOutput_2 : BOOL;
5     xOutput_3 : BOOL;
6     xOutput_4 : BOOL;
7     xOutput_5 : BOOL;
8     xOutput_6 : BOOL;
9     xOutput_7 : BOOL;
10    xOutput_8 : BOOL;
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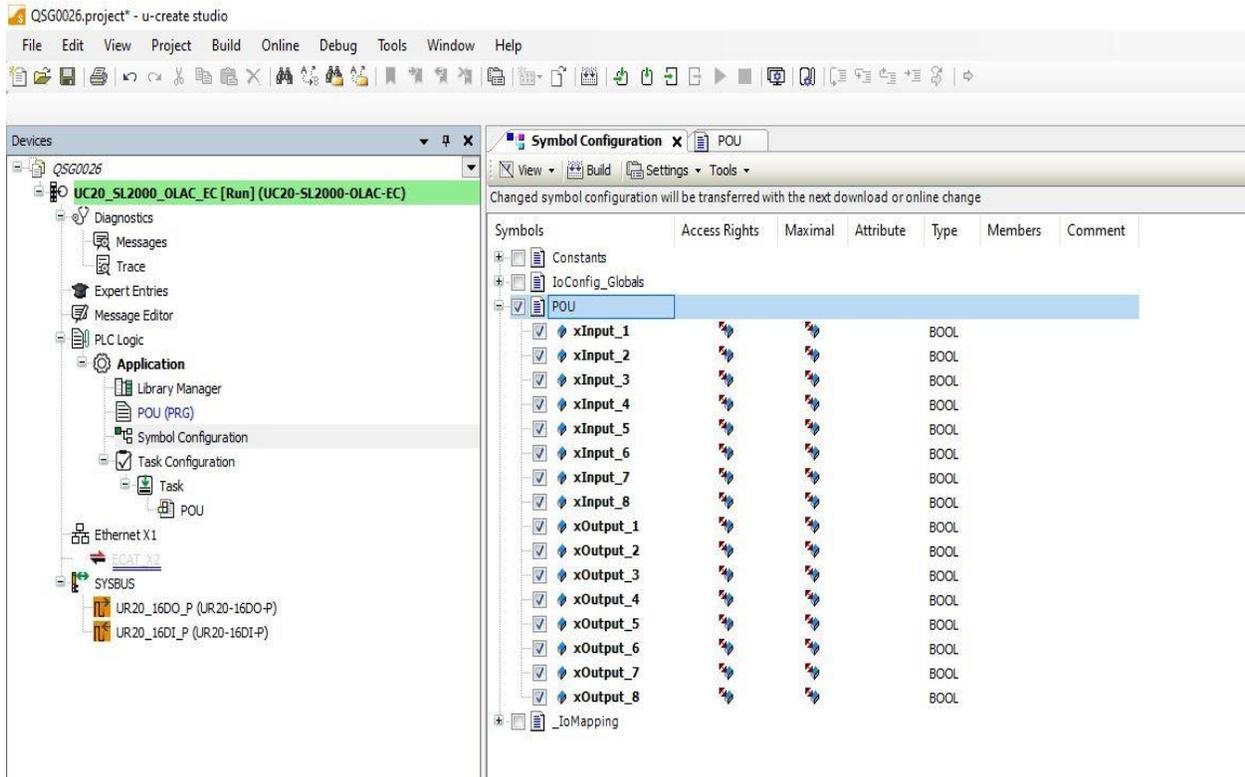
Messages - Total 0 error(s), 1 warning(s), 0 message(s)

Build 0 error(s) 1 warning(s) 0 message(s)

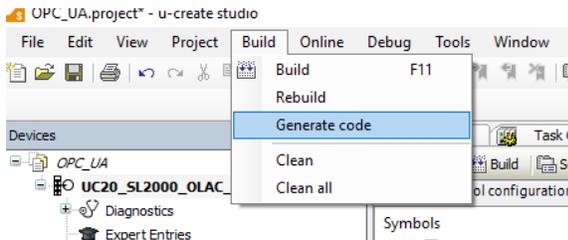
Description	Project	Object	Position
-------------	---------	--------	----------

