

# SwirlMaster FSS400, VortexMaster FSV400

## Swirl and Vortex flowmeter



PROFINET®, Modbus TCP® protocol  
Valid from software version  
01.00.00

**Measurement made easy**

SwirlMaster FSS430, FSS450  
VortexMaster FSV430, FSV450

### Introduction

This manual describes how to configure an Modbus® TCP connection for the following swirl and vortex flowmeters:

- SwirlMaster FSS430, FSS450
- VortexMaster FSV430, FSV450

### Additional Information

Additional documentation on SwirlMaster FSS400, VortexMaster FSV400 is available for download free of charge at [www.abb.com/flow](http://www.abb.com/flow).

Alternatively simply scan this code:



FSV430

FSV450

FSS430

FSS450

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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.

The following interface description is a supplement to the operating instruction of the SwirlMaster FSS4xx and VortexMaster FSV4xx.

The safety instructions it includes are valid and must be observed.

These instructions offer additional information about the supported PROFINET® and Modbus TCP® functionalities and gives information about the configuration.

This description applies to the entire SwirlMaster and VortexMaster series FSx4xx.

## ... 1 Safety

### 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](http://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'.

### 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](http://solutions.abb/industrial-cyber-security)

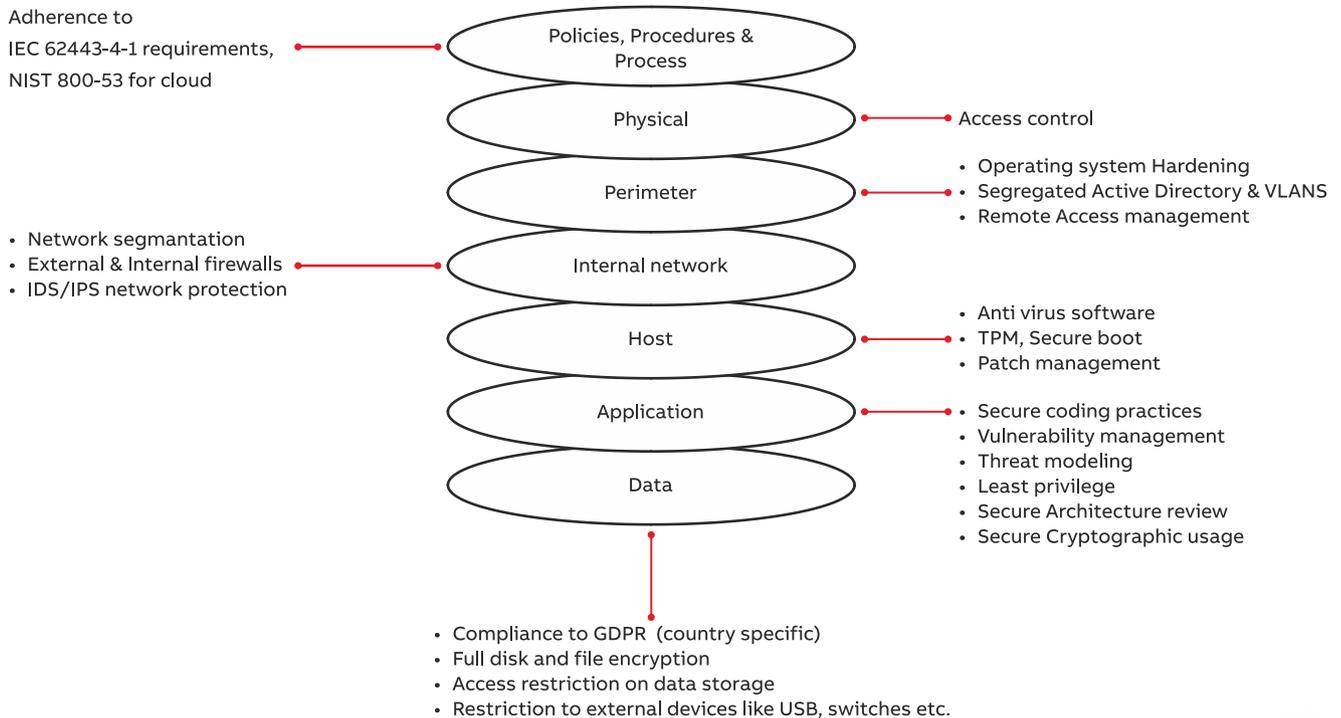


Figure 1: Defense in depth

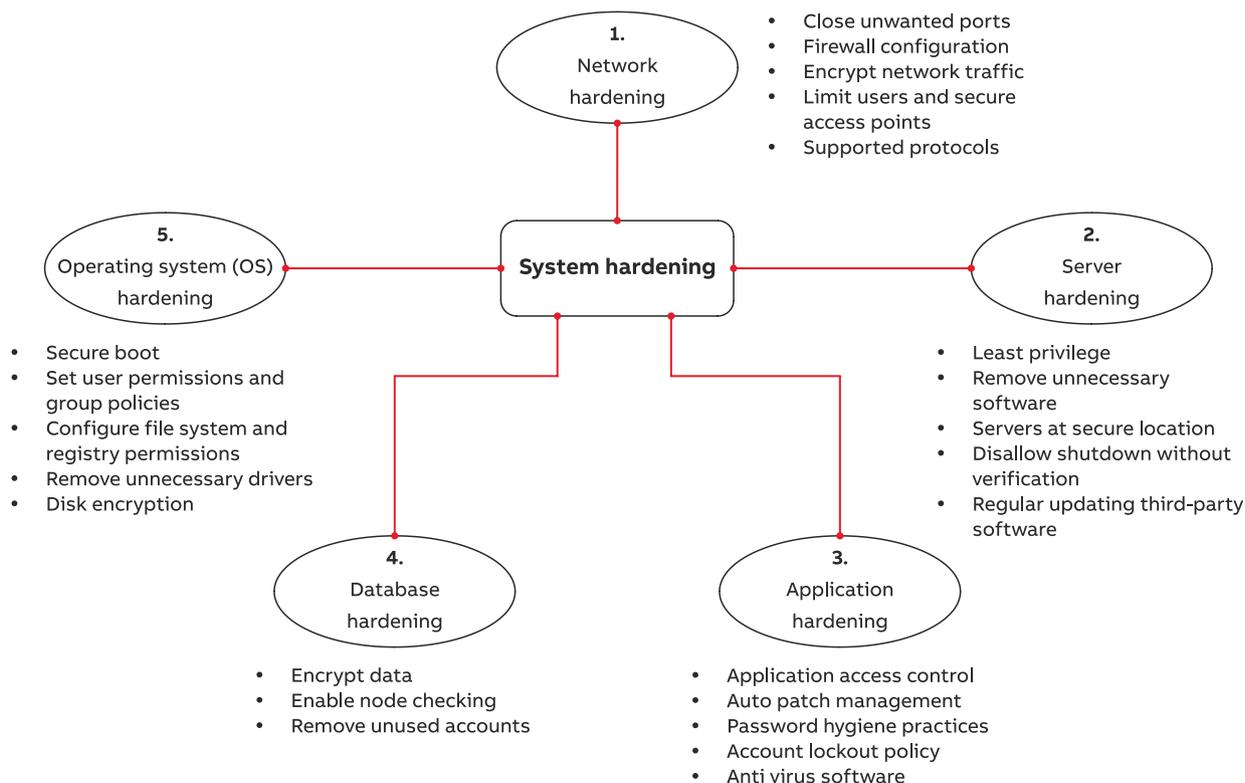


Figure 2: Hardening

## 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 - Swirl flowmeters - Software Downloads](#)



[ABB Library - Vortex flowmeter - Software Downloads](#)



## Further documents

### Note

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

[www.abb.com/flow](http://www.abb.com/flow)

## Manufacturer's address

### ABB AG

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## 2 Supported Ethernet-based communication protocols

### PROFINET®

- Cyclic communication is supported with a suitable PLC e.g. Siemens S7-400 (PCS 7), S7-1200, S7-1500 with TIA Portal or ABB 800xA.
- Process variables, diagnostic values and Device Status Information are accessible cyclically.
- For device configuration a Webserver or Modbus® TCP is available, providing full access to all parameters.

### Modbus® TCP

The common Modbus registers are accessible through Ethernet-APL™ via Modbus TCP Protocol. Access to all Registers allows for device configuration.

### Webserver – Secure http (https)

Use the Webserver or Modbus TCP to configure all of the device parameters.

## Security

### Secured protocols

Webserver https:

- Security modes
- Used ports by Webserver: TCP 443
- Security is based on .x509 Certificates
- Protocol could be deactivated via HMI in case of no function.

PROFINET®:

- Protocol could be deactivated via HMI in case of no function.

### Unsecured protocols

Use the HMI menu to enable or disable the protocols:

- PROFINET® – use ports UDP 34964, UDP 49153
- Modbus® TCP – use port TCP 502.

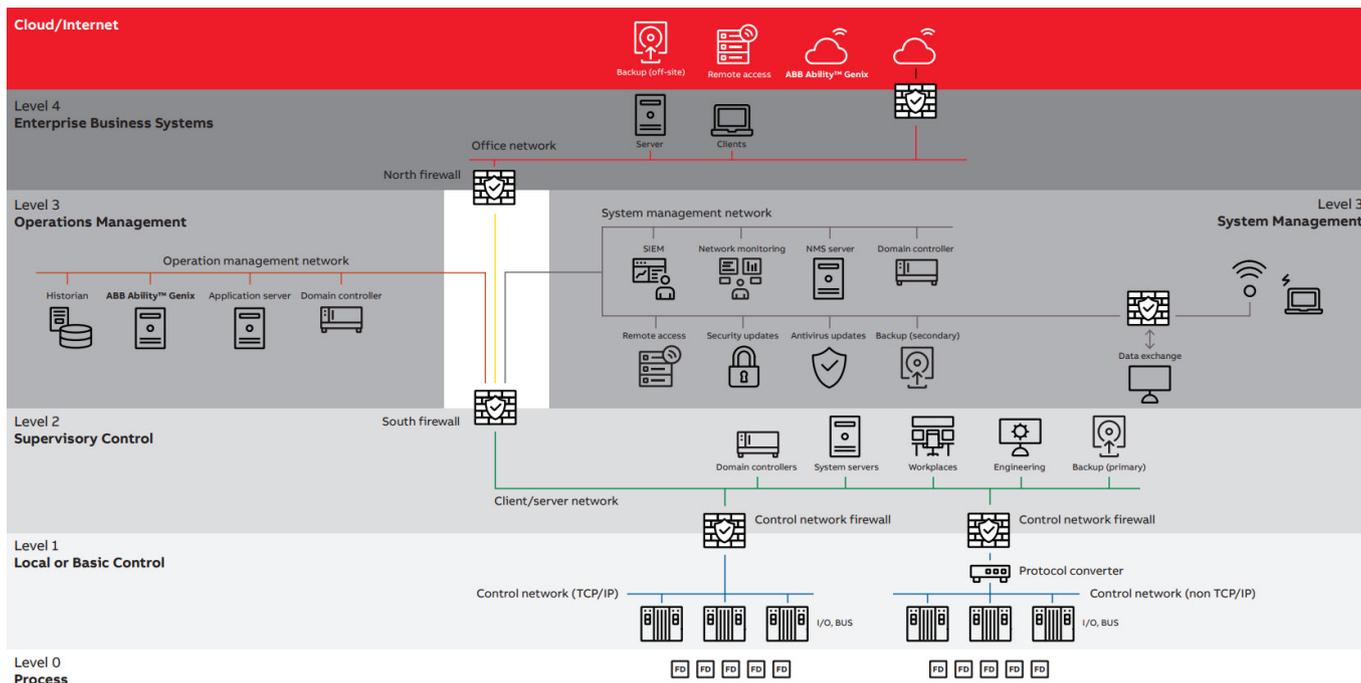


Figure 3: Example of a reference architecture

## 3 Installation

### Devices with Ethernet APL™ communication

#### Terminal layout

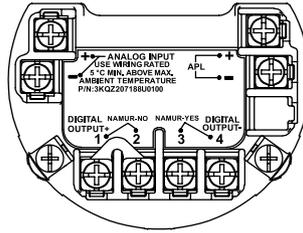


Figure 4: Terminals

Terminal	Function / comment
APL+	Power supply, Ethernet-APL interface
APL-	
DIGITAL OUTPUT 1+	Digital output, positive pole
DIGITAL OUTPUT 2	Bridge after terminal 1+, NAMUR output deactivated
DIGITAL OUTPUT 3	Bridge after terminal 4-, NAMUR output activated
DIGITAL OUTPUT 4-	Digital output, negative pole
ANALOG INPUT +	<b>FSS450, FSV450 only!</b>
ANALOG INPUT -	Analog input 4 to 20 mA for remote transmitter, e.g. for temperature, pressure, etc.

