

ProcessMaster FEP630, FEW630

HygienicMaster FEH630

Electromagnetic flowmeter



EtherNet/IP™, Ethernet-APL™,
Modbus TCP®, PROFINET®,
Webserver
Valid from firmware version
01.13.00

Measurement made easy

—
ProcessMaster FEP630,
ProcessMaster FEW630,
HygienicMaster FEH630

Introduction

This manual describes how to configure an Ethernet connection for the following electromagnetic flowmeters:

- ProcessMaster FEP630
- ProcessMaster FEW630
- HygienicMaster FEH630

Additional Information

Additional documentation on ProcessMaster FEP630, FEW630 HygienicMaster FEH630 is available for download free of charge at www.abb.com/flow. Alternatively simply scan this code:



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1 Safety

General information and instructions

These instructions are an important part of the product and must be retained for future reference.

Installation, commissioning, and maintenance of the product may only be performed by trained specialist personnel who have been authorized by the plant operator accordingly. The specialist personnel must have read and understood the manual and must comply with its instructions.

For additional information or if specific problems occur that are not discussed in these instructions, contact the manufacturer.

The content of these instructions is neither part of nor an amendment to any previous or existing agreement, promise or legal relationship.

Modifications and repairs to the product may only be performed if expressly permitted by these instructions.

Information and symbols on the product must be observed.

These may not be removed and must be fully legible at all times.

The operating company must strictly observe the applicable national regulations relating to the installation, function testing, repair and maintenance of electrical products.

Warnings

The warnings in these instructions are structured as follows:

DANGER

The signal word '**DANGER**' indicates an imminent danger. Failure to observe this information will result in death or severe injury.

WARNING

The signal word '**WARNING**' indicates an imminent danger. Failure to observe this information may result in death or severe injury.

CAUTION

The signal word '**CAUTION**' indicates an imminent danger. Failure to observe this information may result in minor or moderate injury.

NOTICE

The signal word '**NOTICE**' indicates possible material damage.

Note

'**Note**' indicates useful or important information about the product.

Cyber security disclaimer

This product is designed to be connected to and to communicate information and data via a network interface.

It is operator's sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be).

Operator shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

ABB and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

On www.abb.com/cybersecurity under 'Additional resources', 'Alerts and notifications' you will find notifications about newly discovered software vulnerabilities. It is recommended that you visit this website regularly and activate 'Subscribe to email alerts' to receive email notifications about 'ABB cyber security alerts and notifications'.

... 1 Safety

... Cyber security disclaimer

ABB Defense in depth strategy and system hardening

For more information about cyber security offering from ABB, system hardening and defense in depth please refer to ABB`s cyber security web page:

solutions.abb/industrial-cyber-security

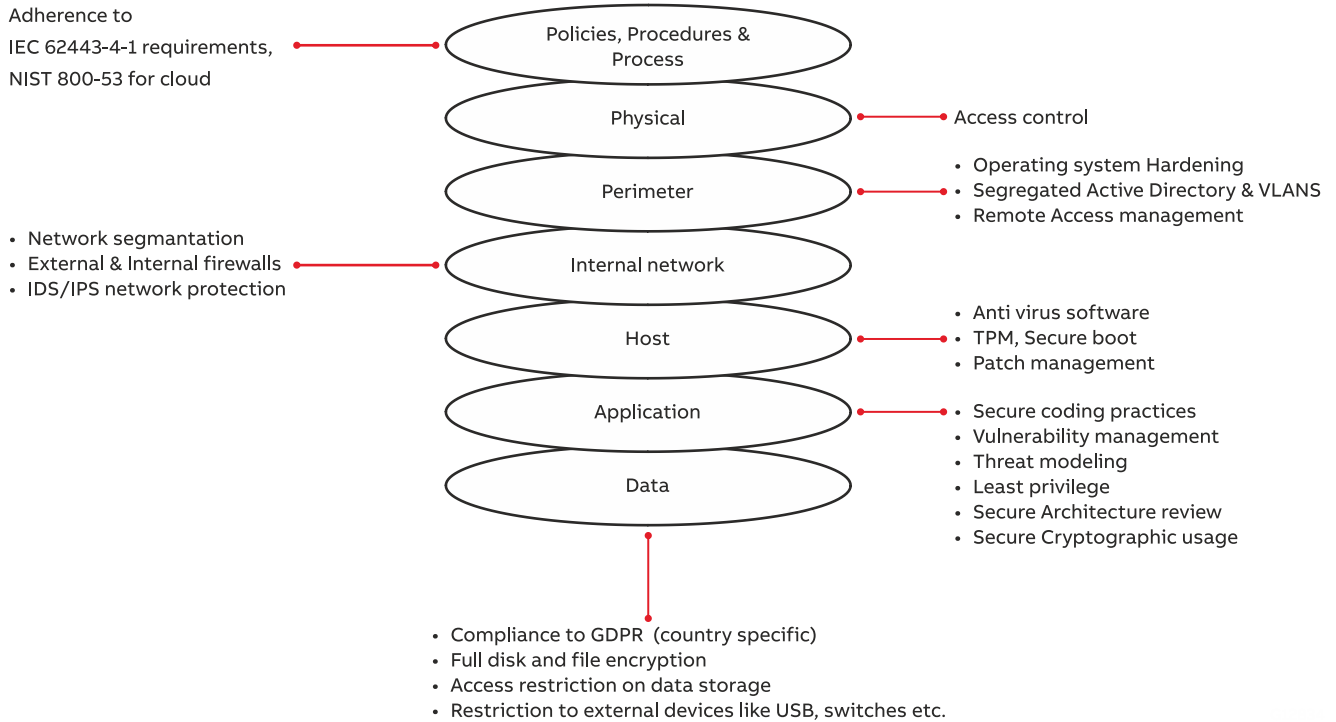


Figure 1: Defense in depth

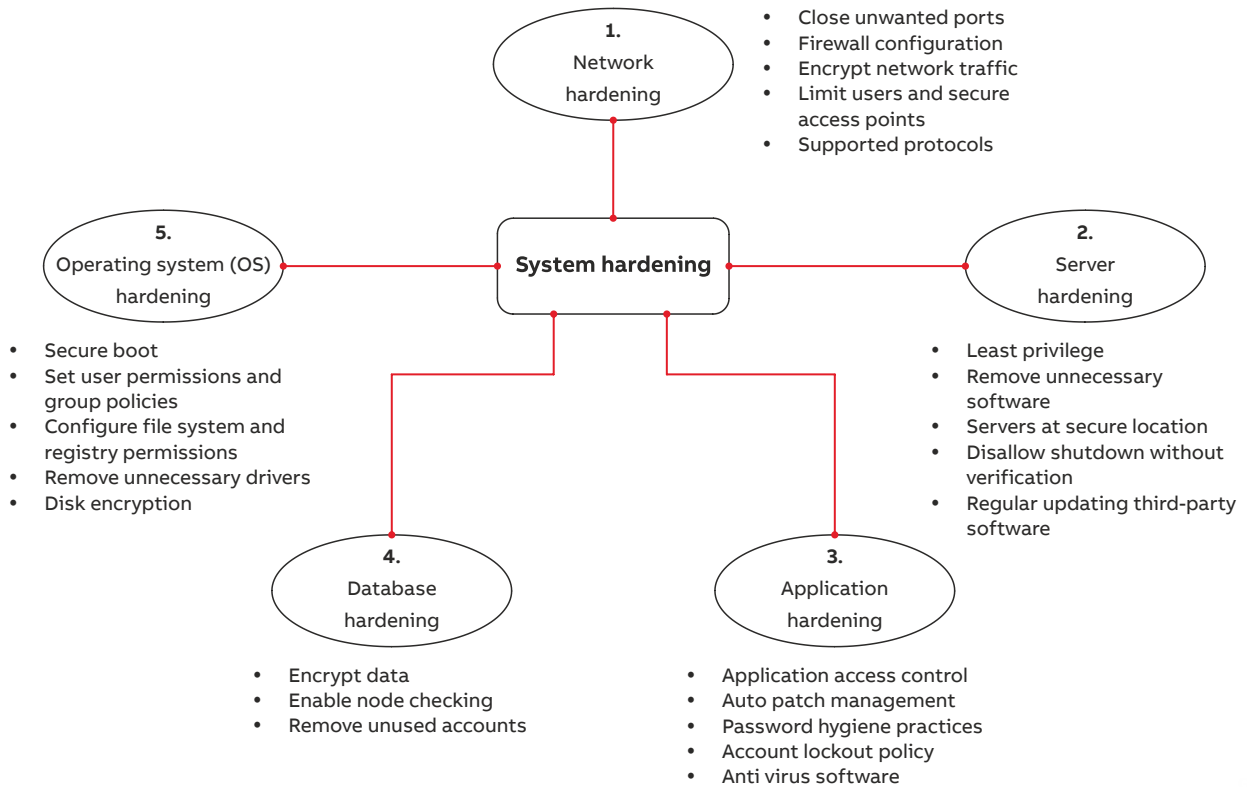


Figure 2: Hardening

Software downloads

By visiting the web page indicated below, you will find options to download the latest software. It is recommended that you visit this web page regularly:

[ABB Library – FEP630 / FEW630 / FEH630](#)



Further documents

Note

All documentation, declarations of conformity, and certificates are available in ABB's download area.

www.abb.com/flow

... 1 Safety

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2 Supported Ethernet-based communication protocols

Protocols and ports on the Ethernet interface

Depending on the type of Ethernet communication, the device supports the following protocols:

Standard Ethernet communication		
Protocol	Ports	Safety
EtherNet/IP™	TCP 44818, UDP 2222	Unsecured protocol
Modbus TCP®	TCP 502	Unsecured protocol
PROFINET®	UDP 34964, 49152	Unsecured protocol
Webserver https	TCP443	Secured protocol, security based on .x509 certificates

Ethernet APL™ communication		
Protocol	Ports	Safety
Modbus TCP®	TCP 502	Unsecured protocol
PROFINET®	UDP 34964, 49152	Unsecured protocol
Webserver https	TCP443	Secured protocol, security based on .x509 certificates

All the protocols can be activated / deactivated in the HMI Menu.

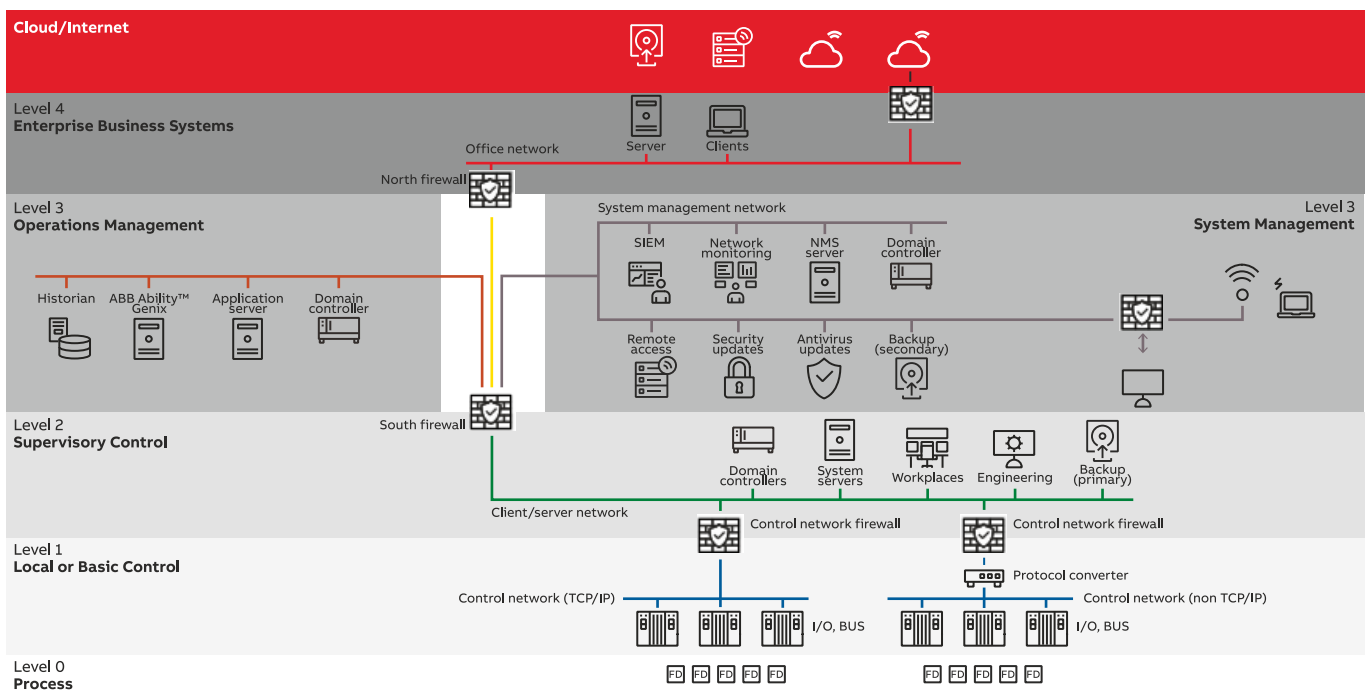


Figure 3: Example of a reference architecture

... 2 Supported Ethernet-based communication protocols

... Protocols and ports on the Ethernet interface

EtherNet/IP™ and PROFINET® protocol

Note

The EtherNet/IP™ or PROFINET® protocols are unsecured protocols (in terms of IT or cyber security), as such the intended application should be assessed to ensure that these protocols are suitable before implementation.

The EtherNet/IP and PROFINET protocol supports cyclic communication. Process Variables, Diagnostic Data and Device Status Information can be accessed cyclically.

With PROFINET communication, the DHCP (Dynamic Host Configuration Protocol) function is not supported and PROFINET DCP (Discovery and Configuration Protocol) is used instead.

For Device Configuration a Webserver is available providing full access to all parameter and diagnostic data.

EtherNet/IP Interface

Available for	Standard Ethernet communication
Configuration	Through the Webserver or the local operating Interface (Display).
EtherNet / IP ProductCode	5002
EDS file	FEW530_FEPFEH630_01_01.eds
Device profile	Profile 0x43, Generic Device, (keyable).
Supporte standards and protocols	Common Industrial Protocol (CIP™) Vol1, Ed 3.25 EtherNet/IP™ Adaptation of CIP™, Vol2, Ed 1.23
Cable	Cat 5

PROFINET Interface

Available for	<ul style="list-style-type: none"> Standard Ethernet communication Ethernet APL™ communication
Configuration	Via the web server or the local operating interface (display).
Device profile	PA Profile 4.01 Specification
GSDML file (Standard Ethernet)	GSDML-V2.42-ABB_001A-3437_FLOW_EL_MAGNETIC-20220713.xml
GSDML file (Ethernet-APL™)	GSDML-V2.45-ABB_001A-343B_FLOW_EL_MAGNETIC-20250429-154000.xml or later
Device ID (Standard Ethernet)	ABB 0x3437 or PNO 0xB332
Device ID (Ethernet-APL™)	ABB 0x34B or PNO 0xB332
Supporte standards and protocols	Common Industrial Protocol (CIP™) Vol1, Ed 3.25 EtherNet/IP™ Adaptation of CIP™, Vol2, Ed 1.23 PROFINET PNO_Version V2.42 for standard Ethernet PROFINET PNO Version V2.42 for Ethernet-APL™

3 Standard Ethernet interface

Standard Ethernet 10/100 BASE-T/TX (IEEE802.3)

Connection via twisted-pair cable (Cat. 5-cable).

With the standard Ethernet plug-in card, the transmitter features 2 Ethernet connections.

The network can be implemented using the ring, star or daisy chain topology.

In addition to the standard Ethernet plug-in card, a plug-in card for 'Power over Ethernet' is available.

Using this card, the 24 V DC version of the flowmeter can be operated via PoE without any additional power supply.

Note

For a detailed description of the electrical connection of the standard Ethernet plug-in card, refer to the operating instructions or commissioning instructions of the device.

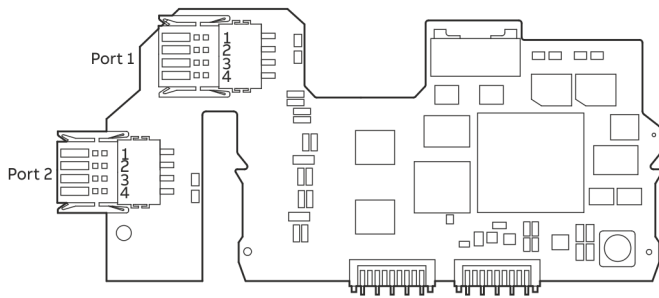


Figure 4: Plug-in card for standard Ethernet communication

Single port connection without Power over Ethernet

Standard Ethernet 10/100 BASE-T/TX (IEEE802.3) Single port connection.

