

CPX-IOT with PROFINET

This document describes how to set up a CPX-IOT gateway and how to use all the performances of the device with PROFINET environment.

CPX-IOT

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Users of this document (application note) must verify that all functions described here also work correctly in the application. By reading this document and adhering to the specifications contained therein, users are also solely responsible for their own application.

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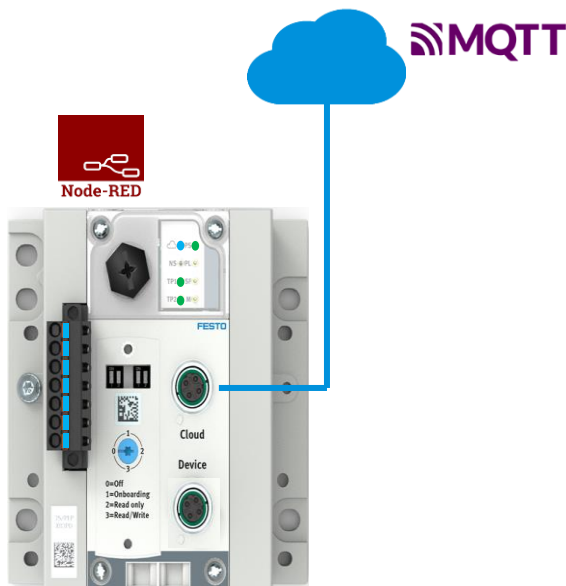
1 Components/Software used

Type/Name	Version Software/Firmware	Date of manufacture
CPX-IOT-O	1.0.6-ac67942f6M.20210831	

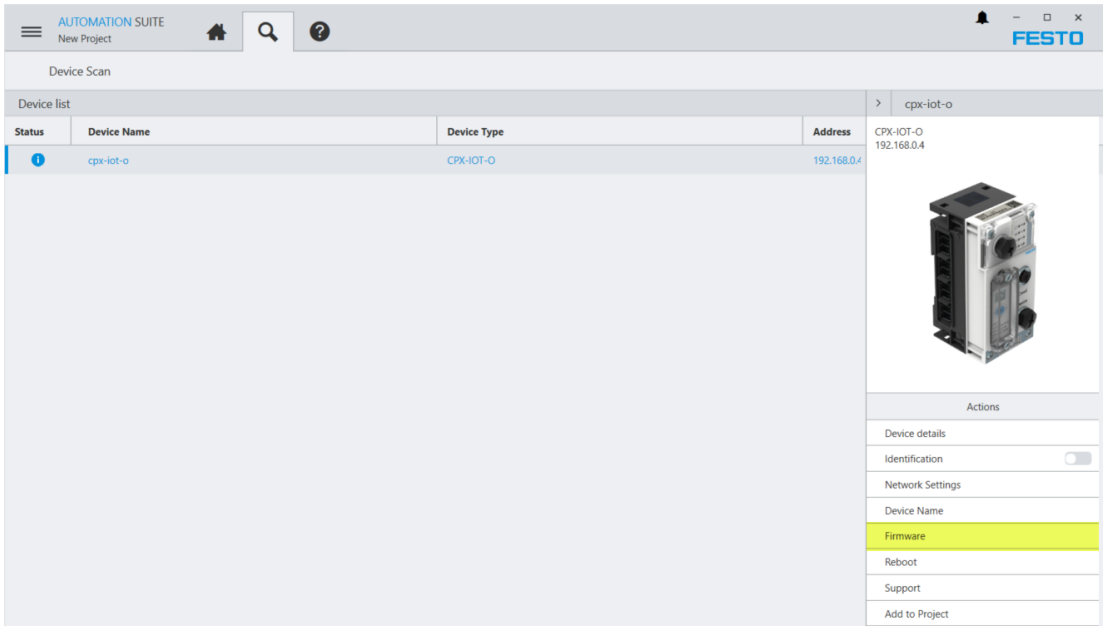
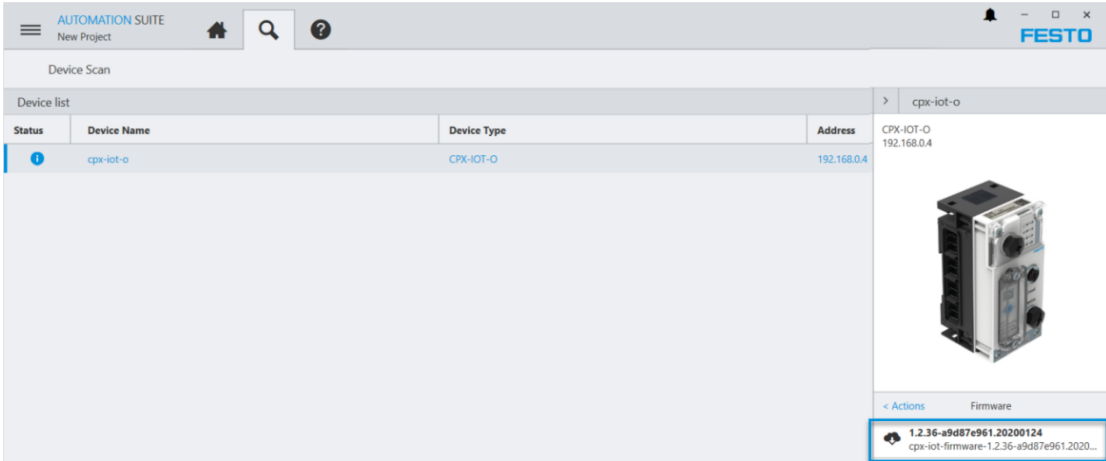
Table 1.1: 1 Components/Software used

1.1 Overview Connectivity

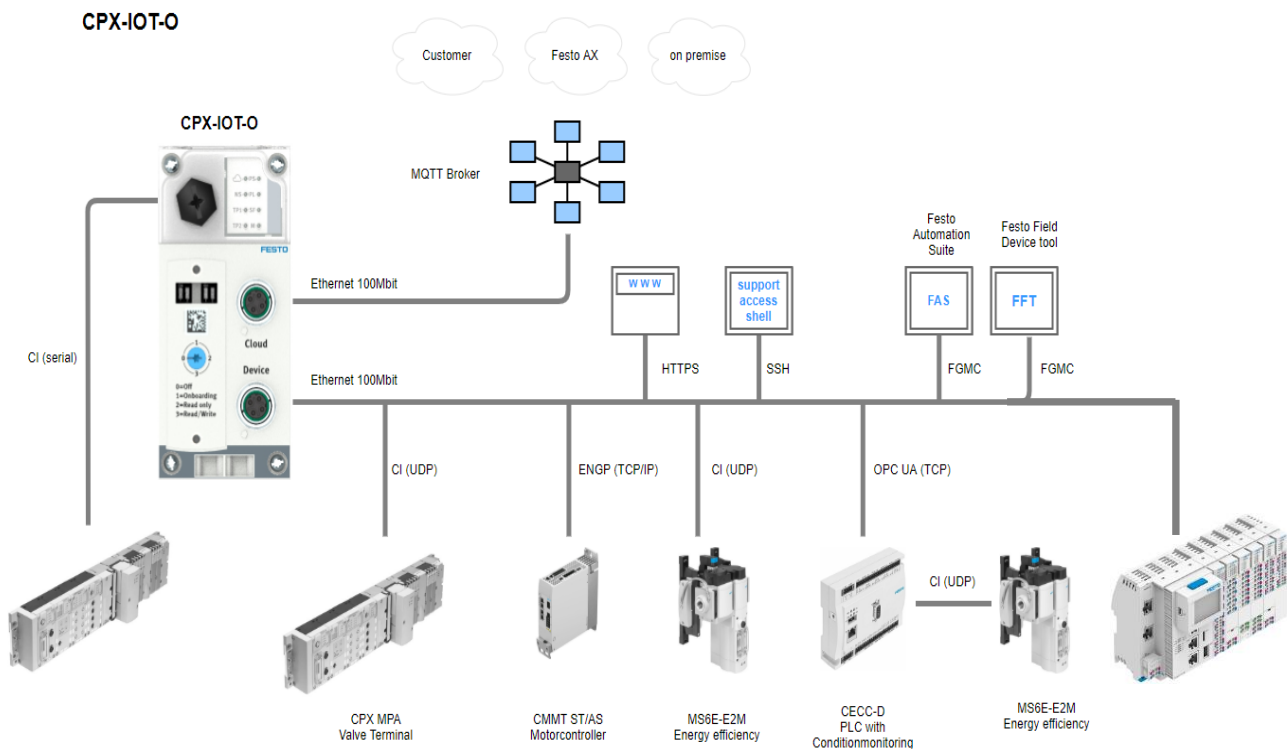
Node-RED is optional and must be installed separately. In order to get the latest security fixes, the correct procedure for updating the CPX-IOT is shown below.



No.	How to update CPX-IOT via Festo Field Device Tool or Festo Automation Suite.								
1.	Update the bootloader file using Festo Field Device tool. Hint: Bootloader should be updated if there is a new version.								
	<table><tr><th>Device name</th><th>IP Address</th><th>Device type</th><th>MAC</th></tr><tr><td>cpx-iot-o</td><td>192.168.0.4</td><td>CPX-IOT-O</td><td>00:0E:F0:60:9A:40</td></tr></table> Firmware Firmware with Backup Network Diagnosis Backup Restore Identification Versions Bootapplication Reboot Telnet Homepage FST FMT Copy IP address Favorite	Device name	IP Address	Device type	MAC	cpx-iot-o	192.168.0.4	CPX-IOT-O	00:0E:F0:60:9A:40
Device name	IP Address	Device type	MAC						
cpx-iot-o	192.168.0.4	CPX-IOT-O	00:0E:F0:60:9A:40						

2	Via Festo Automation Suite
	
	
	 cpx-iot-o-bootloader-1.3.0-6d08cb642.20211021.ffwu
2.	After updating the bootloader, do the same with firmware file. Use the same procedure as before.
	 cpx-iot-o-firmware-1.0.7-6d08cb642.20211021.ffwu
3.	As optional, download the Node-RED file. Use the same procedure as before.
	 cpx-iot-o-node-red-1.0.7-6d08cb642.20211021.ffwu

An overview of the connectivity of the CPX-IOT is shown in the following image. The MQTT broker could be also connected to the Device interface.

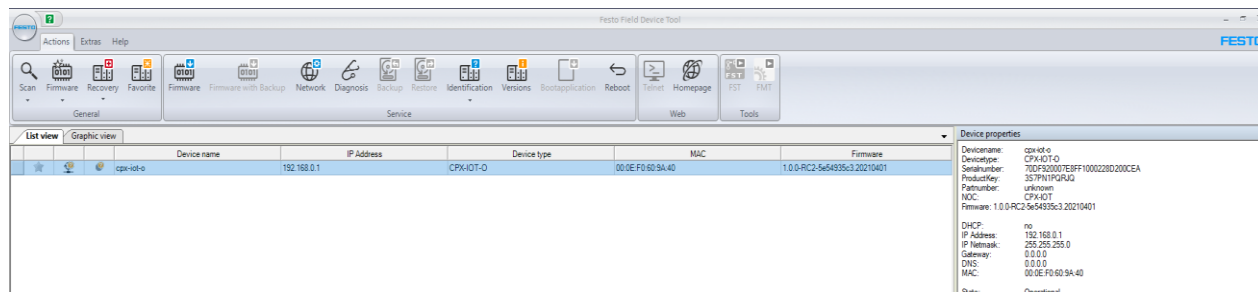


2 CPX_IOT

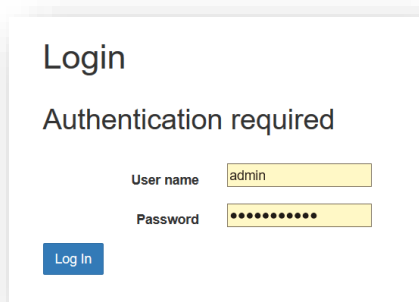
2.1 Login

Default IP address: 192.168.0.1

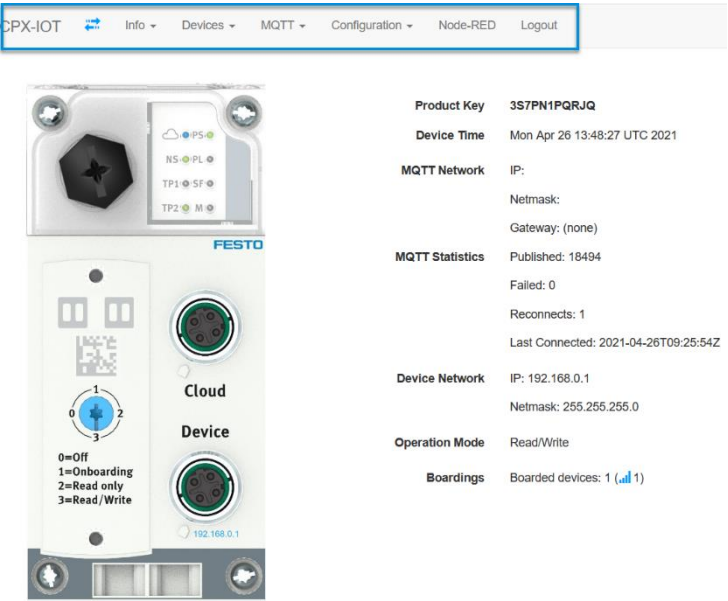
Festo Field Device tool:



- Open a browser <https://your-device-ip-address>
- User name: admin
- Password: Festo Product Key



2.2 Webserver Toolbar.



MQTT connection status.

Red: MQTT disconnected.

Blue: MQTT connected.

Orange: Logout.

Info: General information and diagnosis.

Devices: Device boarding and configuration.

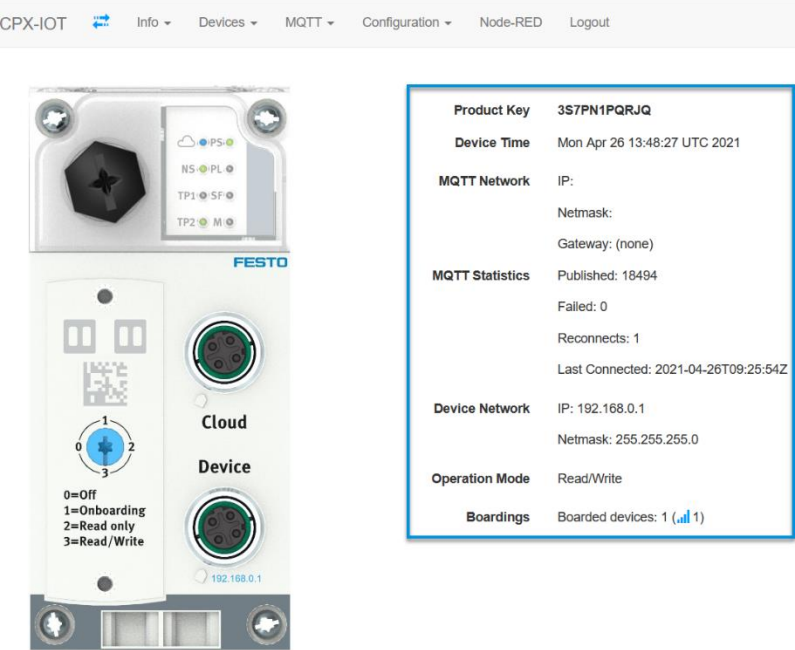
MQTT: MQTT configuration.

Configuration: MQTT and NTP configuration.

Node-Red: Node-Red for custom code.

User: Change user credentials.

2.3 Webserver home page



Product Key: Device Product Key.

Devices Time: Data and time from CPX-IOT.

MQTT Network: MQTT network configuration.

MQTT Network: Basic MQTT statistics.

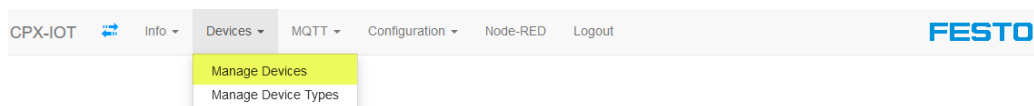
Device Network: Device network configuration.

Operation Mode: Should be on “Read/Write”.

Boardings: Count of boarded devices.

2.4 Manage Devices

Plug devices to the device port as shown on the picture below. For scanning click on Manage Devices.



- Scan automatically.

Scan Devices

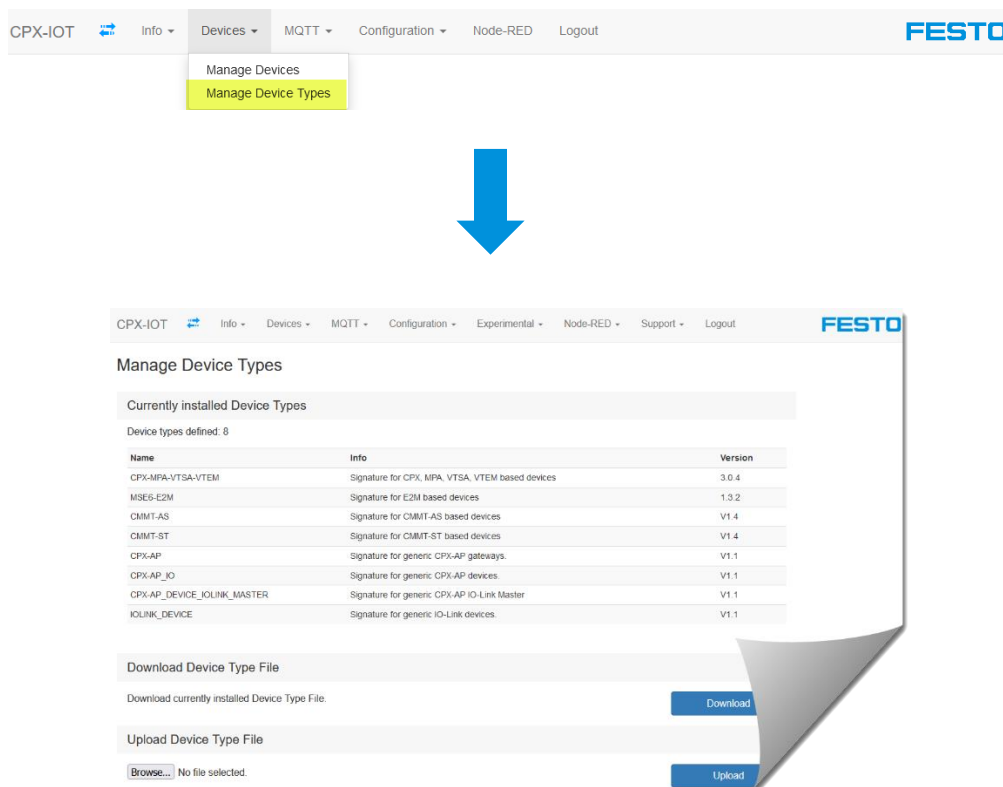
Enter optional filter (e.g. URL or IP-address) Scan

- Write the device IP address.

Scan Devices

1 2 Scan

CPX-IOT supports all the devices shown below. As soon as the device is connected to CPX-IOT the data is automatically received on Node-RED. As mentioned in the section “Overview Connectivity” Node-RED is optional, the data is transmitted via MQTT. If Node-RED is installed the default MQTT setup is transferring the data to Node-RED.



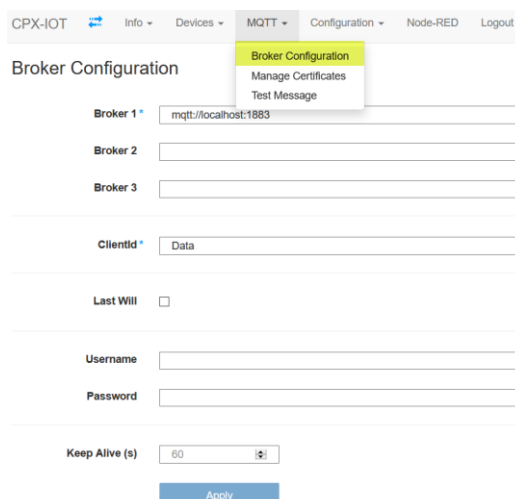
2.5 MQTT

MQTT is an OASIS standard messaging protocol for the Internet of Things (IoT). It is designed as an extremely lightweight publish/subscribe messaging transport that is ideal for connecting remote devices.