#### Power supply

Connection values of APL field switch

Devices with Ethernet APL communication	
Terminals	APL + / APL -
Supply voltage	9 to 15 V DC
Power consumption	0.54 W

## ... 3 Installation

### ... Devices with Ethernet APL™ communication

#### Ethernet-APL™ network topology

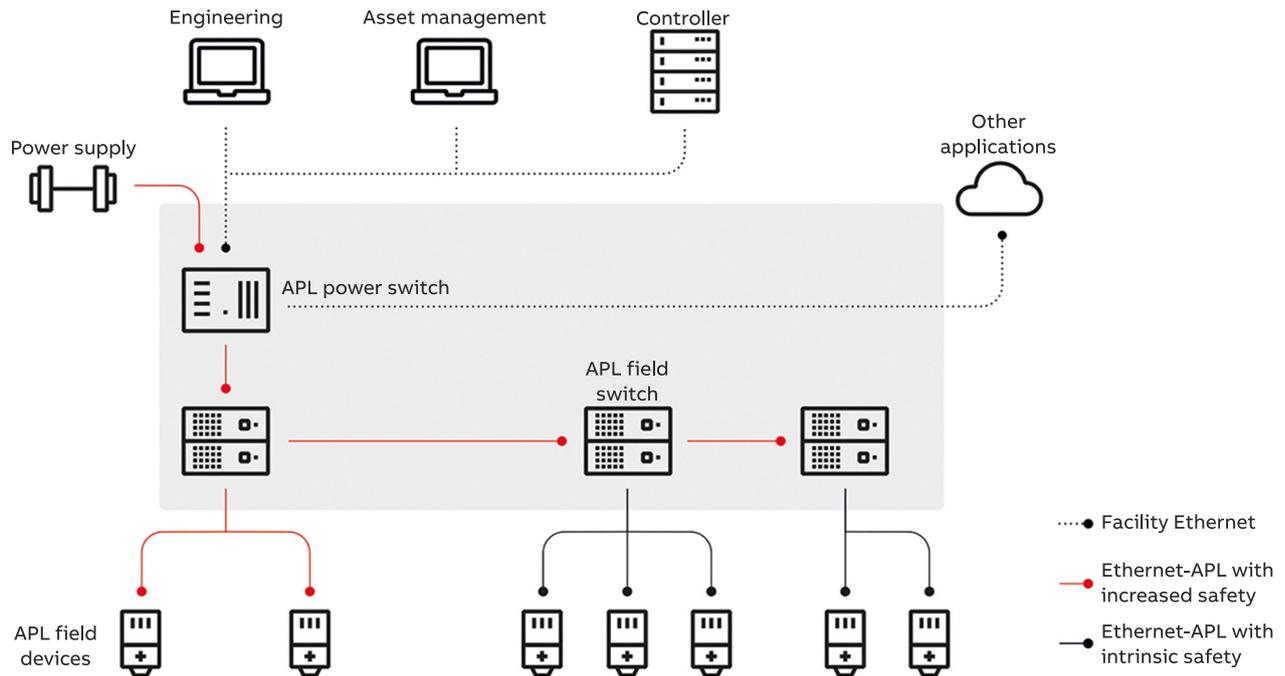


Figure 5: Exemplary Ethernet-APL topology

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

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

Whereas, the spur carries lower power with optional intrinsic safety for lengths up to 200 m (656 ft).

Ethernet-APL explicitly specifies point-to-point connections only with each connection between communications partners constituting a segment. Ethernet-APL switches thus isolate communications between segments.

#### Ethernet-APL™ segment lengths

The permissible segment length is:

- Trunk: < 1000 m (3281 ft)
- Spur: < 200 m(656 ft)

The Ethernet-APL field switch/device used must be certified for use in the intended hazardous area location.

More network topology used in areas with explosive atmosphere please refer to '[Ethernet-APL Engineering Guideline](#)'. See [www.ethernet-apl.org](http://www.ethernet-apl.org) for more information.

#### Note

The SwirlMaster FSS400, VortexMaster FSV400 only support star network topology. Ring and daisy chain network configurations are currently not supported.

## 4 Menu Structure in HMI

### Parameter descriptions

#### Menu: Communication for devices with Ethernet-APL communication

Menu / parameter	Description
<b>Communication</b>	
<b>Ethernet</b>	Selection of submenu ' <b>Ethernet</b> ' using  .
<b>Communication / ...Ethernet / ...Service Port</b>	
Baud Rate	Selection of the transmission speed (baud rate) for the service port. Factory setting: 9600 bd.
<b>Communication / ...Ethernet / ...General</b>	
Protocol Stack	Set the communications protocol stack. <ul style="list-style-type: none"> <li>PROFINET IO</li> </ul>
<b>Communication / ...Ethernet / ...Internet Layer</b>	
DHCP Client	Factory setting: Disable. If 'Disable' has been selected, the host IP address is 192.168.001.122 by default. <ul style="list-style-type: none"> <li>Enable</li> <li>Disable</li> </ul> For PROFINET communication, the DHCP function (Dynamic Host Configuration Protocol) is not supported, the PROFINET DCP (Discovery and Configuration Protocol) is used instead.
Host IP Address	Allows the IP address to be set. 192.168.001.122 is the factory setting, if the DHCP client is set to fixed IP.
Subnet Mask	Factory setting: 255,255,255,000
Gateway IP Address	Factory setting = 000.000.000.000 If you are dealing with a part of a subnet, the first block of numbers should be identical with the HOST IP - for example, 192.168.001.xxx.
Host name	Factory setting: ABB-FSX4x0
Domain name	Factory setting: my-domain
MAC Address	Display of the device's MAC address
NTP Srv. Address 1	Factory setting: 000.000.000.000
NTP Srv. Address 2	Factory setting: 000.000.000.000
DNS IP Address 1	automatically set at DHCP = ON: 000.000.000.000
DNS IP Address 1	

## ... 4 Menu Structure in HMI

### ... Parameter descriptions

Menu / parameter	Description
<b>Communication / ...Ethernet / PROFINET</b>	
Access	Factory setting: Full. Set to 'Full' or 'Read only' for Omron or Rockwell PLC. <ul style="list-style-type: none"> <li>• Disable</li> <li>• Read only</li> <li>• Full</li> </ul>
Vendor ID	Display of the device manufacturer ID. 0xF100
Device Name	PROFINET station name (can only be written via PROFINET) 40 x ASCII characters Factoring setting value is according to meter code.
Device ID	Display of the device ID. 0xB330
Select Device Profile	Selection of device profile <ul style="list-style-type: none"> <li>• PA Profiles 0xB330: PNO Profile GSD(factory setting)</li> <li>• ABB 0x3439: Manufacturer-specific GSD</li> </ul>
Device Tag	Can only be written via PROFINET (e.g. I&M1) 32 x ASCII characters
SNMP Access	Activate / deactivate SNMP access. <ul style="list-style-type: none"> <li>• Disable</li> <li>• Read only</li> <li>• Full (Recommended for PROFINET)</li> </ul>

Menu / parameter	Description
<b>Communication / ...Ethernet / ...ModBus TCP</b>	
Access	Factory setting: Full. <ul style="list-style-type: none"> <li>• Disable</li> <li>• Read only</li> <li>• Full</li> </ul>
IEEE Format	Factory setting: Enable. <ul style="list-style-type: none"> <li>• Enable</li> <li>• Disable</li> </ul>

<b>Communication / ...Ethernet / ...WebServer</b>	
Access	Factory setting: Full. <ul style="list-style-type: none"> <li>• Disable</li> <li>• Read only</li> <li>• Full</li> </ul>
Reset Credentials	Allows the reset of the web server password.
Session Timeout	Time out period to close the web server session. Standard value: 5 minutes. Possible settings: Min.: 1 minute, Max. 99999 minutes.

<b>Communication / ...Ethernet / ...Diagnostics</b>	
TCP Connections	Active TCP connections.
Data Received	No. of bytes received from client.
Data Transmitted	No. of Bytes send to client.
Receive Errors	No. of error frames received.
Transmit Collisions	No. of transmission collisions.

\* If base PROFINET protocol selected.

## 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 'Enable'.
4. Make sure that the flowmeter IP address (host IP address) is set.
5. Set 'Communication / ...Ethernet / ...WebServer' to 'Full'.

## 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.

#### 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.

### 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 'Enable'. Use this address to access the device through the webserver.
  - To use a fixed IP address, set 'DHCP Client' to 'Disable'. 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'.

### 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://192.168.1.122>.

### Password protection

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

Figure 6: 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 7: 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:

- Issuer: ABB Device Root CA
- Subject: my-hostname.my-domain
- Serial: Randomly generated
- Valid From: Time of generation
- Valid Till: Time of generation plus 365 days
- Subject Alt name: 192.168.1.122, my-hostname.my-domain
- Key: 384-bit EC key with secp384 curve.

### 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 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: 5 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 two main elements:

- Device identification consisting of:
  - Device type
  - Sensor Location Tag
  - Calibration Certificate Number
  - IP address
  - Device host name
- Sign in form, for more information about sign in process refer to **Password protection** on page 12.

#### 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
- Ethernet for each 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 13.

### 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:

- 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 PROFINET® interface

#### Note

The PROFINET® protocol is an unsecured protocol (in terms of IT and cyber security), as such the intended application should be assessed to ensure that this protocol is suitable before implementation.

### PROFINET® over Ethernet APL™

#### Note

The protocol as such is not secure. The application should be assessed before implementation to determine the suitability of the protocol.

Cyclic communication is supported in the implemented PROFINET over Ethernet-APL protocol.

Process variables, diagnosis data and information on the device status can be cyclically accessed.

Both protocols support DHCP (Dynamic Host Configuration Protocol), only PROFINET also supports DCP (Discovery and Configuration Protocol).

A web server is available for device configuration with full access to all parameters and diagnosis data, see **Webserver for device configuration** on page 12.

#### PROFINET interface

Protocol	Application layer protocol for decentral device periphery and distributed automation, Version 2.4
Cycle times	64 ms
Real Time Class	Class 1
Media Redundancy Protocol (MRP)	No
System redundancy support	System redundancy S2 (support of back-up Application Relationship, AR).
Neighborhood detection (LLDP)	Yes
Supported connections	2 × AR (IO Controller AR) 2 × AR (device access, acyclic communication)
Configuration options	<ul style="list-style-type: none"> <li>• Web browser</li> <li>• Device master file (GSD): can be read out via the integrated web server of the measuring device.</li> </ul>
Configuration of the device label	<ul style="list-style-type: none"> <li>• DCP protocol</li> <li>• Integrated web server</li> </ul>

## Additional Ethernet communications protocols

### Note

The device supports the following security modes:

Secure protocol	Non-secure protocol
Webserver https	Modbus TCP® and PROFINET®
<ul style="list-style-type: none"> <li>Ports used by the web server: TCP 443</li> <li>Security based on .x509 certificates</li> </ul>	<ul style="list-style-type: none"> <li>Ports used by Modbus TCP: TCP 502</li> <li>Ports used by PROFINET: UDP 34964, 49153</li> </ul>

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

## PROFINET® communication

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

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 DHCP active or with a default / or customer IP and hostname:

Configuration parameter	Default setting
IP-Address	0.0.0.0
Gateway	0.0.0.0
Subnet mask	255.255.255.0
Hostname	ABB FSx4x0

Table 1: Default PROFINET settings

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'.

## Device profiles

The PROFINET functionality corresponds to the PA Profile 4.02 Specification and supports Manufacturer specific features, described in the GSDML Files.

Item	Value (Manufacturer GSDML File)	Value (PA profile GSDML File)
Vendor	ABB	Profile for Process Control Devices
Vendor ID	0x001A	0xF100
Main family	ABB Vortex APL	PA Profile V4.02
Product family	VortexMaster FSV430, FSV450 Flow SwirlMaster FSS430, FSS450	
Device ID	0x3439	0xB330
Information	Vortex Master Swirl Master	Vortex

The FSS4x0 (SwirlMaster), FSV4x0 (VortexMaster) refers to the following GSDML files:

- Manufacturer specific:  
GSDML-V2.43-ABB\_001A-3439\_FLOW\_VORTEX-20240627-093900.xml or later
- Profile specific:  
GSDML-V2.43-PA\_Profile\_V4.02-B330-FLOW\_VORTEX-20230721.xml or later

## Supported standards and protocols

- PROFINET PNIO\_Version V2.42

## IP address setting

The device must be given an IP address before communication with the device is possible. Usually the IP address is set via DHCP.