Terminal designation:

Connection	Pin	Function	Color codes
1	Pin 1	RD+	White / Orange
	Pin 2	RD-	Orange
	Pin 3	TD+	White / Green
	Pin 4	TD-	Green

Single port connection with Power over Ethernet

Standard Ethernet 10/100 BASE-T/TX (IEEE802.3) Single port connection.

Terminal designation:

Connection	Pin	Function	Color codes
1	Pin 1	RD+	White / Orange
	Pin 2	RD-	Orange
	Pin 3	TD+	White / Green
	Pin 4	TD-	Green
2	Pin 1	PWR+	White / Blue
	Pin 2	PWR+	Blue
	Pin 3	PWR-	White / Brown
	Pin 4	PWR-	Brown









Dual port connection without Power over Ethernet

Terminal designation:

Connection	Pin	Function	Color codes
1	Pin 1	RD+	White / Orange
	Pin 2	RD-	Orange
	Pin 3	TD+	White / Green
	Pin 4	TD-	Green
2	Pin 1	RD+	White / Orange
	Pin 2	RD-	Orange
	Pin 3	TD+	White / Green
	Pin 4	TD-	Green

... 3 Standard Ethernet interface

Parameter descriptions

Menu / parameter	Description
Communication / Ethernet	
...General	Selection of submenu '...General' using  .
...Internet layer	Selection of submenu '...Internet layer' with  .
...Webserver	Selection of submenu '...Webserver' with  .
...EtherNetIP	Selection of submenu '...EtherNetIP' with  .
...PROFINET	Selection of submenu '...PROFINET' with  .
...ModbusTCP	Selection of submenu '...ModbusTCP' with  .
...Data link layer	Selection of submenu '...Data link layer' with  .
...Diagnostics	Selection of submenu '...Diagnostics' with  .

Communication / ...General

Base Protocol Stack	Indicates the communication protocol for information purposes only. <ul style="list-style-type: none"> Ethernet IP PROFINET
EtherNetIP Flash	Change base protocol stack to Ethernet IP.
PROFINET Flash	Change base protocol stack to PROFINET.

Communication / ...Internet layer

DHCP client	Factory default: Enabled. If 'disabled-fixed IP', the host IP address defaults to 192.168.001.122. <ul style="list-style-type: none"> Enabled disabled-fixed IP <p>With PROFINET communication, the DHCP (Dynamic Host Configuration Protocol) function is not supported and PROFINET DCP (Discovery and Configuration Protocol) is used instead.</p>
Host IP address	Allows for IP address setting 192.168.001.122 is the factory default in case DHCP client is set to fixed IP.
Subnet mask	factory default: 255.255.255.000
Gateway IP address	Factory default = 000.000.000.000 If it's part of the subnet, the first block of numbers should be identical to HOST IP - for example, 192.168.001.xxx.
NTPServer1 IP addr.	factory default: 000.000.000.000
NTPServer2 IP addr.	factory default: 000.000.000.000
Host name	factory default: ABB-Flow-EMF
Domain name	factory default: my-domain
DNS1 IP address	automatically set with DHCP = ON: 000.000.000.000
DNS2 IP address	

Communication / ...Webserver

Access	Factory default: full <ul style="list-style-type: none"> Disabled read only full
Reset credentials	Allows for resetting the webserver password.
Session timeout	Timeout time closing the webserver session. Default value: 30 minutes. Possible settings: Min: 1 Max: 99999.

Menu / parameter	Description
Communication / EtherNetIP	
Access	<p>Factory Default: full.</p> <p>Set to 'full' or 'read only' with Omron or Rockwell PLCs.</p> <ul style="list-style-type: none"> • Disabled • read only • full
Device status	<p>Mod<G> Net <G> P1</p> <ul style="list-style-type: none"> • P1: Port 1 of the Ethernet card • Mod: Module Status <ul style="list-style-type: none"> – Mod showing <G> continuously = Device ready for Operation. Working properly – Mod changing between <G> and < > = Standby. Device not configured yet – Mod changing between <R> and < > = Simple error which can be fixed – Mod showing <R> continuously = Major Error. Non removable serious error – Mod showing < > continuously = No Power • Net: Network Status. <ul style="list-style-type: none"> – Net showing <G> continuously = Connected. Device has at least one established connection. – Net changing between <G> and < > = No Connection. Device did not establish any connections but was assigned an IP address. – Net showing <R> continuously = Duplicated IP address. Device has detected that the device IP address is already in use. – Net showing < > continuously = No supply voltage or IP Address. – Net changing between <R> and < > = Connection timeout
Vendor ID	46
Product/Device type	43
Product name	ProcessMaster FEP630
Product code	5002
Product major rev.	1
Product minor rev.	1

Communication / PROFINET	
Access	<p>Factory Default: full.</p> <p>Note: DCP is always enabled.</p> <ul style="list-style-type: none"> • Disabled • read only • full
Device status	Representation of LEDs of Option Card, see also Standard Ethernet plug-in card status LEDs on page 13.
Device Name	<p>PROFINET station name</p> <p>40 x ASCII characters</p>
Tag function	<p>Writeable only via PROFINET (e.g. I&M1)</p> <p>32 x ASCII characters</p>
Select Device Type	<p>Selection of the device type:</p> <ul style="list-style-type: none"> • ABB 0x3437 (default) • PA Profile4 0xB332
SNMP access	<p>Enabling SNMP access. Default: disabled</p> <ul style="list-style-type: none"> • Disabled • read only • full (recommended for PROFINET) <p>The device supports SNMP. It is used in a PROFINET system to manage the network infrastructure, including IO controllers and IO devices. SNMP is an unsecured protocol. SNMP communication can be disabled via the HMI or blocked on ports 161 and 162 by firewalls.</p>

... 3 Standard Ethernet interface

... Parameter descriptions

Communication / ...ModbusTCP

Access	Factory Default: full. <ul style="list-style-type: none"> • Disabled • read only • full
IEEE Format	Factory default: Enabled. <ul style="list-style-type: none"> • Enabled • disabled

Menu / parameter	Description
------------------	-------------

Communication / ...Data link layer

Chasis MAC address	Example: 00-24-59-11-00-69
P1 MAC address	
P2 MAC address	
P1 auto negotiation	<ul style="list-style-type: none"> • Enabled • disabled
P1 speed set	10 Mbit/s, 1000 Mbit/s, 1000 Mbit/s
P1 duplex set	<ul style="list-style-type: none"> • Half Duplex • Full Duplex
P1 speed status	Example: 100 Mbits/s
P1 duplex status	Example: Full duplex
P2 auto negotiation	<ul style="list-style-type: none"> • Enabled • disabled
P2 speed set	10 Mbit/s, 1000 Mbit/s, 1000 Mbit/s
P2 duplex set	<ul style="list-style-type: none"> • Half Duplex • Full Duplex
P2 speed status	Example: 100 Mbits/s
P2 duplex status	Example: Full duplex

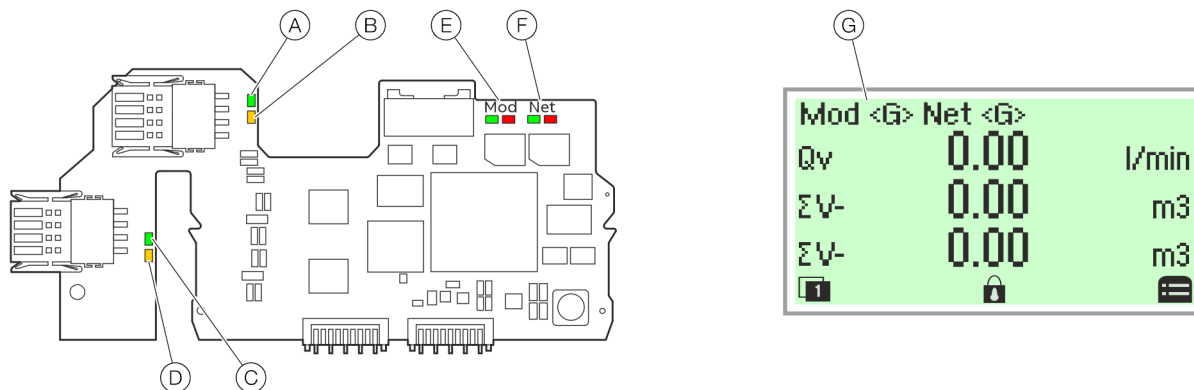
Communication / Diagnostics

TCP connections	Example: 14
P1 received	Example: 1207269 Bytes
P1 transmitted	Example: 2001589 Bytes
P1 receive errors	Example: 000000
P1 transm.collisions	Example: 000000
P2 received	Example: 000000 Bytes
P2 transmitted	Example: 000000 Bytes
P2 receive errors	Example: 000000
P2 transm.collisions	Example: 000000

Standard Ethernet plug-in card status LEDs

The 8 LEDs on the standard Ethernet card indicate the status of each port and the network.

To enable card status indication in the upper HMI Line, navigate to 'Display / Display Tag / Ethernet Status'.



- (A) Link port 1
- (B) Activity 1
- (C) Link port 2
- (D) Activity 2
- (E) Module Status (Mod)
- (F) Network Status (Net)
- (G) Card status indication on LCD indicator (example)

Figure 5: Standard Ethernet card status LEDs

EtherNet/IP™ communication

LED	Status	HMI display	Description
(A) Port 1	ON		Network connection (link up)
	OFF		No network
(B) Activity 1	Flashing or ON		Traffic
	OFF		No traffic
(C) Port 2	ON		Network connection (link up)
	OFF		No network
(D) Activity 2	Flashing or ON		Traffic
	OFF		No traffic
(E) Module Status (Mod)	green, ON	Mod showing <G> continuously	Device ready for Operation. Working properly
	green, Flashing (1 Hz)	Mod changing between <G> and < >	Standby. Device not configured yet
	green/ red, Flashing (1Hz)		Device performs "Power-On" Test
	red, Flashing (1 Hz)	Mod changing between <R> and < >	Simple error that can be corrected.
	red, ON	Mod showing <R> continuously	Major Error. Non removable serious error, please contact service
	OFF	Mod showing < > continuously	No Power
(F) Network Status (Net)	green, ON	Net showing <G> continuously	Connected. Device has at least one established connection
	green, Flashing (1 Hz)	Net changing between <G> and < >	No Connection. Device did not establish any connections, but was assigned an IP address
	green/ red, Flashing (1Hz)		Device performs "Power-On" Test
	red, ON	Net showing <R> continuously	Duplicated IP address. Device has detected that the device IP address is already in use
	OFF	Net showing < > continuously	No supply voltage or IP Address.
	red, flashing (1 Hz)	Mod changing between <R> and < >	Connection timeout

... 3 Standard Ethernet interface

... Standard Ethernet plug-in card status LEDs

PROFINET® communication

LED	Status	HMI display	Description
Ⓐ Port 1	ON		Network connection (link up)
	OFF		No network
Ⓑ Activity 1	Flashing or ON		Traffic
	OFF		No traffic
Ⓒ Port 2	ON		Network connection (link up)
	OFF		No network
Ⓓ Activity 2	Flashing or ON		Traffic
	OFF		No traffic
Ⓔ Module Status (Mod)	green, ON	Mod showing <G> continuously	PROFINET configuration complete
	green, Flashing (1 Hz)	Mod changing between <G> and < >	Blink Test (Profinet)
	green/ red, Flashing (1Hz)		Device performs "Power-On" Test
	red, Flashing (1 Hz)	Mod changing between <R> and < >	A fixable configuration error. For example: an incorrect or incomplete configuration.
	red, ON	Mod showing <R> continuously	Major Error. Non removable serious error, please contact service
	OFF	Mod showing < > continuously	Startup or Device is turned off. No supply voltage.
Ⓕ Network-Status (Net)	green, ON	Net showing <R> continuously	PLC connected
	green, Flashing (1 Hz)	Net changing between <G> and < >	No Connection. Device did not establish any connections, but was assigned an IP address
	green/ red, Flashing (1Hz)		Device performs "Power-On" Test
	red, ON	Net showing <R> continuously	Duplicated IP address. Device has detected that the device IP address is already in use
	OFF	Net showing < > continuously	No supply voltage or IP Address. Device does not have IP Address or is turned off.
	red, flashing (1 Hz)	Mod changing between <R> and < >	No PLC connection

Basic Setup

On initial start, do the steps that follow:

1. Make sure that the transmitter is connected to the Ethernet.
2. Log on to the flowmeter and set the parameters:
3. Set 'Communication / Ethernet / ...Internet layer / DHCP client' to 'Enabled'.
4. Make sure that the flowmeter IP address (host IP address) is set.
5. Set 'Communication / Ethernet / ...Webserver / Access' to 'full'.
6. Set 'Communication / Ethernet / ...EtherNetIP / Access' to 'full'.
7. Set 'Display / Display Tag' to 'Bus Address'.

Flowmeter settings

1. Use the Flowmeter HMI menu to go to 'Communication / ...Ethernet / ...Internet layer / DHCP client'.
2. To assign the device address through the network, set 'DHCP client' to 'Enabled'. Use this address to access the device through the webserver.
 - To use a fixed IP address, set 'DHCP client' to 'disabled-fixed IP'. Make sure that the HOST IP address in the device is set. The factory default is 192.168.001.122
3. Use the Flowmeter HMI menu to go to 'Communication / ...Ethernet / ...Webserver / Access'.
4. Set 'Access' to 'full'.
5. Use the Flowmeter HMI menu to go to 'Communication / ...Ethernet / ...EtherNetIP / Access'.
6. Set 'Access' to 'full'.

4 Ethernet-APL™ interface

Ethernet APL™ interface V1 / V2 (plug-in card)

An Ethernet APL interface can be implemented using the 'Ethernet APL (yellow)' plug-in card.

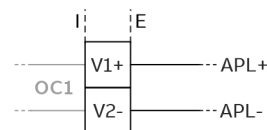


Figure 6: Plug-in card as an Ethernet APL interface (I = internal, E = external)

The corresponding plug-in card can only be used in slot OC1.

Ethernet APL interface

Terminals	V1 (APL+) / V2 (APL-)
APL Power Class	Power Load, Power Class A
Supply voltage	9,6 to 15 V DC
Power consumption	540 mW

It is recommended to use the middle cable gland to route the APL cable into the housing.

Properties of the Ethernet APL interface

- 10 Mbit/s full duplex, 2-wire Ethernet based on IEEE 802.3cg 10BASE-T1L.
- System integration with PROFINET®, Modbus TCP®, Webserver.
- Reliability, long-term stability, high precision and advanced diagnostic functions in critical processes

Note

For a detailed description of the electrical connection of the Ethernet-APL™ plug-in card, refer to the operating instructions or commissioning instructions of the device.

... 4 Ethernet-APL™ interface

... Ethernet APL™ interface V1 / V2 (plug-in card)

Ethernet-APL™ network topology

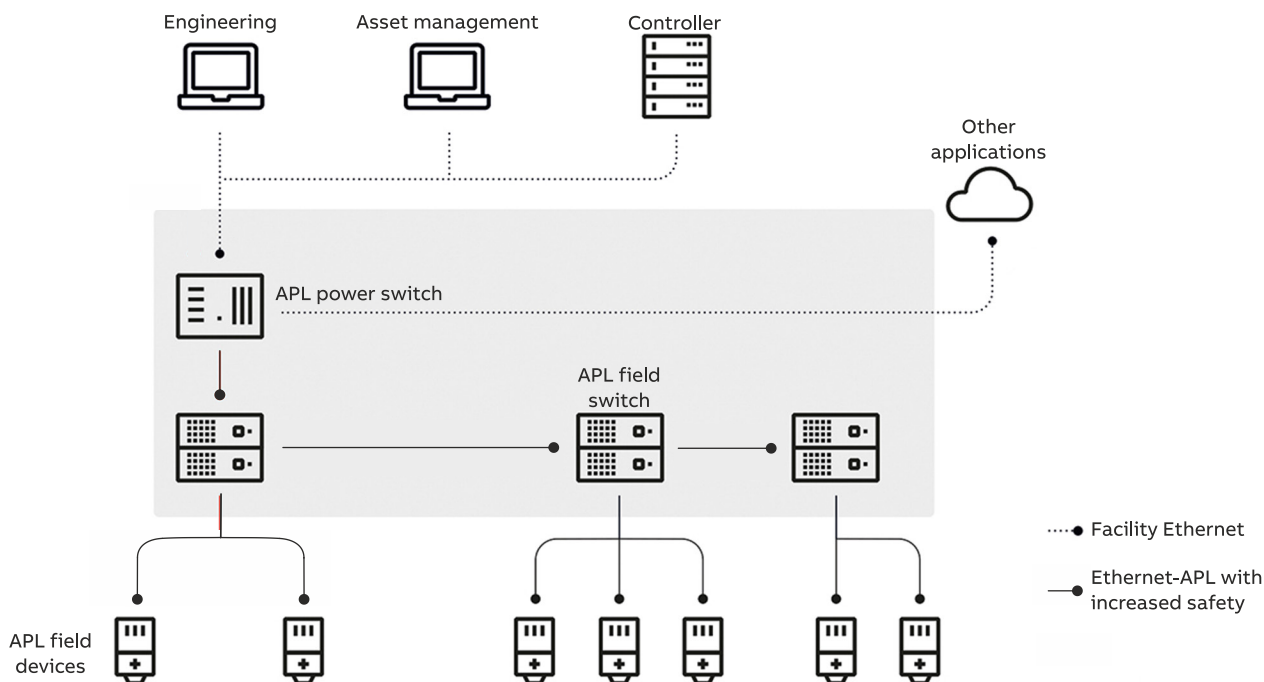


Figure 7: Exemplary Ethernet-APL topology

Ethernet APL is designed to support various installation topologies with optional redundancy or fail-safe concepts and trunk-and-spur.

