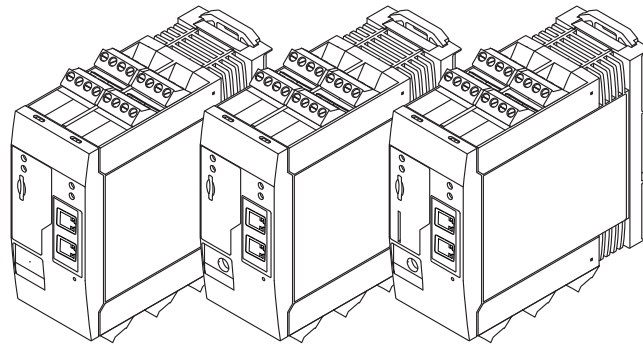


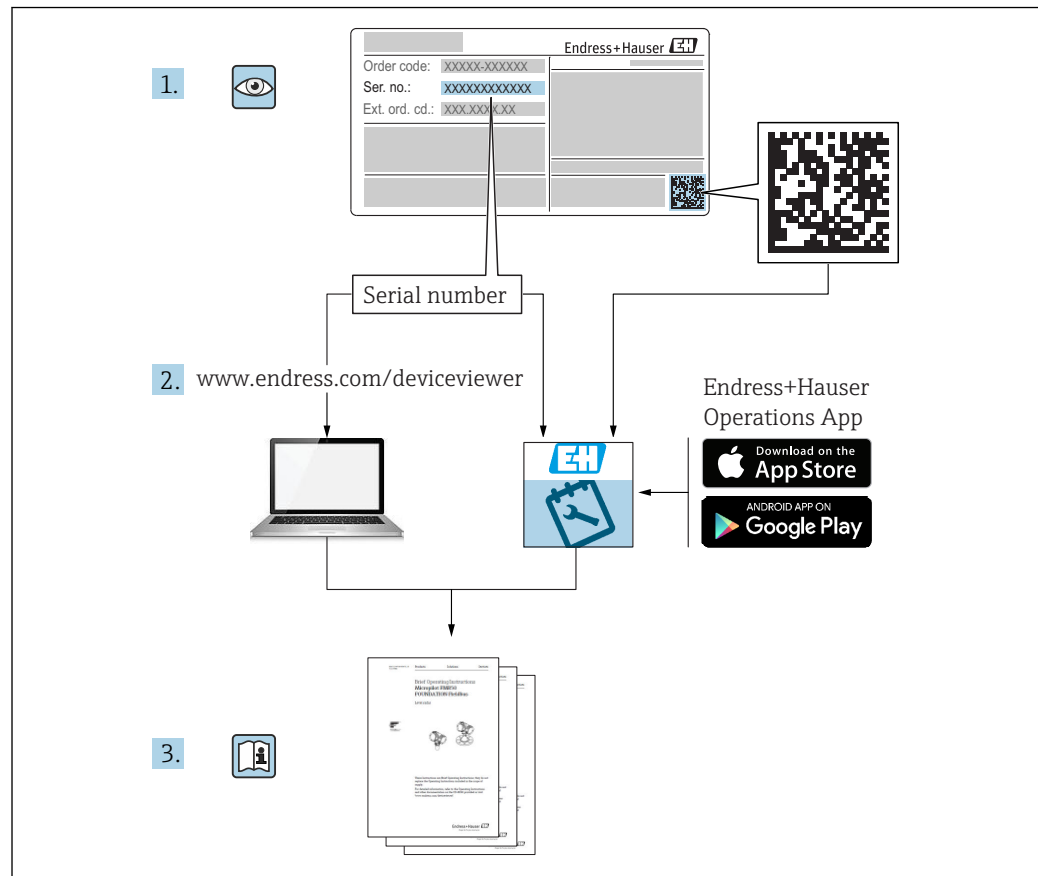
# Operating Instructions

## Fieldgate FXA42

System Products

Programmable Ethernet, 2G/3G and WLAN gateway for data transmission to inventory management software





- Make sure the document is stored in a safe place such that it is always available when working on or with the device.
- To avoid danger to individuals or the facility, read the "Basic safety instructions" section carefully, as well as all other safety instructions in the document that are specific to working procedures.
- The manufacturer reserves the right to modify technical data without prior notice. Your Endress+Hauser distributor will supply you with current information and updates to these Operating Instructions.





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

# 1 About this document

## 1.1 Document conventions






### 1.1.1 Safety symbols

Symbol	Meaning
	<b>DANGER!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
	<b>WARNING!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
	<b>CAUTION!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
	<b>NOTE!</b> This symbol contains information on procedures and other facts which do not result in personal injury.





### 1.1.2 Electrical symbols

Symbol	Meaning
	Direct current
	Alternating current
	Direct current and alternating current
	<b>Ground connection</b> A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
	<b>Protective Earth (PE)</b> A terminal which must be connected to ground prior to establishing any other connections.  The ground terminals are situated inside and outside the device: <ul style="list-style-type: none"> <li>▪ Inner ground terminal: Connects the protective earth to the mains supply.</li> <li>▪ Outer ground terminal: Connects the device to the plant grounding system.</li> </ul>













### 1.1.3 Tool symbols

Symbol	Meaning
 A0013442	Torx screwdriver
 A0011220	Flat blade screwdriver
 A0011219	Cross-head screwdriver
 A0011221	Allen key
 A0011222	Hexagon wrench




### 1.1.4 Communication specific symbols

Symbol	Meaning
	<b>Wireless Local Area Network (WLAN)</b> Communication via a wireless, local network.
	<b>LED</b> Light emitting diode is off.
	<b>LED</b> Light emitting diode is on.
	<b>LED</b> Light emitting diode is flashing.



### 1.1.5 Symbols for certain types of information

Symbol	Meaning
	<b>Permitted</b> Procedures, processes or actions that are permitted.
	<b>Preferred</b> Procedures, processes or actions that are preferred.
	<b>Forbidden</b> Procedures, processes or actions that are forbidden.
	<b>Tip</b> Indicates additional information.
	Reference to documentation.
	Reference to page.
	Reference to graphic.
	Notice or individual step to be observed.
	Series of steps.
	Result of a step.
	Help in the event of a problem.
	Visual inspection.

### 1.1.6 Symbols in graphics

Symbol	Meaning
1, 2, 3 ...	Item numbers
	Series of steps
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections
	<b>Hazardous area</b> Indicates a hazardous area.
	<b>Safe area (non-hazardous area)</b> Indicates the non-hazardous area.

### 1.1.7 Symbols at the device

Symbol	Meaning
	<b>Safety instructions</b> Observe the safety instructions contained in the associated Operating Instructions.
	<b>Temperature resistance of the connection cables</b> Specifies the minimum value of the temperature resistance of the connection cables.

## 1.2 Registered trademarks

### **Modbus®**

Registered trademark of SCHNEIDER AUTOMATION, INC.

### **Microsoft®**

Registered trademark of the MICROSOFT CORPORATION.

## 2 Basic safety instructions

### 2.1 Requirements concerning the staff

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:

- ▶ Trained, qualified specialists: must have a relevant qualification for this specific function and task
- ▶ Are authorized by the plant owner/operator
- ▶ Are familiar with federal/national regulations
- ▶ Before beginning work, the specialist staff must have read and understood the instructions in the Operating Instructions and supplementary documentation as well as in the certificates (depending on the application)
- ▶ Following instructions and basic conditions

The operating personnel must fulfill the following requirements:

- ▶ Being instructed and authorized according to the requirements of the task by the facility's owner-operator
- ▶ Following the instructions in these Operating Instructions

### 2.2 Designated use

#### 2.2.1 Application

With Fieldgate FXA42 it is possible to remotely interrogate connected 4 to 20 mA, Modbus RS485 and Modbus TCP devices, either via Ethernet TCP/IP, WLAN or mobile telecommunications (UMTS). The measured data are processed accordingly and can be evaluated in the Web browser without any additional software. Advanced automation capabilities are available, such as an integrated Web-PLC, OpenVPN and other functions.

#### 2.2.2 Incorrect use

The manufacturer is not liable for damage caused by improper or non-designated use.

Verification for borderline cases:

- ▶ For special fluids and fluids for cleaning, Endress+Hauser is glad to provide assistance in verifying the corrosion resistance of process-wetted materials, but does not accept any warranty or liability.

#### 2.2.3 Residual risks

When in operation, the housing may reach a temperature close to the process temperature.

Danger of burns from contact with surfaces!

- ▶ For elevated process temperatures, ensure protection against contact to prevent burns.

### 2.3 Workplace safety

For work on and with the device:

- ▶ Wear the required personal protective equipment according to federal/national regulations.
- ▶ Switch off the supply voltage before connecting the device.

## 2.4 Operational safety

Risk of injury!

- ▶ Operate the device in proper technical condition and fail-safe condition only.
- ▶ The operator is responsible for interference-free operation of the device.

### Conversions to the device

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers.

- ▶ If, despite this, modifications are required, consult with Endress+Hauser.

### Hazardous area

To eliminate a danger for persons or for the facility when the device is used in the hazardous area (e.g. explosion protection, pressure vessel safety):

- ▶ Based on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area.
- ▶ Observe the specifications in the separate supplementary documentation, such as the XA or SD, which is an integral part of these Instructions.

## 2.5 Product safety

This device is designed in accordance with good engineering practice to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate.

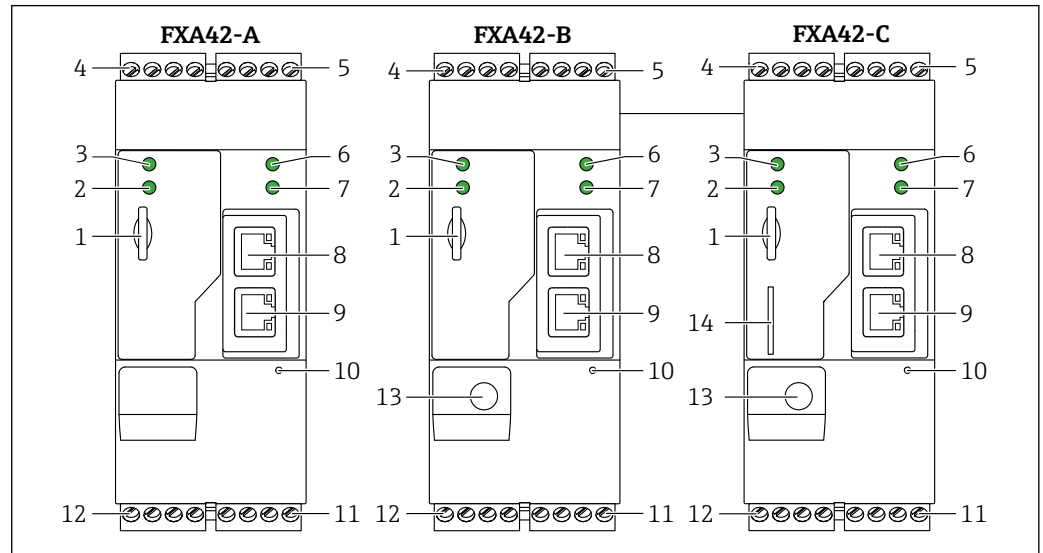
It meets general safety standards and legal requirements. It also complies with the EU directives listed in the device-specific EU Declaration of Conformity. Endress+Hauser confirms this by affixing the CE mark to the device.



## 3 Product description

### 3.1 Product design

Three versions of the Fieldgate FXA42 are available. These versions differ in terms of device features and data transmission technology.



A0030516

1 Fieldgate FXA42 design

A FXA42 Ethernet

B FXA42 Ethernet and WLAN

C FXA42 Ethernet and 2G/3G

1 Slot for memory card, microSD format

2 Status LED for modem / WLAN / Ethernet

3 Status LED for supply voltage

4, 5 Input modules with analog input, digital input, current source and reference potential → 14

6 Status LED for network

7 Status LED for Web PLC

8, 9 Ethernet connections

10 Reset button

11 Power supply for Fieldgate FXA42, power supply for digital outputs, digital outputs → 14

12 RS-485 serial interface → 14

13 Connection for antenna (only WLAN and 2G/3G versions)

14 Slot for memory card, SIM format (only 2G/3G version)

### 3.2 Accessories

→ 103

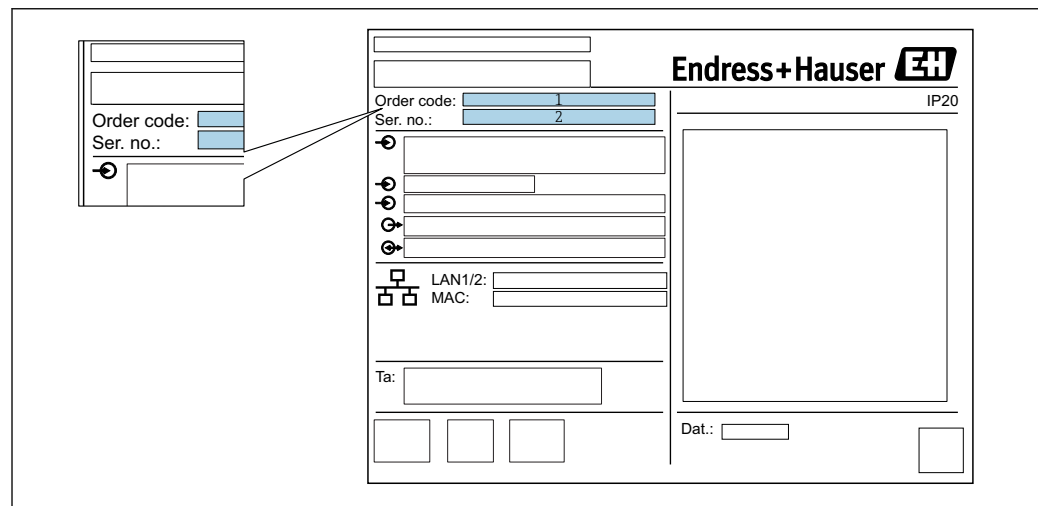
## 4 Incoming acceptance and product identification

### 4.1 Product identification

The following options are available for identifying the gateway:

- Nameplate specifications
- Order code with breakdown of the device features on the delivery note
- Enter the serial number on the nameplate into *W@M Device Viewer* ([www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)): all the information about the gateway is displayed.
- Enter the serial number on the nameplate into the *Endress+Hauser Operations App* or scan the 2-D matrix code (QR code) on the nameplate with the *Endress+Hauser Operations App*: all the information about the gateway is displayed.


#### 4.1.1 Nameplate



- 1 Order code
- 2 Serial number (ser. no.)

### 4.2 Scope of delivery

- Fieldgate FXA42 for DIN rail mounting
- microSD card, 1 GB
- Hard copy of Brief Operating Instructions

 Please note the device accessories in the "Accessories" section of the Operating Instructions.

### 4.3 Manufacturer address

Endress+Hauser SE+Co. KG  
Hauptstraße 1  
79689 Maulburg, Germany

Address of the manufacturing plant: See nameplate.

## 5 Mounting

### 5.1 Installation conditions

#### 5.1.1 Temperature and humidity

Normal operation (EN 60068-2-14; Nb; 0.5 K/min): -20 to 60 °C (-4 to 140 °F)

Side by side installation: -20 to 50 °C (-4 to 122 °F)

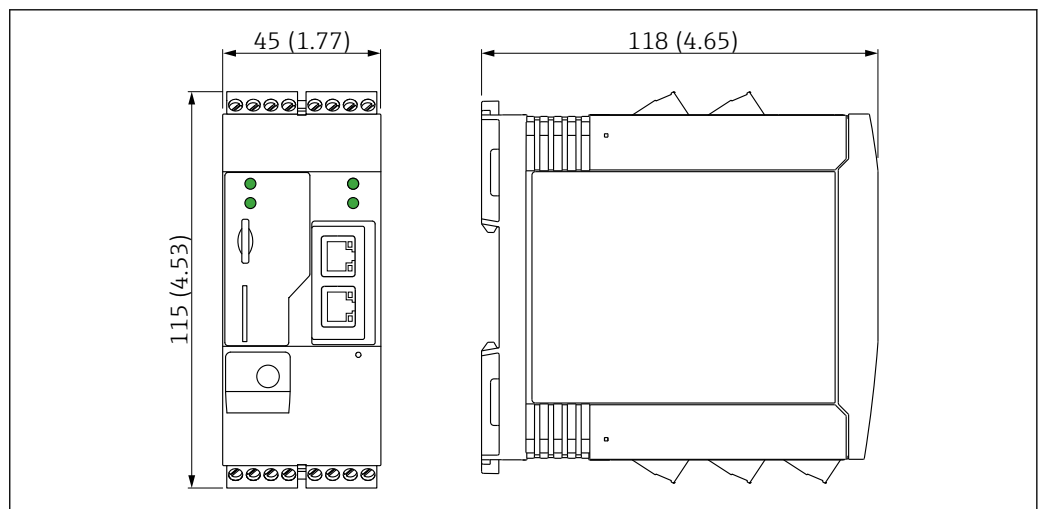
Avoid condensation.

Humidity (EN 60068-2-30; Db; 0.5 K/min): 5 to 85%; non-condensing

#### 5.1.2 Orientation

Vertical or horizontal on DIN rail (HT 35 as per EN 60715).

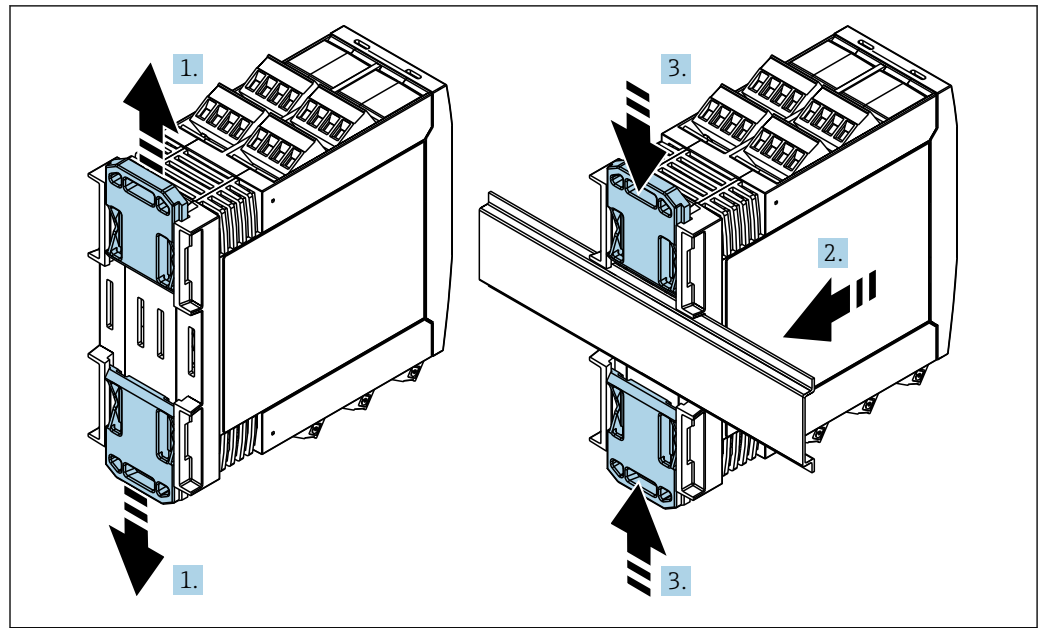
### 5.2 Dimensions



2 Dimensions in mm (in)

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### 5.3 Mounting procedure



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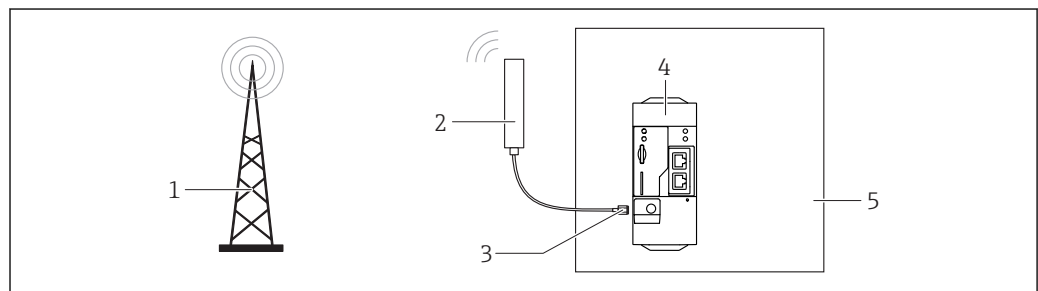
1. Slide the upper DIN rail clip upwards and the lower clip downwards until they click into place.
2. Fit the device on the DIN rail from the front.
3. Slide the two DIN rail clips back together until they click into place.

To disassemble the device, push the DIN rail clips up or down (see 1.) and remove the device from the rail. It also suffices to open just one of the DIN rail clips and then tilt the device to remove it from the rail.

### 5.4 Antenna

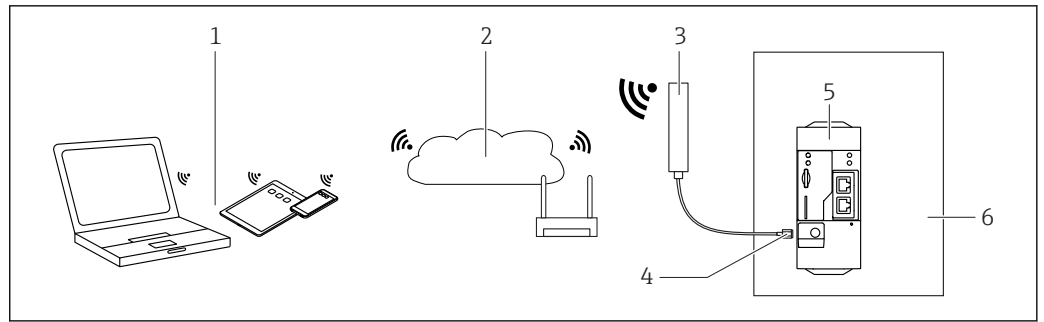
The Fieldgates FXA42 require an external antenna for wireless communication via UMTS (2G/3G) and WLAN. The antenna can be purchased as an accessory from Endress+Hauser. The antenna cable is screwed onto the connection on the front of the Fieldgate. The antenna must be mounted outside the cabinet or field housing. In areas with weak UMTS (2G/3G) or WLAN reception, it is advisable to first check the communication before securing the antenna permanently.

Connection: SMA connection.



A0031111

- 1 UMTS (2G/3G) network
- 2 Antenna for Fieldgate FXA42
- 3 SMA connection
- 4 Fieldgate FXA42 Ethernet and 2G/3G
- 5 Control cabinet



A0031112

- 1 WLAN receivers
- 2 Uplink to Internet or LAN via router
- 3 Antenna for Fieldgate FXA42
- 4 SMA connection
- 5 Fieldgate FXA42 Ethernet and WLAN
- 6 Control cabinet

## 5.5 Post-installation check

- Is the DIN rail clip clicked into place?
- Is the device securely seated on the DIN rail?
- Are all plug-in terminals securely engaged?
- Are the temperature limits observed at the mounting location?

## 6 Electrical connection

**⚠ WARNING**

**Hazardous electric voltage**

Risk of electric shock and injury from startle response.

- ▶ De-energize all power sources before connecting.
- ▶ Before commissioning the device, measure the supply voltage and compare it with the voltage specifications on the nameplate. Only connect the device if the supply voltage measured matches the specifications.

### 6.1 Supply voltage

The supply voltage is 24 V DC ( $\pm 20\%$ ). You may only use power units that ensure safe electrical isolation according to DIN VDE 0570-2-6 and EN61558-2-6 (SELV / PELV or NEC Class 2) and that are designed as limited-energy circuits.

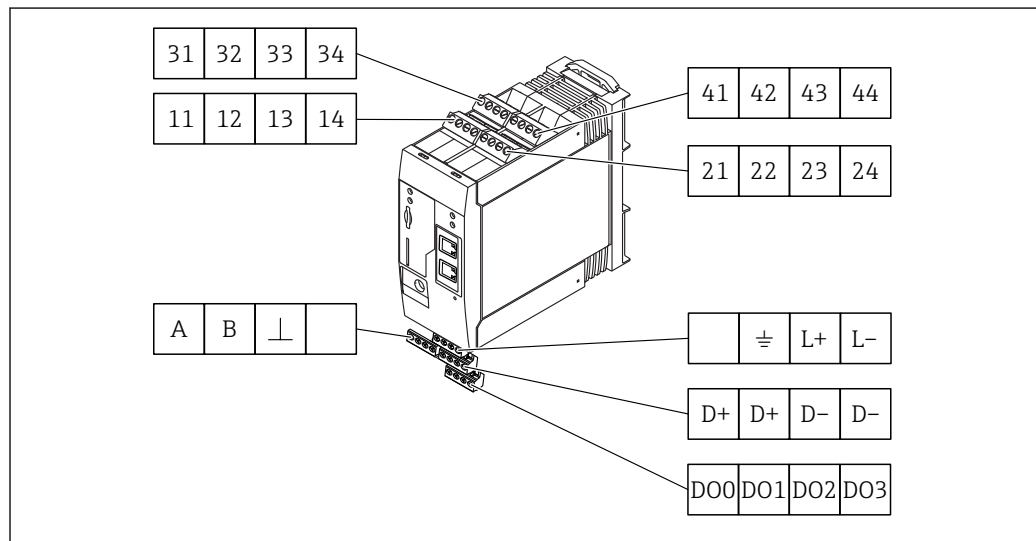
### 6.2 RS485 serial interface (Modbus)

Internal resistance: 96 k $\Omega$

Protocol: Modbus RTU

External termination required ( 120  $\Omega$ )

### 6.3 Terminal assignment



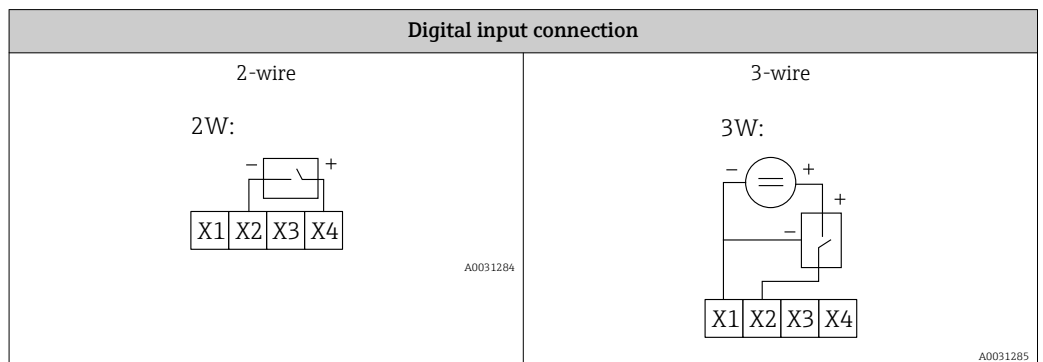
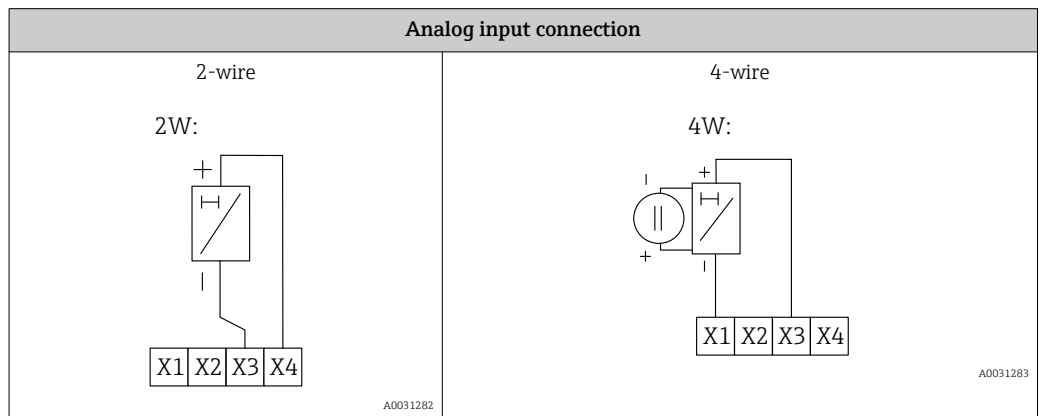
A0030525

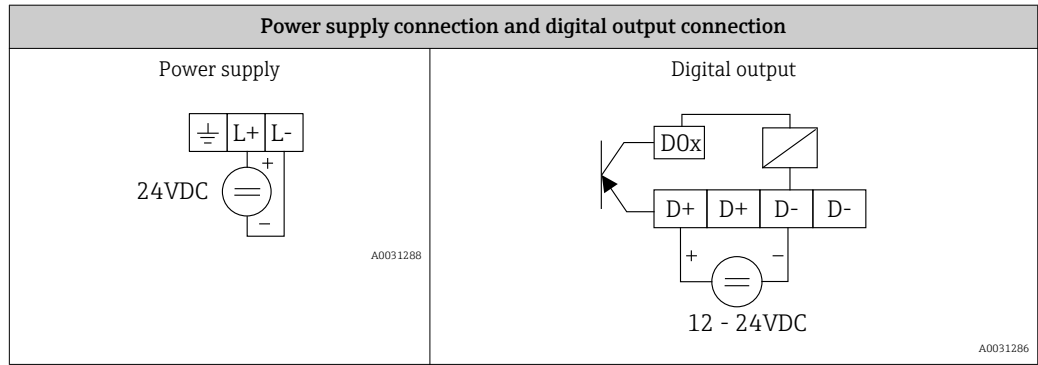
Terminal assignment of input modules				Properties	Function
11	21	31	41		GND
12	22	32	42	Input voltage L: < 5 V Input voltage H: > 11 V Input current: < 5 mA Maximum input voltage: 35 V	Digital input

Terminal assignment of input modules				Properties	Function
13	23	33	43	Maximum input voltage: 35 V Maximum input current: 22 mA Internal resistance: 250 Ω (suitable for HART communication)	Analog input4 to 20 mA
14	24	34	44	Output voltage: 28 V <sub>DC</sub> (no-load) 26 V <sub>DC</sub> @ 3 mA 20 V <sub>DC</sub> @ 30 mA Output current: max. 160 mA The auxiliary voltage is short-circuit proof, galvanically isolated and non-stabilized.	Auxiliary voltage output The auxiliary voltage output can be used for loop power supply or to control the digital inputs.

Terminal assignment				Properties	Terminal assignment				Properties								
DO0	DO1	DO2	DO3	High-side driver, sourcing, DC-PNP. Output current: 500 mA	D+	D+	D-	D-	D+	12 to 24 V <sub>DC</sub>							
Digital outputs					DO1	Power supply for digital outputs, <sup>1)</sup>	D-	D-	D-	D+	12 to 24 V <sub>DC</sub>						
					DO2					D-	GND						
					DO3					D-	GND						
A	B	⊥		Signal	Power supply for Fieldgate FXA42 <sup>1)</sup>					≡	L+	L-	Not assigned				
RS485 serial interface (Modbus)						B	Signal	⊥	⊥				L+	L-	Ground connection		
						⊥									Ground / optional shield connection	L+	24 V <sub>DC</sub>
															Not assigned	L-	GND

- 1) You may only use power units that ensure safe electrical isolation according to DIN VDE 0570-2-6 and EN61558-2-6 (SELV / PELV or NEC Class 2) and that are designed as limited-energy circuits.