Alternatively, a static IP address can be configured.

### 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

## ... 6 PROFINET® interface

### Data structure

For Vortex flow transmitter communicates via PROFINET protocol shall follow PA profile 4.02, which defines the standardization of parameters for operation, commissioning, maintenance, diagnosis within fieldbus devices.

#### Data Structure defined by PA Profile 4.02 (PA Profile 0xB330)

Slot	ModuleName	Subslot	BlockType	Submodulename
Slot0	/	Subslot1	Data Access Point(DAP)	DAP Submodule
		Subslot2	Device Manager(DM)	Device Manager Submodule
		Subslot3	Physical Block(PB)	Transmitter
		Subslot4	Transducer Block 1(TB1)	FLOW - Vortex
Slot1	VOLUME_FLOW	Subslot1	Function Block 1(FB1)	Analog Input (VOLUME_FLOW Input)
		Subslot2	/	/
		Subslot3	/	/
		Subslot4	/	/
Slot2	VORTEX_FREQUENCY	Subslot1	Function Block 2(FB2)	Analog Input (VORTEX_FREQUENCY Input)
		Subslot2	/	/
		Subslot3	/	/
		Subslot4	/	/
Slot3	TOTALIZER	Subslot1	Function Block 3(FB3)	A :TOTALIZER (Volume)
		Subslot2	/	B: TOTALIZER (Volume) + SET_TOT
		Subslot3	/	/
		Subslot4	/	/

Also, PI allows manufacture to define its customized structure which contains device specific parameters and functions.

#### Data Structure defined by manufacturer specific (ABB 0x3439)

Slot	ModuleName	subslot	BlockType	Submodulename	Default
Slot4	Flexible Input 1	subslot1	Function Block 4(FB4)	Analog Input	Volume Flow Ratio
		subslot2			
		subslot3			
		subslot4			
Slot5	Flexible Input 2	subslot1	Function Block 5(FB5)	Analog Input	Housing Temperature
		subslot2			
		subslot3			
		subslot4			
Slot6	Flexible Input 3	subslot1	Function Block 6(FB6)	Analog Input	AI Current mA
		subslot2			
		subslot3			
		subslot4			
Slot7	Flexible Input 4	subslot1	Function Block 7(FB7)	Analog Input	Density
		subslot2			
		subslot3			
		subslot4			
Slot8	Flexible Input 5	subslot1	Function Block 8(FB8)	Analog Input	Pressure
		subslot2			
		subslot3			
		subslot4			

## Definition of INPUT\_SELECTOR

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### Vortex: Definition of INPUT\_SELECTOR

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Volume\_Flow

---

Volume\_Flow\_Ratio

---

Mass\_Flow

---

Mass\_Flow\_Ratio

---

Normal\_Flow

---

Normal\_Flow\_Ratio

---

Density

---

Housing\_Temperature

---

Medium\_Temperature

---

Pressure

---

Totalizer\_Qv

---

Totalizer\_Qm

---

Totalizer\_Qn

---

Steam\_Energy

---

AI current (AI)

---

## 7 Modbus TCP® interface

### Note

The Modbus® protocol is an unsecured protocol (in terms of IT and cyber security), as such the intended application should be assessed to ensure that this protocol is suitable before implementation.

## Register table overview

### Input Coils

Table Id	Table Name	Table Type	Data Type	Start Index	End Index
0x0	<a href="#">ReadOnly 1bit Bool B1RO1</a>	Coil	TUSIGN8	0	1999

### Input Registers

Table Id	Table Name	Table Type	Data Type	Start Index	End Index
0x1	<a href="#">Unsigned Integer 8bit ReadOnly dynamic U8ROD</a>	Single	TUSIGN8	0	199
0x2	<a href="#">Float 32bit ReadOnly dynamic F32ROD</a>	Single	TFLOAT	200	498
0x3	<a href="#">Double 64bit ReadOnly dynamic D64ROD</a>	Single	TDOUBLE	500	996
0x4	<a href="#">Character 8bit ReadOnly C8RO</a>	String	TCHAR	1000	1999
0x5	<a href="#">Unsigned Integer 8bit ReadOnly U8RO</a>	Single	TUSIGN8	2000	2999
0x6	<a href="#">Unsigned Integer 16bit ReadOnly U16RO</a>	Single	TUSIGN16	3000	3999
0x7	<a href="#">Signed Integer 16bit ReadOnly S16RO</a>	Single	TINT16	4000	4999
0x8	<a href="#">Unsigned Integer 32bit ReadOnly U32RO</a>	Single	TUSIGN32	5000	5998
0x9	<a href="#">Float 32bit ReadOnly F32RO</a>	Single	TFLOAT	6000	6998
0xA	<a href="#">Variant 16bit ReadOnly ScanRegister1 V16RO1</a>	Single	TUSIGN16	9000	9099
0xB	<a href="#">Variant 16bit ReadOnly ScanRegister2 V16RO2</a>	Single	TUSIGN16	9100	9199

### Holding Registers

Table Id	Table Name	Table Type	Data Type	Start Index	End Index
0xC	<a href="#">Character 8bit ReadWrite C8RW</a>	String	TCHAR	0	999
0xD	<a href="#">Unsigned Integer 8bit ReadWrite U8RW</a>	Single	TUSIGN8	1000	1999
0xE	<a href="#">Signed Integer 16bit ReadWrite S16RW</a>	Single	TINT16	3000	3999
0xF	<a href="#">Unsigned Integer 32bit ReadWrite U32RW</a>	Single	TUSIGN32	4000	4998
0x10	<a href="#">Float 32bit ReadWrite F32RW</a>	Single	TFLOAT	5000	5998
0x11	<a href="#">Double 64bit ReadWrite D64RW</a>	Single	TDOUBLE	6000	6996
0x12	<a href="#">Action 8bit WriteOnly A8WO</a>	Single	ACTION	7000	7999
0x13	<a href="#">Unsigned Integer 16bit ReadWrite ScanRegister1 U16RW1</a>	Single	TUSIGN16	9000	9099
0x14	<a href="#">Unsigned Integer 16bit ReadWrite ScanRegister2 U16RW2</a>	Single	TUSIGN16	9100	9199

## Register table description

### Input Coils

ReadOnly 1bit Bool B1RO1

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum		Brief Description
									Values	Names	
0	Modbus	mbDiag	diagByte0Bit0	TUSIGN8	1	—	—	0	—	—	ModBus diagnostic status alarm object.
...			...								
7			diagByte0Bit7								
8	Modbus	mbDiag	diagByte1Bit0	TUSIGN8	1	—	—	0	—	—	ModBus diagnostic status alarm object.
...			...								
15			diagByte1Bit7								
16	Modbus	mbDiag	diagByte2Bit0	TUSIGN8	1	—	—	0	—	—	ModBus diagnostic status alarm object.
...			...								
23			diagByte2Bit7								
24	Modbus	mbDiag	diagByte3Bit0	TUSIGN8	1	—	—	0	—	—	ModBus diagnostic status alarm object.
...			...								
31			diagByte3Bit7								
32	Modbus	mbDiag	diagByte4Bit0	TUSIGN8	1	—	—	0	—	—	ModBus diagnostic status alarm object.
...			...								
39			diagByte4Bit7								
40	Modbus	mbDiag	diagByte5Bit0	TUSIGN8	1	—	—	0	—	—	ModBus diagnostic status alarm object.
...			...								
47			diagByte5Bit7								
48	Modbus	mbDiagHis	diagHisByte0Bit0	TUSIGN8	1	—	—	0	—	—	ModBus diagnostic alarm history.
...			...								
55			diagHisByte0Bit7								
56	Modbus	mbDiagHis	diagHisByte1Bit0	TUSIGN8	1	—	—	0	—	—	ModBus diagnostic alarm history.
...			...								
63			diagHisByte1Bit7								
64	Modbus	mbDiagHis	diagHisByte2Bit0	TUSIGN8	1	—	—	0	—	—	ModBus diagnostic alarm history.
...			...								
71			diagHisByte2Bit7								
72	Modbus	mbDiagHis	diagHisByte3Bit0	TUSIGN8	1	—	—	0	—	—	ModBus diagnostic alarm history.
...			...								
79			diagHisByte3Bit7								
80	Modbus	mbDiagHis	diagHisByte4Bit0	TUSIGN8	1	—	—	0	—	—	ModBus diagnostic alarm history.
...			...								
87			diagHisByte4Bit7								
88	Modbus	mbDiagHis	diagHisByte5Bit0	TUSIGN8	1	—	—	0	—	—	ModBus diagnostic alarm history.
...			...								
95			diagHisByte5Bit7								

## ... 7 Modbus TCP® interface

### ... Register table description

#### Input register

Unsigned Integer 8bit ReadOnly dynamic U8ROD

#### Note

Attempting to read an object after its starting register will return an error code.

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
0	Mapper	diagDeviceStatus	0	SIMPLE_U8	1	—	—	0	—	—	—
...			...	SIMPLE_U8	1	—	—	0	—	—	
5			5	SIMPLE_U8	1	—	—	0	—	—	
6	Mapper	diagHistory	0	SIMPLE_U8	1	—	—	0	—	—	—
...			...	SIMPLE_U8	1	—	—	0	—	—	
11			5	SIMPLE_U8	1	—	—	0	—	—	

Float 32bit ReadOnly dynamic F32ROD

#### Note

Attempting to read an object after its starting register will return an error code

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
200	SVMeasurement	QDPercentage	0	TFLOAT	1	—	—	0.0f	—	—	Percentage value of QvMaxDN
202	SVMeasurement	QvDampedObj	value_0	TFLOAT	1	—	—	—	—	—	Access Object for Damped Volume flow
204	SVMeasurement	QvPercentage	0	TFLOAT	1	—	—	0.00f	—	—	Percentage value of QvMax
206	MVMeasurement	QmDampedObj	value_0	TFLOAT	1	—	—	—	—	—	Damped value of mass flow
208	MVMeasurement	QnDampedObj	value_0	TFLOAT	1	—	—	—	—	—	Damped value of volume flow @ ref. conditions
210	MVMeasurement	QpDampedObj	value_0	TFLOAT	1	—	—	—	—	—	Damped value of energy flow
212	Coordinator	temperature_Damped_Obj	value_0	TFLOAT	1	—	—	—	—	—	Process temperature from internal RTD
214	Mapper	dvPressureObj	value_0	TFLOAT	1	—	—	—	—	—	Pressure value from AO
216	Mapper	dvDensityObj	value_0	TFLOAT	1	—	—	—	—	—	
218	Coordinator	frequency_Damped_Obj	value_0	TFLOAT	1	—	—	—	—	—	Flow frequency

**Double 64bit ReadOnly dynamic D64ROD****Note**

Attempting to read an object after its starting register will return an error code

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
500	Totalizer	totDispQv	value	TDOUBLE	1	—	—	TOTDISPVAL_DFLT	—	—	Display Object for Qv Totalizer
504	Totalizer	totDispQn	value	TDOUBLE	1	—	—	TOTDISPVAL_DFLT	—	—	Display Object for Qn Totalizer
508	Totalizer	totDispQm	value	TDOUBLE	1	—	—	TOTDISPVAL_DFLT	—	—	Display Object for Qm Totalizer
512	Totalizer	totDispEnergy	value	TDOUBLE	1	—	—	TOTDISPVAL_DFLT	—	—	Display Object for Energy Totalizer

## ... 7 Modbus TCP® interface

### ... Register table description

Character 8bit ReadOnly C8RO

#### Note

- Attempting to read an object after its starting register will return an error code.
- Private commands can only access whole strings starting with the initial object.