The trunk line provides high power and signal levels for long cable lengths of up to 1000 m (3281 feet).








The spur line, on the other hand, is equipped with lower power and optional intrinsic safety for lengths of up to 200 m (656 feet).

Ethernet APL explicitly specifies only point-to-point connections, where each connection between communication partners represents a segment. Ethernet APL switches therefore isolate communication between the segments.

The implemented Ethernet APL field switch/device must be certified for use in the designated explosion protection zone.

You can find more network topologies that can be used in potentially explosive atmospheres in the '[Ethernet-APL Engineering Guideline](#)'. See www.ethernet-apl.org for additional information.

Parameter descriptions

Menu / parameter	Description
Communication / Ethernet	
...General	Selection of submenu ' ...General ' using  .
...Internet layer	Selection of submenu ' ...Internet layer ' with  .
...Webserver	Selection of submenu ' ...Webserver ' with  .
...PROFINET	Selection of submenu ' ...PROFINET ' with  .
...ModbusTCP	Selection of submenu ' ...ModbusTCP ' with  .
...Data link layer	Selection of submenu ' ...Data link layer ' with  .
...Diagnostics	Selection of submenu ' ...Diagnostics ' with  .

Communication / ...General

Base Protocol Stack	Displays the communications protocol for information purposes only. <ul style="list-style-type: none"> PROFINET
PROFINET Flash	Change base protocol stack to PROFINET.

Communication / ...Internet layer

DHCP client	Factory default: Enabled. If 'disabled-fixed IP', the host IP address defaults to 192.168.001.122. <ul style="list-style-type: none"> Enabled disabled-fixed IP With PROFINET communication, the DHCP (Dynamic Host Configuration Protocol) function is not supported and PROFINET DCP (Discovery and Configuration Protocol) is used instead.
Host IP address	Allows for IP address setting 192.168.001.122 is the factory default in case DHCP client is set to fixed IP.
Subnet mask	factory default: 255.255.255.000
Gateway IP address	Factory default = 000.000.000.000 If it's part of the subnet, the first block of numbers should be identical to HOST IP - for example, 192.168.001.xxx.
NTPServer1 IP addr.	factory default: 000.000.000.000
NTPServer2 IP addr.	factory default: 000.000.000.000
Host name	factory default: ABB-Flow-EMF
Domain name	factory default: my-domain
DNS1 IP address	automatically set with DHCP = ON: 000.000.000.000
DNS2 IP address	

... 4 Ethernet-APL™ interface

... Parameter descriptions

Communication / ...Websserver

Access	<p>Factory default: full</p> <ul style="list-style-type: none"> • Disabled • read only • full
Reset credentials	Allows for resetting the webservice password.
Session timeout	<p>Timeout time closing the webservice session.</p> <p>Default value: 30 minutes.</p> <p>Possible settings: Min: 1 Max: 99999.</p>

Communication / PROFINET

Access	<p>Factory Default: full.</p> <p>Note: DCP is always enabled.</p> <ul style="list-style-type: none"> • Disabled • read only • full
Device status	Representation of LEDs of Option Card, see also Ethernet-APL™ plug-in card status display on page 20.
Device Name	<p>PROFINET station name</p> <p>40 x ASCII characters</p>
Tag function	<p>Writeable only via PROFINET (e.g. I&M1)</p> <p>32 x ASCII characters</p>
Select Device Type	<p>Available device profiles</p> <ul style="list-style-type: none"> • ABB 0x34B: Manufacturer-specific GSDML • PA Profile4 0xB332: PNO Profile GSD
SNMP access	<p>Enabling SNMP access. Default: disabled</p> <ul style="list-style-type: none"> • Disabled • read only • full (recommended for PROFINET) <p>The device supports SNMP. It is used in a PROFINET system to manage the network infrastructure, including IO controllers and IO devices. SNMP is an unsecured protocol. SNMP communication can be disabled via the HMI or blocked on ports 161 and 162 by firewalls.</p>

Communication / ...ModbusTCP

Access	<p>Factory Default: full.</p> <ul style="list-style-type: none"> • Disabled • read only • full
IEEE Format	<p>Factory default: Enabled.</p> <ul style="list-style-type: none"> • Enabled • disabled

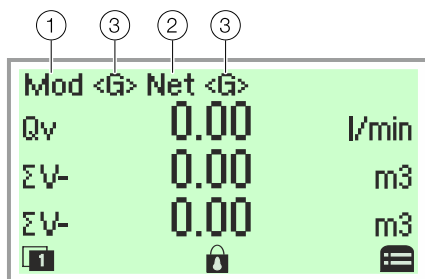
Menu / parameter	Description
Communication / ...Data link layer	
Chasis MAC address	Example: 00-24-59-11-00-69
P1 MAC address	
P2 MAC address	
P1 auto negotiation	<ul style="list-style-type: none"> • Enabled • disabled
P1 speed set	10 Mbit/s, 1000 Mbit/s, 1000 Mbit/s
P1 duplex set	<ul style="list-style-type: none"> • Half Duplex • Full Duplex
P1 speed status	Example: 100 Mbits/s
P1 duplex status	Example: Full duplex
P2 auto negotiation	<ul style="list-style-type: none"> • Enabled • disabled
P2 speed set	10 Mbit/s, 1000 Mbit/s, 1000 Mbit/s
P2 duplex set	<ul style="list-style-type: none"> • Half Duplex • Full Duplex
P2 speed status	Example: 100 Mbits/s
P2 duplex status	Example: Full duplex
Communication / Diagnostics	
TCP connections	Example: 14
P1 received	Example: 1207269 Bytes
P1 transmitted	Example: 2001589 Bytes
P1 receive errors	Example: 000000
P1 transm.collisions	Example: 000000
P2 received	Example: 000000 Bytes
P2 transmitted	Example: 000000 Bytes
P2 receive errors	Example: 000000
P2 transm.collisions	Example: 000000

... 4 Ethernet-APL™ interface

Ethernet-APL™ plug-in card status display

The status of the Ethernet-APL plug-in card is displayed via virtual LEDs in the LCD indicator of the device.

To enable card status indication in the upper Line of the LCD indicator, navigate to 'Display / Display Tag / Ethernet Status'.



- ① Module Status (Mod)
- ② Network Status (Net)
- ③ Card status indication on LCD indicator (example)

Figure 8: Virtual status LEDs of the Ethernet-APL plug-in card

PROFINET® communication

Pos.	Card status indication	Description
① (Mod)	Mod showing <G> continuously	PROFINET configuration complete
	Mod changing between <G> and <>	Blink Test (Profinet) Device performs "Power-On" Test
	Mod changing between <R> and <>	A fixable configuration error. For example: an incorrect or incomplete configuration.
	Mod showing <R> continuously	Major Error. Non removable serious error, please contact service
	Mod showing <> continuously	Startup or Device is turned off. No supply voltage.
② (Net)	Net showing <R> continuously	PLC connected
	Net changing between <G> and <>	No Connection. Device did not establish any connections, but was assigned an IP address Device performs "Power-On" Test
	Net showing <R> continuously	Duplicated IP address. Device has detected that the device IP address is already in use
	Net showing <> continuously	No supply voltage or IP Address. Device does not have IP Address or is turned off.
	Mod changing between <R> and <>	No PLC connection

Basic Setup

On initial start, do the steps that follow:

Scenario A – Ordered with Profinet access disabled and default fixed IP:

1. Make sure that the Ethernet-APL plug-in card is connected to an APL Switch and the APL Switch is showing a link by its status display.
2. Make sure that the transmitter is powered.
3. Log on to the flowmeters Menu and set the parameters.
4. Set / Check 'Communication / ...Ethernet / ...Internet layer / DHCP client' to 'Disabled'.
5. Set / Check 'Communication / ...Ethernet / ...PROFINET / Access' to 'Disabled' (DCP inactive).
6. Set / Check 'Communication / ...Ethernet / ...Webserver / Access' to 'full'.
7. Make sure that the flowmeter IP address & Subnet mask is set by HMI.
 - Default address is 192.168.1.122 with subnet mask 255.255.255.0.

The webserver is now accessible at <https://192.168.1.122>

Scenario B – Ordered with Profinet access disabled and DHCP:

1. Make sure that the Ethernet-APL plug-in card is connected to an APL Switch and the APL Switch is showing a link by its status display.
2. Make sure that the transmitter is powered.
3. Log on to the flowmeters HMI and set the parameters
4. Set / Check 'Communication / ...Ethernet / ...Internet layer / DHCP client' to 'Enabled'.
5. Set / Check 'Communication / ...Ethernet / ...PROFINET / Access' to 'Disabled' (DCP inactive).
6. Make sure that the flowmeter <IP address> (host IP address) is set by a DHCP Server.
7. Set / Check 'Communication / ...Ethernet / ...Webserver / Access' to 'full'.

The webserver is now accessible at [https:// <IP address>](https://<IP address>)

Scenario C – Ordered with Profinet access enabled

1. Make sure that the Ethernet-APL plug-in card is connected to an APL Switch and the APL Switch is showing a link by its status display.
2. Make sure that the transmitter is powered.
3. Log on to the flowmeters HMI and set the parameters:
4. Set / Check 'Communication / ...Ethernet / ...PROFINET / Access' to 'full' (DCP active).
5. Make sure that the flowmeter <IP address> is set by DCP (e.g. Proneta®, also see **IP address and PROFINET® name setting with DCP** on page 47).
6. Set / Check 'Communication / ...Ethernet / ...Webserver / Access' to 'full'.

The webserver is now accessible at <https://<IP address>>

Note

The Ethernet-APL plug-in card is powered by the APL bus and not by the device. In case that the device is powered up but the APL card is either not connected to an APL switch or the APL switch (port) is not powered Electronic Alarm No. 27 will appear: "Communication Card not responding. Check wiring. Check Card. Call Service."

5 Webserver for device configuration

Introduction

The built-in webserver allows for device configuration using a web browser. You must log in to access the device. The device allows for one user to log in at a time.

The web server is accessible at the IP address configured in the basic settings:

- Standard Ethernet: page 15.
- Ethernet-APL: page 20.

Note

When you connect for the first time, the web browser displays a warning that the connection is not private or has expired. This is because the Flowmeter sends an unknown certificate to the web browser.

Computer settings

The IP address of the Ethernet adapter must be set up so that the subnet of the Flowmeter is accessible.

1. Configure the Ethernet adapter for a fixed IP address under TCP/IPV4.
2. To access the Flowmeter's webserver, enter the IP address (for example, <https://192.168.1.122>) in the web browser.

Note

The IP address of the Ethernet adapter of the computer and the Flowmeter must be different, to avoid IP address collision.

- For example, set the IP address of the computer's Ethernet adapter to <http://192.168.1.1>
- If Display Tag on HMI set to 'Bus Address' and it is showing e.g. 192.168.001.122, skip the '0' and enter <https://192.168.1.122> in the web browser.

Password protection

The default password is 'password'. The system will prompt you to set a new password.

Figure 9: Change data

Note

You must set a new password to continue.

Change the password

1. To change the password, go to '<http://192.168.1.122>'.
2. Go to 'User data / Change data / Change password'.

Figure 10: Change password

Note

The password must have the properties that follow:

- At least 8 characters
- At least 1 numeric character
- At least 1 capital letter
- At least 1 small letter
- At least 1 special character.

Note

If an incorrect password is entered three times in a row then sign in cooldown starts. Cooldown takes 10 minutes and blocks any sign in request.

Webpage certificates

The device generates a default certificate. The certificate has the properties that follow:

	Standard Ethernet	Ethernet-APL
Issuer	ABB Device Root CA	ABB Device Root CA
Subject	my-hostname.my-domain	ABB-Ethernet-00-24-57-xx-xx-xx (x from MAC address)
Serial	Randomly generated	Randomly generated
Valid From	Time of generation	Time of generation
Valid Till	Time of generation plus 365 days	Time of generation plus 365 days
Subject Alt name	192.168.1.122, my-hostname.my-domain	<ip-address>, ABB-Ethernet-00-24-57-xx-xx-xx (x from MAC address)
Key	384-bit EC key with secp384 curve	384-bit EC key with secp384 curve

Tabelle 1: Certificate properties

Upload your own certificate

To upload your own certificate, do the steps that follow:

1. Go to webpage menu '**SSL Certificate / New certificate**'.
2. When prompted, attach the certificates that follow:
 - Root CA certificate
 - Server certificate
 - Private key associated with server certificate

Note

The files can be in PEM or DER format. The file names are not important, the device renames them internally.

3. Wait for the device to verify the files.
4. Make sure that a summary of the certificates shows on the webpage.
5. If necessary, upload new certificates or switch to a different certificate.
6. If you switch to a new certificate, sign in at the prompt.

Intermediate CA

A more complex PKI structure is supported, with intermediate certificates.

```
-----BEGIN CERTIFICATE-----
<Endpoint certificate for server>
-----END CERTIFICATE-----
-----BEGIN CERTIFICATE-----
<Intermediate certificate #1>
-----END CERTIFICATE-----
...
-----BEGIN CERTIFICATE-----
<Intermediate certificate #n>
-----END CERTIFICATE-----
```

Private keys protected with passwords are not supported.

Generate a certificate

1. Go to webpage menu '**SSL Certificate / Generate certificate**'.
2. Sign in at the prompt.

Note

The certificate has the properties that follow:

- Issuer: ABB Device Root CA
- Subject: <Host name>.<Domain Name>
- Serial: Randomly generated
- Valid From: Time of generation
- Valid Till: Time of generation plus 365 days
- Subject Alt name: <IP address>, <Host name>.<Domain Name>
- Key: 384-bit EC key with secp384 curve.

... 5 Webserver for device configuration

Using the web server

The Standard Ethernet or the Ethernet-APL interface introduces access to the device via web browser.

1. To access the Flowmeter's webserver, enter the IP address (for example, https://192.168.1.122) in the web browser.
2. To access the webpage the user has to sign in. After signing in a session is started for a user. Each action made on webpage refreshes this session. If user is inactive the session will timeout which will result in signing out.
 - This inactivity timeout can be changed either in HMI menu 'Communication / ...Ethernet / ...Webserver / Session timeout' or via webpage 'Device settings / Communication / Ethernet / Webserver / Session timeout'. Default value: 30 min.

Note

The webpage can be used only by one user at a time. If other user will try to access webpage at this time, error message will be shown indicating that someone else is signed in.

Main page

This is the first page seen when accessing device via web browser.

The Main Page provides the following elements:

- Device identification consisting of:
 - Device type
 - Sensor Location Tag
 - Calibration Certificate Number
 - IP address
 - Device host name

Overview

This page focuses on process variables in the system presenting.

It is divided into the following four sections.

Overview / Datalogger

This Page presents the main process variables as numerical values, and line graphs.

Overview

The Line graph presents last 10 readout of main process variables. The values are updated each 5 seconds.

Hovering over dot in line graph shows exact value of variable. Switching visibility of variables is done by checking/unchecking checkbox next to variable name or by clicking variable name in graph legend.

Up to eight signals can be represented on the overview-page at the same time. The signals are selected from a drop-down list for each signal.

Datalogger

Further each signal can be logged.

The settings for datalogger are located on the bottom of the overview-page.

The user can set a sampling rate and choose which of the three reserved files should be used for datalogging. A logfile is limited to 1MB, so the sampling rate effects the maximum recording time. For a set sampling rate, a maximum recording time is calculated and represented next to the sampling rate setting.

The logging process can be started by clicking on the 'Start data logger' button. Running state of data logger is represented by a rotating gear wheel on the button. The Datalogger can be stopped either by the user clicking the button or automatically when the logfile exceeds a size of 1MB. While datalogger is running no settings can be made on the overview-page. Logfiles can be downloaded in the download section.

Observe

Presents all process variables on one page.

Totalizer

Presents totalized values which for improved readability are grouped.

Identification

Contains general information about the device itself. It also provides link to product identification page.

Device settings

This page presents in a convenient way values available in HMI menu. The structure of this page is based on HMI menu but shows multiple values on one screen.

- The values are read from the device when user enters sub-page or tab in device settings page.
- After the value is updated, the content of active tab is refreshed.