## Quick Start Guide for Node-RED on Studio Controller

### 3.) Mark the variables you want to use inside Node-RED.



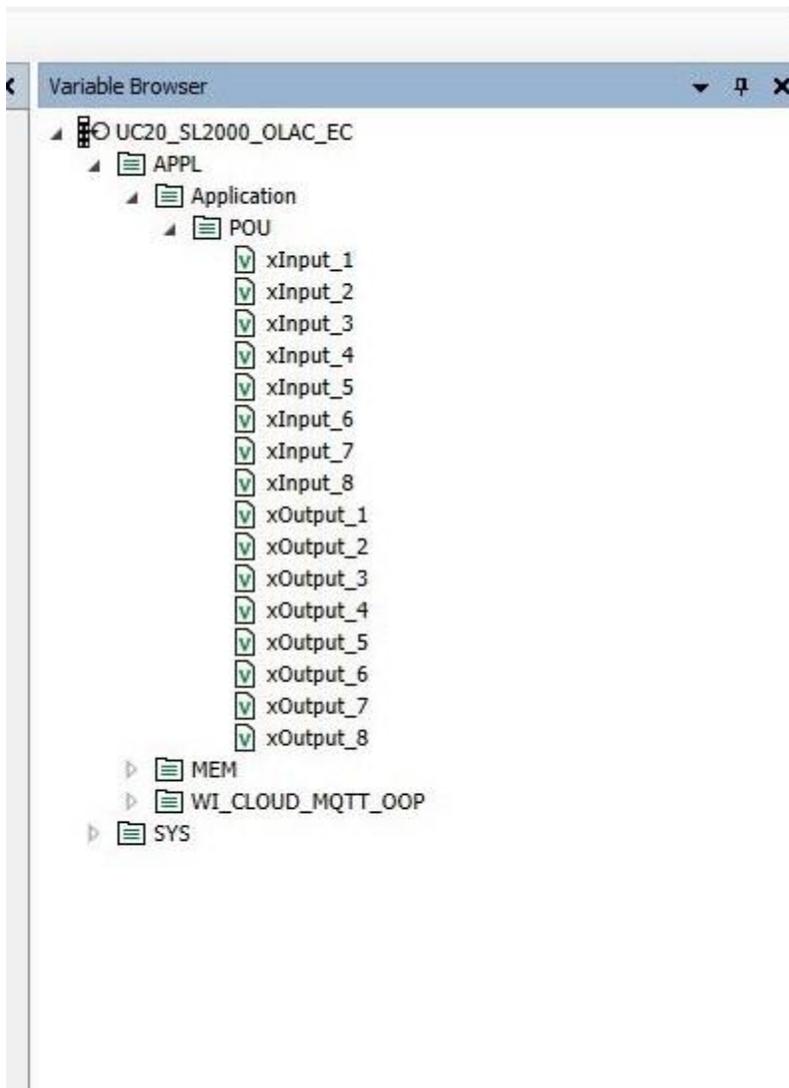
### 4.) If all configurations are done, select “build” and then “generate code” to publish the variables.