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
1000 – 1007	Transmitter Services	sensorID	—	TCHAR	8	—	—	—	—	—	Sensor ID
1008 – 1027	Transmitter Services	sensorSapErpNo	—	TCHAR	20	—	—	—	—	—	Sensor SAP/ERP No.
1028 – 1039	Transmitter Services	sensorCalDate	—	TCHAR	12	—	—	YYYY-MM-DD	—	—	Sensor calibration date.
1040 – 1059	Transmitter Services	sensorCalCertNo	—	TCHAR	20	—	—	—	—	—	Sensor calibration certificate No.
1060 – 1091	Transmitter Services	sensorCalLocation	—	TCHAR	32	—	—	—	—	—	Sensor calibration location
1092 – 1103	Transmitter Services	tranType	—	TCHAR	12	—	—	—	—	—	Transmitter type
1104 – 1111	Transmitter Services	tranID	—	TCHAR	8	—	—	—	—	—	Transmitter ID
1112 – 1131	Transmitter Services	tranSapErpNo	—	TCHAR	20	—	—	—	—	—	Transmitter SAP/ERP No.
1132 – 1139	Transmitter Services	swRevisionHmi_transmitter	—	TCHAR	8	—	—	—	—	—	Software revision HMI transmitter
1140 – 1147	Transmitter Services	hwRevisionHmi_transmitter	—	TCHAR	8	—	—	—	—	—	Hardware revision HMI transmitter
1148 – 1155	Transmitter Services	swRevisionHmi_fe	—	TCHAR	8	—	—	—	—	—	Software revision HMI frontend board
1156 – 1163	Transmitter Services	hwRevisionHmi_fe	—	TCHAR	8	—	—	—	—	—	Hardware revision HMI frontend board
1164 – 1175	Transmitter Services	tranCalDate	—	TCHAR	12	—	—	YYYY-MM-DD	—	—	Transmitter calibration date.
1176 – 1195	Transmitter Services	tranCalCertNo	—	TCHAR	20	—	—	—	—	—	Transmitter calibration certificate No.
1196 – 1215	Transmitter Services	manufacturer	—	TCHAR	20	—	—	—	—	—	Manufacturer
1216 – 1235	Transmitter Services	street	—	TCHAR	20	—	—	—	—	—	Street
1236 – 1255	Transmitter Services	city	—	TCHAR	20	—	—	—	—	—	City
1256 – 1275	Transmitter Services	phone	—	TCHAR	20	—	—	—	—	—	Phone
1276 – 1295	Transmitter Services	sensorLocationTag	—	TCHAR	20	—	—	—	—	—	Sensor location TAG
1296 – 1315	Transmitter Services	sensorTag	—	TCHAR	20	—	—	—	—	—	Sensor TAG
1316 – 1332	Ethernet	portMACstr	—	TCHAR	17	—	—	—	—	—	Ethernet port MAC address as array of characters
1333 – 1338	Profinet	VENDOR_ID	—	TCHAR	6	—	—	0x001A	—	—	Profinet Vendor ID
1339 – 1358	Profinet	DEVICE_NAME	—	TCHAR	20	—	—	ABB-APL-VORTEX	—	—	Profinet Device name
1359 – 1364	Profinet	DEVICE_TYPE	—	TCHAR	6	—	—	0x3439	—	—	Profinet Device type

## Unsigned Integer 8bit ReadOnly U8RO

**Note**

Attempting to read an object after its starting register will return an error code.

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
2000	Coordinator	converterType	0	TUSIGN8	1	-	-	VORTEX	0	SWIRL	Flowmeter sensor type
									1	VORTEX	
2001	Coordinator	vortexmeterSize	0	TUSIGN8	1	-	-	VortexD50mm	0	VortexD15mm	Flowmeter sensor nominal diameter
									1	VortexD25mm	
									2	VortexD40mm	
									3	VortexD50mm	
									4	VortexD80mm	
									5	VortexD100mm	
									6	VortexD150mm	
									7	VortexD200mm	
									8	VortexD250mm	
									9	VortexD300mm	
									10	VortexA15mm	
									11	VortexA25mm	
									12	VortexA40mm	
									13	VortexA50mm	
									14	VortexA80mm	
									15	VortexA100mm	
									16	VortexA150mm	
									17	VortexA200mm	
									18	VortexA250mm	
19	VortexA300mm										
2002	Coordinator	swirlmeterSize	0	TUSIGN8	1	-	-	Swirl50mm	0	Swirl15mm	Flowmeter sensor nominal diameter
									1	Swirl20mm	
									2	Swirl25mm	
									3	Swirl32mm	
									4	Swirl40mm	
									5	Swirl50mm	
									6	Swirl80mm	
									7	Swirl100mm	
									8	Swirl150mm	
									9	Swirl200mm	
									10	Swirl300mm	
11	Swirl400mm										
2003	TransmitterServices	bootloaderRevision	0	SIMPLE_U8	1	-	-	'0'	-	-	Transmitter bootloader version
2004			1	SIMPLE_U8	1	-	-	'0'	-	-	
2005			2	SIMPLE_U8	1	-	-	':'	-	-	
2006			3	SIMPLE_U8	1	-	-	'0'	-	-	
2007			4	SIMPLE_U8	1	-	-	'0'	-	-	
2008			5	SIMPLE_U8	1	-	-	':'	-	-	
2009			6	SIMPLE_U8	1	-	-	'0'	-	-	
2010			7	SIMPLE_U8	1	-	-	'4'	-	-	

## ... 7 Modbus TCP® interface

### ... Register table description

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
2011	ARM	readOnlySwitch Status	0	TUSIGN8	1	-	-	INACTIVE	0	READ_ONLY_ SWITCH_INACTIVE	Read-only (HW) switch disengaged
									1	READ_ONLY_ SWITCH_ACTIVE	Read-only (HW) switch engaged
2012	TransmitterServices	autozeroStatus	0	TUSIGN8	1	-	-	STATUS_NOT_ START	0	STATUS_ COMPLETED	
									1	STATUS_ UNCOMPLETED	
									2	STATUS_FAIL	
									3	STATUS_NOT_ START	
2013	DigitalOutput	logicValue	0	TUSIGN8	1	-	-	LOGIC_LOW	0	LOGIC_LOW	Hardware logic output is low
									1	LOGIC_HIGH	Hardware logic output is high
2014	Coordinator	calibrationStatus	0	TUSIGN8	1	-	-	SENSOR_IS_ UNCALIBRATED	0	SENSOR_IS_ CALIBRATED	Piezo sensor is calibrated.
									1	SENSOR_IS_ UNCALIBRATED	Piezo sensor is not calibrated.
2015	SVMeasurement	KLinearisation	0	TUSIGN8	1	-	-	AVERAGE	0	AVERAGE	
									1	1PT	
									2	2PT	
									3	3PT	
									4	4PT	
									5	5PT	
									6	6PT	
									7	7PT	
									8	8PT	
2016	SVMeasurement	KSET	0	TUSIGN8	1	-	-	KFACTOR_ LIQUID	0	KFACTOR_GAS	KSET_ENABLE_GAS
									1	KFACTOR_LIQUID	KSET_ENABLE_Liquid
2017	Coordinator	vbrFilNumCoef	0	TUSIGN8	1	10	50	15	-	-	
2018	Coordinator	lockMinIntPeriod	0	TUSIGN8	1	1	4	1	-	-	
2019	Coordinator	lockMaxIntPeriod	0	TUSIGN8	1	4	8	4	-	-	
2020	Coordinator	lockEstimation	0	TUSIGN8	1	10	30	10	-	-	
2021	Coordinator	accuracyHigh	0	TUSIGN8	1	1	4	1	-	-	
2022	Coordinator	accuracyMiddle	0	TUSIGN8	1	1	4	1	-	-	
2023	Coordinator	accuracyLow	0	TUSIGN8	1	1	4	1	-	-	

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
2024	Coordinator	totalGain			1			TG_CONTROL_384TIMES	0	TG_CONTROL_0P03TIMES	
									1	TG_CONTROL_0P06TIMES	
									2	TG_CONTROL_0P12TIMES	
									3	TG_CONTROL_0P24TIMES	
									4	TG_CONTROL_0P48TIMES	
									5	TG_CONTROL_0P96TIMES	
									6	TG_CONTROL_1P92TIMES	
									7	TG_CONTROL_3TIMES	
									8	TG_CONTROL_6TIMES	
									9	TG_CONTROL_12TIMES	
									10	TG_CONTROL_24TIMES	
									11	TG_CONTROL_48TIMES	
									12	TG_CONTROL_96TIMES	
									13	TG_CONTROL_192TIMES	
14	TG_CONTROL_384TIMES										
2025	Coordinator	gainCtrl	0	TUSIGN8	1			STATUS_AUTO	0	STATUS_MANUAL	
									1	STATUS_AUTO	
2026	Coordinator	gainMaxShift	0	TUSIGN8	1	0	2	0	-	-	
2027	Coordinator	lowFlowThreshOn	0	TUSIGN8	1			STATUS_OFF	0	STATUS_OFF	
									1	STATUS_ON	
2028	Coordinator	staticDecimation	0	TUSIGN8	1	0	5	0	-	-	
2029	Coordinator	middleBuf	0	TUSIGN8	1	1	6	1	-	-	
2030	Coordinator	freqMinMarginPer	0	TUSIGN8	1	0	30	0	-	-	
2031	Coordinator	freqMaxMarginPer	0	TUSIGN8	1	0	30	0	-	-	
2032	Coordinator	forceReplace	0	TUSIGN8	1			FORCE_REPLACE_NONE	0	FORCE_REPLACE_NONE	NV replace is not enabled
									1	FORCE_REPLACE_FE_TO_CB_COMMON_ONLY	NV replace from FE to CB for common data
									2	FORCE_REPLACE_FE_TO_CB	NV replace from FE to CB for all data
									3	FORCE_REPLACE_CB_TO_FE	NV replace from CB to FE for all data

## ... 7 Modbus TCP® interface

### ... Register table description

Unsigned Integer 16bit ReadOnly U16RO

#### Note

Attempting to read an object after its starting register will return an error code.

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
3000	ServicePort	baudRate	0	TUSIGN16	1	—	—	19200	—	—	Service port baud rate.
3001	Coordinator	sigAmplitude	0	TUSIGN16	1	—	—	0	—	—	
3002	Coordinator	vbrAmplitude	0	TUSIGN16	1	—	—	0	—	—	
3003	Coordinator	sigMagnitude	0	TUSIGN16	1	—	—	0	—	—	

Signed Integer 16bit ReadOnly S16RO

#### Note

Attempting to read an object after its starting register will return an error code.

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
4000	TransmitterServices	snrThreshold	0	TINT16	1	-80	50	-50	—	—	
4001	Coordinator	spanUpperRange	0	TINT16	1	0	32767	32767	—	—	
4002	Coordinator	vbrFilStep	0	TINT16	1	33	1310	33	—	—	
4003	Coordinator	gainLowThresh	0	TINT16	1	2048	10240	2048	—	—	
4004	Coordinator	gainHighThresh	0	TINT16	1	20480	30720	20480	—	—	
4005	Coordinator	gainMarginFreq	0	TINT16	1	660	4096	660	—	—	
4006	Coordinator	lowFlowThreshCoef	0	TINT16	1	-10	10	5	—	—	

## Unsigned Integer 32bit ReadOnly U32RO

## Note

Attempting to read an object after its starting register will return an error code.

Addr.	Sub-system	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
5000	Coordinator	frontend Operation Hour	0	TUSIGN32	1	—	—	0	—	—	
5002	Coordinator	total Working Time Hour	0	TUSIGN32	1	—	—	0	—	—	
5004	Ethernet	ipStats	0	TUSIGN32	1	—	—	0	—	—	Active TCP connections
5006	Ethernet	portEth StatsHMI	0	SIMPLE_U32	1	—	—	0	—	—	Statistics for Ethernet port [0] - Bytes received [1] - Bytes transmitted [2] - Error frames received [3] - Packets with collisions
5008	Ethernet	portEth StatsHMI	1	SIMPLE_U32	1	—	—	0	—	—	Statistics for Ethernet port [0] - Bytes received [1] - Bytes transmitted [2] - Error frames received [3] - Packets with collisions
5010	Ethernet	portEth StatsHMI	2	SIMPLE_U32	1	—	—	0	—	—	Statistics for Ethernet port [0] - Bytes received [1] - Bytes transmitted [2] - Error frames received [3] - Packets with collisions
5012	Ethernet	portEthStats HMI	3	SIMPLE_U32	1	—	—	0	—	—	Statistics for Ethernet port [0] - Bytes received [1] - Bytes transmitted [2] - Error frames received [3] - Packets with collisions
5014	Digital Output	pulseNum	0	TUSIGN32	1	—	—	0	—	—	Pulse output value (the actual number of pulse output)
5016	Totalizer	totQv OverrollCnt	0	TUSIGN32	1	—	—	0	—	—	
5018	Totalizer	totQn OverrollCnt	0	TUSIGN32	1	—	—	0	—	—	
5020	Totalizer	totQm OverrollCnt	0	TUSIGN32	1	—	—	0	—	—	
5022	Totalizer	totEnergy OverrollCnt	0	TUSIGN32	1	—	—	0	—	—	
5024	Coordinator	frontend Maintenance	0	TUSIGN32	1	MIN_ MAINTENANCE_C YCLE_HOURS	MAX_ MAINTENANCE_C YCLE_HOURS	DEFAULT_ MAINTENANCE_C YCLE_HOURS	—	—	

## ... 7 Modbus TCP® interface

### ... Register table description

Float 32bit ReadOnly F32RO

#### Note

Attempting to read an object after its starting register will return an error code.