The procedure of changing values depends on controller in which values is presented:

- Standard inputs – The value can be changed by clicking the controller and typing in new value. When controller is clicked, two buttons on right side of input are shown. One button applies changes and second button cancels making changes. After value is changed and apply button is clicked, new value is validated. If an invalid value was entered information below input will be shown with detailed information. If value was valid, this value will be updated on the device. Result of this update will be presented below the input.
- Drop down menus – The value can be changed by selecting new value from list available after clicking on the controller. When value is changed, update on the device will start. Result of this update will be presented below the drop down menu.
- Slider – presents a percentage value by displaying numerical value next to slider and graphical representation of slider. Changing value is possible by clicking on the dot on the slider and moving it left or right. After sliding move ends, update on the device is started. Result of this update will be presented below the slider.
- Buttons – represent available action. After clicking button, confirmation is needed to start action. After starting action result of starting it is presented below. Note: result shows if action was started correctly, not that it was completed correctly.

Software update

The Webserver provides an interface to perform firmware update of the Ethernet card.

This webpage shows information about currently loaded software and a form to load new software package.

Software update process

Software update process can be divided into stages:

1. Upload the new software package by selecting new software package in webpage form.
 - After the software package is uploaded the device validates the package and shows the validation result
 - If the package is valid, the firmware version from that package and the package checksum is shown. The Checksum is an SHA-256 checksum which can be used to check package integrity.
2. The option to upload the new software package or switch to the new software is available.
3. Switching to new software will start software update process. This can take couple of minutes to complete
4. Result of software update is presented

Note

While the software update is in progress the access to all protocols available via Ethernet card is not possible.

... 5 Webserver for device configuration

... Using the web server

Diagnostics

Ethernet card provides multiple diagnostics of the device and Ethernet card itself.

Alarms

Shows all active alarms coming from the device.

These are the same alarms that can be seen in HMI Menu.

The alarm indications can be seen in top right of the page. The icons indicate if there is any alarm active in particular group. Clicking these icons will navigate to this page.

There is one additional alarm that can be active which is not seen in HMI menu. This alarm indicates problems with connection between Motherboard and Ethernet Card. If this alarm is active process variables will not be updated and changing some configuration options will not be possible.

Module alarms

Additionally to the device alarms, the Ethernet card has its own alarms. These alarms show problems on Ethernet card itself.

Possible alarms are:

- Webserver certificate is near expiration
- Webserver certificate has expired

Audit Log

Audit log a CSV file containing events happening on Ethernet card. The Page allows viewing last 30 events and an option to download whole log.

There is a size limit and after audit log reaches its max size oldest logs are overwritten. Note that the size limit is connected to physical size of audit log, not to number of entries in audit logs.

Audit log tracks following events:

- Changes in objects done via webserver
- Modbus TCP write functions
- Change in webserver SSL certificates
- User management:
 - Sign in
 - Entering wrong password
 - Password change
- Software update
 - Uploading package
 - Package verification result
 - Activation request
 - Update result
- Changing access type from protocols: Webserver, Modbus TCP
- Device reset
- MB diagnostics change – each time alarm is activated or cleared on MB, such event will be recorded

Counters

The Ethernet card tracks multiple performance counters which can be viewed via webpage.

There are two ways to view counters:

- Active view – counters are updated each 10 seconds starting from signing in
- History view – shows values of counters in last 15 minutes with data aggregated in 1 minute time spans

The following counters are tracked on the device:

- Modbus TCP
 - Active connections - Number of currently active connections
 - Started connections - Total number of started connections
 - Rejected connections - New connection is rejected when max connections are reached and all active connections have ongoing transaction
 - Dropped connections - Connection is dropped when it is inactive, max active connections is reached and new connection is requested
 - Received transactions - Number of correctly received transactions
 - Rejected transactions - Transaction is rejected when device is busy and is not able to handle new transactions
 - Corrupted transactions - Transactions which had errors in MBAP header
 - Incomplete transactions - Transactions which had incorrect length
- Standard Ethernet for each Port / Ethernet-APL Port
 - RX bytes - Total number of bytes received
 - RX packets - Total number of packets received
 - TX bytes - Total number of bytes sent
 - TX packets - Total number of packets sent
 - Collisions - Total number of collisions. If this number is higher than 0 then most probably there is speed and/or duplex mismatch. In case half-duplex is selected manually collisions should be expected
 - Dropped - Total number of dropped packets. Packets are dropped if it was not possible to transmit that packet. This indicates that network is becoming congested
 - Error - Total number of errors. Errors happen due to: Electromagnetic interference near cables or network devices, Faulty cabling or Faulty hardware
 - Delayed

- TCP/IP
 - Opened sockets - Number of opened sockets on the device
 - Established - Total number of established connections
 - UDP RX packets - Total number of UDP datagrams received
 - UDP RX errors - Total number of UDP datagrams received with checksum errors
 - UDP TX packets - Total number of UDP datagrams sent
 - TCP RX packets - Total number of TCP segments received
 - TCP RX errors - Total number of TCP segments received with checksum errors
 - TCP TX packets - Total number of TCP segments sent
 - TCP TX retransmissions - Total number of TCP segments retransmitted. Retransmissions happen due to: Network congestion causing segments to be dropped, TCP segments arriving out of order, QoS settings in the network
Less than 3 % of retransmissions is not a problem
 - TCP out resets - Number of segments sent with the RESET flag on. If packets are not received by target then there are some problems on network. If packets are received by target then there might be a problem with application on the receiver side
 - TCP established resets - Number of connections that were reset. Usually connection is reset when connection on other side was closed, it received segment with unacceptable data or no process is listening on port to which connection was started

Time sync

To avoid an old timestamp on the device the device-time can be set manually by user. This is useful especially in case no NTP-server is accessible in network.

By clicking the button, the current system-time of user's device (PC, smartphone etc.) is taken and send to the device.

SSL Certificate management

The Page enables viewing current SSL certificate used for the webserver access.

All certificates in chain are presented in a tree type structure. Each certificate is presented with: subject name, issuer name, serial number, valid from, valid till and type of certificate.

It is also possible to upload or generate new certificate for the device. For more information refer to **Upload your own certificate** on page 23.

User management

The Webserver supports only single account.

This webpage allows user to change the password.

Downloads

The webpage contains download links for files which are relevant to the device.

The following downloads are available:

- EDS file (only with Standard Ethernet)
- EDS collection file (only with Standard Ethernet)
- Device configuration file
- Data logging files
- GSDML file

Verification

Provides QR code which can be used in my Installed Base (myIB) application to perform device verification.

... 5 Webserver for device configuration

... Using the web server

Device Parameter Upload

All device settings which can be done via webserver can be saved in a single configuration file. A configuration file for a device can be generated in the device parameter upload menu and then downloaded in the download section.

This is useful e.g., if user want to store current device-settings or to copy settings of device to another.

When uploading a configuration file, it is verified, the device type must match the type of device where it is uploaded. Therefore, for example, it is not possible to upload an electromagnetic flow meter configuration to a Coriolis.

The last activated configuration is represented on the left side of the menu page, the representation contains following information of the device where the configuration file was generated:

- Date of generation (system time of the device)
- Device type
- Meter size
- Sensor serial number
- Sensor location tag
- Transmitter location tag

After uploading a configuration file and a successful verification, above mentioned information also is represented for the uploaded configuration file.

When a configuration file is uploaded to the device, it can be activated by the user. If also ethernet settings should be written to the device, user must activate a checkbox. In this case connection will get lost, the webserver will not response and a reloading of the webpage is necessary.

Time handling

The Ethernet board needs time for Audit Log, Alarms and Counters. The Time is incremented based on device running time.

The Time is synchronized using two time sources.

- First one is SW build time.
- Second one is SNTP server time, which is synchronized each 30 seconds.

The SW built time is checked against current time on the device during system startup and if SW build time is newer, device time is updated. In case of SNTP, if valid time is provided by server, device time is updated.

6 Firmware update over the Ethernet interface

To update the Ethernet card firmware, log on to the flowmeter's webserver.

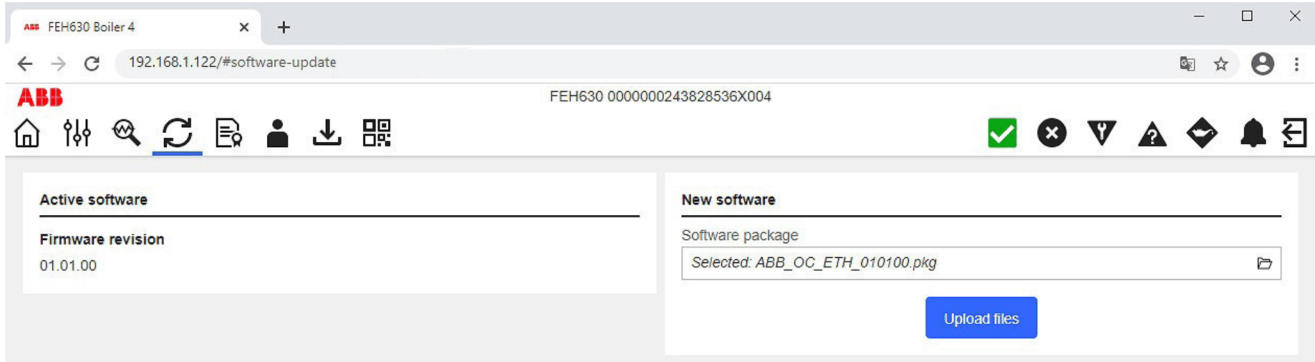


Figure 11: Upload files

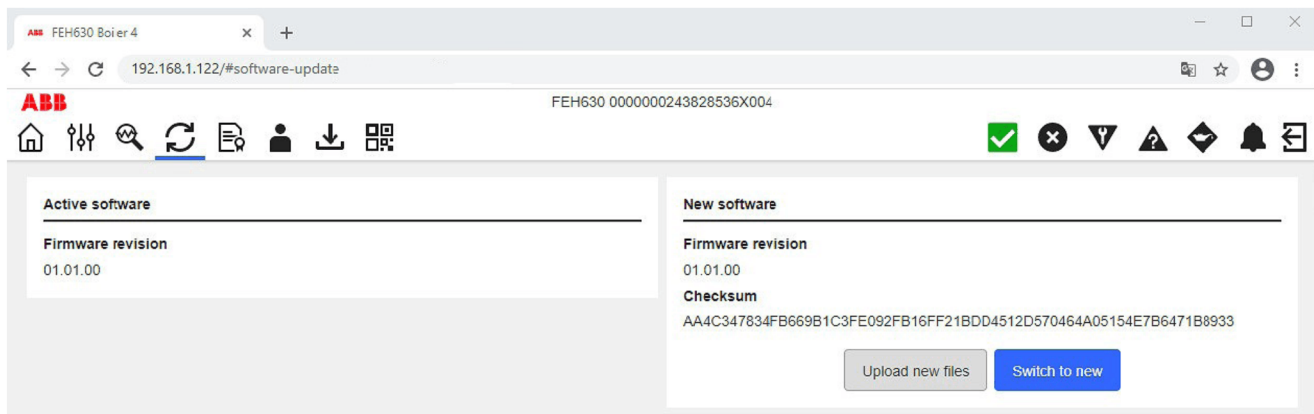


Figure 12: Switch to new

1. Browse for the new firmware and select **Upload files**.
2. Wait for the files to upload to the Ethernet card.
3. Wait for the device to show the validation result for the firmware package.
4. If the firmware validation fails, use the webserver to browse for a different firmware pack.

Note

If the firmware package is valid, the webserver displays the firmware version and checksum. The checksum is an SHA-256 checksum, allowing for package-integrity-check.

5. To install the firmware on the Ethernet card, select **switch to new**.
6. When **Updating SW will disable all protocols from OC for the time of the update** is displayed, click OK.
7. Wait for the webserver to display the message **Software upgraded successfully. Please sign in to continue**.
8. Use the default password to log on to the webserver, which is **Password**.
9. Change the password when prompted.

Note

The password requirements are as follows:

- Capital letters: 1
- Small letters: 1
- Numbers: 1
- Special characters (!, \$, #, etc.): 1
- Min length: 8

Cyber Security

Version and checksum for the current Ethernet card firmware is:

Verification of installed Firmware Version to Ethernet plug-in card:

Firmware Version	SHA2 Checksum
01.01.00	AA4C347834FB669B1C3FE092FB16FF21BDD4512D570464A05154E7B6471B8933

Note

- Device firmware is not available for download from the ABB library.
- Please refer to your local ABB Service Organization if a firmware update is required.

7 EtherNet/IP™ interface

Introduction

Note

The Ethernet/IP protocol is only available with the standard Ethernet interface.

For information on the supported device profiles, see Table **EtherNet/IP Interface** on page 8..

Device to network

You can configure the IP address and the hostname of the device. The device supports the DHCP function.

Based on the device order the device is either shipped with DCHP active or with a default / or customer IP and hostname:

Configuration parameter	Default setting
IP-Address	192.168.1.122
Gateway	0.0.0.0
Subnet mask	255.255.255.0
Default hostname for ProcessMaster	ABB-Flow-EMF

Table 2: Default Ethernet/IP settings

Network related parameters are accessible through the HMI menu.

Once a server is assigned an IP address, the factory default IP address and hostname will be replaced by the ones assigned through the DHCP server.

To check the IP settings, use the Flowmeter HMI menu to go to 'Communication / ...Ethernet / ...Internet layer / Host IP address'.

Set the IP-Address and Local Host name

Static (DHCP Client disabled)

For static IP addressing, the DHCP Client is disabled and the IP address is set ether via the EtherNet/IP™ protocol or utilizing the local HMI. For address setting using the HMI, navigate to 'Communication / ...Ethernet / ...Internet layer / DHCP client' for configuration.

Note

Disabling the DHCP Client, the static IP address defaults to **192 .168 .1 .122**. To change the static IP address, navigate to 'Communication / ...Ethernet / ...Internet layer / Host IP address' for configuration.

The IP-address can be changed via the EtherNet/IP™ Interface TCP/IP 0xF5, Attribute 5.

DHCP (DHCP Client enabled)

The device raises a DHCP request to obtain an initial IP address. The DHCP Server detects this request and assigns an IP address to the device.

The Flowmeter Factory Default is 'DHCP client' = 'Enabled'.

The device waits until the DHCP server assigns the IP address.

You can use the DHCP servers that follow:

- BOOTP/DHCP server from Rockwell (refer to **Parameter descriptions** on page 10)
- Open DHCP (www.dhcpserver.sourceforge.net)
- DHCP server from Windows server editions
- DHCP servers implemented in network switches (for example, Cisco SG350-Series).

Note

Make sure that your firewall settings allow IP address assignment by a DHCP server.

Addressing via Rockwell's BOOTP/DHCP Server

Use the interactive BOOTP/DHCP Server Tool to assign the IP address to 'answer' the device's BOOTP/DHCP request:

1. Make sure that the device is switched to 'ON'.
2. Wait for the device to send a data packet with its MAC address.
3. Double-click on the MAC address and enter the required IP address.

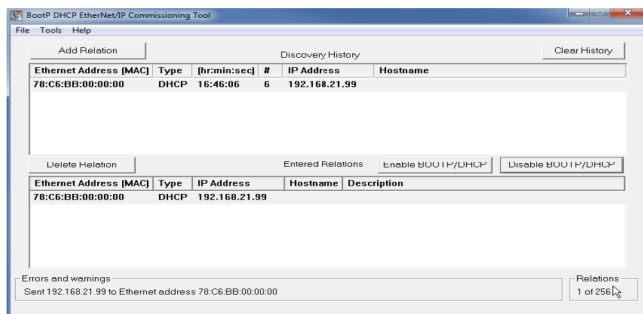


Figure 13: BootP DHCP EtherNet/IP™ Commissioning Tool

... 7 EtherNet/IP™ interface

Process Values Input Assemblies FEP63x / FEH63x -> PLC (T->O)

The Assemblies (100-107 and 110) can be implicitly transferred. A summary of these assemblies is shown below.