### 5.) Download the project to the controller.



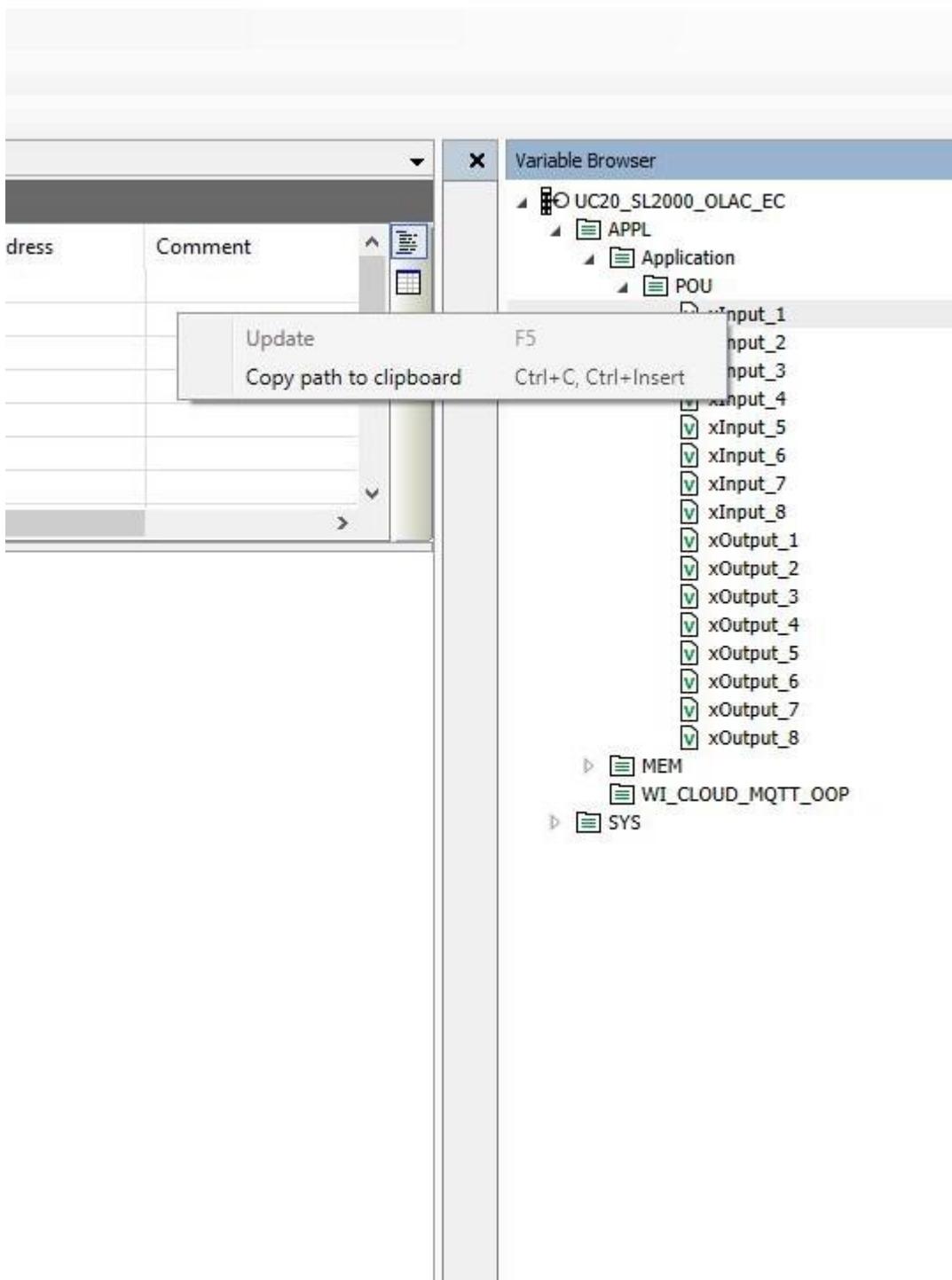
- 6.) Check the variable browser inside u-create studio, if all the selected variables are available.



- 7.) Open Node-RED → add a plc-var-in node and a plc-var-out node to a flow. Double-click each node to configure the node.



- 8.) Type in the path of the variable you want to use inside Node-RED. The easiest way to insert the variable name and prevent errors:  
change to u-create studio → Variable Browser → right click on the variable → copy path to clipboard.



- 9.) → Change to Node-Red → Paste the variable path to the node  
Configure the polling time and click Done.