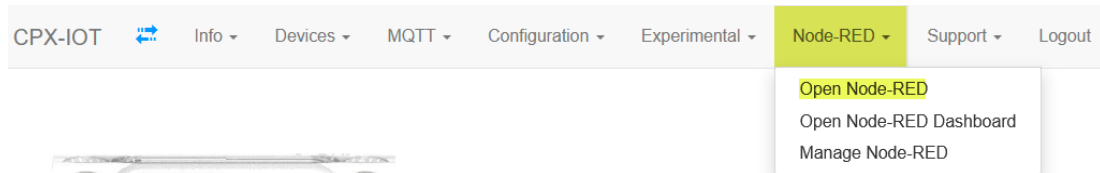
2.5.1 Configure localhost MQTT Broker

In order to read the data from the boarded devices, MQTT communication must be enabled otherwise the MQTT_IN function will be connected but no transmission is possible. How to make a Board of the devices will be explained in the next chapters. It is only detailed on this chapter the principle of localhost MQTT Broker.

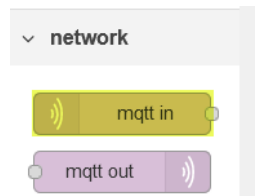
Local MQTT broker --> mqtt://localhost:1883



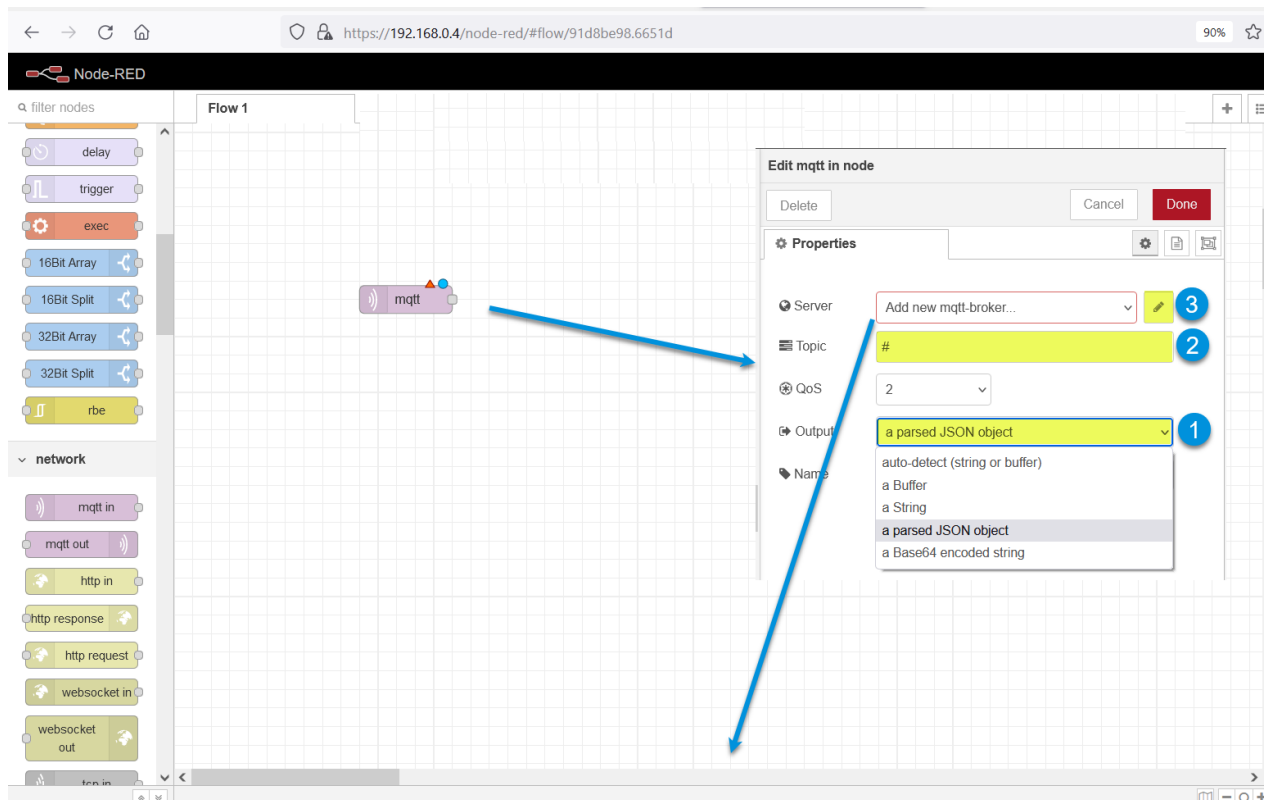
How to open Node-RED in order to read the data published.



Go to the Node-red palette and choose MQTT in and drag & drop.



Configure the MQTT in:



Edit mqtt in node > Add new mqtt-broker config node

Cancel Add

Properties

3 Name localhost

Connection Security Messages

Server 127.0.0.1 Port 1883

☐ Enable secure (SSL/TLS) connection

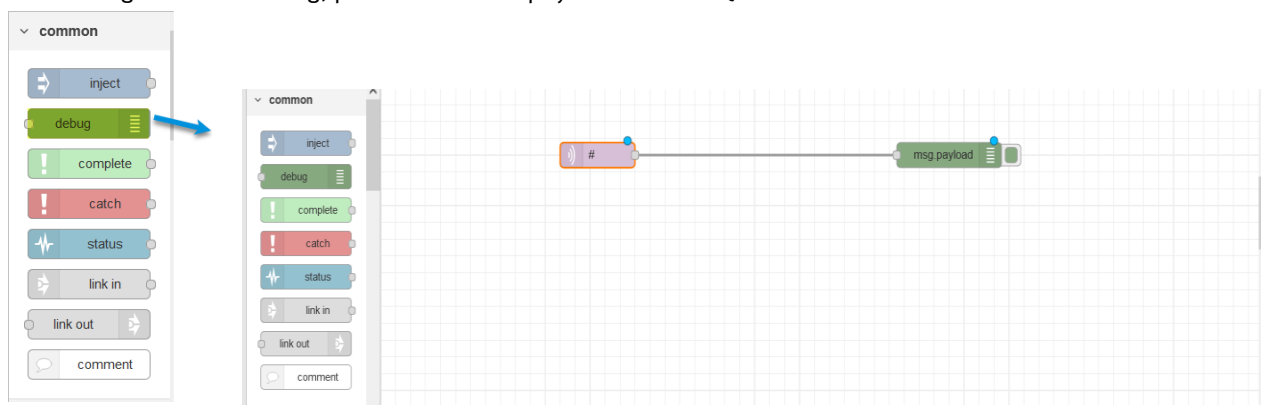
Client ID Leave blank for auto generated

☐ Keep alive time (s) 60 ☒ Use clean session

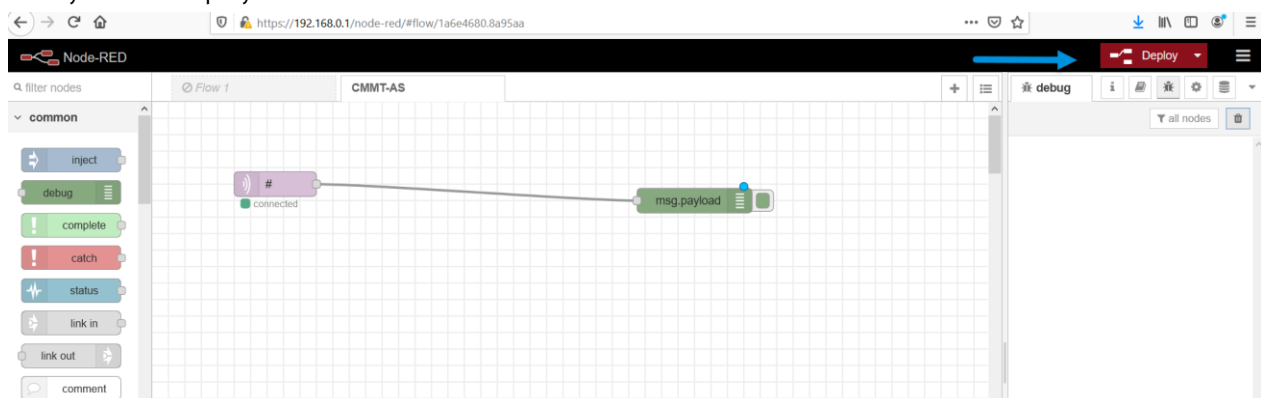
☐ Use legacy MQTT 3.1 support

☐ Enabled 0 nodes use this config On all flows

For reading the data coming, please connect a payload to the MQTT in.



Finally click on deploy



After deploying, please click on debug messages in order to check the data:

The screenshot displays the Node-RED web interface in a browser. The address bar shows the URL: <https://192.168.0.1/node-red/#flow/1a6e4680.8a95aa>. The interface includes a left sidebar with node categories (common and function), a central workspace with a flow named 'CMMT-AS' containing an inject node and a msg.payload node, and a right sidebar with a debug console. A blue arrow points to the 'debug' button in the top right of the workspace. The debug console shows a list of messages with the following structure:

```
{
  fields: object,
  comId: "357PP8JQSKX",
  deviceId: "357PP8JQSKX",
  messageType: "diagnosis",
  timestamp: "2021-05-04T09:48:44.220Z"
}
```

The messages are timestamped 5/4/2021, 11:48:41 AM and 5/4/2021, 11:48:42 AM. The flow is labeled 'Flow 1' and 'CMMT-AS'.

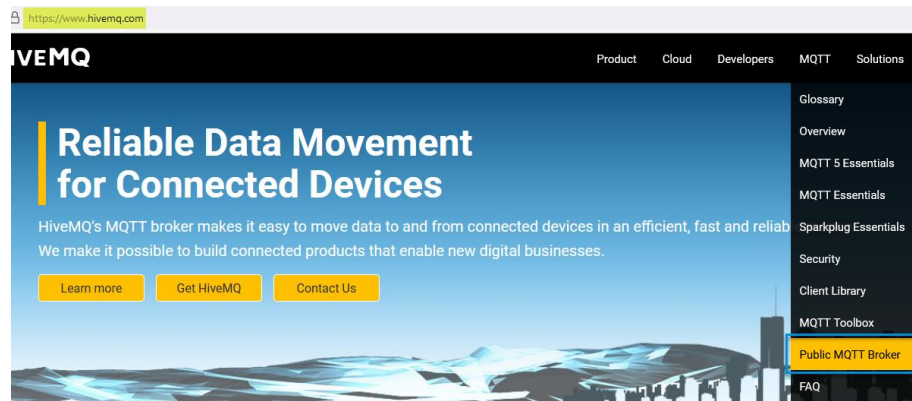
2.5.2 Broker Configuration HIVE MQ

This chapter shows an example how to setup a MQTT communication to a broker. This section is not mandatory for the configuration of the CPX-IOT itself. The aim of this chapter is to show a practical example of a broker connection. A free public broker will be used and only the basic parameters will be configured.



No.	Action
1	Connect cloud port to the Internet. The Router via DHCP assign an IP to the CPX-IOT cloud port. The router assign to CPX_IOT 172.18.92.110
	Product Key 3S7PN1PQRJQ Device Time Wed Aug 25 14:07:02 UTC 2021 MQTT Network IP: 172.18.92.110 Netmask: 255.255.254.0 Gateway: 172.18.92.1 MQTT Statistics Published: 58 Failed: 0 Reconnects: 29 Last Connected: 2021-08-25T12:36:38Z Device Network IP: 192.168.0.4 Netmask: 255.255.255.0 Operation Mode Read/Write Boardings Boarded devices: 1 (1/0)

- 2 On this step, set up a MQTT communication to the public broker (HiveMQ), as an example.
Open a browser and write the following URL: <https://www.hivemq.com/public-mqtt-broker/>



Click on Try MQTT Browser Client, as shown on the image below.

Public MQTT Broker

Our **Public HiveMQ MQTT broker** is open for anyone to use. Feel free to write an MQTT client that connects with this broker. We have a **dashboard** so you can see the amount of traffic on this broker. We also keep a list of **MQTT client libraries** that can be used to connect to HiveMQ.

You can access the broker at:

Broker: `broker.hivemq.com`

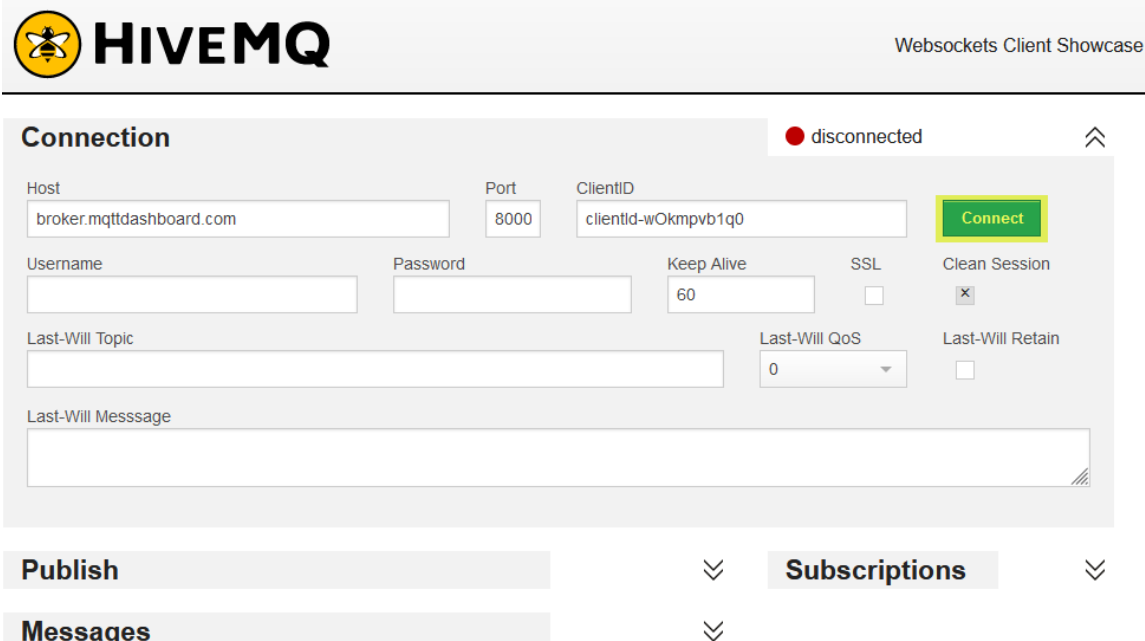
TCP Port: 1883

Websocket Port: 8000

MQTT Browser Client

Try MQTT Browser Client

3. By default, the public broker provides a Host, Port and ClientID. Please keep the default values provided by HiveMQ.
Click on “Connect”.



HIVEMQ Websockets Client Showcase

Connection ● disconnected

Host: Port: ClientID: **Connect**

Username: Password: Keep Alive: SSL: ☐ Clean Session: ☒

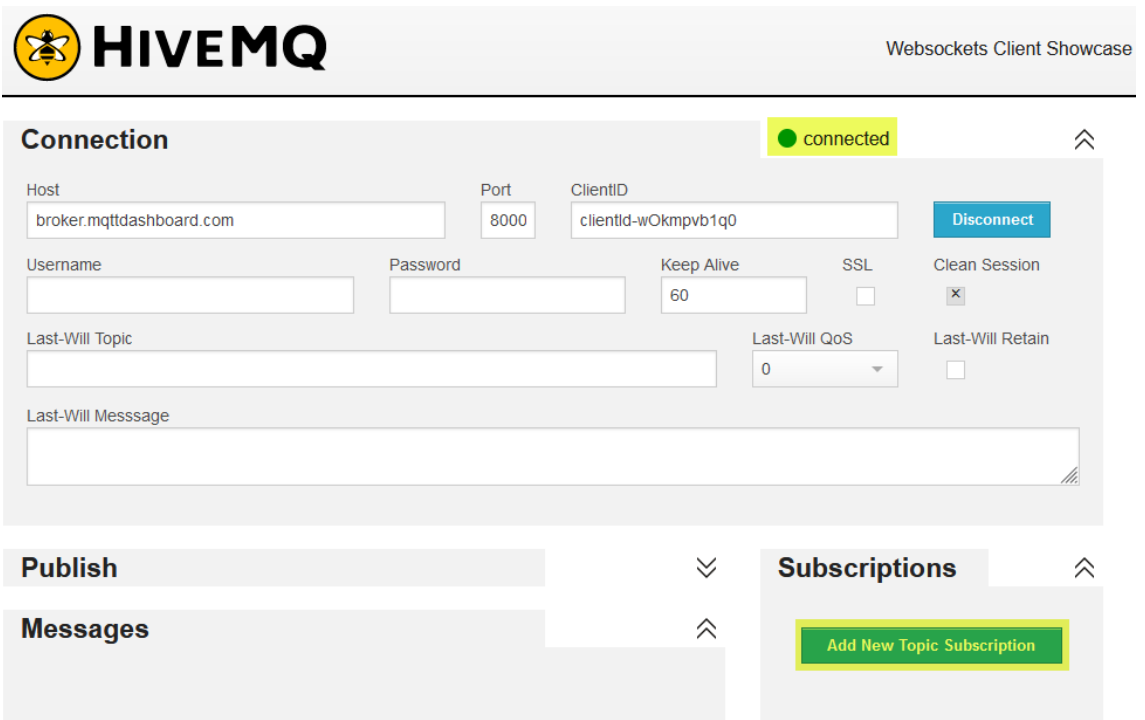
Last-Will Topic: Last-Will QoS: Last-Will Retain: ☐

Last-Will Message:

Publish ⌵ **Subscriptions** ⌵

Messages ⌵

4. Now the Broker is connected successfully. Then please click on “Add New Topic Subscription”



HIVEMQ Websockets Client Showcase

Connection ● connected

Host: Port: ClientID: **Disconnect**

Username: Password: Keep Alive: SSL: ☐ Clean Session: ☒

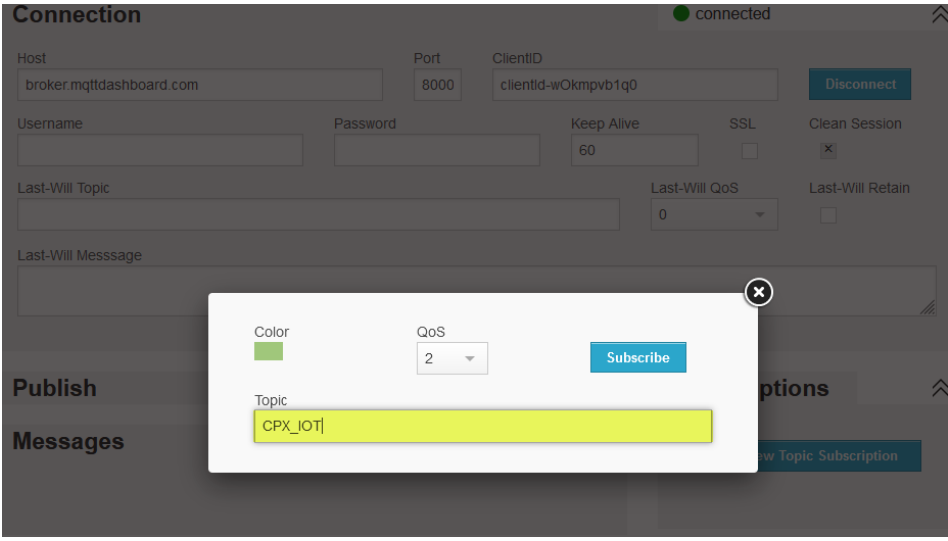
Last-Will Topic: Last-Will QoS: Last-Will Retain: ☐

Last-Will Message:

Publish ⌵ **Subscriptions** ⌵

Messages ⌵

Add New Topic Subscription

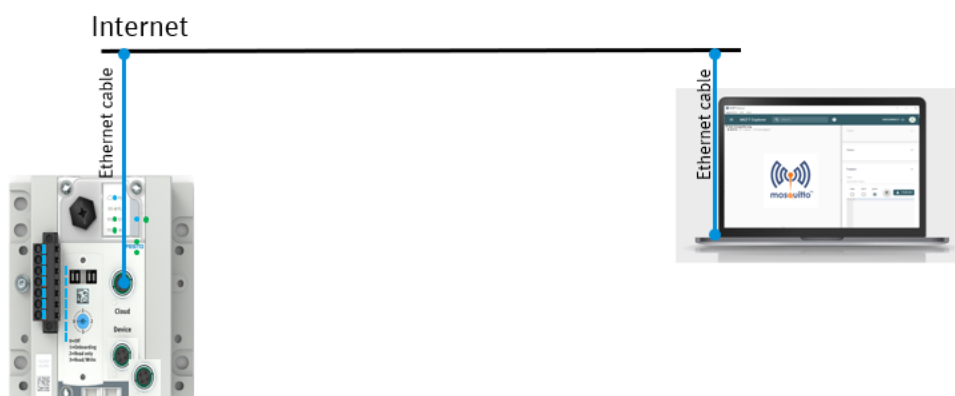
5.	Create a subscription and write a topic name. For example CPX_IOT.
	