100 (Flow)	101 (Totalizer)	102 (Diag Values)	103 (All Process Inputs)
Volume_Flow	Totalizer_Qv_Fwd	Conductivity	Volume_Flow
Mass_Flow	Totalizer_Qv_Rev	Coil_Temperature	Volume_Flow_Ratio
Flow_Velocity	Totalizer_Qv_Diff	Inhouse_Temperature	Mass_Flow
Volume_Flow_Unit	Totalizer_Qm_Fwd	Current_Output_31_32_Reading	Mass_Flow_Ratio
Mass_Flow_Unit	Totalizer_Qm_Rev	Conductivity_Unit	Flow_Velocity
Flow_Velocity_Unit	Totalizer_Qm_Diff	Temperature_Unit	Totalizer_Qv_Fwd
Device_Status_Summary	Volume_Unit	Device_Status_Summary	Totalizer_Qv_Rev
	Mass_Unit		Totalizer_Qv_Diff
	Device_Status_Summary		Totalizer_Qm_Fwd
			Totalizer_Qm_Rev
			Totalizer_Qm_Diff
			Conductivity
			Coil_Temperature
			Inhouse_Temperature
			Current_Output_31_32_Reading
			Volume_Flow_Unit
			Mass_Flow_Unit
			Flow_Velocity_Unit
			Volume_Unit
			Mass_Unit
			Conductivity_Unit
			Temperature_Unit
			Device_Status_Summary

Device Status FEP63x / FEH63x -> PLC (T->O)

104 (Extended_Device_Status)

Device_Status
 Mass_flowrate_exceeds_limits_0_0
 Volume_flowrate_exceeds_limits_0_1
 Simulation_is_on_0_2
 Flowrate_to_zero_0_3
 Maintenance_interval_is_reached_0_4
 All_totalizer_stop_0_5
 Totalizer_reset_0_6
 Display_value_is1600h_at_Qmax_0_7
 Device_not_calibrated_1_0
 Sensor_memory_defective_1_1
 NV_data_defect_Data_storage_1_2
 No_Frontend_Board_detected_1_3
 FEB_communication_error_1_4
 Incompatible_Frontend_Board_1_5
 NV_chips_defect_on_Motherboard_1_6
 Pulse_output_is_cutted_off_1_7
 Current_output_3132_is_saturated_2_0
 CurrOut_V1V2_V3V4_saturated_2_1
 CurrOut_3132_com_error_2_2
 Option_Card_1_com_error_2_3
 Option_Card_2_com_error_2_4
 Safety_Alarm_CurrOut_3132_2_5
 CurrOut_3132_not_calibrated_2_6
 CurrOut_V1V2_not_calibrated_2_7
 CurrOut_V3V4_not_calibrated_3_0
 MB_voltages_outside_range_3_1
 An_alarm_is_simulated_3_2
 Communication_card_not_responding_3_3
 Co3132Uco_curr_loop_readback_failure_3_4
 Coil_regulation_error_3_5
 Coil_wiring_Detection_3_6
 Coil Impedance measurement_3_7
 Electrode short circiut detection_4_0
 Electrode open circiut detection_4_1
 DC Feedback Regulation Error_4_2
 Monitoring Comm ADC and RX210_4_3
 Coil Isolation_4_4
 Gas bubble alarm_4_5
 Conductivity exeedes limits_4_6
 Sensor Temperature exeedes limits_4_7
 TFE alarm_5_0
 EPD alarm_5_1
 ADC Signal overrange_5_2
 SIL self check alarm_5_3
 Inhouse temeprature exceeds limits_5_4

Output Assembly PLC ->FEx (O->T)

110 (Output)

DO_Function_Activation
 DO_Flow_To_Zero
 DO_System_Zero_Adjust
 DO_Counter_Reset
 DO_Counter_Stop
 DO_Dual_Range_Mass
 DO_Dual_Range_Volume

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Assembly-Instances and Data Types

The following Assembly Instances are implemented:

Instance	Description	Attr . ID	Access	Bytes
100	Flow	3	Get	20
101	Totalizer	3	Get	32
102	Diag Values	3	Get	24
103	All Process Inputs	3	Get	76
104	Extended_Dev ice_Status	3	Get	1
110	Output	3	Get	4

Assembly / Instance 100, Flow

100 (Flow)	Data Type	Display	Bytes	Access
Volume_Flow	REAL	Float	4	Read Only
Mass_Flow	REAL	Float	4	Read Only
Flow_Velocity	REAL	Float	4	Read Only
Volume_Flow_Unit	INT	Hex	2	Read Only
Mass_Flow_Unit	INT	Hex	2	Read Only
Flow_Velocity_Unit	INT	Hex	2	Read Only
Device_Status_Summary	BYTE	Hex	1	Read Only
Empty_Byte	SINT	HEX	1	Read Only

Assembly / Instance 101, Totalizer

101 (Totalizer)	Data Type	Display	Bytes	Access
Totalizer_Qv_Fwd	REAL	Float	4	Read Only
Totalizer_Qv_Rev	REAL	Float	4	Read Only
Totalizer_Qv_Diff	REAL	Float	4	Read Only
Totalizer_Qm_Fwd	REAL	Float	4	Read Only
Totalizer_Qm_Rev	REAL	Float	4	Read Only
Totalizer_Qm_Diff	REAL	Float	4	Read Only
Volume_Unit	INT	Hex	2	Read Only
Mass_Unit	INT	Hex	2	Read Only
Device_Status_Summary	BYTE	Hex	1	Read Only
Empty_Int	INT	Hex	2	Read Only
Empty_Byte	SINT	HEX	1	Read Only

Assembly / Instance 102, Diag Values

102 (Diag Values)	Data Type	Display	Bytes	Access
Conductivity	REAL	Float	4	Read Only
Coil_Temperature	REAL	Float	4	Read Only
Inhouse_Temperature	REAL	Float	4	Read Only
Current_Output_31_32_Reading	REAL	Float	4	Read Only
Conductivity_Unit	INT	Hex	2	Read Only
Temperature_Unit	INT	Hex	2	Read Only
Device_Status_Summary	BYTE	Hex	1	Read Only
Empty_Int	INT	Hex	2	Read Only

Assembly / Instance 103, All Process Inputs

103 (All Process Inputs)	Data Type	Display	Bytes	Access
Volume_Flow	REAL	Float	4	Read Only
Volume_Flow_Ratio	REAL	Float	4	Read Only
Mass_Flow	REAL	Float	4	Read Only
Mass_Flow_Ratio	REAL	Float	4	Read Only
Flow_Velocity	REAL	Float	4	Read Only
Totalizer_Qv_Fwd	REAL	Float	4	Read Only
Totalizer_Qv_Rev	REAL	Float	4	Read Only
Totalizer_Qv_Diff	REAL	Float	4	Read Only
Totalizer_Qm_Fwd	REAL	Float	4	Read Only
Totalizer_Qm_Rev	REAL	Float	4	Read Only
Totalizer_Qm_Diff	REAL	Float	4	Read Only
Conductivity	REAL	Float	4	Read Only
Coil_Temperature	REAL	Float	4	Read Only
Inhouse_Temperature	REAL	Float	4	Read Only
Current_Output_31_32_Reading	REAL	Float	4	Read Only
Volume_Flow_Unit	INT	Hex	2	Read Only
Mass_Flow_Unit	INT	Hex	2	Read Only
Flow_Velocity_Unit	INT	Hex	2	Read Only
Volume_Unit	INT	Hex	2	Read Only
Mass_Unit	INT	Hex	2	Read Only
Conductivity_Unit	INT	Hex	2	Read Only
Temperature_Unit	INT	Hex	2	Read Only
Device_Status_Summary	BYTE	Hex	1	Read Only
Empty_Byte	SINT	HEX	1	Read Only

Assembly / Instance 104, Extended Device Status

104 (Extended_Device_Status)	Data Type	Display	Bytes	Access
Device_Status	BYTE	Hex	1	Read Only
Mass_flowrate_exceeds_limits_0_0	BOOL	Decimal		Read Only
Volume_flowrate_exceeds_limits_0_1	BOOL	Decimal		Read Only
Simulation_is_on_0_2	BOOL	Decimal		Read Only
Flowrate_to_zero_0_3	BOOL	Decimal		Read Only
Maintenance_interval_is_reached_0_4	BOOL	Decimal		Read Only
All_totalizer_stop_0_5	BOOL	Decimal		Read Only
Totalizer_reset_0_6	BOOL	Decimal		Read Only
Display_value_is1600h_at_Qmax_0_7	BOOL	Decimal	1	Read Only
Device_not_calibrated_1_0	BOOL	Decimal		Read Only
Sensor_memory_defective_1_1	BOOL	Decimal		Read Only
NV_data_defect_Data_storage_1_2	BOOL	Decimal		Read Only
No_Frontend_Board_detected_1_3	BOOL	Decimal		Read Only
FEB_communication_error_1_4	BOOL	Decimal		Read Only
Incompatible_Frontend_Board_1_5	BOOL	Decimal		Read Only
NV_chips_defect_on_Motherboard_1_6	BOOL	Decimal		Read Only
Pulse_output_is_cutted_off_1_7	BOOL	Decimal	1	Read Only
Current_output_3132_is_saturated_2_0	BOOL	Decimal		Read Only
CurrOut_V1V2_V3V4_saturated_2_1	BOOL	Decimal		Read Only
CurrOut_3132_com_error_2_2	BOOL	Decimal		Read Only
Option_Card_1_com_error_2_3	BOOL	Decimal		Read Only
Option_Card_2_com_error_2_4	BOOL	Decimal		Read Only
Safety_Alarm_CurrOut_3132_2_5	BOOL	Decimal		Read Only
CurrOut_3132_not_calibrated_2_6	BOOL	Decimal		Read Only
CurrOut_V1V2_not_calibrated_2_7	BOOL	Decimal	1	Read Only
CurrOut_V3V4_not_calibrated_3_0	BOOL	Decimal		Read Only
MB_voltages_outside_range_3_1	BOOL	Decimal		Read Only
An_alarm_is_simulated_3_2	BOOL	Decimal		Read Only
Communication_card_not_responding_3_3	BOOL	Decimal		Read Only
Co3132Uco_curr_loop_readback_failure_3_4	BOOL	Decimal		Read Only
Coil_regulation_error_3_5	BOOL	Decimal		Read Only
Coil_wiring_Detection_3_6	BOOL	Decimal		Read Only
Coil Impedance measurement_3_7	BOOL	Decimal	1	Read Only
Electrode short circuit detection_4_0	BOOL	Decimal		Read Only
Electrode open circuit detection_4_1	BOOL	Decimal		Read Only
DC Feedback Regulation Error_4_2	BOOL	Decimal		Read Only
Monitoring Comm ADC and RX210_4_3	BOOL	Decimal		Read Only
Coil Isolation_4_4	BOOL	Decimal		Read Only
Gas bubble alarm_4_5	BOOL	Decimal		Read Only
Conductivity exceeds limits_4_6	BOOL	Decimal		Read Only
Sensor Temperature exceeds limits_4_7	BOOL	Decimal	1	Read Only

104 (Extended_Device_Status)	Data Type	Display	Bytes	Access
TFE alarm_5_0	BOOL	Decimal		Read Only
EPD alarm_5_1	BOOL	Decimal		Read Only
ADC Signal overrange_5_2	BOOL	Decimal		Read Only
SIL self check alarm_5_3	BOOL	Decimal		Read Only
Inhouse temperature exceeds limits_5_4	BOOL	Decimal		Read Only
Reserved3_5_5	BOOL	Decimal		Read Only
Reserved4_5_6	BOOL	Decimal		Read Only
Reserved5_5_7	BOOL	Decimal	1	Read Only
Reserved6	SINT	Hex	1	Read Only

Assembly / Instance 110, Output

Assembly 110 (Output)	Data Type	Display	Bytes	Access
DO_Function_Activation	BOOL	Hex		Read/Write
Empty	BOOL	Hex		Read/Write
Empty	BOOL	Hex		Read/Write
Empty	BOOL	Hex		Read/Write
Empty	BOOL	Hex		Read/Write
Empty	BOOL	Hex		Read/Write
Empty	BOOL	Hex		Read/Write
Empty	BOOL	Hex	1	Read/Write
Empty	BYTE	Hex	1	Read/Write
DO_Flow_To_Zero	BOOL	Hex		Read/Write
DO_System_Zero_Adjust	BOOL	Hex		Read/Write
DO_Counter_Reset	BOOL	Hex		Read/Write
DO_Counter_Stop	BOOL	Hex		Read/Write
DO_Dual_Range_Mass	BOOL	Hex		Read/Write
DO_Dual_Range_Volume	BOOL	Hex		Read/Write
DO_Batch_Start_Stop	BOOL	Hex		Read/Write
Reserved1	BOOL	Hex	1	Read/Write
Empty	BYTE	Hex	1	Read/Write

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EtherNet/IP™ Alarms FEP63x / FEH63x

Error messages of the FEP63x / FEH63x are displayed alarm bits.

- If an error occurs, one or more corresponding warning and / or alarm bits are set.
- If an error disappears, one or more corresponding warning and / or alarm bits are reset.

In addition, this data type also includes a byte enumeration at the beginning which, in summary, includes the device status:

- 0x00: NO Alarm
- 0x01: Check Function Alarm
- 0x02: Off Specification Alarm
- 0x03: Maintenance Alarm
- 0x04: Failure Alarm

For meanings of the alarms see operating instructions **OI/FEP630/FEH630**.

104 (Extended_Device_Status)	Data Type	Display	Bytes	Access
Device_Status	BYTE	Hex	1	Read Only
Mass_flowrate_exceeds_limits_0_0	BOOL	Decimal		Read Only
Volume_flowrate_exceeds_limits_0_1	BOOL	Decimal		Read Only
Simulation_is_on_0_2	BOOL	Decimal		Read Only
Flowrate_to_zero_0_3	BOOL	Decimal		Read Only
Maintenance_interval_is_reached_0_4	BOOL	Decimal		Read Only
All_totalizer_stop_0_5	BOOL	Decimal		Read Only
Totalizer_reset_0_6	BOOL	Decimal		Read Only
Display_value_is1600h_at_Qmax_0_7	BOOL	Decimal	1	Read Only
Device_not_calibrated_1_0	BOOL	Decimal		Read Only
Sensor_memory_defective_1_1	BOOL	Decimal		Read Only
NV_data_defect_Data_storage_1_2	BOOL	Decimal		Read Only
No_Frontend_Board_detected_1_3	BOOL	Decimal		Read Only
FEB_communication_error_1_4	BOOL	Decimal		Read Only
Incompatible_Frontend_Board_1_5	BOOL	Decimal		Read Only
NV_chips_defect_on_Motherboard_1_6	BOOL	Decimal		Read Only
Pulse_output_is_cutted_off_1_7	BOOL	Decimal	1	Read Only
Current_output_3132_is_saturated_2_0	BOOL	Decimal		Read Only
CurrOut_V1V2_V3V4_saturated_2_1	BOOL	Decimal		Read Only
CurrOut_3132_com_error_2_2	BOOL	Decimal		Read Only
Option_Card_1_com_error_2_3	BOOL	Decimal		Read Only
Option_Card_2_com_error_2_4	BOOL	Decimal		Read Only
Safety_Alarm_CurrOut_3132_2_5	BOOL	Decimal		Read Only
CurrOut_3132_not_calibrated_2_6	BOOL	Decimal		Read Only
CurrOut_V1V2_not_calibrated_2_7	BOOL	Decimal	1	Read Only
CurrOut_V3V4_not_calibrated_3_0	BOOL	Decimal		Read Only
MB_voltages_outside_range_3_1	BOOL	Decimal		Read Only
An_alarm_is_simulated_3_2	BOOL	Decimal		Read Only

104 (Extended_Device_Status)	Data Type	Display	Bytes	Access
Communication_card_not_responding_3_3	BOOL	Decimal		Read Only
Co3132Uco_curr_loop_readback_failure_3_4	BOOL	Decimal		Read Only
DSP_Failure_on_Frontend_Board_3_5	BOOL	Decimal		Read Only
Density_failure_3_6	BOOL	Decimal		Read Only
Sensor_temperature_out_max_range_3_7	BOOL	Decimal	1	Read Only
Sensor_temperature_measure_error_4_0	BOOL	Decimal		Read Only
Sensor_amplitude_out_of_range_4_1	BOOL	Decimal		Read Only
Sensor_driver_current_to_high_4_2	BOOL	Decimal		Read Only
Density_too_lowEmpty_pipe_gas_4_3	BOOL	Decimal		Read Only
Density_exceeds_minmax_limits_4_4	BOOL	Decimal		Read Only
Medium_temp_exceeds_limits_4_5	BOOL	Decimal		Read Only
Density_to_1_gcm3_4_6	BOOL	Decimal		Read Only
Concentr_in_unit_exceeds_limits_4_7	BOOL	Decimal	1	Read Only
Concentr_in_ratio_exceeds_limits_5_0	BOOL	Decimal		Read Only
FEB_voltages_outside_max_range_5_1	BOOL	Decimal		Read Only
Sensor_ampl_below_customer_limit_5_2	BOOL	Decimal		Read Only
Reserved1_5_3	BOOL	Decimal		Read Only
Reserved2_5_4	BOOL	Decimal		Read Only
Reserved3_5_5	BOOL	Decimal		Read Only
Reserved4_5_6	BOOL	Decimal		Read Only
Reserved5_5_7	BOOL	Decimal	1	Read Only
Reserved6	SINT	Hex	1	Read Only

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EtherNet/IP™ interface details

This section lists all the available classes, attributes and services included in the EtherNet/IP™ Interface.

The flow meter supports the following standard objects:

- Identity Object (0x01)
- Message Router Object (0x02)
- Assembly Object (0x04)
- Connection Manager Object (0x06)
- Device Level Ring Object (0x47)
- File (0x37)
- Quality of Service Object (0x48)
- TCP/IP Interface Object (0xF5)
- Ethernet Link Object (0xF6)

Abbreviations for service names:

- GAA = Get Attribute All
- GAS = Get Attribute Single
- SAA = Set Attribute All
- SAS = Set Attribute Single.