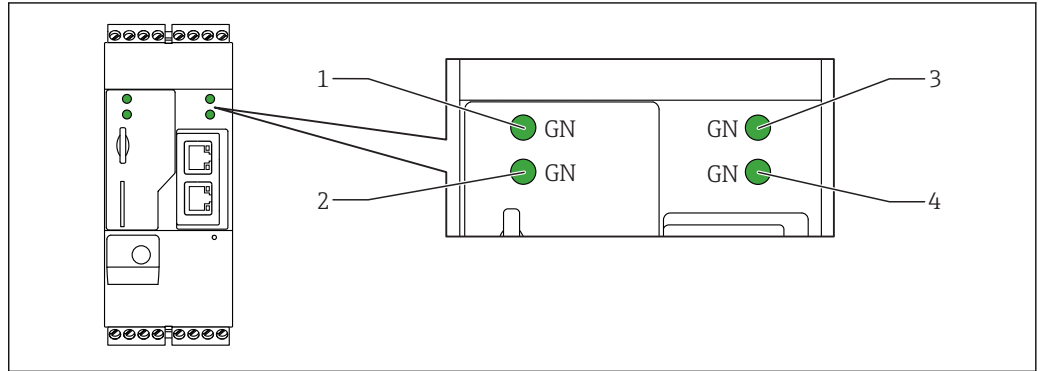






## 7 Commissioning

### 7.1 Display elements (device status indicator / LED)

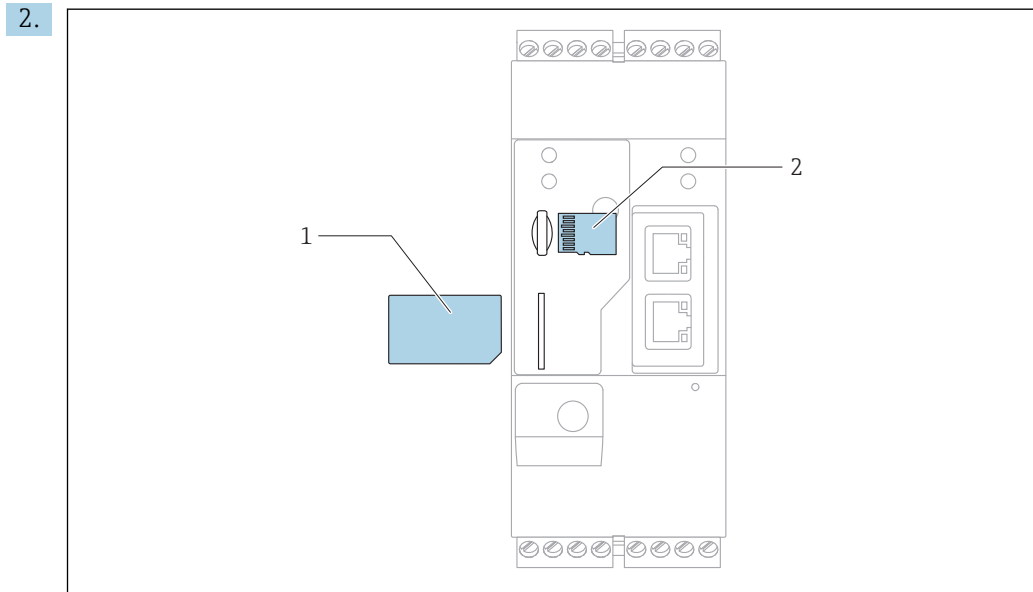


- 1 Power
- 2 Modem (2G/3G version) / WLAN / Ethernet
- 3 Network
- 4 Web-PLC

Description	State	Color	Meaning	Comment
Power		Green (GN)	Power supply ON	
Modem		Green (GN)	Power supply for modem ON	Only UMTS version
WLAN		Green (GN)	Power supply for WLAN module ON	Only WLAN version
Ethernet		Green (GN)	Power supply for Ethernet interface ON	Only Ethernet version
Network		Green (GN)	Data connection established	Ethernet version: valid fixed IP address configured or DHCP completed successfully
			Data connection interrupted	Ethernet version: no valid fixed IP address configured or DHCP not completed successfully
Web-PLC		Green (GN)	Editor program for Web-PLC is enabled	
	2 x	Green (GN)	Manual firmware update completed successfully	
	2 x	Green (GN)	Reset to factory settings (factory reset) confirmed	

### 7.2 Preparatory steps

1. Check that the gateway is securely seated on the DIN rail and that the cable connections are correctly secured at the terminals and the antenna.



- 1 SIM card  
2 microSD card

Insert microSD card.

3. Fieldgate FXA42 UMTS: insert SIM card.
4. Switch on supply voltage.

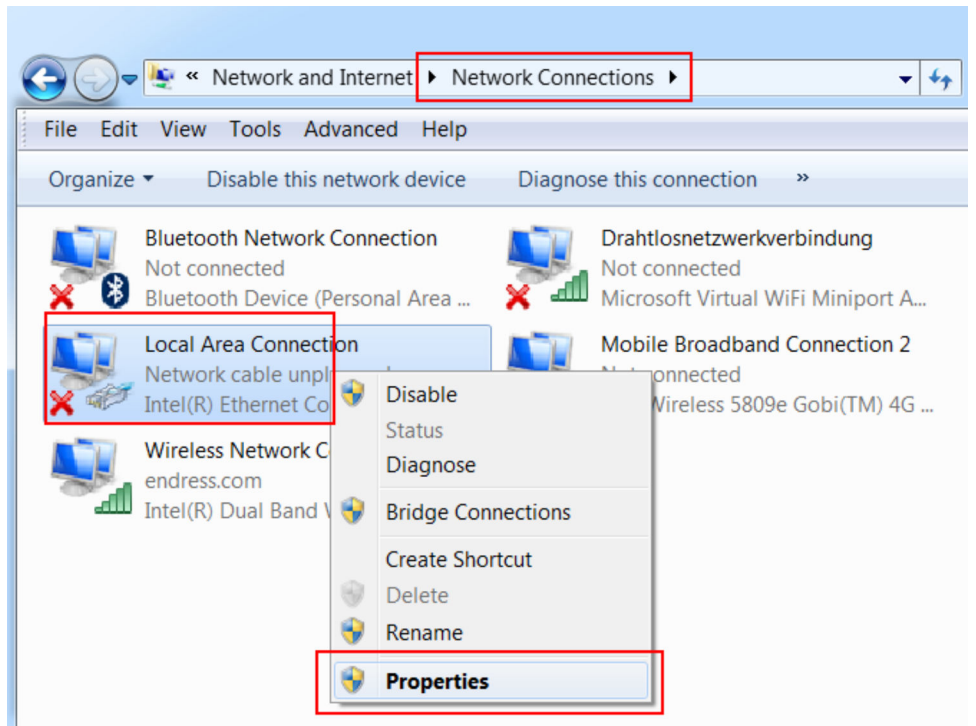
### 7.3 Establishing the data connection

Default settings for the data connection:

- IP address: **http://192.168.252.1**
- User name for the administrator: **super**
- Password for the administrator: **super**
- Users who do not wish to configure the Fieldgate FXA42 or who do not have the necessary authorization can log on with the following default login data. User name: **eh**; password: **eh**

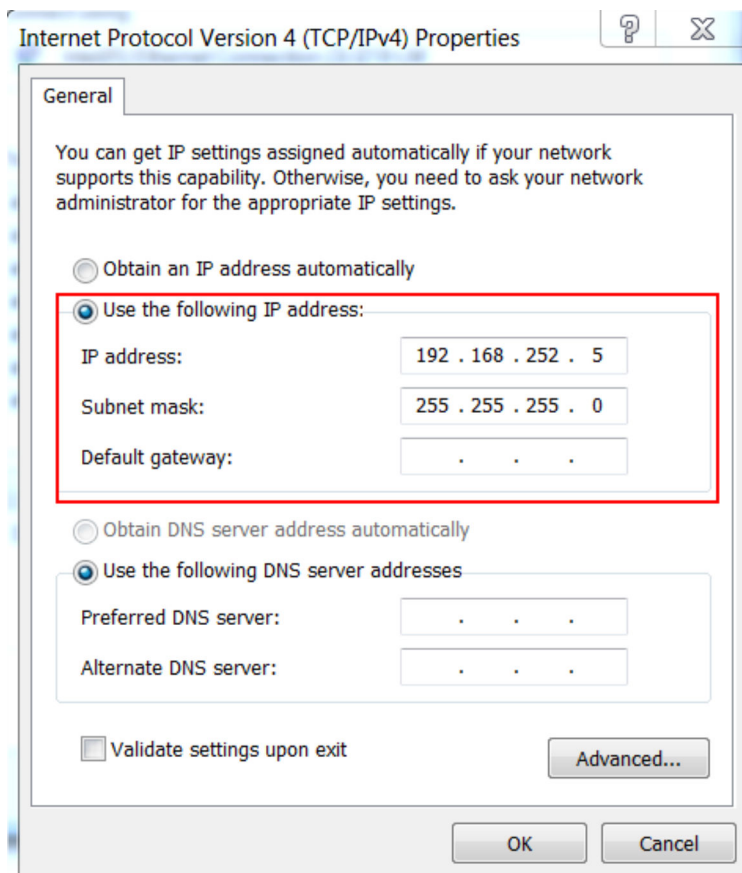
1. Connect the Fieldgate FXA42 directly to a PC or laptop using an Ethernet cable.
2. Assign the computer an IP address that is in the same subnet as that into which the Fieldgate FXA42 is to be integrated. The IP address of the computer and that of the FXA42 may not be identical.
3. Microsoft Windows: Open the **Start** menu, select the **Control Panel** menu item, select the **Network Connections** menu item and select the Ethernet connection to which the Fieldgate FXA42 is connected.

4.



Right-click with the mouse button to open the context menu. Select the **Properties** menu item.

5.



Select the **Use the Following IP Address** option and enter an IP address. Example of an IP address: 192.168.252.2

6.

**Subnet mask** enter 255.255.255.0 and press **OK** to confirm your entry.

7. Open an Internet browser and enter the preconfigured IP address 192.168.252.1 in the address line of the browser.

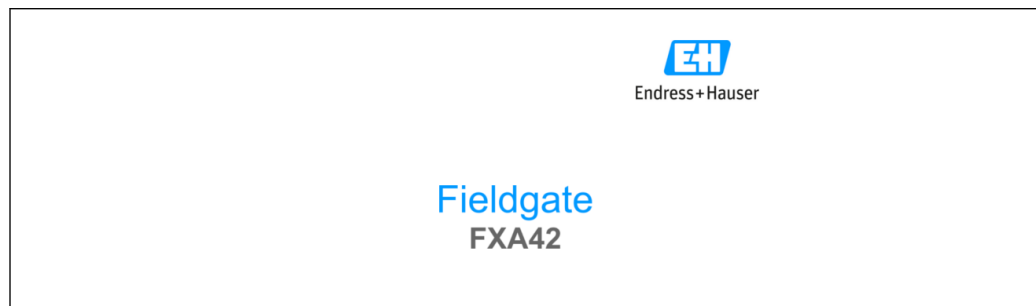
8.



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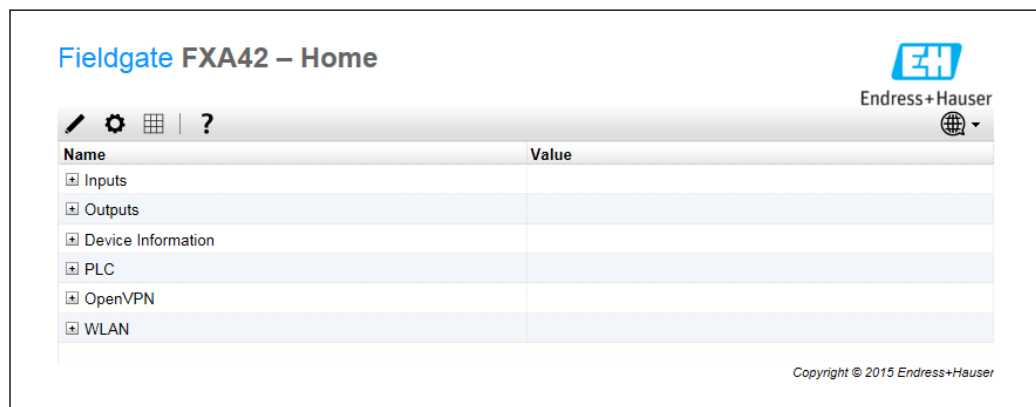
Enter the user name and password. Press **OK** to confirm your entry.

↳ The connection is now established and the Fieldgate FXA42 welcome screen is displayed.



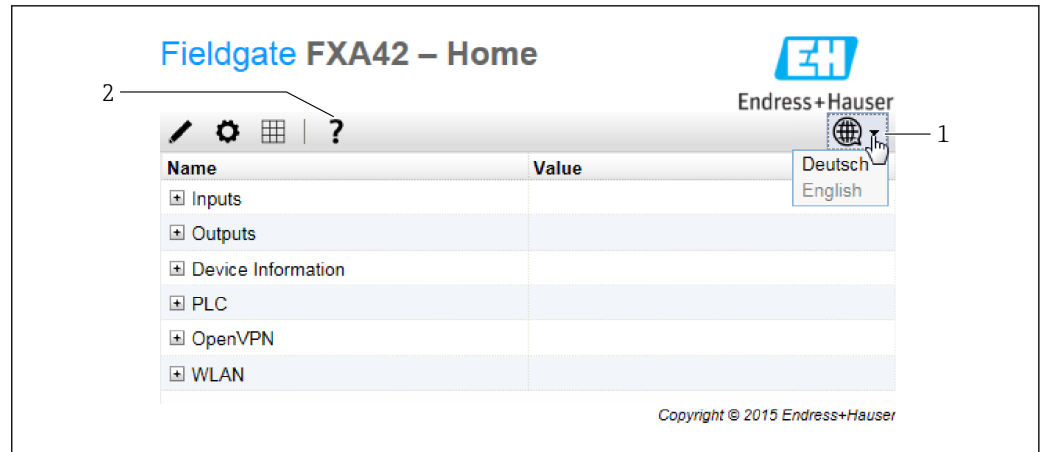
A0030543

The display changes automatically after a few seconds and the home screen to access the configuration menus appears.



A0030546

To change the language: open the drop-down menu on the top right and select the language.




- 1 Selecting the language
- 2 Opening the Help

You can now access the functions of the Fieldgate FXA42. If you are logged on as the administrator, you can change the settings.

## 7.4 Installing the latest firmware from a microSD card

1. Close all the files. Failure to do so may result in data loss.
2. Remove the microSD card from the device.
3. Insert the microSD card with the new firmware.
4. Press the reset button.

The reset button (→  9) can be accessed through a small hole in the front.

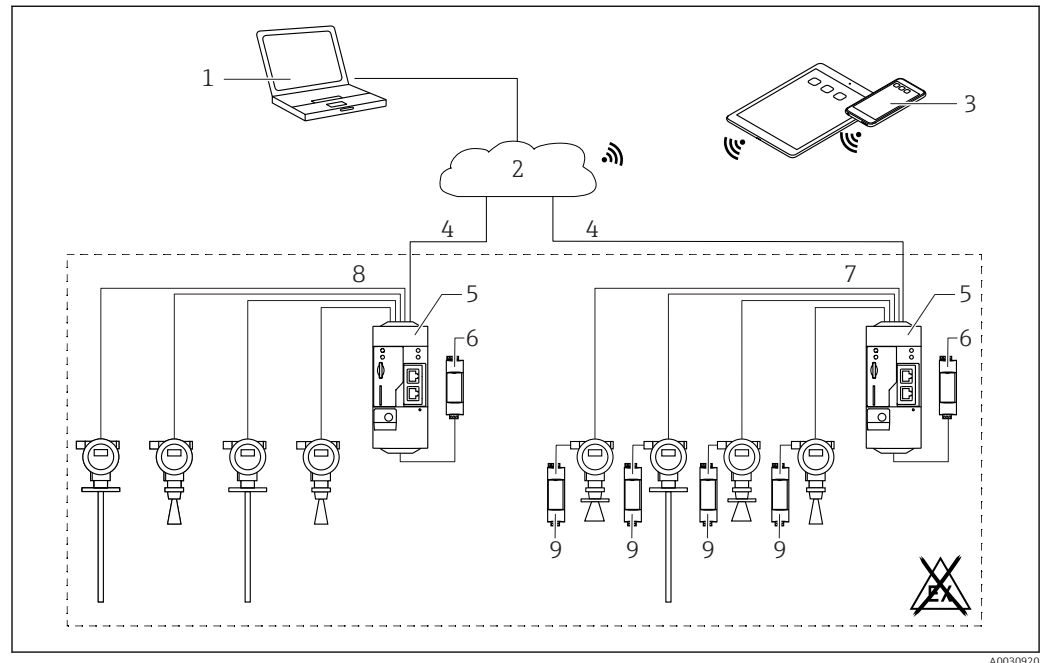
### 7.4.1 Writing firmware to the microSD card

If no microSD card containing the latest firmware is available, the latest firmware can be written to a microSD card using the PC. However, the microSD card must be formatted in the Fieldgate FXA42 beforehand as the storage format is a special FAT format that is protected against power loss.

1. Close all the files. Failure to do so may result in data loss.
2. Switch off the Fieldgate FXA42 (switch off the supply voltage).
3. Remove the microSD card from the device.
4. Insert the new, unformatted microSD card.
5. Switch on the Fieldgate FXA42 and wait for booting to end.
  - ↳ The microSD card is now formatted and can be written to via a PC (path: b:\FXA42\update.cup).

## 7.5 Configuration examples

### 7.5.1 Configuration with 4 to 20 mA analog input (2-wire/4-wire)




3 System architecture of a Fieldgate FXA42 with 4 to 20 mA analog input

- 1 SupplyCare Enterprise / SupplyCare Hosting (via Web browser)
- 2 Internet / LAN
- 3 SupplyCare Enterprise / SupplyCare Hosting on mobile devices (via Web browser)
- 4 Ethernet/WLAN/UMTS
- 5 Fieldgate FXA42
- 6 Power supply 24 V DC
- 7 4 x 4 to 20 mA analog input (active), 4-wire
- 8 4 x 4 to 20 mA analog input (passive), 2-wire (loop-powered)
- 9 Measuring device power supply

Once a device has been connected to the Fieldgate FXA42, the measured values are displayed in the "GridView" .

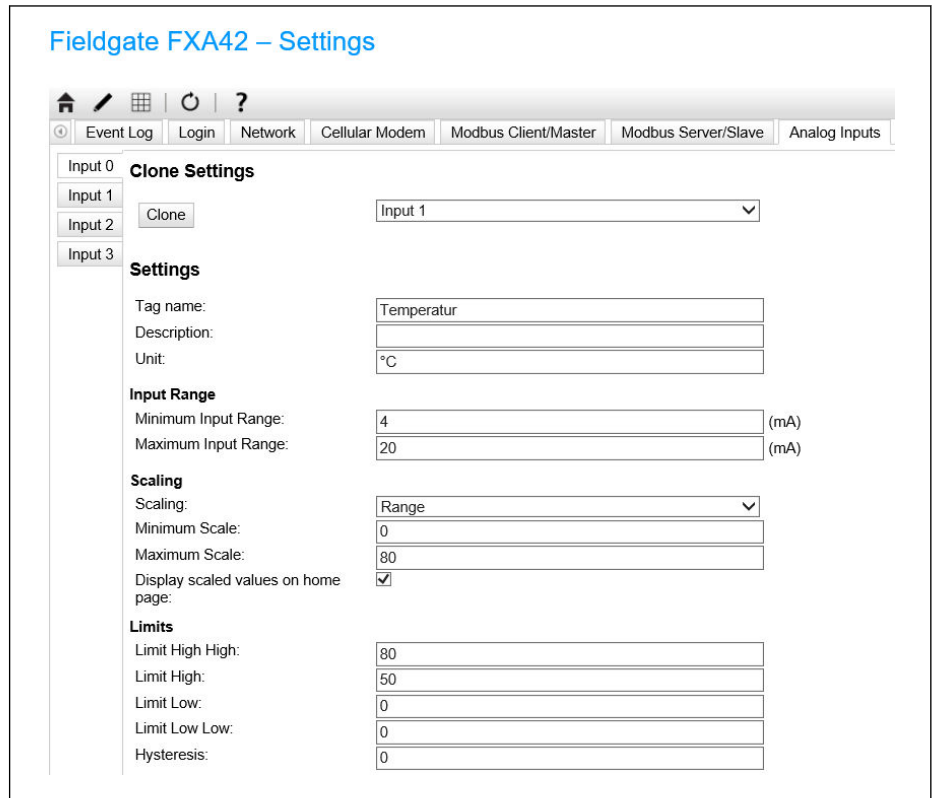
In general, no additional configuration settings are necessary.

Additional configuration settings can be made on the "Analog inputs" tab on the "Settings page" .

### Reading out the analog inputs

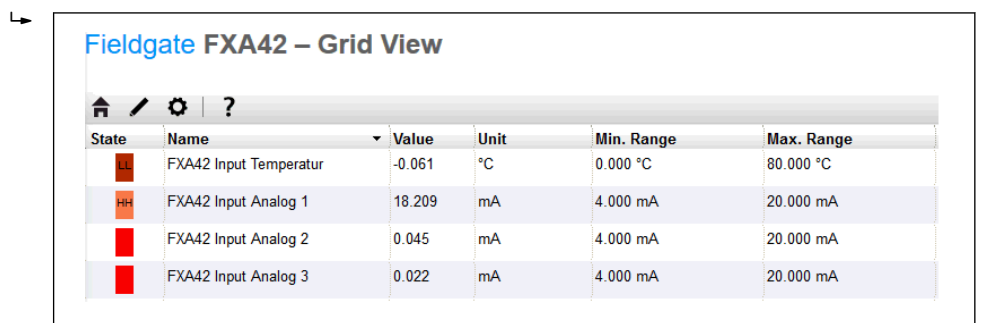
Example

1. On the "Analog inputs" tab, select the desired input and edit the "Settings" ("Tag name" = name to be displayed in the application, "Description" = optional description, "Unit" = physical unit to be displayed).
2. Set "Scaling" to "Range" and enter the min./max. values.
3. ↪



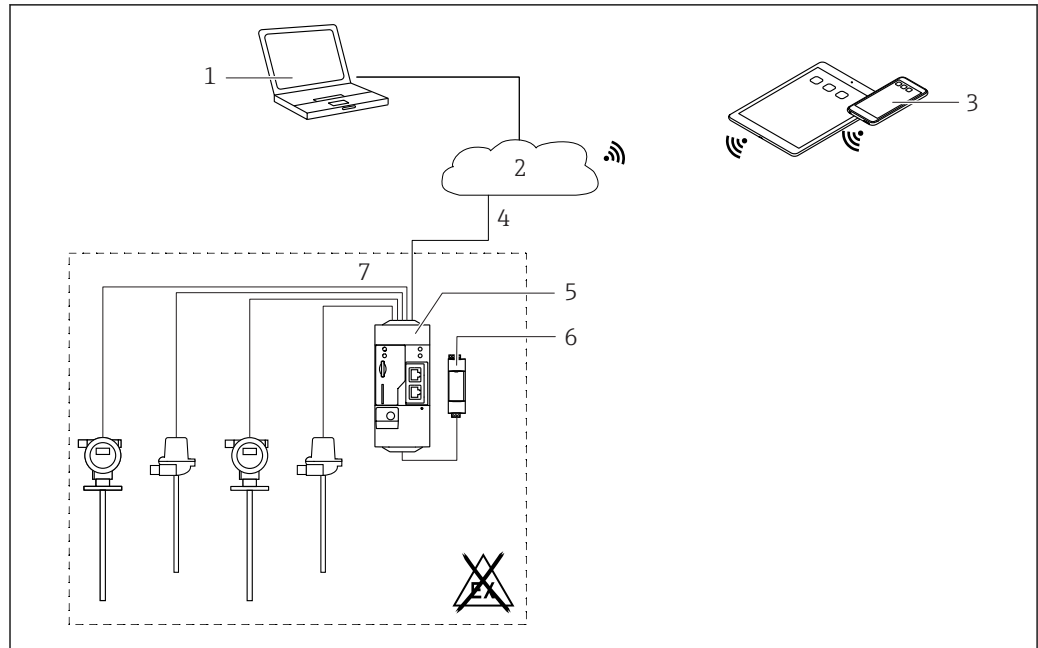
A0035079-EN

4. Click "OK":
5. The calculated values are displayed in the "Grid View":



A0034597

## 7.5.2 Configuration with a digital input



A0030921

4 System architecture of a Fieldgate FXA42 with a digital input

- 1 SupplyCare Enterprise / SupplyCare Hosting (via Web browser)
- 2 Internet / LAN
- 3 SupplyCare Enterprise / SupplyCare Hosting on mobile devices (via Web browser)
- 4 Ethernet/WLAN/UMTS
- 5 Fieldgate FXA42
- 6 Power supply 24 V DC
- 7 4 x digital input and auxiliary voltage output 24 V DC

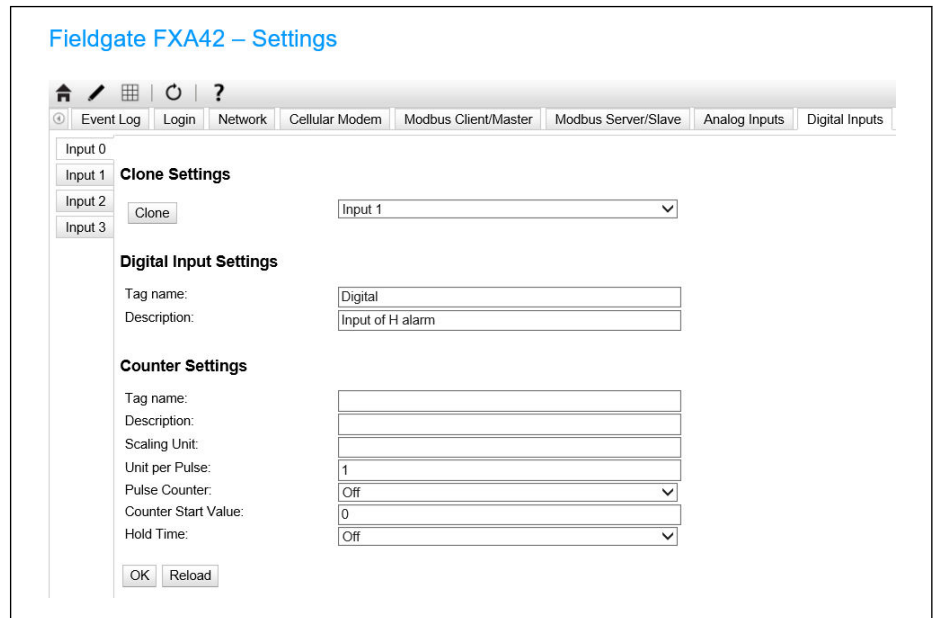


### Configuring the digital input

Example

1. On the "Digital inputs" tab, select the desired input and edit the "Settings" ("Tag name" = name to be displayed in the application, "Description" = optional description).

2. ↪



A0035081-EN

3. Click "OK":

4. The status of the digital inputs is displayed in the "Grid View":

↪

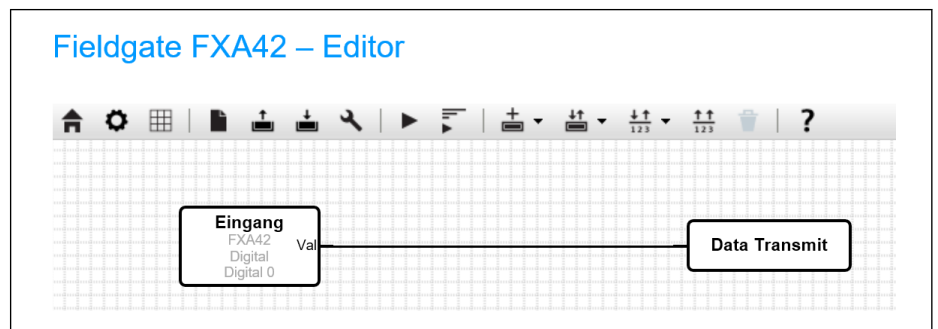
State	Name	Value	Unit	Min. Range
Red	FXA42 Input Analog 2	0.045	mA	4.000 mA
Red	FXA42 Input Analog 3	0.021	mA	4.000 mA
Green	FXA42 Input NAMUR 0	1		
Green	FXA42 Input NAMUR 1	1		
Green	FXA42 Input NAMUR 2	0		
Green	FXA42 Input NAMUR 3	0		
Green	FXA42 Input Digital 0	0		
Green	FXA42 Input Digital 1	0		
Green	FXA42 Input Digital 2	0		

A0035085

5. The configured digital input is now available in the editor of the Web-PLC.

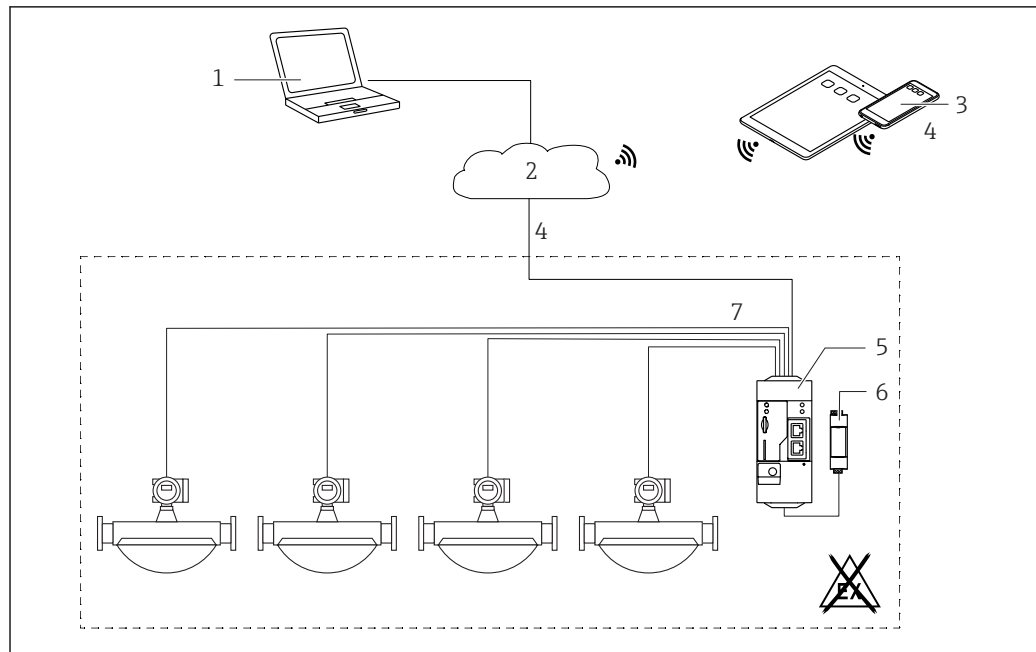
6. Example: The digital input triggers data transmission:

↪



A0035086

### 7.5.3 Configuration with a pulse counter



A0030922

5 System architecture of a Fieldgate FXA42 with a pulse counter

- 1 SupplyCare Enterprise / SupplyCare Hosting (via Web browser)
- 2 Internet / LAN
- 3 SupplyCare Enterprise / SupplyCare Hosting on mobile devices (via Web browser)
- 4 Ethernet/WLAN/UMTS
- 5 Fieldgate FXA42
- 6 Power supply 24 V DC
- 7 4 x digital input with pulse counter

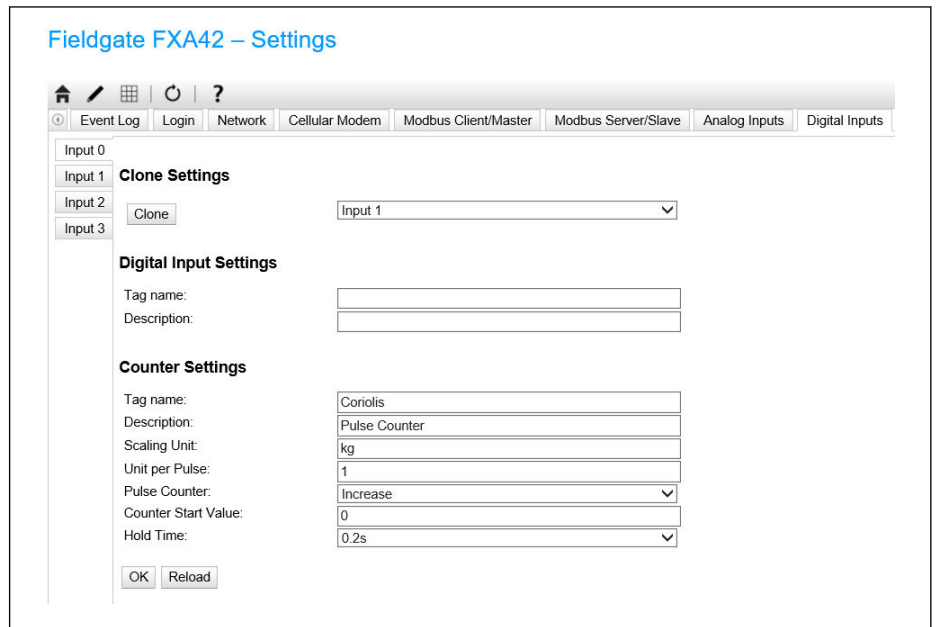
**Reading out the pulse counter**

Example

1. On the "Digital inputs" tab, select the desired input and edit the "Settings" ("Tag name" = name to be displayed in the application, "Description" = optional description).

2.