6	Go to CPX-IOT webserver and click on MQTT --> Broker configuration.
	

7	Write the URL: mqtt://www.MQTT-dashboard.com:1883 This URL allows CPX-IOT to connect to the broker.
Broker Configuration Broker 1 * mqtt://www.MQTT-dashboard.com:1883  Broker 2  Broker 3  ClientId * festo  Last Will☐ Username Password Keep Alive (s) 60  Apply	

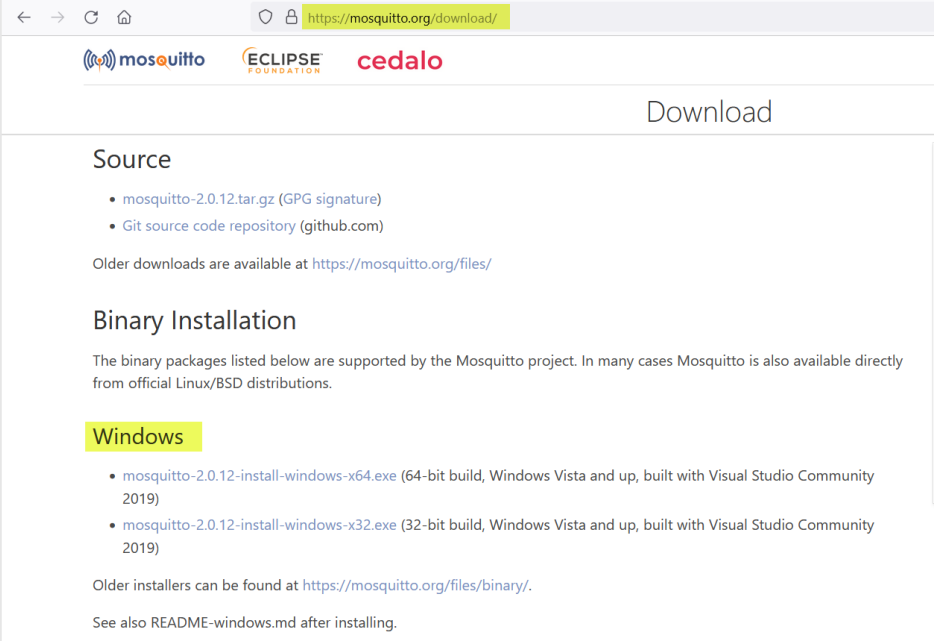
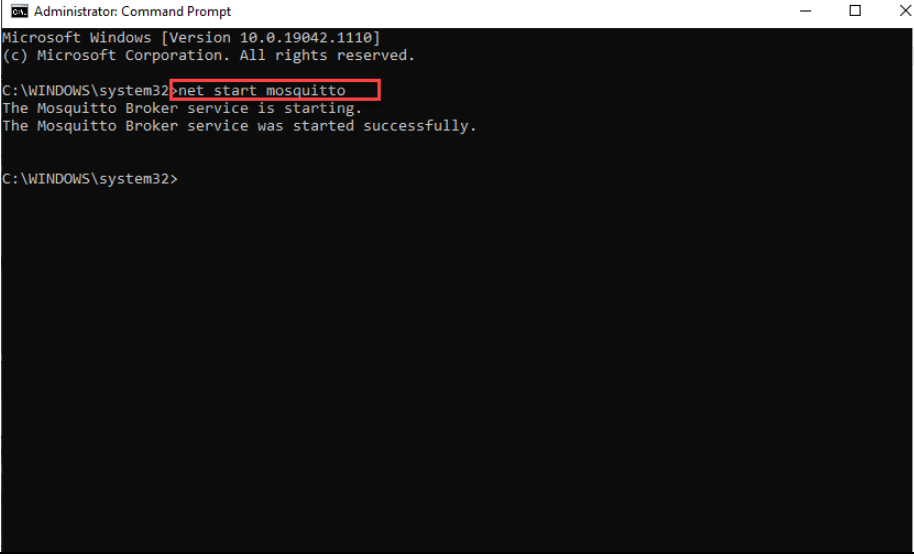
8	Write the topic: CPX_IOT
	Test Message Topic * CPX_IOT Message Hello Broker. I am CPX-IOT QoS 1 - At least once ▼ Send sending test message successful ×
9	Receive the message on HIVEMQ MQTT Broker
	 HIVEMQ Websockets Client Showcas Connection ● connected ⌵ Host broker.mqttdashboard.com Port 8000 ClientID clientId-wOkmpvb1q0 Disconnect Username Password Keep Alive 60 SSL ☐ Clean Session ☒ Last-Will Topic Last-Will QoS 0 Last-Will Retain ☐ Last-Will Message Publish ⌵ Subscriptions ⌵ Add New Topic Subscription Qos: 2 × CPX_IOT Messages ⌵ 2021-08-26 08:56:55 Topic: CPX_IOT Qos: 1 Hello Broker. I am CPX-IOT

2.5.3 Broker Configuration Mosquitto

This chapter shows an example how to setup a MQTT communication to another broker well-known. This section is not mandatory for the configuration of the CPX-IOT itself. The aim of this chapter is to show a practical example of a broker connection. A free public broker will be used and only the basic parameters will be configured.



No.	Action
1	Connect the cloud port to the Internet. The Router via DHCP assign an IP to the CPX_IOT cloud port. The router assign to CPX_IOT 172.18.92.110
	Product Key 3S7PN1PQRJQ Device Time Wed Aug 25 14:07:02 UTC 2021 MQTT Network IP: 172.18.92.110 Netmask: 255.255.254.0 Gateway: 172.18.92.1 MQTT Statistics Published: 58 Failed: 0 Reconnects: 29 Last Connected: 2021-08-25T12:36:38Z Device Network IP: 192.168.0.4 Netmask: 255.255.255.0 Operation Mode Read/Write Boardings Boarded devices: 1 (1/0)

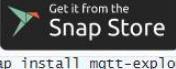
2	First of all, open a browser and write: https://mosquitto.org/download/ and choose correct package depending on your operating system.
	 The screenshot shows the Mosquitto download page in a web browser. The address bar displays https://mosquitto.org/download/. The page features logos for Mosquitto, Eclipse Foundation, and Cedalo. The main heading is "Download". Under the "Source" section, there are links for "mosquitto-2.0.12.tar.gz (GPG signature)" and "Git source code repository (github.com)". A note states "Older downloads are available at https://mosquitto.org/files/". The "Binary Installation" section explains that binary packages are supported by the Mosquitto project. A yellow highlight is placed over the "Windows" sub-section, which lists two installers: "mosquitto-2.0.12-install-windows-x64.exe (64-bit build, Windows Vista and up, built with Visual Studio Community 2019)" and "mosquitto-2.0.12-install-windows-x32.exe (32-bit build, Windows Vista and up, built with Visual Studio Community 2019)". A note mentions "Older installers can be found at https://mosquitto.org/files/binary/" and another note says "See also README-windows.md after installing."
3	Open a Command Prompt and write: net start mosquitto  The screenshot shows an Administrator Command Prompt window. The text displayed is: "Microsoft Windows [Version 10.0.19042.1110] (c) Microsoft Corporation. All rights reserved. C:\WINDOWS\system32>net start mosquitto The Mosquitto Broker service is starting. The Mosquitto Broker service was started successfully. C:\WINDOWS\system32>". The command "net start mosquitto" is highlighted with a red box.

- 4 Open a Web Browser and please download MQTT Explorer. MQTT Explorer is a comprehensive MQTT client that provides a structured overview of your MQTT topics and makes working with devices/services on your broker dead-simple.
<http://mqtt-explorer.com> Please select exe file according to your operating system.

// Download

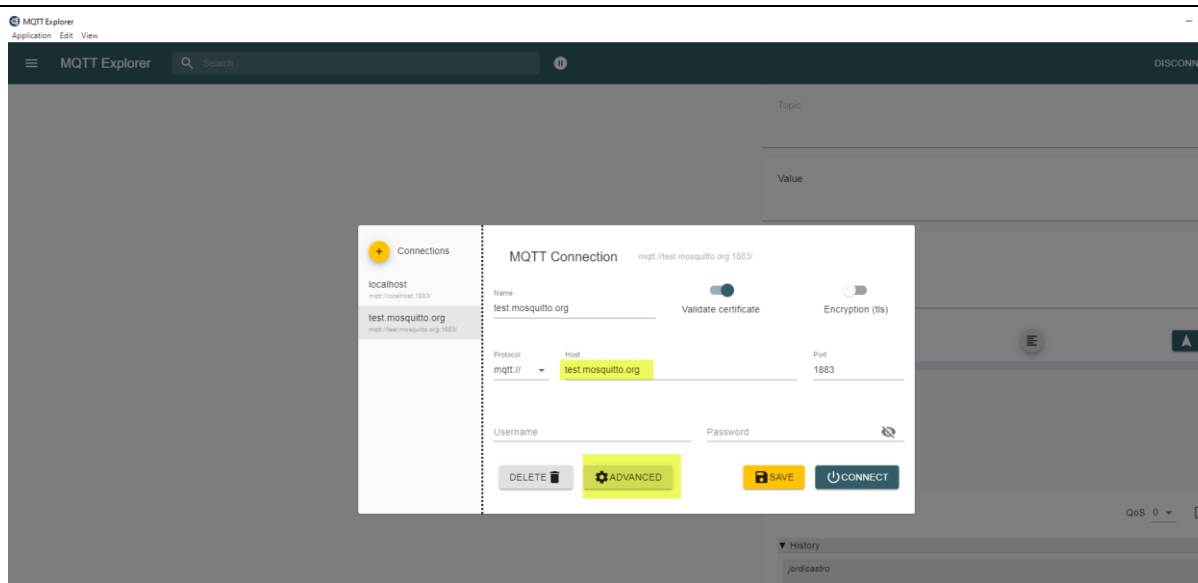
Developing this tool takes a lot of effort, sweat and time, please consider rating the App on the Windows or Mac app store ★★★★★.

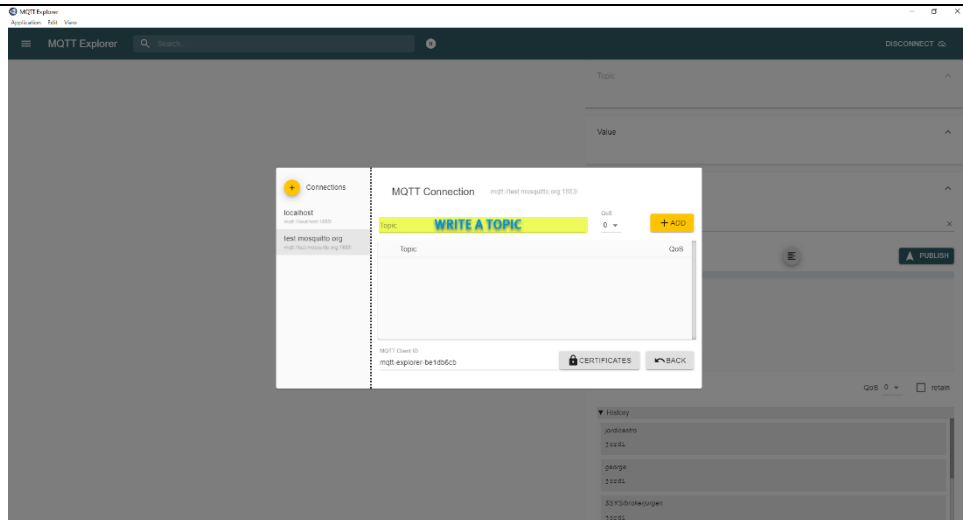
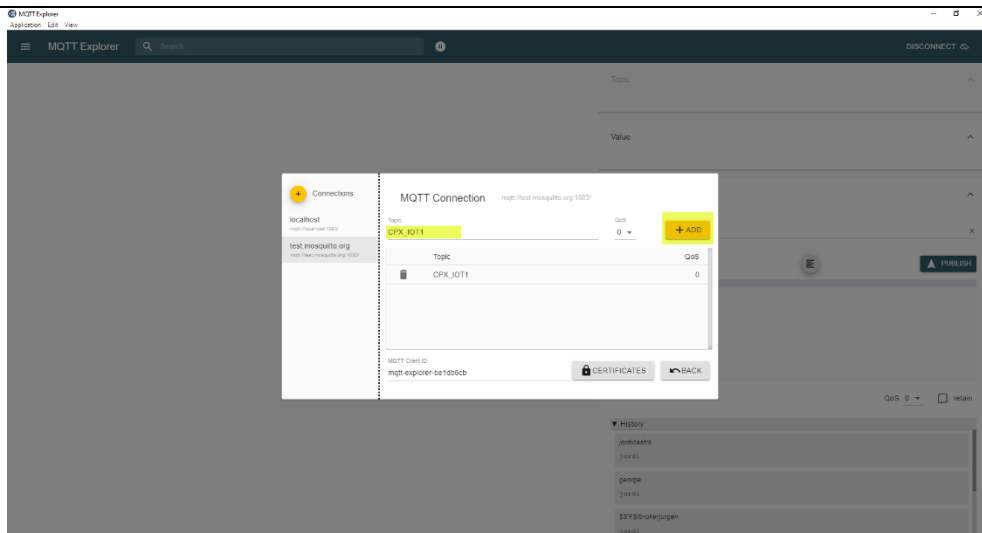
If you feel like a feature is missing or you found a bug, please leave me a [comment](#) / [issue](#) and I'll see what I can do.

Platform	Downloads
 Windows	 portable, installer
 Mac	 dmg
 Ubuntu <i>debian, mint, neon, fedora, etc...</i>	 snap install mqtt-explorer Ubuntu Store
 Linux <i>almost every linux</i>	Applmage <i>Run Applmage: Make it executable and double-click it.</i>

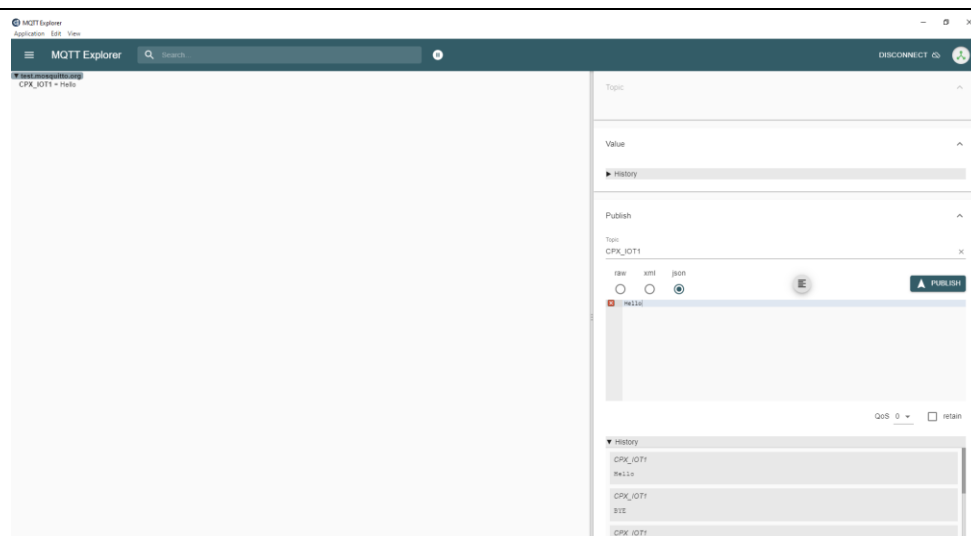
[More Downloads](#)

- 5 Host: test.mosquitto.org Port: 1883
Please click on ADVANCED.



6 Create a **Topic**.7 In this example the TOPIC is **CPX_IOT1** Then, please click on ADD.

8 On MQTT Explorer write an message using the topic that we created before (CPX_IOT1) in order to check that the communication is working.



9	Send a Test Message from CPX-IOT Test Message Topic * CPX_IOT1 Message Hello Mosquitto. I send a messae from CPX_IOT QoS 1 - At least once Send sending test message successful MQTT Explorer Application Edit View MQTT Explorer Search test.mosquitto.org CPX_IOT1 = Hello Mosquitto. I send a message from CPX_IOT Topic Value History Publish Topic CPX_IOT1 raw xml json PUBLISH MQTT Explorer Application Edit View MQTT Explorer Search... test.mosquitto.org CPX_IOT1 = Hello Mosquitto. I send a message from CPX_IOT
---	---

2.5.4 Test Message

Test Message

Topic *

Message

QoS 1 - At least once ▾

- 0 - At most once
- 1 - At least once
- 2 - Exactly once

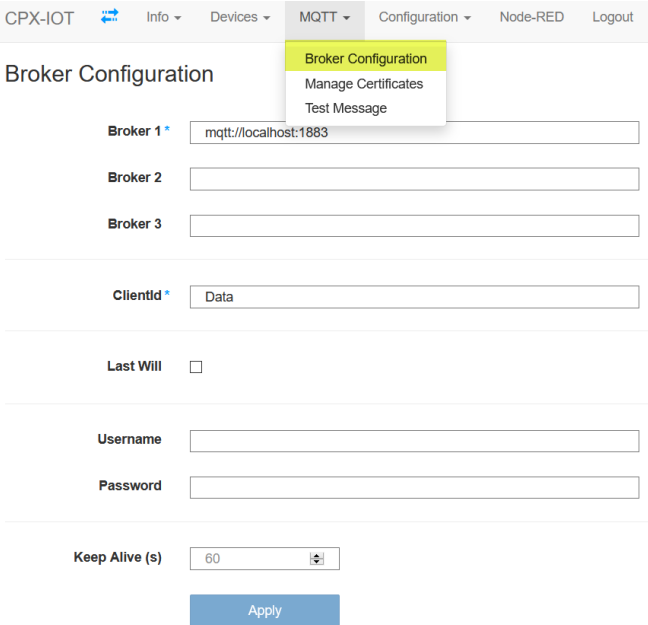
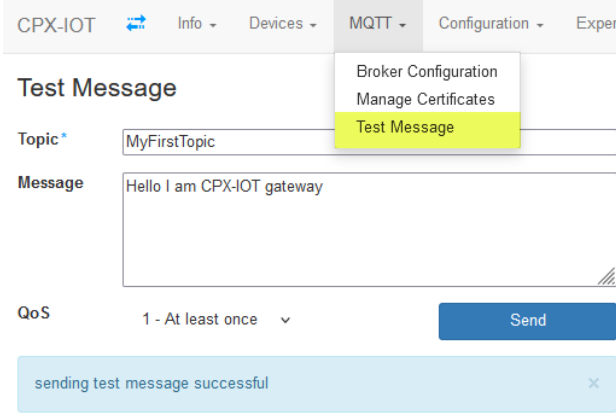
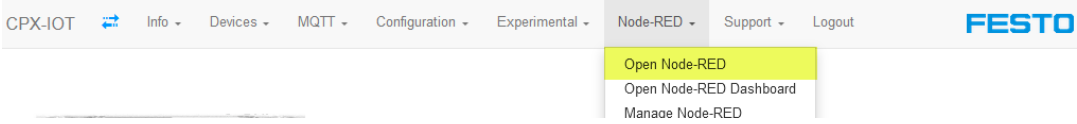
Topic : Topics are an alphanumeric identifier that is assigned to MQTT messages in order to MQTT messages to classify them according to a context.

