

Festo AX Data Access



GASA-DA-SIE

This document describes how to set up a AX DATA ACCESS gateway and how to connect Festo components to it and retrieve data.

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Table of contents

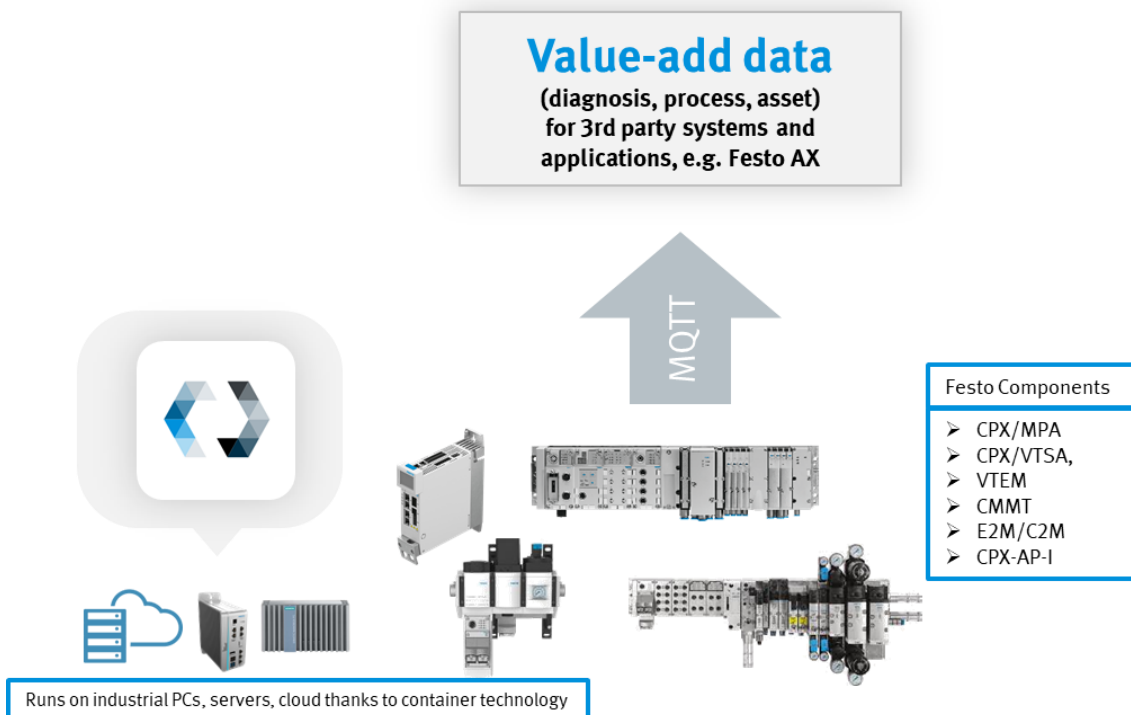
1	Introduction	4
2	Components/Software used	6
3	Overview Connectivity	8
4	Overview AX Data Access.....	9
4.1	Toolbar	9
4.2	Main Page Information	9
5	Set up MQTT configuration.....	10
5.1	Set up connection in AX Data Access.....	10
5.2	Set up MQTT user IE Databus	10
5.3	Send Test Message	12
6	Manage connected devices (Festo automation components)	13
6.1	Manage Devices: Connecting CMMT-AS-xx-PN or CMMT-ST-xx-PN Data to AX DATA ACCESS.	13
6.2	Manage Devices: Connecting CPX-MPA to AX Data Access.....	19
6.3	Manage Devices: Connecting CPX-API-PN to AX DATA ACCESS	22
6.3.1	CPX-AP-I-4IOL-M12.	26
6.4	Manage Devices: Connecting MS6-E2M to AX Data Access	28
6.5	Customizing MQTT Topic	30
6.5.1	Change MQTT Customise Topics	31
6.5.2	MQTT Customise Topics: Select Variables	32
7	Expert Configuration: signature.json	33
7.1.1	Trigger interval.....	33
7.1.2	How to change MQTT topic.	34
7.1.3	How to change the content of the Device ID.	35
8	Appendix.....	36
8.1	CMMT-AS and CMMT-ST MQTT payloads.	36
8.2	CPX-AP-I-PN-M12 payloads.	38
8.2.1	CPX-AP-I-4IOL-M12 payloads.	39
8.2.2	CPX-AP-I-8DI-M12 payloads.	40
8.2.3	CPX-AP-I-4DI4DO-M12-5P payloads.....	41
8.2.4	CPX-AP-I-4AI-U-I-RTD-M12 payloads.....	42
8.3	MS6-E2M payloads.....	43
8.4	MS6-C2M payloads.	44
8.5	VTUG via CPX-AP payloads.	45
8.6	CPX-FB3X or CPX-FB4X payloads.	46
8.6.1	CPX-8DI-D and 16DI-D payloads.....	47
8.6.2	CPX-VTSA payloads.....	50
8.7	MPA-P payloads.	52

1 Introduction

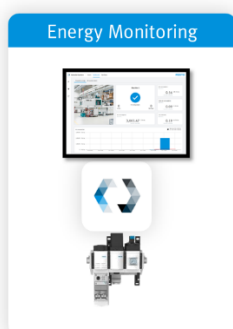
Festo AX Data Access is software that queries data from Festo components and can publish it via MQTT. The software serves as a protocol translator: Festo-proprietary protocols are used to address components for the transmission of data. The components then periodically send data to AX Data Access. In the software, the received data is converted into a JSON structure and published to an MQTT broker under definable MQTT topics. The MQTT broker itself is not part of AX Data Access. AX Data Access provides a so-called "MQTT client".

AX Data Access retrieves data from these Festo components:

- CPX*/MPA
- CPX*/VTSA
- MSE6-C2M
- MSE6-E2M
- CPX-AP-I
- CMMT-AS
- CMMT-ST



3 of many more use Cases to implement with AX Data Access



1.1 Supported CPX Modules

Valve Terminals with CPX-Modules can be combined in many variations. Festo AX Data Access supports the following modules for data access:

Modul name	Festo Part No.
CPX-FB33	548755
CPX-FB43	8110369
CPX-M-FB34	548751
CPX-M-FB44	8110370
CPX-M-FB35	548749
CPX-M-FB45	8110371
CPX-FB36	1912451
CPX-FB37	2735960
8DI-D	541480
2AE-U-I	526168
8DI-8DO	526257
VPPM Display	572411
VPPM ohne Display	542218
VPPM ohne Display	542219
16DI-D	550202
4AI-T	541486
8NDI	543813
16DI	543815
4DO	195754
8DI	195750
8DO	541482
8DO-H	550204
4AI-I	541484
2AO-U-I	526170
4AI-P-B2	560361
4AI-P-D10	560361
T33	3473128
4AE-U-I	573710
MPA1S	533360
MPA1G	533361
MAP2S	537983
MPA2G	537984
MPA1S	538657
MPA1S	533352
MPA1S-D	543331
MAP2S-D	543332

1.2 Compatibility sampling rate vs. number of devices

For Festo AX Data Access, a sampling rate is preset for each connected device. This can be changed. The lowest possible sampling rate is 100ms for all series.

Please adjust this setting only if you possess a profound understanding of consequences.

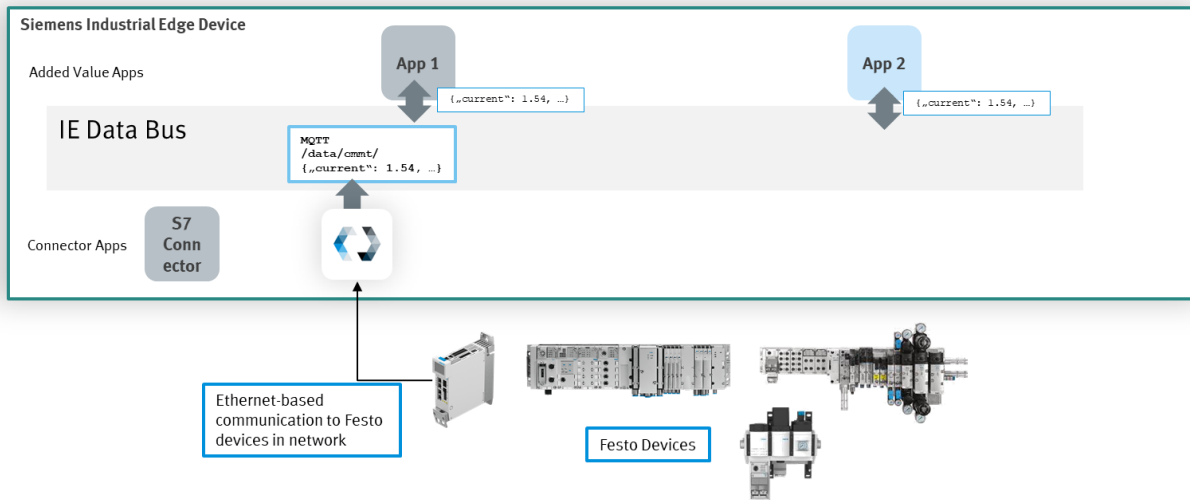
The level of the sampling rate influences the max. number of connectable devices. In particular, the number of connectable devices is technically dependent on the hardware on which AX Data Access is executed. In particular AX Data Access benefits CPU power.