[Identity] 0x01

This object provides identification data from and general information about the device.

Service Code	Service Name
0x0E	GAS
0x01	GAA

Table 3: Class-Services

Attr ID	Name	Access Rule	Data Type	Value
1	Revision	Get	UINT	1
2	Max Instance	Get	UINT	1
3	Number of Instances	Get	UINT	1
6	Maximum ID Number Class Attributes	Get	UINT	7
7	Maximum ID Number Instance Attributes	Get	UINT	7

Table 4: Class attributes

Reset-Type	Description
0	Emulated power cycle reset (Power supply off/on, warm start)
1	The device is reset to factory settings and restarted. Communication parameters are also reset to factory settings, for example, IP address
2	Return to factory settings except communications parameters

Table 5: Reset

Service Code	Service Name
0x0E	GAS

Table 6: Instance-Services

Attr ID	Name	Access Rule	Data Type
1	Vendor ID	Get	UINT
2	Device Type	Get	UINT
3	Product Code	Get	UINT
4	Revision	Get	STRUCT
0	Major Revision	Get	USINT
0	Minor Revision		USINT
5	Status	Get	WORD
6	Serial Number	Get	UDINT
7	Product Name	Get	SHORT_STRING

Table 7: Instance attributes

Bit(s)	Description
0-3	Not supported (= 0)
4-6	Extended Device Status (Refer to Table 9)
8	Easily recoverable error. The device detected an internal error that can probably be corrected. The error does not put the device in Error State.
9	Minor unrecoverable error The device detected an internal error that probably cannot be corrected. Error does not put the device in Error State.
10	Serious recoverable error. The device detected an internal error that triggered the error status Serious recoverable error in the sensor.
11	Serious unrecoverable error. The device detected an internal error that triggered the error status Serious unrecoverable error in the sensor.
12-15	0

Table 8: Description of Bits related for Attribute 5

ID	Description
0	Self-test or unknown (not supported)
1	Firmware update in progress (not supported)
2	At least one I/O connection is faulty (not supported)
3	No I/O connection established
4	Non-volatile storage is insufficient (not supported)
5	Serious error (Bit 10 - 11)
6	At least one I/O connection in run mode (not supported)
7	At least one I/O connection established, all in idle mode
8	0
9	Reserved
10-15	0 (not supported)

Table 9: Description of Bits 4 to 7 for Attribute 5

[Message Router] 0x02

Service Code	Service Name
0x0E	GAS
0x01	GAA

Table 10: Class-Services

Attr ID	Name	Access Rule	Data Type
1	Revision	Get	UINT
2	Max Instance	Get	UINT
3	Number of Instances	Get	UINT
4	Optional attribute list	Get	STRUCT of
	number of attributes		UINT
	optional attributes		ARRAY of UINT
5	Optional service list	Get	STRUCT of
	number services	0	UINT
	optional services	0	ARRAY of UINT
6	maximum ID number class attributes	Get	UINT
7	maximum ID number instance attributes	Get	UINT

Table 11: Class attributes

Service Code	Service Name
0x0E	GAS
0x01	GAA

Table 12: Instance-Services

Attr ID	Name	Access Rule	Data Type
1	Object_list	Get	STRUCT of
	Number	0	UINT
	Classes	0	ARRAY of UINT
2	Number Available	Get	UINT
3	Number active		UINT

Table 13: Instance-Attributes

[Assembly] 0x04

The Assembly Object binds attributes of multiple objects, that data can be sent or received from any object over a single connection.

Assembly objects can be used to bind input or output data. The terms "input" and "output" are defined from the point of view of the network. An input generates data on the network and an output consumes data from the network.

Service Code	Service Name
0x0E	GAS

Table 14: Class-Services

Attr ID	Name	Access Rule	Data Type
1	Revision	Get	UINT
2	Max Instance	Get	UINT
3	Number of Instances	Get	UINT
4	Optional attribute list	Get	STRUCT of
0	number of attributes	0	UINT
0	optional attributes	0	ARRAY of UINT
6	Maximum ID Number Class Attributes	Get	UINT
7	Maximum ID Number Instance Attributes	Get	UINT

Table 15: Class-Attributes

Service Code	Service Name
0x0E	GAS
0x10	SAS

Table 16: Instance-Services

Attr ID	Name	Access Rule	Data Type
3	Data	Get / Set	ARRAY of BYTE
4	Size	Get	UINT

Table 17: Instance-Attributes

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[Connection Manager] 0x06

The Connection Manager Class assigns and manages in-device resources associated with the I/O and Explicit Messaging connection types. The instance generated by the Connection Manager Class is called a Connection Instance or Connection Object.

Service Code	Service Name
0x0E	GAS
0x01	GAA

Table 18: Class-Services

Attr ID	Name	Access Rule	Data Type
1	Revision	Get	UINT
2	Max Instance	Get	UINT
3	Number of Instances	Get	UINT
4	Optional attribute list	Get	STRUCT of
	number of attributes	0	UINT
	optional attributes	0	ARRAY of UINT
6	Maximum ID Number Class Attributes	Get	UINT
7	Maximum ID Number Instance Attributes	Get	UINT

Table 19: Class-Attributes

Service Code	Service Name
0x0E	GAS
0x02	SAA
0x01	GAA
0x10	SAS
0x4E	Forward Close
0x52	Unconnected_Send
0x54	Forward_Open
0x5A	Get_Connection_Owner
0x5B	Large_Forward_Open

Table 20: Instance-Services

Attr ID	Name	Access Rule	Data Type
1	Open Requests	Get/Set	UINT
2	Open Format Rejects	Get/Set	UINT
3	Open Resource Rejects	Get/Set	UINT
4	Open Other Rejects	Get/Set	UINT
5	Close Requests	Get/Set	UINT
6	Close Format Rejects	Get/Set	UINT
7	Close Other Rejects	Get/Set	UINT
8	Connection Timeouts	Get/Set	UINT

Table 21: Instance-Attributes

[File] 0x37

Service Code	Service Name
0x0E	GAS

Table 22: Class-Services

Attr ID	Description	Access Rule	Data Type
1	Revision	Get	UINT
2	Max Instance	Get	UINT
3	Number of Instances	Get	UINT
6	Max ID Number Class Attributes	Get	UINT
7	Max ID Number Instance Attributes	Get	UINT
32	Directory	Get	STRUCT of 1 UNIT and 2 STRING

Table 23: Class-Attributes

Service Code	Service Name
0x0E	GAS
0x4B	Initiate Upload
0x4F	Upload Transfer

Table 24: Instance-Services

Attr ID	Description	Access Rule	Data Type
1	State	Get	USINT
2	Instance Name	Get	STRINGI
3	File Format Version	Get	UINT
4	File Name	Get	STRINGI
5	File Revision	Get	STRUCT of
	Major Revision	Get	USINT
	Minor Revision	Get	USINT
6	File Size	Get	UDINT
7	File Checksum	Get	UINT
8	Invocation Method	Get	USINT
9	File Save Parameters	Get	BYTE
10	File Access Rule	Get	USINT
11	File Encoding Format	Get	USINT

Table 25: Instance-Attributes

[DLR] 0x47

The Device Level Ring (DLR) object provides the configuration and status information interface for the DLR protocol. The DLR protocol is a Layer 2 protocol that enables the use of an Ethernet ring topology. The DLR object provides the CIP application-level interface to the protocol.

An instance of the DLR object is implemented for each supported DLR ring port pair.

Service Code	Service Name
0x0E	GAS
0x01	GAA

Table 26: Class-Services

Attr ID	Name	Access Rule	Data Type
1	Revision	Get	UINT
2	Max Instance	Get	UINT
3	Number of Instances	Get	UINT

Table 27: Class-Attributes

Service Code	Service Name
0x0E	GAS
0x01	GAA

Table 28: Instance-Services

Attr ID	Name	Access Rule	Data Type
1	Network Topology	Get	USINT
2	Network Status	Get	USINT
10	Active Supervisor Address	Get	STRUCT of:
12	Capability Flags	Get	DWORD

Table 29: Instance-Attributes

[QoS] 0x48

Quality of Service (QoS) is a common term for mechanisms for handling data streams with different priorities or other delivery characteristics. Standard QoS mechanisms include IEEE 802.1D/Q (Ethernet frame priority) and Differentiated Services (DiffServ) in the TCP/IP protocol suite.

The QoS object provides the ability to configure specific QoS-related mechanisms in Ethernet/IP devices.

The QoS object is required for devices that support sending Ethernet/IP messages with Nonzero DiffServ code points (DSCP) or sending Ethernet/IP messages in 802.1Q tagged frames.

Service Code	Service Name
0x0E	GAS

Table 30: Class-Services

Attr ID	Name	Access Rule	Data Type
1	Revision	Get	UINT
2	Max Instance	Get	UINT
3	Number of Instances	Get	UINT
6	Maximum ID Number Class Attributes	Get	UINT
7	Maximum ID Number Instance Attributes	Get	UINT

Table 31: Class-Attributes

Service Code	Service Name
0x0E	GAS
0x01	SAS

Table 32: Instance-Services

Attr ID	Name	Access Rule	Data Type
1	802.1Q Tag Enable	Get / Set	USINT
2	DSCP PTP Event	Get / Set	USINT
3	DSCP PTP General	Get / Set	USINT
4	4 DSCP Urgent	Get / Set	USINT
5	DSCP Scheduled	Get / Set	USINT
6	DSCP High	Get / Set	USINT
7	DSCP Low	Get / Set	USINT
8	DSCP Explicit	Get / Set	USINT

Table 33: Instance-Attributes

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[Port] 0x55

Service Code	Service Name
0x0E	GAS
0x01	GAA

Table 34: Class-Services

Attr ID	Name	Access Rule	Data Type
1	Revision	Get	UINT
2	Max Instance	Get	UINT
3	Number of Instance	Get	UINT
6	Maximum ID Number Class Attributes	Get	UINT
7	Maximum ID Number Instance Attributes	Get	UINT
8	Entry Port	Get	UINT
9	Port Instance Info	Get	UINT
0	Port Type	See instance attribute #1	UINT
0	Port Number	See instance attribute #2	UINT

Table 35: Class-Attributes

Service Code	Service Name
0x0E	GAS
0x01	GAA

Table 36: Instance-Services

Attr ID	Name	Access Rule	Data Type
1	Port Type	Get	UINT
2	Port Number	Get	UINT
3	Link Object	Get	STRUCT of
	Path Length	Get	UINT
	Link Path	Get	Padded EPATH
4	Port Name	Get	SHORT_STRING
7	Port Number and Node Address	Get	Padded EPATH
10	Port Routing Capabilities	Get	UDINT

Table 37: Instance-Attributes

[TCP/IP Interface] 0xF5

The TCP/IP Interface object configures the TCP/IP network interface of a device, such as the IP address, network mask, and gateway address.

Each interface that supports the TCP/IP protocol is a physical communication interface related to the TCP/IP interface object.

The TCP/IP Interface object provides an attribute that identifies the connection-specific object for the associated physical communication interface. This connection-specific object typically provides counters and all connection-specific configuration attributes.

Service Code	Service Name
0x0E	GAS
0x01	GAA

Table 38: Class-Services

Attr ID	Name	Access Rule	Data Type
1	Revision	Get	UINT
2	Max Instance	Get	UINT
3	Number of Instances	Get	UINT
4	Optional attribute list	Get	STRUCT of:
	number of attributes	0	UINT
	optional attributes	0	ARRAY of UINT
6	Maximum ID Number Class Attributes	Get	UINT
7	Maximum ID Number Instance Attributes	Get	UINT

Table 39: Class-Attributes

Service Code	Service Name
0x0E	GAS
0x01	GAA
0x10	SAS
0x02	SAA

Table 40: Instance-Services

Attr ID	Name	Access Rule	Data Type
1	Status	Get	DWORD
2	Configuration Capability	Get	DWORD
3	Configuration Control	Get/Set	DWORD
4	Physical Link Object	Get	STRUCT of:
	Path size	0	UINT
	Path	0	Padded EPATH
5	Interface Configuration	Get/Set	STRUCT of:
	IP Address	0	UDINT
	Network Mask	0	UDINT
	Gateway Address	0	UDINT
	Name Server	0	UDINT
	Name Server 2	0	UDINT
	Domain Name	0	STRING
6	Host Name	Get/Set	STRING
8	TTL Value	Get/Set	USINT
9	Mcast Config	Get/Set	STRUCT of:
	Alloc Control	0	USINT
	Reserved	0	USINT
	Num Mcast	0	UINT
	Mcast Start Addr	0	UDINT
10	SelectAcd	Set	BOOL
11	LastConflictDetected	Set	STRUCT of:
	AcdActivity	0	USINT
	RemoteMAC	0	Array of 6 USINT
	ArpPdu	0	ARRAY of 28 USINT
13	Encapsulation Inactivity Timeout	Set	UINT
16	Active TCP Connections	Get	UINT
17	Non-CIP Encapsulation Messages /s	Get	UDINT

Table 41: Instance-Attributes

[Ethernet Link] 0xF6

The Ethernet Link Object manages connection-specific counters and status information for an IEEE 802.3 communication interface.

Each device supports exactly one instance of the Ethernet Link Object for each IEEE 802.3 communication interface in the module.

Service Code	Service Name
0x0E	GAS
0x01	GAA

Table 42: Class-Services

Attr ID	Name	Access Rule	Data Type
1	Revision	Get	UINT
2	Max Instance	Get	UINT
3	Number of Instances	Get	UINT
4	Optional attribute list	Get	STRUCT of:
	number of attributes	0	UINT
	optional attributes	0	ARRAY of UINT
6	Maximum ID Number Class Attributes	Get	UINT
7	Maximum ID Number Instance Attributes	Get	UINT

Table 43: Class-Attributes

Service Code	Service Name
0x0E	GAS
0x01	GAA
0x10	SAS

Table 44: Instance-Services

... 7 EtherNet/IP™ interface

Available units

The following units are available in the device. The unit codes correspond to the Common Industrial Protocol (CIP™) Vol 1, Ed 3.25 Appendix D.

Group	Name	Code	Ethernet/IP
Massflow units	gram per second	g/s	1437
	gram per minute	g/min	140F
	gram per hour	g/h	1436
	gram per day	g/d	1435
	kilogram per second	kg/s	1404
	kilogram per minute	kg/min	1445
	kilogram per hour	kg/h	1410
	kilogram per day	kg/d	1444
	pounds per second	lb/s	140B
	pounds per minute	lb/min	140C
	pounds per hour	lb/h	140D
	pounds per day	lb/d	145C
	metric ton per second	t/s	1464 (in FW)
	metric ton per minute	t/min	1463
	metric ton per hour	t/h	1462
	metric ton per day	t/d	1461
	custom selectable	xx/yy	0803
Mass units	gram	g	2501
	kilogram	kg	2500
	Pound	lb	2505
	metric ton	t	2503
	custom selectable	xx/yy	0804

Group	Name	Code	Ethernet/IP
Volume flow units	cubic meter per second	m3/s	1405
	cubic meter per minute	m3/min	1433
	cubic meter per hour	m3/h	1432
	cubic meter per day	m3/d	1431
	cubic foot per second	ft3/s	1467
	cubic foot per minute	ft3/min	1402
	cubic foot per hour	ft3/h	1466
	cubic foot per day	ft3/d	1465
	milliliter per second	ml/s	1407
	milliliter per minute	ml/min	1411
	liter per second	l/s	1406
	liter per minute	l/min	1413
	liter per hour	l/h	1414
	liter per day	l/d	1446
	hecto liter per hour	hl/h	1439
	mega liter per day	Ml/d	1438
	us gallons per second	ugal/s	1408
	us gallons per minute	ugal/min	1409
	us gallons per hour	ugal/h	140A
	us gallons per day	ugal/d	1434
	mega us gallons per day	Mugal/d	1447
	imperial gallons per second	igal/s	1443
	imperial gallons per minute	igal/min	1442
	imperial gallons per hour	igal/h	1441
	imperial gallons per day	igal/d	1440
	oil barrels per second	bbl/s	143F
	oil barrels per minute	bbl/min	143E
oil barrels per hour	bbl/h	143D	
oil barrels per day	bbl/d	143C	
brew barrels per second	bls/s	141C	
brew barrels per minute	bls/min	141B	
brew barrels per hour	bls/h	141A	
brew barrels per day	bls/d	1419	
custom selectable	xx/yy	0801	

Group	Name	Code	Ethernet/IP
Volume units	cubic meter	m3	2E01
	cubic feet	ft3	2E06
	Milliliters	ml	2E03
	Liter	l	2E02
	hecto liter	hl	2E13
	us gallons	Ugal	2E08
	imperial gallons	lgal	2E15
	oil barrels	bbl	2E14
	brew barrels	Bls	2E1F
	custom selectable	xx/yy	0802
Density units	gram per cubiccentimeter	g/cm3	2F13
	kilogram per cubic meter	kg/m3	2F07
	gram per milliliter	g/ml	2F0E
	gram per liter	g/l	2F0F
	kilogram per liter	kg/l	2F10
	pounds per cubic feet	lb/ft3	2F0C
	pounds per us gallons	lb/ugal	2F0A
	specific gravity	SG	2F26
	custom selectable	xx/yy	0805
Temperature units	Kelvin	K	1202
	Celsius	° C	1200
	Fahrenheit	°F	1201
	custom selectable	xx/yy	0806
Concentration units	%	%	1007
	Brix	Brix	320D
	Variable matrix	Variable matrix	0807
	Baume	Baume	0803
	°API	°API	3000
Pressure units	Pascal	Pa	1309
	kilo pascal	kPa	130A
	Bar	bar	1307
	milli bar	Mbar	1308
	pound per square inch	psi	1300

8 PROFINET® interface

Introduction

The main purpose of the PROFINET Interface is the cyclic interaction with an PLC.