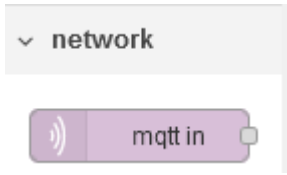
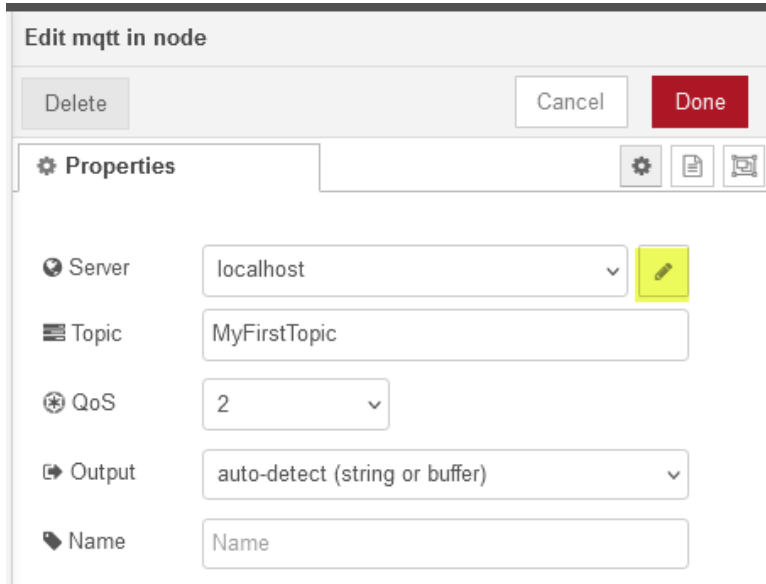
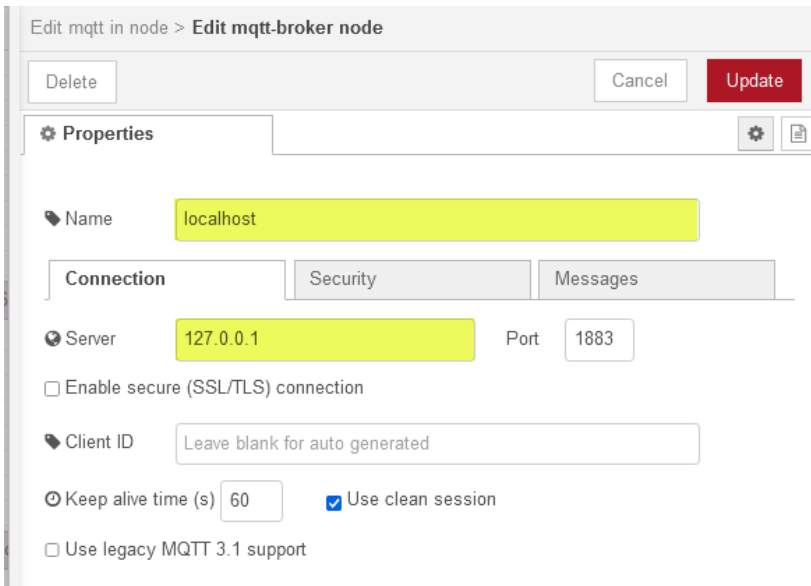
Message : Write the message to be sent here.

QoS (Quality of Service) : It is an agreement between the sender of a message and the receiver of a message that defines the guarantee of delivery for a specific message.

- QoS 0 – at most once : The minimal QoS level is zero. There is no guarantee of delivery. The receiver does not acknowledge receipt of the message and the message is not stored and retransmitted by the sender.
- QoS 1 – At least once: Level 1 guarantees that a message is delivered at least one time to the receiver. The sender stores the message until it gets a Puback packet form the receiver that acknowledges receipt of the message. It is possible for a message to be sent or delivered multiple times.
- QoS 2 – Exactly once : QoS2 is the highest level of service in MQTT protocol. This quality level guarantees that each message is received only once by the intended recipients. QoS 2 is the safest and slowest quality of service level. The guarantee is provided by at least two request/response flows (a four-part handshake) between the sender and the receiver. The sender and receiver use the packet identifier of the original PUBLISH message to coordinate delivery of the message.

There are 3 brokers. They are used for load distribution and fault tolerance. Data is distributed between them randomly. If there is only one broker, always configure broker 1.

No.	Action
1	Go to MQTT --> Broker Configuration. Configure the local Broker: mqtt://localhost:1883 
2	Go to Test Message and write: Topic = <i>MyFirstTopic</i> and Message: <i>Hello I am CPX-IOT gateway</i> 
3	Open NodeRed 

4	Select a MQTT in
	
5	Double click on MQTT in and configure the Server
	
6	Write a name to the server and configure localhost: 127.0.0.1
	

7	Connect a Payload to the MQTT in
	Test Message Topic* MyFirstTopic Message Hello I am CPX-IOT gateway QoS 2 - Exactly once Send sending test message successful
	MyFirstTopic connected msg.payload all nodes 10/7/2021, 9:34:40 AM node: 5c05dc2e.29192c MyFirstTopic : msg.payload : string[26] "Hello I am CPX-IOT gateway"

2.6 Configuration

2.6.1 Setup Device Network

Configuration of the IP address and the subnet mask of the device port.

CPX-IOT Info ▾ Devices ▾ MQTT ▾ Configuration ▾ Experimental ▾ Node-RED ▾ Support ▾ Logout **FESTO**

Setup Device Network

Hostname cpx-iot-0

MAC 00:0e:f0:60:9a:40

DHCP ☐

IP 192 . 168 . 0 . 4

Netmask 255 . 255 . 255 . 0

Apply

2.6.2 Setup Broker Network

Configuration of the IP address and the subnet mask of the cloud port. It is possible to select DHCP.

CPX-IOT Info ▾ Devices ▾ MQTT ▾ Configuration ▾ Experimental ▾ Support ▾ Logout **FESTO**

Setup Broker Network

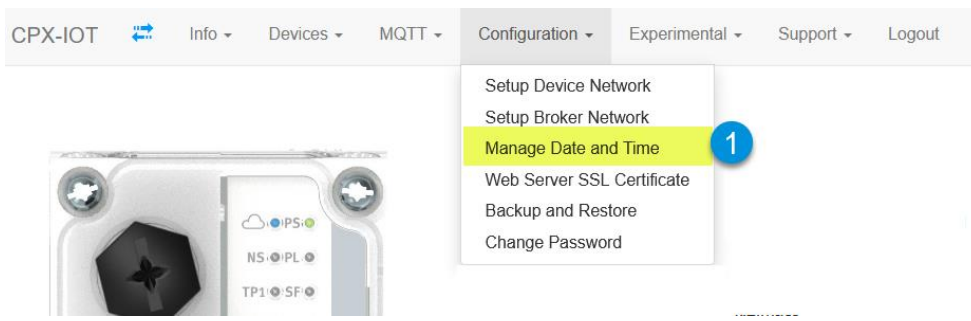
MAC 00:0e:f0:60:9a:41

Hostname cpx-iot-0

DHCP ☒

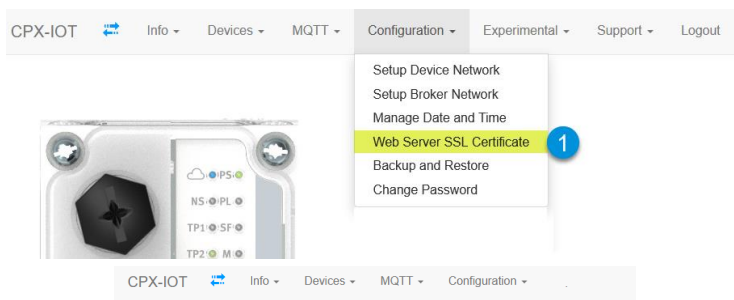
Apply

2.6.3 Manage Date and Time



The screenshot shows the CPX-IOT web interface. The 'Configuration' menu is open, and 'Manage Date and Time' is highlighted with a blue circle labeled '1'. Below the menu, the 'Manage Date and Time' page is shown. It has two checkboxes: 'Enable NTP' (checked) and 'NTP Server via DHCP' (checked, with a blue circle labeled '2'). Below these is a 'Date and Time' field showing 'Thu, 2021-10-14, 09:43:40'. At the bottom is an 'Apply' button.

2.6.4 Web Server SSL Certificate

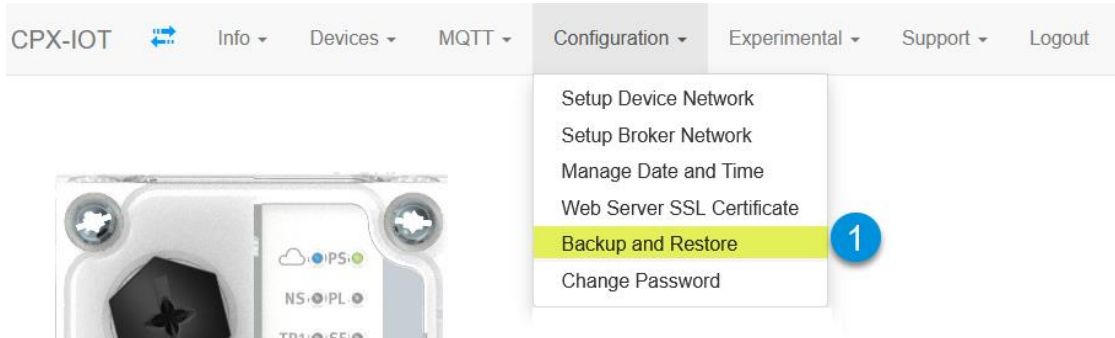


The screenshot shows the CPX-IOT web interface. The 'Configuration' menu is open, and 'Web Server SSL Certificate' is highlighted with a blue circle labeled '1'. Below the menu, the 'Web Server SSL Certificate' page is shown with a blue circle labeled '2'. It contains three sections: 'CA SSL certificate', 'Server SSL certificate', and 'Server SSL certificate key'. Each section has a status indicator (all are 'installed'), a 'View' button, a 'Browse...' button, and an 'Upload' button. The 'Browse...' buttons are all disabled and show 'No file selected.'. At the bottom is a 'Restart Web Server' button.

CA Certificate: This is used by the Gateway to verify the identity of the broker. It is needed to enable encryption. It can be obtained from the administrator of the broker (e.g. cloud provider or IT department).

Client Certificate and Client Certificate Key: They belong together and are used to identify the Gateway at the broker. Using client certificate and key is optional; it is also possible to configure username and password instead. Usually the client certificate and key is created by somebody who owns the CA certificate (e.g. the admin of the broker) and is created for a specific MQTT client.

2.6.5 Backup and Restore



The screenshot shows the CPX-IOT web interface. The top navigation bar includes 'CPX-IOT', 'Info', 'Devices', 'MQTT', 'Configuration', 'Experimental', 'Support', and 'Logout'. The 'Configuration' dropdown menu is open, showing options: 'Setup Device Network', 'Setup Broker Network', 'Manage Date and Time', 'Web Server SSL Certificate', 'Backup and Restore' (highlighted with a blue circle '1'), and 'Change Password'.

Backup and Restore

2

Create Backup

Backup file not available!

Create Backup

Restore Backup

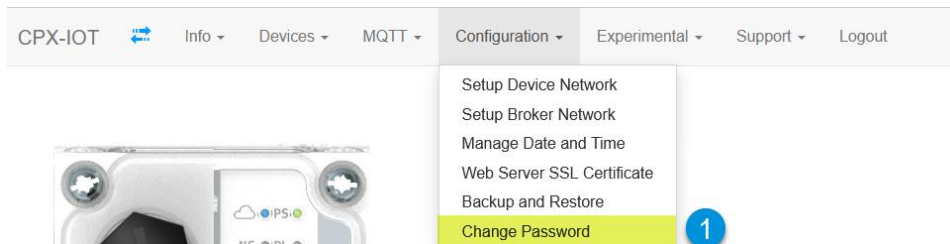
☐ Restore Network Settings

Browse... No file selected.

Restore

Restart System

2.6.6 Change Password



The screenshot shows the CPX-IOT web interface. The top navigation bar includes 'CPX-IOT', 'Info', 'Devices', 'MQTT', 'Configuration', 'Experimental', 'Support', and 'Logout'. The 'Configuration' dropdown menu is open, showing options: 'Setup Device Network', 'Setup Broker Network', 'Manage Date and Time', 'Web Server SSL Certificate', 'Backup and Restore', and 'Change Password' (highlighted with a blue circle '1').

Change Password

2

Passwords must be minimum 8 characters long and include at least 3 of the following groups: Lower case letters, upper case letters, digits, special characters.

admin

.....

New Password

Verify Password

Apply

2.7 Configuration of “Signature.json”

CPX-IOT Info Devices MQTT Configuration Experimental Node-RED Support Logout **FESTO**

Manage Device Types

Manage Device Types 1

Currently installed Device Types

Device types defined: 8

Name	Info	Version
CPX-MPA-VTSA-VTEM	Signature for CPX, MPA, VTSA, VTEM based devices	3.0.4
MSE6-E2M	Signature for E2M based devices	1.3.2
CMMT-AS	Signature for CMMT-AS based devices	V1.4
CMMT-ST	Signature for CMMT-ST based devices	V1.4
CPX-AP	Signature for generic CPX-AP gateways.	V1.1
CPX-AP_IO	Signature for generic CPX-AP devices.	V1.1
CPX-AP_DEVICE_IOLINK_MASTER	Signature for generic CPX-AP IO-Link Master	V1.1
IOLINK_DEVICE	Signature for generic IO-Link devices.	V1.1

Download Device Type File

Download currently installed Device Type File. Download 2

Upload Device Type File

Browse... No file selected. Upload

2.7.1 Trigger interval

Each device sends three messages with a preconfigure time. Diagnosis message payload is sent each 5 seconds. This time can be modified.

```

1 {
2   "Signatures": [
3     {
4       "uid": "CPX-MPA-VTSA-VTEM",
5       "iname": "CPX",
6       "info": "Signature for CPX, MPA, VTSA, VTEM based devices",
7       "version": "3.0.4",
8       "rootnode": "",
9       "Subscriptions": [
10        {
11          "id": "Default",
12          "interval": 5000
13        },
14        {
15          "id": "Data",
16          "interval": 1000
17        }
18      ],
19       "messageTypes": [
20        {
21          "messageTypeId": "DIAGNOSIS",
22          "messageTypeName": "diagnosis",
23          "dataPrefix": "fields",
24          "triggerInterval": 5000,
25          "triggerOnDeviceConnect": false,
26          "triggerOnDeviceDisconnect": false,
27          "force": true,
28          "metaData": [
29            {
30              "id": "topic",
31              "value": "Festo/%deviceId%/%messageTypeName%"

```

Process message payload is sent each 1 second. This parameter is configurable.

```

54   "messageTypeId": "PROCESS",
55   "messageTypeName": "process",
56   "dataPrefix": "fields",
57   "triggerInterval": 1000,
58   "triggerOnDeviceConnect": false,
59   "triggerOnDeviceDisconnect": false,
60   "force": true,
61   "metaData": [
62     {
63       "id": "topic",
64       "value": "Festo/%deviceId%/%messageTypeName%"
65     }
66   ],

```

Asset message payload is sent each 20 seconds. This parameter is configurable.

```
88         "messageTypeName": "asset",
89         "dataPrefix": "fields",
90         "triggerInterval": 20000,
91         "triggerOnDeviceConnect": true,
92         "triggerOnDeviceDisconnect": false,
93         "force": true,
94         "metaData": [
95             {
96                 "id": "topic",
97                 "value": "Festo/%deviceId%/messageTypeName%"
98             }
99         ],
```

2.7.2 How to change MQTT topic.

The MQTT topic is defined in the metadata. In that example the topic is *"Festo/%deviceId%/connectionState"*

```

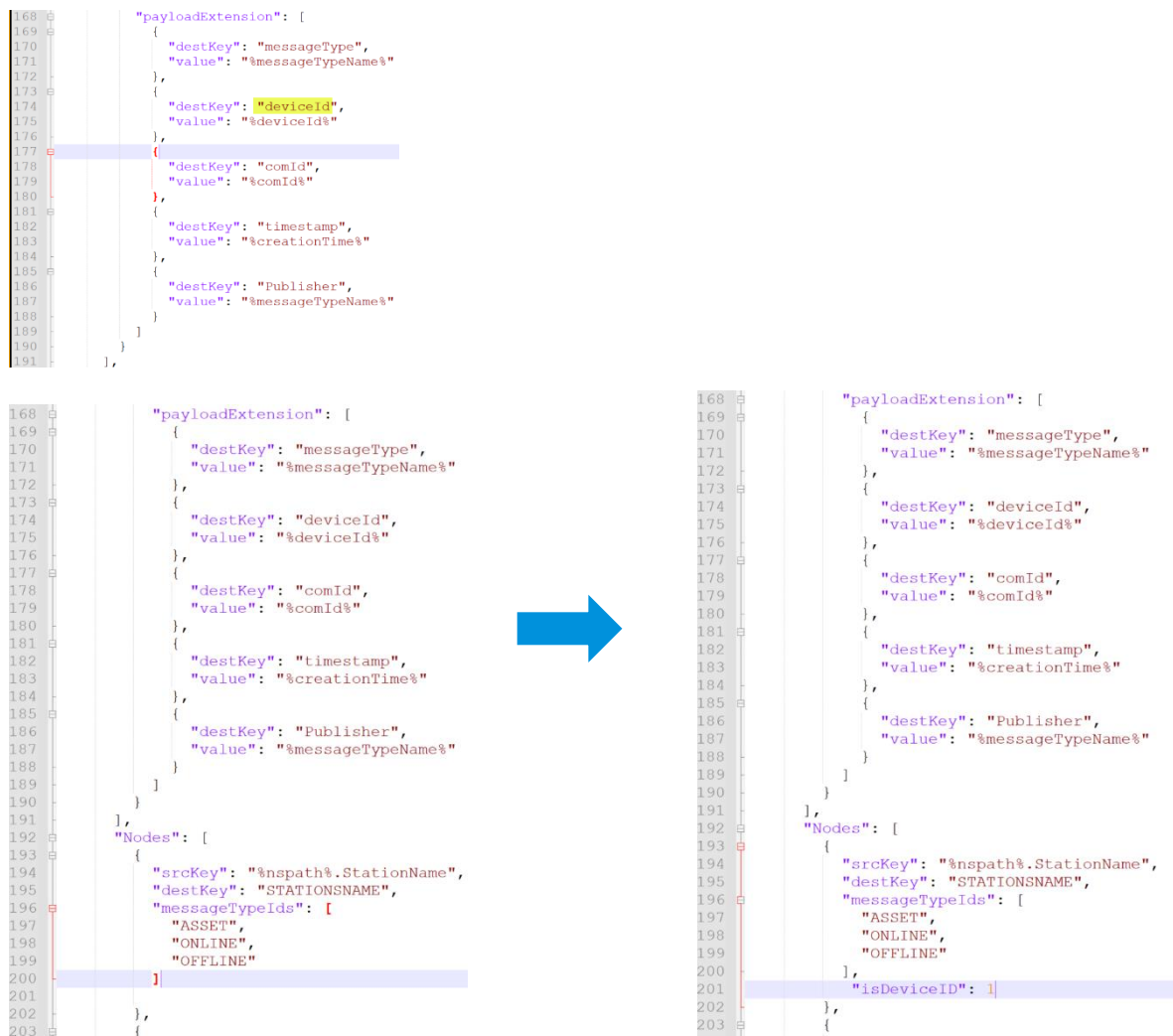
120         "messageTypeId": "ONLINE",
121         "messageTypeName": "online",
122         "dataPrefix": "fields",
123         "triggerInterval": false,
124         "triggerOnDeviceConnect": true,
125         "triggerOnDeviceDisconnect": false,
126         "metaData": [
127             {
128                 "id": "topic",
129                 "value": "Pesto/${deviceId}/connectionState"
130             }
131         ],

```

Note: You can use all variables from the section “Payload extension” as part of the MQTT topic.

2.7.3 How to change the content of the Device ID.

As a default, the DeviceID is the serial number of the valve terminal. In some case, it makes sense to change the DeviceID for example if you want to use the Profinet station as a DeviceID. As a default, the DeviceID is the serial number of the valve terminal. In some case, it makes sense to change the DeviceID. Therefore, the tag “isDeviceID” must be relocate to the related note for example the Profinet station name.