2 Components/Software used

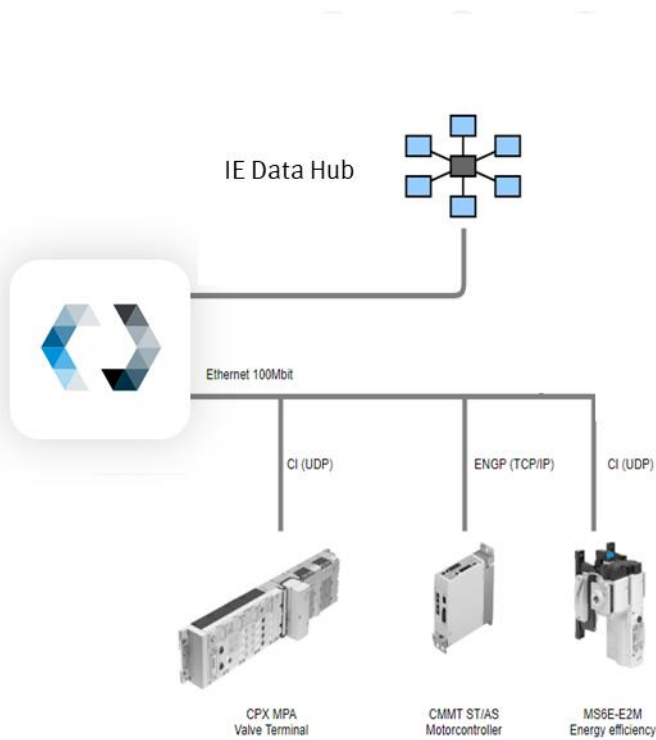
Type/Name	Version Software/Firmware	Date of manufacture
AX DATA ACCESS	1.1.7-max10	

Table 2.1: 1 Components/Software used

3 Overview Connectivity

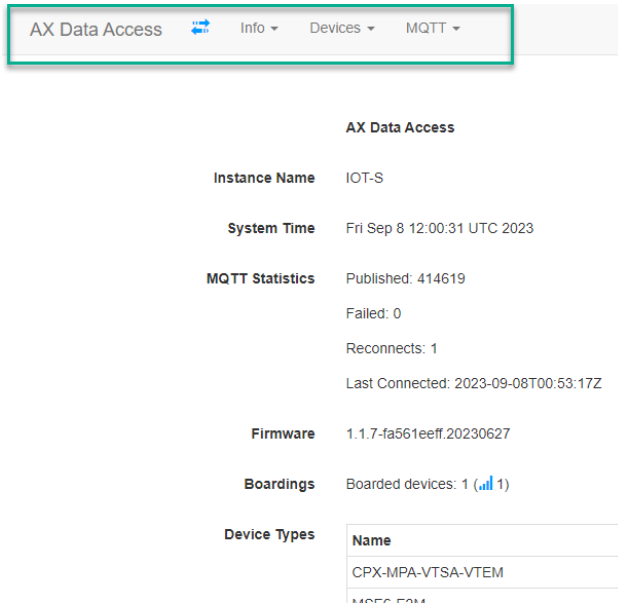



An overview of the connectivity of AX DATA ACCESS to Festo components is shown in the following image.



4 Overview AX Data Access UI

4.1 Toolbar

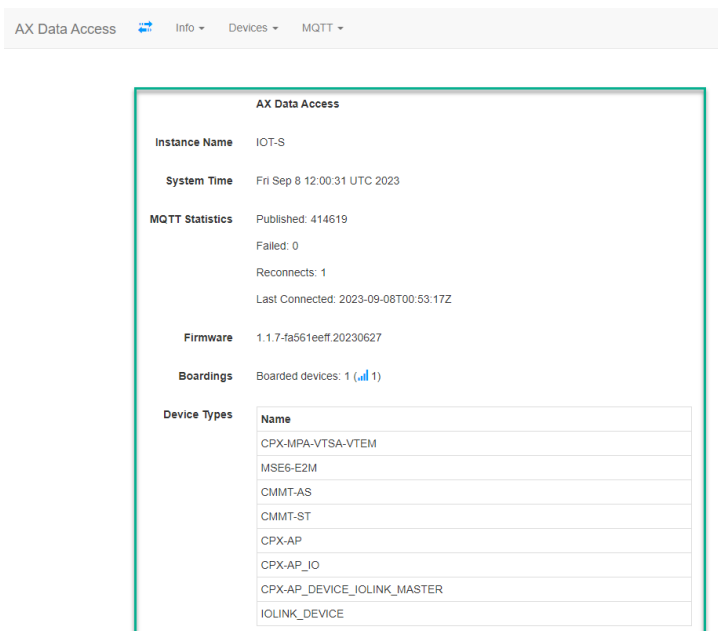


MQTT  connection status.

Red: MQTT disconnected.
Blue: MQTT connected.
Orange: Logout.

Info: General information and diagnosis.
Devices: Device boarding and configuration.
MQTT: MQTT configuration.

4.2 Main Page Information



System Time: Local Date and time from base system

MQTT Statistics:

- Published and failed messages overall
- Attempted Reconnects

Firmware: Version of the running software

Boardings: Count of boarded devices/hardware components.

Device Types: List of supported device types (all are Festo components)

5 Set up MQTT configuration

5.1 Set up connection in AX Data Access

You can set up the MQTT Broker configuration through “MQTT” > “Broker Configuration”.

AX Data Access Info Devices MQTT **FESTO**

Broker Configuration

Broker 1 * ⓘ

Broker 2 ⓘ

Broker 3 ⓘ

ClientId * ⓘ

Last Will ⓘ

Username

Password

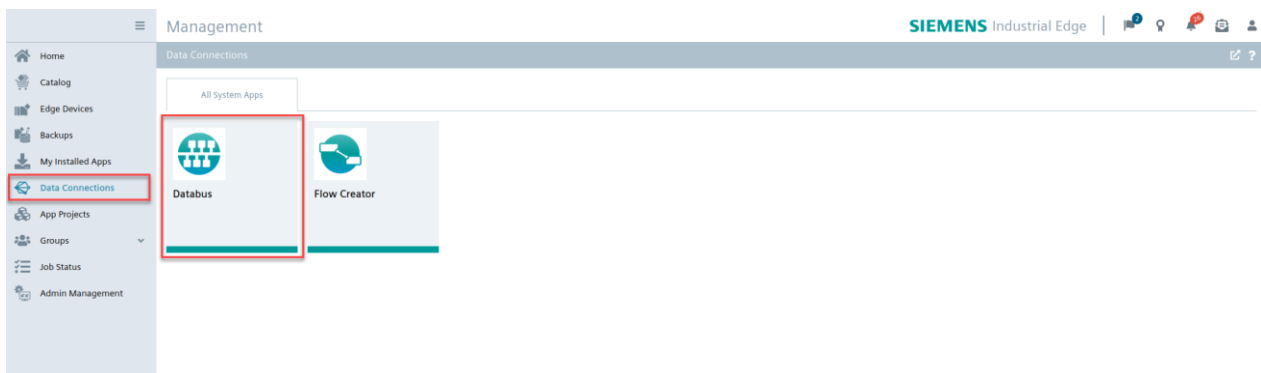
Keep Alive (s) ⓘ

Please fill out the fields according to the individual configuration set up.

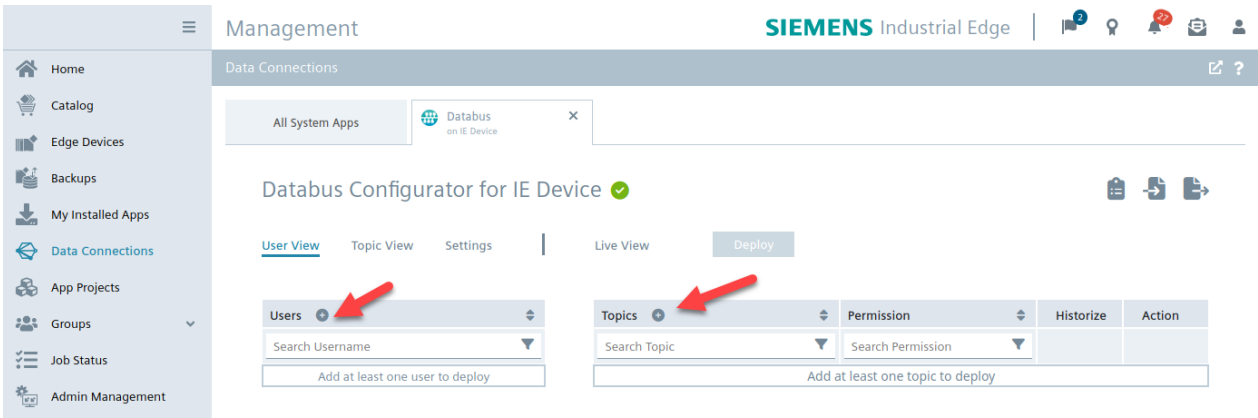
The hostname for Siemens IE Device Databus is “ie-databus”, the port is by default 1883.