3. ↪

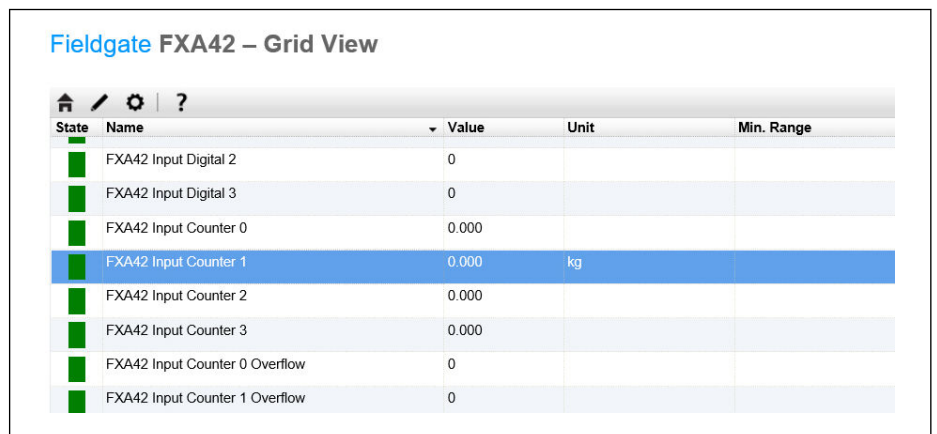


A0035084-EN

4. Click "OK":

5. The values of the pulse counter (e.g. FXA42 Input Counter 1 and FXA42 Input Counter 1 Overflow) are displayed in the "Grid View":

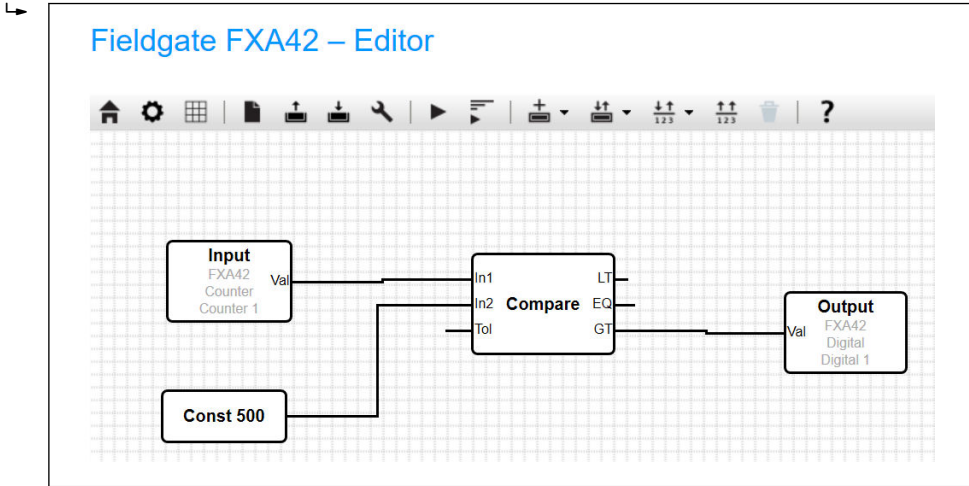
↪



A0035087

6. The configured pulse counter is now available in the editor of the Web-PLC.

7. Example: The digital output is switched on as soon as the value "500" is exceeded:



A0035109

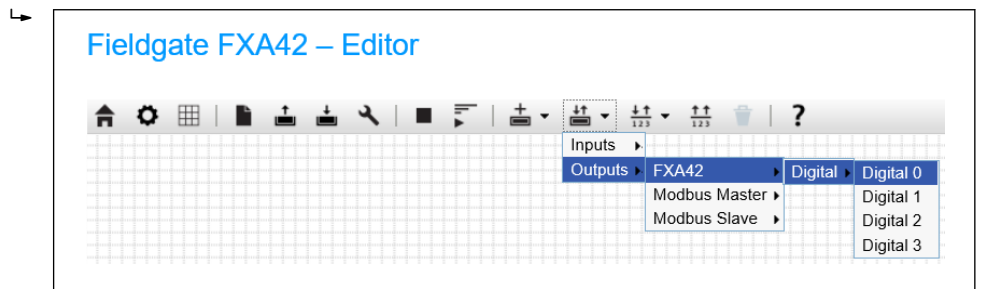
### 7.5.4 Configuring the digital output

The input of the digital output must be connected with an action that returns a 0 or 1. The values of the digital outputs are displayed in the "Grid View":

State	Name	Value	Unit	Min. Range
█	FXA42 Input Counter 1 Overflow	0		
█	FXA42 Input Counter 2 Overflow	0		
█	FXA42 Input Counter 3 Overflow	0		
█	FXA42 Input Counter 0 Hold Time	0	ms	
█	FXA42 Input Counter 2 Hold Time	0	ms	
█	FXA42 Input Counter 3 Hold Time	0	ms	
█	FXA42 Output Digital 0	0		
█	FXA42 Output Digital 1	0		
█	FXA42 Output Digital 2	0		
█	FXA42 Output Digital 3	0		

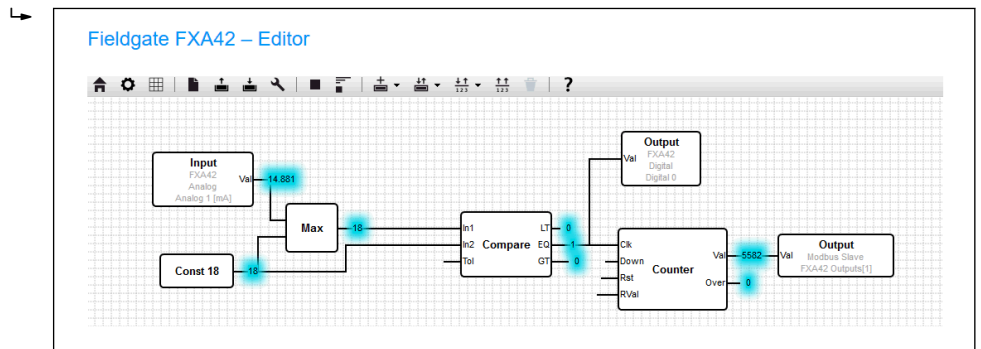
A0035089

1. Select the editor
2. Select the output:



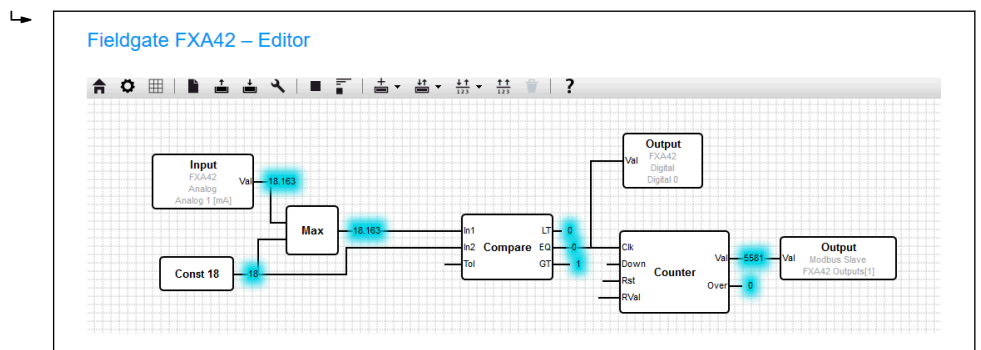
A0034382

3. Connect units with one another, see the following example for output = 1:





A0034595

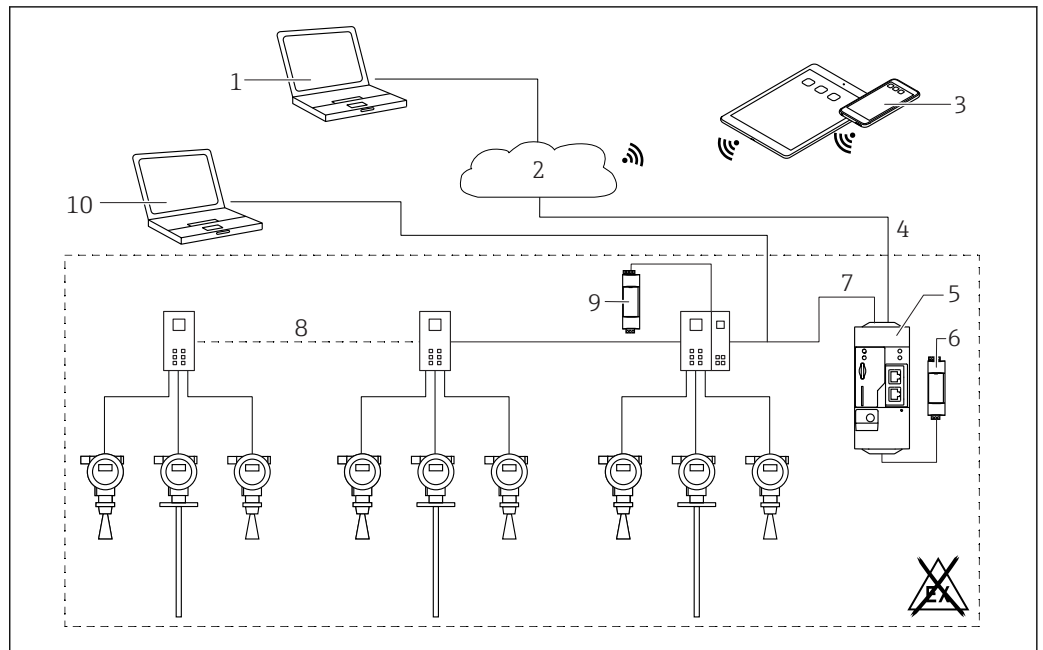
4. Connect units with one another, see the following example for output = 0:



A0034596

5. Save the diagram: 
6. Start Web-PLC: 

### 7.5.5 Communication via Modbus TCP



A0034272

**6** System architecture of a Fieldgate FXA42 with HART point-to-point multiplexer

- 1 SupplyCare Enterprise / SupplyCare Hosting (via Web browser)
- 2 Internet / LAN
- 3 SupplyCare Enterprise / SupplyCare Hosting on mobile devices (via Web browser)
- 4 Ethernet/WLAN/UMTS
- 5 Fieldgate FXA42
- 6 Power supply 24 V DC
- 7 Modbus TCP via Ethernet as server/client
- 8 Phoenix Contact multiplexer from Modbus TCP to HART point to point. 1 head module and up to 5 expansion modules possible. Expansion modules possible for 4 or 8 HART channels (up to 40 devices)
- 9 External power supply
- 10 FieldCare tunneling via Phoenix Contact multiplexer

**i** Modbus TCP can be operated as a server or client at the Ethernet connection of the Fieldgate FXA42.

### Configuration of FXA42 as a Modbus TCP client (reading out data from other systems)

The steps in the example below describe how to read out data from accessories HG1+, HART multiplexer, DATEXEL analog module and other Modbus TCP devices. Please refer to the device documentation for additional information.

1. Open the "Settings page" ⚙️.
2. Select the "Modbus client/master" tab.
3. Select "Edit device" and enter the data:

**Edit device**

Name:  (Up to 64 printable ASCII characters)

Type:

IP address:

Port:  (0..65535)

A0035102-EN

4. Select "Edit value" and enter the data. Example: enter Primary Value (PV) for the first HART device connected to the HG1+ (enable and enter limits if necessary):

**Edit value**

Name:  (Up to 64 printable ASCII characters)

Unit identifier:  (0..255)

Function:

Start address:  (0..65535)

Quantity:  1..123

Data type:

Swap words:

Enable limits:

Limit High High:  (IEEE 754 double precision)

Limit High:  (IEEE 754 double precision)

Limit Low:  (IEEE 754 double precision)

Limit Low Low:  (IEEE 754 double precision)

Hysteresis:  (IEEE 754 double precision)

A0035103-EN

5. Click "OK":

**Fieldgate FXA42 – Settings**

Event Log | Login | Network | Cellular Modem | **Modbus Client/Master** | Modbus Server/Slave | Analog Inputs | Digital Inputs | Data Transmis

**Modbus Client/Master**

Name:       Communication parameters:

Inputs

**Device 1 Primary variable**      Read Analog Inputs (0x04), start address: 2300, quantity: 2, data type: 32-bit floating point, unit identifier: 1

Outputs

**Settings**

Interval:  (200..3600000 ms)

Timeout:  (50..30000 ms)

**RTU**

Enable RTU:

Baud rate:

Parity:

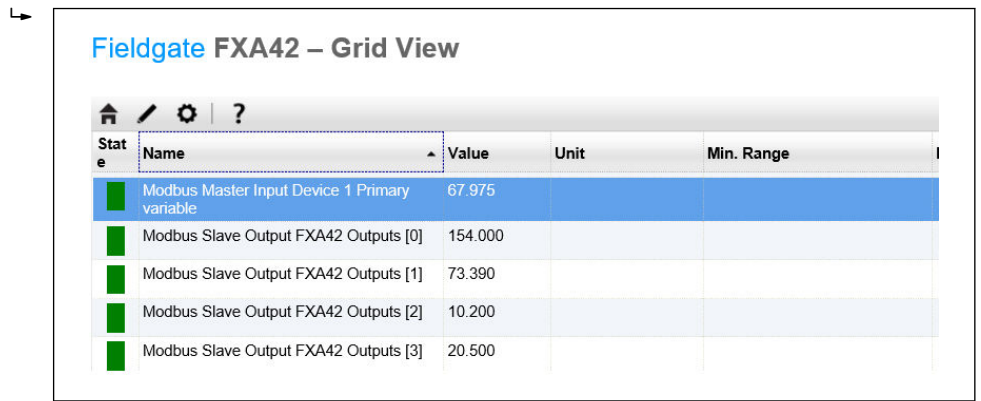
Minimum silent time between frames:  (0..500 ms)

A0035104-EN

6. Restart the device 🔄.



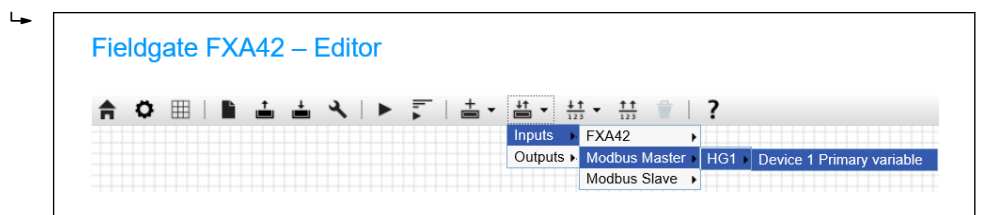
- The exported values are displayed in the "Grid View".



A0035091

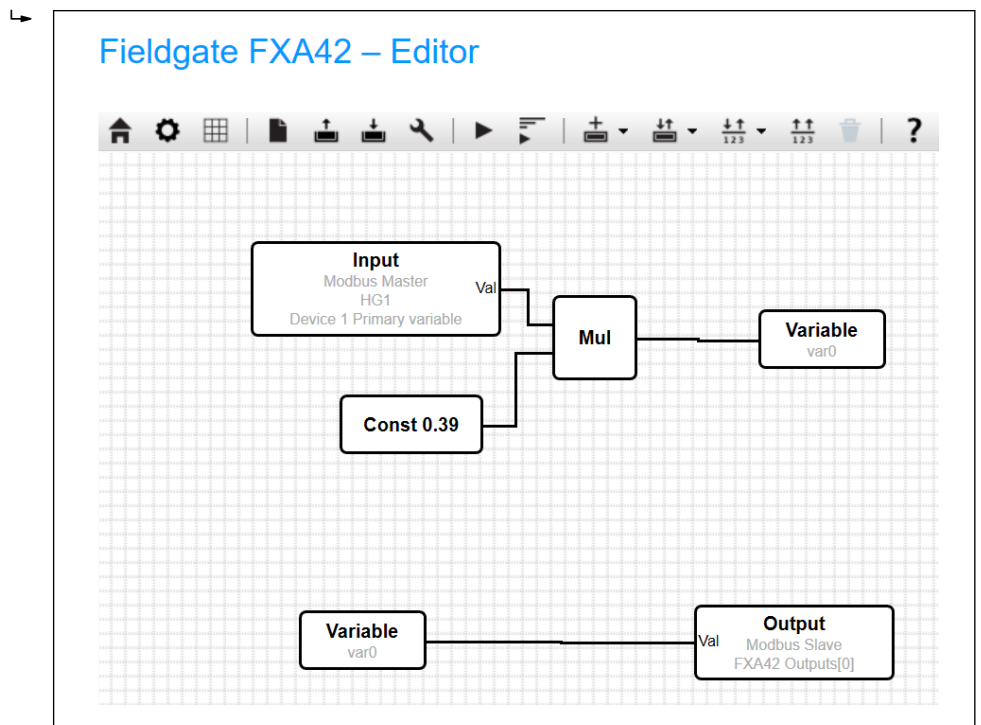
- Select the editor

- Select the input:



A0034397

- Interconnect units, see the following example:



A0035092

- Save the diagram:

- Start Web-PLC:

**Configuration of FXA42 as a Modbus TCP server (transmitting data to other systems)**

The steps in the example below describe how to transmit data to other devices. Please refer to the device documentation for additional information.

1. Open the "Settings page" ⚙️ .
2. Select the "Modbus server/slave" tab.
3. Select "Edit value" and enter the data:

**Edit value**

Name:  (Up to 64 printable ASCII characters)

Function:

Start address:  (0..65535)

Quantity:  1..123

Data type:

A0035105-EN

4. Click "OK":

**Fieldgate FXA42 – Settings**

Event Log | Login | Network | Cellular Modem | Modbus Client/Master | **Modbus Server/Slave** | Analog Inputs | Digital Inputs

**Modbus Server/Slave**

Name	Communication parameters
FXA42 Outputs	Read Analog Inputs (0x04), start address: 100, quantity: 10, data type: 32-bit floating point

Settings

Mode:

Port:  (1..65535)

Keep-alive enable:

Keep-alive timeout:  (10..32767 s)

Keep-alive interval:  (1..600 s)

Keep-alive count:  (0..32767)

A0035106-EN

5. Restart the device 🔄 .
6. The Modbus TCP output values are displayed in the "Grid View":

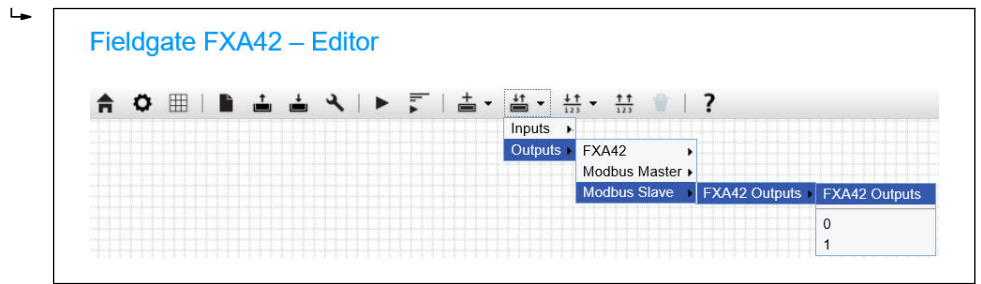
**Fieldgate FXA42 – Grid View**

State	Name	Value	Unit	Mir
🟢	Modbus Slave Output FXA42 Outputs [0]	154.000		
🟢	Modbus Slave Output FXA42 Outputs [1]	76.220		
🟢	Modbus Slave Output FXA42 Outputs [2]	10.200		
🟢	Modbus Slave Output FXA42 Outputs [3]	20.500		
🟢	Modbus Slave Output FXA42 Outputs [4]	-20.000		

A0035093

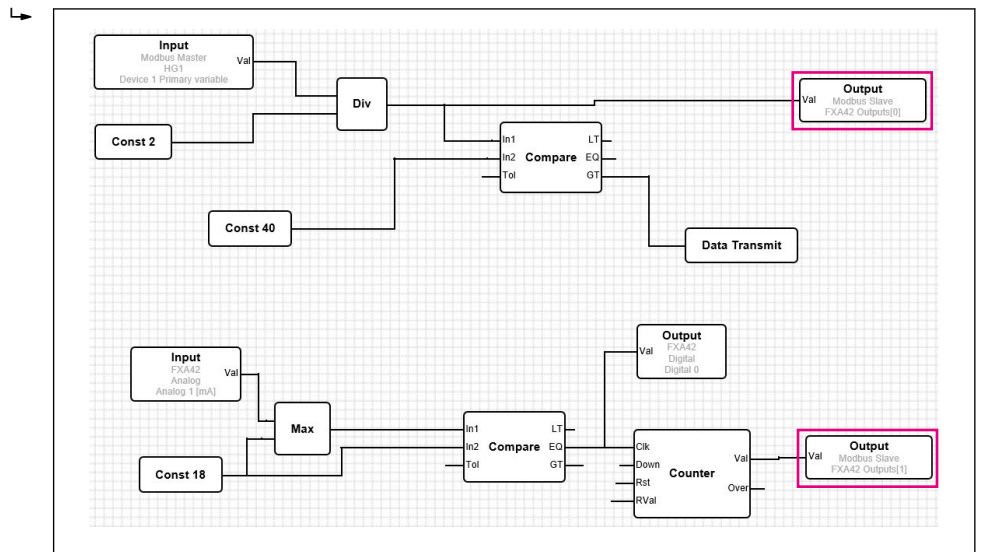
7. Select the editor 🛠️

8. Select the output:



A0034401

9. Interconnect units, see the following example:

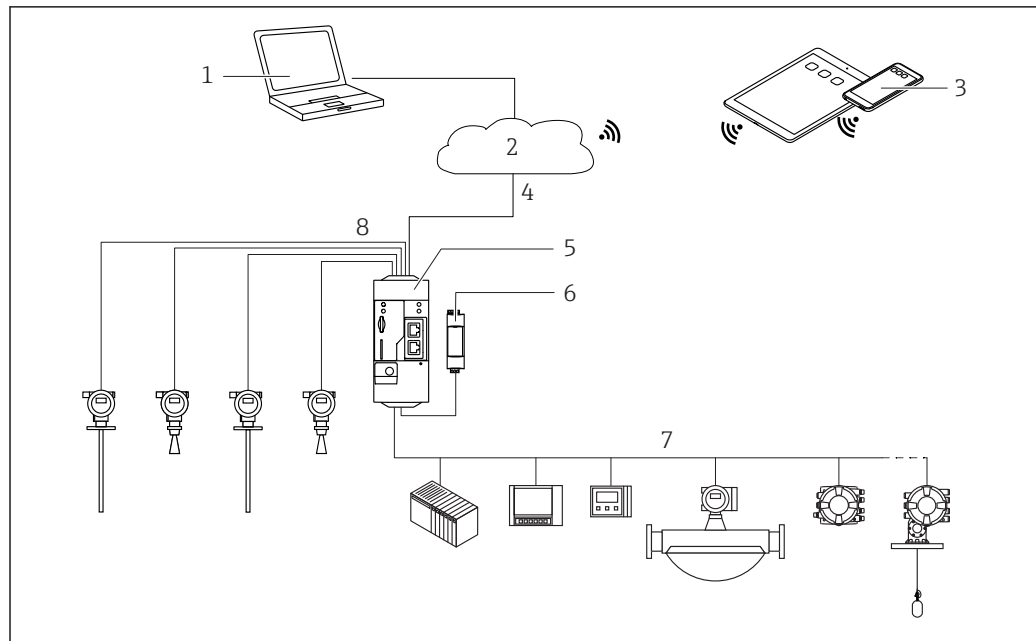


A0034402

10. Save the diagram:

11. Start Web-PLC:


### 7.5.6 Configuration with Modbus RS485



A0030923

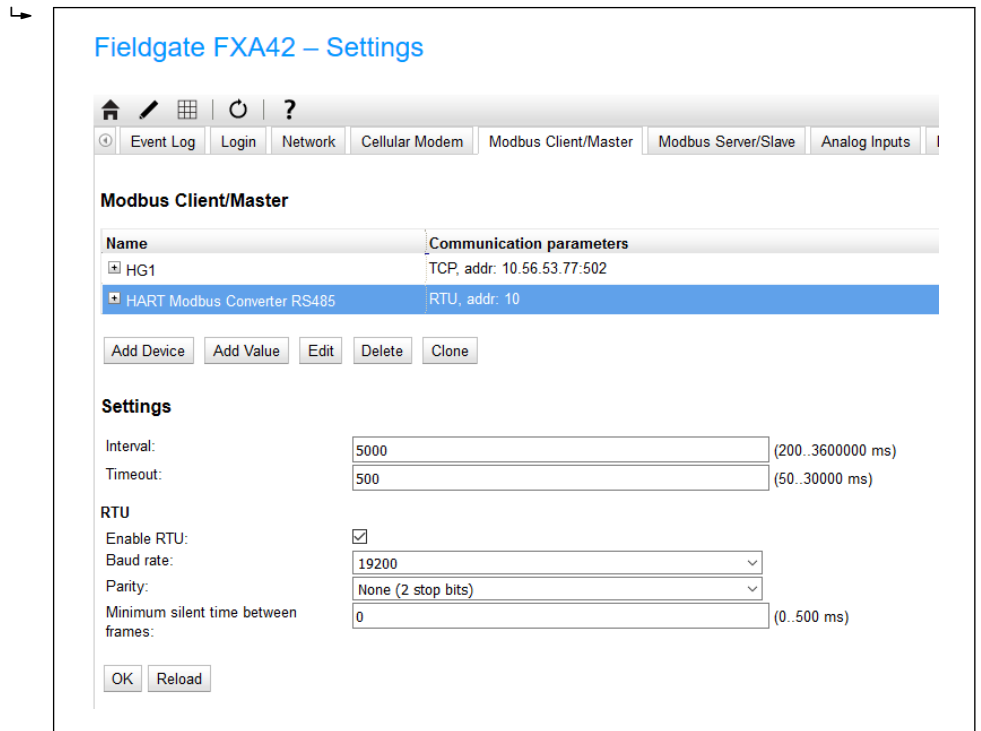
 7 System architecture of a Fieldgate FXA42 with Modbus RS485

- 1 SupplyCare Enterprise / SupplyCare Hosting (via Web browser)
- 2 Internet / LAN
- 3 SupplyCare Enterprise / SupplyCare Hosting on mobile devices (via Web browser)
- 4 Ethernet/WLAN/UMTS
- 5 Fieldgate FXA42
- 6 Power supply 24 V DC
- 7 1 x Modbus RS485 as master or slave
- 8 4 x 4 to 20 mA analog input (2-wire/4-wire)

-  The Modbus RS485 connection can be used as either a master or a slave (but not as both).
- When used as the master, up to 32 addresses (including Modbus RS485 and Modbus TCP) and up to 512 Modbus registers can be interrogated.
  - When used as a slave, 128 Modbus arrays with a total of 512 Modbus registers can be configured.

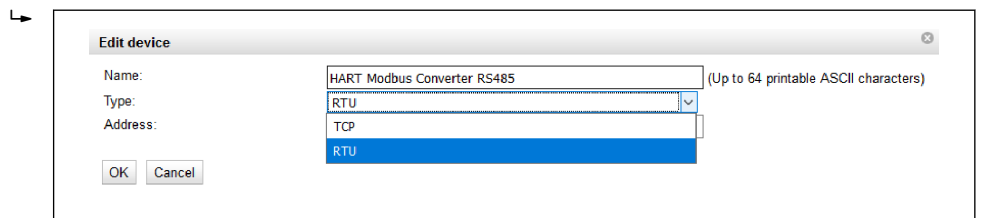
**Configuration of FXA42 as a Modbus RS485 master (reading out data from other systems)**

1. Open the "Settings page" ⚙️ .
2. Select the "Modbus client/master" tab.
3. Under "Settings", select "Enable RTU". Enter the interval, timeout, baud rate etc.:



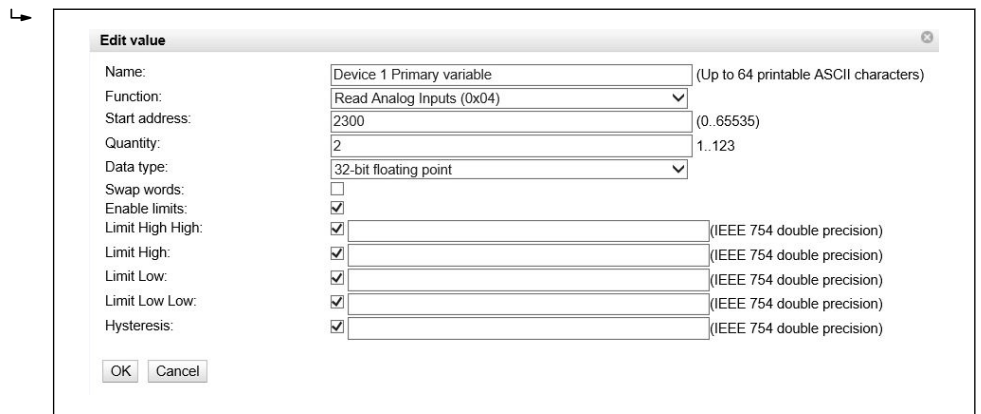
A0035095-EN

4. Click "OK":
5. Select "Edit device" and enter the data:



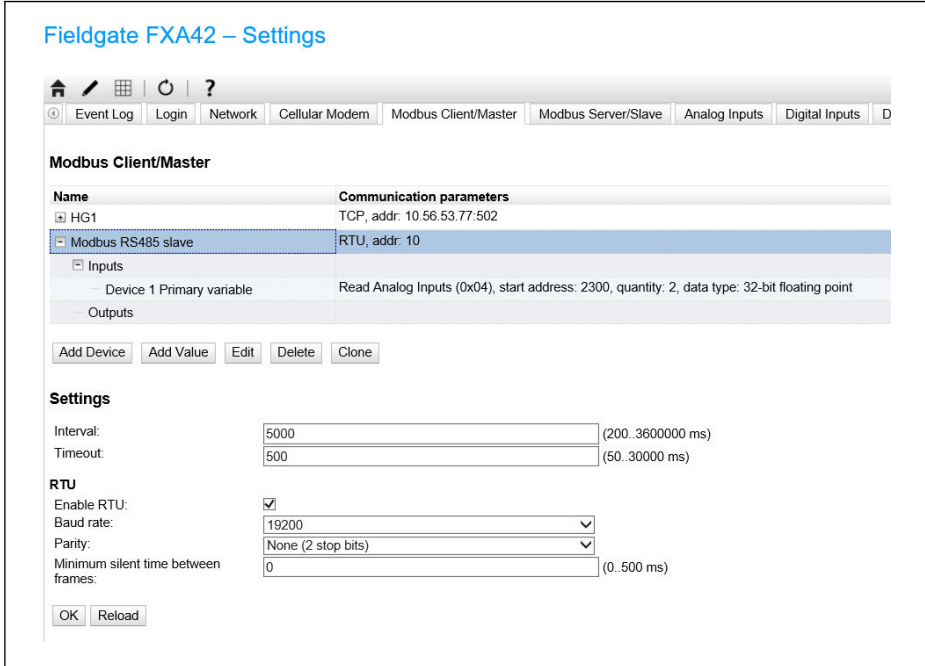
A0035096-EN

6. Select "Edit value" and enter the data. Enable and enter limits if necessary:





A0035098-EN

## 7. Click "OK":




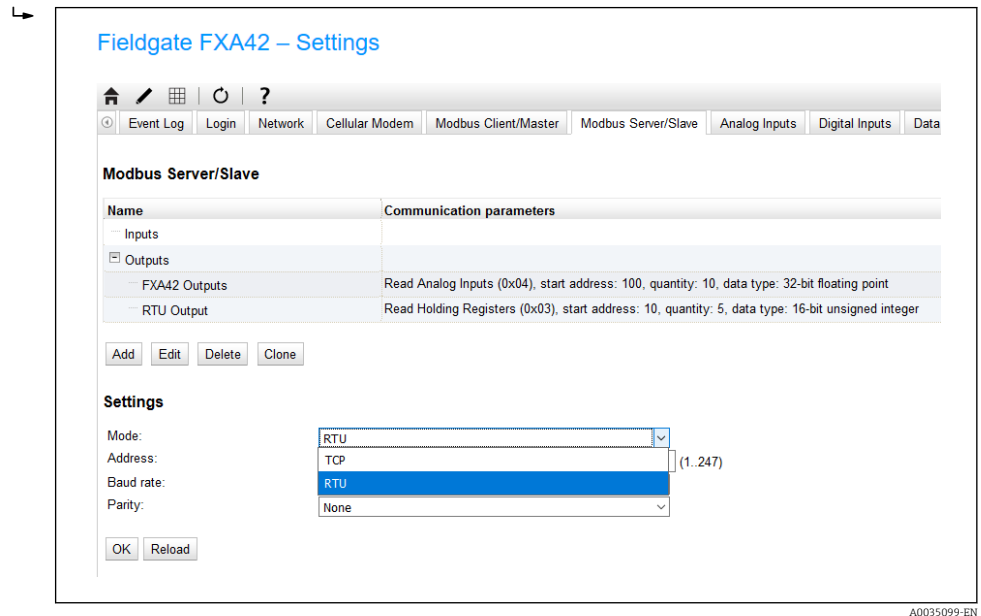
The screenshot shows the 'Fieldgate FXA42 – Settings' interface. At the top, there is a navigation bar with icons for Home, Edit, Grid, Refresh, and Help, and a menu with options: Event Log, Login, Network, Cellular Modem, Modbus Client/Master (selected), Modbus Server/Slave, Analog Inputs, Digital Inputs, and D. Below the navigation bar, the 'Modbus Client/Master' section is active. It contains a table with two columns: 'Name' and 'Communication parameters'. The table has three rows: 'HG1' with 'TCP, addr: 10.56.53.77.502', 'Modbus RS485 slave' (highlighted) with 'RTU, addr: 10', and 'Inputs' with 'Device 1 Primary variable' and 'Read Analog Inputs (0x04), start address: 2300, quantity: 2, data type: 32-bit floating point'. Below the table are buttons for 'Add Device', 'Add Value', 'Edit', 'Delete', and 'Clone'. The 'Settings' section below has 'Interval' set to 5000 (200.3600000 ms) and 'Timeout' set to 500 (50.30000 ms). The 'RTU' section has 'Enable RTU' checked, 'Baud rate' set to 19200, 'Parity' set to 'None (2 stop bits)', and 'Minimum silent time between frames' set to 0 (0.500 ms). At the bottom left are 'OK' and 'Reload' buttons. The document ID 'A0035097-EN' is visible in the bottom right corner of the screenshot.