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
6000	SVMeasurement	QvMaxDNObj	value_0	TFLOAT	1	-	-	-	-	-	Access Object of the maximum measurable volume flow
6002	MVMeasurement	QmMaxDNObj	value_0	TFLOAT	1	-	-	-	-	-	
6004	MVMeasurement	QnMaxDNObj	value_0	TFLOAT	1	-	-	-	-	-	
6006	MVMeasurement	QpMaxDNObj	value_0	TFLOAT	1	-	-	-	-	-	
6008	SVMeasurement	Re	0	TFLOAT	1	-	-	10000.00f	-	-	Reynolds Number
6010	Mapper	dvTExtObj	value_0	TFLOAT	1	-	-	-	-	-	Default backflow temperature
6012	Transmitter Services	Transmitter Temperature_Obj	value_0	TFLOAT	1	-	-	0.0f	-	-	
6014	AnalogInput	aiTempCurr	0	TFLOAT	1	0.0f	26.0f	4.01f	-	-	Actual current of the analog input
6016	DigitalOutput	frequencyValue	0	TFLOAT	1	-	-	0.0f	-	-	The actual frequency the DO output
6018	Totalizer	totOverrollBase	0	TFLOAT	1	-	-	10000000.0f	-	-	
6020	Transmitter Services	Ambient Temperature Max_obj	value_0	TFLOAT	1	-	-	0.0f	-	-	
6022	Coordinator	Temperature MaxRecord_obj	value_0	TFLOAT	1	-	-	-	-	-	
6024	Coordinator	snr	0	TFLOAT	1	0.0f	1.0f	0.0f	-	-	
6026	SVMeasurement	KAverageLiquid	0	TFLOAT	1	10.00f	800000.00f	7420.00f	-	-	Average Liquid K Factor
6028	SVMeasurement	KLiquid	0	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Liquid KFactor of 5 Point
6030	SVMeasurement	KLiquid	1	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Liquid KFactor of 5 Point
6032	SVMeasurement	KLiquid	2	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Liquid KFactor of 5 Point
6034	SVMeasurement	KLiquid	3	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Liquid KFactor of 5 Point
6036	SVMeasurement	KLiquid	4	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Liquid KFactor of 5 Point
6038	SVMeasurement	KLiquid	5	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Liquid KFactor of 5 Point
6040	SVMeasurement	KLiquid	6	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Liquid KFactor of 5 Point
6042	SVMeasurement	KLiquid	7	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Liquid KFactor of 5 Point
6044	SVMeasurement	KLiquidFreq	0	FLOAT	1	0.30F	1000.00F	0.50f	-	-	5 Point Frequency relate to KFactor
6046	SVMeasurement	KLiquidFreq	1	FLOAT	1	0.30F	1000.00F	41.00f	-	-	5 Point Frequency relate to KFactor
6048	SVMeasurement	KLiquidFreq	2	FLOAT	1	0.30F	1000.00F	62.00f	-	-	5 Point Frequency relate to KFactor
6050	SVMeasurement	KLiquidFreq	3	FLOAT	1	0.30F	1000.00F	83.00f	-	-	5 Point Frequency relate to KFactor
6052	SVMeasurement	KLiquidFreq	4	FLOAT	1	0.30F	1000.00F	104.00f	-	-	5 Point Frequency relate to KFactor
6054	SVMeasurement	KLiquidFreq	5	FLOAT	1	0.30F	1000.00F	123.00f	-	-	5 Point Frequency relate to KFactor
6056	SVMeasurement	KLiquidFreq	6	FLOAT	1	0.30F	1000.00F	143.00f	-	-	5 Point Frequency relate to KFactor
6058	SVMeasurement	KLiquidFreq	7	FLOAT	1	0.30F	1000.00F	164.00f	-	-	5 Point Frequency relate to KFactor

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
6060	SVMeasurement	KAverageGas	0	TFLOAT	1	10.00f	800000.00f	7420.00f	-	-	Average Gas K Factor
6062	SVMeasurement	KGas	0	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Gas KFactor of 5 Point
6064	SVMeasurement	KGas	1	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Gas KFactor of 5 Point
6066	SVMeasurement	KGas	2	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Gas KFactor of 5 Point
6068	SVMeasurement	KGas	3	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Gas KFactor of 5 Point
6070	SVMeasurement	KGas	4	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Gas KFactor of 5 Point
6072	SVMeasurement	KGas	5	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Gas KFactor of 5 Point
6074	SVMeasurement	KGas	6	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Gas KFactor of 5 Point
6076	SVMeasurement	KGas	7	FLOAT	1	10.00f	800000.00f	7420.00f	-	-	Gas KFactor of 5 Point
6078	SVMeasurement	KGasFreq	0	FLOAT	1	2.00f	3000.00f	44.00f	-	-	5 Point Frequency relate to Gas K Factor
6080	SVMeasurement	KGasFreq	1	FLOAT	1	2.00f	3000.00f	427.00f	-	-	5 Point Frequency relate to Gas K Factor
6082	SVMeasurement	KGasFreq	2	FLOAT	1	2.00f	3000.00f	810.00f	-	-	5 Point Frequency relate to Gas K Factor
6084	SVMeasurement	KGasFreq	3	FLOAT	1	2.00f	3000.00f	1193.00f	-	-	5 Point Frequency relate to Gas K Factor
6086	SVMeasurement	KGasFreq	4	FLOAT	1	2.00f	3000.00f	1275.00f	-	-	5 Point Frequency relate to Gas K Factor
6088	SVMeasurement	KGasFreq	5	FLOAT	1	2.00f	3000.00f	1375.00f	-	-	5 Point Frequency relate to Gas K Factor
6090	SVMeasurement	KGasFreq	6	FLOAT	1	2.00f	3000.00f	1475.00f	-	-	5 Point Frequency relate to Gas K Factor
6092	SVMeasurement	KGasFreq	7	FLOAT	1	2.00f	3000.00f	1575.00f	-	-	5 Point Frequency relate to Gas K Factor
6094	Coordinator	maxFlowFreq	0	TFLOAT	1	19.0f	3000.0f	3000.0f	-	-	
6096	Coordinator	minFlowFreq	0	TFLOAT	1	0.0f	1000.0f	0.0f	-	-	
6098	Coordinator	febTemperature_Obj	value_0	TFLOAT	1	-	-	0.0f	-	-	
6100	Coordinator	febTemperature_Obj	value_0	TFLOAT	1	-	-	0.0f	-	-	
		MaxRecord_Obj									

### Variant 16bit ReadOnly ScanRegister1 V16R01

#### Note

Attempting to read an object after its starting register will return an error code.

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
9000	Modbus	ScanRegister1	0	SIMPLE_U16	1	—	—	0	—	—	Scan Register 1
...			...								
9031	Modbus	ScanRegister1	31	SIMPLE_U16	1	—	—	0	—	—	

### Variant 16bit ReadOnly ScanRegister2 V16R02

#### Note

Attempting to read an object after its starting register will return an error code

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
9100	Modbus	ScanRegister2	0	SIMPLE_U16	1	-	-	0	-	-	Scan Register 2
...			...								
9131	Modbus	ScanRegister2	31	SIMPLE_U16	1	-	-	0	-	-	

## ... 7 Modbus TCP® interface

### ... Register table description

#### Holding register

Character 8bit ReadWrite C8RW

#### Note

- Attempting to read an object after its starting register will return an error code.
- Private commands can only access whole strings starting with the initial object.

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
0 – 31	TransmitterServices	tranCalLocation	0 – 31	TCHAR	32	—	—	0	—	—	Transmitter calibration location.
32 – 62	Ethernet	hostName	0 – 30	TCHAR	31	—	—	0	—	—	Host name
63 – 93	Ethernet	domainName	0 – 30	TCHAR	31	—	—	0	—	—	Domain Name
94 – 99	Coordinator	internalRTDPassword	0 – 5	TCHAR	6	—	—	*****	—	—	
100 – 105	Coordinator	analogInputPassword	0 – 5	TCHAR	6	—	—	*****	—	—	
106 – 111	Coordinator	energyFlowPassword	0 – 5	TCHAR	6	—	—	*****	—	—	

#### Unsigned Integer 8bit ReadWrite U8RW

#### Note

Attempting to read an object after its starting register will return an error code.

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
1000	HMI	language	0	TUSIGN8	1	-	-	DEFAULT_LANGUAGE	-	-	-
1001	Coordinator	operatingMode	0	TUSIGN8	1	-	-	LIQUID_ACTUAL_VOLUME	0	LIQUID_ACTUAL_VOLUME	Liquid volume
									2	LIQUID_MASS	Liquid mass
									4	GAS_ACTUAL_VOLUME	Gas actual volume
									5	GAS_STANDARD_VOLUME	Gas standard volume
									6	GAS_MASS	Gas mass
									10	STEAM_ACTUAL_VOLUME	Steam actual volume
									11	STEAM_MASS	Steam mass
1002	DigitalOutput	outputMode	0	TUSIGN8	1	-	-	DO1_NONE	0	DO1_NONE	Output DO1 is disabled
									1	DO1_LOGIC	Output DO1 logic signal
									2	DO1_PULSE	Output DO1 pulse signal
									3	DO1_FREQUENCY	Output DO1 frequency signal
1003	DigitalOutput	lgcActState	0	TUSIGN8	1	-	-	ACTIVE_HIGH	0	ACTIVE_HIGH	Logic output Active State is high
									1	ACTIVE_LOW	Logic output Active State is low

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
1004	SVMeasurement	QvObj	unit	TUSIGN8	1	-	-	-	0	ACTIVE_HIGH	Logic output Active State is high
									1	ACTIVE_LOW	Logic output Active State is low
1005	MVMeasurement	QmObj	unit	TUSIGN8	1	-	-	-	0	ACTIVE_HIGH	Logic output Active State is high
									1	ACTIVE_LOW	Logic output Active State is low
1006	MVMeasurement	QnObj	unit	TUSIGN8	1	-	-	-	0	ACTIVE_HIGH	Logic output Active State is high
									1	ACTIVE_LOW	Logic output Active State is low
1007	MVMeasurement	QpDampedObj	unit	TUSIGN8	1	-	-	-	0	ACTIVE_HIGH	Logic output Active State is high
									1	ACTIVE_LOW	Logic output Active State is low
1008	Mapper	dvDensityObj	unit	TUSIGN8	1	-	-	-	0	ACTIVE_HIGH	Logic output Active State is high
									1	ACTIVE_LOW	Logic output Active State is low
1009	Coordinator	temperature_Obj	unit	TUSIGN8	1	-	-	CELSIUS	0	ACTIVE_HIGH	Logic output Active State is high
									1	ACTIVE_LOW	Logic output Active State is low
1010	Mapper	dvPressureObj	unit	TUSIGN8	1	-	-	-	0	ACTIVE_HIGH	Logic output Active State is high
									1	ACTIVE_LOW	Logic output Active State is low
1011	Totalizer	totQvUnit	units Code	TUSIGN8	1	-	-	TOTALIZER_ TotalizerUnitIDXC ubicMetres	0	ACTIVE_HIGH	Logic output Active State is high
									1	ACTIVE_LOW	Logic output Active State is low