Finally, please delete the “isDeviceID”:1 as you can see in the image below.

```

378 {
379   "srcKey": "%nspath%.Module00.SerialNumber",
380   "destKey": "SERIAL00",
381   "messageTypeIds": [
382     "ASSET"
383   ],
384   "isDeviceID": 1
385 },
386 {

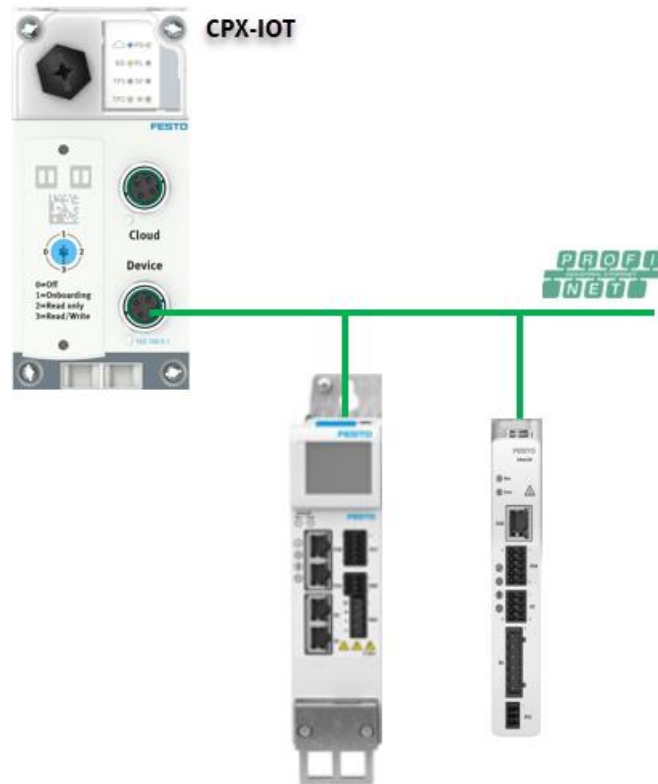
```

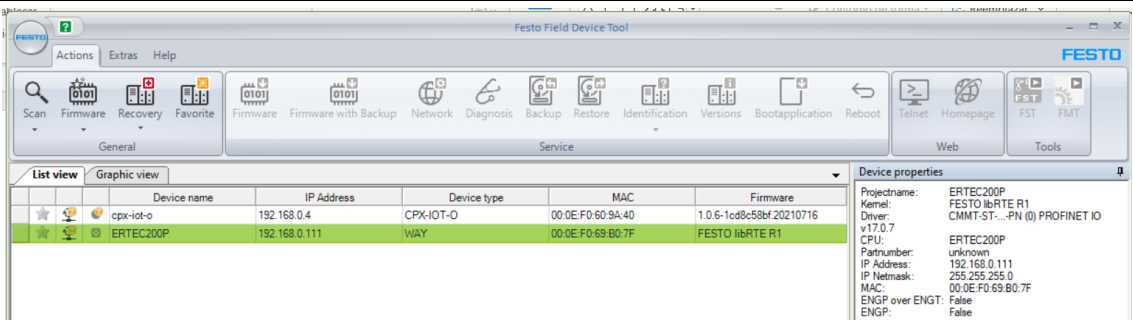
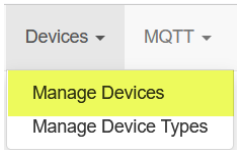
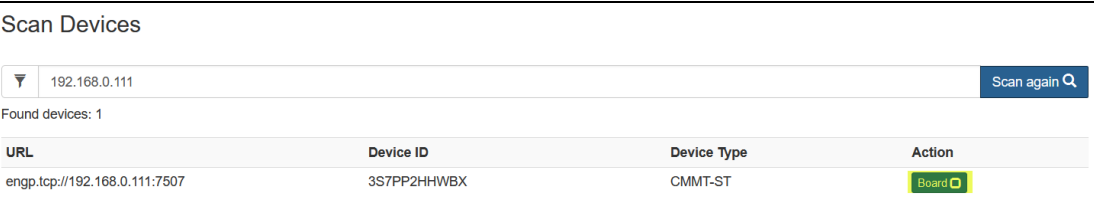
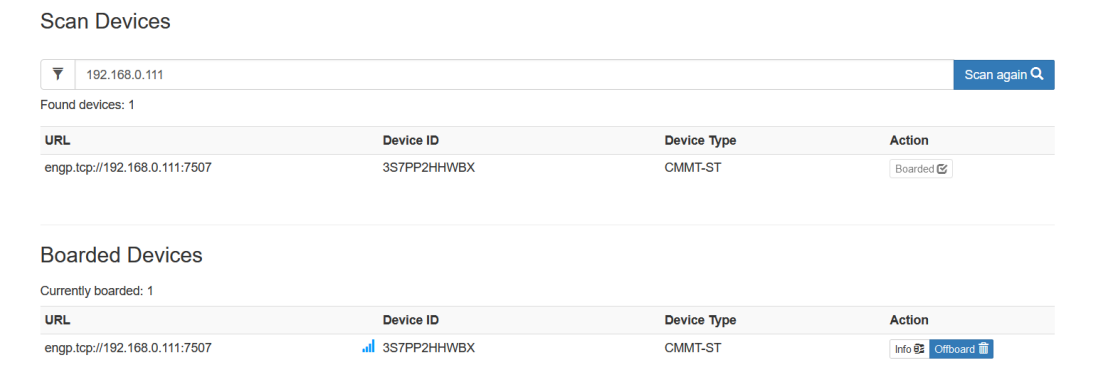
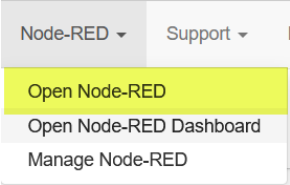
3 Integration of CPX-IOT in Profinet environment

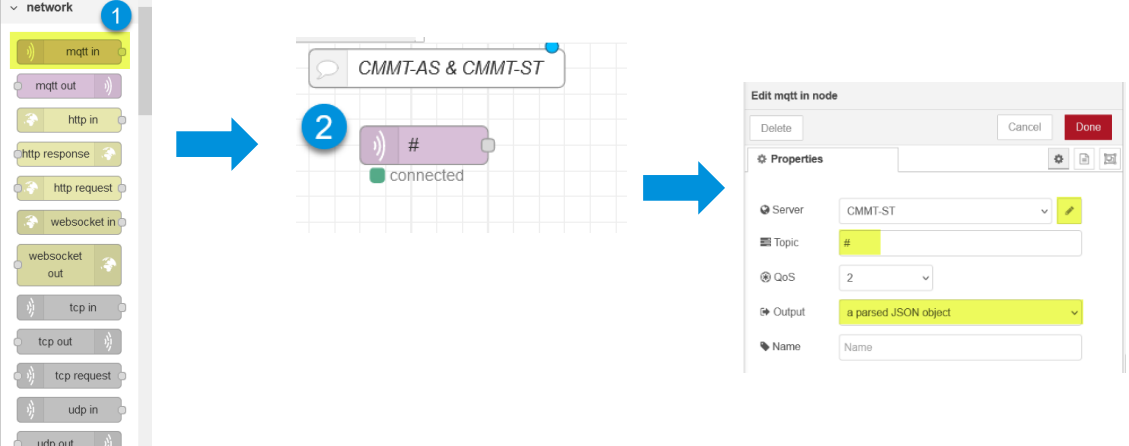
This chapter shows how to collect data from a CMMT-AS or CMMT-ST via the CPX-IOT gateway.

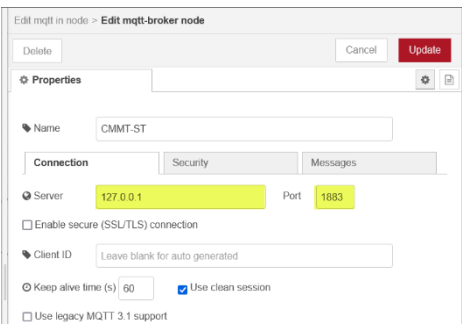
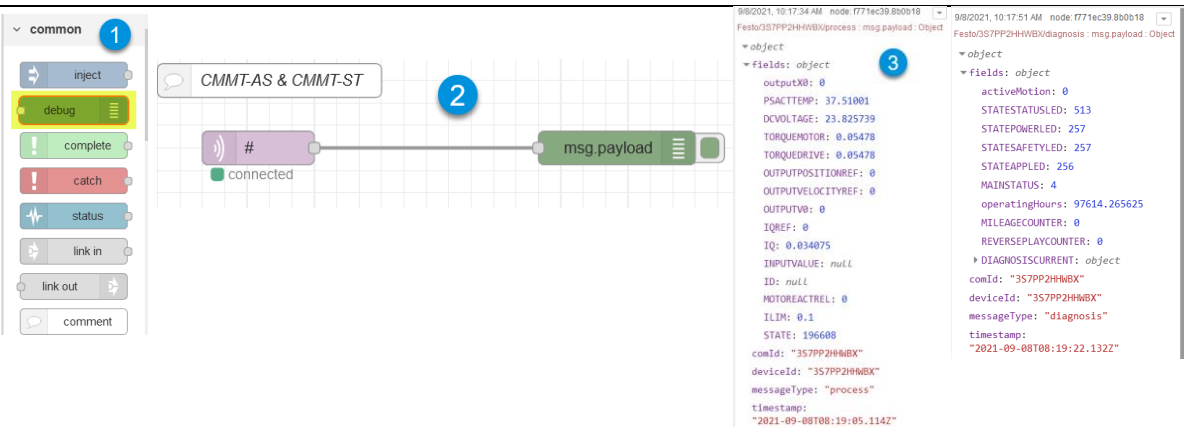
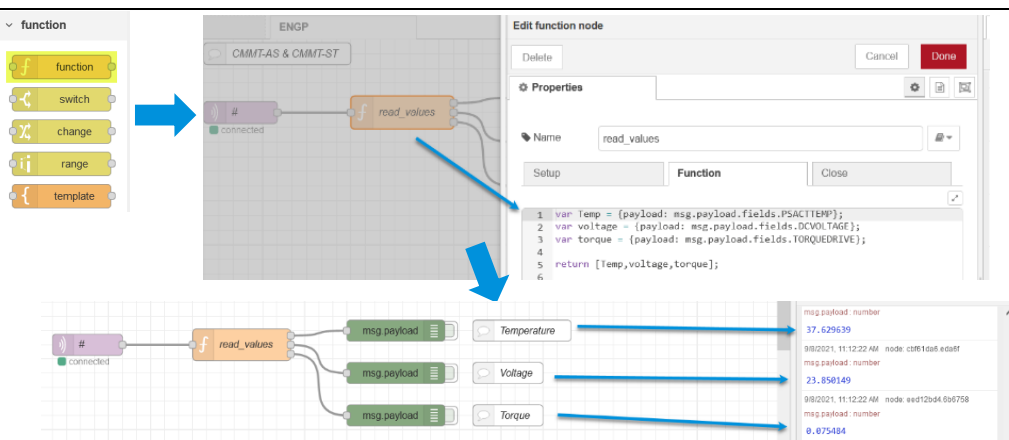
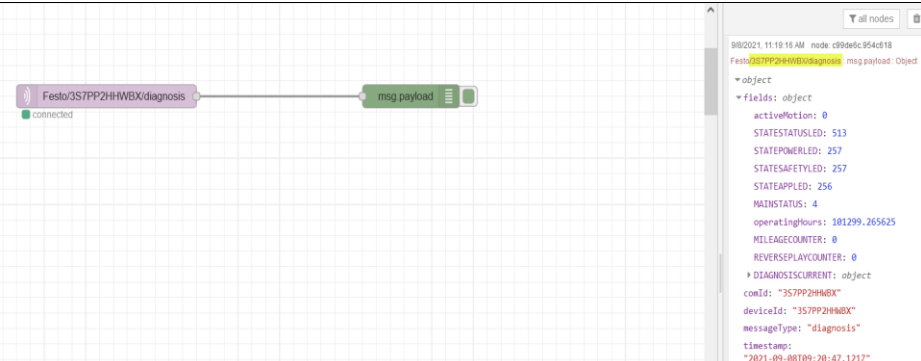
3.1 Manage Devices: Connecting CMMT-AS-xx-PN or CMMT-ST-xx-PN Data to CPX-IOT.

The device port of the CPX_IOT can be connected directly to the PROFINET network. The configuration is the same for both drivers.



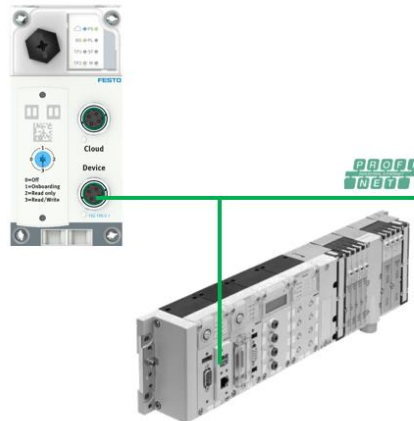
No.	Action
1	The Profinet master PLC must assign a IP address on the XF1IN port (CMMT-AS and CMMT-ST). If you do not have a Profinet master PLC, it is possible to assign the IP address via Proneta (Siemens software). In this example, the Profinet CMMT IP address is: 192.168.0.111
	
2	Go to CPX-IOT webserver and click on Devices --> Manage Devices
	
3	Write on Scan Devices the Profinet IP address of the CMMT an click on Scan again
	
4	The scan process has been completed successfully. Then click on "Board"
	
5	Boarding has been completed successfully. Connection OK  Connection Not OK  . After boarding the message are sent. Node-RED is optional and used here as a demo.
	
6	Open Node-RED
	

7	On Network palette please drag and drop MQTT in. Then press double click on the object MQTT in. Topic = # The subscription can be explicit or use Wildcards (#) Output = choose “a parsed JSON object”.
	 The diagram illustrates the configuration of an MQTT in node in a Profinet environment. It shows three steps: Step 1: Dragging the 'mqtt in' object from the 'network' palette into the workspace. Step 2: Double-clicking the 'mqtt in' object in the workspace to open its configuration window. Configuration Window: The 'Edit mqtt in node' window shows the following settings: Server: CMMT-ST Topic: # QoS: 2 Output: a parsed JSON object Name: Name

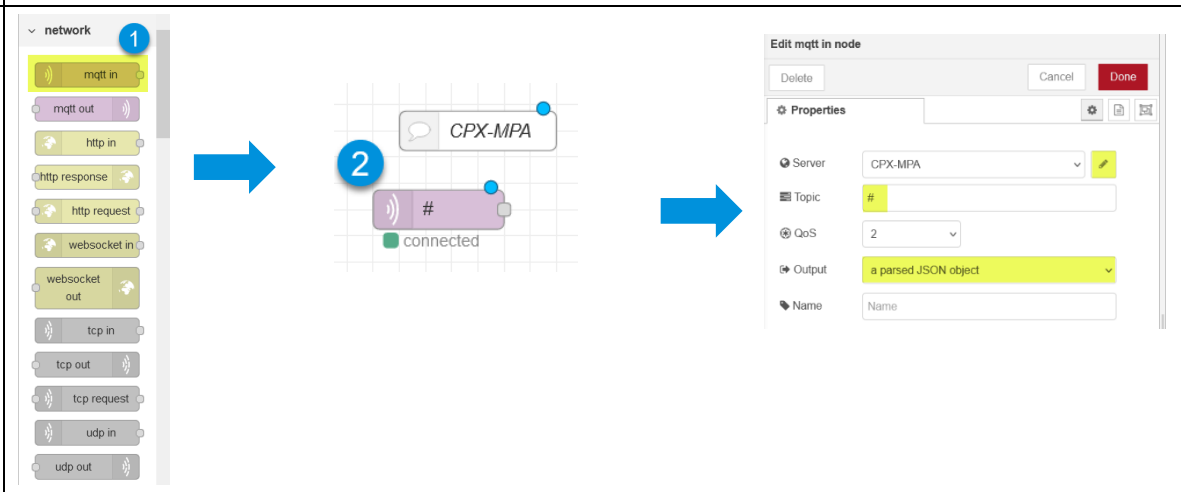
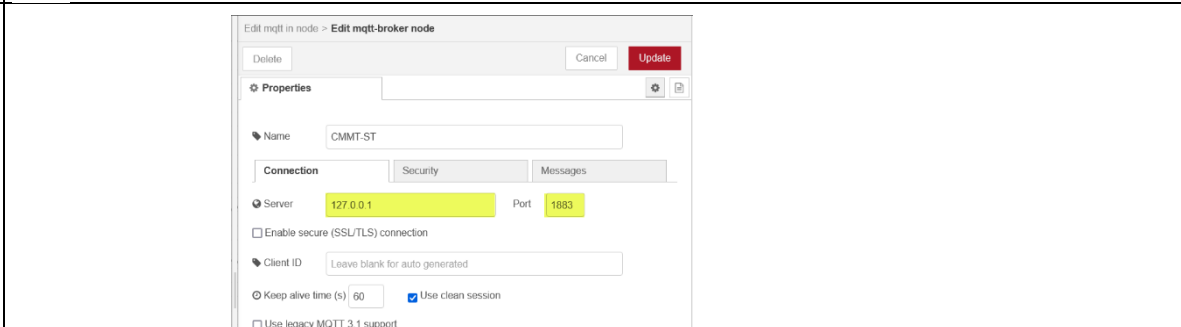
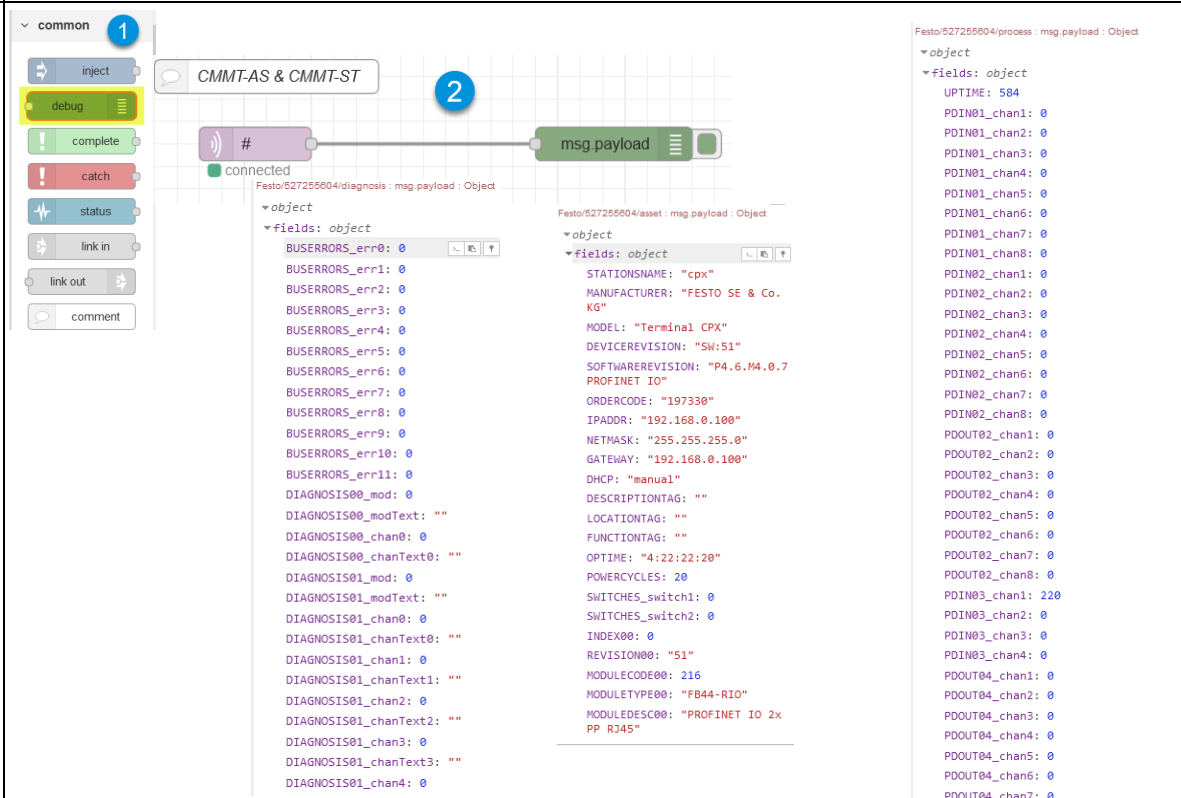
8	 Configure the server.
	