8. Restart the device .

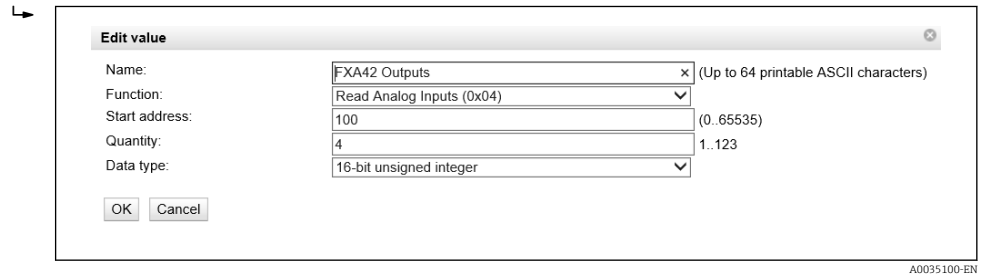
The remaining configuration is the same as the configuration of the Modbus TCP client (see "Configuration of FXA42 as a Modbus TCP client (reading out data from other systems)" →  32)

### Configuration of FXA42 as a Modbus RS485 slave (transmitting data to other systems)

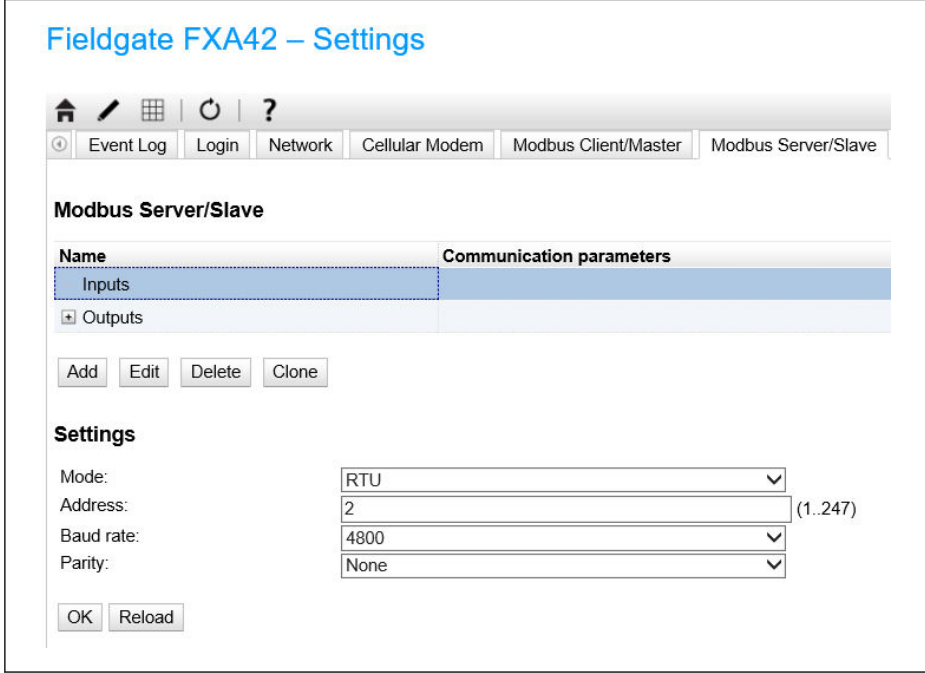
1. Open the "Settings page" .
2. Select the "Modbus server/slave" tab.
3. Under "Settings", select "Enable RTU". Enter the interval, timeout, baud rate etc.:





4. Click "OK".
5. Select "Edit value" and enter the data:



6. Click "OK":



The screenshot shows the 'Fieldgate FXA42 – Settings' web interface. At the top, there is a navigation bar with icons for home, edit, grid, refresh, and help. Below this is a menu with tabs for 'Event Log', 'Login', 'Network', 'Cellular Modem', 'Modbus Client/Master', and 'Modbus Server/Slave'. The 'Modbus Server/Slave' tab is active. Underneath, the 'Modbus Server/Slave' section contains a table with two columns: 'Name' and 'Communication parameters'. The 'Inputs' row is selected. Below the table are buttons for 'Add', 'Edit', 'Delete', and 'Clone'. The 'Settings' section below the table includes four fields: 'Mode' (set to RTU), 'Address' (set to 2), 'Baud rate' (set to 4800), and 'Parity' (set to None). The 'Address' field has a range indicator '(1..247)'. At the bottom of the settings section are 'OK' and 'Reload' buttons. A small reference code 'A0035101-EN' is visible in the bottom right corner of the screenshot.

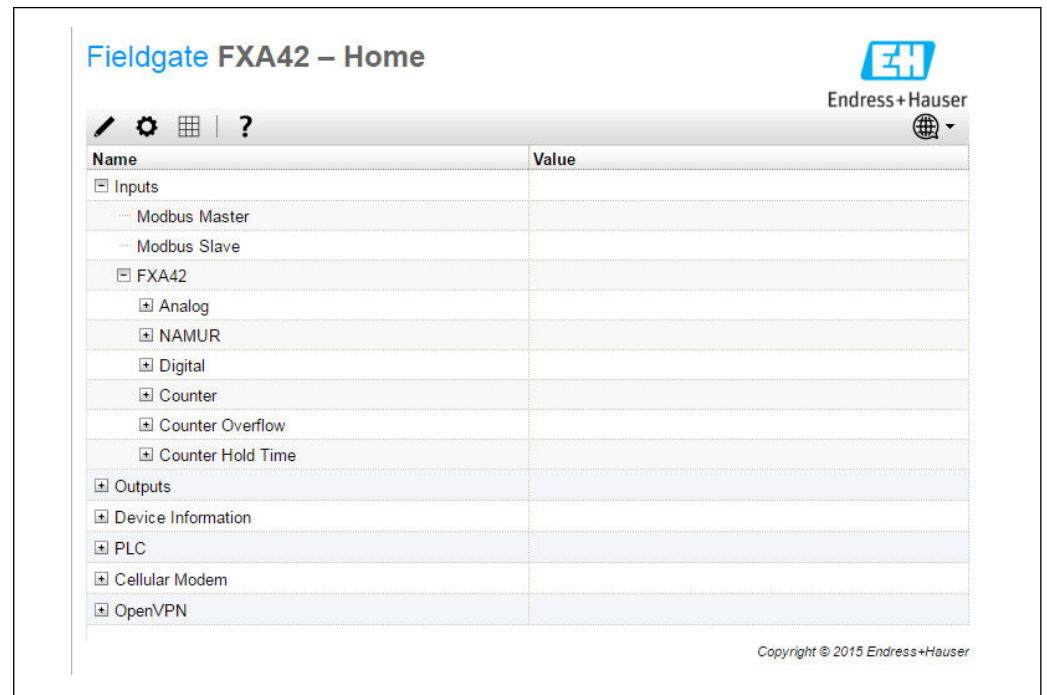
7. Restart the device .
8. The remaining configuration is the same as the configuration of the Modbus TCP server (see "Configuration of FXA42 as a Modbus TCP server (transmitting data to other systems)" →  34).



## 8 Operation





### 8.1 Home page

The home page (see below) contains information about the Fieldgate FXA42, its I/Os and several other components.



A0035224-EN

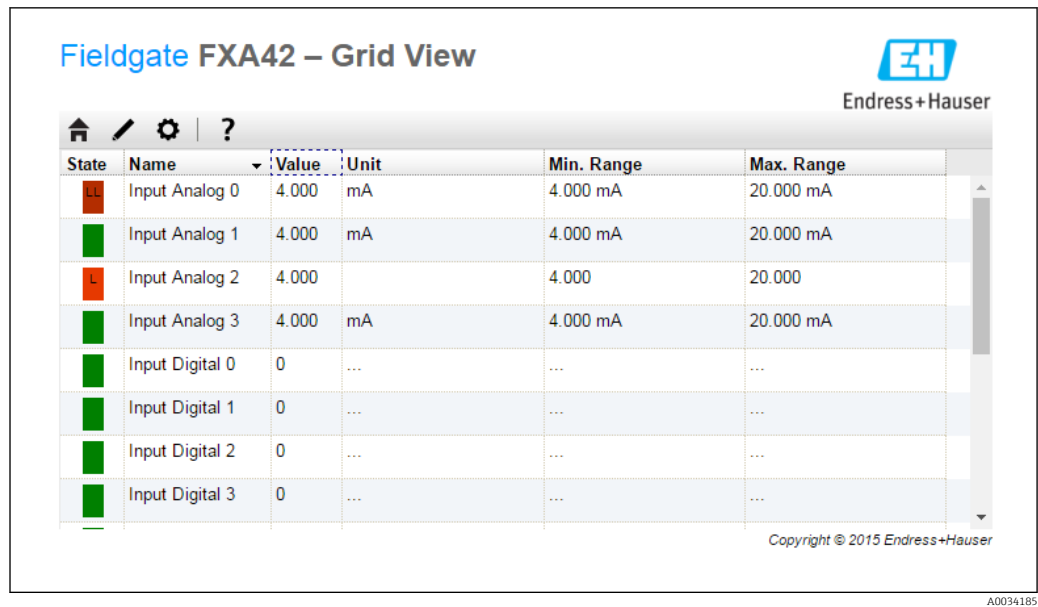
There is a toolbar on the home page. The buttons in this toolbar are described in detail in the following section.

Button	Description
 A0034181	Closes the home page and opens the page with the editor → 44.
 A0034182	Closes the home page and opens the Settings page → 61.
 A0034183	Closes the home page and opens the Grid view → 41.
 A0034184	Opens the Help.





Below the toolbar, you can find a table containing information about the Fieldgate FXA42, its status and its I/Os.

### 8.2 Grid view

You can view the current I/O values of your Fieldgate on the "Grid view" page (see the graphic below).



There is a toolbar on the "Grid view" page. The buttons in this toolbar are described in detail in the following section.




Button	Description
 A0034196	Closes the Grid view page and opens the home page → 41.
 A0034181	Closes the Grid view page and opens the editor → 44.
 A0034182	Closes the Grid view page and opens the Settings page → 61.
 A0034184	Opens the Help.





The "Grid view" page displays all the local I/Os on a convenient grid.

The following information is displayed:

- The value of each I/O: - "unit", "minimum input value", "maximum input value"
- The state of the analog inputs of the Fieldgate FXA42.

The states are as follows:

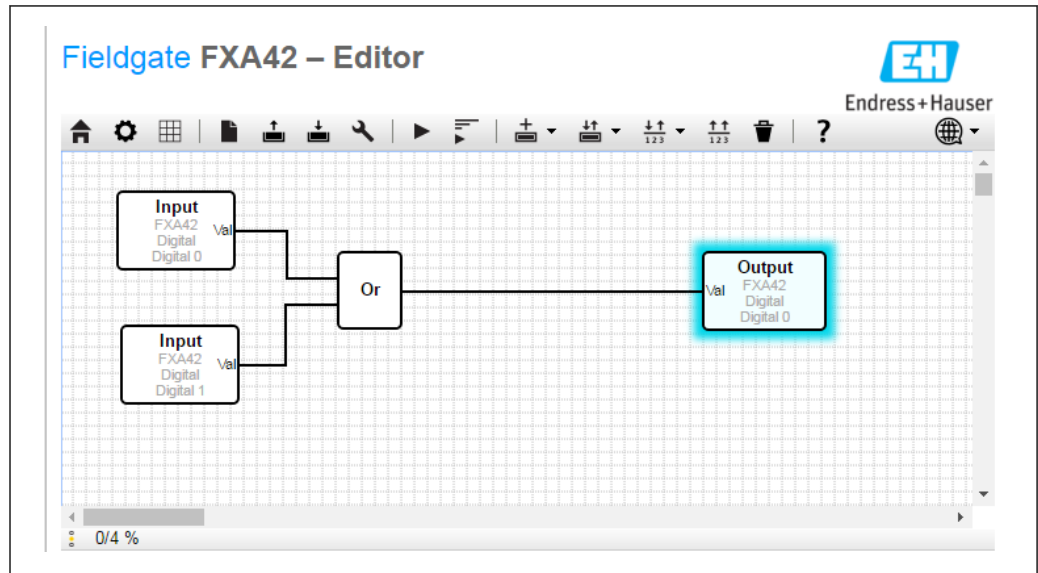
State	Description
 A0034186	The state is "High High"
 A0034187	The state is "High"
 A0034188	The state is "OK"

State	Description
 <small>A0034190</small>	The state is "Low"
 <small>A0034191</small>	The state is "Low Low"
 <small>A0034192</small>	Fault state
 <small>A0034193</small>	Warning state

### 8.3 Fieldgate FXA42 editor

The Fieldgate FXA42 has a graphical editor which can be used to edit function diagrams – similar to the well-known continuous function charts (CFCs). Function blocks can be used to connect the inputs/outputs of the Fieldgate FXA42 and special variables.

Screenshot of the Fieldgate FXA42 editor:



The editor basically consists of three parts.

- A toolbar is located at the top → 45.
- Below this toolbar is the Diagram View → 46. The current function diagram can be edited here. Elements can be positioned and connected to one another.
- At the bottom, you can find a status bar → 58 that displays information on the state of the PLC.













### 8.3.1 Toolbar



The following screenshot shows the toolbar of the Fieldgate FXA42 editor:



A0034195


The buttons in this toolbar are described in detail in the following section.

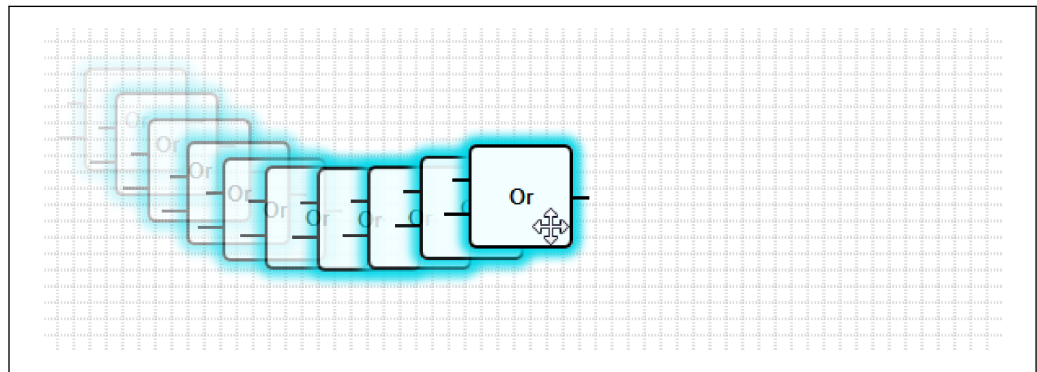
Button	Description
 A0034196	Closes the editor and opens the home page → 41.
 A0034182	Closes the editor and opens the Settings page → 61.
 A0034197	Clears the current diagram view. This does not affect the diagram being executed by the PLC.
 A0034198	Loads the diagram from the PLC. Local changes are overwritten.
 A0034199	Saves the current local diagram to the PLC. If the PLC is currently running, it is stopped.
 A0034200	Opens a dialog box where you can edit the diagram settings. See Diagram Settings → 58 .
 A0034201	Starts/stops the PLC. The PLC can only be started if a non-empty diagram has been saved.
 A0034202	Starts/stops the Live view → 59.
 A0034203	Opens a menu for selecting a unit type to be added to the diagram view. See Editing the diagram → 46.
 A0034204	Opens a menu for selecting inputs and outputs to be added to the diagram view. The menu consists of several submenus for inputs/outputs, interfaces, devices and arrays. Note that in the case of arrays, you can either insert an I/O array element by selecting the topmost entry in the submenu or a plain I/O element representing just one element of the array by selecting the corresponding index in the submenu. See Editing the diagram → 46.
 A0034205	Opens a menu for selecting a variable to be added to the diagram view. See Editing the diagram.
 A0034206	Adds a constant to the diagram view. See Editing the diagram → 46.

Button	Description
 A0034207	Deletes the selected element from the diagram view.
 A0034184	Opens the Help.

### 8.3.2 Editing the diagram

The function diagram consists of up to 256 units, local I/Os, variables and constants.

Elements are added to the diagram via the toolbar →  45. Click an element to select it. A blue shadow around the element indicates that it has been selected. You can delete the selected element by clicking the *Delete* button in the toolbar or by pressing the *DEL* key on the keyboard. To move an element in the diagram view, drag it as illustrated in the picture below.



A0034211

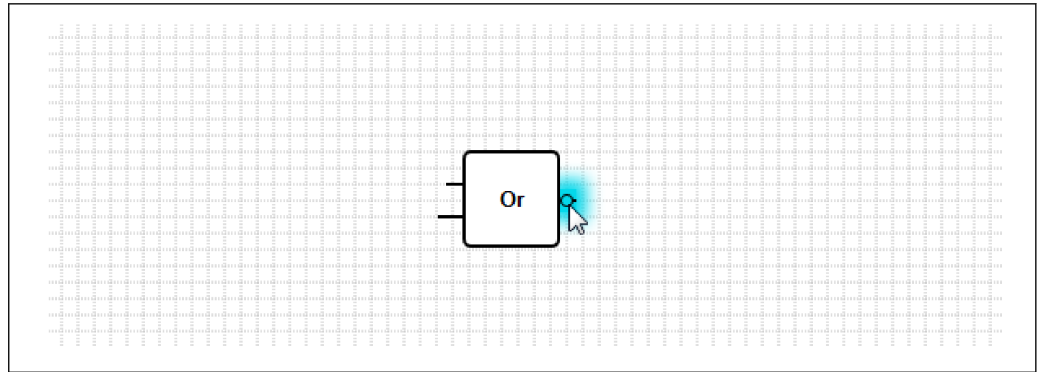
Each element has one or more ports via which it can be connected to other elements. Input ports are shown on the left-hand side and output ports on the right-hand side of the elements. Each port has one of the following data types:

- Boolean [0..1]
- 8-bit unsigned integer [0..255]
- 8-bit signed integer [-128..127]
- 16-bit unsigned integer [0..65,535]
- 16-bit signed integer [-32,768..32,767]
- 32-bit unsigned integer [0..4,294,967,295]
- 32-bit signed integer [-2,147,483,648..2,147,483,647]
- 32-bit floating point number
- 64-bit floating point number
- String (up to 4096 bytes)

Note that when data types are compared to each other, this will be done according to this list. *Boolean* is considered the smallest data type, while *String* is the greatest data type.

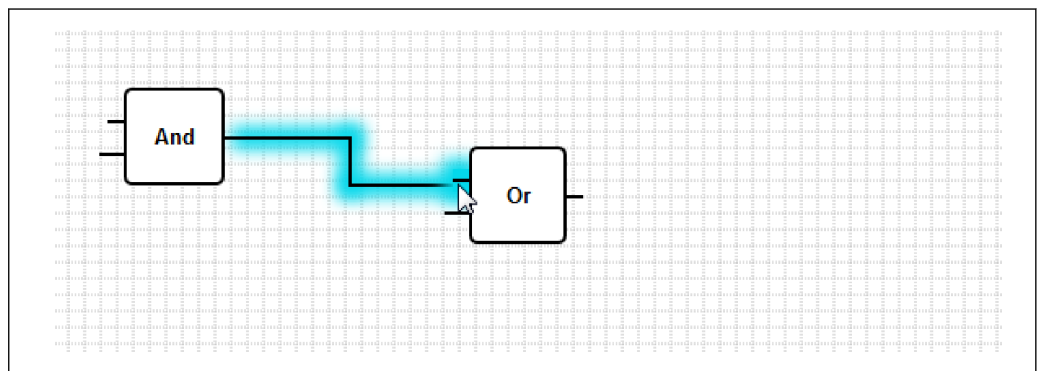
If ports with different data types are connected to one another, the value for the data type of the output port is implicitly converted to the data type for the input port. Note that this conversion lead to loss of data. Open input ports are defined to have the value *0* (Boolean data type). Double click a port to negate it. A small circle indicates that the port is negated (see the graphic below).

The negation is performed logically. The value *0* is negated to *1*. A value not equal to *0* is negated to *0*. Negating a string results in an empty string.



A0034212-EN

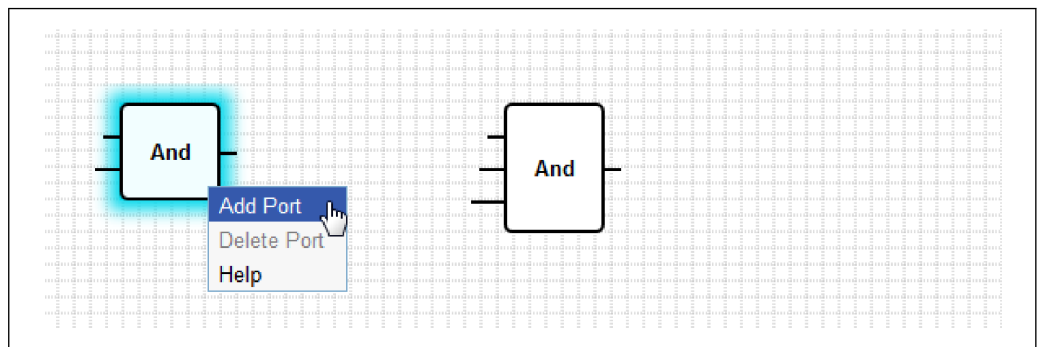
To connect an input port with an output port, click one of the ports, keep the mouse button pressed, drag the blue connector that appears over the other port (see the next graphic), and release the mouse button. Note that one output port can be connected to multiple input ports. However, it is not possible to interconnect two input ports or two output ports. Connectors can be selected just like any other element. Activated connectors can be deleted by clicking the *Delete* button in the toolbar or by pressing the *DEL* key on the keyboard.



A0034213-EN

Some elements allow ports to be added or deleted dynamically. To do this, right-click the element. A popup menu appears (see the following graphic). You can add or delete ports here.



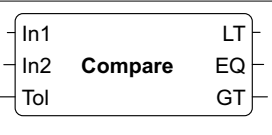
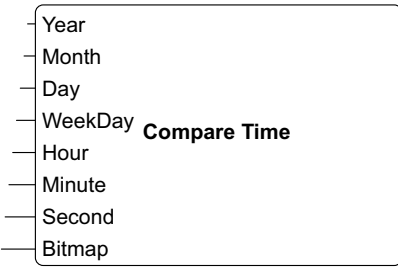
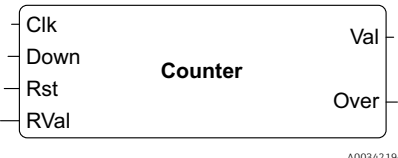
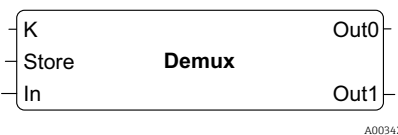
- i** Every element has a minimum and maximum number of ports. You can also use this popup menu to access the help for the particular element.




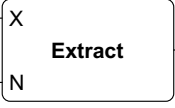




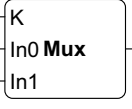
A0034214-EN

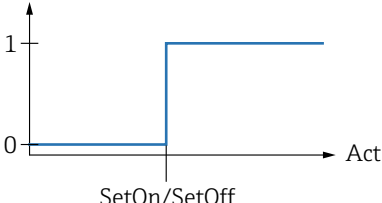
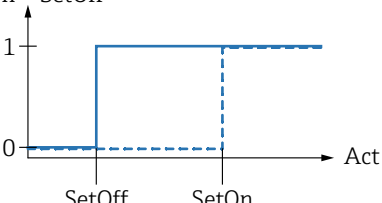
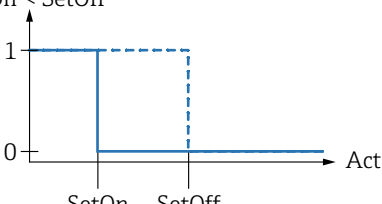

### Units

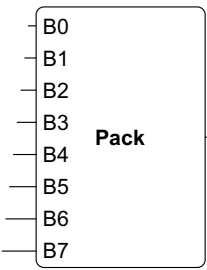

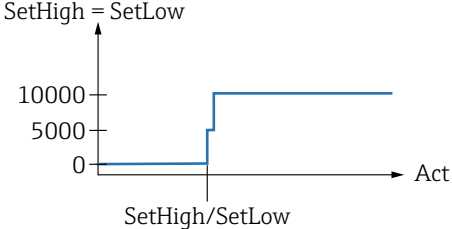
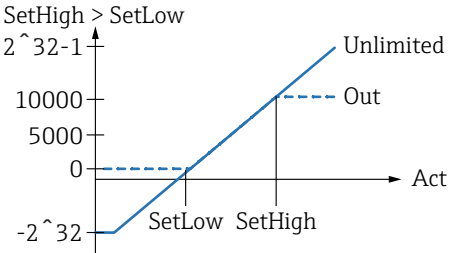
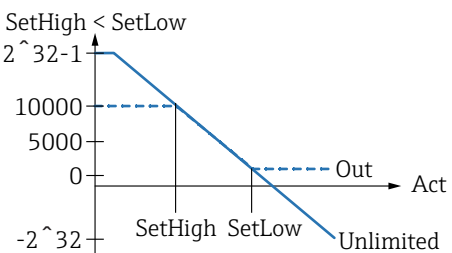

The behavior of the available units is described in the following section. Unless otherwise indicated, units are processed during the processing stage of the IPO cycle → 59.



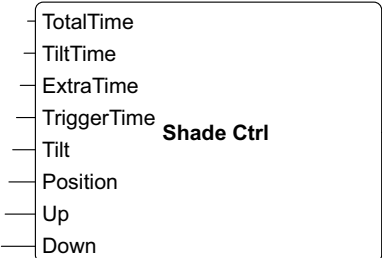

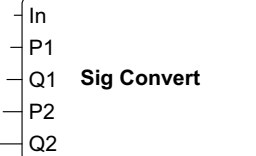
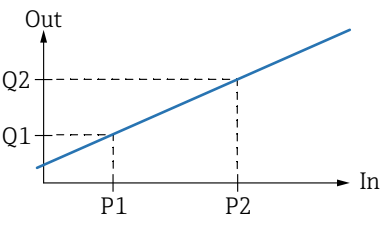

Unit	Description
 <p style="text-align: right;">A0034215</p>	<p>This unit performs an addition. It adds the values of its input ports and writes the total to its output port.</p> <p>The addition is performed in the greatest numeric data type of all the output ports that are connected to the input ports of the unit. All the ports of the unit adopt this data type. Input ports connected to string output ports are treated as if they were connected to a 64-bit floating point output port. For example, if one input port is connected to an 8-bit unsigned integer output port and another input port is connected to an 8-bit signed integer output port, the addition is performed in an 8-bit signed integer, and this will also be the data type for all the ports.</p>
 <p style="text-align: right;">A0034216-EN</p>	<p>This unit performs a binary And. The operation is performed in the greatest integer data type of all the output ports that are connected to the input ports of the unit. All the ports of the unit adopt this data type. Input ports connected to floating point or string output ports are treated as if they were connected to a 32-bit signed integer output port.</p> <p>Example:</p> <ul style="list-style-type: none"> <li>▪ 0 and 0 ⇒ 0</li> <li>▪ 0 and 1 ⇒ 0</li> <li>▪ 1 and 1 ⇒ 1</li> <li>▪ 11 (1011<sub>2</sub>) and 14 (1110<sub>2</sub>) ⇒ 10 (1010<sub>2</sub>)</li> <li>▪ 5 (00000005<sub>16</sub>) and -15 (FFFFFFF1<sub>16</sub>) ⇒ 1 (00000001<sub>16</sub>)</li> </ul>
 <p style="text-align: right;">A0034217-EN</p>	<p>This unit represents a comparator. It compares the values of the two input ports <i>In1</i> and <i>In2</i> and assigns values to the three Boolean outputs.</p> <p>The output port <i>LT</i> is set to 1 if <i>In1</i> is less than <i>In2</i>.</p> <p>The output port <i>EQ</i> is set to 1 if <i>In1</i> is equal to <i>In2</i>. A tolerance value for the equation can be specified via the <i>Tol</i> input port. This is particularly useful for floating point values where direct comparison may not work on account of rounding errors. With a tolerance value of 0.5, the values 1.0 and 1.5 are considered equal. If strings are compared, the <i>Tol</i> input port is ignored and should be left open.</p> <p>The output port <i>GT</i> is set to 1 if <i>In1</i> is greater than <i>In2</i>.</p> <p>The unit operates in the greatest numeric data type of all the output ports that are connected to the input ports of the unit. All the input ports of the unit adopt this data type.</p>
 <p style="text-align: right;">A0034218-EN</p>	<p>This unit performs a time comparison. It compares the date and the time specified through its input ports with the current local time. If the two times match, the Boolean output port is set to 1.</p> <p>The input port <i>Bitmap</i> (8-bit unsigned integer) can be used to specify which components of the date and time should be compared; if the value 0 is set, then all the input ports are ignored and the output port is set to 1.</p> <p>There are input ports for the following date/time components:</p> <ul style="list-style-type: none"> <li>▪ <i>Year</i>: compared if bit 0 of the input port <i>Bitmap</i> (16-bit unsigned integer) is set</li> <li>▪ <i>Month</i>: compared if bit 1 of the input port <i>Bitmap</i> is set (8-bit unsigned integer, range [1 to 12])</li> <li>▪ <i>Day</i>: day of the month – compared if bit 2 of the input port <i>Bitmap</i> is set (8-bit unsigned integer, range [1 to 31])</li> <li>▪ <i>WeekDay</i>: days since Sunday – compared if bit 3 of the input port <i>Bitmap</i> is set (8-bit unsigned integer, range [0 to 6])</li> <li>▪ <i>Hour</i>: compared if bit 4 of the input port <i>Bitmap</i> is set (8-bit unsigned integer, range [0 to 23])</li> <li>▪ <i>Minute</i>: compared if bit 5 of the input port <i>Bitmap</i> is set (8-bit unsigned integer, range [0 to 59])</li> <li>▪ <i>Second</i>: compared if bit 6 of the input port <i>Bitmap</i> is set (8-bit unsigned integer, range [0 to 59])</li> </ul>
 <p style="text-align: right;">A0034219-EN</p>	<p>This unit represents a counter. Each rising edge (transition from 0 to 1) on the Boolean input port <i>Clk</i> increases the numeric value on the output port <i>Val</i> (32-bit unsigned integer) by one. If the value on the Boolean input port is <i>Down</i> 1, the counter value is reduced by one instead. The maximum value that can be output on the <i>Val</i> port is 4,294,967,295 (2<sup>32</sup>-1). The minimum value is 0. An overflow (from 4,294,967,295 to 0 or vice versa) is indicated by the Boolean output port <i>Over</i>. Its value is 1 until the next clock pulse increases or decreases the counter value by one or the counter is reset.</p> <p>If the value on the Boolean input port <i>Rst</i> is 1, the counter value is reset to the current value of the input port <i>RVal</i> (32-bit unsigned integer).</p>
 <p style="text-align: right;">A0034221</p>	<p>This unit represents a demultiplexer. It copies the value of the input port <i>In</i> to the output port <i>Out&lt;K&gt;</i>. The relevant output port is selected by the input port <i>K</i> (8-bit unsigned integer). <i>Out0</i> is selected if <i>K</i> equals 0.</p> <p>If the value for <i>K</i> is too low, <i>Out0</i> is selected. If the value for <i>K</i> is too high, the output port with the highest index value is selected.</p> <p>The value of the Boolean input port <i>Store</i> determines whether a previously selected output port keeps its value (<i>Store</i> 1) or is reset to 0 (<i>Store</i> 0).</p> <p>The input port <i>In</i> and all the output ports adopt the data type of the output port connected to the input port <i>In</i>.</p>