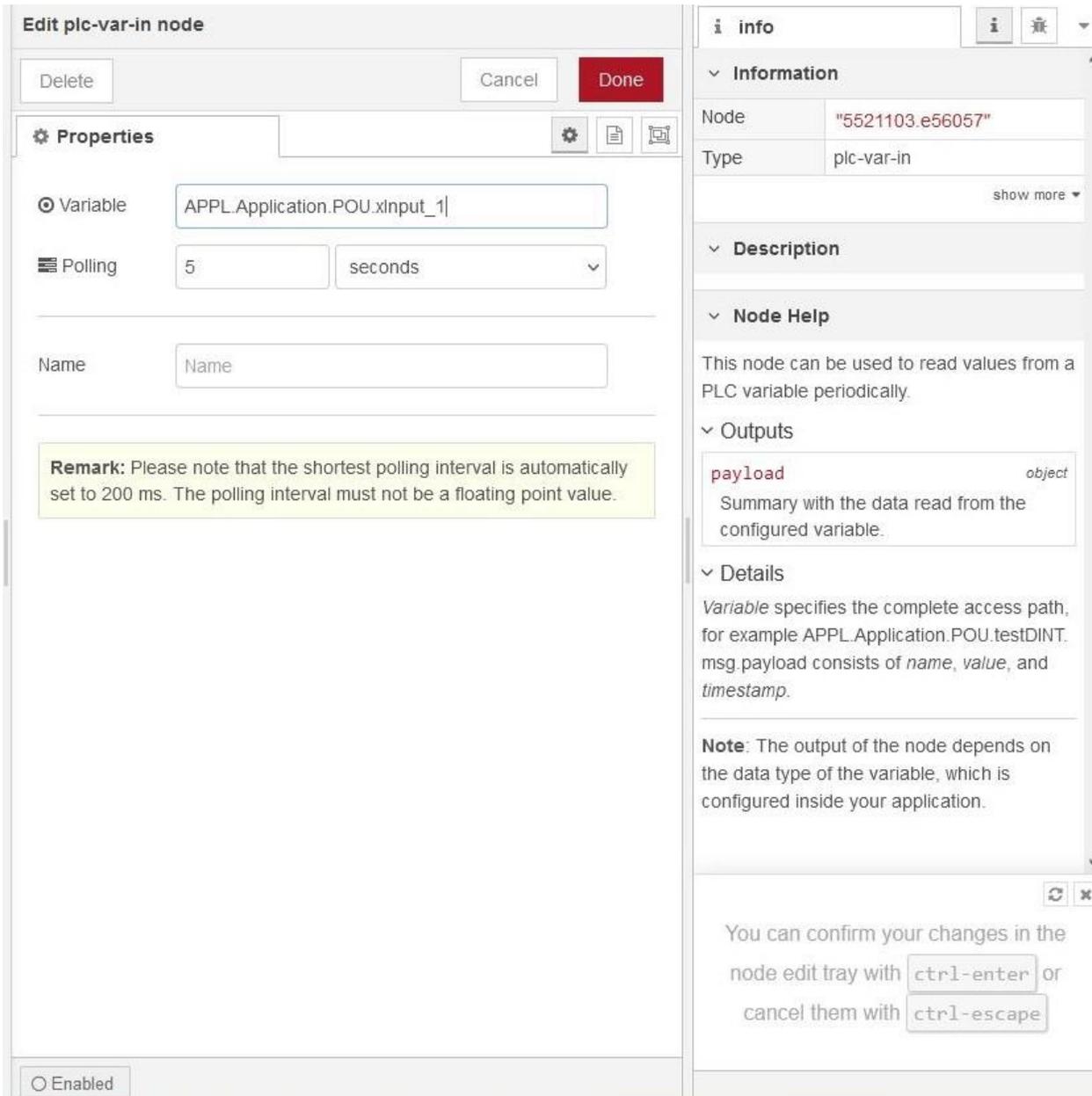