9	On Common Palette drag and drop a debug .
	
10	It is possible to split the data into different and store them in variables. This is done using the object function.
	
11	Another way is to subscribe to the topic using the DeviceId.
	

12	How to read the operating hours?
13	How to read the position of the drive?
14	Flow for reading the position of the drive.
	<pre>[{"id":"5ab20854.acdda","type":"change","z":"5c272f72.5fcdc8","name":"extract value","rules":[{"t":"set","p":"payload","pt":"msg","to":"payload.fields.outputX0","tot":"msg"}],"action":"","property":"","from":"","to":"","reg":false,"x":490,"y":160,"wires":[["697a728f.3a8ce4"]]},{"id":"9645f5ed.3bcac","type":"mqtt in","z":"5c272f72.5fcdc8","name":"","topic":"Festo/3S7PP2HHWBX/process","qos":"2","datatype":"json","broker":"d2becf95.64dd9","x":190,"y":160,"wires":[["5ab20854.acdda"]]},{"id":"697a728f.3a8ce4","type":"debug","z":"5c272f72.5fcdc8","name":"","active":false,"tosidebar":true,"console":false,"tostatus":false,"complete":false,"statusVal":"","statusType":"auto","x":750,"y":160,"wires":[[]]},{"id":"d2becf95.64dd9","type":"mqtt-broker","name":"CMMT-ST","broker":"127.0.0.1","port":"1883","clientId":"","usetls":false,"compatmode":false,"keepalive":"60","cleansession":true,"birthTopic":"","birthQos":"0","birthPayload":"","closeTopic":"","closeQos":"0","closePayload":"","willTopic":"","willQos":"0","willPayload":""}]</pre>

3.2 Manage Devices: Connecting CPX-MPA to CPX_IOT



No.	Action								
1	The Profinet master PLC must assign a IP address to the CPX-MPA (FB43 or FB44). If you do not have a Profinet master PLC, it is possible to assign the IP address via Proneta (Siemens software) or using Festo Maintenance Tool. In this example, the Profinet CPX-MPA address is: 192.168.0.100								
	Scan Devices 192.168.0.100 Scan again Found devices: 1 <table><tr><th>URL</th><th>Device ID</th><th>Device Type</th><th>Action</th></tr><tr><td>ci.udp://192.168.0.100:991</td><td>527255604</td><td>CPX-MPA-VTSA-VTEM</td><td>Board</td></tr></table>	URL	Device ID	Device Type	Action	ci.udp://192.168.0.100:991	527255604	CPX-MPA-VTSA-VTEM	Board
URL	Device ID	Device Type	Action						
ci.udp://192.168.0.100:991	527255604	CPX-MPA-VTSA-VTEM	Board						
2	The scan process has been completed successfully. Then click on “Board”								
	Boarded Devices Currently boarded: 1 <table><tr><th>URL</th><th>Device ID</th><th>Device Type</th><th>Action</th></tr><tr><td>ci.udp://192.168.0.100:991</td><td> 527255604 </td><td>CPX-MPA-VTSA-VTEM</td><td> Info Offboard </td></tr></table>	URL	Device ID	Device Type	Action	ci.udp://192.168.0.100:991	527255604	CPX-MPA-VTSA-VTEM	Info Offboard
URL	Device ID	Device Type	Action						
ci.udp://192.168.0.100:991	527255604	CPX-MPA-VTSA-VTEM	Info Offboard						
3	The board process has been completed successfully. Connection OK Connection Not OK After boarding the message are sent. Node-RED is optional and used here as a demo.								
	Node-RED Support Open Node-RED Open Node-RED Dashboard Manage Node-RED								

4	On Network palette please drag and drop mqtt in. Then press double click on the object mqtt in. Topic = # The subscription can be explicit or use Wildcards (#) Output = choose “a parsed JSON object”.
	
5	 Configure the server.
	
6	On Common Palette drag and drop a debug.
	 <pre> Festo/527255604/process : msg.payload : Object object fields: object UPTIME: 584 PDIN01_chan1: 0 PDIN01_chan2: 0 PDIN01_chan3: 0 PDIN01_chan4: 0 PDIN01_chan5: 0 PDIN01_chan6: 0 PDIN01_chan7: 0 PDIN01_chan8: 0 PDIN02_chan1: 0 PDIN02_chan2: 0 PDIN02_chan3: 0 PDIN02_chan4: 0 PDIN02_chan5: 0 PDIN02_chan6: 0 PDIN02_chan7: 0 PDIN02_chan8: 0 PDOU02_chan1: 0 PDOU02_chan2: 0 PDOU02_chan3: 0 PDOU02_chan4: 0 PDOU02_chan5: 0 PDOU02_chan6: 0 PDOU02_chan7: 0 PDOU02_chan8: 0 PDIN03_chan1: 220 PDIN03_chan2: 0 PDIN03_chan3: 0 PDIN03_chan4: 0 PDOU04_chan1: 0 PDOU04_chan2: 0 PDOU04_chan3: 0 PDOU04_chan4: 0 PDOU04_chan5: 0 PDOU04_chan6: 0 PDOU04_chan7: 0 STATIONSNAME: "cpx" MANUFACTURER: "FESTO SE & Co. KG" MODEL: "Terminal CPX" DEVICEREVISION: "SW:51" SOFTWAREREVISION: "P4.6.M4.0.7" PROFINET_IO: ORDERCODE: "197330" IPADDR: "192.168.0.100" NETMASK: "255.255.255.0" GATEWAY: "192.168.0.100" DHCP: "manual1" DESCRIPTIONTAG: "" LOCATIONTAG: "" FUNCTIONTAG: "" OPTIME: "4:22:22:20" POWERCYCLES: 20 SWITCHES_switch1: 0 SWITCHES_switch2: 0 INDEX00: 0 REVISION00: "51" MODULECODE00: 216 MODULETYPE00: "FB44-RIO" MODULEDESC00: "PROFINET IO 2x PP RJ45" </pre>

7	Read the first input. A sensor is connected to the first input.
---	---

The screenshot displays the CPX-IOT configuration interface. At the top, a table lists the device details:

URL	Device ID	Device Type
ci.udp://192.168.0.100:991	527255604	CPX-MPA-VTSA-VTEM

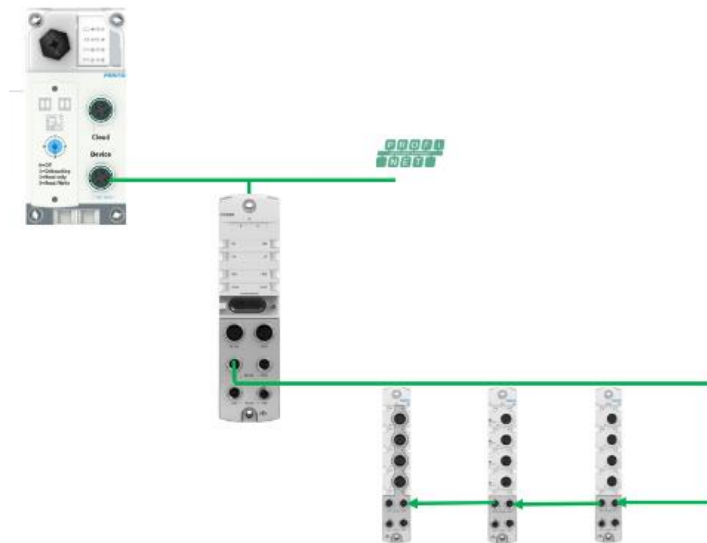
Below the table, a flow diagram shows the data processing sequence: a 'Festo/527255604/process' node (labeled 'connected') connects to an 'extract value' node, which then connects to a 'msg.payload' node. A blue arrow points from the 'Device ID' in the table to the 'extract value' node. Another blue arrow points from the 'extract value' node to the 'Edit change node' dialog box.

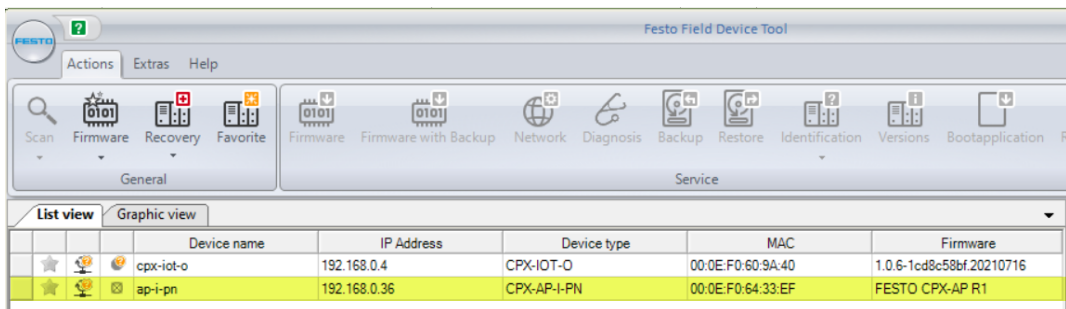
The 'Edit change node' dialog box is open, showing the 'Properties' tab. The 'Name' field is set to 'extract value'. The 'Rules' section shows a 'Set' rule with the following configuration:

- Set (dropdown)
- to (dropdown)
- msg. payload (dropdown)
- msg. payload.fields.PDIN01_chan1 (dropdown)

The 'Done' button is highlighted in red. On the right side of the interface, a log window shows the message: 'Festo/527255604/process : msg.payload : number 1'.

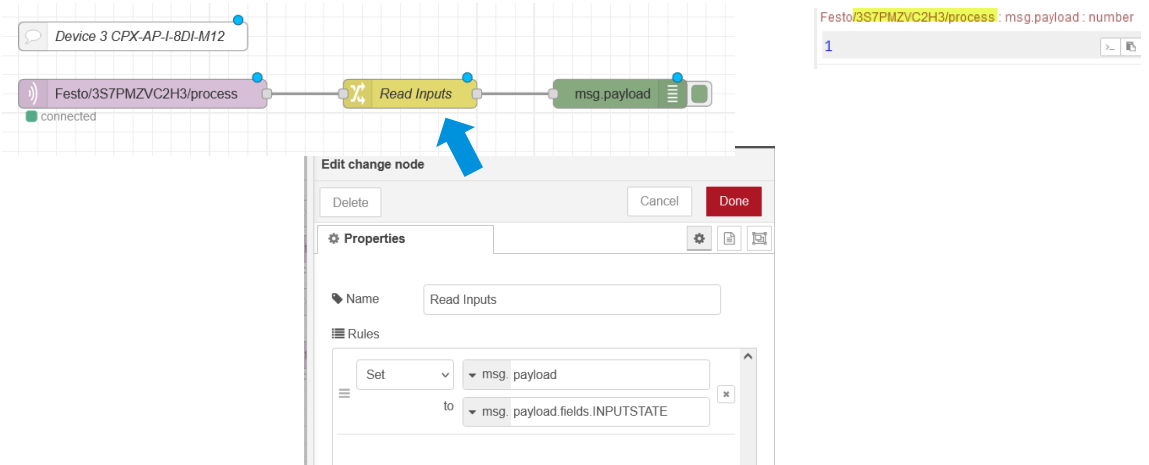
3.3 Manage Devices: Connecting CPX-API-PN to CPX_IOT



No.	Action																								
1	The Profinet master PLC must assign a IP address on XF1. If you do not have a Profinet master PLC, it is possible to assign the IP address via Proneta (Siemens software). In this example, the Profinet CPX-API IP address is: 192.168.0.36																								
	 <table><tr><th></th><th></th><th>Device name</th><th>IP Address</th><th>Device type</th><th>MAC</th><th>Firmware</th></tr><tr><td></td><td>☆</td><td>🔍</td><td>cpx-iot-o</td><td>192.168.0.4</td><td>CPX-IOT-O</td><td>00:0E:F0:60:9A:40</td><td>1.0.6-1cd8c58bf.20210716</td></tr><tr><td></td><td>☆</td><td>🔍</td><td>ap-i-pn</td><td>192.168.0.36</td><td>CPX-API-PN</td><td>00:0E:F0:64:33:EF</td><td>FESTO CPX-API R1</td></tr></table>			Device name	IP Address	Device type	MAC	Firmware		☆	🔍	cpx-iot-o	192.168.0.4	CPX-IOT-O	00:0E:F0:60:9A:40	1.0.6-1cd8c58bf.20210716		☆	🔍	ap-i-pn	192.168.0.36	CPX-API-PN	00:0E:F0:64:33:EF	FESTO CPX-API R1	
		Device name	IP Address	Device type	MAC	Firmware																			
	☆	🔍	cpx-iot-o	192.168.0.4	CPX-IOT-O	00:0E:F0:60:9A:40	1.0.6-1cd8c58bf.20210716																		
	☆	🔍	ap-i-pn	192.168.0.36	CPX-API-PN	00:0E:F0:64:33:EF	FESTO CPX-API R1																		
2	Please go to CPX-IOT webserver and click on Devices --> Manage Devices																								
	Devices ▾ MQTT ▾ Manage Devices Manage Device Types																								
3	Write on Scan Devices the Profinet IP address of the CMMT an click on Scan again																								
	Scan Devices 🔍 192.168.0.36 Scan 🔍																								
4	After doing a Scan, the I/O modules connected to the CPX_AP_I_PN are displayed.																								
	Found devices: 5 <table><tr><th>URL</th><th>Device ID</th><th>Device Type</th><th>Action</th></tr><tr><td>engt.tcp://192.168.0.36:7508/32771</td><td>3S7PMZVC2H3</td><td>CPX-AP_IO</td><td>Board 🔍</td></tr><tr><td>engt.tcp://192.168.0.36:7508</td><td>3S7PNC4J24K</td><td>CPX-AP</td><td>Board 🔍</td></tr><tr><td>engt.tcp://192.168.0.36:7508/32772</td><td>3S7PNCY87LN</td><td>CPX-AP_IO</td><td>Board 🔍</td></tr><tr><td>engt.tcp://192.168.0.36:7508/32770</td><td>3S7PNQQDVRK</td><td>CPX-AP_DEVICE_IOLINK_MASTER</td><td>Board 🔍</td></tr><tr><td>engt.tcp://192.168.0.36:7508/32773</td><td>3S7PNSW35F6</td><td>CPX-AP_IO</td><td>Board 🔍</td></tr></table>	URL	Device ID	Device Type	Action	engt.tcp://192.168.0.36:7508/32771	3S7PMZVC2H3	CPX-AP_IO	Board 🔍	engt.tcp://192.168.0.36:7508	3S7PNC4J24K	CPX-AP	Board 🔍	engt.tcp://192.168.0.36:7508/32772	3S7PNCY87LN	CPX-AP_IO	Board 🔍	engt.tcp://192.168.0.36:7508/32770	3S7PNQQDVRK	CPX-AP_DEVICE_IOLINK_MASTER	Board 🔍	engt.tcp://192.168.0.36:7508/32773	3S7PNSW35F6	CPX-AP_IO	Board 🔍
URL	Device ID	Device Type	Action																						
engt.tcp://192.168.0.36:7508/32771	3S7PMZVC2H3	CPX-AP_IO	Board 🔍																						
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engt.tcp://192.168.0.36:7508/32772	3S7PNCY87LN	CPX-AP_IO	Board 🔍																						
engt.tcp://192.168.0.36:7508/32770	3S7PNQQDVRK	CPX-AP_DEVICE_IOLINK_MASTER	Board 🔍																						
engt.tcp://192.168.0.36:7508/32773	3S7PNSW35F6	CPX-AP_IO	Board 🔍																						

5	Please check the order of the modules using the CPX_AP_I web server.																								
	Found devices: 5 <table><thead><tr><th>URL</th><th>Device ID</th><th>Device Type</th><th>Action</th></tr></thead><tbody><tr><td>engt.tcp://192.168.0.36:7508/32771</td><td>3S7PMZVC2H3</td><td>CPX-AP_IO</td><td> 3 Board </td></tr><tr><td>engt.tcp://192.168.0.36:7508</td><td>3S7PNC4J24K</td><td>CPX-AP</td><td> 1 Board </td></tr><tr><td>engt.tcp://192.168.0.36:7508/32772</td><td>3S7PNCY87LN</td><td>CPX-AP_IO</td><td> 4 Board </td></tr><tr><td>engt.tcp://192.168.0.36:7508/32770</td><td>3S7PNQQDVRK</td><td>CPX-AP_DEVICE_IOLINK_MASTER</td><td> 2 Board </td></tr><tr><td>engt.tcp://192.168.0.36:7508/32773</td><td>3S7PNSW35F6</td><td>CPX-AP_IO</td><td> 5 Board </td></tr></tbody></table> CPX-AP web server ap-i-pn / 192.168.0.36 Home Diagnosis PROFINET / I&M Ethernet Report Device information Device 1 - I-PN-M12 CPX-AP-I-PN-M12 MC: 8321 Product Key: 3S7PNC4J24K OrderNumber: 8086607 SW: 1.3.6 HW: 1 PS: 24.8 V PL: 24.6 V Device 2 - I-4IOL CPX-AP-I-4IOL-M12 MC: 8206 Product Key: 3S7PNQQDVRK OrderNumber: 8086604 SW: 1.1.3 HW: 1 Inputchannels: 8 Inputbytes: 12 Outputchannels: 4 Outputbytes: 8 Device 3 - I-8DI-M12 CPX-AP-I-8DI-M12-5P MC: 8200 Product Key: 3S7PMZVC2H3 OrderNumber: 8086602 SW: 1.43.10 HW: 0 Inputchannels: 8 Inputbytes: 1 Device 4 - I-4DI4DO-M12 CPX-AP-I-4DI4DO-M12-5P MC: 8197 Product Key: 3S7PNCY87LN OrderNumber: 8086603 SW: 1.43.10 HW: 1 Inputchannels: 4 Inputbytes: 1 Outputchannels: 4 Outputbytes: 1 Device 5 - I-4AI CPX-AP-I-4AI-U-I-RTD-M12 MC: 8202 Product Key: 3S7PNSW35F6 OrderNumber: 8086606 SW: 1.0.13 HW: 1 engt.tcp://192.168.0.36:7508 3S7PNC4J24K CPX-AP 1 engt.tcp://192.168.0.36:7508/32770 3S7PNQQDVRK CPX-AP_DEVICE_IOLINK_MASTER 2 engt.tcp://192.168.0.36:7508/32771 3S7PMZVC2H3 CPX-AP_IO 3 engt.tcp://192.168.0.36:7508/32772 3S7PNCY87LN CPX-AP_IO 4 engt.tcp://192.168.0.36:7508/32773 3S7PNSW35F6 CPX-AP_IO 5	URL	Device ID	Device Type	Action	engt.tcp://192.168.0.36:7508/32771	3S7PMZVC2H3	CPX-AP_IO	3 Board	engt.tcp://192.168.0.36:7508	3S7PNC4J24K	CPX-AP	1 Board	engt.tcp://192.168.0.36:7508/32772	3S7PNCY87LN	CPX-AP_IO	4 Board	engt.tcp://192.168.0.36:7508/32770	3S7PNQQDVRK	CPX-AP_DEVICE_IOLINK_MASTER	2 Board	engt.tcp://192.168.0.36:7508/32773	3S7PNSW35F6	CPX-AP_IO	5 Board
URL	Device ID	Device Type	Action																						
engt.tcp://192.168.0.36:7508/32771	3S7PMZVC2H3	CPX-AP_IO	3 Board																						
engt.tcp://192.168.0.36:7508	3S7PNC4J24K	CPX-AP	1 Board																						
engt.tcp://192.168.0.36:7508/32772	3S7PNCY87LN	CPX-AP_IO	4 Board																						
engt.tcp://192.168.0.36:7508/32770	3S7PNQQDVRK	CPX-AP_DEVICE_IOLINK_MASTER	2 Board																						
engt.tcp://192.168.0.36:7508/32773	3S7PNSW35F6	CPX-AP_IO	5 Board																						
6	After boarding the devices, let's subscribe to the modules. To do this, the Product Key must be used to subscribe to the module.																								
7	Device 1 CPX-AP-I-PN-M12 Festo/3S7PNC4J24K/# connected Edit mqtt in node > Edit mqtt-broker node Delete Cancel Update Properties Name EINGP Connection Server 127.0.0.1 Port 1883 Enable secure (SSL/TLS) connection Client ID Leave blank for auto generated Keep alive time (s) 60 Use clean session ☒ Use legacy MQTT 3.1 support ☐																								
8	The same procedure should be done for each module. As a hint: It is not necessary to board all the CPX-AP-I. Only the ones that we want to receive data.																								
9	Device 1 CPX-AP-I-PN-M12 Festo/3S7PNC4J24K/# connected msg payload Device 2 CPX-AP-I-4IOL Festo/3S7PNQQDVRK/# connected msg payload Device 3 CPX-AP-I-8DI-M12 Festo/3S7PMZVC2H3/# connected msg payload Device 4 CPX-AP-I-4DI4DO-M12 Festo/3S7PNCY87LN/# connected msg payload Device 5 CPX-AP-I-4AI Festo/3S7PNSW35F6/# connected msg payload																								