5.2 Set up MQTT user IE Databus

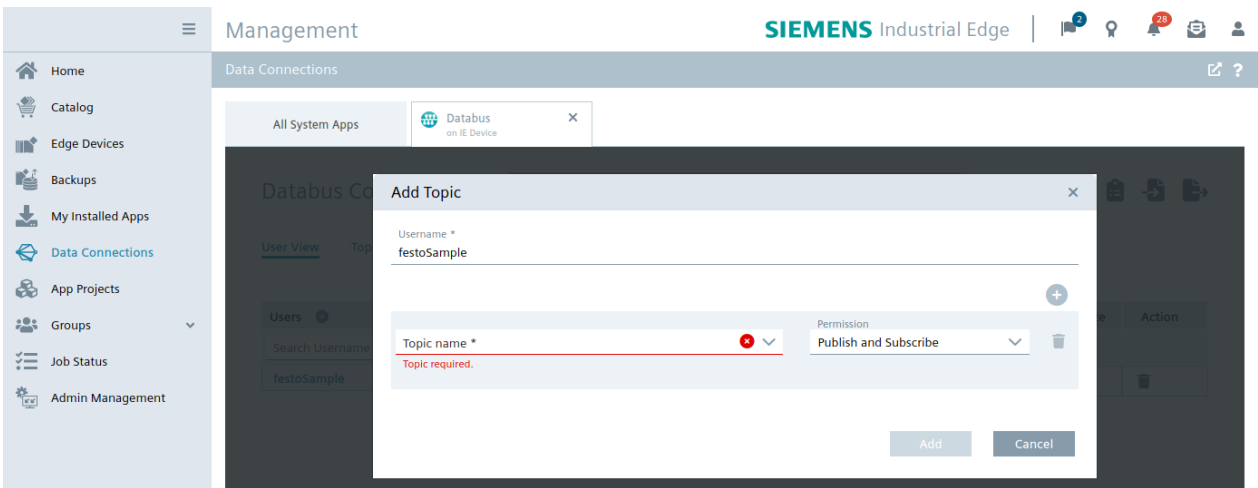
In IE Management go to “Data Connections” and then “Databus” and choose your edge device.



If there is no user created so far, a new user must be created:



All used topics must then be created and assigned to the existing or newly created MQTT user and given the permission “Publish and Subscribe”.



Please refer to chapter 6.5 to check topics that are sent out via the device. You can also register a topic with a static-defined prefix and a wildcard (+ one level wildcard, # multilevel wildcard) to be more flexible, such as

festoIOT/#

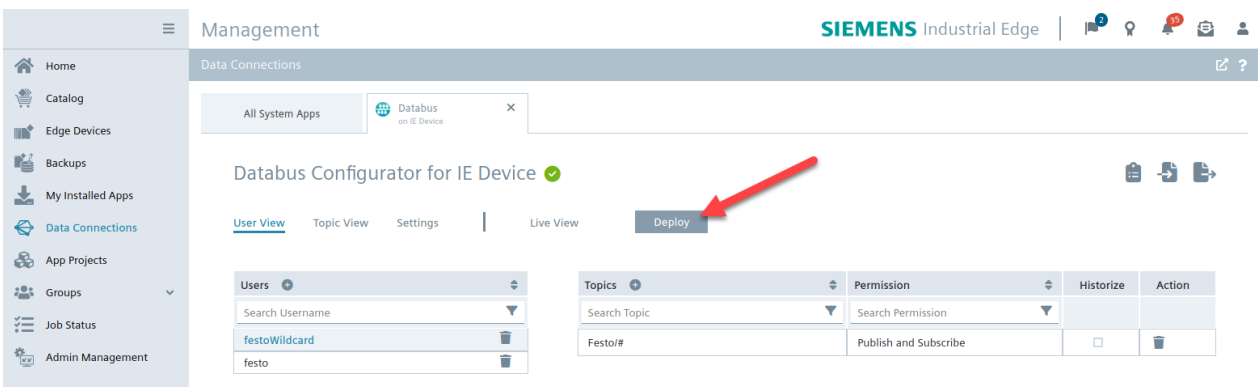
That would also include topics like

festoIOT/deviceId123/status

festoIOT/deviceId123/data

festoIOT/deviceId456/status

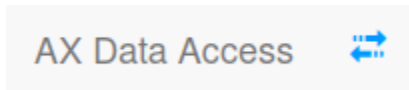
...



Afterwards, deploy the configuration to the edge device by clicking on the “Deploy” button and follow the steps.

Set up MQTT configuration

Once the setup is done successfully, both on device/databus level as well as in the application, AX Data Access automatically tries to connect to the broker. A successful attempt can be seen through the connection icon in the top bar turning blue:



5.3 Send Test Message

For testing purposes, a test message can be sent through “MQTT” > “Test Message”:

Test Message

Topic ^{*}

Message

QoS

- 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.

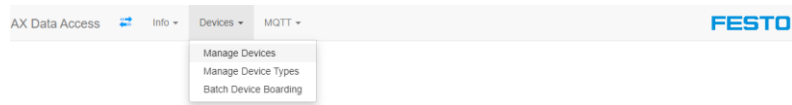
Message : Write the message to be sent here.

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.

6 Manage connected devices (Festo automation components)

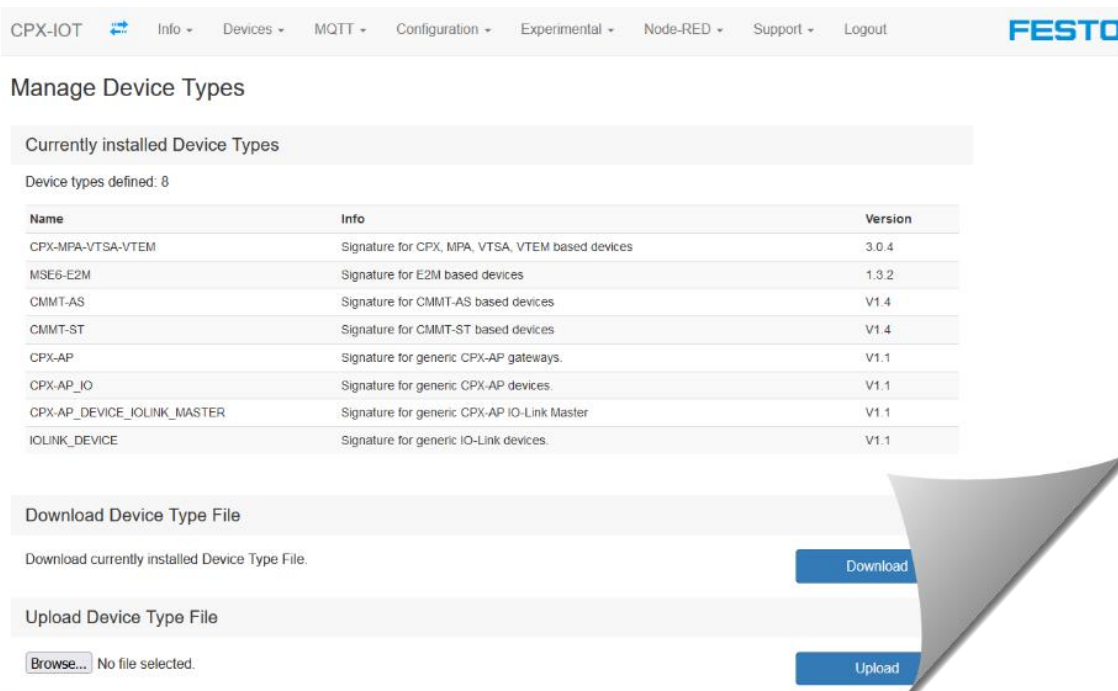
To be connected components must be in the same network than the Siemens IE edge device and reachable (network-wise).



- Type in the IP address of the to be connected device



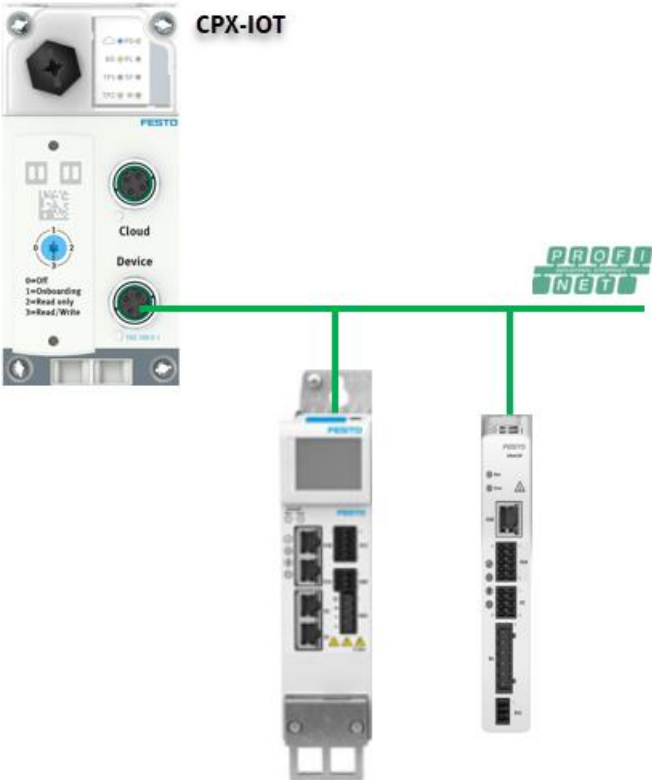
AX DATA ACCESS supports all the devices shown below. As soon as the device is connected to AX DATA ACCESS the data is automatically received and send via MQTT.