## ... 7 Modbus TCP® interface

### ... Register table description

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
1012	Totalizer	totQmUnit	units Code	TUSIGN8	1	-	-	TOTALIZER_ TotalizerUnitDXK ilograms	0	ACTIVE_HIGH	Logic output Active State is high
									1	ACTIVE_LOW	Logic output Active State is low
1013	Totalizer	totQnUnit	units Code	TUSIGN8	1	-	-	TOTALIZER_ TotalizerUnitDXC ubicMetres	0	ACTIVE_HIGH	Logic output Active State is high
									1	ACTIVE_LOW	Logic output Active State is low
1014	Totalizer	totEnergyUnit	units Code	TUSIGN8	1	-	-	TOTALIZER_ TotalizerUnitDXK iloWattHour	0	ACTIVE_HIGH	Logic output Active State is high
									1	ACTIVE_LOW	Logic output Active State is low
1015	AnalogInput	aiSelection	0	TUSIGN8	1	-	-	WITHOUT	0	EXT_TEMPERATURE	For condensate backflow temperature for net energy metering
									1	PRESSURE	
									2	PRESSURE_ABS	
									3	DENSITY	
									5	EXTERNAL_OUTPUT_CUTOFF	
									6	WITHOUT	
									7	INTER_TEMPERATURE	For remote temperature sensor
1016	AnalogInput	aiExternalCutOff Option	0	TUSIGN8	1	-	-	EXTERNAL_CUT_OFF_4MA	0	EXTERNAL_CUT_OFF_4MA	
									1	EXTERNAL_CUT_OFF_8MA	
									2	EXTERNAL_CUT_OFF_12MA	
1017	MVMeasurement	gasDensity Selection	0	TUSIGN8	1	-	-	ACTUAL_DENSITY	0	REFERENCY_DENSITY	Select the Standard Density
									1	ACTUAL_DENSITY	Selectct Preset Density or AI. or Hart.
1018	MVMeasurement	gasRef	0	TUSIGN8	1	-	-	UK	0	UK	14.7 psia 60°F (15.4°C) (UK)
									1	US	14.7 psia 70°F (21.6°C) (US)
									2	DEG0	1013.25 mbar and 0°C
									3	DEG20	(CGPM), 1013.25 mbar and 20°C

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
1019	MVMeasurement	steamType	0	TUSIGN8	1	-	-	STEAMTYPE_SATURATED	0 1 2	STEAMTYPE_OVERHEAT STEAMTYPE_SATURATED STEAMTYPE_WATER	
1020	Coordinator	actualDensity Selection	0	TUSIGN8	1	-	-	EXT_DENSITY	0 1 2 3	EXT_DENSITY CALCULATION_FROM_TP CALCULATION_FROM_T CALCULATION_FROM_P	
1021	MVMeasurement	steamPwrrFR	0	TUSIGN8	1	-	-	FWD_ONLY	0 1	FWD_ONLY FWD_REV	For Steam Gross energy For Steam net energy
1022	HMI	SetPassword_StandardLevel	0	SIMPLE_U8	1	-	-	0x00	-	—	Used by the HMI user to set a new standard level password
1023	HMI	SetPassword_StandardLevel	1	SIMPLE_U8	1	-	-	0x00	-		
1024	HMI	SetPassword_StandardLevel	2	SIMPLE_U8	1	-	-	0x00	-		
1025	HMI	SetPassword_StandardLevel	3	SIMPLE_U8	1	-	-	0x00	-		
1026	HMI	SetPassword_StandardLevel	4	SIMPLE_U8	1	-	-	0x00	-		
1027	HMI	SetPassword_StandardLevel	5	SIMPLE_U8	1	-	-	0x00	-		
1028	ARM	serviceAccount Switch	0	TUSIGN8	1	-	-	CUSTODY_SWITCH_ACTIVE	0 1	CUSTODY_SWITCH_INACTIVE CUSTODY_SWITCH_ACTIVE	Custody (HW) switch disengaged Custody (HW) switch engaged
1029	Coordinator	vbrCorrectionOn	0	TUSIGN8	1	-	-	STATUS_OFF	0 1	STATUS_OFF STATUS_ON	
1030	Coordinator	compressionSetup	0	TUSIGN8	1	-	-	COMPRESSION_OFF	0 1 2	COMPRESSION_OFF COMPRESSION_ON_50HZ COMPRESSION_ON_60HZ	

## ... 7 Modbus TCP® interface

### ... Register table description

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
1031	HMI	displayMode_1	0	TUSIGN8	1	-	-	PAGE_1_	0	Graph view	Configure operator page 1
								DEFAULT_	1	MODE 1x6_B	
								FORMAT	2	MODE 1x6_BAR_B	
									3	MODE 1x9	
									4	MODE 1x9_BAR	
									5	MODE 2x9	
									6	MODE 2x9_BAR	
									7	MODE 3x9	
1032	HMI	mainOperator View_1_1	0	TUSIGN8	1	-	-	PAGE_1_	0	QD%	Selection of process variable displayed in row 1.
								DEFAULT_LINE_1	1	QV	
									2	QV%	
									4	QM	
									5	QN	
									7	QP	
									8	Temperature	
									9	Pressure	
									10	Gas%	
									11	Density	
									12	Tot Act Vol	
									13	Tot Std Vol	
									14	Tot Mass	
									15	Tot Par Act	
									16	Tot Par Std	
									17	Tot Energy	
									18	Frequency	
								1033	HMI	mainOperator View_1_2	
DEFAULT_LINE_2	...										
	18										
1034	HMI	mainOperator View_1_3	0	TUSIGN8	1	-	-	PAGE_1_	0	See description of register 1032	Selection of process variable displayed in row 3.
								DEFAULT_LINE_3	...		
									18		
1035	HMI	mainOperator View_1_bargraph	0	TUSIGN8	1	-	-	PAGE_1_	0	QD%	Selection of process variable displayed as a bar graph.
								DEFAULT_LINE_B	1	QV	
									2	QV%	
									4	QM	
									7	QP	
	16	Tot Par Std									

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
1036	HMI	displayMode_2	0	TUSIGN8	1	-	-	PAGE_2_ DEFAULT_ FORMAT			See description of registers 1031 – 1035 for HMI page 1
1037	HMI	mainOperator View_2_1	0	TUSIGN8	1	-	-	PAGE_2_ DEFAULT_LINE_1			
1038	HMI	mainOperator View_2_2	0	TUSIGN8	1	-	-	PAGE_2_ DEFAULT_LINE_2			
1039	HMI	mainOperator View_2_3	0	TUSIGN8	1	-	-	PAGE_2_ DEFAULT_LINE_3			
1040	HMI	mainOperator View_2_bargraph	0	TUSIGN8	1	-	-	PAGE_2_ DEFAULT_LINE_B			
1041	HMI	displayMode_3	0	TUSIGN8	1	-	-	PAGE_3_ DEFAULT_ FORMAT			See description of registers 1031 – 1035 for HMI page 1
1042	HMI	mainOperator View_3_1	0	TUSIGN8	1	-	-	PAGE_3_ DEFAULT_LINE_1			
1043	HMI	mainOperator View_3_2	0	TUSIGN8	1	-	-	PAGE_3_ DEFAULT_LINE_2			
1044	HMI	mainOperator View_3_3	0	TUSIGN8	1	-	-	PAGE_3_ DEFAULT_LINE_3			
1045	HMI	mainOperator View_3_bargraph	0	TUSIGN8	1	-	-	PAGE_3_ DEFAULT_LINE_B			
1046	HMI	displayMode_4	0	TUSIGN8	1	-	-	PAGE_4_ DEFAULT_ FORMAT			See description of registers 1031 – 1035 for HMI page 1
1047	HMI	mainOperatorView_ 4_1	0	TUSIGN8	1	-	-	PAGE_4_ DEFAULT_LINE_1			
1048	HMI	mainOperatorView_ 4_2	0	TUSIGN8	1	-	-	PAGE_4_ DEFAULT_LINE_2			
1049	HMI	mainOperatorView_ 4_3	0	TUSIGN8	1	-	-	PAGE_4_ DEFAULT_LINE_3			
1050	HMI	mainOperatorView_ 4_bargraph	0	TUSIGN8	1	-	-	PAGE_4_ DEFAULT_LINE_B			

## ... 7 Modbus TCP® interface

### ... Register table description

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
1051	HMI	autoscrollEnable	0	TUSIGN8	1	-	-	DEFAULT_AUTOSCROLL_ENABLE	eTRUE	AUTOSCROLL_ENABLED	Autoscroll Enabled
									eFALSE	AUTOSCROLL_DISABLED	Autoscroll Disabled
1052	HMI	customDP_1	0	TUSIGN8	1	-	-	DEFAULT_CUSTOM_DP_1	0	DP 0 //X	Format for custom DP1
									1	DP 1 //X.X	
									2	DP 2 //X.XX	
									3	DP 3 //X.XXX	
									4	DP 4 //X.XXXX	
									5	DP 5 //X.XXXXX	
1053	HMI	customDP_2	0	TUSIGN8	1	-	-	DEFAULT_CUSTOM_DP_2	0	See description of register 1052	Format for custom DP2
									...		
									6		
									0		
									1		
									2		
1054	HMI	DateFormat	0	TUSIGN8	1	-	-	DATE_FORMAT_YYY_MM_DD	0	DATE_FORMAT_DD_MM_YYYY	DD-MM-YYYY
									1	DATE_FORMAT_MM_DD_YYYY	MM-DD-YYYY
									2	DATE_FORMAT_YYYY_MM_DD	YYYY-MM-DD
1055	Transmitter Services	modeLCDLight	0	TUSIGN8	1	-	-	LIGHT_DYNAMIC	0	LIGHT_OFF	HMI LCD light turn off
									1	LIGHT_ON	HMI LCD light turn on
									2	LIGHT_DYNAMIC	HMI LCD light auto adjust
1056	TransmitterServices	switchBLE	0	TUSIGN8	1	-	-	BLE_TOOTH_ON	0	BLE_TOOTH_OFF	HMI Bluetooth off
									5	BLE_TOOTH_ON	HMI Bluetooth on
1057	DigitalOutput	generalAlarm	0	TUSIGN8	1	-	-	ALARM_DISABLE	0	ALARM_DISABLE	
									1	ALARM_ENABLE	
1058	DigitalOutput	minFlowrateAlarm	0	TUSIGN8	1	-	-	ALARM_DISABLE	0	ALARM_DISABLE	
									1	ALARM_ENABLE	
1059	DigitalOutput	maxFlowrateAlarm	0	TUSIGN8	1	-	-	ALARM_DISABLE	0	ALARM_DISABLE	
									1	ALARM_ENABLE	
1060	DigitalOutput	maxTemperature Alarm	0	TUSIGN8	1	-	-	ALARM_DISABLE	0	ALARM_DISABLE	
									1	ALARM_ENABLE	
1061	DigitalOutput	minTemperature Alarm	0	TUSIGN8	1	-	-	ALARM_DISABLE	0	ALARM_DISABLE	
									1	ALARM_ENABLE	
1062	DigitalOutput	lowFlowCutOff	0	TUSIGN8	1	-	-	ALARM_DISABLE	0	ALARM_DISABLE	
									1	ALARM_ENABLE	
1063	Coordinator	reaction_InputFail	0	TUSIGN8	1	-	-	PRESET	0	PRESET	
									1	LAST_GOOD_VALUE	
1064	Mapper	diagMaintainMask	0	TUSIGN8	1	-	-	DISABLE	0	DISABLE	
									1	ENABLE	
1065	Mapper	diagFunCheckMask	0	TUSIGN8	1	-	-	DISABLE	0	DISABLE	
									1	ENABLE	
1066	Mapper	diagOffSpecMask	0	TUSIGN8	1	-	-	DISABLE	0	DISABLE	
									1	ENABLE	
1067	Mapper	diagMinFlowMask	0	TUSIGN8	1	-	-	DISABLE	0	DISABLE	
									1	ENABLE	
1068	Mapper	diagMaxFlowMask	0	TUSIGN8	1	-	-	DISABLE	0	DISABLE	
									1	ENABLE	

