

# Tutorial: Node-RED on the Turck IM18-CCM50



This tutorial explains how to install and use Node-RED on the Turck IM18-CCM50. The IM18-CCM50 is a small industrial Linux computer, suitable for placing in control cabinets. More information about the IM18-CCM50 can be found on <u>the Turck website</u>.

<u>Node-RED</u> is a programming tool for wiring together hardware devices, APIs and online services in new and interesting ways. It provides a browser-based editor that makes it easy to wire together flows using the wide range of nodes in the palette that can be deployed to its runtime in a single-click.

## Connect to the IM18-CCM50

By default the ethernet interfaces are set the DHCP. The default IP addresses when no DHCP server is active are 192.168.1.20 for ETH0 and 192.168.2.20 for ETH1. After powering up the device and connecting via ethernet it is possible to access the device via SSH. A client like <u>PuTTY</u> can be used. The user is `*sshu*` and the default password is `*P@ssw0rd12ssh!*` It is recommended to change this password after the first login.



## Installing Node-RED

The <u>Node-RED documentation</u> tells us that first Node.js needs to be installed. In the <u>FAQ</u> the recommended and supported versions of Node.js can be found. I recommend to use the most recent supported LTS release of Node.js. Check the <u>Node.js website</u> for information about the current LTS release. At the time of writing Node.js V14 is recommended by Node-RED. Also the modbus package we will install later is not yet supported with Node.js V16.

The <u>Node.js documentation</u> explains that an installation package for Node.js is provided by <u>NodeSource</u>. Use the following commands to install Node.js on the IM18-CCM50:

- sudo curl -fsSL https://deb.nodesource.com/setup\_14.x | sudo bash -
- sudo apt install -y nodejs

To install Node-RED the `*npm*` command can be used. Use the following command to install Node-RED:

• sudo npm install -g --unsafe-perm node-red

Node-RED can be started by executing the following command via SSH:

• sudo node-red

Now Node-RED is available to access via a webbrowser at port 1880. For example: `http://192.168.2.20:1880`. You can use `Ctrl-C` or close the terminal window to stop Node-RED.

To start Node-RED on boot, a script needs to be added. <u>The script is available on github</u>. It can be installed with 1 command:

 sudo wget -O /tmp/node-red https://gist.githubusercontent.com/SankariNL/afe080d53b90ffe19081e720b569a319/ra w && sudo mv /tmp/node-red /etc/init.d && sudo chmod +x /etc/init.d/node-red && sudo update-rc.d node-red defaults

The file can also be manually added to the *`/etc/init.d`* folder via SCP for example. Then the *`chmod`* and *`update-rc.d`* commands need to be executed manually.

Reboot the IM18-CCM50 and access Node-RED via the webbrowser again.



## Using the available scripts

When Node-RED is installed and running, it is possible to use the scripts that are delivered with the IM18-CCM50. These scripts are located in the *`/home/scripts*` directory as mentioned in chapter 7.3 of <u>the manual</u>. Scripts can be executed by Node-RED by using the default `*exec*` node. To execute the `*ambient\_read.sh*` script input the following as the command: *`/home/scripts/ambient\_read.sh*`.

There is a flow <u>available</u> where the `ambient\_read.sh` script is executed every 30 seconds (this can be changed after importing) and the result is added to the `msg` object. The flow looks like this:

ם ⇒ inject ט	•¢	/home/scripts/ambient_read.sh	f function msg.payload

When observing de debug output it shows the payload object with the humidity and temperature:

msg.payload : Object		
▼object		
humidity: 35	.86	
temperature:	25.84	

## Installing additional Node-RED submodule for Modbus

To use Modbus in Node-RED an additional package needs to be installed. There are several packages available, in this tutorial we will use the <u>node-red-contrib-modbus</u> package. Normally packages can be added by using the `manage palette` menu option. However, when trying this the following error shows up in the installation log:



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2021-11-18T14:43:30.768Z [err] gyp ERR! node -v v14.18.1 2021-11-18T14:43:30.768Z [err] gyp ERR! node-gyp -v v5.1.0 2021-11-18T14:43:30.768Z [err] gyp ERR! 2021-11-18T14:43:30.778Z [err] not ok
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2021-11-18114:43:30.702 [err] gyp ERR! 2021-11-18T14:43:30.770Z [err] not ok
2021-11-18/14/143/30.//02 [err] not ok
2021-11-18/14/33/30.7/12 [err]
2021-11-13/14:43:54.4582 [err] npm
2021-11-18/14/33/34.4002 [PTT]
2021-11-13114:43:54.4052 [err] Exk: CODE ELIFECTULE
2021-11-18114:43:34.4052 [eff] npm Exk: effn0 1
2021-11-1014:43:34.0022 [eff] lipm
2021-11-10114:43:34.0632 [UTT] 2021-11-10114:43:34.6602 [own] EDBL @comisionart/biodiagr@D 2 [install, `amobuild install, tag profix @comisionart/biodiagr@   ando ave pobuild`
2021 11 1014.43.34.0007 [eff] Enk: geerlalport/Dinuingsgs.2.5 Install. predulid-installtag-prelix gserlalport/Dinuingsg    noue-gyp reduind
2021-11-10114-42-24 R807 [arch] nom ERR
2021 11-10144-02-04 ROOT [and ] nom EDDI Failed at the General anoth / hindings@0 2 5 install script
2011 11 2017 14/01/2018 (2017) npm FRR Tailed at the generative a problem with npm Theore is likely additional logging output above
2011 11 10114-01-14 8977 [and]
2011 11 1010143734 2017 [cm]
2011 11 13114/43/34 8317 [am]
2021-11-18/11/4/43/34.88/7 [err] FBR! A complete log of this run can be found in:
2021-11-18114-43-34_8367 [err] nnm FREI /root/.nnm/ logs/2021-11-18114_43_34_7927-debug_log
2021-11-18114:43:34.8912 rc=1