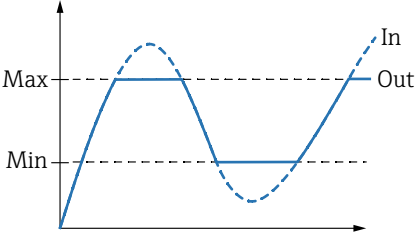
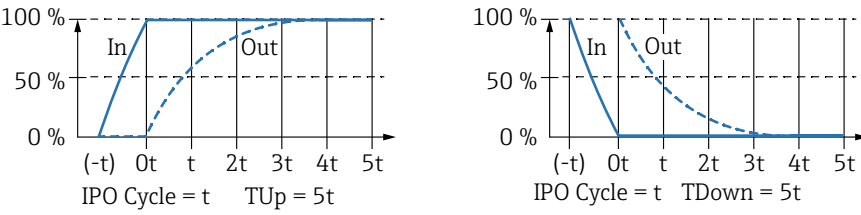
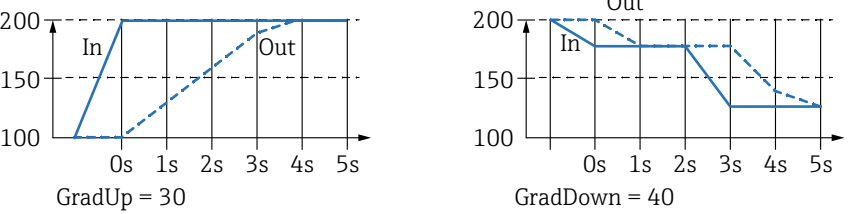


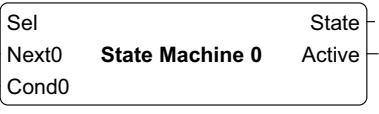


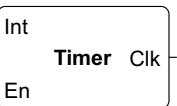
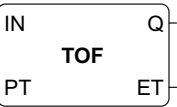
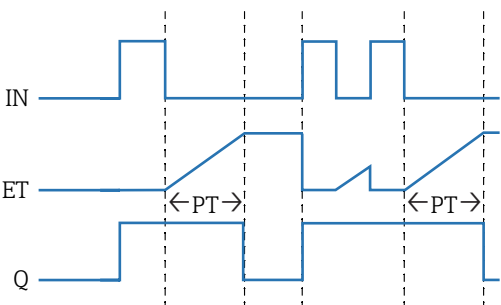

Unit	Description
 <small>A0034222</small>	<p>This unit performs a division. It divides the first input port by all the subsequent input ports and writes the quotient to its output port. If one of the input ports has the value 0, the output port is set to 0. The division is performed in the greatest numeric data type of all the output ports that are connected to the input ports of the unit. All the ports of the unit adopt this data type.</p>
 <small>A0034228-EN</small>	<p>This unit extracts a single bit from the value of its input port <i>X</i> (32-bit unsigned integer). The relevant bit is selected by the input port <i>N</i> (8-bit unsigned integer). The bit is written to the Boolean output port. Bit numbering starts at 0.</p>
 <small>A0034229-EN</small>	<p>This unit has a single Boolean output port that is set to 1 only during the first cycle after the PLC has been started. This unit is processed in the input stage of the IPO cycle → 59.</p>
 <small>A0034230</small>	<p>This unit determines the maximum value of all of its input ports and writes this value to its output port. The function is performed in the greatest numeric data type of all the output ports that are connected to the input ports of the unit. All the ports of the unit adopt this data type.</p>
 <small>A0034231</small>	<p>This unit determines the minimum value of all of its input ports and writes this value to its output port. The function is performed in the greatest numeric data type of all the output ports that are connected to the input ports of the unit. All the ports of the unit adopt this data type.</p>
 <small>A0034232</small>	<p>This unit performs a multiplication. It multiplies the values of its input ports and writes the result to its output port. The multiplication is performed in the greatest numeric data type of all the output ports that are connected to the input ports of the unit. All the ports of the unit adopt this data type.</p>
 <small>A0034233</small>	<p>This unit represents a multiplexer. It copies the value of the input port <i>In&lt;K&gt;</i> to the output port. The relevant input port is selected by the input port <i>K</i> (8-bit unsigned integer). <i>In0</i> is selected if <i>K</i> equals 0. If the value for <i>K</i> is too low, <i>In0</i> is selected. If the value for <i>K</i> is too high, the input port with the highest index value is selected. The input ports <i>In&lt;K&gt;</i> and the output port adopt the greatest data type of all the output ports connected to one of the input ports <i>In&lt;K&gt;</i>.</p>


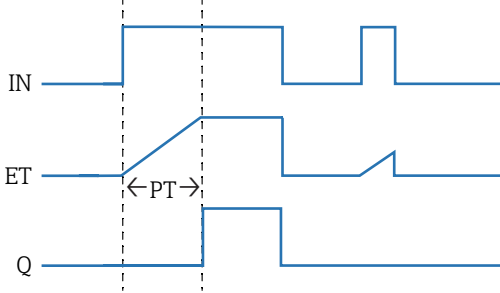
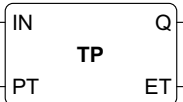
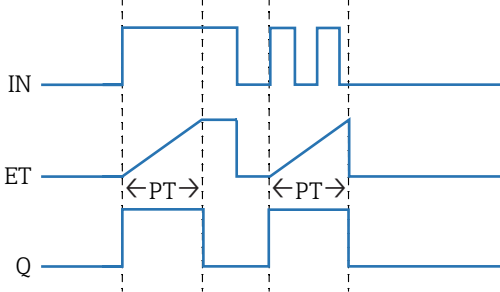

Unit	Description
<div data-bbox="87 257 459 392" style="border: 1px solid black; padding: 5px;"> <p>SetOn SetOff Act En</p> <p style="text-align: center;"><b>On/Off Ctrl</b></p> </div> <p style="text-align: right; font-size: small;">A0034234-EN</p>	<p>This unit represents an on/off controller. It switches its Boolean output port on or off if the value of the input port <i>Act</i> exceeds or drops below the values of the input ports <i>SetOn</i> and <i>SetOff</i> respectively. The Boolean input port <i>En</i> can be used to enable the unit. If the value is 0, the output port is always 0. If <i>SetOn</i> = <i>SetOff</i>, the unit behaves as illustrated in the diagram below. The output port is switched on when <i>Act</i> &gt; <i>SetOn</i>. The output port is switched off when <i>Act</i> ≤ <i>SetOff</i>.</p> <p>SetOn = SetOff</p>  <p style="text-align: right; font-size: x-small;">A0034326</p> <p>If <i>SetOn</i> &gt; <i>SetOff</i>, the unit behaves as illustrated in the diagram below. The output port is switched on when <i>Act</i> ≥ <i>SetOn</i> (broken blue line). The output port is switched off when <i>Act</i> ≤ <i>SetOff</i> (solid blue line).</p> <p>SetOn &gt; SetOff</p>  <p style="text-align: right; font-size: x-small;">A0034601</p> <p>If <i>SetOn</i> &lt; <i>SetOff</i>, the unit behaves as illustrated in the diagram below. The output port is switched on when <i>Act</i> ≤ <i>SetOn</i> (solid blue line). The output port is switched off when <i>Act</i> ≤ <i>SetOff</i> (broken blue line).</p> <p>SetOn &lt; SetOff</p>  <p style="text-align: right; font-size: x-small;">A0034602</p> <p> The input ports <i>SetOn</i>, <i>SetOff</i> and <i>Act</i> adopt the greatest numeric data type of all the output ports that are connected to one of these input ports.</p>
<div data-bbox="87 1534 459 1601" style="border: 1px solid black; padding: 5px;"> <p>Start Stop</p> <p style="text-align: center;"><b>OpenVPN</b></p> <p>Running Connected</p> </div> <p style="text-align: right; font-size: small;">A0034235</p>	<p>This unit can be used to control the OpenVPN client. The client is started when the Boolean input port <i>Start</i> switches from 0 to 1. The client is stopped when the Boolean input port <i>Stop</i> switches from 0 to 1. The Boolean output port <i>Running</i> indicates whether the client is running. The Boolean output port <i>Connected</i> indicates whether the client is connected to a server.</p>
<div data-bbox="87 1691 167 1758" style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Or</b></p> </div> <p style="text-align: right; font-size: small;">A0034237-EN</p>	<p>This unit performs a binary OR. The operation is performed in the greatest integer data type of all the output ports that are connected to the input ports of the unit. All the ports of the unit adopt this data type. Input ports connected to floating point or string output ports are treated as if they were connected to a 32-bit signed integer output port.</p> <p>Examples:</p> <ul style="list-style-type: none"> <li>▪ 0 and 0 ⇒ 0</li> <li>▪ 0 and 1 ⇒ 1</li> <li>▪ 1 and 1 ⇒ 1</li> <li>▪ 3 (0011<sub>2</sub>) and 8 (1000<sub>2</sub>) ⇒ 11 (1011<sub>2</sub>)</li> </ul>

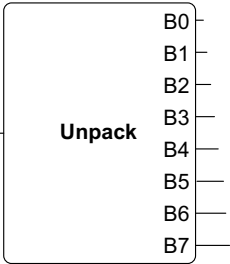

Unit	Description
 <p style="text-align: center;"><b>Pack</b></p> <p style="text-align: right;">A0034290</p>	<p>This unit packs the values of its 8 Boolean input ports into one octet and writes the octet to its 8-bit unsigned integer output port.</p>
 <p style="text-align: center;"><b>P Ctrl</b></p> <p style="text-align: right;">A0034292-EN</p>	<p>This unit represents a proportional controller. On its output port <i>Out</i> (16-bit unsigned integer, range [0..10,000]), it outputs a percentage that is based on the relation between the value for its input port <i>Act</i> and the value range for its input ports <i>SetLow</i> and <i>SetHigh</i>. If the value of the port <i>Act</i> is outside this range, the value for the <i>Out</i> port is limited to the range [0..10,000] (0 % to 100.00 %), while the value for the output port <i>Unlimited</i> (32-bit signed integer) can be greater than 10,000 or less than 0. The Boolean input port <i>En</i> can be used to enable the unit. If the value is 0, the output port is always 0. If <i>SetOn</i> = <i>SetOff</i>, the unit behaves as illustrated in the diagram below. The output port is set to 0 % (0) if <i>Act</i> &lt; <i>SetLow</i>. It is set to 50 % (5,000) if <i>Act</i> = <i>SetLow</i>. It is set to 100 % (10,000) if <i>Act</i> &gt; <i>SetLow</i>. <i>Unlimited</i> will have the same value as <i>Out</i>.</p> <p style="text-align: center;">SetHigh = SetLow</p>  <p style="text-align: right;">A0034327</p> <p>If <i>SetHigh</i> &gt; <i>SetLow</i>, the unit behaves as illustrated in the diagram below. <i>Out</i> will be 0 % (0) if <i>Act</i> &lt;= <i>SetLow</i>. It will rise from 0 % to 100 % if the value for <i>Act</i> rises between <i>SetLow</i> and <i>SetHigh</i>. It will stay at 100 % (10,000) if <i>Act</i> becomes &gt;= <i>SetHigh</i>. <i>Unlimited</i> will drop below 0 % if <i>Act</i> &lt; <i>SetLow</i>. <i>Unlimited</i> will exceed 100 % if <i>Act</i> &gt; <i>SetHigh</i>.</p> <p style="text-align: center;">SetHigh &gt; SetLow</p>  <p style="text-align: right;">A0034603</p> <p>If <i>SetHigh</i> &lt; <i>SetLow</i>, the unit behaves as illustrated in the diagram below. <i>Out</i> will be 100 % (10,000) if <i>Act</i> &lt;= <i>SetHigh</i>. It will drop from 100 % to 0 % if the value for <i>Act</i> rises between <i>SetHigh</i> and <i>SetLow</i>. It will stay at 100 % (10,000) if <i>Act</i> becomes &gt;= <i>SetLow</i>. <i>Unlimited</i> will drop below 0 % if <i>Act</i> &lt; <i>SetHigh</i>. <i>Unlimited</i> will exceed 100 % if <i>Act</i> &gt; <i>SetLow</i>.</p> <p style="text-align: center;">SetHigh &lt; SetLow</p>  <p style="text-align: right;">A0034604</p> <p> The input ports <i>SetLow</i>, <i>SetHigh</i> and <i>Act</i> adopt the greatest numeric data type of all the output ports that are connected to one of these input ports.</p>

Unit	Description
 <p style="text-align: right; font-size: small;">A0034293-EN</p>	<p>This unit takes the binary value of its input port <i>X</i> (32-bit unsigned integer), sets the bit selected by the input port <i>N</i> (8-bit unsigned integer) to the state of the Boolean input port <i>B</i> and writes the resulting value to its output port (32-bit unsigned integer). Bit numbering starts at 0.</p>
 <p style="text-align: right; font-size: small;">A0034294</p>	<p>This unit represents an RS-Flipflop. The Boolean output port starts with a value of 0. If the value for the Boolean input port <i>Set</i> is set to 1, the value of the output port is also set to 1. This value remains unchanged even if the value for the input port <i>Set</i> is reset to 0.</p> <p>If the value for the Boolean input port <i>Rst</i> is set to 1, the value of the output port is set to 0. This value remains unchanged even if the value for the input port <i>Rst</i> is reset to 0.</p> <p>If <i>Set</i> and <i>Rst</i> are activated at the same time, <i>Rst</i> has priority.</p>
 <p style="text-align: right; font-size: small;">A0034295-EN</p>	<p>This unit can be used to control window shades or shutters for example. Its first four input ports are used to define a number of time constants.</p> <p>The input port <i>TotalTime</i> (32-bit unsigned integer) defines the time (in ms) needed to move the shade (or shutter) from its lowest to its highest position (or vice versa).</p> <p>The input port <i>TiltTime</i> (32-bit unsigned integer) defines the time (in ms) needed by the shade to tilt (from the point it starts to ascending to the point it starts descending). This time can be set to zero for simple shutters.</p> <p>The value for the input port <i>ExtraTime</i> (32-bit unsigned integer, in ms) is used if the shade should move to its lowest or highest position to ensure it closes or opens fully.</p> <p>If the input port <i>Up</i> or <i>Down</i> is active for the period of time defined by the value of the input port <i>TriggerTime</i> (32-bit unsigned integer, in ms), this causes the shade to move to its highest or lowest position respectively.</p> <p>Note that the shade controller cannot control the motor of the window shade for periods shorter than the cycle time. Therefore, all times should ideally be a multiple of the cycle time.</p> <p>The input port <i>Tilt</i> (8-bit signed integer) is used to tell the shade controller to tilt the shade to a certain position. Values between -100 and 100 are permitted. -100 represents the extreme tilt position where the slats are lower on the inside. 0 is the horizontal tilt position. 100 represents the extreme tilt position where the slats are lower on the outside.</p> <p>The input port <i>Position</i> (8-bit signed integer) is used to tell the shade controller to move the shade to a certain vertical position. Values between 0 and 100 are permitted. 0 represents the highest position of the shade. 100 represents the lowest position of the shade.</p> <p>The unit first tries to reach the vertical target position and then the target tilt position.</p> <p>The Boolean input ports <i>Up</i> and <i>Down</i> can be used to move the shade manually. The manual input ports have priority over the automatic ports. If either the input port <i>Up</i> or <i>Down</i> is activated, the automatic operation is paused until either the input port <i>Tilt</i> or <i>Position</i> changes its value.</p> <p>The Boolean output ports <i>Up</i> and <i>Down</i> are used to control the shade's motor.</p> <p>The output ports <i>Tilt</i> and <i>Position</i> (8-bit signed integer) display the current position and tilt of the shade.</p> <p>The unit has an initialization sequence that moves the shade to the lowest position when the diagram is started in order to reach a known position. The output port <i>Down</i> is set to the time (<math>TotalTime + TiltTime + ExtraTime</math>) ms. All the inputs are ignored during this time.</p>
 <p style="text-align: right; font-size: small;">A0034296-EN</p>	<p>This unit represents a 32-bit-shift register.</p> <p>With every rising edge on the Boolean input port <i>Clk</i>, the unit shifts the content of its register to the left or right, depending on the value of the Boolean input port <i>Right</i> (1 ⇒ shift right). The value of the Boolean input port <i>In</i> is shifted into the register. The resulting register content is written to the output port (32-bit unsigned integer).</p>
 <p style="text-align: right; font-size: small;">A0034297-EN</p>	<p>This unit transforms the value of the input port <i>In</i> according to a linear function and writes the result to the output port. The linear function is defined by the two points (<math>P1, Q1</math>) and (<math>P2, Q2</math>).</p> <div style="text-align: center;">  </div> <p style="text-align: right; font-size: x-small;">A0034328</p> <p> The transformation is performed in the greatest numeric data type of all the output ports that are connected to the input ports of the unit. All the ports of the unit adopt this data type.</p>

Unit	Description
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     In                      Min                      MinEn <b>Sig Limit</b>                      Max                      MaxEn                 </div>	<p>This unit can be used to limit the value of the input port <i>In</i>. If <i>In</i> is less than <i>Min</i> and the minimum limit is activated by the Boolean input port <i>MinEn</i>, the output is set to <i>Min</i>. If <i>In</i> is greater than <i>Max</i> and the maximum limit is activated by the Boolean input port <i>MaxEn</i>, the output is set to <i>Max</i>.</p>  <p style="text-align: right; font-size: small;">A0034298-EN</p> <p style="text-align: right; font-size: x-small;">A0034329</p> <p><b>i</b> The limitation is performed in the greatest numeric data type of all the output ports that are connected to the input ports <i>In</i>, <i>Min</i> and <i>Max</i> of the unit. These input ports and the output port adopt this data type.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     In                      TUp <b>Sig Smooth</b>                      TDown                      Force                 </div>	<p>This unit is used to smooth a signal. If the value of the input port <i>In</i> changes, the value of the output port will be approximated to this new value using an exponential function. The value of the input port <i>TUp</i> (32-bit unsigned integer) refers to the time (in ms) that is needed to reach the new value if the old value is less than the new value. The value of the input port <i>TDown</i> (32-bit unsigned integer) refers to the time (in ms) that is needed to reach the new value if the old value is greater than the new value.</p>  <p style="text-align: right; font-size: x-small;">A0034299-EN</p> <p style="text-align: right; font-size: x-small;">A0034330</p> <p>If the Boolean input port <i>Force</i> is set, the value of the input port <i>In</i> is copied immediately to the output port. The smoothing is performed in the numeric data type of the output port that is connected to the input port <i>In</i> of the unit. The input port <i>In</i> and the output port adopt this data type.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     In                      GradUp <b>Sig Track</b>                      GradDown                      Force                      En                 </div>	<p>This unit is used to limit the gradient of a signal. If the value of the input port <i>In</i> changes, the value of the output port follows this new value using a linear function. The value of the input port <i>GradUp</i> defines the maximum slope of this linear function per second if the new value is greater than the old value. The value of the input port <i>GradDown</i> defines the maximum slope of this linear function per second if the new value is less than the old value. Both gradients must be positive numbers.</p>  <p style="text-align: right; font-size: x-small;">A0034305</p> <p style="text-align: right; font-size: x-small;">A0034331</p> <p>If the Boolean input port <i>Force</i> is set, the value of the input port <i>In</i> is copied immediately to the output port. The Boolean input port <i>En</i> can be used to enable the unit. If the value is 0, the output port is always 0. The tracking is performed in the greatest numeric data type of all the output ports that are connected to the input ports <i>In</i>, <i>GradUp</i> or <i>GradDown</i>. These input ports and the output port adopt this data type.</p>

Unit	Description
 <p style="text-align: right; font-size: small;">A0034300-EN</p>	<p>This unit represents the state of a state machine. There are eight different state machine units (<i>state machine 0</i> to <i>state machine 7</i>), allowing you to implement eight independent state machines. A state machine is implemented by placing various state machine units with the same state machine index (e.g. state machine 0). The value of the input port <i>Sel</i> (32-bit signed integer) of the relevant unit determines which state is handled by it. A state machine unit checks its Boolean input ports <i>Cond&lt;X&gt;</i> when it becomes active (state = <i>Sel</i>). If one of the Boolean input ports is set to 1, the state machine changes its state – which is determined by the corresponding input port <i>Next&lt;X&gt;</i> (32-bit signed integer) – after the current IPO cycle.</p> <p>The output port <i>State</i> (32-bit signed integer) displays the current state of the state machine. The Boolean output port <i>Active</i> indicates that the corresponding unit is currently active (state of the state machine = <i>Sel</i>).</p> <p>The initial state is 0.</p>
 <p style="text-align: right; font-size: small;">A0034306</p>	<p>This unit performs a subtraction. It subtracts the values of its second input port and the subsequent input ports from its first input port and writes the difference to its output port.</p> <p>The subtraction is performed in the greatest numeric data type of all the output ports that are connected to the input ports of the unit. All the ports of the unit adopt this data type.</p>
 <p style="text-align: right; font-size: small;">A0034307</p>	<p>This unit represents an T-Flipflop. The Boolean output port has the value 0. If the Boolean input port <i>T</i> is set to 1, the Boolean output port changes its state with each rising edge on the Boolean input port <i>Clk</i>. If the input port <i>T</i> is set to 0, the output port retains its previous value.</p>
 <p style="text-align: right; font-size: small;">A0034308</p>	<p>This unit represents a timer. It outputs a periodic clock signal on the Boolean output port <i>Clk</i>. The duration of the signal is specified by the value of the input port <i>Int</i> (interval, 32-bit unsigned integer) and must be a multiple (at least twice) of the cycle time of the PLC. If the value of the input port <i>Int</i> is less than the cycle time or not divisible by the cycle time, the value is rounded up internally to the nearest multiple of the cycle time. The clock signal is only generated as long as the Boolean input port <i>En</i> is set to 1.</p>
 <p style="text-align: right; font-size: small;">A0034309</p>	<p>This unit represents a timer off-delay.</p> <p>When the Boolean input port <i>IN</i> switches to 1, the Boolean output port <i>Q</i> is set to 1. The timer is started when the Boolean input port <i>IN</i> switches to 0. The output port <i>ET</i> (elapsed time, 32-bit unsigned integer) indicates how much time, in milliseconds, has elapsed since the timer was started. When the value of the output port <i>ET</i> reaches the value of the input port <i>PT</i> (preset time, 32-bit unsigned integer) the timer is stopped and the output port <i>Q</i> is reset.</p>  <p style="text-align: right; font-size: small;">A0034332</p> <p> If the value of the input port <i>Int</i> is less than the cycle time or not divisible by the cycle time, the value is rounded up internally to the nearest multiple of the cycle time.</p>

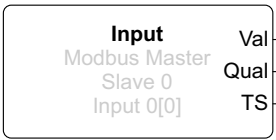
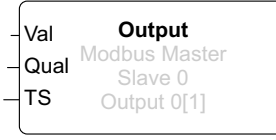
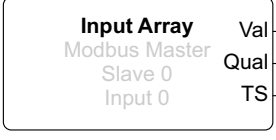
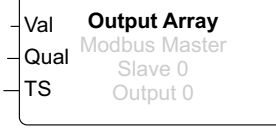
Unit	Description
	<p data-bbox="592 259 938 282">This unit represents a timer on-delay.</p> <p data-bbox="592 284 1517 416">The timer is started when the Boolean input port <i>IN</i> switches to 1. The output port <i>ET</i> (elapsed time, 32-bit unsigned integer) indicates how much time, in milliseconds, has elapsed since the timer was started. When the value of the output port <i>ET</i> reaches the value of the input port <i>PT</i> (preset time, 32-bit unsigned integer) the timer is stopped and the Boolean output port <i>Q</i> is reset. The output port <i>Q</i> is reset when the input port <i>IN</i> switches to 0.</p> <p data-bbox="523 376 576 389">A0034310</p>  <p data-bbox="1474 752 1527 766">A0034333</p> <p data-bbox="592 792 1517 846">Note that if the value of the input port <i>Int</i> is less than the cycle time or not divisible by the cycle time, the value is rounded up internally to the nearest multiple of the cycle time.</p>
	<p data-bbox="592 864 906 887">This unit represents a timer pulse.</p> <p data-bbox="592 889 1501 1021">When the Boolean input port <i>IN</i> switches to 1, the Boolean output port <i>Q</i> is set to 1 and the timer is started. The output port <i>ET</i> (elapsed time, 32-bit unsigned integer) indicates how much time, in milliseconds, has elapsed since the timer was started. When the value of the output port <i>ET</i> reaches the value of the input port <i>PT</i> (preset time, 32-bit unsigned integer) the timer is stopped and the output port <i>Q</i> is reset to 0.</p> <p data-bbox="523 981 576 994">A0034311</p>  <p data-bbox="1474 1357 1527 1370">A0034334</p> <p data-bbox="592 1397 1517 1451">Note that if the value of the input port <i>Int</i> is less than the cycle time or not divisible by the cycle time, the value is rounded up internally to the nearest multiple of the cycle time.</p>
	<p data-bbox="592 1469 1501 1523">This unit represents a trigger. It sets its Boolean output port to 1 for an IPO cycle if it detects a rising edge on one of its Boolean inputs.</p> <p data-bbox="592 1525 1007 1547">Negate the input port to detect a falling edge.</p> <p data-bbox="592 1550 1485 1603">To detect a rising or a falling edge, connect the same input signal to two of the trigger's input ports and negate one of them.</p> <p data-bbox="523 1559 576 1572">A0034312</p>

Unit	Description
 <p style="text-align: right; margin-right: 10px;">B0 B1 B2 B3 B4 B5 B6 B7</p> <p style="text-align: center; margin-top: 20px;"><b>Unpack</b></p> <p style="text-align: right; margin-right: 10px;"><small>A0034314-EN</small></p>	<p>This unit unpacks the 8 bits of the octet value of its input port (8-bit unsigned integer) and writes them to its Boolean output port.</p>
 <p style="text-align: center; margin-top: 20px;"><b>XOr</b></p> <p style="text-align: right; margin-right: 10px;"><small>A0034315-EN</small></p>	<p>This unit performs a binary Exclusive Or (Xor). The operation is performed in the greatest integer data type of all the output ports that are connected to the input ports of the unit. All the ports of the unit adopt this data type. Input ports connected to floating point or string output ports are treated as if they were connected to a 32-bit signed integer output port.</p> <p>Examples:</p> <ul style="list-style-type: none"> <li>▪ 0 and 0 ⇒ 0</li> <li>▪ 0 and 1 ⇒ 1</li> <li>▪ 1 and 1 ⇒ 0</li> <li>▪ 15 (1111<sub>2</sub>) and 8 (1000<sub>2</sub>) ⇒ 7 (0111<sub>2</sub>)</li> </ul>

**I/Os**

There is one element for every input and output. The number and structure of the I/Os depend on the specific Fieldgate FXA42 device and its configuration.

- Each I/O element has three ports that can be connected to other elements, as explained above.
- The port *Val* represents the value of the input/output and has the same data type as the input/output.
- The name of the interface, the device and the value are displayed in gray below the element type.

Unit	Description
 <p style="text-align: right; margin-right: 10px;"><small>A0034317</small></p>	<p>This element represents an input. The value of the input is read from the physical inputs during the input stage of the IPO cycle → 59.</p>
 <p style="text-align: right; margin-right: 10px;"><small>A0034318</small></p>	<p>This element represents an output. The value of the output is written to the physical outputs during the output phase of the IPO cycle → 59.</p>
 <p style="text-align: right; margin-right: 10px;"><small>A0034319</small></p>	<p>This element represents an array of inputs. In contrast to a plain <i>input</i> element, it can only be connected to an <i>output array</i> of the same data type and size. The values of the inputs are read from the physical inputs during the input stage of the IPO cycle → 59.</p>
 <p style="text-align: right; margin-right: 10px;"><small>A0034320</small></p>	<p>This element represents an array of outputs. In contrast to a plain <i>output</i> element, it can only be connected to an <i>input array</i> of the same data type and size. The values of the outputs are written to the physical outputs during the output phase of the IPO cycle → 59.</p>

Internally, the inputs/outputs are addressed via an interface index, device index, value index and, optionally, an array index. If the Fieldgate FXA42 has a number of digital



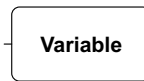



inputs/outputs and a Modbus master interface, for example, the interface index will select one of these two interfaces. The device index can select the Modbus slave, for example, and the value index would select the relevant Modbus register. The array index is also used if the corresponding value addresses an element of an array.

When you hover the cursor over an I/O element, a tool tip appears displaying the indexes, data type and array size.

### Variables

The *Variable* element represents variables that are not linked to a physical I/O. A *Variable* element corresponds to a variable with the same name and can be used as either an input or an output. Variables can be configured on the Variable page.


Unit	Description
 <small>A0034323</small>	This element represents the value of the variable during the input stage of the IPO cycle →  59.
 <small>A0034324</small>	This element represents a variable as an output. It writes its value to the variable during the output phase of the IPO cycle →  59.

### Constants

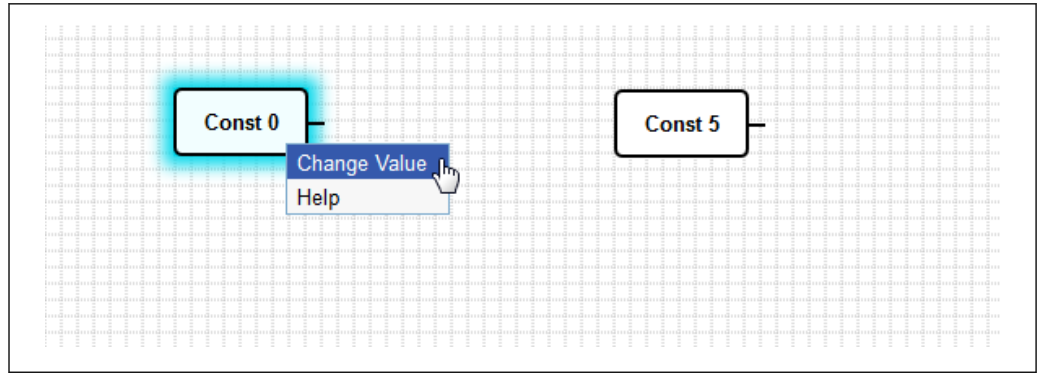
If you add a constant via the toolbar, a dialog box opens which you can use to enter a fixed value. This value can be a decimal integer, a floating point or a string value. Integer values are limited to the range  $[-2^{31}, 2^{32}-1]$ . Floating point values are limited to an accuracy of 15 decimal places. Strings are limited to 4096 bytes.

The data type of a constant is the smallest data type that can represent the value of the constant. Here are some examples:

- 0 → Boolean (false)
- 1 → Boolean (true)
- 120 → 8-bit unsigned integer
- -5 → 8-bit signed integer
- 500 → 16-bit unsigned integer
- -200 → 16-bit signed integer
- 70000 → 32-bit unsigned integer
- -35000 → 32-bit signed integer
- 1.5 → 32-bit floating point number
- 3.14159265359 → 64-bit floating point number
- 5m → String

Constants are processed in the input stage of the IPO cycle →  59.

The value of the constant can be changed. To do this, right-click the element. A popup menu appears (see the following graphic). Select the entry *Change value*. Alternatively, you can double-click the element.



A0034325-EN

### 8.3.3 Diagram settings

Clicking the *Diagram settings* button in the toolbar opens a dialog box where you can change the following diagram settings:

Diagram settings	Description
Description	You can enter a description for the diagram here. The description can comprise up to 1024 printable ASCII characters and line breaks.
Cycle time	Here you can configure the cycle time with which the PLC runs while executing the diagram. A cycle time between 25 and 1000 ms can be configured. Larger values enable a more complex diagram, i.e. more elements. Increase the cycle time if you get a message that the diagram is getting too complex.
Treat all numerical I/O values as 32-bit signed integers	For backward compatibility, select this checkbox so that the diagram treats all I/O values as 32-bit signed integers.