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
1069	Mapper	diagFlow103Mask	0	TUSIGN8	1	-	-	DISABLE	0	DISABLE	
									1	ENABLE	
1070	Mapper	diagLowCutoffMask	0	TUSIGN8	1	-	-	ENABLE	0	DISABLE	
									1	ENABLE	
1071	Mapper	diagTSensorFailMask	0	TUSIGN8	1	-	-	DISABLE	0	DISABLE	
									1	ENABLE	
1072	Mapper	diagTSensorOffSpecMask	0	TUSIGN8	1	-	-	DISABLE	0	DISABLE	
									1	ENABLE	
1073	Mapper	diagTxSensorOffSpecMask	0	TUSIGN8	1	-	-	DISABLE	0	DISABLE	
									1	ENABLE	
1074	Ethernet	selectedMainProtocol	0	TUSIGN8	1	-	-	PROFINETIO_PROTOCOL	0	INVALID_PROTOCOL	Invalid protocol
									1	PROFINETIO_PROTOCOL	PROFINET IO is selected
1075	Ethernet	useDhcp	0	TUSIGN8	1	-	-	DHCP_STATE_DISABLED	0	DHCP_STATE_DISABLED	DHCP is disabled and static IP settings are used
									1	DHCP_STATE_ENABLED	DHCP is enabled
1076	Ethernet	enableProfinetIo	0	TUSIGN8	1	-	-	UNSECURED_ACCESS_READ_WRITE	0	UNSECURED_ACCESS_INVALID	Access is undefined
									1	UNSECURED_ACCESS_DISABLED	Access is disabled
									2	UNSECURED_ACCESS_UNSECURED_READ_ONLY	Access is unsecured with read only permission
									3	UNSECURED_ACCESS_UNSECURED_READ_WRITE	Access is unsecured with read and write permission
1077	Profinet	DeviceTypeSelect	0	TUSIGN8	1	-	-	DEVICE_TYPE_ABB_VORTEX_APL	0	DEVICE_TYPE_PA_PROFILE_V_4_02	
									1	DEVICE_TYPE_ABB_VORTEX_APL	
1078	Ethernet	enableModbusTcp	0	TUSIGN8	1	-	-	UNSECURED_ACCESS_DISABLED	0	UNSECURED_ACCESS_INVALID	Access is undefined
									1	UNSECURED_ACCESS_DISABLED	Access is disabled
									2	UNSECURED_ACCESS_UNSECURED_READ_ONLY	Access is unsecured with read only permission
									3	UNSECURED_ACCESS_UNSECURED_READ_WRITE	Access is unsecured with read and write permission

## ... 7 Modbus TCP® interface

### ... Register table description

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
1079	Modbus	modbusIEEEFormat	0	TUSIGN8	1	-	-	CONFIGURATION_IEEE_FORMAT_ENABLED	0	CONFIGURATION_IEEE_FORMAT_ENABLED	IEEE format enabled for word swap
									1	CONFIGURATION_IEEE_FORMAT_DISABLED	IEEE format disabled for word swap
1080	Ethernet	enableWebserver	0	TUSIGN8	1	-	-	SECURED_ACCESS_READ_WRITE	0	SECURED_ACCESS_INVALID	Access is undefined
									1	SECURED_ACCESS_DISABLED	Access is disabled
									4	SECURED_ACCESS_SECURED_READ_ONLY	Access is secured with read only permission
									5	SECURED_ACCESS_SECURED_READ_WRITE	Access is secured with read and write permission
1081	Coordinator	simulationMode	0	TUSIGN8	1	-	-	SIMULATION_CB_OFF	0	SIMULATION_CB_OFF	Sim off
									1	SIMULATION_CB_QV_VALUE	Qv Val
									2	SIMULATION_CB_QV_PERCENTAGE	Qv Percentage
									3	SIMULATION_CB_QM_VALUE	Qm Val
									4	SIMULATION_CB_QM_PERCENTAGE	Qm Percentage
									5	SIMULATION_CB_MEDIUM_TEMP	Medium temperature
									6	SIMULATION_CB_AMBIENT_TEMP	Ambient temperature
									8	SIMULATION_CB_DO_FREQ	Temp DO Freq DO
									9	SIMULATION_CB_DO_LOGIC	Logic DO
									10	SIMULATION_CB_DO_PULSE	Temp DO Freq DO
									12	SIMULATION_CB_AI_VALUE	PulsAI Val
									13	SIMULATION_FE_SENSOR_FREQ	Sensor Freq
									1082	SVMeasurement	QvSimObj
1083	MVMeasurement	QmSimObj	unit	TUSIGN8	1	-	-	-			
1084	Coordinator	temperatureSimObj	unit	TUSIGN8	1	-	-	CELSIUS			

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
1085	DigitalOutput	lgcSimCmd	0	TUSIGN8	1	-	-	COMMAND_OFF	0	COMMAND_OFF	Simulate logic OFF
									1	COMMAND_ON	Simulate logic ON
1086	Mapper	diagSimulation Type	0	TUSIGN8	1	-	-	OFF	0	OFF	See error
									2	Simulate_Digital_Out	description in
									4	VORTEX_SENSOR_FAILURE	the operating
									5	TEMP_SENSOR_FAILURE	instruction
									6	VIBRAT_SENSOR_FAILURE	
									7	ANALOGINPUT_OUT_OF_RANGE	
									8	FLOWRATE_REACH_QMAX	
									9	PROCESS_TEMP_REACH_TMAX	
									10	ANALOGINPUT_CUT_OFF	
									11	PRESSURE_REACH_PMAX	
									14	FLOWRATE_REACH_QMIN	
									15	PROCESS_TEMP_REACH_TMIN	
									17	PRESSURE_REACH_PMIN	
									20	SNR_FAILURE	
									21	FE_NV_FAILURE	
									22	SENSOR_CAL_STATUS	
23	FE_SYNC_MISSING										
24	FE_BOARD_COMM_ERROR										
27	CB_NV_FAILURE										
28	AI_SPI_COM_FAIL										
29	DIGITAL_OUT_CUTOFF										
30	RE_OUT_LINEAR_RANGE										
34	STEAM_TYPE_MISMATCH										
35	MAINTENANCE_WARNING										
36	CB_INSUF_INPUT_VOLTAGE										

## ... 7 Modbus TCP® interface

### ... Register table description

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
1086	Mapper	diagSimulation Type	0	TUSIGN8	1	-	-	OFF	37	AMBIENT_TEMP_	See error description in the operating instruction
										REACH_TMIN	
									38	AMBIENT_TEMP_	
										REACH_TMAX	
									39	LOW_FLOWRATE_CUTOFF	
									40	FLOWRATE_BG_103	
									41	DATA_SIMU_ALARM	
									42	DIAG_SIMU_ALARM	
									47	NV_REPLACE_ERROR	
									48	FE_RAM_FAILURE	
1087	Coordinator	intRTDType	0	TUSIGN8	1	-	-	TEMP_NONE	0	TEMP_PT100	PT100 temperature sensor
									2	TEMP_NONE	None temperature sensor
1088	Coordinator	autoselfcheck_	0	TUSIGN8	1	-	-	STATUS_ON	0	STATUS_OFF	
									1	STATUS_ON	
1089	Coordinator	noiseSampSize	0	TUSIGN8	1	4	8	4	-	-	

**Signed Integer 16bit ReadWrite S16RW****Note**

Attempting to read an object after its starting register will return an error code.

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
3000	Coordinator	lowFlowThresh	0	TINT16	1	7	2000	7	—	·	—
3001	DigitalOutput	simuPulsesNum	0	TINT16	1	0	10000	100	—	·	— Simulate pulse number
3002	Coordinator	lowFlowThreshold Upper	0	TINT16	1	7	32767	7	—	·	—

**Unsigned Integer 32bit ReadWrite U32RW****Note**

Attempting to read an object after its starting register will return an error code.

Address	Sub-system	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
4000	Ethernet	hostAddress	0	TUSIGN32	1	-	-	0xC0A80103	-	-	Host IP address
4002	Ethernet	subnetMask	0	TUSIGN32	1	-	-	0xFFFFFFFF00	-	-	Subnet mask
4004	Ethernet	gateway Address	0	TUSIGN32	1	-	-	0xC0A80101	-	-	Gateway IP address
4006	Ethernet	ntpServer Address	0	TUSIGN32	1	-	-	0xC0A80164	-	-	NTP primary and secondary server IP address
4008	Ethernet	ntpServer Address	1	SIMPLE_ U32	1	-	-	0xC0A80165	-	-	NTP primary and secondary server IP address
4010	Ethernet	dnsAddress	0	SIMPLE_ U32	1	-	-	0	-	-	Domain Name Server Addresses
4012	Ethernet	dnsAddress	1	SIMPLE_ U32	1	-	-	0	-	-	Domain Name Server Addresses
4014	Web Server	session TimeoutIn Minutes	0	TUSIGN32	1	-	-	5	-	-	Session timeout in minutes
4016	Coor- dinator	Both Maintenance Cycle	0	TUSIGN32	1	MIN_ MAINTENANCE_ CYCLE_HOURS	MAX_ MAINTENANCE_ CYCLE_HOURS	DEFAULT_ MAINTENANCE_ CYCLE_HOURS	-	-	Both FE and CB maintenance cycle
4018	Coor- dinator	tran Maintenance Cycle	0	TUSIGN32	1	MIN_ MAINTENANCE_ CYCLE_HOURS	MAX_ MAINTENANCE_ CYCLE_HOURS	DEFAULT_ MAINTENANCE_ CYCLE_HOURS	-	-	Transmitter maintenace cycle

## ... 7 Modbus TCP® interface

### ... Register table description

Float 32bit ReadWrite F32RW

#### Note

Attempting to read an object after its starting register will return an error code.

Address	Subsystem	Object	Attr.	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
5000	DigitalOutput	pulseFactor	value	TFLOAT	1	—	—	PULSE_FACTOR_DEFAULT	—	—	Pulse factor.
5002	DigitalOutput	pulseWidth	value	TFLOAT	1	—	—	PULSE_WIDTH_DEFAULT	—	—	Pulse Width.
5004	DigitalOutput	minFrequency	value	TFLOAT	1	—	—	OUTPUTFREQ_MIN	—	—	frequency minimum range
5006	DigitalOutput	maxFrequency	value	TFLOAT	1	—	—	OUTPUTFREQ_MAX	—	—	frequency maximum range
5008	Mapper	dvExtRangeObj	value_0	TFLOAT	1	—	—	—	—	—	
5010	Mapper	dvExtRangeObj	value_1	TFLOAT	1	—	—	—	—	—	
5012	Mapper	dvPressureRange RelativeObj	value_0	TFLOAT	1	—	—	—	—	—	
5014	Mapper	dvPressureRange RelativeObj	value_1	TFLOAT	1	—	—	—	—	—	
5016	Mapper	dvPressureRange Obj	value_0	TFLOAT	1	—	—	—	—	—	
5018	Mapper	dvPressureRange Obj	value_1	TFLOAT	1	—	—	—	—	—	
5020	Mapper	dvDensityRangeO bj	value_0	TFLOAT	1	—	—	—	—	—	
5022	Mapper	dvDensityRangeO bj	value_1	TFLOAT	1	—	—	—	—	—	
5024	Coordinator	temperature_ range_Obj	value_0	TFLOAT	1	—	—	—	—	—	
5026	Coordinator	temperature_ range_Obj	value_1	TFLOAT	1	—	—	—	—	—	
5028	MVMeasurement	densigyRefObj	value_0	TFLOAT	1	—	—	—	—	—	
5030	Mapper	dvDensity PresetObj	value_0	TFLOAT	1	—	—	—	—	—	Preset medium density
5032	Coordinator	temperature Preset_Obj	value_0	TFLOAT	1	—	—	0.0F	—	—	Preset flow temperature
5034	Mapper	dvTextPresetObj	value_0	TFLOAT	1	—	—	—	—	—	Preset backflow temperature
5036	Mapper	dvPressure PresetObj	value_0	TFLOAT	1	—	—	—	—	—	
5038	SVMeasurement	QvRangeObj	value_0	TFLOAT	1	—	—	—	—	—	Access Object for Volume flow ranges
5040	MVMeasurement	QnRangeObj	value_0	TFLOAT	1	—	—	—	—	—	Object to combine the Volume flowrate upperrange with the Range unit.