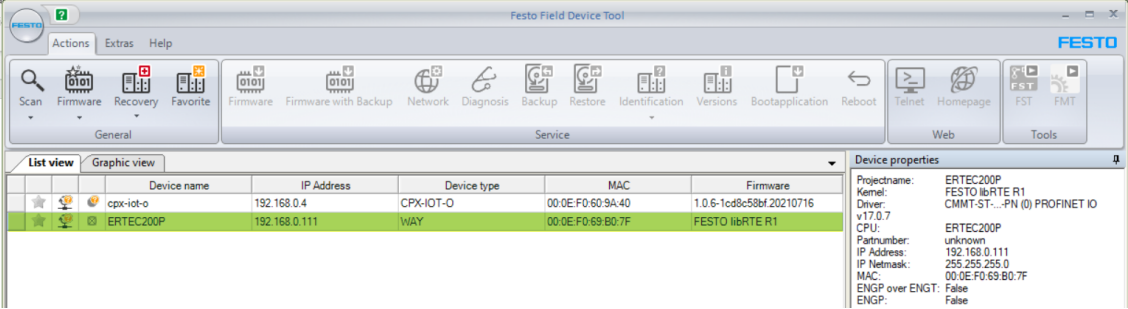
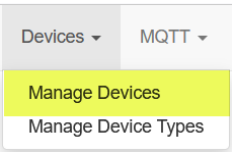
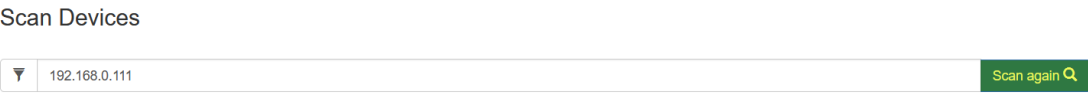






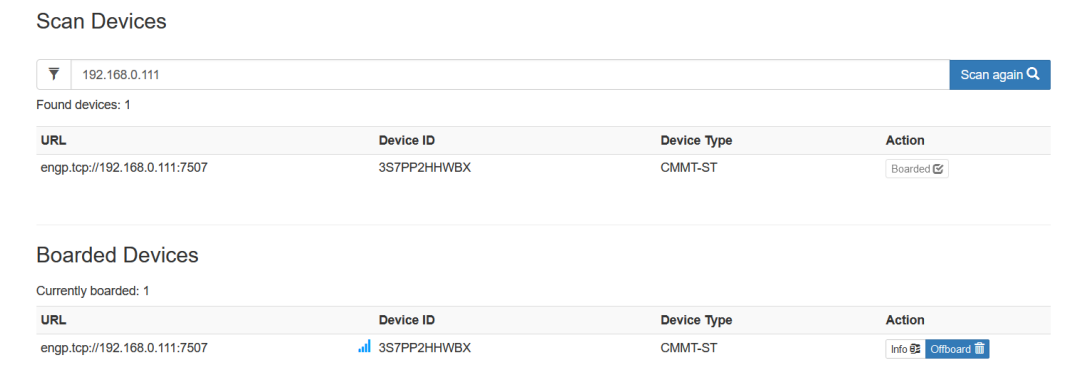












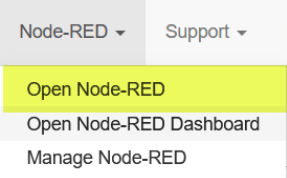


6.1 Manage Devices: Connecting CMMT-AS-xx-PN or CMMT-ST-xx-PN Data to AX DATA ACCESS.

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

Manage connected devices (Festo automation components)

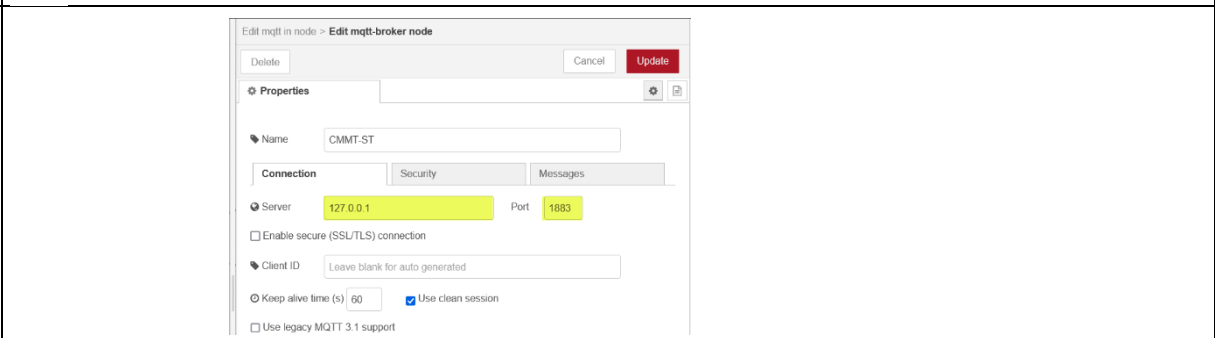
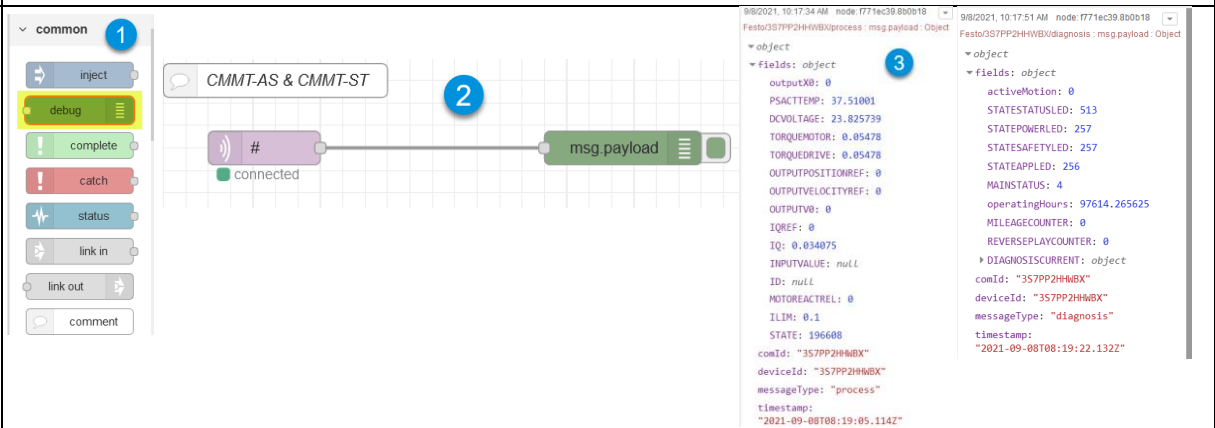
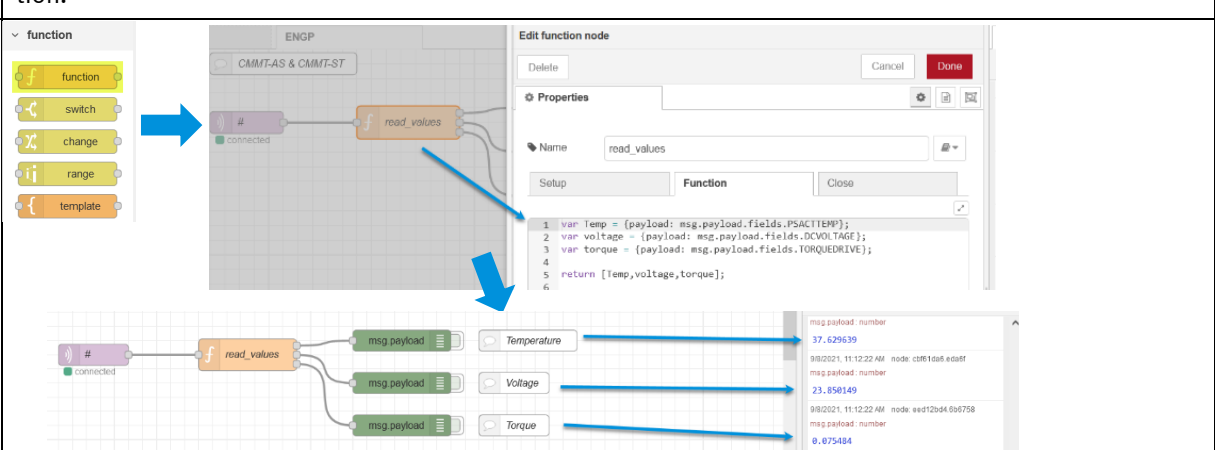
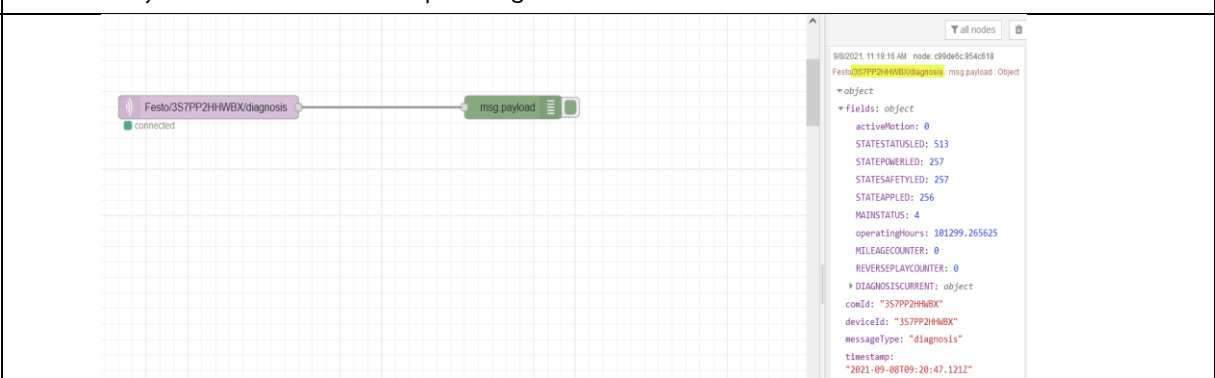