Figure 1: xInput

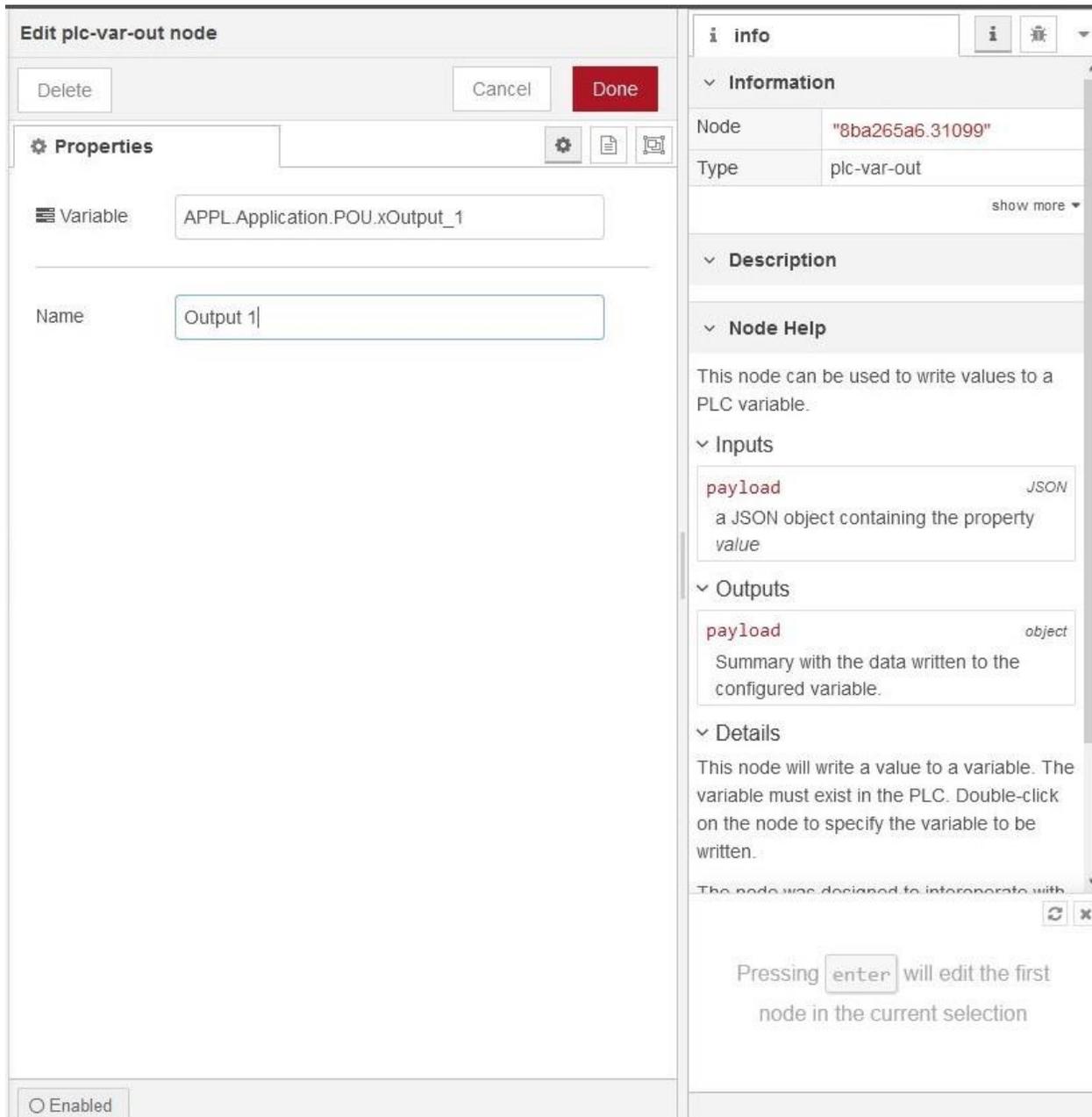