### 8.3.4 Status bar

The following graphic shows the status bar of the Fieldgate FXA42 editor. The status bar displays information about the current state of the PLC.




A0034335


The information that is displayed in the status bar is described in detail in the following section.

Button	Description
 A0034336	This symbol is displayed if the connection to the device is lost.
 A0034340	The stoplight indicates the current state of the PLC: Red: No diagram has been loaded. The PLC is not running. Amber: A diagram has been loaded but the PLC is not running. Green: A diagram has been loaded and the PLC is running.
Duty cycle	The duty cycle of the PLC is displayed behind. This indicates both the current duty cycle and the maximum duty cycle since the PLC started. The duty cycle is indicated as a percentage. A duty cycle of 50% means that the PLC is using 50% of the available CPU processing time.  You must leave spare CPU processing time for other processes in the system. The duty cycle should be kept below 75%. If your diagram becomes more complex, you can increase the PLC cycle time in the Diagram Settings. If the duty cycle is (almost) at 100%, it is no longer possible to operate the Fieldgate FXA42.

### 8.3.5 Running the diagram

Click the Start button in the toolbar to start the execution of the diagram that has been saved to the PLC. While the PLC is running, the Start button →  45 changes to a Stop button. Click the Stop button to stop the PLC.


#### IPO cycle

While the diagram is being executed, the Fieldgate FXA42 runtime system executes an IPO cycle (Input-Process-Output). This means that the inputs are read out first of all (both the physical inputs and the variables and constants). The units are processed and the outputs (the physical outputs and the variables) are then written. The cycle time can be configured in the Diagram Settings dialog →  58. Note that events that which persist for a shorter period of time might not be recognized.

#### Running state at start-up

The PLC stores its current running state in the non-volatile memory. If the PLC is disconnected from the power supply when it is running, it will start running after next start-up.

#### Event log messages

The messages that the PLC may log to the event log →  62. All messages are prefixed with the text *PLC Driver*.

#### The PLC has been started.

The PLC has been started successfully.

#### The PLC has been stopped.

The PLC has been stopped successfully.

#### A new diagram has been saved.

A new diagram has been saved successfully to the PLC.

-10	Out of memory
-12	The internal data queue has overflowed because data was produced faster than it could be processed.


Contact customer support if an error code is displayed that is not listed here.

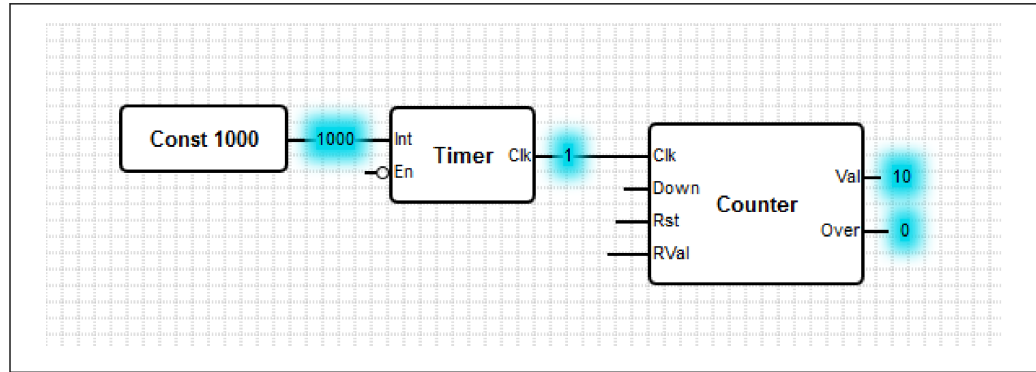
#### Exception in task: <message>

A fatal exception has occurred inside the PLC task. A detailed description is provided.

Contact customer support.

### 8.3.6 Live view

Via the Live view function it is possible to see the current state of the PLC directly in the diagram view. Once you click the Live view button →  45 in the toolbar of the Fieldgate FXA42 editor, the actual value of each output port is displayed in a small blue field next to the port (see the following graphic).



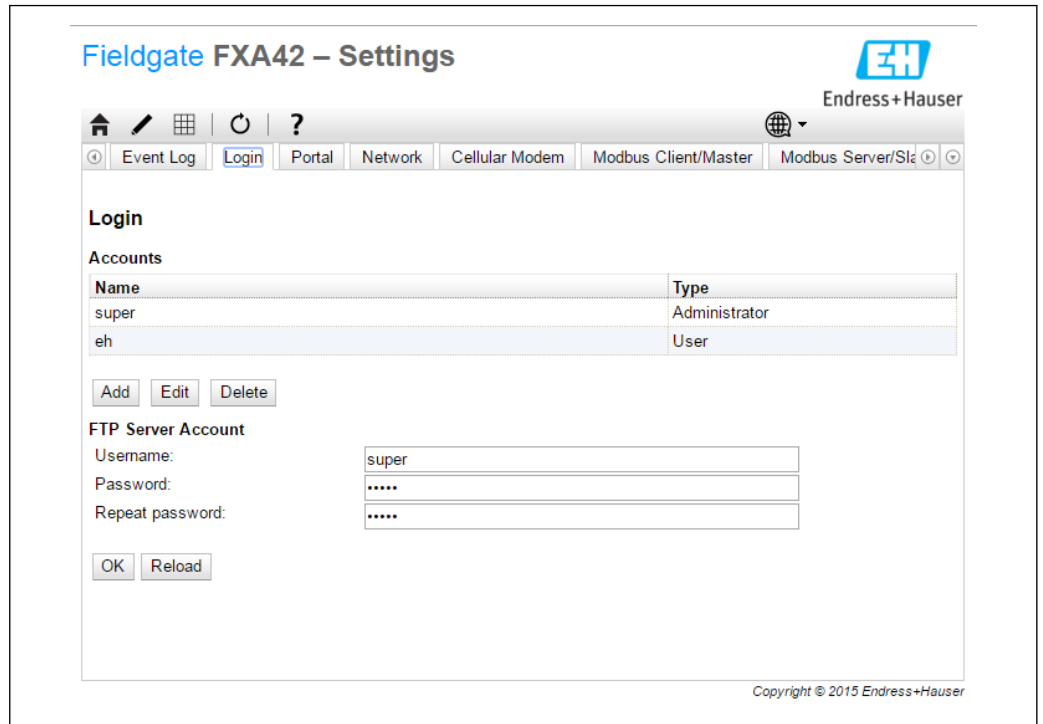
A0034341-EN

The values are updated as quickly as possible. Note that changing the diagram when Live view is active will cause errors to occur because the values received from the PLC will no longer match the diagram. If this happens, the Live view is stopped automatically.

Click the same button in the toolbar to quit the Live view manually.






## 8.4 Settings

You can configure your Fieldgate FXA42 on the "Settings page" (see the graphic below).



A0035246-EN

There is a toolbar on the Settings page. The buttons in this toolbar are described in detail in the following section.

Button	Description
 A0034343	Closes the Settings page and opens the home page.
 A0034181	Closes the Settings page and opens the Fieldgate FXA42 editor.
 A0034183	Closes the Settings page and opens the Fieldgate FXA42 Grid view.
 A0034344	Reboots the Fieldgate FXA42 in order to apply changes.
 A0034184	Opens the Help.

Four tabs are located below the toolbar.

Tab	Description
Event log	This tab shows the event log.
Settings	This tab contains settings for the various functionalities of your Fieldgate FXA42.

Tab	Description
Update	You can use this tab to perform an update.
Export	You can use this tab to export the configuration of your Fieldgate FXA42.

**Functions**

Due to the many features and communication protocols that are available on the device, significant response time latencies (particularly if communicating via the cellular modem) and CPU overload may occur if the functions and communication protocols are used extensively.

**8.4.1 Event log**

The event log is the central point where all the components of the Fieldgate FXA42 firmware store their event messages.





Each event message consists of the message text, a time stamp and an event type.

Click a message text to open the help and to display more detailed information (if any) about the message.

Time stamps are stored in the time zone that is selected in the Fieldgate FXA42 (either the locally stored time zone or the time zone provided by the FIS connection if it is enabled).

Note that the system clock of the Fieldgate FXA42 cannot be synchronized. In this case, the time stamps are not displayed correctly.

The event types are represented by specific icons:





Icon	Description
 A0034345	Information: provides information about the normal operation
 A0034346	Warning: informs the user about unexpected but unproblematic events.
 A0034347	Error: informs the user about a failure in one of the firmware's components.
 A0034348	Fatal error: such errors generally prevent further device operation.

Events are stored in a circular buffer in the RAM. This means that the event log is cleared when the device is restarted and that new events overwrite older events if the buffer is completely full.

**Messages index**

The following section contains an index of all the messages that can be logged by the Fieldgate FXA42 components.

Running the diagram

- The PLC has been started. →  62
- The PLC has been stopped. →  62
- A new diagram has been saved. →  62
- Exception in task: <message> →  62

## FIS update

- Update due to FIS command → 62
- Firmware update via FIS request denied: Firmware update via FIS not enabled → 62
- Firmware update via FIS request denied: Update/configuration already in progress → 62

## Cellular modem

- Stopped → 62
- Started → 62
- Running → 62
- Deactivated → 62
- Activated → 62
- Powered modem → 62
- Modem initialized (RSSI: <x> dBm) → 62
- SIM card ID: <x> → 62
- Registered to network → 62
- Roaming → 62
- Data connection established → 62
- Opening fallback connection → 62
- Closing fallback connection → 62
- GPS module initialized → 62
- Invalid PIN or SIM card locked (code <x>) → 62
- Modem initialization failed. (code <x>) → 62
- Network registration timed out ((not) searching) → 62
- Roaming disallowed → 62
- Network registration failed (code <x>, network status <y>) → 62
- Data connection failed (code <x>) → 62
- Network lost (code <x>, network status <y>) → 62
- Data connection broken (DCD pin: <x>, PPP status: <y>, GPRS pin: <z>) → 62
- Connection supervision failed. → 62
- Modem reset → 62
- Hanging! (state: <x>) → 62
- Could not initialize GPS module → 62

## WLAN

- Started → 62
- Running → 62
- Configured IP through DHCP → 62
- Stopping driver → 62
- Stopped → 62
- Connection indication → 62

## Modbus client/master

- Connected to TCP device at <IP address>:<port>. → 62
- Read/wrote from/to TCP device at <IP address>:<port> (unit: <unit identifier>, function code: <function code>, address: <address>, quantity: <quantity>) → 62
- Read/wrote from/to RTU device <device address> (function code: <function code>, address: <value address>, quantity: <quantity>) → 62
- The interval has been violated. → 62
- Could not connect to TCP device at <IP address>:<port>. (Error code <code>). → 62
- Could not read/write from/to TCP device at <IP address>:<port> (unit: <unit identifier>, function code: <function code>, address: <address>, quantity: <quantity>, result code: <result code>, error code: <error code>, exception code: <exception code>) → 62
- Read illegal floating point value from TCP device at <IP address>:<port> (unit: <unit identifier>, function code: <function code>, address: <address>, quantity: <quantity>) → 62

- Could not read/write from/to RTU device <device address> (function code: <function code>, address: <value address>, quantity: <quantity>, result code: <result code>, exception code: <exception code>) → 62
- Read illegal floating point value from RTU device <device address> (function code: <function code>, address: <value address>, quantity: <quantity>) → 62
- Portal communication error <error code> → 62

#### Modbus server/slave

Portal communication error <error code> → 62

#### Data transmission and data logging

- Sent FIS data message successfully → 62
- Error on parsing FIS data message → 62
- FIS: Recording data → 62
- FIS event message transmitted successfully → 62
- FIS: Recording event → 62
- HTTP error <HTTP-Error> occurred while sending FIS event message → 62
- HTTP connection error occurred while sending FIS event message → 62
- HTTP connection error occurred while sending FIS data message → 62
- FIS data message transmitted successfully → 62
- HTTP error <HTTP-Error> occurred while sending FIS data message → 62
- Invalid FIS authentication → 62
- Logging data → 62

#### Messages

- Sending data e-mail to <name>, address: <name> → 84
- Sending limit e-mail to <email>, address: <address> → 84
- Sending alarm e-mail to <email>, address: <address> → 84
- Sent data e-mail message successfully → 84
- Could not send data e-mail → 84
- E-mail: No data recorded → 84
- E-mail: Recording data → 84
- E-mail: Recording event → 84
- FTP: Recording data → 84
- Could not send file to FTP server → 84
- Sent measurements file to FTP server → 84
- Sending FIS registration message → 84
- Sending configuration to FIS → 84
- Configuration successful → 84
- FIS configuration version: <Version> → 84
- Invalid FIS authentication data. Trying again in <T> minutes. → 84
- HTTP error <HTTP-Error> occurred while sending FIS registration message. Trying again in <T> minutes. → 84
- HTTP connection error occurred while sending FIS registration message. Trying again in <T> minutes. → 84
- FIS registration successful → 84
- New configuration available: <Version> → 84
- Could not apply FIS configuration, update in progress. → 84
- FIS configuration version: <Version> → 84
- Downloading new configuration from FIS → 84
- Could not apply configuration → 84
- Re-booting due to FIS command → 84
- Re-registration due to FIS command → 84
- Update due to FIS command → 84
- Time changed from FIS → 84

#### System time

- Running → 84
- System clock updated via SNTP → 84
- System clock updated from RTC → 84
- Could not get exclusive access to clock(s). → 84



- Daylight saving time rules will be used up within the next two years. → 84
- SNTP client error: <message> → 84
- RTC not available → 84
- Could not write to RTC: <message> → 84
- Could not read from RTC: <message> → 84
- Could not read daylight saving time file. → 84
- No daylight saving time rule found for the current time. → 84
- DNS error (<error code>) for server <server name/IP> → 84
- Could not open socket for server <server name/IP> → 84
- Could not send to server <server name/IP> → 84
- Failed to receive reply from server <server name/IP> → 84
- Unexpected packet format from server <server name/IP> → 84
- Timestamps not plausible from server <server name/IP> → 84

#### OpenVPN

- Driver has been started. → 88
- Driver has been stopped. → 88
- Driver stopped. → 88
- Connection established. → 88
- Connection closed. → 88
- Authority's certificate uploaded. → 88
- Certificate uploaded. → 88
- Private key uploaded. → 88
- User and password file uploaded. → 88
- Diffie-Hellman file uploaded. → 88
- Could not start driver. → 88
- Could not stop driver. → 88
- Driver stopped unexpectedly. → 89
- Upload of authority's certificate failed. → 89
- Upload of certificate failed. → 89
- Upload of private key failed. → 89
- Upload of user and password file failed. → 89
- Upload of Diffie-Hellman file failed. → 89

#### DHCP server

- Running → 89
- Added static lease IP=<x>, MAC=<y> → 89
- Discover message received, CI=<x>, MAC=<y> → 89
- Request message received, CI=<x>, MAC=<y> → 89
- Leased IP=<x>, Leasing Time=<y>, Index=<z> → 89
- Release message received, CI=<x>, MAC=<y> → 89
- Release IP=<x>, Index=<y> → 89
- Network interface not configured → 89
- Failed to send response message, error <x> → 89
- No more client addresses available → 89
- Receive Error <x> → 89
- Received malformed message → 89
- No interface found for given IP address → 89
- Open socket failed → 89
- Bind socket failed → 89
- Only <x> clients possible due to netmask setting → 89
- Failed to allocate client data structure → 89
- Adding static lease IP=<x> failed, IP address is in use → 89
- Adding static lease IP=<x> failed, no free slot → 89
- Adding static lease IP=<x> failed, wrong IP address → 89

## Network address translation

- Running → 92
- `<x>` static mapping(s) read from configuration → 92
- No free mapping entry available for incoming connection from internal interface → 92
- No free firewall rule entry available for outgoing connection → 92

## Update

- Running
- Package successfully loaded via local web server
- Loading package from remote web server...
- Package successfully loaded from remote web server
- Checking package...
- About to reboot...
- Loading package via local web server timed out
- Target directory for remote update package does not exist
- Target file for remote update package is not accessible
- Loading package from remote web server failed (code `<x>`)
- The type of the package's signature does not match the expected type of signature. (`<signature type>`)
- Invalid package flag(s) (`<flags>`)
- Firmware name does not match. This package is for "`<firmware name>`" firmware.
- This package cannot be applied to the current firmware version.
- Target name does not match. This package is for "`<target name>`" target.
- Variant name does not match. This package is for "`<variant name>`" variant.
- This package is limited to the device with the MAC address `<MAC address>`.
- Invalid package signature
- Could not open package. Message: `<message>`
- Update disallowed by application (`<code>`)
- Could not launch update.
- Portal communication error `<x>`

## Export

- Preparing export... → 92
- Packing update package... → 92
- Update package has been successfully packed → 92
- Preparation failed. Message: `<message>` → 92
- Packing failed. Message: `<message>` → 92

## System start

- Started → 92
- I/O hardware manager initialized → 92
- NAT/firewall service initialized → 92
- Ethernet (1) driver started. → 92
- Cellular modem driver initialized → 92
- Update module initialized → 92
- PLC driver initialized → 92
- Message manager initialized → 92
- DHCP server initialized → 92
- OpenVPN client initialized → 92
- Status web service initialized → 92
- System time manager initialized → 92
- COM Server initialized → 92
- Diagram loaded → 92
- Web configuration modules initialized → 92
- Update exporter module initialized → 92
- Update web service initialized → 92
- Running → 92
- Starting update from external medium. → 92
- Link detected at Ethernet (`<interface index>`). → 92
- Restarting DHCP configuration at Ethernet (`<interface index>`). → 92


- DHCP configuration completed at Ethernet (<interface index>). → 92
- Power fail handling not supported → 92
- Not enough power fail capacity → 92
- Retentive data could not be loaded. → 92
- The internal flash drive seems to be weak. → 92
- Flash write error. The internal flash drive is probably defect. → 92
- One or more certificates could not be loaded. → 92
- Could not initialize NAT/firewall service. (<error code>) → 92
- Could not start Ethernet (1) driver. → 92
- Unsupported Ethernet (1) interface type. (<interface type>) → 92
- Could not initialize NAT/firewall service. (<error message>) → 92
- Could not initialize cellular modem driver: <error message> → 92
- Could not initialize WLAN driver: <error message> → 92
- Could not initialize update module: <error message> → 92
- Could not initialize DHCP server. → 92
- Could not initialize OpenVPN client: <error message> → 92
- Could not initialize system time manager: <error message> → 92
- Could not initialize COM server: <error message> → 92
- Could not initialize portal Event Log service: <error message> → 92
- Could not load and start diagram. → 92
- Could not initialize web configuration modules: <error message> → 92
- Could not initialize update exporter module: <error message> → 92
- Could not initialize update web service: <error message> → 92
- Task cycle time has been violated. → 92
- Could not start update from external medium. → 92
- Link lost at Ethernet (<interface index>). → 92
- RTOS version is not supported. Version (<version number>) is required. → 92
- Device is secured with the default password, please change it. → 92
- Fatal error: <error message> → 92

## 8.4.2 Login

You can configure the login data for the Fieldgate FXA42 on this page.

You can create up to five users that can be either administrator accounts or normal user accounts. The first account is always an administrator account. The user list cannot be empty. At least one administrator account must be defined.

Administrators have access to the secured areas of the local website. Users only have access to the home page and the grid view.

 If the default Administrator credentials are configured on the device (user name: "super", password "super"), you will be prompted to change them before loading the configuration web-site.

### NOTICE

#### Forgotten your login data?

All settings will be lost!

- ▶ Press and hold the reset button while the device is starting.
- ▶ Release the button as soon as the Status A LED flashes twice - this indicates that the reset has been performed successfully.

## 8.4.3 FIS update

To enable the "FIS update" functionality you must check the "Enable firmware update via FIS" box. In the "URL" field, you must also enter the URL where the update package is located. This allows the device to download the .cup update package from the selected URL once the "FIS update" procedure has been started.

The user can start the update by pressing the "Start update" button. Alternatively, the FIS sends the corresponding command. The update procedure after the device has downloaded the .cup file is identical to the local update procedure.

#### **Event log messages**

##### **Update due to FIS command**

Starting update due to FIS command. The device is restarted after a successful update.

##### **Firmware update via FIS request denied: Firmware update via FIS not enabled**

The update request was denied. The "FIS update" setting is not enabled.

##### **Firmware update via FIS request denied: Update/configuration already in progress**

The update request was denied. An update is already in progress.

### **8.4.4 Network**

You can configure the general network settings on this page.

In the first section, you can configure the device name and the default gateway and enable IP forwarding.

The device name is registered as a NetBIOS name. Within the local network, you can use the name instead of the IP address to access the Fieldgate FXA42. In addition to the configurable name, another name built from the prefix *MAC* and the MAC-ID of the Fieldgate FXA42 (e.g. *MAC003056A1DB30*) is registered.

The default gateway can be overwritten via a dynamic IP configuration, e.g. via DHCP or when a cellular modem connection is established.

If you enable IP forwarding, the Fieldgate FXA42 will forward IP traffic from one network interface to another. This is necessary for NAT, for example.

#### **Ethernet (0)**

In this section, you can configure the IP address settings of the (first) Ethernet interface of your Fieldgate FXA42. Note that once these settings are changed, it may not be possible to reach the Fieldgate FXA42 at the same address any more.

#### **Ethernet (1)**

This section is displayed if your Fieldgate FXA42 has a second Ethernet interface. You can configure the IP address settings for the second Ethernet interface here.

#### **DNS**

In this section, you can explicitly configure the IP address of a DNS server. This setting is not needed if your Fieldgate FXA42 is configured to get its IP configuration via DHCP or a cellular modem connection. The DNS server is configured automatically in this case.

#### **HTTP proxy**

In this section you can configure a proxy server that should be used for HTTP connections.

Please contact your local network administrator if you are unsure about which values to enter here.

#### **Open-source software**

The following open-source software has been used to implement the NetBIOS name registration:

##### **NetBIOS over TCP/IP (NBT) name registration**

The source code used is based on documentation and code examples by Christopher R. Hertel.

Project website: [ubiqx.org/cifs](http://ubiqx.org/cifs)

License: [LGPL](#)

### 8.4.5 Cellular modem

You can enable and configure the cellular modem on this page. In the first section you can generally enable the modem. Please enter the SIM PIN.

You can allow or disallow the modem to log into a network other than your home network (aka roaming). Note that roaming connections will normally produce higher costs.

To establish a data connection via GPRS or UMTS, check the corresponding box

The cellular modem connection can also be used as a fallback connection. In this case no data connection will be established through the cellular modem as long as any other network interface provides Internet connectivity. The cellular modem data connection will only be established when all other network interfaces lose their Internet connectivity.


The connection supervision (see the following section) will be used to supervise both the cellular modem connection and the other connections. When the cellular modem connection is established, it will be used to check if one of the other interfaces provides Internet connectivity again. The cellular modem data connection will only be closed once the connection supervision has succeeded on another network interface three times in a row.


In the second section you must configure the access data if you want to establish a data connection. The most important setting here is the APN (access point name). If authentication is mandatory, you can configure the authentication type as well as the user name and password here.

You should have received the data to enter into these fields from your mobile phone provider.

#### Connection supervision

The connection supervision will try to connect to the first URL whenever there has been no payload traffic for the period of time indicated. The period can be specified between 60 and 60000 seconds. If the connection to the first URL fails, the second URL will be tried. If the second URL also fails the cellular modem connection will be re-established. Use this function if you are concerned that there could be problems with the recognition of the connection by the cellular modem driver. Note, however, that this function may produce additional network traffic.

Note that the connection supervision may not be disabled if the cellular modem connection is used as a fallback connection (→  69).

 The connection supervision must be enabled for applications that require continuous data collection. This function supervises the cellular modem connection and resets the modem if the connection is broken.

Also note that the predefined supervision URLs are only reachable with SIM cards that allow access to the Internet.

#### Signal strength

The signal quality significantly influences the speed of the data transmission. Low signal strength may decrease the transmission speed significantly or even completely drop the connection and may result in a loss of function of the device.

The correlation between signal strength and connection quality is provided in the following table:

Signal strength	Connection quality
Under -101 dBm	Bad
-101 dBm to -90 dBm	Weak
-89 dBm to -80 dBm	Medium
-79 dBm to -65 dBm	Good
Over -65 dBm	Excellent

To ensure a stable connection and an adequate performance of all the communication functions of the device, please make sure that the signal level is at least -79 dBm (Good) .

### Critical applications

Cellular telecommunication devices operate using radio signals and therefore are not guaranteed to have a reliable connection in all conditions. You should not rely solely on a wireless device for reliable continuous data transmission.

### Antenna

Keeping your body close to a cellular antenna might negatively affect your health. The use of antennas with a gain factor of more than 2.3 dBi might require additional approval.

### Event log messages

The following section describes the messages that the cellular modem driver may log to the event log. All messages are prefixed with the text *Cellular Modem Driver*.

#### Stopped

The cellular modem driver has been stopped.

#### Started

The cellular modem driver has been started.

#### Running

The cellular modem driver is now running.

#### Deactivated

The cellular modem driver has been temporarily deactivated.

#### Activated

The cellular modem driver has been re-activated after temporary deactivation.

#### Powered modem

The supply voltage for the cellular modem hardware has been switched on.

#### Modem initialized (RSSI: <x> dBm)

The cellular modem has been successfully initialized. The RSSI value ranges from  $\leq -113$  to  $\geq -51$  dBm.

#### SIM card ID: <x>

This message provides information about the SIM card's ID.

#### Registered to network

The cellular modem has successfully registered to a cellular network.

#### Roaming

The cellular modem has registered to a network other than the home network. Note that roaming connections will normally produce higher costs.

#### **Data connection established**

A data connection has been successfully established.

#### **Opening fallback connection**

The cellular modem is being used as a fallback interface. The connection is being established because no other network interfaces provide Internet connectivity.

#### **Closing fallback connection**

The cellular modem is being used as a fallback interface. The connection is being closed because another network interface provides Internet connectivity.

#### **GPS module initialized**

The cellular modem's GPS module has been initialized.

#### **Invalid PIN or SIM card locked (code <x>)**

Either the SIM PIN is invalid or the SIM card has already been locked because a wrong PIN has been tried too often.

Possible codes:

Code	Description
10	No SIM card has been inserted
11	Incorrect SIM PIN or SIM PIN not provided
12	The PUK is required because a wrong PIN has been tried too often. Please remove the SIM card, insert it into a mobile phone and unblock the SIM card by entering the PUK.
13	The SIM card has been permanently blocked. Please contact your mobile network provider.

#### **Modem initialization failed. (code <x>)**

Initialization of the cellular modem hardware failed.

Possible codes:

Code	Description
14	The SIM card is busy.
-102	The cellular modem hardware returned an error.
-103	The cellular modem hardware did not answer.
-105	A reply from the cellular modem hardware was too long.
-134	The cellular modem hardware is invalid.

If you see an error code that is not on the above list, please contact customer support.

#### **Network registration timed out ((not) searching)**

No cellular network could be found within a reasonable time. The message also indicates whether the cellular modem hardware is still searching for networks.

#### **Roaming disallowed**

The cellular modem did not connect to any network because the home network was not available and roaming has been disallowed in the configuration.

#### **Network registration failed (code <x>, network status <y>)**

The cellular modem could not register to any network.

Possible codes:

Code	Description
0	See network status
14	The SIM card is busy.
-102	The cellular modem hardware returned an error.
-103	The cellular modem hardware did not answer.
-105	A reply from the cellular modem hardware was too long.
-134	The cellular modem hardware is invalid.

Possible network statuses:

Network status	Description
0	Not registered to any network
1	Registered to home network
2	Not registered to any network; searching for a network to register to.
3	Registration has been denied by the designated network.
4	Unknown network status
5	Registered to a network other than the home network (roaming)

If you see an error code or network status that is not on the above lists, please contact the customer support.

#### **Data connection failed (code <x>)**

No data connection could be established.

Possible codes:

Code	Description
-3	Invalid user name or password
-4	The network interface could not be opened. General error. For example, it could mean a failed login to the mobile provider's network.
-6	An invalid IP configuration was received from the provider.
-7	No PPP connection could be established.

If you see an error code that is not on the above list, please contact customer support.

#### **Network lost (code <x>, network status <y>)**

The cellular modem lost the connection to the network.

Possible codes:

Code	Description
0	See network status
14	The SIM card is busy.
-102	The cellular modem hardware returned an error.
-103	The cellular modem hardware did not answer.
-105	A reply from the cellular modem hardware was too long.
-134	The cellular modem hardware is invalid.



Possible network statuses:

Network status	Description
0	Not registered to any network
1	Registered to home network
2	Not registered to any network; searching for a network to register to.
3	Registration has been denied by the designated network.
4	Unknown network status
5	Registered to a network other than the home network (roaming)

If you see an error code or network status that is not on the above lists, please contact the customer support.

#### **Data connection broken (DCD pin: <x>, PPP status: <y>, GPRS pin: <z>)**

The data connection has been unexpectedly closed. The message also shows the statuses of the cellular modem hardware's DCD pin (1: connected, 0: not connected), GPRS pin (1: connected, 0: not connected) and the status of the PPP client network interface:

Status	Description
-1	The PPP client is not running.
0	Link is down
1	Link opening in progress
2	Link is established
3	The PPP client has been temporarily paused.

If you see an error code that is not on the above list, please contact customer support.

#### **Connection supervision failed.**

The connection supervision has failed to connect to the configured URLs. The connection will be closed.

#### **Modem reset**

The cellular modem hardware has been reset.

#### **Hanging! (state: <x>)**

The cellular modem driver is in an invalid state.

#### **Could not initialize GPS module**

The cellular modem's GPS module could not be initialized.

## **8.4.6 WLAN**


On this page, you can activate and configure the WLAN interface of your Fieldgate device if it has one.

### **Settings**

The following table describes the available settings for the WLAN unit.

Settings	Description
Enable WLAN	Enables the unit
SSID	Network name/identifier (0-32 printable characters). If no SSID is specified, the driver stops its association attempts.

Settings	Description
Security	Select a security method: Open, WEP128 or WPA(2)-PSK (recommended).
WPA passphrase	The passphrase for WPA(2)-PSK security can consist of 8-63 characters
WEP128	If the WEP128 security mode is chosen, a valid WEP key (26 Hex characters) has to be entered in the selected key index field.
Use DHCP	If this option is set, the unit will get its IP configuration through DHCP.
IP address	IP address for the WLAN interface.
IP netmask	Netmask for the WLAN interface.

 It is strongly recommended to modify the WLAN settings only via the Ethernet (hard-wired) connection. Changing the configuration via the WLAN connection itself may cause the currently established connection to be lost after a device restart.


### Wireless scanning

Press the *Scan* button to search for available wireless networks.

The scan takes about 20 seconds. Afterwards the wireless networks found are shown in a dialog.

Select the desired wireless network using the *Select* button or by double-clicking the corresponding entry in the list. The selected wireless network's settings will be applied to the configuration page. The WPA passphrase or the WEP key may need to be completed.

### Event log messages

The following section describes the messages that the WLAN driver may log to the event log →  62. All messages are prefixed with the text *WLAN Driver*.

#### Started

The WLAN unit driver has been started.

#### Running

The WLAN unit driver is now running.

#### Configured IP through DHCP

The WLAN unit driver has configured its IP address through the DHCP protocol.

#### Stopping driver

The WLAN unit driver is being stopped.

#### Stopped

The WLAN unit driver has been stopped.

### Connection indication

Message	Description
NOT_CONNECTED	No specific indication
ASSOCIATED	Success, unit is associated (infrastructure mode)
MGMT_ERROR	Internal protocol error occurred (the unit restarts)
MGMT_TIMEOUT	Internal protocol error occurred (the unit restarts)
BAD_PARAMETERS	Bad parameters specified by the executed API function.
SCAN_FAILURE	Scan failure occurred (the unit restarts)
SCAN_NOT_FOUND	Requested BSS was not found by scan
JOIN_FAILURE	Join failure
JOIN_TIMEOUT	Join timeout

Message	Description
AUTH_FAILURE	Authentication error occurred
DEAUTHENTICATED	Unit was deauthenticated by the access point
ASSOC_FAILURE	Association failure occurred
DISASSOCIATED	Unit was disassociated by the access point
WEP_PAIRKEY_FAULT	Setting of WEP pair key failed
WEP_GROUPKEY_FAULT	Setting of WEP group key failed
DISCONNECTED	Device is not associated
TARGET_HUNG	The WLAN unit cannot be accessed by the host driver (the unit restarts)
KEEPALIVE_FAULT	The host driver has detected a keepalive check timeout (the unit restarts)

### 8.4.7 Modbus client/master

The Modbus client/master can be configured on this page.