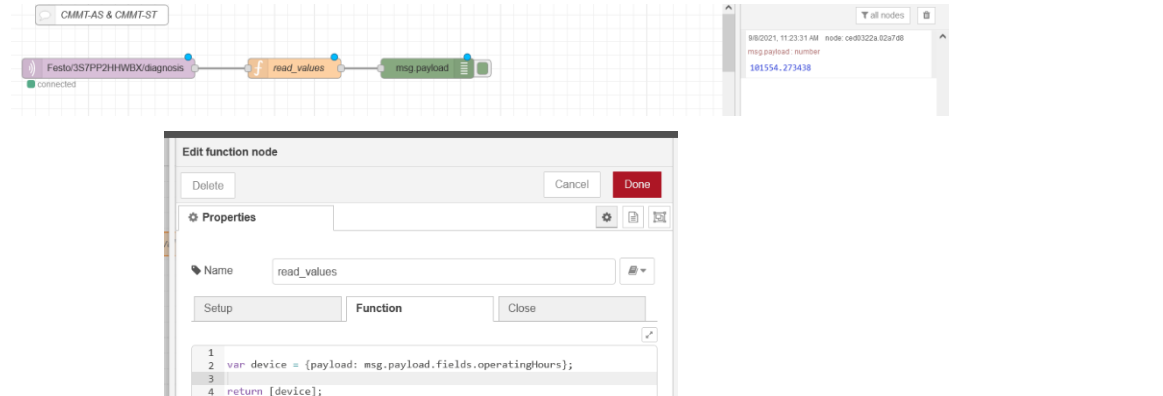
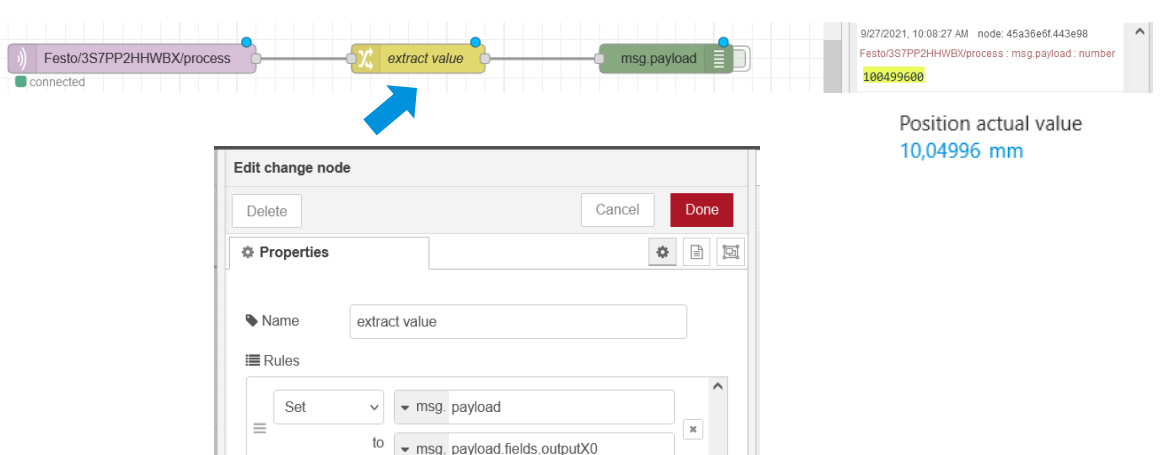
No.	Action																
1	The Profinet master PLC must assign a IP address on the XF1IN port (CMMT-AS and CMMT-ST). If you do not have a Profinet master PLC, it is possible to assign the IP address via Proneta (Siemens software). In this example, the Profinet CMMT IP address is: 192.168.0.111																
																	
2	Go to AX DATA ACCESS 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"																
	 <table border="1" data-bbox="284 1238 1377 1301"> <thead> <tr> <th>URL</th> <th>Device ID</th> <th>Device Type</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>engp.tcp://192.168.0.111:7507</td> <td>3S7PP2HHWBX</td> <td>CMMT-ST</td> <td>Board </td> </tr> </tbody> </table>	URL	Device ID	Device Type	Action	engp.tcp://192.168.0.111:7507	3S7PP2HHWBX	CMMT-ST	Board 								
URL	Device ID	Device Type	Action														
engp.tcp://192.168.0.111:7507	3S7PP2HHWBX	CMMT-ST	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.																
	 <table border="1" data-bbox="284 1556 1377 1608"> <thead> <tr> <th>URL</th> <th>Device ID</th> <th>Device Type</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>engp.tcp://192.168.0.111:7507</td> <td>3S7PP2HHWBX</td> <td>CMMT-ST</td> <td>Boarded </td> </tr> </tbody> </table> <table border="1" data-bbox="284 1736 1377 1787"> <thead> <tr> <th>URL</th> <th>Device ID</th> <th>Device Type</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>engp.tcp://192.168.0.111:7507</td> <td> 3S7PP2HHWBX</td> <td>CMMT-ST</td> <td>Info  Offboard </td> </tr> </tbody> </table>	URL	Device ID	Device Type	Action	engp.tcp://192.168.0.111:7507	3S7PP2HHWBX	CMMT-ST	Boarded 	URL	Device ID	Device Type	Action	engp.tcp://192.168.0.111:7507	 3S7PP2HHWBX	CMMT-ST	Info  Offboard 
URL	Device ID	Device Type	Action														
engp.tcp://192.168.0.111:7507	3S7PP2HHWBX	CMMT-ST	Boarded 														
URL	Device ID	Device Type	Action														
engp.tcp://192.168.0.111:7507	 3S7PP2HHWBX	CMMT-ST	Info  Offboard 														
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”.

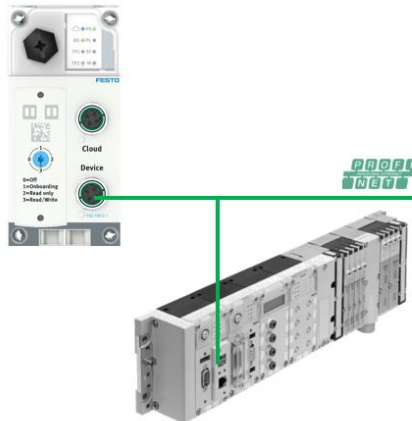
The screenshot illustrates the configuration of an MQTT in node in three stages:

- Step 1:** The 'network' palette on the left shows various communication components. The 'mqtt in' component is highlighted with a blue circle labeled '1'.
- Step 2:** The 'mqtt in' component is placed on a workspace grid. A blue circle labeled '2' points to the component, which is now connected to a server named 'CMMT-AS & CMMT-ST'. The component's topic is set to '#' and it has a 'connected' status indicator.
- Step 3:** The 'Edit mqtt in node' dialog box is shown. The 'Server' is set to 'CMMT-ST', the 'Topic' is '#', the 'QoS' is '2', and the 'Output' is set to 'a parsed JSON object'. The 'Name' field is empty.

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

<p>12</p>	<p>How to read the operating hours?</p> 
<p>13</p>	<p>How to read the position of the drive?</p> 
<p>14</p>	<p>Flow for reading the position of the drive.</p> <pre data-bbox="247 1191 1415 1536"> [{"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.3bcaf","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>

6.2 Manage Devices: Connecting CPX-MPA to AX Data Access



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								
	<p>Scan Devices</p> <p>192.168.0.100 Scan again</p> <p>Found devices: 1</p> <table border="1"> <thead> <tr> <th>URL</th> <th>Device ID</th> <th>Device Type</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>ci.udp://192.168.0.100:991</td> <td>527255604</td> <td>CPX-MPA-VTSA-VTEM</td> <td>Board</td> </tr> </tbody> </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”								
	<p>Boarded Devices</p> <p>Currently boarded: 1</p> <table border="1"> <thead> <tr> <th>URL</th> <th>Device ID</th> <th>Device Type</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>ci.udp://192.168.0.100:991</td> <td>527255604</td> <td>CPX-MPA-VTSA-VTEM</td> <td>Info Offboard</td> </tr> </tbody> </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.								
	<p>Node-RED Support</p> <ul style="list-style-type: none"> Open Node-RED Open Node-RED Dashboard Manage Node-RED 								

Manage connected devices (Festo automation components)

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**.