This is because the <u>SerialPort</u> Node.js package could not be installed. The IM18-CCM50 uses a Texas instruments Sitara processor that is based on ARM v7. According to the <u>documentation of SerialPort</u> this is not a supported platform, but will probably work. To get it to work we need to compile the SerialPort package from scratch.

For this we need the 'build-essential' package and 'python 2.7'.

Use the following command to install the `build-essential` package:

- sudo apt-get update
- sudo apt install build-essential

Install the `*python2.7*` package because by default only the minimal python package is installed. SerialPort uses the `*ast*` package that is not included in the minimal python installation.

• sudo apt install python2.7



Now compile and install the Node.js package with the following command:

• sudo npm install -g serialport --unsafe-perm --build-from-source

Now it is possible to install the `node-red-contrib-modbus` package via the manage palette function in Node-RED. After installing the new modbus related nodes show up on the left side in Node-RED.

## Using modbus in Node-RED

To use the modbus connection, first a modbus device needs to be connected. I've used the <u>QM30VT2 vibration sensor</u> from Banner Engineering that measures vibration and temperature. Attach 24V to pin 1 and 3, and attach pin 4(A) and 2(B) to pin 4(A) and 5(B) of the CAN port of the IM18-CCM50.

To use the modbus serial connection use the `*Modbus - Read*` node to read a register from a connected modbus device. Here fill in the following settings to access the temperature modbus register from the QM30VT2 sensor:

Edit Modbus-Re	ad node	
Delete		Cancel Done
Properties		
Settings	Optionals	
Name	Name	
Торіс	Торіс	
Unit-Id		
FC	FC 3: Read Holding Registers V	
Address	5203	
Quantity	1	
Poll Rate	30 second(s) 🗸	
<b>එ</b> Delay on star	rt 🔽	
O Delay Time	10	
Server	Add new modbus-client	✓

According to the manual the register alias adress is `45204`. The `4` indicates that this is a holding register. So the FC is `*FC 3: Read Holding Registers*`. The address 5204 is offset by 1, so that's why the address to look for is `5203`. It's possible to read out multiple registers at once, but we only read 1 register. Since modbus is based on polling, a poll rate can be set.



The last dropdown is `Server`. Here a modbus-client needs to be configured to be able to read modbus registers. Click the small pencil to add a new modbus-client config node.

Edit Modbus-Read node > Edit modbus-client node				
Delete			Cancel	Update
Properties				\$
Name	Name			
Туре	Serial Expert	~		
ズ Serial port	/dev/ttyO1			Q
Serial type	RTU-BUFFERD	~		
Baud rate	19200	~		
Data Bits	8 🗸			
Stop Bits	1 *			
Parity	None 🗸			
☆ Connection delay (ms)	0			
Unit-Id	1			
Timeout (ms)	1000			
III Reconnect on	i timeout 🔽			
Reconnect timeout (ms)	2000			
🎞 UnitId's in par	allel			
Log states ch	anges 🗌			
III Queue Loggir	ng 🗌			
III Queue comm	ands 🔽			
Queue delay (ms	s) 1			

Choose `Serial Expert` as the type. The serial port can be searched, or filled in manually. For the IM18-CCM50 this is always the '/dev/ttyO1` device. The serial type should be `*RTU-BUFFERD*`. The modbus settings are 19200 baud-rate with 8 data bits and 1 stop bit, without



parity. The Unit-Id is the default modbus address, used only if no other address is specified in a Modbus-read of write node.

There is a flow **<u>available</u>** where the modbus-read node is executed every 30 seconds (this can be changed after importing) and the result is added to the `*msg*` object. The flow looks like this:

Modbus Read	function	msg.payload
active ( 30 sec. )		

When observing de debug output it shows the payload object with the temperature:

msg.payload : Object	
▼object	
temperature:	30.24

In this tutorial we've seen multiple ways on how to measure temperature with the IM18-CCM50 together with Node-RED. In an upcoming tutorial I hope to show multiple ways on how to store and view the data we collected in this tutorial. If you have any more ideas, please let me know!



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