Address	Subsystem	Object	Attr.	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
5042	MVMeasurement	QmRangeObj	value_0	TFLOAT	1	—	—	—	—	—	Object to combine the Volume flowrate uperrange with the Range unit.
5044	MVMeasurement	QpRangeObj	value_0	TFLOAT	1	—	—	—	—	—	Object to combine the Volume flowrate uperrange with the Range unit.
5046	SVMeasurement	QvDamping Time	0	TFLOAT	1	0.0f	100.01f	1.0	—	—	Damping Time of Volume flow
5048	MVMeasurement	QnDamping Time	0	TFLOAT	1	0.0f	100.0f	1.00f	—	—	
5050	MVMeasurement	QmDamping Time	0	TFLOAT	1	0.0f	100.0f	1.00f	—	—	
5052	MVMeasurement	QpDampingTime	0	TFLOAT	1	0.0f	100.0f	1.00f	—	—	
5054	SVMeasurement	QvLowCutOff	0	TFLOAT	1	0.00f	20.0f	4.00f	—	—	Cut off volume flow.
5056	SVMeasurement	dynViscosity	0	TFLOAT	1	1.0E-12f	2.0E+12f	0.0005f	—	—	dynamic Viscosity
5058	Coordinator	temperature OffsetCorrect UserDisp	0	TFLOAT	1	-50.0f	50.0f	0.0f	—	—	
5060	MVMeasurement	QAlmRange	loLim	TFLOAT	1	—	—	0.00f	—	—	
5062	MVMeasurement	QAlmRange	hiLim	TFLOAT	1	—	—	100.0f	—	—	
5064	Coordinator	temperature AlmRange_obj	value_1	TFLOAT	1	—	—	—	—	—	
5066	Coordinator	temperature AlmRange_obj	value_0	TFLOAT	1	—	—	—	—	—	
5068	Mapper	dvPressure AlmRangeObj	value_1	TFLOAT	1	—	—	—	—	—	
5070	Mapper	dvPressure AlmRangeObj	value_0	TFLOAT	1	—	—	—	—	—	
5072	SVMeasurement	ReAlmLimits	0	TFLOAT	1	0.0f	40000.0f	0.0f	—	—	
5074	SVMeasurement	QvSimObj	value_0	TFLOAT	1	—	—	—	—	—	Access Object of Simulation Volume flow.
5076	SVMeasurement	QvPerSim	0	TFLOAT	1	0.00f	120.00f	0.00f	—	—	The simulation value of volume flow in percentage
5078	MVMeasurement	QmSimObj	value_0	TFLOAT	1	—	—	—	—	—	
5080	MVMeasurement	QmPerSim	0	TFLOAT	1	0.00f	120.00f	0.00f	—	—	
5082	Coordinator	temperature Sim_Obj	value_0	TFLOAT	1	—	—	0.0f	—	—	
5084	TransmitterServices	Transmitter Temperature Simulation_Obj	value_0	TFLOAT	1	—	—	0.0f	—	—	
5086	DigitalOutput	simuFrequency	0	TFLOAT	1	FULLSCALE_	FULLSCALE_	10000.0f	—	—	Simulation frequency for frequency outputs.
5088	AnalogInput	aiSimulationData	0	TFLOAT	1	0.0f	30.0f	4.0f	—	—	
5090	Coordinator	frequency_ SimObj	value_0	TFLOAT	1	—	—	0.0f	—	—	

## ... 7 Modbus TCP® interface

### ... Register table description

Double 64bit ReadWrite D64RW

#### Note

Attempting to read an object after its starting register will return an error code.

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
6000	Totalizer	totQvPresetValue	0	TDOUBLE	1	—	—	0.0f	—	—	Qv Totalizer Preset Value
6004	Totalizer	totQnPresetValue	0	TDOUBLE	1	—	—	0.0f	—	—	Qn Totalizer Preset Value
6008	Totalizer	totQmPresetValue	0	TDOUBLE	1	—	—	0.0f	—	—	Qm Totalizer Preset Value
6012	Totalizer	totEnergyPresetValue	0	TDOUBLE	1	—	—	0.0f	—	—	Energy Totalizer Preset Value

**Action 8bit WriteOnly A8WO****Note**

Attempting to read an object after its starting register will return an error code.

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
7000	TransmitterServices	writeAutoZero	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	
7001	Mapper	diagClearHistory	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	
7002	WebServer	resetUserCredentials	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Reset webserver user login and password to default
7003	TransmitterServices	writeSelfDiagnosis	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	
7004	WebServer	clearAuditLog	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	clear Audit log
7005	Totalizer	StartAllTotalizr	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Start All of the Totalizers according to Operation Mode in VT5
7006	Totalizer	StartQvTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Start Qv Totalizer
7007	Totalizer	StartQnTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Start Qn Totalizer
7008	Totalizer	StartQmTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Start Qm Totalizer
7009	Totalizer	StartEnergyTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Start Energy Totalizer
7010	Totalizer	StopAllTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Stop All of the Totalizers according to Operation Mode in VT5
7011	Totalizer	StopQvTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Stop Qv Totalizer
7012	Totalizer	StopQnTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Stop Qn Totalizer
7013	Totalizer	StopQmTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Stop Qm Totalizer
7014	Totalizer	StopEnergyTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Stop Energy Totalizer
7015	Totalizer	ResetAllTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Reset All of the Totalizers according to Operation Mode in VT5
7016	Totalizer	ResetQvTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Reset Qv Totalizer
7017	Totalizer	ResetQnTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Reset Qn Totalizer
7018	Totalizer	ResetQmTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Reset Qm Totalizer
7019	Totalizer	ResetEnergyTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Reset Energy Totalizer
7020	Totalizer	PresetAllTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Preset All of the Totalizers according to Operation Mode in VT5
7021	Totalizer	ResetQvTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Reset Qv Totalizer
7022	Totalizer	ResetQnTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Reset Qn Totalizer
7023	Totalizer	ResetQmTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Reset Qm Totalizer
7024	Totalizer	PresetEnergyTotalizer	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	Preset Energy Totalizer
7025	TransmitterServices	resetCB_Runhour	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	
7026	Coordinator	resetFE_Runhour	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	
7027	Coordinator	readParameters	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	
7028	Coordinator	writeParameters	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	
7029	Coordinator	saveCustomerDef	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	
7030	Coordinator	saveFactoryDef	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	
7031	Coordinator	resetCustomerDef	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	
7032	Coordinator	resetFactoryDef	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	
7033	TransmitterServices	saveAllAsDefault	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	
7034	TransmitterServices	resetAllToDefault	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	
7035	TransmitterServices	deviceReset	WHOLE_OBJECT	ACTION	1	—	—	—	—	—	

## ... 7 Modbus TCP® interface

### ... Register table description

Unsigned Integer 16bit ReadWrite ScanRegister1 U16RW1

#### Note

Attempting to read an object after its starting register will return an error code.

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum Values	Enum Names	Brief Description
9000	Modbus	configScanRegister1	0	SIMPLE_U16	1	—	—	0	—	—	
9001	Modbus	configScanRegister1	1	SIMPLE_U16	1	—	—	0	—	—	
9002	Modbus	configScanRegister1	2	SIMPLE_U16	1	—	—	0	—	—	
9003	Modbus	configScanRegister1	3	SIMPLE_U16	1	—	—	0	—	—	
9004	Modbus	configScanRegister1	4	SIMPLE_U16	1	—	—	0	—	—	
9005	Modbus	configScanRegister1	5	SIMPLE_U16	1	—	—	0	—	—	
9006	Modbus	configScanRegister1	6	SIMPLE_U16	1	—	—	0	—	—	
9007	Modbus	configScanRegister1	7	SIMPLE_U16	1	—	—	0	—	—	
9008	Modbus	configScanRegister1	8	SIMPLE_U16	1	—	—	0	—	—	
9009	Modbus	configScanRegister1	9	SIMPLE_U16	1	—	—	0	—	—	
9010	Modbus	configScanRegister1	10	SIMPLE_U16	1	—	—	0	—	—	
9011	Modbus	configScanRegister1	11	SIMPLE_U16	1	—	—	0	—	—	
9012	Modbus	configScanRegister1	12	SIMPLE_U16	1	—	—	0	—	—	
9013	Modbus	configScanRegister1	13	SIMPLE_U16	1	—	—	0	—	—	
9014	Modbus	configScanRegister1	14	SIMPLE_U16	1	—	—	0	—	—	
9015	Modbus	configScanRegister1	15	SIMPLE_U16	1	—	—	0	—	—	
9016	Modbus	configScanRegister1	16	SIMPLE_U16	1	—	—	0	—	—	
9017	Modbus	configScanRegister1	17	SIMPLE_U16	1	—	—	0	—	—	
9018	Modbus	configScanRegister1	18	SIMPLE_U16	1	—	—	0	—	—	
9019	Modbus	configScanRegister1	19	SIMPLE_U16	1	—	—	0	—	—	
9020	Modbus	configScanRegister1	20	SIMPLE_U16	1	—	—	0	—	—	
9021	Modbus	configScanRegister1	21	SIMPLE_U16	1	—	—	0	—	—	
9022	Modbus	configScanRegister1	22	SIMPLE_U16	1	—	—	0	—	—	
9023	Modbus	configScanRegister1	23	SIMPLE_U16	1	—	—	0	—	—	
9024	Modbus	configScanRegister1	24	SIMPLE_U16	1	—	—	0	—	—	
9025	Modbus	configScanRegister1	25	SIMPLE_U16	1	—	—	0	—	—	
9026	Modbus	configScanRegister1	26	SIMPLE_U16	1	—	—	0	—	—	
9027	Modbus	configScanRegister1	27	SIMPLE_U16	1	—	—	0	—	—	
9028	Modbus	configScanRegister1	28	SIMPLE_U16	1	—	—	0	—	—	
9029	Modbus	configScanRegister1	29	SIMPLE_U16	1	—	—	0	—	—	
9030	Modbus	configScanRegister1	30	SIMPLE_U16	1	—	—	0	—	—	
9031	Modbus	configScanRegister1	31	SIMPLE_U16	1	—	—	0	—	—	

## Unsigned Integer 16bit ReadWrite ScanRegister2 U16RW2

### Note

Attempting to read an object after its starting register will return an error code.

Address	Subsystem	Object	Attribute	Type	Count	Min	Max	Default	Enum	Enum	Brief Description
									Values	Names	
9100	Modbus	configScanRegister2	0	SIMPLE_U16	1	—	—	0	—	—	
9101	Modbus	configScanRegister2	1	SIMPLE_U16	1	—	—	0	—	—	
9102	Modbus	configScanRegister2	2	SIMPLE_U16	1	—	—	0	—	—	
9103	Modbus	configScanRegister2	3	SIMPLE_U16	1	—	—	0	—	—	
9104	Modbus	configScanRegister2	4	SIMPLE_U16	1	—	—	0	—	—	
9105	Modbus	configScanRegister2	5	SIMPLE_U16	1	—	—	0	—	—	
9106	Modbus	configScanRegister2	6	SIMPLE_U16	1	—	—	0	—	—	
9107	Modbus	configScanRegister2	7	SIMPLE_U16	1	—	—	0	—	—	
9108	Modbus	configScanRegister2	8	SIMPLE_U16	1	—	—	0	—	—	
9109	Modbus	configScanRegister2	9	SIMPLE_U16	1	—	—	0	—	—	
9110	Modbus	configScanRegister2	10	SIMPLE_U16	1	—	—	0	—	—	
9111	Modbus	configScanRegister2	11	SIMPLE_U16	1	—	—	0	—	—	
9112	Modbus	configScanRegister2	12	SIMPLE_U16	1	—	—	0	—	—	
9113	Modbus	configScanRegister2	13	SIMPLE_U16	1	—	—	0	—	—	
9114	Modbus	configScanRegister2	14	SIMPLE_U16	1	—	—	0	—	—	
9115	Modbus	configScanRegister2	15	SIMPLE_U16	1	—	—	0	—	—	
9116	Modbus	configScanRegister2	16	SIMPLE_U16	1	—	—	0	—	—	
9117	Modbus	configScanRegister2	17	SIMPLE_U16	1	—	—	0	—	—	
9118	Modbus	configScanRegister2	18	SIMPLE_U16	1	—	—	0	—	—	
9119	Modbus	configScanRegister2	19	SIMPLE_U16	1	—	—	0	—	—	
9120	Modbus	configScanRegister2	20	SIMPLE_U16	1	—	—	0	—	—	
9121	Modbus	configScanRegister2	21	SIMPLE_U16	1	—	—	0	—	—	
9122	Modbus	configScanRegister2	22	SIMPLE_U16	1	—	—	0	—	—	
9123	Modbus	configScanRegister2	23	SIMPLE_U16	1	—	—	0	—	—	
9124	Modbus	configScanRegister2	24	SIMPLE_U16	1	—	—	0	—	—	
9125	Modbus	configScanRegister2	25	SIMPLE_U16	1	—	—	0	—	—	
9126	Modbus	configScanRegister2	26	SIMPLE_U16	1	—	—	0	—	—	
9127	Modbus	configScanRegister2	27	SIMPLE_U16	1	—	—	0	—	—	
9128	Modbus	configScanRegister2	28	SIMPLE_U16	1	—	—	0	—	—	
9129	Modbus	configScanRegister2	29	SIMPLE_U16	1	—	—	0	—	—	
9130	Modbus	configScanRegister2	30	SIMPLE_U16	1	—	—	0	—	—	
9131	Modbus	configScanRegister2	31	SIMPLE_U16	1	—	—	0	—	—	

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