10	Each module send three payloads: Process, diagnosis and asset.
	Festo/3S7PMZVC2H3/process : msg.payload : Object object fields: object INPUTSTATE: 0 OUTPUTSTATE: null comId: "3S7PMZVC2H3" deviceId: "3S7PMZVC2H3" messageType: "process" timestamp: "2021-10-14T13:03:52.549Z" Festo/3S7PMZVC2H3/asset : msg.payload : Object object fields: object PRODUCTKEY: "3S7PMZVC2H3" FIRMWAREVERSIONSTRING: "v1.43.10" comId: "3S7PMZVC2H3" deviceId: "3S7PMZVC2H3" messageType: "asset" timestamp: "2021-10-14T13:03:52.563Z" Festo/3S7PMZVC2H3/diagnosis : msg.payload : Object object fields: object DIAGNOSISCURRENT: object UPTIME: 0 ULOADVALUE: 0 UELSENVALUE: 24420 TEMPERATUREVALUEASIC: 161 comId: "3S7PMZVC2H3" deviceId: "3S7PMZVC2H3" messageType: "diagnosis" timestamp: "2021-10-14T13:03:52.570Z"
	Flow example
	<pre>[{"id":"445cccb.f8b9534","type":"comment","z":"7a3e81eb.53df58","name":"Device 1 CPX-AP-I-EP-M12","info":"","x":180,"y":40,"wires":[]},{id:"a3e396d4.c3a0a","type":"comment","z":"7a3e81eb.53df58","name":"Device 2 CPX-AP-I-4IOL","info":"","x":170,"y":160,"wires":[]},{id:"5687b5fd.833c9c","type":"comment","z":"7a3e81eb.53df58","name":"Device 3 CPX-AP-I-8DI-M12","info":"","x":160,"y":280,"wires":[]},{id:"687269a8.2b2e4","type":"comment","z":"7a3e81eb.53df58","name":"Device 4 CPX-AP-I-4DI4DO-M12","info":"","x":770,"y":40,"wires":[]},{id:"e778f8e5.bde88","type":"comment","z":"7a3e81eb.53df58","name":"Device 5 CPX-AP-I-4AI","info":"","x":740,"y":140,"wires":[]},{id:"bd76b67.0b5d8c8","type":"mqtt in","z":"7a3e81eb.53df58","name":"","topic":"Festo/3S7PNCB048G/#","qos":"2","datatype":"json","broker":"14b2d5c8.45878a","x":120,"y":80,"wires":[["6aa6ed9f.6e4924"]]},{"id":"6aa6ed9f.6e4924","type":"debug","z":"7a3e81eb.53df58","name":"","active":true,"toolbar":true,"console":false,"tostatus":false,"complete":"false","statusVal":"","statusType":"auto","x":390,"y":80,"wires":[]},{id:"a90de56.a6d9918","type":"mqtt in","z":"7a3e81eb.53df58","name":"","topic":"Festo/3S7PNQQDVRK/#","qos":"2","datatype":"json","broker":"14b2d5c8.45878a","x":130,"y":200,"wires":[["f1364836.e0a608"]]},{"id":"f1364836.e0a608","type":"debug","z":"7a3e81eb.53df58","name":"","active":true,"toolbar":true,"console":false,"tostatus":false,"complete":"false","statusVal":"","statusType":"auto","x":390,"y":200,"wires":[]},{id:"d3ed1b.44a242e8","type":"mqtt in","z":"7a3e81eb.53df58","name":"","topic":"Festo/3S7PMZVC2H3/#","qos":"2","datatype":"json","broker":"14b2d5c8.45878a","x":120,"y":340,"wires":[["f9247fdb.98864"]]},{"id":"f9247fdb.98864","type":"debug","z":"7a3e81eb.53df58","name":"","active":true,"toolbar":true,"console":false,"tostatus":false,"complete":"false","statusVal":"","statusType":"auto","x":390,"y":340,"wires":[]},{id:"6c288eec.4a293","type":"mqtt in","z":"7a3e81eb.53df58","name":"","topic":"Festo/3S7PNCY87LN/#","qos":"2","datatype":"json","broker":"14b2d5c8.45878a","x":700,"y":80,"wires":[["646c0a6a.88cd2c"]]},{"id":"646c0a6a.88cd2c","type":"debug","z":"7a3e81eb.53df58","name":"","active":true,"toolbar":true,"console":false,"tostatus":false,"complete":"false","statusVal":"","statusType":"auto","x":1010,"y":80,"wires":[]},{id:"81e06257.410d4","type":"mqtt in","z":"7a3e81eb.53df58","name":"","topic":"Festo/3S7PNSW35F6/#","qos":"2","datatype":"json","broker":"14b2d5c8.45878a","x":700,"y":200,"wires":[["e9030e5a.e72db8"]]},{"id":"e9030e5a.e72db8","type":"debug","z":"7a3e81eb.53df58","name":"","active":true,"toolbar":true,"console":false,"tostatus":false,"complete":"false","statusVal":"","statusType":"auto","x":1010,"y":200,"wires":[]},{id:"14b2d5c8.45878a","type":"mqtt-broker","name":"CPX-AP-I","broker":"127.0.0.1","port":"1883","clientId":"","usetls":false,"compatmode":false,"keepalive":"60","cleansession":true,"birthTopic":"","birthQos":"0","birthPayload":"","closeTopic":"","closeQos":"0","closePayload":"","willTopic":"","willQos":"0","willPayload":""}]</pre>

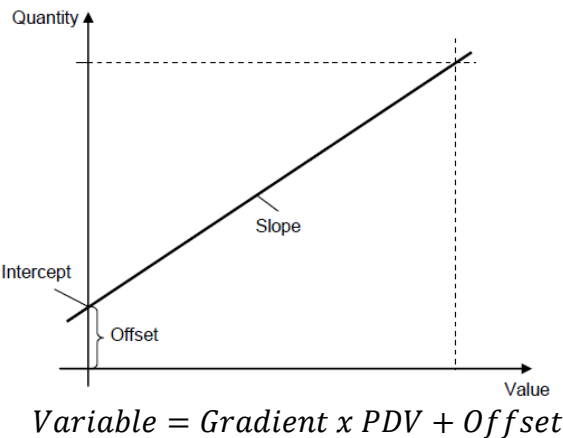
10	Each module of CPX-AP-I system send three message payload: Process, diagnosis and asset. Let's use CPX-AP-I-8DI-M12 to show an example.
	
11	Read the first input of the module CPX-AP-I-8DI-M12.
	

3.3.1 CPX-AP-I-4IOL-M12.

This chapters show how to read data from a Io-Link device connected to a CPX-AP-I-4IOL-M12 module. The example is carried out with a SPAW flow sensor.

Please check the IO-Link Interface and system Specification: [IO-Link Interface and System Specification](#)

Value to quantity conversion via linear equation is taking from IO-Link Interface and System Specification.



1	As an example this is the input process data for IO-Link device																																			
	<table><tr><th colspan="3">process data input</th><th colspan="2">record i</th></tr><tr><td>PDV (InA)</td><td>1</td><td>24</td><td>UIntegerT_14</td><td>0 to 16383</td></tr><tr><td>PDV (InB)</td><td>2</td><td>8</td><td>UIntegerT_14</td><td>0 to 16383</td></tr><tr><td>BDC4 (OutD)</td><td>3</td><td>3</td><td>BooleanT</td><td></td></tr><tr><td>BDC3 (OutC)</td><td>4</td><td>2</td><td>BooleanT</td><td></td></tr><tr><td>BDC2 (OutB)</td><td>5</td><td>1</td><td>BooleanT</td><td></td></tr><tr><td>BDC1 (OutA)</td><td>6</td><td>0</td><td>BooleanT</td><td></td></tr></table>	process data input			record i		PDV (InA)	1	24	UIntegerT_14	0 to 16383	PDV (InB)	2	8	UIntegerT_14	0 to 16383	BDC4 (OutD)	3	3	BooleanT		BDC3 (OutC)	4	2	BooleanT		BDC2 (OutB)	5	1	BooleanT		BDC1 (OutA)	6	0	BooleanT	
process data input			record i																																	
PDV (InA)	1	24	UIntegerT_14	0 to 16383																																
PDV (InB)	2	8	UIntegerT_14	0 to 16383																																
BDC4 (OutD)	3	3	BooleanT																																	
BDC3 (OutC)	4	2	BooleanT																																	
BDC2 (OutB)	5	1	BooleanT																																	
BDC1 (OutA)	6	0	BooleanT																																	
2	Where InA is the flow, InB is the temperature. The IODD xml-File (can be obtained here: IODDfinder (io-link.com))																																			
	<pre><ProcessDataRefCollection> <ProcessDataRef processDataId="PI_ProcessDataIn"> <ProcessDataRecordItemInfo subindex="1" gradient="0.001953244217" off- set="0.000000000000" unitCode="1352" displayFormat="Dec.1" /> <ProcessDataRecordItemInfo subindex="2" gradient="0.006103888177" off- set="0.000000000000" unitCode="1001" displayFormat="Dec.1" /> <ProcessDataRecordItemInfo subindex="3" /> <ProcessDataRecordItemInfo subindex="4" /> <ProcessDataRecordItemInfo subindex="5" /> <ProcessDataRecordItemInfo subindex="6" /> </ProcessDataRef> </ProcessDataRefCollection></pre>																																			

3

Data from the flow sensor on Node RED.

10/13/2021, 10:34:34 AM node: 8b516493.a6f618

Festo/3S7PNQDVRK/process : msg.payload : Object

▼ object

▼ fields: object

▼ INPUTSTATE: array[36]

▼ [0 ... 9]

0: 0

1: 0

2: 16

3: 245

4: 0

5: 0

6: 0

7: 0

8: 0

9: 0

▶ [10 ... 19]

▶ [20 ... 29]

▶ [30 ... 35]

▼ OUTPUTSTATE: array[36]

▼ [0 ... 9]

4

Conversion to HEX

▪ 16 = 0x10

▪ 245 = 0xF5

The raw value is: 0x10F5 = 4341

5

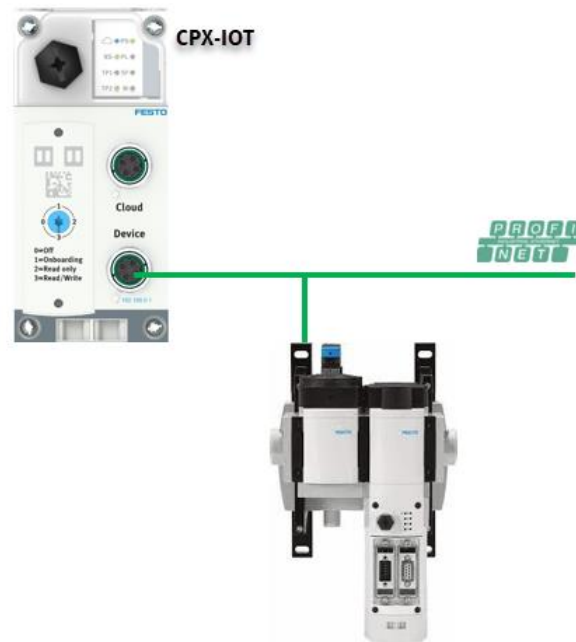
$Variable = Gradient \times PDV + Offset$

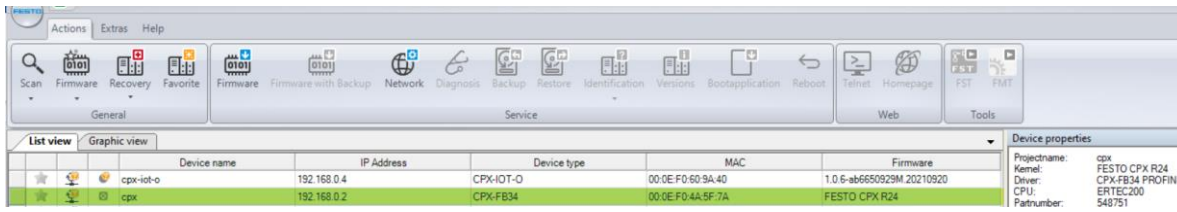
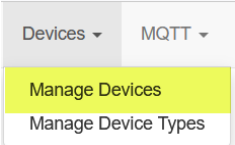
$Variable = 0.006103888177 \times 4341 + 0 = 26.4970 \text{ [}^{\circ}\text{C]}$

Name	Value	Unit
[-] Process data input		
PDV (InA)	0.0	L/min
PDV (InB)	26.4	°C
BDC4 (OutD)	0 (Off)	☐
BDC3 (OutC)	0 (Off)	☐
BDC2 (OutB)	0 (Off)	☐
BDC1 (OutA)	0 (Off)	☐

3.4 Manage Devices: Connecting MS6-E2M to CPX_IOT.

The device port of the CPX_IOT can be connected directly to the PROFINET network.



No	Action												
1	The Profinet master PLC must assign a IP address on the XF1IN port (CMMT-AS and CMMT-ST). If you do not have a Profinet master PLC, it is possible to assign the IP address via Proneta (Siemens software). In this example, the Profinet FB35 address is: 192.168.0.2												
													
2	Go to CPX-IOT webserver and click on Devices --> Manage Devices												
													
3	Write on Scan Devices the IP address of the Profinet slave.												
	Scan Devices ▼ 192.168.0.2 Scan again Found devices: 2 <table><thead><tr><th>URL</th><th>Device ID</th><th>Device Type</th><th>Action</th></tr></thead><tbody><tr><td>ci.udp://192.168.0.2:991</td><td>524967802</td><td>CPX-MPA-VTSA-VTEM</td><td>Board</td></tr><tr><td>ci.udp://192.168.0.2:991</td><td>524967802_cm</td><td>MSE6-E2M</td><td>Board</td></tr></tbody></table>	URL	Device ID	Device Type	Action	ci.udp://192.168.0.2:991	524967802	CPX-MPA-VTSA-VTEM	Board	ci.udp://192.168.0.2:991	524967802_cm	MSE6-E2M	Board
URL	Device ID	Device Type	Action										
ci.udp://192.168.0.2:991	524967802	CPX-MPA-VTSA-VTEM	Board										
ci.udp://192.168.0.2:991	524967802_cm	MSE6-E2M	Board										
4	The scan process has been completed successfully. Then click on “Board”.												

	Scan Devices 192.168.0.2 Scan again Found devices: 2 <table><thead><tr><th>URL</th><th>Device ID</th><th>Device Type</th><th>Action</th></tr></thead><tbody><tr><td>ci.udp://192.168.0.2:991</td><td>524967802</td><td>CPX-MPA-VTSA-VTEM</td><td> Board </td></tr><tr><td>ci.udp://192.168.0.2:991</td><td>524967802_cm</td><td>MSE6-E2M</td><td> Board </td></tr></tbody></table>	URL	Device ID	Device Type	Action	ci.udp://192.168.0.2:991	524967802	CPX-MPA-VTSA-VTEM	Board	ci.udp://192.168.0.2:991	524967802_cm	MSE6-E2M	Board								
URL	Device ID	Device Type	Action																		
ci.udp://192.168.0.2:991	524967802	CPX-MPA-VTSA-VTEM	Board																		
ci.udp://192.168.0.2:991	524967802_cm	MSE6-E2M	Board																		
5	The board process has been completed successfully. Connection OK  Connection Not OK  . After boarding the message are sent. Node-RED is optional and used here as a demo.																				
	192.168.0.2 Scan Found devices: 2 <table><thead><tr><th>URL</th><th>Device ID</th><th>Device Type</th><th>Action</th></tr></thead><tbody><tr><td>ci.udp://192.168.0.2:991</td><td>524967802</td><td>CPX-MPA-VTSA-VTEM</td><td> Board </td></tr><tr><td>ci.udp://192.168.0.2:991</td><td>524967802_cm</td><td>MSE6-E2M</td><td> Boarded </td></tr></tbody></table> Boarded Devices Currently boarded: 1 <table><thead><tr><th>URL</th><th>Device ID</th><th>Device Type</th><th>Action</th></tr></thead><tbody><tr><td>ci.udp://192.168.0.2:991</td><td> 524967802_cm</td><td>MSE6-E2M</td><td> Info Offboard </td></tr></tbody></table>	URL	Device ID	Device Type	Action	ci.udp://192.168.0.2:991	524967802	CPX-MPA-VTSA-VTEM	Board	ci.udp://192.168.0.2:991	524967802_cm	MSE6-E2M	Boarded	URL	Device ID	Device Type	Action	ci.udp://192.168.0.2:991	 524967802_cm	MSE6-E2M	Info Offboard
URL	Device ID	Device Type	Action																		
ci.udp://192.168.0.2:991	524967802	CPX-MPA-VTSA-VTEM	Board																		
ci.udp://192.168.0.2:991	524967802_cm	MSE6-E2M	Boarded																		
URL	Device ID	Device Type	Action																		
ci.udp://192.168.0.2:991	 524967802_cm	MSE6-E2M	Info Offboard																		
6	Open Node-RED																				
	Node-RED Support Open Node-RED Open Node-RED Dashboard Manage Node-RED																				
7	On Network palette please drag and drop MQTT in. Then press double click on the object MQTT in. Topic = # The subscription can be explicit or use Wildcards (#) Output = choose “a parsed JSON object”.																				
	network mqtt in mqtt out http in http response http request websocket in websocket out tcp in tcp out tcp request udp in udp out 2 MS6-E2M # connected Edit mqtt in node Delete Cancel Done Properties Server MS6-E2M Topic # QoS 2 Output a parsed JSON object Name Name																				
8	Configure the server.																				

9

On Common Palette drag and drop a **debug**.

common

1

inject

debug

complete

catch

status

link in

link out

comment

MS6-E2M

#

connected

2

msg.payload

esto524967802_cmprocess : msg.payload : Object

7802_cmasset : msg.payload : Object

3

object

fields: object

ProductKey: "524967802_cm"

CMLibVersion: "scriptCM_1.0.1"

CycleProcessCounter: 3

ShutoffValveClosed: false

AutooffPrepared: false

AutooffActivated: false

ConsumptionMeasureActive: false

FlowRawValue: 0

FlowAvgValue: 0

FlowMinValue: 0

FlowMaxValue: 0

PressureRawValue: 7800

PressureAvgValue: 7831.200195

PressureMinValue: 7820

PressureMaxValue: 7840

ConsumptionRawValue: 0

ConsumptionAvgValue: 0

ConsumptionExtRawValue: 0

ConsumptionExtAvgValue: 0

PressureUnit: "mbar"

FlowUnit: "l/min"

ConsumptionUnit: "l"

ConsumptionExtUnit: "l"

OperationTime: 27

SwitchingCyclesShutoffvalve: 5

ProcessTimePeriod: 25

FlowStandard: "DIN 1343"

SerialNo: "3708768067"

comId: "524967802_cm"

deviceId: "524967802_cm"

messageType: "asset"

packetCounter: 18

timestamp: "2021-10-14T14:39:39.014Z"

object

uctKey: "524967802_cm"

bVersion: "scriptCM_1.0.1"

sureUnit: "mbar"

Unit: "l/min"

umptionUnit: "l"

umptionExtUnit: "l"

ationTime: 27

chingCyclesShutoffvalve: 5

essTimePeriod: 25

_Standard: "DIN 1343"

alNo: "3708768067"

"524967802_cm"

Id: "524967802_cm"

eType: "asset"

Counter: 17

amp: "2021-10-14T14:39:19.013Z"

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Application Note – CPX-IOT with Profinet network – 1.10

4 Appendix

In this appendix section you will find the payload message of the devices.