#### Devices and values

This page contains a list of Modbus devices and their values. You can add, edit, delete or clone devices and values (input or output) via the buttons below the list. For each device or value the list shows a name, the communication parameter and an index. The name can be freely defined and is shown on the portal, for example. The indexes are used internally to address the devices and their values.

When you add or edit a device, a dialog will open where you can configure the following parameters:

Parameter	Description
Name	The device's name.
Type	Here you have to select whether the device will be accessed via Modbus TCP or RTU. The Modbus RTU option will only be available after you have generally enabled Modbus RTU (see below).
Address	Only present for Modbus RTU devices The device's address
IP address	Only present for Modbus TCP devices The device's IP address (e.g. 192.168.0.3)
Port	Only present for Modbus TCP devices Device's TCP port number - typically 502

When you add or edit a value, another dialog will appear. You can configure the following parameters here:

Parameter	Description
Name	The value's name
Unit identifier	Only present for Modbus TCP servers. For Modbus TCP/RTU gateways this is the address of the RTU device to read/write from/to.
Function	Modbus function code used to read/write the value. The function code also defines whether the value is interpreted as an input or output.
Start address	Register/coil address to start reading/writing from/to. Note that addresses start at 0.
Number	Number of registers/coils to read/write. If more registers/coils are read/written than fit into the selected data type (see below), the value will become an array. For example 2 registers would fit into one 32-bit unsigned integer value. The value would be scalar (no array). 4 registers would make up an array with 2 32-bit unsigned integer elements.

Parameter	Description
Data type	Data type of the value
Swap words	Modbus transmits the two bytes of one register in network byte order (big endian). Thus for multi-register values, the registers are expected to be in the same order. However, some devices store multi-register values in the opposite order. This option can be used to correct the word order.

### Value and device amount limits

You can define up to 32 devices and 256 values. As values can become arrays when reading/writing several registers/coils, the following limit applies: The number of all scalar (non-array) values plus the size of all arrays must not exceed 512.

### Settings

Below the device list, there are several fields in which you can configure a number of general settings:

Setting	Description
Interval	Defines the interval in milliseconds in which all Modbus values will be read/written. Note that if the interval is too short to read/write all values, a warning message will be shown in the event log. In this case you should increase the interval. Reading/writing a value may take twice the time specified for the timeout (see below), i.e. if the driver has to connect to a Modbus TCP device (first timeout) before reading/writing the value (second timeout).
Timeout	Defines the maximum time in milliseconds to wait for the reply from a device when reading/writing one of its values or when connecting to a Modbus TCP device.
Enable RTU	Generally enables Modbus RTU.
Baud rate	Defines the baud rate for Modbus RTU.
Parity	Defines the parity (and stop bits) for Modbus RTU. Options: <ul style="list-style-type: none"> <li>▪ None (2 stop bits)</li> <li>▪ Odd</li> <li>▪ Even</li> <li>▪ None (1 stop bit)</li> </ul>
Minimum silent time between frames	Defines the minimum time for which there has to be silence on the bus between two frames. The Modbus RTU driver calculates the silence time depending on the baud rate. You can use this setting to increase the silent time. If the time you configure here is less than the calculated time, your setting will be ignored.

### Event log messages

The following section describes the messages that the Modbus driver may log to the event log. All messages are prefixed with the text *Modbus driver*.

#### Connected to TCP device at <IP address>:<port>.

The driver successfully connected to the Modbus TCP server with the IP address and port indicated. This message will only be shown if the driver failed to connect to the same server before.

#### Read/wrote from/to TCP device at <IP address>:<port> (unit: <unit identifier>, function code: <function code>, address: <address>, quantity: <quantity>)

The driver successfully read/wrote a value from/to the Modbus TCP server with the IP address and port indicated. The corresponding value is identified by the Modbus function code used to read/write it, its address (starting from 0) and the quantity of registers/coils. This message will only be shown if the driver failed to read/write the same value before.

#### Read/wrote from/to RTU device <device address> (function code: <function code>, address: <value address>, quantity: <quantity>)

The driver successfully read/wrote a value from/to the Modbus RTU slave with the address indicated. The corresponding value is identified by the Modbus function code used to read/write it, its address (starting from 0) and the quantity of registers/coils. This message will only be shown if the driver failed to read/write the same value before.

**The interval has been violated.**

The driver was still busy reading/writing slave/client values when a new cycle should have been started. Increase the interval.

**Could not connect to TCP device at <IP address>:<port>. (Error code <code>).**

The driver could not connect to the Modbus TCP server with the IP address and port indicated. The message also shows an error code:

Error code	Description
-2	Could not open TCP socket.
-3	Could not switch TCP socket to blocking mode.
-4	TCP connect failed.
-5	Setting options on TCP socket failed.

If you see an error code that is not on the above list, please contact customer support.

**Could not read/write from/to TCP device at <IP address>:<port> (unit: <unit identifier>, function code: <function code>, address: <address>, quantity: <quantity>, result code: <result code>, error code: <error code>, exception code: <exception code>)**

The driver failed to read/write a value from/to the Modbus TCP server with the IP address and port indicated. The corresponding value is identified by the Modbus function code used to read/write it, its address (starting from 0) and the quantity of registers/coils. The message also shows a result code, an error code from the TCP/IP stack and a Modbus exception code. For documentation on Modbus exception codes please refer to the Modbus application protocol specification. The following table shows the possible result codes:

Result code	Description
-1	Waiting for server response timed out. Either the server is not available or you should increase the timeout.
-2	Received invalid packet (protocol error).
-5	TCP/IP error

If you see an error code that is not on the above list, please contact customer support.

**Read illegal floating point value from TCP device at <IP address>:<port> (unit: <unit identifier>, function code: <function code>, address: <address>, quantity: <quantity>)**

The driver read an illegal floating point value from the Modbus TCP server with the IP address and port indicated. The corresponding value is identified by the Modbus function code used to read it, its address (starting from 0) and the quantity of registers/coils.

**Could not read/write from/to RTU device <device address> (function code: <function code>, address: <value address>, quantity: <quantity>, result code: <result code>, exception code: <exception code>)**

The driver failed to read/write a value from/to the Modbus RTU slave with the address indicated. The corresponding value is identified by the Modbus function code used to read/write it, its address (starting from 0) and the quantity of registers/coils. The message also shows a result code and a Modbus exception code. For documentation on Modbus

exception codes please refer to the Modbus application protocol specification. The following table shows the possible result codes:

Result code	Description
-1	Waiting for slave response timed out. Either the slave is not available or you should increase the timeout.
-2	Received invalid packet (checksum error).
-3	Sending request failed.

If you see a result code that is not on the above list, please contact customer support.

**Read illegal floating point value from RTU device <device address> (function code: <function code>, address: <value address>, quantity: <quantity>)**

The driver read an illegal floating point value from the Modbus RTU slave with the address indicated. The corresponding value is identified by the Modbus function code used to read it, its address (starting from 0) and the quantity of registers/coils.

**Portal communication error <error code>**

A general error has occurred while exchanging data with the port. Possible error codes:

Error code	Description
-10	Out of memory
-12	The internal data queue has overflowed because data was produced faster than it could be processed.

If you see an error code that is not on the above list, please contact customer support.

## 8.4.8 Modbus server/slave

The Modbus server/slave can be configured on this page.

### Values

This page contains a list of Modbus values. You can add, edit, delete or clone settings (input or output) via the buttons below the list. For each value the list shows a name, the communication parameters and an index. The name can be freely defined and is shown on the portal, for example. The indexes are used internally to address the values.

When you add or edit a value, a dialog will appear. You can configure the following parameters here:

Parameter	Description
Name	The value's name
Function	Modbus function code used to read/write the value. The function code also defines whether the value is interpreted as an input or output.
Start address	Register/coil address to start reading/writing from/to. Note that addresses start at 0.
Number	Number of registers/coils to read/write. If more registers/coils are read/written than fit into the selected data type (see below), the value will become an array.
Data type	Data type of the value

### Limits

You can define up to 128 values. As values can become arrays when reading/writing several registers/coils, the following limit applies: The number of all scalar (non-array) values plus the size of all arrays must not exceed 512.

### Settings

Below the value list there are several fields via which some general settings can be configured:

Settings	Description
Mode	Defines whether to operate the device as a Modbus RTU slave or a Modbus TCP server. Depending on this particular setting, two different groups of additional settings are available.

### TCP settings

Settings	Description
Port	TCP port number the Modbus TCP server will be listening on - typically 502.
Keep-alive enable	Enables the TCP keep-alive mechanism for connections from clients. The keep-alive mechanism is used to detect inactive connections. If an inactive connection is detected, resources consumed by this connection can be released.
Keep-alive timeout	Idle time in seconds after which the first keep-alive probe will be sent
Keep-alive interval	Interval in seconds in which keep-alive probes will be sent
Keep-alive count	Number of keep-alive probes that will be sent before closing the connection.

### RTU settings

Settings	Description
Address	RTU slave's address
Baud rate	Defines the baud rate for Modbus RTU
Parity	Defines the parity (and number of stop bits) for Modbus RTU. Options: <ul style="list-style-type: none"> <li>▪ None (2 stop bits)</li> <li>▪ Odd</li> <li>▪ Even</li> </ul>

### Event log messages

The following section describes the messages that the Modbus slave driver may log to the event log. All messages are prefixed with the text *Modbus Slv driver*.

#### Portal communication error <error code>

A general error has occurred while exchanging data with the port. Possible error codes:

Error code	Description
-10	Out of memory
-12	The internal data queue has overflowed because data was produced faster than it could be processed.

If you see an error code that is not on the above list, please contact customer support.

### 8.4.9 Analog inputs

The analog inputs of the Fieldgate FXA42 can be configured on this page. On the left side of the page the user may select one of the four different inputs by clicking the corresponding tab. The settings for each of the four inputs are identical.

### Linearization table

The user may select to scale the input values via the use of a linearization table. In this table the user can add (x,y) value pairs, where the x value is measured in the scaled unit and the y value is measured in mA. Each time a value pair is added or edited, the table is automatically sorted, based on the x values.

Instead of manually adding the value pairs for the linearization table, it is also possible to upload a .csv file containing all the (x,y) value pairs. Once the .csv file is validated and parsed, the table is automatically filled with the given values. A valid .csv file should use the dot "." character as the decimal point and the comma "," character as the (x,y) value separator.

### Clone settings

In order to make the configuration easier, the user may copy the current settings of one input to another one. To do this, the user should first select the input from which the settings are to be copied. Upon clicking the "Clone" button, all the settings from the selected source input are copied to the currently visible input.

### Analog input settings

In this section the user may configure the settings for each analog input. The following settings are available:

Settings	Description
Tag name	The label name of the input.
Description	A text describing the input's function.
Unit	The input's measurement unit.
Minimum input range	The input's minimum current value, measured in mA.
Maximum input range	The input's maximum current value, measured in mA.
Scaling	The scaling may be calculated either by using a Min/Max value pair, or by providing a linearization table.
Minimum scale	Minimum scaled value. This field is enabled when the "Range" option is selected in the Scaling field.
Maximum scale	Maximum scaled value. This field is enabled when the "Range" option is selected in the Scaling field.
Display scaled values on home page	This checkbox defines whether the raw current value, measured in mA, is to be shown on the Homepage and Editor, or the scaled value, measured in the scaled unit.
Limit High	The input's High High limit, measured in the scaled unit.
Limit High	The input's High limit, measured in the scaled unit.
Limit Low	The input's Low limit, measured in the scaled unit.
Limit Low Low	The input's Low Low limit, measured in the scaled unit.
Hysteresis	This value, measured in the scaled unit, defines an offset value below the High and High-High, or above the Low and Low-Low limits, that delays the resetting of an alarm.
Gradient limit	The input's gradient limit, measured in the scaled unit, defines a limit value that triggers an alarm if the input's value is above this limit for a certain time period.
Time period	The time after which a Gradient Limit Alarm should be triggered.

### 8.4.10 Digital inputs

The digital inputs of the Fieldgate FXA42 can be configured on this page. On the left side of the page the user may select one of the four different inputs by clicking the corresponding tab. The settings for each of the four inputs are identical.



### Clone settings

In order to make the configuration easier, the user may copy the current settings of one input to another one. To do this, the user should first select the input from which the settings are to be copied. Upon clicking the "Clone" button, all the settings from the selected source input are copied on the currently visible input.

### Digital inputs settings

In this section the user may configure the settings for each digital input. The following settings are available:

Settings	Description
Tag name	The label name of the input.
Description	A text describing the input's function.

### Counter settings

In this section the user may configure the settings for each counter. The following settings are available:

Settings	Description
Tag name	The label name of the counter.
Description	A text describing the counter's function.
Scaling unit	The counter's measurement unit.
Unit per pulse	Scaling factor of the counter.
Pulse counter	This setting defines the operational mode of the counter. The mode options are turned off, counting upwards, or counting downwards.
Counter start value	This is the value that the counter has each time it is reset.
Hold time	The hold time defines the minimum time between consecutive counting events so that they are registered.

## 8.4.11 Data transmission and data logging

On this page, you can configure which data will be transmitted via FIS or the other communication methods, and which data will be logged internally. You can also set time intervals at which the data is to be transmitted or logged. Data is internally logged or recorded. Recorded data is communicated via all the enabled communication methods.

The following settings apply to all I/Os for which data transmission is enabled:

- Data transmission interval: The interval in which the recorded data is to be transmitted. Example: A value of 2 hours transmits the I/O data at 00:00, 02:00, 04:00, 06:00 etc.
- Time offset: An offset that is added to the data transmission interval. Example: If an interval of 2 hours and an offset of 1 hour are set, data will be transmitted at 01:00, 03:00, 05:00, 07:00 etc. Note that this value cannot be greater than the interval value.
- Transmit now: Transmit all recorded data now.

All the inputs and outputs of the device are visible when you click . Inputs and outputs are named according to their FIS UID. Settings:

- Data transmission: Enables the data transmission for the selected I/O.
- Data logging: Enables the data logging for the selected I/O.
- Data logging interval: The interval (in minutes) in which data is to be logged and recorded.

### Event log messages

Messages relating to the data transmission and data logging functionalities are created by the I/O Task of the device.

**Sent FIS data message successfully**

A FIS data message was sent.

**Error on parsing FIS data message**

XML error when generating a FIS data message. Contact customer support.

**FIS: Recording data**

FIS data is being recorded.

**FIS event message transmitted successfully**

A FIS event message was sent.

**FIS: Recording event**

An event has been recorded.

**HTTP error <HTTP-Error> occurred while sending FIS event message**

HTTP communication error with the FIS server.

**HTTP connection error occurred while sending FIS event message**

An error occurred while trying to transmit an event message to the FIS server. Please check device connectivity status.

**HTTP connection error occurred while sending FIS data message**

An error occurred while trying to transmit a data message to the FIS server. Please check device connectivity status.

**FIS data message transmitted successfully**

The data message was correctly transmitted to the FIS server.

**HTTP error <HTTP-Error> occurred while sending FIS data message**

HTTP communication error with the FIS server.

**Invalid FIS authentication**

The credentials of the device are not correct.

**Logging data**

The device is logging data.

**8.4.12 Messages**

The various communication options for the Fieldgate FXA42 can be configured via this page.

**Upload file(s)**

This section can be used to upload certificate files for encrypted SMTP and FTP connections. The provided certificates have to be DER encoded. Firstly choose which file you want to upload via the drop-down box.

Then chose a file from the local file system and press the *Start upload* button.

**FIS**

The user can enable and configure the access data for the FIS portal on this page. The values to enter here are the FIS server URL, the user name and the corresponding password. The Fieldgate FXA42 can register itself on the server with the default settings. If the registration fails, please consult the FIS portal documentation.

If the registration fails, the device will make another attempt after <T> minutes. <T> is the next number of the Fibonacci sequence starting from 1. The maximum number of minutes between attempts is 1440.

**Configuration exchange**

The Fieldgate FXA42 is able to transmit its current configuration to the FIS in the form of a .cup package. The transmission takes place after every reboot of the device that was not caused by a remote configuration change by the FIS.

The FIS server is able to remotely change the configuration of the Fieldgate FXA42. The FIS server can command the device to download a new configuration and apply it. After the configuration has been downloaded the device will reboot and register itself with the new configuration version.

In this section the user may configure the settings for FIS Alarms and Limits messages. The following settings are available for each of the two types of messages:

Settings	Description
Subject	Message subject
Message	Message text
Message code	Message code
Priority	Message priority

### SMTP

In this section the user may configure the settings for SMTP (e-mail) communication. The following settings are available:

Settings	Description
Enable SMTP	Enable/disable the SMTP functionality.
SMTP server address	The address of the remote SMTP server. It may be either a host name or an IP string.
SMTP server port	The port of the SMTP server.
Login name	This is the username that should be used when connecting to the SMTP server.
Login password	This is the password that should be used when connecting to the SMTP server.
Secure connection	For activating TLS encryption for the SMTP communication.
Trust server certificate	The server certificate is not validated.

### E-mail receiver list

The user may add up to 5 different e-mail recipients. An individual text can be defined for each recipient. In addition, the user can specify what type of information the recipient should receive (measured values, limit alarms, NAMUR alarms).

Text	Description
Enable FTP	Enable/disable the FTP functionality.
FTP server address	The address of the remote FTP server. It may be either a host name or an IP string.
FTP server port	The port of the FTP server.
FTP connection	Set the FTP connection to be active or passive.
Login name	This is the username that should be used when connecting to the FTP server.
Login password	This is the password that should be used when connecting to the FTP server.
Secure connection	For activating TLS encryption for the FTP communication.


## SMS

In this section the user may configure the settings for the transmission of SMS messages (alarm events). The following settings are available:

Settings	Description
Enable SMS	Enable/disable the SMS functionality
SMS confirmation	This setting defines the way that the Alarm SMS messages should be acknowledged so that the SMS escalation stops. There are three possible options for the SMS confirmation: <ul style="list-style-type: none"> <li>None: No acknowledgment is expected for stopping the SMS escalation.</li> <li>Automatic: As soon as an SMS delivery confirmation arrives, the SMS escalation is stopped.</li> <li>Manual: The SMS escalation is stopped when one of the recipients sends an empty SMS to the Fieldgate FXA42.</li> </ul>
SMS send interval	Time to wait before attempting to resend an SMS in the event of a send error. Measured in minutes.
Timeout	Time to wait before sending the SMS to the next recipient of the escalation. Measured in minutes.
Max. send SMS	Maximum number of SMS send retries in the event of a send error.

### SMS receiver list

The user may add up to 5 different SMS recipients by providing the name and phone number of each recipient. The SMS text that is to be sent is generated automatically. It contains the information on the analog input for which "by alarm notification" was selected on the Data Transmission Configuration page.

 The phone number for the SMS recipients must contain the country code, prefixed with the plus (+) sign, e.g. +49123456789. Separating characters are not allowed.

## FIS

In this section the user may configure the settings for FIS Alarms and Limits messages. The following settings are available for each of the two types of messages:

Settings	Description
Subject	Message subject
Message	Message text
Message code	Message code
Priority	Message priority

### Event log messages

Messages relating to the "Messages" tab are created by the I/O Task of the device.

#### **Sending data Email to <name>, address: <name>**

A data email has been sent to the name/email address indicated.

#### **Sending limit Email to <email>, address: <address>**

A limit email has been sent to the name/email address indicated.

#### **Sending alarm Email to <email>, address: <address>**

An alarm email has been sent to the name/email address indicated.

#### **Sent data Email message successfully**

Data e-mail was successfully transmitted.

#### **Could not send data e-mail**

Data e-mail could not be transmitted.

**Email: No data recorded**

No data to transmit via e-mail.

**Email: Recording data**

E-mail data has been recorded.

**Email: Recording event**

An event e-mail has been recorded.

**FTP: Recording data**

FTP data has been recorded.

**Could not send file to FTP server**

An FTP message could not be sent to the server.

**Sent measurements file to FTP server**

An FTP message was sent to the server.

Messages relating to the FIS registration and configuration are created by the I/O Task of the device.

**Sending FIS registration message**

A registration message is being transmitted to the FIS server.

**Sending configuration to FIS**

A configuration message is being transmitted to the FIS server.

**Configuration successful**

The configuration on the FIS server was successful.

**FIS configuration version: <Version>**

The actual configuration version on the FIS server.

**Invalid FIS authentication data. Trying again in <T> minutes.**

During this FIS registration attempt a wrong username/password was used.

**HTTP error <HTTP-Error> occurred while sending FIS registration message. Trying again in <T> minutes.**

HTTP communication error with the FIS server during the registration attempt.

**HTTP connection error occurred while sending FIS registration message. Trying again in <T> minutes.**

An error occurred during the registration attempt. Please check device connectivity status.

**FIS registration successful**

Registration attempt was successful. Device is now registered on the FIS.

**New configuration available: <Version>**

A new configuration is available on the FIS server. The device will try to download and apply this configuration.

**Could not apply FIS configuration, update in progress.**

The device could not be configured via FIS. An update is in progress.

**FIS configuration version: <Version>**

A new configuration is available on the FIS server. The device will not try to download and apply this configuration.

**Downloading new configuration from FIS**

The device is downloading a configuration from the FIS.

**Could not apply configuration**

The device could not be configured via FIS.

**Re-booting due to FIS command**

The device is rebooted due to a FIS command.

**Re-registration due to FIS command**

The device will re-register itself on the FIS due to a FIS command.

**Update due to FIS command**


The device will update itself from the configured URL due to a FIS command.

**Time changed from FIS**

The current time settings have been set by the FIS.

### 8.4.13 System time

On this page, you can set the system time and configure the time synchronization via the Simple Network Time Protocol (SNTP) or the FIS.

 Please note that if FIS is enabled on the Messages settings, the system will use the FIS communication to set the time and time settings from the "System Time" tab will not be possible.

In the first section you can enable and configure the SNTP client. If you enable it, the specified time servers will be contacted several times a day to determine the current time and date. Then the system clock will be updated accordingly.

You can specify up to four time servers, which will be queried one after the other until one of them answers.

The server names can be given either as host names (e.g. ntp.company.org) or as IP addresses (e.g. 192.168.0.23).

Note that contacting the time servers produces data traffic.

In the second section you can enable and configure the FIS time settings. If you enable FIS time, the Fieldgate FXA42 will request the time from the FIS server on each registration. The device is registered at least once daily.

You must also select the location/timezone of the device from the drop-down list.

In the third section you can set the system clock manually. When you click the Set button, the system clock will be set to the current time of your computer.

**Event log messages**

The following section describes the messages that the system time manager and the SNTP client may log to the event log. All messages are prefixed with the text *System Time Manager:* or *SNTP Client:*

**Running**

The system time manager is now running.

**System clock updated via SNTP**

The system clock (and if available the real-time clock) has/have just been updated with the time obtained via SNTP.

**System clock updated from RTC**

The system clock has just been updated with the time from the real-time clock.

**Could not get exclusive access to clock(s).**

The system time manager could not get exclusive access to the system clock and (if available) the real-time clock. Thus the system clock could not be set or the real-time clock could not be read.

**Daylight saving time rules will be used up within the next two years.**

The firmware of your Fieldgate FXA42 device includes daylight saving time rules for a limited time period. New rules will be added with new firmware versions. This message indicates that the rules will be used up within the next two years. You should apply a firmware update to get new rules.

**SNTP client error: <message>**

The SNTP client has returned the error message shown.

**RTC not available**

The device should feature a real-time clock, but it cannot be accessed.

**Could not write to RTC: <message>**

Failed to set the real-time clock. The message also shows an error message returned by the real-time clock driver.

**Could not read from RTC: <message>**

The real-time clock could not be read. The message also shows an error message returned by the real-time clock driver.

**Could not read daylight saving time file.**

The daylight saving time file for this time zone is missing or corrupted.

**No daylight saving time rule found for the current time.**

No daylight saving time rule could be found for the current time. That means either that the daylight saving time rules are outdated or that the Fieldgate FXA42's time is set incorrectly.

**DNS error (<error code>) for server <server name/IP>**

The SNTP client could not determine the IP address of the server with the name indicated. The message also shows the error code returned by the TCP/IP stack.

**Could not open socket for server <server name/IP>**

The SNTP client could not open a UDP socket in order to contact the time server with the name or IP address indicated.

**Could not send to server <server name/IP>**

The SNTP client could not send a request to the time server with the name or IP address indicated.

**Failed to receive reply from server <server name/IP>**

The SNTP client could not receive a reply from the time server with the name or IP address indicated.

**Unexpected packet format from server <server name/IP>**

The SNTP client received an invalid reply from the time server with the name or IP address indicated.

**Timestamps not plausible from server <server name/IP>**


The SNTP client received a reply with implausible timestamps from the time server with the name or IP address indicated.

## 8.4.14 OpenVPN

The Fieldgate FXA42 firmware includes OpenVPN. You can use it to integrate your Fieldgate FXA42 device into a virtual private network.

There are two possible ways of starting OpenVPN. You can either choose to run it automatically at system start-up or you can manually start it via the portal. Fieldgate FXA42 devices have a portal node at the address. Setting this node's value to 1 will start OpenVPN. Of course you can also stop OpenVPN by resetting this node to 0.


The large text input field can be used to edit the OpenVPN configuration file. Please refer to OpenVPN's documentation for further information. Certificate files can be referenced without any path prefix.

 Changes to the OpenVPN configuration may take effect before the device is restarted when the OpenVPN connection is (re-)established. It is recommended to reboot the device shortly after changing the configuration to preserve a consistent state.

### Upload file(s)

This section can be used to upload various files. Firstly choose which file you want to upload via the drop-down box. In the drop-down list you can also see the files names, which can be used to reference the uploaded files in the configuration (see above).

Then chose a file from the local file system and press the *Start upload* button.

 If your device features an external storage medium, it is possible that the files will be temporarily stored on it. They will be deleted later. It may be possible to restore them, however. Therefore, make sure that the external storage medium does not fall into the wrong hands.

### Event log messages

The following section describes the messages that the OpenVPN driver may log to the event log. All messages are prefixed with the text *OpenVPN*: Note that the following list is not complete. Messages from OpenVPN itself are also shown. Please refer to OpenVPN's documentation for further information.

#### **Driver has been started.**

The OpenVPN driver has been successfully started.

#### **Driver has been stopped.**

The OpenVPN driver has been successfully stopped.

#### **Driver stopped.**

The OpenVPN driver has exited.

#### **Connection established.**

An OpenVPN connection has been established.

#### **Connection closed.**

An OpenVPN connection has been closed.

#### **Authority's certificate uploaded.**

The certification authority's certificate file (*ca.crt*) has been successfully uploaded.

#### **Certificate uploaded.**

The certificate file (*cert.crt*) has been successfully uploaded.

#### **Private key uploaded.**

The private key file (*cert.key*) has been successfully uploaded.

#### **User and password file uploaded.**

The user and password file (*userpass.txt*) has been successfully uploaded.

#### **Diffie-Hellman file uploaded.**

The Diffie-Hellman file (*dh.pem*) has been successfully uploaded.

#### **Could not start driver.**

The OpenVPN driver could not be started.

#### **Could not stop driver.**

The OpenVPN driver could not be stopped.



**Driver stopped unexpectedly.**

The OpenVPN driver has stopped unexpectedly. This can happen, for example, if the configuration is invalid. Please look out for error messages from the OpenVPN driver.

**Upload of authority's certificate failed.**

The certification authority's certificate file (*ca.crt*) could not be uploaded.

**Upload of certificate failed.**

The certificate file (*cert.crt*) could not be uploaded.

**Upload of private key failed.**

The private key file (*cert.key*) could not be uploaded.

**Upload of user and password file failed.**

The user and password file (*userpass.txt*) could not be uploaded.

**Upload of Diffie-Hellman file failed.**

The Diffie-Hellman file (*dh.pem*) could not be uploaded.

**Open-source software**

The following open-source software has been used to implement the OpenVPN functionality:

**LZO**

The LZO compression library is used in OpenVPN.

LZO is copyright © Markus F.X.J. Oberhumer.

Project website: [www.oberhumer.com/opensource/lzo](http://www.oberhumer.com/opensource/lzo)

License: [GPL](#)

**OpenSSL**

OpenSSL is used in OpenVPN.

Project website: [www.openssl.org](http://www.openssl.org)

License: [OpenSSL license](#)

**OpenVPN**

"OpenVPN" is a trademark of OpenVPN Technologies, Inc.

Project website: [openvpn.net](http://openvpn.net)

License: [OpenVPN licence](#)

### 8.4.15 DHCP server

The Fieldgate FXA42 firmware features a Dynamic Host Configuration Protocol (DHCP) server which you can enable and configure on this page.

In the first section you have to configure the maximum number of clients that will be serviced (max. 100, including static mappings), the leasing time, the server's own IP address and the netmask. The server will lease IP addresses from the particular network except for his own IP address. Additionally you can specify a gateway and name server IP address that will also be distributed.

**Static leases**

In this section you can configure up to 10 static leases. A static lease will ensure that a client with a specific MAC address will be given a predefined IP address and that this IP address is not leased to another client. The MAC address of the client has to be specified without any delimiters (e.g. 003056A1DB30).

### Event log messages

The following section describes the messages that the DHCP server may log to the event log. The messages are prefixed with the text *DHCP server*:

#### Running

The DHCP server has been successfully started.

#### Added static lease IP=<x>, MAC=<y>

A static lease has been added. The message also shows the respective IP and MAC addresses.

#### Discover message received, CI=<x>, MAC=<y>

A DHCP discover message was received from a client. The message also shows the client identifier (as a hex string) and the client's MAC address.

#### Request message received, CI=<x>, MAC=<y>

A DHCP request message was received from a client. The message also shows the client identifier (as a hex string) and the client's MAC address.

#### Leased IP=<x>, Leasing Time=<y>, Index=<z>

The IP address indicated has been leased to the client. The message also shows the leasing time in seconds and the internal leasing table index.

#### Release message received, CI=<x>, MAC=<y>

A DHCP release message was received from a client. The message also shows the client identifier (as a hex string) and the client's MAC address.

#### Release IP=<x>, Index=<y>

The IP address indicated has been released. The message also shows the internal leasing table index.

#### Network interface not configured

The network interface that the DHCP server is to use does not have a valid IP configuration.

#### Failed to send response message, error <x>

A DHCP response message could not be sent. The message also shows the error code returned by the TCP/IP stack.

#### No more client addresses available

A client's request could be not served because all the available addresses are already leased to or reserved for other clients.

#### Receive Error <x>

No DHCP message could be received. The message also shows the error code returned by the TCP/IP stack.

#### Received malformed message

A malformed DHCP message was received from a client.

#### No interface found for given IP address

The DHCP server could not find a network interface for the configured IP address at start-up.

#### Open socket failed

The DHCP server could not open a UDP socket at start-up.

#### Bind socket failed

The DHCP server could not bind its UDP socket to the designated port at start-up.

#### Only <x> clients possible due to netmask setting

The configured netmask allows fewer IP addresses than configured.

#### **Failed to allocate client data structure**

The DHCP client failed to allocate memory for its internal leasing table at start-up.

#### **Adding static lease IP=<x> failed, IP address is in use**

A static lease could not be added because the IP address indicated is already in use. The message also shows the IP address of the static lease that should be added.

#### **Adding static lease IP=<x> failed, no free slot**

A static lease could not be added because there was no free space in the internal leasing table. The message also shows the IP address of the static lease that should be added.


#### **Adding static lease IP=<x> failed, wrong IP address**

A static lease could not be added because the IP address indicated did not match the network address. The message also shows the IP address of the static lease that should be added.

### **8.4.16 Network address translation**

The Fieldgate FXA42 firmware is able to perform network and port address translation (aka NAT/PAT) in order to route traffic between a local (internal) and a global (external) network. This feature can be used, for example, to allow another device connected to the Fieldgate FXA42's Ethernet interface (local network) to use the Fieldgate FXA42's cellular modem Internet connection (global network).

On the "Settings page" you can enable the NAT service and configure the internal and external network interface as well as the maximum number of mapping entries (incoming and outgoing connections that can be routed).

 Note that IP forwarding will be implicitly enabled because it is needed in order to use NAT. If you later disable NAT, IP forwarding will not be automatically disabled. This can be done via the network settings.

#### **Dynamic mappings**

Dynamic mapping is used to enable devices from the local network to access the global network. Requests from the local network will be given the global IP address of the Fieldgate FXA42 and the replies will be routed to the respective local device.