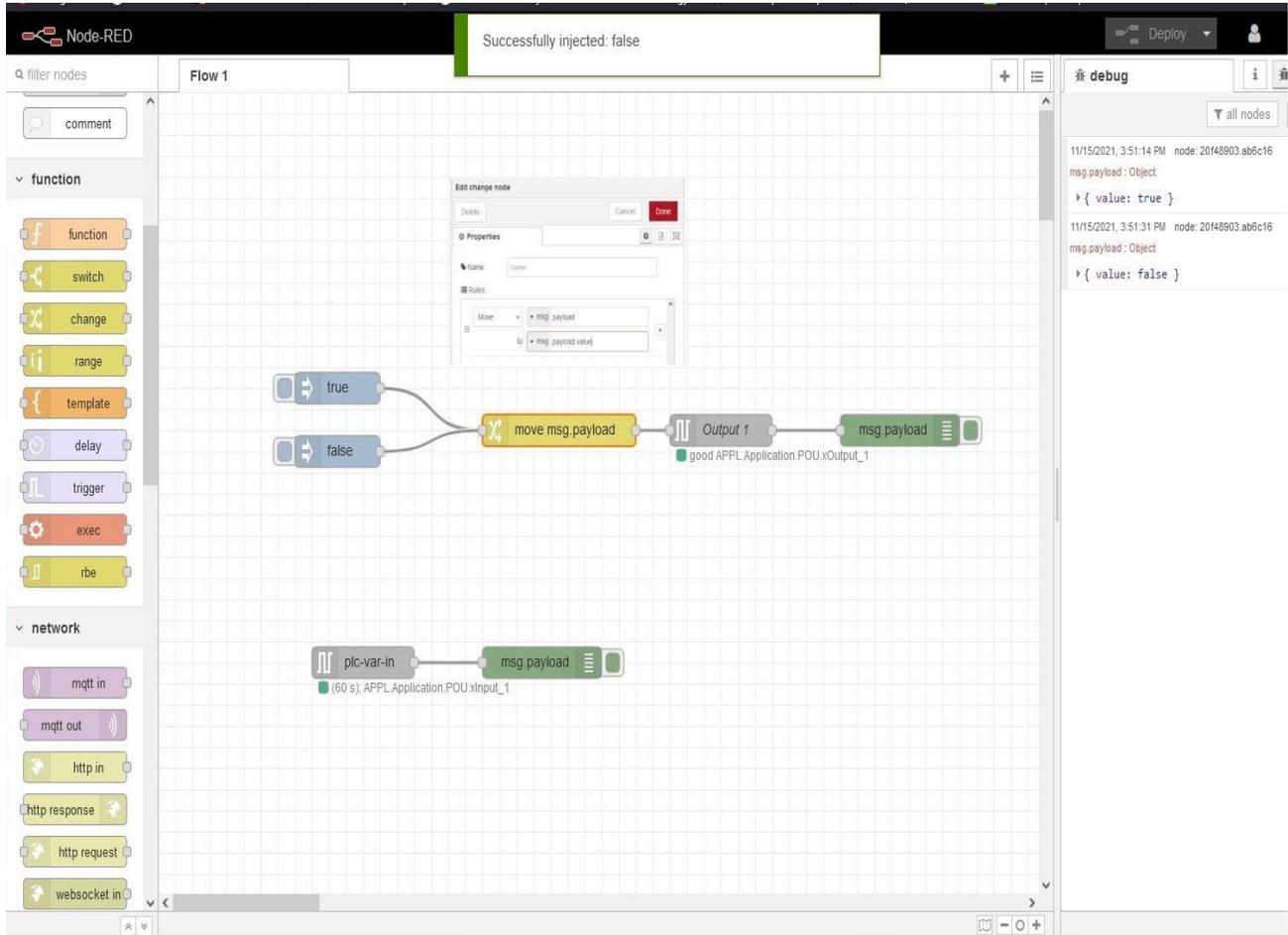