Part of this interface is the communication of device relevant process values like volume or mass flow, support of device diagnosis & alarm management and support of the start-up parameters.

Device Profile / GSDML file

The cyclic and acyclic device capabilities within a PROFINET Network are clearly described by so called GSDML file – used as device integration to the PLC.

Interface description

For information on the supported device profiles, see Table **PROFINET Interface** on page 8..

Device to network

You can configure the IP address and the PROFINET name of the device with DCP.

With PROFINET communication, the DHCP (Dynamic Host Configuration Protocol) function is not supported and PROFINET DCP (Discovery and Configuration Protocol) is used instead.

Based on the device order the device is either shipped with fixed IP / DHCP active or DCP active in case PROFINET was ordered enabled.

To use PROFINET communication set / check 'Communication / ...Ethernet / ...PROFINET / Access' to 'full' (DCP active).

Configuration parameter	Default setting
IP-Address	0.0.0.0
Gateway	0.0.0.0
Subnet mask	0.0.0.0
PROFINET name for CoriolisMaster	Empty string

Table 45: PROFINET DCP defaults:

The most important network parameter for the PROFINET network is the PROFINET name. This unique name is similar to the PROFIBUS-address. The following letters for PROFINET name are allowed: '0' to '9', 'a' to 'z' and '-' ('-' only inside string, not at begin, not at the end).

Network related parameters are accessible through the HMI menu.

- To check the PROFINET name, use the Flowmeter HMI menu to go to 'Communication / ...Ethernet / PROFINET / Device Name'.
- To check the IP settings, use the Flowmeter HMI menu to go to 'Communication / ...Ethernet / ...Internet layer / Host IP address'.

Set the IP-Address and Local Host name

IP address and PROFINET® name setting with DCP

The DCP (Discovery and configuration protocol) is used by PROFINET to determine PROFINET devices and to make basic settings.

- IP-Address
- Subnet Mask
- Device Name

Static IP address and PROFINET name setting with PRONETA

PRONETA BASIC is a tool from Siemens, which supports DCP for settings relevant Parameter of the PROFINET communication.

[PRONETA Basic 3.5 Commissioning and Diagnostics Tool for PROFINET](#)

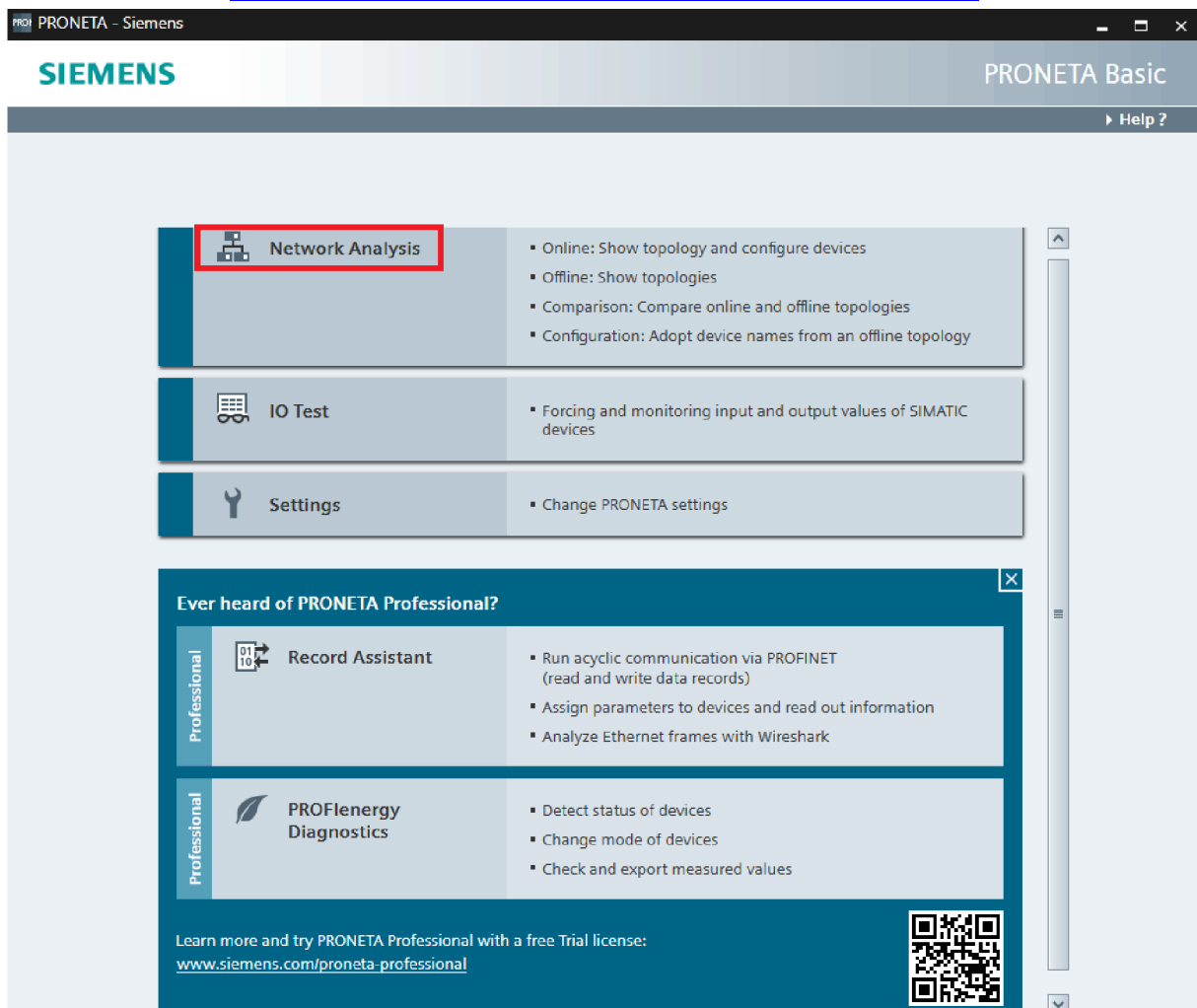
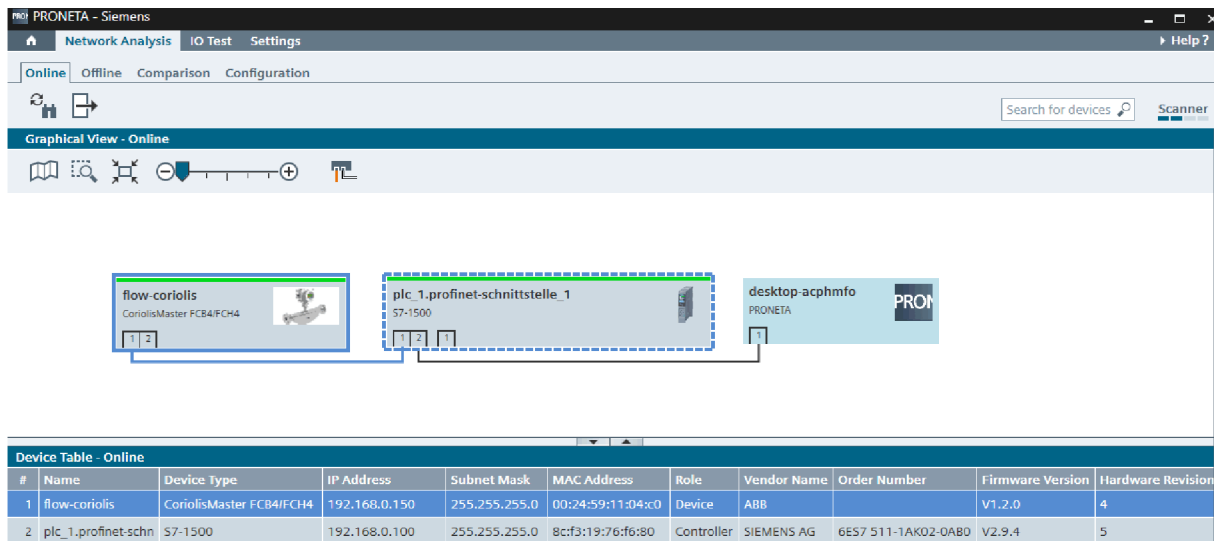


Figure 14: Homescreen of PRONETA Basic

1. Select 'Network Analysis' on the Homescreen of PRONETA Basic.

... 8 PROFINET® interface

... Set the IP-Address and Local Host name



The screenshot shows the PRONETA - Siemens software interface. The top menu includes 'Network Analysis', 'IO Test', and 'Settings'. Below the menu, there are tabs for 'Online', 'Offline', 'Comparison', and 'Configuration'. A search bar for devices is visible on the right. The main area displays a graphical network view with three devices: 'flow-coriolis' (CoriolisMaster FCB4/FCH4), 'plc_1.profinet-schnittstelle_1' (S7-1500), and 'desktop-acphmfo' (PRONETA). A table below the graphical view shows the device details.

#	Name	Device Type	IP Address	Subnet Mask	MAC Address	Role	Vendor Name	Order Number	Firmware Version	Hardware Revision
1	flow-coriolis	CoriolisMaster FCB4/FCH4	192.168.0.150	255.255.255.0	00:24:59:11:04:c0	Device	ABB		V1.2.0	4
2	plc_1.profinet-schn	S7-1500	192.168.0.100	255.255.255.0	8cf3:19:76:f6:80	Controller	SIEMENS AG	6ES7 511-1AK02-0AB0	V2.9.4	5

Figure 15: Graphical online Network view of PRONETA Basic

#	Name	Device Type	IP Address	Subnet Mask	MAC Address	Role	Vendor Name	Order Number	Firmware Version	Hardware Revision
1	flow-coriolis	CoriolisMaster FCB4/FCH4	192.168.0.150	255.255.255.0	00:24:59:11:04:c0	Device	ABB		V1.2.0	4
2	plc_1.profinet-schn	S7-1500	192.168.0.100	255.255.255.0	8cf3:19:76:f6:80	Controller	SIEMENS AG	6ES7 511-1AK02-0AB0	V2.9.4	5

2. Change the device name if necessary.

#	Name	Device Type	IP Address	Subnet Mask	MAC Address	Role	Vendor Name	Order Number	Firmware Version	Hardware Revision
1	flow-coriolis	CoriolisMaster FCB4/FCH4	192.168.0.150	255.255.255.0	00:24:59:11:04:c0	Device	ABB		V1.2.0	4
2	plc_1.profinet-schn	S7-1500	192.168.0.100	255.255.255.0	8cf3:19:76:f6:80	Controller	SIEMENS AG	6ES7 511-1AK02-0AB0	V2.9.4	5

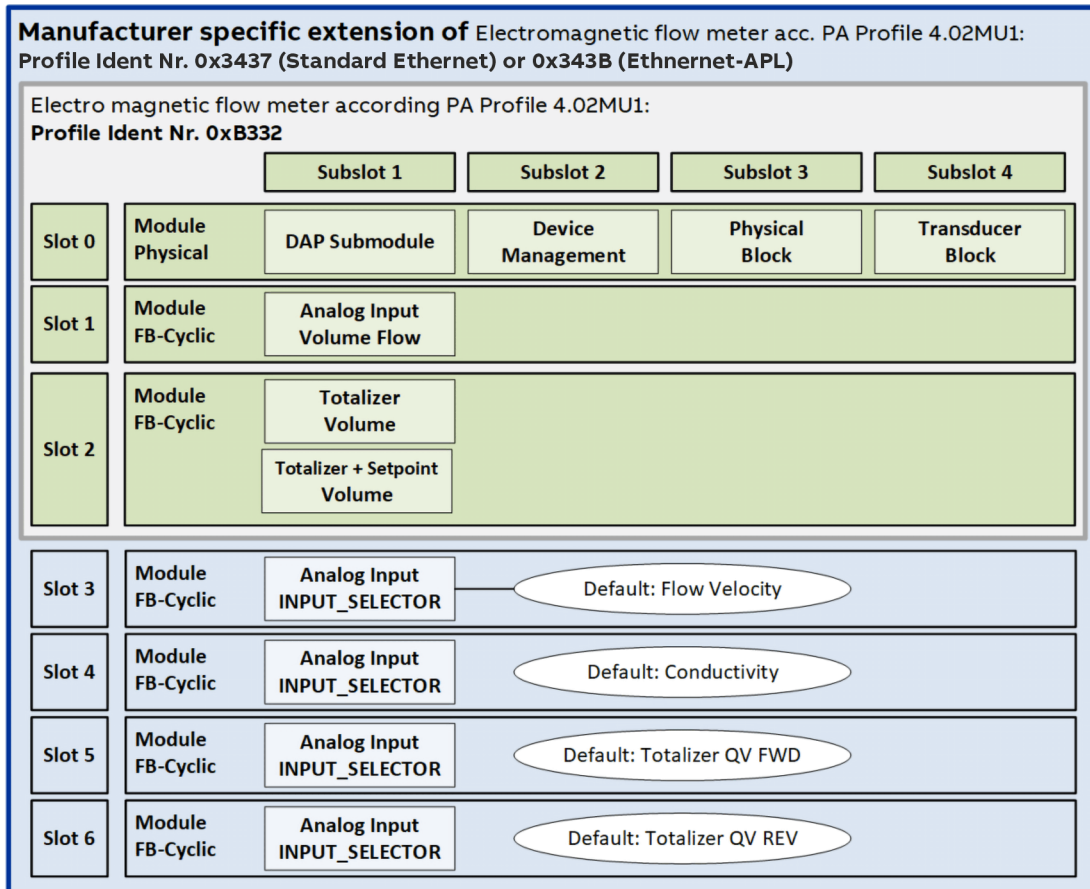
3. Change the IP address if necessary.