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

The interface displays a table of device information and a flowchart of automation nodes.

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

The flowchart consists of three nodes connected in sequence:

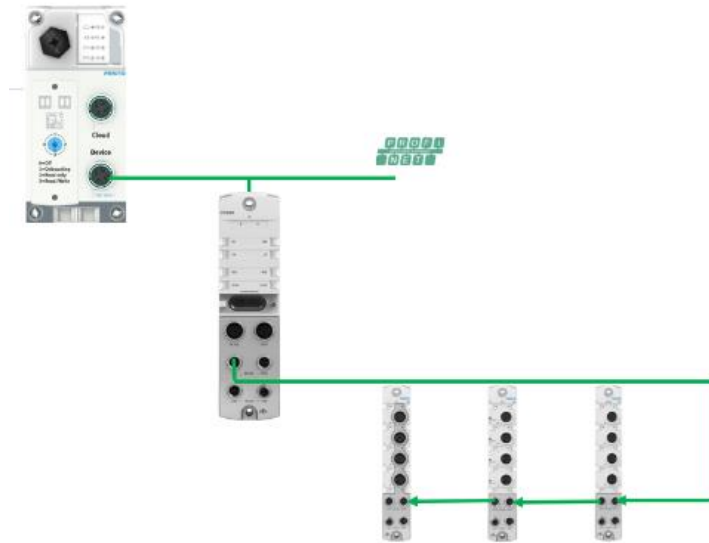
- CPX-MPA** (Device icon)
- Festo/527255604/process** (Process node, status: connected)
- extract value** (Extract node)
- msg.payload** (Output node)

The **extract value** node is currently being edited in the **Edit change node** dialog. The dialog shows the following configuration:

- Name:** extract value
- Rules:**
 - Set **msg.payload** to **msg.payload.fields.PDIN01_chan1**

The **msg.payload** field in the rule is highlighted in yellow in the original image.

6.3 Manage Devices: Connecting CPX-API-PN to AX DATA ACCESS



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 border="1"> <thead> <tr> <th>Device name</th> <th>IP Address</th> <th>Device type</th> <th>MAC</th> <th>Firmware</th> </tr> </thead> <tbody> <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> <td>1.0.6-1cd8c58bf.20210716</td> </tr> <tr> <td>ap-i-pn</td> <td>192.168.0.36</td> <td>CPX-AP-I-PN</td> <td>00:0E:F0:64:33:EF</td> <td>FESTO CPX-AP R1</td> </tr> </tbody> </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-AP-I-PN	00:0E:F0:64:33:EF	FESTO CPX-AP 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-AP-I-PN	00:0E:F0:64:33:EF	FESTO CPX-AP R1																					
2	Please go to AX DATA ACCESS 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	After doing a Scan, the I/O modules connected to the CPX_AP_I_PN are displayed.																								
	<p>Found devices: 5</p> <table border="1"> <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>Board <input type="checkbox"/></td> </tr> <tr> <td>engt.tcp://192.168.0.36:7508</td> <td>3S7PNC4J24K</td> <td>CPX-AP</td> <td>Board <input type="checkbox"/></td> </tr> <tr> <td>engt.tcp://192.168.0.36:7508/32772</td> <td>3S7PNCY87LN</td> <td>CPX-AP_IO</td> <td>Board <input type="checkbox"/></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 <input type="checkbox"/></td> </tr> <tr> <td>engt.tcp://192.168.0.36:7508/32773</td> <td>3S7PNSW35F6</td> <td>CPX-AP_IO</td> <td>Board <input type="checkbox"/></td> </tr> </tbody> </table>	URL	Device ID	Device Type	Action	engt.tcp://192.168.0.36:7508/32771	3S7PMZVC2H3	CPX-AP_IO	Board <input type="checkbox"/>	engt.tcp://192.168.0.36:7508	3S7PNC4J24K	CPX-AP	Board <input type="checkbox"/>	engt.tcp://192.168.0.36:7508/32772	3S7PNCY87LN	CPX-AP_IO	Board <input type="checkbox"/>	engt.tcp://192.168.0.36:7508/32770	3S7PNQQDVRK	CPX-AP_DEVICE_IOLINK_MASTER	Board <input type="checkbox"/>	engt.tcp://192.168.0.36:7508/32773	3S7PNSW35F6	CPX-AP_IO	Board <input type="checkbox"/>
URL	Device ID	Device Type	Action																						
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engt.tcp://192.168.0.36:7508/32772	3S7PNCY87LN	CPX-AP_IO	Board <input type="checkbox"/>																						
engt.tcp://192.168.0.36:7508/32770	3S7PNQQDVRK	CPX-AP_DEVICE_IOLINK_MASTER	Board <input type="checkbox"/>																						
engt.tcp://192.168.0.36:7508/32773	3S7PNSW35F6	CPX-AP_IO	Board <input type="checkbox"/>																						

5 Please check the order of the modules using the CPX_AP_I web server.

Found devices: 5

URL	Device ID	Device Type	Action
engt.tcp://192.168.0.36:7508/32771	3S7PMZVC2H3	CPX-AP_IO	3 Board <input type="checkbox"/>
engt.tcp://192.168.0.36:7508	3S7PNC4J24K	CPX-AP	1 Board <input type="checkbox"/>
engt.tcp://192.168.0.36:7508/32772	3S7PNCY87LN	CPX-AP_IO	4 Board <input type="checkbox"/>
engt.tcp://192.168.0.36:7508/32770	3S7PNQQDVRK	CPX-AP_DEVICE_IOLINK_MASTER	2 Board <input type="checkbox"/>
engt.tcp://192.168.0.36:7508/32773	3S7PNSW35F6	CPX-AP_IO	5 Board <input type="checkbox"/>

CPX-AP web server ap-i-pn / 192.168.0.36

Home
Diagnosis
PROFINET / I&M
Ethernet
Report

Device information

engt.tcp://192.168.0.36:7508 3S7PNC4J24K CPX-AP 1

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

engt.tcp://192.168.0.36:7508/32770 3S7PNQQDVRK CPX-AP_DEVICE_IOLINK_MASTER 2

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

engt.tcp://192.168.0.36:7508/32771 3S7PMZVC2H3 CPX-AP_IO 3

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

engt.tcp://192.168.0.36:7508/32772 3S7PNCY87LN CPX-AP_IO 4

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

engt.tcp://192.168.0.36:7508/32773 3S7PNSW35F6 CPX-AP_IO 5

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

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

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

10	Each module send three payloads: Process, diagnosis and asset.
	<pre> 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 TEMPERATUREVALUEEASIC: 161 comId: "3S7PMZVC2H3" deviceId: "3S7PMZVC2H3" messageType: "diagnosis" timestamp: "2021-10-14T13:03:52.570Z" </pre>
	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.

The screenshot shows a Node-RED workflow with a device node 'Festo/3S7PMZVC2H3/#' (status: connected) connected to a 'msg.payload' node. The right-hand pane displays the message payload for three different message types:

```

Festo/3S7PMZVC2H3/process : msg.payload : Object
  object
  fields: object
    INPUTSTATE: 1
    OUTPUTSTATE: null
    comId: "3S7PMZVC2H3"
    deviceId: "3S7PMZVC2H3"
    messageType: "process"
    timestamp: "2021-10-06T09:41:10.759Z"

Festo/3S7PMZVC2H3/diagnosis : msg.payload : Object
  object
  fields: object
    comId: "3S7PMZVC2H3"
    deviceId: "3S7PMZVC2H3"
    messageType: "diagnosis"
    timestamp: "2021-10-06T09:41:10.794Z"

Festo/3S7PMZVC2H3/asset : msg.payload : Object
  object
  fields: object
    PRODUCTKEY: "3S7PMZVC2H3"
    FIRMWAREVERSIONSTRING: "v1.43.10"
    comId: "3S7PMZVC2H3"
    deviceId: "3S7PMZVC2H3"
    messageType: "asset"
    timestamp: "2021-10-06T09:48:10.765Z"
    
```

11 Read the first input of the module CPX-AP-I-8DI-M12.

The screenshot shows a Node-RED workflow where a device node 'Festo/3S7PMZVC2H3/process' (status: connected) is connected to a 'Read Inputs' node, which is then connected to a 'msg.payload' node. A blue arrow points to the 'Read Inputs' node. The right-hand pane shows the output of the 'Read Inputs' node, which is the number '1'.