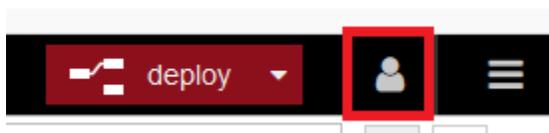
Figure 2: xOutput

## Quick Start Guide for Node-RED on Studio Controller

- 10.) Insert a debug node and connect to the plc-var-in node to view the plc data. The example for plc-var-out also includes 2 inject nodes (configured to boolean true/false) and a switch node (for configuration see embedded screenshot).



- 11.) Deploy the Node-RED program. You need to login:



Default Settings:

Name: **Administrator**

Password: **tobechanged**

12.) Open the debug tab to see the debug messages.

The screenshot displays the Node-RED interface. At the top, a notification box states "Successfully injected: false". The main workspace contains a flow diagram with the following components:

- A "Set/Unset first Output variable" node.
- Two "true" and "false" boolean nodes connected to a "move msg.payload" node.
- An "Output 1" node connected to a "msg.payload" node.
- A "Read first Input variable" node.
- A "plc-var-in" node connected to a "msg.payload" node.

An "Edit change node" dialog is open over the "move msg.payload" node. The "msg" property is set to "msg.payload" and the "to" property is set to "msg.payload.value".

The "debug" tab on the right shows a list of messages:

```
msg.payload : Object
  > { name:
    "APPL.Application.POU.xInput_1",
    value: "0", timestamp:
    "2000-01-01T04:15:03.426Z" }
11/15/2021, 3:54:07 PM node: 358f86a5.46861a
msg.payload : Object
  > { name:
    "APPL.Application.POU.xInput_1",
    value: "1", timestamp:
    "2000-01-01T04:16:03.438Z" }
11/15/2021, 3:55:07 PM node: 358f86a5.46861a
msg.payload : Object
  > { name:
    "APPL.Application.POU.xInput_1",
    value: "1", timestamp:
    "2000-01-01T04:17:03.448Z" }
11/15/2021, 3:56:07 PM node: 358f86a5.46861a
msg.payload : Object
  > { name:
    "APPL.Application.POU.xInput_1",
    value: "1", timestamp:
    "2000-01-01T04:18:03.461Z" }
11/15/2021, 3:57:07 PM node: 358f86a5.46861a
msg.payload : Object
  > { name:
    "APPL.Application.POU.xInput_1",
    value: "1", timestamp:
    "2000-01-01T04:19:03.472Z" }
11/15/2021, 3:57:18 PM node: 20f48903.ab6c16
msg.payload : Object
  > { value: true }
11/15/2021, 3:57:19 PM node: 20f48903.ab6c16
msg.payload : Object
  > { value: false }
```



In the PLC project, you can also force (Input) and monitor (Output) the actual values of the variables which are configured in the Node-RED project.

The screenshot displays the SIMATIC Manager interface for a PLC project. The main window shows a table of variable configurations and a ladder logic editor below it. The Variable Browser on the right shows the project's variable hierarchy.

Expression	Type	Value	Prepared value	Address	Comment
xOutput_1	BOOL	TRUE			
xOutput_2	BOOL	FALSE			
xOutput_3	BOOL	FALSE			
xOutput_4	BOOL	FALSE			
xOutput_5	BOOL	FALSE			
xOutput_6	BOOL	FALSE			
xOutput_7	BOOL	FALSE			

```

1  Qx_16DO_00 TRUE := xOutput_1 TRUE ;
2  Qx_16DO_01 FALSE := xOutput_2 FALSE ;
3  Qx_16DO_02 FALSE := xOutput_3 FALSE ;
4  Qx_16DO_03 FALSE := xOutput_4 FALSE ;
5  Qx_16DO_04 FALSE := xOutput_5 FALSE ;
6  Qx_16DO_05 FALSE := xOutput_6 FALSE ;
7  Qx_16DO_06 FALSE := xOutput_7 FALSE ;
8  Qx_16DO_07 FALSE := xOutput_8 FALSE ;
9
10 xInput_1 FALSE := Ix_16DI_00 FALSE ;
11 xInput_2 FALSE := Ix_16DI_01 FALSE ;
12 xInput_3 FALSE := Ix_16DI_02 FALSE ;
13 xInput_4 FALSE := Ix_16DI_03 FALSE ;
14 xInput_5 FALSE := Ix_16DI_04 FALSE ;
15 xInput_6 FALSE := Ix_16DI_05 FALSE ;
16 xInput_7 FALSE := Ix_16DI_06 FALSE ;
17 xInput_8 FALSE := Ix_16DI_07 FALSE ;
18 RETURN
    
```

**Variable Browser:**

- UC20\_SL2000\_OLAC\_EC
  - APPL
    - Application
      - POU
        - xInput\_1
        - xInput\_2
        - xInput\_3
        - xInput\_4
        - xInput\_5
        - xInput\_6
        - xInput\_7
        - xInput\_8
        - xOutput\_1
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        - xOutput\_5
        - xOutput\_6
        - xOutput\_7
        - xOutput\_8
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  - WI\_CLOUD\_MQTT\_OOP
  - SYS