4.1 CMMT-AS and CMMT-ST MQTT payloads.

Process message	Parameter number	Description
outputX0	1.128.0	Actual Position
PSACTTEMP	0.920.0	Temperature Powerstage
AIRACTTEMP	0.930.0	Temperature Air in Case
MOTORACTTEMP	1.940.0	Temperature Motor
DCVOLTAGE	0.480.0	DC Link Management "Actual value of the DC link voltage"
TORQUEMOTOR	1.150.0	Actual value of the torque (current * torque constant)
TORQUEDRIVE	1.151.0	Actual value of the torque (current*torque constant*gear ratio)
OUTPUTPOSITIONREF	1.90.0	Setpoint Position
OUTPUTVELOCITYREF	1.91.0	Setpoint Velocity
OUTPUTV0	1.1210.0	Actual Velocity
IQREF	1.86.0	Setpoint Current (Active Current)
IQ	1.814.0	Actual Current (Active Current)
INPUTVALUE	1.9912.0	Analog In
ID	1.813.0	Actual value of the reactive current
MOTOREACTREL	1.6331.0	Actual value of the relative I2T monitoring of the motor to the limit
ILIM	1.6334.0	Actual value of the I2T monitoring of the total current
STATE	1.460.0	Status of movement monitoring

The motor controller send 3 groups of message: asset message, process message and diagnosis message. The table below show the data received.

Process message	Parameter number	Description
OUTPUTX0	1.128.0	Actual Position
PSACTTEMP	0.920.0	Temperature Powerstage
AIRACTTEMP	0.930.0	Temperature Air in Case
MOTORACTTEMP	1.940.0	Temperature Motor
DCVOLTAGE	0.480.0	DC Link Management "Actual value of the DC link voltage"
TORQUEMOTOR	1.150.0	Actual value of the torque (current * torque constant)
TORQUEDRIVE	1.151.0	Actual value of the torque (current*torque constant*gear ratio)
OUTPUTPOSITIONREF	1.90.0	Setpoint Position
OUTPUTVELOCITYREF	1.91.0	Setpoint Velocity
OUTPUTV0	1.1210.0	Actual Velocity

IQREF	1.86.0	Setpoint Current (Active Current)
IQ	1.814.0	Actual Current (Active Current)
INPUTVALUE	1.9912.0	Analog Input
ID	1.813.0	Actual value of the reactive current
MOTOREACTREL	1.6331.0	Actual value of the relative I2T monitoring of the motor to the limit
ILIM	1.6334.0	Actual value of the I2T monitoring of the total current
STATE	1.460.0	Status of movement monitoring

Asset message	Parameter number	Description
DEVICENAME	0.902.0.0	name
PARTNUMBER	0.70.0	part number
NOCCODE	0.71.0	order code
PRODUCTKEY	0.791.0	Festo product key
IPADDRESS	0.12004.0	IP Address
IPADDRESSFB	0.12004.1	ipAddressFieldbusInterface (IP address for engp via tcp/ip over the fieldbus interface (currently either Ethernet coexistence in case of Profinet or EoE in case of EtherCAT, depending on the device type)
firmware	0.960.0	CMMT Firmware version in string representation
activeUserUnit	1.1150.0	Currently active user unit

4.2 CPX-AP-I-PN-M12 payloads.

Process message	Description
Inputstate	status of the inputs
Outputstate	status of the outputs
ComID	comID
DeviceID	DeviceId
MessageType	"process"
Timestamp	timestamp

Diagnosis message
Diagnosiscurrent
Uptime
Uloadvalue
Uelsenvalue
TempreatureValueAsic
ComID
MessageType
Timestamp

Asset message
Productkey
FirmwareVersionString
ComID
DeviceID
MessageType
Timestamp

4.2.1 CPX-AP-I-4IOL-M12 payloads.

Process message	Description
Inputstate	status of the inputs
Outputstate	status of the outputs
ComID	comID
DeviceID	DeviceId
MessageType	"process"
Timestamp	timestamp

Diagnosis message
Diagnosiscurrent
Uptime
Uloadvalue
Uelsenvalue
TempreatureValueAsic
IoLinkVariant
SensorSupplyCurrentDrain
SensorSupplyEnable
ComID
MessageType
Timestamp

Asset message
Productkey
FirmwareVersionString
ComID
DeviceID
MessageType
Timestamp

4.2.2 CPX-AP-I-8DI-M12 payloads.

Process message	Description
Inputstate	status of the inputs
Outputstate	<i>Null</i>
ComID	comID
DeviceID	DeviceId
MessageType	"process"
Timestamp	timestamp

Diagnosis message
Diagnosiscurrent
Uptime
Uloadvalue
Uelsenvalue
TemperatureValueAsic
IoLinkVariant
ComID
MessageType
Timestamp

Asset message
Productkey
FirmwareVersionString
ComID
DeviceID
MessageType
Timestamp

4.2.3 CPX-AP-I-4DI4DO-M12-5P payloads.

Process message	Description
Inputstate	status of the inputs
Outputstate	status of the outputs
ComID	comID
DeviceID	DeviceId
MessageType	"process"
Timestamp	timestamp

Diagnosis message
DiagnosisCurrent
Uptime
Uloadvalue
Uelsenvalue
TemperatureValueAsic
ComID
MessageType
Timestamp

Asset message
Productkey
FirmwareVersionString
ComID
DeviceID
MessageType
Timestamp

4.2.4 CPX-AP-I-4AI-U-I-RTD-M12 payloads.

Process message	Description
Inputstate	status of the inputs
Outputstate	<i>Null</i>
ComID	comID
DeviceID	DeviceId
MessageType	"process"
Timestamp	timestamp

Diagnosis message
Diagnosiscurrent
Uptime
Uloadvalue
Uelsenvalue
TempreatureValueAsic
IoLinkVariant
ComID
MessageType
Timestamp

Asset message
Productkey
FirmwareVersionString
ComID
DeviceID
MessageType
Timestamp

4.3 MS6-E2M payloads

Process message	Description
ShutoffValveClosed	State of the shut off valve
AutooffPrepared	Auto off function prepared
AutooffActivated	Auto off function active
FlowRawValue	Flow raw value
FlowAvgValue:	Average flow for the last aggregation period
FlowMinValue: 117	Minimum flow for the last aggregation period
FlowMaxValue: 119	Maximum flow for the last aggregation period
PressureRawValue: 4600	Pressure raw value
PressureAvgValue: 4563.200195	Average pressure for the last aggregation period
PressureMinValue: 4520	Minimum pressure for the last aggregation period
PressureMaxValue: 4600	Maximum pressure for the last aggregation period
ConsumptionRawValue: 65535	Consumption counter (absolute)
ConsumptionAvgValue: 0	Consumption for the last aggregation period (relative)
AirSavingLastPeriod	Fictional saving due to the shutdown function (in the last aggregation period)
Operation_Time	Overall operation time
Switching_Cycles_Shutoffvalve	Number of switching cycles (if available)
CycleProcessCounter	Internal counter for aggregation

Diagnosis message	Description
ErrorChannel	Channel
iErrorNumber	Error code number
sChanneltext	Error code description

Asset message	Description
ProductKey	Festo ProductKey
CMLibVersion	Software version preaggregation
ProcessTimePeriod	Aggregation period
PressureUnit	Pressure Unit
FlowUnit	Flow Unit
ConsumptionUnit	Consumption Unit
Flow_Standard	Flow Standard
Serial_No	Serialnumber

4.4 MS6-C2M payloads.

Process message	Description
ShutoffValveClosed	State of the shut off valve
AutooffPrepared	Auto off function prepared
AutooffActivated	Auto off function active
FlowRawValue	Flow raw value
FlowAvgValue:	Average flow for the last aggregation period
FlowMinValue: 117	Minimum flow for the last aggregation period
FlowMaxValue: 119	Maximum flow for the last aggregation period
PressureRawValue: 4600	Pressure raw value
PressureAvgValue: 4563.200195	Average pressure for the last aggregation period
PressureMinValue: 4520	Minimum pressure for the last aggregation period
PressureMaxValue: 4600	Maximum pressure for the last aggregation period
ConsumptionRawValue: 65535	Consumption counter (absolute)
ConsumptionAvgValue: 0	Consumption for the last aggregation period (relative)
ConsumptionExtRawValue: 65535	Consumption counter extended (absolute)
ConsumptionExtAvgValue: 0	Consumption extended for the last aggregation period (relative)
AirSavingLastPeriod	Fictional saving due to the shutdown function (in the last aggregation period)
Operation_Time	Overall operation time
Switching_Cycles_Shutoffvalve	Number of switching cycles (if available)
CycleProcessCounter	Internal counter for aggregation

Diagnosis message	Description
ErrorChannel	channel
iErrorNumber	error code number
sChanneltext	error code description

Asset message	Description
ProductKey	Festo ProductKey
CMLibVersion	Software Version preaggregation
ProcessTimePeriod	Aggregation period
PressureUnit	Pressure Unit
FlowUnit	Flow Unit
ConsumptionUnit	Consumption Unit
ConsumptionExtUnit	Consumption Extended Unit
Flow_Standard	Flow Standard
Serial_No	Serialnumber

Error Code No	Available Error Codes - Error Description
10	Upper limit exceeded
15	Module/ Channel failed
25	Fault in parametrizing upper limit
26	Fault in actuator supply
29	Fault in parametrizing

4.5 VTUG via CPX-AP payloads.

Process message	Description
Inputstate	status of the inputs
Outputstate	status of the outputs
ComID	comID
DeviceID	DeviceId
MessageType	"process"
Timestamp	timestamp

Diagnosis message
Diagnosiscurrent
Uptime
Uloadvalue
Uelsenvalue
TempreatureValueAsic
ComID
MessageType
Timestamp

Asset message
Productkey
FirmwareVersionString
ComID
DeviceID
MessageType
Timestamp

4.6 CPX-FB3X or CPX-FB4X payloads.

Process message	Description
UPTIME	Uptime since last power cycle in seconds

Diagnosis message	Description
DIAGNOSIS06_mod	Module error code number
DIAGNOSIS06_modText	Module error code description
DIAGNOSIS06_chan0	Channel 0 error code number
DIAGNOSIS06_chanText1	Channel 0 error code description

Asset message	Description
STATIONSNAME	PROFINET station name
MANUFACTURER	Festo manufacturer
MODEL	Festo model
DEVICEREVISION	Module revision
SOFTWAREREVISION	Internal software revision
ORDERCODE	Festo order code
IPADDRESS	IP Address
NETMASK	Subnetmask
GATEWAY	Gateway address
DHCP	DHCP mode
DESCRIPTIONTAG	PROFINET description tag
LOCATIONTAG	PROFINET location tag
FUNCTIONTAG	PROFINET function tag
OPTIME	Cumulative uptime in days:hours:minutes:seconds
POWERCYCLES	Cumulative number of powercycles
SWITCHES_switch1	Position of the DIL switch
SWITCHES_switch2	Position of the DIL switch
INDEX06	Module position on valve terminal
REVISION06	Module revision
MODULECODE06	Module code
MODULETYPE06	Module type
MODULEDESC06	Module description
SUBMODULECODE06	Submodulcode
SERIAL06	Modul Serial number
PARAMETER06_name1	internal parameter
PARAMETER06_value1	internal parameter
PARAMETER06_name2	internal parameter
PARAMETER06_value2	internal parameter
PARAMETER06_name3	internal parameter
PARAMETER06_value3	internal parameter
PARAMETER06_name4	internal parameter
PARAMETER06_value4	internal parameter
PARAMETER06_name5	internal parameter
PARAMETER06_value5	internal parameter
PARAMETER06_name6	internal parameter
PARAMETER06_value6	internal parameter

PARAMETER06_name7	internal parameter
PARAMETER06_value7	internal parameter
PARAMETER06_name8	internal parameter
PARAMETER06_value8	internal parameter

4.6.1 CPX-8DI-D payloads.

Process message	Description
PDIN03_chan1: 0	Input state 0 = inactive 1 = active
PDIN03_chan2: 1	..
PDIN03_chan3: 0	..
PDIN03_chan4: 0	..
PDIN03_chan5: 1	..
PDIN03_chan6: 0	..
PDIN03_chan7: 0	..
PDIN03_chan8: 0	..
PDIN03_chan9: 0	..
PDIN03_chan10: 0	..
PDIN03_chan11: 0	..
PDIN03_chan12: 0	..
PDIN03_chan13: 0	..
PDIN03_chan14: 0	..
PDIN03_chan15: 1	..
PDIN03_chan16: 0	..

Diagnosis message	Description
DIAGNOSIS03_mod: 0	Modul error code number
DIAGNOSIS03_modText: " "	Modul error code description
DIAGNOSIS03_chan0: 0	Channel 0 error code number
DIAGNOSIS03_chanText1: " "	Channel 0 error code description
DIAGNOSIS03_chan1: 0	...
DIAGNOSIS03_chanText2: " "	...
DIAGNOSIS03_chan2: 0	...
DIAGNOSIS03_chanText3: " "	...
DIAGNOSIS03_chan3: 0	...
DIAGNOSIS03_chanText4: " "	...
DIAGNOSIS03_chan4: 0	...
DIAGNOSIS03_chanText5: " "	...
DIAGNOSIS03_chan5: 0	...
DIAGNOSIS03_chanText6: " "	...
DIAGNOSIS03_chan6: 0	...
DIAGNOSIS03_chanText7: " "	...
DIAGNOSIS03_chan7: 0	...

DIAGNOSIS03_chanText8: " "	...
DIAGNOSIS03_chan8: 0	...
DIAGNOSIS03_chanText9: " "	...
DIAGNOSIS03_chan9: 0	...
DIAGNOSIS03_chanText10: " "	...
DIAGNOSIS03_chan10: 0	...
DIAGNOSIS03_chanText11: " "	...
DIAGNOSIS03_chan11: 0	...
DIAGNOSIS03_chanText12: " "	...
DIAGNOSIS03_chan12: 0	...
DIAGNOSIS03_chanText13: " "	...
DIAGNOSIS03_chan13: 0	...
DIAGNOSIS03_chanText14: " "	...
DIAGNOSIS03_chan14: 0	...
DIAGNOSIS03_chanText15: " "	...
DIAGNOSIS03_chan15: 0	...
DIAGNOSIS03_chanText16: " "	...

Asset message	Description
INDEX03	Module position on valve terminal
REVISION03	Module revision
MODULECODE03	Module code
MODULETYPE03:	Module type "M-16DI-D"
MODULEDESC03:	Module description "Input module"
SUBMODULECODE03	Sub module code
SERIAL03	Module Serialnumber
PARAMETER03_name1:	Monitoring short circuit in sensor supply (SCV) "Monitor SCS"
PARAMETER03_value1:	1 = active (presetting) 0=inactive
PARAMETER03_name2: "Behaviour after SCS"	Determines after a short circuit in the sensor supply whether the power is to remain switched off or whether it is to be switched on again automatically
PARAMETER03_value2: 1	0=VSENremains switched off 1=VSENswitch on again (presetting)
PARAMETER03_name3: "Debounce time"	Determines when a change of edge of the sensor signal on this module is to be accepted as a logical input signal
PARAMETER03_value3: 1	Input debounce time 0 0.1 ms 1 3 ms (presetting) 2 10 ms 3 20 ms
PARAMETER03_name4: "Signal extension"	Determines the signal extension time for the relevant I-module. Signal states accepted as logical input signals usually remain valid at least until the specified signal extension time (minimum signal duration) has expired. Changes of edge within the extension time are ignored
PARAMETER03_value4: 1	Signal extension time 0 0.5 ms 1 15 ms (presetting) 2 50 ms 3 100 ms
PARAMETER03_name5: "Signal extension"	...
PARAMETER03_value5: 0	...
PARAMETER03_name6: "Signal extension"	...
PARAMETER03_value6: 0	...
PARAMETER03_name7: "Signal extension"	...
PARAMETER03_value7: 0	...
PARAMETER03_name8: "Signal extension"	...
PARAMETER03_value8: 0	...
PARAMETER03_name9: "Signal extension"	...
PARAMETER03_value9: 0	...
PARAMETER03_name10: "Signal extension"	...
PARAMETER03_value10: 0	...
PARAMETER03_name11: "Signal extension"	...
PARAMETER03_value11: 0	...

PARAMETER03_name12: "Signal extension"	...
PARAMETER03_value12: 0	...
PARAMETER03_name13: "Signal extension"	...
PARAMETER03_value13: 0	...
PARAMETER03_name14: "Signal extension"	...
PARAMETER03_value14: 0	...
PARAMETER03_name15: "Signal extension"	...
PARAMETER03_value15: 0	...
PARAMETER03_name16: "Signal extension"	...
PARAMETER03_value16: 0	...
PARAMETER03_name17: "Signal extension"	...
PARAMETER03_value17: 0	...
PARAMETER03_name18: "Signal extension"	...
PARAMETER03_value18: 0	...
PARAMETER03_name19: "Signal extension"	...
PARAMETER03_value19: 0	...
PARAMETER03_name20: "Signal extension"	...
PARAMETER03_value20: 0	...

4.6.2 CPX-VTSA payloads.

Process message	Description
PDOUT08_chan1: 1	Valve switching state 0 = inactive 1 = active
PDOUT08_chan2: 0	...
PDOUT08_chan3: 0	...
PDOUT08_chan4: 1	...
PDOUT08_chan5: 0	...
PDOUT08_chan6: 1	...
PDOUT08_chan7: 0	...
PDOUT08_chan8: 1	...
PDOUT08_chan9: 0	...
PDOUT08_chan10: 1	...

Diagnosis message	Description
DIAGNOSIS08_mod: 0	Module error code number
DIAGNOSIS08_modText: " "	Module error code description
DIAGNOSIS08_chan0: 0	Channel 0 error code number
DIAGNOSIS08_chanText1: " "	Channel 0 error code description
DIAGNOSIS08_chan1: 0	...
DIAGNOSIS08_chanText2: " "	...
DIAGNOSIS08_chan2: 0	...
DIAGNOSIS08_chanText3: " "	...
DIAGNOSIS08_chan3: 0	...
DIAGNOSIS08_chanText4: " "	...
DIAGNOSIS08_chan4: 0	...
DIAGNOSIS08_chanText5: " "	...
DIAGNOSIS08_chan5: 0	...
DIAGNOSIS08_chanText6: " "	...
DIAGNOSIS08_chan6: 0	...
DIAGNOSIS08_chanText7: " "	...
DIAGNOSIS08_chan7: 0	...
DIAGNOSIS08_chanText8: " "	...
DIAGNOSIS08_chan8: 0	...

Asset message	Description
INDEX08: 8	Module position on valve terminal
REVISION08: "11"	Module revision
MODULECODE08: 69	Module code
MODULETYPE08: "VTSA"	Module type
MODULEDESC08: "Pneumatic interface"	Module description
SUBMODULECODE08: 0	Submodulcode
SERIAL08: "3709486484"	Modul Serialnumber
PARAMETER08_name1: "Monitor Vout/Vval"	Monitoring supply voltage (UVAL)
PARAMETER08_value1: 0	0 = inactive 1 = active (default)
PARAMETER08_name2: "Monitor SCV"	Monitoring short circuit at the valve (SCV)
PARAMETER08_value2: 0	0 = inactive (default) 1 = active
PARAMETER08_name3: "Monitor open circuit"	Wire break monitoring for first valve
PARAMETER08_value3: 0	0 = inactive (default) 1 = active
PARAMETER08_name4: "Monitor open circuit"	Wire break monitoring for second valve
PARAMETER08_value4: 0	0 = inactive (default) 1 = active
PARAMETER08_name5: "Monitor open circuit"	...

PARAMETER08_value5: 0	...
PARAMETER08_name6: "Monitor open circuit"	...
PARAMETER08_value6: 0	...
PARAMETER08_name7: "Monitor open circuit"	...
PARAMETER08_value7: 0	...
PARAMETER08_name8: "Monitor open circuit"	...
PARAMETER08_value8: 0	...
PARAMETER08_name9: "Monitor open circuit"	...
PARAMETER08_value9: 0	...
PARAMETER08_name10: "Monitor open circuit"	...
PARAMETER08_value10: 0	...