The 'Edit change node' dialog for the 'Read Inputs' node is open, showing the following configuration:

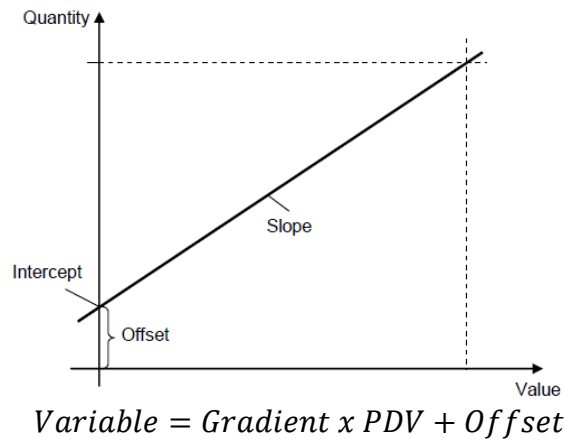
- Name: Read Inputs
- Rules:
 - Set msg.payload to msg.payload.fields.INPUTSTATE

6.3.1 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.

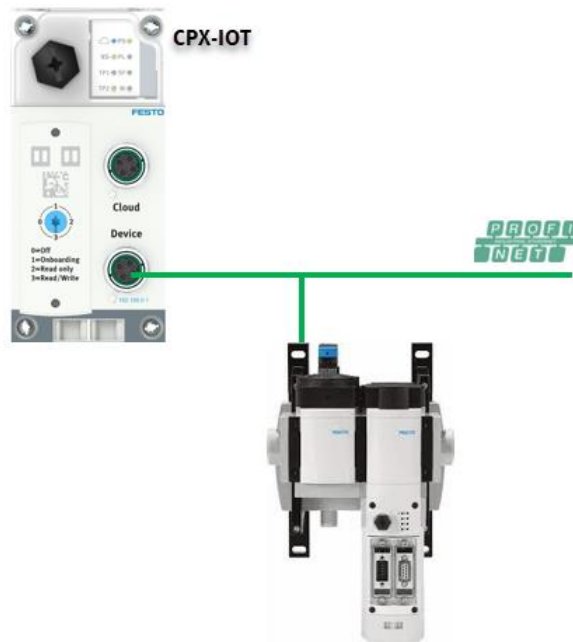


1	<p>As an example this is the input process data for IO-Link device</p> <table border="1" data-bbox="268 1131 1345 1422"> <thead> <tr> <th>process data input</th> <th></th> <th></th> <th>record i</th> <th></th> </tr> </thead> <tbody> <tr> <td>PDV (InA)</td> <td>1</td> <td>24</td> <td>UIntegerT_14</td> <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> </tbody> </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																																
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BDC3 (OutC)	4	2	BooleanT																																	
BDC2 (OutB)	5	1	BooleanT																																	
BDC1 (OutA)	6	0	BooleanT																																	
2	<p>Where InA is the flow, InB is the temperature. The IODD xml-File (can be obtained here: IODDfinder (io-link.com))</p> <pre data-bbox="255 1534 1404 1971"> <ProcessDataRefCollection> <ProcessDataRef processDataId="PI_ProcessDataIn"> <ProcessDataRecordItemInfo subindex="1" gradient="0.001953244217" offset="0.000000000000" unitCode="1352" displayFormat="Dec.1" /> <ProcessDataRecordItemInfo subindex="2" gradient="0.006103888177" offset="0.000000000000" unitCode="1001" displayFormat="Dec.1" /> <ProcessDataRecordItemInfo subindex="3" /> <ProcessDataRecordItemInfo subindex="4" /> <ProcessDataRecordItemInfo subindex="5" /> <ProcessDataRecordItemInfo subindex="6" /> </ProcessDataRef> </ProcessDataRefCollection> </pre>																																			

3	<p>Data from the flow sensor on Node RED.</p> <pre> 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] </pre>																								
4	<p>Conversion to HEX</p>																								
	<ul style="list-style-type: none"> ▪ 16 = 0x10 ▪ 245 = 0xF5 <p>The raw value is: 0x10F5 = 4341</p>																								
5	<p>$Variable = Gradient \times PDV + Offset$</p>																								
	<p>$Variable = 0.006103888177 * 4341 + 0 = 26.4970 \text{ [}^\circ\text{C]}$</p>																								
	<table border="1"> <thead> <tr> <th>Name</th> <th>Value</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td colspan="3">[-] Process data input</td> </tr> <tr> <td>PDV (InA)</td> <td>0.0</td> <td>L/min</td> </tr> <tr> <td>PDV (InB)</td> <td>26.4</td> <td>°C</td> </tr> <tr> <td>BDC4 (OutD)</td> <td>0 (Off)</td> <td><input type="radio"/></td> </tr> <tr> <td>BDC3 (OutC)</td> <td>0 (Off)</td> <td><input type="radio"/></td> </tr> <tr> <td>BDC2 (OutB)</td> <td>0 (Off)</td> <td><input type="radio"/></td> </tr> <tr> <td>BDC1 (OutA)</td> <td>0 (Off)</td> <td><input type="radio"/></td> </tr> </tbody> </table>	Name	Value	Unit	[-] Process data input			PDV (InA)	0.0	L/min	PDV (InB)	26.4	°C	BDC4 (OutD)	0 (Off)	<input type="radio"/>	BDC3 (OutC)	0 (Off)	<input type="radio"/>	BDC2 (OutB)	0 (Off)	<input type="radio"/>	BDC1 (OutA)	0 (Off)	<input type="radio"/>
Name	Value	Unit																							
[-] Process data input																									
PDV (InA)	0.0	L/min																							
PDV (InB)	26.4	°C																							
BDC4 (OutD)	0 (Off)	<input type="radio"/>																							
BDC3 (OutC)	0 (Off)	<input type="radio"/>																							
BDC2 (OutB)	0 (Off)	<input type="radio"/>																							
BDC1 (OutA)	0 (Off)	<input type="radio"/>																							

6.4 Manage Devices: Connecting MS6-E2M to AX Data Access

The device port of the AX DATA ACCESS 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															
	<table border="1"> <thead> <tr> <th>Device name</th> <th>IP Address</th> <th>Device type</th> <th>MAC</th> <th>Firmware</th> </tr> </thead> <tbody> <tr> <td>cpx-iot-o</td> <td>192.168.0.4</td> <td>CPX-IOT-O</td> <td>00:0E:FD:60:9A:40</td> <td>1.0.6-ab6650929M.20210920</td> </tr> <tr> <td>cpx</td> <td>192.168.0.2</td> <td>CPX-FB34</td> <td>00:0E:FD:4A:5F:7A</td> <td>FESTO CPX R24</td> </tr> </tbody> </table>	Device name	IP Address	Device type	MAC	Firmware	cpx-iot-o	192.168.0.4	CPX-IOT-O	00:0E:FD:60:9A:40	1.0.6-ab6650929M.20210920	cpx	192.168.0.2	CPX-FB34	00:0E:FD:4A:5F:7A	FESTO CPX R24
Device name	IP Address	Device type	MAC	Firmware												
cpx-iot-o	192.168.0.4	CPX-IOT-O	00:0E:FD:60:9A:40	1.0.6-ab6650929M.20210920												
cpx	192.168.0.2	CPX-FB34	00:0E:FD:4A:5F:7A	FESTO CPX R24												
2	Go to AX DATA ACCESS webserver and click on Devices --> Manage Devices															
3	Write on Scan Devices the IP address of the Profinet slave.															
	<p>Scan Devices</p> <p>192.168.0.2 Scan again</p> <p>Found devices: 2</p> <table border="1"> <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

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.

▼ 192.168.0.2

Scan

Found devices: 2

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 <input checked="" type="checkbox"/>

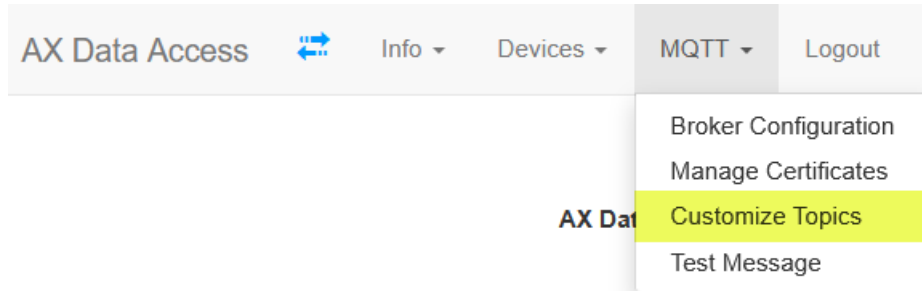
Boarded Devices

Currently boarded: 1

URL	Device ID	Device Type	Action
ci.udp://192.168.0.2:991	📶 524967802_cm	MSE6-E2M	Info Offboard

6.5 Customizing MQTT Topic

The functionalities described in this section belong to the software version of the AX DATA ACCESS gateway (AX DATA ACCESS-S). In MQTT environment is possible to customize the topics.



Choose Topic

Select the topic to be modified in that example CPX-AP-IO-process message.