You have to configure how many minutes dynamic mappings will be valid (time to live).

#### **Static mappings**

Static mappings are used to make a local device's service accessible from the global network under the global IP address of the Fieldgate FXA42. Up to 10 static mappings can be configured. You have to configure the following options for each mapping:

Option	Description
Protocol	TCP or UDP
External port	The port of the Fieldgate FXA42 at which the service should be reachable from the global network.
Internal address	The IP address of the device in the local network whose service should be reachable from the global network.
Internal port	The port number at which the service is available on the device in the local network.

#### **Event log messages**

The following section describes the messages that the NAT service unit may log to the event log. The messages are prefixed with the text *NAT service*:

Note that as the NAT service unit also implements the firewall service, there are also some firewall-related messages.

### Running

The NAT service unit has been successfully started.

#### <x> static mapping(s) read from configuration

The static mapping entries have been successfully read from the configuration. The message also shows the number of static mappings read.

#### No free mapping entry available for incoming connection from internal interface

A client from the internal network tried to open a connection through the NAT service unit but there was no free entry in the mapping table. Therefore the connection could not be established. Try to increase the maximum number of mappings to solve the problem.

#### No free firewall rule entry available for outgoing connection


A new dynamic rule has to be added to the firewall to allow an outgoing connection to be established. However, there was no free entry in the internal rules table. Therefore the connection could not be established. Try to increase the maximum number of rules to solve the problem.

## 8.4.17 Firewall

Your Fieldgate FXA42 features a firewall which improves the system's security by analyzing network traffic and blocking disallowed traffic.

The firewall of the Fieldgate FXA42 has a blocking policy. This means that while outgoing connections are generally allowed, incoming connections will be generally blocked unless there is a rule allowing the specific connection.

On this page, you can enable the firewall and configure the maximum number of rules. This determines the number of connections (incoming and outgoing) that can be handled simultaneously.

 When enabling the firewall, always make sure that you have defined some static rules that allow you to access the web server etc. so you can to disable the firewall if needed. If you enable the firewall without any appropriate rules, you will be unable to access your device in any way. You will need to reset the device to factory settings in this case.

### Dynamic rules

Dynamic rules are created by the firewall for outgoing connections. You have to configure how many minutes dynamic rules will be valid (time to live).

### Static rules

You can add up to 30 static firewall rules. Static rules allow access to a specific service on your Fieldgate FXA42 from the network. Static rules have the following parameters:

Parameter	Description
Network interface	Determines the network interface from which you want to accept connections. For example, you may want to allow access to the device's web server only from the local area network, so you would choose the Ethernet interface here. If a rule should not apply for any specific network interface, select <i>Any</i> .
Service	This selection provides a set of predefined services which you may want to allow connections to. If the desired service is not on the list, choose <i>Other</i> in order to manually specify the service's protocol and port(s) (see below).
Protocol	This parameter only appears if you choose <i>Other</i> for the <i>Service</i> field. It determines which base protocol (TCP or UDP) is used by the service that you want to allow.


Parameter	Description
Minimum/ maximum port	These parameters only appear if you choose <i>Other</i> for the <i>Service</i> field. They determine the port(s) which the service you want to allow runs on. You can specify a single port (set minimum and maximum to the same value) or a port range (e.g. 10000 to 10005). Alternatively, you can set both parameters to 0, which means that you want to allow connections on any port (wildcard).
Minimum/ maximum source IP address	Determines the IP addresses that you want to allow to connect to the specified services. You can specify a single IP address (set minimum and maximum to the same value) or an IP address range (e.g. 192.168.0.1 to 192.168.0.10). Alternatively, you can set both parameters to 0.0.0.0, which means that you want to allow connections from any IP address (wildcard).

### Event log messages

The firewall is implemented inside the NAT service unit. Event log messages are documented there.

## 8.4.18 Update

On this page, you can update the Fieldgate FXA42 firmware on your Fieldgate FXA42. The current firmware version is displayed.

The Fieldgate FXA42 also supports updates via the FIS server. Please refer to the FIS Update section →  67 for help related to this functionality.

To start an update select the update package (\*.cup) and click *Start update*.

The update package will first be stored on the SD card that must be present in the slot of your Fieldgate FXA42. A directory named *com.tom* was created on the card during start-up. This directory will be used to store the contents of the update package. If you only plugged in the SD card after start-up, the directory does not exist and the upload will fail. In this case, please reboot the device with the SD card plugged in.



While accessing the SD card, the device may not be able to update the physical I/Os.

Once the update package has been completely uploaded to the SD card the device will be programmed with the new software. While the device is being programmed, the website may not be able to contact it. Therefore communication errors might be reported. This is normal as long as the error message does not persist for any length of time. Once the update has been programmed you will be forwarded to the index page.



Note that your device will not work anymore if you reset it while the update is being programmed.

### Manual update

It is also possible to copy the update package to the SD card yourself. The package should be located in the *com.tom* directory and named *update.cup*.

The update process can then be started by pressing the reset button until the device acknowledges, which is indicated by the *Status A* LED flashing twice.

### Event log messages

The following section describes the messages that the update system may log to the event log. All messages are prefixed with the text *Update Loader:* or *Update Portal:*

#### Running

The update loader is now running.

#### Package successfully loaded via local web server

An update package has been successfully uploaded via the local web server.

#### Loading package from remote web server...

An update package is being downloaded from a remote web server.

**Package successfully loaded from remote web server**

An update package has been successfully downloaded from a remote web server.

**Checking package...**

An update package has been successfully loaded. The package is now being checked for correctness and compatibility.

**About to reboot...**

The Fieldgate FXA42 will now reboot in order to start the programming of the current update package.

**Loading package via local web server timed out**

A timeout occurred while an update package was being uploaded via the local web server. The upload is aborted.

**Target directory for remote update package does not exist**

Loading an update package from a remote web server failed because the target directory does not exist. One reason may be that an external medium is missing or write-protected.

**Target file for remote update package is not accessible**

Loading an update package from a remote web server failed because the target file already exists but could not be overwritten. One reason may be that an external medium is write-protected.

**Loading package from remote web server failed (code <x>)**

Loading an update package from a remote web server failed. The message contains a code, which is either a positive HTTP response code or a negative error code from the HTTP client:

Code	Description
-2	Opening TCP socket failed
-3	Setting TCP socket options failed
-4	Connection could not be established
-5	Connection refused by remote web server
-6	SSL client could not be started
-7	SSL handshake failed
-8	Sending data to remote web server failed
-9 or -10	Receiving data from remote web server failed
-11	Internal buffer is too small
-12	IP address of remote web server could not be determined
-13	File input/output failed
-14	Invalid HTTP header format
-15	SSL session could not be created/closed
-18	Operation timed out
-19	Out of memory

If you see an error code that is not on the above list, contact customer support.

**The type of the package's signature does not match the expected type of signature. (<signature type>)**

Update packages are signed. From time to time new types of signatures are introduced. If the signature type of the update package does not match the signature type expected by

the firmware, the update package was probably generated for/by an older or newer firmware version. It may be possible to convert the update package to the expected format using a special tool.

**Invalid package flag(s) (<flags>)**

The current update package has invalid flag(s) set. The message shows the package flags bitmap as a hexadecimal number.

**Firmware name does not match. This package is for "<firmware name>" firmware.**

The current update package is not intended for the Fieldgate FXA42 firmware. The firmware that the package is intended for is displayed.

**This package cannot be applied to the current firmware version.**

The current update package cannot be applied to the current firmware version because the package requires a minimum or maximum existing firmware version and is incompatible with the current firmware version.

**Target name does not match. This package is for "<target name>" target.**

The current update package is intended for another target hardware. The hardware that the package is intended for is displayed.

**Variant name does not match. This package is for "<variant name>" variant.**

The current update package is not intended for this variant of the Fieldgate FXA42 firmware. The variant that the package is intended for is displayed.

**This package is limited to the device with the MAC address <MAC address>.**

The current update package is intended for a certain device. The message indicates the MAC address of the device the package is intended for.

**Invalid package signature**

Update packages are signed. If an invalid package signature is indicated, there can be two reasons:

- The update package has been corrupted or manipulated.
- The update package uses a different signature type than that expected by the existing firmware. The update package was possibly intended for an older firmware version. Ask the issuer of the update package for an updated version.

**Could not open package. Message: <message>**

The current update package could not be opened. The message includes a more detailed description of the problem.

**Update disallowed by application (<code>)**

The programming of the current update package could not be started because the application does not allow it in its current state. The code indicated may provide further information about the reason why the update was disallowed.

**Could not launch update.**

The programming of the current update package could not be started.

**Portal communication error <x>**

A communication error has occurred while exchanging data with the portal. Possible error codes:

Code	Description
-10	Out of memory
-12	The internal data queue has overflowed because data was produced faster than it could be processed.

If you see an error code that is not on the above list, contact customer support.

### Open-source software

The following open-source software has been used to implement the update functionality:

#### libarchive

libarchive is used to extract update packages.

Project website: [www.libarchive.org](http://www.libarchive.org)

License: [New BSD license](#)

#### zlib

zlib is used to extract update packages.

Project website: [www.zlib.net](http://www.zlib.net)

License: [zlib license](#)

## 8.4.19 Export

On this page, you can export the configuration of your Fieldgate FXA42. It will be packed into an update package that can be applied to other Fieldgate FXA42 devices. To apply the exported packet to a device, use the Update page.

Select which settings you want to export by checking the corresponding options and then click the *OK* button. Once the update package has been created, it will be provided for download.

### Event log messages

The following section describes the messages that the update system may log to the event log. The messages are prefixed with the text *Update Exporter*:

#### Preparing export...

The export of the configuration of the Fieldgate FXA42 is now being prepared.

#### Packing update package...

The configuration is now being packed into an update package.

#### Update package has been successfully packed

The configuration has been successfully packed into an update package.

#### Preparation failed. Message: <message>

The preparation of the configuration export failed. A detailed error description is appended to the message.

#### Packing failed. Message: <message>

Packing the configuration into an update package failed. A detailed error description is appended to the message.

### Open-source software

The following open-source software has been used to implement the export functionality:

#### libarchive

libarchive is used to create update packages.

Project website: [www.libarchive.org](http://www.libarchive.org)

License: [New BSD license](#)

#### zlib

zlib is used to compress update packages.

Project website: [www.zlib.net](http://www.zlib.net)

License: [zlib license](#)



## 8.5 Event log messages at system start-up

Messages that the firmware may log to the event log are displayed. All messages are prefixed with the text *Run Time System*:

### **Started**

The firmware has just been started.

### **I/O hardware manager initialized**

The I/O hardware manager that manages the physical I/O hardware has been successfully initialized.

### **NAT/firewall service initialized**

The NAT and firewall service has been successfully initialized.

### **Ethernet (1) driver started.**

The driver for the second Ethernet interface has been successfully started.

### **Cellular modem driver initialized**

The cellular modem driver has been successfully initialized.

### **Update module initialized**

The update unit, which manages the loading and programming of update packages, has been successfully initialized.

### **PLC driver initialized**

The PLC driver has been successfully initialized.

### **Message manager initialized**

The message manager, which handles the sending and reception of messages, has been successfully initialized.

### **DHCP server initialized**

The DHCP server has been successfully initialized.

### **OpenVPN client initialized**

The OpenVPN client has been successfully initialized.

### **Status web service initialized**

The status web service, which provides the data to be displayed on the home page, has been successfully initialized.

### **System time manager initialized**

The system time manager has been successfully initialized.

### **COM Server initialized**

The COM server has been successfully initialized.

### **Diagram loaded**

A diagram has been successfully loaded.

### **Web configuration modules initialized**

The web configuration modules, which accept the configuration data from the Settings page, have been successfully initialized.

### **Update exporter module initialized**

The update exporter module, which exports the configuration to an update package, has been successfully initialized.

### **Update web service initialized**

The update web service, which manages the upload of update packages via the local web server, has been successfully initialized.

**Running**

The run-time system has finished initialization.

**Starting update from external medium.**

The user has triggered an update from the external medium.

**Link detected at Ethernet (<interface index>).**

The Ethernet interface with the index indicated has been connected to the network.

**Restarting DHCP configuration at Ethernet (<interface index>).**

The run time system is trying to get a new IP configuration for the Ethernet interface with the index indicated from a DHCP server.

**DHCP configuration completed at Ethernet (<interface index>).**

The run time system has received a new IP configuration for the Ethernet interface with the index indicated from a DHCP server.

**Power fail handling not supported**

The device is not equipped with a power fail circuit. Data (e.g. portal variables) cannot be stored retentively.

**Not enough power fail capacity**

The device is equipped with a power fail circuit, but the capacity supplied is not sufficient to store data (e.g. portal variables) retentively.

**Retentive data could not be loaded.**

Retained data (e.g. portal variables) could not be loaded although the device is equipped with a power fail circuit. This message appears when the device is started for the very first time. If it occurs later, there is probably a problem with the power fail circuit.

**The internal flash drive seems to be weak.**

A write operation to the internal flash drive needed to be retried several times. This is an indication that the flash drive is reaching the end of its life.

**Flash write error. The internal flash drive is probably defect.**

A write operation to the internal flash drive failed. The flash drive seems to have reached the end of its life. The device is no longer usable.

**One or more certificates could not be loaded.**

At least one of the SSL certificate files could not be loaded.

**Could not initialize NAT/firewall service. (<error code>)**

The NAT and firewall service could not be initialized. The message also shows an internal error code returned by the service's initialization routine.

**Could not start Ethernet (1) driver.**

The driver for the second Ethernet interface could not be started.

**Unsupported Ethernet (1) interface type. (<interface type>)**

The Fieldgate FXA42 firmware could not find a driver for the second Ethernet interface. The message also shows the numerical Ethernet interface type.

**Could not initialize NAT/firewall service. (<error message>)**

The NAT and firewall service could not be initialized. The message also shows an error message returned by the service's initialization routine.

**Could not initialize cellular modem driver: <error message>**

The cellular modem driver could not be initialized. The message also shows an error message returned by the driver's initialization routine.

**Could not initialize WLAN driver: <error message>**

The WLAN driver could not be initialized. The message also shows an error message returned by the driver's initialization routine.

**Could not initialize update module: <error message>**

The update module, which manages the loading and programming of update packages, could not be initialized. The message also shows an error message returned by the module's initialization routine.

**Could not initialize DHCP server.**

The DHCP driver could not be initialized.

**Could not initialize OpenVPN client: <error message>**

The OpenVPN client could not be initialized. The message also shows an error message returned by the client's initialization routine.

**Could not initialize system time manager: <error message>**

The system time manager could not be initialized. The message also shows an error message returned by the manager's initialization routine.

**Could not initialize COM server: <error message>**

The COM server could not be initialized. The message also shows an error message returned by the server's initialization routine.

**Could not initialize portal Event Log service: <error message>**

The portal event log service could not be initialized. The message also shows an error message returned by the service's initialization routine.

**Could not load and start diagram.**

A diagram could not be loaded and therefore the PLC could not be started.

**Could not initialize web configuration modules: <error message>**

The web configuration modules, which accept the configuration data from the Settings page, could not be initialized. The message also shows an error message returned by the modules' initialization routines.

**Could not initialize update exporter module: <error message>**

The web configuration modules, which accept the configuration data from the Settings page, could not be initialized. The message also shows an error message returned by the modules' initialization routines.

**Could not initialize update web service: <error message>**

The update web service, which manages the upload of update packages via the local web server, could not be initialized. The message also shows an error message returned by the service's initialization routine.

**Task cycle time has been violated.**

The cycle time of the PLC task has been violated, i.e. the task was still busy with the previous IPO cycle when it was supposed to the next IPO cycle.

**Could not start update from external medium.**

The user has triggered an update from the external medium but the update could not be started.

**Link lost at Ethernet (<interface index>).**

The Ethernet interface with the index indicated has been disconnected from the network.

**RTOS version is not supported. Version (<version number>) is required.**

The current RTOS version is not the version required. Please install the version specified in the event log.

**Device is secured with the default password, please change it.**

This message is shown when the default password is still used. For security reasons, it is recommended to change the password. You can do so via the login settings.

**Fatal error:** <error message>

A fatal error prevented firmware start-up. The message also shows an error message describing the error.

## 8.6 Dojo Toolkit

The Dojo Toolkit has been used to implement these web sites.

Project website: [dojotoolkit.org](http://dojotoolkit.org)

License: [Dojo license](#)

### 8.6.1 Other open-source software

**FileSaver.js**

Project website: [github.com/eligrey/FileSaver.js](https://github.com/eligrey/FileSaver.js)


License: [FileSaver.js license](#)

## 9 Diagnostics and troubleshooting

### 9.1 Faults indicated by the LEDs

Problem	Cause/remedy
The <b>Power</b> LED is not lit.	No power: <ul style="list-style-type: none"> <li>▪ Check to ensure that the power supply is wired correctly</li> <li>▪ Check to ensure that the supply voltage corresponds to the voltage indicated on the nameplate</li> <li>▪ Check to ensure that the power is switched on</li> </ul>
The <b>modem / WLAN / Ethernet</b> LED is not lit.	The power supply for the modem / WLAN unit / Ethernet interface is interrupted Switch off the power supply, wait 30 seconds, then switch it back on again
The <b>Network</b> LED is not lit.	Fieldgate FXA42 Ethernet: the Ethernet data connection is interrupted. A valid fixed IP address has not been configured or DHCP was not completed successfully. <ul style="list-style-type: none"> <li>▪ Check to ensure that the configured IP address is valid</li> <li>▪ Check to ensure that the dynamic allocation of IP addresses (DHCP) works correctly in the connected network</li> <li>▪ Check to ensure that the Ethernet connections are correctly engaged and that the cables are OK</li> </ul>

### 9.2 Restoring factory settings

The reset button (→  9) can be accessed through a small hole in the front.

1. Switch off the Fieldgate FXA42 (switch off the supply voltage).
2. Press and hold the reset button.
3. Switch on the Fieldgate FXA42. Keep the reset button pressed during the booting procedure.
  - ↳ The factory settings are restored.

## 10 Maintenance

No special maintenance work is required.

### 10.1 Exterior cleaning

**Please note the following points when cleaning the device:**

- The cleaning agents used should not corrode the surfaces.
- Observe the degree of protection of the device. See the nameplate if necessary .

## **11 Repair**

### **11.1 General notes**

#### **11.1.1 Repair concept**

Repairs are not possible.


### **11.2 Return**

The measuring device must be returned if the wrong device has been ordered or delivered.


As an ISO-certified company and also due to legal regulations, Endress+Hauser is obliged to follow certain procedures when handling any returned products that have been in contact with medium. To ensure swift, safe and professional device returns, please read the return procedures and conditions on the Endress+Hauser website at [www.services.endress.com/return-material](http://www.services.endress.com/return-material)


## 12 Accessories

### 12.1 Device-specific accessories

Accessories	Description
Power unit	Power unit for power supply Power supply information . Material number: 71327426
Antenna	Antenna with SMA connection for UMTS (2G/3G) or WLAN operation Antenna information →  12. Material number: 71327395
microSD card	On request.
Communication modules	<ul style="list-style-type: none"> <li>▪ HG1 Plus HART to Modbus gateway Material number: 71327424</li> <li>▪ Phoenix Contact: HART Ethernet multiplexer head module Material number: 71363548</li> <li>▪ Phoenix Contact: 4-channel HART extension module Material number: 71363561</li> <li>▪ Phoenix Contact: 8-channel HART extension module Material number: 71363582</li> </ul>

### 12.2 Communication-specific accessories

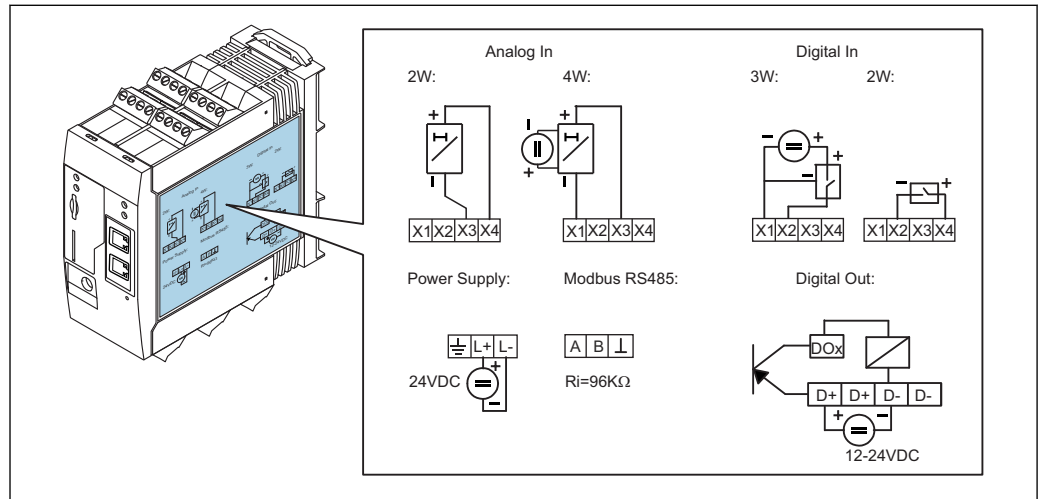
Accessories	Description
SupplyCare Enterprise SCE30B	<p>Inventory management software that visualizes levels, volumes, masses, temperatures, pressures, densities or other tank parameters. The parameters are recorded and transmitted by means of gateways of the type Fieldgate FXA42.</p> <p>This Web-based software is installed on a local server and can also be visualized and operated with mobile terminals such as a smartphone or tablet.</p> <p> For details, see "Technical Information" TI01228S and Operating Instructions BA00055S</p>

Accessories	Description
SupplyCare Hosting SCH30	<p>Inventory management software that visualizes levels, volumes, masses, temperatures, pressures, densities or other tank parameters. The parameters are recorded and transmitted by means of gateways of the type Fieldgate FXA42, FXA30 and FXA30B.</p> <p>SupplyCare Hosting is offered as a hosting service (Software as a Service, SaaS). In the Endress+Hauser portal, the user is provided with the data over the Internet.</p> <p> For details, see "Technical Information" TI01229S and Operating Instructions BA00050S.</p>

## 13 Technical data

### 13.1 Input

#### 13.1.1 Terminal assignment



A0031498

8 Labeling on the housing for terminal assignment

#### 13.1.2 Weight

Approx. 300 g (10.6 oz)

#### 13.1.3 Materials

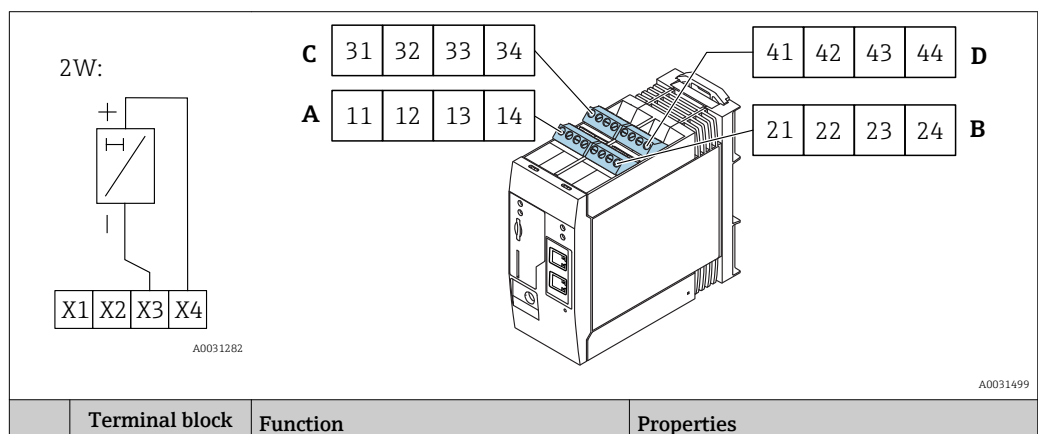
Housing: plastic PC-GF10

#### 13.1.4 Terminals

Plug-in screw terminals, 2.5 mm<sup>2</sup> (14 AWG), 0.1 to 4 mm<sup>2</sup> (30 to 12 AWG), torque 0.5 to 0.6 Nm (0.37 to 0.44 lbf ft)

#### 13.1.5 4 to 20 mA analog input

##### 4 to 20 mA analog input (2-wire) with auxiliary voltage output



A0031282

A0031499

Terminal block	Function	Properties
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	A	B	C	D		
X1 =	11	21	31	41	4 x GND	
X3 =	13	23	33	43	4 x 4 to 20 mA analog input	Maximum input voltage: 35 V Maximum input current: 22 mA Internal resistance: 250 Ω (suitable for HART communication)
X4 =	14	24	34	44	4 x auxiliary voltage output for transmitter loop power supply	Output voltage: 28 V <sub>DC</sub> (no-load) 26 V <sub>DC</sub> @ 3 mA 20 V <sub>DC</sub> @ 30 mA Output current: max. 160 mA

### 4 to 20 mA analog input (4-wire)

4W:

A0031283

	Terminal block				Function	Properties
	A	B	C	D		
X1 =	11	21	31	41	4 x GND	
X3 =	13	23	33	43	4 x 4 to 20 mA analog input	Maximum input voltage: 35 V Maximum input current: 22 mA Internal resistance: 250 Ω (suitable for HART communication)

## 13.1.6 Digital input

### Digital input (2-wire) with auxiliary voltage output

2W:

A0031284

	Terminal block				Function	Properties
	A	B	C	D		
X1 =	11	21	31	41	4 x GND	
X3 =	13	23	33	43	4 x 4 to 20 mA analog input	Maximum input voltage: 35 V Maximum input current: 22 mA Internal resistance: 250 Ω (suitable for HART communication)

X2 =	12	22	32	42	4 x digital input	Input voltage L: < 5 V Input voltage H: > 11 V Input current: < 5 mA Maximum input voltage: 35 V
X4 =	14	24	34	44	4 x auxiliary voltage output to control the digital inputs	Output voltage: 28 V <sub>DC</sub> (no-load) 26 V <sub>DC</sub> @ 3 mA 20 V <sub>DC</sub> @ 30 mA Output current: max. 160 mA

**Digital input (3-wire)**

3W:

A0031285

	Terminal block				Function	Properties
	A	B	C	D		
X1 =	11	21	31	41	4 x GND	
X2 =	12	22	32	42	4 x digital input	Input voltage L: < 5 V Input voltage H: > 11 V Input current: < 5 mA Maximum input voltage: 35 V

**13.2 Output**

**13.2.1 Digital output**

A0031286

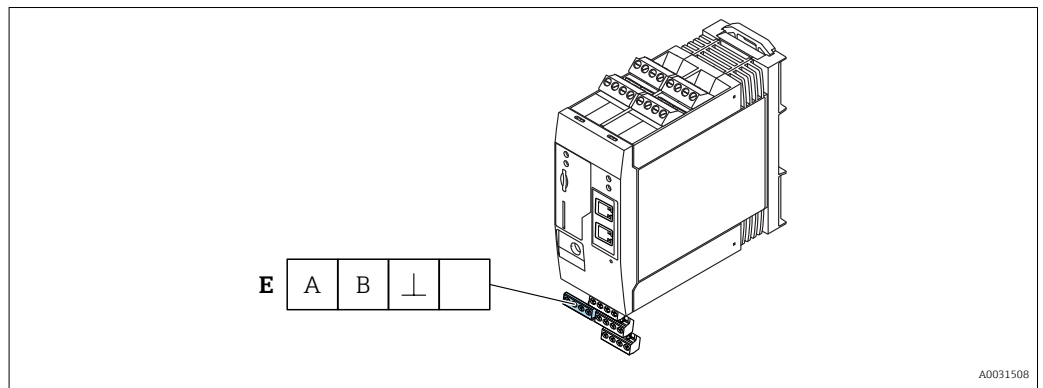
Terminal block	G	Properties				
<table border="1" style="width: 100%; text-align: center;"> <tr> <td>DO0</td> <td>DO1</td> <td>DO2</td> <td>DO3</td> </tr> </table> <p>Digital output</p>	DO0	DO1	DO2	DO3	DO0	High-side driver, sourcing, DC-PNP. Output current: 500 mA
	DO0	DO1	DO2	DO3		
	DO1					
	DO2					
DO3						
Terminal block	H	Properties				

<table border="1"> <tr> <td>D+</td> <td>D+</td> <td>D-</td> <td>D-</td> </tr> </table> Power supply for digital output <sup>1)</sup>	D+	D+	D-	D-	D+	12 to 24 V <sub>DC</sub>
	D+	D+	D-	D-		
	D+	12 to 24 V <sub>DC</sub>				
	D-	GND				
D-	GND					

1) You may only use power units that ensure safe electrical isolation according to DIN VDE 0570-2-6 and EN61558-2-6 (SELV / PELV or NEC Class 2) and that are designed as limited-energy circuits.

### 13.2.2 RS485 serial interface (Modbus)

- Internal resistance: 96 kΩ
- Protocol: Modbus RTU
- External termination required ( 120 Ω)



Terminal block	E	Properties				
<table border="1"> <tr> <td>A</td> <td>B</td> <td>⊥</td> <td></td> </tr> </table> Serial interface RS485	A	B	⊥		A	Signal
	A	B	⊥			
	B	Signal				
	⊥	Ground / optional shield connection				
	Not assigned					

## 13.3 Environment

### 13.3.1 Ambient temperature range

Normal operation (EN 60068-2-14; Nb; 0.5 K/min): -20 to 60 °C (-4 to 140 °F)

Side by side installation: -20 to 50 °C (-4 to 122 °F)

### 13.3.2 Transportation and storage temperature

EN 60068-2-1; Ab; 0.5K/min / EN 60068-2-2; Bb; 0.5K/min: -25 to 85 °C (-13 to 185 °F)

### 13.3.3 Humidity

EN 60068-2-30; Db; 0.5 K/min: 5 to 85%; non-condensing

### 13.3.4 Condensation

Not permitted

### 13.3.5 Climate class

To IEC 60654-1, Class B2

### 13.3.6 Installation height as per IEC61010-1 Ed.3

Generally up to 2 000 m (6 560 ft) above sea level

### 13.3.7 Degree of protection

IP20, NEMA1

### 13.3.8 Shock resistance

DIN EN 60068-2-27: ±15 g; 11 ms

### 13.3.9 Vibration resistance

EN 60068-2-64 / IEC60068-2-64: 20..2000 Hz 0.01 g<sup>2</sup>/Hz

### 13.3.10 Electromagnetic compatibility

- Interference immunity: as per IEC 61326, industrial environment
- Interference emissions: as per IEC 61326, Class B

## 13.4 Certificates and approvals

### 13.4.1 CE mark

The device meets the legal requirements of the applicable EC directives. These are listed in the corresponding EC Declaration of Conformity along with the standards applied.

### 13.4.2 RoHS

The measuring system complies with the substance restrictions of the Restriction on Hazardous Substances Directive 2011/65/EU (RoHS 2).

### 13.4.3 Other standards and guidelines

Other standards and guidelines that have been considered in the design and development of the device:

- EN 60529  
Degrees of protection provided by enclosures (IP code)
- EN 61010-1  
Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use
- IEC/EN 61326  
"Emission in accordance with Class A requirements". Electromagnetic compatibility (EMC requirements).

## 13.5 Telecommunications approval

### 13.5.1 Europe

This device meets the requirements of the Radio Equipment Directive (RED) 2014/53/EU.

### 13.5.2 USA and Canada

This device complies with Part 15 of the FCC rules.

### Federal Communications Commission Notice

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the device off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

To ensure that the unit complies with current FCC regulations and safety requirements limiting both maximum RF output power and human exposure to radio frequency radiation, use an antenna with a maximum gain of 2 dBi and a separation distance of at least 20 cm must be maintained between the unit's antenna and the body of the user and any nearby persons at all times and in all applications and uses.

### Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Endress+Hauser may void the user's authority to operate the equipment.

### Federal Communications Commission Statement

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

### Wireless Notices

In some situations or environments, the use of wireless devices may be restricted. Such restrictions may apply aboard airplanes, in vehicles, in hospitals, near explosives, in hazardous locations, etc. If you are uncertain of the policy that applies to the use of this device, please ask for authorization to use it prior to turning it on.

### 13.5.3 Other certificates

Other national approvals are available on request.

Country	Regulation
Bulgaria	General authorization required for use outdoors and in public.
Italy	General authorization is required for use outside of own premises.
Norway	Use can be limited within a 20-km radius of the center of Ny-Alesund.
Romania	Use as a secondary device; special license required.
Latvia	A national permit is required for outdoor use of the 2.4 GHz frequency.

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