#	Name	Device Type	IP Address	Subnet Mask	MAC Address	Role	Vendor Name	Order Number	Firmware Version	Hardware Revision
1	flow-coriolis	CoriolisMaster FCB4/FCH4	192.168.0.150	255.255.255.0	00:24:59:11:04:c0	Device	ABB		V1.2.0	4
2	plc_1.profinet-schn	S7-1500	192.168.0.100	255.255.255.0	8cf3:19:76:f6:80	Controller	SIEMENS AG	6ES7 511-1AK02-0AB0	V2.9.4	5

4. Change the subnet mask if necessary.

Interface description

PROFINET IO device model



... 8 PROFINET® interface

... Interface description

PROFINET characteristics of the Flow electromagnetic FEP/FEH according to the GSDML file

Overview

Item	Value (Manufacturer GSDML file)	Value (Profile specific GSDML file)
Vendor Name	ABB	Profile for Process Control Devices
Vendor ID	0x001A	0xF100
Main family	Sensors	PA Profiles
Product family	EMF FEP/W/H/B/R6	Flow
Device ID	<ul style="list-style-type: none"> Standard Ethernet: 0x3437 Ethernet-APL: 0x343B 	0xB332
Information	Flow electromagnetic: ProcessMaster	Flow electromagnetic

Device Access Point(s)

Item	Value (Manufacturer GSDML file)	Value (Profile specific GSDML file)
PNIO Version	<ul style="list-style-type: none"> Standard Ethernet: V2.42 Ethernet-APL: V2.45 	<ul style="list-style-type: none"> Standard Ethernet: V2.42 Ethernet-APL: V2.45
Information	ABB Flow Electromagnetic	PA 4.02 Profile Flow electromagnetic

Device Access Points - Certification Info (selection):

Item	Value (Manufacturer GSDML file)	Value (Profile specific GSDML file)
Conformance Class	B	B
Application Class	ProcessAutomation	ProcessAutomation
Netload Class	III	II
Physical Slots	0...6	0...2
Fixed in Slots	0	0
Physical Subslots	<ul style="list-style-type: none"> Standard Ethernet: 32769...32770 Ethernet-APL: 32769 	<ul style="list-style-type: none"> Standard Ethernet: 32769...32770 Ethernet-APL: 32769
Auto Configuration Supported	NO	NO
Supports Multiple Write	YES	YES
CiR Supported	YES	YES

Interface Info (selection): Manufacturer GSDML file and Profile specific GSDML file

Item	Value
Supports Realtime Class	Class 1
Supports Realtime Classes	RT_Class_1
Supports Isochronous Mode	No
Supported Protocols	SNMP, LLDP
Supported Service Protocols	CLRPC
Number of Application	2
Relationships	
Supported Role*	Client
System redundancy supported	S2

* Only with standard Ethernet

Physical Block Startup Parameter Settings

Field Name	Data Type	Byte Offset	Default Value	Changeable	Visible
Startup settings	Unsigned8	0	0 (none applied)	yes	yes
Device tag	VisibleString[32]	1		yes	yes
Language	VisibleString[2]	33	en	yes	yes
Alarm delay	Unsigned16	35	0 (NO)	yes	yes
Parameter change acknowledge mode	Unsigned8	37	1 (manual acknowledge)	yes	yes

Transducer Block

Item	Value
Information	Electromagnetic flow Transducer Block
Fixed in Slots	4
Assigned to API	0 @ Manufacturer GSDML File for standard Ethernet 38656 @ Manufacturer GSDML File for Ethernet-APL 38656 @ Profile specific GSDML File for standard Ethernet and Ethernet-APL
Supports PROFISave Profile	NO
Supports PROFISave PIR	false
Supports PROFISafe FSCP	false
Test Mode (for Ethernet-APL only)	
I&M 5 Supported	NO

Flow Parameter	(Manufacturer GSDML file)					
Field Name	Data Type	Byte Offset	Default Value	Allowed Values	Changeable	Visible
Flow Unit	Unsigned16	0	1349:m3/h	1349 1351 1357 1363 1347 1348 1350 1577 1563 1352 1353 1354 1355 1635 1356 1358 1359 1362 1364 1365 1454 (APL only) 1366 1367 1368 1369 1370 1642 1643 1644 1645 1371 1372 1373 1374 1522	yes	yes
Low flow cut off	Float32	2	0		yes	yes
Flow direction	Unsigned8	6	0:Forward		yes	yes

... 8 PROFINET® interface

... Interface description

Module: Volume flow

Item	Value
Information	Function Block providing process value and status
Fixed in Subslots	1
Assigned to API	0 @ Manufacturer GSDML File for standard Ethernet 38656 @ Manufacturer GSDML File for Ethernet-APL 38656 @ Profile specific GSDML File for standard Ethernet and Ethernet-APL
Supports PROFISave ProfileNO	
Supports PROFISave PIR	false
Supports PROFISafe FSCP	false
Test Mode (for Ethernet-APL only)	
I&M 5 Supported	NO

Cyclic Input Data

Name	Data Type
Volume flow + status	Float32+ Unsigned8

Startup parameters

(Index 24592 @ Manufacturer GSDML file, Index 45072 @Profile specific GSDML file, length 4 Byte)

Name	Data Type	Byte Offset	Default Value	Allowed Values	Changeable	Visible
Damping	Float32	0	1.0		yes	yes

Modules: Volume & Volume + totalizer control

Item	Value
Information	Function Block providing process value and status
Fixed in Subslots	1
Assigned to API	0 @ Manufacturer GSDML File for standard Ethernet 38656 @ Manufacturer GSDML File for Ethernet-APL 38656 @ Profile specific GSDML File for standard Ethernet and Ethernet-APL
Supports PROFISave Profile	NO
Supports PROFISave PIR	false
Supports PROFISafe FSCP	false
Test Mode (for Ethernet-APL only)	
I&M 5 Supported	NO

Cyclic Input Data – for Module Volume and Module Volume + totalizer control

Name	Data Type
Volume + status	Float32 + Unsigned8

Cyclic Output Data – only for Module Volume + totalizer control

Name	Data Type
Totalizer control	Float32 + Unsigned8

Startup parameters

(Index 24596 @ Manufacturer GSDML file - Index 45076 @ Manufacturer GSDML file - length 9 Byte)

Name	Data Type	Byte Offset	Default Value	Allowed Values	Changeable	Visible
Volume Unit	Unsigned16	0	1034:m3	Manufacturer GSDML file: 1034 1038 1043 1048 1040 1041 1049 1051 1641 1544 (APL only) 1545 (APL only) 1546 (APL only) 1526 Profile specific GSDML file: 1034 1038 1043 1048	yes	yes
Totalizer operation mode	Unsigned8	2	1:Forward		yes	yes
Totalizer failure behavior	Unsigned8	3	0:Continue		yes	yes
Preset value	Float32	4	0.0		yes	yes
Assign process variable	Unsigned8	8	1:Volume		No	No

... 8 PROFINET® interface

... Interface description

Modules: Flexible Inputs (Only Manufacturer GSDML file)

Item	Value
Information	Function Block providing process value and status
Fixed in Subslots	1
Assigned to API	0 @ Manufacturer GSDML File for standard Ethernet 38656 @ Manufacturer GSDML File for Ethernet-APL 38656 @ Profile specific GSDML File for standard Ethernet and Ethernet-APL
Supports PROFISave Profile	NO
Supports PROFISave PIR	false
Supports PROFIsafe FSCP	false
Test Mode (for Ethernet-APL only)	
I&M 5 Supported	NO

Cyclic Input Data

Name	Data Type
value + status	Float32+ Unsigned8

Startup parameters

Name	Data Type	Byte Offset	Default Value	Allowed Values	Changeable	Visible
Input selector Transducer Block	Unsigned16	0	1: TB1	1	No	No
Input Selector Measurement Value	Unsigned16	2	Flex. Input 1: 3: Velocity scaled[m/s] Flex. Input 2: 12: Conductivity [μS/cm] Flex. Input 3: 4: Volume Forward Flex. Input 4: 5: Volume Reverse	1,2,3,...15	yes	yes
Damping	Float32	4	0.0		yes	yes

Annex of allowed values for the modules/names/parameters for the Manufacturer GSDML file**Available Units**

Value	Description
1034	m ³
1038	L
1043	ft ³
1048	gal
1040	ml
1041	hl
1545	Kugal (APL only)
1546	Mugal (APL only)
1049	ImpGal
1051	bbl
1641	bbl (fed)
1526	volume
1349	m ³ /h
1351	L/s
1357	ft ³ /min
1363	gal/min
1347	m ³ /s
1348	m ³ /min
1350	m ³ /d
1577	ml/s
1563	ml/min
1352	L/min
1353	L/h
1354	L/d
1355	ML/d
1635	hl/h
1356	ft ³ /s
1358	ft ³ /h
1359	ft ³ /d
1362	gal/s
1364	gal/h
1365	gal/d
1454	kgal/min (APL only)
1366	Mgal/d
1367	ImpGal/s
1368	ImpGal/min
1369	ImpGal/h
1370	ImpGal/d
1642	bbl (fed)/s
1643	bbl (fed)/min
1644	bbl (fed)/h
1645	bbl (fed)/d
1371	bbl/s
1372	bbl/min
1373	bbl/h
1374	bbl/d
1522	volume/time (custom selectable)

Input Selector Measurement

Value	Description
0	Volume Flow [% of range]
1	Mass Flow
2	Mass Flow [% of range]
3	Velocity scaled [m/s]
4	Volume Forward
5	Volume Reverse
6	Volume Diff
7	Volume Sum
8	Mass Forward
9	Mass Reverse
10	Mass Diff
11	Mass Sum
12	Conductivity [μ S/cm]
13	Sensor Coil Temperature [°C]
14	Electronics Temperature [°C]
15	Current Output 31/32 [mA]

Flow direction

Value	Description
0	Forward
1	Reverse

Totalizer Operation mode

Value	Description
0	Net
1	Forward
2	Reverse

Totalizer failure behavior

Value	Description
0	Continue
1	Hold
2	Last valid value + continue

Startup Parameter (Physical Block)

Value	Description
0	None applied
1	Only units applied
2	All applied
4	Only units and device tag applied

Update Event Mode (Physical Block)

Value	Description
0	Auto acknowledge
1	Manual acknowledge

... 8 PROFINET® interface

... Interface description

Annex of allowed values for the modules/names/parameters for the profile specific GSDML file

Available Units

Value	Description
1034	m ³
1038	L
1043	ft ³
1048	gal
1349	m ³ /h
1351*	L/s or l/s
1357	ft ³ /min
1363	gal/min

* 1351 = L/s according PA Profile 4.02
l/s in PA Profile specific GSDML

Flow direction

Value	Description
0	Forward
1	Reverse

Totalizer Operation mode

Value	Description
0	Net
1	Forward
2	Reverse

Totalizer failure behavior

Value	Description
0	Continue
1	Hold
2	Last valid value + continue

Startup Parameter (Physical Block)

Value	Description
0	None applied
1	Only units applied
2	All applied
4	Only units and device tag applied (APL only)

Update Event Mode (Physical Block)

Value	Description
0	Auto acknowledge
1	Manual acknowledge

Annex overview channel diagnosis

Number (only manufacturer specific GSDML)	Description
4096	Mass flowrate exceeds limits
4097	Flow rate exceeds limits
4098	Simulation is on. Simulating process/output
4099	Value
4100	Flowrate to zero
4101	Maintenance interval is reached
4102	All totalizer stopp
4103	Totalizer reset. Reset of one or more Totalizers
4104	Display value is in <1600h at Qmax
4105	Device is not calibrated
4106	Sensor memory defective
4107	NV data defect
4108	No Frontend Board detected
4109	Frontend Board communication error
4110	Incompatible Frontend Board
4111	NV chips defect on Motherboard
4112	Pulse output is cut off
4113	Current Output 31/32 is saturated
4114	Current Output V1/V2, V3/V4 saturated
4115	Current Output 31/32 communication error
4116	Option Card 1 communication error
4117	Option Card 2 communication error
4118	Safety Alarm Current Output 31/32
4119	Current Output 31/32 not calibrated
4120	Current Output V1/V2 not calibrated
4121	Current Output V3/V4 not calibrated
4122	Motherboard voltages outside range
4123	An alarm is simulated
4124	Communication card is not responding
4125	Reserved
4126	Coil regulation error
4127	Coil wiring error
4128	Coil Inductance alarm
4129	Electrode short circuit
4130	Electrode open circuit
4131	DC feedback regulation
4132	ADC RX210 communication error
4133	Coil isolation alarm
4134	Gas bubble alarm
4135	Conductivity limits alarm
4136	Sensor temperature limits alarm
4137	TFE alarm
4138	EPD alarm
4139	ADC overrange alarm
4140	SIL self check alarm
4141	Inhouse temperature alarm

... 8 PROFINET® interface

... Interface description

Number (manufacturer specific GSDML)		Number	Description
Standard Ethernet	Ethernet-APL	(Profile specific GSDML)	
16	16	16	CI_pnetParameterFault
16384	36864	36864	Sensor element exciter faulty
16385	36865	36865	Error in evaluation electronics
16386	36866	36866	Error in internal energy supply
16387	36867	36867	Error in sensor element
16388	36868	36868	Error in actuator element
16389	36869	36869	Faulty install at e.g. dead space
16390	36870	36870	Parameter setting error
16392	36872	36872	Overloading
16393	36873	36873	Wrong polarity of aux power
16394	36874	36874	Maximum line length exceeded
16395	36875	36875	Corrosion /abrasion by medium
16396	36876	36876	Fouling on sensor element
16397	36877	36877	Auxil medium missing or insuffic
16398	36878	36878	Wear reserve used up (operation)
16399	36879	36879	Wear reserve used up (wear)
16400	36880	36880	Error in peripherals
16401	36881	36881	Electromag interference too high
16402	36882	36882	Temperature of medium too high
16403	36883	36883	Ambient temperature too high
16404	36884	36884	Vibration/Impact load too high
16405	36885	36885	Auxiliary power range off-spec
16406	36886	36886	Auxiliary medium missing
16407	36887	36887	Excessive temperature shock
16408	36888	36888	Deviation from measurement
16409	36889	36889	Humidity in electronics area
16410	36890	36890	Medium in electronics area
16411	36891	36891	Mechanical damage
16412	36892	36892	Communication error
16413	36893	36893	Foreign material in electro area
16632	37136	37136	Gas bubbles in the liquid
16633		37113	Fouling, clogging
16634		37114	Erosion, corrosion
16635		37115	Faulty mounting
16636		37116	Asymmetry of measuring tubes
16637		37117	External vibrations
16638		37118	Pulsating flow
	37137	37137	Corrosion of electrodes
	37138	37138	Electrical conductivity too low
	37139	37139	Liner damage
	37140	37140	Electrode fouling
	37141	37141	External magnetic fields
	37142	37142	Electrode short circuit
16639	37143	37143	Incomplete filling
17101	37581	37581	DIA_MAINTENANCE
17104	37584	37584	DIA_MAINTENANCE_ALARM
17105	37585	37585	DIA_MAINTENANCE_DEMANDED
17106	37586	37586	DIA_FUNCTION_CHECK
17107	37587	37587	DIA_OUT_OF_SPEC
17108	37588	37588	DIA_UPDATE_EVENT

Available units

The following units are available in the device.

Group	Name	Code	PROFINET
Massflow units	gram per second	g/s	1318
	gram per minute	g/min	1319
	gram per hour	g/h	1320
	gram per day	g/d	1321
	kilogram per second	kg/s	1322
	kilogram per minute	kg/min	1323
	kilogram per hour	kg/h	1324
	kilogram per day	kg/d	1325
	pounds per second	lb/s	1330
	pounds per minute	lb/min	1331
	pounds per hour	lb/h	1332
	pounds per day	lb/d	1333
	metric ton per second	t/s	1326
			In FW – not in GSDML
	metric ton per minute	t/min	1327
	metric ton per hour	t/h	1328
	metric ton per day	t/d	1329
	custom selectable	xx/yy	1521
Mass units	gram	g	1089
	kilogram	kg	1088
	Pound	lb	1094
	metric ton	t	1092
	custom selectable	xx/yy	1525

Group	name	Code	PROFINET
Volumeflow units	cubic meter per second	m3/s	1347
	cubic meter per minute	m3/min	1348
	cubic meter per hour	m3/h	1349
	cubic meter per day	m3/d	1350
	cubic foot per second	ft3/s	1356
	cubic foot per minute	ft3/min	1357
	cubic foot per hour	ft3/h	1358
	cubic foot per day	ft3/d	1359
	milliliter per second	ml/s	1577
	milliliter per minute	ml/min	1563
	liter per second	l/s	1351
	liter per minute	l/min	1352
	liter per hour	l/h	1353
	liter per day	l/d	1354
	hecto liter per hour	hl/h	1635
	mega liter per day	MI/d	1355
	us gallons per second	ugal/s	1362
	us gallons per minute	ugal/min	1363
	us gallons per hour	ugal/h	1364
	us gallons per day	ugal/d	1365
	us kilo gallons per day	kugal/m	1454
	mega us gallons per day	Mugal/d	1366
	imperial gallons per second	igal/s	1367
	imperial gallons per minute	igal/min	1368
	imperial gallons per hour	igal/h	1369
	imperial gallons per day	igal/d	1370
	oil barrels per second	bbl/s	1371
	oil barrels per minute	bbl/min	1372
	oil barrels per hour	bbl/h	1373
	oil barrels per day	bbl/d	1374
brew barrels per second	bls/s	1642	
brew barrels per minute	bls/min	1643	
brew barrels per hour	bls/h	1644	
brew barrels per day	bls/d	1645	
custom selectable	xx/yy	1522	

... 8 PROFINET® interface

... Available units

Group	Name	Code	PROFINET
Volume units	cubic meter	m3	1034
	cubic feet	ft3	1043
	Milliliters	MI	1040
	Liter	l	1038
	hecto liter	hl	1041
	us gallons	Ugal	1048
	kilo us gallons	kugal	1545
	mega us gallons	Mugal	1546
	imperial gallons	lgal	1049
	oil barrels	bbl	1051
	brew barrels	Bls	1641
	custom selectable	xx/yy	1526
Density units	gram per cubic centimeter	g/cm3	1100
	kilogram per cubic meter	kg/m3	1097
	gram per milliliter	g/ml	1104
	gram per liter	g/l	1105
	kilogram per liter	kg/l	1103
	pounds per cubic feet	lb/ft3	1107
	pounds per us gallons	lb/ugal	1108
	specific gravity	SG	1114
	custom selectable	xx/yy	1523
Temperature units	Kelvin	K	1000
	Celsius	°C	1001
	Fahrenheit	°F	1002
	custom selectable	xx/yy	1524
Concentration units	%	%	—
	Brix	Brix	—
	Variable matrix	Variable matrix	—
	Baume	Baume	—
	°API	°API	—
Pressure units	Pascal	Pa	1130
	kilo pascal	kPa	1133
	Bar	bar	1137
	milli bar	Mbar	1138
	pound per square inch	psi	1141

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Notes

Notes

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