Topic Name

By default has this format *Festo/%deviceId%/%messageTypeName%*

Customize Topics

Choose Topic: CPX-AP_IO-process Apply

Topic Name: Festo/%deviceId%/%messageTypeName% Add Placeholder

Time trigger

Cycle Time: 1000

Trigger on connect

Trigger on disconnect

Selected Only

Select Variables:

Key	Select	Trigger	Note
PRODUCTKEY	<input type="checkbox"/>	None	isDeviceId
FIRMWAREVERSIONSTRING	<input type="checkbox"/>	None	
DIAGNOSISCURRENT	<input type="checkbox"/>	None	
UPTIME	<input type="checkbox"/>	None	
ULOADVALUE	<input type="checkbox"/>	None	
UELSENVALUE	<input type="checkbox"/>	None	
TEMPERATUREVALUEASIC	<input type="checkbox"/>	None	
INPUTSTATE	<input checked="" type="checkbox"/>	None	
OUTPUTSTATE	<input checked="" type="checkbox"/>	None	

As an example of the MQTT topic by default:

```
Festo/FFJGTW9RVWX/process : msg.payload : Object
  ▼ object
  ▼ fields: object
    INPUTSTATE: 2
    OUTPUTSTATE: null
  comId: "FFJGTW9RVWX"
  deviceId: "FFJGTW9RVWX"
  messageType: "process"
  timestamp: "2023-05-26T06:47:44.304Z"
```

6.5.1 Change MQTT Customise Topics

New Topic Name: MQ100/Device/st02

AX Data Access Info Devices MQTT Logout **FESTO**

Customize Topics

Choose Topic: CPX-AP_IO-process Apply

Topic Name: MQ100/Device1/st02 Add Placeholder

Time trigger

Cycle Time: 1000

Check in NodeRED

```
MQ100/Device1/st02/: msg.payload : Object
  ▼ object
  ► fields: object
    comId: "FFJGTW9RVWX"
    deviceId: "FFJGTW9RVWX"
    messageType: "process"
    timestamp: "2023-05-26T06:49:42.531Z"
```

6.5.2 MQTT Customise Topics: Select Variables

For each topics (CMTT,CPX-API,CPX etc..) it is possible to select more variables fully configurable by the user. Some of them are selected by default. As a reference:

Customize Topics

Choose Topic: Apply

Topic Name: Add Placeholder

Time trigger

Cycle Time:

Trigger on connect

Trigger on disconnect

Selected Only

Selected Variables	Key	Select	Trigger	Note
	DEVICENAME	<input type="checkbox"/>	None	▼
	PARTNUMBER	<input type="checkbox"/>	None	▼
	NOCCODE	<input type="checkbox"/>	None	▼
	PRODUCTKEY	<input type="checkbox"/>	None	▼ isDeviceId
	IPADDRESS	<input type="checkbox"/>	None	▼
	IPADDRESSFB	<input type="checkbox"/>	None	▼
	firmware	<input type="checkbox"/>	None	▼
	outputX0	<input checked="" type="checkbox"/>	None	▼
	activeUserUnit	<input type="checkbox"/>	None	▼
	activeMotion	<input type="checkbox"/>	None	▼
	STATESTATUSLED	<input type="checkbox"/>	None	▼

7 Expert Configuration: signature.json

Note:

Please be aware that this should only be done by experts into the AX Data Access software as false information in the signature can lead to the gateway not properly delivering data anymore.

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**

7.1.1 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  }
3  "Signatures": [
4  {
5  "uid": "CPX-MPA-VTSA-VTEM",
6  "iname": "CPX",
7  "info": "Signature for CPX, MPA, VTSA, VTEM based devices",
8  "version": "3.0.4",
9  "rootnode": "",
10 "Subscriptions": [
11 {
12 "id": "Default",
13 "interval": 5000
14 },
15 {
16 "id": "Data",
17 "interval": 1000
18 }
19 ],
20 "messageTypes": [
21 {
22 "messageTypeId": "DIAGNOSIS",
23 "messageTypeName": "diagnosis",
24 "dataPrefix": "fields",
25 "triggerInterval": 5000,
26 "triggerOnDeviceConnect": false,
27 "triggerOnDeviceDisconnect": false,
28 "force": true,
29 "metaData": [
30 {
31 "id": "topic",
32 "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 ],
```

7.1.2 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": "Festo/%deviceId%/connectionState"
130 }
131 ],
```

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

7.1.3 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.

```

168 |         "payloadExtension": [
169 |             {
170 |                 "destKey": "messageType",
171 |                 "value": "%messageTypeName%"
172 |             },
173 |             {
174 |                 "destKey": "deviceId",
175 |                 "value": "%deviceId%"
176 |             },
177 |             {
178 |                 "destKey": "comId",
179 |                 "value": "%comId%"
180 |             },
181 |             {
182 |                 "destKey": "timestamp",
183 |                 "value": "%creationTime%"
184 |             },
185 |             {
186 |                 "destKey": "Publisher",
187 |                 "value": "%messageTypeName%"
188 |             }
189 |         ]
190 |     },
191 | ]

```

```

168 |         "payloadExtension": [
169 |             {
170 |                 "destKey": "messageType",
171 |                 "value": "%messageTypeName%"
172 |             },
173 |             {
174 |                 "destKey": "deviceId",
175 |                 "value": "%deviceId%"
176 |             },
177 |             {
178 |                 "destKey": "comId",
179 |                 "value": "%comId%"
180 |             },
181 |             {
182 |                 "destKey": "timestamp",
183 |                 "value": "%creationTime%"
184 |             },
185 |             {
186 |                 "destKey": "Publisher",
187 |                 "value": "%messageTypeName%"
188 |             }
189 |         ]
190 |     },
191 | ],
192 |     "Nodes": [
193 |         {
194 |             "srcKey": "%nspath%.StationName",
195 |             "destKey": "STATIONSNAME",
196 |             "messageTypeIds": [
197 |                 "ASSET",
198 |                 "ONLINE",
199 |                 "OFFLINE"
200 |             ]
201 |         },
202 |     ],
203 | ]

```



```

168 |         "payloadExtension": [
169 |             {
170 |                 "destKey": "messageType",
171 |                 "value": "%messageTypeName%"
172 |             },
173 |             {
174 |                 "destKey": "deviceId",
175 |                 "value": "%deviceId%"
176 |             },
177 |             {
178 |                 "destKey": "comId",
179 |                 "value": "%comId%"
180 |             },
181 |             {
182 |                 "destKey": "timestamp",
183 |                 "value": "%creationTime%"
184 |             },
185 |             {
186 |                 "destKey": "Publisher",
187 |                 "value": "%messageTypeName%"
188 |             }
189 |         ]
190 |     },
191 | ],
192 |     "Nodes": [
193 |         {
194 |             "srcKey": "%nspath%.StationName",
195 |             "destKey": "STATIONSNAME",
196 |             "messageTypeIds": [
197 |                 "ASSET",
198 |                 "ONLINE",
199 |                 "OFFLINE"
200 |             ],
201 |             "isDeviceID": 1
202 |         },
203 |     ]

```

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 |     ]

```

8 Appendix

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

8.1 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

8.2 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

8.2.1 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
TemperatureValueAsic
IoLinkVariant
SensorSupplyCurrentDrain
SensorSupplyEnable
ComID
MessageType
Timestamp

Asset message
Productkey
FirmwareVersionString
ComID
DeviceID
MessageType
Timestamp

8.2.2 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

8.2.3 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
TempreatureValueAsic
ComID
MessageType
Timestamp

Asset message
Productkey
FirmwareVersionString
ComID
DeviceID
MessageType
Timestamp

8.2.4 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
Uelsvalue
TemperatureValueAsic
IoLinkVariant
ComID
MessageType
Timestamp

Asset message
Productkey
FirmwareVersionString
ComID
DeviceID
MessageType
Timestamp

8.3 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

8.4 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

8.5 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
Uelsvalue
TemperatureValueAsic
ComID
MessageType
Timestamp

Asset message
Productkey
FirmwareVersionString
ComID
DeviceID
MessageType
Timestamp

8.6 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

8.6.1 CPX-8DI-D and 16DI-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	...

Appendix

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	...

8.6.2 CPX-VTSA payloads.

Process message	Description
PDOUT01_chan1:	Valve switching state 0 = inactive 1 = active
PDOUT01_chan2:	Valve switching state 0 = inactive 1 = active
PDOUT01_chan3:	Valve switching state 0 = inactive 1 = active
PDOUT01_chan4:	Valve switching state 0 = inactive 1 = active
PDOUT01_chan5:	Valve switching state 0 = inactive 1 = active
PDOUT01_chan6:	Valve switching state 0 = inactive 1 = active
PDOUT01_chan7:	Valve switching state 0 = inactive 1 = active

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	...

8.7 MPA-P payloads.

Process message	Description
UPTIME:0	Uptime since last power cycle in seconds
PDOUT01_chan1:	Valve switching state 0 = inactive 1 = active
PDOUT01_chan2:	Valve switching state 0 = inactive 1 = active
PDOUT01_chan3:	Valve switching state 0 = inactive 1 = active
PDOUT01_chan4:	Valve switching state 0 = inactive 1 = active
PDOUT01_chan5:	Valve switching state 0 = inactive 1 = active
PDOUT01_chan6:	Valve switching state 0 = inactive 1 = active
PDOUT01_chan7:	Valve switching state 0 = inactive 1 = active
PDOUTxx_chanxx:	Valve switching state 0 = inactive 1 = active

Appendix

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